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THE OFFICIAL STRATEGY GUIDE

Alan Emrich &  
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# **MASTER OF ORION™**

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**THE OFFICIAL STRATEGY GUIDE**



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# **MASTER OF ORION™**

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## **THE OFFICIAL STRATEGY GUIDE**

**Alan Emrich**

and

**Tom E. Hughes, Jr.**



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Executive Editor: Roger Stewart

Managing Editor: Neweleen A. Trebnik

Project Editor: Dan J. Foster

Copyeditor: Susan McColl

Book Design and Production: Danielle Foster, Scribe Tribe

Word Processor: Brittanney J. Trebnik

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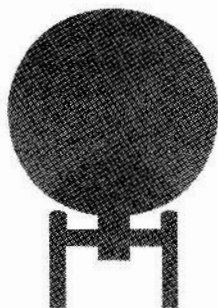
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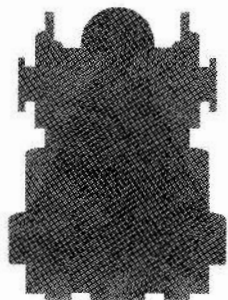
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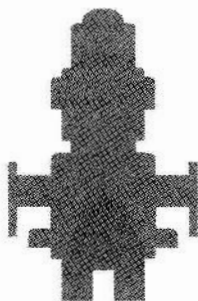
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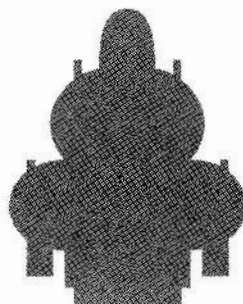
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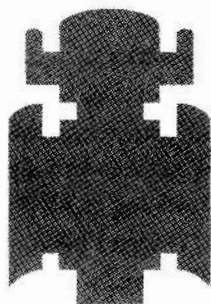
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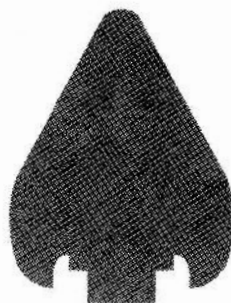


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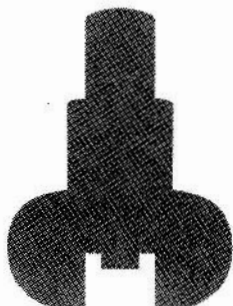
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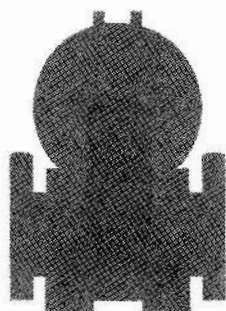
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# FOREWORD

I numbly sat back and watched as the Alkari fleet sowed its Death Spores on the last of my recently founded expansion colonies, the ones that used to be ringed wide around my home worlds. Although my colony was heavily fortified with missile bases, nothing could prevent its ruination by the Alkari biological terror weapons.

To save my inner empire, my home worlds, I negotiated a tenuous peace treaty with my hated enemy. I started to work feverishly on new technology research for the rematch I knew would come. Meanwhile, my espionage networks set out across the galaxy in hopes that they could steal the Bio Toxin Antidote that my race would need to survive another Alkari onslaught.

As the Alkari War progressed against me, their expansion at my empire's expense had washed away my contact with the other races of the galaxy. By the time I negotiated that desperate peace treaty, at the Alkari high tide, I was isolated from the rest of the galaxy, save for my hated feathered foe. When the High Council met soon afterward, they declared the Alkari leader to be the undisputed Ruler of the Galaxy.

Undisputed by all except me, that is.

As I declared myself a renegade against the Alkari-led New Republic, I knew it would be a fight to the bitter end. I had to mobilize quickly. Fortunately, the Bio Toxin Antidote was soon within my hands and I began building a fleet of nearly unbeatable MegaDeath class ships.

These, the pride of my space fleet, were loaded with an impressive array of biological

weapons and high-yield Omega-V bombs. They went forth not to reclaim my lost worlds, but to vaporize any avian-populated planet within range of my colonies.

This was no longer a game. Games have winners and losers, and the "winner" here had already been decided by the High Council. I was no longer interested in reclaiming what had been mine and slowly conquering the galaxy itself. No, I simply wanted to inflict as much pain and destruction on the Alkaris as I could get away with. Revenge was my only concern—cold blooded, red seeing revenge.

*After a moment, I sat back and asked myself, "What the hell am I doing?! Is this really me?"*

Welcome to the *Master of Orion* universe. It is a place where the term "peaceful coexistence" can be found only in the inscriptions on charred artifacts left by civilizations that have long since been vaporized. Of course, no civilization in this universe would ever have the time to excavate such artifacts, being too concerned with either their own (or their neighbor's) imminent destruction.

Unlike *Sid Meier's Civilization*, there are no "Wonders of the World" built to keep your populace happy. As long as your people are working harder and faster at creating *Lebensraum* and scattering their genes across the galaxy, you don't give a flying fig how happy they are. After all, internal rebellions, when they do occur, can be quelled in a swift and bloody manner. There is no room for negotiation with malcontents among your populace. Ruthlessness is a virtue of the triumphant in *Master of Orion*.



Never feel secure in a game of *Master of Orion*. An ounce of paranoia can prevent a ton of damage. Negotiated peace treaties, nonaggression pacts, and even alliances are only as good as the length of time it takes for one side or the other to build up enough strength to renegotiate at sword point (or while sighting down the barrel of an Ion Rifle, as the case may be).

During the five or six hours it will take you to play out a game (or longer, depending on the size of the galaxy you select), you will develop a siege mentality while responding to your neighbor's relentless hostility. Everyone *is*, in fact, out to get you. Unless, of course, you get them first. It is nearly impossible to play *Master of Orion* without having bad vibes toward at least one computer opponent—and usually most of them!

Finally, *Master of Orion* is not so much a simulation of empire building and expansion (which it portrays marvelously, by the way), but a simulation of the psychology of nations at war. And what a psych job it is! Sure, bloodless victories can happen, and wars can be minimized, but usually the galaxy just ain't big enough for everyone. Not for long, anyway...

As my MegaDeath fleet left a 10-parsec radius of rubble around my home worlds, I rallied my forces to defend against the all-out, retaliatory counterattack that I knew was inevitable from the recently forged New Republic. Like General Lee in the aftermath of Gettysburg, I waited for a counterattack that would never come.

I was left to stew in my own radioactive juices. With a heavy hand, I clicked on the Quit button, never having felt so beaten down by a computer, or so filled with a lust for revenge. I will meet these foes again, in another galaxy, in another fight.

*By Peter Pawelek*

# ACKNOWLEDGMENTS

Above all else, thank *Computer Gaming World* magazine for this book. If Alan Emrich had not been employed there, he would not have been assigned to profile MicroProse that fateful spring day in 1993. On that day, Alan ran into his old industry associate, Jeff Johannigman, who showed him the latest game he was producing. It was a submission from an unknown group in Texas who called their company, appropriately enough, SimTex. The game was tentatively titled *Star Lord*.

Although the game looked okay, Alan was not too impressed. Still, he took it with him, along with his bride, Julie, to their wedding reception held by her family in Battle Creek, Michigan. True gamer that he is, Alan soon discovered much of the early addictive qualities of *Star Lord* and was almost too busy to attend his own wedding reception because of it. By the time he had returned from Michigan, Alan knew that there was a great article in here for *Computer Gaming World* magazine, but he wanted a second opinion on the game before he took the matter any further.

Tom Hughes, Alan's friend and gaming buddy since 1973, shares his taste for clean, deep strategy games. When Alan presented *Star Lord* to him, Tom seized on it and started to dissect the game immediately. The stage was set.

Thanks to their intense, repeated playing of the game, Tom and Alan had many suggestions to make during playtesting. Soon Jeff Johannigman got tired of passing them along to the designer, Steve Barcia, and told Alan that

they should talk to Steve directly. Soon the telephone lines were burning, ideas were flowing, and Steve was cooking up a heck of a game. About this time, the title changed to *Master of Orion* and its theme and focus crystallized.

Alan wrote his sneak preview for *Computer Gaming World* describing what he saw to be a good game that was still coming together in playtesting. He said the game had promise, but that it was not *Sid Meier's Civilization* (the recent hallmark of addicting strategy games). But by the time that story was in print, Alan—who was still hooked on playing it—had changed his mind. Tom Hughes called him and said, "You know, I think this game might become more addicting even than *Civilization*," to which Alan replied, "You know, I think it already is."

Within minutes, Alan made the preliminary calls to have this book published. Again, with the blessings of Russell Sipe, publisher of *Computer Gaming World* magazine, the trick was to convince Prima Publishing's Roger Stewart that *Master of Orion* would be as important a game as *Civilization*. After much arm twisting, brow beating, horse trading, and concession giving, the book deal was made and Tom Hughes and Alan Emrich were to coauthor this book.

Thanks must be given to MicroProse for making everything "official," like the title says. Thanks, too, must be given to the long suffering wives of Alan Emrich and Steve Barcia. These ladies have seen too much of their husbands' backsides while they sat at their computers. Gracious women both, it is their lot to love

gaming workaholics and we are very grateful to them for their enduring and endearing support.

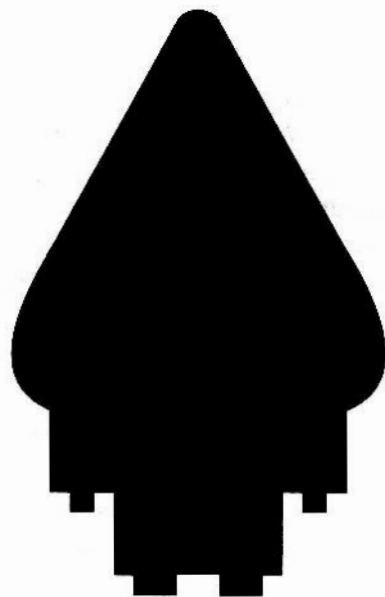
Special thanks must be given to the cast of characters who haunted the *Master of Orion* topics on both GENie and CompuServe. Their questions and comments helped to keep this book in focus. Peter Pawelek, for instance, posted his story up on the Internet, and when Alan read it he knew that, with editing, it would make the perfect Foreword for this book. With his permission, then, we have used it and hope that everyone enjoys its humorous, emotional insights into playing *Master of Orion*.

In particular, we must thank those special players who became our book proofreaders. They are Mark "skulker" Carroll (coauthor of Prima's *Empire Deluxe: The Official Strategy Guide*), Terry Coleman (one of America's winningest board wargamers), Walter-Luc Haas (a retired Swiss teacher and journalist, and long-time European strategy gaming master), Michael Hende (one of Sweden's finest and most thoughtful wargamers), Tom Holsinger (attorney and wargame playtester/developer since the 1960s), Bob "BobP" Pryslak (Canada's premier computer strategist and most competitive modem gamer), Jennifer Schlickbernd (who works at the Jet Propulsion Laboratory in Pasadena, California, is a consummate board and computer strategy gamer, and loves to debate her liberal politics with Alan), and the venerable Redmond Simonsen (of Simulations Publications, Inc. fame in the 1970s and game designer/artiste extraordinaire).

Credit for this book is really due, however, to Steve Barcia. He is a sweet man. Tom and Alan feel that in coming to know him they have both

made a friend. He took daily calls (sometimes *several* a day) from the authors and shared his source code as well as his time and patience. The authors know that gaming has a good friend and a rising star in this reserved man from Texas. They feel that everyone who enjoys good computer strategy games will have a lot to thank him for in the years ahead.

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*How to Use This Book*

◆ If you've already had a taste of what a fine game *Master of Orion* is, congratulations. You have just picked up a treasure trove of wonders about this game. This book deals not only with the basics of the game's four "X's" (explore, expand, exploit, and exterminate—meaning how to discover the map, grow an empire on it, optimize its production, and then eliminate other players who are vying for your territory), but also presents many specific answers to the game's niggling questions.

For instance, how should you approach new ship designs to take advantage of new technologies? Would it be better to place older technology, but more numerous weapons on board ship, or fewer new ones? What is the best way to approach the enemy in battle, considering the various abilities of each ship's design? When should a single technology be "pushed?" When should you offer tribute to end a losing war effort? How much of your resources should go toward spies, counterespionage, or the interplanetary reserves?

We will guide you through these questions and others by using the double track of text and tables. While every strategy guide offers countless words of advice, few are as comprehensive as this one in terms of tabular information. By keeping this tome handy as an instant reference when you reach a decision point or have a question, galactic domination will be more of an enjoyable game and less of a mystery. We even hope to keep you amused as you wade through this, your owner's manual to Galactic Rule.

## FAIR ASSUMPTIONS

Naturally, the authors assume that you have a copy of the MicroProse *Master of Orion* game,

and have installed it and configured the sounds so that they work with your computer's sound card (if you have one). Note that although the generic MicroProse installation routine asks what sound card is to be used for digitized speech, there is none in *Master of Orion*. Furthermore, we also assume that you're using a mouse to play the game. Most of the things we will tell you to do will be by way of the mouse, so those who fly-by-keyboard should be familiar with those commands on their own. We won't be elaborating on them here. All mouse clicks in this book will be left-button mouse clicks unless otherwise indicated.

## CONFLICTING OPINIONS

This strategy guide was written on the basis of the latest (at the time of writing) release version of *Master of Orion*. You will find what version you have on the Main Game menu, in gray text along the bottom of the screen. If no mention of the game version is there, you have version 1.0. The latest version of the game at the time we wrote this book was version 1.3.

If you don't have the latest version, it can usually be found through on-line services such as GENie or CompuServe, or downloaded directly from the MicroProse BBS (see the technical supplement for details). If all else fails, call the MicroProse customer service or technical support number and ask them to send you the upgrade. Both MicroProse phone numbers can be found on the last page of the game's technical supplement.

Because this guide was written after the game's release, we've had a chance to pore carefully over the game itself, its manual, technical supplement, and even the source code for certain vital aspects of the game. We've had



frequent and exhaustive interviews with Steve Barcia at SimTex and thoroughly picked his brain for every tidbit we could find. Believe us, if you find any conflict between what is written in this guide and what the manual might read, we're right and it's wrong.

## **DIE ROLLS**

Many formulas presented in this book rely on random numbers being generated within a certain range. In layman's language, the computer is rolling a die to generate these random numbers. When a computer needs to generate a random number from 1 to 6, it rolls a normal six-sided die, which we abbreviate in this book as a *d6*. To generate a random number from 1 to 100, the computer rolls a *d100*, and so on. This is an important convention to understand while reading this book's many formulas.

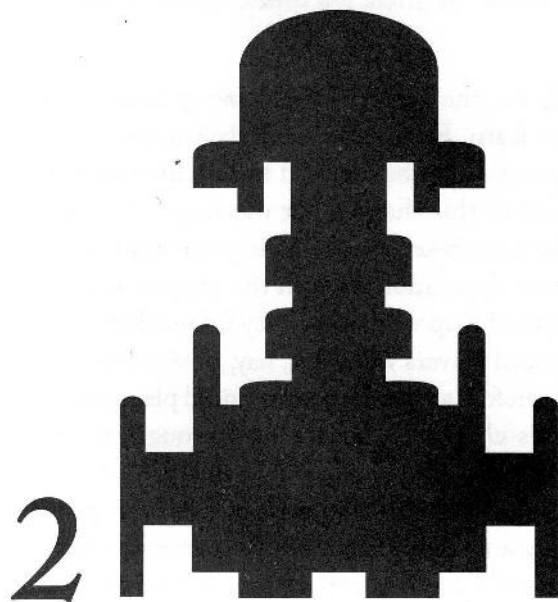
## **IF THIS IS ORION, I MUST BE WINNING**

The road to the stars in *Master of Orion* is an easy one, but the difficulty in dominating the galaxy and gaining control of the Galactic Council means that it is not easy to win. By the end of this book, you will be a superior player and find enjoyment in the challenges that await at the difficult and impossible playing levels.

Because of this classic gaming scenario of a fast and easy beginning that draws players into a long and rich campaign, we have seen something we call the "*Civ* phenomenon." This means that many a computer gamer's friends and loved ones will watch them start a game, learn some of its basics, become interested in it, and then try it themselves. MicroProse's *Sid Meier's Civilization* is a perfect example of what can happen and how wives and kids of

traditional computer strategy gamers became hooked on a fine game (and begin to hog the computer, much to the regular gamer's amusement and distress).

Because we know that *Master of Orion* contains those same addictive elements, we're offering the next chapter for you to share with burgeoning galactic overlords. It takes players from zero to stellar empire builder in a short time span and prepares them for the games and chapters ahead. Therefore, we beg all aspiring space monarchs to turn the page, and urge veteran players to peruse the pages of the tutorial. ♦



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*From Junior Space  
Cadet to Galactic  
Overlord in One  
Easy Lesson*

*If you think education is expensive, try ignorance.*  
—Derek Bok

For the uninitiated, *Master of Orion* is easy to learn. For experienced players, who at this point might be inclined to skip directly to the end of this chapter, fair warning—that would be a mistake. We are laying out some important foundation work in this chapter and have spiced it up with a few juicy tidbits that experienced players will want, nay, *need* to know. We therefore advise even experienced players to give this chapter at least a readthrough, if not a playthrough.

This enhanced tutorial is, however, primarily a dynamic reference for those wanting to plunk a person down in front of their computer in the hopes of teaching him or her the wonders of *Master of Orion*. This chapter presents a step-by-step approach for absolute beginners that quickly covers the basics. What is most important, this chapter concludes by establishing certain good playing habits and a game turn check list that will help keep you organized. By adhering to these good habits and staying organized, your empires will become more manageable and your effectiveness as a Galactic Overlord will be enhanced.

If you're ready to play, we're ready to deliver on the above promises. Grab a drink and, maybe, a snack—get settled down in front of your computer and let the game begin...

## PREGAME SETUP

Go ahead and start the *Master of Orion* program. From the Main menu shown in Figure 2-1, we're going to do something a little different. Instead of selecting to start a new game, there is a special sequence of keys you can press that will take you right to this book's tutorial game.

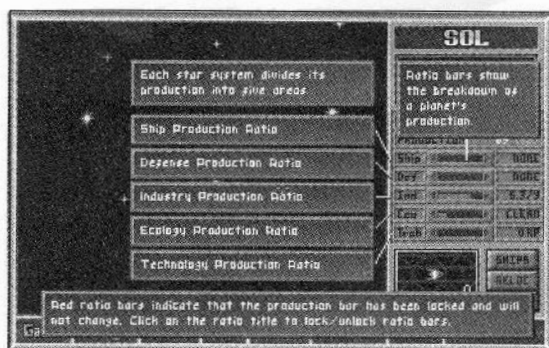
Here is what you do: hold down the **[Alt]** key and, while holding it down, type the word **TUTOR**. The screen will fade out for a moment, and then fade back in with our tutorial game all set up. This scenario has you playing the white-flagged Klackon race at the simple difficulty level on a medium-size map. You have three opponents: the yellow-flagged Sakkra, the blue-flagged Psilons, and the green-flagged Silicoids. Only one race will emerge to rule the galaxy. Will it be your glorious Klackons?

Because you are playing this tutorial at the simple difficulty level, you will be presented with four explanation screens of information before you take control of your burgeoning empire. (Other effects of playing at the simple difficulty level are explained in Chapter 15.)



*Whenever you need an explanation of a game screen, pressing the **[F1]** Help key will provide it.*

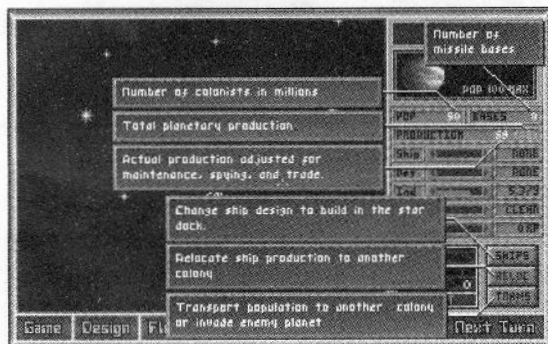
The first screen looks like this:



This first information display explains the Planet Production panel along the right third of the screen. Notice that our system name of Sol is at the top-right corner of the screen. The key idea here is that a planet's economy is set through dynamic Production Ratio bars. These

bars represent the allocation of some of a planet's resources (often called *resource points* or *RPs*) to one of a planet's five different production sectors. From top to bottom, they are ship construction, planetary defense, industry, ecology, and technological research. If a bar increases (by being moved to the right) in a given category, another bar automatically decreases proportionally. This is because the total of all five bars cannot exceed 100 percent of the planet's production. In other words, if you allot 75 percent of a planet's production to one category, the other four will have only the remaining 25 percent to split among them.

The second information display, which covers the remainder of the Planet Production panel, looks like this:



Near the top of this panel you'll see the selected planet's current population (a.k.a. POP, currently at 50, representing 50 million beings of your race) on the left. On the right is the number of planetary defense (i.e., missile) bases (which is zero at the game's start).

The next information line down is the number of BCs (or *billion credits*, the standard unit of wealth in *Master of Orion*) generated this turn on that planet. This wealth is shown in two numbers and can be thought of similarly to your

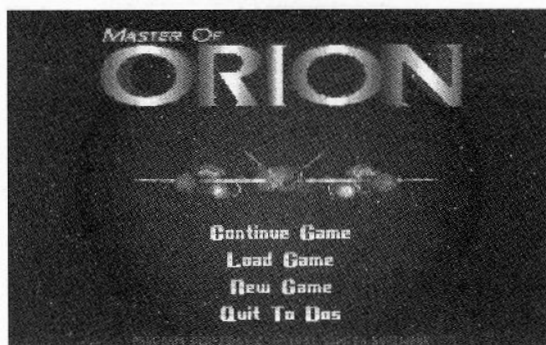


Figure 2-1

The Main menu

paycheck. The number on the left, in yellow, is that planet's "take home pay," presently at 69 BCs this turn. The parenthetical number in green to its right is the planet's gross income (determined by adding the population points on the planet, plus the factories there, to any additional income garnered through trade with other races), which is currently at 82.

What gets subtracted from that gross income (much like taxes are withheld from your paycheck) is that planet's share of the total cost to maintain all of your ships, missile bases, spy and security networks, plus its share of contributions to the Reserve Fund you might be running. These costs are spread out proportionally among all your planets on the basis of their respective income.

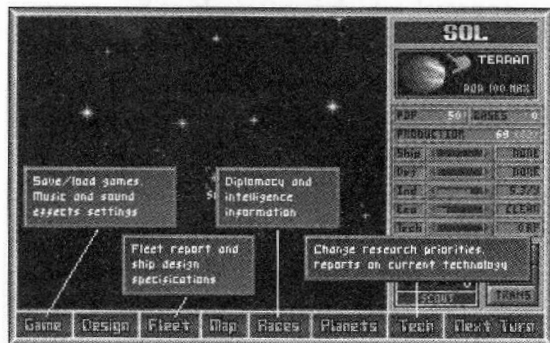
Currently, ship maintenance is your only expense at 13 BCs per turn. This supports your single colony ship and two scouts. Because you have only one planet right now, it must bear the entire support burden.

Please, don't sweat all these expenses for now. We'll cover them in greater detail in Chapter 5. Just know that, like a business, your empire has

a certain amount of overhead, the cost of which is automatically deducted from each of your planets every turn. Trust the computer to do all the boring accounting so that you are free to play the game and have all the fun.

At the bottom of the Planet Production panel are buttons for ordering that planet to perform certain special functions. These include building a certain ship type, automatically relocating newly built ships to another friendly colony (a *colony* is a planet that currently has some population points living there), and transporting population off that colony to another one (either to add to the population of another friendly colony or to invade one that is enemy owned).

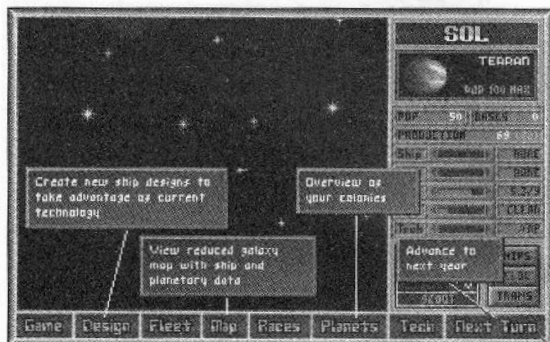
The third information screen introduces the odd-numbered boxes that make up the game menus along the bottom of the screen:



The Game menu lets you save this game when you finally take a break, and is where you can adjust the sound. Note that turning the sound off can speed up play of the game later on, when the map becomes crowded. The Fleet menu provides a comprehensive look at where the heck all those ships you've built are off to and what their respective designs are (ship design is an important aspect of *Master of Orion*

and a lot of fun). The Races menu is where you make your diplomacy, spying, and counterespionage efforts. Finally, the Tech menu allows you to adjust your research and development (R&D) efforts, note your progress toward discoveries, and read up on the latest that science has to offer you.

The final information screen finishes by defining the even boxes that make up the game menus along the bottom of the screen. It looks like this:



The Design menu is where you design new ship types for future construction and where old designs can be scrapped. (You can have only six different ship designs in play at once.) The Map menu presents an overview Galaxy Map with all the planets in play displayed on the main window. This map will include the nebula clouds and ships you've sighted. The Planets menu gives a type of spreadsheet overview of every planet in your empire and how your larger financial picture shapes up. Finally, the Next Turn button tells the computer that you've finished giving your orders for that turn—it then executes them and takes you through the results of your actions, leaving you ready to give orders for the next turn.

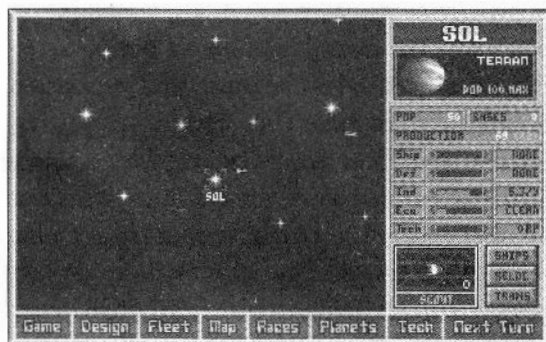


## AT THE CONTROLS

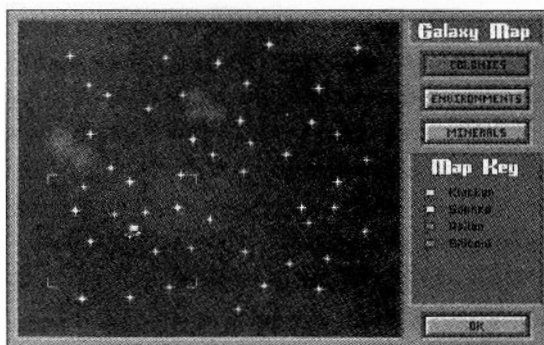
Whew! All that was like sitting behind the wheel of a car for the first time and wondering what all of those knobs and gauges were on the dashboard, wasn't it? Well, it's easier than it looks to learn how to play *Master of Orion*. What makes this game so fascinating is that it's *harder* than it looks to play really well. Fortunately, we're here to help you learn both how to play, and how to play well.

With the information screens gone, you're staring at the Control screen, as shown in Figure 2-2. Good. Take a deep breath and let's begin with some baby steps.

The first thing to do in every game is to select the Map display at the bottom of the screen and examine your strategic position. The Galaxy Map from this book's tutorial game is shown in Figure 2-3. The *Colonies* button is pressed when you open this screen and the information it presents begins with your white flag flying over your home world (i.e., your initial colony), located toward the lower-left corner of the galaxy. Although it is barely visible, your



**Figure 2-2**  
Your initial situation



### Figure 2-3

#### Our initial Galaxy Map

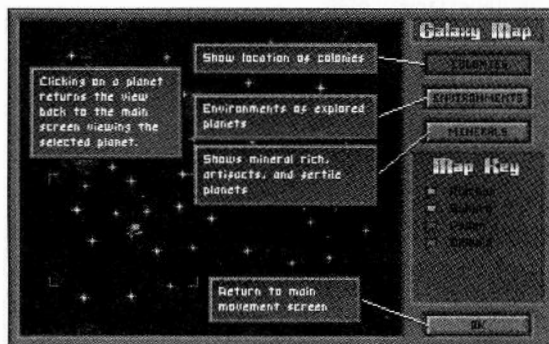
fleet (looking like a right-pointing **Y**) is also there to the right of the flag.

Some distance from your home world, there are four corners floating out in space. These represent the current position of the main Control screen, the one you just came from and where you'll play most of the game. You will also note that medium galaxies, like the one you're currently playing in, have about 50 stars. Finally, the Map Key to the right shows what races are playing in this game and their respective flag/player colors.

Click on the other buttons within this menu—you'll see that selecting *Environments* also brings up a new Map Key on the right side of the screen. The letter *T* appears beside your colony and the key shows that it is a terran-type planet. As you discover more planets, this Environments map will help you keep track of which planets you can land on, as their environment letters will be in green. Most planet letters in red can be landed on later, after you discover the proper technology with which to do so and build it into a new colony ship design. The exception is that stars with no habitable planets can never be settled.

The final button on this screen, labeled *Minerals*, will remind you of any planets you've discovered that have a special attribute affecting their production. The Map Key changes when this button is pressed to show which planets are rich, poor, or have artifacts (the latter helping with technological research).

To remind yourself quickly of anything you just learned about the Map display, just press the **[F1]** key. The help information it provides appears in the following illustration:



Click on the OK button when you're done inspecting the Galaxy Map menu items. This takes you back to the Control screen.

## YOUR WORLD, AND WELCOME TO IT

At this point, let's take a closer look at your starting planet. When placed over your home planet, the cursor changes to a question mark. Click the left mouse button when this question mark cursor is over a planet (or just double-click the left mouse button over any other colony you might have) to bring up its Planet Display screen, as shown in Figure 2-4. Here, a myriad of information concerning that planet is graphically displayed.



**Figure 2-4**

Your starting turn's Planet Display screen

Along the top of the Planet Display screen is the planet's name (Sol) and its environment type (terran). Moving clockwise, the top-right corner has a yellow sun, which is the appropriate color for this star system. Beneath that, any friendly starships in orbit around the planet are displayed, along with a number representing how many are loitering there. You have in orbit a larger (colony) ship at start and two of the small (scout) ships with which to begin the game.

The information box in the bottom-right corner lists several things, including planet size (i.e., how many millions of beings, also known as *population points*, it will hold), which is 100 here; also the *current* number of bases, factories, amount of industrial waste, and population points located there. The last row, showing growth, states how many new population points have been added since the last turn. This last number generally increases in small increments through natural population growth, or rapidly when colonists are sent over from other planets. It can also decrease due to enemy attacks, random plagues, and stripping of the planet's



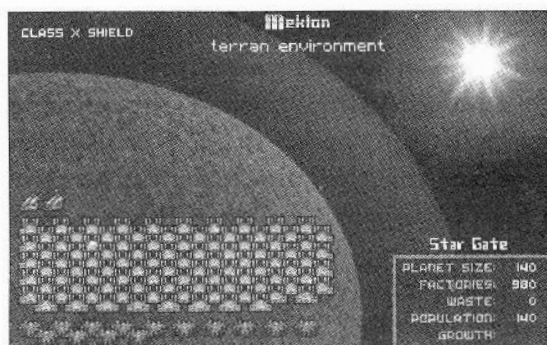
population points to transport them to other colonies.

To the left, on the planet itself, three of the four current figures (number of factories and bases, waste, and population) are translated into graphic form. (Bases do not appear because they have not yet been built.) The bottom row shows the population points on that planet. Each figure represents 10 population points (except the last group, which represents from 1 to 10 million beings—thus, a planet with 11 million beings would have two figures here). The row above that, similarly, shows the number of factories and, if there is any toxic waste or any missile bases, their icons would appear in rows above the factories.

Finally, there is the planet itself. Its color is another indicator of its environment type that, here, is green for terran. Furthermore, if a planetary shield protected this planet, it would have a blue haze showing in its atmosphere and the shield level would be shown in the top-left corner. A highly developed planet might appear something like the one shown in Figure 2-5, just to give you some idea of what you're trying to build up to. Exit out of this display by clicking any mouse button or pressing the **[Esc]** key.

## OTHER THINGS TO SEE

Before issuing your first orders, you might want to pop open the other menus and look at the information they have to offer. Remember, pressing the **[F1]** key will always give you the basic information explaining almost every screen and its function in the game. Don't be shy about using it extensively. After all, that is how you learn.



**Figure 2-5**

A highly developed planet would look something like this.

For the time being, don't do anything more than take a quick glance at the different menus provided at the bottom of the Control screen.



*Don't touch the Next Turn button: (If you do, restart this tutorial.)*

After making a cursory examination of the other displays, close each by pressing either the OK or Cancel button, as appropriate, or just by pressing the **[Esc]** key or right mouse button. We'll get you back to these other screens soon enough, when using them is appropriate to your tutorial education.

## WHITHER NOW?

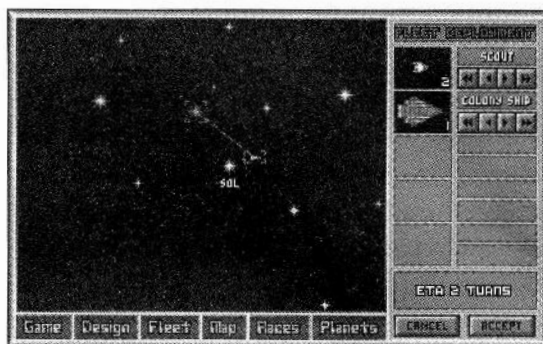
All right, Junior Space Cadet, class is now over and it's time to assume your throne and issue your first command as your race's Imperial Grand Poo-Bah, destined to unite the galaxy. Your first order, by the way, will be to dispatch your fleet.

To do this, simply put the cursor over the ship icon(s) to the right of your home world

and click on them. Note that ships awaiting orders are on the right side of the planet they are orbiting. After selecting the ship group to the right of a planet, the Planet Production panel along the right side of the screen becomes a Fleet Deployment display, as shown in Figure 2-6.

To send ships from point A to point B, first select a ship group and get the Fleet Deployment display on screen, then click on a destination star located on the map. Go ahead and click around on several stars near Sol while the Fleet Deployment display is on screen. (Do not click on either the Accept or Cancel buttons while doing so.) As each is selected a green line appears between Sol and that potential destination, showing the path in pulsating, Broadway-type lighting. At this early juncture in the game, if a star you select is within three spaces (known as *parsecs*) of a friendly colony, an estimated time of arrival (ETA) will appear at the bottom of the Fleet Deployment display, as shown in Figure 2-7.

If, at this stage in this tutorial, you select a star that is more than 3 parsecs away from a



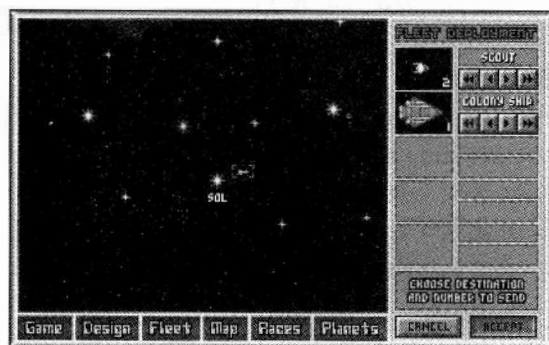
**Figure 2-7**

Movement within 3 parsecs of a friendly colony gives you an ETA for that group.

friendly colony (which is the at-start range for your ships), you will not receive an ETA, but a warning instead, as shown in Figure 2-8. It also changes the green travel line to red (cleverly recreating a stop-and-go traffic light effect).

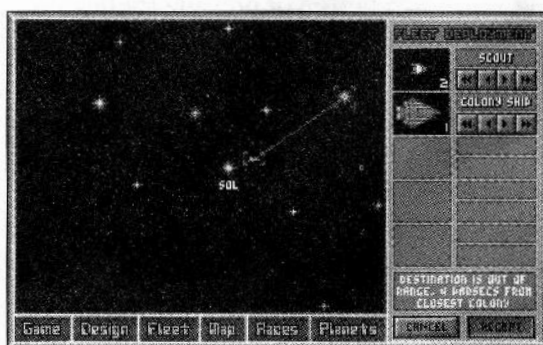
Okay, now let's settle down and move your fleet out, shall we? You should still be on the Fleet Deployment display and able to select a star to travel to.

Start by selecting the green star located down and to the right of Sol. The ETA is three turns. Because all your ships have warp 1 engine tech-



**Figure 2-6**

Selecting a fleet and the Fleet Deployment display



**Figure 2-8**

Movement beyond 3 parsecs from a friendly colony warns you that the destination is out of range.

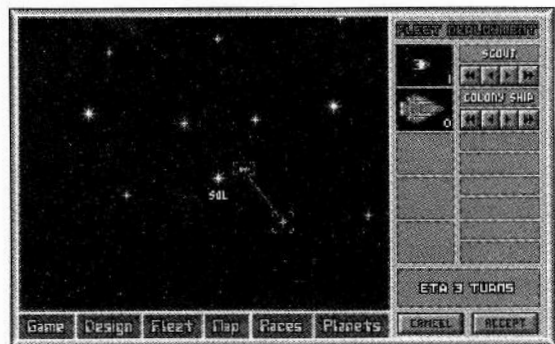
nology at the start of the game, this means that they will move 1 parsec per turn. Therefore, as this star is 3 parsecs away from Sol, it will take these ships three turns to get there.

Now, you don't want to send your entire fleet to this star, which is the default setting on this display. Instead, you just want to scope out the neighborhood and see which neighboring star would be the best to land your colony ship at for now. Therefore, you'll want to send only a single scout to this star. How do you do that? Simple...

See those little Arrow buttons under each ship type listed in the Fleet display? Those control the number of ships receiving the order that is issued once you confirm this movement mission by pressing the Accept button. By clicking on the double-left Arrow button, none of that ship type will be sent. The single-left Arrow button counts down the ships being sent by one per click. This works in reverse for the right Arrow buttons—by pressing these you add ships to the group sent (either all, using the double arrow, or one at a time, using the single arrow), in case you change your mind and reduce the number to too few by accident.

For now, click the single-left Arrow button beneath the scout once (to change the number being sent from two to one). Also, click the double-left Arrow button beneath the colony ship once. (You don't want to send it anywhere until your scouts have found the best spot for it to go.) What you'll have now is a screen that looks like Figure 2-9, showing that you're sending a single scout from your fleet at Sol to this green star. Press the Accept button and that will lock in your order.

After accepting an order on the Fleet display, the game returns to the Control screen. Notice



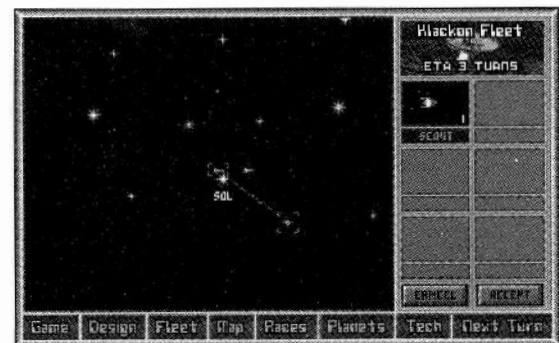
**Figure 2-9**

Moving out that first scout ship

that, if you gave any ships orders, those ships now appear on the left side of the planet, while ships not yet given orders are still in orbit on the planet's right side.

## Oops!

If you make a mistake when issuing ships' orders, you can correct it at any time before selecting the Next Turn toggle at the bottom-right corner of the screen. Simply click on the misordered ships on the left side of the planet, as shown in Figure 2-10, and then select a new destination for them. If you select the world



**Figure 2-10**

Reordering ships may be done before ending the present turn.

they're currently at, they will resume orbiting it (i.e., move back to the right side of the planet). From there, you can give them fresh orders that same turn.

Never panic if you think you're about to select a wrong button. Simply press the **[Esc]** key or right mouse button to exit back out of any screen or display. Eventually, you will wind up back at the Control screen and can collect your thoughts (and our notes) there.

## THE SECOND SCOUT

Now, click again on the ships to the right of your home world and call up the Fleet display again. Send your second scout to the blue star just above and slightly to the right of Sol, as shown in Figure 2-11.

That's it for this turn's fleet deployment. Leave the colony ship where it is (on the right side of the planet) and get ready to adjust the production on Sol a bit.

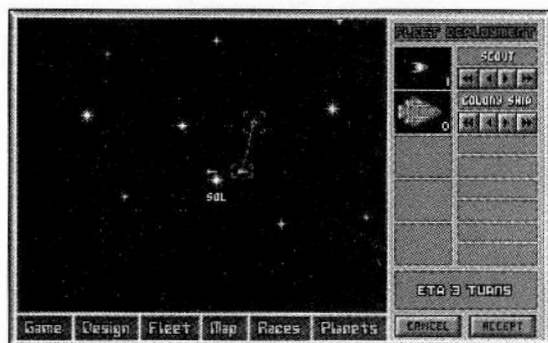
## FIDDLING AROUND

Before moving on to the next turn, you need to fiddle around with the ratio bars on the Planet

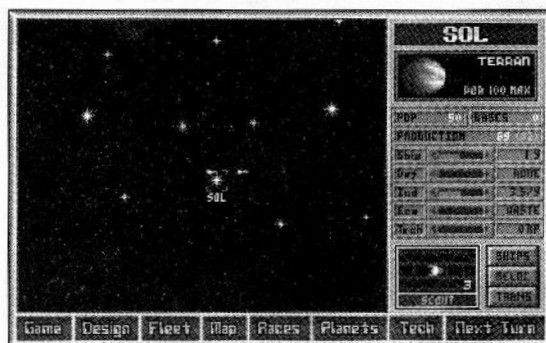
Production panel for your home world of Sol. Don't worry about messing them up. You'll have things back the way you want them in a jiffy.

Start by clicking the pointer once, right in the middle of the top bar labeled "Ship." If you hit it dead center, a blue line will appear in the Ship Production Ratio bar going halfway to the right, as Figure 2-12 illustrates. By this action you have suddenly changed four things:

- The box to the right of the Ship Production Ratio bar now reads "1 y," meaning that the ship(s) will be ready in 1 year (i.e., by the next turn, because each turn represents a year).
- The box to the right of the Industry Production Ratio bar now reads something like "3.5/y," meaning that 3.5 new factories will be built this year due to the present spending allocated to the industry building sector. (This is down from 5.3/y, which is where it started before you fiddled with the ratio bars).
- The box to the right of the Ecology Production Ratio bar now reads "Waste." This is bad (but you'll fix it before ending this



**Figure 2-11**  
The second scout's destination



**Figure 2-12**  
Fiddling with ship production

turn, so don't worry). Waste lowers a planet's ability to support its inhabitants, and must be cleaned up before a planet can grow to its full potential.

- The scout ship pictured at the bottom has a number 3 in its box. This means that three scout ships will be produced in the one year shown to the right of the Ship Production Ratio bar.

If you'd like to see how long it takes to build different ship types, either click on the Ships button next to the picture of the scout ship (near the bottom of the PlanetProduction panel), or simply click on the scout ship itself. Either one of these methods will cycle you through your various at-start, ready-made, standard ship designs. Note that this also changes what ship type the planet's space docks will produce! Pay attention when cycling thus and you'll discover that, with half your spending going toward ship production, you can either build three scouts per year, or two fighters per year, or one destroyer in 3 years, a bomber in 3 years, or a single colony ship in 18 years at the present spending level and with the planet's current economic output (after expenses).

Next, click again in the middle of the Ship Production Ratio bar, only this time hold the left mouse button down. As you move the cursor left and right inside the Ship Production Ratio bar between the extremes of 100 percent ship production and the tiniest amount short of none that you can spend on ships, the number of scout ships you can build will vary from one every 5 years to six per year! Similarly, you can cut down the production time for a colony ship in half, to 9 years, by spending 100 percent of your planet's economy on ship

production and setting its space dock to production of colony ships. Go ahead and change the ratio bar for ship production and then cycle through your ship designs. Go on, We'll wait...

Pretty nifty, eh? Now, instead of clicking and dragging the ratio bars around, try moving them by using the Arrow buttons on either side of the bar. These are used for fine tuning a particular ratio bar. With each click, they move an increment of  $1/25$  (or 4 percent) of your planet's present available resources. Be sure to return your ship production back to building scouts before going on to the next step, because that's exactly what you want to do at this juncture. You can use their help in explore the stars around Sol.

## CALLING THE TUNE WHEN FIDDLING

Have you noticed where all your spending goes when you slide the Ship Production Ratio bar all the way down to zero? Why, to the bottom ratio bar, of course! Why did that happen? Allow us to explain.

Because every turn a planet spends exactly 100 percent of its available resources, increasing the percentage spent in one ratio bar must, consequently, reduce the amount being spent elsewhere. Unlike the U.S. government, no deficit spending can occur and each year's budget balances to the penny (or billion credits, in this case). Nor can you be like the characters in Mel Brooks' movie *The Producers* and sell 15,000 percent of what you have. In *Master of Orion*, spending 100 percent of what you produce means exactly that—allocating no more and no less than your full economic output every turn at every colony you own.



Now, the following four basic “Fiddle Factors” explain why one specific ratio bar was affected when you changed another:

- Give-and-take within the first four ratio bars will immediately affect the bottom-most, *unlocked* ratio bar (we’ll explain that in a second) with resources allotted to it. Usually, this is the Technology Production Ratio bar.
- Give-and-take within the bottommost unlocked ratio bar (again, usually the Technology Production Ratio bar) affects the topmost unlocked bar. Usually, this is the Ship Production Ratio bar.
- When increasing one ratio bar, if the ratio bar it’s depleting becomes empty the next lowest unlocked ratio bar (usually the Ecology Production Ratio bar) will be tapped, and so on up the list.
- *Locking* (clicking on the Ratio bar name boxes, specifically the words “Ship,” “Def,” “Ind,” “Eco,” and “Tech”) is symbolized by changing lettering and slider bar colors to red. This makes that particular ratio bar immune to change. Whereas a bar would normally be increased or decreased when another bar is adjusted, it is skipped instead and the next available unlocked bar (going up or down, as appropriate) is adjusted instead. We’ll experiment with locking and unlocking ratio bars in just a minute.

## FIDDLING THE HIGH AND LOW NOTES

Now it’s time again for a couple of experiments. The first and easiest one is simply to adjust each of the remaining four slider ratio bars between their minimum and maximum levels. Here is what you’ll discover by reading the results of

your fiddling with the Status box to the right of each slider bar:

- The length of time required to build a missile defense base on Sol at this juncture in the game can range from one every 128 years to one every 4 years.
- New factories can be built as slowly as 0.2 per year or as fast as 6.9 per year.
- Your ecology spending will produce the following results, from worst to best: Waste, Clean, +1 POP, +2 POP, or +3 POP. The former pollutes the planet, thus reducing its maximum population size until it is cleaned up, whereas the latter three results spur additional population growth. This would be beyond the planet’s natural population growth, as explained in Chapter 6.
- Investment in future technological discoveries can range anywhere from 2 to 60 research points (also known as *RPs*). Note that, as a rule, 1 BC spent on research equals 1 RP.

New technologies, by the way, generally require a large, cumulative spending of RPs over time. They can cost in the hundreds, thousands, and even tens of thousands of RPs before they are actually discovered and you can enjoy their benefits. BCs spent on research, therefore, should be thought of as banked toward future discoveries. When you have saved up enough RPs in a particular technological category, you are rewarded by discovering what you have been researching there.

## LOCKING AND UNLOCKING

The final experiment is also a fiddling one, only this time you’ll learn to lock and unlock certain categories. Locking up certain spending areas

symbolizes the importance of prioritizing expenditures there.

For example, take all of the resources you might currently have in your Ecology Production Ratio bar and remove them. With this category zeroed out, the Status box will read "Waste." Now, click the mouse on the Ecology Production Ratio bar's right Arrow button six times. On the sixth click, the Status box will change to read "Clean."

Stop right there! That is exactly where you want your Ecology setting. This is the point at which you are spending the minimum amount necessary to keep the planet clean. Now, so that you don't accidentally reduce (or increase) your spending in this category, lock it up by clicking on the box with the word "Eco" in it, just to the left of its slider bar. When the word "Eco" and the bar itself change color to red, the category is now locked. Locked ratio bars are not subject to further fiddling until they are unlocked. To unlock a ratio bar, simply click on the word to its left again, so that the colors revert to black lettering and a blue slider bar.

## SETTING YOUR FIRST TURN'S SPENDING

With your Ecology Production Ratio bar thus locked exactly where you want it (at the minimum clean level), go back to fiddling with the other bars. Note that they cannot be maxed out anymore. This is because the allotment of resources spent on ecology is locked in place and its ratio bar will not move (until it is unlocked). With your ecology spending thus locked, we will set the rest of them to their proper spending ratios and end this turn.

Generally, it's a good idea to build up your home world's industrial base early in a game of

*Master of Orion*. Put all of your spending not locked into ecology into your industrial sector. That would give you 5.2 new factories for next year.

However, there are many stars near Sol, and two scouts simply can't explore them fast enough for you to plan quickly where you want to go. Therefore, adjust your spending so that you will build a single scout in the next turn. Do you remember how to do that? Well, make sure that you've got the scout ship pictured toward the bottom of this display (if not, change it by either clicking on the ship pictured or on the Ships button until the scout design is displayed). Once that is done, add spending to Sol's Ship Production Ratio bar to build scouts there. Do this carefully, one click at a time on its right Arrow button.

The first click will build one scout every 5 years. That's no good. Trust us, you need one next year. A second and third click will each produce only one scout in 2 years. That's no good, either. But a fourth click gives you one scout next year, as pictured in Figure 2-13. That is the kind of scout ship production you need right now, and you're still going to build 4.1 factories this turn. Perfect!

This manipulating of your economy is, in fact, the most important element of play in *Master of Orion*. Becoming familiar with the above Fiddle Factors and sharpening your locking and unlocking skills will greatly speed up your game play. After a game or two, thank goodness, these Fiddle Factors and the slider bar locks will become second nature and you'll be expertly sliding ratio bars with the speed and grace of a fiddle virtuoso. For now, grab your bow and get ready for the next turn.



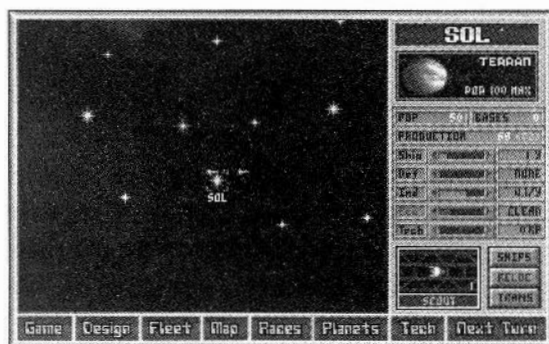


Figure 2-13

Our first turn's spending is now just right.

## TIME MARCHES ON

That's it! You're ready to see the results of your actions plotted for this turn. To do this, click on the Next Turn box in the bottom-right corner of the screen. As the turn unfolds, every ship you can see will move on a temporarily displayed version of the Galaxy Map, as seen in our sample game in Figure 2-14. Go ahead and watch those little white specks fan out to the stars you've assigned as their destinations.

Although you can't see them yet, all of the other (computer) players' ships are moving

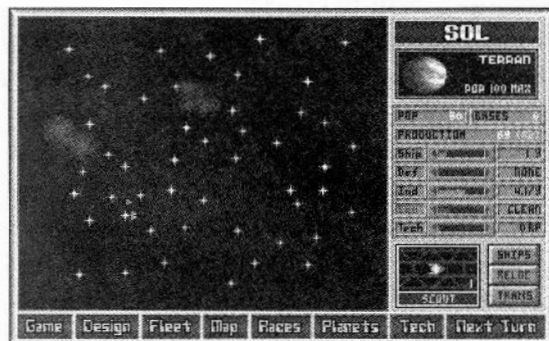


Figure 2-14

Known ships moving simultaneously on the Galaxy Map

simultaneously with yours. When all of the computer players have completed moving all of their ships in the game, a myriad of other activities might have occurred, including battles, computer player diplomacy, and planet discovery. These are all outlined in Appendix A in the order that they occur.

Your second turn begins with a Fleet Production display, as shown in Figure 2-15. There, along with the scout you built, you can see that the turn has advanced from the year 2300 to 2301. Clicking anywhere on the map removes the Fleet Production display.

With the Fleet Production display cleared, you will go back to the Control screen, as shown in Figure 2-16. Now, the big question is...

## WHAT'S CHANGED?

At the beginning of your second turn, a sharp eye will notice three important changes. First, the population on your home world has risen by 2 million beings to 52 million (as shown in the POP box on the right side, about one-third of the way down from the top).

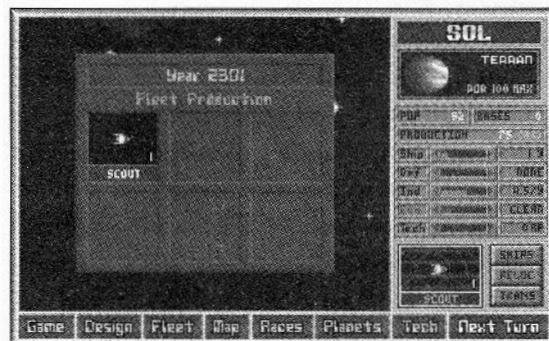


Figure 2-15

The Fleet Production display shows what new ships have just been built and the current year.

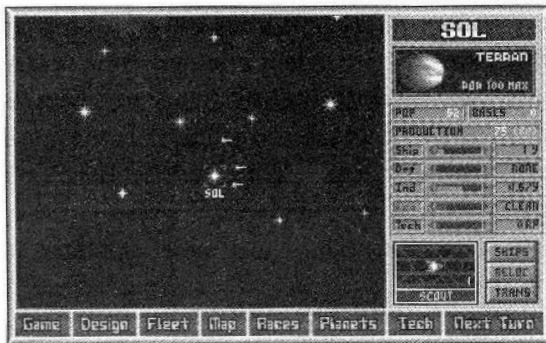


Figure 2-16

The Control screen at the start of turn two

Just below that, the Production box shows that your economy has grown by six resource points. During the last turn, Sol was producing a total of 82 points, of which you could spend 69. In this turn, the planet will generate 88 resource points (the green number in parentheses), of which you can spend 75 this turn (the yellow number to the left of the parentheses).

Your scout ship production has remained unchanged at one per turn, although the number in the Industry Production Ratio bar Status box has gone up from 4.1/y to 4.5/y. This means that with your increased economy (because this planet's population grew and you bought some new factories there), the same percentage of total spending will buy more factories, as the economic pie just got bigger.

Another way to visualize these changes would be to hold the cursor back over your home world so that it changes to a question mark. When it does, click the mouse and call up the Planet Display screen. In this tutorial game, it should look as it does in Figure 2-17.

The changes on this screen are readily apparent. First, you'll notice that the colony

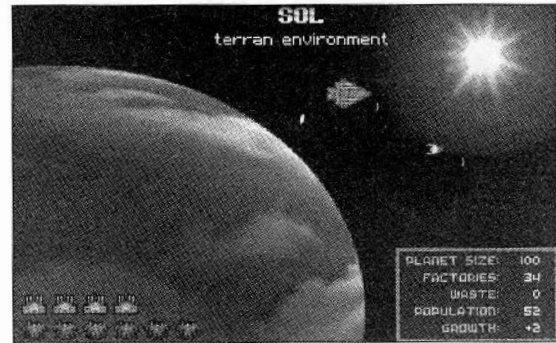


Figure 2-17

Looking at turn two's progress on the Planet Display screen

ship, which you did not move last turn, is still there. Added to it is your newly built scout ship. Next, notice that the numbers have been adjusted in the information box—you now have 52 population points, four factories have been built, and last turn's population growth registers as a healthy increase of two. Finally, the graphic displays on the bottom left have been increased. A sixth group of people has been added (although the sixth group represents only the 2 new population points added this turn), as well as a fourth industry symbol (representing the four new factories built).

## HIT IT!

Exit out of the Planet Display screen by clicking anywhere on it and get back to the Control screen. Send your new scout to the green star to the left of Sol, as shown in Figure 2-18, and then end the turn by selecting Next Turn.

On turn three, send the newly built scout to the red star just above and to the left of Sol, as shown in Figure 2-19. Keep your colony ship in reserve. Over the next two turns, you'll get a look at all four nearby star systems.

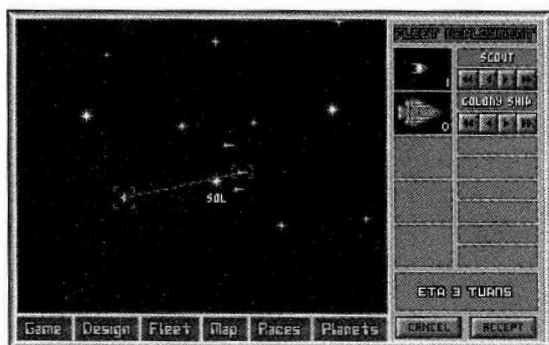


Figure 2-18

The new scout's destination

## WHAT HAVE WE DISCOVERED HERE?

On turn four, a lot will happen. First, you will discover Firma, a boring (but useful), minimal environment planet with a 35 maximum population point limit (i.e., a "minimal 35"). You will also discover Beta Ceti. Ah, now that is a ripe, juicy terran 100, just like Sol. That looks like your second home, if you ask us!

You will also be notified that yet another scout ship has rolled off the assembly lines of Sol, and a *Master's Note* information box will appear

urging you to send your colony ship away at this juncture. When this Master's Note box is removed, the situation will appear as it does in Figure 2-20. Note that, for reasons best explained in Chapter 9, Sol will produce *two* scout ships in the next turns. Because you can use them, don't adjust your ship spending at this time.

All you need to do right now is order your new scout to a distant star. This time, head for the red star to the right of Beta Ceti, as shown in Figure 2-21. Although it is 5 parsecs from your nearest colony, your scout ships can still reach it. This is because your scout ships include special devices, called *Reserve Fuel Tanks*, as part of their design.

Any ship with Reserve Fuel Tanks can travel 3 parsecs beyond its maximum range from your nearest friendly colony. Until you discover better Fuel Cell technology, all of the other ships in your fleet can move only to stars that are within a 3-parsec radius of one of your own colonies. However, by forming a chain of colonies, each within a colony ship's maximum range from the other, you can continue expansion to distant

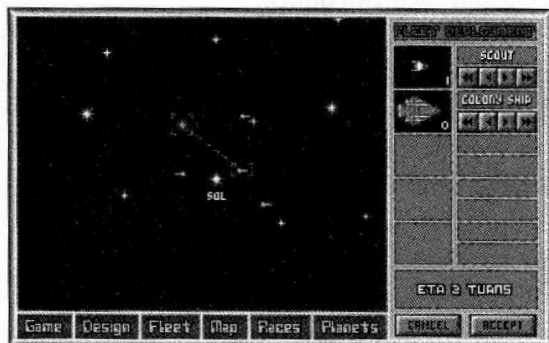


Figure 2-19

Sending out the fourth scout

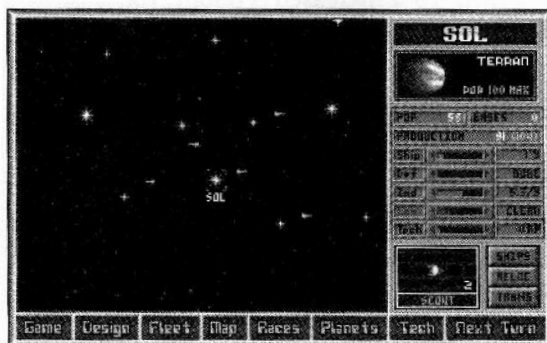
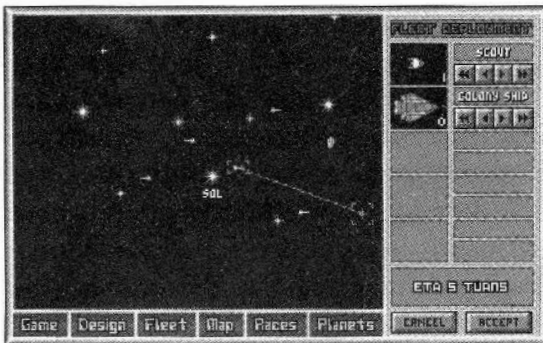


Figure 2-20

The first discoveries are in as scouts continue to fan out.



**Figure 2-21**  
Exploring beyond Beta Ceti

star systems one colony at a time. That is why we want to explore the star beyond Beta Ceti, as it looks like a very promising place to send our first colony ship. Do not send it yet, however. Wait until the next turn, when your two other scouts will reach Sol's other nearby stars. Who knows? You might find a planet out there better than Beta Ceti.

### TURN FIVE, THE DECISION POINT

The information rolls in at the start of turn five. Sol's two other neighbors turn out to be Galos, a jungle 90 that is fertile, and Aurora, a disappointing (but not too terrible) barren 50 that has a hostile environment. On the basis of our experiences in playing *Master of Orion*, you've started out in quite a good neighborhood—so far.

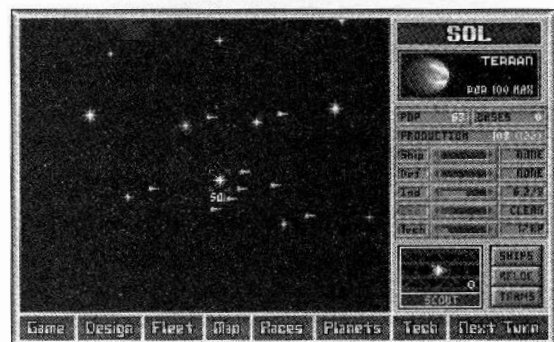
Now that all the information is in on the stars within 3 parsecs of Sol, you've got two promising worlds nearby. Both Beta Ceti's terran 100 and Galos's jungle 90/fertile look most promising. We want you to expand away from the corner of the map (which, we hope, is without any neighboring races and is therefore safe), so order your colony ship to Beta Ceti. Also, send

the two new scouts to the two stars they can reach toward the lower left-hand corner of the map. You can scroll to them by clicking the mouse anywhere on the Control screen that is not a ship or a star. Go ahead and scroll around and back, if you like.

### TURN SIX: RESEARCH BEGINS

On turn six, stop building scouts and let that money go into technological research. This should put you at a technology research spending level of 17 RPs per year, as shown to the right of the Technology Production Ratio bar in Figure 2-22. Also, notice the general growth in population and production over the past five turns. Things are going smoothly.

Once money is going into technological research, it is a good idea to focus your early technology spending a bit. This is because the amount you'll be spending on technology research will, initially, be very small, and spreading it out over all of the six technology sectors means that it will take quite some time before anything is discovered. Therefore, pop open the Technology display by clicking on the Tech



**Figure 2-22**  
Shifting spending from ship construction to technological research

button, located just to the left of the Next Turn toggle, and let's operate.

Here, you can concentrate your technological research into just a few key areas. Early in the game, the crucial areas of technology that you need to advance are usually propulsion, planetology, and construction. That is because these are the best for initial economic expansion. For now, put about half your research spending into propulsion and a quarter each into planetology and construction, as shown by the ratio bar settings in Figure 2-23.

Click on the OK button to return to the Control screen. Send the two scout ships to the two unexplored stars above Sol, one against the left edge of the map that is 5 parsecs away, and one to the right that is 4 parsecs away, toward the center of the map. After clicking on Next Turn, your technology research choices will appear. The first category that appears is construction, where you can choose only Improved Industrial Tech 9. Once discovered, this will lower the cost of building each new factory from 10 BCs to 9. The base cost to

research this technology is 100 RPs (details about technological research are in Chapter 10).

After selecting Improved Industrial Tech 9, your planetology choices appear, and here you have two items to choose from, Improved Terraforming +10 (which allows you to increase the maximum population size of all your colonies) and Improved Eco Restoration (this makes the waste generated by these soon-to-be-cheaper-to-build factories less expensive to clean up). Go ahead and choose the latter, as shown in Figure 2-24. Although Improved Eco Restoration has a high base discovery cost of 500 RPs, it will be worth the wait when you finally get it.

For your propulsion technology, again you have only one choice: Hydrogen Fuel Cells at a base discovery cost of 220 RPs. Once discovered, all your ships can venture out 4 parsecs from your nearest colony, instead of their present range of 3 parsecs. Ships equipped with Reserve Fuel Tanks (i.e., our scouts) are always able to go 3 parsecs beyond the present fuel range, so once you discover this they can venture



**Figure 2-23**

Dividing your early technological research spending. Note the 17 BC in research spending shown in the lower-right corner.



**Figure 2-24**

Selecting Improved Eco Restoration



out 7 parsecs from your nearest colony, instead of their present 6-parsec range.

There is nothing else to do after selecting these technologies to research, so once back at the Control screen, just click on Next Turn again.

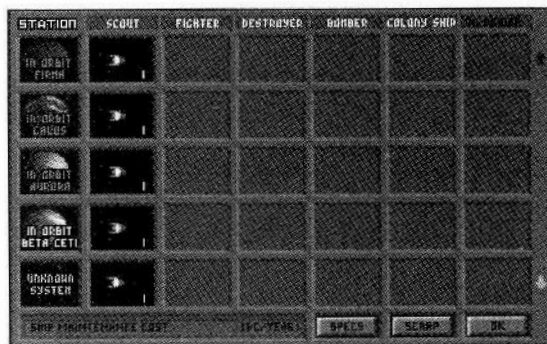
## STARTING THE NEW COLONY AT BETA CETI

The colony ship will eventually arrive at Beta Ceti, and you will be asked if you wish to colonize it. Go ahead and push the Yes button when asked. Watch the animated colony ship come down and your little explorer plant your white-colored flag on the surface. An opportunity to type in a new name for this colony occurs next, but just press the Enter key or click a mouse button and accept the default name of Beta Ceti for now.

## THE NEW COLONY SHIP DESIGN

When back at the Control screen, it's time you started construction of another colony ship. There is at least one other juicy planet out there that needs colonizing (Galos, the jungle 90/fer-tile), so move like you have a purpose. First, however, let us show you something.

Select the Fleet menu on the lower menu bar. Now you will see the Fleet Display screen as shown in Figure 2-25. One thing you'll notice right away is that the station of the fourth scout on the list, which reads "In Orbit Beta Ceti," is in bright lettering. This is because you have a colony there. The three scouts listed above it are not at friendly colonies, so their station lettering is gray instead of white. The last scout is on its way to some unknown system, but since it is currently traveling somewhere its engines are glowing and stars are whooshing by (cute,



**Figure 2-25**

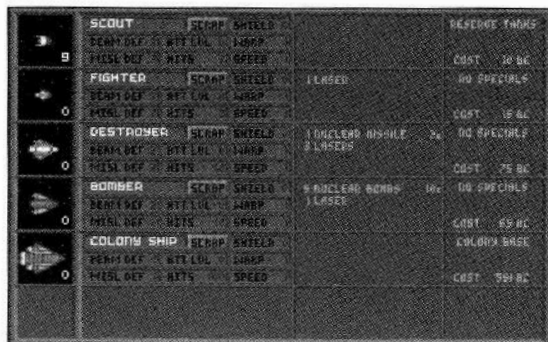
Our current Fleet Display screen

huh?). The highlighted down arrow on the lower-right side of the screen shows that this list scrolls. Go ahead and check it out if you like.

Also, you will see that our per-turn ship maintenance cost has dropped to only 1 BC per turn. This is because your colony ship was dismantled to form the new colony at Beta Ceti. If you want to colonize any more stars (and you do), you must build a new colony ship for each of them. Before going on, press the **[F1]** key and read the help information for this Fleet Display screen, then clear it off the screen by clicking anywhere. Go ahead, we'll wait...

Press the Specs button to see your current ship specifications. You should now be looking at a screen like the one in Figure 2-26. It tells you how many of each ship type you currently have in play (the number to the lower right of each ship's picture, showing you have nine scouts and no other ships available) plus what is built into each ship's design. There is also a Scrap button for each ship type, but don't scrap anything right now.

Notice that your present colony ship design is completely unarmed. This simply won't do.



	SCOUT	SCAMP	SHIELD	DEPENDS	THINKS
SCOUT DEF	ATT LVL	WARP			
MISS DEF	WTS	SPEED			COST 70 BC
FIGHTER	SCAMP	SHIELD	WEAPON		
SCOUT DEF	ATT LVL	WARP			COST 15 BC
MISS DEF	WTS	SPEED			
DESTROYER	SCAMP	SHIELD	WEAPON		
SCOUT DEF	ATT LVL	WARP			COST 75 BC
MISS DEF	WTS	SPEED			
BOMBER	SCAMP	SHIELD	WEAPON		
SCOUT DEF	ATT LVL	WARP			COST 85 BC
MISS DEF	WTS	SPEED			
COLONY SHIP	SCAMP	SHIELD	WEAPON		
SCOUT DEF	ATT LVL	WARP			COST 99 BC
MISS DEF	WTS	SPEED			

Figure 2-26

Your ships' design specifications at a glance

Like a good paranoid, you should design a new colony ship, similar to the design you presently have, but with a few lasers built into it "just in case." It's a cruel universe out there, and we want you to be ready for any close encounters of the belligerent kind.

Escape back to the Control screen with two right mouse button clicks, or press the **[Esc]** key twice, then select Design from the lower menu of the Control screen. Next, press the Clear button on the lower-right side of the screen, then select a Large ship size from the lower-left side of the screen. Now you're ready to fill this empty, large ship hull with your own custom design features.

Start by clicking over the words "Special 1" on the left side of the screen, about halfway down. From the Specials menu that opens when you do so, select a Standard Colony Base. After all, this is your new colony ship and you would be remiss to exclude putting a colony base on board! Then go up to the words "Weapon 1" and click there. From the Weapons menu, choose the bottom one, Heavy Lasers. You'll see that this new colony ship is now armed with one Heavy Laser. Equipping this ship with only

one Heavy Laser isn't paranoid enough, however, so click on the little up arrow in the Count column and add a second Heavy Laser to that weapon's bank. Voilà! With a Heavy Laser on each hip, this cowboy could stand tall in any ship-to-ship shootout.

Finally, click over the ship's suggested name of Avenger (the suggested names on your screen may vary; they are selected randomly from a list) and press the **[Backspace]** key. Type in the name Colony 1. Granted, it's not a fancy name, but it will serve to remind you that this is a regular colony ship with a warp 1 engine. When completed, you'll be looking at a screen similar to that shown in Figure 2-27. Press the Build button in the extreme lower-right corner and you're in business. In future, to cancel a ship design at this stage, you can either press the Cancel button, click the right mouse button, or press the **[Esc]** key.

When back at the Control screen, it's time to start building this new colony ship. Select it for Sol's space dock by cycling through the ship pictures on Sol's Planet Production panel. This should take five clicks on the ship picture box or the Ships button.



Figure 2-27

Your new colony ship design



Next, take five clicks off Sol's Industry Production Ratio bar. (Click on the left arrow next to the box labeled "Ind."). This will shift more spending into technology, which is not where you want it. To transfer it from the technology sector into ship building, click on the right arrow to the right of the ship sector's slider bar. Put those same five clicks into the Ship Production Ratio bar and you should end up with a screen like the one shown in Figure 2-28. It will show that one colony ship will be built in 23 years, 5.1 new factories will be built on Sol this turn, and 22 RPs are going into research this turn. That looks good.

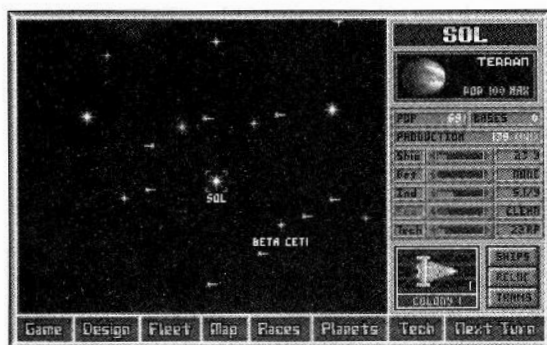
## REINFORCING BETA CETI

When a new colony is founded, like Beta Ceti, only 2 million beings initially settle on that world. Additionally, they scavenge the colony ship that brought them there, thus destroying it as a spaceship. Click the cursor over Beta Ceti and look at its planet information along the right side of the screen. Pretty wimpy, huh? Left completely alone, a newly colonized planet will automatically grow itself into full maturity (i.e., a full population and the maximum number of

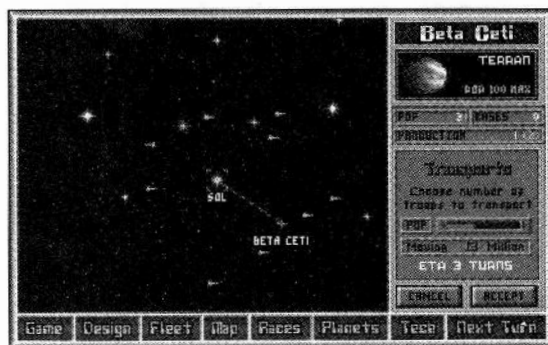
industries it can operate). However, without a little help from you, this process will take a very long time. To help speed the growth of your colonies, you will want to reinforce them by sending over additional population and pouring money into them.

To send over more settlers, make sure that Sol is selected on the Control screen map and its information is up on the Planet Production panel along the right side of the screen. Moving people from one star to another is very easy. Now that you have selected the star from which you want to send population points (Sol), click on the Trans button near the lower-right corner of the screen.

A new display for transports will appear along the right side of the screen. It advises you to use the new, triangular cursor to select a destination star. So, naturally, you should click on your fledgling colony of Beta Ceti at this point. A new display will pop up, as shown in Figure 2-29, asking how many population points to send there and giving their ETA of three turns. An even dozen will give Beta Ceti quite a boost, so adjust the slider bar accordingly. This means that 12 population points will be subtracted



**Figure 2-28**  
Building your new colony ship



**Figure 2-29**  
Sending colonists to reinforce Beta Ceti

from Sol and added to Beta Ceti in three turns. That is what you want to do, so press the Accept button and we'll teach you a bit about population management.

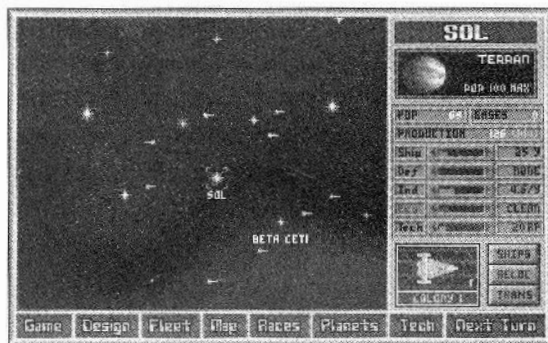
## POPULATION MANAGEMENT

While up to half a planet's population can migrate thus each turn, stripping that many people off your thriving home world of Sol would leave it struggling. You see, each population point on a planet allows two factories to produce 1 BC each there. Thus, if there were only one population point on a world, and 100 factories were built there, only 2 of those factories would produce their 1 BC income while the other 98 sat around idle waiting for more workers to run them. That would be very inefficient. This is why you sent over only a dozen population points from Sol to Beta Ceti. We didn't want to strip Sol down too far and leave it so low on population points that there would be too many idle factories left behind.

Because each transport carries one population point and costs 1 BC to build, Sol's economy will take a small hit this turn. After inspecting it on the Planet Production panel along the right side of the screen, as shown in Figure 2-30, you can see that, due to the 12-BC cost of sending out those dozen transports to reinforce Beta Ceti, the time required to build the new colony ship is up to 25 turns, new factory production for this turn fell to 4.6, and technology research dropped to 20 RPs. You can live with that for one turn.

## OTHER WAYS TO SPEED NEW COLONY DEVELOPMENT

Concentrate spending on developing worlds primarily into building up their industries. This



**Figure 2-30**

The end Control screen after our very busy turn

will expand a planet's economic output geometrically (something that you always want to do). Generally, this means spending the minimum necessary to keep the ecology clean and throwing every other available resource point on that planet into its industrial sector.

Besides sending over additional colonists, you can also send burgeoning colonies some extra money. Like a child struggling to develop, planets also benefit from having some extra money and attention spent on them. However, you can't simply transfer resources from one planet to another. No, for that, your empire has an *Interplanetary Reserve Fund* or "Reserve." To find out where this bank is located, select Planets from the menu bar along the bottom of the Control screen, and the Planets Display screen will appear as shown in Figure 2-31. Press the **[F1]** key and read the helpful descriptions of this display's aspects quickly before we go on. Clear them by clicking anywhere.

There are several important bits of information on this display. First, you'll see that you now have two colonies listed. Colonies on this list always appear in the order that they are located on the map, from top left, across, and



Figure 2-31

The current Planets Display screen

then down 1 parsec at a time until reaching the lower-right corner of the screen. You can see that Sol is really cooking with 69 population points and 68 factories. Beta Ceti, on the other hand, has only 2 population points (newly arrived from the colony ship they just disassembled there).

Along the bottom of the screen, you can see what your fixed expenses are and how much they are costing you each turn. These amounts are expressed as a percentage of your total income, which is displayed in the center of the lower part of this display, just to the right of your fixed spending costs. Presently, your total income is 142 BC.

Where we want you to look right now, however, is just above the Transfer button on the lower-right side of the screen. The word “Reserve” is glowing brightly next to it, and the amount of BCs you have there is presently zero. Whatever amount you may have in this reserve, think of it as currently in a non-interest-bearing checking account. By clicking on the Transfer button, you can select a colony to send money to. Once selected, you can then decide the amount you wish to send from your reserve

to that colony by way of a slider bar that pops up for you to adjust. The receiving colony will then spend every BC you send there as quickly as it possibly can. (Chapter 6 has the details on this subject.)

## MAKING DEPOSITS INTO YOUR RESERVE FUND

At this point, you may wonder how to make deposits into this handy interstellar checking account. There are two methods. First, you can adjust the ratio bar above the word “Reserve” on the Planets Display screen. As you increase it, you’ll notice a “+X BC” number increasing to its right. That number shows half the amount being taxed within your empire. It is also the full amount being added to your Reserve Fund every turn: in other words, 1 BC is added to your reserve for every 2 BC collected in taxes. This tax is levied proportionally according to each planet’s economic output.

The second method can be used only when a planet has built all the factories that it can hold. When this occurs, further investing of that planet’s resources into its Industry Production Ratio bar places those resources directly into your Reserve Fund. In other words, you’re setting up a direct deposit amount there. This money is added directly to the reserve beyond whatever that planet might be taxed via the above Reserve Fund slider bar method and, like taxes, this money is also halved before it ever arrives in the Reserve.

By thus accumulating funds in this Interplanetary Reserve Fund, and then transferring these BCs to developing worlds, you can spur their rate of industrial growth and hasten them to full economic maturity. Naturally, the faster you can build up your empire’s economic base, the

better the position you'll be in to conquer the galaxy as the later stages of the game unfold.

For now, set your tax level at +2 BC by adjusting the slider bar a tiny bit. Then exit back to the Control screen and end this turn. We've kept you busy enough getting things organized for the time being.

## INITIAL GROWTH

We are going to turn you loose for a while. Don't panic! We've got some general advice and guidelines that will get you rolling like a juggernaut through the early, initial growth stages of *Master of Orion*.

First, check the Planets Display screen each turn and transfer all of the money in your reserve into newly developing colonies. Just keep throwing money at them.

Second, continue exploring with your scouts. Move them off the planets they've discovered and keep pushing them out to the limits of their ranges. Knowledge is power, and knowing where to send your next colony ship is crucial.

Third, continue to develop propulsion, planetology, and construction technologies. Feel free to alter their spending ratio bars on the Technology Display screen, but don't ever fail to invest at least a dozen or so total RPs into technological research each turn.

Your goal for this early stage of any *Master of Orion* game is to expand rapidly and colonize every unowned star you can. During this time of expansion, there will usually be little need for extensive building of the tools of war (missile bases on planets, war ships, spies, etcetera). Instead, your goal is to expand as rapidly as possible without conflict and to keep optimizing your economy, planet by planet, by building

up their populations and industries to their maximum levels.

As each planet reaches this fully developed plateau, it is generally wise to shift its resources primarily into technological research until the time for war with another empire is at hand. When war looms, underdeveloped planets should strive to continue their growth while fully developed planets must, on an individual basis, make a guns-or-butter decision. Some of their resources must be put into ship building, and planets that border other empires will need missile bases for their own defense. However, the quest for new technologies must continue, lest your forces become obsolete during a lengthy war. As war looms, that is the time to begin your computer, force field, and weapons technological research. To do this, simply call up the Technology Display screen and press the [=] key. That will automatically even out your technological research spending into each of its six categories.

## GRABBING STARS

At this point, you've explored the neighborhood around your home star, have colonized Beta Ceti, and will soon have another colony ship ready. Galos needs to be colonized and there are other stars yet to explore. This is all very good, but you can't rest here.

Use each new colony or conquest as a jumping-off point for further exploration and expansion. Aggressively pursue the discovery of nearby stars and colonize every star you can. When you have a choice of stars to colonize, choose the best ones first. (Generally, the "best" planets to colonize are the ones that provide a strategic base for further exploration and

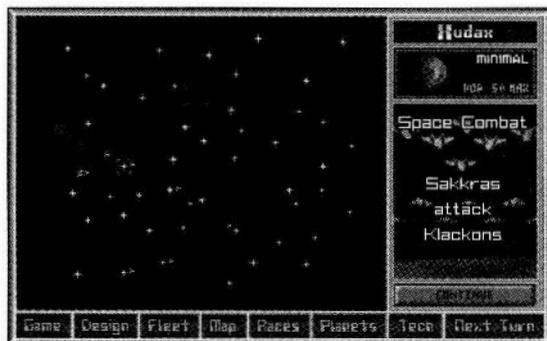
expansion, or that will have the greatest economic potential when fully developed.)

Anyway, keep things growing, read (but do not follow) the Master's Notes that will pop up on the screen from time to time. This chapter is your *personal* Master's Notes, so listen to us instead. Just keep building your empire until you bump into a ship belonging to another race, as shown in Figure 2-32, and find yourself in a space battle, as shown in Figure 2-33. At that point, read the next section.

## CLOSE ENCOUNTERS OF THE FIRST KIND

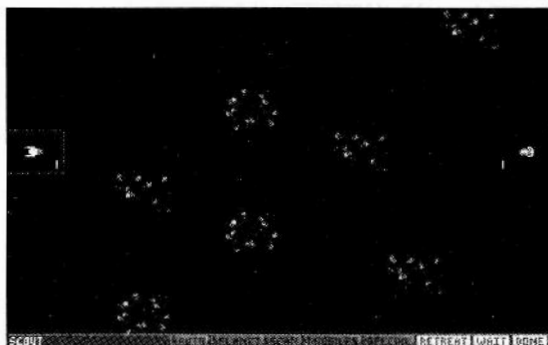
In our game (yours may vary, as we have turned you loose to play on your own), we bump into a Sakkra ship around the star of Xudax. When you run into enemy ships, here is what you do: *click on the Auto button*. This will conduct the battles automatically for you. After this button is selected (and changes in color from red to green), one of three things will happen:

- All the enemy ships will retreat. This is good. This means that they were all



**Figure 2-32**

Contact with the first alien ship



**Figure 2-33**

The Ship Combat Display screen

unarmed scouts and colony ships, and they've left you in control of the space around that star. This will allow you to scan it and see what type of star it is while preventing them from doing so.

- Your ships (on the left) advance to do battle with their ships (on the right). That's usually good, too. Just make sure that you have either more or bigger ships than the other player, whenever possible.
- Their ships will advance to do battle, and yours won't. This is bad. When this occurs, hit the right mouse button or [Esc] key. As each of your ship groups is highlighted in turn, press the Retreat button. This will exit your ships out of combat on the next round and send them on their way back to your closest colony.

If you want to fight your own space battles, ship group to ship group, round by round, you're on your own for now. Go ahead and experiment with ship combat if you like, but know that we've saved the details on this information-rich subject for Chapter 7.



Now that we've shown you how to box with other player's ships, you just keep expanding and growing your empire. These early scout/colony ship battles will all go your way until you begin to encounter armed enemy ships. If you do, you may want to build a few armed ships yourself and go cut your teeth on a small space battle or two.

After you discover Hydrogen Fuel Cells (Range 4) technology, be sure to send a scout ship to the planet closest to the lower left corner and check to see if your other scouts can explore further out along the frontier you'll have spreading out across the middle of the map. When asked what propulsion technology to research next, choose Nuclear Engines (warp 2) as shown in Figure 2-34. Equipping new ship designs with Nuclear Engines allows them to move 2 parsecs per turn, twice as fast as your current engine technology.

When Sol finally builds the maximum number of factories it can operate (which is twice its maximum population), the money that was going into its Industry Production Ratio bar will be dumped into its Technology Ratio bar.

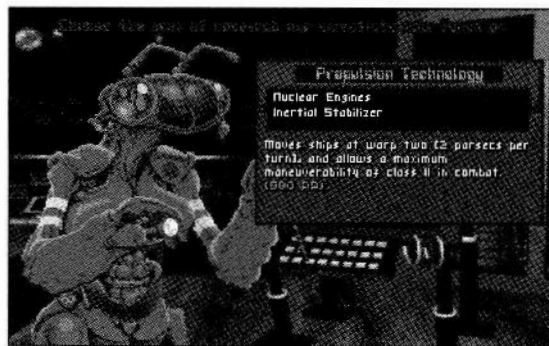


Figure 2-34

Opt for Nuclear Engines technology next

Leave some RPs going to technology, but shift most of that spending up to ship building and keep cranking out colony ships as fast as you can. You want your empire to grow like a weed at this stage, and spread your race's genes to every planet you can.

Continue expanding and sparring with other players until one of their leaders pops up on the screen and says "hello" in some way, as shown in Figure 2-35. When that occurs, read the next section of this chapter.

## FIRST CONTACT

In our game, the Sakkras are the first to announce themselves to us. Again, your first encounter might be different. The Sakkra empire lies to the north of ours. An alien's greeting is their formal *first contact* with you, and that means that several things have just happened. First, a Master's Note will advise you to be diplomatic. Don't worry, you will. Next, you can see the stars that they own in lettering that matches their player color, as shown on the Control screen in Figure 2-36. Alien colonies in bright lettering are ones that are currently

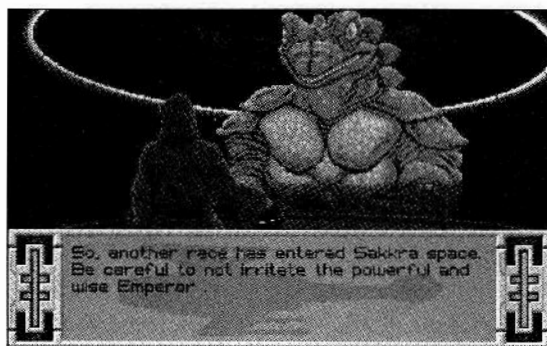


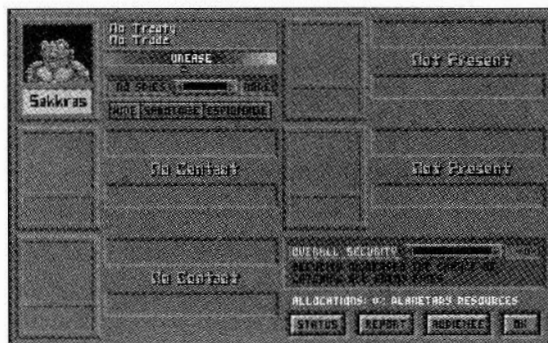
Figure 2-35

The Sakkra race deigns to notice you.

within your scanning range, whereas dimly lettered alien colonies are not. As you'll see, the alien races have been expanding their empire in the same way you have.

The big change, however, after making your first contact with another race, appears when you select the Races Display screen, as shown in Figure 2-37. Do this by clicking on the word "Races" along the menu at the bottom of the Control screen. Now, friend, put your other face on, for you are ready to conduct some serious diplomacy!

First, always get a report on each new race encountered to find out what they are like. Press the Report button at the bottom of the Races Display screen and then use the "Who?" cursor to select your new neighbor. A Report screen will then appear, as shown in Figure 2-38. Beneath the leader's picture, we find that the Sakkras are led by an erratic militarist. Great, a war monger we can't trust to keep the peace. This is bad news, indeed. Chances are that we'll be fighting these lizards soon enough, and they'll be ready for that war when we do. You'll notice that the rest of the information we have

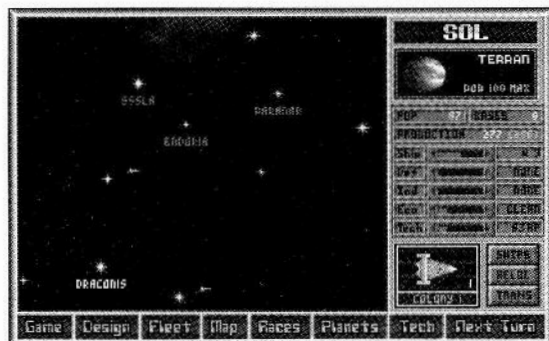


**Figure 2-37**

The Races Display screen after our first contact with another race

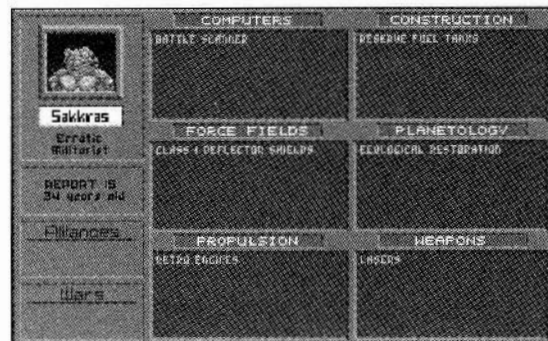
on this race (i.e., their technology discoveries) is very old. Building a spy network with the Sakkra empire will automatically update this information.

However, because you are a friendly, peace-loving Klackon (you did put on your other face, didn't you?), you're going to start off nice (for the time being). Press the right mouse button or **[Esc]** key and exit out to the Races Display screen. First, build the spy network you need to keep your future reports on this race more



**Figure 2-36**

Alien colony locations are instantly made known to you, and vice versa.



**Figure 2-38**

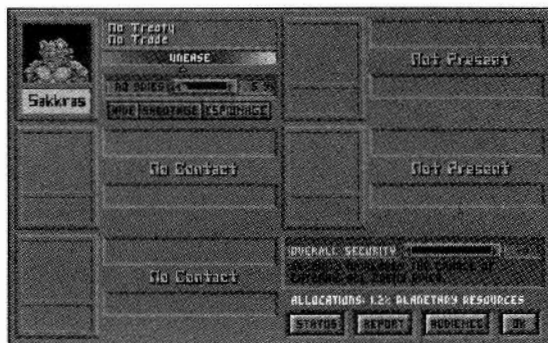
Getting a report on the Sakkras, who turn out to be led by an erratic militarist



current. You can allot resources to building spy networks within an alien empire by using the ratio bar next to their leader's picture. Three clicks' worth of resource allotment into spying on them should be enough.

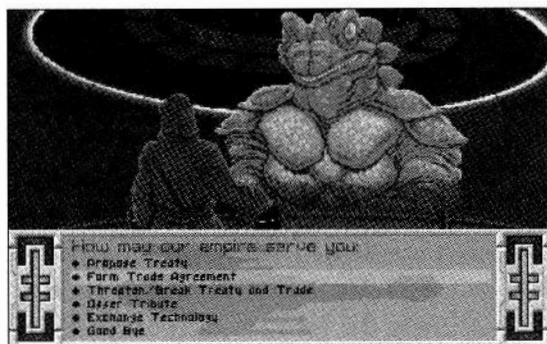
To the right of this Spy slider bar, we are informed that our first network will appear within the Sakkra empire in 5 years ("5 y"). Your time may vary. Next, click on the Espionage button beneath the ratio bar. This means that your spies will actively try to steal that alien race's technology. What the heck, they might have something worth stealing. (For details about spies, see Chapter 12.) These settings for our spying operations against the Sakkra empire are shown in Figure 2-39.

After setting up your future spying operations thus, it is time to parlay. Press the Audience button (near lower-right corner) and move the "Who?" cursor over to the alien leader's picture. You are greeted, then sent to the Diplomatic Options menu, as shown in Figure 2-40. Although diplomacy is explained fully in Chapter 11, for now just choose to form a trade agreement and see how it goes.



**Figure 2-39**

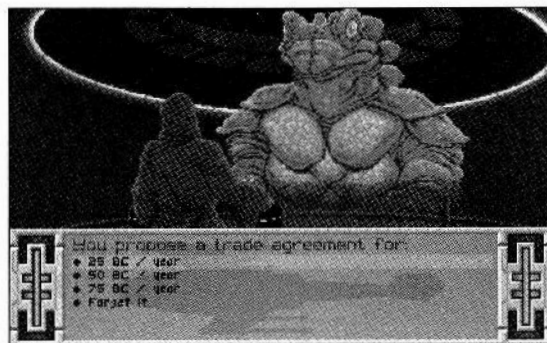
Getting your spying operations organized



**Figure 2-40**

Trying to get a trade agreement

Ask for the minimum amount when creating a trade agreement, as shown in Figure 2-41, and see if they'll accept it. If they do, you'll see their acknowledgment in a screen similar to the one in Figure 2-42. If not, wait three or four turns and try again. Eventually, you should be able to wear them down and accept a trade agreement. The reason you want the minimum possible trade amounts is to keep your initial



**Figure 2-41**

Always begin by offering the minimum trade amount.



Figure 2-42

The Sakkras accept the offer.

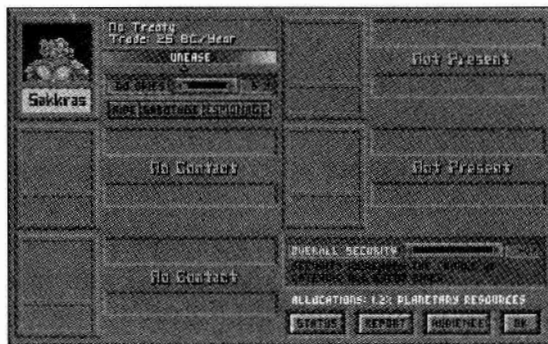


Figure 2-43

Our trade agreement has been recorded on the Races Display screen.

trade deficit low. Chapters 5 and 11 cover these areas in greater detail.

You can experiment with other diplomatic options, but setting up a basic trade agreement with everyone you're not at war with is a good enough start for this tutorial. Not only can you (eventually) make money on them, but they also help improve your relations with another race. If you ever want to parlay and their diplomat is gone, don't worry. They always come back after some time has passed. Just be patient and read Chapter 11 if you're completely confused.

After our new trade agreement is formed with the Sakkras, the Races Display screen looks as it does in Figure 2-43. Note the listing of our new trade agreement above the Spy Ratio bar. Although our relations with the Sakkras are currently "uneasy" (as stated on their Relations bar), with time and trade this will improve.

## THE CLOSING OF THE FRONTIERS

Eventually, you will find yourself boxed in and unable to expand further. Three things might

be limiting your expansion and closing your frontiers:

- The stars that you can reach are enemy owned.
- You can't reach the next star because it's too far away to colonize.
- The planets you have discovered can't be colonized because they all have hostile environments or another race has already colonized them.

For each of these problems, there is a solution: Enemy-owned stars, for instance, can be conquered. Although Chapter 8 explains these martial aspects of the game in greater detail, your object is simply to move your ships to enemy planets and either bombard them to a point at which their colonies are destroyed, or to have your ships control the space above a planet long enough for you to send transports over in sufficient quantities to capture it. All the while, of course, you must prevent the enemy from doing the same to you.

To reach stars that are too far away, shift resources into the Technology Production Ratio bars of some of your planets and develop propulsion technology, as you have already done. If you can't colonize a particular planet because its environment is either barren, tundra, or dead, know that these three environments are, in the order given, the three easiest to deal with: just discover a technology that all allows you to create colony ships capable of settling on them. By investing in planetology technology, you'll eventually discover something that allows you to settle on previously hostile worlds. Note that discovering one level of Controlled Environment technology (e.g., Controlled Tundra technology) not only allows you to colonize the named environment (in this case, tundra), but also all of the less hostile environments shown above it on the list given in the Galaxy Map.

Of course, if the only place you can expand happens to be another player's colony, then you have no other option. It is time to prepare for a major war of aggression.

## WAR

Prepare for wars by creating a new ship design that features some of your latest technological developments, as will be explained fully in Chapter 9. Then, of course, build lots of these new technological terrors and go win space battles with them. Once you have secured the space over an enemy colony, you can either pound it to dust, at which point you may want to send over your own colony ship and start a new colony there, or invade it with your storm troopers.

To invade an enemy planet, just send transports to it like it was one of your own

colonies! Yes, each population point you send will combat the enemy population points there and whoever wins the ground battle will control that colony. If you capture an enemy colony, you will get all of their factories intact and might even steal a technology or two from them in the process!

## WINNING

Eventually, a Galactic Council meeting will be called and you will be asked to vote for who should rule the galaxy. Although all of this is explained in Chapter 4, know that a player must get two-thirds of the votes to be elected. Hopefully, that player will be you. You'll be nominated if you're one of the two largest empires in terms of population and other races will be more inclined to vote for you if you're on good terms with them (particularly if you're allies). They will tend to vote against you if you're on bad terms with them (like at war, for instance). If the game comes down to just two players remaining, however, there will be no more council meetings and it will be a straight fight to the death.

## GOOD LUCK!

In the tutorial game you've been playing while reading this chapter, the path of events you take will begin to go off into directions that we cannot foresee. You might try to establish a peaceful relationship with one neighbor while expanding your empire at the expense of another. Ultimately, however, you must dominate the galaxy to win, and for that there must be conflict.

So, go ahead and finish your tutorial game. Because you're playing at the simple difficulty

level, you will have several advantages that should help offset any missteps that you might take due to inexperience. While playing, be sure to hit the **F1** key whenever you need help about how a particular screen or display works.

Also, you might want to pause and look over the following, final section of this chapter. It will help you develop good playing habits for *Master of Orion* and show you how to organize your game turns for maximum playing efficiency.

## GOOD HABITS

- **Begin each game by checking out the Map menu and getting a feel for your position on the board.** (The Map menu is at the bottom of the Control screen.) If you're not near (within 3 parsecs of) other, promising stars, or you're not happy with your starting position for any other reason (perhaps you don't like starting in a corner, or in the middle, or too near a nebula cloud, or so far from white stars—or for whatever reason), don't waste much time with that game. Simply begin a new one and hope the dice roll better for you this time around when the board is being set up.
- **Explore early and explore often.** Knowing where to direct your colony and war ships is the difference between effective and ineffective play. Look before you leap with cheap, replaceable scout ships. Every time you establish a new colony, keep scouting to the furthest stars that new colony (and your ship range limitation) allows you to explore. Push, push, push, probe, probe, probe! All things being equal, the sooner you occupy an area, the more time you will

have to develop it and the more likely you will be to keep it. And just to sweeten the chase, if you're the first to discover an artifact planet, you may even be rewarded with a free technology.

- **Leave at least a scout ship over every promising new star you explore at the start of a game.** In this manner, you can chase away other players' unarmed scouts and colony ships that might happen over them before you can get a colony ship there and claim those juicy new planets for yourself. Of course, reinforcing your claims with warships is not a bad idea, either. However, you should know that if you have a nonaggression pact or alliance with another player, your ships will not prevent his or hers from hanging around and even colonizing unowned stars right out from under your nose! Chapter 11 explains all this.
- **Lock your Ecology Ratio bar at the minimum Clean level before adjusting the other Ratio bars.** This way, you won't have to worry about inadvertently creating nasty waste and pollution on that planet. However, you'll have to unlock the Ecology box (clicking on it again, so that its background color changes from red back to gray) if you ever want to increase spending there to hasten population growth.
- **Don't waste much of your economy preparing for war until you discover a hostile neighbor.** Otherwise, money invested early in your military is money that could have provided considerable long-term growth through industrial and technological investment by the time you actually find yourself in a shooting war. Besides, those

early-model warships might be obsolete by the time you first need them in battle. If that happens, you'll lose a lot of time and resources when you scrap those old clunkers. This is money that you should have been using to expand your economy in the first place.

- **When in doubt, optimize your economy.** In the face of indecision or when you need to let the situation develop for a few turns, concentrate on fine tuning the economy of every colony you control. If you don't know whether to spend more money on technology, planetary defenses, spies, ships, and so on, then put your money to work optimizing your economy. Simply put, this means helping every planet reach its maximum potential population and making sure that every factory that can be built on a planet, is. If a planet's economy is maxed out, spending a little extra on technological research is a good idea. Alternately, you can put some BCs directly in your Global Reserve Fund by additional industrial sector spending after it is maxed out. Go ahead and put a couple of clicks into your industrial sector until the word "Reserve" appears to the right of its slider bar. At that point, you're depositing money directly into your Reserve account! Pretty cool, huh?
- **When you're informed that a planet's industry or population has reached its maximum, readjust the Ratio bars immediately.** Some people are in the habit of simply clicking forward to the next event when notified that a planet's growth plateau has been reached. However, the planet's various Ratio bars are active when

these notification boxes appear. Therefore, it is better to adjust them the instant these notification messages appear, rather than to try and remember to "get back to them" later in that turn.

- **The best time to consider launching a new ship design is when gearing up for a new war or offensive.** That way, all of the money suddenly invested in that new war or offensive will be spent for the latest ship type(s). This will not only provide the best possible ships that you can muster in battle, but these new designs are (hopefully) not likely to be obsolete for quite some time.
- **Have a mission in mind for a ship when you design it.** Is this to be a fast reconnaissance ship? Then a small-hulled ship built with your fastest available engine and, perhaps, Reserve Fuel Tanks would make a proper design. Will this ship serve primarily to bomb the heck out of enemy planets? Then loading it up with bombs and biological weapons, along with adequate defensive systems and fast speed, would make a good design. How about building a hit-and-run raider? A fast ship armed only with missiles that will retreat from battle at the first sign of danger can do serious damage to enemy shipyards amassing a fleet. Anyway, you get the idea. It's important to have a particular mission in mind for a ship when you design it and then to use your ships in the right combinations to complete the tasks to which they are assigned. All of this is thoroughly examined in Chapter 9.
- **When you have ships that move at different warp speeds, think about whether**



you want to split them up and send the faster ships on ahead, or keep them together in a stronger, slower moving group. Strategic maneuvers often succeed or fail on the basis of a fleet's speed. Design your ships and plan their movement between stars carefully.

- **In a tactical ship battle, maneuver boldly but know when to cut your losses.** The computer player's ships may react timidly. If so, then that is a battle easily won. If the enemy is too much for you, order a retreat. The survivors will regroup at your nearest colony, and there you should reinforce them with more ships. In every space battle, you will want every ship there that you can muster. Therefore, try not to lose them so easily when the enemy outmatches you. Preserve them, instead, and try to hit that enemy when you have built up the advantage.
- **If you have a major advantage in a war (either technologically or in sheer numbers of ships and troops, or both), press it. Do not listen to the enemy's pleas for peace.** Sure, this is a ruthless policy, but eliminating the competition is a proven way to win. Never forget, the best time to kick someone is when they're down! Note, however, that the player who deals the blow that extinguishes another race (i.e., commits the last act of genocide), suffers a diplomatic penalty from all the other, surviving races (see Chapter 11).
- **When your empire starts getting large and unwieldy, remember to use F keys and the RELOC buttons.** The RELOC button on each Planet Production panel allows you

to preset the destination of newly constructed space ships to another friendly planet. This is somewhat like *call forwarding*, except that ships still must spend whatever time it takes to travel to the planets they are being forwarded to. Selecting a friendly colony and pressing (Alt)-(R) will change all relocation routes to that planet, which can help you organize a new staging point in an instant.

The (F2) and (F3) keys allow you to cycle forward and backward through all of your colonies, but always start at your home world so that, when you cycle back to it, you'll know you've seen your entire empire. By cycling through all of your planets every turn or two, you can keep your finger on the pulse of your empire and better know where to make specific economic and military adjustments. The (F5) and (F6) keys take you through colonies that have just built new ships this turn, and the (F7) and (F8) keys scroll through colonies to which other players have ships en route (provided you have either Improved or Advanced Space Scanner technology).

## ORGANIZING YOUR GAME TURN

Although *Master of Orion* has no set sequence of play, it might help beginners to have some sort of check list of things to do each game turn. Think of this rather fastidious check list as, perhaps, the ultimate in good habits. By following this turn organization outline, you can be confident that you haven't skipped anything crucial to your empire's survival.



**I. Check your relations**

1. Open the Races display from the Control screen and check things out.
  - a. Check the Status screen to see how you stand.
  - b. Check the Report screens on other players.
2. Parlay with other races, if appropriate.

**II. Check for threats**

1. Examine other players' fleets on the Control screen (i.e., open the Fleet menu).
  - a. Use the **[F7]** and **[F8]** keys to check for colonies being contracted by aliens.
  - b. Click directly on these fleets to get more information on them.
2. Check the Spies Caught display (press **[C]**).
3. Note any continuing random event(s) that you must deal with.

**III. Get paranoid**

1. Do you suspect any other players of plotting against you?
2. Is your military prepared for any contingency?
  - a. How are you fixed for missile bases and planet shields?
  - b. If at peace, should you be preparing for war this turn?
  - c. If at war, are you committing enough resources to win it?
  - d. Do you need to construct a new warship design?
3. Adjust your spy and counterespionage levels.

**IV. Deal with any special circumstances**

1. Perhaps a new technology or random event changed some of your colonies' production status. Take this opportunity to adjust their ratios to *exactly* what you want if the current settings are not entirely satisfactory. Use the **[F2]** and **[F3]** keys to help you.
2. If you discovered a new technology, check your Technology Production Ratio bars on both your Planets and Technology display screens, readjusting them if needed.
3. Create a new colony ship design when a superior Engine or Controlled Environment technology is discovered.

**V. Adjust your economy**

1. Transfer money from your Reserve to colonies that need it.
2. If your Reserve Fund is too small, consider increasing the slider bar Reserve income rate or spending more on industry at colonies that have already built their maximum number of factories.
3. Go to your home world and, starting there, cycle through all of your colonies by using the **[F2]** and **[F3]** keys. Verify that their spending Ratio bars are where you want them, based on the information and actions taken in all the preceding steps of this turn.

## VI. Empire building

1. Keep probing planets you don't own. You always want the most up-to-date information possible before finally committing yourself.
2. If you discovered a new Controlled Environment technology, look at the Galaxy Map and see which new stars it has allowed you to colonize and then do so.
3. If you have recently acquired a new colony, consider reinforcing it.

## VII. Military matters

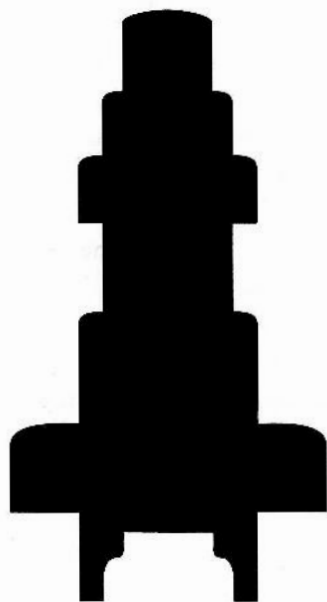
1. Observe enemy fleet assembly points.
  - a. How large an armada are they building?
  - b. Should you raid them and disrupt their fleets there?
  - c. Remember, their invasion troops will come from these assembly point colonies. Fifty percent of that planet's current population points will be sent out as storm troopers when they attack.
2. Counter enemy threats.
  - a. Launch a preemptive strike on their assembly point(s), if appropriate (consider the political consequences).
  - b. Meet them at your colonies before they arrive.
    - i. Send ships there that will arrive ahead of the enemy.
    - ii. Build ships and/or missile bases at those colonies.
  - c. Coordinate a counterattack after they arrive at your colonies.
3. Offensive operations
  - a. Are your ships gathering at their proper assembly points?
  - b. Do any of your ships need to be dispatched from your assembly points to deal with threats?
  - c. Have you amassed enough of the proper ship types to strike?
  - d. Consider the political consequences of an attack.
  - e. If you feel this is the proper time, launch your attack.
    - i. Have an objective in mind. It should be a star you don't control. If there is an enemy colony there, know whether you plan to destroy it completely or will try to capture it with a land assault.
    - ii. Should slower ships be split off and sent ahead of the faster ones to coordinate their arrival at their target destination?
    - iii. Should faster ships be sent ahead to fight the battle before the slower ships arrive there?
  - f. Pray for your good fortune and beg the gaming gods of luck to be your on your side this turn. (*Never skip this step!*)

## EXPLORING FURTHER

Congratulations, Junior Space Cadet. You are now promoted to the rank of Big Cheese, Third Class. Future galaxies to conquer and new races to lead await you. The remaining chapters and appendices of this book are filled with all the important matters, large and small, which will make your play of *Master of Orion* remarkably crisp and efficient. It won't be long before you are persevering against all the enemies you choose, even at the impossible difficulty level.

For now, however, it is important to know where you are in the galactic scheme of things. Finding your way around the stars is an important skill to develop fully, and getting there is always half the fun. In the next chapter, we will teach you these things, as well as reveal the secrets of how your galaxy was created. Turn the page, eager explorer, and discover this for yourself. 🦁

# 3



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*Seeing Stars: Where to  
Go and How to  
Get There*

*This is virgin territory for whorehouses.*  
—Al Capone, on suburbia

It may seem odd to dedicate an entire chapter to what is, essentially, an initial 2-second pause in the game featuring a blackened screen. However, we can assure you that the importance of what is done in that 2 seconds merits this discussion. While generating the random star map, all of the game's geography is determined. This geography includes not only the location of the planets themselves, but also their environments, population support levels, *specials* (such as rich, fertile, or artifact planets), and the all-important starting locations for each player.

In this chapter, we begin by explaining the simple truths of star gazing and apply these to the practical matter of moving your ships around the map. After covering these basics, the second half of this chapter delves into the more complex and revealing elements of how the galaxy is created in *Master of Orion* and what the chances are of your galaxy coming out the way it does.

## FINDING YOUR WAY AROUND THE STARS

Some basic questions often arise while playing *Master of Orion*. These include: Where should I send my scouts? Where do I send my colony ships? Where should I send the war fleet I built up to attack the enemy?

In most strategy games, as in life, knowledge is power. If you want to answer these "Where?" questions correctly, you must first gain some knowledge of the neighborhood around your colonies. After all, sending important (war and colony) ships to unexplored stars can be quite a waste of time and effort (not to mention ships, if a hostile enemy is lurking there *en masse*). Because a good Galactic Overlord strives to

minimize all waste, send cheap, expendable scouts when first probing unknown stars. If they survive, keep them moving. Probe every unknown star that they can possibly reach, given your current range limitations.

## HONEST AND DISHONEST SCOUTING

Two types of ships are particularly well suited for initially exploring the map. We call them the "dishonest" and "honest" scouts. These are, respectively, your scout ships and the fighter designs.

Both are small, inexpensive ships to build. Even early in the game, your home world can produce them with little strain on its economy. You can build enough, if you like, so that every nearby star can have one of these ships parked over it to keep nosy neighbors away. Leaving these ships as garrisons can be useful because, when attacked, they will warn you when another player is encroaching on your border. The question is, which of these two reconnaissance ships can you really trust?

The fighter begins with only a 3-parsec range from your colonies. Every other ship type you build, except for scouts, will have the same travel limitations as your fighters (unless you custom design a new type that, like your scouts, also features Reserve Fuel Tanks as one of its special devices). In other words, if a regular-style fighter can reach a particular star, so can your invasion fleet and colony ships. This makes fighter reports *honest*: they will probe only within the true limitations of your fleet's abilities. Not only that, but because they are armed with lasers, they can shoot back in a fight.

Scouts, with their Reserve Fuel Tanks adding 3 parsecs to the initial range they can travel

from your colonies, distort the value of the information they gather. (In addition, they have no weapons.) Thus, they present a dishonest scouting report because, when they explore beyond your normal ship range, the rest of your fleet will not be able to reach those stars. Although ships with Reserve Fuel Tanks, like your scouts, are extremely useful for finding out “What is beyond the range of the stars I might colonize?,” many players are confused by them. Was the star that scout ship just explored 3 or 4 parsecs away from my nearest friendly base?

To eliminate this confusion, all you have to do to find out is click on a star on the Control screen. The information panel on the right gives you the distance, in parsecs, to that star from your nearest friendly colony. This is the ship range required for you to reach that star. Be sure always to check these distances with your present maximum ship range in mind before you decide to colonize a neighboring star.

## SCAN-A-LOT

The other important way to keep an eye on the map is with scanners. Every planet and ship you own has a scanning ability based on your current scanning technology, as shown in Table

3-1. Improving your scanners is done through computer technology research. Note that Battle scanners, covered in Chapter 7, are different from Space scanners.

Initially, scanners will keep track only of enemy ships, and not very well at that. Your planets will see them coming (or passing by) only when they are within 3 parsecs. Your ships won’t find the enemy unless they happen to be orbiting the same planet, by which time you usually find out when a battle occurs. When you develop Deep Space scanners, these ranges increase, giving both planets and fleets a little more warning time concerning enemy movements.

All you can do before developing Improved or Advanced Space scanners is to watch enemy fleet movement patterns very closely on the Galaxy Map each time you click on the Next Turn button. By studying the direction and speed of those little dots as they eke across the map, with some experience you’ll be able to guesstimate other player’s fleet destinations and ETAs (estimated times of arrival).

This eyeballing of the enemy’s movement is an inexact science that, fortunately, is no longer necessary once you develop the higher scanner

**Table 3-1** Scanning Ranges (in Parsecs)

Scanning Tech Name	Computer Tech Level	Scanning Range		Notes
		Planets	Ships	
Initial	1	3	0	
Deep Space	13	5	1	
Improved <sup>a</sup>	29	7	2	Provides enemy ship ETAs
Advanced <sup>a</sup>	44	9	3	Useful in planet exploration

<sup>a</sup>On the Control screen, any of your colonies that are threatened by enemy ships will have a red line indicating the group(s) of ships heading for them. To scroll between threatened colonies, use the **F7** and **F8** keys.



technologies. Once Improved scanners come on line, for example, not only do your scanning ranges increase, but enemy fleet destinations and ETAs are displayed when you examine them. Knowing this, you can judge if you can reinforce a planet targeted for an enemy attack fast enough or, perhaps, if you should consider evacuating it.

Finally, once you obtain Advanced scanner technology, planet and ship scanning ranges increase to their maximum level of 9 and 3 parsecs, respectively. Additionally, Advanced scanners can explore planet types within their range. Thus, even a ship doing a flyby of an enemy world can ascertain a fresh Last Report information display about it by clicking on that planet, as shown in Figure 3-1.

## PLANETARY PROSPECTING

The goal of all this star gazing is, of course, to stake out the best planets to control. Once a planet has been explored and your needs to own it assessed, you can take the appropriate next step. This might be either to send a colony ship

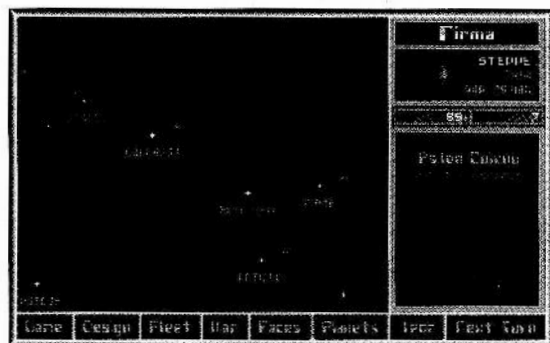
or invasion fleet there, improve your planetology technology to be able to colonize it, or, if it's not that great, you can simply ignore it as your next step.

Six elements decide a planet's priority in a Galactic Overlord's conquest and colonizing scheme of things. Therefore, put each planet you discover to the Colonization Priority Test by asking the following six questions:

### Colonization Priority Test

1. Do you currently have the technology required to settle on this planet? That is, if it has a hostile environment, have you discovered the necessary Controlled Environment technology that allows you to land transports there?
2. Is it within your present colony ship range? That is, can your colony ships reach it?
3. Does the planet have a healthy (50-75) or high (80+) population maximum?
4. Does it have any favorable specials, such as being rich or possessing artifacts?
5. Is it strategically located for military purposes or further expansion?
6. Does another player already own it?

The first two questions of this Colonization Priority test deal with matters of your current technology. If your empire isn't up to it, colonizing extremely hostile planets is simply out of the question. Planets that are outside your present ship range are always very difficult to settle. Although you can design a colony ship with Reserve Fuel Tanks to extend its range, this is a very expensive and time-consuming proposition, especially early in the game. The alternative to colonizing beyond your present ship range is to find an intermediate-range star, even a less desirable one, to settle on. By



**Figure 3-1**

A Last Report information display of an enemy world is given on the right side of the screen.

starting a colony there it will bring other, better planets within your present ship range. We call this “colonial leap-frogging” and it is a very sound strategy, indeed.

The middle two questions will tell you how tempting a planet is to own and develop. Having a high population maximum not only gives a planet more potential economic power, but it is also an important aspect of military strength. When invaded, population is what defends a planet, so having more makes your planet tougher to take. Also, when invading others, the transports you send to enemy planets usually come from your colonies with large populations, so these planets also serve as your “soldier factories.”

Worlds with large population maximums therefore have important economic and military potential. Note, however, that as you reach higher levels of terraforming technology, you can raise a planet’s maximum population limits to the point at which this factor becomes less of a concern. In the early development stages of the game, however, finding planets with large population maximums is an important consideration for fast growth.

Naturally, another consideration is any special environmental factors. Planets that are rich or ultrarich, fertile, or have artifacts on them are prime bits of real estate to own and develop. Conversely, planets that are poor or ultrapoor, or have a hostile environment, may not be among your first choices for development. Of course, these two questions should be weighed together. Often, planets with low population maximums will have good specials, whereas planets with large population maximums will be burdened with poor specials. If you find a planet with both a large population maximum

and good specials, don’t waste time! Do whatever is necessary to get there, own it, and develop it as quickly as possible—before somebody else does. (Wars often escalate during the early land-grabbing stage as everyone scrambles for the same juicy planets.) Planetary development, by the way, is the subject of Chapter 5.

## **WHEN TO PRIORITIZE A NONJUICY PLANET**

The last two questions call for a military outlook when deciding which planet to add to your empire next. For instance, consider the planet’s location on the map. Although we’ve mentioned that using a planet as a leap-frog base in order to extend your colonization and exploration efforts to other, neighboring stars is a sound practice, this is not the only reason for prioritizing a nonjuicy planet for settlement.

Planets that border those colonized by other races are also important to grab, particularly if these planets sit along key travel routes between your empires. Even if a border planet is a piece of junk, it is usually worth settling. Eventually, even the worst planet can be usefully developed over time; in the short term, at least, these colonies always have planetary Space scanners (see Table 3-1) that will monitor other players’ fleet movements. Border planets, as they develop, should usually build plenty of missile bases, because they are often the first targets of enemy aggression and the natural staging points for fleets moving in both directions.

If another player owns an economically or strategically tempting planet, then you must consider the possibility of conquering it. If you are already at war with that player, then that planet becomes your military objective and

you'll try to wrest it from the other player. If you're not at war with a player who has colonized the planet you want, you will have a war with them the instant you either destroy or conquer that colony. This automatic declaration of war by computer players when they lose a colony is something to consider. After conquering another player's colony, you are presented with a new problem—defending it when they want it back! We'll discuss this in Chapters 7 and 8.

## **SUMMING UP COLONIZATION**

It is a fact in *Master of Orion* that each empire's initial colonization habits will influence its victory or defeat as much as any other factor in the game. You should always try to fan out across the galaxy like a plague of locusts, staking out as much territory as possible before the frontiers close. Grab while the grabbing is good, and grab everything you can. Once the frontiers close, the only planets that you can expand to are those already belonging to other players. The peaceful expansion phase of the game ends at this point, and military solutions will be the primary ones used to enlarge your empire.

## **MOVING SHIPS AROUND THE GALAXY**

To elaborate on the "how to" aspects of moving ships presented in Chapter 2, allow us to supplement your knowledge with a few additional pointers. For instance, to center the Control screen on the item currently selected, press [Alt]-[C]. Some other helpful hints follow.

## **FAST FIND**

Some short cuts will help you quickly access fleets and stars on the Control screen. On the

Fleet Display screen, for instance, clicking anywhere along the row of a group of ships instantly selects them on the Control screen.

On the Galaxy Map, clicking on a star or fleet icon will instantly take you back to the Control screen, where you'll find that object already selected. Note that some precision clicking may be needed to hit those small icons on the Galaxy Map.

Finally, on the Planets Display screen, the highlighted colony listed is where the cursor is on the Control screen. To exit out of the Planets Display screen to a different colony, just click anywhere on that colony's row.

## **PUSH BUTTON ELABORATION**

As a game progresses, you will probably be ordering some very large ship groups around. To simplify this, after 40 or more ships are in the same group, each single-arrow transfer click shifts ships over in 5 percent increments (rounded down). Therefore, you may not get to move the exact, ideal number of ships from here to there, but you'll get close to that number much faster and with fewer mouse clicks than you would by transferring only one ship at a time. Because of this 5 percent transfer increment, you're never more than 10 clicks away per group to hitting 50 percent, either staying at or leaving a planet, and that can save smart players many potential mouse clicks.

## **SHIP RANGES**

At the beginning of the game, all of your ships have a range of 3 parsecs that they can travel from your nearest friendly colony. This works like an invisible tether, reining in your ability to expand and explore until you discover better Fuel Cells through propulsion technology

research. The exceptions are ship designs that include Reserve Fuel Tanks, such as your initial scout ship design. They have their ranges extended by an additional 3 parsecs.

As you will learn in Chapter 9, computer players strive to increase their ship ranges right away. Their goal of developing long-range colony ships is very wise, particularly during the early land-grabbing stages of the game. Late in the game, this also allows them to target planets that are deep within other player's empires. You would do well to emulate them and develop better Fuel Cells very early in the game.

## GRID YOURSELF

While at the Control screen, pressing **[Alt]-[M]** will display a map grid over it. Each square on the grid is 5 parsecs wide and 5 parsecs across. This might help you to visualize distances across the Control screen and better estimate travel times.

## ENGINE SPEED

Ship engines determine *warp speed*. Literally, the warp speed is the number of parsecs (spaces) per turn that ships move between stars on the map.

Transports always move at a speed of one less than your current maximum warp speed technology, so they do not speed up past 1 parsec per turn until you discover warp 3 (Sub-Light Drive) propulsion technology. This technology is a big breakthrough for transports. They move more quickly both between stars and when making opposed landings against enemy colonies (see Chapter 8). Therefore, strive to develop Sub-Light Drives.

## STEPPING ON THE GAS (CLOUDS)

Nebula clouds also influence ship movement. There is a warp 1 speed limit for ships while crossing through nebulas. Before entering and after leaving a nebula, ships will move at their full warp speeds, as do ships that merely move to or along the edge of a nebula. It is only the actual crossing of the nebula itself that is done at the rate of 1 parsec per turn.

## ARRIVAL COORDINATION

When you're in a hurry to get to a planet, you will often send ships there in small groups, moving at their best speeds, and they will arrive in dribs and drabs. Coordinating their arrival time is not a major concern.

However, when launching an attack against an enemy colony, it is desirable to coordinate your ships' arrival times so that they all get there on the same turn, thus forming a single battle fleet. Arriving piecemeal over several turns is a good way to lose space battles, so a way around that is given in the next section.

To coordinate your ships' arrival times, keep an eye on the ETAs of moving groups and try to coordinate their arrival times so that they'll occur on the same turn. Move groups that are furthest away from the destination point first. As their ETA shortens, they will match the time it takes closer fleets to arrive at the targeted planet. That is the time to launch those closer fleets. Once everyone has been carefully launched into space, just patiently await the turn during which they make their coordinated arrival at the enemy's colony, then do yo' stuff.

## CONTROLLED RETREATS

Here is one situation that gives you an advantage over your computer adversaries. Because

it was added so late in the game's development, this technique allows you to break rules the computer players can't.

When ships have retreated from a lost space battle, they receive orders to move back to their owner's nearest colony. According to the rules, this is their lot because they are retreating from a battle. You, however, can supersede this retreat order.

That is because ships that are retreating from a space battle are on the left side of a planet, with their destination preset. The Oops rule from Chapter 2 taught you how to issue new orders to ships in such a position, *and this includes ships with orders to retreat*. Of course, you must issue them new orders before ending your first turn after retreating from a battle. After that, they'll be *en route* to their preset retreat colony and the only way you can control ships between stars is to develop Hyperspace Communications.

You can therefore give your ships that have just retreated new orders to go anywhere, *even back to the star from which they were retreating*. By using this *yo-yo technique*, they can keep attacking that star for multiple turns in a row, without interruption. By taking advantage of this cheat, you can be sloppier about coordinating ship arrival times. (Ships that get there early can just hang out, retreating and going back every turn until you've gathered enough strength there to fight.) Also, raider ship designs (see Chapter 9) are far more deadly when exploiting this cheat.

There are two problems when using this yo-yo technique. First, there might be other ships on the left side of a planet, making it impossible for you to click on your newly retreating fleet via the Control screen. When

this occurs, just access this ship group by clicking on its row on the Fleet Display screen.

The second problem is when enemy ships become so high tech that they can destroy you before you can order a retreat and get away. In that case, your ships may be killed. This might discourage you from using this cheat again!

## TIPS FOR RIDING HERD OVER YOUR FLEET

You'll need several mouse clicks to stay on top of all the ships in space, both to keep a tight rein over your fleet and a close eye on the enemy's. Besides clicking on friendly and enemy fleets on the Control screen for closer inspection, here are a few other fleet-maneuvering tricks to help you keep everything in the air while juggling your many fleets.

- Use the Galaxy Map for an instant overview of all known fleets, enemy and friendly. Note their positions relative to the stars.
- The Fleet Display screen provides a shortcut for speedy shifting between fleets. Simply click on the row of a fleet, and it will take you back to the Control screen with that fleet selected in the center of the map!
- Use the RELOC (Relocate) button on planets producing ships "in the rear" to forward them automatically to specific staging areas. Do this by selecting the planet building the ships you want forwarded; pushing the RELOC button; moving the enlarged, triangular cursor back over the map to the planet that will be your staging area and selecting it with a mouse click; then pressing the Accept button to confirm your decision. A line will appear showing your new relocation path.



To undo a relocation path, simply repeat these steps, only this time select the planet of origin as the destination planet as well. When you accept it, the relocation line will disappear. Note that there is a diplomatic penalty for massing ships along a neighbor's border (see Chapter 11).

A hot key exists for changing all of your present relocation paths to a new, friendly colony. By selecting a new staging colony on the Control screen and pressing **[Alt]-[R]**, all of your relocation routes change to that star. This can be particularly useful when you are advancing into another player's empire and want your ship reinforcements to appear close by, at your latest newly conquered colony.

## STAR GATES

Later in the game, you may discover a level-27 propulsion technology called Star Gates, as shown in Figure 3-2. Star Gates are built at your planets just like any other ship design, but they are expensive at 3000 BC to build and 300 BC per turn to maintain. This maintenance cost is 10 percent of their construction cost,



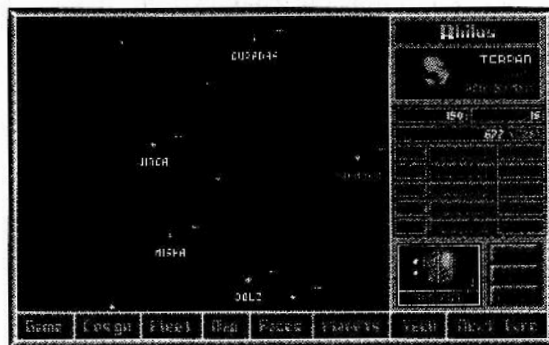
**Figure 3-2**  
Discovering Star Gates

which is never reduced through miniaturization (see Chapter 10). By comparison, ships and missile bases cost only 2 percent of their cost per turn to maintain.

Colonies that have Star Gates are denoted on the Planets Display screen with an asterisk (\*) in their Notes section and on the Control screen by a dark blue rectangle where ships orbit on the right side, as shown around the colony of Rhilus in Figure 3-3. They are also listed above the information box on the Planets Display screen.

Star Gates allow ships to move from one friendly colony to another in one turn, no matter what the distance or the ship engines involved may be, provided both the colony of origin and the destination colony have Star Gates. Star Gate travel will not take your ships to enemy colonies or unowned stars, nor can Star Gates ever be captured when their planet is conquered.

The strategy behind Star Gates is to build as many as you can afford. Be aware of their expense and high maintenance cost, however. Do not buy them too quickly for colonies that are



**Figure 3-3**  
Rhilus has a Star Gate, as indicated by the rectangle along its right side.



not yet fully developed. What Star Gates allow you to do is shift your fleet resources around with ease, so that you can instantly defend any threatened colony that has a Star Gate with every ship you own—all in one turn. On the offense, you can instantly mass on an enemy's border at will (rather than present a slow, obvious build up there that causes political damage; see Chapter 11) and launch a surprise attack against them.

## THE END OF THE BEGINNING

That covers the basics of stargazing and moving ships around. *Master of Orion* is a game of controlling planets. Owning more planets is better, but owning *more, better* planets is best. At this point, you may feel ready to learn some complex "secrets of the universe" (at least, the universe generated at the start of each game of *Master of Orion*). If you are one of these daring seekers, this section deals with the dirty details of the game's galactic construction. Those who do not want their heads swimming with numbers are advised to move on to Chapter 4 at this point.

Since you're still reading, we assume that you want to know how the galaxy was created. This will entail a careful study of this second half of

Chapter 3 and the many tables that follow. Not only will this section make sense out of your game's galaxy, it will also give you the information you need to see if the map you're playing on is about average or some bizarre deviation from the norm. Readers not interested in the numbers behind every galaxy map are, again, urged to skip ahead to the next chapter and learn the story about some numbers that really matter—the ones that add up to enlarging your economy!

## HOW BIG IS MY UNIVERSE?

When you set the galaxy size at the beginning of the game, it determines both the size of the map and the number of stars on it, as shown in Table 3-2. Although the map is created in complex blocks of space (to keep the stars from being placed too close to each other), for our purposes it is simply good to know exactly how far across each map edge is and how many stars are located on it.

## A STAR IS BORN

Initially, the Galaxy Map is blank and the computer begins by placing some space nebulas on the map, according to Table 3-3. These purple blobs slow spaceship travel down to 1 parsec

**Table 3-2** Galaxy Size (in Parsecs)

Galaxy Size	Horizontal	Vertical	Number of Stars
Small	21	15	24
Medium	27	21	48
Large	33	24	70
Huge	39	27	108

**Table 3-3** Number of Nebulas Created

Galaxy Size	Number of Nebulas
Small	0-1
Medium	1-2
Large	2-3
Huge	2-4

per turn and render ineffective all shields (both ship and planetary) within them. Each nebula cloud is roughly 5 by 5 parsecs in size.

The stars themselves are then placed according to a complex formula that helps prevent their being clustered too close together. Once their positions are decided, each star is assigned a color according to Table 3-4.

### CREATING WORLDS

After the stars are placed and their colors figured out, planet environments are generated according to Table 3-5a.

The numbers represent the percent chance of that type of environment being created.

The planets of stars located in nebula clouds will tend to have worse environments, as shown in Table 3-5b.

### How Big Is My Planet?

Following this, any planet with an environment other than "none" receives an initial maximum population size, according to Table 3-6.

Whatever its random initial population size might be as per Table 3-6, every planet also has a 20 percent chance of being altered before the game begins, just for variety's sake. If an adjustment occurs, then it has another 20 percent chance of being altered again (and so on, *ad infinitum*, as long as it keeps hitting that one-in-five chance successfully). Each time one of these "adjustments" occurs, that planet's initial maximum population size has a 50/50 chance of either being raised or lowered by 20 million. The limits on these adjustments are that no planet will ever go below 10 million or above 140 million for its initial (i.e., base) maximum population limit. Because of these adjustments, some planets in the galaxy may turn out to be unexpected gems or dogs. Keep your eyes open for them.

**Table 3-4** Star Color Determination

Star Color	Percent Chance of Occurrence	Percent Chance of Having a Nonhostile Planet <sup>a</sup>
Red	30	65
Green	25	65
Yellow	15	85
Blue	15	25
White	10	35
Neutron	5	5

<sup>a</sup>Subtract 20 percent if the star is located in a nebula.

**Table 3-5a** Normal Planetary Environment Determination<sup>a</sup>

Planet Environment	Star Type					
	Red	Green	Yellow	Blue	White	Neutron
None	5	5	0	15	10	20
Radiated	5	5	0	10	5	25
Toxic	5	5	0	10	10	15
Inferno	5	5	5	10	10	15
Dead	5	5	0	10	10	10
Tundra	5	5	5	10	10	5
Barren	5	5	5	10	10	5
Minimal	5	5	5	10	10	5
Desert	10	5	5	5	5	0
Steppe	10	10	5	5	5	0
Arid	15	10	10	5	5	0
Ocean	10	10	10	0	5	0
Jungle	10	10	10	0	0	0
Terran	5	15	40	0	0	0

<sup>a</sup>"Normal" meaning the star is not in a nebula.

### FOR RICHER OR POORER

Finally, each planet has a chance to be endowed with a *special*, such as being rich or having artifacts. First, the computer gives the bad news and decides if any planets are either poor or ultrapoor. This can occur only in steppe, arid, ocean, jungle, and terran environments, as shown in Table 3-7.

The chance for a planet within the range shown in Table 3-7 of being either poor or ultrapoor depends only on its star type, as shown in Table 3-8.

The chance for a planet, within the range shown in Table 3-7, of being either rich or ultrarich depends on both the star type and the planet environment, as well as on whether

the planet is in a nebula. Planets not in a nebula are shown in Table 3-9a, while those in a nebula are given in Table 3-9b.

### LET'S ROCK

Asteroid placement and density are also decided when the galaxy is created. The dice are rolled for each planet to find out the asteroid density for the space surrounding it, with the probabilities shown in Table 3-10.

Table 3-10 shows that a planet will either have no asteroids around it, or a low- or high-density asteroid belt in its vicinity. A low-density asteroid belt means that a random one to five asteroid squares will appear on the Ship Combat Display screen whenever ships

**Table 3-5b** Planetary Environment Determination in Nebulas<sup>a</sup>

Planet Environment	Star Type					
	Red	Green	Yellow	Blue	White	Neutron
None	<b>25</b>	<b>25</b>	<b>10</b>	<b>35</b>	<b>30</b>	<b>40</b>
Radiated	5	5	<b>5</b>	10	5	25
Toxic	5	5	<b>5</b>	10	10	15
Inferno	5	5	5	10	10	15
Dead	5	5	0	10	10	<b>5</b>
Tundra	5	5	5	10	10	<b>0</b>
Barren	5	5	5	10	10	<b>0</b>
Minimal	5	5	5	<b>5</b>	10	<b>0</b>
Desert	10	5	5	<b>0</b>	<b>5</b>	0
Steppe	10	10	5	<b>0</b>	<b>0</b>	0
Arid	15	10	10	<b>0</b>	<b>0</b>	0
Ocean	<b>5</b>	10	10	0	<b>0</b>	0
Jungle	<b>0</b>	<b>5</b>	10	0	0	0
Terran	<b>0</b>	<b>0</b>	<b>20</b>	0	0	0

<sup>a</sup>Numbers represent the percent chance of that type of environment being created. Numbers in **bold** show changes from Table 3-5a.

engage in combat over that planet. A high-density asteroid belt places a random three to seven asteroid squares in the vicinity.

The exact number and location of asteroids on the Ship Combat Display screen are figured out randomly each time a battle occurs over that planet (i.e., the asteroids “move” between battles there). They are placed such that no two asteroid squares are adjacent either horizontally or vertically. (They can appear next to each other diagonally, however.) Also, asteroids will never appear in the column where a planet is located or in either column next to it. Thus, the planet’s “orbital path” is always free of asteroids, giving its missile defense bases a clear shot at least one column in either direction. Finally, asteroids will

never appear in either row where ships initially deploy for battle. For an asteroid square’s effect on combat, see Chapter 7.

## PLANETARY POPULATION POTENTIAL

With the discovery of the level-22 planetology technology of Atmospheric Terraforming, hostile environment planets can be converted to standard, minimal environment planets. This normalizes their population growth rates and has a one-time cost of 200 BCs. Interestingly, it also has the effect of increasing the base population sizes of radiated, toxic, and inferno planets by 20 million, with dead and tundra planets being raised by 10 million. (Barren

**Table 3-6** Maximum Population Size Ranges by Environment Type

Planet Environment	Initial Maximum Population Size <sup>a</sup>
Radiated	10 – 40
Toxic	10 – 40
Inferno	10 – 40
Dead	20 – 50
Tundra	20 – 50
Barren	30 – 50
Minimal	30 – 50
Desert	35 – 50
Steppe	45 – 60
Arid	55 – 70
Ocean	65 – 80
Jungle	75 – 90
Terran	85 – 100

<sup>a</sup>Planet population sizes will vary in whole increments of 5 population points. For instance, a jungle planet will have a maximum of either 75, 80, 85, or 90 population points.

planets do not have their base population rates increased by the application of Atmospheric Terraforming.) Consequently, every such planet will have a minimum base population level of 30 million.

In Table 3-11, we've extrapolated every possible planet type to its potential extreme maximum population size. The results include the additional 120 million for applying Complete Terraforming technology, and the 50 percent base planet size bonus for using Advanced Soil Enrichment.

To use Table 3-11, simply look up your newly discovered planet in one of the first three columns by its initial planet maximum population.

By looking to the right, you will see that planet's potential, late-game maximum population size after all possible modifications for making that planet fertile, Gaia, and terraformed to the maximum of +120 million. No planet can ever be raised above 300 million maximum population. Note that when a hostile planet is converted using Atmospheric Terraforming to a minimal environment, look it up using the third (Normal Planets) column.

For example, you discover a radiated 25 early in the game and wonder what you can eventually do with this worthless rock. Radiated planets are found in the first column, and eight rows down is the number 25. Looking across, you notice that, after it has been through Atmospheric Terraforming, it will turn into a minimal 45 million planet. When made fertile, 15 will be added to its current population size. When Gaia is added, so will another 10. (Note that if the planet becomes a Gaia before becoming fertile, its maximum population will rise by their combined total of 25.) Finally, when all these effects are added with a maximum increase from Complete Terraforming of 120 million, that planet's potential maximum size can be found in the far left row, which reads 190. Hmm... not bad, considering that a planet that begins as a normal 100 will rise only to 270. You see, eventually, even bad planets are not so worthless after all.

## FOR BETTER OR WORSE

Table 3-12a takes a comprehensive look at a newly created galaxy. This shows the average number of each of the star types to be found in each galaxy size.

Table 3-12b shows the average number of each planet type in the various-sized galaxies,

**Table 3-7** Which Planets Get What Specials

Planet Environment		
Hostile <sup>a</sup>	Radiated	Rich or Ultrarich <sup>d</sup>
	Toxic	
	Inferno	
	Dead	
	Tundra	
	Barren	
Fertile <sup>b</sup>	Minimal	Poor or Ultrapoor <sup>c</sup>
	Desert	
	Steppe	Artifacts <sup>e</sup>
	Arid	
	Ocean	
	Jungle	
	Terran	

<sup>a</sup>Hostile environments halve population growth.

<sup>b</sup>There is a 1/12 chance that a planet in this range will be fertile. Fertile planets receive an additional 25 percent population size bonus and population grows there at 150% of the normal rate.

<sup>c</sup>Poor environments halve the production spent on ships, missile bases, and industry. Ultrapoor environments have spending in these areas reduced to one-third. See Table 3-8 for the percentage breakdown between poor and ultrapoor planets.

<sup>d</sup>Rich environments double the BCs (billion credits) spent on ships, missile bases, and industry. Ultrarich environments have spending in these areas tripled. Planets that range on this scale between arid and terran can be rich or ultrarich only if they are in a nebula. See Tables 3.9a and 3.9b for the percentage breakdowns between rich and ultrarich planets.

<sup>e</sup>Artifacts double resources spent on that planet for research and may give the first player to discover them a free technological discovery. If a planet is neither poor nor ultrapoor, rich nor ultrarich, there is a 10% chance that it will have artifacts.

**Table 3-8** Percentage Chance for a Poor or Ultrapoor Planet

Star Type	Poor	Ultrapoor
Blue, white, and yellow	7.5	2.5
Red	14	6
Green	16.5	13.5
Neutron	0.0	0.0



**Table 3-9a** Percentage Chance for a Regular Planet to Be Rich or Ultrarich

Planet Environment	Red, Yellow Green, or White Star		Blue Star		Neutron Star	
	Rich	Ultrarich	Rich	Ultrarich	Rich	Ultrarich
Radiated	26.25	8.75	29.25	15.75	30	30
Toxic	22.5	7.5	26	14	27.5	27.5
Inferno	18.75	6.25	22.75	12.25	25	25
Dead	15	5	19.5	10.5	22.5	22.5
Tundra	11.25	3.75	16.25	8.75	20	20
Barren	7.5	2.5	13	7	17.5	17.5
Minimal	3.75	1.25	9.75	5.25	15	15
Desert			6.5	3.5		
Steppe			3.25	1.75		

**Table 3-9b** Percentage Chance for a Nebula Planet to Be Rich or Ultrarich

Planet Environment	Red, Yellow Green, or White Star		Blue Star		Neutron Star	
	Rich	Ultrarich	Rich	Ultrarich	Rich	Ultrarich
Radiated	26.25	48.75	21.25	63.75	10	90
Toxic	24.5	45.5	20	60	9.5	85.5
Inferno	22.75	42.25	18.75	56.25	9	81
Dead	21	39	17.5	52.5	8.5	76.5
Tundra	19.25	35.75	16.25	48.75		
Barren	17.5	32.5	15	45		
Minimal	15.75	29.25	13.75	41.25		
Desert	14	26				
Steppe	12.25	22.75				
Arid	10.5	19.5				
Ocean	8.75	16.25				
Jungle	7	13				
Terran	5.25	9.75				

**Table 3-10** Asteroid Belt Density as Determined by Planet Environment and Specials<sup>a</sup>

Planet Environment	All Types but Rich and Ultrarich			Rich			Ultrarich		
	No Asteroids	Low-Density Asteroids	High-Density Asteroids	No Asteroids	Low-Density Asteroids	High-Density Asteroids	No Asteroids	Low-Density Asteroids	High-Density Asteroids
Radiated	46	25	29	36	25	39	26	25	49
Toxic	47	25	28	37	25	38	27	25	48
Inferno	48	25	27	38	25	37	28	25	47
Dead	49	25	26	39	25	36	29	25	46
Tundra	50	25	25	40	25	35	30	25	45
Barren	51	25	24	41	25	34	31	25	44
Minimal	52	25	23	42	25	33	32	25	43
Desert	53	25	22	43	25	32	33	25	42
Steppe	54	25	21	44	25	31	34	25	41
Arid	55	25	20	45	25	30	35	25	40
Ocean	56	25	19	46	25	29	36	25	39
Jungle	57	25	18	47	25	28	37	25	38
Terran	58	25	17	48	25	27	38	25	37

<sup>a</sup>Numbers represent the percent chance of that planet having either no asteroids, or a low- or high-density asteroid belt around it.

including how many should be rich, poor, have artifacts, and so on. Now, these are *averages* (actual results may vary). If you want to inspect the entire map before the game begins, we'll share a secret with you. From the main game display, hold down the **[Alt]** key and type **galaxy**. This will reveal all of the information available on the Galaxy Map (owners, environments, and specials). On the main game display, it will also give you a *last sighting* report for each planet on the map, as if you just scanned everything in the entire galaxy. To switch this cheat key off, just hold down **[Alt]** again—it acts like a toggle.

## WHAT AM I DOING HERE?

After placing all the stars, star colors, and planet types are figured out, one star is chosen (completely at random) to be Orion. This star could appear anywhere in the galaxy, at a star of any color. The planet of Orion itself is always a terran world with a base maximum population of 120 million.

Each player's initial starting location is decided randomly within the following list constraints. If a randomly selected star does not meet one of these constraints, then another one is selected at random until each player has been placed on a star that does.

**Table 3-11** Determining Planetary Maximum Population Potential

		Initial Maximum Population				Final Maximum Population
Radiated, Toxic, and Inferno Planets	Dead and Tundra Planets	Minimal or Better Planets <sup>a</sup>	Fertile Increase	Complete		
				Gaia Increase <sup>b</sup>	Terraforming Increase	
		10	+5	+0	+120	135
		15	+5	+5	+120	145
	10	20	+5	+5	+120	150
	15	25	+10	+5	+120	160
10	20	30	+10	+5	+120	165
15	25	35	+10	+10	+120	175
20	30	40	+10	+10	+120	180
25	35	45	+15	+10	+120	190
30	40	50	+15	+10	+120	195
35	45	55	+15	+15	+120	205
40	50	60	+15	+15	+120	210
45	55	65	+20	+15	+120	220
50	60	70	+20	+15	+120	225
55	65	75	+20	+20	+120	235
60	70	80	+20	+20	+120	240
65	75	85	+25	+20	+120	250
70	80	90	+25	+20	+120	255
75	85	95	+25	+25	+120	265
80	90	100	+25	+25	+120	270
85	95	105	+30	+25	+120	280
90	100	110	+30	+25	+120	285
95	105	115	+30	+30	+120	295
100	110	120	+30	+30	+120	300
105	115	125	+35	+30	+120	300 <sup>c</sup>

<sup>a</sup>Hostile environment planets in the first two columns convert directly across to a third-column minimal environment through Atmospheric Terraforming. For example, an inferno 15 or a tundra 25 will become a minimal 35 after Atmospheric Terraforming.

<sup>b</sup>Must be added to the Fertile increase to get the correct Gaia value (see Chapter 6).

<sup>c</sup>The maximum planet population size is 300, period.

**Table 3-12a** Average Number of Star Types in Galaxies of Various Sizes

Star Type	Galaxy Size			
	Huge	Large	Medium	Small
Red	32–33	21	14–15	7
Green	27	17–18	12	6
Yellow <sup>a</sup>	16	10–11	7	3–4
Blue	16	10–11	7	3–4
White	11	7	5	2–3
Neutron	5–6	3–4	2–3	1

<sup>a</sup>Note that there will always be more than an average number of yellow stars, as every player's home world is arbitrarily turned into a yellow star after its location is selected.

- Starting stars may not be located along a map edge (i.e., there must be at least one star between them and the map edge).
- There must be at least one star (other than Orion) within 4 parsecs of a starting star.
- There must be at least two stars (other than Orion) within 6 parsecs of a starting star.
- There must also be at least 6 parsecs between it and another player's starting star.

## A STAR TO STEER BY

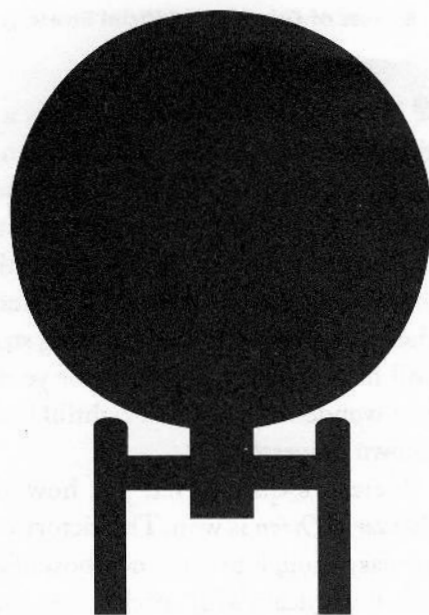
So there you have it; the star charts have been unfurled and your course is clearly mapped. You're now armed with the basics of scouting, scanning, and planetary prospecting. In addition to that, in the second, advanced half of the chapter we even showed you how *Master of Orion* creates the universe and finds your place in it. Now what you need to know is how to survive in a cruel universe while on a budget. First, we will teach you the value of a buck (or a Billion Credits, as it's known in *Master of Orion*), and then we'll teach you how to get a big bang for them. Grab your wallet and turn the page. 🚀

**Table 3-12b** The "Is This Galaxy Average?" Table<sup>a</sup>

Planet Type	Galaxy Size			
	Huge	Large	Medium	Small
<b>Environment</b>				
None	8-9	5-6	4	2
Radiated	6-7	4	3	1-2
Toxic	6-7	4	3	1-2
Inferno	7	5	3	1-2
Dead	6	4	3	1-2
Tundra	7	4-5	3	1-2
Barren	7	4-5	3	1-2
Minimal	7	4-5	3	1-2
Desert	7	4-5	3	1-2
Steppe	8	5	3-4	2
Arid	10-11	7	4-5	2-3
Ocean	8	5	3-4	2
Jungle	7-8	5	3	1-2
Terran <sup>b</sup>	12	7-8	5	2-3
Orion	1	1	1	1
<b>Special</b>				
Artifact	3-4	2	1-2	1
Ultrarich	4-5	3	2	1
Rich	8	5	3-4	2
Poor	6	4	2-3	1
Ultrapoor	3-4	2	1-2	1
Stars in Nebulas	4	3	2	1

<sup>a</sup>Entries represent the average number that should appear in that size galaxy.<sup>b</sup>From zero to seven nonterran planets will be converted by fiat to terran planets—one for each player's starting (home) planet, and one for Orion.

4



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*How to Win*

*It is necessary for me to establish a winner image.  
Therefore, I have to beat somebody.*  
—Richard Nixon



● The galaxy you must conquer is a fairly rational and democratic one. You can (usually) count on the leaders of the other races in the game to react according to their best interests and within their respective personalities (a subject that will be discussed in Chapter 11). It is therefore possible to plot a winning strategy that will help you be recognized for your benevolent wonderfulness as the rightful leader of the known universe.

Here, we quickly tell you how and when *Master of Orion* is won. The victory conditions are easy enough to explain—most of the rest of this book deals with specific tips, tactics, and techniques that provide building blocks for you to use in obtaining your lofty position on the imperial dais. But first things first, m'lord. Listen and learn what it takes for you to don the inspiring robes of the Galactic Emperor.

## TWO-PLAYER VICTORY

When there are only two players remaining in the game, there is only one victory condition: eliminate the other player. In these struggles for sole survivorship, there will be no Galactic Council meetings, as they have been rendered moot. When three or more players are vying for power, however, the Galactic Council is the crucible used for deciding the winner.

## THE GALACTIC COUNCIL

Once two-thirds (rounding fractions down) of the galaxy is colonized (not half, as stated on page 35 of the manual), the Galactic Council is summoned. After it convenes for the first time, it will reassemble on every turn that is a multiple of 25 years. For example, if the first Galactic Council meeting was convened on turn

2370, the next meetings would be scheduled for 2375, 2400, 2425, 2450, and so on.

Only one question is ever raised at these Galactic Council meetings: "Who should rule the galaxy?" The two players with the most votes (i.e., the largest populations) automatically have their names submitted for a democratic, proportional election, held by all of the players in the game. If one of these players can wrangle a two-thirds (again, rounded down) majority of the total votes that could be cast, that player will be recognized by all the computer players as the legitimate ruler of the galaxy.

True, this two-thirds majority being rounded down violates *Roberts' Rules of Order*, but try explaining that to a miffed Mrrshan with Mauler Devices. We're sorry, but *Roberts' Rules of Order* simply don't apply when those who abstain are armed with Hellfire Torpedoes and are more interested in eating you than voting for you.

## VOTING RIGHTS

Each player receives one Galactic Council vote per 100 population points (i.e., 100 million beings) in their empire. This number rounds from the floor up, meaning that any fraction of 100 million population also gives one vote—for example, 101 million beings equal two votes. The computer players will cast their votes (in the order that they are listed on the Galaxy Map/Colony display) for one candidate or another, or they will abstain from voting during that Galactic Council meeting.

You will always vote last and, therefore, have the advantage of seeing which way the political winds are blowing before making your decision. Occasionally, another player might be leading

in the elections and could win if you vote for him. Don't do that. Instead, play the role of electoral spoiler and either abstain or cast your votes for the other candidate, so that the leader does not achieve the required two-thirds majority to be declared the winner. Thus, the game will continue and you will still be in the hunt for the imperial throne.

Note that sometimes you can win if you vote for yourself, but you may not wish to. Instead, you might want to abstain and simply continue the game for another 25 years "just for the heck of it." Alternately, you might want to throw the game to a candidate with your votes, either to surrender or fight them all in a Final War (which is discussed later in this chapter). If that is how you want to play, suit yourself. We can't *make* you win!

## THE RATIONAL ELECTORATE

How computer players will vote at a Galactic Council meeting is quite simple to explain. They think along the lines of the following list of priorities:

- If a computer player is a candidate, it always votes for itself.
- If a computer player is allied to one candidate, and not the other, his votes will go for his ally as a symbol of their unity.
- If a computer player is at war with one candidate, and not the other, his votes will spitefully go to the candidate running against his enemy.
- If a computer player has an alliance with both candidates, or is at war with both of them, or is neither allied to nor at war with either player, his vote is *undecided*.

An undecided computer player voting at a Galactic Council meeting will toss a coin to help try to decide whether to vote for or against the first candidate listed (i.e., the player leading on the basis of population/Galactic Council votes). If that coin toss leaves that voting computer player undecided (a common result), he'll then toss a second coin to see if his feelings toward the remaining candidate persuade him enough to vote one way or the other. If that second coin toss also proves indecisive, the undecided computer player will simply abstain for that election.

## THE BALLOT BOOTH COIN TOSS

An undecided computer player's vote is decided by a coin toss, the result of which is determined by a check of its current relations with a candidate. To better understand this, picture the red-to-green Relations bars on the Races Display screen, as shown in Figure 4-1. The scale goes from feud (the furthest on the red/left side) to harmony (at the extreme right/green end) with various levels in between. At some point along the bottom of each of these bars, a relationship indicator triangle (which we call *the love nub*) will reside. Inside these bars, you can see the words that best describe your present relationships with each race you're in contact with in the game. Note that there are 100 notches on either side of the center of the Relations bar, and the love nubs move over only one pixel (i.e., a single dot on the computer screen) for every two notches of change in a relationship.

For example, Figure 4-1 shows that you are at war with the Bulrathis (who have recalled their diplomat and with whom your relationship



**Figure 4-1**

Friends and enemies as shown on the Races Display screen

is in discord) and the Silicoids (to whom you can speak, at the moment, but your feuding status won't give you a lot to talk about until you offer some tribute or make peace to clear the air—see Chapter 11 for the politics of it all). Also note that you have achieved alliances, harmony, and considerable trade with both the Meklars and Psilons. The Mrrshans are slightly into the green zone and, therefore, showing their relations as relaxed toward you. You have not, however, made any kind of pact or trade agreement with them at this time.

Now, envision each of these Relations bars above a Percentage Chance of Voting scale, as shown in Table 4-1. The location of the relationship indicator triangle (e.g., love nub) determines for each voting computer player the percentage chance of that computer player either voting for or against the candidate. In the absence of any modifying factors (see Table 4-1), there is a maximum 40 percent chance of a computer player voting either for (when harmonious) or against (while feuding) a candidate, depending on their present relations level. Notice that the modifying factors determine the position of the Relations bar along

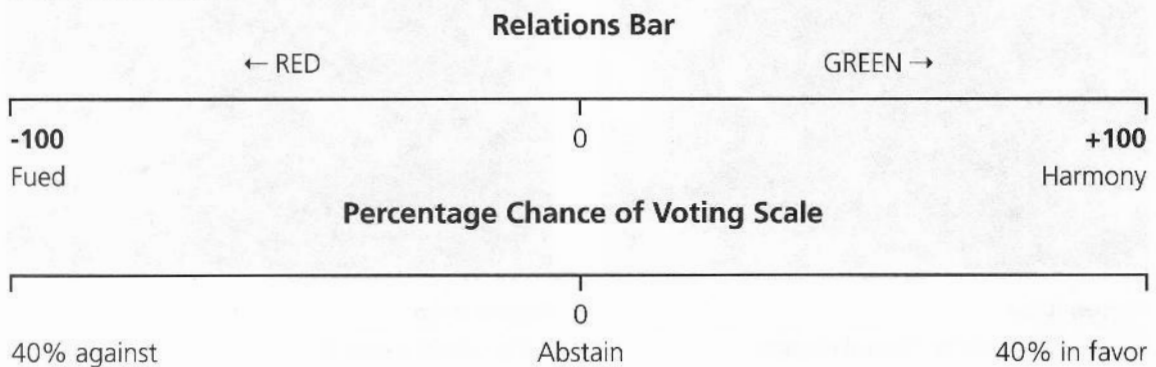
the scale—in the example in Table 4-1, the undecided computer player is at present 20 percent likely to vote against the candidate (or else abstain). But if, let's say, the candidate were the human leader (20 percent) and owned Orion (another 20 percent), the whole Relations bar would shift 40 units to the right along the scale. The computer player would then be 20 percent likely to vote *for* the candidate.

If the d100 roll (i.e., random number generated by the computer between 1 and 100; see Chapter 1) made against the current percentage chance to be persuaded exceeds it (which is the usual case), that computer player is unmoved toward either voting for or against that player. If the first candidate leaves the voter unmoved, he will toss another coin to decide his feelings toward the second candidate. If the second candidate also leaves a voting computer player unmoved, he simply abstains from voting at that Galactic Council meeting.

### STICKING WITH THE SAME CANDIDATE

If a computer player votes for someone (for whatever reason), that candidate will be remembered favorably by that voter again during the very next Galactic Council meeting. If that candidate is nominated again, and none of the other three “surefire vote getter conditions” are forcing that computer player's voting decision (i.e., the computer player is still undecided at the next meeting), its chance to vote again for the player they voted for last time is increased by 60 percent.

Note that this modifier applies only if that computer player voted for another player in the Galactic Council meeting *immediately preceding* the current one (no matter why they voted for that candidate). Computer players have no

**Table 4-1** Using the Relations Bar to Determine the Percentage Chance of Voting

Modifiers:

- Add 60 percent in favor if player voted for current candidate at the previous Galactic Council meeting.
- Add 20 percent in favor if candidate controls Orion.
- Add 20 percent in favor if candidate is the Human leader.
- Add 12.5 percent when considering you, the sentient, breathing player (less 2.5 percent per game difficulty level: i.e., 12.5 percent at simple, 10 percent at easy, 7.5 percent at average, 5 percent at hard, and 2.5 percent at impossible).

voting memory beyond the previous meeting. Also, the candidate they voted for last time might be the *second* nominee at the next meeting. Here, they must still toss a coin in consideration of the first nominee before they may consider the candidate they previously endorsed. If the candidate they voted for at the last Galactic Council meeting is no longer a candidate, this bonus modifier is simply ignored.

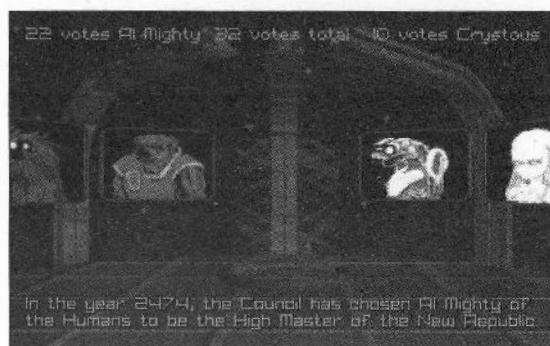
### A SAMPLE BALLOT

For example, let's say that you are running for Galactic Grand Poo-Bah and you're presently the leader in the game (i.e., you have the most

votes per population). Consequently, you are listed as the first candidate.

Now, some third party (i.e., noncandidate) alien is about to cast his vote. Let's say it's the Mrrshans from Figure 4-1. In this example, they are neither at war with nor allied to either candidate. Therefore, their leader is an undecided voter.

First, she checks her relations with you, the leading candidate, and tosses the proverbial coin. Because the Mrrshans are feeling relaxed toward you, and are, therefore, slightly into the green zone of your Relations Bar, there is a slight chance that the Mrrshans will vote *for* you. You will receive a slight bonus because

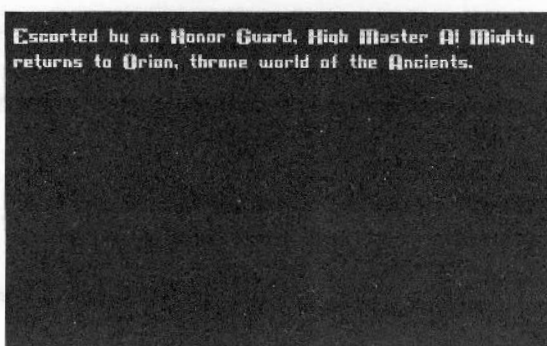
**Figure 4-2a**

Winning the Galactic Council election

you're the living, breathing player and, if you were playing the Human race, controlled Orion, or she voted for you at the previous Galactic Council meeting, those positive modifiers would all be weighed in at this time.

If your relationship with the Mrrshans had been on the left (red) side of the Relations bar, there would be a chance of them voting against you (i.e., for the other candidate), simply out of spite due to your bad relations with them.

Because your relationship indicator is slightly into the green zone, you'll probably have about a 7 percent chance of them voting for you, plus a few extra points depending on the game's difficulty level, as shown on Table 4-1. If the Mrrshan leader was unmoved by this coin toss to vote in your favor (which is likely—as that coin is weighted to land on its edge most of the time), then the Mrrshan's relationship with the second candidate is considered and she will make another (final) coin toss to find out if she'll vote one way or the other. Should that coin toss also result in the Mrrshans being unmoved, their leader will simply abstain.

**Figure 4-2b**

Being named a legend

## DIPLOMATIC REPERCUSSIONS OF YOUR VOTE

While the details of politics are explained in Chapter 11, it is important to know that you will gain and lose on the candidates' Relations bars each time the Galactic Council is convened to elect a new leader. Specifically:

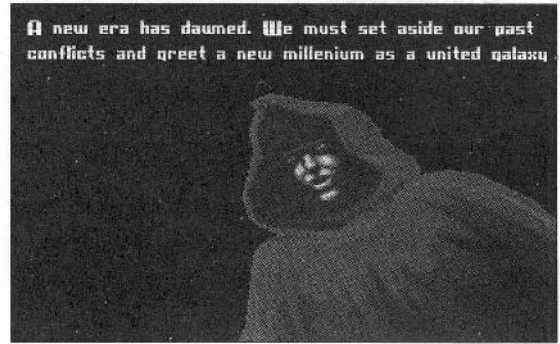
- If you vote *for* a race (other than yourself), their leader is delighted and you gain two relations levels with them.
- If you vote for one race, the other leader running against them (unless it is you) feels slighted and you *lose* one relations level with them.
- If you abstain, both candidates' races are slightly upset (or the other one, if you are one of the two candidates) and you lose half a relations level with them.

What you can do with this knowledge is up to you. If you are running against a player who will not be elected even with your votes, then go ahead and vote for him and reap a quick windfall of an additional two relations levels



**Figure 4-2c**

Your fleet spreads out in victory

**Figure 4-2d**

Beginning a new era

with him. If you're trying either to improve relations or provoke a war with someone, than these conditions should help you to decide which way to cast your ballot. If it's a toss up between equal friends or foes, abstaining is always a tactful retreat.

The key here is, never vote for yourself unless you need those votes to win the game. Otherwise, why upset the other candidate? If he would win with your votes, just abstain, courteously, and let the game continue.

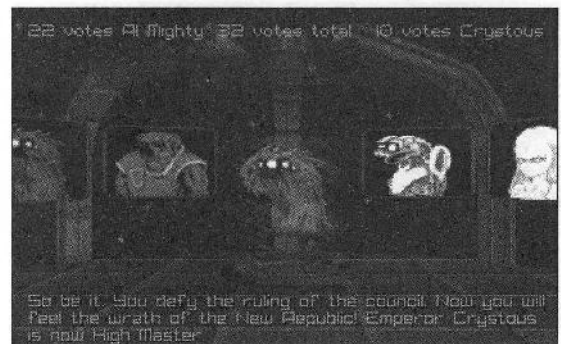
### ACCEPTING AND REJECTING THE COUNCIL'S VERDICT

If the council elects a president with a two-thirds majority (rounded down), you can either accept the outcome of the election or reject it. If you accept it, that elected player has won the game. If that elected player happens to be you, congratulations! You'll be rewarded with screens similar to those shown in Figure 4-2a-d.

### AN OFFER YOU CAN REFUSE

If you refuse the Galactic Council's verdict, no matter who was elected, you will be stepping in some deep doo-doo. To begin with, the council takes great offense and says so, as shown in Figure 4-3.

The council forms its own galactic government, which it dubs the *New Republic*, and chooses the leading vote getter as its President (unless that was you, and you refused the job,

**Figure 4-3**

Refusing the council's decision



in which case the other candidate becomes President of the New Republic). Naturally, for refusing the wisdom of the Galactic Council's vote, you are vilified as an evil tyrant who would rather rule by force than reason.

Every other race declares war on your evil presence, as they are all members in good standing with the New Republic. Not just war, mind you, but the *Final War* aimed at ridding the galaxy of you once and for all. There will be no peace treaties offered or accepted (your Audience button has been rudely deactivated), no further Galactic Council meetings—it's now you against the universe in a battle of annihilation. Look at Figure 4-4 to see what race relations will look like when the New Republic declares Final War on you.

## THE FINAL WAR

To compound matters, from the moment they declare their Final War against you, each member of the New Republic automatically trades every technology that they have with each other, so even the wimpiest among them now shares the best technology on their side (ouch!). A

formal threat usually follows, as shown in Figure 4-5. The confederates of the New Republic instantly break all of their agreements with you, including trade, and form alliances with each other. Finally, any pirates that might be troubling the galaxy (see Chapter 14) simply cease to exist. Pirates will not disturb trade between members of the New Republic.

What happens next is, usually, your demise. The combined weight of every other player on the map, each sharing all of their present and future technological discoveries, each refusing to negotiate a separate peace, each sending their separate fleets and spies in constant waves aimed relentlessly at your destruction...(shudder!). Well, expect to see many scenes like the one shown in Figure 4-6.

While embroiled in this you-against-the-universe campaign, it is still possible to win. Although unlikely, it *is* possible. At least you don't have to put up any diplomatic charades, so go ahead and cause all the destruction you can—use biological weapons freely, commit genocide without a care, spy on players with abandon (since they will all be sharing so much



Figure 4-4

Suddenly, race relations are permanently the pits.

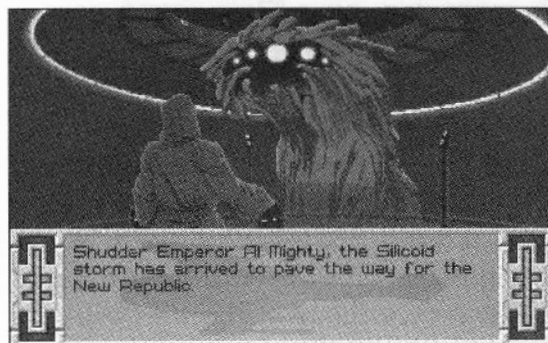
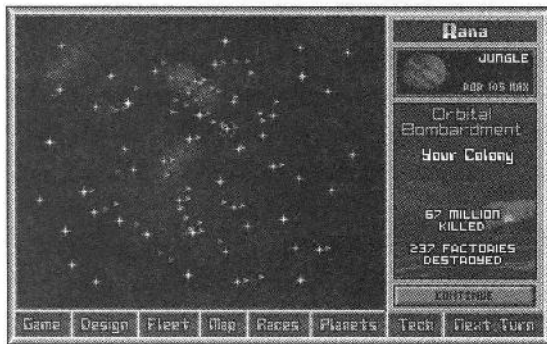


Figure 4-5

Hurling the gauntlet of the New Republic



**Figure 4-6**

The New Republic sends greetings through its initial military move.

technology)—all these political indiscretions have ceased to matter at this point. Don't expect to be very popular at the end of the war, however, as the Figure 4-7 series illustrates.

## STACKING THE VOTES IN YOUR FAVOR

Naturally, when an election year approaches, it is a good time to make your move so that you will have either the largest or second largest population on the map and, thus, be nominated

to win the game. Check the Racial Stats Display screen (press the Status button on the Races Display screen) to keep track of the current game year and various racial statistics, including who is leading the game in population, as shown in Figure 4-8.

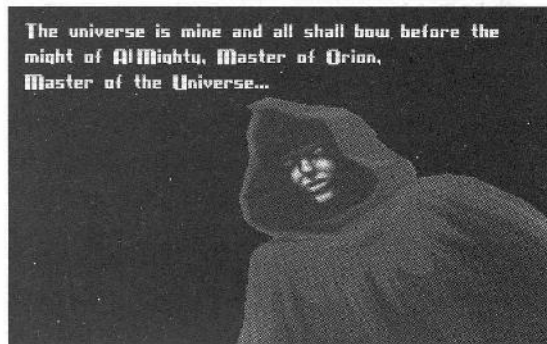
There are only a few things that you can do to shift the votes in your favor before a Galactic Council election. Specifically, they are as follows.

## BE YOURSELF

As the living, breathing player in a game of *Master of Orion*, you get an advantage when considered at the voting booth. At the simple difficulty level, you receive a +12.5 percent favorable modifier. This decreases at 2.5 percent per difficulty level until it is only a +2.5 percent bias in your favor at the impossible level. Hey, isn't it nice that the designer factored in your natural wit and charm in advance?

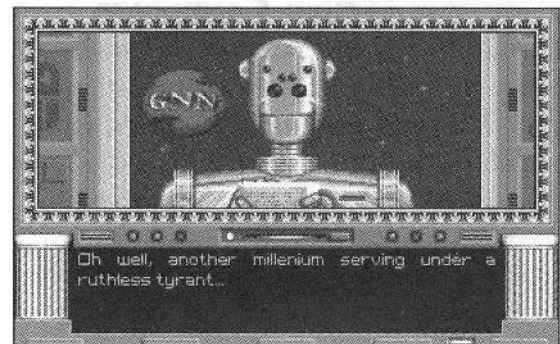
## BE HUMAN

The Human player has an inherent advantage in wooing undecided players in the Galactic



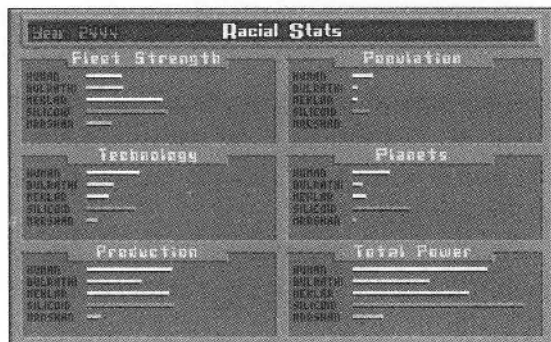
**Figure 4-7a**

Al Mighty ruthlessly conquers the known universe!



**Figure 4-7b**

Much to the stoic chagrin of others



**Figure 4-8**

The Racial Stats Display screen shows the current year and which players are leading in several categories, including population.

Council's voting. This is shown in Table 4-1 as a 20 percent favorable modifier when they are considered for a coin toss. Furthermore, the Humans are the most likable race in the galaxy to begin with, so getting allies who will vote for them is a much easier task than it is for the other races (see Chapters 11 and 13). Conversely, if a computer player is in the game as the Human race, you might want to make an extra effort to bring their empire down so that it will not become large enough to earn a Galactic Council nomination.

### PICK THE OTHER CANDIDATE

Certain leaders and races will be inherently better to run against if you want to win the election. Despised and warlike leaders, which usually include the Darloks, Mrrshans, and Alkaris, will often have many wars going and, therefore, many enemies. Try to fight wars with your objective being to adjust other race's populations so that you'll be running against these leaders. The reason is that you can usually count on their enemies' votes in the Galactic Council. Conversely, the Humans and Psilons tend

to make a lot of friends, so they're the least desirable candidates to run against, as a rule. Whenever you can militarily influence who will be running against you at the Galactic Council, then you are really in control of the game.

### CONTROL ORION

He who controls Orion, the seat of power of the previous Galactic Imperium, has a more legitimate claim when being considered for election to the exalted position of Galactic Big Cheese. Again, Table 4-1 shows this as a 20 percent favorable modifier when Orion's owner is considered for a coin toss. (If the Humans control Orion, look out! That's a 40 percent favorable modifier for wooing the undecided alien races.) Of course, defeating the Guardian that is protecting Orion from marauders (like yourself) is another matter. See Chapter 7 for help with that thorny little problem.

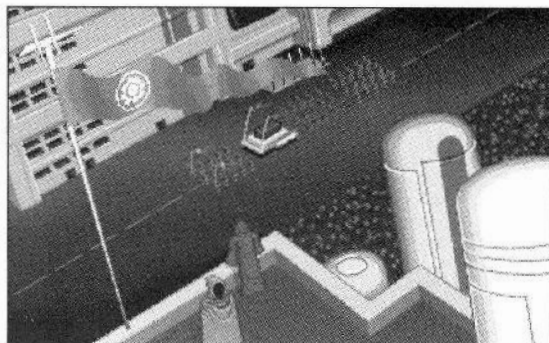
### MAKE DIPLOMATIC MANEUVERS

Of course, shifting the balance of alliances is another excellent way to stack the votes in your favor. By getting people to ally with you (when you will be a candidate), breaking their alliances, or even declaring war on the other candidate, you'll be in a superior position when these alien races step up to vote.

This option usually takes some long-range planning, a lot of time (diplomats have a way of disappearing just when you need to talk to them the most), some reasonably massive bribes, and plenty of luck. For the details of diplomacy, see Chapter 11.

### TAKE COVERT ACTION

One way to deny votes to another player is to persuade planets to rebel. This is can be

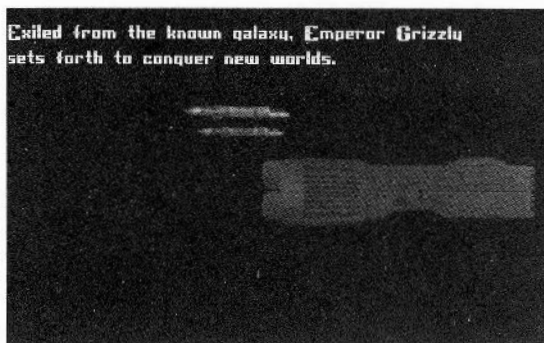
**Figure 4-9**

Losing by military defeat

accomplished when conducting sabotage against that player. It can be just as easy to have your spies incite rebellion on an enemy planet as it is to blow up bases or factories there. When enough of the population is seething with revolution (see Chapter 12), the GNN Newsdroid will announce that the planet has rebelled. The population of a planet in rebellion is not counted when deciding a player's voting strength at Galactic Council meetings.

### EXERCISE MILITARY OPTIONS

The military options of destruction, conquest, and genocide are usually far more efficient than taking covert action. If you want to undercut another player's voting strength, simply take the direct course of killing off his people. It's not an inherently friendly action, but one can usually profit by being a bit ruthless when applying for the job of Galactic Overlord. (Remember: the only good adversaries in *Master of Orion* are dead ones.) A judiciously timed and effective surprise attack, immediately before a Galactic Council vote, can decisively shift the balance of voting power. Wield your military might with a purpose.

**Figure 4-10**

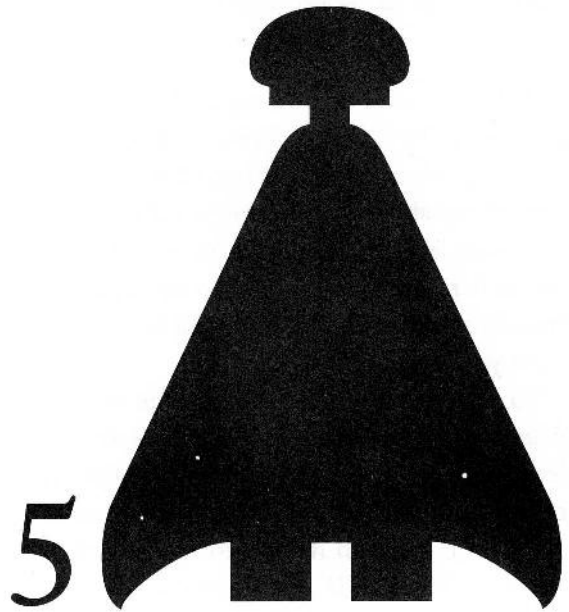
Accepting the Galactic Council's verdict to elect someone else

### DEFEAT STINKS

Losing, of course, is another matter entirely. Whether you are militarily defeated and must watch the parade of those who have triumphed pass you by (as seen in Figure 4-9), or if you've graciously acknowledged the vote of the Galactic Council to elect another player leader and gracefully bowed out (as told in Figure 4-10), when you lose, you lose.

However, this chapter is about winning, so don't dwell too much on losing. We've told you about the intricate machinations of the Galactic Council and what goes on in the minds of its undecided voters. We've explained the consequences of alien voting and offered tips on how to stack those votes in your favor when you find yourself nominated to be the Galactic El Supremo. In short, now you *really* know what it takes to win a game of *Master of Orion*.

If victory still eludes you, however, turn the page. We'll show you how to build your victories in *Master of Orion* by building up your economy. Because you can be neither too smart nor too rich, the next chapter will help you with both. ■



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*Facts Bucks*

*The easiest way to make money is to make money.*  
—Old counterfeiter's saying



▲ It is often said that money makes the world go around. In *Master of Orion*, it makes *all* the worlds go around. In this chapter, we'll explain everything about money, except how to spend it. (There is no shortage of ways to do that). In particular, you'll learn how to make money, transfer it, and what fixed expenses are deducted from your income each turn.

To understand the basic economic model in *Master of Orion*, it is important to know that "one is one is one." This means that the economic resource units of the game have several different names (an RP is a Research Point or Resource Point, a BC is a Billion Credits), but they all have the same value. One Billion Credits equals 1 Resource Point or one Research Point. In other words, one is one is one. Think of each of these terms as interchangeable, for simplicity's sake.

## PRIMARY INCOME THROUGH POPULATION AND INDUSTRY

Other than the odd random event or occasional bit of tribute you might receive from another player, you'll have to make your money the old-fashioned way—earn it. Wealth is created from two primary sources: population points and factories. Each population point starts the game producing about  $\frac{1}{2}$  RP per turn, and each factory always produces 1 RP per turn. Therefore, to earn more money, it is vitally important to expand your empire. Strive to control as many planets as possible, developing them quickly and fully to their maximum population and industrial capacities.

## IMPROVED WORKER OUTPUT

Over time, workers become more productive, depending on your planetology tech level. The exact formula for this productivity increase is:

### Worker Productivity Formula

$$\text{RP per worker per turn} = \frac{(\text{planetology tech level} \times 3) + 50}{100}$$

That number is then multiplied separately by each planet's current population. The result is each planet's current income derived from population points there, rounded down to the nearest whole RP.

Here is an example of the benefits of increased worker productivity. At planetology tech level 13, each worker is producing 0.89 RP. That works out to  $(13 \times 3) + 50$  or 89, divided by 100, which equals 0.89. Table 5-1 shows some

**Table 5-1** Worker Productivity Milestones<sup>a</sup>

Planetology Tech Level	Number of RPs Produced per Worker
8	0.74
17	1.01
25	1.25
33	1.49
50	2.00
67	2.51
83	2.99
99	3.47 (the maximum)

<sup>a</sup>Klackon workers produce double the normal amount of RPs.



worker productivity thresholds (i.e., various planetology tech levels at which each worker is producing about  $\frac{3}{4}$ , 1, 2, or more RP each).

Thus, as Table 5-1 illustrates, once you reach planetology tech level 17, your individual workers are producing more than your individual factories. By the time you hit planetology tech level 50, each worker is producing 2 RP per turn.

## **INDUSTRIAL LIMITATIONS**

Factories produce their RPs only when that planet has sufficient population points to operate them. Initially, each population point (*worker*) can, beyond producing its own income as described above, operate two factories. Think of this as beginning the game with Improved Robotic Controls II technology. As each level of Improved Robotic Controls is discovered, each worker can operate more factories.

You can never build more factories on a planet than your current population maximum times your present Robotic Controls technology level. For example, your home world at the beginning of the game can hold 100 population points. Therefore, you can build 200 factories there. If you terraformed its size by an additional 10 population points, you could then build another 20 factories at your initial Robotic Controls technology.

If your home world thus had 110 population points and 220 factories, and you discovered Improved Robotic Controls III (allowing each worker to operate three factories), that planet could now build another 110 factories for a total of 330. As you can see by this example, each level of terraforming improvement will add a bit to a planet's total production, and every

advancement in Improved Robotic Controls technology creates huge leaps in potential RP output.

## **SECONDARY INCOME THROUGH TRADE**

After you have made diplomatic contact with another race, consider trading with them. The good news about trade is that it can, ultimately, be quite profitable. The bad news is that, when begun, it is a liability. Large trade amounts begin as large liabilities, and multiple large trade amounts are even more so. It is possible to quickly run up such large, negative trade deficits that you will wonder why all of your planets are suddenly so poor. We'll explain how this phenomenon occurs in "Trade Limits" below.

Furthermore, in the time it takes trade relations with a player to become profitable, a war between you might start up, throwing all the time and money spent developing that trade route completely out the window. Without patience, trade can be a very frustrating avenue for investing your income.

## **TRADE LIMITS**

The maximum amount of trade that two races can establish between them is equal to 25 percent of the smaller player's total economic output (population plus industry plus trade). That player must have a gross economy of at least 100 BCs per turn to trade at all (i.e., there is a 25-BC trade minimum). The actual trade amount you can select will vary, as listed while negotiating a trade deal (see Chapter 11).

When you begin or increase trade with another player, your mutual trade incomes will *decrease* by 30 percent of that new or additional

trade amount. This instant negative shows immediately on the trade income section at the bottom of the Planets Display screen, beneath the words "Total Income," as shown in Figure 5-1. This initial loss of trade income is the price paid to open or enlarge trade routes, set up more customs offices, conduct export promotion marketing campaigns, and so on.

## THE BENEFITS OF TRADE

Naturally, trade isn't all a bunch of negatives or players wouldn't conduct any. Besides the profit potential, trade will improve the diplomatic relations between players conducting it. This improvement in relations will appear negligible at first, and it will increase oh-so-slowly over time—but it will increase. Trade is also the easiest relationship to establish with another race, and once trade is established and relations begin to improve, it is easier to negotiate non-aggression pacts, peace treaties, and better technology exchanges. See Chapter 11 for all the political ramifications of trade.



**Figure 5-1**

After negotiating a large trade deal, trade income has plummeted to -44 BCs per turn.

Trade also doesn't keep that initial, huge negative number on your Imperial Balance Sheet for long. Slowly, that negative number becomes less and less until, about 15 turns later (give or take), it zeroes out and turns the corner to become a steadily rising positive number. As that number grows, the income it provides is sprinkled among the stars in your empire, proportional to their relative economic size.

## THE SPEED OF TRADE GROWTH

How fast does trade grow? The manual for *Master of Orion* says it grows from 0 to 5 percent each turn. But what does that really mean? Well, that's one of the reasons you bought this book, so we'll tell you...

Think of the amount of trade you establish with another race as a linear scale that runs from -30 percent (the start-up costs for establishing/increasing a trade route) to 100 percent (the maximum potential profit per turn that trade route will generate once it is fully established over time). This is best illustrated by the Trade Profitability scale:

### Trade Profitability Scale

← Trade loss      Trade profit →

-30%	0%	100%
Initial start-up level	Break-even point	Maximum potential profit per turn

Each turn that you do not increase your present trade level, your profitability should ooze over a little further to the right on this Trade Profitability scale. On turns during which you do increase your trade with another player,

it will jump back over to the left a proportional amount (see the “Trade Examples,” below). How far to the right will it move on the average turn? The Trade Growth Formula will tell you:

### **Trade Growth Formula<sup>a</sup>**

Trade growth percentage points  
this turn =

$$\frac{\text{d200 roll}^b + \text{your current relations value} \\ \text{with that trading partner}^c + 25}{60}$$

<sup>a</sup>The result is rounded down to the nearest whole number.

<sup>b</sup>That is, a random number from 1 to 200; see Chapter 1.

<sup>c</sup>See Table 5-2.

### **TRADE EXAMPLES**

Let’s say you have just established your first trade route, worth 75 BCs, with another player this turn. Because it is a brand-new trade route, you’ll start at -30 percent on the Trade Profitability scale and your net trade income for this new route this turn will be -30 percent of 75, or -22 BCs. Your current diplomatic relations with this race is “unease.”

Once you hit the Next Turn button, among other things (see Appendix A) your trade profitability is calculated. Let’s say that the computer looks at your new trade route and rolls a random number of 140 (on that 1-to-200 random number scale). It adds that to your present relations value (see Table 5-2), say, -20 for unease (this number could be anywhere from -12 to -23 when the Relations bar reads “unease”), then adds +25 to that total. Let’s see,  $140 - 20 + 25 = 145$ . This result is then divided by 60 to give a final figure of 2.4.

Note that with a low d200 roll and poor diplomatic relations (providing a large negative number, as per Table 5-2), it is possible that your trade deficit can actually increase on a given turn!

On the basis of your current relations with another player, the right side of Table 5-2 tells you the likelihood of a particular percentage increase in your trade with that player that turn. The last column shows what *average* trade percentage increase you can expect each turn. You can use this average to gauge the approximate number of turns it will take before a trade route becomes profitable, for instance.

For example, if you began a new trade route with another player who is Amiable toward you, at an average trade route percentage increase of 2.1 percent per turn, it will take about 14 turns before that route starts to turn a profit (assuming that there is no major change in your diplomatic relations).

The trade profitability figure of 2.4 (calculated above) is then rounded down to the nearest whole number, which is 2, and that number becomes the number of percentage points the Trade Profitability scale moves to the right. This two-point shift this turn, in our example, would adjust your Trade Profitability scale from -30 to -28 percent. You would see this reflected only on the Trade Income section of the Planets Display screen, however, where your net trade income for this turn would now reflect -28 percent of your 75-BC trade route, which is -21 BC, this turn—a net decrease of 1 BC for next turn’s calculations.

The practical upshot of the Trade Growth Formula is that it pays to get along with your trading partners. The difference between

**Table 5-2** The Relations Value Table

Relation	Numeric Rating Range	Percentage Chance of Trade Increase						Percentage Average <sup>a</sup>	
		-1%	0%	+1%	+2%	+3%	+4%	+5%	
Harmony	+91 to +100				29	30	30	11	3.3
Unity	+79 to +90			5	30	30	30	5	3.1
Friendly	+67 to +78			11	30	30	29		2.9
Peaceful	+55 to +66			17	30	30	23		2.7
Affable	+43 to +54			23	30	30	17		2.5
Calm	+31 to +42			29	30	30	11		2.3
Amiable	+19 to +30		5	30	30	30	5		2.1
Relaxed	+ 7 to +18		11	30	30	29			1.9
Neutral	+ 6 to - 6		17	30	30	23			1.6
Unease	- 7 to -18		23	30	30	17			1.3
Wary	-19 to -30		29	30	30	11			1.1
Restless	-31 to -42		35	30	30	5			1.0
Tense	-43 to -54		41	30	29				0.8
Troubled	-55 to -66		47	30	23				0.7
Discord	-67 to -78		53	30	17				0.6
Hate	-79 to -90		59	30	11				0.4
Feud	-91 to -100	5	59	30	6				0.3

<sup>a</sup>These numbers are approximate, being based on the middle number of that relation's range.

trading with a partner who is affable, rather than one who is tense, is about a full percentage point per turn. Over time, that percentage point can add up to a lot of money. Besides, trading with someone who is wary toward you (or worse) creates the possibility of causing *negative* trade growth that turn.

Note that not only does the percentage growth number round down (from 2.4 to just two percentage points, in our example), but so does the actual BC amount for trade income. Thus, if you had let that 75-BC trade amount work its way up to +11 percent on the Trade

Profitability scale, that would give you +8.25 BC on the next turn, which then rounds down to only +8 BC.

### TRADE AVERAGING

When you increase the amount of a preexisting trade route, that -30 percent hit for the size of the increase is averaged into its current trade percentage. For example, let's say you've got a 100-BC trade agreement starting to pay off at +8 percent (i.e., +8 BCs). If, on this turn, you decide to raise it by 50 BCs to a 150-BC trade route, what happens?

Well, the answer is pretty complicated. We'll explain trade averaging in the following paragraphs, but you really don't have to concern yourself with it too much. You can just be glad that the computer does all the math and skip down to the next section if all these calculations are starting to make your head swim.

To answer the above question, the computer averages in the 100-BC route at +8 percent with the new 50-BC route increase at -30 percent. It will see that the 100-BC route is twice the size of the 50-BC route, and so it will double the value of the +8 percent factor to +16 percent. By doing so, its impact will be proportional when added to the -30 percent.

Adding +16 to -30 percent gives a sum of -14 percent, which is then divided by the amount of trade increase as compared to the new trade total (i.e., the 50-BC increase is one-third of the new 150-BC total). Thus, the -14 percent would be divided by 3, which would average out the new 150-BC route's profitability percentage to -4.6 percent. That, in turn, would round down to a smooth -4 percent.

The result is that the old 100-BC route's +8 percent (i.e., 8-BC) profit becomes a -4 loss at its new 150-BC trade route size. This would translate to a 6-BC loss for next turn (i.e., -4 percent of the 150-BC trade route). Hey, we warned you that trade averaging was tough!

## THE GROSS TRADE FIGURE

Sadly, there is no "accounting spreadsheet" screen that you can call up to see a breakdown of the profitability or duration of the individual trade routes that you have established with other players. Instead, you can find only three pieces of information concerning trade:

- On the Races Display screen, you will be informed of the BC amount of each of your trade routes.
- The Races Display screen also shows what your present relations level is with each of your trading partners on the Relations bar.
- On the Planets Display screen, you can find out what your gross trade income figure is. This reflects the total of all trade routes established with other players.

By using these three bits of information, and applying them to the formulas presented in this section, you can get some idea of how your trade is working out. It is opaque, to be sure, but we hope that we have shed some light on what is going on behind the screens when the computer calculates your gross trade income for the turn.

## PRETAX CREDITS

We've described the primary source of planetary income (population points and factories) and the more advanced revenue streams created by profitable trade routes; now for a dose of economic reality—the automatic deductions from your gross income each turn, as shown in Figure 5-2. These per-turn, fixed expenses represent the upkeep cost for your ships, bases, spy networks, and internal security measures.

As Figure 5-2 shows, the present maintenance cost for all the ships you currently have on the Galaxy Map is 3.3 percent of your gross income; in addition, bases require 0.7 percent, spies need 10.0 percent, and security takes up 4.4 percent. Therefore, a total of 18.4 percent of your gross income (shown just to the right of these spending costs as 7409 BCs for planetary populations and factories, and an even 0 BC for trade), or 1363 BCs per turn, is being



skimmed off the top just to maintain the forces you already have in place.

We just wanted to point this out so that you would be aware of where all your money is going. These fixed expenses are why your colonies usually have less to spend each turn than they actually generate.

## THE SLIDER BAR TAX

Another deduction—this time a tax—from every planet's available resources each turn is collected by use of the slider bar on the Planets Display screen. Located to the right of the Total Income figures, there is a line designated "Reserve" with a money amount and, above that, a slider bar. Figure 5-2 shows you have 77 BCs in reserve in the Interplanetary Reserve Fund, while the slider bar tax rate is set to add +196 BC per turn to it.

The good news about setting a slider bar tax rate is that it adds money each turn to your reserve, which works like an interstellar piggy bank. The money in it can be redistributed to any planet(s) you deem in need of a cash infu-

sion (as explained a little further on), used to pay tribute to other players (see Chapter 11), or can be used to deal with various random events (see Chapter 14). The bad news is that it is very inefficient to collect this tax revenue in this manner. For every dollar added through this slider bar tax, two are removed in pretax dollars from your planets' economies. In other words, to add 100 BCs to your reserve by using a slider bar tax, a total of 200 BCs is skimmed off here and there from your colonies, each kicking in their proportional fair share (as explained below).

No more than 20 percent of your total planetary production is taxable in this manner. In effect, therefore, no more than 10 percent of your total planetary production can ever be added to your reserve each turn. For example, if your planetary income were 3154 BCs, the most you could collect through the slider bar tax would be +315 BCs. Collecting that much, however, would cause an overall drain on your empire's available production that turn of 630 BCs. Note that trade income is never directly subject to this slider bar tax.

#	PLANET	POPULATION	FAC	SH	BASE	SPY	PSD	SPACE DOCK	NOTES
1	RESEARCH	40	0	0	0	0	0	0	ALTER BOD
2	THU CYCII	50	0	0	0	0	0	0	
3	RESEARCH I	50	0	0	0	0	0	0	RESEARCH
4	RESEARCH	100	0	0	0	0	0	0	
5	ALYSTED	40	0	0	0	0	0	0	HOSTILE
6	PHANTOS	50	0	0	0	0	0	0	HOSTILE
7	THAN	20	0	0	0	0	0	0	HOSTILE
8	MILLON	60	0	0	0	0	0	0	
9	CYCH	100	0	0	0	0	0	0	PAID
10	KEETA	20	0	0	0	0	0	0	HOSTILE
11	ARCUS	20	0	0	0	0	0	0	HOSTILE
12	CORNER POST	20	0	0	0	0	0	0	HOSTILE

Spending Costs		Total Income	RESERVE
SHIPS 23%	SPYING 10%	TRADE 0 BC	77 BC
BASES 0.2%	SECURITY 0.0%	PLANETS 2000 BC	TRANSFER

Figure 5-2

The lower-left part of the Planets Display screen shows the fixed spending costs for ships, bases, spying, and security.

## THE INDUSTRIAL RESERVE TAX

In addition to the slider bar tax, another way to add money to your reserve is by allotting resources to a planet's industrial sector after it has already built the maximum number of factories. Instead of building more factories (which is prohibited), the additional money allocated to building factories will, instead, be added into your reserve, as said by the word "RESERVE" to the right of the Industry Production Ratio bar on the Control screen. Like the slider bar tax, however, only half the amount collected actually makes it to the reserve. There is noth-



ing like a little deduction for government corruption and overhead, right?

Note, however, that an industrial reserve tax is a more efficient way to place money into your reserve than the broader, slider bar tax. This is because the industrial reserve tax takes money only from those planets that have maximized their economies, whereas the slider bar tax takes money globally from all your planets, rich and poor. Thus, with the slider bar tax, the very planets you need to send money to are being taxed to build your reserve. In other words, using the industrial reserve tax allows you to tax developed planets selectively and avoid taxing developing planets.

As a general rule, we put two to three clicks' worth of a normal, fully developed colony's income into the reserve via this industrial reserve tax during nonemergencies. Note, however, that when planets grow through terraforming or by discovery of a higher level of Improved Robotic Controls technology, no industrial reserve taxes are collected. Instead, that money goes toward purchasing more factories on those colonies.

## **THE VALUE OF A BILLION CREDITS**

Here is an interesting note about the industrial reserve tax: it is much more efficient to use it on rich and ultra rich planets, rather than on poor and ultrapoor ones. Consider that to contribute a single BC to the reserve, an ultrarich planets pays two-thirds of a BC, a rich planet pays 1 BC, a normal planet pays 2 BCs, a poor planet pays 4 BCs, and an ultrapoor planet must raise 6 BCs. This is due to their respective multipliers for spending within their industrial sectors of 3, 2, 1,  $\frac{1}{2}$ , and  $\frac{1}{3}$ , respectively.

## **LAUNDERING MONEY**

Here is an interesting way to make a little extra money. When you have a colony that is ultrarich, you have a license to print money. After it is fully developed (which shouldn't take long), pump up its Industry Production Ratio bar so that it is paying the most it can straight into your reserve (i.e., everything except the minimum necessary in that colony's ecology sector to keep the planet clean). For every 2 BCs the planet puts in, 3 BCs are added to the reserve. This is because those BCs are multiplied by three because the planet is ultrarich, and then halved due to the usual government corruption. However, you're still coming out ahead on the deal.

Now, here's the clever bit: take that reserve money next turn *and pump it back into that ultrarich planet*. That will triple its value again! For example, the planet Thrax is ultrarich and completely developed. On this turn, it pays 30 BCs by way of this industrial reserve tax directly to your reserve. Therefore, 45 BCs are added there. (The 30 is multiplied by 3 because the planet is ultrarich, then divided by 2 for corruption when entering the reserve.) Next turn, that 45 BCs is transferred back to Thrax, where it becomes 135 BCs when spent in either Thrax's ship-building, defense, or industrial sectors. These 135 BCs, if placed in Thrax's industrial section, can be dumped into the reserve again via the industrial reserve tax, thus creating an upward income spiral. By repeating this process, you can supplement your income very nicely.

There are limits to this money laundering technique, of course. In particular, a planet can only double its economic output in a single turn through cash infusions from your

Interplanetary Reserve Fund (see Chapter 6). Still, by being a clever bean counter and not using those ultrarich planets for ship production (which is a tempting prospect, particularly during times of war), you can make a few extra BCs on the side through creative accounting. Remember the counterfeiter's motto at the beginning of this chapter.

## PROPORTIONALITY

Money globally added to (through a positive trade income) or subtracted from (through a slider bar tax, negative trade income, or the fixed expenses previously discussed) all the planets in your empire is distributed proportionately to each planet, on the basis of its current total income. For example, as shown on the Planets Display screen in Figure 5-3, this burgeoning empire has plenty of fixed expenses. Although its fleet is small, taxes, trade, spies, and security are all adding up every turn. When the income figures for the fourth planet, Howling (which has a planetary production level of 259 BCs per turn), are checked by clicking on its row and exiting to the control screen, they read: 217 (259)—showing that 42 BCs were deducted off the top this turn and that 217 BCs are available for spending there this turn. A middle-size colony, like the third planet, Omicron, reads: 108 (129) when examined on the control screen. The fledgling colony on the fifth planet, Volantis, reads: 13 (16).

This means that, globally, the expenses for the trade deficit, slider bar tax, and other fixed expenses are running at about 16 percent of gross revenues, and each planet is deducting that amount from its available resources this turn, as shown in the preceding figures. In other words, each planet is taxed at the same rate and,

PLANET	POPULATION	FACT	SM	CASE	1ST	PROD	SPEC	DOCK	NOTES
HAETHA	2					107			
OMI	108					129			
OMICRON	108					129			
HOWLING	217					259			
VOLANTIS	13					16			
STALUZ									HOSTILE
RITZED									

Figure 5-3

A growing empire with some high overhead costs

therefore, its contributions are fair and proportional to meet the empire's present needs (which are currently running at a 16 percent tax burden). Don't you wish all tax systems were that fair?

## MOVING MONEY

Money can be transferred between colonies and players only by way of your reserve. This money can be transferred to any colony or saved for later use (although money saved in your reserve, like a piggy bank, earns no interest). Unlike when money is added to your reserve, money taken from it adds 1 BC to the recipient per BC transferred. In other words, all of the corruption occurs during taxation, not during the allocation of reserve funds (so much for a real-world economic model!).

Because money sitting in your Interplanetary Reserve Fund earns no interest, it is generally wise to invest it in fledgling colonies each turn. Of course, if you are saving up for a particularly large tribute payment or to supplement a colony's production of an important ship type, then that's a different matter and building up your Reserve Fund over time becomes practical.

Besides, money in reserve is always good to have around for dealing with sudden crises such as random events and wars.

## THE HIGH COST OF LIVING

Besides the negative trade incomes and slider bar taxes, you must deal with certain other fixed expenses every turn. Generally, as your empire grows, so will the cost to maintain and support these items. Note that all these fixed expenses are listed on the lower-left corner of your Planets Display screen, including the percentage of your gross income that they are costing you.

## SHIP MAINTENANCE

Each ship costs 2 percent of its *current* construction cost to maintain every turn. Note that the current construction cost of a ship design steadily decreases as technologies miniaturize (see Chapter 10). The exception is Star Gates, which always cost 10 percent of their construction cost (i.e., 300 BCs) per turn to maintain. Star Gate maintenance costs are lumped with ship maintenance payments.

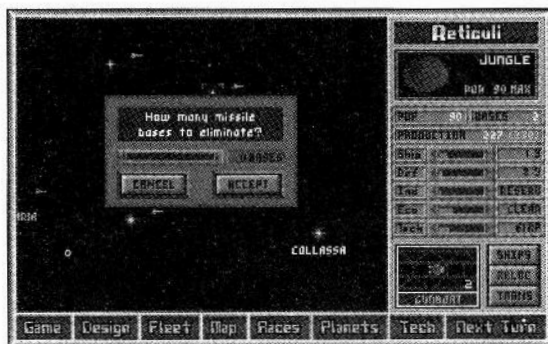
When the percentage of your income spent on fleet maintenance rises to between 15 and 20 percent of your gross income, it is probably time to retire some old ship designs, thus removing some ships from the map. By doing so, you also retrieve one-quarter of their construction cost, which is added directly to your reserve. Unfortunately, you can't scrap Star Gates. If you build too many of them, there will be little you can do about having a high fixed expense for ship maintenance.

## BASE MAINTENANCE

Like ships, each planetary base costs 2 percent of its current construction cost. Note that

because bases are constantly being upgraded to your latest armor, missile, shield, battle computer, and electronic counter-measure technologies (see Chapter 8), the cost for maintaining the same number of bases will rise steadily. Conversely, as some of these technologies linger on your bases, they will also miniaturize and become cheaper (see Chapter 10). However, between the opposing increases in maintenance costs from new technologies and the savings realized from their miniaturization, you can expect that missile base maintenance will, over time, steadily rise, particularly as you build more of them.

Fortunately, you can eliminate your own bases on planets that are now (relatively) safe or that you simply overbuilt in the first place. Simply go to the Control screen and press the **[B]** key: a window with a slider bar will pop up asking you how many missile bases you wish to remove from the colony you have selected, as shown in Figure 5-4. How many missile bases should you build and maintain on each planet? See Chapter 8 for the answer to that question.



**Figure 5-4**

Eliminating missile bases by pressing the **[B]** key

## SPIES AND COUNTERSPIES

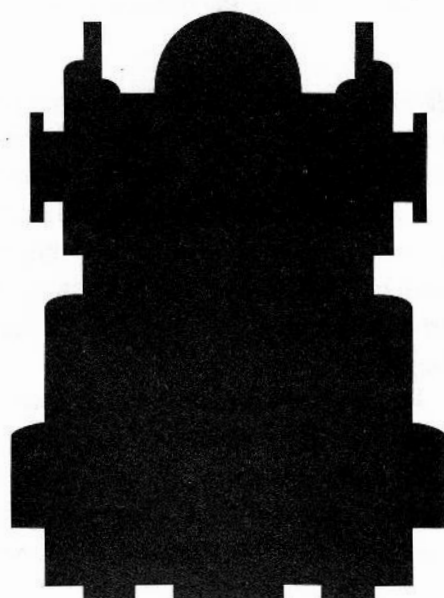
The cost to support spy networks within other races' empires and to increase your internal security shows only as a change in the percentage of your gross income spent for spy operations. This percentage number appears in white along the lower-right side of the Races Display screen, just above the four buttons located there. It will read "Allocations: X.X% Planetary Resources" and remains a constant expense each turn until you alter it. If you want to see a breakdown in the percentage you're spending on spies versus counterspies (security), look at the lower-left corner of the Planets Display screen under "Spending Costs." The cost and use of spies are detailed in Chapter 12.

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## BUDDY, CAN YOU SPARE A FEW BCs?

Congratulations. You have just graduated *e pluribus unum* with a degree in the basic principles of *Master of Orion* economics. You now know where money comes from (colonists, manned factories, and trade), where it goes (to fixed expenses, taxes, trade deficits, and the rest allotted to Planetary Production Ratio bars), and how to get it where you want it (by way of transferring money through your reserve). We are not telling you any secret when we say that the first place you want your money to go is into colony development. Your chances of winning the game are laid on the foundation of imperialist expansion and growth. Exploiting your colonies to their fullest is a sure, safe, and peaceful method for improving your position in the game. Therefore, in the next chapter, we will tell you the true secrets of being an efficient planet developer. ▲

# 6



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## *Planetary Development*

*The population may hiss at me, but when I go home  
and think of my money, I applaud myself.*  
—Horace (Roman Satirist)

■ One important ingredient required on the path to victory is skillful management of your economy. Fortunately, *Master of Orion* features built-in artificial intelligence (AI) routines that prevent you from making any big mistakes and tell you when a planet's status changes from "developing" to "developed" in key spending areas.

However, although you can let your economy coast for a while under the AI, adopting a *laissez faire* attitude is definitely not a winning strategy in *Master of Orion*. Instead, with a little careful tending on your part, and the information provided in this chapter, you can turn your economy from a mere cash crop to a bumper cash crop. (Isn't it great to know that the authors are so full of useful fertilizer?)

One device we're using in this chapter is a helpful way of referring to the planetary slider bars (the individual Production Ratio bars on the Control screen). Because most players are used to their on-screen abbreviations, we have reproduced them in this chapter: the upper-cased portions of slider bar words attach their on-screen abbreviations. Specifically, you'll see the words SHIP, DEFense, INDUstry, ECOlogy, and TECHnology research throughout this chapter. These will help you to identify and remember that we are referring to those specific planetary slider bars.

## BASIC PLANET BUILDING

The most important economic activity you'll perform in a game of *Master of Orion* is colony development. A fledgling colony, starting with but two population points and no factories, will take a long time to mature completely without some outside assistance. You should therefore

take steps to ensure that its growth curve hits a steady climb as rapidly as possible.

There are basically two things that you can do to hasten the development of a colony: throw money at it and throw people at it. Ideally, you should always do both. Let's consider the advantages of each.

## THROWING MONEY AT A DEVELOPING COLONY

Transferring BCs (Billion Credits) from your reserve to developing colonies is an excellent way to help them along, particularly once they reach 10 population points. Receiving money transfers allows a colony to spend up to double its normal planetary production per turn. Thus, if a young colony had a normal planetary production of 10 BCs per turn, by transferring 10 or more BCs to it, it would spend 20 BCs on the next turn.

## PLANETARY RESERVE BANKS

One great thing to know is that each planet has its own little Planetary Reserve Fund (or Bank) for holding unspent money transferred into it. Like your Planetary Reserve Fund, money there earns no interest, but each turn a planet with money in its Reserve Bank will spend all it can from there, up to the aforementioned limit of doubling its per-turn production. For example, if our planet cranking out 10 BCs' worth of production this turn had 50 BCs transferred into it, it would be spending money at double the usual rate for approximately three to four turns (assuming it continues to grow and makes slightly larger withdrawals from whatever remains of the 50 BCs on each subsequent turn).



To illustrate further, let's say this planet spends 20 BCs on the first turn (the 10 BCs it produced, plus 10 BCs withdrawn from money transferred into its Planetary Reserve Bank). This would leave 40 BCs still in its Planetary Reserve Bank waiting to be spent in future turns. The economy grows on the next turn to 11 BCs, so the planet matches that by spending 11 BCs from the 40 BCs remaining in its Planetary Reserve Bank (leaving 29 BCs still there), for a total expenditure on development of 22 BCs on this second turn. Turn three finds its economy up to 13 BCs, so a 13-BC withdrawal is made to match it from its Planetary Reserve Bank (leaving 16 BCs remaining), for a spending total this turn of 26 BCs.

Not bad, huh? And so it goes like this until the money in its Planetary Reserve Bank runs out. Unfortunately, you will not know when this has happened unless you happen to notice a sudden drop in that colony's economy one turn, or you again open up the Planets Display screen and transfer more money there from the Planetary Reserve Fund, as explained in the next section.

## DOLING OUT THE RIGHT AMOUNT

Some people like to keep a tight rein on their money. They would prefer not to put a single BC more into a planet than it can spend that turn. For them, there is a handy keystroke to remember.

When you press the Transfer button on the Planets Display screen, a window with a slider bar pops up for transferring funds from your Planetary Reserve to a particular planet, as shown in Figure 6-1. Pressing the [=] key will automatically adjust that slider bar for you. This

will transfer an amount of BCs from your Planetary Reserve such that the planet will spend at least double its normal production for this turn (only)—it might be slightly more, but very close.

Note that if pressing the [=] key doesn't move the bar at all, it means that the planet already has sufficient money in its Planetary Reserve so that it will spend double its normal production next turn. If pressing the [=] key sends the slider bar all the way to the right, then that planet can probably take more money than you currently have in your Planetary Reserve to double its production that turn.

## MONEY ISN'T EVERYTHING

The down side to merely throwing money at a developing colony is that it can only double its current production level. After so doing, by the way, you might want to readjust that colony's planetary slider bars. They haven't changed, but you may find that you can get away with spending less in the ECOlogy sector, for instance,



**Figure 6-1**

Pressing the [=] key doubles the amount of BCs a planet can spend that turn.

than before you doubled that colony's economy. Anyway, it is worth checking.

On a practical basis, doubling a colony's economy in this manner still means that it will take a long time before a planet consisting of a mere two population points will show positive results. Besides, building factories can be expensive (and, therefore, time consuming) for a fledgling colony. The best thing to do, therefore, when a colony is just starting out, is to throw people at it instead of just money alone. Once it is on the way toward rapid economic development, then money alone suffices to alter its growth from steady to booming.

### THROWING PEOPLE AT A DEVELOPING COLONY

Early in a planet's growth cycle, it is wise to supplement a colony's small population with additional colonists. Or, if you're going to invade another player's planet, you must strive to attack with enough troops so that you win with plenty of survivors with which to develop that newly conquered colony.

In either case, remember this: when using the TRANS button (on the Planetary Production panel of the Control screen) to send population points to another world, a warning in flashing red letters will appear if they would exceed their destination planet's maximum population limit. Note that this does not factor in the loss of population points on the destination planet from transports leaving it this turn, so it may be okay to send more, despite this warning. Also, if you change your mind about sending transports, you can simply reissue the transports' orders any time before pressing the Next Turn button. They will follow only the last set of orders you accept for them.

### THE ECONOMIC ADVANTAGE

The advantages to reinforcing a new colony with additional people are twofold: first, there is an economic advantage. Each colonist produces  $\frac{1}{2}$  BC or more per turn (see Table 5-1) without causing any pollution (i.e., *toxic waste*). Therefore, think of each colonist added to a planet as some fraction of a factory without the industrial waste that factories always generate.

Dumping people on a new colony with a population of 2 million is far better than merely dumping money into it to double its shabby economy of around 1 BC per turn. With an extra 10 million beings, that colony would produce 6 BC per turn or more, which can then be doubled with money transfers. At that point, it will really start to ascend the curve of economic development.

Helping a planet with population supplements becomes an investment with a diminishing return once the receiving colony reaches about one-quarter of its maximum population level. At that point, it is usually better simply to send money and allot transports either to other fledgling colonies or use them for military purposes. This point is illustrated a little further on in Figure 6-2.

### THE MILITARY ADVANTAGE

This brings us to the second reason to reinforce fledgling colonies quickly—defense. There is nothing worse than spending a small fortune on a colony ship, waiting for it to be built, ordering it to move to some far-away star, waiting for it to arrive, finally settling there, and even sending reinforcing colonists—only to have a stray enemy fleet come over and bomb the few people living there off the planet's face during its formative years as a colony.

This sort of thing happens all the time (hey, it's a cruel universe out there), so the best insurance to protect your investment in a new colony is not to make it easy for the enemy either to destroy or capture it. In other words, dump people on it so that it can sustain a bit of orbital bombardment and resist small invasions. Better still, protect it with your fleet until it develops sufficiently to protect itself with missile bases.

You should know that weakly held colonies are prime targets for enemy attacks. Computer players often look to steal small colonies, thus saving them the need to build their own colony ship. By the way, you can do this to *them*, too!

### THE PRICE OF A TRANSPORT TICKET

Naturally, there is a down side to fanning out haphazardly like cosmic gypsies to reinforce new colonies, and that is the economic cost to the planet from which transports depart. Actually, there is a double cost involved. First, each transport costs 1 BC of the planet's production for that turn. Second, those colonists leaving the planet will not be there to contribute their production to that planet, including the resources created by any factories that they were operating.

This could add up to a lot of money over the next several turns it will take for that population to grow back. This can put quite a crimp in the economy of a colony from which transports depart. Keep that in mind before sending too many colonists from a single planet too quickly. It is often better to peel off a few colonists from several planets. This way, each planet stripped of population points will have a smaller amount to recoup and no one planet is hit too hard or left too weak.

### POPULATION GROWTH

Of course, a planet's population will grow on its own. Contrary to what the *Master of Orion* manual says, the percentage of population growth that will occur each turn on planets with a normal environment is based on a linear scale. This scale is such that a normal environment planet with 1 million in population has a 10 percent growth rate, whereas a planet with its population at its maximum level has a 0 percent growth rate. For example, a minimal environment planet with 80 percent of its maximum population level will have a 2 percent population growth rate that turn.

A handy graph, such as the one in Figure 6-2, is the most precise way to answer questions like this one.

When calculating population growth rates, beware: There are two exceptions to the rules:

- All population growth rates are *doubled* for the Sakkra race.
- Silicoids always grow at the hostile environment rate, whatever a planet's actual environment.

For example, if you have a normal environment planet with a population maximum of 100, its population growth rate would look like this at various population levels:

#### Current population:

2	10	20	30	40	50	60	70	80	90	99
---	----	----	----	----	----	----	----	----	----	----

#### Percentage increase:

10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0.1%
-----	----	----	----	----	----	----	----	----	----	------

#### New Population points:

0.2	0.9	1.6	2.1	2.4	2.5	2.4	2.1	1.6	0.9	0.1
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

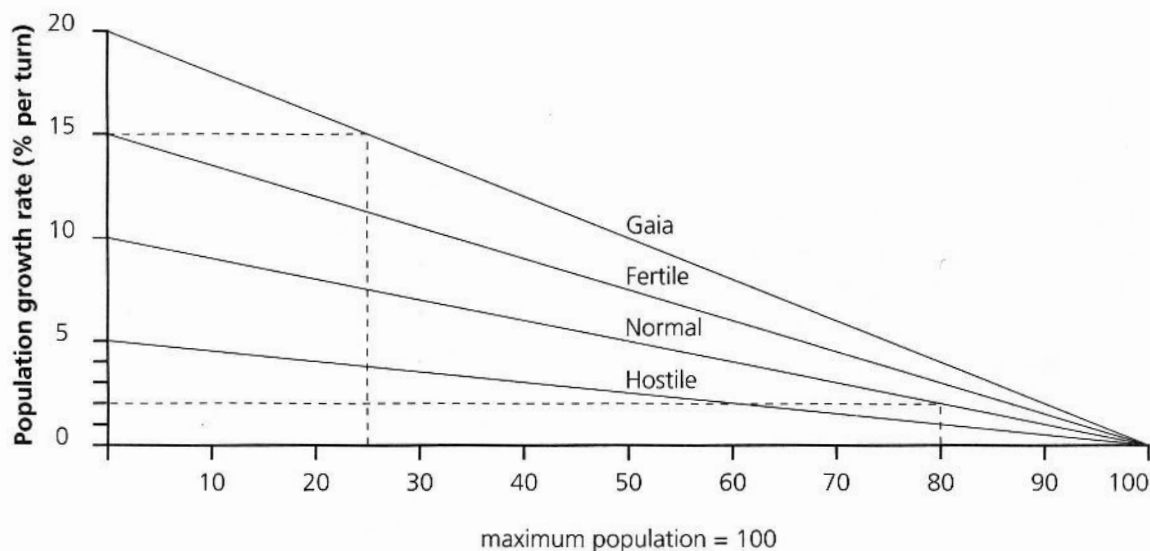


Figure 6-2

The purist's way of determining population growth rate. If this 100 maximum population planet had a Gaia environment and 25 population points, its population growth rate would be 15%. If it had a Normal environment and 80 population points, its growth rate would be 2%.

As you can see from this, when a planet is between 30 and 70 percent filled with population, it will grow the fastest in terms of adding new population points. Thus, population growth works in a bell curve pattern, with slow population point growth on the extreme ends of the curve and the fastest growth in the middle.



*Early in the game, quickly try to fill fledgling colonies to about 25 percent of their maximum population level with transports from other colonies. This will give them an efficient early population growth rate and will give them the best bang for the buck, populationwise.*

Conversely, because the population growth rate falls so dramatically after a colony reaches 90 percent of its maximum size, it is a good idea to invest some extra into its ECOlogy sector to achieve "+1 POP" additional population growth. Otherwise, you could be waiting several turns for that last population point to grow on its own.

When population growth is calculated for a planet, the computer carries over fractions of population points, adding them only when they combine to form a whole million beings. For example, you begin the game on a normal, terran planet with a population maximum of 100 million and 50 million folks already there. Because 50 is half of 100, the growth rate will

be 5 percent on the first turn, and 5 percent of 50 is 2.5. Your population will therefore grow by 2 million, but that extra 0.5 is still hanging around on the planet waiting for another .5 million to show up so that they can be combined and counted as a whole population point.

Now, on the next turn, your 52 million people will have a 4.8 percent growth rate, which works out to another 2.5 million in population growth. This time, because there were 0.5 million people left over from the previous turn, they are added in to this turn's 2.5 million growth, making an even 3 million in new population. Now your colony stands at a total of 55 million and is looking at a 4.5 percent growth rate for next turn...and so on.

## POPULATION GROWTH AND THE ENVIRONMENT

As shown in Figure 6-2, population growth is halved on planets with a hostile (barren, tundra, dead, inferno, toxic, and radiated) environment. Thus, not only is special technology required by most races to land on these planets, but they will take about twice as long to hit their maximum population levels as normal environment planets.

Fertile environment planets are not only larger than normal to start with (see Table 3-7), they also increase the population growth rate of the planet by 50 percent. When a planet's ecology is upgraded to fertile, using Soil Enrichment technology, not only does it become fertile but its base maximum population limit (i.e., before any terraforming increases are added on) is increased by 25 percent (rounded up to the nearest increment of 5 million). For example, a planet that began the game with a maximum population size of 70 million would

see an increase of 17.5 million, which rounds up to 20 million, added to whatever its current maximum population size is.

Planets upgraded using *Advanced Soil Enrichment* technology become paradise planets known as *Gaias*. Not only does this improve their growth rate to double that of a normal environment (see the population growth rate scale in Table 6-1), but the planet's maximum population increases by 50 percent of its original base size (rounded up to the nearest increment of 5 million). If a planet has already received the fertile planet maximum size bonus, described above, the Advanced Soil Enrichment bonus would add a second +25 percent base population maximum size bonus.

## PURCHASING INCREASED POPULATION GROWTH

It is possible to buy people in *Master of Orion*; that is, to invest money in increasing a planet's population growth for that turn. Money placed into a planet's ECOlogy beyond that necessary for eliminating waste or otherwise improving the environment goes toward purchasing additional population points if the planet is not already at its maximum limit. If it is, that additional expenditure will be dumped into your Planetary Reserve Fund and you'll be reminded next turn that the planet has achieved its maximum population (so stop spending money on ECOlogy). Note that additional population points purchased through ECOlogy spending can never exceed one-quarter of the planet's current population on a given turn.

At the beginning of the game, it costs 20 BCs per population point purchased in this manner. Once Cloning technology is discovered, this cost drops to 10 BCs per population point.



With Advanced Cloning technology, it's only 5 BCs per population point added. Thus, with Cloning and Advanced Cloning technology, it becomes cheaper and easier to keep planets at their maximum population levels and to replace lost population points.

## TERRAFORMING

Besides increasing the rate of population growth on a planet, it is also a good thing to increase a planet's maximum population limit. Besides the Soil Enrichment technologies previously described, terraforming is the avenue of choice for enlarging planetary population maximums. When investing in planetology technology, "Terraforming +X" technologies abound, with the +X representing an increase of from 10 to 120 more population points than the planet's starting size. Thus, even the smallest planet that begins the game with a population maximum of 10 million can, with terraforming, grow to a respectable size.

When a planet can be enlarged in size, a plus sign appears as a reminder after its population

maximum on the Planet Production panel. Each +1 million of maximum population added to a planet through terraforming costs from 2 to 5 BCs, depending on your highest level of terraforming research discovered (see Table 6-1).

This money is allotted via the planet's ECOlogy slider bar. It will read "T-FORM" on the right when funds beyond that needed to keep the planet clean are spent and the planet can be enlarged through recent planetology technology advancements. The more you put in, the faster the cost of terraforming will be paid, and new population points will be purchased with any additional funds beyond those needed to complete the terraforming process. Note that there is a 300-population point ceiling for any planet's maximum population size.

## INDUSTRIAL GROWTH

Two primary elements affect putting as many factories as rapidly as possible on a planet, thus developing its maximum industrial capacity. The first concern is the cost of building each

**Table 6-1** Terraforming Cost per +1 Million Increase over Population Maximum

Terraforming Technology	Cost per +1 Million Increase over Planet's Population Maximum
Terraforming +10	5 BCs
Terraforming +20	5 BCs
Terraforming +30	4 BCs
Terraforming +40	4 BCs
Terraforming +50	3 BCs
Terraforming +60	3 BCs
Terraforming +80	2 BCs
Terraforming +100	2 BCs
Terraforming +120	2 BCs



factory. The second is finding ways to put more factories on a planet after its maximum has been reached. Here, we examine both concerns.

### THE COST OF NEW FACTORIES

At the beginning of the game, you have construction technology Tech level 10, which means each factory costs 10 BCs to build. As money is invested in construction technology, you will develop Improved Industrial Tech levels. These levels will be ranked by a descending number such as 9, 8, 7, all the way down to 2. These ranking numbers represent the new (lower) cost of building each factory. Naturally, as factories become cheaper, they can be built faster.

### INCREASING THE FACTORY-TO-WORKER RATIO

At the beginning of the game, all players start with the ability to build and operate two factories on a planet for every point of its current maximum population level. Thus, a planet that can house 100 population points can hold and operate up to 200 factories. As money is invested in computer technology research, Improved Robotic Controls levels III through VII might be discovered. The Roman numeral associated with each level represents the new, higher factories-to-maximum-population ratio allowed on a planet. Thus, at the highest level, a planet can have seven times as many factories built on it as it can hold in population.

This ratio applies to more than just increasing the maximum number of factories that can be built on a planet. It also represents a worker-to-factory ratio. In other words, each population point (or worker) can operate only X number of factories (where X is the current Improved

Robotic Controls Tech level discovered). For example, at the beginning of the game, each worker can operate only two factories. This means that, if you had a planet with 50 factories and only 10 population points, only 20 of those factories would produce their 1 BC that turn. The remainder would sit there idle until either more people were available to operate them or your Robotic Controls Tech level improved.

### THE "MAX" FACTOR(y)

These idle factories do not contribute to a planet's pollution. Furthermore, as a reminder to players when they will be building more factories on a planet than its current population can operate, the word "MAX" appears to the right of a planet's INDUSTRY Production Ratio bar (rather than the usual number of factories that will be built this turn). This means that planet already has more factories than it can currently operate, but that more can be built because it has not yet reached its planetary maximum capacity.

### BETTER FACTORIES COST MORE

There is a cost for upgrading to factories built through higher Improved Robotic Controls technologies. For each level of Improved Robotic Controls discovered, the cost of building individual factories increases by another 50 percent of the current cost per factory. For example, if your cost per factory is 8 BCs (due to discovering Improved Industrial Tech 8) and you then discover Improved Robotic Controls III, the cost to build each factory is 12 (8 + 50 percent of 8). Now let's suppose that, later, you've discovered Improved Robotic Controls IV, and acquired Improved Industrial Tech 7. At this

point, your cost per factory is 14 (7 + 100 percent of 7). Improved Robotic Controls V factories would cost the current price per factory, plus 150 percent of that cost, each, and so forth as shown in Table 6-2.

### SMART FACTORY BUILDING AI

The computer will start your fledgling colony using older Robotic Controls technology when it is beneficial for speeding that colony's development. This means that your colonies will build cheaper-model factories first (i.e., ones not equipped with the latest Robotic Controls technology) until they equal that old technology's maximum factory-to-worker ratio as based on the planet's current maximum population size. Once that many factories are built, the computer refits them by spending the difference required for those older factories to reach the next Improved Robotic Controls tier. It then builds factories at that cost level until it reaches that level's factory-to-worker ratio maximum, and so forth.

Because of this, when you have the option, you should terraform planets to their maximum size potential before you exceed their initial 2:1 factory-to-worker ratio. By doing so, you will get the cheapest factories as quickly as possible, and that is good business in *Master of Orion*.

For example: a player with Improved Robotic Controls IV and Improved Industrial Tech 6 begins a fledgling colony on a planet with a population maximum of 10 million. Initially, the computer will build factories there using the player's old (at start) Improved Robotic Controls II technology level, building 20 factories at 6 BCs each. After that, it will pay the 50 percent cost difference (i.e., 3 BCs each or a total of 60 BCs) to refit them all to Improved Robotic Controls III factories, after which it will build 10 more factories at a cost of 9 BC (6 + 50 percent of 6) each. When that plateau is hit, the computer will upgrade all 30 factories there (again, at another 50 percent of the base cost to build each factory, or 3 BCs each—which would be a total of 90 BCs) to bring them

**Table 6-2** Cost per Factory Matrix at Given Technological Levels<sup>a</sup>

Robotic Controls Level	Industrial Tech Level								
	10	9	8	7	6	5	4	3	2
II	10	9	8	7	6	5	4	3	2
III	15	13.5	12	10.5	9	7.5	6	4.5	3
IV	20	18	16	14	12	10	8	6	4
V	25	22.5	20	17.5	15	12.5	10	7.5	5
VI	30	27	24	21	18	15	12	9	6
VII	35	31.5	28	24.5	21	17.5	14	10.5	7

<sup>a</sup>Numbers represent the cost per factory built when your best Improved Robotic Controls and Industrial Tech levels are as indicated.

up to the Improved Robotic Controls IV level. Once this retrofit cost had been paid, it would build the last set of 10 factories, which that technology allows at a cost of 12 BCs each (6 + 100 percent of 6 at Improved Robotic Controls IV).

## AUTOMATED COLONY DEVELOPMENT

Once colonies are brought up to a point at which their growth is solid and steady each turn, you can pretty much ignore them. They will proceed on automatic pilot until either (1) you manually adjust their planetary slider bars, or (2) they reach either their maximum population or industrial capacity. In this latter case, a notification message will pop up, like the one shown in Figure 6-3, informing you whether it was the population or factory limit that had been reached and allowing you to adjust the planetary slider bars for your next stage of economic planning on that world.

Automated colony development will also notify you when planetary shields have been constructed or upgraded, even if there are no bases on the planet yet. When you are thus notified of the construction/improvement in planetary shields, all of the previous resources allotted to the DEFense sector of that planet are transferred down to TECHnology research. This is handy for players who already have enough missile bases built on a planet, but those seeking to add more under their new shields will want to reallocate resources back to DEFense.

When left completely to automated colony development, a fledgling colony will assign the minimum required each turn to keep its



**Figure 6-3**

Planet U Richie has reached its industry maximum of 110 factories (twice its current maximum population level).

ECOlogy level at “Clean” while pouring the remainder of its resources every turn into INDustrial growth. If it reaches its population maximum first, any excess money being spent there immediately transfers up to building more factories. If a planet builds up all of its factories, resources allotted to INDustrial growth shift down to TECHnology research.

## ADVANCED PLANET BUILDING

Although the basic colony-building techniques presented above are fairly comprehensive, we’d like to emphasize that you should invest in computer, construction, and planetology technology research. These will help you to improve your robotic controls (for more factories per planet), construction technology (to lower the cost of each factory), and terraforming (to increase planet population maximum sizes and improve their environments). We can’t stress enough how important these discoveries are to the general health of your economy.

## **THE CORRUPT MONEY RECOVERY TECHNIQUE**

There is one little tip that we'd like to share as well. When money is transferred into your Planetary Reserve Fund, half is lost to "corruption" while being collected (as described in Chapter 5). In other words, each BC in your reserve costs you 2 BCs to get there. If you want to get full value back on that reserve money, spend it on developing a rich planet or on planets with artifacts that have their money going primarily to research. In both cases, each BC added produces 2 BCs' worth of results! To come out ahead on reserve cash investments, apply the money toward developing ultrarich planets or for technological research on Orion. In these two cases, the "bang for the buck" is tripled and quadrupled, respectively!

Although on most planets one gets a standard ratio of 1 BC in value for every 2 BCs taxed and transferred over, there is the other side to consider: about the worst place to invest reserve dollars is in developing poor and ultrapoor planets. Because each development dollar spent on them receives only one-half or one-third of its value, you receive only 1 BC of value for every 4 or 6 BCs you tax and send to them, respectively. It's more cost efficient (although not always practical, considering the pressure of time) to let these planets just develop (oh, so slowly) on their own. Once they do, have them stick to TECHnology research, where economic poverty doesn't penalize them.

## **THE FLYING BROTHERS KARAMAZOV TECHNIQUE**

The trouble with stripping colonists off one planet to speed up the growth of another is that the planet sending colonists away will often

have quite a dent in its economy after doing so. This is particularly true if that planet was fully developed, because each colonist sent will also leave many factories idle until the population grows back sufficiently to operate them again.

Therefore, early in the game (before Cloning and Advanced Cloning technology makes colonists cheap enough to render this technique moot), build up a floating reserve of transports by shuffling an ever-increasing number of them back and forth between relatively distant, developed (or nearly developed) friendly colonies. When one group is about to land on your destination colony next turn, have that destination colony send away that number of colonists (since they'll be immediately replaced), plus a few more. If you have a new colony or an enemy planet to invade, you can send them there. If not, just keep bouncing them back and forth and building up your floating population point reserve.

The principle behind the Flying Brothers Karamazov technique is to take advantage of planetary population growth rates instead of losing them when a planet reaches its population maximum. By constantly sending out the last 5 to 10 population points on a good-size planet, it will continue to replace them while maintaining a high production output. The goal here, then, is to prevent a planet from ever reaching its population limit, so that it is constantly producing more population points—points that will form a flying reserve with which you can rapidly develop new colonies or assault enemy worlds.

## **THE BATON PASSING TECHNIQUE**

For those not inclined to pay the somewhat detailed attention necessary to use the Flying

Brothers Karamazov technique, there is another approach for fast forwarding troops to the front. We call it the Baton Passing technique. Here is an example of how it works: let's say you want to move a large group of transports to a location that is distant from your main population centers (as often happens). What you can do is move as many transports as possible from the closest planet(s) to the desired destination, while those same planets are concurrently sent reinforcements from your larger populated planets to their rear.

In other words, a fledgling colony is reinforced by a nearby developing colony that is in between it and a developed colony. To replace the population points lost on that developing colony, the developed colony concurrently reinforces it. The net effect is a shift in population from the developed colony to the fledgling one in a relatively short time span, by way of the developing colony between them. The essence of this technique is (1) to get the most transports to the destination as quickly as possible, and (2) to spread out the burden of depopulation over several planets (particularly among those safely in the rear that are already developed). Ignore the red warning messages about sending too many transports when using this technique (they don't factor in population points already set to leave the destination colony).

## THE ECOLOGY OF INDUSTRIAL GROWTH

Because the program has a built-in routine that will not allow you to pollute a planet consciously (money is prioritized into ECOlogy spending to clean up the toxic waste, even if you try to lock it at zero spending there), it will almost never be a problem. Even after a radiation leak

random event, or when you capture a world from the slovenly Silicoids, toxic waste cleanup usually only takes a turn or two and is rarely a threat to a planet's population.

Instead, the waste produced by worker-operated factories should be considered more as a fixed cost on every planet. Refusing to pay it creates pollution, and pollution reduces the planet's population maximum fairly rapidly. The bad news about paying to keep your planets clean is that it comes from after-tax dollars. Just like you receive your paycheck, stripped of a portion of the money you earned to pay for taxes, you still can't go wild and spend the remainder the way you like. The rent and utilities must be paid first and, in *Master of Orion* terms, that means keeping your planets clean through sufficient ECOlogy spending.

## EXORCISING THAT WASTE

Because you must exorcise the waste off every planet every turn, it will be a constant drain on your economy. Each operating factory produces, roughly, one unit of toxic waste. (Remember that idle factories, i.e., those overshooting the current population's ability to operate, do not pollute.) Naturally, the more factories that are operating on a planet, the more pollution generated and, consequently, the greater the cost each turn to keep the planet cleaned up.

When the game begins, it costs  $\frac{1}{2}$  BC to clean up each unit of pollution. In other words, of the 1 BC generated by each working factory, you must spend half of it just cleaning up the mess created in generating it. This is hardly the way to make your fortune in *Master of Orion*. So what are the solutions?

Fortunately, two technologies can reduce this burdensome fixed cost. A construction



technology, aptly named Reduced Industrial Waste, does just that. Each level of this discovery reduces the amount of waste generated by an operating factory from 1 point of waste per turn to either 80, 60, 40, or only 20 percent of that amount. The Industrial Waste Elimination technology negates your ecological cleanup costs from factory pollution entirely.

The other technology, which comes through planetology research, is Ecological Restoration. You'll find it just as beneficial for a planet's fiscal health as cutting down the pollution (as Table 6-3 shows). Ecological Restoration can be enhanced through its Improved, Enhanced, Advanced, and Complete technology stages. Each of these lowers the cleanup cost for a unit of toxic waste from  $\frac{1}{2}$  BC each to  $\frac{1}{3}$ ,  $\frac{1}{5}$ ,  $\frac{1}{10}$ , and  $\frac{1}{20}$ , respectively.

What Table 6-3 shows is that the benefits of Ecological Restoration and Reduced Industrial Waste diminish as you seek their higher levels. For example, at the Enhanced Ecological Restoration level and with Reduced Industrial

Waste at 60 percent, only 12 percent of your factories are required to clean up their own mess, as opposed to the 50 percent required at the start of the game. Thus, you have reduced their waste by a whopping three-quarters from where you started. Any further reductions can diminish only the remaining one-quarter. Therefore, later in the game, you can probably afford to skip researching some of these technology advances in favor of more pressing technological needs.

Between these two technologies, one reducing the waste output of factories and the other making toxic waste clean-up cheaper, the amount of money needed to keep a planet clean can be reduced, even as more factories are added to a planet through Improved Robotic Controls technology. Thus, pollution clean-up can move from an early game situation in which 1 BC is required to clean up the waste of every 2 factories, down through 1 BC cleaning up the pollution of 100 factories (with each factory generating only one-fifth of a toxic waste point and 20 of those being cleaned up for every BC

**Table 6-3** Percentage of Factory Output Used to Clean up Industrial Waste<sup>a,b</sup>

Ecological Restoration Level	Reduced Industrial Waste Percentage				
	100%	80%	60%	40%	20%
At start ( $\frac{1}{2}$ )	50	40	30	20	10
Improved ( $\frac{1}{3}$ )	33.3	26.7	20	13.3	6.7
Enhanced ( $\frac{1}{5}$ )	20	16	12	8	4
Advanced ( $\frac{1}{10}$ )	10	8	6	4	2
Complete ( $\frac{1}{20}$ )	5	4	3	2	1

<sup>a</sup>Numbers represent the percentage of factories required to pay for the clean-up of their own pollution.

<sup>b</sup>Remember, population points also add to a planet's economy, but they are always pollution free.



spent). Eventually, if you discover the level-45 construction technology of Industrial Waste Elimination, your factories won't pollute at all.

## THE FACTS OF SPENDING

When you manipulate planetary slider bars and, thus, adjust a planet's spending priorities, you'll notice certain features that have been built into the game. Allow us to explain them here.

## THE HUGE SHIP SAVINGS PLAN (AND UPGRADING) TECHNIQUE

One thing players notice, particularly when they build their first colony ship, is that building larger ships takes time, often several turns. During each of these turns a fraction of the cost to build a large ship is being banked exclusively for future shipbuilding on that planet (again, earning no interest). Thus if you had been allocating money over several turns to save up for a large or huge ship purchase, then switched production on that planet to a different, small ship type before completing the larger one, all of the money saved up would be spent to buy those smaller ships. Usually, you will have saved up enough to buy several smaller ships, all of which would appear on the next turn. However, this would drain the savings in your shipbuilding account, so buying a new large or huge ship would mean beginning again from scratch.

This technique of saving and switching ship construction can actually constitute clever play. During times of peace and prosperity, by arbitrarily designing some huge, ultraexpensive ship design and having your planets working on building them, a fortune can be stored away for emergency shipbuilding in the future. Just make sure that no planet ever completes this

"savings plan special" ship design or you'll be stuck with it! Instead, when it is a couple of turns away from completion on a planet, reduce ship spending to "None" and wait. Now you've got a ton of money in your ship building savings account on that planet, just waiting to be spent at a moment's notice.

**CAUTION** *The cost of that unpurchased ship will drop as your technology advances, which means you may end up purchasing one with money you have already saved in your ship building sector but hadn't planned to spend just yet!*

Obviously, when a war suddenly breaks out, it will be time to spend these shipbuilding reserve funds. Redesign the huge "savings plan special" ship into a late-model, high-tech killing machine and switch over your planet's ship production to build these and other useful ship types. You'll find that, next turn, plenty of new ships will roll out of your planetary space docks and that your enemies may not be well prepared for your sudden fleet mobilization.

Another advantage of building huge ships and saving up money over several turns is that the time it takes to build them can actually be your ally. If you discover a new type of engine, armor, special, or weapon that you simply have to get into production right away, a quick redesign of a new ship model not yet produced can be quite beneficial.

## THE MISSILE BASE "UPGRADE NOW, PAY LATER" PLAN

When a new missile, shield, armor, battle computer, or ECM technology is discovered, all of your missile bases are instantly improved to your

new, cutting-edge technology. Each planet is then billed separately for upgrading its bases. These are retroactive costs, because the upgrades are automatic and instantaneous. All of this is explained more thoroughly in Chapter 8, along with the costs of building missile defense bases.

### DIRECT DEPOSIT SAVINGS

When a planet has built all the factories that it can hold, any further resources earmarked for INDUSTRY spending are transferred directly into your Planetary Reserve Fund. Thus, you're setting up a direct deposit amount from that planet into your reserve. Such direct deposits are in addition to whatever that planet might be paying in slider bar taxes (see Chapter 5). Like the slider bar tax, for every 2 BCs collected from direct deposit transfers, only 1 BC actually makes it into your reserve.

So here is a tip: Use the slider bar tax only early in the game, with the object of setting up a cash reserve with which to develop fledgling colonies. Once a few planets have fully developed to their maximum factory limits, cease collecting revenue from the slider bar tax (reset it down to zero). Instead, build up your reserve exclusively through direct deposit transfers from these developed worlds. This is a good idea because the slider bar tax taxes everyone, including the developing colonies—the very ones that you're trying to help! Think of this plan as Robin Hood Socialism, stealing from the rich and giving to the poor. (Only, in this universe, with you running the government, a socialist economic system can actually work!)

### THE RACE FOR SPACE

The early turns of a game of *Master of Orion* go through some very distinct stages. During the first stage, each player's scouts prowls around their starting neighborhood. Meanwhile, each initial colony ship will get a colony going on the best, nearby planet it can reach—a colony that will be quickly reinforced with a few transports to help it develop quickly. During this stage, the turns pass rapidly as scouts dash about from star to star and engage in mock space battles with enemy scouts and colony ships.

By the time each player's home world has built up its economy sufficiently to begin producing colony ships (say, around 75 million people and over 100 factories), the scouts have reported on what the neighborhoods look like and the race to colonize space begins throughout the galaxy. If there are stars with agreeable environments close enough to settle, build colony ships right away and rush to join this race to stake your claim on uninhabited worlds. It's a mad dash, and one that will establish the borders of every player in the game. Therefore, do your best to expand now, while the getting is good. Often, toward the end of this land-rush stage of the game, players who find themselves boxed into too little space may want to consider starting a new game or bracing themselves up for a very challenging match, indeed.

### PLANET HOPPING

During this stage of rapid expansion, it is important to grab as many of the best stars as possible, before other players do. This might require colonizing an inferior star first, which opens a travel link to a more desirable star further away. However, the best stars should

have colonization priority whenever possible. Beyond planet hopping, it is a good early strategy to place all of your technology spending into propulsion and quickly discover Range 4 or 5 Fuel Cells.

## **HINDERING OTHER PLAYERS' GROWTH**

There are two basic techniques for hindering other players' expansion into your neighborhood and, thus, staking your claim to nearby planets. The first method is simply to garrison juicy planets that you discover, even if it is with a mere scout ship. Should the enemy encounter your scout ship in a space battle, just hit the Done button and wait them out. If their ships have no weapons (and their early scout and colony ship designs will not), they'll retreat and you will maintain control of the space over that planet. You will want to replace those scouts with fighters or destroyers as soon as possible. However, even a scout is better than no garrison at all and can keep the other players at bay for several turns.

## **NONAGGRESSION PACT PROBLEMS**

Avoid entangling yourself in early nonaggression pacts with your neighbors (see Chapter 11). Such pacts allow participants to colonize unowned planets, even those where the other player has fleets on garrison duty. Because the computer player never forgets this aspect of nonaggression pacts and human players often do, just avoid them during this early, land-rush stage of the game.

## **SNEAK INVASIONS**

The second way to hinder another player's growth is by a more direct approach. If the

enemy goes through all of the time and expense to send a colony ship to a nearby planet that is rightfully yours, your ultimate option is to take it by force. After all, there will be only two population points on a fledgling colony. You won't even have to build a colony ship to land your transports there (the enemy has paid that expense for you), assuming you have the right Controlled Environment technology to settle there.

Therefore, dumping a hefty contingent of troops there not only assures that you will capture that colony, but you can easily arrange for it to begin with enough people both to defend against a counterattack and to develop it fairly quickly. Note that stealing a strategically located planet might have the double advantage of hindering some of that player's potential avenues of expansion.

## **THE PROBLEM OF EARLY WAR**

The down side to this aggressive border readjustment is that it will lead directly to an immediate war with the race whose planet you just liberated. At this delicate juncture in the game you need all of your resources for colony ship construction and research into the crucial areas of propulsion, planetology, and construction—how can you suddenly afford a major war effort? The answer is, you can't. Unless you can appease the other player and draw up a peace treaty quickly, you may be dragging both of you into a protracted war. And while you two are busy trying to kill each other with your meager resources, the other players will be romping about and colonizing the rest of the galaxy. This bodes ill.

Therefore, give careful consideration to the tempting military option of an easy planetary

invasion at this early juncture in the game. The enmity of players with whom you'll be sharing a border for a long time is not something you need, in particular because it drags down your economy during this crucial, early development stage.

## THE KEYS TO PEACEFUL, INTERNAL GROWTH

There will be times, such as at the beginning of the game, during which you will be at peace with your neighbors. Later in the game, after the stars are settled and the borders between empires jell, times of peace present a great opportunity for concentrating on internal growth. It is during these times that more money can be transferred out of ship building and missile base construction and moved into maximizing the economy of every developing colony you have as quickly as possible. This is also the time to increase technological research spending.

## GROWTH

The first priority during times of peaceful, internal development should be growing your economy. The goal here is to hit certain economic plateaus. First, bring up all your planets to their maximum developed state. Second, prioritize your research investment into areas that translate into leaving you more money to spend each turn. In order, the preferred discoveries to make for economic growth are:

1. Improved Robotic Controls (computer technology)
2. Terraforming +X (planetology technology)
3. Reduced Industrial Waste (construction technology)

4. Improved Industrial Tech X (construction technology)
5. Other planetology technologies

## SECURITY

Your second priority during times of peace should be defense spending. It's one thing to put money in the bank and another to make sure that the bank is safe. Concerning defense, make sure colonies that border potentially hostile neighbors have sufficient missile bases. Beefing up internal security a bit to foil enemy spies out to steal your technology might be another worthwhile idea at this time (see Chapter 12).

The bulwark of a planet's defense will be its missile bases and planetary shields. These latter defenses improve through investment in force field technology. Putting money into weapons research to obtain the better missile technology is the best way to raise the effectiveness of your missile bases. They are also improved with each level of battle computers, ECM, and armor discovered (see Chapter 8).

## PREPARE FOR WAR

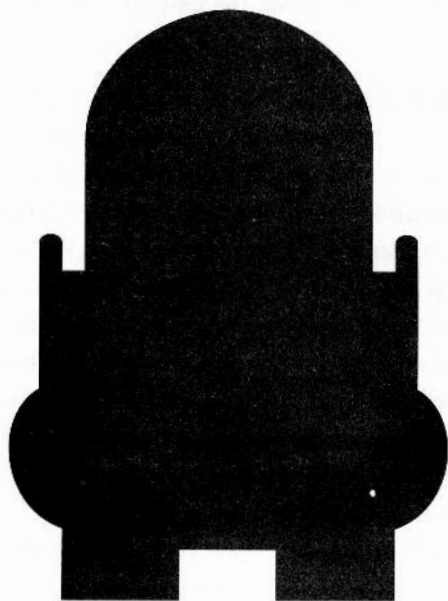
If a period of peace and prosperity lasts long enough, at some point your growth will zenith and your defenses will be prepared. Here is when you should seek expansion through war. Prepare new, carefully considered ship designs, if needed (see Chapter 9), and construct balanced fleets that can both gain space superiority and reduce enemy planetary defenses. Choose the right enemy (the least trustworthy, the smallest, the one you will lose the least amount of positive trade income with, etcetera), build up the necessary fleet strength to attack them, and then hit 'em hard and fast.

To help you sort out how to wage wars, some general strategic advice for military endeavors appears in Chapter 8.

### **PLANET BUILDING: A JOB WELL DONE**

By now you have figured out that, in the great laboratory of theory and game design, government intervention in the economy is a good thing. When playing *Master of Orion*, planet development is a necessary and engaging element of a winning strategy. We've shown you how to build up the economy of individual planets, told you the secrets of population and industrial growth, discussed planet ecology, and explained where to focus your energies during times of peace. ■

7



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*Starship Battles*

*I knew one thing: as soon as anyone said you didn't  
need a gun, you'd better take one along that worked.*  
—Raymond Chandler



Starship combat is almost a game within the game of *Master of Orion*. Generally, whenever two nonallied fleets find themselves in orbit around the same planet, the Ship Combat Display screen will appear and both fleets will line up for battle. If the planet where the battle is taking place is colonized by either player, it will also appear on the battle display. Each ship icon will (and a planet may) have a number assigned to it, representing the number of ships in that group (or missile bases on that planet). All of this is shown in Figure 7-1.

This chapter shows you what starship battles are all about and how to maneuver and fire your weapons to your best advantage. We explore the crucial element of initiative and compare various offensive and defensive aspects of starship warfare to see how hits are scored and damage is inflicted. For everyone who has dreamed of leading a star fleet in a battle against desperate odds and succeed as would be sung in legends, this chapter writes the music for you. In the next two chapters of this combat trilogy

section, we consider planetary combat and ship design.

## THE RULES OF ENGAGEMENT

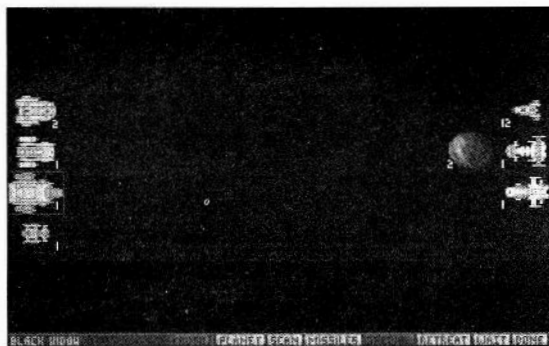
Certain basic concepts and elements work together on the Ship Combat Display screen. To begin with, the “map” on this display represents a grid of squares 8 high by 10 wide. (Think of an  $8 \times 10$  glossy photo with a 1-inch square grid on it to help you remember this.) It is within the confines of this gridded bit of space that the ship groups will maneuver in combat.

Note that distance on the Ship Combat Display screen collapses with the advance of technology. At the start of the game, the distance between ship groups is important, because things move across it very slowly at first. During the later stages of the game its width and breadth are almost irrelevant, as ships can often reach each other in a single bound.

## MAP TERRAIN

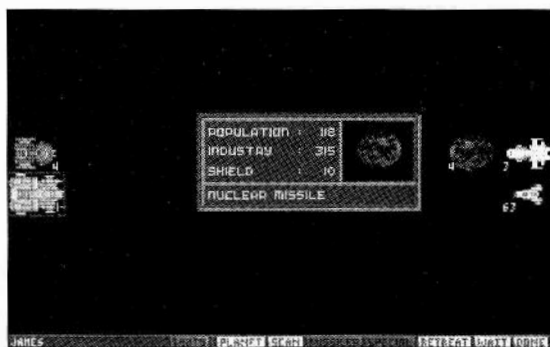
On this  $8 \times 10$  chess board will be placed a colonized planet, if the battle is taking place over one. It will always appear in its owner's second column of squares, in the fourth square from the top. Ships may not maneuver through a planet's square.

Whenever you see a planet on-screen, even if there is no number next to it (indicating that it has no missile bases), be sure to select the Planet button at the bottom of the display. Information concerning the planet will pop up, showing the planet's population, industry, planetary shield strength, and what missiles the base is currently armed with, as shown in Figure 7-2. Although the information from this planetary reconnaissance is not stored anywhere for postbattle study, raiding enemy planets is



**Figure 7-1**

A battle commences: friendly ships on the left, enemy ships and, in this case, an enemy planet on the right

**Figure 7-2**

Information exhibited by pressing the Planets button at the bottom of the Ship Combat Display screen

an excellent way to keep tabs on them and their development.

There is one other feature that might adorn the Ship Combat Display screen: asteroid squares. Their initial density level is determined when the galaxy is created (see Chapter 3), but their numbers and locations within a star system will vary between battles. Ships can't move through them. When beam weapons fire through any asteroid squares, the defender gets +3 added to his Beam Defense Level (see

Table 7-3). Each missile or torpedo that moves through an asteroid square has a chance to be destroyed, as shown in Table 7-1.

## SHIP GROUPS

Finally, both players' ship groups will appear on the Ship Combat Display screen. Friendly ships will always line up along the left side of the display and enemy ships will line up on the right. Ship groups are centered vertically and the number next to each one shows how many individual ships of that type their icon represents. Every ship of the same type moves and fires as a single group in a battle. Ship groups can never be split up or combined on the Ship Combat Display screen.

## THE CLOCK

A battle will last a maximum of only 50 rounds (a round meaning that both players have had a turn to move and fire). After 50 rounds of combat, the *attacker* automatically retreats if the defender has any surviving ships or missile bases. Defending ships with superior movement and inferior weapons, therefore, can attempt

**Table 7-1** Probability of Missile/Torpedo Destruction by Asteroids<sup>a</sup>

Missile Type	Percentage Chance of Destruction
Nuclear and Hyper V	80
Hyper X and Scatter Pack V	72
Mercurite and Scatter Pack VII	64
Stinger, Scatter Pack X, Pulson, and Anti-Matter Torpedo	56
Hercular	48
Hellfire, Zeon, and Proton Torpedoes	40
Plasma Torpedo	32

<sup>a</sup>The numbers, representing the percentage chance of enemy missile/torpedo destruction flying straight across an asteroid square. If they travel across a corner, they will take proportionally fewer losses.

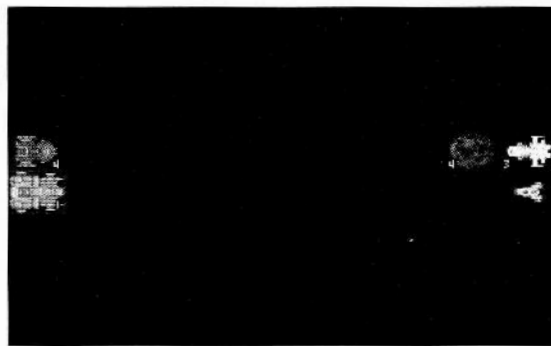
to “dodge the bullets” for 50 rounds and force the attackers to retreat. This ploy isn’t likely to prevent those attackers from coming back in a few turns, but it will buy a few more game turns in which to prepare a better defense.

## PREBATTLE DECISIONS

Before each battle commences, it is best to follow this two-step, prebattle drill. First, gather intelligence about the forces present for the ensuing battle. Second, on the basis of that information, devise a battle plan that employs the proper tactics for exploiting your strengths, shielding your weaknesses, and accomplishing your mission objective. Once these two steps have been conducted, execute your battle plan.

## INTELLIGENCE GATHERING

Before each battle begins, take a moment to do a little intelligence gathering. First, move the cursor over each group of ships in the battle, both enemy and friendly, and read their names and the amount of damage they can sustain—you’ll see this along the lower-left edge of the Ship Combat Display screen, as shown in Figure 7-3.



**Figure 7-3**

A quick glance at the enemy’s fleet via the mouse

Next, if an enemy planet is present and it has any missile bases, put the cursor over it. Note the amount of damage that each missile base can take. Missile bases get tougher as players discover better types of armor. See Table 8-1 in the next chapter for a breakdown of what level of armor provides how many hit points for each missile base.

After this mouse reconnaissance, click on the Planet button, no matter who owns the planet. Whether there are missile bases there or not, you will still see how many population points and factories are on that planet. If there are any missile bases, that information will be added beneath the basic planet information as shown in Figure 7-4a and b, if one of your attacking ship groups is equipped with Battle scanners. This latter information will give you an idea of how those missile bases will perform in the coming battle.

Next, select the Scan button along the screen’s bottom, if it is lit. Note that it will be lit only if one of your ships has Battle scanners or if you’re defending a planet with at least one missile base (every missile base has Battle scanners). If this scanning option is available to you, you’ll get a display of each enemy ship type present in the battle, and their quantity, as shown in Figure 7-5. If the Scan button is not lit, you have to forego this knowledge.

Finally, put the cursor over one of your own ships until it turns into a question mark, then click the left mouse button. This will put up a display similar to that shown in Figure 7-5, but this time featuring your own fleet. Your ship group that moves next is highlighted by Broadway-style lights moving around its icon.



Figure 7-4

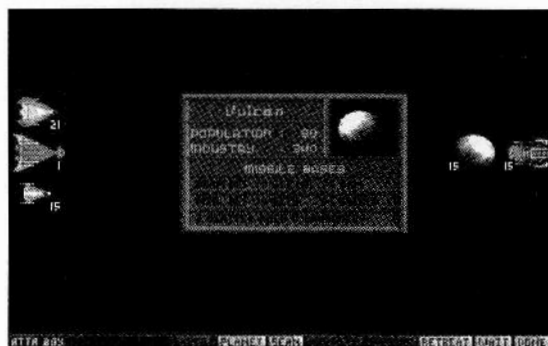
(a) A planet without any missile bases yields a minimum of information, whereas a planet with missile bases (b) tells you some of that planet owner's best ship design (i.e., Battle Computers, shields, ECM, and armor) and missile technology discoveries.

## FORMULATING A TACTICAL BATTLE PLAN

To formulate a proper battle plan for space combat, you'll have to read the rest of this chapter. Sorry, but the nuts-and-bolts lessons of ship initiative, maneuvering on the Ship Combat Display screen, and weapon attacks versus ship defenses are all prerequisites before we can explain mission objectives and provide our ship-to-ship combat tips, tactics, and techniques. By the time you finish this chapter, however, you'll know how to wield the forces you have brought to battle.

## INITIATIVE

The order in which ships move and fire is often crucial to success in a space battle. This turn order on the Ship Combat Display screen is called the initiative. An initiative rating is figured out for each group of ships (i.e., each ship icon) individually.



## HOW IS INITIATIVE DETERMINED?

Each single group of ships in battle has a basic initiative rating equal to its maneuverability plus its Battle Computers. Besides allowing a player to examine the specs of an enemy fleet (as shown in Figure 7-5), Battle scanners also add +3 to that ship group's initiative rating. Not bad, eh?

Ship groups move in order on each round, from highest-to-lowest initiative rating. Tied ratings, however, are not broken randomly, as the *Master of Orion* manual says. Instead, ties always go in favor of the computer player in

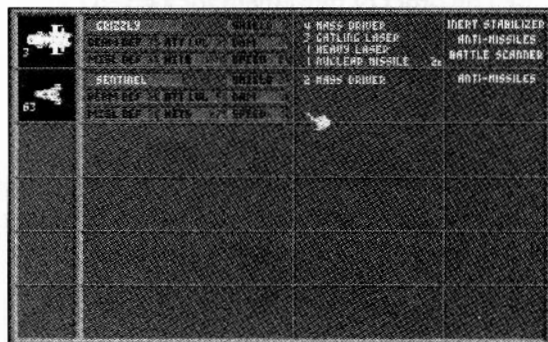


Figure 7-5

Selecting the Scan button gives a complete scan of the enemy fleet.

that battle. If one player has two ships that are tied for initiative, they move in the order that they appear on his fleet list (i.e., from top to bottom in the order they lined up for battle). Certain racial characteristics of the Alkaris and Mrrshans improve their initiative in space battles (see Chapter 13).

## THE ADVANTAGE OF HAVING THE INITIATIVE

The ship group with the highest initiative will always have the opportunity to move and fire first during each round of combat. This includes the *automatic defensive reaction fire* that occurs when enemy ships move within range of unfired weapons belonging to ships with superior initiative. This can be an awesome advantage, particularly in evenly matched battles, in which whoever can land the first shot will often have a large advantage.

## EXCEPTIONS TO INITIATIVE

Ship groups using Subspace Teleporters or Cloaking Devices always fire first after teleporting or decloaking. Operating while cloaked won't affect a ship group's initiative based on order of movement for a given round, but it will negate the defensive reaction fire advantage of a ship with superior initiative. Ships moving via Subspace Teleporters always move before other ships. If multiple groups are moving by Subspace Teleporters, they first move among themselves within their initiative order, before any other ship groups on that turn.

## MISSILE AND TORPEDO INITIATIVE

Missiles and torpedoes will move concurrently with their target ship group. If one of your ship groups is the target, you have an advantage if

you *don't* move that turn and just fire your weapons instead. That way, those enemy missiles and torpedoes will not move until after you've fired your weapons on that turn.

When you *do* move a ship group that is being tracked by enemy missiles and torpedoes (i.e., *bogies*), consider running away. These bogies, generally, have only a two-turn duration on the Ship Combat Display screen before they run out of fuel and disappear. (Planetary defense bases, however, generally fire missiles with a three-turn duration.) If the distance of your ship group from these bogies is such that you can run away from them for only one turn without being hit (see the game's Technical Supplement for missile and torpedo speeds and ranges), you will either have to issue that group a retreat order or consign them to their fate. If you can outrun these bogies for two turns, then the retreating ship group can both avoid the enemy bogies' attack *and* stick around to keep fighting the battle.

## THE WEIGHT OF WAIT

Using the Wait button on a ship group so that it will move at the end of the current round of combat reduces that group's initiative to zero. Thus, that ship group moves dead last. However, using the Wait command does *not* prohibit those ships from performing automatic defensive reaction fire. They will still fire their unused weapons that turn on passing enemy ship groups.

## MANEUVERING SHIPS

All ships can move a certain number of squares each turn on the Ship Combat Display screen. This is a ship's *combat speed*, which is a function of that ship type's *maneuverability*, a key



feature in ship design. Combat speed increases by one for every two levels of maneuverability designed into a ship (see Chapter 9), with the exception that Maneuverability Class II also moves a ship two spaces per turn on the Ship Combat Display screen.

When it is a ship group's turn to move in combat, the mouse cursor will turn into a movement arrow when within a ship's movement range. Firing all weapons and special devices ends a ship group's actions for that round. Thus, if a ship fires its entire salvo of weapons first, it forfeits its movement for that round. However, ships can fire their long-range weapons first and continue to move until they have either exhausted their movement capabilities for that round or fired all of their remaining weapons.

Ships may not move through grid squares containing asteroids or planets, but they can move through each other's without penalty. Two ship groups may not end a move in the same grid square (i.e., *stack*), however.

## **PUSH-BUTTON WARFARE**

Along the bottom-right side of the Ship Combat Display screen are several buttons. When you select one for use in tactical combat, the color of that button usually turns red. This shows that it is currently in effect. To deselect a button, simply click the mouse on it again and it will revert to its normal, green color, which shows that its effect is off. Although these are explained in the *Master of Orion* manual, we've elaborated on their effects here. Those buttons not previously described in this chapter are listed below:

## **THE AUTO BUTTON**

Selecting the Auto button turns control of your ship groups over to the computer. You may watch as the battle rapidly unfolds before your eyes and break the action and take back control of your ships any time by pressing either mouse button or the **[Esc]** key.

Use this button for trivial battles you are sure to win (to speed up play) or if you are simply not interested in fighting so many space battles. Among the drawbacks of allowing the computer AI (artificial intelligence) to handle your space battles are the following:

- It will not withdraw your colony ships, scouts, and other unarmed or otherwise vulnerable ships off the Ship Combat Display screen. Instead, it prefers to leave them like sitting ducks back at your start line.
- The AI has an occasional tendency to fire its missiles at the first opportunity. Early in the game, this means that enemy ships could retreat backward beyond missile range, rendering those missiles useless. A canny player would fire these older, slower missiles when closer to their target.
- The AI is cautious when it comes to charging enemy missile bases. Ship groups with only a limited ability to destroy missile bases (i.e., the computer calculates that their group could not destroy at least one with a single shot) will cower on the left edge of the screen and take their lumps, rather than charging in and, possibly, inflicting some damage to those missile bases.
- The AI tends, recklessly, to keep attacking ships that possess Damage Control, even when little or no net damage is being inflicted.



## THE DONE BUTTON

You will need to use the Done button only if you want to finish a group's actions for that round before it has exhausted its movement ability or fired all of its eligible weapons that turn (such as when withholding missile fire, as just mentioned). Pressing the Done button ends that group's turn for the current round. However, if the group still has unfired weapons, it will still conduct its normal defensive reaction fire.

## THE MISSILE BUTTON

Because ships are equipped with only a limited number of missiles (having racks with either two or five shots during an entire battle), and torpedoes need a turn to recharge before they can fire again, a tactical situation will sometimes occur in which it is wise to withhold firing them this round. Instead, you might want to blast away just with beam weapons (and bombs, if you are able and willing). To withhold missile and torpedo fire against a selected target, select the Missile button. Usually, withholding missile and torpedo fire will require you to press the Done button to end that ship group's turn during that combat round.

## THE RETREAT BUTTON

Pressing the Retreat button gets ship groups off the Ship Combat Display screen and stations them nearby where they must await the outcome of the battle. If the battle is won, they will rejoin their victorious fleet over the contested star. If lost, they will be given retreat orders to head to their nearest colony (orders that you can override; see Chapter 3).

On the Ship Combat Display screen retreating ship groups do the following:

- They will move away from enemy ship groups as rapidly as they can.
- They might not fire on enemy ships, even with reaction fire, while retreating.
- They will bombard enemy planets, however, while retreating.

Note that Battle scanners continue to work on the Ship Combat Display screen, even after a ship group retreats. For example, say you put Battle scanners on your colony ship and it finds itself, along with some of your other ships (none of which have Battle scanners), in a fight. Not wanting to lose your colony ship, you retreat it on the first round of combat. However, even though they're out of there one round later, you can still fully scan the enemy fleet and planet for the duration of the battle!

## THE SPECIAL BUTTON

A common beginner's mistake while learning *Master of Orion* is to press the Special button in hopes of making something special happen. Instead, just the opposite occurs. When activated, the Special button prevents a ship group from firing certain special weapons. In this way, you can prevent putting an unintended target in a stasis field or damaging all of your own adjacent warships in a friendly pulsar attack. (These special weapons are explained later in this chapter).

## OFFENSE VERSUS DEFENSE

At this point, we need to discuss what happens when a normal beam, missile, or torpedo weapon impacts a ship's defenses. Because the *Master of Orion* manual does a very good job of explaining this, we review only the salient points of offense versus defense for our discussion here.

## **FIRING SEQUENCE**

All of a ship's weapons and special devices are employed in the following sequence:

1. Decloaking (if cloaked and firing)
2. Stasis Field Generator
3. Ion and Neutron Stream Projectors
4. Energy and Ionic Pulsars
5. Warp Dissipator
6. Black Hole Generator
7. Technology Nullifier
8. Normal weapons (beams, bombs, missiles, etcetera)
9. Repulsor Beam
10. Recloaking (if uncloaked and nothing was fired)

Normal weapons fire in the order in which they were placed on the New Ship Design screen (see Chapter 9). In other words, if your four weapons appear in a certain order (e.g., Neutron Pellet Guns, Gatling Lasers, Hyper V Rockets, and Nuclear Bombs), then that is exactly the order in which they will fire against the targeted enemy ship group. Consequently, there is a little strategy involved in the order that you place weapons and the range at which you fire them.

## **BEAM WEAPON COMBAT**

For beam weapon attacks, the Attack level equals the firing ship's battle computer level: +1 if the ship has Battle scanners and +3 if firing a Megabolt Cannon.

A ship's beam weapon Defense level is based on its maneuverability (which is enhanced by Inertial Stabilizers and Nullifiers by +2 and +4, respectively) and size. (Medium and small ships receive +1 and +2 to their beam defenses,

respectively, whereas huge ships suffer a -1 beam weapon Defense level penalty.)

For each square a beam weapon is firing beyond one, +1 is added to the target's Defense level. Each asteroid square fired through tacks on another +3 to the target's beam Defense level. Cloaked ships receive an additional +5 levels of defense and are immune to Stasis Field Generator attacks. Finally, if the defender has a Displacement Device, 34 percent of all non-special weapon attacks will simply miss.

Note that when a beam weapon halves enemy shields, it is only versus *that weapon's attack*. Other beam weapons firing on that same target group will be resisted by full-strength enemy shields.

## **MISSILE WEAPON COMBAT**

For missile and torpedo attacks, the Attack level equals the firing ship's Battle Computer level, plus the weapon's attack bonus, as listed in Table 7-2. Note that torpedoes need recharging for one turn after firing and, thus, the fastest they can be fired is every other turn.

A ship's missile Defense level is also based on its maneuverability (which is enhanced by Inertial Stabilizers and Nullifiers by +2 and +4, respectively), size (again, medium and small ships receive an intrinsic +1, and +2 for their missile defenses, whereas huge ships have that same -1 penalty for their unwieldy size), plus its ECM rating.

Firing these weapons through an asteroid square will eliminate some of them (see Table 7-1). Cloaked ships receive an additional +5 levels of defense. If the defender has a Displacement Device, 34 percent of all nonspecial weapon attacks will simply miss.

Certain special devices provide a point defense against missile attacks. These are Anti-Missile Rockets, Zyro Shields, and Lightning Shields. These have a 40, 75, and 100 percent chance of stopping an attacking missile, respectively, less 1 percent per Tech level of the attacking missile (see Table 7-2).

### RESOLVING NORMAL COMBAT

Combat is resolved for each weapon's attack by determining the *combat differential* (i.e., the difference between the attacker's final Attack level and the target's final Defense level), then rolling a d100 (see Chapter 1), and consulting Table 7-3 to determine if that attack hit the target.

For example, your Graviton Beam, which does 1 to 15 points of damage, fires with a +10 combat differential versus the target's beam defense. Therefore, it automatically hits. (Any attack differential of +5 or greater automatically hits.) By looking under +10 in Table 7-3, you'll see the number 33.3 percent. This is the amount lopped off the lower end of the Graviton Beam's damage range, owing to the high combat differential. In effect, the damage range will be changed from its normal 1 to 15 points of damage to a new range of 6 to 15 points of damage (the bottom 33.3 percent having been removed because you achieved a +10 combat differential). Therefore, the higher your

**Table 7-2** Attack Bonuses by Weapon Type

Weapon	Required Technology Level	Attack Bonus
Nuclear Missiles	1	0
Hyper V Rockets	4	0
Scatter Pack V Rockets	11	0
Hyper X Rockets	7	+1
Mercurite Missiles	14	+2
Scatter Pack VII Rockets	27	+2
Stinger Missiles	18	+3
Scatter Pack X Rockets	44	+3
Anti-Matter Torpedoes	23	+4
Pulson Missile	29	+4
Hercular Missiles	34	+5
Hellfire Torpedoes	40	+6
Zeon Missiles	41	+6
Proton Torpedoes	43	+6
Plasma Torpedoes	50	+7

**Table 7-3** Using the Combat Differential to Calculate the Probability of Scoring a Hit with Nonspecial Weapons<sup>a</sup>**Combat Differential: Attack Level minus Defense Level**

-5 or <u>less</u> 5 <sup>b</sup>	-4 10	-3 20	-2 30	-1 40	0 50	+1 60	+2 70	+3 80	+4 90	+5 or <u>more</u> 100
+6 9.1 <sup>c</sup>	+7 16.7	+8 23.1	+9 28.6	+10 33.3	+11 37.5	+12 41.2	+13 44.4	+14 47.4	+15 50.0	

<sup>a</sup>Corrected, expanded, and presented differently from the *Master of Orion* manual.<sup>b</sup>Numbers in this row represent the probability (percent change) of scoring a hit with a nonspecial weapon.<sup>c</sup>When the combat differential is +5 or more, nonspecial weapons always score; numbers in this row therefore represent the best possible increased percentage in bomb and beam weapon attack effectiveness. (Does not apply to missiles, torpedoes, and biological weapon attacks.)

combat differential, the more damage your beam and bomb attacks will do on average.

Note the following when using Table 7-3:

- For each square a beam weapon is firing beyond one, +1 is added to the target's Defense level.
- Cloaked ships receive an additional +5 levels of defense.
- If the defender has a Displacement Device, 34 percent of all nonspecial weapon attacks will simply miss.
- The Alkaris increase all their Defense levels by +3.
- The Mrrshans increase all their Attack levels by +4.

If a missile or torpedo hits, it does damage equal to its strength, less the value of the defender's shields. Beam weapons and bombs, however, have a range for their attack strengths (e.g., basic lasers do 1 to 4 points of damage when they hit). For these weapons, when the d100 roll equals their minimum chance to hit,

the minimum damage listed for that beam weapon or bomb is inflicted on the target, modified if you have a +6 or greater combat differential (as explained in Table 7-3). If the die roll is 100, the maximum amount of damage that weapon can do is inflicted on the target. Any roll in between is interpolated for the amount of damage scored within the range of hits that weapon can inflict.

For example, when you fire a Heavy Laser with an Attack level of 3 at an enemy ship with a Defense level of 3, it has a 50 percent chance to hit. Thus, it will hit if the d100 roll is 51 or higher. The Heavy Laser, which does 1 to 7 points of damage, is accompanied by a die roll of 75, midway between the minimum 51 it needed to hit (which would have inflicted only the minimum amount of its damage range) and the maximum roll of 100 (which would have inflicted the maximum amount of its damage range). Therefore, the Heavy Laser does half its damage range, which is 4 points of damage.

## APPLYING COMBAT LOSSES

When one group of ships fires at another, every weapon within range from every ship in the firing group fires individually, each with its own d100 die roll. Thus, if you have a group of 10 ships, each armed with 5 Gatling Lasers (each of which makes four separate attacks) and 10 Neutron Pellet Guns, and you fire the weapons of this ship group at an adjacent target, the computer would make 300 separate die rolls on Table 7-3 to resolve the attack.

Defending groups take losses one ship at a time. Imagine each ship group as a tall stack of cardboard chits, each representing a single ship—only the top ship in the stack is subject to taking damage in combat from nonspecial weapons. If (and when) it is destroyed, damage from subsequent weapon fire will then be applied to the next ship in the stack, and so on until the ship on the bottom is reached.

## SHIELD LEVEL DAMAGE SUBTRACTION

Suppose a die is rolled and your nonspecial weapon actually hits the target—what then? The target's shield rating is subtracted from the amount of damage your weapon inflicted. In other words, only damage in excess of the target's Shield class is counted. Thus, a ship or missile base with a high-enough shield rating will be immune to certain low damage level attacks.

## A NOTE ABOUT HALVING SHIELDS

Some weapons and specials halve a target's shields. Occasionally, this will be applied multiple times during an attack. When this occurs, the target's shields are halved once, rounding

any fractions down, then halved the second time, again rounding any fractions down. That final shield rating number is subtracted from the attack's damage if it hits the target.

For example, say your planet has a combined shield strength of 31 and an enemy ship group fires on it with a Particle Beam attack backed up by an Oracle Interface, each of which halves a target's shielding. When your planet's shields are halved the first time, their strength will be 15.5, which rounds down to 15. When halved again, they will reduce to 7.5, which rounds down to 7. Thus, your planet will have an actual shield rating of 7 versus this attack.

## DAMAGE BURST GRAPHICS AND DAMAGE VALUES

When you hit an enemy ship and damage it, a graphic burst or explosion appears over it. The size of the burst is relative to the average amount of damage inflicted by each type of weapon, and is supplemented by a number inside it, showing the hit points subtracted from the target ship group. By carefully observing an attack and noting the order in which hits and misses are registered, you can tell (by consulting the design specs of the attacking ship to determine the order in which each weapon is fired) which of your weapons are having what level of effect against that target's defenses, and vice versa.

## AVOIDING EXCESS DAMAGE

Naturally, the computer resolves all of this in an instant. To continue with the above example, if you were amazingly lucky (and were firing at small ships with no armor or shields to speak of), those 300 shots could, in theory, destroy 300 ships. What generally happens, however, is more like the following.



Let's say that you have plenty of a particular weapon type in your stack, and that it is inflicting an average of five hits per shot at the target group. As you whittle down the hit points remaining on the top ship in the enemy stack, one of your die rolls leaves that ship a single point away from destruction (pay attention; here's the gimmick): The next shot that hits it, even if it would normally do 100 hits, will only do 1. In other words, it can only *finish off* the top ship in the stack, and all of the extra damage it would do beyond killing that top ship is wasted.

The moral of this story is, ships equipped with a few, big, heavy weapons can't efficiently reduce huge swarms of small enemy ships. The big ships simply can't kill them fast enough. When you are faced with masses of small enemy ships, remember that certain weapon types are much better suited for their rapid elimination. Scatter Pack Rockets (which MIRV into multiple warheads, each making a small attack), beam weapons that fire multiple times per turn (Gatling Lasers, Gauss Autocannons, Auto Blasters, and Pulse Phasors) and "streaming" weapons, whose excess damage against one ship carries over as damage to the next one in the stack (Graviton and Tachyon Beams), are the proper tools with which to defeat swarms of small enemy ships.

### **SPECIAL ATTACK DEVICES**

Certain special devices can be added to your ship designs that will bring an enemy ship to ruin. We've listed them here. To find the ship designs best suited to use these devices, see Chapter 9.

### **BLACK HOLE GENERATOR**

A Black Hole Generator is a nasty level-43 Force Field technology that completely wipes out 26 percent (not 25 percent, as stated in the *Master of Orion* manual) to 100 percent of ships in targeted stack, less 2 percent per level of their shielding. If the target ship group is equipped with Inertial Stabilizers and Nullifiers, those will also reduce the damage it suffers from Black Hole Generator attacks by 15 and 30 percent, respectively. Note that this weapon kills huge ships as easily as small ones, and is also quite useful against missile bases. See Table 9-8 for more information about the combat effectiveness of a Black Hole Generator.

### **ENERGY PULSARS AND IONIC PULSARS**

Energy Pulsars and Ionic Pulsars are, respectively, level-16 and level-40 propulsion technologies that expand a sphere of energy out from the firing ship group to all adjacent squares, hitting friend and foe alike. A pulsar attack does an identical amount of damage to every ship in a group. The strength of an Energy Pulsar attacking ranges from a random 1 to 5 for the first ship in the group, +1 for every pair of ships in the group making the pulsar attack. The strength of an Ionic Pulsar attack ranges from a random 1 to 10 for the first ship in the group, +1 per ship in the attacking group. Thus, the more ships in the attacking, Pulsar-armed ship group, the greater the random damage spread will be, and the greater their average attack strength. Note that enemy shields will reduce pulsar attack damage.

For example, suppose a group of 50 ships fires Energy Pulsars while stationed next to three enemy targets. Each adjacent group will suffer



its own random 1 to 29 hits (5 for the first ship, plus 24 for the 24 complete pairs of ships remaining in that group, excluding the first ship).

Interestingly, this damage is applied to each ship's *maximum hits* (i.e., its *armor value*) as opposed to reducing its current hits available. This is the number to the right of the slash when examining a ship via the mouse and looking at the lower-left corner of the Ship Combat display. Whenever a ship's armor value falls below its current hits available number, the hits available number is lowered to match the new, reduced armor value (i.e., a ship can never have more hits available to it than its current armor value).

This means that a ship with 1 hit remaining of a possible 100 (i.e., it reads 1/100 at the lower-left corner of the Ship Combat Display screen) that takes 40 in damage from a pulsar attack will now read 1/60 on the display, and not be destroyed! If that same ship were at full strength before the attack (i.e.,  $^{100}/_{100}$ ), it would be reduced to  $^{60}/_{60}$  after this pulsar attack, as the first number (hits remaining) can never exceed the second number (its armor value).

For example, suppose you have a group of 101 ships armed with Energy Pulsars and you carefully move it away from your other ships and next to several enemy ship groups. When the Energy Pulsars fire, they will do from 1 to 55 in damage (1 to 5, plus 50 for the 50 complete pairs of ships in the firing group). Any damage that penetrates the target's shields will reduce the armor of every ship or missile base in each adjacent stack. Note that a die is rolled separately for each stack. Thus, one stack might have every ship hit with a damage level of 1,

whereas the next group might get hit with the full level-55 damage from that same attack.

Automated Repairs and Advanced Damage Control counter the armor-damaging effect of pulsar attacks. They can raise the armor value of every ship in the stack just hit by a pulsar through their normal repair operations. If a ship's current hits available number is repaired above its newly reduced armor value (e.g., by a pulsar attack), then the armor value is also repaired to match it.

## HIGH ENERGY FOCUS

High Energy Focus is a level-34 propulsion technology allowing beam weapons (i.e., every weapon listed on the Beam Weapons Table in the game's Technical Supplement) to fire at a range three squares greater than normal. Thus, most beam weapons on a ship equipped with High Energy Focus have a range of four squares. Heavy beam weapons and Disruptors will have a range of five squares, and Stellar Converters have an impressive six-square range. Of course, +1 is still added to the target's Defense level for every square any beam weapon is fired beyond one, but hey...taking a few free pot shots before an enemy closes in to fire its (shorter range) beam weapons is well worth it!

This is arguably the single most potent special offensive weapon in the game, as it can render missiles and torpedoes virtually obsolete by reducing the advantage of their longer range. Besides, you can fire beam weapons every turn, whereas missiles eventually run out and torpedoes can only be fired, at most, every other turn.

## **ION AND NEUTRON STREAM PROJECTORS**

Ion and Neutron Stream Projectors are, respectively, level-21 and level-47 weapons technology specials that hit every target in the defending group. An Ion Stream Projector reduces the target's current armor value (see "Energy Pulsars and Ion Pulsars," above, for an explanation of how that works) by 20 percent (plus 1 percent for every pair of ships in the attacking group), up to a maximum of 50 percent in a single attack. A Neutron Stream Projector is twice as effective, destroying 40 percent of every target ship's armor, plus 1 percent per attacking ship, up to a maximum of 75 percent in a single attack. The target group's shields do not reduce this damage in any way.

What this means is that a stack of ships with an armor value of 100 that is reduced by 50 percent through a stream projector attack will have a new armor value of 50. If they take another 50 percent hit on their armor again next turn, it will be based on their current armor rating and, thus, their armor will be halved to 25, and so on. It is possible to destroy an entire stack of ships using these stream weapons by reducing their armor value to less than one, but it takes time. Having multiple ship groups armed with stream projectors concentrating their fire at the same target is an effective way to eliminate that group quickly.

## **ORACLE INTERFACE**

Ships equipped with an Oracle Interface, a level-46 computer technology, have all of their beam weapons fire into a single, simultaneous burst along a tiny sector of the target ship's defensive shielding. A ship group armed with

an Oracle Interface, therefore, can halve the target's shield strength (rounded down to the nearest whole number) against all of the attacking ship group's beam weapons.

## **SPECIAL DEFENSE DEVICES**

Certain special devices, when added to a ship's design, can improve its defenses and increase its survivability in combat. We've listed them for you in this section. To find the ship designs best suited to use these devices, see Chapter 9.

## **ANTI-MISSILE ROCKETS, ZYRO SHIELDS, AND LIGHTNING SHIELDS**

Anti-Missile Rockets are a level-6 weapons technology, whereas Zyro Shields and Lightning Shields are level-31 and level-46 force field technologies, respectively. All of these provide a point defense against missile and torpedo attacks. They have a 40, 75, and 100 percent chance, respectively, of stopping an attacking missile or torpedo, less 1 percent per Tech level of the attacking missile or torpedo (see Table 7-2 for these Tech levels).

## **AUTOMATED REPAIR SYSTEMS AND ADVANCED DAMAGE CONTROL**

Automated Repair Systems and Advanced Damage Control (level-14 and level-36 construction technologies, respectively) make ships tougher to kill. With Automated Repair Systems and Advanced Damage Control, undestroyed ships will automatically repair up to 15 or 30 percent, respectively, of their total, prebattle hit points at the end of each round of combat.

This has an effect similar to that of the mythical hydra growing back heads as fast as they

can be lopped off. When attacking ships that have these systems, you can't kill them unless you can inflict more damage on them than they can repair each round. Keep an eye on how ships equipped with these defenses are doing by putting the cursor over their group and noting if their hits remaining (i.e., current hits available number) drops and stays below its armor value. If not, it will take more firepower concentrated against these ship groups to do any lasting damage in that battle.

Note that these repair and damage control systems really pay dividends on larger ship types, as they can repair more damage points per turn. For smaller ship designs, these repair systems are particularly useful in undoing the damage caused to their armor by pulsar and stream projector weapons.

## CLOAKING DEVICE

A Cloaking Device is a nifty level-27 force field technology. A cloaked ship receives +5 to its Defense level versus beam and missile weapon attacks. (They don't help against special weapon attacks, however.) Ships must decloak to fire, but will always shoot first when doing so. This is one way to guarantee you'll get in the first blow against an enemy with a higher initiative. In fact, your opponent loses defensive fire ability while you are cloaked. Note that if you decloak and *then don't move*, enemy ships will still not get their automatic defensive reaction fire—they fire a reaction shot only when a decloaked ship actually moves.

After one turn of not firing, uncloaked ships automatically recloak. Cloaking is good for ships armed with short-range weapons (beams and bombs), as it allows them to close with the enemy at a reduced risk to themselves. As an

added bonus, cloaked ships cannot be placed in a stasis field caused by enemy Stasis Field Generator attacks.



**HINT** *Decloaked ships that are about to be hit by enemy missiles or torpedoes and have not fired their weapons this turn can recloak before those bogies impact them simply by pressing the Done button. This should greatly reduce the amount of damage they'll suffer when those bogies hit.*

## DISPLACEMENT DEVICE

The Displacement Device (level-50 propulsion technology) is sheer simplicity. If a defending ship group is equipped with displacement devices, 34 percent of all nonspecial weapon attacks against it will simply miss. Before each such attack is conducted, the computer decides if it misses due to the defender's Displacement Device. Neat, huh?

## REPULSOR BEAMS

Repulsor Beams (level-16 force field technology) do two things at once: (1) push enemy ships one square away from the ship group firing them (after hitting the bad guys with their other weapons first) and (2) push all ship groups back that attempt to move next to ships armed with Repulsor Beams (*before* they can fire their weapons!). In effect, it makes a ship virtually immune to all enemy weapons with a one-square range.

One interesting note is that multiple ship groups equipped with Repulsor Beams can hand off repulsed enemy ship groups to each other. In effect, they push them back one square each in the same combat round. There are two caveats. First, if a ship is cornered against the

map edge, other ships, asteroids, and so on, it cannot be pushed back. Second, if an enemy ship has superior initiative and you close with it, it *will* get its defensive reaction fire before your Repulsor beam can fire and push it back.

Repulsor Beams are not foolproof, however. Cloaked ships, and those moving via Subspace Teleporters, can move adjacent to Repulsor Beam-equipped ships and open fire before they are pushed back by the Repulsor Beam. Ships with working Subspace Teleporters, of course, can get around a Repulsor Beam whenever they move, in any case.

## **STASIS FIELD GENERATOR**

A Stasis Field Generator is a level-37 force field technology device with a one-square range. A group of ships hit by a Stasis Field Generator is effectively out for one round of combat. Any missiles they previously fired continue to track their targets, but lose their "To Hit" bonus while the firing ships are in a stasis field. While trapped in a stasis field, that group of ships may neither move, fire their weapons, nor be fired on. Missiles and torpedoes targeted at a ship group in stasis will simply disappear without attempting to close or impact (so be careful not to put these already targeted enemy ship groups in a stasis field!).

By using these stasis fields wisely, you can "divide and conquer" an enemy fleet, blocking one strong element while concentrating your strength in destroying another.

Remember, Stasis Field Generators must be turned off manually in order not to be used against the first target you shoot at! Therefore, if you want to fire against another ship first, use the Special button to turn off the Stasis Field Generator. After that attack, select the

Special button again to turn the Stasis Field Generator back on.

An enemy ship group comes out of a stasis field at the beginning of the move of the ship group that placed it there. When leaving a stasis field, the enemy has a de facto Wait command issued to it and, thus, its initiative will be zero for that turn (i.e., it will move last that round and can't conduct any defensive reaction fire). This makes ship groups vulnerable to being repeatedly put back into stasis each turn they emerge from stasis.

Here's a good trick to use: Build a single, 2-rack missile on ships armed with a Stasis Field Generator. If you turn the missile and special weapon's firing abilities off, you can blast an enemy ship group with all of your other weapons and it will still be the firing ship group's move. Turn the special weapons back on, hit the same target group with the Stasis Field Generator and repeat this process every turn. They'll never get to fire back!

Three targets are immune to the effects of a stasis field attack: cloaked ships, planets, and the special ships (i.e., the Guardian of Orion, the Space Amoeba, and the Space Crystal).

## **TECHNOLOGY NULLIFIERS**

When armed with Technology Nullifiers (level-49 computer technology), your ships will have the one weapon for which there is no defense or counter. Technology Nullifiers will automatically hit any enemy target ship group within four squares, jamming their battle computers and ECM systems. Each hit reduces both the target's Battle Computers and ECM by two to six levels (not one to three, as the manual says).

Each system hit is figured out separately by the computer, rolling two three-sided dice; thus,

the damage will tend to average out around four levels per system per hit. Damage done by Technology Nullifiers is cumulative over the course of a battle and is automatically repaired at the battle's conclusion.

Note that if enemy ships are damaged by Technology Nullifiers while their missiles or torpedoes are en route to one of your ship groups, it will reduce their Attack level on Table 7-3. In other words, you can screw up their bogies' shipboard *active homing* by hitting enemy ships with Technology Nullifiers. Therefore, it is always a good tactic to zap enemy missile bases and missile/torpedo armed ships with Technology Nullifiers at every opportunity.

### WARP DISSIPATOR

The Warp Dissipator is a level-20 propulsion technology that fires a disrupting beam at the engines of an enemy ship group. It has a three-square range and a 50 percent chance of hitting. Ships hit by a Warp Dissipator attack are *slimed* with green splotches and have their combat speed reduced by one and maneuverability reduced by two (which also lowers their base Beam and Missile Defense levels!). As with Technology Nullifier attacks, damage done by Warp Dissipators is cumulative over the course of a battle and is automatically repaired at the battle's conclusion.

However, if a ship is reduced to zero maneuverability (i.e., it's dead in space on the Ship Combat Display screen), it no longer has the option to retreat. Therefore, it cannot warp out of the battle. This means that it must fight from its current square to the death (which will often be the case due to the reduction in its beam and missile Defense levels) or the

expiration of the 50-round time limit. The exception is that ships already retreating (i.e., those that have received a retreat order on the previous turn) will still escape. Warp Dissipators do not affect a ship's ability to use Subspace Teleporters, even when that ship is dead in space.

### COMBAT MISSION OBJECTIVES

Before maneuvering your ships in battle, it is important to remember why they are there in the first place. In other words, for every battle, you should consider your fleet's *mission objective*. Knowing what a fleet is trying to achieve in battle allows it to move and fight with a purpose. Remember, your fleet's objective is far more likely to be achieved when it is clearly defined by you, the admiral on the scene. What follows is our listing of various fleet mission objectives and the goals they present you in tactical space combat.

### SECURE AN UNCOLONIZED PLANET FOR FUTURE EXPANSION

Securing an uncolonized planet is, perhaps, the easiest of all. After discovering a planet to colonize, securing it is usually a simple matter of leaving a garrison there. That garrison's mission is to prevent other players from sneaking in and colonizing it before you can.

During the first few turns of the game, almost anything will make an effective garrison, even a single scout ship. That is because the other players will be building primarily scout- and early-colony-ship designs. Because both are unarmed ships, the computer player's artificial intelligence automatically withdraws them from battle (whether your garrison there has any weapons or not).



Soon enough, however, the computer players begin to send out armed colony ships and to escort them with fighters and other warships. At that point, you have to start second-guessing them and leaving garrisons with adequate strength to shoo away these colonizing raider fleets. Once you retreat from a planet you wish to colonize later, it's almost a sure bet that a computer player will seize it. Therefore, always maintain a(n increasingly stronger) garrison over worlds that you plan to colonize when you're able.

## **PROTECT AN EXISTING COLONY PLANET**

Protecting an existing colony planet is the most important defensive mission in the game. As technologies and tactics shift the edge in battle back and forth between attacking and defending forces, it will always remain an important concern to protect the colonies you've already got. Besides building adequate planetary missile bases (which we discuss in Chapter 8), it is also the task of your fleet to protect its citizens from marauding aliens.

First, of course, you've got to have a fleet with which to defend them—this means actually building one. Having a force of ships available, first for an adequate defense and, later, for a potent offense, is your initial step. Next, that fleet must be designed correctly for the task at hand so that it at least matches (or, hopefully, outclasses) potential attackers. Such ship design considerations are the subject of Chapter 9.

Finally, each ship can be in only one place at a time. Therefore, relieving a defending planet before the enemy flattens or captures it is often a matter of your fleet's speed and proximity. Keeping reserves available that can "head the

enemy off at the pass" and get to the destination they appear to be attacking, either before or at the same time they do, is another important building block of defense. Arriving too late often means that your planet winds up either ruined or conquered.

Of course, when the enemy stops bombarding one of your colonies over which their fleet reigns supreme, that can only mean one thing—their invasion transports are on their way. This should give you a little more time to muster a fleet and try to regain control of space above that planet. The question is, can you muster the strength needed and get it there before the enemy soldiers land on and, possibly, take over your colony?

## **RECONNOITER**

The simple mission of reconnoitering, that is, sending ships to explore a neighboring star, is not always as easy as it seems. Besides ships needing a range adequate to reach the star you wish to observe, there might be others already there who do not wish you to reconnoiter that star. While early in the game reconnaissance is easy, as most of the ships exploring will be unarmed (and you can win any battle with them by simply doing nothing, as computer players' unarmed ships always retreat at the first opportunity), this situation quickly changes. When it does, you must conduct more reconnaissance missions *in force*. Unless you can gain space superiority over the planet you wish to observe, you'll be retreating without a clue as to that star's planet. If there is a colony there that does not belong to an ally, this means that you'll also have to destroy all of its missile bases to get a good, lasting look at it.



Without complete reconnaissance of a planet, you can't send transports to it. This means that you can't invade an enemy planet until it has been thoroughly reconnoitered. By doing so early, before an enemy builds up a planet's defenses, you will be allowed to make a surprise attack on it, coordinating invading troops with your attacking fleet and trying to *hole-in-one* the planet by simultaneously clearing the space above it, destroying its missile bases, and capturing it by invasion, all on the same turn. If that enemy planet had not been previously explored, however, you could not launch the transports until after you've defeated the enemy there and gotten a look at the planet's size and atmosphere. Sending troops after the space battle has been decided might give the enemy the time he or she needs to regroup and take back the space above it, which would leave your late-arriving storm troopers in a very bad situation (see Chapter 8 for the gruesome details).

Once you discover the level-23 computer technology of Advanced Scanners, this mission becomes virtually moot. Meanwhile, however, reconnaissance will be an important tool for discovering and then keeping tabs on other players' colonies.

## TEST YOUR WEAPONS

Testing your weapons—that is sending out the first ship(s) built to new design specs and testing them in battle somewhere—is pointless. Naturally, you will want to protect them with adequate escorts in battle, but finding an enemy who will play is not always easy. If you engage an enemy fleet that is too weak, they'll retreat before you can really test out your new ship design. If they're too strong, it could be a very

short test from which you will not get adequate feedback about your new ship design's abilities in battle. Like Goldilocks, you've got to find an enemy fleet that is *just right* to engage for conducting this combat field experiment mission.



*Save the game before conducting these weapons tests. That way, you can restart the game and have the benefit of the test results without starting a war to get them!*

## HARASS AN ENEMY FLEET

Occasionally, you will design ships that cannot survive a close-quarters space battle, but are devastating from long range. The mission of these ships is to raid enemy fleets, using *shoot-and-scoot* tactics. This is accomplished by sending them off to battle, firing their long-range weapons (usually missiles) to destroy a few enemy ships or bases, and then retreating before the enemy can close in and hit back hard. Note that after your ships retreat you can send them back next turn to the planet they just raided by issuing a new movement order to the retreating group (see Chapter 3).

The secret to a successful raiding mission is timing. Never stay a moment longer than it takes your last missile to impact—that is the longest that you should stay in combat during a raid. If the enemy closes too quickly, you may be obliged to fire only some of your missiles or to leave before seeing them impact, in order to get your raiders out of there intact. Making this difficult judgment call, however, is yours. We can't tell you exactly when to hold 'em and when to fold 'em, because so much depends on the other players' ship designs.

## **DISRUPT AN ENEMY ASSEMBLY POINT WITH FRIENDLY SPACE SUPERIORITY**

The computer players' tactic is to form up the fleet at an *assembly point* planet before launching. When you are the target of that fleet's wrath, the assembly point will always be a colony friendly to the enemy (i.e., one owned either by that enemy player or an ally) and that is located closest to your empire's physical and economic *center of gravity*. This center of gravity is a difficult concept to explain; suffice it to say that the computer players' fleet will assemble as close as possible to as many tempting targets as your empire has to offer. It can be extremely useful to know where an enemy's assembly point is.

To destroy the enemy's fleet, you must find it first. When they're massing at an assembly point, finding that enemy is easy. By invading the space over their assembly point colony, you can pick off enemy ships as they straggle in to reinforce the recently defeated enemy armada. Maintaining space superiority over an enemy assembly point forces that computer player to seek another, less advantageous, one at which to gather. Of course, it also puts that enemy colony at the mercy of your ship's guns and leaves it ripe for the plucking by your storm troopers (heheheh).

Conquering an enemy assembly point tells the enemy that (1) it should reconsider attacking you, and (2) if it does, it must recoordinate its fleets to an alternate, less advantageous, assembly point. If you like, you can "mess with the mind" of a computer opponent and *not* leave your fleet over her assembly point and *not* eliminate or capture her colony there (although you

can bombard it a little, if you like, just to say "Hi"). That way, she'll probably continue to use it as her assembly point, and you can sail your fleet over there every few turns and wipe it out.

## **OBTAIN SPACE SUPERIORITY AS A PRELUDE TO INVADING AN ENEMY PLANET**

Obtaining Space Superiority is the usual preliminary to attacking planets you have not previously explored. This is because you can't send transports concurrently with a battle fleet to unexplored planets. The warships must therefore clear the space over the targeted enemy colony, explore it, and await the arrival of your storm troopers.

The big question here is, should you bombard the planet as a prelude to invasion? Although the details of ground combat are explained in Chapter 8, suffice it to say here that preinvasion bombardment of an enemy colony depends on a few things:

- If you want to capture all of the factories intact, you generally shouldn't bombard the planet first.
- If it looks like you might lose the fight on the ground, go ahead and bombard the planet and kill off some of its defenders, even if that means wiping out all of the factories. It's more important to win the land battle than to capture factories.
- If your fleet is so strong that you risk wiping out the colony completely if you bombard it, hold your fire if your soldiers are already en route. Wiping out the colony will instantly kill your storm troopers the moment they arrive, if you haven't established a new colony for them.

Another concern is to retain space superiority over that planet long enough for the invasion troops to arrive. Once they're en route, you're committed to keeping your fleet over the besieged enemy planet. Thus, it becomes that much more important that you don't retreat from a space battle even if it's not going well. Worst case scenario: If you flee while your storm troopers are en route, the fewer ships and missile bases you leave the enemy colony with, the more of your invading soldiers that are likely to land.

### **HARASS (BOMB FOR MINIMAL EFFECT) AN ENEMY PLANET**

Occasionally, there will be lulls in a war you are fighting. During these quiet times, it might be a good idea to raid an enemy planet and slap it around with a bit of bombardment from your fleet. The goal here is not to destroy the enemy colony there, but merely to reduce it so that it will produce less for the enemy and be easier for you to invade in future. This is especially useful if you don't have many colony ships, because it takes a long time to rebuild a planet's factories after you have wiped them out. Using biological weapons won't hurt the factories, but will reduce the planet's maximum population so much that most of those unscathed factories will be idle for some time while the planet is being cleaned up and repopulated.

There are also periods when you are not at war with another player, yet have no peace treaty, nonaggression pact, or alliance with him. You can harass this player, too, during these no war/no peace times, but beware of the political consequences for doing so (see Table 11-5). Such harassment can quickly lead to war under these circumstances.

### **REDUCE OR FLATTEN AN ENEMY PLANET**

There are other times, of course, where sending an enemy colony back into the stone age or even wiping it out completely becomes an important objective. There might be several good reasons for vaporizing another player's colony, including the following:

- To wipe out an enemy assembly point
- To rebuild that planet from scratch, using a colony ship en route
- To gain popularity with that player's enemies (see Chapter 11)
- To eliminate a few hostile votes before an upcoming election by the Galactic Council
- To vastly improve your Peace modifier (see Chapter 11) and get your opponent to negotiate at the peace table
- Just to take the enemy down a peg and undermine the total power of his empire (if pressed continuously he will lose the ability to wage war—the best defense being a good offense)

While ruthlessly smiting enemy colonies won't win you any Galactic Humanitarian Awards (which is fine, particularly if you're not playing as the Humans that game), who cares? Flattening enemy worlds is more than merely satisfying. It can be quite a time saver, particularly when you have a military advantage over another player whom you can grind down completely if you strike swiftly and strongly enough. In these cases, don't worry about the mess, just get the job done and you can sort things out later.

## **TACTICAL TIPS FOR SHIP-TO-SHIP COMBAT**

When maneuvering around on the Ship Combat Display screen, use certain tactics to improve your combat effectiveness in battle and reduce your enemy's. Although some of these can be seen by studying the computer player's battle maneuvers, it is in this arena of ship-to-ship combat that you will find your greatest edge in the game.

Space battles are deadly ballets, subtle in maneuver and rich in nuance. Computer player logic, here, is at its most predictable and fallible. Computer players simply cannot foresee or react correctly to every possible circumstance that a battle might present. You can, however, starting right here with this list of battle tactics. Although this list is not exhaustive, we have included what we feel to be the basic maneuvers you should know and a few clever tricks of our own, besides. Arm your torpedoes and full speed ahead!

### **CONCENTRATE YOUR FIREPOWER ON THEIR MOST DANGEROUS GROUP**

Know that *massing your firepower* is an important concept when selecting your target ship group. It does almost no good to do incremental damage on enemy ships, because they might flee (living to fight another day) or may repair themselves between combat rounds if equipped with Automated Repair Systems or Advanced Damage Control.

You should try to have large enough attacking groups to cleanly destroy many or all of the ships in a targeted group of enemy ships. Naturally, if you can, eliminate the most dangerous group first.

### **JUMP ON AN ISOLATED ENEMY SHIP GROUP**

Computer players tend to advance diagonally, often dividing their forces when doing so. Also, when one of their groups is faster than the others, it will distance itself from the pack and become exposed in its haste. When these opportunities present themselves, concentrate all of your firepower on this, the most vulnerable group. This allows you to engage that group with your greatest possible advantage in numbers and firepower.

### **SPLITTING FIRE BETWEEN MULTIPLE TARGETS**

When you want a single ship group to fire at multiple targets during a round, always shoot at the furthest target first and the closest target last. If a planet is one of your targets, always attack the planet last. In this way, your longer-range beam and missile weapons will not be expended against a close-range target that you fired on first.

### **RETREAT SPENT SHIPS TO SAFETY**

Ships armed solely with missiles or bombs are useless once their last salvo is fired. Do not leave them hanging around the battlefield to be destroyed at the enemy's leisure. Instead, withdraw them after their last shots have scored their damage.

There are several exceptions to this guideline. First, you may want to use those ships to physically block a square next to your colony, just to prevent the enemy from using it themselves. Second, spent ships with special devices like Stasis Field Generators or Repulsor Beams can still come in handy, especially when you

are defending a colony. Third, you might want to leave those spent ships dangling as bait, as explained in the next section.

### MISSILE BASE BAIT

Enemy ships on the attack tend to be more attracted to the ships you have defending a colony, rather than to the colony itself. You can use this to your advantage in two ways: First, you should try to leave a tiny fleet of bait *ships* over every well-defended colony you have, to lure computer players' fleets to stay there and fight. Computer players tend to retreat from battles when you have lots of missile bases and no ships for them to attack.

Second, because they tend to want to destroy your fleet before your planet and its missiles (with the exception of enemy *bombers*, which always make a bee line for your planet and begin attacking it immediately), try to keep a group of bait ships hanging around the battle for as long as possible. Although you may lose a few ships, this will be nothing compared to the many the computer player will lose to the devastating hail of fire from your missile bases.

### THE LONG AND FAST APPROACH

When your ships move faster than the enemy's (or move no faster than the enemy's but possess the initiative), *and* you have longer-range weapons, strive to position your ships so that you can shoot freely but the enemy can't shoot at you. This presupposes that you have at least one short range weapon on that ship design (see Chapter 9) or are keeping your ships at a safe distance, retreating while firing long-range defensive shots as the computer player's ships try to close with you.

### TIME DECLOAKING WELL

Cloaking Devices are generally used to support ships that are equipped with close-in weapons such as beams and bombs. Therefore, don't decloak a ship early to fire missiles at long range. (Hey, missiles are just as effective at short range.) Instead, close in with cloaked ship groups until they're at a favorable range for their principal weapons. Once they're at that distance, decloak and pound their target.

### BOMBERS: BOP OR BAIT?

The problem with *bomber* ship designs (i.e., those whose primary weapon load is bombs for reducing planets) is that they must survive a gauntlet of enemy ship and missile base fire before they can ever land their punch. To compound this problem, enemy computer players always prioritize known bomber groups as targets and try to eliminate them first (a sound strategy, by the way, which you would do well to emulate when defending your worlds).

Therefore, you can use your bombers in two ways: First, you can race them to the enemy's planet as quickly as possible, hoping that enough survive to drop sufficient bombs on the enemy colony to at least knock out all of its defense bases. Second, you can try to hang back with them and preserve them on the map for as long as possible. In effect, you're leaving them exposed as an enemy missile magnet because they tend to draw fire away from your other ships. However, you may not be able to hold your bombers in reserve forever; if the enemy has missile bases, he or she will have an unlimited supply of missiles to fire in that battle, and those missile bases must be destroyed at some point if you intend to win the battle.



## PROPER PULSAR PLACEMENT

It is a common mistake to use pulsar weapons when your own ships are next to them (oops!). Pay attention; don't do that. Pulsar weapons don't discriminate between enemy and friendly ship groups and will damage *everyone* who is adjacent to them!

## THE MISSILE REVERSE TECHNIQUE

Occasionally, you can retreat from enemy missiles until they run out of fuel (and, therefore, fail to hit you). You will notice the computer players doing this a lot, particularly early in the game when missiles move slowly and have short fuel ranges. You simply back up as fast as you can and hope they run out of gas. If you want, you can plan this technique carefully by comparing the bogie's speed and distance (as given in the game's Technical Supplement) to your ships' speed and working out the math to see if you can or can't outrun the incoming enemy bogies. If you can't, consider the Asteroid Screen technique described in the next section.

Because computer players often use this technique, you can turn it to your advantage while on the offense. Approach a fleet of enemy ships and shoot missiles that you know have a limited range. The computer player will back her ships out of range for that turn. However, the other ship groups that you don't target will continue to advance. This allows you a chance to attack and destroy these advancing ship groups before the retreated ships can close in again and influence the battle. In other words, by making the enemy split her forces, you can defeat each group separately by concentrating your firepower against each in turn.

## THE ASTEROID SCREEN TECHNIQUE

When a missile flies through an asteroid square, there is a chance that it will be eliminated (see Table 7-1). By skillfully maneuvering your ships that are targeted for enemy missile attacks, you can force bogies to home their way right through an asteroid square and, thus, reduce their strength through asteroid attrition. Using these asteroid screens might make all the difference between life and death when those bogies finally connect with your ships.

## REPULSING BOMBERS

When you have ships equipped with Repulsor Beams, keep them between enemy bombers and the planet you are defending. When employed properly, they can keep pushing those bombers away from your planet long enough for its missile bases and fleet to seriously reduce their numbers.

## MASS X SPEED = STRENGTH

Remember this: Operational speed multiplies combat power. That is, if your ships' warp engines move them twice as fast as a computer player's, you can engage your fleet in two battles in the time it takes him to get to one. This is an argument for mixing the types of ships in your fleet (as explained in Chapter 9), because you can defend a planet and then race back to the undefended enemy planet and destroy it by bombardment before its fleet can return.

Computer players are not programmed to exploit this principle. Instead, they tend to send out big fleets, wait for their battle result, and then form them up again at some assembly point. They do not rapidly follow up their



victories—which is something that you should do! Once you're winning the space battles, roll up as many enemy colonies as you can. You never know when your advantage will shift.

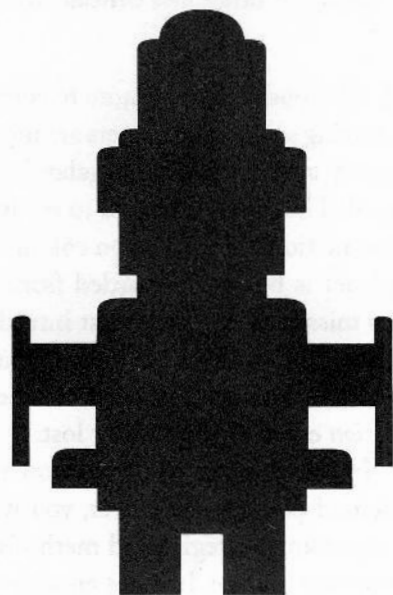
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## CLEARED FOR LANDING

This chapter has provided you with the nuts and bolts of starship combat and taught you how to gain space superiority over your foes. Together we have examined the mechanics of space battles, explored the nuances of initiative and timing, thought through mission planning, and presented proper tactics and techniques. In short, we've made you a qualified Admiral of your Star Fleet.

Clearing the space over enemy planets, however, is not enough. When planetary combat is involved, you must be more than an Admiral, you must be a General, too. When it comes to planetary defense or assault and battles between armies, *Master of Orion* offers more than meets the eye. So, load up some transports and drop in on the next chapter for our complete General's guide to planetary combat. 🛡️

# 8



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## *Planetary Combat*

*Thank goodness we don't live in medieval times  
when people fought wars over ideas.*

—General Wojciech Jaruzelski

♣ Obviously, there is more to combat than just clearing space. The planets are the prizes in this game, and dominating a galaxy's worth is your goal. Therefore, it is vital to study the military interaction that occurs on colonies. Whether a planet is being bombarded from space, firing its missile defenses against intruding ships, or struggling to fight off invading armies on the ground, planetary combat is where *Master of Orion* can truly be won or lost.

In this chapter you learn how to attack and defend planets. Moreover, you will also learn important strategies and methods for expanding your empire. It is not enough to know *how* to conquer another player's colony: you must also know *who* to attack and *why*. This chapter adds stars both to your shoulder epaulettes and to your empire. In other words, we'll make you as fine a general as has ever led a planetary assault or defense in *Master of Orion*.

## MISSILE DEFENSE BASES

A planet's best protection (other than that offered by a massive fleet in space above it) derives from its missile bases. A missile base is an immobile bunker on the planet's surface. It consists of a *slab* fortified by your best armor (which also determines the number of hits each base can take) and a three-tube missile rack (i.e., each shot from a single missile base fires three missiles). Missile bases can fire an inexhaustible supply of your latest missiles, each with enhanced speed and range.

Rounding out each missile base is its Deflector Shield, Battle Computer, and ECM Generator. Each of these is automatically equal to your highest level of discovery in those

technology areas. To top it off, each missile base has a free, built-in Battle Scanner that gives it not only the ability to scan enemy ship designs, but also adds +3 to its initiative and +1 to its Attack level (see Table 7-3). Once discovered, each missile base also receives a free Subspace Interdictor that prevents the use of Subspace Teleporters—sometimes even your own—around that planet.

## THE COSTS OF CONSTRUCTING MISSILE BASES

The total cost of a missile base is calculated by adding the costs for its various components. Notice that in the latest revision of the game (see Chapter 15), some things are less expensive to install on a missile base than on a large ship hull: the prices for the Armor, Battle Computer, Shield, and ECM components of a missile base add up to about 60 percent of what it costs to put each of these items on a large ship hull. Missiles, however, are more expensive because the bases can fire an unlimited number of them (and farther, too); it costs roughly 5.4 times more to place a missile launcher on your missile base than on a large ship hull.

Exact component costs for missile bases are listed in Table 8-1. Note that the individual component costs drop in price with miniaturization (i.e., 50 percent for each 10 levels), as explained in Chapter 10. The costs shown in Table 8-1 represent the maximum cost for each component, before any miniaturization savings.

As an example of how to use Table 8-1, consider a single missile base built at the start of

**Table 8-1** Cost Breakdown for a Single Missile Base

Component	Cost Per Base (in BCs) <sup>a</sup>	Hit Points per Base
Tech level 1 base slab	120	
<b>Armor</b>		
Titanium Armor	0	50
Duralloy Armor	36	75
Zortrium Armor	60	100
Andrium Armor	90	125
Tritanium Armor	120	150
Adamantium Armor	150	175
Neutronium Armor	180	200
<b>Specials</b>		
Battle Scanner	Free!	+3 initiative; +1 Attack level
Subspace Interdictor	Free!	Negates Subspace Teleporters
<b>Missiles<sup>b</sup></b>		
Nuclear Missiles	27	
Hyper-V Rockets	38	
Hyper-X Rockets	65	
Scatter Pack-V Rockets	97	
Mercurite Missiles	70	
Stinger Missiles	84	
Scatter Pack-VII Rockets	151	
Pulson Missiles	108	
Hercular Missiles	141	
Zeon Missiles	162	
Scatter Pack-X Missiles	162	
<b>Shields<sup>c</sup></b>		
Class I Deflector Shield	75	
Class II Deflector Shield	89	
Class III Deflector Shield	103	
Class IV Deflector Shield	117	
Class V Deflector Shield	130	
Class VI Deflector Shield	144	
Class VII Deflector Shield	158	
Class IX Deflector Shield	172	
Class XI Deflector Shield	186	
Class XIII Deflector Shield	199	
Class XV Deflector Shield	213	
<b>Battle Computers</b>		
Battle Computer Mark I	61	
Battle Computer Mark II	73	
Battle Computer Mark III	86	
Battle Computer Mark IV	99	
Battle Computer Mark V	111	
Battle Computer Mark VI	124	
Battle Computer Mark VII	136	
Battle Computer Mark VIII	149	
Battle Computer Mark IX	162	
Battle Computer Mark X	174	
Battle Computer Mark XI	187	
<b>Electronic Countermeasures</b>		
ECM Jammer Mark I	62	
ECM Jammer Mark II	69	
ECM Jammer Mark III	76	
ECM Jammer Mark IV	84	
ECM Jammer Mark V	91	
ECM Jammer Mark VI	98	
ECM Jammer Mark VII	105	
ECM Jammer Mark VIII	112	
ECM Jammer Mark IX	120	
ECM Jammer Mark X	127	

<sup>a</sup>Note: These BC (Billions of Credits) costs are the maximums for those technologies and do not reflect any savings for miniaturization (see Chapter 10).

<sup>b</sup>These missiles are fired in salvos of three per base per combat round. They have a +1 speed bonus and double their normal range.

<sup>c</sup>Shields are paid for even by missile bases built on planets in nebula clouds, where shields have no effect.

the game. The total cost to build it would be 283 BCs, broken down as follows:

Base slab	120
Titanium Armor	0
Nuclear Missiles	27
Class I Deflector Shield	75
Battle Computer Mark I	61
No ECM Jammer technology at start	0
Battle Scanner	0
<b>Total</b>	<b>283 BCs</b>

This new, early model missile base will:

- Cost 283 BCs to build and 2 percent per turn to maintain
- Require 50 points of damage to destroy
- Fire double-range, +1 speed Nuclear Missiles at the rate of three per round of combat
- Have its Class I Deflector Shield absorb one hit every time that missile base suffers damage
- Have an initiative rating of 4 (1 for the Battle Computer Mark I, +0 for its lack of maneuverability, and +3 for the Battle Scanner's initiative increase bonus)
- Have an Attack level of 2 (+1 for the Battle Computer Mark I and +1 for the Battle Scanner's Attack level increase bonus); missile bonuses added to this, when applicable
- Have a Beam Defense level of 1 (for the Battle Computer Mark I)
- Have a Missile and Bomb Defense level of 1 (+0 because players start with no ECM technology, +1 for the Battle Computer Mark I)

A similarly equipped large ship would cost 513 BCs at the start of the game, roughly twice the cost of a missile base. If you really want to

know what a missile base costs, take a look at the amount of money in your reserve on the Planets display. Note that number and then dismantle one missile base, using the [B] key. Look at your reserve again and whatever amount was added will be one-quarter the present cost of one of your missile bases (rounded down, so each might cost up to 3 BCs more than the figure you get by multiplying by four the amount added to your reserve).

## COMPUTER PLAYER COSTS

The cost to computer players for building missile bases varies with the game difficulty level you choose. At the simple level, computer players pay the same price you do. At the easy level, they pay only 90 percent of the normal price (i.e., the price you pay); 80 percent for an average game, 70 percent at the hard level, and they pay only half the normal cost for a missile base at the impossible level. However, they will always pay at least 50 BCs for a missile base.

## REFITTING MISSILE BASES

Missile bases must occasionally refit themselves when improved systems become available. Missile bases instantly and automatically receive the latest technologies as they are discovered. Occasionally, they must be paid for afterward. The key concept here is that each colony is billed separately for upgrading its bases. Whereas ship-building is usually a pay-now-and-receive-later operation, missile-base upgrades work the opposite way. You upgrade now and pay later for them.

Therefore, the resources you allot for Defense spending will go first to paying off any missile base upgrade just received, rather than to the building of new missile bases. Once this debt is

paid off, a colony will go back to building new (and now more expensive) missile bases as usual.

Note that the computer keeps track of each colony's total Defense spending for missile bases. It automatically depreciates the costs of any old technology currently being used in your missile base systems, at the rate of 50 percent of the price for every ten levels old it is (see Chapter 10). This amount is credited against the future cost of new technology upgrades. As an old missile base technology depreciates, however, no refunds are ever issued back to a colony. These depreciation savings can be used only to offset future upgrade costs.

### HOW MANY MISSILE BASES ARE ENOUGH?

The trick to building missile bases is to construct a number on each planet that is adequate to its defense, proportional to its value, and not so large that maintaining them becomes a major budgetary burden each turn. We've found that, as a rule of thumb, the right number of bases to build on a planet that is threatened to the usual extent by potential enemy attacks (but that is also protected by your fleet) is as follows:

- 1 base for every 20 million on ultrapoor planets
- 1 base for every 15 million on poor planets
- 1 base for every 10 million on normal planets
- 1.5 bases for every 10 million on rich and artifact planets
- 2 bases for every 10 million on Orion and ultrarich planets

If a colony cannot count on your fleet to protect it, build double the recommended number

of missile bases recommended to present an adequate, stand-alone planetary defense. It's also smart to build more bases (say, twice as many) at colonies you know will be surefire, front-line, juicy target planets for computer players to attack, and lower it (to about half as many) for planets that are (more or less) safely to the rear of where you anticipate any fighting. Paranoia helps decide which colonies are in the most danger. Missile bases, however, are a very good value. This is because, for less than the cost of a large ship, you can get a lot of high-tech firepower and accessories that are constantly being upgraded.

It's usually advisable not to begin building missile bases while a colony is developing (unless there is an immediate threat). Instead, let its fledgling economy grow for a while. When it becomes reasonably healthy (i.e., is building over five factories per turn), then start building its defenses at whatever pace seems necessary. In general, it's best to build a few missile bases rapidly for that colony's immediate defense. After building these first few missile bases, taper down their construction to only a tick or two of resource allotment, until the remainder of that colony's recommended number of bases has been built.

### BASE MAINTENANCE

Like ships, each planetary base costs only 2 percent of its current construction cost to maintain. Because bases are constantly being upgraded to the latest technologies, the cost for maintaining the same number of bases will tend to rise despite the occasional savings earned from technology depreciation. Note that you can eliminate your own bases by selecting colonies and pressing the [B] key and, as when



scrapping ships, one-quarter (rounded down) of the scrapped base's value will be added to your reserve. However, you are still better off not overbuilding bases in the first place.

### COMPUTER PLAYERS' THOUGHTS ON MISSILE BASE CONSTRUCTION

Computer player defense base construction varies by game difficulty level. The standard number of missile bases built by a computer opponent can reach a maximum of the planet's population in millions, divided by the quantity 3 times 5 minus the game difficulty level (e.g.,  $90/[3(5 - \text{game level})]$ ), where impossible is 4, hard is 3, average is 2, easy is 1, and simple is 0. The number built is never less than 4. This calculated number of bases built is then modified by +50 percent on Orion and on artifact, rich,

and ultrarich colonies, and by -50 percent on poor and ultrapoor colonies.

For example, suppose a computer player's colony is completely developed in a game played at an impossible level of difficulty. It is mineral rich with a population of 90 million. The maximum number of missile bases it will build there is 45. When plugged into the two-step formula, it looks like this:

Step 1:  $90/[3(5 - 4)] = 30$

Step 2:  $30 + (50 \text{ percent of } 30) = 45$  missile bases built by computer opponent

### SWITCHING MISSILES IN COMBAT

Two types of missiles are available for firing by missile bases the latest Scatter Pack and non-Scatter Pack discoveries. When using the Auto button to resolve combat, the computer's

**Table 8-2** When Do I Switch Missile Base Ammunition in Combat?<sup>a</sup>

Target Ship Group's Shield Level	Your Best Scatter Pack Rockets		
	Scatter Pack V	Scatter Pack VII	Scatter Pack X
0	Pulson, Hercular, Zeon		
1			
2			
3	Stinger		
4			
5	Merculite	Zeon	
6	All others	Hercular	
7			
9		Stinger, Pulson	
11		All others	
13			Zeon
15			All others

<sup>a</sup>Use the Scatter Pack Rocket type shown on the column heads until you see the name of a given non-Scatter Pack Rocket. Then, beginning at the shield level indicated on the left, and for every higher shield level of the target ship group, use the named, non-Scatter Pack Rocket instead. Note that Scatter Pack-X Rockets are the most effective weapon your missile bases can fire against almost every enemy shield level.

artificial intelligence (AI) will automatically pick the best missile to use against a given target. When you fight your battles manually, however, it helps to know the optimal time to switch between missile types. Never fear, for Table 8-2 has the answer to this question.

To alternate between Scatter Pack and non-Scatter Pack missiles, simply press the Missile button along the bottom of the Ship Combat Display screen. It will read "S-PACK" when they are armed or "MISSILE" when your best non-Scatter Pack missile is ready to fire. If you forget which best missile type is available, press the Planet button once while each of these missile types is selected via the Missile button, and you'll find the answer.

## PLANETARY SHIELDS

Planetary Shields work in much the same way that local Deflector Shields work: they absorb an amount of damage equal to their level from every nonbiological attack made against that colony from space. This damage absorption is beyond the damage absorbed by a missile base's own, built-in Deflector Shield. Note that Planetary Shields offer no protection, per se, against incoming enemy troop transports. Their cost is shown in Table 8-3. Note that Planetary Shields protect colonies whether or not missile bases are also present.

If you discover a higher class Planetary Shield without first discovering the lower one(s), building those higher class shields will be done incrementally. For example, suppose the first Planetary Shield technology you discover is Class X; after you've paid the first 500 BC installment on it (see Table 8-3), that planet receives a Class V Planetary Shield and will keep sucking up money until you finally reach the

**Table 8-3** Cost of Various Planetary Shield Types

Planetary Shield Type	Total Cost (in BCs) <sup>a</sup>
Class V Planetary Shield	500
Class X Planetary Shield	1000
Class XV Planetary Shield	1500
Class XX Planetary Shield	2000

<sup>a</sup>When upgrading to a higher class Planetary Shield, you pay only the difference between the levels.

1000 BCs required to purchase Class X Planetary Shields. To verify that this interim Planetary Shield upgrade has occurred, check the Planets Display screen or simply double-click the cursor over your own colonies and examine their detailed information screen.

## SPECIAL PLANETARY DEFENSES

Besides the standard missile bases and Planetary Shields, several special devices can greatly help in the defense of a planet.

## REPULSOR BEAMS

Repulsor Beams, a level-16 force field technology, are more completely described in Chapter 7. However, because enemy ships are automatically pushed away from ships that have Repulsor Beams, they are extraordinarily useful when defending planets. Because bombs and biological weapons must be dropped from squares adjacent to a planet on the Ship Combat Display screen, intervening ships equipped with Repulsor Beams can usually keep these bombers at bay (by pushing them away) long enough for them to be destroyed by other means. The trick is to be sure that Repulsor

Beam equipped ships stay between the bombers and the planet they are defending.

## SUBSPACE INTERDICTORS

Once discovered, Subspace Interdictors (level-43 propulsion technology) are immediately added, at no cost, to all of your missile bases. Their effect is to prevent ships equipped with Subspace Teleporters from using them in battles around that planet. Note that Subspace Interdictors are turned on only when the attacking ships are equipped with Subspace Teleporters and that they affect *both* sides. If only the defender's ships have Subspace Teleporters in a given battle, then their Subspace Interdictors won't turn on, and the defender's ships can still use their Subspace Teleporters.

## BIOLOGICAL WEAPON ANTIDOTES

Bio Toxin Antidote and Universal Antidote prevent the loss of 1 and 2 million in population per biological attack, respectively, as shown in Table 8-5. Unfortunately, neither of these will reduce the damage done by biological attacks to a planet's *habitability*.

## ATTACKING AN ENEMY PLANET FROM SPACE

Obviously, the most direct way to reduce a planet's defenses is to bring up weapons and attack them. Five different types of weapons, in addition to special devices, can be hurled at planets. Each type of weapon is explained in the following sections.

## BOMBS

Bombs have only one purpose in *Master of Orion*, and that is to attack colonies. Not

**Table 8-4** Damage Inflicted by Various Types of Bombs

Bomb Type	Damage Range
Nuclear	3-12
Fusion	5-20
Anti-Matter	10-40
Omega V	20-50
Neutronium	40-70

surprisingly, they are quite effective at it. Bombs come in five different types and do increasing amounts of damage, as shown in Table 8-4. Note that each bomb rack purchased for a ship is good for 10 attacks, each at the rate of a single bomb per round of combat.

Bombs have only a 1-square range and can miss when a planet is defended by missile bases. Each base has a Bomb Defense level of 1 plus its ECM rating. For every bomb that attacks, a d100 (see Chapter 1) is rolled to determine whether it hits (the To Hit roll) and how much damage it inflicts within its damage range (see Table 7-3). This is figured out in the same manner as beam weapon damage and is explained in Chapter 7. If a bomb hits and its attack strength ends up greater than the target's combined Deflector and Planetary Shield strengths, the difference is inflicted as hits to the defender.

## BIOLOGICAL WEAPONS

Like bombs, biological weapons have a 1-square range and are designed exclusively for use in attacking planets. When dropped, they have the same chance to miss that bombs do. Unlike bombs (and beam weapons), however, the amount of damage biologicals do when they

**Table 8-5** Effect of Biological Weapons

Biological Weapon	Maximum Population Points Lost <sup>a</sup>	Average Number of Population Points Lost When Defender Has <sup>b</sup> (2):		
		No Antidote	No Antidote	No Antidote
Death Spores	1	1	0	0
Doom Virus	1-2 <sup>c</sup>	1.5	.5	0
Bio Terminator	1-3 <sup>c</sup>	2	1	.33

<sup>a</sup>Numbers represent population points.

<sup>b</sup>Possession of antidote does not affect the reduction of a planet's habitability due to biological attacks.

<sup>c</sup>These probabilities are picked randomly over this range, and are not scaled to their d100 To Hit roll as are those of bombs and beam weapons.

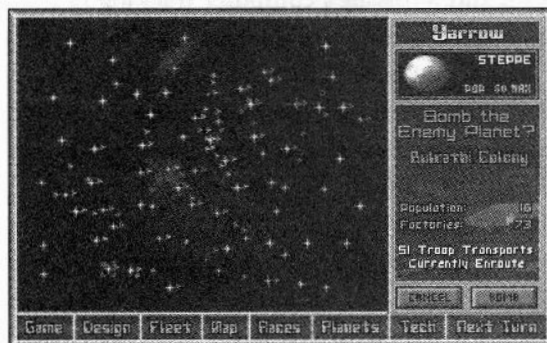
hit isn't decided by how high their To Hit roll is. Instead, if they hit, they have an equal chance of doing a random amount of damage, from 1 to their maximum amount, as shown in Table 8-5. Thus, even if a biological weapon barely hits, it can still do its maximum damage; conversely, a perfect To Hit roll of 100 might inflict only its minimum damage of a single point.

It's most important to remember that, unlike every other weapon, biologicals cause no collateral damage to any missile bases or factories. Instead, they do only three things:

- Eliminate population points from the target planet
- Reduce its maximum population size (i.e., *habitability*)
- Upset every other player in the game

For more information on the political consequences of conducting biological warfare, see Chapter 11. Suffice it to say that everyone will shift one level toward disliking you, while the player you actually attacked with the biologicals will be *really* ticked off!

Whereas bombs come in racks of 10, biological weapon racks hold only 5 weapons each. These racks can be emptied at the rate of one biological weapon per round. Therefore, if you do not wish to depopulate an enemy colony completely (presumably because you have invasion troops coming soon), hit the Planets button before each biological weapon attack you conduct to make sure that the colony's population won't become extinct.

**Figure 8-1**

Be warned! Biological weapons are used freely during postcombat planetary bombardment.

Note that when deciding to bombard a planet outside the Ship Combat Display screen, as shown in Figure 8-1, any biological weapons *will* be used! If you wish to avoid the political consequences of using them, send any ships armed with biological weapons away from there before you conduct these bombardment attacks.

Both the population and planet maximum population losses caused by biological weapon attacks can be recouped. Lost population, of course, can be regenerated in the usual ways (see Chapter 6). Reductions in a planet's habitability can be recovered simply by terraforming (see Table 6-2). In both cases, allotting resources into the planet's Ecology sector will heal the wounds inflicted by biological weapon attacks.

## MISSILES

Although every ship missile rack's ammunition supply is limited to only two to five shots, when fired at a planet they hit with their full strength. This makes them potent bombardment weapons. Of course, they could miss. After all, missile bases are always equipped with their owner's latest ECM technology. However, between the attacker's Battle Computer Tech level and a missile's computer tracking bonus, missiles tend to hit more than they miss.

Once you accept that missiles can and will generally strike a planet hard, it's just a matter of whether their attack strength is greater than the planet's shields (i.e., will they do any actual damage if they hit?). A quick click on the Planets button to find out the planet's shield strength, and a glance at the Technical Supplement for the missile's damage value, can easily give you the answer to that question. As players discover new Planetary Shields, many missiles can no longer damage them. When this

occurs, stick to firing those ineffective antiplanet missiles at enemy ships.

## TORPEDOES AND BEAM WEAPONS

As stated in the *Master of Orion* manual, torpedo and beam attacks against a planet's surface do only half their normal damage. Generally, attacks by individual torpedo and beam weapons must produce many hits to do any damage to a well-defended planet.

Stellar Converters, Scatter Pack Rockets, and Hellfire torpedoes, because they make four miniattacks on their target, are not usually effective against strong Planetary Shields. Neither, for that matter, are multiple-firing beam weapons that make several low-damage shots (Gatling Lasers, Auto Blasters, Gauss Autocannons, and Pulse Phasors). Streaming weapons, such as the Graviton and Tachyon Beams, weren't really made for planet busting, either.

Plasma Torpedoes, on the other hand, when fired from a square next to a colony, will put a major dent in it. Among the beam weapons used for planet busting, most late-model heavy ones (i.e., Heavy Blast Cannons, Heavy Phasors, etcetera) will remain somewhat effective against constantly improving enemy Planetary Shield levels, despite their halved strength. Only when you develop the best of the beam weapons (i.e., Plasma Cannons, Tri-Focus Plasma Beams, Mauler Devices, and Death Rays) will you have truly effective antiplanetary beam weapons.

## RUNNING THE GAUNTLET

Bombers, and other ships that will attack a planet from an adjacent square, must pass



through a gauntlet of enemy fire to reach the enemy colony. Missile bases, in particular, can hurl some significant damage at charging bombers. How many rounds of withering enemy fire these ships must endure is shown in Table 8-6.

## SPECIAL TECHNOLOGIES THAT HELP ATTACK PLANETS

In the often suicidal subgame of closing in on an enemy colony to attack it, an attacker can find a use for many special technologies. The tougher a colony is to crack (and when they have 30 to 60 missile bases parked under their Class XX Planetary Shields, they can be very tough, indeed!), the more important it is not to launch a planetary strike mission without using some of the following special devices.

## INCREASING BOMBER SURVIVABILITY

When designing bombers (i.e., ships that are heavily armed with bombs and biological weapons), certain special devices can be added to increase their survival chances while running the gauntlet. This topic is thoroughly explained in Chapter 9; for now, consider equipping your bomber designs with the following special devices, each of which will increase its survivability:

- Anti-Missile Rockets, Zyro Shields, or Lightning Shields
- Automated Repair Systems or Advanced Damage Control
- A Cloaking Device
- Inertial Stabilizers and Nullifiers
- A Subspace Teleporter

**Table 8-6** Number of Rounds of Combat Charging Ships Must Endure to Reach an Enemy Colony

	Subspace					
Ships' Speed:	1	2	3	4-6	7	Teleporter
Turns to Planet <sup>a</sup> :	7	4	3	2	1	1

<sup>a</sup>Also the number of missile volleys that the colony can potentially hurl against the bombers, less 1 if the bombers have the initiative over them.

Note that Subspace Teleporters are particularly useful; attacking bombers with Subspace Teleporters can make the first move in a space battle by teleporting next to the planet and bombing the missile bases before the bases can fire a shot. This is, of course, providing that the enemy doesn't have Subspace Interdictors to negate players' Subspace Teleporters.

## NONOFFENSIVE, NO COLLATERAL DAMAGE WEAPONS

The Neutron and Ionic Stream Projectors, and the Energy and Ionic Pulsar weapons, are all designed to weaken a target's armor only. A Black Hole Generator, which is a nasty level-43 force field technology that kills a target's crew, will wipe out 26 to 100 percent of all targets in the defender's square, including missile bases, less 2 percent per colony shield level (see Table 9-8). Although the effectiveness of pulsar weapons and the Black Hole Generator is reduced by enemy shielding, none of these special weapons is affected by a planet's atmosphere (as are beam weapons and torpedoes), so they will do their full damage when they hit.

The cool part about using these weapons is that they leave the factories and population on the defending planet unscathed—they cause no collateral damage at all. Specifically, these three



special weapons neither destroy a planet's habitability, nor raise the ire of other players as biologicals do. They allow you to concentrate on destroying enemy missile bases, while leaving their population (intact) for your armies to conquer so that you can reap the reward of any factories that the enemy has there.

## OTHER SPECIAL TECHNOLOGIES

Note that all other special weapon characteristics have the same effect on missile bases as they do on ship targets. For example, beam weapon attacks by ships equipped with an Oracle Interface will halve the planet's shielding (as will an attack made by Neutron Pellet Guns, etcetera). Technology Nullifiers have the same effect against missile bases as they do against enemy ship groups (i.e., they can muck up their Battle Computers and ECM). Streaming weapons carry over their damage from one missile base to the next, and so on.

## RESOLVING SPACE-TO-GROUND ATTACKS

When hit by any but biological weapons, missile bases have their hits reduced and are eliminated in the same way that ships are (see Chapter 7). Generally, attacks against colonies not only reduce and eliminate missile bases, but may also cause some collateral damage to the planet's population and industry. The amount is shown in Table 8-7.

Note that collateral bombardment damage is not figured out per individual attack, but is based on the cumulative destruction rained on a colony over the course of a year (game turn). Interestingly, attacking a colony with any but biological weapons never makes a mess (i.e., generates no toxic waste).

**Table 8-7** Collateral Damage<sup>a</sup> to a Colony per 100 Hits Suffered

Missile Bases Present?	Population Point Losses	Factory Losses
Yes	1/4	1
No	1/2	2

<sup>a</sup>Notes:

- Biological weapons destroy only population, not factories or missile bases. They also create pollution and political fallout.
- Black Hole Generators, pulsars, and Ion and Neutron Stream Projectors destroy only missile bases, not population points or factories.
- No pollution/toxic waste is ever generated by nonbiological attacks or land combat.

As Table 8-7 shows, collateral damage doubles when there are no missile bases remaining on a colony. In other words, without military targets to shoot at, bombarding ships automatically target population centers. Note that factories are always destroyed at a 4:1 ratio compared to population point losses when collateral damage is incurred.

## THE PLANETARY BOMBARDMENT OPTION

After all of the space battles (and any space-to-surface attacks made on the Ship Combat Display screen) have been resolved, the Planetary Bombardment Phase occurs (see Appendix A for a complete turn's Sequence of Play). During this phase, you have the option to bombard enemy colonies, provided you (1) control the space above them after the Combat Phase, and (2) have ships capable of making an effective attack against them. As shown earlier in Figure 8-1, you must make one of two choices: press either Cancel or Bomb.

Naturally, if you press the Cancel button, your ships above that planet will not bombard it that turn. If you opt to bomb a planet, however, all the ships you have in orbit will bombard it for all they're worth. In other words, you can't make some of your ships hold back and bomb the planet "only a little bit." If you have any biological weapons on orbiting ships above an enemy colony, they are used freely if you bomb a colony at this juncture (and you'll have the political consequences to deal with afterward).

### ASSESSING PLANETARY BOMBARDMENT PHASE DAMAGE

Just how strong an attack will a bombarding fleet make when you press the Bomb button? In essence, you'll get the results of 10 rounds' worth of attacks against that planet:

- Beam weapons get 10 attacks.
- Missile weapons will fire their full five- or two-rack volleys.
- Torpedoes will get five attacks.
- Every rack of 10 bombs or 5 biologicals will be dropped in full.



*Even if these weapons were depleted during the preceding space battle, they will always be fully restored for this Planetary Bombardment Phase.*

The big problem then becomes guesstimating how much damage your fleet will inflict versus any Planetary Shield that colony might have. Unfortunately, remembering your orbiting fleet's size and counting its weapons is something we can't help you with.

We're afraid that guesstimating damage from these bombardment attacks is something that you'll have to track for yourself and work out

mathematically with the formulas and information provided in this book, or you'll just have to develop a feel for it through experience. We recommend the latter method. Although gaining experience requires a lot of trial and error, major mistakes can be negated simply by restarting a recent saved game file and then not repeating the mistakes.

### REVOLUTIONARIES

When population points are eliminated on a planet, any malcontent population points (revolutionaries) will also be proportionally eliminated. Thus, if a planet was 20 percent ready to revolt through spy-incited revolutionary activity (see Chapter 12) before planetary bombardment, it would still be at 20 percent after the damage was assessed.

### ELIMINATING A COLONY: THE FALLOUT

When a colony is destroyed, which can happen either during ship-to-ship combat or, more likely, after a full-scale planetary bombardment, certain consequences must be considered. The most important is whether any transports were en route to invade that colony. If they were, they will disappear if they arrive and find out there is no longer a colony there to capture (presuming you don't have Hyperspace Communications and can alter their destination in mid-flight). To reestablish the colony there, someone must send a colony base to that planet and start one from scratch (a slow and expensive process, as you'll recall).

Furthermore, some Ecology expenditures might be required before that planet is brought up to speed, once recolonized. If the Silicoids, for instance, were the last to occupy it, chances are that there will be a lot of toxic waste to clean

up (because they're immune to it). Also, if the planet was attacked by biological weapons, recouping its old planet maximum population size must be done through Ecology spending. Finally, unless your planetology discoveries are better than the previous tenant's, it will take some time and money to terraform it into tip-top shape. All these Ecology expenditures will take considerably longer on planets rebuilt from scratch (using a colony base) than on ones captured by a large planetary assault.

### **CLEAN-KILLED COLONIES**

In addition to reducing a planet's habitability, biological weapons may also leave a planet vacant, with factories and even missile bases still standing. The missile bases will disappear at the conclusion of the space battle, but the factories will remain indefinitely. Planets like this, with free factories just sitting there for the taking, make terrific prizes.

### **SABOTAGE**

Instead of eliminating enemy missile bases the old-fashioned way by blowing them up from space, you can destroy them "from within." By having your spies conduct sabotage operations against an opponent, the opportunity to blow up his or her missile bases will occasionally be presented to you. This depends on how effective your spy network is (and on their counterespionage abilities), and is discussed completely in Chapter 12.

### **LANDING STORM TROOPERS ON ENEMY COLONIES**

Wars often see the dropping of troops on hostile colonies and the landing of reinforcements for besieged friendly colonies. In these cases,

transports that survive fire from enemy defenses will offload their soldiers on the contested colony. Sending transports to invade a colony works the same way as sending them to reinforce one. You will be warned by flashing red script if you attempt to send more than the planet's maximum population limit, but that doesn't matter as much when you're invading another player's colony.

In fact, it might help to send over a few more population points than the target planet can hold. Up to 300 population points can land and fight on the same turn and, if more survive the fighting than that planet can hold, the excess are eliminated, leaving you in control of that colony with its population at maximum. Alternately, you can stagger the arrival of your invading transports over several turns to reduce the worry of exceeding the planet's maximum population limit. Note that you may change your mind after accepting transport missions by issuing them new orders any time before hitting the Next Turn button.

If population points belonging to more than one player find themselves on a planet, a land battle follows from which only one side will survive. Thus, there are two stages to a land battle: first there is the prelanding attack against the invading transports by any defenders in that system, followed by the land battle itself.

### **RUNNING THE GAUNTLET WITH TRANSPORTS**

Transports attempting to penetrate enemy defenses (an enemy fleet over a planet, plus any hostile missile bases that planet might have) do not appear on the Ship Combat Display screen when regular ship-to-ship combat occurs. Instead, they wait for any space battle there to

**Table 8-8** Speed and Exposure Time of Transports Running a Missile Base Gauntlet

Maximum Warp Speed Technology	Exposure Time <sup>b</sup>	Gauntlet Running Speed (squares/turn) <sup>a</sup>
1-4	4	2
5-6	3	3
7-8	2	5
9	1	9

<sup>a</sup>Note that a transport can't have a gauntlet running speed less than 1, or more than 4, squares per turn.

<sup>b</sup>Exposure time represents the number of rounds required to reach the target colony, as well as the number of missile base volleys that will hit invading transports before they reach the target colony. How much damage each missile base volley will inflict is the subject of Table 8-9.

be resolved before landing that turn. Then the transports destined for an enemy colony will fly in one large, unescorted group, as they attempt to cover the 9-square distance across an imaginary Ship Combat Display screen to reach the planet on the opposite side. Once on the imaginary planet's square, they disembark their population points and land combat begins. Note that when an enemy is besieging a friendly planet you wish to reinforce, your transports will still have to run the gauntlet of their fire in this manner.

For the purposes of this invisible troopship landing battle, each colony transport is considered a separate ship with no shields. Although transports move across the Galaxy Map at a speed of one less than their best known warp speed, when this is translated into their gauntlet running speed on the invisible Ship Combat Display screen, it is *half* that number, rounded down (see Table 8-8).

For example, if you have developed Fusion Drive engines, which move starships at warp 4 (i.e., 4 parsecs per turn), your transports would move on the Galaxy Map at warp 3 (one less than your present maximum warp speed). Their gauntlet running speed on the invisible Ship Combat Display screen, however, is half their warp speed, rounded down, the same as any ship's maximum maneuverability for that speed. Here, half of warp 3 gives them a maneuverability of 1.5, which rounds down to only 1 square per turn when running the gauntlet.

Therefore, there are two big breakthrough technologies for transport speed. One is warp speed 3, which doubles transport speed to 2 parsecs per turn on the Galaxy Map. The other is warp speed 5, which doubles the transport gauntlet running speed to 2 squares per turn.

Gauntlet running speed for transports is important, but so is their armor. Transports start with Titanium Armor until you discover better ones. Transports automatically have the best armor and at no additional cost (i.e., they always cost 1 BC each). Each improved level of armor adds another 50 percent to the damage a transport can sustain (see Table 8-9).

When a transport attempts to land on an enemy colony, the transports are attacked for the number of rounds they require to reach the colony across the invisible Ship Combat Display screen, as shown in Table 8-8. All enemy ships in orbit around that colony will close with and attack those transports while they run the gauntlet. Missile bases, too, will attack incoming transports, with their average per-volley damage listed in Table 8-9.

Combat speed for transports running the gauntlet is vitally important. First, transports with faster combat speeds are harder to hit (their

**Table 8-9** Number of Transport Casualties per Single Missile Base Volley<sup>a</sup>

Armor Type <sup>b</sup>	Number of Casualties by Missile Type										
	Nuke	Hyper V	Hyper X	Merculite	Stinger	Pulson	Hercular	Zeon	Scatter V	Scatter VII	Scatter X
Titanium (15)	.80	1.20	1.60	2.00	3.00	4.00	5.00	6.00	6.00	14.00	30.00
Duralloy (22)	.55	.82	1.09	1.36	2.05	2.73	3.41	4.09	4.09	9.55	20.45
Zortrium (30)	.40	.60	.80	1.00	1.50	2.00	2.50	3.00	3.00	7.00	15.00
Andrium (37)	.32	.49	.65	.81	1.22	1.62	2.03	2.43	2.43	5.68	12.16
Tritanium (45)	.27	.40	.53	.67	1.00	1.33	1.67	2.00	2.00	4.67	10.00
Adamantium (52)	.23	.35	.46	.58	.87	1.15	1.44	1.73	1.73	4.04	8.65
Neutronium (60)	.20	.30	.40	.50	.75	1.00	1.25	1.50	1.50	3.50	7.50

<sup>a</sup>Multiply the number of casualties by the number of bases firing and the number of turns those transports must run the gauntlet (see Table 8-8) to get the expected number of transports destroyed by missile bases.

<sup>b</sup>Numbers in parentheses represent the damage transports with various armor types can sustain.

higher maneuverability gives them higher Beam and Missile Defense levels as they are attacked; see Table 7-3). Second, transports with faster combat speeds will be exposed to enemy fire fewer times while they run the gauntlet to the enemy planet, as shown in Table 8-8. The cumulative effect of these two benefits is enormous while these vulnerable little transport ships are running the gauntlet of enemy fire.

## COMBAT TRANSPORTERS

Combat Transporters (level-45 propulsion technology) give every assaulting transport an automatic 50 percent chance of landing on an enemy planet unscathed (but only a 25 percent chance if that planet has missile bases with Subspace Interdictors). These lucky transports will not have to run the gauntlet when attempting a contested landing. Transports that don't make this Combat Transporters die roll must run the gauntlet in the usual manner.



*Sneak invasions are a great strategy to use after discovering Combat Transporters technology. This is particularly true when your ground troops have a technological edge over an opponent or when you can replace your population point losses faster than they can.*

The bottom line is this: Just fling unescorted transport armadas around freely and count on only half of them landing at the target colony. Thus, if you send over twice as many as a planet can hold, chances are that you will land there with the maximum number that planet can hold (assuming 50 percent casualties going in). Wear your enemies down and capture their planets in this manner by relentlessly invading their colonies until you finally overwhelm them, one by one. These sneak invasions can be very effective, but you must remember to protect your newly won colonies.

## RESOLVING LAND COMBAT

Land combat is resolved in a series of one-on-one population point attacks until one side has been eliminated. (To skip to the result of ground combat without watching all of the attrition take place, just click either mouse button—then only the survivors will be left standing.) Each attack consists of a separate d100 roll made for each side, with the highest roller killing off one of the loser's population points on that planet. In the case of a tied die roll (which will happen about 1 percent of the time), both sides lose one population point (which could, if both sides



were down to a single population point, completely denude the contested colony).

### GROUND COMBAT BONUSES

Added to each side's ground combat die rolls will be that race's best current ground combat technology bonuses. These are awarded for improved armor, shields, and weapons. Thus, your best available armor type not only increases the number of hit points your troop transports will have while running the gauntlet, but it also gives your ground troops a combat die roll modifier to boot! The benefits of improved armor are shown in Table 8-10.

In every land battle, the defender receives a +5 combat bonus to represent the natural advantage for knowledge of the terrain being fought over. Besides this defender's bonus and the bonus for your best armor technology, research into construction technology might lead to developments in Powered Armor. These discoveries provide the combat bonuses listed here:

- +10 for Battle Suits (Tech level 11)
- +20 for Armored Exoskeletons (Tech level 24)
- +30 for Powered Armor (Tech level 40)

On screen, these are listed in a combined manner such as "Zortrium Battle Suits," as shown in Figure 8-2. Here, the Darloks are receiving a combined +10 bonus for having Zortrium Armor and another +10 for the Battle Suits, for a total land combat bonus expressed on that line of +20.

On the second line beneath the troop listings (as shown in Figure 8-2) you will generally find each player's best current personal combat shield level listed. These are discovered through force field research and provide the combat bonuses listed here:

**Table 8-10** Armor Technology Effects on Ground Combat

Armor Technology	Troop Transport Hit Points	Ground Combat Modifier
Titanium	15	+0
Duralloy	22	+5
Zortrium	30	+10
Andrium	37	+15
Tritanium	45	+20
Adamantium	52	+25
Neutronium	60	+30

- +10 for Personal Deflector Shields (Tech level 8)
- +20 for Personal Absorption Shields (Tech level 21)
- +30 for Personal Barrier Shields (Tech level 38)

The last line beneath the troop information always lists that player's best available hand weapon. These derive from weapons technology research and are as follows:



**Figure 8-2**

In this battle, the Darlok troops have a combined bonus of +35 compared to the Mrrshans' +10.



- +5 for Hand Lasers (Tech level 2)
- +10 for Ion Rifles (Tech level 12)
- +20 for Fusion Rifles (Tech level 24)
- +25 for Hand Phasors (Tech level 31)
- +30 for Plasma Rifles (Tech level 42)

## PLAYING THE PERCENTAGES IN LAND BATTLES

Significant differences in ground combat technologies will give the leading player a decided advantage during ground combat. For example, a mere +10 bonus advantage will yield a favorable 3:2 kill ratio in ground combat. The effective kill ratios of several possible ground combat advantages are shown in Table 8-11.

By examining Table 8-11, you can estimate how many troops will be required to take (or hold) a planet, based on whichever player has the net land combat advantage. It will also help you to estimate how many survivors should walk away from a given land battle. To refresh your memory as to your opponent's latest, greatest ground combat technological discoveries, press

**Table 8-11** Ground Combat Kill Ratios

Ground Combat Advantage <sup>a</sup>	Average Kill Ratio <sup>b</sup>
0	1:1
+5	1.25:1
+10	1.5:1
+15	1.8:1
+20	2.15:1
+25	2.6:1
+30	3.1:1
+35	3.75:1
+40	4.55:1
+45	5.6:1
+50	7:1
+55	8.8:1
+60	11.35:1
+65	15.1:1
+70	20.2:1
+75	30.15:1

<sup>a</sup>The Bulrathis receive a +25 modifier to their ground combat strength at all times.

<sup>b</sup>Rounded slightly.



**Figure 8-3**

A report on the Humans tells us they have developed only Battle Suits, Personal Deflector Shields, and Hand Lasers. This gives them a combined +25 die roll modifier in ground combat.

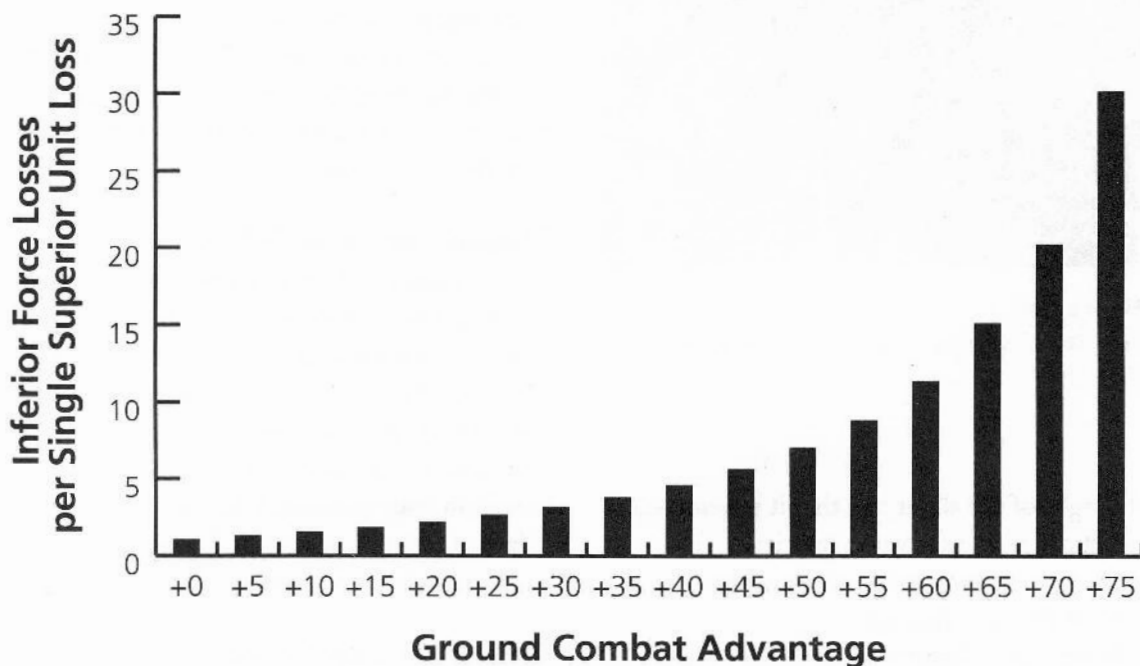
the Report button on the Races Display screen and read all about it, as shown in Figure 8-3.

## POSTBATTLE RESULTS

After a land battle, remember three important things: (1) the planet needs to recover; (2) there might be new technology to steal; and (3) the captured factories need refitting.

## RECOVERY FROM (NEAR) RUIN

First, the contested planet is usually not in the best of shape. While land battles (and nonbiological attacks from space) produce no

**Table 8-11** Ground Combat Kill Ratios Graph

Adapted with permission from Redmond Simonsen

pollution/toxic waste, they will certainly leave the planet's owner with less than a full population. More often, after the smoke clears from land combat, the contested colony has been wracked by death and destruction. Whichever side ends up owning it, they may want to transfer money there to rebuild it as quickly as possible—presumably, at least enough so that it will be better prepared to repel the next invasion attempt. The owner is also likely to leave a fleet there for a while to protect the planet while it regains its economic strength.

### CAPTURING TECHNOLOGY

If the attacker succeeded in the invasion attempt, for every factory captured on that planet, he has a 2 percent chance to steal one of

his opponent's technologies (if he has any that the attacker doesn't already possess). These confiscated technologies could come from any of the six areas of research. A d100 roll is made separately for each factory captured but, on average, that means that you'll steal 1 technology per 50 factories captured. A Technology Discovery screen featuring a member of your race in a military uniform will announce what you have stolen, as shown in Figure 8-4.

### REFITTING CAPTURED FACTORIES

Finally, when reconstruction begins on a freshly conquered planet, all of the factories there must be refit so that the controls are physically adapted to work for their new owners. Money put into Industry on that planet will show, to

**Figure 8-4**

Here, Darlok soldiers have stolen Fusion Beam technology.

the right of the slider bar, that it is being spent to refit these newly won factories. The cost to refit them is reasonably cheap, however, at a fixed 2 BCs per factory.

Note that at Improved Industrial Tech level 2 the price for new factories is also 2 BCs each. Once you have achieved this technology, you can blast away enemy factories and later rebuild them on the conquered colonies at the same cost. However, that would take a bit of time and you would lose the opportunity to steal their technology if you did so.

### ADDITIONAL GENERAL STRATEGY TIPS FOR EXPANSION

We discussed economic strategies in Chapter 6, but this appendage to our discussion of planetary combat concerns the broader aspects of employing proper military strategies to win a game of *Master of Orion*. A successful Galactic Overlord must combine viable economic, military, and diplomatic stratagems to triumph. Here is your military lesson. Diplomacy must wait until Chapter 11.

Because of the ever-shifting nature of military (not to mention economic and political) advantage in *Master of Orion*, these strategic tips will be, out of necessity, of a general nature. Use them as guidelines when considering what courses to set for your wars and potential wars over the next several turns.

### PREPARING FOR WAR

As throughout history, money has been the sinew of war. Therefore, the best way to prepare for war is to build up your economic might first. All other military preparations will stem from spending money derived from as great an economic engine as you can build. If you need to refresh your memory, Chapters 5 and 6 will help you create a universe of wealth by giving you the big bang for your bucks.

### FIRST, FOCUS ON GROWTH

Whenever possible, focus your spending on economic and technological growth first. During times of active warfare, this may be difficult, but it takes quite a while before a BC invested in trade or a new factory starts to pay off. For example, spending 10 BCs for a new factory that produces only 1 BC per turn means that the money invested in it won't show a profit for 11 turns. On a poor planet it takes twice as long to make any money on your investment and three times as long on an ultrapoor planet! Therefore, it is important that you sow investment money today to reap the income you will need in the future: money needed to fight your wars of defense and aggression.

As for continuous technological research, the consequences of falling too far behind in the technology race should be obvious. As you will discover in Chapter 10, because money invested

in technology actually earns interest, the most efficient way to research something is with a steady flow of investment over time. Therefore, once you begin to seriously invest in it, keep a steady, continuous flow of resources going into your technology sectors at all times.

## SECOND, CONCENTRATE ON DEFENSE

After your economy is humming along and planets begin to hit their economic peaks, you must then concentrate on their security. Here, missile bases, better missiles, and new force field technologies work together hand in hand. When building fleets, build enough of the right types so that they will at least reduce and, hopefully, repel any potential enemy incursions over your planets. At this point in your planning, your goal is to maintain space superiority over your own planets. Concentrate on this goal until you achieve it.



**HINT** *Keep your fleet as small as possible while building up your cash reserve. (Building bases first can help here.) When it comes time to switch from defense to offense, your reserve fund can help you to quickly crank out a large fleet of your latest-technology ships with which to attack your enemy.*

## FINALLY, SEE TO YOUR OFFENSIVE CAPABILITIES

Only after the above two concerns have been addressed should you consider forging the tools of aggression. Generally, these will be fleets, either of large and huge ships, or large and huge numbers of medium and small ships, respectively. Among these fleets will be plenty of bombers and, standing behind the fleet, you will want sufficient population points nearby to hop

on transports and storm neighboring enemy colonies when the opportunity arises.

Of course, in war, anything can happen. As a rule of thumb, when you're winning, press the advantage until the enemy finally stops you or makes the cost of whipping him so high that you no longer wish to continue the campaign. If you're losing, go back to the basics of building up your defenses and economy and abandon the thought of launching large-scale, offensive operations at this time. If it's really looking bad for you, start offering tribute and sue for peace (see Chapter 11 for tips on diplomacy).

## CHOOSING THE RIGHT ENEMY

Generally, enemies will find you. However, if you are ever afforded the luxury of peace with all of your neighbors and have built up a sufficient offensive force, you may actually get to choose your opponent. Although picking on weaker neighbors is the standard choice (*Question*: When is the best time to kick a man? *Answer*: When he's down!), there will be times when you have favorable trade relations with them that you don't want to end; or there may be another, more hostile, erratic, or threatening neighbor that should be dealt with first. A more exhaustive study of these ramifications can be found in Chapter 11. Also, there can be important consequences in the Galactic Council during times of war (see Chapter 4).

## CAPTURING VERSUS REDUCING ENEMY PLANETS

Like knowing when to hold 'em and when to fold 'em in poker, after you control the space above an enemy colony you must decide whether to bombard it and whether you should just damage that planet or eliminate the enemy

colony there. Experience is your best teacher here. Just make sure you heed the lessons your experiences with orbital planetary bombardment teach you!

Note that when other players destroy colonies, a race begins to see who can be colonize it first. You can, like a vulture, swoop in on these colony corpses and try to win that race. By paying close attention to the wars of your neighbors, you may be able to pick up a free planet without fighting for it—an attractive possibility.

### **WHEN *NOT* TO BOMBARD AN ENEMY COLONY**

If you have gained space superiority over an enemy colony, there may be good reasons *not* to bombard it. First, it might have only a small garrison, one that you can defeat quickly and easily. This will allow you to swiftly capture that colony intact. This has the benefits of providing a nearly instant (captured) industrial capacity, perhaps some stolen technologies (see Chapter 10), another base from which to count your empire's ship ranges, more economic power for the future, and more.

Another reason not to bombard an enemy planet is that sitting over it is likely to draw a reaction from his fleet. Thus, you can dangle this besieged colony as strategic bait to lure in enemy fleets. Naturally, this is only a good idea if you can destroy those fleets! The computer player's artificial intelligence (AI) will generally not move against you unless it thinks you can be defeated in battle, so you might want to deliberately weaken the garrison you have over an enemy colony to sucker his fleet in, then reinforce it after the enemy commits fleets to move there.

On the other hand, you should bombard a colony that you can't easily capture. The question then becomes, when do you cease bombardment? The answer, naturally, depends on what you are trying to accomplish by wrestling with that enemy colony in the first place.

If you're trying to capture it, reduce it until you can. Even if that means destroying every factory they've built just to get the planet's defending population down to a number you can beat, then do so. You can always build more factories later. Capturing the planet is what's important.

### **WHEN TO FLATTEN AN ENEMY COLONY**

If you're not interested in capturing a colony (or unable, if its environment is more hostile than your technology can handle), but want to deny it to the enemy, simply bombard it until the colony is destroyed. A good time to do this might be just before a Galactic Council meeting, if you suspect that player would have voted "the wrong way" (see Chapter 4). It might also be expedient to eradicate enemy colonies that they are using as an assembly point from which to attack you. Sure, eliminating another player's colony will start a war between you if one didn't already exist, but you've made the decision to win military objectives at this point, not friends.

Remember, vaporizing an enemy colony eliminates all of the present and future benefits your opponent would have received from it. This includes its maximum potential population and industrial capacity, and use as a forward post for their continued expansion and scanning. We want to remind you of that, so that you can morally justify your wanton destruction of a planet's entire population. We don't



want you to feel too guilty about war's little necessities <grin>.

### HOW COMPUTER PLAYERS DECIDE WHETHER TO BOMBARD, FLATTEN, OR INVADE AN ENEMY COLONY

When the computer players find their ships in orbit around an enemy planet, they will bombard it at every opportunity unless they have transports on the way to invade it. If transports are en route, they will cease bombardment of the enemy planet if the number of transports exceeds the population of the planet.

Interestingly, computer players do not consider the qualitative, technological differences between opposing armies when making this decision. Instead, when they launch transports (which always come from their assembly point) to attack a target colony, computer players always send the maximum amount (i.e., half their assembly point's population, rounded down).

### THE ECOLOGY OF WAR

Imagine trying to do an environmental impact study on war, but that is exactly what this section is all about. Fortunately, wars in *Master of Orion* don't generate much pollution (unless biological weapons are used, but even that can be easily cleaned up). However, wars do tend to strip population points (usually in large quantities) from one world and fling them toward another, where many of them are likely to die. We've taught you how to employ storm troopers, and what happens during and after their landing on contested colonies; now the question we'll consider is, "What did launching these transports into space *really* cost me?"

### THE HIGH COST OF SENDING TRANSPORTS

The answer to that question is, a lot. The cost of this wasteful shifting of population points for military purposes can be quite high, particularly early in the game. Consider this example: The frontiers have pretty much closed in your game and, with all of your Tech levels between 15 and 20, you're seeking to expand. You gain space superiority over an enemy colony and then launch 25 population points from a nearby, fully developed world. That nearby world had 100 million beings on it and 300 factories (obviously, you have discovered Improved Robotic Controls III). Not an unusual occurrence, right?

Now, let's add up the cost of this military troop transport endeavor:

- 25 BCs (1 BC per transport) to place them on transports. (This price never varies, whether colonists are sent to friendly or enemy planets, nor will this price go down due to technological advances.)
- 100 BCs from next turn's production on the planet from which they were removed (75 BCs for leaving 75 factories without workers, plus about 25 BCs that those population points would have produced, depending on your planetology Tech level; see Table 5-1.
- 4 BCs per unreplaced population point per turn (based on the above costs). Even if the planet repopulates at the rate of 3 million per year, you're looking at an additional 368-BC loss (total) beyond the first year's 100-BC loss.

This totals 468 BCs in out-of-pocket costs and lost production (admittedly, most of these



expenses are spread out over 10 turns), just to send those lousy 25 million colonists off to die on some enemy rock! That's a rather hefty chunk of change there, oh mighty Cosmic Conqueror. And it would be even more if you had the audacity to send your transports from a fully developed rich or ultrarich planet, or from one where there were more than three factories left idle for every million people sent away. Think about it...

### HOW TO BEAT THE HIGH COST OF STORM TROOPERS

Admittedly, it could happen that your storm troopers capture an enemy world brimming with factories while suffering few losses. They might even steal some new technologies to help offset the high cost of sending them in the first place. But how often do you expect to rip off a cream puff colony like that? No, it's better to count on taking your economic lumps and, instead, try to keep your costs down when dispatching those storm troopers in the first place.

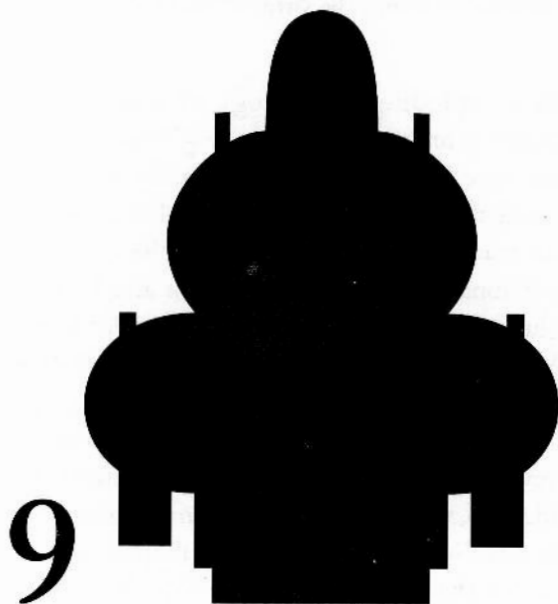
To that end, avoid taking soldiers off rich and ultrarich planets, or off ones with artifacts (including Orion). These colonies need to keep their production bonuses working for you at full steam all the time. Instead, take invading population points from the following:

- Developing colonies that have not yet built up to their maximum industrial capacity. The key here is not to take so many that you leave many factories idle.
- Poor or, better still, ultrapoor colonies. After all, their idle factories would probably have produced less anyway.
- Fertile and Gaia planets: Their populations grow back quicker, thus reducing lost production while waiting for the planet to repopulate.
- Best of all, find combination worlds that are both poor or ultrapoor and fertile or Gaias. Mentally designate them as the "soldier factories" of your empire. Have them peel off needed population points at every opportunity and, when necessary, pump up their Ecology spending (an economic sector from which even poor and ultrapoor colonies get full value for their money) to quickly replace their strip-mined populations.
- Regardless of where transports come from, developing Cloning and Advanced Cloning technologies to help replace them quickly and cheaply always helps.

### THE CONQUEST OF PLANETARY WARFARE

There it is. In the last two chapters we've covered everything about combat from ship to shore. We've given you tactics. We've given you strategies. You've received pointers on offense and lessons on defense. Militarily, at this point, you can persevere and even have a few advantages over your computerized opposition. If we taught you correctly (and we did), your worst enemy is now yourself.

To avoid being your own worst enemy, then, we offer the next chapter as an exercise in preproblem solving. It is our manifesto on ship design in *Master of Orion*. In it, you will learn how to design ships that won't fail to give you your maximum advantage in combat. Unfurl the blueprints. We have plans for your future, Imperious One. ♣



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## *Ship Design*

*Some of my best friends are MX missiles.*  
—Ronald Reagan

♣ Concluding our trilogy of blockbuster chapters on combat in *Master of Orion* is this, our epic treatise on ship design. To help you avoid shooting yourself instead of the enemy, we teach you here to recognize the different missions your fleet must perform and how to blueprint the right ship designs to do them. Most important, you will learn that ship design is really an exercise in preproblem solving.

The importance of *timing* the production of new starship designs is also emphasized. In addition, we reveal strong weapon combinations to place in individual ships, combinations that exceed the sum of their parts. We also keep a close eye on budgetary and hull space constraints as we squeeze in every technological wonder that your ships can hold. So, roll up your sleeves, get out your drafting pencil (er, mouse), and let's create the blueprints for galactic domination.

## THE SHIP SPECIFICATIONS SCREEN

Naturally, the first step in designing ships is to become acquainted with how ship attributes are shown and changed. First, however, it is always wise to get a proper overview of your fleet before tinkering with your ship designs. In the first half of this chapter, we acquaint you with the tools of ship design and present numerous informative tables. Once we finish these nuts-and-bolts aspects of ship design, the second part of the chapter deals with its more philosophical aspects.

Review your current ship designs by selecting the Fleet Display and then choosing the Specs button at the bottom of the screen. This presents a summary of your current ship designs

and the number of each type that you have in service, as shown in Figure 9-1.

Each ship's size is shown both by the relative size of its icon and the number of hit points it has. Although this screen is pretty self-explanatory, allow us to point out a few things:

- The number with each ship icon represents the number you presently have in play.
- *Shield* is the number of hit points that will be absorbed without damage from every attack that inflicts damage points (i.e., most of them).
- *Warp* is how many parsecs per turn that ship moves between stars.
- *Speed* is how many spaces per turn that ship moves on the Ship Combat Display screen.
- The 2c, 5c, and 10c notations next to missiles, biologicals, and bombs show the number of times they can be fired during a space battle.
- Don't press the Scrap button unless you mean it (in other words, until after you've read this chapter).

Ship Icon	Ship Name	Hit Points	Warp	Speed	Shield	Armor	Weapons	Cost
7	BLACK WIDOW	100	10	10	100	100	2 MISSILES, 10 SCATTER BOMBS, 2 FUSION BOMBS	200 BC
10	VENOM	100	10	10	100	100	1 MISSILE, 2 FUSION BOMBS, 1 NUCLEAR BOMB	100 BC
1	TOXIC COL	100	10	10	100	100	1 MISSILE, 2 FUSION BOMBS, 1 NUCLEAR BOMB	100 BC
13	PLANET BUST	100	10	10	100	100	1 MISSILE, 2 FUSION BOMBS, 1 NUCLEAR BOMB	100 BC
1	JAMES	100	10	10	100	100	1 MISSILE, 2 FUSION BOMBS, 1 NUCLEAR BOMB	100 BC
28	KAMIKAZE 19	100	10	10	100	100	1 MISSILE, 2 FUSION BOMBS, 1 NUCLEAR BOMB	100 BC

**Figure 9-1**  
The Fleet Specifications screen

Much of your military strategy is revealed in the numbers, words, and pictures provided by this Fleet Specifications screen. Ponder this screen. Savor the information it provides you. Absorb the *Gestalt* of seeing your entire fleet and ship design philosophy at a glance. As you progress to the second (philosophical) half of this chapter, you will learn to recognize better design ideas for both fleets and ships. These will become instantly apparent to you, once you are familiar with this chapter, simply by reviewing this screen. You will soon see what we mean.

## THE NEW SHIP DESIGN SCREEN: AN OVERVIEW

Behold the New Ship Design screen, as shown in Figure 9-2. Think of this as a blank canvas on which you will paint your ship design masterpieces. However, people are often daunted when seeking inspiration in a blank canvas. In this half of the chapter we show you how to design a ship. In the second half, we provide

the inspiration to create masterpieces within your master plan.

## SHIP SIZE

A ship's size primarily affects how many units of space you will have available to fill with weapons, engines, and so on, while designing it; the base number of hits that it can take in combat; its inherent beam and missile defense modifier; plus the cost to lay down the hull itself, before you ever add a single feature to it. Table 9-1 reproduces this information from the *Master of Orion* manual. However, we have added some important facts in the column headings that were not explicitly stated in the manual.

The interesting bit about Table 9-1 is that you cannot build a ship at construction Tech level 0, or one with a 0 maneuverability rating, or one without an engine. Specifically, you begin the game at construction Tech level 1, which increases all of your available hull space by 2 percent (to 204, 1020 and 5100 for medium, large, and huge ships, respectively) at the beginning of the game. (Note that the *Master of Orion* manual incorrectly states this as only a 1 percent increase per construction Tech level; see Chapter 10 for details.)

Similarly, all initial ship designs default to Retro Engines (warp 1), which increases their cost and takes up some of their initial available hull space. Also, they begin with a maneuverability of 1, thus raising their inherent defense ratings by +1 each. Therefore, a ship's ratings will never appear as they do in Table 9-1 because you start at construction Tech level 1 (not 0) and these mandatory features (engines and armor) are left on, even when you clear the New Ship Design screen.



Figure 9-2

The New Ship Design screen, cleared and ready for action

**Table 9-1 Ship Hull Size****Part 1: Stripped Down**

Ship Hull Size	Hull Space (at construction Tech Level 0)	Hits Absorbed (with Titanium Armor)	Inherent Defense Modifier (with 0 Maneuverability)	Cost in BCs (with No Engine)
Small	40	3	+2	6
Medium	200	18	+1	36
Large	1000	100	+0	200
Huge	5000	600	-1	1200

**Part 2: Hull Space in Tons at Various Construction Tech Levels****Construction  
Tech Level****Space Available for Each Hull Size:**

	Small	Medium	Large	Huge
0	40	200	1000	5000
10	48	240	1200	6000
20	56	280	1400	7000
30	64	320	1600	8000
40	72	360	1800	9000
50	80	400	2000	10000
60	88	440	2200	11000
70	96	480	2400	12000
80	104	520	2600	13000
90	112	560	2800	14000
99 (maximum)	119	596	2980	14900

**SHIP ICONS**

Next to the Ship Sizes box at the bottom-left corner of the New Ship Design screen, you'll find the *Ship Icon* box. This box includes scrolling arrows on its right side, allowing you to select from six prefabricated icon designs for the size hull you've selected. The same icon should not be used for more than one active ship design. The set of icons that will be

available for your ships is based on the player color you choose.

**NAMING YOUR NEW SHIP CLASS**

Next to the Ship Icon box are four rows of information about the current ship design, the top of which is the default name for your new ship class. You may change this by simply clicking the mouse button on the *Name* line and

typing in your own ship class name. Note that the suggested default names are based on the race you've selected to play that game, and on the ship's hull size. Appendix H might help you, too, when considering practical ship names.

## BASIC BLUEPRINTING

Now we're getting into the good stuff—how you actually blueprint ship designs by selecting various component parts from menu selections. Whenever you see the words Computer, Shield, ECM, Armor, Engine, Maneuver, Weapon 1-4, or Special 1-3, highlighted on the screen, that means that you have space available to upgrade your ship design in that area. Click on the appropriate highlighted word to see your design options in that area.

Note that as you peruse your lists of technologies available, certain ones will be missing. For instance, you might have ECM levels 1, 2,

and 4, but be missing 3. Therefore, until you've acquired it, you cannot design any ships that feature ECM level 3. This could present a problem, as designing a ship with ECM 4 might be too expensive or take up too much hull space, whereas ECM 2 may not provide adequate protection for your design. Therefore, stealing or trading for *old* technologies can be useful—not only to increase your Tech level in its field (see Chapter 10), but also to give you more flexibility when designing new ship classes.

## BATTLE COMPUTERS AND BASE ATTACK LEVEL

Instructions in blueprinting ship designs begin in the top-left box of the New Ship Design screen, starting with the area labeled *Computer*. By clicking on the highlighted word Computer, a menu appears listing your current Battle Computer technological discoveries, as shown

**Table 9-2** Initial Cost/Size/Power<sup>a</sup> of Battle Computers: A Computer Technology

Battle Computer Type (Tech Level)	Cost/Size/Power for Each Hull Size			
	Small	Medium	Large	Huge
Mark I (1)	4/3/3	20/5/5	100/20/20	500/100/100
Mark II (5)	5/5/5	24/10/10	120/30/30	600/150/150
Mark III (10)	6/7/7	28/15/15	140/40/40	700/200/200
Mark IV (15)	7/10/10	32/20/20	160/50/50	800/250/250
Mark V (20)	8/12/12	36/25/25	180/60/60	900/300/300
Mark VI (25)	9/15/15	40/30/30	200/70/70	1000/350/350
Mark VII (30)	10/17/17	44/35/35	220/80/80	1100/400/400
Mark VIII (35)	11/20/20	48/40/40	240/90/90	1200/450/450
Mark IX (40)	12/22/22	52/45/45	260/100/100	1300/500/500
Mark X (45)	13/25/25	56/50/50	280/110/110	1400/550/550
Mark XI (50)	14/27/27	60/55/55	300/120/120	1500/600/600

<sup>a</sup>Cost and size decrease with miniaturization (see Chapter 10). Power requirements are constant (but see Appendix B).



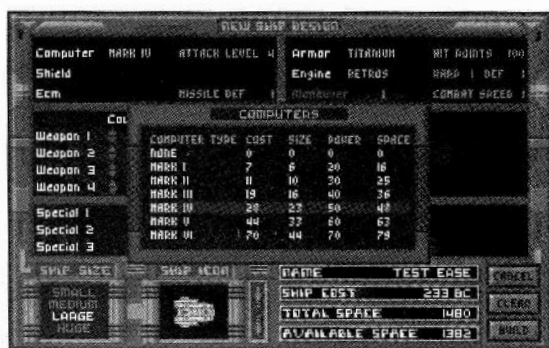


Figure 9-3

The Computers menu for a large-hull ship design: cost and size, but not power, have been reduced by miniaturization (see Table 9-2).

in Figure 9-3. In this example, we've chosen to equip our ship with level IV Battle Computers, and so the Computer line on the New Ship Design screen now reads *Mark IV* and our Attack level changes correspondingly.

## SHIELDS AND HIT ABSORPTION

Beneath the Computer line is the Shield line. Clicking on the highlighted word *Shield* presents the Shields menu, as shown in Figure 9-4. Notice that Class IV Deflector Shield technology is missing, so that option does not appear on the list of choices. Because level V shields are too large and expensive, we opt for level III shields instead. Notice that the New Ship Design screen says we've designed this ship with Class III shields, which absorb three hits from every attack.

## ECM AND BASE MISSILE DEFENSE LEVEL

The last design feature in this part of the New Ship Design screen is the ECM (Electronic Counter-Measures) line. ECM reduces the chance of being hit by enemy missiles and torpedoes. By clicking on the highlighted word

**Table 9-3** Initial Cost/Size/Power<sup>a</sup> of Deflector Shields: A Force Field Technology

Shield Type (Tech Level)	Cost/Size/Power for Each Hull Size			
	Small	Medium	Large	Huge
Class I (1)	3/5/5	19/20/20	120/60/60	750/250/250
Class II (4)	3.5/10/10	22/35/35	140/90/90	875/375/375
Class III (10)	4/15/15	25/50/50	160/120/120	1000/500/500
Class IV (14)	4.5/20/20	28/65/65	180/150/150	1125/625/625
Class V (20)	5/25/25	31/80/80	200/180/180	1250/750/750
Class VI (25)	5.5/30/30	34/95/95	220/210/210	1375/875/875
Class VII (30)	6/35/35	37/110/110	240/240/240	1500/1000/1000
Class IX (34)	6.5/40/40	40/125/125	260/270/270	1625/1125/1125
Class XI (40)	7/45/45	43/140/140	280/300/300	1750/1250/1250
Class XIII (44)	8/50/50	46/155/155	300/330/330	1875/1375/1375
Class XV (50)	9/55/55	49/160/160	320/360/360	2000/1500/1500

<sup>a</sup>Cost and size decrease with miniaturization (see Chapter 10). Power requirements are constant (but see Appendix B).



Figure 9-4

The Shields menu for a large-hull ship design: cost and size, but not power, have been reduced by miniaturization (see Table 9-3).

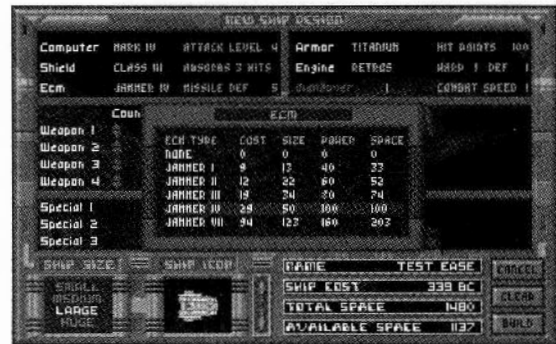


Figure 9-5

The ECM menu for a large-hull ship design: cost and size, but not power, have been reduced by miniaturization (see Table 9-4).

*ECM*, you'll see a menu similar to that shown in Figure 9-5. Again, this sample ECM menu shows the gaps in recent ECM discoveries, showing that ECM Jammers Mark V and VI are not available. Because Mark VII Jammers

are too large and expensive, the smaller, cheaper Mark IV model has been chosen in the hopes that it will suffice.

The text next to the word ECM changes appropriately, and this design's Missile Defense

**Table 9-4** Initial Cost/Size/Power<sup>a</sup> of ECM Jammers: A Computer Technology

ECM Jammer Type (Tech Level)	Cost/Size/Power for Each Hull Size			
	Small	Medium	Large	Huge
Mark I (2)	2.5/10/10	15/20/20	100/40/40	625/170/170
Mark II (7)	2.7/15/15	16.5/30/30	110/60/60	687.5/250/250
Mark III (12)	3/20/20	18/40/40	120/80/80	750/330/330
Mark IV (17)	3.2/25/25	19.5/50/50	130/100/100	812.5/410/410
Mark V (22)	3.5/30/30	21/60/60	140/120/120	875/490/490
Mark VI (27)	3.7/30/30	22.5/70/70	150/140/140	937.5/570/570
Mark VII (32)	4/40/40	24/80/80	160/160/160	1000/650/650
Mark VIII (37)	4.2/45/45	25.5/90/90	170/180/180	1062.5/730/730
Mark IX (42)	4.5/50/50	27/100/100	180/200/200	1125/810/810
Mark X (47)	5/55/5	28.5/110/110	190/220/220	1187.5/900/900

<sup>a</sup>Cost and size decrease with miniaturization (see Chapter 10). Power requirements are constant (but see Appendix B).

level increases to 5, based on the cumulative total of +4 for the new ECM Jammer IV we just added and +1 for the ship's minimum Maneuver rating of 1 (with a +0 modifier for the large hull design we've selected). Missile Defense is used to lower an attacker's chance of hitting a ship with missiles and torpedoes, or of hitting a base with missiles, torpedoes, bombs, or biological weapons.

## ARMOR AND HIT POINTS

Moving over to the upper-right box of the New Ship Design screen, select the highlighted word **Armor** to see its menu, as shown in Figure 9-6. The frugal and paranoid player will opt here for Zortrium Armor. It provides 200 hit points, nearly the maximum available from this Armor



Figure 9-6

The Armor menu for a large-hull ship design: both cost and size, but not hits, have been reduced by miniaturization (see Table 9-5).

menu, yet is much cheaper and more compact than *Double-Hulled Zortrium* armor (i.e., Zortrium II). In our experience, double-hulled

**Table 9-5** Initial Cost/Size/Hits<sup>a</sup> of Ships' Armor: A Construction Technology

Armor Type (Tech Level)	Cost/Size/Hits for Each Hull Size			
	Small	Medium	Large	Huge
Titanium (1)	0/0/3	0/0/18	0/0/100	0/0/600
Titanium II	2/14/4	10/80/27	50/400/150	250/2000/900
Duralloy (10)	2/2/4	10/10/27	60/60/150	300/300/900
Duralloy II	3/17/6	15/85/40	90/425/225	450/2100/1350
Zortrium (17)	4/4/6	20/20/36	100/100/200	500/500/1200
Zortrium II	6/20/9	30/100/54	150/500/300	750/2500/1800
Andrium (26)	6/6/7	30/30/45	150/150/250	750/750/1500
Andrium II	9/23/11	45/115/67	225/575/375	1125/2875/2250
Tritanium (34)	8/8/9	40/40/54	200/200/300	1000/1000/1800
Tritanium II	12/26/13	60/130/81	300/650/450	1500/3250/2700
Adamantium (42)	10/10/10	50/50/63	250/250/350	1250/1250/2100
Adamantium II	15/30/15	75/150/94	375/750/525	1875/3750/3150
Neutronium (50)	12/12/12	60/60/72	300/300/400	1500/1500/2400
Neutronium II	18/35/18	90/175/108	450/875/600	2500/4375/3600

<sup>a</sup>Cost and size will decrease with miniaturization (see Chapter 10). Hits absorbed remain constant.

armor is usually a waste of money and hull space.

## ENGINES AND WARP SPEED

Beneath the Armor line is the Engine line. By pressing the highlighted word Engine, the Engines menu pops up, as shown in Figure 9-7. Although all of the first three engine technology levels (Retro, Nuclear and Sub-Light), are available, you can splurge here. In this case the rest of the fleet has been built with warp 3 (Sub-Light) engines, and it would be best for this new ship class to keep up. Besides, the better the engines, the more options there will be to choose from when selecting the ship's maneuverability. For a detailed study on engine efficiency versus the hull space they take up, see Appendix B.

Notice the information on the Engine line in Figure 9-7: "WARP 3 DEF 1." This tells you that the engine selected will move the ship at warp 3 (i.e., 3 parsecs per turn between



Figure 9-7

The Engines menu: note that none of the categories varies with hull size. Cost, size, and space (i.e., space taken up by all the engines) decrease with miniaturization (see Table 9-6).

stars) and that the ship's current Beam Defense level is 1.

## MANEUVER, COMBAT SPEED, AND DEFENSE BONUSES

This tour of the upper-box New Ship Design screen ends with a look at the vital consideration

**Table 9-6** Initial Cost/Size/Power Output<sup>a</sup> of Ships' Engines: A Propulsion Technology

Engine Type (Warp Speed)	Tech Level	Cost	Size	Power Output per Engine
Retro (warp 1)	1	2	10	10
Nuclear (warp 2)	6	4	18	20
Sub-Light (warp 3)	12	6	26	30
Fusion (warp 4)	18	8	33	40
Impulse (warp 5)	24	10	36	50
Ion Drive (warp 6)	30	12	40	60
Anti-Matter (warp 7)	36	14	44	70
Interphased (warp 8)	42	16	47	80
Hyper Drive (warp 9)	48	18	50	90

<sup>a</sup>Cost and size decrease with miniaturization (see Chapter 10). Power output remains constant (but see Appendix B).

of maneuverability. The word Maneuver is located on the third line, beneath Engine, and the two are inextricably linked. The engine warp speed selected sets the maximum maneuverability class available. By selecting the word Maneuver, the Maneuverability menu appears, as shown in Figure 9-8.

A ship's maneuverability translates into its combat speed on the Ship Combat Display screen, moving that ship 1 square per turn for every two full levels of maneuverability. The exception to this is that Maneuverability class II also yields a combat speed of 2. Note that the level of the warp engine installed affects only the range of available maneuverability options, not the amount of power that such maneuverability requires. This latter value is constant, as shown in Table 9-7.

## SUMMING UP THE TOP OF THE NEW SHIP DESIGN SCREEN

In covering the two upper sections of the New Ship Design screen, you've learned about the six categories that define a ship's basic, unarmed structure. What started out costing 205 BCs per ship has now risen to 423 BCs as goodies like computers, shields, armor, and engines have been added. Also, about one-third of this ship's



**Figure 9-8**  
The Maneuverability menu

interior space has been filled with these necessities of a modern combat starship. As a rule of thumb, keep the remaining two-thirds of a ship's hull space available for weapons and special devices.

## SPECIAL DEVICES

After outfitting a ship's basic design, using the six categories described above, skip the weapons section of the New Ship Design screen and do the special devices (specials) next, as they are more mission specific (as we'll discuss in the second half of this chapter). Because certain specials can improve other weapons (or, indeed, are weapons themselves), knowing what

**Table 9-7** Maneuverability Power Required<sup>a</sup>

Hull Size	Maneuverability Rating Purchased <sup>b</sup>								
	1	2	3	4	5	6	7	8	9
Small	2	4	6	8	10	12	14	16	18
Medium	15	30	45	60	75	90	105	120	135
Large	100	200	300	400	500	600	700	800	900
Huge	700	1400	2100	2800	3500	4200	4900	5600	6300

<sup>a</sup>Amount of power required to achieve this level of maneuverability with the specified hull size. The cost and space listed on the Purchase window when selecting a ship's maneuverability rating reflect the appropriate number of engines required to provide this amount of power.

<sup>b</sup>Excluding maneuverability increases due to Inertial Stabilizers and Nullifiers.



specials are “on the menu today” will help you design the most effective weapons package. Also, many specials take up a lot of hull space (between the size of the special device itself and the extra engines that are automatically added to your ship design to power it). Therefore, placing specials on your design first, and then filling the ship’s remaining hull space with banks of smaller weapons, simply makes good design sense.

Each ship design can have up to three different specials on board. The combination of specials and weapons largely defines a ship design’s mission capabilities. These design combinations and missions are thoroughly discussed in the second half of this chapter.

To add special devices, select the word *Special* and the Special Devices menu will appear, similar to the one shown in Figure 9-9. Note that only one of each type of special device can be placed in a ship design. (No fair having three Inertial Stabilizers!)

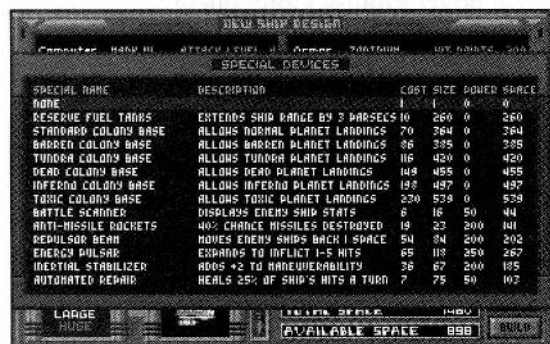
After considering the strategic situation and our mission needs (as discussed later in this chapter), you may decide to build a lightly

armed, long-range beam firing ship with good survivability. Its task will be to patrol and garrison your colonies and lend firepower (and blocking power) in support of the colonies’ missile bases. Survivability is important for baiting computer players into charging into the teeth of our planetary defenses. To that end, equip this ship design with a Repulsor Beam, Anti-Missile Rockets, and Automated Repairs, as shown in Figure 9-10.

Let’s look at the role of the various special devices that can be used in ship designs. Afterward, you will finally place weapons on board this sample ship.

## COLONY BASES

Not surprisingly, placing one of these planetology technology devices on a ship makes it a de facto colony ship. They come in a variety of flavors (Standard at planetology Tech level 1, Barren at 3, Tundra at 6, Dead at 9, Inferno at 12, Toxic at 15, and Radiated at 18—see the pattern?), and each allows you to settle on that or any less hostile environment type. For example, a Tundra Colony Base can start a



**Figure 9-9**  
The Special Device menu



**Figure 9-10**  
A ship design for which specials, but not weapons, have been selected



colony on any tundra, barren, or standard environment worlds. A Radiated Colony Base can plant a colony on any star that has a planet to settle on.

Because players are limited to six ship designs, each is precious. It is seldom practical to have more than one colony ship design in operation on the board. An exception, perhaps, would be in the very early stages of the game, when scrapping an old colony ship design would be impractical because of its high cost relative to a young empire's economy. Therefore, when a new Colony Base technology (or a faster warp engine) is found that can be used right away, create a new colony ship design around it and scrap (or phase out if scrapping is impractical) your old colony ship design. Maintaining a single colony ship design with the most versatile Colony Base technology on it is a smart way to play.

Note that during the later stages of a game, most planets will be colonized and there will be little need to keep a colony ship on your fleet roster. Be ready, however, to build one at a moment's notice, for it is at this stage of the game that colonies tend to be destroyed by planetary bombardment. Should this occur, it will take another colony ship to reestablish your lost colonies or seize newly vacant ones previously belonging to other races.

## OFFENSIVE SPECIALS

The following are some special devices that are designed primarily as offensive weapons.

### BLACK HOLE GENERATOR

The Black Hole Generator is a particularly nasty level-43 force field technology weapon that kills the entire crew of any target it hits,

destroying huge or small ships with identical ease. When hit by a Black Hole Generator, some targets in the defending group are destroyed outright while the others are completely unscathed. Interestingly, this weapon is fairly effective against missile bases and does not destroy any factories or population when fired at a planet.

Only some targets in a group will be hit, however. The percentage of ships in the target group destroyed by a Black Hole Generator attack begins at a random 26 to 100 percent. After that random percentage is generated, 2 percent per level of the defender's shields is subtracted from the result. Furthermore, if the target group is equipped with Inertial Stabilizers, another 15 percent (or 30 percent if they have Inertial Nullifiers) is subtracted. Table 9-8 breaks down Black Hole Generator attack effectiveness by defender shield level.

## ENERGY AND IONIC PULSARS

When fired, Energy and Ionic Pulsars (level-16 and -40 propulsion technology weapons, respectively) hit every adjacent target group, enemy and friendly, and affect every ship in these target groups. Consequently, you should give ships armed with pulsars a wide berth (which, interestingly, computer players don't seem to do very well).

An Energy Pulsar can do from 1 to X points of damage, where X is 5 for the first ship in the firing group, +1 for every additional complete pair of ships in that group. An Ionic Pulsar is twice as effective, inflicting from 1 to 10 points of damage for the first ship, and increasing the maximum damage at a rate of +1 point of damage for every additional ship in the Ionic

**Table 9-8** Black Hole Generator Target Destruction Percentages<sup>a</sup>

Defender's Shield Level	Percent Normal Destruction		Percent Destruction with Inertial Stabilizers		Percent Destruction with Inertial Nullifiers	
	Range	Avg. <sup>b</sup>	Range	Avg. <sup>b</sup>	Range	Avg. <sup>b</sup>
0	26-100	63.0	11-85	48.0	0-70	33.1
1	24-98	61.0	9-83	46.0	0-68	31.3
2	22-96	59.0	7-81	44.0	0-66	29.5
3	20-94	57.0	5-79	42.0	0-64	27.7
4	18-92	55.0	3-77	40.0	0-62	26.0
5	16-90	53.0	1-75	38.0	0-60	24.4
6	14-88	51.0	0-73	36.0	0-58	22.8
7	12-86	49.0	0-71	34.0	0-56	21.3
8	10-84	47.0	0-69	32.2	0-54	19.8
9	8-82	45.0	0-67	30.4	0-52	18.4
10	6-80	43.0	0-65	28.6	0-50	17.0
11	4-78	41.0	0-63	26.9	0-48	15.7
12	2-76	39.0	0-61	25.2	0-46	14.4
13	0-74	37.0	0-59	23.6	0-44	13.2
14	0-72	35.0	0-57	22.0	0-42	12.0
15 <sup>c</sup>	0-70	33.1	0-55	20.5	0-40	10.9
16	0-68	31.3				
17	0-66	29.5				
18	0-64	27.7				
19	0-62	26.0				
20	0-60	24.4				
21	0-58	22.8				
22	0-56	21.3				
23	0-54	19.8				
24	0-52	18.4				
25	0-50	17.0				
26	0-48	15.7				
27	0-46	14.4				
28	0-44	13.2				
29	0-42	12.0				
30	0-40	10.9				
31	0-38	9.9				
33	0-34	7.9				
35 <sup>d</sup>	0-30	6.2				

<sup>a</sup>Range is the percent range of targets destroyed per Black Hole Generator attack. Average is the average percentage of targets destroyed in an attack after deducting for shields, Inertial Stabilizers, and Nullifiers.

<sup>b</sup>Average number of ships in target group destroyed, rounded slightly.

<sup>c</sup>Maximum ship shield level.

<sup>d</sup>Maximum combined missile base and Planetary Shield level.

Pulsar-armed attacking group.

For example, suppose a group of 75 ships equipped with Ionic Pulsars fires this weapon next to 2 enemy target groups. Both adjacent groups will suffer their own random 1 to 84 hits (10 for the first ship, plus 74 -1 for each firing ship remaining in that group, excluding the first ship), with the same amount of damage applied to every ship in that group.

Interestingly, this damage reduces every ship's *maximum hits* (i.e., the *armor value*) as opposed to reducing its current hits remaining. Whenever this armor value drops to less than the number of hits remaining, that number is also lowered. This means that a ship with 1 hit remaining of a possible 100 (i.e., it reads  $1/100$  on lower part of the Ship Combat Display screen) that takes 40 points in damage from a pulsar attack will now read  $1/60$  (instead of  $1/100$ ) on the display, and not be destroyed! If that same ship were at full strength before the attack, it would be reduced to  $60/60$ , as the first number (current hits remaining) cannot exceed the second number (its armor value).

For example, say you have a group of 101 ships armed with Energy Pulsars. Naturally, you carefully move it away from your other ships and adjacent to several enemy ship groups. Assuming you take no losses in this group before it attacks, when the Energy Pulsar fires, it will do from 1 to 55 points in damage (1 to 5 + 50 for the additional 50 pairs of ships firing in that group). This damage reduces the maximum armor of every ship in each adjacent stack. Note that a random number is rolled separately for each stack. Thus, the armor value of every ship in one stack might be reduced only by 1, whereas each ship in another stack might get hit by the full 55 points of damage.

After repeated pulsar attacks, every target in a stack will eventually have its armor level reduced to zero, at which time they will all be eliminated. In other words, the whole stack will go "poof!" at the same time when the fatal pulsar attack is delivered.

Automated Repairs and Advanced Damage Control counter this effect between battle turns. They can raise the armor value of every ship in a stack just hit by a pulsar. If a ship's current hits remaining are repaired above a reduced maximum armor value, then the maximum armor value is also repaired (raised) to match it.

## HIGH ENERGY FOCUS

A High Energy Focus (level-34 propulsion technology) is a wonderful supplement for any beam/normal direct fire weapons a ship might be armed with (these include every weapon listed in the Beam Weapons Table in the game's Technical Supplement). It increases all of their maximum ranges by three spaces on the Ship Combat Display screen. Remember, however, for each square a beam weapon is firing beyond one, +1 is added to the target's Defense level. Therefore, pot shots at long range are less likely to hit (and cause less damage when they do), but they can still soften up targets before you close in to a more accurate and deadly range. This device also allows particularly fast ships to get in close enough to fire their beam weapons at long range against missile bases, possibly destroying them before they can fire or before their missiles have time to hit.

## ION AND NEUTRON STREAM PROJECTORS

Ion and Neutron Stream Projectors (level-21 and -47 weapons technology specials) hit every

target in a defending group up to a range of 2 squares. They might not kill them with the first shot, but they will all be equally softened up for subsequent attacks by other weapons. The effect of an Ion Stream Projector is to reduce the target's current armor value (see "Energy and Ionic Pulsars," above, for an explanation of how reducing armor works) by 20 percent, plus 1 percent for every pair of ships in the group making the Ion Stream Projector attack, up to a maximum of 50 percent (rounding fractional damage up to the next whole point). This means that having 61 ships in a group attacking with Ion Stream Projectors is the optimal number ( $20\% + 30\% = 50\%$ , its maximum attack ability). Any additional ships in this group, although they can contribute with their other weapons, are just cannon fodder as far as Ion Stream Projector attacks are concerned (i.e., they can take losses so that the ship group can keep making maximum-value stream projector attacks longer).

A Neutron Stream Projector is twice as effective as an Ion Stream Projector, destroying 40 percent of every target ship's armor plus 1 percent per attacking ship, up to a maximum of 75 percent (again, rounding fractional damage up to the next whole point). Consequently, the optimal attacking group size for this weapon is 36 ships. Having multiple ship groups armed with stream projector weapons concentrate their fire on a single enemy ship group until it is eliminated allows them to quickly kill off large numbers of enemy ships with their last, fatal shot.

### ORACLE INTERFACE

The Oracle Interface is a charming little level-46 computer technology that allows all of

the beam weapons in every ship of the firing group to hit an enemy target at one precise point simultaneously. Its effect is to halve the enemy target's shielding. Note that weapons that already halve enemy shields will, when supplemented by an Oracle Interface, halve them twice (rounded down each time they are halved).

## DEFENSIVE SPECIALS

Other specials that a ship might have built into its design are defensive in nature. This section looks at each of these.

### ANTI-MISSILE ROCKETS, ZYRO SHIELDS, AND LIGHTNING SHIELDS

Anti-Missile Rockets are a level-6 weapons technology, and Zyro and Lightning Shields are level-31 and -46 force field technologies, respectively. All of these provide a point defense against missile and torpedo attacks. They have a 40, 75, and 100 percent chance of stopping a missile or torpedo attack respectively, less 1 percent per Tech level of the attacking missile or torpedo.

These are ideal defenses for ships that must survive an enemy ship group's *stand-off* (i.e., long-range) missile and torpedo weapons to get in close and return fire. Often, ECM can be sacrificed when these point defense special systems are included in a ship's design. Table 9-9 gives the exact percentages of missiles that will be stopped by each anti-missile special device.

### CLOAKING DEVICE

A Cloaking Device is a level-27 force field technology that adds 5 to a ship group's Defense level versus beam and missile weapon attacks. It does not normally affect special weapon

**Table 9-9** Anti-Missile Specials Effectiveness<sup>a</sup>

Missile Type	Anti-Missile Special		
	Anti-Missile Rockets	Zyro Shields	Lightning Shields
Nuclear Missile	39	74	99
Hyper-V Rocket	36	71	96
Hyper-X Rocket	32	67	92
Scatter Pack V	29	64	89
Merculite Missile	26	61	86
Stinger Missile	22	57	82
Anti-Matter Torpedo	17	52	77
Scatter Pack VII	13	48	73
Pulson Missile	11	46	71
Hercular Missile	6	41	66
Hellfire Torpedo	0	35	60
Zeon Missile	0	34	59
Proton Torpedo	0	32	57
Scatter Pack X	0	31	56
Plasma Torpedo	0	25	50

<sup>a</sup>Numbers represent the percent chance each special has of destroying each incoming missile.

attacks (exception: Stasis Field Generators). Ships must decloak to fire, but will always get in the first shot when doing so. This is one way to guarantee you'll strike the first blow against an enemy with a higher initiative. In fact, he'll even lose his defensive reaction fire ability while you are cloaked. Enemy ships will also not get their reaction fire against a ship that just decloaked if it does not move after decloaking.

After one turn of not firing, ships with Cloaking Devices will automatically recloak. Cloaking is ideal for ships armed with short-range weapons (beams and bombs), as it allows them to close in on the enemy with less reduced risk. Furthermore, cloaked ships cannot be the targets of enemy Stasis Field Generator attacks.



*Cloaking, under average circumstances (i.e., when the enemy's Attack level is equal to your Defense level), makes a ship 10 times harder to hit (based on Table 7-3). Therefore, don't expect a Cloaking Device to serve as a ship's primary defense. Maintain sufficient maneuverability that your base Beam and Missile Defense levels keep up with enemy Attack levels even when the ship is decloaked.*

### DISPLACEMENT DEVICE

A Displacement Device (level-50 propulsion technology) is very easy to understand. If a defending ship group is equipped with Displacement Devices, 34 percent of all nonspecial

weapon attacks against it will simply miss. Before each missile is launched, the computer determines separately if it misses due to the defender's Displacement Device. For those that aren't displaced, the computer proceeds to make their To Hit die rolls (see Table 7-3) and continues their attacks normally. That's it!

## REPULSOR BEAMS

A ship with a Repulsar Beam (level-16 force field technology) does two things automatically: (1) it pushes enemy ships back 1 square, after hitting them with its other weapons first (see "Weapons Firing Order," below) and (2) if ship groups attempt to move into neighboring squares it pushes them away *before* they can fire their weapons! In effect, a Repulsor Beam makes a ship virtually immune to all 1-square range weapons.

One interesting note is that ship groups equipped ship with multiple Repulsor Beams can *hand off* a repulsed enemy ship group. In effect, they can push them back 1 square each during the same combat round. There are two caveats. First, if a ship is cornered against the map edge, other ships, asteroids, or whatever, it cannot be pushed back any farther. Second, if an enemy ship has superior initiative and you close in on it, it will get its defensive reaction fire before your Repulsor Beam can fire and push it back.

## STASIS FIELD GENERATOR

A Stasis Field Generator is a level-37 force field technology device with a 1-square range. A group of ships hit by a Stasis Field Generator is effectively out of action for one round of combat. While trapped in a stasis field, they can't move, fire, or be fired upon. Any missiles they've

fired previously continue to track their targets, but lose their To Hit bonus while their firing ship is in a stasis field.

In effect, a Stasis Field Generator allows you to divide and conquer an enemy fleet, blocking one strong element while concentrating your strength to destroy another. Note that cloaked ships cannot be targeted for Stasis Field Generator attacks.

Use this weapon carefully. It must be turned off manually in order not to be used against the first target you shoot at! If you want to fire at a ship group with regular weapons first, use the Special button at the bottom of the Ship Combat Display screen to turn off the Stasis Field Generator. After that attack, press the Special button again to reactivate the Stasis Field Generator.

A ship group comes out of stasis at the beginning of the move of the ship group that attacked it with the Stasis Field Generator. This is vital to know, because the same group that put those ships in a stasis field can put them back in again before they can react. When leaving a stasis field, a ship group has a *de facto* Wait command issued to it. Consequently, its initiative will be zero for that turn (i.e., it will move last that round, but can use defensive reaction fire).

## TECHNOLOGY NULLIFIER

A Technology Nullifier (level-49 computer technology) overloads a target's computer systems and, thus, reduces its Battle Computer and ECM ratings. It never misses when fired at a target, and each hit reduces both the target's Battle Computers and ECM by 2 to 6 levels (not 1 to 3 as the *Master of Orion* manual says). This is determined by the sum of a roll of two



d3 dice, so that the outcome probability will average around 4 levels lost per Technology Nullifier attack.

The damage to each system hit is figured out separately. Damage done by this weapon is cumulative through the course of a battle. Note that if ships hit by Technology Nullifier attacks survive, all damage is automatically repaired at the battle's conclusion. Note that Technology Nullifier attack damage *does* affect a target group's missiles and torpedoes that are still en route to their target. Their To Hit probabilities are instantly reduced in midflight by Technology Nullifier damage to the firing ships' Battle Computers.

Note that the effects of being hit by a Technology Nullifier could put the target's Defense level versus your Attack level deep into negative numbers. Therefore, you'll have to extrapolate Table 7-3 a bit to work out your actual To Hit probabilities.

### WARP DISSIPATOR

The Warp Dissipator is a special level-20 propulsion technology that fires a disrupting beam at the engines of an enemy ship group. Each Warp Dissipator shot has a 50 percent chance of reducing the target ship group's combat speed by one and its Beam and Missile Defense levels by two. A Warp Dissipator has a 3-square range and its effects are repaired after the battle is over.

However, if a ship is reduced to speed 0 (i.e., it's dead in space on the Ship Combat Display screen) it no longer has the option to retreat and must fight to the death from its current square. The only exception is if a ship group was already ordered to retreat the previous turn,

in which case it escapes. Warp Dissipators do not affect a ship's ability to use Subspace Teleporters, even when that ship is dead in space (although Subspace Teleporters will not allow them to retreat off the Ship Combat Display screen). Note that ships that are dead in space usually have their Defense levels reduced to such a low point that they become sitting ducks. Happy duck hunting.

## MOVEMENT AND MANEUVER SPECIALS

Some special devices are not exactly offensive or defensive in nature. Instead, they affect ship movement and maneuverability. This section examines these important special devices.

### BATTLE SCANNERS

Battle Scanners are a level-1 computer technology, so all players have them available from the start. When a ship design that includes Battle Scanners is present at the beginning of a battle, you are allowed to use the Scan button along the bottom of the Ship Combat Display screen for the duration of that battle (even if your ships with Battle Scanners retreat or are destroyed). This, of course, allows you to examine all of the opposing fleet's design specifications.

Additionally, Battle Scanners increase ship or missile base Attack levels by +1 and their initiative ratings by +3. Initiative determines the order of combat for ship groups and missile bases on the Ship Combat Display screen (see Chapter 7).

### INERTIAL STABILIZER AND NULLIFIER

Inertial Stabilizers and Nullifiers are level-10 and -46 propulsion technology specials that

reduce the effects of inertia, making a ship faster and more nimble in tactical space combat. Stabilizers give a +2 bonus to a ship design's maneuverability. Therefore, its Beam and Missile Defense levels are raised by +2, and its speed on the Ship Combat Display screen increases by +1. Furthermore, Inertial Stabilizers reduce damage of Black Hole Generator attacks by 15 percent (see Table 9-8).

Inertial Nullifiers work twice as well, giving a +4 bonus to a ship design's maneuverability, therefore increasing its Beam and Missile Defense levels by +4, and combat speed by +2. It also reduces the damage from Black Hole Generator attacks by 30 percent (again, see Table 9-8).

## RESERVE FUEL TANKS

Reserve Fuel Tanks are a level-1 construction technology, so your ships begin every game with them. They extend a ship design's range by 3 parsecs. You are likely to find little use for them later in the game, as you discover ever-increasing ship ranges via improved propulsion technologies. However, early on, Reserve Fuel Tanks have an important role to play.

Scout designs begin the game equipped with Reserve Fuel Tanks, thus enabling you to explore the star *beyond* the star that you're considering colonizing (see Chapter 3). Reserve Fuel Tanks are also useful for extending the range of raider ship designs, as discussed later in this chapter.

## Long-Range Colony Ships

There will be times when you are tempted to create a colony ship with Reserve Fuel Tanks that can make a long jump across 6 to 9 parsecs

of space. Why? To reach a prize star that is so important that it is worth all the extra expense.

At the beginning of the game, placing both a colony base and Reserve Fuel Tanks in the same ship requires 1300 hull spaces. Because a large ship begins with only 1020 hull spaces, you must either build an expensive (and time consuming), huge-hulled design to accommodate them, or wait for things to miniaturize to the point at which both can be fitted into a cheaper, large-hulled ship. How many advances in which Tech levels will allow you to create a large-hulled, long-range colony ship? The answer to that question is in Table 9-10.

Try using Table 9-10: To create a large-hulled ship that includes both a Standard Colony Base and Reserve Fuel Tanks, you must miniaturize things a total of 280 hull space units. The fastest way to get there would be through construction research, because it both miniaturizes the Reserve Fuel Tanks and increases the ship's available hull space. However, any combination that totals 280 or more in Table 9-10 will allow you to construct a large, long-range colony ship.

For example, reaching Tech level 7 in construction (which yields an extra 200 hull spaces), Tech level 5 in planetology (which adds another 77), and Tech level 4 in propulsion (opening up another 10 hull spaces) gives you a total of 287. Because that is greater than the 280 you need to create a large, long-range colony ship, you may now design one!

Interestingly, computer players always tailor their early research strategy around the idea of extending the range of their colony ships. Their early research strategy concentrates, in turn, on propulsion, planetology, and construction technologies. This allows the computer players to

**Table 9-10** Effect of Miniaturization on a Large-Hulled Ship: Number of Hull Spaces Gained or Saved<sup>a</sup>

Tech Level	Technology Category		
	Construction	Planetology	Propulsion
1	0	0	0
2	35	21	10
3	70	42	10
4	100	56	10
5	135	77	20
6	165	91	20
7	200	112	20
8	230	126	20
9	265	147	30
10	295	161	30
11		175	30
12		189	30
13		203	30
14		217	40
15		231	40

<sup>a</sup>Numbers represent hull spaces saved (by advances in planetology or propulsion Tech level) or created (by advances in construction Tech level).

pursue early, rapid expansion by aggressively researching the technologies required to build long-range colony ships. You would be wise to emulate them.

### SUBSPACE TELEPORTER

The Subspace Teleporter is one of the best specials: this level-38 propulsion device allows ships equipped with it to move from any square on the Ship Combat Display screen to any other, instantly, without moving through any of the intervening squares. Ships moving via Subspace Teleporters also get the first firing opportunity after moving, whatever the enemy's

initiative rating. Thus, teleporting ships can instantly close in on enemy ship groups and colonies, hitting them first and hitting them hard before they can react. The prospects are awesome.

Unfortunately, this powerful special device can be nullified when fighting over an enemy planet after that enemy has discovered the level-43 propulsion technology of Subspace Interdictors. Subspace Interdictors are added to all of that player's missile bases for free. Their presence at a battle requires ships with Subspace Teleporters to move normally during combat (i.e., in their regular initiative order).

Subspace Teleporters can be used, however, the instant all such missile bases are destroyed during a battle.

When fighting over friendly planets, missile base Subspace Interdictors will not operate if the defending fleet has Subspace Teleporters and the enemy does not. In other words, they have the good sense not to ruin their own advantage over the enemy. However, if the enemy has at least one ship design with Subspace Teleporters, then the friendly missile bases will automatically turn on their Subspace Interdictors and negate the Subspace Teleporters on both sides. Therefore, when you acquire Subspace Teleporters, use them quickly, before the enemy discovers Subspace Interdictors.

## SPECIAL SHIP ITEMS OVERVIEW

As is explained later in this chapter, special devices, like other components of a ship design, will miniaturize and become smaller and less expensive as technology advances. However, knowing their initial cost, size, and power ratings would be useful, so they are presented in Table 9-11.

## EITHER/OR SPECIALS

Here is the final note about equipping your ship designs with special devices: You can't place two of the same device in a single ship design. Also, many special devices are merely improved versions of other ones. For example, Inertial Nullifiers are an improved version of Inertial Stabilizers. In these situations, you may add either the earlier or later version of that technology to a ship design, but not both (in hopes of gaining their cumulative advantage).

Specifically, the Either/Or Specials List includes:

- Either Anti-Missile Rockets, Zyro Shields, or Lightning Shields
- Either Automated Repair Systems or Advanced Damage Control
- Either Inertial Stabilizers or Inertial Nullifiers
- Either Ion Stream Projectors or Neutron Stream Projectors
- Either Energy Pulsars or Ionic Pulsars
- Either a Standard, Barren, Tundra, Dead, Inferno, Toxic, or Radiated Colony Base

## WEAPONS FIRING ORDER

All of a ship's weapons and special devices are employed in the following sequence:

1. Decloaking (if cloaked and firing)
2. Stasis Field Generator
3. Ion and Neutron Stream Projectors
4. Energy and Ionic Pulsars
5. Warp Dissipator
6. Black Hole Generator
7. Technology Nullifier
8. Normal ships' weapons (beams, bombs, missiles, etcetera) in the order of their placement (see below)
9. Repulsor Beam
10. Recloaking (if uncloaked and nothing was fired)

When placing normal ships' weapons on your designs, which you're about to do, it is important to keep in mind that during space combat they fire in the order in which they are listed on this screen. For example, if you put the Heavy Fusion Beams on the list higher than the Ion Cannons, then the Heavy Fusion Beams will make their attacks each round before the Ion Cannons. The reason this is important is that once a bank of weapons

**Table 9-11** Initial Cost, Size, and Power Rating of Special Ship Items

Fixed-Cost Specials (Regardless of Hull Size)					
Type Special	Tech Level	Technology Category	Cost <sup>a</sup>	Power Size <sup>a</sup>	Consumed
Battle Scanner	1	Computer	30	50	50
Technology Nullifier	49	Computer	300	750	1000
Repulsor Beam	16	Force Field	55	100	200
Stasis Field	37	Force Field	250	200	275
Black Hole Generator	43	Force Field	275	750	750
Standard Colony Base	1	Planetology	350	700	0
Barren Colony Base	3	Planetology	375	700	0
Tundra Colony Base	6	Planetology	400	700	0
Dead Colony Base	9	Planetology	425	700	0
Inferno Colony Base	12	Planetology	450	700	0
Toxic Colony Base	15	Planetology	475	700	0
Radiated Colony Base	18	Planetology	500	700	0
Energy Pulsar	16	Propulsion	75	150	250
Ionic Pulsar	40	Propulsion	150	400	750
Warp Dissipator	20	Propulsion	65	100	300
Ion Stream Projector	21	Weapons	100	250	500
Neutron Stream Projector	47	Weapons	200	500	1250

**Variable-Cost Specials (Cost Based on Hull Size)**

Type of Special	Tech Level	Technology Category	Cost/Size/Power <sup>a</sup> for Each Hull Size			
			Small	Medium	Large	Huge
Oracle Interface	46	Computer	3/8/12	15/40/60	60/200/300	275/1000/1500
Reserve Fuel Tanks	1	Construction	2/20/0	10/100/0	50/500/0	250/2500/0
Automated Repair	14	Construction	0.2/3/3	0.8/15/10	5/100/50	30/600/300
Advanced Damage Control	36	Construction	4/9/9	20/45/30	100/300/150	500/1800/450
Cloaking Device	27	Force Field	3/5/10	15/25/50	75/120/250	375/600/1250
Zyro Shields	31	Force Field	5/4/12	10/20/60	20/100/300	30/500/1500
Lightning Shields	46	Force Field	20/6/15	30/30/70	40/150/350	50/750/1750
Inertial Stabilizer	10	Propulsion	2/4/8	7.5/20/40	50/100/200	270/500/1000
High Energy Focus	34	Propulsion	3/35/65	13.5/100/200	62.5/150/350	350/500/1000
Subspace Teleporter	38	Propulsion	2.5/4/16	10/20/80	45/100/400	225/500/2000
Inertial Nullifier	46	Propulsion	6/6/12	20/30/60	150/150/300	500/750/1500
Displacement Device	50	Propulsion	3/15/5	15/75/25	30/375/125	275/1875/625
Anti-Missile Rockets	6	Weapons	10/2/8	10/10/40	10/50/200	10/250/1000

<sup>a</sup>Cost and size will decrease due to miniaturization (see Chapter 10). Power requirements are constant (but see Appendix B).

destroys the last ship in a group, the remaining, unfired banks of weapons on that ship type may fire at any different, newly designated group that you select in that same round.

## WEAPONS

Finally, add weapons to fill up your sample ship design's hull space. Banks of up to 4 different weapon types can be placed on a single ship design, and each bank can include up to 99 of

the same weapon. To continue building this ship, select the word *Weapons* on the New Ship Design screen to bring up the menu shown in Figure 9-11a.

Because this patrol ship design has a Repulsor Beam, you should install beam weapons with at least a 2-square range. Therefore, select a Heavy Fusion Beam. After you see it placed on the New Ship Design screen, click on the Up Arrow button next to it so that a second one is



WEAPONS	DESCRIPTION	RNG	COST	SIZE	DAMAGE	SPACE
10 CATLING LASER	FIRE 4 TIMES/TURN	1-4	2	2	76	42
26 NEUTRON PELLET CUN	HALVES ENEMY SHIELDS	2-5	3	2	25	16
14 HYPER-X ROCKET	2 SHOTS, +1 TO HIT	8	4	18	20	28
9 HYPER-X ROCKET	5 SHOTS, +1 TO HIT	8	8	27	20	45
19 FUSION BOMB	GROUND ATTACKS ONLY	5-20	1	5	0	5
7 SCATTER BOMB	2 SHOTS, +1 TO HIT	6	1	25	60	61
4 SCATTER BOMB	5 SHOTS, +1 TO HIT	6	14	27	30	91
22 DEATH SPORER	BIOLOGICAL WEAPON	1	4	18	0	18
10 MASS DRIVER	HALVES ENEMY SHIELDS	5-8	7	12	50	41
10 NEUTRON BLASTER	2-12	7	5	60	41	
7 HEAVY BLAST CANNON	2-24	21	17	120	128	
6 STINGER MISSILE	2 SHOTS, +3 TO HIT	15	10	34	20	72
4 STINGER MISSILE	5 SHOTS, +3 TO HIT	15	14	50	45	107
5 HARD BEAM	HALVES SHIELD STRENGTH	8-12	12	18	100	73
3 FUSION BEAM	4-16	10	8	75	53	
2 HEAVY FUSION BEAM	4-20	28	24	225	159	
12 OMEGA-U BOMB	GROUND ATTACKS ONLY	20-50	4	25	0	25
2 ANTI-MATTER TORD	FIRE ONE PER 2 TURNS	30	41	22	200	217

Figure 9-11a

The Weapons menu

added to this weapons bank, as shown in Figure 9-11b.

Note that the Up and Down Arrow buttons allow you to adjust how many of that weapon type you wish to have on board in that particular weapons bank, from 1 to 99. Because each ship can hold up to 4 weapons banks, that means that, theoretically, up to 396 weapons can be placed on board a single ship!

Finish off this ship design by adding a Heavy Blast Cannon, which also has a 2-square range, to the ship's armament. Although there is room to add a Nuclear Bomb, don't waste the money, as this is a purely defensive patrol ship for garrisoning your own stars. In a pinch, it could be used aggressively for space superiority over enemy planets, but you should be planning to create other designs that are better suited to that later. When completed, this Test Ease class ship design looks as shown in Figure 9-11c. Now all you need to do is build a few of them and have them garrison your threatened colonies.

## BEAM WEAPONS

The definition of a beam weapon is rather broad. It includes everything listed in the Beam

NEW SHIP DESIGN

Computer: MARK IV ATTACK LEVEL 4 Armor: ZORTHUM HIT POINTS: 200  
 Shield: CLASS III ABSORBS 2 HITS Engine: SUB-LIGHT RANGE: 3 DEF: 3  
 ECM: JAMMER IV MISSILE DEF: 7 Maneuver: 2 COMBAT SPEED: 2

Count Ship Weapons Damage And Notes

Weapon 1: 2 HEAVY FUSION BEAM 4-20 2  
 Weapon 2:  
 Weapon 3:  
 Weapon 4:

Special 1: REPULSOR BEAM MOVES ENEMY SHIPS BACK 1 SPACE  
 Special 2: ANTI-MISSILE ROCKETS 40% CHANCE MISSILES DESTROYED  
 Special 3: AUTOMATED REPAIR HEALS 25% OF SHIP'S HITS A TURN

SHIP SIZE: LARGE SHIP NEED: 1480

GAME TEST EASE  
 SHIP COST: 588 BC  
 TOTAL SPACE: 1480  
 AVAILABLE SPACE: 128

Figure 9-11b

Adding a second Heavy Fusion Beam using the Up Arrow button

Weapons Table in the *Master of Orion* Technical Supplement. In effect, beam weapons can be more accurately defined as direct fire, point-to-point weapons, all of which are enhanced by the High Energy Focus device. Note that all beam weapons do half damage when attacking colonies, due to the interference of planetary atmospheres.

Interestingly, there are many different special features about the beam weapons in *Master of Orion*. Allow us to explain them.

NEW SHIP DESIGN

Computer: MARK IV ATTACK LEVEL 4 Armor: ZORTHUM HIT POINTS: 200  
 Shield: CLASS III ABSORBS 2 HITS Engine: SUB-LIGHT RANGE: 3 DEF: 3  
 ECM: JAMMER IV MISSILE DEF: 7 Maneuver: 2 COMBAT SPEED: 2

Count Ship Weapons Damage And Notes

Weapon 1: 2 HEAVY FUSION BEAM 4-20 2  
 Weapon 2: 1 HEAVY BLAST CANNON 2-24 2  
 Weapon 3:  
 Weapon 4:

Special 1: REPULSOR BEAM MOVES ENEMY SHIPS BACK 1 SPACE  
 Special 2: ANTI-MISSILE ROCKETS 40% CHANCE MISSILES DESTROYED  
 Special 3: AUTOMATED REPAIR HEALS 25% OF SHIP'S HITS A TURN

SHIP SIZE: LARGE SHIP NEED: 1480

GAME TEST EASE  
 SHIP COST: 588 BC  
 TOTAL SPACE: 1480  
 AVAILABLE SPACE: 3

Figure 9-11c

The completed Test Ease class ship design



## LONG-RANGE AND HEAVY BEAM WEAPONS

Beam weapons are more accurate at closer ranges. For each square a beam weapon fires beyond one, +1 is added to the target's Defense level. Each additional square of firing range, therefore, makes it harder to hit the target, and less likely for the beam attack to do its maximum damage (see Table 7-3).

Late model *heavy* beam weapons (i.e., Heavy Ion Cannons, Heavy Phasors, etcetera) are among the more useful beam weapons when attacking enemy missile bases. Their very high strengths are improved enough over the older models that, even when halved, they often inflict significant damage against a defending planet's strong shielding.

## MULTIPLE-FIRING BEAM WEAPONS

Some weapons fire multiple times during each round of combat. In particular, the Gatling Laser and Gauss Autocannon each fire four times per combat round, whereas the Auto Blaster and Pulse Phasor both fire three times. None of these weapons, however, inflict as much damage per shot as other beam weapons of comparable Tech levels. Having multiple shots, however, makes them particularly well suited for fighting swarms of smaller ships and unarmed, unshielded enemy transports attempting to run the gauntlet of your fleet (see Chapter 8). When combined with an Oracle Interface, however, multiple-firing weapons can slice and dice enemy targets very efficiently.

## SHIELD-REDUCING BEAM WEAPONS

The Neutron Pellet Gun, Mass Driver, Hard Beam, Gauss Autocannon, and Particle Beam all halve the strength of enemy shields (rounded

down) before applying their damage to a target that they successfully hit. This means that they will maintain their damage effectiveness over a greater range of enemy shield strengths (i.e., they won't become obsolete as quickly), making them of value in active service for a long time. Note that this halving effect is for damage inflicted by these weapons only (i.e., the enemy shields are not permanently affected and will apply their full value to other successful attacks, even after being hit by these weapons).

## STREAMING WEAPONS

Both the Graviton and Tachyon Beam weapons *stream* their damage. As explained in Chapter 7, it is possible to finish off the top defender in the target group with several points of overkill damage being wasted. Streaming weapons, however, carry over any overkill damage done to a target that is eliminated and apply it against the next target in that same group. Like multiple-firing weapons, this makes it particularly efficient for attacking smaller ships and transports. Streaming weapons are less useful when firing at ships with many hit points (i.e., large- and huge-hulled ships) and those with high shield strengths (because their carryover damage must penetrate the next ship's shields before inflicting any hits).

## THE MEGABOLT CANNON

Because the Megabolt Cannon is a *wide beam* weapon, it receives a +3 modifier to its Attack level, giving it a much greater chance to hit (see Table 7-3) and causing more damage when it does hit. Megabolt cannons on a swarm of medium-size ships can be very effective against missile bases and the Guardian of Orion, especially when teamed with good Battle

Computers and/or when used by the Mrrshans (see Chapter 13).

### THE STELLAR CONVERTER

The Stellar Converter is one of the two *enveloping* weapons that attack all the target's shielding simultaneously (the other being Hellfire Torpedoes). A Stellar Converter has a range of 3 spaces and, if it hits, attacks four times with 10 to 35 damage points per attack. The important thing to know here is that this weapon makes only a single To Hit die roll on Table 7.3 and it applies the result to all four of its attacks on the target. Thus, if it misses, all four attacks miss. If its To Hit roll is great, however, the target is really going to have its teeth rattle from this lucky quadrupled attack (although the target's shielding will reduce each of the four attacks separately).

### THE DEATH RAY

The Death Ray, an ancient weapon, is acquired automatically after you defeat the Guardian of Orion (see Chapter 15). Although not listed on the Beam Weapons Table in the game's Technical Supplement, it is a level-36 beam weapon for all purposes. The Death Ray inflicts 200 to 1000 points of damage and has a 1-space range (*not* 3). A Death Ray has a base cost of 100 BCs, takes up 2000 units of hull space, and requires 2000 units of power when designed into a ship. Remember, for all its might, a single Death Ray can kill only one target each time it is fired! Note that enemy missile bases can be eliminated very quickly when attacked by Death Rays because even their highest level of shielding (i.e., 35) will hardly stop their damage.

## MISSILES

Missiles and rockets (the two are synonymous in *Master of Orion*) always inflict full damage when they hit (less the target's shielding) and come in two standard varieties: the two-rack and the more expensive five-rack. Each launcher can launch one missile per combat round until it runs out of missiles on its racks. Missiles, unlike beam weapons and torpedoes, do their full damage to planetary targets and can, therefore, be quite effective at reducing enemy missile bases.

Each missile base, by the way, is equipped with three launchers that can fire an unlimited number of missiles during a battle. At three missiles fired per base per round, that can be a lot of missiles in a single battle, folks! Also, those missiles have increased range and flight duration (see Table 8.1).

### SCATTER PACK ROCKETS

While Scatter Pack Rockets also come in the two-rack and five-rack variety, they are MIRVs (*multiple independent reentry vehicles*, meaning that each rocket fired separates into several smaller ones). Scatter Pack-V, -VII, and -X rockets separate into 5, 7, and 10 separate warheads, each inflicting 6, 10, or 15 points of damage, respectively. Like multiple-firing and streaming weapons, this makes them particularly effective at killing off large numbers of smaller ships and transports. Consequently, missile bases can change their ammunition by selecting the Missile button on the Ship Combat Display screen and choosing between either their latest, greatest regular missile or Scatter Pack missile before firing (see Table 8-2).

## TORPEDOES

Torpedoes pack a lot of punch and can fire an unlimited number of times in combat. They are also equipped with good tracking computers. So what's their down side? They can fire, at most, only every other turn—i.e., it takes a turn to recharge them after they're fired. This is shown by a red/green button you'll see on the Ship Information display next to their name—green meaning you can fire them that turn. Also, their strength is halved when fired at planetary targets.

## HELLFIRE TORPEDOES

Like the Stellar Converter, the Hellfire Torpedo is an enveloping weapon. In effect, a Hellfire Torpedo MIRVs at the last possible moment and attacks all the target's shielding simultaneously. It moves at speed 5, is guided by a +6 level targeting computer, and, if it hits, it delivers damage equal to four 25-point attacks. This weapon makes only a single To Hit die roll (see Table 7-3) so, if it misses, all four attacks miss. If it hits, however, the target is going to get a big *owie* from its quadruple attack (although the target's shielding will reduce each of the four attacks separately).

## PLASMA TORPEDOES

When a Plasma Torpedo is fired, it is armed to deliver 150 points of damage and has a +7 level guidance computer. However, its energy dissipates as it travels (moving at speed 6) so that it loses 15 points in strength per space traveled after the first one (i.e., it will impact a target in an adjacent square for the full 150-point effect). Note that this is a handy weapon to use against nearby enemy missile bases because it

is devastating even when halved and even against the strongest shields.



*Once Plasma Torpedoes miniaturize to the point at which you can fit them on a medium-hulled ship, do so. Build swarms of them. A stack of about 100 Plasma Torpedo-armed medium-size ships can take down any space monster or other larger, deadly ships.*

## BOMBS

Bombs are dirty little planet attacking devices that destroy planetary targets when dropped from an adjacent square. They are useless against enemy ships.

Each bomb rack built into a ship holds 10 bombs that can be dropped at the rate of 1 per combat round. See Chapter 8 for all of the details on how bombing planets works in practice.

## BIOLOGICALS

Biological weapons work similarly to bombs, in that they must be fired from a square adjacent to the enemy planet, and they can miss. However, biological weapon racks carry only five bombs each, which can be dropped at the maximum rate of one per rack per combat round.

Their main difference from normal, *dirty* bombs (i.e., those that cause collateral damage to factories) is that biologicals destroy enemy population points and reduce the target's habitability (i.e., its maximum population size), leaving any missile bases and factories there intact. Although this is a good way to reduce the enemy's ground strength before your transports arrive to contest control of a colony, remember that biologicals won't destroy missile bases—other weapons must be used if you

want to reduce or eliminate the missile bases before your storm troopers show up to run the gauntlet of enemy fire (see Chapter 8).

Biological weapons have inherent disadvantages in that using them reduces a planet's habitability (but never to less than 10 population points) and causes political fallout. The effect is that casualties inflicted by biological weapons anger the surviving victims twice as much as a conventional attack would have, and leave them on a planet that will require normal terraforming expenditures to build back up to its old population maximum. What is more important, every other player in the game shifts a level toward despising you (see Chapter 11) for using biological weapons.

To compound the danger of using biologicals, when deciding whether or not to bombard an enemy planet that is bereft of missile bases, if there are any biological weapons in your orbiting fleet *they will freely use them* (thus leaving you stuck with the political bill to pay). Therefore, it might be a good idea to withdraw biologically armed ships from planets that you want to bombard in future turns if you don't want to be universally loathed.

## SHIP COSTS AND MINIATURIZATION

All shipboard items (weapons, armor, specials, etcetera) decrease in cost by 50 percent for every 10 levels of technology advancement in their respective technology areas achieved beyond the base level for their discovery (up to a maximum of 50 levels, which will reduce the cost of an item to about 3 percent of its original cost).

For example, an Ion Cannon is a level-10 weapon technology that costs 4 BCs to build.

If you've achieved weapon technology 20, then it would cost only 2 BCs.

Thus, as things miniaturize due to advancing technology levels, a ship design that cost 1000 BCs when first blueprinted will, a few discoveries later (after its components miniaturize a bit), not only have more hull space available (which, unfortunately, you can't use) but will also become cheaper to build. Hurrah!

Note that this reduction in the price of a ship design can cause an interesting effect to occur. You might receive a new ship that you didn't even know you were building! Here is how that happens...

## THE SHIPYARD SURPRISE

Say you were building a certain ship type at a colony and, after a while, stopped by setting the Ship Ratio bar (on the Planet Production panel of the Control screen; see Chapter 2) all the way down to zero. What will happen is that there is probably some money left over in that account. (This would either be money accumulated but not yet spent on a ship or the change back from your last ship's purchase there. In either case, this could be a considerable sum, all the way up to nearly the cost of the ship type currently shown in that planet's space dock window.) Now, if the price of the ship in that planet's space dock window drops through miniaturization, it might become so cheap that the idle money in that planet's Ship Ratio bar account is suddenly enough to buy it.

Guess what? That's exactly what happens, even though you've got no money currently allotted for shipbuilding! Note that you can also receive surprise ships if you've switched production at that planet to a cheaper ship

design. This often occurs when the ship model that planet used to show in its space dock window is scrapped for a small, more economical model. Because those star docks cannot build scrapped ship designs, they automatically produce the new design (whatever that may be). If it's a less expensive ship, you may find yourself suddenly deluged with them next turn, unless you carefully check all of your planets' space docks following a change in ship designs.

### **AVAILABLE HULL SPACE AND MINIATURIZATION**

When putting it all together on a ship design, the major limiting factor is always hull space. The cost of a ship is usually a secondary consideration because expensive ships are always purchased over time. Once the first ship in that class is built, however, there will be no modifying or refitting that ship design without first scrapping all existing ships of that class.

### **SIZE MINIATURIZATION FORMULA**

Although costs for all shipboard items decrease at the rate of 50 percent per 10 levels of advancement within each item's appropriate technology area, their sizes (except for weapons) miniaturize at half that rate. Every shipboard item (except for weapons) decreases in size at the rate of 25 percent per 10 levels of technology advancement in its respective technology area achieved beyond its base level for discovery (up to a maximum of 50 levels, which will eventually reduce the size of an item to about 24 percent of its original size). Weapons, fortunately, decrease in size at the same rate in which they decrease in cost, which is 50 percent per 10 levels! This makes cramming more, older weapons in a ship design extremely easy.

See Chapter 10 for all the sordid details on miniaturization.

For example, a Battle Scanner is a level-1 computer technology that takes up 50 units of hull space in a ship design. If you've achieved computer technology 11, then it would take up only 38 units of space. (Additionally, as explained above, the cost would drop by half from 30 BCs to only 15. Neat, eh?)

### **INCREASES IN SHIP HULL SPACE**

Construction technology is a wonderful thing. Not only does it make the armor placed on ships smaller and cheaper through miniaturization, thus allowing more room on board your ship designs, it also increases the base hull space in all ship sizes. Table 9-1 showed what these base hull space amounts were per ship size, but you should be aware that they are increased at the rate of 2 percent per construction technology level you achieve, beginning with level 1 all the way through 99. (The *Master of Orion* manual erroneously says that this is only a 1 percent increase.)

### **PREPRODUCTION, LATE DESIGN CHANGES**

Before the first ship in a class is built, however, you can take advantage of any late technology advances and modify its design. (This usually works only for large- and huge-hulled ships, as they usually take so long to produce that there is adequate time for a technological breakthrough or two to occur before the first one rolls off the assembly line.) Just make sure, after you tweak the design specifications for this latest ship, that you scrap its older, not yet built design to make room for the new, improved model. This way, the planets that were building the



older design automatically shift to building the newer one.

## ENGINES AND POWERING OF ALL SHIP SYSTEMS

When purchasing a system to place on board a ship, there are generally four factors to be concerned with: cost, size, power, and space. This section explains what these four factors mean when designing your ship's systems. Please, allow us to apologize in advance if this section gets a bit technical, but there is really no other way to explain it.

### COST

When first discovered, an item is as expensive as it will ever be; it becomes less expensive (and smaller) as your technology level in its category progresses. For further details on cost reductions through technology, see Chapter 10.

### SIZE

The size, power, and space that an item takes up on board a ship are interrelated. The size of an item, quite simply, is how much physical space that item takes up inside the ship's hull. Along with the cost of the item, its size also decreases as further advances are made in its technology category. An item is at its maximum size when first discovered and becomes smaller (and less expensive) over time.

### POWER

Power represents how much energy is required for that item to function.



*Power, unlike cost and size, is a constant number that never changes for a particular item.*

For example, no matter how small or how inexpensive a Mark I Battle Computer becomes due to miniaturization, it will still require 20 units of power to operate on board a large-hulled ship. When an item is placed on a ship's design, engines adequate to power it are also automatically added (i.e., these engines come part and parcel with the item added). You cannot place an item on board a ship without also creating the additional engines required to power it.

### SPACE

The amount of space taken up by an item is shown in the last column of numbers when it is purchased. This is a crucial number when considering your ship design. It is the total amount of hull space that item (and the additional engines placed on board required to power it) will take up. Because these two elements are inseparable, their single, combined figure in the space column is really the only number you need to know.

### ENGINES

When you select the engine type for a ship design, you're making a crucial decision. You already know that engines determine a ship's warp speed (i.e., how many parsecs/spaces it will move per turn between stars) and its maximum maneuverability in combat (i.e., how many spaces it moves per turn on the Ship Combat Display screen and its base Beam and Missile Defense levels). However, there are two other elements to consider that are crucial to a ship's design: the amount of power that engine type generates, and the amount of space taken up by each engine of that type at your current propulsion technology level.



## ENGINE POWER PRODUCED/ REQUIRED

The amount of power produced by an engine is easy to work out. It is 10 times its warp speed. Therefore, Retro Engines, which move a ship along at warp 1, produce 10 units of power for each such engine a ship possesses. Similarly, each Hyper Drive engine, which moves a ship at warp 9, produces 90 units of power per engine added to a ship's design. Therefore, adding a bank of weapons that requires 270 units of power would mean adding another 27 Retro Engines or 3 Hyper Drives (or enough of some in-between engine type to produce at least 270 units of power).

## ENGINES AS A PERCENTAGE OF HULL SPACE

As you might imagine, because every item requires its own power supply, more engines are, of necessity, automatically added to a ship as you design in each additional system. In fact, by the time you've finished a ship design, somewhere between one-half and three-quarters of the ship's total hull space will be taken up by all of the engines required to power its various components. Miniaturizing engines, therefore, and keeping an eye on their power-to-space ratio are critical to successful ship design. You want to get the most bang for your hull space buck with every ship design.

## ENGINE POWER-TO-SPACE RATIOS

So, you want to know what engine type to put in your latest, greatest ship design, eh? Well, assuming you have no set criteria demanding that it move at the fastest warp speed available (which limits your choices to only the most

advanced engine type), then a key element to consider is the engine power-to-space ratio. This will vary widely as your present propulsion technology level miniaturizes older-model ship engines. Whichever engine type has the best power-to-space ratio will allow you to fit the most other goodies on board your ship design. (Remember, engines take up most of a ship's hull space, so you want the one that provides the most power while taking up the least hull space.)

While engines always produce a constant amount of power (10 times the engine warp speed), the space they take up (and cost) keeps diminishing as your propulsion technology advances (for up to 50 levels beyond an engine's base propulsion technology level). Truly, those old ship engines can get downright tiny. Would it be more efficient for your ship design to include numerous older, smaller engines or fewer new, high-powered ones? The answer awaits you, in the easy-to-use Engine Power to Hull Space Ratio Table in Appendix B.

## SHIP FLEET AND DESIGN PHILOSOPHY

This half of Chapter 9 combines all of the elements presented so far and in the previous two combat chapters. With our help, you'll orchestrate brilliant ship designs that work harmoniously in well-balanced fleets. You will learn what combinations of weapons and specials are particularly effective and when to scrap obsolete ship designs. You'll gain insight into the computer players' complex thought process concerning ship design and fleet composition. Before reading further, clear your mental decks for action. What follows is no drill.

## FLEET DESIGN PHILOSOPHY

The secret to creating the right fleet composition is to make sure that you always have the ship types you need, in quantities and at technology levels sufficient for their mission. Now, creating ships in the quantities you need was covered in the economics lessons of Chapters 5 and 6, and technology is further explained in Chapter 10.

Here, we focus on mission types and fleet composition. The secret is that you always want to have the right tool for the job to be done. However, in *Master of Orion*, your toolbelt can hold only six different tools. In other words, the limitation of six active ship designs in your fleet is a constant consideration.

## THE BALANCED FLEET

To make sure that you always have the right tool for the job, you must strive to design a balanced fleet. Primarily, it will consist of three to four different *space superiority* ship designs (fighters, missile frigates, cruisers, etcetera), one or two *planet busters* (bombers, biological attack ships, etcetera), a colony ship design and, perhaps, a scouting ship design. To minimize the costs of continually upgrading your fleet, try to create designs that keep their tactical value in battle for a long time before they are outclassed and rendered obsolete. By carefully maintaining a balanced fleet, that is, by phasing out obsolete ship designs and replacing them with more effective and efficient ones, you will always be able to meet any challenge.

## THE COMPUTER PLAYER'S BALANCED FLEET APPROACH

When a computer player decides that it is time for a new ship design (see page 186), it strives

to maintain a balanced fleet approach. First, it will decide the size of the new ship design, based largely on the computer player's race (see Chapter 13). Next, it will decide the class of ship it is going to replace, and then which class of ship it is going to replace it with.

There are four basic ship classes in a computer player's balanced fleet: beam ships, missile ships, bombers, and colony ships (these are described below). A computer player will always keep at least one bomber and one colony ship design active. Otherwise, it maintains a combination of four different beam and missile ship designs. You, however, must make these tough design decisions on your own, and must consider many of the following elements in the process.

## BIG VS. SMALL SHIP DESIGNS

As you will have noticed from playing *Master of Orion*, different alien races have different philosophies about what size ships to build (see Chapter 13). If you've ever fought against hordes of small ships that you simply could not kill fast enough, or against huge behemoths that you could hardly scratch, then you've learned the hard way the inherent advantages in each of these fleet design philosophies.

What it really boils down to is this: Deciding whether to build hordes of small ships or a few huge ones (or some degree in between) is a matter of meeting specific needs and tactical taste. We feel that you can win with any ship size philosophy you choose. The inherent strengths and weaknesses of each extreme are outlined in Appendices C and D. We refer you to them for the great ship size philosophy debate.

## MAINTENANCE

Each ship (and missile base) costs 2 percent of its current construction cost to maintain each turn. You can find your total ship maintenance costs in two places. First, the gross BC amount is displayed on the Fleet Display screen. Alternatively, you can see it as a percentage expense of your income on the Planets Display screen. In either case, the amount appears in the lower-left corner.

When the percentage of your income spent on fleet maintenance rises to between 15 and 20 percent of your gross income, it has become a major fixed expense. It might be time to consider reducing it by retiring an old ship design and removing some of your less effective ships from the map. In so doing, you'll retrieve one-quarter of their construction cost, which is added directly to your Planetary Reserve.

## WHEN TO CREATE A NEW SHIP DESIGN

In certain situations you should create a new ship design to take advantage of your latest, greatest technological discoveries. Note that there are many occasions when you can design a new ship type. The following conditions are when you *should*:

- A particular need requiring a new ship design must be met (i.e., your older ship weapons are becoming ineffective, you're under attack and need specific planetary defense ship designs, etcetera).
- A general cascade of technology advances has just occurred and there are no immediate (or important) new ship item discoveries on the horizon, or those

discoveries are not relevant to the current design's purpose.

- A crucial new technology that will give you an immediate, decided edge has been discovered (see below).

## SHOULD YOU JUMP ON THAT NEW TECHNOLOGY?

Generally, keeping older ship designs in production is the prudent way to go. They don't get any better, but they do get less expensive. There are, however, certain key technological discoveries that should cause you to drop everything and scramble to the New Ship Design screen to make room for a new, late model ship class. These include the following:

- A new, faster engine technology: Instantly upgrade your colony ships—they can't reach a star fast enough.
- A major propulsion technology advance: Reexamine the efficiency of your designs when this occurs, because every item on board ship will require fewer engines for its power (as it just miniaturized).
- Subspace Teleporters: Incorporate Subspace Teleporters into new ship designs quickly, because their period of greatest usefulness ends once enemies discover the Subspace Interdictor.
- High Energy Focus: This, too, can alter the balance of power very quickly. Therefore, redesign new classes of ships to take advantage of this discovery right away.
- Warp Dissipator and Repulsor Beam technologies: When your planets are threatened, incorporate these instantly into new planetary defense ship designs.

*Avoid superweapon syndrome.*

**CAUTION** *This is when you slow down or put off building needed ships in order to increase your technological research spending in hopes of developing an ultimate killer ship. Such a ploy is problematic, at best. When you need something now, buy it now. Major research efforts are for times of (relative) peace and security.*

## WHEN DO COMPUTER PLAYERS DESIGN NEW SHIPS?

Computer players do not reconsider their ship designs using any kind of logic as we've just explained. Instead, randomly, every 6 to 15 turns, a computer player will automatically design a single new ship type.

## MODIFYING A NEW DESIGN BEFORE THE FIRST ONE IS BUILT

An advantage of larger ships is that a new (and, presumably, expensive) design will take several turns before the first one rolls off the assembly line. How is a long wait to receive a new ship design an advantage? Ah...

In the time it takes to build the first ship in its class, new technological advances might occur—advances that could miniaturize some ship's components or allow it to feature an entirely new item discovered in the turns since it was conceived. If this occurs before the first ship in a new class has been built, you can scrap that design and immediately replace it with a newer, revised one that takes advantage of these late technological discoveries. However, once the first ship is constructed, you're committed to that ship's design specifications as is, unless you want to scrap your prototype ship and lose

three-quarters of the money you've been investing for such a long time (ouch!).

If you modify a ship's design in this manner, be sure to scrap the old design to make room for it! Scrapping the old design causes all of the planets that were working on it to automatically start work on the new model.

## TWO GROUPS ARE BETTER THAN ONE

If you should ever find yourself with a good, all-purpose space superiority ship design, build more than one class of the same design! For instance, let's say that your brilliant, large-hulled ship design, which is bristling with Neutron Pellet Guns and carries a few Nuclear Bombs (just in case), is really kicking butt in space battles. Perhaps it's also armed with certain particularly useful special devices that do not benefit from being in a single ship group (specifically the Warp Dissipator, Black Hole Generator, Stasis Field Generator, and Technology Nullifier). Instead of simply building more of them, make a duplicate design, using one of your precious six design allotments.

After these duplicate designs are built and combined in fleets with the original ships, they will give you added flexibility during space combat. Instead of moving one large stack of your most effective ship type and firing all of its weapons at a single target group, you'll have *two* stacks of them roaming around the Ship Combat Display screen. You will find this to be a decided advantage because they can maneuver separately and fire on different targets. This ploy is particularly useful in the face of an enemy Stasis Field Generator, Warp Dissipator, or Technology Nullifier. Try it!

## SHIP CLASSES

We have often mentioned various ship classes such as fighters, cruisers, colony ships, scouts, and so forth. Here is what these ship classes are all about.

### SCOUTS

Each player begins the game with a basic scout design consisting of an unarmed, small ship with Reserve Fuel Tanks. The function of scout ships is to boldly go where you have never gone before (i.e., exploring unexplored star systems). They are also good for staking out uncolonized stars and shooing away unarmed enemy scouts and colony ships during the early stages of the game (see Chapters 6 and 7).

As your empire's borders become settled, ship ranges will increase due to the discovery of better fuels. This, and the discovery of Deep Space Scanners, greatly reduces the need to maintain a scout class ship on your roster of six ship designs. After all, to see an enemy colony, one must be able to remain unmolested in space above it—and unarmed and even lightly armed scout ships are unlikely to survive any encounter with armed enemy warships or missile bases. You'll need Advanced Scanners or heavily armed reconnaissance-in-force missions to pry open their secrets. Once scouts cease to be useful, scrap them for a more practical, new ship design.

### COLONY SHIPS

Generally, you should keep a single colony ship handy to take advantage of settling any vacant planet that might turn up. With the right planetology technology behind it, even a barely

habitable rock can be developed into something quite large and useful (see Table 3-11).

Always upgrade your colony ship designs to feature your fastest ship engines and the most advanced Controlled Environment technology you have. Colonizing opportunities might arise suddenly as established colonies are destroyed. These newly depopulated worlds create a vacuum that every player (who knows about it) will try to fill. A race to colonize these planets often results, and there will be times when you will want to win it (e.g., when you believe you can protect that planet long enough to develop it).

It is also a good idea to equip colony ships with decent armor and a heavy beam weapon or two. This will scare off enemy scouts and threaten their lightly armed and armored colony ships, but will also provide them with some teeth and staying power, which might prove decisive in a closely fought space battle.

Note that later in the game, Atmospheric Terraforming will get around and many planets will cease to have hostile environments. Some players like to revert to using Standard Colony Bases at that time. When your Tech levels rise high enough, it is even possible to fit colony bases on medium-size ships.

### BOMBERS, CLEAN BOMBERS, AND PLANET BUSTERS

It is usually a good idea to have at least one ship specifically designed for reducing enemy missile bases and bombing enemy planets. These are the ships that will be particularly effective when attacking during the Orbital Bombardment Phase of a game turn (see Appendix A).



## SPEED

Generally, bombers must run the gauntlet of enemy fire (during which they are always a computer player's priority targets) to reach a square next to an enemy planet so that they can deliver their payload. Having an initiative superior to the defender's missile bases means that they will get one less shot at that incoming group. Therefore, a high initiative is crucial for bombers: after all, having to endure one less volley from enemy missile bases might make the difference between you killing them and them killing you.

## PROTECTION

Bombers should have your best ECM available, along with a Cloaking Device, Displacement Device, or an anti-missile special to protect them. This is because they will be the primary targets of enemy missile base attacks. If possible, design their shields so that they will take more than a single hit by the enemy's most advanced missile type (i.e., the one its missile bases will be firing at them) to kill them. (Note that you may have to switch from small to medium-size bombers to meet this criterion.) This combination of protection from enemy missiles, and enough shielding and armor so that at least two hits are required to kill one bomber, will give them satisfactory survivability in the heat of battle. Consequently, you'll have optimized the number of bombers surviving the enemy's gauntlet of fire to reach the enemy planet.

## BOMBS

Bombers, naturally, should carry lots of bombs and, if enemy shield levels are low enough, possibly missiles, too (because missiles do 100

percent of their damage when attacking colonies). Because enemy missile bases are always equipped with their best ECM, you will want to equip your bombers with your best Battle Computers to match them. Remember, bombs can miss!

## STANDARD BOMBERS

A *standard bomber* design is a small- or medium-hulled ship armed with an effective bomb or two and, perhaps, a few missiles. Generally, it will take between 1 and 10 rounds of bombing on the Ship Combat Display screen to destroy an enemy planet's missile bases. During the Orbital Bombardment Phase, these ships are especially good at softening up an enemy world (i.e., killing a few of its people and several of its factories). However, their job is *not* to wreak massive destruction on an enemy colony. Instead, their mission is to chip down the defenders a bit in preparation for a ground assault.

## CLEAN BOMBERS

A *clean bomber* design is one that will not damage the factories on an enemy planet under attack. Regular bombs, missiles, torpedoes and beam weapons attack a planet indiscriminately—hitting its missile bases, population, and factories concurrently (see Table 8-7). However, the Neutron and Ionic Stream Projectors, Energy and Ionic Pulsar weapons, and the Black Hole Generator, when fired at a planet, will destroy only its missile bases. They leave unharmed a colony's population points and factories.

Suppose, however, that you need to reduce the enemy's population, as a prelude to invasion by your ground troops, but you still covet



all of the factories there; your only option is to use biological weapons. These kill only enemy population points, leaving their missile bases and factories intact. Their use also has the decided disadvantage of raising diplomatic tension with every other player in the game. See Chapters 8 and 11 for the potentially devastating military and diplomatic effects of using biological weapons.

## PLANET BUSTERS

A *planet buster* is a big ship, packed to the gills with bombs and missiles. Its job is to completely wipe out colonies in a single turn or, at most, two turns. The goal in using planet busters is to wipe out enemy colonies quickly, rather than preparing them for an eventual ground assault. Employing them for this "scorched earth" policy is usually followed by a mad dash of colony ships racing to purged planets to reestablish a colony there.

Using scorched earth tactics gives you a couple of options. First, you can build colony ships to go with your planet busters. This will allow you to seed those depopulated worlds rather than conceding them to other players. Alternately, you can let other players go through all of the time and expense of developing them for a while, then go back and flatten them again, thus wasting their time and money. It's mean, we admit, but very effective.

## PLANETARY DEFENSE SHIPS

Planetary defense ships are primarily designed to complement friendly missile bases and prevent your colony from being attacked, particularly by enemy bombers. These ships should be equipped with Repulsor Beams, anti-small ship weaponry (i.e., multiple-firing beam

weapons, streaming weapons, and Scatter Pack Rockets), Warp Dissipators, and/or Stasis Field Generators. In short, they need anything that will stop or hinder enemy bomber runs toward your colony while leaving the heavy, offensive punching to the planet's missile bases.

## SPACE SUPERIORITY DESIGNS

The bulk of your ship designing will be focused on trying to gain that elusive edge in ship-to-ship combat. In this fascinating game of *scissors, rock, paper*, how can you best master the space over the planets in your galaxy? The following basic ship missions will help you to frame some ideas.

## BEAM SHIPS

The most reliable weapons in a space battle are the so-called beam weapons. Note that beam weapons include a variety of direct fire, point-to-point devices, all of which are listed on the Beam Weapon Table included with your copy of *Master of Orion*. Although these ships must survive long enough to close with their targets, their ability to fire every round is a great asset, particularly after enemy ships have exhausted their missile supplies.

## Fighter, Destroyer, Cruiser, and Dreadnought Class Ships

Beam ship designs work fairly well on any size hull. They are often called fighters, destroyers, cruisers, and dreadnoughts in their small, medium, large and huge incarnations, respectively. It is wise to give beam ships excellent shields and armor. This will help them survive enemy fire until they reach a range where they can fire back.

Beam ships are also well served by having higher speeds on the Ship Combat Display screen (e.g., they will benefit from having a high maneuverability and Inertial Stabilizers/Nullifiers). This combat speed will shorten the amount of time it will take them to close in for their attacks. Note that High Energy Focus and Subspace Teleporters neutralize the disadvantage of needing to close with the enemy by extending a beam ship's range in combat. Employing these special devices radically alters the balance of power on the Ship Combat Display screen in favor of beam ship designs, so their invention calls for an immediate rethinking of your current ship design philosophy.

## Monitor Class Ships

Because of the efficiency of older-technology engines, many more weapons can be crammed into slower moving ships (see Appendix B for the particulars). Such a slow-moving ship, bristling with beam weapons, is called a *monitor* class design. Monitors should always be huge-hulled ships because their slow speed on the Ship Combat Display screen usually dooms them to take many long-range hits before they can close in for battle. Any monitor class ship that can get next to any enemy ship or colony, however, probably can inflict major damage on it.

Note that monitor class ships also make reasonably effective planet busters (because they can hold so many bombs) and decent planetary defense designs. They are at less of a disadvantage when equipped with a High Energy Focus, Subspace Teleporters, or when you have a network of Star Gates to move them between, each of which will reduce the time they need to travel to bring their strength to bear.

## MISSILE SHIPS

Missile ships, like beam ships, come in all sizes. We've named them interceptors, corvettes, frigates, and strike cruisers for their small, medium, large, and huge models. These are ships armed, primarily, with missiles. It is a good idea for them to carry at least one beam weapon also. There are two reasons for this. The first is for much the same reason that soldiers carry pistols into battle with them—when their main weapon runs out of ammunition, it is better to have a small, secondary weapon handy than to face the enemy completely unarmed. The other reason is that, with a single beam weapon on board, these ships can fire their missiles and still be able to move afterward (i.e., they can use the *shoot 'n scoot* tactics discussed later on).

When designing missile ships, do not worry about their maneuverability or defensive capabilities (other than armor): If they can fire their salvos of missiles before the enemy can effectively close, they can always retreat from the battle after the last barrage impacts. If you're lucky, they'll even draw some enemy missile fire away from your other ships trying to close in with the enemy in the process. Missile ships are the opposite of beam ships: they are designed for quick, decisive fleet battles (whereas beam ships excel in protracted fights because they can fire an unlimited number of times).

## Raiders

A special class of missile ships is the *raider* ship design. Three special elements of the raider ship design set it apart from other missile ships:

- They are always built with the fastest engines available (although their maneuverability still need not be high), so that

they quickly arrive at enemy colonies, then quickly retreat to friendly bases.

- They generally feature Fuel Tanks, so that they can penetrate deep to reach any colony they choose to raid.
- They usually carry only two-rack missile launchers of the latest available type, and a single (usually wimpy) beam weapon. The two-rack missile launchers are used so that they don't have to stick around in battle a second longer than it takes their last missile salvo to impact. Because the latest missiles are usually the fastest, and two-rack missiles receive a +1 speed bonus, that combination is the most effective for raiders' weaponry.

As with other missile ship designs, the single beam weapon tacked onto a raider allows it to continue its moves after launching a missile volley from long range (i.e., using *shoot 'n scoot tactics*). Having one crummy beam weapon means that, even after its missiles are spent, a raider will never be completely unarmed. With luck, it can even draw fire away from other ships during the heat of battle.

The mission of raiders is to form large groups, strike quickly, chip away at an enemy fleet or missile bases, then retreat and repeat this process. (Using the *Yo-Yo Movement Technique* from Chapter 3 is particularly useful for raiders.) This makes them capable of both conducting missions by themselves, or as a *first strike* firing group element when supporting a fleet.

By conducting fairly low-risk, long-range attacks that involve few losses, huge quantities of raiders can be built up, making their missile barrage strength ever more devastating. Their raiding mission serves the double purpose of

keeping the enemy's strength from building up too quickly and keeping a computer player off balance about where your intended point of attack will be.

## Missile Ship Obsolescence

Late in the game, missile-armed ships of all types become less useful as the enemy ships gain higher initiatives and move faster on the Ship Combat Display screen. In the face of enemy Subspace Teleporters or High Energy Focus weapons, a missile's long-range fire advantage is lost. Even the missiles themselves become less effective as opposing ships become stronger and faster and improve their ECM. There will be a time late in a game, therefore, when raiders and even regular missile ship designs become virtually obsolete.

## JEEPS

The word *jeep* comes from the abbreviation "GP," which was the moniker of the general purpose vehicles used by the American army during World War II. Jeep spaceship designs, therefore, are general purpose in nature and are the mutts of your fleet. Since they might include a beam weapon or two, perhaps some missile launchers, maybe some bombs, Jeeps can support just about any operation, although they can't lead the charge like a more specialized ship design could. Generally, it is better to build a fleet of specialized ship designs and avoid Jeeps, even though they can find a minor role to play in any type of space battle. (A good space superiority Jeep designer, however, is worth cloning.)

## SHIP DESIGN PHILOSOPHY

Here is the payoff for sticking with us through this and the two previous chapters: We are going

to assemble the class design concepts and missions described above into a practical philosophy for each offensive and defensive element of your designs. These are our observations derived from hundreds of hours of playing *Master of Orion*. We think you'll find them to be highly palatable food for thought.

## BATTLE COMPUTERS

Because Battle Computers affect both a ship's initiative and its ability to hit a target with its regular weapons (see Chapter 7), avoid skimping except where a ship has no regular weapons (i.e., only specials) and/or where initiative is unimportant (e.g., Subspace Teleporters or Cloaking devices bypass the normal initiative ladder). Check Table 7-3: Because squeezing out the maximum Attack level is most important when you are lagging behind enemy Defense levels, you may want to trade off top-notch computers for weapons, shields, or specials. It depends on where on Table 7-3 you expect to be. One Attack level means a lot when it increases your To Hit probability from 10 to 20 percent, a lot less for an 80 to 90 percent rise. Also, ships bristling with huge numbers of weapons, such as monitors, while much more effective with good Battle Computers, can probably still pack plenty of punch, even when their Battle Computers are less than top drawer.

## SHIELDS

The optimum shield strength is directly related to two things: the range of a ship design's primary weaponry, and the size of its hull. The shorter the range of the ship's primary weapons, or the larger the hull, the more important and effective strong shields will be. A monitor class design, for example, should always feature your maximum shield level technology.

Conversely, ships that feature longer range weapons and smaller hull sizes should deemphasize shields in their design. This is because ships with longer range weapons can fire from outside the enemy's range and have time to retreat if attacked, and because small- and medium-size ships generally don't have enough hit points to make shields very cost effective at improving their survivability. They are better off trying to increase their Beam and Missile Defense levels to make them harder to hit, rather than trying to absorb the damage when they are hit.

## ECM

Often, anti-missile special devices (Anti-Missile Rockets, Zyro Shields, and Lightning Shields) are a better use of hull space than ECM. Even better, protect missile magnets, such as bombers, with both ECM and an anti-missile device.

## ARMOR

As a rule, you can't go wrong putting the best or, at worst, second best armor you have available on any ship design that is liable to see combat. Your latest armor may be expensive, but it is a good use of hull space.

Double-hulled armor, however, is a waste of space. The *Master of Orion* manual states that double-hulled armor takes up twice the space of regular armor, but the truth is that it's closer to *four times* that amount of hull space. The return of an additional 50 percent in hit points for this tremendous cost in hull space is seldom worth it. It is better to use that hull space for offensive weaponry and take the war to the enemy, rather than cower behind a few extra hit points of ships' armor that they will eventually destroy anyway.

The exception is when, late in the game (say, after you've reached at least construction Tech level 70), Neutronium II armor has miniaturized. At this point you should consider placing it on your ships (particularly the huge ones that have a Damage Control special device built into them).

## ENGINES

Colony ships, raiders, and ships that require high maneuverability (such as smaller beam ships and bombers) should have your best engine technology. Always ask whether there is a compelling strategic reason to build a particular level of warp engines on a ship design.

For example, suppose your three core economic planets are each 3 parsecs from one another. Therefore, you want to build ships with a minimum engine speed of warp 3 so that your defending fleets can reinforce any of these planets in a single turn. If you have no compelling reasons for a particular minimum warp speed engine, use the model that provides the best power-to-hull space ratio, as shown in Appendix B.

## MANEUVERABILITY

Ships that must close in quickly to fire their short-range weapons, such as beam ships and bombers, will want a high level of maneuverability to reduce the amount of time they spend exposed to enemy long-range weaponry. Also, small- and medium-hulled ships, because their low hit points make them easy to destroy, will want to be maneuverable to make them harder to hit. Conversely, ships armed primarily with long range weapons or big hulls seldom need a high maneuverability rating.

When considering using Inertial Stabilizers/Nullifiers to increase a ship design's maneuverability, remember this: It is generally better to maximize a ship's maneuverability rating within its warp engine limits first, and then add an inertial device to enhance that maximum. Thus, inertial devices are most effective where they *push the envelope* of what would otherwise be a ship's maneuverability limit, based on its engine speed.

## GENERAL PHILOSOPHY: OFFENSIVE VS. DEFENSIVE ABILITY

When deciding on a ship design, always bear in mind what the net effect (see Table 7-3) will be an improvement in either your offensive or defensive capabilities. For example, it's *twice* as hard to hit a target at -4 than it is at -3. Alternately, raising your Attack level from +0 to +1 nets only a 20 percent increase in attack efficiency. When you must decide between investing in a ship's Battle Computers, ECM, and maneuverability, have your enemy's general offensive and defensive abilities in mind and then see Appendix E.

There are other offense-versus-defense issues to consider as well. For instance, what will a ship's time over target be? In other words, how long will that ship be expected to stay in combat? Raiders, for instance, are built to quickly flee a battle, so they will need fewer defenses. Conversely, monitors are built to stay in battles to the end, so they will need heavy defenses.

Because small and medium ships aren't expected to survive in combat for a long time, you should focus on getting the maximum attacking power out of them while they are in



battle. Conversely, ships with Auto Repair and Damage Control should be armored and shielded well enough to be reasonably sure of their survival between rounds of combat so that they can use these special devices.

Here is another example: Because bombers will be the focus of enemy fire, bomber escorts should concentrate on offensive punch, so that they can quickly take out the enemy groups attacking the bombers they're escorting. Planetary defense ships, too, should maximize their offensive abilities to deal with enemy bombers quickly, yet they must still resist the enemy's bomber escorts. And so it goes...

## WEAPONS

Although the weapons you'll want to place on a ship are largely a function of its ship class, there are still nuances to consider. These are examined below, and weapons effectiveness is analyzed in Appendices F and G.

### HEAVY AND LONG-RANGE VERSUS NORMAL BEAM WEAPONS

Lasers, Ion Cannons, Neutron Blasters, Fusion Beams, and Phasors can all be added to a ship design as either normal or heavy weapons. Heavy weapons generally do twice as much damage as their normal-size counterparts and fire with a range of 2 squares. For this doubling of range and firepower, however, they require triple the BCs, hull space, and power of their nonheavy counterparts.

Remember that beam weapons increase the target's Defense level by +1 per square they are fired at beyond the first one. Although this is an inefficient trade-off, 2-square heavy weapons can have their advantages (not the least of which is the ability to score damage against

better shielded targets that their nonheavy counterparts could not penetrate).

A ship armed primarily with any beam weapon that has a range greater than 1 square (this would include Disruptors and Stellar Converters) should include a single laser or other 1-square beam weapon. That way, you can fire your main beam weapon armament at long range and can still move, because you haven't fired your 1-square weapon yet! Thus, you can use shoot 'n scoot tactics, enabling you to retreat after firing so that enemy ships can't close in on you on their next turn. Alternately, equipping that ship with a single crummy missile launcher, and then pressing the Missile button so that those missiles aren't launched, will also enable the ship to use shoot 'n scoot tactics.

In other words, because their arms are longer, long-range beam weapon designs can slap around shorter range beam weapon ships while falling back and keeping their distance until the enemy ships corner them (unless those enemy ships move faster than the long-range beam weapon ship). If you add a Repulsor Beam and conduct your battles with some skill, a long-range beam weapon ship design can almost reign supreme as the queen of a beam weapon battlefield, at least until "technonasties" such as Subspace Teleporters are introduced.

### MULTIFIRING AND STREAMING WEAPONS

Gatling Lasers, Auto Blasters, the Gauss Autocannon, and Pulse Phasors all fire multiple times in a single turn. Graviton and Tachyon beams both have the streaming effect of transferring overkill damage inflicted on the top target in a group to the next one in line.



Each of these weapons is relatively cheap and provides sufficient bang for the buck. Because they inflict fairly low amounts of damage, however, their primary usefulness is against unshielded enemy transports and swarms of small enemy ships, making them useful for planetary defense class ships that need to deal with these threats. The Gauss Autocannon is particularly effective because it also halves the enemy's shield strength when it hits (see the next section). Note that these weapons are greatly enhanced when combined with an Oracle Interface.

### **SHIELD-HALVING WEAPONS**

Neutron Pellet Guns, Mass Drivers, Hard Beams, the Gauss Autocannon, and Particle Beams all halve the strength of enemy shields (in terms of computed damage) if they hit their target. Although it can be more effective to overwhelm a target's shields with massive damage than to hit them with shield-halving weapons that do less damage, the case for these weapons must be made because they are slower to become obsolete.

The time to prioritize the inclusion of shield-halving weapons in your ship designs is when the enemy's defense has an advantage over your offense: specifically, when your opponent's average Defense levels are higher than your beam weapon Attack levels, or when you plan on firing at planetary targets through the enemy's strong planetary shields. In these cases, you'll get more damage done with less firepower by halving the enemy's shield strength through the use of these weapons. Note that combining these with an Oracle Interface will halve enemy shielding twice (rounded down each time they

are halved), making these weapons particularly effective.

### **SPECIALS**

Although many special devices have already been mentioned in the "Ship Design Philosophy" section, we will review all of them. Remember, a ship's special devices often define the mission and, therefore, the other equipment needs of a ship.

### **ANTI-MISSILE ROCKETS, ZYRO SHIELDS, AND LIGHTNING SHIELDS**

Anti-Missile Rockets, Zyro Shields, and Lightning Shields are usually more effective than ECM of comparable Tech levels. The biggest disadvantage to using these anti-missile specials instead of ECM, however, is that they take up a Special slot in a ship's design.

Combining anti-missile specials and some ECM is a good idea for bombers, less so for missile and small beam ships. In these cases, both anti-missile specials and ECM are less of a concern. Smaller beam ships should emphasize their maneuverability and, therefore, beam and missile defense, and focus more on armor than anti-missile defenses.

### **AUTOMATED REPAIRS AND DAMAGE CONTROL**

Correctly used, Automated Repairs and Damage Control can make large-enough ships almost invincible, under the right circumstances, by repairing 15 or 30 percent of a ship's maximum hit points in damage between rounds of combat. Enemy ships that can't inflict more damage than these ships can repair might as well give up the fight. Fortunately for you, computer players don't realize this (see Chapter 15).

Use these on large and huge ships, where the number of damage points that can be repaired is great—small (and often medium) ships have much lower hit point totals and therefore are less likely to use these specials effectively, because enemy fire is concentrated on the top ship in a stack. Also note that these repair specials are particularly good at countering the armor-damaging effects of both pulsar and stream projector special devices.

### BLACK HOLE GENERATOR DESIGNS

Let's face it, this is an awesome weapon that kills whole targets outright. Because of its immense size, however, you'll never see it on anything smaller than a large-hulled ship, and even that is a tight squeeze. No, this weapon is primarily destined to be based on a huge ship, so putting many of these into space quickly isn't likely to happen. However, this is a wonderful offensive weapon and can serve as part of a clean bomber design. Note, however, that enemy ship groups equipped with inertial devices will greatly reduce the number of ships they'll lose from a Black Hole Generator attack (see Table 9-8).

### CLOAKING DEVICE DESIGNS

Like the inertial specials, Cloaking Devices are best employed in a design when a ship has already maximized its natural abilities. Before adding a Cloaking Device, your money is better spent on increasing a ship design's natural defenses through maximized maneuverability and/or ECM. Philosophically, the purpose of a Cloaking Device should be to extend a ship design's natural defense beyond its maximum limit, thus providing a truly awesome defensive capability.

Cloaking Devices are good for bomber designs. They are also ideal for missile ship designs armed with torpedoes only, because these ships automatically recloak during the rounds their torpedoes are recharging. Cloaked ships also have the advantage of being able to fly past enemy repulsor beams and they are immune to Stasis Field Generator attacks. Decloaked ships, however, lose these two special advantages.

### COLONY BASE DESIGNS

When you put a colony base on a ship, don't waste much money making it combatworthy. Because that ship will be dismantled and turned into a colony the moment it makes landfall, its life expectancy as a ship is short. Generally a couple of your best heavy beam weapons should be enough armament for a colony ship.

Colony ships should always feature your single highest Controlled Environment technology (as it allows you to colonize all types of hostile environments up to its level) and the fastest warp engines you have. The latter is so that you can outrace other players to opportune planets and get colonies started that much sooner. When you discover either an improved Controlled Environment technology or a faster warp engine, redesign your colony ship to incorporate these improved features.

### DISPLACEMENT DEVICE DESIGNS

Although you won't see a Displacement Device very often (because it's a level-50 propulsion technology), this relatively cheap special takes up a fair bit of hull space. In exchange, however, it provides the ultimate camouflage for a ship design. Unlike a Cloaking Device, a Displacement Device is always on and it negates

34 percent of all nonarea (i.e., nonspecial weapon) attacks before their To Hit rolls are conducted (see Table 7-3). Naturally, this works well on any ship design that requires some extra protection (beam ships and bombers in particular).

### **ENERGY AND IONIC PULSAR DESIGNS**

Pulsar special devices powerfully supplement the close-in combat capabilities of beam ships and bombers. In the latter case, they act as special clean bomber weapons that do not destroy the factories or population points on an enemy planet. Note that enemy shields reduce the damage from pulsar attacks (whereas they are useless against other special weapon attacks).

Because pulsars attack all squares next to the firing ship, proper employment tactics are to charge them into the midst of several nearby enemy target groups while keeping your other ships at least 2 squares away. Because of the dangerous nature of this kamikaze-like attack plan, padding pulsar-armed ships with excellent shields and armor, along with other helpful defensive special devices, is a given.

Because of their size, pulsars are likely to appear only in large- and huge-hulled ship designs. Because they are more effectively employed when in a group with a large numbers of ships, it is generally wiser to build lots of large-hulled ships equipped with pulsars than a few huge ones.

Here is one final note about pulsars: Repair specials are the antidote to pulsar attacks. Although pulsars can do an unlimited amount of damage to enemy ships (depending on the size of the pulsar-armed group), chances are they won't kill them all in one shot. What generally happens is that the pulsars will reduce

the armor of every ship in a target's stack and chip them down a bit. Repair system specials, however, can repair every ship in a stack and build their armor back up in the process, as explained earlier in this chapter.

### **HIGH ENERGY FOCUS DESIGNS**

Obviously, the High Energy Focus was meant to enhance beam ships. Because of its size, this special device is unlikely to appear in small- or even medium-size ships. That's fine, though, because there is plenty of beam enhancement for the buck on large- and huge-ship designs that feature a High Energy Focus device. Naturally, avoid arming a ship that features this special with bombs, missiles, and torpedoes. To get the maximum value from a High Energy Focus device, cram in every beam weapon that will fit in that ship's design.

Note that the advent of incorporating High Energy Focus devices into your ship designs marks a new era on the Ship Combat Display screen. The advantage to an enemy's long-range weapons (missiles and torpedoes) is greatly reduced when your ships are armed with beam weapons featuring the extended range provided by a High Energy Focus device.

### **INERTIAL STABILIZER/NULLIFIER DESIGNS**

The effect of adding an Inertial Stabilizer or Nullifier to a ship design is to help a ship move fast, first, and keep its losses down while closing in. This can be particularly useful for ship designs that feature close-in weapons (bombers and beam ships) and for those with stand-off weapons wanting to close in quickly and tactically withdraw before the enemy can close (such as raiders and other missile ship designs).

As with a Cloaking Device, it is usually better (i.e., more cost efficient and sparing of a special device slot) to increase a ship design's maneuverability to its maximum potential level before considering adding an Inertial Device. Once at the maximum maneuverability that a ship's engine type will allow, however, adding an Inertial Stabilizer/Nullifier to it and "pushing it beyond the edge of the envelope" is an extremely effective way to go. Only ships with these inertial devices can ever move faster than 5 spaces per turn on the Ship Combat Display screen. Later in the game, it can be cheaper for large and huge ships to tack on an inertial device and to increase their maneuverability by two or four.

Note that Inertial Stabilizers/Nullifiers are the only antidotes to the awesome Black Hole Generator's attacks (see Table 9-9). They reduce the number of ships destroyed in their group by 15 and 30 percent, respectively.

## ION AND NEUTRON STREAM PROJECTOR DESIGNS

Ion and Neutron Stream Projectors are similar to the special pulsar weapons in many ways (see above), with their primary difference being that these stream projectors can be fired only at a single target group up to 2 squares away. Like pulsars:

- A stream projector attack affects every ship in the target group.
- They reduce the targets' armor (thus, allowing you to make clean planetary attacks that destroy only missile bases).
- The more stream projectors in the attacking stack, the more damage they'll do with their concentrated firepower (within their

respective 50 and 75 percent maximum damage per attack limits).

- They are so large that you'll probably fit them only on large- and huge-hulled ship designs.
- Ships with Automated Repair or Damage Control have the right antidote to combat the main strength of these weapons (i.e., the ability to hit every target in a stack).

Consequently, a good design that features either an Ion or Neutron Stream Projector would be one that also had 2-square-range weapons and, perhaps, a Repulsor Beam. This is because these stream projectors are particularly effective when they get to hit an enemy stack repeatedly at stand-off range and, after a few shots, can finish off an entire stack at once (provided the enemy doesn't have any type of repair system). Also, these stream projectors make fine weapons for larger hulled clean bomber designs.

Their primary disadvantage lies in the limited amount of damage that they can do to an enemy stack. Ion Stream Projectors can reduce enemy armor by only 50 percent of its current level per whack, while Neutron Stream Projectors are better with their 75 percent maximum damage capability (note that damage rounds up to the next whole hit). Therefore, an enemy stack would have to be hit several times before these stream projectors would eliminate them outright. Instead, think of stream projectors as "softening up" devices that make an enemy ship group easy for other weapons to finish off.

## ORACLE INTERFACE DESIGNS

This weapon merely supplements a ship design's beam weapon attack capabilities (allowing them

all to halve the enemy's shields or, if they have already done so, to halve them twice, rounded down both times). It doesn't take a genius to see that ships equipped with an Oracle Interface need as many beam weapons on board as they can pack. Consequently, this special device was made to augment any beam ship design. Multiple-firing and streaming beam weapons, in particular, benefit from being augmented by an Oracle Interface device because they generally do less damage (which is now offset by the Oracle Interface's ability to halve the enemy's shields).

### REPULSOR BEAM DESIGNS

Because keeping enemy ships at a 2-square distance from friendly ships equipped with Repulsor Beams is what this device is all about, they are best employed by being added to ship designs that feature weapons with a range greater than 1 square. Because missile ships should never get in close, and 1-range weapons must, a Repulsor Beam would not complement either of those designs particularly well. Repulsor Beams are also the special device of choice for planetary defense, as they can help keep enemy bombers from closing in next to a friendly planet. Their weaknesses? Enemy ships with long-range weapons, Cloaking Devices, and Subspace Teleporters.

### RESERVE FUEL TANK DESIGNS

Reserve Fuel Tanks are for ship designs that would benefit from having 3 squares added to their maximum range. Specifically, these include scouts, raiders, and long-range colony ships. As the game progresses, the size of Reserve Fuel Tanks will greatly decrease (as does

their usefulness when longer ship ranges are also discovered).

### STASIS FIELD GENERATOR DESIGNS

This device gives its user the tactical option of putting one adjacent enemy group on ice for a complete battle round, leaving it with a zero initiative rating when it thaws out and becomes active again (i.e., it will automatically move last that turn and loses its defensive reaction fire ability that turn). Because it has only a 1-square range, it must be packed into ship designs that are built to close in on the enemy—meaning that it would best supplement beam ships, planetary defense ships, and, if you're feeling weird enough, bomber designs. Note that cloaked ships cannot be attacked by Stasis Field Generators.



*When a ship group comes out of stasis (i.e., following the move during which your ship put it there), you can pull a sneaky maneuver. Just press the Special button to turn off your Stasis Field Generator on the ship group that iced them last turn, and fire all their other weapons at the poor group who just came out of the stasis field. Afterward, press the Special button again, then fire on that same ship group again, putting them back into a stasis field. You're not exactly playing cricket, old chap, but this nasty technique for slapping ships as they momentarily emerge from stasis gets 'em every time.*

### SUBSPACE TELEPORTER DESIGNS

Subspace Teleporters are about the most potent offensive supplement imaginable for any ship design that has to get in close to fire its weapons. Because it allows ships to teleport to any empty square on the Ship Combat Display



screen, closing with targets through their long-range fire ceases to be a concern. Better still, ships that teleport get the drop on enemy ships, allowing teleporting ships to shoot before the defender's defensive fire attacks. Jumping across the Ship Combat Display screen by teleporting is also an excellent way to dodge enemy missiles and torpedoes. Warp Dissipators do *not* affect a ship's ability to use Subspace Teleporters, even when that ship has its speed reduced to zero.

Subspace Teleporters are relatively small and can fit inside any size hull. However, they consume a lot of energy, so efficient (even if slow) engines will usually accompany them, just so there will be room for plenty of firepower to back up the ship's ability to teleport in among the enemy and launch surprise attacks.

The down side to Subspace Teleporters is that they can be completely negated when fighting at enemy colonies that feature missile bases equipped with Subspace Interdictors. Similarly, friendly colonies that have missile bases equipped with Subspace Interdictors will use them to negate your ships if there are also enemy ships present with Subspace Teleporters. (Hey, those people in the missile bases are paranoid about enemy bombers teleporting onto their doorstep. They don't care whether their own navy gets to use Subspace Teleporters.) Therefore, ship designs that depend too much on Subspace Teleporters for effective movement on the Ship Combat Display screen may be in a heap of trouble when they are negated by Subspace Interdictors, as they will be left with whatever pitiful tactical speed and initiative ratings they would otherwise have without them. Plan your designs carefully so

that you're not left completely unprepared for this contingency.

## TECHNOLOGY NULLIFIER DESIGNS

The Technology Nullifier is a marvelous weapon that can, through repeated attacks, completely neutralize an enemy target group by reducing the Battle Computers and ECM of every target in it to low, and even negative, values. Because of its size, however, you can place it only on larger size ships.

Technology Nullifiers are useful on virtually any space superiority ship design except raiders. Because of its long (4-square) range, even missile ships can usually get in close enough to fire this weapon. The strategy with Technology Nullifiers is to use them multiple times against the same target group, until it is rendered ineffective (keep scanning those enemy ships to monitor the cumulative effect of this weapon's attacks).

The secret is to include this device in as many of your different ship classes as possible, so that you will be making multiple Technology Nullifier attacks during every round of combat. By concentrating their fire on a single enemy target group at a time, it won't be long before the enemy will be an ineffective fighting force with no other options but to retreat or die.

Note that no matter how low their Attack level drops due to Technology Nullifier damage, a firing group's weapons will always have a minimum 5 percent chance of hitting, as shown in Table 7-3 (which may still be enough to do you some damage if that group has a lot of weapons). On reaching this point of diminishing returns, stop reducing that target group and start reducing another.



## WARP DISSIPATOR DESIGNS

Warp Dissipators have a fine 3-square range and a 50 percent chance of reducing the target group's speed by one. Note that this also reduces that target ship group's maneuverability, initiative, and Beam and Missile Defense levels. If an enemy ship group's speed is reduced to zero, not only are they sitting ducks that your weapons will hit with ease, but they can no longer select the Retreat option and warp out of combat. Warp Dissipators do *not* affect a ship's ability to use Subspace Teleporters, even when that ship has its speed reduced to zero.

In many ways, the philosophy for employing Warp Dissipators is the same as for Technology Nullifiers and, indeed, you can combine their effects to make an enemy group unable to fight and unable to retreat (heh heh heh). Because they affect an entire enemy ship group with each attack (slowing their speed until they're dead in space and can no longer warp out of battle by retreating), having multiple ship designs in your fleet firing several shots per round at one enemy ship group at a time (until it is dead in space) is the proper way to use this weapon in combat.

Because Warp Dissipators are smaller than Technology Nullifiers, however, they can be fitted on all but small-size ships. Although they do not affect enemy missile bases, they are extremely useful in helping defend friendly colonies. After all, once an enemy ship is immobilized through repeated Warp Dissipator attacks, long-range weaponry (such as that from missile bases) can finish them off at leisure. Therefore, including Warp Dissipators in planetary defense ship designs is a good idea and, if included in other ship designs, it should become a standard item so that your fleet can

fire multiple Warp Dissipator shots per round and quickly halt each enemy ship group.

## COMPUTER PLAYER SHIP DESIGN PHILOSOPHY

Now that you know how to design *your* ships, you might be interested to know how computer players design *theirs*. We don't recommend that you emulate them, however. What we've already taught you is the best way to go, so peruse this section for your personal enlightenment only. It explains why computer players build the types of ships they do.

The first thing a computer player does when designing a new ship type is to determine its hull size semirandomly, with the odds depending on racial preference (see Chapter 13). Races that prefer to design smaller ships include the Alkaris and Klackons. Races that prefer to design larger ships include the Bulrathis, Meklars, and Silicoids. When you, the sentient human being playing *Master of Orion*, have any ships in combat armed with pulsars, all computer players in contact with you will tend more toward larger ship designs.

## HOW COMPUTER PLAYER SHIPS EQUIP THEMSELVES WITH NONSPECIAL ITEMS

Table 9-12 presents the probabilities of a new computer player ship design being equipped with either its best or an inferior technology in a given ship design category. Note that smaller ship designs tend to be equipped with inferior shield and ECM discoveries.

There are other elements in computer player ship designs. For instance, once a race contacts you and discovers that you currently have ships in service with Warp Dissipators, their designs

**Table 9-12** Probability of Computer Player Choosing Equipment of a Particular Level of Quality for a New Ship Design

New Ship Hull Size		Level of Quality							
	Best	2nd	3rd	4th	5th	6th	7th	8th	
Battle Computers <sup>a</sup>									
Small	10	18	28.8	34.6	8.6				
Medium	20	32	38.4	9.6					
Large	35	45.5	19.5						
Huge	50	50							
Shields <sup>a</sup>									
Small	5	9.5	17.1	27.4	32.8	8.2			
Medium	15	25.5	35.7	23.8					
Large	40	48	12						
Huge	70	30							
ECM <sup>a</sup>									
Small	2	3.9	7.5	13.9	23.3	31.6	17.8		
Medium	8	14.7	24.8	33.6	18.9				
Large	20	32	38.4	9.6					
Huge	30	42	28						
Armor <sup>a</sup>									
Small	1	2	3.9	7.5	13.7	23	31.3	17.6	
Medium	2	3.9	7.5	13.9	23.3	31.6	17.8		
Large	4	7.7	14.1	23.7	32.3	18.2			
Huge	8	14.7	24.8	33.6	18.9				
Engines <sup>a</sup>									
All	60	40							
Maneuverability <sup>a</sup>									
Small	30	42	28						
Medium	20	32	38.4	9.6					
Large	20	32	38.4	9.6					
Huge	15	25.5	35.7	23.8					
Weapons <sup>b</sup>									
Small	100	0	0	0					
Medium	100	50	0	0					
Large	100	75	50	25					
Huge	100	100	100	50					
Another Weapon of the Same Sort in That Slot? <sup>c</sup>									
Small	100	0	0	0					
Medium	60	40	0	0					
Large	60	20	10	10					
Huge	60	20	10	10					

<sup>a</sup>Numbers represent the percent chance that a computer player will equip a new ship design of a certain size with a certain relative level of technology. Note that if a computer player doesn't have these number of technology levels required by the die roll (e.g., 7th-level armor is called for, but he's developed only three levels), the worst level available is selected (in this case level 3). This means that if the computer player hasn't developed all possible levels, the probabilities "pile up" at the end. Example: Suppose the computer player with only three levels of armor is designing a new, large-hulled ship; there's still a 4 percent chance that he'll equip it with his best-level armor, and a 7.7 percent chance for second best. But instead of a 14.1 percent chance for third best armor, there's actually a  $14.1 + 23.7 + 32.3 + 18.1 = 88.2$  percent chance that the ship will be equipped with third-level armor.

<sup>b</sup>Numbers represent the percent chance of a computer player equipping that size ship design with a weapon in that bank. Therefore, a huge ship will always have three different weapon types on it, with a 50% chance of also having a fourth type on board.

<sup>c</sup>Numbers represent the percent chance of a computer player equipping that size ship design with another of the already determined weapon in that bank. Note that if a computer player doesn't have a weapon in every slot listed, probabilities for the missing banks are added to that for its worst weapons' bank. Computer players roll 200 times on this table per ship design, ignoring results for weapons' banks to which no weapons can be added because of insufficient hull space remaining.

will no longer feature beam weapons with only a 1-square range. Also, if half or more of your ship designs are small or medium hull size ships, computer players will prioritize multiple-firing weapons, streaming weapons, and Scatter Pack Rockets in their new ship designs in order to deal with your fleet composition more effectively. (Realizing this fact, you may be tempted to take unfair advantage of these computer design priorities.)

### OPTIMAL COMPUTER PLAYER SHIP DESIGN SPECIALS

When it comes to placing special devices, computer players will always attempt to put an item into each of the three special design slots, ranked by an item's usefulness to that race and ship hull size. When available, computer players will tend to specialize in offensive special weapons. Above all others, they prefer the Technology Nullifier, Oracle Interface, and High Energy Focus specials.

According to designer Steve Barcia, "These [special devices] are the easiest of the bunch for the computer players to use in light of how the artificial intelligence was set up. Many other weapons, like Repulsor Beams, Warp Dissipators and Cloaking Devices require a lot of finesse, which human players are much better at than artificial ones. That's why the computer players [in *Master of Orion*] are better served by the simplicity of using the Technology Nullifier, Oracle Interface and High Energy Focus."

### TOM AND ALAN'S PATENTED KILLER COMBOS

After the heavy feasting on information provided in our trilogy of combat chapters, it is

only appropriate to finish up with dessert. To that end, we hope that you will enjoy this special bonus section.

We have observed that, as human players gain experience in *Master of Orion*, they tend to design fewer general purpose ship designs. Instead, they tend to specialize their designs and focus them along particular themes and philosophies, often building them around a certain key shipboard device.

We have also learned that beyond the value of any single device in a ship's design lies the value of certain equipment *combinations*. We have discovered shipboard elements that combine and enhance each other, making the whole design greater than the sum of its parts. Here, then, are some of our *killer combo* discoveries for you to try out in future ship designs.

### SHIPS THAT BEAM

Perhaps the most obvious killer combo to put together is a ship design that features a High Energy Focus device, an Oracle Interface, and as many beam weapons as it can comfortably hold. This powerful, superbeam ship design has considerable strength and reach across the Ship Combat Display screen. Consequently it will reduce, if not negate, the long-range firepower advantage previously enjoyed by missile ships, as these beam ships can strike back at fairly long range themselves.

### THE PULSAR/STREAM PROJECTOR DEADLY DUO

Think about pulsars and stream projectors for a moment. Each strips away a target's armor, each is a clean planetary attack weapon (that destroys enemy missile bases only), and each has its strength enhanced when employed in

large attacking stacks. Therefore, try to combine one Ion/Neutron Stream Projector and one Energy/Ion Pulsar in a single, huge-hulled ship. (After they've miniaturized enough, you can fit them both into a large-hulled ship.) After that, you must build as many of them as you can to exploit their strength advantage when fired by large attacking groups. Their combined attacks on an enemy target stack's armor will make them vaporize as if by magic.

When you can't fit both onto a single huge-ship design, strive to fit one or the other of them on large hulls instead of on huge ones, so that you can build more of them quicker. The goal here is to concentrate these devices on large groups of ships.

### **THE KILLER SHIP WITH NO WEAPONS**

No weapons? How can that be? Ah, consider this...

Take a huge (or, after a lot of miniaturizing, large) ship and arm it with three special devices: a Subspace Teleporter, an Energy/Ion Pulsar, and an Ion/Neutron Stream Projector (which makes it a variation of the deadly duo design described above). Protect it with your maximum available shields, but put no Battle Computer on board, because neither of these weapons requires one (they never miss). All you have to do is teleport this ship next to as many enemy ship groups as you can and start zapping away whole stacks of them in rapid order.

Because this ship design has no Battle Computer, it will have a very low initiative. However, that will matter only in one of two possible circumstances: (1) if there are enemy ships also equipped with Subspace Teleporters (remember that all ships with Subspace

Teleporters move before ships without them, but if multiple ships are equipped with them, those ships move among themselves in the order of their initiative, with ties going to the computer players), and (2) if you're contesting a planet that has activated a Subspace Interdictor, thus negating the Subspace Teleporters completely. In either one of these cases, this ship design will not do nearly as well in battle.

### **THE ULTIMATE CLEAN BOMBER**

For players who prefer to capture enemy colonies, rather than destroy them, consider the features of the ultimate *clean bomber*. Packed inside a huge hull, it would contain a Black Hole Generator, plus the deadly duo of an Energy/Ion Pulsar and an Ion/Neutron Stream Projector. These three devices, remember, kill a planet's missile bases, but leave its factories and population intact.

More ruthless players might want to chip down that defending population a bit before landing on an enemy colony. If you don't mind the political consequences of using them (or cleaning up the pollution they leave), fill the corners of that hull with some of your best biological weapons. Even if your biological weapons destroy every person on the planet, the planet's environment can support a minimum of 10 million people and the factories will remain standing—ready to be used by the first player to colonize it (you *did* bring along a colony ship, didn't you?)—and its missile bases will automatically disappear on the turn when the last population points are killed by biological warfare (in the meantime they will keep firing, even without any population points surviving there). Note that walking onto a totally

depopulated planet and taking over any factories there does not allow you to steal any technology for doing so.

### THE CLOAKED TORPEDO COMBO

Talk about two things that were made for each other! A Cloaking Device and torpedoes go together like Laurel and Hardy, pork and beans, or death and taxes. The reason is that, because torpedoes fire every other turn, a ship can recloak on the turn they recharge! It is very convenient to be cloaked while impotently waiting for these weapons to rearm. The secret is to avoid putting any nontorpedo weapons on this ship design, as you might be tempted to use them during turns while the torpedoes are recharging and, thus, forfeiting the benefits of being cloaked. (Exception: A single wimpy beam weapon that will allow you to use shoot 'n scoot tactics would be acceptable.)

### THE HOG TIE COMBO

Although using a Warp Dissipator to stop a ship allows you to go back and kill it at your leisure, this may not be so easy if it is firing back with long-range weapons. Because computer players will react to your Warp Dissipator technology by building ships that have minimum 2-square range weapons, chipping away at stalled ships with your beam weapons may prove hazardous to your health.

What is the solution to dealing with well-armed enemy ships adrift in a space battle? Soften them up at long range with Technology Nullifiers before closing in for the kill. After a few turns of having their computers fried, their ability to attack and defend will be reduced even more than by the Warp Dissipators alone. The

most vicious enemy ship design can be brought to heel with this one-two combination of Warp Dissipator/Technology Nullifier special devices.

### I'LL HAVE MINE MEDIUM

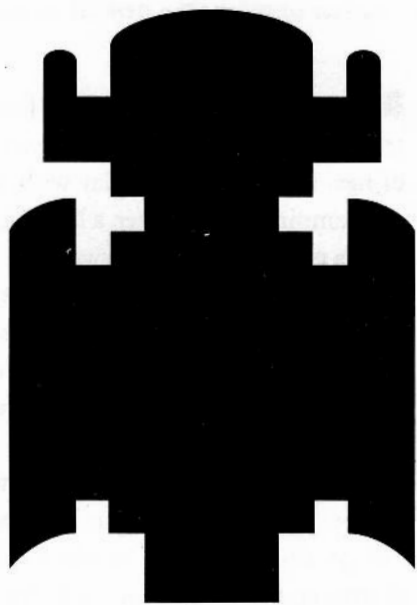
After a while, pulsars can fit on medium-size ship hulls. When they can, design a medium-size ship fitted with a pulsar and crank out a bazillion of these little suckers. Because there is no upper limit on the damage they can inflict, a swarm of medium-size, pulsar-armed ships can cut through enemy fleets like the Grim Reaper's sickle. If there is room on that medium ship hull, a Subspace Teleporter will make this ship design unbelievably deadly.

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### AWAY FROM THE OLD DRAWING BOARD

At ease! Well, if you survived reading this chapter (in fact, this trilogy of chapters on combat in *Master of Orion*), you probably feel a bit fatigued, as if after a long march. Tell you what...go relax by playing some *Master of Orion*. We know that you've got plenty of ideas now for new ship designs, so go try them out. If you want to try something cute in your next game, see Appendix H. When you're ready to pick up this book and learn more about *Master of Orion*, we'll move into our next trilogy of chapters, which focus on the tools of the trade: technology, politics, and spies (in that order). ♣

10



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*The Technology Trio*

*There is just one thing I can promise you about the  
outer-space program: Your dollars will go farther.*  
—Wernher von Braun



One of *Master of Orion*'s best features is that, throughout the game, you'll discover all kinds of new technologies to play with. Each makes your empire a little better, a little stronger. Each adds a new ability or improves an old one, making it cheaper and more efficient. New technologies also make one player's empire distinct from another's, offering (temporarily) unique advantages that a smart player can boldly exploit.

In this chapter, after a brief overview of what can be discovered, we examine how new technology discoveries are made. With each new discovery, there will be a rise in the technology level of the area that discovery comes from. Therefore, we also consider the effects of technology levels independent of the new inventions they provide, then end this chapter with our list of priority research items to help direct you to a more secure future.

## TECHNOLOGICAL DISCOVERIES: AN OVERVIEW

Although the game's documentation provides various listings and tables about what technologies can be discovered and what their effects are, we've put everything together in Appendix I, and refer you to it at this time. Stick your finger at this page, flip back to Appendix I for a minute, and then flip back here. We'll wait for you...

Neat, eh? We did some rewording, fixed a few mistakes made in the versions of this information that appear in the *Master of Orion* manual and on the game screens, and added cross references to tables and chapters in this book. Therefore, treat the information in Appendix I as *definitive*.

Now, consider what each technology category influences and, more important, what becomes less expensive and smaller (i.e., miniaturizes) as a category advances to higher Tech levels. Table 10-1 provides this information.

## HOW NEW TECHNOLOGIES ARE DISCOVERED

There is more than one way to make new technological discoveries in *Master of Orion*. Whether by luck, hook, or crook, new technologies will come to you. The birth of each new technology has its own roots, and this section explains the different ways in which they can be added to your list of discoveries.

## THE OLD-FASHIONED WAY: EARNING THEM

The bottom planetary ratio bar, labeled *TECH*, is your incubator for hatching new technologies. Every billion credits (BC) from every planet that is pumping part of its economy into its technology sector is pooled into a large, single *Research Fund*. This sum is shown on the lower-right corner of the Technology Display screen, as shown in Figure 10-1.



**Figure 10-1**

The Technology Display screen, showing the Research Fund at 3914 BCs

**Table 10-1** Technology Overview, by Category**Computers**

*Can be miniaturized:* Battle Computers, ECM, Oracle Interface, and Technology Nullifier  
*Also affects:* Space Scanners, Robotic Factory Controls, success with and against spies (see Chapter 12)

**Construction**

*Can be miniaturized:* Ship hulls (available space increases by 2 percent per level up to level 99), Armor, Missile Defense Base "Slabs" (see Table 8-1), Automated Repairs, and Advanced Damage Control  
*Also affects:* Industrial technology (i.e., the price of factories), Reduced Industrial Waste/Industrial Waste Elimination, and land combat armor

**Force Fields**

*Can be miniaturized:* Deflector Shields, Repulsor Beam, Cloaking Device, Zyro Shield, Stasis Field, Black Hole Generator, and Lightning Shield  
*Also affects:* Planetary and land combat shields

**Planetology**

*Can be miniaturized:* Colony bases and biological weapons  
*Also affects:* Biological weapon antidotes, Cloning, worker productivity (see Tables 5-1 and 13-2), the maximum population limit, and the per-million costs of Terraforming planets (see Table 6-2)

**Propulsion**

*Can be miniaturized:* Ships' engines, Inertial Stabilizer, Energy Pulsar, Warp Dissipator, High Energy Focus, Subspace Teleporter, Ionic Pulsar, Inertial Nullifier, and Displacement Device  
*Also affects:* Ship range, Star Gates, Subspace Interdictor, and Combat Transporters

**Weapons**

*Can be miniaturized:* Bombs, beam weapons (including the Death Ray), missiles, torpedoes, Anti-Missile Rockets, and Ion and Neutron Stream Projectors  
*Also affects:* Land combat weapons

This total Research Fund is divided among the six different technology sectors each turn by using slider bars like those used for divvying up a planet's economic output (see Chapter 2). There is one important difference, however, with the ratio bars used on the Technology Display screen: There are 50 total clicks' worth of ratio bar to be divided (instead of a planet's 25). Consequently, each click on a ratio bar's Left or Right Arrow button represents a 2 percent allotment of BCs from the total Research Fund.

### AUTOMATIC BALANCED TECHNOLOGY POOL SPENDING

The other difference is that you can automatically even out your technology spending in each sector by hitting the equals (=) key when viewing the Technology Display screen. This allots eight clicks (16 percent of spending) to the first four sectors (i.e., computers, construction, force fields, and planetology), while the last two (propulsion and weapons) receive nine clicks (18 percent) each.

### RESEARCH DISCOVERY BASE COST FORMULA

Every item a player researches has a base discovery cost. It is calculated using the Research Discovery Base Cost Formula.

#### Research Discovery Base Cost Formula

The Game's Difficulty Level;  
times The Item's Base Technology Level, Squared;  
times The Racial Modifier;  
equals The Base Discovery Cost for That Technology

$$\begin{matrix} \text{(Game} \\ \text{difficult} \\ \text{level)} \end{matrix} \times \begin{matrix} \text{(Item's base} \\ \text{technology} \\ \text{level)}^2 \end{matrix} \times \begin{matrix} \text{(Racial} \\ \text{modifier)} \end{matrix} = \begin{matrix} \text{(Base} \\ \text{discovery} \\ \text{cost)} \end{matrix}$$

### Game's Difficulty Level Modifiers

Level	Value
Simple	= 20
Easy	= 25
Average <sup>a</sup>	= 30
Hard	= 35
Impossible	= 40

### Racial Modifiers

Race	Computers	Construction
Alkaris	Average	Average
Bulrathis	Poor	Good
Darloks	Good	Average
Humans	Average	Average
Klackons	Average	Excellent
Meklars	Excellent	Average
Mrrshams	Average	Poor
Psilons	Good	Good
Sakkras	Average	Average
Silicoids	Good	Poor

Race	Force Fields	Planetology
Alkaris	Poor	Average
Bulrathis	Average	Average
Darloks	Average	Average
Humans	Excellent	Good
Klackons	Average	Average
Meklars	Average	Poor
Mrrshams	Average	Average
Psilons	Good	Good
Sakkras	Average	Excellent
Silicoids	Poor	Poor

Race	Propulsion	Weapons
Alkaris	Excellent	Average
Bulrathis	Average	Good
Darloks	Average	Average
Humans	Good	Average
Klackons	Poor	Average
Meklars	Average	Average
Mrrshams	Average	Excellent
Psilons	Good	Good
Sakkras	Average	Average
Silicoids	Poor	Poor

### Racial Modifier Multipliers

Racial Modifier	Multiplier
Excellent	= 0.6 (i.e., times 60 percent)
Good	= 0.8 (i.e., times 80 percent)
Average	= 1.0 (i.e., times 100 percent)
Poor	= 1.25 (i.e., times 125 percent)

\* = The Average rating is always used by computer players, whatever the difficulty level you select for yourself.

For example, let's say that we're playing the Bulrathis at a Hard level of difficulty. If we went to research Zortrium Armor (a level-17 construction technology), here is how the Research Discovery Base Cost Formula would work to calculate its base discovery cost:

$$\begin{aligned}
 & 35 \text{ (for the game's level of difficulty)} \\
 & \times 289 \text{ (the item's technology level of 17, squared)} \\
 & \times 0.8 \text{ (because the Bulrathis are "good" at construction research)} \\
 & \hline
 & = 8092 \text{ BCs as the Bulrathis's base discovery cost for Zortrium Armor at the Hard level of difficulty.}
 \end{aligned}$$

### WHAT THE BASE DISCOVERY COST MEANS

This base discovery cost is the amount of money that must be poured into an item's technology category to completely fill its light bulb symbol, as shown to the right of the ratio bars in Figure 10-1. In Figure 10-1, notice that the force field, planetology, and propulsion technologies each have their light bulbs filled to a different level. The more one is filled, the closer you are to reaching a BC investment amount in that technology sector equal to the base discovery cost of whatever item you're presently researching there.

The lighted area of the light bulbs themselves, by the way, is 9 pixels high. (A pixel is a single dot on the computer screen.) Therefore, each pixel row of a light bulb's illumination represents having paid about 10 percent of that item's base discovery cost. Thus, when the first pixel row on a light bulb is lit, you have paid somewhere between 10 and 20 percent of that item's base discovery cost. When the last (ninth) pixel row on a light bulb is lit (i.e., the light bulb is completely filled), you have paid somewhere between 90 and 100 percent of that item's base discovery cost.

After this base discovery cost for researching an item has been paid, the light bulb will be replaced by a percentage number. In Figure 10-1, for example, the weapons technology light bulb has been replaced by the number "22%." This number (or less) must be obtained on a d100 roll during the Technological Discovery Phase during the Next Turn Sequence of Play (see Appendix A, Step VIII) to develop the item being researched.

This per-turn percentage chance for discovery cumulatively increases at the rate of +1 percent for every additional 2 percent of the item's base discovery cost invested beyond its full base discovery cost. To continue with the above example, for every 162 BCs (2 percent of its base discovery cost) spent researching Zortrium Armor beyond the initial 8092-BC investment, the chance to discover it in that or following years increases by +1 percent. So, by the time we've spent double its base discovery cost in research investment, we would have an even 50 percent chance for discovering Zortrium Armor that turn.

## EARNING INTEREST ON RESEARCH INVESTMENTS

Each turn that you continuously invest in researching a given item, the money already invested in it actually grows (i.e., earns interest). The maximum interest that can be earned is 15 percent of the amount presently invested in researching that item, but never more than *twice* your present BC investment in that technology this turn (the *Master of Orion* manual is incorrect on this subject). Note that you will be earning compound interest (which is good). What all this means is that a continuous stream of money invested over time is the most efficient, economical way to research a new technology, even if that amount varies a bit from turn to turn.

Sadly, the actual numbers for your present totals of research money already invested in a technology are not available to you, although you can estimate your investment progress by using the light bulbs and percentage numbers and working out the math for yourself.

Continuing with our example, assume that we've already sunk 6000 BCs into Zortrium Armor research. The light bulb would be about three-quarters filled and we could earn up to 900 BCs (15 percent of the present amount invested) in free interest, if we invest at least half that much this turn in continuing to research it. If we only added another 350 BCs to researching Zortrium Armor research this turn, then that would limit our free interest to a matching 700-BC amount (for a total growth this turn of 1050 BCs). However, that still triples our 350-BC research investment this turn, and that's nothing to sneeze at!

## PENALTIES FOR FAILURE TO INVEST CONTINUOUSLY

If your research spending on a given technology ever drops to zero for any reason, this equates to shelving that project and laying off all the researchers. Should this happen, you will get no chance to discover it that turn (if you had one before) and, even worse, the current amount of money already invested in it is reduced by 10 percent. These shelving penalties continue every turn until research investment money begins to flow back in again.

## INVESTMENT ADVICE

Once investment in an item has reached the point at which you have between a 10 and 15 percent chance to discover it, taper back its ratio bar somewhat (but not all the way to zero!) and increase your spending in another area for a while. Our reasoning for this is simple: it is at this point that your money would be better spent on the early stages of researching a different technology, where it will earn plenty of interest over time. This is a better investment than throwing BCs into a project that is about to pay off and, thus, robbing that money of its chance to earn a lot of interest over time.

## THE LIMITED RESEARCH LIST

No player in *Master of Orion* is able to research all of the possible inventions during a single game. Each player's *Technology Discovery Limited Research List* is predetermined while the universe is being created and is fixed for the game's duration. Every possible discovery has a 50 percent chance of being included on a player's Limited Research List, so you must acquire some technologies from other players if you want them.



Note, however, that every player's Limited Research List must include at least:

- One Planetary Shield technology
- One Robotic Factory Control technology
- One missile (i.e., either a missile, rocket, or torpedo) technology
- Either Hydrogen (Range 4) or Deuterium (Range 5) Fuel Cells

If each of these does not appear on a player's Limited Research List, the computer will simply keep rerolling it until all of these conditions are met. This way, no player will be without at least one of these critical defense, exploration, or industrial technologies.

## TECHNOLOGY QUINTILES

Technologies are presented in the game's Technical Supplement as a table divided into quintiles. For our purposes, a *quintile* is a group of five Tech levels ranging from 1-5, 6-10, 11-15, and so on. There are two important reasons for this. First, you will always have at least one item from each sector's quintile on your Limited Research List. Second, you may select items to research from a quintile only after you've made at least one discovery in the quintile before it.

For example, your first discovery of an item in the second weapons technology quintile (i.e., either Anti-Missile Rockets, Neutron Pellet Gun, Hyper-X Missile, Fusion Bomb, or Ion Cannon) adds to your list of researchable items everything from the third quintile (i.e., Scatter Pack-V Rockets, Ion Rifle, Mass Driver, Merculite Missiles, or Neutron Blaster) that is on your Limited Research List. Making discoveries in each new quintile, therefore, is how you push the envelope and find out which

increasingly higher technologies you can research. In other words, this is how you reveal the next few items on that technology category's Limited Research List.

## ADVANCED TECHNOLOGIES

Just because you have discovered everything on your Limited Research List does not mean that you are through researching a particular category. Instead, you will be asked to select generic Advanced technology levels in those categories in which you have already discovered everything you could. Each Advanced technology level is equivalent to discovering something that is five Tech levels higher than your current Tech level in that category.

These Advanced technology levels are only good for raising that category's Tech level. They don't provide specific items. Instead, you're getting the benefits of further miniaturization in that category, which we'll explain in the section "Miniaturization," below.

## FILLING IN THE PLANETARY SHIELD GAPS

If you discover a higher level Planetary Shield without first discovering the lower one(s), building those shields will be done incrementally. For example, if the first Planetary Shield technology you discover is Level X, then when you're halfway through constructing one (i.e., after you've paid the first 500 BCs; see Table 8-3), that planet will be protected by a level-V Planetary Shield automatically. To verify this has occurred, check the Planets Display screen or simply double-click the cursor over your own colonies to see their detailed Information screens.



## **CONQUERING FACTORIES**

The reasons you want to capture an enemy planet with its factories intact are twofold. First, it can be developed much more quickly because the expense of building those factories has already been graciously paid by the enemy. The second reason, more germane to this discussion, is that each factory captured gives you a 2 percent chance to steal one of that player's technologies that you don't already possess. These stolen technologies are chosen randomly from all categories and players can obtain a maximum of only six stolen technologies from a single planetary conquest. Note that you'll average about 1 stolen technology for every 50 factories you capture.

## **ESPIONAGE**

A primary function of spies is to steal other players' technologies. Exactly how this is done is explained in Chapter 12.

## **DISCOVERING ARTIFACT PLANETS**

If you are the first to discover (not colonize) an artifact planet, you receive an immediate, one-time, 75 percent chance of discovering a single, random new technology from any category of up to 10 levels higher than your present technology in that category. These technologies are truly random and are not limited to those on a player's Limited Research List. Thus, the Silicoids might discover Controlled Environment technologies, even though they could never normally research them.

Besides a possible free technology, colonies on artifact planets provide 2 BCs' worth of technology research for every BC that they allot to their Technology ratio bar. This is double the normal rate.

## **DEFEATING THE GUARDIAN AND DISCOVERING ORION**

When the Guardian of Orion is defeated, the conquering player will be awarded the Death Ray beam weapon that the Guardian uses. Also, for being the first to discover Orion (i.e., take a close look at it after defeating the Guardian versus discovery via normal scanners), that player will receive, randomly, up to three other items already on their Limited Research List from any technology category (see Chapter 15). In addition, an Orion colony provides 4 BCs' worth of technology research for every BC it invests.

## **RANDOM EVENTS**

Occasionally, a random event occurs, in which a player is told he or she discovered an ancient derelict ship. This ship is brimming with new weapons and shield technology and its effects are explained in Chapter 14.

## **TECHNOLOGY EXCHANGES WITH OTHER PLAYERS**

As one of your diplomacy options, you can try to wrangle a technology trade with another race with whom you are in contact. How good a deal you're likely to get and what the other leaders will want for their technologies are thoroughly examined in Chapter 11.

## **GIFTS FROM OTHER PLAYERS**

Finally, other players may actually give you technologies as tribute or to sweeten deals that they want to make with you. This doesn't occur often, particularly when playing at the higher difficulty levels, but it does happen occasionally.

## KEEPING TRACK OF OTHER PLAYERS' TECHNOLOGIES

Of course, concerns about new technologies are not limited to what you have; they're also about what you need and, in general, about keeping up with your neighbors. For meeting your needs, we have listed all of the methods for getting new technologies for you to consider. In practice, to get what you can't discover on your own, due to your preordained Limited Research List, you'll have to trade, steal, or count on blind luck to bring it to you.

While you can't count on being lucky, there is an easy way to find out which player has a technology you're missing, so that at least you'll know who to deal with or steal from. By opening the Races Display screen and checking the Report screen for a particular race with which you're in contact, you will see lists of their eight latest discoveries (that you're aware of through spying; see Chapter 12) in each of the six technology categories. Any technology on that list that they have and you don't will be listed in bright white lettering, instead of the usual off-white lettering used for the technologies listed that you share. If that race has many technologies listed in bright lettering, you'll know to look them up—either to trade with or to steal from.

## TECHNOLOGY LEVELS

Each technology category has its own technology level, or simply *Tech level*, which is shown to the right of the light bulb or discovery percentage number on the Technology Display screen (see Figure 10-1). These levels will range from 1 to 99 (their maximum). As these numbers rise, older discoveries in those technology

categories become smaller and less expensive through miniaturization (see page 216).

As Table 10-1 indicates, the Tech levels of certain categories have additional effects. Spies, for example, do better for the players with a Tech level advantage in the computer sector (see Chapter 12). Similarly, the hull space available for every size ship you build increases 2 percent per construction Tech level achieved up to 99 (not 1 percent per level, as indicated in the *Master of Orion* manual).

## HOW TECHNOLOGY LEVELS ARE DETERMINED

To determine a given sector's Tech level, add the following:

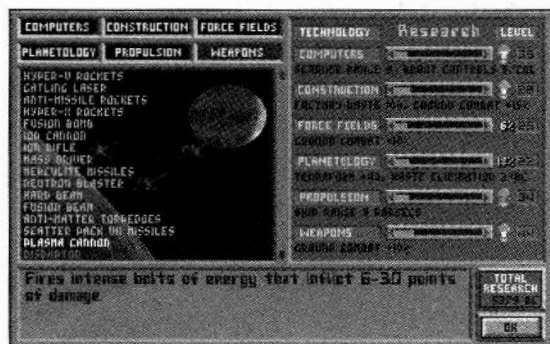
- 80 percent of the base Tech level of your most advanced discovery in that sector (rounded down)
- +1
- The total number of items that you've discovered in that sector (excluding the ones with which you started the game)

Therefore, leapfrogging ahead from one major breakthrough to the next will not, alone, maximize your technology level. Instead, a large base of lesser discoveries, each adding +1 to that sector's technology level, is a surer way to increase it. There is a natural tradeoff, therefore, between lower level technologies that will be discovered faster and add a solid base to that sector's overall Tech level, and higher level discoveries that will take a much longer time to research (due to their greater expense), but will provide a (presumably) better item and may open up the next quintile on your Limited Research List.

For example, consider the weapons technology level of 44 as shown in Figure 10-2. This is achieved by taking 80 percent of the base Tech level of this sector's most advanced discovery, which is the Plasma Cannon in this case, a Tech level-35 device. (Note that the Disruptor is currently being researched—it is not yet discovered!).

Well, 80 percent of 35 equals 28. To this is added 1, plus 15 for the 15 discoveries made in weapons technology beyond the Nuclear Missile, Nuclear Bomb, and Laser technologies initially available. Thus,  $28 + 1 + 15 = 44$ , the level shown on the screen.

Note that going back and researching older, obsolete technologies (for example, Hand Lasers when you already have Ion Rifles) is still useful. These will provide the double benefit of being reasonably quick to discover and, once found, they raise their category's Tech level by one, miniaturizing everything in that category in the process (see the next section).



**Figure 10-2**

On the Technology Display screen, note the weapons technology level of 44 on the lower-right side.

## MINIATURIZATION

The primary reason for increasing a sector's technology level is to miniaturize previous discoveries made there. The specific items in a sector that can benefit from miniaturization are listed in Table 10-1.

Miniaturization makes items smaller (so they take up less hull space when placed on a ship) and less expensive. For every 10 levels that an item's sector technology level is above its base discovery Tech level, its price is reduced by 50 percent and its size is reduced by 25 percent (except weapons, which also reduce in size by 50 percent). Table 10-2 gives the exact cost and size reduction percentages for miniaturized items. Note that 50 levels of miniaturization is the maximum benefit that an item can receive (exception: hull space, as explained further on).

## SPECIAL WEAPONS MINIATURIZATION

Interestingly, the three weapons technology special devices (Anti-Missile Rockets, plus Ion and Neutron Stream Projectors) miniaturize at the same 50 percent rate as all the other weapons. Thus, they miniaturize twice as fast as every other special device in the game (which miniaturize at the 25 percent rate). This makes these three items particularly easy to fit into ship designs after they've miniaturized a few levels.

## CONSTRUCTION TECHNOLOGY DOUBLE MINIATURIZATION BONUS FOR SHIP DESIGNS

Each Tech level increase in construction technology provides a double bonus for all of your ship designs. First, each level of construction technology increases the hull space of all size

ships by 2 percent per level (all the way up through Tech level 99!). Second, it also miniaturizes the size of armor. Because every ship design must be built with some kind of armor, miniaturizing it, in effect, increases the hull space available for other things. Therefore, every new level of construction technology reached adds a lot of hull space to your future ship designs.

### MISCELLANEOUS MINIATURIZATION NOTES

Star Gates never miniaturize. Also, terra-forming and cloning don't miniaturize, although the cost per million to perform them does drop as you reach higher Tech levels of their respective technology types.

### KEY TECHNOLOGIES

We have found that certain discoveries are key or *milestone* technologies. They provide important breakthroughs that can shift the balance of power strongly in an empire's favor. They are described in the following sections so that you may emphasize them in your research plans.

### ALL IMPROVED ROBOTIC CONTROLS

Each Improved Robotic Controls computer technology has a tremendous effect upon the potential size of your economy. Because money is the sinew of both war and peace, you should pounce on this opportunity to enlarge your economy without intruding on a neighbor's space.

### IMPROVED OR ADVANCED SPACE SCANNER

Improved or Advanced Space Scanners (level-13 or -23 computer technology) add enemy ship destinations and estimated times of arrival (ETAs) to the information you receive. Also, when you select one of your own colonies that has enemy ships en route to it, a red line will appear from enemy ships heading to that colony, thus providing you with a visual warning of their impending attack. Using the **F7** and **F8** keys will, after this or the Advanced Space Scanner technology has been discovered, scroll you between only those colonies of yours that enemy ships are already heading for.

### HYPERSPACE COMMUNICATION

Hyperspace Communication (level-34 computer technology) allows you to reroute your fleets in midflight. Thus, you are now able to correct mistakes and react to changing situations more quickly, providing impressive tactical flexibility. It is also the perfect technology to trade away to computer players (see Chapter 15).

### ORACLE INTERFACE

The Oracle Interface is a level-46 computer technology special device, and it makes all of the beam weapons on board that ship awesome by halving enemy shields. Don't build a beam ship without one.

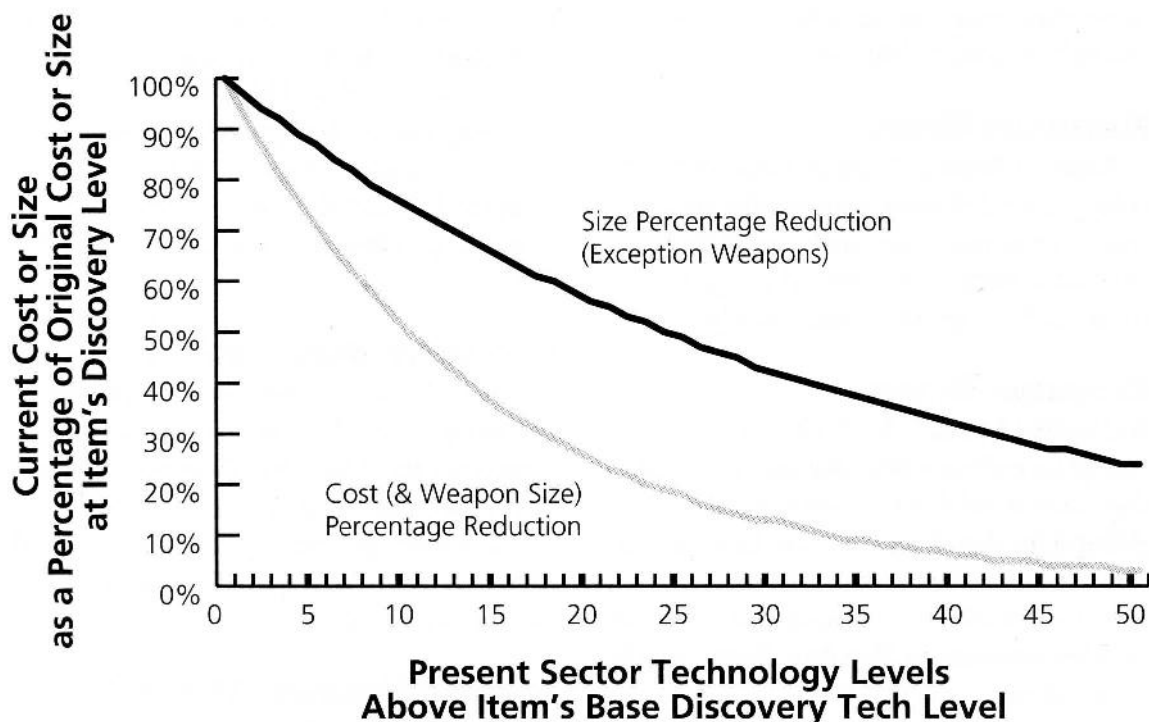
### ALL ARMORS

Improving armor through construction technology not only gives you better armor for future ship designs, but it is also immediately added to your missile bases (allowing them to

**Table 10-2** Cost and Size Reduction Percentages for Miniaturization<sup>a</sup>

Present Sector Technology Levels above Item's Base Discovery Tech Level	Size as Percentage of Original (Except Weapons)	Cost (and Weapon Size) as Percentage of Original
0	100	100
1	97	93
2	94	87
3	92	81
4	89	76
5	87	71
6	84	66
7	82	62
8	79	58
9	77	54
10	75	50
11	73	47
12	71	44
13	69	41
14	67	38
15	65	35
16	63	33
17	61	31
18	60	29
19	58	27
20	56	25
21	55	23
22	53	22
23	52	20
24	50	19
25	49	18
26	47	16
27	46	15
28	45	14
29	43	13
30	42	13
31	41	12
32	40	11
33	39	10
34	38	9
35	37	9
36	36	8
37	35	8
38	34	7
39	33	7
40	32	6
41	31	6
42	30	5
43	29	5
44	28	5
45	27	4
46	27	4
47	26	4
48	25	4
49	24	3
50 <sup>b</sup>	24	3

<sup>a</sup>Note, when calculating miniaturization of an item's size or cost, the amount to which it is reduced is always rounded down.<sup>b</sup>Maximum miniaturization level that an item can achieve.

**Table 10-2** Cost and Size Reduction Percentages for Miniaturization Graph

Adapted with permission from Redmond Simonsen

take more hits; see Table 8-1) and your ground troops (raising their Combat modifier; see Table 8-10), even if they are on transports in deep space at the time.

### ADVANCED DAMAGE CONTROL

Advanced Damage Control (level-36 construction technology), along with its kid brother, Automated Repair, will greatly increase your survivability in combat with large and, particularly, huge ships. In a toe-to-toe space battle in which you have a few big ships, their Advanced Damage Control/Automated

Repairs can often make all of the difference between victory and death. This is also the ultimate counter to pulsar and stream projector special weapons.

### PLANETARY SHIELDS

Any Planetary Shield (force field technology level 12, 22, 32, or 42) force field technologies will raise the shield level of your colonies by either +5, +10, +15, or +20 once the construction cost has been paid (see Table 8.3). Face it, your colonies are going to be attacked, and having good Planetary Shields will make them as



tough as possible. Each level of planetary shielding helps force hostile neighbors to improve their weaponry in order to match your colony's improving defenses.

### REPULSOR BEAM

A Repulsor Beam (a level-16 force field technology special weapon) changes the nature of space battles and is extremely useful for keeping enemy bombers away from friendly colonies while conducting tactical ship combat.

### CLOAKING DEVICE

A Cloaking Device (a level-27 force field technology special) also alters the nature of tactical ship combat, helping bombers to penetrate and giving ships that decloak to fire their weapons superior initiative. Note that cloaked ships are immune to Stasis Field Generator attacks. They are also immune to Repulsor Beam attacks while *moving*.

### BLACK HOLE GENERATOR

A Black Hole Generator (a level-43 force field technology special weapon) is simply awesome, killing whole ships in a target group outright (see Table 9-8). It is also a standard weapon on clean bombers (see Chapter 9).

### CONTROLLED RADIOACTIVE LANDINGS

When placed in a colony ship design, Controlled Radioactive Landings technology (level-18 planetology technology) allows you to settle on any planet in the game. Many mineral-rich and ultrarich planets require advanced Controlled Environment technologies.

## BIO TOXIN AND UNIVERSAL ANTIDOTES

Bio Toxin and Universal Antidotes (level-17 and -36 planetology technologies, respectively) are crucial to develop. This is because there are too many personality types in the galaxy who will use biological weapons all too freely (see Chapter 11), and their effects can be all too devastating unless you have a cure (see Table 8-5).

### SUB-LIGHT DRIVE (WARP 3)

Sub-light Drive Engines (level-12 propulsion technology), which move ships at warp 3 (3 parsecs per turn), have the all-important effect of doubling the speed of your transports from 1 to 2 parsecs per turn. This makes a crucial difference not only for peaceful expansion, but also for military invasion (see Chapter 8).

### IMPULSE ENGINES (WARP 5)

Similarly, Impulse Engines (level-24 propulsion technology) greatly increase the survivability of invading transports running the gauntlet of enemy fire. Because this discovery doubles their speed on the Ship Combat Display screen, it halves the vulnerability of invading transports vulnerability to enemy fire (see Table 8-8).

### WARP DISSIPATOR

A level-20 propulsion technology, the Warp Dissipator also changes the complexion of tactical space combat and, with luck, will leave enemy ships unable to move or retreat from battle. It also reduces their Defense levels, making them far more vulnerable to enemy attacks. Warp Dissipators can be devastatingly effective when first introduced.

## STAR GATES

Although expensive, Star Gates (level-27 propulsion technology devices) change the strategic nature of warfare on the Control screen. Suddenly, fleets and reserves can be moved about as easily as a pistol. When properly positioned and employed, Star Gates can really keep computer players off balance and will help you to counter most military threats to your empire more quickly and with fewer ships.

## HIGH ENERGY FOCUS

The High Energy Focus, a level-34 propulsion technology, extends the range of all beam weapons by 3 squares, making them far more dangerous in tactical ship-to-ship combat. The standoff, long-range advantage of missiles is greatly reduced and, when combined with an Oracle Interface, this technology makes beam ship designs the queens of the battlefield.

## SUBSPACE TELEPORTER/ SUBSPACE INTERDICTORS

Subspace Teleporters/Subspace Interdictors (level-38 and -46 propulsion technologies respectively) also change the nature of tactical ship combat. With a Subspace Teleporter, short-range weapon ships can close in on their targets in an instant and receive the highest combat initiative. Subspace Interdictors, thank goodness, will prevent enemies from using Subspace Teleporters around your colonies that have missile bases.

## ALL SCATTER PACK ROCKETS

Your missile bases will need Scatter Pack Rockets to defend against vast swarms of small enemy ships.

## ALL TORPEDOES

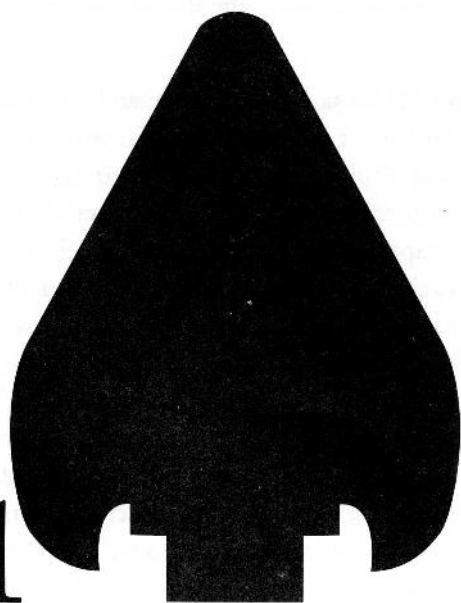
Torpedoes are excellent, all-around weapons. Although they fire only every other turn at most, they are fast and destructive against both ships and colonies.

## TICK TOCK, TECH TALK

Well, time has run out on our technological tour. The three essential elements of what the technologies are, where you get them, and how they miniaturize have, hopefully, been made clear by our scientific approach to explaining them. As an added bonus, we have even included a list of important, breakthrough technologies for you to consider.

Although technology is definitely a science, many people would also consider the study of politics and personalities to be a science. In *Master of Orion*, learning about the nature of your computer adversaries is certainly no less a science. In the next chapter, we will put this topic under our editorial microscope. ■

11



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*Politics and  
Personalities:  
Alien Leaders and  
How to Deal  
with Them*

*Trust is good. Control is better.*  
—Feliks Dzerzhinski,  
founder of the Soviet secret police

♠ We've said that a successful Galactic Overlord must combine viable economic, military, and diplomatic strategies to triumph. The former elements have been covered in previous chapters; in this chapter we negotiate the intricacies of diplomacy. You will learn what your diplomatic options are, as well as the odds of your proposals being accepted. More importantly, you will receive insights into the logic underlying each leader's personality and racial objective. Yes, when it comes to interracial relations, we've got the nuance by the numbers, and we're not afraid to show you exactly how it all adds up.

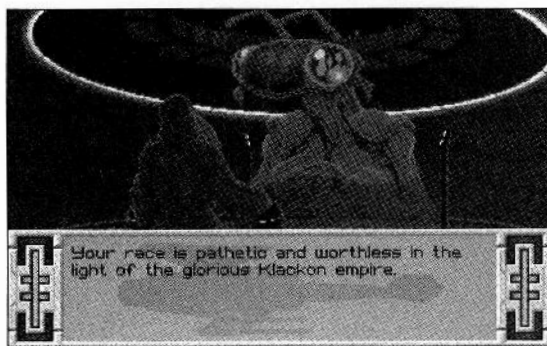
## CONTACT: ESTABLISHING DIPLOMATIC RELATIONS

Diplomatic relations with another race cannot begin until after contact has been established, which occurs if one player's colony is within the present ship range of another player. This range is based on either player's most advanced Fuel Cell (i.e., ship range) technology. The explanation in the *Master of Orion* manual is misleading, because it is not based solely on your own ship range.

For example, say you are still at ship range 4, but suddenly you receive a first contact notification (as shown in Figure 11-1) from a race whose nearest colony is 6 parsecs away. Guess what? That other race has discovered Fuel Cells with a 6-parsec range at least, and now they're knocking at your door.

## LOSING CONTACT WITH ANOTHER RACE

If contact is broken because you no longer have colonies within range of each other, the following occurs:



**Figure 11-1**

A typical first contact greeting. Really friendly, huh?

- All trade between you ceases
- All spies on both sides go into permanent hiding
- All treaties between you are automatically broken (with no oath breaker penalties; see "The Oath Breaker Penalties," on page 230)
- The No Contact Diplomacy Point modifiers are still in effect (as explained in "The No-Contact Relations Bar Modifiers," on page 258).

## BRIGHTLY LIT AND DIMLY LIT STAR NAMES

After contact is established, the locations and names of all the other races' colonies are permanently revealed to you. However, some of their stars might have their names in bright lettering, whereas others might be in dim lettering. Bright star names indicate planets that are currently being scanned by your ship and colony scanners (allowing you to scan the other player's fleets). Dimly lettered star names indicate planets that are not currently under your surveillance.

## HOW RELATIONS ARE MEASURED: THE RELATIONS BAR AND LOVE NUB

After you've contacted another race, go to the Races Display screen and start dealing with them right away. You might want to set up a spy network in the other player's empire (see Chapter 12) or offer a diplomatic parlay such as a trade agreement, treaty, or technology exchange. The crucial element on this display, however, is your Relations bar with each of the other races, as shown in Figure 11-2.

To the right of the picture and name of each race on your Races Display screen are six important lines of information. The top line shows your status with them in terms of wars, non-aggression pacts, and alliances (if any). The second line shows the annual trade amount, in billions of credits (BCs), required by your trade treaty, if any, with that race.

The third row down contains that player's Relations bar with you. This is the red to green-



**Figure 11-2**

Relations bars contain a one-word description of your present status and a relationship indicator triangle (aka "love nub") pointing to your position on that scale.

colored scale with a one-word description of your present status. In the next row down, just beneath the Relations bar, is a relationship indicator triangle we call the "love nub." It, and the corresponding word above it, indicate your Relations level (see Table 11-1).

The last two lines of information concern your spying activity within that player's empire. The first line shows, from left to right, how many spies you presently have there, a ratio bar showing how much you are presently spending each turn to purchase more spies there, and the

**Table 11-1** The Relations Bar<sup>a,b</sup>

Relationship Level (Name)	Diplomacy Point (DP) Spread	
Harmony	+91 to +100	Green zone
Unity	+79 to +90	
Friendly	+67 to +78	
Peaceful	+55 to +66	
Affable	+43 to +54	
Calm	+31 to +42	
Amiable	+19 to +30	
Relaxed	+7 to +18	Black zone
<b>Neutral</b>	<b>-6 to +6</b>	
Unease	-7 to -18	Red zone
Wary	-19 to -30	
Restless	-31 to -42	
Tense	-43 to -54	
Troubled	-55 to -66	
Discord	-67 to -78	
Hate	-79 to -90	
Feud	-91 to -100	

<sup>a</sup>Each shade of color on the Relations bar represents a range of 10 Diplomatic Points (DPs).

<sup>b</sup>The love nub moves 1 pixel (i.e., one dot on the screen) for every 2 DPs. Consequently, each shade of color on the Relations bar is exactly 5 pixels wide.

time frame in which new recruited spies will appear. Beneath this are three buttons, one of which will always be highlighted, indicating your spies' present mission within that player's empire: either to hide, conduct sabotage, or attempt espionage. Spies are fully explained in Chapter 12.

As Table 11-1 shows, the Relations bar is just a graphic representation of a numbered scale that runs from -100 to +100. Each point on this scale is called a Diplomacy Point, or DP for short. Pleasing another race adds DPs while angering them subtracts DPs. Table 11-1 and Diplomacy Points are key concepts in this chapter.

## PERMANENT DIPLOMACY POINT MODIFIERS

This section talks mainly about events that add or subtract some Diplomacy Points when they occur. Before a number of DPs is added or subtracted, it is always first modified as shown in Table 11-2.

## NATURAL RELATIONS GRAVITATION

On turns in which no Diplomacy Points are either earned or lost on a Relations bar, the love nub will automatically gravitate a single DP toward a race's starting Diplomatic Relations level (as shown in Table 11-3). This natural drift in relations is not subject to the permanent DP modifiers.

## THE AUDIENCE MENU: IMPORTANT BACKGROUND INFORMATION

Your diplomats can run into potential snags. The first includes leaders who no longer want

**Table 11-2** Permanent Diplomacy Point Modifiers<sup>a</sup>

If the event increases the DPs on their Relations bar with you, and your love nub is between...

-100 and +33	you gain the full benefit
+34 and +66	you gain only two-thirds of its benefit
+67 and +99	you gain only one-third of its benefit

If the event decreases the DPs on their Relations bar with you, and your love nub is between...

-99 and -67	you suffer only one-third of the penalty
-66 and -34	you suffer only two-thirds of the penalty
-33 and +50	you suffer the full penalty
+51 and +100	you suffer <i>double</i> the penalty

- <sup>a</sup>Notes:
- Don't use Table 11-2 to determine the effect of a temporary modifier.
  - Fractional DPs are always rounded down to the nearest whole number.
  - The Human race always receives double the amount of any positive DPs earned.
  - All computer players always receive double the amount of any positive Diplomacy Points earned with another computer player after turn 100.
  - All DP gains earned with a Xenophobic leader are halved.
  - All DP decreases with an Honorable or Xenophobic leader are doubled. If your Relations level with them is between +51 and +100, they are quadrupled.

to speak with you, and the second is those leaders that speak to you but say "No" (or worse!). To understand why these snags arise and to get what you want from a diplomatic parlay, we must first explain what elements combine to affect the computer players' feelings toward you and how they make their diplomatic decisions.



**Table 11-3** Starting (Base) Diplomacy Point Levels<sup>a</sup>

Race	Race									
	Alkaris	Bulrathis	Darloks	Humans	Klackons	Meklars	Mrrshans	Psilons	Sakkras	Silicoids
Alkaris	—	0	-7	+7	-7	0	-31	0	-7	0
Bulrathis	0	—	-7	+7	0	0	-7	0	0	0
Darloks	-7	-7	—	+7	-7	-7	-7	-7	-7	-7
Humans	+7	+7	+7	—	+7	+7	+7	+7	+7	+7
Klackons	-7	0	-7	+7	—	0	-7	0	-7	+7
Meklars	0	0	-7	+7	0	—	0	0	-7	+7
Mrrshans	-31	-7	-7	+7	-7	0	—	0	-19	0
Psilons	0	0	-7	+7	0	0	0	—	0	0
Sakkras	-7	0	-7	+7	-7	-7	-19	0	—	0
Silicoids	0	0	-7	+7	+7	+7	0	0	0	—

<sup>a</sup>Note: Each time two races change their status to "At War," the following occurs:

- They each receive an immediate -5-DP penalty on each other's Relations bar.
- They each receive a permanent -5-DP penalty on their above-listed Starting (Base) Diplomacy Point levels.

## A COMPUTER PLAYER'S CORE REACTION

The Core Reaction is another key concept in this chapter. An alien race's Core Reaction is its current general feeling about another player. It is kept track of separately for each alien race and is the key element in most of its decision making. A computer player's Core Reaction value is a number generated by combining the following four variables:

1. The Diplomacy Point value of your starting (base) relation with that race. See Table 11-3 for these exact numbers.
2. A permanent +5 modifier for each technology tribute you've paid them regardless of the specific item. (Monetary tribute does not modify Core Reactions.) This number is combined with the following:
3. A permanent -5 penalty for each oath breaker action you commit. Every time you break a peace treaty, nonaggression pact, alliance, or trade agreement with that player, you have committed a heinous oath-breaker act. (Note that this is separate from the permanent -5 penalty to starting [base]

Diplomacy Point levels for each new war, as shown in Table 11-3.)

Modifiers 2 and 3, combined, cannot modify the Core Reaction by more than +30, but can modify it by an unlimited negative amount. If you prove treacherous enough, it is possible for a race to want never to speak to you again! Remember, each oath-breaker penalty can be offset by a corresponding gift of technology as tribute.

4. The player's leader's Personality modifier also modifies a computer player's Core Reaction rating (see Table 11-4).

**Table 11-4** Leader Personality Modifier Values

Personality	Modifier Value
Pacifist	+20
Honorable	+10
Erratic	-40 to +40 (random) <sup>a</sup>
Aggressive	-10
Ruthless	-30
Xenophobic	-50

<sup>a</sup>Rolled for once at the start of each turn.

## TEMPORARY MODIFIER VARIABLES ON COMPUTER PLAYER'S CORE REACTION

Besides a computer player's fairly stable Core Reaction rating, most of the diplomatic decisions they'll make are also affected by a more volatile temporary modifier variable. This applies in each of the following decision-making areas and are kept track of separately:

- Temporary Treaty modifier (for nonaggression pacts and alliances)
- Temporary Peace Treaty modifier (for peace treaties)
- Temporary Trade modifier (for trade)
- Temporary Exchange modifier (for technology exchanges)
- Temporary Diplomat Gone modifier (for their leader's patience)

### "NO" REALLY MEANS "STOP ASKING"

Every parlay, no matter its outcome, inflicts a -10 point penalty on each of these five temporary modifiers. (In effect, you're wearing down their leader's patience in general.) If your diplomatic offer is rejected with such remarks as "We are not interested at this time," "Your offer does not seem fair to us," "You have no technology that interests us," and so on, then the temporary modifier for the area in which you were specifically rejected receives a -30 point penalty instead of the usual -10 point penalty if they agree.

These temporary modifier penalties are cumulative. They are adjusted back toward 0 at the rate of 10 points per turn per category (see Appendix A, Phase III, Step 4).

For example, if a computer player says "No" to your desperate peace treaty proposal to end

a senseless war (that you're probably losing or you wouldn't be asking for a peace treaty), then your Temporary Peace Treaty modifier would go to -30, while every other temporary modifier would change by -10. After the beginning of the next turn, there would be no penalties for negotiating with the player on subjects other than a peace treaty (which is too bad, because they won't talk about anything else until you've ended the war except, possibly, to hear your offers of tribute). After three turns of not seeking an audience with them, you would have waited long enough for that -30 Temporary Peace Treaty modifier to be reduced to zero, thus giving you another decent shot at that peace treaty, as there will be no temporary modifier penalties hanging over your head, reducing your chances for success.

The principle behind these temporary modifiers is quite simple. They're designed to prevent you from annoying computer players with incessant demands on their diplomatic time. They simulate that point in time where computer players simply get tired of dealing with you and, consequently, will be more likely to say "No" to any of your proposals. It might help to think of these temporary modifiers as patience modifiers instead.

## THE DIPLOMAT GONE COLD SHOULDER

Leaders are always available to speak to you unless it says that their diplomat is gone, as with the Alkaris in Figure 11-2. Specifically, this occurs when their Core Reaction toward you, plus their Temporary Diplomat Gone modifier, falls below -100. In such cases, all you can do is let time pass to reduce their Temporary Diplomat Gone modifier and let your love nub

gravitate (as previously explained) to a possibly better position on the Relations bar.

For example, if the Alkaris were trying to talk to a Xenophobic Mrrshan leader, they're probably looking at a -81 starting Core Reaction (-31 for Restless base relations, plus another -50 for the Mrrshan leader's xenophobia), provided no wars have previously broken out between them. This diplomatic situation is barely tenable. The second parlay with the Mrrshan leader will have them recalling their diplomat, because calling a second parlay adjusts the Temporary Diplomat Gone modifier by a further -20.

### **TEMPORARY MODIFIERS: THE -100 PENALTY**

Any time a player drives a temporary modifier down below -100 points, half of the excess below -100 (rounded down) is taken as an instant Diplomacy Point penalty on their Relations bar (i.e., an insult to their leader). Note that these DP penalties are not modified by the permanent Diplomacy Point modifiers listed on Table 11-2. Also note that the penalty for the Temporary Peace modifier for suffering damage in war (as explained later) is not included in this calculation.

For example: Let's say you're dealing with an Honorable Human leader, so your Core Reaction starts at +17 (+7 for Relaxed relations and +10 for their being honorable). On the turn you first meet them, you ask them four times for a nonaggression pact, and four times they refuse you. While all the other temporary modifiers have been reduced to -40 (including the Temporary Diplomat Gone modifier, which means that they're still patiently listening to you), your Temporary Treaty modifier is currently sitting

at -120. With that fourth failed request for a nonaggression pact, you just put a -10 Diplomacy Point hit on your Relations bar with the Human race, not subject to modification by the permanent Diplomacy Point modifiers.

Although this penalty rarely occurs, it can happen through stupid and reckless diplomacy on your part. Another occasion when this penalty usually occurs is when you threaten to attack another player, as explained later in this chapter.

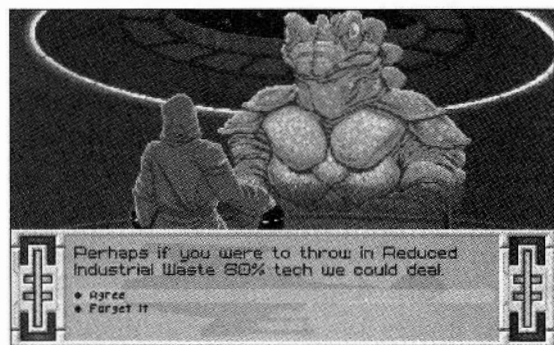
### **TEMPORARY MODIFIERS: THE HUMAN RACE'S ADVANTAGE**

Because of their canny diplomatic skills, the Human race receives a +60 bonus to all of their treaty, trade, and technology exchange temporary modifiers when offering these deals to other races. This bonus does not affect the Temporary Diplomat Gone modifier, nor does it lower the minimum current diplomatic level required with another race before they will accept certain agreements (see below).

### **COUNTEROFFERS**

Occasionally, you'll entreat alien leaders, who will say neither "Yes" nor "No" to your proposal. Instead, they will make you a counter offer, as shown in Figure 11-3. When this happens, the first thing they'll do is look for some random piece of technology that you have that they don't, and they'll ask you for it. If you give it to them, they'll accept your original offer; if not, they'll reject it.

Only if you don't have a technology that they haven't got will they consider taking a cash inducement instead. The amount they'll want is equal to the sum of two d8 rolls, times the game turn number (with the result rounded down to



**Figure 11-3**

A counteroffer being made to your proposal

the nearest whole 25 BCs). If you don't have that much money in your Interplanetary Reserve Fund, they will make no counteroffer and simply reject your original proposal instead.

For example, on turn 33, an alien leader decides that your latest proposal is almost, but not quite, acceptable. Therefore, he needs you to sweeten the deal. First, he'll peruse your technological discoveries. On discovering that he has everything that you do, he considers a cash bribe. In his mind, he rolls two 8-sided dice and adds the results together (the average result will be 9, so let's assume that is the outcome for the sake of this example), and multiplies that sum by the game turn number that, in this case, is 33. Well, 9 times 33 is 297, so the bribe amount he'll require is 275 BCs (297 rounded down to the nearest 25 BCs). If you have at least that amount in your reserve, he'll ask you for it. If not, he won't even bother and will simply reject you out of hand.

The moral is the following: Before entering into a parlay where you really want the other leader to accept your offer, check to make sure that you have a technology they haven't got. If

not, have plenty of BCs in the bank in case they demand a bribe to accept your offer. Money in the bank to draw on for these little diplomatic palm (claw?) greasing emergencies could make all the difference in the galaxy...

## THE OATH BREAKER PENALTIES

Every time one player breaks a treaty with another, whether a peace treaty, nonaggression pact, alliance, or trade agreement, they will be remembered by the aggrieved race as an oath breaker and suffer a double penalty in both the long and short term. First, they must endure a permanent, cumulative -5 modifier to the offended player's Core Reaction toward them. Second, they will suffer an immediate drop of three levels (i.e., -36 DPs) on the offended player's Relations bar. Think long and hard before you go around breaking treaties, friend, and be careful not to break any by accident.

## YOU CAN SAY "No," Too

If you reject a computer player's offer or counteroffer, there is seldom a direct diplomatic penalty to you. The rejected computer player's temporary modifiers with you will increase in the same manner that yours would (so it may be a few turns before they broach that subject with you again). All you really lose is whatever benefits you might have gained by accepting their proposal, so don't be shy about giving them the thumbs down when you want to.

## THE AUDIENCE MENU: DECISIONS, DECISIONS

The way to formally initiate diplomacy with other races is to seek an audience with them. This is done through the Races Display screen, by selecting the Audience button. Place the

“Who?” cursor over the picture of the leader with whom you wish to parlay, and click the left mouse button. After a greeting message, which suggests that leader’s personality and current attitude toward you, the Diplomatic Options menu appears as shown in Figure 11-4. At this point, you’ve taken the diplomatic initiative and are ready to discuss whatever you want to with them.

## THE PROPOSE TREATY OPTION

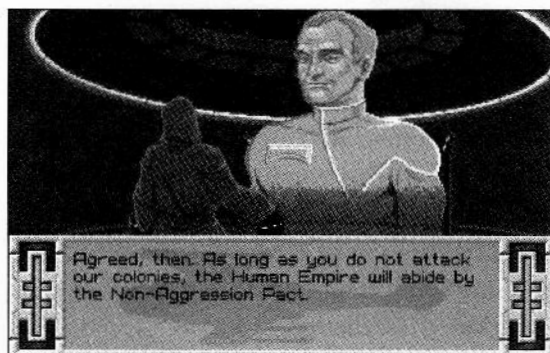
The first of your diplomatic options, Propose Treaty, lets you ask for agreements that improve their relations with you, or allows you pressure them into degrading their relations with another player, as shown in Figure 11-5. Let us explain the subtleties of getting each proposal accepted, and the exact effect it will have.

## NONAGGRESSION PACT

An alien leader will accept a nonaggression pact only if your current relationship with them is at least +15 DPs on their Relations bar (i.e., Relaxed or better). With this condition met, the chance that they will accept a nonaggression pact when asked is based on the sum of

their Core Reaction, plus their current Temporary Treaty modifier, plus a random d100 die roll.

If that sum equals or exceeds 75, they accept your nonaggression pact offer outright. If it is between 50 and 74, they will make you a counteroffer. If you lack what they want for a deal sweetener or decline their counteroffer, or if the sum is 49 or less, they reject your offer.



Once a nonaggression pact is in place, you have mutually agreed neither to send ships or transports to each other’s colonies nor to engage in starship combat in systems containing uncolonized or third player-owned planets (instead, your ships will peacefully coexist

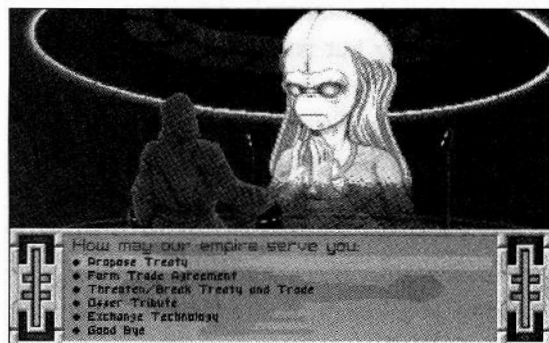


Figure 11-4

The Diplomatic Options menu

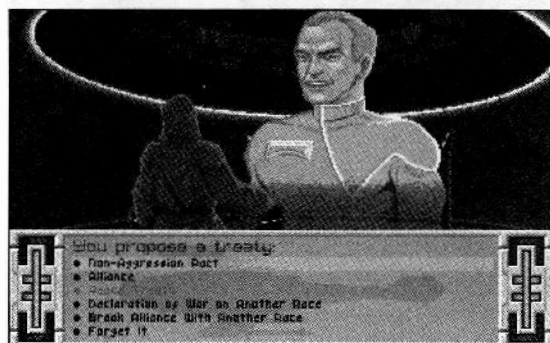


Figure 11-5

The Propose Treaty menu

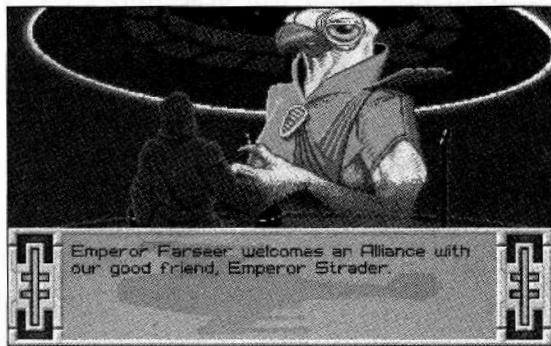


there). The down side to a nonaggression pact is that you are not able to keep "your friend" from landing colony ships on uncolonized or third player-owned planets that you're currently garrisoning. However, a nonaggression pact increases your Relations bar by +20 Diplomacy Points, plus a random +1 to +3 DPs per turn, subject to the permanent DP modifiers (see Table 11-2).

## ALLIANCE

Alien leaders will accept an alliance only if your current relationship with them is at least +50 DPs on their Relations bar (i.e., Affable or better). With this condition met, the chance that they will accept an alliance when asked is based on the sum of their Core Reaction, plus their current Temporary Treaty modifier, plus a random d100 die roll.

If that sum equals or exceeds 125, they accept your alliance offer outright. If it is between 100 and 124, they will make you a counteroffer. If you either lack what they want for a deal sweetener, decline their counteroffer, or if the sum is 99 or less, they reject your offer.



Once an alliance is in effect, you have mutually agreed not to attack each other. You may also freely base at each other's colonies and use

them for ship refueling purposes. This allows both of you to count your ship's ranges from each other's colonies as well as your own. Computer players are obliged to vote for their allies at Galactic Council meetings (although you are not so obliged, see Chapter 4).

Computer players always ask their allies to fulfill the mutual defense clause that is a de facto part of every alliance. In other words, they'll ask you to declare war on their enemies. You, too, may ask your allies to fulfill this obligation and declare war on third parties with whom you're at war.

Computer players will always declare war to support you but there is a 75 percent chance that they will demand, in exchange, some technology you have that they lack. If you have no such technology, or refuse to give it to them, then they will callously reject your pleas for their assistance. (Hey, you can always ask again.)

When you become allies, your relations with that race will immediately increase by +20 Diplomacy Points, plus a random +1 to +6 DPs per turn, subject to the permanent DP modifiers (see Table 11-2).

## PEACE TREATY

If a war is really looking bad for you, or if you are persevering but want to end the wasteful destruction and concentrate on building up your economic and political position, then sue for peace. The Temporary Peace Treaty modifier, however, has two additional modifiers. Added to it is a positive number equal to the damage you inflicted on them since this state of war between you began, and a negative number equal to the damage they've inflicted on you. These damage modifiers are cumulative throughout the duration of war between you,



and they are reset to 0 once you establish a peace treaty.

Table 11-6 lists the exact damage values. These values have opposite effects, depending on whether you're at war or peace. In other words, while at peace, the damage you inflict is subtracted from their Relations bar with you; during war, the damage you inflict is added to your chance to secure a peace treaty. Therefore, the best time to get a peace offer accepted is after time has removed any temporary negative modifiers from past rejections and other parleys (such as offering tribute) and, preferably, right after you've just conducted a particularly devastating attack (i.e., you can guess that you're one up on them in the damage modifier department).

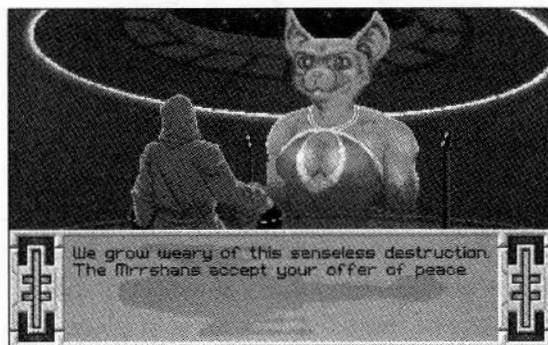
Note that all glory is fleeting. This means that, because these damage modifiers (yours and the enemy's) are calculated in with the Temporary Peace Treaty modifier, success or failure in war will be gradually negated as this variable inexorably moves 10 points per turn back toward 0. Thus, a lull in the fighting allows the losing side to recover (politically, as well as economically and militarily) from a disastrous campaign, while the winning player's Temporary Peace Treaty modifier advantage fades away.

### GETTING A PEACE TREATY ACCEPTED

Alien leaders will accept a peace treaty no matter the status of your current Relations level with them (thank goodness). The chance that they will accept a peace treaty when asked is based on the sum of their Core Reaction, plus their current Temporary Peace Treaty modifier (including the additional modifiers for war

damage inflicted and suffered), plus a random d100 die roll.

If that sum equals or exceeds 0, they accept your peace treaty offer outright. If it is between -25 and -1, they will make you a counteroffer. If you either lack what they want for a deal sweetener, decline their counteroffer, or if the sum is -26 or less, they reject your offer.



### PEACE TREATY EFFECTS

When a peace treaty is accepted, your Relations bar with that player immediately shifts by +40 Diplomacy Points, subject to the permanent DP modifiers (see Table 11-2). That computer player's spies within your empire will go into hiding and their spy wars warning count with you is reset to zero (see Chapter 12). Furthermore, they will not send any more ships and transports to your colonies for the duration of the peace agreement. A peace agreement's duration of enforced peace is between 8 and 15 turns, determined randomly (i.e., it is not modified by game difficulty or leader personalities). Of course, ships already en route are another matter entirely (see "The Inertia Factor," below).

Naturally, computer players expect reciprocating behavior from you. If your spies are

identified as succeeding in a mission against that player, or if your ships or transports show up at their colonies during this period of enforced peace (although you can't be certain exactly when it ends) and destroy even the slightest thing of theirs, you will instantly suffer an oath breaker penalty and end this era of enforced peace. Therefore, to keep the peace, place your spies in hiding lest they be caught, and don't attack that player for any reason until you no longer find the peace treaty convenient.

### THE INERTIA FACTOR

Getting a peace treaty or nonaggression pact signed does not instantly resolve a hostile situation between two races—it merely bodes well for their long-term future. Sometimes, shortly after one of these two treaties is in place, one side or the other will see their ships and/or land transports arrive at another player's colony, fight there, and possibly even capture it. Believe it or not, if a computer player does this, it is not technically a direct violation of the new treaty. Instead, it is merely an aftereffect from your pretreaty state—something we call the Inertia Factor (or the big IF).

What this Inertia Factor represents is the amount of time it takes a player's fleets and transports to arrive at their destinations. Because you can't recall them en route (unless you have the level-34 computer technology of Hyperspace Communications), once on their way, they will plod along through space until they arrive at their prechosen destination—a destination that may well have been set with a war aim when those ships launched. Computer players at war are in *rampage mode* toward you, meaning that their war aim is to crush the

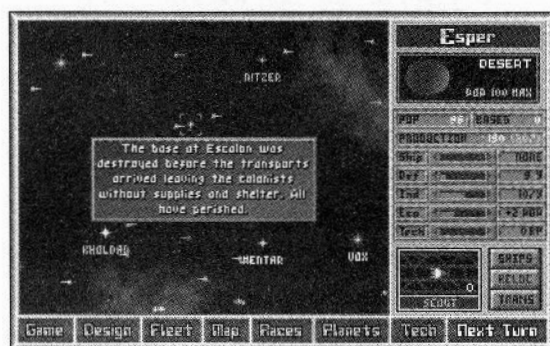
richest of your colonies (i.e., those with the most factories) that they feel they can safely attack (i.e., they are hell bent on causing destruction).

For example, last turn, your enemy launched a huge invasion armada at your colony. This turn, you establish a peace treaty (while trembling, no doubt, at their armada). However, their armada en route can't be turned back, so guess what? The Inertia Factor comes into play and, in a turn or two, when that armada stops by your colony to say hello, their warships won't attack you (they retreat without a space battle), but their transports will. Now, the computer player won't send over any more forces after an alliance or peace treaty is in place, but you still have to worry about transports en route when a peace treaty is signed.

Note that a nonaggression pact, once signed, may still allow your fleets to clash over each other's colonies, Inertia Factor or no. This is because computer players are in *expansion mode* (as opposed to *rampage mode*) at this time. Their aim in expansion mode is to establish new colonies on planets where they can raise the largest populations, including those other players might already own!

How you react to being attacked by an enemy fleet due to this Inertia Factor is up to you. You can run over to the Races Display screen and break your agreements with them or even threaten to attack, if you like. Conversely, you can just sit there and take it, knowing that it shouldn't happen again now that your new treaty is in place (although beware of computer players in expansion mode that see your stars as too nice not to try to take). In either case, there is no such thing as an oath breaker penalty for computer players hosing you. You must keep

track of your own grudges against specific computer players in your head, nurse them, and plot your revenge accordingly.



Computer players, on the other hand, are livid when they suffer attacks due to this Inertia Factor. (This is a primary reason wars between two computer players are so easily reignited shortly after they end.) Computer players do not consider or even understand the Inertia Factor. Instead, they translate Inertia Factor incidents as immediate and deliberate breaking of their new treaty, complete with assigning an oath breaker penalty.

Note that you can always have your combat ships retreat without firing at computer players, thus avoiding an incident. This is because you must actually destroy something of theirs to violate a treaty. When your space marines are en route to an enemy colony, however, don't even bother offering or accepting a new peace treaty or nonaggression pact until after they land, lest the Inertia Factor quickly rob you of that treaty's benefits and plunge you deeper into war. After all, you can't recall transports unless you have Hyperspace Communications and, once they get to a colony, they automatically try to land on it.

Finally, alliances are not subject to the Inertia Factor. Allied ships cannot fight each other and, if one side sends transports to the other's colonies, those transports will simply disappear (poof!) on arrival while the alliance is in effect. Also, under a peace treaty, a computer player's ships sent over by way of the Inertia Factor will automatically retreat before combat once they arrive at your colonies, without ever appearing on the Combat Display screen. Their transports arriving due to the Inertia Factor, however, will automatically assault the planet (only allied transports can pull that disappearing stunt).

## DECLARATION OF WAR ON ANOTHER RACE

If you ask an ally to fulfill its treaty obligation to declare war on those with whom you're at war, they automatically accept your proposal but, 75 percent of the time, they'll demand a technology bribe of something you have that they don't in exchange. If you have no such technology, they simply reject your proposal. If you refuse to pay this bribe, you won't lose any Diplomacy Points with them, but they won't declare war for you, either.

Aliens not allied with you will declare war on another race at your behest only if your current relationship with them is at least +19 DPs (i.e., Amiable or better). With this condition met, the chance that they will declare war on another race when you ask is based on the sum of their Core Reaction, plus their current Temporary Treaty modifier, plus a random d100 die roll.

If they do not have a nonaggression pact or alliance with a third-party race, and this sum equals or exceeds 150, they accept your offer

outright and declare war on the player you specified. If it is between 125 and 149, they will make you a counteroffer. If you either lack what they want for a deal sweetener, decline their counteroffer, or if the sum is 124 or less, they reject your offer.

If they do have a nonaggression pact or alliance with third-party race, then getting them to accept your offer is far more difficult. This sum must be equal to or greater than 250 for them to accept your offer outright and declare war on the player you specified. If it is between 225 and 249, they will make you a counteroffer. If you either lack what they want for a deal sweetener, decline their counteroffer, or if the sum is 224 or less, they reject your offer.

Chances are that you'll have more success at persuading them to declare war if you get them to break their nonaggression pact or alliance with another player as a separate action before asking them to declare war. This prelude diplomatic maneuver is an attainable first step. We recommend that you prefer this to simply going for the gusto and trying to get a computer player to stab his friend in the back for no reason.



The lesson here is that you have to be very friendly with someone to get them to consider

declaring war on another race. When that happens, of course, they will fight each other and, in turn, this will distract their attention away from you (at least for their war's duration). This is also a useful ploy before a Galactic Council meeting, to get leaders to vote against a particular candidate.

### **BREAK ALLIANCE (OR NONAGGRESSION PACT) WITH ANOTHER RACE**

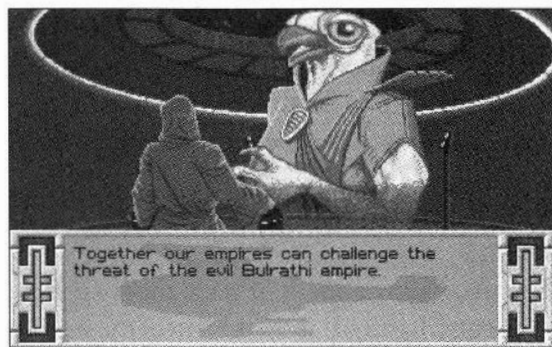
When this option is highlighted as a possible choice on the Propose Treaty menu, it means that that race has either an alliance or nonaggression pact with another player. If you choose this option, the menu that follows lists all of the players with whom they currently have either an alliance or nonaggression pact, but you can't tell which of these treaty types they have simply by looking at this list. Instead, you must back out to the Races Display screen and get a report on the race with which you're parlaying; this report lists all actual alliances. (By the way, there is no diplomatic penalty for failing to complete a parlay by breaking out before one side either accepts or rejects a proposal.) If a race is not listed there as a formal ally, but they appear on the Break Alliance with Another Race list, then you know that they lack an alliance and must, therefore, have a nonaggression pact with that race.

An alien leader will break its alliance/nonaggression pact with another race at your behest only if your current relationship with them is at least +19 DPs (i.e., Amiable or better). With this condition met, the chance that they will break their alliance/nonaggression pact with another race when you ask is based on the sum of their Core Reaction, plus their current



Temporary Treaty modifier, plus a random d100 die roll.

If that sum equals or exceeds 200, they accept your offer outright and break their alliance with the player you specified. If it is between 175 and 199, they will make you a counteroffer. If you lack what they want for a deal sweetener, decline their counteroffer, or if the sum is 174 or less, they reject your offer.



Note that it is harder to get a leader to break an alliance/nonaggression pact with another race than it is to get him to declare war on that same race after they do. (That says something about the galaxy you're playing in, doesn't it?) Once broken, it is often a good idea to follow up your success here by having them declare war on their former ally. With their treachery complete against that third-party alien race, you can bask in the glory of your duplicitous success, knowing that you got one race to be marked as an oath breaker by another, and that now they are busy fighting among themselves. You're a real Machiavellian Prince now.

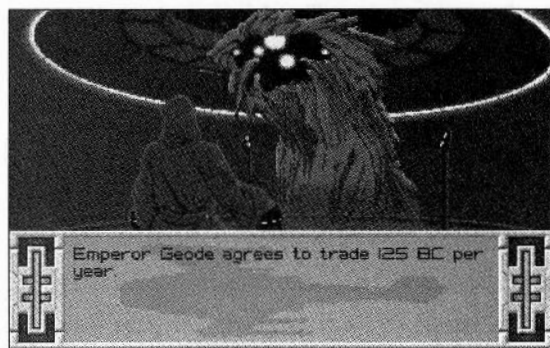
## THE FORM TRADE AGREEMENT OPTION

Your second diplomatic option is to form a new trade agreement, as shown in Figure 11-6.

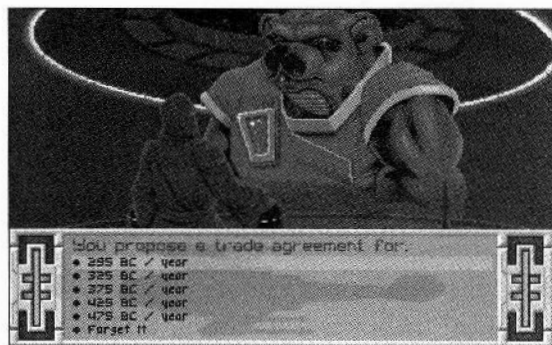
While trade is explained fully in Chapter 5, know that it is about the easiest agreement to establish with another race and, once in place, it will slowly improve your relations with them so that stronger treaties, such as nonaggression pacts and alliances, can be forged and technology exchanges can more easily be made.

An alien leader may agree to establish a new/expanded trade treaty with you, whatever his feelings toward you are on the Relations bar (provided you are not at war with him, of course). The chance that they establish/increase trade activity when asked is based on the sum of their Core Reaction, plus their current Temporary Trade modifier, plus a random d100 die roll.

If that sum equals or exceeds 100, they accept your offer outright and establish/increase their trade activity to the level you specified. If it is between 75 and 99, they will make you a counteroffer. If you lack what they want for a deal sweetener, decline their counteroffer, or if the sum is 74 or less, they reject your offer.



Besides the initial economic penalties and later economic benefits of trade (see Chapter 5), your relations with that race will increase by a random +1 to +6 Diplomacy Points per turn, depending on the trade amount established,

**Figure 11-6**

The Form Trade Agreement menu

subject to the permanent DP modifiers. Note that, unlike other treaties, trade agreements yield no DP signing bonus, just an improvement of relations over time.

The trade amount influences the per-turn Diplomacy Point gain from establishing trade based on size (yes, size matters) according to the following formula:

### **Per-Turn Diplomacy Point Gain through Trade Formula**

Each turn, trade will add a random 1 to X Diplomacy Points to that player's Relations bar, subject to the permanent DP modifiers.

$$X = \frac{1 + (\text{percentage of smaller trading partner's economy involved in trade})}{5}$$

The range of Diplomacy Point gain through trade is dynamic (i.e., its value for the purposes of DP gain is rechecked every turn). Today's 100-BC, maximum possible trade route might be below the minimum level after several turns of economic growth. Therefore, to get the fastest DP gain, you should make the largest trade

agreements for which you can afford the initial negative trade balance. Checking the Races Display screen from time to time and seeing if your trade routes can be enlarged is the only way to be sure you're keeping them maximized.

However, even at the lowest amount of trade you can select, you will gain +1 DP per turn. This will work fine until you hit +34 on the Relations bar, at which time the permanent DP modifier kicks in and that +1 DP is reduced and rounded down to zero. To gain any DPs through trade above +34 on a player's Relations bar, you'll have to make sure your trade routes with those players are above the minimum level.

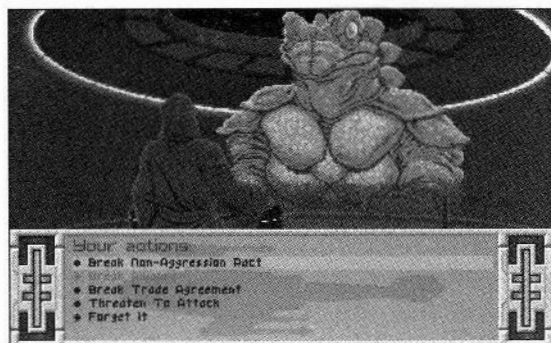
### **THE VARIOUS RANGES OF TRADE LEVELS**

The maximum amount of trade that two races can establish is equal to 25 percent of the smaller empire's gross production per turn. Each of the various, lower levels that might be offered represents either 20, 15, 10, or 5 percent of that amount. Note that all but the lowest trade amount offered are rounded down to the nearest 25-BC increment.

### **THE THREATEN/BREAK TREATY AND TRADE OPTION**

Next on the Diplomatic Options menu are the saber-rattling options through which you can break your current nonaggression pact, alliance, or trade treaty with that race, and/or threaten to attack that player, as shown in Figure 11-7. Selecting any of these choices should be done with care and only after carefully considering their various consequences.



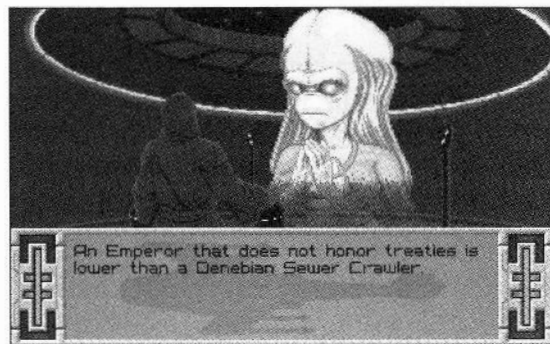


**Figure 11-7**

The Threaten/Break Treaty and Trade menu

### BREAK NONAGGRESSION PACT

Assuming you have a nonaggression pact established with this player, selecting the Break Nonaggression Pact option will put its effects to an immediate end. You will now attack each other freely at all enemy, friendly, and neutral stars.



You will immediately suffer a -12-DP penalty, subject to the permanent DP modifiers (see Table 11-2), and cease to get +1- to +3-DP bonus every turn for having a nonaggression pact in effect. Furthermore, because you broke the treaty, they will remember this as an oath breaker act, thus penalizing all your future diplomacy with them.

### BREAK ALLIANCE

Similarly, if you have an alliance to break, the Break Alliance option immediately ends its effects. A broken alliance does not reduce to a nonaggression pact. Once broken, all bets are off.



You will immediately suffer a -12-DP penalty, subject to the permanent DP modifiers (see Table 11-2), and cease to get the +1- to +6-DP bonus every turn for having an alliance in place. You can no longer trace ship ranges from each other's colonies and you will again fight each other wherever you meet. Furthermore, you will also receive an oath breaker penalty with your former ally.

### BREAK PEACE TREATY

Although it is not listed on the Diplomatic Options menu (or Diplomacy screen), you can break a peace treaty by committing any hostile actions while that peace treaty is in effect. A hostile action includes any violation of the peace, such as killing a single enemy ship, factory, or population point, any action that would brand you as an oath breaker (i.e., breaking an agreement), or any action that would cause the computer player to threaten you (as explained later in this chapter, but this includes being

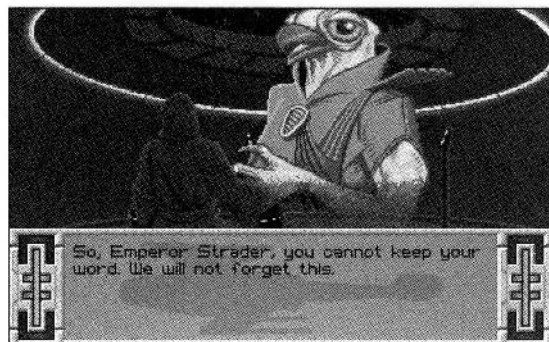
framed for another player's spying activity!). This will quickly deteriorate your relations with them, often back to war. There is no immediate Diplomacy Point penalty for breaking the peace, but because of it you will be remembered by that player as a treacherous oath breaker.

Peace treaties last a random number of turns (between 8 and 15), so if you want to start up a scrap with someone with whom you have a peace treaty, you might want to be patient with them so that you do not violate the treaty itself. Doing so inflicts an oath breaker penalty on you with that race.

Unfortunately, you will never know the exact duration of a peace treaty with another player, so you'll either have to wait the full 16 turns before attacking them again, or follow their lead if they attack you first. Once a peace treaty is ended, either by a new war breaking out or simply by expiration, you may freely attack the other race to the point of starting a new war, without the threat of suffering an oath breaker penalty for doing so.

## BREAK TRADE AGREEMENT

If you have a trade agreement to break, selecting the Break Trade Agreement option immediately puts an end to all trade that you have established with that player. Sometimes this can be useful, particularly when you have just agreed to a large trade amount and your economy cannot sustain the early trade deficits you'll suffer for it. Of course, if you had a profitable trade route going, there is really little point in breaking a trade agreement, except to spite the Human race's advantage if you are trading with them. (Humans receive more from trade than other players; see Chapter 13.)



Naturally, you will immediately suffer a -12-DP penalty, subject to the permanent DP modifiers (see Table 11-2), and cease to get the DPs every turn for having a trade agreement in place. Also, because you deliberately and separately ended the treaty (i.e., it was not broken as an additional consequence of declaring war), this is an oath breaking act, for which you will be remembered accordingly.

## THREATEN TO ATTACK

Now, this is an interesting option. By rattling your saber, you are hoping to elicit one of two potentially favorable responses. One gratifying response is to get them to cower before you and offer tribute in the face of your wrath. The other option you might be seeking is to provoke them into declaring war on you, thus saving you from the oath breaker penalty that would be incurred for declaring war on them, if you currently have a peace treaty, nonaggression pact, or alliance with that race. The other race always has a third option, unsatisfactory to you, and that is simply to ignore your blustering threats.

## COMPUTER PLAYERS RESPECT TOTAL POWER

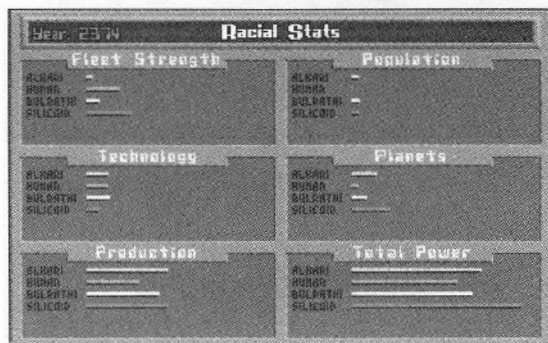
The key to their reaction to your threatened attack will be based on how much more total

power you have than they do. In the Races Display screen, if you select the Status button, the Racial Stats screen appears as shown in Figure 11-8 and, in the bottom-right graph, each contacted player's total power is shown by a colored line graph. Total power represents the sum of the other graphs on this screen; the formulas used to calculate the value of each graph are given in Chapter 15. The strongest player's line always goes all the way to the right, whereas the other players' shorter lines represent their percentage of the strongest player's strength.

When a threatened computer player compares your total power to its own, this will create a Relative Power variable ranging from +0 to +100. If your total power is less than or equal to theirs, this variable will be +0. It increases proportionally all the way up to the maximum of +100 if your total power is at least twice as great as theirs.

## HOW COMPUTER PLAYERS REACT WHEN THREATENED WITH ATTACK: APPEASEMENT

The way that an alien race will react when threatened by your attack is based on the sum

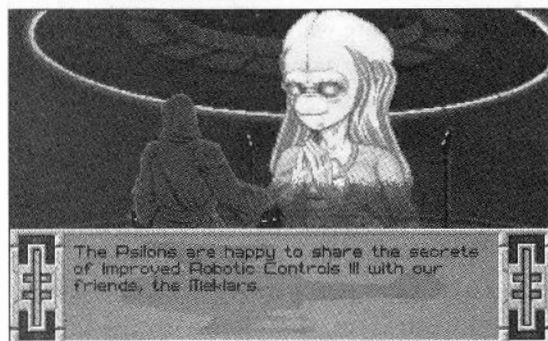


**Figure 11-8**

The Racial Stats screen, where contacted races can be compared, including their total power.

of the Relative Power variable, plus their leader's Personality modifier (see Table 11-4), plus a random d100 die roll.

If the result is 100+, they will appease you with a bribe. First, they will attempt to offer you a new technology. Basically, they'll foist off some randomly selected technology of theirs that (1) you don't already have and (2) that is at least 10 levels below their current technology level for the sector from which that item comes. Thus, you will never be bribed with their "latest, greatest" anything.



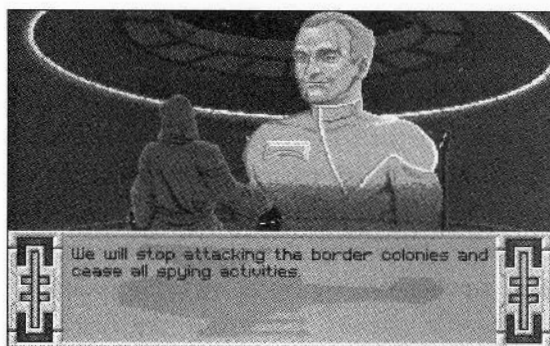
If they haven't got a technology for you that meets these criteria, then they will try to offer you a cash bribe. The amount is figured using the same formula that they would expect for a deal sweetener (i.e., the sum of two d8 dice, times the game turn number, rounded down to

the nearest 25-BC increment). If they just happen to have that amount in their reserve (and they often do; computer players are big on tax collecting and redistributing money through their global reserve banking system), they will offer it to you as a bribe. If they haven't got that kind of money in their reserve, they automatically shrug off bribing you and simply ignore you instead.

As you take a bribe, however, there is something important to keep in mind. Like being ignored, accepting a bribe still leaves a no war/no peace situation between your races. They are still free to declare war on you at any time (and may do so as early as next turn) and vice versa. Nothing has really been resolved.

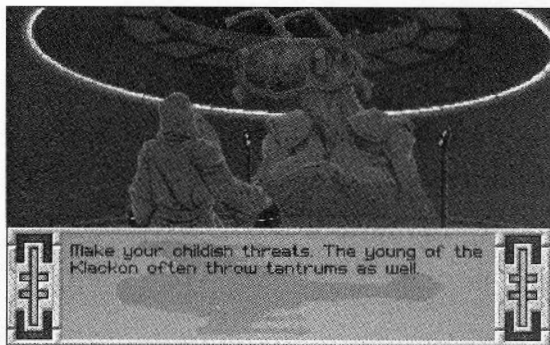
## COWER

If the result of their calculation is between 75 and 99, the computer player will cower. This causes a de facto peace treaty to be established between your races, complete with the immediate +40 Diplomacy Point signing bonus. In other words, their spies will go into hiding, they will cease to send ships and transports to your colonies for between 8 to 15 turns, and the warning count for their spy wars operations against you is reset to zero (see Chapter 12 for the poop on spying). If you violate this new peace treaty, they will consider you to be an oath breaker. If a peace treaty is not what you wanted from them, too bad. You're stuck with it now.

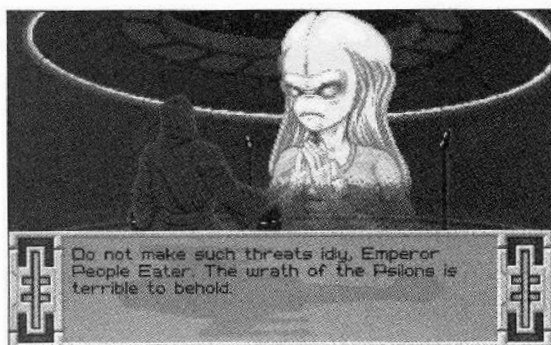


## IGNORE

If the computer player calculates a Relative Power variable between 25 and 74, they figure (often correctly) that you were bluffing and ignore your threat to attack. (You *were* only bluffing, right?) When this occurs, nothing extraordinary happens except for their usual upset that you even threatened to attack them in the first place (see below).

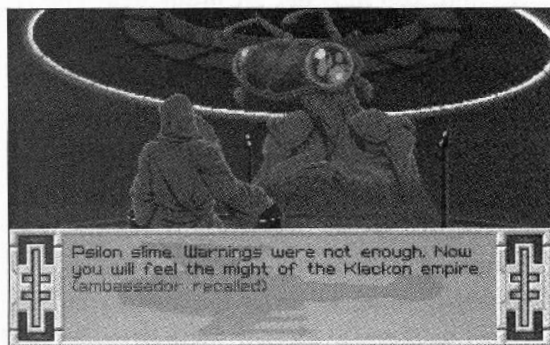






## DECLARE WAR

Finally, if they calculate a Relative Power variable of 24 or less, the alien race will decide not to take any more of your guff. They recall their ambassador and immediately declare war on you. Now, this may be part of a shrewd plan on your part to provoke them into declaring war on you, thus saving you from suffering any potential oath breaker penalties by declaring war on them if you currently had a peace treaty, nonaggression pact, or alliance in effect. On the other hand, this might just as easily be a bad case of *oops* on your part, with them taking your threat a bit harder than you'd hoped. Either way, brace yourself for a lot of shooting in the immediate future.



## HOW UPSET DO COMPUTER PLAYERS BECOME WHEN THREATENED?

Whatever their reaction, threatening to attack will usually end your parlay with that player and see them recall their diplomat for quite a while. This is because, if you threaten to attack another player, all of their temporary modifiers (as explained earlier) are adjusted by -50 points, including the Temporary Diplomat Gone modifier. In other words, computer players are not going to be available for extortion every turn. Remember, too, that for every 2 points any temporary modifier drops below -100, you suffer a -1-Diplomacy Point penalty at that instant as well.

Besides that potential Diplomacy Point penalty from excess negative temporary modifiers, a direct DP penalty is also immediately applied. Your threat will alter their Relations bar by -30 DPs, plus their Leader Personality modifier (see Table 11-4). For example, if you threaten a Xenophobic leader (with their -50-point Personality modifier), you'll see an instant adjustment of -80 DPs on their Relations bar! Therefore, threatening someone with whom your relations are already strained can greatly hasten a war between you, should it not cause one outright as their immediate reaction to your threat.

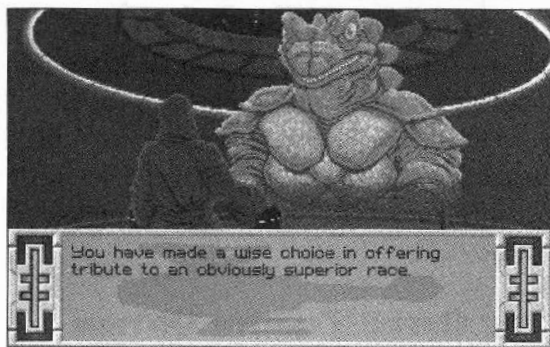
## THE OFFER TRIBUTE OPTION

If you wish to immediately affect your relations with another race in a positive way, offer them a gift (known as tribute), as shown in Figure 11-9. Bribes to curry their favor in this manner can come in two flavors: cash and technology. Each is discussed below.

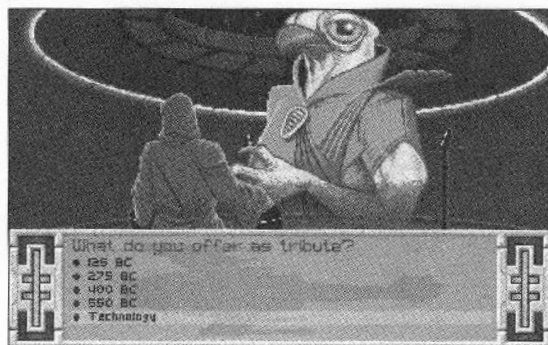
## CASH BRIBES

A cash bribe can be made only if you have at least 25 BCs in your Interplanetary Reserve Fund, because that is where the money comes from when paid, and 25 BCs is the minimum bribe level. (Already you should hear warning bells—this is an expensive way to do business, because you must collect 2 BCs in taxes for every 1 BC in this fund, as you learned in Chapter 5).

It is difficult to gauge accurately how much good a cash bribe will do you. The basic formula for that is their Relations bar will shift +12 DPs for every 100 percent of their current gross economy you offer as a cash tribute payment. Fractions and multiples of their current gross economic figure will divide and multiply that +12 DPs proportionally, with any fractional DPs rounded down. Thus, if you offer less than one-twelfth of their gross economic output as a bribe, you won't even earn a single DP from your meager offer of tribute.



Because you'll never know exactly how large their gross economic output is on a given turn, you'll have to guesstimate it by comparing your production graph with theirs on the Racial Stats screen. This is shown in Figure 11-8 and explained in Chapter 15. About the only way you can really gauge the effectiveness of your



**Figure 11-9**

The Offer Tribute menu

bribes is to see if you notice any movement of their love nub after they take your money.

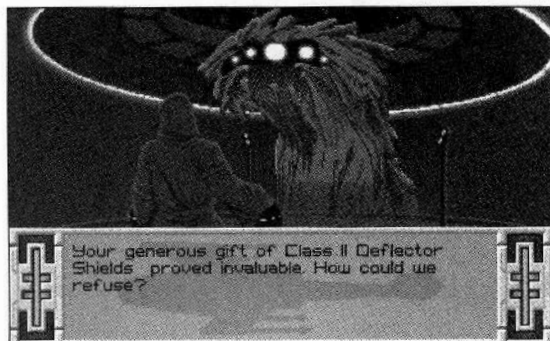
## TECHNOLOGY BRIBES

Giving technology as tribute has a double advantage. First, each technology you give another player as tribute adds a permanent +5 to their Core Reaction variable. The technology level or usefulness of your tribute to the giftee of your tribute doesn't matter when considering this bonus. Foisting off junk technology that you think will do them the least amount of good gets you this same +5 modifier.

Second, you also get an immediate Diplomacy Point gain on their Relations bar of approximately one level (i.e., 12 DPs). If the item you give them is equal to their current technology level in that sector, you'll receive 12 DPs. If the item you give them is proportionally higher or lower than their current technology level there, you will receive proportionally more or fewer Diplomacy Points. Therefore, if you're looking for a large, immediate DP shot in the arm from your technology tribute, you'll want to give your highest



technology item in their least developed technology sector.



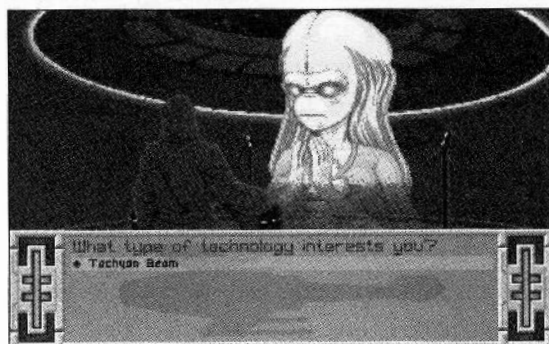
## THE EXCHANGE TECHNOLOGY OPTION

If you're not at war with them, an alien race will always be open to an offer for exchanging one of their technologies for one of yours. Any trade you work out, however, must get them a higher level technology item than they give. Note that they will never trade away their highest current technology item in any technology sector. (The galaxy ain't a fair place, kid.)

Assuming these criteria are met, you should know that all of the potential technologies that they are willing to trade, and what they will accept in return for each, are predetermined before you ever open the Exchange Technology menu. If you don't have anything of a sufficiently high technology level to interest them, or if they don't have something they'll part with that you need in return (and you can verify whether these conditions exist by checking out the Report screen to see which technologies they have; the ones you're missing will be highlighted in bright white letters), then they will simply reject your offer outright.

## MAKING YOUR CHOICES

If the above conditions are met, your first step is to select something from their predetermined list of what they will make available. Don't expect great things here, but you may find an important "filler" technology that was not on your Limited Research List (see Chapter 10).



After selecting a single item from their list of offerings (a list that might contain only one item), you must then decide what you will give them in exchange. Brace yourself, because your latest, greatest discoveries are usually what they'll demand in trade. However, the better the item you offer them in exchange, the better your chances are that they'll accept the deal. Why? Keep reading...



## THE UNFAIR TRADE ADVANTAGE VARIABLE

Consummating a technology exchange with you hinges on a new variable called their Unfair Trade Advantage. The amount of benefit you receive for their Unfair Trade Advantage ranges from +1 to +100, where the maximum of +100 is awarded if the technology you're giving them is at least twice as many Tech levels above the one you're accepting in return. Fractions of that double-Tech level maximum award a proportional Unfair Trade Advantage bonus. For example, if you were giving them a level-12 technology in exchange for a level-9 technology, you would receive a +33 Unfair Trade Advantage bonus because the item you're giving them is one-third as many Tech levels higher than the item you're getting in return. Where this fits in is explained in the next section.

## WILL THEY ACCEPT YOUR TECHNOLOGY EXCHANGE OFFER?

The chance that they will accept your technology exchange offer when asked to do so is based on the sum of their Core Reaction, plus their current Relations level; plus their Unfair Trade Advantage, plus a random d100 die roll.

If that sum equals or exceeds 100, they accept your technology exchange offer outright. If it is between 75 and 99, they will make you a counteroffer. If you lack what they want for a deal sweetener, decline their counteroffer, or if the sum is 74 or less, they reject your offer.

Because the d100 is rolled at the beginning of this process, its result, plus your current Relations level, is known before the potential trade items are listed. Using this information, the computer calculates all potential Unfair

Trade Advantage modifiers before listing which items it will trade away and which it will accept in return (noting any close-call trades that will require them to make a counteroffer before they'll accept it).

Therefore, the computer does not even list trades for your consideration that it has already rejected on the basis of the above formula. In other words, the list of exchangeable technologies, at the time you see it, is its preapproved trading list. At worst, you'll receive a counteroffer for the items you select to trade, depending on how large their Unfair Trade Advantage variable is. You'll never receive an outright rejection from a computer player once they post a technology exchange list.

## SMART HORSE TRADING

Although computer players will trade only when they are coming out ahead in Tech levels, occasionally they are rubes—so take advantage of them. For instance, they might accept from you a lower level of Industrial Technology, Terraforming, Controlled Environment technology, ship range, Improved Robotic Controls, Planetary Shields, and so on, than their current best. In other words, it will not provide them any other benefit than to raise their Tech level by one in that item's sector. Because they will gain fewer benefits, you should always consider trading them these technologies. Similarly, whenever computer players will accept Hyper-space Communications from you, trade it to them without hesitation (see Chapter 15).

## A SUMMARY OF DIPLOMATIC ACTIONS

Now that we have thoroughly examined your diplomatic options (summarized in Table 11-5),

**Table 11-5** A Summary of Diplomacy Actions<sup>a</sup>**Your diplomatic actions**

Option You've Selected	Minimum DPs to Ask	Temporary Modifier Used	Diplomacy Die Roll <sup>b</sup> Results			Notes
			Accept	Counter offer	Reject	
Nonaggression	+15 (Relaxed)	Treaty	75+	50 to 74	<50	+20 DPs, and +1 to +3 DPs per turn
Alliance	+50 (Affable)	Treaty	125+	100 to 124	<100	+20 DPs, and +1 to +6 DPs per turn
Peace treaty	-100 (Feud)	Peace	0+	-25 to -1	<-25	+40 DPs, and 8 to 15 turns of enforced peace
Declare war	+19 (Amiable)	Treaty	150+	125 to 149	<125	If no pact/alliance with victim
Declare war	+19 (Amiable)	Treaty	250+	225 to 249	<225	If they have a pact/alliance with victim
Break alliance						
with another race	+19 (Amiable)	Treaty	200+	175 to 200	<175	Also breaks pacts between computer players
Trade	-100 (Feud)	Trade	100+	75 to 99	<75	Cannot be at war; +1 to +5 DPs per turn
Exchange technology	-100 (Feud)	UTA <sup>c</sup>	100+	75 to 99	<75	
			Appease	Cower	Ignore	War
Threaten to attack	-100 (Feud)	Total power	100+	75 to 99	25 to 74	<25 -30 DPs + Personality modifier
Current Agreement			Notes			
Break Pact	Pact		-12 DPs; oath breaker			
Break alliance	Alliance		-12 DPs; oath breaker			
Break trade	Trade		-12 DPs; oath breaker			
Break peace treaty	Peace treaty		oath breaker (not an option, per se)			
Cash tribute	n/a <sup>d</sup>		+12 DPs per 100 percent of their gross economy offered			
Technology tribute	n/a		+6 DPs; +5 to their permanent Core Reaction toward you up to a maximum of +30			
Oath breaker effect	Any		-36 DPs; -5 to their permanent Core Reaction toward you, cumulative, without limit			

**Computer player diplomatic actions**

Option They've Selected	Current Agreement	Notes
Break agreement with another race	Any	They have an offer to make, but won't while you're friends with their enemy
Trade	n/a	They will always offer the maximum possible trade amount
Honor alliance	Alliance	Either declare war on their enemy or break alliance with them
Threat	n/a	Raises Spy Wars level (see Chapter 12); negated by an atta boy; two warnings in a row is war.
Atta Boy	n/a	Negates an outstanding warning, if one exists

<sup>a</sup>"Pact" means nonaggression pact.<sup>b</sup>Diplomacy die roll results are usually the sum of the listed temporary modifier, their Core Reaction, and the result of a d100 die roll.<sup>c</sup>UTA, Unfair Trade Advantage.<sup>d</sup>n/a, Not Applicable.

it's time to explore the hidden motivations behind the computer player's diplomatic initiatives.

## COMPUTER PLAYER'S DIPLOMATIC INITIATIVES

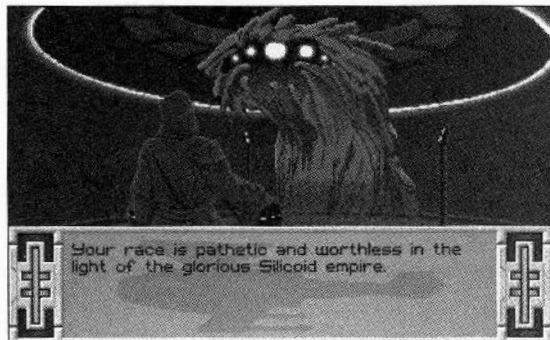
When you select Next Turn from the Control screen, during step XIV of the sequence of play (see Appendix A), all computer player-initiated diplomacy is conducted. Basically, computer

players have every diplomatic option open to them that you do (as described above) and their chance to succeed or fail is based on the same criteria. It is here that they will contact you (and each other, although you won't see that) and try to form and break agreements, threaten to attack, declare war, ask you to break alliances with third-party races, and offer technology exchanges or even peace treaties.

Many diplomatic messages will appear on your screen at this time. The following is a comprehensive listing of them all, along with some information about why the computer player is making that particular offer/announcement. It is important to note the wording used in these messages. You can usually infer from their tone what your present diplomatic relations are with that race, as well as their leader's personality type.

### ACKNOWLEDGE CONTACT

When you first establish contact with another race, they never fail to announce it immediately. If you reestablish contact after it has been broken, that will not be announced (you'll have to check the Races Display screen).



### WHAT THEY ASK OF WHOM, AND HOW OFTEN: THE ASKING CHECK

Computer players are busy little diplomats. They will make an *asking check* with every player with whom they're in contact, on every potential diplomatic subject available to them, on every turn. These asking checks are made on the basis of the following standard formula:

### Standard Computer Player Diplomacy Asking Check Formula

Their Core Reaction to that player

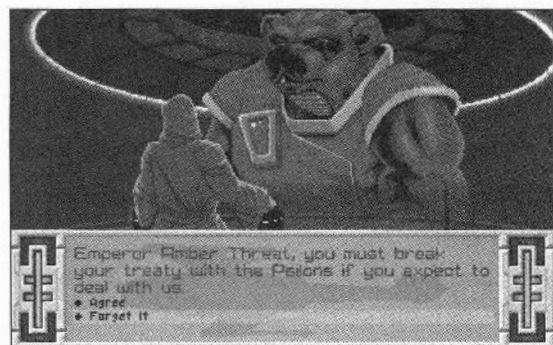
- + their own temporary modifier for that diplomatic area
- + double their leader's Personality modifier (as per Table 11-4)
- + the result of a d100 roll
- + the Game Difficulty Level modifier (applies to every diplomatic option except for deciding to declare war): the Game Difficulty Level modifier is a bonus added to the Asking Check Formula. Specifically, it is +50 percent at the simple level, +40 percent at easy, +30 percent at average, +20 percent at hard, and +10 percent at impossible

By now, looking at the above formula should shine some light on why computer players make certain diplomatic arrangements with each other. With these numbers in mind, you'll start to see the sense in their diplomatic affairs.

### THE CONDOM OF DIPLOMATIC INTERCOURSE

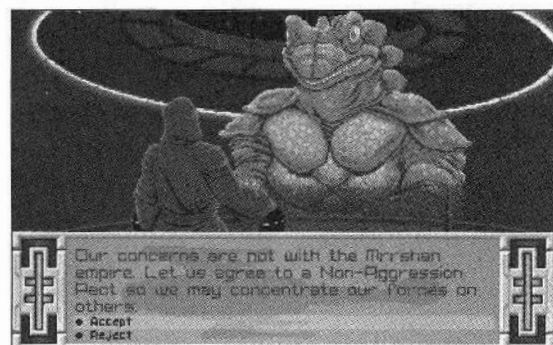
Occasionally, you will be told by a computer player that before you can deal with them, you must break your alliance with some third party. This means two things. First, they have an immediate offer waiting for you. Second, they are at war with that third party and won't present their offer to you until you cease to be the ally of their enemy. Sadly, there is no way of knowing exactly what their offer is in

advance. If you accept their condition and break your alliance with that third party, you'll also incur an oath breaker penalty with them, of course.



Note that this is a 100 percent guaranteed blocker of diplomatic intercourse (initiated by the computer players) until the two computer players patch things up with a peace treaty or you break the alliance.

### OFFER A NONAGGRESSION PACT



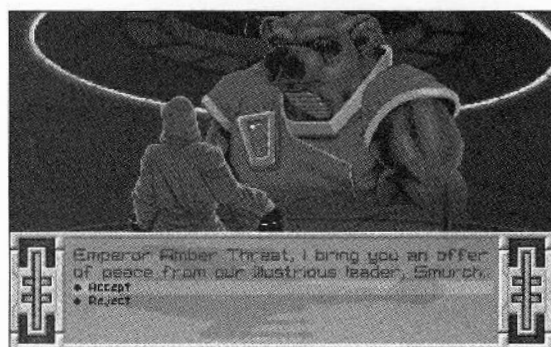
If a computer player's relations with another player are at least +7 (i.e., Relaxed or better), then they will make an asking check on this subject. If the result is +50 or greater, they will offer that player a nonaggression pact this turn.

### OFFER AN ALLIANCE

If a computer player already has a nonaggression pact with another player, and their current relations are at least +50 (i.e., at Affable or better), then they will make an asking check on this subject. If the result is +100 or greater, they will offer that player an alliance this turn.

### OFFER A PEACE TREATY

If a computer player is at war with another player, then they will make an asking check on this subject. If the result is +50 or greater, and they get a 1 on a d8 roll, they will offer that player a peace treaty this turn. This second condition means that, on average, computer players offer peace only about once every eight turns. Because they are so rarely offered, this makes computer player peace treaty proposals even more compelling to accept.

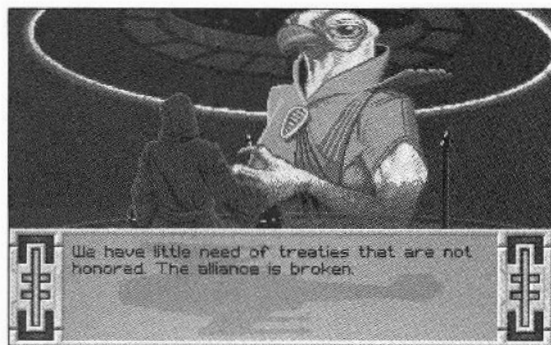
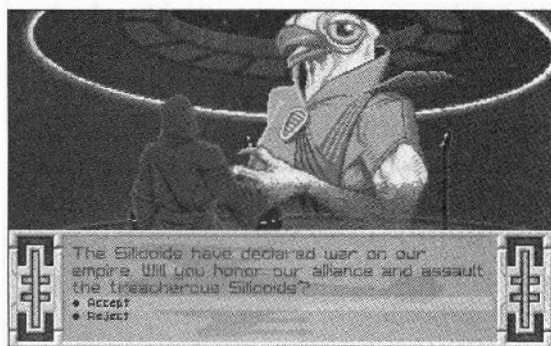


### ASK ONE PLAYER TO FULFILL ITS ALLIANCE OBLIGATIONS AND DECLARE WAR ON ANOTHER RACE

On the turn after they find themselves at war with someone, computer players always demand that their allies fulfill their treaty obligation and



take sides in the conflict by declaring war on their newly acquired enemies. Refusal means breaking that alliance and being remembered by them as an oath breaker. Note that one little war between two players can occasionally have a domino effect as each participant asks their allies to join in the fray, who then ask their allies to join, and so forth (shades of World War I).



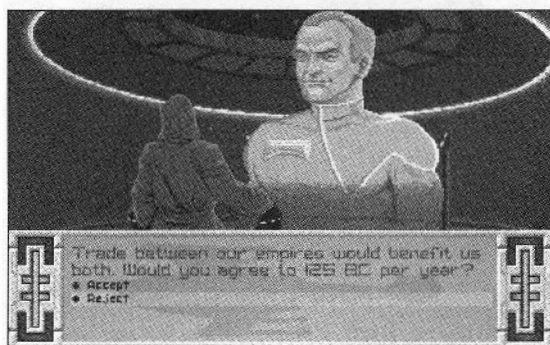
When asked by an ally to declare war on its enemies, consider the matter very carefully. Choosing between either starting a war or breaking an alliance is seldom a pleasant choice, but how you extricate yourself from the horns of this dilemma says a lot about you as a diplomat. Remember, computer players never ask you to declare war on another race merely to stir up

trouble between you and that other race (like you can and will do). Unlike you, they must be at war with someone to ask you to join in the fight against them.

Now, those two might be fighting a real blood-and-guts war or a phony war. In the latter case, you might find yourself doing all the fighting while your ally quickly cuts a separate peace treaty. It could happen!

## OFFER TO ESTABLISH/INCREASE TRADE

If a computer player is not at war with another player, or is not currently trading the maximum BCs that they could with another player, then they will make an asking check on this subject, using the result of a d150 roll instead of the standard formula's d100 (see "The Form Trade Agreement," on page 237). If the result is 50 or greater, they will offer that player a trade agreement for the maximum amount that those two races could be trading (i.e., 25 percent of the smaller empire's gross income). As you can see, computer players are very big on trading with each other.





## **OFFER TRIBUTE**

Computer players never offer tribute. When they give you something, which will occasionally happen, it will be the direct result of some action on your part. Largess is not in their programming.

Occasionally, however, after you accept an offer from a computer player, if you look you will notice an unannounced infusion of cash into your reserve. This was the computer player “sweetening the deal” without telling you. When this happens, smile—you just got lucky.

## **EXCHANGE TECHNOLOGY**

If a computer player is not at war with another player, they will make an asking check on the possibility of exchanging technology. If the result is 125 or greater, they will offer that player a technology exchange. Note that they will never trade away their highest current technology item in any technology sector, even when they take the initiative and come knocking on your door, looking to trade a technology.

## **OFFER ADDITIONAL REWARDS FOR ATTACKING THOSE WITH WHOM THEY'RE AT WAR**

If one race is at war with another race, and a third party is not, and the first race has a technology that that third party doesn't, and that technology is at least 10 levels below the third party's Tech level in that sector, the first race will make an asking check with that third party on the subject of enlisting their aid in attacking their enemy. If the result is 100 or greater, they will offer that third party a free, randomly selected, qualifying technology if the third party inflicts 30 points of damage (see Table 11-6) on the target race. This offer expires when the

player offering it is no longer at war with the target race and, sadly, you do not have this same option to offer computer players.

## **THREATEN YOU WITH NOTICE OF YOUR DETERIORATING RELATIONS**

Whenever you have committed an act that reduces your Diplomacy Point level with another race (and many of these are covered in “Specific Actions That Affect Diplomacy Points,” on page 255), there is a chance that they will notify you of their concerns about your deteriorating relations. Each turn, for every net Diplomacy Point their Relations bar drops, there is a 2 percent chance that they will mention it to you. Thus, if you dropped 8 DPs this turn, there is a 16 percent chance that they will send you a message warning you about your deteriorating Relations level.

This notification is, in fact, a bona fide threat from them and should be taken very seriously. Basically, you get only one threat by that race and still remain at peace. If there is already a threat from that race currently outstanding, and the above conditions for a threat are again met, you will not receive a second threat. Instead, the aggrieved player will declare war on you. In other words, two strikes and you're out.

## **NEGATING THREATS**

Fortunately, there is a way to negate a single, outstanding threat by another race. To do this, you must achieve an *atta boy* from them (as explained in “Give You an Atta Boy,” on page 252). Unfortunately, you cannot save up *atta boys* to negate future threats from that race, but they're great for dealing with a single threat that is currently outstanding.

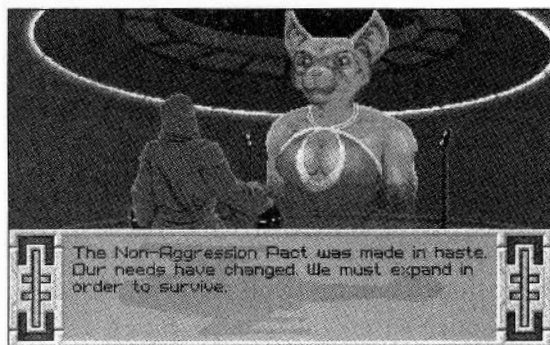
## THREATS AND COMPUTER PLAYER'S SPY WARS

Threats are also remembered by computer players for purposes of escalating their spy wars campaign against you. After the first threat, the next two each increase the chance that computer players will conduct sabotage, rather than espionage, against you. This threat count is reset to zero, however, when the two of you enact a peace treaty. See Chapter 12 for details on computer player spying operations.

## BREAK A TREATY

If a computer player decides to threaten someone (see above), there is a 50 percent chance that they will also break any outstanding treaty and trade agreement that might exist between them. If this happens to you, the threat will take on a "We need to expand" tone, or another similar treaty-breaking message will be presented. When this happens, remember that they are not only breaking treaties, they are also issuing you a threat.

Treaty breaking in this manner is a true act of betrayal on the computer player's part. The victim's Temporary Diplomat Gone modifier with the back-stabbing computer player is adjusted by -200 points. This means that they won't be available to talk to for several turns. Fortunately, it does not cause any DP penalty in addition. Note that, at the simple and easy difficulty levels, computer players will never break a treaty with you. They remain free to break them with each other, however.



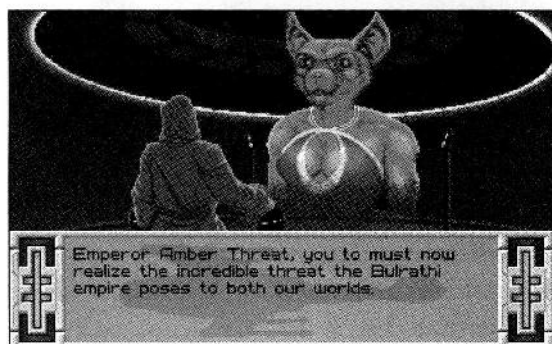
## GIVE YOU AN ATTA BOY

Occasionally, you'll receive an atta boy message. These are earned using the same 2 percent chance per net Diplomacy Point shift formula as for a warning message (see "Threaten You with Notice of Your Deteriorating Relations" on page 251), but are based on DPs gained that turn, rather than lost. Therefore, if you netted a gain of 11 DPs with a race that turn, you'd have a 22 percent chance of receiving an atta boy message from them. The value of an atta boy message is to grant absolution for an outstanding threat that you might have earned from that race.

One type of atta boy missive is of the "vile Bad Guys are our mutual enemy" ilk. This means that you have received sufficient points for destroying stuff (according to Table 11-6) belonging to a race with whom the atta boy giver is at war to earn their praise. (See "Causing Convention Death and Destruction" later in this chapter for the explanation of the exact formula for earning these points.)

Also along the atta boy lines are messages akin to "Trade has greatly reduced the tensions between our two races," or "We're pleased with

your voting at the Galactic Council.” This tells you that some diplomatic accomplishment of yours has racked up enough positive DPs that turn to get noticed. No matter how it’s framed, an attabo message is a good thing.

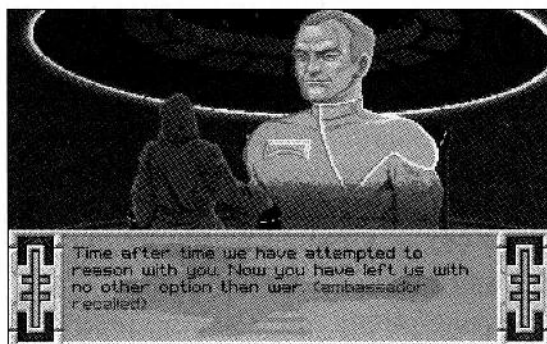


## DECLARE WAR

Certain circumstances will cause a computer player to declare war on someone, usually with the proviso that they are not currently under an enforced, postpeace treaty truce with that player. These reasons are conveniently listed and explained in the following sections. These should answer the question “Why me?” the next time you’re attacked by a computer player.

## THEY SIMPLY HATE SOMEONE’S GUTS

When a race’s Relations bar drops to -90 DPs or below (i.e., Feud), a declaration of war will follow. If a peace treaty is currently preventing them from declaring war on you under these circumstances, you’d better improve relations with them quickly, before it expires.



## THEY’VE ISSUED THEIR SECOND CONSECUTIVE THREAT TO THAT PLAYER

As previously explained, two consecutive threat messages, without an attabo message between them, results in the second threat becoming a declaration of war instead.

## THEY ARE REACTING TO A PLAYER’S THREATENED ATTACK

As previously explained, when one player threatens to attack another, the threatened player might respond with an immediate declaration of war. In this case, not only won’t an outstanding peace treaty with the threatening player prevent them from declaring war, but the threatening player, not the player who was threatened, will get hit with an oath breaker penalty. This is because a bully who threatens someone with whom he already has a treaty is a particularly treacherous so-and-so who deserves it.

## THEY WERE ATTACKED FIRST

Certain acts of war against computer players will automatically provoke their declaration of war against the aggressor. These specific acts of war include killing 10 or more of their

population points in a single attack (either due to bombardment or ground battles) or forcefully changing the status of one of their colonies either by conquering or destroying it (no matter how many people were killed in the process).

### THEY HAVE A LARGE FLEET SUPERIORITY

Computer players with a military superiority will, naturally, tend to use it (which makes them behave very much like we do, doesn't it?). They will declare war on a weaker race when they have an advantage in terms of Fleet Strength ratio, which is based on the game's difficulty level. These Fleet Strength ratios are as follows: 3:1 at an impossible level, 4:1 at hard, 5:1 at average, 6:1 at easy, and 7:1 at simple. The same ratio will be used when computer players consider declaring war on each other for this reason, as well as when they size *you* up.

Calculating Fleet Strength ratios is easy: each noncolony ship design is worth 1 for a small-hulled ship, 2 for medium, 3 for large, and 4 for huge. To get a reading on comparative Fleet Strength ratios, you must again consult the Racial Stats screen, as shown in Figure 11-8. The upper-left graph shows every contacted player's relative Fleet Strength, and you can eyeball their ratios from that graph. (Chapter 15 explains how to read all of the graphs on this screen.)



### THEIR ALLY INVITED THEM

If invited to declare war on a third-party race with which their computer player ally is at war, the percent chance that a solicited party will accept is equal to their current Relations level with that ally. For example, if their ally's love nub were at +71, they would have a 71 percent chance of accepting their offer and declaring war on their ally's enemy.

### THEIR NONALLIES INVITED THEM

If a computer player is at war with someone, and a third-party computer player race is not at war with either of these players, asking checks will be made by the warring computer players to determine whether it's worth asking the third party to join in. If the result is 200 or greater, that neutral computer player will declare war on the enemy of the computer player who succeeded in asking him. The order in which computer players ask (or do just about anything, for that matter) is the order that their flags appear on the legend of the Galaxy Map display.

### AN ASSASSINATION RANDOM EVENT

Forget what the *Master of Orion* manual says about this "diplomatic blunder" random event setting you at the brink of war. It's worse—this

event causes an automatic declaration of war by the aggrieved race against the assassin's race. It also resets their Diplomacy Point level with that player to -75 DPs on the Relations bar.

## THEY HAVE AN ERRATIC LEADER



Every turn, there is a straight 2 percent chance that a leader with an erratic personality will just up and declare war on a random player with whom they are not currently at war, breaking any treaties between them in the process.

## SPECIFIC ACTIONS THAT AFFECT DIPLOMACY POINTS

Some other specific actions will add or subtract points from your Relations bar with another player as they occur. The following sections list them all and explain their exact consequences.

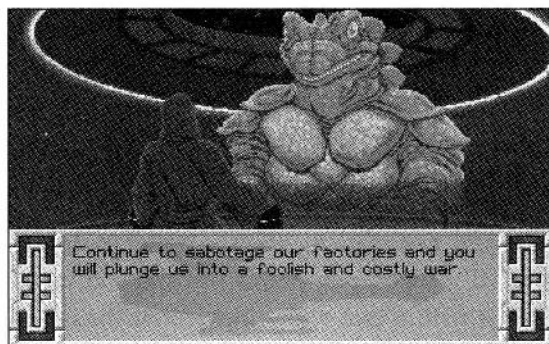
## VOTING IN THE HIGH COUNCIL

You will gain or lose Diplomatic Points on each candidate's Relations bars each time the Galactic Council is convened to elect a Galactic President. Although voting strategy is detailed in Chapter 4, here are the specifics about what the diplomatic stakes are when you cast your vote:

- If you vote for a race other than your own, their leader is delighted and you gain two levels (i.e., +24 DPs) with them.
- If you vote for one race, the leader of the opposing race (unless it is you) feels slighted and you lose one level (i.e., -12 DPs) with them.
- If you abstain, both candidates' races are slightly upset (or the other one, if you are a candidate) and you lose half a level (i.e., -6 DPs) with both races.

## WHEN YOUR SPIES ARE CAUGHT IN THE ACT

If one of your spies should succeed and then be captured (this can happen—see Chapter 12 for all the lurid details), or if you are framed for another's spying misdeeds, the race those spies were working against will be none too pleased with you. Each successful spy captured (or each job for which you were framed) will cost you two times a d12 roll in negative Diplomacy Points with that player. Thus, the political damage could range anywhere from -2 to -24 DPs, but will average -13 DPs.







## HAVING "TOO MANY" PLANETS

Other races become jealous when one race has colonized more than 25 percent of the total number of stars in the galaxy (including stars with no planets). The penalty for succeeding too well is -1 DP per turn with each player per planet above the 25 percent threshold. It can take a lot of work to maintain good diplomatic relations once you start doing so well that it makes others jealous!

Note that even other players who own more than 25 percent of all the stars in the galaxy will hate players that own more than 25 percent. Therefore, if there are only two or three players out there in the galaxy, the situation is likely to become and stay permanently tense, as this jealousy factor creates a natural hatred between everyone who is doing well.

## MASSING FLEETS ON ANOTHER PLAYER'S BORDER

The effect of massing ships is tricky to define. Basically, when one player has ships at a star that is within two turns' movement (based on each ship's currently equipped warp engines) of another player's colony, that player considers you as massing on its border. That computer player will compare the value of its nearby ships with

that of the massing ships. The value assigned each noncolony ship is, again: 1 for a small-hulled ship, 2 for a medium, 3 for a large, and 4 for a huge-hulled design.

If a player's border Fleet Strength is less than or equal to another's, there is no Diplomacy Point penalty. If it exceeds another's, the DP penalty increases in proportion to the excess, all the way up to a maximum of -12 DPs per turn if their Fleet Strength value is at least twice as great as the other player's. Therefore, if your border fleet were 35 percent larger than theirs, you would receive a -4-DP adjustment (fractions always rounded down) in your Relations level that turn.

## ATTACKING ANOTHER PLAYER

If you just up and start fighting another player, the diplomatic penalties are assessed against you on the basis of the amount of destruction you caused. This is all measured according to Table 11-6. Note that if your attack also violates a treaty you have with that player, you will also suffer an oath breaker penalty.

## CAUSING CONVENTIONAL DEATH AND DESTRUCTION

Table 11-6 gives the fixed schedule of Diplomacy Points that are lost on a player's Relations bar when you destroy something of theirs. Note that there is no DP penalty for engaging in battle and failing to kill anything (although you might feel quite stupid about it).

## UNIVERSAL OUTRAGE AGAINST THOSE COMMITTING GENOCIDE

When a player commits genocide and eliminates another player completely from the game, his Relations bar with all other players drops



**Table 11-6** Damage Value<sup>a</sup>: Diplomatic Points Lost per Destructive Act

Diplomacy Points Lost	Destructive Act
-1 DP	Factory destroyed <sup>b</sup>
-1 DP	Small-hulled ship destroyed
-2 DPs	Medium-hulled ship destroyed
-3 DPs	Large-hulled ship destroyed
-3 DPs	Missile base destroyed
-4 DPs	Huge-hulled ship destroyed
-5 DPs	Population point destroyed by conventional attack
-10 DPs	Population point destroyed by biological attack

<sup>a</sup>Destroying 10+ population points in a single turn will result in an automatic declaration of war from the aggrieved player.

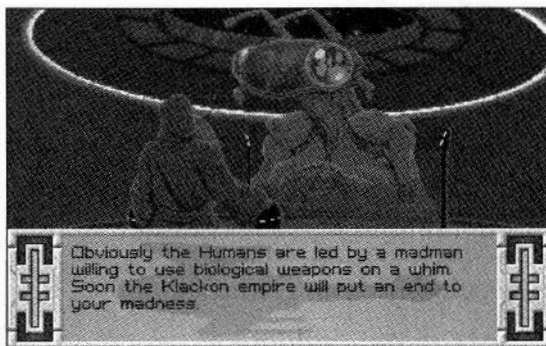
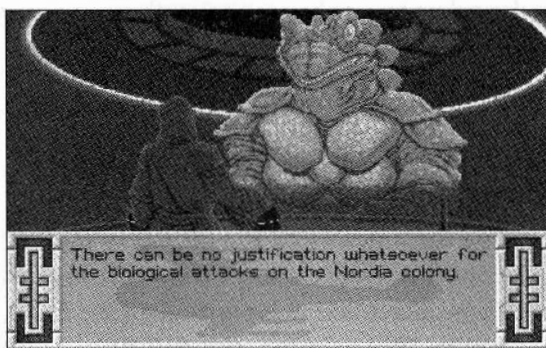
<sup>b</sup>Captured factories are a moot concern. If a colony changes hands or is bombed into extinction, it results in an automatic declaration of war from that player.

by three levels. In other words, when you're the player who eliminates another player's last colony, there is a -36 DP penalty with all remaining players. Note that ships belonging to the newly extinct player will disappear when they arrive at their destination star, after the combat phase.

### UNIVERSAL OUTRAGE AGAINST THOSE CONDUCTING BIOLOGICAL WARFARE

When a player successfully conducts a biological weapons attack of any size (i.e., kills at least one population point), every other race in the game (including the one being attacked) takes considerable offense. A player will suffer a one-level drop (i.e., -12 DPs) in Relations with every other race for each biological warfare attack it conducts, whatever the size of the attack or the amount of damage it inflicts (if any).

Therefore, if you're going to use biological weapons, use them carefully and in massive numbers, because the penalty will be no greater if you wipe out an entire enemy colony than if you don't kill even a single population point. Of course, there are times when diplomacy no longer matters. We will discuss what to do under these circumstances in "The Final War and the End of Diplomacy," on page 258.



### MAKING THE ENEMIES OF YOUR ENEMIES YOUR FRIENDS

When you attack another player and inflict damage on him, any other player who is also at war with that player will be pleased with your actions. You score bonus Diplomat Points with these enemies of your enemies at the rate of +1

DP for every four points of destruction inflicted (as defined by Table 11-6).

Thus, if you vaporized a player's planet this turn that had 1 missile base, 24 population points, and 10 factories on it, your Relations bars with the other players at war with the owner of that newly destroyed colony would increase by a windfall of +33 DPs [ $4 + (24 \times 5) + 10 = 134$ ; divided by 4 = 33.5, rounded down to 33]. Quite often, these large DP gains are followed up by atta boy messages showing their satisfaction with your common enemy's destruction.

### THE NO-CONTACT RELATIONS BAR MODIFIERS

During the times when you are not in contact with another race, certain events will modify your precontact love nub position on the Relations bar. Specifically, the following DP modifiers apply even when you are not in contact with another race:

- Voting in the High Council
- Having too many planets
- Pleasing those at war with those whom you attack
- Committing genocide
- Using biological weapons
- Natural relations gravitation

Although the penalty for massing your fleet on another player's border could also be included in this list, it's unlikely to happen without already being in contact with the aggrieved player. Therefore, if you see your initial contact diplomatic ratings at some level other than the one specified in Table 11-3, it will be because of these precontact influences.

### COMPUTER PLAYER CHEATING

After turn 100, when dealing with each other, computer players receive double any net increase in Diplomacy Points due to positive actions done for each other (i.e., bribes, trade, peace treaties, etcetera). This makes it easier for computer players to avoid constant and futile bickering among themselves, allowing them to focus more of their attention and energy on dealing with you. Sure, it's cheating, but it does make the game more interesting.

### THE FINAL WAR AND THE END OF DIPLOMACY

If you have rejected the Galactic Council's elected leader (even if they elected you!) and, therefore, are fighting the Final War, your diplomatic concerns are over (see Chapter 4). They will no longer deal with you in any way other than a war of annihilation, so the shackles of diplomatic niceties are removed.

Go ahead and kill your neighbors all you like with complete abandon during the Final War. Use spies freely and drop biological weapons like there is no tomorrow. Commit all the genocide you can, too, because you simply can't make things worse. In short, don't hold anything back—screw 'em.

### PERSONALITIES

The leader of each alien race has a distinct personality type. These personalities have a strong influence on diplomatic decision making (see Table 11-4) and some have additional quirks, as explained in the following sections:

#### PACIFISTS

Beyond their extremely high +20 Leader Personality modifier, there is nothing particularly

special about Pacifist leaders except that they will not use biological weapons.

## **HONORABLE**

Honorable leaders have a mellow +10 Leader Personality modifier—until you cross them. They take great umbrage at anyone breaking treaties with them, so all oath breaker penalties (both permanent and Diplomacy Point) will be doubled when applied to relations with an Honorable leader. In other words, people who break their treaties with an Honorable leader will suffer an immediate -72 Diplomacy Point penalty (wow!) and a permanent -10 modifier will be added to the Honorable leader's Core Reaction toward them.

Like Xenophobic leaders, Honorable leaders also double all DP losses made on their Relations bars. These are cumulative with the effects described in Table 11-2, so that if you're ever above +50 on an Honorable leader's Relations bar, any DP loss with them will be quadrupled.

Honorable leaders will never attack someone with whom they currently have a treaty. Instead, they will take a turn to formally break the treaty first. Also, like Pacifists, Honorable leaders will never resort to using biological weapons.

Should an Honorable leader be overthrown, the doubled permanent oath breaker Core Reaction modifier penalties (-10) go back down to normal (-5) retroactively. If an Honorable leader should ascend to rule an empire during the middle of a game, any old broken oaths have their permanent penalties doubled (to -10) while that Honorable leader is around.

## **ERRATIC**

An Erratic leader's Personality modifier is rolled at the beginning of each turn and will be

a random number between -40 and +40. Consequently, you never can predict what his mood might be on a given turn until you attempt to parlay with him.

Erratic leaders have no qualms about using biological weapons and will build and use them freely. Furthermore, there is a straight 2 percent chance each turn that an Erratic leader will just up and declare war (completely out of the blue) on a single, random, contacted player with whom they are not currently at war.

## **AGGRESSIVE**

Besides their -10 Leader Personality modifier, Aggressive leaders are twice as likely as other leaders to peacefully expand and colonize unowned stars (see below). They will also freely use biological weapons.

## **RUTHLESS**

Besides their -30 Leader Personality modifier, there is nothing at all special about a Ruthless leader except that she will freely use biological weapons.

## **XENOPHOBIC**

These guys are mean. They hate everybody and have a -50 Leader Personality modifier. Furthermore, they halve any Diplomacy Point gains and double all DP losses made with them. These are cumulative with the effects described in Table 11-2, so that if you're ever above +50 on a xenophobe's Relations bar, any DP loss will be quadrupled! (Don't ever expect to be popular with these guys.)

Xenophobes will never miss an opportunity to attack (see page 260) and will freely use biological weapons (and probably laugh afterward).

## GIVEN THE OPPORTUNITY, WILL THIS PERSONALITY ATTACK?

Each turn, every computer player will check to see if they can launch an attack against another player that turn. The formula for this check is a 50 percent chance, plus a percentage equal to the reverse value of their Leader Personality modifier (see Table 11-4; i.e., a Xenophobe receives a +50 modifier, and a Pacifist a -20). The results of this calculation are shown in Table 11-7.

If they successfully pass this check, they will consider the following items in deciding if, against whom, and where to launch an attack that turn:

1. First, they will decide whom, at the moment, they hate the most. (Generally, they'll launch an attack on only one front per turn.)
2. Then they will see if they have a fleet close enough to attack that player in the near future.
3. If they do, they will figure out the best target (they prefer the ones with the most

factories) in the hated player's empire. Note that they gather their intelligence by normal scanning methods, just as you do.

4. Finally, if they feel that their fleet is powerful enough to have a reasonable chance of success in destroying that target, the fleet launches. Their long-term chances for success, however, are not considered—only this specific attack.

## RACIAL OBJECTIVES

Besides being influenced by their leader's personality, each alien race has a racial objective. This sets their guidelines for certain activities such as where they focus their spending, what technologies they tend to concentrate on, how freely they use their spies, and at what rate they will expand their empires. First, we must explain a couple of general concepts concerning racial objectives and spending ratios.

## RACIAL SPENDING ON PLANETS

Every race allots at least 5 percent (i.e., one click) of their planetary spending into each of the first four spending categories of ships,

**Table 11-7** Calculating the Probability That a Computer Player Will Attack

Leader Personality Type	Leader Personality Modifier	Probability That They'll Launch an Attack
Pacifist	+20	$50\% + (-20\%) = 30\%$
Honorable	+10	$50\% + (-10\%) = 40\%$
Erratic	-40 to +40	$50\% + (40 \text{ to } -40\%) = 90 \text{ to } 10\%^a$
Aggressive	-10	$50\% + 10\% = 60\%$
Ruthless	-30	$50\% + 30\% = 80\%$
Xenophobic	-50	$50\% + 50\% = 100\%$

<sup>a</sup>Depending on their current turn's Leader Personality modifier result that turn.

defense, industry, and ecology. The fifth spending sector of each planet, Technology, always receives a minimum investment of 20 percent of each colony's per-turn spending (i.e., four clicks' worth). The remaining 60 percent of a planet's output is allotted in fifteen 5 percent (one click) increments among all 5 categories once every 3 to 18 turns (a number of turns equal to the sum of three d6 dice rolled at the time a planet's ratio bars are changed). No matter how compelling the reason, no changes occur before the predetermined period expires.

Where each remaining 5 percent allotment goes is rolled for on the basis of the owner's racial planetary spending priorities and the result of a d15 roll; their first spending priority sector has a  $\frac{5}{15}$  chance of receiving that 5 percent allotment, their second priority sector has a  $\frac{4}{15}$  chance, their third priority sector has a  $\frac{3}{15}$  chance, their fourth has a  $\frac{2}{15}$  chance, and their lowest priority spending sector has only a  $\frac{1}{15}$  chance (see Table 11-8).

After these resources are allotted, there is a check to make sure that the minimum amount required to keep a planet's ecology sector clean is always allocated. Also, computer players will never spend excess money on ecology if a planet is completely developed (i.e., the planet has reached its maximum population level and is fully terraformed). Neither will a computer player allot resources to the industrial sector once it has reached its factory maximum. In other words, a computer player will never put money into its Interplanetary Reserve through the Industry Tax, only by using the slider bar tax (and collecting the change when a planet's maximum factory level is reached that turn).

## **RACIAL SPENDING ON TECHNOLOGY SECTORS**

First, computer players always allot 100 percent of their technology spending to a single sector at a time, and they keep it that way until the item being researched is finally discovered. No spending will go to a random technology sector until after an alien race builds their initial priority: the long-range colony ship that was explained in Chapter 9. Once the discoveries necessary for this long-range colony ship design are completed, 100 percent of their technology spending is allotted as a single chunk to a new sector based on that player's racial technology spending priorities and the result of a single d16 die roll; their first spending priority sector has a  $\frac{5}{16}$  chance of receiving that BC allotment, their second priority has a  $\frac{4}{16}$  chance, their third priority sector has a  $\frac{3}{16}$  chance, their fourth has a  $\frac{2}{16}$  chance, and their fifth and sixth priority spending sectors each has a  $\frac{1}{16}$  chance (see Table 11-8).

## **PEACEFUL EXPANSION**

Here is the question: Given the opportunity to peacefully expand this turn (i.e., a player has a colony ship already built with a suitable colony base and the fuel range required to reach an unowned planet), will a computer player do so? Each alien race makes a check each turn, on the basis of the following formula, to see if they will seize an opportunity to peacefully expand their empire.

The answer is always "Yes" if three-quarters (rounded down) or more of their colonies have populations that are at least half their planet's maximum population limit. Here, they simply need living space and will always go for it.



**Table 11-8** Computer Player Spending Priorities

Planetary Spending Priority	While at War <sup>a</sup>	Peacetime Planetary Spending Priorities by Racial Objective					
		Diplomat	Ecologist	Expansionist	Industrialist	Militarist	Technologist <sup>b</sup>
First	Ships	Technology	Ecology	Technology	Industry	Ships	Technology
Second	Technology	Industry	Technology	Defense	Technology	Technology	Industry
Third	Industry	Defense	Industry	Ships	Defense	Industry	Defense
Fourth	Defense	Ships	Defense	Industry	Ecology	Defense	Ecology
Fifth	Ecology	Ecology	Ships	Ecology	Ships	Ecology	Ships

Technology Spending Priority	Peacetime Technology Spending Priorities by Racial Objective						
	Diplomat	Ecologist	Expansionist	Industrialist	Militarist	Technologist <sup>b</sup>	
First	Weapons	Force Fields	Planetology	Force Fields	Construction	Weapons	n/a
Second	Force Fields	Weapons	Force Fields	Weapons	Force Field	Force Fields	n/a
Third	Propulsion	Propulsion	Weapons	Planetology	Weapons	Propulsion	n/a
Fourth	Construction	Planetology	Construction	Propulsion	Propulsion	Computers	n/a
Fifth	Computer	Construction	Computer	Construction	Planetology	Construction	n/a
Sixth	Planetology	Computer	Propulsion	Computers	Computers	Planetology	n/a

<sup>a</sup>This column is used by every computer player who is currently at war with one or more other races. Only in the absence of any wars will they use their respective peacetime racial objective spending priorities.

<sup>b</sup>Technologists don't really have any peacetime technology spending priorities. They tend to research everything about evenly.

When the above condition for required living space does not exist within a particular player's empire, it gets, each turn, a base-level 10 percent chance to otherwise seize an opportunity for peaceful expansion. This is multiplied by the game's level of difficulty (1 for Easy; 2 for Simple; 3 for Average; 4 for Hard; and 5 for Impossible). Aggressive leader personality types, or those races with an expansionist objective, then double this percentage. For example, in a game of average difficulty, a computer player would have a 30 percent chance (10 percent times 3) each turn of seizing an opportunity for peaceful expansion,

should one present itself. If their leader were aggressive or if they had an expansionist objective, they would have a 60 percent chance of expanding that turn.

## USE OF SPIES

Generally, each computer player's objective determines its base willingness to spy on others. This is modified by their leader's personality (the meaner they are, the more they will use spies) and the other players' current relations with that computer player (the worse they are, the more likely spies will be sent out). How

these factors combine is explained in detail in Chapter 13.

### DIPLOMATS

Diplomats have one of the highest base spy ratings. They also receive a +50 modifier when considering whether to offer or accept trade agreements.

### ECOLOGISTS

Ecologists have one of the lowest base spy ratings. Generally, their peacetime spending priorities focus on economic growth and planetary development, as shown in Table 11-8.

### EXPANSIONISTS

Expansionists have one of the lowest base spy ratings. When not pressed for living space, they will seize peaceful expansion opportunities twice as readily as most other races (see above).

### INDUSTRIALISTS

Industrialists have an average base spy rating. They tend to focus their energy on building more factories and love to rush a planet's factory level to its maximum and keep it there.

### MILITARISTS

Militarists have only an average base spy rating. Because they tend to build so many ships, the maintenance on them alone can often run as high as +60 percent of their economy. If this happens, it usually leaves them unable to maintain their base ecology spending levels and keep their planets clean, much less allowing them to invest in economic growth. If you can snatch a few planets from them when they're strapped for money to pay their ship maintenance, they might just fold up like a house of cards!

### TECHNOLOGISTS

Technologists have one of the highest base spy ratings. As Table 11-8 shows, they prioritize planetary spending to sectors that will increase their rate of technological discoveries.

When it comes to their peacetime technology spending priorities, things work a bit differently for technologists. Their chance to research each sector against the d16 die roll is given in parentheses on their technology spending priority list:

1. Computer ( $3/16$ )
2. Force fields ( $3/16$ )
3. Weapons ( $3/16$ )
4. Construction ( $3/16$ )
5. Planetology ( $2/16$ )
6. Propulsion ( $2/16$ )

### SPECIAL PERSONALITY/ OBJECTIVE SCRAMBLE KEY

A special key has been provided in *Master of Orion* that allows you to randomly scramble all of the races' leader personalities and racial objectives. From the Control screen, press **[Alt]-[P]**, and then go to the Races Display screen and get a report on each race with which you're in contact. Beneath the leader's picture will be their new personality and racial objective. If you don't like how things came out, exit back to the Control screen and try again until you get a group of players you like.

### THE OVERTHROW OF COMPUTER MONARCHS

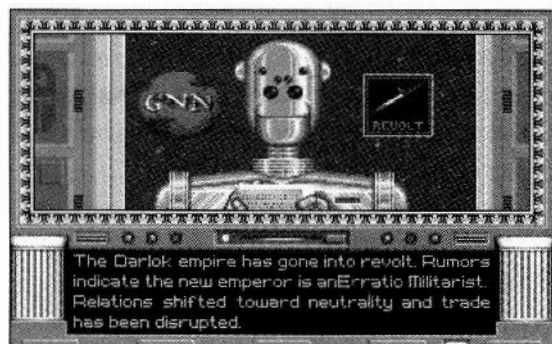
A leader's personality will also randomly change when they are overthrown due to a revolution within their empire. This occurs automatically when half (rounded down) of their planets are

in revolt (see Chapter 12 for the details on causing and spreading revolts). When their leader is overthrown, all revolts within that empire immediately cease. Furthermore, the computer also analyzes that empire's most pressing need and selects a new racial objective that will best deal with their present problems. You will be notified of this by the GNN Newsdroid, as shown in Figure 11-10. Note that this event will rarely occur in a game.

When a computer player's empire goes through this change in leadership, all of their trade agreements and treaties are broken (and they will suffer an oath breaker penalty with every other computer player so affected) and their love nubs will shift with each player to a new value halfway (rounded down) between their present Diplomatic Point level and zero.

## DIPLOMATIC STRATEGY

Winning a game of *Master of Orion* is seldom a purely military matter. Instead, it is more often a game of diplomatic warfare, backed by spies and guns. Virtually every action you take must



**Figure 11-10**

Announcing the overthrow of a computer player government

first be weighed for its political ramifications, lest you find yourself friendless and at war with several races. It's a cold, cruel galaxy out there, and we're advising you to be on your best diplomatic behavior. If you don't successfully manipulate others to suit your needs, you can bet that you'll wind up with enemies attacking you from all directions at once. Don't let this happen to you. Heed our advice...

## MATTERS OF WAR AND PEACE

This is really very simple. Avoid wars with players that you cannot beat relatively quickly. If your advantage is slight, a long and protracted war could leave you victorious but bled dry and well behind the players able to expand peacefully, assuming they don't take the opportunity to stab you in the back. It is better to cut your losses early and prepare yourself for a swift, victorious campaign at a time of your choosing.

When you find yourself in a war without rosy prospects, don't be ashamed to kowtow and make peace if you can. Now, this might be difficult if the enemy's leader is Ruthless or Xenophobic. If that proves to be the case, try to form a coalition of races to join you in a crusade against your enemy (which shouldn't be too hard if he has an unsavory personality or race). With enough of his borders being attacked at once, your chances to get ahead in the war and either successfully sue for peace or eliminate that player go way up.

## SKATING PAST COLD SHOULDERS

Whenever you can't deal with one leader, deal with the others and try to set them against the leader giving you grief. If the troublesome leader won't talk to you face to face, get another race to stick a knife in his back. This should distract

an obstinate leader's attention away from you for a while.

### **KNOW HOW HEAVY TO TREAD**

Although wars can often begin by accident through uncontrolled circumstances, wars, and the peace treaties that end them, are often the products of skillful engineering on someone's part. You must learn to be that someone. Tread heavily around those whom you would provoke into declaring war on you. Raid their colonies and threaten to attack them. It won't be long before they leap into the abyss and declare war on you.

Always tread lightly, however, when considering violating a treaty and breaking your oath. The negative modifiers they present are permanent and they can often leave you diplomatically crippled, perhaps even isolated during the later stages of a game. Do all you can to avoid upsetting someone that you're trying to court into a treaty. Improving your relations with them is often a slow process, but carefully nurtured good relations can all too easily drop like a stone if you tread heavily around them. When you need something from a computer player, approach them slowly, carefully, and walk on eggshells every step of the way.

### **EXCHANGING TECHNOLOGIES**

Technology exchange deals must always be considered on the merits of the individual technologies being exchanged. You will always come out behind on these deals, on a straight Tech level basis. You might find a key piece of technology that you need among their offerings (particularly improved missiles for planetary defense, higher Robotic Controls, construction

technology, Planetary Shields, or Terraforming). In exchange, you probably can give them your less-than-best ECM, Terraforming, or some other technology that they can't threaten you with. (Hyperspace Communications is ideal, see Chapter 15.) In cases such as these, go ahead and exchange technologies.

Note that if you have a wonderful new breakthrough technology that every other player wants to have, you may want to trade it to them—all of them. In this way, you will get multiple technologies for trading away the same item to multiple players, while trading with only one other player would leave you at a disadvantage. When you can trade that same technology two, three, or more times to different players, you're coming out way ahead on the deal!

### **OFFERING TRIBUTE**

When you want a treaty with another player bad enough, some major kissing up might be in order, by way of tribute. Generally, you should always give them a relatively harmless technology if you can, at least for the first six times you offer tribute. This will maximize your positive Core Reaction's permanent modifier with that race. After those first six technology tribute offers, you are still likely to earn more positive Diplomacy Points by continuing to offer technology bribes rather than cash, but technology tribute offsets accumulated oath breaker penalties. Besides, every BC in your reserve costs you, on average, 2 BCs to put there. In effect, you're really paying double whatever you're offering as a cash bribe—cash that could be put to more immediate use in developing new colonies.

## OUR FINAL THOUGHTS ON DIPLOMACY

By monitoring the computer networks, we've heard many players complain that they didn't understand why a computer player did this or that, or reacted in some seemingly illogical way. By carefully examining all of the elements in this chapter, their actions should make a lot more sense now.

Also, we've noted those who've complained about Erratic leaders. Erratic leaders have their own problems, because they are seldom able to keep allies for long periods of time and often find themselves fighting continually in war after war. In other words, they have trouble sticking to a long-term strategy. If you don't like them, we urge you to mark them for extinction and take them out of the game first, or hit the [Alt]-[P] keys until you have none left in the game. We think Erratic leaders are quite realistic and have noted many diplomatic maneuvers on the part of human players that made Erratic leaders look like Ghandi.

Finally, there are a couple of diplomatic options excluded from the game that you might be looking for, but won't find. For one, there is no formal Declare War option. This would be useful when you want to stab an ally in the back by conducting a sneak attack, but you can't formally break your alliance because their diplomat is gone. In this case, you're hosed, because they can interact with you any time they want, while you have to wait for their ambassador to return.

Another one you won't find is a Broker of Peace option between warring races, so that your ally doesn't drag you into a stupid war you don't want to fight. Finally, there is no option

to get the other player to agree to lower trade barriers, thus increasing the speed at which trade routes will become profitable (i.e., no NAFTA or GATT treaties can be made).

## ALL POLITICS ASIDE

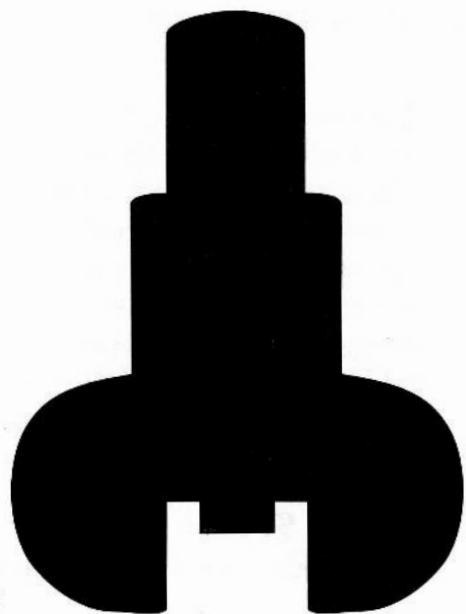
And that, dear innocent gamer, is a concise look at the complex diplomatic web that is spun in every game of *Master of Orion*. We hope you now appreciate the strengths and limitations of diplomacy, and recognize it as the important tool for victory that it is. By teaching you the dirty details of Diplomacy Points, oath breaking, and how various game play aspects affect diplomatic relations, we've tossed you the life line you need when the seas of diplomacy become murky and rough.

The diplomatic machinations in *Master of Orion* are meant to be easy for you to interact with; they were designed to be logical and challenging to compete against. They were *not* meant to be taught to you, as we have just done. Just remember: the information in this chapter is invaluable.

There is another important tool that the aspiring Galactic Dictator should not hesitate to use: the covert game-within-a-game of spies and counterespionage. Even when the enemy might have the upper hand, never surrender to him the under hand. An efficient network of spies can steal the technologies you need, destroy an enemy's pesky missile defense bases, and even cause other empires to collapse by fomenting internal rebellion. To learn the secrets of spying, just turn the page and start reading. ♠



12



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*Spies*

*I steal.*

—Sam Giancana, explaining his livelihood to his draft board

As the CIA, MI-5, Mossad, or the KGB would tell you during the height of the Cold War, using spies is a game within a game. Their covert actions yield stolen technologies through espionage, sabotage enemy factories and bases, or even incite enemy colonists to revolt. Spies also update your enemy Report screen, as shown in Figure 12-1. In this chapter you will learn everything there is to know about spies in *Master of Orion*.

## HIRING SPIES

Spies do not come from mommy and daddy spies (well, not in this game). In *Master of Orion*, you must hire spies through the Races Display screen, as shown in Figure 12-2. The Spy slider bar beneath each race's Relations bar is used to set your spending level for spies within that particular race's empire. This level can range anywhere from 0 to 10 percent of your gross economic output per turn. In other words, paying for your spy efforts becomes a per-turn,

"pretax dollar" cost (see Chapter 5), akin to ship or missile base maintenance (although you can vary your spying per-turn costs far more easily). Therefore, in a five-player game, if you spent the maximum on each opponent's Spy slider bar, a full 50 percent of your economy would be automatically siphoned off every turn to pay for hiring new spies. That is a potentially huge fixed expense, and we'll examine later (in "Efficient Spying," on page 279) how you can determine the optimal number of spies you need.

## SPY SLIDER BAR INFORMATION

To the left of each Spy slider bar you are told how many spies you currently have operating in that race's empire. To the right of the Spy slider bar is an indicator of spy production that works the same way as the boxes to the right of ship production on the Planet Production Panel (part of the Control screen).

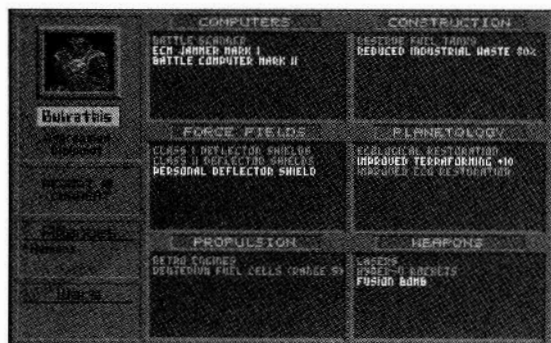


Figure 12-1

How current your reports are appears on the left side of the Report screen and depends on when you last had a spy in that player's empire.



Figure 12-2

The Races Display screen, where spy and security resources are allocated each turn

## HOW TO BEAT THE HIGH COST OF SPYING

Well, actually, you can't beat the high cost of spying. The first spy you hire in another player's empire will cost you 25 BCs plus double your current computer technology level (for all that James Bond-like high-tech computer equipment they require). Therefore, if you were at computer Tech level 13 and had no spies operating in another player's empire, hiring your first spy there would cost 51 BCs [ $25 + (2 \times 13) = 51$ ].

Each additional spy purchased, beyond those already existing within that same opponent's empire, costs double what the previous one would at your current computer technology level. Continuing with our example, if you already had one spy currently alive in an opponent's empire, adding a second spy would cost 102 BCs, a third spy 204 BCs, a fourth spy 408 BCs, and so on. Basically, having more than three or four spies operating within a single opponent's empire usually won't occur because they become outrageously expensive beyond that point.

Because spies tend to have a high mortality rate, as you will soon see, keeping a steady flow of money coming in for their continued replacement is a sound idea. This is because, as your living spies accumulate within an opponent's empire, the money allocated to spying there is saved in a separate little account until you can afford the cost of adding the next spy. When spies within that race's empire are eliminated, however, replacing them means paying lower costs because the price of the next spy is determined by how many spies you currently have alive within an opponent's empire, not by how many you've purchased there over the course of a game.

## SPIES AND SECURITY: THE PER-TURN COST

The total cost of investing in spy recruitment and increasing your own overall security against other players' spies is shown on the Races Display screen only as a change in the percentage of your gross income spent for spy operations. This percentage appears in white along the lower-right side of the Races Display screen, just above the four buttons located there, as shown in Figure 12-2. It will read "Allocations: *X.X* percent Planetary Resources" and, like purchasing spies, remains a fixed percentage of your production expense every turn until you alter it. A breakdown of this allocation appears on the lower-left corner of the Planets Display screen, under Spending Costs for spying and security, as shown in Figure 12-3.

Sadly, because the costs for spying and security are always given as slider bar amounts and gross income percentages, it is difficult to get a grip on the actual number of BCs you're dealing with for covert activity. Those wishing to



**Figure 12-3**

The Planets Display screen shows fixed "Spending Costs" in the lower-left corner. Here, "Spying" is 16.0 percent and "Security" is 3.2 percent of that player's total income per turn.

do the math should go to their Planets Display screen and work it out. On the basis of Figure 12-3, this player is spending 16 percent of 5964 BCs in total income, or 954 BCs, for recruiting new spies that turn. Similarly, the 3.2 percent being spent on security works out to 190 BCs that turn.

### SPY MISSION ALLOCATIONS

Beneath the Spy slider bar information line on the Races Display screen are three buttons. One of them will always be selected, and they indicate the general mission of your spies within that race's empire. Pressing the *Hide* button orders them to cease covert operations and lay low, thus reducing their chances of being caught by security forces (see footnote <sup>b</sup> in Table 12-1). Selecting *Sabotage* instructs your spies to attempt to destroy enemy factories or missile defense bases, or incite rebellion. If successful in this endeavor, you can select the location and specific act of sabotage they perform. Pressing the *Espionage* button instructs your spies to attempt to steal a technology from that player. If successful, you will be given a list of possible technology categories from which to steal a single item that turn.

### SPY OPERATIONS, STEP 1: SECURITY

Each turn, spies must first get past the opponent's overall security before they can attempt to steal, destroy, or incite rebellion. Thus, every empire is allowed to attempt to thwart, expose, and eliminate all other players' spies operating within its territory by rolling for their fate, as shown in Table 12-1.

How this initial, spy-catching step works is that each empire generates a separate number


for every spy within its borders, every turn. That number is the sum of a d100 roll plus the empire's Overall Security rating percentage (see "Overall Security," below) and, if the empire's current computer technology level is higher than the spy's, the difference between them. (Note: There is no bonus to the spy if the empire's current computer technology level is lower than the spy's.) The result is read in Table 12-1.

### OVERALL SECURITY

Your current Overall Security level is set by a slider bar in the lower-right section of the Races Display screen. It can consume from 0 to 20 percent of your economy every turn (i.e., *double* what each spy's slider bar can). This time, however, the money is spent to catch enemy spies operating within *your* empire. For each 1 percent of your economy pumped into security, 2 percent is added to your chance to catch every alien spy operating within your empire.

Unlike the Spy slider bars (which are 25 clicks long), the length of the Overall Security slider bar is exactly 20 clicks. Therefore, each click represents exactly 1 percent of your gross production each turn and adds 2 percent to your security rating (i.e., each click gives you a +2 die roll modifier in Table 12-1). You will see this 1 percent per-turn expense shown with all your other per-turn fixed expenses on the Planets Display screen.

### THE SPIES CAUGHT DISPLAY

You may at any time, while examining the Control screen, press the  key to bring up the Spy Report screen. This will bring up the Spies Caught display as shown in Figure 12-4. This display allows you to gauge, somewhat, the

**Table 12-1** Calculating the Fate of Spies

D100 Roll <sup>a</sup>	Result <sup>b</sup>
0 or less	The spy is cleared to attempt infiltration, and frames another race if its mission succeeds (see Spy Operations, Step 4: Political Consequences later in this Chapter)
1–30	The spy is cleared to attempt infiltration, and is not discovered
31–50	The spy is cleared to attempt infiltration, but will be correctly identified if its mission succeeds. The spy's owner will suffer the full diplomatic penalty for being caught spying unless a spy manages to frame another race while succeeding in its mission that turn (see Table 12-2)
51–70	The spy is stopped for this turn, escaping unnoticed
71–99	The spy is stopped and eliminated
100+	The spy is stopped, eliminated, and confesses before dying. This negates the efforts of all of that player's other spies to successfully infiltrate that turn, and imposes on that player the full diplomatic penalty for being caught spying

<sup>a</sup>Die roll modifiers:

- + Overall Security rating percentage
- + Difference in computer technology levels (if higher than spy's)
- + 20 for Darloks attempting to capture the other player's spies
- - 30 if spy is hiding

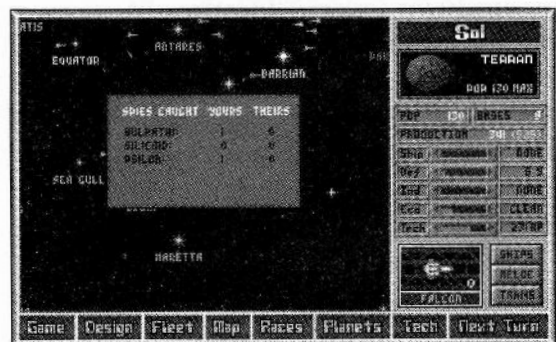
<sup>b</sup>Unless a spy confesses, all spies that are not hiding and have been cleared to attempt infiltration go on to the next step, which is to roll separately on Table 12-2.

amount of spy activity you have ongoing with each player, based on the number of spies you've eliminated and vice versa and adjust your spy and security spending accordingly.

Now, just because you don't see a lot of captured spies appearing on this display doesn't mean that the computer players are not spying on you. As you can see from Table 12-1, there is only a base 30 percent chance of catching an active spy to begin with. (And, if they're hiding, that base chance drops to 0 percent.) Thus, if you're not spending money to increase your security percentage, your empire might be infested with uncaught spies. Low numbers of spies caught may mean no one's spying on you. It's more likely, however, that the spies are there but you're not catching them. Remember, an ounce of paranoia is worth a ton of sabotaged missile bases.

## SPY OPERATIONS, STEP 2: INFILTRATION

Unless any spies confess or their mission is to hide, all spies that are cleared to attempt

**Figure 12-4**

The Spies Caught display shows who eliminated whose spies that turn, and how many.



infiltration (see Table 12-1) now roll again (see Table 12-2) to find out whether they infiltrate successfully. How this infiltration step works is that each infiltrating spy generates a separate number that is the sum of a d100 roll plus, if the spy's current computer technology level is higher than that of the empire being infiltrated, the difference between them. (Note: There is no penalty to the spy if its current computer technology level is lower than that of the empire it's infiltrating.) The result is read in Table 12-2.

### SPY OPERATIONS, STEP 3: PERFORMING MISSIONS

Assuming a spy survives the first two checks given in Tables 12-1 and 12-2, something might still go wrong. That is because many spy missions have a chance for failure while being conducted, as explained in the following mission descriptions.

#### ESPIONAGE

Espionage is a spy's attempt to steal a technology from another player, and it's always a crap shoot. First, for each spy that successfully infiltrates a separate random number is rolled, from 1 to the infiltrated player's current highest technology level in his or her most advanced technology sector. The highest roll from all spies making this espionage check is used and called the *steal number*, which is the highest possible technology level of the single item they will steal that turn.

If the victim has no technologies in any sector that the spying player doesn't already have at or below the steal number, the espionage mission is a failure but that spy will live to try again next turn. If he does, that category will appear to the spying player on a screen similar

**Table 12-2** Calculating the Success of Spy Infiltration Attempts

D100 Roll <sup>a</sup>	Result <sup>b</sup>
0–84	The spy's infiltration attempt fails
85–99	The spy's infiltration attempt succeeds
100+	The spy's infiltration attempt succeeds, and another race can be framed if its mission also succeeds (see below)

<sup>a</sup>Die roll modifiers: • + Difference in computer technology levels (if the spy's is higher)

• + 20 for Darlok spies attempting to infiltrate  
<sup>b</sup>Each spy that successfully infiltrates proceeds to step 3 (see "Spy Operations, Step 3," below) and performs its assigned mission of either espionage or sabotage.

to the one shown in Figure 12-5. Spies always steal the highest technology item available in the category that does not exceed their steal number.

Note that you can try to keep close tabs on which other player has what technologies you can steal (shown in bright lettering on their Report screen), but often you'll never be able to predict exactly what your spies might come up with from a given player's technology category. Also, you will receive notification that a specific technology was stolen from you only when their spies are noticed by your security forces (i.e., they rolled between 31 and 50 on Table 12-1 and then went on to steal your technology without being able to frame another race for it).

#### SABOTAGE

Sabotage attempts come in three flavors: destroying enemy missile defense bases,

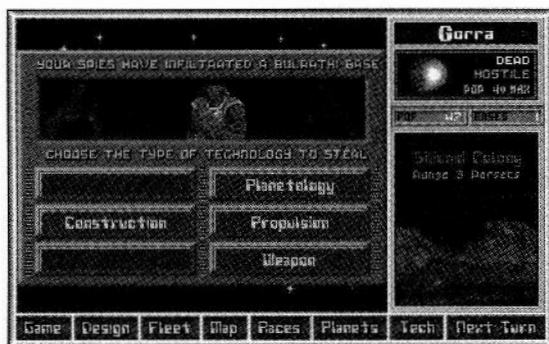


Figure 12-5

If your spies roll a high enough steal number, they may get a choice of stealing a technology from among several sectors.

destroying enemy factories, and inciting revolution among the enemy's populace. At this juncture, if any spies have successfully infiltrated and are on a sabotage mission, they will be greeted with a Galaxy Map screen similar to the one in Figure 12-6.

### SELECTING THE COLONY TO SABOTAGE

Once at the Galaxy Map screen shown in Figure 12-6, you can peruse all the planets belonging to the targeted player simply by clicking the cursor over their colonies on the map section of the screen (they are conveniently marked with flags of that player's color). As you examine different colonies, the latest information provided by your ship and planetary scanners (also previous spying missions) on their population, factories, and missile defense bases is listed in a box along the right side of the screen.

If that colony is presently within scanning range of your ships and colonies, this information will be current. If that colony is not presently within range of your scanners, this



Figure 12-6

The Galaxy Map screen allows you to examine all of your opponent's colonies by clicking on their map locations (as marked by the flags).

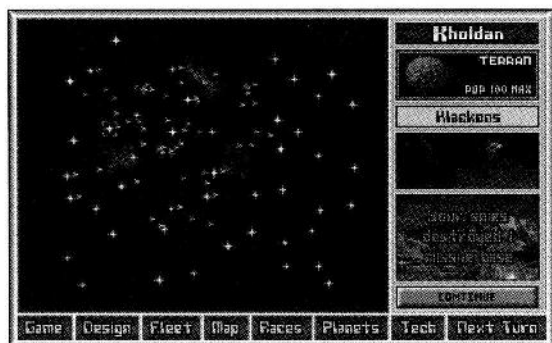
information will be the latest information based on the last time you did scan or successfully sabotage that colony (if ever). If you have not previously scanned or sabotaged that colony, no information about it will appear.

After carefully inspecting the colonies in that opponent's empire, it is simply a matter of choosing the one you want to undermine and the most devastating of the three possible ways to sabotage it, as explained in the following sections.

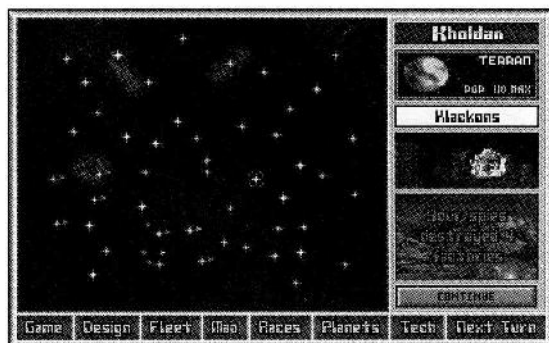
### DESTROYING ENEMY MISSILE DEFENSE BASES

If your selected target is a colony that you will attack in the immediate future, you might want to soften it up by destroying as many of its missile bases as possible before your warships and transports arrive. Success here will look as shown in Figure 12-7.

Each spy that successfully infiltrates enemy missile bases receives a number of 50 percent chances to destroy a single missile defense base. That number of chances is equal to 1 for every

**Figure 12-7**

Your spies successfully destroying an enemy missile base

**Figure 12-8**

Your spies successfully destroying enemy factories

10 weapons technology levels the spying race has currently achieved, or fraction thereof, as listed in Table 12-3.

### DESTROYING ENEMY FACTORIES

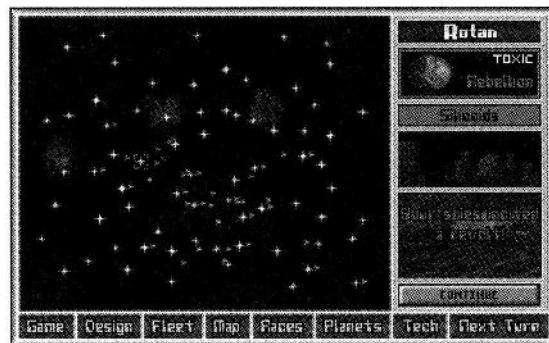
If you're not going to attack the targeted enemy colony for a while, you will probably want to put a crimp in its economy by destroying some of its factories, as shown in Figure 12-8. This can be a particularly devastating tactic against poor and ultrapoor planets, as they must pay two and three times the normal amount to replace each lost factory. Conversely, rich and ultrarich planets can quickly heal the wounds from destroyed factories, although they will lose far more production in the short run.

Each spy that successfully infiltrates enemy factories receives a certain number of chances to destroy from one to five factories. The number of chances is equal to 1 for every 10 weapons technology levels the spying race has currently achieved, or fraction thereof, as listed in Table 12-3.

### INCITING REVOLUTION AMONG THE ENEMY POPULACE

Ignore that Beatles "I don't want to start a revolution" stuff. By selecting this option, that is exactly what you hope to accomplish, as shown in Figure 12-9. Getting there, however, is often a slow process.

Each spy that incites rebellion adds a random 2 to 10 percent of that planet's population

**Figure 12-9**

Successfully inciting an enemy colony into revolt

**Table 12-3** Calculating the Number of Chances Each Successful Spy Has to Sabotage Enemy Missile Defense Bases or Factories<sup>a</sup>

Spying Race's Current Weapons Technology Level	Number of Chances for Each Successful Spy
1-10	1
11-20	2
21-30	3
31-40	4
41-50	5
51-60	6
61-70	7
71-80	8
81-90	9
91+	10

<sup>a</sup>Notes: (1) For destroying missile defense bases, each chance gives the successful spy a 50 percent shot at destroying one base. (2) For destroying factories, each chance destroys a random one-to-five factories. (3) If you discover that there are no enemy missile bases or factories at that colony, none can be blown up. If you attempt to do so, the mission will fail, your spies will not be identified (see Table 12-1), and you won't be able to frame another race for your successful infiltration (see Tables 12-1 and 12-2).

points to the number already currently seething with discontent. Multiple spies combine their percentages together each turn when increasing the actual number of dissenting population points.

A number of population points equal to that percentage (rounded down to the nearest whole number, although it will always be a minimum of 1) become rebels. When 50 percent or more (not more than 50 percent, as the *Master of Orion* manual states) of a planet's population is thus incited (see Chapter 9), you will be informed, as shown in Figure 12-9. Additionally,

the GNN Newsdroid will announce that the planet has rebelled.

Note that inciting rebellion can never fail. If any spy successfully infiltrates, at least one population point will rebel. Also note that there is nothing you can do to increase a spy's effectiveness at subversion (they will always convert 2 to 10 percent). Finally, although rebels do not like their masters, they're not crazy about you, either. There is no way to get them to ally with you in any way. If you invade an opponent's rebelling planet, you must still defeat their entire population, and that opponent will still consider your conquering his planet as *casus belli* and immediately declare war on you (see Chapter 11).



**HINT** *Whenever the other player forms a new colony, incite rebellion there. With only two population points present, combined with the fact that you will always incite at least one point with every attempt, you will get that colony to revolt automatically. So what? You think that it's just a worthless colony, right? Read the next section...*

## REBELLIONS

Planets rebel when spies incite 50 percent or more of their population or when a random rebellion event occurs (see Chapter 14). Rebellions are nasty for the empire they are rebelling against for several reasons, including:

- Rebelling colonies contribute no production.
- Rebelling colonies contribute no votes at a Galactic Council meeting.
- Troops must be dispatched to crush them.
- They may spread their rebellion to other planets within the owner's empire.

## THE SPREAD OF REBELLION

Each turn, every planet in your empire has a 1 percent chance of rebelling per colony in your empire that is currently in rebellion. Thus, if you had two colonies in revolt, each turn every planet in your empire is checked with a 2 percent chance that, *poof!*, it also revolts. This could be brutal and it is a most compelling reason not to let rebellions fester. You can't negotiate with rebels—crush them immediately!

### HINT

*Always use superior numbers when sending troops to combat rebels. This is because (1) rebels will always have your latest ground combat technology (even if it was discovered after they rebelled), so you will never have an advantage there; (2) they are defending, so they will always have a +5 bonus for ground combat (see Chapter 8); and (3) you will want survivors after the battle to join the nonrebellious populace to help get the planet's economy back up to speed as quickly as possible.*

## COMPUTER PLAYER REBELLIONS

Beyond inciting rebellion against computer player colonies through spies (or hoping that they get hit by the random rebellion event), computer players have an inherent handicap that you do not. Each turn, each computer player's empire is checked against a 1 percent chance that a single colony will spontaneously combust into revolution (i.e., for no other reason than that they failed this check). If it is within scanning range at the time it occurs, the GNN Newsdroid will announce it.

When half (rounded down) of a computer player's colonies are in revolt, their leader is overthrown and all revolts in that empire

immediately end. Their colonies then peacefully and immediately rejoin the empire and its new leader. This new leader will have a randomly generated personality, according to their racial characteristics (see Chapter 13), and an objective based on their empire's current needs. For example, if they're behind militarily, expect that race to adopt a militarist objective (see Chapter 11). This is the only time that computer player leaders will change during a game (exception: see the Cheat Keys section of Chapter 15).

When a computer player's empire goes through this change in leadership, all of its trade agreements and treaties are broken (and they will suffer an oath breaker penalty for each), and their diplomatic ratings will shift with each player to a new value halfway (rounded down) between their present diplomatic rating and zero (see Chapter 11 for all of the political details).

## REBELS, DEATH, AND POPULATION GROWTH

For the curious among you, when a colony in rebellion suffers casualties from bombardment, random events, land attacks from outside that empire, and so on, rebel population points will die in proportional numbers. Thus, if half a planet's population points are rebels, they will take half the losses when the planet is bombarded from space.

Population growth still occurs on planets in revolt. Population points added from normal growth, however, are added only to the non-rebel population. Rebel population points on a planet in revolt can never increase (they're probably too busy talking politics to reproduce) but, as long as even one rebel population point



survives, that planet stays in revolt and all of the other population points there remain hostages of the revolution.

### **SPY OPERATIONS, STEP 4: POLITICAL CONSEQUENCES**

First, if a spy confesses, the player sending that spy will suffer political damage with the empire that caught the spy. Second, if no spies confess within an opponent's empire that turn, and at least one spy succeeding in its mission can frame another race, then the framed player will take the political heat for the all those spies' actions within that empire.

If neither of the above two conditions exists, and a spy that has been correctly identified from Table 12-1 (i.e., the result is between 31 and 50) then proceeds to complete its mission successfully (i.e., it actually blows something up, incites rebels, or helps steal a technology), the player who sent that spy will suffer the diplomatic wrath of the empire being spied on.

Because of the order of these "who gets the blame" priorities, having a spy that succeeds be one that can frame another race will always take precedence over a different spy that was correctly identified. There is no political damage if spies are simply eliminated or otherwise not successful in their mission.

### **ASSESSING THE POLITICAL DAMAGE**

How upset will another race get? That depends. If the successful spy was conducting an espionage operation, then the offended player will roll 10 d3 dice and deduct that many Diplomacy Points from their Relations bar. This will net between -10 and -30 DPs due to that

spying incident, with a bell curve average of -20 DPs. This penalty is essentially *doubled* when the matter concerns a sabotage operation, following which the offended player rolls 20 d3 dice for a -20- to -60-DP penalty range—*ouch!* (Diplomacy Points are explained in Chapter 11.)

### **FRAMING OTHER RACES AND BEING FRAMED**

Races are no less irate when another race is framed, no matter who framed whom, as shown in Figure 12-10a and b. The player who was framed "did it" in the eyes of the aggrieved race, and will pay the full diplomatic penalty for that successful act of spying against them.

When another race is framed, it will be from a list of two other players with whom the victim's empire has established contact. If they are not in contact with at least two other races besides the one attempting the frame job, then that frame job cannot take place. Instead, the aggrieved empire will have no clue about who just successfully spied against it, even if a different spy was successfully identified (i.e., the ability to frame another race shields a careless but successful spy that was identified, even if the framing attempt cannot actually be made due to the victim's empire not being in contact with at least two other races).

### **SPY OPERATIONS: AN EXAMPLE**

Suppose you are spying on the Mrrshans, just for the fun of it, hoping to sabotage their three missile bases on a planet that you're ready to attack. You have a trade agreement with them, but don't want to break it to declare war, so you would be just as pleased if they notice your spies'

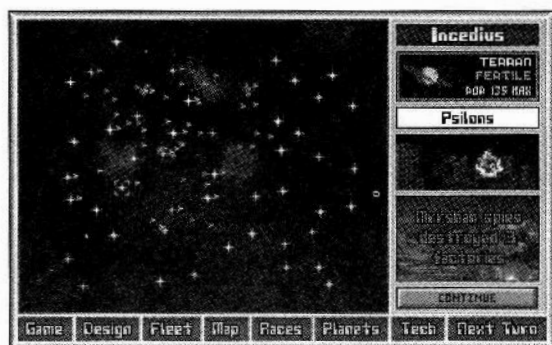


Fig 12-10

Framing another race for your spies' successful efforts

success and declare war on you, thus saving you an oath breaker penalty (see Chapter 11).

You have three spies operating within their empire this turn, and the Mrrshans begin by rolling for each of them, as per Table 12-1, to decide their fate. Because your computer technology level is higher than theirs by six, the only modifier they have in Table 12-1 is +10 for their own security spending. (How much computer players spend on security is explained in "Computer Player Security Allocations," on page 283).

The three die rolls, after modification, are 29, 47, and 92. Thus, one spy is cleared to infiltrate and was undiscovered (29), the second is cleared but will be identified if it successfully completes its mission (47), and the third one was eliminated at this point (92).

Your two spies that were cleared to attempt infiltration then go on to roll on Table 12-2. Because your computer technology is currently six levels higher than the Mrrshans', you get a +6 modifier for each roll your spies make. The

first, undetected, spy craps out with an adjusted roll of 11. The second, identified, spy, however, rolls an 85—barely enough to continue and attempt its mission.

Although you already had it in mind to blow up the missile bases of a particular planet, you take a moment to click around the Galaxy Map and check out all of the Mrrshans' other colonies. Discovering that no target looks better than your first choice, you select that colony and click on the Bases button.

Because your weapons technology level is currently 42, Table 12-3 shows that the spy will get five attempts to sabotage the Mrrshan missile bases, each with a 50 percent chance to destroy a single base. As luck would have it, you roll hot and can destroy four missile bases. Because there were only three there, however, that is all you destroyed.

Now, as this spy was identified at the outset from its roll on Table 12-1, and because it successfully completed its mission (had it failed to blow up any missile bases, its mission would not be considered successful) but was unable to frame another race for it when rolling on Table 12-2, the Mrrshans get steamed at you and roll to see how angry they will get. They roll 20 d3 dice and their total equals 44. Consequently, the Mrrshan love nub drops 44 points on their Relations bar, putting you about halfway into the red zone with them.

This 44-point drop in relations, however, irks the Mrrshan leader enough to warn you to stop spying on them. But because you already had a previous threat outstanding, this second threat becomes a declaration of war against you instead (see Chapter 11).

Now you've done it—destroyed all the missile bases on a planet that you're ready to launch

an attack against and gotten the Mrrshans to declare war on you, so that you don't have to break your oath to declare war on them. Rather neat, eh? Sometimes things work out. (Just make sure that you can win the war now!)

### EFFICIENT SPYING

After analyzing the numbers, we have come up with Table 12-4, which shows that putting more spies to work in another player's empire is not always the best way to go. This is due to the greatly increasing expense incurred by adding additional spies and because one of those spies might confess and blow it for all of the other spies operating there that turn (see Table 12-1). In other words, there is a point of diminishing returns when purchasing spies.

Table 12-4 shows the percentage chance of successfully infiltrating one or more spies within another race's empire that turn, based on the number of spies you have operating there and

their advantages (if any) over those spies. For example, you guesstimate from your last look at their Report screen that the player you're spying on is probably six or so levels ahead of you in computer technology. After reading this chapter, you decide that enemy spying activity in this player's empire is fairly light, so their security level percentage is probably around 10 percent. This gives you a total negative modifier of 16, so you look at Table 12-4 and consult the row labeled 15 under Negative Modifier. Table 12-4 tells you how many spies you should operate against this player: one spy would have slightly less than a 35 percent chance of successfully infiltrating that turn (because your negative modifier is 16, which is slightly worse than 15, the line you're looking at). With two spies, the chance that one or both of them will infiltrate that turn rises to 46.6 percent, and with three spies at least one (and maybe more) has a 47.5 percent chance of infiltrating that

**Table 12-4** Spy Infiltration Success Percentages<sup>a</sup>

Negative Modifier <sup>b</sup>	Number of Spies Attempting to Infiltrate									
	1	2	3	4	5	6	7	8	9	10
0 or less	50.0	74.8	85.3	90.3	92.3	92.8	92.5	91.9	91.2	90.4
5	45.0	64.4	71.3	72.3	70.6	67.6	64.2	60.6	57.1	53.8
10	40.0	55.2	58.7	57.0	53.0	48.3	43.6	39.0	34.9	31.1
15	35.0	46.6	47.5	44.0	39.0	33.8	28.8	24.5	20.7	17.4
20	30.0	38.4	37.5	33.2	28.0	22.9	18.5	14.8	11.8	9.4
25	25.0	30.8	28.8	24.2	19.4	15.0	11.5	8.7	6.5	4.8
30	20.0	23.6	21.1	16.9	12.8	9.4	6.8	4.8	3.4	2.4
35	15.0	17.0	14.5	11.0	7.9	5.5	3.7	2.5	1.6	1.1

<sup>a</sup>Results are the percentage chance of having one or more spies successfully infiltrate that turn.

<sup>b</sup>The Negative modifier is the number of computer technology levels you are behind the race you're spying on, plus their security rating percentage (i.e., the total number of negative modifiers working against your spies' chances to infiltrate successfully).

turn. After that, when you add more spies, the chance that one or more of them will successfully infiltrate actually *decreases*.

Therefore, never send more than three spies under these circumstances. Furthermore, because the third spy purchased that turn costs double what the second spy did, and increases your chances of successfully infiltrating by less than 1 percent, it's far more economical to operate with two spies in that empire, instead of three.



**HINT** *Because each additional spy costs twice as much as the previous one, you should generally adjust the Spy slider bar so that you'll have two or three spies operating within another player's empire each turn, maximum. That is, generally, where the point of diminishing returns really begins.*

## COMPUTER PLAYER SPYING PRACTICES

Let's start out with the basics of this rather complex topic. First, unless they are at war, computer players will not even bother with spies before game turn 50 (i.e., year 2350). Second, there are certain automatic conditions that will immediately alter a computer player's spy expenditure level against another player.

Specifically, when a computer player is at war with another race, it will immediately spend the equivalent of between 80 and 100 percent of the appropriate Spy slider bar (i.e., between 8 and 10 percent of their gross economy) on spies to be used against their enemy. When a peace treaty is enacted, the computer player instantly reduces its spy expenditures against its former enemy to zero. Additionally, their existing spies go into hiding during peace—a

condition that is enforced as long as the peace treaty is in place (see Chapter 11 for matters of war and peace).

## "SPY WARS"

Computer players think of spying on each opponent in terms of their Spy Wars level with that player. Each warning or declaration of war that an alien race makes against an opponent increases their Spy Wars level with them by one. Unlike their treatment for purposes of declaring war on an opponent, these threats are not negated by a subsequent attack (see Chapter 11). Instead, the computer player's *threat count* for Spy Wars purposes is reset to zero only when a peace treaty is adopted.

## SPY WARS LEVEL 1

A computer player will be at Spy Wars level 1 if their current threat count against that player is zero or one. At Spy Wars level 1, that computer player will not spy on another player, and any current spies operating there will go into hiding, if either of the following conditions exist:

- That computer player has amiable or better relations with them (i.e., +19 or higher on the Relations bar).
- That opponent's security die roll modifier for Table 12-1 is +20 or greater. (Yes, the computer players get to cheat and know what you're spending on security. Don't worry, though, you'll find out how to estimate their spying and security expenditures in "Computer Player Security Allocations," on page 283).

If neither of these conditions exist, that computer player will check to adjust their spy

spending level normally, as described a little further on. At Spy Wars level 1, spies will only conduct espionage missions.

### SPY WARS LEVELS 2 AND 3

When a race's threat count with another race rises to two, they move up to Spy Wars level 2 against that race. Similarly, a threat count of three or more will take them to Spy Wars level 3. At these Spy Wars levels, the amiable relations and high opponent security spending restrictions are removed; computer players will spy on players despite these conditions at Spy Wars levels 2 and 3.

At Spy Wars level 2, there is a 75 percent chance that the computer player's spies will conduct espionage operations against its opponent, with a 25 percent chance for conducting sabotage operations instead. At Spy Wars level 3, these percentages are reversed, and that computer player's spies will attempt sabotage missions 75 percent of the time and espionage the other 25 percent. This espionage/sabotage decision is made each turn that any spies successfully infiltrate the opponent's empire.

### NO NEWS IS NOT GOOD NEWS

Many players seem to grow complacent during peacetime, when they hear of no enemy spies stealing their technology. Don't worry, they are! Like your spies, they succeed only occasionally and are usually unidentified. Remember, they are identified only when they roll a 31-50 on Table 12-1 and succeed in stealing one of your technologies. Only then are you notified which technology has been stolen, and by whom, as shown in Figure 12-11. Remember, spies who conduct sabotage often announce their activity that turn with blown-up factories and bases.

Those that steal technology will do so very quietly and, usually, unbeknownst to you. Stay paranoid, friend. Their spies really are operating behind your back!

### ASSESSING SPY NEEDS

Computer players always reevaluate their spy expenditures after their scientists discover whatever technology they were working on (see Appendix A, Section VIII). The base percentage chance that they will send spies out against another player is equal to the sum of their racial objectives Base Spy rating (see Table 12-5), the reverse of their current Diplomatic Relations value, and the reverse of their leader's Personality modifier (see Table 11-4).

For example, say the Sakkra leader is an aggressive expansionist. Once they reallocate their technology spending after discovering the item they were researching, they check to see if they will spy on each of the other races they've contacted. Their Base Spy rating is 20 for having an expansionist racial objective. To this is added the reverse of their Aggressive leader's



**Figure 12-11**

Rarely are you notified of the other player's espionage success.



modifier, making their normal -10 rating a +10 by this formula. Finally, to this is added the reverse of their current Relations value with the race they're checking on. Let's say it is the Humans, and that they currently stand at +11 on the Relations bar. The reverse of +11 is -11, so the sum would be  $(20 + 10 - 11)$ , or 19. Therefore, the Sakkras would have a 19 percent chance of actively spying on the Humans until the next time this spy check is made (i.e., after their next research spending allocation) or a declaration of war or a peace treaty occurs.

### SPY EXPENDITURES

If a race passes a spy check (i.e., rolls the check percentage number or less on a d100 roll), they will allocate a random 8 to 10 percent of their gross economic output toward spying on that race. If they fail some future spy check against a player or a peace treaty is declared with that race, the spies they currently have in that player's empire go into hiding and will remain there until they resume spying at some future time (assuming they survive until then).

### COMPUTER PLAYER SPY MISSIONS

If a computer player decides to spy on another race, they will conduct espionage only, unless they are at war with them. If there is no technology that they can steal (i.e., they already have everything their opponent has discovered), the spies hide until a "stealable" technology is developed.

When conducting sabotage against another player, computer players always go for the

**Table 12-5** Racial Objectives Base Spy Rating<sup>a</sup>

Racial Objective	Base Spy Rating
Diplomatic	40
Ecologist	20
Expansionist	20
Industrialist	30
Militarist	30
Technologist	40
Any objective while at war <sup>b</sup>	40

<sup>a</sup>Psilons and Darloks have their Base Spy ratings modified by +10 and +30, respectively.

<sup>b</sup>"At War" means currently at war with any race. This can increase a computer player's spy activity with every race, even those with whom it is not formally at war (exception: when a peace treaty is in force, a computer player's spying expenditures against that player stay at zero and their surviving spies remain in hiding).

missile bases on any enemy planet that they have targeted for an attack. Such missile base sabotage is a red flag, warning you of where a computer player is directing its offensive efforts and that a formal fleet attack will likely soon follow.

If a computer player conducting sabotage does not have an enemy colony currently targeted for attack, a random colony within the victim's empire is chosen instead. There is a 25 percent chance that they will incite rebellion there; otherwise they will destroy factories or missile bases with an even chance of choosing either (unless they are likely to overkill the bases, in which case they tend to destroy factories instead).

## COMPUTER PLAYER SECURITY ALLOCATIONS

Computer players automatically spend enough to raise their security rating by 1 click on their Overall Security bar for every spy that is currently actively operating (i.e., not hiding) within their empire (yes, they cheat and get to know how many there are), up to the normal maximum of 20 clicks. Thus, enemy spies each increase a computer player's gross economic spending on security by 1 percent and modify their Table 12-1 security die roll by +2 each.

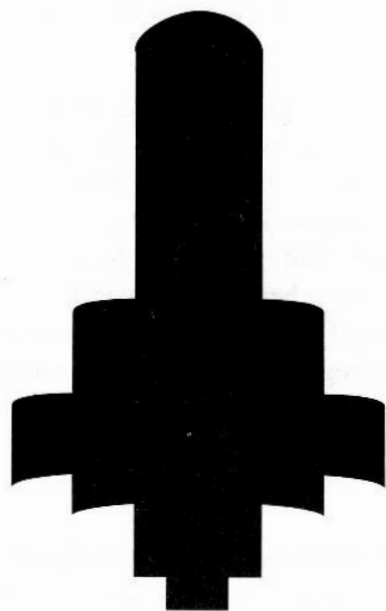
Remember, computer players cheat when it comes to allotting their resources to security against spies. They get to know how many spies there are in their empire and adjust their security spending accordingly (whereas you have to guess). Perhaps this makes up for the fact that one of their colonies could spontaneously revolt on any turn, whereas yours cannot.

## BEHIND THE CLOAK AND DAGGER

Now you know the secret game within a game of spies and counterspies in *Master of Orion*. The efficient use of spies can benefit any player, but the penalties for their being caught are high, indeed. Thanks to this, however, framing another race for your covert coups can be a windfall opportunity by starting a war between two races.

Behind every great spy, however, is the empire it serves. In *Master of Orion*, these empires are those of the 10 great starfaring races, each with their own strengths and weaknesses. To learn about racial abilities, seek the next chapter. ♣

13



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*Races*

*The time may have come when the issue of race could  
benefit from a period of "benign neglect."*  
—Daniel Patrick Moynihan

↓ Every player in *Master of Orion* is in a unique position by virtue of the special abilities and liabilities their race. Vying for control of the galaxy are 10 spacefaring races, each with a special ability that gives them an advantage over every other race. Many races have weaknesses, too. The trick, therefore, is to play up your race's strengths in the game and compensate for its weaknesses while minimizing the strengths and exploiting the weaknesses of opposing races. This chapter helps you do this.

## GENERAL INFORMATION

There are certain characteristics that define each of the 10 player races in *Master of Orion* besides their special abilities. Each race will have listed, in its Basic Information Box, the following:

- The personalities of its leaders
- Its racial objective
- Its starting diplomatic relations with each of the other races, if other than neutral
- Its technology sector aptitude, if other than average
- Its preferred ship hull size

The first three items on this list are all explained in Chapter 11. The fourth item, on technology, is covered in Chapter 10. The matter of preferred ship size is determined by a d12 die roll made when that race designs a new ship type (see Chapter 9), as shown in Table 13-1.

In addition to each race's Basic Information Box is a general description of that race, followed by an examination of its military, economic, and political strengths and weaknesses. This provides the information you will need when either leading or combatting these races.

**Table 13-1** Determination of Each Player's New Ship Design Hull Size

d12 Die Roll <sup>a</sup>	Ship Hull Size
1	Small
2-4	Medium
5-9	Large
10-12	Huge

<sup>a</sup>Die roll modifiers:

- -3 if Alkari or Klackon
- +3 if Bulrathi, Meklar, or Silicoid
- +2 for all computer player races if you have ships currently in play that are equipped with pulsars

## ALKARI

When you're given the birds, prepare for a fight (i.e., combat is for the birds). With few friends and many enemies in the galaxy, the Alkaris have no economic advantages to turn to for victory. For them, the game hinges on success in battle, where their natural flying and hunting instincts are an effective combination.

## MILITARY INTELLIGENCE

Because all Alkari ships receive +3 Defense levels (see Table 7-3) and +3 to their initiative ratings (see Chapter 7), they will tend to move and shoot first in battle and, should opposing ships survive the Alkaris' initial barrage, be darn hard to hit with return fire. Alkari ship designs should push these advantages to their furthest possible extremes. Smaller designs with high maneuverability, accentuated with a Battle Scanner and Inertial Stabilizers or Nullifiers, can take their initiative and Defense levels to previously unimagined heights. Other defenses, such as shields, armor, ECM, and defensive

### Alkari Basic Information Box

Leader probabilities:	60 percent Honorable, 20 percent Pacifist, 20 percent Erratic
Objective tendency:	50 percent Militarist, 10 percent each other objective type
Preferred ship size:	Small
Excellent at researching:	Propulsion
Poor at researching:	Force fields
Favorably disposed:	Humans
Unfavorably disposed:	Darloks, Klackons, and Sakkras
Loathe:	Mrrshans

special devices can be deemphasized in Alkari ship designs. (Who needs them when you're naturally hard to hit in the first place?)

Alkari combat tactics should focus on swarms of smaller ships, each armed to the teeth, closing rapidly and dealing massive destruction with strong beam weapons and short-range offensive special devices. In other words, get in close and hit hard with overwhelming numbers.

Certain enemy ship designs and weapons can counter the Alkaris' innate advantages. Huge ships with repair specials can be quite difficult for Alkari swarms to take out. Streaming weapons, such as Graviton and Tachyon Beams, hyperaccurate Megabolt Cannons, and Scatter Pack Rockets make effective anti-Alkari weapons. Specials that are good for hunting these birds include Subspace Teleporters (to supersede the avian's fire and movement advantages in combat), Warp Dissipators and Repulsor Beams to slow them down and keep them from

using their 1-square range beam weapons freely, plus stream projectors and pulsars to wipe out the largest stacks with a few well-placed shots.

### POLITICAL COMMENTARY

It's a good thing the Alkaris can fight, because they have a lot of enemies out there, and the warlike Mrrshans are the first among them. While the Alkaris tend to prepare for war with their racial objective tending toward militaristic, having an Honorable leader can put them at a severe disadvantage. Such Honorable leaders tend to get themselves into feuds that are slow to settle and quick to reignite. The Alkaris can usually be kept as an ally by the races they do not dislike, and should be. It is much better to have the Alkaris fighting with you than against you.

### ECONOMIC OUTLOOK

There is nothing remarkable about the Alkari economy except that they will tend to spend a healthy portion of it on ship building and maintenance to take advantage of their military prowess.

### BULRATHI

The Bulrathis are good at forging the tools of war and have a natural gift for winning land battles due to their tremendous physical strength.

### MILITARY INTELLIGENCE

Because they have a knack for construction and weapons research, the Bulrathis will usually enter into a space battle with the technical resources to inflict punishment on other players. With their primarily large- and huge-hulled ship designs, the Bulrathi navy is likely to be



**Bulrathi Basic Information Box**

Leader probabilities:	60 percent Aggressive, 20 percent Ruthless, 20 percent Erratic
Objective tendency:	50 percent Ecologists, 10 percent each other objective type
Preferred ship size:	Large
Good at researching:	Construction and weapons
Poor at researching:	Computers
Favorably disposed:	Humans
Unfavorably disposed:	Darlocks and Mrrshans

few in numbers but always loaded for bear (hmm... bad metaphor).

It is in ground fighting that the Bulrathi excel. Their natural strength gives them an extra +25 (not +20 as the *Master of Orion* manual indicates) in every land battle. This works out to a +20 advantage when attacking, or about a 2:1 kill ratio, because defenders always receive a +5 for knowledge of the terrain being fought over. The Bulrathis are truly bears on defense, however, because they then receive both bonuses for a combined defensive advantage of +30, giving them about a 3:1 kill ratio if all other factors are even (see Table 8-7 for land battle kill ratios).

Therefore, when playing as the Bulrathis, build fleets ample enough to gain space superiority over an enemy colony and then send in your troops to capture it intact. Not only will this save you a lot of money in developing new conquests, but you might also steal some much needed technology.

The Bulrathis must protect their population points from destruction at the hands of an enemy fleet. Therefore, being a little paranoid about building enough missile bases is a good idea, as is leaving an ample reaction force to counter enemy raids over your colonies. Every Bulrathi population point is another nail in an enemy's coffin, so raise them in abundance (a large, poor world is still ideal for growing soldiers) and preserve them for their primary mission—fighting land battles.

**POLITICAL COMMENTARY**

In matters of politics, the Bulrathis are not remarkable. Although their leader's temper will tend toward the nasty side, you should be able to deal with it. The Bulrathis tend to be slow to anger and slow to embrace you (bear hugs!). If you're reasonably careful not to upset them, you should be able to get the treaties and technologies you want from them without resorting to war.

In covert matters, the Bulrathis are an inferior race. Their poor computer research ability often leaves them with a lower computer technology level when compared to the other players. This translates to their spies receiving no advantages when attempting to infiltrate and makes enemy spies difficult for them to catch without investing considerable resources into internal security. See Chapter 12 for details.

**ECONOMIC OUTLOOK**

Because they tend to be ecologists, computer Bulrathi players will focus their economy on building up their planets until they are at war with someone. This usually finds them in wars with a healthy economic base and able to sustain their war effort better than most. Generally,

### Darlok Basic Information Box

Leader probabilities:	60 percent Aggressive, 20 percent Ruthless, 20 percent Erratic
Objective tendency:	50 percent Diplomat, 10 percent each other objective type
Preferred ship size:	Average
Good at researching:	Computers
Poor at researching:	None
Favorably disposed:	Humans
Unfavorably disposed:	All other races

they're not one of the faster expanding races, but it's not wise to look like Goldilocks when their empire is seeking the porridge of new colonies to take over. Because of their tendency toward internal development during times of peace, the Bulrathis grow more dangerous in peace than in war. If the Bulrathis are your neighbors, it is a good idea to keep them busy fighting some third party if you're able to, just to keep their economy from running too smoothly.

### DARLOKS

To misquote the old saying, "There are spies, damn spies, and Darloks." While they have few friends, their gift of framing other races for their own covert misdeeds will cause a galaxy of agitation and perpetual angst. If the Darloks single you out for a full-scale spy offensive, try to hang on!

### MILITARY INTELLIGENCE

There is not much remarkable about the Darloks' war effort in terms of space battles or

ground fighting. Their propensity for computer technology research will likely give their weapons more of a chance to hit and help them dodge missiles and bombs with their high ECM, but that's about it.

### POLITICAL COMMENTARY

It is in the political arena where the Darloks are true terrors. Because all other races naturally dislike them except for the Humans, it will take considerable time and, usually, more than a little tribute before getting them to cooperate with you politically. When at war, however, expect the Darloks eventually to mount a major offensive with their spies and cause sabotage that will cross your eyes. Even when not at war with them, it takes little to provoke them into threatening other races and, therefore, escalating their Spy Wars level (see Chapter 12).

When you play as the Darloks, you should not do differently. Because their spies are half price and are superior at infiltrating an enemy's empire (and then framing others), they should be used extensively (but see Table 12-4). You can divert resources from research to espionage, simply to steal the technologies you need from the other races rather than waiting for your scientists to discover them. On matters of security, it is all but impossible to infiltrate the Darlok Empire.

As leader of the Darloks, strive to stay ahead of the other players in computer technology and steal new computer technologies at every opportunity to help you maintain as great a lead as possible. This further increases your spies' advantages, allowing them better chances to infiltrate the enemy and prevent the enemy from penetrating Darlok security. Press your spies' advantages to their maximum by taking

advantage of the ease with which the Darloks can conduct (and steal) computer technology research. Weapons research, to improve the blows delivered through sabotage, should be an important, secondary research area for the Darloks.

Because of their evil disposition, once you're in a war with the Darloks, expect it to last. As for their spies, there are only two ways to counter them effectively. First, you can beef up your per-turn security spending. Second, and more to the point, you should hammer their economy by reducing their richest planets to ashes. This will give them less money with which to purchase spies, and give you a victory impressive enough to get them to the peace table (see Chapter 11).

If you want to be the Darloks' friend, remember the Diplomacy Points you can earn by attacking their enemies (and there will be plenty of those to choose from!). One way to help you win the game is to influence the balance of power in the galaxy so that you're nominated at the Galactic Council and you will be running against the Darlok leader. Because the Darloks are so hated, you should be a shoo-in at the election!

## **ECONOMIC OUTLOOK**

When played by the computer, the Darloks will have a tendency to manage their economy erratically. They're not likely to quickly build themselves into any kind of economic superpower and, in fact, should not be able to withstand a long, protracted war of expensive space battles and ground combat. If you can take what their spies dish out, chances are that you'll be able to give better than you get in the real fighting and you should be able to break

the Darloks' economic back by persistently doing so.

## **HUMANS**

It is nice to be liked, and the Humans are well liked (who ever said that aliens were good judges of character?), giving them advantages in all matters political and in the Galactic Council. There is more to being Human than wearing a smiley face button on your lapel, however. Humans are also expert traders and can make their fortune quickly through trade.

## **MILITARY INTELLIGENCE**

They are unremarkable fighters in space and on land, and only when they have an Erratic leader will Humans ever resort to using biological weapons against an enemy. Humans are not afraid to use spies, however.

## **POLITICAL COMMENTARY**

Here is where the Human race shines. First of all, they receive double any permanent, positive Diplomacy Points they earn (see Table 11-2).

Second, the Human race receives a +60 bonus to all of their treaty, trade, and technology exchange temporary modifiers when offering these deals to other races. This bonus does not affect the temporary Diplomat Gone modifier, nor does it lower the minimum current diplomatic level required with another race before they will accept certain agreements. All of these elements of diplomacy are detailed in Chapter 11.

Third, Human players strongly attract the votes of undecided leaders at Galactic Council meetings (see Chapter 4). Because Humans will tend to have the most allies in the first place,

### Human Basic Information Box

Leader probabilities:	60 percent Honorable, 20 percent Pacifist, 20 percent Erratic
Objective tendency:	50 percent Diplomat, 10 percent each other objective type
Preferred ship size:	Average
Excellent at researching:	Force fields
Good at researching:	Planetology and Propulsion
Poor at researching:	None
Favorably disposed:	All other races
Unfavorably disposed:	None

having the added ability to strongly influence undecided votes makes them much more likely to win a closely fought game.

Therefore, when playing as the Humans, deal, deal, deal! Use the Races Display screen every two or three turns and play the diplomatic game like the virtuoso you are. As the Humans, you can cherry pick your allies from among all the other players in the game and, thus, line up their votes in the Galactic Council or cause them to declare war on each other with the greatest of ease—even when it involves treacherously breaking their treaties to do so. It is much easier for the Humans to concentrate their war effort against one enemy race at a time. Furthermore, if they're ever in trouble during a war, their +60 bonus for getting a peace treaty accepted gives them a fairly safe out whenever they need it.

To deal with the Human menace, you must strive to keep them out of the running for Galactic President (i.e., see to it they are beat

down to having no greater than the third largest population). Frame them whenever possible and give whatever tribute is necessary to get their allies to stab them in the back. Use every advantage you have against the Humans to keep their empire small and insignificant. If it grows, you'll probably be looking at a losing position in the game.

### ECONOMIC OUTLOOK

For the Human player, trade is everything. When you trade with him, be careful not to establish too large a trading amount, for the long deficit you will carry is considerably more expensive than the quick profits the Humans will make. Conversely, when playing the Humans, always negotiate the highest possible trade deals you can, and keep checking to see if they can be increased. This is because the Humans get a +25 percent trade bonus, meaning that every new deal begins at only -5 percent and can rise all the way to +125 percent in value. It is common, when peacefully playing the Humans, to substantially increase your per-turn gross income, over time, through trade. Do so.

### KLACKONS

Klackons have one goal in life: to work. No one can get a new colony off the ground more quickly than the industrious Klackons.

### MILITARY INTELLIGENCE

The Klackons have a propensity for small ship designs. Because they also have a propensity for discovering new construction technology, their ship designs will, generally, have more space available to them—so look for the Klackons to have a little extra oomph with every new

### Klackon Basic Information Box

Leader probabilities:	60 percent Xenophobic, 20 percent Ruthless, 20 percent Aggressive
Objective tendency:	50 percent Industrialist, 10 percent each other objective type
Preferred ship size:	Small
Excellent at researching:	Construction
Poor at researching:	Propulsion
Favorably disposed:	Humans and Silicoids
Unfavorably disposed:	Alkaris, Darloks, Mrrshans, and Sakkras

design. Because they are slow to develop propulsion technologies, though, their ships are likely to be neither fast nor nimble. This is one of their two inherent weakness, along with their naturally dislikable nature, which you must exploit if you're to deal with their strengths.

When combatting them, know that the only good Klackon is a dead Klackon (or, to put it a different way, "Dead Klackons make no RPs [resource points]"). Using biological weapons against the Klackons, therefore, is particularly devastating because of their double whammy, both killing population points and ruining a planet's maximum population level until it is terraformed back up to snuff. In other words, ants were made to be sprayed with Raid (provided you can take the political heat).

### POLITICAL COMMENTARY

Because Klackon computer players will always have bad dispositions and start with a natural dislike of about half the galaxy, they will find

themselves in plenty of wars. Also, it is generally easy to provoke them into declaring war on you so as to avoid oath breaker penalties (see Chapter 11). Some diplomatic care will be needed when you are playing the Klackons to keep multifront wars from developing.

When you are combatting them, it is usually possible to get crusades started against the vile Klackons and force them into fighting multiple-front wars against several players at once. Keeping the Klackon Empire's attrition rate high is vital if you are to keep their strong economic advantages in check.

### ECONOMIC OUTLOOK

When they're not at war, the Klackons' industrialist tendencies will lead them to develop a mighty economy very quickly, indeed. Because all of their workers produce twice as many resource points per turn as other races, something very interesting occurs.

Worker productivity increases for all players with every new planetology technology level reached, as shown back in Table 5-1. Because the Klackon workers are twice as productive, you'll need to refer to Table 13-2 (instead of Table 5-1) to determine their productivity.

What this means is that, at planetology Tech level 50, the Klackons' production bonus will equal that of the Meklars' (with their +2 factories per population point advantage). Beyond planetology Tech level 50, the Klackons can actually derive more RPs from a planet than the Meklars can. Regardless, Klackons should always generously reinforce new colonies with transported population points, because their workers can develop them quickly, adding many RPs per turn with no initial pollution. The trick for the Klackons, of course, is to develop



**Table 13-2** Klackon Worker  
Productivity by Planetology Technology  
Level

Planetology Technology Level	Number of RPs Produced per Klackon Worker
8	1.48
17	2.02
25	2.50
33	2.98
50	4.00
67	5.02
83	5.98
99	6.94 (the maximum)

planetology as quickly as possible and to protect the Klackon population from the ravages of war (something that their computer leaders are not particularly good at).

## MEKLARS

Factories and lots of them, that's the Meklar way. Beware, however, when playing as the Meklars. The mighty sword of increased factory building has edges that cut both ways.

## MILITARY INTELLIGENCE

Although there is nothing special about the Meklars in space or land battles, their preference for large ships and excellent computer technology research will have consequences. Expect them to build large ships with superior Battle Computer and ECM technology. The Meklars are also likely to be the first to develop the Oracle Interface and they will get a lot of

## Meklar Basic Information Box

Leader probabilities: 60 percent Erratic,  
20 percent Honorable,  
20 percent Ruthless  
Objective tendency: 50 percent Industrialist,  
10 percent each other  
objective type

Preferred ship size: Large

Excellent at researching: Computers

Poor at researching: Planetology

Favorably disposed: Humans and Silicoids

Unfavorably disposed: Darloks and Sakkras

use out of it, too, for the Meklars tend to get into some unusual war situations.

When playing as the Meklars, you must protect your large, factory-endowed planets at all costs. If an opponent should capture all those factories in a land battle, they will steal so many of your technological secrets that you will weep and rust. Conversely, when playing against the Meklars, their planets are particular prizes for all of the factories they contain.

## POLITICAL COMMENTARY

The Meklars are the only race that actually tends to have an Erratic leader. Because they might be at your throat this turn, and your feet the next, do not expect any condition between your races to last too long, be it war or some sort of treaty. Erratic leaders need no rational reason for declaring war on someone and, when fighting the Meklars, as their economy shifts to wartime production and technology research, they can rapidly build a credible war effort. If you are playing as the Meklar race, there is little

remarkable about their political situation, except that they're the only race favorably disposed toward the Silicoids (other than the Humans, of course).

## ECONOMIC OUTLOOK

Here is the Meklars' greatest strength and, within that strength, their greatest weakness. The Meklars can always build and operate two more factories per population point than other races can. In the beginning of the game, this can give them impressive economic dominance as each of their planets will be producing nearly twice as much per capita as those of other players of equal size. As the game progresses, however, and all players increase their Robotic Controls, the Meklar production edge becomes less significant because all planets will be able to produce fairly high amounts of RPs every turn.

And with factories come problems. Factories are expensive, for instance, and they pollute. A single transported or destroyed population point off a Meklar colony could leave several factories idle, thus greatly increasing the opportunity cost for the Meklars to move their population points about. These problems must be overcome with construction and planetology research, the latter being a particular foible of the Meklar race. Always go for Improved Industrial Tech (i.e., cheaper factories) before Improved Robotic Controls (i.e., more factories). The Meklars will be building plenty of factories, and billions of credits (BCs) saved in their construction can quickly add up.

When playing as the Meklar race, never lose sight of gaining more planetology technology and keeping your economy running at maximum. Press your economic advantage early in

the game when it is greatest over other races. Also, when you capture planets, know that any factories you conquer will not require refitting for your use, so plan on them being productive fairly quickly.

## MRRSHANS

The Mrrshans is a matriarchal society of killer kitties, sharp in tooth and claw. They can, will, and should come out fighting like the feline Amazons that they are and press the inherent advantages in space combat to their fullest. Interestingly, we've found them to be the most difficult race to win with.

## MILITARY INTELLIGENCE

The Mrrshan should attack, attack, attack! Unless their opponent is using Subspace Teleporters or decloaking, the Mrrshans will almost invariably get the first move and shot against any enemy in battle. This is because they have a natural +4 Attack level rating (see Table 7-3) for all nonspecial weapon attacks. Not only does this increase their initiative by +4 as well (see Chapter 7), but it effectively gives the Mrrshans the fastest draw and deadliest aim in space. When armed with multiple firing weapons (Gatling Lasers, Auto Blasters, Gauss Autocannons, and Pulse Phasors) or weapons that hit all four shields simultaneously (Stellar Converters and Hellfire Torpedoes), their opponents are likely to end up buried on Puss 'n Boot Hill under a mound of kitty litter.

When you play the Mrrshans, the important thing is to aggressively exploit your victorious space battles. This means either destroying enemy colonies completely or, preferably, capturing them. The Mrrshans shouldn't have to resort to hit-and-run raids on enemy colonies.

### Mrrshan Basic Information Box

Leader probabilities:	60 percent Ruthless, 20 percent Aggressive, 20 percent Xenophobic
Objective tendency:	50 percent Militarists, 10 percent each other objective type
Preferred ship size:	Average
Excellent at researching:	Weapons
Poor at researching:	Construction
Favorably disposed:	Humans
Unfavorably disposed:	Bulrathi, Darloks, and Klackons
Loathe:	Alkaris and Sakkras

They should be able to build up and stab an enemy right through the heart or, better still, their fleet assembly point (which, if successfully controlled, will disrupt their war plans against you for some time to come). Wage war offensively, win the battles, and take what you need through conquest.

When fighting the Mrrshans, you'll have to outgun them if you want to defeat them in a starship battle. Superior numbers or technology is the most direct way to undo the Mrrshan's inherent combat advantages. However, there is an indirect way to tame these kitties, and that is by using superior strategy against them. If you can build up a planet-busting fleet and hit those of their planets not heavily guarded by the Mrrshan fleet, you can leave their economic sinews in ruin, thus cutting deeply into their military advantage. Not only will planet busting their empire bring the Mrrshans to the peace table, it will reduce their economy to the

point at which they cannot quickly build new ships or, with luck, even maintain the ones they already have.

### POLITICAL COMMENTARY

Politically, most other races hate the Mrrshans, which is fine because the Mrrshans are spoiling for a fight anyway. Expect the Mrrshans to be quick to fight and slow to make peace unless you are beating them handily. When you are playing as the Mrrshans, use some care in diplomacy so as to avoid fighting wars against several races at once. Other Players' common dislike for you will often lead them to ally, making it difficult for you, both in battle and at the Galactic Council. Winning the game will not be easy for the Mrrshan race. When combatting them, it's usually an easy matter to get others to declare war on the Mrrshans.

### ECONOMIC OUTLOOK

Except for a propensity for military research and production, there is nothing outstanding about the Mrrshan economy. When you are playing as the Mrrshans, rather than spending money on colony ships, consider gaining space superiority over an enemy planet and bombing it down to only a few population points; then go in and capture it. That way, you'll have more money for offensive military vessels, rather than wasting it on short-lived colony ships.

### PSILONS

Left to their own devices, the Psilons can outresearch any other race in the game. They also play the spy game more aggressively than any other player except the Darloks.

### Psilon Basic Information Box

Leader probabilities:	60 percent Pacifist, 20 percent Honorable, 20 percent Erratic
Objective tendency:	50 percent Technologist, 10 percent each other objective type
Preferred ship size:	Average
Good at researching:	All
Poor at researching:	None
Favorably disposed:	Humans
Unfavorably disposed:	Darloks

### MILITARY INTELLIGENCE

The Psilons tend to be peace loving, as this allows them to develop a broad range of technologies. Therefore, they are usually not as well prepared for war as some of the other, more aggressive races will be (i.e., the Alkaris and Mrrshans). However, in a protracted war, after their economy shifts into military production, expect the Psilons' technological edge to reverse any early defeats they might have suffered if they do not bow out and sue for peace. When combatting the Psilons, therefore, go for a massive attack by which you will gain early victories, and then get them to the peace table. Because of the bitter taste of their technology when fully deployed for battle, the Pilon Empire should be swallowed in pieces and not whole.

When playing as the Psilons, it is more important not to let your factories be conquered than it is to conquer other player's factories. The technology that can be stolen from you will severely cut into your technological edge, so Pilon

planets with many factories should be extremely well defended. Because the Psilons have no natural abilities in combat, they must rely on a constant technological edge in order to triumph against more militaristic races.

### POLITICAL COMMENTARY

Slow to make war and quick to make peace, the Psilons prefer to focus their energies on research. The Psilons make excellent allies and, when they are favorably disposed toward you, will almost always be there for a technology exchange if you have anything they might need.

Because the Psilons are frequently spied on, they will tend to keep their security levels pretty high. Also, their technologist tendencies and innate Pilon characteristics tend to make them aggressive players of the spying game as well. Chapter 12 has all of the Spy Wars details. When you are in contact with a Pilon computer player, always maintain at least a modest security level, unless you currently have a peace treaty with them.

### ECONOMIC OUTLOOK

As it is with combat, the Psilons have no economic advantages that they do not have to discover for themselves. However, because they have a triple research bonus, technological advances come quickly for them, and in large numbers. Specifically, when their Limited Research List (see Chapter 10) is made up, they have a base 75 percent chance of having an item on their list (whereas others have only a 50 percent chance). Not only is their Limited Research List longer because they are good at researching every technology sector, but they will require only 80 percent of the normal effort to discover anything they research. If that

weren't enough of an advantage, every planetary RP committed to its technology sector produces 1.5 BCs' worth of technology research spending. This means that they get triple research value on artifact planets and Orion multiplies their research efforts by six!

About the only way to combat the Psilons' great advantages in research is to keep them at war (with other players, preferably). This will shift their spending from peaceful research to more immediate fleet construction. Spying on them usually helps, as does capturing Orion (see Chapter 15) and using its research advantages to help you keep up.

## SAKKRAS

The Sakkra lizards multiply at twice the normal rate of other races (see Table 6-1), even when being cloned. This proclivity leaves them constantly in search of living space and more than able to replace population losses quickly.

## MILITARY INTELLIGENCE

Although not especially adept in space combat, the Sakkras are no slouches, either. Where they excel is in ground combat. Not because they're great fighters like the Bulrathis, but because they can take heavy losses, replace them quickly, and keep coming until they win.

Nothing is more dangerous than hordes of well-armed Sakkra soldiers. Therefore, never give them better troop armor or ground combat technology to use against you. Conversely, when you are playing as the Sakkras, you don't have to worry about getting ahead in the land combat technology race, but you shouldn't allow yourself to fall too far behind, either. Just keep making "lizard wave assaults" until the enemy's population is finally conquered.

## Sakkra Basic Information Box

Leader probabilities: 60 percent Aggressive,  
20 percent Ruthless,  
20 percent Erratic

Objective tendency: 50 percent Expansionist,  
10 percent each other  
objective type

Preferred ship size: Average

Excellent at researching: Planetology

Poor at researching: None

Favorably disposed: Humans

Unfavorably disposed: Alkaris, Darloks,  
Klackons, and Meklars

Loathe: Mrrshans

## POLITICAL COMMENTARY

As it is in nature, creatures that breed prolifically have many natural enemies. The Sakkras are no exception. With only the Humans as natural friends and half the galaxy as natural enemies, the tendency of Sakkra policies toward aggressive expansionism frequently keeps them growing and at war. If they survive, you can expect them to build a very large empire and carve out a considerable number of council votes for themselves. Having them as an ally when they are not running for the Galactic Presidency themselves can usually net you a large voting bloc.

The best way to keep their growth in check is to keep the Sakkras at war with as many other players as possible. Once they start to win friends and influence other computer players around the galaxy, it is difficult to stop them from being nominated and winning elections.



Therefore, keep other players at war with them constantly, whenever you can arrange it.

## ECONOMIC OUTLOOK

The prime economic advantage of the Sakkras is their ability to quickly populate and, therefore, develop every new colony that they start. Because they tend to start new colonies aggressively, watch for them to grow like weeds on every planet in the galaxy that they can reach and have the technology to colonize. If you vaporize an enemy colony, the Sakkras will invariably make a dash for it and try to colonize it before you do.

When playing as the Sakkras, send over population points sufficient to equal about one-third of the planet's maximum population size. It will reach that maximum in no time, particularly because extra population points purchased by the Sakkras through their ecology spending ratio bars are also produced at double the normal rate. Also, keep up your planetary research. Not only will it help you increase maximum population point sizes through terraforming and soil enrichments, but each technology level also increases the productivity of your workers (see Table 5-1), of whom you will have many that are quickly replaced when lost.

## SILICIDS

These guys can rock and, when rolling, it's usually downhill, making them difficult to stop. Silicoids gather no moss during the early stages of the game, because they don't need to research any Controlled Environment technologies or spend money to clean up pollution. Although they lack diplomatic and research skills, their greatest handicap is their low birth rate.

## Silicoid Basic Information Box

Leader probabilities:	60 percent Xenophobic, 20 percent Ruthless, 20 percent Aggressive
Objective tendency:	50 percent Expansionist, 10 percent each other objective type
Preferred ship size:	Large
Good at researching:	Computers
Poor at researching:	All others
Favorably disposed:	Humans, Klackons, and Meklars
Unfavorably disposed:	Darloks

## MILITARY INTELLIGENCE

Silicoids occasionally benefit from some decent computer technology (i.e., good Battle Computers and ECM), but they're usually a threat in space only through their preference for large ships. Since they are not too great at researching other areas, don't expect their fleet to be composed of technological terrors; just remember that they tend to make plenty of work-a-day ships and maintain a large fleet.

The Achilles' heel of the Silicoids is their low birth rate. This makes them less able to recover following enemy planetary bombardment and land combat. When playing as the Silicoids, covet any technology that better arms your populace for ground combat and use those population points with great discretion when assaulting another player's planet. Also, every planet should be protected from enemy bombardment. Planetary defensive preparations cannot be too extensive because every Silicoid life is so difficult to replace.

## POLITICAL COMMENTARY

Their leader attitude and racial objectives clearly mark the Silicoids as a hostile race. Expect to see them starring in several wars which, if they're not lucky with their early expansion and economic potential, they will not be able to sustain for long. Peace with the Silicoids is a precious commodity and a state that is usually fleeting. Strongly consider grabbing it whenever the Silicoids offer peace unless you know that you can easily beat them.

## ECONOMIC OUTLOOK

Early expansion to every star they can reach is the key to Silicoid strategy. Because their population always grows at the hostile growth rate regardless of a planet's actual environment (see Table 6-1), settling on hostile worlds is not a disadvantage for the Silicoids. What they must do, however, is prioritize grabbing rich and ultra rich planets that are inaccessible to other players early in the game (because they lack the proper Controlled Environment technologies to settle there) and develop them as economic and military bases. Without a good number of these planets to sustain the Silicoid war effort, their race will be doomed to lose their many long wars of attrition.

When reinforcing fledgling colonies with additional population points, there is a trick to use when playing the Silicoids. Always send over, at most, one or two population points per turn from a single colony to a colony that needs reinforcing. Do not remove large lumps of population points from a single source if you can help it. Rather, you must husband your population points. Either remove them slowly over time from a single source, or have several planets send over a population point or two

concurrently. In this manner, you can keep your population growing as rapidly as the Silicoids' racial handicap allows.

Silicoids cannot research, and neither will they steal or trade for, any Controlled Environment or Reduced Industrial Waste technologies. This is because they have the important advantage of being able to ignore planetary pollution (and its per-turn costs to keep planets clean). Note that, although the Silicoids do not benefit from improving environments through soil enrichment technologies, they do get the increases for planetary maximum population limits.

Cloning, on the other hand, is a much coveted technology for the Silicoids, and something you should strive for when playing them. However, to accelerate population growth on a particular planet they will first have to clean up the pollution they have probably hitherto ignored (unless terraforming). Purchasing extra Silicoid population points is often a situational necessity, however, which renders their ability to ignore the effects of pollution moot whenever it's time to clean up their act (er, planets) and pay for added population growth.

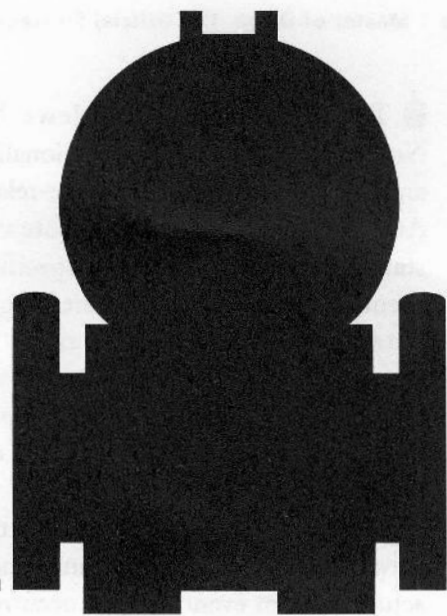
## THE SILICOID SUMMARY

Remember, when playing as the Silicoids: expand quickly, grab every hostile rich and ultrarich world you can, terraform like crazy to make room for every Silicoid that you can breed, use every trick in the book to keep your population growing and your planets filled, and don't launch ground attacks on enemy colonies where your victory is doubt—either overwhelm them with superior numbers or technology, or soften them up with planetary bombardment until you can win.

## RACE RELATIONS

Now that you are aware of the cast of characters involved, you can see why it is a dangerous galaxy out there. Knowing the strengths and weaknesses of all of the races in the game, however, will give you a decided edge in the pursuit of your rightful place on the imperial throne.


Even emperors, however, are the playthings of the ancient gods. Loki or the Fates have been known to alter the destiny of ordinary *Master of Orion* players on many occasions and shape the future of the galaxy through the fickle fortune of random events. For a better understanding of these unpredictable occurrences, just turn the page. ↓



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## *Disastrous Details*

*Dieu a donc oublié tout ce que j'ai fait pour lui?*  
*[Has God forgotten everything I've done for him?]*  
—Louis XIV

 The GNN (Galactic News Network) Newsdroid will interrupt occasionally to make announcements and relay game-related news. Announcements generally denote changes in status not directly due to a specific random event, such as a new leader emerging in a computer player's empire or a race's complete genocide. Similar news items of interest include who is ahead in such areas as population or military strength, or who has been expanding their empire the fastest.

From time to time, however, the GNN Newsdroid will appear and announce that an actual random event has just occurred or is in progress. Although the *Master of Orion* manual provides an overview of many of these random events, this chapter provides experienced *Master of Orion* players with the details they may need to react to such events.

### CHANCES ARE...

No random events will occur before turn 50. Beginning on turn 51 and every turn after that, the probability of a random event occurring increases from a 0 percent chance by the amount shown on Table 14-1. Once a random event occurs, the percentage chance stops accumulating, is reset to 0 percent, and begins accumulating again on the next turn.

What you can gather from examining Table 14-1, is that, at the Impossible level, a random event will occur, on average, every 25-30 turns. It will take twice that many turns at the Simple level.

Note that every event can occur only once during a single game. If all of the different random events have happened during a game, no more can occur.

**Table 14-1** Random Event Per Turn Probability Increase

Game Difficulty Level	Per-Turn Probability Increase
Simple	1 percent
Easy	1½ percent
Average	1½ percent
Hard	1¾ percent
Impossible	2 percent

### WHY ME?

When deciding which player receives a random event, good events tend to favor players with the lowest gross production that turn, while bad events tend to befall those possessing the game's leading economies. This determination is made by using a square-of-the-proportional-ratio formula, meaning that if you were twice as great as another player in gross planetary production, you would be four times more likely to suffer a bad random event and he would be four times more likely than you to be blessed by a good one. A production ratio of three means a probability difference of nine, and so on.

Exception: No player with four or fewer planets is subject to any random event occurrence, good or bad.

### BE PREPARED

What can you do to prepare yourself for a trapdoor, pie-in-the-face kind of occurrence? Short of cheating (as explained in "How to Disable Random Events," on page 308), there is only one universal antidote—money in the bank.



Keep a reserve sufficient to mobilize ships to fight pirates, comets, and monsters, buy the research necessary to stop plagues and novas, or rebuild planets ravaged by earthquakes or rebellions. Keeping money jingling in your reserve is the best way to deal with emergencies.

### ANCIENT DERELICT

The player who discovers an ancient derelict ship is not consumed by alien monsters, like in the movies. Instead, it is a treasure trove of weapons and shield technology secrets.

What happens is that the race that discovered the ancient derelict receives all of the weapons and force field technologies on their own Limited Research List that are up to 10 technology levels higher than their present technology levels in those sectors. A maximum of 10 “free discoveries” can be made by finding an ancient derelict, each chosen completely at random if there are more than 10 possible items from which to choose.

### COMET

Comets aren’t so hard to stop, but failure to do so will destroy the planet that it is headed for (leaving it with no habitable colonies). All comets will have a random 400 to 600 hit points that do not regenerate between turns. All ships in the comet’s destination system that have at least one-third of their hull space taken up with weapons and the engines required to power them (which should be most warships) will chip away at the comet each turn, at the rates shown in Table 14-2. Ships that have less than one-third of their hull space devoted to weapons and the engines required to power them will do proportionally less damage.

**Table 14-2** Reduction in Comet Hit Points,<sup>a</sup> per Turn, by Defending Ships

Ship Hull Size	Reduction in Comet Hit Points
Small	1
Medium	5
Large	25
Huge	125

<sup>a</sup>Each comet has a random 400–600 hit points.

When you are first warned about a comet, the number of turns it has until impact is found out by obtaining the sum of 10, minus the game’s difficulty level (Simple = 0, Easy = 1, Average = 2, Hard = 3, and Impossible = 4), plus a random number from 1 to 5. This means that you’ll be warned of a comet’s impact between 11 and 15 turns ahead in a simple game and between 7 and 11 in an impossible game. As you can see, it really doesn’t take too large a fleet to deal with a comet nuisance, but failure to do so will have disastrous consequences.

### COMPUTER VIRUS

When this occurs, all of the billions of credits (BCs) accumulated by that player in the single, designated technology category are lost (i.e., the BC investment level for that technology becomes zero). Note that the computer does not select the player’s technology sector that has the most money accumulated in it. Instead, it selects randomly from among computer, force field, weapons, and propulsion technology sectors. Thus, construction and planetology research are always immune from computer virus attacks.

### DEPLETED PLANET

Suddenly, bink!, a random planet within the predetermined player's empire changes its resource status to mineral poor. Note that planets that are already poor or ultrapoor are excluded from the lottery and will not be selected to receive this event.

### DIPLOMATIC BLUNDER

Forget what the *Master of Orion* manual says about diplomatic blunders putting the two players involved "on the brink of war." This event triggers an automatic declaration of war, with the player who made the assassination attempt having its Diplomacy Point (DP) rating instantly reset to -75 DPs on the victim's Relations bar (see Chapter 11 for all of the diplomatic details).

### DONATION

The amount of money donated by the wealthy merchant always equals 10 times the current game turn number.

### EARTHQUAKE

A random colony with 30 or more population points is selected within the recipient's empire to receive an earthquake. Its effect is to destroy a random 21 to 30 percent of that colony's population points and 31 to 80 percent of its factories. No pollution (i.e., waste) is created by an earthquake.

### FERTILE PLANET

Suddenly, bink!, a random planet within the predetermined player's empire changes its status to fertile. Note that planets that are already fertile or Gaia are excluded from the lottery and will not be selected to receive this event.

### INDUSTRIAL ACCIDENT

A random planet with 30 or more factories in the recipient's empire is selected. That planet's environment immediately changes to radiated (and it can never be changed back). Note that your colonists can still survive there, even if you don't have the appropriate Controlled Environment technology for establishing colonies on radiated planets.

The selected planet is filled to capacity with toxic waste (i.e., 10 less than its maximum population size, but this pollution can be cleaned up very quickly) and will temporarily have its maximum population size reduced by half. This latter penalty, however, can be recovered through normal terraforming procedures. It may take a while but, like the fallout from a biological warfare attack, at least the damage to the planet's maximum population size isn't permanent.

### MINERAL-RICH PLANET

Suddenly, bink!, a random planet within the predetermined player's empire changes its status to mineral rich. Note that planets that are already rich or ultrarich are excluded from the lottery and will not be selected to receive this event.

### PIRACY

Pirates will appear in a system chosen at random, excluding Orion while the Guardian is still there. If the Crystal or Amoeba monsters should pass through the pirates' star system, those monsters will helpfully eliminate any pirates operating there.

When created, pirates have a random number of hit points, between 300 and 450, and start doing a random amount of trade damage,

between 60 and 90 percent of the BC value of trade. They are easily eliminated in the same manner as comets (see Table 14-2). As their hit points are chipped away, their trade damage percentage is also reduced proportionally.

While alive, pirates effectively reduce all players' trade amounts by their current trade damage percentage. Any players in contact with the race in whose empire the pirates are holed up are affected by their commerce raiding. In other words, if the name of the planet the pirates are using as their base of operations appears on your Control screen, you're certainly being affected by them. If you don't see it, then you might not be in contact with the owner's race, and they're probably not affecting you.

Note, however, that pirates might set up shop at uncolonized stars (including those with no habitable planets), so you might want to click around the map to find their hide-out for sure. Also, if you go to another player's colony to beat up any pirates there (or space monster, for that matter), the owner of that colony might not take too kindly to your meddling, so consider the diplomatic consequences of these helpful gestures on your part.

## PLAGUE

A random colony with 30 or more population points within the recipient's empire is selected. That planet will continue to lose a random 5 to 10 percent of its population points every turn until a cure is found. Note that this population loss is not the net loss, as it is offset by that planet's normal population growth!

The cost for the plague's cure equals a random 3 to 10 times the planet's current gross production value. This amount of money is spent on a cure by paying into that planet's

Technology Ratio bar. Such spending on a cure produces no technology research, by the way. It merely reduces the amount still owed before the cure is found. Also, to reach this research amount more rapidly, you will want to transfer funds from your reserve to double the beleaguered planet's per-turn research spending ability.

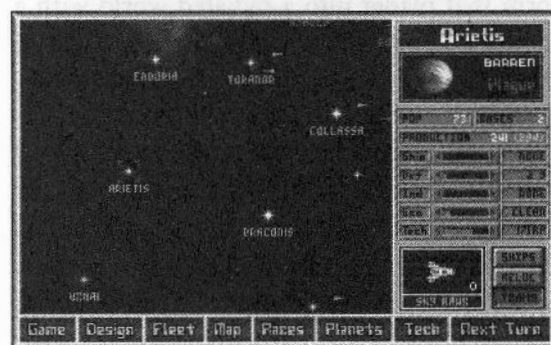
While a planet is suffering from a plague it is quarantined, as shown in Figure 14-1. Although transports can land there, none may be sent from that colony until the cure is found and the plague ceases.

## REBELLION

*Poof!* A random planet within the recipient's empire (except their starting or home planet) instantly goes into rebellion. Half its current population points (rounded down) will become rebels. For more information on the effects of having a planet in rebellion, see Chapter 12.

## SPACE MONSTERS

These bad boys, the Space Amoeba and Space Crystal, have a few things in common. First,



**Figure 14-1**

A colony with plague is so designated. Note that transports cannot be sent from such a colony.

they will begin their operations at a random location along an edge of the map (i.e., not near any one player's empire as a play-balancing device—their starting location is completely random). They will then move toward the nearest star at a speed of warp 1. Note that because there is a minimum 1-parsec border around the map edge that contains no stars, there will be at least one turn's warning before they arrive. Once they reach a planet, they will instantly wreak havoc on it after any space battles there are conducted.

Afterward, they will hang out at that now ruined star for a random two to three turns, at which time they get hungry again and seek out a new colony to devour. This means they will move to a random star within 6 parsecs of their present location (not necessarily within the previous victim's empire—this is all random, remember). Finally, after slagging five planets, they will both simply burp and disappear.

## THE SPACE AMOEBEA

Once the Space Amoeba is securely over a planet, it kills all of that colony's population and 90 percent of its industry. It will also transform that planet into a radiated world with a random 10 to 25 maximum population limit. Note that this might actually improve a particularly crummy planet.

The Space Amoeba can take 1,000 points of damage per difficulty level of the game (i.e., 1,000 points at the Simple level, 2,000 at the Easy level, and going up to 5,000 damage points at the Impossible level of difficulty). It has no shields, it has Beam and Missile Defense levels of 1, and it moves 2 spaces per turn on the Ship Combat Display screen. Being an amoeba, this monster regenerates itself exactly like a ship

with Advanced Damage Control (see Chapter 9). Specifically, it regenerates the number of hit points per round of combat, as shown in Table 14-3.

Because space monsters always go after planets, they will usually encounter missile bases. Table 14-4 shows how many bases equipped with what type of missile are required to equal the Space Amoeba's regenerative capabilities. Think of this as a threshold number. If you can exceed it (either with more missile bases or with the support of your fleet) you'll damage the Space Amoeba in combat and, with enough extra damage, kill it. (Remember, it has no shields and low Defense levels, but takes a lot of damage.) If it doesn't look like you can kill it with a planet's missile bases backed by your fleet, you should evacuate the population of that planet as quickly as possible.

The Space Amoeba is armed with a single Amoeba Stream. It does 250 to 1000 points of damage and has a range of 3 squares with an Attack level of 10. Its continuous streaming effect allows it to carry damage over from one ship to another, so expect large groups of small ships to be whittled down fairly quickly when fired on by this weapon.

## THE SPACE CRYSTAL

Once the Space Crystal is securely over a planet, it kills all of that colony's population but does not harm a single factory. Therefore, once the Space Crystal leaves a planet, there is likely to be a tremendous rush to grab that planet and start a new colony there, as it will quickly enjoy the benefits of all the free factories left behind. However, the Space Crystal, like a little kid, is very messy. It always leaves a planet filled to capacity with waste (i.e., the pollution will equal

**Table 14-3** Space Amoeba Hit Point Regeneration per Round of Combat

Difficulty Level	Hit Points Regenerated <sup>a</sup>
Simple	300
Easy	600
Average	900
Hard	1,200
Impossible	1,500

<sup>a</sup>Make sure you're inflicting more damage than this amount in every round of combat or you cannot defeat the Space Amoeba in that battle.

10 less than the planet's current maximum population).

A Space Crystal can take 2,000 points of damage plus 1,000 more points per difficulty level of the game (i.e., plus 1,000 points at the Simple level, 2,000 at Easy, and going up to

5,000 damage points at the Impossible level of difficulty giving it a predetermined 3,000 to 7,000 hit points). On defense, it is equipped with a Class V ship shield and Lightning Shields, but has only a Beam and Missile Defense level of 1.

Because the Space Crystal has Lightning Shields and Class V shielding, missiles will not be particularly effective against it. Table 14-5 shows the average amount of damage per type of missile or torpedo fired at the Space Crystal, modified by its chance to penetrate the Lightning Shield and subtracting five for its Class V shielding. This assumes that the missile hits (it might miss, but that is unlikely considering the Space Crystal has a Missile Defense level of only 1).

On offense, the Space Crystal has a Black Hole Generator. In addition, the Space Crystal is armed with 10 deadly Crystal Ray weapons

**Table 14-4** Missile Bases Required to Match the Space Amoeba's Regenerative Ability

Missile Type	Difficulty Level				
	Simple	Easy	Average	Hard	Impossible
Nuclear	25	50	75	100	125
Hyper V	17	34	50	67	84
Hyper X	13	25	38	50	63
Scatter V	4	7	10	14	17
Mercurite	10	20	30	40	50
Stinger	7	14	20	27	34
Scatter VII	2	3	5	6	8
Pulson	5	10	15	20	25
Hercular	4	8	12	16	20
Zeon	4	7	10	14	17
Scatter X	1	2	2	3	4



with a range of 3 spaces and an Attack level of 10. Crystal Rays work like a Stellar Converter, surrounding their target and, thus, making four attacks at a time. Each of these four Crystal Ray attacks does 100-300 points of damage.

## SUPER NOVA

A random star within the recipient's empire (except its starting or *home* planet) is selected to go nova. It will blow up in a random 5 to 15 turns unless a reatomizer can be invented at that colony in time. Like the cure for a plague, researching a reatomizer requires a colony to pump resources into its Technology Ratio bar. When an amount equal to a random 5 to 15 times that colony's current gross production level is spent on technology there, its sun stabilizes and will no longer go nova.

If a reatomizer is not discovered in time, the sun goes nova. The maximum population size of its planet immediately changes to some randomly selected number between 11 and 20 million (which means that a tiny planet might actually *grow*). That planet will then become permanently radiated and a random number (from 1 population point up to the planet's new maximum population size) of surviving population points will survive this disaster, even if the owner does not have Controlled Radiated technology. Finally, a random 80 to 100 percent of the factories built there will also be destroyed.

## HOW TO DISABLE RANDOM EVENTS

Not everyone likes playing with random events. Although they tend to balance out the game by smiting the mighty and helping the weak,

**Table 14-5** Average Damage Inflicted on Space Crystal by Missile Type

Missile Type	Average Damage
Nuclear	0.0
Hyper V	0.0
Hyper X	0.2
Scatter V	0.5
Mercurite	0.7
Stinger	1.8
Scatter VII	9.4
Pulson	4.3
Hercular	6.8
Zeon	10.2
Scatter X	44.0
Anti-Matter	5.7
Hellfire	32.0
Proton	30.1
Plasma	72.5

some people just can't handle fighting against a random number generator. For them, a toggle is included in *Master of Orion* to switch these random events on and off.

From the Control screen, hold down the **[Alt]** key and type **EVENTS**. Afterward, random events will no longer occur in that particular game and the Control screen will have the words "Events Off" displayed in the upper-left corner. To reinstate random events, simply repeat this procedure. Note that if you save a game and restart it later, random events will default to being back on, so you'll have to turn them off again.

Note that when you turn off the random events in *Master of Orion* and subsequently turn

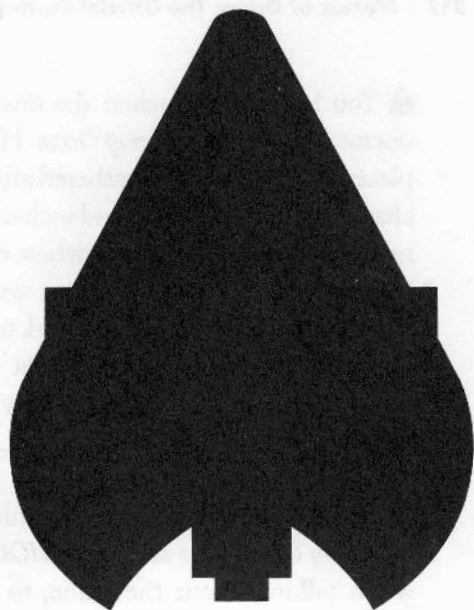
them back on, two important things must be considered: first, the random events themselves are reset, which means that this entire list will occur again from the point at which they were switched back on. Second, the percentage chance that an event will occur is continually updated, even when random events are switched off. Therefore, when reinstated after being toggled off for a while, the built-up probability of a random event occurring will likely cause one to happen very soon.

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## **FAIT ACCOMPLI**

Now that we've examined all of the jokers in destiny's deck, there remains one thing to do. In the next chapter, we've put together our galactic gossip, gathered our notes, and placed in it all the things that did not fit neatly into the previous 14 chapters. You'll discover all that really happens when you choose a certain game difficulty level, find a special keystroke summary, and get inside the brain of the artificial intelligence routines that is managing your computer opponents. As always, we've saved some of the best for last. ■

15



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## *Odds and Ends*

*Don't forget to split all my infinitives.*  
—Noted gangster Dutch Schultz,  
to reporters at a press conference

♠ You have now reached the dustbin of our doctoral thesis on *Master of Orion*. Here we have placed late information gathered after the other chapters were completed and included all of the miscellany that didn't fit anywhere else. For the sake of completeness, we didn't want to leave anything out. We wanted, instead, to make sure that you got every sentence that was left in Alan's word processor, so here they are:

### DON'T HAVE A COW

First, we have a bit of trivia. The nickname for *Master of Orion* is its acronym, *MOO*. Feel free, when talking about the game, to say *MOO*. Believe us, everyone who helped make the game and this book already does!

### DIFFICULTY LEVELS

What, exactly, happens when you select one of the various difficulty levels at the start of a game? What elements change, and to what degree, with each difficulty level? Although we've sprinkled some answers throughout the preceding chapters, we assembled everything for you here, in one neat package.

### DIPLOMATICALLY SPEAKING

At the Simple and Easy levels of difficulty, computer players will never break a treaty with you. They will still declare war, when appropriate, breaking their treaties in the process, but the separate act of specifically breaking an alliance or nonaggression pact is something that they will not do to you at the Simple and Easy levels of difficulty (although they will freely break them with each other). Consequently, when it is time to fight them, prepare to accept oath

breaker penalties if you go ahead and bring about the states of war you seek.

Computer players are also more inclined to initiate diplomacy with you than with any of the other computer players. Although you still must meet all of their minimum criteria to be considered by them for a diplomatic parlay (i.e., you must have at least +43 Diplomacy Points on their Relations bar to have any hope of achieving an alliance, or +7 for a nonaggression pact, etcetera), their *asking check* formula for initiating diplomacy with you on any subject but a declaration of war is going to be lower at lower difficulty levels (see Chapter 11).

Computer players are less sensitive to each other's transgressions at higher difficulty levels, with the Diplomacy Point penalties being just 67 percent of the normal amount at the Hard level and only 50 percent at the Impossible level. You, however, are as offensive as always. This means that computer players are less likely to wear each other out in continual, stupid wars, making them stronger in their continual, stupid wars against you. This, when combined with their postturn 100 doubling of positive diplomacy points among each other, greatly helps the computer players and truly makes life hard or impossible for you.

When computer players are undecided in their votes at a Galactic Council meeting, if you are a candidate, you receive an edge when they consider how they feel about you. As shown in Table 4-1, this begins as a +12.5 percent undecided voter inclination in your favor at the Simple level and decreases 2.5 percent per difficulty level to a minimum 2.5 percent bias in your favor at the Impossible level.

## THE COMPUTER PLAYER AS BULLY

A computer player will automatically declare war on a contacted race when they have a decided military advantage. It determines this by assigning a point value for all of the noncolony ships in both players' fleets and, if that computer player's superiority advantage is 7:1 or greater at the Simple level (6:1 at Easy, 5:1 at Average, 4:1 at Hard, and 3:1 at Impossible), they consider it time to strike and, unless restrained by some treaty with that militarily weaker race, will issue a declaration of war on them. Thus, the harder the game, the more you must keep up militarily with the stronger players or they will consider you ripe for the picking.

## THE COMPUTER PLAYER AS COWARD

At what point a computer player will pack up fleet and retreat from a space battle also depends on the difficulty level selected. Once you have a firepower advantage over the computer player, they begin to check for retreating their remaining ships. At the Simple level, they'll begin to consider retreating when your firepower advantage is three times what theirs is. At the Simple and Easy levels the firepower ratio is 4:1; it's 5:1 at the Average level, 6:1 at the Hard level, and they'll stick it out until your combat superiority in that battle is at least 7:1 at the Impossible level. Once those levels are reached, there is a chance that the computer player will issue a general retreat order from that battle. Once you have achieved a 10:1 firepower ratio, their retreat is automatic.

The cost of building missile bases for computer players, too, varies by the game difficulty level. At the Simple level, computer

players pay the full price for their missile bases. At the Easy level, they pay only 90 percent of the normal price. Then it's 80 percent for an Average game, 70 percent at the Hard level, and only 50 percent of the normal cost for a missile base at the Impossible level. However, they will always pay at least 50 BCs for a missile base. Computer players don't necessarily build more missile bases at higher difficulty levels, but what they do build will be less expensive and, therefore, faster for them to produce. See Chapter 8 for missile base costs.

## COMPUTER PLAYER PRODUCTION RATES

Computer players have a production handicap at the lower difficulty levels and a production advantage at the higher ones. Each computer player's planetary production (not trade income) is adjusted by -20 percent at the Simple level, -10 percent at the Easy level, and is unaffected at the Average level; then it goes up +25 percent at the Hard level, and +50 percent at the Impossible level.

## PEACEFUL EXPANSION RATES

When an opportunity to expand peacefully this turn is presented to a computer player (i.e., they have a colony ship already built, with a suitable colony base and the fuel range required to reach an unowned planet), it has a base chance of 10 percent to seize the opportunity (and colonize the ripe planet under consideration), multiplied by the game's difficulty level (1 for Easy, 2 for Simple, 3 for Average, 4 for Hard, and 5 for Impossible). Therefore, the harder the game, the more likely computer players will be to expand rapidly. This is further increased for Aggressive leaders and races with an



expansionist objective. See Chapter 11 for more details.

## TECHNOLOGICALLY SPEAKING

Except for having more or less money to spend than normal in pursuit of technological research, due to their variable production rate multiplier (described above), computer players are unaffected by the game's difficulty level when it comes to researching a new technology. You, however, will have an easier time at the lower difficulty levels and a harder time at the higher ones. Specifically, the formula for figuring out the base discovery cost of any item is the Game Difficulty Level value times the technology level squared of the item being researched (this is also modified by racial characteristics; see Chapter 11).

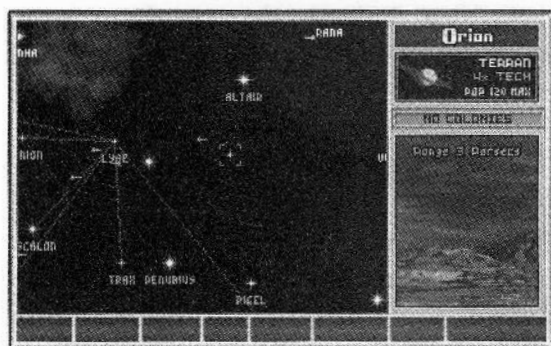
The Game Difficulty Level Value multipliers are 20 (Simple level), 25 (Easy level), 30 (Average level which is what all computer players use), 35 (Hard level), and 40 (Impossible level). Thus, every item you research is twice as expensive to discover (on average) at the Impossible level than it would be at the Simple level. For further details about this formula, see Chapter 10.

## MONSTER TOUGHNESS

As shown in Table 15-1, the hit points for the special ships called Space Monsters (i.e., Orion's Guardian, the Space Amoeba, and Space Crystal), also vary by difficulty level. Basically, each level of game difficulty adds another 1,000 hits to these beasties. Details on the Space Amoeba and Space Crystal can be found in Chapter 14, whereas the Guardian of Orion is discussed next.

## ORION

Orion is always at a randomly selected star determined when the game is created. The star could be of any color and, once the computer places Orion there, the planet there is immediately changed to a Terran 120 with a 4× Technology Research modifier (see Chapter 3). Having Orion is not only a boon for technological research—colonizing it is very helpful for persuading undecided voters to support your cause when you are a candidate in the Galactic Council (see Chapter 4).



Before Orion can be colonized, however, the Guardian left there by the ancients must be defeated. This bad boy has between 6,000 and 10,000 hit points, as shown in Table 15-1.

Adding to its defenses will be a high class of shields, plus strong Beam and Missile Defense levels, as shown in Table 15-1. The Guardian is also equipped defensively with Lightning Shields that help block missile attacks against it. When playing at the Hard level of difficulty, it will also have Automated Repair Systems or, at the Impossible level, Advanced Damage

**Table 15-1** Summary of Difficulty Level Variables

Game Variable <sup>a</sup>	At Difficulty Level				
	Simple	Easy	Average	Hard	Impossible
Will CPs separately break treaties with you?	No	No	Yes	Yes	Yes
Diplomatic <i>asking check</i> bonus toward you (see Chapter 11)	+50 %	+40 %	+30 %	+20 %	+10 %
Negative DP activities between CPs are multiplied by:	1	1	1	$\frac{2}{3}$	$\frac{1}{2}$
Bonus percentage chance of an undecided CP voting for you	+12.5 %	+10 %	+7.5 %	+5 %	+2.5 %
CP fleet strength advantage required before a DoW on you	7:1	6:1	5:1	4:1	3:1
Your firepower advantage before CPs consider retreating <sup>b</sup>	4:1	4:1	5:1	6:1	7:1
CP missile base construction cost multiplier	100 %	90 %	80 %	70 %	50 %
CP production (RP, Resource Point, see Chapters 1 and 6) multiplier	-20 %	-10 %	None	+25 %	+50 %
CP's base chance for peacefully expanding this turn	10 %	20 %	30 %	40 %	50 %
Your base cost multiplier for new technology research	20	25	30	35	40
Chance CP will expand that turn when fenced in	1/10	1/9	1/8	1/7	1/6
Space Amoeba hit points	1,000	2,000	3,000	4,000	5,000
Space Crystal hit points	3,000	4,000	5,000	6,000	7,000
Guardian of Orion hit points	6,000	7,000	8,000	9,000	10,000
Guardian of Orion shield, Beam and Missile Defense levels	5	6	7	8	9
Guardian of Orion Scatter Pac- X Rockets equipped	5	25	45	65	85
Guardian of Orion Stellar Converters equipped	5	15	25	35	45
Guardian of Orion Plasma Torpedoes equipped	6	9	12	15	18

<sup>a</sup>CP, Computer player; DoW, declaration of war.

<sup>b</sup>CPs automatically retreat from a battle when you have a 10:1 firepower advantage over them.

Control. The Guardian moves 2 spaces per turn on the Ship Combat Display screen.

Offensively, the Guardian of Orion has an Attack level of 10 and is armed with a High Energy Focus special device. Its weapons also include those listed in Table 15-1, and a single Death Ray. It will take a lot of firepower to destroy the Guardian of Orion, and you'll need many ships if any are to survive in battle long enough to kill it. The maximum average damage the Guardian can dish out is shown in Table 15-2.

After the Guardian is defeated, you will be awarded the Guardian's secret Death Ray technology. The Death Ray is a Tech level-36 weapon that does 200 to 1,000 points of damage per attack at a range of 1 square. A Death Ray costs 100 BCs to place on a ship, it has a size of 2,000 hull spaces, and each Death Ray consumes 2,000 power units.

You will also receive up to three random technologies between levels 20 and 50, but no higher than 25 levels above your current technology level in a particular category. Note that these are purely random technologies and are not restricted to those on a player's Limited Research List (see Chapter 10).

## CHEAT KEYS

Certain keystroke combinations have been included in *Master of Orion* that allow you to violate the core rules of the game. We have listed them here for your reference:

- **[Alt]-[P]** Scrambles all the computer players' personalities and racial objectives to completely random ones (see Chapter 11). Use this key from the Control screen and listen for the confirmation *click* sound.

**Table 15-2** Maximum Average Damage<sup>a</sup> Inflicted by Guardian of Orion

Game Difficulty Level	Defending Ship's Shield Level											
	0	1	2	3	4	5	6	7	9	11	13	15
Simple	2,709	2,632	2,555	2,478	2,401	2,324	2,247	2,170	2,016	1,862	1,711	1,572
Easy	7,069	6,749	6,429	6,109	5,789	5,469	5,149	4,829	4,189	3,549	2,908	2,296
Average	11,429	10,866	10,303	9,740	9,177	8,614	8,051	7,488	6,362	5,236	4,125	3,029
Hard	15,789	14,983	14,177	13,371	12,565	11,759	10,953	10,147	8,535	6,923	5,743	3,762
Impossible	20,149	19,100	18,051	17,002	15,953	14,904	13,855	12,806	10,708	8,610	6,539	4,495

<sup>a</sup>The numbers represent the average damage the Guardian of Orion will inflict in a single turn when all of its weapons are firing (i.e., it still has missiles and its torpedo tubes are armed).

- **[Alt]-EVENTS** Toggles on/off the game's random events feature (see Chapter 14). Use this key from the Control screen and listen for the confirmation *click* sound. The words "No Events" will appear in the upper-left corner of the Control screen when activated.
- **[Alt]-GALAXY** Toggles on/off a secret mapwide scanner that reveals every ship and gives an updated sighting report on every planet (see Chapter 3). Use this key from the Control screen and listen for the confirmation *click* sound.
- **[Alt]-MOOLA** Increases your Interplanetary Reserve Fund by 100 BCs per time used (may be used an unlimited number of times without any penalty). Use this key from the Control screen and listen for the confirmation *click* sound.

Note that the confirmation clicks work only if you have a sound card for your computer.

## BEYOND THE 32,000-SHIP LIMIT

If you really go wild and build many ships of a single type, you'll find out that there is a limit of 32,000 ships in a single stack. The actual limit is really 65,256, but the number on the screen will never show more than 32,000, even if more ships are in that stack. If you ever see a 32,000-ship group, you really can't know exactly how many ships it really contains (it will be at least 32,000, though).

## THE STATUS QUO

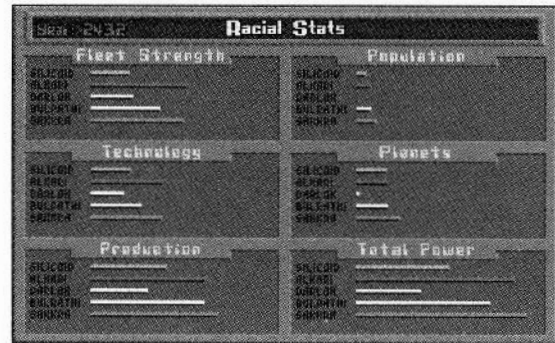
Some people have trouble interpreting the bars on the Racial Stats Display screen, which is re-ached by pressing the Status button within the Races Display screen, as shown in Figure 15-1. The trick to reading this screen is that every bar's maximum length is exactly 100 pixels. However, the formula determining each bar's length is different, as explained when you press the **[F1]** key. We reveal the formulas behind these bars in the following sections.

## FLEET STRENGTH

Each Fleet Strength bar graph represents the combat potential of a player's entire fleet, measured on a logarithmic scale. Every noncolony ship (i.e., ships that include a Colony Base special device are excluded from this count, regardless of how well armed they might otherwise be) is given a special Ship Point value for this scale. These Ship Point values are 1 for small, 5 for medium, 25 for large, and 125 for huge-hulled ships. Note that each ship size is worth five times the previous size.

To reach the tenth pixel of this 100-pixel bar, you must have 125 Ship Points. Each of the first 10 pixels represents one-tenth of that amount, or 12.5 Ship Points per pixel.

To reach the twentieth pixel requires the 125 Ship Points to reach the tenth pixel plus double that amount to reach the twentieth. In other words, 125 + 250, or 375 Ship Points, are required for this bar to reach its twentieth pixel.



**Figure 15-1**

The Racial Stats Display screen shows that things are relative.

Each of the 10 pixels between the eleventh and twentieth represents an increase of one-tenth of this 250-point increase, or 25 Ship Points per pixel.

This pattern continues. The thirtieth pixel makes a 500-point leap, requiring 875 Ship Points to reach it. The fortieth pixel adds

**Table 15-3** Fleet Strength Bar Graph Values

Pixels	Ship Point Value per Pixel	Total Ship Points Required to Reach Highest Pixel in Group	Net Increase
1-10	12.5	125	+125
11-20	25	375	+250
21-30	50	875	+500
31-40	100	1,875	+1,000
41-50	200	3,875	+2,000
51-60	400	7,875	+4,000
61-70	800	15,875	+8,000
71-80	1,600	31,875	+16,000
81-90	3,200	63,875	+32,000
91-100	6,400	127,875	+64,000

another 1,000 Ship Points to that, then a 2,000-Ship Point increase, then 4,000, 8,000, and so on, as shown in Table 15-3.

In much the same way that the Richter Scale measures earthquakes, each block of 10 pixels on the Fleet Strength bar graph represents, approximately, a doubling of that player's Fleet Points. Therefore, when you see that another player's line is 10 pixels longer than yours, be aware that it means they have twice your fleet strength, as measured on this scale.

## POPULATION

The length of each Population bar graph on the Racial Stats Display screen is equal to:

1. The sum of every population point that a player has
2. Divided by the number of stars in the game
3. Multiplied by 1.5
4. Plus 1 pixel

For example, suppose that you're playing on a medium-size map (with 48 stars; see Table 3-2), and you have 612 population points when you check the Racial Stats Display screen. The way the above formula would work would be:

$$\begin{aligned} 612/48 &= 12.75 \\ \times 1.5 &= 19.125 \\ + 1 &= 20.125 \end{aligned}$$

After truncating the decimal values, that would give you a 20-pixel long Population bar graph.

## TECHNOLOGY

The length of the Technology bar graph is the easiest one to calculate. The number of pixels on this line equals the total number of technology levels you've achieved in all six categories, divided by 6 (to get the average),

plus 1 pixel. So if you were averaging around Tech level 23 in each of the six technology sectors, your bar graph would be 24 pixels long.

## PLANETS

The Planets bar graph works a bit differently. Its length in pixels is equal to the number of colonies (no matter their size) a player owns, expressed as a percentage of the total number of stars on the map. For example, if you had 11 colonies in a large map game (with 70 stars; see Table 3-2), the math would look like this:  $(11/70) \times 100 = 15.7$  percent. Therefore, the length of your Planets bar graph would be 15 pixels long.

Note that even if you should add the length of every player's Planets bar graph, you would never get a full 100 pixels (i.e., 100 percent of the total stars on the map). This is because not every star will be colonized. Some, for instance, might have no habitable planets.

## PRODUCTION

The Production bar graph merely concerns itself with each player's gross income that turn in BCs, including the positive or negative effects of their present trade situation. Therefore, if a player was raking in 4,327 BCs from their planets, but had a negative trade figure of -57 BCs, their gross income for that turn (before fixed expenses are paid) would be calculated as  $4,327 - 57$ , or 4,270. Note: Gifts of tribute are not counted in this graph.

The Production bar graph works like the Fleet Strength bar graph, except that the base value for the first 10-pixel group is 100, not 125. Therefore, the values work out as shown in Table 15-4.

Again, there is an approximate doubling of the amount of BCs required to move to the end



of the next 10-pixel grouping. Therefore, when you see that another player's line is 10 pixels longer than yours, be aware that it means they're producing twice the number of BCs that you are, as measured on this scale.

## TOTAL POWER

The Total Power bar graph is based on the sum, in pixels, of the other five bar graphs on this screen. Whichever player, among those on the Racial Stats Display screen, has the highest total number of pixels from the other five bar graphs, has a Total Power bar graph a full 100 pixels in length. The bars of the less powerful players are proportionally smaller, at 1 pixel per percentage point of the strongest player's total power.

For example, let's say the strongest player had a sum of 122 pixels from the other five bar graphs, and you had a sum of only 77. The

strongest player would have a Total Power bar graph of a full 100 pixels. Your line, however, because 77 is a little over 63 percent of 122, would be 63 pixels long.

## HEY, I THOUGHT I KILLED THOSE GUYS!

Occasionally, it will appear as if another player has been wiped out of the game, only to reappear suddenly some time later. This is not a bug. What has happened is that you have crushed all of the other player's colonies within scanning distance and, thus, have broken contact with that race. However, they still have a distant colony lurking somewhere out in the depths of unscanned space. Thus, they might come back to haunt you.

A race isn't really dead until the GNN Newsdroid informs you of their genocide. At that point, you know that their last colony has

**Table 15-4** Production Bar Graph Values

Pixels	Gross Income per Pixel	Total Gross Income Required to Reach Highest Pixel in Group	Net Increase
1-10	10	100	+100
11-20	20	300	+200
21-30	40	700	+400
31-40	80	1,500	+800
41-50	160	3,100	+1,600
51-60	320	6,300	+3,200
61-70	640	12,700	+6,400
71-80	1,280	25,500	+12,800
81-90	2,560	50,900	+25,600
91-100	5,120	121,000	+51,200

been wiped out and they are permanently out of the game.

### **IT'S HARDER THAN YOU THINK**

Playing MOO on a huge map is not playing the most challenging game. In fact, because there is so much room to expand and build an empire before the frontiers close, it is the easiest map size on which to compete. Small maps are the second easiest because, when there are several computer players, they tend to get into wars with each other very quickly and stunt their early growth to the point at which they can easily be dominated. Large maps with five players are fairly tough, but there is usually enough of an early game for every player to have some sort of economic base with which to sustain a war effort before they start knocking each other's blocks off.

However, the most difficult game, by far, is the medium map/Impossible setting with five computer opponents, particularly when you play as the hated Mrrshans. Even with everything we know from writing this book, we can't always win in that scenario. To give yourself an easy game, play as the Klackons, Humans, or Psilons. They have, we think, the strongest racial abilities and most friends—always a winning combination.

### **HYPERSPACE COMMUNICATIONS CHEAT**

In case you have not developed Controlled Radiated Environment technology (which allows you to land on any environment planet in the game) before you acquire Hyperspace Communications, there is an interesting cheat that you can use. When you send off colonists to a certain destination, they can legitimately

land there (i.e., there must be a colony there and you must have the proper Controlled Environment technology to send transports to it). However, after transports are en route, with Hyperspace Communications you can alter their destinations in midflight—even sending them to colonies lacking the proper technology for landing! Thus, if you want to invade an enemy colony on a hostile world you can't land on, now you can—by rerouting them via Hyperspace Communications.

### **CHARGE!**

Computer players will wait until they have a certain firepower level before attacking another player's colony. Before the first Galactic Council meeting, this is approximately a 2:1 firepower advantage. After that first Galactic Council meeting, they will attack if they can achieve at least a 1:1 balance in forces. After the Final War is declared, they will attack you almost recklessly, provided you have no greater than a 2:1 firepower advantage over them.

### **THE AI SUMMARY**

Besides the detailed examinations in this book of how computer players design ships (see Chapter 9), conduct diplomacy and research (see Chapter 11), and spy (see Chapter 12), certain other computer player habits are noteworthy. They are condensed here in this section on the computer player's artificial intelligence, and presented in the interest of greater understanding between species.

### **COMPUTER PLAYER SHIP CONSTRUCTION**

Although Chapter 9 has an entire section dedicated to the computer players' philosophy of

ship design, here are a few quick points to keep in mind.

- Computer players design a single new ship type every (random) 6 to 15 turns.
- Once computer players see that you, the human player, have ships with Warp Dissipators currently in service, all of their future designs will feature beam weapons with at least a 2-square range.

## COMPUTER PLAYER COMBAT TACTICS

Although Chapter 7 focused on this subject, some important things to remember include the following.

- Computer players' unarmed ships automatically retreat from battle at their first opportunity.
- When using AUTO combat, the AI will never withdraw your ships.
- The AI will not fire any ship's missiles unless it calculates that the volley fired will kill at least one ship in the target group and that the missiles have the best opportunity to reach the target group before they run out of fuel.
- The AI does not consider firing Repulsor Beams sufficient reason to decloak ships.
- Computer players think they're smart by retreating 1 square away from your ships so that they can fire their 2-square range weapons. Actually, this is dumb. Not only does it have them retreating away from your ships (thus allowing you to drive them in one direction or another—presumably away from the colony you're defending), but beam weapons, when fired at long range, increase the target ship group's Defense

level!

- You can dangle some tactical bait (i.e., a single-ship group that the enemy fleet can kill) to draw enemy ship groups into a battle. This will keep computer players fighting for at least a few rounds so that your missile bases can get some shots into them before they retreat. Computer players will charge into a hail of deadly missiles provided you draw them on by keeping at least one ship group on display for them to kill.
- Opposing computer player fleets do *not* duke it out on an invisible Ship Combat Display screen. Instead, they use a quick-resolution, simplified combat system. This means that both fleets are boiled down to two numbers each: power and total hits. Starting with the attacker, they alternate inflicting hits on each other, with the hits equaling 1 to 10 percent of their current total power, until one side or the other is eliminated. The surviving fleet then applies the damage (i.e., loses ships) based on the number of hits it suffered.
- Computer players, once they prioritize a target in a space battle, tend to stick with it. Therefore, try to maneuver your fleet to provide that target the maximum protection you can while using it to bait computer player ships into areas where your firepower is concentrated.
- Computer players' ships do not withhold their defensive reaction fire. They always fire at the first target of opportunity that passes within their range. So, when closing with an enemy ship you know to have superior initiative (i.e., it can use its reaction fire against you), close first with either

the most expendable group you have first (i.e., a group with a single small ship, perhaps) or one that you know can take it (e.g., a huge-hulled ship with good armor and some kind of repair system).

## COMPUTER PLAYER MILITARY STRATEGY

Military strategy is probably the computer players' greatest vulnerability. Good military strategy is tough to program, so there are ways to catch a computer player by surprise that wouldn't work repeatedly against a more adaptable human mind. Consider the following points carefully.

- Computer players are not programmed to use Hyperspace Communications at all. They might discover this technology, but they will never use it to reroute ship groups in midflight. Cede it to them in trade or as tribute freely.
- Computer players don't try to build up a constant fleet *speed*. In other words, they'll have ship designs that can move from, say, 2 to 7 parsecs per turn out on the map simultaneously. The really dumb part is that they often move them together, which means the faster ships are reduced to moving at the speed of the slowest ships in the group, thus forfeiting a major advantage of their superior engines.
- Computer players think in terms of *assembly points* when preparing to conduct military operations against another player. This will always be the friendly colony located nearest the opponent's *economic center of gravity* (i.e., not the center of the enemy's empire but, on balance, the point

at which his empire's economic strength is located). If you can locate where they are massing their fleet and disrupt their staging area, it will take them several turns to recover and reassemble at another colony.

- What is a computer player thinking when it launches an attack against another's colony? First, computer players won't try to take a colonized world while there are uncolonized planets still available for them to settle, unless they are at war with that colonized planet's owner. Once there are no such planets remaining (i.e., the frontiers have closed for them and they are fenced in), they will pick their moment to expand based on a random 1-in-10 chance at the Simple level of difficulty (or 1 in 9 [Easy], 1 in 8 [Average], 1 in 7 [Hard], or 1 in 6 [Impossible]), checked after pressing the Next Turn button (see Appendix A, item I.B.).

A computer player will then randomly select a neighbor against which to expand (i.e., it will try to attack one of their planets). Each neighbor has an even chance of being targeted when a computer player decides to expand, reduced by 25 percent if a nonaggression pact is in effect and 95 percent if an alliance is in effect with that player. If they can expand only at one other player's expense (i.e., that is the only player they're in contact with), then even if they're allied the expanding player will break that agreement. Computer players that decide to expand are quick to break their treaties and send out messages suggesting their need to grow. Attacks usually follow quickly.

After determining at whose expense its growth will be made, a computer player checks

its feelings toward that player. In other words, it will see if it is in *expansion* or *rampage* mode against that opponent. Expansion mode means that the computer player is not spoiling for a fight so much as merely looking to pick up another good colony to add to its empire. Rampage mode, however, occurs when that computer player hates its intended victim (as during a war) and wants to inflict the maximum punishment on him or her. In either case, it assigns to every planet a planet value, as shown in the Base Planet Values Box, picks one, and attacks it.

Which planet will a computer player attack? The values from the above formula are sorted from greatest to least. The first planet on the list (i.e., the most promising target) has a 30 percent chance of being selected as the attacker's objective. If it is not, the second planet on the list has a 30 percent chance of being selected, and so on until a planet on the prospective target list makes that 30 percent roll. Once one does, the expanding player marshals his forces and will soon be off to battle!

- When sending land forces, computer players always take half, rounded down, of their assembly point's population, rather than some more carefully calculated number of soldiers or group of soldiers taken from among several of their colonies.
- You can also dangle strategic bait (i.e., leave a weakly defended planet in the economic heart of your empire that computer players will calculate as the easiest to capture or destroy and reasonably advantageous to take). Computer players will, predictably, move against such a planet. The trick is to keep a massive fleet parked near that planet.

### Base Planet Values Box

Expansion mode planet value = maximum population + planet type bonus

Rampage mode planet value =  $\frac{\text{Factories}}{2}$  + planet type bonus

Planet type bonus = +100 for rich,  
+130 for ultrarich,  
+70 for artifact,  
+140 for Orion,  
-100 for poor,  
-130 for ultrapoor

Planet values are multiplied by a power ratio that compares the attacking computer player's total assembly point fleet strength versus the prospective defending planet's missile and fleet strength. This product is then divided by the number of turns it would take the attacker's fleet to arrive at the colony.

This fleet won't appear in their calculation of the planet's value, but it is close enough to get there before they can attack it. After the computer player launches an attack against that planet, reinforce it to the hilt before they arrive and conduct a Reverse Pearl Harbor operation against the poor, unsuspecting computer player.

- A variant of this idea is the *Trojan Horse* technique. When an enemy player is superior to you technologically, but you can still win battles against it militarily, bait the computer player into capturing a planet with many factories on it. You can do this by removing your fleet from orbit around that planet (although you should keep it close by), sending away much of that planet's population and using the [B] key to eliminate some or all of your bases there. The trick is to lure the computer player into capturing the planet intact. When it does,



it might steal some of your lesser technologies to fill some gaps it might have on its Limited Research List (which is no big deal).

You, however, must quickly recapture that planet and, thanks to all those factories that you thoughtfully left for the computer player to refit with advanced technologies, you will reap a great benefit by stealing their technologies, which are ahead of the ones you currently have. This dangerous ploy has worked for us in the past, but there are many things that can go wrong and no guarantees that you'll always come out ahead technologically, even when you so successfully pull off this Trojan Horse technique.

- Computer players always know when enemy ships are en route to their planets, even when they can't legitimately scan them. They do not, however, know the ETA of those ships unless their current scanning technology allows them to find out, and even then only if the ships are within those scanners' proper range. This slight bit of cheating was deliberately included so that computer players would react a bit faster and smarter, giving a more balanced and competitive game.
- Computer players are very poor at fighting mobile battles. If you can keep up attacks at a high rate and keep destroying their planets out from under them, they don't cope well at all.

## COMPUTER PLAYER TECHNOLOGY

Chapter 10 was filled with lessons on how the computer players conduct their technological

research. Key points to remember in summary are as follows:

- Computer players always research one technology at a time. They will commit 100 percent of their research spending to that item until they discover it. This is not an efficient method of research.
- Occasionally, computer players will be dealt a "bum hand" *vis-à-vis* their Limited Research List, possibly not getting a decent missile until after weapons Tech level 40, no Planetary Shields below level XX, no new engine types before Impulse Engines (warp 5), and so on. Now, you, the canny human player, will trade with or steal from other players to compensate for such technological deficiencies in your Limited Research List. Computer players, however, do not aggressively pursue technologies that make up for such weaknesses. In other words, there is no "keeping up with the Jones's" formula in the computer players' way of thinking. If you can find a weakness in a computer player's technology, like the ones just described, exploit it!
- Computer players are big on tax collecting and redistributing money through their global reserve banking system.

## AFTERWORD

Well, that's it. That's about all we could milk from a game called MOO. This book took about 4,400 man-hours just to write, most of which saw Alan Emrich pounding away at his keyboard an average of 40 hours per week around his regular, full-time job as the on-line editor of *Computer Gaming World* magazine. Tom Hughes' calculations and analysis of

MOO's source code not only made it possible to forge for you the tools of conquest detailed in these pages, but his valuable input helped the game's programming team tighten up and refine the game in ways that regular playtesters never could and go far beyond the normal software patches that follow a game's release.

It is Steve Barcia of SimTex software, however, who really took a hit while this book was being written. He always made himself available to us, even at odd hours, and graciously answered our questions. The wealth of information filling this book is Steve Barcia's gift to you.

One final, wry note: You don't have to defeat the Guardian of Orion to win the game. However, the victory screen always shows you being escorted to Orion to assume the throne. Now, if you won and the Guardian was left alive, those few ships escorting you would probably not provide enough protection to stop it, don't you think? Imagine if they drew the next screen. It would probably illustrate your incredibly short reign as, while en route to Orion, the Guardian blasts you to bits and the other emperors snicker in glee. ♠

# A

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## *The Next Turn Sequence of Play*

After you hit the Next Turn button, events go through a certain, set order. It might help you to know when these events occur in this, the sequence of play. They are listed in order below.

### **I. Computer Players Prepare**

- A. Computer players check to see if they're under any *peace treaties* with any other players (see Chapter 11) and plan their turns accordingly if they are.
- B. Computer players plan their movement on the basis of their needs to expand (see Chapters 11 and 15), to press attacks against previously determined target worlds they're in the process of conquering/destroying, or in reaction to defend themselves from further attack by other players.
- C. Computer players plan any new ship designs. This is done randomly every 6-15 turns (see Chapter 9).
- D. Computer players plan their production strategy and set their ratio bars (see Chapter 11).

### **II. Income and Growth**

- A. Transports are launched into orbit around their planet of departure and the cost is deducted (see Chapter 6).
- B. Production is executed (see Chapter 5).
- C. Population growth occurs (see Chapter 6)
- D. Research points accrue any interest they have earned (see Chapter 10).
- E. New research points are added into research totals (see Chapter 10).
- F. Trade growth occurs (see Chapter 5).
- G. Newly purchased spies are added (see Chapter 12).

### III. Automatic Diplomatic Ratings Adjustments

#### A. Diplomacy Points are adjusted (see Chapter 11)

1. Love nub gravitates toward its *natural state* if there is no treaty or war between two players.
2. Diplomacy Points are added if there is a trade agreement, nonaggression pact, or alliance between two players.
3. Diplomacy Points are subtracted for excessive military build-up along borders and for owning more than one-fourth of the stars on the map.
4. Temporary modifiers are adjusted toward 0 by 10 points each.

### IV. Receiving of New Ships and Bases

#### A. Receive new missile bases and Planetary Shields (see Chapter 8).

#### B. Receive new ships (see Chapters 7-9).

### V. Economic Adjustments

#### A. Each player collects taxes and surplus industrial spending and places it in the reserve fund (see Chapter 5).

#### B. New factories are built (see Chapter 6).

### VI. Movement and Space Combat

#### A. All ships move simultaneously (see Chapter 3).

#### B. Ship-to-ship combat is conducted (see Chapter 7).

### VII. Spying

#### A. Spies that are not hiding conduct espionage and sabotage attempts. Players select sabotage targets and receive any stolen technologies at this time (see Chapter 12).

### VIII. Technological Discoveries

#### A. The computer rolls dice for every player's technology categories that have a discovery (percentage) chance pending this turn, notifying you of any discoveries by your scientists (see Chapter 10).

#### B. If a computer player discovers its research item this turn, it reevaluates its need to spy on each race with which it is in contact (see Chapter 12).

### IX. Planet Exploration

#### A. The results of planetary exploration are shown (see Chapter 3).

### X. Enemy Colony Bombardment and Invasions

#### A. Orbital Bombardment is conducted (see Chapter 8).

#### B. Transports land (see Chapter 8).

#### C. Ground combat is resolved (see Chapter 8).

### XI. Genocide

#### A. The computer checks to see if a player is completely eliminated from the game and the GNN Newsdroid announces it. If only one player survives, it is hailed as the winner of the game (see Chapter 4).

**XII. Random Events**

- A. The computer adds 2 percent to the cumulative event probability chance, multiplied by the game difficulty modifier (see Chapter 14), and rolls a d100 die to see if an event occurs (see Chapter 14).
- B. If an event happens, it is randomly selected from those that have not yet occurred and the event probability is reset to zero. The target player is determined and the event takes effect (see Chapter 14).

**XIII. First Contacts**

- A. Any first contacts are announced. These occur if one player's colony is within normal ship movement range—either his or the other race's—of one of their colonies (see Chapter 11).

**XIV. Diplomatic Interaction**

- A. All computer player-initiated diplomacy is conducted (see Chapter 11).
- B. A High Council meeting is convened, when appropriate (usually every year divisible by 25). If a winner is elected, it is announced at this time (see Chapter 4).
- C. Diplomatic messages to the human player from the computer players are announced. Any action or decisions required occur at this time (see Chapter 11).
- D. If contact was broken with another race, notification occurs (see Chapter 11).

**XV. Economic Announcements**

- A. Planetary production/completion messages are displayed (e.g., a planet has reached its maximum population or factories, built a Planetary Shield, etc.). Slider bars can be adjusted at this time (see Chapter 6).
- B. Production numbers for the next turn are calculated so that players can fiddle with them (see Chapter 6).

**XVI. Housekeeping**

- A. The information regarding any star system within scanning range of a player's colonies and fleets is updated (see Chapter 3).
- B. The year/turn is advanced by 1.
- C. Each player's current technology levels are calculated—increasing with new discoveries made this turn (see Chapter 10).
- D. The game is automatically saved (as it is when you exit the game).



# B

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## *Power-To-Hull Space Ratio for Ship's Engines*

This appendix shows the various power-to-hull space ratios for each class of ships' engines at every possible propulsion technology level. Now, if everything were equal, you would always want to use the best engines you have available on every ship you design. But everything is not equal, due to *miniaturization* (see Chapter 10).

To use Table B-1, find your current propulsion technology level in the first column and read across to see how much power you can get out of every hull space taken up by these engines. Because between one-half and three-fourths of the hull space of most ship designs will be taken up with providing power to the remainder of its onboard features, efficient use of this power-to-hull space ratio is crucial for getting the most goodies inside every ship design you create.

You should use Table B-1 when designing new ships. When looking at the numbers under the various engine warp speeds, each represents the amount of power produced by that warp

speed engine per hull space. Quite simply, the bigger the number in that row, the better the engine is for producing the most amount of power in the least amount of hull space (i.e., the largest number shows the best power-to-hull space ratio for engines at that propulsion technology level).

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### **USING TABLE B-1**

For example, at propulsion technology level 44, a warp 1 engine provides 5 units of power per hull space and a warp 5 engine provides 2.5 units of power per hull space. Therefore, when designing your ship, you can fit almost *twice as many items* on board a ship using warp 1 engines, as opposed to warp 5 engines. If you're willing to trade off speed and potential combat maneuverability to build a slow monitor class ship design (see Chapter 9), it can be brimming with almost twice as many goodies (more weapons, better ECM, better shields, etcetera).

As a rule of thumb: when two adjacent numbers in a row are nearly the same size (i.e., there

is less than a 10 percent difference between them), seriously consider using the better warp speed engine. Conversely, when two adjacent numbers in a row significantly differ (e.g., by 10 percent or more), consider the slower engine with its better power-to-space ratio.

The original game concept was that each warp level increase would cause about a 10

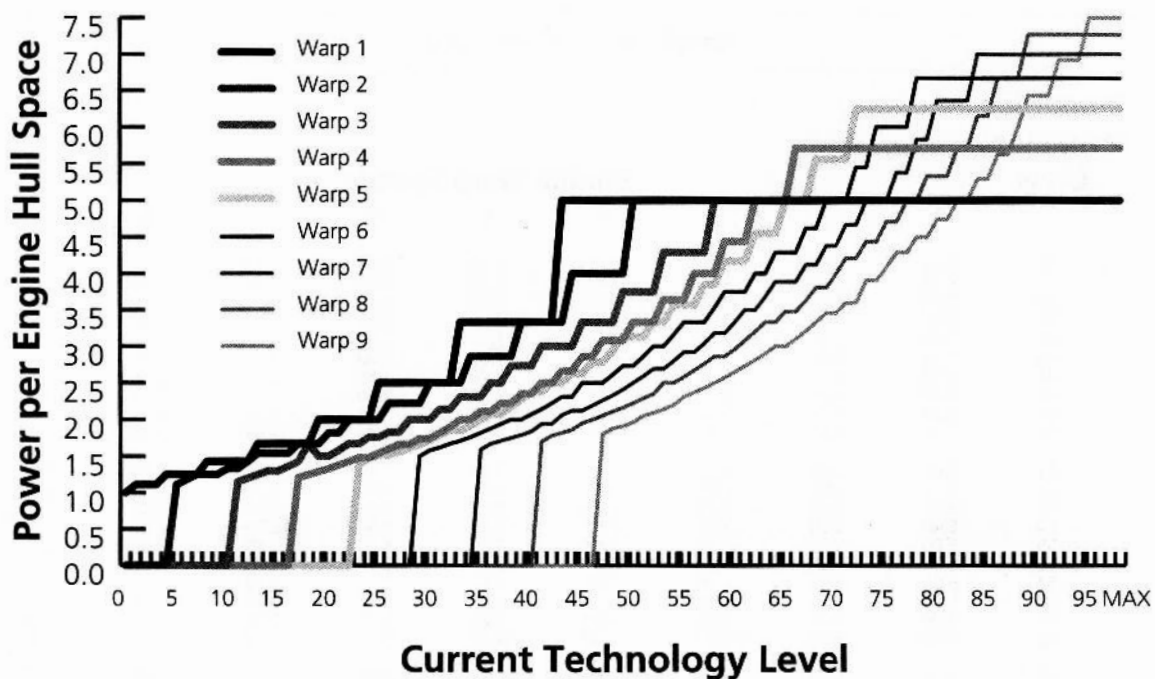
percent drop in the power-to-hull space ratio. However, because IBM computers work in the wonderful world of *integer truncation* (which means that they drop fractions during mathematical computations), these decreases can vary widely and this table lets you take advantage of the resulting numerical quirks.

**Table B-1** Calculating Power-to-Hull Space Ratio, by Propulsion Level

Propulsion Technology Level	Engine Warp Speeds								
	1	2	3	4	5	6	7	8	9
1	1.00	—	—	—	—	—	—	—	—
2	1.11	—	—	—	—	—	—	—	—
3	1.11	—	—	—	—	—	—	—	—
4	1.11	—	—	—	—	—	—	—	—
5	1.25	—	—	—	—	—	—	—	—
6	1.25	1.11	—	—	—	—	—	—	—
7	1.25	1.18	—	—	—	—	—	—	—
8	1.25	1.25	—	—	—	—	—	—	—
9	1.43	1.25	—	—	—	—	—	—	—
10	1.43	1.25	—	—	—	—	—	—	—
11	1.43	1.33	—	—	—	—	—	—	—
12	1.43	1.33	1.15	—	—	—	—	—	—
13	1.43	1.43	1.20	—	—	—	—	—	—
14	1.67	1.43	1.25	—	—	—	—	—	—
15	1.67	1.54	1.30	—	—	—	—	—	—
16	1.67	1.54	1.30	—	—	—	—	—	—
17	1.67	1.54	1.36	—	—	—	—	—	—
18	1.67	1.67	1.43	1.21	—	—	—	—	—
19	1.67	1.67	1.67	1.25	—	—	—	—	—
20	2.00	1.67	1.50	1.29	—	—	—	—	—
21	2.00	1.82	1.50	1.33	—	—	—	—	—
22	2.00	1.82	1.58	1.38	—	—	—	—	—
23	2.00	2.00	1.67	1.43	—	—	—	—	—
24	2.00	2.00	1.67	1.48	1.39	—	—	—	—
25	2.00	2.00	1.76	1.48	1.47	—	—	—	—
26	2.50	2.00	1.76	1.54	1.52	—	—	—	—
27	2.50	2.22	1.83	1.60	1.52	—	—	—	—
28	2.50	2.22	1.83	1.66	1.56	—	—	—	—
29	2.50	2.22	2.00	1.66	1.61	—	—	—	—
30	2.50	2.22	2.00	1.74	1.66	1.50	—	—	—
31	2.50	2.50	2.00	1.74	1.72	1.58	—	—	—
32	2.50	2.50	2.14	1.82	1.79	1.62	—	—	—
33	2.50	2.50	2.14	1.90	1.85	1.67	—	—	—
34	3.33	2.50	2.31	2.00	1.85	1.71	—	—	—
35	3.33	2.86	2.31	2.00	1.92	1.76	—	—	—
36	3.33	2.86	2.31	2.11	2.00	1.82	1.59	—	—
37	3.33	2.86	2.50	2.11	2.08	1.88	1.67	—	—
38	3.33	2.86	2.50	2.22	2.08	1.94	1.71	—	—
39	3.33	2.86	2.73	2.22	2.17	2.00	1.75	—	—
40	3.33	3.33	2.73	2.35	2.27	2.00	1.79	—	—

**Table B-1** Continued

Propulsion Technology Level	Engine Warp Speeds								
	1	2	3	4	5	6	7	8	9
41	3.33	3.33	2.73	2.35	2.38	2.07	1.84	—	—
42	3.33	3.33	3.00	2.50	2.38	2.14	1.94	1.70	—
43	3.33	3.33	3.00	2.50	2.50	2.22	1.94	1.78	—
44	5.00	3.33	3.00	2.66	2.50	2.31	2.06	1.82	—
45	5.00	4.00	3.00	2.66	2.63	2.31	2.12	1.86	—
46	5.00	4.00	3.33	2.86	2.63	2.50	2.12	1.95	—
47	5.00	4.00	3.33	2.86	2.78	2.50	2.19	2.00	—
48	5.00	4.00	3.33	3.08	2.78	2.50	2.26	2.05	1.80
49	5.00	4.00	3.33	3.08	2.94	2.61	2.33	2.11	1.88
50	5.00	4.00	3.75	3.08	3.13	2.73	2.41	2.16	1.91
51	5.00	5.00	3.75	3.33	3.13	2.73	2.50	2.22	1.96
52	5.00	5.00	3.75	3.33	3.13	2.86	2.59	2.29	2.05
53	5.00	5.00	3.75	3.33	3.33	3.00	2.69	2.35	2.09
54	5.00	5.00	4.29	3.64	3.33	3.00	2.69	2.50	2.14
55	5.00	5.00	4.29	3.64	3.57	3.16	2.80	2.50	2.20
56	5.00	5.00	4.29	3.64	3.57	3.33	2.92	2.58	2.31
57	5.00	5.00	4.29	4.00	3.57	3.33	2.92	2.67	2.37
58	5.00	5.00	4.29	4.00	3.85	3.33	3.04	2.76	2.43
59	5.00	5.00	5.00	4.00	3.85	3.53	3.18	2.86	2.50
60	5.00	5.00	5.00	4.44	4.17	3.75	3.18	2.86	2.57
61	5.00	5.00	5.00	4.44	4.17	3.75	3.33	2.96	2.65
62	5.00	5.00	5.00	4.44	4.17	3.75	3.50	3.08	2.73
63	5.00	5.00	5.00	5.00	4.55	4.00	3.50	3.20	2.81
64	5.00	5.00	5.00	5.00	4.55	4.00	3.68	3.33	2.90
65	5.00	5.00	5.00	5.00	4.55	4.29	3.89	3.33	3.00
66	5.00	5.00	5.00	5.00	5.00	4.29	3.89	3.48	3.00
67	5.00	5.00	5.00	5.71	5.00	4.29	3.89	3.48	3.10
68	5.00	5.00	5.00	5.71	5.00	4.62	4.12	3.63	3.21
69	5.00	5.00	5.00	5.71	5.56	4.62	4.12	3.81	3.33
70	5.00	5.00	5.00	5.71	5.56	5.00	4.38	3.81	3.46
71	5.00	5.00	5.00	5.71	5.56	5.00	4.38	4.00	3.46
72	5.00	5.00	5.00	5.71	5.56	5.00	4.67	4.21	3.60
73	5.00	5.00	5.00	5.71	6.25	5.45	4.67	4.21	3.75
74	5.00	5.00	5.00	5.71	6.25	5.45	5.00	4.44	3.91
75	5.00	5.00	5.00	5.71	6.25	6.00	5.00	4.44	3.91
76	5.00	5.00	5.00	5.71	6.25	6.00	5.00	4.71	4.09
77	5.00	5.00	5.00	5.71	6.25	6.00	5.38	4.71	4.29
78	5.00	5.00	5.00	5.71	6.25	6.00	5.38	5.00	4.29
79	5.00	5.00	5.00	5.71	6.25	6.67	5.83	5.00	4.50
80	5.00	5.00	5.00	5.71	6.25	6.67	5.83	5.33	4.50
81	5.00	5.00	5.00	5.71	6.25	6.67	6.36	5.33	4.74
82	5.00	5.00	5.00	5.71	6.25	6.67	6.36	5.33	4.74
83	5.00	5.00	5.00	5.71	6.25	6.67	6.36	5.71	5.00
84	5.00	5.00	5.00	5.71	6.25	6.67	6.36	5.71	5.00
85	5.00	5.00	5.00	5.71	6.25	6.67	7.00	6.15	5.29
86	5.00	5.00	5.00	5.71	6.25	6.67	7.00	6.15	5.29
87	5.00	5.00	5.00	5.71	6.25	6.67	7.00	6.67	5.63
88	5.00	5.00	5.00	5.71	6.25	6.67	7.00	6.67	5.63
89	5.00	5.00	5.00	5.71	6.25	6.67	7.00	6.67	6.00
90	5.00	5.00	5.00	5.71	6.25	6.67	7.00	7.27	6.00
91	5.00	5.00	5.00	5.71	6.25	6.67	7.00	7.27	6.43
92	5.00	5.00	5.00	5.71	6.25	6.67	7.00	7.27	6.43
93	5.00	5.00	5.00	5.71	6.25	6.67	7.00	7.27	6.92
94	5.00	5.00	5.00	5.71	6.25	6.67	7.00	7.27	6.92
95	5.00	5.00	5.00	5.71	6.25	6.67	7.00	7.27	6.92
96	5.00	5.00	5.00	5.71	6.25	6.67	7.00	7.27	7.50
97	5.00	5.00	5.00	5.71	6.25	6.67	7.00	7.27	7.50
98	5.00	5.00	5.00	5.71	6.25	6.67	7.00	7.27	7.50
MAX	5.00	5.00	5.00	5.71	6.25	6.67	7.00	7.27	7.50



Adapted with permission from Redmond Simonsen

# C

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## *Which Is Better, Small or Huge Ships?*

Appendix C was inspired by the writings of Redmond Simonsen, whom some might remember as a driving force behind Simulations Publications, Inc. (SPI), a board wargame company that reached its zenith during the 1970s. Redmond still loves games and has become a regular player of *Master of Orion*. In the following section, we present his discussion on the small-versus-huge ship size debate, and will follow that with some other points of view.

### **WHICH PREVAILS? BY REDMOND SIMONSEN**

In *Master of Orion*, you can build four sizes of ships: small, medium, large, and huge—sort of like Slurpy sizes, except that there's no such thing as a *small* Slurpy, right? Anyway, which is best and which is most *all purpose*? The conclusion I've come to, after playing several Hard-level games in large galaxies, is this: small and medium ships are the winning sizes, even though they aren't as dramatic or as groovy to build and design as their larger cousins. Let me count the reasons why.

1. By the mid-to-late stages of the game, when you can assemble an advanced (60+) technology level fleet of some size, the following holds true: you can put one of almost any weapon (sometimes two or three) on a small ship. Thus, at an advanced technology level, you can put a Disruptor or a Gauss Autocannon on a single small ship. You can also fit a High Energy Focus device to this same small ship, permitting it to smite the big boys from afar.
2. You can get 147 small ships or about 32 mediums for the cost of 1 huge ship. And you will start getting those smaller ships sooner. Thus, with several planets churning out powerful Little Guys, you can have the hitting power of a huge ship in *one turn*, rather than in the several turns it will take any one planet to turn out a dreadnought. Thus, assuming the ships are fast, you can assemble and concentrate small ship power more rapidly than big ships.
3. Small ships (if you make two or three nearly identical types) can be upgraded without



throwing away your entire fleet's hitting power in one shot. Usually, you have only one huge and perhaps two large ship types in your Order of Battle. If you want to upgrade your huge ship, you're kissing off an enormous amount of capital in one shot. With small ships, you can halve or cut to one-third this effect. Thus, small ships are safer from a fleet integrity point of view.

4. Small and medium ships are much more flexible in their threat response: you only have to send as many as you think are necessary to cover the given situation. You don't have a choice with a large or huge ship. You have to send the whole ship. This granularity problem is solved by having small ships in large groups.
5. Hull and shield strengths have relatively low ceilings, and these ceilings can be overwhelmed by lots of small and medium ships attacking in mass with the initiative. So what if the other player has 2,400 hit points in his dreadnoughts with Advanced Damage Control? He'll never get to repair anything if I attack him with 32 Death Ray-armed medium ships, will he? *Poof*, he's gone in one shot! Since my ships are smaller, and probably faster, I'll get the first shot and he loses. My group of 32 mediums costs about the same as his 1 huge ship, too.

In MOO, big ships are simply bigger versions of the small ships—and small ships (eventually) can mount any weapon except the Death Ray. Moreover, the difference in the armor a big ship can carry is not sufficient to compensate for this, and the way in which that armor works in the game is also inadequate to properly support the

difference that miniaturized advanced weaponry on small ships makes. Thus the smaller ships are superior.

6. To cope with swarms of small and medium ships, the large and huge ships must carry relatively weak streaming or repeating weapons. These antismall weapons, however, are ineffective against planets. A technologically advanced small or medium ship can be armed with one or two heavy weapons and not have this problem. That is because, in a parity situation, these small and medium ships have weapons that can knock out an enemy's nearly identical small ship design in one shot. These same weapons, employed en masse, can overwhelm the shields of larger ships and destroy them in one shot, just as easily as they can blow up a planet. These Little Guys are just *too* deadly!

What I'm exploiting here against the larger ships is that their shield strength does not scale upward with the size of the ship producing it. Only their hit points scale up, not their ability to shield themselves. Early in the game (when you don't have the production depth to build them), large and huge ships would be a boon since the light-to-moderate weapons you can pack in a small or medium ship of that technological era will have no serious effect on a huge design. During this time period, the larger ships are virtually invulnerable to small ship attacks. However, by the mid-to-late technology eras, this equation flips on its head, and the small ships can destroy the big boys with miniaturized strong weapons from the upper ranges.

7. An optimal medium ship can carry one Death Ray, three Mauler Devices, and a Gauss Autocannon. It needs the following specials: High Energy Focus and an Inertial Nullifier. Optionally, you could also install the Oracle Interface or a Battle Scanner. Used in hunter-killer groups of 100 or more ships, this ship type can bust any planetary defense and probably suffer zero damage in the process. It will never undergo a missile base attack because the missile bases will never get off a shot before these advanced medium ships can totally destroy them (and probably the rest of the planet in the process).

A variant design includes a Battle Scanner, Ionic Pulsar, and Subspace Teleporter. A large (300 to 500) group of such medium ships can virtually wipe out any enemy fleet in one blow. This medium ship group must have the initiative so that it can teleport (or rapidly move) adjacent to the three juiciest enemy groups before they have had a chance to do anything. It then uses Ionic Pulsars to zap all (or almost all) of those enemy ship groups in one blow. Any remainders are finished off with beam weapons at close range.

I took to designing this latter ship after a Pilon computer player used it against me with devastating effect. The strongest ships I could build were always destroyed immediately as I warped onto the battle screen. The only way I coped against them was to build my own teleporter so that the missile bases on his home planets would turn on their Subspace Interdictors, thus preventing their own planet's defending fleet from using its most effective weapon.

When opposing forces are supporting the planet, a couple of swarms of advanced small ship designs can cope with them while these killer medium ships destroy the planet itself. A small ship should have a Mauler Device plus, perhaps, a Tachyon Beam or a bomb or two (to draw the computer player's attention to them, rather than the real threat, your medium ships). Included in this small ship type would be a High Energy Focus device, an Inertial Nullifier, and, optionally, some sort of antimissile device, an Oracle Interface, or a Battle Scanner.

## DOCTRINAL DISCUSSION

The key to using small versus large ships is in having a flexible material response in the wars of attrition that always occur in MOO. You will see that the computer players always try to draw your fleets into killer battles so that their production advantage at the higher difficulty levels helps them to defeat you. You can't build ships as fast as they can, ergo, when you're out of ships, they still have enough left to blow up your planets. You will notice that they often simply refuse battle against one of your planets that has no fleet cover but does have a large number of missile bases. They do this even though they could overwhelm those bases. Why? Because your fleet wasn't available to kill, so they conserve their forces. Not very sophisticated, but it works.

This computer player way of thinking is one of the reasons why you should not make your move for galactic domination until you've advanced to this higher technological state. In other words, play a conservative game of survival and try to hold out until the end of technological progress (or as near as possible) so that you can

devote the entire output of all your planets to the job of making ships. Toward the end stages of a game, the computer players seem to be still devoting significant BCs to technology (or *something*) and, thus, you can actually begin to outproduce them.

Therefore, your response to these wars of attrition should be to turn the tables. The flexibility inherent in small ships allows you to divide your forces readily into powerful, medium-sized groups, each capable of destroying smaller enemy groups with ease and then making an enemy planet useless as an economic base from which to support their continued fleet production. The computer players rarely have the brain power (CPU bandwidth) to run more than one or two attacks per turn. You can easily run six to eight planet-destroying attacks, given a rough parity in technology. What this means is that, in a matter of a few turns, the computer player can no longer build replacements. Moreover, it panics and runs ships off to "protect" planets you've already scorched to nearly lifeless hulks. Thus it drains its own attacking power in response to your hunter-killer raids.

The computer players basically *do not know how to fight a mobile battle*. The mobile battle concept is to never stop moving and to hit very hard, very quickly, *at the soft spots* in the enemy defense, while avoiding set-piece battles against equal or superior forces. It is a reiteration of the Stosstruppen doctrine of World War I, the Blitzkrieg of World War II, and current combined arms doctrine in most modern armies. If your fleets are faster or simply as fast as the computer player's, you will always win because they do not know how to use mobility. By attacking their planets, you will put them immediately

on the defensive and they'll scurry around trying to protect the now useless worlds that you have already raided. You can then defeat them in detail (i.e., find enemy groups small enough to be sure they will suffer much more than you will, so that it will be costly to the enemy). Smash several such forces per turn and, pretty soon, the computer player has nothing left to fight with but remnants.

Once a computer player's industrial base has been cut to one-third or less of its peak, you can mass your swarms of small and medium ships into multithousand ship battle groups that will be the superior of any large or huge ship conglomeration your opponent may throw at you. Then it's on to victory.

# D

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## *Ship Size: Sometimes Bigger Is Better*

*I have come to the conclusion that there is no right answer to the dreadnought versus swarm approach. It depends on what the computer players are building. I find going the opposite direction is usually the right approach. If he's building swarms, a few dreadnoughts with longer range weapons is usually the answer. If he is building dreadnoughts, swarms usually work.*

—Dondo, *Master of Orion* player

Thank you, Redmond, for presenting your thoughts to us in the Appendix C, on the small versus huge ship size debate. We don't feel that the issue is quite so one sided, however. Our experience shows that larger class ships have their place in a balanced *Master of Orion* fleet.

First, let's go over the basics. Table D-1 lists the strengths and weaknesses of huge versus small ship designs. Naturally, the extreme advantages and disadvantages for huge and small ship philosophies shown in Table D-1 can be muted by building medium- and large-hulled ship designs. These midsize ships tend to reduce both the inherent strengths and weaknesses of

either extreme design and offer a bit more balance. However, in *Master of Orion*, there is always a tradeoff.

There will invariably be combat situations in which an extremely huge (or small) ship design philosophy will yield particularly strong advantages. The question is, will such an extreme hull size design be useful often enough to justify it taking up one of your six precious active ship design positions? Again, only your personal taste and experiences in the present game you're playing can answer that question.

From our experiences, though, we tend to build fleets of smaller ships early in the game. As our economic capacity increases and the time to produce larger ships diminishes proportionally, we tend to build larger ship designs, eventually reaching the point at which we build almost exclusively large- and huge-hulled ships. We like the big ships' survivability in combat, preferring to withdraw them when they're in danger of being destroyed so that they live to fight another day.

There is also the computer player's response to small ship designs to consider. When a computer player sees that half or more of your ship designs are small- or medium-hull size ships, they will prioritize multifire weapons, streaming weapons, and Scatter Pack Rockets in their new ship designs in order to deal with your fleet more effectively.

Finally, larger ships are more fun to play with. Not only are they easier to move (requiring

fewer clicks to divide into groups because there will be fewer of them), they will also hold your latest special device discoveries, thus packing plenty of offensive and defensive capabilities. They make the best general purpose ships (because there is more room to add a bit of everything) and really come into their own with high levels of armor and Damage Control. We think that larger ships are a big deal. Don't discount them too easily.

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**Table D-1** Huge versus Small Ship Design Philosophies

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Small Ships	
Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• With their large numbers and extra Defense level bonus, some usually live long enough to "get in close" and attack</li> <li>• They're cheap, easily replaced, and quickly built in quantity</li> <li>• Good against single-fire, nonstreaming weapons because they can kill only one small ship at a time</li> <li>• Increasing their maneuverability is relatively cheap, making them faster and harder to hit</li> </ul>	<ul style="list-style-type: none"> <li>• Expect casualties: small ships, when hit, are easily killed</li> <li>• It often takes massive numbers of them to damage well-armored targets seriously</li> <li>• Vulnerable to multifire and streaming weapons, plus Scatter Pack Rockets</li> <li>• Large-size weapons and specials simply won't fit into small hulls</li> <li>• Their shields are more expensive and take up more space (proportionally) than other hull sizes</li> </ul>
Large Ships	
Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• There is time to upgrade its design before the first ship in its class is built</li> <li>• When it gets close to dying, there is usually time for it to retreat—thus it can live to fight another day</li> <li>• Shields are less expensive and take up less space (proportionally) than other hull sizes</li> <li>• Repair Systems and Advanced Damage Control are at their most effective on huge-hulled ships</li> <li>• A badly damaged huge ship still throws out its full firepower until destroyed, whereas several small ships would have died from the same amount of damage</li> </ul>	<ul style="list-style-type: none"> <li>• Their long construction times, due to their great expense, means they can't be built quickly to meet emergency situations</li> <li>• Increasing their maneuverability is more expensive and takes up more space (proportionally) than other hull sizes</li> </ul>

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# E

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## *When to Include Better ECM or Battle Computers*

Appendix E addresses the following situation: suppose you're designing a ship and must come up with its Missile Defense level. What combination of ECM and/or maneuverability do you really need to effectively combat the missiles and torpedoes that will be thrown at you from enemy ships and planets?

What you need to pay attention to in Table E-1 is the range of numbers between 5 and 100 for a given weapon type. This is known as the *window of change*. What you're trying to do is design ships with missile defenses that have a significant net effect in reducing their vulnerability (i.e., down to the 5 range).

Table E-1 allows you to examine this window of change and your ship design's location in it by cross-indexing a particular missile type (row) and the difference between the enemy's Attack level (basically, the level of their Battle Computers, with the Gauss Autocannon and Mrrshans receiving their respective attack bonuses) and your ship's Missile Defense level

to arrive at the column that will give you the base To Hit probability.

For example, suppose you're designing a large-hulled bomber to go up against an enemy whose missile bases are armed with Stinger missiles. They have level-V Battle Computer technology. Your Missile Defense level is currently only 1, which is generated by its Nuclear Engines providing your large hull a maneuverability rating of 1.

Subtracting 1 (the base Missile Defense level) from their +5 Battle Computer takes you to the +4 column on this Table E-1 (i.e., the Attack level is greater by a net of 4). When you cross-index this with their Stinger Missiles, you can see that those missiles will hit this ship design 100 percent of the time. Even if you raised its Missile Defense Level to 2 or 3, those Stinger Missiles would *still* hit that ship design 100 percent of the time.

To reach the window of change and knock down that 100 percent chance you'll be hit to

**Table E-1** To Hit Probability by Enemy Missile Type, Defense Level, and Attack Level<sup>a</sup>

Missile Attacking Your Ship	Difference between Enemy's Attack Level and Your Ship's Missile Defense Level																		
	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	
	Missile Defense level greater													Attack level greater					
Nuclear or Hyper V	5	5	5	5	5	5	5	5	10	20	30	40	50	60	70	80	90	100	
Hyper X or Scatter V	5	5	5	5	5	5	5	10	20	30	40	50	60	70	80	90	100	100	
Mercurite or Scatter VII	5	5	5	5	5	5	10	20	30	40	50	60	70	80	90	100	100	100	
Stinger or Scatter X	5	5	5	5	5	10	20	30	40	50	60	70	80	90	100	100	100	100	
Pulson or Anti-Matter	5	5	5	5	10	20	30	40	50	60	70	80	90	100	100	100	100	100	
Hercular	5	5	5	10	20	30	40	50	60	70	80	90	100	100	100	100	100	100	
Zeon, Proton, or Hellfire	5	5	10	20	30	40	50	60	70	80	90	100	100	100	100	100	100	100	
Plasma	5	10	20	30	40	50	60	70	80	90	100	100	100	100	100	100	100	100	

<sup>a</sup>Numbers represent the percent chance of enemy missile or torpedo hitting its target (i.e., the To Hit number).

90 percent, you have to raise that ship's Missile Defense level to 4. If you raised your Missile Defense level to 5, their To Hit probability drops to 80 percent, and so forth.

Raising your Missile Defense level means either increasing a ship design's maneuverability and/or placing some (or additional) ECM on it. Note that there would be no additional benefit to raising our sample ship's Missile Defense level beyond 13, as 5 percent is the minimum hit probability (and going

beyond Missile Defense level 13 would, again, take you outside the window of change).

Note that anti-missile special devices (Anti-Missile Rockets, Zyro Shields, and Lightning Shields) will *separately* affect a ship's vulnerability to missile/torpedo attacks. It is also possible to use Table E-1 in reverse. If you know what the opposing ship's Missile Defense levels are, you can use Table E-1 to design ships with an Attack level sufficient to attack it effectively.

# F

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## *Average Damage Versus Defender's Shield Level When Hit*

Appendix F answers the question, "What is the average amount of damage I can expect to inflict when my weapon hits?" Now *assuming* that the weapon hits the target (which is another question entirely), all you have to do is cross-index the type of weapon fired with the target's shield level to find the average damage that weapon will cause. Table F-1 is used for ship targets, and Table F-2 is for attacking planetary targets.

**Table F-1** Damage Inflicted as a Function of Weapon Type and Ship Shield Level

Weapon Type	Ship Shield Level											
	0	1	2	3	4	5	6	7	9	11	13	15
Laser	2.5	1.5	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	4.0	3.0	2.1	1.4	0.8	0.4	0.1	0.0	0.0	0.0	0.0	0.0
Gatling Laser	10.1	6.1	2.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	3.5	3.5	2.5	2.5	1.5	1.5	0.7	0.7	0.2	0.0	0.0	0.0
Ion Cannon	5.6	4.6	3.6	2.6	1.6	0.9	0.4	0.1	0.0	0.0	0.0	0.0
Heavy Ion Cannon	9.1	8.1	7.1	6.1	5.1	4.2	3.4	2.7	1.5	0.7	0.2	0.0
Mass Driver	6.5	6.5	5.5	5.5	4.5	4.5	3.5	3.5	2.5	1.5	0.7	0.2
Neutron Blaster	7.6	6.6	5.6	4.6	3.6	2.8	2.0	1.4	0.5	0.1	0.0	0.0
Heavy Blast Cannon	13.6	12.6	11.6	10.6	9.6	8.7	7.8	7.0	5.4	4.1	2.9	2.0
Graviton Beam	8.1	7.1	6.1	5.2	4.4	3.6	2.9	2.3	1.3	0.6	0.2	0.0
Hard Beam	10.0	10.0	9.0	9.0	8.0	8.0	7.0	7.0	6.0	5.0	4.0	3.0
Fusion Beam	10.1	9.1	8.1	7.1	6.1	5.1	4.2	3.4	2.1	1.1	0.4	0.1
Heavy Fusion Beam	17.1	16.1	15.1	14.1	13.1	12.2	11.2	10.3	8.6	7.0	5.6	4.4
Megabolt Cannon	13.2	12.2	11.2	10.2	9.2	8.2	7.2	6.2	4.4	3.0	1.8	0.9
Phasor	12.6	11.6	10.6	9.6	8.6	7.6	6.6	5.7	4.1	2.8	1.7	0.9
Heavy Phasor	22.7	21.7	20.7	19.7	18.7	17.7	16.7	15.8	13.9	12.2	10.6	9.1
Auto Blaster	30.2	27.2	24.2	21.2	18.2	15.3	12.7	10.3	6.2	3.2	1.2	0.2
Tachyon Beam	13.1	12.1	11.1	10.2	9.3	8.4	7.6	6.8	5.4	4.2	3.1	2.1
Gauss Autocannon	34.1	34.1	30.1	30.1	26.1	26.1	22.1	22.1	18.1	14.1	10.1	6.1
Particle Beam	15.1	15.1	14.1	14.1	13.1	13.1	12.1	12.1	11.1	10.1	9.1	8.1
Plasma Cannon	18.1	17.1	16.1	15.1	14.1	13.1	12.1	11.1	9.3	7.6	6.1	4.8
Death Ray	604.0	603.0	602.0	601.0	600.0	599.0	598.0	597.0	595.0	593.0	591.0	589.0
Disruptor	25.2	24.2	23.2	22.2	21.2	20.2	19.2	18.2	16.2	14.2	12.3	10.6
Pulse Phasor	37.8	34.8	31.8	28.8	25.8	22.8	19.9	17.2	12.3	8.3	5.0	2.6
Tri-Focus Plasma	35.2	34.2	33.2	32.2	31.2	30.2	29.2	28.2	26.2	24.2	22.2	20.2
Stellar Converter	91.0	87.0	83.0	79.0	75.0	71.0	67.0	63.0	55.0	47.0	39.6	32.8
Mauler Device	60.4	59.4	58.4	57.4	56.4	55.4	54.4	53.4	51.4	49.4	47.4	45.4
Crystal Ray	804.0	800.0	796.0	792.0	788.0	784.0	780.0	776.0	768.0	760.0	752.0	744.0
Amoeba Stream	629.0	628.0	627.0	626.0	625.0	624.0	623.0	622.0	620.0	618.0	616.0	614.0
Anti-Matter Torpedo	30.0	29.0	28.0	27.0	26.0	25.0	24.0	23.0	21.0	19.0	17.0	15.0
Hellfire Torpedo	100.0	96.0	92.0	88.0	84.0	80.0	76.0	72.0	64.0	56.0	48.0	40.0
Proton Torpedo	75.0	74.0	73.0	72.0	71.0	70.0	69.0	68.0	66.0	64.0	62.0	60.0
Plasma Torpedo	150.0	149.0	148.0	147.0	146.0	145.0	144.0	143.0	141.0	139.0	137.0	135.0
Nuclear Missile	4.0	3.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	6.0	5.0	4.0	3.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	8.0	7.0	6.0	5.0	4.0	3.0	2.0	1.0	0.0	0.0	0.0	0.0
Scatter Pack V	30.0	25.0	20.0	15.0	10.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	10.0	9.0	8.0	7.0	6.0	5.0	4.0	3.0	1.0	0.0	0.0	0.0
Stinger Missile	15.0	14.0	13.0	12.0	11.0	10.0	9.0	8.0	6.0	4.0	2.0	0.0
Scatter Pack VII	70.0	63.0	56.0	49.0	42.0	35.0	28.0	21.0	7.0	0.0	0.0	0.0
Pulson Missile	20.0	19.0	18.0	17.0	16.0	15.0	14.0	13.0	11.0	9.0	7.0	5.0
Hercular Missile	25.0	24.0	23.0	22.0	21.0	20.0	19.0	18.0	16.0	14.0	12.0	10.0
Zeon Missile	30.0	29.0	28.0	27.0	26.0	25.0	24.0	23.0	21.0	19.0	17.0	15.0
Scatter Pack-X	150.0	140.0	130.0	120.0	110.0	100.0	90.0	80.0	60.0	40.0	20.0	0.0

**Table F-2** Damage Inflicted as a Function of Weapon Type and Planetary Shield Level

Weapon Type	Planetary Shield Level																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Laser	1.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	1.8	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	4.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	1.5	1.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	2.5	1.5	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	4.3	3.3	2.3	1.5	0.9	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	3.0	3.0	2.0	2.0	1.0	1.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	3.5	2.5	1.6	0.9	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	6.6	5.6	4.6	3.7	2.9	2.2	1.6	1.1	0.7	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	3.8	2.8	2.0	1.3	0.8	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	4.8	4.8	3.8	3.8	2.8	2.8	1.8	1.8	0.8	0.8	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Fusion Beam	4.8	3.8	2.8	1.9	1.2	0.6	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	8.3	7.3	6.3	5.4	4.5	3.7	3.0	2.4	1.8	1.3	0.9	0.6	0.3	0.1	0.0	0.0	0.0
Megabolt Cannon	5.3	4.3	3.4	2.6	1.9	1.3	0.8	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	6.1	5.1	4.1	3.1	2.2	1.5	1.0	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	11.1	10.1	9.1	8.1	7.2	6.3	5.5	4.7	4.0	3.4	2.8	2.2	1.8	1.3	1.0	0.7	0.4
Auto Blaster	14.3	11.3	8.3	5.7	3.6	1.9	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	6.3	5.3	4.4	3.6	2.9	2.2	1.7	1.2	0.8	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	16.0	16.0	12.0	12.0	8.0	8.0	4.0	4.0	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	7.3	7.3	6.3	6.3	5.3	5.3	4.3	4.3	3.3	3.3	2.3	2.3	1.4	1.4	0.8	0.8	0.3
Plasma Cannon	8.8	7.8	6.8	5.8	4.9	4.0	3.2	2.6	1.9	1.4	1.0	0.6	0.3	0.1	0.0	0.0	0.0
Death Ray	302.0	301.0	300.0	299.0	298.0	297.0	296.0	295.0	294.0	293.0	292.0	291.0	290.0	289.0	288.0	287.0	286.0
Disruptor	12.4	11.4	10.4	9.4	8.4	7.4	6.4	5.5	4.7	3.9	3.2	2.6	2.1	1.6	1.1	0.8	0.5
Pulse Phasor	18.2	15.2	12.2	9.2	6.7	4.6	2.9	1.6	0.6	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	17.4	16.4	15.4	14.4	13.4	12.4	11.4	10.4	9.4	8.4	7.4	6.4	5.5	4.7	3.9	3.2	2.6
Stellar Converter	44.5	40.5	36.5	32.5	28.5	24.5	20.7	17.2	14.0	11.2	8.7	6.5	4.6	3.0	1.8	0.9	0.3
Mauler Device	30.0	29.0	28.0	27.0	26.0	25.0	24.0	23.0	22.0	21.0	20.0	19.0	18.1	17.1	16.2	15.3	14.5
Crystal Ray	402.0	398.0	394.0	390.0	386.0	382.0	378.0	374.0	370.0	366.0	362.0	358.0	354.0	350.0	346.0	342.0	338.0
Amoeba Stream	314.3	313.3	312.3	311.3	310.3	309.3	308.3	307.3	306.3	305.3	304.3	303.3	302.3	301.3	300.3	299.3	298.3
Anti-Matter Torpedo	15.0	14.0	13.0	12.0	11.0	10.0	9.0	8.0	7.0	6.0	5.0	4.0	3.0	2.0	1.0	0.0	0.0
Hellfire Torpedo	48.0	44.0	40.0	36.0	32.0	28.0	24.0	20.0	16.0	12.0	8.0	4.0	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	37.0	36.0	35.0	34.0	33.0	32.0	31.0	30.0	29.0	28.0	27.0	26.0	25.0	24.0	23.0	22.0	21.0
Plasma Torpedo	75.0	74.0	73.0	72.0	71.0	70.0	69.0	68.0	67.0	66.0	65.0	64.0	63.0	62.0	61.0	60.0	59.0
Nuclear Missile	4.0	3.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	6.0	5.0	4.0	3.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	8.0	7.0	6.0	5.0	4.0	3.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	30.0	25.0	20.0	15.0	10.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Merculite Missile	10.0	9.0	8.0	7.0	6.0	5.0	4.0	3.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	15.0	14.0	13.0	12.0	11.0	10.0	9.0	8.0	7.0	6.0	5.0	4.0	3.0	2.0	1.0	0.0	0.0
Scatter-Pack VII	70.0	63.0	56.0	49.0	42.0	35.0	28.0	21.0	14.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	20.0	19.0	18.0	17.0	16.0	15.0	14.0	13.0	12.0	11.0	10.0	9.0	8.0	7.0	6.0	5.0	4.0
Hercular Missile	25.0	24.0	23.0	22.0	21.0	20.0	19.0	18.0	17.0	16.0	15.0	14.0	13.0	12.0	11.0	10.0	9.0
Zeon Missile	30.0	29.0	28.0	27.0	26.0	25.0	24.0	23.0	22.0	21.0	20.0	19.0	18.0	17.0	16.0	15.0	14.0
Scatter-Pack X	150.0	140.0	130.0	120.0	110.0	100.0	90.0	80.0	70.0	60.0	50.0	40.0	30.0	20.0	10.0	0.0	0.0
Nuclear Bomb	7.6	6.6	5.6	4.6	3.6	2.8	2.0	1.4	0.9	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	12.6	11.6	10.6	9.6	8.6	7.6	6.6	5.7	4.9	4.1	3.4	2.8	2.2	1.7	1.2	0.9	0.6
Anti-Matter Bomb	25.2	24.2	23.2	22.2	21.2	20.2	19.2	18.2	17.2	16.2	15.2	14.2	13.3	12.3	11.4	10.6	9.8
Omega-V Bomb	35.2	34.2	33.2	32.2	31.2	30.2	29.2	28.2	27.2	26.2	25.2	24.2	23.2	22.2	21.2	20.2	19.2
Neutronium Bomb	55.2	54.2	53.2	52.2	51.2	50.2	49.2	48.2	47.2	46.2	45.2	44.2	43.2	42.2	41.2	40.2	39.2



Table F-2 Continued

Weapon Type	Planetary Shield Level																
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	35
Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Megabolt Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auto Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plasma Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Death Ray	285.0	284.0	283.0	282.0	281.0	280.0	279.0	278.0	277.0	276.0	275.0	274.0	273.0	272.0	271.0	269.0	267.0
Disruptor	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulse Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	2.1	1.6	1.1	0.8	0.5	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stellar Converter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mauler Device	13.6	12.8	12.0	11.3	10.5	9.8	9.1	8.5	7.8	7.2	6.6	6.1	5.5	5.0	4.5	3.6	2.8
Crystal Ray	334.0	330.0	326.0	322.0	318.0	314.0	310.0	306.0	302.0	298.0	294.0	290.0	286.0	282.0	278.0	270.0	262.0
Amoeba Stream	297.3	296.3	295.3	294.3	293.3	292.3	291.3	290.3	289.3	288.3	287.3	286.3	285.3	284.3	283.3	281.3	279.3
Anti-Matter Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hellfire Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	20.0	19.0	18.0	17.0	16.0	15.0	14.0	13.0	12.0	11.0	10.0	9.0	8.0	7.0	6.0	4.0	2.0
Plasma Torpedo	58.0	57.0	56.0	55.0	54.0	53.0	52.0	51.0	50.0	49.0	48.0	47.0	46.0	45.0	44.0	42.0	40.0
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	3.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	8.0	7.0	6.0	5.0	4.0	3.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	13.0	12.0	11.0	10.0	9.0	8.0	7.0	6.0	5.0	4.0	3.0	2.0	1.0	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nuclear Bomb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anti-Matter Bomb	9.0	8.2	7.5	6.8	6.1	5.5	4.9	4.4	3.9	3.4	2.9	2.5	2.1	1.7	1.4	0.9	0.5
Omega-V Bomb	18.2	17.2	16.2	15.2	14.2	13.3	12.3	11.4	10.6	9.8	9.0	8.2	7.5	6.8	6.1	4.9	3.9
Neutronium Bomb	38.2	37.2	36.2	35.2	34.2	33.2	32.2	31.2	30.2	29.2	28.2	27.2	26.2	25.2	24.2	22.2	20.2

# G

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## *Overall Weapon Effectiveness*

Tables G-1 and G-2 answer the question, "How much firepower am I getting per 100 units of hull space of a given weapon type?" In other words, because hull space is the primary limiting factor when designing a ship, how do you get the most bang out of them?

Each table begins by stating the assumptions used to create it. They include the average technology level for both players (the one being shot at and the one doing the shooting), the Attack, Beam Defense, and Missile Defense levels used in computing these numbers, and the power-to-hull space ratio used to figure out the space taken up by the engines required to power each weapon.

By cross-indexing an available weapon type with an opponent's estimated shield level, the resulting number is the average amount of damage inflicted by 100 hull spaces filled with that weapon type (including fractions of weapons) at the given technology level.

Tables G-1 and G-2 factor in all of the following key elements:

- The To Hit probability of that weapon type
- Its average damage versus the indicated shield level
- Weapons' special abilities (i.e., multiple firing, shield halving, etcetera)
- Weapon miniaturization
- Engine miniaturization and their improving power-to-space ratios

These tables do *not* factor in the following:

- The limited firing ability of missile racks
- The limited firing ability of torpedoes (i.e., if you multiply their numbers by  $2/3$ , you'll get a figure more comparable to those generated for beam weapons, which can fire every turn)

Finally, Tables G-1 and G-2 were generated from the actual numbers used in the source code of the program. This means they might sometimes look a little off, but they accurately reflect the reality in the game.

## HOW TO USE TABLES G-1 AND G-2

Table G-1 covers ship versus ship combat, and Table G-2 covers ship versus planetary targets. Each table is divided into various average technology levels. When deciding what average technology level suits your specific need, use the *higher* level one. In other words, if things are at an average technology level of 11 in the game, use the appropriate section of Table G-1 or G-2, that being the Average Technology Level of 20 (not level of 10) section. That way you can design ships now that will grow into the numbers that the higher technology level table provides.

Here is an example of how to use Tables G-1 and G-2. Let's say the game is around Tech level 17. You're designing a space superiority ship and what to know which are the most effective weapons to put on it. Your main opponent's average shields have been sighted at level 3, so you look at Table G-1 (Ship versus Ship Average Technology Level of 20 under Shield Level column 3.

Looking at that column, we see that the Neutron Pellet Gun is the best relative beam weapon to use, with a hefty 6.5 average damage per 100 hull spaces. The next most effective beam weapons are the Graviton Beam and Fusion Beam, which come in at 5.7 and 5.6, respectively. If you have discovered any of these currently most effective beam weapons, they should be your first-choice candidates for ship armament.

Note that the numbers provided in Tables G-1 and G-2 are absolute only when all of the assumptions used to create them are met exactly. As this will rarely happen, use them to find out each weapon's *relative* (as opposed to exact)

effectiveness. In other words, a ship loaded with weapons listed as 6.2 in a given column will inflict about twice as much damage as one armed with weapons that have a rating of only 3.1.

## SHIP-VERSUS-SHIP COMBAT

Table G-1 deals exclusively with ship-to-ship combat situations. Note that in Table G-1, the various beam weapons are listed in order of their overall effectiveness. Torpedoes, missiles, and rockets are listed in order of their technology level; the best weapon is usually the last one listed in its group.

## SHIP-VERSUS-PLANET COMBAT

Table G-2 deals exclusively with situations in which ships are attacking planets. In Table G-2, all weapons are listed in order of technology level; usually the best weapon is the last one listed in its group. Note that the numbers at shield level 0 might seem abnormally high. This is because planets with a Shield level of 0 have been calculated with beam and missile defense levels of 0, because, obviously, they have no missile bases there to provide them.

**Table G-1** Ship-to-Ship Combat: Using Weapon Type and Shield Level to Determine Damage Inflicted per 100 Hull Spaces**Average Technology Level of 10****Assumptions:****Attack level = 3****Beam Defense = 4****Missile Defense = 5****Power-to-hull space ratio = 1.43**

Weapon Type	Shield Level											
	0	1	2	3	4	5	6	7	9	11	13	15
Beam Weapon												
Neutron Pellet Gun	4.8	4.8	3.4	3.4	2.0	2.0	1.0	1.0	0.3	0.0	0.0	0.0
Heavy Ion Cannon	3.1	2.7	2.4	2.1	1.7	1.4	1.1	0.9	0.5	0.2	0.0	0.0
Ion Cannon	5.8	4.8	3.8	2.8	1.7	1.0	0.5	0.2	0.0	0.0	0.0	0.0
Gatling Laser	6.6	4.0	1.7	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Laser	4.5	2.7	1.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	2.5	1.7	1.3	0.8	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Two-Rack Missile												
Nuclear Missile	3.0	2.2	1.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	3.2	2.7	2.0	1.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	3.3	2.9	2.5	2.1	1.6	1.2	0.8	0.4	0.0	0.0	0.0	0.0
Five-Rack Missile												
Nuclear Missile	2.0	1.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	2.1	1.7	1.3	1.0	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	2.2	1.9	1.6	1.4	1.0	0.8	0.5	0.2	0.0	0.0	0.0	0.0

**Average Technology Level of 20****Assumptions:****Attack level = 5****Beam Defense = 5****Missile Defense = 7****Power-to-hull space ratio = 1.67**

Weapon Type	Shield Level											
	0	1	2	3	4	5	6	7	9	11	13	15
Beam weapon												
Hard Beam	4.8	4.8	4.3	4.3	3.9	3.9	3.4	3.4	2.9	2.4	1.9	1.4
Heavy Fusion Beam	4.4	4.2	3.9	3.6	3.4	3.1	2.9	2.6	2.2	1.8	1.4	1.1
Fusion Beam	7.9	7.1	6.4	5.6	4.8	4.0	3.2	2.6	1.7	0.9	0.3	0.0
Heavy Blast Cannon	4.6	4.2	3.9	3.6	3.2	2.9	2.6	2.3	1.8	1.4	1.0	0.6
Graviton Beam	9.1	8.0	6.8	5.7	4.8	4.0	3.3	2.6	1.5	0.6	0.2	0.0
Mass Driver	5.2	5.2	4.4	4.4	3.6	3.6	2.8	2.8	2.0	1.2	0.6	0.1
Neutron Pellet Gun	9.0	9.0	6.5	6.5	4.0	4.0	2.0	2.0	0.5	0.0	0.0	0.0
Neutron Blaster	7.7	6.7	5.7	4.6	3.6	2.8	2.0	1.4	0.6	0.0	0.0	0.0
Heavy Ion Cannon	5.4	4.8	4.2	3.6	3.0	2.5	2.0	1.6	0.9	0.4	0.1	0.0
Ion Cannon	10.3	8.5	6.6	4.8	2.9	1.8	0.7	0.3	0.0	0.0	0.0	0.0
Gatling Laser	10.6	6.4	2.9	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Laser	8.1	5.0	2.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	3.8	2.8	2.1	1.3	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0
Two-rack missile												
Nuclear Missile	5.0	3.7	2.5	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	5.5	4.7	3.5	2.6	1.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	6.0	5.2	4.5	3.8	2.9	2.1	1.4	0.7	0.0	0.0	0.0	0.0

**Table G-1** Continued

Weapon Type	Shield Level											
	0	1	2	3	4	5	6	7	9	11	13	15
Two-rack missile												
Scatter-Pack V	13.5	11.3	9.0	6.8	4.5	2.3	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	6.3	5.7	5.1	4.5	3.8	3.2	2.5	1.8	0.6	0.0	0.0	0.0
Stinger Missile	6.0	5.6	5.2	4.8	4.4	4.0	3.6	3.2	2.4	1.5	0.7	0.0
Five-rack missile												
Nuclear Missile	3.2	2.4	1.6	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	3.7	3.1	2.3	1.7	1.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	3.9	3.4	3.0	2.5	1.9	1.4	0.9	0.4	0.0	0.0	0.0	0.0
Scatter-Pack V	8.5	7.1	5.6	4.3	2.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	4.2	3.8	3.4	3.0	2.6	2.1	1.6	1.2	0.4	0.0	0.0	0.0
Stinger Missile	4.0	3.7	3.4	3.2	2.9	2.6	2.4	2.1	1.6	1.0	0.5	0.0

**Average Technology Level of 30**

Assumptions:

Attack level = 7

Beam Defense = 6

Missile Defense = 9

Power-to-hull space ratio = 2.00

Weapon Type	Shield Level											
	0	1	2	3	4	5	6	7	9	11	13	15
Beam weapon												
Megabolt Cannon	18.8	17.1	15.4	13.7	12.2	10.7	9.4	8.1	5.8	3.9	2.4	1.3
Auto Blaster	25.7	23.2	20.5	18.0	15.4	12.9	10.8	8.7	5.3	2.8	0.9	0.1
Tachyon Beam	13.1	12.1	11.1	10.3	9.3	8.5	7.6	6.8	5.5	4.1	3.1	2.1
Hard Beam	8.3	8.3	7.5	7.5	6.7	6.7	5.8	5.8	5.0	4.2	3.2	2.4
Heavy Blast Cannon	7.4	6.8	6.3	5.7	5.2	4.7	4.2	3.7	2.9	2.2	1.6	1.0
Graviton Beam	14.8	13.0	11.2	9.6	8.1	6.6	5.4	4.2	2.4	1.2	0.3	0.0
Fusion Beam	12.9	11.7	10.4	9.1	7.8	6.5	5.5	4.4	2.7	1.4	0.4	0.0
Heavy Phasor	7.6	7.2	6.9	6.6	6.2	5.9	5.6	5.2	4.6	4.1	3.5	3.0
Phasor	12.8	11.8	10.8	9.8	8.8	7.8	6.8	5.8	4.1	2.8	1.8	1.0
Heavy Fusion Beam	7.3	6.9	6.4	6.0	5.5	5.2	4.7	4.3	3.6	3.0	2.3	1.9
Mass Driver	9.5	9.5	8.0	8.0	6.6	6.6	5.2	5.2	3.5	2.1	0.9	0.2
Neutron Pellet Gun	14.6	14.6	10.0	10.0	6.0	6.0	2.6	2.6	0.6	0.0	0.0	0.0
Neutron Blaster	12.4	10.8	9.1	7.5	5.9	4.5	3.2	2.4	0.8	0.0	0.0	0.0
Heavy Ion Cannon	8.7	7.7	6.8	5.8	4.9	4.1	3.3	2.5	1.4	0.6	0.1	0.0
Ion Cannon	17.0	14.0	11.0	8.0	5.0	3.0	1.5	0.5	0.0	0.0	0.0	0.0
Gatling Laser	16.3	9.7	4.4	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	6.2	4.7	3.2	2.0	1.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0
Laser	11.5	6.9	3.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Torpedo												
Anti-Matter Torpedo	10.8	10.5	10.1	9.7	9.4	9.0	8.6	8.3	7.6	6.8	6.1	5.4
Two-rack missile												
Nuclear Missile	7.5	5.6	3.7	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	9.0	7.6	5.7	4.2	2.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	10.3	9.0	7.8	6.5	5.0	3.7	2.5	1.2	0.0	0.0	0.0	0.0
Scatter-Pack V	21.9	18.3	14.6	11.0	7.3	3.7	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	11.5	10.4	9.3	8.1	7.0	5.9	4.5	3.4	1.1	0.0	0.0	0.0
Stinger Missile	11.0	10.2	9.5	8.7	8.0	7.3	6.6	5.9	4.4	2.8	1.4	0.0
Scatter-Pack VII	22.0	19.8	17.6	15.4	13.2	11.0	8.8	6.6	2.2	0.0	0.0	0.0
Pulson Missile	8.4	8.0	7.6	7.2	6.7	6.3	5.8	5.4	4.6	3.8	2.9	2.1
Five-rack missile												
Nuclear Missile	5.0	3.7	2.5	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	6.1	5.1	3.8	2.9	1.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	6.8	6.0	5.2	4.3	3.3	2.5	1.6	0.8	0.0	0.0	0.0	0.0
Scatter-Pack V	13.6	11.4	9.1	6.8	4.5	2.3	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	7.7	6.9	6.2	5.4	4.6	3.9	3.0	2.2	0.7	0.0	0.0	0.0
Stinger Missile	7.4	6.9	6.4	5.9	5.4	4.9	4.4	3.9	3.0	1.9	0.9	0.0
Scatter-Pack VII	16.0	14.3	12.8	11.2	9.5	8.0	6.4	4.7	1.6	0.0	0.0	0.0
Pulson Missile	5.6	5.3	5.0	4.7	4.5	4.2	3.9	3.6	3.0	2.5	1.9	1.4

**Table G-1** Continued**Average Technology Level of 40****Assumptions:****Attack level = 9****Beam Defense = 7****Missile Defense = 11****Power-to-hull space ratio = 2.35**

Weapon Type	0	1	2	3	4	Shield Level		7	9	11	13	15
						5	6					
<b>Beam weapon</b>												
Death Ray	17.9	17.9	17.9	17.8	17.8	17.8	17.7	17.7	17.6	17.6	17.5	17.5
Gauss Autocannon	23.2	23.2	20.4	20.4	17.7	17.7	15.0	15.0	12.3	9.6	6.8	4.1
Plasma Cannon	20.3	19.2	18.0	16.9	15.7	14.6	13.4	12.3	10.3	8.5	6.8	5.3
Pulse Phasor	31.4	28.9	26.3	23.8	21.4	18.9	16.4	14.2	10.2	6.9	4.2	2.2
Auto Blaster	41.7	37.6	33.3	29.2	25.0	20.9	17.4	14.1	8.6	4.5	1.5	0.1
Megabolt Cannon	30.0	27.2	24.5	21.8	19.4	17.0	14.8	12.9	9.1	6.2	3.7	1.8
Tachyon Beam	22.4	20.7	19.0	17.5	15.8	14.3	13.1	11.7	9.2	7.0	5.3	3.6
Disruptor	14.3	13.7	13.1	12.5	12.0	11.4	10.8	10.3	9.1	8.0	6.9	5.9
Particle Beam	12.4	12.4	11.5	11.5	10.6	10.6	9.8	9.8	9.0	8.2	7.4	6.6
Hard Beam	13.3	13.3	12.0	12.0	10.7	10.7	9.4	9.4	8.1	6.7	5.2	3.9
Heavy Phasor	11.9	11.3	10.8	10.2	9.7	9.2	8.7	8.2	7.2	6.3	5.5	4.7
Phasor	19.7	18.2	16.6	15.1	13.5	12.0	10.4	8.8	6.4	4.4	2.6	1.3
Heavy Fusion Beam	11.0	10.3	9.7	9.0	8.3	7.7	7.1	6.5	5.5	4.5	3.6	2.8
Mass Driver	15.8	15.8	13.4	13.4	11.0	11.0	8.6	8.6	6.2	3.7	1.7	0.3
Fusion Beam	19.7	17.7	15.8	13.8	11.9	10.0	8.3	6.6	4.1	2.2	0.8	0.0
Graviton Beam	22.8	20.0	17.2	14.8	12.4	10.4	8.4	6.4	3.6	1.6	0.4	0.0
Heavy Blast Cannon	11.1	10.3	9.5	8.7	7.9	7.0	6.3	5.6	4.5	3.3	2.4	1.6
Neutron Pellet Gun	22.7	22.7	16.3	16.3	10.0	10.0	4.5	4.5	0.9	0.0	0.0	0.0
Neutron Blaster	18.9	16.4	13.9	11.4	8.9	6.7	5.0	3.5	1.4	0.0	0.0	0.0
Heavy Ion Cannon	13.0	11.6	10.2	8.7	7.3	6.1	4.8	3.8	2.2	1.0	0.2	0.0
Ion Cannon	26.0	21.3	16.6	12.0	8.0	4.6	2.0	0.6	0.0	0.0	0.0	0.0
Gatling Laser	23.6	14.3	6.3	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Laser	18.0	11.0	5.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	8.4	6.3	4.5	3.0	1.5	0.6	0.3	0.0	0.0	0.0	0.0	0.0
<b>Torpedo</b>												
Anti-Matter Torpedo	14.2	13.7	13.2	12.8	12.3	11.8	11.3	10.8	9.9	9.0	8.0	7.1
Hellfire Torpedo	30.5	29.3	28.0	26.8	25.6	24.4	23.2	21.9	19.5	17.1	14.6	12.2
<b>Two-rack missile</b>												
Nuclear Missile	10.9	8.1	5.4	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	14.6	12.3	9.2	6.9	4.6	2.3	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	17.3	15.2	13.1	11.0	8.4	6.3	4.2	2.1	0.0	0.0	0.0	0.0
Scatter-Pack V	35.1	29.4	23.4	17.7	11.7	6.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	21.2	19.1	17.0	15.0	12.9	10.8	8.3	6.2	2.0	0.0	0.0	0.0
Stinger Missile	20.0	18.4	17.1	15.8	14.5	13.2	11.9	10.6	8.0	5.2	2.6	0.0
Scatter-Pack VII	39.6	35.6	31.7	27.7	23.7	19.8	15.8	11.8	4.0	0.0	0.0	0.0
Pulson Missile	15.4	14.6	13.9	13.1	12.3	11.6	10.7	10.0	8.4	6.9	5.4	3.9
Hercular Missile	12.5	11.9	11.4	10.9	10.4	10.0	9.5	9.0	8.0	6.9	5.9	5.0
<b>Five-rack missile</b>												
Nuclear Missile	7.0	5.2	3.5	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	9.5	8.0	6.0	4.5	3.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	11.7	10.3	8.9	7.5	5.7	4.2	2.8	1.4	0.0	0.0	0.0	0.0
Scatter-Pack V	20.5	17.1	13.6	10.3	6.8	3.5	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	14.1	12.7	11.3	10.0	8.6	7.2	5.5	4.1	1.3	0.0	0.0	0.0
Stinger Missile	13.3	12.3	11.4	10.5	9.7	8.8	7.9	7.1	5.3	3.4	1.7	0.0
Scatter-Pack VII	28.5	25.6	22.8	20.0	17.1	14.3	11.4	8.5	2.8	0.0	0.0	0.0
Pulson Missile	10.3	9.8	9.3	8.8	8.3	7.8	7.2	6.7	5.6	4.6	3.6	2.6
Hercular Missile	8.3	8.0	7.6	7.3	7.0	6.6	6.3	6.0	5.3	4.6	4.0	3.3



**Table G-1** Continued**Average Technology Level of 50**

Assumptions:

Attack level = 11

Beam Defense = 8

Missile Defense = 13

Power-to-hull space ratio = 3.13

Weapon Type	0	1	2	3	4	Shield Level		7	9	11	13	15
						5	6					
<b>Beam Weapon</b>												
Death Ray	34.7	34.7	34.6	34.5	34.5	34.4	34.4	34.3	34.2	34.1	34.0	33.8
Gauss Autocannon	43.8	43.8	38.5	38.5	33.4	33.4	28.2	28.2	23.1	18.0	12.8	7.7
Tri-Focus Plasma	26.7	26.0	25.2	24.5	23.7	23.0	22.1	21.4	19.9	18.3	16.8	15.3
Mauler Device	21.6	21.2	20.8	20.5	20.1	19.8	19.4	19.0	18.3	17.6	16.9	16.2
Plasma Cannon	35.6	33.6	31.7	29.7	27.8	25.8	23.9	21.9	18.2	14.8	11.9	9.5
Particle Beam	24.4	24.4	22.8	22.8	21.2	21.2	19.6	19.6	18.0	16.4	14.6	13.0
Pulse Phasor	55.4	50.9	46.5	42.1	37.6	33.2	29.0	25.0	18.0	12.1	7.4	3.8
Stellar Converter	29.5	28.2	26.9	25.6	24.2	22.9	21.7	20.3	17.7	15.1	12.7	10.5
Auto Blaster	71.7	64.4	57.3	50.2	42.9	36.1	30.0	24.4	14.7	7.6	2.9	0.2
Disruptor	25.6	24.6	23.6	22.6	21.6	20.6	19.4	18.4	16.4	14.4	12.5	10.7
Tachyon Beam	37.8	35.0	32.1	29.2	26.7	24.2	21.7	19.6	15.7	12.1	8.9	6.0
Megabolt Cannon	47.6	43.6	39.6	35.6	31.6	28.0	24.4	20.8	15.2	10.0	6.0	3.2
Hard Beam	21.8	21.8	19.7	19.7	17.5	17.5	15.4	15.4	13.2	11.0	8.9	6.7
Heavy Phasor	18.8	17.9	17.1	16.2	15.4	14.6	13.8	12.9	11.5	10.1	8.7	7.5
Phasor	32.9	30.0	27.4	24.8	22.2	19.6	17.0	14.8	10.6	7.0	4.5	2.2
Mass Driver	27.8	27.8	23.6	23.6	19.4	19.4	14.7	14.7	10.5	6.3	3.1	0.5
Heavy Fusion Beam	17.6	16.6	15.6	14.6	13.4	12.5	11.5	10.6	8.8	7.1	5.7	4.4
Graviton Beam	38.2	33.5	28.8	24.7	20.5	17.0	14.1	11.1	6.4	2.9	0.5	0.0
Fusion Beam	32.4	29.2	26.0	22.8	19.6	16.4	13.6	11.2	6.8	3.6	1.2	0.0
Neutron Pellet Gun	40.0	40.0	28.5	28.5	17.1	17.1	8.5	8.5	1.4	0.0	0.0	0.0
Heavy Blast Cannon	17.5	16.2	15.0	13.7	12.4	11.2	10.1	9.0	7.0	5.3	3.8	2.5
Neutron Blaster	30.5	26.5	22.5	18.5	14.5	11.0	8.0	6.0	2.0	0.5	0.0	0.0
Heavy Ion Cannon	20.8	18.5	16.2	14.0	11.7	9.7	8.0	6.2	3.4	1.7	0.5	0.0
Ion Cannon	40.9	33.6	26.3	19.0	11.8	7.2	2.7	0.9	0.0	0.0	0.0	0.0
Gatling Laser	36.8	22.2	10.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Laser	28.5	17.1	8.5	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	14.3	10.4	7.3	4.7	2.6	1.3	0.4	0.0	0.0	0.0	0.0	0.0
<b>Torpedo</b>												
Anti-Matter Torpedo	20.0	19.4	18.7	18.1	17.4	16.7	16.0	15.3	14.0	12.7	11.4	10.0
Hellfire Torpedo	48.9	46.9	45.0	43.0	41.0	39.1	37.2	35.2	31.2	27.4	23.4	19.5
Proton Torpedo	36.1	35.6	35.1	34.6	34.1	33.7	33.2	32.7	31.7	30.7	29.8	28.8
Plasma Torpedo	51.1	50.8	50.5	50.1	49.8	49.4	49.1	48.8	48.1	47.4	46.7	46.0
<b>Two-rack missile</b>												
Nuclear Missile	17.1	12.8	8.5	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	23.7	20.0	15.0	11.2	7.5	3.7	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	30.0	26.3	22.7	19.0	14.5	10.9	7.2	3.6	0.0	0.0	0.0	0.0
Scatter-Pack V	53.4	44.7	35.6	26.9	17.8	9.1	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	36.4	32.8	29.2	25.7	22.1	18.5	14.2	10.7	3.5	0.0	0.0	0.0
Stinger Missile	35.3	32.6	30.3	28.0	25.7	23.4	21.1	18.8	14.2	9.2	4.6	0.0
Scatter-Pack VII	72.8	65.5	58.3	51.1	43.6	26.5	29.1	21.8	7.3	0.0	0.0	0.0
Pulson Missile	29.5	28.1	26.6	25.2	23.7	22.2	20.6	19.1	16.2	13.3	10.4	7.5
Hercular Missile	24.1	23.0	22.1	21.1	20.2	19.2	18.3	17.3	15.4	13.4	11.5	9.6
Zeon Missile	18.2	17.6	17.0	16.4	15.8	15.2	14.5	13.9	12.7	11.5	10.3	9.1
Scatter-Pack X	50.8	47.4	44.0	40.6	37.2	33.8	30.5	27.1	20.3	13.5	6.7	0.0
<b>Five-rack missile</b>												
Nuclear Missile	10.9	8.1	5.4	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	14.6	12.3	9.2	6.9	4.6	2.3	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	20.6	18.1	15.6	13.1	10.0	7.5	5.0	2.5	0.0	0.0	0.0	0.0
Scatter-Pack V	31.5	26.4	21.0	15.8	10.5	5.3	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	24.2	21.9	19.5	17.1	14.7	12.3	9.5	7.1	2.3	0.0	0.0	0.0
Stinger Missile	23.5	21.7	20.2	18.7	17.1	15.6	14.1	12.5	9.4	6.1	3.0	0.0
Scatter-Pack VII	50.2	45.2	40.2	35.2	30.1	25.2	20.1	15.0	5.0	0.0	0.0	0.0
Pulson Missile	19.1	18.2	17.2	16.3	15.4	14.4	13.3	12.4	10.5	8.6	6.7	4.8
Hercular Missile	15.9	15.2	14.6	14.0	13.3	12.7	12.1	11.4	10.2	8.8	7.6	6.3
Zeon Missile	12.1	11.7	11.3	10.9	10.5	10.1	9.6	9.2	8.4	7.6	6.8	6.0
Scatter-Pack X	30.2	28.2	26.2	24.2	22.2	20.1	18.11	16.1	12.1	8.0	4.0	0.0

**Table G-1** Continued**Average Technology Level of 60****Assumptions:****Attack level = 11****Beam Defense = 8****Missile Defense = 14****Power-to-hull space ratio = 4.17**

Weapon Type	0	1	2	3	4	Shield Level		7	9	11	13	15
						5	6					
<b>Beam Weapon</b>												
Death Ray	56.5	56.4	56.3	56.2	56.2	56.1	56.0	55.9	55.7	55.5	55.3	55.1
Gauss Autocannon	70.7	70.7	62.3	62.3	54.1	54.1	45.6	45.6	37.4	29.2	20.7	12.5
Tri-Focus Plasma	42.3	41.1	40.0	38.8	37.6	36.4	35.0	33.8	31.4	29.1	26.7	24.3
Mauler Device	35.4	34.8	34.3	33.7	33.1	32.5	31.8	31.3	30.1	28.9	27.8	26.6
Particle Beam	40.6	40.6	38.0	38.0	35.3	35.3	32.6	32.6	30.0	27.3	24.3	21.6
Stellar Converter	49.6	47.4	45.2	43.0	40.8	38.6	36.4	34.2	29.7	25.4	21.4	17.7
Pulse Phasor	84.7	77.7	71.1	64.4	57.5	50.8	44.4	38.3	27.5	18.6	11.3	5.8
Plasma Cannon	52.1	49.2	46.4	43.5	40.7	37.8	35.0	32.1	26.7	21.7	17.5	13.9
Disruptor	39.0	37.5	35.9	34.4	32.8	31.3	29.6	28.0	25.0	21.9	19.0	16.3
Auto Blaster	01.6	91.2	81.2	71.2	60.8	51.2	42.5	34.5	20.8	10.8	4.1	0.4
Tachyon Beam	55.7	51.5	47.3	43.1	39.4	35.7	32.1	28.9	23.1	17.8	13.1	8.9
Megabolt Cannon	70.0	64.1	58.2	52.3	46.4	41.1	35.8	30.5	22.3	14.7	8.8	4.7
Hard Beam	31.1	31.1	28.0	28.0	25.0	25.0	21.9	21.9	18.8	15.7	12.6	9.6
Heavy Phasor	26.5	25.2	24.0	22.8	21.7	20.5	19.4	18.2	16.2	14.2	12.3	10.5
Phasor	46.3	42.2	38.6	35.0	31.3	27.7	24.0	20.9	15.0	10.0	6.3	3.1
Mass Driver	40.7	40.7	34.6	34.6	28.4	28.4	21.5	21.5	15.3	9.2	4.6	0.7
Heavy Fusion Beam	4.6	23.2	21.7	20.3	18.7	17.5	16.0	14.8	12.3	10.0	8.0	6.2
Graviton Beam	54.1	47.5	40.8	35.0	29.1	24.1	20.0	15.8	9.1	4.1	0.8	0.0
Fusion Beam	45.0	40.5	36.1	31.6	27.2	22.7	18.8	15.5	9.4	5.0	1.6	0.0
Heavy Blast Cannon	24.2	22.4	20.6	18.8	17.1	15.5	14.0	12.4	9.7	7.3	5.3	3.5
Neutron Pellet Gun	56.0	56.0	40.0	40.0	24.0	24.0	12.0	12.0	2.0	0.0	0.0	0.0
Neutron Blaster	43.5	37.8	32.1	26.4	20.7	15.7	11.4	8.5	2.8	0.7	0.0	0.0
Heavy Ion Cannon	8.0	25.0	21.9	18.8	15.7	13.0	10.7	8.4	4.6	2.3	0.7	0.0
Ion Cannon	56.2	46.2	36.2	26.2	16.2	10.0	3.7	1.2	0.0	0.0	0.0	0.0
Gatling Laser	50.6	30.6	13.7	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Laser	40.0	24.0	12.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	19.4	14.1	10.0	6.4	3.5	1.7	0.5	0.0	0.0	0.0	0.0	0.0
<b>Torpedo</b>												
Anti-Matter Torpedo	23.7	22.9	22.2	21.4	20.6	19.8	18.9	18.1	16.6	15.0	13.5	11.9
Hellfire Torpedo	67.5	64.8	62.0	59.4	56.6	54.0	51.3	48.5	43.1	37.8	32.4	27.0
Proton Torpedo	48.2	47.5	46.9	46.2	45.6	45.0	44.3	43.7	42.4	41.1	39.8	38.5
Plasma Torpedo	75.0	74.5	74.0	73.5	73.0	72.5	71.9	71.4	70.4	69.5	68.5	67.5
<b>Two-Rack Missile</b>												
Nuclear Missile	16.0	12.0	8.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	21.6	18.3	13.3	10.0	6.6	3.3	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	35.7	31.4	27.1	22.8	17.1	12.8	8.5	4.2	0.0	0.0	0.0	0.0
Scatter-Pack V	66.4	55.7	44.2	33.5	22.1	11.4	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	51.2	46.2	41.2	36.2	31.2	26.2	20.0	15.0	5.0	0.0	0.0	0.0
Stinger Missile	55.0	50.7	47.1	43.5	40.0	36.4	32.8	29.2	22.1	14.2	7.1	0.0
Scatter-Pack VII	102.5	92.1	82.1	71.7	61.4	51.4	41.0	30.7	10.3	0.0	0.0	0.0
Pulson Missile	43.5	41.4	39.2	37.1	35.0	32.8	30.3	28.2	23.9	19.6	15.3	11.0
Hercular Missile	40.4	38.6	37.0	35.4	33.8	32.2	30.6	29.0	25.9	22.5	19.3	16.1
Zeon Missile	31.1	30.1	29.1	28.0	27.0	26.0	24.8	23.8	21.7	19.7	17.6	15.6
Scatter-Pack X	82.2	76.7	71.2	65.8	60.3	54.8	49.3	43.8	32.9	21.9	10.9	0.0
<b>Five-rack missile</b>												
Nuclear Missile	8.8	6.6	4.4	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	13.0	11.0	8.0	6.0	4.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	22.7	20.0	17.2	14.5	10.9	8.1	5.4	2.7	0.0	0.0	0.0	0.0
Scatter-Pack V	35.7	30.0	23.8	18.0	11.9	6.1	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	31.5	28.4	25.3	22.3	19.2	16.1	12.3	9.2	3.0	0.0	0.0	0.0
Stinger Missile	36.6	33.8	31.4	29.0	26.6	24.2	21.9	19.5	14.7	9.5	4.7	0.0
Scatter-Pack VII	71.7	64.5	57.5	50.2	43.0	36.0	28.7	21.5	7.2	0.0	0.0	0.0
Pulson Missile	29.0	27.6	26.1	24.7	23.3	21.9	20.2	18.8	15.9	13.0	10.2	7.3
Hercular Missile	26.9	25.7	24.6	23.6	22.5	21.5	20.4	19.3	17.2	15.0	12.8	10.7
Zeon Missile	20.5	19.9	19.2	18.5	17.8	17.2	16.4	15.7	14.4	13.0	11.6	10.3
Scatter-Pack X	48.7	45.4	42.2	38.9	35.7	32.4	29.2	25.9	19.4	12.9	6.4	0.0

**Table G-1** Continued**Average Technology Level of 70**

Assumptions:

Attack level = 11

Beam Defense = 8

Missile Defense = 15

Power-to-hull space ratio = 5.00

Weapon Type	0	1	2	3	4	Shield Level		7	9	11	13	15
						5	6					
Beam weapon												
Death Ray	83.7	83.6	83.5	83.3	83.2	83.1	82.9	82.8	82.5	82.2	81.9	81.7
Gauss Autocannon	98.5	98.5	86.7	86.7	75.3	75.3	63.5	63.5	52.1	40.7	28.9	17.5
Mauler Device	52.2	51.3	50.5	49.6	48.8	47.9	46.9	46.1	44.4	42.6	40.9	39.2
Tri-Focus Plasma	59.1	57.5	55.8	54.1	52.5	50.8	48.9	47.2	43.9	40.6	37.2	33.9
Stellar Converter	74.4	71.2	67.8	64.5	61.2	57.9	54.6	51.3	44.6	38.1	32.1	26.6
Particle Beam	55.4	55.4	51.8	51.8	48.1	48.1	44.5	44.5	40.9	37.2	33.1	29.5
Pulse Phasor	108.9	100.0	91.4	82.8	73.9	65.3	57.1	49.2	35.3	23.9	14.6	7.5
Plasma Cannon	66.3	62.7	59.0	55.4	51.8	48.1	44.5	40.9	34.0	27.7	22.2	17.7
Disruptor	52.0	50.0	47.9	45.8	43.8	41.7	39.4	37.4	33.3	29.2	25.3	21.7
Auto Blaster	128.4	115.2	102.6	90.0	76.8	64.7	53.6	43.6	26.3	13.6	5.2	0.5
Tachyon Beam	70.6	65.3	60.0	54.6	50.0	45.3	40.6	36.6	29.3	22.6	16.6	11.3
Megabolt Cannon	85.0	77.8	70.7	63.5	56.4	50.0	43.5	37.1	27.1	17.8	10.7	5.7
Hard Beam	38.5	38.5	34.7	34.7	30.9	30.9	27.1	27.1	23.3	19.5	15.7	11.9
Heavy Phasor	32.1	30.5	29.1	27.7	26.3	24.9	23.5	22.1	19.6	17.1	14.9	12.8
Phasor	53.6	48.9	44.7	40.5	36.3	32.1	27.8	24.2	17.3	11.5	7.3	3.6
Mass Driver	48.1	48.1	40.9	40.9	33.6	33.6	25.4	25.4	18.1	10.9	5.4	0.9
Heavy Fusion Beam	30.0	28.2	26.5	24.7	22.8	21.3	19.5	18.0	15.0	12.1	9.7	7.6
Graviton Beam	65.0	57.0	49.0	42.0	35.0	29.0	24.0	19.0	11.0	5.0	1.0	0.0
Fusion Beam	54.0	48.6	43.3	38.0	32.6	27.3	22.6	18.6	11.3	6.0	2.0	0.0
Heavy Blast Cannon	29.4	27.2	25.1	22.9	20.8	18.9	17.0	15.1	11.8	8.9	6.4	4.3
Neutron Pellet Gun	56.0	56.0	40.0	40.0	24.0	24.0	12.0	12.0	2.0	0.0	0.0	0.0
Neutron Blaster	50.8	44.1	37.5	30.8	24.1	18.3	13.3	10.0	3.3	0.8	0.0	0.0
Heavy Ion Cannon	33.1	29.5	25.9	22.2	18.6	15.4	12.7	10.0	5.4	2.7	0.9	0.0
Ion Cannon	64.2	52.8	41.4	30.0	18.5	11.4	4.2	1.4	0.0	0.0	0.0	0.0
Gatling Laser	57.8	35.0	15.7	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	22.0	16.0	11.3	7.3	4.0	2.0	0.6	0.0	0.0	0.0	0.0	0.0
Laser	40.0	24.0	12.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Torpedo												
Anti-Matter Torpedo	24.2	23.4	22.6	21.9	21.1	20.3	19.3	18.5	16.9	15.3	13.8	12.2
Hellfire Torpedo	79.7	76.6	73.3	70.2	66.9	63.8	60.6	57.4	51.0	44.7	38.3	31.9
Proton Torpedo	56.1	55.2	54.5	53.7	53.0	52.3	51.5	50.8	49.3	47.7	46.3	44.8
Plasma Torpedo	95.6	95.0	94.4	93.7	93.1	92.5	91.8	91.1	89.9	88.6	87.4	86.1
Two-rack missile												
Nuclear Missile	8.0	6.0	4.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	11.6	10.0	6.6	5.0	3.3	1.6	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	24.2	21.4	18.5	15.7	11.4	8.5	5.7	2.8	0.0	0.0	0.0	0.0
Scatter-Pack V	48.4	40.7	32.3	24.6	16.1	8.4	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	44.2	40.0	35.7	31.4	27.1	22.8	17.1	12.8	4.2	0.0	0.0	0.0
Stinger Missile	62.0	57.0	53.0	49.0	45.0	41.0	37.0	33.0	25.0	16.0	8.0	0.0
Scatter-Pack VII	120.5	108.3	96.6	84.4	72.2	60.5	48.3	36.1	12.2	0.0	0.0	0.0
Pulson Missile	60.0	57.0	54.1	51.1	48.2	45.2	41.7	38.8	32.9	27.0	21.1	15.2
Hercular Missile	61.2	58.4	56.0	53.6	51.2	48.8	46.4	44.0	39.2	34.0	29.2	24.4
Zeon Missile	50.7	49.0	47.3	45.7	44.0	42.3	40.4	38.8	35.4	32.1	28.8	25.4
Scatter-Pack X	123.0	114.8	106.6	98.4	90.2	82.0	73.8	65.6	49.2	32.8	16.4	0.0
Five-rack missile												
Nuclear Missile	5.0	3.7	2.5	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	7.7	6.6	4.4	3.3	2.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	17.0	15.0	13.0	11.0	8.0	6.0	4.0	2.0	0.0	0.0	0.0	0.0
Scatter-Pack V	27.3	23.0	18.2	13.9	9.1	4.7	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	31.0	28.0	25.0	22.0	19.0	16.0	12.0	9.0	3.0	0.0	0.0	0.0
Stinger Missile	41.3	38.0	35.3	32.6	30.0	27.3	24.6	22.0	16.6	10.6	5.3	0.0
Scatter-Pack VII	83.4	75.0	66.9	58.4	50.0	41.9	33.4	25.0	8.4	0.0	0.0	0.0
Pulson Missile	39.2	37.3	35.3	33.4	31.5	29.6	27.3	25.3	21.5	17.6	13.8	10.0
Hercular Missile	40.2	38.4	36.8	35.2	33.6	32.1	30.5	28.9	25.7	22.3	19.2	16.0
Zeon Missile	33.8	32.6	31.5	30.4	29.3	28.2	26.9	25.8	23.6	21.4	19.2	16.9
Scatter-Pack X	74.0	69.1	64.2	59.2	54.3	49.3	44.4	39.5	29.6	19.7	9.8	0.0

**Table G-1** Continued**Average Technology Level of 80****Assumptions:****Attack level = 11****Beam Defense = 8****Missile Defense = 16****Power-to-hull space ratio = 5.83**

Weapon Type	Shield Level											
	0	1	2	3	4	5	6	7	9	11	13	15
<b>Beam weapon</b>												
Death Ray	109.7	109.5	109.3	109.1	108.9	108.8	108.6	108.4	108.0	107.6	107.3	106.9
Mauler Device	72.5	71.3	70.1	68.9	67.7	66.5	65.2	64.0	61.6	59.2	56.8	54.4
Stellar Converter	105.7	101.1	96.3	91.7	86.9	82.3	77.6	72.8	63.4	54.2	45.6	37.8
Gauss Autocannon	125.4	125.4	110.4	110.4	95.9	95.9	80.9	80.9	66.3	51.8	36.8	22.2
Particle Beam	81.3	81.3	76.0	76.0	70.6	70.6	65.3	65.3	60.0	54.6	48.6	43.3
Tri-Focus Plasma	78.8	76.6	74.4	72.2	70.0	67.7	65.2	63.0	58.6	54.1	49.7	45.2
Pulse Phasor	138.6	127.2	116.3	105.4	94.0	83.1	72.7	62.7	45.0	30.4	18.6	9.5
Disruptor	67.6	65.0	62.3	59.6	57.0	54.3	51.3	48.6	43.3	38.0	33.0	28.3
Plasma Cannon	81.1	76.6	72.2	67.7	63.3	58.8	54.4	50.0	41.6	33.8	27.2	21.6
Auto Blaster	162.6	146.0	130.0	114.0	97.3	82.0	68.0	55.3	33.3	17.3	6.6	0.6
Tachyon Beam	88.3	81.6	75.0	68.3	62.5	56.6	50.8	45.8	36.6	28.3	20.8	14.1
Megabolt Cannon	108.1	99.0	90.0	80.9	71.8	63.6	55.4	47.2	34.5	22.7	13.6	7.2
Hard Beam	45.0	45.0	40.5	40.5	36.1	36.1	31.6	31.6	27.2	22.7	18.3	13.8
Heavy Phasor	38.9	37.0	35.3	33.6	31.9	30.2	28.5	26.8	23.8	20.8	18.0	15.5
Phasor	68.0	62.0	56.6	51.3	46.0	40.6	35.3	30.6	22.0	14.6	9.3	4.6
Mass Driver	58.8	58.8	50.0	50.0	41.1	41.1	31.1	31.1	22.2	13.3	6.6	1.1
Heavy Fusion Beam	35.3	33.3	31.2	29.2	26.9	25.1	23.0	21.2	17.6	14.3	11.5	8.9
Graviton Beam	81.2	71.2	61.2	52.5	43.7	36.2	30.0	23.7	13.7	6.2	1.2	0.0
Fusion Beam	67.5	60.8	54.1	47.5	40.8	34.1	28.3	23.3	14.1	7.5	2.5	0.0
Heavy Blast Cannon	35.1	32.5	30.0	27.4	24.8	22.5	20.3	18.0	14.1	10.6	7.7	5.1
Neutron Pellet Gun	70.0	70.0	50.0	50.0	30.0	30.0	15.0	15.0	2.5	0.0	0.0	0.0
Neutron Blaster	61.0	53.0	45.0	37.0	29.0	22.0	16.0	12.0	4.0	1.0	0.0	0.0
Heavy Ion Cannon	38.4	34.2	30.0	25.7	21.5	17.8	14.7	11.5	6.3	3.1	1.0	0.0
Ion Cannon	75.0	61.6	48.3	35.0	21.6	13.3	5.0	1.6	0.0	0.0	0.0	0.0
Gatling Laser	67.5	40.8	18.3	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	27.5	20.0	14.1	9.1	5.0	2.5	0.8	0.0	0.0	0.0	0.0	0.0
Laser	50.0	30.0	15.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Torpedo</b>												
Anti-Matter Torpedo	23.2	22.4	21.6	20.9	20.1	19.4	18.4	17.7	16.2	14.7	13.2	11.6
Hellfire Torpedo	88.4	84.9	81.3	77.8	74.2	70.7	67.2	63.6	56.5	49.5	42.4	35.3
Proton Torpedo	60.2	59.3	58.5	57.7	56.9	56.1	55.3	54.6	53.0	51.3	49.7	48.1
Plasma Torpedo	110.9	110.2	109.4	108.7	108.0	107.2	106.4	105.7	104.2	102.8	101.3	99.8
<b>Two-rack missile</b>												
Nuclear Missile	5.0	5.0	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	8.0	6.0	4.0	4.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	15.0	13.3	11.6	10.0	6.6	5.0	3.3	1.6	0.0	0.0	0.0	0.0
Scatter-Pack V	30.0	25.4	20.0	15.4	10.0	5.4	0.0	0.0	0.0	0.0	0.0	0.0
Merculite Missile	35.0	31.6	28.3	25.0	21.6	18.3	13.3	10.0	3.3	0.0	0.0	0.0
Stinger Missile	52.2	47.7	44.4	41.1	37.7	34.4	31.1	27.7	21.1	13.3	6.6	0.0
Scatter-Pack VII	113.0	101.5	90.7	79.2	67.6	56.9	45.3	33.8	11.5	0.0	0.0	0.0
Pulson Missile	82.0	78.0	74.0	70.0	66.0	62.0	57.0	53.0	45.0	37.0	29.0	21.0
Hercular Missile	91.4	87.1	83.5	80.0	76.4	72.8	69.2	65.7	58.5	50.7	43.5	36.4
Zeon Missile	73.2	70.8	68.4	66.0	63.6	61.2	58.4	56.0	51.2	46.4	41.6	36.8
Scatter-Pack X	166.0	155.0	143.9	132.8	121.7	110.7	99.6	88.5	66.4	44.2	22.1	0.0
<b>Five-rack missile</b>												
Nuclear Missile	2.8	2.8	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	5.0	3.7	2.5	2.5	1.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	10.0	8.8	7.7	6.6	4.4	3.3	2.2	1.1	0.0	0.0	0.0	0.0
Scatter-Pack V	16.5	14.0	11.0	8.5	5.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Merculite Missile	23.3	21.1	18.8	16.6	14.4	12.2	8.8	6.6	2.2	0.0	0.0	0.0
Stinger Missile	36.1	33.0	30.7	28.4	26.1	23.8	21.5	19.2	14.6	9.2	4.6	0.0
Scatter-Pack-VII	81.6	73.3	65.5	57.2	48.8	41.1	32.7	24.4	8.3	0.0	0.0	0.0
Pulson Missile	48.2	45.8	43.5	41.1	38.8	36.4	33.5	31.1	26.4	21.7	17.0	12.3
Hercular Missile	55.6	53.0	50.8	48.6	46.5	44.3	42.1	40.0	35.6	30.8	26.5	22.1
Zeon Missile	48.1	46.5	45.0	43.4	41.8	40.2	38.4	36.8	33.6	30.5	27.3	24.2
Scatter-Pack X	101.0	94.3	87.6	80.8	74.1	67.3	60.6	53.9	40.4	26.9	13.4	0.0

**Table G-1** Continued**Average Technology Level of 90****Assumptions:****Attack level = 11****Beam Defense = 8****Missile Defense = 17****Power-to-hull space ratio = 7.27**

Weapon Type	Shield Level											
	0	1	2	3	4	5	6	7	9	11	13	15
Beam weapon												
Death Ray	145.0	144.8	144.5	144.3	144.1	143.8	143.6	143.3	142.8	142.4	141.9	141.4
Mauler Device	101.2	99.5	97.9	96.2	94.5	92.9	91.0	89.3	86.0	82.7	79.3	76.0
Stellar Converter	143.1	136.8	130.3	124.1	117.6	111.3	105.0	98.6	85.8	73.3	61.7	51.1
Tri-Focus Plasma	109.2	106.1	103.0	100.0	96.9	93.8	90.3	87.3	81.1	75.0	68.8	62.6
Gauss Autocannon	162.3	162.3	142.9	142.9	124.1	124.1	104.7	104.7	85.8	67.0	47.6	28.8
Particle Beam	101.6	101.6	95.0	95.0	88.3	88.3	81.6	81.6	75.0	68.3	60.8	54.1
Pulse Phasor	179.4	164.7	150.5	136.4	121.7	107.6	94.1	81.1	58.2	39.4	24.1	12.3
Plasma Cannon	112.3	106.1	100.0	93.8	87.6	81.5	75.3	69.2	57.6	46.9	37.6	30.0
Disruptor	84.5	81.2	77.9	74.5	71.2	67.9	64.1	60.8	54.1	47.5	41.2	35.4
Tachyon Beam	117.7	108.8	100.0	91.1	83.3	75.5	67.7	61.1	48.8	37.7	27.7	18.8
Megabolt Cannon	148.7	136.2	123.7	111.2	98.7	87.5	76.2	65.0	47.5	31.2	18.7	10.0
Auto Blaster	203.3	182.5	162.5	142.5	121.6	102.5	85.0	69.1	41.6	21.6	8.3	0.8
Hard Beam	57.8	57.8	52.1	52.1	46.4	46.4	40.7	40.7	35.0	29.2	23.5	17.8
Heavy Phasor	48.1	45.7	43.6	41.5	39.4	37.3	35.2	33.1	29.4	25.7	22.3	19.2
Phasor	85.0	77.5	70.8	64.1	57.5	50.8	44.1	38.3	27.5	18.3	11.6	5.8
Mass Driver	75.7	75.7	64.2	64.2	52.8	52.8	40.0	40.0	28.5	17.1	8.5	1.4
Heavy Fusion Beam	44.5	41.9	39.3	36.7	33.8	31.6	29.0	26.7	22.2	18.0	14.5	11.2
Graviton Beam	108.3	95.0	81.6	70.0	58.3	48.3	40.0	31.6	18.3	8.3	1.6	0.0
Fusion Beam	81.0	73.0	65.0	57.0	49.0	41.0	34.0	28.0	17.0	9.0	3.0	0.0
Heavy Blast Cannon	43.6	40.4	37.2	34.0	30.8	28.0	25.2	22.4	17.6	13.2	9.6	6.4
Neutron Pellet Gun	93.3	93.3	66.6	66.6	40.0	40.0	20.0	20.0	3.3	0.0	0.0	0.0
Neutron Blaster	76.2	66.2	56.2	46.2	36.2	27.5	20.0	15.0	5.0	1.2	0.0	0.0
Heavy Ion Cannon	48.6	43.3	38.0	32.6	27.3	22.6	18.6	14.6	8.0	4.0	1.3	0.0
Ion Cannon	112.5	92.5	72.5	52.5	32.5	20.0	7.5	2.5	0.0	0.0	0.0	0.0
Gatling Laser	90.0	54.4	24.4	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Laser	66.6	40.0	20.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	33.0	24.0	17.0	11.0	6.0	3.0	1.0	0.0	0.0	0.0	0.0	0.0
Torpedo												
Anti-Matter Torpedo	21.6	20.9	20.2	19.5	18.8	18.1	17.2	16.5	15.1	13.7	12.3	10.9
Hellfire Torpedo	98.0	94.2	90.1	86.3	82.3	78.4	74.6	70.5	62.6	55.0	47.1	39.2
Proton Torpedo	64.9	63.8	63.0	62.2	61.3	60.5	59.6	58.8	57.1	55.2	53.5	51.8
Plasma Torpedo	130.7	129.8	129.0	128.1	127.2	126.4	125.4	124.5	122.8	121.1	119.4	117.7
Two-rack missile												
Nuclear Missile	6.6	6.6	3.3	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	10.0	7.5	5.0	5.0	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	10.0	8.0	8.0	6.0	4.0	4.0	2.0	2.0	0.0	0.0	0.0	0.0
Scatter-Pack V	20.0	16.6	13.3	10.0	6.6	3.3	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	22.0	20.0	18.0	16.0	14.0	12.0	8.0	6.0	2.0	0.0	0.0	0.0
Stinger Missile	40.0	36.2	33.7	31.2	28.7	26.2	23.7	21.2	16.2	10.0	5.0	0.0
Scatter-Pack VII	70.0	62.7	56.3	49.0	41.8	35.4	28.1	20.9	7.2	0.0	0.0	0.0
Pulson Missile	68.8	65.5	62.2	58.8	55.5	52.2	47.7	44.4	37.7	31.1	24.4	17.7
Hercular Missile	93.6	89.0	85.4	81.8	78.1	74.5	70.9	67.2	60.0	51.8	44.5	37.2
Zeon Missile	117.6	113.8	110.0	106.1	102.3	98.4	93.8	90.0	82.3	74.6	66.9	59.2
Scatter-Pack X	196.8	183.7	170.6	157.5	144.3	131.2	118.1	105.0	78.7	52.5	26.2	0.0
Five-rack missile												
Nuclear Missile	3.3	3.3	1.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	5.7	4.2	2.8	2.8	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	6.2	5.0	5.0	3.7	2.5	2.5	1.2	1.2	0.0	0.0	0.0	0.0
Scatter-Pack V	10.5	8.8	7.0	5.2	3.5	1.7	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	13.7	12.5	11.2	10.0	8.7	7.5	5.0	3.7	1.2	0.0	0.0	0.0
Stinger Missile	26.6	24.1	22.5	20.8	19.1	17.5	15.8	14.1	10.8	6.6	3.3	0.0
Scatter-Pack VII	48.1	43.1	38.7	33.7	28.7	24.3	19.3	14.3	5.0	0.0	0.0	0.0
Pulson Missile	41.3	39.3	37.3	35.3	33.3	31.3	28.6	26.6	22.6	18.6	14.6	10.6
Hercular Missile	60.5	57.6	55.2	52.9	50.5	48.2	45.8	43.5	38.8	33.5	28.8	24.1
Zeon Missile	72.8	70.4	68.0	65.7	63.3	60.9	58.0	55.7	50.9	46.1	41.4	36.6
Scatter-Pack X	116.6	108.8	101.1	93.3	85.5	77.7	70.0	62.2	46.6	31.1	15.5	0.0

**Table G-1** Continued**Average Technology Level of 99****Assumptions:****Attack level = 11****Beam Defense = 8****Missile Defense = 18****Power-to-hull space ratio = 7.50**

Weapon Type	Shield Level											
	0	1	2	3	4	5	6	7	9	11	13	15
Beam weapon												
Death Ray	149.0	148.8	148.5	148.3	148.0	147.8	147.5	147.3	146.8	146.3	145.8	145.3
Mauler Device	110.4	108.6	106.8	105.0	103.1	101.3	99.3	97.5	93.8	90.2	86.5	82.9
Stellar Converter	158.6	151.7	144.5	137.6	130.4	123.4	116.5	109.3	95.2	81.3	68.4	56.7
Tri-Focus Plasma	109.2	106.1	103.0	100.0	96.9	93.8	90.3	87.3	81.1	75.0	68.8	62.6
Gauss Autocannon	162.3	162.3	142.9	142.9	124.1	124.1	104.7	104.7	85.8	67.0	47.6	28.8
Particle Beam	101.6	101.6	95.0	95.0	88.3	88.3	81.6	81.6	75.0	68.3	60.8	54.1
Pulse Phasor	179.4	164.7	150.5	136.4	121.7	107.6	94.1	81.1	58.2	39.4	24.1	12.3
Plasma Cannon	112.3	106.1	100.0	93.8	87.6	81.5	75.3	69.2	57.6	46.9	37.6	30.0
Disruptor	88.2	84.7	81.3	77.8	74.3	70.8	66.9	63.4	56.5	49.5	43.0	36.9
Tachyon Beam	117.7	108.8	100.0	91.1	83.3	75.5	67.7	61.1	48.8	37.7	27.7	18.8
Megabolt Cannon	148.7	136.2	123.7	111.2	98.7	87.5	76.2	65.0	47.5	31.2	18.7	10.0
Auto Blaster	203.3	182.5	162.5	142.5	121.6	102.5	85.0	69.1	41.6	21.6	8.3	0.8
Hard Beam	57.8	57.8	52.1	52.1	46.4	46.4	40.7	40.7	35.0	29.2	23.5	17.8
Heavy Phasor	49.4	47.0	44.8	42.7	40.5	38.3	36.2	34.0	30.2	26.4	22.9	19.7
Phasor	85.0	77.5	70.8	64.1	57.5	50.8	44.1	38.3	27.5	18.3	11.6	5.8
Mass Driver	75.7	75.7	64.2	64.2	52.8	52.8	40.0	40.0	28.5	17.1	8.5	1.4
Heavy Fusion Beam	44.5	41.9	39.3	36.7	33.8	31.6	29.0	26.7	22.2	18.0	14.5	11.2
Graviton Beam	108.3	95.0	81.6	70.0	58.3	48.3	40.0	31.6	18.3	8.3	1.6	0.0
Fusion Beam	81.0	73.0	65.0	57.0	49.0	41.0	34.0	28.0	17.0	9.0	3.0	0.0
Heavy Blast Cannon	43.6	40.4	37.2	34.0	30.8	28.0	25.2	22.4	17.6	13.2	9.6	6.4
Neutron Pellet Gun	93.3	93.3	66.6	66.6	40.0	40.0	20.0	20.0	3.3	0.0	0.0	0.0
Neutron Blaster	76.2	66.2	56.2	46.2	36.2	27.5	20.0	15.0	5.0	1.2	0.0	0.0
Heavy Ion Cannon	48.6	43.3	38.0	32.6	27.3	22.6	18.6	14.6	8.0	4.0	1.3	0.0
Ion Cannon	112.5	92.5	72.5	52.5	32.5	20.0	7.5	2.5	0.0	0.0	0.0	0.0
Gatling Laser	90.0	54.4	24.4	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Laser	66.6	40.0	20.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	33.0	24.0	17.0	11.0	6.0	3.0	1.0	0.0	0.0	0.0	0.0	0.0
Torpedo												
Anti-Matter Torpedo	15.0	14.5	14.0	13.5	13.0	12.6	11.9	11.4	10.4	9.5	8.5	7.6
Hellfire Torpedo	82.0	78.8	75.4	72.2	68.8	65.6	62.4	59.0	52.4	46.0	39.4	32.8
Proton Torpedo	55.0	54.1	53.3	52.6	51.9	51.2	50.5	49.8	48.3	46.7	45.3	43.9
Plasma Torpedo	119.5	118.7	117.9	117.1	116.4	115.6	114.6	113.9	112.3	110.7	109.2	107.6
Two-rack missile												
Nuclear Missile	6.6	6.6	3.3	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	10.0	7.5	5.0	5.0	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	10.0	8.0	8.0	6.0	4.0	4.0	2.0	2.0	0.0	0.0	0.0	0.0
Scatter-Pack V	20.0	16.6	13.3	10.0	6.6	3.3	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	12.0	10.0	10.0	8.0	8.0	6.0	4.0	4.0	2.0	0.0	0.0	0.0
Stinger Missile	21.2	18.7	17.5	16.2	15.0	13.7	12.5	11.2	8.7	5.0	2.5	0.0
Scatter-Pack VII	38.1	34.5	30.9	26.3	22.7	19.0	15.4	11.8	3.6	0.0	0.0	0.0
Pulson Missile	46.6	44.4	42.2	40.0	37.7	35.5	32.2	30.0	25.5	21.1	16.6	12.2
Hercular Missile	70.9	67.2	64.5	61.8	59.0	56.3	53.6	50.9	45.4	39.0	33.6	28.1
Zeon Missile	94.6	91.5	88.4	85.3	82.3	79.2	75.3	72.3	66.1	60.0	53.8	47.6
Scatter-Pack X	126.9	118.4	110.0	101.5	93.0	84.6	76.1	67.6	50.7	33.8	16.9	0.0
Five-rack missile												
Nuclear Missile	3.3	3.3	1.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	5.7	4.2	2.8	2.8	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	6.2	5.0	5.0	3.7	2.5	2.5	1.2	1.2	0.0	0.0	0.0	0.0
Scatter-Pack V	10.5	8.8	7.0	5.2	3.5	1.7	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	7.5	6.2	6.2	5.0	5.0	3.7	2.5	2.5	1.2	0.0	0.0	0.0
Stinger Missile	14.1	12.5	11.6	10.8	10.0	9.1	8.3	7.5	5.8	3.3	1.6	0.0
Scatter-Pack VII	26.2	23.7	21.2	18.1	15.6	13.1	10.6	8.1	2.5	0.0	0.0	0.0
Pulson Missile	28.0	26.6	25.3	24.0	22.6	21.3	19.3	18.0	15.3	12.6	10.0	7.3
Hercular Missile	45.8	43.5	41.7	40.0	38.2	36.4	34.7	32.9	29.4	25.2	21.7	18.2
Zeon Missile	58.5	56.6	54.7	52.8	50.9	49.0	46.6	44.7	40.9	37.1	33.3	29.5
Scatter-Pack X	75.0	70.0	65.0	60.0	55.0	50.0	45.0	40.0	30.0	20.0	10.0	0.0



**Power-to-hull space ratio = 1.43**

[illegible]

**Table G-2** Continued**Average Technology Level of 20****Assumptions:****Attack level = 5****Beam Defense = 1****Missile Defense = 5****Power-to-hull space ratio = 1.67**

Weapon Type	Planetary Shield Level																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Beam weapon																	
Laser	6.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	3.4	1.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	8.3	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	7.5	7.0	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	9.2	5.1	2.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	5.1	3.5	2.5	1.6	0.9	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	4.7	4.2	2.8	2.8	1.4	1.4	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	7.1	4.6	2.8	1.6	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	4.4	3.3	2.7	2.2	1.7	1.3	1.0	0.6	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	8.4	5.5	4.0	2.6	1.5	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	4.5	4.0	3.2	3.2	2.3	2.3	1.5	1.5	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Beam	7.5	5.3	3.9	2.6	1.7	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	4.2	3.4	2.9	2.4	2.1	1.7	1.3	1.0	0.8	0.6	0.4	0.2	0.1	0.0	0.0	0.0	0.0
Two-rack missile																	
Nuclear Missile	16.6	6.2	4.1	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	17.6	7.6	5.8	4.4	2.9	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	14.5	7.8	6.7	5.6	4.3	3.2	2.1	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	32.9	16.8	13.4	10.1	6.7	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	12.5	8.0	7.1	6.2	5.3	4.5	3.5	2.6	1.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	9.9	7.4	6.9	6.4	5.8	5.3	4.8	4.3	3.7	3.2	2.7	2.1	1.5	1.0	0.5	0.0	0.0
Five-rack missile																	
Nuclear Missile	10.8	4.0	2.7	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	11.7	5.0	3.9	2.9	1.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	9.6	5.1	4.4	3.7	2.8	2.1	1.4	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	20.8	10.6	8.4	6.3	4.2	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	8.4	5.3	4.7	4.2	3.6	3.0	2.3	1.7	1.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	6.6	5.0	4.6	4.2	3.9	3.5	3.2	2.8	2.5	2.1	1.8	1.4	1.0	0.7	0.3	0.0	0.0
Bomb																	
Nuclear Bomb	50.6	40.0	34.0	27.3	22.0	16.6	12.6	8.6	5.3	3.3	1.3	0.6	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	45.0	37.5	34.2	31.0	27.8	24.6	21.4	18.5	15.7	13.2	11.0	8.9	7.1	5.3	3.9	2.8	1.7
Anti-Matter Bomb	40.6	35.1	33.7	32.2	30.8	29.3	27.9	26.4	25.0	23.5	22.0	20.6	19.1	17.9	16.6	15.3	14.1

**Table G-2** Continued

Weapon Type	Planetary Shield Level (Continued)																
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	35
Beam weapon																	
Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Two-rack missile																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Five-rack missile																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bomb																	
Nuclear Bomb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anti-Matter Bomb	13.0	11.9	10.8	9.8	8.8	8.0	7.0	6.2	5.6	4.8	4.1	3.5	3.0	2.5	2.0	1.2	0.6

**Table G-2** Continued**Average Technology Level of 30****Assumptions:****Attack level = 7****Beam Defense = 1****Missile Defense = 7****Power-to-hull space ratio = 2.00**

Weapon Type	Planetary Shield Level																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Beam weapon																	
Laser	9.2	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	5.0	2.2	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	12.6	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	10.6	10.6	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	13.5	8.5	3.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	7.6	5.7	4.1	2.6	1.5	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	7.6	7.3	5.0	5.0	2.6	2.6	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	10.5	7.2	4.5	2.4	1.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	6.6	5.4	4.5	3.6	2.8	2.1	1.6	1.0	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	13.3	9.3	6.6	4.2	2.4	1.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	6.7	6.5	5.2	5.2	3.8	3.8	2.4	2.4	1.0	1.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Fusion Beam	11.2	8.7	6.5	4.4	2.7	1.4	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	6.6	5.5	4.8	4.1	3.4	2.8	2.3	1.8	1.4	0.9	0.7	0.4	0.2	0.0	0.0	0.0	0.0
Megabolt Cannon	12.8	10.5	8.6	6.7	4.9	3.3	2.0	1.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	11.1	9.0	7.3	5.6	4.1	2.8	1.8	1.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	6.9	6.0	5.5	4.9	4.3	3.8	3.3	2.8	2.4	2.0	1.6	1.3	1.0	0.8	0.6	0.3	0.2
Auto Blaster	22.3	17.1	12.9	8.7	5.4	2.9	1.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	12.1	9.8	8.1	6.6	5.3	4.0	3.0	2.1	1.5	0.8	0.3	0.1	0.0	0.0	0.0	0.0	0.0
Torpedo																	
Anti-Matter Torpedo	7.6	6.4	6.0	5.5	5.1	4.6	4.1	3.7	3.2	2.8	2.3	1.8	1.3	0.9	0.4	0.0	0.0
Two-rack missile																	
Nuclear Missile	25.0	9.3	6.2	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	28.5	12.3	9.5	7.1	4.7	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	25.0	13.4	11.5	9.6	7.5	5.6	3.7	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	53.5	27.3	21.7	16.4	10.8	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	22.7	14.5	12.9	11.3	9.7	8.1	6.3	4.7	3.1	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	18.0	13.6	12.6	11.6	10.7	9.7	8.7	7.8	6.8	5.9	4.9	3.8	2.8	1.9	0.9	0.0	0.0
Scatter-Pack VII	43.2	27.5	24.5	21.4	18.3	15.3	12.2	9.1	6.1	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	11.9	10.2	9.7	9.2	8.6	8.1	7.5	7.0	6.4	5.9	5.4	4.8	4.3	3.8	3.2	2.7	2.1
Five-rack missile																	
Nuclear Missile	16.6	6.2	4.1	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	19.3	8.3	6.4	4.8	3.2	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	16.6	8.9	7.7	6.4	5.0	3.7	2.5	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	33.3	17.0	13.5	10.2	6.7	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	15.1	9.6	8.6	7.5	6.5	5.4	4.2	3.1	2.1	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	12.1	9.1	8.5	7.8	7.2	6.5	5.9	5.2	4.6	3.9	3.3	2.6	1.9	1.3	0.6	0.0	0.0
Scatter-Pack VII	30.9	19.7	17.6	15.3	13.1	11.0	8.8	6.5	4.3	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	7.9	6.8	6.4	6.1	5.7	5.4	5.0	4.6	4.3	3.9	3.5	3.2	2.8	2.5	2.1	1.8	1.4
Bomb																	
Nuclear Bomb	83.0	70.0	60.0	50.0	40.0	30.0	22.0	16.0	10.0	6.0	3.0	1.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	86.8	76.8	70.6	64.3	58.1	51.8	45.6	39.3	33.7	28.1	23.1	18.7	15.0	11.2	8.7	6.2	3.7
Anti-Matter Bomb	84.2	77.2	74.2	71.2	68.1	65.1	62.1	59.0	56.0	53.0	50.0	46.9	43.9	40.9	37.8	35.1	32.4
Omega-V Bomb	43.9	41.2	40.1	38.9	37.7	36.6	35.4	34.3	33.1	31.9	30.8	29.6	28.4	27.3	26.1	25.0	23.8

**Table G-2** Continued

Weapon Type	Planetary Shield Level (Continued)																
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	35
Beam weapon																	
Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Megabolt Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auto Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Torpedo																	
Anti-Matter Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Two-rack missile																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Five-rack missile																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bomb																	
Nuclear Bomb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	2.5	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anti-Matter Bomb	29.6	27.2	24.8	22.4	20.3	18.1	16.3	14.5	12.7	11.2	9.6	8.1	6.9	5.7	4.5	2.7	1.5
Omega-V Bomb	22.6	21.5	20.3	19.1	18.0	16.8	15.6	14.5	13.4	12.4	11.3	10.4	9.5	8.6	7.7	6.2	4.8

**Table G-2** Continued**Average Technology Level of 40****Assumptions:****Attack level = 9****Beam Defense = 1****Missile Defense = 9****Power-to-hull space ratio = 2.35**

Weapon Type	Planetary Shield Level																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Beam weapon																	
Laser	12.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	6.6	3.3	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	16.6	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	15.4	15.4	6.3	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	19.3	12.0	5.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	10.4	8.1	6.1	4.0	2.4	1.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	11.0	11.0	7.5	7.5	4.1	4.1	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	15.0	11.0	7.5	3.9	1.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	9.4	7.9	6.7	5.5	4.4	3.3	2.4	1.6	1.0	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	19.2	14.4	10.4	6.8	4.0	2.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	9.6	9.4	7.5	7.5	5.6	5.6	3.7	3.7	1.8	1.8	0.3	0.3	0.0	0.0	0.0	0.0	0.0
Fusion Beam	15.8	12.5	9.7	6.9	4.1	2.2	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	9.2	8.0	7.0	6.1	5.2	4.3	3.5	2.7	2.0	1.5	1.0	0.6	0.3	0.1	0.0	0.0	0.0
Megabolt Cannon	19.4	16.2	13.5	10.8	8.1	5.4	3.5	1.8	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	15.7	13.1	10.8	8.6	6.4	4.4	2.6	1.5	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	10.0	8.8	8.1	7.4	6.6	5.9	5.2	4.4	3.8	3.2	2.6	2.1	1.6	1.2	0.9	0.6	0.3
Auto Blaster	33.3	26.2	20.3	14.5	9.0	4.9	1.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	19.5	16.3	13.9	11.4	9.0	7.0	5.1	3.6	2.4	1.4	0.7	0.2	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	16.3	16.2	12.4	12.4	8.5	8.5	4.7	4.7	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	9.3	9.0	7.9	7.9	6.7	6.7	5.5	5.5	4.4	4.4	3.2	3.2	2.0	2.0	1.1	1.1	0.4
Plasma Cannon	16.6	14.6	13.0	11.4	9.8	8.2	6.6	5.2	3.9	2.8	2.0	1.2	0.6	0.3	0.0	0.0	0.0
Death Ray	15.1	14.6	14.5	14.5	14.4	14.4	14.4	14.3	14.3	14.2	14.2	14.1	14.1	14.1	14.0	14.0	13.9
Disruptor	11.6	10.4	9.6	8.8	8.0	7.2	6.4	5.6	4.8	4.1	3.3	2.7	2.0	1.6	1.2	0.8	0.4
Pulse Phasor	25.1	20.8	17.2	13.7	10.2	6.9	4.3	2.3	0.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Torpedo																	
Anti-Matter Torpedo	10.0	8.4	7.8	7.2	6.6	6.0	5.4	4.8	4.2	3.6	3.0	2.4	1.8	1.2	0.6	0.0	0.0
Hellfire Torpedo	16.1	14.7	13.4	12.0	10.7	9.3	8.0	6.7	5.3	4.0	2.6	1.3	0.0	0.0	0.0	0.0	0.0
Two-rack missile																	
Nuclear Missile	36.3	13.6	9.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	46.1	20.0	15.3	11.5	7.6	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	42.1	22.6	19.4	16.3	12.6	9.4	6.3	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	85.7	43.7	34.8	26.2	17.4	8.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercutite Missile	41.6	26.6	23.7	20.8	17.9	15.0	11.6	8.7	5.8	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	32.6	24.5	22.8	21.0	19.3	17.6	15.8	14.1	12.3	10.6	8.9	6.9	5.2	3.4	1.7	0.0	0.0
Scatter-Pack VII	77.7	49.6	44.2	38.6	33.1	27.6	22.1	16.5	11.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulsor Missile	21.7	18.8	17.8	16.8	15.8	14.8	13.8	12.8	11.8	10.8	9.8	8.9	7.9	6.9	5.9	5.0	3.9
Hercular Missile	15.4	14.8	14.1	13.5	12.9	12.3	11.7	11.1	10.4	9.8	9.2	8.6	8.0	7.4	6.7	6.1	5.5
Zeon Missile	11.0	10.7	10.3	9.9	9.5	9.2	8.8	8.4	8.1	7.7	7.3	7.0	6.6	6.2	5.9	5.5	5.1
Scatter-Pack X	55.3	41.8	38.8	35.8	32.8	29.8	26.9	23.9	20.9	17.9	14.9	11.9	8.9	5.9	2.9	0.0	0.0
Five-rack missile																	
Nuclear Missile	23.5	8.8	5.8	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	30.0	13.0	10.0	7.5	5.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	28.5	15.3	13.2	11.0	8.5	6.4	4.2	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	50.0	25.5	20.3	15.3	10.1	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercutite Missile	27.7	17.7	15.8	13.8	11.9	10.0	7.7	5.8	3.8	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	21.7	16.3	15.2	14.0	12.8	11.7	10.5	9.4	8.2	7.1	5.9	4.6	3.4	2.3	1.1	0.0	0.0
Scatter-Pack VII	54.6	34.9	31.0	27.1	23.2	19.4	15.5	11.6	7.7	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulsor Missile	14.5	12.6	11.9	11.3	10.6	10.0	9.2	8.6	7.9	7.2	6.6	5.9	5.3	4.6	4.0	3.3	2.6
Hercular Missile	10.3	9.9	9.5	9.0	8.6	8.2	7.8	7.4	7.0	6.6	6.1	5.7	5.3	4.9	4.5	4.1	3.7
Zeon Missile	7.3	7.1	6.8	6.6	6.4	6.1	5.9	5.6	5.4	5.1	4.9	4.6	4.4	4.1	3.9	3.6	3.4
Scatter-Pack X	33.0	24.9	23.1	21.4	19.6	17.8	16.0	14.2	12.4	10.7	8.9	7.1	5.3	3.5	1.7	0.0	0.0
Bomb																	
Nuclear Bomb	146.6	126.6	110.0	93.3	76.6	60.0	43.3	30.0	20.0	11.6	5.0	1.6	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	147.0	133.0	123.0	113.0	103.0	93.0	83.0	73.0	63.0	53.0	44.0	36.0	28.0	22.0	16.0	11.0	7.0
Anti-Matter Bomb	163.3	153.3	147.7	142.2	136.6	131.1	125.5	120.0	114.4	108.8	103.3	97.7	92.2	86.6	81.1	75.5	70.0
Omega-V Bomb	89.5	85.4	83.1	80.9	78.6	76.3	74.0	71.8	69.5	67.2	65.0	62.7	60.4	58.1	55.9	53.6	51.3
Neutronium Bomb	31.2	30.3	29.7	29.2	28.7	28.2	27.6	27.1	26.6	26.1	25.5	25.0	24.5	24.0	23.4	22.9	22.4



Table G-2 Continued

Weapon Type	Planetary Shield Level (Continued)																
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	35
<b>Beam weapon</b>																	
Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Megabolt Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auto Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plasma Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Death Ray	13.9	13.8	13.8	13.8	13.7	13.7	13.6	13.6	13.6	13.5	13.5	13.4	13.4	13.3	13.3	13.2	13.1
Disruptor	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulse Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Torpedo</b>																	
Anti-Matter Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hellfire Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Two-rack missile</b>																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	2.9	1.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	4.9	4.3	3.7	3.0	2.4	1.8	1.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Five-rack missile</b>																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	1.9	1.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	3.3	2.8	2.4	2.0	1.6	1.2	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Bomb</b>																	
Nuclear Bomb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	4.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anti-Matter Bomb	64.4	58.8	53.8	48.8	43.8	39.4	35.5	31.1	27.7	23.8	20.5	17.7	15.0	12.2	10.0	6.1	3.3
Omega-V Bomb	49.0	46.8	44.5	42.2	40.0	37.7	35.4	33.1	30.9	28.6	26.3	24.0	22.0	20.0	17.9	14.5	11.3
Neutronium Bomb	21.8	21.3	20.8	20.3	19.7	19.2	18.7	18.2	17.6	17.1	16.6	16.1	15.5	15.0	14.5	13.4	12.4

**Table G-2** Continued**Average Technology Level of 50****Assumptions:****Attack level = 11****Beam Defense = 1****Missile Defense = 11****Power-to-hull space ratio = 3.13**

Weapon Type	Planetary Shield Level																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Beam weapon																	
Laser	18.5	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	10.4	5.6	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	23.1	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	25.7	25.7	11.4	11.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	27.2	17.2	8.1	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	15.4	12.2	9.4	6.5	3.7	1.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	17.3	17.3	12.1	12.1	6.8	6.8	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	22.0	16.5	11.5	6.5	2.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	13.7	11.7	10.1	8.5	6.9	5.3	3.8	2.5	1.6	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	30.0	23.5	17.6	11.7	6.4	3.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	14.0	13.7	11.0	11.0	8.3	8.3	5.6	5.6	2.9	2.9	0.5	0.5	0.0	0.0	0.0	0.0	0.0
Fusion Beam	23.6	19.2	15.2	11.2	7.2	4.0	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	13.7	12.1	10.8	9.6	8.3	7.0	5.7	4.4	3.4	2.4	1.6	1.0	0.5	0.2	0.0	0.0	0.0
Megabolt Cannon	29.6	25.2	21.2	17.2	13.2	9.2	5.6	3.2	1.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	23.8	20.3	17.0	13.8	10.6	7.4	4.5	2.5	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	14.7	13.4	12.3	11.3	10.3	9.2	8.2	7.2	6.1	5.1	4.2	3.4	2.6	2.0	1.5	1.0	0.6
Auto Blaster	52.0	42.0	33.2	24.4	15.5	8.5	3.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	30.7	26.0	22.5	18.9	15.3	11.7	8.9	6.0	3.9	2.5	1.0	0.3	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	27.1	26.9	20.6	20.6	14.2	14.2	7.9	7.9	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	16.4	16.2	14.2	14.2	12.2	12.2	10.2	10.2	8.2	8.2	6.2	6.2	4.2	4.2	2.2	2.2	1.0
Plasma Cannon	27.0	23.9	21.4	19.0	16.5	14.1	11.7	9.2	7.0	5.1	3.4	2.1	1.2	0.4	0.0	0.0	0.0
Death Ray	26.8	26.2	26.1	26.0	26.0	25.9	25.8	25.7	25.6	25.5	25.5	25.4	25.3	25.3	25.2	25.1	25.1
Disruptor	19.1	17.4	16.2	14.9	13.6	12.4	11.1	9.8	8.6	7.3	6.0	4.9	3.7	2.9	2.1	1.5	0.8
Pulse Phasor	40.5	34.3	28.9	23.4	18.0	12.5	7.8	4.1	1.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	18.9	17.7	16.7	15.8	14.9	13.9	13.0	12.0	11.1	10.1	9.2	8.3	7.3	6.4	5.4	4.5	3.6
Stellar Converter	21.7	19.6	18.0	16.4	14.8	13.1	11.5	9.9	8.3	6.7	5.2	3.8	2.7	1.8	1.0	0.5	0.1
Mauler Device	16.6	15.7	15.3	14.8	14.4	14.0	13.5	13.1	12.6	12.2	11.7	11.3	10.8	10.4	10.0	9.5	9.1
Torpedo																	
Anti-Matter Torpedo	14.1	11.9	11.1	10.2	9.4	8.5	7.7	6.8	6.0	5.1	4.3	3.3	2.5	1.6	0.8	0.0	0.0
Hellfire Torpedo	25.8	23.6	21.5	19.3	17.2	15.0	12.9	10.7	8.6	6.4	4.3	2.1	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	19.5	19.0	18.5	17.9	17.4	16.9	16.4	15.8	15.3	14.8	14.2	13.7	13.2	12.6	12.1	11.6	11.1
Plasma Torpedo	25.5	25.2	24.9	24.5	24.2	23.8	23.5	23.2	22.8	22.5	22.1	21.8	21.5	21.1	20.8	20.4	20.1
Two-rack missile																	
Nuclear Missile	57.1	21.4	14.2	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	75.0	32.5	25.0	18.7	12.5	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	72.7	39.0	33.6	28.1	21.8	16.3	10.9	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	130.4	66.5	53.0	40.0	26.5	13.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	71.4	45.7	40.7	35.7	30.7	25.7	20.0	15.0	10.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	57.6	43.4	40.3	37.3	34.2	31.1	28.0	25.0	21.9	18.8	15.7	12.3	9.2	6.1	3.0	0.0	0.0
Scatter-Pack VII	142.8	91.2	81.2	71.0	60.8	50.8	40.6	30.4	20.2	10.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulsar Missile	41.6	36.0	34.1	32.2	30.4	28.5	26.4	24.5	22.7	20.8	18.9	17.0	15.2	13.3	11.4	9.5	7.5
Hercular Missile	29.7	28.5	27.3	26.1	25.0	23.8	22.6	21.4	20.2	19.0	17.8	16.6	15.4	14.2	13.0	11.9	10.7
Zeon Missile	20.0	19.3	18.6	18.0	17.3	16.6	16.0	15.3	14.6	14.0	13.3	12.6	12.0	11.3	10.6	10.0	9.3
Scatter-Pack X	83.3	63.0	58.5	54.0	49.5	45.0	40.5	36.0	31.5	27.0	22.5	18.0	13.5	9.0	4.5	0.0	0.0
Five-rack missile																	
Nuclear Missile	36.3	13.6	9.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	46.1	20.0	15.3	11.5	7.6	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	50.0	26.8	23.1	19.3	15.0	11.2	7.5	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	76.9	39.2	31.2	23.5	15.6	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	47.6	30.4	27.1	23.8	20.4	17.1	13.3	10.0	6.6	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	38.4	28.9	26.9	24.8	22.8	20.7	18.7	16.6	14.6	12.5	10.5	8.2	6.1	4.1	2.0	0.0	0.0
Scatter-Pack VII	98.5	62.9	56.0	49.0	41.9	35.0	28.0	20.9	13.9	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulsar Missile	27.0	23.3	22.1	20.9	19.7	18.5	17.1	15.9	14.7	13.5	12.2	11.0	9.8	8.6	7.4	6.2	4.8
Hercular Missile	19.6	18.8	18.1	17.3	16.5	15.7	14.9	14.1	13.3	12.5	11.8	11.0	10.2	9.4	8.6	7.8	7.0
Zeon Missile	13.3	12.8	12.4	12.0	11.5	11.1	10.6	10.2	9.7	9.3	8.8	8.4	8.0	7.5	7.1	6.6	6.2
Scatter-Pack X	49.6	37.5	34.8	32.1	29.5	26.8	24.1	21.4	18.7	16.0	13.4	10.7	8.0	5.3	2.6	0.0	0.0
Bomb																	
Nuclear Bomb	230.0	200.0	175.0	150.0	125.0	100.0	75.0	52.5	35.0	20.0	10.0	2.5	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	256.6	235.0	218.3	201.6	185.0	168.3	151.6	135.0	118.3	101.6	85.0	68.3	55.0	41.6	31.6	21.6	13.3
Anti-Matter Bomb	342.2	323.3	312.2	301.1	290.0	278.8	267.7	256.6	245.5	234.4	223.3	212.2	201.1	190.0	178.8	167.7	156.6
Omega-V Bomb	185.4	177.7	173.1	168.6	164.0	159.5	155.0	150.4	145.9	141.3	136.8	132.2	127.7	123.1	118.6	114.0	109.5
Neutronium Bomb	62.6	60.9	59.8	58.8	57.8	56.8	55.7	54.7	53.7	52.6	51.6	50.6	49.5	48.5	47.5	46.4	45.4

Table G-2 Continued

Weapon Type	Planetary Shield Level (Continued)																
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	35
Beam weapon																	
Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Megabolt Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auto Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	1.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plasma Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Death Ray	25.0	25.0	24.9	24.8	24.7	24.7	24.6	24.5	24.5	24.4	24.3	24.2	24.2	24.1	24.0	23.9	23.7
Disruptor	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulse Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	2.8	2.1	1.6	1.1	0.6	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stellar Converter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mauler Device	8.6	8.2	7.7	7.3	6.8	6.4	6.0	5.5	5.1	4.7	4.3	4.0	3.6	3.2	2.9	2.3	1.8
Torpedo																	
Anti-Matter Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hellfire Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	10.5	10.0	9.5	8.9	8.4	7.9	7.4	6.8	6.3	5.8	5.2	4.7	4.2	3.7	3.1	2.1	1.0
Plasma Torpedo	19.7	19.4	19.1	18.7	18.4	18.0	17.7	17.4	17.0	16.7	16.3	16.0	15.6	15.3	15.0	14.3	13.6
Two-rack missile																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	5.6	3.7	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	9.5	8.3	7.1	5.9	4.7	3.5	2.3	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	8.6	8.0	7.3	6.6	6.0	5.3	4.6	4.0	3.3	2.6	2.0	1.3	0.6	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Five-rack missile																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	3.6	2.4	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	6.2	5.5	4.7	3.9	3.1	2.3	1.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	5.7	5.3	4.8	4.4	4.0	3.5	3.1	2.6	2.2	1.7	1.3	0.8	0.4	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bomb																	
Nuclear Bomb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	8.3	3.3	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anti-Matter Bomb	145.5	134.4	123.3	112.2	101.1	91.1	81.1	72.2	63.3	55.5	47.7	41.1	34.4	28.8	23.3	14.4	7.7
Omega-V Bomb	105.0	100.4	95.9	91.3	86.8	82.2	77.7	73.1	68.6	64.0	59.5	55.0	50.4	45.9	41.3	33.1	25.9
Neutronium Bomb	44.4	43.4	42.3	41.3	40.3	39.2	38.2	37.2	36.1	35.1	34.1	33.0	32.0	31.0	30.0	27.9	25.8

Table G-2 Continued

## Average Technology Level of 60

Assumptions:

Attack level = 11

Beam Defense = 1

Missile Defense = 11

Power-to-hull space ratio = 4.17

Weapon Type	Planetary Shield Level																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Beam weapon																	
Laser	26.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	14.1	7.6	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	31.8	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	36.0	36.0	16.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	37.5	23.7	11.2	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	20.7	16.5	12.6	8.8	5.0	2.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	25.3	25.3	17.6	17.6	10.0	10.0	2.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	31.4	23.5	16.4	9.2	3.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	18.8	16.2	14.0	11.7	9.5	7.3	5.3	3.5	2.2	1.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	42.5	33.3	25.0	16.6	9.1	5.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	20.0	19.6	15.7	15.7	11.9	11.9	8.0	8.0	4.2	4.2	0.7	0.7	0.0	0.0	0.0	0.0	0.0
Fusion Beam	32.7	26.6	21.1	15.5	10.0	5.5	2.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	19.1	16.9	15.1	13.3	11.6	9.8	8.0	6.2	4.8	3.3	2.3	1.4	0.7	0.3	0.0	0.0	0.0
Megabolt Cannon	43.5	37.0	31.1	25.2	19.4	13.5	8.2	4.7	1.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	33.6	28.6	24.0	19.5	15.0	10.4	6.3	3.6	1.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	20.7	18.8	17.3	15.9	14.4	13.0	11.5	10.1	8.6	7.2	5.9	4.7	3.7	2.8	2.1	1.4	0.8
Auto Blaster	73.7	59.5	47.0	34.5	22.0	12.0	5.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	45.2	38.4	33.1	27.8	22.6	17.3	13.1	8.9	5.7	3.6	1.5	0.5	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	43.8	43.5	33.3	33.3	23.0	23.0	12.8	12.8	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	27.3	27.0	23.6	23.6	20.3	20.3	17.0	17.0	13.6	13.6	10.3	10.3	7.0	7.0	3.6	3.6	1.6
Plasma Cannon	39.6	35.0	31.4	27.8	24.2	20.7	17.1	13.5	10.3	7.5	5.0	3.2	1.7	0.7	0.0	0.0	0.0
Death Ray	43.7	42.6	42.5	42.4	42.3	42.2	42.1	41.9	41.8	41.7	41.6	41.5	41.4	41.2	41.1	41.0	40.9
Disruptor	29.0	26.5	24.6	22.6	20.7	18.8	16.9	15.0	13.0	11.1	9.2	7.5	5.7	4.4	3.2	2.3	1.3
Pulse Phasor	61.9	52.5	44.1	35.8	27.5	19.1	11.9	6.3	2.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	30.0	28.0	26.5	25.0	23.5	22.0	20.5	19.1	17.6	16.1	14.6	13.1	11.6	10.1	8.6	7.1	5.8
Stellar Converter	36.4	33.0	30.3	27.6	24.8	22.1	19.4	16.7	14.0	11.2	8.7	6.5	4.6	3.0	1.7	0.8	0.2
Mauler Device	27.3	25.9	25.1	24.4	23.7	22.9	22.2	21.5	20.8	20.0	19.3	18.6	17.8	17.1	16.4	15.6	14.9
Torpedo																	
Anti-Matter Torpedo	19.4	16.4	15.3	14.1	12.9	11.8	10.6	9.4	8.3	7.1	5.9	4.6	3.5	2.3	1.1	0.0	0.0
Hellfire Torpedo	40.0	36.6	33.3	30.0	26.6	23.3	20.0	16.6	13.3	10.0	6.6	3.3	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	29.3	28.5	27.7	26.9	26.1	25.3	24.6	23.8	23.0	22.2	21.4	20.6	19.8	19.0	18.2	17.4	16.6
Plasma Torpedo	41.2	40.6	40.1	39.5	39.0	38.4	37.9	37.3	36.8	36.2	35.7	35.1	34.6	34.0	33.5	32.9	32.4
Two-rack missile																	
Nuclear Missile	80.0	30.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	100.0	43.3	33.3	25.0	16.6	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	114.2	61.4	52.8	44.2	34.2	25.7	17.1	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	214.2	109.2	87.1	65.7	43.5	22.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	125.0	80.0	71.2	62.5	53.7	45.0	35.0	26.2	17.5	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	107.1	80.7	75.0	69.2	63.5	57.8	52.1	46.4	40.7	35.0	29.2	22.8	17.1	11.4	5.7	0.0	0.0
Scatter-Pack VII	250.0	159.6	142.1	124.2	106.4	88.9	71.0	53.2	35.3	17.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	71.4	61.7	58.5	55.3	52.1	48.9	45.3	42.1	38.9	35.7	32.5	29.2	26.0	22.8	19.6	16.4	12.8
Hercular Missile	56.8	54.5	52.2	50.0	47.7	45.4	43.1	40.9	38.6	36.3	34.0	31.8	29.5	27.2	25.0	22.7	20.4
Zeon Missile	38.4	37.1	35.8	34.6	33.3	32.0	30.7	29.4	28.2	26.9	25.6	24.3	23.0	21.7	20.5	19.2	17.9
Scatter-Pack X	161.2	121.9	113.2	104.5	95.8	87.0	78.3	69.6	60.9	52.2	43.5	34.8	26.1	17.4	8.7	0.0	0.0
Five-rack missile																	
Nuclear Missile	44.4	16.6	11.1	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	60.0	26.0	20.0	15.0	10.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	72.7	39.0	33.6	28.1	21.8	16.3	10.9	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	115.3	58.8	46.9	35.3	23.4	11.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	76.9	49.2	43.8	38.4	33.0	27.6	21.5	16.1	10.7	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	71.4	53.8	50.0	46.1	42.3	38.5	34.7	30.9	27.1	23.3	19.5	15.2	11.4	7.6	3.8	0.0	0.0
Scatter-Pack VII	166.6	106.4	94.7	82.8	70.9	59.2	47.3	35.4	23.5	11.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	47.6	41.1	39.0	36.9	34.7	32.6	30.2	28.0	25.9	23.8	21.6	19.5	17.3	15.2	13.0	10.9	8.5
Hercular Missile	37.8	36.3	34.8	33.3	31.8	30.3	28.7	27.2	25.7	24.2	22.7	21.2	19.6	18.1	16.6	15.1	13.6
Zeon Missile	25.4	24.5	23.7	22.8	22.0	21.1	20.3	19.4	18.6	17.7	16.9	16.1	15.2	14.4	13.5	12.7	11.8
Scatter-Pack X	95.5	72.2	67.0	61.9	56.7	51.5	46.4	41.2	36.1	30.9	25.7	20.6	15.4	10.3	5.1	0.0	0.0
Bomb																	
Nuclear Bomb	306.6	266.6	233.3	200.0	166.6	133.3	100.0	70.0	46.6	26.6	13.3	3.3	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	513.3	470.0	436.6	403.3	370.0	336.6	303.3	270.0	236.6	203.3	170.0	136.6	110.0	83.3	63.3	43.3	26.6
Anti-Matter Bomb	616.0	582.0	562.0	542.0	522.0	502.0	482.0	462.0	442.0	422.0	402.0	382.0	362.0	342.0	322.0	302.0	282.0
Omega-V Bomb	370.9	355.4	346.3	337.2	328.1	319.0	310.0	300.9	291.8	282.7	273.6	264.5	255.4	246.3	237.2	228.1	219.0
Neutronium Bomb	126.6	123.1	121.0	118.9	116.8	114.7	112.7	110.6	108.5	106.4	104.3	102.2	100.2	98.1	96.0	93.9	91.8

Table G-2 Continued

Weapon Type	Planetary Shield Level (Continued)																
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	35
Beam weapon																	
Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Megabolt Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auto Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	1.6	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plasma Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Death Ray	40.8	40.7	40.5	40.4	40.3	40.2	40.1	40.0	39.8	39.7	39.6	39.5	39.4	39.3	39.1	38.9	38.7
Disruptor	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulse Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	4.4	3.4	2.5	1.7	1.0	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stellar Converter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mauler Device	14.2	13.5	12.7	12.0	11.3	10.5	9.8	9.1	8.4	7.8	7.1	6.5	5.9	5.4	4.8	3.8	2.9
Torpedo																	
Anti-Matter Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hellfire Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	15.8	15.0	14.2	13.4	12.6	11.9	11.1	10.3	9.5	8.7	7.9	7.1	6.3	5.5	4.7	3.1	1.5
Plasma Torpedo	31.8	31.3	30.7	30.2	29.6	29.1	28.5	28.0	27.4	26.9	26.3	25.8	25.2	24.7	24.1	23.0	21.9
Two-rack missile																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulsar Missile	9.6	6.4	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	18.1	15.9	13.6	11.3	9.0	6.8	4.5	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	16.6	15.3	14.1	12.8	11.5	10.2	8.9	7.6	6.4	5.1	3.8	2.5	1.2	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Five-rack missile																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulsar Missile	6.4	4.2	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	12.1	10.6	9.0	7.5	6.0	4.5	3.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	11.0	10.1	9.3	8.4	7.6	6.7	5.9	5.0	4.2	3.3	2.5	1.6	0.8	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bomb																	
Nuclear Bomb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	16.6	6.6	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anti-Matter Bomb	262.0	242.0	222.0	202.0	182.0	164.0	146.0	130.0	114.0	100.0	86.0	74.0	62.0	52.0	42.0	26.0	14.0
Omega-V Bomb	210.0	200.9	191.8	182.7	173.6	164.5	155.4	146.3	137.2	128.1	119.0	110.0	100.9	91.8	82.7	66.3	51.8
Neutronium Bomb	89.7	87.7	85.6	83.5	81.4	79.3	77.2	75.2	73.1	71.0	68.9	66.8	64.7	62.7	60.6	56.4	52.2



Table G-2 Continued

## Average Technology Level of 70

Assumptions:

Attack level = 11

Beam Defense = 1

Missile Defense = 11

Power-to-hull space ratio = 5.00

Weapon Type	Planetary Shield Level																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Beam weapon																	
Laser	26.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	16.0	8.6	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	36.4	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	36.0	36.0	16.0	16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	42.8	27.1	12.8	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	24.5	19.5	15.0	10.4	5.9	2.7	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	30.0	30.0	20.9	20.9	11.8	11.8	2.7	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	36.6	27.5	19.1	10.8	4.1	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	22.9	19.7	17.0	14.3	11.6	8.9	6.4	4.3	2.7	1.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	51.0	40.0	30.0	20.0	11.0	6.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	24.7	24.2	19.5	19.5	14.7	14.7	10.0	10.0	5.2	5.2	0.9	0.9	0.0	0.0	0.0	0.0	0.0
Fusion Beam	39.3	32.0	25.3	18.6	12.0	6.6	2.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	23.2	20.6	18.4	16.3	14.1	11.9	9.7	7.6	5.8	4.1	2.8	1.7	0.8	0.4	0.0	0.0	0.0
Megabolt Cannon	52.8	45.0	37.8	30.7	23.5	16.4	10.0	5.7	2.1	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	38.9	33.1	27.8	22.6	17.3	12.1	7.3	4.2	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	25.0	22.8	21.0	19.2	17.5	15.7	14.0	12.2	10.5	8.7	7.1	5.7	4.5	3.5	2.6	1.7	1.0
Auto Blaster	93.1	75.2	59.4	43.6	27.8	15.2	6.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	57.3	48.6	42.0	35.3	28.6	22.0	16.6	11.3	7.3	4.6	2.0	0.6	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	61.0	60.7	46.4	46.4	32.1	32.1	17.8	17.8	3.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	37.2	36.8	32.2	32.2	27.7	27.7	23.1	23.1	18.6	18.6	14.0	14.0	9.5	9.5	5.0	5.0	2.2
Plasma Cannon	50.4	44.5	40.0	35.4	30.9	26.3	21.8	17.2	13.1	9.5	6.3	4.0	2.2	0.9	0.0	0.0	0.0
Death Ray	64.8	63.2	63.0	62.8	62.7	62.5	62.3	62.1	62.0	61.8	61.6	61.5	61.3	61.1	60.9	60.8	60.6
Disruptor	38.7	35.3	32.8	30.2	27.6	25.1	22.5	20.0	17.4	14.8	12.3	10.0	7.6	5.8	4.3	3.0	1.7
Pulse Phasor	79.6	67.5	56.7	46.0	35.3	24.6	15.3	8.2	3.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	41.8	39.1	37.0	35.0	32.9	30.8	28.7	26.6	24.5	22.5	20.4	18.3	16.2	14.1	12.0	10.0	8.1
Stellar Converter	54.6	49.5	45.5	41.4	37.3	33.2	29.1	25.1	21.0	16.9	13.1	9.7	6.9	4.5	2.6	1.3	0.4
Mauler Device	40.3	38.1	37.0	36.0	34.9	33.8	32.7	31.7	30.6	29.5	28.4	27.4	26.3	25.2	24.1	23.1	22.0
Nuclear Missile	80.0	30.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	100.0	43.3	33.3	25.0	16.6	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	114.2	61.4	52.8	44.2	34.2	25.7	17.1	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	230.7	117.6	93.8	70.7	46.9	23.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	142.8	91.4	81.4	71.4	61.4	51.4	40.0	30.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	150.0	113.0	105.0	97.0	89.0	81.0	73.0	65.0	57.0	49.0	41.0	32.0	24.0	16.0	8.0	0.0	0.0
Scatter-Pack VII	388.8	248.3	221.1	193.3	165.5	138.3	110.5	82.7	55.0	27.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	117.6	101.7	96.4	91.1	85.8	80.5	74.7	69.4	64.1	58.8	53.5	48.2	42.9	37.6	32.3	27.0	21.1
Hercular Missile	100.0	96.0	92.0	88.0	84.0	80.0	76.0	72.0	68.0	64.0	60.0	56.0	52.0	48.0	44.0	40.0	36.0
Zeon Missile	71.4	69.0	66.6	64.2	61.9	59.5	57.1	54.7	52.3	50.0	47.6	45.2	42.8	40.4	38.0	35.7	33.3
Scatter-Pack X	300.0	226.8	210.6	194.4	178.2	162.0	145.8	129.6	113.4	97.2	81.0	64.8	48.6	32.4	16.2	0.0	0.0
Torpedo																	
Anti-Matter Torpedo	23.8	20.1	18.7	17.3	15.8	14.4	13.0	11.5	10.1	8.7	7.3	5.7	4.2	2.8	1.4	0.0	0.0
Hellfire Torpedo	53.9	49.4	44.9	40.4	35.9	31.4	26.9	22.4	17.9	13.4	8.9	4.4	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	38.9	37.8	36.8	35.7	34.7	33.6	32.6	31.5	30.5	29.4	28.4	27.3	26.3	25.2	24.2	23.1	22.1
Plasma Torpedo	59.0	58.2	57.4	56.6	55.9	55.1	54.3	53.5	52.7	51.9	51.1	50.3	49.6	48.8	48.0	47.2	46.4
Two-rack missile																	
Nuclear Missile	50.0	18.7	12.5	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	66.6	28.8	22.2	16.6	11.1	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	80.0	43.0	37.0	31.0	24.0	18.0	12.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	130.4	66.5	53.0	40.0	26.5	13.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	100.0	64.0	57.0	50.0	43.0	36.0	28.0	21.0	14.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	100.0	75.3	70.0	64.6	59.3	54.0	48.6	43.3	38.0	32.6	27.3	21.3	16.0	10.6	5.3	0.0	0.0
Scatter-Pack VII	259.2	165.5	147.4	128.8	110.3	92.2	73.7	55.1	36.6	18.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	76.9	66.5	63.0	59.6	56.1	52.6	48.8	45.3	41.9	38.4	35.0	31.5	28.0	24.6	21.1	17.6	13.8
Hercular Missile	65.7	63.1	60.5	57.8	55.2	52.6	50.0	47.3	44.7	42.1	39.4	36.8	34.2	31.5	28.9	26.3	23.6
Zeon Missile	47.6	46.0	44.4	42.8	41.2	39.6	38.0	36.5	34.9	33.3	31.7	30.1	28.5	26.9	25.3	23.8	22.2
Scatter-Pack X	180.7	136.6	126.8	117.1	107.3	97.5	87.8	78.0	68.3	58.5	48.7	39.0	29.2	19.5	9.7	0.0	0.0
Five-rack missile																	
Nuclear Bomb	306.6	266.6	233.3	200.0	166.6	133.3	100.0	70.0	46.6	26.6	13.3	3.3	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	513.3	470.0	436.6	403.3	370.0	336.6	303.3	270.0	236.6	203.3	170.0	136.6	110.0	83.3	63.3	43.3	26.6
Anti-Matter Bomb	770.0	727.5	702.5	677.5	652.5	627.5	602.5	577.5	552.5	527.5	502.5	477.5	452.5	427.5	402.5	377.5	352.5
Omega-V Bomb	582.8	558.5	544.2	530.0	515.7	501.4	487.1	472.8	458.5	444.2	430.0	415.7	401.4	387.1	372.8	358.5	344.2
Neutronium Bomb	233.8	227.3	223.4	219.6	215.7	211.9	208.0	204.2	200.3	196.5	192.6	188.8	185.0	181.1	177.3	173.4	169.6



Table G-2 Continued

Weapon Type	Planetary Shield Level (Continued)																
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	35
<b>Beam weapon</b>																	
Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Megabolt Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auto Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	2.2	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plasma Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Death Ray	60.4	60.2	60.1	59.9	59.7	59.6	59.4	59.2	59.0	58.9	58.7	58.5	58.3	58.2	58.0	57.7	57.3
Disruptor	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulse Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	6.2	4.7	3.5	2.5	1.4	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stellar Converter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mauler Device	20.9	19.8	18.8	17.7	16.6	15.5	14.5	13.4	12.4	11.5	10.5	9.6	8.8	7.9	7.2	5.6	4.4
<b>Torpedo</b>																	
Anti-Matter Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hellfire Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	21.0	20.0	18.9	17.8	16.8	15.7	14.7	13.6	12.6	11.5	10.5	9.4	8.4	7.3	6.3	4.2	2.1
Plasma Torpedo	45.6	44.8	44.0	43.3	42.5	41.7	40.9	40.1	39.3	38.5	37.7	37.0	36.2	35.4	34.6	33.0	31.4
<b>Two-rack missile</b>																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	15.8	10.5	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	32.0	28.0	24.0	20.0	16.0	12.0	8.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	30.9	28.5	26.1	23.8	21.4	19.0	16.6	14.2	11.9	9.5	7.1	4.7	2.3	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Five-rack missile</b>																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	10.3	6.9	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	21.0	18.4	15.7	13.1	10.5	7.8	5.2	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	20.6	19.0	17.4	15.8	14.2	12.6	11.1	9.5	7.9	6.3	4.7	3.1	1.5	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Bomb</b>																	
Nuclear Bomb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	16.6	6.6	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anti-Matter Bomb	327.5	302.5	277.5	252.5	227.5	205.0	182.5	162.5	142.5	125.0	107.5	92.5	77.5	65.0	52.5	32.5	17.5
Omega-V Bomb	330.0	315.7	301.4	287.1	272.8	258.5	244.2	230.0	215.7	201.4	187.1	172.8	158.5	144.2	130.0	104.2	81.4
Neutronium Bomb	165.7	161.9	158.0	154.2	150.3	146.5	142.6	138.8	135.0	131.1	127.3	123.4	119.6	115.7	111.9	104.2	96.5

**Table G-2** Continued**Average Technology Level of 80****Assumptions:****Attack level = 11****Beam Defense = 1****Missile Defense = 11****Power-to-hull space ratio = 5.83**

Weapon Type	Planetary Shield Level																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Beam weapon																	
Laser	32.5	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	20.0	10.8	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	42.5	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	45.0	45.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	50.0	31.6	15.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	28.4	22.6	17.3	12.1	6.8	3.1	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	36.6	36.6	25.5	25.5	14.4	14.4	3.3	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	44.0	33.0	23.0	13.0	5.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	27.4	23.5	20.3	17.0	13.8	10.6	7.7	5.1	3.2	1.9	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	63.7	50.0	37.5	25.0	13.7	7.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	28.8	28.3	22.7	22.7	17.2	17.2	11.6	11.6	6.1	6.1	1.1	1.1	0.0	0.0	0.0	0.0	0.0
Fusion Beam	49.1	40.0	31.6	23.3	15.0	8.3	3.3	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	27.4	24.3	21.7	19.2	16.6	14.1	11.5	8.9	6.9	4.8	3.3	2.0	1.0	0.5	0.0	0.0	0.0
Megabolt Cannon	67.2	57.2	48.1	39.0	30.0	20.9	12.7	7.2	2.7	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	49.3	42.0	35.3	28.6	22.0	15.3	9.3	5.3	2.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	30.4	27.6	25.5	23.4	21.2	19.1	17.0	14.8	12.7	10.6	8.7	7.0	5.5	4.2	3.1	2.1	1.2
Auto Blaster	118.0	95.3	75.3	55.3	35.3	19.3	8.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	71.6	60.8	52.5	44.1	35.8	27.5	20.8	14.1	9.1	5.8	2.5	0.8	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	77.7	77.2	59.0	59.0	40.9	40.9	22.7	22.7	4.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	54.6	54.0	47.3	47.3	40.6	40.6	34.0	34.0	27.3	27.3	20.6	20.6	14.0	14.0	7.3	7.3	3.3
Plasma Cannon	61.6	54.4	48.8	43.3	37.7	32.2	26.6	21.1	16.1	11.6	7.7	5.0	2.7	1.1	0.0	0.0	0.0
Death Ray	84.8	82.7	82.5	82.3	82.0	81.8	81.6	81.4	81.1	80.9	80.7	80.5	80.2	80.0	79.8	79.6	79.3
Disruptor	50.3	46.0	42.6	39.3	36.0	32.6	29.3	26.0	22.6	19.3	16.0	13.0	10.0	7.6	5.6	4.0	2.3
Pulse Phasor	101.3	85.9	72.2	58.6	45.0	31.3	19.5	10.4	4.5	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	55.8	52.2	49.4	46.6	43.8	41.1	38.3	35.5	32.7	30.0	27.2	24.4	21.6	18.8	16.1	13.3	10.8
Stellar Converter	77.6	70.4	64.6	58.8	53.0	47.2	41.4	35.6	29.8	24.0	18.6	13.9	9.8	6.5	3.7	1.8	0.5
Mauler Device	55.9	52.9	51.4	50.0	48.5	47.0	45.5	44.0	42.5	41.0	39.5	38.0	36.5	35.0	33.5	32.0	30.5
Torpedo																	
Anti-Matter Torpedo	28.3	23.9	22.2	20.5	18.8	17.1	15.4	13.7	12.0	10.3	8.6	6.7	5.0	3.3	1.6	0.0	0.0
Hellfire Torpedo	69.5	63.7	57.9	52.1	46.3	40.5	34.7	28.9	23.1	17.3	11.5	5.7	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	48.6	47.3	46.0	44.7	43.4	42.1	40.7	39.4	38.1	36.8	35.5	34.2	32.8	31.5	30.2	28.9	27.6
Plasma Torpedo	78.1	77.0	76.0	75.0	73.9	72.9	71.8	70.8	69.7	68.7	67.7	66.6	65.6	64.5	63.5	62.5	61.4
Two-rack missile																	
Nuclear Missile	100.0	37.5	25.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	120.0	52.0	40.0	30.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	133.3	71.6	61.6	51.6	40.0	30.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	272.7	139.0	110.9	83.6	55.4	28.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	166.6	106.6	95.0	83.3	71.6	60.0	46.6	35.0	23.3	11.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	166.6	125.5	116.6	107.7	98.8	90.0	81.1	72.2	63.3	54.4	45.5	35.5	26.6	17.7	8.8	0.0	0.0
Scatter-Pack VII	538.4	343.8	306.1	267.6	229.2	191.5	153.0	114.6	76.1	38.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	200.0	173.0	164.0	155.0	146.0	137.0	127.0	118.0	109.0	100.0	91.0	82.0	73.0	64.0	55.0	46.0	36.0
Hercular Missile	178.5	171.4	164.2	157.1	150.0	142.8	135.7	128.5	121.4	114.2	107.1	100.0	92.8	85.7	78.5	71.4	64.2
Zeon Missile	120.0	116.0	112.0	108.0	104.0	100.0	96.0	92.0	88.0	84.0	80.0	76.0	72.0	68.0	64.0	60.0	56.0
Scatter-Pack X	535.7	405.0	376.0	347.1	318.2	289.2	260.3	231.4	202.5	173.5	144.6	115.7	86.7	57.8	28.9	0.0	0.0
Five-rack missile																	
Nuclear Missile	57.1	21.4	14.2	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	75.0	32.5	25.0	18.7	12.5	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	88.8	47.7	41.1	34.4	26.6	20.0	13.3	6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	150.0	76.5	61.0	46.0	30.5	15.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	111.1	71.1	63.3	55.5	47.7	40.0	31.1	23.3	15.5	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	115.3	86.9	80.7	74.6	68.4	62.3	56.1	50.0	43.8	37.6	31.5	24.6	18.4	12.3	6.1	0.0	0.0
Scatter-Pack VII	368.4	235.2	209.4	183.1	156.8	131.0	104.7	78.4	52.1	26.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	117.6	101.7	96.4	91.1	85.8	80.5	74.7	69.4	64.1	58.8	53.5	48.2	42.9	37.6	32.3	27.0	21.1
Hercular Missile	108.6	104.3	100.0	95.6	91.3	86.9	82.6	78.2	73.9	69.5	65.2	60.8	56.5	52.1	47.8	43.4	39.1
Zeon Missile	78.9	76.3	73.6	71.0	68.4	65.7	63.1	60.5	57.8	55.2	52.6	50.0	47.3	44.7	42.1	39.4	36.8
Scatter-Pack X	326.0	246.5	228.9	211.3	193.6	176.0	158.4	140.8	123.2	105.6	88.0	70.4	52.8	35.2	17.6	0.0	0.0
Bomb																	
Nuclear Bomb	460.0	400.0	350.0	300.0	250.0	200.0	150.0	105.0	70.0	40.0	20.0	5.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	770.0	705.0	655.0	605.0	555.0	505.0	455.0	405.0	355.0	305.0	255.0	205.0	165.0	125.0	95.0	65.0	40.0
Anti-Matter Bomb	1026.6	970.0	936.6	903.3	870.0	836.6	803.3	770.0	736.6	703.3	670.0	636.6	603.3	570.0	536.6	503.3	470.0
Omega-V Bomb	816.0	782.0	762.0	742.0	722.0	702.0	682.0	662.0	642.0	622.0	602.0	582.0	562.0	542.0	522.0	502.0	482.0
Neutronium Bomb	467.6	454.6	446.9	439.2	431.5	423.8	416.1	408.4	400.7	393.0	385.3	377.6	370.0	362.3	354.6	346.9	339.2

Table G-2 Continued

Weapon Type	Planetary Shield Level (Continued)																
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	35
<b>Beam weapon</b>																	
Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Megabolt Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auto Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	3.3	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plasma Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Death Ray	79.1	78.9	78.7	78.4	78.2	78.0	77.8	77.5	77.3	77.1	76.9	76.6	76.4	76.2	76.0	75.5	75.1
Disruptor	1.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulse Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	8.3	6.3	4.7	3.3	1.9	1.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stellar Converter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mauler Device	29.1	27.6	26.1	24.6	23.1	21.6	20.1	18.6	17.3	15.9	14.6	13.4	12.2	11.0	10.0	7.9	6.1
<b>Torpedo</b>																	
Anti-Matter Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hellfire Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	26.3	25.0	23.6	22.3	21.0	19.7	18.4	17.1	15.7	14.4	13.1	11.8	10.5	9.2	7.8	5.2	2.6
Plasma Torpedo	60.4	59.3	58.3	57.2	56.2	55.2	54.1	53.1	52.0	51.0	50.0	48.9	47.9	46.8	45.8	43.7	41.6
<b>Two-rack missile</b>																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	27.0	18.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	57.1	50.0	42.8	35.7	28.5	21.4	14.2	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	52.0	48.0	44.0	40.0	36.0	32.0	28.0	24.0	20.0	16.0	12.0	8.0	4.0	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Five-rack missile</b>																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	15.8	10.5	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	34.7	30.4	26.0	21.7	17.3	13.0	8.6	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	34.2	31.5	28.9	26.3	23.6	21.0	18.4	15.7	13.1	10.5	7.8	5.2	2.6	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Bomb</b>																	
Nuclear Bomb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	25.0	10.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anti-Matter Bomb	436.6	403.3	370.0	336.6	303.3	273.3	243.3	216.6	190.0	166.6	143.3	123.3	103.3	86.6	70.0	43.3	23.3
Omega-V Bomb	462.0	442.0	422.0	402.0	382.0	362.0	342.0	322.0	302.0	282.0	262.0	242.0	222.0	202.0	182.0	146.0	114.0
Neutronium Bomb	331.5	323.8	316.1	308.4	300.7	293.0	285.3	277.6	270.0	262.3	254.6	246.9	239.2	231.5	223.8	208.4	193.0

Table G-2 Continued

## Average Technology Level of 90

Assumptions:

Attack level = 11

Beam Defense = 1

Missile Defense = 11

Power-to-hull space ratio = 7.27

Weapon Type	Planetary Shield Level																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Beam weapon																	
Laser	43.3	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	24.0	13.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	56.6	11.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	60.0	60.0	26.6	26.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	75.0	47.5	22.5	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	36.0	28.6	22.0	15.3	8.6	4.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	47.1	47.1	32.8	32.8	18.5	18.5	4.2	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	55.0	41.2	28.7	16.2	6.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	34.0	29.2	25.2	21.2	17.2	13.2	9.6	6.4	4.0	2.4	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	85.0	66.6	50.0	33.3	18.3	10.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	37.1	36.4	29.2	29.2	22.1	22.1	15.0	15.0	7.8	7.8	1.4	1.4	0.0	0.0	0.0	0.0	0.0
Fusion Beam	59.0	48.0	38.0	28.0	18.0	10.0	4.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	34.5	30.6	27.4	24.1	20.9	17.7	14.5	11.2	8.7	6.1	4.1	2.5	1.2	0.6	0.0	0.0	0.0
Megabolt Cannon	92.5	78.7	66.2	53.7	41.2	28.7	17.5	10.0	3.7	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	61.6	52.5	44.1	35.8	27.5	19.1	11.6	6.6	2.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	37.6	34.2	31.5	28.9	26.3	23.6	21.0	18.4	15.7	13.1	10.7	8.6	6.8	5.2	3.9	2.6	1.5
Auto Blaster	147.5	119.1	94.1	69.1	44.1	24.1	10.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	95.5	81.1	70.0	58.8	47.7	36.6	27.7	18.8	12.2	7.7	3.3	1.1	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	100.5	100.0	76.4	76.4	52.9	52.9	29.4	29.4	5.8	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	68.3	67.5	59.1	59.1	50.8	50.8	42.5	42.5	34.1	34.1	25.8	25.8	17.5	17.5	9.1	9.1	4.1
Plasma Cannon	85.3	75.3	67.6	60.0	52.3	44.6	36.9	29.2	22.3	16.1	10.7	6.9	3.8	1.5	0.0	0.0	0.0
Death Ray	112.2	109.4	109.1	108.8	108.5	108.2	107.9	107.6	107.3	107.0	106.7	106.4	106.1	105.8	105.5	105.2	104.9
Disruptor	62.9	57.5	53.3	49.1	45.0	40.8	36.6	32.5	28.3	24.1	20.0	16.2	12.5	9.5	7.0	5.0	2.9
Pulse Phasor	131.1	111.1	93.5	75.8	58.2	40.5	25.2	13.5	5.8	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	77.3	72.3	68.4	64.6	60.7	56.9	53.0	49.2	45.3	41.5	37.6	33.8	30.0	26.1	22.3	18.4	15.0
Stellar Converter	105.0	95.2	87.4	79.6	71.7	63.9	56.0	48.2	40.3	32.5	25.2	18.8	13.3	8.8	5.0	2.5	0.7
Mauler Device	78.1	73.9	71.8	69.7	67.7	65.6	63.5	61.4	59.3	57.2	55.2	53.1	51.0	48.9	46.8	44.7	42.7
Torpedo																	
Anti-Matter Torpedo	34.8	29.5	27.4	25.3	23.2	21.1	19.0	16.9	14.8	12.7	10.6	8.3	6.2	4.1	2.0	0.0	0.0
Hellfire Torpedo	92.3	84.6	76.9	69.2	61.5	53.8	46.1	38.4	30.7	23.0	15.3	7.6	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	62.7	61.0	59.3	57.6	55.9	54.2	52.5	50.8	49.1	47.4	45.7	44.0	42.3	40.6	38.9	37.2	35.5
Plasma Torpedo	107.1	105.7	104.2	102.8	101.4	100.0	98.5	97.1	95.7	94.2	92.8	91.4	90.0	88.5	87.1	85.7	84.2
Two-rack missile																	
Nuclear Missile	133.3	50.0	33.3	16.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	150.0	65.0	50.0	37.5	25.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	160.0	86.0	74.0	62.0	48.0	36.0	24.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	333.3	170.0	135.5	102.2	67.7	34.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	200.0	128.0	114.0	100.0	86.0	72.0	56.0	42.0	28.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	187.5	141.2	131.2	121.2	111.2	101.2	91.2	81.2	71.2	61.2	51.2	40.0	30.0	20.0	10.0	0.0	0.0
Scatter-Pack VII	636.3	406.3	361.8	316.3	270.9	226.3	180.9	135.4	90.0	45.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	222.2	192.2	182.2	172.2	162.2	152.2	141.1	131.1	121.1	111.1	101.1	91.1	81.1	71.1	61.1	51.1	40.0
Hercular Missile	227.2	218.1	209.0	200.0	190.9	181.8	172.7	163.6	154.5	145.4	136.3	127.2	118.1	109.0	100.0	90.9	81.8
Zeon Missile	230.7	223.0	215.3	207.6	200.0	192.3	184.6	176.9	169.2	161.5	153.8	146.1	138.4	130.7	123.0	115.3	107.6
Scatter-Pack X	937.5	708.7	658.1	607.5	556.8	506.2	455.6	405.0	354.3	303.7	253.1	202.5	151.8	101.2	50.6	0.0	0.0
Five-rack missile																	
Nuclear Missile	66.6	25.0	16.6	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	85.7	37.1	28.5	21.4	14.2	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	100.0	53.7	46.2	38.7	30.0	22.5	15.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	176.4	90.0	71.7	54.1	35.8	18.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	125.0	80.0	71.2	62.5	53.7	45.0	35.0	26.2	17.5	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	125.0	94.1	87.5	80.8	74.1	67.5	60.8	54.1	47.5	40.8	34.1	26.6	20.0	13.3	6.6	0.0	0.0
Scatter-Pack VII	411.7	262.9	234.1	204.7	175.2	146.4	117.0	87.6	58.2	29.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	133.3	115.3	109.3	103.3	97.3	91.3	84.6	78.6	72.6	66.6	60.6	54.6	48.6	42.6	36.6	30.6	24.0
Hercular Missile	147.0	141.1	135.2	129.4	123.5	117.6	111.7	105.8	100.0	94.1	88.2	82.3	76.4	70.5	64.7	58.8	52.9
Zeon Missile	142.8	138.0	133.3	128.5	123.8	119.0	114.2	109.5	104.7	100.0	95.2	90.4	85.7	80.9	76.1	71.4	66.6
Scatter-Pack X	555.5	420.0	390.0	360.0	330.0	300.0	270.0	240.0	210.0	180.0	150.0	120.0	90.0	60.0	30.0	0.0	0.0
Bomb																	
Nuclear Bomb	460.0	400.0	350.0	300.0	250.0	200.0	150.0	105.0	70.0	40.0	20.0	5.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	770.0	705.0	655.0	605.0	555.0	505.0	455.0	405.0	355.0	305.0	255.0	205.0	165.0	125.0	95.0	65.0	40.0
Anti-Matter Bomb	1026.6	970.0	936.6	903.3	870.0	836.6	803.3	770.0	736.6	703.3	670.0	636.6	603.3	570.0	536.6	503.3	470.0
Omega-V Bomb	816.0	782.0	762.0	742.0	722.0	702.0	682.0	662.0	642.0	622.0	602.0	582.0	562.0	542.0	522.0	502.0	482.0
Neutronium Bomb:	868.5	844.2	830.0	815.7	801.4	787.1	772.8	758.5	744.2	730.0	715.7	701.4	687.1	672.8	658.5	644.2	630.0

Table G-2 Continued

Weapon Type	Planetary Shield Level (Continued)																
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	35
Beam weapon																	
Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Megabolt Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	0.7	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auto Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	4.1	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plasma Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Death Ray	104.6	104.3	104.0	103.7	103.4	103.1	102.8	102.5	102.2	102.0	101.7	101.4	101.1	100.8	100.5	99.9	99.3
Disruptor	1.6	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulse Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	11.5	8.8	6.5	4.6	2.6	1.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stellar Converter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mauler Device	40.6	38.5	36.4	34.3	32.2	30.2	28.1	26.0	24.1	22.2	20.4	18.7	17.0	15.4	13.9	11.0	8.5
Torpedo																	
Anti-Matter Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hellfire Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	33.8	32.2	30.5	28.8	27.1	25.4	23.7	22.0	20.3	18.6	16.9	15.2	13.5	11.8	10.1	6.7	3.3
Plasma Torpedo	82.8	81.4	80.0	78.5	77.1	75.7	74.2	72.8	71.4	70.0	68.5	67.1	65.7	64.2	62.8	60.0	57.1
Two-rack missile																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	30.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	72.7	63.6	54.5	45.4	36.3	27.2	18.1	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	100.0	92.3	84.6	76.9	69.2	61.5	53.8	46.1	38.4	30.7	23.0	15.3	7.6	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Five-rack missile																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	18.0	12.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	47.0	41.1	35.2	29.4	23.5	17.6	11.7	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	61.9	57.1	52.3	47.6	42.8	38.0	33.3	28.5	23.8	19.0	14.2	9.5	4.7	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bomb																	
Nuclear Bomb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	25.0	10.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anti-Matter Bomb	436.6	403.3	370.0	336.6	303.3	273.3	243.3	216.6	190.0	166.6	143.3	123.3	103.3	86.6	70.0	43.3	23.3
Omega-V Bomb	462.0	442.0	422.0	402.0	382.0	362.0	342.0	322.0	302.0	282.0	262.0	242.0	222.0	202.0	182.0	146.0	114.0
Neutronium Bomb	615.7	601.4	587.1	572.8	558.5	544.2	530.0	515.7	501.4	487.1	472.8	458.5	444.2	430.0	415.7	387.1	358.5



Table G-2 Continued

## Average Technology Level of 99

Assumptions:

Attack level = 11

Beam Defense = 1

Missile Defense = 11

Power-to-hull space ratio = 7.50

Weapon Type	Planetary Shield Level																
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Beam weapon																	
Laser	43.3	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	24.0	13.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	56.6	11.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	60.0	60.0	26.6	26.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	75.0	47.5	22.5	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	36.0	28.6	22.0	15.3	8.6	4.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	47.1	47.1	32.8	32.8	18.5	18.5	4.2	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	55.0	41.2	28.7	16.2	6.2	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	34.0	29.2	25.2	21.2	17.2	13.2	9.6	6.4	4.0	2.4	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	85.0	66.6	50.0	33.3	18.3	10.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	37.1	36.4	29.2	29.2	22.1	22.1	15.0	15.0	7.8	7.8	1.4	1.4	0.0	0.0	0.0	0.0	0.0
Fusion Beam	59.0	48.0	38.0	28.0	18.0	10.0	4.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	34.5	30.6	27.4	24.1	20.9	17.7	14.5	11.2	8.7	6.1	4.1	2.5	1.2	0.6	0.0	0.0	0.0
Megabolt Cannon	92.5	78.7	66.2	53.7	41.2	28.7	17.5	10.0	3.7	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	61.6	52.5	44.1	35.8	27.5	19.1	11.6	6.6	2.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	38.6	35.1	32.4	29.7	27.0	24.3	21.6	18.9	16.2	13.5	11.0	8.9	7.0	5.4	4.0	2.7	1.6
Auto Blaster	147.5	119.1	94.1	69.1	44.1	24.1	10.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	95.5	81.1	70.0	58.8	47.7	36.6	27.7	18.8	12.2	7.7	3.3	1.1	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	100.5	100.0	76.4	76.4	52.9	52.9	29.4	29.4	5.8	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	68.3	67.5	59.1	59.1	50.8	50.8	42.5	42.5	34.1	34.1	25.8	25.8	17.5	17.5	9.1	9.1	4.1
Plasma Cannon	85.3	75.3	67.6	60.0	52.3	44.6	36.9	29.2	22.3	16.1	10.7	6.9	3.8	1.5	0.0	0.0	0.0
Death Ray	115.3	112.4	112.1	111.8	111.5	111.2	110.9	110.6	110.3	110.0	109.7	109.4	109.1	108.8	108.4	108.1	107.8
Disruptor	65.6	60.0	55.6	51.3	46.9	42.6	38.2	33.9	29.5	25.2	20.8	16.9	13.0	10.0	7.3	5.2	3.0
Pulse Phasor	131.1	111.1	93.5	75.8	58.2	40.5	25.2	13.5	5.8	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	77.3	72.3	68.4	64.6	60.7	56.9	53.0	49.2	45.3	41.5	37.6	33.8	30.0	26.1	22.3	18.4	15.0
Stellar Converter	116.5	105.6	96.9	88.2	79.5	70.8	62.1	53.4	44.7	36.0	28.0	20.8	14.7	9.7	5.6	2.8	0.8
Mauler Device	85.2	80.6	78.4	76.1	73.8	71.5	69.3	67.0	64.7	62.5	60.2	57.9	55.6	53.4	51.1	48.8	46.5
Torpedo																	
Anti-Matter Torpedo	35.7	30.2	28.0	25.9	23.8	21.6	19.5	17.3	15.2	13.0	10.9	8.5	6.4	4.2	2.1	0.0	0.0
Hellfire Torpedo	96.0	88.0	80.0	72.0	64.0	56.0	48.0	40.0	32.0	24.0	16.0	8.0	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	66.0	64.2	62.5	60.7	58.9	57.1	55.3	53.5	51.7	50.0	48.2	46.4	44.6	42.8	41.0	39.2	37.5
Plasma Torpedo	117.1	115.6	114.0	112.5	110.9	109.3	107.8	106.2	104.6	103.1	101.5	100.0	98.4	96.8	95.3	93.7	92.1
Two-rack missile																	
Nuclear Missile	133.3	50.0	33.3	16.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	150.0	65.0	50.0	37.5	25.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	160.0	86.0	74.0	62.0	48.0	36.0	24.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	333.3	170.0	135.5	102.2	67.7	34.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	200.0	128.0	114.0	100.0	86.0	72.0	56.0	42.0	28.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	187.5	141.2	131.2	121.2	111.2	101.2	91.2	81.2	71.2	61.2	51.2	40.0	30.0	20.0	10.0	0.0	0.0
Scatter-Pack VII	636.3	406.3	361.8	316.3	270.9	226.3	180.9	135.4	90.0	45.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	222.2	192.2	182.2	172.2	162.2	152.2	141.1	131.1	121.1	111.1	101.1	91.1	81.1	71.1	61.1	51.1	40.0
Hercular Missile	227.2	218.1	209.0	200.0	190.9	181.8	172.7	163.6	154.5	145.4	136.3	127.2	118.1	109.0	100.0	90.9	81.8
Zeon Missile	230.7	223.0	215.3	207.6	200.0	192.3	184.6	176.9	169.2	161.5	153.8	146.1	138.4	130.7	123.0	115.3	107.6
Scatter-Pack X	1153.8	872.3	810.0	747.6	685.3	623.0	560.7	498.4	436.1	373.8	311.5	249.2	186.9	124.6	62.3	0.0	0.0
Five-rack missile																	
Nuclear Missile	66.6	25.0	16.6	8.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	85.7	37.1	28.5	21.4	14.2	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	100.0	53.7	46.2	38.7	30.0	22.5	15.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	176.4	90.0	71.7	54.1	35.8	18.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	125.0	80.0	71.2	62.5	53.7	45.0	35.0	26.2	17.5	8.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	125.0	94.1	87.5	80.8	74.1	67.5	60.8	54.1	47.5	40.8	34.1	26.6	20.0	13.3	6.6	0.0	0.0
Scatter-Pack VII	437.5	279.3	248.7	217.5	186.2	155.6	124.3	93.1	61.8	31.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	133.3	115.3	109.3	103.3	97.3	91.3	84.6	78.6	72.6	66.6	60.6	54.6	48.6	42.6	36.6	30.6	24.0
Hercular Missile	147.0	141.1	135.2	129.4	123.5	117.6	111.7	105.8	100.0	94.1	88.2	82.3	76.4	70.5	64.7	58.8	52.9
Zeon Missile	142.8	138.0	133.3	128.5	123.8	119.0	114.2	109.5	104.7	100.0	95.2	90.4	85.7	80.9	76.1	71.4	66.6
Scatter-Pack X	681.8	515.4	478.6	441.8	405.0	368.1	331.3	294.5	257.7	220.9	184.0	147.2	110.4	73.6	36.8	0.0	0.0
Bomb																	
Nuclear Bomb	460.0	400.0	350.0	300.0	250.0	200.0	150.0	105.0	70.0	40.0	20.0	5.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	770.0	705.0	655.0	605.0	555.0	505.0	455.0	405.0	355.0	305.0	255.0	205.0	165.0	125.0	95.0	65.0	40.0
Anti-Matter Bomb	1026.6	970.0	936.6	903.3	870.0	836.6	803.3	770.0	736.6	703.3	670.0	636.6	603.3	570.0	536.6	503.3	470.0
Omega-V Bomb	816.0	782.0	762.0	742.0	722.0	702.0	682.0	662.0	642.0	622.0	602.0	582.0	562.0	542.0	522.0	502.0	482.0
Neutronium Bomb	868.5	844.2	830.0	815.7	801.4	787.1	772.8	758.5	744.2	730.0	715.7	701.4	687.1	672.8	658.5	644.2	630.0



Table G-2 Continued

Weapon Type	Planetary Shield Level (Continued)																
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	33	35
<b>Beam weapon</b>																	
Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gatling Laser	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Pellet Gun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Ion Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mass Driver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neutron Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Blast Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Graviton Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hard Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Fusion Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Megabolt Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Heavy Phasor	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auto Blaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tachyon Beam	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gauss Autocannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Particle Beam	4.1	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plasma Cannon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Death Ray	107.5	107.2	106.9	106.6	106.3	106.0	105.7	105.4	105.1	104.8	104.5	104.2	103.8	103.5	103.2	102.6	102.0
Disruptor	1.7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulse Phasor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tri-Focus Plasma	11.5	8.8	6.5	4.6	2.6	1.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stellar Converter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mauler Device	44.3	42.0	39.7	37.5	35.2	32.9	30.6	28.4	26.3	24.3	22.2	20.4	18.6	16.8	15.2	12.0	9.3
<b>Torpedo</b>																	
Anti-Matter Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hellfire Torpedo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proton Torpedo	35.7	33.9	32.1	30.3	28.5	26.7	25.0	23.2	21.4	19.6	17.8	16.0	14.2	12.5	10.7	7.1	3.5
Plasma Torpedo	90.6	89.0	87.5	85.9	84.3	82.8	81.2	79.6	78.1	76.5	75.0	73.4	71.8	70.3	68.7	65.6	62.5
<b>Two-rack missile</b>																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	30.0	20.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	72.7	63.6	54.5	45.4	36.3	27.2	18.1	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	100.0	92.3	84.6	76.9	69.2	61.5	53.8	46.1	38.4	30.7	23.0	15.3	7.6	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Five-rack missile</b>																	
Nuclear Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-V Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hyper-X Rocket	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack V	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mercurite Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stinger Missile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scatter-Pack VII	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pulson Missile	18.0	12.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hercular Missile	47.0	41.1	35.2	29.4	23.5	17.6	11.7	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Zeon Missile	61.9	57.1	52.3	47.6	42.8	38.0	33.3	28.5	23.8	19.0	14.2	9.5	4.7	0.0	0.0	0.0	0.0
Scatter-Pack X	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Bomb</b>																	
Nuclear Bomb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fusion Bomb	25.0	10.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anti-Matter Bomb	436.6	403.3	370.0	336.6	303.3	273.3	243.3	216.6	190.0	166.6	143.3	123.3	103.3	86.6	70.0	43.3	23.3
Omega-V Bomb	462.0	442.0	422.0	402.0	382.0	362.0	342.0	322.0	302.0	282.0	262.0	242.0	222.0	202.0	182.0	146.0	114.0
Neutronium Bomb	615.7	601.4	587.1	572.8	558.5	544.2	530.0	515.7	501.4	487.1	472.8	458.5	444.2	430.0	415.7	387.1	358.5

# H

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## *A Ship Naming Convention*

by Redmond Simonsen\*

If you are actively engaged in upgrading and replacing ships in a typical *Master of Orion* arms race, it is helpful to have a more regular taxonomical scheme by which to name ships (as contrasted with the romantic or funny names we are inclined to assign when addled by lack of sleep or frustration with some enemy empire). The best scheme is one that carries the largest amount of information about the ship in the smallest number of characters. To this end, you may want to try the following nomenclature based on the ship's hull size, two prime weapon types, and average technology level. This will provide you, at a glance, with a clue as to the basic defensive/offensive capability of the ship and its degree of obsolescence relative to enemy forces.

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### **SYNTAX**

The syntax is very simple and follows this formula:

Hull size + first weapon + second weapon  
[-] average Technology level + Enhancements

For example, a ship might be named "SD-31E." This would mean it is a small-hulled, direct fire-armed ship designed with level-31 technology and carrying an engine enhancement of some sort. For color, you can even add a short nickname to the taxonomical label. (Remember, the whole name can be no more than 11 characters long.) Thus, "FOX SD31E" or "BEAR HMB42" would work nicely. Optionally, you might try using the NATO practice of developing nicknames: to wit, all bomber names begin with "B," fighters with "F," and so forth. Using a nickname is a good choice for discriminating ships of the same basic type built at the same technology level.

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## Suggested Codes to Use in Naming Ships

### Hull Sizes

- S = Small
- M = Medium
- L = Large
- H = Huge

### Weapon Categories<sup>a</sup>

- B = Bombs
- D = Direct fire (beam weapons)
- M = Missiles
- V = Virus/biowarfare weapons  
(these are distinguished from regular bombs, due to the diplomatic ramifications of their use; see Chapter 11)

### Enhancements (Specials)<sup>b</sup>

- C = Colony base (which may be suffixed with the landing type if desired, i.e., [S]tandard, [B]arren, [T]undra, [I]nferno, To[X]ic, [R]adiated)
- E = Engine, movement, or fuel tank enhancement
- W = Special weapon (e.g. Technology Nullifier)
- S = Defensive (shield) enhancement

### Developing the Average Technology Rating

Use only the relevant technology numbers (i.e., exclude the planetology rating). You can either cast the average accurately, using a calculator, or (more usually) simply by "eyeballing" the average of the high and low numbers. The purpose of the average technology rating is to give a raw indication of how advanced the ship is and at what stage in your overall technology development it was designed.

<sup>a</sup>In general, indicate only the first two (most significant) weapons.

<sup>b</sup>In general, indicate only the most significant, using one suffix.

# I

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## *Technology Information Summary*

Appendix I presents the Technology screen summary descriptions of everything that can be discovered, enhanced by a few notes of our own. These descriptions are divided by technology category and level.

The number on the left of each item's name is its base technology level. For the construction cost, size, and power of individual items that can be placed onboard ships, see Chapter 9.

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### **COMPUTER TECHNOLOGY**

- 1 **Battle Scanner**  
Reveals technical specifications of enemy spacecraft in combat and increases Attack level by +1 and initiative by +3 (see Table 9-11)
- 1 **Battle Computer Mark I**  
Increases weapon accuracy to level 1 (see Table 9-2)
- 2 **ECM Jammer Mark I**  
Adds one level to defense against enemy bomb, biological, missile, and torpedo attacks (see Table 9-4)
- 4 **Deep Space Scanner**  
Detects enemy ships up to 5 parsecs away from your colonies and 1 parsec away from your ships. The cost is free to all friendly colonies
- 5 **Battle Computer Mark II**  
Increases weapon accuracy to level 2 (see Table 9-2)
- 7 **ECM Jammer Mark II**  
Adds two levels to defense against enemy bomb, biological, missile, and torpedo attacks (see Table 9-4)
- 8 **Improved Robotic Controls III**  
Allows up to three factories to be operated per population. The refit cost to upgrade to Robotic Controls III is half the standard cost of each factory (see Table 6-3)
- 10 **Battle Computer Mark III**  
Increases weapon accuracy to level 3 (see Table 9-2)
- 12 **ECM Jammer Mark III**  
Adds three levels to defense against enemy bomb, biological, missile, and torpedo attacks (see Table 9-4)

**13 Improved Space Scanner**

Detects enemy ships up to 7 parsecs away from your colonies and 2 parsecs away from your ships. Enemy destinations and ETAs can also be accurately determined. The cost is free to all friendly colonies

**15 Battle Computer Mark IV**

Increases weapon accuracy to level 4 (see Table 9-2)

**17 ECM Jammer Mark IV**

Adds four levels to defense against enemy bomb, biological, missile, and torpedo attacks (see Table 9-4)

**18 Improved Robotic Controls IV**

Allows up to four factories to be operated per population. The refit cost to upgrade to Robotic Controls IV is the standard cost of each factory (see Table 6-3)

**20 Battle Computer Mark V**

Increases weapon accuracy to level 5 (see Table 9-2)

**22 ECM Jammer Mark V**

Adds five levels to defense against enemy bomb, biological, missile, and torpedo attacks (see Table 9-4)

**23 Advanced Space Scanner**

Allows exploration of planets from colony bases up to 9 parsecs away and detects enemy ships up to 3 parsecs away from your ships. The cost is free to all friendly colonies

**25 Battle Computer Mark VI**

Increases weapon accuracy to level 6 (see Table 9-2)

**27 ECM Jammer Mark VI**

Adds six levels to defense against enemy bomb, biological, missile, and torpedo attacks (see Table 9-4)

**28 Improved Robotic Controls V**

Allows up to five factories to be operated per population. The refit cost to upgrade to Robotic Controls V is 1.5 times the standard cost of each factory (see Table 6-3)

**30 Battle Computer Mark VII**

Increases weapon accuracy to level 7 (see Table 9-2)

**32 ECM Jammer Mark VII**

Adds seven levels to defense against enemy bomb, biological, missile, and torpedo attacks (see Table 9-4)

**34 Hyperspace Communications**

Allows you to communicate with ships and transports in hyperspace, and change their destinations while en route

**35 Battle Computer Mark VIII**

Increases weapon accuracy to level 8 (see Table 9-2)

**37 ECM Jammer Mark VIII**

Adds eight levels to defense against enemy bomb, biological, missile, and torpedo attacks (see Table 9-4)

**38 Improved Robotic Controls VI**

Allows up to six factories to be operated per population. The refit cost to upgrade to Robotic Controls VI is twice the standard cost of each factory (see Table 6-3)

**40 Battle Computer Mark IX**

Increases weapon accuracy to level 9 (see Table 9-2)

**42 ECM Jammer Mark IX**

Adds nine levels to defense against enemy bomb, biological, missile, and torpedo attacks (see Table 9-4)

**45 Battle Computer Mark X**

Increases weapon accuracy to level 10 (see Table 9-2)

**46 Oracle Interface**

Coordinates all beam weapon attacks into one simultaneous burst of concentrated fire, halving the enemy's shield strength (see Table 9-11)

**47 ECM Jammer Mark X**

Adds 10 levels to defense against enemy bomb, biological, missile, and torpedo attacks (see Table 9-4)

**48 Improved Robotic Controls VII**

Allows up to seven factories to be operated per population. The refit cost to upgrade to Robotic Controls VII is 2.5 times the standard cost of each factory (see Table 6-3)

**49 Technology Nullifier**

Scrambles enemy Battle Computers and ECM, reducing them each, separately, from two to six levels (averaging four) every time the nullifier hits them. This weapon has a 4-space range (see Table 9-11)

**50 Battle Computer Mark XI**

Increases weapon accuracy to level 11 (see Table 9-2)

**CONSTRUCTION TECHNOLOGY****1 Reserve Fuel Tanks**

Extends the range of a ship by an additional 3 parsecs (see Table 9-11)

**3 Improved Industrial Tech 9**

Reduces base factory construction costs to 9 BCs each

**5 Reduced Industrial Waste 80%**

Decreases factory pollution levels to 80 percent of the normal rate (see Table 6-4)

**8 Improved Industrial Tech 8**

Reduces base factory construction costs to 8 BCs each

**10 Duralloy Armor**

Increases the hit points of ships and transports by 50 percent. Personal combat armor is also enhanced, adding 5 to all ground attacks (see Table 9-5)

**11 Battle Suits**

Armor that not only protects but also boosts strength. Adds 10 to all ground combat rolls

**13 Improved Industrial Tech 7**

Reduces base factory construction costs to 7 BCs each

**14 Automated Repair System**

Undestroyed ships can repair up to 15 percent of their total hit points at the end of each turn in battle (see Table 9-11)

**15 Reduced Industrial Waste 60%**

Decreases factory pollution levels to 60 percent of the normal rate (see Table 6-4)

**17 Zortrium Armor**

Increases the hit points of ships and transports by 100 percent. Personal combat armor is also enhanced, adding 10 to all ground attacks (see Table 9-5)

**18 Improved Industrial Tech 6**

Reduces base factory construction costs to 6 BCs each

**23 Improved Industrial Tech 5**

Reduces base factory construction costs to 5 BCs each

**24 Armored Exoskeleton**

Advanced mobile suits that not only boost power and increase defenses but also offer limited flight to ground troops. Adds 20 to all ground combat rolls

**25 Reduced Industrial Waste 40%**

Decreases factory pollution levels to 40 percent of the normal rate (see Table 6-4)



**26 Andrium Armor**

Increases the hit points of ships and transports by 150 percent. Personal combat armor is also enhanced, adding 15 to all ground attacks (see Table 9-5)

**28 Improved Industrial Tech 4**

Reduces base factory construction costs to 4 BCs each

**33 Improved Industrial Tech 3**

Reduces base factory construction costs to 3 BCs each

**34 Tritanium Armor**

Increases the hit points of ships and transports by 200 percent. Personal combat armor is also enhanced, adding 20 to all ground attacks (see Table 9-5)

**35 Reduced Industrial Waste 20%**

Decreases factory pollution levels to 20 percent of the normal rate (see Table 6-4)

**36 Advanced Damage Control**

Unde-stroyed ships can repair up to 30 percent of their total hit points at the end of each turn in battle (see Table 9-11)

**38 Improved Industrial Tech 2**

Reduces base factory construction costs to 2 BCs each

**40 Powered Armor**

Combines high mobility, anti-grav flight, and heavy armored plating to form the most advanced armor available for ground troops. Adds 30 to all ground combat rolls

**42 Adamantium Armor**

Increases the hit points of ships and transports by 250 percent. Personal combat armor is also enhanced, adding 25 to all ground attacks (see Table 9-5)

**45 Industrial Waste Elimination**

Factories cease to pollute

**50 Neutronium Armor**

Provides the best internal protection of any armor and increases the hit points of a ship by 300 percent. Personal combat armor is also enhanced, adding 30 to all ground attacks (see Table 9-5)

**FORCE FIELD TECHNOLOGY****1 Class I Deflector Shields**

Absorbs 1 point of damage from all normal attacks (see Table 9-3)

**4 Class II Deflector Shields**

Absorbs 2 points of damage from all normal attacks (see Table 9-3)

**8 Personal Deflector Shield**

Protects individual ground troops with a directional force field. Adds +10 to all ground combat battles

**10 Class III Deflector Shields**

Absorbs 3 points of damage from all normal attacks (see Table 9-3)

**12 Class V Planetary Shield**

Absorbs 5 points of damage from all normal attacks against a planet's surface and is cumulative with missile base deflector shields (see Table 8-3)

**14 Class IV Deflector Shields**

Absorbs 4 points of damage from all normal attacks (see Table 9-3)

**16 Repulsor Beam**

Repels enemy ships back one space away from the defending ship. This special weapon has a one-space range (see Table 9-11)

**20 Class V Deflector Shields**

Absorbs 5 points of damage from all normal attacks (see Table 9-3)

**21 Personal Absorption Shield**

Absorbs damage from all hand weapons.  
Adds +20 to all ground combat battles

**22 Class X Planetary Shield**

Absorbs 10 points of damage from all normal attacks against a planet's surface and is cumulative with missile base deflector shields (see Table 8-3)

**24 Class VI Deflector Shields**

Absorbs 6 points of damage from all normal attacks (see Table 9-3)

**27 Cloaking Device**

Renders ships nearly invisible until they attack. While cloaked, ships receive a +5 bonus to their missile and beam defenses. Ships must uncloak to attack (but generally receive first fire) and will automatically recloak on any subsequent turn in which they don't attack (see Table 9-11)

**30 Class VII Deflector Shields**

Absorbs 7 points of damage from all normal attacks (see Table 9-3)

**31 Zyro Shield**

An energy field that destroys incoming missiles and torpedoes 75 percent of the time, -1 percent per technology level of the missile (see Tables 9-9 and 9-11)

**32 Class XV Planetary Shield**

Absorbs 15 points of damage from all normal attacks against a planet's surface and is cumulative with missile base deflector shields (see Table 8-3)

**34 Class IX Deflector Shields**

Absorbs 9 points of damage from all normal attacks (see Table 9-3)

**37 Stasis Field**

Freezes one group of enemy ships, up to one space away, for one turn. Frozen ships cannot attack or be attacked (see Table 9-11)

**38 Personal Barrier Shield**

Completely encases the soldier in a nearly impenetrable force field. Adds +30 points to all ground combat rolls

**40 Class XI Deflector Shields**

Absorbs 11 points of damage from all normal attacks (see Table 9-3)

**42 Class XX Planetary Shield**

Absorbs 20 points of damage from all normal attacks against a planet's surface and is cumulative with missile base deflector shields (see Table 8-3)

**43 Black Hole Generator**

Creates a sub-space field that warps normal space, creating an instantaneous black hole and destroying 25 percent to 100 percent of enemy ships or missile bases, less 2 percent per shield class. Also less 15 percent if the target group has Inertial Stabilizers, or 30 percent if the target group has Inertial Nullifiers (see Tables 9-8 and 9-11)

**44 Class XIII Deflector Shields**

Absorb 13 points of damage from all normal attacks (see Table 9-3)

**46 Lightning Shield**

An energy field that destroys incoming enemy missiles and torpedoes 100 percent of the time, -1 percent per technology level of the missile (see Tables 9-9 and 9-11)

**50 Class XV Deflector Shields**

Absorbs 15 points of damage from all normal attacks (see Table 9-3)

**PLANETOLOGY TECHNOLOGY****1 Ecological Restoration**

Eliminates 2 units of industrial waste for a cost of 1 BC (see Table 6-4)

- 2 **Improved Terraforming +10**  
Increases the population capacity of planets by 10M for a cost of 5 BCs per million
- 3 **Controlled Barren Environment**  
Permits the colonization of barren and standard planets (see Table 9-11)
- 5 **Improved Eco Restoration**  
Eliminates 3 units of industrial waste for a cost of 1 BC (see Table 6-4)
- 6 **Controlled Tundra Environment**  
Permits the colonization of tundra, barren, and standard planets (see Table 9-11)
- 8 **Improved Terraforming +20**  
Increases the population capacity of planets by 20M for a cost of 5 BCs per million
- 9 **Controlled Dead Environment**  
Permits the colonization of dead, tundra, barren, and standard planets (see Table 9-11)
- 10 **Death Spores**  
Horrible biological weapons capable of reducing the maximum planetary populations by 1 million per attack—with political consequences (see Table 8-5 and Chapter 11)
- 12 **Controlled Inferno Environment**  
Permits the colonization of inferno, dead, tundra, barren, and standard planets (see Table 9-11)
- 13 **Enhanced Eco Restoration**  
Eliminates 5 units of industrial waste for a cost of 1 BC (see Table 6-4)
- 14 **Improved Terraforming +30**  
Increases the population capacity of planets by 30M for a cost of 4 BCs per million
- 15 **Controlled Toxic Environment**  
Permits the colonization of toxic, inferno, dead, tundra, barren, and standard planets (see Table 9-11)
- 16 **Soil Enrichment**  
Converts standard planets to fertile environments, increasing population growth by 50 percent and raising the base planetary size by +25 percent for a one-time cost of 150 BCs
- 17 **Bio Toxin Antidote**  
Reduces casualties taken from biological weapons by 1 million per attack (see Table 8-5)
- 18 **Controlled Radiated Environment**  
Permits the colonization of radiated and all other planets (see Table 9-11)
- 20 **Improved Terraforming +40**  
Increases the population capacity of planets by 40M for a cost of 4 BCs per million
- 21 **Cloning**  
Allows bio-engineered colonists to be grown at a rate of 1M per 10 BCs (half the cost of the standard rate)
- 22 **Atmospheric Terraforming**  
Converts hostile planets to standard minimal environments (including raising its base population size by up to 20 million; see Chapter 3), normalizing population growth for a one-time cost of 200 BCs
- 24 **Advanced Eco Restoration**  
Eliminates 10 units of industrial waste for a cost of 1 BC (see Table 6-4)
- 26 **Improved Terraforming +50**  
Increases the population capacity of planets by 50M for a cost of 3 BCs per million
- 27 **Doom Virus**  
Dreadful biological weapons capable of reducing planetary populations by 2 million per attack—with political consequences (see Table 8-5 and Chapter 11)

**30 Advanced Soil Enrichment**

Converts standard and fertile planets to gaias, doubling the population growth and increasing the planet's base size by +50 percent for a low, low, one-time cost of 300 BCs

**32 Improved Terraforming +60**

Increases the population capacity of planets by 60M for a cost of 3 BCs per million

**34 Complete Eco Restoration**

Eliminates 20 units of industrial waste for a cost of 1 BC (see Table 6-4)

**36 Universal Antidote**

Reduces casualties taken from biological weapons by 2 million per attack (see Table 8-5)

**38 Improved Terraforming +80**

Increases the population capacity of planets by 80M for a cost of 2 BCs per million

**40 Bio Terminator**

Abominable biological weapons capable of reducing planetary populations by 3 million per attack—with political consequences (see Table 8-5 and Chapter 11)

**42 Advanced Cloning**

Allows bio-engineered colonists to be grown at a rate of 1M per 5 BCs

**44 Improved Terraforming +100**

Increases the population capacity of planets by 100M for a cost of 2 BCs per million

**50 Complete Terraforming**

Increases the population capacity of planets by 120M for a cost of 2 BCs per million

**PROPULSION TECHNOLOGY****1 Retro Engines (Warp 1)**

Moves ships at warp one (1 parsec per turn) and allows a maximum maneuverability of class I in combat (see Table 9-6)

**3 Hydrogen Fuel Cells (Range 4)**

Fuel reserves allow ships to move up to 4 parsecs away from colony planets

**5 Deuterium Fuel Cells (Range 5)**

Fuel reserves allow ships to move up to 5 parsecs away from colony planets

**6 Nuclear Engines (Warp 2)**

Moves ships at warp two (2 parsecs per turn) and allows a maximum maneuverability of class II in combat (see Table 9-6)

**9 Irridium Fuel Cells (Range 6)**

Fuel reserves allow ships to move up to 6 parsecs away from colony planets

**10 Inertial Stabilizer**

Generates a field that reduces the inertia of ships, and adds 2 classes of maneuverability in combat (i.e., +2 defense and +1 combat speed). Also reduces the effect of Black Hole Generator attacks by -15 percent (see Table 9-11)

**12 Sub-Light Drives (Warp 3)**

Moves ships at warp three (3 parsecs per turn) and allows a maximum maneuverability of class III in combat (see Table 9-6)

**14 Dotomite Crystals (Range 7)**

Fuel reserves allow ships to move up to 7 parsecs away from colony planets

**16 Energy Pulsar**

A potent engine modification that generates a sudden spherical burst of energy, striking all adjacent targets' armor for up to 5 points of damage +1 per two ships in the attacking, pulsar-armed group (see Table 9-11)

**18 Fusion Drives (Warp 4)**

Moves ships at warp four (4 parsecs per turn) and allows a maximum maneuverability of class IV in combat (see Table 9-6)

**19 Uridium Fuel Cells (Range 8)**

Fuel reserves allow ships to move up to 8 parsecs away from colony planets

**20 Warp Dissipator**

Specialized weapon that disrupts the warp fields surrounding enemy ships. It has a 50 percent chance of reducing their speed by 1 each time the target group is fired upon and can, with enough hits, leave that group "dead in space" and unable to warp out of combat (see Table 9-11)

**23 Reajax II Fuel Cells (Range 9)**

Fuel reserves allow ships to move up to 9 parsecs away from colony planets

**24 Impulse Drives (Warp 5)**

Moves ships at warp five (5 parsecs per turn) and allows a maximum maneuverability of class V in combat (see Table 9-6)

**27 Intergalactic Star Gates**

Allows your ships to move between any two friendly owned colonies equipped with star gates in a single turn. Costs 3000 BCs each to build, plus 300 BCs per turn to maintain

**29 Trilithium Crystals (Range 10)**

Fuel reserves allow ships to move up to 10 parsecs away from colony planets

**30 Ion Drives (Warp 6)**

Moves ships at warp six (6 parsecs per turn) and allows a maximum maneuverability of class VI in combat (see Table 9-6)

**34 High Energy Focus** Increases the firing range of all energy weapons by three (see Table 9-11)**36 Anti-Matter Drives (Warp 7)**

Moves ships at warp seven (7 parsecs per turn) and allows a maximum maneuverability of class VII in combat (see Table 9-6)

**38 Sub-Space Teleporter**

Teleports ships to any space on the combat map and gives movement initiative and first fire to the teleporting ship group. It is negated by Sub-Space Interdictors (see Table 9-11)

**40 Ionic Pulsar**

A powerful engine modification capable of generating a spherical burst of phased energy striking all adjacent target's armor for up to 10 points of damage +1 per ship in the attacking, pulsar-armed group (see Table 9-11)

**41 Thorium Cells (Unlimited Range)**

Self-replenishing fuel that allows ships to move any distance from colony planets

**42 Inter-Phased Drives (Warp 8)**

Moves ships at warp eight (8 parsecs per turn) and allows a maximum maneuverability of class VIII in combat (see Table 9-6)

**43 Sub-Space Interdictor**

Creates an intense gravity well surrounding colony planets, rendering sub-space teleporters useless. The device is automatically added to all missile bases for free

**45 Combat Transporters**

Transports equipped with these devices have a 50 percent chance of beaming down onto enemy surfaces before they can be attacked by enemy ships and missile defense bases. This is reduced to a 25 percent chance if the enemy has missile bases on that planet equipped with Sub-Space Interdictors

**46 Inertial Nullifier**

Generates a field that negates the inertia of ships and adds two classes of maneuverability in combat (i.e., +4 defense and +2 combat speed). Also reduces the effect of Black Hole Generator attacks by -30 percent (see Table 9-11)

**48 Hyper Drives (Warp 9)**

Moves ships at warp nine (9 parsecs per turn) and allows a maximum maneuverability of class IX in combat (see Table 9-6)

**50 Displacement Device**

Randomly shifts the equipped ship group in and out of normal space, allowing it to avoid one third of all non-area (i.e., non-special) weapon attacks (see Table 9-11)

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**WEAPONS TECHNOLOGY**
**1 Lasers**

Direct-fire beam weapon that inflicts 1 to 4 points of damage. Heavy lasers have a 2-space range and do 1 to 7 points of damage

**2 Hand Lasers**

Personal lasers that add 5 points to your ground combat rolls

**4 Hyper-V Rockets**

Swift missiles that explode for 6 points of damage and move at a speed of 2.5

**5 Gatling Laser**

An advanced laser that fires up to four times per turn for 1 to 4 points of damage with each hit

**6 Anti-Missile Rockets**

Trans-light rockets capable of destroying incoming enemy missiles 40 percent of the time, -1 percent per technology level of the missile (see Tables 9-9 and 9-11)

**7 Neutron Pellet Gun**

Heavy particle stream weapon that halves the effectiveness of enemy deflector shields and inflicts 2 to 5 points of damage

**8 Hyper-X Rockets**

Missiles equipped with high-energy warheads that explode for 8 points of damage, move at a speed of 2.5, and are controlled by a +1 level targeting computer

**9 Fusion Bomb**

Bombs that explode for 5 to 20 points of damage against planetary targets only

**10 Ion Cannon**

High-intensity beam weapons capable of inflicting 3 to 8 points of damage. Heavy ion cannons strike for 3 to 15 points and have a two-space range

**11 Scatter Pack V Rockets**

MIRV versions of Hyper-V Rockets, splitting into five separate warheads that each explode for 6 points of damage and move at a speed of 2.5

**12 Ion Rifle**

Personal beam weapons that add 10 points to your ground attacks

**13 Mass Driver**

A linear accelerator that halves the effectiveness of enemy deflector shields and inflicts 5 to 8 points of damage

**14 Merculite Missiles**

Hard-hitting, swift missiles that explode for 10 points of damage, move at a speed of 3, and are controlled by a +2 level targeting computer

**15 Neutron Blaster**

High-powered beam weapons capable of inflicting 3 to 12 points of damage. Heavy neutron blasters strike for 3 to 24 points and have a two-space range



**16 Anti-Matter Bomb**

Bombs that explode for 10 to 40 points of damage against planetary targets only

**17 Graviton Beam**

Tractor-repulsor beam capable of rendering ships to pieces. It strikes for 1 to 15 points damage, and the continuous streaming effect of the ray allows excess damage to carry over from one ship to another

**18 Stinger Missiles**

Steady, hyper-accurate missiles that do 15 points of damage, move at a speed of 3.5, and are controlled by a sophisticated +3 level targeting computer

**19 Hard Beam**

An energy-to-matter beam weapon that halves the effectiveness of enemy deflector shields and inflicts 8 to 12 points of damage

**20 Fusion Beam**

High-intensity beam weapon capable of doing 4 to 16 points of damage. Heavy fusion beams strike for 4 to 30 points and have a two-space range

**21 Ion Stream Projector**

Fires an intense ionic blast reducing the armor of every target in the opponent's group by 20 percent plus 1 percent per two firing ships, up to a maximum of 50 percent of its starting hit points in a single attack. The projector has a range of two spaces (see Table 9-11)

**22 Omega-V Bomb**

High-yield bombs that explode for 20 to 50 points of damage against planetary targets only

**23 Anti-Matter Torpedoes**

High-energy tracking torpedoes that deliver 30 points of damage but may be fired only every other turn. Each torpedo is equipped with a +4 level targeting computer

**24 Fusion Rifle**

Inaccurate but incredibly powerful beam weapons that add 20 points to your ground combat rolls

**25 Megabolt Cannon**

Releases multiple bolts of pure energy in a wide field. It has a bonus +30 percent chance to hit and strikes for 2 to 20 points of damage

**26 Phasor**

Phased-energy beams capable of inflicting 5 to 20 points of damage. Heavy phasors strike for 5 to 40 points of damage and have a two-space range

**27 Scatter Pack VII Missiles**

MIRV versions of Hyper-X Rockets, splitting into seven separate warheads that each explode for 10 points of damage, move at a speed of 3, and are guided by a +2 level targeting computer

**28 Auto Blaster**

An advanced neutron blaster that fires up to three times per turn for 4 to 16 points of damage with each hit

**29 Pulson Missiles**

Powerful missiles equipped with anti-matter warheads that explode for 20 points of damage, move at speed 4, and are controlled by a +4 level targeting computer

**30 Tachyon Beam**

Fires an intense stream of tachyon particles that strike enemy ships for 1 to 25 hits. The continuous streaming effect of the ray allows it to carry damage over from one ship to another

**31 Hand Phasor**

Potent hand-held energy weapons capable of reducing an opponent to his component atoms. Adds 25 to your ground combat rolls

**32 Gauss Autocannon**

An advanced linear accelerator capable of firing four explosive rounds per turn that inflict 7 to 10 points of damage each. These projectile rounds also halve the effectiveness of enemy shields

**33 Particle Beam**

High-intensity particle accelerators capable of striking enemy ships up to one-space away for 10 to 20 points of damage and halving the effectiveness of their deflector shields

**34 Hercular Missiles**

Highly advanced missile that explodes for 25 points of damage. The hercular missile moves at speed 4.5 and is controlled by a +5 level targeting computer

**35 Plasma Cannon**

Fires intense bolts of energy that inflict 6 to 30 points of damage at a range of 1

**36 Death Ray**

An ancient weapon of unbelievably destructive power that inflicts 200 to 1000 points of damage and has a one-space range (*not* 3). Only available after defeating the Guardian of Orion, who is armed with it (see Chapter 15)

**37 Disruptor**

Unleashes tremendous bolts of pure energy that can strike enemy targets up to two-spaces away for 10 to 40 points of damage

**38 Pulse Phasor**

An advanced phasor capable of firing three bursts per turn for 5 to 20 points of damage with each hit

**39 Neutronium Bomb**

A devastating bomb that explodes for 40 to 70 points of damage against planets only

**40 Hellfire Torpedoes**

Enveloping energy torpedoes that simultaneously strike all shields. They move at speed 5, are guided by a +6 level targeting computer and, if they hit, deliver damage equal to four 25-point attacks. They may be fired only once every other turn

**41 Zeon Missiles**

Most advanced missile available. Capable of striking enemy ships for 30 points of damage and moving at a speed of 5. The zeon missile is guided by a +6 level targeting computer

**42 Plasma Rifle**

The most devastating hand-held weapon available. Adds 30 to your ground attacks

**43 Proton Torpedoes**

High-yield energy torpedoes that deliver 75 points of damage but may be fired only every other turn. Each torpedo is equipped with a +6 level targeting computer

**44 Scatter Pack X Missiles**

MIRV versions of Stinger Missiles, splitting into ten separate warheads that each explode for 15 points of damage, move at speed 3.5, and are guided by a +3 level targeting computer

**45 Tri-Focus Plasma Cannon**

Fires a triad of high-intensity plasma beams capable of inflicting 20 to 50 points of damage

**46 Stellar Converter**

Surrounds the target with an extremely powerful matter-energy conversion field, inflicting four 10 to 35-point attacks. It has a range of three spaces

**47 Neutron Stream Projector**

Fires a blast of concentrated neutrino rays, reducing the armor of every target in the opponent's group by 40 percent plus 1 percent per firing ship, up to a maximum of 75 percent of its starting hit points in a single attack. The projector has a range of two spaces (see Table 9-11)

**48 Mauler Device**

Unleashes enormous amounts of focused energy at enemy targets, inflicting 20 to 100 points of damage

**50 Plasma Torpedoes**

Pure energy torpedoes that deliver 150 points of damage and move at speed 6, but lose 15 of strength per space traveled (which is always at least one). The launcher can fire every other turn and has a +7 level guidance computer

**\*\* The Amoeba Stream**

This is the weapon used by the Amoeba Space Monster (see Chapter 14). You'll never get to use it, but you may have to face it, so be aware that an Amoeba Monster packs one of these as its sole armament. An Amoeba Stream does 250 to 1000 points of damage and has a range of three spaces. Its continuous streaming effect allows it to carry damage over from one ship to another, so expect large groups of small ships to get whittled down fairly quickly when fired upon by this weapon

**\*\* The Crystal Ray**

This weapon is a weapon used by the Crystalline Space Monster (among others; see Chapter 14). Again, you'll never get to use one, but you'll find yourself on the business end of them when combating this creature. Know that a Crystal Monster packs up to 10 of these babies and each one surrounds a target's shields (like a Stellar Converter), thus making four attacks, each of which does 100 to 300 points of damage. The Crystal Ray has a range of three spaces.

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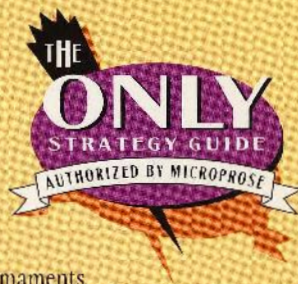


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