

3.2 Weapons Comparison Charts
 3.2.1 Estimated Damage for each Hit against different shields
 The following two charts show estimated damage for each turn for each weapon against each shield level:

Beam Weapons:															Shields		name	tech
dmg(shots)	sz/pow	(bon)	rng	0	1	2	3	4	5	6	7	9	11	13	15	Laser	1	
4(x1)	10/	25(+0)	1	2.5	1.5	0.7	0.2	--	--	--	--	--	--	--	--	Hvy Laser	1 1-7(x1)	
30/	75(+0)	2	4.0	3.0	2.1	1.4	0.9	0.4	0.1	--	--	--	--	--	--	Gat Laser	5 1-4(x4) 20/	
70(+0)	1	10.0	6.0	3.0	1.0	--	--	--	--	--	--	--	--	--	--	^Neut. Pellet	7 2-5(x1) 15/ 25(+0)	
1	3.5	2.5	2.5	1.5	1.5	0.7	0.7	0.2	--	--	--	--	--	--	--	Ion Cannon	10 3-8(x1) 15/ 35(+0) 1	
5.5	4.5	3.5	2.5	1.7	1.0	0.5	0.2	--	--	--	--	--	--	--	--	Hvy Ion	10 3-15(x1) 45/105(+0) 2 9.0	
8.0	7.0	6.0	5.1	4.2	3.5	2.8	1.6	0.8	0.2	--	--	--	--	--	--	^Mass Driver	13 5-8(x1) 55/ 50(+0) 1 6.5	
5.5	5.5	4.5	4.5	3.5	3.5	2.5	1.5	0.7	0.2	--	--	--	--	--	--	Neutron Blst	15 3-12(x1) 20/ 60(+0) 1 7.5	
6.5	5.5	4.5	3.6	2.8	2.1	1.5	0.6	0.1	--	--	--	--	--	--	--	Hvy Blast	15 3-24(x1) 60/180(+0) 2 13.5	
12.5	11.5	10.5	9.5	8.6	7.8	7.0	5.5	4.1	3.0	2.0	--	--	--	--	--	~Graviton	17 1-15(x1) 30/ 60(+0) 1 8.0	
7.0	6.1	5.2	4.4	3.7	3.0	2.4	1.4	0.7	0.2	--	--	--	--	--	--	^Hard Beam	19 8-12(x1) 50/100(+0) 1 10.0	
9.0	9.0	8.0	8.0	7.0	7.0	6.0	5.0	4.0	3.0	2.0	--	--	--	--	--	Fusion Beam	20 4-16(x1) 20/ 75(+0) 1 10.0	
9.0	8.0	7.0	6.0	5.1	4.2	3.5	2.2	1.2	0.5	0.1	--	--	--	--	--	Hvy Fusion	20 4-30(x1) 60/225(+0) 2 17.0	
16.0	15.0	14.0	13.0	12.0	11.1	10.2	8.6	7.0	5.7	4.4	--	--	--	--	--	Megabolt	25 2-20(x1) 30/ 65(+3) 1	
11.0	10.0	9.0	8.1	7.2	6.3	5.5	4.8	3.5	2.4	1.5	0.8	--	--	--	--	Phasor	26 5-20(x1) 20/ 90(+0) 1	
12.5	11.5	10.5	9.5	8.5	7.5	6.6	5.7	4.1	2.8	1.7	0.9	--	--	--	--	Hvy Phasor	26 5-40(x1) 60/270(+0) 2	
22.5	21.5	20.5	19.5	18.5	17.5	16.5	15.6	13.8	12.1	10.5	9.0	--	--	--	--	Auto Blastor	28 4-16(x3) 30/	
90(+0)	1	30.0	27.0	24.0	21.0	18.0	15.2	12.7	10.4	6.5	3.5	1.4	0.2	--	--	~Tachyon Beam	30 1-25(x1) 30/ 80(+0) 1	
13.0	12.0	11.0	10.1	9.2	8.4	7.6	6.8	5.4	4.2	3.1	2.2	--	--	--	--	^Gauss Auto	32 7-10(x4) 105/105(+0) 1	
34.0	30.0	30.0	26.0	26.0	22.0	22.0	18.0	14.0	10.0	6.0	3.0	--	--	--	--	^Particle	33 10-20(x1) 90/ 75(+0) 2	
15.0	14.0	14.0	13.0	13.0	12.0	12.0	11.0	10.0	9.0	8.0	7.0	--	--	--	--	Plasma Canon	35 6-30(x1) 30/110(+0) 1	
18.0	17.0	16.0	15.0	14.0	13.0	12.0	11.0	9.2	7.6	6.1	--	--	--	--	--	Death Ray	36 200-1000(x1) 2000/2000(+0) 3	
600.	599.	598.	597.	596.	595.	594.	593.	591.	589.	587.	585.	--	--	--	--	Disruptor	37 10-40(x1) 70/160(+0) 2	
25.0	24.0	23.0	22.0	21.0	20.0	19.0	--	--	--	--	--	--	--	--	--	Pulse Phasor	38 5-20(x3) 40/120(+0) 1	
37.5	34.5	31.5	28.5	25.5	22.5	19.7	17.1	12.4	8.4	5.2	2.8	--	--	--	--	Tri-focus Pl	45 20-50(x1) 70/180(+0) 1	
35.0	34.0	33.0	32.0	31.0	30.0	29.0	28.0	26.0	24.0	22.0	20.0	--	--	--	--	Stellar Conv	46 10-35(x4) 200/300(+0) 3	
90.0	86.0	82.0	78.0	74.0	70.0	66.0	62.0	54.0	46.2	38.9	32.3	--	--	--	--	Mauler Dev	48 20-100(x1) 150/300(+0) 1	
60.0	59.0	58.0	57.0	56.0	55.0	54.0	53.0	51.0	49.0	47.0	45.0	--	--	--	--	~: These are streaming weapons, so damage carries over from one target to another		
^: These are penetrating weapons, that halve the effects of shields.																		
Missiles and Torpedoes:															Shields		name	tech
dmg(shots)	sz/pow	(bon)	spd	0	1	2	3	4	5	6	7	9	11	13	15	Nuclear	1	
4(x1)	50/	20(+0)	2.0	4	3	2	1	--	--	--	--	--	--	--	--	-Hyper-V	4 6(x1) 70/	
20(+0)	2.5	6	5	4	3	2	1	--	--	--	--	--	--	--	--	-Hyper-X	7 8(x1) 100/ 20(+1) 2.5	
8	7	6	5	4	3	2	1	--	--	--	--	--	--	--	--	-Scatter V	11 6(x5) 115/ 50(+0) 2.5	
30	25	20	15	10	5	--	--	--	--	--	--	--	--	--	--	-Merculite	14 10(x1) 105/ 20(+2) 3.0	
10	9	8	7	6	5	4	3	1	--	--	--	--	--	--	--	-Stinger	18 15(x1) 155/ 30(+3) 3.5	
15	14	13	12	11	10	9	8	6	4	2	--	--	--	--	--	-Anti-Mat Trp	23 30(x1) 75/300(+4) 4.0	
30	29	28	27	26	25	24	23	21	19	17	15	--	--	--	--	Scatter VII	27 10(x7) 230/ 50(+2) 3.0	
70	63	56	49	42	35	28	21	7	--	--	--	--	--	--	--	-Pulson	29 20(x1) 160/ 40(+4) 4.0	
20	19	18	17	16	15	14	13	11	9	7	--	--	--	--	--	Hercular	34 25(x1) 220/ 40(+5) 4.5	
25	24	23	22	21	20	19	18	16	14	12	--	--	--	--	--	Hellfire Trp	40 25(x4) 150/350(+6) 5.0	
100	96	92	88	84	80	76	72	64	56	48	--	--	--	--	--	Zeon	41 30(x1) 250/ 50(+6) 5.0	
30	29	28	27	26	25	24	23	21	19	17	--	--	--	--	--			

15Proton Torp 43 60(x1) 100/400(+6) 8.0 60 59 58 57 56 55 54 53 51 49 47
45Scatter X 44 15(x10) 250/ 50(+3) 3.5 150 140 130 120 110 100 90 80 60 40 20
-Plasma Torp 50 135(x1) 150/450(+7) 6.0 135 134 133 132 131 130 129 128 126 124
122 120 Note: Plasma Torpedo stats assume that torpedo fired at adjacent stack.

3.2.2 Shield Protection

Planet shield level where weapons cease to affect:
2: Laser, Gatling Laser
4: Heavy Laser, Ion Cannon, Nuclear Missile
Planetary Shield V:
5: Neutron Pellet Gun
6: Neutron Blaster, Hyper V Rockets, Scatter Pack Vs
7: Mass Driver, Heavy Laser
8: Heavy Ion Cannon, Graviton Beam, Fusion Beam, Auto Blaster, Hyper X Missiles
Planetary Shield X:
10: Megabolt Cannon, Phasor, Pulse Phasor, Gauss Autocannon, Merculite Missiles, Scatter Pack VIIs
12: Nuclear Bomb, Hard Beam, Heavy Blast Cannon
13: Tachyon Beam, Hellfire Torps
15: Heavy Fusion Beam, Plasma Cannon, Stinger Missiles, Scatter Pack Xs, Anti-Matter Torps
Planetary Shield XV:
18: Stellar Converter
20: Heavy Phasor, Disruptor, Fusion Bomb, Pulson Missile
Planetary Shield XX:
25: Tri-Focus Plasma, Hercular Missiles
31: Zeon Missiles, Proton Torpedoes

Weapons beyond max defense: Mauler Device, Death Ray, Anti-Matter Bomb, Omega-V Bomb, Neutronium Bomb, Plasma Torps. (35 is maximum Planet Defense)

Ship shield level where weapons cease to affect:
4: Laser, Gatling Laser, Nuclear Missile
6: Hyper V Rockets, Scatter Pack Vs
7: Heavy Laser
9: Neutron Pellet Gun, Ion Cannon, Hyper X Missiles
11: Merculite Missiles, Scatter Pack VIIs
13: Neutron Blaster
15: Heavy Ion Cannon, Fusion Beam, Auto Blastor, Graviton Beam, Mass Driver, Stinger Missiles, Scatter Pack Xs

Following weapons beyond max defense: Megabolt Cannon, Phasor, Pulse Phasor, Gauss Autocannon, Hard Beam, Heavy Blast Cannon, Tachyon Beam, Hellfire Torps, Heavy Fusion Beam, Plasma Cannon, Anti-Matter Torps, Stellar Converter, Heavy Phasor, Disruptor, Pulson Missile, Tri-Focus Plasma, Hercular Missiles, Zeon Missiles, Proton Torpedoes, Mauler Device, Death Ray, Plasma Torps.

3.2.3 Damage per unit of space

I have noted that if you are using current technology, the space that a weapon takes up is pretty well denoted by the following equation:
 $(\text{current size} + \text{power} * (1 - \text{current tech level}/100))$
at least through tech level 60. The following tables then, show the total damage per turn (assuming all shots hit) for each unit of space used. This is a handy means of comparing weapons of different tech levels:

Weapon comparison for tech level 10

Assumption: Space = size + power * .9

Beam Weapons:

Shieldsname	tech	cost/spc(bon)	rng	0	1	2	3	4	5	6	7	9	11	13	15
Laser	1	2/ 28(+0)	1	.089	.054	.027	.009	--	--	--	--	--	--	--	--
Hvy Laser	1	5/ 84(+0)	2	.048	.036	.026	.017	.010	.005	.002	--	--	--	--	--
Gat Laser	5	7/ 77(+0)	1	.130	.078	.039	.013	--	--	--	--	--	--	--	--
Neut. Pellet	7	3/ 35(+0)	1	.100	.071	.071	.043	.043	.021	.021	.007	--	--	--	--
Ion Cannon	10	4/ 47(+0)	1	.117	.096	.074	.053	.035	.021	.011	.004	--	--	--	--
Hvy Ion	10	11/140(+0)	2	.064	.057	.050	.043	.036	.030	.025	.020	.012	.005	.002	--

Missiles and Torpedoes:

Shieldsname	tech	cost/spc(bon)	spd	0	1	2
Nuclear	1	27/ 45(+0)	2.0	.089	.067	.044
Hyper-V	4	46/ 64(+0)	2.5	.094	.078	.062
Hyper-X	7	81/ 99(+1)	2.5	.081	.071	.061

Weapon comparison for tech level 20

Assumption: Space = size + power * .8

Beam Weapons:

Shieldsname	tech	cost/spc(bon)	rng	0	1	2	3	4	5	6	7	9	11	13	15
Laser	1	1/ 23(+0)	1	.109	.065	.033	.011	--	--	--	--	--	--	--	--
Hvy Laser	1	3/ 68(+0)	2	.059	.044	.032	.021	.013	.006	.002	--	--	--	--	--
Gat Laser	5	4/ 63(+0)	1	.159	.095	.048	.016	--	--	--	--	--	--	--	--
Neut. Pellet	7	2/ 26(+0)	1	.135	.096	.096	.058	.058	.029	.029	.010	--	--	--	--
Ion Cannon	10	3/ 36(+0)	1	.153	.125	.097	.069	.046	.028	.014	.005	--	--	--	--
Hvy Ion	10	6/107(+0)	2	.084	.075	.065	.056	.047	.040	.032	.026	.015	.007	--	--

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.002 -- ^Mass Driver 13 6/ 74(+0) 1 .088 .074 .074 .061 .061 .047 .047 .034 .020 .010 .003
-- Neutron Blst 15 5/ 62(+0) 1 .121 .105 .089 .073 .058 .045 .034 .024 .010 .002 -- -- Hvy
Blast 15 13/186(+0) 2 .073 .067 .062 .056 .051 .046 .042 .037 .029 .022 .016 .011~Graviton
17 5/ 72(+0) 1 .111 .097 .084 .072 .061 .051 .042 .033 .019 .009 .003 -- ^Hard Beam 19
12/127(+0) 1 .079 .071 .071 .063 .063 .055 .055 .047 .039 .031 .024 .016Fusion Beam 20 7/
80(+0) 1 .125 .113 .100 .087 .075 .063 .053 .043 .027 .014 .006 .001Hvy Fusion 20
21/240(+0) 2 .071 .067 .062 .058 .054 .050 .046 .043 .036 .029 .024 .019 Missiles and
Torpedoes: Shieldsname tech cost/spc(bon) spd 0 1 2 3 4 5 6 7 9
11 13 15Nuclear 1 13/ 29(+0) 2.0 .138 .103 .069 .034 -- -- -- -- -- -- -- -- Hyper-
V 4 23/ 39(+0) 2.5 .154 .128 .103 .077 .051 .026 -- -- -- -- -- -- -- -- Hyper-X 7 41/
57(+1) 2.5 .140 .123 .105 .088 .070 .053 .035 .018 -- -- -- -- Scatter V 11 62/102(+0) 2.5
.294 .245 .196 .147 .098 .049 -- -- -- -- -- -- -- -- Mercurite 14 69/ 85(+2) 3.0 .118 .106 .094
.082 .071 .059 .047 .035 .012 -- -- -- -- Stinger 18 135/159(+3) 3.5 .094 .088 .082 .075 .069
.063 .057 .050 .038 .025 .013 -- Weapon comparison for tech level 30 : Assumption: Space =
size + power * .7 Beam Weapons: Shieldsname tech cost/spc(bon) rng 0
1 2 3 4 5 6 7 9 11 13 15Laser 1 1/ 19(+0) 1 .132 .079 .039 .013 -- --
-- -- -- -- -- -- Hvy Laser 1 2/ 57(+0) 2 .070 .053 .038 .025 .015 .008 .003 -- -- --
-- -- Gat Laser 5 2/ 53(+0) 1 .189 .113 .057 .019 -- -- -- -- -- -- -- -- ^Neut. Pellet
7 1/ 21(+0) 1 .167 .119 .119 .071 .071 .036 .036 .012 -- -- -- -- Ion Cannon 10 2/
29(+0) 1 .190 .155 .121 .086 .057 .034 .017 .006 -- -- -- -- Hvy Ion 10 3/ 85(+0) 2
.106 .094 .082 .071 .060 .050 .041 .033 .019 .009 .003 -- ^Mass Driver 13 3/ 52(+0) 1 .125
.106 .106 .087 .087 .067 .067 .048 .029 .014 .005 -- Neutron Blst 15 3/ 49(+0) 1 .153 .133
.112 .092 .073 .057 .043 .031 .012 .002 -- -- Hvy Blast 15 7/147(+0) 2 .092 .085 .078 .071
.065 .059 .053 .047 .037 .028 .020 .014~Graviton 17 3/ 54(+0) 1 .148 .130 .112 .096 .081
.068 .056 .044 .026 .012 .004 -- ^Hard Beam 19 6/ 93(+0) 1 .108 .097 .097 .086 .086 .075
.075 .065 .054 .043 .032 .022Fusion Beam 20 4/ 63(+0) 1 .159 .143 .127 .111 .095 .081 .067
.055 .034 .018 .007 .001Hvy Fusion 20 11/188(+0) 2 .090 .085 .080 .074 .069 .064 .059 .054
.046 .037 .030 .024Megabolt 25 6/ 67(+3) 1 .164 .149 .134 .120 .107 .094 .082 .071 .052
.035 .022 .012Phasor 26 7/ 78(+0) 1 .160 .147 .135 .122 .109 .096 .084 .073 .053 .036
.022 .012Hvy Phasor 26 20/234(+0) 2 .096 .092 .088 .083 .079 .075 .071 .067 .059 .052 .045
.039Auto Blastor 28 13/ 89(+0) 1 .337 .303 .270 .236 .202 .171 .143 .117 .073 .039 .016
.003~Tachyon Beam 30 9/ 86(+0) 1 .151 .140 .128 .118 .107 .098 .088 .080 .063 .049 .036
.026 Missiles and Torpedoes: Shieldsname tech cost/spc(bon) spd 0 1 2
3 4 5 6 7 9 11 13 15Nuclear 1 7/ 21(+0) 2.0 .190 .143 .095 .048 -- -- -- --
-- -- -- -- Hyper-V 4 12/ 26(+0) 2.5 .231 .192 .154 .115 .077 .038 -- -- -- -- --
Hyper-X 7 20/ 34(+1) 2.5 .235 .206 .176 .147 .118 .088 .059 .029 -- -- -- -- Scatter V
11 31/ 66(+0) 2.5 .455 .379 .303 .227 .152 .076 -- -- -- -- -- -- -- -- Mercurite 14 35/ 49(+2)
3.0 .204 .184 .163 .143 .122 .102 .082 .061 .020 -- -- -- -- Stinger 18 67/ 88(+3) 3.5 .170
.159 .148 .136 .125 .114 .102 .091 .068 .045 .023 -- Anti-Mat Trp 23 46/256(+4) 4.0 .117 .113
.109 .105 .102 .098 .094 .090 .082 .074 .066 .059Scatter VII 27 187/222(+2) 3.0 .315 .284 .252
.221 .189 .158 .126 .095 .032 -- -- -- -- Pulson 29 149/177(+4) 4.0 .113 .107 .102 .096 .090
.085 .079 .073 .062 .051 .040 .028Weapon comparison for tech level 40 : Assumption: Space =
size + power * .6 Beam Weapons: Shieldsname tech cost/spc(bon) rng 0
1 2 3 4 5 6 7 9 11 13 15Laser 1 1/ 16(+0) 1 .156 .094 .047 .016 -- --
-- -- -- -- -- -- Hvy Laser 1 1/ 47(+0) 2 .085 .064 .046 .030 .018 .009 .003 -- -- --
-- -- Gat Laser 5 1/ 44(+0) 1 .227 .136 .068 .023 -- -- -- -- -- -- -- -- ^Neut. Pellet

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7 1/17(+0) 1 .206 .147 .147 .088 .088 .044 .044 .015 -- -- -- -- Ion Cannon 10 1/
23(+0) 1 .239 .196 .152 .109 .072 .043 .022 .007 -- -- -- -- Hvy Ion 10 2/69(+0) 2
.130 .116 .101 .087 .074 .061 .050 .040 .023 .011 .003 -- ^Mass Driver 13 2/38(+0) 1 .171
.145 .145 .118 .118 .092 .092 .066 .039 .020 .007 -- Neutron Blst 15 2/40(+0) 1 .187 .163
.138 .113 .090 .070 .052 .037 .015 .003 -- -- Hvy Blast 15 4/119(+0) 2 .113 .105 .097 .088
.080 .073 .065 .058 .046 .035 .025 .017~Graviton 17 2/42(+0) 1 .190 .167 .144 .124 .105
.087 .071 .057 .033 .016 .005 -- ^Hard Beam 19 3/72(+0) 1 .139 .125 .125 .111 .111 .097
.097 .083 .069 .056 .042 .028Fusion Beam 20 2/50(+0) 1 .200 .180 .160 .140 .120 .102 .085
.069 .043 .023 .009 .002Hvy Fusion 20 6/150(+0) 2 .113 .107 .100 .093 .087 .080 .074 .068
.057 .047 .038 .030Megabolt 25 3/50(+3) 1 .220 .200 .180 .161 .143 .126 .111 .096 .069
.047 .029 .016Phasor 26 4/62(+0) 1 .202 .185 .169 .153 .137 .121 .106 .092 .067 .045
.028 .015Hvy Phasor 26 10/185(+0) 2 .122 .116 .111 .105 .100 .095 .089 .084 .074 .065 .057
.049Auto Blastor 28 7/67(+0) 1 .448 .403 .358 .313 .269 .227 .189 .155 .096 .052 .021
.003~Tachyon Beam 30 5/63(+0) 1 .206 .190 .175 .161 .147 .133 .121 .109 .086 .067 .050
.035^Gauss Auto 32 17/123(+0) 1 .276 .244 .244 .211 .211 .179 .179 .146 .114 .081 .049
.024^Particle 33 10/100(+0) 2 .150 .140 .140 .130 .130 .120 .120 .110 .100 .090 .080
.070Plasma Canon 35 9/87(+0) 1 .207 .195 .184 .172 .161 .149 .138 .127 .106 .087 .070
.055Death Ray 36 228/2716(+0) 3 .221 .221 .220 .220 .219 .219 .219 .218 .218 .217 .216
.215Disruptor 37 18/153(+0) 2 .163 .157 .150 .144 .137 .131 .124 .118 .105 .092 .080
.069Pulse Phasor 38 22/107(+0) 1 .350 .322 .294 .266 .238 .210 .184 .159 .116 .079 .049 .026
Missiles and Torpedoes: Shieldsname tech cost/spc(bon) spd 0 1 2 3 4
5 6 7 9 11 13 15Nuclear 1 3/15(+0) 2.0 .267 .200 .133 .067 -- -- -- -- --
-- -- Hyper-V 4 6/18(+0) 2.5 .333 .278 .222 .167 .111 .056 -- -- -- -- -- Hyper-X
7 10/22(+1) 2.5 .364 .318 .273 .227 .182 .136 .091 .045 -- -- -- -- Scatter V 11 15/
45(+0) 2.5 .667 .556 .444 .333 .222 .111 -- -- -- -- -- Merculite 14 17/29(+2) 3.0
.345 .310 .276 .241 .207 .172 .138 .103 .034 -- -- -- Stinger 18 34/52(+3) 3.5 .288 .269
.250 .231 .212 .192 .173 .154 .115 .077 .038 -- Anti-Mat Trp 23 23/203(+4) 4.0 .148 .143 .138
.133 .128 .123 .118 .113 .103 .094 .084 .074Scatter VII 27 93/123(+2) 3.0 .569 .512 .455 .398
.341 .285 .228 .171 .057 -- -- -- Pulson 29 75/99(+4) 4.0 .202 .192 .182 .172 .162 .152
.141 .131 .111 .091 .071 .051Hercular 34 145/169(+5) 4.5 .148 .142 .136 .130 .124 .118 .112
.107 .095 .083 .071 .059Hellfire Trp 40 150/360(+6) 5.0 .278 .267 .256 .244 .233 .222 .211 .200
.178 .156 .133 .111Weapon comparison for tech level 50 : Assumption: Space = size + power *
.5 Beam Weapons: Shieldsname tech cost/spc(bon) mg 0 1 2 3 4
5 6 7 9 11 13 15Ion Cannon 10 1/19(+0) 1 .289 .237 .184 .132 .088 .053 .026 .009
-- -- -- -- Hvy Ion 10 1/56(+0) 2 .161 .143 .125 .107 .091 .076 .062 .049 .029 .014 .004
-- ^Mass Driver 13 1/29(+0) 1 .224 .190 .190 .155 .155 .121 .121 .086 .052 .026 .009 --
Neutron Blst 15 1/32(+0) 1 .234 .203 .172 .141 .113 .087 .066 .047 .019 .003 -- -- Hvy
Blast 15 2/95(+0) 2 .142 .132 .121 .111 .100 .091 .082 .073 .057 .044 .032 .022~Graviton
17 1/33(+0) 1 .242 .212 .184 .158 .133 .111 .091 .073 .042 .020 .006 -- ^Hard Beam 19 2/
56(+0) 1 .179 .161 .161 .143 .143 .125 .125 .107 .089 .071 .054 .036Fusion Beam 20 1/
41(+0) 1 .244 .220 .195 .171 .146 .124 .103 .084 .053 .028 .011 .002Hvy Fusion 20
3/121(+0) 2 .140 .132 .124 .116 .107 .099 .092 .084 .071 .058 .047 .037Megabolt 25 2/
38(+3) 1 .289 .263 .237 .212 .188 .166 .145 .126 .091 .062 .039 .021Phasor 26 2/49(+0)
1 .255 .235 .214 .194 .173 .153 .134 .116 .084 .057 .036 .019Hvy Phasor 26 5/146(+0) 2
.154 .147 .140 .134 .127 .120 .113 .107 .094 .083 .072 .062Auto Blastor 28 4/52(+0) 1 .577
.519 .462 .404 .346 .293 .244 .200 .124 .067 .027 .004~Tachyon Beam 30 3/48(+0) 1 .271

.250 .230 .211 .193 .175 .158 .142 .113 .087 .065 .046^Gauss Auto 32 9/ 83(+0) 1 .410 .361
.361 .313 .313 .265 .265 .217 .169 .120 .072 .036^Particle 33 5/ 66(+0) 2 .227 .212 .212
.197 .197 .182 .182 .167 .152 .136 .121 .106Plasma Canon 35 5/ 66(+0) 1 .273 .258 .242 .227
.212 .197 .182 .167 .140 .115 .093 .073Death Ray 36 114/1758(+0) 3 .341 .341 .340 .340
.339 .338 .338 .337 .336 .335 .334 .333Disruptor 37 9/108(+0) 2 .231 .222 .213 .204 .194
.185 .176 .167 .148 .130 .113 .097Pulse Phasor 38 11/ 77(+0) 1 .487 .448 .409 .370 .331 .292
.256 .222 .161 .110 .068 .037Tri-focus Pl 45 18/139(+0) 1 .252 .245 .237 .230 .223 .216 .209
.201 .187 .173 .158 .144Stellar Conv 46 38/302(+0) 3 .298 .285 .272 .258 .245 .232 .219 .205
.179 .153 .129 .107Mauler Dev 48 48/281(+0) 1 .214 .210 .206 .203 .199 .196 .192 .189 .181
.174 .167 .160 Missiles and Torpedoes: Shieldsname tech cost/spc(bon) spd 0
1 2 3 4 5 6 7 9 11 13 15Scatter V 11 8/ 33(+0) 2.5 .909 .758 .606 .455 .303
.152 -- -- -- -- -- -- -- Mercurite 14 9/ 19(+2) 3.0 .526 .474 .421 .368 .316 .263 .211 .158
.053 -- -- -- Stinger 18 17/ 32(+3) 3.5 .469 .437 .406 .375 .344 .312 .281 .250 .187 .125
.062 -- Anti-Mat Trp 23 12/162(+4) 4.0 .185 .179 .173 .167 .160 .154 .148 .142 .130 .117 .105
.093Scatter VII 27 47/ 72(+2) 3.0 .972 .875 .778 .681 .583 .486 .389 .292 .097 -- -- --
Pulson 29 37/ 57(+4) 4.0 .351 .333 .316 .298 .281 .263 .246 .228 .193 .158 .123
.088Hercular 34 73/ 93(+5) 4.5 .269 .258 .247 .237 .226 .215 .204 .194 .172 .151 .129
.108Hellfire Trp 40 75/250(+6) 5.0 .400 .384 .368 .352 .336 .320 .304 .288 .256 .224 .192
.160Zeon 41 134/159(+6) 5.0 .189 .182 .176 .170 .164 .157 .151 .145 .132 .119 .107
.094Proton Torp 43 62/262(+6) 8.0 .229 .225 .221 .218 .214 .210 .206 .202 .195 .187 .179
.172Scatter X 44 165/190(+3) 3.5 .789 .737 .684 .632 .579 .526 .474 .421 .316 .211 .105 --
Plasma Torp 50 150/375(+7) 6.0 .360 .357 .355 .352 .349 .347 .344 .341 .336 .331 .325
.320Weapon comparison for tech level 60 : Assumption: Space = size + power * .4 Beam
Weapons: Shieldsname tech cost/spc(bon) rng 0 1 2 3 4 5 6 7
9 11 13 15Fusion Beam 20 1/ 31(+0) 1 .323 .290 .258 .226 .194 .164 .136 .112 .069 .037
.015 .002Hvy Fusion 20 2/ 94(+0) 2 .181 .170 .160 .149 .138 .128 .118 .109 .091 .075 .060
.047Megabolt 25 1/ 29(+3) 1 .379 .345 .310 .278 .247 .218 .191 .165 .120 .082 .051
.027Phasor 26 1/ 38(+0) 1 .329 .303 .276 .250 .224 .197 .173 .150 .109 .074 .046 .025Hvy
Phasor 26 3/114(+0) 2 .197 .189 .180 .171 .162 .154 .145 .137 .121 .106 .092 .079Auto
Blastor 28 2/ 39(+0) 1 .769 .692 .615 .538 .462 .391 .325 .266 .166 .089 .036 .006~Tachyon
Beam 30 2/ 36(+0) 1 .361 .333 .307 .281 .257 .233 .211 .190 .151 .117 .087 .061^Gauss Auto
32 5/ 57(+0) 1 .596 .526 .526 .456 .456 .386 .386 .316 .246 .175 .105 .053^Particle 33 3/
44(+0) 2 .341 .318 .318 .295 .295 .273 .273 .250 .227 .205 .182 .159Plasma Canon 35 3/
49(+0) 1 .367 .347 .327 .306 .286 .265 .245 .225 .189 .155 .125 .098Death Ray 36
57/1179(+0) 3 .509 .508 .507 .506 .506 .505 .504 .503 .501 .500 .498 .496Disruptor 37 5/
78(+0) 2 .321 .308 .295 .282 .269 .256 .244 .231 .205 .180 .156 .134Pulse Phasor 38 6/
57(+0) 1 .658 .605 .553 .500 .447 .395 .345 .299 .217 .148 .092 .049Tri-focus Pl 45 9/ 97(+0)
1 .361 .351 .340 .330 .320 .309 .299 .289 .268 .247 .227 .206Stellar Conv 46 19/196(+0) 3
.459 .439 .418 .398 .378 .357 .337 .316 .276 .235 .199 .165Mauler Dev 48 24/185(+0) 1 .324
.319 .314 .308 .303 .297 .292 .286 .276 .265 .254 .243 Missiles and Torpedoes:
Shieldsname tech cost/spc(bon) spd 0 1 2 3 4 5 6 7 9 11 13 15Anti-Mat
Trp 23 6/126(+4) 4.0 .238 .230 .222 .214 .206 .198 .190 .183 .167 .151 .135 .119Scatter VII
27 23/ 43(+2) 3.0 1.628 1.465 1.302 1.140 .977 .814 .651 .488 .163 -- -- -- Pulson 29
19/ 35(+4) 4.0 .571 .543 .514 .486 .457 .429 .400 .371 .314 .257 .200 .143Hercular 34 36/
52(+5) 4.5 .481 .462 .442 .423 .404 .385 .365 .346 .308 .269 .231 .192Hellfire Trp 40
38/178(+6) 5.0 .562 .539 .517 .494 .472 .449 .427 .404 .360 .315 .270 .225Zeon 41 67/

87(+6) 5.0 .345 .333 .322 .310 .299 .287 .276 .264 .241 .218 .195 .172 Proton Torp 43
 31/191(+6) 8.0 .314 .309 .304 .298 .293 .288 .283 .277 .267 .257 .246 .236 Scatter X 44
 82/102(+3) 3.5 1.471 1.373 1.275 1.176 1.078 .980 .882 .784 .588 .392 .196 -- Plasma Torp 50
 75/255(+7) 6.0 .529 .525 .522 .518 .514 .510 .506 .502 .494 .486 .478 .471 3.3. Ground Combat

Odds Following is a guide for how ground combat is determined: $\text{GROUND ROLL} = d100 + \text{Personal Shield} + \text{MAX}(\text{Personal Armor, Ship Armor}) + \text{Personal Weapon} + \text{Race Bonus}$ (d100 stands for a die roll uniformly distributed between 1 and 100). Both sides do a ground role, highest wins and lives, the other is eliminated. Personal Shields (from force field technology): None(1) - 0 Personal Deflector Shield(8) - +10 Personal Absorption Shield(21) - +20 Personal Barrier Shield(38) - +30 Personal Armor (from Construction technology): None(1) - 0 Battle Suits(11) - +10 Armored Exoskeleton(24) - +20 Powered Armor(40) - +30 Ship Armor (from Construction technology): Titanium Armor(1) - 0 Duralloy Armor(10) - +5 Zortrium Armor(17) - +10 Andrium Armor(26) - +15 Tritanium Armor(34) - +20 Adamantium Armor(42) - +25 Neutronium Armor(50) - +30 Weapons: (from Weapons technology) None(1) - 0 Hand Lasers(2) - +5 Ion Rifle(12) - +10 Fusion Rifle(24) - +20 Hand Phasor(31) - +25 Plasma Rifle(42) - +30 Racial Bonus is +20 if Bulrathi, otherwise 0 To figure out ratio that is needed, add your highest bonuses in each category together, subtract the highest bonuses for your opponent, and consult the following formula or table for expected losses: $P(\text{Losing}) = .5 * (100 - \text{Diff}) * (99 - \text{Diff})$
 $(100)^2 P(\text{Tie}) = (100 - \text{Diff})$

----- $(100)^2$ So Expected lost = Chance you lose
 ----- * Opponents # of troops (1 - Chance you lose - Chance you tie)
 This leads to the following table: Differential Expected Loss as Percentage of Opponent's forces

Differential	Expected Loss as Percentage of Opponent's forces
0	100%
+5	82%
+10	68%
+15	56%
+20	47%
+25	39%
+30	32%
+40	22%
+50	14%
+60	8%
+70	5%
+80	2%
+90	< 1%

(maximum differential if not Bulrathi) For example, you are the Bulrathi. You have discovered: hand lasers, ion rifle, Armored Exoskeleton, Adamantium Armor. Your opponents have made no ship armor advances, but have Personal Deflector Shields, also Armored Exoskeleton, and Hand Lasers. Their bonus would be 10 (for shield) + 20 (Armored Exoskeleton) + 5 (Hand Lasers). Yours would be 0 (for shield) + 25 (Adamantium Armor) + 10 (ion rifle) + 20 (racial bonus). Your differential would be +20. You want to send colonists from two colonies to take a world of the opponents with 100 pop. If you send a total of 100 pop, you should expect approximately 53 to survive the battle.