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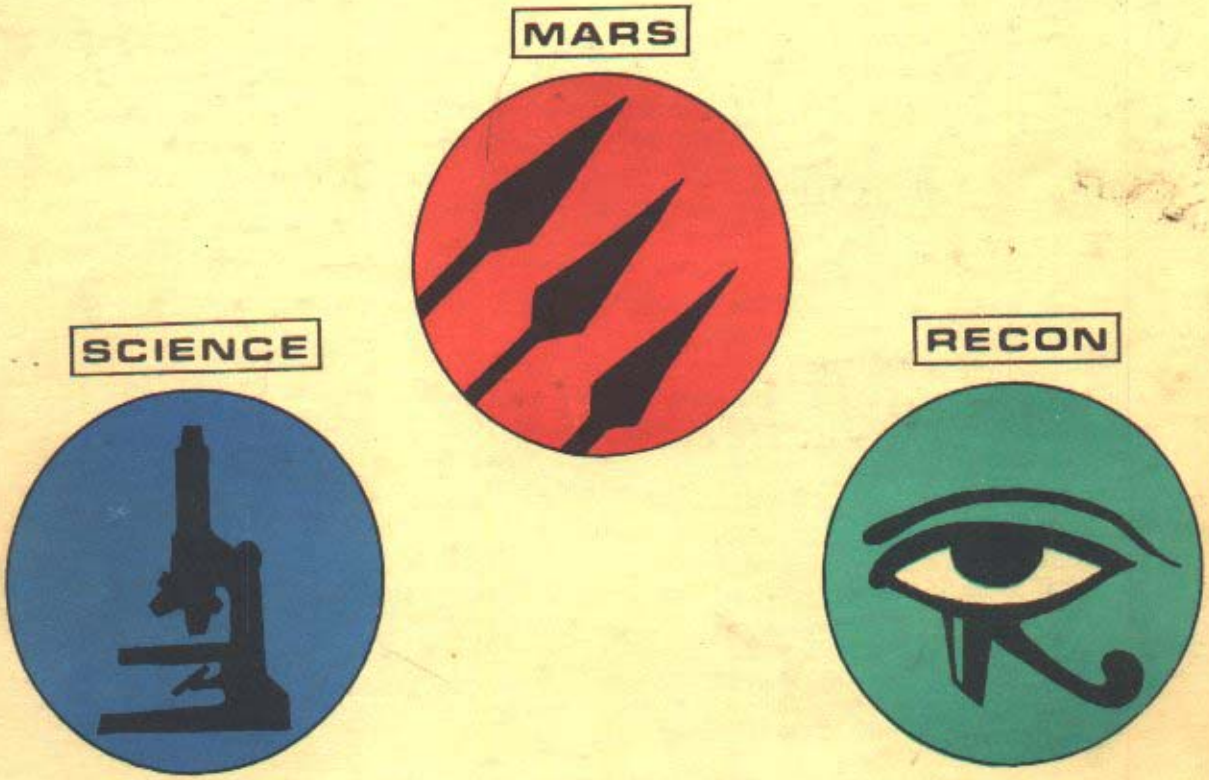
TM 1-1

MORROW INDUSTRIES, TRAINING DIVISION



THE MORROW PROJECT

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The authors wish to thank the following individuals and organizations: The Order of Leibowitz of Oakland University, Metro Detroit Gamers Association, Michigan State University Science Fiction Society, The United States Armed Forces, Cadillac Gage, and David Filpus, Paula George, Ben James, Carla Mitchell, Anna O'Connell, Liese Sadler, and Kevin Appleton for so thouroughly testing the medical system whenev he played the game. The Original Crew of MARS ONE, and all the people we forgot to mention before they yell at us for forgetting to mentio them.

THE MORROW PROJECT
INTRODUCTION

In 1962 a mysterious man known by the name of Bruce Edward Morrow, origin unknown, gathered nine of the country's leading industrialists into an organization known as the Council of Tomorrow. What method of coercion he may have used to achieve this feat remains a matter mostly for conjecture. The concensus of noted historians indicates that Morrow was a rare form of esper. He seemed to have possessed the ability to transport himself and some small amount of nearby matter into or out of the future. Building a convincing argument from the future, he and the council structured an organization dedicated to the continued survival of the human race beyond the point of destruction.

This organization brought forth the concept of the Morrow Project; an ambitious plan to cryogenically freeze special teams and equipment to aid in the reconstruction of the U.S. after nuclear war. For many years the Project secretly stored their teams to await the proper time for reawakening. Gradually their processes improved and their equipment became more advanced. In 1979, Morrow returned from a long absence bearing a small device which proved to be a functioning fusion power plant and advanced laser technology. In 1987, the Project carried out a complete updating of all the previously "stored" equipment, opening the buried and sealed chambers of the sleepers without waking them and leaving behind new equipment, vehicles, and the instruction manuals on how to operate them.

The prime central base of the Morrow Project is a vast underground complex designed to sustain the lives of some one hundred and fifty people through the holocaust as they recorded the data linked with the war. Also to act as a central communications point for the rest of the Project when they should wake. So thorough was their recording that this base remains as the only comprehensive source of information on pre-war times. A few teams ventured out from Prime Base on reconnaissance missions shortly after the end of the war, and they soon found they could establish a viable community. It looked as if the mission of the Project was going to be completed without a hitch, but such good fortune was not to be theirs. A small war with a madman named Krell resulted in the destruction of the colony by a nuclear bomb and the loss of Prime Base to biological sabotage.

With their control base inoperative the Morrow teams continued to sleep for 150 years. When their long-delayed wakeup signal was finally sent by a damaged computer they found themselves in a hostile world. Survival was the key word for most of the remnants of the battered U.S.

This is the world of the Morrow Project as it runs in this game. The personnel of the Project are all well trained, but they are not all combat veterans, nor do they engage in wholesale slaughter. Pledged to help humanity recover in whatever way they can, they can easily lose sight of their own ideals and adopt the brutal code of survival. They must find Prime Base and each other in order to survive. Will your team survive?

THE WAR

World War Three begins on Thursday, November 18, 1989 with the launching of the first strike by the United States against the Soviet Union. The attack was initiated by the U.S. after the NORAD command center detected an apparent Russian missile attack force coming in over the North Pole. It was later found that the attack force was actually a computer training program that was accidentally fed into the NORAD computers and communication network.

Due to this mistake, the U.S. managed to knock out a majority of Russia's nuclear arsenal. However, enough weaponry was left to effectively destroy the United States. As the Soviets and Americans were exchanging nuclear gifts, the rest of the world joined in the exchange, using the war as an excuse to finalize age-old disputes with other countries.

As the rest of the world joined in nuclear madness, the Russian missiles began to impact on the U.S. The first targets in America were the military bases and missile launching points so that any remaining military strength could be destroyed. As these missiles fell, others began targeting on population and manufacturing centers with devastating results. As the rockets fell, it was found that a number of them targeted for civilian areas carried biological warheads containing virulent man-made diseases designed to decimate the population while leaving buildings and material intact.

As the days rolled on, the lingering radiation and lethal diseases took their toll. As the bodies piled up, civilization collapsed. Due to the destruction of transport systems and the spread of nuclear ignited fires, food became scarce. Famine stalked the land, slaying at will. The survivors found that medical centers were either swamped or destroyed, the death toll from disease mounted. Within 6 months, 95% of the world's population was dead. Those who remained were characterized by being self-centered, selfish, and were guided by man's baser instincts as civilization's thin veneer was stripped away.

TARGETING

When targeting missiles, the first priorities go to military installations, especially those with missile launching capabilities. Along with the military bases, the largest of the cities would be struck to cause the maximum disruption of communications.

The above would be the targets for the primary missiles, those with the most accurate and destructive nuclear warheads.

The secondary targets would be manufacturing and population centers (above 75,000 population). The population centers would be especially vulnerable to biological agents. These agents are lethal diseases that have been genetically tailored for more effective use as weapons, they kill people and animals but leave an area otherwise untouched.

The list of targets following have all been struck by the type of weapon as shown in the table. As the radiation level increased, it would tend to disrupt the guidance circuits of the last of the incoming missiles. To account for this, and to allow for individuality in different game worlds, there is an allotment of 150 missiles for individual use. After determining which city you wish struck, use the Random Missiles table to find exactly where the missiles hit, as well as the Bomb Effect and Russian Missiles Data tables as needed.

THE TARGETS

The following table lists the targets destroyed within the United States. Shown is the target name, in some cases what type of target it is, the nearest town in the case of military and industrial targets, and the number (in most cases one) and type of missile which impacted. In the case of MIRV missiles, all of the warheads are assumed to have impacted on or around the target. The list is given in alphabetical order by state.

TARGET	TARGET TYPE	NEAREST TOWN	MISSILE
ALABAMA			
Birmingham ++			SS-17
Mobile +++			SS-N-8
Montgomery *+++			SS-18M1b
ALABAMA (Cont.)			
Anniston Army Depot	Chem. & Bio. weapon storage	Anniston	SS-N-8
Redstone Arsenal			SS-17
Ft. McClellan	CBW school	Anniston	SS-17
Browns Ferry 1, 2, 3	Nuclear reactor	Decatur	SS-N-8
Farley 1	Nuclear reactor	Wash. Co.	SS-N-17
ALASKA			
Juneau *			SS-N-17
Eielson AFB			SS-18M1
Elemdorf AFB			SS-17
Point Barrow	DEW line Hq.		SS-17
ARIZONA			
Phoenix *++			SS-N-17
Tucson ++			SS-17
Navaho Army Depot		Bellemont	SS-N-17
Yuma Proving Ground			SS-17
Davis Monthan AFB	Titan II base	Tucson	10 SS-18M2
ARKANSAS			
Little Rock *+++			SS-N-8
Pine Bluff Arsenal	Chem. & bio test & manufacture	Pine Bluff	SS-N-17
Blythville AFB	SAC base	Manila	SS-18M1b
Little Rock AFB	Titan II base		10 SS-18M2
Arkansas 1	Nuclear reactor	Russelville	SS-17
CALIFORNIA			
Los Angeles +			SS-18M1
Long Beach ++			SS-16
Oakland ++	Naval Biowar lab		SS-N-17
San Diego ++			SS-N-8
San Francisco ++			SS-N-17
Anaheim +++			SS-N-17
Berkley +++			SS-17
Fresno +++			SS-N-8
Glendale +++			SS-N-17
Pasadena +++			SS-17
Sacramento *+++			SS-17
Santa Ana +++			SS-19
Torrance +++			SS-17
Vallejo	Nuc. Sub. shipyard		SS-17
Livermore	Nuc. weapons lab.		SS-19
Ft. Ord		Monterey	SS-N-8
Sacramento Army Depot			SS-N-8
Sharpe Army Depot		Lathrop	SS-17
Sierra Army Depot		Herlong	SS-N-17
Camp Pendelton	Marine Base	Oceanside	SS-N-17
Ft. Irwin			SS-17
Beale AFB	SAC base	Marysville	SS-N-8
Mather AFB	SAC base	Perkins	SS-17
Travis AFB	SAC base	Fairfield	SS-N-17
Vandenburg AFB	SAC base, Missile test site	Lompoc	SS-N-17
Castle AFB		Merced	SS-19
March AFB		Riverside	SS-N-8
Rancho Seco 1	Nuclear reactor	Sacramento	SS-17
COLORADO			
Denver *++			SS-N-17
Rocky Flats	Nuc. weapons manufacturing		
Ft. Carson		Colo. Springs	SS-19
Pueblo Army Depot		Avondale	SS-17
Rocky Mount. Arsenal	Nerve gas manufacturing	Denver	SS-N-8
Lowery AFB		Aurora	SS-17
USAF Academy		Colo. Springs	SS-N-8
Indian Mountain	NORAD HQ.	Colo. Springs	SS-18M1

TARGET	TARGET TYPE	NEAREST TOWN	MISSILE
CONNETICUT			
Bridgeport +++			SS-N-17
Hartford *+++			SS-18M1b
New Haven +++			SS-19
Waterbury +++			SS-19
New Britain			SS-18M2
East Gronby			SS-17
Groton	Nuc. sub. shipyard		SS-N-17
New London	Nuc. sub. base		SS-N-8
Millstone 2	Nuclear reactor	Waterford Co.	SS-19
Disease & Parasite Research lab.	Bio. warfare lab.	Plum island	SS-17
DELAWARE			
Dover *			SS-18M2
Wilmington +++			SS-18M2
DISTRICT OF COLOMBIA			SS-18M1
FLORIDA			
Tampa ++			SS-17
Jacksonville +++			SS-N-8
St. Petersburg			SS-N-17
Tallahassee *			SS-17
Holmstead AFB			SS-N-17
Patrick AFB		S Patrick Sh.	SS-N-17
Eglin AFB	Chem/Bio research	Eglin	SS-19
Crystal River 3	Nuclear reactor	Citrus	SS-17
St. Lucie 1	Nuclear reactor	Ft. Pierce	SS-19
Cape Kennedy		Merritt Isl.	SS-18M2
GEORGIA			
Atlanta *++			SS-N-8
Columbus +++			SS-16
Savanna +++			SS-19
Atlanta Army Depot		Forest Park	SS-N-8
Ft. Benning		Columbus	SS-17
Ft. Gordon		Augusta	SS-17
Robins AFB			SS-17
Turner AFB			SS-18M2
HAWAII			
Honolulu *++			SS-N-8
Wheeler AFB			SS-17
Hickham AFB			SS-16
IDAHO			
Boise *			SS-N-8
Nat. Reactor Test Site		Arco	SS-17
Mountain Home AFB		Mountain Home	SS-17
ILLINOIS			
Chicago +			SS-18M1
Peoria +++			SS-18M1b
Rockford +++			SS-17
Springfield *			SS-18M1
Elwood Ordinance Plant		Elwood	SS-17
Granite City Army Depot		Granite City	SS-19
Rock Island Arsenal		Rock Isl.	SS-17
Zion 1, 2	Nuclear reactor	Zion	SS-N-17
Dresdon 2, 3	Nuclear reactor	Morris	SS-17
INDIANA			
Evansville ++			SS-N-8
Ft. Wayne ++			SS-16
Gary ++			SS-17
Hammond ++			SS-18M2
Indianapolis *++			SS-17
South Bend ++			SS-N-8

TARGET	TARGET TYPE	NEAREST TOWN	MISSILE
INDIANA (Cont.)			
Indiana Army Ammunition Plant		Charlestown	SS-17
Newport Army Ammo. Plant	Nerve gas manufacturing	Newport	SS-N-17
Bunker Hill AFB			SS-N-17
Naval Ammunition Depot			SS-N-17
	Chem/Bio storage	Crane	SS-N-8
IOWA			
Des Moines *			SS-18M1
Iowa Army Ammunition Plant		Burlington	SS-17
KANSAS			
Wichita ++			SS-17
Kansas City +++			SS-N-8
Topeka *+++			SS-17
Salina			SS-18M1
McConnell AFB	Titan II missile site	Whita	10SS18M2
KENTUCKY			
Louisville ++			SS-18M1b
Frankfort *			SS-N-17
Bath Co. (Licking River)	Hydroelectric plant		SS-N-8
Ft. Knox		Louisville	SS-N-17
Blue Grass Army Ammunition Depot	Chem/Bio Storage	Lexington	SS-N-17
LOUISIANA			
New Orleans ++			SS-19
Baton Rouge *+++			SS-18M1b
Shreveport +++			SS-N-17
Louisiana Army Ammunition Depot		Doyline	SS-N-17
MAINE			
Portland +++			SS-N-17
Augusta *			SS-17
Loring AFB			SS-17
MARYLAND			
Baltimore ++			SS-17
Annapolis *			SS-N-17
Aberdeen Proving Ground		Perryman	SS-17
Ft. Detrick	Bio war Lab	Frederick	SS-17
Edgewood Arsenal	Chem. war lab.	Edgewood	SS-17
Ft. Meade		Odenton	SS-N-17
Andrews AFB		Camp Springs	SS-17
US Naval Academy		Annapolis	SS-N-17
Calvert Cliffs 1, 2	Nuclear reactor	Lusby	SS-18M2
MASSACHUSETTS			
Boston *++			SS-N-17
Cambridge +++			SS-18M1
New Bedford +++			SS-N-17
Springfield +++			SS-17
Worcester +++			SS-17
Holyoke			SS-18M1
Fitchburg			SS-N-8
Fall River			SS-17
Watertown Arsenal			SS-N-8
Westover AFB		Holyoke	SS-18M1
Otis AFB		Mashpee	SS-17
MICHIGAN			
Detroit +			SS-18M2
Dearborn +++			SS-N-8

TARGET	TARGET TYPE	NEAREST TOWN	MISSILE
MICHIGAN (Cont.)			
Flint +++			SS-18M1
Grand Rapids			SS-N-17
Lansing *+++			SS-N-17
Ludington	Hydroelectric dam		SS-17
K.I. Sawyer AFB		Skandia	SS-N-17
Kincheloe AFB		Rudyard	SS-N-8
Wurtsmith AFB		Oscoda	SS-17
Selfridge AFB		Mount Clemens	SS-17
Donald Cook 1	Nuclear reactor	Bridgeman	SS-N-8
Big Rock	Nuclear reactor	Petoskey	SS-17
MINNESOTA			
Minneapolis ++			SS-17
St. Paul *++			SS-N-17
Duluth ++			SS-17
MISSISSIPPI			
Jackson *+++			SS-N-17
Columbus AFB			SS-18M1
MISSOURI			
Kansas City ++			SS-N-17
St. Louis ++			SS-N-17
Jefferson City *			SS-17
Lake City	Ammunition plant		SS-17
Whiteman AFB	351 Strategic Missile Wing (Minuteman base)	Warrensburg	10 SS-18M2
MONTANA			
Helena *			SS-16
Malmstrom AFB	341 SMW	Great Falls	10 SS-18M2
Glasgow AFB			SS-16
NEBRASKA			
Omaha ++			SS-16
Lincoln *+++			SS-18M1
Sioux Army Depot		Sidney	SS-19
Offut AFB		Omaha	SS-17
NEVADA			
Carson City			SS-19
Hoover (Boulder) Dam	Hydroelectric dam		SS-17
NEW HAMPSHIRE			
Concord *			SS-17
Manchester +++			SS-18M1
Portsmouth			SS-17
Pease AFB			SS-17
NEW JERSEY			
Jersey City ++			SS-18M2
Newark ++			SS-N-17
Elisabeth +++			SS-N-8
Paterson +++			SS-N-8
Trenton *+++			SS-18M1
Ft. Dix			SS-16
Pickatinny Arsenal			SS-18M1
Naval Ammunition Depot	Chem & bio storage	Earle	SS-N-17
Lakehurst	US Naval Air Base	Lakehurst	SS-N-17
Salem 1	Nuclear reactor	Salem	SS-N-17
McGuire AFB		Wrightstown	SS-N-17
NEW MEXICO			
Albuquerque +++			SS-N-17
Santa Fe *			SS-N-17
White Sands	Missile range	Las Cruces	SS-19
Ft. Wingate Army Depot		Gallup	SS-N-8

TARGET	TARGET TYPE	NEAREST TOWN	MISSILE
NEW MEXICO (Cont.)			
Walker AFB			SS-18M2
NEW YORK			
New York City			SS-18M2
Buffalo ++			SS-N-8
Rochester ++			SS-18M1
Niagra Falls +++			SS-19
Syracuse +++			SS-N-17
Utica +++			SS-17
Yonkers +++			SS-N-17
Albany *+++			SS-N-17
Yaphanik			SS-18M1b
Plattsburg			SS-17
Schenectady Army Depot			SS-18M2
Seneca Army Depot		Romulus	SS-N-17
Military Academy		West Point	SS-N-8
Watervliet Arsenal			SS-N-8
Griffiss AFB		Hampstead	SS-17
Robert Moses	Hydroelectric dam	Niagra	SS-18M1
Indian Point 2	Nuclear reactor	Buchanan	SS-17
Indian Point 3	Nuclear reactor	Peekskill	SS-N-17
Fitzpatrick	Nuclear reactor	Oswego	SS-17
NORTH CAROLINA			
Charlotte +++			SS-N-8
Greensboro +++			SS-19
Winston-Salem +++			SS-N-8
Raleigh *			SS-N-8
Ft. Bragg		Fayetteville	SS-N-8
Charlotte Army Missile Plant		Charlotte	SS-N-17
Seymore Johnson AFB			SS-17
NORTH DAKOTA			
Bismark *			SS-17
Minot AFB	19 SMW		10 SS-18M2
Grand Forks AFB	321 SMW		10 SS-18M2
OHIO			
Akron ++			SS-N-17
Cincinnati ++			SS-17
Cleveland ++			SS-17
Columbus *++			SS-18M1
Dayton ++			SS-17
Toledo ++			SS-N-8
Canton +++			SS-18M2
Youngstown +++			SS-17
Lockbourne AFB			SS-19
Wright Patterson AFB			SS-19
OKLAHOMA			
Oklahoma City *++			SS-N-8
Tulsa ++			SS-17
Clinton Sherman AFB			SS-N-17
Altus AFB			SS-N-8
OREGON			
Portland ++			SS-17
Salem *			SS-N-8
Bonneville Dam			SS-N-8
John Day	Hydroelectric dam	Columbia Riv.	SS-17
Cheif Joseph Dam	Hydroelectric dam	Columbia Riv.	SS-17
Umatilla Army Depot	Chem & Bio storage site	Hermiston	SS-N-17
PENNSYLVANIA			
Philadelphia +			SS-18M1
Pittsburg ++			SS-19
Allentown +++			SS-17

TARGET	TARGET TYPE	NEAREST TOWN	MISSILE
PENNSYLVANIA (Cont.)			
Erie +++			SS-17
Harrisburg *			SS-17
Scranton +++			SS-19
Frankford Arsenal		Philadelphia	SS-N-17
Letter Kennedy Army Depot		Culburston	SS-N-17
New Cumberland Army Depot			SS-17
Scranton Ammunition Plant			SS-N-8
Tobyhanna Army Depot			SS-16
Peach Bottom 2, 3	Nuclear reactor	York Co.	SS-18M2
3 Mile Island 1, 2	Nuclear reactor	Dauphin Co.	SS-18M1
Beaver Valley 1	Nuclear reactor	Shippingport	SS-19
RHODE ISLAND			
Providence +++			SS-N-17
Newport	Naval base		SS-19
SOUTH CAROLINA			
Columbia *			SS-19
Charleston Army Depot		N Charleston	SS-N-17
Ft. Jackson		Columbia	SS-18M1b
Charleston	Nuc. sub. base		SS-N-17
Oconec 1, 2, 3	Nuclear reactor	Oconic Co.	SS-19
SOUTH DAKOTA			
Pierre *			SS-19
Black Hills Army Depot		Igloo	SS-19
Ellsworth AFB	44 SMW		10 SS-18M2
TENNESSEE			
Memphis ++			SS-17
Knoxville +++			SS-N-17
Nashville *+++			SS-18M1b
Holston Army Ammunition Plant			SS-19
Milan Army Ammunition Plant			SS-19
TEXAS			
Houston +			SS-N-8
Dallas ++			SS-19
El Paso ++			SS-18M1
Ft. Worth ++			SS-N-17
San Antonio ++			SS-18M2
Amarillo +++			SS-N-17
Austin *+++			SS-N-17
Beumont +++			SS-19
Corpus Cristy +++			SS-N-17
Libbock +++			SS-17
Wichita Falls +++			SS-N-8
Abalene			SS-17
Ft. Bliss		El Paso	SS-N-17
Ft. Worth Army Depot			SS-17
Ft. Hood		Killeen	SS-19
Longhorn Army Ammunition Plant		Karnack	SS-N-17
Amarillo AFB			SS-17
Bergstrom AFB			SS-N-8
Dyess AFB			SS-N-8
Carswell AFB			SS-N-8
Sheppard AFB			SS-N-17
Lackland AFB			SS-16
UTAH			
Salt Lake City *+++			SS-17
Desert Test Center	Chem & Bio Testing	Ft. Douglas	SS-17
Toole Army Depot	Chem & Bio storage	Toole	SS-16
UTAH (Cont.)			
Utah Army Depot		Ogden	SS-18M1
VERMONT			
Montpelier *			SS-17
VIRGINIA			
Arlington +++			SS-17
Newport News +++			SS-18M2
Richmond *+++			SS-N-8
Norfolk ++			SS-N-8
Redford Ammunition Depot		Pepper	SS-17
Quantico	Marine Base		SS-N-8
WASHINGTON			
Seattle ++			SS-16
Spokane +++			SS-N-17
Tacoma +++			SS-18M1
Olympia *			SS-17
Grand Colder	Hydroelectric dam		SS-N-8
Fairchild AFB			SS-19
McChord AFB			SS-17
Naval Ammunition Depot	Chem & Bio storage		SS-N-17
WEST VIRGINIA			
Charleston *			SS-17
WISCONSIN			
Milwaukee +++			SS-17
Madison *+++			SS-N-8
WYOMING			
Cheyenne *			SS-19
Francis E. Warren AFB	90 SMW		10-SS-18M2

Legend:

* State Capital
\+ Over 1,000,000 population
++ 250,000 to 1,000,000 population
+++ 100,000 to 250,000 population
SS18M1b - Biological warhead (roll disease from Biological Warfare Agent table)

NOTE: the targets listed as storage or test sites for biological agents would be heavily contaminated after the war.

RUSSIAN NUCLEAR MISSILES DATA

MISSILE	RANGE	WARHEAD	YEILD	NUMBER DEPLOYED	DIE ROLL (1D100)
SS-16	8000km	Single	1 Mt	60	1-3
SS-17	9000km	4 MIRV	200 Kt (each)	752	4-35
SS-18M1	10500 km	Single	25 Mt	150	36-41
SS-18M1b	10500km	Single	Bio	50	42-43
SS-18M2	9250km	10 MIRV	2 Mt (each0	110	44-48
SS-19	9000km	6 MIRV	300 Kt (each)	240	49-58
SS-N-17*	4000km	3 MIRV	500 Kt (each)	544	59-81
SS-N-8*	8000km	Single	2 Mt	452	82-00

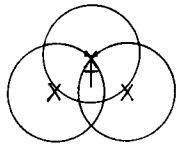
*Carried by missile submarines.

MIRV IMPACTS

MIRV warheads are designed to cause as much damage as possible to the target area. To accomplish this they are given trajectories that make the warheads land in specific patterns as shown below. The spacing of the bursts is such that the areas of total destruction overlap.

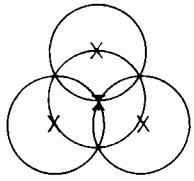
The following are the impact patterns for the various MIRV missiles.

SS-N-17, 3 MIRV warheads of 500 kilotons each.



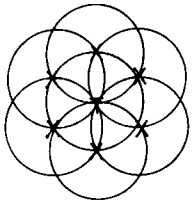
Crater Dia.	Fireball Dia.	Total Destruction Radius	Heavy Damage Radius	Moderate Damage Radius	Light Damage Radius
.473km	.797km	3.266km	5.081km	7.257km	9.072km

SS-17, 4 MIRV warheads of 200 kilotons each.



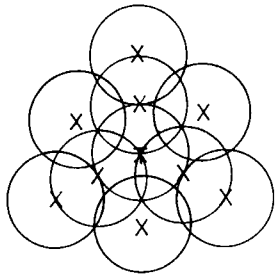
Crater Dia.	Fireball Dia.	Total Destruction Radius	Heavy Damage Radius	Moderate Damage Radius	Light Damage Radius
.464 km	.73 km	3.208km	4.99km	7.13km	8.912km

SS-19, 6 MIRV warheads of 300 kilotons each.



Crater Dia.	Fireball Dia.	Total Destruction Radius	Heavy Damage Radius	Moderate Damage Radius	Light Damage Radius
.53km	.866km	3.672km	5.714km	8.162km	10.202km

SS-18M2, 10 MIRV warheads of 2 megatons each.



Crater Dia.	Fireball Dia.	Total Destruction Radius	Heavy Damage Radius	Moderate Damage Radius	Light Damage Radius
1.797km	2.772km	10.368km	16.128,m	23.04km	28.803km

10 SS-18M2 missiles

4.491km	8.316km	31.104km	48.384km	69.12km	86.409km

NUCLEAR BOMB EXPLOSION DATA (contact surface burst)

Yeild	Crater Dia.	Fireball Dia.	Total Destruction Radius	Heavy Damage Radius	Moderate Damage Radius	Light Damage Radius
5Kt	.068	.084	.469	.678	1.042	1.303
10Kt	.085	.111	.591	.919	1.313	1.642
20Kt	.108	.146	.745	1.158	1.655	2.608
50Kt	.146	.211	1.011	1.572	2.246	2.807
100Kt	.184	.278	1.273	1.981	2.830	3.537
200Kt	.232	.368	1.604	2.495	3.565	4.456
300Kt	.265	.433	1.836	2.857	4.081	5.101
500Kt	.315	.531	2.177	3.387	4.838	6.048
1Mt	.396	.700	2.743	4.267	6.096	7.620
2Mt	.499	.924	3.456	5.376	7.680	9.601
3Mt	.572	1.087	3.956	6.154	8.792	10.980
4Mt	.629	1.219	4.355	6.774	9.677	12.096
5Mt	678	1.333	4.691	7.297	10.424	13.030
8Mt	.792	1.609	5.486	8.534	12.192	15.240
10Mt	.854	1.759	5.910	9.193	13.133	16.417
20Mt	1.076	2.322	7.446	11.583	16.547	20.684
25Mt	1.159	2.538	8.021	12.477	17.825	22.281
30Mt	1.231	2.730	8.524	13.259	18.942	23.677
40Mt	1.355	3.063	9.382	14.594	20.848	26.060
50Mt	1.460	3.349	10.106	15.720	22.458	28.072
100Mt	1.839	4.420	12.733	19.807	28.295	35.369
150Mt	2.105	5.198	14.575	22.673	32.390	40.487

All measurements are in km.

RANDOM MISSILES

Due to radiation levels affecting the incoming missiles, the guidance circuits of some of the last of the missiles would go random and impact almost anywhere. There is an allotment of 150 missiles to account for this happening. This gives approximately 3 missile per state.

To determine the missiles aiming point, divide the map you are using into 10 sections, this is just general and need not be exact. Roll 1D10 to find which square the missile is headed for. Breaking this square into 10 smaller squares and again rolling 1D10 gives you a finer aiming point. This procedure is followed until you have a several square kilometer area the missile is centering on. Another option is to choose a target at random and aim a missile at it.

After the aiming point or target has been determined use the following tables to find the effect of the missile.

#1 MISSILE TYPE

Using the Russian Nuclear Missiles Data table, roll 1D100 and determine which type of missile has been fired. Go to Table #2.

#2 MISSILE ACCURACY

Role 1D8
1-7 Hits target (go to #5)
8 Misses (go to #3)

#3 MISS DISTANCE

Roll 1D6
1-Burns on re-entry, no effect
2-Misses 20-40km (1D20+20) (go to #4)
3-Misses 40-60km (1D20+40) (go to #4)
4-Misses 60-80km (1D20+60) (go to #4)
5-Misses 80-100km (1D20 + 80) (go to #4)
6-Misses 100-1100km (1D100(3D10)+100) (go to #4)

#4 DIRECTION OF MISS

Roll 1D8

1-N	5-S
2-NE	6-SW
3-E	7-W
4-SE	8-NW

(go to #5)

#5 BOMB EFFECT

Roll 1D8
1-High air burst
2-Low air burst
3-6 Ground burst
7-Underground burst
8-Special (go to #6)

#6 SPECIAL BOMB EFFECT

Roll 1D8
1-7 Warhead duds, shatters on impact.
8 Warhead duds, lands intact.

Example; A GM decides to aim a missile at Hazelton, Pennsylvania (he received a speeding ticket there once). He rolls a 51 on 1D100 which indicates an SS-19 missile is used (from the Russian Nuclear Missiles Data table). On the accuracy roll of 1D8 he rolls an 8 which indicates the missile veers from its target, the GM then looks to table #3. His roll of 1D6 results in a 2. This shows that the missile impacted 33km (13 on 1D20+20) from the target. The direction of the miss is Southwest (6 on 1D8 table #4). The bomb detonates in a ground burst (6 on 1D8 table #5) with the pattern being that of a 6 MIRV warhead (see MIRV Impacts). The missile ends up obliterating a small town called New Boston just off Highway 81.

RADIOACTIVE CONTAMINATION

The primary effect still found after the war is the residual radiation from the nuclear explosions and the areas of biological contamination from biological warheads. Due to the long time period following the war, before the waking of the Morrow teams, much of the radiation due to fallout would be largely dissipated. The only area still "hot" in a radioactive sense is the small area immediately surrounding the nuclear explosion. The most radioactive area would be the bomb crater itself. This area is referred to as Zone I, and the active radiation level of this zone varies according to the type of burst (see following table). The size of this is equal to the size of the bomb crater as found in the Nuclear Bomb Explosion Data table. Zone II is a secondary area of radiation surrounding the bomb crater. The radiation in this zone is only found in the craters resulting from surface and subsurface bursts. The size of Zone II is equal to the diameter of the bombs fireball. The residual radiation for Zones I and II are shown below:

BIOLOGICAL CONTAMINATION

	SUBSURFACE BURST	SURFACE BURST	AIR BURST	HIGH AIR BURST
Zone I	150 rad/hr	100 rad/hr	30 rad / hr	20 rad/hr
Zone II	75 rad/hr	50 rad/hr	n/a	n/a

BIOLOGICAL CONTAMINATION

Biological warheads can retain their lethality for extended lengths of time so the possibility of running into an active warhead or contaminated area is very real. To determine the area of active contamination, roll 1D12 to find the length of the contaminated area in kilometers. Using a standard ellipse template (available at a drafting supply store) find an ellipse of the right length (number of kilometers rolled) according to the scale of the map you are using. The direction the ellipse is pointing is found by using table #4 Direction of Miss from the Random Missiles table. After finding the direction, place the ellipse so that it points in the proper direction with the impact site of the warhead being at one end of the ellipse.

The agents contaminating a particular area are found by rolling 1D6 and looking to the following table;

BIOLOGICAL WARFARE AGENTS

Die Roll	Agent	Incubation Time	% of Deaths	Length of Illness	Symptoms
1-2	Lugo Fatigue	2-5 days	10%	3 months	Incapacitating sores in nose and throat
3-4	September Fever	1-3 days	3%	10 days	High fever, aches, vomiting, exaustion
5-6	Toledo Infection	1-3 days	90%	n/a	High fever, swollen glands, coughing, open sores on skin

MUTATION POSSIBILITIES

Roll 1D20

1-12	No effect		
13	Increased lethality (10%)	17	Decreased length of illness (50%)
14	Increased lethality (5%)	18	Decreased incubation time (50%)
15	Decreased lethality (10%)	19	Non-infectious
16	Decreased lethality (5%)	20	Highly infectious (100%)

The average infectiousness of these biological agents is 75%

RADIATION EXPOSURE

The total dosage of radiation received by a character depends on several factors, the dose rate, time exposed, and shielding if any. In the table listed below are the more common dose rates found in the world of the Morrow Project. The rates are listed by hour, game turn, and combat turn. To use the table simply multiply the proper dose rate by the amount of hours or turns the character was exposed.

DOSE RATES

RADS/HR.	RADS/GAME TURN	RADS/COMBAT TURN
6000	600	4
5000	500	3.3
4000	400	2.7
3000	300	2
2000	200	1.3
1000	100	0.7
150	15	0.1
100	10	0.07
75	8	0.05
50	5	0.03
30	3	0.02
20	2	0.01

SHEILDING

The other factor involved with radiation exposure is any sheilding a character may have between himself and the radiation source. The following list gives several types of vehicles and buildings and the transmission factor involved with each. To use the table, multiply the dosage of radiation a character is exposed to by the transmission factor of the sheilding he has. This results in the total radiation the

character receives.

SHEILDING

VEHICLES	TRANSMISSION FACTOR
MARS ONE, Scientific One	0.002
M60 Tank	0.04
M48A2 Tank	0.02
HAAM Suit	0.1
Commando vehicles, SK-5	0.2
M113A1 APC	0.3
M114 APC	0.3
Trucks	
¼ Ton (jeep), XR311	0.8
2½ Ton, Airscout	0.6
Structures	
Multistory buildings	
Upper floor	0.01
Lower floor	0.1
Frame buildings	
First floor	0.6
basement	0.1
Woods (Heavily Forested)	0.8
Underground shelter (1m earth cover)	0.0002
Foxholes	0.1

Example; Joe is riding in a Commando Ranger past a bomb crater from an underground burst. He takes two game turns to pass the outer edge (Zone II) of the crater. The total dose he receives 3.2 rads (Zone II = 8 rads/game turn, 8x2 turns = 16, 16x0.2 (transmission factor of Commando) = 3.2)

RADIATION DAMAGE

Radiation damage is permanent and any further exposure is cumulative and is added to the character's total. The following list is the classes of radiation exposure a character is placed in according to their cumulative total. The classes are to be used to determine which characters should allow themselves to be exposed to radiation if they are given the choice.

EXPOSURE CLASS	CLASSES EXPOSURE (IN RADS)	RISK
RS-0	0 Exposure	May take normal risks.
RS-1	Greater than 0, less than or equal to 70	Should avoid further exposure
RS-2	Greater than 70, less than or equal to 150	Should not risk any further exposure
RS-3	Greater than 150	Only in absolute emergency should any further exposure be risked

The following table lists the effects of different radiation dosages on humans. The damage resulting from radiation is listed with the convalescent period being the time required to recover from the damage.
NOTE; Though the damage resulting from radiation can be healed the radiation absorbed is permanent and cannot be "healed".

EFFECTS OF ACUTE RADIATION DOSAGES

Dose range (In rads)	Incidence of Vomiting	Characteristic Signs	Convalescent Period	Death Rate
0-100	None	None	None	None
100-200	5%	Blood Change (-1 Const.)	2 weeks	None
201-600	100%	Blood change (-2 Const.) Hemorrhaging	1-12 Months	200 rad-20% 400rad-50%
601-1000	100%	(-50 Bp) Loss of hair Above 300 rads Same as above	1-12 months (1D12)	600 rad-80% 800 rad-90% 1000 rad-99%
1000-6000+	100%	Same as above+ Diarrhea and Fever (-4 Const. -75 Bp)	4-48 months (4D12)	99%
10,000	100%	Convulsions	None	100% death within 20 min.

Example; Joe has absorbed 350 rads of radiation. He starts vomiting shortly after being exposed and becomes very weak. He rolls 35 on 1D100 and so does not die from the exposure. During the 9 months of his convalescence (9 on 1D12) all his hair falls out. After recovering his radiation class is RS-3 and he must be very careful not to risk any further exposure to radiation. Any further exposure would be added to his 350 rads of absorbed radiation. For example, if he received 10 more rads of radiation his dosage (and damage) would be for 360 rads.

MUTATIONS

One of the most lingering of the residues of nuclear war is the radiation and fallout remaining from the exploded bombs. The background radiation found will have dropped from the 80-100 roentgens immediately following the war to the approximately .025 roentgens at the time of the Morrow Project (150 years after the war).

These high radiation levels, expecially those very high levels around bomb impact sites, will increase the natural mutation frequency to 12-20 percent of all births for mammals (including man). Irregardless of what popular opinion might want, 95 to 99 percent of all mutations are harmful and usually lethal. Radiation induced mutations are caused by radioactive particles impacting on and moving or destroying part of the DNA in reproductive cells. Any change in a cell's DNA causes a "misprint" in the information "blueprint" a cell follows for its existence.

Most "misprints" cause immediate death, even those few that live are mostly sterile and cannot reproduce. Some of the mutations that live are known as "sports" and account for many of the very strange individual "monsters" that are encountered. Many of the mutations that live and breed would be characterized by the more common defects. These defects include dwarfness, muscular and skeletal defects, gigantism, thickening and hardening of the skin, hemophilia, mental disorders including epilepsy, mongoloidism, and schizophrenia, deafness, albinism, and hypersensitivity to light.

Some combinations of the mutational disorders could create the legends out of earths past. A combination of hemophilia, schizophrenia, albinism, light sensitivity, and digestive malfunction could create a race of "vampires". Mongoloidism combined with gigantism, light sensitivity, and thickening of the skin can create "trolls" or "ogres". Racial regression can return caveman and, in some reptiles, a return of the dinosaurs. Any mutation that would add to a creature's survival, such as added strength, flexibility, or viciousness, would be encouraged by nature and become established. All these and more would be created by the combination of biology and radiation.

THE MORROW PROJECT

MORROW PROJECT PERSONNEL

When the Project was first formed the powers-that-be began a search for intelligent volunteers to be frozen and revived after the war. In almost all of the cases of a potential volunteer it was found that he did not meet each one of the requirements fully. Therefore, volunteers were accepted on the basis of an agreement with a majority of the requirements (individual cases subject to the decision of Personnel and the computer). As a result a wide variety of people were allowed into the Project, each with their own speciality.

In the Morrow Project the personnel are given substance in reality through the imagination of the player and the list of physical attributes that is given to each character. These attributes are very important to the playing of the game as they tell the players when the characters have been hurt and how badly. They also put restrictions on what each character can attempt and how successful they are in the attempt.

The following is a list of these attributes along with a short paragraph for each in explanation.

STRENGTH—This is the value that determines the relative physical prowess of a character. It is used in finding how much damage he can accumulate before incapacitation or death. It also aids in determining the extent of actions directly relating to it. The GM should remember that a high strength value does not imply that the character can perform superhuman feats. He can, however, carry more weight and equipment with him without being encumbered. (see Basic Loads)

CONSTITUTION—This is the value that will aid in determining your characters resistance to disease and radiation, as well as the seriousness of a physical wound and the amount of blood that can be lost.

DEXTERITY—This value will tell if a character can use more than one piece of equipment at a time, how proficient they are at individual combat, and how many actions can be taken during a combat turn. It can also serve the GM as a basis for determining if a character trips over their own feet when marching and chewing gum at the same time.

ACCURACY—Simply that. This value is used to tell whether you can strike your target while firing at it. It is used in conjunction with the Firing tables.

CHARISMA—This is a measure of the relative attractiveness of a character, both physical and mental. It is used most often in determining the reaction between characters in a chance meeting.

PSI—This is a relative measurement of psionic ability, or if you wish, the possibility of your character possessing a mind with a potential for ESP powers.

LUCK—This value could be viewed as a spinoff of PSI. It is used to aid in the handling of a situation where there is a slight possibility of success and the GM does not wish to make an arbitrary decision. For good luck in a situation roll 1D20 and if it comes up as less than the character's luck the situation moves in favor of the character. If the roll is equal to or more then the character's luck, the opposite holds true.

The above attributes are designed to give the character a more solid reality in the mind of the player. We found it best to allow the player to supply the more subtle mental and emotional talents of the character he is playing so as to more readily identify with their character.

In the first appendix at the back of this manual you will find a suggested layout for a character sheet. You are invited to duplicate this sheet or make up your own versions. To use the sheet simply follow the directions regarding the methods used for obtaining the characters attributes. Then fill in the appropriate spaces in your character sheet and proceed to outfit your character. Each character should have their own sheet and equipment lists.

DETERMINING CHARACTER ATTRIBUTES

To obtain the values for all of the attributes listed above you will need four (4) six-sided dice. Roll all four dice to come up with a random number between 4 and 24 and then subtract 4 from the total. This should give you a number from 0 to 20 inclusive. This system of rolling dice is known as 4D6-4 and is spoken "Four die six minus four." To lean characteristics in favor of characters, such as specialized teams, roll 5D6 and remove the lowest die then continue as above.

Example; To find Joe's strength score we roll 4D6 and come up with the numbers 6, 3, 5 & 4. Adding them together we get a value of 18 and after the final subtraction of 4 we find he has a St. of 14.

Follow this same procedure for the rest of the attributes and record the results in the appropriate spaces on the individual's character sheet.

STRUCTURE AND BLOOD POINTS

The next step in creating a character is to calculate the Structure points and Blood points (Sp and Bp). This is one of the most important values that you give your character as all the damage systems are based on it. To calculate the Sp/Bp multiply the strength of a character times their constitution and add 100 to the product as is shown in the following formula.

(St x Const.) + 100 = Sp/Bp

This formula gives a range of values from 100 to 500 with the average being 250. This should be considered as equal to the character's mass or size.

The Sp value gives the maximum amount of damage a character may receive while the Bp is representative of the total amount of blood in the character's body. The two values are started as equal but are used separately. When a character is hit they suffer physical damage and blood loss. It is possible for a character to suffer a great deal of physical damage with almost no blood loss and still die. The reverse is also true, a relatively minor wound physically can cause the character to die from blood loss.

Physical damage is incurred according to the weapon type and the area hit. Further explanations on the specifics of the damage done can be found in the various weapons damage sections.

Division of the Sp value over the body allows for more realism in that specific areas can take only so much damage and still function. This division is accomplished by multiplying the Sp total by the decimal equivalent of that area's percentage of the body. Below is a table of the body percentages and their decimal equivalents.

BODY PERCENTAGES

BODY PART	PERCENTAGE	DECIMAL EQUIVALENT
Torso	38%	.38
Leg (each)	19%	.19
Thigh	8%	.08
Calf	5%	.05
Foot	4%	.04
Hip Joint	1%	.01
Knee	1%	.01
Ankle	1%	.01
Arm (each)	9%	.09
Upper arm	2%	.02
Lower arm	2%	.02
Shoulder joint, Hand, Elbow and Wrist	1%	.01
Head	6%	.06

There is a large section on the character sheet to account for each of the body's parts. To fill out this section simply multiply the total Sp's by the decimal equivalent of that part of the body. As the numbers are calculated round off upwards to the nearest whole number.

Another important aspect of your character is their Bp score. This score should also be accompanied by the character's blood type. If it becomes necessary in the course of a game to give a character a blood transfusion he must receive the proper blood type or it may kill him. This transfusion is given by either another character or an equipped medical section. Often another character is the only available option. To find a particular blood type use the following table for both the type and the Rh factor.

BLOOD TYPES

DIE ROLL	BLOOD TYPE
1-8	O
9-16	A
17-19	B
20	AB

DIE ROLL	Rh FACTOR
1-17	+ (positive)
18-20	- (negative)

Now you can fill out the section on blood type with both the blood's type and Rh factor.

PSI

If the GM wishes he may choose to use in the game the option of PSI or ESPER (extra sensory perception) powers. Giving this factor to a character is done in the same manner as the other attributes but it is much more difficult to receive an actual power. If the player rolls a PSI below 15 his character has no PSI power at all. If he rolls a 15 or greater he has the following chances of having a PSI ability.

PSI	% CHANCE OF PSI
15	5%
16-17	10%
18-19	15%
20	20%

As you can see having a high PSI score does not mean that one possesses an innate PSI talent and even if the die rolls indicate a positive result the talent may be of a low type. The type and strength of the PSI abilities are rolled from the following table.

PSI ABILITIES
Roll 1D100

DIE ROLL	TYPE, STRENGTH, AND LIMITATIONS	
1-10	EMPATHY,	Level 1 - 10% controllable with partial reception and no transmission.
11-18	EMPATHY,	Level 2 - 30% controllable with partial reception and no transmission.
19-24	EMPATHY,	Level 3 - 50% controllable with full reception and partial transmission.
25-28	EMPATHY,	Level 4 - 70% controllable with full reception and transmission.
29-30	EMPATHY,	Level 5 - 95% controllable with full reception and transmission.
31-38	HEALING,	Level 1 - 5% controllable to slow minor bleeding by 50% and arrest sickness.
39-44	HEALING,	Level 2 - 25% controllable to slow minor bleeding by 75% and arrest sickness.
45-48	HEALING,	Level 3 - 50% controllable to slow all bleeding by 75%, arrest sickness, and increase natural healing by 50%.
49-50	HEALING,	Level 4 - 75% controllable to slow all bleeding by 75%, to arrest and cure sickness and to speed healing by 50%.
51-52	HEALING,	Level 5 - 95% controllable to stop bleeding, arrest and cure sickness, and speed healing by 75%
53-58	TELEPATHY,	Level 1 - 10% controllable (tends to be sporadic) with partial reception and no transmission.
59-63	TELEPATHY,	Level 2 - 30% controllable with partial reception and no transmission.
64-67	TELEPATHY,	Level 3 - 50% controllable with full reception and partial transmission.
68-69	TELEPATHY,	Level 4 - 75% controllable with full reception and transmission.
70	TELEPATHY,	Level 5 - 95% controllable with full reception and transmission.
71-76	* TELEKINESIS,	Level 1 - 10% controllable for 1-20 grams at 1-20 meters distance.
77-80	* TELEKINESIS,	Level 2 - 30% controllable for 1-100 grams at 1-20 meters.
81-82	* TELEKINESIS,	Level 3 - 50% controllable for 50-500 grams at 1-50 meters.
83	*TELEKINESIS,	Level 4 - 75% controllable for 1-6 kilograms at 1-100 meters.
84	*TELEKINESIS,	Level 5 - 95% controllable for 2-24 kilograms in line-of-sight.
85-91	*PYROKINETICS,	Level 1 - 10% controllable for heat from 1-100 degrees within 1-6 meters.
92-94	*PYROKINETICS,	Level 2 - 30% controllable for heat from 50-200 degrees within 1-10 meters.
95-96	*PYROKINETICS,	Level 3 - 50% controllable for heat from 100-400 degrees within 10-40 meters.
97-98	*PYROKINETICS,	Level 4 - 75% controllable for heat from 100-600 degrees within 10-40 meters.
99	*PYROKINETICS,	Level 5 - 95% controllable for heat from 100-1000 degrees within line-of sight.
00	Roll twice from this table ignoring another 00.	

* For these powers roll the strength limitations once and record them. If the GM wishes they may be increased in relation to their use.

MOVEMENTS

Movement of the characters is determined by the individual's dexterity score. As the individual's dexterity is higher they may do more movements in a given time (combat turn).

DEXTERITY	MOVEMENTS
0-4	1
5-8	2
9-13	3
14-18	4
19-20	5

A character may commit any or all of it's movements during a combat turn. The movements also include moving over a distance. However, if the character's movements allowance is above 2 the individual may commit other actions while moving.
Example; Joe has a dexterity of 11 and may do 3 movements per combat turn. During a firefight Joe can run from point A to point B, and, while running, draw and fire his pistol. He cannot grab a grenade off his belt, pull the pin and throw it, all while running, as this requires 4 movements.

ACTIONS

Below is given a list of several common actions and the movements required to complete them. The list is by no means complete and is intended as a guide in determining other actions and their movement requirements.

MOVEMENTS	ACTIONS
1	Move
1	Mount/ Dismount
1	Draw weapon/equipment (each piece)
1	Fire weapon
1	Aim weapon (maximum accuracy)
1	Reload weapon (clip feed)
1	Holster or sheath weapon
1	Prepare explosive charge (set detonator)
1	Arm weapon (pull pin on grenade or detonator)
1	Throw weapon (grenade, knife, or explosive)
1	Prepare ammunition (arm fuse or shell)
2	Prepare disposable weapon for firing
2	Assemble weapon (attach scope, silencer, etc.)
2	Clear action (work action or clear jam)
2	Open/Close hatch or door
3	Load revolver or belt fed weapon
3	Unpack weapon or ammunition (remove from carrying container, case, or crate)
3	Aim or re-aim mortar
3	Put on protective mask (gas mask)
6	Reload missile launcher (TOW or Dragon)
30	Don or remove powered armor (HAAM Suit)

TRAVEL MOVEMENT

Movements also include covering ground, that is the act of getting from one place to another. The amount of distance covered is dependent on the moving object's speed and length of time it travels. The rate of travel varies depending on the terrain being covered. In the case of vehicular travel it has been found that tracked vehicles must cruise at a slower rate then wheeled vehicles to prevent excessive wear on the tracks.

The following tables are for use in determining the distance a character can travel in a given situation. The first tables refer to foot travel. These tables are broken up into the following categories;
Normal; This is a walk with only normal alertness and care in traveling.
Double time; A quick march, almost a jog but not quite.
Searching; Taking time to look carefully through the surrounding area.
Movement under cover; Taking advantage of all possible cover while moving and trying not to be seen.
Running; A dead run ignoring cover and noise.

The other sets of tables refer to vehicular travel. There is no maximum rates listed as these are determined by the specific vehicle type. The listings run much the same as for foot travel with the following different movement rates;
Blackout; This is driving at night using vision devices and having all visible light turned off.
Cover and movement; This is moving from one covered position to another keeping a close watch on all the activity in an area.

The tables list two numbers for most categories. These refer to movement in day or night. The first is for movement in daytime and the second is for movement at night. Vehicles normally run at night with headlights on.
Note; If using a night vision device while on foot use the Movement under cover rate of march for daytime.

FOOT MOVEMENT RATES

(meters per game turn) RATES	ROADS	CROSS COUNTRY	SWAMPS OR MOUNTAINS	WATER
Normal	800/534	400/267	200/134	270
Double time*	1600/1068	800/534	400/267	405
Searching	400/267	200/134	100/67	n/a
Movement under cover	200/134	100/67	50/34	n/a
Running**	2400/1602	1600/10681	n/a	n/a
(meters per combat turn)				
Normal	5/4	3/2	1/1	2
Double time*	11/7	5/4	2/2	3
Searching	3/2	1/1	1/1	n/a
Movement under cover	1/1	1/1	1/1	n/a
Running**	16/11	11/7	n/a	n/a

VEHICULAR MOVEMENT RATES

(meters per game turn)

RATES WHEELED	Roads	Trails	Cross Country	Swamps or Mountains	Water ***
Normal	4000/4000	3000/3000	1200/800	600/400	500
Blackout	1600	1200	800	400	n/a
Searching	2000/2000	1500/750	1000/1000	500/500	n/a
Cover and movement	1000/1000	750/750	500/500	250/250	n/a
(meters per combat turn)					
Normal	27/27	20/20	8/5	4/3	3
Blackout	11	8	5	3	n/a
Searching	13/13	10/5	7/7	3/3	n/a
Cover and movement	7/7	5/5	3/3	2/2	n/a

(meters per game turn)

RATES TRACKED					
Normal	2400/2400	1800/1800	1600/800	800/400	500
Blackout	1600	1200	800	400	n/a
Searching	1600/1600	1200/1200	800/800	400/400	n/a
Cover and movement	1000/1000	750/750	500/500	250/250	n/a
(meters per combat turn)					
Normal	16/16	12/12	11/5	5/3	3
Blackout	11	8	5	3	n/a
Searching	11/11	8/8	5/ 5	3/3	n/a
Cover and movement	5/5	4/4	3/3	1/1	n/a

*Uses 3 times the endurance points
** Uses 6 times the endurance points
***Amphibious vehicles only

Note; Vehicles running at night with no headlights or vision devices move at ½ the blackout rate.

NON-HUMAN MOVEMENT

The movement of non-humans (animals) use the tables for human foot travel. On the average, biped animals travel at twice the human rate and quadruped animals travel at four times the human rate. Any creatures who normally live in one of the terrains that limit travel (i.e. Mountains or Swamps) run at the Cross Country rate for their rate of travel for that area.
Example; A Snapper would be able to travel in a swamp at 400m (daytime) per game turn and 3m (daytime) per combat turn.

All creatures who normally "see in the dark" (hunt or travel at night) would travel at night as if using night vision devices.

ENDURANCE

The total endurance of a player's character is found by multiplying the constitution score times the dexterity score. The resulting number is used to decide how long a character can work and otherwise exert themselves.

In combat there is a loss of one point for each combat turn the player is involved in. This includes combat turns in which actual fighting does not occur. When the endurance score reaches zero the character's dexterity score reaches one inside of 4 turns (roll 1D4). This allows for a "warning" of exaustion to be given to the player.

In normal game turns where a character is doing work or must stay alert, there is a loss of one point per turn. Again, when all the endurance points are used the dexterity reaches one within 4 turns.

RESTING

To regain points a character must rest. There is a gain of 2 points per turn in which the character is just sitting and need not be alert, such as a passenger in a vehicle. A gain of 4 points per turn takes place when the character is asleep. There is a gain of 5 points for the character sitting and eating a meal. This may only be gained once every 4 hours.

STIMULANTS

Stimulants give a gain of 50 points endurance for each injection. However the points are "artificial" in that the character is forcing the burning of his body's reserves. It is due to this that when the stimulant has worn off, the points have been used, the character goes into negative endurance points. In this situation, more than the normal point allowance has been used and the character will immediately drop from exhaustion when the stimulant wears off. The points used by the stimulant must first be regained before any recovery of the normal endurance points takes place.

Note; The character may not rest until all the stimulant points are used or an antidote (sleep injection) is given. If the negative points used are equal to the normal endurance points, from taking multiple injections, the character has an 80% chance of death, minus 5% for each point of constitution, from exhaustion.

Example; Joe must get to point Z and report as soon as possible. He has used all but 10 of his 150 endurance points and still has 20 turns of movement to do before he gets to point Z. He takes an injection of stimulant from his Medkit and gains another 50 points. When he gets to point Z and reports he still has 40 points left from the stimulant that must wear off before he can sleep. When he finally gets to sleep, 40 turns later, he must sleep for 50 turns (8½ hours) to regain all his 150 points plus the 50 points he gained from his stimulant. If he is awakened inside of 12 turns he has not regained the points used by the stimulant and is exhausted (Dexterity = 1).

THE PERSONNEL OF THE MORROW PROJECT

TYPES OF MORROW TEAMS

A team is defined by the American Heritage Dictionary as: "any group organized to work together: a team of engineers." Such are the small groups of people that are put together by, and make up, the Morrow Project. Each group must work together for their own survival and the completion of the mission of the Project.

While each team is equipped to survive on its own, it proved impossible to equip all the teams for every possible contingency. In the overall plan to rebuild after the war the Project had given each team a speciality and equipped them for it. This is why each team is (or can be) so different from the others in the equipment they are issued. Some Recon teams are equipped almost as well for heavy combat as a MARS unit, except that they were not given all the training of a military unit. Others are more specialized teams which include Engineering, Agricultural, and Medical teams.

Listed below are the major types of teams the Project considered necessary to the successful completion of the Project's mission.

RECONNAISSANCE (RECON) Teams; These are the general purpose teams intended to seek out the condition of the countryside ahead of the other teams to help Prime Base decide what other teams should next be awakened. These are the most numerous type of team and also the most variable. Recon teams may be crewed by from two to six people and be equipped in any one of a half-dozen different type of vehicles. These vehicles include the Commando V150 in all i. variations, the Commando Scout, the Commando Ranger, the XR311 , and even the SK-5. The GM will probably wish to begin his newer players (and possibly himself) by first running the simpler Recon vehicles and teams. As GM you may assign any vehicle to any type of team, the vehicles in the equipment section all have some passenger capacity and suggested uses in the descriptions.

SCIENTIFIC Teams; A non-specialized team designed to be capable of coping with just about any situation. The Scientific units are specially designed mobile laboratories with facilities for the practical use of just about any of the sciences from biology to nuclear physics. These vehicles are equipped with armament second only to that supplied to the MARS teams. The crews are all trained scientists and technicians.

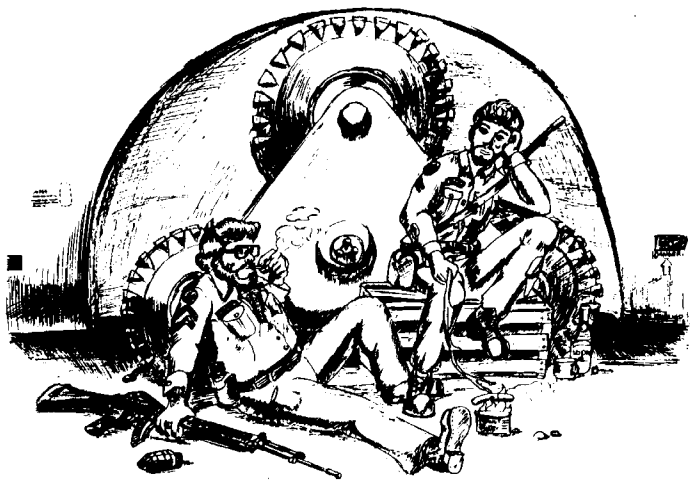
MARS Teams; The warriors of the Morrow Project. MARS stands for Mobile Assault, Rescue, and Strike forces. The members of these teams are equipped with heavy weapons and the knowledge of how to use them. The teams are centered around the 4 MARS ONE vehicles, heavily armed mobile command posts. The MARS teams are in no way mercenaries but are pledged to defend the Morrow Project and the people it was created to help. Many of the members of the MARS teams are veterans and as such have higher scores in accuracy, strength, and dexterity than some of the other Morrow teams.

SPECIALTY Teams; This is the broad term applied to any Morrow team which has a specific function in regards to its equipment and personnel. A specialty team generally requires that someone with the knowledge of the specialty be in the players group. This is not a requirement, it is just that we have found it is more fun to have someone there who can retain some of the realism in the game play. Specialty teams generally consist of several vehicles each. The teams are frozen separately and are intended to meet in a predesignated rendezvous. Most specialty teams are not as heavily armed as the Recon or MARS teams as it was felt that they could not make the inhabitants fear them and yet still complete their assignment. Listed below are some of the specialty teams assigned to the Morrow Project.

Engineering teams; Building, construction, repair and maintenance.

Agricultural teams; Farming and livestock, biologically and botanically equipped to assist farming communities.

Psychological teams; Formed to handle extremist groups and rioting mobs.



JOBS AND POSITIONS

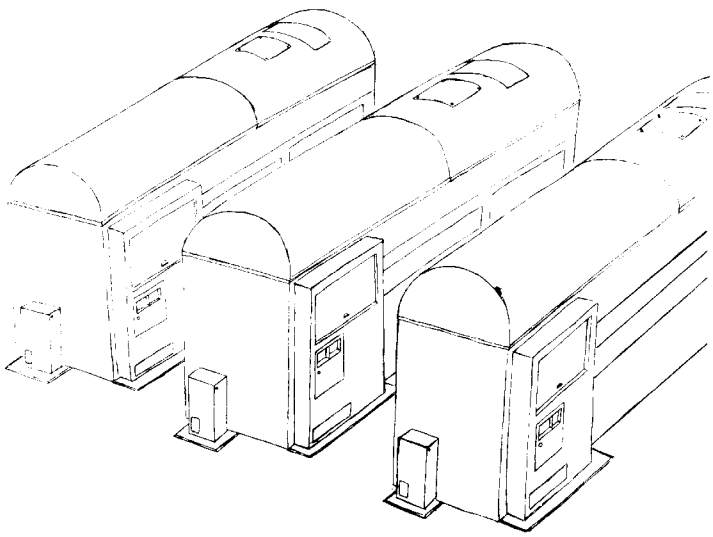
Each player/character in the Morrow Project has a job to do. We suggest that the GM have an assortment of jobs available to the players but not to hesitate in assigning them if necessary.

The choice of jobs that need to be done are actually easier than one might first realize. Each vehicle and team have certain requirements that must be filled if they are to function properly. You might for instance have a Recon team with a V-150 vehicle. The designation Recon team gives the unit no special prioritys except that they have a scout. The V-150 on the other hand, must have a crew of at least two to man it properly and, depending on the weapons, may need a larger crew. There has to be at least a driver and a commander/gunner who operates the machinegun.

Needless to say, it is often very necessary for characters to double up on assignments. For example, the team commander is usually the top gunner and the driver can act as a mechanic if needed. All members of a team know at least the basics of each others job so they can do it in the case of an emergency.

It is not difficult to invent the necessary jobs, only a little thought is required. All vehicles need someone to drive them, equipment needs an operator, weapons require a gunner in most cases. The MARS teams must have some trained military men, the Scientific teams must have scientists or technicians each with their own specialty. The necessary jobs make themselves obvious if you look for them. We have found it advisable to have someone who is playing a doctor or driver play another character as well as these characters tend to have long periods with nothing to do.

It is also amusing to give the players temporary duties such as the infamous "KP", after all every character has to eat sometime.



THE FREEZING PROCESS

The first achievement of the Morrow Project at the time of it's founding in 1962 was the development of a means by which volunteers could survive the coming nuclear holocaust and the chaos which was to follow. Morrow scientists perfected the science of cryogenics early in 1964 and immediately began placing groups of volunteers into "cold sleep".

The freezing process operates by creating a controlled environment of intense cold. It is intended to slow the human metabolic rate to a level where it is almost undetectable. This environment is maintained through the use of a complex balance of gases which dissolve in the body fluids to aid in the prevention of ice crystals forming in the cells of the body. Careful monitoring of the temperature along with precise application of microwave heating prevents any possibility of ice crystals forming.

When the electronic wake up signal is received by the freezing unit it immediately begins the warming procedure. The body's temperature is brought up slowly and uniformly by the application of microwaves. At this point the persons blood is run through a chemical filter which removes any remaining dissolved gases. As the body approaches normal temperature several minor electrical shocks are administered to the body to stimulate muscle and nerve tissue, most notably the heart. Should the heart not immediately start, an automatic heart massage and respirator begins to function. If all attempts to resuscitate the patient fail the unit puts him back into cold storage until a doctor can later attempt to awaken him.

The Morrow freezing capsules underwent many refinements over the years from 1964 to 1989 and as each year came and went the teams that were put to sleep had an increasing chance of survival out of freezing.

Note; This information is for planning use only. The authors highly recommend that after the long process involved in creating a character you do not kill them off in the freezing tube before they have had a chance to play.

PLACEMENT OF THE TEAMS

The question of survival during and after a nuclear war was only one of the problems which the Project had to overcome. Besides the freezing process which preserved the teams until their revival, there was the problem of where to place the cryogenics and other equipment, as well as how to place them. Morrow himself made the suggestion that each team should be separate from any other, on the basis that a widely separated force such as this would be less likely to fall victim to unforeseen circumstances. There was, after all, no way to protect huge bunkers housing large numbers of people from the possibilities of a near miss or direct hit from nuclear weapons. While the probability of such a disaster could be kept quite low, just the possibility of such a problem was enough to begin the placement of each individual team a minimum distance from any other.

Individual bunkers were then buried around the country in widely varying locations; and as a further precaution against any kind of catastrophy overtaking more than one group, only a few of the specialized teams had more than a vague idea of the location of any other team.

Prior to the game (or the campaign, should the GM be planning one) careful note should be taken of the positions and other pertinent information on each team placed. Such information should include:

1. The date that each team was orginally placed. (This may come in handy in determining the level of equipment that the team carries.)
2. The exact location of placement. Include the nearest town or city, state, latitude and longitude.
3. The type of team as originally placed.
4. The number of team members originally frozen.
5. A complete list of all important equipment and weapons available at the bunker.

When the GM is placing the teams there are a few pieces of advice that we would like to impart. It is best to place all of your teams before you actually throw out any stray nuclear warheads. That way there is a possibility that a bomb could land near a Morrow bunker and make life interesting. We also suggest that the teams be placed close to some small town but a good distance from any obvious hotspots such as the larger cities and military installations.

AVAILABLE EQUIPMENT AND WEAPONS

It must be remembered that after a nuclear war, equipment of a technological nature will have fallen into disuse or disrepair within a relatively short time. With the major manufacturing centers destroyed it will have been impossible to obtain spare parts, and the specialized knowledge needed to repair many things we take for granted will have been lost. Barring very special and isolated cases it is certain that electrical power will be non-existent. Automobiles will have quit on the roads and have been left were they stood for lack of fuel.

Weapons would also have been severly affected. For the first few years they would probably be very common, because almost every family owns a gun or two, especially in the country. Until the ammunition ran low they would prove to be most necessary for survival. When the ammo ran out, however, there would prove to be few facilities for making more. Thus firearms will also take a big drop in technology, although they won't vanish completely because of their usefulness. There will be enough ingenuity to manufacture

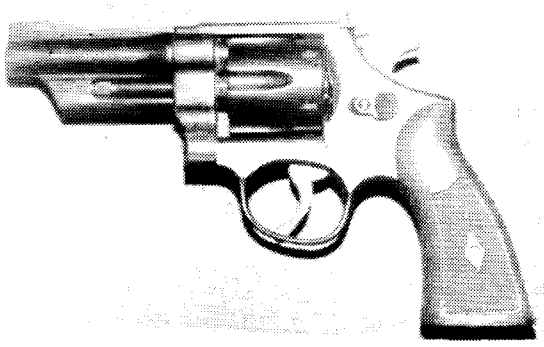
homemade firearms and at least partially repair the older weapons. The technological level would be equivalent to the 1870's.

In these respects the Morrow teams would have a tremendous advantage over anyone they encounter in the course of the game. Their equipment is in prime working condition when they awaken, and the crews have the necessary tools and knowledge to keep their equipment in good repair. (It should be noted that the GM may wish to require 1-2 hours per day of maintenance on equipment). It is the possession of such good equipment that causes all Morrow teams to be the object of such greedy consideration by every selfish survivor in the area. This is the reason that Morrow personnel are given adequate means to defend themselves.

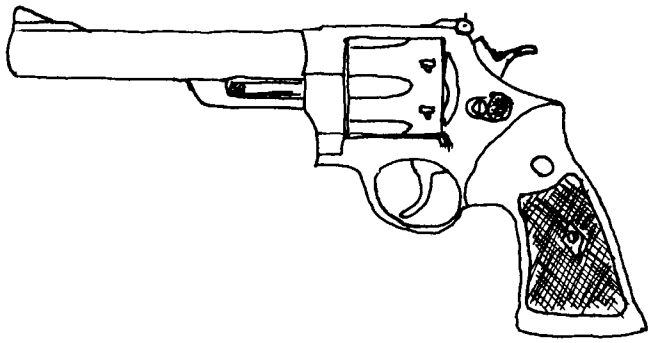
WEAPONS AND EQUIPMENT

TYPE: Pistols

NAME Browning HP-35
CAL. 9x19 mm
E-FACTOR 9
WT. (EMPTY) .88 kg
EFF. RNG. 45m
MAX. RNG. 2012m
TYPE OF FIRE Semi-automatic
RATE OF FIRE 40 rpm
FEED DEVICE 13 rd magazine
FEED DEVICE WT. .2kg
BASIC LOAD 3 magazines (39 rds)
LOAD WT. .6 kg
TOTAL WT. 1.48 kg
ADDITIONAL COMMENTS This pistol, also known as the Browning Hi-Power, fires a single shot for each pull of the trigger. It's 13 round magazine is a distinct advantage in close-in fighting. The weapon may be fitted with a silencer (wt. .545kg).

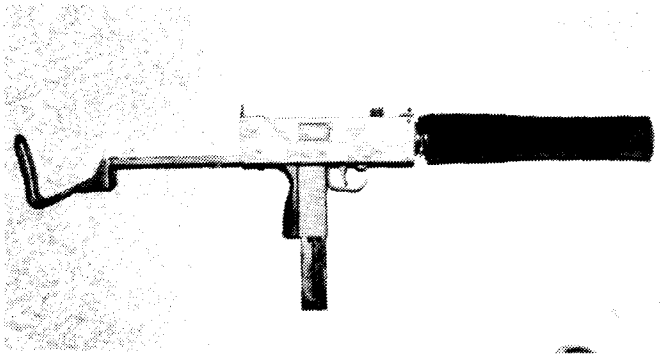


NAME Smith & Wesson M27-3½
CAL. .357 Magnum
E-FACTOR 10
WT. (EMPTY) 1.238 kg
EFF. RNG. 75m
MAX. RNG. 2150m
TYPE OF FIRE Single-shot repeater
RATE OF FIRE 24 rpm
FEED DEVICE 6 rd cylinder
FEED DEVICE WT. n/a
BASIC LOAD 24 rds
LOAD WT. .45 kg
TOTAL WT. 1.688 kg
ADDITIONAL COMMENTS A snub-barreled, heavy framed revolver. It can fire both .38 Special as well as .357 Magnum ammunition (E-factor = 8 with .38 Special). The short barrel on this weapon allows it to be more easily concealed.

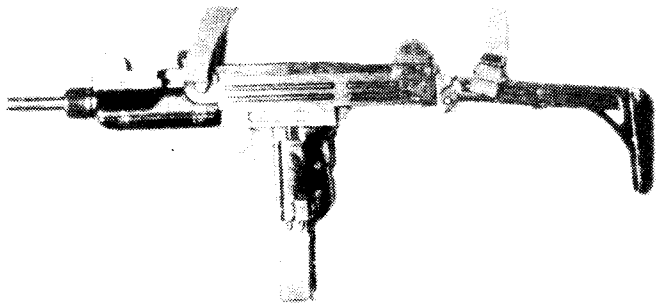


NAME Smith & Wesson M29-6¼
CAL. .44 Magnum
E-FACTOR 13
WT. (EMPTY) 1.35kg
EFF. RNG. 150m
MAX. RNG. 2290m
TYPE OF FIRE Single-shot repeater
RATE OF FIRE 24 rpm
FEED DEVICE 6rd cylinder
FEED DEVICE WT. n/a
BASIC LOAD 24 rds.
LOAD WT. .56kg
TOTAL WT. 1.91kg
ADDITIONAL COMMENTS An extremely powerful handgun, the equal to a rifle in some cases. Not commonly issued due to its recoil and power making it difficult to handle.

TYPE Submachineguns

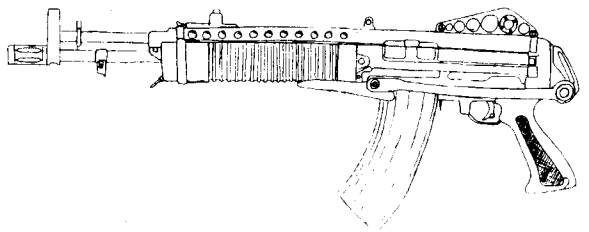


NAME Ingram M10
CAL. 9x19mm
E-FACTOR 9
WT. (EMPTY) 2.84kg
EFF. RNG. 100m
MAX. RNG. 2012 m
TYPE OF FIRE Selective fire
RATE OF FIRE 40/96 rpm
FEED DEVICE 32 rd magazine
FEED DEVICE WT. .62kg
BASIC LOAD 12 magazines (384 rounds)
LOAD WT. 7.44kg
TOTAL WT. 10.28kg
ADDITIONAL COMMENTS A small submachinegun carried in a hip holster as a pistol would be. It is issued with a silencer (included in the weight data).

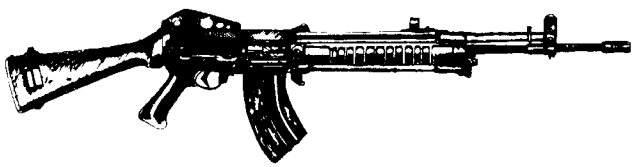


NAME UZI No 2 , Mk A
CAL 9x19 mm
E-FACTOR 9
WT. (EMPTY) 3.6kg
EFF. RNG. 200m
MAX. RNG. 2012m
TYPE OF FIRE Selective fire
RATE OF FIRE 64/128 rpm
FEED DEVICE 32 rd magazine
FEED DEVICE WT. .62 kg
BASIC LOAD 12 magazines (384 rounds)
LOAD WT. 7.44kg
TOTAL WT. 11.04kg
ADDITIONAL COMMENTS A very rugged submachinegun equipped with a folding stock. Its compact design allows the weapon to be fired with only one hand. Its size is such that it can easly be carried slung at the hip ready for instant use.

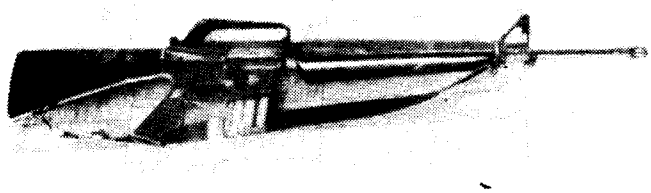
TYPE: Rifles



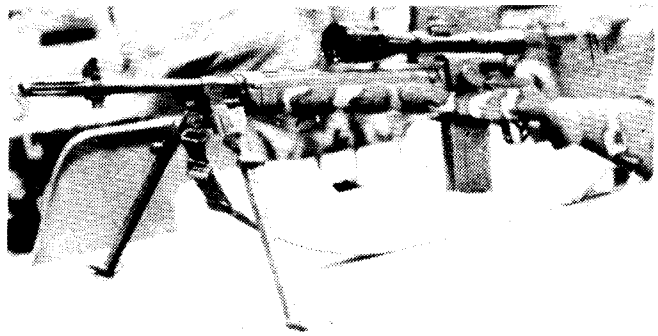
NAME Stoner M23 Carbine
CAL. 5.56x45mm
E-FACTOR 14
WT. (EMPTY) 3.7kg
EFF. RNG . 300m
MAX. RNG. 2,600 m
TYPE OF FIRE Selective fire
RATE OF FIRE 40/94 rpm
FEED DEVICE 30 rd magazine
FEED DEVICE WT. .455kg
BASIC LOAD 12 magazines (360 rounds)
LOAD WT. 5.46 kg.
TOTAL WT. 9.16 kg
ADDITIONAL COMMENTS This is a lightweight, folding stock carbine version of the Stoner weapons system. In the system any one of several different weapons can be assembled from a single set of components (see Firearms Use).



NAME Stoner M22 Rifle
CAL. 5.56x45mm
E-FACTOR 15
WT. (EMPTY) 3.7kg
EFF. RNG. 400m
MAX RNG. 2,653m
TYPE OF FIRE Selective fire
RATE OF FIRE 90/94 rpm
FEED DEVICE 30 rd magazine
FEED DEVICE WT. .455kg
BASIC LOAD 12 magazines (360 rounds)
LOAD WT. 5.46 kg
TOTAL WT. 9.16kg
ADDITIONAL COMMENTS This rifle version of the Stoner system has a longer barrel and a fixed stock as compared to the carbine.

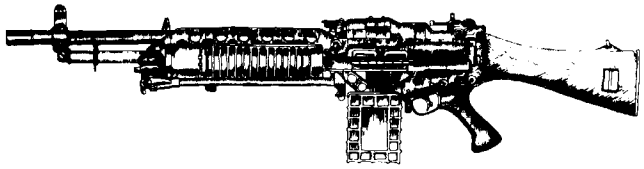


NAME M16A1
CAL. 5.56x45mm
E-FACTOR 15
WT. (EMPTY) 3.18kg
EFF. RNG. 400m
MAX. RNG. 2,653 m
TYPE OF FIRE Selective fire
RATE OF FIRE 45/150 rpm
FEED DEVICE 30 rd. magazine
FEED DEVICE WT. .455kg
BASIC LOAD 12 magazines (360 rounds)
LOAD WT. 5.46 kg
TOTAL WT. 8.64 kg
ADDITIONAL COMMENTS The standard rifle of the U.S. Army. It can be mounted with either a starlight scope or a standard telescopic sight. The rifle can also be equipped with the M203 40mm grenade launcher.



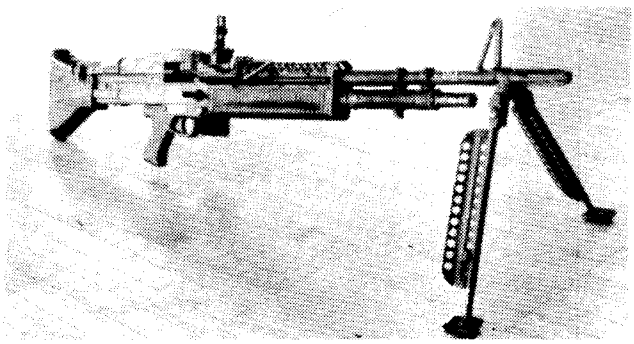
NAME M21 Sniper rifle
CAL. 7.62x51mm
E-FACTOR 17
WT. (EMPTY) 5.3kg
EFF. RNG. 1000m
MAX. RNG. 3,725m
TYPE OF FIRE Semi-automatic
RATE OF FIRE 40 rpm
FEED DEVICE 20rd magazine
FEED DEVICE WT. .68kg
BASIC LOAD 12 magazines (240 rounds)
LOAD WT. 8.16kg
TOTAL WT. 13.46kg
ADDITIONAL COMMENTS This sniper rifle is built on a highly accurate version of the M14 rifle. The weapon comes equipped with a telescopic sight and a sionics noise suppressor (silencer.) The telescopic sight can be removed and a starlight scope attached for use at night.

TYPE: Machineguns



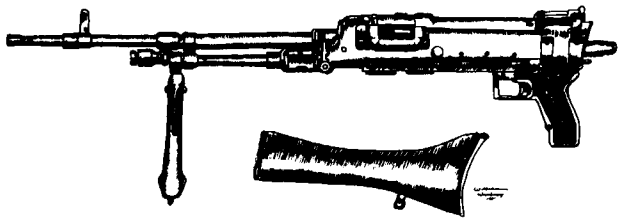
NAME Stoner Mk23
CAL. 5.56x45mm Linked
E-FACTOR 14
WT. (EMPTY) 4.5 kg
EFF. RNG. 700m
MAX. RNG. 2,650m
TYPE OF FIRE Full automatic
RATE OF FIRE 150 rpm
FEED DEVICE 150 rd belt
FEED DEVICE WT. 1.95 kg
BASIC LOAD 4 belts (600 rounds)
LOAD WT. 7.8 kg
TOTAL WT. 12.3kg
ADDITIONAL COMMENTS A short, lightweight, belt fed machinegun version of the Stoner weapons system. Also referred to as a "commando" machinegun.

NAME Stoner M207
CAL. 5.56x45mm Linked
E-FACTOR 15
WT. (EMPTY) 5.4kg
EFF. RNG. 800m
MAX. RNG. 2,650m
TYPE OF FIRE Full automatic
RATE OF FIRE 150 rpm
FEED DEVICE 150 rd belt
FEED DEVICE WT. 1.95kg
BASIC LOAD 4 belts (600 rounds)
LOAD WT. 7.8 kg
TOTAL WT. 13.2kg
ADDITIONAL COMMENTS This is a heavier, longer range version of Stoner system machineguns.

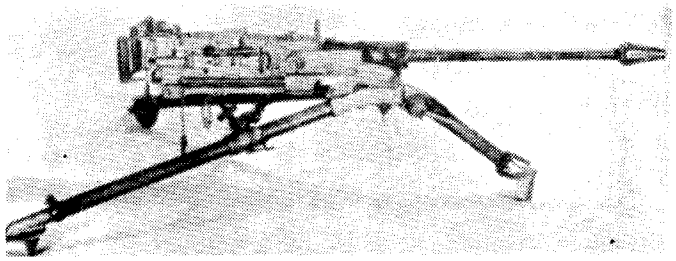


NAME M60
CAL. 7.62x51mm Linked
E-FACTOR 17
WT. (EMPTY) 10.51kg
EFF. RNG. 1,200m
MAX. RNG. 3,100m
TYPE OF FIRE Full automatic
RATE OF FIRE 200 rpm
FEED DEVICE 100 rd belt
FEED DEVICE WT. 2.94kg
BASIC LOAD 3 belts (300 rounds)
LOAD WT. 8.82kg
TOTAL WT. 19.33kg

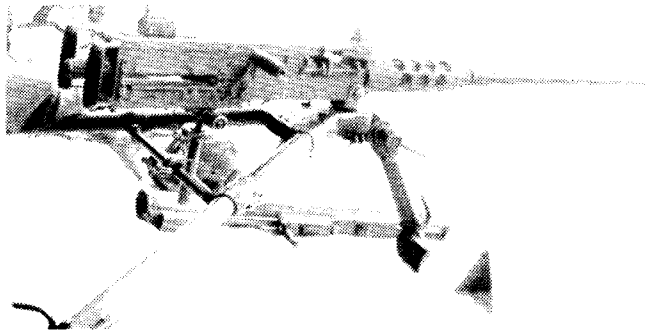
ADDITIONAL COMMENTS The standard issue U.S. Army machinegun. It can be mounted on a tripod or used on its own built-in bipod. Mounted on the tripod the weapon can use the larger 250 round belt.



NAME MAG-58
CAL. 7.62x51mm Linked
E-FACTOR 17
WT. (EMPTY) 10.85kg
EFF. RNG. 1,200 m
MAX. RNG. 3,100m
TYPE OF FIRE Full automatic
RATE OF FIRE 250 rpm
FEED DEVICE 100 rd belt
FEED DEVICE WT. 2.94 kg
BASIC LOAD 3 belts (300 rounds)
LOAD WT. 8.82kg
TOTAL WT. 19.67kg
ADDITIONAL COMMENTS A strongly built machinegun which can be either bipod or tripod mounted. The weapon is very often found mounted on vehicles that carry a 7.62mm machinegun.



NAME M85C
CAL. 12.7x99mm linked
E-FACTOR 30
WT. (EMPTY) 30.6kg
EFF. RNG. 1000m
MAX. RNG. 6,660m
TYPE OF FIRE Selective fire
RATE OF FIRE 70/150 rpm
FEED DEVICE 105 rd belt
FEED DEVICE WT. 13.05kg
BASIC LOAD 3 belts (315 rounds)
LOAD WT. 39.05kg
TOTAL WT. 69.65kg (89kg with tripod)
ADDITIONAL COMMENTS A shortened lightweight .50 caliber gun designed to be mounted in vehicle turrents. The gun can be mounted on a tripod for ground use.

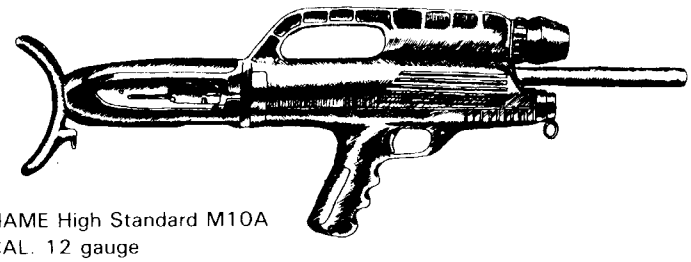


NAME M2HB
CAL. 12.7x99mm Linked

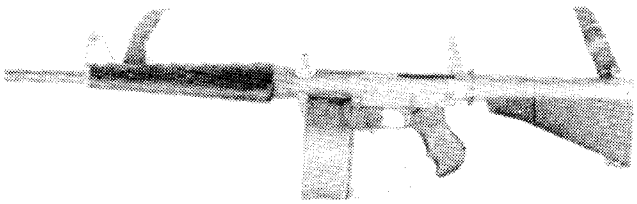
E-FACTOR 30
WT. (EMPTY) 38.1kg
EFF. RNG. 1,300m
MAX. RNG. 6,660m
TYPE OF FIRE Selective fire
RATE OF FIRE 70/150 rpm
FEED DEVICE 105 rd belt
FEED DEVICE WT. 13.05kg
BASIC LOAD 3 belts (315 rounds)
LOAD WT. 39.05kg
TOTAL WT. 77.15kg (96.5kg with tripod)
ADDITIONAL COMMENTS This gun is designed to be fired from either a tripod or a vehicle mount. Its great weight and heavy recoil requires it to be firmly set before firing and prevents any possibility of hip-firing it. The weapon's size and weight requires at least a three man crew to carry the weapon and its ammunition.

NAME Rh 202
CAL. 20mm
E-FACTOR 57
WT. (EMPTY) 81.5kg
EFF. RNG. 2,000m
MAX. RNG. 7,000m
TYPE OF FIRE Selective fire
RATE OF FIRE 70/100 rpm
FEED DEVICE 100 rd belt
FEED DEVICE WT. 41.7kg
BASIC LOAD n/a
LOAD WT. n/a
TOTAL WT. 157.55kg
ADDITIONAL COMMENTS A "machine cannon" mounted in vehicle turrents. It can fire either high-explosive, armor piercing or incendary ammunition at the switch of a lever. The E-factor shown is for the armor piercing ammunition.

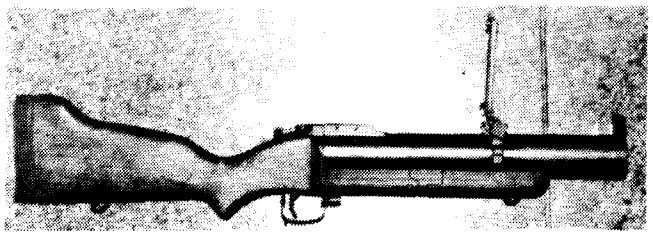
TYPE: Miscellaneous



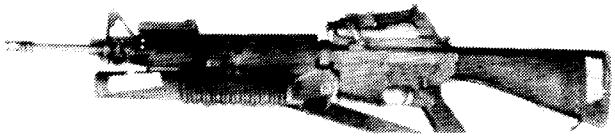
NAME High Standard M10A
CAL. 12 gauge
E-FACTOR 8
WT. (EMPTY) 3.6kg
EFF. RNG. 90m
MAX. RNG. 510m
TYPE OF FIRE Semi-automatic
RATE OF FIRE 25 rpm
FEED DEVICE 5 rd tubular magazine
FEED DEVICE WT. .4kg
BASIC LOAD 50 rounds
LOAD WT. 4kg
TOTAL WT. 7.6kg
ADDITIONAL COMMENTS A semi-automatic shotgun action inside a nylon sheath. The weapon has a buttstock that swivels which is braced against the inside of the right arm so the weapon can be fired accurately one-handed. The flashlight on top of the weapon is focused so the shot pattern hits in the center of the light beam. Where the light hits is where the shot impacts. The E-factor and ranges shown are based on magnum 00 buckshot.



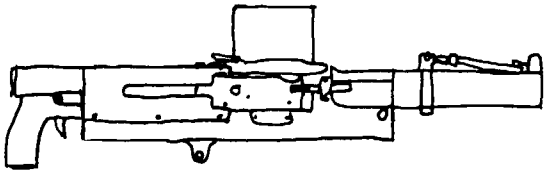
NAME Atchisson assault shotgun
CAL. 12 gauge
E-FACTOR 8
WT. (EMPTY) 5.2kg
EFF. RNG. 90m
MAX. RNG. 510m
TYPE OF FIRE Selective fire
RATE FIRE 45/90 rpm
FEED DEVICE 20 rd drum
FEED DEVICE WT. 1.8kg
BASIC LOAD 4 drums (80 rounds)
LOAD WT. 7.2 kg
TOTAL WT. 12,4 kg
ADDITIONAL COMMENTS A "machine-shotgun" firing 12 gauge shotshells of any load. Normally loaded with 00 buckshot magnum loads (12. 33 cal. pellets per shell).



NAME M79 Grenade Launcher
CAL. 40mm
E-FACTOR **
WT. (EMPTY) 2.72 kg
EFF. RNG. 350m
MAX. RNG. 400m
TYPE OF FIRE Single shot
RATE OF FIRE 15 rpm
FEED DEVICE Break open manual loading
FEED DEVICE WT. .27kg
BASIC LOAD 36 rounds
LOAD WT. 9.72kg
TOTAL WT. 12.44kg
ADDITIONAL COMMENTS A "shotgun" type grenade launcher firing various 40mm shells. It fires the grenades common to all the 40mm launchers. It can also fire a rocket powered grapnel hook to a height of 150m (hook wt. 2.25kg).



NAME M203 Grenade Launcher
CAL. 40mm
E-FACTOR **
WT. (EMPTY) 1.36kg
EFF. RNG. 350m
MAX. RNG. 400m
TYPE OF FIRE Single Shot
RATE OF FIRE 15 rpm
FEED DEVICE Slide action manual loading
FEED DEVICE WT. .27kg
BASIC LOAD 36 rounds
LOAD WT. 9.72kg
TOTAL WT. 11.08kg
ADDITIONAL COMMENTS A grenade launcher designed to be mounted underneath an M16A1 rifle. When mounted on the rifle both weapons can be fired simultaneously. The launcher cannot be used unless it is mounted on the rifle.

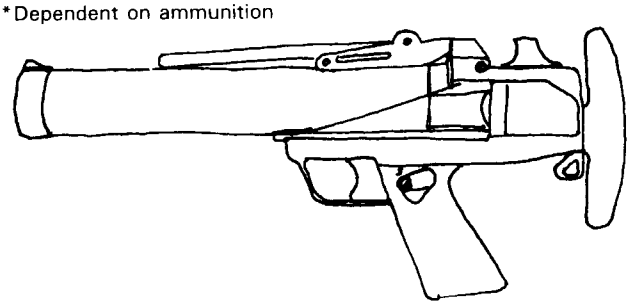


NAME M174E3 Grenade Launcher

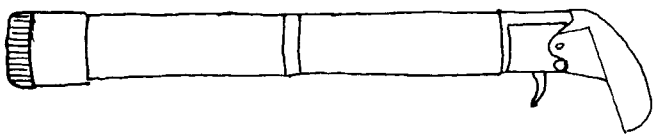
CAL. 40mm
WT. (EMPTY) 7.25kg
EFF. RNG. 400m
MAX. RNG. 400m
TYPE OF FIRE Selective fire
RATE OF FIRE 40/90 rpm
FEED DEVICE 12 rd drum
FEED DEVICE WT. 4.5kg
BASIC LOAD 3 drums (36 rounds)
LOAD WT. 13.5kg
TOTAL WT. 20.75kg (M122 tripod wt. 6.35kg)
ADDITIONAL COMMENTS A machinegun grenade launcher. It may be either tripod mounted or hand held and fired. It fires all the 40mm family of grenades except the M576E2 Multiple projectile.

Note; The M122 tripod also fits the M60, MAG-58, and Stoner machineguns.

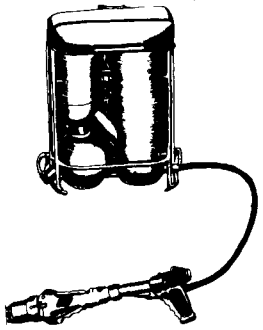
**Dependent on ammunition



NAME HK69A1 Grenade launcher
CAL. 40mm
E-FACTOR **
WT. (EMPTY) 1.8kg
EFF. RNG. 350m
MAX. RNG. 400m
TYPE OF FIRE Single shot
RATE OF FIRE 15 rpm
FEED DEVICE Break open manual loading
FEED DEVICE WT. .27kg
BASIC LOAD 36 rounds
LOAD WT. 9.72kg
TOTAL WT. 11.52kg
ADDITIONAL COMMENTS A short, folding stock grenade launcher. The weapon, with the stock folded, can be carried in a hip holster.



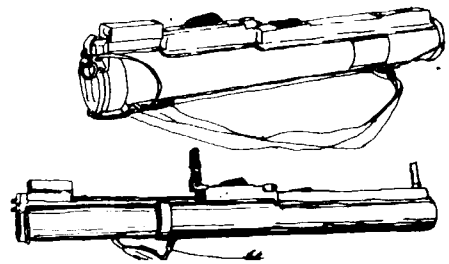
NAME HAFLA-35L
CAL. 35mm
E-FACTOR n/a
WT. .625kg
EFF. RNG. 70m
MAX RNG. 70m
TYPE OF FIRE Single shot disposable
BASIC LOAD 3 rounds
LOAD WT. 1.85kg
TOTAL WT. 1.875kg
ADDITIONAL COMMENTS A single shot disposable "flamethrower" firing an incendary shell. The shell burns at 1,300°C. for 120 seconds.



NAME M9A1-7 Flamethrower
WT. (EMPTY) 11.8kg
EFF. RNG. 55m
MAX. RNG. 55m
TYPE OF FIRE Semi-automatic
RATE OF FIRE 5 rpm
FEED DEVICE 4¼ gallon tank
FEED DEVICE WT. 10.9kg
BASIC LOAD one filling
TOTAL WT. 22.7kg
ADDITIONAL COMMENTS A backpack type flamethrower with a hand-held flamegun. The flamegun can fit inside a hip holster issued with the weapon. The tank holds enough fuel for 5 - four second "bursts". Each burst burns at 1,200°C. for 120 seconds. The weapon can be fired with the fuel either lit or unlit. The entire tank may be fired in one long shot.

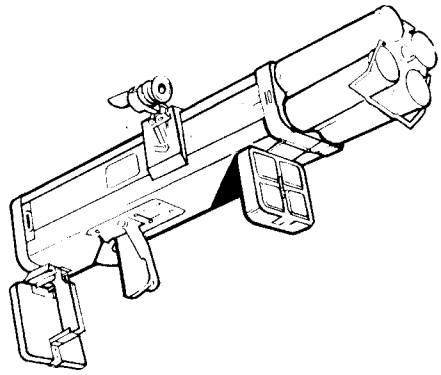
NAME M29A1 Mortar
CAL. 81mm
E-FACTOR **
WT. (EMPTY) 40.48kg
EFF. RNG. 4,595m
MAX. RNG. 4,595m
TYPE OF FIRE Single shot
RATE OF FIRE 6 rpm
FEED DEVICE Single shell
FEED DEVICE WT. 4.23kg
BASIC LOAD 6 rounds
LOAD WT. 25.38kg
TOTAL WT. 65.86kg
ADDITIONAL COMMENTS A smooth-bore, muzzle-loading cannon firing a fin stabilized shell. The high arc of the fired shell allows it to drop on targets hidden behind obstacles. The great weight of the weapon and it's ammunition requires at least three men to carry it.

TYPE: Rockets and missiles

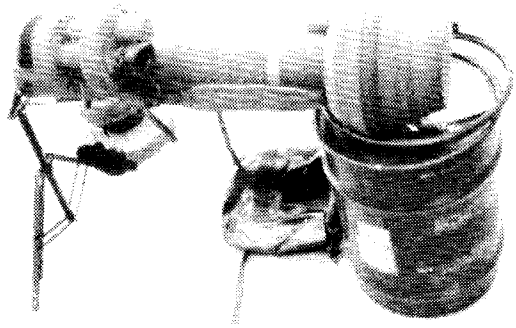


NAME M72A2 LAW
WT. 2.37kg
MIN. RNG. 50m
EFF. RNG. 350m
MAX. RNG. 1000m
BURST RADIUS 5m
BASIC LOAD 1
LOAD WT. 2.37kg
ADDITIONAL COMMENTS A lightweight disposable rocket launcher firing a high explosive warhead. The warheads blast will penetrate 28 centimeters of steel. The "backblast" from the weapon prevents it from being fired from inside a room smaller than 5x5m.

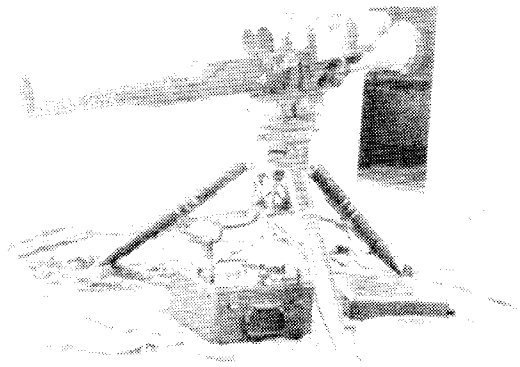
NAME ARMBRUST 300
WT. 6.3kg
MIN. RNG. 30m
EFF. RNG. 300m
MAX. RNG. 1000m
BURST RADIUS 5m
BASIC LOAD 2
LOAD WT. 12.6kg
ADDITIONAL COMMENTS A disposable, flashless, noiseless, recoiless gun firing a high explosive shell. The shell will penetrate 30 centimeters of steel. The "backblast" from the weapon is made up of plastic flakes and is so short the firer can stand with a wall only 1 meter behind him.



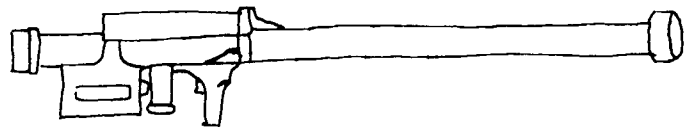
NAME M202A1 Flame weapon
WT. 5.175kg
MIN. RNG. 20m
EFF. RNG. 750m
MAX. RNG. 750m
BURST RADIUS 15m
BASIC LOAD 3 4rd clips
LOAD WT. 20.25kg
TOTAL WT. 25.425kg
ADDITIONAL COMMENTS A 4-barrel reloadable rocket launcher. The rocket fired is incendary and will cover the burst radius with flame that burns for 40 seconds at 1000°C. The weapon has the same backblast as the M72A2 LAW.



NAME M47 Dragon
WT. 14.6kg
MIN. RNG. 65m
EFF. RNG. 1000m
MAX. RNG. 1000m
BURST RADIUS 10m
BASIC LOAD 3 missiles
LOAD WT. 34.5kg
TOTAL WT. 37.6kg
ADDITIONAL COMMENTS This is a man-portable guided missile. The missiles carrying case is the launch tube and is disposed of after firing. When the sight is held on the target the missile automatically tracks to the target. The warhead will penetrate 58cm of steel. The target must stay in sight to be hit.

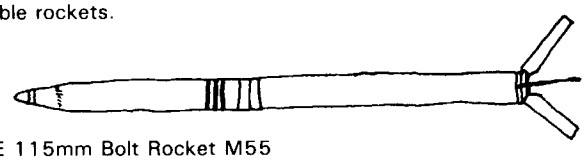


NAME M151E2 TOW
WT. 78.5kg
MIN. RNG. 65m
EFF. RNG. 3750m
MAX. RNG. 3750m
BURST RADIUS 10m
ADDITIONAL COMMENTS TOW stands for Tube launched, Optically sighted, Wire guided. The missile will penetrate 58cm of steel and is sighted the same as a Dragon. The guide impulses follow a wire that trails behind the missile. If the wire breaks the missile goes wild and crashes.

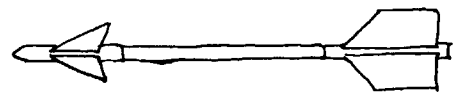


NAME FIM-92A Stinger
WT. 13.4kg
MIN. RNG. 300m
EFF. RNG. 4800m
MAX. RNG. 4800m
BURST RADIUS 20m
BASIC LOAD 3 missiles
LOAD WT. 30.3kg
TOTAL WT. 33.7kg
ADDITIONAL COMMENTS A shoulder-fired, heat seeking, guided anti-aircraft missile. The missile comes complete in a launch tube which is thrown away after use. When fired at the target the missile will automatically track no matter what the aircraft does. If the target is not reached before the missile reaches maximum range the warhead will self destruct.

NAME 2.75 in. Rocket pod M159C
WT. 130.545kg
MIN. RNG. 100m
EFF. RNG. 3000m
MAX. RNG. 3000m
BURST RADIUS 20m
BASIC LOAD 19 missiles
LOAD WT. 154.755kg
TOTAL WT. 285.3kg
ADDITIONAL COMMENTS This is a multi-tube rocket launcher firing 19 rockets. The pod is normally mounted on helicopters or large vehicles. The rockets can be fired in pairs, one per second, or in multiples of two. The pods are normally mounted in pairs totaling 38 available rockets.



NAME 115mm Bolt Rocket M55
WT. 24.95kg
MIN. RNG. 1000m
EFF. RNG. 10,600m
MAX. RNG. 12,000m
ADDITIONAL COMMENTS This rocket is packed in a special tube that allows it to be fired from the multiple TOW launchers that are mounted on some MARS vehicles. The warhead contains GB nerve gas and will contaminate an area 16x16x4m. The gas will kill through skin contact or inhalation. It can be counteracted by a prompt injection of atropine (carried in a Medkit). Protection requires a mask and gas proof clothing. Upon inhalation the gas will kill in 15 minutes or less, skin contact kills inside of two hours.

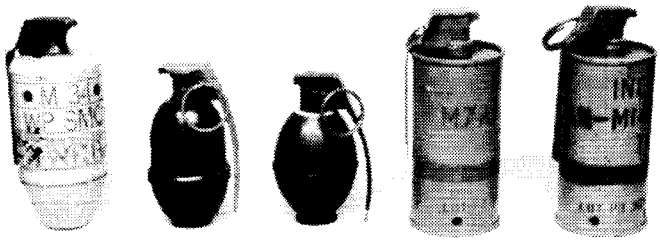


NAME Chaparral (Sidewinder AIM-9D)
WT. 88.5kg

MIN. RNG. 300m
EFF. RNG. 17,700m
MAX. RNG. 17,700m
ADDITIONAL COMMENTS A large, heat-seeking missile. This weapon is fired from a vehicular mount and will track on the strongest heat source it is aimed at. The missile has an automatic override that prevents it from tracking on a magnesium flare.

NAME Maverick AGM-65D
WT. 209.5kg
MIN. RNG. 150m
EFF. RNG. 22,500m
MAX. RNG. 22,500m
BURST RADIUS 25m
ADDITIONAL COMMENTS This missile will track any object that it is sighted on irregardless of where it dodges. The weapon tracks on infrared and will also target on a picture that is programmed into it from a remote camera. The missile has a camera and computer in its nose and actually "looks" for its target. The warhead will penetrate over 1.22 meters of steel.

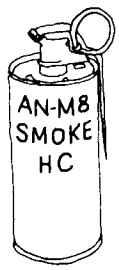
TYPE: Grenades



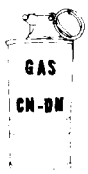
M34 Mk1 M26A1 M7A3 AN-M14

NAME M26A1 Fragmentation
WT. .448kg
EFF. RNG. 40m
FUSE DELAY 4 seconds
BURST RADIUS 15m
BASIC LOAD 4
LOAD WT. 1.792kg
PACKAGING 30 per case
PACKAGE WT. 23.4kg
EFFECTS The standard issue fragmentation grenade. Containing 156 grams of explosive the grenade explodes into approximately 400 fragments (E-factor = 4) over the burst radius.

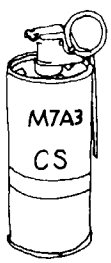
NAME M34 White Phosphorus
WT. 756kg
EFF. RNG. 30m
FUSE DELAY 4 seconds
BURST RADIUS 35m
BASIC LOAD 4
LOAD WT. 3.024kg
PACKAGING 16 per case
PACKAGE WT. 18.9kg
EFFECTS This grenade contains white phosphorus as its filler. When the grenade explodes it throws fragments of phosphorus throughout the burst radius. The fragments, which burn at 2,700°C. for 60 seconds, will ignite any flammable substance they contact. The grenade also creates a large cloud of dense white smoke while burning.



NAME AN-M8, HC Smoke
WT. .672kg
EFF. RNG. 30m
FUSE DELAY 2 seconds
BASIC LOAD 2
LOAD WT. 1.344kg
PACKAGING 16 per case
PACKAGE WT. 18.45kg
EFFECTS This is a burning-type grenade that produces a dense cloud of white smoke during its burning time of 120 seconds. While burning the grenade canister reaches a temperature of 1,200°C.

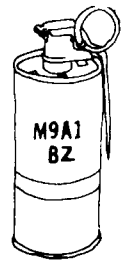


NAME M6, CN-DM Gas
WT. .476kg
EFF. RNG. 35m
FUSE DELAY 2 seconds
BASIC LOAD 2
LOAD WT. .952kg
PACKAGING 16 per case
PACKAGE WT. 15.75kg
EFFECTS This grenade acts the same as the AN-M8 grenade but the smoke cloud consists of a mixture of tear and vomit gases. The DM gas causes immediate heavy vomiting. The effects last for up to one hour after exposure. The grenade burns for 60 seconds.

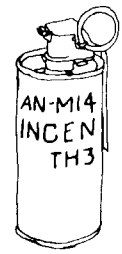


NAME M7A3, CS Gas
WT. .434 kg

EFF. RNG. 40m
FUSE DELAY 2 seconds
BASIC LOAD 2
LOAD WT. .868kg
PACKAGING 16 per case
PACKAGE WT. 13.5kg
EFFECTS This grenade creates a dense cloud of CS tear gas. The gas causes pain in the skin, eyes, throat, and lungs as well as difficulty in seeing. The effects of the gas disappear 15 minutes after exposure. The grenade burns for 60 seconds.



NAME M9A1, BZ Gas
WT. .450 kg
EFF. RNG. 40m
FUSE DELAY 2 seconds
BASIC LOAD 2
LOAD WT. .9kg
PACKAGING 16 per case
PACKAGE WT. 14.2kg
EFFECTS This is a burning type grenade. Upon ignition it releases a cloud of BZ gas and burns for 60 seconds. The gas causes temporary slowing of physical and mental activity, disorientation, and hallucinations. The effects last for up to 6 hours,
Note; For this grenade, if you unscrew the fuse and hold it up to someone's face they receive the full effects of the gas without firing the grenade.



NAME AN-M14, TH3 Thermite
WT. .896kg
EFF. RNG. 25m
FUSE DELAY 2 seconds
BASIC LOAD 2
LOAD WT. 1.792kg
PACKAGING 16 per case
PACKAGE WT. 21.15kg
EFFECTS The extreme heat (2,200°C.) of this grenade will destroy any equipment it is placed on and ignite any flammable material within 2 meters. The grenade will burn its way through 15mm of armor steel and will burn underwater. The grenade burns for 40 seconds.

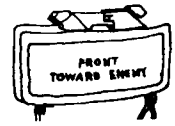
NAME Mk3A2, Explosive
WT. .437kg
EFF. RNG. 40m
FUSE DELAY 4 seconds
BURST RADIUS 2m
BASIC LOAD 2
LOAD WT. .874kg
PACKAGING 20 per case
PACKAGING WT. 20.295kg
EFFECTS This is a prepackaged demolition charge of .226kg of TNT. The grenade's fibreboard casing causes no fragmentation.

NAME Mk 1, Illuminating
WT. .28kg
EFF. RNG. 40m
FUSE DELAY 7 seconds
BASIC LOAD 4
LOAD WT. 1.12kg
PACKAGING 25 per case
PACKAGE WT. 22.95kg
EFFECTS This is a hand-thrown flare. The grenade illuminates a 200m diameter area with 55,000 candlepower for 25 seconds.

TYPE: Mines

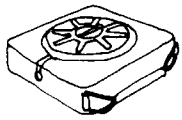
NAME M25, Antipersonnel
WT. .077kg
BURST RADIUS .156m
PACKAGING 150 per case
PACKAGE WT. 18.5kg
EFFECTS This small blast mine is directional and designed to puncture a tire or wound a foot (E-factor = 6). It is emplaced by simply pressing it into the ground.

NAME M16A1, Antipersonnel
WT. 3.6kg
BURST RADIUS 30m
PACKAGING 4 per case
PACKAGE WT. 20.25kg
EFFECTS This mine when fired throws a shell 1 meter into the air. When the shell explodes it hurls steel balls (E-factor = 4) over a 30 meter radius circle. The mine will fire from pressure or it may use two 10 meter tripwires.



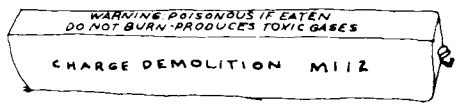
NAME M18A1 Claymore
WT. 1.6kg
BURST RADIUS 16m (100x50m fan)

BASIC LOAD 1
LOAD WT. 1.6kg
PACKAGING 1 per bandoleer, 6 bandoleers per case
PACKAGE WT. 23.85kg
EFFECTS This mine acts as a giant shotgun shell. The mine's blast sends fragmentation (E-factor = 4) out in a cone 100m long and 50 meters wide by 2 meters high at its end. The mine is issued in a bandoleer with an M57 electrical firing device and an M4 blasting cap with 30 meters of firing wire.

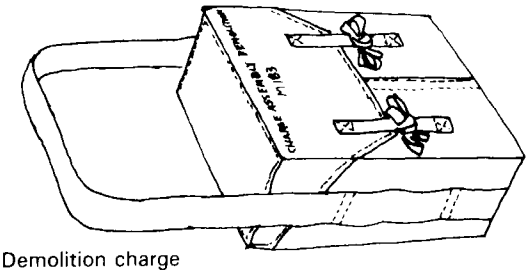


NAME M19 Antitank
WT. 12.6kg
BURST RADIUS 48m
PACKAGING 2 per case
PACKAGE WT. 36kg
EFFECTS A non-metallic blast mine made entirely of plastic. The mine is designed to destroy armored vehicles but may also be used as a packaged demolition charge. The explosive charge is equal to 8.815kg of C-4 explosive.

TYPE: Explosives



NAME M112, C-4 Demolition block
WT. .563kg
BURST RADIUS 6.75m
BASIC LOAD 4
LOAD WT. 2.252kg
PACKAGING 30 per case
PACKAGE WT. 21.6kg
EFFECTS A packaged block of C-4 plastic explosive. The block has adhesive on one side that will stick to any dry surface. One block will blast a hole 30 cm square through 10mm thick steel plate or a .6m diameter hole through a 10 cm thick rock or concrete wall. The explosive can be detonated by primercord, blasting cap, or another explosion.



NAME M183 Demolition charge
WT. 10.5kg
BURST RADIUS 108m
BASIC LOAD 1
LOAD WT. 10.5kg
PACKAGING 2 per case
PACKAGE WT. 25.65kg
EFFECTS A satchel charge containing 16, M112 demolition blocks and 4 M15 priming assemblies. The priming assemblies are 2 meters of primercord with a blasting cap at each end. The charge will blast a 2 meter square hole through 1 meter of concrete or rock. It will also blast a .6 meter hole through 7.6cm of steel.

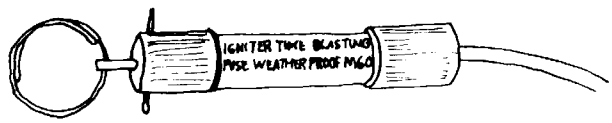
NAME Primercord
WT. 5kg per 152m
BURST RADIUS .5m
BASIC LOAD 152m roll
LOAD WT. 5kg
PACKAGING 8, 152m rolls per case
PACKAGE WT. 56.65 kg
EFFECTS A flexible cord with a center core of high explosive. It can be used for connecting explosive charges so they detonate simultaneously. The cord will detonate explosives and can itself be used as an explosive charge. Gunfire will detonate primercord. The cord detonates at 24,000 feet per second.

NAME M2A1 Detonator
WT. .050kg
FUSE DELAY 8 seconds
BASIC LOAD 5
LOAD WT. .250kg
PACKAGING 200 per case
PACKAGE WT. 27.9kg
EFFECTS This is a combination igniter/fuse/detonator assembly. With the detonator imbedded in the explosive being used and the T-ring pulled, the fuse is ignited and 8 seconds later the explosive is set off.

NAME M1 Timer/Detonator
WT. .3kg
FUSE DELAY 10 seconds to 48 hours
BASIC LOAD 2
LOAD WT. .6kg
PACKAGING 150 per case
PACKAGE WT. 26kg
EFFECTS An adjustable mechanical detonator. The time delay can be set from 10 to 60 seconds and from 1 minute to 10 minutes in 1 minute intervals, and from 1 hour to 48 hours in 10 minute intervals. The detonator will set off any explosive charge.

NAME M700 Time fuse
WT. .45kg per 15m
FUSE DELAY 1 second per cm
BASIC LOAD 15m
LOAD WT. .45kg
PACKAGING 80, 15m coils per case
PACKAGE WT. 29kg
EFFECTS This is a waterproof, plastic covered fuse used to time explosive charges. A 15 meter coil burns for 25 minutes. To detonate explosives a blasting cap must be crimped on one end.

NAME M7 Blasting cap
WT. .004kg
BURST RADIUS .25m
BASIC LOAD 20
LOAD WT. .08kg
PACKAGING 3,600 per case
PACKAGE WT. 51.5kg
EFFECTS This cap will detonate explosives or primercord. It requires a fuse inserted into the cap for ignition.



NAME M60 Fuse igniter
WT. .069kg
BASIC LOAD 20
LOAD WT. 1.38kg
PACKAGING 300 per case
PACKAGE WT. 25.2kg
EFFECTS With this igniter a fuse may be lit underwater. To use the igniter a fuse is placed in the base, the safety pin removed and the igniter ring pulled.

SMALL ARMS AMMUNITION TYPES

The following ammunition types are commonly found in the cartridges fired in most weapons. In the case of pistol and submachinegun ammunition only the Ball type is normally found. The list gives a brief explanation of the different types.

BALL; This is the most common of the bullet types. The bullet consists of a lead core surrounded by a full jacket of cupronickel alloy. The E-factor formula is based on this bullet type.

TRACER; A ball type bullet with a chemical in the base that ignites when the bullet is fired. The chemical burns with a very bright light and "traces" the path of the bullet to the target. Due to the heat of the burning chemical, a tracer will ignite fires in combustable materials 25% of the time. The E-factor of a tracer is the same as for a ball round.

ARMOR PIERCING; In this bullet the lead core is replaced by a core of hardened steel. This allows the bullet to penetrate more resistant materials. To account for this 10% is added to the computed E-factor of an armor piercing round.

ARMOR PIERCING-INCENDIARY; An armor piercing round with an incendiary chemical in the bullet's nose. The bullet will ignite fires in combustible materials 75% of the time as well as penetrating armor. The round has the same E-factor as an armor piercing round.

ARMOR PIERCING-INCENDIARY-TRACER; This bullet is the same as an API round but includes a tracer element in the base.

AMMUNITION SUPPLY

All of the firearms in the Morrow Project will eventually have their ammunition supply exhausted. To resupply individual and vehicular basic loads supply dumps were placed throughout the countryside (see Installations).

To allow for easy interchangeability of ammunition the NATO designation for ammunition is used. If a weapon uses 5.56x45mm ammunition it may only fire that size of ammunition and no other. In the case of an automatic weapon that uses linked ammmunition, its ammunition must be in belts for the weapon to properly function. Linked ammunition is normally found in combat loads. That is the belt is made up of different bullet types linked together in a repeating order.

The following list shows the types of ammunition available in the Morrow Project and the Project's weapons that they fit in.

AMMUNITION

9x19mm Ball; HP-35, M10, UZI
.357 Magnum Ball; S&W M27-3½
.44 Magnum Ball; S&W M29-6¼
5.56x45mm Ball, Tracer; Stoner M22 & M23, M16A1
7.62x51mm Ball, Tracer; M21
5.56x45mm Linked, 4 Ball; 1 Tracer; Stoner Mk 23 &M207
7.62x51mm Linked, 4 Ball, 1 Tracer; M60, MAG-58
12.7x99mm Linked, 4 API, 1 API-T; M85C; M2 HB
20mm Linked, 3 HEI, 2 API; Rh 202
12 Gauge, Magnum 00 Buckshot; M10A, Atchisson
40mm Grenades; M79, M203, M174E3, HK69A1

AMMUNITION PACKAGING

The following list is of the small arms ammunition that is always found in a supply dump. The list shows only that ammunition that is not covered elsewhere in the book.

9x19mm Ball, 72 rounds to a carton, 20 cartons to a metal box, 2 boxes to a wooden crate.
2880 cartridges per case — Case wt. 52.16kg
.357 Magnum Ball, 50 rounds to a carton, 50 cartons to a metal-lined wooden box.
2500 cartridges per case — Case wt. 41.73kg
.44 Magnum Ball, 50 rounds to a carton, 12 cartons to a metal can, 2 cans to a wooden case.
1200 cartridges per case — Case wt. 43.09kg
5.56x45mm Ball or Tracer, 20 rounds to a carton, 41 cartons to a metal box, 2 boxes to a wooden case.
1640 cartridges per case — Case wt. 31.29kg
5.56 x 45mm Linked, 150 rounds to a bandoleer, 4 bandoleers to a metal box, 2 boxes to a wooden case.
1200 cartridges per case — Case wt. 31.29kg
7.62x51mm Ball or Tracer, 20 rounds to a carton, 23 cartons to a metal box, 2 boxes to a wooden case
920 cartridges per case — Case wt. 31.29kg
7.62x51mm Linked, 100 rounds to a bandoleer, 2 bandoleers to a metal box, 4 boxes to a wooden case.
800 cartridges per case — Case wt. 34.92kg
12.7x99mm Linked, 105 rounds per metal box, 2 boxes per wooden case.
210 cartridges per case — Case wt. 37.64kg
20mm Linked, 100 rounds per metal box
100 cartridges per case — Case wt. 43.09kg
12 Gauge Magnum 00 Buckshot, 25 rounds to a carton, 20 cartons to a wooden case.
500 cartridges per case — Case wt. 39.91kg

AMMUNITION COUNTS

The firearms in the Project all hold limited amounts of ammunition, either in a belt, magazine, or some other feed device. These weapons run out of ammunition quickly, especially in the case of automatic weapons, such as submachineguns with a relatively small magazine. To help keep a count of the ammunition used and that amount still available the following system has been developed.

An example of an ammunition count sheet is as follows.

M10 Ingram submachinegun, 3-30 rd. magazines, short burst = 4 rds., medium burst = 8 rds., long burst = 12 rds.

*******__******__******__ __ __

* = short burst
__ = reload
__ __ __ = out of ammunition

To use the sheet, one or more, depending on the burst, of the asterisks would be crossed out each time the weapon was fired. When a dash is reached the magazine is empty and the weapon must be reloaded. When three dashes are reached the weapon is completely out of ammunition. In the case of semi-automatic fire, a separate count is kept of the individual shots and when they add up to a short burst an asterisk is marked off. For a semi-automatic weapon, there would be an asterisk for each round in the magazine since it cannot fire a burst. This system is also used for keeping track of other supplies that can be used up. Such as grenades, blocks of explosives, Medkit injections and so on.

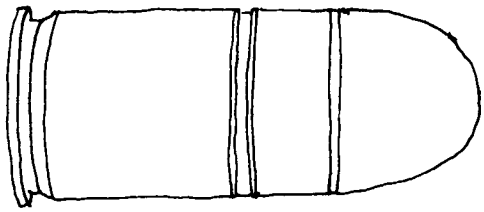
Note; A magazine is not designed to be thrown away after being used. Ammunition is replaced in it and it is used again. There are always some spare magazines at a supply dump but emptys should not be thrown away unless absolutely necessary.

TYPE Ammunition

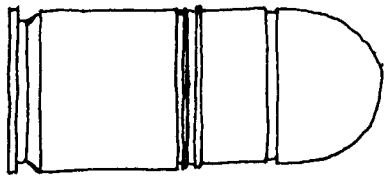
NAME 20mm M56A1 High Explosive Incendiary
WT. .254kg
MIN. RNG. 11m
EFF. RNG. 2,000m
MAX. RNG. 7,000m
BURST RADIUS 1m
E-FACTOR 57
PACKAGING 100 round belt per case
PACKAGE WT. 41.7kg
ADDITIONAL COMMENTS This cartridge is used where a high explosive effect combined with an incendiary effect is most useful. This would be against vehicles, personnel, buildings, and aircraft. If the round impacts on a fuel container it will ignite the contents, In a combat loaded belt there are two HE-I rounds for every three AP-I rounds.

NAME 20mm T221E3 Armor Piercing Incendiary
WT. .254kg
MIN. RNG. 11m

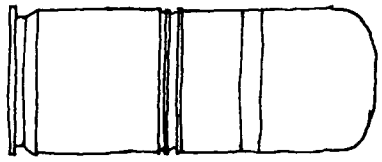
EFF. RNG. 2,000m
MAX. RNG. 7,000m
E-FACTOR 63
PACKAGING 1, 100 round belt per case
PACKAGE WT. 41.7kg
ADDITIONAL COMMENTS An armor piercing round with an incendiary element for use against armored targets. The round contains no explosive but will ignite any combustible material it strikes. In a five-round burst there would be fired first three of these AP-I rounds followed by two HE-I rounds.



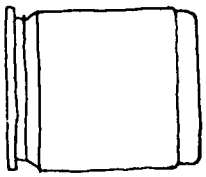
NAME 40mm M381 High Explosive
WT. .226kg
MIN. RNG. 30mm
EFF. RNG. 350m
MAX. RNG. 400m
BURST RADIUS 5m
PACKAGING 6 rounds per bandoleer, 72 rounds per case
PACKAGE WT. 26.308kg
ADDITIONAL COMMENTS A high explosive grenade for use against personnel. The round explodes into fragments (E=4) on contact. The round will not penetrate a hard surface as the contact sets it off.



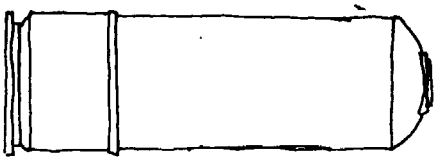
NAME 40mm M433 High Explosive Dual Purpose
WT. .226kg
MIN. RNG. 30m
EFF. RNG. 350m
MAX. RNG. 400m
BURST RADIUS 5m
E-FACTOR 120
PACKAGING 6 rounds per bandoleer, 72 rounds per case
PACKAGE WT. 26.308kg
ADDITIONAL COMMENTS A combination round with fragmentation combined with an anti-armor capability. The round explodes on contact sending fragments (E=4) through the burst radius. The main force of the explosion is focused forward where it will penetrate 5 centimeters of steel.



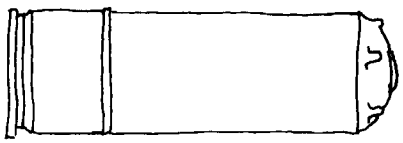
NAME 40mm M651 CS Gas
WT. .308kg
MIN. RNG. 30m
EFF. RNG. 200m
MAX. RNG. 400m
BURST RADIUS 2.5x4.5x2m
E-FACTOR 2
PACKAGING 24 rounds per case
PACKAGE WT. 11.793kg
ADDITIONAL COMMENTS A burning-type CS grenade. The round, on impact, starts burning and fills the burst radius with a cloud of CS gas. The round burns for 30 seconds and will penetrate a hard surface (i.e. 1cm pine or a normal window) before functioning. See M7A3 CS grenade for the effects of the gas.



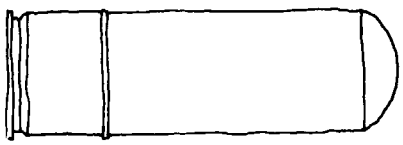
NAME 40mm M576E2 Multiple Projectile
WT. 226kg
MIN. RNG. Om
EFF. RNG. 35m
MAX. RNG. 50m
E-FACTOR 4
PACKAGING 12 rounds per bandoleer, 144 rounds per case
PACKAGE WT. 42.58kg
ADDITIONAL COMMENTS This is a 40mm shotgun shell. The round contains 20 pellets of 00 buckshot. The round has a very short range and will function in all the 40mm grenade launchers except the M174E3.



NAME 40mm M583 White Parachute Flare
WT. .226kg
MIN. RNG. n/a
EFF. RNG. 200m
MAX. RNG. 200m
BURST RADIUS 100m
PACKAGING 44 rounds per case
PACKAGE WT. 20.819kg
ADDITIONAL COMMENTS This is a parachute flare used to illuminate an area. The round is fired into the air and when it reaches it's maximum altitude (170m) it ejects a magnesium flare on a parachute. The flare burns for 40 seconds illuminating a circle 400m across with 45,000 candlepower.

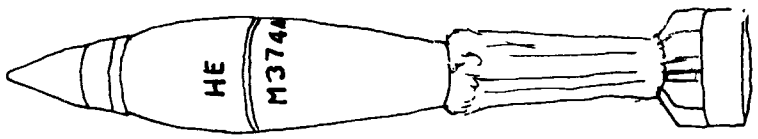


NAME 40mm M585 (white), M663 (green), and M664 (red) Star Shells
WT. .226kg
EFF. RNG. 200m
MAX. RNG. 200m
PACKAGING 44 rounds per case
PACKAGE WT. 20.189kg
ADDITIONAL COMMENTS These are respectively white, green, and red signal flares. When fired the shells burst at approximately 170 meters altitude and release 5 illuminating stars which burn for 7 to 11 seconds. The shells are used for signalling and are bright enough for use during the day as well as at night.



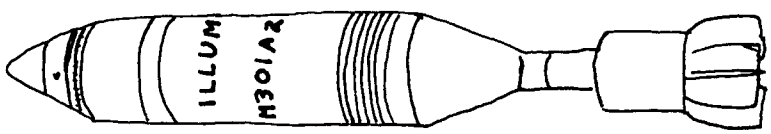
NAME 40mm Stunbag
WT .226kg
MIN. RNG. Om
EFF. RNG. 50m
MAX. RNG. 70m
E-FACTOR 0
PACKAGING 44 rounds per case

PACKAGE WT. 20.189kg
ADDITIONAL COMMENTS This round, when fired, opens into a 15 centimeter diameter cloth bag filled with fine lead shot. The bag will not penetrate armor but is designed to knock down or knock out personnel without doing permanent harm (the bag does 1D6 damage, ignoring the death % in the medical tables).

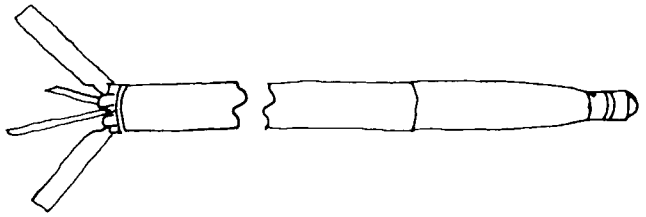


NAME 81mm M374A2 High Explosive
WT. 4.23kg
MIN. RNG. 72m
EFF. RNG. 4,595m
MAX. RNG. 4,595m
BURST RADIUS 34m
PACKAGING 3 rounds per case
PACKAGE WT. 23.13kg
ADDITIONAL COMMENTS A high explosive round that is used against unarmored targets and personnel. The round, on impact, explodes into fragments (E=6) throughout the burst radius. The explosion will blast through .8 meters of concrete or 1.1 meters of rock.

NAME 81mm M375A4 White Phosphorus
WT. 4.23 kg
MIN. RNG. 72m
EFF. RNG. 4,737m
MAX. RNG. 4,737m
BURST RADIUS 20m
PACKAGING 3 rounds per case
PACKAGE WT. 23.13kg
ADDITIONAL COMMENTS This shell is used for smoke, antipersonnel, and incendiary uses. It contains white phosphorus which will burn at 2,700°C. for 120 seconds in particles spread throughout the burst radius. The explosion and burning of the shell creates a very dense cloud of white smoke.



NAME 81mm M301A3 Illuminating
WT 4.89kg
MIN. RNG. 100m
EFF. RNG. 3,150m
MAX. RNG. 3,150m
BURST RADIUS 1,200m
PACKAGING 3 rounds per case
PACKAGE WT. 24.94kg
ADDITIONAL COMMENTS Also known as a star shell, this round on functioning, ejects a white magnesium flare on a parachute. The flare illuminates a 1,200 meter area with 500,000 candlepower for 75 seconds. The fuse of the round is adjustable for what altitude the round will function at. The round can also be set to function on impact in which case the magnesium will burn at 1,980°C. igniting any flammable material it contacts.



NAME 2.75 inch M1 High Explosive Rocket
WT. 8.145kg
MIN. RNG. 100m
EFF. RNG. 3,000m
MAX. RNG. 3,000m
BURST RADIUS 20m
PACKAGING 3 per case
PACKAGE WT. 46.72kg
ADDITIONAL COMMENTS A long, slender rocket fired from the M159C rocket pod. The rocket has four fins which unfold to guide it after it is fired. The rocket acts as an artillery shell against ground targets. The high explosive warhead will blast through 35 centimeters of steel or 1.4 meters of concrete.

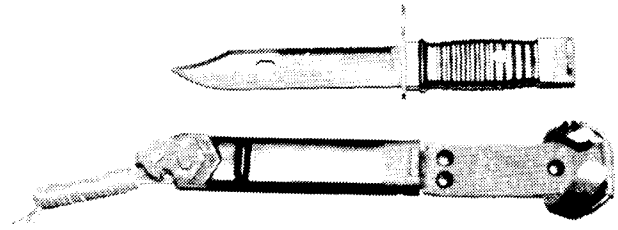
TYPE General issue

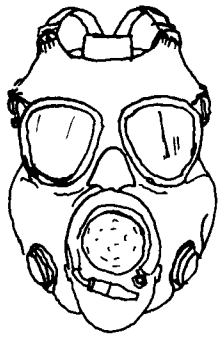
NAME Basic Pack
TYPE Survival Pack
WT. 10.52kg
UNIT OF ISSUE Ea.
ADDITIONAL COMMENTS The standard issue equipment pack given to all Morrow Personnel. Packaged in a nylon backpack with an equipment belt and ammunition pouches the equipment consists of the following; a 1 liter canteen w/canteen cup, a 5 liter folding canteen, 14 days dehydrated food, an aluminum mess kit, a compass, a flashlight, matches, a weapons cleaning kit, 50m nylon cord, a toilet kit, a change of clothes and two changes of underwear, a waterproof poncho, a lightweight sleeping bag, and a combination hip/shoulder holster.

NAME Coveralls
TYPE Body Armor
WT. 1.71kg
UNIT OF ISSUE Pr.
ADDITIONAL COMMENTS The Morrow Project standard uniform. The coveralls are made of a bullet-resistant (AC=7) resistweve cloth. They have pockets, a zip-on hood, and are water and gas resistant. On the right shoulder is the Morrow Project patch with a unit (MARS, Recon, etc.) patch and bar on the left shoulder. A name tape is above the right chest pocket.

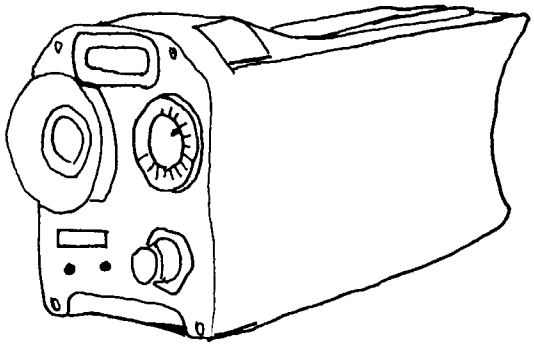
NAME Boots
TYPE Armored
WT. 1.52kg
UNIT OF ISSUE Pr.
ADDITIONAL COMMENTS These are black leather boots with an armored sole (AC=4). They also have a steel capped toe and heel.

NAME KCB-70
TYPE Knife/Bayonet
WT. .77kg
UNIT OF ISSUE Ea.
ADDITIONAL COMMENTS A knife or bayonet with multiple uses. The knife will fit on the M16A1, Stoner M22 and M23 rifles, and the UZI SMG. The knive's sheath has a built-in screwdriver. The knife combined with the sheath makes a wirecutter which can safely cut a 20,000 volt high-tension line. There is also a hacksaw blade built into the back of the knive's blade.





NAME M17A1
TYPE Protective Mask
WT. 1.3kg
UNIT OF ISSUE Ea.
ADDITIONAL COMMENTS This is a protective gas mask. Its filters provide protection from any gas or biological agent that has to be inhaled to be effective. The filters last a year under use after which they have to be replaced. The mask has an attachment that allows a drink to be taken from a canteen while still wearing the mask.



NAME M1 CBR Kit
TYPE Detector/Treatment Kit
WT. .79kg
UNIT OF ISSUE Ea.
ADDITIONAL COMMENTS A combination detector set and treatment kit for chemical and biological agents as well as radiation. The kit will sound an alarm and identify any dangerous chemicals in the area. If pressed against the body it will automatically inject the proper antidote (the kit contains 6 doses). It will sound an alarm 75% of the time if a dangerous biological agent is in the area. The kit will also detect and measure radiation, as well as keep a record of the amount of radiation the person wearing it has been exposed to. The kit will sound an alarm if the radiation count goes up above the background level.

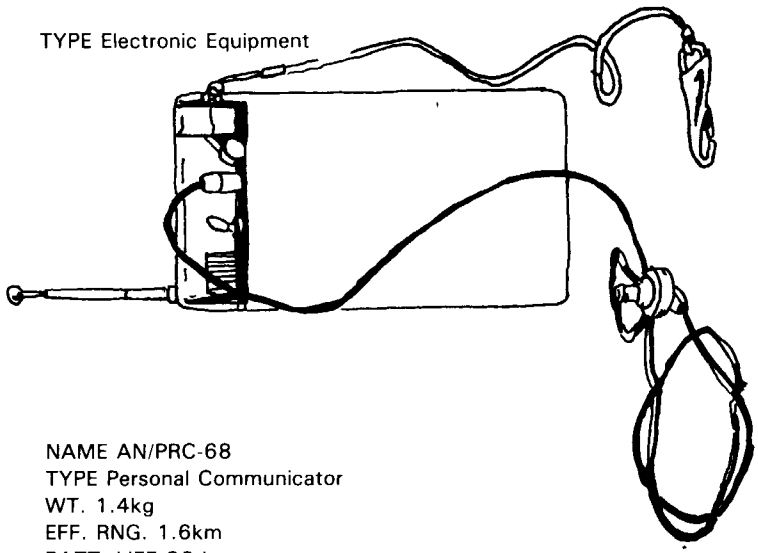
NAME Cold Kit
TYPE Cold Weather Personal Equipment
WT. 8.139kg
UNIT OF ISSUE Set
ADDITIONAL COMMENTS A box containing a set of down cold weather clothing (pants, parka, gloves, etc.) good for protection to -50°C. The box also contains a set of magnesium snowshoes, a pocket stove, and a white camouflage coverall.

NAME Mountain Kit
TYPE Mountain Climbing Equipment
WT. 12.83kg
UNIT OF ISSUE Set
ADDITIONAL COMMENTS A large pack containing the materials needed for rock climbing. The pack contains the following; 2-33m coils of 11mm nylon rope (breaking strength 1700kg), a folding grappling hook, 20 pitons (spikes for attaching rope to rocks), 30 snaplinks (rings for attaching the rope to a piton), a 225 gram hammer for driving in and removing pitons, and a set of climbing spikes for added traction. The set also has 6 M688 rocket shells for launching the grappling hook from the M79 grenade launcher.

NAME Ration Pack
TYPE Food Supplies
WT. 17kg
UNIT OF ISSUE Ea.
ADDITIONAL COMMENTS This is simply a backpack of dehydrated food, canned juices, and vitamins sufficient for 4 people for 15 days. The pack also contains materials for heating, a folding pot, and water purification tablets.

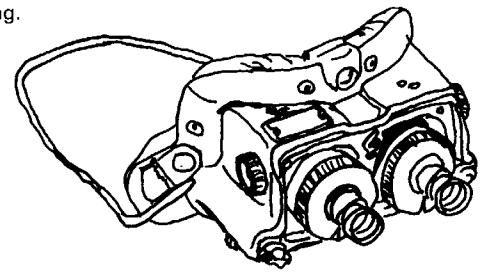
NAME Trade Pack
TYPE Miscellaneous Materials
WT. 15kg
UNIT OF ISSUE Ea.
ADDITIONAL COMMENTS This is a pack containing luxury items for trade to locals. The pack contains 50 gold double eagle coins, 50 silver dollars, 6-one liter bottles of liquor, tobacco, candy, 6 sewing kits, 4 mirrors, 6 combs and brushes, various toilet articles, 6 knives and a selection of fishing gear.

TYPE Electronic Equipment



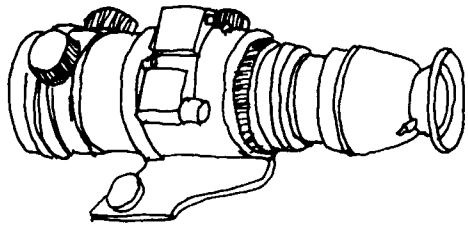
NAME AN/PRC-68
TYPE Personal Communicator
WT. 1.4kg
EFF. RNG. 1.6km
BATT. LIFE 36 hours
EFFECTS A small pocket communicator. This radio has a telescoping antenna, a built-in microphone, an earphone, and a lanyard for attaching it to an equipment belt. It also has a built-in voice scrambler which can be turned on or off and is automatically decoded by another Morrow Project radio. The unit can be used with the antenna collapsed or extended. With the antenna collapsed the unit will fit into a shirt pocket but the range is cut in half. The batteries are recharged by plugging them into a vehicular power system.

NAME AN/PRC-70
TYPE Backpack Communicator
WT. 17.7kg
EFF. RNG. 40/4,000km
BATT. LIFE 30 hours
EFFECTS A man-pack radio suitable for vehicular and portable use. With the backpack antenna the range is 40 kilometers, with the larger vehicular antenna the range reaches 4,000 kilometers. This radio also has an integral voice-scrambler. The batteries can be recharged from a vehicular power system and the radio can be used while charging.



NAME AN/TVS-5
TYPE Electronic Binoculars
WT. .408kg
EFF. RNG. 150m

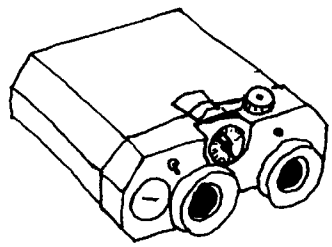
BATT. LIFE 100 hours
MAGNIFICATION 4x
EFFECTS This is a pair of infrared binoculars designed to be worn on the head. The binoculars are normally used by vehicle drivers so vehicles can be driven at night without lights. A map can also be read while wearing these binoculars. If worn for more than 4 hours straight, eye fatigue develops and the user finds it difficult to focus his eyes.



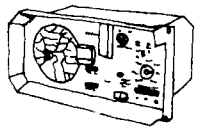
NAME M9823
TYPE Starlight scope
WT. 1.75kg
EFF. RNG. 600m
BATT. LIFE 48 hours
MAGNIFICATION 3.5x
EFFECTS This is an electronic telescopic sight for use on small arms. The scope magnifies available light so that you can see a man-sized target at 600 meters. it works in situations where there is at least a little light (starlight on an overcast night is sufficient), but will not work in absolute darkness (such as in a cave). The device uses rechargeable batteries.

NAME AN/PAS-7
TYPE Thermal (infrared) viewer
WT. 5kg
EFF. RNG. 400/3,000m
BATT. LIFE 48 hours
MAGNIFICATION 4.5x
EFFECTS This is a vision device that "sees" heat (infrared), either the presence or lack of it. It can see a warm body hiding in a tree or a cold vehicle hidden under brush. It also uses rechargeable batteries. The device can make out a man at 400 meters and a running combustion engine at 3,000 meters. It will also penetrate fog, rain, or smoke.

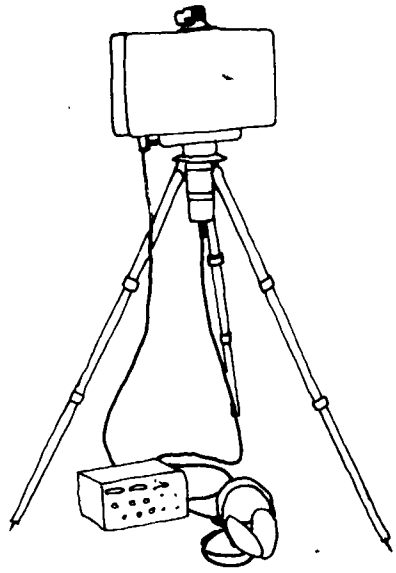
NAME Magnetic sensor
TYPE Metal locator/detector
WT. 15kg
EFF. RNG. 500m
BATT. LIFE 12 hours
EFFECTS This device detects any mass of ferrous metal over 200 grams in weight. The device, when set on automatic, will sound an alarm and indicate the range, direction, and size of any metallic object of sufficent mass. It has a "dead space" of 15m around the device itself in which it will not react. The detector can be mounted in vehicles and tap the vehicular power supply. This device also uses rechargeable batteries.



NAME CP-7 Laser rangefinder
TYPE 7x45 binoculars/rangefinder
WT. 1.7kg
EFF. RNG. 160-3,000m
BATT. LIFE 600 "shots" (rangings)
EFFECTS This is a pair of 7 power binoculars with a built-in laser transmitter and receiver. When aimed at a target and "fired" the range to the target is immediately shown inside the eyepiece. The laser's pulse is to quick and weak to be detected by the target.



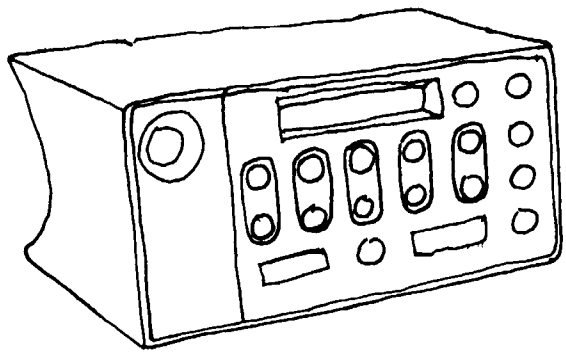
NAME AutoNav
TYPE Automatic navigation system
WT. 18kg
EFFECTS This is a vehicle mounted, inertial navagation system. The system is powered off the vehicle's electrical system and also contains an emergency 12 hour power system of its own. The AutoNav will automatically track and show the vehicles position on the proper map projected on a screen from the systems microfilm files. The AutoNav can also show the location of objects found by either the radar or magnetic sensor systems. Maps can also be selected from the files and shown on the systems screen as desired.



NAME AN/PPS-12
TYPE Portable Radar
WT. 6.35kg
EFF. RNG. 1,500/3,000m
BATT. LIFE 12 hours
EFFECTS A portable radar set. This device will detect moving objects, including aircraft, out to the ranges shown above. The difference in ranges is for moving personnel and moving vehicles respectively. The set will indicate the approximate size, range, speed, and direction of the moving object. There is also an integral alarm that can be set on automatic as a warning of something approaching. The device uses rechargeable batteries and can be tapped into a vehicular power system.

NAME Power supply
TYPE Rechargeable batteries
WT. .100kg
EFFECTS This is a battery pack of nickel-cadmium batteries that is adjustable to fit any of the Project's electronic equipment. The batteries become fully charged automatically when a team and its equipment is activated. There is an integral system that allows the batteries to be hooked up to any electrical source for recharging.

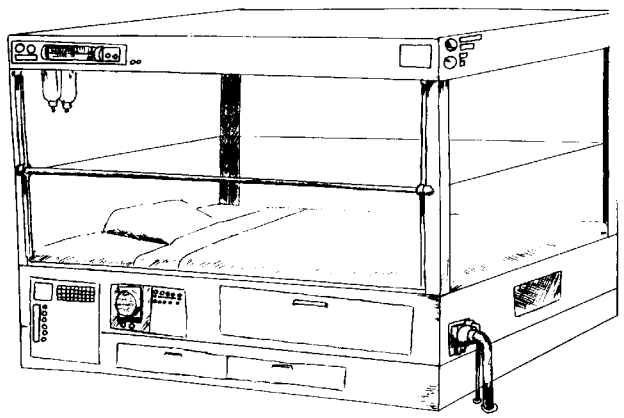
TYPE: Medical equipment



NAME Medkit
TYPE Individual First Aid Kit
WT. .68kg
UNIT OF ISSUE Ea.
ADDITIONAL COMMENTS An automatic medical kit that will fit on an equipment belt. The kit will treat small wounds, close major wounds, automatically inject or spray antitoxins, antibiotics, coagulants, pain-relievers, sleep-inducers, and stimulants, (8 doses of each). It will also read off the patients vital signs for a doctor or medic. The kit automatically functions when it is pressed against a wound or the skin . The pain-relievers, sleep-inducers, and stimulants can be injected on demand. The kit also contains instructions for the treatment of major wounds. There is a large version of the kit (6 times as big) for use by medics and doctors. This kit is carried slung from the shoulder.

NAME Surgical Kit
TYPE Medical kit
WT. 11.3kg
UNIT OF ISSUE Set
ADDITIONAL COMMENTS A large backpack kit for use by doctors or medics. The kit contains instruments and supplies to conduct major operations in the field.

NAME Drug Kit
TYPE Treatment supplies
WT. 13.6kg
UNIT OF ISSUE Set
ADDITIONAL COMMENTS A complement to the surgical kit. This pack contains various drugs and the means for administering them as well as instructions for their use. The kit contains 20 doses of any given major drug. Also contained in the kit are 6 reloads for medkits or one reload to a large medkit.



NAME Med Unit
TYPE Medical Treatment Center
WT. 272kg
UNIT OF ISSUE Ea.
ADDITIONAL COMMENTS This is a large enclosed bed with attached medical support equipment. It is normally found in bases and in the MARS-ONE and Scientific-One vehicles. The unit is self-contained and may be used as an operating theater with a sterile environment. The med unit is attached to a bio-comp for automatic diagnosis and treatment. The unit can also be used as a freeze-tube for cold sleep.

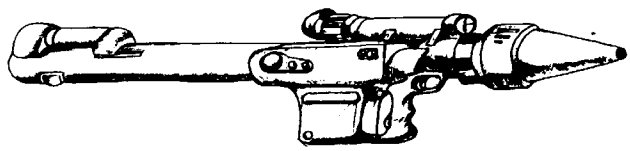
NAME Bio-Comp
TYPE Medical Computer
WT 385.5kg
UNIT OF ISSUE Ea.
ADDITIONAL COMMENTS A small specialized computer for use by medical personnel. The computer is programmed with all known medical knowledge and will state diagnosis and treatment after receiving data either manually or from a med unit. The unit will train people as doctors and instruct in operations. The units are found with one or more med units.

NAME Universal Antibody
TYPE Disease Cure
WT. .907kg
UNIT OF ISSUE 20 dose bottle
ADDITIONAL COMMENTS One of the most closely guarded secrets of the Morrow Project. This is a specialized drug used only by doctors. The agent will cure disease in 24 hours and speed up healing at 6 times the normal rate. The agent is successful 80% of the time for each injection. Not more than one injection can be given within 24 hours with no more than 4 injections total being given. The antibody must be "tuned" to the patient's body chemistry by a med unit connected to a Bio-Comp. If this adjustment is not made there is an 80% chance of immediate death of the patient upon injection with no chance of a cure.

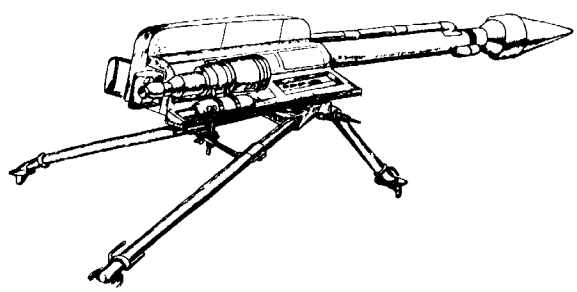
NAME Universal Antidote
TYPE Poison Cure
WT. .907kg
UNIT OF ISSUE 20 dose bottle
ADDITIONAL COMMENTS Used for poisons, such as those from snake or spider bite. The antidote must be injected but need not be "tuned" to the patient. It is effective 90% of the time and the dosage is the same as for the universal antibody.

TYPE: Energy Weapons & Devices

NAME HAAM Laser Mk 1
TYPE 10m Laser
WT. 5kg
EFF. RNG. 30m
E-FACTOR 15 per second
POWER OUTPUT 40Kw
ADDITIONAL COMMENTS A specialized laser mounted in the left wrist of a HAAM suit. The laser may be tuned for either cutting or welding metals. The laser's power source is the suit's reactor and it may not be used off the suit. The beam comes from a folded CO2 laser tube, is infrared, and penetrates 10mm of steel a second.



NAME Manpack Laser Mk 2
TYPE 50m Laser
WT. 10kg
EFF. RNG. 100m
E-FACTOR 120 per second
POWER OUTPUT 200Kw
ADDITIONAL COMMENTS The output of this laser is set and cannot be tuned. The laser requires a fusion pack as a power source and, with the pack, may be carried by one man. The laser's beam, as with all the Project's lasers, may be fired for a maximum of three seconds at a time. If the burst exceeds 3 seconds, the laser overheats and shuts down for 20 minutes then resets. There is a selector switch on all the lasers for one second beams or continuous fire. The beam from this laser penetrates 5 centimeters of steel a second.



NAME Mounted Laser Mk 3
TYPE 200m Laser
WT. 30kg
EFF. RNG. 500m
E-FACTOR 700 per second
POWER OUTPUT 800Kw
ADDITIONAL COMMENTS A vehicle or tripod mounted laser. The output of this laser may be tuned for cutting or welding. The beam focuses automatically as do the beams from all the lasers. The power source required for this laser is a fusion reactor. The laser may be connected to the reactor by a 50m cable when it is tripod mounted. When mounted on a vehicle it taps directly into the vehicle's reactor. This laser's beam penetrates 20 centimeters of steel a second.

NAME Fusion Reactor
TYPE Primary Vehicle and Base power source
WT. 500kg
POWER OUTPUT 150,000Kw
ADDITIONAL COMMENTS This is a large, self-contained, electrical power source. Due to it's size and weight it is used in only the largest vehicles. The fusion reaction is contained in a magnetic bottle and is started by crystal-fired lasers. The reaction continues as long as fuel is available in the reactor (a 20 year supply is in this model). The electricity is stripped from free electrons given off by the reaction and the casing of the reactor prevents any radiation leakage.

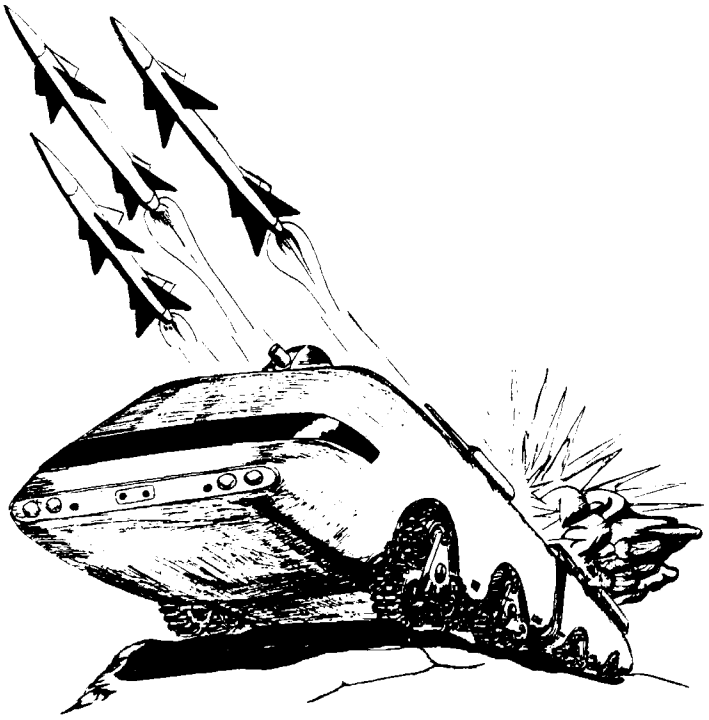
NAME Fusion Pack
TYPE Portable Power Source
WT. 15kg
POWER OUTPUT 20,000Kw
ADDITIONAL COMMENTS A man-portable backpack power source. The reactor works in the same manner as the larger reactor. The casing prevents any radiation leakage and contains all materials needed to run the reactor for 18 months. An external power source is required to start the reaction.

NAME Fusion Charge
TYPE Nuclear Demolition Charge
WT. 15kg
POWER OUTPUT 1 Megaton
ADDITIONAL COMMENTS The same as the fusion pack, however this device is designed to consume all its fuel in a thermonuclear blast. The reaction has to be started in the same manner as the fusion pack before the explosion can take place. The charge has an internal timer adjustable from 1 to 72 hours in ½ hour increments. The charge may also be detonated by radio from a MARS-ONE vehicle.

VEHICLES

Morrow vehicles are all adaptations of designs available at the time of a units freezing. All such vehicles are modified to make use of the Project's fusion power packs. Among the vehicles of such modified military design are those that are most widely used in the game as reconnaissance vehicles, especially the armored Commando Scout and Ranger. The first of these, the four-wheel drive Scout, is specifically designed for the military as a two or three man scouting vehicle. There are several different variations in armament and weapons systems available for the Scout, but the one most widely used in the game incorporates a MAG-58 machinegun mounted parallel to an Rh 202, 20mm cannon. The second of the Recon vehicles, the Commando Ranger, is principally a four-wheel drive armored personnel carrier (APC). This is the most numerous of all Morrow vehicles and is usually found armed with a top mounted .50 caliber machinegun. The Ranger has a very flexible crew capacity and can carry an operating crew of two with as many as 10 passengers.

The Commando V-150 is another Project vehicle which can be used in almost any situation. This is principally a four-wheel drive armored car and as such can carry armament ranging from a 7.62mm machinegun to a TOW missile launcher. The V-150 is used more in situations where its aggressive capabilities might be needed and one is found as a support vehicle in each MARS team.



MARS-ONE
TYPE Special
CREW 8
LENGTH 21.336m
WIDTH 4.572m
HEIGHT (WITHOUT ARMAMENT) 3.658m
HEIGHT (TURRET TOP) 4.877m
TURNING RADIUS 14.326m
MAX. ROAD SPEED 88km/hr
WATER SPEED 10km/hr
GRADIENT 50%
VERTICAL OBSTACLE 1m
TRENCH 5.486m
ARMOR CLASS 1100
ARMAMENT (see below)

Pod A	Pod B
4 rd TOW launcher	3-Maverick Missiles
2-M159C Rocket Pods	2-Chaparral Missiles
	2-M159C Rocket Pods

Standard armament
2-Rh202, 20mm cannons
2-M10-8 Flame guns
5-81mm Mortars
6-M85C Machineguns
10-M18A1 Claymores

AMMUNITION
(ready rounds)

Pod A	Pod B
4 TOW Missiles	3 Maverick Missiles
32 2.75 in Rockets	2 Chaparral Missiles
	32 2.75 in Rockets

Standard
100 rds 20mm per gun
1 rd 81mm per gun
200 Gallons gasoline per gun
105 rds 12.7x99mm per gun
10 M18A1 Claymores

AMMUNITION
(reserve)

Pod A	Pod B
8 TOW missiles	9 Maverick missiles
120 2.75 in rockets	4 Chaparral missiles
4 115 mm M55 rockets	120 2.75 in rockets

Standard
20mm - 8 belts (800 rds)
81mm - 135 rds
12.7 x99mm - 24 belts (2490 rds)
M18A1 Claymores - 44

The principal MARS vehicles are the culmination of Morrow military technology and comprise the primary power around which the rest of the MARS forces are centered. There are only three of these vehicles stored around the country with a fourth at Prime Base. Each of them is the focus of several support teams frozen in the same area close enough so that they can link up should this prove necessary.

The MARS vehicle itself has a flexible armored joint in its center to assist it in maneuvering and special rotating, individually powered tires to help it in climbing over rough terrain. The vehicle carries a complete computer system on board and is powered by a fusion reactor. The medical section consists of a mini-hospital complete with a bio-comp and two med units.

The vehicle is completely self-contained and can remain sealed for a year with the supplies and equipment on board. The weapons systems are mounted as follows from bow to stern; 1 forward firing Claymore mine, 2 forward firing fixed M85C machineguns, 2 forward firing 81mm mortars, 1 turrent mounted 81mm mortar, Note; All the mortars are breech-loaded. Next, 2 turrents each mounting an M85C machinegun and an M10-8 Flame gun, 2 turrents each mounting an Rh 202, 20mm cannon, The rear heavy weapons pod can mount either Pod A or Pod B. In the stern is mounted 2 81mm mortars, 2M85C machineguns, and a Claymore mine, all rear firing. There are also 4 Claymores on each side as well as gun ports.

The M10-8 flameguns are turrent mounted "Flame cannons" that can throw burning fuel to 170 meters. Each gun has enough fuel for 32 seconds of continuous fire, this can be fired in "bursts" of 4 seconds duration. Each burst burns at 1,200° C. for 180 seconds.

Also carried by the vehicle is a Mk 2 HAAM suit and 2 motorcycles, as well as the following small arms and ammunition;

Small Arms Stores
HP-35 (10)
M27-3½ (2)
M10 (6)
UZI (4)
Stoner Weapons system, complete (6)
M16A1 (2)
M21 (2)
MAG-58 (2)
Atchisson (4)

M79 (2)
M203 (2)
M174E3 (1)
HK69A1 (2)
M9A1-7 (1)
M10A (2)
M202A1 (1)
M47 (2)
FIM-92A (2) With Pod A only
Laser Mk 2(1)
Fusion Pack (1)
Fusion Charge (1)

Small Arms Ammunition Stores
9x19mm, 5 cases
5.56x45mm, 12 cases
7.62x51mm, 4 cases
12 gauge, 8 cases

.357 Magnum, 2 cases
5.56x45mm Linked, 4 cases
7.62x51mm Linked, 8 cases

Explosives and Grenades
M183, 2 cases
Primercord, 1 case
M1 Timers, 1 case
M60 Igniters, 1 case
M26A1 Frags, 3 cases
AN-M8, 1 case
M7A3 CS, 1 case
AN-M14 TH3, 1 case
Mk 1, 1 case

M112, 2 cases
M2A1 Detonators, 1 case
M700 Fuse, 1 case
M7 Caps, 1 case
M34 WP, 3 cases
M6, CN-DM 1 case
M9A1 BZ, 1 case
Mk3A2, 1 case

40mm Grenades
HE, 4 cases
M651 CS, 2 cases
M583 Flare, 1 case
Stunbag, 1 case

HEDP, 2 cases
M576E2 MP, 2 cases
Star Shells, 1 case each color

81mm Mortar
M374A2 HE, 90 rounds
M375A2 WP, 30 rounds

M301A3 Illum, 20 rounds

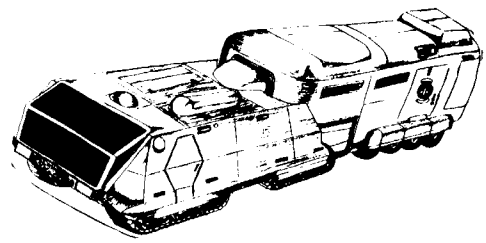
Miscellaneous
M47 rockets, 6
M74 (M202A1) rockets, 24 rounds
M72A2 LAWs, 30 rounds
HAFLA-35L, 102 rounds

FIM-92A missiles, 6

ARMBRUST 300s, 30 rounds

8 each, Mountain kits, Cold kits, Trade kits, Ration packs
6 Starlight Scopes
4 AN/PRC-70s

4 AN/TVS-5s
2 AN/PAS-7s



Scientific-One

CREW 6
LENGTH 21.366m
WIDTH 4.572
HEIGHT 3.658m
GROUND CLEARANCE .25m
TURNING RADIUS 11.582m
MAX. ROAD SPEED 68km/hr
WATER SPEED 10km/hr
GRADIENT 50%
VERTICAL OBSTACLE .5m
TRENCH .5m
ARMOR CLASS 1100

The Scientific One vehicles are mobile laboratories on wheels and tracks. The front tractor is detachable and can leave the trailers behind as it explores on its own. Both the tractor and the trailer have their own fusion power source.

Designed primarily for scientific exploration the vehicles are not, at first glance, armed. All the external weapons systems are retractable into housings on the outside of the vehicle. The mounted weapon systems consist of the following; Twin M85C's in turrents on the tractor top. 1, Mk 3 laser mounted on the tractor top. Two side mounted Stoner M207's on the tractor and 7 claymore mines around the sides. The trailer has a retractable missile launcher with two Chaparral missiles as well as two side turrents each holding an M207 machinegun. Both the tractor and the main trailer have retractable gas jets which can fire any of the available gases.

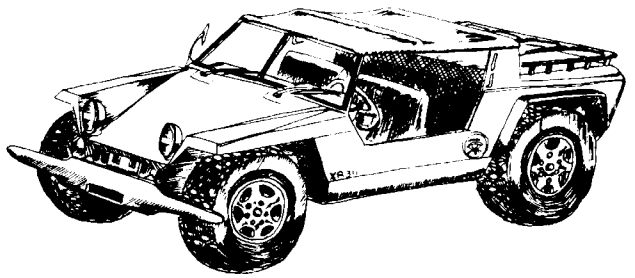
There is also a small towed trailer holding a 6-wheeled ATV and a dismantled Airscout gyrocopter. There is a Mk 2 HAAM suit in the main trailer, as well as the following supplies;

2 portable fusion packs
1 Manpack laser Mk2
4 Starlight scopes
10 AN/TVS-5 Binoculars
Small Arms and Ammunition
1 Atchisson
1 High Standard M10A
1 M203 Grenade launcher (mounted on an M16A1)
2 Complete Stoner weapon systems
3 Ingram M10's
4 HP-35's
1 M60
1 M174A3 Grenade launcher
1 M47 Dragon w/3 missiles
1 Stinger w/3 missiles
6 HAFLA-35L's
6 ARMBRUST 300's
2 cases 9x19mm
4 cases 5,56x45mm
2 cases 12 gauge shot shells
1 case each of the following:
40mm M433 HEDP
40mm M651 CS
AN-M8 HC
M7A3 CS
AN-M14 TH3
Mk 1 Illum.

4 cases 5.56x45mm Linked
2 cases 7.62x51mm Linked
8 cases 12.7x99m Linked

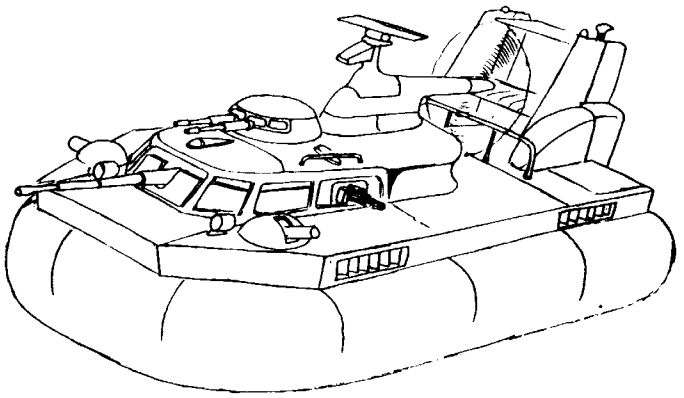
40mm M583 Flare
40mm Stunbags
M6 CN-DM
M9A1 BZ
Mk3A2
M7 Blasting caps

M700 Fuse
M2A1 Detonat
M1 Timers
2 cases each of the following:
M26A1 Frag
M112 C-4
Primercord
M34 WP
M183 Demo Charges
M60 Igniters
6 each Cold Kits, Mountain Kits, Ration Packs, and Trade Packs.



XR311
CREW 2
LENGTH 4.343m
WIDTH 1.93m
HEIGHT 1.6m
GROUND CLEARANCE .335m
TURNING RADIUS 6.51m
MAX. ROAD SPEED 129km/hr
FORDING DEPTH .75m
GRADIENT 60%
VERTICAL OBSTACLE .2m
TRENCH .25m
ARMOR CLASS 35
ARMAMENT 1-M2HB
AMMUNITION 5 belts (525 rounds)

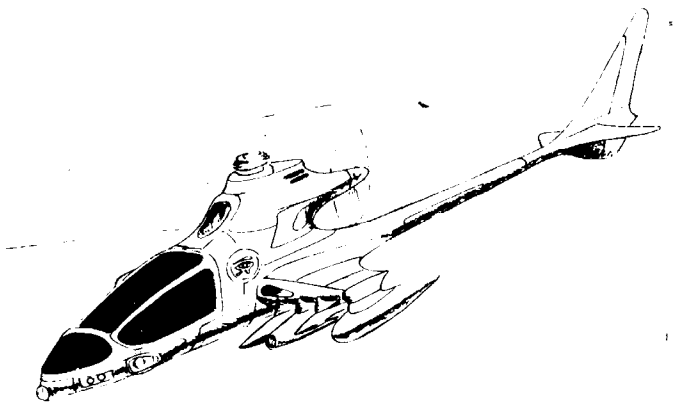
This vehicle is the Morrow Projects answer to the army jeep. This four-wheel drive vehicle is highly maneuverable and acts much like a dune buggy. There is a ring mount available for a machinegun to be mounted and used by the passenger. The tires are bulletproof, all-terrain balloon types.



SK-5 Hovercraft
CREW 6
LENGTH 12m
WIDTH 9m
HEIGHT (inflated) 8m
(deflated) 6m
MAX. GROSS WT. 9072kg
MAX. CARGO WT. 2041kg
MAX. SPEED 112km/hr
ARMAMENT 1, Rh 202 20mm cannon
Twin M85C's
2, M134 7.62mm Miniguns
2, M174E3 Launchers
AMMUNITION
(ready rounds) 100 rds 20mm
210 rds 12.7x99mm (105 rds per gun)
300 rds 40mm (150 rds per gun)
3,000 rds 7.62x51mm (1,500 rds per gun)
AMMUNITION
(reserve)
600 rds 20mm
6,000 rds 7.62x51mm
840 rds 12.7x99mm

This is a specialized hovercraft used on swamps, in water, and on grasslands. The vehicle is completely amphibious and is primarily used in swamps and lakes. The vehicle will float if the power is cut off. The M174E3 launchers are loaded from a 150 round magazine and are remotely controlled. The 7.62mm miniguns are a very high rate of fire machinegun. The miniguns have 6 barrels and fire at a rate of 6,000 rounds a minute. They are normally fired in 1 second (100 round) bursts. The E-factor of the minigun is 17.

The crew consists of a commander (fires the bow 20mm), a pilot, a radar man (controls the 40mm's), 2 waist gunners on the miniguns, and a turrent gunner on the 50's.



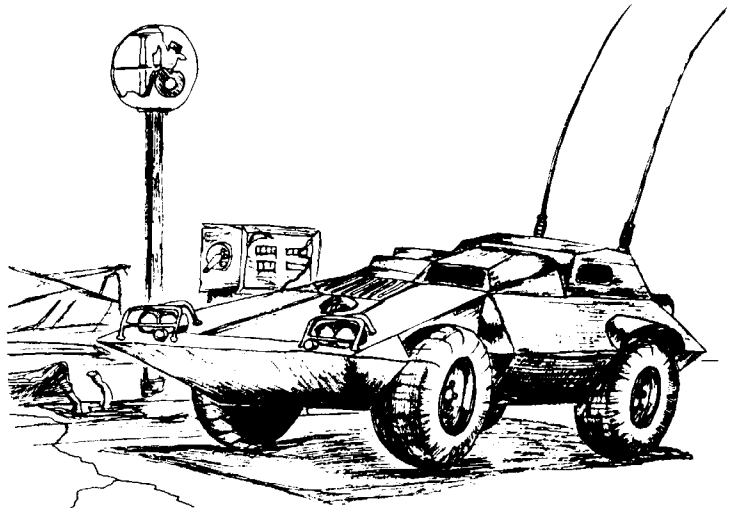
AIRSCOUT
CREW 2
LENGTH 3.71m
WIDTH 1.64m
ROTOR DIA. 7.01m
HEIGHT 2.34m
WEIGHT (EMPTY) 250kg
W/ARMAMENT 313kg
MAX. TAKEOFF WT. 510kg
LANDING GEAR Skids w/inflatable float pads
MAX. SPEED 185 km/hr
MAX. CRUISING SPEED 145km/hr
MIN. SPEED 24km/hr
MAX. RATE OF CLIMB 213m/min.
SERVICE CEILING 4,265m
T-O RUN 61m
LANDING RUN 0-6m
RANGE 1,800km
ARMAMENT 2 Stoner Fixed machineguns (equal to M207)
4 2.75in Rockets
AMMUNITION 800 rounds per gun

This is a very small aircraft known as a gyrocopter. The helicopter-like rotating blades are powered only for take-off and the craft cannot hover unless it is facing into a 25 kph wind. It is used for scouting and is lightly armed for its own defense. The aircraft breaks down into 6 small (man-portable) packages and is carried broken down in each of the Scientific-One vehicles. The crew normally consists of a pilot/gunner and an observer. The range is only limited by the strain on the rotors and airframe as the vehicle is fusion powered. After the maximum range is reached, or the craft has flown for more than 12 hours, a full lubrication and maintenance is required that takes about 2 hours to do properly.

COMMANDO V-150

	APC	w/20mm	w/81 mm Mortar
CREW	2(12)	2	5
LENGTH	5.689m	-	-
WIDTH	2.26m	-	-
HEIGHT without armament	1.955m	n/a	1.955m
turrent top	n/a	2.54m	n/a
GROUND CLEARANCE	.381m	-	-
TURNING RADIUS	8.382m	-	-
MAX. ROAD SPEED	88km/hr	-	-
WATER SPEED	4.8km/hr	-	-
GRADIENT	60%	-	-
VERTICAL OBSTACLE	.609m	-	-
TRENCH	.5m	-	-
ARMOR CLASS	100	-	-
ARMAMENT	M2HB	Rh 202 20mm MAG-58 (2)	81mm Mortar MAG-58
AMMUNITION	2100 rds	400 rds 20mm 3,000 rds 7.62	80 rds 81mm 2,000 rds 7.62

This is the workhorse of the Project. It is an armored car with bulletproof tires. The various weapon systems are all mounted on the same chassis. The APC version can carry 10 people besides its crew of two. There is also a special version that mounts a TOW missile launcher. It has a crew of 4 and 9 missiles. It is also armed with a MAG-58 with 2,000 rounds of 7.62x51mm ammunition.



COMMANDO SCOUT

CREW 2
LENGTH 4.699m
WIDTH 2.159m
HEIGHT 2.057m
GROUND CLEARANCE .381m
TURNING RADIUS 7.62m
MAX. ROAD SPEED 96km/hr
FORDING DEPTH 1.168m
GRADIENT 60%
VERTICAL OBSTACLE .610m

TRENCH .25m
ARMOR CLASS 100
ARMAMENT Rh 202 20mm
MAG-58
AMMUNITION 300 rds 20mm
3,000 rds 7.62x51mm

This is a very small, fast armored car designed primarily for Recon teams.

COMMANDO RANGER

CREW 8
LENGTH 5.344m
WIDTH 2.159m
HEIGHT 2.413m
GROUND CLEARANCE .203m
TURNING RADIUS 7.925m
MAX. ROAD SPEED 112km/hr
FORDING DEPTH .762m
GRADIENT 60%
VERTICAL OBSTACLE .254m
TRENCH .25m
ARMOR CLASS 100
ARMAMENT M2HB
AMMUNITION 2,000 rds 12.7x99mm

This vehicle is designed to protect the crew without looking especially threatening to outsiders. It is most often used by specialist teams and those teams not needing a heavy combat capability.

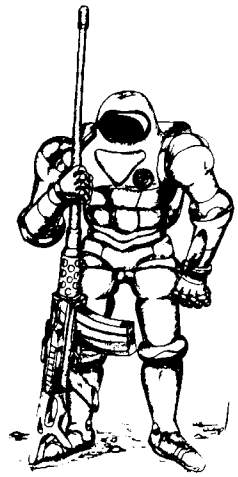
VEHICLE SUPPLIES

The following list of supplies are carried in all the vehicles. The supplies are placed in the vehicles while they are in storage and so are available for immediate use.

1 pr. AN/TVS-5 Binoculars
1 Laser Rangefinder
AutoNav navigation system
AN/PRC-70
1 Radio Direction Finder
1 Shovel
1 Ax
1 Sledgehammer
1 Machete
20m Tow chain
50m 11mm Nylon rope
3 Fire extinguishers
Tool Kit (specific to vehicle)
Tripod (M122 or .50 cal.)
2 Ration packs
1 Trade pack

Extra weapons and ammunition carried:

1 M21 rifle
1 case M26A1 grenades
1 case M7A3 CS grenades
1 roll (152m) primercord
2 M1 timers
1 case 9x19mm
1 case 7.62x51mm
4 ARMBRUST 300's
1 case M34 WP grenades
1 M183 demolition charge
10 M2A1 detonators
2 M18A1 claymores
1 case 5.56x45mm
1 case 12 gauge



HAAM SUIT Mk2
HEIGHT 2.134m
WIDTH 1.219m
WEIGHT 907kg
ARMOR CLASS 620

The HAAM suit (Hydraulically Assisted Armored Man) was originally designed to allow an individual to do work that would otherwise call for heavy equipment. The suit is the Project's answer to a bulldozer, crane, and forklift. This, the second model of the suit, is powered by magnetohydrodynamic flexion of the joints as compared to the originals use of hydraulics. Positive feedback to the operator is used in the suit so that it is limited in its strength and simply multiplies the user's strength 25 times.

The suit has an air recycling system and can remain sealed for up to 24 hours, can work underwater down to a depth of 350 meters, is vaccuum-proof, can resist temperatures up to 2,000°C. for one hour, has built-in infrared vision, and an automatic vision protection screen for the user.

There is a Mk 1 laser mounted in the left arm of the suit which can be operated from the inside. The suit has a computer operated self-survival system that will move the suit out of the way of incoming projectiles if it is not over-ridden by the operator. The suit's radio system is also tied into the computer system. In the case of something happening to the operator, a MARS or Scientific computer can control the suit and have it return to the vehicle irregardless of the state of the operator. With the power cut off the suit absolutely will not move and all the operator can do is climb out of the top. There is an operator's harness inside the suit that has to be adjusted to the individual. This adjustment takes 30 minutes to do properly. An untrained operator loses 75% of their dexterity when they attempt to use a suit while a trained operator only loses 25% of their dexterity.

There is a special 20mm automatic rifle designed for use with the suit. It has a 20 round magazine and is selective fire. The ammunition used is the same as that used in the Rh 202 cannon, the weapon also has the same characteristics as the Rh 202.

The suit is not commonly issued due to its power. One is in each of the major MARS and Scientific vehicles and one or more is found in each of the major supply bases. There was at least one "flying squad" of men frozen with each man outfitted with a HAAM suit. This a specially trained combat group for use in cities and is part of the MARS forces.

BASIC LOADS

The term basic load refers to the set of equipment issued for an individual, weapon, or vehicle. The basic loads for vehicles are listed in the section on vehicles. The loads applying to individuals are

described here.

A load is all the weapons and equipment issued to an individual including their clothes and personal gear. The weight of this equipment is standardized at 38.5 kilograms total for an average individual. The maximum weight of an individual's basic load can be determined as follows.

Take the character's strength score and multiply this figure by 3.5. The resulting number is the maximum basic load weight that can be carried without suffering any dexterity loss. For each 3.5 kilos over this weight carried, a loss of one point of dexterity is taken. This is continued until the individual is carrying so much weight that their dexterity reaches zero and they can do only one movement per combat turn. If any more weight is carried the individual cannot move.

Example:Joe (Dex. 14, St. 12) wants to carry his full basic load and some additional missiles for an M47 Dragon. His load of equipment weighs 18.69kg and his weapons load (#1) weighs 19.88kg so his total basic load wt is 38.57kg. His maximum basic load is 42 kg (St. = 14, 14x3.5 = 42), his maximum full load including his dexterity is 91kg (Dex. = 14, 14x3.5 = 49, 49 + 42 = 91). He may carry 4 missiles including his basic load (38.57 + (11.5x4) = 84.57kg). This is a tremendous load to carry so his dexterity is reduced to 2.

Note: As his ammunition and missiles are used his dexterity increases since his load weight goes down.

STANDARD EQUIPMENT

Included in each basic load is an issue of equipment that is common to all Morrow Project personnel. This set of equipment and an issue of weapons and ammunition is stored in a locker that is part of the individual's freeze tube. This locker is keyed to open with a Morrow project I.D. card which is stored with each individual inside their tube. There is a master card which can open all the lockers available to some base commanders and team leaders. The standard issue of equipment, not including weapons, is as follows:

STANDARD ISSUE

ITEM		WT.
1 pr	Coveralls (AC=7)	1.71kg
1 pr	Boots (AC=4)	1.52
1	KCB-70 Knife/Bayonet	.77
1	M17A1 Protective mask	1.3
1	M1 CBR Kit	.79
1	Medkit	.68
1	AN/PRC-68 Personal communicator w/scrambler	1.4
1	Basic pack containing	10.52

1, 1 liter canteen w/canteen cup
1, 5 liter folding canteen
14 days rations
1, mess kit
1, compass
1, generator flashlight
3, boxes matches
1, set coveralls
2 sets underwear
weapons cleaning kit
toilet kit
50m nylon cord (50kg breaking strength)
1 sleeping bag
1 waterproof poncho
1 web belt w/ammunition pouches and holster

MEDICAL ISSUE

A medics or doctors load would include all the standard issue equipment plus a sidearm. The medical equipment carried would usually be a large medkit and a surgical kit. An assistant would carry a weapon and well as a drug kit. Two medical loads are listed below.

#1 Medics or Doctors issue WT. 19.311kg
1 HP-35 w/3 mags
2 AN-M8, HC grenades
1 Surgical kit
1 Large medkit
1 Flask, universal antidote

#2 Assistants issue WT. 23.904kg
1 Stoner M22 w/4 mags
1 HP-35 w/3 mags
4 M26A1 Grenades
1 Drug kit

WEAPONS ISSUE

Weapons and ammunition are included in an individuals basic load. The issue consists of a primary weapon, a sidearm, ammunition and magazines for both, and an assortment of grenades or explosives. These loads average 20 kilos each so that when included with the standard issue equipment the total load does not exceed the 38.5 kilo standard. 20 prepared basic weapons loads follow.

Note: Some of the loads exceed the standard weight limit. It is expected that the extra ammunition for the heavy weapons would be either carried by the whole group or placed in a vehicle.

INDIVIDUAL BASIC LOADS

#1 WT. 19.88kg
1 Stoner M22 w/12 mags.
1 HP-35 w/3 mags
5 M26A1 Grenades
3 M34 WP Grenades
2 M72A2 LAWs

#2 WT. 23.608kg
1M203 w/36 rds 40mm & 12 mags
1 HP-35 w/3 mags
2 M26A1 Grenades
2 M34 WP Grenades

#3 WT. 19.756kg
1 M21 w/12 mags
1 HP-35 w/3 mags
4 M26A1 Grenades
4 M34 WP Grenades

#4 WT. 46.586kg (23.568kg)*
1 M47 Dragon w/3 missiles
1 M10 w/6 mags
2 M26A1 Grenades
2 M34 WP Grenades

#5 WT. 19.492kg
1 Stoner Mk 23 w/4 belts
1 HP-35 w/3 mags
6 M26A1 Grenades
4 M34 WP Grenades

#6 WT. 19.596kg
1Atchisson w/4 drums
1 HP-35 w/3 mags
4 M26A1 Grenades
4 M34 WP Grenades
2 M9A1 BZ Grenades

#7 WT. 20.112 kg
1 M10 w/6 mags
1 M183 Demolition charge
4 M2A1 Detonators
2 M1 Timers
2 M26A1 Grenades
1 M34 WP Grenade

#8 WT. 19.826kg
1 MAG-58 w/3 belts
1 HP-35 w/3 mags
2 M26A1 Grenades
1 M34 WP Grenade

#9 WT. 20.564kg
1 UZI w/12 mags
1 HP-35 w/3 mags
4 M26A1 Grenades
2 M34 WP Grenades
2 M72A2 LAWs

#10 WT. 20.06 kg
1 M10A w/50 rds
1 M27-3¼ w/24 rds.
8 M26A1 Grenades
6 M34 WP Grenades
3 M7A3 CS Grenades
3 M9A1 BZ Grenades

11 WT. 19.948 kg
1 Stoner M23 w/12 mags
1 HP-35 w/3 mags
8 M26A1 Grenades
4 M34 WP Grenades
4 Mk3A2 Grenades
2 M6 CN-DM Grenades

#12 WT. 19.496kg
1 Stoner M207 w/4 belts
1 HP-35 w/3 mags
4 M26A1 Grenades
4 M34 WP Grenades

#13 WT. 29.359kg
1 M9A1-7 Flamethrower
1 HP-35 w/3 mags
2 M34 WP Grenades
2 AN-M14 TH3 Grenades
3 HAFLA-35 Ls

#14 WT. 24.562kg
1 M60 w/3 belts
1 HP-35 w/3 mags
2 M26A1 Grenades
2 M34 WP Grenades
2 AN-M8 HC Grenades

#15 WT. 33.777 kg (20.277kg)*
1 M202A1 w/3 clips
1 M10 w/6 mags

#16 WT. 43.564kg (23.264kg)*
1 Stinger w/3 missiles
4 M26A1 Grenades
2 M34 WP Grenades

#17 WT. 20.024kg
1 ARMBRUST 300
1 M10 w/6 mags
1 HP-35 w/3 mags
4 M26A1 Grenades
4 M34 WP Grenades
2 M7A3 Grenades

#18WT. 19.672kg
1 M10 w/6 mags
1 HK69A1 w/20 rds 40mm
1 HP-35 w/3 mags
4 M26A1 Grenades
2 M7A3 Grenades
2 AN-M14 TH3 Grenades

#19 WT. 19.366kg
1 M10 w/12 mags
1 HP-35 w/ silencer & 3 mags
4 M26A1 Grenades
2 M6 CN-DM Grenades
2 M9A1 BZ Grenades
2 M34 WP Grenades
3 HAFLA-35Ls

#20 WT. 30.064kg
1 MK 2 laser w/ fusion pack
1 HP-35 w/3 mags

* Wt. in brackets is with one load in the primary weapon.

TYPES OF MORROW PROJECT INSTALLATIONS

The Morrow Project has many installations buried throughout the country. They serve differing functions which range from protecting a team until wakeup to providing facilities for constant monitoring of all operations. There are several different types of installations or bases possible. The GM may choose to utilize some or all of them in his play campaign.

The first and most important of the installations is Prime Base. This is a large, permanent, manned installation and is the nerve center of the Morrow Project. There are no more than two such bases with the second being a "backup" base with its personnel compliment being all in cold sleep. A base of this nature is placed in a relatively isolated, protected position in the United States. (In one of the play-test campaigns, Prime Base was underground, 5 levels deep, and had a compliment of 250 people).

The second type of installation is that of a permanent depot/base. These installations are scattered throughout the country and may be either manned or automated. The purpose of such bases is to resupply and support the Morrow teams as needed. They carry complete stocks of materials and equipment. The stocks included the materials to help start man back on the road to civilization and include construction equipment and materials as well as full libraries on microfilm. The MARS-ONE vehicles are stationed in such bases and include very large arsenals of weapons and ammunition. Installations of this type should be limited to a maximum of 10.

Another type of installation is of a more specialized nature. These are the bases for the specialist teams and include complete farms, hospitals, supply bases, and power stations. They can be either manned or automated as required. There is also rumored to be an experimental rocket base buried but the location of any such base is known to a very few of the Projects personnel.

The most common form of manned installation is referred to as a "bolt-hole". This is the base most players find themselves in when they are awakened. The base contains nothing more than the freeze tubes, the team vehicle, and a minimum of supplies for the vehicle and crew. The "bolt-hole" is a very small concrete bunker in relation to the other bases. They are designed to be used once and then abandoned. They are the most often used base for the Recon teams and a few support teams.

Included with the bases are many supply caches scattered throughout the countryside. Each cache is well stocked with a variety of Morrow equipment and has a good supply of ammunition and spare parts. The caches are contained in a "bolt-hole" type base with the entrance being well hidden. Each team knows the location of at least 6 caches throughout the country.

Note: For security reasons none of the teams know the exact location of other teams. Only Prime Base has this information.

THE USE OF FIREARMS

Firearms play a very important part in the survival and success of the Morrow Project and its personnel. The weapons used in the Morrow Project are of several conventional types and all are available on the arms market. The available weapons range from pistols and revolvers through submachineguns, carbines, assault rifles, light and heavy machine guns, shotguns, grenade launchers, mortars, flamethrowers and missile launchers. Each class of weapons has advantages specific to itself, as is shown below.

PISTOLS AND REVOLVERS: Pistols are semi-automatic, that is they fire one shot for each pull of the trigger. They are loaded with a magazine or "clip" of ammunition and may be fitted with a silencer. Revolvers are generally more powerful, larger and are manually operated; that is the weapon must be cocked and/or trigger pulled for the weapon to fire. The ammunition inside a revolver is held in a 6 round cylinder that is slower to load than a pistol with its magazine. Both weapons are carried in holsters and can be used with one hand.

Examples; (pistol) Browning HP-35, (revolvers) S&W M27-3½, S&W M29-6¼

SUBMACHINEGUNS; Also known as "machine-pistols", these weapons are larger than pistols, hold more ammunition in their magazines and are normally fired fully automatic. In full automatic fire the weapon continues to fire as long as the trigger is pulled and they have ammunition in the magazine. Most submachineguns are selective-fire, that is there is a switch on the weapon that allows it to be fired either semi-automatically or fully automatic. The weapons are normally fitted with a folding stock that can be extended for bracing against the shoulder or hip while firing. A submachinegun is commonly fired in bursts of 4 rounds, the trigger being held until 4 rounds are fired, then released. Pistol ammunition is normally fired in submachineguns, and some are small enough to be carried in a holster.

Examples; Ingram M10, UZI no. 2 Mk A.

CARBINES AND ASSAULT RIFLES; A short rifle, normally loaded with an "intermediate" round larger than a pistol cartridge but smaller than a "full-sized" rifle cartridge. They also have a large magazine and are usually selective-fire. The weapon can be used as either a submachinegun or a rifle. When used as a submachinegun they are fired in 4 round bursts.

Examples; (carbine) Stoner M23, (assault rifle) Stoner M22, M16A1.

RIFLES; These are long range weapons, usually only semi-automatic. They fire a large cartridge that will reach a long distance and penetrate deeply in wood or concrete. The weapon can be fitted with a telescopic sight or a starlight scope as well as a silencer for use as a sniper weapon.

Example; M21

LIGHT MACHINEGUNS; These are large, heavy weapons capable of only full-automatic fire. They are belt-fed, that is the ammunition is held in flexible metal belts that break up into separate links after being used. They have a built in bipod for shooting from the ground or can be mounted on a tripod. These weapons are capable of long-range fire but are light enough to be hand-held and fired like a rifle from either the hip or shoulder. They fire rifle caliber ammunition and are normally fired in 6 round bursts.

Examples; Stoner Mk23, Stoner M202, MAG-58, M60

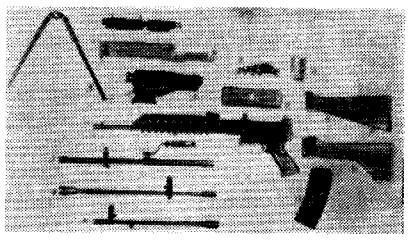
HEAVY MACHINEGUNS; A very large weapon, the ammunition for some being in the small cannon class. These weapons are always mounted either in a vehicle or on a tripod, and require a crew of from 3 to 6 men to carry the weapon and its ammunition. Capable of being fired either semi or full automatic, these guns can be utilized as a long range sniping system. When used on full automatic they are normally fired in 10 round bursts.

Examples; M85C, M2HB, Rh202.

SHOTGUNS; These weapons fire many projectiles for each shot. Most often used with 12 gauge magnum 00 buckshot loads they fire 12 .33 caliber lead balls for each shot. There are also fully automatic shotguns that are fired in 4 round bursts which, when fired with magnum loads, results in 36 projectiles launched in each burst. These are very devastating close-in weapons as the shot spreads to cover a large area but loses power rapidly over long range.

Examples; High Standard M10A, Atchisson assault gun.

GRENADE LAUNCHERS; These are multi-purpose weapons firing the 40mm family of grenades. With the high-explosive rounds the launchers act as small mortars, as flare guns when used with white parachute flares or star clusters, and as non-lethal weapons if used with gas or stunbag rounds. Some of the launchers are mounted on rifles, carried in holsters, or mounted on vehicles. With the multiple projectile buckshot rounds the launchers act as large shotguns firing 20 00 buckshot for each round fired.
Examples; M79, M203, HK69A1, M174E3.
MORTARS; A short, smooth-bore cannon that fires fin-guided bombs in a high arc. Mortars are used to fire a shell over an obstacle, such as a wall or hill, to hit a target close behind it. The weapon is normally fired by dropping the round down the muzzle of the gun a single shot at a time. Some vehicular mounted mortars can be breech loaded from the back like a cannon. Since the mortar is fired at targets out of sight this is known as an "indirect fire" weapon. They are most accurately used with a "forward observer", someone who actually sees the target and calls back corrections for misses to the mortar crew. When mounted on the ground the heavy recoil settles the base of the gun deeper and deeper into the ground with each shot. This means the weapon must be re-aimed with each shot for maximum accuracy. When ground mounted the weapon requires a crew of at least 3 to carry and operate the mortar and its ammunition. One man can operate the gun slowly, but cannot carry the weapon.
Example; M29A1.
FLAMETHROWERS; These come in several types, the most common being a backpack of tanks with a hose leading to a hand held gun. A flamethrower is psychologically devastating as the flame is terrifying to watch. It may either be fired with the fuel ignited or the fuel can be sprayed over a target, allow to soak in, and then ignited. Used in this manner it is an especially effective threat since, if the fuel is ignited it will consume all the air in the target unless the target is especially sealed against flame.
Examples; M9A1-7 HAFLA-35L
MISSILE LAUNCHERS; These are recoilless weapons of several types. They range from small, hand-held, single shot launchers to large, mounted missile systems. Their complexity varies from simple tubes or guide rails to complex launching systems with integral sighting and tracking systems. All missile launchers have a danger area behind the missile. This is caused by the "back blast" of the rocket's exhaust as it is launched. Some of the largest launchers can only be used on vehicles while some of the medium variety can be operated by a crew.
Examples; M72A3 LAW, ARMBRUST, 300, M202A1, M47 Dragon, FIM-92A Stinger, M151E2 TOW, Chaparral, Maverick, 2.75 in. Rocket Pod, M55 Bolt.
Note; The Stoner weapons system adopted by the Morrow Project is a special case in the field of firearms. It may either be issued as a particular weapon or as a kit of parts. The kit consists of several different barrels, feed mechanisms, and stocks, and a single receiver. By assembling different barrels and parts, one receiver can be assembled into any one of the different Stoner weapons.



USE OF GRENADES

Grenades are used for multiple purposes. They can be thrown into a room before entering, create clouds of smoke for cover and concealment, blast holes in walls, illuminate a dark area, melt or weld steel, and make an area intolerable with gas. The grenades are very easily used. The pin is pulled to arm the grenade, but as long as the lever is held down it will not fire. When the grenade is thrown the lever is released, igniting the fuse. After the fuse's time delay, depending on the grenade, the grenade either explodes or starts burning.
RANGES; As grenades are normally hand thrown, the distance they can be thrown is dependent on their size, shape, and weight. All grenades shown in the weapons tables have an average throwing range listed. A variation on this range is as follows:

Look up a specific grenade on the following table and find the distance it can be thrown per strength point. Multiply this number by the strength points of your character and you have the maximum distance that character can throw one of the following grenade groups.

A	B	C	D
M26A1	M6,CN-DM	AN-M8, HC	AN-M14, TH3
M7A3, CS	M112, C4	M34, WP	
M9A1, BZ			
Mk3A2			
Mk1			

A = 4m/St. Pt. B = 3.5m/St. Pt. C = 3m/St. Pt. D = 2.5m/St. Pt.

HITTING THE TARGET

Use the standard firearms tables, however, if the grenade misses it still goes off somewhere. To determine where the grenade lands in the case of a miss, roll 1D8 and use the following table.

DIE ROLL	RESULT
1	Left and past target
2	On line and past target
3	Right and past the target
4	Left and on line with target
5	Right and on line with target
6	Left and short of target
7	Short and on line with target
8	Right and short of target

1	2	3
4	target	5
6	7	8

If the grenade misses it has no effect on the target. If the grenade would affect another target, roll 3D6 to determine the distance the grenade missed by (the die roll is equal to the number of meters). The direction is taken from the table above.

EFFECTS

Fragmentation grenades have a blast effect as well as a fragment effect. The M26A1 grenade will blast a ½m hole through a normal wooden wall. The M34 WP grenade will also spread fragments however these cause damage by burning.

The number of fragments hitting a character within a grenades blast radius is determined by rolling 1D20, the number rolled equalling the fragments hitting the character. The Dp are found by multiplying the number of fragments by the E factor of the fragments, after they have pentrated any armor. Note: WP fragments cause 4 points burn damage per fragment per turn. The number of turns the fragments burn is determined by rolling 1D4, the number rolled being the number of turns the phosphorus burns.

Gas and smoke grenades create a dense cloud of smoke. The cloud is normally 18m long, 4m wide and 2m high. In the case of a gas grenade, the clouds effect lasts 4 times the burning time and a white phosphorus grenade's smoke lasts the grenade burning time.

OPTIONS

1. Anyone with a dexterity of 4 or less has a 10% chance of dropping a grenade when they try to throw it. They may, of course, immediately try to pick it up and throw the grenade, but they are unable to aim it other than in the general direction of the target. Roll ¼ of the character's accuracy.

2. A saving throw for a Morrow Project grenade or a fresh grenade requires 00 on a roll of 2D10. If the roll is made, the grenade duds and will not explode. Very old or crudely made grenades have a 75% chance of failing to explode.

EXAMPLE

Joe (St-15, Acc-12, Dex-6) is going to try to throw a M34 WP grenade into a pit 45m away. His range with a M34 grenade (Class C) is 45m (M34 = C, C = 3m/St. Pt., 3x15 = 45m), so he can make the throw. He throws, his die roll is 13 so he misses. The miss roll die roll is 4, and the distance roll is 14, so the grenade lands 14m to the right of the target. It so happens there was another guy standing there and he catches the blast from the grenade. He is hit by 8 fragments (result of 1D20 roll) which burns for 3 turns (result of 1D4 roll). He takes 96 Dp total (8 fragments x 4dp x 3 turns). From the burn table it is found he has received 3rd degree burns and misses his roll on the death percentage (20% chance, he rolls 12 on 2D10) so he dies from burn shock. The smoke cloud from the grenade lasts 15 turns (60 seconds burning time divided by 4 seconds a combat turn).

THE USE OF EXPLOSIVES

Explosives are used in many of the weapons found in the Morrow Project. Explosives function by sending out shock waves and producing vast quantities of gas, the two combined can shatter and move material. The most common explosive in the Project is Composition C-4, better known as plastic explosive or simply C-4. C-4 is used as the base explosive that all of the explosive tables are calculated from. It is normally issued in blocks (M112) or assemblies of blocks in canvas bags (M183 demo charge).

To use an explosive it must be detonated, set off, by another explosion. This is most often accomplished by using a blasting cap or primercord but it may also be done by using a hand grenade, mortar shell, rocket, or any other major explosion. A normal detonator assembly has a blasting cap at one end that must be imbedded in the explosive being used. To use a blasting cap it should be attached to the end of a piece of fuse or primercord and then placed inside the explosive to be detonated.

Note; All explosives, except Black Powder or Primercord, must be set off by an explosion or blasting cap. Both black powder and primercord can be set off by flame, primercord will also detonate when hit by bullets. C-4 cannot be detonated by fire, impact (bullets), or electricity, only another explosion will detonate it.

To decide how much explosive is needed to blast a man-sized hole through an obstacle look to the following chart.

BREACHING CHARGES

THICKNESS OF CONCRETE	C-4 NEEDED WT.	#OF M112 BLOCKS
.5m or less	3.5kg	6
.6m	4.8kg	8
.8m	9.2kg	17
.9m	13.2kg	24
1.1m	21kg	38
1.2m	31.5kg	56
1.4m	44.7kg	80
1.5m	48.1	86

If the material being blasted is rock or masonry, instead of concrete, multiply the weight of C-4 needed by 0.5. A single block (M112) of C-4 will blast a man-sized hole through a normal wooden wall (less than 12cm thick).

To calculate the weight needed of some other explosive besides C-4 the following table is provided.

RELATIVE EFFECTIVENESS (RE)

EXPLOSIVE	RE	EXPLOSIVE	RE
PETN (Primercord)	1.24	Picric Acid	0.70
Nitroglycerine	1.12	Guncotton	0.69
C-4 or C-3	1.00	Dynamite (60%)	0.62
Tetryl	0.93	Nitrostarch	0.60
Amatol	0.87	Dynamite (40%)	0.49
RDX	0.85	Black Powder	0.41
TNT	0.75	Ammonium Nitrate	0.31

To use the table, find the RE of the explosive you want to use and divide the weight of C-4 you would need by this number. This gives you the weight of explosive required to do the job.

Example; Joe wants to blast a hole he can crawl through in a wall. The wall is made of stone. Joe needs to decide how much explosive he needs. Since it is a normal building wall (less than .5m thick) he needs 3.5kg of C-4 to blast a hole through an equivalent wall made of concrete. The wall is made of rock so Joe only needs 1.75 kg (3.5 x 0.5 (rock factor) = 1.75kg) of C-4. However Joe has no C-4 only a barrel of black powder. Joe needs to use 4.26kg (1.75 ÷ 0.41 (RE of black powder) = 4.26kg) of powder to blow the wall.

EXPLOSIVE DAMAGE

The biological damage done by an explosion is caused by the shock waves rupturing the internal organs of the organism affected. This damage varies according to the amount of explosive detonated and the distance the organism was from the site of the explosion.

The following table lists the whole body damage points (Dpw) caused by contact with the explosion of various items of ordnance. The Dpw go down by 100 points for each meter distance from the point of detonation.

EXPLOSIVE DAMAGE POINTS

EXPLOSIVE	Dpw	EXPLOSIVE	Dpw
M112 C-4	1300	20mm M56A1 HE	40
M183 Demolition charge	20,800	81mm M374A2 HE	1,240
Mk3A2 Grenade	295	2.75 in. Rocket	2,600
M26A1 Grenade	232	M47 Dragon	3,120
Primercord	10 (per m)	M151E2 TOW	3,120
Blasting cap	1	Stinger	2,900
M72A2 LAW, ARMBRUST			
300	533	Chapparal	13,260
40mm M381 HE	100	Maverick	76,700
40mm M433 HEDP	120	M19 AT mine	20,355
M25 AP mine	20	M18A1 Claymore mine	1,460
M16A1 AP mine	888		

Example; Joe is standing 17 meters away from the explosion of 4 M112 blocks of C-4. The damage done at the site of the explosion is 5200 Dpw (4 x 1300 Dpw per block = 5200). Since he is standing 17 meters away and not under cover which would protect him from the blast, Joe would receive 3500 Dpw (5200 Dpw - (17 x 100) = 3500) and be effectively blown to shreds.

To find the exact extent of damage to a body, use the Whole Body Damage tables.

ACCURACY, HITTING THE TARGET

To fire any weapon and hit the target involves many variables. The problems of range, conditions, target size, weapon characteristics, and personal ability all come into play. To simplify this there are the following tables to account for a majority of these factors.

All the tables modify the individual's accuracy. To determine whether or not an individual hits his target roll 1D20. If the number rolled is below the characters accuracy a hit takes place on the target. If the results of the roll are equal to or higher than the characters accuracy they have missed the target. The following table should assist in determining a hit or miss.

#1 ACCURACY

INDIVIDUALS ACCURACY	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
# OR LESS TO HIT	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
# OR MORE TO MISS	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Note; In the case of an accuracy of one or zero the only way an individual can hit the target is to use either luck or the additional tables and a weapon with a high modifier. The authors recommend a machine shotgun (Atchisson).

The following tables add additional factors in hitting a target. The numbers they list are either added or subtracted from an individual accuracy as required by the table.

#2 RANGE AND VISIBILITY

Situation	Point Blank 0-10m	Short 10-50m	Range Medium 50-250m	Long 250-Max. Eff.	Extreme Max. Eff.-Max. Rng.
Can See	+2	+1	Normal	-1	Luck
Can hear, Can see vaguely	+1	Normal	-1	Luck	N/E
Cannot hear, can see vaguely	Normal	-1	Luck	N/E	N/E
Cannot see, can hear	-1	Luck	N/E	N/E	N/E
Cannot see or hear	Luck	N/E	N/E	N/E	N/E

N/E-No Engagement, the target is to far away for there to be a reasonable chance to hit it. If an attempt is made anyway roll 1D100 on a 00 Luck may be used.

#3 RANGE AND WEAPON MODIFER

Weapon	Point Blank	Short	Range Medium	Long	Extreme
SHOTGUN	+4	+2	Normal	N/E	N/E
MACHINEGUN*	+2	+2	+1	+1	Normal
SUBMACHINEGUN*	+2	+1	Normal	N/E	N/E
ASSAULT RIFLE*	+2	+2	+1	Normal	Normal
SINGLE SHOT	Normal	Normal	Normal	Normal	Normal
PISTOL	Normal	Normal	Luck	N/E	N/E
TELESCOPIC SIGHT**	Normal	Normal	+2	+1	+1
MACHINE SHOTGUN*	+8	+4	+1	N/E	N/E
GUIDED MISSILE	-2	Normal	+4	+6	N/E

* = Points per short burst. Add 1 point for each multiple of the burst on one target (i.e. Medium burst = +1, Long burst = +2).

** Includes starlight scope, must be mounted on weapon. N/E - No Engagement, in this case the projectile cannot normally reach the target due to the range being to long.

#4 HEARING

Range short or less, roll 1D10, if the number rolled is in the range shown on the following chart the other party is heard.

SITUATION	TERRAIN BRUSH	ROCKY	WET	SANDY	INSIDE BUILDING
Both moving	1-4	1-2	1-3	1	1-3
Their moving your not moving	1-8	1-3	1-6	1-2	1-5
Their not moving, your moving	1-2	1	1	Luck	Luck
Neither Moving	1	Luck	1	Luck	1

#5 FIRER OR TARGET MOVEMENT

SITUATION	RATE OF MOVEMENT SLOW (WALK) 1-8 kph	MEDIUM (JOG) 8-16kph	QUICKLY (RUN) 16-24kph	FAST (DEAD RUN) 25-48+kph
Their moving, your not moving	0	-1	-2	-4
Your moving, their not moving	-1	-2	-4	-6
Your both moving	-2	-4	-6	-8

Note; the speed given in kph is for use with vehicles.

#6 TARGET SIZE

SIZE	MODIFIER
¼ MANSIZE (Lying prone or shooting over an obstacle, firing tripod mounted heavy gun)	-4
½MANSIZE (Kneeling or shooting through a window, standing in turrent of vehicle)	-2
MANSIZE	0
1½MANSIZE	+1
2xMANSIZE	+2
2½xMANSIZE	+3
3xMANSIZE	+4
4xMANSIZE (Most vehicles)	+5

#7 FIRING TERRAIN

TERRAIN	MODIFIER
GRASSLAND, DESERT, WATER	0
FORESTS, HEAVY BRUSH	-2
ROCKY, MOUNTAINOUS	-1
MARSH, SWAMPLAND	-1
BUILT-UP (Cities)	-2

#8 LUCK

Roll 1D20 and 1D6. On an odd roll on 1D6 (1,3,5) and if the results of the roll of 1D20 is less than the persons luck they receive a "lucky" hit on their target.

#9 AUTOMATIC FIRE

When firing a weapon on full automatic a short burst is needed for each target.* For two targets a medium burst (two short bursts) would have to be fired, and so on. Accuracy to hit must be rolled for each target. The number of bullets hitting the target is found by using the following table.

WEAPON	SHORT BURST	DIE ROLL EQUAL TO BULLETS HIT
Submachineguns, Carbines, Assault Rifles	4 rds	1D4
Light Machineguns	6 rds	1D6
Heavy Machineguns	10 rds	1D10
Machine Shotguns	4 rds	1D4 see Shotguns
Shotguns	12 "bullets" per shell	1D12 per shell
Grenade Launchers (w/ M576E2 Multiple Projectile)	20	1D20

* In the case of machine shotguns only a single shell is needed per target. A short burst could engage 4 targets (accuracy to hit must be rolled for each target).

Example; Joe (Acc 12) is walking through a forest and hears Ivan (GM rolls 3 on 1D10, table #4) moving nearby. Joe waits until he sees Ivan 20m away and then fires a short burst from his M10 submachinegun. Joe needs an 11 or less to hit (range = +1, weapon = +1, target movement = 0, terrain = -2, 1+1+0-2=0, 12-0=12). Joe rolls a 7 on 1D20 and so hits Ivan with 3 (3 on 1D4, table #9) bullets.

INDIRECT FIRE

An indirect fire weapon is one that fires at a target that is normally out of sight of the firer. These weapons include mortars, some missile launchers, cannons, and can include grenade launchers.

Due to the fact that the gunner cannot see the target he must be told or know its range and direction otherwise it is impossible for him to effectively engage it. Given this information the gunner may fire at the target with his normal accuracy. If there is a "forward observer", that is someone who can see the target and is in communication with the gunner, he can call back corrections for misses to the gunner. With every correction called back one point is added to the gunners accuracy. The direction and distance of any misses are taken from the following tables.

DIRECTION OF MISS

Roll 1D8

1 Left and past the target
2 On line and past the target.
3 Right and past the target
4 Left and on line with the target
5 Right and on line with the target
6 Left and short of the target
7 Short and on line with the target
8 Right and short of target

1	2	3
4	T	5
6	7	8

DISTANCE OF MISS

ROLL 1D20

1-20m	6-70m	11-150m	16-275m
2-30m	7-80m	12-175m	17-300m
3-40m	8-90m	13-200m	18-350m
4-50m	9-100m	14-225m	19-400m
5-60m	10-125m	15-250m	20-500m

* When firing 40mm grenade launchers roll 1D6 and use the ranges from 1 to 6 on the table.

Example; Joe (Acc 12, Mov 3) is firing an 81mm mortar at a target beyond a hill 1,500m away. Ed, Joe's forward observer, has the target, a bunker, under observation and has radio contact with Joe. Joe has prepared 6 rounds of high explosive for firing at the bunker and he has aimed the mortar according to Ed's directions. Joe fires the mortar and misses (rolls 20 on 1D20). The shell lands right and over (past) the target (3 on 1D8) by 125m (10 on 1D20). Ed calls back for Joe to drop 100m and left 50m on the mortar and Joe spends the next turn reaiming the gun. Joe fires the mortar and hits the target (rolls 3 on 1D20). Since Joe had corrected his aim he needed a 12 or less to hit (+1 on his Acc of 12 = 13).

ARMOR PENETRATION

A projectile carries energy with it to the target and in this manner causes damage. This energy takes the form of the speed in which the projectile strikes the target. It was to account for this energy that the E-factor was developed.

The term E-factor comes from the Efficiency of a projectile. It accounts for the amount of armor a projectile can penetrate as well as damage it does. The E-factor is found by multiplying the projectiles diameter (in thousandths of an inch) times the velocity of the projectile at launch (in feet per second) and dividing the result by 50. The formula looks like this;

$$\frac{\text{Dia.} \times V}{50} = E$$

Dia. = Projectile diameter
V = Velocity at launch (muzzle velocity)
E = Factor

This formula is used to develop an E-factor for any projectile that is fired at a target and does damage by its speed and size. It works equally well on a pellet from a slingshot to a bullet fired from a .50 caliber machinegun.

The E-factor is used to find how much armor the projectile can penetrate. The following tables are used to find the amount of material (armor) a projectile can penetrate and how much energy is left after penetration. After deciding what the armor class is of the material you are firing at, this number is subtracted from the E-factor of the projectile you are firing. If the armor class is greater than the E-factor, no penetration takes place. If the E-factor is greater than the targets armor class the projectile penetrates the armor. The E-factor remaining after the armor class is subtracted is the number of damage points (Dp) the projectile does to the target.

Note; The E-factor is approximately equal to the projectiles penetration into flesh in inches.

The only case in which the E-factor formula is not used is in the case of armor penetrating (shaped charge) explosive warheads. In the case of these weapons the E-factor is found by determining how much armor the weapon penetrates. The armor class of the weapons penetration is taken as that weapons E-factor.

ARMOR CLASS

ARMOR CLASS	CM. OF STEEL	CM. OF WOOD	CM. OF CONCRETE	CM. OF STONE	MATERIAL
A	-	-	-	-	Skin
B	-	-	-	-	Cloth (heavy)
C	-	-	-	-	Leather
1	-	2.54	.03	-	13mm light plastic
2	-	5.08	.5	-	13mm heavy plastic
3	.25	7.62	.76	-	Chain mail
4	.34	10.16	1.02	7.62	3mm Armor plate
5	.42	12.7	1.27	8.89	
6	.5	15.24	1.52	-	Nylon body armor
7	.57	17.78	1.79	-	Resistweve cloth
8	.64	20.32	-	-	6mm Fiberglass plate
9	.7	22.86	-	-	6mm Aluminim plate
10	.76	25.4	3.18	16.51	
14					Kelvar vest
15	1.02	34.29	7.62	22.86	
16	-	-	-	-	19mm Lexan
18	-	-	-	-	Fiberglass/ Titanium plate
19	-	-	-	-	13mm Aluminium
20	1.27	45.72	10.16	30.48	
21	-	-	-	-	3mm Boron carbide ceramic
25	1.52	55.88	15.24	36.83	
30	1.79	66.04	19.05	43.18	
35	2.03	78.74	22.86	49.53	3mm Boron/carbon filament plate
40	-	88.9	29.21	55.88	
42	2.29	-	-	-	
45	-	99.06	34.29	60.96	
48	2.54	-	-	-	
50	-	109.22	39.37	66.04	
55	-	121.92	45.72	71.12	
60	-	129.54	50.8	76.2	
65	3.18	-	-	-	
82	3.81	-	-	-	
90	4.06	190.5	91.44	106.68	
100	4.45	-	-	-	
120	5.08	-	-	-	
160	6.35	-	-	-	
200	7.62	-	-	-	
250	8.89	-	-	-	
300	10.16	-	-	-	
350	11.43	-	-	-	
400	12.7	-	-	-	

ARMOR CLASS

E FACTOR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
1	0	NP																																	
2	1	0	NP																																
3	2	1	0	NP																															
4	3	2	1	0	NP																														
5	4	3	2	1	0	NP																													
6	5	4	3	2	1	0	NP																												
7	6	5	4	3	2	1	0	NP																											
8	7	6	5	4	3	2	1	0	NP																										
9	8	7	6	5	4	3	2	1	0	NP																									
10	9	8	7	6	5	4	3	2	1	0	NP																								
11	10	9	8	7	6	5	4	3	2	1	0	NP																							
12	11	10	9	8	7	6	5	4	3	2	1	0	NP																						
13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP																					
14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP																				
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP			E																
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		F																
17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		F															
18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		E														
19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		C													
20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		T												
21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		I											
22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		V										
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		E									
24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		N								
25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		E							
26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		S						
27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		S					
28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP						
29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP					
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP				
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP			
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP		
33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP	
34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	NP
35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

NP= No Penetration; 0 = Imbedded in Armor;

A factor of more than 8 completely penetrates the human body

A factor of 11 or more has a 25% chance of amputation or decapitation if it hits a limb or the head.

DAMAGE, MEDICAL TABLES

When a projectile strikes flesh its E-factor converts straight into Damage points (Dp). These Dp account for the extent of a wound. The factors of wound shock, wound severity, hydrostatic pressure, bleeding, and the striking of major bloods vessels are all taken into consideration.

The first step in finding damage is to determine where the strike has taken place. To do this use the following table.

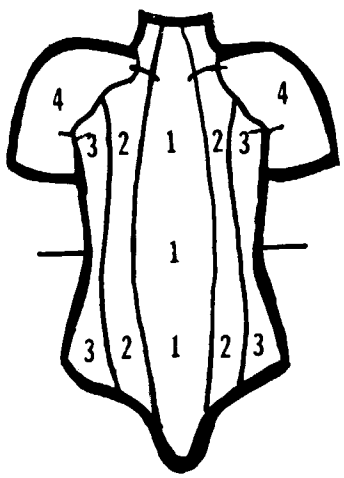
BODY HITS
ROLL 1D100

DIE ROLL	AREA HIT
1-5	Head
6	Neck
7	Right Hand
8	" Wrist
9-10	" Lower arm
11	" Elbow
12-13	" Upper arm
14	" Shoulder joint
15	Left Hand
16	" Wrist
17-18	" Lower arm
19	" Elbow
20-21	" Upper arm
22	" Shoulder joint
23-26	Right Foot
27	" Ankle
28-32	" Calf
33	" Knee
34-41	" Thigh
42	" Hip joint
43-46	Left Foot
47	" Ankle
48-52	" Calf
53	" Knee
54-61	" Thigh
62	" Hip joint
63-71	Torso Area 4
72-80	" Area 3
81-90	" Area 2
91-00	" Area 1

Note; The above chart is for general use where a specific target area was not stated by the firer. The tables are changed by the GM as his particular situation requires.

The areas defined as torso are generalized and cover the whole of that portion of the body. If the GM wishes a finer location of a body hit, roll 1D4 and use the following chart.

TORSO CHART



DIE ROLL
1 Upper left
2 Upper right
3 Lower left
4 Lower right

DEATH PERCENTAGES

After the area of the body struck has been determined the possibility of immediate death is decided. This possibility is given as a percentage chance that varies with the area struck and the amount of damage inflicted.

The most lethal area hit would be the head. Due to its importance the head may take only a little damage before there is a very high chance of death. The possibility of decapitation also becomes very real with enough damage.

HEAD DAMAGE

Dp	DEATH %
Dp GREATER THAN 5	90%
Dp LESS THAN OR EQUAL TO 5	75%
Dp OF 1	10%

CHANCE OF DECAPITATION

Dp	% CHANCE
Dp GREATER THAN OR EQUAL TO 10	25%

CHANCE OF UNCONSCIOUSNESS

Dp	% CHANCE
Dp GREATER THAN OR EQUAL TO 6	95%
Dp LESS THAN 6	50%

To use the table roll 1D100. If the number rolled is less than or equal to the number of the death percentage, the character dies. If the number rolled is greater than the death percentage, the character lives and damage is alloted to him.
Note; Unconsciousness lasts for at least 1D20 + 20 turns, minus 1 turn for each point of constitution the character has.

Following the head the next most lethal area hit is the torso. The torso, due to its complexity, is broken up into 4 zones. Each of these zones have a degree of lethality according to their importance and the amount of damage taken.

TORSO DAMAGE, DEATH PERCENTAGE

ZONE	Dp LESS THAN 16	Dp 16 OR GREATER	Dp 35 OR GREATER
1	60%	90%	99%
2	40%	70%	80%
3	20%	40%	50%
4	10%	30%	40%

A strike on a limb of over 10 Dp has a 25% chance of amputation (this includes the throat). Any strike on a limb has a 16% (roll 1 on 1D6) chance of striking a major blood vessel and rupturing it.

DAMAGE

If a character survives the death percentage of a hit he must then account for the damage taken. The Dp are subtracted from the Structure points (Sp) of the area hit. When all the Sp are taken from an area due to damage, it no longer functions. In the case of a limb, any portion of the limb below that area struck no longer works (i.e. If a hit destroys an elbow, the arm below that joint no longer bends). If the torso loses all its Sp's death results immediately.

WOUND SHOCK

In the case of any wound there is a possibility of wound shock causing unconsciousness. This is dependent on the amount of damage taken.

WOUND SHOCK

Dp	CHANCE OF UNCONSCIOUSNESS	ROLL OF 1D6 FOR UNCONSCIOUSNESS
1-4	16%	1
5 OR MORE	32%	1,2
10 OR MORE	64%	1,2,3,4

Unconsciousness lasts for 1D20 + 20 turns* minus one turn for each point of constitution the character has.

* In most cases a turn means a combat turn, GM's discretion.

Note; The wound shock table is not used in the case of a head wound.

BLOOD LOSS

There is a loss of Blood points (Bp) for every wound taken. This loss is equal to the Dp of the original wound and these points are multiplied according to the following table.

SITUATION	SIMPLE WOUND	BLOOD VESSEL STRUCK OR LIMB AMPUTATION
NO ASSISTANCE	Dp x 3 turns	Dp x 5 turns
W/FIRST AID	Dp x 2 turns	Dp x 3 turns
W/ MEDICAL ATTN.	Dp	Dp x 2 turns

Note; Only trained medical personnel can replace Bp and then only to the original amount.

BLOOD TRANSFUSIONS

The following table lists the various blood types and if a transfusion is possible between different donor and recipient types.

DONOR	RECIPIENT							
	0+	0-	A+	A-	B+	B-	AB+	AB-
0+	+	+*	+	+*	+	+*	+	+*
0-	+	+	+	+	+	+	+	+
A+	-	-	+	+*	-	-	+	+*
A-	-	-	+	+	-	-	+	+
B+	-	-	-	-	+	+*	+	+*
B-	-	-	-	-	+	+	+	+
AB+	-	-	-	-	-	-	+	+*
AB-	-	-	-	-	-	-	+	+

+ = Transfusion possible

- = Transfusion impossible

+* = Transfusion possible but may be attempted only once.

HEALING

Given total rest the body's structure points are replaced at the rate of 1 point per day (game time). Blood points are replaced at a rate of 2 points per day. If a joint was damaged it has a 75% chance of healing normally. If the joint was destroyed (Dp was more than the joint's Sp) or does not heal normally the character loses 2 dexterity points for each joint destroyed.

Example; Joe (Acc 12, Sp/Bp 250) is walking down a hallway when he sees Ivan (Acc 10, Sp/Bp 200) turning a corner in front of him, 20 meters away. Joe fires a shot from his S&W M27-3½ at Ivan as Ivan fires his HP-35 at Joe. Joe needs an 8 (see Accuracy tables) or less to hit Ivan. Ivan needs a 6 or less to hit Joe. Joe rolls an 8 and Ivan rolls a 12 (both on 1D20) for accuracy and so Joe's bullet hits while Ivan's misses. Since it was a snap-shot the full Body hit table is used as it's given. Joe rolls a 95 on 1D100 and hits Ivan in the torso, area 1. This area has a death percentage of 60% (M27-3½ = E-factor 10, = 60% death area 1, Torso damage table). Ivan rolls a 52 on 1D100 and so dies immediately.

WHOLE BODY DAMAGE

The effects of explosions, shock waves, and electrical shock cause damage to an organism as a whole and the effects are felt throughout the body. When all possibilities are taken into account the primary results of this type of damage is either unconciousness or death. The following table shows how many Whole Body damage points (Dpw) result in a certain percentage chance of death or unconsciousness for a given range of Structure points (sp).

WHOLE BODY DAMAGE

SP RANGE	CHANCE OF DEATH OR UNCONSCIOUSNESS									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	99%
100-150	50	55	60	65	65	75	80	85	90	95+
151-200	75	83	91	99	107	115	123	131	139	147+
201-250	100	110	120	130	140	150	160	170	180	190+
251-300	137	149	161	173	185	197	209	221	233	245+
301-350	150	165	180	195	210	225	240	255	270	285+
351-400	175	192	209	226	243	260	277	294	311	328+
401-450	200	220	240	260	280	300	320	340	360	380+
451-500	225	247	260	291	313	335	357	379	401	423+
	Dpw REQUIRED									

To use the table first find in what range a particular character's Sp is in. Then locate what percentage chance of death or unconsciousness is stated at the top of the table for the amount of Dpw the character has taken. Roll 1D100 twice with the first roll being for the chance of death and the second roll being for the chance of unconsciousness if the character lives. Unconsciousness lasts for 1D20 - 20 turns minus one turn for each point of the character's constitution.

ELECTRIC SHOCK

Shock from electric power will cause burns, unconsciousness and often death. The extent of all these results depends on the amount of power the character is exposed to. For ease of play the following table is provided showing the Dpw for a given voltage. The factor of burns is ignored and the power of the shock is at least 1 amp in all cases of electric shock.

Note; In the case where no power is being transmitted, such as a Telsa coil or electrostatic shock, no damage results no matter what the voltage as very little power is being transmitted.

ELECTRIC SHOCK DAMAGE

VOLTS	Dpw	VOLTS	Dpw
50	50	440	268
75	78	800	346
110	106	1,000	425
150	134	2,000	600
200	162	5,000	800
220	190	10,000	1,000

The Electric Shock table is designed to be used with the Whol Body damage tables. To use the table find how many Dpw would result from an electric shock of so many volts. Then find the results of receiving so many Dpw according to the Whole Body damage table.

Example; Idiot Joe (Sp 240, Const 12, Int. 0) is trying to find out if the power is on in an abandoned bunker. He sees an electric socket in the wall and not being real bright, sticks his finger in it while standing in a puddle of water. The power is on as Joe finds out when 110 volts rip through his body blowing him across the room. Joe takes 106 Dpw (see Electric Shock damage) from the shock. According to the Whole Body damage table 106 Dpw for a constitution of 240 results in a 10% chance of death or unconsciousness. Joe rolls a 27 on 1D100 for his death percentage and so does not die. He rolls a 07 on his unconsciousness roll and is knocked out for 14 turns (6 on 1D20 +20 = 26, 26 - 12 Const. = 14).

MULTIPLE HITS DAMAGE

In the case of rapid-fire weapons or shotguns a character may suffer multiple wounds, that is, more than one bullet or fragment may strike him. This increases the amount of damage by a substantial amount. (realistically, shock to the surrounding tissues from several impacts increases the effect by the square of the number of hits).

The amount of damage received from a multiple hit is equal to the E-factor of the weapon times the number of hits. When determining blood loss or death percentages treat the multiple wounds as one and use the total Dp. The death percentage is taken from the torso, area 3, except when the head is involved in which case the head death percentage is used.

Example; Joe took 3 hits from a short burst from an M16A1 (E-factor 15). The medical tables put the locations of the hits all on h legs (right calf and ankle, left knee). His coveralls reduce the E-factor of the bullets to 8 (E-factor 15 - AC 7 = 8). Total damage taken is 24 Dp (3 x 8 = 24). His death percentage is 40% (Torso Damage table) and he rolls 52 on 1D100 and so does not die. Assuming he receives immediate first aid and that no major blood vessels were hit,

he would lose 48 Bp over a two turn period. The damage to the joints is still determined when healing takes place.

Note; The death percentage is normally taken from the torso, area 3, if the hits are in a more lethal area, such as torso, area 1, the death percentage for that area is used.

BURN DAMAGE

Since one of the major causes of injuries is burns of one type or another, the extent of this damage can be found in this section. The GM must know the following information to use the tables effectively;

A Time of exposure (in seconds)

B Temperature of heat source (in degrees Celsius)

C Distance in meters from the heat source

To use the table find the temperature in C°. in the vertical column and cross-index to the exposure time across the top. This gives you the damage inflicted by a burn within one meter of the heat source. If the distance is greater than one meter, move up to the next lower temperature for each meter distance from the heat source.

After finding the damage done the GM subtracts any armor class involved from the Dp and determines the severity of the burn according to the Burn Severity table. From the Burn Results table the GM finds the effect on the character in terms of loss of strength and dexterity. A death percentage table is also included for the GM who wishes to use it to account for the shock suffered by the victim of a burn.

The table assumes exposure to the specified heat source within one meters distance. This involves the heat affecting the entire body except for those areas covered by any form of armor. The Dp should be subtracted from the body parts using the Medical tables to find the percentages. Any armor involved should be subtracted from the Dp before they are subtracted from the body. Should a physical contact with the flame or other heat source occur the body suffers a contact burn. These burns are normally of at least 4 seconds exposure before the burning material can be removed or extinguished.

BURN DAMAGE

EXPOSURE TIME (seconds)

TEMPERATURE C°	F*	1	2	3	4	5	6	7	8	9	10
100	0	0	1	1	1	1	2	4	6	8	10
200	0	1	1	1	1	2	4	6	8	10	20
400	1	1	1	1	2	4	6	8	10	20	40
600	1	1	1	2	4	6	8	14	20	40	80
800	1	1	2	4	6	8	14	20	40	80	160
1000	1	2	4	6	8	14	20	40	80	160	320
1200	2	4	6	8	14	20	40	80	160	320	500+
1400	4	6	8	14	20	40	80	160	320	500+	
1600	6	8	14	20	40	80	160	320	500+		
1800	8	14	20	40	80	160	320	500+			
2000	14	20	40	80	160	320	500+				
2200	20	40	80	160	320	500+					
2400	40	80	160	320	500+						
2600	80	160	320	500+							
2800	160	320	500+								
3000	320	500+									
3200	500+										

*Flash, momentary exposure while moving of less than one second.

BURN SEVERITY

1st DEGREE	8-14 Dp
2nd DEGREE	21-40 Dp
3rd DEGREE	80 Dp or more

BURN RESULTS

1st DEGREE	No loss of strength or dexterity, normal healing.
2nd DEGREE	Loss of 1 pt. strength, 2 pts. dexterity, normal healing.
3rd DEGREE	Loss of 4 pts. strength, 8 pts. dexterity for every 20 Dp above 80, ½ normal healing rate, bad scarring.

DEATH PERCENTAGE (optional)

1st DEGREE	0%
2nd DEGREE	10%
3rd DEGREE	20% (add 10% for each additional 20 Dp above 80)

Example; Joe is standing near a thermite grenade when it goes off (temp. 2200°C). He is three meters from the source but is hit by a small fragment in his shoulder that burns for 2 seconds. The shoulder suffers 73 Dp and a 3rd degree burn. The rest of Joe's body takes only 2 seconds of exposure as he jumped behind cover. Total damage here would be 7 Dp (three meters distance = 14 Dp, 14 Dp - 7 AC = 7). If the death percentages were used Joe would have a 20% (73Dp + 7Dp = 80 Dp, 80Dp = 3rd degree burn) chance of death from burn shock.

Another aspect of burn damage is the loss of bodily fluids. While this is not equal to blood loss in a normal wound it is most simply dealt with by using the Bp as the standard from which it is subtracted. If the burn is second degree the Bp loss is ½ the Dp of the burn. If the burn is third degree the Bp loss is equal to the burns Dp.

POISONS

Any character affected by poison rolls a 1D100 to determine their survival according to the following chart. The chart lists the death percentages according to constitution and poison virulence.

POISON DEATH PERCENTAGES.

	VIRULENCE (type)			
	A	B	C	D
CONSTITUTION				
0-1	35%	45%	70%	99%
2-3	30%	40%	70%	95%
4	30%	40%	65%	90%
5	25%	35%	60%	90%
6	25%	35%	60%	80%
7-8	25%	35%	55%	80%
9-11	20%	30%	50%	75%
12	20%	30%	45%	70%
13	15%	25%	45%	70%
14-15	15%	25%	40%	76%
16-17	10%	20%	30%	55%
18	5%	20%	30%	55%
19	5%	15%	30%	55%
20	1%	15%	30%	50%

The death percentage in the chart includes all first aid measures short of injecting the actual antidote. If the poison does not prove fatal the character will become ill resulting in all abilities being cut in half. This weakness will last for 20 days minus one day for each point of the characters constitution.

Note; The period of sickness cannot be less than one day.

The GM can decide what type (virulence) of poison is being used according to the following chart. The chart does not give detailed poisons, but rather general types of poisons which may be encountered and where each type may be found.

TYPE	POISON
A	Most poisonous insects, lesser poisonous spiders and snakes such as tarantulas, copperheads etc.
B	Poisonous snakes and spiders such as rattlesnakes, coral snakes, moccasins, black widows, brown recluses, banana spiders and most plant poisons.
C	Giant snakes and spiders, mineral poisons such as cyanide, arsenic, strychnine, mercury, etc.
D	Nerve agents, mutant poisonous animals.

Please note that all poisons are assumed injected or ingested. If the poisoning is by contact lower the virulence by one factor (except for Nerve agents). If no first aid of any type is given within one game turn increase the virulence by one factor.

DISEASES

In the world of the Morrow Project one of the problems facing characters is that of disease. Without the benefit of modern medicine to assist them, the majority of survivors of the war will fall prey to disease within a very short time. In the chaos following the war trained medical personnel would become one of the most valuable people in any community. Anyone harming a doctor would probably be punished by summary execution.

Medical science can only deteriorate without the aid of modern manufacturing and abundant raw materials. As the years go by the stockpiles of medicine and equipment will dwindle through use and expiration. Plagues will sweep the countryside while available doctors often will become victims themselves. Flair-up of diseases such as typhoid, diptheria, cholera, and others from the past will sweep through the remaining survivors.

New types and strains of disease will appear. Caused in part by the increase in radioactivity in the air and water. Biological warheads will leave behind flourishing colonies of virus to spread and mutate.

Morrow personnel can be especially vulnerable to the new diseases. Their natural defences will date from a time 150 years before and they will not have some of the developed antibodies that the regular populace would have. For this reason the Morrow Project has a modern medical miracle known as the "universal antibody". This antibody will combat any of the known diseases and has a chance against some of the mutated ones. Despite this help, it is still possible for the Projects personnel to contract and die of disease.

HAND-TO-HAND (UNARMED) COMBAT

In hand-to-hand, or unarmed, combat, the two major factors in determining the outcome of combat are the characters strength and dexterity. The strikes (blows or kicks) an individual may attempt during a combat turn is equal to their movement allowance (see Movements). The damage done by a strike is determined from the following table according to the characters strength.

HAND-TO-HAND DAMAGE

Hand, elbow, and knee strike	Dp = ¼ St.
Kick, edge of hand strike (requires training)	Dp = ½ St.
Claws and teeth (bite)	Dp = ½ St.

COMBAT

Determining which character lands the first blow can be determined by several methods. In a face-to-face confrontation, the character with the highest dexterity strikes first. If both characters have equal dexterity roll 1D6 for both and the one with the highest roll strikes first. In the case of an ambush, the initial blow takes effect. After the first blows have been determined, combat resum as normal with the highest dexterity striking first (if he is able).

The combat takes place simultaneously between combatants. That is, the player whose character has the initiative (first strike) states his action, then the other player(s) in turn commit their characters movements. After all the players have committed their characters the results of the various strikes and blocks are rolled.

STRIKE DAMAGE

The character's accuracy is used to determine the success or failure of a strike or block. Roll 1D20, if the number rolled is less than the accuracy of the character they were successful in their attempt. If the number rolled was equal to or more than the character's accuracy, the block or strike failed to connect. If the character throws a strike that a subsequent block stops there is no damage taken.

The Dp of a blow is found by subtracting the armor class of the character struck (use the Modified Armor Class table, see Edged Weapons) from the Dp of the blow. The medical tables are used to find the point of impact of the character's strike if the player did not earlier state an aiming point.

The medical tables are also used to find the effect of a blow (the bleeding factor is ignored). The death percentage is not used except if the torso loses all its Sp. the character is dead. A strike on the head has a 20% chance of death at 5Dp or less. 10% is added to the death percentage for every 5Dp struck above 5, this includes a kick or hand strike. A successful blow to the head also has a 30% chance of causing unconsciousness with the increase again being 10% for each 5Dp above 5.

Note; The amputation factor is ignored along with the blood loss factor.

For ease of play the following table is included.

HEAD STRIKE DEATH AND UNCONSCIOUSNESS PERCENTAGES

STRIKE AT HEAD Dp	% CHANCE OF DEATH	% CHANCE OF UNCONSCIOUSNESS
1-5	20%	30%
6-10	30%	40%
11-15	40%	50%
16-20	50%	60%
21-25	60%	70%
26-30	70%	80%
31-35	80%	90%
36-40	90%	99%
41 and up	99%	99%

Unconsciousness lasts for 1D20 + 20 turns minus one turn for each point of the characters constitution. A successful strike on the groin, throat, or head gives the initiative to the other player for the next turn.

Note; The use of teeth and claws as well as blows can be used for both human and non-human combat.

Example; Joe (Dex. 9, Mov. 3, St. 13, Acc. 13, Const. 14) is in a face to face confrontation with Ivan (Dex. 19, Mov. 5, St. 8, Acc. 14, Const. 15). Ivan has the higher dexterity so he takes the initiative and launches a hand strike to Joe's abdomen and a kick to Joe's head. Joe states he will attempt to block the kick and will himself kick at Ivan's knee and then his groin. After both players have stated the above they roll the results. Ivan rolls a 10 on 1D20 and an 11 for his kick (he needed below a 14 to hit). Joe rolls a 19 on his block, a 17 on his kick to the knee, and a 9 on his kick t Ivan's groin (he needed less than a 13 to hit or block). Ivan does 2 Dp to Joe's abdomen (hand = ¼ St., ¼ of 8 = 2) and 4Dp to Joe's head (kick = ½ St., ½ of 8 = 4). Joe rolls an 87 on 1D100 for the death percentage (20% chance) on the head kick so he does not die.

He rolls a 09 for unconsciousness (30% chance) so he is unconsciousness for the next 16 turns (1D20 roll = 10, 10+20-14 Const. = 16). Before he is knocked out Joe's groin strike lands (simultaneous combat) doing 7Dp (kick = ½St., ½ of 13=6½=7) and since the strike is to the groin, the initiative goes to Joe. However Joe is unconscious for the next 16 turns and Ivan can wait until the effects of the kick wear off the next turn. After the effects have worn off, Ivan may beat Joe to a pulp at his leisure.

BLUNT WEAPONS

The damage resulting from blunt weapons is based on ½ of the characters strength added to the factor of the weapon. Striking is determined the same as for hand-to-hand combat with the following addition. If the weapons factor of the attacking weapon is greater than the weapons factor of blocking weapon, a block is not totally complete but only ½ of the Dp are received. Weapons factors for some classes of weapons follows.

WEAPON FACTORS, BLUNT WEAPONS

FACTOR	WEAPON
0	Stick
	Light (.5 kilo or less) thrown object.
+2	Small rock
	Blackjack
	Brass knuckles
	Pistol (empty)
	Bottle
+4	Club
	Baseball bat
	Rifle butt
	Quarterstaff
	Heavy (.6 kilo or more) thrown object
+5	Pipe (.75m or longer)
	Large rock (1 kilo or heavier)
	Crowbar
+6	Sledgehammer
	Mace

To determine the Dp, add the weapons factor to ½ of the striker's strength. The medical tables are used in the same way as for hand-to-hand combat.

EDGED WEAPONS

The damage taken from edged weapons is found by adding ½ the characters strength to the factor of the weapon used. The weapons factor for various edged weapons is given below.

WEAPON FACTORS, EDGED WEAPONS

FACTOR	WEAPON
+1	(will not penetrate armor class C)
	Small throwing or regular knife (under 12cm blade).
	Butcher knife
	Broken bottle
	Straight razor
+2	Throwing or combat knife (larger than 12cm blade).
	Dagger
	Bayonet (KCB-70)
+4	Machete (regular)
	Hatchet
	Cleaver
+5	Machete (large)
	Saber
	Broadsword
+6	Ax
	Pickax
	Spear
	Shovel (large)

To determine the Dp take the total from adding the weapon factor to ½ the attackers strength. If the character being attacked is wearing any armor then subtract the armor class, taken from the Modified Armor Class table, from the attackers Dp. The remaining Dp is taken from the character attacked according to the medical tables (including amputation and bleeding factors and death percentage). The modified armor class is given in the following table.

MODIFIED ARMOR CLASSES

ARMOR	ARMOR CLASS	ARMOR	ARMOR CLASS
A-Skin	AC=0	2-13mm Heavy plastic	AC=12
B-Cloth (heavy)	AC=1	3-Chain mail	AC=13
C-Leather	AC=3	4-3mm Armor plate	AC=14
1-13mm Light plastic	AC=6	5-4mm Steel plate	AC=15

When determining a strike use the same method as in the Hand-to-hand tables. When a block is attempted subtract the Dp of the blocking weapon from the Dp of the attacking weapon and any Dp remaining is taken by the target. Any armor worn by the character being attacked would be subtracted from any attacking Dp.
Example; Big Joe (ST. 18, AC-C) strikes at Ivan (St. 10, AC-C) with a machete (weapons factor +4). Ivan blocks Joe's strike with a bayonet (weapons factor +2). Joe's Dp is 13 (½ St. = 9, 9+4=13), Ivan's Dp is 7 (½ St. = 5, 5 + 2=7). Since Ivan's block is successful (using the Hand-To-Hand combat system), his 7Dp is subtracted from Joe's 13Dp. Joe's remaining Dp is 6 which then strikes Ivan's leather clothing (AC-3, Modified Armor Class table). The armor class is subtracted from the Dp which leaves 3Dp damage that is taken by Ivan.

EDGED PROJECTILE WEAPONS

This class of weapons are normally thrown in some way to their target. The weapons include arrows, crossbow quarrels, spears, and axes. The manner of hitting the target is the same as for single shot firearms (see Accuracy).

The damage done by the weapon is the same as for other projectile weapons, the armor class is subtracted from the attacking E-factor and the remaining Dp is received by the target. The medical tables are used as-is but with the amputation factor being ignored. The E-factor is used with the Modified Armor Classes (see Edged Weapons). Following is a list of several types of edged projectile weapons and their characteristics.

EDGED PROJECTILE WEAPONS CHARACTERISTICS

WEAPON	EFF. RNG.	MAX. RNG.	E-FACTOF
Small throwing knife	5m	10m	2
Large throwing knife	15m	20m	3
Tomahawk	10m	20m	4
Ax	10m	20m	6
Short spear	20m	60m	10
Spear	30m	70m	14
Short bow (15kg pull)	30m	400m	8
Long bow (25kg pull)	60m	600m	14
Compound bow (35kg pull)	80m	700m	16
Crossbow-wood (25kg pull)	40m	400m	14
Crossbow-steel (50kg pull)	100m	800m	18

VEHICULAR DAMAGE

To determine the amount of damage done to a vehicle first decide whether the vehicles armor (if any) was penetrated. The following tables show the classes of the various anti-armor weapons and these classes ranked against various vehicles.

ANTI ARMOR WEAPONS CLASSES

CLASS	WEAPON
A	Maverick
B	TOW, Dragon
C	2.75in Rocket
D	M72A3 LAW, ARMBRUST 300, 81mm HE, M19 AT, M183 Demo.
E	40mm HEDP, 20mm API
F	20mm HEI, M112-C4, 12.7x99mm AP
G	40mm HE, M26A1, Mk3A2
FLAME	M202A1, M9A1-7, HAFLA-35L

After finding the class of the particular weapon you are using, use the following table to find if the weapon will penetrate the armor of your target. The number given in the chart is the percentage chance of that weapon class penetrating a certain amount of armor. To use the table roll 1D100, if the number rolled is equal or less than the number shown in the chart for the vehicle you are fighting, penetration takes place. If the number rolled is more than the number shown in the chart there is no penetration of the vehicle's armor.

VEHICLE PENETRATION PERCENTAGES

WEAPONS CLASS	VEHICLE TYPES MARS, Scientific	M60 Tank	Commando Vehicles	M113A1 M114	XR-311 Jeep	SK-5 Normal Vehicle
A	60	95	99	99	99	99
B	30	90	99	99	99	99
C	10	90	99	99	99	99
D	0	50	99	99	99	99
E	0	5	80	90	99	99
F	0	0	50	70	90	99
G	0	0	1	40	99	99
FLAME	n/a	50	n/a	90	95	95

Note; In the case of flame weapons there is no actual penetration except for open vehicles and those not sealed against flame. The number in the table indicates the possible damage by a flame weapon against the crew.

In the situation where the vehicle was struck but no penetration occured use the following table to find the damage against the vehicle itself.

VEHICLE DAMAGE
Roll 1D8

DIE ROLL	DAMAGE
1	Tire/Track hit, vehicle can no longer move.
2	Weapon system hit, Main weapon damaged.
3	Engine hit, vehicle can no longer move.
4	Antennas hit, no radio communication
5	Body hit, vehicle sensor systems (if any) damaged.
6	Steering damaged, vehicle moves at ½ speed.
7	No effect
8	No effect

Note 1; Any damage has a 50% chance of being repaired in 1 to 6 hours (roll 1D6).
Note 2; The above table is not used for a MARS or Scientific vehicle if the weapon striking the vehicle is less than class A or B.

The following table shows the number and type of casualties in a vehicle if a weapon penetrates. To use the table roll 1D8, find the column under the crew size of the vehicle hit and look across from the number rolled.

CREW CASUALTIES

DIE ROLL	CREW SIZE 1	2	3	4	5	6	7	8
1	W	W-	-W-	- -W-	-W-K W	-W-K WK	-W-W WKW	-W- - WKWW
2	K	-W	- -K	-K- W	W-WK K	W- - W KW	W-W- -K-	-WW- WWWK
3	-	K-	W-K	W-KW	WWWK -	WKW- WW	WWW -KK	WKWW WWWK
4	W	-K	W-K	-WKK	-KKK -	-W-W KK	K-KK WWK	-WKW WKKW
5	-	WK	WWK	WWWK	WWWK K	WW-W KK	KWWK -W	WKWK KKWW
6	W	KW	WWW	WKKW	WKKW -	-KKW KK	KW-K KK	KWKK -KKW
7	K	KK	WKK	KWKK	KKKW W	KKKW KW	WKWK KK	KWKW KKKK
8	K	WW	KKK	KKKK	KKKK K	KKKK KK	KKKK KKK	KKKK KKKK

K= Killed
W=Wounded (1-6Dp, 1D6, use medical tables ignoring death%)
- = Non-Wounded

Example; Joe and Ed are both driving a Commando V-150 with a 20mm cannon. Ivan ambushes both vehicles with an M203 grenade launcher and 40mm HEDP grenades. Ivan hits both vehicles when he fires at them. The 40mm HEDP is a class E anti-armor weapon and has an 80% chance of penetrating the armor of a Commando vehicle. Ivan rolls a 56 on 1D100 for Joe's vehicle and an 85 for Ed's and so penetrates the armor on Joe's vehicle. Ivan then rolls 1D8 to see if he has killed or wounded Joe (Crew Casualties table). He rolls a 6 for a crew of one so Joe is wounded with 4Dp (result of roll of 1D6), his exact wound is found by using the medical tables ignoring any death percentage. Ivan then rolls 1D8 for Ed's vehicle (Vehicle Damage table). Ivan rolls a 3 and so damages Ed's engine. Ed rolls a 05 on 1D100 (50% chance) and so can repair his engine in 6 hours (result of roll of 1D6).

CONDITIONS IN A POST-WAR WORLD

What will the Earth be like after World War III? In creating the game of the Morrow Project we have tried to simulate the probable circumstances of some of the survivors. It was not always easy deciding which of several possible ideas was the best. After much work the authors feel we have come up with one possible future for man after he has managed to blow himself to hell.

The world is not populated exclusively with ultra-modern technologies or massive armies of warring mutants and humans, nor have some of these been left completely out of the game. The world of the Morrow Project is populated primarily by the same creatures that have inhabited it for millions of years, with enough variations to account for the harsh conditions and high radiation.

The game has been designed to be primarily composed of encounters between different groups of humans in very extreme circumstances. In these situations such encounters can be often counted on to be difficult due to highly suspicious and probably hostile humans as well as vicious animals.

WEATHER

There is little doubt that the weather throughout the entire world will undergo drastic changes immediately following a nuclear war. For the purposes of the Morrow Project it is assumed that the weather will have stabilized in the 150 years following the war. The following tables have been created for the GM who wishes to include variations in the weather for his game.

To use the tables follow from one to the next in order, rolling the dice as are called for at the top of each table. Note the result of each table so as to inform your players as to what is happening in the world around them.

No. 1 INITIAL BASIC WEATHER CONDITIONS
Roll 1D100

DIE ROLL	WEATHER
1-10	Clear
11-18	Clear with occasional scattered clouds
19-23	Scattered clouds
24-41	Partly cloudy
42-53	Mostly cloudy
54-62	Overcast
63-67	Fog
68-71	Sprinkling/Snow flurries
72-76	Drizzle/Sleet
77-89	Light rain/Light snow
90-96	Heavy rain/Heavy snow
97-99	Thunderstorm/Blizzard
00	See "Special Weather"

No. 2 INITIAL WIND DIRECTION
Roll a 1D10 to find the wind direction in degrees from North.

1 South/Southwest from 195°	6 West from 270°
2 South/Southwest from 210°	7 West/Northwest from 285°
3 Southwest from 225°	8 West/Northwest from 300°
4 West/Southwest from 240°	9 North/Northwest from 315°
5 West/Southwest from 255°	10 North/Northwest from 330°

No. 3 INITIAL WIND SPEED
Roll 1D10 for initial wind speed in kph

1 1-4 kph (.6-2.4 mph)	6 21-24 kph (12.6-14.4 mph)
2 5-8 kph (3-4.8 mph)	7 25-28 kph (15-16.8 mph)
3 9-12 kph (5.4-7.2 mph)	8 29-32 kph (17.4-19.2 mph)
4 13-16 kph (7.8-9.6 mph)	9 33-36 kph (19.8-21.1 mph)
5 17-20 kph (10.2-12 mph)	10 37-40 kph (22.2-24 mph)

It might be preferred to think of the wind speed as varying between the two speeds shown in the table. Or 1D4 could be rolled to determine the exact wind speed at any particular time. The figures for mph are included for aid in visualization. If the GM finds it easier he may elect to use the figures for kph as mph, however a 40 mph wind is normally considered as special weather.

No. 4 WEATHER MODIFIERS
Roll 1D10 every 4 hours (game time) to see if the weather changes as the result of the following table.

1 Reduce by a factor of 2	6 No change
2 Reduce by a factor of 1	7 No change
3 No change	8 No change
4 No change	9 Increase by a factor of 1
5 No change	10 Increase by a factor of 2

If a reduction or increase is called for by the table, perform the required change on table 1 only. Every 12 hours (game time) perform a modification roll for each of the two wind condition charts and change them as indicated.

SPECIAL WEATHER

As the GM rolls on the modification table he will find that occasionally the modifier will increase the weather roll to 00 or above. When this happens some form of special weather is indicated. Special weather is quite simply very violent weather of one form or another.

Included in this classification are such effects as windstorms, heavy and severe thunderstorms, electrical storms, tornados and hurricanes. Each of these forms of weather have different ways of manifesting themselves.

The tornado is probably the most difficult to fit into a role-playing scenario due to its unpredictable movement. These storms are devastating to the small area at the end of their funnel when they touch down and are accompanied by high winds and rain. The area of destruction at the base of the funnel is from 5 to 30 meters in radius (roll 1D6 for size in increments of 5 meters). The table following is to aid the GM in directing a tornado from the place of initial ground contact. Tornados generally travel in a southwesterly direction at from 20 to 40 kilometers per hour. They may at times reverse their direction for a short time or they may jump into the air several tens of meters and then touch down again. A tornado may withdraw into the parent cloud formation at any time.

TORNADO MOVEMENT
Roll 1D20

DIE ROLL	CHANGE
1-10	No change
11	Increase speed (roll 1D20 for addition in kph)
12	Decrease speed (roll 1D20 for decrease in kph)
13-15	Swerve left or right (roll 1D6, odd No. left, even No. right) from 5 to 30 degrees (roll 1D6 for increase)
16	Reverse for 1-6 (1D6) combat rounds
17-20	Withdraws into clouds, storm over

A tornado will generally only last for a few minutes. The storm which accompanies a tornado is usually a violent thunderstorm which of itself can last for several hours.

Hurricanes are a massive form of tornado. These storms are formed over large expanses of water and so will generally strike coastal areas. They may travel inland but lose much of their power in doing so., diminishing to little more than a severe thunderstorm when far inland. Hurricanes generally obey the normal rules for weather, that is, they will last for several days in a specific area and then move on with the prevailing wind. The GM needs no special rules to play them but must remember very high winds are involved, up to 120 kph. The movements of players would be very limited with a strong danger of being blown away or struck by wind-blown objects.

Severe thunderstorms are inland hurricanes of a very small degree. High winds, heavy rain, and lightning are all very characteristic of these storms.

Electrical storms may appear anywhere but are more often seen in the highlands. These storms produce large numbers of electrical discharges (lightning) which may or may not contact the ground. Radio communications are severely disrupted by these storms. Medium winds and rain often accompany them.

Windstorms are just that, heavy winds. These occur quite frequently in the midwest where the large areas of flatland allow the winds to pick up velocity. Dangers here are the wind-blown objects and the decrease in visibility due to whirling dust and sand.

SPECIAL WEATHER, RANDOM GENERATION
Roll 1D6

DIE ROLL	WEATHER
1	Severe thunderstorm
2	Heavy thunderstorm
3	Electrical storm
4	Windstorm
5	Tornado
6	Hurricane (where applicable, otherwise severe thunderstorm)

TECHNOLOGY

In the post-war world of the Morrow Project you will not encounter any of the highly advanced "superscience" technology which is so popular in writings of Earth's future. Instead you will find a level of technology that is not far advanced from that which we have now and, in most cases, much lower.

The Morrow Project hypothesizes a nuclear war of catastrophic extent in the year 1989. This date is only a few short years from the time of this writing. Even assuming the continuation of the amazing growth of technology in the last several decades the next ten years will not see a widespread use of fusion power or laser weapon technology.

It is, however, likely to produce astounding advances in communications and media science, and it is almost certain to produce and develop new and important energy sources. Already our present technology allows the building of massive concrete and steel structures that could easily be dwarfed in the decade to come. Military technology is just as certain to produce new and better weapons so man can continue his popular hobby of killing his fellow man.

The following sections will cover the extent of some of the possible surviving technology. This is for both soon after the war and 150 years later when the Morrow Project's personnel start to awake.

COMMUNICATIONS

Advances in communications technology by the year 1989 are likely to be tremendous. We can expect wide spread development of the video media to include home video sets, that will also be computers, televisions, video recorders, and home microfilm libraries. The "multi-vision" could become the focus of american home life. You will be able to play games on it, watch and record your favorite programs, and make calls to libraries for a high-speed recording of any book in the microfilm files.

Unfortunately all of this marvelous equipment will be totally useless after the war as it is very unlikely that any of the major power stations would survive. Even the occasionally surviving piece of equipment needs power and uninterrupted lines between stations to function. If power is available and if the machine is still functional, the user would have a computer and possibly a few recordings at his disposal. Any long distance communications would continue to be very difficult if not impossible.

Radio is one type of equipment that, if power and maintenance is available, would continue to be useful in long distance communications. That is assuming that the interference caused by the high radiation levels is not such that any type of broadcasting equipment could work.

Most of the people left in the U.S. after a nuclear war will be forced to go without news of other places unless they can get a story out of some passer-by. One of these passers-by could make a profession of travelling from place to place delivering any news or mail he might be given. He would also spread news of other survivors, all for the cost of a meal, a bed, and possibly the occasional luxury. Such men would become protected by an unwritten law forbidding that any harm come to them. This law would be enforced by the people themselves acting as judge, jury and executioner.

It should be noted that any rule has it's exceptions and that there could very possibly be communities with working power sources and communications equipment. This would enable them to stay in contact with other communities that would also have the same good fortune. However, for most events of the Morrow Project there will be no advanced warning of what may be waiting around the next bend or in the next town. Such things will simply have to be investigated and dealt with as they arise.

ENERGY

Energy technology by the year 1989 will probably consist of many things only experimental today. For instance, fusion power could be under development, although it would be unlikely that any power plants would be far enough along in construction to be running at full capacity. And many solar powerplants could also be supplying the country's electrical needs. Any such important sources of power would be among the targets of enemy missiles and so would be unlikely to survive.

As a general rule energy use in the United States would decline at an ever increasing rate following the war. The first ten years following the war would see some effort to keep the few survivir power plants operational. But these same plants would soon cea running as equipment breaks down and spares run out.

For the sake of the game we have given the vehicles of the Project fusion power-packs and electric drive. The major purpose of the packs is to free the vehicles and crews from limitations of an empty fuel tank. The packs can, in some vehicles, be removed to power outside equipment and small encampments as well as the portable lasers.

What most people would be using for power would be the same as our ancestors used, muscle power and any power that may be harnessed from nature. Wood stoves would be back in style, and would also be hard to come by. Fireplaces and animals harnessed to carts and wagons would again be commonplace.

WEAPONS

Firearm technology, like all other technologies, would deteriorate in the years following WWIII. However, due to its importance as a survival tool, such technology would not disappear as others would. Fabrication of complex spare parts would probably cease completely. The repair and manufacture of the remaining arms would become some peoples sole profession.

The technology required for the manufacturing of simple firearms will still be available after the war. It may take some time for the survivors to build the necessary tools but they will certainly do so eventually. The results of most of these home-shops will be relatively simple single-shot weapons that will be primarily for hunting use. Some gunsmiths will be able to produce repaired versions of modern weapons and a functional fascimile of modern ammunition.

Explosives technology will still be possible after the war. Using remaining pre-war materials and locally manufactured items a few individuals or groups would be able to make some quite effecti explosive devices. Most of the explosives that the members of the Project are likely to encounter will be simple adaptations of the old standby black powder.

After 150 years of declining culture the most numerous weapons are going to consist of bows and arrows, swords, spears, knives, hatchets, and other hand-wielded instruments, as well as some crossbows or equivalent technology. These weapons are largely ineffective against most Morrow vehicles and will do little damage to the Project's personnel because of the protection of their resistweve uniforms. Because of this the GM may wish to place some heavy weapons behind the lines of combat for use as a last resort. The following is a chart of some of the possible existing weapons and their general characteristics.

Short bow and arrows-for short range and close quarters use.
Long bow and arrows-for longer range and open positions.
Crossbow-for very powerful delivery but slow rate of fire.
Large-bore, single shot firearm-a simple hunting weapon, damaging when close in.
Small bore firearms-usually automatic weapons left over from the war, ammunition would be rare limiting their use.
Gunpowder and homemade explosives-vary from place to place, if the people could make it they would know how to use it.

These are only a few of the possibilities the GM may use. W suggest that the GM use his imagination and make things fairly difficult for the Project members as they are very efficiently armed. More detail on weapons and equipment can be found in the section Available Equipment.

CONSTRUCTION TECHNOLOGY

We have so far discussed what the surviving people might be like after the war, but we have not as yet stated in what they might be living. What kind of shape are existing buildings going to be in after 150 years? Will the survivors even be living in the older buildings or will they build their own homes?

For the most part, the population will continue to live in existing towns and houses as much as possible. There will of course be problems with this, the first of which is the condition of various types of structures given different climates and care. The table has been extended to include all of the time after the war to the time of the Morrow Project in the event the GM might wish to hold a scenerio earlier that we have set.

To use the chart first determine the type of structure in question. Is it a frame, reinforced frame, or steel/concrete? A frame structure is defined as a modern home made entirely of soft wood (pine) and wood byproducts. A reinforced frame building is one which uses primarily brick or stone in its outside structure and wood for the interior. A building made entirely of hardwood (oak, maple, etc.) is also considered a reinforced structure. The third classification of steel/concrete buildings include industrial and manufacturing plants as well as any surviving office or apartment high-rises.

The second step in using the table is to decide the general climate in the area the building is found. Third, determine the age of the structure including the additions of any modifiers given below. Cross-index the climatic conditions and the building type with the age of the structure to find the final condition of the building.

AGE MODIFIERS

Add 1 year for each year the structure is occupied without repair.
Add 150 years if the building is located in a heavy damage zone from a nuclear blast.
Add 100 years if in the moderate damage zone.
Add 75 years if located in a light damage zone.
Add 25 years if the building is within 150 kilometers of any nuclear blast.

STRUCTURE CONDITION

AGE	BUILDING TYPE: FRAME			REINF. FRAME			STEEL/CONCRETE		
	ENVIRONMENT								
(years)	Dry	Temp.	Damp	Dry	Temp.	Damp	Dry	Temp.	Damp
1-20	A	A	B	A	A	A	A	A	A
21-40	B	B	C	A	B	B	A	A	A
41-60	B	C	D	A	C	C	A	A	B
61-80	C	D	E	B	D	E	A	A	B
81-100	D	E	X	C	D	X	A	A	B
101-120	D	X	X	C	E	X	A	B	C
121-140	E	X	X	D	X	X	A	B	C
141-160	X	X	X	D	X	Z	A	B	D
161-180	X	Z	Z	E	X	Z	B	B	D
181-200	X	Z	Z	E	Z	Z	B	B	D
201-240	Z	Z	Z	X	Z	Z	B	C	E
241-290	Z	Z	Z	Z	Z	Z	C	C	E
292-350	Z	Z	Z	Z	Z	Z	C	D	X
351-400	Z	Z	Z	Z	Z	Z	D	E	X
401-450+	Z	Z	Z	Z	Z	Z	D	E	Z

RESULT — DEFINITION

- A — Intact; Structurally sound, all windows intact, needs cleaning.
- B — Mostly intact; Structurally sound, some windows intact, needs cleaning, removal of vermin, and minor repairs.
- C — Partially intact; Basic structure weakening, little glass unbroken, wood rotting, steel rusting, walls cracking, needs major repairs.
- D — Partially collapsed; Horizontal structure sagging or collapsed, (upper floors, roof, wood flooring, etc.) gaps in concrete or stone, some salvageable building materials.
- E — Collapsed; Horizontal and vertical structure collapsed. Building is a pile of rubble with an occasional standing wall.
- X — Destroyed; Building is a pile of rubble which is not even good cover.
- Z — Gone; Slight mound where building was, some small foundation stones may still be visible.

With so few people left in an area it is very likely that within months or even weeks after the war all cities above 1,000 population will be abandoned. There are many reasons for this abandoment, the most important being the lack of sufficient food supplies to support large groups of people. With the transportation problem created by the war, the large quantities of supplies necessary to support our major, and minor, cities will be unavailable. The results being either leave the city or starve. Cities would be considered unsafe and the possible targets of future bombs, they would therefore become places to be feared to the point of banning any who would enter them. Some cities and areas hit by a biological weapon would be intact but would almost certainly have a "taboo" placed on them by the people in the surrounding countryside.

It is therefore reasonable to assume that any communities of people which would exist after the war would consist of less that 250 people. There will be a few communities that will manage to have more people either because of their location within a large cooperative area, or because of their ability to hold a high technological level to support their population.

PEOPLE

Any character in the Morrow Project can be classified as either a player character, that is one that is role-played by one of your players, or it can be a non-player character run by the GM. Generally characters belonging to the Project would be player characters (PC s) while any characters belonging to the "outside world" will be of the non-player type (NPC's). The NPC's include some of the animals that would be encountered.

When a member of the Morrow Project meets another person (or thing) in the course of the game, that meeting is called an encounter. Encounters are what keeps any role-playing game interesting, full of action, and absorbing for both the GM as well as the players. The "encounter" is also one of the prime weapons in a GM's arsenal.

PEOPLE AS PLAYER CHARACTERS

As a general rule the GM will assign players to the role of one of the Morrow Project's team members, the attributes and statistics of which have been explained earlier. There may be times however, when the GM may wish to put his players in the role of the survivors of the war and their decendants. These people are struggling against the rigors of the postholocaust world, a viewpoint that could be very interesting to all concerned.

If the GM opts to take this road for one or several of his scenarios then he would create the people of the outside world in the same manner as the Morrow Project's personnel. The attributes must be rolled and the division of Sp and Bp done. The new characters should be assigned to a position or group that gives a basis for the run of the game. Many of the obstacles that these players meet would be the same as for the Project with the exception that these players would run into the Project itself as outsiders. Also this type of character would not have the extensive equipment and weapons issued to the project's personnel but they would have a fairly extensive knowledge of the outside world's dangers. They could, perhaps, even discover one of the Morrow Project's bases or supply dumps. The GM can use any of the groups given in the encounter tables as a basis for his people or any creation of his own.

PEOPLE AS NON-PLAYER CHARACTERS

The primary difference between a player character (PC) and non-player character (NPC) is mainly that of detail. A PC run in the game by a player must of necessity, be created in detail so that it will lend substance to the game. An NPC, on the other hand, does not require the detail of attributes given a PC. The actions of the NPC are ruled primarily by a roll of the dice to speed up action on their part and to ease the pressure on a GM when he must run a large group of NCPs.

The attributes of an NPC are simpler than those of a PC, though they are meant to encompass the same areas. The first attribute of

an NPC is that of a combination Strength/Constitution. This single number is used as a basis for relative size, simply assuming that the two values are so closely related as to be equal. If the GM wishes such detail the Sp/Bp values can be determined by multiplying the St/Const. value by itself and adding 100 as with PC values. The second of the NPC attributes is that of Dexterity/Accuracy, again assuming that the two closely related values are equal. This value may be used as either dexterity or accuracy depending on the situation and which is required.

The last attribute is call the Hostility and Motivational index and is used to determine the NP's basic attitude and actions in differing situations.

The values for St/Const., Dex/Acc., and H&M index, are rolled in the same manner as for players. That is, 4D6 - 4 is rolled for each attribute.

NPCs are generally the GM's major opponents to use against the game players. And as such their strategic use will afford much greater enjoyment of the game by all concerned. Some GMs treat the NPC as expendable and throw them at their players in large numbers as he expects the majority of them to be killed outright. For this situation we have created the NPC Fast Kill table for use with large numbers of NPCs.

This table is for use with firearms and area weapons and not for edged or blunt weapons.

Note; The table may be used with arrows or spears.

To use this table simply find the column which corresponds with the type of weapon being used. Roll 1D10 and look to the table for the result.

NPC FAST KILL

HIT WITH SINGLE SHOT		HIT WITH AREA WEAPON, SHOTGUN, OR AUTOMATIC WEAPON	
DIE ROLL	EFFECT ON NPC	DIE ROLL	EFFECT ON NPC
1-2	No effect on combat.	1-2	May complete 2 actions next turn before death.
3-4	May complete 2 actions next turn before death.	3-4	May complete 1 action before death.
5-7	May complete 1 action before death.	5-10	Immediate death.
8-10	Immediate death.		

HOSTILITY AND MOTIVATION OF NPC's

The Hostility and Motivational factor is provided to give the GM an idea at a glance of how an NPC might think. The H&M factor is rolled the same as the other attributes with the higher the number the more cooperative and frendly the NPC is. The hostility portion of this factor can assist the GM in deciding whether the character is upset or not. To do this roll 1D20, if the number rolled is above the H&M of the character the NPC is upset at the situation whatever it may be. The motivational part of the factor is used to tell the GM what the character considers important and what their basic philosophy is. The general personalities according to the H&M index can be found in the following table.

HOSTILITY AND MOTIVATIONAL CHARACTERISTICS

DIE ROLL	CHARACTERISTICS
0	Totally or innately hostile, this person or group will kill for fun but may not always be direct, can be very deceiving and cunning.
1	Hostile, Will kill for any reason but will not take chances with their own safety or possessions.
2-3	Easily angered or provoked, this type of people are basically greedy with very few, if any, inhibitions.
4-5	Easily angered or provoked, this type of people are very often paranoid and are motivated by their own self-interests above all else.
6-7	Easily angered or provoked, this type of people are also often paranoid and are either ideologically motivated (fanatics) or motivated by their own interests.
8-9	Intemperate, hot tempered but oriented towards their community and family.
10-11	Normal temperament, Self oriented, this type may steal for themselves but not out of maliciousness.
12-14	Normal temperament, Community oriented, these people are usually reasonable unless crossed.
15-17	Normal temperament, some humanitarian instincts, can often be helpful with directions.
18	Non-violent, (possibly religious) motivated by the security of their families and groups, will help if no harm will obviously come of it.
19	Non-violent, community oriented, often helpful in both words and deeds.
20	Non-violent, will not cause harm to others, willing to sacrifice self for the greater good, not fanatical but very passive in resistance.

PC/NPC RELATIONS

When the GM runs into a situation where he is not sure of the reactions of an NPC the following table is used. To use the table take the H&M index of the NPC involved and cross-index this against the Charisma of the PC involved. If there is more than one NPC or PC involved use the average value of the group, if there is a group spokesman use their charisma or H&M index.

PC/NPC REACTIONS

	PC's CHARISMA									
NPC's H&M	0-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20
0-2	H	H	G	G	F	F	E	E	D	D
3-4	H	G	G	F	F	E	E	D	D	C
5-6	G	G	F	F	E	E	D	D	C	C
7-8	G	F	F	E	E	D	D	C	C	B
9-10	F	F	E	E	D	D	C	C	B	B
11-12	F	E	E	D	D	C	C	C	B	B
13-14	E	E	D	D	C	C	C	B	B	B
15-16	E	D	D	C	C	C	B	B	B	A
17-18	D	D	C	C	B	B	B	B	A	A
19-20	D	C	C	B	B	B	B	A	A	A

RESULT	DESCRIPTION OF RESULT
A	Full cooperation, will volunteer information to questions not asked, will definitely assist if asked and may volunteer.
B	Partial cooperation, will volunteer some information, will answer any question asked, may assist if asked.
C	Little cooperation, will give simple answers and volunteer nothing, will not assist, can be insulted into action.
D	No cooperation, will give neutral answers to questions, giving little or no information, provokable.
E	Mild distrust, may give false answers to questions, will not hinder but may pass on information to hostiles.
F	Distrust, will give false answers to questions if pressed, May lead into trap or openly hinder group.
G	Open dislike, will not give any answers, may attack, will attempt to hinder or even kill if possible.
H	Hostile, no time to ask questions, will attack immediately, if hopelessly outnumbered or out gunned, will try to lead into trap.

NPC TECHNOLOGY LEVELS

If the GM rolls a random encounter and the result rolled is of the human variety, then he must decide not only how they will react but at what technology level they can react at. Given this information it becomes relatively simple to equip NPCs with the appropriate weapons and equipment. To find the tech level of any group roll D100 and use the following table.

DIE ROLL	TYPE
1-10	F
11-40	E
41-70	D
71-87	C
88-99	B
00	A

RESULT EXPLANATION

F LATE IRON AGE (circa 1770) Tools of soft iron and mild steel. Good forge work, can rework steel but cannot make it. Good farming technology, some firearm technology and crude explosives. (percussion firearms bordering on cartridge weapons)

E EARLY STEAM AGE (circa 1840) High metal working skills, steam power technology. Good firearm technology (repeaters and early revolvers. some repair of modern weapons, some high explosives)

D LATE STEAM AGE (circa 1880) More extensive mining technology. Crude electrical machines with some steam-powered travel. Good firearm technology. (early machine-guns, good repair of modern weapons)

C EARLY ELECTRIC AGE (circa 1920) Good but limited manufacturing skills. Central electricity, some combustion (alcohol) power, good communications. (may manufacture modern ammunition)

B LATE ELECTRIC AGE (circa 1955) Can rebuild some pre-war remains but limited by available raw materials. Common combustion travel, excellent firearms (WWII level weapons)

A ATOMIC AGE (circa 1980 +) Unlimited power, fusion and laser technology and population. Some weapons equivalency to the Morrow Project. Limited only by available materials and population (work Force).

ENCOUNTERS

For the purpose of this game the word "encounter" will be used to indicate a meeting of the players with some obstacle placed in their path by the GM. Such an obstacle is usually a contact with some form of native life but could also include a variation in the weather or difficulty with the vehicle.

When a GM plans a scenario he will often have several encounters of his own design already placed in the character path. He may however choose to have the players travel over some expanse of the countryside in order to reach some pre-planned objective. In this case random encounters are used to "fill in" the time required to travel from place to place. This section offers both encounters with humans as well as with local fauna and mutations.

The usual method of checking for encounters is to roll a 1D6 every 2 or 4 hours game time with a 6 indicating an encounter of some type. Alternate methods include rolling 1D6 every time a town or prominent geographical feature is encountered, with again a 6 indicating a meeting with some form of life. Also the GM may simply roll on the encounter table any time he feels it necessary to liven up the game.

TYPES OF ENCOUNTERS

Roll 1D20

DIE ROLL ENCOUNTER

1-3 Human encounter; roll 1D20 for number encountered, roll on random encounter table.

4-6 Human encounter (large group); roll 1D100 for number, roll on random encounter table.

7-11 Human encounter (individual); roll on random encounter table.

12-20 Fauna encounter; roll on Fauna Encounters table and follow instructions for creature indicated.

HUMAN ENCOUNTER TYPES

NAME Badges
GEOGRAPHICAL LOCATION Anywhere
H&M AVERAGE 5
H&M RANGE 2-8
NUMBER FOUND 1-6
TECH. LEVEL E-C
POWER/RESOURCES No power/basic survival equipment
WEAPONS Shotguns, some repaired modern, homemade
SPECIAL ATTRIBUTES Sneaky, vicious and unpredictable
DESCRIPTION Badges travel around the country as self-styled lawmen, judge, jury, and executioner. They may pick as a victim, anyone who, in their opinion, has disobeyed some vague, extinct legal system. Sometimes they are right, more often they are wrong

NAME Ballooners
GEOGRAPHICAL LOCATION Anywhere, often westward bound
H&M AVERAGE 12
H&M RANGE 3-16
NUMBER FOUND 2-12 /balloon
TECH. LEVEL C
POWER/RESOURCES Solar power, some battery electric, gas/knowledge of terrain
WEAPONS Small bombs and light firearms, explosives
SPECIAL ATTRIBUTES Often travel in flying "cities" connected by ropes
DESCRIPTION An airborne culture which comes to earth for food and supplies. They are known to raid but are basically traders. They are always searching for more dependable ways of staying aloft, like a dependable (fusion?) power source.

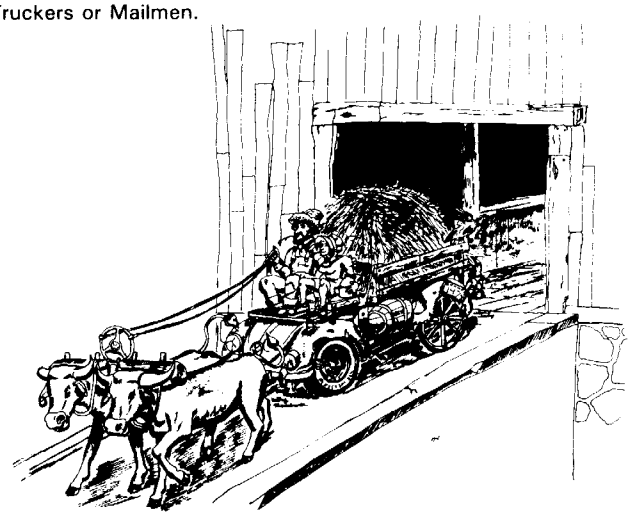
NAME Bikers
GEOGRAPHICAL AREAS 9,11,12,14,15
H&M AVERAGE 10
H&M RANGE 1-14
NUMBER FOUND 1-20
TECH LEVEL B
POWER/RESOURCES Combustion engines (alcohol)
WEAPONS Shotguns, rifles, small arms, grenades, some bike mounted weapons
SPECIAL ATTRIBUTES Very maneuverable and fast, AC = 2
DESCRIPTION The survivors of the classic motorcycle gangs. They do not always deserve their bad reputation.

NAME Breeders
GEOGRAPHICAL LOCATION Anywhere, based in 11
H&M AVERAGE 6
H&M RANGE 2-9
NUMBER FOUND 2-12/patrol
TECH LEVEL C-B
POWER/RESOURCES Combustion engines, some generated electricity and batteries
WEAPONS Dart guns, shotguns, rifles, gas grenades, explosives
SPECIAL ATTRIBUTES Semi-scientists with religious convictions
DESCRIPTION These people hunt throughout the country for pure, unmutated, uncontaminated human stock. They are descended from a group of genetic scientists who survived the war. They believe there will be a super-race to emerge from the CHAOS as they refer to the war.

NAME Cannibals
GEOGRAPHICAL LOCATION Anywhere but 5 & 13
H&M AVERAGE 3
H&M RANGE 0-5
NUMBER FOUND 2-24
TECH. LEVEL E-F
POWER/RESOURCES No power/hunters
WEAPONS Edged and blunt hand weapons, some bows, few firearms
SPECIAL ATTRIBUTES Excellent woodsmen
DESCRIPTION Though conditions have improved 150 years after the war, there are still groups that depend on the consumption of human flesh as a part of their diet. Some submerge the practice in religious rites and ceremonies. Very dangerous people to meet.

NAME Children of the night
GEOGRAPHICAL LOCATION 9,11,12,14,15
H&M AVERAGE 1
H&M RANGE 0-3
NUMBER FOUND 1-10
POWER/RESOURCES None
WEAPONS Edged and blunt hand weapons, some spears
TECH LEVEL F
SPECIAL ATTRIBUTES Light sensitive, can only digest fresh blood
DESCRIPTION The victims of radiation and a biological weapon. These people are slightly empathic/telepathic and as such are drawn to each other. They infect anyone they attack with the disease they carry.

NAME Emdees
GEOGRAPHICAL LOCATION Everywhere
H&M AVERAGE 17
H&M RANGE 14-19
NUMBER FOUND 1 or 2
TECH. LEVEL Same as group found with, otherwise C
POWER/RESOURCES n/a
WEAPONS Edged hand weapons, possible sidearm
SPECIAL ATTRIBUTES A somewhat distorted knowledge of medicine
DESCRIPTION Emdees are decendants or pupils of medical personnel who survived the war. They are highly respected among the townspeople who will extend every effort to protect them. They can occasionally be found on the road, sometimes in the company of Truckers or Mailmen.



NAME Farmers
GEOGRAPHICAL LOCATION Everywhere
H&M AVERAGE 12
H&M RANGE 8-15
NUMBER FOUND 2-12 /family
TECH LEVEL B-D
POWER/RESOURCES Wind, water, animals etc
WEAPONS Firearms common, explosives, occasional heavy weapons
SPECIAL ATTRIBUTES May possess heavy equipment, strong homes
DESCRIPTION Farmers are the backbone of the community to which they belong. They are good hosts to those with good intentions especially is you have information of the outside world.

NAME Frozen chosen
GEOGRAPHICAL LOCATION 8-11
H&M AVERAGE 7
H&M RANGE 5-9
NUMBER FOUND 2-40
TECH. LEVEL C
POWER/RESOUCES Steam, some electricity/farming, shallow min.
WEAPONS Firearms, both homemade and some modern
SPECIAL ATTRIBUTES Have some knowledge of freezing technology buried in their religion
DESCRIPTION A fanatical group of religious power-seekers who spent their power and savings to freeze themselves before the war in order to awake in a "more tolerant" age. In the chaos following the war they found a very tolerant age in which they are expanding as quickly as they can make converts, voluntary or otherwise.

NAME Gypsy truckers
GEOGRAPHICAL LOCATION Anywhere
H&M AVERAGE 10
H&M RANGE 4-12
NUMBER FOUND 2-24
TECH LEVEL C
POWER/RESOURCES Combustion engines, some electricity
WEAPONS Firearms in good repair, explosives and automatic weapons.
SPECIAL ATTRIBUTES Travel in large vehicles, make their own fuel and booze
DESCRIPTION Truckers travel in clans. They are traveling traders who live, work, and party in their trucks. Some have working CBs and use them to communicate with other truckers. There are some who use their vehicles as raiding engines. All would lose any inhibitions in order to obtain a "legendary" fusion power pack.

NAME Inquisitors
GEOGRAPHICAL LOCATION 6-11
H&M AVERAGE 2
H&M RANGE 0-3
NUMBER FOUND 20-40
TECH LEVEL D
POWER/RESOURCES Some combustion and steam engines
WEAPONS Blunt and edged weapons favored, some firearms
SPECIAL ATTRIBUTES Teach torture as a fine art
DESCRIPTION Self-styled do-gooders out to purge mankind of his sins, using the Spanish inquisition as their role-model. They will kill and torture for the fun of it in the name of their god. Several regional churches and one main one.

NAME Maxwell's militia
GEOGRAPHICAL LOCATION 6 extending into 8
H&M AVERAGE 12
H&M RANGE 8-15
NUMBER FOUND 10-40
TECH LEVEL B
POWER/RESOURCES Hydroelectric, steam, some solar/mining, farming, coal
WEAPONS Modern automatic weapons, explosives, some armored vehicles
SPECIAL ATTRIBUTES Good repair of a few modern (M60) tanks and heavy guns
DESCRIPTION An organization founded by a ruthless but efficient tyrant in the early days following the war. He managed to carve out a sizable empire before he was assassinated. The empire still exists in the form of a feudalism. The militia still protects the locals from any attack. Basically intelligent people who have a working system.

NAME Monks
GEOGRAPHICAL LOCATION Everywhere
H&M AVERAGE 19
H&M RANGE 17-20
NUMBER FOUND 4-24
TECH LEVEL E or F
POWER/RESOURCES Some possible steam power/farming
WEAPONS None

SPECIAL ATTRIBUTES Have the following of the surrounding people
DESCRIPTION Similar to the monasteries of the medieval ages. These people may have nothing to do with anyone but themselves, or they may have the backing of other groups in the area. They will often preserve any knowledge they find though they cannot understand its nature.

NAME Napoleon's own
GEOGRAPHICAL LOCATION Based in 10, found anywhere
H&M AVERAGE 10
H&M RANGE 0-19
NUMBER FOUND 1-10
TECH LEVEL Any
POWER/RESOURCES All but nuclear power
WEAPONS Any except energy or laser weapons
SPECIAL ATTRIBUTES Unpredictable
DESCRIPTION This group sprang up initially in upper Wisconsin immediately following the war. They are the decendants of an institution specializing in the treatment of schizophrenics. As such they go well out of their way to imitate some admired person out of history or fiction. They have a very widespread library available and so can be almost anyone. Napoleon is their hereditary leader.

NAME New confederacy
GEOGRAPHICAL LOCATION 7 and 9
H&M AVERAGE 8
H&M RANGE 1-14
NUMBER FOUND 1-8 on patrol
TECH LEVEL C-D
POWER/RESOURCES Steam, combustion engines, some electricity/farming
WEAPONS Shotguns, automatic weapons on homesteads, rifles, explosives, light cannon
SPECIAL ATTRIBUTES Slave-using culture
DESCRIPTION A loose-knit government adopting the creed of the earlier confederacy. Basically friendly but sensitive to any slur on their culture. They deal with slavers but rarely take any themselves as they consider it undignified.

NAME New american indians
GEOGRAPHICAL LOCATION 6, 8, 10-14
H&M AVERAGE 12
H&M RANGE 8-18
NUMBER FOUND 1-100
TECH LEVEL D-F
POWER/RESOURCES Steam power if any/hunters, farmers, some mines
WEAPONS Edged and light firearms, explosives, gases, poisons
SPECIAL ATTRIBUTES Good trackers and hunters
DESCRIPTION After the war these people found it easy to revert to their old ways on their reservations. Their population grew rapidly through their tolerance of wanderers. Well organized and peaceful people who will fiercely defend what is theirs.

NAME New presidencies
GEOGRAPHICAL LOCATION Anywhere
H&M AVERAGE 8
H&M RANGE 6-14
NUMBER FOUND 1-100
TECH LEVEL C-E
POWER/RESOURCES Steam, some electricity/mining, farming
WEAPONS Repaired modern weapons
SPECIAL ATTRIBUTES Possible heavy pre-war weapons
DESCRIPTION After the war new mini-governments sprang up all over the country, each claiming to be the official U.S. government. Most are at best dictatorships while some still follow a democratic government style.

NAME Oilers
GEOGRAPHICAL LOCATION 10
H&M AVERAGE 7
H&M RANGE 3-14
NUMBER FOUND 1-100
TECH LEVEL B
POWER/RESOURCES Oil based, gasoline, some electricity/Oil
WEAPONS Good firearms of all types, some explosives
SPECIAL ATTRIBUTES Available petroleum products
DESCRIPTION These people gained control of the few surviving oil fields immediately after the war. They use the oil as trade goods and for their own needs. Their installations are well defended and they are wary of strangers.

NAME Overlords
GEOGRAPHICAL LOCATION Anywhere
H&M AVERAGE 10
H&M RANGE 0-15
NUMBER FOUND 1 + followers
TECH LEVEL Any
POWER/RESOURCES Any
WEAPONS Any
SPECIAL ATTRIBUTES n/a
DESCRIPTION Overlord is the general term used for any individual who manages to hold an empire together. They are found everywhere and are generally followed by 1-10 other hard-core misfits.

NAME Rich five
GEOGRAPHIC LOCATION 3 and 4
H&M AVERAGE 5
H&M RANGE n/a
NUMBER FOUND 5
TECH LEVEL A
POWER/RESOURCES Equal to the Project but not as widespread
WEAPONS Any modern including limited amounts of lasers
SPECIAL ATTRIBUTES Highly developed empire far outnumbering the Morrow Project's personnel
DESCRIPTION The Rich Five are the survivors of a group of 5 industrialists who had been frozen before the war along with portions of their empires. They have gathered a following and are building a city in the Kentucky highlands. They are a slave culture and are easily insulted.

NAME Razers
GEOGRAPHICAL LOCATION Anywhere
H&M AVERAGE 2
H&M RANGE 0-6
NUMBER FOUND 10-30
TECH LEVEL F or less
POWER/RESOURCES None/whatever they can pick up
WEAPONS Edged weapons, arrows, spears, fire a favorite
SPECIAL ATTRIBUTES Travel from place to place raiding, looting and burning.
DESCRIPTION Razers are the destroyers of all technology. They would have mankind living back in the middle ages. They burn books and libraries. They will use some explosives to the extent of destroying something they cannot tear down with their hands.

NAME Shipmen
GEOGRAPHICAL LOCATION 6
H&M AVERAGE 12
H&M RANGE 6-15
NUMBER FOUND 10-30
TECH LEVEL D
POWER/RESOURCES Steam, some combustion engines/fishing and trading
WEAPONS Some breech loading cannon, good firearms, catapults
SPECIAL ATTRIBUTES Water based, well defended ships
DESCRIPTION Remnants of the Great Lakes shipping industry. Operating out of their ore freighters these people have established a fairly large trading empire. Good people who work hard for a living and respect people who do as well.

NAME Slavers
GEOGRAPHICAL LOCATION Anywhere

H&M AVERAGE 4
H&M RANGE 1-6
NUMBER FOUND 2-20
TECH LEVEL C
POWER/RESOURCES Combustion engines, electric batteries/trade in people
WEAPONS Any, gases, nets, and darts as well.
SPECIAL ATTRIBUTES Sneaky and well equipped, trade with the Rich Five.
DESCRIPTION The slavers of the new world differ little from those of the old. They steal men, women, and children whenever possible and do not discriminate between victims.

NAME Snake-eaters
GEOGRAPHICAL LOCATION Anywhere
H&M AVERAGE 12
H&M RANGE 8-16
NUMBER FOUND 2-12
TECH LEVEL A
POWER/RESOURCES A smaller version of the Project backed by the U.S. military
WEAPONS Any modern weapons including a possible laser
SPECIAL ATTRIBUTES Especially interested in the Morrow Project
DESCRIPTION Special forces teams of American Green Berets and Canadian commandos. Frozen before the war with the express purpose to find out what the Morrow Project is. They were triggered to wake-up on the release of a Morrow wake up signal. Reasonable men but fast and vicious when necessary. They can be fiercely loyal, talk fast or else. Experts in all forms of warfare.

NAME Soviets
GEOGRAPHICAL LOCATION Scattered
H&M AVERAGE 10
H&M RANGE 6-16
NUMBER FOUND 1-10
TECH LEVEL D
POWER/RESOURCES Steam and combustion/mining and farming
WEAPONS A few remnants of modern USSR weapons, home-made firearms and explosives
SPECIAL ATTRIBUTES Confused
DESCRIPTION Decendants of Russian soldiers who, for one reason or another, found themselves in the United States. They have made a living out of hiding from the Americans and in some cases do not realize the war is over. They are hard to capture, but if they can be talked to they can usually be converted. They are not stupid, just ignorant.

NAME Texans
GEOGRAPHICAL LOCATION 10
H&M AVERAGE 10
H&M RANGE 8-12
NUMBER FOUND 1-20
TECH LEVEL E
POWER/RESOURCES Steam, combustion engines/oil, farming (cattle) slaves
SPECIAL ATTRIBUTES Same as Oilers
DESCRIPTION Very territorial and sometimes expansive. There are many "New Texans" scattered throughout the old state and surrounding areas and they may often go to war against each other. Good people but they can be easily insulted.

NAME Townspeople
GEOGRAPHICAL LOCATION Anywhere
H&M AVERAGE 10
H&M RANGE 1-20
NUMBER FOUND 10-110
TECH LEVEL Any
POWER/RESOURCES Any but primarily agricultural
WEAPONS Firearms, edged and blunt weapons, rare heavy weapon
SPECIAL ATTRIBUTES n/a
DESCRIPTION The normal American small town type. These are the people the Project was most designed to help.

NAME Universities
GEOGRAPHICAL LOCATION Anywhere
H&M AVERAGE 10
H&M RANGE 4-16
NUMBER FOUND n/a
TECH LEVEL A-C
POWER/RESOURCES Any/knowledge
WEAPONS Any including heavy vehicles
SPECIAL ATTRIBUTES Usually control a large surrounding area.
DESCRIPTION Educational institutions that managed to survive the chaos after the war. They all went through a period of defensive preparedness and can well defend themselves. Some are controlled by dictators.

NAME Warriors of Krell
GEOGRAPHICAL LOCATION 7
H&M AVERAGE 4
H&M RANGE 2-10
NUMBER FOUND 4-24
TECH LEVEL B
POWER/RESOURCES Electricity, steam, solar/mining, farming
WEAPONS Modern weapons, heavy vehicles
SPECIAL ATTRIBUTES Knowledge of the Morrow Project and have some Project equipment, want more.
DESCRIPTION Stopped once from building an extensive, repressive empire by the Project, the dictator Krell caused the capture or destruction of several Morrow bases. He captured one intact and had himself frozen. He arises every few decades to incite his followers to further expansion. The same followers guard his bunker while he "sleeps".

NAME Whale worshippers
GEOGRAPHICAL LOCATION 15
H&M AVERAGE 12
H&M RANGE 9-19
NUMBER FOUND 4-24
TECH LEVEL F
POWER/RESOURCES Remnants only/fishing, hunting, farming
WEAPONS Edged weapons
SPECIAL ATTRIBUTES n/a
DESCRIPTION These people live off the whales that beach themselves near their communities. Religious significance is centered around this phenomena as many of the peoples needs are met by the whales. They will not allow any harm to come to the whales by outsiders.

NAME Wanderers
GEOGRAPHICAL LOCATION Anywhere
H&M AVERAGE 10
H&M RANGE 2-18
NUMBER FOUND 2-20
TECH LEVEL E
POWER/RESOURCES Animal power
WEAPONS Some firearms, edged and blunt weapons
SPECIAL ATTRIBUTES n/a
DESCRIPTION Wanderers are bands of nomadic people that do not fit into any real community. They have created their own culture. They are often unscrupulous in their trading with others and are competitive amongst themselves.

NAME Wandering warlock
GEOGRAPHICAL LOCATION Anywhere
H&M AVERAGE 19
H&M RANGE 18-20
TECH LEVEL A
POWER RESOURCES/ Unknown
WEAPONS Unknown
SPECIAL ATTRIBUTES Seems to have extensive knowledge of all subjects including the Morrow Project.
DESCRIPTION A figure out of the legends of the post-war world. This man seems to roam the country at will. He apparently travels unarmed but cannot be suprised and leaves all attackers either unconscious or dead. He always appears out of nowhere at times of crisis and seeks to help the common people. He has no tolerance of power seekers but will rarely become directly involved. Some Morrow reports state that this man might be Morrow himself.

NAME Warlocks, Witches, etc.
GEOGRAPHICAL LOCATION Anyhwere
H&M AVERAGE 10
H&M RANGE 4-18
NUMBER FOUND 1-4
TECH LEVEL Any
POWER/RESOURCES Any
WEAPONS Any
SPECIAL ATTRIBUTES PSI powers
DESCRIPTION Growing more and more common as the years go by are the people gifted with the powers of the mind. They can be found in any community that will accept them. Most will appreciate being accepted for what they are, a benefit to mankind though some can be power seekers.

RANDOM ENCOUNTERS, HUMAN
Roll 1D20 + 1D6 (2-26)

ENCOUNTER	TERRAIN TYPE														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BADGES	2	2	2	2	2-3	2	2	2	2	2	2	2	2	2	2
BALLOONERS	3	3	3	3	4	3	3	3	3	3	3	3	3	3	3
BIKERS	-	-	-	-	-	-	-	-	4	-	4	4-5	-		4
BREEDERS	4	4	4	4	5	4	4	4	5	4	5*	6	4	6	5
CANNIBALS	5	5	5	5	-	5	5	5	6	5	6	7	-	7	6
CHILD. OF NIGHT	-	-	-	-	-	-	-	-	7	-	7	8	-	8	7
EMDEES	6	6	6	6	6	6	6	6	8	6	8	9	5	9	8
FARMERS	7-8	7-8	7-8	7-8	7-8	7-8	7-8	7-8	9	7	9	10	6	10-11	9-10
FROZEN CHOSEN	-	-	-	-	-	-	-	9	10	8	10	-	-	-	-
GYPSY TRUCKERS	9-10	9-10	9-10	9-10	9	9	9	10	11	9	11	11-12	7-8	12	11
INQUISITORS	-	-	-	-	-	10	10	11	12	10	12	-	-	-	-
MAXWELL'S MILITIA	-	-	-	-	-	11	-	12	-	-	-	-	-	-	-
MONKS	11	11	11	11	10	12	11	13	13	11	13	13	9-10	13	12
NAPOLEON'S OWN	12	12	12	12	11	13	12	14	14	12*	14	14	11	14	13
NEW CONFED-ERACY	-	-	-	-	-	-	13	-	15	-	-	-	-	-	-
NEW AMER. INDIANS	-	-	-	-	-	14	-	15	-	13	15	15	12-13	15	-
NEW PRES-IDENCYS	13	13	13	13	12	15	14	16	16	14	16	16	14	16	14
OILERS	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-
OVERLORDS	14	14	14	14	13	16	15	17	17	16	17	17	15	17	15
RICH 5	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-
RAZERS	15	15	15	15	14	17	17	18	18	17	18	18	16	18	16
SHIPMEN	-	-	-	-	-	18	-	-	-	-	-	-	-	-	-
SLAVERS	16-17	16-17	16-17	16-17	15-16	19	18	19	19	18	19	19	17-18	19	17
SNAKE-EATERS	18	18	18	18	17	20	19	20	20	19	20	20	19	20	18
SOVIETS	19	19	19	19	18	21	20	21	21	20	21	21	20	21	19
TEXANS	-	-	-	-	-	-	-	-	-	21	-	-	-	-	-
TOWNS-PEOPLE	20-21	20-21	20-21	20-21	19-20	22	21	22	22	22	22	22	21	22	20
UNIVERSITYS	22	22	22	22	21	23	22	23	23	23	23	23	22	23	21
WANDERERS	23-24	23-24	23-24	23-24	22-23	24	23	24	24	24	24	24	23-24	24	22
WANDER'G WARLOCK	25	25	25	25	24	25	24	25	25	25	25	25	25	25	23
WARLOCKS, WITCHES	26	26	26	26	25-26	26	25	26	26	26	26	26	26	26	24
WARRIORS OF KRELL	-	-	-	-	-	-	26	-	-	-	-	-	-	-	-
WHALE WORSHIPPERS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25-26

* Main base or primary location.

TERRAIN AND GEOGRAPHICAL AREAS

As an aid in the random encounter tables we have divided the continental USA into 15 geographical areas roughly divided according to their terrain types. The following table lists these areas and the number used to refer to them in the encounter tables.

NO.	TERRAIN NAME	STATES INCLUDED IN THE AREA
1	Northeast coastal region	Maine, N.H., Mass., R.I., Conn., N.Y., N.J., Del., Md., Va.
2	Southeast coastal region	Va., N.C., S.C., Ga., Fla.
3	Northeastern highlands	Vt., N.Y., Pa., W. Va., Md., Ky.
4	Southeastern highlands	S.C., Ga., Tenn., Ky., Ala.,
5	Southeastern swampland	S.C., Ga., Fla., Ala., Miss., La.
6	Northeastern lakes region	N.Y., Pa., Ohio, Ind., Mich. Wis., Minn.
7	Northcentral region	Minn., Iowa, Ill., Mo.
8	Southcentral region	Mo., Tenn., Ark., Miss., La.
9	Northern midwest plains	N. Dak., S. Dak., Nebr., Kans.
10	Southern midwest plains	Kans., Okla., Tex.
11	N. Rocky Mountain highlands	Mont., N. Dak., S. Dak., Wyo., Colo., Idaho, Utah, Calif., Nev., Oreg., Wash.
12	S. Rocky Mountain highlands	Calif., Nev., Utah, Ariz., N. Mex., Colo.
13	Southwestern desert region	Calif., Nev., Utah, Ariz., N. Mex.
14	Southwest coastal region	Calif.
15	Northwest coastal region	Calif., Oreg., Wash.

THE FAUNA OF THE MORROW PROJECT

SMALL MAMMALS; Most of these animals can be found almost anywhere in the continental United States in one form or another, the exceptions being Lemmings which are only found in the northern regions and the Prairie Dogs, which are found only in the western plains. Unless mutated these animal hold little danger except perhaps for a large group such as a rat colony or an occasional rabid animal. They are more likely to be a nuisance than anything else. The larger squirrels and rabbits can be a food source.

MOLES; The worst these tiny creatures can do is trip up a character. But if they are mutated or their habits changed by the GM they can be interesting.

St/Cn = 1, Dx = 10, AC = A, Sp/Bp = 10

SHREWS; These little carnivores are very aggressive for their size. Put them in a large enough group and they could be real trouble.

St/Cn = 1, Dx/Acc = 15, Ac = A, Sp/Bp = 10

WEASELS; This is a large family of sleek and fast mammals. They have the ability and temperment to put up a savage fight. They normally hunt singly or in pairs, a colony of them is not outside of reason.

St/Cn = 5, Dx/Acc = 18, AC = B, Sp/Bp = 25

RATS; These are the well known rodents that will survive almost anywhere. They are aggressive and quick and can be found in packs.

St/Cn = 3, Dx/Acc = 15, AC = A, Sp/Bp = 18

MICE; Meek and mild unless cornered, these small creatures are fast but not at all aggressive. They will run given the slightest chance. They excell at creating a nuisance.

St/Cn = 1, Dx/Acc = 15, AC = A, Sp/Bp = 10

SQUIRRELS; The funny little creatures one watches out in the yard haven't changed much. Their numbers have increased since mankinds numbers decreased.

St/Cn = 2, Dex/Acc = 16, AC = A, Sp/Bp = 20

CHIPMUNKS; Miniature ground dwelling squirrels

St/Cn = 2, Dx/Acc = 12, AC = A, Sp/Bp = 14

PRAIRIE DOGS; Basically large, gopher-like animals known for their extensive networks of underground tunnels and for placing a guard over the colony.

St/Cn = 5, Dx/Acc = 12, AC = B, St/Bp = 30

GOPHERS; Small, squirrel-like creatures that make a living out of digging holes and tunnels. They live on the roots and tend to be very timid.

St/Cn = 5, Dx/Acc = 12, AC = B, St/Bp = 25

LEMMINGS: These are small rodent-like creatures that are the northlands answer to mice. They are known for their mass migrations when their population in a particular area becomes too large. This is a field day for all the local carnivores and predators.

St/Cn = 2, Dx/Acc = 15, AC = A, St/Bp = 12

RABBITS; Cute, furry little creatures that go out and multiply. They are a major food source for many predators. They are mostly harmless but will scratch and bite if cornered and can cause rabies.

St/Cn = 5, Dx/Acc = 15, AC = B, Sp/Bp = 25

MUSKRATS; These rodents like water and are often found in old beaver dens, They have sharp teeth but are easy tempered and only eat plants.

St/Cn = 4, Dx/Acc = 14, AC = C, Sp/Bp = 20

MEDIUM SIZED MAMMALS; There are usually several different species of each family of mammals and some can be quite large. Due to their size some can be dangerous if provoked and can cause a lot of damage especially to supplies.

RACCOONS; The notorious mischief maker. This animal is more of a nuisance than a threat though an old boar raccoon is known to attack fiercely.

St/Cn = 10, Dx/Acc = 20, AC = C, St/Bp = 40

WOLVERINES; For its size this is the most dangerous animal on earth. The largest member of the weasel family the wolverine does not know what fear is. They will attack anything including vehicles and will not stop in all-out attack unless they kill their enemy or are themselves killed. They travel singly (70%) or in pairs (30%). They have been known to make a full grown grizzly bear back down. These can be real trouble. Due to the fierceness of their attack they do double damage.

St/Cn = 12, Dx/Acc = 19, AC = C, St/Bp = 75

OTTERS (river or sea); These creatures are playful and normally harmless. They are, however, curious and can on occasion be destructive.

St/Cn = 8 Dx/Acc = 19, AC = C, Sp/Bp = 40

SKUNKS; The world's answer to the efficiency of chemical warfare. These creatures have good claws and teeth and will use them if their terrific smell won't drive their attacker away. They will not normally attack but carry rabies very often (25%)

St/Cn = 8, Dx/Acc = 18, AC = C, Sp/Bp = 40

BADGERS; The economy wolverine. This small creature lives in burrows during the day and comes out to forage at night. They will not fight unless bothered, then they will do their best to eat you. Their front digging claws do double damage. Leave them alone.

St/Cn = 10, Dx/Acc = 18, AC = C, Sp/Bp = 50

FOXES, COYOTES, AND SMALL DOGS; These are typical canines. They are aggressive only if hungry or cornered. They will stalk an intended victim for long distances to size them up for attacking. They often travel in packs.

St/Cn = 10, Dx/Acc = 16, AC = C, Sp/Bp = 60

LYNX, BOBCAT; Both of these felines are accomplished hunters and climbers. If necessary they will attack an enemy many times their size with total, all-out, assault. The Lynx is found in the northern areas while the Bobcat is found almost anywhere.

St/Cn = 10, Dx/Acc = 20, AC = C, Sp/Bp = 45

BEAVERS; Slapping tails, dams, and custom built homes are all trademarks of this, the largest rodent in North America. Beavers are herbivorous, eating the bark of trees and water plants. They will attack only as a last resort and are very clumsy out of the water.

St/Cn = 10, Dx/Acc = 10, AC = C, Sp/Bp = 60

PORCUPINES; The "pincushion" of nature the porcupine is a very mild tempered animal. The spines of the porcupine cannot be thrown but they will lash out with their tail which has a good supply of spines. They are very clumsy and can be killed with a stick as they ball-up when attacked showing only their spines.

St/Cn = 10, Dx/Acc = 8, AC = B, Sp/Bp = 65

WOODCHUCKS AND MARMOTS; Woodchucks are found in the eastern states and marmots in the northwestern states. They are both large versions of the prairie dogs but do not have the same herding instinct.

St/Cn = 8, Dx/Acc = 12, AC = B, Sp/Bp = 40

RABBITS AND HARES; This family includes the Jackrabbit, actually a hare, and the snowshow rabbit. These creatures are fast and tend to

be very well camouflaged.
St/Cn = 8, Dx/Acc = 17, AC = B, Sp/Bp = 40

LARGE SIZED MAMMALS; These include some of the most dangerous animals on the American continent. They also include most of the large herd animals which in themselves present little danger. Danger comes in the form of the large herd bulls and, especially in some species, a cow with a calf.
BIGHORN MOUNTAIN SHEEP; Found only in the western highlands these agile sheep can climb rocky slopes and crags that a man would find very difficult if not impossible. A very shy animal that is normally seen only at long (300m or more) range.
St/Cn = 15, Dx/Acc = 18, AC = C, Sp/Bp = 150
MULE DEER; These deer are found in the western highlands and plains. They are timid as all deer are, and will run at the slightest provocation. The bucks can be dangerous during the rutting season (late fall).
St/Cn = 18, Dx/Acc = 15, AC = C Sp/Bp = 200
WHITETAIL DEER; Found in the midwest and east this is the most numerous of the deer Can be an excellent food source.
St/Cn = 15, Dx/Acc = 15, AC = C, Sp/Bp 250
ELK; The larger of the deer only the moose being bigger. The elk is found in the same range as the whitetail deer and can be found in the highlands of the west.
St/Cn = 30, Dx/Acc = 15, AC = C, Sp/Bp = 500

MOUNTAIN GOATS; Like the bighorn sheep these animals can traverse the most difficult slopes with relative ease. They are found in the western mountain areas.
St/Cn = 15, Dx/Acc = 18, AC = C, Sp/Bp = 150
WILD CATTLE; Found from the midwest to the western states. These are the remnants of the domestic herds that went wild after the war. They are found in large herds roaming for food.
St/Cn = 16, Dx/Acc = 13, AC = C, Sp/Bp = 400
WILD HORSES; These creatures are found in large herds and will usually run from strangers. The stallion will lead the herd away from an aggressor. However, the herd is made up of mares 50% of which will have colts. If the herd runs, a mare will fight and kill to protect a colt which cannot keep up.
St/Cn = 24, Dx/Acc = 15, AC = C, Sp/Bp = 500
PRONGHORNS; Often called antelopes, which they are not, these creatures are smaller than most deer and run faster. They are not dangerous but will not allow anyone within several hundred meters if they can see them. They are found in the western plain states.
St/Cn = 15, Dx/Acc = 18, AC = C, Sp/Bp = 125
BEARS; BLACK OR BROWN; These are the smaller bears, only about 1.5 meters tall and about 200 kilos in weight. They will not attack man normally but can be unpredictable especially a female with cubs.
St/Cn = 25, Dx/Acc = 17, AC = C, Sp/Bp = 400
BEARS, KODIAK AND GRIZZLY; These bears are known to be bad-tempered, a female with cubs will attack anything it sees as a threat. They can stand over 2 meters tall and weigh more than 400 kilograms. In attack their power and strong claws make them a match for almost any animal.
St/Cn = 40, Dx/Acc = 18, AC = C, Sp/Bp = 800

FAUNA ENCOUNTERS

The following table is for the use in the random generation of fauna encounters. To use the table roll 1D10 and look to the column under the region the players are in. The specifics on the animals will be found in the fauna section.

FAUNA ENCOUNTER	TERRAIN TYPE														
CREATURE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Alligators	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-
Bear, Black or Brown	1	2	1	-	-	1	1	1	1	1	1	1	-	-	-
Bear, Kodiak or Grizzly	-	-	-	-	-	-	-	-	2	2	2	2	-	1	1
Bear, Polar	2	-	2	-	-	2	-	-	3	-	-	-	-	-	2
Bird, Predator	3	3	3	1	2	3	2	2	4	3	3	3	1	2	3
Cat(s) Large	-	-	-	2	-	-	-	-	-	-	4	4	2	3	4
Chipmunk	4	4	4	3	-	4	3	3	5	4	5	5	3	4	5
Insect, poisonous	-	-	-	-	3	-	-	-	-	-	-	-	4	-	-
Mammals, Small	5	5-6	5	4-5	4	5	4	4	6	5	6	6	5	5	6
Mammals, Medium	6-7	7	6-7	6-7	5	6	5-6	5	7	6	7	7	6	6	7
Mammals, Large	8	8	8	8	6	7-8	7	6-7	8	7	8	8	7	7	8
Snakes	-	-	-	-	7	-	-	8	-	8	-	-	8	8	-
Snakes, poisonous	9	9	9	9	8-9	9	8-9	9	9	9	9	9	9	9	9
RARE or MUTATED species	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

MUTANT ENCOUNTERS

The following table lists the various established mutants found in the world of the Morrow Project. The encounter table is designed for random encounters during the run of the game. To generate further mutations use as a guide the Mutation section given earlier in this book.

ENCOUNTERS: RARE AND MUTATED SPECIES

	TERRAIN TYPE														
NAME	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BATS	1	1	1	1-2	1	1	1	1	1	1	1	1-2	1-2	1	1
BEAR (GIANT)	-	-	-	-	-	-	-	-	2	-	2-3	3-4	-	2-3	2
BIGFOOT	2	-	2	3	-	-	-	-	-	-	4	5	-	-	3-4
BLACK FLIES	3	2	3	4	2	2	2	2	3	2	5	6	3-4	4	5
BLUE UNDEAD	4	3	4	5	3	3	3	3	4	3	6	7	5-6	5	6
BUFFS	-	-	-	-	-	4	4	4	5	4-5	-	-	7-8	6	-
CROWS	5	4	5	6	4	5	5	5-6	6	6	7	8	-	7	7
DRAGON LIZARD	-	5	-	-	5	-	-	-	-	7	-	9	9-10	8	-
ELEC. CATFISH	6	6	6	7	6	6	6	7	7	8	8	10	-	9	8
GILA MONSTER	-	-	-	-	-	-	-	-	-	9	-	-	11-12	-	-
GRUNTS	7	7	7	8	7	7	7	8	8	10	9	11	13-14	10	9
MAGGOTS	8	-	8	-	-	8	8	-	9	-	-	-	-	-	-
MINIMOOSE	9	-	-	-	-	9	9	-	10	-	-	-	-	-	10
MINK	10	-	9	-	-	10	10	-	-	-	-	-	-	-	-
MOSQUI-TOES	11	8-9	10	9	8-9	11	11	9	11	11	10	12	-	11	11
PIKE	12	10	11	10	10	12	12	10	12	12	11	13	-	12	12
PORCUPINE	13	11	12	11	11	13	13	11	13	13	12	14-15	-	13-14	13
SCORPION	-	-	-	-	-	-	-	-	-	14	-	-	15-16	15	-
SCRAGGER	14	12	13	12	12	14	14	12	14	15	13	16	17-18	16	14
SKUNK	15	13	14	13-14	13	15	15	13	15	16	14	17	-	17-18	15
SLASHER	-	14-15	15	15-16	14	-	-	14-15	-	17	15	18	-	-	16
SMOTHER	-	16	-	17	15-16	-	-	16	-	-	-	-	-	-	-
SNAPPER	-	17	-	-	17	-	-	17	-	-	-	-	-	-	-
STUBS	16	18	16	18	18	16	16	18	16	18	16	19	19-20	19	17
STURGEON	17	19	17	19	19	17	17	19	17	19	17	20	-	20	18
TIMBER RATTLER	18	20	18	20	20	18	18	20	18	20	-	-	-	-	-
WOLVER-INE	19	-	19	-	-	19	19	-	19	-	18-19	-	-	-	19
WOLVES	20	-	20	-	-	20	20	-	20	-	20	-	-	-	20

MUTANT ENCOUNTER TYPES

NAME; Bats
TYPE: Mutated bat
LOCATIONS: All areas, in caves and old buildings
SIZE: ½-1 meter long, Wt. 10-20kg.
ST/CN: 4-6
DX/ACC: 8
SP/BP: 40-60
ARMOR CLASS: B
H&M: 8
ATTACKS: Bite
SPECIAL ATTRIBUTES: Can "see" in the dark, are attracted to radar sets.
DESCRIPTION: These are larger decendants of today's common bat. They prefer to eat insects but are not above catching small animals when they can. One of the characteristics of their mutation is that they are attracted to functioning radar sets. The bats will not normally attack but will bite if grabbed. They are found in dark areas or flying in swarms of 10-20 bats.

NAME: Bear (Giant)
TYPE: Mutated grizzly bear
LOCATIONS: 9, 11, 12, 14, 15
SIZE: 4.5-5.5 meters tall (standing), wt. 800-1200 kg.
ST/CN: 20-26
DX/ACC: 12-16
SP/BP: 600-900
ARMOR CLASS: B
H&M: 4
ATTACKS: Bite, 2 claws
SPECIAL ATTRIBUTES: Has ½ the death % from damage.
DESCRIPTION: A "throwback" to the days of the prehistoric cave bear this animal began as a grizzly bear. Bears have poor vision but an excellent sense of smell and hearing. The bears are solitary, very territorial and hate humans. The males will attack 50% of the time on detecting an intruder and a female with cubs (50% chance of 1 or 2 cubs) will attack 75% of the time on detecting a threat in her territory. Being very hard to kill, the bears can run 50 to 100 meters and attack even with a bullet in their heart. A brain shot will drop a bear in its tracks.

NAME: Bigfoot
TYPE: Early human
LOCATIONS, 1, 3, 4, 11, 12, 15
SIZE: 2-2.5 meters tall, wt. 120-250kg.
ST/CN: 16-26
DX/ACC: 10-14
SP/BP: 400-800
ARMOR CLASS: A
H&M 8
ATTACKS: Attacks as human
SPECIAL ATTRIBUTES: Will use blunt weapons
DESCRIPTION: The "sasquatch" of legend this creature is a very distant relative of man. They can be seen in the forests of the areas in which they live. Normally only individuals are seen and even then

a short time. The bigfoot will only fight when cornered but can sometimes be surprized when their curiosity brings them into a campsite. This happens especially at night which is the time that bigfoot prefers to hunt in.

NAME: Black flies
TYPE: Mutated insect
LOCATIONS: All areas
SIZE: .5 meters long, wt. 1-2kg
ST/CN: 6
DX/ACC: 8
SP/BP: 15
ARMOR CLASS: C
H&M: 12
ATTACKS: Bite
SPECIAL ATTRIBUTES: Contact has a 10% chance of causing a biowar disease.
DESCRIPTION: A large version of the modern housefly these insects are attracted to the smell of meat or cooking. Being that they will feed and breed on the carcasses of any dead animal, they will often carry any disease the animal may have died of. The larva (maggots) of the flies are found on rotting carcasses and are several centimeters long.

NAME: Blue undead
TYPE: Mutated humans
LOCATIONS: In or near bomb craters in all areas.
SIZE: Mansize
ST/CN: St. 10-30, Const. 100
DX/ACC: 1-4
SP/BP 1000-1500
ARMOR CLASS: A
H&M: n/a
ATTACKS: None
SPECIAL ATTRIBUTES: Radiates 1000-6000 rads of radiation.
DESCRIPTION: The blue undead are creatures that at one time were living people. When caught in the heavy radiation after the war some people, instead of dying outright, became what is known as the blue undead. These creatures have almost no intelligence due to the higher centers of their brains being destroyed by the radiation. Because their bodies are supported almost totally by the radiation they absorbed they must be almost blown apart (all Sp's taken) before they "die". They are fairly strong but are extremely radioactive (1000-6000 rads/hr.) and can kill with a touch or by being in their close vicinity for a length of time. Due to their innate radiation they sometimes glow blue in the dark. Their once having been human makes them curious and attracted to people who come near them. They try to contact passersby and, due to their lack of intelligence, cannot easily "change their minds" and go away even while they're being destroyed.

NAME: Buffs
TYPE: Mutated buffalo
LOCATIONS: 6, 7, 8, 9, 10, 13, 14
SIZE: 3 meters tall, wt. 1000-4000kg
ST/CN: 30-40
DX/ACC: 4
SP/BP: 1000-2000
ARMOR CLASS: C
H&M 12
ATTACKS: Stomp (equal to kick), ram
SPECIAL ATTRIBUTES: Relatively peaceful, will stampede if frightened.
DESCRIPTION: As giant buffalo these animals are found in herds of 10-20 individuals. Buffs are peaceful giants preferring to simply graze on vegetation to doing anything else. A buff will sometimes charge and ram for almost no reason and because of this should be left alone. They have very poor eyesight but excellent hearing, and a very good sense of smell.

NAME: Crows
TYPE: Mutated bird
LOCATIONS: All but area 13
SIZE: ½-1 meter long, wt. 10-15kg
ST/CN: 4-6
DX/ACC: 10-14
SP/BP: 40-60
ARMOR CLASS: B
H&M: 10
ATTACKS Bite: (peck)
SPECIAL ATTRIBUTES: Attack in packs
DESCRIPTION: This giant crow will rarely attack but may attempt to drive off intruders who approach while the crows are feeding. Crows fly in flocks of 6-12 birds when feeding and can devastate crops and farms. Farmers love to see these birds shot.

NAME: Dragon lizard
TYPE: Mutated monitor lizard
LOCATIONS: 2, 5, 10, 12, 13, 14
SIZE: 3-5 meters long, wt. 150-300kg
ST/CN: 18-26
DX/ACC: 18-22
SP/BP: 500-850
ARMOR CLASS: C
H&M: 2
ATTACKS: 2 claws, bite, tail
SPECIAL ATTRIBUTES: Bite has a 25% chance of causing an immediate infection (equal to type A poison)
DESCRIPTION: A giant meat-eating reptile this lizard prefers to eat carrion, however it is not above bringing down any big game it can catch. Normally slow-moving and solitary, the dragon can strike very quickly when aroused, bringing down its prey with its lashing tail and powerful teeth and claws.

NAME: Electric catfish
TYPE: Mutated catfish
LOCATIONS: All bodies of fresh water
SIZE: 3 to 5 meters long, wt. 150-300kg
ST/CN: 14-18
DX/ACC: 4
SP/BP: 300-500
ARMOR CLASS: B
H&M: 10
ATTACKS: Electric shock
SPECIAL ATTRIBUTES: Can shock with 400 volts once per turn.
DESCRIPTION: Very large, slow-moving decendants of aquarium

breeding pond escapees. This fish stuns its prey with a powerful shock of electricity. After their prey is knocked unconscious the catfish feeds at its leisure. Catfish live in almost any body of water large enough to support them and are feared by local natives due to their ability to shock anything that comes in contact with the water in which they live.

NAME: Gila monster
TYPE: Mutated reptile
LOCATIONS: 10, 13
SIZE: 2½ - 3 meters long, wt. 150-250kg
ST/CN: 16-22
DX/ACC: 4-8
SP/BP: 450-700
ARMOR CLASS: 1
H&M: 8
ATTACKS: Bite, 2 claws
SPECIAL ATTRIBUTES: Bite has 75% chance of injecting Type C poison into victim.
DESCRIPTION: A gigantic version of todays gila monster this lizard is normally slow moving and sluggish but can attack suddenly when hungry or threatened. The gila monster has poison glands in its mouth but does not have fangs to inject it with. To inject the poison the lizard bites and holds on, chewing it's poison into the wound. Once it bites, either the gila monster or it's prey must die before it releases it's bite.

NAME: Grunts
TYPE: Mutated human
LOCATIONS: All areas
SIZE: 2-2½ meters tall, wt. 140-180kg
ST/CN: 15-25
DX/ACC: 1-10
SP/BP: 325-725
ARMOR CLASS: A
H&M 18
ATTACKS: Attacks as a human
SPECIAL ATTRIBUTES: Will use blunt or edged weapons.
DESCRIPTION: A worker caste found with most other groups of people who will accept them. Grunts are a low-intelligence, strong, hard working, friendly group of people. They are willing to work for food and lodging and are fond of bright shiny objects. Very loyal, they will become violent if they find they have been used to harm other people.

NAME: Maggots
TYPE: Mutated human
LOCATIONS: 1, 3, 6, 7, 9
SIZE: ½ mansize
ST/CN: 4-10
DX/ACC: 18-20
SP/BP: 60-150
ARMOR CLASS: B
H&M: 0
ATTACKS: 2 claws, bite
SPECIAL ATTRIBUTES: Night vision, very fast, cannibalistic, may use blunt weapons.
DESCRIPTION: Inbred, mutated decendants of people who moved underground after the war. Looking only semi-human, these creatures have 3-fingered hands that they clench together and use as a single claw. Maggots rarely face their opponents preferring instead to strike from behind, tearing out their victim's throat with their claws. Being nocturnal, maggots only come aboveground at night preferring to sleep by the day in their maze of underground tunnels. The tunnels entrances can be found by the slight mounds. (4-6 meters wide, 1-2 meters high) they make on the surface.

NAME: Minimoose
TYPE: Mutated moose
LOCATIONS: 1, 6, 7, 9, 15
SIZE: .75-1 meter tall, wt. 100-150kg
ST/CN: 8-12
DX/ACC: 10-14
SP/BP: 175-250
ARMOR CLASS: B
H&M 4
ATTACKS: Kick, ram (horns act like claws for damage)
SPECIAL ATTRIBUTES: Normally found near water.
DESCRIPTION: As a dwarf moose this animal is very aggressive its size. They are normally found singly near water where they f on plants. The males will attack on sight 50% of the time. A cow with a calf (25% chance) will attack 75% of the time on sighting nearby intruders.

NAME: Mink
TYPE: Mutated weasel
LOCATIONS: 1, 3, 6, 7
SIZE: 2-2½ meters long, wt. 80-100kg
ST/CN: 10-16
DX/ACC: 18
SP/BP: 200-350
ARMOR CLASS: B
H&M 2
ATTACKS: 2 claws, bite
SPECIAL ATTRIBUTES; Very violent attack
DESCRIPTION: This is an especially vicious giant mutant. Due to its size it has very few natural enemys and it also has to eat a great deal to keep itself healthy. The mink is a solitary animal and will attack anything it considers food.

NAME: Mosquitoes
TYPE: Mutated insect
LOCATIONS: Near bodies of water in all areas except 13
SIZE: .5 meters long, wt. 1-2kg
ST/CN: 4
DX/ACC: 4
SP/BP: 10
ARMOR CLASS: C
H&M: 10
ATTACKS: Bite, draws 4 Bp per turn for 4 turns.
SPECIAL ATTRIBUTES; Bite has a 25% chance of causing Septembe fever (Biowar agent).
DESCRIPTION: Due to the bloodthirsty nature of the female members of this giant species, the mosquito can do damage simply from the volume of blood it can draw from its victim. Mosquitoes very often carry a disease from feeding on the carcasses of disease victims.

NAME: Pike
TYPE: Mutated fish
LOCATIONS: All large bodies of clean fresh water
SIZE: 3-4 meters long, wt. 100-150 kg
ST/CN: 15-25
DX/ACC: 10
SP/BP: 300-500
ARMOR CLASS: C
H&M 2
ATTACKS: Bite
SPECIAL ATTRIBUTES: Will attack anything in the water.
DESCRIPTION: A giant member of the pike family this fish can be compared to a freshwater shark. Though the pike is not attracted to blood in the water it will attack someone swimming on the surface. Pike sometimes float on the surface and when doing so resemble a sunken log.

NAME: Porcupine
TYPE: Mutated porcupine
LOCATION: All areas except area 13
SIZE: .5-2 meters long, wt. 25-150kg
ST/CN: 8-18
DX/ACC: 4-6
SP/BP: 100-400
ARMOR CLASS: B
H&M: 12
ATTACKS: Bite, quills for protection
DESCRIPTION: A giant, slow-moving vegetarian, the porcupine is one of the most harmless mutants. The animal is easily killed and can be

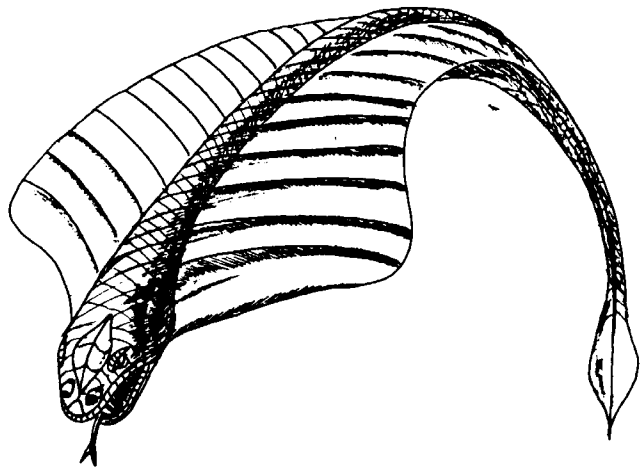
a source of food. Porkies will rarely attack preferring to turn its quill covered back on any aggressor. They can cause a great deal of damage due to their attraction to anything containing salt which they will chew to shreds to obtain the salt.

NAME: Scorpion
TYPE: Mutated scorpion
LOCATIONS: 10, 13, 14
1½ meters long, wt. 20-40kg
ST/CN: 6-8
DX/ACC: 10-12
SP/BP: 60-80
ARMOR CLASS: 1
H&M: 2
ATTACKS: 2 claws (pincers), bite, sting
SPECIAL ATTRIBUTES: Sting injects type C poison
DESCRIPTION: These large poisonous scorpions will feed on anything they can find. They prefer to hide in the shadows of cliffs and under boulders during the day and hunt at night. Scorpions are very solitary and two of them will attack each other on sight.

NAME: Scragger
TYPE: Mutated human
LOCATIONS: All areas
SIZE: 2-2½ meters tall, wt. 120-250kg
ST/CN: 15-25
DX/ACC: 8-12
SP/BP: 325-725
ARMOR CLASS: A
H&M: 1
ATTACKS: Attacks as a human
SPECIAL ATTRIBUTES: Attracted to people, will use blunt weapons.
DESCRIPTION: A "throwback" human to the level of the prehistoric era. These people are much like a modern neanderthal except that their bodies are covered with hair. Scraggers dislike normal humans and will attack any lone individuals or small groups they outnumber.

NAME: Skunk
TYPE: Giant skunk
LOCATIONS: All areas except area 13
SIZE: 1-1½ meters long. wt. 75-110kg
ST/CN: 10-15
DX/ACC: 10-12
SP/BP: 200-300
ARMOR CLASS: B
H&M: 10
ATTACKS: Bite, 2 claws, spray
SPECIAL ATTRIBUTES: Sprays a gas equal to CN-DM in effects, effects last 6-10 hours.
DESCRIPTION: The "magnum" version of the modern skunk. This animal has complete faith in it's chemical weapon and because of this fears few other animals in its territory.

NAME: Slasher
TYPE: Crossbreed pig gone wild
LOCATIONS: 2, 3, 4, 5, 8, 10, 11, 12, 15
SIZE: 1¼ meters tall, wt. 300-500 kg.
ST/CN: 12-24
DX/ACC: 10-20
SP/BP: 250-700
ARMOR CLASS: B
H&M: 2
ATTACKS: Bite
SPECIAL ATTRIBUTES: Eats almost anything.
DESCRIPTION: A large fearless wild boar, these pigs when forced to fight will try to slash their attackers with their tusks. The animal prefers to feed quietly on roots and nuts and will often run away if approached. If attacked they will fight viciously. Normally solitary, a sow pig with piglets (25% chance) will often attack anything she sees as a threat to her brood.



NAME: Smother
TYPE: Mutated constrictor snake (tree boa)
LOCATIONS: 2, 4, 5, 8
SIZE: 1½-2 meters long, wt. 10-20 kg.
ST/CN: 10-20
DX/ACC: 10
SP/BP: 100-150
ARMOR CLASS: C
H&M: 8
ATTACKS: Will attack head (smother or crush)
SPECIAL ATTRIBUTES: Able to glide short distances from treetops.
DESCRIPTION: This is an arboreal (tree-dwelling) snake that has membranes attached to its extended ribs. When the snake spreads these "wings", much like a cobra spreading its hood, they will allow it to glide down and attack its prey. The prey is killed by the snake wrapping itself around the victims head and smothering it. Smothers do not normally attack anything too large for them to eat but will attack any animal that disturbs the tree that they are in.

NAME: Snapper
TYPE: Mutated alligator snapping turtle.
LOCATIONS: 2, 5, 8
SIZE: 3-5 meters long, wt. 400-1200 kg.
ST/CN: 40-80
DX/ACC: 12-18
SP/BP: 1700-6500
ARMOR CLASS: 2
H&M: 1
ATTACKS: Bite, 2 claws
SPECIAL ATTRIBUTES: Articulated shell adds to dexterity, always found near water.
DESCRIPTION: Mutated from an alligator snapper, this turtle has an articulated (jointed) shell which allows it to move more easily than its hard-shelled ancestor. Snappers are solitary and very territorial. They prefer to attack suddenly from ambush when their prey approaches closely enough.

NAME: Stubs
TYPE: Mutated human
LOCATIONS: All areas
SIZE: .75-1¼ meters tall, wt. 50-75 kg.
ST/CN: 1-10
DX/ACC: 2-12
SP/BP: 100-250
ARMOR CLASS: A
H&M: 12-14
ATTACKS: Attacks as a human
SPECIAL ATTRIBUTES: Will use all available weapons.
DESCRIPTION: An agricultural group of people. Stubs are marked by their all being dwarfs due to radiation induced genetic change. Generally a friendly people, they tend to be distrustful of the "Bigs", the name they use when referring to the normal human population.

NAME: Sturgeon
TYPE: Mutated fish
LOCATIONS: All large bodies of fresh water
SIZE: 7-9 meters long, wt. 800-1500 kg.
ST/CN: 20-30
DX/ACC: 4
SP/BP: 600-1100
ARMOR CLASS: 1
H&M: 12
ATTACKS: None, may strike with tail.
SPECIAL ATTRIBUTES: Bony plates on body instead of scales.
DESCRIPTION: This is a very large peaceful fish that inhabits clean lakes and rivers. Sturgeons are bottom feeders and eat clams and other shellfish. While they are excellent eating they are difficult to catch due to their hard, bony skin making spearing difficult and their size and strength allowing them to break most nets.

NAME: Timber rattler
TYPE: Mutated rattlesnake
LOCATIONS: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
SIZE: 10-15 meters long, wt. 150-250 kg
ST/CN: 16-18
DX/ACC: 18-20
SP/BP: 350-700
ARMOR CLASS: 1
H&M: 4
ATTACKS: Bite
SPECIAL ATTRIBUTES: Bite injects type C poison
DESCRIPTION: This giant rattlesnake is larger than a modern anaconda. Their venom is not exceptionally toxic but because they inject so much of it when they strike it acts as a type C poison. The rattler is not afraid of anything and will eat whatever comes its way when it is hungry. Being cold-blooded the snake prefers to spend its time sunning itself on large rocks.

NAME: Wolverine
TYPE: Giant wolverine
LOCATIONS: 1, 3, 6, 7, 9, 11, 15
SIZE: 1 meter tall, wt. 100-150 kg
ST/CN: 10-20
DX/ACC: 18-24
SP/BP: 250-550
ARMOR CLASS: B
H&M: 0
ATTACKS: Bite and 4 claws
SPECIAL ATTRIBUTES: Very violent attack, can use all 4 claws and teeth during one attack.
DESCRIPTION: This is a giant wolverine and as such is the most feared animal in the world. It will attack anything, including vehicles, that comes into its territory and that the animal sees as a threat. They are solitary animals and rarely is more than one encountered at one time. The wolverine does not fear anything and will only stop fighting when it or its target is dead. This is one of the few animals known to kill just for the fun of it.

NAME: Wolves
TYPE: Mutated (Throwback) wolf
LOCATIONS: 1, 3, 6, 7, 9, 11, 15
SIZE: 2-4 meters long, wt. 150-300 kg
ST/CN: 14-20
DX/ACC: 16
SP/BP: 300-500
ARMOR CLASS: B
H&M: 8
ATTACKS: Bite
SPECIAL ATTRIBUTES: Semi-intelligent (smarter than a modern dog).
DESCRIPTION: These are genetic throwbacks to the prehistoric Dire wolf. These wolves act in packs of 4 to 8 individuals and a pack can bring down a full grown Buff if they are hungry enough to risk it. Being very fast learners these wolves recognize Man as an enemy and will attack individuals whenever they can.

RUNNING THE GAME

The following section refers to the preparation for and running of the Morrow Project by a Game Master. This book is written to be a guide for a GM and all the rules and tables given can be modified to fit an individual's requirements. Extensive modification however, will destroy the "realism" inherent in the systems.

MAPPING AND LAYING OUT A WORLD

Before a GM begins to run a game he must prepare an "area of operation" for his players to move about in . In the first section of this book is given the information needed to find the bomb impact sites resulting from WWIII. It is not necessary to complete the entire war, that is map all the impact sites, before starting your first game. Covering a few bordering states in normally sufficient to begin with, adding more states as the game progresses.

It is advisable to have at least 2 maps on hand. One map, the GM's copy, should have the bomb impact sites, villages, bases, supply dumps, wilderness areas and any other items of specific interest marked on it. The second map should be given to the playe and is not marked except for their location and the location of their base's supply caches. It is often easier to start the run of the game by indicating some prominent feature on either the player's map or instrument to guide them in a direction at the start of the game.

STARTING A GAME

After all the characters have been rolled up (created) and jobs assigned, the GM should give his players a briefing on what they are to do before starting the game. An example of such a briefing is as follows:

Your team consists of _____ volunteers who accepted the task of the Morrow Project. Each of you is fully trained and can operate all of the standard issue equipment in the Project given to yourself and team. It is assumed that your knowledge of the team's weapons is complete and this would prevent you from making any ignorant mistakes (i.e. throwing a grenade without pulling the pin). Any question you may have on the equipment please feel free to ask.

The team was frozen before the war. You expect to be awakened shortly following the war. To prevent any information leaks in case of capture you only know the location of your own base and of your team's supply caches.

There were no specific orders given before you were frozen. Details were to be given to you by radio after you were awakened and the situation was better know. Your standing orders are to assist the population in recovering in any way that you can and to reunite with the bulk of the Morrow forces.

Your characters are know awakening and the first thing they see is the top of their individual freeze-tubes opening . . .

This is a standard briefing and can be changed to meet the individual GM's requirements.

GAME TURNS/COMBAT TURNS

When playing the game the real time is either condensed or expanded to fit the needs of the moment. To condense the time during the course of traveling or any long period of relative inactivity for the characters, the Game Turn is used. The Game Turn represents 0 minutes of time on the game world and the players are given a few minutes to react to any possible situation that arose before moving on to the next turn.

When the situation requires fast movement or actions, a Combat Turn is used to measure the time. A Combat Turn represents 4 seconds of game-time. It is used most often during fighting but is not limited in use to only that time. The players should be given 1 or 2 minutes to decide their next move after having the situation described to them by the GM. If more time is needed for discussion or description give it, but try to keep the pace of the game fast during combat. Do not allow yourself and the game to be bogged down by nit-picking.

SIMULTANEOUS COMBAT

Combat takes place with actions on both sides simultaneously. To run a Combat Turn first decide which side has the initiative to start actions. After this is decided ask the side with the initiative what it's actions are. After this is stated ask the other side what it's actions are. After all players have stated their character's actions the results are decided. Remember that as the GM you are the final authority in deciding the outcome of any situation.

SURVIVAL REWARDS AND EXPERIENCE

As your player's characters become more experienced in surviving and dealing with the world of the Morrow Project certain of their attributes would improve over time with use. These improvements are as follows:

Strength - +1 point for each 60 days game time up to a maximum improvement of 4 points.

Dexterity- +1 point for each 60 days game time up to a maximum improvement of 4 points.

Accuracy- +1 point for each 30 days game time up to a maximum improvement of 5 points.

Constitution- +1 point for each 90 days game time up to a maximum improvement of 3 points.

Charisma- +1 point for each 120 days game time up to a maximum improvement of 2 points.

Note; none of the additions can take any attribute above 20.

When additions are made to Strength, Dexterity, or Constitution the scores for Movements and the Sp/Bp points would also improve.

METRIC UNITS

Length

1 kilometer (km)	= 1,000 meters
1 meter (m)	= 100 centimeters
1 centimeter (cm)	= 10 millimeters (mm)

Volume

1 Kiloliter = 1 cubic meter = 1,000 liters
1 liter (l) = 1,000 cubic centimeters = 1,000 milliliters
1 milliliter (ml) = 1 cubic centimeter (cc)

Weight

1 kilogram (kg)	= 1,000 grams
1 gram (gm)	= 1,000 milligrams

EQUIVALENTS

Length

1 inch = 2.54 centimeters = 25.4 millimeters
1 foot = 30.48 centimeters
1 yard = 0.9114 meters
1 mile = 1.61 kilometers
1 centimeter = 0.3937 inch
1 meter = 3.28 feet = 1.093 yards
1 kilometer = 0.6214 mile

Volume

1 quart = 0.946 liter
1 gallon = 3.785 liters
1 cubic foot = 28.32 liters
1 liter = 1.057 quarts
1 cubic meter = 35.31 cubic feet = 1.38 cubic yards

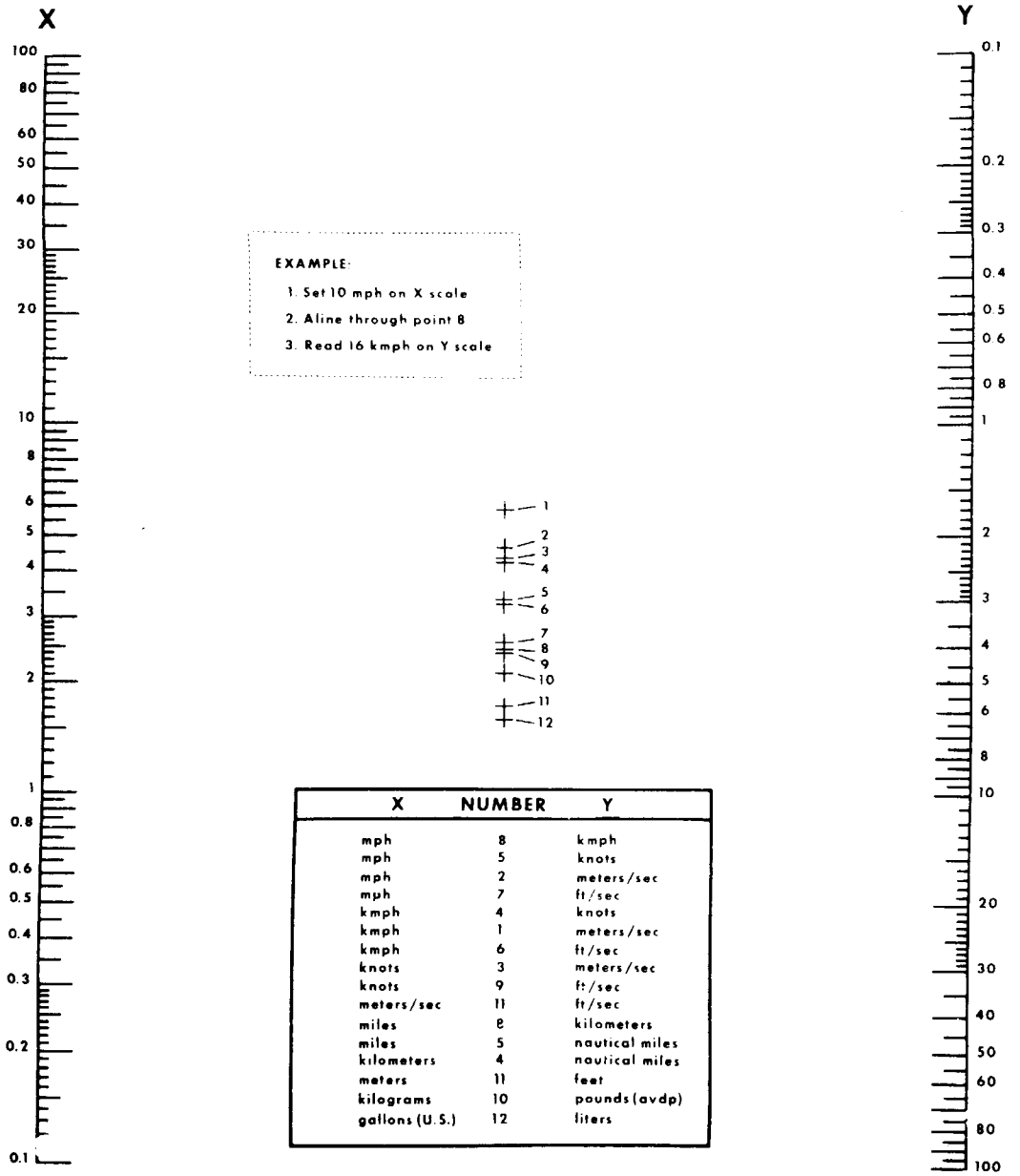
Weight

1 ounce = 28.35 grams
1 pound = 453.6 grams
1 gram = 0.03553 ounce (avoirdupois)
1 kilogram = 2.206 pounds (avoirdupois)

GLOSSARY OF ABBREVIATIONS

AC	Armor class, a measurement of the relative protection of armor.
APC	Armored personnel carrier, a vehicle for carrying personnel safely.
Acc	Accuracy
Bp	Blood point, a unit for measuring the relative amount of blood available.
Cal	Caliber, the size of a weapon's projectile.
Ch	Charisma, a measurement of personality and attractiveness.
Cn	Constitution, the measurement of a characters hardiness and health.
Dp	Damage point, a unit of inflicted damage, a negative Sp.
Dx	Dexterity, The measurement of a character's coordination and speed.
E	Efficiency, the measurement of the power of a projectile.
Eff.	Effective, the best at which to use somehting.
Esper	Someone with psionic ability.
GM	Game master, the coordinator and designer of a particular game.
H&M	Hostility and motivation, a character's manner of thinking
HAAM	Hydraulically assisted armored man, an armored man-amplifier.
Kg	Kilogram, a measurement of weight equal to 2.2 lbs.
Km	Kilometer, a measurement of distance equal to 0.6 miles.
MARS	Mobile assault, rescue, and strike, the military arm of the Morrow Project.
m	Meter, a measurement of distance equal to 3.3 feet.
MAX	Maximum, the upper limit.
MIN	The lower limit, in the case of a weapon the closest it can be used.
Mk	Mark, used to indicate the particular model of something.
n/a	Not applicable
NPC	Non player character, a character run by the GM.
PC	Player character, a character run by the player.
PSI	Psionics, powers of the mind.
Rads	A unit of measurement for radiation.
Recon	Reconnaissance, a division of the Morrow Project.
RNG	Range
Sp	Structure point. The relative size of something.
St	Strength
Temp	Temperature
WP	White phosphorus
Wt	Weight

CONVERSION SCALE



X	NUMBER	Y
mph	8	kmph
mph	5	knots
mph	2	meters/sec
mph	7	ft/sec
kmph	4	knots
kmph	1	meters/sec
kmph	6	ft/sec
knots	3	meters/sec
knots	9	ft/sec
meters/sec	11	ft/sec
miles	8	kilometers
miles	5	nautical miles
kilometers	4	nautical miles
meters	11	feet
kilograms	10	pounds (avdp)
gallons (U.S.)	12	liters

APPENDIX I
CHARACTER SHEET

CHARACTER NAME _____

ASSIGNMENT _____

JOB/POSITION _____

ATTRIBUTES

AGE _____ SEX _____ HEIGHT _____ WEIGHT _____ HAIR _____ EYES _____

St. _____	Move _____	Charisma _____	Sp/Bp _____
Const. _____	Endu. _____	PSI _____	Blood type _____
Dext. _____	Acc. _____	Luck _____	

ADDITIONAL _____

EQUIPMENT ISSUED _____

Grenade throwing range A= _____ B= _____ C= _____ D= _____

Hand-to-hand damage ½ St. = _____ ¼ St. = _____

Sp BREAKDOWN

TORSO _____

LEG (LEFT)						LEG (RIGHT)					
Thigh						Thigh					
Calf						Calf					
Foot						Foot					
Hip Joint						Hip Joint					
Knee						Knee					
Ankle						Ankle					
ARM (LEFT)						ARM (RIGHT)					
Upper Arm						Upper Arm					
Lower Arm						Lower Arm					
Shoulder Joint						Shoulder Joint					
Hand						Hand					
Elbow						Elbow					
Wrist						Wrist					

HEAD _____

Bp _____

Endurance _____

RADIATION CLASS _____

ABSORBED RADIATION _____

OTHER FACTORS OR INFORMATION _____

THE MORROW PROJECT BIBLIOGRAPHY

BOOKS USED:

Jane's Infantry Weapons 1978, by Denis H.R. Archer
Jane's Weapon Systems 1977, by Ronald T. Pretty
Brassey's Infantry Weapons of the World, by J.I.H. Owen
Modern Small Arms, by Frederick Myatt
Small Arms of the World (11th Ed.), by Edward Clinton Ezell
Pictoral History of the Sub-Machine Gun, by F.W.A. Hobart
Infantry Weapons of the World, by Christopher F. Foss and T.J. Gander
The Soviet War Machine, by Ray Bonds
Tanks, by Eric Morris
Rockets and Missiles, by Bill Gunston
World War 3, by Shelford Bidwell
Encyclopedia of Tanks, by Duncan Crow and Robert J. Hicks
Modern Armor, by Pierangelo Caiti
Helicopters at War, by Bill Gunston
Chemical and Biological Warfare, by Seymore M. Hersh
War in 2080, by David Langford
Automatic Weapons of the World, by Melvin M. Johnson Jr. and Charles T. Haven
Jane's World Armored Fighting Vehicles, by Christopher F. Foss
Pistols and Revolvers, by Walter H.B. Smith
Ammunition, by Melvin M. Johnson Jr. and Charles T. Haven
German Machineguns, by Daniel D. Musgrave and Smith Hempston Oliver
Silencers, Patterns and Principals, by Leonard Skochko and Harry A. Greveris
Crowd and Riot Control, Rex Applegate
The Prospect of Immortality, by Robert C.W. Ettinger
Tomorrows Weapons, by J.H. Rothschild
The Constructive Uses of Nuclear Explosives, Edward Teller, Wilson K. Talley, Gary H. Higgens, and Gerald W. Johnson
An Atlas of Human Anatomy, by Barry J. Anson
Essentials of Medicine, by Charles Phillips Emerson and Jane Elizabeth Taylor
Control of Communicable Diseases in Man, by Abram S. Benenson
Home in Your Pack, by Bradford Angier
The Complete Backpacker, by Jerry Herz
A Glossary of the Construction, Decoration and Use of Arms and Armor, by George Cameron Stone
A manual of First-Aid Instruction, by the Bureau of Mines
Knive Throwing, A Practical Guide, by Harry K. McEvoy
The Book of Survival, by Anthony Greenbank
Nuclear Theft: Risks and Safeguards, by Mason Willrich and Theodore B. Taylor
The New Hunter's Encyclopedia
The World's Fighting Shotguns, by Thomas F. Swearengen
The World's Submachineguns, by Thomas B. Nelson
The World's Machine Pistols and Submachineguns, by Thomas B. Nelson and Daniel D. Musgrave
Modern Firearms, by Yves Cadiou and Alphonse Richard
The Fallen Sky; Medical Consequences of Thermonuclear War, by Saul Aronow, Frank R. Ervin M.D., and Victor W. Sidel M.D.
Live; A Handbook of Survival in Nuclear Attack, by Roger S. Connel
1962 Official Fallout Shelter Plans,
Starship Troopers, by Robert Heinlein
The Texas-Israeli War, by Jake Saunders and Howard Waldrop
Heiro's Journey , by Sterling E. Lanier
Damnation Alley, by Roger Zelazny
The Wild Geese, by Daniel Carney
Lucifer's Hammer, by Larry Niven and Jerry Pournelle
Vault of the Ages, by Paul Anderson
Blackmark, by Gil Kane

MILITARY MANUALS

FM 1-15 Aviation Reference Data
FM 3-2, Tactical Employment of Riot Control Agent CS
FM 3-8, Chemical Reference Handbook
FM 3-10, Employment of Chemical and Biological Agents
FM 3-12, Operational Aspects of Radiological Defense
FM 3-13, Nuclear Accident Contamination Control
FM 3-22, Fallout Prediction
FM 5-15, Field Fortifications
FM 5-25, Explosives and Demolitions
FM 5-26, Employment of Atomic Demolition Munitions (ADM)
FM 5-34, Engineer Field Data
FM 5-35, Engineers Reference and Logistical Data
FM 7-7, The Mechanized Infantry Platoon and Squad
FM 9-13, Ammunition Handbook
FM 17-12, Tank Gunnery
FM 17-47, Air Cavalry Combat Brigade
FM 20-32, Mine/Countermine Operations at the Company Level
FM 20-33, Combat Flame Operations
FM 20-60, Battlefield Illumination
FM 21-15, Care and Use of Individual Clothing and Equipment
FM 21-18, Foot Marches
FM 21-40, Chemical, Biological, Radiological, and Nuclear Defense
FM 21-41, Individual Defense NBC
FM 21-50 , Ranger Training and Ranger Operations
FM 21-150, Combatives
FM 23-3, Tactics, Techniques and Concepts of Antiarmor Warfare
FM 23-7, Redeye Guided Missile System
FM 23-9, Rifle, 5.56-MM, M16A1
FM 23-23, Antipersonnel Mine M18A1, (Claymore)
FM 23-30, Grenades and Pyrotechnic Signals
FM 23-31, 40-MM Grenade Launcher M79 (April 1965)
FM 23-31, 40-MM Grenade Launchers, M203 and M79
FM 23-31, 66MM HEAT Rocket M72A1 and M72A2 (LAW)
FM 23-90, 81MM Mortar, M29
FM 24-24, Radio and Radar Reference Data
FM 30-40, Handbook on Soviet Ground Forces
FM 30-102, Opposing Forces Europe
FM 31-50, Combat in Fortified and Build-Up Areas
FM 31-70, Basic Cold Weather Manual
FM 100-5, Operations
FM 101-31-3 Staff Officers Field Manual Nuclear Weapons Employment Effects Data

TM'S

TM 3-1040-257-14, Flamethrower, Portable, M9A1-7
TM 3-215, Military Chemistry and Chemical Agents
TM 3-216, Technical Aspects of Biological Defense
TM 5-220, Passage of Obstacles Other Than Minefields
TM 5-311, Military Protective Construction
TM 8-230, Medical and Surgical Technicians (August 1950)
TM 8-230, Medical Corpsman and Medical Specialist
TM 9-1005-249-34, Rifle, 5.56-MM, M16A1
TM 9-1010-221-10, 40-MM Grenade Launcher M203
TM 9-1010-221-14, Launcher, Grenade, 40-MM, M203
TM 9-1015-200-12, Mortar, 81-MM: M29A1 and Mortar, 81-MM, M29
TM 9-1300-203, Artillery Ammunition
TM 9-1300-214, Military Explosives
TM 9-1300-200, Ammunition, General
TM 9-1305-200, Small-Arms Ammunition
TM 9-1330-200, Grenades, Hand and Rifle
TM 9-1345-200, Landmines
TM 9-1375-213-12, Demolition Materials

THE MORROW PROJECT

The year is 1989. As the civilized countries of the world exchange gifts of nuclear missiles, the small volunteer population of the Morrow Project sleep far away from the blossoming nuclear fireballs in a deep dreamless winter. These few people, long prepared for the holocaust which rages around them, await the time when their ever-watchful machines will awaken them. They expect the time of their cold sleep to be a mere three or four years but everything had gone well right up to the war and it was now that the infamous gremlin Murphy shifted the gears. The "cryonauts" sleep on for one hundred and fifty years before their delinquent machines finally restore them. One hundred and fifty years of eroding culture and technology; one hundred and fifty years of fall-out boosted mutations; one hundred and fifty years of dog-eat-dog survival.

In the Morrow Project you will take the role of one of these "cryonauts", and by doing so place yourself in a situation of forced survival. You know nothing of the changeling world around you and find dangers around every turn. You will find yourself face-to-face with the conditions created after a nuclear war. Genetic mutations in almost every form of affected wildlife constantly surprise and endanger you; radioactive "hot spots" are an always present peril; and you find that the most dangerous animal left on Earth continues to be Mankind itself. Survival is the only rule left to a chaotic society.

Somehow the separated Morrow Teams must contact one another, find their main base, and again bring civilization to the human race. They are Man's last hope for a future beyond survival, but mankind and the blasted forces of nature seem to unite in the task of destroying that last hope. Can the Morrow Teams survive in the world of 2139?

CAN YOU SURVIVE???