

FOODSTUFFS

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FOODSTUFFS

Note: While most of these rations are based on US ration types, similar rations are available in the armies of most countries, making allowances for industrial level and capabilities.

A-Rations: This is a mixed ration of semi-perishable and perishable food, based on the UGR-H&S. In addition to the standard non-perishable UGR food containers, the A-Ration contains luxury items like concentrated juice instead of instant, pastries, cooking oil, pudding, cake, cookies, steak sauce, and generally better-tasting food items. Items such as UHT milk, irradiated bread slices, breakfast cereal, hot sauce, catsup, jelly, spices, napkins, paper towels, Styrofoam cups, fiberboard trays, and plastic utensils are also included. Some of the items in the A-Ration require refrigeration to keep properly. If properly kept, the A-Rations have a minimum shelf life of 5 months, and may keep much longer. One module feeds 75 persons, a tier feeds 150 persons, and a pallet feeds 600 persons. Required intake is 2.2 kg per day. Weight: (single module) 165 kg, (single tier) 325 kg, (pallet) 1310 kg; Price: (single module) \$985, (single tier) \$1575, (pallet) \$6290 (R/R)

B-Rations: These are primarily used by US Marines and special operations personnel in base camps. They are midway between the A-Rations and the UGR-H&S, having no perishable components, but providing more palatable food than the UGR-H&S. 10 breakfast and 10 lunch/dinner menus are provided, with items such as juice, scrambled eggs, potatoes, canned fruit, and dinner dishes ranging from beef and gravy to baked chicken, with vegetables. Accessory items margarine, peanut butter, jelly, coffee, cocoa, Kool-Aid, tea, fiberboard trays, cups, utensils, and trash bags. The food is very nutritious and filling. The ration is delivered in 200-meal pallets, and is strong enough to be parachuted or sling-loaded. Required intake is 1.3 kg per day. Minimum shelf life under poor conditions is 2 years. Weight: (pallet) 285 kg; Price: (pallet) \$1250 (R/R)

Beer (per liter): \$10 (S/S)

Candy (per kilogram): \$25 (S/S)

Chewing Gum (per kilogram): \$50 (S/S)

Chocolate (per kilogram): \$100 (S/S)

C-Rations: These are the predecessor of the MREs, first used by the US and Britain in World War 2. They were still being used by the US Marines as late as the early 1990s, and local variations were quite common during the Twilight War in China, Russia, and Third World nations. The ration consists of one can of meat or vegetarian dish, one can of fruit or vegetables, a can with a bread or cake item, a can with crackers, a can with peanut butter, cheese spread, or jelly, a pouch with a candy disc (usually chocolate, sometimes with a filling), and an accessory package with a spoon, salt, pepper, instant coffee, sugar, creamer, chewing gum, matches, a P-38 can opener, and toilet paper (enough for one act if you're careful). Some countries also supply them with cigarettes, usually 4-6 per C-Ration. Required daily intake is 2 kg. Weight (per ration) 1.1 kg, (per case of 12) 14 kg; Price: (per ration) \$9, (per case) \$85 (S/S)

Dehydrated Milk (per kilogram): Highly sought after in the Twilight 2000 world, almost as much as the UHT Milk, and it may also be consumed safely by the lactose-intolerant. \$15 (C/S)

Domestic/Common Food (per kilogram): Pre-prepared food such as field rations or locally made meals. Required intake is 2kg per day. \$4 (V/V)

Energy Bars/Energy Gel (per kilogram): High-calorie, high-carbohydrate food supplements. If packing energy supplements, reduce required food rations by one-third. This assumes that the energy supplements are accounting for a maximum of 1/3 of the caloric intake. If living off energy supplements alone figure 0.8kg required intake per day; however, increase daily water intake. Living off energy supplements for more than 3 days would be extreme. \$20 (R/R)

FPSAS (Food Packet, Survival, Abandon Ship): This is a minimal survival ration designed for storage on life rafts and life jackets and to be grabbed in a hurry when abandoning sinking ships. It consists of 6 calorically-dense cereal bars. It will minimize the effects of acute starvation, but does not provide full nutrition. It is hard on the digestive process and it is not recommended for consumption more than five days in a row except in extreme circumstances. Required daily intake is 0.13 kg. Minimum shelf life is 5 years. Weight: (per ration) 0.15 kg, (per case of 40) 21.77 kg; Price: (per ration) \$7, (per case) \$290 (S/S)

FPSGP-I (Food Packet, Survival, General Purpose, Improved): This ration is designed for shot-down aircrews. It is a lightweight, high nutrition rations consisting of compressed food bars (2 cereal, 3 cookie, and one sucrose), lemon tea mix, dehydrated soup, and dehydrated gravy. It is nutritious, but not very filling, can lead to constipation, and contains a minimum of protein to reduce the amount of water intake required. Daily required intake is 0.3 kg. Minimum shelf life is 5 years. Weight: (per

ration) 0.32 kg, (per case of 24) 8.26 kg; Price: (per ration) \$13, (per case) \$250 (S/S)

HDR (Humanitarian Daily Ration): These rations are often given out to displaced populations living in refugee camps and devastated areas by government or relief organizations. They are designed to provide an inexpensive, but nourishing meal to people with moderate malnutrition. To appeal to the maximum number of people, the meals are vegetarian, with two entrees in each pouch, consisting of things such as bean salad and brown rice with lentils to lentil stew and red beans and rice. Foods are chosen for nutritional content and filling capability, as per haps as little as one meal may be provided per day. Other items such as crackers and peanut butter or jelly, flat bread, raisins, fruit bars, biscuits, and shortbread are also in the pouch. An accessory packet with red and black pepper, salt, sugar, matches, a moist towelette (alcohol-free), a napkin, and a spoon are included. Required daily intake is 1 kg. Minimum shelf life is 3 years. Weight: (per ration) 1.1 kg, (per case of 10) 12 kg; Price: (per ration) \$5, (per case) \$40 (S/S)

Hospital Ration Supplement (per kilogram): This is a package of easily digestible foods usually fed to hospital patients in field hospitals, especially those with abdominal wounds. The ration could be a supplement to normal foods or given as the whole meal, depending on the condition of the patient. Normal troops also liked to acquire these packs as a nice change of pace from standard rations. The pack consisted of cans of preserved fruit, concentrated orange juice, evaporated milk, instant coffee, condensed soup, canned meat, and tomato juice, as well as teabags, and packets of cocoa, breakfast cereal, and items such as plastic knives, spoons, and forks, straws, a roll of toilet paper, and a roll of paper towels. This package generally came in 5 kg and 10 kg sizes. Required intake is 2 kg per day. \$7 (S/R)

Insulated Food Container: This is not something to eat, but rather a way of keeping cooked and perishable food fresh and at proper serving temperature for at least two hours. It is basically a giant Thermos, about 64x43x24 centimeters in size, with a lid that is sealed tight with a gasket and three pans inside to hold the food. It will keep food at acceptable levels in temperatures ranging from -25 to 120 degrees Fahrenheit. Weight: 3 kg; Price: \$130 (V/C)

K-Rations: These are lightweight rations, sort of halfway between the freeze-dried LRRP Rations and the pre-packaged MREs. They were generally issued by countries unable to manufacture the LRRP Rations at light rations for long patrols and special operations units. Later in the war, they were issued by larger countries as a cheaper alternative to LRRP rations and a more-durable alternative to MREs. They were also produced by independent, local manufacturers in a variety of forms as emergency and survival rations for civilians. Typical contents were one can of chopped ham or turkey and egg mixture, a small pound cake, a freeze-dried biscuit, a fruit bar, a packet of coffee or cocoa, tablets of dextrose or malted milk balls, a packet of chewing gum or candy, one can of meat, potted meat, deviled ham, or chicken or turkey salad, and a daily dose of vitamins, along with a plastic spoon, a packet of salt, and toilet paper (enough for one act if you use it carefully). Required intake is 1.25 kg per day. Weight: (per ration): 0.42 kg, (per case of 12) 5.5 kg; Price: (per ration) \$6, (per case) \$60 (S/S)

Liquor (per liter): excluding moonshine (ethanol), \$6 (C/C)

LRP (Long-Range Patrol) Rations: These are freeze-dried, dehydrated, just-add-water rations, along with items such as ranger cookies, cookie bars, candy, powdered beverages such as Kool-Aid, cocoa, coffee, and apple cider. There is an accessory packet with a spoon, sugar, creamer, toilet paper (enough for 2 acts), matches, salt, and chewing gum. Required intake is 0.4 kg per day. Use of this ration for longer than 5 days at a time is not recommended, as it can cause digestive problems such as constipation and cramps. 8 menus are available. Weight: (one ration) 0.45 kg, (per case of 16) 9.07 kg; Price: (per ration) \$16, (per case) \$205 (S/S)

MCW/LRP (Meal, Cold Weather/Long Range Patrol): These combination rations were starting to be issued just before the Twilight War. They are designed for use by both troops operating in extreme cold and by Long-Range Patrol units. They come in bags similar to the RCW and MRE, with one bag per day being used for troops in normal climates and three bags per day for troops in extreme cold. 12 menus are available, ranging from oriental chicken with rice to a western omelet, with fruit or sports bars, crackers and peanut butter, cheese or jelly, candy bars, and items such as nut raisin mixes, ramen, cookies, granola bars, or nuts. An accessory packet with items such as Kool-Aid, lemon tea, cocoa, coffee, creamer, sugar, chewing gum, matches, hot sauce, moist towelette, toilet paper, salt, and a spoon if in the packet. Daily required intake is 0.55 kg in normal climate or 1.65 kg in extreme cold. Weight (per bag) 0.55 kg, (per case of 12 bags) 8.16 kg; Price: (per bag) \$12, (per case) \$115 (R/R)

MRE (Meal Ready-to-Eat): This is the standard ration of many armies, with countless variations all over the globe. They are packed in a weatherproof plastic pouch or box, with individual foil or plastic pouches within for the ingredients of the meal. In the US, 24 menu variations are available, with moist main entrees ranging from grilled beefsteak and chicken with noodles to a bean and rice burrito and meat loaf with gravy. Along with this is a side dish ranging from western beans and pound cake to Mexican rice and mashed potatoes. Other ingredients include beef jerky, hard candy, applesauce, cheese and crackers, and soft pretzels, and usually there are items such as crackers with cheese, jelly, or peanut butter. Rounding out the MRE are beverage powders such as Kool-Aid, cocoa, and coffee, a small bottle of hot sauce, or dehydrated fruits. An accessory packet is in the MRE containing a

spoon, sugar, nondairy creamer, salt, chewing gum, matches, toilet paper (about enough for one act if you're careful), a moist towelette, a flameless heating device, and sometimes candy or apple cider. The minimum shelf life is about 3 years, but I have kept some MREs for 10 years that were still edible. Required daily intake is 1.7 kg. Weight: (per ration) 0.86 kg, (per case of 12) 10.3 kg, (per pallet of 576) 494 kg; Price: (per ration) \$8, (per case) \$77, (per pallet) \$3685 (C/C)

MREV (Meal, Ready-to-Eat, Vegetarian): This is similar to the MRE, but contains no food items derived from animals or animal by-products. 4 menus are available, and contain food items such as minestrone, beans and rice, and other bean dishes, along with crackers, peanut butter or jelly, potatoes, chocolate covered cookies, brownies and oatmeal cookie bars, cocoa or Kool-Aid, and a standard MRE accessory packet. All foods have been vitamin and mineral fortified to meet military nutritional requirements. Required intake is 1.7 kg per day. The minimum shelf life is 3 years. Weight: (per meal) 0.86 kg, (per case of 12) 10.3 kg, (per pallet of 576) 494 kg; Price: (per meal) \$10, (per case) \$95, (per pallet) \$3810 (S/S)

MRK (Meal, Religious, Kosher): This variant of the MRE is designed to meet the needs of Jewish and Islamic soldiers. It is based on meals acceptable to those groups, most notably without those items based on pork and ham (amongst other things). A similar meal exists, largely in South Asia, for Hindu troops, who cannot eat beef. The meal comes in two bags, one with the entrée/meal items, and one with accessory items such as are normal in MREs and snack items such as tea, coffee, hot or cold cereal, items such as bagel chips or granola bars, and sealed containers of fruits or nuts such as raisins, prunes, peanuts, or almonds. It has a somewhat shorter shelf life, starting at 10 months. 10 menus are available. Required intake is 1.7 kg per day. Weight: (per ration) 0.86 kg, (per case of 12) 10.3 kg; Price: (per ration) \$10, (per case) \$95 (S/S)

Pouch Bread/Pastries: Pouch bread was first introduced to coalition forces during the 1990-91 build up to Desert Storm. It rapidly became a hit, and is much sought-after to improve the soldier's lot in life. It is basically a small loaf of bread sealed in a foil or plastic pouch, treated with preservatives, stabilizers, water-control agents, and oxygen-scavenging sachets to keep the bread fresh at least three years at normal storage conditions. Shortly before the Twilight War, this technology was extended to some other items, such as brownies, cookies, pop-tarts, pound cake, and other such items, and these were likewise well received, with morale being improved in units where these items were available. The pouch bread and pastries were not intended to be ration-replacing items, and so are not as nutritious as rations, but one may replace one-quarter of the weight of pouch bread or one-fifth of the weight of pouch pastries with an equivalent amount of rations (thus, 1 kg of pouch bread may replace 0.25 kg of rations for nutritional purposes). Weight: (per pouch of bread) 0.25 kg, (per case of 24 pouches of bread) 7 kg, (per pouch of pastry or cookies) 0.15 kg, (per case of 40 pouches of pastry or cookies) 7 kg; Price: (per pouch of bread) \$1, (per case of bread) \$20; (C/S); (per pouch of pastry or cookies) \$2, (per case of pastry or cookies) \$60 (S/-)

RCW (Ration, Cold Weather): These are rations designed for extreme cold weather to resist cold and to meet the extra caloric requirements of individuals operating in extreme weather. The food is either low-moisture or freeze-dried, and the rations consist of two bags (Bag A and Bag B). Bag A consists of high-fat foods, largely oatmeal, cocoa, apple cider, chicken noodle soup, fruit bars, crackers, and an accessory packet for the meal with a spoon, coffee, nondairy creamer, sugar, chewing gum, toilet paper, and matches, and hexamine heat tabs. Bag B has the main entry; 6 menus are available, from chicken stew to spaghetti and meat sauce, along with granola bars, cookies or brownies, instant orange drink, a toffee roll, chocolate covered cookie, and lemon tea. All ingredients are fortified with extra vitamins, electrolytes, and carbohydrates, as well as fat, while limiting sodium and protein to reduce the risk of dehydration. Shelf life is a minimum of 3 years. Required daily intake is 1.2 kg. A case consists of 6 rations (one for each menu available). Weight: (per ration) 1.25 kg, (case) 9.67 kg; Price: (per ration) \$10, (per case) \$62 (R/R)

Russian Field Rations (per 2-kilogram box): A standard ration pack (intended to last one day) is contained in a 175x145x135mm cardboard box. The package contains two 300-gram cans of meat (various types, none being particularly appetizing), a lump of black bread (prepared for long-term storage, meaning it must be soaked in tea or water, before it can be eaten), two grams of tea, and nine small packs of sugar. There is no seasoning, not even any salt, and none of the accessories (utensils, matches, toilet paper, etc.) found in MREs. \$8 (R/C)

Shelf-Stable Pocket Sandwich: These were first issued to US soldiers in early 1995, and production was quickly ramped up in order to provide easy meals to soldiers in the field and in active operations. They are basically hollowed-out Pouch Bread filled with a variety of fillings, from roast beef to turkey to ham to vegetarian meals like alfalfa sprouts and cheese. They proved immensely popular with troops, and due to ease of use and consumption were issued as rations to many troops who did not have time to stop and eat a meal. When NATO and Israeli troops saw what the US soldiers had, they demanded the same, and with a couple of months they were being produced by many NATO countries, as well as by Israel. Required intake is 1.5 kg per day. The pocket sandwiches keep at least three years if unopened. Weight: (per sandwich) 0.35 kg, (per case of 24) 9.5 kg; Price: (per pocket sandwich) \$5, (per case) \$96 (C/-)

TOTM (Tailored Operational Training Meal): These are pre-packed meals used primarily to feed trainees, garrison and armory personnel, and other low-priority feeding needs. In the US, hundreds of thousands were handed out by FEMA after the November Nuclear Strikes. They are low-bulk, high-nutrition meals designed to not take up much room (typically, the pockets of a

military uniform). The packaging is similar to an MRE, but in more commercial packaging, and often with civilian equivalents to MRE items. There are also things not normally found in MREs, such as preserved fruit, moist towelettes, napkins, and red pepper. One case contains 12 meals, and a pallet contains 600 meals. 18 menus are available, and a case typically 6 menus in sets of 2. Required daily intake is 1.9 kg per day. Weight: (per meal) 0.76 kg, (per case) 9.07 kg, (per pallet) 464 kg (C/S)

Transdermal Nutrient Delivery System (TNDS): This is similar technology to the nicotine patch for people quitting smoking, but instead of delivering nicotine, the TNDS delivers a concentrated dose of vitamins, minerals, and other nutrients to the wearer. These patches were generally issued only to NATO and Israeli special operations units who were on high-intensity missions for use when there was no time for an extended period for eating. There was a rumor that these patches were also treated with steroids and adrenaline, but this was never confirmed. These patches were never meant as a total replacement for rations, and could replace about one-quarter of the daily requirements of rations per day, with two being used per day. They do not alleviate the hunger pains or stomach growling caused by lack of food. Some of these patches were also used by astronauts and pilots on long missions, but they are more rare in those applications. Weight: (per pack of 10) 0.1 kg; Price: (per pack) \$500 (-/-)

T-Rations: In bivouac, the normal ration is A/C/A, or hot breakfast, MRE lunch, and hot dinner. This requires the mess section to cook twice daily, and keeping food fresh and restocked presents logistical problems. The T-Ration is a pre-prepared meal kit consisting of sealed metal trays of entrees and side dishes such as meat, scrambled eggs, lasagna, etc., and items like canned fruit and vegetables, designed to feed multiple (18) soldiers per tray. They are heated by boiling the trays in water for a specific time. This system lessens mess personnel staffing requirements and eases preparation. There are 7 breakfast and 14 lunch/dinner menus. A module also contains various instant beverages, nondairy creamers, hot sauce, jelly, Styrofoam cups, cardboard plates, and utensils. The T-Rations are normally supplemented with irradiated, individually wrapped bread slices, UHT Milk (both provided with the modules), and locally procured salad (which became harder to get as the war wore on). Required intake is 2kg per day. The T-Rations are designed to last a minimum of 3 years under poor conditions, and if kept carefully, can last much longer. A can opener is required to open the tins. Weight: (single module) 42 kg, (pallet of 24 modules) 1010 kg; Price: (single module) \$215, (pallet) \$4125 (S/R)

UGR-H&S (Unitized Group Ration-Heat & Serve): These are evolutionary developments of the T-Rations, designed to replace them. They are easier to open, vitamin and mineral-fortified, and packed in lighter containers. There is an arctic supplement to the UGR-H&S that provides an additional 914 calories per soldier per day; this supplement costs and weighs an additional 60%. The modules are essentially similar to the T-Rations, but are somewhat more nutritious and are larger. The UGR-H&S has a minimum shelf life of 18 months under poor conditions, and normally last far longer. One module feeds 50 people, one tier feeds 100 people, and a pallet feeds 400 people. Required intake is 1.9 kg per day. Weight: (single module) 95 kg, (single tier of 2 modules) 190 kg, (pallet of 8 modules) 760 kg; Price: (single module) \$570, (single tier) \$905, (pallet) \$3630 (R/R)

UHT (Ultra-High Temperature) Milk: These are small, single-serving boxes of milk that have been specially treated to kill all microbes and keep fresh even under high temperatures without refrigeration. (Nothing like the taste of warm milk on a hot day!) The container comes with a straw. Several variations are available, including whole and 2% versions of white, chocolate, and strawberry. A single box provides 236 ml of milk. These items were highly sought after by soldiers and civilians alike, especially mothers with infants. Minimum shelf life under poor, high-temperature conditions is 10 months, and most last for several years, if unopened. Weight: (single box) 0.25 kg, (case of 27) 6.75 kg, (pallet of 3240) 825 kg; Price: (single box) \$7, (case) \$150, (pallet) \$18,000 (C/R)

Water, DE (Drinking, Emergency): These are plastic pouches of distilled water for emergency use by aircrews and life raft occupants for use after a crash, bailout, or ship sinking. They are guaranteed fresh for 5 years after manufacture, and contain 118 ml of water each, with a nipple for drinking. Weight: 0.12 kg, 3 kg per case of 24; Price: \$2, \$38 per case (C/C)

Water, DS (Drinking, Sterile): This is a larger container of emergency water, also used by medical personnel. It is packaged in a rigid plastic bottle, and contains 473 ml of water. Weight: 0.5 kg, 12 kg per case of 24; Price: \$8, \$150 per case (S/S)

Wild Food (per kilogram): Foraged food such as berries and tubers and hunted food such as deer. Required intake is 3kg per day. \$2 (C/C)

Wine (per liter): \$20 (S/S)

FUELS

Aviation Gasoline (AvGas) (per liter): Price \$60 (R/R)

Butane (per liter): \$10 (S/S)

Diesel (per liter): Price \$40 (R/R)

Ethanol (per liter): \$8 (C/C)

Gasoline (per liter): Price \$48 (R/R)

Hexamine Heat Tabs: Weight: 0.2 kg per package of 12; Price: \$10 per package (S/R)

Methanol (per liter): \$4 (V/V)

Motor Oil (per liter): \$15 (S/S)

Propane (per liter): \$20 (S/S)

Rifle Bore Cleaner (RBC) (per liter): \$10 (S/S)

Transmission Fluid (per liter): \$15 (S/S)

Drum, 200-liter: Normal steel or aluminum drum, though plastic is becoming available. Weight: 10kg; Price: \$30 (V/V)

FLEXCEL Liquid Container: This is the large rubber fuel bladder so often seen slung underneath Chinook helicopters during Gulf War footage. These bladders can be parachuted without using a pallet or any sort of padding, can survive a fall of 100 meters without a parachute, or a fall of 12 meters from an aircraft moving at 170kmh (ComMov 137). Fuel is pumped by putting a heavy weight on the bladder (normally, the vehicle receiving the fuel runs over the bladder), and the bladder can typically be emptied in 25 seconds. A FLEXCEL comes in two sizes, a large (2.6x0.36m) and a small (1x0.2m). Large FLEXCELS hold 250 liters; small ones hold 45 liters. Weight and cost include hoses and valves. Weight: (250L) 56.7kg (45L) 10.3kg; Price: (250L)\$150 (45L)\$30 (V/S)

Jerry Cans, 20-liter: These are the standard cans for fuel and water. Fuel cans are normally metal, while water cans are plastic. Weight: 1 kg; Price: \$5 (V/V)

Rubber Fuel Bladder, 50-liter: Collapsible fuel bladder. Fuel may be pumped by placing a heavy weight on the bladder (squashing it with a vehicle is the normal method). Includes hoses and valves. These bladders can be safely airdropped from a height of 100 meters without a parachute. Weight: 3kg; Price: \$200 (S/R)

Rubber Fuel Bladders, NATO: This is a generic category of fuel bladders, used by many countries since they take up far less space than the usual assortment of jerry cans and 200-liter fuel drums found at other fuel dumps. These are normally shaped like a giant rubber pillow (unlike the drum-shaped FLEXCELS), and do not have the strength of a FLEXCEL; the bladder will need a pallet for a parachute drop, and can be free-dropped only 50 meters, or from aircraft moving at a maximum of 80kmh without preparation. Many sizes are generally available. All of these bladders will collapse to 15% of their normal size when empty. Weight and cost include hoses and valves, and fuel is pumped by squashing (requiring 3 phases per liter to empty). Weight (210L) 19kg, (380L) 34kg, (945L) 42kg, (1,890L) 48kg, (1,950L) 50kg, (2,840L) 52 kg, (3,785L) 62kg, (5,670L) 68kg, (7,570L) 77kg, (9,460L) 83kg, (11,355L) 97kg, (15,140L) 102kg, (18,295L) 117kg, (28,380L) 151kg, (37,850L) 169kg, (56,775L) 197kg (75,710L) 273kg, (189,300L) 564kg; Price (210L) \$95, (380L) \$170, (950L) \$420, (1,890L) \$850, (1,950L) \$875, (2,840L) \$1275, (3,785L) \$1700, (5,670L) \$2550, (7,570L) \$3400, (9,460L) \$4250, (11,355L) \$5100, (15,140L) \$6800, (18,295L) \$8200, (28,380L) \$12375, (37,850L) \$16500, (56,775L) \$24750, (75,710L) \$33000, (189,300L) \$82500 (S/R)

Rubber Fuel Bladder, Warsaw Pact/Eastern Bloc: Similar to the NATO fuel bladders above, the size of these bladders is based on metrics instead of gallons. They are often used to convert flatbed trucks to makeshift fuel tankers. Weight (4,000L) 125kg, (6,000L) 135kg, (25,000L) 290kg, (50,000L) 580kg, (150,000L) 1050kg, (250,000L) 1450kg; Price (4,000L) \$3400, (6,000L) \$5100, (25,000L) \$21250, (50,000L) \$42500, (150,000L) \$127500, (250,000L) \$212500 (R/S)

GENERATORS

Generator, Compact: A compact generator used by mountain troops and special forces. It is only 10x10x15cm and extremely efficient. Wt 5kg, Fuel Cons 1/4L per period (G,AvG,A); Output 400watts; Cost \$300 (C/S)

Generator, Solar, M85: A backpack-style solar panel set. Its folded size (22x12.5x5cm) expands (100x22x0.4cm) and can be set up on its own frame or hung from a tree, vehicle, or man's back. It can charge one 12- or 24-volt battery per period provided there is strong sunlight. Wt 2.2kg, Output 21 watts, Price \$600 (C/S)

Generator, Hand-Cranked, M91: A small, folding generator designed primarily to give radios periods of extended range (usually triple the radio's normal range). Operating this counts as hard labor for one period, though one person can operate it for two half-hour segments once per period. It could be operated in shifts, but broadcast times are kept short to avoid eavesdropping, jamming, and detection. Wt 2kg, Output 1Kw (Maximum); Price \$200 (C/C)

8x8x10' Refrigerated Container: Similar to the 8x8x20' container listed below, this is scaled to fit smaller vehicles. They are usually scaled to fit a truck of at least 3 tons in size. The container comes with an integral 5kW generator to power it. They are approximately 8x8x10 feet (2.5x2.5x3 meters) in size, and contain 320 cubic feet (98 cubic meters) of refrigerated space. The internal temperature may be kept from 0-40 degrees Fahrenheit (-18 to 4.5 degrees Celsius). As with the larger container, these containers are used to transport and store large amounts of perishable food, medical supplies, or human bodies. It has hooks to enable it to be sling-loaded. Weight: 2.6 tons; Fuel Cons: 5 liters per period; Price: \$17,000 (S/R)

8x8x20' Refrigerated Container: These are usually scaled and based to fit a truck of at least 7 tons capacity in size. As the name says, they are approximately 8x8x20 feet (2.5x2.5x6 meters) in size, and have 800 cubic feet (244 cubic meters) of usable refrigerated volume. The container comes with an integrated 10kW generator to power it. The internal temperature may be maintained from 0-40 degrees Fahrenheit (-18 to 4.5 degrees Celsius). These containers are generally used to transport and store large amounts of perishable food, medical supplies, or human bodies. Weight: 6.4 tons; Fuel Cons: 7 liters per period; Price: \$42,000 (S/R)

Camp Stove: 2 large and 1 small burner. Includes windscreen, and a case that can be used as a stew pot. Wt 5.4kg; Fuel Cons 0.75 Liter/period; Price \$100 (S/R)

H-45 Space Heater: This is a milspec space heater that burns fuel instead of requiring a generator. It is a 45,000 BTU heater that provides enough energy to heat a building, container, or tent of approximately 400 square feet (122 square meters) in size, to comfortable temperatures. It is effective in temperatures ranging from -30 to 60 degrees Fahrenheit (-35 to 16 degrees Celsius). The heater can burn most available liquid fuels, such as gasoline, diesel, butane, propane, or even AvGas. Its construction provides smokeless combustion. The heater includes flexible smokestack, gravity feed adapter, hoses, and a fuel can. Weight: 29 kg; Fuel Cons: 4 liters per period; Price: \$700 (S/R)

Mounted Water Ration Heater (MWRH): This device is used to heat water, which can then be used for hot drinks, to heat pouched or canned rations, or to provide hot water for hygiene purposes. It can heat 3.75 liters of water to boiling in 20 minutes. The basin is large enough to hold up to 5 MRE entrees at once. There is a spigot on the front of the device to dispense water for beverages or hygiene purposes. The device can be set to heat and keep water heated to any temperature up to boiling. This device is designed to be installed in a vehicle, and runs off vehicle power. They were increasingly common on NATO vehicles during the Twilight War, being installed or retrofitted to many vehicles through early 1999. They can be installed successfully on any armored vehicle with an Easy: Mechanic or Electronics roll, or a Difficult: Intelligence or Education roll. Weight: 4.5 kg; Price: \$40 (C/R)

Nonflammable Ration Heater (NRH): This small device, issued with most Western MRE-type meals, is designed for individual heating of meal components in water. The device consists of a long plastic bag and two packets of chemicals. The chemicals are poured into the bag, water added to the fill line, and the bag sealed. It is then placed into a container of water. The device is able to heat all the applicable parts of an MRE to 140 degrees Fahrenheit in less than 15 minutes. The NRH is cheap, produces no toxic fumes, and is very light. These devices were also available on the civilian market in Western countries starting in 1995. Weight: 0.06 kg; Price: \$1 (V/S)

Pocket Stove: This device was approved for issue to NATO troops in 1996; prior to this, it had been available on the civilian market for at least half a decade. It is a small stove with a stand and a fuel can, and burns diesel, aviation gasoline, or gasoline. Approximately 30 ml of fuel is added to the basin below the stand; this much fuel will burn for about 10 minutes and heat a half a liter of water to boiling. The stove cools to storable levels in about 5 minutes. These stoves were issued on an individual basis to personnel in NATO light units, airborne and air assault units, and special operations. A similar unit was made for Pact units, but was much more rare. Weight: 0.4 kg; Price: \$14 (S/-)

Remote-Unit Self-Heating Meal Module (RUSHMM): This is a device for heating A-Rations, B-Rations, or T-Rations without the cooking overhead normally required. The device comes in a cardboard box. The box is opened, the rations placed on top of the heating element and the box closed again. A tab is pulled, and the device heats the rations in about 20 minutes. Though the device does produce a small amount of smoke, the smoke is non-toxic and does not smell. There are no open flames, and are self-contained. After use, the device is discarded. These were originally designed for airborne and special operations use in remote areas, but most of these units did not use the high weight A, B, or T rations and did not normally carry the RUSHMM. As such, they were generally used in rear areas to feed sudden large influxes of troops or refugees. One of these modules is sufficient to heat the rations for about 18 people. Weight: 5 kg; Price: \$95 (C/R)

Space Heater Arctic (SHA): This device is similar in concept to the H-45 space heater, but is used in smaller spaces and in colder climates. It is useful in buildings, containers, and tents of approximately 230 square feet (71 square meters), and is effective in temperatures from -60 to 60 degrees Fahrenheit (-51 to 16 degrees Celsius). Weight: 18.6 kg; Fuel Cons: 2.5 liters per period;

Price: \$650 (S/R)

Space Heater Convective (SHC): This is a larger heater, designed to heat larger buildings, field hospitals, command post complexes, and other such areas. It will provide a comfortable climate to an area of about 640 square feet (198 square meters). The burner is an enhanced-efficiency design, and uses the burned fuel to provide power to the electrical convection cells. The system includes blowers, fuel pumps, safety devices, and an electrical control box. The heater may be set up outside or inside a structure. The device is effective in an outside temperature of -40 to 60 degrees Fahrenheit (-40 to 16 degrees Celsius). Weight: 33.6 kg; Fuel Cons: 5.5 liters per period; Price: \$1100 (S/R)

Space Heater Small (SHS): This is a small military space heater meant to provide a comfortable temperature to small tents up to 100 square feet in size. It may burn all sorts of military fuels, including butane, propane, diesel, gasoline, and aviation fuel. The design provides for combustion without smoke and a minimum of fuels. The heater includes a smoke pipe and integral fuel tank, and takes up a minimum of space (approximately 35x22x41 centimeters). It is effective in temperatures ranging from -60 degrees Fahrenheit to 60 degrees. Weight: 9.07 kg; Fuel Cons: 1 liter per period; Price: \$275 (S/R)

Squad Stove: This stove has one gas burner, and the case serves as a pot. The device burns butane, kerosene, gasoline, diesel, or aviation fuel. They were typically used in lower-priority units where the Pocket Stove was not available, and they were also available on the civilian market for about 15 years before the war. Weight: 0.71 kg; Fuel Cons: 0.25 liters per period; Price \$25 (C/S)

Tommy Cooker: Folding stove, made from simple steel stampings. Uses Hexamine "heat tabs". One tab will boil a liter of water in 15 minutes. Wt 0.2kg; Price \$5 (S/R)

TACTICAL LIGHTING AND SIGNALS

[Signal Device Rules](#)

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MEDICAL SUPPLIES

Blister Treatment Kit: One of the banes of a soldier's existence is blisters. This kit contains moleskins, gauze, paddings, "Second-Skin" blister pads, antiseptic gel, and sterile needles. The kit is sufficient to treat 50 blisters. It will not be sufficient to provide more than surface protection for blister gas injuries. Wt 0.1kg; Price \$50 (S/R)

Cravat (1x1m): A triangular or square muslin sling. It is also used as bandanna or dust mask (drive-on rag), or any number of improvised uses. Wt 0.05kg, Price \$4 (V/V)

Field Dental Kit: A small kit for use by characters with Medical (Surgical) skill who also have dental knowledge. It is, however, designed for use by amateurs. It does not necessarily provide the materials for a permanent solution to dental problems. The kit contains:

- 10 gauze pads (100x100mm)
- 1 forceps
- 1 pair tweezers
- 1 dental mirror
- 25 cotton balls
- 100g filling material
- 100 units toothache remedy
- 10 units local anesthetic
- 1 mixing dish
- 100g cementing material
- 1 spatula
- 1 set dental instructions

Wt 0.3kg; Price \$700 (R/R)

Field Dressings: Bandages used to bind typical wounds; they consist of a pad with muslin or cotton strips. Many sizes are available, but three are given. The size given is the size of the pad; consider the bandage to have a long enough binding strip to accomplish the task.

Small: The normal size found in first aid kits and personal medical kits. 100x180mm. Wt: 0.05kg; Price \$4 (V/V)

Medium: Also found in most medical kits (but not the personal medical kit). 190x203mm. Wt 0.11kg; Price \$9 (V/V)

Large: Found in larger medical assortments, and used for large wounds such as burns, chest wounds, and shotgun wounds. 300x300mm. Wt 0.25kg; Price \$20 (C/C)

Field Medical Assortment #1: A kit typically carried by medics, nurses, and doctors. This kit contains:

- 12 Band-Aids (various sizes)
- 6 butterfly bandages
- 6 gauze pads (100x100mm)
- 1 compress bandage (100mm)
- 2 rolls gauze (25mmx5m)
- 1 wire mesh splint (1m)
- 1 thermometer
- 1 pair tweezers
- 10m sutures
- 3 surgical needles
- 1 needle
- 1 razor blade
- 1 bar antibacterial soap (100g)
- 100 units mild pain reliever
- 100ml antiseptic
- 6 antacid tablets
- 10 alcohol pads
- 1 zip-lock plastic bag

Wt 0.6kg; Price \$500 (S/S)

Field Medical Assortment #2: A larger version of the above. The kit contains:

- 32 Band-Aids (assorted sizes)
- 4 adhesive knit (25x75mm)
- 3 suture strips
- 10 gauze pads (100x100mm)

- 1 compress bandage (190x203mm)
- 10 Telfa pads (75x100mm)
- 6 butterfly bandages
- 2 eye pads
- 1 compress bandage (100x180mm)
- 1 compress bandage (300x300mm)
- 2 rolls gauze (50mmx5m)
- 2 moleskins (75x100mm)
- 1 cravat (1x1m)
- 1 elastic bandage (75mmx2.5m)
- 1 wire mesh splint (1m)
- 1 pair vinyl examining gloves
- 1 pair EMT shears
- 1 forceps
- 1 hypothermia thermometer
- 6 surgical needles
- 1 needle
- 20m sutures
- 2 razor blades
- 4 safety pins
- 10 cotton swabs
- 20 alcohol pads
- 2 bars antibacterial soap (100g)
- 20ml plastic bottle
- 100ml antiseptic
- 100g antiseptic gel
- 100 units mild pain reliever
- 10 units mild sedative
- 10 units strong sedative
- 8 antacid tablets
- 10 units antihistamine
- 20 salt tablets

Wt 1.4kg; Price \$800 (S/S)

Field Surgical Kit: A set of stainless steel instruments for use in emergency operations. These instruments are often seen in the hands of special forces medics and civilian paramedics. The instruments come in a zippered cloth pouch with an emergency surgery manual. The kit also contains, in sterile pouches (upon first use):

- 1 suture kit (20 operations)
- 20 scalpel blades
- 1 pair bandage scissors
- 1 pair tweezers
- 10 units local anesthetic
- 10 units +/- antibiotic
- 1 set prep pads (20 operations)
- 1 pair suture scissors
- 2 pair forceps
- 1 scalpel handle w/blade
- 10 units total anesthetic
- 1 penlight

Weight 1kg; Price \$450 (S/S)

First Aid Assortment #1: This is an assortment of minor medical supplies assembled into a kit. This first aid assortment contains:

- 8 Band-Aids (various sizes)
- 2 gauze pads (100x100mm)
- 2 Telfa pads (100x75mm)
- 1 roll medical tape (25mmx10m)
- 1 safety pin
- 1 razor blade
- 1 bandage compress (100mm)

1 roll of gauze (25mmx5m)
1 moleskin (75x100mm)
1 needle
4 alcohol pads
Wt 0.25kg, Price \$40 (C/C)

First Aid Assortment #2: Another assortment of medical supplies. This first aid assortment contains:

12 Band-Aids (various sizes)
4 butterfly bandages
4 gauze pads (100x100mm)
4 Telfa pads (100x75mm)
1 bandage compress (100mm)
1 roll gauze (25mmx5m)
1 roll medical tape (25mmx10m)
1 moleskin (75x100mm)
1 cravat (1x1m)
1 pair tweezers
1 needle
4 safety pins
1 razor blade
6 alcohol pads
Wt 0.4kg; Price \$65 (C/C)

First Aid Assortment #3: A larger first aid kit, normally found in a plastic box issued with US and NATO vehicles. The kit features a set of first aid instructions that allow a +2 Medical (Trauma Care) during first aid attempts.

1 pair EMT shears
1 pair tweezers
10 safety pins
50ml antiseptic
1 Carlisle dressing
5 alcohol pads
1 roll gauze (25mmx5m)
50 units mild pain reliever
3 compress bandages (100mm each)
100g antiseptic gel
1 thermometer
100ml burn mixture
20 cotton swabs
2 rolls medical tape (25mmx10m each)
100ml petroleum jelly
2 Telfa pads (75x100mm)
10 salt tablets
1 cravat (1x1m)
Wt 0.8kg; Price \$250 (C/C)

First Aid Assortment #4: A small assortment normally issued to airborne troops. This first aid kit contains:

10 Band-Aids (various sizes)
50ml antiseptic
1 roll gauze (25mmx5m)
1 roll medical tape (25mmx10m)
1 compress bandage (100mm)
25 units mild pain reliever
25 units mild sedative
1 cravat (1x1m)
4 safety pins
4 alcohol pads
100g antiseptic gel
1 pair small scissors
1 pair tweezers
Wt 0.45kg; Price \$100 (S/S)

Insect Repellent: Known as "bug juice" to troops; this also liberally issued to troops. Wt 0.1kg; Price \$2 (V/V)

Iodine Tablets (100 units): Makes water safe to drink, but leaves a strong metallic taste. One unit is sufficient to treat one quart of water; 30 minutes are required for the iodine to work. Wt 0.05kg; Price \$30 (~V)

Medic Bag, "Airborne": So called because these pouches were first designed for paratroopers in WW II. The pouch is hard in order to resist crushing. Holds 2.5kg; Wt 0.2kg; Price \$15 (C/C)

Medic Bag, Large: Holds 8kg, and is organized for storage and quick finding of medical supplies. Wt 1kg; Price \$40 (C/C)

Medic Bag, Small: A smaller version of the above. Holds 4kg. Wt 0.3kg, Price \$25 (C/C)

Sunscreen: All-purpose, waterproof, non-irritating. In the US, this is normally issued liberally to troops prior to field training or wartime deployment. Wt 0.1kg, Price \$5 (S/S)

Survival Blanket: An aluminized, insulated emergency blanket used to cover accident or hypothermia victims. It is not made for comfort, but seals in body heat. It folds into a small space (102x51x38mm), but opens to 2.1x1.5m. Wt 0.11g, Price \$20 (S/R)

Tranq Autoinjectors: Similar to the atropine autoinjectors described in Twilight:2000 but loaded with a fast-acting tranquilizer drug, these devices were originally made for use by mental hospitals and police, but the merc and military trade soon adopted them. When applying one to an unresisting target (one surprised or subdued by unarmed combat), the user may choose the body part the injector is used on. Resisting targets must be subdued using unarmed combat before the injector can be applied.

As with tranq darts, a hit in any part of the body will be effective eventually, but some areas give faster results than others. Head hits result in instant unconsciousness. Chest and abdomen hits result in unconsciousness after 1D6~2 phases five to 15 seconds). An arm hit requires the target to roll his Constitution or less on 1D10 to stay awake each phase. The drug will take effect even if the injector is removed immediately. Tranq autoinjectors also affect dogs in the same way as tranq darts. Wt:0.1 kg per set of three. Price: \$75 per set of three (R/R)

Water Chlorinating Kit: This kit contains ampoules of calcium hypochlorate sufficient to disinfect 3000 liters of water, and a test set to determine if the water has been sufficiently disinfected. (It cannot determine if the water is clean to begin with.) The process takes 30 minutes to fully disinfect and test. This kit also contains 50 units of iodine for individual canteen disinfections. Wt 2kg; Price \$1000 (S/S)

OTHER EQUIPMENT

Barbed Wire, Antipersonnel: Concertina wire consisting of strips of metal with razor-like blades. This is in common use by NATO forces. Weight (per meter): 2kg; Price: (Per meter): \$20 (V/C)

Barbed Wire, Concertina: Spring-like coil of barbed wire, with interlaced strands of normal barbed wire, also known as a "combat slinky." Weight (per meter): 2kg; Price: (per meter): \$10 (V/V)

Barbed Wire (Straight): Normal lines of heavy wire with knots of barbs. Weight (per meter): 0.3kg; Price: (per meter) \$2 (V/V)

Body Bag: An all-too-common necessity. Weight: 0.5kg; Price: \$35 (V/V)

Bucket: Holds 10 liters, may be plastic, wood, or metal. Weight: 0.5kg; Price: \$5 (V/V)

Bullhorn: Makes voice distinctly audible at 300 meters and indistinctly audible at 600 meters. Powered from internal batteries. Weight: 3kg; Price: \$40 (S/S)

Bungee Cord: 1 meter long (stretches to 2 meters). These are in common use by soldiers to attach gear and build shelters. Weight: (per 4) 0.17kg; Price: (per 4) \$8 (C/C)

Camouflage Netting: Modern camouflage netting is typically infrared- and radar-scattering, and impose a one level penalty on such detection attempts. Eastern-Bloc nets are normally square; NATO nets are a modular set of hexagons and diamonds. Camouflage nets have a different pattern on each side (normally summer/spring and fall; other patterns include winter/snow, sand/scrub, jungle, and others are certainly available). Weight and price is for an arbitrary 10x10m square, and includes the poles and spreaders for erection. Weight: 10kg; Price: \$1500 (V/V)

Chemlight: A small tube filled with glowing chemicals. Chemlights are available in red, green, yellow, orange, and blue. A chemlight glows at maximum intensity for 3 hours (visible at 100 meters, or at the maximum range of a night vision device) and half intensity for 9 hours. (Merely putting the chemlight in a pocket will stop the light.)

Another variety of chemlight, the Brightstick, will produce very bright light for 30 minutes (visible at 250 meters, or twice maximum night-vision gear range). Brightsticks come only in white or yellow.

High-intensity chemlights are used by police and special operations, and are sometimes issued to pilots. A high-intensity chemlight produces 5 minutes of extremely bright light, the first minute of which is actively blinding. They are available only in red.

Infrared chemlights function as normal chemlights, but are visible only to individuals using night-vision gear. They glow for 6 hours.

Lightdiscs are simply disc-shaped chemlights. They may be written upon and are most often used as markers. They glow for 4 hours, and are available only in green. A lightdisc is 100mm wide. Weight: (per box of 12) (Lightdisc) 0.5kg (Others) 0.25kg; Price: (Chemlights)\$26 (V/C) (Brightstick)\$32 (V/C) (High-Intensity Chemlight)\$36 (C/S) (Infrared Chemlight)\$75 (S/R) (Lightdisc)\$30 (C/S)

Chemlight Case: A plastic tube used to hold a chemlight. Twisting the endcap turns a shutter which blocks as much of the chemlight's glow as desired. Weight: Negligible; Price: \$3 (C/S)

Cigar: Average quality, per 10. Weight: 0.1kg; Price: \$50 (R/R)

Cigarettes: Any brand, per carton of 240. Weight: 0.5kg; Price: \$50 (S/S)

Cigarette Lighter: Total 500 seconds of flame (approximately 250 lights). Most require butane or propane, but some can be fueled by motor fuels or alcohol. (Tinkering might help.) Lighters can be found in the pockets of most soldiers. Weight: 0; Price: \$10 (S/S)

Compass, Lensatic: Reads in degrees or mils, and is luminous for night use. Weight: 0.1kg; Price: \$30 (V/S)

Cord: Such as "550 Cord" parachute line. Per 15 meters. Weight: 0.1kg; Price: \$3 (V/V)

Dictionary, Language: An extensive translation of one language to another, including idiomatic phrases. Unfortunately, it takes some time to use in a conversation. Weight: 0.5kg; Price: \$20 (C/S)

Dictionary, "Pointee-Talkee": Small booklet consisting of basic phrases on one and the equivalent phrase in two other languages on the opposite page. The user points to the desired phrase and asks the other person to point to his reply (the instructions are the first set of phrases). Phrases are simple ("Where is food?" "Does anyone speak English" "Glad to meet you", etc.) and contain phrases in the following subjects: finding an interpreter, courtesy phrases, food and drink, comfort and lodging, communications, injury, hostile forces, and friendly forces. There are approximately 5-20 phrases per subject (as necessary). These dictionaries are normally issued to aircrews. Weight: 0.1kg; Price: \$50 (R/R)

Drum, 200-liter: Normal steel or aluminum drum, though plastic is becoming available. Weight: 10kg; Price: \$30 (V/V)

Field Washstand: This is a small washstand for field use, able to be used by four people at once. The faucets are pumped manually using a foot pump, and the stand has a paper towel holder and soap dispenser. The stand is fed by an 83-liter water tank and a 10-liter soap tank, and has another tank for capture of wastewater. Weight: (empty water tanks) 27.22 kg; Price: \$115 (C/R)

Fishing Line: 20 meters, including a hook. Weight: 0.2kg; Price: \$5 (S/S)

Fishing Net: 1x1 meters, with weights. Weight: 1.8kg; Price: \$38 (S/S)

Fishing Pole: With 20 meters of line and a hook. Weight: 4kg; Price: \$50 (C/C)

FLEXCEL Liquid Container: This is the large rubber fuel bladder so often seen slung underneath Chinook helicopters during Gulf War footage. These bladders can be parachuted without using a pallet or any sort of padding, can survive a fall of 100 meters without a parachute, or a fall of 12 meters from an aircraft moving at 170kmh (ComMov 137). Fuel is pumped by putting a heavy weight on the bladder (normally, the vehicle receiving the fuel runs over the bladder), and the bladder can typically be emptied in 25 seconds. A FLEXCEL comes in two sizes, a large (2.6x0.36m) and a small (1x0.2m). Large FLEXCELS hold 250 liters; small ones hold 45 liters. Weight and cost include hoses and valves. Weight: (250L) 56.7kg (45L) 10.3kg; Price: (250L)\$150 (45L)\$30 (V/S)

Grapple: This is a multiple-pronged hook to be used at the end of a length of rope to assist in climbing walls, etc. It can be thrown as any other object, but counts as two kilograms instead as one (because of the rope also attached). Some models are designed to fold, collapse, or otherwise dismantle for ease of transport. Wt: 1 kg; Price: \$60 (V/V).

Handcuffs: Used to restraining appendages. There are two types—metal and plastic. Metal cuffs are reusable and open with a key, while the plastic cuffs are disposable and must be cut off. Applying handcuffs counts as an action and takes five seconds. Wt: Metal, 0.2 kg; plastic, 0.001 kg; Price: Metal, \$20 (C/C); plastic, \$2 (V/S)

Jerry Cans, 20-liter: These are the standard cans for fuel and water. Fuel cans are normally metal, while water cans are plastic. Weight: 1 kg; Price: \$5 (V/V)

Jumar Ascender: This is a special climbing rig consisting of a pair of foot loops attached to clamps which lock on a hanging rope when downward pressure is applied. The climber uses the Jumar Ascender to literally walk up the rope, almost as efficiently as climbing a ladder, at a speed of 2 1/2 meters per phase. This may be doubled (AVG: Climbing or DIF: Agility) or tripled (DIF: Climbing or FOR: Agility). Weight: Negligible; Price: \$100 (C/C)

Krill Light: These are basically electronic versions of chemlights. They are powered by AA batteries and have LED bulbs. They come in red, green, orange, yellow, blue, and white, and come in the standard version, the Krill 180 (where the luminosity is variable), and the Extreme Krill (twice as bright as the standard Krill Light). The Krill and Krill 180 last 120 hours on a single charge, while the Extreme Krill lasts 50 hours. The standard Krill Light is slightly brighter than a chemlight. Weight: 0.1 kg; Price: (standard) \$6, (Krill 180) \$7, (Extreme Krill) \$9 (S/-)

Lantern: Lights a 10-meter radius. Weight: 2kg; Fuel Consumption: 1 liter; Price: \$25 (V/V)

Lock, Average: Key or combination. Weight: 0.1kg; Price: \$5 (V/V)

Lock, Bulletproof: Key or combination. Will withstand most blows and gunshots (gunshots and very heavy blows will ruin the lock, but it will not open.) Weight: 0.1kg; Price: \$15 (V/V)

Maturing Theatre Latrine (MTL): This is a very fancy name for a porto-potty made to military specifications. It is the normal sort of outdoor toilet common at open-air events and construction sites throughout the US and other countries, but in addition to the wastes being carted away or disposed of in sewers systems or other ways, the bowl for the wastes can be removed from the toilet, flammable liquid placed within, and the wastes burned. Though popular at command posts of higher echelons, they were generally considered too big for elements of maneuver units and even if issued to them, they were generally discarded or traded to rear elements for more desirable items. Weight: 50 kg; Price: \$300 (S/-)

Modular Initial Deployment Latrine (MIDL): Somewhat more robust than the personal commode, this is used to service units up to platoon size in the first stages of deployment or when the unit will not be long in one place. It consists of a collapsible fiberglass or plastic commode with hangers for a plastic bag below the opening. Wastes are deposited into the bag, and then the bag is sealed and burned or buried. A frame for supporting a privacy screen is provided with the MIDL. Enough bags are provided with the kit for 25 soldiers for 30 days, assuming normal bowel functions during that time. Weight: 8 kg; Price: \$90 (S/-)

Mosquito Net: 2 1/2x2 1/2 meters. Weight: 0.5kg; Price: \$10 (S/S)

Paint: Any Color, one liter. Weight: 1kg; Price: \$10 (C/C)

Personal Defense Aerosol: These have been marketed extensively to civilians and police forces in the United States, but civilian sales have been prohibited in other Western nation such as Canada. Normally, the filler is CS or CN aerosol, but it can also be 1% capsaicin, a cayenne pepper derivative. All fillers act as per irritant gas rules in Twilight: 2000. A special 5% capsaicin solution is sold only law enforcement personnel, and the irritant gas rules are modified for this by making the Constitution roll at: DIF level. Hitting is accomplished according to standard direct-fire rules, with the total range being limited to 10 meters. The spray contaminates any surface it hits, but disperses within 10 minutes. Wt: 0.2 kg. Cost. \$25 (C/R)

Rope: This is milspec 11mm rappelling line. Wt: 5 kg per coil; Price: \$100 per 50m coil (V/V).

Rubber Fuel Bladder, 50-liter: Collapsible fuel bladder. Fuel may be pumped by placing a heavy weight on the bladder (squashing it with a vehicle is the normal method). Includes hoses and valves. These bladders can be safely airdropped from a height of 100 meters without a parachute. Weight: 3kg; Price: \$200 (S/R)

Rubber Fuel Bladders, NATO: This is a generic category of fuel bladders, used by many countries since they take up far less space than the usual assortment of jerry cans and 200-liter fuel drums found at other fuel dumps. These are normally shaped like a giant rubber pillow (unlike the drum-shaped FLEXCELS), and do not have the strength of a FLEXCEL; the bladder will need a pallet for a parachute drop, and can be free-dropped only 50 meters, or from aircraft moving at a maximum of 80kmh without preparation. Many sizes are generally available. All of these bladders will collapse to 15% of their normal size when empty. Weight and cost include hoses and valves, and fuel is pumped by squashing (requiring 3 phases per liter to empty). Weight (210L) 19kg, (380L) 34kg, (945L) 42kg, (1,890L) 48kg, (1,950L) 50kg, (2,840L) 52 kg, (3,785L) 62kg, (5,670L) 68kg, (7,570L) 77kg, (9,460L) 83kg, (11,355L) 97kg, (15,140L) 102kg, (18,295L) 117kg, (28,380L) 151kg, (37,850L) 169kg, (56,775L) 197kg (75,710L) 273kg, (189,300L) 564kg; Price (210L) \$95, (380L) \$170, (950L) \$420, (1,890L) \$850, (1,950L) \$875, (2,840L) \$1275, (3,785L) \$1700, (5,670L) \$2550, (7,570L) \$3400, (9,460L) \$4250, (11,355L) \$5100, (15,140L) \$6800, (18,295L) \$8200, (28,380L) \$12375, (37,850L) \$16500, (56,775L) \$24750, (75,710L) \$33000, (189,300L) \$82500 (S/R)

Rubber Fuel Bladder, Warsaw Pact/Eastern Bloc: Similar to the NATO fuel bladders above, the size of these bladders is based on metrics instead of gallons. They are often used to convert flatbed trucks to makeshift fuel tankers. Weight (4,000L) 125kg, (6,000L) 135kg, (25,000L) 290kg, (50,000L) 580kg, (150,000L) 1050kg, (250,000L) 1450kg; Price (4,000L) \$3400, (6,000L) \$5100, (25,000L) \$21250, (50,000L) \$42500, (150,000L) \$127500, (250,000L) \$212500 (R/S)

Sandbag: Wt 0.2kg (empty) 10kg (full); Price \$1 (V/V)

Skyhook (Ground Unit): A specialized ground/air pickup rig for extraction by aircraft when ground conditions do not permit a landing, which was originally designed for military and civilian air/sea rescue units. The ground unit consists of a personnel harness (very similar to a parachute harness), a coil of cable, and an inflatable helium balloon large enough to carry the cable several hundred feet into the air. The unit can be used for either personnel or cargo. Skyhook requires a specially modified multiengine aircraft, usually provided by the patron (few merc groups can afford to maintain them).

Using Skyhook: The passenger dons the harness, inflates the balloon (upon arrival of the pickup aircraft), and prepares himself for the shock of pickup. A specially modified cargo aircraft snares the balloon/cable with a specially fitted V-shaped "blimp-catcher" on its nose, and reels in the passenger until the passenger is close enough to a specially installed cargo door on the bottom of the aircraft. The aircrew snares the passenger/cargo, hauls him/it aboard the plane, and prepares for another pickup if necessary.

The shock involved is no more severe than an opening parachute, provided that the pickup aircraft does not fly too fast. The process is dangerous, but no more so than a parachute jump if done properly.

The pickup plane must fly straight and level a few hundred feet off the ground. The whole operation needs suitable terrain (no nearby obstructions) and reasonable privacy. The blimp can be equipped with IR/white light strobes (activated at the last moment) for a night pickup. The weather must be reasonably clear, with no excessive wind conditions. Skyhook can also be used at sea. A skyhook ground unit may not be reused. Wt: 18 kg; Price: \$800 (R/-)

Small Unit Shower (SUS): This is a hollow collapsible metal frame with rubberized fabric walls to provide four shower stalls. The shower units are similar to those aboard naval vessels, with push button controls that spray only when the button is pushed. Hot water is provided by a 75-liter water heater that can provide 16 showers to soldiers before the tank is exhausted. The tank requires 50 minutes to fully heat the water, and is powered by diesel or aviation fuel (30 liters per period), an external generator (45kW), or vehicle power. The unit packs into two canvas bags. It may be set by two soldiers in 15 minutes. Weight: 68 kg; Price: \$275 (S/-)

Spray Paint: Any color. Weight: 1kg; Price: \$10 (C/C)

Tactical Smoke Generator: This is a device to produce a massive volume of thick smoke that is opaque to certain optical frequencies. There are several types available, based on when they are made:

Pre-1970s: The smoke blocks vision and image intensification. Price: \$2000 (V/V)

1970-1980: The smoke blocks vision, image intensification, and lasers. Price: \$2500 (V/V)

1981-1985: The smoke blocks vision, image intensification, infrared, and lasers. Price: \$3000 (V/C)

1986-1993: The smoke blocks vision, image intensification, infrared, thermal imaging, and lasers. Price: \$4000 (C/S)

1994-2000: The smoke blocks vision, image intensification, infrared, millimetric imaging (such as the guidance of fire and forget missiles), and lasers. Price: \$5000 (S/R)

When vision is blocked, all tasks related to the vision or aiming (if lasers or millimetric waves are blocked) become three levels more difficult.

A tactical smoke generator weighs 1.2 tons, and may be transported in any vehicle or trailer capable of supporting its weight. The smoke generator produces a cloud equal to three smoke grenades in volume every phase, and typically runs for 90 minutes on a tank of fuel (about 650 liters, 7.2 liters per minute). It is basically a pulse jet engine that injects special oil into its exhaust to produce the smoke. The fog oil also lasts for 90 minutes on a tank (about 450 liters, 5 liters per minute). The jet engine runs on almost any type of military fuel except alcohol, including diesel, jet fuel, gasoline, AvGas, etc. Fog oil costs are as follows:

Pre 1970s: \$15 per liter (S/S)

1970-1980: \$20 per liter (S/S)

1981-1985: \$25 per liter (S/R)

1986-1993: \$35 per liter (S/R)

1994-2000: \$45 per liter (R/-)

Fog oil is not acceptable for use as motor oil or transmission fluid without refining. Fog oil of earlier types can be used in later generators, but will only produce the effects of that earlier type of oil. Fog oil of later types cannot be used in earlier generators without damaging the generator.

Certain armored vehicles can lay a smokescreen by injecting diesel fuel into their exhaust. Such smoke screens are equivalent to tactical smoke generators from the period 1970-1980, but are only the equivalent to two smoke grenades per phase of generation. Such smoke screens cost the generating vehicle one liter of fuel per phase of laying.

Conventional smoke grenades are also equivalent to 1970-1980 tactical smoke generators. More advanced smoke grenades exist; these cost quadruple for 1981-1985 equivalent, and 8 times normal cost for 1986-1993 equivalent.

Underwater Carrier: A sealed container to transport weapons, ammunition and equipment underwater. This cylindrical container is 1.5 meters long and about 0.4 meter in diameter. It opens like a clamshell for ease of access, and contains several straps and lashing rings to secure gear inside. When sealed, the container will protect its contents from water damage. By inflating or deflating several internal flotation/ballast bladders, its buoyancy can be adjusted to enable it to float, sink, or be neutral (preferable for hauling gear long distances underwater). Pulling a lever will inflate several emergency bladders, making the loaded container capable of supporting the weight of an average person as well.

The container can carry up to 50 kilograms of equipment, and when neutrally buoyant, has the same effect on a swimmer as light personal equipment. The weight given below is empty. The carrier weighs this plus the weight of any contents when out of the water. Wt: 6 kg; Price: \$85 (S/S).

Vehicle Low-Altitude Extraction Kit: This consists of a drogue parachute and a shock-absorbing pallet strapped to the bottom of the vehicle. The aircraft must have a rear cargo ramp to utilize this kit. The aircraft flies at extremely low altitude (three to five meters) at minimum speed and deploys the drogue chute out the back. The drogue chute opens; the vehicle is yanked out of

the aircraft; and the pallet absorbs most of the shock of landing. Vehicles larger than 25 tons cannot be dropped in this fashion.

Crew may not ride in the vehicle while this goes on. It requires 10 minutes to make a vehicle operational after landing. Wt: 1.5 tons; Price \$8000 (R/R)

Vehicle Parachute Kit: This consists several parachutes (depending on the weight of the vehicle to be dropped), a retrorocket assembly, and a shock-absorbing pallet strapped to the bottom of the vehicle. After the vehicle is dropped from the aircraft and the chute deployed, a contact sensor on a cord drops three meters below the vehicle and the retrorocket package deploys above the vehicle. When the sensor touches ground, the retrorocket package fires and slows the vehicle's descent even further. Vehicles larger than 15 tons cannot be dropped in this fashion.

Crew may not ride in the vehicle while this goes on. It requires 10 minutes to make vehicle operational after landing: disconnecting the chute and the pallet, freeing everything that had to be tied down for air transport, screwing down everything that was jarred loose during the landing, and—last but not least—a quick inspection, which is not something to have to do in a hot DZ. Wt: 1 ton; Price: \$12,000 (R/R).

Water Desalination Unit: This unit is capable of desalinating 300-700 liters per hour, depending on the raw salt content of the water. No chemicals are needed for the operation of the unit, though a tank is provided to add chlorine, if desired. The unit requires that an external 1.5 kW generator be hooked up during operation. A disinfecting unit is also provided, but other pollutants such as fallout, sand, and mud cannot be removed by this device. Water can be siphoned from containers, or directly from a natural water source. Weight: 175 kg; Price: \$2,600 (S/R)

Water Purification Unit, Medium: This is a machine carried in a backpack. It eliminates organic, mineral, and bacterial pollutants by using a set of mechanical filters. Filters last for 1,200 liters. Water is purified at the rate of 200 liters per hour. The unit runs from internal batteries and can purify up to 7 liters of water from internal tanks while being carried, or siphon water from containers or directly from a natural water source such as a pond, lake, or stream. It is not capable of desalinating water. Weight: (unit) 18 kg, (extra filter) 5 kg; Price: (unit) \$750, (filter) \$150 (S/R)

Water Purification Kit, Small: A small machine designed to draw water through a system of filters, purifying the water of most contaminants. Purifies 0.75 liters per minute, and runs on hand power. It is not capable of desalinating water. Filters last for 50 liters. Weight: 1.5kg; Price: \$170 (S/R)

NOISE SUPPRESSERS AND FLASH SUPPRESSERS

The use of a noise suppressers degrades the performance of a weapon. Weapons fitted with noise suppressers have their armor penetration degraded by one category (1-Nil becomes 2-Nil, 1-2-Nil becomes 2-3-Nil, etc.). The noise suppresser reduces the range of the weapon by 5m (for a pistol, revolver, or submachinegun) or 10m (for any other sort of weapon). Some weapons are specially designed to take silencers and may break these rules. Fitting a suppresser to a weapon not already prepared for one is a task (DIF:Gunsmith). Adding a suppresser to a weapon threaded for one requires no special skill.

Flash Suppresser, Pistol: Prevents a bright muzzle flash by venting explosive gasses. This suppresser is suitable for pistols (but not machine pistols). Attempting to spot a character using causes their Observation skill to be degraded by -3 during the day and one full place at night. Suppressers cannot be made which will eliminate the flash of Magnum ammunition. Wt 0.1 kg; Price \$65 (R/R)

Flash Suppresser, Rifle: Suitable for use with sporting rifles, sniping rifles and semiautomatic battle rifles. It gives the same benefits to rifles as pistol flash suppressers. Wt 0.2 kg; Price \$75 (R/R)

Noise Suppresser, Automatic Weapon: Suitable for use with assault rifles, machine pistols, automatic battle rifles, and submachineguns. There are no noise suppressers for use with automatic rifles and machineguns. The character attempting to spot someone using this suppresser gets a -4 Observation at short and medium range and -3 Observation as long and extreme range. Wt 0.5kg, Price \$200 (R/R)

Noise Suppresser, Automatic Shotgun: Suitable for use with shotguns such as the HK CAW, SPAS-12, and Assault 12. It may also be used with the 25mm version of the MM-1, if used with 12-Gauge ammunition. (Using this suppresser on the MM-1 with grenade ammunition is 50% likely per shot of destroying the noise suppresser!) Attempting to spot a character using this suppresser causes a -2 Observation at short and medium range, and -3 Observation at long and extreme range. Wt 0.6kg, Price \$300 (R/R)

Noise Suppresser, Pistol: Suitable for use with pistols. This device will do nothing to silence a revolver. This device cannot be used with machine pistols (such as the Stechkin or Micro-Uzi); an automatic weapon noise suppresser is required for these weapons. The character attempting to spot someone using a pistol with a noise suppresser is degraded by one place. Wt 0.25kg; Cost \$135 (R/R)

Noise Suppresser, Rifle: Suitable for use with sporting rifles, sniper rifles, and battle rifles. (Automatic battle rifles require the automatic weapon noise suppresser.) Attempting to spot a character using this device is degraded by one place. Wt 0.5kg; Price \$225 (R/R)

Noise Suppresser, Shotgun: Suitable for use with pump or semi-automatic shotguns. Attempting to spot the character using this suppresser gets -2 observation at short and medium range and -3 observation at medium and short range. Wt 0.6kg, Price \$275 (R/R)

Noise/Flash Suppresser, Pistol: Combines the effects of noise and flash suppressers (all effects are cumulative). Suitable for use with pistols (but not machine pistols). The flash-suppressing aspect will not work with Magnum ammunition. Wt 0.25 kg; Price \$400 (R/R)

Noise /Flash Suppresser, Revolver: Silencers for revolvers are huge, bulky affairs and must be hand-made for each weapon. They shroud the barrel and cover the revolver cylinders, requiring an extra step (removing the cylinder cover) to reload. (Add two extra rounds to reload a silenced revolver.) These weapons are extremely rare and were produced mainly as curiosities. Attempting to spot a character using one of these weapons is DIF: Observation. Wt 1.5kg; Price \$1000 (-/-)

Noise/Flash Suppresser, Rifle: Suitable for use with sporting rifles, sniper rifles, and semiautomatic battle rifles, combining the benefits of noise and flash suppression. Wt 0.5kg; Price \$600 (R/R)

PERSONAL GEAR

Assault Suit: Special assault equipment intended for use on drug lab raids, hostage rescues, and other similar situations. The suit consists of a set of black fatigues, gloves, a Kevlar helmet (with integral individual tactical radio, a throat mike and bone conduction earphones), a gas mask, tactical web gear and boots. Body armor and personal weapons must be purchased separately. Luminescent markings (such as "POLICE" or "DEA") are usually stenciled on the back for quick identification of friend or foe during dimly lit firefights. Wt: 8 kg; Price: \$1100 (S/R).

Body Veil, Camouflage: Infrared-defeating body camouflage. Wt 1kg; Price \$100 (R/R)

Brass Catcher: These became standard issue to most armies after late 1998, with supplies becoming ever more questionable, to catch those valuable shell casings. Usually made of plastic or cloth (some rare metal brass catchers do exist). Usually holds 100-200 rounds or links. Brass catchers do not exist for bolt-action, lever-action, or pump-action weapons, or pistols or revolvers. Weight (empty, cloth) 0.5kg, (empty, plastic) 1kg, (full, any) 5kg; Price (cloth) \$5, (plastic) \$15 (C/C)

Can Opener: Such as the US "P38." Weight: none; Price: \$1 (V/V)

Canteen, 1-liter: Self explanatory. Canteens are not intended to serve as a soldier's only water supply, but they are just that for soldiers on special missions. Because of this, characters may wish to carry two or more. Wt: 1 kg (loaded); Price: \$10 (V/V)

Canteen, 2-liter Reserve: This is a large-capacity reserve water supply, attached to the outside of a field pack or slung on a strap. Wt: 2 kg (loaded); Price: \$25 (V/S).

Canteen, 5-liter Reserve: This is a larger reserve water supply, usually carried inside field pack or slung on a strap. Wt: 5 kg (loaded); Price: \$30 (V/V).

Chaplaincy Logistical Support Package (CLSP): This is a fiberglass or Kevlar box, light yet strong, issued to chaplains and their assistants for field ministry purposes. The box is about 1x0.75x0.75 meters in size, and contains supplies needed to conduct chaplain's services for about a company-sized element at a time (about 100 troops). The box contains a laptop computer, about 40 pocket-sized religious books, various papers needed by a chaplain (such as forms for Red Cross support and notification of families of casualties), writing implements, pocket hymnals, sacramental wine, holy water, holy wafers or the equivalent, and the vestments required by the chaplain. The box functions as a makeshift altar and desk. Weight: 25 kg; Price: \$5000 (S/R)

Civilian Winter Coat: Worn over fatigues. Protects against 30°. Weight: 3kg; Price \$100 (C/C)

Close Assault Armor: Improved, but bulky, body armor incorporating additional layers of Kevlar and metal/ceramic plate inserts. It protects the chest and abdomen with an armor factor of 3. Because of this armor's bulk, wearers may not move faster than a trot, and all tasks become one level more difficult. Wt: 16 kg; Price: \$1200 (S/-).

Clothing: Most mercs don't worry about clothing costs. Most mercs don't really care how they look on the job, either. In a special operations environment, this may change. Walking into an upper-class cocktail party in grimy fatigues is not a good way to convince security that you're supposed to be there. Prices given are for complete ensembles. Wt: 2 kg ; Price: \$50 for poor clothing, \$100 for casual dress clothing, \$250 for formal dress clothing, \$500 and up for ultra-chic fashion clothing. Availability (all clothing) (V/V)

Cold-Weather Gear: This set of clothing is designed to supplement the basic clothing issue for troops that must operate in cold weather. It consists of a hood for the field jacket (issued with fatigues), wool underwear, a sweater, a scarf, a pile cap, a pair of wool gloves with outserts, and a pair of insulated overshoes ("Mickey Mouse Boots"). Various pieces of this setup are worn depending on the individual's taste and the temperature. The gear is usually issued in camouflage pattern or OD green, but can sometimes be had in white. Weight: 5kg; Price: \$200 (S/S)

Cold Weather Gear, Extreme: This is intended to supplement the cold-weather gear. It consists of a heavy parka, insulating liners for the field jacket, trousers, and poncho, and a pair of mittens and insulating inserts. Only under the coldest conditions will everything be worn. This gear is usually issued in camouflage pattern or OD green, but sometimes can be had in white. Weight: 10kg; Price: \$200 (V/V)

Combat Webbing: Commonly known as Load-Carrying or Load-Bearing Equipment (LBE or LCE), or "kit". Combat webbing consists of a set of suspenders and a web belt (giving rise to another common name, "web gear"), and may consist of any number of other pouches or gear, as follows:

Suspenders and belt: Weight 0.77kg, Price \$22 (V/V)

Butt pack: Named for the place it is carried, but can also be carried between the shoulders. Carries 4.5kg. Weight: 0.2kg, Price \$13 (C/C)

1-quart canteen and pouch: Weight (full)1.25kg, Price \$8 (V/V)

Canteen Cup: Metal cup which fits inside the canteen pouch. Weight: 0.25kg, \$10 (V/V) .

Personal Medical Kit/Compass Pouch: Note: the PMK includes this pouch. Weight 0.05kg, Price \$3 (V/V)

Rifle Magazine Pouch: Holds 3 magazines. Weight 0.2kg, Price \$9 (V/V)

Shotshell Pouch: Holds 6 10-Gauge, 12 12-Gauge, 14 20-Gauge, 18 28-Gauge, 27 .410-Gauge, or 12 25mm MM-1 shells. Weight 0.08kg, Price \$8 (S/S)

Pistol Magazine Pouch: Holds 2 magazines. Weight 0.08kg, Price \$6 (V/V)

Utility Pouch: Holds 0.5kg. Weight 0.1kg, Price \$3 (S/S)

Utility Box/Pouch: Holds 0.5kg. Weight 0.1kg, Price \$5 (S/S)

Holster: Carries most pistols of either NATO or Pact. Weight 0.28kg, Price \$14 (V/V)

Belt Pouch: Zippered. Holds 0.5kg. Weight 0.08kg, Price \$9 (S/R)

Large Belt Pouch: Zippered. Holds 0.8kg. Weight 0.1kg (S/R)

A typical set-up is the suspenders and belt, 2 canteens, one personal medical kit, and two rifle magazine pouches. Other commonly used pieces of military gear are typically made to attach to the belt and suspenders.

Cot, Folding: Weight 5.5kg, Price \$40 (S/R)

Cot, Light Folding: Made of thinner canvas and a lower, lighter aluminum frame. Weight: 3.2kg; Price \$62 (S/R)

Duffel Bag: Large canvas sack with carrying straps. Carries 50kg. Weight: 1.5kg; Price \$23 (V/V)

Flak Jacket: This type of body armor is intended to provide protection from fragments, not direct hits from small arms. Wt: 8kg; Price \$400 (C/C)

Flashlight, "4-Battery": An adjustable flashlight often carried by police and private security guards. It also makes a very effective club. Weight: 1.05kg; Price: \$40 (C/C)

Flashlight, Krypton: Three times as bright as a military flashlight, but requires a special lithium battery that lasts only 6 hours. Weight: 0.14kg; Price: \$30 (R/R)

Flashlight, Military: Battery-powered flashlight of rugged construction, such as the US "angle" flashlight. Weight: 0.3kg; Price: \$12 (C/C)

Flashlight, Military Krypton: This flashlight is in common use by special forces. It is very tough, has a light 3 times as bright as a standard military flashlight, and comes with a clip for attachment to firearms. Weight: 0.3kg; Price: \$45 (R/-)

Flashlight, Mini Mag-Light: Popular flashlight carried instead of the normal flashlight by many US soldiers since it is every bit as bright as the angle flashlight. The light can be focused. Weight: 0.17kg; Price: \$22 (S/-)

Flashlight, Penlight: Issued to pilots and in field surgical kits. Weight: 0.08kg; Price: \$13 (C/C)

Foam Sleeping Mat: This unfortunately acts as a sponge in wet weather, but smoothes out the bumps in rough ground. Weight: 0.5kg; Price \$15 (C/S)

Ghillie Suit: Worn by snipers and special operations infiltration teams. Normally made from burlap strips and netting by the person wearing it, it can also be bought. Covers entire body; makes Observation rolls against the protected individual one level harder (if standing or moving) or two levels harder (if lying or crouching and not moving). Weight: 2kg; Price (self-made) \$30 (bought) \$140 (S/S)

Gloves, Heavy: Heavy winter gloves or mittens. May affect tasks requiring manual dexterity. Protects hands against frostbite down to 10 degrees. Weight: 0.5kg; Price: \$30 (C/C)

Gloves, Light: Light leather, synthetic, or wool gloves. Protects hands against frostbite to 30 degrees. Weight: 0.2kg Price: \$15 (C/C)

Gloves, Ski: Heavy gloves made of materials such as Gore-Tex. May affect tasks requiring manual dexterity. Protects hands against frostbite down to -10 degrees. Weight: 0.5kg; Price \$50 (S/R)

Goggles: With interchangeable tinted/polarized and clear lenses. Weight: none; Price: \$17 (V/V)

Gore-Tex ECWS (Extreme Cold-Weather System): This is the most modern of cold-weather survival, issued to US and some NATO countries as well as Pact Arctic units and other alpine units and mountain climbers. The ECWS consists of Gore-Tex equivalents of the items in the cold-weather and extreme-cold weather gear, but this gear is much more durable, is waterproof, and more resistant to cold than ordinary gear. ECWS is much sought-after by troops who don't have it, and as a result items of the ECWS can be found worn by just about anyone. This gear is usually issued in a camouflage pattern, but civilian versions are usually in bright colors (such as orange or blue), and it can be had in white. Weight: 15kg; Price: \$895 (S/R)

HALO Rig: HALO stands for high-altitude, low-opening, and refers to a particular style of parachute drop. The parachutist leaves the plane at a great height (usually over 25,000 feet (7600m)--high enough to require oxygen gear) and free-falls to a level below radar and visual observation height before opening. The HALO rig consists of a standard parachute, oxygen tank, face mask, insulated overgarment (it gets cold up that high) and altimeter. Wt: 14 kg. Price: \$3500 (S/S).

Hammock: Normal canvas hammock with wooden end stays. Weight: 0.7kg; Price: \$19 (C/S)

Hammock, Covered Jungle: A normal hammock with a canopy over the hammock and insect netting between the canopy and hammock. Weight: 1.25kg; Price: \$32 (S/R)

Hammock, Light Mesh: Supports 225kg, yet rolls into a fist-sized ball. Weight: 0.3kg; Price: \$10 (C/R)

HCP-1 (Health and Comfort Pack, Type 1): This is general issue in most Western and Middle Eastern military forces, and in lesser issue with Eastern military forces. It is also common in disaster relief organizations. Each HCP-1 is designed to equip 10 persons for 30 days. The pack consists of 10 bags and 10 boxes. Each bag contains a toothbrush, 2 tubes of toothpaste, 100 meters of dental floss, 10 disposable double-bladed razors, 2 cans of shaving cream, 3 bars of soap, a large container of foot powder, 20 moist towlettes (the large size), a bottle of hair shampoo, two sticks of deodorant, 5 ball-point pens, and a jar of petroleum jelly. The box contains a box of laundry detergent, 4 rolls of toilet paper, a comb, a small sewing kit, fingernail clippers, a hairbrush, a small mirror, a bottle of hair conditioner, a tin of shoe polish, another box of 50 moist towelettes, shaving gel (for female legs and underarms, but may also be used for faces), a writing tablet with 100 sheets of paper, a tweezers, a box of Band-aids, electric shave lotion, a bottle of hand lotion, a bottle of mink oil, 4 bottles of sunscreen, 3 sets of boot laces, a box of 50 envelopes, 3 nail files, a shoe polishing brush, 4 hair nets, another jar of petroleum jelly, and shave powder. These items are packed in a crate. Weight: 155 kg; Price: \$1950 (S/R)

HCP-2 (Health and Comfort Pack, Type 2): This is an additional HCP designed for female military personnel and refugees. Like the HCP-1, it is designed for 10 persons for 30 days. The HCP-2 comes in a box and contains the following items: 48 regular sanitary napkins, 72 heavy sanitary napkins, 60 regular tampons, 84 heavy tampons, 250 panty shields, 400 moist towlettes, 20 4.55-liter self-seal plastic bags, 150 76x178mm plastic bags, 10 68-liter plastic garbage bags, 10 ponytail holders, 1 hairbrush, 2 plastic combs, 50 bobby pins, and 10 personal hygiene body wipes (large versions of the moist towelette, with an additional deodorizer). Weight: 155 kg; Price: \$1950 (S/R)

Kevlar Helmet: This is intended to provide protection from fragments, not direct hits from small arms (yet often does). Weight: 0.5kg; Price \$100 (C/S)

Kevlar Vest: This type of body armor is intended to provide protection from fragments, not direct hits from small arms (yet often does). Weight: 4kg; Price \$800 (C/S)

Life Jacket: Buoyant wearer's weight, plus the weight of the jacket, and 10kg. Reduces difficulty of Swimming rolls by one level for purposes of staying afloat. Weight: 6kg; Price: \$75 (S/R)

Load-Bearing Equipment/Special Patrolling Insertion-Extraction (LBE/SPIE) System: A modular combat webbing system capable of carrying an individual's combat-essential equipment while enhancing the capability to quickly and easily conduct rappelling insertions and SPIE operations. Essentially combines ALICE suspenders, pistol belt and rappelling harness into one. Combat webbing accessories may be used with this system. Wt 2kg; Price \$130 (R/R)

Mess Kit: A metal tray to cook food, plus a fork, knife, and spoon. Weight: 0.4kg; Price: \$9 (V/V)

MOLLE Load-Bearing System: New issue to US forces at the start of the war, the MOLLE system consists of a load-bearing vest and pack combination connected by a special ball-and-socket that allows the pack to be dropped in less than one combat phase. The load-bearing vest (LBV) has different pouch attachments for each weapons specialist, though all have an integral belt and harness system and small removable butt pack (carries 3kg). The pack with integral frame can carry 40kg of goodies, and also

has the following: a SINGARS radio pocket, a claymore mine pocket that contains several extra buckles and a six-magazine bandolier, a removable pouch on each side, a sleeping bag cover, and a 2-liter pressurized water bladder with a drinking hose. In addition to this, a special combat patrol pack, which is really just a small backpack, can be attached to the back for another 10kg of supplies.

The LBV may be set up as follows:

Rifleman: Six 30-round magazine pouches, two hand grenade pouches (2 grenades each), and one 100-round/utility pouch.

Grenadier: Four 30-round magazine pouches, 20 40mm grenade pouches, four 40mm ILLUM pouches, one 100-round/utility pouch.

SAW Gunner: Two 30-round magazine pouches, two 200-round belt pouches, three 100 round/utility pouches.

Medic: Three 30-round magazine pouches, one hand grenade pouch, one medical bag (4kg).

Shotgunner: 12 shotgun shell pouches, three 100-round/utility pouches, 4 hand grenade pouches.

OICW Gunner: Four 8-round 25mm magazine pouches, four 30-round magazine pouches, one 100-round/utility pouch.

Weight: (Standard MOLLE system) 5kg (combat patrol pack) 1kg; Price (MOLLE and combat patrol pack) \$100 (S/R)

Overwhites: A lightweight, white (usually splotched with dark gray or forest green) garment to be worn over the individual's other clothing. Overwhites are not intended to provide a great deal of insulation, just camouflage under snow conditions. Weight: 1kg; Price \$50 (C/C)

Pack, ALICE, Medium: Standard US field pack. Carries 25kg, including 3 external pockets which carry 10kg of the total volume. Weight: 1.4kg; Price \$50 (V/V)

Pack, ALICE, Large: Larger version of the above; typically issued only to infantry, armor, artillery, and Special Forces personnel. Carries 40kg, including 3 external pockets which hold 16kg of the total volume, and 3 other small pockets for miscellaneous items. Weight: 2.2kg; Price \$80 (C/S)

Pack, Civilian: Usually zippered and normally not waterproof or only nominally waterproof. Different packs vary widely in arrangement of external or internal pockets (if any). Holds 10kg. Weight: 0.5kg; Price: \$20 (C/C)

Pack, Generic: A rucksack capable of carrying 30kg. Weight: 2kg; Price: \$20 (V/V)

Pack, Locopack System: Combat pack designed for use by NATO special forces. Locopack is a modular system with a main pack holding 20kg, 0.2kg each in two shoulder pockets, and two detachable side pockets holding 4 kg each. (These side pockets can also be attached to ALICE webbing or combat vests.) Locopack also has an integral combat webbing set which includes two canteens, a personal medical kit pouch, and two magazine pouches (3 rifle magazines each), as well as two pouches holding 1.8kg each. Any part of the Locopack can be quick disconnected from any other. Weight: (complete pack) 4.1kg (main pack) 1.2kg (each side pocket) 0.2kg (combat webbing) 2kg (shoulder pouches/side belt pouches, each) 0.1kg; Price: \$325 (S/R)

Pack, LRRP: Another alternate field pack, designed for long-range reconnaissance troops. Holds 27kg in the main pack and 4 kg in each of two quick-release side pouches. Weight: (complete pack) 2kg (main pack) 1.5kg (side pouch) 0.25kg each; Price: \$200 (S/R)

Pack, ShadowPack System: A common alternative field pack (known by different names in different countries. ShadowPack has a main pack holding 10.5 kg, two quick-release side pouches holding 2.5kg each, one back pouch holding 2kg, and one buttpack, holding 4.5kg. Each pouch can be quick-released from the others and attached to standard load-carrying harness. Weight: (complete) 2kg (main pack) 0.8kg (side pouch) 0.25kg (back pouch) 0.2kg (buttpack) 0.6kg; Price: \$160 (S/S)

Parachute: A device which allows a character to leap from a perfectly good aircraft and probably reach the ground intact. Includes main canopy, reserve canopy, and all necessary harnesses. If recovered, the parachute can be repacked and reused. A character may carry up to four times his normal load during a parachute drop (note, however, that he may not be able to carry it far on the ground). Wt: 15 kg; Price: \$450 (C/C).

Paraglider (Steerable Parachute): A special form of parachute permitting the passenger to direct his descent more than is possible with a normal parachute. If recovered, the paraglider can be repacked and reused. Weight: 16kg; Price \$650 (C/C)

Parka: Includes overboots, socks, etc. Cannot be worn over the winter combat suit. Protects against 35°. Weight: 3kg Price \$150 (C/C)

Personal Commode: Known as a PC by the troops, these were first issued to Allied troops during the Gulf War. It consists of a heavy, corrugated cardboard seat covered by a vinyl shell. The PC is, amazingly, capable of supporting 545 kilograms. One of the secondary uses is as a seat on hot desert sands. The PC folds down to a package of only 0.45kg.

An optional add-on is a privacy cover in the form of a waterproof tent to pull over the PC. This weighs 1 kg. If the user is careful, the PC may be re-used. Weight (PC) 0.45kg, (Privacy Cover) 1kg; Price (PC) \$12, (Privacy Cover) \$50 (C/R).

Poncho, Plastic or Vinyl: Weight 0.62kg, Price \$19 (V/V)

Poncho Liner: Light, thin quilted cloth, surprisingly warm and used to make the poncho into an impromptu sleeping bag. Protects against 30 degrees, even when wet. Weight: 0.6kg; Price: \$30 (V/C)

Poncho/Sleeping Bag: Widely issued to German troops, and issued in small quantities to US troops. Also known as the IMPS (Individual Multi-Purpose Shelter). As it sounds, this is an insulated poncho that can be unfolded and closed off to form a sleeping bag. Small stays keep the other end off the wearer's head and chest if desired. It folds into the hood for carrying. Weight: 1.4kg; Price: \$200 (C/R)

Radio Pouch: Designed to hold the 2km radio, but can also hold a transponder. Can be clipped to the combat webbing. Wt 0.1kg, Price \$10 (C/C)

Rappelling Gear: Includes a "Swiss Seat" harness, 4 carabiners, and one pair of work gloves. Weight: 1.1kg; Price: \$80 (C/C)

Rainsuit, Vinyl or Plastic: Weight 0.88kg, Price \$30 (V/V)

Shelter Half, Canvas: A rubberized canvas sheet that can be combined with another shelter half to form a two-man tent or alone as a one man tarp. Includes pegs, poles, and rope. Weight: 1kg; Price: \$25 (C/C)

Shoulder Holster: This type of holster is specially designed to be worn under a jacket or loose shirt, holding the weapon against the body for concealment. It only works for pistols and SMGs with a bulk of 2 or less—weapons of bulk 3 can be concealed under a long coat, but shoulder-holsters aren't made for them. Weapons of bulk 4 or more can't be concealed. The harness provides space for the weapon and two extra magazines/speedloaders. Wearing a shoulder holster makes the detection task one level more difficult. Wt: 1 kg; Price: \$50 (C/C)

Sleeping Bag: Protects against 30°. Weight: 4kg; Price: \$50 (C/C)

Sleeping Bag Bivy Cover, MSB: This is a waterproof, windproof bag designed to be used with the MSB or by itself. It incorporates the same material that is used in the Extended Cold-Weather System. It comes with a breakaway zipper that can completely enclose the occupant and be egressed quickly. Weight: 1kg; Price \$25 (S/R)

Sleeping Bag, Modular (MSB): This is a two-bag system consisting of a lightweight outer patrol bag (temperature rated to 30°F) and an intermediate inner bag (temperature rated to -10°F). The bags can be used independently or mated together to form the extreme cold weather bag rated to -30°F. The MSB incorporates the latest sleeping bag technology using lightweight polyester fibers for insulation. It is hydrophobic (water hating) and light, weighing less than 7 pounds. It comes with a compression sack for easy stowage. Weight (Patrol Bag) 1.1kg, (Inner Bag) 2kg; Price (Total) \$150 (S/R)

Sleeping Bag, Winter: Protects against 45°. Weight: 5kg; Price: \$100 (S/S)

Small Concealed Holster: A holster designed to hold a pistol of bulk 0 in a concealed position (fastened around an ankle, clipped to a waist belt or brassiere, etc.). These holsters only hold the weapon, not extra magazines/speedloaders. Wearing a small-concealed holster makes the detection task two levels more difficult. Weight: 0.3kg; Price \$25 (C/C)

Snorkel Gear: A mask, snorkel, and swim fins, permitting character to swim completely underwater for periods of up to 30 seconds, with a minimum of surface interaction (pulling the snorkel below the surface and holding his breath). The character need only gently break the surface and can then breathe normally without making great amounts of noise or surface ripples. Spotting is done normally for characters on the surface, but characters swimming underwater cannot be spotted. Wt: 2 kg; Price:\$120 (V/V).

Steel Helmet: This is intended to provide protection from fragments, not direct hits from small arms fire. Weight: 1kg; Price: \$50 (C/C)

Strobe Light: A powerful flashing Xenon light used as a distress signal. Pilots are issued one of these, and they are commonly carried by other soldiers. From the air they are visible at a range of 15km during the day and 50km at night. The strobe will flash continuously for 9 hours. Weight: 0.14kg; Price: \$50 (S/S)

Sunglasses, Polarized: Weight none, Price \$40 (V/V)

Survival Kit: Contains a wide variety of useful items in a high-impact plastic container that can double as a 0.7-liter canteen.

- 2-man Emergency Tent
- Signal Mirror
- High-Pitch Whistle
- 3 Band-Aids (assorted)
- 2 Gauze Pads (100x100mm)
- 3 butterfly Band-Aids (assorted)
- 4 units mild pain-reliever
- 1 candle
- 2 small flares
- 50 waterproof matches
- 6m nylon cord
- 0.5m wire
- 50mmx1m duct tape
- 1 razor blade
- 1 zip-lock bag
- 1 safety pin
- 1x1m aluminum foil
- 2 energy bars (1/2 day food)
- 5 dextrose cubes (1/4 day food)
- 2 salt packets
- 3 bouillon cube
- 3 tea bags

The kit also contains 4 laminated cards containing survival tips that give the user a default skill of Survival 1 when trying to find food or make an expedient shelter. There was a massive run on these kits in the last few weeks before nuclear strikes began.

Weight: 0.5kg; Price: \$40 (S/R)

Survival Kit, Aviator's: Though the Special Operations Kit was often acquired by aircrews, this kit was the official issue for NATO aircrews.

- 3-blade pocket knife
- 1 water bag (1-liter)
- 6m steel wire
- 10 waterproof matches
- 2 striker strips
- 3 fishhooks
- 1 button compass
- 2 large needles
- 4 magnesium fire starters
- 10m fishing line

Weight: 0.14kg; Price: \$30 (S/S)

Survival Kit, Special Operations: Unlike the above kit, this kit was primarily issued to LRSU teams, special operations units, and aviators. It is packaged in an aluminum tin, which can also serve as a cup or cooking pot.

- Signal mirror
- Hacksaw blade
- Lanyard saw
- 50 waterproof matches
- Flint and steel
- 1-liter water bag
- 3 fishhooks
- 2 razors
- 10 Band-Aids (assorted)
- 4 gauze pads (100x100mm)
- 20 salt tablets
- 10 units mild pain-reliever
- 1 high-intensity chemlight
- Notepaper and pencil
- 50mmx2m duct tape
- 1 Pair tweezers

1 candle
3m snare line
10m fishing line
Button compass
4 large Band-Aids (assorted)
3 safety pins
5 units +/- antibiotic
1 roll medical tape (25mmx5m)
1 flare
2 energy bars (1/2 day food)
1 Sharpening stone
20m nylon cord

The kit also comes with a set of survival tips, but these were rarely used by the units to which the kits were issued (they already knew the information). Weight: 0.3kg; Price: \$150 (R/R)

Survival Knife: Knife with hollow handle to store survival gear. The knife is not properly balanced for throwing (FOR: Thrown Weapon), but the butt can be used as a hammer. In addition to the supplies listed below, 0.1kg of other gear can be carried in the handle.

Lanyard Saw
5m Thread
3 Fishhooks
6 Waterproof Matches
1 Sharpening Stone
3m Snare Wire
10m Fishing Line
2 Needles
Button Compass
Weight: 0.5kg; Price: \$75 (C/C)

Sweater: Synthetic or wool sweater. Protects against 20°. Weight: 0.5kg; Price: \$30 (C/C)

Tarp, 2x3m: Waterproof heavy canvas, and often issued with vehicles. Weight: 2.5kg; Price: \$8 (V/V)

Tent, 1-Man: Wt 1.3kg, Price \$60 (S/R)

Thermal Fatigues: Woolen fatigues for winter use. Includes socks and boots. Protects against 25 degrees. Weight 5kg; Price \$40 (S/S)

Thermal Underwear: Worn under clothing. Includes socks. Protects against 15°. Weight: 0.5kg; Price: \$40 (C/S)

Umbrella, Bulletproof : An umbrella made of Kevlar, with special recoil systems in the shaft. It serves as one level of armor for the bearer when opened and pointed toward the source of bullets. It is not perfect—each bullet only hits it on a 1D6 roll of 1-4. On a 5-6, the bullet bypasses the umbrella and hits the bearer. It is waterproof and serves its ostensible function fairly well, but is quite heavy and tiring to carry one-handed. Wt: 4 kg; Price: \$1500 (R/R)

Vest, ALICE: This is simply a canvas vest with 30 attaching loops on the front and back for gear that clips on with standard clips. It replaces the standard LCE harness, and is more comfortable and quiet than the standard harness, as well as allowing for more individual preference in arranging equipment. Weight (without equipment); 0.28kg; Price: \$40 (S/R)

Vest, Battle: This is an LCE originally developed for Israeli Defense Forces and since adopted worldwide by police and military forces. It consists of a canvas harness with 4 rifle magazine pouches (2 magazines each), 3 grenade pouches, personal medical kit pouch, 1-liter canteen and pouch, 1 backpack, 1 knife/bayonet sheath, and 4 miscellaneous attachment points. A sore point among soldiers is that the pouches close with Velcro strips, which can become painfully loud when someone is trying to be quiet. Weight: 2.07kg; Price: \$130 (S/R)

Vest, Commando: This vest was developed for IDF special operations forces, and has since been adopted by special forces worldwide. It consists of an adjustable canvas vest with a holster and pistol magazine pouch, knife/bayonet sheath, personal medical kit pouch, 2km radio pouch (plus a microphone and cord holder on the front of the vest), 2 rifle magazine pouches (4 magazines each), 1 grenade pouch (2 grenades), 1 backpack, 1 canteen and pouch, 4 shotshell loops, and one miscellaneous

pocket and 4 miscellaneous attachment points. This vest has the problem with Velcro closures. Weight: 1.28kg; Price: \$100 (S/R)

Vest, Fishing: These vests have been widely pressed into use as combat vests by civilians and militia forces. A typical vest (for game purposes) has 11 large and 14 small pockets, both inside and out and can hold up to 12kg of gear. A person might not find his gear as easily accessible as he would in a military vest. Weight: 2kg; Price: \$30 (S/R)

Vest, Pilot's Survival: This is also used by US armor crews (a similar vest is worn by NATO armor crews). It is a nylon mesh vest with 3 large and 3 small zippered pouches on the chest, a holster (merely enough to hold the pistol in place, not to protect it from the elements), a knife/bayonet sheath, and four small and one large miscellaneous attachment point. Two more pockets are found on the inside of the vest. The vest comes in five sizes. Weight: 0.62kg; Price: \$65 (C/S)

Watch, Military: Simple watch with a luminous dial. Weight: none; Price: \$20 (V/V)

Winter Combat Suit: Insulated combat suit, usually white (but sometimes reversible). Includes winter boots. Protects against 40 degrees. Weight: 5kg; Price: \$300 (R/S)

RADARS AND SURVEILLANCE EQUIPMENT

AN/GRC-17-2 Ground Surveillance Radar System: The AN/GRC-17-2 is a very advanced, ground-based, surveillance radar system. This unit consists of three pieces: the antenna, the power unit, and the radar receiver-transmitter. The unit is capable of picking up the motion of a ground vehicle at 10 kilometers, an aircraft at 25 kilometers, or a man at four kilometers. It requires the successful passing of a **Electronics:ESY** task check to set up the unit and a **Computer:AVG** task to operate it. Wt: total, 32 kg; antenna, 10 kg; power unit, 12 kg; radar unit, 10 kg Cost: \$20,000 (R/R)

Audio Recorder: Audio recorders record sound from a designated source (usually they include a small condenser microphone). Any character with **Electronics** skill can hook one up to a wire-tap or a broadcast monitor. They come in simple and advanced varieties; both types use standard audio cartridge tapes. The simple variety merely records sound. The advanced recorder has better recording quality, including the ability to record a greater sound range (including ultrasonic and subsonic), varied playback speeds, and so on. Wt: Simple, 0.3 kg; advanced, 2 kg ; Price: Simple, \$75 (V/V); advanced, \$750, (S/S)

Audio Recording Cartridge: A cassette that records sounds from an audio recorder. Available in one-, two-, three- and six-hour versions. Wt: Negligible. Price: \$1 per hour of recording time.

Bore-Scope: A fiber-optic light guide, inserted into a room or container and allowing a view of that space's interior. Telescopic or wide-angle lenses can be fitted. The image is then carried via optical cable to the human eye, camera or TV monitor, regardless of twists, coiling or bends. The cable is trimmed to a specific length when purchased and cannot be shortened or lengthened after that time. For technical reasons, the diameter is 5mm, and maximum length 20 meters. Wt: 0.5 kg per meter; Price \$3000 per meter (C/S)

Broadcast Monitoring Equipment: This kit, combined with an electronics repair kit, permits characters with **Electronics** skill to listen in on cellular phones, radios and other broadcast signals, provided that the operating frequency of the broadcast source is known. Wt: 1 kg; Price \$400 (C/R)

Bugs: Electronic listening devices come in three stages, with each higher stage representing greater complexity and concealability. Stage I bugs are rather large (roughly 2x3x1 centimeters) and sport a small whisker antenna. They have a broadcast range of 0.5 kilometer, broadcasting continually for 24 hours between recharges. They may be hooked to a building's electrical system (an **Easy: Electronics** task). Since they broadcast continuously, they are easy to detect: an FM radio tuned to the correct frequency can receive their signal.

Stage II bugs are smaller (one-centimeter cubes with a whisker antenna) and have 36 hours of broadcasting time and a broadcast range of one kilometer. They may be bought as voice-activated, extending their actual charge life (the unit only uses energy when it hears something to broadcast).

Stage III bugs are very small (5mm cubes with whisker antenna), have a range of 200 meters and a broadcasting charge of 12 hours between recharges. They are voice-activated.

Wt: Negligible. Price: Stage I, \$150 (V/C); stage II, \$450 or \$550 for voice activation (C/S); stage III \$1100 (S/R)

Bug Detector Kit: This briefcase-sized kit contains several sophisticated electronic devices designed to detect common electronic bugging devices and neutralize them. Once detected, the bugs can be located and destroyed, jammed or masked (a jammer and a white-noise generator are included). Locating bugs without a bug-detector kit is a **Difficult: Observation** task to find stage I bugs. No other kind of bugs can be found without a bug-detector kit. Locating bugs with a bug-detector kit uses the **Electronics** skill. Locating Stage I bugs is **Easy**; locating stage II bugs is **Average**, and locating stage III bugs is **difficult**. Wt: 6 kg; Price \$2500 (C/R)

Bug Monitor: A special radio with an integral audio recorder. Can be tuned to any bug frequency. Uses standard audio recording cartridge tapes. Wt: 0.6 kg; Price: \$750 (C/S)

Camera Briefcase: A briefcase equipped with a concealed cut-out for a camera lens, and an activator button on the handle. It can conceal an advanced still camera, a digital camera, or a video camera. Wt: 2 kg; Price \$150 (C/S)

Digital Sound Processor: Digital sound processing (DSP) manipulates sound waveforms as bits of data and allows much greater alteration of audio input than the analog sound processor described above. This item requires **DIF: Computers Skill** to use properly. Because it is heavily computer based, the DSP has the same processing capability the FSP does but also has the

following:

Speech Repair/Extrapolation: This is the synthesization of words missing in the audio input but either identified by computer or deduced by context in the conversation.

Transtation: Once identified, the computer can synthesize the speech as it were spoken in another language.

Voiceprinting: The Computer automatically generates a voiceprint from the spoken sample.

Switching: The computer is able to synthesize the speech as if it were spoken by a different person.

Voice Stress Analysis: The computer can also add or eliminate microtremors which indicate voice stress.

Keyword Scanning: The computer is able to search for specific keyword and phrases in the speech, then flag them for the surveillance expert's attention.

Mixing: The DSP allows the blending of multiple audio sources so as to appear that only one source was used.

Current Tech: In current technology, the DSP is limited to post-processing because of its bulk and power requirements. The DSP presented here is actually a special board for a personal computer. The board allows all DSP functions except speech repair/extrapolation and translation. Functions at this stage require custom software and much more powerful computers. This system is available to all civilians in Western nations. Wt: N/A; Cost: \$800 (board), \$500-\$2000 (software).

HI-Tech: The DSP is shrunk down so that it will fit within a palmtop computer for real-time processing. Speech repair/extrapolation and translation functions become available to laptop and desktop computers, but require custom software. The custom software is only available to government agencies.

Directional Microphone: Also called a "shotgun mike," this device permits the user to electronically "eavesdrop" on normal conversations at ranges of up to 500 meters. It functions off an internal battery, and requires 30 seconds to set up and tune. Wt: 5 kg; Price: \$3000 (C/C).

Directional Tracker: This device is used to track trancellers, hidden microphones, trail mikes, and radios (if properly tuned). A directional tracker is the size of a small briefcase. Proper reading of the device is AVG: Electronics or DIF: Intelligence, and will give only a general distance to the target (i.e. near, far away, in between, etc.). Powered by internal batteries. Weight: 4.5kg; Price: \$1200 (S/S)

Electronic Voice Mask: This device transforms a person's telephone voice into something else, clearly distorted but unrecognizable, even with a voice stress analyzer. Wt. 2 kg; Price: \$300 (S/C)

Fiber-Optic Sensors: It is a little-known fact that the pattern of modulation in a fiber-optic cable varies with the pressure placed on the cable. NATO considered using this principle in an array of ground-sensor mechanisms in Europe to pick up advancing tank vibrations. The fiber-optic sensor can also be used as a microphone inside buildings. The fibers must be placed within the targeted building, either inside a wall or attached through adhesives, then illuminated by a tiny diode laser. A photoreceptor on the other end of the fiber picks up the laser light modulated by any sound in the environment, and passes the data on for transmission or storage.

Current Tech: This kit consists of a five-meter spool of optical fibers, a diode laser and transformer so the laser can feed off of house AC current, and a photoreceptor module with a serial output jack. Available to the general public in Western nations in component form. Assembled kits are only available to government personnel. Wt: 1.3 kg.; Cost: \$1200 (R/-).

Hidden Microphone: A generic term for a "bug.". A hidden microphone is ranges in size from tiny devices less than pea size to more normal microphones about the size of a silver dollar. Sound resolution is usually related to size, with smaller devices being less readable. The microphone transmits continuously once activated, for two weeks. The microphone is readable at 1500 meters, though a character with Electronics skill can pick up the signal at 3000 meters (AVG:Electronics) or even 4500 meters (DIF:Electronics), a check being required each phase. Weight: Negligible; Price: \$200 (C/C)

Laser Microphone: A device that projects a laser beam onto a windowpane and translates the sounds in the room from the vibration of the pane. An Easy: Electronics task allows the operator to listen in on conversations hundreds of meters away. All that is required is uninterrupted LOS to the target window, and a relatively flat trajectory between window and laser microphone. Wt: 5 kg; Price:\$1500 (S/R)

Miniature Camera: These are miniature versions of the advanced or digital still cameras. They can be made to resemble cigarette lighters, breath spray bottles, wristwatches, etc. Wt: Negligible; Price: Advanced, \$1000 (C/R); digital, \$2000 (R/-)

Motion Detector: An electronic motion detector that uses ultrasonic waves to detect moving objects. Any moving object larger than one centimeter moving in any one dimension will trip the device (speed and size can be adjusted as desired). Motion detectors can be set up to sound an alarm, signal a switchboard or activate another device (like a camera or mine). Motion detectors detect an area up to five meters in radius (the exact radius is set when the detector is set) and can be deployed in numbers to scan large areas. They are not much use in areas where there is a lot of motion, such as areas with wind-blown foliage, etc. Wt: 3 kg; Price \$2000 (C/C)

Parabolic Booster: A small dish-shaped booster used to increase the range and acuity of a sound amplifier 30 times. The booster also allows the user to zero in on specific sources and eliminates confusing background noise. Wt 0.2kg; \$60 (R/R)

PRD-303/SV Surveillance System: The PRD-303/SV is a small motion sensor with 120 degrees of covered arc. It detects the motion of solid objects between one and two meters off the ground. Several PRD-303/Ss are usually tied into a single PRD-303/V. Effective range of the sensor is about 250 meters in open terrain.

The PRD-303/V can receive signals from up to 10 different PRD-303/Ss, tell which one has been tripped, and inform the operator of the motion. The PRD-303/V can be located up to two kilometers away from the sensors, as long as it has an unobstructed line of sight.

Setting up the PRD-303/V is a Computer: ESY task. Implanting the PRD-303/S is an Electronics: AVG task. Operation of the unit is a Computer: AVG, task. Wt: sensor, 0.75 kg, receiver, 3.3 kg; Cost: sensor \$700; receiver \$1800; Both (R/R)

Radioactive Trace Dust: This fine dust can be placed on the ground, on tires, on shoes, etc., in order to trace something. It leaves a faint trail on the ground for 200 to 2000 meters. Beyond that, it leaves no trail, but traces will remain on the marked person or object. Radioactive trace dust can only be detected (and followed) with a Geiger counter. Wt: 0.5 kg per dose; Price: \$200 per dose (R/S)

Radio Direction Finder: A specialized radio receiver designed to determine the specific direction a particular radio broadcast is coming from. These are useful for a variety of tasks. Getting a directional fix using one of these is a task (Easy: Electronics) and requires one minute (provided that the signal stays on the air that long). The result is a compass bearing, not a distance. Two or three such RDF units, spaced far apart, can get two or more bearings for triangulation of broadcast source. Wt 2 kg; Price. \$1500 (C/C).

Revolver Camera: A miniature camera mounted on the side a revolver, the camera "fires" every time the trigger is pulled. In essence, it is a gun camera for revolvers. It can be mounted on the side of rifles and submachineguns, but not semiautomatic pistols. The photographs are for verifying that the target was hit by the weapon. Wt: 1 kg; Price: \$250 (R/-)

RF Scanner/Filter: The RF scanner is an incredibly useful device for SIGINT (SIGnals INTelligence) spooks. This device is capable of picking up RF emissions across a wide band and passing them along to other devices for processing. To operate the scanner/filter properly is AVG: Electronics. What can be done with this device is nothing short of amazing.

For example, the device could detect RF emissions of computer monitors, allowing other monitors following signal processing, DIF: Electronics to reproduce what is displayed on the eavesdropped monitor. The same can be done with computer microprocessors. Or cordless and cellular telephones. Or radio transmissions. The scanner/filter can pick up transmissions within the range of the transmit. For low-power emissions, such as monitors and microprocessors, this is limited to 200 meters. For cordless/cellular telephones, this is one kilometer. For all others, range is indefinite and depends on transmitter strength. Also, Such devices can be used as direction-finding gear to locate RF emissions. This is DIF: Electronics.

Current Tech: This device is a small, hand-held unit with an LCD display showing the current frequency and signal strength. An attached speaker/headphone jack can be fed into processing equipment. This device is available to any civilian in Western nations. Wt 2 kg; Cost: \$750. (S/R)

Seismometer: Detects movement by detecting tiny tremors. Detects movement within a 25m radius of the detector. Powered by internal batteries. Comes in two versions: one is connected to the receiver by commo wire; the other transmits to the receiver by radio up to 2000m away. The receiver can handle up to 6 seismometers. The detector can be tuned to detect even animal-sized tremors or ignore anything up to large vehicles. Setting the seismometer is ESY: Electronics or Computer; or AVG :Intelligence or

Combat Engineer. Wt (receiver) 2kg (detector) 4kg; Price (receiver) \$1250 (radio receiver) \$3750 (detector) \$3750 (radio detector) \$11250 (R/R)

Shortstop Electronic Protection System (SEPS): This is an electronic countermeasures system designed to predetonate fused artillery shells, mortar shells, and artillery rockets. When operating, these rounds detonate in the air out of range to do the protected ground troops any harm. The system protects all units within 250 meters and predetonates all HEDP, HE, FAE, AA, and WP rounds 50% of the time before they can do any harm to the protected units. This unit will protect all troops, not just friendly ones, within the radius of effect. This unit requires 30 seconds to set up and activate. Weight: 11.4 kg; Price: \$200,000 (-/-)

Sound Amplifier: This device consists of a flashlight-sized sound-gathering microphone and earphones. The device amplifies sound to the point that a whisper could be heard at 100 meters. The amplifier has a dampener to prevent hearing damage from sudden loud noises. It is not always possible to distinguish near noise from far noise. The amplifier works in a 45° arc in the direction it is pointed. Powered by internal batteries. Wt 0.9kg; \$80 (R/R)

Special Vision Adapter: This device allows an advanced or digital still camera, or a video camera, to be attached to an IR scope, starlight scope or image intensifier. Wt: Negligible; Price: \$25 (C/S)

Still Camera: These cameras record a visual image on film (or in digital memory). There are three Versions:

Simple. A one-shot, self-contained camera-in-a-box. You take the pictures, turn in the camera at a developing center, and receive the developed pictures in an hour.

Advanced. A quality, 35mm, film-using camera with a complete set of lenses and accessories (telephoto lenses, etc.) in a convenient, padded shoulder-bag. The advanced camera's film requires darkroom developing.

Digital. It comes with complete accessories and uses digital memory to store its images. A digital camera memory is read into a computer, and the computer's printing systems are used to print the picture. The advantage of digital cameras is the ease of transfer to data systems where the picture may be electronically enhanced analyzed or altered. Wt: Simple, 0.3 kg; advanced, 3 kg; digital, 2 kg; Price: Simple, \$10 (C/C); advanced, \$850 (C/C) (film costs \$8 for 24 exposures, and developed pictures cost \$0.50 per picture); \$1200 (R/R)

Telephone Oscillograph: This device is the size of an average hardbound book. It can record the dialing sound of a tapped phone and then identify any number called from that phone. Wt: 6 kg; Price:\$1000

Telephone Scrambler: Works just like a radio scrambler, but for telephones. Wt: 0.3 kg; Price:\$250 (S/C)

Telephone Tap Analyzer: A cigar-box-sized device that locates and verifies the presence of any taps on any connected line out to 10 miles. It also identifies the location of the tap. A recorder can be wired in and activated to record the tapped conversations. Detecting a tap analyzer while operating a tap is a Difficult: Electronics task. Wt: 1 kg; Price: \$500 (R/S)

Telephone Tap Detector: A cigar-sized box device that contains a signal light that lights up whenever an extension phone is lifted, or when a transmitter or telephone bug is placed on the phone line or the telephone itself. The light stays lit until reset by the user. Fooling a tap detector requires that the tapper knows that the detector is there, and then is a Difficult: Electronics task (and the tapper can't know he's successful until he gets a look at the defector or otherwise learns it is or isn't working). Wt: 2 kg; Price: \$500 (S/C)

Tracker Bug: This is a miniaturized transponder that allows tracking with a radio-direction finder, which detects the signal put out by the tracker bug. It is about the size of an aspirin tablet and has one-kilometer range (it can't be hooked up to an antenna like a standard transponder) and an internal battery giving it six hours broadcast time (rechargeable by anyone with Electronics skill and an electronics tool kit). It has a self-adhesive coating on one for attachment to a vehicle or whatever is being tracked moving the tracker bug from its plastic carrying case activates it. Wt: Negligible; Price: \$1800 (S/-)

Video Cameras: Cameras to capture continuous audio and video data. They use standard video recording cartridges. The two versions are large and small. The large version is about 40x25x5 centimeters and takes steadier pictures due to its larger size and greater stability. The small version is 5x3x3 centimeters (videotapes have gotten much more compact). Wt: Large, 2.5 kg; small, 0.5 kg; Price \$750 (C/C), Small \$950 (C/R)

Video Recording Cartridges: Six hours of video and audio recording. Wt:0.1 kg; Price:\$5 (C/R)

Wire-Tapping Tools: This kit, combined with an electronics repair kit, permits characters with Electronics skill to tap into and monitor electronic communications lines (phone lines, mostly). Wt: 2 kg; Price \$300 (C/R)

RADIOS AND COMMUNICATIONS EQUIPMENT

British Radios

Caracal (PRM 4740A) Secure Hand Radio: These British-made radios were sold to a Middle-Eastern nation (possibly Kuwait), and are rumored to be used by US Special Operations, British SAS, and British SBS units. They are possibly the smallest radios to incorporate frequency-hopping technology. 10 channels may be preprogrammed for quick frequency changing, and they are interoperable with US and allied frequency hopping radios. Weight: 1 kg; Price: \$4,000

Cougarnet (PRC6515) Hand/Manpack/Vehicular/Ground Radio: This British-made radio is used by the British Army and Navy, civilian agencies in Great Britain and elsewhere, and has enjoyed some foreign military sales, most notably to the US Air Force. The radio is able to bridge communications using UHF and VHF, especially when acting as a repeater. Cougarnet may be powered by a battery, vehicular power, or a 1.5 kW generator. The radio is modular, plugging into a variety of amplifiers for hand (2km range), manpack (10 km range), or vehicular/ground mount use (20 km range). Only the vehicular/ground version may be used as a repeater, but all versions may send and receive VHF and UHF traffic. A scrambler may be added by use of a cable. Weight: (Hand unit) 2 kg, (Manpack) 16.5 kg, (Vehicular/ground) 20 kg; Price: (Complete system): \$2,300

Jaguar-V Secure Manpack Radio: This British radio is used by that country and several NATO countries, Oman, Cyprus, Saudi Arabia, Brazil, and an unnamed Latin American country; a total of 42 countries worldwide are using this radio. Use of this radio began in the Desert Storm. It is a frequency-hopping radio with considerable ECCM capability, resisting jamming by constantly shifting hopsets to unjammed frequencies. Security is further heightened by use of a scrambler. The Jaguar-V can also be used for data transmission at a rate of 16 kbps. The Jaguar-V may tolerate up to 50 radio nets, each with dozens of radios, at once, if each net is frequency hopping in a different sequence, and still transmit to all of them. Short range is 5 km with a whip and 20 km with a long antenna. Weight: 7.5 kg; Price: \$4,200

Jaguar-V Secure Vehicular Radio: This is the same radio as above, linked to a mounting base, a longer antenna, and a high-power amplifier. Range is 50 km. Weight: 14.1 kg; Price: \$23,000

Panther 2000-V Secure Manpack/Vehicular Radio: This British radio is one generation advanced from the Jaguar-V set of radios, and was just beginning to be adopted by the British military and some NATO countries at the outset of the Twilight War. It is based on the Jaguar-V, but is much lighter. The Panther 2000-V is a frequency-hopping radio with antijamming ECCM capability, and also has a scrambler to further protect communications. If a Panther is captured, a signal can be sent from a secure radio to block the captured radio from the net, preventing it from broadcasting or listening to friendly frequencies. In addition, if an attempt is made to extract operating codes or hopsets from the radio without following the proper procedures, the radio destroys all codes and hopsets without revealing the data. The Panther may also function as a 16 kbps modem. The Panther is resistant to EMP from nuclear blasts, and thus may be one of the few digital radios operating after a nuclear battle. The radio may be remote-controlled from a range of 4 km. Short range is 5 km with a whip or 20 km with a long antenna. Weight: 6 kg; Price: \$5,200

Panther 2000-V Secure Vehicular Radio: This is a Panther 2000-V Manpack Radio as above, with a Vehicular Interface Unit (VIU) and power amplifier. Range is 50 km. Weight: 8.69 kg; Price: \$25,000

PRC/VRC 2000 Manpack/Vehicular/Ground Radio: This is an older British-made radio operating in the HF band. It entered service in 1981 with several African, Middle Eastern, and Latin American countries. Middle Eastern countries have mostly switched to newer secure radios, but the PRC/VRC 2000 may still be found in service with the African and Latin American countries. The radio is not secure, but can be used as a low-speed modem, with a speed of 600 bps. A scrambler may be added with a cable. Range is 4 km with a whip and 15 km with a long antenna for manpack operations, or 20 km on a vehicular or ground mount. A 1.5 kW generator is required for ground mount operations. Weight: 8.5 kg; Price: \$1,550

PRC/VRC 2000 Manpack/Vehicular/Ground Radio: This is an older British-made radio operating in the HF band. It entered service in 1981 with several African, Middle Eastern, and Latin American countries. Middle Eastern countries have mostly switched to newer secure radios, but the PRC/VRC 2000 may still be found in service with the African and Latin American countries. The radio is not secure, but can be used as a low-speed modem, with a speed of 600 bps. A scrambler may be added with a cable. Range is 4 km with a whip and 15 km with a long antenna for manpack operations, or 20 km on a vehicular or ground mount. A 1.5 kW generator is required for ground mount operations. Weight: 8.5 kg; Price: \$1,550

PRM4021 Manpack Radio: This is a small, inexpensive, yet powerful radio in service with a number of armed forces worldwide. It is an AM radio operating in the HF band with special filters to clean up the signal-to-noise ratio, allowing for very clear transmissions, and to read transmissions that would be unintelligible over normal radios. Unfortunately, the PRM4021 requires manual antenna tuning in addition to frequency tuning. Range is 10 km. Weight: 7 kg; Price: \$835

PRM4041A Manpack/Vehicular Radio: This is one generation advanced from the PRM4021 above. Improvements include automatic antenna tuning. The antenna may be detached and located up to 10 meters away by use of a cable. Short range is 15 km as a manpack and 20 km from a vehicle. Weight: 9.65 kg; Price: \$1,800

PRM4720A Hand Radio: This lightweight radio is built by England and used by Belize, Denmark, Cyprus, Greece, and an unnamed sub-Saharan nation. It may be made secure by the addition of a scrambler, and may be used as a 16 kbps modem. Range is 1 km and cannot be boosted, even with the addition of an amplifier, though its signals may be rebroadcast via a repeater. It is generally used as a short-range squad radio. Weight: 0.6 kg; Price: \$500

PTR349 Hand Radio: This radio was designed to be used by patrols and ambushing parties; the radio is capable of amplifying whispered communications to normal volume at the receiving end. It is small, but very powerful for a radio its size. Short range is 2km with a short 0.5m whip and 2.5 km with a longer 1m whip. The PTR349 is built by Britain and used by several countries in Europe, Africa, and the Middle East. Weight: 1.6 kg; Price: \$1,250

PTR4402 Secure Manpack/Vehicular Radio: This frequency-hopping radio is used by Canadian FALO teams and air controllers. The radio is highly resistant to ECM and ESM, hopping frequencies almost instantly to avoid jamming and surveillance. The PTR4402 may be used for digital, voice, and data communications. It may be remote controlled at a range of 15 meters. Short range is 5 km with a whip or 16 km with a long antenna in the manpack mode, or 50km with the vehicular adapter. The radio is tough, able to survive being immersed in water for 2 hours or dropped from a height of 1.2 meters without damaging it. Weight: (Manpacked) 4.75 kg, (Vehicular adapter and amplifier) 13 kg; Price (Manpack set) \$3,500; (Vehicular set) \$23,100

PVS1430 Vehicular/Ground Radio: This British-built radio is used by Egypt, Iraq, Kuwait, Libya, Oman, and some African and Far Eastern nations. It is compatible with both Western and Eastern-Bloc vehicles. It may also be powered by both sides' generators with at least 1.5 kW power. It may transmit both voice and data (16 kbps). Short range is 3 km with a whip or 24 km with a normal antenna. Weight: 12 kg; Price: \$2,800

PVS1850 (Smalltalk) Manpack Radio: This is claimed by the manufacturer to be the smallest radio in its class. It is designed to be used by patrols, ambushing parties, parachute drop zone communications, internal security, and other short-range applications. It can translate a whispered voice on its end into a normal-volume voice on the receiving end. Short range is 2 km. This radio is used by the British and by various armed forces in Africa, Asia, and Latin America, as well as Iraq and Qatar. Weight: 3 kg; Price: \$500

PVS2410 Manpack/Vehicular Radio: This British-built radio is used by armed forces in Africa, Europe, Latin America, and the Middle East. It is an FM radio operating in the VHF band, and is interoperable with other VHF radios used by the US, UK, and NATO. It may pass data at the rate of 16 kbps. The radio may be remotely operated at a range of 3 km, and may be used as a repeater. Range is 4 km as a manpacked radio, or 20 km in a vehicle mount. Weight: 8 kg; Price: \$1,800

PVS2450 Vehicular Radio: This British-made radio has been exported worldwide. It is an FM radio operating in the VHF band, designed for command use at longer ranges than the PVS2410 (above), and is more compact than that radio. The PVS2450 is compatible with US and NATO VHF radios. Multiple radios of this type may be operated on the same frequency in close proximity (such as in a command post vehicle) without interfering with each other. A scrambler may be added by using a cable. Range is 4 km using a short whip or 50 km using a standard vehicular antenna. Weight: 6 kg; Price: \$5,800

PVS5300 Manpack/Vehicular Radio: This is a small radio designed for immediate tactical communications at platoon level and below. It can operate in whisper mode, meaning that a whispered communication from the user can be amplified by the radio to be received at normal volume by the listener. The PVS5300 operates in the HF band, so as not to interfere with higher-level communications. Short range is 4 km with a short whip or 20 km with a longer whip. The PVS5300 is British-made, but has been exported to every continent except the Americas. Weight: 3.8 kg; Price: \$835

Scimitar Secure Manpack Radio: This is a new radio designed by England, and exported to Turkey, Nepal, Sweden, Pakistan, the Middle East, and North Africa. It is a frequency hopping radio with ECCM protection and versions that operate in the HF (Scimitar-H) and VHF (Scimitar-V) range are available; both versions use AM. Data transmission is up to 2.4 kbps. Short range is 20 km. Weight: 7.72 kg; Price: \$6,700

Scimitar Secure Vehicular Radio: This version of the Scimitar adds a powerful amplifier and a faster-acting ECCM module. Short range is 100km with a normal AM Vehicular antenna and 400 km with a longer antenna. Weight: 12.6 kg; Price: \$46,000

UK/PRC319 Secure Manpack Radio: This radio is primarily used by special operations units in Britain, the US, Australia,

and New Zealand. It may transmit in both the HF and VHF bands, up to frequencies used by aircraft. Included is an Electronic Message Unit; this is a small alphanumeric keyboard that allows transmission of written words when any voice transmission would be dangerous, as well as data, coordinates, and direct communication with fire control computers and fire direction computers. The UK/PRC319 is also a burst transmitter, able to store messages for up to 500 hours before automatically transmitting them at a high rate of speed. The radio may be operated by remote control up to 50 meters away, and the radio may be used with Vertical Satellite Beamer (see below). The burst transmission feature allows considerable security, and to increase security, a scrambler/descrambler may be added. Short range without the satellite transmission gear is 5 km with a short rod antenna and 50 km with a whip. Weight: 10 kg; Price: \$21,000

UK/PRC320 Clansman Manpack/Vehicular Radio: This is part of the old standard British tactical radio range, and is also used by other NATO countries, and armed forces in Africa and the Middle East. It is still used for some longer-range communications roles. The radio consists of an HF transmitter and receiver, a battery, and a small hand generator to recharge the battery or power the radio when the battery is dead. With the proper antenna, the UK/PRC320 may also communicate with aircraft. The vehicle-mounted variant (the UK/VRC-320/2) adds an amplifier and uses a longer antenna for extended range. A scrambler may be added with a cable. Range for the manpacked version is 3 km with a short whip and 30 km with a longer antenna. The vehicular version has range of 30 km on a short antenna and 100 km with a long antenna. A scrambler may be added by a cable. Weight (manpacked): 8.5 kg, (vehicular) 10 kg; Price: (manpacked) \$2,500; (vehicular) \$11,000

UK/PRC344 Clansman Manpack Radio: This is a short-range member of the Clansman family. It is a UHF-band radio operating on AM, and is useable for ground-to-ground and ground-to-air transmissions. It is normally used by FALO teams, naval transports and landing parties and marines. The radio can be operated by remote control at a range of 3 km, and may be used as a repeater. A scrambler may be used with this device. Short range is 4 km in the ground-to-ground mode and 40 km for ground-to-air transmissions. This radio is used by Britain, and at least two other NATO countries, Bahrain, and the Dutch Marines. Weight: 7.5 kg; Price: \$1,850

UK/PRC349 Clansman Hand Radio: This small member of the Clansman family uses a headset with a boom microphone or throat mike. It is normally used by squad leaders. It is signal-activated, meaning that the battery is kept in a low power-consumption mode until a signal is sent or received. This results in a split-second delay at transmission times, but contributes to a longer battery life (20 hours). A scrambler may be used with this radio. Short range is 1 km. The UK/PRC349 is used by the UK and Spain. Weight: 1.5 kg; Price: \$500

UK/PRC350 Clansman Manpack Radio: This was the standard British tactical radio before the advent of the Jaguar, Panther, and Cougar series, and as they were produced by the thousands and widely exported, many are still being used. Knobs on this radio are large to allow for the wearing of extreme-cold weather mittens, and the entire radio will remain operating down to -40 degrees Fahrenheit. The radio can be used in whisper mode. A scrambler may be used with this radio. The UK/PRC350 operates in the mid-VHF band. Short range is 2 km. Price: \$750

UK/PRC351/352 Clansman Manpack Radio: This member of the Clansman family operates in most of the VHF band, at a longer range than the UK/PRC350. Battery life is a full 18 hours, as opposed to the 350s 12 hours. The radio may be connected to another UK/PRC351 by commo wire to use as a sort of field telephone with links up to 3 km. The UK/PRC351 may be used with a power amplifier (in which case it is known as the UK/PRC352). A scrambler may be added by a cable. Short range is 4 km for the UK/PRC351 and 20 km for the UK/PRC352. Weight: (UK/PRC351) 7.5 kg, (UK/PRC352) 9 kg; Price: (UK/PRC351) \$335 (UK/PRC352) \$1,670

UK/VRC321 Clansman Vehicular Radio: This member of the Clansman family was designed to operate from armored vehicles, but can also be used as a ground station. It may communicate with ground and air units. A scrambler may be added to the unit. Short range is 5 km or 40 km, depending upon what length of antenna is used. Weight: 27 kg; Price: \$4,600

UK/VRC322 Clansman Vehicular Radio: This is a longer-range, HF-band radio used in command, reconnaissance, and logistics vehicles. It can also be used to communicate with aircraft. It may be equipped with a variety of microphones, handsets, speakers, data transmission units, and scramblers. It may be operated by remote control at a range of 3 km. Short range is either 40 or 300 km, depending on antenna used. Weight: 72 kg; Price: \$19,600

UK/VRC353 Clansman Vehicular Radio: This radio was designed primarily for fighting vehicles, but can also be used in fixed or mobile ground stations, running off a generator or vehicular power. It may transmit voice or data (at a speed of 20 kbps). It is a powerful unit that normally overpowers enemy jamming. It is easily and quickly set and operated. A scrambler may be used with the UK/VRC353. Short range is 1 km, 15 km, or 50 km, depending on antenna and amplifier used. Weight: 22.2 kg; Price: \$5,770

Bulgarian Radios

- R-33 Manpack/Vehicular Radio: This Bulgarian radio is in common use by Pact forces. It is an older, heavier radio with a short range of 5km with a 3-meter whip antenna, or 10 km with a 10-meter mast antenna. Weight: 40 kg; Price: \$2,300

R-39 Secure Manpack/Vehicular Radio: This Bulgarian radio is a more modern design, with digital readouts and push-button input controls. Included is a 256-bit encryption set. Short range is 1-1.5 kilometers, depending on terrain. This radio can be remote controlled at a range of 3 km. Weight: 12 kg; Price: \$5,500

R-56 Manpack Radio: This is the standard tactical Manpack radio with Bulgarian forces, and is also used by other Pact forces and Bulgarian allies. It is a modern system, with digital readouts and push-button inputs. The radio has a short range of 3 km with the 2.7-meter whip antenna or up to 10km with the 4-meter mast antenna. Weight: 11 kg; Price: \$1,500

Chinese Radios

10 W SSB Manpack Radio: This is a Chinese radio set that may also be used for telegraphy. Short range is 10 km when used for voice communications, and 8 km when used for telegraphing, if using the 15-meter antenna. The radio can be powered by batteries, a generator, or a hand generator. Weight: 9.8 kg; Price: \$1,150

15 W SSB Vehicular Radio: This is basically a high-powered version of the 10 W SSB that requires vehicle or generator power. Short range is 50 km when used for voice, or 40 km when used for telegraphy. Weight: 7.7 kg; Price: \$5,800

125 W SSB Vehicular Radio: This is an older Chinese radio for shorter-range communications. Short range is 7.5 km. Weight: 22 kg; Price: \$865

200 W SSB Vehicular Radio: This Chinese radio can be used for voice, telegraph, and Teletype traffic. It has a very long range of 125 km (short), and can be remotely controlled at a range of 3 km. Weight: 28 kg; Price: \$14,000

BWT-22B Manpack Radio: This is an older Chinese tactical radio. It is powered by internal batteries. Though an encryption module is not supplied with the basic radio, one may be easily added by means of a cable. The radio is resistant to EMP effects. Short range is 2 km with a whip antenna or 5 km with a mast antenna. Weight: 6.9 kg; Price: \$1000

BWT-133 Manpack Radio: This is a newer Chinese tactical radio that may be powered by a battery or hand generator. It may be used for voice or telegraphy. Short range is 4.5 km with a whip antenna or 15 km with a mast. Weight: 13 kg; Price: \$2,250

HF 100W Power Amplifier: This unit may be attached to Chinese radios to boost range by 600%. It must be powered by a vehicle or generator (but not a hand generator). Weight: 6.8 kg; Price: \$9,000

XD-D2B 15/25 W Manpack Radio: This is one of the more modern Chinese designs. It may be powered from a battery, generator, or hand generator. Short range is 8 km when using a whip or 15 km when using a mast. Weight: 10 kg; Price: \$4,000

French Radios

350H Secure Manpack Radio: This is the standard manpack radio in French service. The communications are secured by means of frequency hopping, both for security purposes and to defeat jamming. The frequency switches among any of 285,000 possible channels several hundred times per second. It was designed to work in networks and to act as a modem for computers, and may be remotely controlled. Short range is 2 km. Weight: 5.9 kg; Price: \$2,000

353H Secure Vehicular Radio: This is one of the standard vehicular radios in the French military. It is basically a version of the 350H listed above equipped with a power amplifier. Short range for this radio is 20 km. Weight: 8.85 kg; Price: \$9,200

354H Secure Vehicular Radio: Another standard vehicular radio in French service, the 354H adds a second power amplifier and relay equipment for other, shorter range radios. Short range for the 354H is 100 km. Weight: 20 kg; Price: \$46,000

TRC331 Vehicular Radio: This is an older French radio most commonly found in older French-made armored vehicles. It is without security features or data transmission capability. A scrambling module or telegraph set may be added via cables. Short range is 20km. Weight: 9.4 kg; Price: \$2,300

TRC340 Manpack Radio: This is an older French-made radio for use at platoon level and above. Short range is 2 km with a 1.2-meter whip, 15 km with a 2.4-meter whip, or 20 km with a 7-meter mast. Weight: 7.9 kg; Price: \$1,000

TRC342 Vehicular Radio: This French-built radio is a combination HF/AM device. Telegraph operations are also possible. This radio has a short range of 20 km with a whip and 100 km with a mast. Weight: 25.8 kg; Price: \$11,500

TRC-344 Vehicular Radio: This is a French-built radio using the FM and AM bands. Telegraph operations are also possible. Short range is 100 km with a whip and 400 km with a mast. This radio is normally used by upper-echelon command and reconnaissance elements. Weight: 54 kg; Price: \$46,000

TRC350 Manpack/Vehicular Radio: This is a French-built radio designed for use at company level and by patrolling elements. In vehicles it is typically paired with an amplifier for longer range (and is then known as the TRC353), though it may be found without one in vehicles. The TRC350 may transmit voice and data, and features easy to change frequencies. Short range is 10 km. Weight: 9.6 kg; Price: \$5,000

TRC353 Vehicular Radio: This is basically a TRC353 with an amplifier and automatic matching unit to allow for quick frequency changes. The amplifier may be separated from the radio up to 40 meters by use of a cable. Short range is 50 km. Weight: 31 kg; Price: \$5,800

TRC354 Vehicular Radio: This is a TRC350 with a more powerful amplifier than the TRC353. Short range is 200 km. Weight: 64 kg; Price: \$23,000

TRC374 Hand Radio: This French radio was designed for difficult conditions such as jungles, deserts, and mountainous terrain. Short range is 5 km. Weight: 2.5 kg; Price: \$2,500

TRC570 Vehicular Radio: This radio is built in France and is used by that country and several overseas forces. It is designed to defeat jamming and can transmit for a Teletype machine or act as a modem at a rate of 16 bps. It can also be connected as a field telephone through the use of comms wire. Short range is 30 km. Weight: 8 kg; Price: \$3,500

TRC950 Vehicular Radio: This is a long-range French radio used by that country's FAR and several Middle Eastern countries. It incorporates a scrambler and frequency-hopping technology. Communication with computers is possible via a 16 Kbps modem, and this modem can be used to program the radio or an attached weapon system. Short range is 50 km. Weight: 12 kg; Price: \$23,000

TRC9100 Secure Hand Radio: This is a small, yet powerful French radio that allows immediate secure tactical communications. It uses frequency-hopping technology in the 33-88 MHz band as well as scrambling. Short range is 2 km. Weight: 1 kg; Price: \$4,000

TRC9200 Secure Manpack Radio: This French radio combines frequency hopping and transmission scrambling to provide excellent security for communications. It has built-in 4800 bps modem. Short range is 4 km. Weight: 7 kg; Price: \$8,000

TRC9300 Secure Vehicular Radio: This is a modular radio designed for long-range communications. It is primarily found on French command and reconnaissance vehicles. It incorporates frequency hopping and scrambling, and can be used as a repeater for other radios. Short range is 50 km. Weight: 26 kg; Price: \$23,000

TRC9500 Secure Vehicular Radio: This is the standard radio for newer French vehicles (such as the Leclerc MBT), and has been retrofitted to many other vehicles. It too uses frequency hopping and scrambling. Short range is 40 km. Weight: 13 kg; Price: \$18,500

- German Radios

HRS 7000 Manpack/Vehicular Radio: This German radio was designed for the reconnaissance and special operations missions. It is a small, yet powerful radio that contains a keyboard for data transmission and frequency input as well as a conventional radio. Short range is 30 km when manpacked and 200 km when used on vehicular or generator power. The radio

has ECCM features and a scrambling module. Weight: 8 kg; Price: \$14,000

SEM 52-S Hand Radio: This small radio is in use by German armed forces and has been widely exported. It may also be used as a modem, with a data transfer rate of 16 Kbps. A scrambler may be added by use of a cable. It may also be used as a loudspeaker. Short Range is 2 km. Weight: 0.95 kg; Price: \$1,000

SEM 52-SL Hand Radio: This is a more advanced version of the SEM 52-S hand radio listed above. It has twice the channels available, and a keyboard may be plugged into the radio for data transmission and to program the stored channels in the radio. Data transfer rate is 16 Kbps. This radio is interoperable between military, police, and civilian radio nets. Short range is 2 km. Weight: 0.95 kg; Price: \$1,500

SEM 173 Secure Manpack/Vehicular Radio: This German radio is in use by that country and has been exported to several countries. Controls are all push-button and digital, and the control panel may be used as a modem (16 Kbps) or handset, or a regular handset may be plugged in. The radio has ECCM features. The smart handset may also be used to remote control the radio at a range of 15 m. The SEM 173 is equipped with a loudspeaker. This radio is a frequency-hopping radio, and also incorporates a scrambler. Short range is 5 km. Weight: 5.2 kg; Price: \$5,800

SEM 183/193 Secure Vehicular Dual Radio: These are basically two SEM 173 radios combined in one unit with an amplifier added. These radios may be remote controlled at a range of 4 km. One radio may transmit at a range of 5 km, and the other at a range of 50 km, if both are transmitting or receiving at the same time. Otherwise, the amplifier is automatically slaved to the transmitting or receiving radio. Weight: 24.7 kg; Price: \$12,700

Iranian Radios

PRC-105/A Manpack Radio: This radio has been use by Iran since the 1987. It is a compact yet powerful radio that unfortunately has a narrow range of operating frequencies (40MHz total). Short range is 0.6 km with a short rod antenna, 2.5 km with a whip, and 5 km with a mast. It is otherwise unremarkable. Weight: 4.6 kg; Price: \$1,350

PRC-122 Manpack Radio: This radio began to replace the PRC-105/A in the Iranian military shortly before the Twilight War, and was thus never fielded in any large numbers. It increases the number of channels available by 400, incorporates some ECCM protection, has a lower power setting for listening silence, and channel presets. Displays are digital and designed for low-light operation. A scrambler may be added via a cable. Short range is 0.6 km with a short rod antenna, 2.5 kg with a whip, and 5 km with a mast. Weight: 4.65 kg; Price: \$1,360

RTX-5051/IR Hand Radio: This is an Iranian radio operating on a narrow band (10 MHz total), for immediate tactical communications. The radio can be used as a modem. Short range is 1 km. Weight: 0.87 kg; Price: \$500

VRC/GRC-105 Vehicular Radio: This is a PRC-105/A radio coupled with an amplifier and a software-controlled matching unit, in a frame. It has been in use by the Iranians since 1990. Other statistics are the same as the PRC-105, except that short range is 30 km. Weight: 10.5 kg; Price: \$3,500

Israeli Radios

PRC-624 Hand Radio: This radio is in common use in Israel. It is light and compact, yet powerful for a radio its size. The radio can be used as a modem with a speed of 20 Kbps. Short range is 2 km. Weight: 1 kg; Price: \$1,000

PRC-2200 Manpack Radio: This is an older-generation radio used by the Israeli military (an Israeli-made version of the US Sincgars radio, called the PRC-730, began replacing it in the late 1980's). It is still in use by second-line, home defense, and police units. Short range is 1.5 km with a rod antenna, 11 km with a whip, and 20 km with a mast. Weight: 8 kg; Price: \$17,000

PRC-624 Hand Radio: This radio is in common use in Israel. It is light and compact, yet powerful for a radio its size. The radio can be used as a modem with a speed of 20 Kbps. Short range is 2 km. Weight: 1 kg; Price: \$1,000

PRC-2200 Manpack Radio: This is an older-generation radio used by the Israeli military (an Israeli-made version of the US Sincgars radio, called the PRC-730, began replacing it in the late 1980's). It is still in use by second-line, home defense, and police units. Short range is 1.5 km with a rod antenna, 11 km with a whip, and 20 km with a mast. Weight: 8 kg; Price: \$17,000

VRC-2200 Vehicular Radio: This Israeli radio is the vehicular-mounted version of the PRC-2200. The VRC-2200 adds an amplifier, a vehicle mounting rack, and an antenna-matching unit. Short range is 30 km. Weight: 24 kg; Price: \$3,500

Italian Radios

Commando Hand Radio: This is the standard hand radio of Italy. It operates in a narrow band range (18 MHz total) in the VHF range. It is of very rugged construction, and simple to operate. Short range is 1 km. Weight: 0.7 kg; Price: \$500

ERC-321 Secure Manpack Radio: This radio has been produced in large numbers for the Italian military and also exported to many Italian and former Italian allies. It is a lightweight, compact radio that uses frequency-hopping technology for security and ECCM. Short range is 3 km. Weight: 4 kg; Price: \$3,000

GTR-100 Ground Radio: This Italian radio was designed for use as a base station, to be run from a generator. Features include digital controls and an ability to preset up to 30 frequencies. A 1.5 kW generator is required to power this radio. Short range is 125 km. Weight: 21 kg; Price: \$14,400

PRC-738 Secure Manpack/Vehicular Radio: This Italian radio is used in heavy electronic warfare (EW) environments due to its ECCM capabilities. The PRC-738 is a frequency-hopping radio that automatically hops to an unjammed frequency set. Short range is 2.5 km on the short whip, and 20 km on the long whip. Weight: 6.6 kg; Price: \$5,800

PRC-638 Manpack Radio: This radio fills the same niche in the Italian military as the PRC-447, but operates in the VHF/FM band for shorter-range but clearer transmissions. It is also half the weight of the PRC-447. Short range is 2 km with a whip or 4 km with a longer whip. Weight: 3.5 kg; Price: \$1,170

PRC-447 Manpack Radio: This is a previous generation Italian radio, superseded by the ERC-321, but not until just before the Twilight War. It is still used in large numbers. It is used to transmit in the HF band using AM, for longer-range tactical communications. Short range is 4 km with the 2.3-meter whip or 20 km with a long antenna. Weight: 7 kg; Price: \$1,700

PRC-677A Manpack/Vehicular Radio: This is a newer Italian radio than the PRC-638. It is also used by the British military (where it is known as the MEL-8677A). This radio may be made secure by adding a scrambler, and may be used as a modem with a speed of 16 kbps. Short range is 3 km. Weight: 4.5 kg; Price: \$875

PRC-738 Secure Manpack/Vehicular Radio: This Italian radio is used in heavy electronic warfare (EW) environments due to its ECCM capabilities. The PRC-738 is a frequency-hopping radio that automatically hops to an unjammed frequency set. Short range is 2.5 km on the short whip, and 20 km on the long whip. Weight: 6.6 kg; Price: \$5,800

PRC-447 Manpack Radio: This is a previous generation Italian radio, superseded by the ERC-321, but not until just before the Twilight War. It is still used in large numbers. It is used to transmit in the HF band using AM, for longer-range tactical communications. Short range is 4 km with the 2.3-meter whip or 20 km with a long antenna. Weight: 7 kg; Price: \$1,700

PRC-638 Manpack Radio: This radio fills the same niche in the Italian military as the PRC-447, but operates in the VHF/FM band for shorter-range but clearer transmissions. It is also half the weight of the PRC-447. Short range is 2 km with a whip or 4 km with a longer whip. Weight: 3.5 kg; Price: \$1,170

PRC-677A Manpack/Vehicular Radio: This is a newer Italian radio than the PRC-638. It is also used by the British military (where it is known as the MEL-8677A). This radio may be made secure by adding a scrambler, and may be used as a modem with a speed of 16 kbps. Short range is 3 km. Weight: 4.5 kg; Price: \$875

RV-2/400 Hand Radio: This is a small radio that can also be used as a transponder in case of emergencies. It is standard equipment among Italian platoons (sometimes down to the fireteam level) and FIST teams. Short range is 1 km. Weight: 1.2 kg; Price: \$500

Polish Radios

Dracena-R Vehicular/Ground Radio: This Polish radio can be run from vehicular power or a 1.5 kW generator. It may be used for voice, telegraph or data transmission (the latter with a speed of 16 kbps). The radio used a 2-meter bar antenna, which may be mounted on a 10-meter mast for extra range. Range is 6 km with the bar antenna, or 30 km with the antenna mounted on a mast. Weight: 20 kg; Price: \$3,500

Russian Radios

AKVEDUK 5UN-1 Manpack Radio: This is small radio in use by Russian forces, including frontier troops and national guard units. It operates in the UHF band, unlike most military radios, and can also be used as a relay device, to transmit Morse code, and to transmit data at a speed of 32 bps for download to an attached computer. It may be operated by remote control at a range of 10 meters. Short range is up to 8 km, depending on terrain. Weight: 5.6 kg; Price: \$4,000

R-111 Vehicular Radio: This is a huge, old radio still used in Category 3 and Mobilization-Only units in Russia and the Warsaw Pact. Some third-world countries that were Soviet client states may also have them. The R-111 has a short range of 9 km with the short 3.4-meter antenna or 13 km with the antenna mounted on a mast. The radio may be remotely controlled at a range of 500 meters. Weight: 100 kg; Price: \$1,500

R-112 Vehicular Radio: This is another ancient Russian radio, used in low-priority units. It has a longer range than the R-111. The R-112 has a short range of 6 km with a whip antenna or 25 km with a mast. Weight: 90 kg; Price: \$2,900

R-113 Vehicular Radio: This is one of the oldest Russian radios still in service, but is still often found in Russian and Pact armored vehicles. It must be run from vehicle power or by a generator. It has a short range of 5 km, using a 4-meter whip antenna. Weight: 17 kg; Price: \$575

R-123M Vehicular Radio: This Russian radio is used in armored vehicles, primarily the 2S1 howitzer and SNAR-10 self-propelled radar system. It is roughly equivalent to US radios of mid-1970s vintage, using a variety of dials and knobs to set it. Short range is 5km with a 4-meter whip antenna, or 14 km with a 10-meter telescopic antenna (usable only when the vehicle is stationary). Weight: 45 kg; Price: \$1,600

R-130 Vehicular Radio: The R-130 is primarily installed in Russian command vehicles. It has a short range of 13km with a 4-meter whip antenna, 19 km with a 10-meter whip, or 88 km with a mast antenna. Weight: 44 kg; Price: \$10,000

R-148 Manpack Radio: This small radio is issued to Russian company commanders and staff officers in airborne and motorized rifle units. Controls and readouts are simple and easy to read and use quickly. Short range is 1.25 km. Weight: 3 kg; Price: \$625

R-154-2M Vehicular Radio: This Russian radio is primarily issued to reconnaissance and command vehicles. It consists of an HF radio, an AM long-range radio, and Teletype transmitter. The radio is described as "unusual and complex" to operate, but in the hands of an experienced RTO, gets good results. Short range is 12 km in the HF or Teletype mode and 100 km in the AM mode. Weight: 90 kg; Price: \$6,500

R-159 Manpack Radio: This Russian radio is widely issued throughout Pact armed forces, and can even be found in some Category 3 and Mobilization-Only units. It operates in the UHF band, and has a short range of 2.5 km with a whip antenna or 12.5 meters with a mast. The radio is also capable of passing data to computers at a speed of 16 Kbps. Weight: 9.2 kg; Price: \$1,150

R-163V (Arbalet-1V) Secure Manpack Radio: This is a more modern Russian radio, used at all levels and all categories of the Russian and Pact military. It has digital readouts and push-button controls. Radio traffic from this unit is encrypted, and the radio can download information to a computer at a rate of 32 Kbps. Short range is 2 km with a whip or 5 km with a mast. Weight: 8 kg; Price: \$4,000

R-163-10V (Arbalet-10V) Secure Vehicular Radio: This is the vehicular counterpart to the R-163V listed above. It has all the features of that radio, and can also transmit Teletype information, and has limited ECCM ability (making it harder to jam). Short range is 18 km with a whip antenna and 60 km with a mast antenna (usable only when the vehicle is stationary). Weight: 35 kg; Price: \$8,300

R-163-10K Secure Manpack/Vehicular Radio: This Russian radio is for tactical command use. It can be used for voice and telegraph operations. Range is 2.5 km when used manpacked, or 7.5 km when used in vehicular mode. Information may be downloaded to computers at a rate of 32 Kbps. Weight: 13.5 kg; Price: \$5,000

R-173 Secure Vehicular Radio: This modern radio is primarily employed by Russian and Pact Tanks. It operates in the VHF band, and has a range of 10 km with a whip and 30 km with a mast. Weight: 43 kg; Price: \$9,200

South Korean Radios

PRC-999K Secure Manpack/Vehicular Radio: This is a South Korean frequency-hopping radio. It can be made further secure by the addition of a scrambling module on a cable. When not using frequency hopping, the radio is interoperable with the PRC-77 and PRC-1077; in frequency-hopping mode, the radio is interoperable with US and US allies frequency hopping radios (such as Sincgars). Short range when manpacked is 0.3 km with a rod antenna and 5 km with a whip. Vehicular range is 25 km. Weight: 5.8 kg; Price: \$9,200

PRC-999K Secure Manpack/Vehicular Radio: This is a South Korean frequency-hopping radio. It can be made further secure by the addition of a scrambling module on a cable. When not using frequency hopping, the radio is interoperable with the PRC-77 and PRC-1077; in frequency-hopping mode, the radio is interoperable with US and US allies frequency hopping radios (such as Sincgars). Short range when manpacked is 0.3 km with a rod antenna and 5 km with a whip. Vehicular range is 25 km. Weight: 5.8 kg; Price: \$9,200

US Radios

AM 1077 VHF Power Amplifier: This device, when linked to an AN/PRC-77 (the standard manpack/vehicular radio in the *Twilight: 2000 Version 2.2* rules), PRC 1077, or AN/VRC-12 (13 km vehicle radio in the rules), boosts range by up to 400%. To achieve this range, a standard US 3.084m whip or its equivalent, or a better antenna, must be used. (This is a normal antenna for most US vehicles.) Weight: 3.6 kg; Price: \$2,900

AM-4677B Power Amplifier: This amplifier may be connected to an AN/GRC-125, AN/GRC-160, AN/VRC-53, AN/VRC-64, AN/PRC-77, or AN/PRC-25 to boost the range of these radios by 400%. There is an AM-4677C version, designed to support certain European radios. This device includes a speaker for the radio installed. This amplifier must be run from vehicle or generator power. Weight: 2.4 kg; Price: \$2,900

AM-4700 Power Amplifier: This amplifier can work with a wide variety of radios, including most VHF radios used by US, NATO, and allied countries. It must be powered by a vehicle or generator. This device boosts range by 400%. Weight: 2.5 kg; Price: \$3,200

AM-6987/GR Power Amplifier: This amplifier is designed for AM-band UHF radios (such as those used to communicate with aircraft by FALOs). It boosts range of these radios by 770%. Weight: 38.56 kg; Price: \$5,800

AM-7175/URC Power Amplifier: This amplifier is used by FM or AM UHF radios to provide a large boost in range. It is a modern device that includes a speaker. It is normally used by aircraft and ships. This device boosts range of such radios by 15 times. Weight: 9.98 kg; Price: \$11,500 (C/-)

AM/7209()/VRC Power Amplifier: This device can amplify the signals of most VHF radios, including frequency-hopping radios like the US Sincgars and radios equipped with scramblers such as the US AN/VRC-89. Hookup is simple, with few external controls and only a single cable connection to the radio and antenna. Signal is boosted 770%. This device requires vehicle or generator power. Weight: 7.5 kg; Price: \$7,000

AM-7238 Filter/Power Amplifier: Designed for VHF radios on standard NATO tactical frequencies, the AM-7238 combines the filtering of crosstalk between two co-located radios, and an amplifier that boosts range by 400%. This device has been produced for the US Sincgars radio since 1991, and variants for European radios have been made since 1994. Weight: 5.4 kg; Price: \$3,600

AN/GRA-39A Radio Set Control Group: A normal radio transmitter must be located within a few meters of its antenna; the antenna, the actual source of the broadcasts, is easily located. Thus develops a major problem for radio operators -- keep moving, requiring a short antenna and reduced range, or take the chance of having an enemy artillery barrage sent your way, ruining your whole day. The US Army came up with a solution—the AN/GRA-39A.

This unit consists of two pieces: one is attached to the antenna and the other to the radio, connected by WD-1. This system allows both the radio and its human operator to be up to one mile from the antenna, thus removing them from danger.

To set up the AN/GRA-39A requires WD-1 along with a successful Electronics: ESY task completion. Use of this device is Electronics: ESY task. Wt: 7.5 kg Cost: \$1000

AN/GRC-103(V) Radio Relay Set: This Canadian system is in use by Canadian, US, NATO, and other armed forces. It is used to relay radio communications over longer distances than normal radios are able to communicate. This relay set is able to pass communications over a range of up to 180 km, depending on terrain and antenna used. By itself, it cannot be used to hear or send radio calls, but instead passes calls to other radios. Weight: 61.5 kg; Price: \$20,800

AN/GRC-106A Vehicular/Ground Radio: This radio is normally employed in a fixed station, but may be mounted in a

vehicle. It operates in the low HF-range, and ground-to-ground communication is 20 km. Ground-to-air communication is 600 km. The radio requires a 4.57-meter antenna and either vehicular or generator power. It can be coupled with a scrambler. Weight: 51.7 kg; Price: \$10,000

AN/GRC-206(V) Vehicular/Ground Radio: This radio is normally used in a ground station, but may be vehicular-based. Functions and controls are monitored by a microcomputer. The radio operates in either HF, VHF, or UHF ranges and in the FM or AM bands. The radio was specifically designed to be mounted in a Jeep or M-113 APC, but is adaptable to other vehicles with ease (in the US Army, they are often mounted in HMMWVs). Two persons may use this radio at once. The AN/GRC-206(V) may be remote controlled by wire from up to 3.3 km away. A scrambler may be added by use of a cable attachment. This radio is often employed by US special operations units and on US Air Force special operations aircraft. Short range is 30 km, 35 km, or 150 km, depending on antenna used. Weight: 14 kg; Price: \$8,300

AN/GRC-213A Vehicular Radio: This radio was first issued to US units in 1983, and is based on the HF AN/PRC-104 manpack radio. The AN/GRC-213 adds an amplifier and a vehicle mounting rack. The radio is capable of burst transmissions and data transfers at the rate of 15.3 kbps. Short range is 20 km. Weight: 19.5 kg; Price: \$2,300

AN/GRC-233 Special Operations Communications Assemblage V1 (SOCA V1): This is a large radio meant to be powered from a vehicle, portable generator, conventional generator, or commercial power outlets. The radio set includes a lightweight portable generator, a scrambler, a vertical satellite beamer (SATCOM), a fax machine, and connections to transmit voice, data and video transmissions (the latter two at a rate of 16 kbps). The radio includes interface equipment for commercial telephone networks, field telephones, military and civilian fax machines, military and civilian keyboards, computers, and antijam equipment. The set can be configured by a competent operator for any mode in less than five minutes. Operation is in the UHF range, and either the FM or AM bands. Range for ground-to ground communications is up to 30 km short range, depending on antenna used, and range for ground-to-air communication is 600 km. Satellite transmission range is potentially infinite. The assemblage comes in 4 cases. Weight (each case): 31.5 kg; Price (Complete): \$145,000

AN/GRC-226 Vehicular Radio: This is an older Canadian-built radio in use by NATO forces and several other allied countries. It has a short range of 10 km when using a mast antenna. Weight: 36 kg; Price: 1,150

AN/GRC-238(V) Vehicular/Ground Radio: This radio combines two AN/PRC-139 hand radios, an amplifier, and an interface box into a single radio able to communicate over longer ranges than the base radios. The lid of the container contains an input panel with push-button controls, LED readouts, and a speaker. A handset and a headset come with the radio. Short range is 5 km, 16 km, or 40 km, depending on antenna used, or 2 km without an antenna. The AN/GRC-238 (V) may use either the VHF or UHF band. A scrambler is included with the AN/PRC-139s. The component AN/PRC-139 radios may be removed and used separately if desired, but the amplifier will not function unless both radios are in the interface box. Weight: 6.3 kg; Price: \$1,820

AN/GRC-512 Vehicular Radio: This radio has ECCM (Electronic Counter-Countermeasures) features to allow it to continue operating in an environment where radio communications are being jammed. It is a frequency-hopping radio, and can also be used to allow computers to communicate with its built-in modem. The AN/GRC-512 can also be used as a relay set and may be operated by remote control. Short range is 15 km. Weight: 27 kg; Price: \$8,500

AN/PRC-104 Manpack/Vehicular/Ground Radio: This is an HF radio used for communicating with ground units and air units. It is a small, yet powerful radio that marked the first use of Large-Scale Integrated (LSI) circuits in a military radio. The radio has a short range of 8 km ground to ground and 100 km ground to air in the manpack mode; in the vehicle-mounted version (known as the AN/MRC-138) with a range of 50 km/300 km, and a ground-mounted generator-powered base station (known as the AN/GRC-193) with a range of 400 km both ground to ground and ground to air. These radios may be used with a scrambler. These radios are used by the US Air Force, Navy and Marines (Reserve forces), as well as New Zealand, Sweden (reserve forces), Spain, and some countries in the Middle East, Africa, and Far East. Weight: (AN/PRC-104) 6.4 kg, (AN/MRC-138) 10 kg, (AN/GRC-193) 15 kg; Price: (AN/PRC-104) \$670, (AN/MRC-138) \$4,200; (AN/GRC-193) \$7,100

AN/PRC-112 A Secure Transponder: This radio is more a survival radio than anything else; it operates on only 8 frequencies on the UHF/AM band, including the international emergency band. There is a newer version, the GPS-112, which adds a GPS (Global Positioning System) receiver. Short range is 4 km. Weight: 0.8 kg; Price: (AN/PRC-112) \$1,300, (GPS-112) \$3,300

AN/PRC-117A Secure Manpack Radio: This is a first-generation frequency-hopping radio, first fielded in 1982 by US special operations forces. It has since been superseded by the Sincgars radio, but is still used by reserve special operations units. It may be used with a scrambler. The frequency hopping also adds ECCM capability. In clear net mode, it may communicate with all other US, NATO, and allied VHF/FM-band radios. The AN/PRC-117A may also be used as a repeater. Short range is 10 km.

Weight: 5.8 kg; Price: \$3,300

AN/PRC-117B(C) Secure Manpack Radio: This is an AN/PRC-117A with an integrated Vinson scrambling module.
Weight: 6.9 kg; Price: \$5,300

AN/PRC-117D(C) Secure Manpack Radio: This radio is a VHF/UHF AM/FM version of the PRC-117B(C), used by FALO teams and to communicate with other aircraft. This radio is also used by the CIA, NSA, and other clandestine government agencies. Range is 10 km in ground-to-ground mode and 80 km in ground-to-air mode. Weight: 6.86 kg; Price: \$9,300

AN/PRC-119 Singcars Secure Manpack Radio: This is the standard manpack radio of US forces and some allied countries, such as Israel. This unit has a built in frequency-hopping unit. Any radio can communicate with any other by means of a special frequency-hopping unit that changes frequency (all 2300 of them) at 30-second intervals so that it is almost impossible to listen in on a conversation for any long period of time. However, both radios must be on a same link to be able to communicate. The AN/PRC-119 may also be used as a modem, transmitting and receiving data at a rate of 16 kbps. The Singcars Manpack may be combined with a Vinson scrambler for maximum security. This radio has a maximum range of about 8km as a manpack radio. Wt: 7.5kg; Price: \$4000

AN/PRC-126 Hand Radio: This is a VHF/FM-band squad-level radio. This radio normally operates in the 30-88 MHz range, but the US Air Force version, the AN/PRC-128 Scope Shield, can use either the 30-88 MHz range or 130-174 MHz range. It is used by security teams at US Air Force bases. Short range is 1 km. Weight: 1.17 kg; Price: \$500

AN/PRC-130 Secure Manpack/Vehicular Radio: This is an HF radio with a frequency-hopping module and an optional encryption module (not included with the basic radio). Short range is 5 or 20 km with the manpack version, and 50 km with the vehicle mounting. This radio is in limited use by US forces, used to fill the gap when Singcars production could not meet demand after the Twilight War began. Weight: (manpack) 6.4 kg, (Vehicle mount) 10.4 kg; Price: (Manpack) \$6,700; (Vehicle mount) \$16,700

AN/PRC-132 Manpack Radio: This small-but-powerful radio was designed for US Navy SEAL teams, Special Forces, and Delta units. 80 channels may preprogrammed into its memory, and add-in cards may be used to give modem capability or to expand available frequencies. A scrambler may be added with a cable. Range is 5, 10, 20 or 50 km depending on antenna used. Weight: 5 kg; Price: \$1,770

AN/PRC-139 Hand Radio: This radio operates over either the 30-88 MHz, 136-174 MHz, or 403-470 MHz bands, depending on what transceiver is installed. (Changing transceivers is a task requiring a Phillips screwdriver and no special skills.) It features an embedded Vinson (scrambler) module. The radio may also function as a modem, at a data rate of 16 kbps. This radio is in use by most US forces, particularly the US Army and Air Force. Short range is 2 km. Weight: 1.35 kg; Price: \$1,000

AN/PRC-140 Saturn Secure Manpack Radio: This radio is the replacement for the Singcars system, but as production had just begun as the Twilight War commenced and production facilities were not in full operation, it is relatively rare. The radio features fast frequency hopping, and can be used with a scrambler to provide extra security. It may also transmit in the UHF and VHF bands, in both the AM and FM mode, to ensure a wide variety of applications. It is virtually impossible to jam the Saturn or break into its nets, since frequency hopping is so fast and the radio may send out signals to block out other radios if they are captured. Hopsets and codes can only be retrieved from the radio with a special procedure; if that procedure is not followed exactly, the radio destroys any hopsets and codes programmed into it. Short range is 2 km with a short rod antenna or 10 km with a whip. Weight: 5.85 kg; Price: \$4,000

AN/PSC-5 Manpack/Vehicular SATCOM Terminal: This device, when linked to a portable satellite downlink subsystem or a vertical satellite beamer (see below), allows communications via satellites in orbit. Normal transmission mode is voice, but a keyboard may be attached for text, as can a fax machine or a computer. The device may also be used as a regular radio, with a short range of 18 km. It may be used as a beacon for rescue or other homing operations. Weight: 7.5 kg; Price: \$6,000

AN/TRC-199(V) Tactical Repeater: This is a radio repeater based on two AN/PRC-139 radios in a case with an amplifier and rebroadcast equipment. The two component AN/PRC-139 hand radios may be removed and used as normal, but the rebroadcast feature of the device will not work unless both AN/PRC-139s are in their cradles. Short range for rebroadcast is 2 km, 10 km, or 40 km, depending on antenna used. A scrambler may be added. Weight: 25.4 kg; Price: \$4,300

AN/URC-101 Manpack SATCOM Radio: This is a self-contained satellite communications system (terminal, antenna, and transmitter are contained in the same unit). The unit transmits either AM or FM voice or data and in the high VHF or standard UHF bands, and can also be used as an emergency locator beacon. It may also be used as a normal radio, with a range of 5 km in the VHF band and 20 km in the UHF band. The AN/URC-100 is scrambler-compatible. The radio transmits in a 60-degree arc using

a hand-held antenna. Weight: 7.26 kg; Price: \$6,700

AN/URC-111 Manpack Radio: This radio was designed for point-to-point transmissions. It uses a hand-held antenna to transmit in a 60-degree cone, providing the enemy less chance to intercept the signal. It is otherwise similar to the AN/URC-101 radio listed above, but was designed to operate in the standard NATO VHF tactical band (30-88 MHz). It may also use the 225-400 MHz UHF band for communication with aircraft. Range is 5 km in the VHF band and 20 km in the UHF band. A scrambler may be attached to this radio. Weight: 7.7 kg; Price: \$6,250

AN/URC-120 Manpack Radio: This is the HF counterpart to the AN/URC-111 listed above (though it is not merely a modified version of that radio). It is used for long-range directional communications, with a short range of 100 km. Weight: 8.6 kg; Price: \$31,000

AN/TLG-17B Radio Jamming System: The AN/TLG-17B is a high-powered radio and radar jamming system. It is capable of jamming multiple frequencies of radio waves. In order to successfully use this equipment, the operator is required to pass an Electronics: AVG task check. The operator of the jammed radio or radar must then pass a Electronics: DIF task in order to continue operating on the same frequency. This unit requires 550 watts of power to operate and has the effective range of 50 kilometers. Wt: 100 kg (including generator) Cost. \$25,000

AN/VRC-86 Vehicular Radio: This is an HF-band radio used for long-range communications from wide-ranging vehicles or by command elements. It entered US service in 1985. The radio may be combined with a Vinson scrambler or a GPS system to receive or transmit position updates. Special transmission filters allow it some ECCM protection. Short range is 150 km. Weight: 27.2 kg; Price: \$17,300

AN/VRC-87C Singcars Secure Vehicular Radio: This is the standard vehicular radio of US forces and some allied forces, such as Israel, Kuwait, and Saudi Arabia. This radio has a short range of about 50km from a vehicle only. This unit has a built in frequency-hopping unit. Any radio can communicate with any other by means of a special frequency-hopping unit that changes frequency (all 2300 of them) at 30-second intervals so that it is almost impossible to listen in on a conversation for any long period of time. However, both radios must be on a same link to be able to communicate. A Vinson scrambling module may be added for maximum security. Wt: 12kg; Price: \$3500

AN/VRC-91A Singcars Secure Manpack/Vehicular Radio: This is a version of the US Singcars radio. This radio has a short range of 8km/35km. It can be man portable or mounted in a vehicle. This unit has a built in frequency-hopping unit. Any radio can communicate with any other by means of a special frequency-hopping unit that changes frequency (all 2300 of them) at 30-second intervals so that it is almost impossible to listen in on a conversation for any long period of time. However, both radios must be on a same link to be able to communicate. A Vinson scrambling module may be added for maximum security. Wt: 7.5kg; Price: \$3000

AN/VRC-92A Singcars Secure Vehicular Radio: Vehicular powered, dual channel (two radios in one) radio that can hold two separate conversations at the same time. It has a short range of 50km. This unit has a built in frequency-hopping unit. Any radio can communicate with any other by means of a special frequency-hopping unit that changes frequency (all 2300 of them) at 30-second intervals so that it is almost impossible to listen in on a conversation for any long period of time. However, both radios must be on a same link to be able to communicate. A Vinson scrambling module may be added for maximum security. Wt: 20kg; Price: \$5000

AN/VRC-94A Secure Vehicular Radio: This radio comes from the generation of frequency hopping radios one generation before the US Singcars family of radios. Total frequency range available in this radio is 30-90 MHz, but the radio may conduct frequency hopping receiving and transmitting only when in the 30-60 MHz range. The base receiver/transmitter of this radio is the same as in the AN/PRC-117A manpack radio. This radio may be made further secure by the addition of a scrambler/descrambler. Short range is 50 km. Weight: 21.3 kg; Price: \$23,000

AN/VRC-94D Secure Vehicular Radio: This is a version of the AN/VRC-94A (see above) that can operate in the VHF or UHF band, in AM or FM mode. It allows communication with other ground units, ships, and aircraft. Weight: 21.3 kg; Price: \$24,000

F-200 Co-Site Filter: This small device prevents crosstalk caused by having more than one radio in close proximity to each other (such as in the same vehicle) in the same frequency band and operating frequencies close to each other. Each F-200 may insulate two radios. Weight: 2.93 kg; Price: \$400

Joint Advanced Special Operations Radio System (JASORS) Secure Manpack Radio: This is the next-generation radio, slated to replace Singcars with US special operations units and agencies like the CIA, NSA, and DIA. The

JASORS radio has a short range of 24 km and can be used with portable satellite uplink subsystem (see below). It is a frequency-hopping radio, and a scrambler may be added for additional security. Other devices that may be attached include keyboards, a digital camera, fax machines, computers, and various amplifiers. The JASORS includes a modem with a speed of 24 kbps, a transponder, and an optional directional antenna that transmits and receives only in a 60-degree cone. The JASORS has the ability to lock out of a radio net radios that have been captured. Few of these radios were produced before the factory was torched by rioters in 1998. Weight: 6.8 kg; Price: \$8,000

KDT-882A Ground-To-Air Radio: This Chinese radio is used by airborne and airmobile troops to communicate with aircraft. It is also used by Chinese FALO teams to coordinate air strikes. It consists of an AM and FM radio. Ground to air short range is 9km, and short-range ground-to-ground communication range is 6 km. Weight: 9 kg; Price: \$2,100

Leprechaun Secure Hand Radio: This is the squad-level member of the Singcars radio family. It is a frequency-hopping radio with an integral Vinson scrambler/descrambler module, includes a 16 kbps modem, and a GPS receiver may be added via a cable to transmit and receive instant location updates. The Leprechaun is derived from the AN/PRC-139 (see above). Short range is 5 km. Weight: 1.4 kg; Price: \$2,500

Miniature Secure Hand-Held Radio (MSHR): This pocket radio uses a scrambler to provide secure communications. Used by the FBI, the MSHR is interoperable with military UHF radios. It will continue working even if immersed in water. Short range is 2.5 km. Weight: 0.28 kg; Price: \$1,250

MP-25 Manpack Radio: This simple radio operates in the low HF range using the AM and FM bands. It is not used by US forces, but is instead exported to several Asian, African, and South American countries. It can use a large variety of headsets and handsets, and accessories such as solar battery chargers and encryption modules. Short range is 25 km in FM mode and 10 km in AM mode. Weight: 4.3 kg; Price: \$2,100

PH-26 Phantom Secure Hand Radio: This radio is designed for shot-down aircrews to contact rescue forces. It gives the pilot over 4,000 frequencies to work with, and secure communications by means of frequency hopping. It operates in the UHF FM band. Short range is 5 km. Weight: 0.59 kg; Price: \$2,500

PR 1605 Hand Radio: This radio is waterproof, and functions (to a limited extent) underwater. Range underwater is in a 100-to-1 ratio: 1 meter underwater uses the equivalent of 100 meters of signal strength above water, so that an operator 10 meters underwater would use up 1 km of range just to get the signal out of water. Naturally, diving gear with special facemasks and voicemitters must be used when underwater to use this radio. It operates in both the VHF and UHF bands, and thus ground radios, ships, and aircraft can be contacted. This radio is used by US special operations forces, the US Marines, the Portuguese Navy, and other unnamed foreign forces. Weight: 1 kg; Price: \$2,000

RC-292 Antenna System: The RC-292 is a 10-meter-tall radio antenna. The radio attached to this antenna has its broadcast range tripled in normal mode or multiplied by six in high-power—thus highly detectable—mode. The antenna is non-mobile and takes one man-hour to assemble (i.e., one man takes one hour, two men take one-half hour, four men take one-quarter hour, etc.). In addition, it takes one-half man-hour to disassemble. Both assembly and disassembly require a successful Intelligence: ESY task completion. This antenna broadcasts in 360 degrees for purposes of reception and detection. Wt: 10kg; Cost \$1000

RC-585 Antenna System: The RC-585 is identical to the RC-292 except the RC-585 only broadcasts on a 90-degree arc—thus making it harder to detect. It takes an additional one-half man-hour to erect. Wt: 13kg Cost: \$1500

SB-22/PT Field Switchboard: This switchboard is designed to be a compact, rugged battery-operated, self-contained unit capable of handling up to 22 separate telephone lines. Setting up the unit requires WD-1 to be run to serviced telephones and a successful Electronics: ESY task completion. An Intelligence: ESY task is necessary each period to successfully operate this unit. Wt: 7.5 kg Cost: \$600

TA-1 Field Telephone: Requires commo wire to link it to other field telephones. Secure unless the wire is tapped. Includes 30m of commo wire. Sound-powered. Wt 3kg; Price \$100

TA-312/PT Field Telephone: This small, rugged, battery-operated, field telephone is quite common in US Army field organizations. It is used, for the most part, in areas where units are planning to stay for an extended period of time. The field telephone unit consists of a handset, as well as a box-like base that has a hand crank.

To set the unit up requires WD-1 telephone line (commo wire), run to a switchboard or destination phone, and an Electronics: ESY task completion. Wt: 2.5 kg Cost: \$250 (C/S)

TA940B Power Amplifier: This device may be attached to British-designed, US, or NATO HF-band radios to boost range by 770%, or to boost AM radios by 200%. It must be powered by a vehicle or generator. Weight: 8.6 kg; Price: \$5,800

TA944 Power Amplifier: This newer amplifier superseded the TA940B in NATO service. It has the same capabilities as the TA940B. Weight: 5.9 kg; Price: \$6,000

TA4044B Power Amplifier: This amplifier is used in the same way as the above two amplifiers, but adds support for VHF radios (the normal band used by most military radios, such as those listed in the *Twilight: 2000 Version 2.2* rules). It cannot be used for AM radios, but will boost range of HF and VHF radios by 770%. Weight: 15.5 kg; Price: \$5,800

Generic Radio Equipment

Antenna, 500km: A wire antenna used to rig field-expedient antennas and a half a dozen resistors and insulators. Rigged from trees or other supports and grounded, the antenna alone will triple the radio's range. When used in conjunction with a generator, the full range may be reached. Weather and terrain will affect the range of the radio when using these antennas. Wt 3kg; Price \$100

Commo Wire: Has a myriad of other uses other than for communications. 300-meter roll. Wt 3kg; Price \$25

Cellular Telephone: A portable cellular phone allowing access to cellular communications networks. Wt: 1 kg; Price: \$800

Expendable Jammer: This is a compact, disposable electronic jamming unit. Once activated, the jammer operates continuously for 2 hours, overpowering any transmitter or receiver within 20 meters and requiring operator checks within 40 meters. Once set, the jammer can be programmed to delay activation for up to 100 hours, in one-minute intervals. Weight: 2.25kg; Price: \$4000

Field Sound Processor: Roughly the size of a small briefcase, the field sound processor (FSP) is packed with electronics, allowing the user to record audio inputs and perform real-time analog processing at the same time. Capabilities include a high-gain/low-noise amplifier, speech passband filter, compressor, and equalizer. Essentially, this means the unit is able to take in a weak signal and boost it to within a set range to filter out all noise beyond the human speech range, and to improve the quality of the sound within that range. To work properly, this requires the skill of Electronics

Current Tech: Current tech FSP gear is as described above. The unit runs on a set of rechargeable 9.6V batteries, with duration of seven hours before recharging. This item must be custom built. Wt: 7kg; Price \$850

Hi-Tech: No new features, aside from smaller size and manufacture from government contractor. This unit is available only to government personnel. Wt: 5kg (about the size of a handbag).

Frequency-Hopping Radio: This radio resists jamming and interception by shifting among several preset frequencies at preset intervals (usually several hundred per second). Unless a listener knows the frequencies and intervals, he cannot remain locked onto the signal. All sets in a system must be synchronized in order to communicate, but this can be accomplished by any of the radios in the loop at a predetermined time using an electronic key coder. Weight (radio) 5kg (coder) 0.5kg; Price (radio) \$800 (coder) \$500

Global Positioning System (GPS) Receiver: This is a small, handheld, Global Positioning System (GPS) receiver featuring selective availability/antispoofing and antijam capability. It provides precise positioning and timing solutions based upon signals received from the GPS satellite constellation. It is a five-channel receiver, capable of Precision Code (P-Code) and Y-Code (encrypted P-Code) reception. Positioning solutions can be displayed in latitude, longitude, military grid reference system, Universal Transverse Mercator, British National Grid, and Irish Transverse Mercator Grid coordinates. It contains 49 map datums, and can be programmed to support navigation. The GPS has a built-in test feature, and is night-vision goggle compatible. The GPS is accurate to within 10 meters. Note: In T2000, satellite availability is spotty at best, since many have been shot down. Weight: 1.3kg; Price \$3000

GPS, Commercial: This is a civilian version of the military GPS described above. It has no encryption or antijam capability, widely varying map availability (some are actually better in this regard than military versions), and are accurate to within only 100 meters. Weight: 0.3kg; Price \$2000

Individual Tactical Radio: A small radio of limited range (one kilometer) designed to be used by small groups who require precise coordination and hands-free operation. The radio consists of a voice activated throat mike (strapped in place over the larynx), a headset with bone-conduction earphones, and a battery case (usually carried in a shirt pocket). This radio is hands-free and allows the wearer to hear more-or-less normally when in use. The set also incorporates a manual "beeper" button; enabling

Morse signals to be sent if the sender does not want to speak. These are relatively sophisticated radios and are more expensive than the normal walkie-talkie. Wt: Negligible; Price: \$550

Portable Facsimile Machine: Connected to a radio, this enables recon photos, situation maps and other reports to be sent and received by units in the field. Wt: 6 kg; Price: \$1800

Portable Fax Machine: Connected to a phone, portable phone, computer or satellite downlink system, this enables documents to be sent and received (or just printed out in the case of the computer) in remote locations. Wt: 6 kg; Price: \$1800

Portable Satellite Downlink Subsystem: An antenna system permitting radio communication via geosynchronous satellite with practically any location in the world when linked into a proper radio in place of the normal antenna. It requires five minutes to erect and align, and two minutes to completely dismantle. Wt: 4 kg; Price: \$12,000 (R/S).

RF Emitter: The RF emitter can create RF emissions at frequencies set by the user. This is most commonly used for jamming other devices, especially communications devices. However, the RF emitter has several advanced uses—DIF: Electronics to succeed—such as jamming microprocessors, video screens and microprocessor-controlled equipment. Success means that the equipment is jammed and inoperable. Range for such jamming is limited to the strength of the emitter, but for the models shown below is 200 meters.

This is a hand-held unit with an integral transmission antenna and an LCD display showing current frequency. This device is available to any civilian in a Western nation, but spraying RF emissions without regard for radio communications guidelines is illegal in all jurisdictions. Wt: 1 kg; Cost: \$200.

RL-37 Reel Unit: This sawhorse-looking device allows the rapid and mobile deployment of the one-mile reel of WD-1. This unit can be stationary mounted, drawing the wire out from the central location, or mounted on the back of an open vehicle, allowing the laying of lengthy segments of wire rapidly. Wt: 8 kg; Cost \$100

Scrambler/Descrambler: Used with a telephone or voice radio unit, this scrambles conversation to seemingly random noise at the transmitter and back to conversation at the receiver. A sophisticated computer analysis can descramble a particular conversation within hours and, once the scramble pattern is known, can be used to program a scrambler with a similar pattern. Wt: 1 kg; Price: \$2000

Trail Bug: This is little more than a powerful hidden microphone. The trail bug is silver-dollar-sized and 13mm thick, and is normally hidden on a vehicle in order to track it. Once activated the device will function for 10 weeks, and can be tracked at a range of 8km in an urban or mountainous environment, or up to 30km in open country. A character with skill can read the trail bug at 12km/40km (AVG: Electronics) or 15km/50km (DIF: Electronics). Weight: 0.5kg; Price: \$300

Transponder: Special radio transmitter designed to broadcast a specific signal at a specific frequency to provide a homing beacon for pickup aircraft, radiation homing missiles, etc. The device has a one-kilometer range without an antenna, which extends to 10 kilometers with an antenna. Its internal battery will power the broadcast for 18 hours and can be started with an internal timing circuit up to 72 hours after emplacement. Wt: 1 kg; Price \$1800

Transponder, Encrypted: As the above, with encrypted burst-mode transmissions and IFF (Identification Friend or Foe) interrogator. The US AN/PRC-112(V) is an example. Weight: 0.2kg; Price \$2500

Vertical Satellite Beamer: This device resembles a portable satellite downlink system, but is an infrared laser transmitter, allowing transmission only to orbiting satellites equipped with laser-receptors. The transmission beam is only visible to IR vision gear. It takes five minutes to set up and two minutes to take down. Wt: 12 kg; Price: \$35,000

WD-1 Telephone Line: This line is highly useful for a wide variety of purposes, including, but not limited to, the laying of telephone lines. It is also used in wiring remote electronic detonators, claymore mines, or trip wires—or simply stringing something up. The cost of the wire includes a linesman set—a leather belt pouch containing a set of wire cutters/strippers, a roll of electrical tape, and a pocketknife. The WD-1 comes in three size reels—one mile (1609m), one-half mile (805m), and one-quarter mile (402m). Weight: (1 mile) 22 kg (1/2 mile) 10 kg (1/4 mile) 5 kg; Cost: (1 mile) \$200 (1/2 mile) \$75 (1/4 mile) \$35 (all)

Wind-Up Radio: Though first placed on the US market in the mid 1980's, sales of these items took off only in the mid-1990s as many models came to the worldwide market. It is a standard commercial radio that can be used to pick up commercial radio stations, weather stations, and civil defense broadcasts. This radio gets its power from a wind-up magnet, the mainspring charging a Nickel-Cadmium battery. 200 cranks will run the radio for an hour, or the built-in flashlight for 35 minutes. These types of radios are not likely to be damaged by EMP. Weight: 0.8 kg; Price: \$70

HAND TOOLS

20-molar acid: Concentrated acid (usually nitric or sulfuric). 100 grams. Wt 0.1kg; Price \$250 (R/R)

AN/PRS-3 Mine Detection Unit (Metallic): The AN/PRS-3 is virtually identical to the AN/PRS-7A except that it is effective in finding metallic mines only--an Electronics or Combat Engineer:AVG task. Wt: 13 kg Cost: \$1500 (S/R)

Mines can still be detected through the old probing method. This is done by a character crawling at up to one-third his normal rate and probing around himself with a knife or similar object. It is an Observation:AVG task to do successfully; failure may result in missing a mine.

The removal of detected mines may take anywhere from five to 30 minutes per mine, depending upon any anti-handling devices and how well the character passes a Combat Engineer:EASY task check. Task check failure may result in the mine's detonation.

AN/PRS-7A Mine Detection Unit (Non-Metallic): The AN/PRS-7A is a backpack-mounted, man-portable, battery-operated, mine detection unit. It consists of a headset, a backpack unit, and a telescoping mine detection wand (one meter in length, fully extended). In the hands of an experienced combat engineer, this unit is effective in detecting all kinds of mines, both metallic and nonmetallic. Detecting normally emplaced mines is an Electronics or Combat Engineer: Easy task for nonmetallic mines and an Electronics or Combat Engineer: Average task for nonmetallic ones. Each battery lasts for 60 hours of operation. A man can use this unit and walk at one-half his normal rate. Wt: 15 kg Cost: \$2500 (R/R); Battery, \$50 (S/R)

Anvil: This is part of the basic blacksmith tools, but must be bought and handled separately. This and a small forge allows basic blacksmithing (creation of simple metal parts). Price: \$50 (S/S)

Battery Charger: Charges batteries from generator power. Generator not included. Weight 1kg; Price \$100 (V/V)

Blacksmith Tools: These include tongs, hammers, bending rods, engravers, etc. A basic tool set can also be used but suffers a -1 penalty. Price: \$100 (C/C)

Bolt Cutters: Cuts dropforged steel (such as lock hasps) up to 15mm thick, or wire up to 25mm or chains and similar material of comparable dimensions. Wt 3.5kg, Price \$35 (C/C)

Bullet Molds: One mold will allow casting of the lead bullet of one caliber of weapon. Shot is made much more simply by dropping molten lead into a bucket of water. Lead bullets are usually much worse penetrators (+1 to each penetration category), but cannot be jacketed with primitive technology. They can be crossed into Dum-Dums (by hollowing out the tip), this reduces the range by 1/2 and worsens the penetration further (+1), but increases the damage by 1 die. Gunpowder or cordite is still needed however. Price: \$250 (S/S)

Cranes: These are fixed assemblages (which have to be built into the shop) which lift and move heavy objects via electrical power. they require around 2Kw/ton for everyday use, with peak power ranging in the 15Kw/ton range (usually handled by batteries). Diesel cranes can also be found, and consume fuel at the rating listed for generators of that power. They are essential for speedy replacement of large vehicle parts (engines, turrets), or moving immobilized vehicles around. A 10 Ton crane is good enough for parts and engines, a 50 Ton crane for vehicles (except the heaviest of tanks). They can also be invaluable in construction of buildings, bridges etc. Setting up a crane at a site is a Major (but Average) task for Civil Engineer, or Machinist. Price: \$500/ton (S/S)

Crucible: This holds molten metals (steel/copper), and can be attached to a crane to move molten metal out of the forge, and cast it into the mould in a controlled manner. The price depends on the size and how advanced the pouring technique. For \$100 you get an insulated bucket with handles, for \$5000, an industrial 500L steelcasting bucket. Price: \$100-5000 (S/S)

Cutting Torch: This requires acetylene and oxygen (or compressed air) tanks. Small tanks will last for 4-5 jobs, while large tanks will last 30 jobs (10 min cutting time/job). Tanks cost \$50 for a small one, or \$150 for a large one and are V/V. A new charge of fuel costs \$40/job for acetylene (R/R) and \$5/job for oxygen (R/R) or \$1/tank compressed air (V/V). Cutting torches and Arc welders are necessary for jury-rigging. Price: \$300 (C/C)

Duct Tape: Per roll 50mm wide by 50m long. Also known as 100-mph tape. Any color (usually olive drab or black in military use). Wt1kg; Price \$7 (C/C)

Epoxy Glue: Per 50 gram tube. Wt 0.1kg; Price \$10 (S/R)

Entrenching Tool: the E-Tool, a folding shovel/pick. Wt 0.75kg; Price \$26 (C/C)

Finishing Tools: These are power hand tools for "blueprinting" parts to fit exactly into place. They are needed for using cast parts, and augment the normal tools for the machinist. Price: \$1500 (S/S)

Forge: The quality of the forge is determined by it's cost, a gas fired industrial forge from a steel foundry will run into the 10's of thousands of dollars, and are immobile. Small experimental gas fired forges will cost \$4-5000. Primitive hand-made coal burning forges will run \$1000-\$5000 depending on size. As natural gas is as rare as can be, hardly anyone will be using gas-fired forges, but they have about twice the efficiency, and are much easier to work with. Price: \$1000-50000 (S/S)

Glass Cutter: Wt 0.1kg, Price \$5 (S/S)

Machine Shop: The shop consists of 4 basic parts. The lathe, the disk grinder, the drill press, and metal saw. The one listed here is for a small experimental shop. An Industrial set could cost up to 1 million dollars. These require at least 50Kw to operate a small shop (and up to 500Kw for industrial). To use the shop, one has to have Machinist skill, though any "shop" skill (Metallurgy, mechanic, civil engineer) will allow use at 1/2 skill level. A well run Machine shop can create practically any metal part from stock metal. These parts are hand made, rather than produced in a factory, and will take a great deal of time (and thus money) to create. however, it is the only source of new parts. Other machines can be bought for specialized jobs. A brass stamper for turning out cartridges (with different dies for each caliber). Price:\$10000 (S/S)

Metal Detector: A device the size of a walkie-talkie, this detects the presence of metal up to two feet away. Wt: 4 kg Price: \$750 (C/C)

Mine Detector: Detects metallic objects within 300mm; interpreting the signal is up to the operator (AVG: Electronics or Combat Engineer). Some mines are magnetic and may be set off by the detector. Some mines are non-metallic and are very difficult or impossible to detect. Runs off internal batteries. Wt 10kg; Price \$500 (S/C)

Lockpick Set, Electronic: Used to "read" combination and electronic locks. Wt 0.5kg; Price \$500 (R/R)

Reloader Kit: This machine makes it possible to reload 40 shots per hour. Wt: 10 kg, Price: \$1000 (S/S).

Reloading Bullets: Enough bullets for 350 shots. Wt: 3 kg, Price: \$25 (V/V).

Reloading Powder: Enough propellant for 350 shots. Wt: 5 kg, Price: \$150 (C/C).

Reloading Primers: Enough primers for 350 shots. Wt: 10 kg, Price: \$250 (C/C).

Sandcasting Setup: Rather than one fixed product, this represents the gathering of all the materials in order to do sandcasting, it includes braces, a clean supply of sand, and clamps. Once an object has been created, it can be cast by placing it (or a wax copy) in sand, and hyper compressing the sand around it (or melting the wax out). A crude copy (unfinished) can be made then by pouring molten metal into the mould. This is the fastest way of making parts, called Drop Forging. The parts then have to be annealed, and finally finished. Price: \$1000 (S/S)

Small Arms Cleaning Kit: Wt 0.7kg; Price \$16 (S/S)

Swiss Army Knife: A many-bladed utility knife that folds into a small package. Includes large 57mm blade, small 40mm blade, Large screwdriver, bottle opener, wire stripper, small screwdriver, can opener, corkscrew, scissors, wood/rope saw; reamer, tweezers, plastic toothpick, key ring, fish scaler. Wt 0.1kg; Price \$22 (S/R)

Temperature-Controlled Ovens: These allow the slow cooling of metals to properly anneal newly cast metal parts. Crude annealing will cause the part to automatically have a wear value of d10 (10 being automatic failure of the part). Price: \$1000 (R/R)

Wire Clippers: Clips up to 10mm wire. Wt 0.5kg; Price \$10 (V/V)

VISION DEVICES

Telescopic Sights of several types and powers are normally found on civilian hunting rifles or military sniping rifles, although they can also be found on assault rifles and battle rifles, and (much more rarely) pistols, revolvers, and auto rifles. They are almost never used on other weapons. Use of telescopic sights on auto rifles, machineguns, and grenade launchers tends to ruin the sight due to the extreme vibration encountered. Sniper rifles include the weight of a sight.

1.5x Sight: Wt 0.1, Price \$27 (R/R)

2x Sight: Wt 0.1, Price \$36 (R/R)

2-6x Sight : Wt 0.3kg, Price \$150 (R/R)

2.5x Sight: Wt 0.1, Price \$40 (R/R)

3x Sight: Wt 0.15kg, Price \$45 (R/R)

3-9x Sight: Wt 0.45kg, Price \$200 (R/R)

3.5x Sight: This is the standard sight in the game rules, and is the sight fitted to weapons such as the AUG, G-11, Colt ACR, and other such weapons with integral sights. Wt 0.18kg, Price \$47 (R/R)

4x Sight: Wt 0.2kg, Price \$48 (R/R)

4x Day/Night Sight: This telescopic sight combines both magnification and night vision. It uses light intensification for night vision. Weight: 1.45 kg; Price: \$1850 (S/R)

6x Sight: Wt 0.3kg, Price \$100 (R/R)

7.5x Sight: Wt 0.4kg, Price \$120 (R/R)

8.5x Day/Night Sight: This is a stronger version of the 4x Day/Night Sight. Weight: 2.22 kg; \$3400 (S/R)

9-12x Sight: Wt 0.6kg, Price \$350 (R/R)

10x Sight: Wt 0.5kg, Price \$250 (R/R)

12x Sight: Wt 0.6kg, Price \$275 (R/R)

20x Sight: Wt 1kg; Price \$450 (R/R)

Add-On Starlight Scope: This device is designed with the addition of a telescopic sight in mind. The telescopic sight is attached to the starlight scope, and then the starlight scope is attached to the weapon. This provides night vision equal to starlight scope, and magnification equal to the telescopic sight. Effective range at night is limited to the range of the starlight scope (450 meters). Weight: 1.46 kg; Price: \$1100 (S/R)

Add-On Image Intensifier: This is a miniaturized image intensifier first produced by Norway in the early 1990s, but soon distributed all over NATO and other friendly nations. The procedure is reversed from the above sight; the image intensifier is mounted on top of the optical sight. The resulting hybrid sight can be used both day and night. Protection is protected against blinding by explosive burst and flares. Effective range at night is limited to the range of the image intensifier (900m). Weight: 0.79 kg; Price: \$2500 (S/-)

Aimpoint Laser Sight: Allows +2 to hit when properly fitted and sighted. This device provides this modification out to a range of 100 meters. Wt 0.1kg, Price \$350 (R/R)

Infrared Aiming Light: This weapon, when properly boresighted to a weapon, provides a dot of light similar to that of an Aimpoint Laser Sight. This dot, however, is visible only to those using night vision devices. Maximum range of sight for this dot is 600 meters. These devices were first used by Coalition forces during Desert Storm. Weight: 0.13 kg; Price: \$350 (S/R)

Laser/Infrared Aiming Light: This combines the utility of the Aimpoint sight and the infrared aiming light. It can also be used

underwater to a range of 20 meters. It may also be used as a flashlight. Weight: 0.25 kg; Price: \$750 (R/-)

Light Intensifier Goggles: These amplify existing light thousands of times, rather than heat emanating from objects and people. They have the same range as IR Goggles when used in the passive mode, but double their range and allow for better short-range vision clarity when used in the active mode. The drawback to active mode is that the goggles are acting as a flashlight and show up clearly to starlight scopes, IR goggles, thermal vision, and passive/active IR viewers. Weight 0.5kg; Price \$1800 (S/S)

Thermal Weapons Sight: This is a thermal vision sight designed to be mounted on small arms and heavy weapons, such as the US military's AN/PAS-13(V)2 TWS. A user of this sight can identify targets at a range of 690 meters (down to telling what type of uniform is worn, type of weapon carried, whether the target has a mustache, etc.), and larger objects such as vehicles and buildings at a range of 1000 meters. Most of these devices have crosshairs to facilitate aiming. Glass and Plexiglas are opaque to the Thermal Weapons Sight, and appear black. These sights were introduced by NATO and Israeli forces in early in 1997; as such, supplies of these sights are low, and they are hard to come by. Weight: 2kg; Price: \$4000 (R/-)

OPTICAL DEVICE	MODIFIER	MER
Iron Sights	0 Meters	500 Meters
1x Sight	4 Meters	600 Meters
1.5x Sight	6 Meters	600 Meters
2x Sight	8 Meters	600 Meters
2.5x Sight	10 Meters	750 Meters
3x Sight	12 Meters	800 Meters
3.5x Sight (Standard)	15 Meters	900 Meters
4x Sight	17 Meters	1000 Meters
6x Sight	20 Meters	1200 Meters
7.5x Sight	25 Meters	2000 Meters
9x Sight	30 Meters	2400 Meters
10x Sight	35 Meters	3000 Meters
12x Sight	45 Meters	3600 Meters
20x Sight	60 Meters	6000 Meters
Aimpoint Laser Sight	26m (Short), 20m (Medium)	200 Meters
Coincidence Rangefinder	15 Meters	Infinite
Image Intensifier	20 Meters	7000 Meters
Laser Rangefinder	30 Meters	Infinite
Laser Rangefinder with Computer	40 Meters	Infinite
Starlight Scope	20 Meters	1600 Meters
Thermal Sight	12 Meters	7000 Meters