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Researched and compiled by Joe Cyr (www.joe-cyr.com)

MACH NUMBER - The ratio of the velocity of a body to that of sound in the surrounding medium. [1.1]

MACHINE CODE - Computer instructions and data definitions expressed in a form that can be recognized by the processing unit of a computer. [3]

MACHINE LANGUAGE - A language that can be recognized by the processing unit of a computer. Such a language usually consists of patterns of 1s and 0s, with no symbolic naming of operations or addresses. [3] See also **ASSEMBLY LANGUAGE**.

MADDEN KNEEBOARD - See **ELECTRONIC KNEEBOARD**.

MAGIC COOKIE - See **COOKIE**.

MAGIC LANTERN - A wide area light detection and ranging (LIDAR) system used to detect moored and free-floating mines. It employs a neodymium:YTTRIUM-ALUMINUM GARNET laser as a light source. The system also directs a compact mini-torpedo, or torpedolet, called "Terminator", to destroy the mine. **MAGIC LANTERN** can operate at altitudes between 400 feet and 1,500 feet above sea level. There is a trade-off between improved resolution and **SIGNAL-TO-NOISE RATIO** at lower altitudes and expanded field of view at higher altitudes. The system's search depth is not greatly affected by the aircraft's altitude. [10:2555] Also called **AIRBORNE LASER MINE-DETECTION SYSTEM (ALMDS)**.

MAGIC WARRIOR (MW) - A mobile tactical multi-sensor ground surveillance vehicle designed to provide line-of-sight surveillance and targeting. The MW sensor suite consists of a bore-sighted FLIR camera, high-resolution long-range color and black & white cameras, a radar, a Mini Eye-safe Laser Infrared Observation Set (MELIOS), a digital compass, and a GPS system. The MW is leveled using four hydraulic jacks controlled from the driver's compartment and can be deployed or stowed in less than five minutes. [10:2747]

MAGNESIUM DIBORIDE - See **HIGH TEMPERATURE SUPERCONDUCTIVITY (HTSC)**.

MAGNETIC ANOMALY DETECTOR (MAD) - A system, employed by ASW patrol aircraft, helicopters, and blimps, to detect the presence of a submerged submarine's metal hull through measurement of local fluctuations in the earth's

magnetic field. The MAD sensor was extended well behind the aircraft's fuselage to minimize interference from its metal structure. [] NOTE: One MAD tactic used by a low-flying aircraft was to drop a bright yellow dye marker and/or a white smoke float on the water at the point of a detected a magnetic signal (at which point the MAD operator would transmit the codeword "MADMAN" to alert other ASW forces in the area). After several more passes over the marked location, if signals were still detected, the aircraft would drop a depth charge or homing torpedo at the location. MAD-carrying aircraft include the Navy's P-3 Orion, the RAF Nimrod MR2, and the Air Force SH-2G Super Sea Sprite helicopter.

MAGNETIC COOLING - The use of magnetic fields for cooling. [10:44] See also **MAGNETOCALORIC EFFECT**.

MAGNETIC GRADIOMETER - A magnetic sensor configured to detect the spatial variation of the magnetic field intensity from sources external to the instrument, that is, the *gradient* of the magnetic field intensity. [12] NOTE: Magnetic gradiometers and **MAGNETOMETERS** are key elements of **MAGNETIC ANOMALY DETECTORS**, mine fuses, intrusion and ordnance detection systems, proximity detection systems, underwater mine detection systems and active **DEGAUSSING** systems. Magnetic sensors in a tactical missile can be used to detect and localize a target, such as a tank, from the background magnetic field variations. [12]

MAGNETIC MATERIALS - That category of **MATERIALS TECHNOLOGY** which addresses materials with military applications in magnetic shielding, **SONAR** (e.g., magnetostrictive alloys), and very high-speed power supplies. [12]

MAGNETIC RANDOM ACCESS MEMORY (MRAM) - A type of **RANDOM ACCESS MEMORY (RAM)** that does not lose data when power is removed. []

MAGNETIC SIGNATURE CONTROL - The employment of materials, electronics, and platform design features intended to reduce the susceptibility of the platform to detection, tracking, and engagement by an adversary using magnetic sensors, such as those found in mines. **MAGNETIC SIGNATURE CONTROL** includes the use of specially designed materials, structures, coatings, or paints to reduce magnetic signature. It also includes the use of nonferrous armors, magnetic **SPOOFING** devices, and **DEPERMING** or **DEGAUSSING** techniques for larger military items. [12] See also **ACOUSTICS SIGNATURE CONTROL**, **INFRARED SIGNATURE CONTROL**, **LASER SIGNATURE CONTROL**, **MULTISPECTRAL SIGNATURE CONTROL**, **OPTICAL SIGNATURE CONTROL**, **RADIO FREQUENCY (RF) SIGNATURE CONTROL**, and **SIGNATURE CONTROL**.

MAGNETIC WOOD - Thin wood panels sandwiching minute ferrite materials and used to shield areas from cell phones and similar microwave devices. [] NOTE:

Magnetic wood is used in places such as restaurants and theaters to disable the effectiveness of cell phone use within those areas without the need to resort to signal jammers.

MAGNETOCALORIC EFFECT - The phenomenon where magnetic materials heat in a magnetic field and cool upon its removal. [10:44] See also **CRYOGENICS**.

MAGNETOELECTRONICS - The use of electrons' spins (not just their electrical charge) in information circuits. Also called **SPIN ELECTRONICS** or **SPINTRONICS**. [10:2782] **NOTES:** (1) One magnetoelectronic device is the magnetic hard drive based on the **GIANT MAGNETORESISTANCE (GMR)** effect. (2) The use of spin would make it possible to produce quantum computers that would not have to rely on binary digits, but instead could encode information in different spin states.

MAGNETOHYDRODYNAMICS - See **HYDROMAGNETICS**.

MAGNETO-IONIC MEDIUM - An ionized gas which is permeated by a fixed magnetic field. [3]

MAGNETOMETER - An instrument for measuring the intensity and/or direction of a magnetic field. [3] See also **MAGNETIC GRADIOMETER**.

MAGNETO OPTICAL RECORDING (MO RECORDING) - A digital recording technique involving magnetic material on which magnetic fields are used to store the data. In MO recording, a tightly-focused laser beam supplements the magnetic field used to write to the MO disk. The laser alone is used to read the disk, employing the **KERR EFFECT**: when influenced by a (local) magnetic field, a reflected light beam polarization is rotated slightly. []

MAGNETORHEOLOGICAL FLUID - A liquid made up of microscopic iron particles mixed with silicon oil or corn syrup to form a mayonnaise-thick solution that changes its properties in milliseconds when a magnetic field is applied. [www.sciencentral.com, 12/20/2004] **NOTE:** Current (2004) research is addressing the use of magnetorheological fluids in personal armor fabrics such as Kevlar vests.. Also called **LIQUID ARMOR**.

MAGNIFIED TELEVISION SYSTEM - A system consisting of a television monitor and camera which allows the operator to visually identify targets at long ranges. The system may also include an infrared feature to allow night operation in the mid-infrared spectrum (3-5 microns). [10:6]

MAILBOMB An excessively large number of e-mail messages (typically many thousands of messages) or one large message sent to a user's e-mail account, for the

purpose of crashing the system, or preventing genuine messages from being received. []

MAIN LOBE - See MAJOR LOBE.

MAJOR LOBE - The radiation lobe containing the direction of maximum radiation. [3] Synonymous with MAIN LOBE. See also LOBE.

MALICIOUS CACHE POISONING - The providing of false information to a DOMAIN NAME SYSTEM (DNS) by a host not authorized to provide such information. Also called DNS SPOOFING and DOMAIN NAME SYSTEM SPOOFING. [] NOTE: Susceptibility to DNS spoofing is a significant security threat in that it can allow attackers to access a site's E-mail, can cause users to be redirected to the wrong web site, and can be an opening move in a denial of service attack, or E-BOMB.

MALICIOUS SOFTWARE - Computer programs created by CRACKERS and designed to infect target computer systems. Malicious software may be grouped as follows: VIRUSES, which hide themselves and replicate in computer file systems, TROJANS (or TROJAN HORSES), which masquerade as useful or amusing software to be accepted by unsuspecting users, and WORMS, which propagate themselves across computer networks, attacking target systems without human intervention. [10:2911] See VIRUS for a list of virus types and characteristics.

MALWARE - A generic term used to describe MALICIOUS SOFTWARE. []

MANHUNTER - See FIELD EFFECT DETECTOR.

MAN-IN-THE-LOOP SYSTEM - A system which requires human decision, data input, or other action for its proper operation. Contrast with AUTONOMOUS TARGET RECOGNITION. []

MANIPULATIVE COMMUNICATION DECEPTION (MCD) - Action to eliminate revealing, or convey misleading communications. []

MANIPULATIVE ELECTROMAGNETIC DECEPTION - That type of ELECTROMAGNETIC DECEPTION that involves actions to eliminate revealing, or convey misleading, electromagnetic telltale indicators that may be used by hostile forces. [7:CJCS MOP 6, APPENDIX B]

MANIPULATIVE ELECTRONIC DECEPTION - Action to eliminate revealing, or convey misleading, telltale indicators that may be used by hostile forces. [1.1]

MANPOWER AND PERSONNEL INTEGRATION (MANPRINT) - An Army program which promotes the embedding of human factors at the start of the development of a weapon system. [10:2738]

MANTIS - See MULTI-ADAPTABLE NIGHT TACTICAL IMAGING SYSTEM

MARINE ASSET TAG TRACKING SYSTEM (MATTS) - A miniature sensor, data-logging computer, radio transceiver and inertial-assisted tracking system for containers - all integrated into a small black box. Affixed to a ship container, MATTS configures a container's location, stores the container's travel history and records each instance of the container being opened, reporting it to a Web-based center. [10:3092]

MARINE PATTERN (MARPAT[®]) - A new (*circa* 2000) technique of CAMOUFLAGE that employs five optimized colors and digital technology (Digital Camouflage, or “digicam”) to produce the pattern used on combat utility uniforms. An example of digicam appears below. []



MARKER - See TAGGANT

MASKING - A COVER technique that conceals characteristics, such as CAMOUFLAGE or electronic measures to make an operation invisible. [10:49]

MASKIROVKA - A set of processes designed to mislead, confuse, and interfere with accurate data collection regarding all areas of plans, objectives, strengths, and weaknesses (of a force organization or nation). Also called SOVIET MASKIROVKA. [10:2974]

MASQUERADER - A person who obtains and uses authorized user access privileges (*e.g.*, user names and passwords) to enter a system and then, posing as that user, attacks the system. [10:2964] NOTE: Masqueraders are usually persons outside the penetrated organization. See also BLACK-HAT HACKER, MISFEASOR.

MASSIVELY PARALLEL COMPUTER - A computer capable of simultaneous operations among multiple processing elements. [10:52]

MAST-MOUNTED SENSOR (MMS) - An integrated, precise, multi-sensor, electro-optical sighting system. Designed for shipboard use, the MMS employs a thermal imaging sensor, a thermally stabilized laser range-finder designator, a digital scan converter that has freeze frame and electronic zoom, and a **FORWARD LOOKING INFRARED SENSOR (FLIR)**. [10:90] See also **NON HULL-PENETRATING PERISCOPE (NPP)**. NOTE: The MMS can be used for search and rescue, naval gunfire support, mine detection, **IDENTIFICATION, FRIEND-OR-FOE (IFF)**, as an aircraft landing assistance device, and a navigation tool.

MATCHED FIELD PROCESSING - A technique for processing ocean acoustic data to estimate the location of sources of acoustic energy. []

MATERIALS INTELLIGENCE - The collection, processing, and scientific analysis of gas, liquid, or solid samples. [] NOTES: (1) Materials intelligence is critical for determining nuclear, chemical, and biological warfare threats. It is also important for analyzing military and civil manufacturing activities, public health concerns, and environmental problems. Samples are collected by both automatic equipment, such as air samplers, and directly by humans with access to areas of interest. Samples, once collected, may be rapidly characterized or undergo extensive forensic laboratory analysis to determine the identity and characteristics of the sources of the samples. (2) Materials intelligence is encompassed under **MEASUREMENT AND SIGNATURE INTELLIGENCE (MASINT)**.

MATERIALS TECHNOLOGY - In the military context, technology relating to materials that provide specific military advantage, covering the physical properties, mechanical properties, behavior, and/or processing required to achieve that advantage. The technology includes materials engineered to defeat an enemy threat and functional materials needed to preserve the capability of high-performance hardware in daily operations. The **MILITARILY CRITICAL TECHNOLOGIES LIST (MCTL)** identifies the categories of materials technology listed in the table below: [12]

<i>CATEGORIES OF MATERIALS TECHNOLOGY</i>
Anti-Armor Materials
Armor Materials
Biomaterials
Electrical Materials
Magnetic Materials
Optical Materials

Special Function Materials
Structural Materials

MAXIMUM USABLE FREQUENCY (MUF) - The highest frequency of radio waves that can be used between two points under specified conditions for reliable transmission by reflection from the regular layers of the IONOSPHERE. [3]

MEACONING - A system of receiving radio beacon signals and re-broadcasting them on the same frequency to confuse navigation. The meaconing stations cause inaccurate bearings to be obtained by aircraft or ground stations. [1.1]

MEASUREMENT AND SIGNATURE INTELLIGENCE (MASINT) - Scientific and technical intelligence information obtained by quantitative and qualitative analysis of data (metric, angle, spatial, wavelength, time dependence, modulation, plasma, and HYDROMAGNETICS) derived from specific technical sensors for the purpose of identifying any distinctive features associated with the source, emitter, or sender and to facilitate subsequent identification and/or measurement of the same. [1.1] See also SIGNALS INTELLIGENCE (SIGINT). NOTE: MASINT includes the components listed in the following table:

<i>MEASUREMENT AND SIGNATURES INTELLIGENCE (MASINT)</i>	
ACOUSTIC INTELLIGENCE (ACINT or ACOUSTINT)	DIRECTED ENERGY WEAPONS INTELLIGENCE (DEWINT)
ELECTRO-OPTICAL INTELLIGENCE (ELECTRO-OPTINT) INFRARED INTELLIGENCE (IRINT)	LASER INTELLIGENCE (LASINT)
MATERIALS INTELLIGENCE CHEMICAL AND BIOLOGICAL INTELLIGENCE (CBINT) EFFLUENT/DEBRIS COLLECTION	NUCLEAR INTELLIGENCE (NUCINT)
RADAR INTELLIGENCE (RADINT)	RADIO FREQUENCY/ELECTROMAGNETIC PULSE INTELLIGENCE (RF/EMPINT)
SPECTROSCOPIC INTELLIGENCE	UNINTENTIONAL RADIATION INTELLIGENCE (RINT)

MEASUREMENTS OF POLLUTION IN THE TROPOSPHERE (MOPITT) - A satellite system which measures carbon monoxide and methane in the troposphere using correlation spectroscopy with pressure modulated and length modulated gas cells. [NASA] See also CERES and MISR.

MECHANICAL-THERMAL NOISE - In **MICROELECTROMECHANICAL SYSTEMS (MEMS)**, the noise component of the output signal that is primarily due to the random, temperature- dependent motion of gas molecules striking the microstructures and imparting mechanical forces that are indistinguishable from the inertial forces that the sensor is designed to measure. [10:2633]

MECHATRONICS - The optimal integration of mechanical, electronic and computer systems in order to create high precision products and manufacturing processes. []
NOTE: A mechatronic system might combine electronic, mechanical, and computing components such as automatic cameras, miniature disk drives, CD players, camcorders, VCRs, etc. As an interdisciplinary subject it has now evolved to incorporate optical, communication, and information technologies. In particular, optical sensing and data processing technologies are being integrated, at an accelerated rate, into mechatronic systems because these optical based technologies provide components for high precision, rapid information processing, and smart functions.

MEDIUM EXTENDED AIR-DEFENSE SYSTEM (MEADS) - A system of missile launchers, ground radars, and sensors to track hostile targets. The system, intended to replace the aging HAWK and PATRIOT missile systems, contains multiple communications links and a high resistance to jamming. [10:2950] NOTES: (1) MEADS, transportable on five-ton trucks, can be flown to the theater of operations in a variety of aircraft, including the C-130 and C-160. (2) MEADS is a co-developmental program involving the U.S., Germany and Italy. It is a highly mobile ground-based terminal defense system that will be able to engage theater ballistic missiles, large-caliber rockets, cruise missiles and aircraft. Current (2002) plans involve using the PAC-3 interceptor that will provide 360 degrees of protection for joint maneuver forces. [Source: MDA web site <http://www.acq.osd.mil/bmdo/bmdolink/>]

MEDUSA - A countermeasures concept that entails detection and identification of a radiating threat signal, followed by immediate deployment of an appropriate response. []

MELIOS - Acronym for **Mini Eye-safe Laser Infrared Observation Set**. It is a hand-held LASER rangefinder/compass used for target location and fire direction. MELIOS can range to a distance of nearly 10 km with an accuracy of +/- 5 meters. [10:2801]

MEMORY CARD - A subgroup of the **SMART CARD**, or **INTEGRATED CIRCUIT CARD** group. Memory cards are further subdivided into free access and secure access categories. The former have variable storage capacities, are reusable and have service functions that involve frequently changed data. Secure access memory cards, on the other hand, include non-reusable (or paid reusable) read/write functions. [10:2479] See also **MICROPROCESSOR CARD**. NOTE: Examples of free access cards include portable files and electronic marketing memory cards. Examples of secure access cards include pay-per-view television cards, identification cards, and subscriber cards.

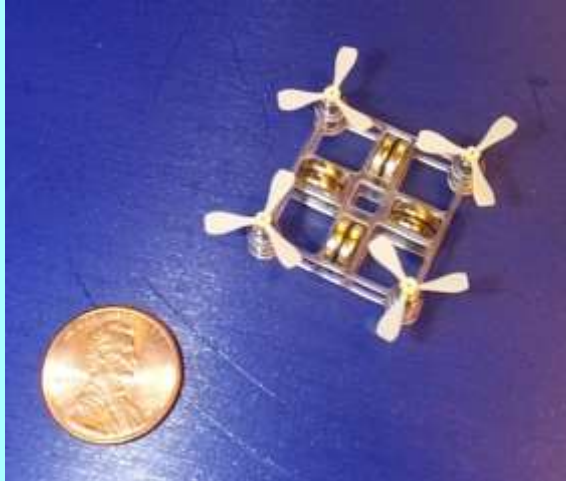
MEMORY POLYMER - A structural material which becomes pliable when stimulated with a moderate electrical current and solidifies when the stimulating current is removed. [See 10:3079] NOTE: Memory polymers are used in the design of **MORPHING AIRCRAFT STRUCTURES**.]

MERCHANT INTELLIGENCE (MERINT) - In intelligence handling, communication instructions for reporting by merchant vessels of vital intelligence sightings. [1.1]

MESH ENABLED ARCHITECTURE (MEA) - A self-forming, self-healing networking technology that allows emergency personnel to communicate instantly with each other, the Internet, public safety networks and government systems. [10:3020] NOTE: Australian firefighters will be among the first (2004) to use the technology.

MESH NETWORK - A high-level network used to connect widely separated wireless routers that can't "see" each other [*e.g.*, limited to line of sight (LOS)]. It essentially consists of a network of intermediate points, called **AIRHEADS** which can be seen by their respective networks, called **AIRHOODS**. [10:2938] NOTE: In an Internet mesh network, the airheads are connected to a distribution point called a "backhaul aggregation point," which in turn is connected (backhauled) to the Internet service provider.

MESICOPTER - A centimeter-size electric helicopter designed to stay airborne while carrying its own power supply. [10:3002] See below. NOTE: Successful constrained tests of a 4-rotor mesicopter demonstrated the basic feasibility of the design and manufacturing concepts.



MESOSCALE ELECTRONIC DEVICE - An electronic component or device that straddles the size range between conventional microelectronics (submicron range) and traditional surface mount components (10-mm range). NOTE: This size range is particularly important to the military, wireless communications, and medical communities. [10:2955]

METADATA - Information about information (*e.g.*, subject, category, title, author) [Linda L. Hill, ADL, lhill@alexandria.ucsb.edu and <http://fat-albert.alexandria.ucsb.edu:8827/glossary.html>] NOTE: Metadata describes the attributes of an information bearing object (IBO) - document, data set, database, image, artifact, collection, etc.

METAL EMBRITTLEMENT - The use of agents which severely weaken metals by chemically changing their molecular structure. They are clear, leave imperceptible residue, can attack almost any metal, and can be applied with a felt tip pen. [10:2754]

METAL OXIDE VARISTOR (MOV) - A semiconducting device that conducts at high voltages. MOVs typically are used in overload protection circuits. [10:2541] See also **NUCLEAR ELECTROMAGNETIC PULSE COUNTERMEASURES (NEMPCM)**.

METAMATERIAL – Material which has modified electromagnetic properties not found in nature. (An example is the so-called “invisibility cloak.”) []

METALLIC GLASS ALLOYS - See **STRUCTURAL AMORPHOUS METAL**.

METEOR BURST COMMUNICATIONS - A method of communications involving the reflection of bursts of high frequency (HF) or very high frequency (VHF) radio waves off the transient ionized trails of free electrons left by meteors. [5:6] NOTE: Billions of meteor trails are laid down 50 to 65 miles above the Earth's surface daily. Effective

communication ranges are from 150 to 1,200 miles. Meteor burst communications have low probability of intercept and are relatively unaffected by nuclear weapon effects and solar flares.

MICRO AIR VEHICLE (MAV) - A miniature UNMANNED AIR VEHICLE (UAV) used for intelligence, surveillance and reconnaissance, and ELECTRONIC WARFARE (EW) applications. MAVs do not exceed six inches in any direction, fly up to six miles and travel at 40-50 miles per hour. Mission endurance ranges between 20 minutes to two hours. [10:2642] Also called MINIATURE AIR VEHICLE, MICRO UAV. [10:2671] See also FLY ON THE WALL, MICROMECHANICAL FLYING INSECT (MFI). NOTE: A possible mission involves the landing of a radar-jamming payload directly on an enemy radar. The tiny payload will take advantage of the very low power needed to jam radars at such short ranges. The concept of operation is to carry the MAV within several kilometers of the target, either by individual soldiers or a larger UAV. After launch, the MAV will fly autonomously and, due to its small size and quiet propulsion system, discreetly to its target, landing on it unnoticed. Another example of the MAV is the Army's Quick Look, which is fired from a 155mm howitzer, flying out up to 50 km to acquire and transmit targeting information such as video and GPS data back to the delivery platform via a wireless Sensor-to-Shooter link.

MICROCHAIN - A microscopic silicon chain used to rotate multiple micro drive shafts, microcamera shutters, and other devices in micro-electromechanical systems (MEMS). [10:2932] NOTE: A microchain is much like the leather drive belt used in 19th-century textile mills to power multiple sewing machines, quilling machines, etc....

MICROCODE - A symbolic representation of a MICROPROGRAM. [3]

MICRODOT - A greatly-reduced photograph which can be pasted, say, over a period text character in an otherwise innocuous document. [10:2815] NOTE: The microdot is an early (WW II) example of STEGANOGRAPHY.

MICROELECTRICAL MECHANICAL SYSTEM (MEMS) -- See MICROELECTROMECHANICAL SYSTEM.

MICROELECTROMECHANICAL SYSTEM (MEMS) - A micrometerized system that can sense the environment and then act on this sensor information using mechanical actuators. Also called MICROELECTRICAL MECHANICAL SYSTEM. NOTE: An example of the use of MEMS (1995) is on the leading edge of aircraft wings to control boundary-layer turbulence. Vortices form around the wing as it rips a path through the atmosphere. Because boundary-layer thickness decreases as air speed increases, at high speeds, the turbulent layer over a wing may be only a few microns thick. MEMS are used to employ micron-sized flaps for controlling the formation of these vortices. [10:2577] Other applications include gyroscopes, compact lasers, optical sensors, internal surgery devices, miniature computer disk drives and wrist-watches. [10:2625] See also ARTIFICIAL EYELID.

MICROENCAPSULATED HEALING AGENT - See AUTONOMIC HEALING

MICROGRAVITY TECHNOLOGY - Technology employing the properties of matter and laws of nature which manifest themselves in the absence of gravity. [adapted from an NRL description of *microgravity research*]

MICROLATTICE – Ultra-light metallic structure made from a polymer template. [“Pop-Up Satellites?,” *SIGNAL*, May 2013, 73] NOTE: It is billed by manufacturers as the lightest metal structure ever created.

MICROMACHINING - Techniques used to fabricate MICROELECTROMECHANICAL SYSTEMs (MEMS) such as accelerometers and angular gyroscopes. [10:2633]

MICROMECHANICAL FLYING INSECT (MFI) - A paper-clip sized mechanical flying robot to be used in search and rescue (SAR) missions, mine detection, and (presumably) covert operations. [10:2848] See also MICRO AIR VEHICLE (MAV), FLY ON THE WALL.

MICROMETER - See MICRON.

MICROMIRROR - A MICROELECTROMECHANICAL SYSTEM (MEMS) consisting of tiny mirrors that can be moved by electrostatic forces. [10:2769] NOTE: In one application, the mirrors, 100 μ m on a side, are used to steer infrared light into an infrared detector.

MICRON - The millionth part of a meter (micrometer). [3]

MICROPHONICS - Changes in electrical characteristics of a device traceable to mechanical vibration; it causes the vibration waveform to appear in the device's output signal, hence it is a type of NOISE. [10:2636]

MICROPROCESSOR CARD - A subgroup of the SMART CARD group. Microprocessor cards use an operating system that provides high-level security and flexible access to advanced functions such as cryptography algorithm, memory and secret code management. [10:2479] See also MEMORY CARD.

MICROPROGRAM - A sequence of elementary instructions that correspond to a computer operation, is maintained in special storage, and whose execution is initiated by the introduction of a computer instruction into an instruction register of a computer. [3] NOTE: Microprograms are often used in place of hard-wired logic.

MICRO-ROCKET - A device employed by some space **MICROELECTROMECHANICAL SYSTEMS (MEMS)**. It consists of digital thrusters arranged in an array of chambers holding one shop of propellant each. A heater element detonates a chamber, resulting in a standard amount of thrust. [10:2894] Also called **MICROROCKET**; **MICRO ROCKET**. NOTES: (1) The effectiveness of a rocket engine relates to the amount of thrust it generates relative to its own weight; for example the space shuttle's main engine produces a thrust-to-weight ratio of 70. Some microrockets have achieved a ratio exceeding 80. (2) The term "microrocket" also refers to the so-called "match-stick rocket", a home-made rocket sometimes demonstrated in science classes. The rocket is made by wrapping a piece of aluminum foil tightly around a match head; a tiny exhaust channel is then formed using a pin to create a tunnel between the foil and the match from the edge of the foil to the head. When complete, the device is placed on a suitable launcher (e.g., bent paper clip) and then heat is applied to the foil-covered head with a flame, causing the rocket to ignite. (CAUTION: THIS CAN BE A DANGEROUS OPERATION).

MICROSCALE GENERATOR - A small power unit consisting of a micromotor that uses JP8 fuel and a microgenerator that can produce up to 20 watts of power. [10:3056] NOTE: The rotational speed of the microscale generator may (2005) exceed 300,000 rpm

MICROSCAN RECEIVER - A receiver which can scan a frequency band several orders of magnitude faster than would be possible with conventional scanning superheterodyne receivers. [4:9] Synonymous with **COMPRESSIVE RECEIVER** and **MICROSWEEP RECEIVER**.

MICROSTRIP ANTENNA - A type of **CONFORMAL ANTENNA**, consisting of a sandwich of two parallel conducting layers separated by a single thin dielectric substrate. The lower conductor functions as a ground plane, and the upper conductor may be a dipole or a monolithically (*i.e.*, contained in the same layer) printed array of patches or dipoles and the associated feed network. [10:54] Synonymous with **MICROSTRIP DEVICE**. Contrast with **STRIPLINE DEVICE**. See also **BROADBAND MICROSTRIP ANTENNA**, **DOUBLY-CONFORMAL ANTENNA**, **CONFORMAL ANTENNA**, **SHARED-APERTURE ANTENNA**, **CONFORMAL ANTENNA ARRAY**.

MICROSWEEP RECEIVER - See **MICROSCAN RECEIVER**.

MICROTAGGANT - Microscopic - about 44 microns in size - identification particles used to invisibly mark products such as explosive materials, toxic waste, equipment, labels, adhesives, etc. Each particle is a "sandwich" of layers forming a unique color code combination. The particles are mixed with the material to be identified. [] NOTE: Microtaggants can be used to identify explosive residue after detonation has occurred.

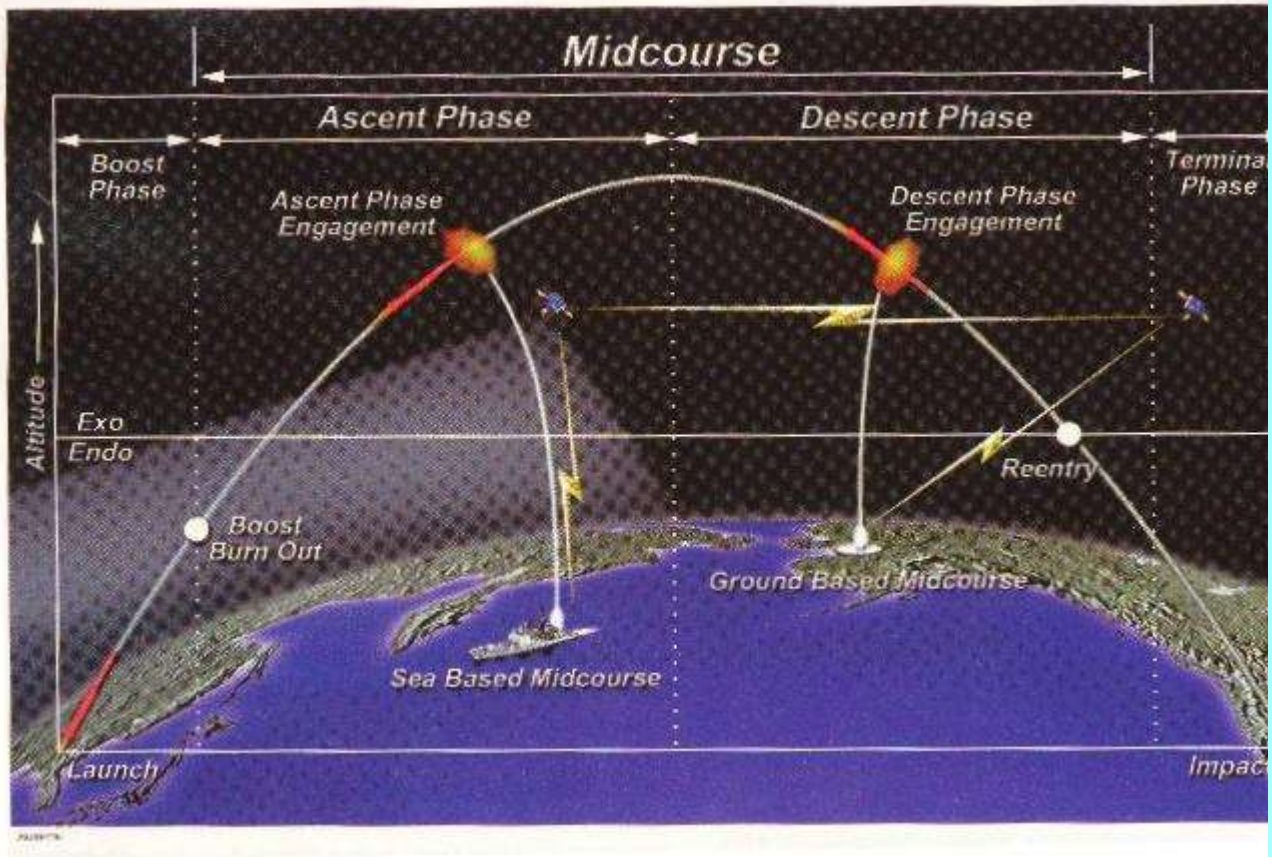
MICRO UAV - See MICRO AIR VEHICLE.

MICROVIA - A VIA (electrical path) that is less than 0.1 mm in diameter between two layers of a circuit board structure. [10:2713] See also RESIN-COATED COPPER (RCC).

MICROWAVE LIGHTCRAFT -- A lens-shaped launch vehicle for delivering payloads to orbit using power transmitted via microwaves, beamed from either a ground station or an orbiting solar power satellite to the lightcraft. The energy received breaks air molecules into a plasma and a magnetohydrodynamic fanjet provides the lifting force. Only a small amount of propellant is required for circulation, attitude control and de-orbit. The airship part is a pressurized helium balloon-type structure made of advanced silicon carbide film (transparent to microwaves) to make the craft partly buoyant and to provide for a large parabolic reflector for the energy beamed from space. The craft would be encircled by two superconducting magnet rings and a series of ion engines, and topped with solar cells. At launch, the Lightcraft would use electricity from its solar cells (at night, the power would come from an infrared space-based laser) to ionize the air and move the craft through electrostatic discharges. The craft could move at 80 to 160 km/h (50-100 mph). This propulsion would be used to climb out to a good altitude and beyond the speed of sound where it would switch to the magnetohydrodynamic drive (MHD). Now the craft tilts from flying edgewise to flying flat into the air stream. The microwaves are reflected forward to create a superheated bubble of air above the craft, forming an air spike that acts as the nose cone as the Lightcraft accelerates to 25 times the speed of sound. This air spike provides the aerodynamics to a vehicle that does not look like it would be able fly in that attitude. When the load is properly balanced the craft sails through the air without leaving a shock wave and virtually no supersonic wake. Water is used by the craft to cool the RECTENNAs and as a propellant in the last stages of ascent. [Riding the Highways of Light http://science.msfc.nasa.gov/newhome/headlines/prop16apr99_1.htm] NOTE: The hyper-energetic performance of the lightcraft will require that the crew ride in liquid-filled escape pods to protect them from g-forces greater than even fighter pilots occasionally endure. In some Air Force Space Command schemes, the crew would breath an oxygenated fluid to protect their lungs.

MIDCOURSE GUIDANCE - The guidance applied to a missile between termination of the boost phase and the start of the terminal phase of flight. [1.1] NOTE: The midcourse guidance phase is partitioned into the Ascent Phase and the Descent Phase. [10:2973]

MISSILE PHASES



Source: *U.S. NAVAL INSTITUTE PROCEEDINGS*, January 2003, page 69

MID INFRARED - The portion of the infrared spectrum band between 3.00 and 6.00 microns. [10:27] Synonymous with **MID WAVE INFRARED**. See also **ELECTRO-OPTIC**, **NEAR INFRARED**, **FAR INFRARED**, **EXTREME INFRARED**. NOTE: Mid infrared sensors can detect hot exhaust plumes. [10:2547]

MID INFRARED ADVANCED CHEMICAL LASER (MIRACL) - A **DIRECTED ENERGY WEAPON (DEW)** in the megawatt-class power regime at a 3.9 micron average operating wavelength intended for use against supersonic and subsonic targets, such as cruise missiles. [10:2560] See also **HIGH-ENERGY LASER WEAPON SYSTEM (HELWEPS)**.

MID-LEVEL NETWORK - The second level of the **INTERNET** hierarchy. They are the **TRANSIT NETWORKS** which connect the **STUB NETWORKS** to the **BACKBONE** networks. [10:2736] See also **NETWORK**.

MID WAVE INFRARED - See MID INFRARED.

MILITARILY CRITICAL TECHNOLOGY (MCT) - A technology that DoD assesses, in support of the Joint Chiefs of Staff (JCS) objectives, as critical to the development, production and use of military capabilities of significant value to potential adversaries. The MCTL process is the systematic ongoing assessment and analyses of technologies to determine which technologies are Militarily Critical. The Militarily Critical Technologies Lists (MCTL) for four periods are shown in the table below : (the list for 2000 is identical with that for 1999 with the exception that Materials and Marine Systems have swapped positions in the list)

MILITARILY CRITICAL TECHNOLOGY AREAS			
1991 [10:117]	1993 [10:2506]	1996 [12]	1999 [12.1]
AIR BREATHING PROPULSION	CHEMICAL AND BIOLOGICAL SYSTEMS	AERONAUTICS SYSTEMS	AERONAUTICS SYSTEMS
BIOTECHNOLOGY	COMPUTERS	ARMAMENT & ENERGETIC MATERIALS	ARMAMENT & ENERGETIC MATERIALS
COMPOSITE MATERIALS	DIRECTED ENERGY (DE) AND KINETIC ENERGY (KE) SYSTEMS	CHEMICAL & BIOLOGICAL SYSTEMS	CHEMICAL AND BIOLOGICAL SYSTEMS
COMPUTATIONAL FLUID DYNAMICS	ELECTRONICS	DIRECTED AND KINETIC ENERGY	DIRECTED & KINETIC ENERGY SYSTEMS
DATA FUSION	INDUSTRIAL PRODUCTION	ELECTRONICS	ELECTRONICS
FLEXIBLE MANUFACTURING	LASER, OPTICS, AND POWER SYSTEMS	GROUND SYSTEMS	GROUND SYSTEMS
HIGH ENERGY DENSITY MATERIALS (HEDM)	MARINE SYSTEMS	GUIDANCE, NAVIGATION, & VEHICLE CONTROL	GUIDANCE, NAVIGATION, & VEHICLE CONTROL
HIGH PERFORMANCE COMPUTING	MATERIALS	INFORMATION SYSTEMS	INFORMATION SYSTEMS
HYPERVELOCITY PROJECTILES PROPULSION	MUNITIONS DEVICES AND ENERGETIC MATERIALS	INFORMATION WARFARE	INFORMATION WARFARE
MACHINE INTELLIGENCE/ROBOTICS	NAVIGATION GUIDANCE AND VEHICLE CONTROL	MANUFACTURING & FABRICATION	MANUFACTURING & FABRICATION
PASSIVE SENSORS	NUCLEAR-RELATED TECHNOLOGY	MARINE SYSTEMS	MARINE SYSTEMS
PHOTONICS	PROPULSION AND VEHICULAR SYSTEMS	MATERIALS	IMATERIALS
PULSED POWER	SENSORS AND ELECTRONIC COMBAT	NUCLEAR SYSTEMS	NUCLEAR SYSTEMS
SEMICONDUCTORS/MICRO-ELECTRONIC CIRCUITRY	SURVIVABILITY AND HARDENING	POWER SYSTEMS	POWER SYSTEMS
SENSITIVE RADARS	TELECOMMUNICATIONS	SENSORS & LASERS	SENSORS & LASERS
SIGNAL & IMAGE PROCESSING		SIGNATURE CONTROL	SIGNATURE CONTROL
SIGNATURE CONTROL		SPACE SYSTEMS	
SIMULATION & MODELING		WEAPONS EFFECTS AND COUNTERMEASURES	SPACE SYSTEMS
SOFTWARE ENGINEERING			WEAPONS EFFECTS AND COUNTERMEASURES
WEAPON SYSTEM ENVIRONMENT			

NOTES: (1) Technologies are selected for inclusion in the MCTL through deliberation and consensus of working groups of technical experts from Government, Industry and Academia. (2)

For more recent and comprehensive information, visit the Defense Technical Information Center (DTIC) Militarily Critical Technologies List web page.

MILITARY CAPABILITY - The ability to achieve a specified wartime objective. It includes four major components: (1) **FORCE STRUCTURE**; (2) **MODERNIZATION**; (3) **READINESS**; and (4) **SUSTAINABILITY**. [1.1]

MILITARY DECEPTION - Actions executed to mislead foreign decision-makers, causing them to derive and accept desired appreciations of military capabilities, intentions, operations, or other activities that evoke foreign actions that contribute to the originator's objectives. There are three categories of military deception: (a) **STRATEGIC MILITARY DECEPTION**; (b) **TACTICAL MILITARY DECEPTION**; and (c) **DEPARTMENT/SERVICE MILITARY DECEPTION**. [1.1] NOTE: Military deception is a part of offensive information operations.

MILITARY INTEGRATED INTELLIGENCE DATA SYSTEM/ INTEGRATED DATA BASE (MIIDS/ IDB) - The Military Intelligence Integrated Data System (MIIDS) Program provides order-of-battle and installation/facility data to military intelligence users (national, theater, and tactical) through an architecture designed to better assist decision- makers in planning for and executing their missions in peace, crisis, and wartime scenarios. The cornerstone of the MIIDS Program is the Integrated Data Base, which structures this intelligence in terms of units, equipment, installations/ facilities and locations tied together with relational data sets that address attributes of these relationships. [7:CJCS MOP 6, APPENDIX B]

MILITARY NET - See **GHILLIE SUIT**.

MILITARY OPERATIONS ON URBANIZED TERRAIN (MOUT) - Military operations in the urban battlespace. [10:2980] NOTE: MOUT seeks to achieve military objectives with minimum casualties and collateral damage.

MILITARY REQUIREMENT - An established need justifying the timely allocation of resources to achieve a capability to accomplish approved military objectives, missions, or tasks. [1.1] See also **OPERATIONAL REQUIREMENT**, **TOP LEVEL WARFARE REQUIREMENT**.

MILLIMETER WAVE (MMW) - Radio frequencies in the range from 30 to 300 GHz. [4:15]

MILLIMETER-WAVE CAMERA - A camera capable of measuring the time delay and intensity of millimeter-wave energy that radiates naturally from living beings and inanimate objects. [10:2729] NOTE: Millimeter-wave cameras can be used for "remote frisking" to detect weapons or drugs carried by persons. This is because at millimeter

wavelengths, people are good emitters, while metals are very poor emitters. Dielectric objects, such as plastics, ceramics and powdered drugs are somewhere in-between. Clothing and building materials such as wallboard, on the other hand, are virtually transparent.

MILLIMETER-WAVE PROJECTOR - A NONLETHAL WEAPON which consists of a microwave antenna able to transmit a narrow beam of microwaves that rapidly heats up the surface layer of the skin, prompting targets to flee. []

MILLION THEORETICAL OPERATIONS PER SECOND (MTOPS) - A measure of performance used by the U.S. government and cooperating countries in determining whether a computer can be exported abroad to certain countries that might use it for nuclear arms development. []

MIME - Acronym for Multipurpose Internet Mail Extensions. MIME defines the standard ways of packaging one or more separate objects into a message so that any compliant mail system can use it. It specifies how to encode and encapsulate non-text attachments, such as voice and animation, to e-mail. [10:2757] NOTE: The full definition of MIME is described in the following REQUEST FOR COMMENTS: RFC 1521 and RFC 1522. MIME is fully described at <http://www.cis.ohio-state.edu/cgi-bin/rfc/rfc1522.html>.

MIMICKING - A DECEPTION technique involving the use of one thing imitating another, such as a fighter mimicking a bomber to lure enemy fighters. [10:49]

MINE CLEARING LINE CHARGE (MICLIC) - A rocket projected explosive line charge (350 feet long, containing 5 pounds per linear foot of C-4 explosive) which provides a close-in breaching capability for maneuver forces. When detonated, MICLIC provides a lane 8 meters wide by 100 meters long. [*U.S. Army*]

MINE COUNTERMEASURES (MCM) - Techniques and tactics for detecting, classifying, and neutralizing land mines and sea mines. [] NOTE: Mine countermeasures may be partitioned into ORGANIC MCM SYSTEMS (tactical in nature) and DEDICATED MCM SYSTEMS (theater or strategic assets). [10:2972]

MINE COUNTERMEASURES			
NOTE: This is neither an official nor a comprehensive listing			
LAND MINES		SEA MINES	
<i>Detection</i>	<i>Clearing</i>	<i>Detection</i>	<i>Clearing</i>
ATAMIDS	Air-chisel mine clearing	ALMDS	ALISS

Chemical residue detector	Clausen Power Blade	Imagery techniques	AMNS
Dogs & other animals	Directed-energy devices	LRS	BZA
Electromagnetic Induction Detector	ESMB	Magnetic Gradiometer	DET
Genetically-improved bees and other insects	ESMC	LMRS	Joint Amphibious Mine Clearance system
GPR	Mine roller	MMS	Line Charge
Imagery techniques	Miniature shaped-charge arrays	MNS	Mission Package
Laser Doppler vibrometer	Pasotron	MUDSS	MNS
NQR	Water-jet mine clearing	OASIS	MNV
Nuclear residue detector	Wattenburg Plow	RMS	Pasotron
VMMD		Sea mammals	RAMICS
Water jet erosion		SQUID	SABRE
		STIL	SZA
		TVSS	VTDP compound helo
		VTDP compound helo	Water Hammer
			Water-jet mine clearing

OTHER LAND-MINE DETECTION TECHNOLOGIES

Source: [10:3032]

TECHNOLOGY	OPERATING PRINCIPLE
Acoustic/seismic	Examines acoustic waves reflected by mines

Biological (dogs, bees, bacteria)	Living organisms react to explosives vapors
Electrochemical	Measure changes in electrical resistance
Infrared (IR)	Measures heat differences in the soil
Neutron	Induces radiation emissions from the explosive's atomic nuclei
Piezoelectric	Measures the shift in resonant frequency of various materials exposed to explosives vapors

MINEFIELD BELT - A minefield consisting of a line of mines, from 60 to 150 meters in width, used to protect a border or perimeter. It may be enclosed with concertina wire reinforced with engineer stakes. [] Also called **OBSTACLE BELT**.

MINE-NEUTRALIZATION SYSTEM (MNS) - A system consisting of shipboard consoles and a remotely-operated electro-hydraulic submersible **MINE-NEUTRALIZATION VEHICLE (MNV)** equipped with a low-light TV camera, high-resolution SONAR, and the ability to deliver several types of explosive charges, or **MISSION PACKAGES** to neutralize all types of maritime mines. [10:2792]

MINE-NEUTRALIZATION VEHICLE (MNV) - An underwater vehicle (UV) guided by commands from the launch ship via an umbilical cable to maneuver close to suspected mines in order to make positive identification. It may then engage an identified mine by deploying an appropriate **MISSION PACKAGE**. [10:2779]

MINE RECONNAISSANCE SYSTEM - See **LONG-TERM MINE RECONNAISSANCE SYSTEM (LMRS)**.

MINE ROLLER - A heavy (multi-ton) device attached to the front of a tank and rolled over the ground to detonate mines before they reach the first **BOGEY WHEEL**. It is used to clear large sections of land. [] NOTE: A World War II (and perhaps earlier) forerunner of the mine roller was a chain-flail device mounted on the front of a tank. When activated, it resembled a street-sweeper with "bristles" of chain lengths flailing the ground in front of the vehicle to detonate land mines.

MINIATURE AIR-LAUNCHED DECOY (MALD) - An airborne decoy system designed to generate a radar return of any Air Force tactical aircraft. The MALD's electronics can present an enemy radar system with a signal return indicating the presence of an aircraft. [10:2605] NOTES: MALDs are equipped with signature

augmentation subsystems that can actively expand the vehicle's RADAR CROSS SECTION (RCS) to portray a tactical fighter to the enemy radar system. MALDs may be employed as follows: (1) Tactical combat aircraft can launch the decoy in the heat of battle to protect themselves against enemy radar-guided missiles. (2) Air defense suppression aircraft could employ the decoy in a WILD WEASEL application to trick ground-based enemy systems into betraying their radar locations. (3) Stand-off aircraft can launch large numbers of decoys to fool an adversary into diverting scarce air defense assets against a phantom large attack force.

MINIATURE AIR VEHICLE (MAV) - See MICRO AIR VEHICLE.

MINI EYE-SAFE LASER INFRARED OBSERVATION SET (MELIOS) - See MELIOS.

MINIMIZE - A condition wherein normal message and telephone traffic is drastically reduced in order that messages connected with an actual or simulated emergency shall not be delayed. [1.1] NOTE: MINIMIZE is also referred to as the "reduction and control of information transfer in an emergency."

MINIMUM ESSENTIAL INFORMATION INFRASTRUCTURE (MEII) - The minimum mixture of U.S. information systems, procedures, laws, and tax incentives necessary to ensure the nation's continued functioning, even in the face of a sophisticated strategic INFORMATION WARFARE (IW) attack. [10:2761]

MINOR LOBE - Any radiation lobe except a MAJOR LOBE. [3] See also BACK LOBE, SIDE LOBE.

MIRRORED MEMORY - See REFLECTED MEMORY.

MISFEASOR - An authorized user for a system who gains additional but unauthorized access to system resources or otherwise misuses existing privileges and authority (*e.g.*, falsifying records, embezzling money) [10:2964] Contrast with HACKER, MASQUERADER.

MISSILE APPROACH WARNING SYSTEM (MAWS) - A system used to detect and provide warning of approaching missiles. MAWS may be partitioned into ACTIVE MAWS and PASSIVE MAWS. [10:2558]

MISSILE HEIGHT TARGET (MHT) - An aircraft-towed target which simulates a sea-skimming missile for live-fire and tracking exercises. []

MISSILE MAGNET - An appellation for the TOWED DECOY because the decoy lures missiles to itself. [].

MISSILE RELEASE LINE - The line at which an attacking aircraft could launch an air-to-surface missile against a specific target. [1.1]

MISSILE WARNING DEVICE - A device that detects and warns of missile-related threat signals, such as missile guidance radar signals, CW illumination, and active missile seeker signals. []

MISSION - (1) The task, together with the purpose, which clearly indicates the action to be taken and the reason therefore. (2) In common usage, especially when applied to lower military units, a duty assigned to an individual or unit; a task. (3) The dispatching of one or more aircraft to accomplish one particular task. [1.1]

MISSION PACKAGE - In anti-mine operations, one of the following devices carried by a **MINE-NEUTRALIZATION VEHICLE (MNV)**: (1) an explosive cutter to cut a moored mine's cable, allowing it to rise to the surface; (2) an explosive bomblet charge to neutralize a bottom mine; and (3) a buoyant explosive charge attached to a mine-mooring cable to render the mine inert. [10:2779]

MISSION-RECONFIGURABLE UNMANNED UNDERSEA VEHICLE (MRUUV) - A system (approximately 21 inches in diameter, and 2,800 lbs. weight) designed to be launched from a Virginia-class or Los Angeles-class attack submarine (SSN) for clandestine intelligence collection, surveillance, and reconnaissance (ISR), as well as mine neutralization and tactical ocean survey. [10:3010]

MISSION-RESPONSIVE ORDNANCE - Ordnance containing computer-controlled, microminiaturized detonators integrated into the explosive material that can control the timing, magnitude, shape, and lethal area of the ordnance, thus changing its blast and fragmentation pattern depending on the target. [10:2845]

MISSION SUCCESS CRITERIA (MSC) - A set of measurable quantitative thresholds relating to mission performance. Each of these thresholds must be attained or exceeded for the related mission to be considered successful. []

MISSION SUPPORT - A mission area in which dedicated EW or tactical cryptologic program (TCP) platforms and systems provide counter-surveillance and threat warning, or disruption, of enemy C3 systems in support of other platforms. [] See also **SELF-PROTECTION**.

MIXED SEEKER TECHNIQUES - ECCM techniques which employ two or more types of **SEEKERS** on missiles. []

MOAB – MASSIVE ORDNANCE AIR BLAST (referred to as “MOTHER OF ALL BOMBS”). The GBU-43/B Massive Ordnance Air Blast (MOAB) is a large-yield conventional (non-nuclear) bomb, developed at the Air Force Research Laboratory. At the time of development, it was touted as the most powerful non-nuclear weapon ever designed. The bomb was designed to be delivered by a C-130 Hercules, primarily the MC-130E Combat Talon I or MC-130H Combat Talon II variants. Notes: (1) MOAB replaced the so-called “daisy-cutter,” a bomb (BU-82) which was employed in Vietnam and Afghanistan to clear forest areas for helicopter landings. (2) In 2007, Russia has tested its thermobaric "Father of All Bombs" (FOAB), which is claimed to be four times as powerful as the MOAB.

MOBILE COMPUTER CORE (MCC) - (2000) A battery-operated dual-speed (300 MHz and 800 MHz), roughly a 3/4 x 3 x 5" 9-ounce computer with a 10 GB hard drive, 3-D graphics chip, voice and handwriting recognition and 128 MB of RAM. It is suitable for carrying by individuals in the field. [10:2957] NOTE: MCC may be employed with other devices such as GPS, helmet-mounted displays, watch displays, etc. One application is the downloading of thermal images from, say, a helicopter in order to pinpoint a target in an urban area.

MOBILE ELECTRONIC WARFARE SUPPORT SYSTEM (MEWSS) - A system of electronic jammers and related EW systems mounted on an armored chassis, designed to support fast-moving Marine units. [10:2643*]

MOBILE ANALYTICAL LABORATORY SYSTEM (MALS) - A mobile system designed to provide rapid on-site analysis of chemical, biological or nuclear contaminants to a controlling Weapons of Mass Destruction Civil Support Team (WMD-CST). [10:2986]

MOBILE TACTICAL HIGH ENERGY LASER (MTHEL) - A battlefield weapon designed to destroy cruise missiles, UNMANNED AIR VEHICLES (UAVs), very-short-range ballistic missiles, mortar shells, ground- and air-launched rockets and artillery projectiles. MTHEL employs a steady-state deuterium-fluoride (DF) LASER beam that suffers very little absorption in the atmosphere to destroy its targets. [10:3016] NOTE: The MTHEL laser optics employ very low-absorption optical coatings, eliminating the need for unwieldy active cooling systems.

MOBILE UNDERWATER DEBRIS SURVEY SYSTEM (MUDSS) - An ELECTRO-OPTIC LASER system designed to hunt mines and other underwater debris. It produces high resolution images that allow searchers to find, identify and locate items on the ocean floor. MUDSS comprises two sensing devices: a SYNTHETIC APERTURE SONAR (SAS) and a LASER LINESCAN SONAR, which are housed in a torpedo-like underwater vehicle designed to be towed behind a

ship over the search area. The submersible has wings by which its attitude and the depth of its search run are controlled. Information recorded by the sensors is transmitted to the surface where it is fed into a computer, producing near real-time detailed images. []

MOBILE USER OBJECTIVE SYSTEM (MUOS) - An integrated combat connectivity communications system scheduled (2003) to enter service in 2009. It comprises a space segment, groundstations and mobile user terminals. The satellites will provide unprotected, narrowband UHF communications capable of reaching handheld devices under adverse signal and weather conditions. [10:3013] NOTE: MUOS is to replace the UHF Follow-On (UFO) satellite communications system.

MOBILITY KILL Vehicle stoppage without affecting the vehicle's ability to employ its weapons. []

MODERNIZATION - The component of **MILITARY CAPABILITY** that relates to technical sophistication of forces, units, weapon systems, and equipment. [1.1]

MODULAR ADVANCED ARMED ROBOTIC SYSTEM (MAARS) - A ground robot system that can launch a variety of munitions and carry a number of payloads. It features a uni-body chassis with a plug-and-play design. Features include loudspeakers, a green pulsing laser and a two-way communications system. MAARS can launch smoke, star clusters and pepper spray as well as engage the enemy with a machine gun firing 7.62-millimeter ammunition. NOTE: MAARS is a tracked vehicle that can traverse a variety of terrains, including stairs, and can also be outfitted with wheels to increase travel speed while reducing noise. [10:3105]

MODULAR CROWD CONTROL MUNITION (MCCM) - A **NONLETHAL WEAPON** system which utilizes materials that produce a shock effect consisting of appropriate levels of light intensity, sound intensity, and percussion at a range of up to 50 meters. [10:2745] NOTE: The modular crowd control munition, intended to disperse crowd, produces a flash bang and delivers about 600 rubber balls that will not penetrate the body. It resembles the lethal claymore mine used extensively in Vietnam.

MODULAR PACK MINE SYSTEM (MOPMS) - A system which forms an **INTELLIGENT MINE FIELD (IMF)** by deploying **SMART MINES** which can be controlled by means of a hand-held remote control radio unit. Theoretically, the user is able to turn off the minefield to allow friendly forces to pass through it, and then turn it on again to entrap or harass the enemy. [10:2735]

MODULAR ROBOT - A robot comprised of interconnecting reconfigurable modules which, together, perform the overall function desired of the robot. [10:2923] NOTE:

Reconfigurability, for example, allows certain robots to automatically change shape and mode of locomotion (*e.g.*, roll like a tank tread, climb stairs, slither like a snake, climb like a caterpillar, and walk like a spider) in order to proceed over varying terrains.

MODULAR WEAPON - A weapon which is loaded (*e.g.* on a helicopter) to meet specific weapon requirements. [10:2773] Contrast with **ORGANIC WEAPON**.

MODULATED HOT LAMP - An infrared power source which is mechanically or electronically modulated, and is used for jamming infrared missiles. Examples are alkali metal vapor lamps, silicon carbide lamps, and rubidium-filled lamps. [4:10]

MODULATED MULTIPLE FREQUENCY REPEATER - A **FUZE JAMMING** technique that simulates the Doppler shift needed to trigger a Doppler fuze. [4:2]

MODULATED RETROREFLECTOR - An optical mirror device which always reflects light back to its source (*i.e.*, **RETROREFLECTION**), as in a base station to an **UNMANNED AERIAL VEHICLE (UAV)** or satellite. []

MODULATING SIGNAL - See **MODULATION**.

MODULATION - A variation in the **AMPLITUDE**, **FREQUENCY**, or phase of a **WAVE** (called a **CARRIER**) in accordance with some signal called a **MODULATING SIGNAL**. [11.2]

MOLECULAR ELECTRONICS - Electronics components and circuits made from molecular-sized building blocks. These blocks are designed to self-assemble into a circuit or device much in the same way that biological molecules self-assemble into cells, tissues, and organs. One of these potential electronic building blocks is the carbon **NANOTUBE**, which can have diameters as small as one nanometer (10^{-6} meters). [10:2705] See also **BUCKY TUBE**, **ROTAXANE**.

MOLNIYA ORBIT - A highly elliptic 12-hour orbit named for the Russian communications satellites (**COMSATS**) which use it. **NOTE**: A Molniya orbit has a constant ground track and is an alternative to **GEOSYNCHRONOUS** orbits (*e.g.*, for **RF weapons**) [11.6]

MONITORING - (1) The act of listening, carrying out **SURVEILLANCE** on, and/or recording the emissions of one's own or allied forces for the purposes of maintaining and improving procedural standards and security, or for reference, as applicable. (2) The act of listening, carrying out surveillance on, and/or recording of enemy emissions for intelligence purposes. [1.1]

MONITOR MODE - See **PROMISCUOUS MODE**.

MONOCYCLE RADAR - See IMPULSE RADAR.

MONOPULSE - A radar technique in which information concerning the angular location of a source or target is obtained by comparison of signals received in two or more simultaneous antenna beams, as distinguished from techniques such as lobe switching or conical scanning in which the beams are generated sequentially. [3] Synonymous with SIMULTANEOUS LOBING. NOTE: The simultaneity of the monopulse beams makes it possible to obtain a two-dimensional angle estimate from a single pulse (hence the name monopulse), although multiple pulses are usually employed to improve the accuracy of the estimate or to provide Doppler resolution. The monopulse principle can be used with CONTINUOUS WAVE RADAR as well as PULSED RADAR.

MONOPULSE ANGLE JAMMING INTEGRATED COUNTERMEASURES (MAJIC) - A system intended to counter certain air-defense tracking radars, thus preventing missile launch, and MONOPULSE radar guided missiles using angle jamming techniques such as CROSS-EYE (X-EYE) and CROSS-POLARIZATION (X-POL). [10:2689]

MONOPULSE ESM SYSTEM - An ESM system which provides instantaneous emitter direction on a single pulse. The ANGLE OF ARRIVAL is determined by comparing amplitude, phase, or both from two or more antenna apertures. [4:24]

MONOPULSE JAMMING - ECM techniques used against monopulse radars. []

MONOSTATIC RADAR - A radar for which both transmitter and receiver are collocated. [] Contrast with BISTATIC RADAR.

MOONLIGHT MAZE - A term assigned to the investigation of cyber security threats from HACKERS [more accurately, CRACKERS] to DoD networks overseas. [10:2762] See also SOLAR SUNRISE.

MOORE'S LAW - With respect to memory chips, the trend (observed by Gordon Moore in 1965) that each new chip generation contains about twice as much capacity as its predecessor, and is released within 18-24 months of the previous chip. The result is that computing power rises exponentially over relatively brief periods of time. [10:2803]

"MORE ELECTRIC" AIRPLANE - A future airplane in which on-board hydraulics, pneumatics, and mechanical systems will be minimized. These systems will be replaced by miniaturized, high-power, solid stated switches and electric actuators. [10:2507] NOTE: The following are some of the innovations anticipated for the "More Electric" airplane: Electric-driven accessories; environmental control system; solid-state power

controllers; electric driven flight actuators; electric anti-icers; electric actuated brakes; fault-tolerant solid-state electrical distribution system.

MORPHING AIRCRAFT STRUCTURE (MAS) - An adaptable, time-variant air frame capable of in-flight changes in geometry to influence aerodynamic performance. [10:2955] Also called **MORPHING AIRPLANE**. NOTES: (1) An aircraft with MAS will be capable of changing critical physical characteristics in flight, thus allowing it to achieve multiple mission profiles. (2) MAS is a result of Continuous Moldline Technology (CMT), an innovative structural concept that utilizes highly flexible materials to enable in-flight modification of airframe geometry.

MORSE CODE - A method of transmitting text information as a series of on-off tones, lights, or clicks .

INTERNATIONAL & AMERICAN MORSE CODE					
<i>LETTERS A - M</i>			<i>LETTERS N - Z</i>		
<i>Letter</i>	<i>International</i>	<i>American</i>	<i>Letter</i>	<i>International</i>	<i>American</i>
A	!#	!#	N	#!	#!
B	#!!!	#!!!	O	###	! !
C	#!#!	!! !	P	!##!	!!!!!
D	##!	##!	Q	##!#	!!#!
E	!	!	R	!#!	! !!
F	!!#!	!#!	S	!!!	!!!
G	##!	##!	T	#	#
H	!!!!	!!!!	U	!!#	!!#
I	!!	!!	V	!!!#	!!!#
J	!###	#!#!	W	!##	!##
K	#!#	#!#	X	#!!#	!#!!
L	!###	—	Y	#!##	!! !!
M	##	##	Z	##!!	!!! !
<i>NUMBERS (International Morse Code)</i>					
0 #####	1 !#####	2 !!####	3 !!!##	4 !!!!!#	
5 !!!!!!	6 #!!!!!	7 ##!!!!	8 ###!!	9 ####!	

NUMBERS (American Morse Code)

0	1 !##!	2 !!##!!	3 !!!#!	4 !!!!!#
5 ###	6 !!!!!!	7 ##!!	8 #!!!!	9 #!!!#

NOTES

Dashes are three times the length of dots (except for the American Morse "L" and "0").

If you wish to learn Morse Code, learn the **sounds** rather than the visual representation

(e.g., the letter *A* should be learned as "di-dah"; *M* as "dah-dah"; *V* as "di-di-dah", etc...)

**International (or Continental) Morse Code
Special Letters and Punctuation Marks**

<i>Letter</i>	<i>Code</i>	<i>Punctuation Mark</i>	<i>Code</i>
Ä	!#!#	Full-Stop [.]	!#!#!#
Á	!##!#	Comma [,]	##!#!##
Å	!##!#	Colon [:]	###!!!
Ch	####	Question Mark [?]	!!##!!
É	!!##!	Apostrophe [']	!####!
Ñ	##!##	Hyphen [-]	#!!!!#
Ö	###!	Fraction Bar [/]	#!#!!
Ü	!!##	Brackets [()]*	#!##!#
		Quotation Mark ["]	!#!#!!

* 5/29/2004: Mr. Robert Moffatt, former Canadian Navy signalman comments: "With regards to brackets (): Open brackets are #!##! and

closed brackets are # ! # # ! # , or a combination of 'KN' for open and 'KK' for closed."

"A mistake has been made; delete the last word" ! ! ! ! ! ! ! !

MOTE - See SMART DUST.

MOUNTED COOPERATIVE TARGET IDENTIFICATION SYSTEM (MCTIS) - A lightweight system comprising a TRANSPONDER, transceiver, processor, and antennas that communicate with one another so that a weapon system with MCTIS, say a tank, locking onto a target equipped with a MCTIS transponder will receive a signal from the target identifying it as a friendly unit. [10:3018]

MOUSE - A small hand-held device used in place of a keyboard to enter commands into a computer. [10:45]

MOUSETRAP - A World War II era stand-off anti-submarine weapons consisting of a small array of jet-assisted explosive-filled projectiles (*e.g.*, 4) to be launched simultaneously at a target submarine. These were installed on certain frigates and smaller sub-hunters. As with the HEDGEHOG (HH), mousetrap ordnance was designed to detonate only upon impact with the submarine. []

MOVEMENT TRACKING SYSTEM (MTS) - A two-way digital position and communication system utilizing GPS for movement control and route planning of military vehicles and cargo. []

MOVING TARGET INDICATION (MTI) - A technique that enhances the detection and display of moving radar targets by suppressing fixed targets, such as land features and chaff. [3*]

MOZILLA - An open-source web browser designed for standards compliance, performance and portability. []

MRX - A low-power molecule disrupter weapon which it was claimed (1994) to be capable of destroying any specific type of molecule without affecting any other type of molecule. [10:2533] NOTE: The Russians reportedly developed a similar type device called "Elipton"

MUBTAKKAR DEVICE - A binary cyanide gas generator that is easily portable, contains no components that are in themselves greatly toxic or otherwise dangerous to those transporting the device, but nevertheless capable of generating sufficient

quantities of cyanide gas to flood a subway system or other such target. NOTE: The word "*mubtakkar*" is found both in Arabic and in Farsi. In the former it means "the invention," and in the latter it means "the initiative." [extracted from dkopedia.com]

MULTI-ADAPTABLE NIGHT TACTICAL IMAGING SYSTEM (MANTIS) - A hand-held pocket scope that can be used for direct observation or as a night weapon sight using its **INFRARED (IR) LASER**. The IR laser beam can be used to covertly mark targets for air strikes, and can be adjusted by the user from a pinpoint size to a "floodlight" thirty degrees to augment night vision operations. [*From a Night Vision Equipment Company product description*]

MULTI-ANGLE IMAGING SPECTRORADIOMETER (MISR) - A satellite system which measures top-of-atmosphere, cloud and surface angular **REFLECTANCE** functions, and measures surface **Bidirectional Reflectance Distribution Functions (BRDF)**, aerosol, and vegetation properties using four spectral bands in each of nine **PUSHBROOM IMAGING** cameras oriented at different angles along-track. [NASA] See also **CERES** and **MOPITT**.

MULTIBAND IMAGING RADAR - A **SYNTHETIC APERTURE RADAR** having the ability to detect small objects in all weather conditions. Its high-resolution capability is due to the use of motion to synthesize the aperture of a radar antenna. []

MULTIBAND LASER SENSOR SYSTEM - A suite of **LASER** devices used to inspect and model target components. Different frequencies of electromagnetic energy vary in their ability to penetrate materials. For a particular material, radiation at one frequency may be reflected by the surface, while another will penetrate the material. By employing laser devices over a wide frequency range, a complete internal and external inspection of a structure can be made. [USAF 2025 Study] NOTE: This tool can be used for nondestructive inspection of components, target **VULNERABILITY** analysis, **TARGET IDENTIFICATION**, decoy rejection, and reconnaissance.

MULTI-CLOUD DECOY - A **DECOY** designed to protect ships from **INFRARED** missiles. It consists of a false target, which may be floating, some distance from the protected ship to lure incoming missiles. []

MULTICOLOR SPECTRAL PROCESSING - A method of discriminating between various sources of optical or IR wavelengths, allowing a sensor to distinguish targets from background or clutter. The sensor employs two detectors with differing wavelength responses to view the same pixel in object space. By comparing relative signal magnitude in both bands simultaneously, the target can be distinguished from clutter and background signals. [10:85]

MULTICONE ANTENNA - A PHASED ARRAY ANTENNA that permits the use of multiple parallel time-synchronized transmit and receive modules to continually "watch" independent conical sectors of space. [10:2640]

MULTIFUNCTION ELECTROMAGNETIC RADIATING SYSTEM (MERS) - A multifunction stealthy antenna system intended (1997) to replace a multitude of shipboard antennas with a single, low-observable structure. MERS combines four functions: UHF communications, Joint Tactical Information Distribution System (JTIDS), IDENTIFICATION FRIEND-OR-FOE (IFF), and the Combat DF V/UHF receive and direction-finding system. [10:2597]

MULTIFUNCTION STARING SENSOR SUITE (MFS³) - A modular, reconfigurable system utilizing sensor fusion and multiple advanced sensor components including staring infrared arrays, multifunction laser, and acoustic arrays. The MFS³ provides ground vehicles, amphibious assault vehicles, and surface ships with a compact, affordable sensor suite for long range non-cooperative target identification, low signature target acquisition, mortar/sniper fire location, and air defense targeting against low signature UAVs and long range helicopters. [10:2743]

MULTILINK POINT-TO-POINT PROTOCOL - A network protocol for handling simultaneous communications between computers over multiple independent links, thus increasing the effective communications bandwidth, and hence speed. Also called MULTILINK PPP. []

MULTIMISSION MARITIME AIRCRAFT (MMA) - A U.S. Navy maritime patrol aircraft able to perform armed intelligence, surveillance and reconnaissance, anti-submarine warfare (ASW) and anti-surface warfare (ASUW) missions. It is a planned replacement (2000) for the EP-3E and P-3C aircraft. [10:2843]

MULTIMISSION MOBILE PROCESSOR (M³P) - A transportable ground station designed to meet the early warning, command and control (C²) and battlefield awareness needs of future expeditionary forces by providing leaders with REAL TIME data from orbiting reconnaissance satellites. [10:2884]

MULTIMODE FUZING - A fuze counter-countermeasure requiring the signals from two or more modes to be consistent in order to trigger the fuze. [4:2] NOTE: Examples of multimode fuzing are Doppler fuzes operating at two frequencies, and fuzes that measure both range and range rate.

MULTIPATH - Reference to a signal reaching a point (e.g., a receiver) via two or more paths. []

MULTIPATH ERROR - With respect to the Global Positioning System (GPS), the result of the contamination of GPS signals by delayed versions of these same signals. These delayed, degrading signals are received by the GPS antenna from reflective surfaces near the antenna location, and introduces NOISE into the received GPS signals. [10:2550]

MULTIPLE BAND JAMMING - Jamming on two or more frequency bands simultaneously. []

MULTIPLE EVENT FUZE - A fuze designed to trigger multiple munitions functions, such as detonating a blast-fragmentation warhead to tear open an installation, and then igniting a FUEL AIR EXPLOSIVE (FAE) charge to incinerate its contents. [10:2927] See also THERMOBARIC WEAPON.

MULTIPLE FREQUENCY REPEATER (MFR) JAMMING - See FALSE DOPPLER TARGET (FDT) JAMMING.

MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES) - A training system for providing integrated training. It allows for direct fire force-on-force (individuals and vehicles) using eye safe LASER "bullets." Each individual and vehicle in the training exercise has a detection system to sense hits and perform casualty assessment. The laser transmitters, attached to each individual and vehicle weapon system, accurately replicate actual ranges and lethality of the specific weapon systems. MILES includes an After Action Review (AAR) feature to record and assess the performance of the units and engagements. [10:2917] NOTE: Upgrades to MILES use laser pulses to transmit weapon information to a target. The pulses are transmitted each time a weapon is fired; information in the pulses include the player ID and the type of weapon used. The target entity processes the information to produce a casualty assessment - for an individual soldier, the casualty assessment produces a state of *killed* or *wounded*. The casualty assessment for a mobile weapon system can produce several outcomes: *catastrophic kill*, *mobility kill*, and *communication kill*.

MULTIPROCESSING - The simultaneous execution of two or more programs or sequences of instructions by a computer NETWORK consisting of two or more processors. [3] See also PARALLEL PROCESSING, PROCESSOR FARM.

MULTIPURPOSE INTERNET MAIL EXTENSIONS (MIME) - See MIME.

MULTIPURPOSE SECURITY and SURVEILLANCE MISSION PLATFORM (MSSMP) - A distributed network of remote sensors mounted on vertical-takeoff-and-landing (VTOL) mobility platforms and portable control stations. The system is designed to provide a rapidly deployable, extended-range surveillance capability for a wide variety of security operations and other tactical missions. [10:2823]

MULTISENSOR DATA FUSION -- An engineering discipline used to combine data from multiple and diverse sensors and sources in order to make inferences about events, activities, and situations. [10:2861] Also called **DISTRIBUTED SENSING**. NOTE: Data-fusion technology has been applied to military applications such as battlefield surveillance and tactical situation assessment, and in commercial applications such as robotics, manufacturing, medical diagnosis, and remote sensing. [*ibid*]

MULTISENSOR INTEGRATION - See **DATA FUSION**.

MULTISOURCE CORRELATION - See **DATA FUSION**.

MULTISPECTRAL IMAGING SENSOR - A sensor which is capable of simultaneous or serial acquisition of imaging data from two or more discrete spectral bands. [12] See also **HYPERSPPECTRAL IMAGING SENSOR**.

MULTISPECTRAL OBSCURATION - The use of obscurants in several spectra, such as the generation of smoke and graphite-based compositions that can screen in the visual, IR and MMW ranges. [10:2575]

MULTISPECTRAL SIGNATURE CONTROL - Any combination of two or more of the following **SIGNATURE CONTROL** techniques that can reduce the basic signatures in each category: **ACOUSTICS SIGNATURE CONTROL**, **INFRARED SIGNATURE CONTROL**, **LASER SIGNATURE CONTROL**, **MAGNETIC SIGNATURE CONTROL**, **OPTICAL SIGNATURE CONTROL**, and **RADIO FREQUENCY (RF) SIGNATURE CONTROL**. [12]

MULTI-SPECTRAL TARGETING SYSTEM (MTS) - A system comprising **ELECTRO-OPTICAL** and **INFRARED** sensors plus a **LASER DESIGNATOR** that allows remote operators to search for, identify and then designate hostile targets for precision-guided weapons. [10:3009]

MULTITECHNOLOGY AUTOMATED READER CARD (MARC) - A "smart card" which it intended to be carried by individual soldiers, and which will handle six different functions (1995):

1. Preparation for overseas movement and mobilization;
2. Manifesting onto aircraft;
3. Peacetime medical care;
4. Field medical care;
5. Food service; and
6. Transportation.

Functions 1, 2, and 6 are managed by an embedded chip; functions 3 and 5 by a BAR CODE, and function 5 by a magnetic stripe. Security is handled through use of a personal identification number (PIN). [10:2567]

MULTIWARHEAD TOMAHAWK - An advanced version of the Tomahawk Land Attack Missile (TLAM), armed with seven warheads rather than one. Under a project (*ca* 2003) titled Multiple Responsive Ordnance (MRO) the Tomahawk could be fitted with seven independent warheads, each with its own guidance system and capable of acting independently or together as a single weapon. For example, the TLAM could release some of its payload to attack targets of opportunity while enroute to a site programmed in its memory. [10:3017]

MULTIWARHEAD TOMAHAWK FEATURES			
UNITARY MODE	AREA MODE	DISTRIBUTED MODE	INTEGRAL CHARGE
Single target Proximity, impact, delay fuzes Blast & fragmentation	Single target area Controlled pattern Simultaneous kills	Small discrete targets Multiple-dispense points Multiple kills per missile	All Warheads Dispensed Warhead in missile Target penetration followed by warhead blast
Source: [10:3017]			