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**GALILEO** - European satellite navigation system. Under civil control, Galileo will be (2001) a global navigation infrastructure consisting of 30 satellites, the associated ground infrastructure and regional/local augmentations [Source: Galileo Web site, [http://europa.eu.int/comm/energy\\_transport/en/gal\\_en.html](http://europa.eu.int/comm/energy_transport/en/gal_en.html) ] View an artist's concept of GALILEO. NOTE: Galileo will be inter-operable with the GLOBAL POSITIONING SYSTEM (GPS) and GLOBAL NAVIGATION SATELLITE SYSTEM (GLONASS).

**GALLIUM ARSENIDE (GaAs)** - A compound used in integrated circuits (ICs). [10:12] NOTE: GaAs provides a speed of electron mobility about five times that of silicon, and lower power dissipation at the same speed than silicon of the same feature size. Potential GaAs advantages include increased radiation hardness and operation at higher temperatures than can be achieved with silicon. Additionally, the band structure of GaAs allows light-emitting devices to be made, not previously possible with silicon (Recently, etched silicon has also been made to emit light by applying a voltage or a "pumping" light).

**GALLIUM NITRIDE LIGHT-EMITTING DIODE (GALLIUM NITRIDE LED)** - A white-light emitting diode with potential to produce, efficiently, light roughly 100 times as bright as an incandescent bulb and will last 100 times as long. [10:2965]

**GAMMA-RAY LASER (GRASER) - A DIRECTED ENERGY WEAPON (DEW)** under DoD's WEAPONS SYSTEMS TECHNOLOGIES (WST). The projection of coherent electromagnetic (EM) energy to a distant target at the speed of light. [www.dtic.mil] Also called Gamma X-ray laser. NOTES: (1) Grasers can be small-size devices. (2) GRASERS penetrate deeply into targets and can produce a range of lethality from SOFT KILL to HARD KILL. (3) GRASERS are being considered (*circa* 1999) for space application against missiles and satellites. (4) Propagation through the atmosphere is attenuated, but a GRASER could attack targets from space to as far down as 40 km above the ground. (5) Countermeasures against GRASERS are difficult because of the deep penetration of its beam. See also **ANTIMATTER PARTICLE BEAM (APB)**, **CHARGED PARTICLE BEAM (CPB)**, **HIGH POWER MICROWAVE/RADIO FREQUENCY (HPM/RF)**, **KINETIC ENERGY WEAPON (KEW)** and **NEUTRAL PARTICLE BEAM (NPB)**.

**GAMMA X-RAY LASER** - See **GAMMA-RAY LASER**.

**GAPFILLER SATELLITE (GAPSAT)** - A high capacity super high frequency (SHF) wideband communications satellite to provide critical information to the US military and Allied forces. Three or more GAPSATs will form the Wideband Gapfiller

Satellite (WGS) system to be launched in the 2004 time frame. [*Defence Systems Daily*, 18 June 2001] See the WGS logo.



**GARDIAN** - An acronym for General AREA Defense Integrated ANti-missile. GARDIAN is a LASER system that utilized a high energy CHEMICAL LASER to protect military assets against low flying tactical threats such as cruise missiles and UNMANNED AERIAL VEHICLEs (UAVs). GARDIAN generates a laser beam which is focused on a moving target creating immense heat at a single spot, effectively burning a hole in the target. The laser can engage within a few seconds and locks on until the target is destroyed. [10:2557] See also DIRECTED ENERGY WEAPON (DEW).

**GARNISHING** - In surveillance, natural or artificial material applied to an object to achieve or assist CAMOUFLAGE. []

**GARRET SCANNER** - An electronic device used to scan rooms for concealed weapons. It includes a "reduced sensitivity" mode for scanning near floors containing reinforcement bars (rebar). []

**GAS LASER** - A LASER in which a gas is used as a light-emitting source. The electrons in the gas molecules are excited by x-rays plus electrical discharges (called *electrical/gas lasers*), or by chemical reactions (called CHEMICAL LASERs). The choice of gas determines the color of the output light. [10:2559] See also CRYSTAL LASER, DIODE LASER, DYE LASER.

**GATE** - (1) An interval of time during which some portion of a circuit or display is allowed to be operative. (2) The circuit which provides gating. [3]

**GATE DECEPTION** - A SELF SCREENING ECM technique that returns a large jamming or on-frequency noise signal back to a victim automatic tracking radar. The jamming signal is much stronger than, and thus masks in the (velocity, range, or angle) gate, the true signal returned by the radar cross section of the jamming

platform. The jamming signal is then gradually increased or decreased relative to the true return signal, causing the radar's gate to move away from the true signal. After a specified time or signal-magnitude, the jamming signal is turned off, causing the radar to lose its track and go into a search mode to reacquire the target. This process then repeats itself. [8]

**GATEWAY** - A device that forwards information from one network to another. [10:2619] Also called a **ROUTER** or switch.

**GATING** - (1) The process of selecting those portions of a signal that exist during one or more selected time intervals. (2) (Radar) The application of enabling or inhibiting pulses during part of a cycle of equipment operation. [3]

**GATOR MINE** - A component of the Navy's CBU-78/N and the Air Force's CBU-89/B air-launched cluster bombs. Each Navy bomb contains 15 antipersonnel and 45 antitank Gator mines; each Air Force bomb contains 22 antipersonnel and 72 anti-tank Gator mines. Gator mines can also be deployed from vehicles and helicopters using the VOLCANO multiple delivery mine system. [10:2735]

**GENERIC THREAT SIMULATOR (GTS)** - A test and evaluation tool which employs simulation to evaluate the effectiveness of a ship's **ELECTRONIC COUNTER-COUNTERMEASURES (ECCM)** and anti-missile **DECOYS**. It tests the entire system: the **ELECTRONIC SUPPORT MEASURES (ESM)** system, which detects incoming missiles; the fire control system, which launches a counter-measure or decoy; the decoy itself; and the performance of the human operators aboard the ship. []

**GENERIC WEAPON** - A weapon that is useful against any target. []

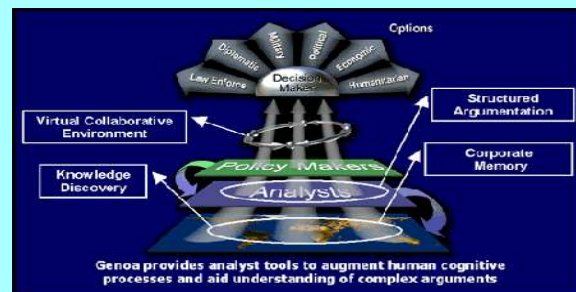
**GENETIC ALGORITHM (GA)** - A computer algorithm based on the mechanisms of biological natural selection, using populations of objects which can reproduce based on the biological concepts of survival of the fittest and mutation. [10:51]

**GENETIC ANTENNA** - An antenna designed through use of **GENETIC ALGORITHMS** to best meet the antenna specifications. It is particularly useful in situations where existing designs are not adequate. [10:2602] See also **FRACTAL ANTENNA**.

**GENETIC DATA MINING** - The automatic extraction of prediction and classification rules from databases using advanced **GENETIC ALGORITHMS**. [10:2767]

GENISYS - A Defense Advanced Research Project Agency (DARPA) Total Information Awareness (TIA) program to produce technology enabling ultra-large all-source information repositories. [10:2969] (1) modeling and use a simpler query language; (2) support automated restructuring and projection of data; (3) store data in context of time and space to help resolve uncertainty; (4) create privacy filters, "aliasing" methods, and automated data expunging agents to protect the privacy of U.S. citizens and others not involved with foreign terrorists; and (5) develop a large, distributed system architecture for managing the huge volume of raw data input, analysis results, and feedback.

GENOA - A Defense Advanced Research Project Agency (DARPA) Total Information Awareness (TIA) program to rapidly and systematically accumulate evidence, facilitate collaboration (while protecting critical information), and test hypotheses that support decision-making at the national level. [10:2969].



### *GENOA Concept*

GENOA II - A Defense Advanced Research Project Agency (DARPA) Total Information Awareness (TIA) program to develop information technology needed by teams of intelligence analysts and operations and policy personnel in attempting to anticipate and pre-empt terrorist threats to U.S. interests. [10:2969].

GENOMICS - (1) The study of genes and their function. [] (2) A new technology combining biotechnology, genetic engineering, and microelectronics. []

GEOGRAPHIC SYNTHETIC APERTURE RADAR (GEOSAR) - An airborne all-weather radar system used to map terrain. GEOSAR employs a dual frequency SYNTHETIC APERTURE RADAR (SAR) design to penetrate forest canopy and so map the actual Earth's surface. []

GEOPOSITIONING - The placement, by radio control, of a satellite from one GEOSYNCHRONOUS position to another. []

GEOSAR - See GEOGRAPHIC SYNTHETIC APERTURE RADAR.

**GEOSTATIONARY SATELLITE** - A satellite that has a circular orbit, lies in the plane of the earth's equator, and moves about the earth's polar axis in the same direction and with the same period as the earth's rotation. Thus, the satellite remains above a fixed point on the earth's equator. [10:14] See also **GEOSYNCHRONOUS SATELLITE**. NOTE: (2005) A list of current geostationary satellites and other satellite news and information (including lists of failed launches, failed satellites, and former geostationary satellites) can be found at [www.sat-index.com](http://www.sat-index.com).

**GEOSTATIONARY TRANSFER ORBIT (GTO)** - an orbit around the Earth used as an intermediate stage between a low Earth orbit (LEO) and a geostationary orbit (GSO). It is an ellipse where the perigee is a point on the LEO and the apogee has the same distance from the Earth as the GSO. []

**GEOSYNCHRONOUS SATELLITE** - A satellite that orbits the earth such that it remains stationary with respect to a given point on the earth because its orbit has the same period of revolution as the earth. That is to say that a radial line originating at the center of the earth and passing through the point of interest on the surface of the earth will also pass through the satellite. [10:2620\*] See also **GEOSTATIONARY SATELLITE**, **MOLNIYA ORBIT**. NOTE: (2005) A list of current geostationary satellites and other satellite news and information (including lists of failed launches, failed satellites, and former geostationary satellites) can be found at [www.sat-index.com](http://www.sat-index.com).

**GHILLIE SUIT** - A **CAMOUFLAGE** jump suit with pieces of "camo mesh" having various colored tattered rags sewn onto it. Its purpose is to blend an individual, such as a sniper, into the surroundings by breaking up the distinctive human form. [] See also **BALACLAVA**, **DRAG BAG**, **SNIPER FACE VEIL**, **UNIFORM CAMOUFLAGE**. NOTE: The term "ghillie" likely was taken from that used to refer to Scottish game-keepers, who are called "ghillies." Other related terms are **BODY BLIND**, **BODY VEIL**, **MILITARY NET**.

**GIANT MAGNETORESISTANCE (GMR)** - An application of **MAGNETOELECTRONICS**. In a GMR material, consisting of a stack of alternating layers of magnetic and nonmagnetic atoms, a small magnetic field can produce a large change in electrical resistance, thus allowing great increases in hard drive densities. [10:2782] See also **EXTRAORDINARY MAGNETORESISTANCE (EMR)**

**GLADIATOR** - A multipurpose unmanned ground system (UGS) robot intended to support combat operations. The UGS can be equipped with machine guns or grenade launchers. [10:3098]]





## **GLADIATOR UGS**

**GLARE LASER** - A **NONLETHAL WEAPON** intended to cause temporary loss of sight to the targeted individual (TI). [10:2730]

**NOTE:** One of these devices under development is the so-called "laser dazzler," which emits low-power green laser flashes 20 times per second.

**GLINT** -- The inherent random component of error in measurement of position or Doppler frequency of a complex target due to interference of the reflections from different elements of the target. [3]

**GLINT ENHANCE JAMMING** -- A jamming technique which features a jamming signal transmitted alternately from different antennas, switching from one antenna to the other either sequentially or randomly. []

**GLOBAL AREA STRIKE SYSTEM (GLASS)** - A system incorporating a **HIGH-ENERGY LASER (HEL)** system, a **KINETIC ENERGY WEAPON (KEW)** system, and a **transatmospheric vehicle (TAV)**. The HEL system consists of ground-based lasers and space-based mirrors which direct energy to the intended target. The KEW system consists of terminally-guided projectiles, and the TAV is a flexible platform capable of supporting maintenance and replenishment of the space assets, and can be used for rapid deployment of special operations forces (SOF). [USAF 2025 Study]

GLOBAL COMBAT SUPPORT SYSTEM (GCSS) - "The GCSS concept provides the joint warfighter with a single, end-to-end capability to manage and monitor units, personnel, and equipment from mobilization through deployment, employment, sustainment, redeployment, and demobilization. As an end state, GCSS is a secure network environment allowing Department of Defense (DoD) users to access shared data, and applications, regardless of location and supported by a robust network/information-centric infrastructure." [GCSS Web Site (2002); updated (2003) to: [www.pmlis.lee.army.mil/GCSS-ARMYmain.htm](http://www.pmlis.lee.army.mil/GCSS-ARMYmain.htm)]

GLOBAL COMMAND AND CONTROL SYSTEM (GCCS) - "... A single joint command and control system for the Chairman, Joint Chiefs of Staff. GCCS assists Commanders-in-Chiefs (CINCs) and Joint Task Force commanders in the maintenance of dominant battlefield awareness through a fused, integrated, near real-time picture of the battlespace. GCCS provides information processing support in the areas of planning, mobility, and sustainment to combatant commanders, the Services, and Defense agencies." [DISA]

GLOBAL INFORMATION MANAGEMENT SYSTEM (GIMS) - A network of intelligent information gathering, processing, analysis, and advisory nodes. GIMS collects, stores, analyzes, fuses, and manages information from ground, air, and space sensors and all-source intelligence. Sensors used include acoustic, optical, radio frequency (RF), olfactory, etc. It employs neural processing to provide information tailored to the user's personal requirements. [USAF 2025 Study]

GLOBAL NAVIGATION SATELLITE SYSTEM (GLONASS) - A Russian small lightweight jammer designed to jam the Global Positioning System (GPS) []

GLOBAL POSITIONING SYSTEM (GPS) - A constellation of 24 operating satellites and three in-orbit spares (1995). Each satellite continuously emits a pair of signals by which the system's precision and accuracy are achieved. GPS receivers employed by various users can provide positioning accuracy to within centimeters. [10:2573]

NOTE: The determining of position of a GPS receiver requires the simultaneous measurement of the distances to four orbiting satellites. The measurement of raw range from a single satellite places the receiver on the surface of a sphere centered on the satellite with a radius equal to the measured range. A simultaneous measurement of the range to a second satellite creates a second sphere that intersects the first and creates a sector upon which the receiver may be found. A third measurement produces the intersection of three spheres with only two points common to all three. One of these points will be in space, the other at the receiver's terrestrial position. In theory, these three measurements should be sufficient to produce an unambiguous positional fix. In practice, however, the inaccuracy of the user's inexpensive clock must be accommodated by a range measurement to a fourth satellite. At this point there are four unknowns -- the user's longitude, latitude and altitude measured from the center of the earth, as well as the bias required to bring the user's clock error into synchronicity with system time and four independent range

equations. Solving the system of equations yields user position data to an accuracy of at least 15 meters and time to within 100 NANOSECONDS. [10:2599] There are at least two levels of precision associated with GPS -- Coarse/Acquisition (C/A) code, which involves ionospheric and geoid correction algorithms, and encrypted Precision (P) code, presumably for ballistic missile and other military usage. See also GALILEO.

**GLOBAL SURVEILLANCE, RECONNAISSANCE, AND TARGETING SYSTEM (GSRT)** - A space-based all-sensor collection, processing, and dissemination system which provides a real-time information database. This database is used to create a VIRTUAL REALITY (VR) image of the area of interest, thus providing all levels of command SITUATIONAL AWARENESS (SA), technical and intelligence information, and command & control (C<sup>2</sup>). [USAF 2025 Study]

**GOVERNMENT OSI PROFILE (GOSIP)** - A subset of OPEN SYSTEM INTERCONNECTION (OSI) standards specific to U.S. Government procurements, designed to maximize interoperability in areas where plain OSI standards are ambiguous or allow too many options. [10:2736]

**GRACEFUL DEGRADATION** - A system design feature to prevent catastrophic failure by allowing the system to operate at a predictably decreasing capability in the presence of increasing subsystem failure. []

**GRAPHENE** - A one-atom-thick sheet of carbon with remarkable electrical properties for applications in high-speed transistors. Graphene ribbons range in width from a few nanometers to a few hundred nanometers. [10:3107] NOTE: By varying its width a graphene ribbon can be made to act as a semiconductor or as a metallic conductor.

**GRASER** - See GAMMA-RAY LASER

**GRATING LIGHT VALVE (GLV)** - A television display that relies on MICROELECTROMECHANICAL systems technology to control and direct light from semiconductor LASERS to form a TV picture on a screen or wall. [10:3029]

**GRAY** - A term used to indicate countries other than the U.S. or the Soviet Union; e.g., gray forces, gray equipment. [] Contrast with BLUE, RED FORCES.

**GRAYBODY** - A temperature radiator whose spectral emissivity is less than unity and the same at all wavelengths. [3] NOTE: Graybody radiation can emanate from an infrared-generating missile in flight: from the leading edges, exhaust smoke, and the engine enclosure.

**GRAYBODY RADIATOR** - A flare designed to emit over a wide spectrum. [10:65]



GRAY-HAT HACKER - A HACKER whose aim is to publicly expose security flaws in software, and who generally posts the results on the Internet. [ ] Contrast with CRACKER. See also BLACK-HAT HACKER, HONEYPOT, TROPHY GRABBING.

GRAYTOOTH - A BLUETOOTH-like link that transmits in the 5-10 watt, sufficient power to achieve a distances of more than 2 km. GRAYTOOTH employs higher frequencies to avoid detection and self-jamming in the 2.4 GHz band and the Industrial, Scientific, and Medical (ISM) band in the vicinity of 5 Ghz. [10:3037]

GRENAD-LAUNCHED IMAGING MODULAR PROJECTILE SYSTEM (GLIMPS), A 40mm projectile containing a camera and a radio transmitter. [ ] NOTE: GLIMPS has been developed also as a stand-off sensor for a variety of applications in surveillance and law enforcement..

GRID - A VACUUM TUBE element used to control the electrical current flowing through the tube by varying its voltage with respect to that of the CATHODE. [ ]

GRID AMPLIFIER - A solid state high power amplifier, destined (*ca* 2003) to replace VACUUM TUBES now used as MILLIMETER WAVE (MMW) amplifiers. The grid amplifier consists of an array of transistors fabricated on a single GALLIUM ARSENIDE or indium phosphide chip. Transistor output signals are combined to form a beam emanating from the face of the chip, providing as many as 20 watts of power at 30 GHz from a single chip. [10:2981]

GRIDLOCK - (1) The process of removing navigational and radar biases by calibrating to a common force reference point. This is accomplished by all units of the force simultaneously recording the position of a commonly-held target that has a specified relative position from the force center (or other reference point) at the same instant. [ ] (2) The computer process used to compare an individual ship's track data with remotely originated track data, and to determine the correction necessary to bring the tracks into alignment. [10:84]

GROUND-BASED ELECTRO-OPTICAL DEEP SPACE SURVEILLANCE SYSTEM (GEODSS) - A system of three telescope sensors linked to video cameras, which feed their space pictures into a nearby computer for display on a monitor and recording on magnetic tape. [ ]

GROUND CLUTTER - CLUTTER resulting from the ground or objects on the ground. [3] See also RADAR CLUTTER, WAVE CLUTTER.

**GROUND EFFECT** - A condition which occurs when a helicopter hovers near (within 1/2 rotor diameter) of the ground, and is due to the interference of the surface with the airflow pattern of the rotor system. When a helicopter is hovering In Ground Effect (IGE), blade efficiency increases, and less power is required than a hover Out of Ground Effect (OGE). [10:2776] NOTE: Maximum ground effect is achieved when hovering over smooth paved surfaces.

**GROUND-EMPLACED MINE SCATTERING SYSTEM (GEMSS)** - A mine dispenser designed to be towed by a vehicle. It flips one mine out of a tube every two seconds, and is capable of thus scattering up to eight hundred antipersonnel mines and/or antitank mines per load. The mines are similar to those used by the ADAM system. [10:2735]

**GROUND HOMING ON PSEUDO-TARGET** - An ECM technique consisting of pointing the ECM antenna in a direction other from that of the victim radar in order to create off-angle noise strobing or false targets. [8\*]

**GROUNDING** - The BONDING of an equipment case, frame or chassis, to an object or vehicle structure to ensure a common [electrical] potential. [1.1] See also EARTHING.

**GROUND PENETRATING RADAR (GPR)** - A radar which produces ultrawide-band impulses that penetrate ground substrata and produce signal reflections from more dense deposits contained therein. [10:2681] Also called GPEN RADAR. NOTE: GPRs have been used to detect deposits of gold ore lying two-to-three feet deep within the tunnel wall of a working gold mine. This technology has also been used for detection of subterranean tunnels and fortifications as well as buried antipersonnel and anti-vehicle mines. In this latter role, however, GPR does not perform well in dry soil and produces false positives from rocks and tree roots. [10:2674] A hand-held GPR system that integrates the ground penetrating radar with a pulsed induction metal detector to produce a unit that can be used by a combat engineer or infantryman to reliably detect buried mines, including heavy anti-tank mines and small plastic anti-personnel mines. [10:2702]

**GROUND TRUTH** - The actual facts of a situation, without errors produced by sensors or human perception and judgment. [10:2979]

**GROUND WAVE** - A radio wave that is propagated over the earth and is ordinarily affected by presence of the ground and troposphere. [3] Contrast with SKY WAVE.

**GUARD BAND** - A frequency band between two channels which gives a margin of safety against mutual interference. [3]

GUARD GATING - An ECCM technique wherein the velocity- and/or range-gate of a tracking radar is protected from GATE DECEPTION, CHAFF, and other forms of ECM by the use of additional gates. [8]

GUARDRAIL/COMMON SENSOR (GR/CS) - An airborne SIGINT collection/location system that integrates the Improved GuardRail V (IGR V), the Communication High Accuracy Airborne Location System (CHAALS) and the Advanced QUICKLOOK (AQL) into the same platform aircraft. The system consists nominally of twelve aircraft which perform operational missions in flights of three. [10:2811] NOTE: The GR/CS can employ five operation modes, selectable by the mission commander: *Direct Tether* - each aircraft talks to its own tracking operator via a data link; *Extended Tether* - The aircraft talks to both the ground station and to the other two aircraft in the flight of three; *Untethered* - The aircraft records data while aloft for later downloading; *Repeater Operations* - Extended data-collection capability with downlink to a ground vehicle, which in turn retransmits the data to a satellite for global redirection when a downlink is available; and *Direct Air-to-Satellite Relay* -- All three aircraft transmit directly to a satellite, which in turn relays to an Integrated Processing Facility (IPF) ground station that does not have to be in the operational area.

GUIDED MUNITION - A "one-on-one" munition: A specific munition engages a specific target, which is advantageous during close combat situations. An operator is required in the loop to select the target and often assist in the guidance. The munition may be either COMMAND-TO-LINE-OF-SIGHT (CLOS), or possess HOMING GUIDANCE. [12] Contrast with BRILLIANT MUNITION. See also SMART MUNITION.

GUNSHOT DETECTION SYSTEM (GDS) - A wireless package comprising acoustic sensors, transmit/receive components, computer chips, an integrative motherboard and a power source. It operates as a "sleeper," activating only when it perceives the distinct signature of a gunshot, at which time it transmits to authorities precise data about the type gun used, number of shots fired, and the location from which the shots were fired. [10:2995] NOTE: The GDS may be deployed in trees, on power lines, or even on soldiers' helmets (the latter to provide data on sniper fire).

GULL - In electronic warfare, a floating radar reflector used to simulate a surface target at sea for deceptive purposes. []

GYROCHIP - An angular rate sensor designed to be a reliable replacement for iron gyros. It is a single piece of piezoelectric quartz shaped like a double-ended tuning fork. It uses the Coriolis effect in determining angular rate. The unit operates on 600 milliwatts of DC power and has no motors or bearings and is essentially solid-state. The gyrochip is used in applications that include helicopter yaw control, infrared line of sight stabilization, missile flight control and guidance, parachute instrumentation and periscope stabilization. [10:2524]

GYROTRON - A high power microwave generating device suitable for use as a DIRECTED ENERGY WEAPON in the MILLIMETER WAVE band. [10:16] See also BEAM-PLASMA DEVICE, FREE- ELECTRON LASER; VIRTUAL- CATHODE OSCILLATOR.