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OBJECTIVE FORCE WARRIOR (OFW) - A program (*circa* 2002) for designing and producing the warfighter's uniform. Starting at the skin, the uniform is built outward, integrating as many functions as possible. Intended to weigh about 50 pounds, the system will include multi-purpose electronics, including goggles what will allow the soldier to see in both the **INFRARED** and thermal realms, as well as have a **HEAD-UP DISPLAY** monocle positioned about 1.5 inches from either eye that will produce a virtual 19-inch color monitor of 800 x 600 pixels. A warning system will be incorporated that will react to a trigger squeeze if the weapon is aimed at a friendly soldier. The helmet will incorporate a **GLOBAL POSITIONING SYSTEM (GPS)** , radio, and infrared target designator and locator. The traditional microphone will be replaced by a dime-sized sensor fastened to the head to transmit cranial vibrations to the communications system. System voice control will allow the soldier to control the computer through the microphone. For survivability, the uniform will include vented body armor. Uniform-embedded body sensors will measure the diastolic and systolic blood pressure, resting heart rate, core body temperature and skin temperature - information which will be relayed to field medics so that they can respond to a wounded soldier. Powered tourniquets will be embedded in sleeves and pant legs, and will be capable of being activated with one hand, and operate in a pulsing motions to allow limited blood flow to the limb. [10:3008] See also **ELECTRO-OPTIC TEXTILE, NANOTECHNOLOGY-ENHANCED CLOTHING.**

OBLIQUE FLYING WING AIRCRAFT - A DARPA program (*circa* 2006) with the objective of demonstrating the feasibility of a tailless, supersonic, variable sweep oblique flying wing aircraft. [10:3074] NOTE: An oblique wing aircraft has part of the wing swept forward and the other part swept backward in an asymmetrical configuration when flying at supersonic speeds. The sweep angle of the wing varies according to the airspeed (*i.e.*, low angle for slower speeds for efficient low-speed aerodynamics and larger angles at higher speeds to reduce supersonic wave draft.) [10:3074]

OBSCURANT - A material used to limit or prevent reconnaissance, surveillance, target acquisition, and weapon guidance. Obscurants may be identified by their impact on the **ELECTROMAGNETIC SPECTRUM**. [12] Examples of Obscurants are listed in the table below:

EXAMPLES OF OBSCURANTS		
<i>Conventional (visible)</i>	<i>New (visible/infrared)</i>	<i>Experimental (IR/MMW)</i>
Fog oil	Brass flakes	Carbon fibers
		Metal coated fibers
Diesel fuel	Graphite flakes	Metal coated glass
		Metal microwires
Phosphorous	Titanium oxide	Iron
Hexachloroethane	Terephthalic acid	Polymers

Delivery systems for the above include generators, artillery, smoke pots, mortars, smoke grenades, and rockets. [10:2801] NOTES: (1) Obscurants have the potential to negate the value of high-cost sensor and guidance systems. Examples of obscurants include those produced by large mechanized generators, and those produced by self-protection grenades, such as the BURSTING OBSCURANT SMOKE GRENADE, as well as other devices to defeat sensors through scattering or absorbing in the visual, INFRARED, and MILLIMETER WAVE regions. (2) Obscurants can also be used for signaling (Indian smoke signals?) deception, and other uses.

OBSERVABLES - Characteristics of an object or phenomenon by which it can be detected. [] See also SIGNATURE. NOTE: Examples of observables are radiations, reflections, magnetic fields, wakes, contrails, pressure anomalies, magnetic anomalies, environmental disturbances, and seismic sources.

OBSTACLE BELT - See MINEFIELD BELT.

OCEAN MARKING - The use of FILM-FORMING POLYMERS to provide an all-weather day and night location marker on the surface of a body of water. The two film-forming compounds are contained in a packet that, when placed in the water, disperses a film that creates a surface having a slick appearance with respect to the surrounding water. The marked area also has a reduced radar BACKSCATTER compared to the surrounding water, and as a result of reduced evaporation, has a warmer surface temperature than the surrounding water. Consequently, the marked area can be detected visually, with radar, and with INFRARED (IR) sensors. [10:2544]

OFF-BOARD COUNTERMEASURES - Countermeasures systems carried by a platform, and deployed (or activated) when under direct attack by the threat. [10:2350] Contrast with ON-BOARD COUNTERMEASURES.

OFFENSIVE AIRCRAFT SURVIVABILITY EQUIPMENT (OASE) - Equipment including RADAR WARNING RECEIVERS, jammers, laser warning receivers, acoustic detectors, and optical countermeasures used in support of aggressive action. [10:91]

OFFENSIVE COUNTER CYBER (OCC) - Offensive operations to destroy, disrupt, or neutralize adversary CYBERSPACE capabilities both before and after their use against friendly forces, but as close to their source as possible. [1-3] NOTE: The goal of OCC operations is to prevent the employment of adversary cyberspace capabilities prior to employment. This could mean preemptive action against an adversary.

OFFENSIVE COUNTERSPACE OPERATIONS - That part of COUNTERSPACE OPERATIONS that is intended to destroy or neutralize an adversary's SPACE SYSTEMs or the information they provide, [Air Force Doctrine Document (AFDD)-1, *Air Force Basic Doctrine*, September 1997, 47] See also DEFENSIVE COUNTERSPACE OPERATIONS.

OFFENSIVE CYBERSPACE OPERATIONS (OCO) - Activities that, through the use of CYBERSPACE, actively gather information from computers, information systems, or networks, or manipulate, disrupt, deny, degrade, or destroy targeted computers, information systems or networks. [1-3]

OFFENSIVE ECCM - ECCM techniques that induce the enemy to use ECM waveforms or tactics that are helpful to the victim radar. [10:2446]

OFFENSIVE INFORMATION OPERATIONS - The integrated use of assigned and supporting capabilities and activities, mutually supported by intelligence, to affect [*sic*] adversary decision makers to achieve or promote specific objectives. These capabilities and activities include, but are not limited to, operations security (OPSEC), military deception, psychological operations (PSYOPS), electronic warfare (EW), physical destruction and special information operations, and could include computer network attack (CNA). [10:2764]

OMNI SPECTRAL CORRELATOR (OSCOR) - A portable micro-computer controlled scanner able to detect surveillance devices and analyze signals in the audio (50Hz - 15KHz), radio VLF-Microwave (10KHz - 3 GHz) and INFRARED spectra. []

ON-BOARD COUNTERMEASURES - Countermeasure systems that are either internal or pod-mounted on the platform, and used against all modes of the threat, including functions that precede direct attack. On-board countermeasures usually encompass a receiver, a processor/ techniques generator, and a transmitter, along with associated antennas. [10:2350] Contrast with **OFF-BOARD COUNTERMEASURES**.

ONION ROUTER - A technique for communicating anonymously over the **INTERNET** in real time. The "onion" is a layered, encrypted set of instructions that establishes the connection between the initiator and recipient. The actual message, also encrypted, is then sent. As the message moves through the Internet, it is successively decrypted, arriving at the recipient as unencrypted text. [10:2815]

ON-THE-MOVE (OTM) - Part of the **RADIO ACCESS POINT (RAP)** system, OTM is a system of phased array antennas and high capacity trunk radios (HCTRs) installed in a Standard Integrated Command Post (SICP) shelter which is mounted on a High Mobility Multipurpose Wheeled Vehicle (HMMWV) [10:2741]

OPEN-LOOP SIMULATION - Simulation in which there is a one-way path from the simulator to the system being tested. [10:2503] Contrast with **CLOSED-LOOP SIMULATION**.

OPEN SOURCE INFORMATION (OSINT) - See **OPEN SOURCE INTELLIGENCE**.

OPEN SOURCE INTELLIGENCE (OSINT) - Publicly available information (i.e., any member of the public could lawfully obtain the information by request or observation), as well as other unclassified information that has limited public distribution or access. Also called **OPEN SOURCE INFORMATION**. [11:1]

OPEN SYSTEMS INTERCONNECTION (OSI) - A suite of **PROTOCOLS** constituting the international standard computer **NETWORK ARCHITECTURE**. [] See also **OSI REFERENCE MODEL**.

OPERATION ORDER (OPORDER) - A directive issued by a commander to subordinate commanders for the purpose of effecting the coordinated execution of an operation. [10:2764] See also **FRAGMENTARY ORDER (FRAGO)**.

OPERATIONAL CHARACTERISTICS - Those military characteristics which pertain primarily to the functions to be performed by equipment, either alone or in conjunction with other equipment; e.g., for electronic equipment, operational characteristics include such items as frequency coverage, channeling, type of

modulation, and character of emission. [1.1] Contrast with TECHNICAL CHARACTERISTICS.

OPERATIONAL CONTROL - Transferable command authority which may be exercised by commanders at any echelon at or below the level of combatant command. Operational control is inherent in Combatant Command (command authority) and is the authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission.... [1*]

OPERATIONAL COVER - That element of Operational Deception intended to discourage interest in the units of the force and to conceal the true mission, movement, composition, disposition, and capabilities of the force.. [10:3] See also COVER.

OPERATIONAL DATA STORE (ODS) - A database which contains current data being accessed by transactional users. An ODS has little or no historical data and is, therefore, up to date. [10:2766] Compare with DATA WAREHOUSE.

OPERATIONAL DECEPTION - A SPACE AND ELECTRONIC WARFARE (SEW) warfare discipline that begins with diplomatic posturing, ends with technical reinforcement, and includes a multiplicity of actions in between (e.g., cover and security, feint, technical deception). [10:2505]

OPERATIONAL DECEPTION AND COVER (OPDEC) - One of the principal elements of Area Electronic Warfare. Employment of deception measures against the enemy with regard to own force systems, doctrines, tactics, techniques, personnel operations, and other activities. [10:3] See also COVER AND DECEPTION.

OPERATIONAL ENVIRONMENT - A composite of the conditions, circumstances, and influences which affect the employment of military forces and bear on the decisions of the unit commander. [1.1]

OPERATIONAL PARAMETER - A property describing the performance level of a system, defined at a level above system specification, but in sufficient detail to allow a functional architecture and/or system specification to be developed. []

OPERATIONAL REQUIREMENT (OR) - An acquisition document consisting of a cover sheet plus 3 pages max and no attachments. An OR is an established need justifying the timely allocation of resources to achieve a capability to accomplish approved military objectives, missions, or tasks. An OR does not contain goals, but

contains the following: Program definition; Key capabilities in general terms; Thresholds of performance or readiness parameters; EMC planning and frequency spectrum assignment; and Cost Summary. [10:7] See also MILITARY REQUIREMENT.

OPERATIONAL SECURITY - A SPACE AND ELECTRONIC WARFARE (SEW) warfare support discipline that consists of measures taken to minimize hostile knowledge of ongoing and planned military operations. It includes physical security, counterespionage, and personnel security. [10:2505]

OPERATIONAL SETTING - The Operational Environment, level of conflict, ORDER OF BATTLE for both sides, and description of other local military forces and commercial activity. []

OPERATIONS SECURITY (OPSEC) - A process of analyzing friendly actions attendant to military operations and other activities to: (a) Identify those actions that can be observed by adversary intelligence systems. (b) Determine indicators hostile intelligence systems might obtain that could be interpreted or pieced together to derive critical information in time to be useful to adversaries. (c) Select and execute measures that eliminate or reduce to an acceptable level the vulnerabilities of friendly actions to adversary exploitation. [1.1] See also **OPERATIONS SECURITY INDICATORS, OPERATIONS SECURITY VULNERABILITY**. NOTE: Operations security is a part of offensive information operations, and includes communications security (COMSEC), emission control (EMCON), etc.

OPERATIONS SECURITY INDICATORS (OPSEC INDICATORS) - Friendly detectable actions and open-source information that can be interpreted or pieced together by an adversary to derive critical information. [1.1] See also **OPERATIONS SECURITY, OPERATIONS SECURITY VULNERABILITY**.

OPERATIONS SECURITY MEASURES - Methods and means to gain and maintain essential secrecy about critical information. The following categories apply: (a) action control; (b) countermeasures; and (c) counter-analysis. [1.1] See also **OPERATIONS SECURITY VULNERABILITY**.

OPERATIONS SECURITY VULNERABILITY - A condition in which friendly actions provide **OPSEC INDICATORS** that may be obtained and accurately evaluated by an adversary in time to provide a basis for effective adversary decision-making. [1.1] See also **OPERATIONS SECURITY, OPERATIONS SECURITY MEASURES**.

OPTICAL COMPUTER - A computer designed or modified to use light to represent data and whose computational logic elements are based on directly-coupled optical devices. [12]

OPTICAL COMPUTING - The utilization of light waves to achieve the interconnects that in conventional computers would be accomplished through wires, traces on PC boards and surface metallization on ICs. [10:89]

OPTICAL COUNTER-COUNTERMEASURES (OCCM) - That division of **INFORMATION WARFARE (IW)** involving measures taken to counter **OPTICAL COUNTERMEASURES (OCM)**. [12]

OPTICAL COUNTERMEASURES (OCM) - That division of **INFORMATION WARFARE (IW)** involving the use of **LASERS**, remote sensing television, **INFRARED (IR)** devices, **ULTRAVIOLET (UV)** sensors, spectrometers, **RADIOMETERS**, **HYPER SPECTRAL** devices, **MULTISPECTRAL** devices, and **DECOYS**. [12]

OPTICAL CROSS SECTION (OCR) - The measure of radiation at the surface of the object in the **ELECTRO-OPTIC (EO)** band of interest (between 0.01 and 1,000 μm) emitted or reflected from the object (target) of interest. []

OPTICAL MATERIALS - That category of **MATERIALS TECHNOLOGY** which addresses materials critical to the reliable transmission of electromagnetic radiation to surveillance sensors, weapon guidance systems, or for countermeasures purposes while protecting the associated electronic components from the environment. Optical materials include **IR** optical materials, **IR** coating materials for protection against hazardous environments, germanium optics, specialty transparent materials for coating and filters, nonlinear optical (**NLO**) materials for wavelength conversion, and substrates and optical thin film coatings for high energy laser optical components (e.g., mirrors, beam splitters and windows). [12]

OPTICAL PARAMETRIC OSCILLATOR (OPO) - A crystal which increases the wavelength of an impinging **LASER** beam (i.e., the frequency decreases). An input laser beam of one wavelength results in two output beams of longer wavelength. Contrast with **DOUBLER** and **TRIPLER**. [10:2559]

OPTICAL POWER - **RADIANT POWER** in the visible spectrum. []

OPTICAL 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 optical sensors. **OPTICAL**

SIGNATURE CONTROL includes the use of passive and active devices, materials, features, or techniques on a platform, such as lighting to reduce or mask contrast with the background, techniques to reduce, hide, or mask emissions that could be signature enhancements such as wake, smoke, contrails, other exhaust products, etc., and active and passive techniques to reduce optical cross section, and retroreflection of optical and infrared systems. [12] See also ACOUSTICS SIGNATURE CONTROL, INFRARED SIGNATURE CONTROL, LASER SIGNATURE CONTROL, MAGNETIC SIGNATURE CONTROL, MULTISPECTRAL SIGNATURE CONTROL, RADIO FREQUENCY (RF) SIGNATURE CONTROL, and SIGNATURE CONTROL.

OPTOELECTRONICS (OE)- (1) Devices that respond to optical power, emit or modify optical radiation, or utilize optical radiation for internal operations. ELECTRO-OPTICS is often incorrectly used as a synonym. [3] (2) The study of devices containing both electronic and optical components. [10:56] Also called OPTO-ELECTRONICS. NOTE: Example optoelectronic devices are photodiodes and light-emitting diodes (LEDs).

OPTRONIQUE SECTEUR FRONTAL (OSF) SYSTEM - A system used to provide French aircraft with a passive surveillance capability, as well as target-detection-and-identification functions. The OSF system is an optronic, visual and INFRARED (IR) search-and-track system that combines an IR sensor, a charge-coupled-device IMAGER, and an eye-safe LASER RANGEFINDER. [10:2880]

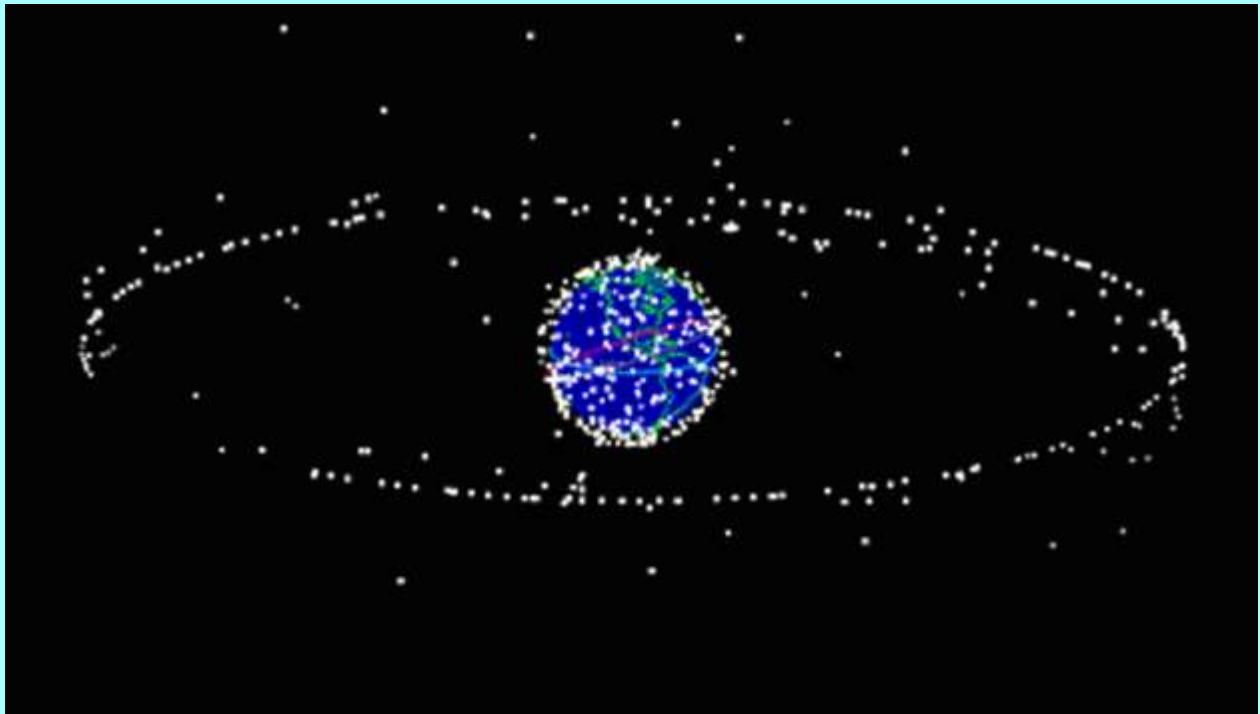
ORANGE FORCES - Those forces used in an enemy role during NATO exercises. See also BLUE FORCES, PURPLE FORCES, RED FORCES. [1.1]

ORBITAL EXPRESS - A satellite with the capability of detecting other satellites, rendezvousing with them and transferring fuel and electronic parts using robotics for docking and servicing [- in effect, a "space gas-station."] [10:3088]

ORBIT FAMILIES - Examples of satellites in LEO, MEO and GEO orbits:

- LEO: low earth orbit, typical altitude < 2000 km
 - space shuttle
 - space station
 - Hubble Space Telescope
 - iridium
 - remote sensing: EROS, Landsat
 - communications: email, text messaging, paging
- MEO: medium earth orbit, typical altitude 10,000 to 20,000 km
 - GPS: Global Positioning System

- GEO: geosynchronous earth orbit, seven earth radii, one-ninth of the distance to the moon, altitude = 36,000 km
 - Arthur C. Clarke: In 1945, while still in his late 20s, he was the first to propose the concept of using a network of satellites in the geosynchronous orbit for television and telecommunications
 - meteorology: GOES - Geosynchronous (Geostationary) Operational Environmental Satellites
 - communication:
 - signal relays for terrestrial broadcast and cable systems
 - direct broadcast satellite TV and radio
 - GOES - Geosynchronous (Geostationary) Operational Environmental Satellites



A "snapshot" of the earth and about 500 of its artificial satellites generated one summer evening in 2002. Nearly all of them are GEOs or LEOs. Satellites on the ring are in geosynchronous earth orbit (GEO). Those clustered near the earth are in low earth orbits (LEO). Scattered in between are satellites in medium earth orbits (MEO). The moon, earth's only natural satellite, is approximately nine times farther from the earth than the ring of geosynchronous satellites. Source: NASA. [from Web site <http://hypertextbook.com/physics/mechanics/orbital-mechanics-1/>]

ORDER OF BATTLE (OOB or ORBAT) - The identification, strength, command structure, and disposition of the personnel, units, and equipment of any military force. [1.1] See also **ELECTRONIC ORDER OF BATTLE**. NOTE: Orders of battle may be specific to certain warfare areas; thus terms such as Air Defense Order of Battle (ADOB), Ground Order of Battle (GOB), and Naval Order of Battle (NOB) may be encountered.

ORGANIC - Assigned to and forming an essential part of a military organization. Organic parts of a unit are those listed in its table of organization for the Army, Air Force, and Marine Corps, and are assigned to the administrative organizations of the operating forces for the Navy. [1.1]

ORGANIC AIRBORNE AND SURFACE INFLUENCE SWEEP (OASIS) - A helicopter-towed mine countermeasures system. []

ORGANIC GMTI RADAR (OGR) - A UHF Ground Moving Target Indicating (GMTI) radar system employing beam processing and multiple receivers connected with fiber-optic links for the detection and tracking of moving vehicles and personnel through foliage. [10:2955]

ORGANIC LIGHT EMITTING DIODE (LED) - A light-emitting device consisting of two layers of organic thin films sandwiched between two conductors. When an electric current is applied, bright, visible light is emitted. NOTE: Organic LEDs are lightweight, durable, flexible, power efficient, and hence ideal for portable applications and installation on sculptured surfaces (such as automobile dashboards). They need fewer process steps and use fewer and cheaper materials than the conventional LEDs. [10:2940]

ORGANIC WEAPON - A weapon that is required for each sortie. [10:2773] Contrast with **MODULAR WEAPON**.

ORTHOGONAL POLARIZATION ECCM - An **OFFENSIVE ECCM** technique in response to **CROSS-POLARIZATION JAMMING**. The victim radar continues to transmit on its current polarization and tracks on the orthogonal polarization using the jamming signal as a beacon. [Derived from 10:2446]

ORTHOGONAL SIGNALS - A pair of **SIGNALS** that (at least theoretically) are considered mutually non-interfering; for example, frequency-modulated signals and amplitude modulated signals are orthogonal to each other. Thus, orthogonality of signals is relative and not an intrinsic property of a single signal. [10:14]

OSI REFERENCE MODEL - A seven-LAYER NETWORK ARCHITECTURE model of data communication **PROTOCOLS** developed by International Organization

for Standardization (ISO) and CCITT (*Comite Consultatif International de Telegraphique et Telephonique*). Each layer specifies particular network functions:

Layer 7 - the *application layer* (the highest layer of the model) defines the way applications interact with the network.

Layer 6 - the *presentation layer* includes protocols that are part of the operating system and defines how information is formatted for display or printing and how data are encrypted.

Layer 5 - the *session layer* coordinates communications between systems, maintaining sessions for as long as needed and performs security, logging, and administrative functions.

Layer 4 - the *transport layer* controls the movement of data between systems, defines protocols for structuring messages, and supervises the validity of transmissions by performing error checking.

Layer 3 - the *network layer* defines protocols for routing data by opening and maintaining a path on the network between systems to ensure that data arrive at the correct destination node.

Layer 2 - the *data-link layer* defines the rules for sending and receiving information from one node to another between systems.

Layer 1 - the *physical layer* (the lowest layer of the model) governs hardware connections and byte-stream encoding for transmission. It is the only layer that involves a physical transfer of information between network nodes.

[10:2737]

OTTO FUEL - An odoriferous, reddish-orange oily liquid that used as a fuel for torpedoes and other weapon systems. [] NOTE: Otto fuel is a mixture of three synthetic substances: propylene glycol dinitrate (the major component), 2-nitrodiphenylamine, and dibutyl sebacate.

OUTBOARD - Acronym for "Organizational Unit Tactical Baseline Operational Area Radio Detection," a countermeasures exploitation system consisting of a direction finder (DF) with the capability to detect, locate, and identify hostile targets at long range. OUTBOARD data are sent directly to the ship's tactical data system. [] NOTE: OUTBOARD, an acronym, itself has the acronym "OB."

OUTLAW HAWK - A long-range over-the-horizon (OTH) target detection system for aircraft carriers. []

OUTLAW SHARK - A long-range over-the-horizon (OTH) target detection system for submarines. []

OVERLAP TELLING - Transferring information to an adjacent facility concerning tracks detected in the adjacent facility's area of responsibility. [1.1] See also BACK TELLING, CROSS TELLING, FORWARD TELLING, RELATERAL TELLING, TRACK TELLING.

OVERHEAD CHEMICAL AGENT DISPERSAL SYSTEM (OCADS) - A NONLETHAL WEAPON system which provides a flash-bang effect when the chemical agents are rapidly dispersed. It can be used for crowd control or to provide a remotely generated protective barrier. [10:2857]

OVER-THE-HORIZON RADAR (OTH-R) - A BISTATIC RADAR which utilizes the Earth's ionospheric layer for refracting the transmitted and received radar signals, thus allowing the detection and tracking of targets over the normal RADAR HORIZON. []

OVER-THE-HORIZON TARGETING (OTH-T) - Actions taken in order to target systems beyond the line of sight of sensors carried by the weapon platform. []