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MILITARY STANDARDIZATION HANDBOOK

GLOSSARY OF GUIDED MISSILE TERMINOLOGY

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DEPARTMENT OF DEFENSE
WASHINGTON, D.C.

MIL–HDBK–143
Glossary of Guided Missile Terminology
30 December 1966

1. This standardization handbook has been developed by the Department of Defense in accordance with established procedures.

2. This publication was approved on 30 December 1966 for printing and inclusion in the military standardization handbook series.

3. This document provides uniform terminology peculiar to the general field of Guided Missiles. The handbook is not intended to be referenced in purchase specifications except for *informational purposes, nor shall it supersede any specification requirement.*

4. The coverage of the glossary is broad. Every effort has been made to define terms used primarily by personnel engaged in the development, production and utilization of Guided Missiles. This handbook will be reviewed periodically to insure its completeness and accuracy. Users of this document are encouraged to report any errors discovered and any recommendations for changes or inclusions to the Commanding General, U. S. Army Missile Command, Redstone Arsenal, Alabama 35809 (ATTN: AMSMI-IDD).

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FOREWORD

This handbook establishes terms and abbreviations used in the Guided Missile and Rocket fields and presents definitions for future use. It is not intended that this handbook be used in identifying items of supply or establishing the names therefor. For this purpose, Cataloging Handbook H6–1 shall be used.

All terms, definitions, and abbreviations are entered alphabetically in this handbook. Those terms which occur as item names in Cataloging Handbook H6–1 are entered in capital letters, basic names from Handbook H6–1 are entered in initial capital and lower case letters. An asterisk is used to indicate abbreviations.

Terms followed by a reference "See" or "(which see)" are defined under the term to which referenced and "Cf:" indicates a cross-reference for comparison or additional information.

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A

*aam**—Air-to-air missile. See: missle, air-to-air.

aberration—The phenomenon caused by rotation of the earth in its orbit which is sufficient to cause the light from a star to appear to shift forward. For those stars at right angles to the direction of the earth's travel, the maximum effect is 20.5 seconds of arc.

ablation—The wearing away of surface material due to the action of a fluid moving past it at either high speed or high temperature, or both. Ablation is used as a method of removing the aerodynamic heating effects on missile nose cones during re-entry. Using the ablative approach, the nose cone material is subjected to thermal degradation involving pyrolysis, depolymerization, melting, vaporization, and combustion with a resulting continuous removal of material.

ablative materials—Special materials on the surface of a spacecraft which can be sacrificed—i.e., carried away or vaporized—during re-entry into the atmosphere. Kinetic energy is dissipated and excessive heating of the main structure of the spacecraft is prevented.

abort—To cause a Guided Missile to fall short of its mission for any reason other than enemy action. It may occur at any point after the firing command and before the missile reaches the target.

absolute altitude—The height or altitude of an object considering, as a base of reference, the surface terrain over which the object is located.

absolute velocity—The highest velocity theoretically attainable, i.e., the velocity of light (3×10^{10} cm/sec).

acceleration blowout—Inadvertent loss of combustion in a turbojet engine incident to an attempted acceleration and over-rich fuel mixture. Also called flameout (which see).

acceleration feedback—A sensing system for control of a missile by elimination of body-bending effects and maintenance of angles of attack at predetermined values. Accelerometers are used to sense body accelerations which are fed into the control system for correction of the motion.

Accelerometer, Guided Missile—An instrument designed to measure one or more acceleration components of a Guided Missile.

Accelerometer, integrating—An acceleration-measuring device whose output signals are either proportional to vehicle velocity or to distance traveled, and which performs an integrating function to achieve these outputs. When used in a Rocket or missile, the intergrating Accelerometer may be preset to reduce fuel flow when the programmed speed has been achieved.

accessory power supply (aps*)—A self-powered device used to supply electrical and/or hydraulic power to accessory or other auxiliary equipment carried in a missile or aircraft.

Accumulator—1. In computer applications, a device which stores a number and which on receipt of another number adds it to the number already stored.

2. In hydraulic and pneumatic applications, a device which stores liquid and gas under pressure for momentary use at a time when additional energy is required.

acoustical system—A system adapted for the transmission of sound and consisting of one or all of the following acoustical elements: acoustical resistance, inertance, and acoustical capacitance.

activator, inertial—A mechanical device employing springs that absorb energy from a velocity change and releases this energy to activate a circuit.

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active homing—See: guidance, homing.

actual exhaust velocity—The real velocity of the exhaust gas leaving a nozzle, as determined by making an accurate measurement at a specified point along the nozzle exit plane; the velocity obtained when the kinetic energy of the gas flow produces an actual thrust. Cf: exhaust velocity.

actuator—A self-contained power transmitting device designed to convert electrical, chemical, or fluid dynamic energy into a controlled mechanical force.

ACTUATOR, ELECTRO-MECHANICAL, LINEAR—A self-contained power transmitting device designed to convert electrical energy into controlled mechanical force, in the form of linear (straight line) mechanical movement. Comprised of an electric motor(s), gear box(es), screwjack(s), limit switch(es) and such accessories as required for the specific moving and positioning of other components. Excludes hydraulic and pneumatic cylinders and screwjacks.

ACTUATOR, ELECTRO-MECHANICAL, ROTARY—A self-contained power transmitting device designed to convert electrical energy into controlled mechanical force in the form of torque (rotation mechanical movement). Comprised of an electric motor(s), gear box(es), limit switch(es), and such accessories as required for the specific moving and positioning of other components. Excludes hydraulic and pneumatic cylinders and screwjacks.

ACTUATOR, EXPLOSIVE, LINEAR—A self-contained power transmitting device designed to convert chemical energy into controlled mechanical force in the form of linear mechanical movement. It is comprised essentially of a piston, powder charge, electrical bridge wire and contacts enclosed in a housing.

ACTUATOR, LINEAR, AIR TURBINE DRIVEN—A self-contained power transmitting unit, consisting of an air turbine, gear assembly, ball nut and screw assembly, and control valves. May include power take-off. Designed to convert air pressure to mechanical force in the form of linear mechanical movement.

adaption kit—Items, supplied as a kit, needed for the proper installation of a warhead and its carrier.

address—In computer applications; an expression, usually numerical, which designates a particular location in a storage or memory device, or other source or destination information.

aeroballistic missile—A wingless vehicle employing the boost-glide and continuous roll technique for flight at hypersonic speeds through the earth's atmosphere. The trajectory is ballistic to apogee; after which the vehicle assumes an angle of attack and descends, partly ballistically and partly through aerodynamic lift, to a pre-set altitude from which it resumes a ballistic dive to the target.

aerodynamic damping—Resistance to motion of a missile; caused by aerodynamic forces acting on the aerodynamic surfaces at a distance from the center of gravity incident to the pitching motion of the missile. The component of lateral velocity of such a surface in combination with the velocity due to forward speed of the missile produces an angle of attack which, in itself, provides a restoring moment.

aerodynamic forces—The aerodynamic effects experienced by a missile in flight, which are functions of ambient atmospheric pressure, flight Mach number and missile size.

aerodynamic heating—The rise in missile-skin temperature while in flight, due to increasing air friction.

aerodynamic lifting surfaces—Missile surfaces which produce normal forces to overcome gravity or to execute a maneu-

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ver. Generally of either double wedge or modified double wedge and biconvex cross-sectional profile.

aerodynamic loads—See: aerodynamic forces.

aerodynamic missile—A missile which uses aerodynamic forces to maintain its flight path, generally employing propulsion guidance and a winged configuration. Cf: ballistic missile; Guided Missile.

aerodynamic trajectory—A trajectory or part of a trajectory in which the missile or vehicle encounters sufficient air resistance to stabilize its flight or to modify its course significantly. Cf: ballistic trajectory.

aeroelastic effects—Structural deformations due to aerodynamic forces. The magnitude of aeroelastic effects for any particular missile configuration at a particular flight condition will depend upon: (a) the dynamic pressure, (b) the trim conditions, (c) the structural rigidity, and (d) normal acceleration.

aeropulse—A propulsive jet device which utilizes air to produce an intermittent thrust as opposed to the hydropulse, which employs water.

aerothermodynamic duct (athodyd)—See: ENGINE RAMJET.

afterburning—1. The characteristic of certain ROCKET MOTORS to burn irregularly for some time after main burning and thrust have ceased. (Also called thrust trailoff.)

2. The process of fuel injection into and combustion within the exhaust jet of a TURBO-JET ENGINE.

*AGE**—Aerospace ground equipment.

*agm**—Air-to-ground missile. See: missile, air-to-ground.

*aigs**—All-inertial guidance system.

alignment station—A concrete structure housing the equipment, used to align the missile to its proper azimuth and to reference the Gyroscope platforms properly.

all-inertial guidance—The guidance of a missile entirely by use of inertial devices.

allowable flutter speed—A speed above maximum expected operation velocity at which flutter may occur.

amplidyne—A rotary-magnetic or dynamoelectric amplifying device frequently used in servomechanism and control applications requiring high power gain.

ancillary equipment, Guided Missile—Equipment of a Guided Missile not directly employed in its operation but necessary for logistics support, preparation for flight, or assessment of target damage: i.e., test equipment and vehicle transport. Cf: AGE, AVE, and GSE.

angle of attack—The angle between a fixed reference line of a vehicle and a line in the direction of movement of that vehicle.

antenna array—Two or more antennas coupled together.

antimissile missile—A defensive missile launched to intercept and destroy other missiles in flight.

antisatellite missile—A missile designed to destroy an orbiting satellite.

*aps**—Accessory power supply.

*apu**—Auxiliary power unit.

*aql**—Accepted quality level.

area ratio—See expansion area ratio.

*arl**—Accepted reliability level.

armament system—A configuration consisting of a triad of missile components—fuze, safety and arming mechanism, and warhead—which is used to produce and control the damage effects of a missile.

arming—As applied to explosives, the changing from a safe condition to a state of readiness for initiation.

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ARMING DEVICE, GUIDED MISSILE WARHEAD—An item designed to perform the electrical and/or mechanical alignment necessary to permit the initiation of the explosive train of a Guided Missile warhead.

arm-to-arm—As used in the ordnance of Guided Missiles, the changing from a safe condition to a state of readiness in preparation for initiation or ignition of the propulsion system.

artillery Guided Missile—A missile, of comparatively short range, guided to the target by wire or radio command.

*asm**—Air-to-surface missile. See: missile, air-to-ground.

astrotracker—A star tracker.

athodyd—Aerothermodynamic duct. See: ENGINE, RAMJET.

attitude—The position of a missile as determined by the inclination of its axes to some frame of reference. If not otherwise specified, this frame of reference is fixed to the earth.

*aum**—Air-to-underwater missile. See: missile, air-to-underwater.

auxiliary propulsion system—A backup system to supply power for a mission if the primary unit should fail.

*AVE**—Aerospace vehicular equipment.

azimuth (az)—1. Celestially, the angle at the zenith measured clockwise from true north to the verticle circle passing through a celestial body.

2. Terrestrially, the same as bearing (which see) but limited to radar components such as computers and indicators.

AZIMUTH CIRCLE—A navigational instrument used for the determination of the azimuths of celestial objects and the bearings of terrestrial objects through the employment of sighting vanes, prisms, and mirrors mounted on a ring formed to fit and rotate about the bezel of a marine compass, permitting simultaneous viewing of a target and the compass card reading.

B

ballistic cap—See: false ogive.

ballistic coefficient—The numerical measure of the ability of a missile to overcome air resistance. It is dependent upon the mass, the diameter and the configuration.

ballistic missile—Any missile which does not rely upon aerodynamic surfaces to produce lift and consequently follows a ballistic trajectory when thrust is terminated. Cf: aerodynamic missile; Guided Missile.

ballistics—The science or art that deals with the motion, behavior, appearance, or modification of missiles or other vehicles acted upon by Propellants, wind, gravity, temperature, or any other modifying substance, condition, or force.

ballistic trajectory—The trajectory traced after the propulsive force is terminated and the body is acted upon only by gravity and aerodynamic drag.

bang-bang control—A control method wherein the corrective control applied to the missile always is applied to the full extent of the servo motion arc.

battery inverter accessory power supply (biaps*)—A battery-motor-alternator combination that supplies electrical power for missile operation.

beam-riding guidance—See: guidance, beam-riding.

bearing—The angle between a reference datum point, such as true or magnetic north, and an object, such as a beacon station, as measured in a clockwise direction from a Guided Missile. The angle between true north and the object is true

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bearing; the angle between the magnetic north and the object is magnetic bearing.

BLAST DEFLECTOR—See: DEFLECTOR BLAST.

boattail—The conical section of a ballistic body that progressively decreases in diameter toward the tail to reduce overall aerodynamic drag.

body mounted Gyroscope — A Gyroscope mounted directly on the body of a missile airframe; used as a reference instead of a stabilized platform.

BODY SECTION, GUIDED MISSILE — That which makes up a portion of a Guided Missile body, and, when used in conjunction with other missile body sections, forms a complete missile. It provides the housing and may contain and/or have accommodations for attaching mechanical, electronic, and high explosive components.

boil-off—The vapor loss from any volatile liquid, e.g., LIQUID OXYGEN, particularly when stored in a missile ready for flight.

booster—An auxiliary or initial propulsion system which travels with a missile and may or may not be separated from the missile when its impulse has been delivered. A booster system may contain or consist of one or more units.

boost-glide vehicle—An air-breathing vehicle capable of aerodynamic lift, which is propelled to extreme altitudes by reaction propulsion and returns with little or no power or guidance. It uses glide principles to increase effective range on re-entry.

boot-strap operation—A self-generating or self-sustaining process. In liquid ROCKET ENGINE operation, the feeding back of a portion of the turbo-pump output to a gas generator which causes an increase in available energy for driving the turbo-pump, which in turn delivers more Propellant to the gas generator.

boundary layer—The thin region of nearly static fluid next to the surface over which the fluid stream is moving. In the case of a missile traveling in the atmosphere, the stagnant layer of air along the surface of the airframe or aerodynamic control surfaces.

burner drag—The total drag created by a missile propulsion system; includes the drag forces on the igniter, flame holders, diffuser wall, combustion chamber wall, etc.

burnout—The point in time or in the missile trajectory when combustion of fuels in the ROCKET ENGINE is terminated by other than programmed cutoff.

C

canard configuration—A missile airframe which has the horizontal surfaces used for trim and control on the forward portion of the body, and the main lifting surfaces attached to the rear section. The forward control surfaces can be used to vary lift by varying the angle of attack of the body-wing combination. Cf: dart configuration.

canted nozzles—ROCKET MOTOR nozzles which are set at various angles with respect to the axis line of a missile vehicle either to improve the stability of the vehicle or to deflect hot exhaust gases away from the missile air frame.

captive flight—A missile flight test in which the missile, or components of it, are carried on an aircraft as a means of simulating flight conditions.

captive test—The firing of a missile's ROCKET MOTOR while the vehicle is mounted on a test stand, to check the performance of the system. Flight conditions cannot be simulated, but engines usually can be operated up to full thrust. Cf: static testing.

capture—The process by which a missile, after having reached flight velocity, is

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taken under control by the guidance system.

carrier rocket—A Rocket vehicle which is used to carry a warhead or payload. In the case of a Guided Missile, the ROCKET MOTOR and airframe portion.

celestial azimuth—See: azimuth.

celestial guidance—See: guidance, celestial.

celestial horizon—That great circle of the celestial sphere, formed by the intersection of the celestial sphere and a plane through the center of the earth and perpendicular to the zenith-nadir line.

celestial inertial guidance—See: guidance, celestial inertial.

celestial radio tracking—A navigation technique which uses microwave radiations from the sun, moon, and some stars to determine their positions in relations to the point from which the observations are being taken.

*cep**—Circular error probable.

CHAFF COUNTERMEASURES — See: COUNTERMEASURES, CHAFF.

characteristic exhaust velocity—A descriptive parameter of ROCKET ENGINE performance, measuring the thrust coefficient produced by the chemical reaction of Propellants in the combustion chamber.

checkout—See: missile checkout.

chemical fuel—A fuel that requires an oxidizing agent to produce combustion and the resultant thrust in a liquid or solid Propellant ROCKET ENGINE. Chemical fuels undergo reactions or rearrangement of atoms to form different molecules.

chemical pressurization—The use of high-pressure gases, produced by combining a fuel and an oxidizer or from the decomposition of a substance, to pressurize Propellant tanks in a Rocket vehicle.

chuffing—(Also called chugging, combustion resonance, or pogo effect.) The irregular or intermittent burning of Propellants in a liquid ROCKET ENGINE which creates a low frequency pressure oscillation parallel to the thrust axis and sometimes produces an irregular puffing noise.

chugging—See: chuffing.

circular error probable (cep*)—(Also called circular probable error, cpe.) An indicator of the accuracy of a missile or projectile, used as a factor in determining probable damage to a target. It is the radius of a circle within which half of the missiles or projectiles are expected to fall.

closed loop test—The testing of a missile system during which all dynamic elements, such as aerodynamic controls, aerodynamic characteristics, and guidance subsystems, are actually used or simulated with all loops closed as the system sustains itself in flight.

cluster—Two or more engines bound together so as to function as one propulsive unit.

*CM**—Countermeasures.

cold-flow test—A test of liquid fueled Rocket, without firing, to check the efficiency of the propulsive subsystem, taking into account the conditioning and flow of Propellants.

cold soak—The exposure of equipment to low temperature for a long period of time.

combustion resonance—See: chuffing.

command destruct—A command control system which destroys a Rocket or missile in flight. Actuated by the range safety officer whenever the performance of the vehicle indicates a safety hazard. See: missile destruct system.

command guidance — See: guidance, command.

COMPUTER, DESTINATION PRESET—A computer utilizing electronic control sig-

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nals for the development of flight parameters to one or more predetermined locations.

COMPUTER, MISSILE GUIDANCE — A computer utilizing electronic data for the development of control signals to establish a collision course with an airborne and/or surface target. Cf: COMPUTER, DESTINATION PRESET.

console—A grouping of controls, indicators, and similar electronic or mechanical equipment, used to monitor readiness of and/or control specific functions of a system, such as missile checkout, countdown, or launch operations.

constant-bearing course—A missile trajectory wherein the line-of-sight from the vehicle to the target maintains a constant direction in space.

constant m control—The method of controlling a missile ROCKET MOTOR by keeping the Mach number (m) constant rather than the velocity of the vehicle. This method is used because of the ease of measuring parameters required for the control and because other parameters are a function of the Mach number rather than the velocity.

constant velocity control—The reverse of constant m control wherein a missile power plant is controlled to maintain a constant velocity rather than a constant Mach number.

CONTROL, ALTITUDE, GUIDED MISSILE—A specifically designed control that is manually preset to establish maximum altitude of a Guided Missile's flight.

CONTROL, GUIDED MISSILE WARHEAD ARMING DEVICE—An item specifically designed to control the operation of an arming device for a Guided Missile warhead. Cf: ARMING DEVICE, GUIDED MISSILE WARHEAD.

CONTROLLER, FLIGHT, MISSILE GUIDANCE SET—A specifically designed, manually preset item for controlling a Guided Missile in pitch, yaw, and roll, through a missile guidance set, prior to acquisitions by remote command guidance.

control rocket—A vernier engine or retrorocket used to change the attitude, direction, or velocity of a missile in flight.

control system — In a Guided Missile, the units which maintain missile stability about the yaw, pitch, and roll axes, and also receive signals from the command guidance system and convert these into mechanical movements of the engines or aerodynamic surfaces to change or maintain the missile course.

control vane—A movable tab or aerodynamic surface attached to a missile airframe and used to control the flight attitude of the vehicle.

cooldown—The reducing of the temperature in cryogenic containers and associated piping to lessen the thermal shock and boil-off when liquid oxygen or liquid nitrogen are introduced into them. Usually accomplished by allowing amounts of the cryogenic fluids to circulate through the system and boil-off, thereby absorbing residual heat in the container.

cooling, film—The cooling of a body or surface, such as the inner surface of a ROCKET ENGINE combustion chamber, by maintaining a thin fluid layer over the affected area.

cooling, regenerative—The cooling of a part of an engine by the fuel or Propellant being delivered to the combustion chamber; specifically, the cooling of a ROCKET ENGINE combustion chamber or nozzle by circulating the fuel or oxidizer, or both, around the part to be cooled.

cooperative systems (instrumentation) — Systems which require transmission of information from ground stations during the flight of the missile. Also processing of information by missile borne equipment

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and re-transmission of the processed data to the ground stations.

cotar (correlation tracking and ranging)—A passive ranging system which provides missile position information by computing the angle between the remote ground station antenna and a missile transmitter, using a phase comparison technique.

countdown—The step-by-step process leading to initiation of missile testing, launching, and firing. It is performed in accordance with a predesignated time schedule.

countermeasures (CM*)—The art of employing devices and techniques to impair the operational effectiveness of enemy activity, such as anti-missile defense systems.

countermeasures, active electronic—Countermeasure devices or techniques, based on the use of electronic systems, which are of such a nature that their use can be detected by the enemy.

COUNTERMEASURES, CHAFF—Narrow metallic strips which reflect electromagnetic radiation and can be dispensed by incoming missile or aircraft to create radar echoes which confuse enemy radars.

countermeasures, electronic — The use of electronics to reduce the effectiveness of enemy equipment or tactics which can be affected by electromagnetic radiation.

countermeasures, passive electronic—Electronic countermeasures which are of such a nature that their use cannot be detected by the enemy.

cruciform configuration—An aerodynamic configuration consisting of identical control and stabilization surfaces which are located at right angles to each other around the body of a missile airframe.

cutoff—The deliberate shutting off of a reaction engine.

D

damage volume of a missile—The volume of space which can be effectively hit by a missile system; determined by the range of the missile and the destructive capability of the warheads it can carry.

dart configuration — A missile airframe which has the surfaces used for trim and control attached to the rear portion of the body, and the main lifting surfaces attached to the forward portion. Cf: canard configuration.

deception, electronic—Radiation or re-radiation of electromagnetic energy in such a way as to confuse enemy interpretation of information received from their electronic equipment.

deck, motion predictor—A device which predicts, at regulated intervals, the motion of a missile firing ship or submarine so that the firing can be timed to coincide with a desired attitude and motion of the vessel.

decoder—A device for translating electrical signals into predetermined functions, as in an airborne guidance system, which accepts only properly coded guidance and control command signals.

decoy—A countermeasure device which is used to divert a missile or antimissile from its target.

DEFLECTOR, BLAST — A conelike device used to divert the exhaust of a ROCKET ENGINE fired from a vertical position.

deluge collection pond—A basin at a launch site into which water used to cool the flame deflector is flushed as the Rocket begins its ascent.

deluge system—A water system at missile test stands and launch sites which is used to inundate the area in case of fire or Propellant spillage.

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derivatives, stability—Aerodynamic quantities which express the various forces and moments acting on an aircraft or missile airframe due to factors other than steady motion.

destruct—Intentional destruction of a missile or similar vehicle for safety or other reasons.

destruct line—A boundary line on each side of a test site downrange course beyond which a Rocket cannot fly without being destroyed by the range destruct system.

destructor—A device which employs explosives or other means to intentionally destroy a missile or a component thereof if the vehicle's flight is to be cut short, for safety or other reasons.

destruct system—A system which, when operated by external command or preset internal means, destroys the missile or similar vehicle.

diergolic (non-hypergolic) — Liquid Propellants, oxidizer and fuel, which do not burn spontaneously when mixed, but which require an igniter system.

dihedral angle—The angle, usually the upward angle, between the plane of an aircraft or missile wing or other control surface and a horizontal plane at the root of that wing or surface.

dipole antenna—An antenna comprising a straight conductor, having an overall length of one half wavelength or less, connections to which are made at the center. It responds to waves polarized along the axis of the conductor, and is used at short wavelengths for discriminating between waves of polarizations.

directional antenna—An antenna which radiates or receives radio signals in some directions more efficiently than in others.

directional stability—The characteristic of an aircraft or missile configuration which causes the vehicle to right itself from a side-slip or yawing condition.

directivity—That characteristic of an antenna which enables it to radiate or receive more energy in some directions than in others.

disarm—To render a missile warhead incapable of exploding.

disassociation—The breaking down of the atmosphere into atomic molecules of nitrogen and oxygen caused by the passage of a high-speed missile through the medium.

discone antenna — An antenna which is formed by a disc and a cone whose apex approaches and becomes common with the outer conductor of the coaxial feed at its extremity.

dispersion—1. In rocketry, the deviation of a missile from its prescribed flight path; specifically, circular dispersion.

2. A measure of the scatter of data points around a mean value or around a regression curve.

distance measuring equipment (DME*)—A radio navigation aid, which provides distance information by timing the round-trip of a radio signal from an interrogator to a transponder.

Doppler effect—The phenomenon evidenced by the change in the observed frequency of a sound or radio wave caused by a time rate of change in the effective length of the path of travel between the source and the point of observation.

doran—A Doppler ranging system which uses phase comparison to establish missile range.

double-base Propellant—A solid rocket Propellant, which uses two unstable compounds, such as nitrocellulose and nitroglycerin. A separate oxidizer is not needed to sustain combustion.

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double-integrating gyro—A single-degree-of-freedom gyro (which see) with essentially no restraint of its spin about the output axis. The output signal is produced by gimbal (which see) angular displacement, relative to the base.

dovap—Doppler velocity and position; a range instrumentation and safety system used to determine velocity and position of a missile with electromagnetic radiation.

down the slat—Vernacular expression for a successful flight of a missile down the test range and within the left and right range limits (parallel lines previously plotted on the range-plotting board) established by range safety personnel.

downwash—Aerodynamic interference from the wings of an aircraft or missile which can strike the aft tail surfaces in such a way as to cause positive trim angles of attack even in cases where the wings are located at the vehicle's center-of-gravity.

drift—In guidance, the gradual lateral deviation of a missile away from the desired trajectory, due to misalignments, electrical biases or cross winds.

drift rate—The amount of lateral deviation of a missile away from a desired trajectory, per second or any other unit of time.

drogue—A device, usually funnel- or cone-shaped, which is dragged or towed behind a moving body to regulate velocity or provide gross stabilization control.

drogue parachute—1. A type of parachute attached to a missile to slow it down (also called deceleration parachute or drag parachute).

2. A small parachute specifically used to pull a larger parachute out of stowage.

drogue recovery—A recovery system for stabilizing and decelerating payloads, warheads, or booster sections from missiles in the atmosphere, so that larger recovery parachutes can be deployed at lower altitudes within specified opening shock constraints.

drone—A remotely controlled vehicle often used as a target for Guided Missile tests or training exercises. Also applies to special missiles used as target vehicles.

dry emplacement—A launch facility that has no provision for water cooling of Rocket exhaust blast during launch. Also called dry stand.

dry stand—See: dry emplacement.

dual modulation—The process of modulating a single carrier wave or sub-carrier by two different types of modulation, amplitude and frequency modulation, each conveying separate information.

dual thrust—A Rocket thrust force derived from two Propellant grains using the same propulsion section of a missile. Used to provide two-stage propulsion without the need for jettisoning of booster stages.

dual-thrust motor — A solid-Propellant ROCKET MOTOR built to obtain dual thrust. Can consist of a single combustion chamber with both booster and sustainer grains and a mechanical throat nozzle or two separate chambers in tandem.

duration, shutdown—The interval in time between shutdown signal and thrust depletion.

duration, total—The total firing time in seconds from the start of the rise in thrust to the end of the thrust tail-off.

dynamic load—For aircraft or missiles, a load or force generated by acceleration of the vehicle by wind gusts, maneuvering, or landing, as distinguished from static loads.

dynamic model — A model of a missile or other vehicle reproduced in a scale (dimen-

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sions, weight, and moments of inertia) proportionate to the original.

E

earth-rate correction—A command rate applied to a gyro to compensate for the apparent precession of the gyro spin axis with respect to its base, caused by the rotation of the earth.

earth-rate unit—A unit of angular drift, as of a gyro, equal to the rate of angular movement of the earth with respect to the stars, 15 deg./hour.

*ECCM** — Electronic counter-countermeasures.

ecliptic—Plane of the earth's orbit around the sun, used commonly as a reference for other interplanetary orbits.

*ECM**—Electronic countermeasures.

effective atmosphere—That portion of the atmosphere of the earth which effectively influences a particular process or motion, its outer limits varying according to the terms of the process or the motion under consideration.

effective exhaust velocity—The calculation of ROCKET ENGINE performance limitations based on the product of the specific impulse and the gravitational conversion factor; the total velocity of the exhaust stream after the effects of friction, heat transfer, and nonaxially directed flow. Cf: exhaust velocity.

effective Propellant — The total Propellant minus the Propellant that is consumed in starting and shutdown, or that which is trapped in tanks, pumps, lines, valves, or cooling jackets.

effective thrust—The theoretical thrust, in a ROCKET MOTOR or ENGINE, minus the incomplete combustion and friction flow in the nozzle.

effector—Any device used to maneuver a Rocket in flight, such as an aerodynamic surface, a gimbaled motor, or a jet.

*egads**—Electronic ground automatic destruct sequence.

egads button—A button used by a range safety officer to initiate destruction of a Rocket vehicle in flight if its course, as plotted upon initiation of the flight sequence, is predicted to go beyond the destruct line. Cf: egads.

electrical engine—A ROCKET ENGINE in which the Propellant burning-rate is accelerated by some electrical device. The electrical engine can be classified as electrothermal, electrostatic or electromagnetic, depending on the nature of the device. Also called electric propulsion system and electric Rocket.

electric propulsion—A general term encompassing all the various types of propulsion, in which the Propellant consists of charged electrical particles which are accelerated by electrical or magnetic fields, or both; for example electrostatic propulsion, electromagnetic propulsion and electrothermal propulsion.

electronic counter-countermeasures (ECCM*) — That major subdivision of electronic warfare involving actions taken to insure our own effective use of electromagnetic radiations despite the enemy's use of countermeasures. Cf: electronic warfare.

electronic countermeasures (ECM*) — That major subdivision of electronic warfare involving actions taken to prevent or reduce the effectiveness of enemy equipment and tactics employing or affected by electromagnetic radiations and to exploit the enemy's use of such radiations. Cf: electronic countermeasures, active; electronic countermeasures, passive.

electronic countermeasures, active — Electronic jamming or electronic deception to reduce effectiveness of enemy equipment. Jamming is the radiation, reradiation or reflection of electromagnetic signals to im-

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pair the devices of an enemy. Deception is the deliberate radiation, reradiation, alteration, absorption or reflection of electromagnetic radiations intended to mislead the enemy in interpreting signals from his equipment.

electronic countermeasures, passive — The conduct of such search, interception, direction finding range estimation and signal analysis of communication and noncommunication electromagnetic radiations as may be undertaken to permit immediate operational use of the information.

electronic warfare — That division of the military use of electronics involving actions taken to prevent or reduce an enemy's effective use of radiated electromagnetic energy and actions taken to insure our own effective use of radiated electromagnetic energy. Electronic warfare includes electronic countermeasures and electronic counter countermeasures (which see).

engine—An independent, self-contained unit for supplying thrust or propulsive power to a vehicle. It usually does not include main Propellant, pneumatic or electrical power supply systems, and produces its power by the inputs of those systems together with its internal components.

ENGINE, RAMJET — A continuous mass flow power unit designed to exert thrust by means of atmospheric air being compressed by ram compression in the inlet diffuser. The compressed air is charged with a continuous spray of pressurized fuel, ignited and ejected at high velocities through the exit nozzle.

ENGINE, TURBO-JET—A continuous-combustion type power unit designed to exert thrust, prime physical characteristics of which include an air compressor, combustion chamber(s) and a gas turbine, operating as follows: atmospheric air is inducted into the unit at its front, compressed, heated by combustion of a fuel, expanded through the gas turbine, and ejected at high velocity at its rear.

entry ballistics—That branch of ballistics pertaining to the entry of a missile, projectile, or other object into and through a gaseous medium from a vacuum or near-vacuum.

exhaust nozzle—The portion of the nozzle of a thrust chamber located on the downstream side at the nozzle throat.

exhaust velocity—A term used for the discharge velocity of an exhaust nozzle. Four common exhaust velocities are characteristic exhaust velocity; actual exhaust velocity; effective exhaust velocity, and ideal exhaust velocity (which see).

F

fail-safe device—A device built into a potentially hazardous piece of equipment which provides that the equipment will remain safe to friendly users even though it might fail in its intended purpose. They may be self-destructive in the event of equipment failure, or may be destroyed by command if operated remotely. Cf: missile destruct system.

fallaway section—A section of a launch vehicle cast off during flight, particularly that which returns to earth.

fallback—Immediate vertical return of a malfunctioning missile after it has been launched, with impact commonly in the vicinity of the launching site.

false ogive—A rounded or pointed hollow cup added to the nose of a projectile to improve streamlining. Also called windshield, or ballistic cap.

film cooling—See: cooling, film.

final mass—The mass of a Rocket after its Propellants are consumed.

fine data channel—The channel of a trajectory-measuring system delivering accurate

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but ambiguous data as opposed to the coarse channel needed to resolve the ambiguity.

FIN, GUIDED MISSILE—A movable airfoil, forming a part or all of the main directional control surfaces of a missile. It is usually perpendicular or approximately perpendicular to the longitudinal axis of the missile. Its function is to maintain uniformity of direction and to aid in the control of yaw, pitch, and roll of a Guided Missile in flight.

fire—The launching of a missile or Rocket; to ignite.

Firing Box—A box-like item in which are mounted switches, cables, fuzes, plugs, indicator lights, batteries, and similar components, especially designed for and useful in firing a Rocket and Guided Missile from a remote position. Excludes permanently mounted firing panels.

firing chamber—Combustion chamber.

flame attenuation—The degradation of a radio signal produced by ionization resulting in the exhaust of a burning engine.

flame deflector—In a vertical launch any of variously designed obstructions that intercept the hot gases of the ROCKET ENGINE in order to deflect them away from the ground or from a structure.

flameout—The extinguishment of the flame in a reaction engine. Cf: burnout.

flight attitude — The angle formed by the axes of any launch vehicle or payload after achieving liftoff and a line either indicative of airflow or parallel to the ground. Cf: angle of attack.

flight characteristic—A characteristic exhibited by a Guided Missile during flight, such as its tendency to yaw, pitch or roll or its ability to remain stable through certain flight regimes (which see).

flight control system—Vehicle control system (which see).

flight envelope—A plot of velocity versus altitude which depicts maximum and minimum velocity capabilities. Cf: mission profile.

flight Mach number—A free-stream Mach number measured in flight, as distinguishable from the number measured in a wind tunnel environment.

flight path—The path described or followed by the center of gravity of a Guided Missile while either in the air or in space.

flight path angle—The angle between the horizontal and a tangent to the flight path at a given point.

flight regime—A plot of air distance versus altitude for a given configuration and takeoff gross weight with parameters of fuel and time.

flight simulator—A training device or apparatus that stimulates certain conditions of actual flight or of flight operations.

flight test—Test of an aircraft, Rocket, missile, or other vehicle by actual flight or launching. Flight tests are planned to achieve specific test objectives and gain operational information.

flight test vehicle—A test vehicle for the conduct of flight tests, either to test its own capabilities and reliabilities or to carry equipment which requires flight testing.

*flt**—Flight.

flutter—The vibrating and oscillating movement of a control surface caused by aerodynamic forces acting upon the surface with elastic or inertial characteristics.

footprint—The area generally asigned as the optimum envelope for the return of a spacecraft through the atmosphere.

free fall—The fall or drop of a body toward the earth without guidance or descent aids.

free flight—The flight of a Guided Missile or the like after the fuel is exhausted, depleted or shut off.

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fuel cell—1. Mechanically, a compartment within a fuel tank.
2. Electrically, a device which converts chemical energy directly into electrical energy but differing from a storage battery in that reactant chemicals are continuously supplied as need for output.

Fuse—An item designed for protection against the flow of current in a circuit exceeding specified values by utilizing the low melting point of a fusible element to open the circuit.

Fuze—1. A device with explosive components designed to initiate a train of fire or detonation in an item of ammunition by an action such as hydrostatic pressure, electrical energy, chemical, impact, mechanical time or a combination of these. Excludes Fuse.
2. A nonexplosive device designed to initiate an explosion in an item of ammunition by an action such as continuous or pulsating electromagnetic waves, acceleration or deceleration forces or piezoelectric action. Used with a functional modifier, such as radar.

FUZING SECTION, GUIDED MISSILE WARHEAD—A group of items, such as safing and arming devices, baroswitches, timers, power supplies, controls, relays and switches, necessary to perform and control the fuzing of a Guided Missile warhead.

G

G—Also g. An acceleration equal to the acceleration of gravity, 980.665 centimeters per second per second, (approximately 32.2 feet per second per second at sea level) used as a unit of stress measurement of bodies which are being influenced by acceleration.

GANTRY—A large crane-like structure that spans a work area, usually with platforms at different levels, mounted on wheels, to erect and service large, vertically-launched missiles.

*GFE**—Government furnished equipment.

G-force—That force exerted upon an object by gravity or by reaction to acceleration or deceleration, measured in Gs (which see).

gimbal—A device containing two mutually perpendicular and interesting axes of motion, providing free angular movement in two directions for the mounting of a missile engine. In a gyro, the support providing the spin axis with some degree of freedom.

G-indicator—G-display. A display that portrays the total inertial force acting to influence a body.

*GM**—Guided Missile.

*GMT**—Greenwich Mean Time.

go, no-go—Of a missile launch; so controlled at the end of the countdown as to permit an instantaneous change in decision on whether to launch or not to launch.

grain—A molding or extrusion of solid Propellant for a Rocket, without regard for sizing.

ground control—The guidance given to a missile during flight by signals generated on the ground. The electronic equipment or network used to issue the control itself. To guide or direct a missile from the ground.

ground start — An ignition sequence of a Rocket's main stage, initiated and "cycled through" on the ground. In large Rocket systems the ground start can be fueled from pressurized tanks external to the vehicle, to permit a launching with the Rocket's own internal Propellant load intact and at desired capacity.

*GSE**—Ground support equipment.

guidance, beam-riding—A system in which a missile is directed along a line between a beam source and the target. If corrective control commands are generated automatically within the vehicle, it is a true beam-riding missile. The commands also may be

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generated at a control point on the ground and transmitted to the missile. Also referred to as beam rider and beam rider guidance.

guidance, celestial—The process of directing movements of a missile along a desired flight path by reference to celestial bodies.

guidance, celestial inertial—A process of directing the flight path of a missile with an inertial guidance system which receives reference inputs from observations of celestial bodies.

guidance, command — A type of electronic guidance for missiles or aircraft which depends on the transmission of signals or pulses to guide the vehicle onto the desired flight path.

guidance, homing—Guidance given a Guided Missile by the vehicle's built-in homing devices; the system by which a missile can be caused to home on, or fly toward a target due to some distinguishing characteristics of the target, such as sound, light, heat, or radar transmission or reflection.

guidance, hyperbolic—The guidance or control of a Guided Missile or the like in which the difference in the time delay of radio signals transmitted simultaneously from two ground stations, arriving at the missile at different time intervals, controls the position of the missile. This system is based upon the geometric theorem that the locus of all points of fixed difference in distance from two base points is a hyperbola.

guidance, inertial—A kind of guidance for Guided Missiles or the like, effected by means of mechanisms that automatically adjust the missile after launching to follow a given flight path, the mechanisms reacting to inertial forces during flight and independent of outside information.

guidance, infrared—Homing guidance using heat-seeking techniques.

guidance, map-matching—The guidance of a Guided Missile by means of a radarscope film previously obtained by a reconnaissance flight over the proposed route, and used to direct the vehicle by aligning itself with radar echoes received during the airborne missions from the terrain below.

guidance, midcourse—Guidance of a missile from the termination of the powered launching phase to some arbitrary point at which terminal guidance begins.

guidance, passive homing—A guidance system which enables a missile to direct itself toward a target by means of energy waves transmitted or radiated by the target.

guidance, preset — A type of guidance in which devices in the missile, adjusted before launching, control the path of the vehicle.

guidance, semiactive homing — Guidance in which a vehicle is directed toward a destination by means of information received from the destination in response to transmissions from a source other than the vehicle.

guidance system—A system which evaluates flight information, correlates it with target data, determines the desired flight path of the missile and communicates the necessary commands to the missile flight control system.

guidance, terminal — Guidance provided a missile from the arbitrary point, at which mid-course guidance ends, until the missile reaches its destination. For ballistic missiles, the terminal guidance phase is that part of the trajectory from atmospheric re-entry to impact or warhead detonation.

guidance, terrestrial reference — The technique of providing intelligence to a missile from certain characteristics of the surface over which the missile is flown, thereby achieving flight along a predetermined path.

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Guided Missile (GM)* — A missile (which see) that is directed to its target while in flight or motion, either by a preset or self-reacting device within the missile, or by radio command outside.

Guided Missile Accelerometer—See: Accelerometer, Guided Missile.

GUIDED MISSILE ALTITUDE CONTROL—See: CONTROL, ALTITUDE, GUIDED MISSILE.

GUIDED MISSILE BODY SECTION—See: BODY SECTION, GUIDED MISSILE.

GUIDED MISSILE, DECOY — A Guided Missile specifically designed to provide characteristics for leading another missile(s) from the intended target(s).

Guided Missile, interceptor—A Guided Missile specifically designed to generate a collision course with an aircraft, missile or other object.

GUIDED MISSILE, RECONNAISSANCE—A Guided Missile specifically designed for passive observations of geographical, electronic and/or physical phenomena.

GUIDED MISSILE SAFETY AND ARMING DEVICE — See: SAFETY AND ARMING DEVICE, GUIDED MISSILE.

GUIDED MISSILE SELF-DESTRUCT CHARGE — See: SELF-DESTRUCT CHARGE, GUIDED MISSILE.

GUIDED MISSILE, TARGET — A Guided Missile specifically designed for use as a target during weapons system evaluation and operational readiness tests.

GUIDED MISSILE, TRAINING—A Guided Missile used exclusively for training purposes.

GUIDED MISSILE WARHEAD ARMING DEVICE — See: ARMING DEVICE, GUIDED MISSILE WARHEAD.

GUIDED MISSILE WARHEAD ARMING DEVICE CONTROL — See: CONTROL, GUIDED MISSILE WARHEAD ARMING DEVICE.

GUIDED MISSILE WARHEAD FUZING SECTION — See: FUZING SECTION, GUIDED MISSILE WARHEAD.

gyro—Short for Gyroscope. Used in numerous combinations such as gyro compass, gyro instrument.

Gyroscope—A device consisting of a wheel so mounted that its spinning axis is free to rotate about either of two other axes perpendicular to itself and to each other; also, the wheel of the device itself; by extension, any instrument which functions like a Gyroscope.

H

hangfire—The delayed ignition of a Rocket Propellant or igniter.

hardened structure—A structure which has been strengthened sufficiently to withstand nuclear weapon effects.

hard points—On a missile's exterior surface, structurally strengthened areas suitable for support during handling.

hard stand—Any paved, compacted or otherwise specially prepared surface or area set up for use in launching Guided Missiles.

heading — 1. The horizontal direction in which a missile is to be pointed.
2. The direction of its longitudinal axis, usually offered as the angle measured clockwise from a fixed reference point, such as north, to the axis.

heat barrier—See: thermal barrier.

heat of ablation—A measure of the effective heat capacity of an ablating material, numerically the heating rate input divided by the mass loss rate which results from ablation. Cf: ablation.

heat seeker—A Guided Missile or similar device using a heat-sensitive homing unit to

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direct the system to a source of heat radiation.

heat shield—The protective structure needed to prevent destruction of a re-entry body during aerodynamic heating. A material sink may be used to absorb heat, or ablating materials may be used similarly. Cf: ablation.

Hohmann transfer ellipse—In astronautics, a theoretical optimum flight path of a Guided Missile requiring the least expenditure of fuel for travel from one circular orbit to another in the same plane. The Hohmann ellipse requires two thrust impulses of minimum energy, one at the beginning of guided flight and the second at the termination, with a transfer ellipse between the two.

hold—1. During a countdown, to stop counting and to wait until the particular impediment to flight has been identified, corrected or removed, so that the countdown can be resumed where it was halted.

2. In a Guided Missile computer, to hold information in a storage device until it can be read out or copied.

holddown—See: holddown test.

holddown fitting—See: tail grab (missile retainer).

holddown launch—The holddown of a Guided Missile while the engine is firing; the missile itself is restrained from flight on its stand.

holddown test—The testing of some system or subsystem in a Rocket while the engine is firing but while the vehicle itself is restrained from flight on its stand.

home—Usually to home on or to home in on; to direct toward a target by self-guidance based on heat radiation, radar echoes, radio waves, or other means of radio/directional communication.

homer—A kind of ground-based direction-finding station that uses radio transmissions from airborne instrumented aircraft to determine bearing and guides the aircraft toward the station by means of voice communication.

homing device—Any transmitter, receiver or adapter used for homing aircraft, Guided Missile or the like.

homing guidance—See: guidance, homing.

hyperbolic guidance—See: guidance, hyperbolic.

hypergolic Propellant—A bipropellant combination of a liquid fuel and a liquid oxidizer that react when brought in contact and achieve ignition temperature without any outside assistance.

hypersonic—Having a high velocity. Usually applied to velocities of more than Mach 5. Cf: Mach number.

I

*ICBM**—Intercontinental ballistic missile.

ideal exhaust velocity—The theoretical maximum velocity, relative to the nozzle, of the gas flow as it passes from a given nozzle inlet temperature and pressure to a given ambient pressure, when the gas has a given mean molecular weight. Cf: actual exhaust velocity, effective exhaust velocity.

ideal rocket — A ROCKET MOTOR or ROCKET ENGINE that would have a velocity equal to the velocity of its jet gases. It is a theoretical Rocket postulated for parameters which are corrected in practice.

ideal velocity—The velocity acquired by an ideal Rocket in free space under the influence of no external forces except that of thrust.

identification, friend or foe (IFF*)—System of radio interrogation and reply (if friendly) generally used in connection with radar for identifying an aircraft, ship or craft. Commonly referred to as IFF.

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ignition delay—The time lapse between the initiation of the igniting action and the onset of a specified burning reaction. Cf: ignition lag.

ignition lag—The delay between igniting action and reaction.

ignition stage—That portion of the starting sequence of a launch vehicle in which combustion is initiated and stabilized at a low level in the thrust chamber. In the H–1 and J–2 engine systems, for example, the flow of the oxidizer from the main oxidizer feed system into the combustion chamber is established under gravity head alone, and fuel is provided from the start system. The resulting mixture is ignited by the igniter.

IGOR—A long-focal-length telescopic camera used to observe attitude and other details of a missile in flight, usually during tests.

impact predictor—A device which takes information from a trajectory measuring system and continuously computes — in real time—the point at which a missile or its payload will strike the earth.

impinging-stream injector — A fuel injector in a liquid fueled Rocket that injects the fuel and the oxidizer into the combustion chamber in such a manner that the two streams of fluid intersect one another.

impulse maneuver—In missile flight, a controlled change of flight path or trajectory by means of a regulated thrust force.

incourse guidance—Sometimes used for midcourse guidance (which see).

INDICATOR, AZIMUTH — An instrument for displaying the terrestrial bearing of a target with respect to a fixed reference point. Cf: azimuth.

INDICATOR, BEARING — An instrument that displays data for the determination of the terrestrial bearing between a target and a fixed reference point. Cf: bearing.

INDICATOR, BEARING-HEADING — An instrument that displays data for the determination of the angle between a target and a fixed reference point, and the angle between a point such as true or magnetic north and the longitudinal axis of the aircraft, missile or vehicle in which it is installed. Cf: bearing; heading.

INDICATOR, COURSE — An instrument that displays the angular value of the course of an aircraft or missile.

INDICATOR, RANGE—An instrument that displays data from which range between two or more points may be determined. Cf: range.

induced rolling moments—The resultant of aerodynamic forces which act to roll a missile during flight at angles of attack other than zero. Generally, anything which effects the symmetry of a missile during lateral maneuvers at large angles of attack is likely to produce rolling moments.

inertial activator—See: activator, inertial.

inertial guidance—See: guidance, inertial.

inertial navigation system—See: navigation system, inertial.

inertial system—A system which furnishes guidance information by determining the distance a missile has traversed from its starting point through a series of measurements of the acceleration of the vehicle in relation to the earth. Cf: guidance, inertial.

infrared — That portion of the electromagnetic radiation spectrum lying in the wavelength band between visible light and the microwave regions of the spectrum; usually considered between the boundaries of 75 microns and an indefinite upper boundary often set at 1,000 microns.

infrared guidance—See: guidance, infrared.

inner loop—In a Guided Missile control system, the feedback loop comprised of the control system and missile aerodynamics as opposed to the outer loop which includes the external guidance system dynamics.

used to observe attitute and other details

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*Intcp**—intercept; interceptor.

integral tanks—A fuel or oxidizer tank built inside the normal contours of an aircraft or missile frame and using the skin of the vehicle for a tank wall.

integrated trajectory system (ITS*) — A multiple trajectory measuring system which uses several angle-measuring-equipment and distance-measuring-equipment sites to provide the best geometrical solution to a missile's position in space at any time during its flight.

intensity modulated indicator—Radar indicators on which echoes from targets vary in brilliance or intensity depending upon the power of the echo signal.

interceptor Guided Missile — See: Guided Missile, interceptor.

intercontinental ballistic missile (ICBM*)—A ballistic missile with a range of over 3,000 nautical miles.

interior ballistics—That branch of ballistics that deals with the propulsion of projectiles, i.e., the motion and behavior of projectiles in gun barrels or missiles in launcher tubes, or the temperatures and pressures developed inside Rockets. Sometimes called internal ballistics.

intermediate-range ballistic missile (IRBM*)—A ballistic missile with a range up to 1500 nautical miles.

ion engine—A reaction engine in which ions, accelerated in an electrostatic field, are used as Propellant.

*IRBM** — See: intermediate range ballistic missile.

J

jacket—A covering or casing, specifically a shell around the combustion chamber of a liquid Propellant Rocket, through which some of the propellant is circulated for regenerative cooling.

jammer, automatic search—An intercept receiver and jamming transmitting system that automatically searches for and jams enemy signals of specific radiation characteristics.

jammer, repeater—A jammer which radiates a signal on the frequency of the enemy equipment, the reradiated signal being so modified as to cause the enemy equipment to present erroneous data on azimuth, range and number of targets.

jamming — A countermeasure technique in which an attempt is made to block a communication or control channel in order to abort an enemy mission.

jitter—A vibratory motion imparted either intentionally or unavoidably to mechanisms operating under servo-control. Intentional jitter is introduced to prevent sticking of valves, to direct radar antennas onto targets by means of error detections incident to their jittering motion, or for other mechanical or electrical reasons.

*JP**—Jet Propellant.

jump—The angular displacement of a projectile or missile from the line of elevation and direction at the time the projectile or missile leaves the tube or missile launcher. Also called angle jump.

K

kill probability — The chance that a target will be destroyed by a given operation. The likelihood of producing the desired kill under the conditions specified. Kill probability is a function of guidance accuracy and the radius of warhead action.

L

launch—The transition from static repose to dynamic flight of a missile.

launch azimuth—The initial heading of a powered vehicle at launch, commonly applied to launch vehicles. Cf: azimuth.

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launch base area—For ground-launched missiles, an area encompassing numerous command posts, launch stations and associated guidance stations, a control center and a support base.

launch complex — The site, facilities and equipment used to launch a Rocket vehicle. The complex differs according to the type Rocket and whether it is to be launched from the ground or from a ship at sea. It is sometimes used to include the launch personnel. Cf: launch site.

launch crew—A group of technicians who prepare and launch a Rocket.

launch emplacement—A launching pad and its associated equipment.

Launcher—A structure or device, often making use of a tube, a group of tubes or a set of tracks, from which self-propelled missiles are sent forth, and by means of which they are aimed or given initial guidance. Cf: LAUNCHING SHOE, MISSILE-ROCKET.

Launcher and missile storage structure (surface or underground)—A single structure combining the functions of the Launcher and the missile storage structure.

Launcher dispersion—The departure (usually, but not necessarily, random) from the desired flight path which a Guided Missile takes during the launching phase.

Launcher, rail-type—A structure supporting a set of rails which in turn support the missile-booster combination. The rails provide orientation and control during the early portion of the launching phase.

Launcher, retractable—A Launcher designed to carry a missile in one position and extend it to a new position for launching.

Launcher, underground — See: underground Launcher.

Launcher, zero length — A Launcher which supports the missile in the desired attitude prior to ignition, but which exercises little control on the direction of the missile's travel after ignition.

launching base — An area that has several launch sites.

launching pad—See: launch pad.

launching rack — A skeleton-like structure, usually incorporating rails, from which a missile is launched.

launching rail — A rail which gives initial support and guidance to a Rocket launched in a non-vertical position. Cf: Launcher.

launching ramp—A ramp used for launching a missile into the air.

LAUNCHING SHOE, MISSILE ROCKET—An irregular shaped item specifically designed for mating with the rails of a Launcher to impart the rotating or straight motion required to maintain ability of a Guided Missile or Rocket after ignition of the power system.

launching site—See: launch site.

launch-latch — A device which restrains a missile until the proper conditions for its launching have been achieved.

launch pad—The load-bearing base or platform from which a missile may be launched. Cf: pad.

launch point—The geographic position from which a missile is to be launched.

launch site—1. Broadly, a launching base (which see) or launch complex (which see).

2. A defined area from which a Rocket vehicle may be launched.

launch stand — A facility or station from which a Rocket vehicle may be launched, normally incorporating a launch pad and launcher.

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launch station—One or more launchers with associated storage, assembly, and maintenance facilities.

launch vehicle — A Guided Missile used to launch a satellite, probe, or any type of spacecraft.

launch window—The postulated opening in the continuum of time and space, through which a spacecraft must be launched to achieve a desired encounter, rendezvous, impact or other goal.

*lchr**—Launcher.

lift-off—The initial motion of a missile as it rises from the Launcher.

LINEAR ELECTRO-MECHANICAL ACTUATOR—See: ACTUATOR, ELECTRO-MECHANICAL, LINEAR.

LINEAR EXPLOSIVE ACTUATOR — See: ACTUATOR, EXPLOSIVE, LINEAR.

line of flight—See: flight path.

load cells — Strain gauges in the thrust mounts to weigh a missile, and measure forces acting on a vertical missile when in a test or launch stand.

lock on—The instant at which a radar is enabled to automatically track its target.

lock on range—The range from a radar to its target at lock on.

M

Mach—See: Mach number.

MACHMETER—An instrument to measure and indicate speed relative to the speed of sound, which infers the Mach number (which see).

Mach number—The ratio of the velocity of a body to that of sound in the surrounding medium.

main stage—1. Within a multistage Rocket or launch vehicle, the stage designed to develop the greater amount of thrust, with or without booster engines.

2. In a single-stage Rocket vehicle powered by one or more engines, the period when full thrust (at or above 90 per cent) is achieved.

3. A sustainer engine, considered as a stage after booster engines have fallen away, as in the main stage of the Atlas.

map-matching guidance — See: guidance, map-matching.

midcourse guidance — See: guidance, midcourse.

missile—Any object that is, or is designed to be, thrown, dropped, projected or propelled, for the purpose of making it reach and strike a target. Cf: Guided Missile; ballistic missile.

missile, air-to-air—A Guided Missile which can be launched from an airborne vehicle and whose target is another vehicle in flight.

missile, air-to-ground — A Guided Missile which can be launched from an airborne vehicle and whose target is on the ground.

missile, air-to-underwater—A Guided Missile which can be launched from an airborne vehicle and whose target is under the surface of a body of water.

missile checkout—Performance of those procedures which enable a determination to be made of whether all parts of the missile are apparently capable of functioning properly.

missile destruct system—That portion of a missile which, upon command or due to failure, is capable of initiating destruction of the vehicle, usually for reasons of safety.

MISSILE GUIDANCE COMPUTER—See: COMPUTER, MISSILE GUIDANCE.

MISSILE GUIDANCE SET FLIGHT CONTROLLER — See: CONTROLLER, FLIGHT, MISSILE GUIDANCE SET.

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missile impact location system—An impact location range instrumentation system consisting of an array of hydrophones encircling the target area. Used to locate the missile's point of impact.

MISSILE-ROCKET LAUNCHING SHOE—See: LAUNCHING SHOE, MISSILE-ROCKET.

missile silo—An underground structure to either store or store and launch a Guided Missile.

mission profile—A plot of air distance versus altitude for a given configuration and lift-off gross weight with parameters of fuel and time. The relationship is based on a no-wind condition and a mission sequence of liftoff, thrust climb, and an approximate range cruise.

module—A self-contained unit of a launch vehicle or spacecraft which acts as a building block for the overall structure. The module usually is designated by its primary function, such as command module.

monocoque—A type of construction, as of a rocket body, in which all or most of the stress is carried by the skin. It may incorporate formers but not longitudinal stringers.

monopropellant—A Rocket Propellant which consists of a single phase, especially a liquid, containing both fuel and oxidant, either combined or mixed. It does not require an oxidizer. Some monopropellants decompose to furnish their own oxidant and reductant.

multiplexer—A device which collects data from many individual sources and arranges the information for simultaneous transmission over a single network.

multipropellant—A Rocket Propellant which consists of two or more substances fed separately to a combustion chamber. When only two substances are involved, it is also called bipropellant.

N

navigation set, astronomic—A complete electronic set for the determination of a terrestrial line of position by utilizing star tracking techniques in the solution of a celestial navigation problem.

NAVIGATION SYSTEM—The internal or external system of a vehicle, which in process finds the position of the vehicle and thereby makes it possible for the overall system to reach a pre-determined destination through use of the associated guidance.

navigation system, inertial—A navigation system effected by means of mechanisms which react to inertial forces.

nonimpinging injector—An injector used in ROCKET ENGINES whose function is to employ parallel streams of Propellant usually emerging normal to the face of the injector.

NOSE SECTION, GUIDED MISSILE—The extreme forward portion of a Guided Missile, designed to contain instrumentation, spotting charges and/or fuzing or arming devices and the like, but does not contain the payload. It is usually tapered or rounded for ease of atmospheric penetration.

nozzle diaphragm—A ring of stationary, equally spaced, blades or vanes forming an annulus of nozzles through which fluid is directed onto a nozzle wheel. Also called a nozzle ring.

NOZZLE, EXHAUST, ROCKET MOTOR—An item designed with a constricting throat section and a divergent section. The constricting throat section compresses the Propellant gases and maintains the pressure within the thrust chamber of the ROCKET MOTOR by limiting the flow of gases. The divergent section controls the expansion of the gases causing changes in thrust delivery.

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O

operational capability—The extent to which a missile system can fulfill its assigned operational mission.

outage—The Propellant remaining due to the difference between the loaded and the burned mixture ratio.

outer loop—A term describing the control loop including the missile and its guidance dynamics. This loop is outside the normal control system feedback loop which includes the aerodynamics of the missile.

overshoot—An occurrence in a control system when the control process exceeds the target value as operating conditions change.

overshoot factors — Aerodynamic factors which define the load applied to a surface or body as the result of maneuvers. The missile overshoots the desired angle of attack due to control system and aerodynamic damping characteristics.

P

pad—Short for launch or launching pad. A permanent or semi-permanent base, usually concrete, constructed to support a missile-launching device.

pad deluge—Water sprayed on certain portions of the launch pad to reduce the temperature of critical parts of the pad or the missile system during launch. Cf: underdeck spray.

parallel cluster missile—A descriptive term applied to missiles in which the sustainer and booster stages are set side by side instead of in tandem.

passive electronic countermeasures — See: countermeasures, passive electronic.

passive homing guidance—See: guidance, passive homing.

payload—That portion of a missile which is carried for the purpose of accomplishing a system or subsystem mission.

penetration aids—Components of the re-entry system utilized to penetrate and confuse enemy defenses thus enhancing the mission probability of delivering a re-entry vehicle(s) to its intended destination.

penetration ballistics—That part of terminal ballistics which treats the motion of a projectile, such as a guided missile warhead, as it forces its way into targets of solid or semi-solid substances.

penetration velocity—The minimum velocity at which a particular projectile, such as a Guided Missile warhead, is expected to consistently perforate plates of given thickness and physical properties at a specific angle of obliquity.

perforation—In missile dynamics, the passage of a missile warhead completely through a target structure.

phototheodolite — Range instrumentation equipment used to track missiles optically. The missile image and angular coordinates are recorded against time.

phugoid oscillation—In a missile flight path, a long-period longitudinal oscillation consisting of shallow climbing and diving motions about a medium flight-path and involving little or no change in angle of attack.

pitchover—The programmed turn that a Rocket takes from the vertical, as it describes an arc and points in a direction other than vertical. A maneuver performed at the termination of the vertical ascent phase of the launch sequence.

plasma sheath—An envelope of ionized gas that surrounds a body moving through the atmosphere at hypersonic velocities.

platform, stabilized—See: Gyroscope.

plotting board—A device used to record the function of a variable; usually in real time. In Guided Missile applications, it is used to monitor range, target bearing, missile position, etc., by automatically plotting the variables.

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plus count—In the launch of a Rocket, a count in seconds (plus 1, plus 2, etc.) that immediately follows T-time, and is used to check on the sequence of events after the action of the countdown has ended.

pogo effect—The result of inharmonic surging of Propellants in a Guided Missile fuel system, producing an extreme vertical force due to analomic pressures. Cf: chuffing.

posigrade Rocket — An auxiliary Rocket which fires in the direction in which the missile vehicle is traveling; used, for example, in separating two stages of a missile by slowing the rear stage.

precombustion chamber—In a ROCKET ENGINE assembly, a chamber in which Propellants are ignited and from which the burning mixture expands to ignite the mixture in the main combustion chamber.

predictor, impact—See: impact predictor.

pre-launch console—A unit consisting of a display panel and control panel in the block-house, that will automatically monitor or check out the missile during a time interval prior to actual launch.

preset guidance—See: guidance, preset.

pressure feed system — In liquid fueled ROCKET ENGINE, the mechanisms used to cause the Propellants to flow into the combustion chamber.

prestage—A step in the action of igniting a large liquid fueled ROCKET ENGINE taken prior to the initiation of full propellant flow; consisting of igniting a partial flow of Propellants in the thrust chamber. Also called preliminary stage.

prevalves—Leakproof valves which, when opened, permit the Propellant to reach the turbopumps in advance of ignition.

primacord—An explosive charge shaped like a rope. Used in flight missiles to serve structure for flight termination purposes or for staging, etc.

programmer—A device, either airborne or groundbased, used to control the motion of a missile in accordance with a predetermined plan.

programmer, electronic command signals—An item which processes electronic command signals in a manner and sequence suitable for the predetermined automatic control of another item such as a missile.

PROGRAMMER-TEST STATION, GUIDED MISSILE, TRUCK MOUNTED—An item specifically designed to perform prefiring examinations of missile guidance components and to compute and program desired flight data for insertion into a missile guidance set. May also contain firing equipment.

Propellant—Any agent used for combustion in a ROCKET ENGINE and from which the Rocket derives its thrust, such as fuel, oxidizer, additives, catalysts or any compound or mixture of these.

PROPELLANT GRAIN—A solid preformed charge specifically designed to produce the required propulsive effect in non-air-breathing Rocket systems. It contains all the ingredients necessary for sustained combustion.

Propellant utilization system—A series of metering devices used in long range Rockets to insure that the fuel and oxidizer are consumed in the proper ratio so that minimum amounts of both elements remain at the end of powered flight.

propulsion system—That portion of a Guided Missile vehicle required to propel it, and which can include the engine, pumps, turbines, pressurization system, tankage and all related equipment.

proving stand—A facility on which ROCKET ENGINES are tested.

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pump drive assembly (PDA)—The turbines, Propellant impellers, gear boxes, power takeoffs and housings used in liquid Rocket propulsion assemblies.

purge—The flushing of Propellant lines or tanks in a missile system to rid them of residual fluids; especially the flushing of fuel or oxidizer from a Rocket after a test firing or simulated firing.

pursuit course—A homing guidance technique in which the missile is directed along a flight path whose tangent coincides with the line-of-sight from missile seeker to target or deviates from it by a predetermined fixed angle.

Q

quick-look data—Those data provided at the termination of a test, or at some period during the test, on an expedited basis to provide rapid review of results.

R

radar — Radio detection and ranging equipment that determines the distance and usually the direction of objects by transmission and return of electromagnetic energy.

radar cross section—An echo area considered as a cross section of the target.

radar guidance—See: beam-riding guidance.

radio command — A radio signal to which a Guided Missile is programmed to respond.

radio guidance—See: command guidance.

range—1. The distance betwen any point and a target.

2. Extent or distance limiting the operation or action of something such as a missile.

3. Area equipped for firing missiles.

4. The distance that can be covered by a missile under specified conditions.

range deviation—The distance by which a missile strikes beyond, or short of, the target.

rate gyro—A single-degree-of-freedom gyro having primarily elastic restraint of its spin axis about the output axis. In this gyro an output signal is produced by gimbal angular displacement, relative to the base, which is proportional to the angular rate of the base about the input axis.

rate integrating gyro—A single-degree-of-freedom gyro having primarily viscous restraint of its spin axis about the output axis. In this gyro, the output signal is produced by gimbal angular displacement, relative to the base, which is proportional to the integral of the angular rate of the base about the input axis.

rawin—A method of winds aloft observation useful in guided missilry. The determination of wind speeds and directions in the atmosphere above the launching facility, and the target. It is accomplished by tracking a balloon-borne radar target, a responder, or radiosonde transmitter with either radar or a radio direction finder. Rawin is an acronym composed of *radar* and *wind*.

reaction balance—A type of thrust meter using a balance to measure the static thrust of a MISSILE ENGINE.

readied missile—A missile which has been pre-flight tested, fueled, sequenced, systems checked and prepared in all respects to ready it for initiation of the firing sequence.

readout—The action of a radio transmitter in transmitting data either instantaneously with the acquisition of the data, or by playing a magnetic tape upon which the data has been recorded. Cf: tape dump.

real time—Time in which reporting on events or recording of events is simultaneous with the events. For example the real time of a satellite is that time in which it simultaneously reports its environment as it en-

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counters it; the real time of a computer is that time during which it is accepting data.

RECONNAISSANCE GUIDED MISSILE—See: GUIDED MISSILE, RECONNAISSANCE.

reconnaissance satellite — See: GUIDED MISSILE, RECONNAISSANCE.

recoverable—That portion of a Rocket system designed to be recovered and re-used after a single flight.

recovery—The procedure or method by which a launch vehicle, or portions of its systems, or a satellite, or portions from it, are retrieved after being launched.

recycle—In the countdown of a Guided Missile, to stop the count before launching and return to an earlier point in the countdown cycle. Cf: hold.

re-entry—The event which occurs as a vehicle, having once been launched—commonly thought of as in orbit—is returned to the sensible atmosphere; the action involved in re-entry.

re-entry system—A sub-system of long range Guided Missiles which includes the re-entry vehicle, plus necessary attaching structure, separation devices, penetration aids, and ancillary equipment needed to assure safe delivery of the payload to its intended destination.

re-entry trajectory—That part of a trajectory which begins at the point of re-entry and ends at the target. The re-entry trajectory of an unguided vehicle is ballistic in character.

re-entry vehicle—That part of a space vehicle designed to re-enter the earth's atmosphere in the terminal portion of its trajectory.

regenerative cooling—See: cooling, regenerative.

restart—The act of starting, or firing, a Rocket stage after termination of initial power and a period of propulsive system shutdown.

restricted Propellant—A solid Propellant having only a portion of its surface exposed for burning, the other surfaces having been covered by an inhibitor.

retrograde—To move or appear to move backward. To apply force opposite the direction of flight, usually by firing a Rocket on command in the direction of travel to change orbital parameters or to effect re-entry.

Rocket (rkt*)—An unmanned self-propelled vehicle, with or without a warhead, designed to travel above the surface of the earth and whose trajectory or course, while in flight, cannot be controlled. Excludes Guided Missile and other vehicles whose trajectories of course, in flight, can be controlled.

ROCKET ENGINE — A non-air-breathing reaction propulsion system that consists essentially of an injector, one or more thrust chambers and exhaust nozzles, and makes use of liquid fuels and oxidizers at controlled rates from which hot gases are generated by combustion and expanded through the nozzle(s).

ROCKET MOTOR—A non air-breathing reaction propulsion device that consists essentially of a thrust chamber and exhaust nozzle and that carries its own solid oxidizer-fuel combination from which hot gases are generated by combustion and expanded through a nozzle.

rocket sled—A sled mounted on rails which is accelerated to high velocities by a ROCKET ENGINE to determine g-tolerance and crash-survival techniques.

rumble—A type of combustion instability, particularly in a liquid-Propellant ROCKET ENGINE, typified by a low-pitched,

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low-frequency rumbling noise; the noise made during this kind of combustion.

S

sabot—An attachment which fits within the launching tube of one projectile to permit the positioning and firing of a projectile of smaller dimension. The sabot normally is detached from the projectile in flight, although it may incorporate a ROCKET MOTOR for added velocity.

SAFETY AND ARMING DEVICE, GUIDED MISSILE—A mechanism which prevents or allows the warhead train of explosives to operate.

salvo launch—A simultaneous or nearly simultaneous launching of Rocket vehicles from adjacent sites toward the same target.

screaming—A form of combustion instability, especially in a liquid-Propellant ROCKET ENGINE, of relatively high frequency and characterized by a high-pitched noise.

scrub—The act of scrubbing, or postponing at least temporarily, the launching of a missile.

SELF-DESTRUCT CHARGE, GUIDED MISSILE—An explosive element which operates together with that part of the missile which, of itself or by command, senses a catastrophic flight malfunction and effects the destruction of the missile.

semiactive homing guidance—See: guidance, semiactive homing.

semiactive tracking system—A trajectory measuring system which tracks a signal source normally aboard the target for other purposes, or a system that illuminates the target by use of a ground transmitter but requires no special electronics on the missile.

separation—1. The action of a fallaway section or companion body as it casts off from the remaining body of a vehicle, or the action of the remaining body as it leaves a fallaway section behind it. Cf: staging.
2. The moment of this action.

shot—Commonly, the launching of a missile.

shutdown—The process of decreasing engine thrust to zero.

shutoff—In Rocket propulsion, a term used to define the intentional termination of burning where the shutoff time is preset before the vehicle is launched or commanded by a self-container or internal guidance system: Cf: burnout.

skin—The outside covering of a missile.

skirt—The flared portion of a missile's exterior configuration which normally is employed to cover the propulsion system.

skirt fog—The cloud of steam and water that surrounds the engines of a Rocket being launched from a wet emplacement.

sloshing—The back-and-forth movement of a liquid fuel in its tank, creating problems of stability and control in the vehicle.

slurry—A suspension of fine solid particles in a liquid.

sofar (sound fixing and ranging)—A system for determining the point of origin of a sound on water, such as the impact of a missile.

solid Propellant—A Rocket Propellant in solid form, usually containing both fuel and oxidizer combined or mixed and formed into a monolithic grain.

spin-stabilized—Directional stability of a vehicle obtained by the action of gyroscopic forces which result from spinning the body about its axis of symmetry.

stable platform—A gyroscopic device so designed as to maintain a plane of reference in flight regardless of the movement of the vehicle on which the stable platform is carried.

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staging—The process or operation during the flight of a Guided Missile whereby a step is disengaged from the remaining body and made free either to decelerate or to be propelled along a separate flight path. To stage. Cf: separation and step.

star tracker—A telescopic instrument on a missile that locks onto a celestial body and gives guidance reference to the vehicle during the flight. Cf: guidance, celestial.

static firing—The firing of a ROCKET ENGINE in a hold-down position to measure thrust and accomplish other tests.

static testing—The testing of a Rocket in a stationary or hold-down position either to verify structural design criteria, structural integrity and the effects of limit loads, or to measure the thrust of a ROCKET ENGINE.

step—A self-propelled separable element of a Guided Missile.

strap-ons—Rockets which are attached by a form of straps to a missile as an aid to the missile's primary propulsion system.

subliming ablator — An ablation material characterized by sublimation of the material at the heated surface.

supersonic—Pertaining to speed relative to a surrounding fluid, from one to five times the speed of sound in that medium.

surface-to-air missile (SAM*) — Missile, ground-to-air; Missile, Guided; model designation.

surface-to-surface missile (SSM*)—Missile, ground-to-ground; Missile, Guided; model designation.

surface-to-underwater missile (SUM*) — Missile, ground-to-ground; model designation.

sustainer engine—A ROCKET ENGINE that maintains the powered flight of a missile.

sustainer engine cutoff (SECO)—Shutdown, or cutoff, either by command or by Propellant depletion, of the sustainer engine.

T

tail grab (missile retainer)—A device which secures a missile to its Launcher by holding the missile tail section strong points and preventing missile motion until the desired launch thrust level is reached.

tandem (multiple stage) missile—A fore and aft configuration used in boosted missile or long-range ballistic missiles, in which the stages are stacked together in series and are discarded or staged as the Propellant in each stage is expended.

tape dump—The method by which digital or analog data is stored for a period on a vehicle and then transmitted, or dumped, to a ground receiving station.

target acquisition—The detection and location of a target in relation to a known control point or datum with sufficient accuracy and detail to permit the effective employment of appropriate weapons by the commander.

target discrimination—That capability of a system which enables it to distinguish a target from its background, between two or more targets in close proximity or between targets and decoys. Cf: target identification.

target identification—The act of determining the nature of a target, including whether it is friend or foe. Cf: target discrimination; identification, friend or foe.

target profile area—A sectional area of a target, as it affects detection, radar reflection and vulnerability.

telemetry—The science of measuring a quantity or quantities, transmitting the data to a distant station and there interpreting, indicating, and/or recording the quantities measured.

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terminal ballistics—That branch or ballistics dealing with the action and the effect of a Guided Missile when it impacts or bursts.

terminal guidance—See: guidance, terminal.

thermal barrier—The speed at which the heating effect upon a missile moving through the atmosphere imposes a limitation to flight. The effect is due to friction heating and is regarded as a range of velocities above which special cooling methods must be applied rather than as a true ceiling.

thrust chamber—In a liquid ROCKET ENGINE, the assembly consisting of the injector, nozzle, and combustion chamber in which mixing of liquid Propellants takes place to form hot gases which are ejected to produce a propelling force.

thrust terminator—A device used to stop the thrust in a ROCKET ENGINE; either by cutting off the flow of Propellants in a liquid fueled system, or through diverting the flow of gases from the nozzle, as in a solid Propellant system.

thrust vector control (tvc*)—A means of controlling a missile by use of vanes in the Rocket exhaust which, in response to signals from the vehicle's autopilot, deflect portions of the exhaust and thereby maintain proper attitude and path control.

*TOC**—Tactical Operations Center.

topping—The replacement of that portion of a missile system's Propellants that are lost through vaporization and initial consumption from ground supply prior to launch of the missile.

tracking—The process of following the movement of a Guided Missile or target using various techniques, two of which are keeping the reticle of an optical system or a radar beam on the object.

trajectory—The path a Guided Missile follows from its launch to impact with its target. Cf: flight path; ballistic trajectory; aerodynamic trajectory.

trajectory, ballistic—See: ballistic trajectory.

trajectory, glide—A long-range missile trajectory in which the initial powered flight is followed by a re-entry glide at optimum lift/drag ration in the upper portions of the atmosphere. The glide portion may include maneuvers to avoid countermeasures.

trajectory phases—1. Launch phase: Normally that portion of the test from launch to booster burnout in the case of ballistic missiles. (Must be defined for each missile system.)

2. Mid-course phase: From end of launch phase to beginning of terminal phase.

3. Terminal phase: That portion of the test from initiation of terminal dive or recovery, in the case of aerodynamic missiles, or from re-entry, in the case of ballistic missiles, to termination of test.

trajectory, powered flight—In a ballistic, or glide missile trajectory, that part which includes flight while under power from booster, sustainer, or vernier engines. During this period; azimuth, elevation, and velocity adjustments are made in terms of intended target coordinates.

trajectory, skip—A long-range missile trajectory in which the initial powered flight is followed by a re-entry skip and glide path using the upper portion of the atmosphere to support the missile aerodynamically on successive ballistic type re-entries.

trajectory, terminal—That portion of long-range ballistic missile trajectory between re-entry and impact. Re-entry occurs at an altitude of approximately 250,000 ft.

trajectory, zero lift—A trajectory in which the control system acts to maintain a condition of no aerodynamic lift on the missile.

transonic—Pertaining to the speed of a vehicle moving through a surrounding fluid, when certain portions of the vehicle are traveling at subsonic speeds while other portions are moving at supersonic speeds.

terminal ballistics—That branch of ballistics

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trap—In solid Propellant ROCKET ENGINES, a device which prevents the loss of unburned Propellant through the nozzle.

trapped Propellant—In liquid propulsion systems, the residual Propellant in feed lines which cannot be used because of inadequate suction head. Trapped Propellant plus engine dry weight equals engine net weight.

trud count (from time remaining until dive—A count in minutes and seconds that measures the time between a missile launch and the moment it reaches apogee and begins to dive.

T-time—Any specific time, minus or plus, as referenced to zero or launch time, during a countdown sequence that is intended to result in the firing of a Rocket propulsion unit that launches a missile vehicle.

U

*uam**—Underwater-to-air missile.

ullage—The volume of a Propellant tank in excess of the amount of Propellant carried; provided to allow for thermal expansion of the Propellant and for accumulation of gaseous products evolved from the Propellants.

ullage Rocket—A small ROCKET MOTOR used in space to impart an acceleration to a liquid Propellant missile tank system to insure that the Propellants collect in the tanks in such a manner as to flow properly into the pumps or thrust chamber.

umbilical cord—A cable fitted to a missile vehicle with a quick disconnect plug; used to control or test missile equipment while the vehicle still is attached to its launching platform or carrying vehicle. Often shortened to umbilical.

umbilical tower—A vertical structure supporting the umbilical cords running into a missile set in launching position.

underdeck spray—That part of a pad deluge in which the water is directed upward from beneath the missile at launch.

underground Launcher—A launching complex capable of launching a missile from beneath the surface of the earth. Contrast with underground storage.

*usm**—Underwater-to-surface missile.

V

vehicle control system—A system, incorporating control surfaces or other devices, which adjusts and maintains the altitude and heading, and sometimes speed, of a vehicle in accordance with signals received from a guidance system.

velocity shock—The shock condition occurring in equipment when a sudden change occurs in the linear velocity, or in the direction of motion, of the equipment or its mount.

ventral—Pertaining to the belly or underside of a missile or aircraft, as in ventral fin.

W

warhead—Commonly, that part of a missile which carries the explosive, chemical, or other agent designed to inflict damage upon an enemy. By extension, also used to infer payload or nose cone.

water-deluge system—A high-capacity, high-pressure system in which water is used at the test and launch stands to cool the missile system and the immediate area during engine operations, including launchings.

wet emplacement—A launch emplacement that includes a provision for a deluge of water used to cool the flame bucket, ROCKET ENGINES and other related equipment during the ignition and launching of a missile.

Z

zero launch—The launch of missile from a launching platform which has zero-length guide rails.

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zero-length Launcher—A Launcher that holds a missile or Rocket vehicle in position and releases the vehicle simultaneously at two points so that the buildup of thrust, normally ROCKET MOTOR thrust, is sufficient to take the missile or vehicle off directly into the air without need of a take-off run and without imposing pitch rate release.

zero lift trajectory—A trajectory in which the control system acts to maintain a condition of no aerodynamic lift on the missile.

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DOCUMENT IDENTIFIER AND TITLE

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☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

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   A. GIVE PARAGRAPH NUMBER AND WORDING.

   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

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   ☐ YES ☐ NO *(If "Yes", in what way?)*

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