ENLISTED AVIATION WARFARE SPECIALIST (EAWS)
Fixed Wing Electronic Attack (VAQ)
SPECIFIC TUTORIAL

Welcome to the EAWS EA-6B Specific PQS questions and answers. This study guide was designed to aid instructors and students alike. Study information on this site was provided by ADC(AW) Michael Chapman, VAQ-136. All of the questions were answered from instructions and directives found in NAVEDTRA 43902-6 , Personnel Qualification Standard (PQS), Enlisted Aviation Warfare Specialist (EAWS), Unit Specific For Fixed Wing Electronic Attack (VAQ).

The EAWS (Core) program was designed to encompass basic areas of study applicable to the entire Navy. Just click on the section of the PQS that you would like to review. Good luck and study hard!

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VAQ PQS EAWS Sections

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101: SAFETY FUNDAMENTALS

References:
(a) OPNAVINST 5100.23D, Navy Occupational Safety and Health (NAVOSH) Program manual
(b) NAVAIR 01-85ADC-2-1, Organizational Maintenance, General Information and Servicing, Navy Model EA-6B Aircraft
(c) NAVAIR 00-80T-105, CV NATOPS

101.1 Discuss the basic requirements for each of the following Navy Occupational Safety and Health (NAVOSH) programs: [ref. a]

(a) Respiratory Protection - Any Naval facility where maintenance activities generate air contaminants which can be dangerous if inhaled.

(b) Hearing Conservation - Environments that produce a high intensity noise which occurs as a result of either impulse or blast noise. A continuous or intermittent sound at 84db for 8 hours or 140db impulse noise.

(**c) Sight Conservation** - Eye protection is required for any activities that involve: (1) Pouring or handling of molten metals or corrosive liquids and solids (2) Cutting and welding (3) Drilling (4) Grinding (5) Melting (6) Chipping (7) Sand blasting or other dust producing operations

(d) Personal Protective Equipment - Where it is determined by competent authority that it's use is required and that such use will lessen the likelihood of occupational injuries and/or illness.

101. .2 Describe the personal protective gear to be worn while at flight quarters.[ref. c, p. 2-2]

The items to be worn are a Cranial (with ear and eye protection), Long sleeve shirt, Float Coat (with inflatable bladder and strobe light), and Flight deck boots or LOX boots.

101.3 Identify the EA-6B danger areas. [ref. b, WP 009 00, pp. 9 thru 13]

While turning; all moveable surfaces, 25 feet from centerline and in front of the intakes, 80 feet from exhaust at low power, 200 feet at high power. The search radar sweep azimuth is 57dg each side of centerline from the nose. 101.4 State the purpose and identify the location of the following safety features:

101.4 State the purpose and identify the location of the following safety features: [ref. b]

(a) Ground Safety Pins - To protect maintenance personnel and prevent damage to the aircraft while the aircraft is on the ground. There are 8 pins in the Pilot's and ECMO-1's ejection seats and 7 in ECMO 2 and 3's seats. There are 3 landing gear safety pins one on each main mount and one on the nose. Canopy ejection safety pins are removed by the aircrew and there is one in each cockpit.

(**b) Aircraft Step, NO Step Areas** - Provides aircrew/ground crew a surface area to walk on while boarding or working on the aircraft without doing any damage to the aircraft's surface.

(**c) Handholds/Grips** - Provides ground crew and aircrew a place to grasp while boarding or working on the aircraft.

(d) Walkways - Areas that provide traction on the most walked on topdeck surfaces on the aircraft.

(e) Aircraft Grounding Points - There are two primary points to ground the aircraft one being the tail bumper static ground point and the other is the nose wheel well static grounding point

101.5 State the general safety precautions associated with applying and removing external power.

(a) Check all cockpit switches and ensure that they are in the OFF, NORM or SAFE positions.
(b) Ground aircraft and external electrical power supply source.
(c) Ensure all personnel around or working on the aircraft are informed of the application of power.

102: AIRCRAFT HANDLING FUNDAMENTALS

References:
(a) NAVAIR 01-85ADC-2-1, Organizational Maintenance, General Information and Servicing, Navy Model EA-6B Aircraft
(b) MIL-HDBK-274 (AS), Military Handbook, Electrical Grounding for Aircraft Safety
(c) NAVAIR 00-80T-96, US Navy Support Equipment Common, Basic Handling and Safety Manual

102.1 State the number of tie-down points on the EA-6B and identify their location.[ref. a, WP 011 00, p. 19]

(a) There are 10 tie-down points on the EA-6B aircraft.

(1) Nose gear drag brace
(2) Tail scag
(3) Forward left outboard pylon
(4) Aft left outboard pylon
(5) Forward right outboard pylon
(6) Aft right outboard pylon
(7) Left main gear
(8) Right main gear
(9) Left main gear wheel axle
(10) Right main gear wheel axle

102.2 State the proper procedures for aircraft grounding. [ref. b, p. 67]

Secure power from the Aircraft. Must have a certified grounding point in the deck. First connect the grounding strap to the point in the deck and then to the Aircraft.

102.3 Discuss the requirements, duties, and responsibilities of the following Aircraft Handling Team personnel.

(a) Move Director - Assemble and brief the move team for Aircraft movement. Ensure that the team has properly donned all PPE, including a whistle. There is a qualified brake rider in the cockpit and that the correct towbar and axle pins are used. The towbar is properly secured to the Aircraft and the tow tractor. Responsible for overall safety of the Aircraft and the move personnel during movement.

(b) Brake Rider - Conduct a premovement inspection and ensure that all cables (power and grounding strap) are removed from the Aircraft. Ensure that safety pins and locks are installed and that the brake system is up and serviced for the move.

(c) Chock Walker - Responsible to pull, install, and carry chocks. Chock Walker has to escort the Aircraft from a safe position making sure of no obstructions to the Aircraft movement. This individual has to be always alert and ready to chock the Aircraft.

(**d) Safety Observers (Tail Walker/Wing Walker)** - Primary responsibility is to ensure that the Aircraft is ready to be towed and that there is ample clearance for the Aircraft.

(e) Tractor Driver - The safe and slow movement of the Aircraft from hook up to the final parking spot. This individual is responsible to the Move Director.

103: AIRFRAME FUNDAMENTALS

References:
(a) NAVEDTRA 12338, Aviation Structural Mechanic (S&H) 3 & 2
(b) NAVAIR 01-1A-509, Aircraft Weapons Systems Cleaning and Corrosion Control
(c) NAVAIR 01-85ADC-2-4, Organizational Maintenance, Flight Control Systems, Navy Model EA-6B Aircraft
(d) NAVAIR 01-85ADC-2-7, Organizational Maintenance, Hydraulic Power Systems, Navy Model EA-6B Aircraft

103.1 State the purpose of a hydraulic patch test.

Patch testing is the primary contamination measurement method used at all levels of maintenance. Most organizational levels still utilize the Contamination Analysis kit, however, many Intermediate levels now utilize the newer particle counting machine, which is much more accurate.

103.2 State the purpose of a tactical paint scheme.

Tactical paint schemes are used for deception, for reduction of detection range, or to confuse and mislead observers.

103.3 Sate the purpose of the NAVAIR 01-1A-509.

The purpose of this manual is to provide information on materials and procedures for the prevention and repair of corrosion damage to equipment on land and at sea. Supervisory and maintenance personnel shall use this manual as a guide for all corrosion control and maintenance efforts.

103.4 Explain the purpose of the nose wheel steering actuating switch.

Allows the pilot to activate the nose wheel steering with weight on wheels. This ports hydraulic power to the system. When hydraulic power to the steering assembly is turned off, operation of the rudder pedals has no affect on steering operation. The steering switch is located on the pilot's handgrip of the control stick.

103.5 Explain the purpose of the spin recovery system.

The spin recovery system provides an alternate method of increasing stabilizer and rudder (control surface) throws during a clean flight configuration.

103.6 Explain the purpose of the Wing Fold system.

The aircraft is provided with folding wings to facilitate parking within limited areas.

103.7 Discuss the purpose of the following hydraulic systems:

(a) Flight - The flight hydraulic power system provides power for the operation of the primary flight controls

(b) Combined - The Combined hydraulic power system consists of two parallel power circuits. Pressure from the two pumps provides power to the primary flight controls and general utility (secondary) systems. The tandem control valves and actuators that operate the primary flight controls permit operation from both or either the flight or combine system sources. With this arrangement, power from either the flight or combined hydraulic power system can be lost with no effect on operation of the primary flight controls. Secondary systems not required during flight.

(**c) Auxiliary** - The auxiliary hydraulic pump system supplies hydraulic power for ground operation of the radome and extensible equipment platform, and pressurizes the wheel brake accumulator for auxiliary and emergency operation of the wheel brakes.

104: PROPULSION FUNDAMENTALS

Reference:
(a) NAVAIR 01-85ADC-2-9, Maintenance Instructions Organizational, Fuel and In-Flight Refueling Systems, Navy Model EA-6B Aircraft
(b) NAVAIR 01-85ADC-2-8, Maintenance Instructions Organizational, Power Plant and Relating Systems, Navy Model EA-6B Aircraft

104.1 State the purpose and identify the location of the in-flight refueling probe.

Purpose - Provides a means of refueling the aircraft while in flight. Location - In front of the wind screen.

104.2 State the type and identify the model of the engines used on the EA-6B aircraft.

Turbojet J52-P-408A

104.3 State the six basic sections of the EA-6B engine.

(1) Inlet section
(2) Compressor Section
(3) Diffuser section
(4) Combustion section
(5) Turbine Exhaust section
(6) Accessory section

104.4 State the two methods of starting the engine.

(1) By using external bleed air
(2) Taping bleed air from operating engine (cross bleeding)

104.5 Explain the purpose of the Engine Fuel system.

It maintains a supply of fuel by weight, sufficient to meet the engines demands under all operating conditions.

105: AVIONICS/ELECTRICAL FUNDAMENTALS

References:
(a) NAVAIR 01-85ADC-2-1, Organizational Maintenance, General Information and Servicing, Navy Model EA-6B Aircraft
(b) NAVAIR 01-85ADC-1, NATOPS Flight Manual, Navy Model EA-6B Aircraft
(c) NAVEDTRA 12329, Aviation Electronics Technician 3
(d) NAVEDTRA 12000, Airman
(e) NAVEDTRA 172-02-00-91, NEETS Module 2 - Introduction to Alternating Current and Transformers
(f) NAVAIR 01-85ADC-2-14, Automatic Flight Control System AN/ASW- 41, Automatic Central Air Data Computer CPU-140/A

105.1 Define the following acronyms:

(a) IFF - Identification Friend or Foe
(b) INS - Inertial Navigation System
(c) RADAR - Radio Detection and Ranging
(d) TACAN - Tactical Air Navigation
(e) ESM - Electronic Surveillance Mission
(**f) ACLS** - Automated Carrier Landing System
(g) APC - Approach Power Compensator
(**h) AFCS** - Automated Flight Control System
(i) EFIS - Electronic Flight Instrumentation System
(j) OAT - Outside Air Temperature

105.2 State the purpose of Electronic Countermeasures (ECM) equipment.

The purpose of ECM is to deceive and jam enemy radar

105.3 State the two basic categories of airborne ECM systems.

(a) Electronic - Used for Jamming
(b) Non-Electronic - Chaff

105.4 Identify the primary electrical power source for the AN/ALQ-99 Tactical Jamming System (TJS) Pod.

Self-contained Ram-Air Turbine/Generator - It provides 115v AC, 400Hz, and 3 phase power.

105.5 Explain the difference between alternating current (ac) and direct current (dc).

(a) Alternating Current - It constantly changes in amplitude and reverses direction at regular intervals.

(b) Direct Current - It flows in one direction. Amplitude is determined by the number of electron's flowing past a point in the circuit in 1 second. 105.6 Explain the difference between the following altimeters:

(a) Radar - A range tracking radar that measures the surface or terrain clearance below the aircraft. The operating range 0 - 5000 feet with accuracy limited to within +/- 30dg of roll and +/- 40dg of pitch.

(b) Barometric - It works as a pressure altimeter combined with an AC powered servo mechanism to give an altitude read out in hundreds of feet by the outside air pressure or density.

106: ARMAMENT FUNDAMENTALS

Reference:
(a) COMNAVAIRPAC INSTRUCTION 8023.3F, Explosives Handling Personnel Qualification And Certification (Qual/Cert) Program
(b) NAVAIR 00-80T-103, NATOPS Conventional Weapons Handling Procedures Manual (Ashore)

106.1 State the objective of the Explosive Handling Personnel Qualification and Certification Program.

To ensure that personnel are qualified and certified and having demonstrated the qualifications to properly & safely perform all functions & task involving explosive devices.

106.2 Discuss the ordnance safety precautions taken prior to hot seat (crew swap) procedures.

The aircraft must be in a designated area & all weapons will be safe. All with a missile will be required to enter an Arm/De-arm area.

107: AVIATION LIFE SUPPORT SYSTEMS/EGRESS FUNDAMENTALS

References:
(a) OPNAVINST 3710.7Q, NATOPS, General Flight and Operating Instruction
(b) NAVAIR 14-1-6.3-2, Seat Survival Kits
(c) NAVAIR 13-1-6.7, Aircrew Personal Protective Equipment (PPE)
(d) NAVAIR 01-85ADC-1, NATOPS Flight Manual, Navy Model EA-6B Aircraft
(e) NAVEDTRA 10401, Aviation Structural Mechanic (E) 2
(f) OPNAVINST 4790.2G, The Naval Aviation Maintenance Program (NAMP), Vol. 5
(g) NAVAIR 13-1-6.1-2, Inflatable Survival Equipment, Life Preservers
(h) NAVAIR 13-1-6.4, Oxygen Equipment

107.1 Identify the minimum requirements for aircrew Personnel Protective Equipment (PPE).

(1) Protective Helmet *
(2) Aircrew safety/flyer boots *
(3) Fire Resistant (Aramid) flight gloves *
(4) Fire Resistant fight suit (Aramid) *
(5) Identification Tags
(6) Survival knife and sheath *
(7) Personal Survival kit * (8) Signal device *
(9) Survival radios and beacons
(10) Flashlight
(11) Anti-Exposure suits
(12) Anti-Blackout suits
(13) Inflatable life preserver
(14) Laser Eye Protection (LEP)
(15) Helicopter Emergency Egress Device (HEED)

NOTE: Items marked (*) may be omitted by flight personnel flying in fixed wing cargo/transport class aircraft if such flight does not involve carrier operations. Deviations shall be specified by NATOPS flight manual for individual model aircraft refer to NAVAIR 13-1-6.7, Aircrew Personal Protective Equipment.

107.2 State the purpose of the following personal flight equipment.

(a) Oxygen Mask - Designed for use in aircraft where the mask is required at all times and an audio amplifier is required for communication compatibility.

(b) Oxygen Regulator - Designed to regulate 100% oxygen to the aircrew during flight.

(c) Life Preserver - Designed for use in ejection seat equipped aircraft and provides a minimum of 65 pounds buoyancy.

(d) Anti-G Suit - Designed to provide protection for the aircrewmen against the effects of the high G-Forces experienced in high performance aircraft.

107.3 State the purpose of the following parachutes.

(a) Drogue - To stabilize and decelerate the seat and to position the seat in the proper attitude for aircrew separation.

(b) Main - Pulls occupant, survival kit and lower restraint harness free of sticker clips allowing seat to fall free and occupant to continue normal parachute descent.

107.4 Identify the items contained in the Seat Survival Kit.

Nylon Cord
Signal and Smoke Flares
Sea Dye Marker
Bailing Sponge
SRU-31/P Survival Kit #1
SRU-13/P Survival Kit #2
Canned Drinking Water
Emergency Drinking Water
Combat Casualty Blanket
Can Opener
Emergency Code Card
Packing List
Radio Beacon Set
Inflatable Liferaft

107.5 State the objective of the Egress System Checkout Certification Program.

Establishes policies, responsibilities and requirements for egress system checkout procedures.

107.6 Define the following conditions.

(a) Hypoxia - A deficiency of oxygen reaching the tissues of the body.

(b) Anoxia - A complete lack of oxygen, which results in permanent physical damage or death.

108: OPERATIONS FUNDAMENTALS

References:
(a) OPNAVINST 3710.7Q, NATOPS, General Flight and Operating Instructions
(b) NAVAIR 01-85ADC-1, NATOPS Flight Manual, Navy Model EA-6B Aircraft
(c) NWP 3-51.4, EA-6B TACMAN
(d) OPNAVINST 4790.2G, The Naval Aviation Maintenance Program (NAMP), Vol. 1
(e) NAVAIR 00-80T-104, NATOPS Landing Signal Officer Manual

108.1 Define and explain the following acronyms:

(a) VMC - Visual Meteorological Conditions is defined as Meteorological conditions expressed in terms of visibility, cloud distance, and ceiling that are equal or better than specified minimums. Basic weather conditions prescribed for flight under Visual Flight Rules (VFR).

(b) IMC - Instrument Meteorological Conditions are Meteorological conditions expressed in terms of visibility, distance from clouds, and ceiling less than the minimums specified for visual meteorological conditions. IMC conditions exist anytime a visible horizon is not distinguishable.

(c) VFR - Visual Flight Rules, The see and avoid concept applies to visual flight conditions, thus eliminating the need for specific route clearance from air traffic control. The weather minimums are that the ceiling and visibility must be at least 1000 feet and 3 statue miles. The minimum altitude is 500 feet above the terrain surface or water.

(d) IFR - Instrument Flight Rules purpose is the decrease the probability of midair collisions, all flights in naval aircraft shall be conducted in accordance with IFR to maximum extent practicable. This shall include all point-to-point and round-robin flights using Federal airways and other flights or portions thereof, such as flights to and from target or operating areas accessible through IFR filing. All other portions of flights shall be conducted under positive control to the maximum extent possible.

Waiving IFR Requirement - Where VFR conditions exist, pilots may waive this requirement for specific flights when necessary to circumnavigate or otherwise avoid severe weather or when dictated by an in-flight emergency.

108.2 Identify and briefly explain the primary roles f the following personnel:

(a) Mission Commander - Responsible for execution of mission. Makes all decisions not related to safety of flight.

(b) Formation Leader - Responsible for other aircraft in formation. Flies in lead aircraft.

(c) Pilot - The aircraft commander in the EA-6B community. Responsible for the safety of flight.

(d) ECMO-1 - (Electronic Countermeasures Officer ONE) Acts as Co-Pilot ECMO-1 also controls the RADAR, Navigation, and Communications

(e) ECMO-2 and ECMO-3 - The mission specialists. Control Jamming operations using ALQ-99. Also perform HARM (High Speed Anti-Radiation Missile) setup, although HARM is considered a crew missile, in that all aircrew members play a part in the successful deployment of a HARM shoot.

108.3 Define and explain the following acronyms:

(a) SEAD - Suppression of Enemy Air Defenses. Two basic ways of accomplishment; Jamming their radar and HARM utilization.

(b) WASEX - War at Sea Exercise; Coordinated training attack on ship(s).

(c) EWCAS - Electronic Warfare, Close Air Support. Providing SEAD in support of Close Air Support (CAS).

(d) FCF - Functional Check Flight. There are 4 different Profiles, “A” through “D”. More than one profile can be accomplished in one flight. Required when major maintenance has been performed on the aircraft. Each profile lists specific maintenance actions that require the FCF. Only specifically qualified aircrew can fly an FCF.

(e) HARMEX - AGM-88 (HARM) Training exercise. Involves setting a target, usually a barge with some form of emitter, and launching a live HARM at it.

(f) FCLP - Field Carrier Landing Practice. Simply aircraft carrier landing practice performed at an airfield. LSO will be present and landing are performed and graded as if they were aboard ship.

201: AIRFRAME SYSTEM

References:
(a) NAVEDTRA 12338, Aviation Structural Mechanic (H & S) 3 and 2
(b) NAVAIR 01-85ADC-1, NATOPS Flight Manual, Navy Model EA-6B Aircraft
(c) NAVAIR 01-85ADC0-2-6, Organizational Maintenance, Environmental Control Systems, Navy Model EA-6B Aircraft
(d) NAVAIR 01-85ADC-2-5, Organizational Maintenance, Escape and Survival Systems, Navy Model EA-6B Aircraft
(e) NAVAIR 01-85ADC-2-1, Organizational Maintenance, General Information and Servicing, Navy Model EA-6B Aircraft
(f) NAVEDTRA 10401, Aviation Structural Mechanic (E) 2
(g) NAVAIR 01-85ADC-2-3, Organizational Maintenance, Landing Gear and Arresting Gear Systems, Navy Model EA-6B Aircraft
(h) NAVAIR 01-85ADC-2-10, Organizational Maintenance, Instrument Systems, Navy Model EA-6B Aircraft

201.1 Systems components and component parts

Referring to a standard print of this system or the actual equipment, identify the following system component parts and discuss the designated items for each:

A. What is its function? B. Where is it located?

201.1.1 Aircraft structure: The Aircraft structure consists of principal parts, and must be fast, maneuverable.

(1) Fuselage:

(a) It provides space for the crew, passengers, cargo, most of the accessories, and other equipment (b) The fuselage is the main structure or body of the aircraft to which all other units attach.

(2) Empennage:

(a) For inspection and maintenance purpose, attachment point for vertical and horizontal stabilizers.
(b) The entire tail section is considered a single unit of the airframe, and is referred to as the “Empennage”.

(3) Wings:

(a) The wings of an aircraft are designed to develop lift when they move through the air.
(b) The wings are located on the right and left side of the fuselage.

201.1.2 Flight Control Surfaces:

The Flight Control Surfaces are hinged or moveable airfoils designed to change the attitude during flight.

(1) Flaps:

(a) The wing flaps are semi-fowler type slotted flaps and work with the wing slats to provide additional lift during takeoff and landing.
(b) The flaps are supported by a hinge and carriage assembly in the wing trailing edge.

(2) Slats:

(a) The wing slats work with the flaps to provide additional lift during takeoff and landing.
(b) The wing slats are supported by reversible screw jacks, and guided by rollers in the wing leading edge.

(3) Flaperons:

(a) Flaperons are used for lateral control (ROLL). Stick movement to left results in the left flaperon being used with the right flaperon remaining flush with the wing. Conversely, stick movement to the right results in the right flaperon being used and the left flaperon remaining flush with the wing.

(b) Flaperons are located just forward of the wing flaps. The flaperons are divided on each wing at the wing fold.

(4) Horizontal Stabilizer:

(a) Longitudinal control (PITCH) is provided by the horizontal stabilizer. The slab-type stabilizer responds to fore and aft movement from the stick. Stabilizer movement is limited when flaps and slats are retracted, and is increased when flaps and slat are extended, or with flaps and slats retracted and ASSIST SPIN RECOVERY switch to ON.

(b) Connected to the Empennage, left and right sides that rotate as a unit.

(5) Rudder:

(a) Directional control (YAW) is provided by a single rudder. Rudder control is provided through movement from the rudder pedals in the cockpit. Rudder movement is limited when flaps and slats are retracted, and is increased when flaps and slats are extended, or with flaps and slats retracted and ASSIST SPIN RECOVERY switch to ON.

(b) Connected to the aft edge of the vertical fin at two hinge points, the lower section has an attachment point for rudder actuator

(6) Speed Brakes:

(a) Speed brakes are hinged movable control surfaces used for reducing the speed of the aircraft. Their primary purpose is to keep the aircraft from building up excessive speed during dives.

(b) Surfaces at the trailing tip of each wing tip, outboard of the flaps.

201.1.3 Hydraulics:

Various types of hydraulic components make up a power system.

(1) Reservoirs:

(a) The reservoir is a tank in which an adequate supply of fluid for the system is stored, fluid flows from the reservoir to the pump, where it is forced through the system and eventually returned to the reservoir.

(b) There are two hydraulic reservoirs on the EA-6B, Flight and Combine. The flight reservoir is located on the right side, aft and below the starboard engine intake, below the starboard boarding ladder. The combine reservoir is located under the port wing root, above the port forward engine bay door.

(2) Hydraulic Pumps:

(a) All aircraft hydraulic systems have one or more power-driven pumps and may have a hand pump as an additional source of power. Power-driven pumps are the primary source of energy, and may be either engine-driven or electric motor driven.

(3) Actuators:

(a) Actuating cylinders are the most commonly used actuating units in aircraft hydraulic systems. An actuating unit may be defined as a unit that transforms hydraulic fluid pressure into mechanical force, which performs work (moving some mechanism).

(4) Accumulators:

(a) The purpose of the accumulator in a hydraulic system is to store volume of fluid under pressure. An accumulator acts as a cushion against pressure surges that may be caused by the pulsating fluid delivery from the pump or from system operations.

201.1.4 Landing Gear:

The aircraft has a fully retractable tricycle landing gear. The landing gear system provides the aircraft with complete carrier and land takeoff and landing capability. Also that portion of the aircraft that supports the weight of the aircraft while it is on the ground.

(1) Nose Landing Gear:

(a) The nose gear is hydraulically interconnected with the main gear. The nose gear system includes an air-oil shock strut, duel wheels with tubeless tires, a supporting drag strut, and a nosewheel steering and damper system.

(b) It is located forward, under the cockpit.

(2) Main Landing Gear:

(a) The main gear system consists of an air-oil shock strut that houses a multiple-disk wheel brake, a single wheel and tubeless tire assembly, and a supporting drag brace.

(b) It is located under the port and starboard wing roots.

(3) Wheel Brakes:

(a) The main wheel brakes are hydraulically powered multiple disk brakes. The brake system is designed to retard or stop the aircraft's motion on the ground. They also aid in controlling the direction of the aircraft while it is taxiing.

(b) The wheel brakes are mounted on the bottom of the main landing gear shock struts, inside the tire assembly.

(4) Nose Tow Catapult system (tow-link):

(a) The components necessary for a catapult launch, serves the dual purpose of guiding the aircraft to the shuttle from the lead-in track and attaching the aircraft to the shuttle.

(b) It is located forward of the nose gear, lower part of the shock strut.

(5) Arresting Hook:

(a) The arresting hook system provides carrier landing capability and arresting landing capability equipped with arresting gear.

(b) It is located in the belly of the Empennage.

201.1.5 Environmental Control Systems:

(a) Cabin Air Conditioning - The cabin air-conditioning system is an air-cycle system used to maintain the forward and aft cockpit temperature within the limits of crew safety and comfort. The system distributes a mixture of dehumidified, refrigerated bleed air and engine hot bleed air through air conditioning ducts in the forward and aft cockpits. The forward refrigeration unit supplies the refrigerated bleed air for the cabin air-conditioning system. The cockpit air-conditioning system can maintain temperature between 60F and 80F and can be operated in three modes; auto, manual, and ram air. Auto Mode: Utilizes a variety of air temperature sensors, shutoff valves and a controller to maintain temperature automatically at a given setting through constant analysis of signals sent from sensors to the controller and then to valves regulating the flow of both hot and cold air to get the desired temperature. Manual Mode: Uses a switch on the air-conditioning control panel placed cold or hot to drive a dual temperature control valve hot or cold depending on the needs of the aircrew. When the switch is released it returns to a hold position and maintains the valve at the last selected position. Ram-Air Mode: Ram air mode is an

emergency backup used in the event the forward refrigeration fails. Ram air is brought in from outside the aircraft utilizing the Ram-Air valve and the ducting already in place for normal air-conditioning.

(b) Cabin Pressurization - The cabin pressurization system is used to maintain forward and aft cockpit pressures within the limits of crew safety and comfort. With today's high performance aircraft the altitudes at which flight is now possible is astounding. The pressures at which the human body operates at peak effectiveness are those maintained when between sea-level and 8,000 feet. The cabin pressurization system is the means to maintain the proper pressures and regulating them in the aircraft. The cockpit pressurization system regulates the out-flow of conditioned air through a set of valves to regulate pressures suitable for aircrew efficiency. These valves are the cabin pressure regulator located outboard of ECMO-3 on the rear bulkhead. The cabin pressure regulator maintains pressure from sea level through 8,000 feet at ambient, 8,000 feet to 23,000 feet is maintained at 8,000 feet and above 23,000 feet a 5-PSI differential is maintained. The cabin safety valve is used the event the cabin pressure fails and then by selecting dump on the cabin dump control panel to dump excessive pressure overboard and also allows for removing smoke in the cockpit.

(c) Defogging - The defogging system provides the inner surfaces of the forward windshield, windshield quarter panels and forward cockpit canopy with a conditioned bleed air blast to defog and defrost these surfaces. The temperature of the conditioned bleed air is automatically maintained by the defog and equipment cooling controller. The system uses hot bleed air from both motors mixed with cooled bleed air supplied by the main heat exchanger of the forward refrigeration unit to automatically supply conditioned bleed air at a temperature of 240F +/- 5F during stabilizer flight and then 240F +/- 10F o transient flights to provide defogging. The system is manually controlled by the defog thumb-wheel on the defog/anti-ice/rain removal panel. This control turns the system on and off and controls the flow by increasing/decreasing the numbers on the thumb-wheel.

(d) Vent Suit - The vent suit system provides the personnel services (vent suit or cushion airflow) of each crewmember with a supply of automatically temperature controlled, conditioned air as desired. This system automatically maintains a selected temperature throughout a continuous range between 50F and 100F within a tolerance of +/- 2F during stabilizer flight conditions and +/- 10F during transient flight. This system uses hot bleed air from both engines and refrigerated air from the forward refrigeration unit. Each crewmember controls the flow of conditioned bleed air or refrigerated bleed air to his/her personal services through the use of an airflow thumb-wheel. The pilot's suit temperature thumb-wheel controls the temperature of the system to all seat positions.

(e) Equipment Cooling - The equipment cooling system provides specially cooled electronic equipment installed in the forward equipment bays, aft compartment, tail compartment and fin pod with direct ducted conditioned bleed air at a temperature of 75F +/- 5F. The system uses hot bleed air from the engines and refrigerated bleed air from the aft refrigeration unit installed in the aft compartment. The aft refrigeration unit is one of the main components of this system. It consists of a heat exchanger, cooling turbine, mass-flow control valve and mass flow controller all mounted in the right side of the aft compartment. A water separator is installed at the outlet port of the aft cooling turbine to remove most of the water from the refrigerated bleed air produced by the aft cooling turbine. The automatic temperature-control system is used by the equipment cooling system to reheat the refrigerated bleed air. This further reduces the relative humidity and ensures delivery of drier air to the specially cooled electronic equipment. The automatic temperature control system operates as soon as the engines are started and consists of defog and equipment cooling controller and various sensors used to regulate temperatures. Through comparing signals and sending signals to valves to open or close mixing hot and cold air together to maintain the desired temperatures of 75F +/- 5F.

(f) Equipment Pressurization - The equipment pressurization system supplies electronic equipment in the aft forward equipment bay with a supply of dry, pressurized air on aircraft 158029 through 163048. This air is necessary to provide proper performance of the electronic equipment by preventing corrosion and arcing due to accumulation of moisture. The system uses cooled bleed air from the auxiliary heat exchanger of the forward refrigeration unit. The cooled air from the auxiliary heat exchanger is piped to a pressure regulator. The pressure regulator reduces and maintains pressure to the electronic equipment to 30PSI +/- 2PSIG. Tubing downstream of the pressure regulator provides pressurized air for the magnetic tape transport in the right forward equipment compartment. A bleed port in the tubing to the magnetic tape transport provides a collecting and draining point for moisture from the pressurized air supplied to this equipment.

(g) Windshield Washing - The windshield washing system is installed to provide cleaning of the pilot's windshield. The windshield washing system is controlled by the Windshield switch on the defog/anti-icing/rain removal control panel when selected to WASH. The system cleans the windshield by directing a stream of 50% water-methyl-alcohol mixture is then dried by engine bleed air through the rain removal nozzles (which is selected afterwards by holding the Windshield switch to AIR). The windshield wash system uses cooled bleed air provided by the auxiliary heat exchanger of the forward refrigeration unit to pressurize the windshield washing tank which stores the washing solution. The pressure forces the fluid through a series of five nozzles located at the base of the pilot's windscreen. The windshield washing shutoff valve controls the flow of cool bleed air to the top of the windshield wash tank to expel the liquid. (h) Rain Removal - The rain removal

system is installed in the aircraft to provide for cleaning the pilot's windshield. The rain removal system is controlled by the windshield switch, on the defog panel, when selected to AIR. The system uses hot bleed air from both engines to remove ice and rain from the pilot's windshield. The rain removal pressure regulator shutoff valve controls the airflow to the windshield.

201.1.6 Egress Systems:

(a) Canopy - The canopies for the EA-6B are of a transparent plastic type comprised of two plastic panels on a frame set up with hinges at the rear and canopy actuators (one for each canopy) to assist with the closing and opening. Normal canopy closing and opening can be controlled internally or externally with 2 handles forward of the port boarding ladder set flush in the fuselage and 2 handles, 1 in each cockpit center forward console. In the event the normal canopy system fails to open the canopies an auxiliary system is incorporated which over-rides the primary and opens both forward and aft canopies. In the event of ejection for aircrew while in flight a jettison system is also incorporated which blows the canopies off back and up into the windstream where they are out of the way for ejection (if time permits). Two jettison handles are provided, one in the front cockpit and one in the aft cockpit. The canopies are also made so that during the ejection sequence the seat and occupant go through the glass.

(b) Ejection Seat - There are four Martin Baker MK-GRUEA-7 ejection seats installed in the EA-6B aircraft. Used to provide aircrew members with a comfortable work seat and provide a safe, efficient, completely automatic escape at ground level (zero altitude, 80 knots minimum) and throughout the entire speed and altitude range of the aircraft. The primary means of ejection is through the canopy glass though if time permits the canopy may be jettisoned (only below 250KIAS) prior to ejection. Once ejection is initiated by command initiated ejection the aircrew members are ejected in a timely order as follows: ECMO-3 first at time 0, ECMO-2 second at .40 sec, ECMO-1 third at .80 sec and last the Pilot at 1.20 seconds. Individual ejections would also have the same times if done separate than command sequenced ejection. Pilot and ECMO-1 seats have 8 safety pins and the two rear seats, ECMO-2 and ECMO-3 have 7 a piece. The difference is for the command ejection capability for both front seats.

201.1.7 Survival Systems:

(a) Liquid Oxygen - The LOX system converts liquid oxygen to gaseous oxygen, and delivers the gaseous oxygen to the crew. This enables them to operate above 10,000 feet altitude and to maintain peak body efficiency at altitudes above 5,000 feet. The system delivers 100% oxygen to each crewmembers chest mounted breathing regulator. At normal atmospheric pressure, liquid oxygen boils at -297F degrees and changes to gaseous oxygen in volumetric ratio of 862 to 1. A low-pressure warning switch activates the OXYGEN caution lamp whenever system pressure drops below 50 psi. Each converter has a capacity of 10 liters and total system capacity is 30 liters.

(b) Emergency Oxygen - In addition to the liquid oxygen supply, each ejection seat is equipped with an oxygen cylinder and is capable of providing gaseous emergency oxygen. There are two types of emergency oxygen supply survival kits, each different in size and oxygen supply time. The RSSK-7 survival kit has a 94 cubic inch capacity that supplies oxygen for approximately 15 minutes. The SKU-2/A survival kit has 100 cubic inches with about a 20-minute supply of oxygen. Each survival kit is equipped with a pull type lanyard for switching to emergency bottle operation should the aircraft oxygen fail. The emergency bottles are also automatically activated during ejection as the ejection seat travels up the rails, a lanyard attached to the personal services block (which is attached to the deck) actuates the supply of emergency oxygen.

(c) Anti-gravity (Anti-G) - The primary function of the anti-g system is to automatically regulate air pressure flow to the crewmembers g-suits. The system is designed to protect the crew against blackout and grayout and to alleviate fatigue resulting from repeated g-loads below blackout levels. The anti-g valve uses cooled engine bleed air from the auxiliary heat exchanger of the forward refrigeration unit to pressurize the four pressure regulating anti-g valves and their associated lines and fittings. The system works to force blood from the lower extremities of the crewmember to their upper body helping them overcome the effects of g-forces; grayout and blackout.

201.1.8 Main Landing Gear forward door override valve.

(a) A door control override valve, which controls opening and closing of the main gear forward door for ground servicing.

(b) Located in each nacelle aft of the main gear shock strut.

201.1.9 Sate the purpose of the nose landing gear strut lock.

The nose gear strut lock system renders the shock strut almost rigid for a catapult launch. The system is actuated by combine hydraulic system pressure when the CATAPULT GRIP handle is rotated and lifted, activating the strut lock selector switch.

201.1.10 State the purpose of the Landing Gear Emergency system.

The emergency landing gear system is used to lower the main and nose gear using pneumatic pressure when a malfunction occurs in the electrical control or hydraulic power portions of the landing gear systems.

201.1.11 State the purpose of the Integrated Position Indicator (IPI).

The integrated position indicator, located on the left side of the pilot's panel, displays the position of slats, stabilizer, flaps, wing-tip speed brakes, wheels, and tow link. Each indicator in the integrated position indicator displays three positions (except nosewheel and flap position indicators). Each of the display functions is controlled by individual solenoids.

201.2.1 Briefly discuss how the control stick and rudder pedals operate the primary flight control surfaces.

The flight control surface consist of a stab stabilizer, a rudder, and upper wing surface spoilers called flaperons. The control stick and rudder pedals are linked directly to their corresponding surface actuators by a system of pushrods, bellcranks, and cables.

201.5 What special safety precautions apply to the:

(a) Ejection Seat - Due to the explosive nature of the four installed Martin Baker MK GRUEA-7 ejection seats caution must be adhered to whenever working around or sitting in the ejection seat. Each seat has it's own set of safety pins installed at various explosives initiation points. The safety pins are checked for installation prior to entering the cockpit every time. With an ejection sequence time of 1.20 sec for all seats to be ejected out of the aircraft, the ejection seats need the utmost respect and caution.

(b) Canopy Jettison System - The canopy jettison system is another explosives system on the EA-6B aircraft, which if not given proper respect may damage machinery, injure, or kill personnel. Prior to entering the cockpit the canopy jettison pins shall be checked to ensure they are installed. The system is safety pinned at the initiation points in the forward and aft cockpits at the jettison handles. The handles are pinned and unpinned by aircrew members prior to launch and again after landing.

(c) Canopy Normal System - The canopy normal system, is the system, which allows for opening and closing of both the forward and aft canopies. Nitrogen is the primary force in opening and closing the canopies and operates a canopy actuator to accomplish this. The canopy handles are pinned immediately after opening and prior to entrance into the cockpit.

LOX - LOX (liquid oxygen) is by its very nature a hazardous material and should be handled only by qualified personnel. LOX presents a hazard by being a fire accelerator and is very unstable with petroleum based products. LOX has an expansion rate of 862 to 1 and if expansion is not controlled, can turn a LOX converter into a bomb. LOX presents a hazard in that proper personal protective equipment must be utilized to prevent frostbite and the handlers clothes from becoming saturated with oxygen.

202: Propulsion System

References:
(a) NAVAIR 01-85ADC-2-8, Maintenance Instructions Organizational, Power Plants and Related Systems, Navy Model EA- 6B Aircraft
(b) NAVAIR 01-85ADC-2-9, Maintenance Instructions Organizational, Fuel and In-Flight Refueling Systems, Navy Model EA-6B Aircraft
(c) NAVAIR 01-85ADC-2-1, Organizational Maintenance, General Information and Servicing, Navy Model EA-6B Aircraft
(d) NAVAIR 01-85ADC-1, NATOPS Flight Manual, Navy Model EA-6B

202.1 SYSTEM COMPONENTS AND COMPONENT PARTS

Referring to a standard print of this system or the actual equipment, identify the following system components and component parts and discuss the designated items for each.

202.1.1 Engines:

A. Starter - Turns engine over during starting; center front accessory drive pad on generator.

B. Fuel Control - Lightweight, hydromechanical, high capacity, fuel flow metering unit that permits selection of a desired engine thrust level and provides automatic compensation through the full range of thrust for existing ambient operating conditions; located on the left rear pad of the accessory gear box.

C. Power level control quadrant - Provides control of the engine throughout the range of operation and automatically sequences ignition and fuel during the starting cycle; located forward cockpit on pilots left hand console.

D. Engine oil system - Supplies oil under pressure to lubricate the main bearings, the engine and accessory drive; located in the main gear box.

E. Fire overtemperature detection system - Provides cockpit indication of a fire or overtemperature or either engine compartment, aft equipment bay or nosewheel well.

F. Engine indicating system:

(1) Oil Pressure Indicator - Receives a signal from the engine mounted oil pressure transmitter indicating operating pressures; located on pilots instrument panel lower left hand side.

(2) Fuel Flow Indicator - Receives a signal from engine mounted fuel flow transmitter and displays it in PPH (Pounds Per Hour); located on pilots instrument panel right hand side.

(3) Engine speed (rpm) indicator - Tachometer generator sends a signal to cockpit mounted indicator and is read in percentages; located on pilots instrument panel left hand side.

(4) Exhaust Gas Temperature (EGT) indicator - 6 thermocouples mounted on the exhaust case sense the temperature and send it to cockpit mounted gauge; located on pilots instrument panel left hand side.

202.1.2 Fuel System:

A. Forward fuel cell - Self sealing type, capacity of 392 gallons (2,666 lbs) of fuel. Contains the following , dual seat shutoff valve, pilot valve (non-modulating), transfer and dump pump, two fuel quantity probes, float vent valve, acceleration check valve, catapult check valve (inertia) and a catapult vent check valve; located behind ECMO 2 and 3 seats and directly under TB #1.

B. Mid fuel cell - Bladder type cell with a 256 gallon (1741 lbs) capacity of fuel, contains a pilot valve, two fuel quantity units and catapult vent check valve; located directly behind forward fuel cell.

C. Aft fuel cell - Self sealing type having a capacity of 643 gallons (4372 lbs) of fuel. Contains a dual seat shutoff valve, pilot valve, transfer and dump pump, fuel booster pump, defueling check valve, two fuel probes, forward baffle check valve, aft baffle check valves. Located directly behind the mid fuel cell under TB #3.

D. Wing tanks - Structurally integral tanks. There is two outboard wing tanks and one inboard wing tank; located outboard and inboard wings.

E. AERO-1D drop tank - Drop tanks are installed on wing and fuselage stations to provide an extra source of fuel; located on any of the 5 station pylons.

202.2 PRINCIPLES OF OPERATION - None to be discussed

202.3 PARAMETERS/OPERATING LIMITS

202.3.1 State the maximum limit as the apply to:

A. Attempted engine starts:

(1) 1 minute on and 1 minute off (2) 1 minute on and 1 minute off (3) 1 minute on and 30 minutes off

B. AERO-1D drop tank capacity - 295 gallons

C. Internal fuel tank capacity: (1) Wings (977 gallons) (2) Main Bags (1291 gallons)

202.4 SYSTEM INTERFACE

202.4.1 How does the engine bleed air interface with the engine starting?

A. Either engine can be started with the other engines bleed air by cross bleeding.

202.5 SAFETY PRECAUTIONS

202.5.1 What safety precautions must be observed during engine ground turn-up?

A. Personnel shall stay clear of danger areas such as intakes, exhaust and rotation line of starter and engine turbine blades, ear protection shall be worn in the area of engine operation.

202.5.2 What special safety precautions apply to :

A. Fueling - During hot pumps do not fuel aircraft outboard wings with wings folded due to fire hazard. Aircraft needs to be grounded and flight line fire extinguishing agent present. Personnel need to wear proper personnel protective equipment. No radio or radar activity within 100 feet of aircraft.

B. Defueling - Ensure that aircraft is properly grounded and all personnel are wearing the proper personnel protective equipment. No radio activity within 100 feet and no radar activity within 300 feet.

204: ARMAMENT SYSTEM

Reference:
(a) NAVAIR 01-85AD-75, Airborne Weapons/Stores Loading Manual Navy Models A-6E Series And EA- 6B Aircraft
(b) NAVAIR 01-85ADC-2-1, Organizational Maintenance, General Information and Servicing, Navy Model EA-6B Aircraft
(c) NAVEDTRA 12309, Aviation Ordnanceman 3, 2, and 1

204.1 SYSTEM COMPONENTS AND COMPONENT PARTS

Referring to a standard print of this system or the actual equipment, identify the following system components and component parts and discuss the designated items for each:

204.1.1 Identify the bomb racks utilized.

EA-6B Aircraft use four AERO 7D series and one AERO 7B series ejector rack. The AERO 7B is only utilized on the center pylon station which designated as station three. These racks are used to carry, launch, suspend ordnance and stores.

204.1.2 Identify when jettison system checks are required.

Jettison checks must be performed within a 24 hour period prior to loading and after reconfiguration and/or after any malfunction has been corrected in release and control section.

204.1.3 State the purpose of the AGM-88 High Speed Anti-Radiation Missile (HARM).

The AGM-88 (HARM) is used to destroy shore and sea based enemy radar installations. Four missiles can be carried and launched.

204.1.4 State the purpose of chaff/decoy flares.

Chaff/Decoy flares are used to confuse, mislead, and jam enemy missiles.