CVN ENLISTED AVIATION WARFARE SPECIALIST (EAWS) TUTORIAL

Welcome to the CVN EAWS PQS questions and answers. This study guide was designed to aid instructors and students alike. All of the questions were answered from instructions and directives found in NAVEDTRA 43902-15, Personnel Qualification Standard (PQS), CVN Enlisted Aviation Warfare Specialist (EAWS).

The EAWS 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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CVN EAWS Core PQS Sections

ACRONYMS USED IN THIS PQS

Not all acronyms or abbreviations used in this PQS are defined here. The Subject Matter Experts from the Fleet who wrote this Standard determined the following acronyms or abbreviations may not be commonly known throughout their community and should be defined to avoid confusion. If there is a question concerning an acronym or abbreviation not spelled out on this page nor anywhere else in the Standard, use the references listed on the line item containing the acronym or abbreviation in question.

AAE	**Aircraft Armament Equipment**
AESR	**Aeronautical Equipment Service Record**
AESS	**Aircraft Electrical Servicing Station**
AIMD	**Aircraft Intermediate Maintenance Department**
ALBAR	**Adjustable Length Towbar**
ALREMP	**Aircraft Launch and Recovery Maintenance Program**
ALSS	**Aviation Life Support System**
AMRR	**Aircraft Material Readiness Report**
AMSU	**Aeronautical Material Screening Unit**
ATO	**Air Transfer Officer**
AVCAL	**Aviation Consolidated Allowance List**
AWP	**Awaiting Parts**
BMOW	**Boatswain's Mate of the Watch**
CATCC	**Carrier Air Traffic Control Center**
CCA	**Carrier Control Approach**
CDC	**Combat Direction Center**
CIWS	**Close-In Weapons System**
COVER	**Electromagnetic Coverage**
CVIC	**Carrier Intelligence Center**
DCU	**Document Control Unit**
ECM	**Electromagnetic Countermeasures**
EMCON	**Emissions Control**
EOD	**Explosive Ordnance Disposal**
ERT	**Emergency Reclamation Team**
FEDLOG	**Federal Logistics**
FLOLS	**Fresnel Lens Optical Landing System**
GFMPL	**Geophysics Fleet Mission Program Library**
HERO	**Hazards of Electromagnetic Radiation to Ordnance**
ICCS	**Integrated Catapult Control System**
ILARTS	**Integrated Launch and Recovery Television System**
LOSS	**Electromagnetic Path Loss**
LRCA	**Local Repair Cycle Assets**
LSO	**Landing Signal Officer**
MEPP	**Mobile Electronic Power Plant**
METOC	**Meteorology and Oceanography**
MOVLAS	**Manually Operated Landing Aids System**
NATO	**North Atlantic Treaty Organization**
PALS	**Precision Approach and Landing System**
PMU	**Program Management Unit**
QMOW	**Quartermaster of the Watch**
RO	**Reactor Officer**
RCU	**Requisition Control Unit**
SEAOPDET	**Sea Operational Detachment**
SSU Supply	**Screening Unit**
TRU	**Technical Research Unit**

101: Carrier Shipboard Fundamentals

References:

[a] The Blue jacket's Manual (Twenty-First Edition)
[b] NAVEDTRA 12147, Engineering Administration
[c] NAVEDTRA 12360-A, Aviation Boatswain's Mate E, 3 & 2
[d] NAVEDTRA 12149, Engineman 2
[e] NAVEDTRA 12001, Fireman
[f] NAVEDTRA 10539, Engineman 3
[g] NAVEDTRA 12016, Seaman
[h] NAVEDTRA 12100, Boatswain's Mate
[I] NAVEDTRA 10276-1, Fire Controlman Third Class
[j] OPNAVINST 3120.32, Standard Organization and Regulations Manual of the U. S. Navy (SORM)
[k] NAVEDTRA 12120, Quartermaster

101.1 Briefly describe the general duties and responsibilities of each of the following:

a. Reactor Officer (RO) [ref. a, p. 311]

The RO is responsible for the operation and maintenance of reactor plants and their associated auxiliaries aboard nuclear-powered ships.

b. Engineering Officer (CHENG) [ref. b, pp. 1-6, 1-7]

The CHENG is responsible for operating and maintaining the ship's machinery, damage and casualty control, repair of hull and machinery, power lighting, water maintenance, and underwater fittings.

c. Main Propulsion Assistant (MPA) [ref. b, p. 1-9]

On TR, the MPA assists the RO in all matters concerning the ship's propulsion plants.

d. Damage Control Assistant (DCA) [ref. b, pp. 1-9, 1-10]

Assists the CHENG in all matters concerning the ship's damage control efforts.

101.2 Discuss how steam is supplied to the catapult systems. [ref. c, p. 4-1]

Steam is the principal source of energy and is supplied by the ship’s reactor plant. The steam is drawn the reactor plant to the catapult steam receiver/accumulator where it is stored at the desired pressure. From there it is directed to the launching valves, and provides the energy to launch aircraft.

101.3 Discuss the source of the following types of compressed air: [ref. d]

a. High Pressure (HP) [p. 6-4]

The function of the HP air system is to provide 4,200 psig air. There are four HP air compressors on board TR. Number 1 & number 2 are located in the number 1 Main Machinery room (#1 MMR). Number 3 and number 4 are located in #2 MMR. All compressors are located on the fourth deck.

b. Ship's service Low Pressure (LP) [p. 6-1]

The function of the LP air system is to provide 125 psig air throughout the ship. There are three LP air compressors on board TR. Number 1 is located in #1 MMR, #2 is located in #2 Reactor Auxiliary Room, and #3 is located in #2 MMR. All compressors are located on the fourth deck.

101.4 Discuss the function of the following major components: [ref. e]

a. Ship's service/emergency generators [pp. 12-3, 12-5]

Ship's service generators furnish electricity for the service of the ship. Aboard most steam driven ships of the Navy, these generators are driven by turbines. Emergency generators are diesel driven. Diesel generators are particularly suited for this application because of their quick starting capability. Emergency generators furnish power directly to the radio, radar, gunnery and vital machinery through emergency switchboards and automatic bus transfer equipment.

b. **Switchboards [p. 12-7]**

Ship's service 450 volt ac switchboards are generally of the dead front (no live connections exposed). These switchboards are built to provide safe and efficient operation of the electrical system.

c. Boilers [p. 4-1]

The function of the boiler in the steam cycle is to convert water into steam.

d. Evaporators [p. 10-5]

The evaporators take in and de-salinate sea water to supply the ship with feed-water, reactor cooling water, potable water for the crew, etc.

e. Steam turbine, gear drive [p. 8-2]

Steam turbine gear drives consist of one high-pressure turbine and one-low pressure turbine, and provide "ahead" (forward through the water) propulsion. Smaller and simpler turbine elements inside the low-pressure turbine provide "astern" propulsion.

101.5 State the purpose of the electrohydraulic steering gear. [ref. f, p. 18-2]
The electro-hydraulic steering gear links the bridge helm with the ship steering plant. The engine log and helms controls convert the orders to electrical signal that are passed to the after steering spaces via wiring. The signal are received at the aft steering space, where they cause hydraulic actuators to mechanically increase the ships speed and change the ship's rudder angle.

The following questions apply to deck/navigation:
101.6 Describe the purpose of the following as applied to ground tackle: [ref. g]

a. Bit [p. 4-18]

Bitts are cylindrical shapes of cast iron or steel arranged in pairs on deck, forward and aft of each chock for use in delaying mooring lines.

b. Chock [p. 4-18]

A chock is a heavy fitting through which mooring lines are fed; the lines run from bitts on deck, through chocks to bollards on the pier. The three types of chocks are "open", "closed", and "roller".

c. Cleat [p. 4-18]
Cleats consist of a pair of horns for belaying lines. The "A"-cleat is the most widely used cleat in the navy today.

d. Capstan [p. 4-12]

The capstan is a device consisting of a vertical cylinder rotated manually or by a motor, which is used to lift or move heavy loads by winding a cable or line. The capstan is also used for tightening the ships mooring lines.

e. Chain marking [p. 4-7]

The ship's anchor chains are comprised of individual units called "links". The links are connected together to form "shots". A single shot of anchor chain is 15 fathoms long, with a fathom being 8 feet each. Each shot is connected by a special link called the "detachable" link. These links, and their adjacent links, are painted red, white, or blue, to let the anchor detail know exactly how much chain has paid out. Each link of the "last-to next" shot is painted yellow. The entire final shot is painted red. The paint scheme for these shots are as follows:

Shot Number Color of detachable Link Number of adjacent links painted white

Turns of wire on last white links
1 (15 fathoms) Red 1 1
2 (30 fathoms) White 2 2
3 (45 fathoms) Blue 3 3
4 (60 fathoms) Red 4 4
5 (75 fathoms) White 5 5
6 (90 fathoms) Blue 6 6

f. Anchor [p. 4-1]

Anchors are defined by their stowage locations aboard ship or by their construction. Bower anchors are secured on the bow and are secured in the Hawsepipes. Stern anchors are carried on the stern. The most common type of anchors used aboard ship, as in the case of the TR, is the standard stockless anchor. TR uses two Standard Stockless anchors. TRs anchor is dropped via gravity, and raised mechanically.

g. Chain stopper [p. 4-6]

A chain stopper is a length of chain attached to the ship and the anchor chain to keep the anchor from dropping in the event the anchor brake gives way. It is attached to the ship on one end by a deck fitting, and attached to the anchor chain on the other end by the Pelican Hook.

h. Pelican hook [p. 4-6]

The pelican hook attaches the chain stopper to the anchor chain, and is designed to be released by use of a bale, or heavy sledge hammer.

i. Wildcat [p. 4-9]

The wildcat is a sprocketed “hub” that guides the anchor chain to the hawse pipe. The wild cat is driven by a large electrical or steam driven motor that is used to turn the Capstan when raising the ship's anchor.

j. Anchor brake [p. 4-9]

The anchor brake, as the name implies, is a friction brake designed to stop, or hold, the wild cat shaft, thereby preventing the anchor from dropping.

101.7 Discuss the following terms in regard to Replenishment at Sea (RAS): [ref. h,p. 10-1]

a. Underway Replenishment (UNREP) - A broad term that applies to all methods of transferring fuel, ammunition, supplies, and personnel from one ship to another while underway.

b. Vertical Replenishment (VERTREP) - Involves the use of helicopters to transfer cargo between ships while underway. The transfer of personnel in this manner is referred to as a Passenger (or PAX) transfer.

c. Connected Replenishment (CONREP) - Two or more ships steam side by side and hoses and lines are used to transfer fuel, ammunition, supplies and personnel between the ships.

101.8 Discuss abandon ship procedures, including the following:

a. Who orders abandon ship [ref. a, p. 444]

The CO.

b. Word to be passed [ref. j, p. 6-246]
The BMOW will pass the word when ordered to do so.

c. Actions of the crew [ref. a, p. 443]
Proceed to your abandon ship station with your life jacket.

d. Life rafts [ref. a, p. 443]

Each life raft is equipped with survival and first air equipment.

101.9 Explain the duties of the following bridge watch personnel: [ref. k]

a. Officer of the Deck (OOD) [p. 11-21]

Responsible for the safe navigation of the ship, Carrying out the orders of the POD, acts as the CO's representative while underway, and ensures all shipboard evolutions are carried out.

b. Conning Officer [p. 11-24]

Works directly for the OOD. Responsible for all steering and engineering orders.

c. Boatswain's Mate of the Watch (BMOW) [p. 11-24]

In charge of the enlisted bridge watch team (helmsman, leehelm, messenger, lookouts, etc). Responsible for all announcements. Answers to the OOD.

d. Helmsman/Lee helmsman [p. 11-24]

Steers the ship, and operates the engine order telegraph as directed by the conning officer.

e. Lookouts [p. 11-24]

Responsible for positively identifying and reporting all surface, subsurface and air contacts to the OOD.

f. Quartermaster of the Watch (QMOW) [p. 11-23]

Responsible to the OOD for the safe navigation of ship with the use of manual and electronic navigation equipment

101.10 Discuss the differences between emergency and standard breakaway. [ref. h,p. 10-24]

Emergency breakaway is an accelerated means of separating the receiving and delivery ships from each other. An emergency breakaway differs only from a standard breakaway in that the procedures used to secure from the UNREP (ie, stop pumping, disconnect hoses, retrieve hoses) are performed at a more rapid pace.

101.11 State the purpose of the following:

a. Special sea and anchor detail [ref. j, p. 6-210]

Set while entering or leaving port. Requires the manning of multiple stations throughout the ship (ie. bridge, fo'csle, fantail, eng plant, after steering, secondary conn in dc central, and line handlers)

b. Low visibility detail [ref. j, p. 4-34]

Set during conditions of decreased visibility, and entails additional lookouts being set on the bridge, fantail, and forward starboard catwalks, with the purpose of listening for sound signals, such as approaching ships or other craft, buoys and channel markers, etc.

c. Flight quarters [ref. j, pp. 6-121 thru 6-123]

Self explanatory

d. Restricted maneuvering [ref. k, p. 4-41]

Set when during periods when the ship is restricted in its ability to maneuver as normal, as in entering or leaving port and during UNREPs. Personnel assigned watches during restricted maneuvering are designated in writing by the CO, and must be experts in their field, ie: Master helmsman, Conning Officer, OOD, engineering watch standers, after steering, etc.

101.12 State the three common types of man-overboard recovery. [ref. a, p. 439]

Shipboard, boat recovery, and helicopter recovery.

The following questions apply to communications:

101.13 Discuss the purpose of the following visual communications: [ref. a]

a. Flags / pennants / Day Shapes [p. 597]

Flags and pennants are used to communicate with other vessels. Each Alphabet flag has the phonetic name of the letter it represents. A numeral flag takes the name of the numeral it represents. Special flags and pennants are used in tactical maneuvers to direct changes in speed, position, formation, and course. Certain flags have specific meanings when used either by themselves, or in groups:

Flag or Pennant Definition:

NOVEMBER/CHARLIE	International signal for "I am in distress
CHARLIE	Ordnance transfer or handling in process
OSCAR	Man over board
FLAG FIVE	Vessel is having engine and steering difficulty
PAPA	General recall; all personnel return immediately
HOTEL	Conducting helicopter flight operations
FOXTROT	Conducting fixed-wing flight operations

Day shapes are navigational aids flown from the yard arms to indicate various conditions under which the ship is operating;

ball-diamond-ball	Restricted maneuvering
ball-ball-ball	The ship has run aground
ball-ball	The ship is not under command
ball	The ship is at anchor

b. Flashing light (directional/omni-directional) [p. 595]

Uses 12" searchlights to communicate Morse code via to a single ship (directional), or 360 degrees to communicate with several ships (omni-directional). Flashing light communications can be either plain language or coded.

c. Semaphore [p. 596]

The use of hand flags to communicate to other ships

The following questions apply to operations:

101.14 Discuss the purpose of the ship's navigation radar: [ref. i, p. 3-4]

Used for the safe navigation of the ship through the water and while entering and leaving port, TR uses a number of RADAR systems for navigational purposes. Chief among these are the Furuno and SPS-64 RADAR systems. Developed for the commercial maritime industry, the Furuno antenna is mounted in front of the ship's mast above the Navigation Bridge and is used for coastal navigation. The SPS-64 is a similar system that is designed for "collision avoidance" at sea.

The following questions apply to administration:

101.15 State the purpose of the following bills: [ref. j]

a. Administrative [p. 6-2]

The Administrative bill provides a detailed description of how the ship will be run. It includes such information as Request Chit routing, watch standing requirements, Leave procedures, etc. The TR SORM is an example of an Administrative Bill.

b. Operational [p. 6-94]

As the name implies, operational bills deal with specific evolutions by the ship's company. Most operational bills spell specific duties and responsibilities for these operations. Typical examples are Boat Bill, Fire Bill, Darken Ship, etc.

c. Emergency [p. 6-228]

Specific to emergency situations, ie GQ, Crash and Rescue, etc. These bills provide specific instructions to be carried during the emergency.

d. Special [p. 6-279]

Anti-sneak/Swimmer Attack, Civilian Evacuation, Prisoner of War, and Troop Lift are the four categories of Special Bills.

e. Watch, quarter and station [p. 6-1]

The WQ&S bill lists, by billet number and rate, divisional stations to be manned for various evolutions. The billet number consists of either four numbers or a letter and three numbers. The first number (or letter) indicate the person's division; the second number indicates the duty section; the last two numerals show the person's seniority in the section. For instance, BM1 Methuselah, an E-6 with 30 years in the navy and is assigned to 3rd division, duty section 4 would have a billet number of "3401".

102: Air Department Fundamentals

References:
[a] NAVEDTRA 12000, Airman
[b] NAVEDTRA 12368, Aviation Boatswain's Mate H, 3 & 2
[c] COMNAVAIRLANT/COMNAVAIRPACINST 3100.4B, Air Department Standard Operating Procedures (SOPs)
[d] NAVEDTRA 12360-A, Aviation Boatswain's Mate E, 3 & 2
[e] NAVEDTRA 12364, Aviation Boatswain's Mate F
[f] NAVAIR 00-80T-105, CV NATOPS Manual
[g] Naval Air Warfare Center Visual Landing Aids General Service Bulletin, Nr. 8 (Rev. L)
[h] NAVAIR AE-CVATC-OPM-000, Carrier Air Traffic Control Handbook

102.1 Describe what constitutes a full flight deck uniform. [ref. a, p. 9-45]

a. Cranial on and buckled
b. goggles down over eyes
c. Flight deck jerseys on with sleeves rolled down
d. Float coat on and fastened
e. Safety shoes

102.2 Discuss the purpose of a conflagration station. [ref. b, p. 5-8]

They are responsible to the Integrity Watch Officer (IWO) or OOD, as appropriate, for the security of the Hangar bay for the proper operation of all remotely controlled fire-fighting apparatus on the hangar deck. At a minimum, one conflagration station per bay (containing aircraft) will be manned during the watch period.

102.3 What is the purpose of hangar deck ballistic/deck edge doors? [ref. b, p. 5-9]

Ballistic doors are large metal doors athwartship that are used to divide the hangar deck into sections or bays. This compartmentalization of the hangar deck aids isolation of hangar deck fires and CBR contamination. Deck-Edge Elevator Doors are used to open and close the hangar deck openings through which aircraft are moved onto the deck-edge elevators.

102.4 Define the term flight quarters. [ref. c, p. 2-1]

Flight quarters is the condition in which normal fixed wing and helicopter flight operations are conducted.

102.5 Describe alert conditions for fixed-wing aircraft and helicopters [ref. f. p. 4-17, ref. c. p. 2-8]

a. **Condition I**- Aircraft shall be spotted on the catapult or in a position affording a clear route to the catapult.
b. **Condition II**- All provision for condition I apply, except that flightcrews are not required in the aircraft.
c. **Condition III**- Flightcrews shall be in full flight gear, briefed, and standing by the ready rooms.
d. **Condition IV**- this is similar to condition III except that minor maintenance may be performed on the aircraft if no delay in launch is involved.

102.6 Describe the following aircraft handling equipment [ref. b]

a. TD-1A/B tiedown chain [p.2-24]

Is a quick-release aircraft tie-down chain assembly that has been used almost exclusively aboard ship and ashore for nearly 20 years. You can adjust the TD-1A/B from 1 foot 6 inches to 9 feet 10 inches. Weighs about 12 pounds and has a safe working load of 10,000 pounds. Another version, used only on amphibious ships, has a 14-foot chain for high point tie downs.

b. Adjustable length towbar (ALBAR) [p. 2-26]

Presently there are four lengths. The Model 15 ALBAR is and will remain the standard towbar for movement of most land-based and CV-based aircraft weighting up to 90,000 pounds.

Model 8 ALBAR (9 feet long)
Model 15 ALBAR (15 feet long)
Model 20 ALBAR (20 feet long)
Model 24 ALBAR (25 feet long)

102.7 State the minimum personnel required to move an aircraft. [ref. c, pp. 4-3, 4-4]

Six; these include:

a. Director
b. Brake Rider
c. Tractor/spotting dolly driver
d. Port wing walker
e. Starboard wing walker
f. Tail safety observer

102.8 Explain the functions of personnel wearing the following colored jerseys on the flight deck: [ref. f, p. 2-3]

a. Yellow - Aircraft Handling Officers and Plane Directors
b. Blue - Aircraft Handling crews
c. Red - Crash and Smash crews, EOD
d. Green
1) Catapult and Arresting Gear Officers and crews
2) GSE troubleshooters
3) Line and Maintenance LPOs
4) Aircraft maintenance crews
5) Photographers
e. Purple - Fuels crews
f. Brown - Plane Captains
g. White
1) Cargo Handlers
2) Elevator Operators
3) LOX crews
4) Messengers/phone talkers
5) ATO members

102.9 Explain the function of personnel wearing the following flight deck gear: [ref. f, pp. 2-3, 2-4]

a. White jersey with red cross - Medical
b. Green jersey with red cranial -
c. Red jersey with black stripes - Ordnance crews
d. Cranial with three orange stripes - All AIR department khakis and LPOs, EOD team members, and ordnance officers
e. Yellow jersey with blue vest - Tractor King
f. White jersey, no cranial- LSO
g. White jersey with green cross- Safety

102.10 Explain the following flight deck equipment markings, the purpose of each, and the related safety precautions: [ref. g]

a.**Foul line** - A red and white line painted on the flight deck to separate landing areas from the rest of the deck. No equipment or personnel shall be permitted in the landing area during launch or recovery unless specifically authorized.

b.**Jet Blast Deflector (JBD)** - Used to protect personnel, equipment, and other aircraft from hot exhaust gases coming from aircraft about to be launched from the catapult. They're hydraulically operate and salt-water cooled. Personnel and equipment

shall remain clear of the JBD machinery when it is being raised or lowered. JBD panels are designed to withstand the weight of an aircraft only temporarily. Aircraft should not be stopped, or parked, on top of the JBD panels.

c.**Elevators** - Shall be operated only by qualified personnel. They're used to transfer aircraft and equipment between the flight deck and the hanger or main deck. Never attempt to get on/off a moving elevator. The deck edge is identified by a 6"x12" red-and-white line.

d.**Stanchions** - Electrically operated, they provide safety for flight-and hangar-deck elevator areas. Stanchions are automatically raised and lowered when the elevator up/down button is pressed.

e.**Safe launch line** - A white line associated with each catapult. Gives the catapult officer a reference for determining a "clear shot" to ensure nothing interferes with the launch.

f.**Deck edge scupper** - Provided around the edge of the flight deck to ensure immediate drainage of water and fluids. Painted white.

g.**Barricade stanchion** - 24' barricade stanchion is used to raise and support (by means of tensioning pendants) the barricade which is used for emergency aircraft arrestments.

h.**Bomb jettison ramps** - Provides a means for jettisoning bombs in emergency situations. Ramps should be exercised daily to ensure operability. They're identified by a yellow stripe painted up and over the wheel ramp coming at both ends of the ramp opening. The flight deck in front of the opening is marked with alternating 4" red and yellow stripes with a 12" dark facsimile of a bomb.

i.**Access ladders** - Allows access to the flight deck from the cat walks. Identified by white 12" deep box as wide as the ladder or platform.

j.**Ordnance elevator** - Weapons elevators are used to transfer ordnance between the magazines and the flight deck.

k.**Retractable sheave** -

102.11 State the purpose of the following flight deck edge scupper markings and describe the appearance of each: [ref. g]

a.**Catapult steam smothering valve** - 18" white facsimile of a valve handle identifies the catwalk location of the valve.

b.**Aqueous Film-Forming Foam (AFFF)** - 18" wide green stripe painted up and over the 3" high "AFFF" painted in the center of the stripe.

c.**Saltwater station** - 18" wide stripe painted over the deck edge wheel stop coaming with a 3" high yellow "W".

d.**CO2** - 12" wide red stripe painted over the deck edge wheel stop coaming with a red 5" high "CO2".

e.**PKP** - 12" wide red stripe painted over the deck edge wheel stop coaming with a 3" high white "PKP".

f.**Electrical power hatch** - Hatches are painted blue, and identify the "deck edge" and "flush deck" electrical power stations.

102.12 State the hazards of the arresting gear cable during arrestment/respot.

- During respot, aircraft handling and maintenance crews must be alert for the cable return to slap if it has been stretched out of place by aircraft movement. Also the arresting gear is raised which gives way to the possibility of an individual coming in contact with the cable as an aircraft is rolling over it. Great care must be taken to keep feet and hands out from under the cable.

102.13 Explain the purpose of the barricade.

- Used for the emergency arrestment of aircraft which, because of mechanical failure, cannot make a normal arrested landing.

102.14 Discus the three major systems that make up the MK-7 recovery equipment (ref d, p. 3-1)

a. **Emergency recovery equipment**
- an emergency arrestment is accomplished in the same manner as a normal arrestment except that a barricade webbing assembly transmits the aircraft's landing force to the purchase cable through the webbing assembly instead of a crossdeck pendant.

b. **Drive System**
- When a landing aircraft engages a deck pendant, or barricade, it pulls the purchase cable from the arresting engine. This action causes the crosshead to move toward the fixed sheave end of the engine, causing fluid displacement from the engine cylinder. The movement of the crosshead causes the drive system to rotate a valve cam, forcing a plunger down onto a set of levers. This action forces a valve sleeve and valve stem down to mate with a valve seat to close the valve, shutting off the flow of fluid from the engine cylinder to the engine accumulator, bringing the aircraft to a stop.

c. **Engine Installation**
- a framework for supporting the engine and most of its components and for securing the entire assembly to the ship's structure. It is composed of a welded steel base made in two longitudinal box sections with the necessary ties, plates, and other structural members. It encases the Main Engine Cylinder, Accumulator, Constant Run-out Valve (CROV) and the Air Flask as the main components.

102.15 Discuss the purpose of the deck pendant/purchase cable

- The purchase cable is the wire rope reeved onto the arresting engine sheaves and fed through fairlead tubing and over the fairlead sheaves to the deck gear on the flight deck. The purchase cable transmits the force of the landing aircraft from the deck gear to the arresting engine.

102.16 Discuss the purpose of the impact pads located on the flight deck

- Impact pads are made up of several sections of polyurethane pads laid side by side and secured within an outer steel frame. Upon initial arrestment by an aircraft the terminal will impact on the pads instead of the steel deck, minimizing damage to the fittings, purchase cable, and crossdeck pendants.

102.17 Discuss the purpose of the cross deck pendant wire support

- The wire support provides a method of raising the crossdeck pedant off the flight deck to ensure arresting (tail) hook engagement of the incoming aircraft. Height requirement is 2 to 5 inches.

102.18 Discuss the function of the retractable deck sheave

- The function of a retractable sheave is to provide a means of lowering deck sheaves that would interfere with passage of aircraft and deck equipment when in the raised operating position.

102.19 Discuss the function of the aircraft integrity watch

- Aircraft Integrity watch is responsible to the Command Duty Officer/Officer of the Deck for the security of all aircraft and equipment on the flight deck and hangar bays.

102.20 Describe the purpose of these:

- The shuttle carries the forward motion of the pistons to the aircraft by means of a launch bar attached to the aircraft nose gear and connected to the nose gear launch shuttle spreader.

102.21 Discuss the function of the JBD.

- The JBD consists of three to four "panels" of oblative material, cooled by circulating salt-water, and is used to deflect jet blast up and away from personnel, equipment, and other aircraft during catshots.

102.22 Discuss the function of the water brake cylinder

- The water brakes stop the forward motion of the shuttle and pistons at the end of the catapult power stroke. The water-brake cylinders are installed at the forward end of the launching engine cylinder. The after end of each water-brake cylinder is supported and aligned by the most forward section of each launching engine cylinder, which fits closely around the end of the water-brake cylinder. The forward end of each cylinder is anchored in place by upper bracket and lower support saddle and a chock.

102.23 Discuss the term catapult no-load

- Testing of the catapult during periods when no aircraft are to be launched but the catapult is in an up status. These tests consist of at least two catapult shots, during which the control system is operated through its complete cycle.

102.24 Discuss the purpose for the Integrated Catapult Control System (ICCS)

- Is the primary mode of controlling fixed-wing-aircraft launching operations. The Catapult Officer directs all phases of the launch from the ICCS.

102.25 State the purpose of aviation fuels watch

- This watch is stood 24 hours a day when the ship is not at flight quarters. Personnel standing this watch must be properly trained, familiar with the AvFuels system, and fully PQS-qualified as an AvFuels Security Watch.

102.26 Discuss the purpose of the Fresnel Lens Optical Landing System (FLOLS)

- The Fresnal Lens Optical Landing System (FLOLS) is the visual landing aid normally used by the pilot to bring the aircraft down a glide slope to the deck within the arresting gear crossdeck pendant pattern with safe clearance between the tail hook and the stern of the ship. Its primary control station is in PRI-FLY with secondary control capability from the fresnal lens control room. Remote indicators are located in PRI-FLY control and on the LSO platform.

103: Operations Fundamentals

References:

[a] NAVEDTRA 10371, Aerographer's Mate 2, Vol. 2
[b] NAVAIR AE-CVATC-OPM-000, Carrier Air Traffic Control Handbook
[c] NAVEDTRA 12701, Photography (Advanced)
[d] NAVAIR 00-80T-105, CV NATOPS Manual

103.1 Explain the effects of the following weather phenomena on flight operations:

a. Lightning and electrostatic discharge -

Lightning strikes and electrostatic discharges are two of the leading causes of reported weather-related aircraft accidents and incidents. All types of aircraft are susceptible to lightning strikes and electrostatic discharges. Aircraft have been struck by lightning or have experienced electrostatic discharges on the ground or at altitudes ranging to at least 43,000 feet Lightning strikes can cause severe structural damage to aircraft. Damage to aircraft electrical systems, instruments, avionics, and radar is also possible. Transient voltages and currents induced in the aircraft electrical systems, as well as direct lightning strikes, have caused bomb doors to open, activated wind-folding motors, and made the accuracy of electronic flight-control navigational systems questionable. Pilots and crew are not immune to the effects of lightning strikes either. Flash blindness can last up to 30 seconds, and the shock wave can cause some temporary hearing loss if headphones or some form of hearing-loss-protection gear is not worn. Some aircrews have even experienced a mild electric shock and minor burns. A charge also may build up on an aircraft after it has been flying through clouds and precipitation, including snow as well as rain, or solid particles such as dust, haze, or ice. The larger the aircraft and the faster it flies, the more particles it impacts, generating a greater charge on the aircraft. The electrical field of the aircraft may interact with the cloud, and an electrostatic discharge may then occur. Electrostatic discharges usually cause only minor physical damage and indirect effects, such as electrical circuit upsets. Lightning occurs at all levels in a thunderstorm. The majority of lightning discharges never strike the ground but occur between clouds or within the same cloud. However, aircraft flying several miles from a thunderstorm can still be struck by the proverbial "bolt out of the blue." Electrical activity generated by a thunderstorm may continue to exist even after the thunderstorm itself has decayed. This electrical activity may drift downstream and is usually found within the cirrus deck that at one time was connected to the thunderstorm cell.

b. Hail -

Hail is regarded as one of the worst hazards of thunderstorm flying. As a rule, the larger the storm, the more likely it is to have hail. Hail has been encountered as high as 45,000 feet in completely clear air and may be carried up to 10 miles downwind from the storm core. Hail can occur anywhere in a thunderstorm, but it is usually found beneath the anvil of a large cumulonimbus. Hailstones larger than ½ to ¾ inch can cause significant aircraft damage in a few seconds.

c. Icing -

The formation of ice on lift-producing airfoils (wings, propellers, helo rotors, and control surfaces) disrupts the smooth flow of air over these surfaces. The result is decreased lift, increased drag, and increased stall speed of fixed-wing aircraft. Most aircraft that are normally loaded can fly with icing conditions ongoing and, under normal circumstances, the danger is not too great. When aircraft are critically loaded, however, icing is extremely important. The formation of ice on some structural parts of an aircraft can cause vibration and place added stress on those parts. For example, vibration caused by a small amount of ice unevenly distributed on a delicately balanced rotor or propeller can create dangerous stress on the system, transmission, and engine mounts.

d. Turbulence -

Turbulence is defined as 'any irregularity or disturbed flow in the atmosphere that produces wind gusts or wind eddies.' Any sudden change in wind direction, speed or general flow can be called turbulence and can cause problems for aircraft. Turbulence can also be manmade or occur naturally. Aircraft in motion generate turbulence in their wake (called, appropriately enough, 'wake turbulence'), which can present a serious hazard to other aircraft flying through this wake. This section is concerned with turbulence associated with thunderstorms. Storm clouds are the visible portions of a turbulent weather system, whose updrafts and down drafts often extend outside the storm proper. Hazardous turbulence is present in all thunderstorms, and in a severe thunderstorm it can cause serious injury to passengers and crew. Outside the cloud, shear turbulence has been encountered several thousand feet above and 20 miles laterally from a severe storm. Severe turbulence

can be encountered in the anvil of a thunderstorm 15 to 30 miles downwind. Any air operations (especially launch and recovery) must take into account the presence of turbulent systems near the carrier, along intended flight routes and at possible divert fields.

e. Fog/stratus -

Fog is a layer of suspended water droplets adjacent to the Earth's surface. Stratus is fog that has been lifted or has formed some distance above ground. Stratus clouds and fogs occur at or near the surface of the earth and can seriously restrict visibility at low levels. Therefore, they are a very important consideration in aircraft operations, particularly in connection with landings and takeoffs. Fogs are especially significant to the pilot who limits his flying to visual flight rules, because ceilings under stratus clouds often are very low, and visibility in fog conditions often are not sufficient to permit navigation by visual reference.

103.2 State the weather criteria for the following launch/recovery conditions:

a. Case I -

When it is anticipated that flights will not encounter instrument conditions during daytime departures, recoveries, and the ceiling and visibility in the carrier control zone are no lower than 3,000 feet and 5 nm respectively.

b. Case II -

When it is anticipated that flights may encounter instrument conditions during a daytime departure or recovery, and the ceiling and visibility in the carrier control zone are no lower than 1,000 feet and 5 nm respectively.

c. Case III -

When it is anticipated that flights will encounter instrument conditions during a departure or recovery, because the ceiling or visibility in the Carrier Control Zone is below 1,000 or 5 nm respectively; or a nighttime departure or recovery (one-half hour after sunset and one-half hour before sunrise).

103.3 Explain the function of the plane guard helicopter. -

During flight operations, a plane guard (helicopter) mission is scheduled on each departure and recovery for the purpose of rescuing aircraft crew members who may go down during the operations.

103.4 Discuss the following: -

On a carrier, two spaces are responsible for the control of airborne aircraft – the Carrier Air Traffic Control Center (CATCC) and the Combat Direction Center (CDC). CATCC (pronounced "KAT-SEE") is responsible for the control of aircraft operating within the Carrier Control Area (a circular airspace within a radius of 50 nm around the carrier). It is organized into Air Operations (AirOps), Carrier Controlled Approach (CCA), and the Air Transfer Office (ATO). CCA is responsible for operational control of aircraft departing the ship and recovery of inbound aircraft after a mission is complete. It is roughly equivalent to the Approach Control branch of an ashore Air Traffic Control (ATC) facility. Air traffic control is provided by the following positions in CCA: Departure Control, Marshal Control, Approach Control and Final Control. Each of these four areas has ‘control’ of aircraft at different times and during different phases of aircraft flight. a. Departure control - Departure Control is responsible for the control of departing aircraft during Case I, II and III departures. Departure control is provided between initial radar contact with aircraft and transfer of control to CDC. This position is also responsible for monitoring the location and package status of tanker aircraft; the location of low-state aircraft and their fuel requirements; and may provide positive control during rendezvous between a tanker and low-state aircraft. b. Marshal control - Marshal Control is responsible for the control of inbound aircraft during Case I, II and III. Control is provided between initial contact normally commencing with the pilot’s check-in report and transfer of control to either PriFly during Case I operations or to Approach control during Case II and III operations. Marshall Control provides arrival information, establishes the initial interval between aircraft, and monitors the commencement of the approach until a handoff has been completed. Note: Positive control is provided only upon commencement and radar contact unless under non-radar control. c. Approach control - Approach Control is responsible for the control of aircraft on approach during Case II and III. Control is provided between handoff from Marshall and transfer of control to PriFly during Case II. Control is transferred to Final Control during Case III operations but Approach Control retains responsibility for aircraft separation. Approach Control tasks include making holes for bolter traffic, maintaining the appropriate interval and ensuring the first aircraft makes the ramp time. d. Final control -

Final Control is responsible for the control of aircraft on final approach during Case III to ensure optimum alignment until transfer of control to the LSO or the aircraft reaches approach weather minimums. Final Control is primarily responsible for the control of aircraft glide slope and lineup performance and secondarily responsible for aircraft separation.

103.5 Discuss the following evolutions as they pertain to air traffic control:

a. Cyclic operations -

Normal flight operations are conducted in cycles. In cyclic operations, aircraft are launched and recovered in groups. These groups of aircraft are referred to as events, and are assigned a numeric designator based upon their launch order, i.e., Event 1, Event 2, Event 3, etc. Each aircraft in an event is referred to as a sortie. A sortie is the flight of one aircraft from launch to recovery. In cyclic operations, the launch of each event is followed immediately by the recovery of the preceding event.

b. Carrier Qualifications (CQ) -

Carrier Qualification (CQ) operations, also referred to as CARQUALS, are conducted by carriers to qualify newly designated pilots in carrier flight operations and to requalify previously qualified pilots. CQ operations differ from cyclic operations in that launch and recovery operations are conducted concurrently (i.e., as each aircraft is recovered, it is taxied to the catapult area and launched, referred to as a hot spin). This process is interrupted only for aircraft refueling and the switching of pilots (during CQ operations, more than one pilot will qualify in the same aircraft). To expedite CQ operations, aircraft refueling and the switching of pilots are often performed with the aircraft engines running, referred to as hot pump and hot switch, respectively. Special recovery condition requirements are imposed upon CQ in terms of approach weather minimums, carrier deck motion, divert fields, air traffic control procedures, etc. The requirements are more stringent than those for cyclic operations. Also the shorter cyclic interval enables aircraft to be recovered immediately after their fuel and/or weapons are expended, i.e., after one, two or three cyclic intervals.

c. Flex deck -

Flex Deck is a special type of flight operation in which the flight deck is kept ready (flexible) to launch and recover aircraft at short and irregular intervals of time. The operations are performed when there is a calculable and significant threat of attack to the carrier. The normal cyclic interval of 90 minutes is typically reduced to between 40 and 60 minutes. The shorter cyclic interval enhances the capability of the carrier to respond to the escalated threat of attack by increasing the opportunities for launching, recovering, refueling, rearming and reconfiguring aircraft.

103.6 Define the term ramp time. -

During cyclic operations, launch times are fixed but recovery times are not. Recovery times are estimates calculated by the Air Boss and are referred to as Charlie time for Case I recoveries, break time for Case II recoveries and ramp time for Case III recoveries.

103.7 State the responsibilities of the Landing Signal Officer (LSO). -

The Landing Signal Officer (LSO), under supervision of the air officer, is responsible for the visual control of aircraft in the terminal phase of the final approach and landing. The LSO assumes control of aircraft when they are approximately ¾ nm from the carrier, giving radio directions to the pilot if necessary. If the pilot fails to respond or if the approach continues to deteriorate, the LSO will command a waveoff. For aircraft that are waved off or fail to make an arrested landing, the LSO is responsible for ensuring that pilot and aircraft performance is satisfactory during the initial climb out. The LSO's primary responsibility is the safe recovery of fixed-wing aircraft aboard ship. The LSO shall inform the Commanding Officer, through the Air Boss, of any conditions which might interfere with the recovery (e.g., equipment malfunctions, improper deck configuration, adverse weather, wind or sea conditions). In addition, the LSO must constantly monitor pilot performance, schedule and conduct necessary ground training, counsel and debrief individual pilots, and certify their carrier readiness qualification and maintain records of each carrier landing.

103.8 Describe the following systems: [ref. b]

a. Bullseye -

A term used in pilot/controller communications to refer to the Independent Landing Monitor (ILM). The ILM components are the AN/SPN-41 (shipboard) or AN/TRN-28 (shore based) and the AN/ARA-63 or AN/ARN-138 (airborne). The SPN-41 radar measures azimuth and elevation of the approaching aircraft and relays the data to a display within the aircraft, giving the pilot an indication of where the aircraft is (high, low, left, right) in relation to the proper glide-slope required to land on the carrier. The display is similar to the 'needles' display covered below (in 'PALS') and gives the pilot a visual 'bullseye' of sorts to aim for. The Bullseye system (SPN-41) only provides this info to the approaching aircraft (not the controllers onboard the carrier). Bullseye is normally used in conjunction with PALS.

b. Precision Approach and Landing System (PALS) -

PALS enables carrier pilots to perform instrument approaches under either manual or automatic control. The system consists of a precision tracking radar coupled to a computer and data link that provides continuous azimuth and elevation information to aircraft and shipboard controllers. PALs is also referred to as easy rider. The following terms are associated with PALS: APC – Approach Power Compensator. An aircraft component that automatically controls engine thrust to maintain the appropriate angle-of-attack during PALS approaches. AFCS – Automatic Flight Control System. An autopilot used to automatically control aircraft on approach to the carrier. It controls aircraft pitch and bank attitude from commands furnished through the data link (see above). DRO – Data Readout. A component of the PALS system that provides the PALS operator (Final Controller) with aircraft address and range, final bearing, and the status of the data link. Needles. Term used in pilot/controller communications to refer to the PALS display of azimuth (left – right) and elevation error signals (i.e. – how far left or right, and high or low the aircraft on approach is relative to it's proper glide slope).

103.9 State the effects of Emissions Control (EMCON) on aviation. -

Electronic Emission Control (EMCON) imposes restrictions on the use of electronic systems to deny information to the enemy for determining the location of the carrier. When imposed, radio transmissions between pilots, and between pilots and carrier control agencies, are held to the minimum necessary for safety of flight. During EMCON, restrictions can be imposed on the use of all electronic systems, including the radar and radio systems used by CATCC to control aircraft. As a result, CATCC provides monitor control during EMCON. However, CATCC is manned as required by the type of departure and recovery (Case) being conducted, and prepared to assume control of aircraft if EMCON is terminated.

103.10 State the purpose of the Air Plan. -

The Air Plan is an event by event listing of scheduled flight activity (see 'cyclic ops' above), in visual form. It lays out in plain view what squadrons will be flying what types of missions, the type of aircraft, when they are scheduled to launch and recover, sunrise and sunset times (and moonrise and moonset times for night ops), all on a single sheet of paper. Also included on the reverse side are divert field information, fuel loads, ordnance loads (if any), and any other notes. The Air Plan is drafted by Strike Operations.

103.11 Define the acronym TARPS. -

Tactical Air Reconnaissance Pod System. TARPS is a system of photographic cameras mounted in a "pod" and carried on properly configured F-14 aircraft. It gives the carrier battle group its only organic (ship-based) photoreconnaissance capability. The pod contains 2 film cameras and an infrared line scanner. A digital version that can transmit its images directly to the carrier in real time is being deployed to some units.

104: Aircraft Intermediate Maintenance Department (AIMD) Fundamentals

References:

[a] OPNAVINST 4790.2G, Naval Aviation Maintenance Program, Vol. I
[b] COMNAVAIRLANT/COMNAVAIRPACINST 1306.18C, Management Procedures/Policies for Sea Operational Detachments
[c] NAVEDTRA 10356, Aviation Support Equipment Technician 3
[d] OPNAVINST 8600.2B, Naval Aviation Weapons Maintenance Program (NAWMP), Vol. II, (CH-1)

104.1 Discuss the basic engine test facility procedures. -

Engine test procedures are outlined in the applicable engine MIM (Maintenance Instruction Manual) and test system pre-operational MRCs (Pre-Op Cards).. All jet engine test facilities custodians shall prepare a check list of start up, shutdown, and emergency procedures to be used during engine test system operation. The check lists will be available within the control cab and will be used by all operators.

104.2 Explain the purpose of the Aviation Life Support System (ALSS) rotatable pools: -

ALSS items, by their nature, require specialized storage and maintenance requirements. Items placed in the ALSS pool cannot be exposed to the same temperature and humidity factors as other aircraft pool items. Additionally, these items must always be ready for use when they're drawn and issued to an aviator. This pool allows the aircrew survival equipment technicians to ensure the highest possible integrity is maintained over these items.

104.3 State the purpose of an Aeronautical Equipment Service Record (AESR). -

An insert to the basic logbook, it is used as a service record for various aircraft equipment. Examples are helicopter gear boxes and rotor blades. Each of these items has a corresponding AESR that is shipped with the component. When the component is installed on an aircraft, the AESR for that components is inserted into the Aircraft's Log Book. When the component is removed for repair or inspection, the AESR is removed from the logbook and shipped along with the component.

104.4 Discuss the purpose of the Sea Operational Detachment (SEAOPDET). -

Sea Otters are skilled technicians, on sea duty, who are assigned to deploy with designated carriers in support of the air wing. They work in the AIMDs at their home bases (ie AIMD Oceana, Jax, etc) until required by the assigned carrier.

104.5 Discuss the reporting custodian's responsibility to the Emergency Reclamation Team (ERT).

The basic function of the AIMD ERT is to process 'Reclaimed" components as they're received from the squadron's ERT, "track" them through a corrosion inspection, removal, treatment process as required, and then verify their operational status as RFI or BCM.

104.6 Discuss the basic purpose of Support Equipment (SE). -

All equipment required to make an aeronautical system, command and control system, support system, subsystem or end item of equipment operational in its intended environment.

104.7 Discuss the basic functions of the following Support Equipment (SE): [ref. c]

a. Mobile Electronic Power Plant (MEPP) -

Provides 115VAC and 28VDC for the purpose of aircraft servicing and maintenance.

b. Mobile air start systems/gas turbine compressors -

Various aircraft are “air-started”. As such, they use these “huffers” to rotate the turbines until they systems fire on line themselves.

c. Aircraft spotting dolly -

A spotting dolly is used on the aircraft carrier to maneuver aircraft through and around congested aircraft areas. d. Aircraft crash crane - Used to remove aircraft wreckage and debris from the flight deck.

104.8 Discuss the basic scope and categories of Aircraft Armament Equipment (AAE). -

Armament Handling Equipment will vary depending upon the ordnance to be loaded. This equipment includes railroad, industrial, and automotive equipment used to transport the ordnance, as well as bomb “skids”, pallets, carriers, and aircraft loading equipment.

105: Supply Department Fundamentals

References:
[a] NAVEDTRA 10395, Aviation Storekeeper 1
[b] NAVEDTRA 12655, Aviation Storekeeper 2
[c] NAVEDTRA 10654, Aviation Storekeeper 3
[d] COMNAVAIRPAC/COMNAVAIRLANTINST 4440.1B, Supply Operations Manual
[e] COMNAVAIRPAC/COMNAVAIRLANTINST 5442.5D, Aircraft Material Readiness Reporting

105.1 Define the following acronyms:

a. SSC - Supply Support Center b. SRS -

Supply Response Section c. CCS - Component Control Section d. RAM - Repairable Asset Management

105.2 Discuss the basic functions of the following units of SRS:

a. Requisition Control Unit (RCU) -

Receives all requests for material requirements, prepares appropriate documentation, maintains appropriate files and registers, and provides status to the customer.

b. Technical Research Unit (TRU) -

Responsible for the verification of requisition data such as part number, stock number, and other technical data.

c. Program Management Unit (PMU) -

Responsible for processing and expediting high-priority requirements, such as NMCS/PMCS, broad arrow, work stoppage, EXREP items. Distributes daily status listings and performs a continuous reconciliation of outstanding requirements between supply and maintenance activities.

d. Material Delivery Unit (MDU) -

Responsible for the pick-up and delivery of all material. Fragile material and delicate components that require special handling, including special padding, racks and so on, should be delivered to the most direct route to reduce the risk of damage.

105.3 Discuss the basic functions of the following CCS units:

a. Document Control Unit (DCU) -

Responsible for the control of all non-RFI components in the IMA repair cycle, components awaiting turn-in from customers, and all associated documents.

b. Supply Screening Unit (SSU) -

Responsible for processing all items returned from the IMA. The SSU prepares the retrograde material for shipment to the designated support point within two workdays.

c. Local Repair Cycle Assets (LRCA) -

Those components within the repair cycle, including all items in the rotatable pool, that are able to be repaired on board. They’re maintained under the custody of the LRCA storage unit.

d. Awaiting Parts Unit (AWP) -

Known affectionately as the “AWP Locker”, the AWP is responsible for receiving, storing, and controlling all AWP components returned from the IMA. This unit should be located next to production control.

105.4 Discuss the following:

a. Federal Logistic (FEDLOG) data -

An interactive data base, located on the ship's LAN, that provides the researcher with parts data for all items carried by the Federal Government Supply System.

b. Aviation Consolidated Allowance List (AVCAL) -

A listing of repair parts, required for use by repair work centers, authorized to be stored on board for future requisitions.

105.5 Discuss the purpose of the Aircraft Material Readiness Report (AMRR). -

Basically, a daily message that provides a snap shot as to the readiness of the Carrier Air Wing. A “status” report, the AMRR lists all aircraft systems and test benches assigned to a particular battle group and their current level of availability. The AMRR lists such information as high-priority aircraft and bench components that have been ordered and other pertinent information deemed necessary by the Air Wing Commander.

106: Weapons Fundamentals

References:
[a] NAVEDTRA 12309, Aviation Ordnanceman, 3, 2, and 1
[b] OPNAVINST 8600.2B, The Naval Airborne Weapons Maintenance Program (NAWMP), Vol. II (CH-1)

106.1 State the objective of the Non-Nuclear Ordnance/Explosive Handling Qualification Program. -

Ensures that persons handling ordnance are trained and properly qualified to do so. The process includes classroom instruction, OJT, hands-on demonstration of ordnance handling, and an oral board chaired by the Weapons Officer, or Maintenance Officer in a squadron/IMA.

106.2 Explain the purpose of the following conditions: [ref. a, pp. 11-31, 11-32]

Hazards of Electromagnetic Radiation to Ordnance (HERO) - Naval ordnance systems are generally armed, actuated, and detonated by means of electrical pulses. Electromagnetic radiation from transmitting antennae can may cause a voltage to be induced into these systems, which in turn would cause the actuation or detonation sequence to begin. Emission Control (EMCON) -Requires transmitting systems be secured to prevent enemy ships / aircraft from locating us through their passive detection systems. Goes back to the days of “radio silence”.

106.3 State the purpose of performing a stray voltage check. -

Aviation ordnance is activated, and detonated, by electrical current from the aircraft's 28vdc bus. Stray voltage checks are performed prior to ordnance loading to ensure that no electrical charges exist within the aircraft's firing circuits that would inadvertently cause the activation or detonation of the loaded ordnance.

106.4 Define and discuss the following acronyms: [ref. a]

a. AIM - Air-launched, intercept-aerial guided missile

b. AGM - Air-launched, surface-attack guided missile

c. RIM - Ship-launched, intercept-aerial guided missile

d. ATM - Air-launched, training guided missile

e. CBU - Cluster Bomb Units f. TALD - Tactical Air-Launched Decoy

106.5 Discuss the following missile guidance terms: [ref. a, pp. 3-5, 3-6]

a. Active -
Uses active detection and tracking methods to destroy its. Generally, these missiles use RADAR guidance systems.

b. Semi-active -
Uses a combination of active and passive detection and tracking methods to destroy its target.

c. Passive -
Uses information collected from the target itself. These include Infra-Red detection of a target's "heat-sources" and reception of radio-wave transmissions.

106.6 Discuss the purpose of the two types of weapons elevator: [ref. a]

a. Upper stage -

For transporting weapons from the second deck, or hangar deck, to the flight deck for staging and loading onto aircraft.

b. Lower stage -

For transporting weapons from the weapons magazines to the second deck, or the hangar deck, for staging.

106.7 Explain the difference between hung ordnance and unexpended ordnance.

a. Hung -

Ordnance that failed to fire properly. A 20mm round that failed to fire from the M61A1 machine gun would be considered "hung". The phrase "hang-fire" is the term used to describe this condition.

b. Unexpended -

Ordnance that was loaded, but was never expended by the aircrew. For example, 3,000 rounds of 20mm ammunition are loaded into the M61A1 machine gun, but only 1,000 rounds are fired. That would 2,000 rounds unexpended.

106.8 State the purpose of color coding in regards to ammunition. -

Identification of ammunition is extremely important when handling ordnance. Color codes represent explosive hazards associated with ammunition.

COLOR INTERPRETATION

a. Yellow High Explosives (HE)

b. Brown Indicates the presence of explosive, either sufficient to function as a low explosive, or to be particularly hazardous to the user.

c. Gray w/Red Bands Irritant (harassing agent)

d. Black Armor piercing ammunition

e. Light Green Smoke or "marker" ammunition

f .Light Red Incendiary ammunition

g. White Illuminating ammunition, or ammunition that produces a colored light

h . Light Blue Training, or firing practice ammunition

201: Air Department System

References:

[a] NAVAIR 00-80T-105, CV NATOPS Manual
[b] COMNAVAIRLANT/COMNAVAIRPACINST 3100.4B, Air Department Standard Operating Procedures (SOPs)
[c] NAVEDTRA 12360-A, Aviation Boatswain's Mate E, 3 & 2
[d] NAVEDTRA 12364, Aviation Boatswain's Mate F
[e] NAVEDTRA 12368, Aviation Boatswain's Mate H, 3 & 2
[f] NAVEDTRA 12000, Airman

201.1.1 Primary Flight Control (PRI-FLY):

a. State the duties and responsibilities of the Air Officer

The Air Officer is responsible, under the Commanding Officer, for the supervision and direction of the launching, recovery, V.L.A. and shipboard handling of aircraft, and servicing per current instruction. Also the Air Officer determines the case launch and/or recovery. The Air Officer is also responsible for visual control of all aircraft operating in the carrier control zone. Under Case I and II conditions, this responsibility may be extended beyond the carrier control zone to include all aircraft that have switched to air officer's control frequency. For special operations such as bombing a sled or air demonstrations, the air officer may exercise control outside of the carrier control zone. Additionally, the air officer is the carrier control zone clearing authority. Agents desiring to operate aircraft within the control zone must obtain the air officer's approval prior to entry. This clearance shall include the following:

1. Operating instructions as required for avoiding other traffic.
2. Information concerning hazardous conditions.
3. Altitude and distance limitations to which aircraft may be operated.

b. Identify the stations manned in PRI-FLY

1. Air Officer (Air Boss)
2. Assistant Air Officer (Mini Boss)
3. Primary Flight Control Supervisor
4. Land/Launch Record Keeper
5. Integrated Shipboard Information System (ISIS) Computer Operator
6. Forward spotter
7. Aft spotter
8. Recovery Equipment Controller
9. Fresenel Lens Optical Landing System (FLOLS) Controller

201.1.2 Aircraft handling/crash and salvage:

a. Identify the stations manned in flight deck control

1 Aircraft Handling Officer/Flight Deck Officer
2. Air Boatswain/Assistant Flight Deck Officer
3. Aviation Fuels representative
4. Sound-power phone talkers
5. Elevator operators
6. CAG Maintenance Representative
7. Weapons Personnel (as required)

b. State the duties and responsibilities of the Aircraft Handling Officer -

The Aircraft Handling Officer exercises overall supervision of the handling of embarked aircraft on the flight deck and hangar deck and assists the Air Officer in the conduct of flight operations.

c. Discuss the duties and responsibilities of the aircraft crash, salvage, and rescue -

The Crash Crews primary job is to save lives. They are responsible for flight deck fire fighting, rescue, clearing flight deck crashes, and maintaining crash and fire fighting equipment.

201.1.3 Aircraft launch and recovery equipment:

a. State the duties and responsibilities of the Catapult and Arresting Gear Officer -

Catapult and Arresting Gear Officer is responsible for the operation of the ship's Aircraft Launch and Recovery Equipment (ALRE) and Visual Landing Aids (VLA) equipment.

b. Briefly describe the operation of the arresting gear engine -

The MK-7 arresting engine is a hydropneumatic system composed basically of the engine structure, a cylinder and ram assembly, the crosshead and fixed sheaves, a control valve system, the accumulator system, auxiliary air flasks, and a sheave and cable arrangement.

c. Briefly describe the operation of the steam -

Steam is the principal source of energy and is supplied to the catapults by the ship's reactors. The steam is drawn from the ship's reactors to the catapult steam receivers, where it is stored at the desired pressure. From the receivers, it is directed to the launch valves, and provides, the energy to launch aircraft.

d. Briefly describe the following visual landing aids

1. Fresnal Lens Optical Landing System (FLOLS)- Is the visual landing aid normally used by the pilot to bring the aircraft down a glide slope to the deck within the arresting gear crossdeck pendant pattern with a safe clearance between the tail hook and the stern of the ship.

2. Manually Operated Visual Landing Aids System (MOVALS)- The MOVLAS is used as a back-up, should the FLOLS system be inoperative or ineffective due to excessive pitch or roll of the ship. It can also be rigged for LSO/pilot training. It consists of a light box, LSO controller, a power control box and mounting facilities.

3. Integrated Launch and Recovery Television system (ILARTS) - ILARTS is a completely integrated system of electronic pictures and sound recording, designed to monitor and simultaneously record aircraft launching and landing operations under day and night conditions. It is also used to play back the recording for the post flight analysis and evaluation and will be used for investigations in the event of an incident on the flight deck.

e. State the primary objective of the Aircraft Launch and Recovery Maintenance Program (ALREMP) -

The primary objective of the ALREMP is to achieve and sustain maximum operational readiness of aircraft launch and recovery equipment in support of carrier flight operations and was based upon the NAMP(Naval Aviation Maintenance Program).

f. Discuss the two types of barricades -

When an aircraft is required to make an emergency landing, the nose of the aircraft passes through the barricade and allows the vertical straps to contact the leading edges of the wings and wrap the aircraft. The barricade installation then passes the force of the arrestment through the purchase cable to the arresting engine. Currently there are two types of barricades available to the fleet. One for jet aircraft, and one for the E-2/C-2 aircraft. The E-2/C-2 barricade is designed so that the props of the E-2/C-2 aircraft can pass through it with minimal damage to the aircraft during arrestment.

201.1.4 Hangar deck

a. Identify the stations manned in hangar deck control

1. Hangar Deck Officer/Deck CPO/LPO
2. Elevator Operators

201.1.5 Aviation Fuels

a. Briefly describe the organization of the aviation fuels division -

The aviation fuels division is normally made up of the V-4 Division Office. The Flight Deck workcenter (which includes flight deck repair and the quality surveillance lab), and the Below Decks workcenter that combines the maintenance and repair of the below decks workcenters.

b. Briefly describe the Lube Oil (L/O) system -

The lube oil system is a separate, independent system. It is composed of a storage tank, one or two pumps, valves, and piping. The piping is arranged to supply two (or four, based on which ship you are on) ready service tanks, located in the catapult spaces. The pumps take suction from the manifolds connected to the lube oil storage tank and discharge through a manifold to the riser going to the service tanks.

201.5 Safety Precautions

a. Discuss the three causes of nearly all aircraft handling mishaps/incidents -

Nearly all aircraft-handling mishaps/incidents are the result of poor supervision, disinterest, and/or disregard of applicable handling instructions.

b. Discuss general safety precautions that must be observed in the vicinity of launch and recovery equipment during operations -

During launch, only members of the catapult crews are permitted in the catwalks in the vicinity of the deck edge stations. Flight deck personnel must be aware of the requirement for visual signals between catapult crewmembers and make a conscious effort not to impede their line of sight. During recovery, no personnel are permitted to work on or occupy aircraft in the port side parking area unless aircraft parked in the safe parking area abeam and aft of the island. All maintenance personnel shall remain clear of the Arresting Gear Officer’s deck edge control station during recovery operations. Alert crews may normally man up and occupy their aircraft where it is spotted but must remain ever vigilant during launch/recovery operations. During launch or recovery, all personnel shall exit the flight deck area via the shortest and most expeditious means consistent with safety. If you are not a flight deck member, you will always enter and exit the flight deck to the starboard side of the island.

c. What is the constant danger to all personnel involved in fueling/defueling of aircraft -

Aircraft fuel is highly flammable, extreme caution shall be observed while fueling/defueling aircraft. The number one danger concerned is “Static Electricity”.

202: Operations System

References:

[a] NAVAIR AE-CVATC-OPM-000, Carrier Air Traffic Control Handbook

202.1.1 Meteorology and Oceanography (METOC):

a. **State the service that the METOC office provides for flight operations** -

METOC collects, interprets and disseminates weather information. Weather information is disseminated for aircraft operations, including present and forecast weather at the carrier and at shore facilities used as divert fields for aircraft with fuel shortages and emergencies, Because weather conditions significantly impact air operations, coordination between CATCC and the weather office is continuous.

202.1.2 Carrier Air Traffic Control Center (CATCC): -

On a carrier, two spaces are responsible for the control of airborne aircraft – the Carrier Air Traffic Control Center (CATCC) and the Combat Direction Center (CDC). CATCC is responsible for the control of aircraft operating within the Carrier Control Area (a circular airspace within a radius of 50 nm around the carrier). It is organized into Air Operations (AirOps), Carrier Controlled Approach (CCA), and the Air Transfer Office (ATO).

a. **Discuss the function of air operations** -

Air Operations (AirOps) has overall responsibility and makes real-time decisions necessary for safe and efficient aircraft launch and recovery. The AirOps Officer is responsible to the Operations Officer for the coordination of all matters pertaining to aircraft operations, the proper function of CATCC, and the aircraft under it's control. Other responsibilities include:

- Control of assigned aircraft when airborne, except when control is assigned to other authority. Collection and coordination of requests for operational logistics services required by the carrier in support of operations.

- Requests for operating area assignments and aircraft clearances incident to the movement and operation of the carrier

- Determine the type of approach and required control IAW prescribed weather criteria

- Manage tanker assets and airborne fuel. Determine tanking operations/actions based on type of recovery, amount of available fuel, pilot performance, local and divert field, suitability of divert field and supporting navigational aids, and deck conditions.

b. Identify the positions manned in air operations during flight operations:

a. Air Operations Watch Officer
b. AirOps Plotter
c. Status Board Keeper
d. Land/Launch Recorder
(Status Board Keeper and Land/Launch Recorder are being combined into one position)

c. **Discuss the function of Carrier Control Approach (CCA)** - CCA is responsible for operational control of aircraft departing the ship and recovery of inbound aircraft after a mission is complete. It is roughly equivalent to the Approach Control branch of an ashore Air Traffic Control (ATC) facility. Air traffic control is provided by the following positions in CCA: Departure Control, Marshal Control, Approach Control and Final Control. Each of these four areas has ‘control’ of aircraft at different times and during different phases of aircraft flight.

d. **State the duties and responsibilities of the Air Transfer Officer (ATO)** - The ATO is responsible to the AirOps Officer for the safe and orderly handling of All COD/VOD passengers, mail, and cargo arriving or departing the carrier.

202.1.3 Combat Direction Center (CDC):

a. **Discuss the function of the CDC** - CDC is responsible for the execution of tactical orders for the carrier and air wing during battles. In Combat, CDC "directs" the actions of the carrier and its air wing and coordinates the actions of other ships within the battle group. CDC detects, evaluates and reports air, surface and subsurface contacts to the appropriate control stations. Other responsibilities include the execution of Electronic Warfare (EW) and cryptologic operations in support of combat operations and the conduct of Search and Warfare (SAR) operations. A major function of CDC is mission-control of airborne aircraft, e.g., conducting airborne Undersea Warfare (USW) operations or controlling Air Intercept Control (AIC) missions.

202.1.4 Strike operations:

a. **Discuss the responsibilities of strike operations** - Strike Operations is responsible for planning daily aircraft operations to support the requirements of the Battle Group Commander. The Strike Operations Officer writes the Air Plan.

202.1.5 Carrier Intelligence Center (CVIC):

a. **Discuss the responsibilities of CVIC:** - The Carrier Intelligence Center (CVIC) (pronounced "SIV-ICK") is responsible for the collection, display, analysis and dissemination of intelligence information, including the briefing and debriefing of pilots prior to and following missions. Other duties include the preparation of operational orders, plans, training schedules, and other reports and directives, and maintaining intelligence files in support of combat operations.

203: Aircraft Intermediate Maintenance Department (AIMD) System

References:
[a] OPNAVINST 4790.2G, Naval Aviation Maintenance Program, Vol. I
[b] OPNAVINST 4790.2G, Naval Aviation Maintenance Program, Vol. V

203.1.1 State the basic function of Intermediate Maintenance Activities (afloat). -

The basic function of the IMA (afloat) is to support the embarked airwing. This includes SE training, repair of inducted aircraft components, special inspections, and technician assistance on aircraft discrepancies.

203.1.2 Discuss the basic organizational structure of the AIMD (afloat). [ref. a, fig. 8-6] -

AIMD is headed by the AIMD Officer (Maintenance Officer) who overseas the operation of the Department. He is assisted by the Assistant Maintenance Officer (AMO), and the Maintenance Material Control Officer (MMCO). AIMD is broken down into the following divisions:

a. IM-1 Division (ADMIN) -
The administrative branch of AIMD, this division consists of the following work areas:

1) AIMD Admin (includes manpower and career counselor)
2) Quality Assurance
3) Production Control
4) Material Control (Supply)

b. IM-2 Division (AIRFRAMES) -
Consists of the Airframes, Power Plants, and Life-support work centers (bubble-chasers, metal-benders, nose-pickers, and parachute-riggers).
c. IM-3 Division (AV/ARM) -
Consists of the Avionics, Electrical, and Ordnance repair work centers ("Trons", "One-wires", and "Ordies").
d. IM-4 Division (GSE) -
Maintains the ship's pool of "yellow-gear". Conducts the ship's Support Equipment Licensing program.

203.1.3 Discuss the basic function(s) of the Aeronautical Material Screening Unit (AMSU). -

AMSU is the screening point for all repairables inducted into the AIMD by the squadron supply work centers. AMSU uses the Individual Component Repair List (ICRL) to determine which IMA work center maintains repair capability for the particular component.

203.1.4 Discuss the purpose of the Navy Metrology and Calibration Program (METCAL). -

Consisting of numerous different ratings, the "Cal Lab" is the central point of repair and calibration for all test equipment, calibrated tools, and gauges used throughout the ship.

203.1.5 Discuss the purpose of the Support Equipment (SE) Training and Licensing Program. -

Ensures that persons using Ground Support Equipment items are properly trained prior to turning them loose on the world. General requirements for licensing include formal classroom instruction, OJT, a written examination, and interview by the Quality Assurance Officer, or Maintenance Officer.

203.1.6 Discuss the all-hands responsibility of the SE Misuse/Abuse Program. -

It is the responsibility of all hands to ensure that SE is utilized properly. Anyone witnessing the misuse of Support Equipment is expected to submit an SE misuse/abuse report.

204: Supply Support Center (SSC) System

References:
[a] NAVEDTRA 10395, Aviation Storekeeper 1
[b] NAVEDTRA 12655, Aviation Storekeeper 2
[c] COMNAVAIRLANT/COMNAVAIRPACINST 4440.1B, Supply Operations Manual

204.1 System components and component parts

204.1.1 Explain the basic responsibilities of the SSC. -

Also referred to as the aviation support division (ASD), is the single point of contact where material control centers of O- and I-level maintenance activities place requirements for material and equipment required for support of weapons systems maintenance. The SSC/ASD is composed of two sections, the supply response section (SRS), and the component control section (CCS). The SSC is responsible for responding to requisitions for parts in the following time period.

Priority ..... Processing Time
I ..... 1 hour
II ..... 2 hours
III ..... 24 hours

204.1.2 State the basic responsibilities of SRS and CCS.

a. SRS -

The single point of contact for processing customer requirements and providing follow ups and status as required. The SRS is divided into 6 units: requisition control unit (RCU), technical research unit (TRU), stock locator unit (SLU), material delivery unit (MDU), pre-expended bin (PEB) unit, and the program management unit (PMU).

b. CCS -

Also known as the repairable management section (RMS), is responsible for the management and accounting of all repairable assets stored in the LRCA storage areas as well as items in the IMA repair cycle. This section is divided in to four units: the DCU, the LRCA, storage unit, the SSU, and the AWP unit.

204.1.3 Discuss the basic responsibilities of the RAM unit. -

The RAM unit maintains custody of high-cost, or pilferable, Aviation Depot Level Repairables (AVDLRS) that are ordered by the individual IMA work centers. The AVDLRs are issued only upon immediate receipt of a turn component.

204.1.4 State the purpose of the Aviation Consolidated Allowance List (AVCAL) -

The AVCAL is a listing of all repair parts, both repairable and consumable, that are deemed necessary for supporting the maintenance needs of the assigned airwing and IMA. Based on historical data from other battle group deployments, the AVCAL, in theory, should be of sufficient “width” (the correct types of items stocked) and “depth” (the correct quantity of these items) to allow a battle group to complete an extended deployment with minimal NMCS and PMCS time.

205: Weapons Department System

References:
[a] OPNAVINST 8600.2B, The Naval Airborne Weapons Maintenance Program (NAWMP), Vol. II (CH-1)

205.1.1 Explain the functions of the following divisions within the weapons department:

a. G-1 - Hangar Bay and Flight Deck Ordnance
b. G-2 - Armory
c. G-3 - Magazines
d. G-4 - Elevators
e. G-5 - Administration
f. Explosive Ordnance Disposal (EOD) - EOD

206: Air to Air Warfare (AAW) Mission Area

References:

[a] The Blue jacket's Manual (Twenty-First Edition)
[b] NAVEDTRA 12309, Aviation Ordnanceman 3, 2, and 1
[c] NAVEDTRA 12000, Airman
[d] NAVEDTRA 12966, Naval Orientation
[e] NAVEDTRA 10276-1, Fire Controlman Third Class

206.1.1 Discuss the function of the following detection systems:

a. **E-2C Hawkeye** -

The E2-C is the forward-deployed portion of any airborne strike. The basic mission of the Hawkeye is to monitor air and surface areas for enemy contacts. Using the LINK-11 and JTIDS Data Link systems, the Hawkeye is able to relay this data to the other ships and aircraft of the strike force.

b. **Surface combatants' ship** -

Major surface combatants, such as the Spruance Class Destroyer and Aegis Cruiser are equipped with surveillance systems able to monitor the oceans for surface, subsurface, and airborne contacts. "Linking" this data with that of other ships and aircraft in the operating area, a constant "snapshot" of the Battle Force's "threat" environment is able to be displayed in the Combat Direction Centers of each ship.

c. **Electronic Countermeasures (ECM) (active and passive)** -

ECM, both active and passive, are designed to deprive the enemy of their use of radio transmitting systems, such as fire-control and search-radar systems, Electronic Surveillance systems, and radio-communications systems.

d. **Surface Search RADAR** -

The SPS-64 is the primary Surface Search RADAR onboard TR.

e. **Fire Control RADAR** -

The Mk-23 is the primary fire control radar systems onboard TR.

206.1.2 Discuss the following direction systems:

a. E-2C Hawkeye -
b. Surface combatants' ship -

206.1.3 Discuss the following delivery systems: [ref. a]

a. F-14 Tomcat -
b. F/A-18 Hornet -

206.1.4 Discuss the following destruction systems: [ref. b]

a. **Missiles (AIM)**

1) **AIM-7F Sparrow II** - A supersonic air-to-air guided missile, it is designed to be "rail" or "ejection" launched from an interceptor aircraft. The tactical mission of the missile is to intercept and destroy enemy aircraft in all weather environments. The missile is 12' long, 8" in diameter, and weighs 510lbs.

2) **AIM-9L Sidewinder** - A supersonic air-to-air weapon, it has passive infrared target detection, proportional navigation guidance, and torque balanced control systems. The missile is shipped without the wings and control fins, and must be assembled prior to use. The missile is 9.5' long, 5" in diameter, and weighs lbs.

3) **AIM-54C Phoenix** - A long-range, air-to-air guided missile employing active, semi-active, and passive homing capabilities, the Phoenix is launched exclusively from the F-14. It may be launched in multiple missile attacks against groups of aircraft, or against a single aircraft. A maximum of six Phoenix missiles can be launched from a single aircraft with miscellaneous guidance against widely separated targets. This missile is 13' long, 15" in diameter, and weighs lbs.

b. **Aircraft guns** - The M61A1 20-mm automatic machine gun is a six-barrel, rotary action, mechanism gun based on the early Gatling gun design. It is a revolving cluster of barrels fired once per each revolution. The gun is hydraulically driven and electronically controlled by the aircraft's weapons control systems. The gun has two pilot selectable firing rates of 4,000 (gun low) rounds per minutes, or 6,000 (gun high) rounds per minute.

207: Undersea Warfare (USW) Mission Area

References:
[a] NTP-S-50-8208F, Navy Training Plan Aircraft Carrier Tactical Support Center (CV-TSC) AN/SQQ-34/A/B/C
[b] NAVEDTRA 12000, Airman
[c] NAVAIR AE-CVATC-OPM-000, Carrier Air Traffic Control Handbook
[d] The Blue jacket's Manual (Twenty-First Edition)

207.1.1 Discuss the following detection systems:

a. **CV Fast Time Analyzer System (CV FTAS)** -
Used by UnderSea Warfare Module (USWM) to download and analyze sonar data as received by ASW aircraft.

b. **H-60** - Refer to Common Core Section 109

c. **S-3B** - Refer to Common Core Section 109

207.1.2Discuss the following direction systems:

a. Combat Direction Center (CDC)

207.1.3 Discuss the following delivery systems:

a. **S-3B** - Refer to Common Core Section 109
b. **H-60** - Refer to Common Core Section 109
c. **F/A-18** - Refer to Common Core Section 109

207.1.4 Discuss the following destruction systems:

a. **Torpedoes**

The Mk-46 is the primary weapon used in ASW. Launched from any number of aircraft, it is designed to search for, detect, attack, and destroy submarines. The torpedo can be configured into exercise configurations (called an "exercise shot") for training use. The tactical torpedo consists of a nose section, warhead, control group, long fuel tank, and after body. The physical characteristics (weight, length, etc) Carry with the configuration and launch accessories attached. The Mk 46 can be configured with launch accessories for helo- or fixed-wing launch. The Mk-46 can also be launched from surface ships via launching tubes mounted on or within the hull of the ship, or as part of the Anti-Submarine Rocket (ASROC) system. The Mk-46 is salt-water activated, and uses OTTO fuel II for its propulsion. Torpedoes may be launched from submarines, surface ships, helicopters and fixed-wing aircraft. They are also used as parts of other weapons; the Mark 46 torpedo becomes the warhead section of the ASROC (Anti-Submarine rocket) and the Captor mine uses a submerged sensor platform that releases a torpedo when a hostile contact is detected. The three major torpedoes in the Navy inventory are the Mark 48 heavyweight torpedo, the Mark 46 lightweight and the Mark 50 advanced lightweight. The MK-48 is designed to combat fast, deep-diving nuclear submarines and high performance surface ships. All Navy submarines carry it. The improved version, MK-48 ADCAP, is carried by attack submarines, the Ohio class ballistic missile submarines and will be carried by the Seawolf class attack submarines. The MK-48 replaced both the MK-37 and MK-14 torpedoes. The MK-48 has been operational in the U.S. Navy since 1972. MK-48 ADCAP became operational in 1988 and was approved for full production in 1989. The MK-46 torpedo is designed to attack high performance submarines, and is presently identified as the NATO standard. The MK-46 Mod 5 torpedo is the backbone of the Navy's lightweight ASW torpedo inventory and is expected to remain in service until the year 2015. The MK-50 is an advanced lightweight torpedo for use against the faster, deeper-diving and more sophisticated submarines. The MK-50 can be launched from all ASW aircraft, and from torpedo tubes aboard surface combatant ships. The MK-50 will eventually replace the MK-46 as the fleet's lightweight torpedo.
MK-48 and MK-48 ADCAP torpedoes can operate with or without wire guidance and use active and/or passive homing. When launched they execute programmed target search, acquisition and attack procedures. Both can conduct multiple reattacks if they miss the target. The MK-46 torpedo is designed to be launched from surface combatant torpedo tubes, ASROC missiles and fixed and rotary wing aircraft. In 1989, a major upgrade program began to enhance the performance of the MK-46 Mod 5 in shallow water. Weapons incorporating these improvements are identified as Mod 5A and Mod 5A(S).

b. **Mines**

Aircraft laid mines may be used in either offensive or defensive capacities. In either case, the primary objective is to defend or control straits, port approaches, convoy anchorages, and seaward coastal batteries.
Aircraft mine delivery has been the principal method for large-scale mining attacks into enemy coastal and port areas. Mines that are delivered by aircraft are usually carried and dropped in much the same manner as bombs. Mines have different ballistic flight paths than bombs, and usually require parachutes.
Mines can be categorized into the following categories:

1) **Contact Mines -** Can be moored to the ocean floor, or left to float though shipping channels. These mines detonate upon contact with the skin of the ship. The mines may be magnetized to hold them against the ship's surface, allowing the ship time to make harbor before detonating. This will allow the mine to inflict damage on any ships anchor or moored near the original ship.

2) **Influence Mines** - Usually left to sit on the floor of shallow waterways, these mines are activated by various methods. As a ship passes over the mine, the mine senses the pressure difference created by the movement of the ship through the water. The mine can be programmed to allow a specific number of ships to pass before detonating. Other mine types detect the disruption of magnetic fields as the ship passes over head. Ships utilize de-gaussing equipment to counter this type of mine. The MK56 ASW mine (the oldest still in use) was developed in 1966. Since that time, more advances in technology have given way to the development of the MK60 CAPTOR (short for "encapsulated torpedo"), the MK62 and MK63 Quickstrike and the MK67 SLMM (Submarine Launched Mobile Mine). Most mines in today's arsenal are aircraft delivered to target.

208: Air to Surface Warfare (ASW) Mission Area

References:
[a] The Blue jacket's Manual (Twenty-First Edition)
[b] NAVEDTRA 12966, Naval Orientation
[c] NAVEDTRA 12000, Airman
[d] NAVEDTRA 12309, Aviation Ordnanceman 3, 2, and 1
[e] NAVEDTRA 10276-1, Fire Controlman Third Class

208.1.1 Discuss the following detection systems:

a. E-2C Hawkeye - Refer to Common Core Section 109
b. Surface combatants' ship [ref. b, pp. 19-5 thru 19-8]
c. Electronic Countermeasure (ECM) (active and passive) [ref. c, pp. 7-19, 7-20]
d. Surface search [ref. e, p. 3-4]

208.1.2 Discuss the following direction systems:

a. E-2C Hawkeye - Refer to Common Core Section 109
b. Surface combatants' ship [ref. b, pp. 19-5 thru 19-8]

208.1.3 Discuss the following delivery systems: [ref. a]

a. F/A-18 - Refer to Common Core Section 109
b. F-14 - Refer to Common Core Section 109
c. S-3B - Refer to Common Core Section 109
d. EA-6B - Refer to Common Core Section 109
e. SH-60B - Refer to Common Core Section 109

208.1.4 Discuss the following destruction devices:

a. Missiles (AGM)

1) **AGM-84 Harpoon** - All weather air-launch, antiship missile. The Harpoon has a low-level cruise trajectory with over-the-horizon range, making it less susceptible to radar detection. It uses active guidance and has counter-countermeasures capabilities. The missile is 12.5' long, and weighs 1,144lbs.

2) **AGM-65 Maverick** - The Maverick is a laser-guided, rocket-propelled, air-to-ground missile designed for use against fortified ground installations, armored vehicles, and surface combatants.

3) **AGM-78E Standard Antiradiation Missile (ARM)** - The ARM is an air-launched, supersonic guided passive missile for use against surface targets that radiate microwave electromagnetic energy. The ARM was designed for use with the A-6 Intruder, and saw extensive service in Vietnam.

4) **AGM-88 High-Speed Antiradiation Missile (HARM)** - An air-launched, supersonic, guided missile used against targets that radiate microwave electromagnetic energy. The HARM missile offers many improvement of the older ARM missile, such as displaying threat information to the pilot, and computing its own target parameters.

5) **AGM-65 Shrike** - The Shrike is an anti-radar surface attack guided missile using passive homing. It is 10' long, 8" in diameter, and weighs 1414 lbs.

6) **Walleye** - The Walleye is self-contained, self-guided, high explosive weapon. It does not contain a propulsion system as do other missiles, but is still classified as a missile because it does contains a guidance system, a control system, and externally mounted control surfaces.

b. Bombs - Mk 80 (series) General Purpose Bomb - A low-drag, general-purpose (LDGP) bomb used in aircraft bombing operations. The case of the bomb is aerodynamically designed and relatively light, allowing 50% of the bomb's total weight to be comprised of explosives. A complete bomb consists of all the components and accessories necessary for the bomb to function, as follows:

Bomb Body - A metal container that contains the HE charge. The bomb body has threaded fittings to accommodate the fuses, suspension lugs, and hoisting lugs.
Suspension Lugs - Used to attach the assembled bomb onto the aircraft suspension and releasing equipment.
Fuzing - Mechanical fuses are installed in the nose and tail of the bomb, and are "safetied" by cotter pins and release wires. As the bomb falls away from the aircraft, the pins are pulled free, allowing the arming vane to rotate in the airstream, arming the fusing.
Fin Assemblies - Fin assemblies provide bomb stability and cause it to fall in a smooth, definite curve to the target. The bomb may be equipped with a conical fin for unretarded trajectory, or the snake-eye fin assembly for use in low level bombing applications.

c. **Rockets** The navy currently uses three different rocket assemblies; the Mighty Mouse (2 variants) and the Zuni rocket. All three are folding fin aircraft rockets (FFARs). The 2.75-inch Mighty Mouse rockets differ only in the type of nozzle and fin assembly used on the rocket motors. generally, the Mighty Mouse is fired in large numbers. The 5.0-inch Zuni, on the other hand, is fired singularly. Due to the advances of missile technology, rockets are limited to use against air-to-ground targets.

d. **Aircraft guns** - In addition to the M61A1 machine gun, the .30-caliber machine gun has seen use as an air-to-ground weapon for a number of years. Intended more for self-defense than for offensive uses, the .30 cal has been mounted from helicopter doorways since the concept of pilot-rescue was conceived.

209: Point-Defense/Countermeasures System

References:
[a] The Blue jacket's Manual (Twenty-First Edition)
[b] NAVEDTRA 12309, Aviation Ordnanceman 3, 2, and 1
[c] NAVEDTRA 12966, Naval Orientation
[d] NAVEDTRA 12000, Airman

209.1.1 Discuss the basic function of the following:

a. **. 50 caliber mounts** - Located strategically about TR, the ship's .50 caliber guns are intended to counter small-boats and attempts at boarding, both ashore and in port.

b. **North Atlantic Treaty Organization (NATO) Sea Sparrow Missile system** - The Sea Sparrow, sometimes called the "Sea Chicken", is an adaptation of the aircraft version of the Sparrow missile. It is designed to counter airborne threats to the ship.

c. **Close-In Weapons System (CIWS)** - A fast-reaction, rapid-fire, 20mm Gatling-gun system. The Phalanx provides US Navy ships with a terminal defense against anti-ship missiles that have penetrated other fleet defenses. Designed to engage anti-ship cruise missiles and fixed-wing aircraft at short range, Phalanx automatically engages functions usually performed by separate, independent systems such as search, detection, threat evaluation, acquisition, track, firing, target destruction, kill assessment and cease fire.

* Primary Function: Anti-ship missile defense
Weight: 12,500 pounds (5,625 kg) - Later models: 13,600 pounds (6,120 kg)
* Range: Classified
* Gun Type: M-61A1 Gatling
* Type of Fire: 3,000 rounds per minute - Later models: 4,500 rounds/min
* Magazine Capacity: 989 rounds - Later models: 1,550 rounds

d. **Electronic Countermeasures (ECM)** - ECM is designed to deny an aircraft or missile the use of its basic guidance system. The primary ECM system for use against missiles is Rapid Blooming Outboard Chaff (RBOC). Larger than the similar aircraft chaff system, the missile's radar echoes are presented with a much larger target (the chaff "cloud"), causing the missile to search for the wrong target.

210: Battle Force Intermediate Maintenance Activity (BFIMA) System

References:
[a] CINCPACFLTINST 4700.9/CINCLANTFLTINST 4700.11, Maintenance Policy for Battle Force Intermediate Maintenance Activities (BFIMA)

210.1.1 Discuss the function and organization of Battle Force Intermediate Maintenance Activity (BFIMA).

The Aircraft Carrier is the central figure in today's Naval Battle Group. All other ships, steaming as members of this battle group, serve the carrier in some capacity. Cruisers provide AAW support; Frigates provide USW support; and Destroyers provide Surface support. In turn, Oilers and Combat Stores ships provide logistic support. Repair of the numerous weapons systems on these "picket" ships have, in the past, been performed by technicians on these ships. Due mostly to space limitations, a sufficient stock of repair parts were rarely maintained. For this reason, the Fleet Repair Ships (ARs, ADs, and ASs) were constructed to operate in the rear echelon of the battle force. This has worked, as long as the picket ship has had the operational "stand down" time available to conduct a restricted availability period with the appropriate Tender.
The BFIMA (pronounced "BIF-IM-UH") is a concept developed whereby repair capabilities for these smaller ships would be placed onto the carrier, and where Tradesmen for these repair requirements would billeted in to the AIMD. AIMD lies at the heart of the BFIMA concept, with the required technicians and systems experts assigned to AIMD. In the BFIMA concept, the AIMD Officer would serve as the Battle Force Maintenance Officer. The concept would require that all ships systems (RADAR, Computer Systems, etc), for which a maintenance action may be expected, be identified, and the proper level of repair parts be stored on the carrier in the event that they're required. This is similar to determining AIMD's AVCAL requirements, based on the load-out of assigned CVW aircraft, and ensuring that S-6 is stocked accordingly. An example of the BFIMA concept at work would be on an FFG with a CIWS that is down due to a faulty power supply. On the FFG, the Fire Control Technician would replace the entire power supply, vice troubleshooting the Power Supply himself - a potentially time consuming task. In this manner, the CIWS would be quickly returned to a Mission Ready status. The faulty Power Supply, in turn, would be shipped to the Carrier for repair, and subsequent return to the Supply "pool". This is nothing more than the NAMP's O- and I-level concepts at work on a larger scale. The following is an excerpt from CINCLANFTLINST 4700.11 - "The BFIMA is composed of the collective Battle Force elements capable of performing maintenance beyond the organizational level. The function of the BFIMA is to maximize the Battle Force's ability to operate and sustain itself at sea through improved repair capabilities and material self-sufficiency and strengthen Battle Force material readiness to conduct Navy/joint/combined operations from the sea. Each Battle Force will establish a BFIMA organization to take maximum advantage of the total capabilities of the Force. The Amphibious Readiness Group IMA (ARGIMA) is intended to function as an independent entity when the ARG is detached from the carrier Battle Force."

211: Carrier Air Wing System

References: [a] NAVEDTRA 12000, Airman

211.1.1 Discuss the function of the carrier air wing. -

The purpose of the carrier air wing is to conduct naval air defensive and offensive missions, SAR missions, and logistical support for the carrier.

211.1.2 Discuss the organization of a carrier air wing.

- Carrier air wings consist of squadrons assigned by the CNO. The air wing is under the command of an air wing commander. Air wing commanders report for duty to the CO of the parent carrier. They have tactical command of the wings during wing operations. In matters pertaining to the Air department, the commander acts under the direction of the air department officer. Under the direction of the Operations officer, the commander coordinates in matters concerning operations department functions. Under the carrier CO and the air wing commander, the squadron COs maintain the squadron organization.