ENLISTED AVIATION WARFARE SPECIALIST (EAWS) STUDY GUIDE

Phase I

ENLISTED AVIATION WARFARE SPECIALIST

PHASE I: Introduction

Background:

The Enlisted Aviation Warfare Specialist (EAWS) program was established in 1980 to recognize enlisted personnel who acquired the specific professional skills, knowledge, and military experience that resulted in unique qualification for service in the aviation activities of the Navy. This program has gone through many changes in regards to modernization of aircraft and air-capable vessels, mission requirements and personal qualification expectations since program inception.

In August 2010, Mandatory qualification for all Sailors assigned and serving in or on an eligible command or platform as outlined in the governing instruction was approved. This qualification in its current form is to ensure that enlisted Sailors have and retain the requisite knowledge to sustain planes and platforms in their highest warfighting posture.

Intent:

This qualification should not be taken lightly. The expectation is for every enlisted Sailor to know their aircraft and ship thoroughly; both practical and knowledge based. Attainment of the EAWS designation signifies a milestone in a Sailors career and professional development as an Aviation Sea Warrior.

The integrity of this program lies with the qualifying Petty Officers to properly train all Qualification Petty Officers to ensure that every Sailor attaining the EAWS is fully trained and ready to qualify. The Chiefs Mess will validate the training by conducting walk-thru's and board testing each Sailor. Qualification status reports are required to maintain training standards and the professional development of every enlisted Sailor assigned.

THE SUCCESS OF THIS PROGRAM LIES WITH EVERY DECK PLATE LEADER

Table of Contents

Block I - Command SORM and Organization

References:

(a) XXXX

This page intentionally left blank, placeholder for local development.

Block II - First Aid

References:

(a) NAVEDTRA 14325, Military Requirements, Basic (BMR)
(b) DOI: 10.1161/CIRCULATIONAHA.110.971150, American Heart Association and American Red Cross Guidelines for First Aid

A. Overview (Ref a, b)

The frequency that accidents and injuries occur makes having a working knowledge of First Aid essential, the ability to act promptly with knowledge of a variety of techniques can mean the difference between life and death.

B. First Aid (Ref a, b)

The three objectives of first aid are to prevent further injury, infection, and the loss of life.

The fundamental elements of First Aid can be categorized into eight main areas. Knowledge of these areas allows us to accomplish the three main objectives of First Aid.

Bleeding, the four methods of controlling bleeding are direct pressure, elevation, pressure points, and use of a tourniquet as a last resort.

- A pressure point is a point on the body where a main artery lies near the skin surface and over a bone. You can reduce or stop blood flow to areas of the body by applying physical pressure to this point with the fingers or with the heel of the hand. There are 11 principal pressure points on each side of the body.

- Superficial temporal artery (temple)

- Facial artery (jaw)

- Common carotid artery (neck)

- Subclavian artery (collar bone)

- Brachial artery (inner upper arm)

- Brachial artery (inner elbow)

- Radial/Ulnar artery (wrist)

- Femoral artery (upper thigh)

- Iliac artery (groin)

- Popliteal artery (knee)

- Anterior/posterior tibial artery (ankle)

Burns, the three classifications of burns are First, Second, and Third degree.

- First degree. Produces redness, warmth and mild pain.

- Second degree. Causes red, blistered skin and severe pain.

- Third degree. Destroys tissue, skin and bone in severe cases, however severe pain may be absent due to nerve endings being destroyed.

Fractures, the two types of fractures are "closed/simple" or "open/compound"; closed/simple is a broken bone without a break in the skin, whereas open/compound has a break in the skin with possible bone protrusion.

Electric shock, when a person comes into contact with an electric energy source shock occurs; the wide variety of injuries that can result from an electrical shock range from little or no evidence of injury to severe trauma with associated cardiac arrest.

Obstructed airways, obstruction of the upper airway can be caused by many things depending on age and situation. Indications of an airway obstruction are inability to talk, grasping and pointing to the throat, exaggerated breathing efforts, and the skin turning a bluish color.

Heat related injuries, these types of injuries are very common in the demanding environments that the U.S. Navy operates. The two types of heat related injuries that can occur are;

- Heat exhaustion. A serious disturbance of blood flow to the brain, heart and lungs. The skin is cool, moist, and clammy and the pupils are dilated. Body temperature may be normal or high; the victim is usually sweating profusely.

- Heat stroke. A very serious condition caused by a breakdown of the sweating mechanism of the body. The victim is unable to eliminate excessive body heat buildup. Symptoms may include hot and/or dry skin, uneven pupil dilation, and a weak, rapid pulse.

Cold weather injuries, the three types of cold weather injuries are Hypothermia, Superficial and Deep frostbite.

- Hypothermia. A general cooling of the whole body caused by exposure to low or rapidly falling temperature, cold moisture, snow or ice. The victim may appear pale and unconscious, and may even be taken for dead. Breathing is slow and shallow, pulse faint or even undetectable. The body tissues feel semi-rigid, and the arms and legs may feel stiff.

- Superficial frostbite. Is when ice crystals are forming in the upper skin layers after exposure to a temperature of 32 degrees or lower.

- Deep frostbite. Develops when ice crystals are forming in the deeper tissues after exposure to a temperature of 32 degrees or lower.

Shock, this is a life-threatening medical condition whereby the body suffers from insufficient blood flow throughout the body as a result of severe injury or illness. The types of shock are:

- Septic shock. Results from bacteria multiplying in the blood and releasing toxins. Common causes of this are pneumonia, intra-abdominal infections (such as a ruptured appendix) and meningitis.

- Anaphylactic shock. A type of severe hypersensitivity or allergic reaction. Causes include allergy to insect stings, medicines or foods (nuts, berries, seafood) etc..

- Cardiogenic shock. Occurs when the heart is damaged and unable to supply sufficient blood to the body. This can be the end result of a heart attack or congestive heart failure.

- Hypovolemic shock. Caused by severe blood and fluid loss, such as from traumatic bodily injury, which makes the heart unable to pump enough blood to the body.

- Neurogenic shock. Caused by spinal cord injury, usually as a result of a traumatic accident or injury.

Block III - Cardiopulmonary Resuscitation (CPR)

References:

(a) DOI: 10.1161/CIRCULATIONAHA.110.970913, American Heart Association guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular care
(b) ISBN: 0-8016-7062-4, American Red Cross, Adult CPR

A. Cardiopulmonary Resuscitation (CPR) (Ref a, b)

CPR is a combination of rescue breathing and chest compressions delivered to victims thought to be in cardiac arrest. When cardiac arrest occurs the use of CPR can support a small amount of blood flow to the heart and brain to "buy time" until normal heart function is restored.

The steps for CPR have changed from the A/B/C method or Airway/Breathing/ Circulation to C/A/B or Circulation/Airway/Breathing. This change was due to the recognition of the importance chest compressions have on successful victim resuscitation. Breath/ respiratory rate and pulse detection are very difficult and unreliable even for the skilled medical responders as cardiac arrest, gasping, and individual victim characteristics influence these.

All rescuers should be certified and refer to the current procedures as published by the American Heart Association (AHA) and American Red Cross (ARC).

B. The Survival Chain (Ref a, b)

Successful resuscitation following cardiac arrest requires an integrated set of coordinated actions referred to as the survival chain.

The key to survival for victims of cardiac arrest is the prompt recognition of the arrest and immediate activation of the emergency response system. The steps of the survival chain are:

- Recognition/activation of CPR
- Chest compressions
- AED/defibrillator
- Rapid defibrillation
- Effective advanced life support (EMT's, ambulance)
- Integrated post-cardiac arrest care

Block IV - Occupational and Personal Safety

References:

(a) OPNAVINST 3500.39, Operational Risk Management
(b) OPNAVINST 5102.1D CH-2, Mishap Reporting
(c) OPNAVINST 5100.23 CH-15,18,20, Navy Safety and Occupational Health (SOH) Program

A. Operational Risk Management (ORM) (Ref a)

ORM is a systematic, decision-making process used to identify and manage hazards that endanger naval resources. ORM is a tool used to make informed decisions by providing the best baseline of knowledge and experience available. ORM is a tool for both on and off duty; it encompasses a 5 step process that requires constant review for new hazards or engineering controls available.

The ORM process:

- Identify hazards. Begin with an outline or chart of the major steps in the operation or operational analysis. Next, conduct a preliminary hazard analysis by listing all of the hazards associated with each step in the operational analysis along with possible causes for those hazards.

- Assess hazards. For each hazard identified, determine the associated degree of risk in terms of probability and severity. Although not required, the use of a matrix may be helpful in assessing hazards.

- Make risk decisions. Develop risk control options. Start with the most serious risk first and select controls that will reduce the risk to a minimum consistent with mission accomplishment. With selected controls in place, decide if the benefit of the operation outweighs the risk. If risk outweighs benefit or if assistance is required to implement controls, communicate with higher authority in the chain of command.

- Implement controls. The following measures can be used to eliminate hazards or reduce the degree of risk; Engineering controls, administrative controls, and personnel protective equipment.

- Supervise. Conduct follow-up evaluations of the controls to ensure they remain in place and have the desired effect. Monitor for changes, which may require further ORM. Take corrective action when necessary.

B. Mishap Classes (Ref b)

There are three different classes of mishaps identified by the Naval Safety Program; the level is determined by monetary means and injury classification.

- Class A. The resulting total cost of reportable material property damage is $2,000,000 or more; or an injury or occupational illness results in a fatality or permanent total disability.

- Class B. The resulting total cost of reportable material or property damage is $500,000 or more, but less than $2,000,000; or an injury or occupational illness results in permanent partial disability; or three or more personnel are inpatient hospitalized.

- Class C. The resulting total cost of reportable material or property damage is $50,000 or more, but less than $500,000; a non-fatal injury that causes any loss of time beyond the day or shift on which it occurred; or a non-fatal illness or disease that causes loss of time from work or disability at any time (lost time case). For reporting purposes, reportable lost workday Class C mishaps are those which result in 5 or more lost workdays beyond the date of injury or onset of illness (exceptions apply).

C. Personal Protective Equipment (PPE) (Ref c)

The PPE program was established as a last line of defense in the event of equipment breakdown, failure, misuse to include hazardous environments and working conditions that would immediately expose the worker to a hazard. This method is a last resort after trying to eliminate hazards through the preferred method of engineering controls.

Examples of types of PPE utilized in Naval Aviation are;

- Cranials. Incorporate impact protection, hearing protection and eye protection. Proper fit and wear are essential to the efficiency of this piece of PPE.

- Eye Protection. Impact resistant goggles or chemical goggles.

- Hearing Protection. Soft disposable, earmuffs.

- Impact Protection. Hard Plastic shells, with foam liner.

- Gloves. Protect the worker from a wide variety of conditions. Selection of appropriate hand protection is essential and is based on the application the individual will be involved in. Examples are: leather, rubber, welders.

- Foot Protection. Naval Aviation operates in a highly industrial environment and the need for foot protection is essential due to the wide variety of tasks that individuals could be tasked with on a daily basis. The minimum protective footwear requirements for Naval Aviation are; steel toed boots, ANSI approved, and FOD free soles.

Block V - Chemical, Biological and Radiological Warfare

References:

(a) OPNAV P-86-1-95, USN Chemical, Biological & Radiological (CBR) Defense/USMC Nuclear, Biological & Chemical (NBC) Defense Handbook,
(b) CNE-CBR-001, CBR and HAZMAT Identification, Protective Equipment and Measures, Navy Knowledge Online
(c) NTTP 3-20.31, Surface Ship Survivability
(d) NAVAIR 00-80T-121, Chemical and Biological Defense, NATOPS Manual

A. Overview (Ref a, b)

U.S. forces face a potential CBR threat across a broad range of military operations. The term “NBC environment” includes a deliberate or accidental employment or threat of NBC weapons attack with other CBR materials, including toxic industrial materials. The employment and threat of NBC weapons and other toxic materials pose unique challenges to U.S. military operations worldwide.

B. Chemical Warfare (Ref a, b, d)

Chemical Warfare is the employment of chemical agents that are intended for use in military operations to kill, seriously injure, or incapacitate personnel due to their physiological effect. Types of chemical agents are:

- Nerve Agents. Liquid casualty agents that disrupt nerve impulses to the body while damaging body functions rather than tissue. Examples are Sarin (GB), Tabun (GA), SOMAN (GD), and VX.

- Blister Agents. Liquid or solid casualty agents that can cause inflammation, blisters, and general destruction of tissues which often results in temporary blindness and/or death. Examples are Distilled mustard (HD), Lewisite (L), Phosgene Oxime (CX), and Levinstein Mustard (HL).

- Blood Agents. Gaseous casualty agents that attack the enzymes carrying oxygen in the blood stream. Rapid breathing or choking may occur due to lack of oxygen in the blood. Examples are Hydrogen Cyanide (AC), Cyanogen Chloride (CK), and Arsine (SA).

- Choking Agents. Gaseous or liquid casualty agents with initial symptoms that include; tears, dry throat, nausea, vomiting, and headache. The lungs can become filled with fluid, making the victim feel as if they are drowning, causing breathing to become rapid and shallow. Examples are Phosgene (CG) and Diphosgene.

M9 Chemical Agent Detector Paper. Detects the presence of liquid chemical agents by turning a red or reddish color, it does not detect chemical agent vapors.

Atropine/2-PAM-chloride Auto Injector. Used as specific therapy for nerve agent casualties, they are issued for intramuscular injection, self-aid or first aid.

C. Biological Warfare (Ref a, b, d)

Biological Warfare is the use of agents to cause disease, sickness, or death to reduce the effectiveness of opposing combatant forces is. The basic division in biological agents is between pathogens and toxins.

- Pathogens. The pathogens that could be used as biological agents include bacteria, rickettsia, viruses, fungi, protozoa and prions.

- Toxins. The categorization of toxins is based on the organisms (source) that produce them and the physiological affects the toxins cause in humans.

  - The major groupings by source are mycotoxins (which are from fungi), bacterial toxins, algal toxins, animal venoms and plant toxins.

  - The primary groups based on physiological effects are neurotoxins, cytotoxins, enterotoxins and dermatoxins.

D. Individual Protective Equipment (IPE) for Chemical/Biological Warfare (Ref a, b, c, d)

Training and awareness of personnel is the primary way to limit the chemical and biological warfare impact. To accomplish this all personnel shall have access to IPE while in the workstations and be aware of ventilation controls, fittings, and closures that must be set immediately prior to an attack.

The decision to employ IPE is the most important decision in the risk management of chemical agent environments. This is due to extended wearing of various items of IPE will result in varying degrees of degradation to individual performance. IPE for chemical/biological agent environments consists of:

- Protective mask MCU-2P with components (C-2 canister filter)

- Advanced chemical protective garment (ACPG)

- Chemical protective gloves and liners

- Chemical protective overboots and laces

- Skin decontamination kit

Medical self-treatment supplies are not considered IPE but are provided to complement the individual protection capability.

The phased employment of IPE is specified by the increasingly stringent levels of MOPP, maintaining the proper MOPP level as dictated by the tactical situation and environment is paramount.

E. Radiological Warfare (Ref a, b, c)

Radiological Warfare is the deliberate use of radiological weapons to produce widespread injury and death of all life. Types of nuclear explosion are:

- High altitude air burst occurs at altitudes in excess of 100,000 feet, with ionosphere disruptions and EMP.

- Air burst where fireball does not reach the surface. The vacuum created collects debris caused by the severe blast damage resulting in radiation fallout.

- Surface Burst has the worst fallout due to the fireball touching the surface which results in massive radioactive fallout.

- Shallow underwater burst has a small fireball and blast wave however, it causes large waves and water contamination.

- Deep underwater burst is similar to the shallow underwater burst but with less visual effect and yields greater contaminated water.

Shipboard shielding stations are categorized as either ready or deep-shelter stations.

- Ready-shelter stations are just inside the weather envelope, with access to deep shelter. They provide minimum shielding from nuclear radiation and allow the crew to remain close to battle stations.

- Deep-shelter stations are low in the ship and near the centerline. They provide maximum shielding from nuclear radiation, often requiring personnel to be far removed from battle stations.

DT-60 dosimeter is a non-self reading high range casualty dosimeter, which has to be placed in a special radiac computer-indicator to determine the total amount of gamma radiation to which the wearer is exposed in the 0-600 roentgens.

A. Mission Oriented Protective Posture (MOPP) (Ref a, b, c, d)

MOPP is a management tool that is used to coordinate the use of systems and equipment in Chemical or Biological environment. Full protective clothing and equipment will not be necessary in all CB threat scenarios and using the full IPE could result in unacceptable personnel performance degradation.

- MOPP level 0. Issue IPE, accessible within five minutes.

- MOPP level 1

    - Afloat. JSLIST, MASK, Gloves readily accessible.

    - Ashore. Don protective equipment, M9 tape.

- MOPP level 2

    - Afloat. Mask carried, decon supplies stage.
    - Ashore. Additional to level 1 is don protective over-boots.

- MOPP level 3

    - Afloat. GQ, install filters, don over-boots.

- Ashore. fill canteens, activate decon stations.

- MOPP level 4

  - Afloat. Don mask/hood, gloves, Circle William, countermeasure washdown.

  - Ashore. Gloves with liners, untie bow in retention cord, loop between legs and secure to web belt.

Block VI - Firefighting Fundamentals

References:

(a) NAVAIR 00-80R-14/NATOPS
(b) NAVEDTRA 14014, AIRMAN

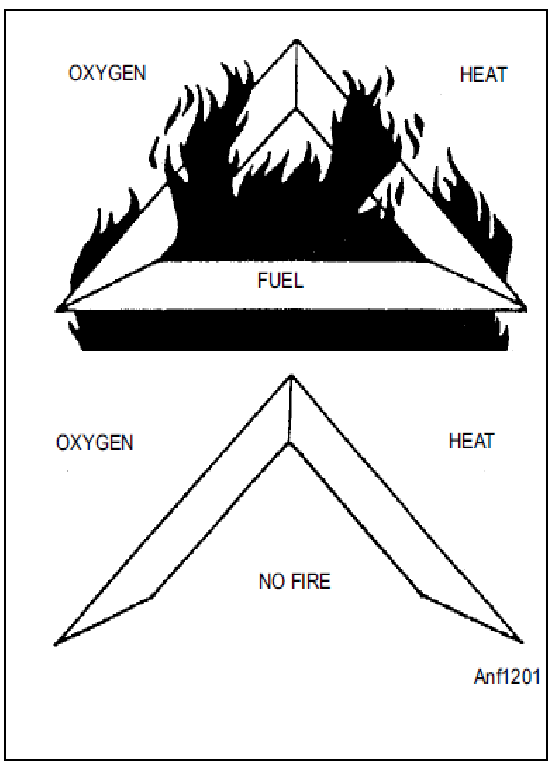
A. Overview (Ref a, b)

The primary duty of the firefighter is saving lives. The secondary responsibility is to extinguish fires and limit the damage to aircraft, shipboard, airfield installed equipment, and/or airfield structures.

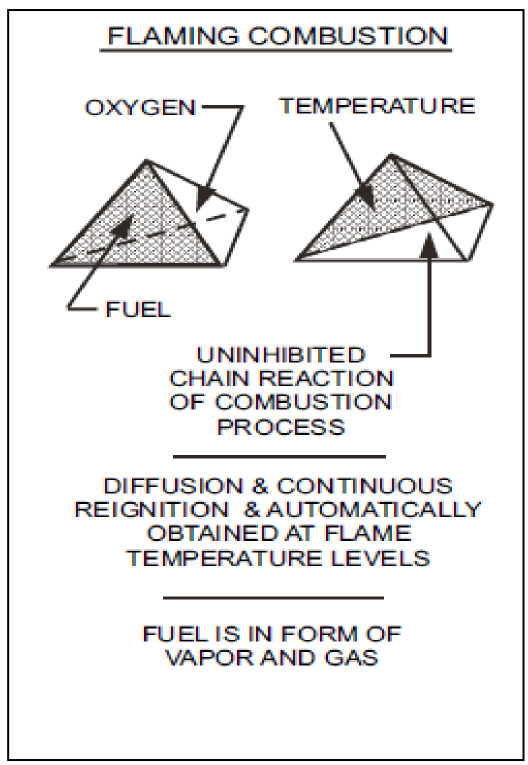
B. Fire Composition and Types (Ref a, b)

The fire triangle is a simple model that includes heat, fuel, and oxygen as the key components. It has been replaced in the fire fighting and protection industry partially by the fire tetrahedron.

Research in the past 30 years has indicated the presence of a fourth critical element which is the chemical chain reaction that takes place in a fire and allows the fire to both sustain itself and grow. The addition of a fourth element is what makes the triangle become a tetrahedron. The removal of any one of the elements prevents or extinguishes a fire.



Fire Triangle



Fire tetrahedron

Fires are divided into four classes. Each class has special characteristics and therefore requires different methods of extinguishment. It is very important to use the correct extinguishing method on each class of fire.

- Class Alpha Fires. Occur in combustibles materials that produce an ash such as burning wood and wood products, cloth, textiles and fibrous materials, and paper products. Effective extinguishing agents are water (H_2O) or Aqueous Film Forming Foam (AFFF).

- Class Bravo Fires. Occur with flammable liduid substances such as gasoline, jet fuels, oil, and other petroleum based products. Effective extinguishing agents are AFFF, Halon 1211, Purple K Powder (PKP) and Carbon Dioxide (CO_2).

- Class Charlie Fires. Are energized electrical fires that are attacked by using non-conductive agents. Effective extinguishing agents are:

  - Energized. CO_2, Halon, PKP, and H_2O in fog patterns with a minimum distance of 4 feet.

  - De-energized. Treat as a Class A, B, or D fire.

- Class Delta Fires. Combustible metals such as magnesium and titanium. Effective extinguishing agents are H_2O in large quantities in high velocity fog, apply water from a safe distance or from behind shelter as small explosions can occur.

C. Firefighting Agents and Equipment (Ref a, b)

Aqueous Film Forming Foam (AFFF). AFFF liquid concentrates consist primarily of synthetic fluorocarbon surfactant materials that are noncorrosive and have an unlimited shelf life when stored in a protected area. Three-percent and six-percent AFFF concentrate is approved for naval use. Current shipboard equipment requires six-percent concentrate.

Water(H_2O). Water is not generally considered to be a suitable agent for use in combating large aircraft fuel fires without the addition of either foam agents or surfactants. It has the ability, when properly applied, to cool the aircraft fuselage and provide a heat shield for personnel. Water is also an effective agent for cooling ordnance, batteries, and Class A fires.

Halon 1211 (Bromochlorodifluoromethane). Intended primarily for use on Class B and C fires; however it is effective on Class A fires. Halon 1211 is a colorless, faintly sweet smelling, electrically nonconductive gas that leaves no residue to clean up. Halon 1211 extinguishes fires by inhibiting the chemical chain reaction of the combustion process.

Carbon Dioxide 15-Pound Portable Units and 50-Pound Wheeled Extinguisher Units. These units are intended primarily for use on Class B and C fires. CO_2 is a colorless, odorless gas that is approximately one and one-half times heavier than air. Fire suppression is accomplished by the displacement of oxygen to below the level that is required to support combustion.

Potassium Bicarbonate (Purple-K-Powder or PKP). PKP is intended primarily for use on Class B fires. The principal chemical in PKP is potassium bicarbonate and the dry chemical extinguishes the flame by breaking the combustion chain. It does not have cooling capabilities, therefore it will not result in permanent extinguishing (reflash protection) if ignition sources are present.

Block VII – Airfield and Flight Deck Familiarization

References:

(a) NAVAIR 00-80T-105 CV NATOPS
(b) NAVAIR 00-80T-106 LHA/LHD NATAOPS
(c) NAVAIR 00-80T-113 AIRCRAFT SIGNALS NATOPS

A. Overview and Safety (Ref a, b)

Airfield Familiarization. Airfield familiarization is essential to personnel learning how to perform their duties for their personal safety and the safety of the aircrew. The interaction between, people, vehicles, support equipment and aircraft in the airfield environment requires all personnel to have a good working knowledge of the airfield and its unique features.

Safety Guidelines. extensive flight line training is given for the airfield environment however the safety concerns are the same as the flight deck. Jet blast, rotor arcs, propellers and jet intakes are potentially life threatening while being FOD free, wearing your PPE, being qualified, and keeping your head on a swivel are essential to safely working on the flight line.

Safety Equipment. Anytime personnel are working on the flight line they will be issued the proper safety equipment. The required flight line protective equipment will include the following items:

- Flight deck (steel-toed) safety shoes
- Cranial impact helmet
- Protective eye goggles
- Leather gloves.

B. Airfield Components (Ref a, b, c)

Runways. Paved areas that are used for aircraft takeoff and landing. Runways vary in length at each airfield as determined by the aircraft sizes and weights that will be utilizing them.

Threshold Markings. These are parallel stripes on the ends of the runways. The stripes are 12 feet wide by 150 feet long and designate the landing area.

Overrun Area. Paved or un-paved section on the ends of the runways that provide a reasonably effective deceleration area for aborting or overshooting aircraft.

MA-1 Series Overrun Barrier. Designed to stop tricycle landing gear equipped aircraft not equipped with tail hooks. The MA-1A is always in a standby status, in case there is an aborted takeoff or an emergency overrun landing.

Emergency shore based recovery equipment. Used during in-flight emergencies that require stopping the aircraft during landing in the shortest distance possible to minimize the chance of injury to pilot or aircrew and damage to the aircraft.

Taxiways. Paved areas for aircraft to move between parking aprons, runways, and airfield services.

Parking Apron. Open paved areas adjacent to hangers, fuel, services often called the flight line. Used for parking, servicing, and loading aircraft; they are connected to the runways by taxiways.

Compass calibration pad (Compass Rose). A paved area in a magnetically quiet area where the aircraft compass is calibrated.

Runway numbering system. Runways are normally numbered in relation to their magnetic heading rounded off to the nearest 10 degrees, i.e., a runway heading of 250 degree is runway 25. If there are 2 runways whose centerline is parallel, the runway will be identified as L (left) and R (right) or 25L or 25R, if there are 3 parallel runways C (center) is added.

Airfield rotating beacon. When the airport is below VFR weather conditions, day or night, the airport rotating beacon is used to identify the airport's location. It rotates clockwise at a constant speed and military airfields use 2 white lights and one green flashing 12 to 15 times per minute.

B. Flight Deck Familiarization (Ref a, b, c)

The carrier flight deck is one of the most hazardous portions of real estate on the planet therefore proper training, qualification, and awareness of your surroundings in essential when working in this highly dangerous environment.

Safety. While exhaustive training in flight deck safety is beyond the scope of this text; a few of the hazards and safety concerns are oil, grease, and fuel which create slip hazards on the deck and ladderwells. Also jet intakes and exhaust, rotor and propellers arcs are the life threatening hazards present during flight operations. The vast myriad of hazards to personnel and equipment underline the importance PPE and situational awareness have on flight deck safety.

Safety Equipment. Anytime personnel are required to work on the flight deck they will be issued the proper safety equipment. The required flight deck protective equipment will include the following items:

- Flight deck (steel-toed) safety shoes

- Protective jersey

- Cranial impact helmet

- Protective eye goggles

- Leather gloves

Color Coded Classification System. Those crewmembers who do have specific, clearly defined functions will be readily recognizable at a glance by the colored coded jerseys and helmets that denote their role. The color classification system is as follows:

- Yellow Jerseys. Aircraft Handling Officer, Flight Deck Officer, Catapult Officer, Air Bos'n, Arresting Gear Officer and Plane directors.

- White Jerseys. Safety department, Air Transport Officer, Landing Signal Officer, Squadron Plane Inspectors (troubleshooters) and medical.

- Brown Jerseys. Plane captains.

- Blue Jerseys. Aircraft Handling and Chock Crewman (Chocks, Chains and Tractors) and Elevator Operators.

- Green Jerseys. Catapult and Arresting Gear personnel, Squadron Aircraft Maintenance personnel, Helicopter Landing Signal Enlisted-man and Photographers.

- Red Jerseys. Crash and Salvage, Explosive Ordnance Disposal, and Ordnance handling personnel.

- Purple Jerseys. Aviation fuel crew.

Deck Edge Fire Fighting Symbols. In addition to knowing the required flight deck safety equipment it's also important to your fire fighting agents. You may be the first one on the scene of a fire on the flight deck and knowing the identification, function, and location of the various fire fighting agents could make the difference between extensive material damage/death of minimal injury. The fire fighting agents include:

- Purple K Powder (PKP). Identified by a 12-inch wide red stripe with a white 3-inch high "PKP" stenciled in the center of the stripe on the wheel stop coaming. At locations where coamings are not installed, a white 18-inch diameter circle with red 5-inch high "PKP" letters is painted on the flight deck.

- Saltwater Stations. Identified by an 18-inch wide red stripe with a yellow 3-inch high "W" stenciled in the center of the stripe on the wheel stop coaming. At locations where coamings are not installed, a red triangle 18-inches per side with a yellow "W" is painted on the flight deck.

- CO_2 Bottle Stowage. Identified by a 12-inch wide red stripe with a white 3-inch high "CO_2" stenciled in the center of the stripe on the wheel stop coaming. At locations where coamings are not installed, a white 18-inch diameter circle with a red 5-inch high "CO_2" is painted on the flight deck.

- AFFF Station. Identified by an 18-inch wide green stripe with white 3-inch high "AFFF" stenciled in the center of the stripe on the wheel stop coaming. At locations where coamings are not installed, a green 18-inch square with white 3-inch high "AFFF" letters is painted on the flight deck.

- Bomb Jettison Ramp. Ramps designated to eliminate loose ordinance will have a yellow stripe painted up and over the deck edge at both ends of the ramp opening. The flight deck in front of the ramp opening is marked with alternating 4-inch wide red and yellow stripes with a 12-inch black facsimile of a bomb centered.

- Steam Smothering. Identified by an 18” black stripe with a 3” white ”STEAM” stenciled in the center of the stripe on the wheel stop coaming.

Block VIII – Aircraft Handling Fundamentals

References:

(a) NAVEDTRA 14014, Airman
(b) A1-F18EA-NFM-600, NATOPS Servicing Checklist

A. Safety (Ref a)

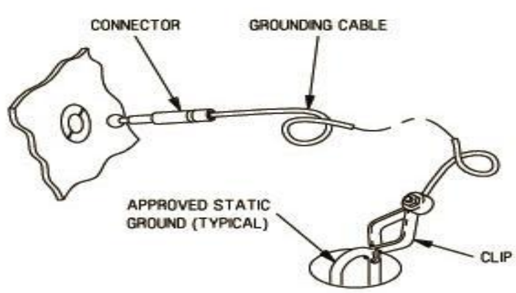
Aircraft handling is a part of day to day operations in the aviation community. Because this is a daily part of our jobs it is easy to become complacent and overlook the ever present dangers. However, combating complacency with training and constant attention to the danger areas can increase the safety margin of personnel and equipment.

One often overlooked aspect of aircraft handling is the use of support equipment (SE) to service, test and troubleshoot aircraft systems. Vehicles should never pass under any part of a parked aircraft and all vehicles should be driven or parked adjacent to aircraft to prevent collision due to inadvertent movement of SE. If it is necessary for the SE to have the motor running the SE must be manned at all times.

Danger areas for aviation include intakes, exhaust, flight controls, compressed gases, cryogenics, explosives, hazardous materials, eye, hearing and other industrial environment dangers. Knowledge of the dangers areas related to the aircraft platform, ship, and airfield should be stressed to all personnel engaged in aviation related duties.

B. General Aircraft Handling (Ref a, b)

Aircraft static grounding discharges the static electricity harmlessly to the earth or deck. Aircraft generate static electricity while in flight or during operation of internal electrical equipment. The procedures for grounding are to first hook up a grounding strap to a certified static ground and then to the aircraft grounding receptacle. Extra care must be taken to always hook the grounding strap to the deck first, failure to do so could cause the discharge of electricity through the person holding the strap.



Windshield static grounding is necessary because during flight a high voltage (100,000 volts) static electrical charge may build up and be stored in the windshield. After flight or prolonged exposure to high winds on deck, static charge build up must be discharged using a static charge removal kit before personnel can safely touch the windshield.

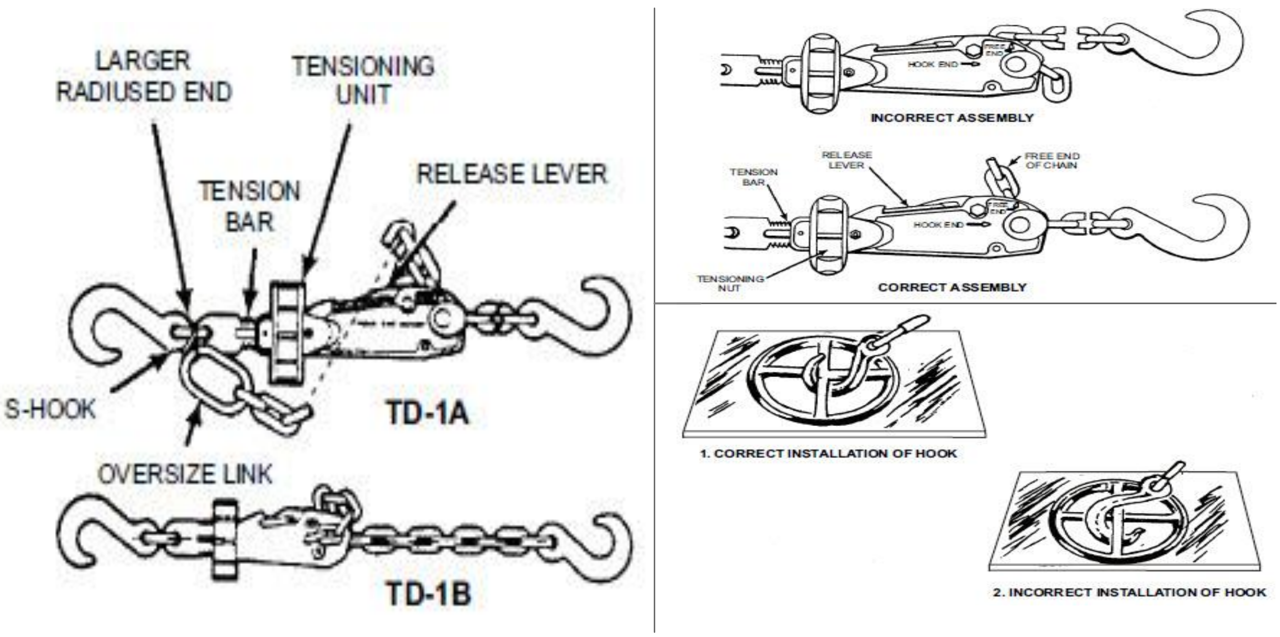
Aircraft have to tied down to the deck when not in use and during maintenance evolutions. The wind velocity determines which category of tie-down must be used for securing the aircraft. The categories are:

- Up to 45 Knots. Initial tie-down: a minimum of 6 chains are required, initial tie-down is used immediately prior to, in between, or immediately after flight.

- Up to 45 Knots. Normal weather tie-down, 9 chains required.

- 46 to 60 Knots. Moderate weather tie-down, 14 Chains required.

- Above 60 Knots. Heavy weather tie-down, 20 Chains required.



Aircraft critical walkways that cannot be walked on are identified by “NO STEP” markings. The use of fragile materials is usually the cause of the step restriction; if work has to be performed on these areas the use of a maintenance stand is required.

Aircraft hand signals are the way we communicate in the high tempo high noise environments of naval aviation. Each type of fixed wing aircraft has variations of the standard hand signals and memorizing the applicable signals for your aircraft is highly important. Regardless of aircraft type when giving hand signals keep the hands well separated; as it is better to exaggerate a signal than to make it in such a manner that it may be misinterpreted.

When directing fixed wing aircraft the only mandatory signal regardless of aircraft type is “emergency stop”. Likewise for rotary wing aircraft the signals “wave-off” and “hold” cannot be changed due to platform variations. The requirement for standardization is due to these signals being critical to the safety of aircraft, aircrew, and ground personnel.

C. Aircraft Towing and Handling Team (Ref a, b)

Towing or re-spotting an aircraft has inherent risks for damage to personnel or equipment, therefore proper training and understanding of towing/re-spotting procedures are essential.

Towing speed shall not exceed 5 mph or the speed of the slowest walker. During cold weather towing avoid excessive power and sudden movement of tow vehicle. High breakaway loads imposed by snow, ice, or frozen tires may result in damage to landing gear.

The Movement of aircraft is accomplished by a team of six to ten personnel with each person being assigned a specific task in the moving evolution. The personnel assigned to the move crew are;

- Move Director. Overall responsible for assembling the move crew, ensuring they are properly qualified to perform their duties, pre move briefing, safe movement of the aircraft with an emphasis on safety.

- Brake Rider. Conducts a pre-move inspection of brake system and aircraft to ensure it is mechanically sound and ready for movement.

- Chock Walker. Responsible for removing, carrying and installing the wheel chocks. This individual escorts the aircraft while being moved and is always alert and ready to chock the aircraft.

- Safety Observers. Primarily responsible for ensuring that the aircraft is ready to be towed and that there is ample clearance for the aircraft. The safety observers are positioned at the wing tips and tail of the aircraft.

- Tractor Driver. Responsible for the safe and slow movement of the aircraft from hook up to the final parking spot. This individual is responsible directly to the Move Director and must be fully qualified and licensed for the equipment they are operating.

Block IX – Security and Force Protection

References:

(a) NWP 3-07.2, Navy Doctrine for Antiterrorism/Force Protection
(b) DoD Instruction 2000.16 (series), "DoD Antiterrorism (AT) Standards"

A. Overview (Ref a, b)

Each region of the Navy has an office that manages Force protection. The Public Safety, Force Protection Program Offices provide management, coordination, and leadership to ensure that each mission is met with an appropriate capability. Some of the departments used to accomplish this are Personnel Management, Antiterrorism, Counter Intelligence, Electronic Security, Investigations, Law Enforcement, and Physical Security.

As a result of attacks in the past, multiple scales were developed to identify the threat conditions and defense postures required based on threats that are identified. While the *THREATCON* scale determines the condition for defense of the United States homeland and assets abroad, the *DEFCON* scale determines the posture of the military to prepare for the likelihood of war.

B. Force Protection Measures (Ref a)

Force protection conditions (FPCONs) are a series of measures designed to increase the level of a unit's defense against terrorist attacks. FPCONs are not aimed at specific threats, but are selected based on a combination of the following factors:

- The terrorist threat level.

- The capability to penetrate existing physical security systems.

- The risk of terrorist attack to which personnel and assets are exposed.

- The asset's ability to execute its mission even if attacked.

- The protected asset's criticality to their missions.

Commanders at any level can set the FPCON level; subordinate commanders can set a higher FPCON if the local situation warrants. FPCON measures are mandatory when declared, are implemented immediately and can be supplemented by additional measures. The declaration, reduction and cancellation of a FPCON remain the responsibility of the commander issuing the order. Each FPCON is briefly described below:

- FPCON NORMAL applies when a general global threat of possible terrorist activity exists and warrants a routine security posture.

- FPCON ALPHA applies when there is an increased general threat of possible terrorist activity against personnel or facilities, the nature and extent of which are unpredictable. Alpha measures must be capable of being maintained indefinitely.

- FPCON BRAVO applies when an increased or more predictable threat of terrorist activity exists. Sustaining Bravo measures for a prolonged period may affect operational capability and relations with local authorities.

- FPCON CHARLIE applies when an incident occurs or intelligence is received indicating some form of terrorist action or targeting against personnel or facilities is likely. Prolonged implementation of Charlie measures may create hardship and affect the activities of the unit and its personnel.

- FPCON DELTA applies in the immediate area where a terrorist attack has occurred or when intelligence is received that terrorist action against a specific location or person is imminent. Normally, this FPCON is declared as a localized condition, also FPCON Delta measures are not intended to be sustained for substantial periods.

B. Defense Readiness Condition (Ref a)

A defense readiness condition (DEFCON) is an alert posture used by the United States Armed Forces. The DEFCON system was developed by the Joint Chiefs of Staff, unified, and specified combatant commands. The system prescribes five graduated levels of readiness (or states of alert) for the U.S. military, and increase in severity from DEFCON 5 (least severe) to DEFCON 1 (most severe) to match varying military situations.

DEFCONs are a subsystem of a series of Alert Conditions (LERTCONS) along with EMERGCONs, WATCHCONs, and FPCONs. The different levels of Defense Conditions are described briefly below:

- DEFCON 5: Normal peacetime readiness.

- DEFCON 4: Normal, increased intelligence and strengthened security measures.

- DEFCON 3: Increase in force readiness above normal readiness.

- DEFCON 2: Further Increase in force readiness, but less than maximum.

- DEFCON 1: Maximum force readiness.

Block X – Naval Aviation Maintenance Program (NAMP)

References:

(a) COMNAVAIRFORINST 4790.2 (Series), Naval Aviation Maintenance Program

A. Overview (Ref a)

The objective of the NAMP is to achieve and continually improve aviation material readiness and safety standards established by the CNO/COMNAVAIRFOR, with coordination from the CMC, with optimum use of manpower, material, facilities, and funds. Since all maintenance activities have similarities in mission, operation, and administration, these areas have standardized organization and administration. The NAMP helps to standardize operations of any naval aviation command. The Chief of Naval Operations is in charge of the NAMP.

B. Aviation Maintenance Personnel (Ref a)

Naval aviation maintenance includes hundreds of personnel per command; however there are key personnel in every maintenance organization that drive the production effort. The following list briefly described their duties and responsibilities.

- Maintenance Officer (MO). As head of the Maintenance Department, the MO manages the department and is responsible to the CO for the accomplishment of the department's mission. CV IMA MOs shall also coordinate the Air Wing Training Plan to ensure billet requirements, personnel identification, and assignments are satisfied.

- Assistant Maintenance Officer (AMO). Assistant head of the maintenance department. The AMO shall assist the MO in the performance of duties and keep the MO fully informed of matters concerning the department. Additionally the AMO coordinates temporary assigned duty personnel, inspects spaces, acts as the administrative officer in their absence, liaisons with the Operations department, manages the SE training and licensing program (O-level), utilize NTMPS/FLTMPS for manpower management and additional duties as defined in the NAMSOPS.

- Maintenance/Material Control Officer (MMCO). Responsible for the overall production and material support of the department. The MMCO coordinates and monitors the department workload while maintaining liaison with supporting activities and the Supply Department to ensure requirements and workload are known and satisfied. Additionally the MMCO is responsible for preparing and publishing the MMP.

- Maintenance Master Chief Petty Officer (MMCPO). Senior Enlisted Advisor for the Maintenance Department, reports to the MO and advises the CO in all matters affecting aircraft operations, aircraft maintenance, and department personnel. The MMCPO directs all maintenance in an operational unit on a day-to-day basis in support of its operations and assigned missions. The MMCPO’s charter is to maintain assigned aircraft and aeronautical equipment in an RFT status while providing training for those in the Maintenance Department to improve the maintenance process.

- Quality Assurance Officer (QAO). QAO will ensure personnel assigned to perform QA functions receive continuous training in inspecting, testing, and quality control methods specifically applicable to their area of assignment. The QAO will also ensure QARs receive cross training to perform those QA functions not in their assigned area. This training should include local training courses, OJT, rotation of assignments, PQSs, and formal schools.

- Material Control Officer (MCO). Supply corps officers assigned to a deployable squadron will be assigned as the MCO for the handling of finances, material requisition etc..

C. Maintenance Concepts (Ref a)

The NAMP is founded upon the three-level maintenance concept and is the authority governing management of O-level, I-level, and D-level aviation maintenance. It provides the management tools required for efficient and economical use of personnel and material resources in the performance of maintenance. It also provides the basis for establishing standard organizations, procedures, and responsibilities for the accomplishment of all maintenance on naval aircraft, associated material, and equipment. The three levels of maintenance are:

- O-Level. Maintenance which is performed by an operating unit on a day-to-day basis in support of its own operations. The O-level mission is to maintain assigned aircraft and aeronautical equipment in a full mission capable status.

- I-level. The I-level maintenance mission is to enhance and sustain the combat readiness and mission capability of supported activities by providing quality and timely material support at the nearest location with the lowest practical resource expenditure.

- D-level. Performed at or by FRC sites to ensure continued flying integrity of airframes and flight systems during subsequent operational service periods. D-level maintenance is also performed on material requiring major overhaul or rebuilding of parts, assemblies, subassemblies, and end items. It includes manufacturing parts, modifying, testing, inspecting, sampling, and reclamating. FRC sites support O-level and I-level maintenance by providing engineering assistance and performing maintenance beyond their capabilities.

The two types of maintenance described in the NAMP are rework and upkeep. Rework is the restorative or additive work performed on aircraft, aircraft equipment, and aircraft SE at FRCs, contractors' plants, and such other industrial establishments designated by TYCOMs. Upkeep is the preventive, restorative, or additive work performed on aircraft, equipment, and SE by operating units and aircraft SE activities.

First we will focus on the upkeep maintenance; there are many different inspections that fall into this category, below is a short list of the types of upkeep inspections/maintenance.

- Turnaround. Conducted between flights to ensure the integrity of the aircraft for flight, verifies proper servicing, and detects degradation that may have occurred during the previous flight. Good for 24 hours, provided that no flight occurs during this period and no maintenance other than servicing was performed.

- Daily. Conducted to inspect for defects to a greater depth than the turnaround inspection. It is valid for 72 hours without flight or major maintenance and the aircraft can be flown for 24 hours before another daily is needed as long as it does not surpass the 72 hour time limit.

- Special. This inspection is a scheduled inspection with a prescribed interval other than daily or phase. The intervals are specified in the applicable PMS publication and are based on elapsed calendar time, flight hours, operating hours, or number of cycles or events, for example, 7, 28 days; 50, 100, 200 hours; 10, 100 arrestments; or 5,000 rounds fired. In some cases, aircraft special inspections contain within them engine inspection requirements. They are referred to as combined airframe and engine special inspections.

- Conditional. Conditional maintenance requirements are unscheduled events required as the result of a specific overlimit condition, or as a result of circumstances or events which create an administrative requirement for an inspection.

- Phase. This inspection divides the total scheduled maintenance requirement into smaller packages, or phases of the same work content. These are done sequentially and at specified intervals.

- Acceptance. Performed at the time a reporting custodian accepts a newly assigned aircraft or support equipment from any source and on return of an aircraft from SDLM or other major depot level maintenance.

- Transfer. Performed at the time a reporting custodian transfers an aircraft or support equipment.

Second is rework maintenance, since rework is a more intensive type of maintenance it is performed at D-Level.

- Reliability centered maintenance (RCM). A process to ensure that assets continue to do what their users require in their present operating context. The military adopted the RCM from the commercial aviation industry in the mid-1970s. As a result we now have different types of rework maintenance modeled after the RCM concept such as the Aircraft Service Period Adjustment (ASPA) and Periodic Maintenance Interval (PMI).

D. Maintenance and Production Control (Ref a)

Management is defined as "the efficient attainment of objectives," and maintenance as, "all actions taken to retain material in a serviceable condition or to restore it to serviceability". When combined, maintenance management can be defined as "the actions necessary to retain or restore material or equipment to a serviceable condition with a minimum expenditure of resources". It is the responsibility of every maintenance manager to manage resources in an efficient manner.

The main difference between maintenance control and production control is the level of maintenance at which the duties are performed. Maintenance control is at the O-level and production control is I-level. Requirements for being qualified to perform the duties of maintenance and production control differ in the schools required to be qualified for the duties prescribed in the NAMP.

Two of the most critical aspects in naval aviation are the release of an aircraft safe for flight and the acceptance of the aircraft. Both of these functions carry a great deal of importance and go hand in hand to ensure the safety of the aircrew and the aircraft. The person certifying a safe for flight condition has the overall responsibility to provide the aircrew with the best product available.

Monthly Maintenance Plan (MMP). The purpose of the MMP is to provide scheduled control of the predictable maintenance workload, for example, inspections, transfer or receipt of aircraft, and compliance with TDs. By scheduling predictable maintenance, the capability for accomplishing unscheduled work can be determined. In addition, requirements for SE, material, manpower, and other factors affecting the maintenance operation can be determined in advance of actual need. It is prepared and distributed by the 25th of each month at the O-level and the 1st of each month at I-level.

Aircraft logbook. The logbook is a hard bound record of equipment, inspections, scheduled removal items, and installed equipment. Each aircraft logbook shall have a record of rework, major repairs, flight and operational data; also included in the logbook is a record of maintenance directives affecting the aircraft, its components, and accessories.

Each logbook is broken down into different sections; they are Non-aging record, Flight time, Inspection records, Repair/Rework, Technical Directive, Miscellaneous History, Preservation and De-preservation record, Installed Explosive Devices, Inventory Record, Assembly Service Record, Equipment History Record, Scheduled Removal Components cards (SRCs), Aviation Life Support System records, and Aeronautical Equipment Service Records (AESRs).

E. Quality Assurance (QA) (Ref a)

Quality Assurance (QA). The QA concept is fundamentally the prevention of the occurrence of defects. The concept embraces all events from the start of the maintenance operation to its completion and is the responsibility of all maintenance personnel. The achievement of QA depends on prevention, knowledge, and special skills. The principle of prevention is that it is necessary to preclude maintenance failure. This principle extends to safety of personnel, maintenance of equipment, and virtually every aspect of the total maintenance effort. Prevention is about regulating events rather than being regulated by them.

QA is a relatively small group of highly skilled personnel. The permanently assigned personnel under the QA Officer are responsible for conducting and managing the department's QA effort. Different levels of inspectors are included in the Quality Assurance organization, they are:

- Quality Assurance Representative (QAR). The maintenance personnel assigned to QA are known as QARs, They certify that the work involved has been personally inspected by them; it has been properly completed, and is in accordance with current instructions and directives.

- Collateral Duty QAR (CDQAR). Although CDQARs are assigned to production work centers, they function in the same capacity as QARs and must meet the same qualifications. CDQARs may be assigned on a temporary or permanent basis.

- Collateral Duty Inspector (CDI). CDIs assigned to production work centers are to inspect all work and comply with the required QA inspections during all maintenance actions performed by their respective work centers. They are responsible to the QA Officer when performing such functions. CDIs will spot check all work in progress and will be familiar with the provisions and responsibilities of the various programs managed and audited by QA.

QA manages and monitors many programs in the maintenance department, they insure the workcenters and personnel are doing maintenance in accordance with the NAMP and all applicable instructions. The programs managed by QA are:

- Central Technical Publications Library (CTPL). It provides a central source of up-to-date information for use by all personnel in the performance of their work, and it is an excellent source of reference information to facilitate personnel training and individual improvement.

- Maintenance Department/Division Safety. QA is assigned overall responsibility for Maintenance Department safety; however the intent is not to conflict with any portion of the activity's overall safety program but to assist in coordination of the total safety effort. QA’s duties within the departmental/divisional safety scope are to disseminate safety posters/literature, report all hazards/mishaps/ unsafe practices within the department, conduct safety meetings at least monthly, and to coordinate with the Aviation Safety Officer.

Quality Assurance Audit Program. Auditing is an assessment of the effectiveness of programs managed within the Maintenance Department. Audits serve as an orderly method of identifying, investigating, and correcting deficiencies on a scheduled and unscheduled basis. The CSEC is a tool used by QA during the audits that provides a standardized objective measurement tool to conduct audits. There are three types of audits that QA performs;

- Special. Conducted to evaluate specific maintenance tasks, processes, procedures and programs. They may be requested by the work center at any time or when a new work center supervisor is assigned. Copies of audits are held for one year.

- Workcenter. Conducted semi-annually to evaluate the overall quality performance of each work center. All areas of the work center are evaluated including personnel, monitored and managed programs, logs and records, licenses, etc..

- Program audits. evaluate specific programs, providing a systematic and coordinated method of identifying deficiencies and determining adequacy of and adherence to technical publications and instructions. QA shall audit the programs, at a minimum, annually.

SE Misuse/Abuse. Proper operation of SE is the key to safe and efficient aircraft/equipment maintenance. Improper use of SE has resulted in personnel injury, excessive ground handling mishaps, repair, replacement costs, and reduced operational readiness. All personnel operating SE must be fully knowledgeable of operational characteristics, safety precautions, emergency procedures, and be qualified/licensed for designated T/M/S.

Aircraft Confined Space Program (ACSP). The objective of the ACSP is to ensure a safe environment is maintained when working on aeronautical equipment fuel cells and tanks. Activities not having a sufficient demand for entry authority (EA) services use the services of the supporting FRC site EA.

Naval Aviation Maintenance Reporting Program (NAMDRP). QA maintains the program binder and assists with the reporting of substandard workmanship, improper QA procedures, and deficiencies in material and publications.

Block XI – Naval Air Training and Operating Procedures Standardization (NATOPS)

References:

(a) A1-F18EA-NFM-000, NATOPS Flight Manual F/A-18 E/F
(b) A1-E6AAB-NFM-000, NATOPS Flight Manual E-6B
(c) A1-C2AHA-NFM-000, NATOPS Flight Manual C-2A

A. Overview (Ref a, b, c)

The Naval Air Training and Operating Procedures Standardization (NATOPS) Program is a positive approach toward improving combat readiness and achieving a substantial reduction in the aircraft mishap rate. Standardization, based on professional knowledge and experience, provides the basis for development of an efficient and sound operational

B. NATOPS History (Ref a, b, c)

NATOPS was established by the United States Navy in 1961 as a positive approach towards improving combat readiness and achieving a substantial reduction in naval aircraft mishaps. In 1950 the US Navy/Marine Corps lost 776 aircraft (roughly 2 airplanes per day or a rate of 54 major mishaps per 10,000 flight hours). Numerous technical initiatives, including the angled flight deck in 1954, and standardization programs, were credited with significantly reducing the rate to 19 major mishaps per 10,000 flight hours by 1961, and further to 9 by 1970 (the current rate, for comparison, is under 2 major mishaps per 10,000 flight hours).

A lack of standardization and training in both maintenance and flight operations was cited as causal in a large percentage of mishaps. Several standardization programs were initiated in the late 50's and early 60's to counter this problem. The first was the Naval Aviation Maintenance Program (NAMP) in 1959. Prior to the NAMP, aircraft maintenance practices were completely non-standardized. The second standardization initiative began in 1961 with the introduction of the Fleet Replacement Squadron (FRS) program. FRSs indoctrinate newly designated aircrew and aircraft mechanics into the peculiarities of specific aircraft. Prior to the FRS concept, qualified pilots transitioning to a new aircraft were essentially told how to start it, and then sent to go fly. The final major standardization program put in place was NATOPS in 1961.

B. NATOPS Information (Ref a, b, c)

Since NATOPS is a manual designed to standardize procedures for operating an aircraft we use it for events where the operation of a system or the aircraft is needed. One of the most dangerous times for maintenance and personnel is during engine start, operation, and shutdown. Below are the procedures as outlined in the NATOPS:

- Before starting an engine, the wheels of the aircraft shall be chocked and the parking brake set unless a deviation from this requirement is specifically authorized by the applicable model NATOPS manual.

- Where applicable, intake screens shall be installed on jet aircraft.

- Prior to starting jet engines, intakes and surrounding ground/deck shall be inspected to eliminate the possibility of Foreign Object Damage (FOD).

- When an engine is started by non-pilot personnel for testing and warm-up purposes on aircraft other than transport and patrol class equipped with parking brakes, the plane shall be tied down.

- Whenever an engine is started, personnel with adequate fire extinguishing equipment, if available, shall be stationed in the immediate vicinity of the engine but safely clear of intakes or propellers.

Standardization also included the terms and phrases we use in naval aviation speech and literature, the following is a brief list of meaning for terms used in the NATOPS Manual:

- Warning. An operating procedure, practice, or condition, etc., that may result in injury or death if not carefully observed or followed.

- Caution. An operating procedure, practice, or condition, etc., that may result in damage to equipment if not carefully observed or followed.

- Note. An operating procedure, practice, or condition, etc., that must be emphasized.

- Shall. means a procedure that is mandatory.

- Should. Means a procedure that is recommended.

- May. "May" and "need not" mean the procedure is optional.
- Will. Indicates futurity and never indicates any degree of requirement for application of a procedure.

The visual identification system for naval aircraft provides for the assignment of aircraft markings and side numbers that identify aircraft of one unit from those of another using unit identification assigned by the CNO. The system provides a means of rapid identification of Navy and marine aircraft that is simple, flexible and readily adaptable to expansion in the event of mobilization. The vertical stabilizer of the aircraft is where the below marking will be located.

- COMNAVAIRLANT. The first character shall be "A through M"; second character "A through Z".

- COMNAVAIRPAC. The first character shall be "N through Z"; second character "A through Z".

- CNATRA. The first character shall be "A through G"; there is no second character.

Block XII – Naval Aviation Heritage

References:

(a) ISBN 0-945274-34-3, United States naval aviation, 1910-1995
(B) NAVEDTRA 14014, Airman

A. Overview (Ref a, b, c)

__Naval Aviation Heritage__

The rich history of naval aviation provides the opportunity to gain an insight and learn about the origins, achievements and traditions of Naval Aviation as it relates to the rich naval heritage of the United States. Naval Aviation has undergone immense change since 1910. It now plays a defining role in the nation's defense structure and is on call to respond to military crises around the world. The past developments, as chronicled in this section, serve as a prologue to future developments in Naval Aviation. Below are some of the significant milestones in naval aviation history

14 November 1910. First take-off from a ship—Eugene Ely, a civilian pilot, took off in a 50-hp Curtiss plane from a wooden platform built on the bow of USS BIRMINGHAM (CL 2). The ship was at anchor in Hampton Roads, Va., and Ely landed safely on Willoughby Spit.

8 May 1911. Captain W. I. Chambers prepared requisitions for two Glenn Curtiss biplanes, although these requisitions lacked the signature of the Chief of the Bureau of Navigation they did indicate Captain Chambers' decision as to which airplanes the Navy should purchase. The planes were purchased for $5,500 each and later became the Navy's first aircraft the A-1 Triad. From this, May 8 has been officially proclaimed to be the birthday of naval aviation. The Wright brothers soon sold the Navy another aircraft. Curtiss and the Wrights agreed to train a pilot and a mechanic.

20 June 1913. Ensign William D. Billingsley, piloting the B-2 at 1,600 feet over the water near Annapolis, Md., was thrown from the plane and fell to his death, the first fatality of Naval Aviation. Lieutenant John H. Towers, riding as passenger, was also unseated but clung to the plane and fell with it into the water, receiving serious injuries.

22 October 1917. Special courses to train men as inspectors were added to the Ground School program at MIT with 14 men enrolled. Eventually established as an Inspector School, this program met the expanding need for qualified inspectors of aeronautical material by producing 58 motor and 114 airplane inspectors before the end of the war, becoming the predecessors of the modern Quality Assurance Representatives.

20 March 1922. The Jupiter, a former collier or coal-carrier, was re-commissioned after conversion to the Navy's first carrier, the USS LANGLEY (CV-1).

10 March 1948. FJ-1 Fury, The first Navy jet made its first carrier landing on the USS Boxer (CV 21).

Some conflicts of significant historical significance to Naval Aviation are:

Coral Sea 7-8 May 1942. Thanks to the breaking of the Japanese Navy code, the U.S. was alerted to a large Japanese force moving to the Coral Sea to seize Port Moresby on the southwest coast of New Guinea. It was to be the first step of a planned invasion of Australia. The Japanese operation centered around three aircraft carriers and dozens of troop transports, but the Americans met them with two carriers of their own. On May 7, the Japanese planes sank two minor ships, while U.S. planes sank an isolated enemy carrier. The next day, both sides launched all their planes against the other. The aircraft passed each other unseen in the clouds, in the world's first carrier verses carrier battle. One Japanese carrier was damaged. The U.S. carrier Lexington was sunk, and the carrier Yorktown was damaged. After this action, both sides withdrew. Although a tactical victory, Coral Sea was a strategic setback for the Japanese who never again threatened Australia.

Midway 3-5 June 1942. Midway was the turning point of the Pacific war. The U.S. breaking of the Japanese naval code was again the key element as it had been at Coral Sea a month earlier. A huge Japanese armada of 160 warships was involved, but Commander-in-chief Admiral Yamamoto split his force, sending some ships north to the Aleutian Islands in a diversionary attack. The Japanese retained superior numbers approaching Midway which included 4 aircraft carriers and 11 battleships. At Midway the U.S. had 3 carriers and no battleships. The Americans knew what was coming because of the broken codes, and Admiral Nimitz positioned his 3 carriers, the Hornet, Enterprise and Yorktown, out of Japanese reconnaissance range. As the Japanese carriers launched their planes to assault the Midway defenses, the U.S. planes headed for the enemy carriers. It took attack after attack, but finally the U.S. crews got through and sank 3 Japanese carriers. The next day the fourth carrier was sunk. Japanese planes sank the Yorktown. In one day Japan lost its bid for control of the Pacific.

Guadalcanal 13-15 November 1942. After three days of bitter fighting, the Japanese naval forces retreated and U.S. Marines were able to secure the island of Guadalcanal. The Japanese lost 2 cruisers and 6 destroyers. The USS JUNEAU was involved in the battle. Navy policy was to place members of the same family on different ships, but the five Sullivan brothers, from Waterloo, Iowa, insisted on staying together. An exception was made and they all became crewmen onboard the JUNEAU. The JUNEAU was damaged during the battle in a close-range night encounter. As it limped off for repairs, it was torpedoed. The Sullivan's along with 700 others were lost. Because of this tragedy, Navy policy concerning family member separations was reinstated. A ship was later named in their honor. With the fall of the island, the southern Solomon's came under Allied control and Australia was in less danger of attack.

Block XIII – Command History and Heritage

References:

(a) XXXX

This page intentionally left blank, placeholder for local development.

Block XIV - Fundamentals of Flight

References:

(b) NAVEDTRA 14014, Airman
(c) NAVEDTRA 12390, Air Traffic Controller

A. The Physics of Flight (Ref a)

Motion is the act, or process, of changing place or position; simply put, motion is movement. Motion is the basic fundamental of aviation, the 3 types of motion pertaining to flight are:

- Acceleration. The rate of change of the speed and or velocity of matter with time.

- Speed. The rate of movement in terms of distance measured in an allotted amount of time.

- Velocity. The quickness or speed of an object in a given time and direction.

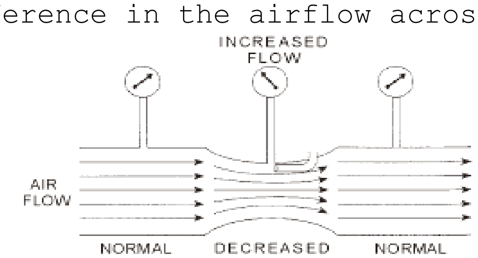
Laws of motion:

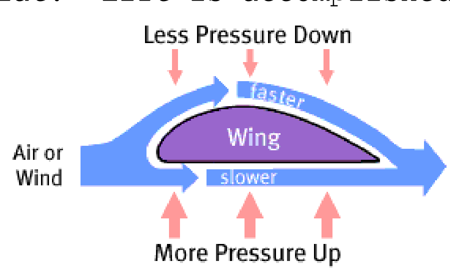
Newton's First Law. According to Newton's first law of motion (inertia), an object at rest will remain at rest, or an object in motion will continue in motion at the same speed and in the same direction, until acted upon by an outside force.

Newton's Second Law. The second law of motion (force) states that if an object moving with uniform speed is acted upon by an external force, the change of motion, or acceleration, will be directly proportional to the amount of force and inversely proportional to the mass of the object being moved.

Newton's Third Law. The third law of motion (action and reaction) states that for every action there is an equal and opposite reaction.

Bernoulli's principle. The principle states that when a fluid flowing through a tube reaches a constriction or narrowing of the tube, the speed of the fluid passing through the constriction is increased and its pressure decreased. The general lift of an airfoil is dependent upon the airfoil's ability to create circulation in the air stream and develop the lifting pressure over the airfoil surface. As the relative wind strikes the leading edge of the airfoil, the flow of air is split. Part of the air is deflected upward and aft, and the rest is deflected down and aft. Since the upper surface of the wing has camber, or a curve, the flow over its surface is disrupted, and this causes a wavelike effect to the wing. The lower surface is relatively flat. Lift is accomplished by the difference in the airflow across the airfoil.





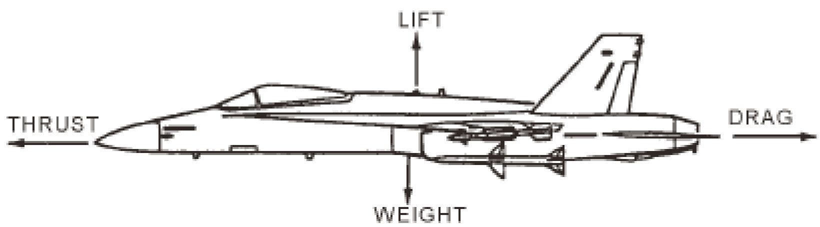
B. Principles of Flight and Aeronautic Terms (Ref a)

Lift. The force that acts, in an upward direction, to support the aircraft in the air. It counteracts the effects of weight. Lift must be greater than or equal to weight if flight is to be sustained.

Weight. The force of gravity acting downward on the aircraft and everything on the aircraft.

Drag. The force that tends to hold an aircraft back. Drag is caused by the disruption of the air about the wings, fuselage or body, and all protruding objects on the aircraft. Drag resists motion.

Thrust. The force developed by the aircraft's engine, and it acts in the forward direction. Thrust must be greater than or equal to the effects of drag in order for flight to begin or be sustained.



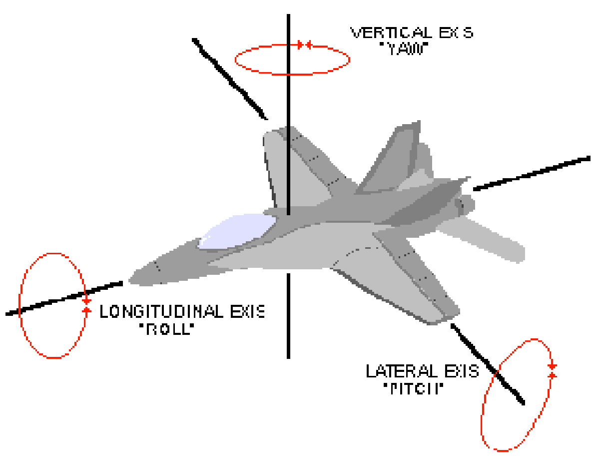
Forces affecting flight.

Aircraft axis:

- Longitudinal axis. An imaginary reference line running down the center of the aircraft between the nose and tail.

- Lateral axis. An imaginary reference line running parallel to the wings.

- Vertical axis. An imaginary reference line running from the top to the bottom of the aircraft.



B. Basic Aircraft Components and Equipment (Ref a)

Aircraft have movable surfaces installed that cause and control movement or rotation about the three axis.

Fixed wing aircraft:

- Ailerons (roll). longitudinal axis.

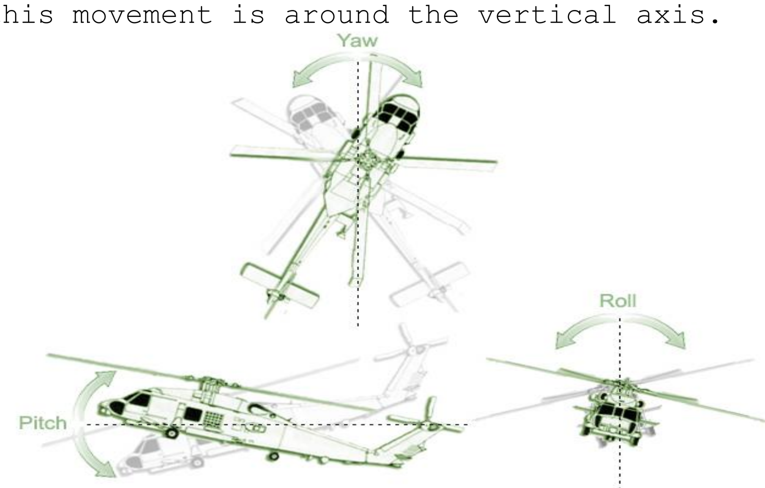
- Elevators (pitch). lateral axis.

- Rudder (yaw). vertical axis.

Rotary wing aircraft:

- The cyclic stick (roll/pitch). Tilts the plane (angle) of the rotor blades forward, aft or sideways, giving the helicopter its directional motion by changing the direction of the lift; from vertical to a varying degree based on a 0° centerline.

- Tail rotor (yaw). This component counteracts torque of the main rotor by increasing or decreasing the amount of horizontal thrust the tail rotor produces, this movement is around the vertical axis.



The following is a list of non axis affecting flight controls; they may or may not be installed on all aircraft.

- Flap (leading/trailing edge). Creates extra lift by lengthening the top section of the wing resulting in maximum lift to reduce takeoff runs and landing rollout.

- Spoiler. Used to decrease or spoil wing lift by destroying the smooth flow of air over the wing surfaces, this creates a more predictable landing glideslope.

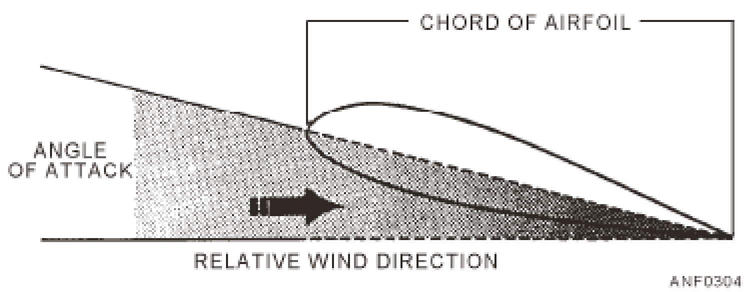
- Speed brakes. Hinged or moveable control surfaces used for reducing the speed of aircraft. Location varies on the model of aircraft; however the purpose remains the same.

- Slats. Slats are movable control surfaces attached to the leading edge of the wing. When open, or extended forward, a slot is created between the slat and the wing leading edge. High-energy air is introduced into the boundary layer over the top of the wing. At low airspeeds, this improves the lateral control handling characteristics, allowing the aircraft to be controlled at airspeeds below the normal landing speed. This is known as boundary layer control.

Unique flight terms and conditions:

Collective. The main rotor of a helicopter consists of two or more rotor blades. Lift is accomplished by rotating the blades through the air at a high rate of speed. Lift may be changed by *collectively* increasing the angle of attack or pitch of the rotor blades. When the rotor is turning and the blades are at zero angle (flat pitch), no lift is developed.

Angle of Attack (AoA). The angle at which the airfoil or fuselage meets a flow of air. Defined as the angle between the chord line of the wing (an imaginary straight line from the leading edge to the trailing edge of the wing) and the relative wind. The relative wind is the direction of the air stream in relationship to the wing. Angle of attack is measured in "units" as opposed to degrees.



Autorotation. A method of allowing a helicopter to land safely from altitude without using engine power. As a helicopter is descending in altitude the collective is lowered allowing the reverse airflow through the rotor to maintain RPM. When the helicopter reaches a predetermined altitude the collective pitch is increased to convert inertial energy into lift to reduce the rate of descent and cushion the landing.

Basic aircraft hydraulic system:

- A reservoir to hold a supply of hydraulic fluid.
- A pump to provide a flow of fluid.
- Tubing to transmit the fluid.
- A selector valve to direct the flow of fluid.
- An actuating unit to convert the fluid pressure into useful work.

Landing gear main components and their purpose:

- Shock Strut Assembly. Absorbs the shock that otherwise would be sustained by the airframe.

- Tires. Allows the aircraft to roll easily and provides traction during takeoff and landing.

- Wheel Brake Assembly. Used to slow and stop the aircraft. Also used to prevent the aircraft from rolling while parked.

- Retracting and Extending Mechanism. All the necessary hardware to electrically or hydraulically extend and retract the landing gear.

- Side Struts and Supports. Provides lateral strength/support for the landing gear.

Block X – NALCOMIS and OOMA/OIMA.

References:

(d) COMNAVAIRFORINST 4790.2 (Series), the Naval Aviation Maintenance Program

A. Naval Aviation Logistics Command Management Information System (NALCOMIS) Optimized Organizational Maintenance Activity/Optimized Intermediate Maintenance Activity (OOMA/OIMA) (Ref a)

NALCOMIS provides the capability to manage maintenance and supply functions and processes by allowing system users to enter, collect, process, store, review and report information required by the organization. The use of this system significantly reduces the administrative burden and produces up-to-date status information necessary for the control of maintenance.

At the Organizational level, OOMA resides on a computer server referred to as the foundation tier. This tier consists of modules such as:

- Maintenance subsystem

- Material subsystem

- Flight subsystem

- Platform software interface

- CM/Logs and records subsystem

OOMA is a management tool that provides essential, real time information on a continuing basis through the online Visual Electronic Displays (VEDs) and MAINT-1 through -6 reports as well as Adhoc data extraction. The system tracks the following and enables maintenance managers to assigns a relative importance to each item. The ability to review the following allows the maintenance managers to carry out their duties more effectively and efficiently.

- NMCS/PMCS status

- Flyable discrepancies

- Non-aircraft related discrepancies

- ALSS status

- SE status

- Mission Mounted Equipment (MME) status

Maintenance/Production control must be in control of the maintenance to ensure successful operation or repair of critical assets. Some of the responsibilities of maintenance control are listed below.

- Monitor current aircraft/equipment status

- Maintain cognizance of incomplete maintenance actions and sets workcenter priorities.

- Take actions necessary for reporting configuration, material readiness, and flight data.

- Brief pilots/aircrew prior to an FCF through the use of the appropriate QA and workcenter personnel.

- Ensure upon completion of a flight that the aircrew initiates a Work Order (WO) for each discrepancy. For discrepancies discovered by personnel other than the pilot/aircrew the person who discovers the discrepancy initiates the WO.

- Review, update and approve all WOs, once approved the WO is automatically populated into the Automated Aircraft Discrepancy Book (AADB) and workcenter workload report.

- When the corrective action is completed, Maintenance Control reviews, approves, or rejects the corrective action block of the WO. Upon completion and approval the AADB is automatically updated where it remains for 10 flights.

- When parts are required Maintenance Control assigns the project/priority code for the requisition. The material request is automatically forwarded to Material Control's via online DDSN assignment process.

- Work Orders/MAF Initiation. Upon completion of the flight, the pilot/aircrew initiates a MAF for each discrepancy. For discrepancies discovered by other than pilot or aircrew, the MAF will be initiated by the person who discovered the discrepancy. In the case of When Discovered Code O, Maintenance Control will initiate the MAF. NALCOMIS prompts the user for required data fields during MAF initiation. The JCN is automatically assigned when the MAF is approved. The Type MAF Code, TEC, BUNO, T/M, MODEX, received date, and received time are pre-filled. The received date and time can be changed. Work center, discrepancy, initiator, and up/down status field shall be filled in prior to saving to the database. All other fields are optional.

Inside of NALCOMIS and OOMA the WO have numerous data fields that are used for many up-line purposes, the following are some of the data fields.

- JCN. 9 character alphanumeric code that is the basis for data collection.

- Type Maintenance. Is prefilled based on the type of WO selected.

- Type WO. A two character code that describes the type of maintenance to be performed.

- Accumulated Job Status History. The history of the WO from start to finish.

- Worker Hours. To include the workers name, tools used, the QA/CDI that inspected them and the hours they worked.

- Workcenter. This identifies the workcenter responsible to complete the maintenance action.

- Work Unit Code. A numeric or alpha-numeric code that identifies the system or subsystem of the malfunction.

There are many different types of work orders and the type can be dependent on the level of maintenance that the work is being performed at. Some common types of Work Orders (WO) include:

- DM, Discrepancy Maintenance

- TS, Troubleshooting

- CM, Cannibalization Maintenance

- AD, Assist Maintenance

- FO, Facilitate Other Maintenance

- CL, Conditional look phase

- CF, Conditional fix Phase

- SX, Special inspection one workcenter

- SC, Special inspection control

- TD, Technical Directive

Optimized IMA (OIMA) provides the capability to manage maintenance and supply functions and processes at the intermediate level by allowing system users to enter, collect, process, store, review, and report information required by the maintenance activity. These processes include engine and SE repair, material requisitions, repairable management, AWP management, personnel assignment and deployment, sub-custody of equipment, use of resources and additional miscellaneous functions at the maintenance activity to include the Aviation Supply Division.

Data Accuracy. Accurate documentation must be a continuous concern throughout NALCOMIS. The analyst must ensure discrepancies are documented via SMTS, BTR, or a change proposal to the aviation 3M MDS VALSPEC Guide (A7257-01). Higher level Navy managers use this data to:

- Analyze high system failures and high man-hour consumers by specific weapon system.

- Identify desirable product improvements.

- Analyze inspection requirements as a basis for adjusting inspection criteria and intervals.

- Adjust component scheduled removal intervals.

- Improve I-level repair capabilities.
- Identify failed items under warranty.
- Establish realistic manning factors.
- Determine and justify the need for modifications and engineering changes.
- Establish equipment reliability factors.
- Determine tooling and equipment requirements.
- Predict probable failures through trend analysis.
- Determine the status of compliance with mission readiness type TDs.
- Monitor aircraft readiness trends in support of Congressional and Joint Service initiatives.

At the local level, summaries of this data will assist in identifying (with documented evidence) the following:

- High man-hour per operating hour equipment (by SERNO or type equipment).
- Man-hours lost to cannibalization and removal of items to FOM.
- Areas with skill or training deficiencies.
- Efficient or inefficient use of available manpower.
- Items with high failure rates.
- Inadequate troubleshooting.
- Reasons for ground and in-flight aborts.
- High usage items.
- Status of TD compliance.
- Warranted item failure and subsequent repair.

Block XVI – NAVAL AVIATION PLATFORMS AND MISSIONS

References:

(a) NAVEDTRA 14014, AIRMAN

A. Overview (Ref a)

The shape of Naval Aviation is a dynamic and constantly changing force; aircraft models are introduced and retired however the mission of aviation in a maritime environment remains relatively unchanged. The challenge, both wartime and peacetime, demands change but our response is a constant force that brings stability to regions far from our shores.

B. Core Capabilities (Ref a)

We have six basic core capabilities that we address.

Forward Presence. Key capability that establishes maritime forces in regions throughout the world. The deployability and expeditionary character of Naval Aviation distinguishes it as the centerpiece of this core capability.

Deterrence. Aligned to the national belief that preventing wars is as important as winning wars. Removing conditions for conflict, providing for the protection of forces deployed, and possessing superior military strength all serve to deter aggressors from acting.

Sea Control. Protects the ability to operate freely at sea and is an important enabler of joint and interagency operations. Maintaining sea control relies on numerous maritime capabilities such as surveillance, detection, and attack of coastal, surface, and subsurface platforms. These are missions readily executed by Naval Aviation assets in support of this capability.

Power Projection. The ability to project from the sea is the essential combat element of the Maritime Strategy. This core capability is uniquely suited to the strengths of Naval Aviation.

Maritime Security. The maintenance of security at sea and the mitigation of threats short of war. Combating terrorism, piracy, drug trafficking, and other threats enhances global stability and protects U.S. shorelines.

Humanitarian Assistance/Disaster Relief. A human obligation and a foundation of human character. The majority of the world’s population lives within a few hundred miles of the ocean, meaning that access is best achieved by maritime forces.

C. Aviation Communities (Ref a)

Aviation communities and their missions.

- Helicopter Sea Combat (HSC). These units perform rescue, logistics, mine countermeasures, and eventually combat search-and-rescue missions.

- Helicopter Maritime Strike (HSM); Tasked with the primary roles of antisubmarine and anti-surface warfare, and secondary roles of logistics and rescue.

- Helicopter Training (HT). Provides basic and advanced training of student Naval Aviators in rotary wing aircraft.

- Tactical Electronic Warfare (VAQ). Fixed wing squadrons that tactically exploit, suppresses, degrade and deceive enemy electromagnetic defensive and offensive systems including communication, in support of air strike and fleet operations.

- Carrier Airborne Early Warning (VAW). Fixed wing carrier based squadrons that provide early warning against weather, missiles, shipping and aircraft.

- Fleet Composite (VC). Fixed wing utility squadrons providing air services for the fleet such as simulations and target towing.

- Strike Fighter (VFA). Fixed wing squadrons employed for both fighter and attack missions.

- Patrol (VP). Fixed wing land based squadrons that perform anti-submarine warfare, anti-submarine warfare, anti-surface warfare, reconnaissance and mining.

- Fleet Air Reconnaissance (VQ). Fixed wing squadrons that provide electronic warfare support to include search, interception, recording, and analysis of radiated electromagnetic energy. Selected squadrons serve as elements of the Worldwide Airborne Command Post System and provide communications relay services.

- Aircraft Logistics Support (VR). Fixed wing squadrons for the transport of personnel and supplies.

- Carrier Logistics Support (VRC). Fixed wing squadrons that transport personnel and supplies for carrier onboard delivery.

- Training (VT). Fixed wing squadrons that provides basic and advanced training for student naval aviators and flight officers.

- Air Test and Evaluation (VX/VXE). Fixed wing squadrons that test and evaluate the operational capabilities of new aircraft and equipment in an operational environment. They develop tactic and doctrines for their most effective use.

Block XVII – HAZARDOUS MATERIAL/HAZARDOUS WASTE (HAZMAT/HAZWASTE)

References:

(a) OPNAVINST 5100.23, Navy Occupational Safety and Health Program Manual
(b) OPNAVINST 5100.19, Navy Occupational Safety and Health (NAVOSH) Program Manual for Forces Afloat, Vol. II
(c) OPNAVINST 4110.2, Hazardous Material Control & Management (HMC&M)
(d) OPNAV P-45-110-91, Hazardous Material Users Guide (HMUG)

A. Hazardous Material (HAZMAT) (Ref a, b, c, d)

Hazardous material (HAZMAT) is defined as any material that, because of its quantity, concentration, or physical or chemical characteristics, may pose a substantial hazard to human health or the environment when purposefully released or accidentally spilled. Once these materials have been used, the discarded material (liquid, solid, or gas which meets the definition of HAZMAT is designated as a hazardous waste (HAZWASTE) HAZMAT. It is everyone's job to ensure the proper disposal and/or storage of HAZMAT/HAZWASTE to minimize personal and environmental impact.

HAZMAT storage and inspection; stowage locations shall be inspected weekly and quarterly; the inspections should consist of tightness of closure, corrosion, leakage, improper or inadequate labeling, and shelf-life.

Material Safety Data Sheet (MSDS); MSDS's are technical bulletins containing information about materials, such as composition, chemical and physical characteristics, health and safety hazards, and precautions for safe handling and use.

The six categories of HAZMAT are:

- Flammable or combustible materials
- Aerosol containers
- Toxic materials
- Corrosive materials (including acids and bases)
- Oxidizing materials
- Compressed gases

Secondary labeling of HAZMAT. When removed from the original container is essential to identifying what is inside of a container. Many HAZMAT items are issued in bulk, so the use of a more manageable secondary container is essential. Use only approved containers; ensure that existing precautionary labeling is retained and that subsequent containers are marked with appropriate precautionary labeling.

HAZMAT Authorized Use List (AUL). A current inventory of HAZMAT, chemical substances, or components known or suspected to contain HAZMAT used for local acquisition and use. Local workcenters or codes should maintain a current inventory of items authorized for local use and keep it current.

Training for all hands should include the following:

- Types of HAZMAT in their work area and aboard ship.

- What HAZWASTE is and how to dispose of it.

- How to read and interpret hazard warning labels.

- What an MSDS is, how to read it, and where a copy is available to review. Protective measures when handling HAZMAT.

- Emergency procedures.

B. Hazardous Waste Disposal (Ref a, b, c, d)

When disposing of adhesives, grease, hydraulic fluid, paint/paint thinners, fuels, and waste oils all personnel must ensure they comply with local ship/station procedures for disposal of HAZWASTE and HAZWASTE contaminated items.

Planned Maintenance System (PMS) disposal methods shall be followed during performance of PMS.

HAZWASTE is disposed of based on the category of HAZWASTE, some of these methods are, containers (HAZWASTE specific), double plastic bagged, and drums. For Flammables the containers must be fire safe in nature, NEVER place flammables HW into the ships incinerator.

Containerize spent or spilled hydraulic fluids in approved containers for proper shore disposal.

Keep collected petroleum fluids separate from synthetic fluids.

The PPE required when handling HAZMAT/HAZWASTE. All personnel must read the MSDS for that HAZMAT, general PPE includes eye protection, respiratory devices, and gloves.

B. Hazardous Material/Hazardous Waste Spill (Ref a, b, c, d)

HAZMAT/HAZWASTE spill - Because of the hazardous nature of many materials used aboard ships, only trained personnel shall respond to a HAZMAT spill. The general steps of spill response are:

- Discovery

- Notification

- Initiation of action

- Evaluation

- Containment
- Damage control
- Dispersion of Gases/vapors
- Cleanup and decontamination
- Disposal
- Certification for re-entry
- Follow-up reports

Block IX – Hangar Familiarization

References:

(a) NRL/MR/6180-00-8464, Aircraft Hanger Fire Suppression System
(b) UFC 4-211-01N, Unified Facilities Criteria (UFC) Aircraft Maintenance Hangars: Type I, II, and III
(C) NA 00-18R-14, NATOPS Manual

A. Overview (Ref b)

Naval Aviation operates in a wide range of environments and conditions, however the hangar is designed to provide an environmentally protected area to perform maintenance on aircraft or store them away from the elements. The types of hangars vary depending on the type of aircraft that they are intended for as well as the geographic area they are built in. There have been many studies conducted as to the design and minimum requirements for hangars due to the high value of military aircraft that are repaired and maintained in high bay hangars.

B. Shore Station Hangars (Ref b)

There are three types of hangars used in Naval Aviation. The roof systems are a column free front cantilevered roof structure.

A Type I maintenance hangar is primarily designed for carrier aircraft, but is adaptable to meet requirements for rotary wing and various types of smaller aircraft. The O1 and O2 level spaces in this type of hangar are configured for a typical strike fighter squadron, two carrier airborne early warning squadrons, or a helicopter antisubmarine warfare squadron. The Type I hangar bay module is 235'wide by 85' deep.

A Type II hangar is primarily provided for US Marine Corps Aviation. The hangar is designed to accommodate CH-53 Helicopters, V-22 Ospreys and C-130 Hercules aircraft. This type of hangar may also accommodate Navy versions of the C-130, V-22 and H-53 aircraft. The Type II hangar bay module is 119 feet deep by 325 feet wide.

A Type III maintenance hangar is principally designed for land based patrol and large transport aircraft. The Type III hangar module is 165 feet deep by 165 feet wide.

There are peculiar items to the shore based hangars, some of the items you need to be aware of are:

- A painted red fire lane adjacent to the bulkhead that divides the hangar from the maintenance workcenters must be kept clear at all times.

- Portable CO2 fire extinguishers mounted on the bulkhead above the deck.

- Aircraft electrical system with cords for applying external electrical power to aircraft.

- Manually or automatically operated hangar door for securing access to the space and sealing off elements.

- Aircraft grounds that provide a 10ohm or less point to ground and discharge stray voltage are located on a pattern or grid through the hangar deck.

C. Fire Protection Systems (Ref a)

Fire protection for aircraft stored inside of hangers becomes paramount when assessing the value of the aircraft being stored compared to the value of the building. Aircraft stored inside can cost up to 10 times the value of the building. When you look at the number of aircraft stored inside of hangars the importance of protecting the aircraft becomes clear. The likelihood of a fire in a hangar is due to the mixture of flammable HAZMAT, aircraft materials, and heat producing devices installed in naval aircraft.

Hangar protection requirements for the protection of high value aircraft are:

- A low level AFFF system with low profile nozzles designed for a high degree of reliability and low maintenance requirements.

- A closed head water only overhead sprinkler system designed to protect the building and provide cooling to adjacent aircraft.

- Optical detection system to activate the low level AFFF system.

- Appropriate drainage systems to limit any spill pool size and contain AFFF.

- Draft curtains, to prevent cooling of the sprinkler heads, allowing earlier detection of heat sources.

Training on the fire suppression system is necessary due to the impact false activation of fire suppression systems causes such as loss of man-hours, materials, readiness, and financial burden. These activations have been caused by a multitude of sources to include: lightning, water hammers, accidental releases, vandalism, roof leakage, and false activations. The Estimated cost for a false activation would be in excess of $80,000 due to the following:

- Damage to aircraft

- Cost to recharge the system

- Cost of run-off retention

- Cost of AFFF removal

- Associated manpower expenses

D. Shipboard Hangars (Ref a, c)

Aircraft hangars are installed on aviation capable ships ranging from the LHD's to the CVNs. These hangars serve as a maintenance area and storage area for the aircraft that are not engaged in flight operations.

The largest hangars are the CVN or aircraft carrier hangar bays; they are 110ft wide by 685 feet long with 25 feet of overhead clearance encompassing 1.4 acres of maintenance and storage space. The hangar bays can hold more than 60 aircraft as well as spare jet engine, fuel tanks, and other heavy equipment. These hangars have divisional doors that can be closed in approximately 18 seconds and isolate the hangar bays into three separate bays to prevent the spread of fire. Hangar bay one and two have aircraft elevators on the starboard side and hangar bay three has aircraft elevators mounted on both the port and starboard side for moving aircraft, large support equipment, and essential supplies to the flight deck.

The hangar bays have AFFF fire protection installed in the overhead like their shore counterparts. Located on the port and starboard bulkheads are the portable fire extinguishing equipment, aircraft external power cables, high pressure air connections, and various ship specific systems.

MASTER REFERENCE LIST

A1-F18EA-NFM-000, NATOPS Flight Manual F/A-18 E/F

A1-E6AAB-NFM-000, NATOPS Flight Manual E-6B

A1-C2AHA-NFM-000, NATOPS Flight Manual C-2A

A1-F18EA-NFM-600, NATOPS Servicing Checklist

CNE-CBR-001, CBR and HAZMAT Identification, Protective Equipment and Measures, Navy Knowledge Online

COMNAVAIRFORINST 4790.2 (Series), The Naval Aviation Maintenance Program (NAMP)

DOI: 10.1161/CIRCULATIONAHA.110.971150, American Heart Association and American Red Cross Guidelines for First Aid

DOI: 10.1161/CIRCULATIONAHA.110.970913, American Heart Association guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular care

ISBN: 0-8016-7062-4, American Red Cross, Adult CPR

ISBN 0–945274–34–3, United States naval aviation, 1910–1995

NAVEDTRA 12390, Air Traffic Controller

NAVEDTRA 14325, Military Requirements, Basic (BMR)

NAVEDTRA 14014, AIRMAN

NAVAIR 00-80R-14, NATOPS

NAVAIR 00-80T-105, CV NATOPS

NAVAIR 00-80T-106, LHA/LHD NATAOPS

NAVAIR 00-80T-113, AIRCRAFT SIGNALS NATOPS

NAVAIR 00-80T-121, Chemical and Biological Defense, NATOPS Manual

NTTP 3-20.31, Surface Ship Survivability

NWP 3-07.2, Navy Doctrine for Antiterrorism/Force Protection

DoD Instruction 2000.16 (series), "DoD Antiterrorism (AT) Standards”

OPNAVINST 3500.39, Operational Risk Management

OPNAVINST 4110.2, Hazardous Material Control & Management (HMC&M)

OPNAVINST 5102.1D CH-2, Mishap Reporting

OPNAVINST 5100.23, Navy Occupational Safety and Health Program

OPNAVINST 5100.19, Navy Occupational Safety and Health Program Vol. II

OPNAV P-45-110-91, Hazardous Material Users Guide (HMUG)

OPNAV P-86-1-95, USN Chemical, Biological & Radiological (CBR) Defense

NRL/MR/6180-00-8464, Aircraft Hanger Fire Suppression System

UFC 4-211-01N, Unified Facilities Criteria (UFC) Aircraft Maintenance Hangars: Type I, II, and III