ENLISTED AVIATION WARFARE SPECIALIST (EAWS)

FIXED-WING FIGHTER/ATTACK SPECIFIC TUTORIAL

Welcome to the EAWS F-18 Specific PQS questions and answers. This study guide was designed to aid instructors and students alike. All of the questions were answered from instructions and directives found in NAVEDTRA 43902-2 , Personnel Qualification Standard (PQS), Enlisted Aviation Warfare Specialist (EAWS), Unit Specific For Fixed Wing Fighter/Attack (VFA).

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

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ACRONYMS USED IN THIS PQS

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

AAW	**Anti-Air Warfare**
ABO	**Aviator's Breathing Oxygen**
ADB	**Aircraft Discrepancy Book**
ADC	**Air Data Computer**
ADSU	**Airstream Direction Sensing Units**
AFCS	**Automatic Flight Control System**
AMAD	**Airframe Mounted Accessory Drive**
AMRAAM	**Advanced Medium Range Air-to-Air Missile**
AMW	**Amphibious Warfare**
ANTI-G	**Anti-Gravity**
AOA	**Angle of Attack**
APU	**Auxiliary Power Unit**
ARI	**Attitude Reference Indicator**
ASU	**Anti-Surface Ship Warfare**
ASW	**Anti-Submarine Warfare**
C2W	**Command and Control Warfare**
CADS	**Cartridge Actuated Devices**
CATCC	**Carrier Air Traffic Control Center**
CBUs	**Cluster Bomb Units**
CCC	**Command, Control, and Communications**
CG	**Center of Gravity**
CLC	**Command Launch Computer**
DDI	**Digital Display Indicator**
DIFRS	**Deployable Flight Incident Recorder Set**
DMS	**Digital Map Set**
E BATT	**Emergency Battery**
ECS	**Environmental Control System**
FIRAMS	**Flight Incident Recorder and Monitoring System**
FLIR	**Forward Looking InfraRed**
FLOLS	**Fresnel Lens Optical Landing System**
FSO	**Fleet Support Operations**
GCU	**Generator Converter Unit**
GPS	**Global Positioning System**
HARM	**High-speed Anti-Radiation Missile**
HI	**Horizontal Indicator**
HS1	**Hydraulic System 1**
HS2	**Hydraulic System 2**
HUD	**Heads-Up Display**
IAS	**Intercommunication and Audio System**
ICAO	**International Civil Aviation Organization**
IFF	**Identification Friend or Foe**
ILS	**Instrument Landing System**
INS	**Inertial Navigation System**
INT	**Intelligence**
LDT	**Laser Detector Tracker**
LEX	**Leading Edge Extension**
LOX	**Liquid Oxygen**
MAX	**Maximum**
MC	**Mission Computer**

MDG	**Multipurpose Display Group**
MIL	**Military**
MIW	**Mine Warfare**
MLG	**Main Landing Gear**
MOB	**Mobility**
MOVLAS	**Manually Operated Visual Landing Aid System**
MPCD	**Multipurpose Color Display**
NCO	**Non-Combat Operations**
NLG	**Nose Landing Gear**
OBOGS	**On-Board Oxygen Generating System**
PPE	**Personal Protective Equipment**
SLAM	**Standoff Land Attack Missile**
SMS	**Stores Management System**
STW	**Strike Warfare**
TACAN	**Tactical Air Navigation**
TEWS	**Tactical Electronic Warfare Systems**
TR	**Transformer-Rectifier**
TTP	**Total Temperature Probe**
U BATT	**Utility Battery**
VEN	**Variable Exhaust Nozzle**

101 Safety

References:
[a] OPNAVINST 5100.23D, Navy Occupational Safety and Health (NAVOSH) Program Manual
[b] NAVAIR A1-F18AC-GAI-000, Organizational Maintenance, General Aircraft Information, Navy Model F/A-18A/B/C/D 161353 and up
[c] OPNAVINST 8600.2B, The Naval Airborne Weapons Maintenance Program (NAWMP) Vol. II
[d] NAVAIR 01-1A-509, Aircraft Weapons Systems, Cleaning and Corrosion Control
[e] NAVAIR A1-F18AC-LMM-000, Technical Manual, Organizational Maintenance, Line Maintenance Procedures, Navy Model F/A-18A/B/C/D 161353 and up

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

a) **Respiratory Protection Program [p. 15-1]**

A program which identifies employees as requiring respirator protection equipment due to the nature of their work or job. A trained Respiratory Protection Program Manager shall be appointed in writing by the Commanding Officer. One of the following courses is required for the RPPM.

OSHA training institute course 222 or 222a
NIOSH course 593
Navy RPPM course
Any applicable 32 hour course (topic specific)

Applies to any worker subject to areas or tasks known to require respirators. Medical screening and individual fit testing is required for each worker.

b) Hearing Conservation Program [p. 18-1]

A program which surveys and identifies potentially hazardous noise levels and personnel at risk. Program goal is to prevent hearing loss and ensure auditory fitness for duty. Enrollment is required if routinely exposed to 84 db (continuous or intermittent) or peak level routinely exceeds 140 db. Periodic hearing testing shall be conducted to monitor the effectiveness of the hearing conservation program. Education of individuals, their supervisors and people providing hearing conservation services to these individuals is vital to the overall success of hearing conservation program.

c) Sight Conservation Program [p. 19-2]

A program which surveys all activity work areas equipment and processes to determine which are eye hazards, which personnel require eye protection and what type of protection is required. In addition the common eye hazards the survey shall also consider the eye hazard associated with exposure to various forms of electromagnetic radiation. There shall be written certification that the hazard assessments have been made, shall identify the name of the person making the certification, date of the hazard assessment, and shall identify all areas designated as eye hazard. All eye hazard areas shall have the appropriate warning signs posted. Eye wash stations shall be provided in all areas where any employee may be exposed to corrosive materials. Any employee with 20/200(corrected) in one eye shall be considered visually impaired, and not assigned duties, which would present a hazard to his/her remaining eye. Required wearing eye protection to protect their remaining sight even if they do not work in eye hazard areas.

d) Personal Protective Equipment (PPE) [p. 20-1]

A program which assess all workplaces to determined if hazards are present that necessitate the use of Personal Protective Equipment. If such hazards are present, or likely to be present, the following actions shall be accomplished.
Verify that the workplace hazard assessment has been performed through a written certification that identifies the workplace evaluated, the person certifying that the evaluation has been performed, the date's) of assessment, and which identifies the document as a certification of hazard assessment. Select and have each affected employee use the types of PPE that will protect them from the hazards identified in the hazard assessment. Communicate selection decisions to each affected employee.

101.2 Identify the F/A-18 danger areas. [ref. b, WP 006 00, pp. 2, 3]

a) Flammable liquids, compressed gasses - areas including hydraulic reservoirs, fuel tanks, nitrogen charge struts, high pressure accumulators

b) Canopy, seat and DFIRS explosive devices - many explosive devices are located throughout the airframe which have rocket motors, initiators and thrusters also controls that require special handling.

c) Airframe and external stores - external fuel tanks, vertical ejection racks missiles launchers and conventional /nuclear weapons loaded on the wing or fuselage centerline pylons may be ejected. The area near those devices must be considered hazardous.

d) Engine- danger areas resulting from engine operation are related to exhaust velocity and temperature, air intakes and high noise levels.

e) Radar antenna- operation of the radar makes this a radiation hazard to personnel.

f) APU exhaust - extreme caution should be used during aircraft start up this hazard area presents a high temperature danger.

g) Arresting Hook

h) All moving flight control surfaces.

101.3 Identify the minimum safe distance safe distances from turning aircraft intakes/exhaust at the following power settings: [ref. b, WP 006 00]

(Note: difference in the exhaust safe distance is due to first being temperature safe distance second being velocity safe distance)

a. Idle 9 feet radius intake / 115-155 feet from exhaust

b. Military 25 feet radius from intake / 325-725 feet from exhaust

c. Mazimum 25 feet radius from intake / 850-925 feet from exhaust

101.4 State the purpose and identify the location of the aircraft STEP, NO STEP areas: [ref. b, WP 004 00, p. 4]

Areas to avoid are your leading edge flaps, Trailing edge flaps, horizontal stabilizers, ailerons, and radome surfaces. Areas that are designated, as walkways will have a non-skid on the surface also the wings themselves are considered walkways. Protective shoe covering should always be used worn when walking on aircraft. To avoid in damaging the composite material through out the aircraft structure extreme caution should be used with toolboxes and heavy parts with sharp edges.

101.5 State the general safety precautions associated with applying and removing external power.
[ref. e, WP 004 00, pp. 8 thru 17]

Circuit breakers and switches must be position as specified in the required MIMS. Failure to comply may cause aircraft systems to be energized to an in flight condition resulting in injury to personnel or damage to equipment. (Example; pitot tubes)

To prevent shock and damage to aircraft inspect power cables and cable assembly plugs for pin internal corrosion and damage or missing insulator washer or sleeves.

Ensure power source is secured prior to application and removal.

If using a mobile power unit ensure power unit is chocked and facing away from aircraft.

101.6 Identify the personnel danger areas during Auxiliary Power Unit (APU) operations. **[ref. b, WP 006 00, p. 31]**

At the most center point of the APU exhaust it's exhaust velocity reaches 142 MPH from exhaust to the deck with a temperature of 328-350 Fahrenheit degrees.

At 19-inch diameter the exhaust reaches a 24-MPH with a temperature range of 250-300 Fahrenheit. NOTE: This poses an extreme danger to anyone that might be working underneath the aft section of the aircraft. Or a fire hazard should a puddle of fuel or flammable solvent may be on the deck.

101.7 State the precautions/restrictions that apply to performing maintenance on ordnance loaded aircraft. [ref. c, p. 6-2-8]

Major maintenance on aircraft is prohibited. Maintenance requiring electrical power to the arm relay is prohibited.

Minor maintenance and routine servicing necessary to ready the aircraft for the next launch may be conducted after all weapons have been safeties to the maximum degree as specified in loading check list.

101.8 Identify the precautions that must be observed when handling graphite or carbon/epoxy composite materials. [ref. d, p. 9-11]

Wear respirators and goggles when exposed to these materials and in addition, wear close weave cotton gloves when handling these materials.

Composite material normally does not present a hazard until the composite material is broken and fiber has been exposed raising health concerns.

Fiber will embed into exposed skin and become difficult to remove

The inhalation of graphite composite fibers resulting from aircraft fires and/or aircraft material damage may be harmful to personnel.

102 Aircraft Handling

References:
[a] NAVAIR A1-F18AC-PCM-000, Technical Manual, Organizational Maintenance, Plane Captain Manual, Navy Model F/A-18A/B/C/D 161353 and up
[b] NAVAIR 00-80T-96, US Navy Support Equipment Common, Basic Handling, and Safety Manual
[c] NAVAIR A1-F18AC-LMM-000, Technical Manual, Organizational Maintenance, Line Maintenance Procedures, Navy Model F/A-18A/B/C/D 161353 and up

102.1 State the number of tie-down points on the F/A-18 and identify their location. [ref. a, WP 003 00, pp. 3, 10 thru 14]

There are 12 tie down points. (*14)

Rings 1 and 2 are located on the nose landing gear.
Rings 4, 6, and 8 are located on the left main landing gear.
Rings 5, 7, and 9 are located on the right main landing gear.
Rings 3, 10, 11 and 12 are located on the fuselage and wing pylons.

* Rings 13 and 14 are located on the centerline jacking beam when centerline drop tank is removed and aircraft is in a jack configuration.

102.2 State the proper procedures for aircraft grounding. [ref. a, WP 004 00, p. 3]

To ensure proper grounding of the F/A-18C, connect grounding cable snugly to approved ground receptacle first and then connect other end to one of nine locations on the aircraft.

102.3 State the purpose of aircraft plugs and covers. [ref. a, WP 022 00, p. 5]

To protect a/c opening and protruding surfaces from physical and environmental damage and FOD intrusion.

102.4 Discuss the requirements, duties, and responsibilities of the following Aircraft Handling Team personnel: [ref. b, WP 005 00, pp. 23 thru 27]

*** Note - All move team will have whistles at the ready during a/c movement.**

a. Move Director

Prime responsibility lies with the director for the aircraft movement.
Ensures a qualified brake rider mans cockpit.
Ensures tow bar is secure prior to movement.
Ensures a/c is ready for the move.
Ensures a/c has enough brake pressure.
Ensures enough clearance all around the a/c for and during the move.
Sets the pace to a slow walking speed.

b. Brake Rider

Conducts a pre-movement inspection of a/c ensuring a/c has all safety equipment installed. (Seat Pins / landing gear safety pins)
Ensures a/c is free from servicing equipment / external cords.
Ensures a/c has enough brake pressure.
Stays alert during entire a/c move while not leaving the cockpit until a/c is final spotted.

c. Chock Walker

Pulls and installs chocks when instructed by the director.
Stays alert to director's signals.
Ensures a/c is ready for move.
Free of any chains, power cords, and servicing equipment.
Watches out for ground obstacles and warns the director accordingly.
Stays in a relatively safe position of aircraft wheels.

d. Safety Observer (Wing-Walker/Tail-Walker)

Conduct's a pre-tow inspection of the a/c.
Ensures safety pins are installed.
Ensures a/c is ready for move.
Ensures a/c is free of chains, cable cords, and support equipment.
Ensures a/c will clear all obstructions during movement.

e. Tractor Driver

Tows a/c at a slow walking speed avoiding sudden stops or starts.
Pre-OP's tractor ensuring the support equipment is up and ready.
Follows instructions from the director while avoiding any and all obstructions.

102.5 Discuss towing preparations. [ref. c, WP 040 00, pp. 6 thru 9]

a. Minimum structural access doors must be installed to prevent damage to a/c.
b. Radome must be closed and secured (if installed).
c. Do not tow a/c with doors 68 L/R open. (engine bay doors).
d. Ensure a/c emergency brake accumulator pressure gauge reads 2900 psi minimum.
e. Ensure a/c is clear of all obstacles and support equipment.

102.6 State the purpose of the landing gear aircraft ground safety pins. **[ref. a,WP 023 00, p. 8]**

Landing gear safety pins safeties nose and main landing gear in the down position, preventing gear retraction.

102.7 Describe the hazard associated with canopy static buildup. [ref. a, WP 004 00, p. 4]

During flight a high voltage (100,000 volts) static electrical charge may build up and be stored in the windshield and canopy. This is a hazard to touch unless it is discharged using a static charge removal kit.

102.8 Briefly discuss the canopy static discharge process. [ref. a, WP 004 00, pp. 3 thru 6]

*** Note - A crackling / popping noise indicates a static charge exist while running mittens over.**

a. Make sure a/c is properly grounded.
b. Ensure static charge removal kit has had a continuity check within the last 30 days.
c. Connect kit to aircraft nose landing gear wheel well ground receptacle.
d. Run the kit mittens over the canopy and windshield until static discharge is gone

103 Airframe

References:
[a] NAVEDTRA 12338, Aviation Structural Mechanic (H&S) 3 & 2
[b] NAVAIR 01-1A-509, Aircraft Weapons Systems, Cleaning, and Corrosion Control
[c] NAVAIR A1-F18AC-SRM-500, Organizational Intermediate and Depot Maintenance, Aircraft Corrosion Control, Navy Model F/A-18A/B/C/D 161353 and up
[d] NAVAIR A1-F18AC-130-100, Organizational Maintenance, Principles of Operation, Landing Gear and Related Systems, Navy Model F/A-18A/B/C/D 161353 and up
[e] NAVAIR A1-F18AC-SRM-200, Organizational Intermediate and Depot Maintenance,Structural Repair, General Information, Navy Model F/A-18A/B/C/D 161353 and up

103.1 State the purpose of a hydraulic patch test. [ref. a, p. 4-8]

The purpose is to check the level of contamination of the aircraft hydraulic systems or support equipment hydraulic system. This ensures a high level of fluid purity. The maximum level of contamination for aircraft is class5 and class 3 for support equipment. The primary method of measurement is electronic particle counter. The alternate method is patch testing. These two methods are used at all levels of maintenance.

103.2 State the purpose of a tactical paint scheme. [ref. a, p. 14-36]

The tactical paint scheme is applied to an aircraft to lessen the probability of visual or photographic detection. It is also used for deception, reduction of detection range and to confuse and mislead observers.

103.3 State the purpose of the following publications and their application to the F/A-18:

a. NAVAIR 01-1A-509 [ref. b, p. 1-1]

Provides information on material and procedures for the prevention and repair of corrosion and upkeep of aircraft paint scheme. Supervisory and maintenance personnel shall use this manual as a guide for all corrosion control and maintenance efforts. Contractors who are required to maintain and repair corrosion of aircraft and related equipment shall use this manual.

b. NAVAIR A1-F18AC-SRM-500 [ref. c, WP 002 00, p. 1]

Provides corrosion control procedures for organizational, intermediate, and depot levels of Maintenance. Should be used with NA 01-1A-509. When tasks are identified as intermediate or depot they will be identified as within each specific procedure work package.

103.4 State the three modes of wheel brake operation. [ref. d, WP 008 00, pp. 8 thru 10]

a. Normal brake Used for taxing, supported by aircraft hydraulic system.

b. Emergency brake When no hydraulic system pressure is available. Emergency Brake Accumulator

c. Parking brake Used at all times unless aircraft is being moved.

103.5 Discuss the purpose of composite airframe materials. [ref. e, WP 003 00, p. 3]

a. New materials are used in aircraft to limit weight, decrease effects of corrosion attack and to increase strength.

b. All composites are used for high performance composite structure, both monolithic and sandwich material.

103.6 Discuss the following repair terms: [ref. e, WP 003 00, pp. 4, 5]

a. Temporary Repair

One, which may allow aircraft to be flown until permanent repair can be made. Normally restores full load carrying capabilities to required structure member. May be lacking from the standpoint of interchangeability off parts, aerodynamically, or with respect to fatigue life. Normal temporary repair will be removed and permanent repair installed at earliest practical time. Instructions for temporary repair includes information on flight restriction which must be observed until permanent have been completed . Temporary repairs are as simple and practical as possible.

b. One-time flight

Repair made to restore limited load carrying requirements to allow an aircraft to be flown to a repair station for permanent repairs. Instructions for one time flight repair include all information on flight restrictions, which must be observed during ferry flight.

c. Permanent repair

Repair equals or exceeds strength of original structure or component with no adverse affects on structural integrity, fatigue life, safety , or flying characteristics

104 Propulsion

References:
[a] NAVAIR A1-F18AC-GAI-000, Organizational Maintenance, General Aircraft Information, Navy Model F/A-18A/B/C/D 161353 and up
[b] NAVAIR A1-F18AC-NFM-000, NATOPS Flight Manual, Navy Model F/A-18A/B/C/D161353 and up

104.1 State the type and identify the models of engines used in the F/A-18. [ref. a,WP 005 00, p. 8]

Low by-pass axial flow turbo fan with afterburner.

ENGINE SECTIONS:

Fan
Compressor
Combustion
High pressure turbine
Low pressure turbine
Afterburner

MODELS - (A, B, C, & D) - USE VIRTUALLY THE SAME ENGINE
A/C BUNO'S

161353 - 164692 : F404-GE400 ENGINE
164693 & UP : F404-GE402 ENGINE

104.2 State the three modes of operation for the Auxiliary Power Unit (APU). [ref. a,WP 005, p. 8]

a. Main engine start (MES)

b. Ground maintenance mode (GMM) – Gives the aircraft hydraulic and electrical power. Engine de-coupled.

c. Environmental control system (ECS) – Brings air into the aircraft.

104.3 State the purpose and identify the location of the In-Flight Refueling (IFR) probe. [ref. a, WP 005 00, p. 17]

a. Located on the right forward part of fuselage.
b. Allows A/C to take fuel from a tanker.
c. Electrically controlled (w/switch in cockpit), hydraulically operated.

104.4 Explain the purpose of the Aircraft Fuel Storage system. [ref. a, WP 005 00, p. 16]

The fuel system contains and supplies on board fuel to the aircraft engines, auxiliary power unit, and to provide cooling for certain hydraulic and lubrication systems. The F/A-18 can hold three drop tanks which carry330 gallons each for a total of 2240 lbs. Has 4 interconnected fuselage bladder type tanks plus integral wing tanks.

a. Internal	10,200 LBS.
b. W/1 Drop tank	13,500 LBS.
c. W/2 Drop tanks	15,000 LBS.
d. W/3 Drop tanks	17,500 LBS.

104.5 State the purpose of the foam-lined wing tanks. [ref. b, p. I-2-7]

The wing tanks have sealed channels and suppression foam blocks inside the wings, to prevent an explosion atmosphere in case of battle damage/accidental damage (rupture). The integral tanks are in an area inside each wing and contain foam throughout for accidental/fire reasons. The external tanks are mounted on pylons located on stations 3,5,7.

105 Avionics/Electrical

References:
[a] NAVEDTRA 10348-G, Aviation Electrician' s Mate 3 & 2
[b] NAVEDTRA 12329, Aviation Electronics Technician 3

105.1 State the difference between a barometric and radar altimeter. [ref. a, p. 6-6]

a. Barometric Altimeter

Gives aircraft altitude by sensing the difference in air pressure as the aircraft changes altitude. Altitude information is mean sea level (msl)**.**

b. Radar Altimeter

Gives aircraft altitude by transmitting a signal and bouncing it off the surface of the earth and receiving the same signal back. The greater the time required the higher the aircraft's relative altitude. The maximum altitude displayed is 500 feet above ground level (agi).

105.2 Define the following terms:

a. Azimuth [ref. b, p. AI-2]

Angle of position of bearing. (measured clockwise).

b. Bearing [ref. b, p. AI-2]

Angle of position of object.

c. Range [ref. b, p. AI-8]

Distance to the target or station.

4) Heading [ref. a, p. 7-1]

The direction you are pointing.

True heading
Direction measured by true north.

Magnetic direction
Direction based on the 360-azimuth circle going counter clockwise (with the 0/360-azimuth radial aligned with magnetic north).

Relative direction
Uses the current direction that an object is facing as the 0/360-azimuth alignment.

106 Armament

References:
[a] OPNAVINST 8600.2B, The Naval Airborne Weapons Maintenance Program (NAWMP) Vol. II
[b] NAVAIR A1-F18AE-LWS-000, Airborne Weapons/Stores Loading Manual
[c] NAVEDTRA 12309, Aviation Ordnanceman 3, 2, & 1

106.1 State the objective of the Explosive Qualification and Certification Program [ref. a, p. 6-3-1]

To ensure military and civilian personnel are qualified / certified in the safe handling, stowage and transportation of ordnance in which they are associated with.

106.2 State the purpose of suspension/accessory equipment. [ref. b, p. 2-58]

To suspend single stores, bombs, and a variety of missile launchers.

106.3State the purpose of an impulse cartridge (Cartridge Actuated Devices (CADS) [ref. b, p. 2-70]

To eject single stores and a variety of weapons from the aircraft.

106.4 State the purpose of the following types of free-fall weapons/stores: [ref. b]

a. Cluster Bomb Units (CBUs) [p. 2-71] - Free fall weapon containing several small bomblettes used against armored vehicles.

b. Fire bombs [p. 2-81] - A thin skinned, unstable (non-aerodynamic) container, used in the clearing of dense foliage. Designed to rupture upon impact enabling maximum dispersal.

c. Air-laid Mines [p. 2-81] - Used to defend our straights, port approaches and coastal barriers.

d. Glide weapons [p. 2-81] - Designed to deliver self guided high explosive weapons from the attacking aircraft. Does not have a rocket motor (propulsion section)

e. Pyrotechnics [p. 2-83] - Used for signaling, marking, and search and rescue.

f. Practice Bombs [p. 2-84] – Training devices used to simulate the performance characteristics of live weapons.

106.5 Define the following acronyms:

a. AIM [ref. b, Glossary-1] - Air-launched intercept-aerial guided missile. (Air intercept missile).

b. AGM [ref. b, Glossary-1] - Air-launched surface-attack guided missile. (Air to ground missile).

c. CATM [ref. a, p. 1-3-6] - Captive air training missile.

d. HERO [ref. b, Glossary-3] - Hazards of electromagnetic radiation to ordnance.

1. OP3565 is the main hero manual.
2. NAVAIR11-1-529 (not as in-depth as OP3565)

106.6 Describe the application of the following types of bombs: [ref. b, p. 2-71]

a. Retarded - slows the weapon down before it gets to the target in order to allow the jet to get away from bomb. Used for low level bombing missions.

b. Nonretarded - No means to slow bomb down. Used in high level bombing missions where the pilot and aircraft are safe from the bombs detonation.

106.7 Explain the significance of the following color coding on weapons: [ref. c, p. 12-2]

a. Yellow – High explosive. Identified by striping around the circumference of the weapon and/or warhead section.

b. Brown – Live rocket motor. Identified by striping around the motor section of the weapon.

c. Blue – Inert. Identified by the color in its entirety or by striping around the circumference of the weapon or warhead section.

106.8 Define the following types of weapon guided systems: [ref. c]

a. Active

Missile is self-guiding and works by itself. Sends and receives its own signal.

b. Semi-active

Needs independent or external source to track and lock on target. Any a/c can send out a signal to target and missile receives the signal back to lock on to target.

c. Passive

Heat seeking infrared. Locks onto heat.

106.9 Describe the purpose of chaff and flares as countermeasure devices. [ref. b, p. 2-84]

a. Chaff - Very fine pieces of metal that are expelled into the airway. Used for radar guided missiles. Degrades launching missiles target lock. F/A-18 can carry four buckets of chaff / each bucket carries 30 tubes.

b. Flares - Used for heat seeking infrared missiles. FA-18 can carry four buckets of flares / each bucket carries 30 flares. A flare reaches 4000 degrees Fahrenheit.

107 Aviation Life Support Systems/Egress

References:
[a] OPNAVINST 3710.7Q, NATOPS, General Flight and Operating Instructions
[b] NAVAIR 13-1-6.3-2, Seat Survival Kits
[c] NAVAIR 13-1-6.7, Aircrew Personal Protective Equipment
[d] NAVAIR A1-F18AC-GAI-000, Organizational Maintenance, General Aircraft Information, Navy Model F/A-18A/B/C/D 161353 and up
[e] NAVEDTRA 10401, Aviation Structural Mechanic E 2
[f] OPNAVINST 4790.2G, The Naval Aviation Maintenance Program (NAMP), Vol. V
[g] NAVAIR 13-1-6.1-2, Inflatable Survival Equipment, Life Preservers
[h] NAVAIR 13-1-6.4, Oxygen Equipment

107.1 Identify the minimum requirements for aircrew Personnel Protective Equipment: **[ref. a, p. 8-1]**

1) Flight suit (aremid6 cloth)
2) Aircrew fliers boots
3) Anti-g garment
4) Helmet
5) Survival radio/beacon
6) Aviator flight gloves (aremid cloth)
7) Anti-exposure suit
8) Identification tags (dog tags)
9) Survival knife and sheath
10) Personal survival kit
11) Signal device
12) Flashlight
13) Life preserver
14) Laser eye protection
15) HEEDS
16) Pressure suit

107.2 State the purpose of the Environmental Control System (ECS.) [ref. d, WP 005 00,pp. 10, 11]

Provides aircrew comfort (i.e.. pressurization/temp. control) and avionics cooling. (Has 13 subsystems)

1) Bleed air control
2) Bleed air leak detection
3) Air cycle conditioning
4) Cabin cooling and defog
5) Avionics cooling
6) Cabin pressurization
7) Anti-g
8) Vent suit
9) Windshield anti-ice and rain removal
10) Radar Liquid cooling
11) Canopy seal
12) Wave guide pressurization
13) On-board oxygen generating system (OBOGS)

107.3 State the purpose of the following personal flight equipment:

a. Oxygen Mask [ref. c, p. 14-1]

The MBU-20/P mask is designed for use with a regulator, which provides breathing gas (100% oxygen or oxygen diluted with air) upon demand at a pressure schedule dependent on the altitude. The mask provides facial protection from projectiles and fire as well as being qualified for depths of 16ft under water.

b. Oxygen Regulator [ref. h, p. 8-1]

The CRU-103/P Oxygen regulator is a chest mounted , positive pressure, g-modulated regulator that provides demand oxygen flow to the aircrew member. Oxygen demand regulators can be used routinely up to 43,000 ft and up to 50,000 ft for short periods of time in case of emergency. The regulator was designed to be used with the MBU-20/P oxygen mask as part of the oxygen system in aircraft with liquid oxygen (LOX) or on-board oxygen generating systems (OBOGS).

c. Life Preserver [ref. g, p. 18-1]

The LPU-33/P Life Preserver, Low Profile Floatation Collar (LPFC) is equipped with the FLU-8B/P automatic/manual inflation assembly. The LPU-33/P is authorized for use only by aircrew personnel operating aircraft equipped with ejection seat systems. The floatation assembly consists of two independent inflatable assemblies (bladders), each with a FLU-8B/P assembly and oral inflation valve. The LPU-33/P is mounted directly to the modified torso harness. The LPU-33/P weighs only 3 ¼ lbs. and provides a minimum of 65 lbs. of buoyancy to the aircrew member.

d. Anti-Gravity (ANTI-G) suit [ref. c, p. 6-2]

Anti-G garments consist of a bladder system encased in fire-resistant cloth outer shell. As G-forces increase the bladders inflate automatically to apply pressure on the body to restrict the flow of blood downward to the aircrew members waist and feet to lessen the effects of blackout. The garment discussed is the CSU-13B/P and are to be worn over the flight suit.

107.4 State the objective of the Egress Systems Checkout Certification Program. [ref. f, p. 16-1]

1) To thoroughly familiarize personnel working in or around the cockpit with the ejection Systems / Any special hazards associated with those systems, and to routinely monitor all such qualified personnel.

2) All maintenance personnel must qualify upon arrival to command / prior to working on a/c.

3) All qualified personnel must re-qualify every 6 months.

4) TAD personnel must re-qualify after being away from command for 90 days.

107.5 State the purpose of the ejection seat. [ref. d, WP 005 00, p. 3]

1) For supplying a place for the aircrew to sit during normal conditions.

2) For propelling an occupant out and away from the aircraft in an emergency condition.

a) Automatic cartridge operated and rocket assisted.

107.6 Define the following conditions: [ref. e, p. 4-2]

a. Hypoxia (blackout)

The higher the altitude the amount of oxygen per unit of volume of air decreases, there for the oxygen intake is reduced unless the individual breathes additional oxygen the eyes, body, and muscles will fail.

b. Anoxia

Death caused by complete lack of oxygen.

107.7 Identify the two types of Aviator's Breathing Oxygen (ABO.) [ref. e, p. 4-2]

a. gaseous oxygen (type I)	MIL-0-27210D
b. Liquid oxygen (type II)	99.5% Pure

108 Operations

References:
[a] OPNAVINST 3710.7Q, NATOPS, General Flight and Operating Instructions
[b] NWP 55-5-F/A18C/D (Rev. A), F/A-18C/D, Tactical Manual, Vol. 1
[c] OPNAVINST 4790.2G, The Naval Aviation Maintenance Program (NAMP), Vol. I
[d] NAVAIR 00-80T-104, NATOPS Landing Signal Officer Manual
[e] NAVAIR 00-80T-105, CV NATOPS Manual
[f] NAVEDTRA 12390, Air Traffic Controller

108.1 Define and explain the following acronyms:

a. SEAD (SUPPRESSION OF ENEMY AIR DEFENSES) [ref. b, Glossary, p. 46]

Most of our adversaries today have the capability to shoot down our aircraft via some variant of the surface-to-air missile (SAM). Oftentimes there will be a high concentration of SAM's in or near the target areas that we as Strike aircraft must fly over when delivering ordinance. SEAD's function is to neutralize, destroy, or temporarily degrade the enemy air defenses (SAM's) in or around the target area by physical attack and/or electronic warfare. The role of SEAD is essentially to force the enemy to "run for cover" rather than shoot a missle during the specific time that our Strike aircraft will be flying into the SAM threat rings.

b. WAS (WAR AT SEA) [ref. b, Glossary, p. 49]

Our objective in this mission is to destroy the enemy's naval vessels and amphibious force. Not only does superiority of the seas help secure the carrier from enemy attack but it also protects our aircraft flying that might be flying over the ocean surface.

c. CAS (CLOSE AIR SUPPORT) [ref. b, Glossary, p. 38]

Friendly troops sometimes need the support of Strike aircraft when executing ground operations against hostile forces on the battlefield. Our job in the CAS arena is to precisely deliver various munitions at a set time. The forward air controller (FAC) is the person responsible for passing certain key pieces of information to the CAS aircraft. Things like target description, location of friendly forces, time-on-target (TOT), and suspected air threat in the area must all are passed. The FAC might be another pilot orbiting from above or one of the troops, oftentimes a Navy SEAL, who is actually down on the battlefield. It is important to note that not only precise weapons delivery crucial to a safe CAS operation due to the close proximity of friendly forces, but so is timing. Strike aircraft are expected to meet their TOT within a few seconds. Gross deviations from the specified time may create a safety hazard to the aircraft involved due to the naval gunfire or field artillery fire that may be used in conjunction with the air support.

d. MAS (MARITIME AIR SUPERIORITY) [ref. b, Glossary, p. 43]

That degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and it's related land, sea, and air forces at a given time and place with out prohibitive interference by the opposing force. Maritime IN SHORT – we maintain the airspace around the battle group.

e. ACM (AIR COMBAT MANEUVERING) [ref. b, Glossary, p. 35]

With today's technology most air-to-air battles are executed from beyond visual range (BVR) using long-range missiles and advanced radar systems. If, However an intercept degrades to the point where opposing aircraft find themselves within visual range of their adversary, ACM rules now apply. Often characterized as "Dog Fighting", ACM involves two or more opposing aircraft attempting to maneuver their aircraft to a weapons solution while in this visual arena. ACM engagements rarely last longer than 1 minute and success requires one pilot to fight his aircraft more efficiently and effectively than his opponent.

f. CAC (COMBAT AIR CONTROL) [ref. b, Glossary, p. 37]

Mission executed by two or more fighter aircraft. The flight maintains a station that allows the fighters to intercept other aircraft inbound to the protected assets/area. The aircraft are usually under the direct control of either the E-2 or some other long-range radar assest (i.e. Ship in the battle group). Before the flight a determination is made as to the closest that unidentified aircraft will be allowed to approach before being intercepted. While manning the cap, both aircraft fly at a conservative airspeed to preserve fuel should an intercept be required.

g. FCF (FUNCTIONAL CHECK FLIGHT) [ref. c, par. 12.1.4]

FCF's are required to determine whether the airframe, power plant, accessories, and equipment are functioning per predetermined standards following some type of maintenance or extended no-fly period. These flights are conducted when it is not possible to determine proper operations by ground checks. There are four types of FCF's: A, B, C, and D. Type "A" must be down when the aircraft has not flown for 30 days. Generally only the senior pilots are qualified to conduct these flights because the possibility of experiencing an in-flight emergency is much higher than during a typical sortie.

h. FCLP (FIELD CARRIER LANDING PRACTICE) [ref. d, p. II-16-1]

A form of training that is used to simulate landing on the aircraft carrier performed just prior to deploying aboard the ship. The required elements for FCLP's are a Fresnel lens (Meatball) and LSO. Pilots are graded on every landing and de-briefed by the LSO on their performance. Due to the fact that landing aboard the aircraft carrier is perhaps the most challenging task performed by a naval aviator, a very high priority is placed upon ensuring that every pilot in the squadron is given the chance to execute some minimum number of PCLP periods.

108.2 Define and explain the following acronyms: [ref. a]

a. VMC (VISUAL METEOROLOGICAL CONDITIONS) [p. 1-8]

Meteorological conditions expressed in terms of visibility, cloud distance, and ceiling that are equal to or better than specified minimums. The basic weather requirements for VMC are a 1000 ft. ceiling and 3 mile visibility (1000/3). If VMC conditions exist then a pilot can operate under visual flight rules (VFR).

b. IMC (INSTRUMENT METEOROLOGICAL CONDITIONS) [p. 1-5]

Meteorological conditions expressed in terms of visibility, distance from clouds and ceiling less than the minimum specified for visual meteorological conditions. If the weather is less than 1000/3 then IMC exists. IMC also exists anytime a visible horizon is not distinguishable. If IMC conditions exist then a pilot must operate under instrument flight rules (IFR).

c. VFR (VISUAL FLIGHT RULES) [p. 5-10]

If VMC exists then pilots have the option of operating their aircraft with in a set of rules known as visual flight rules. Essentially, when the weather is good (i.e. better than 1000/3) we can operate VFR. These Visual Flight Rules are spelled out in the Federal Aviation Regulations (FAR).

d. IFR (INSTRUMENT FLIGHT RULES) [p. 5-12]

If IMC exists then pilots are required to operate with adherence to Instrument Flight Rules (IFR). Operating IFR requires the pilots to file a flight plan with the local air traffic control facility. Aircraft operating IFR are under the positive control of some ATC agency. Instrument Flight Rules are used when the weather has degraded to the point that it would be unsafe to attempt VFR flight. Additionally, any instrument rated pilot can choose to operate under IFR control. Doing so helps ensure collision avoidance with other participating aircraft because a designated air traffic controller is constantly monitoring aircraft flight paths and altitudes. Naval aircraft are to operate on an IFR flight plan whenever feasible.

108.3 Discuss the purpose of the Carrier Air Traffic Control Center (CATCC) [ref. e, Glossary, p. 17]

This is the centralized agency responsible for the status keeping of all carrier air operations and the control of all airborne aircraft under the operation officer's cognizance except those being controlled by the CDC and the air officer, comprised of two independent work centers, Air Ops and Carrier Controlled Approach (CAA).

108.4 Describe the following: [ref. f, pp. 13 thru 22]

a. Fresnel Lens Optical Landing System (FLOS)

The FLOS or "meatball" is an optical system on board the carrier that aids pilots in landing aboard the ship. This device is essentially a circular yellow light that moves up or down with reference to a row of green horizontal lights. Its movement is dependent on the pilot's positioning with respect to the prescribed glide slope. Typically, the lens is set for a 3 degree glide slope. The system is designed such that if the pilot crosses the aft end of the ship with a centered ball there will be 15 ft. of clearance between his tailhook and the ramp. If the pilot is high with respect to the glide slope, the yellow light will appear above the green datum's. The opposite holds true if low.

b. Manually Operated Visual Landing System (MOVLAS)

MOVLAS is an emergency system that is supposed to be used when the primary optical landing system is rendered inoperative. The primary condition that would cause this is a flight deck that is pitching excessively due to heavy seas. A pitching deck outside of certain limits will cause the FLOLS system to lag behind the moving deck, thus giving erroneous indications to the landing pilot. The MOVLAS is nothing more than an FLOLS that is being manually controlled by the LSO. There are 3 modes of operation for the MOVLAS and they differ only on the physical location of the meatball.

Mode 1 – Has a light box installed in front of the FLOLS lens, acts as a substitute for the normal ball presentation, but still uses datum, waveoff, and cut lights of FLOLS.

Mode 2 – Completely independent of the FLOLS located between 75' and 100' of the inoperable system. Beside ball presentation, consists of reference datum, wave off, and cut lights.

Mode 3 – Installation similar to Mode 2, but located on starboard side of the flight deck aft of the island structure.

201 Airframes Systems

References:

[a] NAVAIR A1-F18AC-GAI-000, Organizational Maintenance, General Aircraft Information, Navy Model F/A-18A/B/C/D 161353 and up

[b] NAVAIR A1-F18AC-570-100, Organizational Maintenance, Principles of Operation, Integrated Flight Controls, Navy Model F/A-18A/B/C/D 161353 and up

[c] NAVAIR A1-F18AC-240-100, Organizational Maintenance, Principles of Operation, Secondary Power System, Navy Model F/A-18A/B/C/D 161353 and up

[d] NAVAIR A1-F18AC-130-100, Organizational Maintenance, Principles of Operation, Landing Gear and Related Systems, Navy Model F/A-18A/B/C/D 161353 and up

[e] NAVAIR A1-F18AC-PCM-000, Technical Manual, Organizational Maintenance, Plane Captain Manual, Navy Model F/A-18A/B/C/D 161353 and up

[f] NAVAIR A1-F18AC-LMM-000, Technical Manual, Organizational Maintenance, Line Maintenance Procedures, Navy Model F/A-18A/B/C/D 161353 and up

[g] NAVEDTRA 10401, Aviation Structural Mechanic E 2

201.1 System Components and Component Parts

201.1.1 Aircraft Structure [ref. a, WP 004 00]

a. Radome [p. 2]

Provides an electrically transparent window for transmission and reception of radar signals. Spans from Y coordinate 60.50 to Y coordinate 128.50. It is a filament wound fiberglass epoxy shell mounted on a articulated hinge.

b. Forward Fuselage [p. 2]

Spans from Y coordinate 128.50 to Y coordinate 383.00 or from the end of the Nose Radome to the forward edge of panel 26. It includes the windshield, canopy, cockpit, leading edge extension, and nose landing gear.

c. Center Fuselage [p. 3]

Spans from Y coordinate 383.00 to Y coordinate 557.50 or from the forward edge of panel 26 to the aft edge of panel 55L/R. Includes main landing gear, intake ducts, external stores stations, fuselage fuel tanks and airframe mounted accessory drive.

d. Aft Fuselage [p. 3]

Spans from Y coordinate 557.50 to the end of the aircraft or from panel 54L/R to the exhaust nozzles. It includes the engines, speed brake, vertical stabilizers, horizontal stabilators, and arresting hook.

e. Wing [p. 4]

Provides lift for the aircraft, stores fuel, houses LEF's, TEF's and Ailerons, outboard section folds for carrier operation, allows for attachment of non jettison able pylons for weapons/fuel stores. The outer wing tip stations are 1 and 9 (9 stations on the wing). Attached to the center fuselage by wall lugs which mate lugs on the wing main torque box.

f. Leading Edge Extension (LEX) [p. 5]

Provides added lift at high angles of attack. Mounted on either side of the Forward Fuselage they are an extension of the wing leading edge. The port LEX houses the Boarding Ladder.

201.1.2 Flight Control Surfaces [ref. b]

a. Ailerons [WP 003 00, p. 5]

In flight, the ailerons are commanded asymmetrically to produce roll motion, during takeoff and landing (with flaps switch set to half or full) they deflect symmetrically with the trailing edge flaps up to 42 degrees, trailing edge flap down to change lift. The ailerons are located on the outboard trailing edge of each wing.

b. Leading Edge Flaps [WP 003 00, p. 7]

When taking off or landing the leading edge flaps deflect symmetrically to change lift. In flight they deflect asymmetrically to aid the ailerons in producing roll motion. The leading edge flaps are located on the inboard and outboard leading edge of each wing.

c. Trailing Edge Flaps [WP 003 00, p. 7]

When taking off or landing the leading edge flaps deflect symmetrically to change lift. In flight they independently deflect asymmetrically to aid the ailerons in producing roll motion. The trailing edge flaps are located on the trailing edge of each wing.

d. Stabilators [WP 003 00, p. 6]

The stabilators deflect symmetrically to produce pitch motion and asymmetrically to produce roll motion. The stabilators are located on either side of the tail of the aircraft.

e. Rudders [WP 003 00, p. 6]

During take off or landing when the AOA is less than 8 degrees the rudders toe-in to increase lift and improve stability, when AOA is more than 8 degrees the rudders toe-out to improve stability. In flight the rudders are commanded symmetrically to produce yaw motion. The rudders are located on the rear of each vertical stabilizer.

f. Speed brake [WP 024 00, pp. 1, 2]

Under certain conditions the speed brake may be extended into the air stream creating drag and slowing the aircraft's airspeed. The speed brake is located on top of the Aft Fuselage between the vertical stabilizers.

201.1.3 Hydraulics

a. Hydraulic System 1 [ref. a, WP 005 00, p. 16]

Provides hydraulic fluid pressure to the primary flight controls either as a primary or backup source. System contains pump manifold, pump reservoir, filter unit, case drain filter, oil fuel heat exchange, and related indicators.

b. Hydraulic System 2 [ref. a, WP 005 00, p. 16]

Same as System 1. Provides hydraulic fluid pressure to the primary flight controls either as a primary or backup source. The system also supplies pressure to all other non-flight control systems.

c. Auxiliary Power Unit Accumulator [ref. c, WP 003 02, p. 6]

Gas Charge cylinder provides required fluid pressure to the APU start motor and emergency hydraulic systems.

d. Switching Valves [ref. b, WP 003 00, p. 4]

Each switching valve allows backup hydraulic pressure to replace the primary hydraulic pressure, if the primary hydraulic pressure fails. If primary hydraulic is restored, the switching valve shifts to normal operating position.

201.1.4 Landing Gear

a. Nose Landing Gear [ref. a, WP 004 00, p. 3]

Nose landing gear strut assembly provides landing, takeoff and taxi energy absorption, and tire/runway compliance. Located on the underside of the Forward Fuselage. Dual chamber design provides a smooth long strike during landing and catapult operations.

b. Main Landing Gear [ref. a, WP 004 00, p. 3]

A lever design with a shock absorber. Provides a stable platform for aircraft carrier and shore based operations. Also absorbs the energy from ground loads during landing and taxi operations. Located on the underside of the Center Fuselage.

c. Wheel Brakes [ref. a, WP 005 00, p. 6]

Provides pilot modulated individual wheel-controlled braking. An anti skid system is combined with the normal system to prevent wheel skid. Located on the main landing gear wheels.

d. Launch Bar [ref. d, WP 011 00, pp. 2, 7]

Provides a means of steering the aircraft during carrier deck tracking and engages the catapult, applying catapult tow forces to the aircraft. Located on the forward side of the nose landing gear shock strut.

e. Arresting Hook [ref. d, WP 010 00, pp. 2, 10]

A hydraulically controlled arm attached to the underside of the aft fuselage. A hook point is attached to the end of the arm. When the arresting hook is lowered for carrier landing, the hook point engages an arrestment cable on the carrier deck to stop the aircraft. Also provides a means of stopping the aircraft where normal runway landings are not available. Located on the underside of the aft fuselage.

201.1.5 Environmental Control Systems [ref. a, WP 005 00]

a. Bleed Air System [p. 11]

Engine bleed air is extracted from the last compressor stage of both engines, regulated and routed to the air cycle air conditioning system.

b. Air Cycle Air Conditioning System [p. 11]

Cools and conditions hot bleed air for use in various aircraft systems, such as fuel pressurization, canopy seal, anit-g, throttle boost, anti ice, rain removal, avionics and cabin cooling.

c. Anti-Gravity System [p. 12]

Automatically regulates the air to the pilot's anti-g suit to increase pilot tolerance to high acceleration levels.

d. Oxygen System [p. 12]

In Bunos 161353 thru 164068 oxygen is supplied from a 10 liter liquid oxygen system. Oxygen is routed from the left console to the ejection seat, through the survival kit, to the pilot's oxygen regulator connector.

e. On-Board Oxygen Generating System [p. 12]

On bunos 164196 and up OBOGS removes nitrogen and other contaminants from engine bleed air. The resultant product gas is an oxygen rich breathing mixture for pilots use.

201.1.6 Egress Systems

a. Ejection Seat System [ref. a, WP 005 00, p. 3]

Provides support for the crewmember during normal flight conditions and a method of escape from the aircraft during emergency conditions. System is made up of main beam, parachute, seat bucket, survival kit, and catapult.

b. Canopy System [ref. a, WP 005 00, p. 4]

Main components are electro-mechanical canopy actuator, canopy unlatch thruster, canopy jettison motors. Provides entry to the cockpit and protects the crewmember from the elements. May be operated electrically or manually and can be jettisoned in an emergency.

c. Emergency Oxygen System [ref. e, p. I-2-111]

Oxygen is required at altitudes over 10,000 feet. The emergency oxygen bottle, located in the ejection seat survival kit, is actuated automatically upon ejection or manually in the case of an oxygen system failure. Actuation is performed by pulling a green ring on the left hand side of the seat pan assembly.

201.1.7 Fire Systems [ref. a, WP 005 00, p. 8]

a. Fire Detection System

A double loop system that provides warnings for the APU bay, left and right AMAD bays, and aft engine bays. A single loop system is used for the left and right forward engine bays. A fire condition in either engine or AMAD is indicated by left or right fire warning light, a fire condition in the APU bay is indicated by APU fire warning light, a voice elert is transmitted to the headset during fire conditions.

b. Fire Extinguishing System

Single extinguisher tank with three distribution lines, one for each APU or engine / AMAD bays. It is a one shot bay system. During ground operations, if a fire in the APU bay occurs the APU shuts down, 10 seconds later the fire extinguishing agent is discharged into the bay. During flight, manually pressing the APU warning light and ready discharge light will actuate the fire extinguishing system. Same procedure for engine / AMAD, press the warning light which shuts down the engine and press the ready discharge light.

201.2. Principles Of Operation

201.2.1Electronic Flight Control System: [ref. a, WP 005 00, p. 20]

The Electronic flight control system is made up of two flight control computers, control surface servo actuators, air data and inertial sensors and control sensors. The system also includes a built-in test to provide failure warning and fault isolation. The flight control computers combine inputs with air data and inertial inputs and provide electrical signals to servo actuators. The servo actuators move control surfaces the direction and amount required to produce desired aircraft motion.

201.2.2 Purpose of the Backup Mechanical System: **[ref. a, WP 005 00, p. 21]**

Provides automatic connection of a direct mechanical link from the stick to the differential stabilator servo actuators. This provides limited pitch and roll control after a complete electrical failure or complete failure of both flight control computers.

201.2.3 Emergency Extension of the Landing Gear: [ref. d, WP 003 00, p. 2]

Emergency extension is primarily free fall aided by stored energy in the MLG shock absorber and hydraulic system no. 2B pressure. Hydraulic system no. 2B pressure is supplied by the Auxiliary Power Unit (APU) and emergency brake accumulators and serves to unlock the landing gear up lock mechanisms and aid in landing gear down lock. Emergency extension is controlled by the LDG GEAR control.

201.5 Safety Precautions

201.5.1

a. Ejection Seat [ref. e, WP 023 00, pp. 5, 6]

Main Firing Handle Safety Pin: Safeties the ejection control handle during all ground parking, servicing and towing. It is inserted through the hole in the base of the ejection control handle.

Ejection Seat Safe/Armed Handle: Safeties the ejection control handle, preventing accidental seat ejection. In the safe position it is rotated full up and forward to the locked SAFE position.

b. Canopy Jettison System [ref. e, WP 023, pp. 5, 6]

Canopy Jettison Ground Safety Pin: Safeties the internal CANOPY JETT lever, preventing accidental canopy jettison by movement of internal CANOPY JETT lever. The pin must penetrate internal CANOPY JETT lever mounting plate and initiator lever to prevent accidental canopy jettison.

c. Canopy Normal System [ref. f, WP 016, p. 5]

Open door 9 set and hold external canopy control switch to the open position until canopy is fully opened and release. If an electrical or mechanical failure occurs when the canopy is open, do not close canopy manually, unless weather conditions exists that require it.

Caution: Do not open canopy in wind excess of 60 knots.
Warning: To prevent death or injury from electrical shock, make sure windshield and canopy static charge is discharged.

d. Liquid Oxygen [ref. g, p. 5-4]

Comply with safety directives.

Never allow Liquid Oxygen (LOX) to contact you skin.

Safe distance to permit smoking, open flames, or sparks in a LOX handling area is 50 feet.

When LOX equipment is in use, keep it in a well ventilated area away from all gasoline, kerosene, oils, greases, and other hydrocarbons. Spontaneous ignition may result from contact with these sunstances.

Personal protective equipment must be worn to prevent the skin from being exposed to the venting box.

During LOX servicing operations, the 2 person integrity rule must be used.

202 Propulsion Systems

References:
[a] NAVAIR A1-F18AC-GAI-000, Organizational Maintenance, General Aircraft Information, Navy Model F/A-18A/B/C/D 161353 and up
[b] NAVAIR A1-F18AC-240-100, Organizational Maintenance, Principles of Operation, Secondary Power System, Navy Model F/A-18A/B/C/D 161353 and up
[c] NAVAIR A1-F18AC-LMM-000, Technical Manual, Organizational Maintenance, Line Maintenance Procedures, Navy Model F/A-18A/B/C/D 161353 and up
[d] NAVAIR A1-F18AC-PCM-000, Technical Manual, Organizational Maintenance, Plane Captain Manual, Navy Model F/A-18A/B/C/D 161353 and up

202.1 SYSTEM COMPONENTS AND COMPONENT PARTS

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

a. What is it's function?

b. Where is it located?

202.1.1. Secondary power systems [ref. a, WP 005 00, p. 8]

a. Auxiliary Power Unit (APU)

To provide pneumatic air for motoring over/starting a main engine or to drive an AMAD, can also be used for ground check out of the ECS. Located in door 52.

b. Airframe Mounted Accessory Drive (AMAD)

The airframe mounted accessory drives are two identical interchangeable gearboxes. Each is mechanically connected to an engine by a power transmission shaft (PTS). The AMAD is pneumatically connected to the APU through the air turbine starter (ATS). The AMAD transmits power to the engine for starts. Power to drive the AMAD accessories is provided by the engine during normal operations or by the APU during ground maintenance operations. Located inside door 53L and 53R. The AMAD is connected to the airframe by one top mount (adjustable) and two side mounts.

c. Secondary Power Compressed Air

Provides pneumatic power for operating the air turbine starter or the environmental control system, provided by the APU or engine bleed air. An air connection is located in the right well wheel and allows use of an external air source for system operation (huffer starts).

202.1.2 Power Plant and related systems [ref. a, WP 005 00]

a. Engines [pp. 8, 9]

F404-GE-400 or F404-GE-402 - axial-flow turbo fan engine with afterburner.

b. Ignition [p. 9]

Alternator, electrical control unit, ignition exciter, main igniter and after burner igniter. Remains on until engine reaches 45% or throttle is moved to off, A/B ignition comes on when A/B is selected and remains on until light off is detected.

c. Lubrication [p. 9]

Self contained oil system, supply tank, combination lube and scavenge pump, filters, oil cooler, gear box, engine sumps, scavenge screens, magnetic chip detectors, pressure transducer and inter connecting tubes. MIL-L-23699.

d. Main fuel [p. 9]

Throttle movement is mechanically transmitted through the power lever control (PLC). The PLC acts as a power booster and positions the main fuel control.

e. Afterburner fuel [p. 9]

When throttle is moved to AB the ECA positions the AB metering valve to a minimum (pilot) flow and holds this until light off is sensed.

f. Variable Exhaust Nozzle (VEN) [p. 9]

The VEN system is a self-contained, hydraulically controlled throat area for the exhaust gasses from the turbine and afterburner. The VEN is controlled to provide required thrust and fuel efficiencies while maintaining exhaust gas temperature. Mil–L-23699 will be used in the VEN system.

g. Variable Geometry [p. 9]

Consists of the fan variable geometry, which provides the best efficiency of the fan while preserving fan margin. It also consists of the compressor variable geometry, which provides the best efficiency of the compressor while preserving stall margin.

h. Anti-icing [p. 9]

Uses fourth stage high pressure compressor bleed air to prevent build up of ice on the front frame struts, inlet guide vanes and inlet center body. Anti-icing air enters the 18 hollow struts and passes through the number one bearing support into the centerbody. Anti-icing air exits through holes in the trailing edge of each strut, de-icing air exits through holes in the trailing edge of each strut, de-icing fan IGV's and through holes around the aft side of the inlet centerbody. Prevents ice buildup on inlet guide vanes.

i. Engine instrument [p. 10]

Integrated fuel - engine indicator (IFEI) - displays compressor speed, exhaust gas temperature, fuel flow, variable exhaust nozzle position, oil pressure and fuel quantities.

j. Throttle [p. 10]

movement is transmitted by mechanical linkage and airframe mounted throttle boost actuators to the Power Lever Control (PLC).

202.1.3 Fuel Systems [ref. a]

a. Fuel storage [WP 005 00, p. 16; WP 006 00, p. 4]

Fuel is carried internally by four interconnected fuselage tanks and two wing tanks. External fuel can also be carried on three 330 gallon tanks.

b. Refuel/Defuel [WP 005 00, p. 16]

Can be done with or without electrical power. Maximum supply pressure 55 psi. Re-fueled through a single point pressure receptacle in door 8 or the IFR probe. De-fuel is done by applying suction pressure at the refuel/defuel receptacle.

c. Internal Fuel Transfer [WP 005 00, p. 17]

Keeps the feed tanks (2 and 3) full and controls the sequence of tank to tank transfer.

d. Center of Gravity (CG) Control [WP 005 00, p. 17]

The signal data computer monitors the amount of fuel in tanks 1 and 4, therefore, if fuel in tank 4 becomes excessive the computer will close the valves in the effected tank to prevent an aft CG problem.

e. Hot Fuel Re circulation [WP 005 00, p. 18]

Cools the fuel by circulating fuel up into the wings to be cooled by means of convection, which is used to dissipate heat from the AMAD and hydraulic system.

f. Fuel Pressurization and Vent [WP 005 00, p. 18]

Provides regulated engine bleed air to all internal tanks. Pressurization prevents boil off at high altitude and provides positive pressure to tank bladders and to external tanks for fuel transfer. The internal tanks vent into a vent tank, which in turn is vented through the outlets in each vertical fin.

g. Fuel Quantity and Gauging [WP 005 00, p. 18]

Integrated Fuel-Engine Indicator is the primary fuel quantity display. Normally, total fuel and internal fuel will be displayed in pounds. The QTY push button switch will change the amounts in pounds to :

Tank no. 2 and no. 3

Tank no. 1 and no. 4

Left wing tank and right wing tank

External left and external right

Centerline (external)

The IFEI will also display BINGO.

202.2 PRINCIPLES OF OPERATION

202.2.1 State the components driven by the Airframe Mounted Accessory Drive (AMAD) [ref. a, WP 005 00, p. 8]

Hydraulic pump, generator and motive flow boost pump and air turbine starter control.

202.3 PARAMETERS/OPERATING LIMITS-

None to be discussed.

202.4 SYSTEM INTERFACE

202.4.1 How does the AMAD interface with the APU and engine? [ref. b,WP 006 01, p. 2]

The AMAD is pneumatically connected to APU through the air turbine starter (ATS). The AMAD transmits power from the ATS to the engine for starting and motoring. Power to drive the AMAD accessories is provided by the engine during normal operation and by the APU in the ground maintenance mode of operation.

202.5 SAFETY PRECAUTIONS

202.5.1 What safety precautions must be observed during engine ground turn-up? [ref. c, WP 022 00, p. 5]

Do not operate engine with TTU-205 test set connected. Engine may go to high power due to N2 lock-up function.

Do not enter area of 9 foot radius of engine inlets while engines are at idle and 25 foot while at MIL or MAX power.

On engines equipped with Viton coated outer bypass ducts, combustion can produce toxic fumes of hydrogen floride and carbonyl floride.

To prevent damage to newly installed engines, service oil system.

To prevent damage to newly installed engine, motor at 29-35% rpm for 3 minutes and ensure oil pressure gets to 10 psi within 30 seconds and fuel flow is zero.

If ambient temperature is 45 deg F or below and dew point is within 7 deg F of ambient temperature, the ground run up screen may be used with continual observation for ice build up on the air inlet leading edge and screen. If ice forms shut down.

To prevent engine damage, if temperature is below 45 deg F engine anti-ice must be turned on.

If ambient temperature is below 32 deg F or below and precipitation exists, ground run up screens are not recommended.

To prevent engine damage do not try to start or motor engine after emergency shut down until the malfunction has been corrected.

To prevent fuel spillage, if two starts are tried on one engine or previous starts/shutdowns since flight or tank draining is unknown, drain fuel dump catch tank before attempting another start.

If visible tailpipe fire occurs, chop throttle to off. If fire continues, push left or right engine fire warning light. Be sure APU ready light is on or external air or crossbleed air is available to motor engine. When engine speed drops to 20 % N2, move engine crank switch of affected engine. Allow to motor for up to 5 minutes to extinguish fire. Move engine crank switch to off. If fire continues, discharge ground extinguisher into tail pipe.

Normal brake pressure is not available with out right engine operating. To maintain aircraft control, make sure parking brake is set.

To prevent damage to fuselage formers if stabilator is to be operated, doors 68 L/R must be closed, top row of fasteners installed and lockset assemblies secured.

202.5.2 What special safety precautions apply to? [ref. d]

a. Fueling [WP 008 00, p. 3]

The wearing of goggles, watch gauges to prevent over pressuring fuel cells and watch vents for fuel overflow.

b. Defueling [WP 011 00, p. 5]

Never refuel during aircraft maintenance.

Aircraft with suspected hot brakes shall not be refueled.

Make sure aircraft and fuel servicing equipment are grounded.

Make sure fire fighting equipment is available.

Inspect refueling nozzle locking device to make sure aircraft ground refuel/defuel receptacle is serviceable.

Make sure vent outlets on each vertical stabilizer and pressure relief vents on each external tank are not obstructed.

Make sure refueling is not done within 100 feet of operating airborne type radio or radar equipment or within 300 feet of ground radar equipment.

Make sure refueling is not done within 50 feet of other aircraft with engines operating.

Operation of auxiliary power unit (APU) is prohibited during refueling.

Loose metal objects, such as knifes, keys, or other objects which might produce sparks, should not be carried or worn.

Never refuel during electrical storms.

Do not carry matches or cigarette lighters.

Shoes with exposed nails, metal plates or hobnails shall not be worn.

All ordnance shall be safetied.

Fuel pressure from servicing equipment shall not exceed 55 psi. If all foam in a wing tank has been replaced, the first fueling pressure should not exceed 25 psi.

All persons involved in refueling shall dissipate static potential by touching or gripping an approved static ground often during refueling operation.

When defueling is done using truck, a person will be stationed on top of truck to observe fuel level in truck and to signal defueling operator to avoid an overflow.

203 Avionics/Electrical Systems

References:
[a] NAVAIR A1-F18AC-GAI-000, Organizational Maintenance, General Aircraft Information, Navy Model F/A-18A/B/C/D 161353 and up
[b] NAVAIR A1-F18AC-NFM-000, NATOPS Flight Manual, Navy Model F/A-18A/B/C/D 161353 and up

203.1.1 State the purpose of the following communication systems: [ref. a,WP 005 00 p. 25]

a. Very-High Frequency/Ultra-High Frequency (VHF/UHF)

The VHF/UHF communication system provides air-to-air and air-to-ground plain or secure communications in fixed frequency mode, anti-jam (ECCM) mode, or maritime mode. The system operates on 20 preset channels (fixed frequency mode or anti-jam mode) guard (G) channel, manual (M) channel, cue (C) channel, and 55 maritime (S) channels, within the range of 30 to 399.975 MHz. There are 2 UHF/VHF transceivers installed in the F/A-18 aircraft. To operate in secure mode, a KY-58 must be used in conjunction with either transceiver.

b. Intercommunication and Audio System (IAS)

Provides amplification and routing of audio signals between cockpit, ground crew, and rear cockpit. It also provides supplemental and backup Communication, radio navigation, and identification (CNI) controls, combined aircraft threat warnings and advisories, weapon tones, and voice alerting.

203.1.2 State the purpose of the following navigation systems: [ref. a, WP 005 00]

a. Tactical Air Navigation (TACAN) [p. 25]

Used to determine the relative bearing and slant range distance to a TACAN ground station or a similar TACAN equipped aircraft. The TACAN is also used as a source to keep aircraft present position and update the aircraft present position being kept by another source (INS or ADC)

b. Inertial Navigation System (INS) [p. 26A]

A self-contained, fully automatic dead reckoning navigation system. On 164945 and up A/C the INS is closely coupled by the mission computer with the global positioning system (GPS) to provide highly accurate aircraft present position and velocity data. The Ins detects aircraft motion (acceleration and attitude) and provides acceleration, velocity, present position, pitch, roll, and true heading to related systems.

c. Global Positioning System (GPS) [p. 36]

A navigation system which receives reference information from a satellite source. This satellite information provides the pilot and other aircraft systems continuously updated present position, velocity and time information.

d. Attitude Reference Indicator (ARI) [p. 26A]

A self-contained attitude reference system which provides backup pitch and roll attitude for use by other systems.

e. Instrument Landing System (ILS) [p. 26]

An all weather approach guidance system. The ILS decodes transmitted azimuth and elevation signals during an aircraft approach and provides steering information to be displayed on the head-up display (HUD), the attitude reference indicator or the electronic ADI indicator display. The ILS can be activated by three modes of operation. Primary mode, which uses the upfront control (UFC), the backup mode which uses the intercommunication panel, and the automatic carrier landing (ACL) mode which uses the mission computer system to control the ILS when the data link system is in ACL mode.

203.1.3 State the purpose of the following tactical mission systems: [ref. a, WP 005 00]

a. Identification Friend or Foe (IFF) [p. 26]

Provides automatic identification function for the aircraft. The system receives challenging signals and determines the correct code and mode of challenge, and automatically transmits a coded reply. The system operates in modes 1,2, and 3a, which are selective identification feature (SIF) modes and in mode C, altitude reporting mode. Mode 4, which is a crypto mode, is available when the mode 4 computer is installed.

b. Data Link [p. 26]

Provides digital communication between the aircraft and other shipboard, airborne, or ground systems. It provides these tactical data systems the ability to communicate directly with the aircraft's Mission Computer by receiving digital information and relaying it directly to the Mission Computer through the MUX Bus.

c. Forward Looking Infrared (FLIR) [p. 36]

Provides thermal imagery, in television format, for detection and identification of tactical targets. It is able to automatically track selected targets and provide accurate target line-of-sight pointing angles and rates to the mission computer system.

d. Radio Detection and Ranging (RADAR) [p. 30]

Provides Air-to-air (A/A) and Air-to-ground (A/G) modes for target detection, designation, tracking and navigation. Also provides terrain avoidance for low level navigation, a detection and tracking capability for moving surface targets, and precision velocity measurement for navigation update and improved weapon delivery accuracy.

e. Mission Computer (MC) [p. 29]

Computes and controls the data sent to the MPCD group. Computes and produces missile launch and weapon release commands. Provides mode control and option select for various avionics systems. Provides mode control and option select data from the MPCD group to avionics systems for control and computation. Outputs built-in test (BIT) initiate signals to various avionics systems and monitors BIT status.

f. Laser Detector Tracker (LDT) [p. 35]

The LDT pod is mounted on station 6, and used to detect and track reflected laser energy. This reflected laser energy is used in delivering Laser Guided Bombs.

203.1.4 State the purpose of the following Tactical Electronic Warfare Systems (TEWS): [ref. a, WP 005 00]

a. Interference blanker [p. 35]

Interfaces onboard rf transmitters and receivers that share common parts of the radio frequency spectrum.

b. Countermeasure set (ALQ-126) [p. 35]

Detects and deceives enemy pulse fire control and guidance radars. When threat signals are received, the countermeasures set detects, processes and transmits deception signals.

c. Countermeasures warning and control [p. 36]

Provides aural and visual alerts upon detection of threat radar signals and at the same time provide information to the HARM missile and countermeasures set.

203.1.5 Describe the following Multipurpose Display Group (MDG) components: [ref. a, WP 005 00]

a. Heads-Up Display (HUD) [p. 30]

The primary flight instrument in the aircraft. It provides flight, navigational steering, and weapon delivery information. The combiner assembly reflects the symbology into the pilot's forward field of view.

b. Digital Display Indicators (DDI) [p. 30]

LDDI-used primarily for stores management, caution, advisory, and BIT displays. RDDI-used primarily for sensor displays. Information can be brought up on either DDI and both are interchangeable.

c. Horizontal Indicator (HI) (BUNO 161353 thru 163782) [p. 31]

Used primarily to provide aircraft attitude, steering, and navigation information with a projected moving map superimposed over the CRT display.

d. Multipurpose Color Display (MPCD) (BUNO 163985 and up) [p. 32]

Provides following displays, aircraft attitude, navigation, A/A, A/G, warnings, cautions, and advisories, and various aircraft checklists. The MPCD is also capable of displaying all information displayed by the DDI's if selected.

203.1.6 Describe the function of the Digital Map Set (DMS)-Provides the following: [ref. a, WP 005 00, p. 32]

Moving map image, continuously updated for tactical and navigational situations.

Alphanumeric and graphic symbology for tactical and navigational situations. The symbology can be displayed overlaying the moving map or by itself.

Up to 100 data frames for display. The data frames contain information such as check list and emergency procedures.

203.1.7 State the location, purpose, and color of the following exterior lights: [ref. b]

a. Position [p. I-2-31]

A white light just below the tip of the vertical tail fin (Vertical Stab.). Three green lights on the right side of the A/C and three red lights on the left side of the A/C. The green and red lights are located at the following locations. Wing Tip, Lex Forward of the Wing Root, Aileron Hinge.

b. Strobe [p. I-2-31]

Two red (anti-collision) lights, one on each outboard vertical stab.

c. Landing/taxi [p. I-2-32]

White light on the nose gear strut. Used to illuminate the taxiway/runway.

d. Approach [p. I-2-31]

Green, Amber, Red lights located on the nose gear strut. Function of angle of attack. Green indicates high angle of attack, Amber indicates optimum, and Red indicates low angle of attack. The operating light flashes if the arresting hook is not down when the hook bypass switch is in carrier.

e. Formation [p. I-2-31]

8 lights green in color. 2 on each wing tip, one on the outside of each vertical stab., one below each vertical. stab. On the aft fuselage, one on each side of the forward fuselage just forward of the Lex.

203.1.8 State the purpose of Flight Incident Recorder and Monitoring System (FIRAMS). [ref. a, WP 005 00, p. 23]

Monitors engine and airframe operational status for unit failures and caution/advisory conditions when the mission computer system is operating. If the mission computer system detects a unit failure, it commands the FIRAMS to store the applicable maintenance code. When the mission computer system detects specific unit failures, it commands the FIRAMS to store significant maintenance data and selected tactical information in a solid state memory device.

203.1.9 State the purpose of the Deployable Flight Incident Recorder Set (DIFRS). [ref. a, WP 005 00, p. 24]

The DFIRS has two functions; the storage of flight data and the deployment of this data. The DFIRS signal data recorder and DFIRS data transfer interface unit provide flight data storage. The DFIRS front mount, rear mount, underwater initiator, impact initiator, sever able door, thin layer explosive and shielded mild detonating cord provide recorder deployment. Thirty minutes of continuous flight data is stored. The impact initiator is activated when sufficient G loads exist. The underwater initiator is activated when the aircraft reaches a depth of 15 to 25 feet. When the recorder is deployed, the beacon transmits on the military UHF guard frequency of 243 MHz. The antenna is an integral part of the recorder and transmits signals in all directions. The battery supplies power to operate the beacon for at least 72 hours.

203.1.10 State the purpose of the following flight reference equipment: [ref. a, WP 005 00]

a. Pitot Static system [p. 18]

Measures pitot and static pressures surrounding the aircraft.

b. Indicated airspeed indicator [p. 19]

Displays airspeed as a function of the pitot and static pressure. Airspeed is indicated in 10 knot increments from 20 to 200 knots and 50 knot increments from 200 to 850 knots.

c. Standby pressure altimeter [p. 19]

Uses static pressure and provides a pointer display for altitude to 1000 feet, a drum display for altitude 1000 feet to 50,000 feet and a four digit display for indicating barometric pressure.

d. Vertical speed indicator [p. 19]

Senses changes in static air pressure and displays them in the form of climb or dive rate from 0 to 6000 feet per minute.

203.1.11 Describe the function of the following Air Data Computer (ADC) system components: [ref. a, WP 005 00]

a. ADC [p. 19]

Receives inputs from various aircraft sensors. Any errors in these inputs are corrected in the ADC. These corrected signals are used to compute accurate air data and magnetic heading. ADC outputs are used for primary flight data displays, navigation, weapons delivery, altitude reporting, environment control, and unsafe landing warning.

b. Airstream Direction Sensing Units (ADSU) [p. 19]

Provides angle of attack (AOA) information to the ADC and electronic flight control system. The ADSU measure the difference between the longitudinal axis of the aircraft and the local air stream surrounding the aircraft.

c. Angle of Attack (AOA) indexer [p. 20]

On the left side of the HUD. Shows approach angle of attack (AOA) with lighted symbols. The indexer operates only with the landing gear down and weight off the gear. Symbol lights to indicate approach speed red V (fast), amber circle (optimum), and green V (slow). The Lighted symbol will flash if the arresting hook is up and the HOOK BYPASS switch is in CARRIER.

d. Total Temperature Probe (TTP) [p. 20]

Measures total temperature of the air outside the aircraft. The TTP converts the temperature to an electrical signal and sends it to the ADC.

203.1.12 Describe the function of the following electrical power components: [ref. b]

a. Generator Converter Unit (GCU) [p. I-2-25]

Protects against damage due to under voltage, over voltage, over and under frequency, and feeder faults. If a fault or malfunction occurs, the GCU removes the affected generator from its buses.

b. Transformer-Rectifier (TR) [p. I-2-26]

Two in A/C. Transforms AC power from the generators into DC electrical power and supplies to the DC buses.

c. Utility Battery (U BATT) [p. I-2-26]

Used for engine start when external power or aircraft generator power is not available, and are used to power the essential 24/28 volt dc bus when both transformer-rectifiers are lost. Powers the maintenance 24/28 volt dc bus when both transformer-rectifiers are inoperative. Allows operation of the canopy and maintenance monitor on the ground without any other electrical power on the aircraft.

d. Emergency Battery (E BATT) [p. I-2-26]

Used for engine start when external power or aircraft generator power is not available, and are used to power the essential 24/28 volt dc bus when both transformer-rectifiers are lost. Contactor will automatically close in response to a low voltage condition from the U BATT.

203.1.13 Describe the function of the Automatic Flight Control System (AFCS) [ref. a, WP 005 00, p. 22]

Provides autopilot and automatic throttle control (ATC). Auto pilot provides commands to the electronic flight control system to maintain a constant heading, altitude, or attitude. ATC positions the engine throttle levers and power lever control to maintain a constant angle of attack during landing, with approach power compensation (APC), or constant airspeed during flight, with velocity control system (VCS).

203.1.14 State the purpose of the nose wheel well Digital Display Indicator (NDDI). **[ref. a, WP 005 00, p. 22]**

Receives and stores maintenance codes from the recorder, and provides a visual display of stored maintenance codes on operator request. Provides for manual activation of MSDRS to perform fluids level test of consumable fluids.

204 Armament Systems

References:
[a] NAVAIR A1-F18AC-GAI-000, Organizational Maintenance, General Aircraft Information, Navy Model F/A-18A/B/C/D 161353 and up
[b] NAVAIR A1-F18AE-LWS-000, Airborne Weapons/Stores Loading Manual
[c] NAVAIR A1-F18AE-740-100, Organizational Maintenance, Principles of Operation, Weapon Control Systems, Navy Model F/A-18C and F/A-18D 163427 thru 165206

204.1.1 State the purpose of the following components of the Stores Management System (SMS). [ref. a, WP 005 00]

a. Armament control processor set [p. 27]

The brain of the SMS system , consists of the Armament Computer and nine Command Signal Encoder-Decoders. Communication between these are accomplished through the armament MUX bus, allowing the Armament Computer to monitor and control the weapon stations and the gun system.

b. Command Launch Computer (CLC) [p. 28]

The command launch computer (CLC) controls and monitors the high speed anti-radiation missile (HARM).

c. Electrical fuzing power supply (PP-6419) [p. 28]

On BUNO 163427 THRU 165206 the electrical fuzing power supply provides the electrical fuzing function of the SMS for weapons requiring electrical fuzing. On BUNO 165207 AND UP the armament computer provides the electrical fuzing function to the SMS weapon requiring electrical fuzing.

204.1.2 Describe the following characteristics of the M61 20mm Gun system. [ref. b]

a. Rate of fire [p. 2-15]

High-6000 rounds per minute; Low-4000 rounds per minute.

b. Capacity [p. 2-15]

The system can accommodate a maximum of 578 rounds of 20mm ammunition.

c. Modes of operation [p. 2-14]

Two Air to Ground Modes, CCIP (continuously computed impact point) and Man (manual). One Air to Air (A/A) mode.

204.1.3 State the purpose of the Countermeasures Dispensing system (AN/ALE-39/47). [ref. a, WP 005 00, p. 35]

The system provides protection for the aircraft against enemy radars and missiles by ejecting chaff, flares, or other jammer payloads.

204.1.4 State the basic armament configuration of the F/A-18 aircraft. [ref. b, p. 3-1]

2 Wing tip mounted LAU-7 missile launcher. (stations 1 and 9)
2 LAU-116 missile launchers. (fuselage stations 4 and 6)
4 SUU-63 wing pylons.
1 SUU-62 centerline pylons.
5 BRU-32 (pylon station 2,3,5,7,and 8)
M61 gun.

204.1.5 State the basic characteristics of the following air to air missiles. [ref. b, p. 2-94]

a. AIM-7 series (sparrow) guided missile

Is a supersonic, radar guided, air-to-air weapon. Semi-active CW homing radar and hydraulically operated control surfaces direct and stabilize the missile on course.

b. AIM-9 series (sidewinder) guided missile

Is a supersonic, air-to-air weapon, with a passive infrared target detection, proportional-navigation guidance, and torque-balance control system.

c. AIM-120 Advanced Medium Range Air-to-Air Missile (AMRAAM)

Is a supersonic, air-to-air weapon, with active radar target detection and on-board inertial navigation guidance.

204.1.6 State the basic characteristics of the following air to ground missiles.

a. AGM-65 (maverick) series missile [ref. b, p. 2-94]

is a guided, rocket propelled, air-to-ground missile for use against field fortifications, surface to air missile sites and armored vehicles. The forward section of the missile consists of a hermetically sealed guidance unit and main section. There are two types Laser and Infrared.

b. AGM-84 (series) missile

1. Harpoon [ref. b, p. 2-94]

Is a long range, all weather anti ship missile. It can be launched at various altitudes, airspeeds, and aircraft attitudes and uses a low level cruise trajectory, active radar guidance and terminal maneuvering to destroy the target.

2. Standoff Land Attack Missile (SLAM) [ref. c, WP 087 01, p. 2]

Is an air-to-ground guided missile designated for use against both stationary and mobile targets. The SLAM can be loaded with up to three pre-planned (PP) mission and one target of opportunity (TOO) mission. It is a video guided missile, controlled by the launching aircraft or by a second aircraft through the data link mode.

c. AGM-88 High-speed Anti-Radiation Missile (HARM) [ref. b, p. 2-94]

Is a passive supersonic, air-to-ground missile used for defense suppression, such a surface to air missile sites (SAMS).

205 Warfare Mission Areas

References:
[a] Squadron Standard Organizational and Regulations Manual (SORM)
[b] OPNAVINST C3501.2J, Naval Warfare Mission Areas and Required Operational Capability (ROC) and Projected Operational Environment (POE) Statements
[c] OPNAVINST C3501.2H (Change 4), Required Operational Capabilities (ROC)/and Projected Operational Environment (POE) Statements for F/A-18 (VFA) Squadrons

205.1 MISSION STATEMENT

205.1.1 State and discuss your command's mission statement. [ref. a]

VFA-136

The mission of Strike Fighter Squadron ONE THREE SIX is combat readiness as a part of U.S. Atlantic Fleet Carrier Striking Forces, utilizing the F/A-18 aircraft to project power ashore and at sea, to defend the fleet against air and sea threats and to carry out all other missions which may be assigned by cognizant authority.

ANTI-AIR WARFARE (AAW)

205.1.2 Explain the term AAW and discuss the role of the F/A-18 in an AAW mission. [refs. b, c]

a. The detection, tracking, destruction or neutralization of enemy air platforms and airborne weapons, whether launched by the enemy from air, surface, subsurface, or land platforms.

b. The Hornet's specific strengths lie in it's ability to detect contacts at medium range (around 40nms) and contacts that are not hot to the fighters (i.e. beaming, dragging or flanking). The Hornet performs AAW in many areas: Pre Strike Sweep (Offensive Counter Air - OCA) as a stand alone sweep into enemy territory to attack enemy aircraft, Close Escort - (Defensive Counter Air - DCA) as an attached or detached shielding fighter element to a strike package, High Value Airborne Asset Protection (HVAAP) which normally escorts the Prowler into enemy territory to protect it from enemy airborne attack.

AMPHIBIOUS WARFARE (AMW)

205.1.3 Explain the term AMW and discuss the role of the F/A-18 in an AMW mission. [refs. b, c]

a. Attacks launched from the sea by naval forces and by landing forces embarked in ships or craft designed to achieve a shore presence in a littoral zone. This includes fire support for troops in contact with enemy forces through the use of close air support or shore bombardment.

b. The Hornet performs AMW primarily through Close Air Support (CAS), and are controlled via a ground based Forward Air Controller (FAC) or a Forward Air Controller - Airborne (FAC-A)an air based controller in an F-14 or A-10. CAS involves our checking in with the FAC or FAC-A and having our eyes talked onto the target area from large features to small until we have the actual target in sight. We then drop ordnance on the target, and may get corrections from the FAC for follow on ordnance delivery.

ANTI-SURFACE SHIP WARFARE (ASU)

205.1.4 Explain the term ASU and discuss the role of the F/A-18 in an ASU mission. [refs. b, c]

a. The detection, tracking, and destruction or neutralization of enemy surface combatants and merchant ships.

b. We have little to do with ASU. This became a PMA of ours during the cold war, when it was likely that we would openly engage in hostilities with the Soviet Fleet. Currently, we perform Sledge Hammer events to practice attacking a large combatant, but the most likely use of ASU for the Hornet is our destroying a small, heavily armed boat, inbound to the CVN.

ANTI-SUBMARINE WARFARE (ASW)

205.1.5 Explain the term ASW and discuss the role of the F/A-18 in an ASW mission. [refs. b, c]

a. The detection, tracking, and destruction or neutralization of enemy submarines.

b. We currently don't do any ASW. S-3's and Helos do the bulk of this mission.

COMMAND, CONTROL, AND COMMUNICATIONS (CCC)

205.1.6 Explain the term CCC and discuss the role of the F/A-18 in a CCC mission. [refs. b, c]

a. Providing communications and related facilities for coordination and control of external organizations or forces, and control of own unit's capabilities.

b. The Hornet performs CCC on virtually every mission, with the integration of our Ground Control Intercepts (GCI) or Airborne Intercept Control (AIC). If we perform any mission within the battle group, we are normally assigned a controller to alert us to hostile aircraft in the vicinity. Talking to the AIC or GCI controllers exercises this PMA.

COMMAND AND CONTROL WARFARE (C2W)

205.1.7 Explain the term CCC and discuss the role of the F/A-18 in a CCC mission. [refs. b, c]

a. The integrated use of psychological operations (PSYOP), military deception, operations security (OPSEC), electronic warfare (EW), and physical destruction; mutually supported by intelligence, to deny information to, influence, degrade, or destroy adversary C2 capabilities while protecting friendly C2 capabilities against such actions C2W is a subset of IW (below) that specifically attacks and protects the C2 target set. Formerly Electronic Warfare (ELW) and subsequently Space & Electronic Warfare (SEW).

Information Warfare (IW). Actions taken to achieve information superiority by affecting adversary information, information-based processes, information systems, and computer-based networks while defending one's own information, information-based processes, information systems, and computer-based networks.

b. The E-2 and Air Force Rivet Joint assets are primarily responsible for this, as well as the ES-3's on board.

FLEET SUPPORT OPERATIONS (FSO)

205.1.8 Explain the term FSO and discuss the role of the F/A-18 in a FSO mission. [refs. b, c]

a. Naval forces and designated shore facilities providing supporting services other than logistics replenishment to fleet units.

b. This is not one of our PMA's. We occasionally run missile profiles against the battle group ships.

INTELLIGENCE (INT)

205.1.9 Explain the term INT and discuss the role of the F/A-18 in an INT mission. [refs. b, c]

a. The collection, processing, and evaluation of information to determine location, identification, and capability of hostile forces through the employment of reconnaissance, surveillance, and other means.

b. This is not one of our PMA's. Our input to INT involves the pilot's airborne observations as well as any airborne sensor footage (FLIR) that we might be able to collect.

MINE WARFARE (MIW)

205.1.10 Explain the term MIW and discuss the role of the F/A-18 in a MIW mission. [refs. b, c]

a. The use of mines for control/denial of sea or harbor areas, and mine countermeasures over, under, or upon the surface.

b. This is one of our PMA's, and is the only mission area that is strategic in nature. We have few opportunities to practice mining, and they usually occur during workups. We are evaluated during the IDTC by having a CV wide MINEX as well as the Mine Readiness Certification and Inspection (MRCI). Each Hornet can carry 2 mines, and with GPS and the Hornet's precise delivery capability, we are able to place mines with remarkable accuracy.

MOBILITY (MOB)

205.1.11 Explain the term MIW and discuss the role of the F/A-18 in a MIW mission. [refs. b, c]

a. The ability of naval forces to maneuver and maintain themselves in all situations over, under, or upon the surface.

b. Mobility involves our ability to deploy and get around. It is one of our PMA's. We get points for and includes our pilot's NATOPS and Instrument checks, CQ simulators, FCLPs, shipboard CQ and Airways Navigation.

NON-COMBATANT OPERATIONS (NCO)

205.1.11 Explain the term NCO and discuss the role of the F/A-18 in a NCO mission. [refs. b, c]

a. Selected operations of a noncombatant nature not clearly categorized in any other warfare mission area. Included in this category are the necessary support requirements and/or special missions that are required of a unit but not directly related to the other Warfare Mission Areas.

b. Not one of our PMA's. Our squadron's involvement with Non-Combat Expeditionary Operations (NEO) have become more likely in the last few years. NEO's would normally involve flying protection for a helicopter evacuation of an area that is becoming dangerous for US citizens. Or flying presence ops over a country to establish stability and announce that US forces are in the area.

STRIKE WARFARE (STW)

205.1.11 Explain the term STW and discuss the role of the F/A-18 in a STW mission. [refs. b, c]

a. The destruction or neutralization of enemy targets ashore through the use of conventional or nuclear weapons. This includes, but is not limited to, strategic targets, building yards, and operating bases from which the enemy is capable of conducting air, surface, or subsurface operations against U.S. or allied forces.

b. This is one of our most important PMA's. The squadron fly's STW missions in all theaters we pull into. Strike planning is a necessary part of the pilot's mission. The Hornet's involvement in STW can include dropping MK-80 series bombs, GBU's, Walleye, Maverick, JSOW and HARM. STW missions include executing pre-planned strikes in country, interdiction bombing campaigns, kill box missions and contingency operations.