Pocket Checklist

F-14A/B AIRCRAFT

REV: 20220605

DISCLAIMER

This document represents a personal project and is intended for entertainment purposes only. Do not use for training purposes or in real life scenarios.

Contents

Chapter 1

PROCEDURES

Contents

Procedures

1.1 START-UP

1.1.1 PILOT - PRE-START

1.	**Parking Brake**	**ENGAGED**
2.	**Ground Power**	connected
3.	**Compressed Air**	connected
4.	**ICS**	**HOT MIC**
5.	**TO RIO**	*"Begin Start-Up"*
6.	**ICS**	**Comm Check**
7.	**MASTER TEST Selector**	(a) **LTS** • **Warning Lights** ....checked • **Caution Lights** ....checked • **Advisory Lights** .... checked (b) **FIRE DET/EXT** • **L FIRE GO** ....illuminated • **R FIRE GO** ....illuminated (c) **INST** • **RPM** ....96% • **EGT** ....960 C • **FF** ....10500 pph • **AOA** ....18 ± 5 • **Wing Sweep** ....45 ± 2.5 • **FUEL QTY** ....2000 ± 200 • **Oxygen QTY** .... 2 liters • **L&R FF lights** ....illuminated (d) **OFF**
8.	**Ejection Seat**	Armed
9.	**RIO**	Canopy Closed
10.	**Oxygen**	**ON (FWD)**
11.	**Emergency Wing Sweep**	**OVERSWEEP**

1.1.2 PILOT - ENGINE START

#		
1.	**AIR SOURCE**	**OFF**
2.	**Hydraulics**	(a) **HYD TRANSFER PUMP** .... **SHUTOFF** (b) **Emerg. Hyd.** ....**AUTO (LOW)**
3.	**L&R MASTER GEN**	**NORM**
4.	**RIO**	*"Ready to Start"*
5.	**Right Engine Start-Up**	(a) **Engine Crank** .... **R** (b) **R Eng N2** .... 20% (c) **R Throttle** .... **IDLE** (d) **TIT** .... < 890 C during start (e) **R GEN CAUTION** .... extinguised
6.	**Stabilized Parameters**	• **RPM** .... 62-78% • **TIT** .... approx 500 C • **Fuel Flow** ....950-1400 pph • **NOZ** .... 5 (100%) • **Oil Pressure** ....25-35 psi • **Hyd Pressure** ....3000 psi
7.	**Left Engine Start-Up**	(a) **Engine Crank** .... **L** (b) **L Eng N2** ....20% (c) **L Throttle** .... **IDLE** (d) **TIT** .... < 890 C during start (e) **L GEN Caution** .... extinguised
8.	**Stabilized Parameters**	• **RPM** .... 62-78% • **TIT** .... approx 500 C • **Fuel Flow** ....950-1400 pph • **NOZ** .... 5 (100%) • **Oil Pressure** ....25-35 psi • **Hyd Pressure** ....3000 psi
9.	**HYD TRANSFER PUMP**	**NORM**
10.	**HYD PRESSURE**	3000 psi
11.	**AIR SOURCE**	**BOTH ENG**
12.	**Ground Power**	disconnected
13.	**Compressed Air**	disconnected

1.1.3 PILOT - POST-START

1.	**TO RIO**	*"Both Engines Running"*
2.	**Displays Control Panel**	• **VDI** .... **ON** • **HUD** .... **ON** • **HSD** .... **ON** • **HDS MODE** ....**TID** (monitor INS)
3.	**RIO**	**Select Align Quality** • **INS GO NOW:** shortest but least precise alignment • **INS GO COARSE:** does not meet Launch Criteria for AIM-7 / AIM-54 • **INS GO MIN WPN LAUNCH:** allows AIM-7 / AIM-54 launch • **INS GO FINE** fine align (8 min)
4.	**ACM Panel**	• **GUN RATE** ....as required • **SW COOL** ....**OFF** • **MSL PREP** .... **OFF** • **Missile MODE/STP** .... **NORM**
5.	**Gun Rounds**	**Set**
6.	**ANTI-SKID SPOILER BK**	**OFF**
7.	**Emergency Wing Sweep**	(a) **Handle** ....**AFT** (b) **Angle** .... Verify 68 deg
8.	**AFCS Panel - SAS STAB AUG**	• **PITCH** .... **ON** • **ROLL** .... **ON** • **YAW** ....**ON**
9.	**WING/EXT TRANS**	**AUTO**
10.	**UHF 1 Function Selector**	**BOTH**
11.	**TACAN Function Selector**	**T/R**
12.	**ARA-63 ICLS RECEIVER**	**ON**

13.	**Radar Altimeter**	(a) **Control Knob** …….. one click CW to turn on (b) **Display** …………………6000 ft (warm up) (c) **Display** ……………………………0 ft (ready)
14.	**Standby ADI**	erect at least 2 min before T/O
15.	**KY-28 Crypt. Key**	**Set** (refer to GROUND SETTINGS kb)
16.	**RIO**	set D/L frequency
17.	**Lights**	As desired

WARNING

- **PARKING BRAKE MUST BE ENGAGED DURING ALIGNMENT.**
  Lack of parking brake engagement inhibits INS alignment

1.1.4 RIO - PRE-START

1.	**Oxygen**	**ON (FWD)**
2.	PILOT	• **Ground Power** . . . . connected • **Compressed Air** . . . . connected
3.	**ICS**	Comm Check
4.	**Lights**	As required
5.	**LTS Test**	Coordinate with Pilot
6.	**Ejection Seats**	**ARMED**
7.	**Canopy**	**CLOSED**
8.	TO PILOT	*"Ready to Start"*

1.1.5 RIO - POST-START - SHORE

1.	PILOT	• **Engines** . . . . started • **AIR SOURCE** . . . . BOTH ENG
2.	**INS STARTUP**	(a) **LIQUID COOLING** . . . . **ON (FWD)** (b) **WCS Switch** . . . . **STANDBY** (c) **IR/TV Power** . . . . **STBY/IR/TV** (d) **TID/DDD** . . . . illuminated after 40 s
3.	**Kneeboard**	Retrieve Coordinates, Elevation, Magnetic Variation from GROUND SETTINGS Page
WARNING Input Coords **BEFORE** selecting **GND ALIGN** if using ASH		

4.	**Start INS Align**	(a) **Nav Mode** . . . . **GND ALIGN**
		(b) **CAP**
		    • **Category** . . . . **NAV**
		    • **MESSAGE** . . . . **OWN AC**
		(c) **Keyboard**
		    • **CLEAR**, **LAT**, latitude, **ENTER**
		    • **LONG**, longitude, **ENTER**
		    • **ALT**, altitude, **ENTER**
		(d) **CAP MESSAGE** . . . . **MAG HDG VAR**
		(e) **Keyboard** . . . . **HDG**, mag var, **ENTER**
		(f) **Align Progress** . . . . Monitor

5.	**U/VHF Mode**	**T/R G**

6.	**Datalink**	(a) **Kneeboard** .... TACTICAL DL
		(b) **DL Power** .... **ON (FWD)**
		(c) **DL Mode** .... **TAC (AFT)**
		(d) **DL Freq.** .... **Set**
7.	**TACAN**	**T/R**
8.	**RWR Panel**	(a) **Display Type** .... **NORM**
		(b) **PWR** .... **ON**
		(c) **TEST** .... **SPL**
		(d) **MODE** .... **LMT**
9.	**DECM**	**STBY**, then **ACT**
10.	**IFF**	(a) **MASTER** .... **STBY**
		(b) **CODE** .... as required
11.	**Altimeter**	Reset
12.	**CAP**	Enter Data (WP, FP, *etc.*)
13.	**Displays**	• **DDD** ....Set
		• **TID** ....Set
		• **Multiple Display Indicator** ....Set
14.	**Hand Control Panel**	Set
15.	**AN/ALE-39**	Set (as required)
		• **AUTO (CHAFF)/MAN**
		• **MAN**
16.	**Flare Mode**	**PILOT**
17.	**Complete INS Align**	• **Duration Full Fine** ....8 min
		• **Duration ASH** .... much faster
		(a) **Align Complete** .... Caret → Diamond
		(b) **NAV Mode** .... **INS NAV**
18.	**Standby ADI**	Erect at least 2 min before T/O
19.	**TO PILOT**	*"Ready to Taxi"*

Once Airborne

20.	**IR/TV Power**	**ON**
21.	**WCS Switch**	**WCS XMT**

1.1.6 RIO - POST-START - CARRIER

1.	**PILOT**	• **Engines** .... started • **AIR SOURCE** ....BOTH ENG
2.	**INS STARTUP**	(a) **LIQUID COOLING** ....**ON (FWD)** (b) **WCS Switch** ....**STANDBY** (c) **IR/TV Power** ....**STBY/IR/TV** (d) **TID/DDD** ....illuminated after 40 s
3.	**Datalink**	(a) **Kneeboard** ....TACTICAL DL (b) **DL Power** ....**ON (FWD)**
4.	**Start INS Align**	(a) **DL FREQ** ....Set (b) **DL Mode** ....**CAINS/WAYPT** (c) **Nav Mode** ....**CVA**
5.	**U/VHF Mode**	**T/R G**
6.	**TACAN**	**T/R**
7.	**RWR Panel**	(a) **Display Type** ....**NORM** (b) **PWR** ....**ON** (c) **TEST** ....**SPL** (d) **MODE** ....**LMT**
8.	**DECM**	**STBY**, then **ACT**
9.	**IFF**	(a) **MASTER** ....**STBY** (b) **CODE** ....as required
10.	**Altimeter**	Reset
11.	**CAP**	Enter Data (WP, FP, *etc.*)
12.	**Displays**	• **DDD** ....Set • **TID** ....Set • **Multiple Display Indicator** ....Set
13.	**Hand Control Panel**	Set
14.	**AN/ALE-39**	Set (as required) • **AUTO (CHAFF)/MAN** • **MAN**
15.	**Flare Mode**	**PILOT**

16.	**Complete INS Align**	• **Duration Full Fine** ....9 min • **Duration ASH** .... much faster (a) **Align Complete** .... Caret → Diamond (b) **NAV Mode** .... **INS NAV**
17.	**Datalink**	(a) **DL Mode** ....**TAC (AFT)** (b) **DL Freq.** .... **Set**
18.	**Standby ADI**	Erect at least 2 min before T/O
19.	TO PILOT	*"Ready to Taxi"*

Once Airborne

20.	**IR/TV Power**	**ON**
21.	**WCS Switch**	**WCS XMT**

WARNING

- Input Coords **BEFORE** selecting **GND ALIGN** if using ASH. Else alignment can progress too far to correct coordinates by the time they are input.
- **PARKING BRAKE MUST BE ENGAGED DURING ALIGNMENT.** Lack of parking brake engagement inhibits INS alignment

1.2 TAKEOFF & LANDING

1.2.1 PRE-TAXI

1.	**ANTI-SKID SPOILER BK**	**OFF**
2.	**HOOK BYPASS**	As Required
3.	**Nose Strut**	**RETRACTED**
4.	**HUD MODE**	**TO**
5.	**Parking Brake**	**Released (IN)**
6.	**NWS**	**ENGAGED**
7.	**Path**	verify clear

1.2.2 TAKEOFF - SHORE

1.	**Wing Sweep**	**After Lining Up On Runway** (a) **EM WING SWEEP** .... **FWD**, then **IN** (b) **MASTER RESET** .... **PRESS** (c) **Wings** .... Verify thumb controller (d) **WING SWEEP** .... **AUTO** (e) **Wings** .... Verify at 20 deg
2.	**ANTI SKID SPOILER BK**	**BOTH (UP)**
3.	**FLAPS**	**UP**
4.	**Trim**	0 deg
5.	**NWS**	**DISENGAGED**
6.	**Takeoff**	(a) **Throttle** .... **MIL** (90% RPM) (b) **Stick** .... **Back** at 130 KIAS (c) **Rotation** .... approx 140 KIAS (d) **GEAR** .... **UP** < 250 KIAS

1.2.3 TAKEOFF - CARRIER

	Lineup	• Wait behind JBD until Catapult is clear • Follow Taxi Directors Instructions to line up on Catapult
1.	**Wing Sweep**	(a) **EM WING SWEEP** .... **FWD**, then **IN** (b) **MASTER RESET** .... **PRESS** (c) **Wings** .... Verify thumb controller (d) **WING SWEEP** .... **AUTO** (e) **Wings** .... Verify at 20 deg
2.	**FLAPS**	**DOWN**
3.	**Launch Bar Preparation**	(a) **Nose Strut** .... **KNEEL** when directed (b) **Throttle** .... **UP** when directed (c) **Taxi** .... launch bar into shuttle (d) **Throttle** .... **IDLE** when directed
4.	**Trim**	2-3 deg nose up
5.	**Speed Brakes**	**IN**
6.	**Final Checks**	(a) **Throttle** .... **MIL** when directed (b) **Control Wipeout** - Stick Full Forward - Stick Full Aft - Stick Full Left - Stick Full Right - Rudder Full Left - Rudder Full Right (c) **Eng. Inst.** .... **Checked** (d) **Caution/Warnings** .... **None**
7.	**Catapult Shot**	(a) **Salute** .... **CAT SHOT** (b) **Gear** .... **UP** < 250 KIAS (c) **Flaps** .... **UP** < 225 KIAS
8.	**Clearing Turn**	

1.2.4 LANDING - OVERHEAD PATTERN
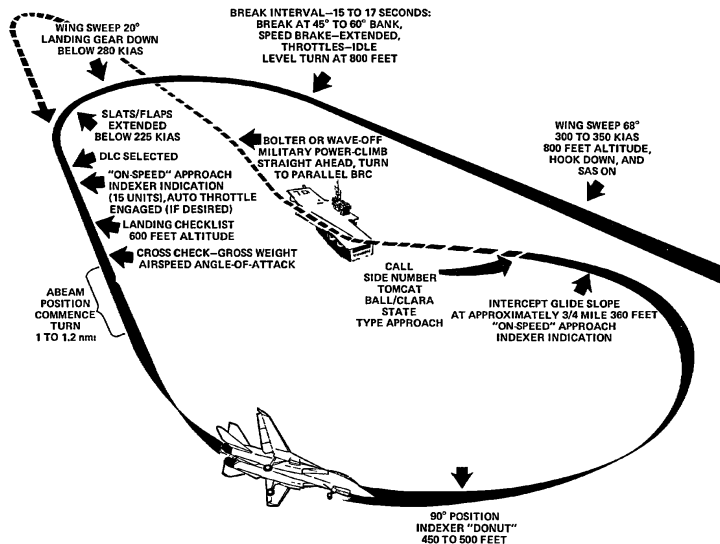
1.	**Initial Approach**	• **WING SWEEP** ....**68 deg** • **HOOK** ....**DOWN** • **SAS** ....**ON** • **HUD** ....**LDG** • **Airspeed** ....**300-350 KIAS** • **Altitude** ....**800 ft**
2.	**Initial Break**	• **Break Interval** ....**15-17 s** • **BANK** ....**45-60 deg** • **SPEED BRAKE** ....**EXTEND** • **Throttle** ....**IDLE** • **G** ....**3-4 G** • **Altitude** ....**800 ft**
3.	**Break Turn**	• **Wing Sweep** ....**AUTO** < 280 KIAS • **Landing Gear** ....**DOWN** < 280 KIAS • **FLAPS** ....**DOWN** < 225 KIAS
4.	**Downwind**	• **DLC** ....**Selected** once flaps out • **AOA** .... **ON-SPEED** • **LANDING CHECKLIST** • **Altitude** ....descend to **600 ft**

5.	Final Turn	180 Deg Position
		• **Abeam Pos.** .... **1-1.2 nmi**
		90 Deg Position
		• **AOA** .... **DONUT**
		• **Altitude** .... **400-500 ft**
6.	Intercept Glideslope	• **Distance** .... **3/4 Mile**
		• **Altitude** .... **360 ft**
		• **AOA** .... **ON-SPEED**

1.2.5   LANDING - CHECKLIST

1.	Wing Sweep	20 deg AUTO
2.	Wheels	• **Lights** .... **3 DOWN**
		• **Transition Light** .... **OUT**
3.	SAS	ON
4.	FLAPS	DOWN
5.	DLC	Checked
6.	Hook	• **HOOK** .... **DOWN**
		• **Transition Light** .... **OUT**
7.	Harness	Locked
8.	Speedbrakes	EXT
9.	Brakes	Check
10.	Fuel	Check

1.3   IN-FLIGHT

1.3.1   AERIAL REFUELING

1.	**REFUELING CHECKLIST**	(a) **WCS** .... **STBY**
		(b) **ARMING** .... **SAFE**
		(c) **DUMP Switch** .... **OFF**
		(d) **AIR SOURCE** .... **L ENG**
		(e) **REFUEL PROBE** .... **As desired** (transition light off)
		(f) **WING SWEEP** .... **As desired**
2.	**DISENGAGE-MENT**	(a) **REFUEL PROBE** .... **RET** (transition light off)
		(b) **AIR SOURCE** .... **BOTH**
		(c) **WING SWEEP** .... **AUTO**

1.3.2   AIRSTART

• **Spooldown**	*Before significant spooldown*
	  (a) **Non-Running ENG** .... **IDLE** or above
	
	If no relight occurs
	  (b) **Non-Running ENG** .... **OFF** then **IDLE**
	
	If still no relight occurs
	  (c) **ENG MODE** .... **SEC**
	  (d) **Non-Running ENG** .... **OFF** then **IDLE**

• **Cross-Bleed Restart**	*With one ENG running, if Spooldown fails*
	  (a) **Non-Running ENG** .... **OFF**
	  (b) **FUEL SHUT OFF** ....check
	  (c) **Running throttle** .... 80%+
	  (d) **BACK UP IGNITION** .... **ON**
	  (e) **ENG CRANK** ....non-running eng
	  (f) **Non-Running ENG** ....**IDLE**
	If no start occurs
	  (g) **Non-Running ENG** .... **OFF** then **IDLE**
	
	If still no start
	  (h) **ENG MODE** .... **SEC**
	  (i) **Non-Running ENG** .... **OFF** then **IDLE**

• **Windmill Restart**	(a) **Airspeed** ....>450 kts (b) **Throttle** ....IDLE or above (c) **BACK UP IGNITION** .... ON *If no relight occurs* (d) **Throttle** ....OFF then IDLE *If still no relight* (e) **ENG MODE** .... SEC (f) **Throttle** ....OFF then IDLE
• **Post Restart**	(a) **BACK UP IGNITION** .... OFF (b) **ENG MODE** ....PRI

Chapter 2

SYSTEMS

Contents

2.1 FLIGHT CONTROL SYSTEMS

2.1.1 AFCS - SAS

• **SAS**	• **Stability Augmentation System**
	
	  – **Not Fly-by-Wire**
	  – Automatic control surface commands generated by analog computer to improve stability

• **Controls**	• **Three individual Switches**
	
	  – Pitch
	  – Roll
	  – Yaw

• **Autopilot Emergency Disengage Paddle**	• **Paddle on Stick**
	
	  – Disengages Autopilot Modes
	  – Deactivates Pitch, Roll SAS Channels

2.1.2 AFCS - AUTOPILOT

• **Attitude Hold**	• **Basic Attitude Hold**
	
	  – Maintains existing pitch & roll
	  – Attitude can be changed with stick input
	  – If engaged outside limits will automatically move within range
	
	• **Limits**
	
	  – Pitch: 30 deg
	  – Roll: 60 deg
	
	• **Engagement**
	
	  (a) **SAS Switches** .... **ON (FWD)**
	  (b) **Alt. Hold Mode** .... **OFF**
	  (c) **VEC/PCD/ACL** .... **OFF**
	  (d) **Heading Mode** .... **OFF**
	  (e) **Autopilot Switch** ...... **ENGAGE (FWD)**

- **Altitude Hold**

  - **Barometric Altitude Hold**
    - Maintains current barometric altitude
  - **Limits**
    - Vertical velocity: < 100 ft/s
  - **Engagement**
    - (a) **SAS Switches** .... **ON (FWD)**
    - (b) **Autopilot Switch** ...... **ENGAGE (FWD)**
    - (c) **Alt. Hold Mode** .... **ALT (FWD)**
    - (d) **A/P REF Light** .... Wait until appears
    - (e) **NWS Button** .... **Press**

- **Heading Hold**

  - **Magnetic Heading Hold**
    - Maintains current magneatic heading
  - **Limits**
    - Bank angle < 5 deg
  - **Engagement**
    - (a) **SAS Switches** .... **ON (FWD)**
    - (b) **Autopilot Switch** ...... **ENGAGE (FWD)**
    - (c) **Heading Mode** .... **HDG (FWD)**

- **Ground Track**

  - **Autopilot follows ground track**
    - Similar to heading hold
    - Compensates for wind drift
    - Uses INS data instead of mag. bearing
  - **Limits**
    - Bank angle < 5 deg
  - **Engagement**
    - (a) **SAS Switches** .... **ON (FWD)**
    - (b) **Autopilot Switch** ...... **ENGAGE (FWD)**
    - (c) **Heading Mode** .... **GT (AFT)**
    - (d) **A/P REF Light** .... Wait until appears
    - (e) **NWS Button** .... **Press**

- **VEC/PCD**

  - **Vector / Precision Course Direction**
    - Allows Link 4 controller to remotely direct the aircraft
    - **Not Modelled in DCS**

• **ACL**	• **Automatic Carrier Landing** – See relevant section

• **Autopilot Emergency Disengage Paddle**	• **Paddle on Stick**
	  – **Disengages Autopilot Modes**
	  – **Deactivates Pitch, Roll SAS Channels**

2.1.3 APC / AUTOTHROTTLE

• **APC**	• **Approach Power Compensator**
	  – Automatic throttle control
	  – **Maintains ON SPEED AoA**

• **Conditions**	Inhibited / disengaged if conditions not met: • **Throttles** ....75%-90% RPM • **Landing Gear Handle** ....**Down** • **Weight on Wheels** ....**No**
• **Engage**	• **Throttle Mode** .... **AUTO (FWD)**
• **Disengage**	**Cage/Seam Button**

2.1.4 ACLS

2.1.5 WING-SWEEP

• **Overview**	• **In Flight Limited between 20 deg & 68 deg**
	• **On Ground can Oversweep to 75 deg**
	• **Hydromechanically Controlled**
	  – Automatically through CADC
	  – Manually with emergency wing-sweep handle
	• **15 deg/s at 1g loading**
	• **Mechanically linked to ensure symmetry**

- **CADC Modes**

  - **AUTO**
    - CADC controls wing position as function of current Mach via wing-sweep program
  - **MAN**
    - Pilot manually chooses desired wing sweep angle with thumb controller
  - **BOMB**
    - Sets wing sweep to **55 deg** or further aft

- **Emergency Mode**

  - **Emergency Wing-Sweep Handle**
    - Moved with wing sweep program by spider detent under normal operation
    - Can be forced out of spider detent and moved manually

- **Oversweep**

  - **Selected via Emergency Wing-Sweep Handle**
    - (a) **Em. Wing-Sweep** .... **68 deg**
         Wait for wing-seal airbags to deflate
    - (b) **HZ TAIL AUTH** .... **Illuminated**
    - (c) **Em. Wing-Sweep** .... **75 deg**

- **Return to CADC Control**

  - **After Emergency Mode / Oversweep**
    - (a) **Em. Wing-Sweep** .... **Spider Detent**
         (Fwd on startup)
    - (b) **MASTER RESET** .... **Press**

Indicated Mach	Max Forward Wing Position
0.4	20 deg
0.7	25 deg
0.8	50 deg
0.9	60 deg
1.0	68 deg

NOTE

- Indicates **Max** forward selectable wing sweep position

2-6

2.2 NAVIGATION SYSTEMS

2.2.1 OVERVIEW

• **CAINS**	**C**arrier **A**ircraft **I**nertial **N**avigation **S**ystem	
	• **Primary navigation system of F-14**	
	• Additionally provides information for tactical systems	
	– Own position for long-range AIM-7 & AIM-54 modes	
	– Accurate Datalink sharing/receiving	

<div align="center">Main Components</div>

• **IMU**	**I**nertial **M**easurement **U**nit	
	• 3-Axis, 4-Gimbal system prevents gimbal-lock	
	• 2 gyros provide aircraft attitude and stabilize the platform	
	• 3 accelerometers measure accelerations in all orthogonal axes	
• **CSDC**	**C**omputer **S**ignal **D**ata **C**onverter	
	• Handles data interface between sensors and **WCS**	
• **WCS**	**AWG-9 Computer**	
	• **WCS** performs general navigation computations and provides them to PILOT & RIO through displays	
• **NPS**	**N**avigation **P**ower **S**upply	
	• Provides power to **IMU** & **CSDC**	
• **Subsystems**	• Radar Altimeter	
	• TACAN	
	• AHRS	

<div align="center">Controls</div>

• **CAP**	• Used for Data Entry	
	• **CATEGORY** – **NAV**	

• **NAV MODE Se-lector**	• **OFF** – Turns off power to IMU
	• **ALIGN** – Three align modes
	See Alignment Section
	• **INS** – Selects normal INS navigation mode
	• **IMU/AM** – Selects backup mode. Uses IMU for aircraft attitude, TAS from CADC, and stored/entered winds for navigation
	• **AHRS/AM** – Selects further degraded backup mode. Uses magnetic heading from AHRS, TAS and AoA from CADC, and stored wind and mag var for navigation

Failure Indicators

• **NAV COMP Light**	• If illuminates while **NAV MODE** is in **INS** indicates failure in **INS** or **CSDC**
	• Navigation system automatically switches to **IMU/AM**
	• Remains illuminated until **NAV MODE** is set to **IMU/AM**

• **IMU Light**	• Indicates failure of **IMU**
	• Navigation system automatically switches to **AHRS/AM**
	• Remains illuminated until **NAV MODE Switch** is set to **AHRS/AM**

• **AHRS Light**	• Indicates **AHRS** self-test detected a failure
	• Magnetic heading now commanded by WCS computer using last known mag var values
	• Heading values will degrade over time

2.2.2   ALIGNMENT - OVERVIEW

• **Main Phases**	(a) **Coarse Alignment** • Warm-up of IMU elements • Gimbals caged to Airframe • Gyros brought up to speed • Coarse IMU platform leveling performed with accellerometer outputs • Begins upon completion of initializatin sequence • Computes Initial coarse estimates of IMU wander angle (b) **Fine Alignment** • Uses gryoscopic drift to calculate true heading

• **Primary Align Modes**	• **SAT** – **NOT IMPLEMENTED**
	  – Ground
	  – Carrier
	
	• **NON-SAT**
	  – Ground
	  – Carrier

• **Align Submodes**	• **CAT ALIGN** – overrides parking brake requirement • **STORED HEADING** – uses previous aligment as reference for rapid aligment • **HANDSET** – for **CVA ALIGN** when SINS data not available

NOTE

- Initialization requires Aircraft or Homebase data
    - Lat/Long
    - Pressure Altitude

    If **HANDSET Alignment** used requires Carrier parameters

    - Speed
    - True heading

- **Parking brake must be on during initialization of any mode**
    - If released during coarse align, **STBY** and **READY** lights flash, align program reinitializes
    - If released during fine align, suspend align discrete sent to CSDC, **STBY** or **READY** light blinks, time-to-align clock on **TID** stops

2.2.3 ALIGNMENT - NON-SAT

• **Enter GND Align**	• **GND ALIGN** requires own-aircraft or Homebase parameters
	– Latitude / Longitude
	– Altitude
	• Can be entered into **CAP** before or within 90-120 s after selecting **GND ALIGN**

NOTE

- Whatever has been hooked when **ALIGN** is selected is injected as own-aircraft coordinates
- If fine align complete not yet achieved, own-aircraft latitude entry will reinitialize the alignment

• **Enter CVA Align**	• **CVA ALIGN** requires **DL CAINS Mode** to align aircraft IMU to ship's INS
	(a) **Datalink** ....**ON**
	(b) **WCS** ....**STBY**
	(c) **D/L Mode** ....**CAINS/WAYPT**
	(d) **NAV MODE Switch** ....**CVA ALIGN**

• **Initialization**	• After approx. 20 s **STBY/READY Lights** illuminate
	• **TID** displays alignment time of **0.7** during initialization
	• After 42-45 s **NAV COMP** and **READY** lights extinguish, indicating IMU is ready
	• Upon completion of initialization the **Alignment Status Indicator (CARET)** appears,
• **Coarse Alignment**	• **CARET** before coarse-align complete marker (first tick)
	• Upon completion of coarse alignment phase the **CARET** is directly above the first tick and changes to a **DIAMOND**

NOTE

- Parking brake can be released for taxi after coarse align is complete. Will suspend align
- Suspend align indicated by flashing **STBY** and/or **READY Lights**
- During suspend align taxiing more than 4000 ft will render the **INS** performance unreliable

• **Fine Alignment**	• **DIAMOND** between first and third ticks
	• **Second Tick** – minimum weapon launch criteria met
	– **STBY Light** – extinguishes
	– **READY Light** – light illuminates
	– **INS Mode** – may be selected
	• **Third Tick** – fine alignment complete
	– Dot appears in Diamond
	– Can be left in align for progressively more accurate alignment
• **Exit Alignment**	• **Select INS Mode**
	– **READY Light** – extinguishes
	– Tactical tape appears
	– Normal navigation display available

• **Reinitialization**	If observable acronym (**O**) or stalled align noticed during fine align. RIO can apply any of following methods
	(a) **NAV MODE SWITCH** ....**OFF**
	(b) **WCS** ....**OFF**
	(c) Proceed with normal start sequence
	(a) **NAV MODE SWITCH** ....**OFF**
	(b) **NAV MODE SWITCH** .. **Desired Align Mode**
	(a) **NAV MODE SWITCH** .... **INS**
	Verify **IN** on **TID**
	(b) **NAV MODE SWITCH** ....**OFF**
	(c) **NAV MODE SWITCH** .. **Desired Align Mode**

NOTE

- You will get **Erroneous Heading Readings on a Carrier** even with fine align complete (up to 30 deg) due to ship's magnetic field
- Deviation goes away shortly after takeoff

2.2.4   ALIGNMENT - NON-SAT - SUBMODES

• **Stored Heading Alignment**	• Reference alignment stored prior to powering-down the aircraft
	• **ASH** – Automatic Stored Heading displayed on TID when align selected and reference align available
• **Handset Alignment**	• For use when SINS data not available (indicated by flashing **HS** on **TID**)
	• Similar to **GND ALIGN** but requires additional parameters for the ship movement
	– Latitude / Longitude
	– Ship's Speed
	– Ship's True Heading
• **Catapult Alignment**	• Inhibits suspend align while positioned on the catapult when parking brake released

2.2.5   ALIGNMENT - FAILURES

• **TID Status Indicators**	Appear between first and second ticks • **C** – **Cal Data Fail** • **T** – **Temp** (cold IMU) • **S** – **SINS Data Invalid** • **O** – **Observable** (alignment data bad)

• **INS Status Indicators**	• **STBY ON / READY ON**
	  – Normal during align initialization
	  – Else indicates IMU, NAV COMP, NPS or AHRS Failure
	• **STBY ON / READY OFF**
	  – Normal during align after initialization
	  – Normal when **IMU/AM** selected prior to completion of coarse align
	• **STBY FLASHING / READY FLASHING**
	  – Alignment not initiated due to suspended alignment (check parking brake)
	• **STBY FLASHING / READY OFF**
	  – Align suspended (check parking brake)
	• **STBY OFF / READY ON**
	  – Min weapon launch requirements met
	• **STBY OFF / READY OFF**
	  – System operating normally
	• **STBY OFF / READY FLASHING**
	(After 5 s both off)
	  – Occurs when **IMU/AM** selected and IMU is aligned. If another mode not selected within 5 s, alignment lost, INS not available
	• **STBY OFF / READY FLASHING**
	  – Alignment suspended past mission alert criteria with parking brake off

2.2.6 WAYPOINT

• **Reference Point Types**	• **Navigation Waypoint** – Used for navigation. Maximum of 3 stored simultaneously • **Fixed Point (FP)** – Arbitrary point to establish current position relative to external references • **Initial Point (IP)** – Starting point for A/G attack run • **Surface Target (ST)** – Enemy surface target • **Defended Point (DP)** – Area to protect (i.e friendly forces) • **Hostile Area (HA)** – Area with known ground or air hostiles • **Home Base (HB)** – Airfield / CV

2.2.7 TACAN

• **Overview**	**Tac**tical **A**ir **N**avigation System
	• Indicates Position relative to station
	  – **Slant Range** within 0.1 nm
	  – **Bearing** within 0.5 deg
	• **Operating Range** – approx 300 nm
	• 126 channels, 2 modes of operation

• **Operating Modes**	• **REC** – Receive only • **T/R** – Transmit & Receive, enables ranging • **A/A** – Air to air mode
• **Typical Operation**	**TACAN Setup** (a) **Mode** .... **As Desired** (b) **Frequency** .... **As Desired** (c) **TACAN CMD** .... **As Required** (Corresponding Crewmember) **Pilot Setup** (a) **STEER CMD** .... **TACAN** (b) **HSD MODE** .... **NAV** (c) **Desired Course** .... **Set** via **CRS Knob** **Consult BDHI and HSD to track TACAN station**

2.2.8 VOR/ADF

•	**Overview**	**A**utomatic **D**irection **F**inder
		• Used with **ARC-182 Radio**
		• **BDHI** – Displays **Relative Bearing** to transmitting ground station
		• **Range** – Line of sight
		• **Frequency Range** – 108-399.975 MHz
		• Only operable for RIO
•	**Typical Operation**	**RIO Setup**
		(a) **V/UHF 2 Mode** .... **T/R**
		(warm-up, at least 5 min)
		(b) **V/UHF 2 Frequency Mode** .... **MAN**
		(c) **V/UHF 2 Frequency** .... **As desired**
		(d) **V/UHF 2 Mode** .... **DF**

NOTE

• **UHF 1 ADF** is not functional despite controls in **PILOT** cockpit

2.2.9 DISPLAYS

Pilot Cockpit Interface	
• **HUD**	**H**eads **U**p **D**isplay • Displays flight & combat information onto front canopy

• **VDI**	**V**ertical **D**isplay **I**ndicator
	• **TV Mode**
	  – Displays **TCS** imagery
	• **NORM Mode**
	  – Displays similar flight & combat information as HUD

• **HSD**	**H**orizontal **S**ituation **D**isplay
	• **NAV Mode** Information
	  – **Diamond** – Current heading
	  – **Chevron** – **TACAN TO** bearing
	  – **+** – **TACAN FROM** bearing
	  – **House** – **ADF** bearing
	  – **RNG** – Range to Waypoint (nm)
	  – **MODE** – **NAV STEER** mode
	  – **W** – Wind heading / speed (kts)
	  – **TAS** – **T**rue **A**ir**S**peed (kts)
	  – **GS** – **G**round**S**peed (kts)
	• **TID Mode** Information
	  – **Repeat of TID Symbology**
	  – Overhead View
	  – Waypoint Coordinates

• **BDHI**	**B**earing **D**istance **H**eading **I**ndicator
	• Displays A/C magnetic heading with nav bearing & range data
	• 2 Servo driven needles
	  – **No.1** (single bar) – **UHF (ADF)** system
	  – **No.2** (double bar) – **TACAN** System

2.3 COMMUNICATION SYSTEMS

2.3.1 OVERVIEW

• **ARC-159 UHF 1**	• **Air-to-Air & Air-to-Surface Communication**
	 • **Pilot Controlled**
	 • **Frequency**
	    – **Range** – 225.000 - 399.975 MHz
	    – **Steps** – 25 kHz
	    – **Channels** – 20

• **ARC-182 V/UHF 2**	• **Air-to-Air & Air-to-Surface Communication**
	 • **RIO Controlled**
	 • **Frequency**
	    – **Band 1** – 30 - 88 MHz
	    – **Band 2** – 108 - 156 MHz
	    – **Band 3** – 156 - 174 MHz
	    – **Band 4** – 225 - 399.975 MHz
	    – **Steps** – 25 kHz
	    – **Channels** – 20

• **ARA-50 UHF ADF**	• **UHF Automatic Direction Finder** • **LoS bearing to UHF Transmitter** • **Bearing displayed on BDHI, Pilot HSD** • **5 min Warmup**
• **KY-28 Voice Security Equipment**	• **Voice Ciphering** • **Integrated with UHF 1 and V/UHF 2** • **2 min Warmup**

2.3.2 ARC-159 UHF 1

• **ARC-159 UHF 1**	• **Air-to-Air & Air-to-Surface Communication**
	 • **Pilot Controlled**
	 • **Frequency**
	    – **Range** – 225.000 - 399.975 MHz
	    – **Steps** – 25 kHz
	    – **Channels** – 20

•	**VOL Knob**	• **Controls Pilot UHF 1 Audio Level**
•	**BRT/TEST Knob**	• **Controls Radio FREQ Display** • Turn past max to display **888.888**
•	**SQL Switch**	• **Toggles radio squelch (noise attenuation)**
•	**READ Switch**	• **Displays Frequency of Selected Preset Channel**
•	**LOAD Button**	• **Saves Displayed Frequency to Selected Preset Channel**
•	**TONE Button**	• **Steady 1.020 kHz Test Tone**

•	**Mode Selector**	• **Frequency Selection Method**
		   – **GUARD** – 243.000 MHz
		   – **MANUAL** – Manual tuning
		   – **PRESET** – Preset channels

•	**Function Selector**	• **Selects Transceivers to Energize**
		   – **ADF** – Not simulated
		   – **BOTH** – Main & Guard
		   – **MAIN** – Main
		   – **OFF** – Secures UHF 1 radio

•	**CHAN SEL**	• **Selects from 20 preset Channels**

2.3.3   ARC-182 V/UHF 2

•	**ARC-182 V/UHF 2**	• **Air-to-Air & Air-to-Surface Communication**
		• **RIO Controlled**
		• **Frequency**
		   – **Band 1** – 30 - 88 MHz
		   – **Band 2** – 108 - 156 MHz
		   – **Band 3** – 156 - 174 MHz
		   – **Band 4** – 225 - 399.975 MHz
		   – **Steps** – 25 kHz
		   – **Channels** – 20

•	**VOL Knob**	• **Controls RIO UHF 2 Audio Level**
•	**BRT/TEST Knob**	• **Controls Radio FREQ Display**
•	**SQL Switch**	• **Toggles radio squelch (noise attenuation)**

•	**Mode Selector**	• **Transceiver Settings**
		  – **OFF** – Secures V/UHF radio unless frequency mode set to **243**
		  – **T/R** – Energizes transmitter and main receiver
		  – **T/R & G** – Energizes transmitter, main, and guard receiver
		  – **DF** – Automatic direction finding from 108 - 399.975 MHz
		  – **TEST** – BIT

•	**CHAN SEL Outer Dial**	• **Selects Frequency Tuning Mode**
		  – **243** – Selects UHF Guard
		  – **MAN** – Manual Select frequency
		  – **G** – Tunes Tranceiver to guard frequecy in last selected band
		  – **PRESET** – Allows selection between 40 preset channels (31-40 are Have Quick and not simulated)
		  – **READ** – Displays frequency of selected preset channel
		  – **LOAD** – Saves displayed frequency to selected preset channel

•	**CHAN SEL Inner Dial**	• **Selects one of 40 Preset Channels**

2.3.4 KY-28 VOICE SECURITY EQUIPMENT

•	**KY-28 Voice Security Equipment**	• **Voice Ciphering** • **Integrated with UHF 1 and V/UHF 2** • **2 min Warmup**
•	**ZEROIZE Switch**	• **Lift Guard to Erase Preloaded Codes** • Codes loaded via ground crew

• **Power-Mode Switch**	• **Selects Mode**
	  – **P/OFF** – Removes power from system
	  – **C** – Transmit / Receive in secure mode
	  – **DELAY** – Between PTT and trans.

• **Radio-Select Switch**	• **Selects Radio Mode**
	  – **RELAY** – Acts as relay for other stations (not simulated)
	  – **RAD-2** – Secure voice for V/UHF 2
	  – **RAD-1** – Secure voice for UHF 1

2.3.5 LINK 4 DATALINK - OVERVIEW

• **Link 4**	• **Modes** – Mutually exclusive – **Link 4A** – AWACS / Surface Ship – **Link 4C** – Fighter to Fighter • **Data Speed** – up to 5000 bit/s!
• **Link 4A**	• **Network** – AWACS / Surface Ship • Additionally used for ACLS
• **Link 4C**	• **Network** – Fighter to Fighter – Up to four F-14s – Unique to F-14

• **Basic Operation**	(a) **Power Switch** . . . . As Desired
	
	   • **Link 4A** . . . . **ON**
	   • **Link 4C** . . . . **AUX**
	
	(b) **Mode Switch** . . . . **TAC**
	(c) **Frequency** . . . . **Set**

2.3.6 LINK 4 DATALINK - CONTROL PANEL

• **Test Switch**	• **Controls Test / Anti-Jam Modes** – **TEST** – Initiates BIT – **NORM** – Normal Operation – **A-J** – Anti-Jam (not simulated)
• **Frequency Thumbwheels**	• **Selects Datalink Frequency** – **First Digit** – **Fixed as 3** – **Allowable Range** – 300.0 - 324.9 MHz
• **Power Switch**	• **Controls System Power** – **ON** – Enables Link 4A – **OFF** – Disables system – **AUX** – Enables Link 4C

2.3.7   LINK 4 DATALINK - REPLY/ANTENNA PANEL

• **ANTENNA Switch**	• **Selects Antenna**
	  – **Shared with UHF 1** – Mutually exclusive
	  – **UHF 1 LWR / DL UPR**
	  – **UHF 1 UPR / DL LWR**

• **REPLY Switch**	• **Sets Reply Mode**
	  – **NORM** – Own Aircraft replies to datalink messages
	  – **CANC** – Receive only

• **MODE Switch**	• **Controls Overall Mode**
	  – **TAC** – Normal airborne mode
	  – **CAINS/WAYPT** – Enables CV align

• **Address Thumbwheels**	• **Sets Two Least Significant Bits of Aircraft D/L Address**

2.4 DEFENSIVE SYSTEMS

2.4.1 ALR-67 RWR - CONTROLS / OVERVIEW

• **PWR Switch**	• **Set to ON to Operate**
• **VOL Knob**	• **Sets RIO Audio Level**
• **TEST Switch**	• **Springloaded to Center** • **BIT** – Initiates Build In Test • **SPL** – Holds BIT status page while held
• **MODE Switch**	• **Springloaded to Center** • **OFST** – Separates overlapping symbols • **LMT** – Displays 6 highest threats
• **DISPLAY TYPE Selector**	• **Changes Priority of Display** – **NORM** – Normal threat symbology – **AI** – Airborne Interceptor prioritized – **AAA** – Anti-aircraft artillery prioritized – **UNK** – Unknown prioritized – **FRIEND** – Friendly threats prioritized • **Indicated by Letter in Display Center**

• **Display**	• **Outer Band**
	– **Critical Band**
	– Imminent threat to own aircraft
	– Blinking indicates engaging own aircraft
	• **Middle Band**
	– **Lethal Band**
	– Potentially threatening emitters
	– Not actively engaging own aircraft
	• **Inner Band**
	– **Non-Lethal Band**
	– Not currently within capability of emitter
	• **Inner Circle**
	– **N, I, A, U, F** – Prioritization type
	– **O** – Offset
	– **L** – Limit
	– **B** – BIT Failure
	– **T** – Thermal overload
• **Alert Tones**	• **Short Tone** – New emitter / emitter moved
	• **Slow Warbling** – Threat in critical band
	• **Fast Warbling** – Threat actively engaging own aircraft
	• **4-Tone Sequence** – New threat capable of silently engaging own aircraft

2.4.2 ALR-67 RWR - THREAT SYMBOLOGY

	SHIPS
AB	Arleigh Burke
AK	Admiral Kuznetsov
GR	Grisha 5 (Albatros)
HP	Oliver Hazard Perry
J2	Type 054A Frigate, "Jiangkai II class"
KK	Krivak 3 (Rezky)
KV	Kirov (Pyotr Velikiy)
L1	Type 052B Destroyer, "Luyang I class"
L2	Type 052C Destroyer, "Luyang II class"
N	*Ship with Nav Radar*
NE	Neustrashimy
NZ	Nimitz (Vinson, Stennis)
SV	Slava (Moscow)
TC	Ticonderoga
TT	Tarantul 3 (Molniya)
TW	Tarawa
YU	Type 071 Amphibious Transport Dock, "Yuzhao class"

	AIRCRAFT
14	F-14A/B
15	F-15C/E
16	F-16C
17	JF-17
18	F/A-18C
19	MiG-19

21	MiG-21bis
23	MiG-23MLD
24	Su-24M/MR
25	MiG-25PD
29	MiG-29A/G/S Su-27 Su-33 J-11A
30	Su-30
31	MiG-31
34	Su-34
37	AJS-37
39	Su-25TM
50	A-50
52	B-52
AN	AN-26B AN-30M
AP	AH-64D
B1	B-1B
BE	Tu-95 Tu-142M
BF	Tu-22M3
BJ	Tu-160
E2	E-2D
E3	E-3C
F4	F-4E
F5	F-5E
HX	Ka-27
IL	IL-76MD IL-78M
KC	KC-135

KJ	KJ-2000
M2	Mirage 2000-C Mirage 2000-5
S3	S-3B
SH	SH-60B
TO	Tornado
TR	C-130 C-17A

AIR DEFENSE

2	S-75 TR SNR (SA-2) "Fan Song"
3	S-125 TR SNR-125 (SA-3) "Low Blow"
6	Kub SA-6
7	HQ-7 TR
8	OSA (SA-8)
10	S-300PS 30N6 TR (SA-10)
11	Buk (SA-11)
12	S-300V
15	Tor 9A331 (SA-15)
19	Tunguska 2C6M (SA-19)
A	Gepard M-163 Vulcan ZSU-23-4 Shilka
BB	S-300PS 64H6E SR (SA-10/Big Bird)
BF	Rapier Blindfire TR
CS	S-300PS 5N66M SR (SA-10/Clam Shell)
DE	Sborka (Dog Ear)
FF	S-125 P-19 SR (SA-3/Flat Face)
GR	Roland SR

HA	Hawk SR
HK	Hawk TR
HQ	HQ-7 SR
PT	Patriot
RO	Roland
RP	Rapier SR
S	1L13 55G6 EWR
SD	Buk TR (SA-11/Snow Drift)
SN	PRW-11 (Side Net)

MISSILES

M	AIM-54 AIM-120 MICA-EM R-37 R-77 SD-10

ATC

T	Airport ATC Radar

2.4.3 ALE-39 CMS DISPENSER

	Programmer

• **CHAFF Section**	• **B QTY** – Number of cartridges to eject in burst
	   – **Options** – **1-4** cartridges, **C** continuous, **R** random (4-6 cartridges)
	• **B INTV** – Time in seconds between each cartridge ejection
	   – **Options** – **.1, .2, .5, .7, 1** seconds, **R** random
	• **S QTY** – How many salvos of bursts
	   – **Options** – **1, 2, 4, 6, 8, 10, 15** salvos
	• **S INT** – Time in seconds between salvos
	   – **Options** – **2, 4, 6, 8, 10** seconds

NOTE

• **R** & **C** burst settings have special **INTV** behavior

• **JAMMER Sect.**	Jammer cartridges not implemented in DCS

• **FLARE Section**	• **QTY** – Number of cartridges to eject in burst
	   – **Options** – **2, 3, 4, 6, 8, 10** cartridges
	• **INTV** – Time in seconds between each cartridge ejection
	   – **Options** – **2, 4, 6, 8, 10** seconds

	Control Panel
• **PWR/MODE Switch**	• **AUTO (CHAFF) / MAN** – Enables power to system and allows automatic chaff ejection program initiation • **MAN** – Enables power to system • **OFF** – Disables system

2.4.4   ALQ-100 / ALQ-126 DECM

• **DECM OVERVIEW**	**D**efensive **E**lectronic **C**ounter **M**easures • Modelled as simple noise jammers in DCS

• `Controls`	• **AUDIO Knob** – Controls volume of audio played to RIO. Audio is generated directly from received PRF signals
	• **Mode Selector**
	  – **OFF** – Turns off power to the system
	  – **STBY** – Begins pre-warming systemm
	  – **HOLD 3 SEC** – Prepares system for BIT
	  – **ACT** – BIT of system, takes approx 30 s
	  – **REC** – Receive only mode
	  – **RPT** – Full system functionality

• `STANDBY Light`	Indicates system warmup not yet complete or system has a fault

• **Threat Advisory Indicator**	• **IFF** – Friendly IFF signal received but no reply generated
	• **RCV** – ALQ-126 is receiving a signal
	• **XMIT** – ALQ-126 is transmitting
	• **SAM**
	  – **Steady** – Lockon from SAM detected
	  – **Flashing** – SAM launch detected
	• **AAA**
	  – **Steady** – Lockon from AAA detected
	  – **Flashing** – AAA engagement detected
	• **CW** – CW emitter detected
	• **AI** – Airborne Intercepter lockon detected

Chapter 3

AWG-9 RADAR

Contents

3.1 OVERVIEW

3.1.1 MAIN MODES - OVERVIEW

	Pulse		Pulse Doppler			
	Pulse Search	P-STT	PD Search	RWS	TWS	PD-STT
Range	60 nm	50 nm	110 nm	90 nm	90 nm	90 nm
AIM-7	BRSIT	CW	BRSIT		-	PD
AIM-54	BRSIT	ACT	BRSIT		Multi TGT	PD/ACT

3.1.2 MAIN MODES

• **Pulse**	• **Basic Pulse w/o doppler filtering**
	– Cannot be notched
	– Ground Clutter
	– Rudimentary Ground mapping
	• **Pulse Sub-Modes**
	– **Pulse Search**
	– **Pulse-STT**
• **Pulse Doppler**	• **Doppler filter –> no ground returns**
	– Susceptible to notching
	– No ground clutter
	– Greater range
	– Advanced sub modes
	– AIM-54 Guidance
	• **Pulse Doppler Sub-Modes**
	– **PD Search**
	– **RWS**
	– **TWS**
	– **PD-STT**

3.2 PULSE MODES

3.2.1   PULSE - PULSE SEARCH

RANGE
SWEEP

SELECTIVE
ERASE SWEEP

ALTITUDE
RETURN

30   0   30

SEARCH (±10° SCAN)

• **Pulse Search**	**Basic Mode** - AWG-9 does not use pulse doppler filtering
	• **Advantages**
	– All aspect target detection
	– Cannot be notched
	– Rudimentary ground mapping
	• **Disadvantages**
	– Cannot discern ground returns and targets
	– Lower range
• **DDD**	• **Range/Azimuth**
	• Visual representation of radar and erase sweeps
• **TID**	• **No Information from Pulse**
	• **Cannot guide AIM-54**

3.2.2   PULSE - PSTT

TARGET IMAGE
MAXIMUM LAUNCH RANGE SYMBOL
AZ/EL STEERING SYMBOL
RANGE GATE (TRACKS TARGET)
CLOSING RATE SYMBOL
ARTIFICIAL HORIZON
MINIMUM LAUNCH RANGE SYMBOL
ALLOWABLE STEERING ERROR (ASE) CIRCLE

SINGLE TARGET TRACK
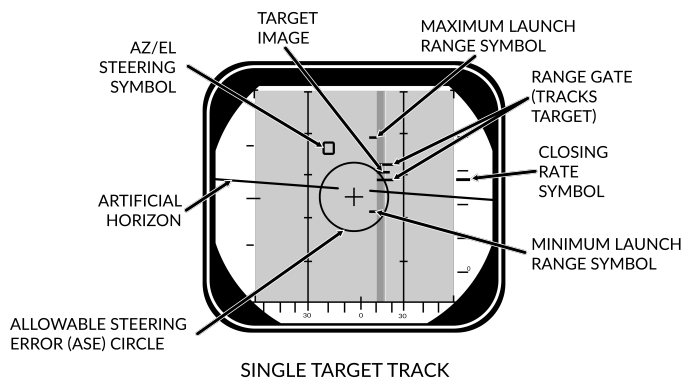
• **Pulse STT**	Lock Target w/o doppler filtering
	• **Advantages**
	  – Cannot be notched
	• **Disadvantages**
	  – Susceptible to ground clutter

• **Lock Target**	• **Conditions**
	  – Pulse Search Mode selected
	  – RDR HCU Mode selected
	• **Lock Target**
	  (a) Hold HCU Half-action
	  (b) Slew to desired Target
	  (c) HCU Full-Action to lock
	• **Unlock Target**
	  (d) HCU Half-action

• **DDD**	• **Track Indications**
	  – ANT TRK light
	  – RDROT light
	  – Tracking gates
	  – Closure rate
	  – Attack Symbology

3-5

3.3   PULSE DOPPLER MODES

3.3.1   PD - PULSE DOPPLER SEARCH

TARGET IMAGE

SELECTIVE ERASE SWEEP

PULSE DOPPLER SWEEP

WRITTEN REGION

MAINLOBE CLUTTER TRACE

JET SIGNAL

PD COVERAGE (ASPECT SWITCH SHIFTS COVERAGE UP OR DOWN; BEAM COVERAGE SHOWN)

AGC TRACE (JAMMING INTENSITY)

SEARCH (±40° SCAN)

• **Pulse Doppler Search**	**"Early Warning" Mode** - Longest Range, cannot display range
	• **Advantages**
	  – Longest Range
	  – Doppler Filtering
	  – **"Look Down Shoot Down"**
	• **Disadvantages**
	  – Can be notched
	  – No range information

• **DDD**	• **Closure Rate/Azimuth** • Visual representation of radar and erase sweeps

•	**Doppler Filters**	• **Main Lobe Clutter (MLC) Filter**
		   – **Own GS +/- 133 knots**
		   – Removes main ground return
		   – Source of notching
		• **Zero Doppler Filter**
		   – **Negative own GS +/- 100 knots**
		   – Removes Radar reflection from ground directly beneath own AC	

•	**MLC Switch**	• **IN:** Enables MLC filter • **AUTO:** Enables MLC filter if look-up angle less than 3 deg • **OUT:** Disables MLC filter	

•	**Vc Switch**	Changes closure rate DDD scale
		   • **X-4:** -800 to 4000 knots
		   • **NORM:** -200 to 1000 knots
		   • **VID:** -50 to 250 knots	

•	**ASPECT Switch**	Changes closure rate processing scale
		   • **NOSE:** -600 to 1800 knots
		   • **BEAM:** -1200 to 1200 knots
		   • **TAIL:** -1800 to 600 knots	
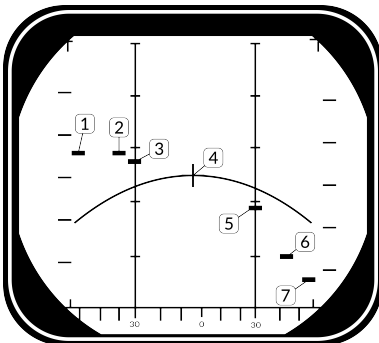
	Look Angle	Line of Sight Rate	Target Heading
1	60 deg	1490	180 deg
2	45 deg	1500	120 deg
3	30 deg	1428	100 deg
4	0 deg	1200	90 deg
5	30 deg	672	80 deg
6	45 deg	210	60 deg
7	60 deg	-300	0 deg

3.3.2 PD - RWS

• **Range While Search**	**FM Ranging**, used for getting good A/A picture before selecting TWS
	• **FM Ranging**
	– Pulse Doppler with ranging
	– TID shows momentary tracks with ranges
	– Processing reduces max range
	• **Advantages**
	– Long Range
	– Doppler Filtering
	– **"Look Down Shoot Down"**
	– Signal Processing
	• **Disadvantages**
	– Can be notched
• **DDD**	• **Closure Rate/Azimuth**
	• Visual representation of radar and erase sweeps
• **TID**	• **Momentary Tracks**
	• Max concurrent tracks: 48
	• **Cannot lock targets from TID**
• **Filtering**	**Same as Pulse Doppler Search**

3.3.3   PD - TWS

• **Track While Scan**	**Builds Track Files**, high situational awareness, multi-target AIM-54 launch
	• **Track Files**
	– AWG-9 builds Trackfiles for contacts
	– Can launch multiple AIM-54
	– Processing reduces max range
	– Can lock targets from TID
	• **FM Ranging**
	– Pulse Doppler with ranging
	– TID shows momentary tracks with ranges
	– Processing reduces max range
	• **Advantages**
	– Doppler Filtering
	– **Multi-Target AIM-54**
	• **Disadvantages**
	– **Lowest Range**
	– Can be notched
• **DDD**	• **Closure Rate/Azimuth**
	• Visual representation of radar and erase sweeps
• **TID**	• **Tracksfiles**
	• Max concurrent tracks: 24
	• Max displayed tracks: 18
• **Filtering**	**Same as Pulse Doppler Search**
• **Scan Volume**	Trackfiles require update every 2.5 s –>
	• 20 deg 4 bar (if selected)
	• 40 deg 2 bar (else)
• **TID Mode Selector**	• **GND STAB:** Ground Stabilized, True North is up on TID
	• **A/C STAB:** Aircraft Stabilized
	• **ATTAK:** same as A/C STAB with superimposed attack steering symbology
	• **TV:** Displays TCS on TID, dispays LANTIRN on TID if equipped

- **TID Display Selector Buttons**
  - **RID DISABLE:** Not simulated
  - **ALT NUM:** Enables display of track altitudes on left side of track symbols
  - **SYM ELEM:** Enables display of all supplementary symbology of tracks and waypoints
  - **DATA LINK:** Enables display of D/L contacts
  - **JAM STROBE:** Enables display of jam strobes
  - **NON-ATTK:** enables/disables display of targets not possible to engage (friendlies)
  - **LAUNCH ZONE:** Enables display of weapon launch zones
  - **VEL VECTOR:** Enables display of velocity vectors

- **TRACK HOLD CLSN Steering Buttons**
  - **TRACK HOLD**
    - Normally: Tracks maintained for 14 s after last observation
    - Track Hold: maintained for 2 min after last observation
  - **CLSN Button**
    - begins collision steering to currently tracked target
    - enables Steering Centroid if in TWS
    - LD CLSN presents azimuth steering only
    - CLSN presents both azimuth and elevation steering

- **TWS AUTO / MAN**
  - **TWS MAN:** Manual azimuth/elevation control, target designation by RIO
  - **TWS AUTO:** Automatic prioritization of targets and azimuth elevation control

3.3.4   PD - TWS MAN

• **TWS MAN**	• **Target Selection:** Manual • **Scan Azimuth/Elevation:** Manual

• **Target Selection**	• **Conditions**
	  – TWS MAN Radar Mode selected
	  – TID CURSOR TID Mode selected
	
	• **Hook Target**
	  (a) Hold HCU Half-Action
	  (b) Slew TID Cursor over desired Tgt
	  (c) HCU Full-Action to select Tgt
	
	• **TID Symbology**
	  – Range (**RA**)
	  – Bearing (**BR**)
	  – Altitude (**AL**)
	  – Magnetic course (**MC**)
	
	• **Lock Target**
	  (d) Press **PD STT** or **Pulse STT** buttons
	
	• **Deselect Target**
	  (e) press HCU Half-Action

• **AIM-54 Launch**	• **Automatically selects TWS AUTO** • **Prevents selection of TWS MAN**

3.3.5   PD - TWS AUTO

• **TWS AUTO**	• **Target Selection:** prioritizes contacts based off range, aspect, closure • **Scan Azimuth/Elevation:** Geometric center of targets in scan volume

• **Centroid / Steering Cues**	• **Steering Centroid**
	  – facilitates steering cues
	  – HUD, VDI, TID, DDD
	  – Appears as **X** on TID
	  – Takes Gimbal limits into account
	  – Weights individual Tracks based on parameters
	• **Illumination Centroid**
	  – **Not Visible**
	  – Controls azimuth and elevation of scan pattern
	  – Takes scan volume into account

• **Pilot Steering Cues**	• **Conditions**
	  – A-A HUD Mode selected
	  – Master Arm ON (UP)
	  – AIM-54 or AIM-7 selected
	  – TWS-AUTO selected

3.3.6   PD - PDSTT

SINGLE TARGET TRACK

• **Pulse Doppler STT**	Lock Target with doppler filtering
	• **Advantages**
	  – Ground Clutter filtering
	• **Disadvantages**
	  – Susceptible to notching

• **Lock Target**	• **Conditions**
	  – Pulse Doppler Mode selected (PD Search, RWS, TWS)
	  – RDR HCU Mode selected
	• **Lock Target**
	  (a) Hold HCU Half-action
	  (b) Slew to desired Target
	  (c) HCU Full-Action to lock
	• **Unlock Target**
	  (d) HCU Half-action

• **DDD**	• **Track Indications**
	– ANT TRK light
	– RDROT light
	– Tracking gates
	– Closure rate
	– Attack Symbology

3.4   ACM

3.4.1   ACM MODES - OVERVIEW

	PLM	VSL	PAL	MRL
Range	5 nm	5 nm	15 nm	5 nm
Description	Boresight	Vertical	Horizontal	RIO
Weapons	Gun + All Missiles			

• **PLM**	• **Pilot Lockon Mode**
	 • **Highest Priority ACM**
	 • **Search Pattern**
	    – Small Boresight
	    – Range: 5 nm	
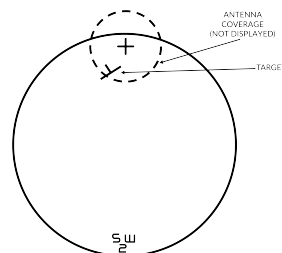
• **VSL**	• **Vertical Scan Lockon**
	 • **HI Search Pattern**
	    – Width: 5 deg
	    – Vertical: +15 to +55 deg
	    – Range: 5 nm
	 • **LO Search Pattern**
	    – Width: 5 deg
	    – Vertical: -15 to +25 deg
	    – Range: 5 nm
	 • **RIO/PILOT Controlled**	

|	

• **PAL**	• **Pilot Automatic Lockon**
	• **Search Pattern**
	    – Width: +/- 20 deg
	    – Vertical: 8-bar
	    – Range: 15 nm

• **MRL**	• **Manual Rapid Lockon**
	• **RIO Controlled**
	• **Search Pattern**
	    – HCU Controlled
	    – Range: 5 nm

3.4.2   APX-76 IFF

3.5 TACTICAL INFORMATION DISPLAY

3.5.1 TID SYMBOLOGY

| GENERAL		
Center Dot	·	• **Basic Component of Symbols** – Marks coordinates of symbol

Own AC	⊕	• **Symbol representing own aircraft**
		  – Ground Stabilized: Moves
		  – Aircraft Stabilized: Stationary
		  – Outside TID: line drawn from TID center towards symbol

TID Cursor	◯	• **Hook Cursor**
		  – Controlled by **HCU** in **TID mode**
		• **Half-Action**
		  – Enables display of symbol
		  – Enables HCU stick to move cursor
		• **Full-Action**
		  – Hooks closest symbol
		  – If no symbol near, cursor dropped at location

TWS Steering Centroid	✕	• **Steering centroid of TWS tracks** – Selected by WCS for weapons engagement
ONBOARD SENSORS	Symbol Above Dot	
Unknown	⌐·⌐	• **Unknown Sensor Track** • **All Returns in RWS**
Hostile	⌃·	• **Sensor Track designated Hostile by RIO**
Friend	⌣·	• **Sensor Track designated Friendly by RIO**

Angle-Tracked Radar Target		• **Radar Angle Tracking** – Jamming Target

Angle-Tracked Radar Target with Altitude Difference Ranging		• **Radar Angle Tracking**
		  – Jamming Target
		  – Alt. diff. ranging

TCS-Angle Tracked Target		• **TCS Angle Tracking**
TCS-Angle Tracked Target with Altitude Difference Ranging		• **TCS Angle Tracking** – Alt. diff. ranging
D/L TARGETS		**Symbol Below Dot**
Unknown		• **D/L Track designated Unknown by Source**
Hostile		• **D/L Track designated Hostile by Source**
Friendly		• **D/L Track designated Friendly by Source**
MANUAL REF POINTS		

Home base		• **Waypoint Representing**
		  – Home Base
		  – Carrier
		  – Airfield

Waypoint		• **Nav Waypoint** • **Supplanted by Number** – 1, 2, or 3
Defended Point		• **Waypoint to Defend**
Fixed Point		• **Generic Waypoint**
Hostile Area		• **Waypoint Indicating Hostile Area**
Surface Target		• **Waypoint Indicating Surface Target**
IP		• **Initial Point** – Waypoint for A/G engagement
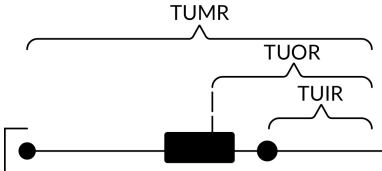
D/L REF POINTS

Home Base		• **D/L Waypoint Representing Home Base**
Waypoint		• **D/L Generic Waypoint**
Data Link Fixed Point		• **D/L Waypoint Representing Fixed Point**
Surface Target		• **D/L Waypoint Representing a Surface Target**

POS SYMB MODIFIERS

Mandatory Attack		• **Additional Symbology on TWS Track**
		   – Horizontal bar through center dot
		 • **Selected by RIO**
		   – Only 1 target can be designated
		   – Guaranteed WCS priority number

Data Link Destroy		• **Additional Symbology on D/L Track**
		   – Horizontal bar through center dot
		 • **Selected by Source**
		   – No effect on WCS prioritization

Do Not Attack		• **Additional Symbology on TWS or D/L Track**
		   – Vertical bar through center dot
		 • **If Set by RIO**
		   – Removes WCS prioritization

Multiple Targets		• **Additional Symbology on TWS or D/L Track** – Horizontal bar on left side of symbol • **Indicates Multiple Targets**

Data Link Challenge		• **Additional Symbology on D/L Track** – Small **V** with center at center dot • **Command to Visually Identify**

Track Extrapolated		• **Additional Symbology on TWS or D/L Track**
		  – Small **X** with center at center dot
		• **No Update within 8 seconds**
		  – Track deleted after 14 seconds
		  – Or after 2 min if track hold

Altitude Numerics		• **Altitude to Nearest Ten Thousand** – example: 35000-45000

Firing Order Numerics		• **Indicates AIM-54 Prioritization**
		  – Numbers 1-6
		  – Only in TWS

Time-to-Impact (TTI)		• **After AIM-54 Launch** – Prioritization replaced with estimated TTI • **Flashes after Pitbull**

Velocity Vector		• **Additional Symbology from center Dot**
		  – Direction represents track heading
		  – Length represents speed
		• **Varies with Mode**
		  – Ground Stabilized: true heading and ground speed
		  – Aircraft Stabilized: relative heading and velocity

Launch Zone Vectors		TUMR
		TUOR
		TUIR
		
		• **Additional Symbology for AIM-54**
		  – Selected manually by RIO
		  – Or 60 seconds from max launch
		• **TUMR**
		  – Time-Until-Minimum-Range
		  – Max: 180 seconds, 1.5 inches
		• **TUOR**
		  – Time-Until-Optimal-Range
		  – Start of bar is 8 seconds from optimum
		• **TUIR**
		  – Time-Until-In-Range

Jamming Strobe		• **Line from own AC towards Jammer**
Radar Antenna Scan Pattern Azimuth Limits		• **Limits of Current Scan Azimuth** • **Single Line in STT**
Data Link Jamming Strobe		• **Line from D/L point towards Jammer**

Data Link Pointer		• **Additional Symbology on D/L Track**
		  – Circle
		  – Indicates operator concern

Data Link Priority Kill		• **Additional Symbology on D/L Track**
		  – Square
		  – Indicates target must be destroyed
		  – No effect on WCS prioritization

ATTACK DISPLAY SYMBOLOGY

Artificial Horizon		• **Represents Pitch and Roll**
Steering Guidance Symbol		• **Represents Steering Error** – Should be placed as near as possible to center of ASE circle
Allowable Steering Error Circle		• **Indicates Allowable Steering Error for Missile Launch** • **Size Varies with Geometry, Mode, Missile**
Breakaway Indication		• **Appears when Target Range Less than Minimum for Selected Weapon**

Chapter 4

TCS - LANTIRN

Contents

4.1   TCS

4.1.1   OVERVIEW

4.2   LANTIRN

4.2.1   OVERVIEW

•	**LANTIRN**	**L**ow **A**ltitude **N**avigation and **T**argeting **I**nfra-**R**ed for **N**ight
		• **Only Targeting Pod** – Nav pod was deleted
		• **Incomplete Integration** – Own control panel, supplants TCS feed
•	**Master Modes**	• **A/G** – Allows bomb release guidance
		• **A/A** – Optimized for air targets
•	**FOV Levels Overview**	• **Wide**
		– **FOV** – 5.9 deg
		– **Slew** – 8.5 deg/s
		• **Narrow**
		– **FOV** – 1.7 deg
		– **Slew** – 1.8 deg/s
		• **Expanded**
		– **FOV** – 0.8 deg
		– **Slew** – 0.7 deg/s
		– **Digital Zoom** – Degraded quality

4.2.2   OVERVIEW - STARTUP

1.	**Power Switch**	**POD**
2.	**Pod Startup Sequence**	• 8 min startup sequence • **MODE Switch** shows **STBY** when complete
3.	**MODE Switch**	**Press**
4.	**Initialization Sequence**	• 30 sec initialization • **MODE Switch** shows **OPER** when ready
5.	**VIDEO Switch**	**FLIR**
6.	**TID MODE**	**TV**

4.2.3 OVERVIEW - POINTING MODES

• **Sensor Modes Overview**	• **Contrast Lock**
	   – **Area Track**
	   – **Point Track**
	
	• **Q Designation**
	   – **Directional Q** – QSNO / QADL / QHUD
	   – **Location Q** – QWp / QDES

• **Directional Q**	• **Do Not Allow Weapon Guidance**
	• **QSNO**
	   – Pod slaved to **ground 15 nm in front** along own aircraft heading
	
	• **QADL**
	   – **Pod slaved to ADL**
	   – In A/A mode
	
	• **QHUD**
	   – **Pod slaved to HUD**
	   – In A/G mode

• **Location Q**	• **Allow Weapon Guidance**
	• **QWp**
	   – Pod slaved to WCS waypoint
	   – Cycled with **QWp+** / **QWp-**
	
	• **QDES**
	   – **Designate targets for engagement**
	   – **LANTIRN Trigger Second Detent** to designate
	   – Coordinates can be manually added to WCS for navigation

4.2.4 OVERVIEW - LASING/DESIGNATION

• **A/G Designation**	(a) **Designate** ....**Trigger Full-Action**
	    • Laser Fires
	    • Slant Range calculated
	    • Time-to-Go calculated

• **Steering Cues**	• **Automatically activated when QDES se-lected/designated** • QDES remains even if new Q selected • Cues still point towards QDES even if pod at another point
• **Manual Lase**	(a) **Lase** ....**Trigger Half-Action Hold**
• **Latched Lase**	• **Effect** – Lases for 60 sec (a) **Activate** ....**Latch Lase Button Press** (b) **Extend** ....**Latch Lase Button Press** (c) **Deactivate** ....**Trigger Half-Action**
• **Auto Lase**	• **Effect** – Fires from -10 to +4 sec TIMP (a) **Laser Mode** ....**Slider AFT Short** (b) **Cycle A/M** ....**Right 4-Way Depress**
• **Laser Notes**	• **Always at current Pod location** • Can point to different location than QDES

4.2.5 CONTROLS - PANEL

• **Power Switch**	• **OFF** – Disables power to system • **IMU** – Only powers LANTIRN IMU **(Not Simulated in DCS)** • **POD** – Powers whole system
• **MODE Switch**	• **STBY** – Standby • **OPER** – Operational
• **LASER Switch**	• **ARM** – Arms laser • **SAFE** – Inhibits laser use

•	**VIDEO Switch**	• **FLIR** – Displays LANTIRN FLIR on TID • **TCS** – Displays TCS video on TID
•	**Indicator Light**	• **Indicate Error States**
•	**IBIT Button**	• **Initiates Build-In-Test**

4.2.6 CONTROLS - STICK

•	**Master Mode**	• **A/G Mode – Side 2-Way FWD** • **A/A Mode – Side 2-Way AFT**
•	**Slew**	**Center Slew Hat**
•	**WHOT/BHOT**	**Center Slew Hat Depress**
•	**Contrast Track**	• **Point Track – Left 4-Way Up** • **Area Track – Left 4-Way Down**
•	**Q Select**	• **QADL/QHUD – Right 4-Way Up** • **QDES – Right 4-Way Right** • **QSNO – Right 4-Way Down**
•	**Declutter**	**Right 4-Way Depress**
•	**Zoom Level**	**FOV Button**
•	**Cycle Gain Control Mode**	**Slider FWD short**
•	**Manual Gain Control**	(a) **Slider** .... **FWD long** (b) **Gain** .... **Right 4-Way Up/Down** (c) **Level** .... **Right 4-Way Left/Right**
•	**Laser Code**	(a) **Slider** .... **AFT short** (b) **Select Digit** .... **Right 4-Way Left/Right** (c) **Change Digit** .... **Right 4-Way Up/Down**
•	**Focus Control**	(a) **Slider** .... **AFT hold** (b) **Right 4-Way** .... **Up/Down**
•	**Manual Lase**	**Trigger Half-Action**
•	**Latched Laser**	**Latched Laser Fire Button**

- **Designate QDES** | **Trigger Full-Action**

4.2.7 DISPLAY

• **Top Left**	• **Own Aircraft Datablock** – **Lat** – deg:min.dec – **Long** – deg:min.dec – **ALT** – Altitude (ft) – **KGS** – Knots Ground Speed – **DIVE** – Dive Angle (deg)
• **Mid Left**	• **Sensor Mode** – **WHOT** / **BHOT** • **Gain Control** – **Auto** / **Manual**
• **Bottom Left**	• **Pod Info Datablock** – **SRA** – Slant Range – **AZ** – Pod LoS Azimuth L/R – **EL** – Pod LoS Elevation – **Time** – UTC Time – **IBIT** – Codes
• **Bottom Center**	• **Master Mode** – **A/A** / **A/G** • **Track Mode** – **AREA** / **POINT** / **Q** • **Current Weapon** • **Laser Code** • **L** – **Steady** – Laser Armed – **Flashing** – Laser Firing
• **Bottom Right**	• **Q Datablock** – **TTG** – Time-To-Go – **B/R** – Bearing and Range – **ELEV** – Elevation (ft) of Q – **Lat** – deg:min:dec – **Long** – deg:min:dec
• **Mid Center**	• **Crosshair** – **Bounding Box** – Indicates currently tracked target in point mode – **Zoom Boxes** – Indicates next zoom levels – **FLIR Pointing Cue** – Shows Pod LoS, screen center indicates straight down

• **Mid Right**	• **Bomb Rlease Cue**
	– Only shown if current Q is **QDES**, with valid weapon selected
	– **TREL** – Time to release
	– **TIMP** – Time to Impact (after release)
• **Top Center**	• **Steering Guidance to Q**
	– Relative bearing L/R to commanded heading

Chapter 5

A/G WEAPONS

Contents

A/G

5.1 SETTINGS

5.1.1 A/G WEAPON SETTINGS - OVERVIEW

• **WPN TYPE**	• **Selects Weapon Type** – Configures WCS for selected weapon – Refer to Kneeboard for list of mounted weapons – Mk-81 / 82 / 83 have both **L** and **H** option refering to high and low drag
• **DLVY MODE**	• **STP-SGL** – Single weapon per press • **STP-PRS** Single pair per press • **RPL-SGL** – QTY of weapons per press • **RPL-PRS** – QTY of pairs per press
• **DLVY OPTNS**	• **INTERVAL** – Interval in ms • **QTY** – Number of stores to be released
• **MECH FUZE**	• **NOSE** – Arms nose fuze • **SAFE** – Inhibits arming of fuzes • **NOSE/TAIL** – Arms both fuzes
• **ELEC FUZE**	• **SAFE** – Inhibits electrical bomb fuzing • **VT** – Sets air-burst mode at preset burst height for compatible stores • **INST** – Sets instantaneous burst mode • **DLY 1** – Sets preset time delay 1 • **DLY 2** – Sets preset time delay 2
• **STA SEL**	• **Selects Stations for Employment/Jettison** – Set to **SEL** to activate a pylon – Stations 1 & 8 should be set to **B** for selection – Station 1 & 8 **SW** was used for Sidewinder jettison, is now inoperable
• **TANK JETT**	• **Allows Drop Tank Jettison**
• **SEL JETT**	• **JETT** – Selective jettison • **SAFE** – Inhibits jettison • **AUX** – Backup mode

•	**JETT OPTIONS**	• **MER TER** – Jettisons ejector racks • **WPNS** – Jettisons weapons only

•	**ATTK MODE**	• **CCMPTR TGT**
		   – **Computer Target** – Similar to CCRP
		• **CMPTR IP**
		   – **Computer initial point**
		   – Extended **CMPTR TGT** mode using known IP
		   – For use when target hard to spot visually but close to landmark
		• **CMPTR PLT**
		   – **Computer Pilot** – similar to CCIP
		• **MAN**
		   – **Manual** – HUD displays pipper
		   – Backup mode
		• **D/L BOMB**
		   – **Data-Link Bomb** – Automatic mode steered by D/L cues
		   – **Not Implemented in DCS**

5.1.2 SELECTIVE ORNANCE JETTISON

1.	**Pilot Conditions**	• **MASTER ARM** .... **ON**
2.	**RIO Conditions**	• **Desired Stations** .... **Selected** • **JETT OPTIONS** .... **As Desired**
3.	**Jettison**	(a) **SEL JETT Guard** .... **Flipped** (b) **SEL JETT Switch** .... **JETT**

5.2 UNGUIDED

5.2.1   M61 GUN

1.	**Pilot Conditions**	• **MASTER ARM** .... **ON** • **HUD** .... **A/G** • **WEAPON SELECTOR** .... **GUNS** • **Wing Sweep** .... **BOMB**
2.	**Employment**	(a) **Dive** .... 20-30 deg (b) **Pipper** .... on target (c) **TRIGGER** .... **FIRE**
3.	**Note: TCS**	• TCS slaved to radar impact point • Rio can select **NAR** or **WIDE**

5.2.2   FFAR / ZUNI ROCKETS

1.	**RIO Conditions**	• **WPN TYP** .... **LAU-10** • **Attack Mode** .... **Pilot Attack** • **Deliver Mode** .... **RPL-SGL** • **Mechanical Fuze** .... **NOSE** • **Electronic Fuze** .... **INST** • **Delivery Options** .... **As Desired** • **Stations** .... **Armed**
2.	**Pilot Conditions**	• **MASTER ARM** .... **ON** • **HUD** .... **A/G** • **WEAPON SELECTOR** .... **OFF** • **Stations** .... verify selected • **Wing Sweep** .... **BOMB**
3.	**Employment**	(a) **Dive** .... 20-30 deg (b) **Pipper** .... on target (c) **TRIGGER** .... **FIRE**

5.2.3 UNGUIDED BOMB - CCIP

1.	**RIO Conditions**	• **WPN TYP** **MK-8X**
		• **Attack Mode** .... **Pilot Attack**
		• **Deliver Mode** .... **STP-PRS**
		• **Mechanical Fuze** .... **NOSE**
		• **Electronic Fuze** .... **INST**
		• **Delivery Options** .... **As Desired**
		• **Stations** .... **Armed**
2.	**Pilot Conditions**	• **MASTER ARM** .... **ON**
		• **HUD** .... **A/G**
		• **WEAPON SELECTOR** .... **OFF**
		• **Stations** .... verify selected
		• **Wing Sweep** .... **BOMB**
3.	**Employment**	(a) **Dive** ....40 deg
		(b) **Pipper** .... on target
		(c) **STORE RELEASE** .... **Press and Hold**

5.2.4 UNGUIDED BOMB - CCRP

1.	**RIO Conditions**	• **WPN TYP** **MK-8X**
		• **Attack Mode** .... **Target Attack**
		• **Deliver Mode** .... **STP-PRS**
		• **Mechanical Fuze** .... **NOSE**
		• **Electronic Fuze** .... **INST**
		• **Delivery Options** .... **As Desired**
		• **Stations** .... **Armed**
2.	**Pilot Conditions**	• **MASTER ARM** .... **ON**
		• **HUD** .... **A/G**
		• **WEAPON SELECTOR** .... **OFF**
		• **Stations** .... verify selected
		• **Wing Sweep** .... **BOMB**
3.	**Designation**	(a) **Slew Diamond** .... **VSL HI/LO**
		(b) **Designate** .... **PAL**
4.	**Employment**	(a) **Flight Path** .... Straight, Level
		(b) **Vel Vector** .... on Bomb Fall Line
		When Solution Cue meets Velocity Vector
		(c) **STORE RELEASE** .... **Press and Hold**

5.3   GUIDED

5.3.1   LASER GUIDED BOMB

1.	**LANTIRN PREP**	(a) **Target Pod Power** ....**POD**
		• Warm up takes approx. 8 min
		• Automatically switches to **STANDBY**
		(b) **Laser Code** .... as desired
		• **MUST BE SET ON THE GROUND**
		• **Default:** 1688
		(c) **LANTIRN Mode** ....**OPERATE**
		• **STANDBY** caution will flash for 30 s
		• Then switches to **OPER**
		(d) **VIDEO Switch** ....**FLIR**
		(e) **TID Mode** ....**TV**
2.	**RIO Conditions**	• **WPN TYP** ....**GBU-XX**
		• **Attack Mode** ....**Manual**
		• **Deliver Mode** ....**STP-SGL**
		• **Mechanical Fuze** ....**NOSE**
		• **Electronic Fuze** ....**INST**
		• **Delivery Options** ....**As Desired**
		• **Stations** ....**Armed**
3.	**Pilot Conditions**	• **MASTER ARM** ....**ON**
		• **HUD** ....**A/G**
		• **WEAPON SELECTOR** ....**OFF**
		• **VDI Mode** ....**TV**
		• **Stations** ....verify selected
		• **Wing Sweep** ....**BOMB**
4.	**Slew LANTIRN**	**Refer to LANTIRN Control Section**
		• **Slave to WYPT** ....**Left-4-Way RIGHT**
		• **QSNO (Snowplow)** ....**S4 HAT Down**
		• **Toggle FOV** ....**LANTIRN Toggle FOV**
		• **Slew** ....**LANTIRN Stick**
		• **Area Track** ....**Left-4-Way UP**
		• **Point Track** ....**Left-4-Way Down**
		• **Undesignate** ....**LANTIRN Undesignate**

5.	**Designate**	**Refer to LANTIRN Designation Section**
		(a) **Designate** ....**Trigger Full-Action**
		• Slant Range calculated
		• Time-to-Go calculated
		Once Time-to-Realease (TREL) is 0
		(b) **Auto-Lase** ... If selected: lases 10s to impact
		(c) **Manual Lase** .... **Trigger Full-Action**
		(d) **While Lasing** ....**L** blinks
6.	**Employment**	**Once Time-to-Realease (TREL) is 0**
		(a) **STORE RELEASE** ....**Press and Hold**
		(b) **Flight Path** ....Gentle right-hand turn
		(to prevent masking)

5.3.2 TALD DECOYS

1.	**RIO Conditions**	• **WPN TYP** ....**TALD**
		• **Deliver Mode** .... **STP-SGL**
		• **Delivery Options** .... **As Desired**
		• **Stations** ....**Armed**
2.	**Pilot Conditions**	• **MASTER ARM** .... **ON**
		• **HUD** .... **A/G**
		• **WEAPON SELECTOR** ....**OFF**
		• **HSD Mode** .... **TID**
		• **Stations** ....verify selected
3.	**Employment**	(a) **Flight Path** ....High / Fast
		(b) **RWR** .... Monitor to locate emitters
		(c) **STORE RELEASE** ....**Press and Hold**

Chapter 6

A/A WEAPONS

Contents

A/A

6.1   M61 GUN

6.1.1   M61 GUN - OVERVIEW

• **GUN RATE Button**	• **Cycles Gun Rate**
	  – **HIGH** – 6000 rpm
	  – **LOW** – 4000 rpm

• **A/A Gun Modes**	• **RTGS**
	  – **Real-Time Gunsight Mode**
	  – Selected automatically with guns
	  – **If No WCS Data Available** displays bullet location at 2000 ft with diamond and 1000 ft with pipper
	  – **If WCS Data Available** pipper displays bullet location at targets current range out to 4000 ft
	
	• **MANUAL**
	  – Fixed manual pipper
	  – Adjust with **GUN ELEV** knob
	  – Press **CAGE/SEAM** to select

• **CAGE/SEAM Button**	• **Cycles RTGS / MANUAL Gun Modes**
• **ROUNDS Knob**	• **Allows selection of remaining gun rounds**

6.1.2   M61 GUN - MANUAL

1.	**Pilot Conditions**	• **MASTER ARM** .... **ON** • **HUD** .... **A/A** • **Gun Rate** .... **HIGH** • **Gunsight Lead** ....as required • **WEAPON SELECTOR** .... **GUNS**
2.	**Employment**	(a) **Gun Mode** .... **MANUAL** (b) **Pipper** .... on target (c) **Trigger** .... **FIRE**

6.1.3   M61 GUN - RTGS / NO RADAR

1.	**Pilot Conditions**	• **MASTER ARM** .... **ON** • **HUD** .... **A/A** • **Gun Rate** .... **HIGH** • **WEAPON SELECTOR** .... **GUNS**
2.	**Employment**	(a) **Gun Mode** .... **RTGS** (b) **Pipper** .... on target (c) **Trigger** .... **FIRE**

6.1.4   M61 GUN - RTGS / RADAR

1.	**Pilot Conditions**	• **MASTER ARM** .... **ON** • **HUD** .... **A/A** • **Gun Rate** .... **HIGH** • **WEAPON SELECTOR** .... **GUNS**
2.	**Employment**	(a) **Gun Mode** .... **RTGS** (b) **Radar** ....**STT** (c) **Pipper** .... on target (d) **Trigger** .... **FIRE**

6.2   AIM-9 SIDEWINDER

6.2.1   AIM-9 - OVERVIEW

• **Missile Preparation**	• **MSL PREP**
	  – AIM-9 seeker must be cooled
	  – Either press **SW COOL** button
	  – Or activation of **ACM**

• **Seeker Head Modes**	• **SEAM**
	  – **Sidewinder Expanded Acquisition Mode**
	  – **Double-D search pattern** invisible to pilot
	  – 4.5 sec search time
	  – **Allows AIM-9 to be uncaged and track target**
	  – 40 deg track limit
	  – **Allows WCS to slave AIM-9 to radar track**
	
	• **Boresight**
	  – AIM-9 locked to ADL
	  – 2.5 deg FOV
	  – Selected if **MODE/STP** set to **BRSIT**
	  – And **ACM** not active

• **MODE/STP Switch**	• **NORM**
	  – Allows **SEAM** seeker mode
	
	• **BRSIT**
	  – Forces Boresight seeker mode
	  – Overridden if **ACM** active

• **CAGE/SEAM Button**	• **Uncages Seeker**
	  – Starts 4.5 second double-D search
	  – If no IR source found cages again
	
	• **Slaves Seeker**
	  – If radar STT locked

6.2.2 AIM-9 - SILENT

1.	**Pilot Conditions**	• **MASTER ARM** .... **ON**
		• **HUD** .... **A/A**
		• **SW COOL** .... **ON**
		• **MODE/STP** .... **As Desired**
		• **WEAPON SELECTOR** .... **SW**
2.	**Employment**	(a) **CAGE/SEAM** .... **Uncage Seeker**
		(b) **IR-Lock** .... **Good Tone**
		(c) **Trigger** .... **FIRE**

6.2.3 AIM-9 - RADAR

1.	**Pilot Conditions**	• **MASTER ARM** .... **ON**
		• **HUD** .... **A/A**
		• **SW COOL** .... **ON**
		• **MODE/STP** .... **NORM**
		• **WEAPON SELECTOR** .... **SW**
2.	**Employment**	(a) **Radar** ....**STT**
		(b) **CAGE/SEAM** ....**Slave Seeker**
		(c) **IR-LOCK** .... **Good Tone**
		(d) **Steering** ......center T-shaped cue with ASE
		(e) **Trigger** .... **FIRE**

6.3 AIM-7 SPARROW

6.3.1 AIM-7 - OVERVIEW

• **Missile Preparation**	• **MSL PREP**
	  – AIM-7 must be tuned to AWG-9
	  – Either press **MSL PREP** button
	  – Or activation of **ACM**

• **Launch Modes**	• **Normal**
	  – Standard operation, STT target designated before launch
	  – AIM-7 uses SARH all the way to target
	  – WCS can use CS or PD for guidance set with **MSL OPTIONS** Switch
	
	• **Boresight**
	  – Uses CS flood antenna of AWG-9
	  – Missile will **track strongest return** in Flood area
	  – Automatically activated if STT broken
	  – Selected if **MODE/STP** set to **BRSIT**
	  – **Or if no STT available**
	  – **Shown Below**

• **MSL SPD GATE Switch**	• **NOSE QTR**
	  – Standard setting in DCS
	
	• **All Others**
	  – Not simulated

• **MSL OPTIONS Switch**	• **NORM**
	  – WCS uses dedicated CW antenna for AIM-7 guidance
	
	• **SP PD**
	  – WCS uses PD from main flood antenna for AIM-7F/M guidance

• **MODE/STP Switch**	• **NORM**
	  – Sets normal launch mode logic
	
	• **BRSIT**
	  – Forces Boresight launch mode

6.3.2   AIM-7 - STT

1.	Pilot Conditions	• **MASTER ARM** .... **ON** • **HUD** .... **A/A** • **MSL PREP** .... **ON** • **MODE/STP** .... **NORM** • **WEAPON SELECTOR** .... **SP**
2.	RIO Conditions	• **MSL SPD GATE** .... **NOSE QTR** • **MSL OPTIONS** .... **As Desired**
3.	Employment	(a) **Radar** ....**STT** (b) **Steering** • **Target** < 20 deg from ADL • **ASE** center T-shaped cue within (c) **Trigger** ....**Press and Hold** (until weapon release) (d) **Radar** ....**Maintain Lock** (until impact)

6.4 AIM-54 PHOENIX

6.4.1 AIM-54 - OVERVIEW

• **Missile Preparation**	• **Weapon Cooling**
	  – AIM-54 requires liquid cooling
	  – RIO enabled **LIQUID COOLING** switch
	• **MSL PREP**
	  – AIM-54 must be tuned to AWG-9
	  – Either press **MSL PREP** button
	  – Or activation of **ACM**

• **Launch Modes**	• **PDSTT SARH**
	  – AIM-54 uses SARH all the way to target
	  – Faster update rate than TWS
	  – **Slightly increased effective range** as compared to a TWS launch
	• **TWS SARH/ARH**
	  – Allows **6 AIM-54 launches at 6 targets**
	  – Missile is initially SARH guided
	  – When within AIM-54 seeker range AWG-9 sends activation command
	  – **Not Fire and Forget:** Requires automatic activation command
	• **ACM Active**
	  – Activated when **BRSIT** selected
	  – Or when **ACM** active with no radar track
	  – Missile commanded active **before launch**

• **MSL SPD GATE Switch**	• **NOSE QTR**
	  – Standard setting in DCS
	• **All Others**
	  – Not simulated

• **MSL OPTIONS Switch**	• **NORM**
	  – Normal guidance (SARH or SARH/ARH)
	• **PH ACT**
	  – WCS immediately sends AIM-54 activation command on launch
	  – Reverts to SARH if no target detected
	  – **Must be selected before launch**

• **TGTS Switch**	• **SMALL** – 6nm activation range • **NORM** – 10nm activation range • **LARGE** – 13nm activation range
• **Missile Next Launch Button**	• **Selects Hooked Track as Next Target for AIM-54 TWS Engagement**

• **MODE/STP Switch**	• **NORM**
	  – Normal operation
	• **BRSIT**
	  – Commanded active **before launch**
	  – Missile follows ADL and locks strongest return

• **TWS Symbology**	**Refer to TID Symbology Section**
	• **Pre-Launch**
	  – Prioritization numbers assigned to tracks automatically or manually
	  – Blinking indicates optimal launch parameters
	• **Post-Launch**
	  – Target prioritization number replaced with TTI
	  – Other prioritization numbers collapsed by one
	  – Tracks under missile attack brightened
	  – **TTI blinks when missile active**

• **Launch To Eject (LTE) Time**	• **Normal Operation** – 3-4 seconds • **When in ACM** – 1 second

6.4.2   AIM-54 - PD-STT

1.	**Pilot Conditions**	• **MASTER ARM** .... **ON** • **HUD** .... **A/A** • **MSL PREP** .... **ON** • **MODE/STP** .... **NORM** • **WEAPON SELECTOR** .... **PH**
2.	**RIO Conditions**	• **LIQUID COOLING** .... **ON (FWD)** • **MSL SPD GATE** .... **NOSE QTR** • **MSL OPTIONS** .... **As Desired** • **TGTS Switch** .... **As Desired**

3.	**Employment**	(a) **Radar** .... **STT**
		(b) **Steering**
		    • **Target** < 20 deg from ADL
		    • **ASE** center T-shaped cue within
		(c) **Trigger** .... **Press and Hold**
		(until weapon release)
		(d) **Radar** .... **Maintain Lock**
		(until impact)

6.4.3   AIM-54 - TWS / MULTI

1.	**Pilot Conditions**	• **MASTER ARM** .... **ON** • **HUD** .... **A/A** • **MSL PREP** .... **ON** • **MODE/STP** .... **NORM** • **WEAPON SELECTOR** .... **PH**
2.	**RIO Conditions**	• **LIQUID COOLING** .... **ON (FWD)** • **MSL SPD GATE** .... **NOSE QTR** • **MSL OPTIONS** .... **As Desired** • **TGTS Switch** .... **As Desired** • **WCS Mode** .... **TWS MAN/AUTO**
3.	**Employment**	(a) **Radar** .... **TWS** (b) **Trigger** .... **Press and Hold** (until weapon release) (c) **Repeat** .... for remaining targets (d) **Radar** .... **Maintain Track** (until active)

6.4.4 AIM-54 - ACM

1.	**Pilot Conditions**	• **MASTER ARM** .... **ON** • **HUD** .... **A/A** • **MSL PREP** .... **ON** • **ACM COVER** ....**UP** • **WEAPON SELECTOR** .... **PH**
2.	**RIO Conditions**	• **LIQUID COOLING** ....**ON (FWD)** • **MSL SPD GATE** .... **NOSE QTR** • **MSL OPTIONS** .... **As Desired** • **TGTS Switch** .... **As Desired**
3.	**Employment**	(a) **Steering** • **Range** < 10 nm for immediate tracking • **Azimuth** near ADL (b) **Trigger** ....**Press and Hold** (until weapon release) (c) **Repeat** ....Can fire additional missiles (no guarantee good missile distribution to targets)

WARNING

• **MISSILE IS PITBULL OFF THE RAIL** – No IFF capabilities