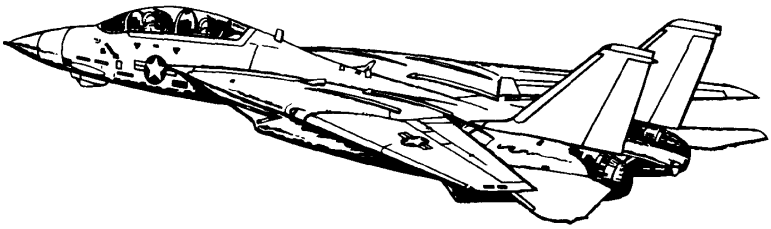
Pocket Checklist

F-14A/B AIRCRAFT

REV: 20220616



Procedures

Systems

AWG-9 Radar

TCS LANTIRN

A/G Weapons

A/A Weapons

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

1.1 START-UP

1.1.1 PILOT - PRE-START

1.	**Parking Brake**	**ENGAGED**
2.	**Ground Crew**	(a) Ground Power .....connected (b) Compressed Air .....connected
3.	**ICS**	**HOT MIC**
4.	**TO RIO**	*"Begin Start-Up"*
5.	**ICS**	**Comm Check**
6.	**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**
7.	**Ejection Seat**	**Armed**
8.	**RIO**	Canopy Closed
9.	**Oxygen**	**ON (FWD)**
10.	**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** ..... extinguished
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** ..... extinguished
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
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

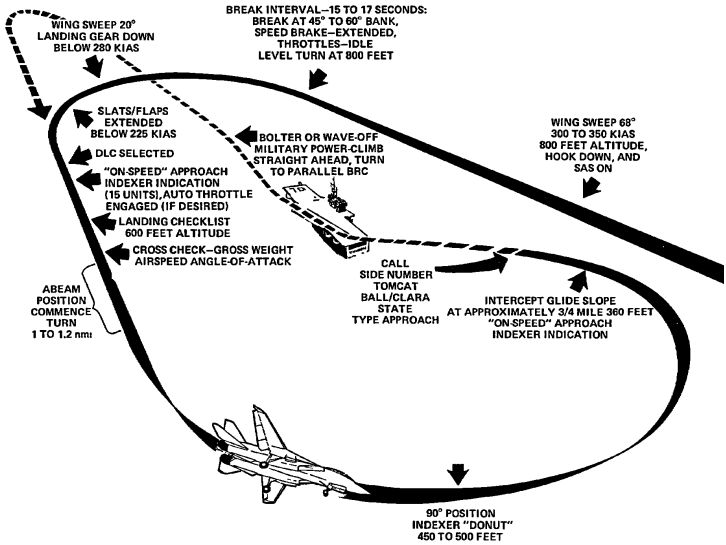
1.2.2 TAKEOFF - SHORE

		After Lining Up On Runway
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.	**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 Glides-lope	• 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**

1.4 EMERGENCY PROCEDURES

1.4.1 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

2.2 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
Main Components	
• **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
Controls	
• **CAP**	• Used for Data Entry • **CATEGORY – NAV**

• **NAV MODE Selector**	• **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** • **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 Method 1 (a) **NAV MODE SWITCH** ..... **OFF** (b) **WCS** ..... **OFF** (c) Proceed with normal start sequence Method 2 (a) **NAV MODE SWITCH** ..... **OFF** (b) **NAV MODE SWITCH** .. **Desired Align Mode** Method 3 (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

2.3 COMMUNICATION SYSTEMS

2.3.1 OVERVIEW

• **ARC-159 UHF 1**	• **Pilot Controlled** • **Frequency** – **Range** – 225.000 - 399.975 MHz – **Steps** – 25 kHz – **Channels** – 20
• **ARC-182 V/UHF 2**	• **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** – 30
• **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

• **Stats**	• **Range** – 225.000 - 399.975 MHz • **Steps** – 25 kHz • **Channels** – 20
• **Power**	**Function Selector – BOTH**
• **Tune**	• **Channel** (a) **Mode Selector** ..... **PRESET** (b) **CHAN Select Knob** .....Rotate (until desired channel) • **Manual** (a) **Mode Selector** ..... **MANUAL** (b) **Freq. Tuning Switches** ..... Adjust (until desired Frequency) • **Guard** (a) **Mode Selector** ..... **GUARD**
• **Adjust Volume**	• **Pilot – VOL Knob** on ARC-159 Panel • **RIO – UHF 1 VOL Knob** on COMMUNICATION/TACAN Panel
• **Load Channel**	(a) **Preset Channel** .....As Desired (b) **READ Switch** ..... **ON** (c) **Manual Frequency** ..... As Desired (d) **LOAD Button** ..... **Depress** (e) **READ Switch** .....**OFF**
• **Miscellaneous**	• **TONE Button** – Steady 1.020 kHz test tone • **READ Swtich** – Displays freq. of channel • **SQL Switch** – Toggles radio squelch • **BRT/TEST Knob** – **Controls Radio FREQ Display** – Turn past max to display **888.888**

2.3.3 ARC-182 V/UHF 2

• **Stats**	• **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** – 30 selectable
• **Power**	**Function Selector – T/R & G**
• **Tune**	• **Channel** (a) **Freq. Mode Selector** .....**PRESET** (b) **CHAN Select Knob** .....Rotate (until desired channel) • **Manual** (a) **Freq. Mode Selector** .....**MAN** (b) **Freq. Tuning Switches** ..... Adjust (until desired Frequency) • **Guard** (a) **Mode Selector** .....**G**
• **Adjust Volume**	• **Pilot – V/UHF 2 Knob** on VOLUME Panel • **RIO – VOL Knob** on V/UHF 2 Panel
• **Load Channel**	(a) **Preset Channel** .....As Desired (b) **Freq. Mode** .....**READ** (c) **Manual Frequency** ..... As Desired (d) **Freq. Mode** .....**LOAD** (e) **Freq. Mode** .....**READ** (f) **Freq. Mode** .....**PRESET**
• **Miscellaneous**	• **UHF Mode Switch** – Selects between AM/FM while in 225-399 MHz band • **TEST Mode** – V/UHF 2 BIT • **TONE Button** – Steady 1.020 kHz test tone • **READ Swtich** – Displays freq. of channel • **SQL Switch** – Toggles radio squelch • **BRT Knob** – Controls display brightness

NOTE

- **UHF 1 Pilot Controlled & V/UHF 2 RIO Controlled**
  - Crewmembers can transmit on either radio
  - Necessitates crew communication for tuning / mode selection
- **UHF 1 Guard**
  - **BOTH** – monitoring of selected freq. and Guard (243.00)
  - **GUARD** – enables monitoring and transmission on UHF Guard
- **V/UHF 2 Guard**
  - **G** – selects Guard frequency in **last used radio band**
  - **243** – forces selection of UHF Guard (243.00)

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

• **Stats**	• **Modes** – Mutually exclusive – **Link 4A** – AWACS / Surface Ship – **Link 4C** – Tomcat to Tomcat • **Range** – 300.0 - 324.9 MHz • **Data Speed** – up to 5000 bit/s!
• **Power / Basic Modes**	(a) **Power Switch** .....As Desired • **Link 4A** – **ON** Position • **Link 4C** – **AUX** Position
• **Tune**	(a) **MODE Switch** .....As Desired • **TAC** – Normal airborne mode • **CAINS/WAYPT** – Enables CV align (b) **Freq. Thumbwheels** .....As Desired
• **Miscellaneous**	• **Test Switch** – Controls test / anti-jam modes – **TEST** – Initiates BIT – **NORM** – Normal Operation – **A-J** – Anti-Jam (not simulated) • **ANTENNA Switch** – **UHF 1 LWR / DL UPR** – **UHF 1 UPR / DL LWR** • **REPLY Switch** – **NORM** – Own Aircraft replies to datalink messages – **CANC** – Receive only • **Address Thumbwheels** – Sets two least significant bits of aircraft D/L address

NOTE

- **All controls in RIO Cockpit**
- **Datalink Frequency** – First digit fixed as 3
- **Antenna** – Shared with UHF 1, **Mutually Exclusive**

2.4 DEFENSIVE SYSTEMS

2.4.1 ALR-67 RWR

• **Threat Bands**	**See RWR Symbology** • **Outer / Critical Band** – Imminent threat to own aircraft – Blinking – engaging own aircraft • **Middle / Lethal Band** – Potentially threatening emitters • **Inner / Non-Lethal Band** – Not within threat range
• **Power**	**PWR Switch – ON**
• **Volume**	• **PILOT – ALR-67 Knob** on VOLUME Panel • **RIO – VOL Knob** on RWR Panel
• **Change Display Type**	(a) **DISPLAY TYPE Selector** ..... As Desired • **NORM** – Normal threat symbology • **AI** – Airborne Interceptor prioritized • **AAA** – Anti-aircraft artillery prioritized • **UNK** – Unknown prioritized • **FRIEND** – Friendly threats prioritized (b) **Display Center** .....Verify Symbology
• **Alert Tones**	• **Short Tone** – New emitter / emitter moved • **Slow Warbling** – Threat in critical band • **Fast Warbling** – Threat engaging own A/C • **4-Tone Sequence** – New threat capable of silently engaging own aircraft
• **Inner Circle Symbology**	• **N, I, A, U, F** – Prioritization type • **O** – Offset, **L** – Limit, **B** – BIT Failure, **T** – Thermal overload
• **Miscellaneous**	• **Test Switch** – **BIT** – Initiates Build In Test – **SPL** – Holds BIT status page while held • **MODE Switch** – **OFST** – Separates overlapping symbols – **LMT** – Displays 6 highest threats

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 SEARCH

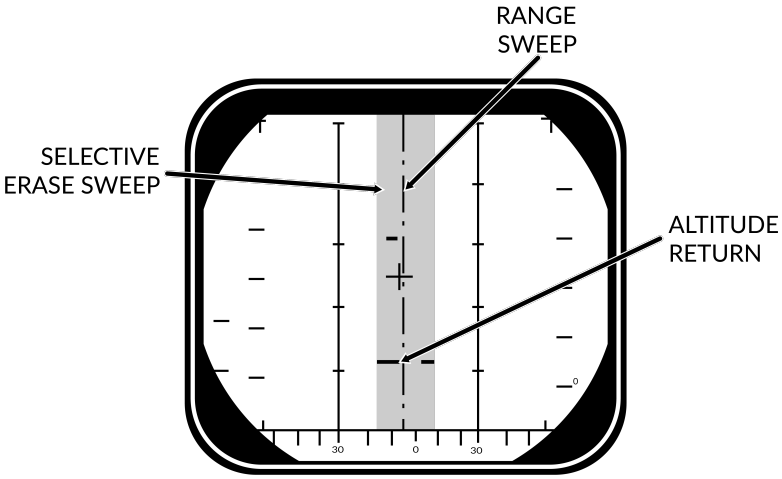


Figure 3.1: **DDD Format in Pulse Search Mode**

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

3.2.2 PSTT

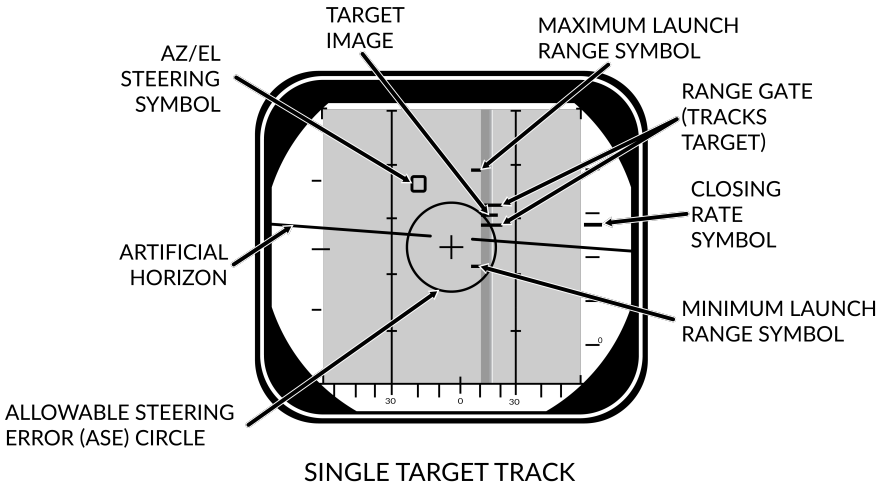


Figure 3.2: **DDD Format in PSTT Mode**

• **Pulse STT**	Lock Target w/o doppler filtering • **Advantages** – Cannot be notched • **Disadvantages** – Susceptible to ground clutter
• **DDD**	• **Track Indications** – ANT TRK & RDROT lights – Tracking gates – Closure rate – Attack Symbology

NOTE

- **PSTT Lock Affects Missile Logic**
  - AIM-54 launched in **Active Launch Mode**
  - AIM-7 launched in **CW Mode**

3.2.3 PSTT ACQUISITION

• **Pulse To PSTT**	• **Conditions** – Pulse Search Mode selected – RDR HCU Mode selected • **Lock Target** (a) Hold HCU Half-action (b) Slew acquisition gates over desired Target on DDD (c) HCU Full-Action to lock • **Unlock Target** (d) HCU Half-action
• **TWS to PSTT**	• **Conditions** – TWS Mode selected – RDR HCU Mode selected • **Lock Target** (a) Hook Target on TID (b) Press PSTT button on DDD Panel • **Unlock Target** (c) HCU Half-action
• **ACM to PSTT**	• **Lock Target** (a) Select desired ACM Mode (Pilot or RIO) (b) Place target in search volume through maneuvering • **Unlock Target** (c) HCU Half-action
• **PDSTT to PSTT**	• **Conditions** – Target PDSTT Locked • **Lock Target** (a) Press PSTT button on DDD Panel • **Unlock Target** (b) HCU Half-action

3.3 PULSE DOPPLER MODES

3.3.1 PULSE DOPPLER SEARCH

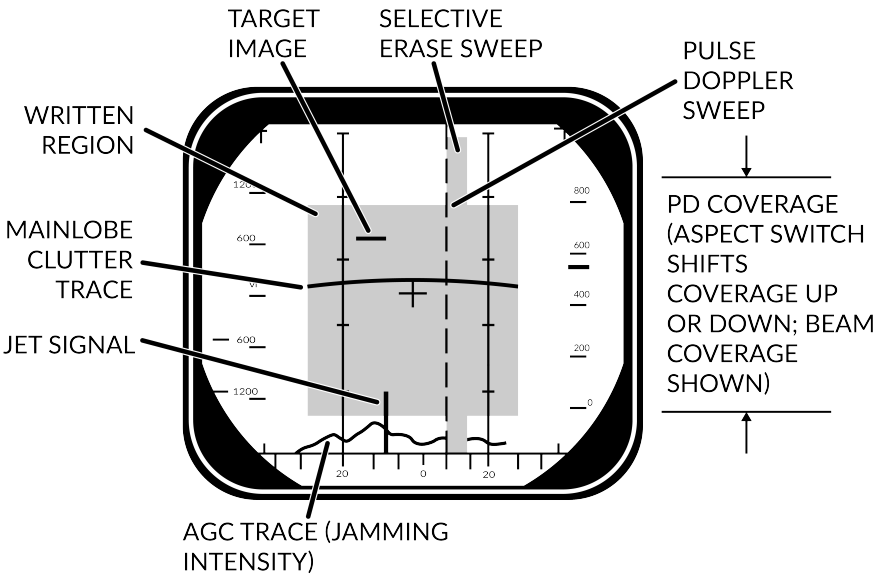


Figure 3.3: **DDD Format in PD Search Mode**

• **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** • Visualization of radar and erase sweeps

• **Doppler Filters**	• **MLC – Main Lobe Clutter Filter** – **Own GS +/- 133 knots** – Removes main ground return – Source of notching • **ZD – 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

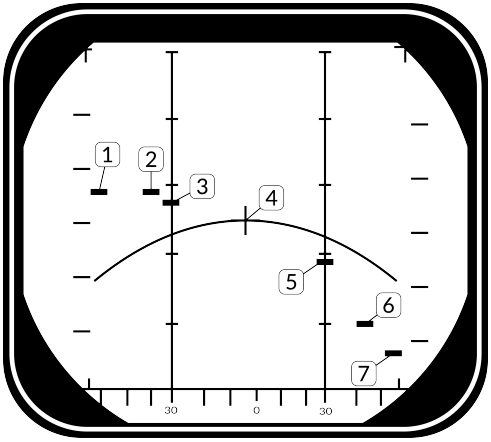


Figure 3.4: **DDD Showing Contacts in PD Mode**

Table 3.7: **Target Data for Figure 3.4**

	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

NOTE

- Target **4** is *notching* and thus shows no radar return

3.3.2 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** • Visualization of radar and erase sweeps
• **TID**	• **Momentary Tracks** • Max concurrent tracks: 48 • **Cannot lock targets from TID**
• **Doppler Filters**	• **MLC – Main Lobe Clutter Filter** – **Own GS +/- 133 knots** – Removes main ground return – Source of notching • **ZD – Zero Doppler Filter** – **Negative own GS +/- 100 knots** – Removes Radar reflection from ground directly beneath own AC

3.3.3 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** • Visualization of radar and erase sweeps
• **TID**	• **Tracksfiles** • Max concurrent tracks: 24 • Max displayed tracks: 18
• **Doppler Filters**	• **MLC – Main Lobe Clutter Filter** – **Own GS +/- 133 knots** – Removes main ground return – Source of notching • **ZD – Zero Doppler Filter** – **Negative own GS +/- 100 knots** – Removes Radar reflection from ground directly beneath own AC
• **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 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 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 PDSTT

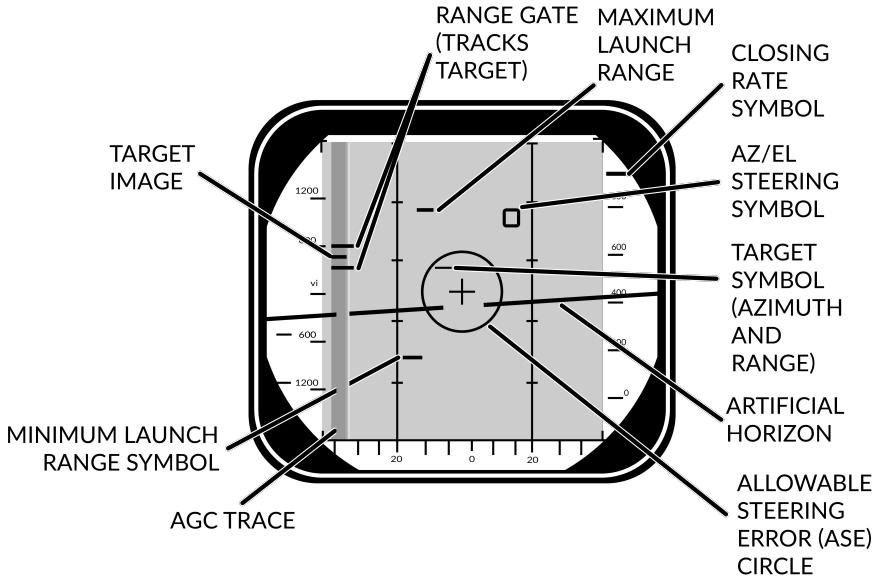


Figure 3.5: **DDD Format in PDSTT Mode**

• **Pulse Doppler STT**	• **Advantages** – Ground Clutter filtering • **Disadvantages** – Susceptible to notching
• **DDD**	• **Track Indications** – ANT TRK & RDROT lights – Tracking gates – Closure rate – Attack Symbology

NOTE

- **PDSTT Lock Affects Missile Logic**
  - Enables launch of AIM-54/AIM-7 in **PD Mode**
  - AIM-7 PD launch requires **MSL OPTIONS Switch** to be in **SP PD**

3.3.7 PDSTT ACQUISITION

• **PD To PDSTT**	• **Conditions** – PD Search Mode selected – RDR HCU Mode selected • **Lock Target** (a) Hold HCU Half-action (b) Slew acquisition gates over desired Target on DDD (c) HCU Full-Action to lock • **Unlock Target** (d) HCU Half-action
• **TWS to PDSTT**	• **Conditions** – TWS Mode selected – RDR HCU Mode selected • **Lock Target** (a) Hook Target on TID (b) Press PDSTT button on DDD Panel • **Unlock Target** (c) HCU Half-action
• **PSTT to PDSTT**	• **Conditions** – Target PSTT Locked • **Lock Target** (a) Press PDSTT button on DDD Panel • **Unlock Target** (b) HCU Half-action

3.4 ACM MODES

3.4.1 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** – see Figure 3.6a
  - **Highest Priority ACM**
  - **Search Pattern**
    - Small Boresight
    - Range: 5 nm
- **VSL**
  - **Vertical Scan Lockon** – see Figure 3.6c
  - **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** – see Figure 3.6b
  - **RIO Controlled**
  - **Search Pattern**
    - HCU Controlled
    - Range: 5 nm

NOTE

- **ACM Modes Result in PSTT Lock** – affects missile logic
  - AIM-54 launched in **Active Launch Mode**
  - AIM-7 launched in **CW Mode**

WARNING

- **Active Launch Mode Phoenixes Have Limited IFF Capability**
  - Employ with caution when friendlies airborne

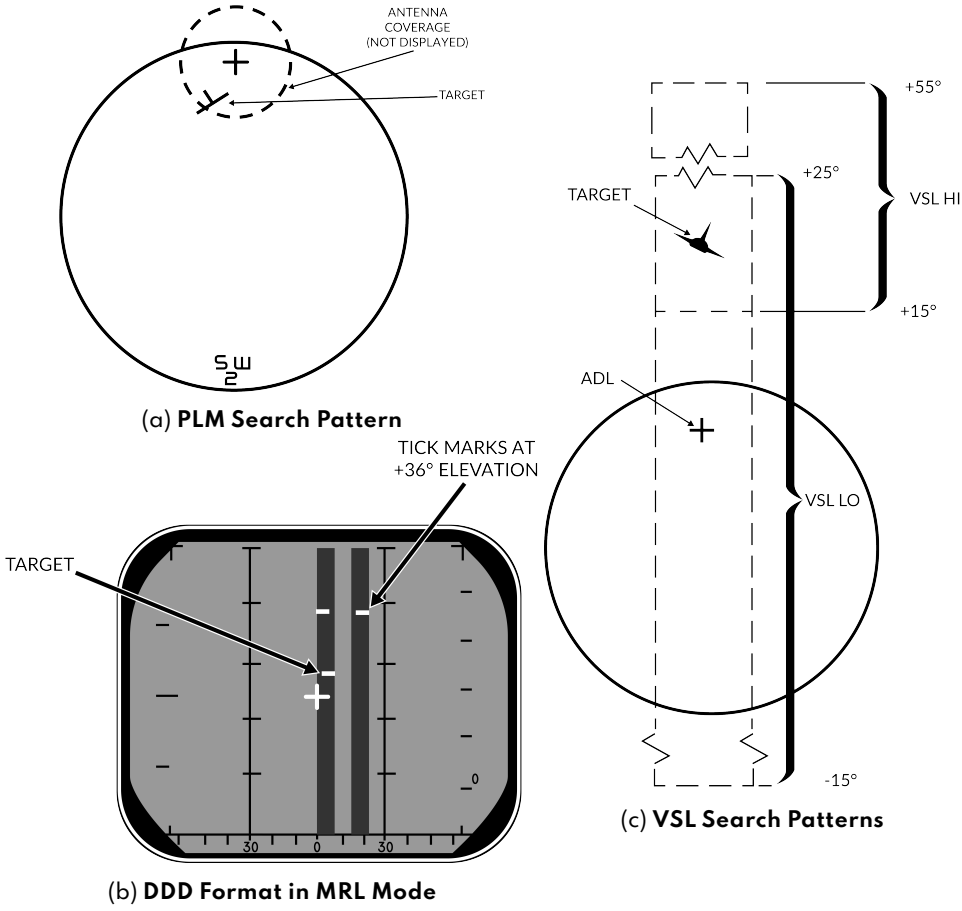


Figure 3.6: **ACM Search Mode Visualization**

3.5 APX-76 IFF

3.5.1 OVERVIEW

• **Activation**	**IFF Switch** – **Press & Hold** (up to 10 sec)
• **Search Modes**	• **DDD** – 2 horizontal bars above & below all friendly returns
• **TWS / STT Modes**	• **DDD** – 2 horizontal bars above & below hooked / locked friendly • **DDD Range** – shows **10 EXP**
• **Control Panel**	**Non-Functional in DCS** – it *just works*

NOTE

- **APX-76 Data is Not Correlated with TWS Tracks** – RIO must manually enter target status (HOST, UNKN, FRIEND) via the **CAP**
- **Lack of IFF Return does NOT necessarily mean Hostile**
- **APX-76 is a Secondary, Transponder-type Radar**
  - Can receive IFF returns from targets not detected by AWG-9

3.6 TACTICAL INFORMATION DISPLAY

3.6.1 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

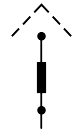
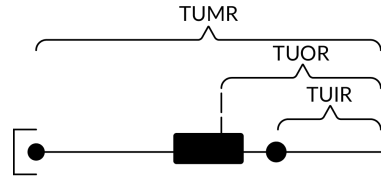
D/L REF POINTS

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		 • **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 selected/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

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 ORDNANCE 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 ORDNANCE

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 ORDNANCE

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

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** – **R**eal-**T**ime **G**un**S**ight 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** – **S**idewinder **E**xpanded **A**cq. **M**ode – **Double-D** search pattern (invisible to pilot) – 4.5 sec search time – Allows AIM-9 to uncage & track target – 40 deg track limit – WCS slaves 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**

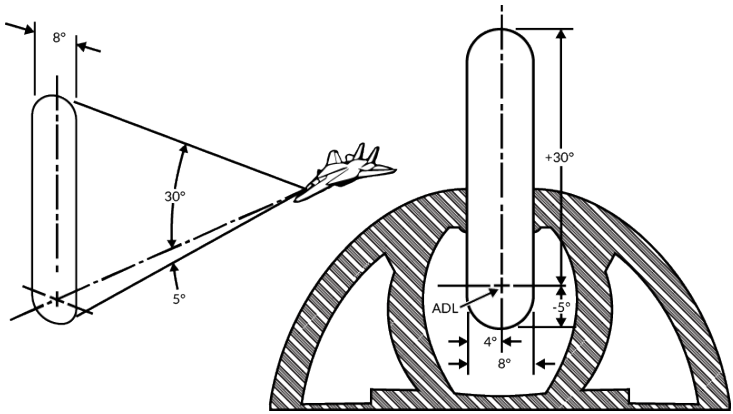
6.2.3 AIM-9 - RADAR

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 CW 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)

6.3.3 AIM-7 - PDSTT -VS- PSTT

• **PSTT**	• **AIM-7 Guided in CW Mode** • **PSTT Advantages / Disadvantages** – Susceptable to ground clutter – In close range scenarios (<20 NM) extremely hard to break lock
• **PDSTT**	• **AIM-7 CAN be Guided in SP PD Mode** – Requires **MSL OPTIONS – SP PD** – Only available on AIM-7F and newer • **PDSTT Advantages / Disadvantages** – Susceptable to notching – Enables longest range Sparrow shots

NOTE

- **If launch is initiated on a PDSTT target with MSL OPTIONS switch set to NORM**
  - CW illumination & guidance will be used
  - Lock still based off PDSTT

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 launches at 6 targets** – Missile 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 **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)

NOTE

- **Missile SARH until impact** – must maintain radar lock

WARNING

- **ACM Radar Modes Result in PSTT Lock**
  - Missile is active off the rail
  - Employ with caution when friendlies airborne

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)

NOTE

- **AWG-9 Responsible for Sending Activation Command**
  - Must maintain track until this point
  - AWG-9 continues to send guidance information after missile activation

WARNING

- **AIM-54 has NO IFF Capability**
  - Employ with caution when friendlies airborne

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

- **AIM-54 Is Pitbull off the Rail** – No IFF capabilities
  - Employ with caution when friendlies airborne