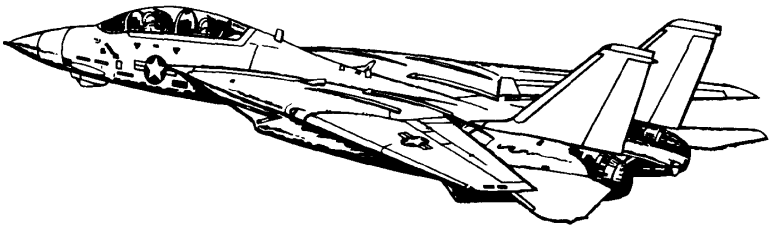
Pocket Checklist

F-14A/B AIRCRAFT

REV: 20220617



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 - CASE I / OVERHEAD PATTERN

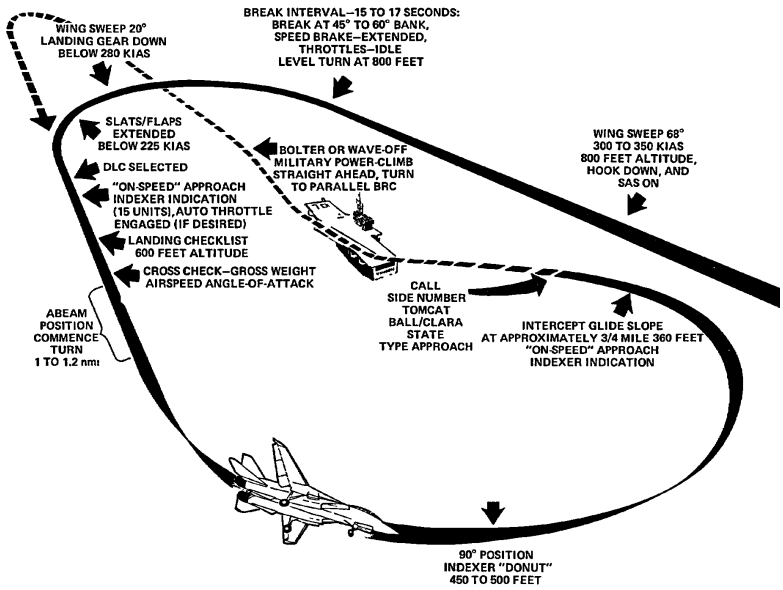


Figure 1.1: **Case I / Overhead Pattern**

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**

1.2.6 LANDING - CASE III - ICLS

1.	**Inbound Call**	(a) **UHF 1 & V/UHF 2** ..... As Required (b) Contact Carrier and note QFE, Pattern Altitude, BRC
2.	**Cockpit Check**	(a) **Altimeter QFE** ..... **Set** (b) **Cockpit Lighting** ..... As Desired (c) **Navigation Lights** ..... As Desired
3.	**Nav Systems**	(a) **ARA-63** ..... **ON** & tuned (b) **TACAN** ..... **T/R** & tuned
4.	**Approach Navigation**	*Use TACAN / ILS steering* (a) **VDI Mode** ..... **NORM** (b) **HSD Mode** ..... **NAV** (c) **HUD Mode** ..... **LDG** *If ILS steering is desired must set AWL Mode* (d) **HUD AWL** ..... **ILS** (e) **VDI AWL** ..... **ILS** *Set steering command to desired mode* (f) **STEER CMD** ..... **TACAN** or **AWL/PCD**
5.	**Prepare Landing Systems**	(a) **ANTI-SKID SPOILER BK** ..... **OFF** (b) **HOOK BYPASS** ..... **CARRIER** (c) **HOOK** ..... **DN** (d) **WING SWEEP** ..... **AUTO** (e) **SPEED BRAKE** ..... **OUT**
25 NM FROM CARRIER		
6.	**Intercept Marshall Radial**	• **Range** – 25nm • **Radial** – Marshall Radial • **Altitude** – 10,000ft (descend to 5,000ft) • **IAS** – 250 kts
15 NM FROM CARRIER		
7.	**Intercept Runway Heading**	• **Range** – Maintain 15nm during turn • **Radial** – Runway Heading • **Altitude** – Maintain 5,000ft • **IAS** – 250 kts

8.	**ILS Steering**	(a) **STEER CMD** ..... **AWL/PCD** (b) **HUD AWL** ..... **ILS** (c) **VDI AWL** ..... **ILS**
10 NM FROM CARRIER		
9.	**Landing Configuration**	(a) **HOOK** ..... **DN** (b) **SPEED BRAKE** ..... **OUT** (c) **WING SWEEP** ..... **20deg AUTO** (d) **GEAR** ..... **Down** (e) **FLAPS** ..... **Full** (f) **Autothrottle** ..... **AUTO** (if desired) (g) **AOA** ..... **ON-SPEED** (Autothrottle should maintain On-Speed)
10.	**FINAL**	(a) **Follow ICLS Needles** (b) **Transition to flying the ball once visual**

NOTE

- **APC does NOT advance throttle on touchdown**
- **Refer to VDI Caution Indicator Table for summary**

1.2.7 LANDING - CASE III - ACLS

1.	**Inbound Call**	(a) **UHF 1 & V/UHF 2** ..... As Required (b) Contact Carrier and note QFE, Pattern Altitude, BRC
2.	**Cockpit Check**	(a) **Altimeter QFE** ..... **Set** (b) **Cockpit Lighting** ..... As Desired (c) **Navigation Lights** ..... As Desired
3.	**Nav Systems**	(a) **ARA-63** ..... **ON** & tuned (b) **TACAN** ..... **T/R** & tuned
4.	**Approach Navigation**	*Use TACAN / ILS steering to follow approach pattern before engaging ACLS on final* (a) **VDI Mode** ..... **NORM** (b) **HSD Mode** ..... **NAV** (c) **HUD Mode** ..... **LDG** *If ILS steering is desired must set AWL Mode* (d) **HUD AWL** ..... **ILS** (e) **VDI AWL** ..... **ILS** *Set steering command to desired mode* (f) **STEER CMD** ..... **TACAN** or **AWL/PCD**
5.	**ACLS Setup**	(a) **DL Power** ..... **ON** (b) **DL Mode** ..... **TAC** (c) **DL Freq.** ..... As Required (d) **APN-154 Power** ..... **ON** (e) **ACLS TEST Light** ..... Verify ON
6.	**Prepare Landing Systems**	(a) **ANTI-SKID SPOILER BK** ..... **OFF** (b) **HOOK BYPASS** ..... **CARRIER** (c) **HOOK** ..... **DN** (d) **WING SWEEP** ..... **AUTO** (e) **SPEED BRAKE** ..... **OUT**
25 NM FROM CARRIER		
7.	**Intercept Marshall Radial**	• **Range** – 25nm • **Radial** – Marshall Radial • **Altitude** – 10,000ft (descend to 5,000ft) • **IAS** – 250 kts
15 NM FROM CARRIER		

8.	**Intercept Runway Heading**	• **Range** – Maintain 15nm during turn • **Radial** – Runway Heading • **Altitude** – Maintain 5,000ft • **IAS** – 250 kts
9.	**Autopilot Setup**	(a) **STEER CMD** ..... **AWL/PCD** (b) **HUD AWL** ..... **ACL** (c) **VDI AWL** ..... **ACL** (d) **Autopilot Selector** ..... **ACL** (e) **Autopilot Switch** ..... **ENGAGE** (f) **A/P REF Light** ..... Verify Illuminates (autopilot ready for activation) (g) **Autothrottle** ..... **AUTO**
10 NM FROM CARRIER		
10.	**Landing Configuration**	(a) **HOOK** ..... **DN** (b) **SPEED BRAKE** ..... **OUT** (c) **WING SWEEP** ..... **20deg AUTO** (d) **GEAR** ..... **Down** (e) **FLAPS** ..... **Full** (f) **AOA** ..... **ON-SPEED** (Autothrottle should maintain On-Speed)
11.	**FINAL**	(a) **LANDING CHK Caution** ... Illuminates (6nm) (b) **ACL READY Caution** ..... Illuminates (4nm) (c) **AP/CPLR Caution** ..... Illuminates (Indicates Carrier ready to control A/C) • **Localizer Needle** – Verify Centered • **Glideslope Needle** – Verify Centered (d) **Autopilot Reference** ..... **Depress** (e) **CMD CONTROL Caution** ..... Illuminates (f) **10 SECONDS Caution** ..... Illuminates Prior to touchdown

NOTE

- **Pilot should be ready to disengage ACLS at any time**
  - Can be disengaged with **PLM Depress**
- **APC does NOT advance throttle on touchdown**
- **Refer to VDI Caution Indicator Table for summary**

Table 1.14: **VDI Caution Indicators**

Light	Description
ADJ A/C	Indicates other aircraft close to own traffic pattern
LANDING CHK	Indicates carrier has channel ready for ACL, crew should prepare for carrier landing, center needles
ACL READY	Indicates CATCC has aquired aircraft and is transmitting glidepath information
A/P CPLR	Indicates CATCC is ready to control aircraft
CMD CONTROL	Indicates aircraft is under data link control for landing
10 SECONDS	Indicates that carrier motion is added to data link info and commands during landing Indicates 10 seconds to arrival at the next point in approach pattern in other modes
TILT	Caution that data link command received for the last 2 seconds during ACL When not in ACL it indicates no data link messages during last 10 seconds
VOICE	Caution that CATCC not ready for ACL, switch to standard voice procedures
AUTO THRO	Caution that autothrottle has been disengaged
A/P REF	Indicates autopilot selected but not engaged. Exception altitude and heading hold
WAVEOFF	Indicates waveoff commanded
WING SWEEP	Caution indicating failure in both wing-sweep channels or disengagement of spider detent
REDUCE SPEED	Indicates flap retraction failure with greater than 225 knots indicated airspeed Also indicates safe Mach number exceeded
ALT LOW	Non functional, refer to radar altimeter

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**	• **A**utomatic **C**arrier **Landing** – **See ACLS Section**
• **Autopilot Emergency Disengage Paddle**	• **Paddle on Stick** – **Disengages Autopilot Modes** – **Deactivates Pitch, Roll SAS Channels**

2.1.3 APC / AUTOTHROTTLE

• **APC**	• **A**pproach **P**ower **C**ompensator – 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**

NOTE

- **With APC engaged use gentle pitch input to adjust glideslope**

2.1.4 ACLS

• **ACLS**	• **A**utomatic **C**arrier **L**anding **S**ystem • Precision Datalink Landing guidance using APN-154 Radar Beacon
• **ACLS Setup**	• **DL Power** ..... **ON** • **DL Mode** ..... **TAC** • **DL Freq.** ..... As Required • **APN-154 Power** ..... **ON** • **ACLS TEST Light** .....Verify ON
• **Autopilot Setup**	• **STEER CMD** ..... **AWL/PCD** • **HUD AWL** ..... **ACL** • **VDI AWL** ..... **ACL** • **Autopilot Selector** ..... **ACL** • **Autopilot Switch** ..... **ENGAGE** • **A/P REF Light** .....Verify Illuminates (autopilot ready for activation) • **Autothrottle** ..... **AUTO**
• **ACLS Engage**	(a) **LANDING CHK Caution** ...Illuminates (6nm) (b) **ACL READY Caution** .....Illuminates (4nm) (c) **AP/CPLR Caution** .....Illuminates • **Localizer Needle** – Verify Centered • **Glideslope Needle** – Verify Centered (d) **Autopilot Reference** ..... **Depress** (e) **CMD CONTROL Caution** .....Illuminates (f) **10 SECONDS Caution** .....Illuminates Prior to touchdown
• **Disengage**	• **ACLS – PLM** • **Autothrottle – CAGE/SEAM Button**

NOTE

- **ACLS can not handle large deviations**
  - **Must be ON-Localizer & ON-Glideslope at engagement**
  - Pilot should be ready to disengage ACLS at any time
- **APC does NOT advance throttle on touchdown**
- **Refer to VDI Caution Indicator Table for summary**

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 own position for tactical systems (long range missiles & D/L)
• **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** – performs general navigation computations and provides them to PILOT & RIO through displays • **NPS** – **N**avigation **P**ower **S**upply – Provides power to **IMU** & **CSDC** • **Subsytems** – Radar Altimeter – TACAN – AHRS
• **Controls**	• **CAP** – Used for Data Entry • **NAV MODE Selector** – Used to select alignment/operation mode

2.2.2 ALIGNMENT

• **Enter GND Align**	(a) **NAV MODE Switch** ..... **GND ALIGN** • Requires A/C or Homebase Lat, Long, Alt • Can be entered before or within 90-120 s after selecting **GND ALIGN**
• **Enter CVA Align**	(a) **Datalink** ..... **ON** (b) **WCS** ..... **STBY** (c) **D/L Mode** ..... **CAINS/WAYPT** (d) **NAV MODE Switch** ..... **CVA ALIGN**
• **Indicators & Symbology**	*Initialization* • After 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 *Coarse Alignment* • **CARET** before coarse-align complete marker (first tick) *Fine Alignment* • **DIAMOND** between 1st and 3rd ticks • **2nd Tick** – min weapon launch criteria met – **STBY Light** – extinguishes – **READY Light** – light illuminates – **INS Mode** – may be selected • **3rd Tick** – fine alignment complete – Dot appears in Diamond
• **Exit Alignment**	(a) **NAV Mode** ..... **INS** • **READY Light** – extinguishes • Tactical tape appears • Normal navigation display available
• **Automatic Stored Heading**	• Reference alignment stored prior to powering-down the aircraft • Allows for fine alignment in < 2min • **ASH** acronym shown on TID during align

• **Handset Align**	• Allows for carrier alignment even when SINS data not available • Indicated by flashing **HS** acronym on TID on setting **NAV MODE** to **CVA ALIGN** • Total align duration slightly longer due to ship's motion **RIO must enter following data (in order)** (a) Ship's speed, true heading (b) Lat/Long (c) Corrected pressure altitude

NOTE

- **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
  - During suspend align taxiing more than 4000 ft will render the **INS** performance unreliable
- **GND Align**
  - 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
- **CVA Align**
  - You will get **Erroneous Heading Readings on a Carrier** (up to 30 deg) due to ship's magnetic field
  - Deviation goes away shortly after takeoff

2.2.3 NAVIGATION UPDATE

• **Radar Update**	*Prestored update point must be easily recognizable through pulse ground returns* (a) **Desired Update Point** ..... **Hooked** (b) **Radar Mode** ..... **PULSE SRCH** (c) **Sensor Control Panel** ..... Set • **STAB Switch – IN** • **EL BARS – 1** • **AZ SCAN** – As Desired (d) **RDR FIX Button** ..... **Depress** (e) **HCU Mode** ..... **DDD** (f) **HCU** ..... **Half-Action** • HCU cursor visible on DDD • Position cursor over desired point (g) **HCU** ..... **Full-Action** • **TID** – observe lat/long delta • If results unsatisfactory deselect **RDR FIX**, repeat from (d) (h) **FIX ENABLE Button** ..... **Depress**
• **TACAN Update**	*Prestored update point must be colocated with TACAN station* (a) **TACAN** ..... **On & Tuned** (b) **Desired Update Point** ..... **Hooked** (c) **TACAN FIX Button** ..... **Depress** • **TID** – observe lat/long delta • If results unsatisfactory deselect **TACAN FIX**, repeat from (b) (d) **FIX ENABLE Button** ..... **Depress**
• **Visual Update**	(a) **Desired Update Point** ..... **Hooked** (b) **VIS FIX Button** ..... **Depress** (As overflying waypoint) • **TID** – observe lat/long delta • If results unsatisfactory, press **VIS FIX** to clear data and try again (c) **FIX ENABLE Button** ..... **Depress**

WARNING

- **Nav update can easily lead to an increase in Navigation Error rather than reduction**

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

Table 2.10: **INS Status Indicators**

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

2.2.5 ALIGNMENT REINITIALIZATION

• **Reinitialization**	If observable acronym (**O**) or align stalls during fine align. RIO can apply any of following methods
• **Method 1**	(a) **NAV MODE** ..... **OFF** (b) **WCS** ..... **OFF** (c) Proceed with normal start sequence
• **Method 2**	(a) **NAV MODE** ..... **OFF** (b) **NAV MODE** ..... **Desired Align Mode**
• **Method 3**	(a) **NAV MODE** ..... **INS** Verify **IN** on **TID** (b) **NAV MODE** ..... **OFF** (c) **NAV MODE** ..... **Desired Align Mode**

2.2.6 INS (BACKUP) MODES

• **INS Mode**	• **Standard Navigation Mode** • IMU provides system state
• **IMU/AM Mode**	• **Backup Navigation Mode** • Automatic activation upon CSDC or select IMU failures • **TID – IM** replaces **IN** acronym • **STBY**, **READY** lights flash until RIO sets **NAV MODE** to **IMU/AM**
• **IMU/AM Mode**	• **Backup Navigation Mode** • Automatic activation upon IMU failure • **TID – AH** replaces **IN**/**IM** acronym • **STBY**, **READY** lights illuminate until RIO sets **NAV MODE** to **AHRS/AM** • Uses dead-reckoning from last known position using stored wind data and velocity measurements

2.2.7 WAYPOINT NAVIGATION

• **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
• **CAP Entry**	(a) **CAP CATEGORY** ..... **TAC DATA** (b) **Desired Point** ..... **Select** (c) **Cap Keyboard** ..... **CLEAR** (d) **LAT** ..... Input, **ENTER** (e) **LONG** ..... Input, **ENTER**
• **Point Navigation**	(a) **CAP CATEGORY** ..... **TAC DATA** (b) **Desired Point** ..... **Select** (c) **DEST Mode Selector** ..... As Desired (d) Monitor steering information on Displays

2.2.8 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 • **Channels** – 126
• **Power / Tune**	(a) **Mode** ..... **As Desired** • **REC** – Receive only • **T/R** – Transmit & Receive, enables ranging • **A/A** – Air to air mode (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** (d) Consult BDHI, HSD to track TACAN station
• **Miscellaneous**	• **BIT Button** – Initiates self test • **GO & NO-GO Lights** – Indicate BIT result • **VOL Knob** – Allows audio monitoring • **BCN Mode** – Beacon Mode (Non-functional)

2.3 COMMUNICATION SYSTEMS

2.3.1 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**

2.3.2 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)

2.3.3 ARA-50 UHF 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
• **Power / Tune**	(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

2.3.4 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**

2.3.6 ARA-63 ICLS

• **Overview**	• **I**nstrument **C**arrier **L**anding **S**ystem • Provides **Glideslope and Localizer** *Needles* for precision approach
• **Power**	**ARA-63 POWER – ON**
• **Tune**	(a) **ICLS Channel Selector** ..... As Desired
• **Display**	(a) **HUD MODE** ..... **LDG** (b) **VDI MODE** ..... **NORM** (c) **HUD AWL** ..... **ILS** (d) **VDI AWL** ..... **ILS** (e) **STEER CMD** ..... **AWL/PCD** (f) **HUD / VDI** ..... Verify needles visible
• **Miscellaneous**	• **BIT Button** – Displays landing sybology if HUD & VDI modes set accordingly

2.3.7 APN-154 RADAR BEACON

• **Overview**	• **Radar Beacon** for ACLS tracking & guidance
• **Power**	**PWR Switch – ON**
• **Tune**	(a) **Datalink** ..... **ON** & **TAC** (b) **Datalink Host** ..... **CV** (c) **ACLS TEST Light** ..... Illuminates
• **Miscellaneous**	• **ACLS TEST Button** – Illuminates indicating successful test when in ACLS Mode • **MODE Selector** – **ACLS** – Enables augmentor. Required for CATCC radar lock on for ACLS – **SINGLE** – Beacon responds to single pulses – **DOUBLE** – Beacon responds to double pulses

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 ALE-39 CMS DISPENSER

• **ALE-39**	• **Control** – Pilot and/or RIO • **Operation** – manual, program, auto-chaff • **Capacity** – 60 cartridges (100 with LAU-138)
• **Power**	(a) **PWR/MODE Switch** ..... **MAN** (or AUTO(CHAFF) / MAN) (b) **FLARE MODE Switch** ..... **PILOT**
• **Chaff Setup**	• **B QTY** – Cartridges per burst – **1 / 2 / 3 / 4 / C** (continuous) **/ R** (random, 4-6 cartridges) • **B INTV** – Seconds between cartridges – **.1 / .2 / .5 / .7 / 1 / R** (random) • **S QTY** – Salvos of bursts per program – **1 / 2 / 4 / 6 / 8 / 10 / 15** • **S INT** – Seconds between salvos – **2 / 4 / 6 / 8 / 10**
• **Flare Setup**	• **QTY** – Cartridges per burst – **2 / 3 / 4 / 6 / 8 / 10** • **INTV** – seconds between cartridges – **2 / 4 / 6 / 8 / 10**
• **LAU-138**	• Hold 20 chaff cartridges (equivalent) each • When mounted **R10** controls LAU-138, **R20** controls both R10 R20 buckets
• **Load Cartridges**	(a) **RESET Switch** ..... **Hold** 5 sec (resets internal counters) (b) **L10/L20/R10/R20** ..... **C** or **F** (as required)

• **Miscellaneous**	• **Jammer Settings** – Not implemented in DCS • **FLARE MODE Switch** – **MULT** – Fires 1 flare from each flare bucket per pulse – **NORM** – Normal behavior per pulse – **PILOT** – 1 Flare per DLC depress • **SALVO FLARES** – Rapidly ejects all flares

NOTE

- **Burst settings R & C have special behavior**
  - **C QTY R INTV** – 1st 3 cartidges at 0.125s intervals, rest at 0.25-4s intervals until all cartridges ejected
  - **R QTY R INTV** – Each burst has 4-6 cartidges, 1st 3 cartidges of 1st burst at 0.125s intervals, rest at intervals of 0.25-4s
  - **R QTY Number INTV** – Each burst has 4-6 cartridges, 1st 3 cartridges of 1st burst at 0.125s intervals
  - **Fixed QTY R INTV** – Each burst ejects 1 cartridge disregarding B QTY
- **AUTO (CHAFF) / MAN**
  - Automatic chaff ejection (often wasteful)

2.4.3 ALQ-100 / ALQ-126 DECM

• **DECM**	• **D**efensive **E**lectronic **C**ounter **M**easures • Modelled as simple noise jammers in DCS
• **Power**	(a) **Mode Selector** ..... **HOLD 3 SEC** (b) **Mode Selector** ..... **ACT** (BIT, approx 30s) (c) **Mode Selector** ..... **REC** (Receive only mode) (d) **Mode Selector** ..... **RPT** (Full system functionality)
• **Miscellaneous**	• **AUDIO Knob** – Controls volume of audio played to RIO. Audio is generated directly from received PRF signals • **STANDBY Light** – Indicates system warmup not yet complete or system has a fault
• **Threat Advisory Indicator**	**See Threat Advisory Indicators for RCV/XMIT Status**

Table 2.25: **Threat Advisory Indicators**

Light	Description
IFF	Friendly IFF signal received but no reply generated
RCV	ALQ-126 DECM is receiving a signal
XMIT	ALQ-126 DECM 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

Table 3.1: **Overview of AWG-9 Radar Modes**

	Pulse		Pulse Doppler			
	Pulse Search	**P-STT**	**PD Search**	**RWS**	**TWS**	**PD-STT**
Range (approx.)	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

3.1.1 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

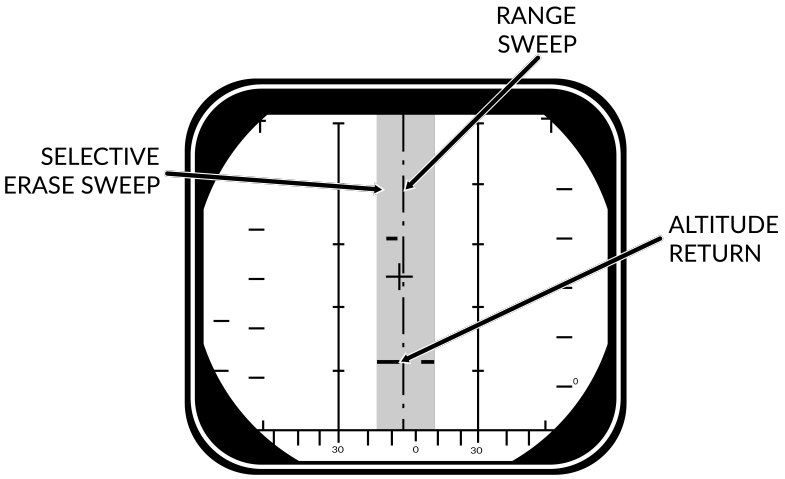


Figure 3.1: **DDD Format in Pulse Search Mode**

• **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

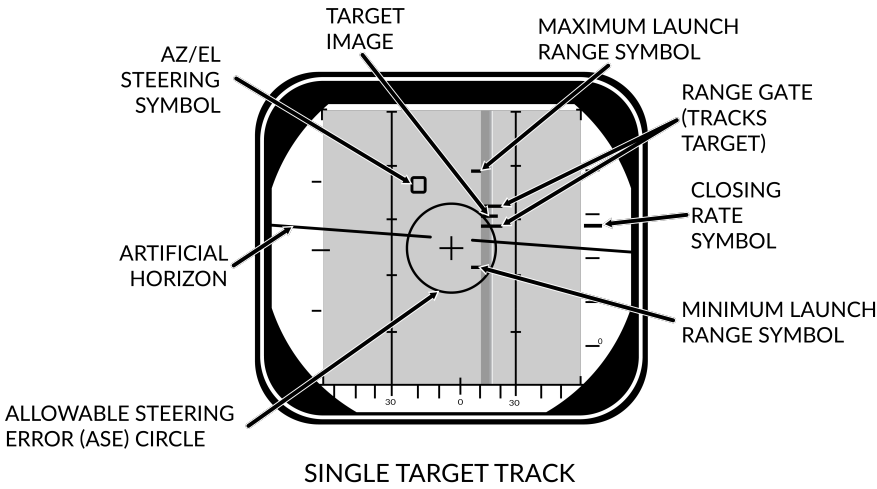


Figure 3.2: **DDD Format in PSTT Mode**

• **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

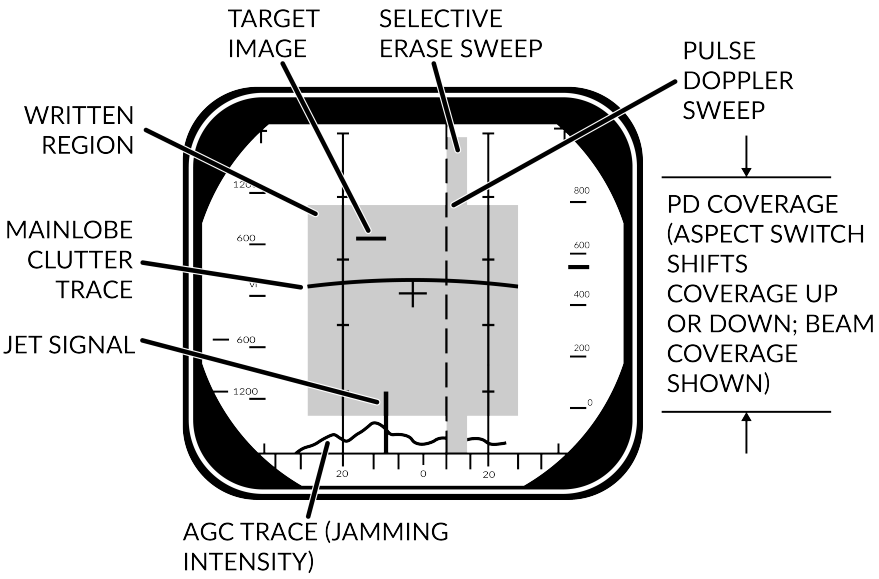


Figure 3.3: **DDD Format in PD Search Mode**

• **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

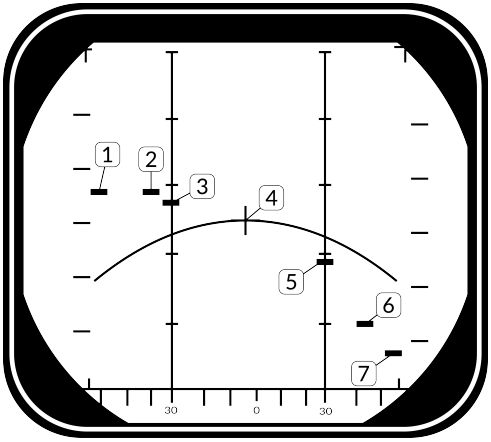


Figure 3.4: **DDD Showing Contacts in PD Mode**

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

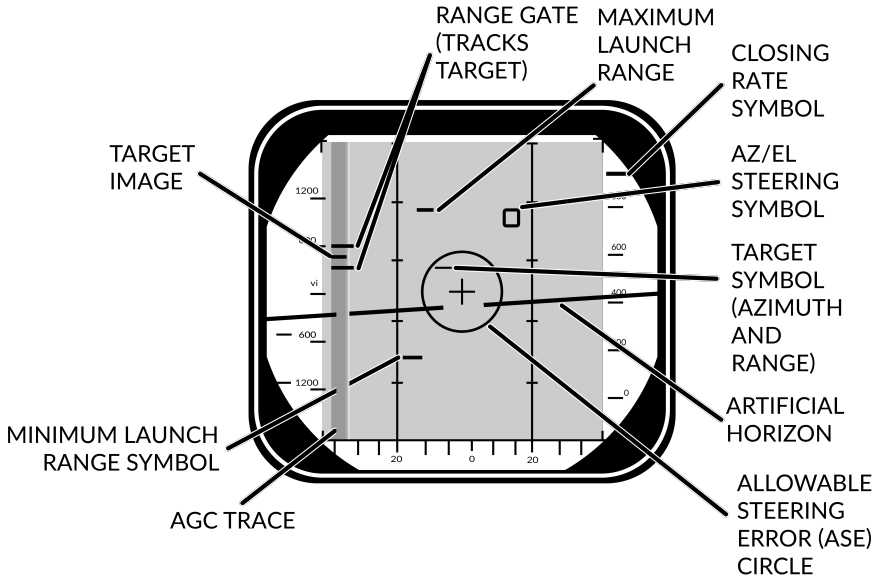


Figure 3.5: **DDD Format in PDSTT Mode**

• **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

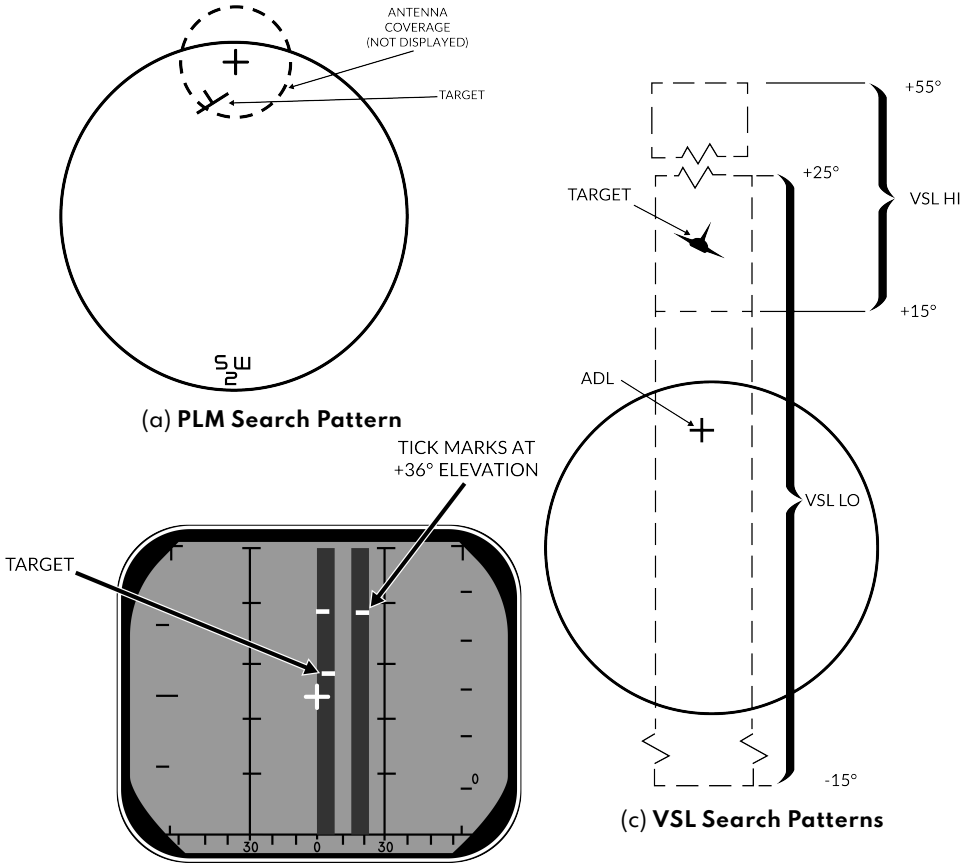


Figure 3.6: **ACM Search Mode Visualization**

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

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

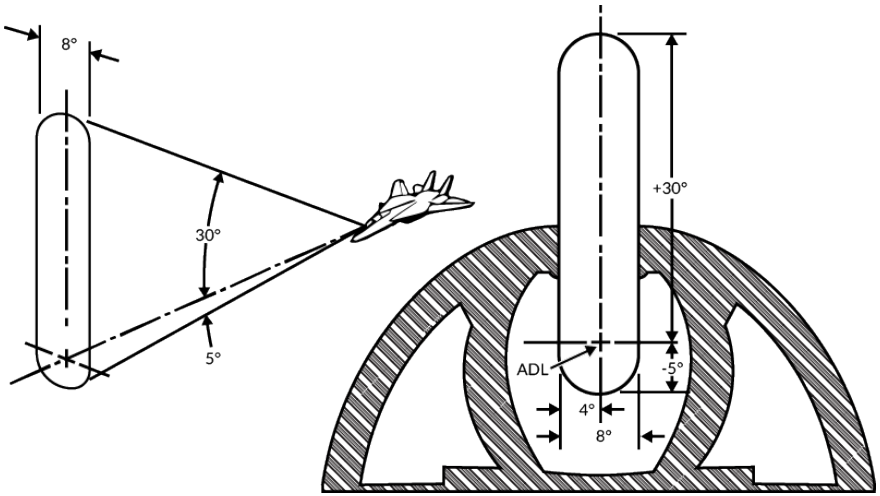


Figure 6.1: **CW Flood Search Pattern**

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

Chapter 7

APPENDIX

Contents

7.1 SYMBOLOGY

7.1.1 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

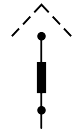
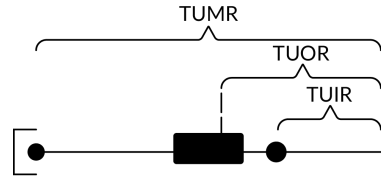
7.1.2 TID SYMBOLOGY

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**

7.2 INDICATORS

7.2.1 THREAT ADVISORY INDICATORS

Light	Description
IFF	Friendly IFF signal received but no reply generated
RCV	ALQ-126 DECM is receiving a signal
XMIT	ALQ-126 DECM 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

7.2.2 INS STATUS INDICATORS

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

7.2.3 VDI CAUTION INDICATORS

Light	Description
ADJ A/C	Indicates other aircraft close to own traffic pattern
LANDING CHK	Indicates carrier has channel ready for ACL, crew should prepare for carrier landing, center needles
ACL READY	Indicates CATCC has aquired aircraft and is transmitting glidepath information
A/P CPLR	Indicates CATCC is ready to control aircraft
CMD CONTROL	Indicates aircraft is under data link control for landing
10 SECONDS	Indicates that carrier motion is added to data link info and commands during landing Indicates 10 seconds to arrival at the next point in approach pattern in other modes
TILT	Caution that data link command received for the last 2 seconds during ACL When not in ACL it indicates no data link messages during last 10 seconds
VOICE	Caution that CATCC not ready for ACL, switch to standard voice procedures
AUTO THRO	Caution that autothrottle has been disengaged
A/P REF	Indicates autopilot selected but not engaged. Exception altitude and heading hold
WAVEOFF	Indicates waveoff commanded
WING SWEEP	Caution indicating failure in both wing-sweep channels or disengagement of spider detent
REDUCE SPEED	Indicates flap retraction failure with greater than 225 knots indicated airspeed Also indicates safe Mach number exceeded
ALT LOW	Non functional, refer to radar altimeter