

DCS: JF-17 Thunder

QUICK GUIDE

(Early Access)



DEKA IRONWORK SIMULATIONS

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CHAPTER1 Introduction

1.1 Airplane

1.1.1 Airplane Introduction

JF-17 is a single engine, single seat multirole tactical fighter aircraft developed by China and Pakistan jointly in late 1990s. The airplane is optimized for mid-low altitude, high subsonic speed maneuver capability. It has both great air to ground and intercepting capability. JF-17 equipped with advanced avionic systems.

JF-17 has a conventional tri-plane empennage arrangement, medium aspect ratio wing with vortex-control strakes. The strakes extend to aircraft's tail. Semi-monocoque and truss structure combined fuselage is designed with area rule. It has all moving horizontal stabilator, a pair of ventral fins, all wing-span leading-edge slats and flaps. Wings, stabilators and vertical stabilizer's sweep angle are all 42 degrees. The landing gear is in tricycle configuration. JF-17 has a one-piece windshield, "bubble" shape explosive shattered canopy and zero-zero ejection system.

1.1.2 Specifications

Length: 14.93 m (49 ft)

Wingspan: 9.48 m (31.1 ft, including 2 wingtip missiles)

Height: 4.72 m (15.5 ft)

Wing Area: 24.43 m² (263 ft²)

Empty Weight: 6,586 kg (14,520 lb)

Max Takeoff Weight: 12,383 kg (29,750 lb)

G Limits: +8 g / -3 g

Internal Fuel Capacity: 2,329 kg (5,135 lb)

Engine: 1 × Klimov RD-93 Afterburning Turbofan, with DEEC

Military Power: 49.4 kN (11,105 lbf)

Max Power: 85.3 kN (19,180 lbf)

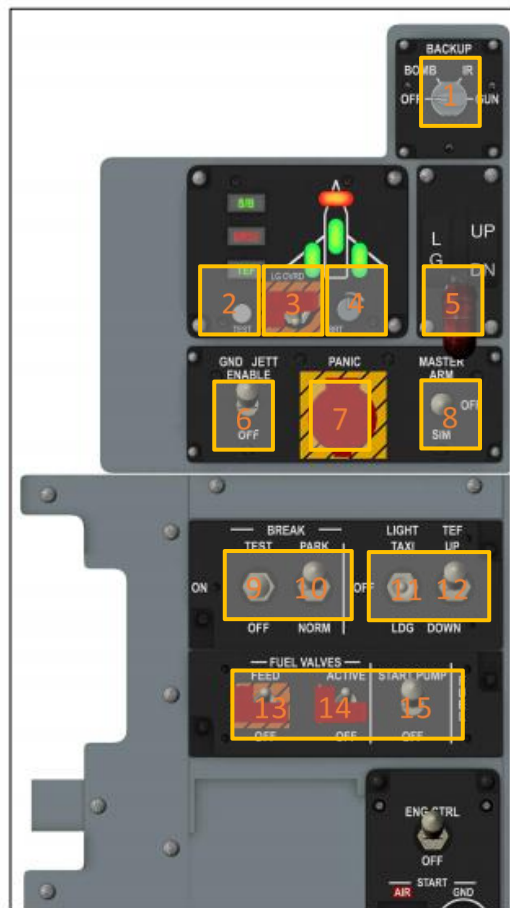
Max Mach Number: Mach 1.6 (1,960.1 km/h; 1,217.9 mph)

Service Ceiling: 16,916 m (55,500 ft)

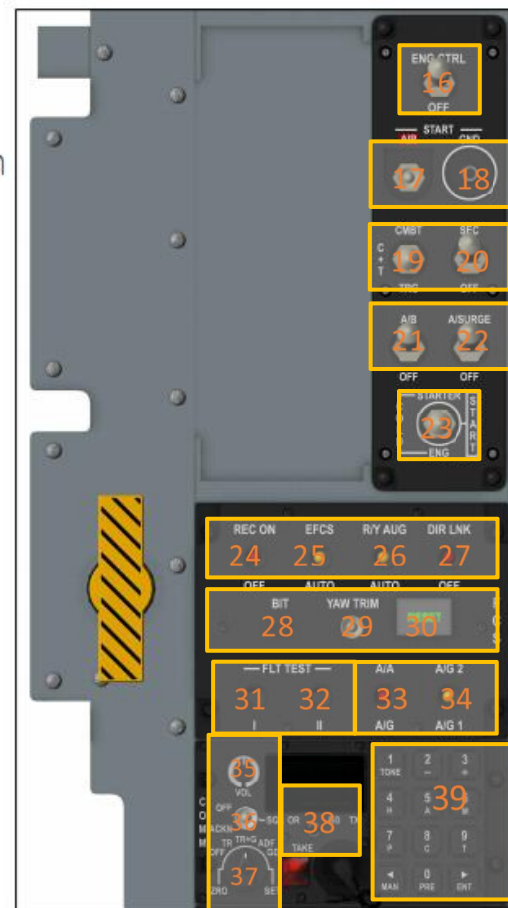
Thrust/Weight: 0.95

1.1.3 Cockpit

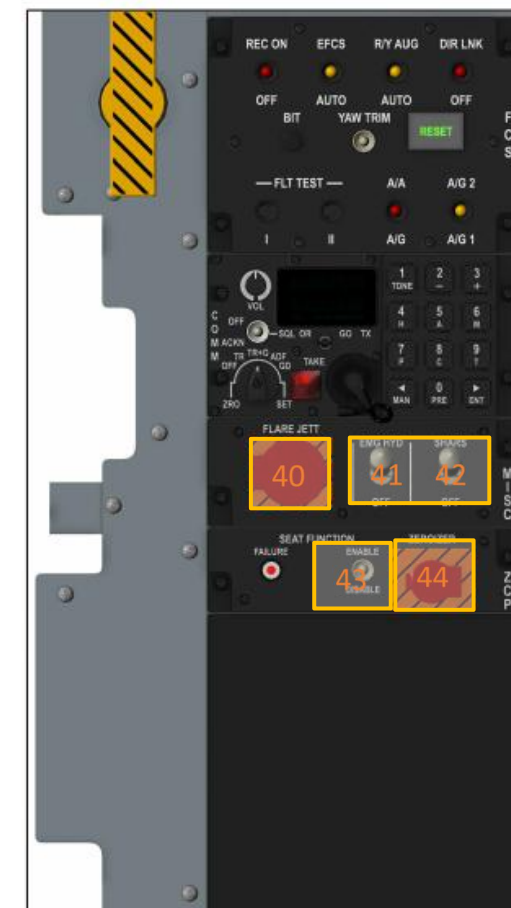
LEFT PANEL



1. Backup SAIU Knob Selector
2. Landing Gear Indicator Light Test Button
3. Landing Gear Override Button
4. Landing Gear Override Button Cover
5. Landing Gear Lever
6. Ground Jettison Button
7. Emergency Jettison Button
8. Weapon Master Arm Switch
9. Brake Test
10. Brake Park/Norm
11. Light Switch - Land/Off/Taxi
12. Flap Switch - Up/Down
13. Feed Cut-off Valve
14. Active Fuel Cut-off Valve
15. DC Electric Motor Pump Switch

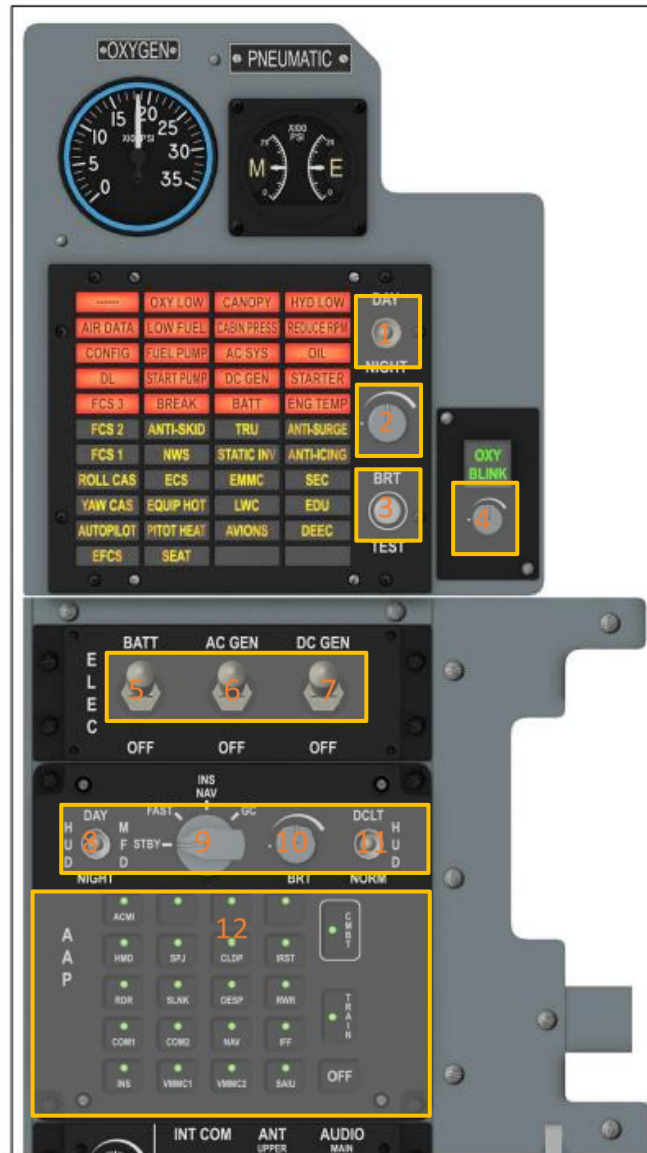


16. Engine Control Switch
17. Air Start Button
18. Ground Start Button
19. Engine Mode Switch
20. SEC EEC Switch
21. Afterburner Switch
22. Anti-Surge Switch
23. Start Mode Selector
24. Record Switch
25. EFCS Switch
26. Yaw/Roll CAS Switch
27. Direct Mode Switch
28. FCS BIT Button
29. Yaw Trim Switch
30. AA/AG Switch
31. AG1/AG2 Switch
32. Radio Volume Knob
33. Squelch OFF/SQL/ACKN
34. Radio Mode Switch
35. Radio Control Handover
36. Radio Key



40. Flare Dispense Button
41. Emergency Hydraulic Pump Switch
42. SHARS Switch
43. Ejection Seat Activate Destruct
44. Self Destruct Button

RIGHT PANEL



1. Warning Panel Day/Night Switch
2. Warning Panel Brightness Knob
3. Warning Panel Test Button
4. Oxygen Indicator Brightness Knob
5. Battery Switch
6. Main AC Gen Switch
7. DC Gen Switch
8. HUD/MFCD Day/Night Switch
9. INS Mode Knob Selector
10. Brightness Knob
11. HUD Symbology Reject Switch
12. AAP



13. COMM1 Volume Knob
14. Intercom Switch
15. Radio Top/Bottom Antenna Switch
16. Speaker Control Box Channel Antenna Switch
17. COMM1 Volume Knob
18. TCN/ILS Volume Knob
19. MSL Volume Knob
20. Air Temp Knob Selector
21. Defog Switch
22. ECS Mode Knob Selector
23. Landing Gear Override Button
24. Inst. Light Knob
25. Console Light Knob
26. Flood Light Knob
27. Exterior Light Master Switch
28. Formation Light Knob Selector
29. Anti-Collision Light Knob Selector
30. Navigation Light Switch - Bright/Off/Dim
31. Navigation Light Switch - Flash/Steady
32. Light Switch - Tow/Off/Anti-Collision

CHAPTER2 Normal Procedure

2.1 Pre-start check

2.1.1 Left Console

1. Miscellaneous Panel

“SHARS” (Strapped-down Heading Attitude Reference System) switch→“SHARS” (on) ;

Emergency hydraulic pump switch→“OFF”;

2.Flight control panel

Direct Mode Switch→“OFF”;

AA/AG Switch→As desired;

AG1/AG2 Switch→As desired;

EFCS Switch→“AUTO”;

Roll Yaw Augmentation Switch→“R/Y AUG”。

3.Engine Control Panel

ENG CTRL Switch→“OFF”;

Air Start (engine in-air start) Switch→disengage;

Engine mode Switch→As Desired;

Afterburner Switch→“A/B”(Engage);

Anti-Surge Switch→“A/SURGE”;

Start Mode Selector→As desired;

SEC EEC(secondary engine control) Switch→ “OFF”.

4. Throttle Quadrant

After Burner lock → pull out position;

Speed Break Switch → Close。

5. Fuel Control Panel

“ACTIVE” Switch → “ACTIVE”;

“FEED” Switch → “FEED”;

“START PUMP” Switch → “OFF”。

6. Takeoff/Landing System Panel

“BRAKE” Switch → “ON”;

“BRAKE” Switch → “PARK”;

“TEF” → “OFF”。

7. Oxygen Valve → On

8. Armament Panel

GND JETT → “OFF”;

“PANIC” → Cover closed;

“MASTER” Switch → “OFF”.

9. “LG” Switch → “DOWN”.

10. “SAIU” Switch → “OFF”.

2.1.2 Instrument Panel

1. Drag chute → Middle position;

2. “EMER BRK” handle → Close;

3.UFCP:

“HUD CONT” knob → Middle position;

“HUD BRT” knob → Middle position;

Rocker Switch → Middle position;

“BAK BRT” Knob → “OFF”;

“UFCP BRT” Knob → Middle position。

3. Three MFD switches → On。

2.1.3 Right Console

1. PNEUMATIC both indications are 1600~1900PSI (11.03~13.1Mpa) 。

2.Warning Light Panel

“DAY/NIGHT” Switch → As desired;

“BRT” Adjust Knob → Middle position 。

3.Electric Panel

Main AC Generator Switch → “AC GEN”;

DC Generator Switch → “DC GEN”;

Battery Switch → “BATT”;

4. Aviation Avionics Panel

HUD/MFCD Day/Night Switch → As desired;

Brightness Knob → Middle position

HUD Symbology Reject Switch → "NORM".

5. Audio Control Box

COMM1 Volume Knob → Middle position;

COMM2 Volume Knob → Middle position;

TCN/ILS Volume Knob → Middle position;

MSL Volume Knob → Middle position;

INT COM Switch → OFF;

Antenna Switch → UPPER.

6. Air Conditioner Panel

ECS Mode Knob Selector → "NORM";

Air Temp Knob → "AUTO".

7. "EMERGENCY LANDING GEAR HANDLE" Switch → OFF

8. Interior Lighting

"INST/DISPLAY" Knob → As desired;

"CONSOLES" Knob → As desired;

"FLOOD" Knob → As desired.

9. Exterior Lighting

"FLASH/STEADY" Switch → As desired;

“BRI/DIM” Switch→As desired;

“NAV-FORM” Switch→As desired。

10. Flashlight→As desired。

2.2 Start up

2.2.1 Electric system

At right console’s ELEC panel:



“AC GEN” Switch→“AC GEN”;

“DC GEN” Switch→“DC GEN”;

“BATT” Switch→“BATT”.

2.2.2 Avionics

On the bottom of ELEC panel is AAP panel:



At AAP you can turn corresponding system, but we have a simpler solution. If you want to shoot some missiles/drop some bombs, please click “CMBT”. If you only want sightseeing, click “TRAIN”. If you want to do stress relief, click them one by one...

After finish configure AAP, turn on 3 MFDs, HUD and UFCP. Warning light brightness knob and oxygen flow indicator brightness are also default off, remember to turn them on (on right front panel)

2.2.3 SHARS (Strapped-down Heading Attitude Reference System)

On Left console please check MISC panel



Turn on SHARS switch, SHARS starts alignment. On MFD’s EFIS (Electronic Flight Instrument System) page, blinking “SHARS ALIGN” will appear. Alignment takes about 1 min. When alignment completes, “SHARS ALIGN” disappears and pitch ladder appears. Do not move the aircraft when SHARS is aligning.



2.2.4 INS Alignment

Since you probably need INS to navigate back home, let's start INS's alignment procedure.



On UFCP, DST00 will appear as default. This is INS's alignment point. You can input latitude, longitude and altitude below. Check your plane's position in F10 page and input them in UFCP as alignment point. Please be notice latitude/longitude should be accurate to 0.1''.



After inputs complete, switch INS knob to “FAST” to start fast alignment.



On center MFD, “REMAIN TIME” appears. Please input plane’s true heading in THDG section before countdown ends. When alignment complete, switch INS knob to “INS NAV” and INS starts working.

2.2.5 Loading DTC (Data Transfer Cartridge)

Check the rearmost of the right console. Click to load DTC.



DTC (Data Transfer Cartridge) is used for transfer weapon data, nav data, approach data and EWS data to airplane. After DTC inserted, left MFD will show DTC page automatically.



Click "ALL" and then click "ENT" to load data.

NAV: Navigation info (0 is the initial point, 1-29 are for FP-A, 30-33 are for PR, 34-39 are for PP, 40 is SPI, 41-49 are for mark point, 50-59 are for airports).

SMS: Stories info

CNI: Minimal Radar altitude and TACAN procedure

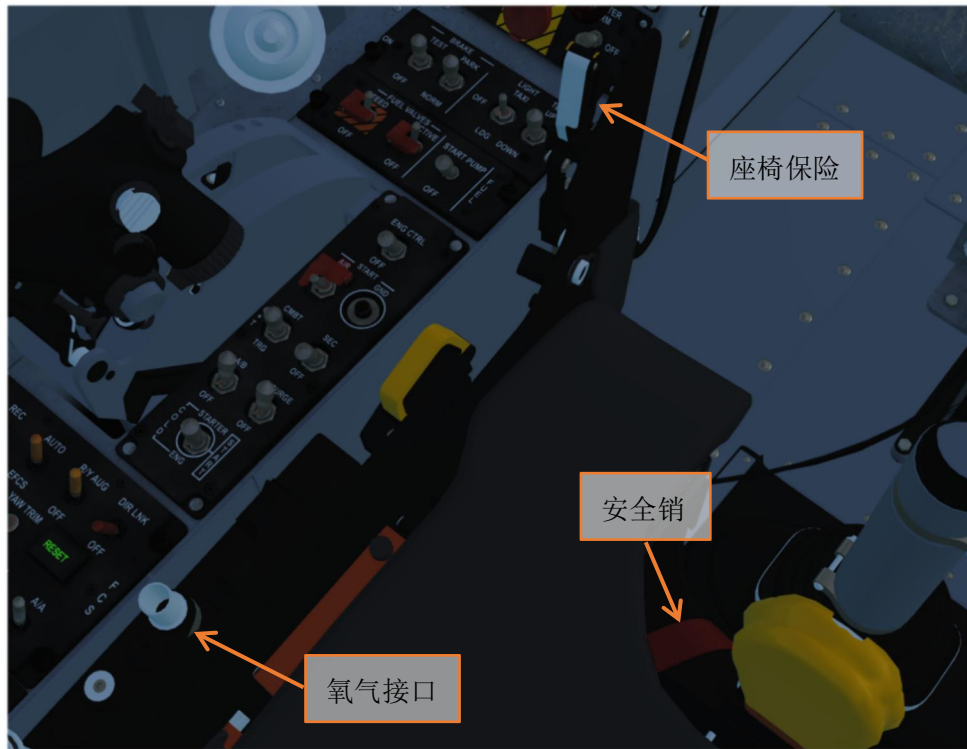
APR: 10 Airports' data

OAP: Offset Aiming Point

EWS: Threat data and countermeasure programs.

2.2.6 Ejection seat check

Turn off seat safety on the right side of the seat, connect oxygen hose, remove safety pin. When oxygen activates (remember to turn on oxygen value on left side panel), oxygen supply light (right front panel) should keep blinking.



2.2.7 Engine start

Clear surrounding, and check engine control panel on the left console.



ENG CTRL to “ENG CTRL”, STARTER switch to “START”, click engine stop pin, push forward throttle a little bit and then click “GND” for 1-2 second. Monitor MFD’s N2 and T4 indication. At idle stats, N2 should be around 70% and T4 < 500° C.

2.3 Take Off

2.3.1 Hydraulic System Checklist

1. When N2 is about 60%, “HYD LOW” warning light should off.
2. When engine idle and control surfaces remain still, EP12’s hydraulic reading should ≥ 2900 PSI. Reading should drop when moving control surfaces.
3. When using speed break switch on the throttle to open speed break, green “S/B” light should light up.
4. When BREAK is at “PARK” position, breaking pressure should ≥ 2750 PSI. switch BREAK to “NORM” before takeoff, when apply full break, breaking pressure should be around 1350 PSI.

2.3.2 Flight Control System Checklist.

1. All FCS malfunction lights are off.
2. Setup FCS panel based on plane’s loadout.

Direct link Switch → OFF

AA/AG Switch → As loadout

AG1/AG2 Switch → As loadout

EFCS Switch → AUTO

4. Using “BIT” switch on FCS panel to perform test for the FCS. When testing is performing, “FCS BIT” appears on HUD. When BIT finishes with no malfunction, “FCS BIT” disappears.
5. Check control surfaces. MFD main menu: “DATA” → “FCS” → “SPCHK” , check control surfaces based on stick/rudder position and indication. ◦
6. EFCS system, when EFCS switch is at “EFCS”:
 - On Status light panel, Green “EFCS” light on.
 - On Warning light panel, red “FCS3”, “FCS2” and yellow “FCS1” light blink.
 - On Warning light panel, red “ROLL.CAS” light blinks.
 - On Warning light panel, red “YAW.CAS” light blinks.

2.3.3 ECS Check

1. On Warning light panel, red “CABIN PRESS” light off;
2. On Warning light panel, yellow “ECS” light off;
3. On Warning light panel, yellow “EQUIP HOT” light off;

2.3.4 Pre-taxi Checklist

1. HUD and three MFDs works normal. Avionics switch to NAV mode.
2. MFD’s FCS page, “P” is solid circle.
3. On UFCP panel, select waypoint switch mode to AUTO
4. All warning lights are off.
5. On state light panel, “ROLL TRIM” and “YAW TRIM” lit up. Configure light is corresponding to aircraft’s loadout.

2.3.5 Taxi

1. Apply break, switch BREAK switch from "PARK" to "NORM".
2. Minimum turning radius is around 8 meters.

2.3.6 Takeoff

1. Taxi plane to runway and align runway heading. Apply break to stop plane from rolling, increase engine RPM to 80% check for instruments and warning light. If everything is good, increase throttle as desired and release break.
2. At basic configuration, when IAS is around 120kts, gently apply pull control stick to establish takeoff attitude. Plane will take off when IAS is around 140kts.
3. Airplane as takeoff assist function. When IAS > 108kts, airplane automatically pitch up so pilot should be notice about control stick pull amount.
4. Retract landing gear when airplane is over 30ft AGL.

2.4 Landing

2.4.1 Touch down

Control AOA based on HUD's indication. Flare at 3ft AGL and control plane touchdown with 2 main gears. Keep plane AOA to perform aerodynamic braking, when IAS is around 135kts, deploy drag chute. Front wheel will touchdown automatically when speed reduces. Gently apply breaks (max break speed is 145kts). Jettison drag chute when speed is below 20kts. Retract flaps and leave runway.

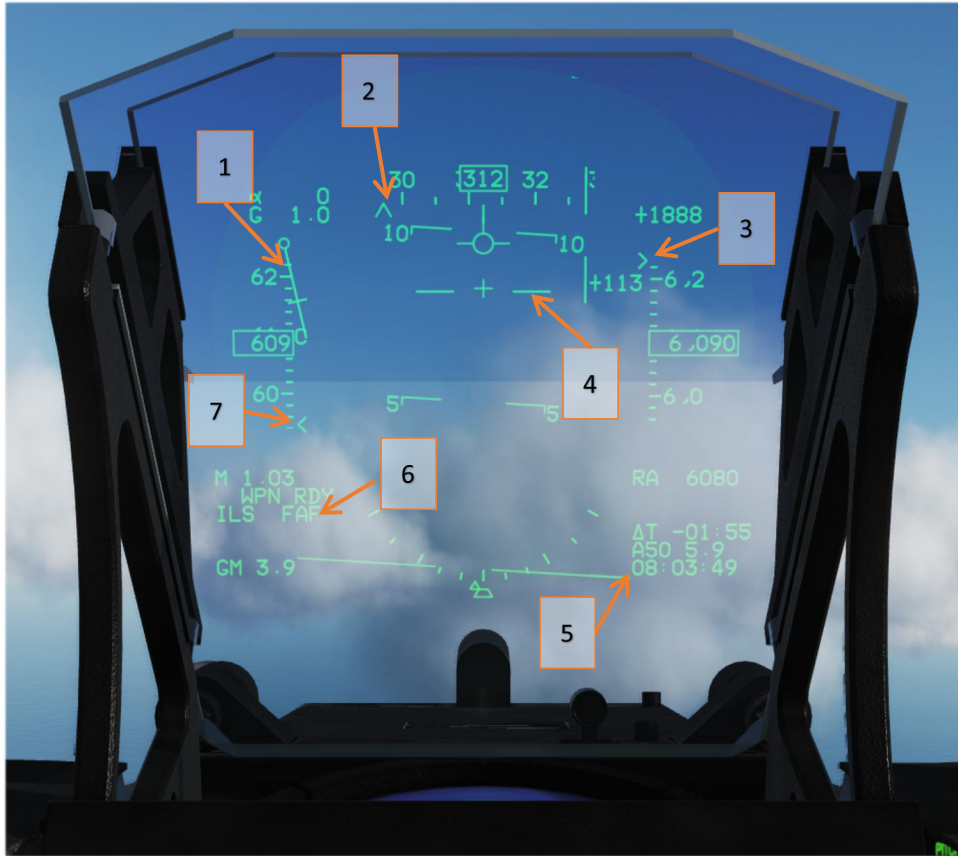
2.4.2 Instrument landing

In low ceiling/visible condition, JF-17 can use instrument approaching system to safely

approach and land. Click UFCP's L1 button and select APR, click R1 select airport (waypoint 50-69, default at 50), click L2 select aircraft equipment (ILS, SCA or TACAN), click R2 select approach's sub mode (FAF or RWY).

Approach-landing has 2 sub-mode: FAF and RWY. when select APR mode, sub-mode default at FAF. When airplane passed near station, it will automatically switch to RWY mode.





Legend:

1. Navigation tadpole (short bar is for distance)
2. Expected Heading
3. Expected Altitude
4. ILS guidance
5. Waypoint and distance
6. Approach Mode

2.4.3 Shut down

1. Emergency Hydraulic Switch to OFF;
2. On throttle quadrant, throttle uncage handle to rear most.
3. At Fuel control panel, "START PUMB" Switch to "OFF" .

4. ENG CTRL Switch to "OFF", turn off all necessary switches.

CHAPTER3 Air to Air combat

3.1 Realize a fact...

Before learning JF-17's air to air combat, you must realize that JF-17 is a very small fighter jet with about 14,000lb empty weight. Although it has a decent radar (KJL-7), not too bad medium range A2A missile (SD-10) and very powerful datalink system, plane's size naturally limits its speed, loadout and range. So... Don't do stupid thing...

3.2 WVR

3.2.1 Setup Gun

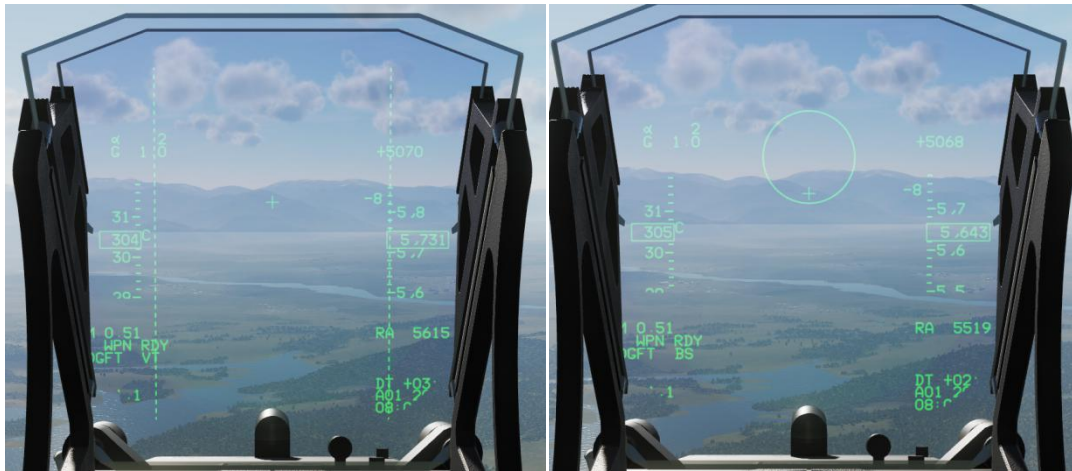
JF-17 equipped with a 23-2 cannon, rate of fire is 3000-3400rpm, muzzle velocity is around 715m/s, rounds capacity 180rd. Click GUN button in SMS page, then GUN symbol will blink, after blink stops, gun is selected. To select Gun crosshair, control stick S1 Switch forward to select AA ACM mode, S1 forward again to select gun crosshair.

But that's not the whole story... When use the gun for the first time in a flight or gun malfunction, you need to click FEED button on SMS page, when the box around FEED stop blinking, your gun is ready to fire. (similar to mig-21)

However, you can only click FEED three times, after third attempt, the system won't response your command and FEED will keep blinking.

3.2.2 Radar ACM Mode

In dogfight, the key to success is lock on your opponent fast. HOTAS S1 Forward enter ACM mode, there are 3 sub mode in ACM mode, in VT mode radar will scan in a $10^{\circ} \times 50^{\circ}$ area. Using S2 Forward enter BS mode, in BS mode radar will scan in cone with diameter of 4° . S2 Right enter HA mode, in HA mode radar will scan whole HUD area.



VT Mode

BS Mode



HA Mode

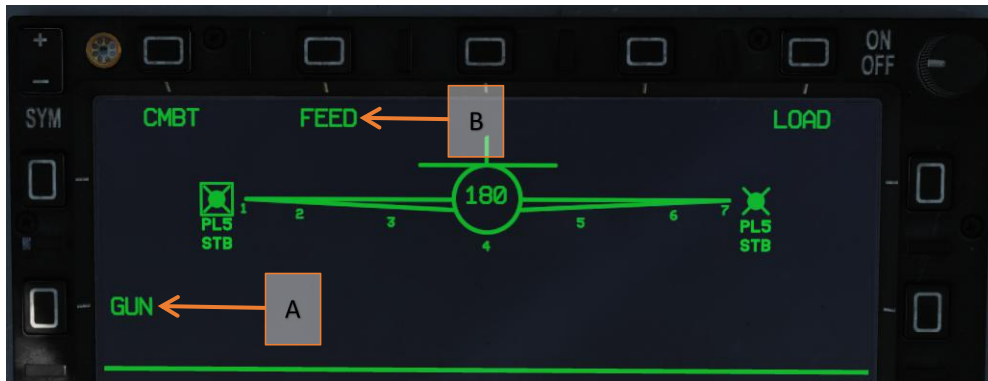
3.2.3 AA gun Aiming

After locking your target in ACMO mode, if you have PL-5E, launch them. If you want some more fun, it's not a bad idea to select 23-2 canon.

There are 3 methods to aim: SS (sweep shooting), LCOS and SSLC (LCOS + SS). Be notice AA gun can only be used in ACM mode.

Chengdu (JF-17's design bureau, also produce China's MiG-21 variants J-7) seems very satisfy with Gsh-23. So, in JF-17 from gun to its operation method are very similar too mig-21.

Our great 23-2 canon can't use HOTAS to control, after switch to ACM mode, click MFD's GUN button, a box will appear over "GUN" when gun is been selected. But you need to click FEED button to load the weapon. Our canon may jam during your mission, so please use FEED to reload/clear jam. You will have 3 chances to FEED (which is plenty for 180rds capacity).



Legend: A. Gun selection button

B. Gun feed button

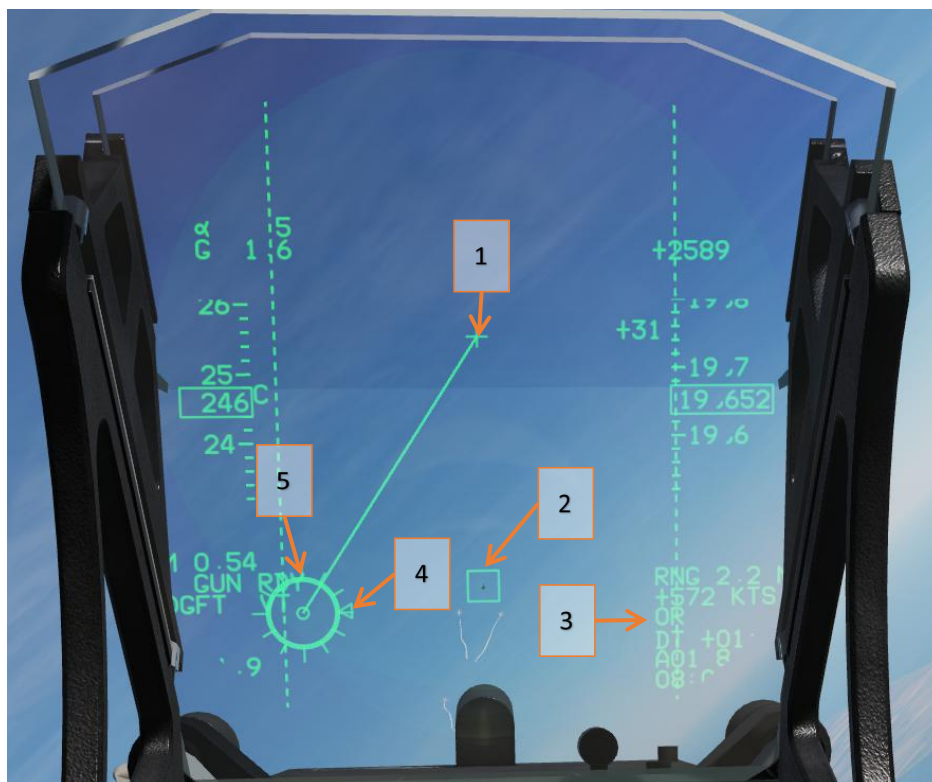


Legend:

1. Canon limiter: Switch between 0.2s/0.5s/OFF.

2. Gun crosshair: Switch between LCOS/SS/SSL.

The only major difference between 23-2 and Gsh-23 is the modern gun crosshairs on JF-17. But (again...) JF-17's canon has negative(downward) mounting angle. This means in AA combat you need to pull very big lead to hit target. We suggest you forget about you have a canon except emergency...



Legend:

1. Gun crosshair
2. Target box
3. Target info
4. Approaching speed, 200kts per mark.
5. Distance, 400ft per mark.

3.3 BVR

3.3.1 Weapon

SD-10 is the only BVR missile JF-17 can use. This missile is PLAAF's PL-12 missile's export version. Overall performance is better than AIM-120B. Although its overall performance is worse than AIM-120C, but its performance is very good when within boost range. Because of its thicker body, it has weaker glide performance. Please keep these in mind when using them.

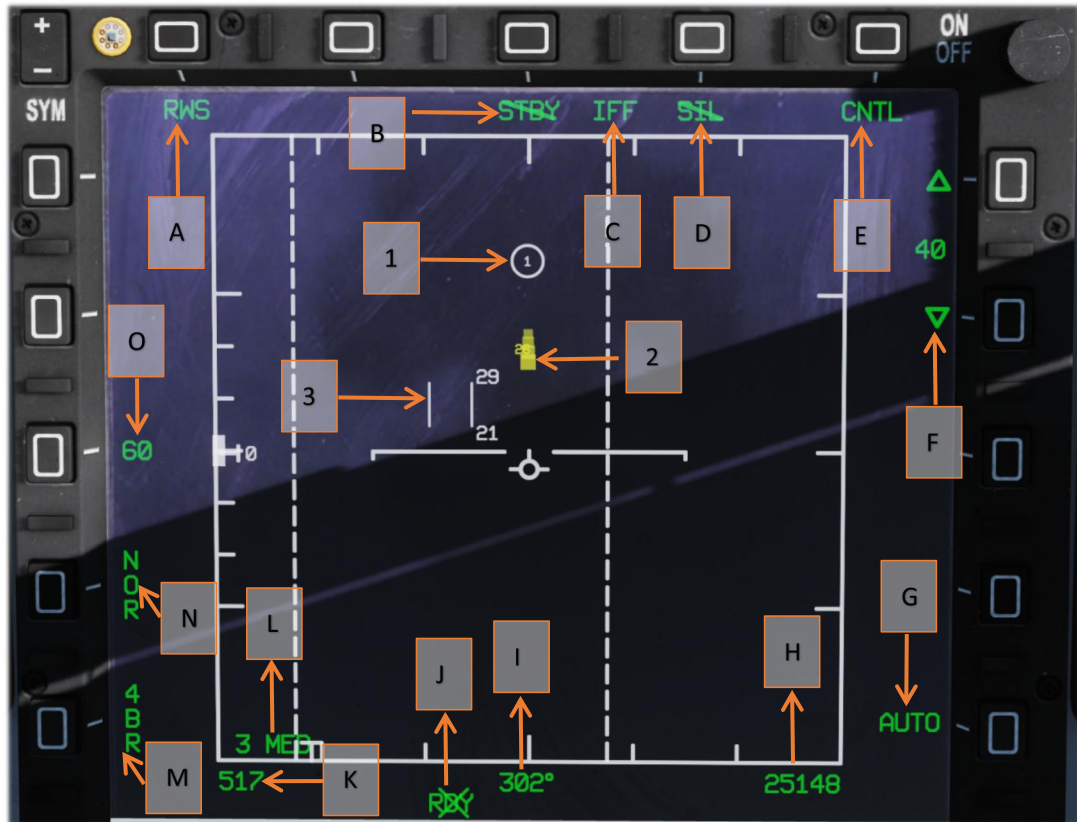
3.3.2 Radar's AA mode and performance

KJL-7radar has the following AA modes: RWS, TWS, VS, ACM, SAM, STT and DTT. For target with RCS=5m², radar has a detection range of $\geq 100\text{KM}$ if target is higher than aircraft, $\geq 80\text{KM}$ look down range. In TWS mode, radar can track up to 10 targets.

3.3.3 RWS mode

On throttle handle, T1 Switch is for aircraft's master mode. T1 backward will enter intercept mode.

RWS can be used in intercept mode and navigation mode. Here is RWS display:



Legend:

A. Radar Mode

Press this button enter radar mode menu.

B. STBY mode

Cross mark indicates it's not in STBY mode.

C. IFF status

A box will appear over IFF when aircraft is at IFF mode.

D. SIL mode

Cross mark indicates it's not in SIL mode.

E. Radar control menu

Press this button enter radar control menu.

F. Radar distance scale

G. Radar frequency selection

H. Aircraft current altitude

I. Aircraft current heading

J. Weapon status.

X mark appears when weapon is ready.

K. Aircraft current speed in KTS.

L. Current radar frequency.

M. Scan lines.

N. Radar altitude stabilization mode.

O. Current radar azimuth scan range.

1. Current selected waypoint.

2. Detected target.

Yellow indicates unidentified target.

3. TDC

3.3.4 TWS Mode

TWS can be used in intercept mode and navigation mode. Here is TWS display:



Legend:

1.HPT Target

High priority target, when lock this target second times, radar will switch to STT mode. When HTP target exist, using ACM and VS mode will also switch radar into STT mode.

2. SPT target

When HTP target exist, radar's altitude control is locked. Scan area is slaved to HTP target.

3.HPT target data

Distance, impact time, relative speed, target aspect.

3.3.5 VS mode

VS can be used in intercept mode and navigation mode. Radar will exit VS mode when a target is been locked. Here is VS display:



Legend:

1. Speed scale

Can be set to 12 and 24, represent 1200kts. and 2400kts.

2. VS cursor

Number on upper left corner indicate approaching speed with unit of 10kts.

3.3.6 ACM mode

In ACM mode we can select ACM sub modes. in ACM sub modes, radar will automatically scan and lock target with max lock target of 10 nm. When a target is locked, radar exit ACM mode.

Here are available ACM sub-modes:

1. Bore sight mode (BS)

Radar will scan in cone with diameter of 4°

2. HUD mode (HA)

Radar will scan whole HUD area.

3. Vertical scan mode (VERT)

Radar will scan in a $10^\circ \times 50^\circ$ area.

Use S2 switch on control stick to select ACM sub mode.

3.3.7 SAM mode

SAM mode is a mode between RWS and STT. When locked a target in RWS mode, radar enter SAM mode. In SAM mode, radar will periodically scan the locked target while scanning the whole area. In SAM mode, the controls are basically same as RWS.

3.3.8 STT and DTT mode

STT is single target tracking, it's pretty simple so we will not discuss too much about this. DTT is dual target tracking. In this mode radar can track an HPT and a SPT. HUD will only show HPT's TD box. Using S2 left to switch between HPT and SPT.



Legend:

1. HPT target
2. Max range
3. No escape zone
4. Min range
5. SPT target
6. Control aiming point
7. ASE

3.3.9 Using SD-10

The only BVR AA missile JF-17 can carry is SD-10 (if you don't consider C-701... 😊). JF-17's 2/6 hardpoint can carry dual pylon, so maximum you will have 4 SD-10s.

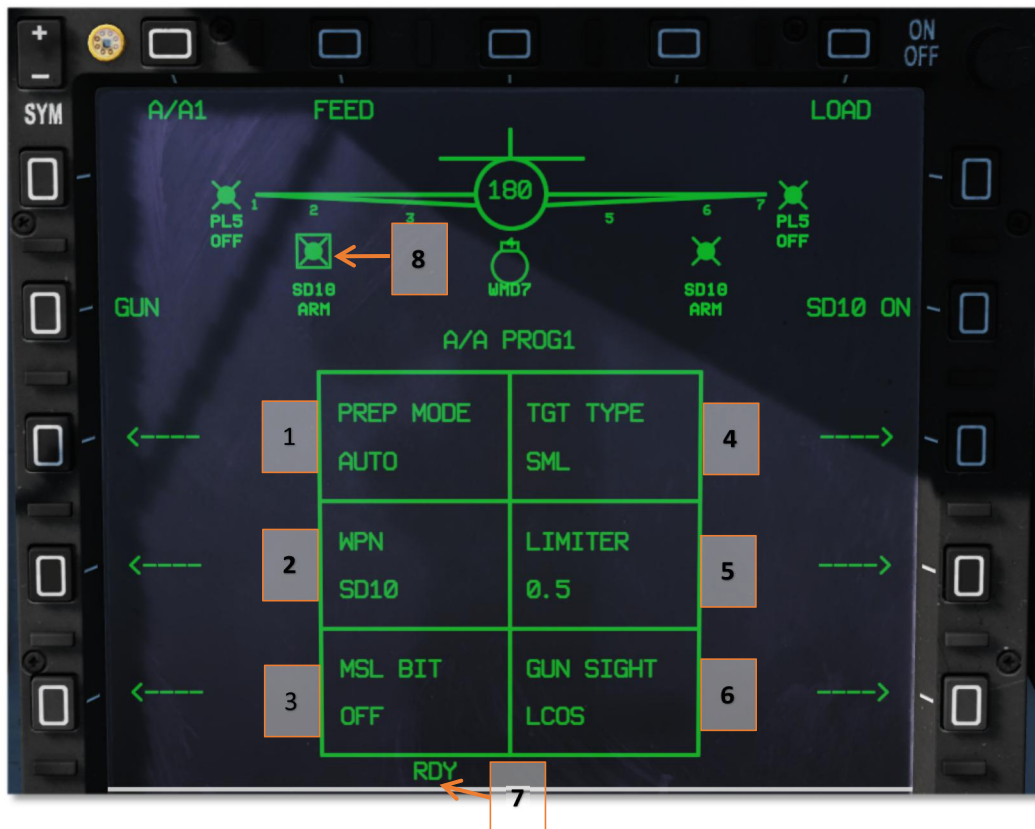
You can launch SD-10 to a locked target, or using "mad dog" mode, it also has HOJ mode.

Let's talk about how to use SD-10

First, Master Arm switch Arm



Let check SMS page on MFD.



Legend:

1. Missile prep mode

No function

2. Weapon Select button

Click to select SD-10 or PL5E, in INCT mode, default select SD-10.

3. Missile BIT

No function

4. Missile target type

Small/medium/large.

5. Gun limiter

OFF/0.2/0.5, unit is second.

6. Gun crosshair type

SS/LCOS/SSLC。

7. Weapon RDY

If Master Arm switch is not at Arm position or missile malfunction (X), indicates missile can't be launched.

8. Selected weapon (SD-10)

After selecting SD-10, a box appears, blinking STB indicates missile is start up, when it's ready, ARM appear.

After radar locked on target and selected SD-10 is at RDY state, we can use HUD to launch the weapon. Figures below are showing before launch and after launch symbols.



Legend:

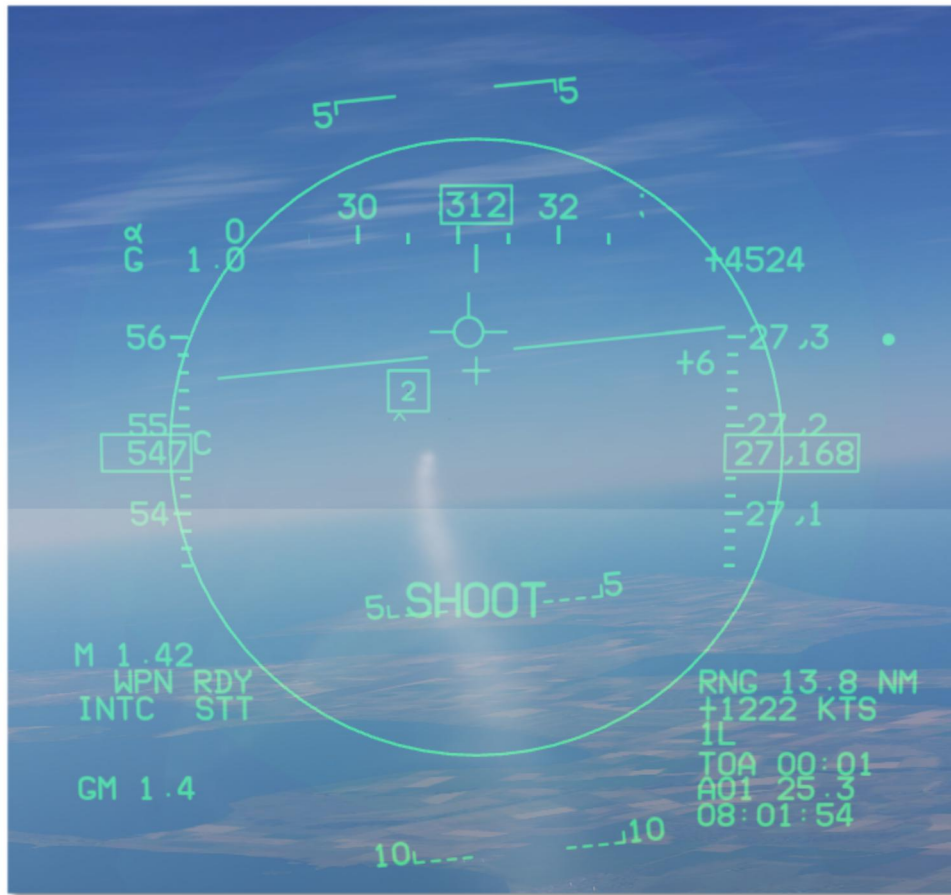
1. Altitude difference to target
2. Control aiming point.
3. TD-BOX

Number Inside the box is TOF time. > on the left of the box indicates target is within max range. When arrow is below the TD box, target is within no-escape zone. If arrow is on the right side of the TD box, target is at minimum range.

4. ASE
5. SHOOT Cue
6. Target info (Same as radar)
7. TOF
8. Flight plan information

9. Plane's Mach number and attack status

10. Max experienced G



After SD-10 launched, the only change on HUD is TOF switched to TOA. When TOA reaches 0, missile is using its own seeker to track target. However, indicated TOA will have some error. Try to keep target lock as long as possible.

3.4 IFF

IFF is the necessary method to avoid kill your friendly on the battlefield. For online player, if the server is using magic IFF mode, you just need to turn on any of the IFF modes' interrogation function. To turn on magic IFF on server side: Add MAGIC_IFF or CUSTOM_IFF=0 in mission's description.

If server's is using custom IFF, please read the contents below carefully.

Click UFCP numpad 8(IFF) to enter IFF setting:

1. INT is for interrogation, TRS is for transponder.
2. M1, M2 M3A and M6 are different IFF mode, Click "-" correspond to those modes to turn them on, "+" indicates that mode is on.

3. For Magic IFF, you just need to turn on any of these mode to get IFF interrogation capability.
4. For custom IFF, you need to turn on the correct mode's INT and TRS and set the correct code to perform proper IFF.



INT setting page



TRS setting page



INT/TRS code setting page

3.5 Datalink

Datalink is a very handy tool in A2A combat, you can use it to acquire targets without your own radar.

Use UFCP to enter datalink setting



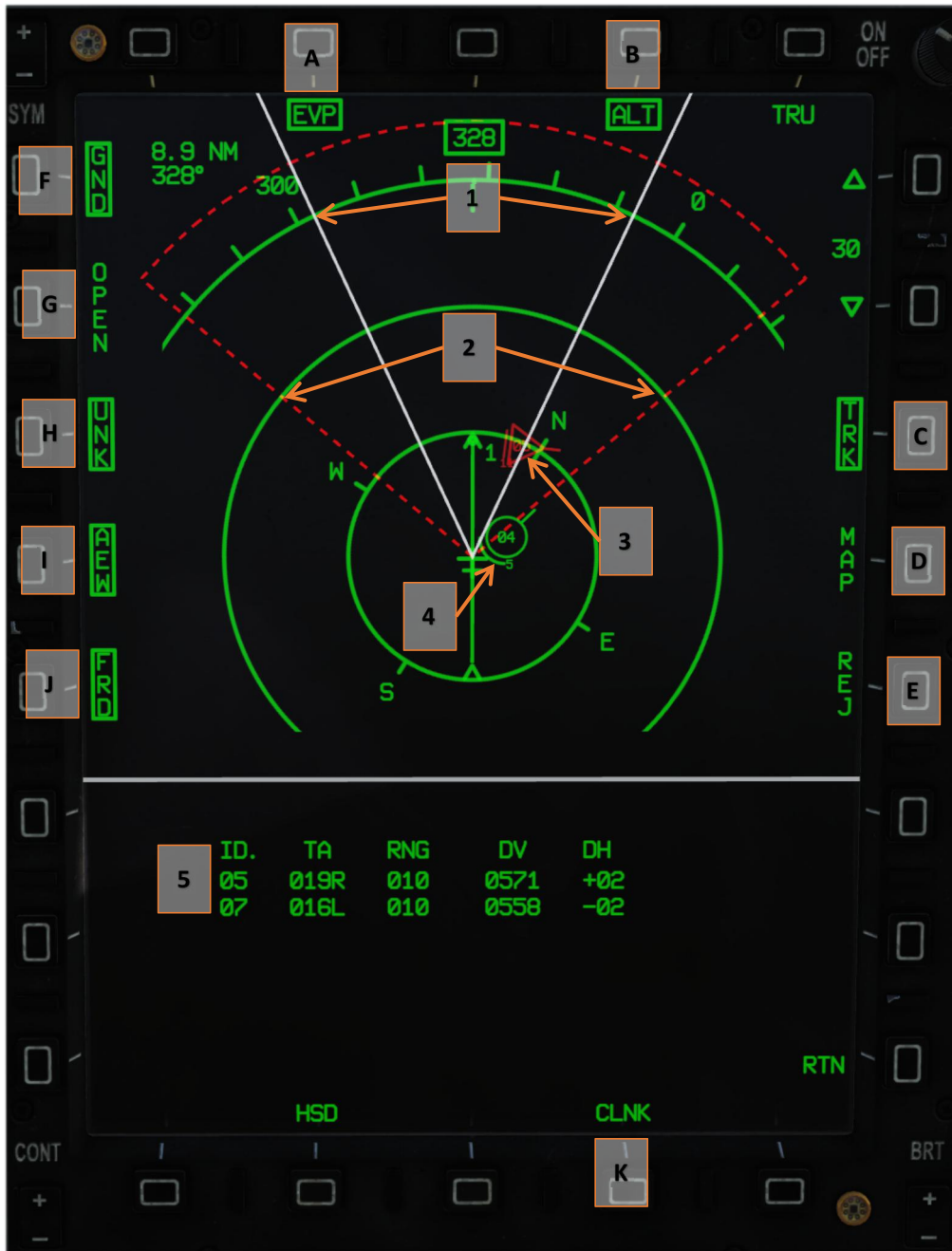
1. Click UFCP COM2, enter 199;



2. Select SLAV or MAST mod. (When teaming with AI you can only use MAST mode)



3. Press NE-, when NE- changes to NES, you are in the network.



Legend:

- A. Missile and radar range
- B. Target and Friendly Altitude
- C. Flight path
- D. Map
- E. Declutter
- F. Ground targets

G. RWR Threat number

H. Unidentified target

I. AWACS targets

J. Friendly targets

K. Datalink page

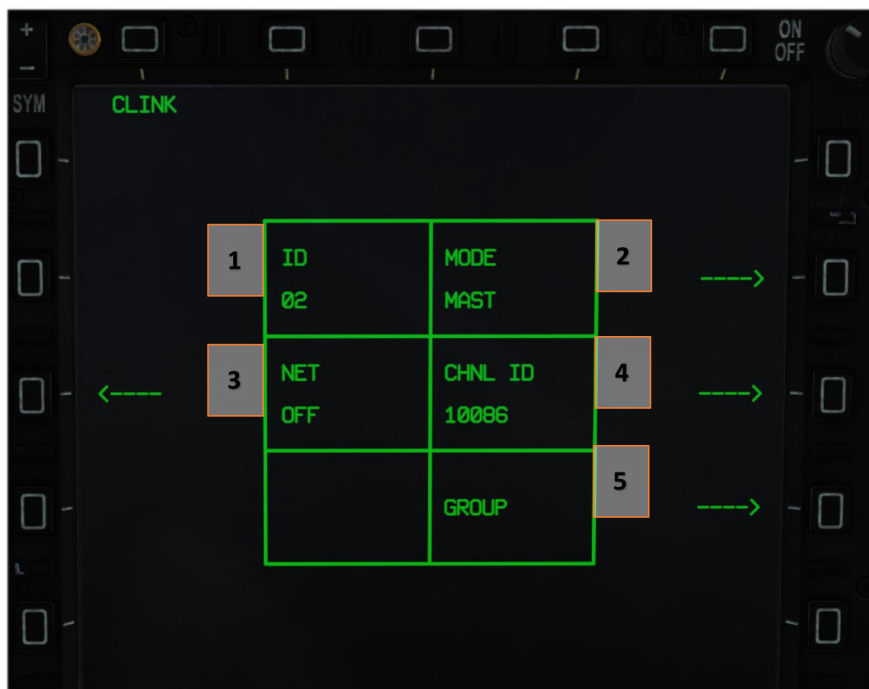
1. Radar range

2. Missile range

3. Bandit, number inside the circle is its number, number outside is its altitude. Line underneath indicates your radar doesn't detected this target.

4. Friendly. Legend is the same as Bandit

5. HPT



Legend:

1. Own ID (must be unique);

2. MAST/SLAV mode (same as UFCP);

3. Join the network (same as UFCP);

4. Channel ID;

5. Group info (ID, flight, team lead/wingman info, fuel quantity).

CHAPTER 4 Air to Ground Combat

4.1 Introduction

In my mind, air to ground can bring me even more fun than air to air. JF-17 can carry a large variety of air to ground weapons. But please keep in mind, as a type of light fighter jet, pylon amount and tank size will limit your option. Think wisely about what type weapons you want to carry before takeoff.

4.2 Air to Sea Combat

4.2.1 C-802AK

For large warships, C-802AK is the best choice. JF-17 can carry up to 2 missiles and you can shoot can forget. The missile will scan for target and attack by itself.

Make sure you carried C-802AK and switch to Air to Ground Master Mode.



Legend:

A. Missile control menu

B. Missile manual power on switch

1. missile mode selection

There are 3 modes: DIR, COO and LOS. In DIR mode, missile will attack target on SPI. In COO mode, missile will attack target on a fixed coordinate. In LOS mode missile will scan along launch heading.

2. Missile launch quantity.

You can launch 2 C-802AKs at the same time

3. Weapon selection menu

4. Sea condition

Chose different skimming altitude (INOP).

5. Fuse

Choose from DIRECT and DELAY (operable but... no significant effect).

6. Target size selection

Target size preference (INOP).

After selecting your desire mode, enter CNTL into control menu to set launch parameters.



Legend:

A. Missile mode

B. Target coordinate

C. Missile alignment time

1. Missile cruise altitude selection

H=3500m, M=1500m, L=50m

2. Target latitude

In COO mode, enter target latitude.

3. Missile turning point

Select a waypoint as turning point. Missile will fly to turning point then fly to target.

4. Target longitude

In COO mode, enter target longitude.

5. Final attack mode

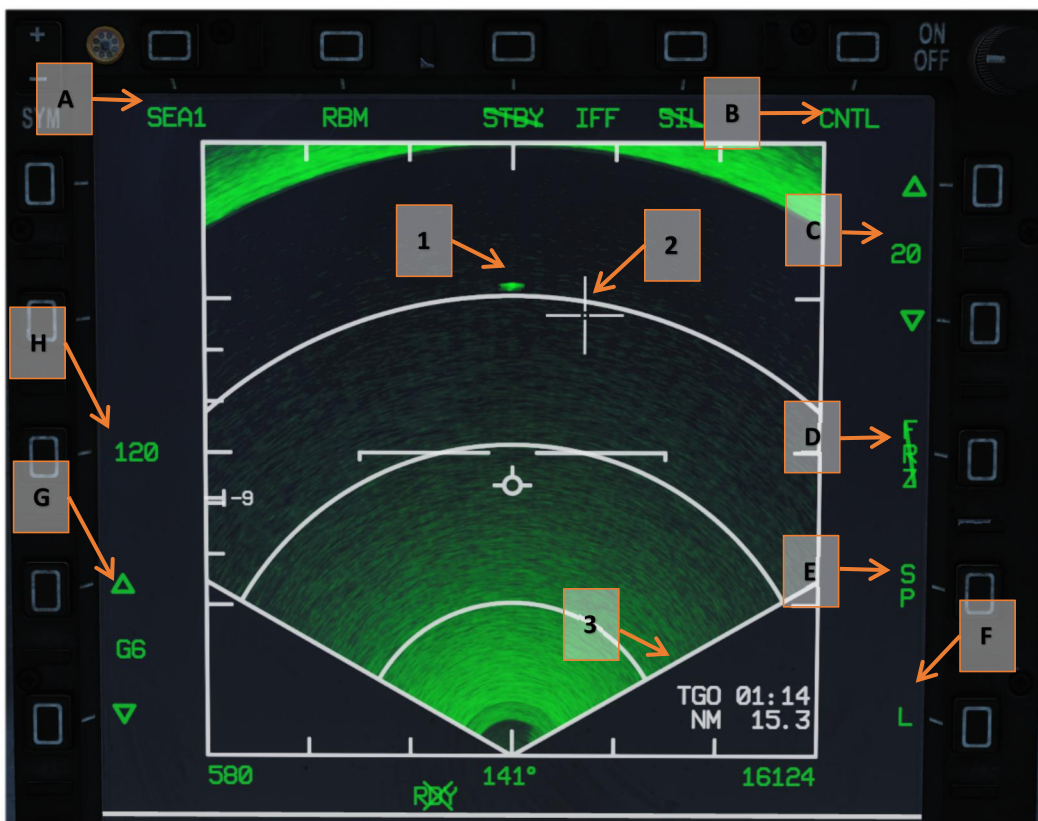
Select from POPUP and SKIM.

6. Search mode

In EFF mode, missile's radar will power at 10s after launch. In CC mode, radar will power on when 25km to target.

4.2.2 Air to sea radar

JF-17's KJL-7 radar has 2 air to sea mode, SEA1 mode can search still and moving targets, SEA2 mode can only search moving targets. Normally we use SEA1 mode to search and attack.



Legend:

A. Radar mode

Click will enter menu, you can select other modes.

B. Radar control menu

You can control target decay and declutter function.

C. Distance scale

D. Freeze radar image

E. Snow plow mode

Click to switch to slave mode.

F. Moving target speed gate

L=7kts, H=15kts.

G. Gain level

H. Radar scan azimuth range

1. Target contact

2. TDC

3. Distance and ETA to waypoint

Switch to to-target info after lock.

4.3 Air to Ground Combat

Since Thunder has limited hardpoints, normally we will not carry unguided weapon. If you really want to do that, you can refer to CCIP/CCRP guide for other modern fighter jets in DCS...

4.3.1 Laser guided weapon

In order to use laser guided weapon, you'd better carry a targeting pod. JF-17 can carry WMD-7 targeting pod. The pod can slave to SPI nor it can use SP mode to search for target. Although WMD-7 doesn't have dedicate AA mode, it can still slave to AA target locked by radar.

WMD-7 have TV and IR mode, and can adjust contrast manually. For an IFV size target, the detection range is around 20nm.

WMD-7 can be carried at No. 2/6 and No. 4 pylon. It can't be jettison in air. Select POD in MFD's main menu and select WMD-7.

Thunder can carry different LGBs (GBU-12/16/10) and BRM-9 90mm laser guided rocket. We will introduce them separately.

The procedure of LGB is very standard so let's keep it brief. However, the laser code for the bombs can only be set by ground crew.



Legend:

1. Release mode

Click to change release mode.

2. Release quantity

3. Current select weapon

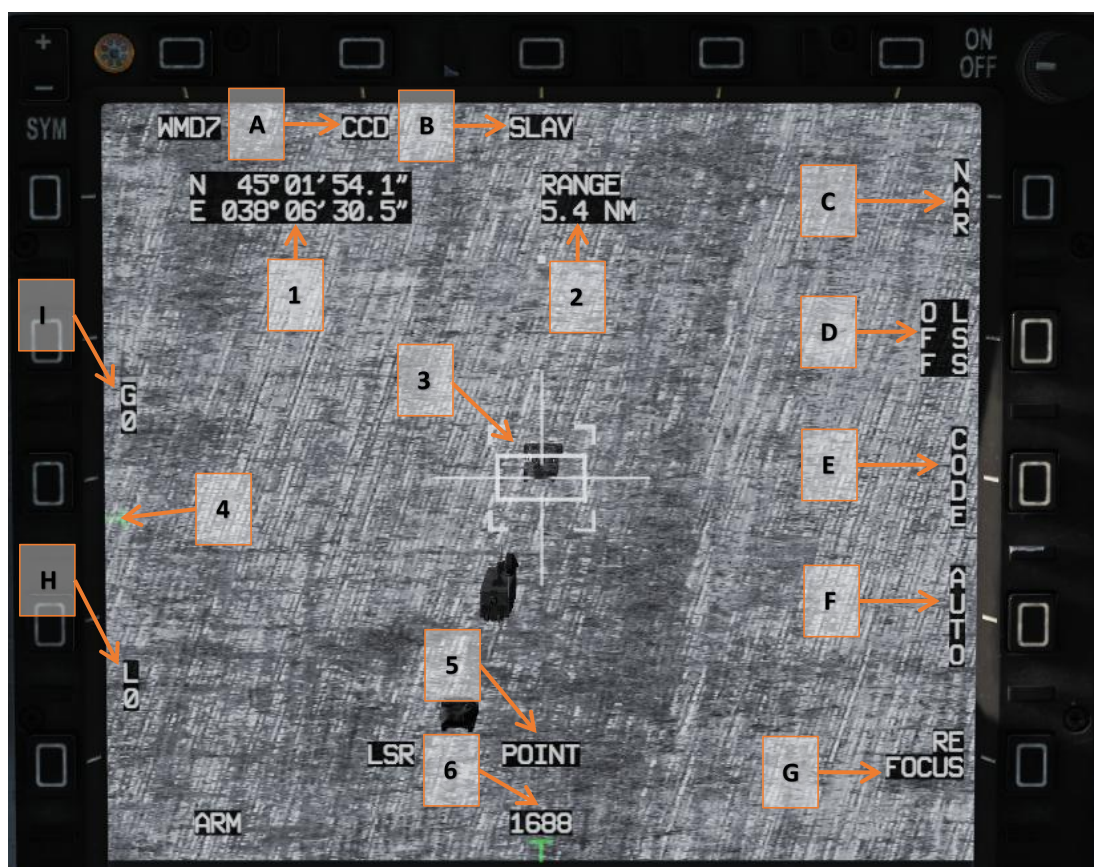
Click to select other weapons.

4. Release interval

5. Laser code

6. Break off altitude

After select and configure LGB, select WMD7 pod page in POD menu. The pod can slave to SPI nor it can use SP mode to search for target. Acquire and lock on target.



Legend:

A. CCD mode

Click to change to IR mode.

B. SLAV mode

Click to change to SP mode.

C. NAR mode

Click to change to WIDE mode.

D. LSS

Click to turn on laser

E. Laser code

Click to enter laser code for WMD-7 pod.

F. Laser emission mode

G. Focus

H. Image contrast

I. Image gain

1. Target coordinate

2. Target distance

3. Lock symbol

4. Gimbal mount's pitch position

5. Point tracking mode

6. Current laser code

Let's check on HUD after WMD-7 locked a target and a bomb is selected in auto mode. A 2 seconds beep will appear at 4 seconds before enter launch envelop. You can release weapon when launch cue appears and approaching FPM.



Legend:

1. Launch cue
2. Bomb drop line
3. Target info
4. Target box
5. Target states and release mode

BRM-1 90mm rocket is a laser guided air to surface rocket. In JF-17, BRM-1 can be carried by a 16-tube launcher. This means if you can stay in battlefield safely, fuel will be your biggest limitation, not onboard weapon quantity...

Similar to LGB, in order to use BRM-1, you need to lock the target on WMD-7 and then focus to HUD to launch weapon. There is no aiming reticle for BRM-1 on HUD since the target is locked by WMD-7. Launch weapon when INRNG cue appears on HUD. Do not launch with large off-boresight angle.



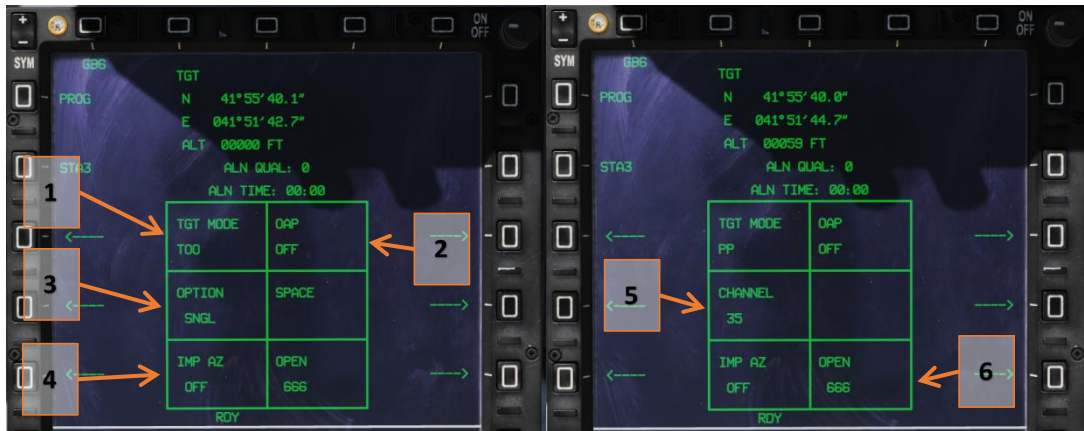
Legend:

1. WMD-7 aiming circle
2. Target box
3. In range cue

4.3.2 Glide weapon

If you don't like the adrenaline brought by laser guided weapon, glide weapon is a safer choice. JF-17 can carry two kinds of glide bombs: LS-6 and GB-6. Their procedures are similar. GB-6 is bigger and heavier, it also has 3 warhead types: high explosive, cluster and sensor fused. In conclusion, GB-6 is more flexible but heavier.

LS-6 and GB-6 can launch in TOO and PP mode. TOO going for current SPI, PP mode uses WPT34-39



Legend:

1. Mode selection

TOO/PP mode

2. OAP Switch

3. SNGL mode

SNGL/TAND/SBYS mode

4. Entrance azimuth setting

Click to enter weapon entrance azimuth.

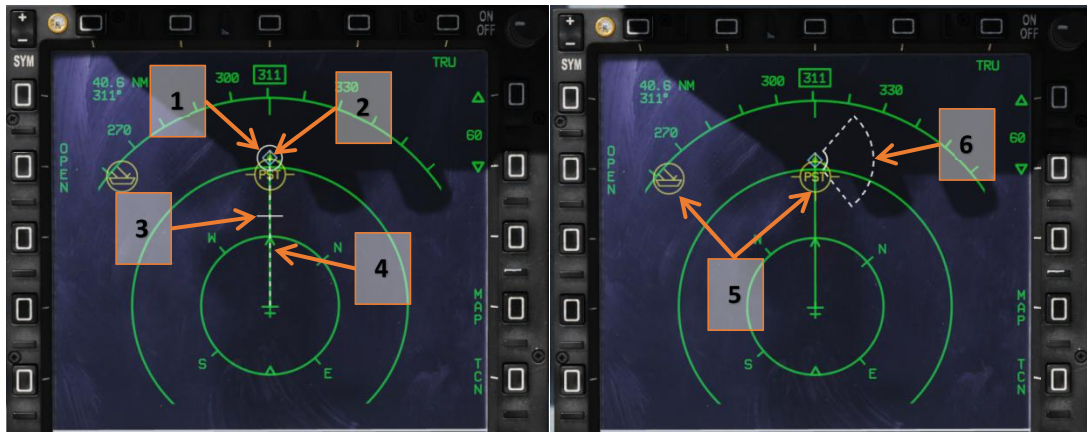
5. PP point

In PP mode, click to cycle through PP point.

6. Cluster/Sensor fused munition height of fall

Click to enter altitude.

Target point and DLZ will appear after target is designated. If AZ is set, a fan area will appear on HSD to indicate launch zone.



Legend:

1. Minimum launch zone (circle)
2. Target (diamond)
3. Maximum launch range

Disappear after in range

4. Range cue

A line between aircraft and target. Dashed line will become solid when in range.

5. Radiation source
6. Launch zone when AZ is set.

Dashed line will become solid when plane is in launch zone.

4.3.3 Anti-radiation weapon

In theory, all above weapons can be used for anti-radiation.

JF-17 also can carry LD-10 anti-radiation missile. But compare to other AG weapons, LD-10 is pretty weak. The only highlight of LD-10 is its range --- similar to SD-10.

JF-17 doesn't have anti-radiation targeting system like HTS. LD-10 has 3 launch mode: active mode (ACT), passive mode (PAS) and self-protect mode (SP). In ACT mode missile is launch to SPI. PAS mode is somewhat like mad dog mode. In SP mode missile will attack the radiation source that is locking you.

In conclusion, only in SP mode you can make sure who you are attacking.

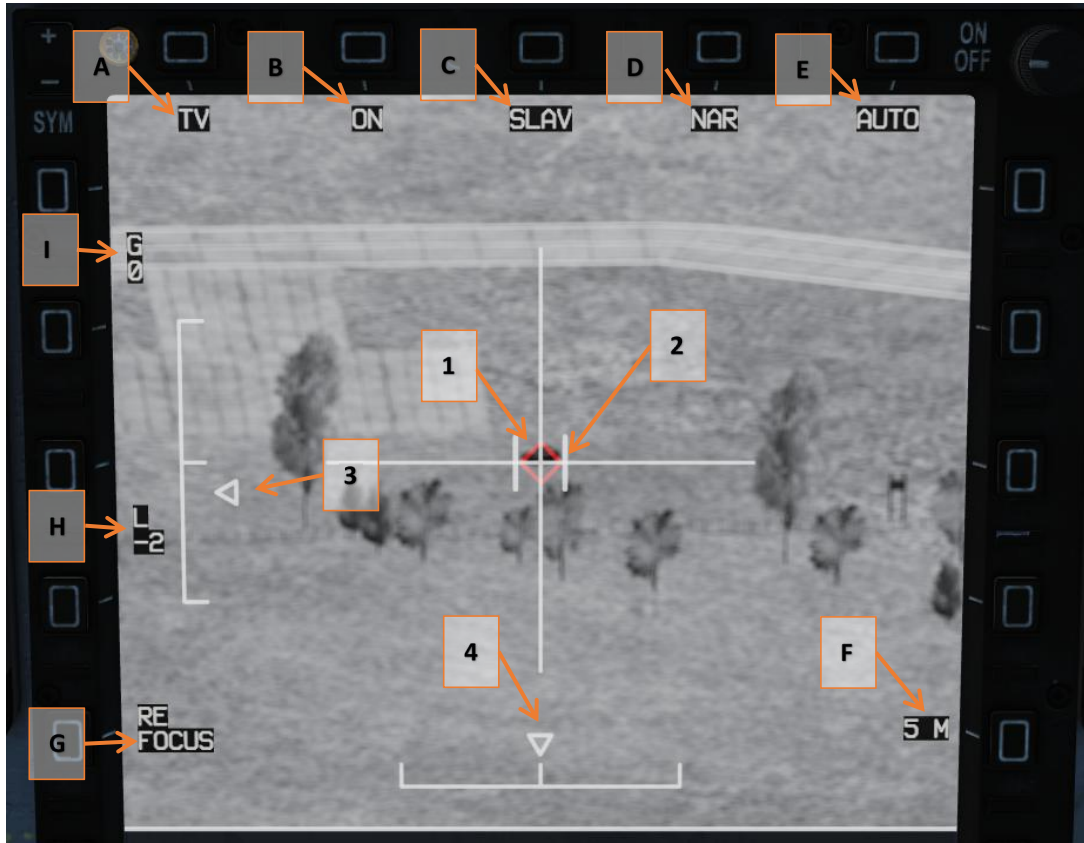
4.3.4 TV guided weapon

TV guided weapon is my favorite. JF-17 can carry 2 kind of TV guided missile: C-701 and C-802AKG.

C-701 is a small TV/IR guided missile similar to AGM-65. It's an OK missile with decent range, but tiny warhead limits its usage.

C-802AKG is another kind of animal. As a derivative of C-802AK, with over 150km of low-profile range and man in the loop (MITL) control, it's far more flexible than C-701.

C-701 is very easy to use, you can slave its seeker to other sensor, or using snow plow mode to search target. C-701 doesn't have ranging capability, but when you can lock on target using its seeker (about 10nm), you're most likely already in range. C-701 is type of launch and forget missile.



Legend:

A. TV seeker

B. Sensor status

C. Sensor mode

Click to cycle through SLAV and SP.

D. Narrow view mode

Click to cycle through NAR and WIDE.

E. Auto lock mode

Click to switch to manual mode.

F. Target size

G. Re-focus

H. Image contrast

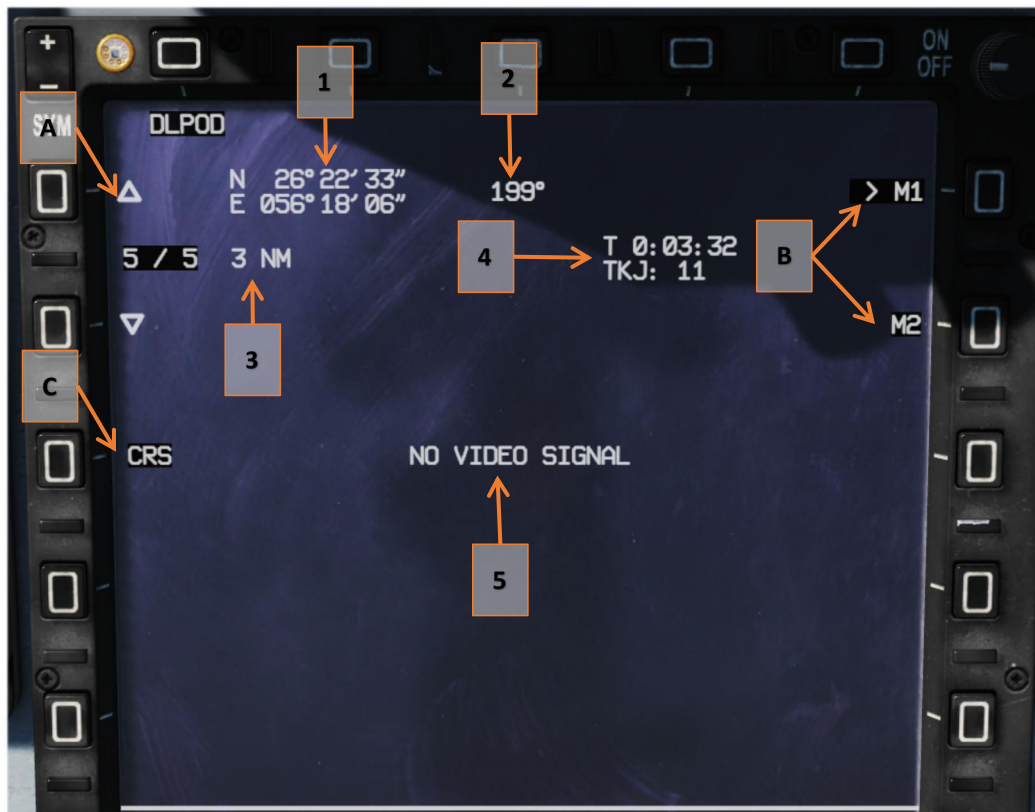
I. Image gain

1. Target lock box
2. Target size box
3. Sensor pitch position
4. Sensor pan position

For most modern weapons, the moment you press launch button is like the day your daughter get married – the rest has nothing to do with you.

But C-802AKG is different, at specific mod, you can control the weapon from launch to hit. C-802AKG has three launch modes: DIR, COO and MAN. In DIR mode, missile fly to SPI directly. In COO mode missile will attack PP point (choose from No. 36-39). For MAN mode, missile will fly through RP points (waypoint No. 30-35). In DIR and COO mode, seeker will power on 20km before the designated target point. In MAN mode, seeker will power on about 2km before the last waypoint and enter MITL mode.

To use MITL mode, JF-17 needs to carry data link pod. Data link pod can provide two-way data link between missile and aircraft. It can transceive signal in 360° azimuth, but only below the wings. For the missile, C-802AKG can transceive signal from its tail in a cone of 120° radius. In cruise stage C-802AKG has terrain following function so you don't need to worry about keep data link connected. But when planning missile and aircraft's path, please make sure you can control the missile in MITL stage.



Legend:

A. Cruise waypoint selection

In cruise stage you can select waypoint.

B. Missile control selection

> indicates the missile is selected

C. Missile stage selection

1. Missile current coordinate

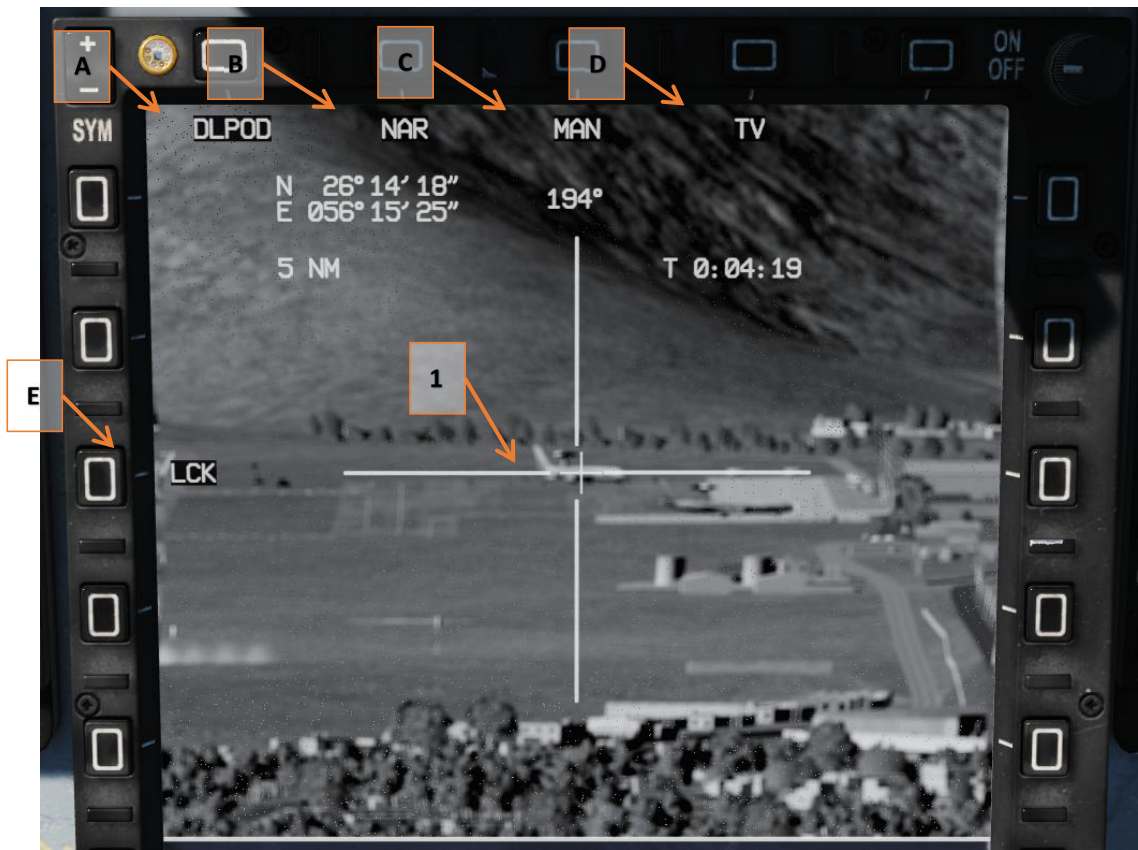
2. Missile current heading

3. Distance to current waypoint

4. Flight time and time to seeker on

T is total flight time, TKJ is time to seeker on.

After C-802AKG seeker power on, you can start to control the missile. Remember missile's attitude change will cause image noise and skew to increase, so please be gentle.



Legend:

- A. Datalink pod
- B. Narrow FOV mode
- C. Manual mode
- D. TV mode
- E. Target locked
- 1. Missile control crosshair

CHAPTER 5 Aircraft Warning System

Plane's warning system provide malfunction information for different systems and devices. Warning lights consists Master warning light panel, status light panel and warning light panel.



Master warning light

Master warning light provide level 1 warning. Master warning light will light up when fire or FCS malfunction occurs. Meanwhile, blinking "DANGER" appears on HUD.

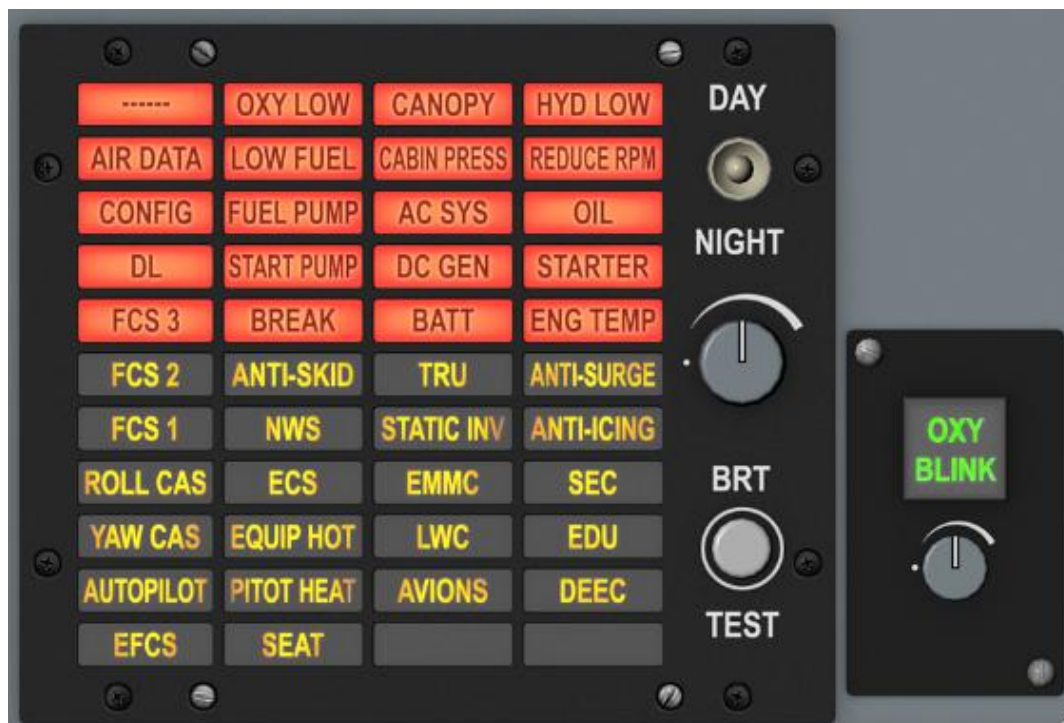


Status Light

Status Light provide plane's status information.

Status	Reason
A/A	A/A configuration
A/G1	A/G1 configuration
A/G2	A/G2 configuration
ROLL TRIM	Roll trim neutral position.
YAW TRIM	Yaw trim neutral position.

EFCS	EFCS on
No.3 TANK	No. 3 tank empty
No.1 TANK	No. 1 tank empty
CTR D/T	Center tank empty
WING D/T	Wing tank empty
START	Engine start
AB	After burner on
COMBAT	Combat mode
EMG HYD	Emergency hydraulic pump on
NWS	Nose wheel steering on
ADVISORY	SHARS malfunction



Warning light

Light	First Column	Info
-------	--------------	------

AIR DATA		Air data system malfunction
CONFIG		Aircraft configuration switch error
DL		Direct link mode
FCS3		FCS level 3 status
FCS2		FCS level 2 status
FCS1		FCS level 1 status
ROLL CAS		Roll CAS off
YAW CAS		YAW CAS off
AUTOPILOT		Autopilot off
EFCS		EFCS malfunction
OXY LOW		Second Column
LOW FUEL	Low fuel	
FUEL PUMP	Fuel pump malfunction	
START PUMP	DC electric pump malfunction	
BREAK	Break malfunction	
ANTI-SKID	Anti-skid malfunction	
NWS	Nosewheel steering malfunction	
ECS	Environment control system malfunction	
EQUIP HOT	Equipment overheat	
PITOT HEAT	Pitot heat malfunction	
SEAT	Ejection seat safety on	
CANOPY	Third Column	Canopy not sealed
CABIN PRESS		Cabin pressure decrease
AC SYS		Main AC system malfunction
DC GEN		DC malfunction

BATT		Battery malfunction
TRU		Transformer malfunction
STATIC INV		Static inverter malfunction
EMMC		EMMC malfunction
LWC		Warning light malfunction
AVIONS		Avionics malfunction
HYD LOW	Fourth Column	Hydraulic low
REDUCE RPM		RPM reduced
OIL		Low Oil
STARTER		Starter malfunction
ENG TEMP		Engine temperature high
ANTI-SURGE		Anti-surge malfunction
ANTI-ICING		Anti-icing malfunction
SEC		Secondary engine control malfunction
EDU		EDU malfunction
DEEC		Digital electronic engine control malfunction

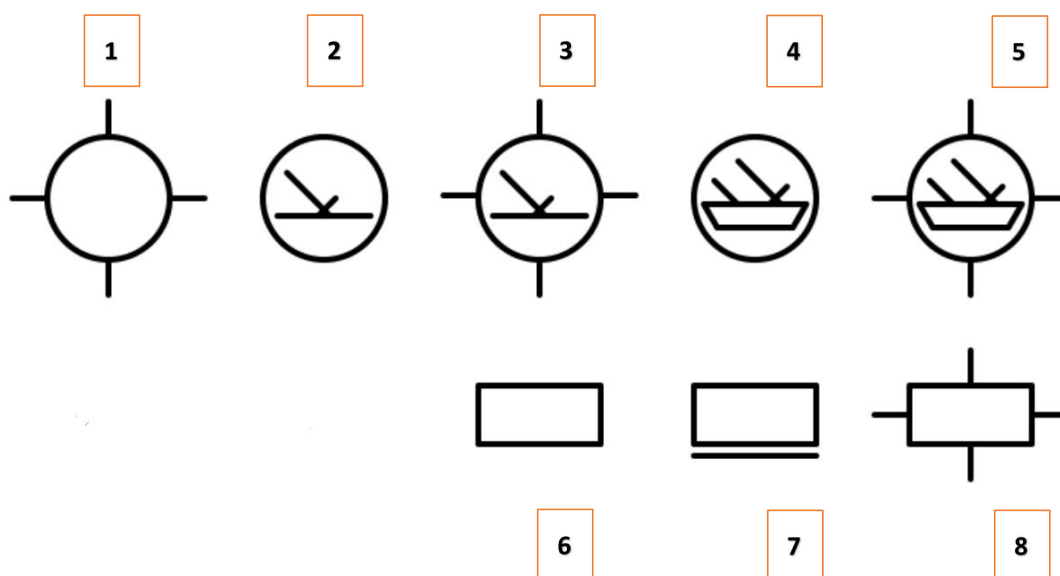
CHAPTER 6 Self-defense and countermeasures

6.1 Passive detection

There is no clear boundary between prey and predator. In order to survive in the battlefield, you need to know when your enemy is attacking you.

6.1.1 RWR

RWR will response to different radar signal. It can detect radar's scan, track and attack states. It uses audio and image symbol to notice pilot. Detected radio emissions are displayed on HSD. For tracking emission, RWR can measure its distance after a certain period. Please be notice, this distance is not very accurate, should be used only for reference.



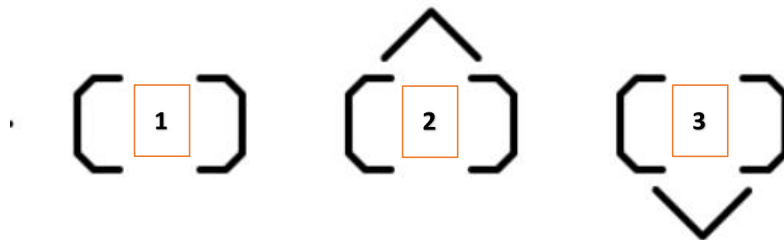
Legend:

1. Main surface threat
- Threat type is in the circle
2. Secondary AAA threat
 3. Main AAA threat
 4. Secondary sea threat

5. Main sea threat
6. Secondary air threat
7. Secondary air threat is under jamming
8. Main air threat

6.1.2 MAWS

MAWS is another system can keep you from been ambushed. Its detectors are installed on the sides of the vertical stabilizer to protect planes rear hemisphere. MAWS have higher chance for successful detection when missile is within 5km. If you got MAWS warning, response immediately.



Legend:

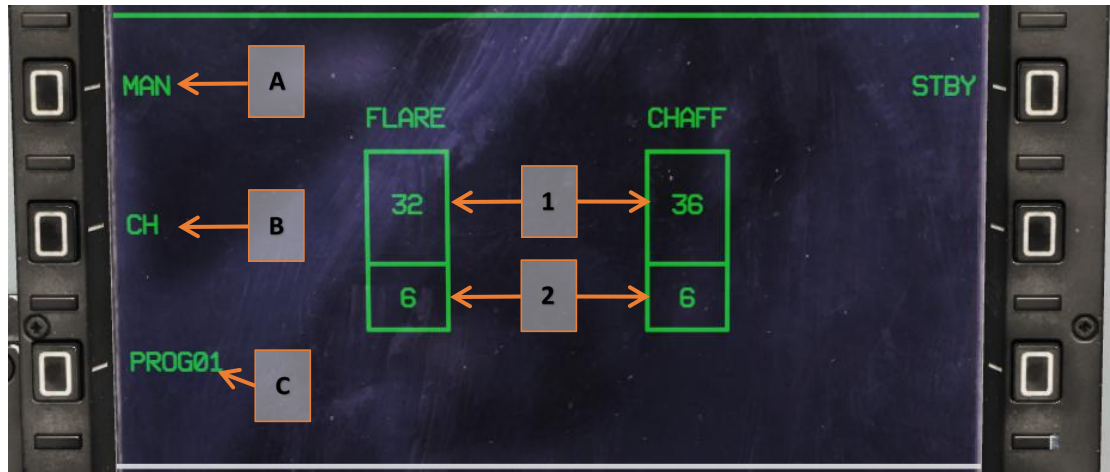
1. Missile warning symbol;

For activate radar missile, missile type is displayed in the box. Otherwise M shows in the box.

2. MAWS detected missile above airplane;
3. MAWS detected missile below airplane.

6.2 Countermeasures.

Maneuver is not always enough to shake off missiles coming at you. You'll need countermeasure. Thunder can carry up to 36 chaffs and 32 flares. You can use auto mode or 5 set of preset programs (set in game's special setting) to dispense these countermeasures.



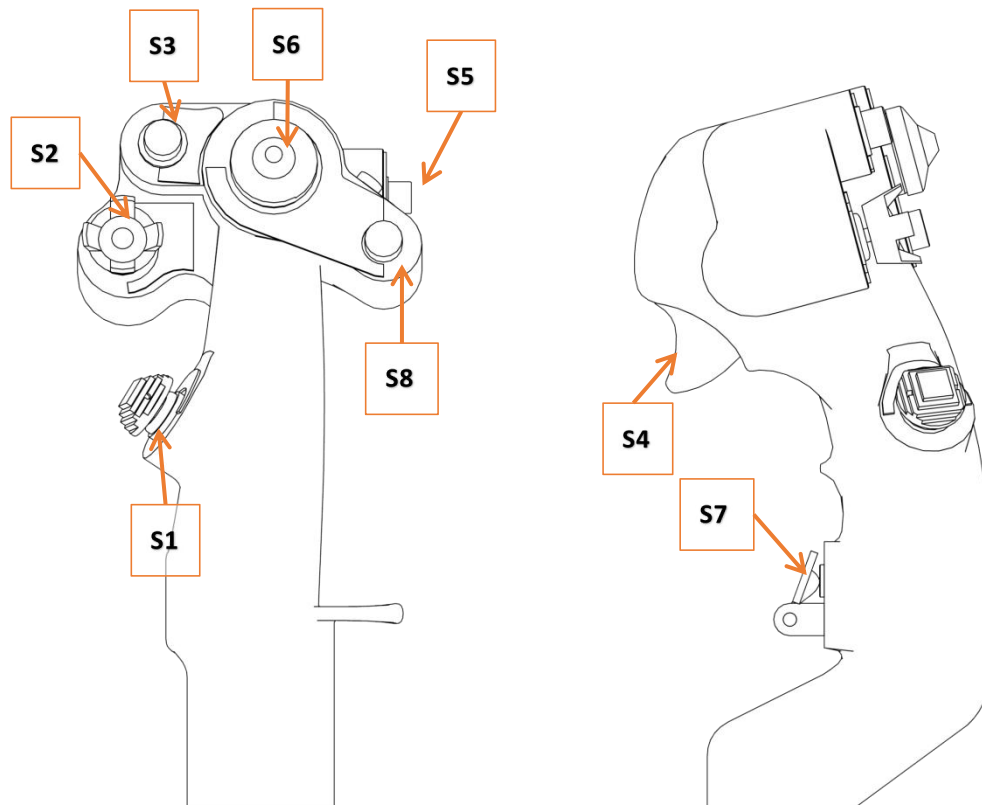
Legend:

- A. Manual/Auto mode switch
- B. Current countermeasure type.
- C. Current program.
- 1. Current flare and chaff quantity.
- 2. Program's flare and chaff quantity.

CHAPTER 7 HOTAS

7. Control Stick

If you studied about JF-17 Thunder's development history, it's very easy to find out that PAF is in love with F-16. PAF thought JF-17's control interface should be as similar as possible to F-16, since it will be easier to train pilots. As a result, JF-17's HOTAS is **heavily** influenced by Viper.



Legend:

S1. Sensor Selection Switch

S2. Sensor Control Switch

S3. Weapon launch/release button

S4. Gun trigger

S5. Missile jettison button/nose wheel control button

S6. Trim switch

S7. Auto pilot disengage button

S8. Missile type selection button

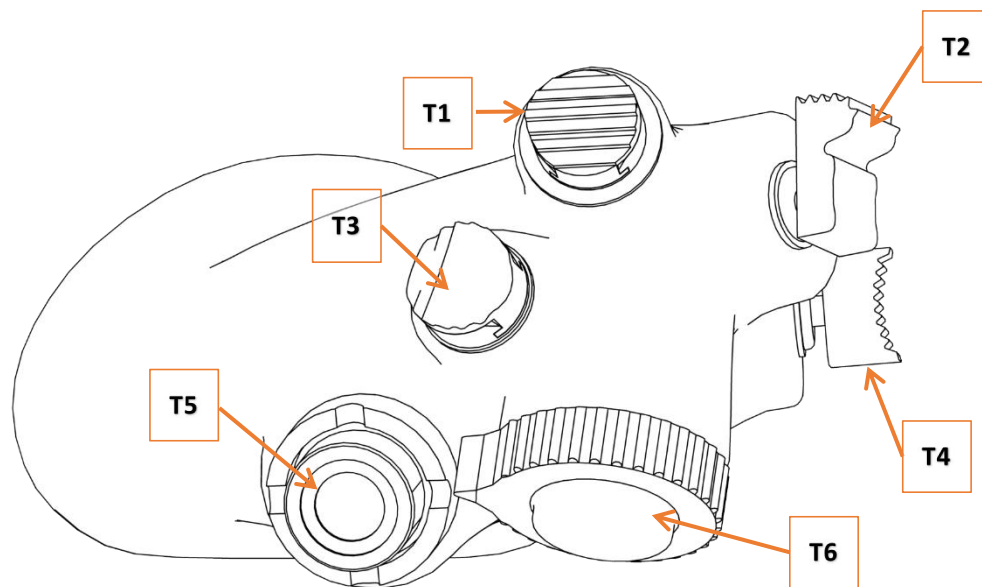
Button/Switch	Function	Operation	Master Mode (NAV)	Master Mode (AG)	Master Mode (AA)						ACM mode (DGFT)	
					Intercept Mode (INTC)							
					w/o locked target	w/ locked target					w/o locked target	w/ locked target
		RWS/TWS/VS	HPT	SAM	DTT	STT						
S1	Sensor Selection (SS)	Forward	Select ACM mode, then cycle gun reticles								-	
		Backward	Cycle select HUD/Middle MFD	Select Middle MFD			-		-			
		Right	Select Right MFD				-		-			
		Left	Select Left MFD				-		-			
		Push	-	-	Allow enter DTT	Allow enter DTT	-	-	Return to previous Master Mode			
S2	Sensor Control (SC)	Forward	Increase display distance	Increase display distance (Except AGR mode)	Increase display distance	-	-	-	BS	BS		
		Backward	Decrease display distance	Decrease display distance (Except AGR mode)	Decrease display distance	-	-	-	VERT	VERT		
		Right	Change azimuth scan range (Except TWS mode)	Change azimuth scan range or cancel DBS/EXP	Change azimuth scan range (Except TWS mode)		-	-	HA	HA		
		Left	Depends on radar mode	At MAP mode, cycle select EXP/DBS At GMTI, SEA and TCN Mode, select EXP	Cycle select RWS/TWS/VS	Select RWS	Cycle select SAM/NAM sub mode	Switch HPT/SPT	-	-		
		Push		Discard target	MFD fresh	Discard HPT	Discard HPT, enter RWS	Discard SPT, enter SAM	Return to RWS/TWS/VS	Enter WIDE/NAR Mode	Break Lock	

S3	Weapon launch/release	Press	-	Weapon Release	Launch PL5E or SD10	
S4	Gun trigger	Press	-	Fire Gun	-	Fire Gun
S5	Missile jettison	Press	-	-	Manual jettison selected missile and auto select next same type missile.	
S6	Trim	4 Directions	Trim for pitch and roll			
S7	Auto pilot disengage	Press	Manual disengage auto pilot	-		
S8	Missile type selection	Press	-	-	Cycle select PL5E and SD10	

Control Stick HOTAS function

7.2 Throttle

Maybe you guys think JF-17 is a “REDFOR” fighter jet, but in fact from design to operation this is a typical “BLUEFOR” fighter. If you want to experience true “REDFOR”, please wait for our next module... I’m not sure why Chengdu still kind of conserved about the control stick, maybe just because the stick has enough buttons. But for the throttle grip, they decided just choose this thing...



Legend:

T1. Master mode switch

T2. Countermeasure switch, Chaff/flare dispense/Cage Uncage switch

T3. Speed brake switch

T4. Radio PTT/IFF interrogation button

T5. TDC switch

T6. Antenna elevation switch

Button/Switch	Function	Operation	Master Mode (NAV)	Master Mode (AG)	Master Mode (AA)							
					Intercept Mode (INTC)					Intercept Mode (INTC)		
					w/o locked target	w/o locked target				w/o locked target	w/o locked target	
					RWS/TWS/VS	RWS/TWS/VS	RWS/TWS/VS	RWS/TWS/VS	RWS/TWS/VS			
T1	Master mode switch (MMS)	Up			AA Master Mode (INTC)					-		
		Middle			Nav Master Mode (NAV)					-		
		Down			AG Master Mode (AG)					-		
T2	Countermeasure switch/Chaff/flare dispense	Forward			Countermeasure pod emission switch							
		Backward			Flare/Chaff dispense							
	Cage	Push	-	Select Manual sub mode	Missile seeker CAGE							
T3	Speed brake	Up			Speed Brake on							
		Press			Speed Brake on/off Switch							
		Down			Speed Brake off							
T4	Radio PTT/IFF interrogation	Forward			Comm 1 PTT							
		Push			IFF interrogation start/stop							
		Backward			Comm 2 PTT							
T5	TDC	4 Direction		Move TDC/cursor	Move TDC				-	-	-	
		Press		Ranging sensor slave to selected sensor or target's LOS	From RWS/VS mode enter SPOT	-	Enter SPOT Mode	-	-	-		

		Release		Target Mark/Sensor Lock	From RWS enter SAM mode, From VS enter STT or return to previous mode. At TWS mode, Mark target.	If TDC is on HPT: Enter STT; Else: Switch HPT	If TDC is on HPT: Enter STT; Else: DTT	If TDC is on HPT/SPT: Enter STT Else: N/A	If it is from RWS entered STT, release TDC and enter SAM mode. If is from VS entered STT, release TDC and enter VS mode.	-	Discard Target
T6	Antenna elevation	Up		Scan elevation Up (Except AGR mode)	Scan elevation Up	-					
		Down		Scan elevation Down (Except AGR mode)	Scan elevation Down	-					

Throttle Grip HOTAS Function

CHAPTER 8 FCS

8.1 Pitch FCS

Fourth-gen fighters normally have FBW flight control system, with fancy features like worry-free control and multiple control laws based on different mission. In general, JF-17's pitch axis FBW FCS has these features:

1. Auto trim;
2. Adjust LEF to achieve best lift-drag ratio;
3. Auto limit G and AoA;
4. Control aerodynamically unstable (some circumstances) plane.

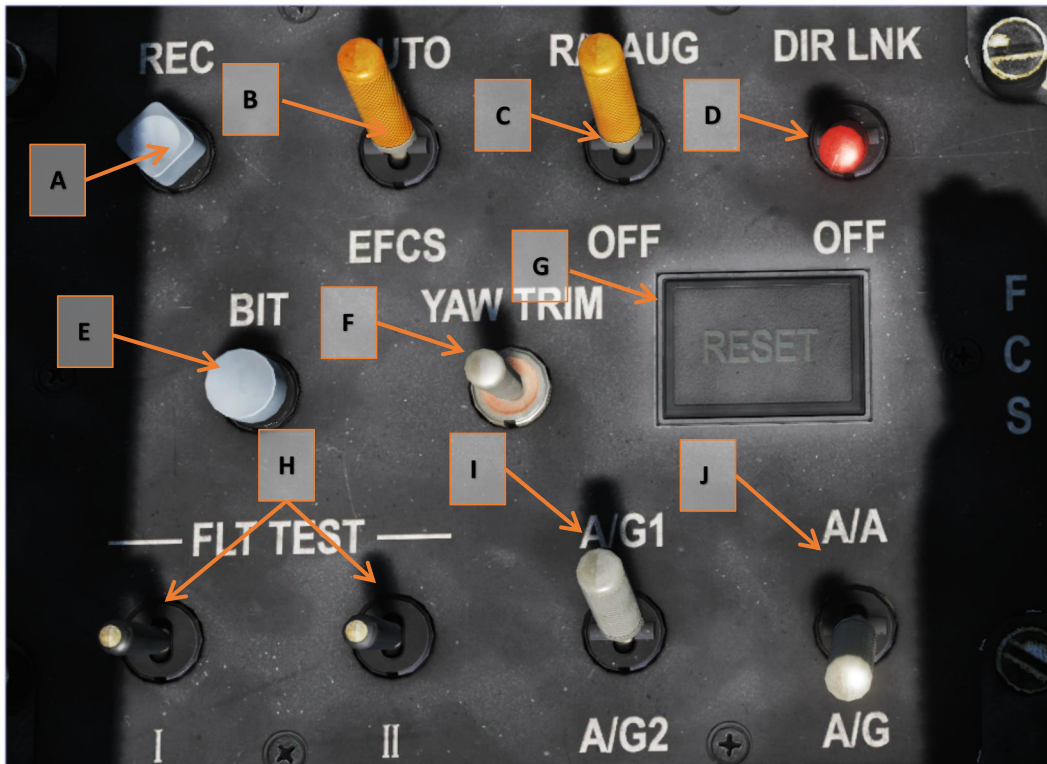
At high speed range, stick controls plane's vertical G. At low speed range, it controls plane's pitch rate. At high AoA, it controls plane's AoA. After landing gear extracted, plane has positive speed stability.

If plane entered spin, use direct link switch to help exit spin. But if plane is within AoA limits, direct link switch doesn't work.

Press AP buttons on UFCP to enter auto pilot. ATT for attitude hold and ALT for altitude hold. You can enter desired altitude in UFCP.

8.2 Roll and Yaw FCS

Since the planes' buyer is not very rich... although we have a very fancy pitch control system, Thunder's roll and yaw control systems are not FBW. But don't worry, our multiplex digital CAS system can still ensure decent control performance.



Legend:

A. Stop recording switch.

B. EFCS switch

Select AUTO default select DFCS.

C. Roll/Yaw Control Augmentation System switch

D. Direct link switch

Can't be turn on if AoA is within limit.

E. BIT button

F. Yaw trim

G. Reset button

When FCS malfunction, click this button to reset FCS.

H. Test flight testing port

I. A/G configure selection

Select A/G2 if plane carries wing tank.

J. Plane configuration selection

Select A/G if plane carries air to ground weapon or wing tank.

CHAPTER 9 Limits

In order to avoid misunderstanding “quirks” (limits, or features...) as bugs, we suggest you read this section.

9.1 Aircraft Limits

9.1.1 Speed

First thing is takeoff speed and brake speed, these 2 speeds are determined by DCS's computing.

Max IAS in low altitude is 1300 km/h (702 kts), but you may exceed this speed in the game. In the real world, plane will have aeroelastic problem over this speed. In the game, your acceleration will be very slow when above this speed.

In high altitude, plane's max Mach number is M1.6, but you also may exceed this speed in the game. In the real world, the limitation is come from plane's stability and aerodynamic heating. Of course, we won't let you go much faster than this.

9.1.2 AoA and G

When takeoff and landing, keep AoA within 12° , if plane carries large payload (GBU-12 or 800L tank) in center pylon, keep AoA within 10° .

At AA configuration, max AoA is 27° , max G is 8G, when over M0.85, max G reduce to 6.5G. Be aware your speed when enter dogfight.

At AG configuration, max G is 6G, but this limits only protect your plane, not your payloads.

9.1.3 Fuel System

As you may already know, negative G tanks is not big. Bad thing will happen if you keep the afterburner over 5 seconds or mil power over 12 seconds in negative or zero G condition.

9.1.4 Emergency

JF-17 doesn't have an EPU (like F-16) to power the plane when engine flame out. But it has plenty of battery and hydraulic accumulator. Battery can support avionics and navigation system for about 10 minutes, hydraulic system can also support you till you land (if you can...).

Of course, ECS can only use ram air when engine is flame out. You have to manually change ECS's mode. To prevent hypothermia or suffocation, descend ASAP.

9.2 Weapon Limits

Good news is there are no limits for A2A missiles and all pods.

But for A2G weapon, heavier weapons are more likely to damage their pylon in high G situation. When pylon is damaged, you won't be able to launch or even jettison the payload. Ask ground crew to repair it after landing.



One more thing you need to be noticed when request repairing is to turn of the zeroize function of the ejection seat. We simulated ejection seat's zeroization function: if enabled, when ejected or seat removed, All IFF, COMM, RWR and DTC data will be destroyed. And in our setting, during the repairing the ejection seat will be removed. Please put SEAT FUNCTION switch to DISABLE prior to repair otherwise the data we mentioned above will be deleted. ZEROIZER button locates on the right side of the ZCP panel, it can manually delete all sensitive data. For instance if you have to land at enemy airport, you can open the protect cover and press the ZEROIZER button.



C-701 is an exception. Although it's very light, but high G will more likely to damage the missile rather than the pylon. Be careful when carrying it.

For all A2G weapons and external tanks, there are G, speed and attitude limits for deploy/jettison, if you can't launch/jettison your A2G weapon even launch condition is satisfied, maybe your speed/G/attitude are over limit.

The last pain point is the 23-2 cannon, this thing can easily get jammed. When fired too much ammo in a short period of time, this ancient cannon may get stuck. If jam happened, click MFD's FEED button to reload the gun.