

D I G I T A L   C O M B A T   S I M U L A T O R

# F-5E TIGER II

for *DCS*World



Quickstart manual



***HEALTH WARNING!***

Please read before using this computer game or allowing your children to use it.

A very small proportion of people may experience a seizure or loss of consciousness when exposed to certain visual images, including flashing lights or light patterns that can occur in computer games. This may happen even with people who have no medical history of seizures, epilepsy, or "photosensitive epileptic seizures" while playing computer games.

These seizures have a variety of symptoms, including light-headedness, dizziness, disorientation, blurred vision, eye or face twitching, loss of consciousness or awareness even if momentarily.

**Immediately stop playing and consult your doctor if you or your children experience any of the above symptoms.**

The risk of seizures can be reduced if the following precautions are taken, (as well as a general health advice for playing computer games):

- Do not play when you are drowsy or tired.
- Play in a well-lit room.
- Rest for at least 10 minutes per hour when playing the computer game.

## ***INSTALLATION AND LAUNCH***

Place the Setup.exe file and all .bin files in the same folder and double click on the Setup.exe file to begin installation. Then follow the on-screen instructions.

*Note: You will need to be logged into Windows with Administrator rights in order to install the game.*

### ***Launching DCS: F-5E TIGER II***

After installation, you will have icon on your desktop, DCS World.



DCS World is the PC simulation environment that the F-5E TIGER II simulation operates within. When you run DCS World, you in turn launch DCS: F-5E TIGER II.

As part of DCS World, the Su-25T Frogfoot attack aircraft and TF-51 training aircraft are also included for free.

After executing the DCS World icon on your desktop, the DCS World Main Menu page is opened. From the Main Menu, you can read DCS news, change your wallpaper by selecting either the F-5E TIGER II or Su-25T Frogfoot icons at the bottom of the page, or select any of the options along the right side of the page. To get started quickly, you can select Instant Action and play any of the missions listed in the F-5E TIGER II tab.

### ***Game Problems***

If you encounter a problem, particularly with controls, we suggest you back up and then delete your Saved Games\User Name\DCS\Config folder, which is created by DCS on your operating system drive at first launch. Restart the game and this folder will be rebuilt automatically with default settings, including all of the controller input profiles.

If problems persist, we suggest consulting our online technical support forums at <http://forums.eagle.ru/forumdisplay.php?f=251>

***Game Manuals***

The **Activation Guide** describing **serial key activation/deactivation** is available in the /Doc folder of the game's root installation directory.

Additional documentation for DCS: F-86F Sabre, including the complete Flight Manual and a key commands guide can be found in the /Mods/aircraft/F-5E/Doc folder of the game installation directory.

***Useful Links***

DCS Homepage:

<http://www.digitalcombatsimulator.com/>

DCS: F-5E TIGER II forum:

<http://forums.eagle.ru/forumdisplay.php?f=332>

DCS Wiki:

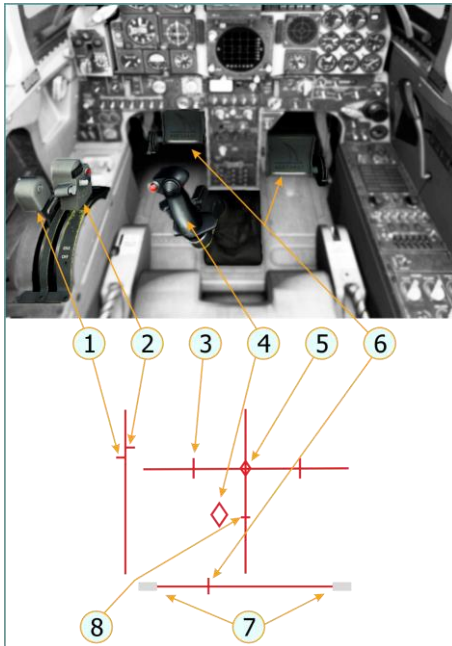
[http://en.wiki.eagle.ru/wiki/Main\\_Page](http://en.wiki.eagle.ru/wiki/Main_Page)

## FLIGHT CONTROL

Primary aircraft flight controls include the flight control stick, throttle, and rudder pedals. The stick is used to roll the aircraft left and right to perform turns and pitch the nose up and down to climb or descend. The throttle is used to control engine power and resulting airspeed. The pedals are used to yaw the airplane left and right using the rudder (like a boat). Pedal use in flight is limited to eliminating sideslip and helping to coordinate smooth turns, but they are also used on the ground to turn the nose wheel when taxiing.

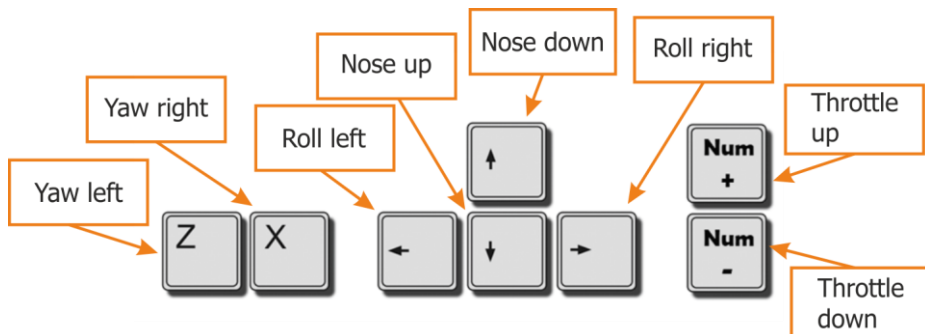


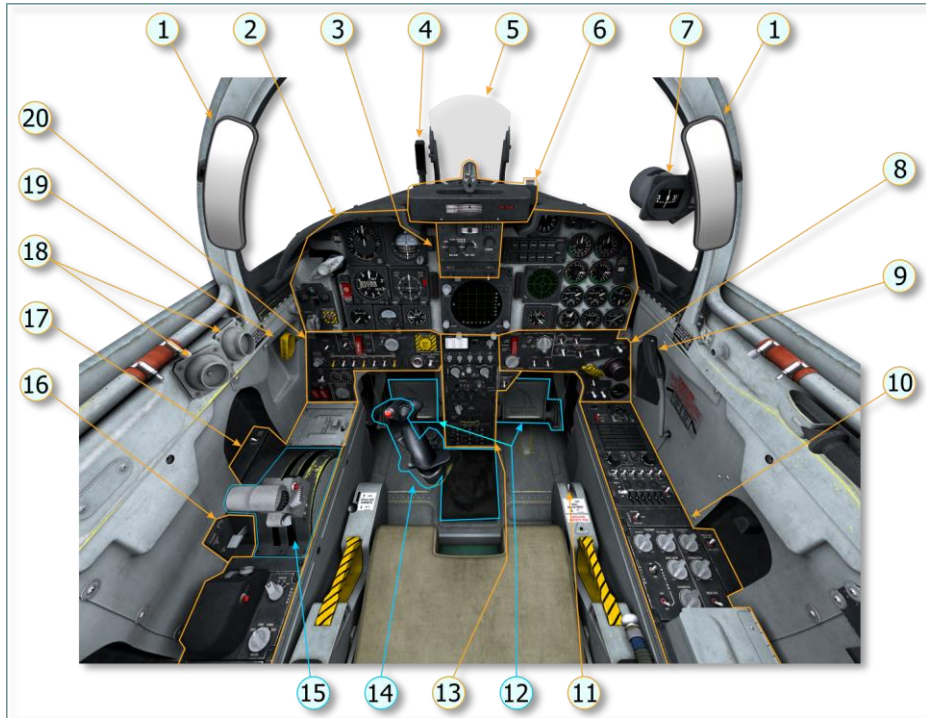
When flying from the cockpit, you can toggle the Controls Indicator display by pressing **|RCtrl + Enter|** to see a visual reference of the positions of your flight controls.



1. Left Throttle and Position Indication
2. Right Throttle and Position Indication
3. Aileron Spring Stop
4. Control Stick and Position Indication
5. Trim Tab Position (mechanism used to reduce pressure on control stick)
6. Pedals and Rudder Pedal Indicator
7. Wheel Brake pressure Indicator
8. Maximum Pitch Trim Deviation Indicator. Before takeoff, the pitch trim indicator (5) shall be set approximately to a neutral position

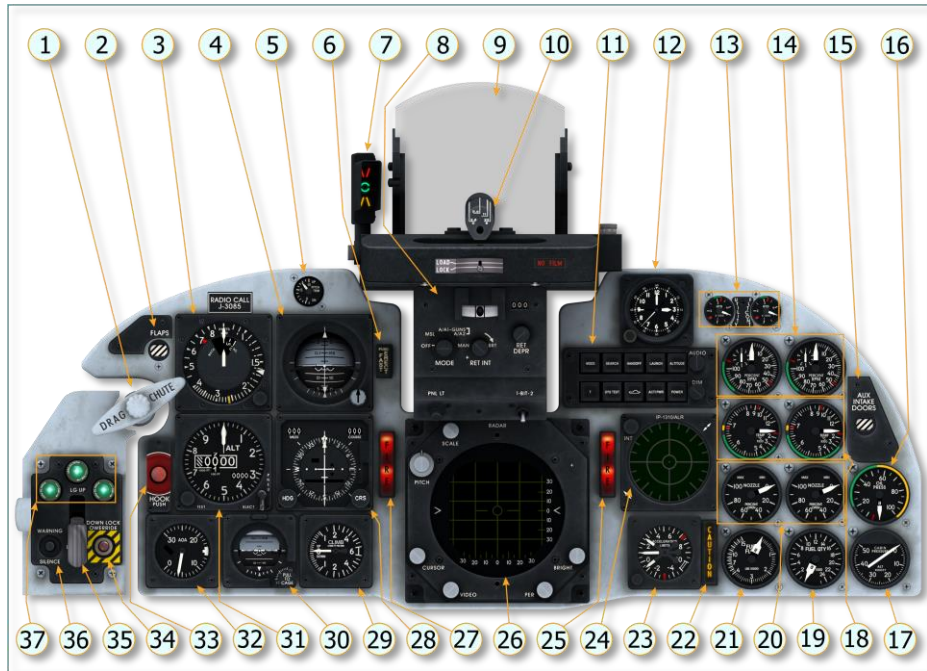
If you are flying on keyboard only, the primary flight control keys will be: **arrow keys** to control roll and pitch, **|Numpad+|** and **|Numpad-|** to control throttle, and **|Z|** / **|X|** to control pedals. If you do have a joystick, it may be equipped with a throttle handle and/or a twist grip, which will allow you to control the pedals.



***COCKPIT***

- |                            |  |
|----------------------------|--|
| 1. MIRROR (EACH SIDE)      | 12. PEDALS                                   |
| 2. INSTRUMENT PANEL        | 13. PEDESTAL                                 |
| 3. COMPUTING OPTICAL SIGHT | 14. CONTROL STICK                            |
| 4. ANGLE-OF-ATTACK INDEXER | 15. THROTTLES (L&R)                          |
| 5. SIGHT REFLECTOR         | 16. FLAP LEVER                               |
| 6. SIGHT CAMERA            | 17. LEFT CONSOLE                             |
| 7. MAGNETIC COMPASS        | 18. CONDITIONED AIR INLETS                   |
| 8. RIGHT VERTICAL PANEL    | 19. LANDING GEAR<br>ALTERNATE RELEASE HANDLE |
| 9. CANOPY HANDLE           | 20. LEFT VERTICAL PANEL                      |
| 10. RIGHT CONSOLE          |  |
| 11. SEAT ADJUST SWITCH     |  |



**INSTRUMENT PANEL**

- |   |  |
|---|--|
| 1. DRAG CHUTE T-HANDLE                  | 20. NOZZLE POSITION INDICATORS                   |
| 2. FLAP POSITION INDICATOR              | 21. FUEL FLOW INDICATOR (DUAL)                   |
| 3. AIRSPEED/MACH INDICATOR              | 22. MASTER CAUTION LIGHT                         |
| 4. ATTITUDE INDICATOR                   | 23. ACCELEROMETER                                |
| 5. PITCH TRIM INDICATOR                 | 24. RWR AZIMUTH INDICATOR                        |
| 6. ATTITUDE INDICATOR FAST-ERECT SWITCH | 25. FIRE WARNING LIGHT (right engine)            |
| 7. ANGLE-OF-ATTACK INDEXER              | 26. RADAR INDICATOR                              |
| 8. COMPUTING OPTICAL SIGHT              | 27. FIRE WARNING LIGHT (left engine)             |
| 9. SIGHT REFLECTOR                      | 28. HORIZONTAL SITUATION INDICATOR               |
| 10. SIGHT CAMERA                        | 29. VERTICAL VELOCITY INDICATOR                  |
| 11. RWR INDICATOR CONTROL               | 30. STANDBY ATTITUDE INDICATOR                   |
| 12. CLOCK                               | 31. ALTIMETER                                    |
| 13. HYDRAULIC PRESSURE INDICATORS       | 32. ANGLE-OF-ATTACK INDICATOR                    |
| 14. ENGINE TACHOMETERS                  | 33. ARRESTING HOOK BUTTON                        |
| 15. AUX INTAKE DOORS INDICATOR          | 34. LANDING GEAR DOWNLOCK OVERRIDE BUTTON        |
| 16. OIL PRESSURE INDICATOR (DUAL)       | 35. LANDING GEAR LEVER                           |
| 17. CABIN PRESSURE ALTIMETER            | 36. LANDING GEAR AND FLAP WARNING SILENCE BUTTON |
| 18. EXHAUST GAS TEMPERATURE INDICATORS  | 37. LANDING GEAR POSITION INDICATOR LIGHTS       |
| 19. FUEL QUANTITY INDICATOR (DUAL)      |  |



## ***INSTRUMENT PANEL INDICATORS AND INSTRUMENTS***

### ***Flap Position Indicator***



Flaps fully retracted



Flaps position depends on angle of attack and flight speed



Flaps in intermediate posit



Flaps position depends on flight speed and altitude

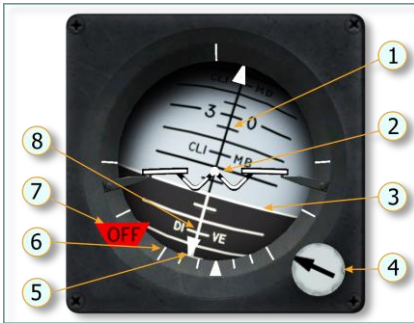


Flaps fully extended

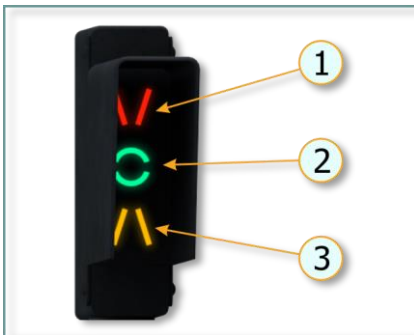
### ***AVU-8 Airspeed/Mach Indicator***



1. Airspeed dial
2. Airspeed Index (should be manually set)
3. Airspeed Index Set Knob
4. Maximum Landing Gear Extended Speed Index
5. Airspeed and Mach Number Pointer
6. Mach Number Dial
7. Maximum Allowable Indicated Airspeed Pointer

**ARU-20/A Attitude Indicator**

1. Pitch Reference Scale (climb)
2. Miniature Aircraft (indicates aircraft attitude)
3. Horizon Bar
4. Pitch Trim Knob (should be adjusted on the ground)
5. Bank Pointer
6. Bank Scale
7. OFF flag
8. Pitch Reference Scale (dive)

**Angle-Of-Attack Indexer**

1. Slow speed
2. On Speed
3. Fast speed

*Simultaneous illumination of two symbols, for example green and yellow, means that the speed is slightly fast; green and red, the speed is slightly slow.*

**Engine Tachometers (L&R)**

1. Minimum Idle RPM
2. Engine RPM Dial (graduated in increments of 2 %)
3. Continuous RPM (corresponds to maximum continuous power of engine)
4. Maximum Permissible RPM at Military (MIL) or Afterburner (AB) Power (during acceleration)
5. Engine RPM dial (graduated in increments of 1 %)

**Exhaust Gas Temperature Indicators (L&R)**

1. Maximum Temperature during Start and Acceleration.
2. Minimum Temperature at IDLE
3. Continuous Operation Temperature Range
4. Temperature Range Allowable Under Limited Conditions (time-limited)
5. Maximum Temperature at MIL or AB Power

**Nozzle Position Indicators (L&R)**

1. Nozzle Position (indicated in percent of fully open position)

*Note: When the pointer is against 100 %, the nozzle is fully open (in accordance to nozzle operation schedule, i.e. the nozzle is at mechanical stops for fully opened position); 0% - nozzle diameter is minimum (at mechanical stops for fully closed position)*

**Angle-Of-Attack Indicator**

1. AOA (Angle-of-Attack) Dial - Calibrated in units. Units are corrected AOA value and differ from real AOA degrees.
2. On-Speed Index - Optimum angle-of-attack for landing approach with gear and flaps down.
3. AOA Pointer - Indicates actual angle-of-attack
4. OFF Flag - Appears when electrical power is removed.

**AAU-34/A Altimeter**

1. Dial (graduated in 20 and 100-foot increments)
2. Tens and Units of FT (permanently displays 00, the data are indicated by the pointer on dial 1)
3. Pressure (can be set to pressures from 28.10 to 31.00 inches of mercury)
4. Mode Control Lever (lever is spring-loaded in neutral position)
  - ELECT – Corrected altitude (computed by central air data computer (CADC));
  - PNEU – Altitude pressure (spring-loaded in neutral position)
5. Pressure Set Knob
6. 100-foot Drum
7. 1000-foot Drum
8. 10000-foot Drum (instrument indicates altitude up to 80,000 feet)
9. PNEU flag (appears in the event of altitude readout error accumulation (possible during transonic flight conditions) or CADC failure. Altimeter indicates uncorrected pressure altitude.)

## ***PROCEDURES***

### ***Cold Start***

*The automatic start-up procedure can be activated by pressing |LWin + Home|  
Automatic shutdown can be activated by pressing |LWin + End|*

All procedures from the start of the engine before the flight to the after flight procedures are described in the FLIGHT MANUAL.

## ***AIR-TO-AIR COMBAT EMPLOYMENT***

### ***JOINT OPERATION OF RADAR AND SIGHT SYSTEM DURING AIR-TO-AIR COMBAT***

#### ***MSL Mode***

This mode provides target search, acquisition, lock-on, and tracking when firing the AIM-9 missiles.

The mode is used in long-range missile combats at distances up to 40 miles.

Target search:

1. Set radar mode selector to OPER position (1) (right mouse button or |0|).
2. Set the RANGE selector to 40 (2) (right mouse button or |-|).
3. Set GUNS/MISSILE and CAMERA switch to top position (3) (right mouse button or |LCtrl + LShift + G|).
4. Turn on position selector switches of wingtip launchers with AIM-9 missiles on armament control panel (4) (mouse button or |LCtrl + LShift + 1| – left wingtip; |LCtrl + LShift + 7| – right wingtip.)



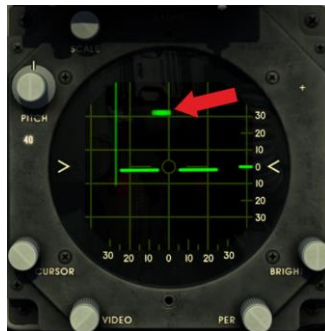
5. Select MSL mode [1].



6. Use ELEV lever to watch upper and lower hemisphere  
[RShift + ] – Radar dish up;  
[RShift + ] – Radar dish down.



7. Target symbol appears on radarscope after target acquisition, continue approach to target up to 20-mile range.





- Set RANGE selector to 20 |-.|.

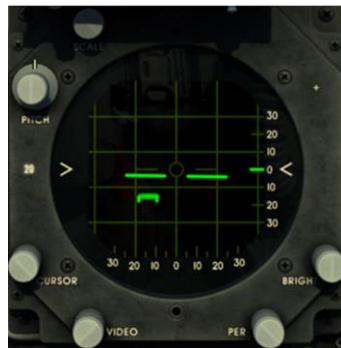
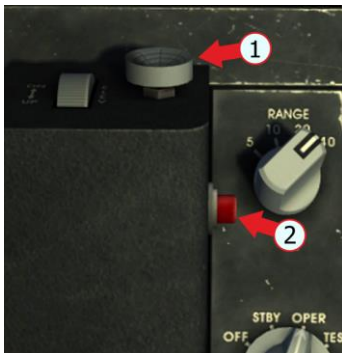


- Target acquisition symbol appears, continue approach to target up to 10-mile range.

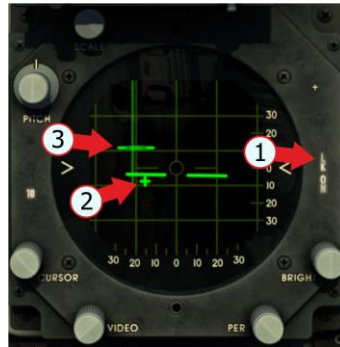


### Target lock-on and tracking:

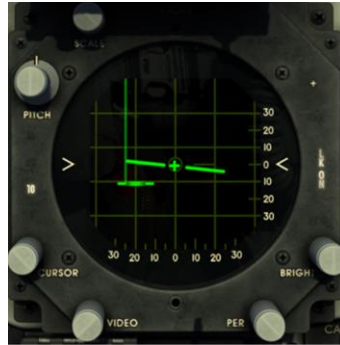
- When 10-mile range is reached, align acquisition symbol with target using TDC button (1) (|;| - up, |,| - left, |.| - down, |/| - right), and push ACQ button (2) |Enter| to lock on the target, at the same time radar display scale is automatically changed to 10 miles.



2. After the target is locked on, the following is shown on the radar indicator:
  - LK ON light (1);
  - Aim symbol (2);
  - Radar beam is shifted to the left to facilitate the use of targeting information;
  - Range gate on target (3);
  - Sight piper shows radar antenna position.

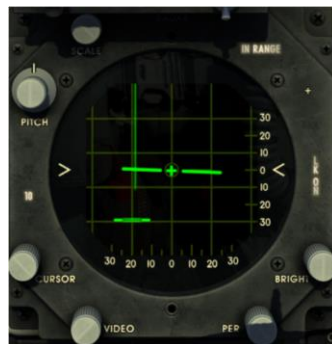


3. Maneuver the aircraft to align radarscope center circle with the aim symbol and continue approach keeping aim symbol inside center circle.



### Target attack:

1. IN RANGE light comes on and the targeting information is displayed on optical sight when aircraft reaches optical launch range.



2. Continue target approach until seeker lock-on audio tone is heard. Press and hold MISSILE UNCAGE switch |RShift + M| after seeker lock-on to facilitate maneuvering to advantageous attack position.



3. After attack position is taken, push BOMB-ROCKET button to initiate launch |RAlt + Space|.

In MSL mode, the radar stores target parameters for 1.75 s after target lock-on is lost. The radar continues to track the target if it appears within 1.75 s.

If target does not appear, radar initiates search phase.

Radar antenna returns to the position held during previous search phase. Acquisition symbol appears in last target position before lock-on was lost.

Perform target acquisition and lock-on once again.

If it is necessary to break lock-on, push ACQ button |Enter|

- Radar initiates target acquisition;
- Acquisition symbol reappears at the last range and azimuth position before lock-on was broken.

In order to go back to target search phase, push DOGFIGHT/RESUME SEARCH switch on the aircraft control stick |R|. Radar antenna will initiate target search.

***Dogfight Missile (DM) Mode***

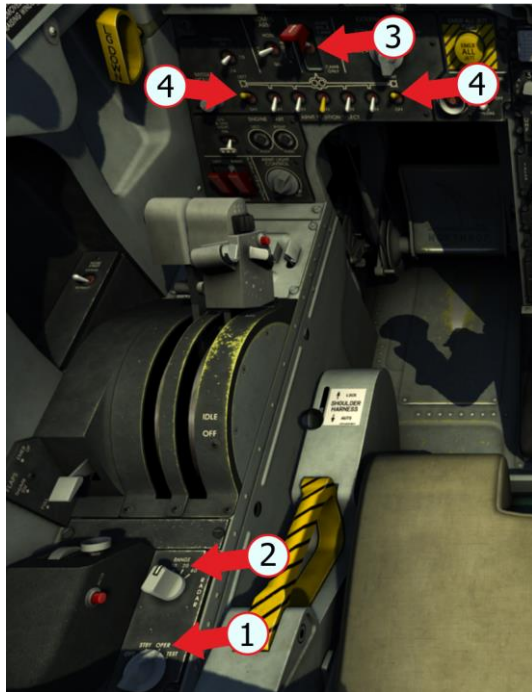
This mode provides target search, acquisition, and lock-on when firing AIM-9 missiles.

The mode shall be used in short-range air-to-air combats.

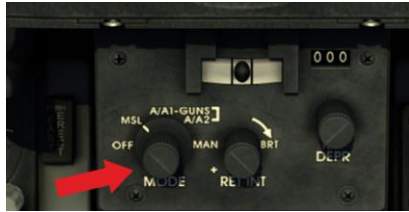
It is recommended to perform target search and acquisition in 20-mile range before selecting DM mode.

Target search:

1. Set radar mode selector to OPER position |0|.
2. Set RANGE selector to 20 |-|.
3. Set GUNS/MISSILE and CAMERA switch to top position |LCtrl + LShift + G|.
4. Turn on position selector switches of wingtip launchers with AIM-9 missiles on armament control panel |LCtrl + LShift + 1| – left wingtip; |LCtrl + LShift + 7| – right wingtip.

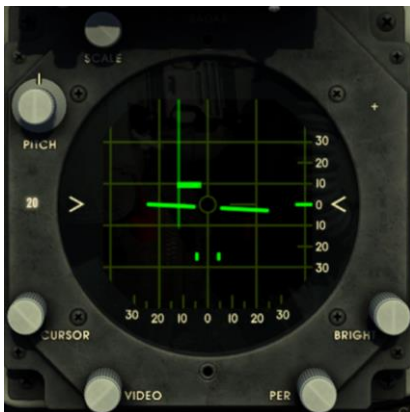


5. Turn on optical sight in any of the modes for display sight reticle |1|.

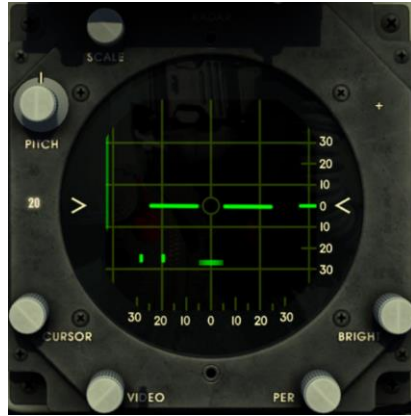


6. After target symbol appears on radarscope, maneuver the aircraft to align target to 0° azimuth and elevation and continue approach to target up to 10-mile range.

If the target and fighter are at the same altitude, a banked turn is sufficient to place the target symbol along the Central vertical line of the radar indicator. It will correspond to 0° in azimuth (1). Maintaining flight altitude equal to the height of the target will correspond to 0° in elevation (2).

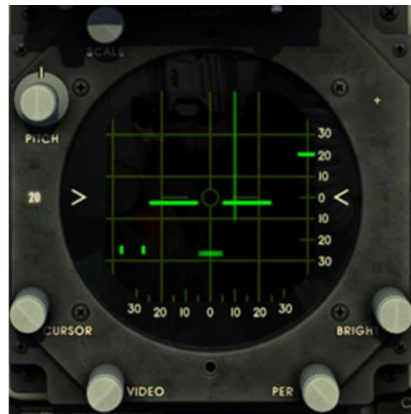
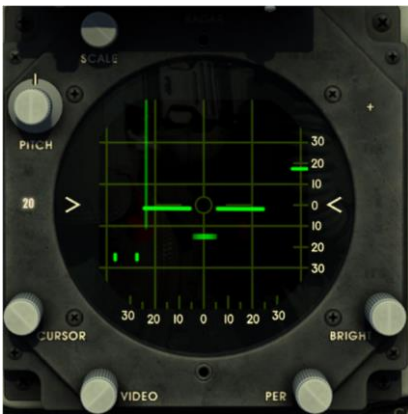


- Continue to approach the target up to 30,000 ft (4.9 nautical miles), maneuver the aircraft to keep the target symbol at zero azimuth and to maintain level flight. Target symbol will move down as range decreases..



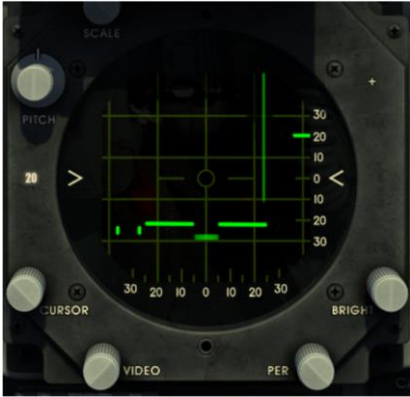
- Upon reaching the target range 30,000 ft select DM mode with a quick tap of the Dogfight/Resume Search switch in forward position [5].

If the target is above (below), maneuver to achieve target position corresponding to the azimuth 0, and continue approach to the range of 30,000 ft (4.9 nautical miles). Target symbol will move down as range decreases.



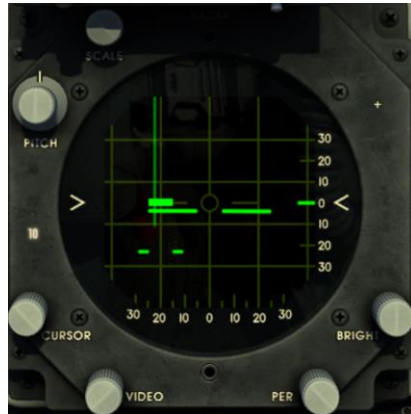
Upon reaching distance of 30,000 ft, start to climb (descend) with an angle equal to the antenna elevation angle, thereby achieve target position 0 in elevation (altitude).

Select DM mode with a quick tap of the Dogfight/Resume Search switch in forward position [5].



Target lock-on and tracking:

1. After DM mode is selected, target lock-on and tracking is started automatically, at the same time radarscope scale changes to 10-mile range. Continue approach to the target up to 30,000 ft range.



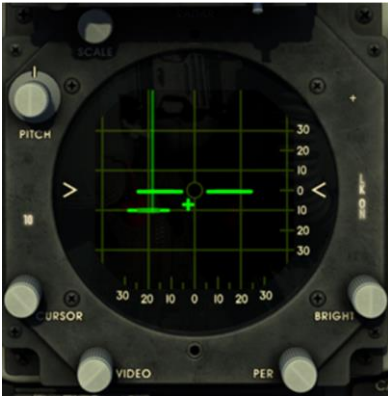
2. If target is between 500 and 30,000 ft range, radar locks on to target automatically.

After target is locked on:

- LK ON light comes on.
- Aim symbol appears on the radar display.
- Targeting information is shown on reticle.

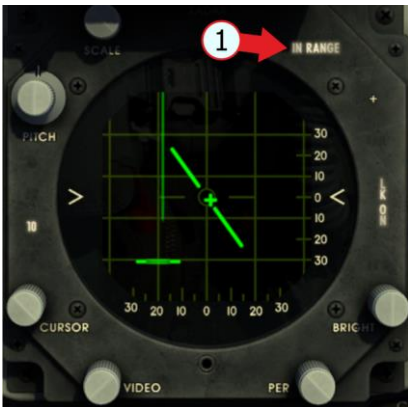


3. Maneuver the aircraft to align radarscope center circle with aim symbol and continue approach to the target.



### Target attack:

1. After visual contact with target, maneuver the aircraft to align reticle pipper with target.
2. IN RANGE light comes on (1) and in-range marker is displayed (2) on optical sight when aircraft reaches launch range.



3. Continue the target approach until seeker lock-on audio tone is heard. Push and hold **MISSILE UNCAGE** switch [**RShift + M**] after seeker lock-on to facilitate maneuvering to advantageous attack position. After the position is taken, push **BOMB-ROCKET** button to initiate launch [**RAIt + Space**].



*WARNING: When launching a missile, the excess-G marker shall not be displayed on the optical sight.*

***Dogfight Gun(DG) Mode***

This mode provides target search, acquisition, and lock-on during guns firing.

The mode is used in short-range combats against maneuvering targets with different angular rates.

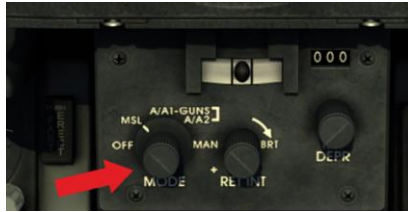
It is recommended to perform target search and acquisition in 10-mile range before selecting DG mode.

Target search:

1. Set radar mode selector to OPER position (1) |0|.
2. Set RANGE selector to 20 (2) |1|.
3. Set GUNS/MISSILE and CAMERA switch to top position (3) |LCtrl + LShift + G|.



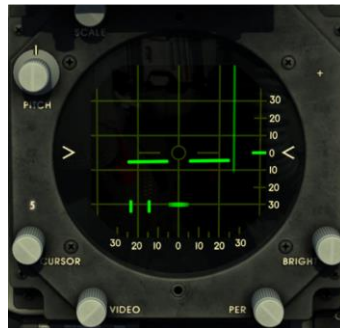
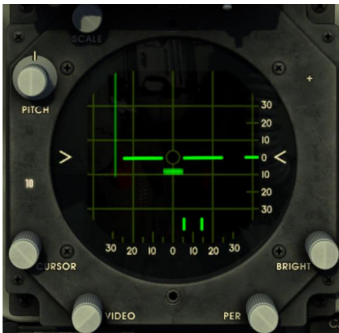
- Turn on optical sight in any of the modes for display sight reticle |1|.



- After target symbol appears on radarscope, maneuver the aircraft to center target on  $0^\circ$  azimuth and slightly below ARL. Continue approach to the target up to 5-mile range.

If the target and fighter are at the same altitude, a banked turn is sufficient to place the target symbol along the Central vertical line of the radar indicator. It will correspond to  $0^\circ$  in azimuth. Maintaining flight altitude equal to the height of the target will correspond to  $0^\circ$  in elevation.

Continue to approach the target up to 5600 ft, maneuver the aircraft to keep the target symbol at zero azimuth and to maintain level flight. With decreasing range target symbol will move down.

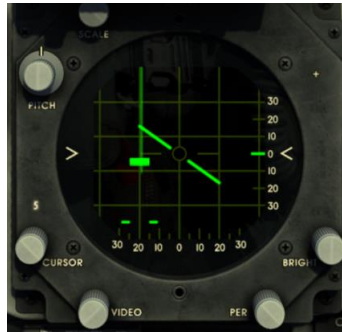


After visual target detection select DG mode with a quick tap of the Dogfight/Resume Search switch in aft position |6|.

If the target is above (below), maneuver to achieve target position corresponding to the azimuth  $0^\circ$ , and continue approach to the range of 5600 ft. After a visual target detection select DG mode and maneuver to put the target into radar cone of detection.

### Target lock-on and tracking:

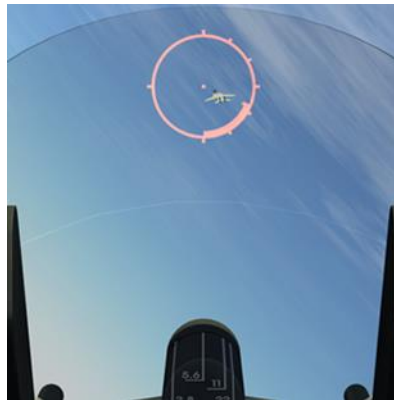
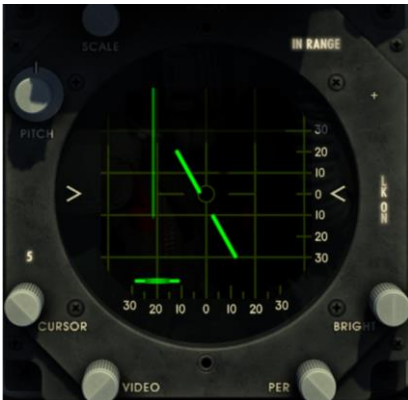
1. After DG mode is selected, target lock-on and tracking is started automatically, at the same time radarscope scale changes to 5-mile range. Continue approach to the target up to 5600 ft range.



2. If target is between 500 and 5600 ft range, radar locks on to target automatically.

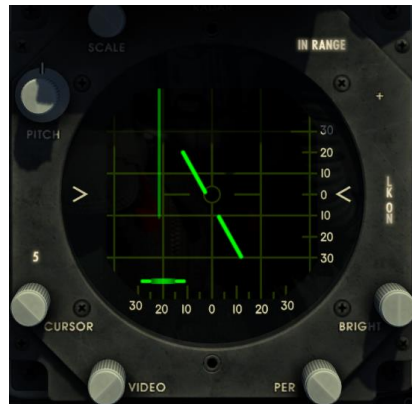
### After target is locked on:

- LK ON light comes on;
- Targeting information is shown on reticle.



### Target attack:

1. The task is to project target and pipper motion to a point of intersection and to fire approximately one projectile time-of-flight before intersection would occur. IN RANGE light comes on and in-range marker is displayed on optical sight when aircraft reaches launch range of 2700 ft. Trigger - Squeeze (Second Detent) [Space].



***GUN A/A1 and A/A2 GUNS MODES******A/A1 GUNS MODE***

A / A1 GUNS mode is same as Dogfight Guns (DG) mode.

1. The mode is selected by setting the switch to A/A1 position on the AN/ASG-31 control panel [2].



2. Push ACQ button to lock on to the target [Enter], at the same time radarscope scale changes to 5-mile range.





**A/A2 GUNS mode**

This mode provides target search, acquisition, and lock-on during gun firing.

The mode is primarily used in short-range air-to-air combats against unaccelerated constant rate maneuvering target.

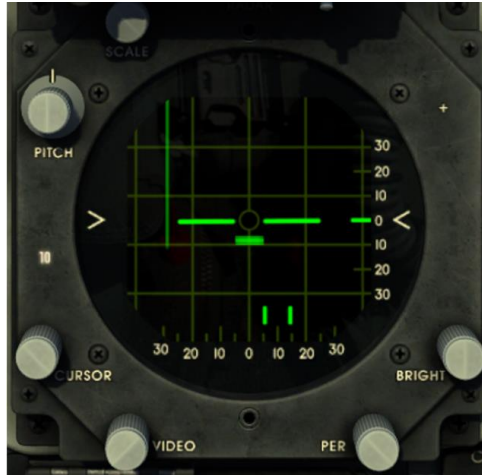
It is recommended to perform target search and acquisition in 10-mile range before selecting A/A2 mode.

Target search:

1. Set radar mode selector to OPER position |0|.
2. Set RANGE selector to 20 (2) |1|.
3. Set GUNS/MISSILE and CAMERA switch to top position |LCtrl + LShift + G|.



- After target symbol appears on radarscope, maneuver the aircraft to center target on 0° azimuth and slightly below ARL. Continue approach to the target up to 5-mile range.

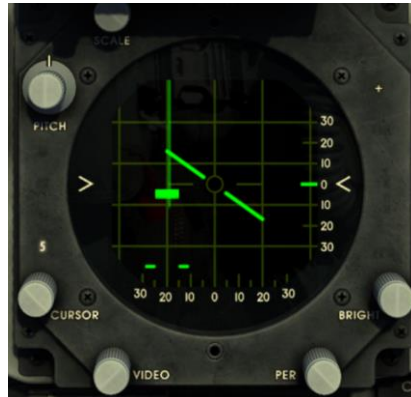


- Set selector to A/A2 position on AN/ASG-31 control panel [3].



Target lock-on and tracking:

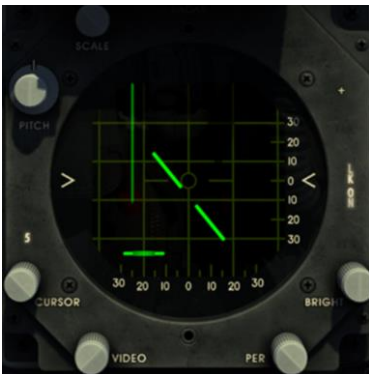
6. Push ACQ button [|Enter|](#) to acquire and lock on to target, at the same time radarscope scale changes to 5-mile range.



7. If target is between 500 and 5600 ft range, radar locks on to target automatically.

After the target is locked on:

- LK ON light comes on;
- Targeting information is shown on reticle.



**Target attack:**

1. After visual contact with target, maneuver the aircraft to align reticle pipper with target. Keep sight reticle pipper over target by maneuvering the aircraft.



2. IN RANGE light comes on and in-range marker is displayed on optical sight when aircraft reaches launch range of 2700 ft. Trigger - Squeeze (Second Detent) | [Space](#).



In DM, DG and GUN modes, the radar stores target parameters for 1.75 s in after target lock-on is lost. The radar continues to track the target if it appears within 1.75 s. If the target does not appear, the radar initiates search phase. The radar needs to be locked on to the target once again.

If it is necessary to break the lock-on, momentarily press the DOGFIGHT/RESUME SEARCH switch to the forward position in DM mode | [5](#) | or to the aft position in DG mode | [6](#) | or momentarily press the ACQ button | [Enter](#) |.

Momentarily press the ACQ button in GUN mode | [Enter](#) |.

Range gate resumes slewing from rejected target to lock on to the first target that is at least 450 feet or further in range.

If the target is locked on in MSL and GUN modes, transition to DM and DG modes does not break target lock-on.

Press DOGFIGHT/RESUME SEARCH Switch on the aircraft control stick to reinitiate target search |R|.

Pressing and holding the ACQ switch causes the range gate to return and stow at minimum range.

### ***OPTICAL SIGHT OPERATION DURING AIR-TO-AIR COMBAT.***

#### ***AIM-9P Missile Employment***

Target search and acquisition:

1. Acquire target visually.
2. Select MSL mode on the sight control panel |0|.

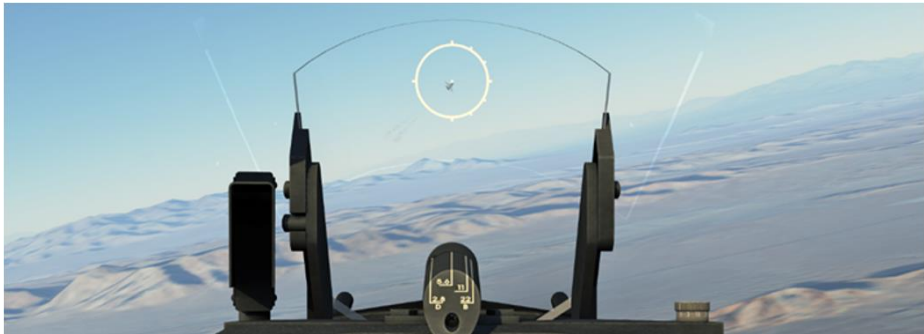


3. Set GUNS/MISSILE & CAMERA switch to top position (1) |**L**Ctrl + **L**Shift + **G**|. Turn on position selector switches of wingtip launchers with AIM-9 missiles (2) on armament control panel (|**L**Ctrl + **L**Shift + **1**| – left wingtip; |**L**Ctrl + **L**Shift + **7**| – right wingtip).

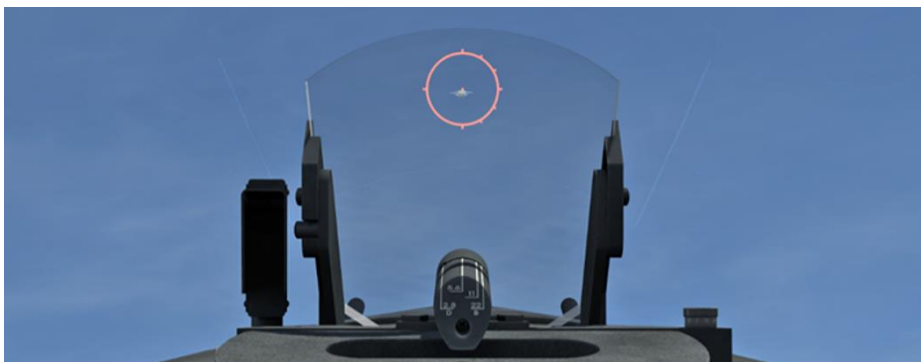


#### Target lock-on and tracking:

4. Maneuver the aircraft to take attack position at target range of 5000 to 7000 ft and align reticle pipper with target.



5. Keep reticle pipper positioned over target and continue target approach until seeker locks on to target. Press and hold MISSILE UNCAGE switch after seeker lock-on to facilitate maneuvering to advantageous attack position |**R**Shift + **M**|.



### Target attack:

1. Push bomb-rocket button after attack position is achieved [[RAIt](#) + [Space](#)].
2. Launch range is to be determined by comparison of visible target size with reticle diameter.





**SCOPE SIGHT OPERATION DURING AIR-TO-AIR COMBAT WITH M-39A3 GUNS****A/A1GUNS Mode Employment**

Target search and acquisition:

1. Acquire target visually.
2. Set GUNS/MISSILE and CAMERA switch to top position [**LCtrl + LShift + G**].



3. Set sight mode selector to A/A1 position [**2**].



Target attack:

1. Maneuver the aircraft to attack position at 1500 ft target range, 90 kt approach speed.

- The task is to project target and pipper motion to a point of intersection and to fire approximately one projectile time-of-flight before intersection would occur.



- Fire at 1500 ft range |Space|.
- Firing range and distance to the target are determined by comparing visible target size with reticle diameter.



**A/A2GUNS mode employment**

Target search and acquisition:

1. Acquire target visually
2. Set GUNS/MISSILE & CAMERA switch to top position |LCtrl + LShift + G|.

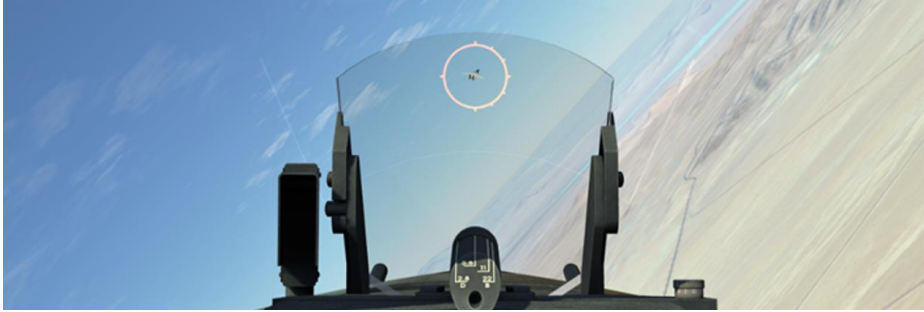


3. Set sight mode selector to A/A2 position |3|.



Target attack:

1. Maneuver the aircraft to attack position at 1500 ft target range, 90 kt approach speed.
2. Perform target approach and maneuver the aircraft to align reticle pipper with target, keep reticle pipper over target by equalizing angular velocities.



1. Fire at 1500 ft range |Space|.
2. Firing range and distance to the target are determined by comparing visible target size with reticle diameter.



*WARNING: When the trigger is fully squeezed to the second detent, firing is carried out in 0,25 s. Take this into account when firing.*

## Air-to-ground Combat Employment

### MK-82, 83, 84 and M117 Bomb Dropping

1. Set sight mode selector to MAN position on AN/ASG-31 control panel (1) |4|.
2. Use RETICLE DEPRESSION knob (2) to select reticle depression required for bombs and based on employment conditions [Table 1](#).

|RCtrl + ]| – increase angle of the reticle;

|RCtrl + [| – decrease angle of the reticle.



3. Set EXTERNAL STORES switch to BOMB position (1) (cyclical switching |LCtrl + LShift + ]| or |LCtrl + LShift + [|).
4. Set Bombs Arm switch as required by fuze configuration in bomb (2) (|LCtrl + LShift + E| or |LCtrl + LShift + F|).
5. Select pylons with bombs on armament control panel (3).  
 |LCtrl + LShift + 2| – left outboard pylon;  
 |LCtrl + LShift + 3| – left inboard pylon;  
 |LCtrl + LShift + 6| – right outboard pylon;  
 |LCtrl + LShift + 5| – right inboard pylon.

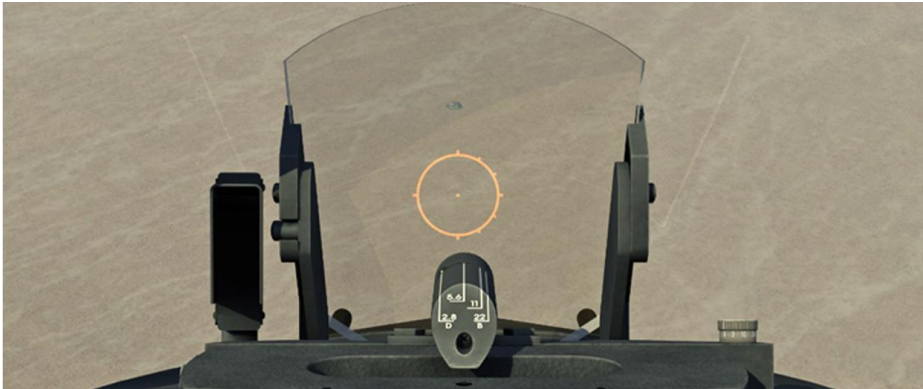




6. Approach target at specified speed and altitude [Table 1](#). Maneuver so as to position target at specified line-of-sight angle. As soon as target is at specified line-of-sight angle, initiate diving.



7. Dive so as to locate sight piper below target.



8. As the aircraft descends, move sight piper to the center of target upon approaching the altitude and speed specified for a given dive bombing condition. When specified altitude is reached, press BOMB-ROCKET button [[RAlt](#) + [Space](#)] and perform 4-G pullout which has to be done in 2 seconds.

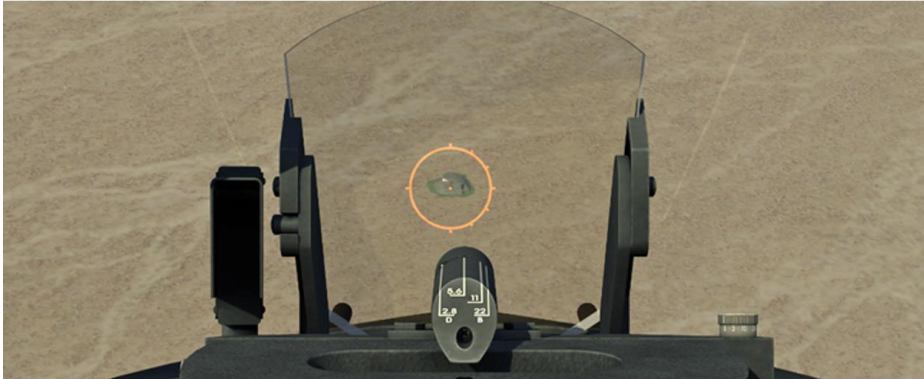


Table 1 Dive bombing

Parameter	Dive angles, degrees	
	20	30
Dive initiation altitude, ft	5000	6000
Dive initiation speed, kt	350	350
Release altitude, ft	1500	2000
Release speed, kt	380 to 400	440 to 450
Reticle depression, mil	80	79

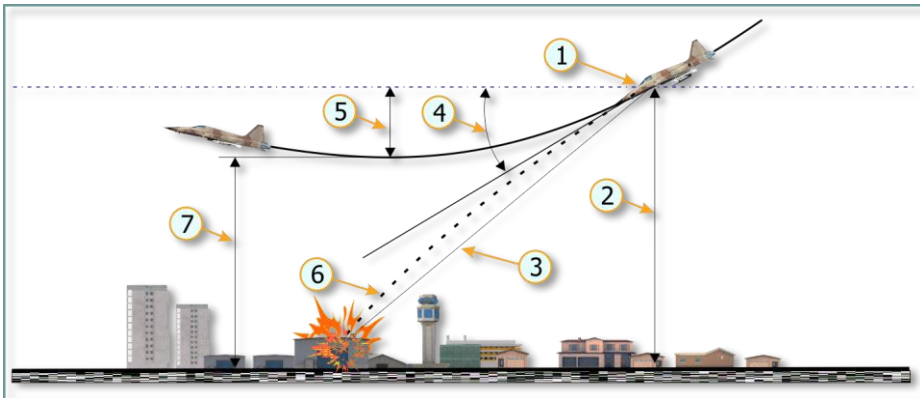


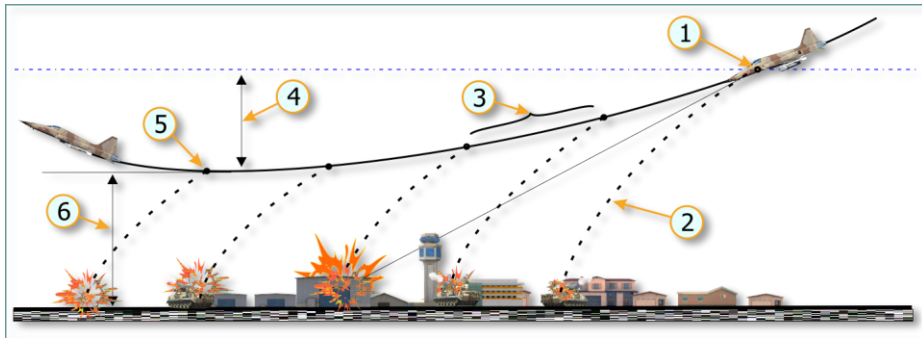
Figure 1 Dive bombing

- |                                  |                         |
|----------------------------------|-------------------------|
| 1. BOMB RELEASE -START PULLOUT   | 5. ALTITUDE LOST        |
| 2. RELEASE ALTITUDE ABOVE TARGET | 6. BOMB TRAJECTORY      |
| 3. SIGHT LINE                    | 7. MINIMUM ALTITUDE AGL |
| 4. DIVE ANGLE                    |                         |

*NOTE: Bomb release interval can be adjusted. For this purpose, set the EXTERNAL STORES switch to RIPL position (1) (cyclical switching |LCtrl + LShift + J| и |LCtrl + LShift + I|). Set INTERVAL switch (2) to an appropriate position (cyclical switching up - |LCtrl + LShift + Q|; down - |LCtrl + LShift + A|).*



Perform roll-in and aiming in a regular manner, when the specified release altitude is reached press the BOMB-ROCKET button |RAIt + Space| and hold it during the specified time interval at the same time keeping the specified dive angle.



**Figure 2 Ripple release bombing**

- |                          |                         |
|--------------------------|-------------------------|
| 1. FIRST BOMB RELEASE    | 4. ALTITUDE LOST        |
| 2. BOMB TRAJECTORY       | 5. LAST BOMB RELEASE    |
| 3. BOMB RELEASE INTERVAL | 6. MINIMUM ALTITUDE AGL |

### ***Rocket Attack***

1. Set rocket firing mode, single or ripple, before flight ([Adjust controls – Category Ground Adjustment](#)). Selection for single or ripple must be made before starting engines.
2. Set sight mode selector to MAN position (1) on AN/ASG-31 control panel |4|.



- Use RETICLE DEPRESSION knob (2) to select reticle depression required for rockets based on employment conditions [Table 2](#).  
|RCtrl + ]| – increase angle of the reticle;  
|RCtrl + [| – decrease angle of the reticle.



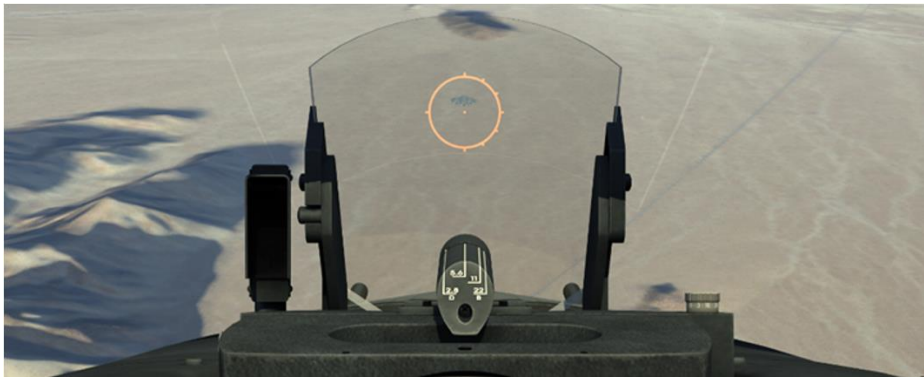
- Set EXTERNAL STORES switch to RKT/DISP position (1).
- Select pylons with LAU-68/A or LAU-60 on the armament control panel (2).



- Approach target at specified speed and altitude [Table 2](#). Maneuver so as to position target at specified line-of-sight angle. As soon as target is at specified line-of-sight angle, initiate diving.



7. Start diving so as to locate sight piper below target.



8. Align sight piper with target and keep it over target. When specified altitude is reached, press BOMB-ROCKET button [**RAlt** + **Space**] and perform 4-G pullout which has to be done in 2 seconds.

**Table 2 Air-to-Ground Rocket Attack HYDRA/FFAR**

Parameter	Dive angles, degrees	
	20	30
Dive initiation altitude, ft	5000	6000
Dive initiation speed, kt	350 to 370	350 to 370
Rocket firing altitude, ft	1500	2000
Rocket firing speed, kt	400	400
Reticle depression, mil	14/34	10/30

**Gun Attack**

1. Set sight mode selector to MAN position (1) on AN/ASG-31 control panel |4|.
2. Use RETICLE DEPRESSION knob (2) to select reticle depression as required by gun employment conditions [Table 3](#)

|RCtrl + ]| – increase angle of the reticle;  
|RCtrl + [| – decrease angle of the reticle.



3. Set GUNS/MISSILE and CAMERA switch to top position |LCtrl + LShift + G|.



4. Approach target at specified speed and altitude [Table 3](#). Maneuver so as to position target at specified line-of-sight angle. As soon as target is at specified line-of-sight angle, initiate diving.

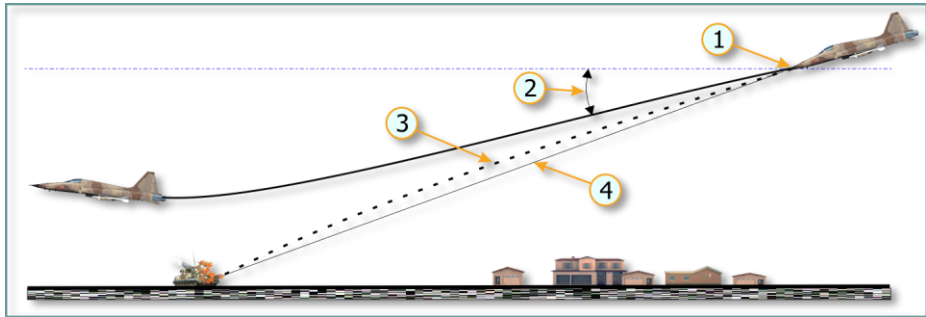


5. Start diving so as to locate sight pipper below target.
6. Align sight pipper with target and keep it over target.
7. When specified altitude is reached, squeeze TRIGGER [Space] and perform 4-G pullout which has to be done in 2 seconds.



Table 3 Air-to-Ground Gun Attack

Parameter	Dive angles, degrees	
	20	30
Dive initiation altitude, feet	5000	6000
Dive initiation speed, knots	350 to 370	350 to 370
Firing altitude, feet	2000	3000
Speed at the moment of firing, knots	400	400
Reticle depression, mils	12	8

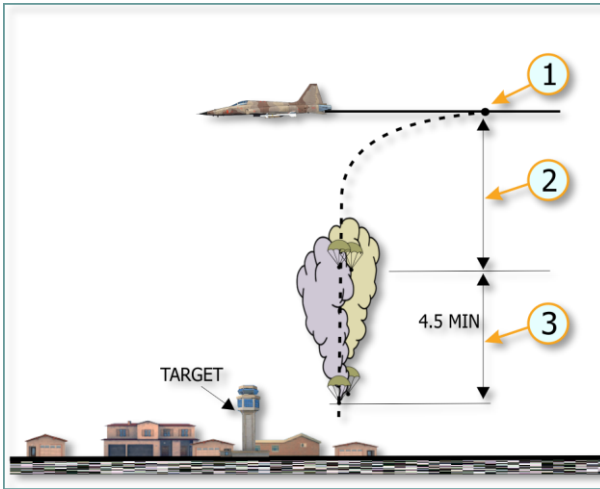


**Figure 3 Air-to-ground gun attack**

- |               |                      |
|---------------|----------------------|
| 1. OPEN FIRE  | 3. BULLET TRAJECTORY |
| 2. DIVE ANGLE | 4. SIGHT LINE        |

### ***Flare Drop***

1. Set sight mode selector to MAN position |4| on AN/ASG-31 control panel.
2. Set EXTERNAL STORES switch to RKT/DISP position (cyclical switching clockwise |LCtrl + LShift + J|, cyclical switching counterclockwise |LCtrl + LShift + I|).
3. Select pylons with SUU-25 dispensers on armament control panel  
 [LCtrl + LShift + 2] – left outboard pylon;  
 [LCtrl + LShift + 6] – right outboard pylon.
4. Perform horizontal target approach at speed of 300–400 knots and at altitude not less than 1000 ft.
5. Push BOMB-ROCKET button |RAlt + Space|. Two flares are released every time the button is pressed.



1. RELEASE
2. FREE FALL (DELAY TIME)
3. CHUTE OPEN & IGNITION.

Figure 4 Flare drop profile

***GBU-12 Release WIP***

We wish you good flight,  
Belsimtek team.