



# ITO TRAINING

# MISSIONS

## FOR BMS 4.33

VERSION: 15.10

ISRAEL THEATER



## JDAM – IAF Barak Specific

### AIRCRAFT:

IAF F-16C Block 30 (Barak I).  
1x300 Gal wing tanks  
4xGBU-38 Training Munition  
2xCATM-9

### TAKEOFF OPTION: In-flight

LOCATION: Over the Jordan Valley, Approximately 75NM north of range 409

GOAL: Learn to Employ JDAM bombs using IAF specific avionics in multiple scenarios.

Range 409 is a target range intended for dry runs or using inert weapons. In today's training we will be dropping some inert GBU-38s.

The JDAM (Joint Direct Attack Munition) is a guidance kit, giving standard MK80 series bombs precision at all weather conditions via the use of GPS. Commonly used variants are the GBU-31 (MK-84/BLU-109 2000lb warheads), GBU-38 (MK-82 500lb warhead) and the GBU-35 (MK-83 1000lb warheads) which is used mainly by US Navy.

While JDAM munitions are standard weapons in BMS, As their real life counterparts the IAF F-16s have an addition mode that allows bombs to be preprogrammed thus allowing rapid employment of multiple bombs on multiple targets in a very short time. The Implementation is slightly different between the Barak and the Sufa, the main difference between the platforms is that the Barak is able to drop one or more bombs on a single target with every press of the pickle. While the Sufa can auto-cycle targets, allowing the pilot to employ weapons against multiple targets in one push of a button.

In this Mission, we will learn how to employ JDAM munitions against multiple targets with the Barak.

Normally the F-16 is able to drop bombs on the SPI (the standard mode in BMS). Against static targets it is common to slave the SPI to a waypoint pre-programmed with the target position and altitude. The IAF mode uses this ability to decouple the Target from the SPI and feed the target coordinates to the bomb directly. This is done by using a dedicated page on the SMS. This means you are limited to a maximum of 34 pre-programmed targets but it's always less, as you need to use your normal waypoint slots. So waypoints 1-24 are available (which are also being used for navigation) and in addition waypoints 80-99 are also available for targets. In this Training missions, the four targets are pre-loaded onto the DTC to slots 15-18. But when you start to plan your own flights, you'll need to make sure the targets are assigned (via the Recon screen).

This training has three scenarios. They both use the same mission, but different settings and flight profile. You can only practice one of them – so you will probably want to fly this mission more than once.

Scenario 1: High altitude, 4 bombs to 4 targets

Scenario 2: Low altitude loft, 4 bombs to 2 targets

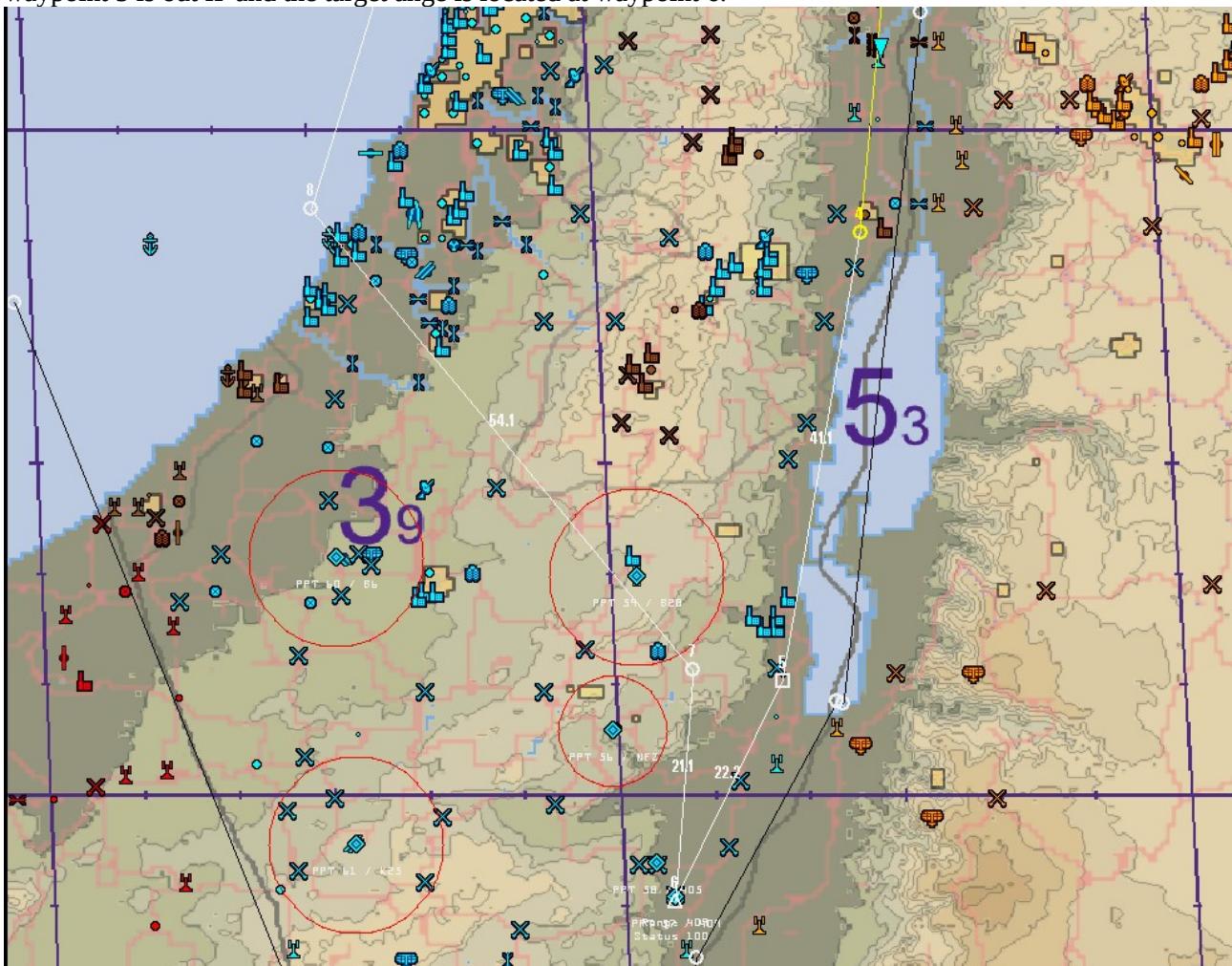
Scenario 3: High altitude, 4 bombs on to 3 targets (i.e different amount of weapons per target).

## Mission Flight plan

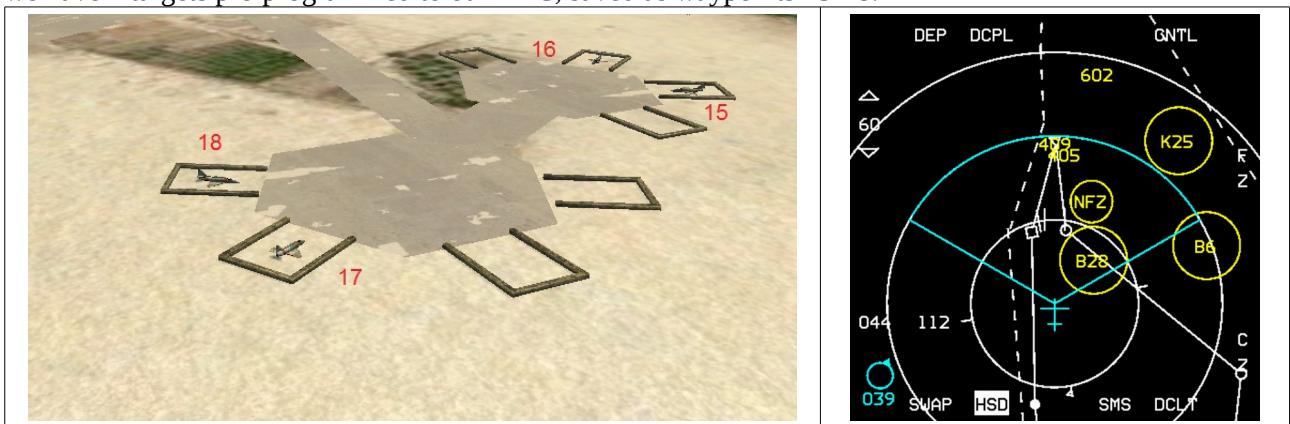
All Scenarios will be preformed in the same location.

We will start above the Jordan valley at 18kft, heading south towards waypoint 4.

waypoint 5 is out IP and the target ange is located at waypoint 6.



we have 4 targets pre-programmed to our DTC, saved as waypoints 15-18.

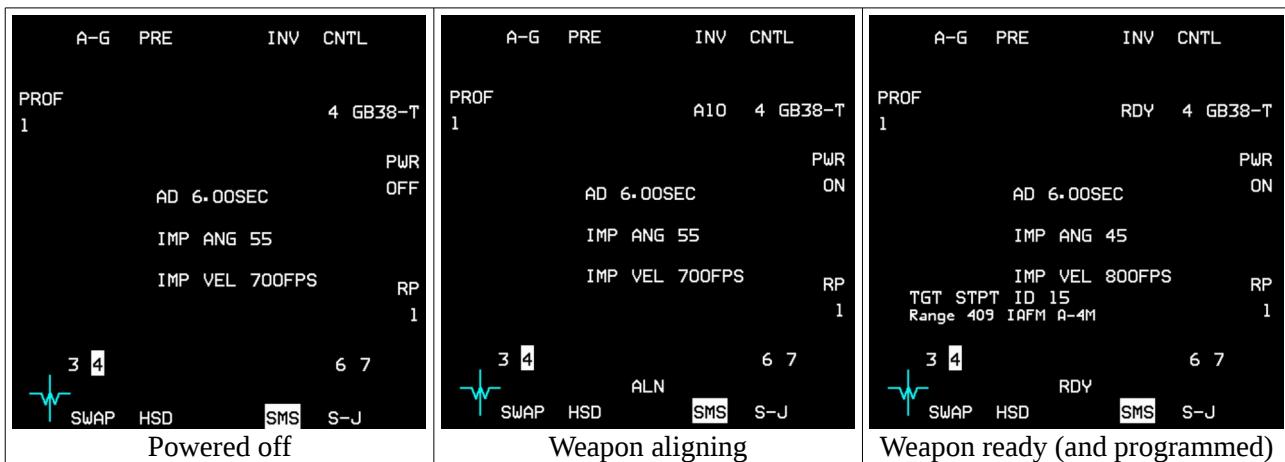


We have about 10 minutes of flight from the starting point to the target range. But at any moment you can Freeze the sim (default key is SHIFT+P) – this will stop the aircraft from flying but the avionics will continue to operate normally, thus allowing you to explore all the options without pressure or time.

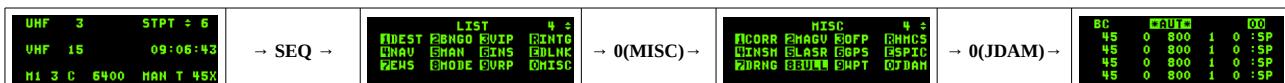
## Powering the weapon and access the JDAM DED page - Common to all scenarios

As of BMS4.33 all IAM weapons need to be powered on and aligned before use. For JDAM, there is no power-on time limit, so you can turn them ON prior to take-off. In this training missions, you will need to power them on manually first, as the process of aligning the bombs take about 3 Minutes, we will power them on before starting to program the weapon system.

Go to A/G Master-Mode, in the SMS MFD cycle to the JDAM weapon. And press the PB7 on the MFD to power on the weapon. Align status will appear. Once finished the status will change to “RDY”. Once the weapon is powered on, there is no need to remain in AG mode, you can freely work with the avionics (i.e. switch MFD page or even switch back to NAV or AA Master mode).



Programming the weapons is preformed from a dedicated DED page (available in all Master Modes). IAF jets have a slightly different DED from the USAF fighters. There is no LIST button, instead, you use the DCS SEQ function to bring up the list.



In this default state, where there is no target waypoint assigned. The weapon will drop on SPI using the standard “USAF mode”.

The Input fields on the JDAM page are:

|   |                |                        |                        |                 |
|---|----------------|------------------------|------------------------|-----------------|
| Impact angle<br>(INOP – used for release cue in loft) | Impact azimuth | Impact velocity (INOP) | No. of bombs on target | Target waypoint |
|---|----------------|------------------------|------------------------|-----------------|

Navigating the page is done using DCS UP and DCS DOWN to move up and down between the lines. To cycle between the fields in the page we will used DCS SEQ.

**NOTE:**

*DCS RTN will drop you back to the main DED page. (this is a feature, not a bug)*

## Scenario 1: High Altitude, 4 bombs on 4 targets

In this scenario we will drop 4 bombs on 4 pre-planned targets, from a medium to high altitude at normal cruise speed. This allows a single formation to wipe out entire target complex with ease. This type of delivery should be used after air-superiority is achieved as cruising at these altitudes makes you an easy target for air-defenses.

### Ingress flight parameters:

Altitude: 15,000-25,000 ft. (MSL)

Speed: M0.8 – M0.9

Because we are using Barak avionics, each press of the pickle will drop on one target, once the pickle is depressed (after bomb drop) the next target will automatically be selected. Please note MSL STP will cycle the next bomb to be dropped, however, targets (lines in the DED) are not bound to specific bombs. So the target order can only be changed from within the JDAM DED page. Once you exit the page, the target id will be set to the first line, as after the last line is triggered, the counter does not wrap around.

Let's start programming this scenario.

Targets are 4 A-4s on the north of the 409 target range. They are already pre-programmed to waypoints 15-18 on the DTC.

Starting with the default DED screen, this scenario is easy, as we only need to put in the targets.

So we'll start with the first target

| BC | AUT   | 00      |  |
|----|-------|---------|--|
| 45 | 0 800 | 1 0 :SP |  |
| 45 | 0 800 | 1 0 :SP |  |
| 45 | 0 800 | 1 0 :SP |  |
| 45 | 0 800 | 1 0 :SP |  |

→ DCS DOWN,1,5,ENT →

| BC | AUT   | 00       |  |
|----|-------|----------|--|
| 45 | 0 800 | 1 15 :SP |  |
| 45 | 0 800 | 1 0 :SP  |  |
| 45 | 0 800 | 1 0 :SP  |  |
| 45 | 0 800 | 1 0 :SP  |  |

See how easy it is? :)

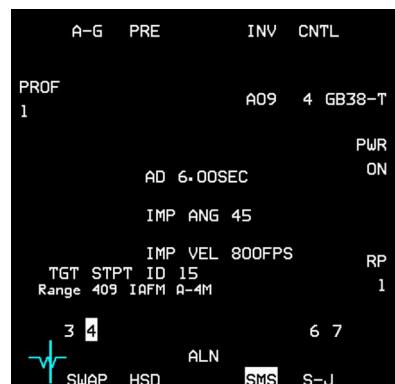
now we need to put in the rest of the targets. With the DCS UP and DOWN we can move up and down the list. So in the target column, we'll punch in 15 to 18 and we should end up with something like this:

| BC | AUT   | 00       |  |
|----|-------|----------|--|
| 45 | 0 800 | 1 15 :SP |  |
| 45 | 0 800 | 1 16 :SP |  |
| 45 | 0 800 | 1 17 :SP |  |
| 45 | 0 800 | 1 18 :SP |  |

NOTE:  
At anypoint, if from some reason it looks like the cursor is “stuck” on a field, that means it’s on “data entry” mode, and you will need to press RCL or ENT to get back to “Navigation” mode.

SMS MFD will show you which target is the currently selected, and you can make sure the correct targets are selected.

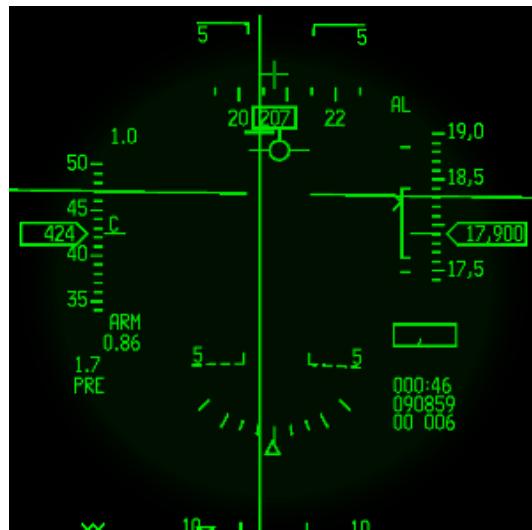
Once you are done, use the DCS RTN to return back to DED main screen, the “target pointer” will jump back to the first target and your system is ready. As long as the pointer is on a programmed target, the SPI is decoupled, and the bomb will be dropped on the pre-programmed target regardless of where the SPI is.



### NOTE:

When A/G mode is selected the navigation system will show the current active target as the active waypoint. Also, prior to entering the DLZ, a loft cue will appear – for this scenario, ignore it.

HUD is a standard IAM symbology. With the DLZ showing drop envelope, As you will get closer to the target, the “carrot” will lower into the launch envelope.



Once the first weapon is dropped, and you lift your thumb off the pickle. the computer will continue down the target list and will cycle the targets, all you need to do is make sure you are in the DLZ and press the pickle again.

| A-G   | PRE            | INV | CNTL     |
|---|----------------|-----|----------|
| PROF  |                | RDY | 4 GB38-T |
| 1   |                |     |          |
|   |                | PWR |          |
|   | AD 6.00SEC     | ON  |          |
|   | IMP ANG 45     |     |          |
|   | IMP VEL 800FPS |     | RP       |
| TGT STPT  | ID 15          |     |          |
| Range 409   | IAFM A-4M      |     | 1        |
| 3   | 4              | 6   | 7        |
|  |                | RDY |          |
| SWAP  | HSD            | SMS | S-J      |

|   |                |     |          |
|---|----------------|-----|----------|
| A-G   | PRE            | INV | CNTL     |
| PROF  |                | RDY | 3 GB38-T |
| 1   |                |     |          |
|   |                |     | PWR      |
|   | AD 6.00SEC     |     | ON       |
|   | IMP ANG 45     |     |          |
|   | IMP VEL 800FPS |     | RP       |
| TGT STPT  | ID 16          |     |          |
| Range 409   | IAFM A-4M      |     | 1        |
| 3   |                | 6   | 7        |
|  | RDY            | SMS | S-J      |
| SWAP  | HSD            |     |          |

Once all the bombs are away you can safely turn away and egress the target area.

## Scenario 2: Low Altitude Loft, 4 bombs on 2 targets

In this scenario we will drop 4 bombs on 2 pre-planned targets. From low altitude allowing us very low exposure to ground threats at the target area. We will program our weapon at altitude, and then descend for the actual drop. This Method is best used when target is protected by Surface threats and NOE flight is the best option to get to the target. With practice, you should be able to complete the weapon delivery and be back in low altitude speeding out of the target area in 600 kts in less than 30 seconds.

### Ingress flight parameters:

Altitude: 100-500 ft AGL.

Speed: 420-540 kts (CAS).

From the 4 targets available for us in this training, we will use 15 and 17 this time.

Once in the JDAM DED page we'll program the targets to the first two slots. As we did in the previous scenario. However, this time around, we have some more parameters to adjust.

We need to set the bomb impact angle to 35 degrees, as this is also used for the Loft cue calculation and we will need to set the number of bombs per target to 2 bombs.

As we've seen before the Input fields on the JDAM page are:

| Impact angle<br>(INOP – used for release cue in loft) | Impact azimuth | Impact velocity (INOP) | No. of bombs on target | Target waypoint |
|---|----------------|------------------------|------------------------|-----------------|
|   |                |                        |                        |                 |

And we move between them the the DCS SEQ. Reminder, hitting DCS RTN will drop you back to the main DED page.

We should end up with the DED page looking like this:

|         |     |              |
|---------|-----|--------------|
| BC      | AUT | 00           |
| 35      | 0   | 800 2 15 :SP |
| 35*000* | 800 | 2 17 :SP     |
| 45      | 0   | 800 1 0 :SP  |
| 45      | 0   | 800 1 0 :SP  |

once this is done, use DCS RTN and return to the main DED page.

These settings actually tell our weapon system that we allow maximum of two bombs to each target.

However, this does not mean the the weapon system will release two bombs. To do that, we need to change the bomb ripple value in the SMS MFD as shown here:

|                     |                |         |
|---------------------|----------------|---------|
| A-G PRE             | INV CNTL       |         |
| PROF                | RDY 4 GB38-T   |         |
| 1                   |                | PWR ON  |
|                     | AD 6.00SEC     |         |
|                     | IMP ANG 35     |         |
|                     | IMP VEL 800FPS |         |
| TGT STPT ID 17      |                | RP 2    |
| Range 409 IAFM A-4M |                |         |
| 3 4                 |                |         |
| SWAP HSD RDY        | SMS            | 6 7 S-J |

This Setting actually sets the maximum number of bombs to release when the pickle is pressed.

The actual number of bombs released on a pickle press will be the lower number of the two (SMS or DED). Assuming that you will be inside the release basket (carrot is in the DLZ). Once you move out of it. The computer will stop releasing weapons.

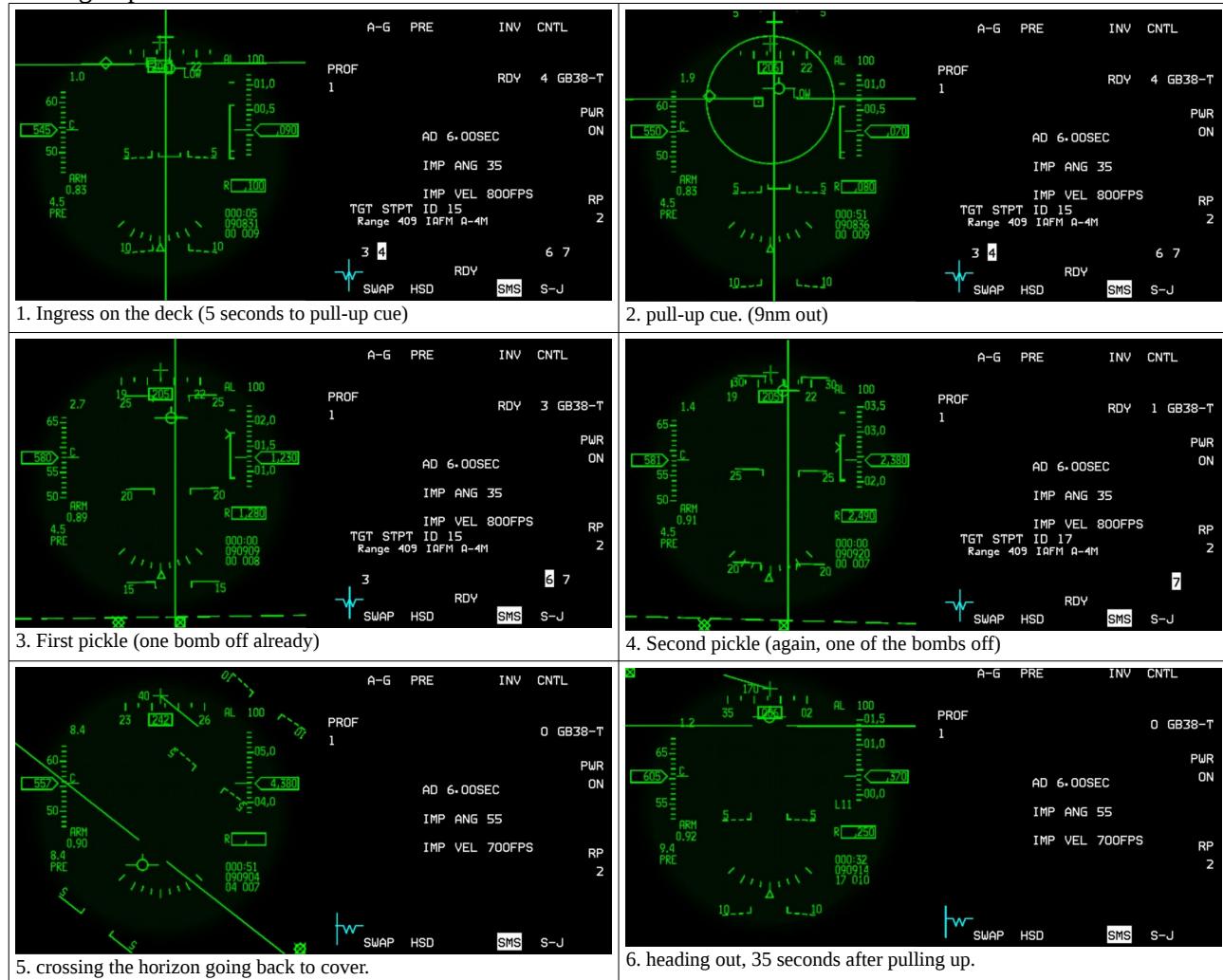
After crossing WP4, descend to low altitude, and cruise along to the IP. Once at the IP, turn towards the target WP6 and switch to A/G Master-Mode if you are not in it already.

At about 20nm from the target, go to full mil, let the plane pick up as much speed as possible. In heavy configurations (like 2XGBU-31 with 3 fuel tanks) you might top out at about 520kts, in light low drag configuration, like we have here, the plane will happily accelerate, try and keep your speed under 560kts to avoid possible damage to the bomb fuses causing them not to detonate on impact.

As you approach the target, a solution marker will drop along the ASL, once it reaches the FPM, a pull cue circle will flash to the HUD. Start pulling up your nose gently (3-4Gs) and kick in to full AB. Stop pulling up when you reach 30-35 degrees. As the nose comes up a second solution marker will appear, press and hold the Pickle, the bombs will release once it crosses the FPM. Once the two bombs are off, release and repress the pickle. This will step to the next target and drop the second pair. Once they are off, roll 135 degrees and start the pull out. In some cases, your nose will not reach the 35 degrees pitch up angle, and you will be

crossing back the horizon topping off at about 3000-4000ft AGL. Because of this and the speed, DO NOT attempt to perform a split-S, if you are with wing tanks, you are limited in the amount of G you can pull, and combined with the very high speed, you will not be able to pull out.

Lofting in pictures:



#### Scenario 3: High altitude, 4 bombs on to 3 targets (a challenge)

In the first two scenarios we have covered two basic scenarios. But they are merely show two options, the variations are unlimited.

So this scenario, you are tasked to go after 3 of the targets, with the following weapon allocation:

Target 15 – 1 Bomb

Target 16 – 1 Bomb

Target 17 – 2 Bombs

You should be able to perform this in 3 presses on the Pickle button. Good luck.

## JDAM – IAF Sufa Specific

### AIRCRAFT:

IAF F-16I Block 30 (Sufa).  
1x300 Gal wing tanks  
4xGBU-38 Training Munition  
2xCPython-4  
2xCATM-120

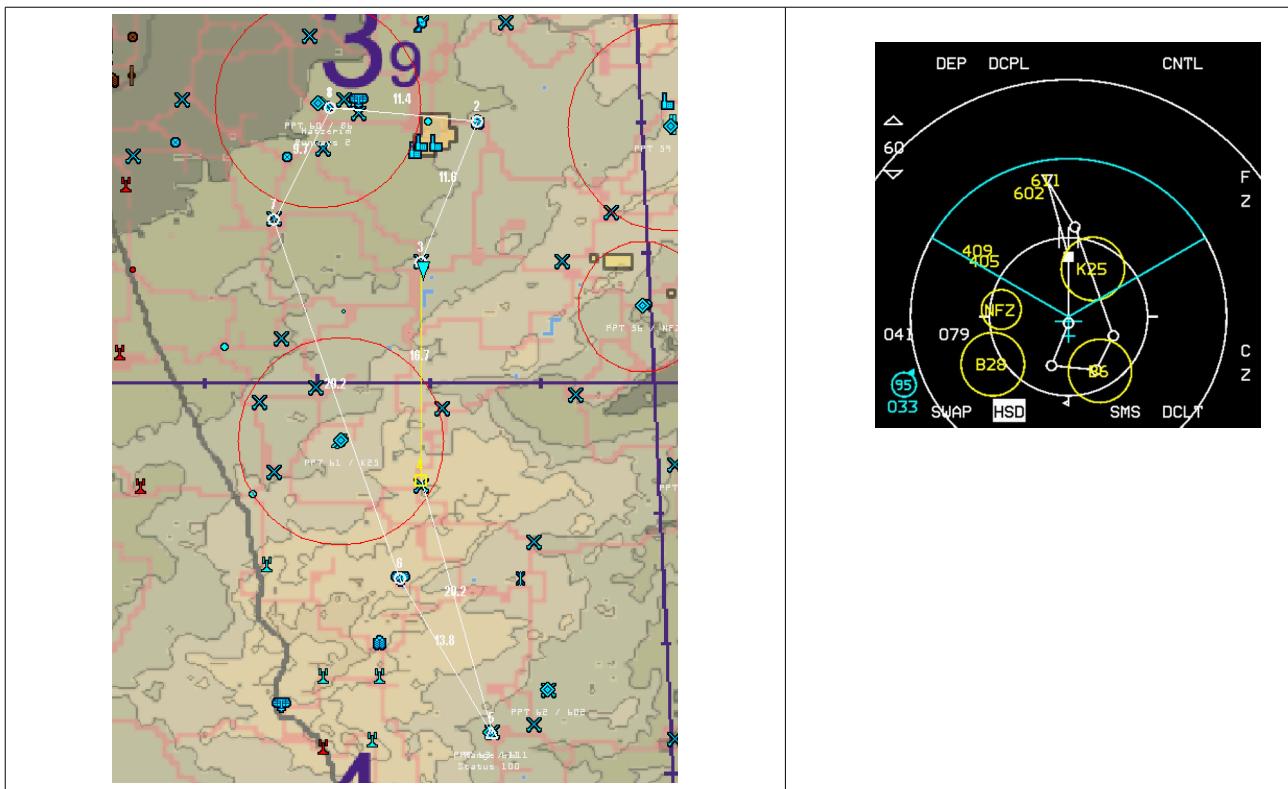


TAKEOFF OPTION: In-flight

LOCATION: South of Beer-Sheva, Approximately 45NM North of range 611

GOAL: Learn to Employ JDAM bombs using Sufa specific avionics

Range 611 is a target range intended for dry runs or using inert weapons. In today's training we will be dropping an inert GBU-38s.



## Training scenario: High Altitude, 4 bombs on 4 targets

In this scenario we will drop 4 bombs on 4 pre-planned targets, from a medium to high altitude at normal cruise speed. In a very similar scenario to what we have done on the Barak JDAM training. However, The Sufa avionics is slightly different the the Barak avionics. The main difference as far as IAM weapons are concerned is the ability of the FCC to cycle through the targets without releasing the Pickle.

### Ingress flight parameters:

Altitude: 15,000-25,000 ft. (MSL)

Speed: M0.8 – M0.9

And another reminder, when using this delivery method, make sure you have air-superiority beforehand, unless you like being shot at.

The targets, old UH-1 frames already pre-programmed to waypoints 15-18



As soon as you enter the cockpit, You will also need to power up the weapons – We'll not got over that again, as it is identical to the Barak tutorial. This needs to be done quickly, as we start closer to the target range then in the Barak training. Again, you can use Freeze to have more time for everything.

now that we have powered the weapons, let's program them.

Targets are 5 UH-1s on the 611 target range. Four of them are already pre-programmed to waypoints 15-18 on the DTC. Entering the DED page is the same as in the Barak.

|    |       |          |
|----|-------|----------|
| BC | AUT   | 00       |
| 45 | 0 800 | 1 15 :SP |
| 45 | 0 800 | 1 16 :SP |
| 45 | 0 800 | 1 17 :SP |
| 45 | 0 800 | 1 18 :SP |

However there is a slight twist. Because we want to harness the Sufa avionics to drop all the bombs in a ripple. We need to set the Ripple to 4 in the SMS. So you should end up with something like this on the DED

|       |       |                |          |
|-------|-------|----------------|----------|
| A-G   | PRE   | INV            | CNTL     |
| PROF  |       | RDY            | 4 GB38-T |
| 1     |       |                |          |
|       | PWR   | ON             |          |
|       | AD    | 6.00SEC        |          |
|       | IMP   | ANG 45         |          |
| TGT   | STPT  | IMP VEL 800FPS | RP       |
| Range | ID 15 |                | 4        |
| 611   | RNG   | - Target South |          |
| 3 4   |       |                |          |
| SWAP  | HSD   | RDY            | 6 7      |
|       | SMS   | S-J            |          |

Once you reach the target the drop is intuitive. Once the carrot drops into the DLZ, press and hold the pickle till all the bombs in the ripple have been dropped and exit the area.

Feel free to run this scenario and experiment with other scenarios, like lofting 4 bombs to 4 targets (possible with the Sufa because of the short pickle delay on the ripple) or dropping different number of bombs on different targets.

DED and SMS page

## SPICE – Stand-off autonomous weapon

### AIRCRAFT:

- IAF F-16C Block 30 (Barak I).
- 1x300 Gal wing tanks
- 4xSPICE 2000 (live munitions)
- 2xCATM-9



TAKEOFF OPTION: In-flight

LOCATION: Over the Ashkelon, Approximately 75NM North-West from range 602

GOAL: Learn to Employ SPICE bombs using IAF specific avionics in a complex scenario.

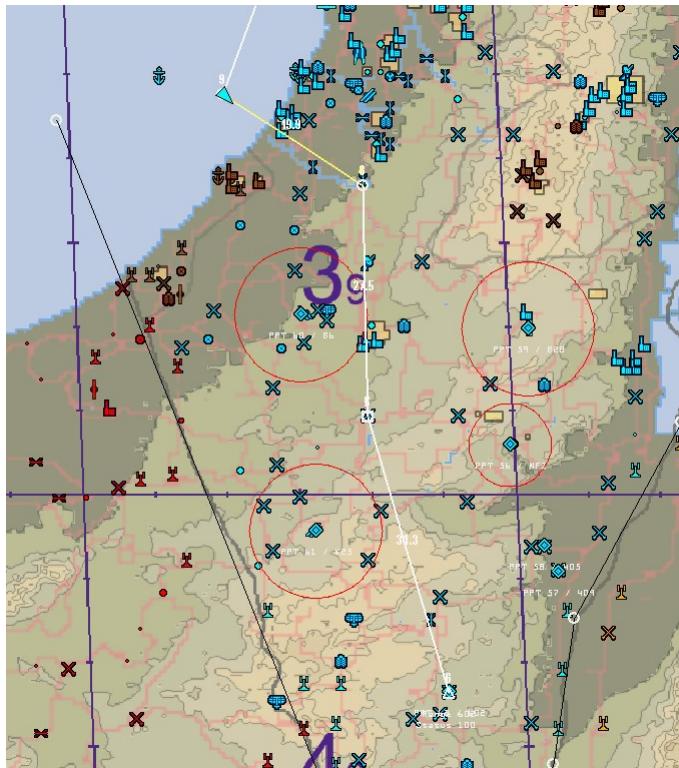
The SPICE is an Israeli autonomous standoff gliding weapon, giving you (in BMS) about 20nm range from 18kft. SPICE incorporates GPS and image recognition to allow pinpoint accuracy in all weather conditions and in GPS jamming conditions. It also allows the weapon to hit specific part of the target, for example a specific window. But this ability is not modeled in BMS.

In BMS 4.33 you will find 4 variants of SPICE weapons.

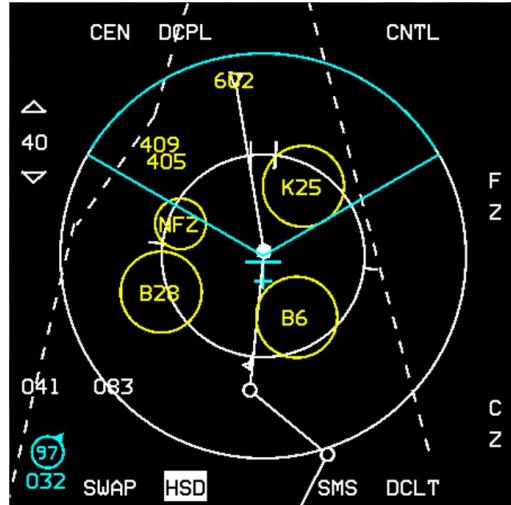
The SPICE2000 are the heavy hitters, the “classic” SPICE if you will. The warhead is a 2000 lbs GP bomb. MK-84 on the normal one, and BLU-109 on the penetrating variant (marked with P).

The SPICE 1000, are a long range variant, using the smaller MK-83 as a warhead, and sporting a set of deployable wings, they can reach out further. They don't have the same punch, but can definitely get to places the 2000 pounds version cannot. Again, the P marks the penetrating version. For those tough to destroy bunkers.

Range 602 is a live firing range used to evaluate advanced weaponry, unlike the other ranges, which are mostly used for dry runs or use of inert training munitions. In this range, a set of targets are placed to be used for live weapons – like the one we will be using today.



Route and HSD for the missions



As opposed to JDAM, the SPICE has NO ability to strike targets of opportunity, but is limited to pre-programmed targets, making it only useful against static targets. However, the weapon uses a dedicated memory module, allowing up to 100 targets to be stored. This allows the aircraft to launch multiple weapons onto multiple targets in one volley.

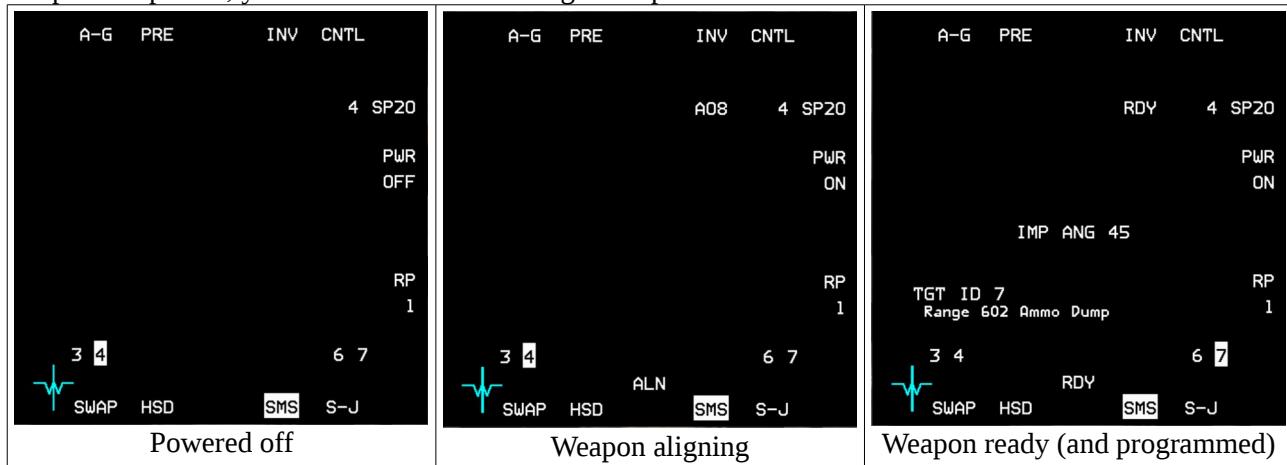
Before we go into the actual usage, there is a quick note about programming the weapon. Unlike JDAM (or any other weapon), the target data is saved on a dedicated cartridge rather than on the DTC. So to program the bomb, you will need to save it as "WPN\_TGT" in the recon screen, as shown here. There are 99 targets available (1-99) and they do not conflict with the aircraft NAV system.



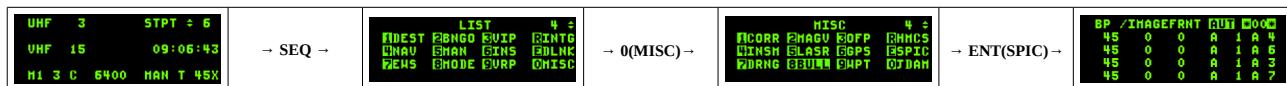
## Training Scenario

This training is based on earlier knowledge in IAF JDAM Avionics, as the operation is very similar. If you feel like something is missing, I would suggest going over the JDAM training again.

As with the JDAM we would need to power up the weapon and allow 3 minutes for alignment. As there is no power-up limit, you can turn the bombs on ground prior to takeoff.



Programming the weapons is again performed from a dedicated DED page (available in all Master Modes). And of course, IAF jets have a slightly different DED from the USAF fighters. There is no LIST button, instead, you use the DCS SEQ function to bring up the list.



The input fields are similar to those of the JDAM, However most of them are INOP in F4 can be ignored:

|                      |  |                         |                    |  |
|----------------------|--|-------------------------|--------------------|--|
| "BP"                 | Selected target reference Image (INOP) |                         | Weapon mode (INOP) | Requested impact point on image (INOP)   |
| Impact angle (input) | Impact azimuth (input)                 | Target waypoint (input) | "A 1"              | weapon station (automatically generated) |

Bomb station is generated by the number of bombs available "A 4" is the first Bomb on station 4.

Target waypoint: Target ID in the data cartridge (for this training the targets has already been preloaded to slots 1-7)

Impact angle: the angle in which the bomb will try to hit the target. 90 is pure vertical. 20 is the flattest angle possible. For most cases - stay with the default.

Impact azimuth: No input (a single "0") means the bomb will fly directly to the target. Putting in an azimuth allows the bomb to come from a different direction avoiding hill or other obstacles. (with of course limitations to how much the bomb can turn. 60 degrees is pretty much the maximum and it will cost you in range)

Unlike in JDAM mode, here the targets are assigned per bomb. And you can switch between the current "target" by using MSL STEP to select the next weapon.

For this training we will attack targets 4-7 which are the four buildings on range 602.

However, target 5 is a flat vertical strafing target so for that we will put in special settings. We'll set Impact angle to 20, and azimuth to 140. after configuring the weapons, your DED screen should look similar to this:

| BP / IMAGEFRNT AUT 000 | BP / IMAGEFRNT AUT 00 | BP / IMAGEFRNT AUT 00 |
|------------------------|-----------------------|-----------------------|
| 45 0 0 A 1 A 4         | 45 0 4 A 1 A 4        | 45 0 4 A 1 A 4        |
| 45 0 0 A 1 A 6         | 45 0 5 A 1 A 6        | 20 140*               |
| 45 0 0 A 1 A 3         | 45 0 6 A 1 A 3        | 5* A 1 A 6            |
| 45 0 0 A 1 A 7         | 45 0* 7* A 1 A 7      | 45 0 6 A 1 A 3        |
| Default                | Targets configured    | Special settings      |

The cool thing about this weapon is that it's not relaying on the aircraft for anything except position update. Meaning that the release can be a lot quicker. In addition, on the SMS page you can see the target assigned to each bomb and they can be cycled through to drop on specific target. To drop multiple bombs on a cluster of targets, just set the bomb Ripple from the DED. To get two bombs on the same target, you'll need to program the same target to both bombs manually.

| A-G  | PRE | INV        | CNTL   |  |  |  |
|--|-----|------------|--------|--|--|--|
|  |     | RDY        | 4 SP20 |  |  |  |
|  |     |            | PWR ON |  |  |  |
|  |     | IMP ANG 20 |        |  |  |  |
|  |     | IMP AZ 140 |        |  |  |  |
| TGT ID 5   |     |            | RP     |  |  |  |
| Range 602 RMG - Vertic Tgt2                        |     |            | 1      |  |  |  |
| 3 4  |     | 6 7        |        |  |  |  |
| SWAP HSD   | RDY | SMS S-J    |        |  |  |  |
| Showing target and settings for a single bomb drop |     |            |        |  |  |  |
|  |     |            |        |  |  |  |
|  |     |            |        |  |  |  |
| A-G  | PRE | INV        | CNTL   |  |  |  |
|  |     | RDY        | 4 SP20 |  |  |  |
|  |     | PWR ON     |        |  |  |  |
|  |     | IMP ANG 45 |        |  |  |  |
|  |     |            | RP     |  |  |  |
| TGT ID 6   |     |            | 4      |  |  |  |
| Range 602 Control Center                           |     |            |        |  |  |  |
| 3 4  |     | 6 7        |        |  |  |  |
| SWAP HSD   | RDY | SMS S-J    |        |  |  |  |
| Ripple of 4 bombs set                              |     |            |        |  |  |  |



HUD is standard IAM weapons display. However, if a limiting factor is dialed in (I.e azimuth or impact angle). The DLZ will show an internal DLZ. Launching outside of that internal limit means that the bomb cannot comply with the settings you have selected, and will instead fly straight to the target (rejecting your settings).

Shown here is the DLZ for target 5.

Note that the carrot is just entering the inner DLZ. Also note that from around 17kft, we get to drop from 15nm WITH a maneuver for the bomb (it's around 18nm without maneuvering).

Once all bombs are released, egress the target area.

## GBU-15 – Heavy hitting Man In The Loop

### AIRCRAFT:

IAF F-16D Block 40 (Barak II).  
2x370 Gal wing tanks  
1xAN/ASW-55  
1xGBU-15 TV  
1xGBU-15 IR  
2xCATM-9



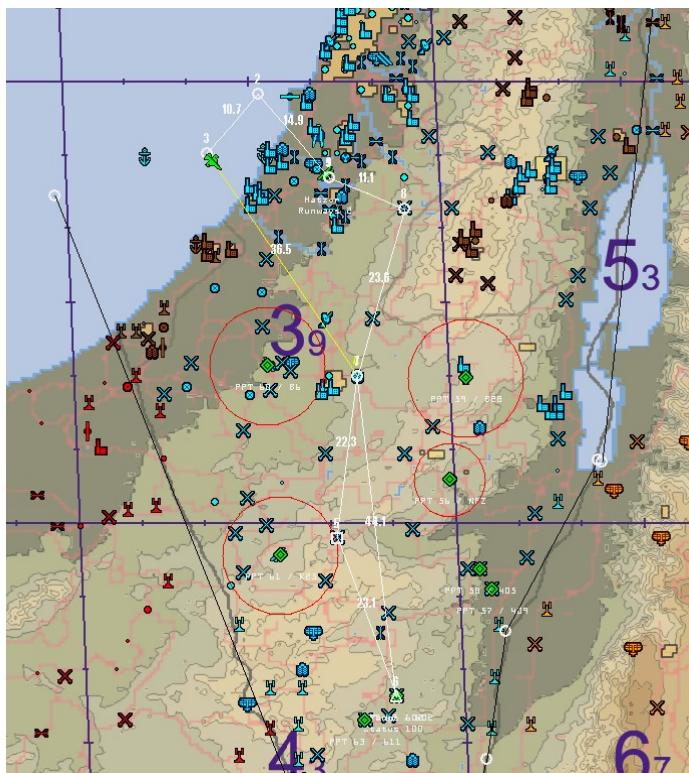
TAKEOFF OPTION: In-flight

LOCATION: Over the Ashkelon, Approximately 70NM North-West from range 602

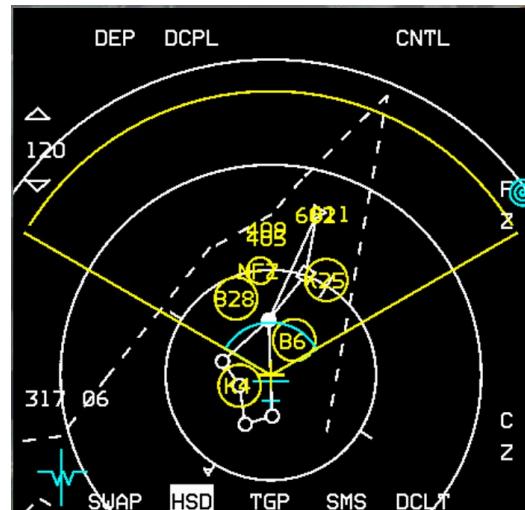
GOAL: Learn to Employ the GBU-15 against a static stationary target

Range 602 is a live firing range used to evaluate advanced weaponry, unlike the other ranges, which are mostly used for dry runs or use of inert training munitions. In this range, a set of targets are placed to be used for live weapons – like the one we will be using today.

The GBU-15 is a gliding bomb, guided by the WSO in the back seat using a TV or a FLIR camera in the nose of the bomb. It uses MK-84 or BLU-109 warhead and allows pinpoint attack on fortified targets from stand off ranges. From 16kft, you should be able to drop at about 16nm. The bomb have two variants, in ITO TV and IR. For this mission you carry one of each. As this is a day scenario, it doesn't matter which one you will drop in this training. But on pre-dusk and night missions, make sure you load the IR version.

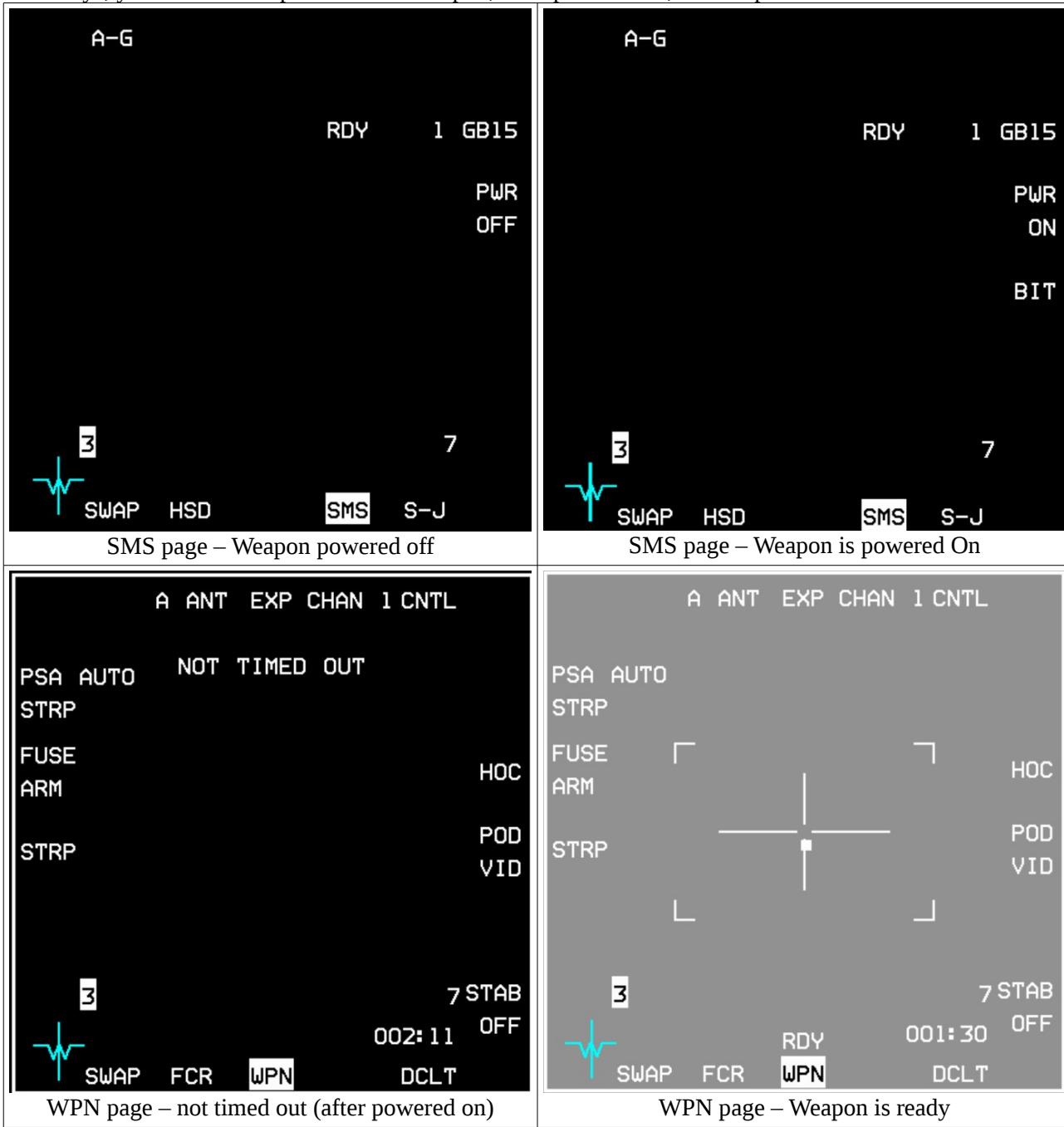


Route and HSD for the missions



## Powering the weapon

As always, you will need to power on the weapon, once powered on, the weapon needs 3 minutes to timeout.



Before you continue it is recommended to go over the MITL chapter in the BMS manual, as not everything will be explained here. The important fields you should know:

### Weapon mode:

in the pictures above it says STRP. Possible modes are:

STRP – weapon is strapped to the aircraft

LOFT – weapon is not steering and flying a ballistic arc, this is the default mode when weapon is released.

TRANS - “cruise mode” weapon is steering in yaw only pitch is set to get a gliding range.

TERM – Terminal homing phase, weapon will steer in pitch and yaw, attempting to “center the dot” in addition to that, there is a sub-mode in TERM, which is ground stabilized, but that is something that is indicated by the symbology. (which will see later).

POD VID – when marked, the video feed is coming from the datalink pod. When de-selected, it's coming from the weapon strapped to the wing.

FUSE ARM – when marked the bomb will detonate on impact. When not selected, the weapon will be inert

on impact. Remember to ARM the weapon before impact. It is recommended to do that arm the weapon as soon as the target has been positively identified and you are committing (switching to TERM).

A ANT – when marked the rear antenna in the pod is used, then not selected, the front facing antenna is used.

EXP – same as with every other sensor/weapon, expands the FOV.

### Scenario 1: MITL basics – “Image matching”

The most basic skill you will need while employing these medium range MITL weapons is to find your target. To do that, you'll need to be able to correlate where the weapon is looking to where the target is. In BMS your best friend is the TGP as it allows you slave it to a target coordinates (either pre-planned or target of opportunity).

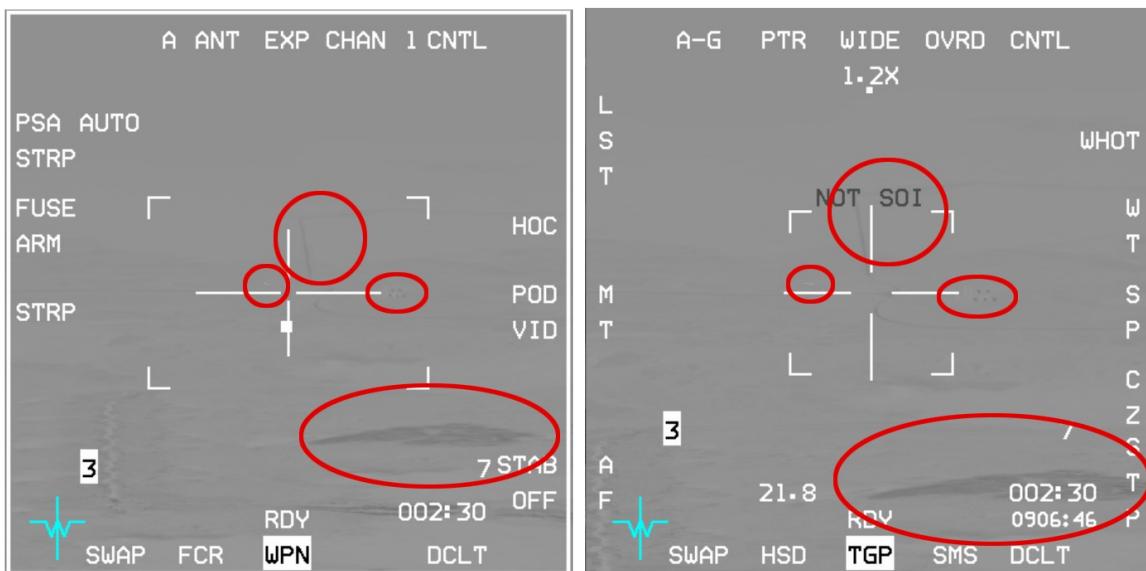
Normally, you would have the TGP on the Left MFD and the WPN page on the right, but because the HSD is so important for situational awareness, it is recommended to put the WPN page on the L-MFD and the TGP on the R-MFD. However this is personal, so feel free to find your comfort zone.

So our training begins with not dropping weapons. Just learning to find targets.

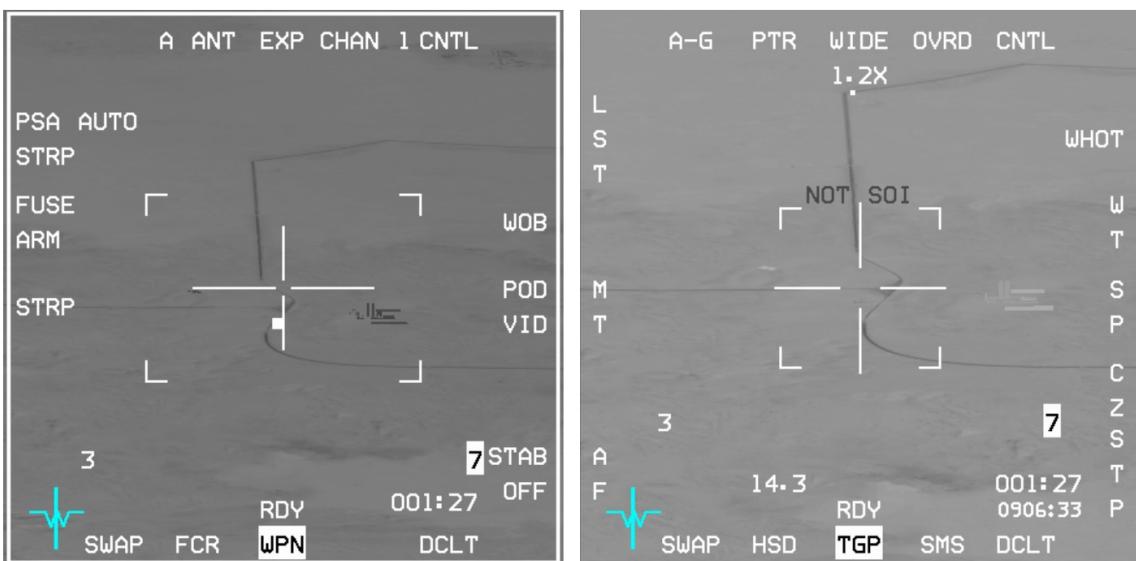
Waypoints 4-8 all sit on different objects, so you can fly along the route, practicing locating targets.

In long ranges, it's easy, you have the TD on the HUD, you just place the circle that represent where the weapon is looking, on the target, and that's it. However, as you move closer, the TD will drop below the HUD lower limit. Use the ASL to guide the circle down until you locate the target, in longer ranges you won't see the target, but you'll see the terrain around it.

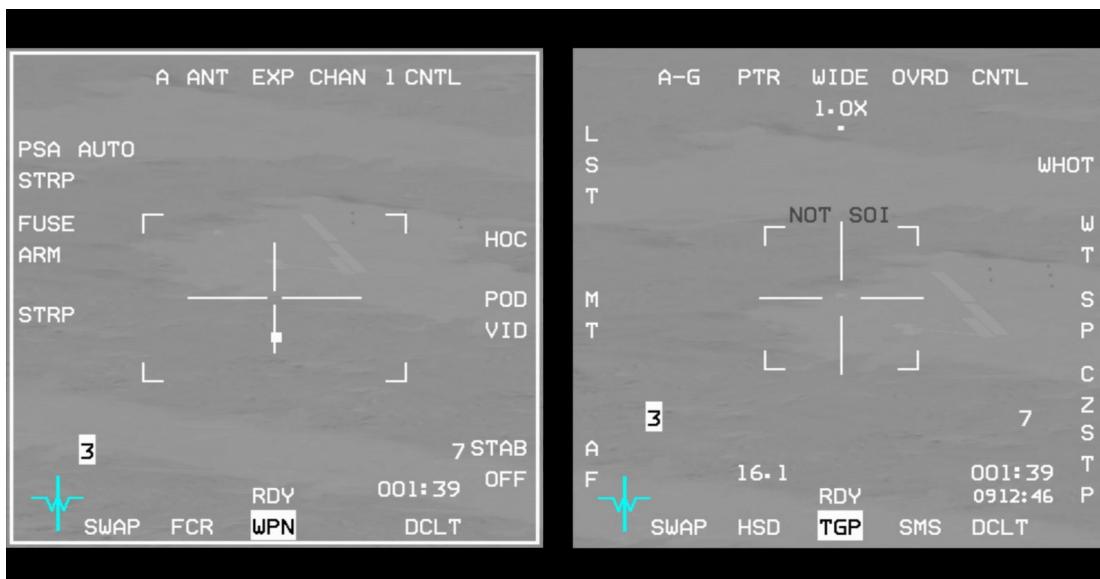
Here are a few examples



Waypoint 5 – note the the distinct features, the dark patch, the bend in the road and the junction with buildings on both sides.



Same target at shorter range, this time from the TV seeker of the weapon on the right wing. Note the bend on the road, and the way the junction is built.



Waypoint 6, the runway is the dominant feature.

Once you feel comfortable with identifying targets, you can continue to the next training scenario.

## Scenario 2: Dropping GBU-15s

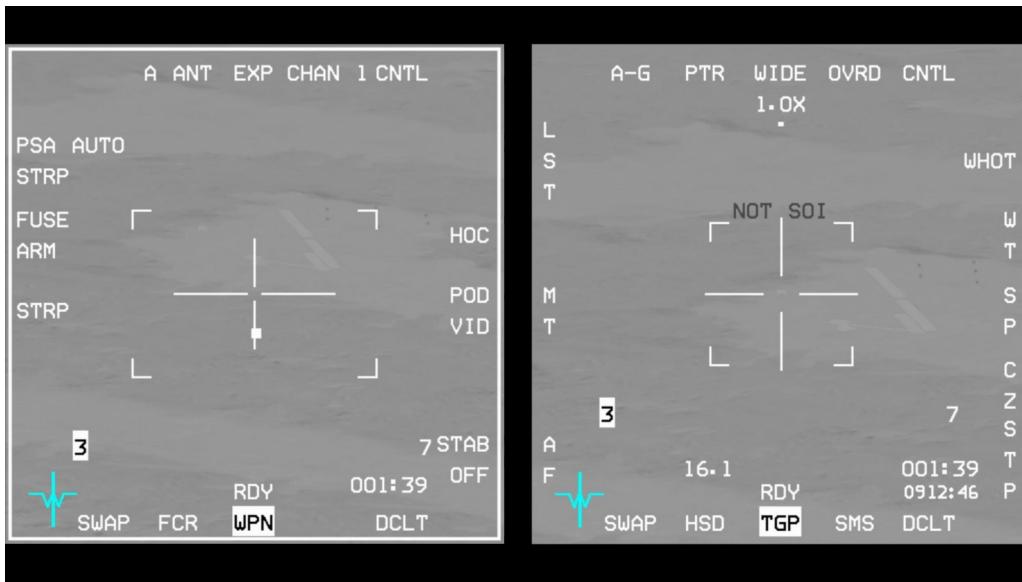
Now that you got the idea of how to find the target, it's time to hit it.  
Our target is that big building, just east of the runway on the 602 target range.



It is position on waypoint 6, and you have already should have seen it in the previous practice session.

After powering on the weapon, you may want to program the autopilot to hold heading of 270. because after the drop, you aircraft will be very imbalanced as you are dropping a 2500lbs bomb from one wing. While retaining one on the other. So having the AP hold altitude and heading will help you considerate on guiding the bomb. Because as the name suggest, this one require a man in the guidance loop for several key actions, so you'll have plenty on you hands without fighting the aircraft. You must be comfortable with all this, because when the time comes, you will be dropping this weapon while being shot at.

Once you have located the target range with the weapon camera it's game time, however, don't be afraid to extend or move a bit if you have clouds blocking your line of site. Once you turn in from the IP, you'll have about 10 nm to locate the target and drop if you want to maximize the stand off potential.



Once again, this is the target in the TGP and on the WPN cam.

Notice that this is predrop – as the weapon is in STRP mode. And we are 16.1nm from the target (as indicated in the TGP).

It's almost time to drop. It is recommended that you pull the nose slightly up prior to bomb drop, as it tends to pitch down, so arching it up, will give you more time “to catch it”.

The first two seconds after the release are important, as they will help you “catch the bomb” quickly. As you

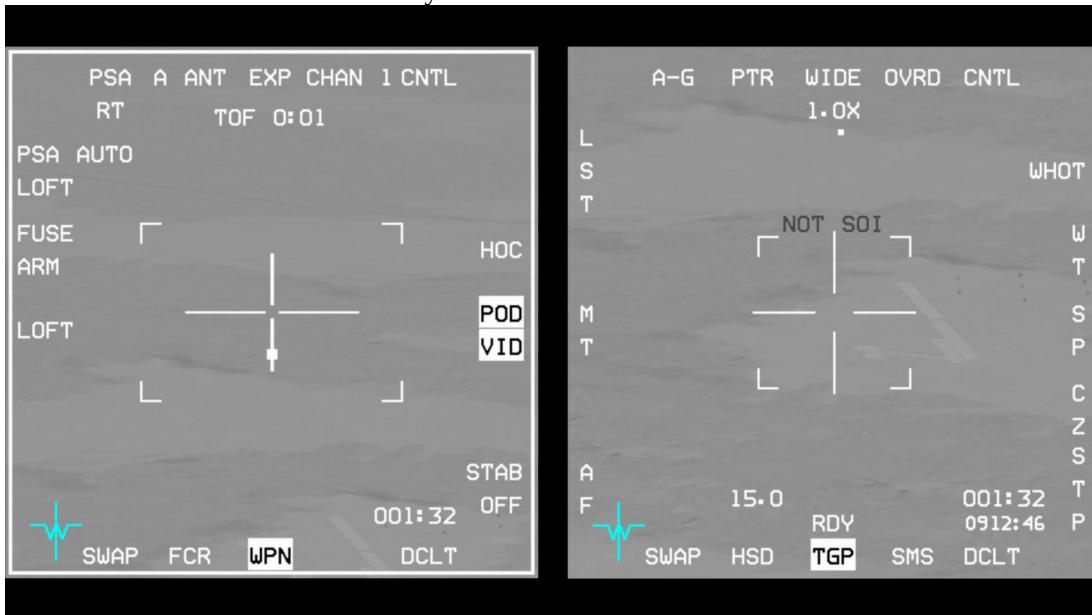
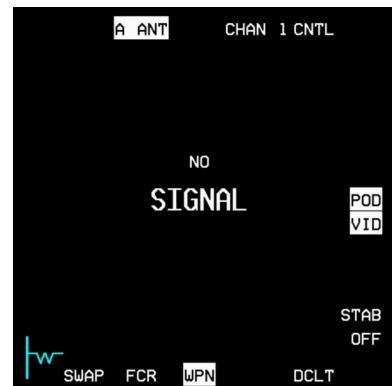
get more experienced with this weapon, it will become easier, but for the first few drops, make sure you “do it right” it will make it easier.

Before the drop, make sure you use the forward antenna, as the weapon is leaving the aircraft, this antenna will allow you to switch the bomb to TRANS mode very quickly.

But there is another screen you should know.

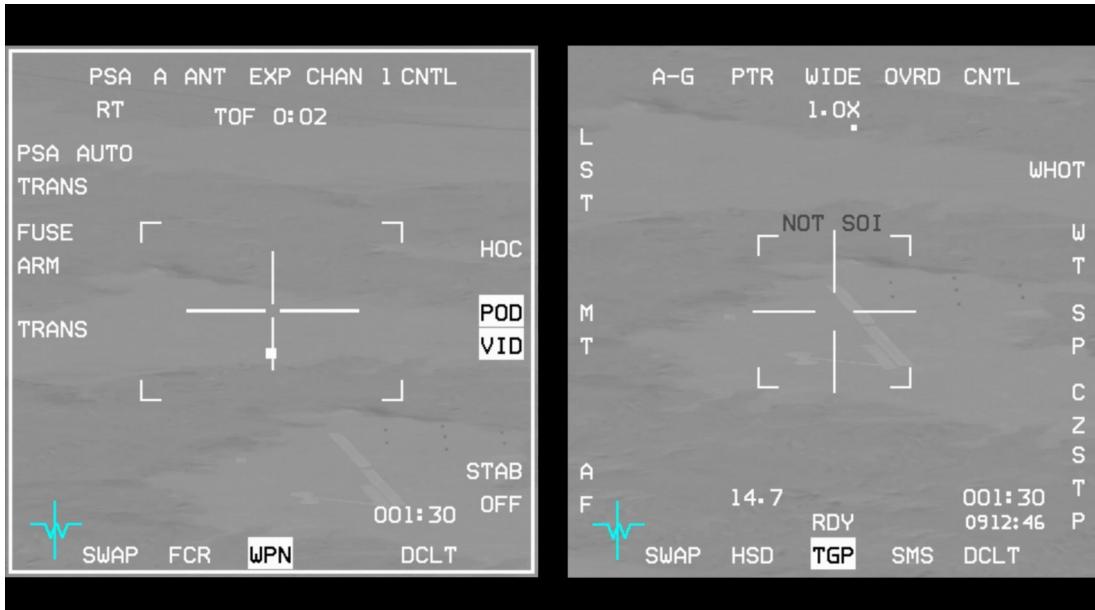
When POD VID is on, and there is not signal from the bomb, usually when it moves out of the antenna reception zone. You'll see it quite a bit – and that is normal, but you need to make use that in the final stages, you have a clear and stable signal, as this is the most critical part and the bomb might miss.

It's drop time, A normal GBU-15 drop will hit the target somewhere between 90 to 120 seconds after release. Might sound like a lot of time, but it is VERY short and packed. As most of the first minute is a big “blink” as you maneuver out of the immediate target area causing the pod to lose LOS to the weapon. Leaving you less than a minute to locate the target and steer the weapon into it. So feel free to PAUSE or FREEZE as much as you need.



When released, the POD VID will turn on automatically, and Time Of Flight counter will appear on the WPN page. You can see that the bomb is in LOFT mode, feeding video via the DL pod and looking slightly above the target range.

Once the weapon is dropped in “straight and level”, the first thing you should do is switch it to TRANS mode.

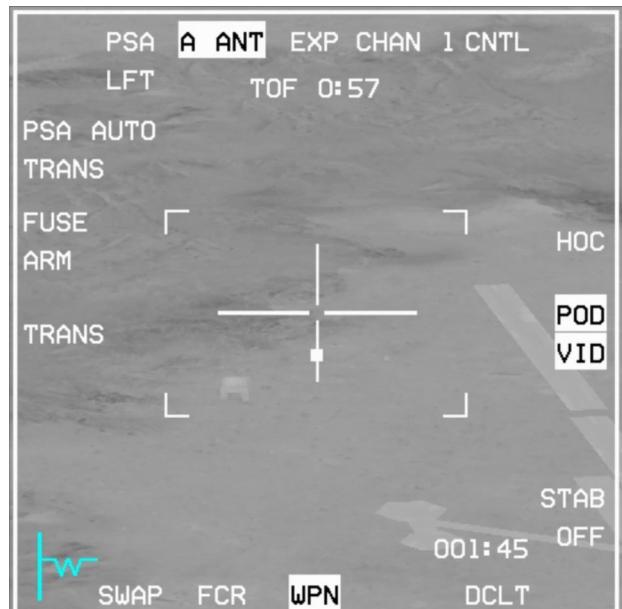
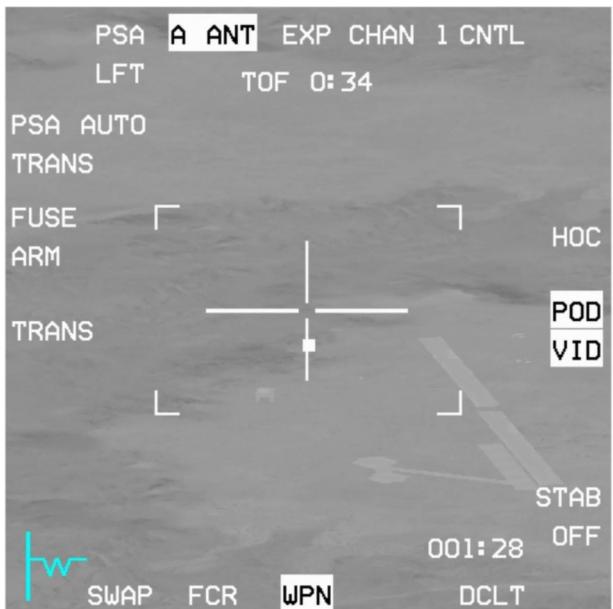
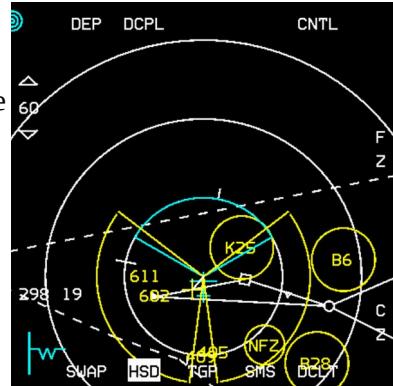


This can be done by either pressing the MFD PB next to the mode label, or use TMS UP on the stick. It is very important to remember, that once you have switched mode, you cannot go back the previous mode. So use this switching smartly. TRANS will allow us limited steering of the weapon, without bleeding too much energy from the weapons. Once you switch to TRANS the bomb will pitch down, don't worry about this, the weapon will stabilize on a flat dive angle allowing it to maintain energy.

Once you have the bomb in TRANS, let's switch to the Aft Antenna. And turn out and catch the bomb on the rear antenna. Start turning, our goal is to put the target about 140 degrees off our nose. So it's behind us and to the left or right. You can use the HSD to make sure the target area is covered by the antenna.

Now that we are heading out, you can engage the AP for altitude and heading hold. This will help you maintain Data link to the weapon, as it will hold steady even with the extreme weight imbalance.

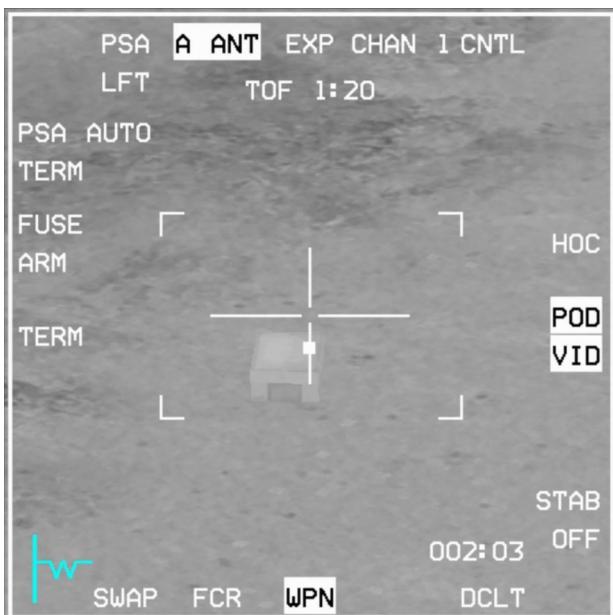
Let's look at the guidance sequence...



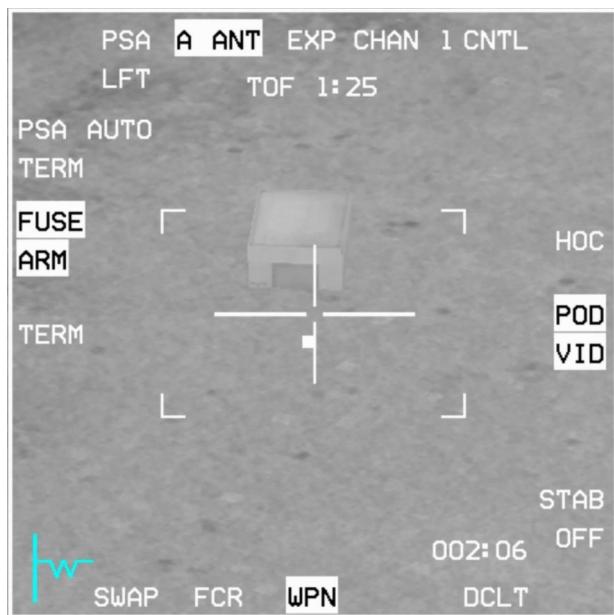
1. On Aft antenna, in TRANS.

Target is visible just left and below the cross-hairs (target to our left – indicated by the PSA LFT label)

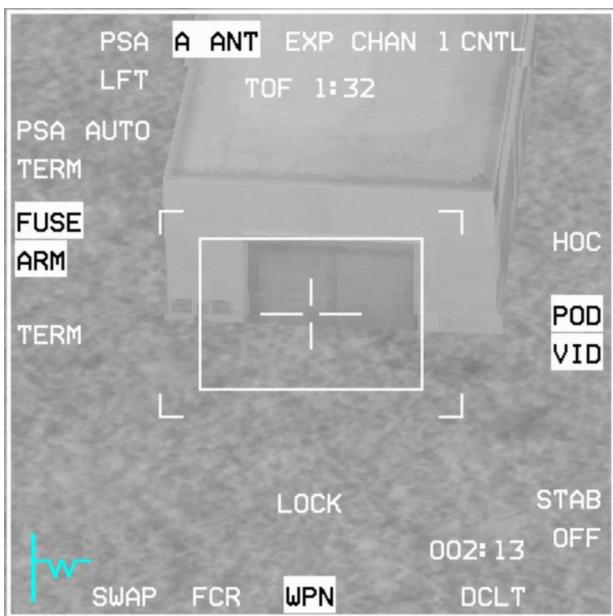
2. bombs is moving closer, we can clearly see the target now



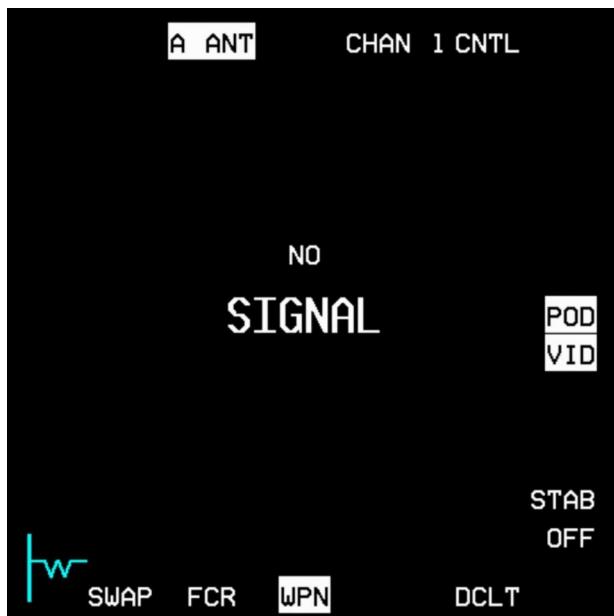
3. target identified, TMS UP to to into TERM. Start putting the crosshair on the target.



4. Target is verified, and we are committed. It's time to Arm the bomb.



5. TMS UP again, we switch to ground stabilized mode. The bomb will now steer to the selected aim point. You can update the aim point at any time by moving the cursor and confirm with TMS UP



6. Weapon hit, it's No Signal again. Time to reset for the next weapon. Hit POD VID to revert the display to the second strapped weapon. You can drop that one on the range too if you like.

**Note:** If the weapon has ground stabilized mode, (like the GBU-15) USE IT. Locking on the target ensures the weapon will impact even if you lose DL to the weapon from some reason. So if possible lock the weapon and Arm the warhead as soon as you positively confirm the target. You can always update the aim-point as the weapon goes closer.

## IMI Delilah – Hunter's weapon of choice

### AIRCRAFT:

IAF F-16I Block 52 (Sufa).  
2x370 Gal wing tanks  
1xAN/ASW-55  
1xDelilah TV  
1xDelilah IR  
2xCATM-9

### TAKEOFF OPTION: In-flight



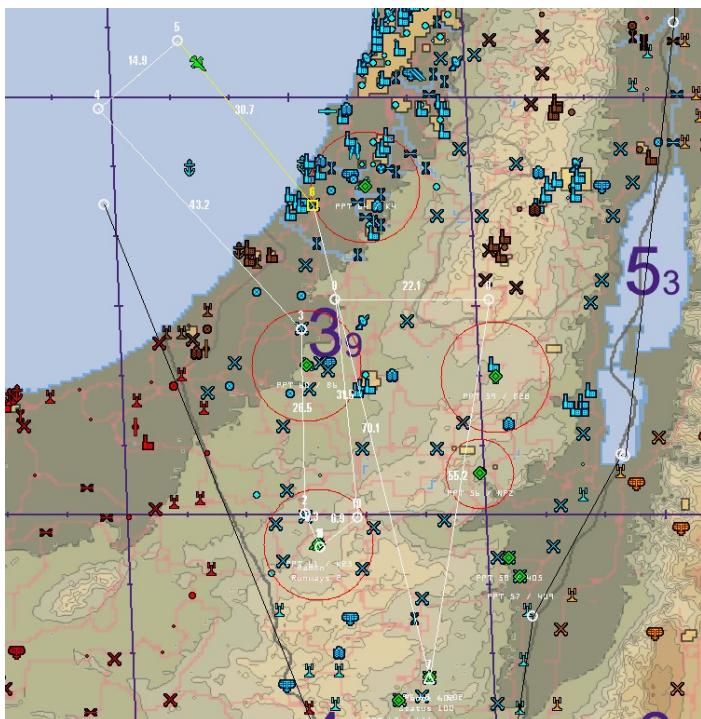
LOCATION: over the Mediterranean, Approximately 110NM north-west of target range 602.

GOAL: Learn to Employ the Delilah MITL missile against small targets at long ranges.

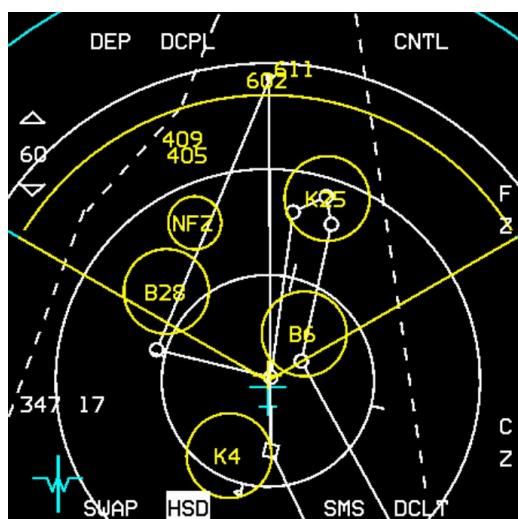
Range 602 is a live firing range used to evaluate advanced weaponry, unlike the other ranges, which are mostly used for dry runs or use of inert training munitions. In this range, a set of targets are placed to be used for live weapons – like the one we will be using today.

The IMI Delilah is a long-range Loitering MITL Weapon, designed to locate and strike mobile targets, such as SAM batteries.

In BMS, The Delilah is a long range 3<sup>rd</sup> Gen MITL weapon, capable of striking targets over 110 nm away. However, due to falcon limitations, the player must be within 80nm for the target to de-aggregate properly. Which dictates a more limiting launch and flight profile. Like it's real life counterpart, the missile weighs just a shy over 400 lbs, forcing a small warhead in favor of range and operation flexibility. The 30Kg (~60lbs) warhead is just enough for a small radar or a vehicle (such as a SAM site FCR). But you would rarely use it against stationary static objects, because of the lack of "punch" (which the GBU-15 has plenty of).



We will start the mission at 18kft, about 30nm from our IP at waypoint 6. Target range is located at waypoint 7. in addition, we will use waypoint 8 and 9 as markers for the guidance holding pattern.



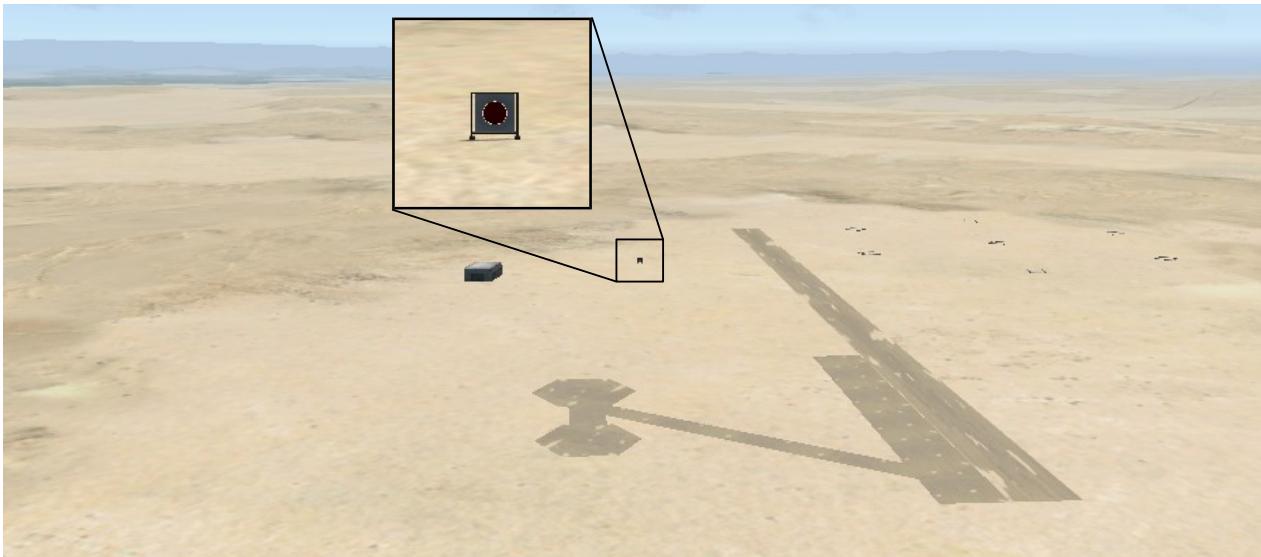
Unlike other weapons, the DLZ of the Delilah in BMS is a guideline. To will allow you to ensure you have enough time as distance to stay out of range for most (if not all) surface to air threats while being deep inside the actual range of the missile (about 110nm).

### Training scenario:

As will most smart weapons, you will need to power on the missile, with 3 minutes warm-up time (same procedure as GBU-15). Due to the range of the missile and it's flight time, it is recommended to keep the HSD up on the R-MFD, and use the L-MFD for the WPN page. The Israeli airspace is small, and we'll need to maintain our holding pattern for 5 to 10 minutes (depending on drop range and exact flight path of the weapon), while keeping ourselves within 80nm of the target range. When going after a target in a predesignated area, it is recommended that you allow about 75nm between the IP and target area, and place your egress point (in this case waypoint 8, 20-30 nm to the side from your IP-to-target vector, about 55nm miles from the target).

It's also possible to add another point about 55-60nm on the vector itself (waypoint 9). you'll see how they are used later. Make sure those points are outside areas of known ground threats (i.e over water or over friendly territory), and as with all MITL weapons, have a buddy in AA mode to watch your back and keep an eye for threats in the area (don't go AG together). The person dropping the weapons cannot be expected to hold formation and maintain SA, so lead/wingman roles should switch depending on the one actively guiding weapons.

First, lets look at the range again, you probably remember it from the GBU-15 training, but this time, we're not going for the building, do you see that little speck between the runway and the building? yeah, that one.. that is where we are going to put a missile in this mission. As you can see it's actually a strafing target.



### Ingress flight parameters:

Altitude: 15,000-25,000 ft. (MSL)

Speed: M0.8 – M0.9

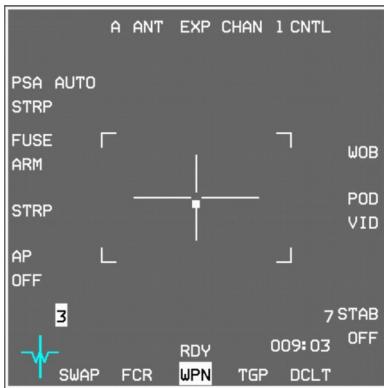
Once in the cockpit, power on the weapon and adjust the MFDs. The missile should be timed out just before you reach waypoint 6 (or immediately after) You have two Delilah missiles, one IR and one TV. As this is a day scenario, it doesn't matter which one you will drop in this training. But on pre-dusk and night missions, make sure you take the IR version.

Another great help for this long range drops, is the AP, use it! That is why the extra waypoints are set. Switch your AP on STRG SEL, with ALT HOLD. It will fly to the selected waypoint (6 initially) while maintaining altitude.



Once you turn it from IP to the target (also using the AP – just advance the waypoint). Once you move inside 65nm or so from the target, you can choose to wait for the DLZ or manually drop (this will come to you with practice, you'll see as we go).

Before we drop, let's make a last quick verification of the settings. WPN is STRP, and A ANT is off (using the FWD antenna).



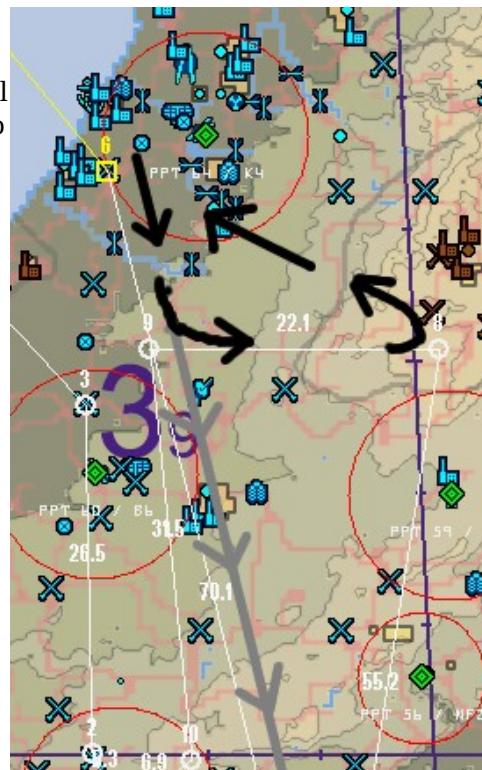
WPN page also sports a new line, compared to the GBU-15. Line currently says "AP OFF". The missile too has an autopilot to assist with flying the distance towards a target you can't see. If allowed, the AP will hit the SPI, but as the missile will rarely be used to attack stationary, known objects, we will take manual control towards the endgame and make sure we hit our intended target.

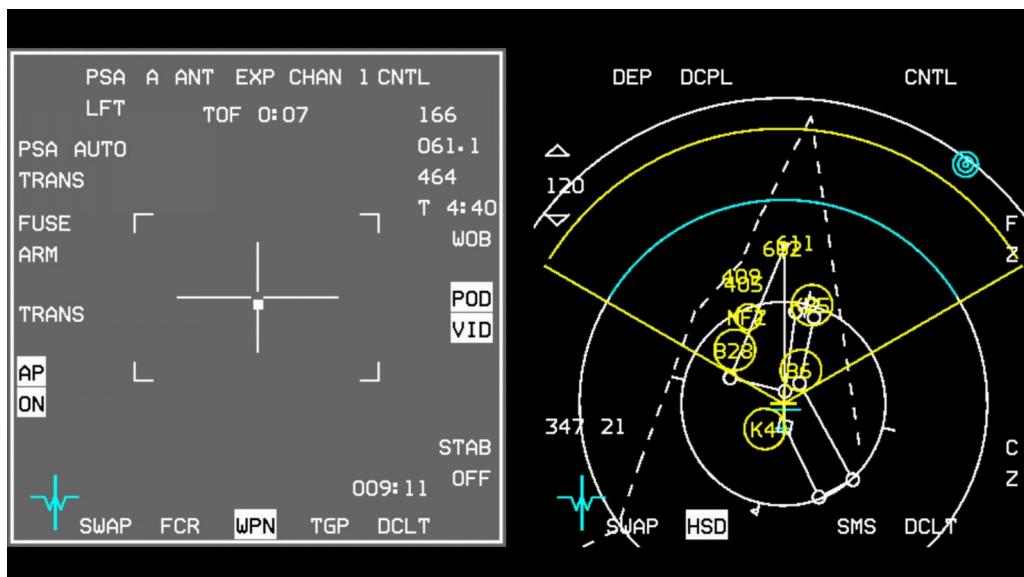
Once dropped, we'll wait for the missile to overtake us (takes about 3 seconds), and just hit the PB next to the AP, it will light up showing AP ON. The missile will now fly to the SPI which is waypoint 7 in our training mission. Depending on the drop distance, flight time should be about 6 minutes in this scenario. As soon as the weapon is flying on its own, turn towards your pre-planned egress point (waypoint 8), this will allow us to start the holding pattern. A 25nm to the waypoint will give us 3-4 minutes (8nm/min@480kts GS). And heading back will give you the same lag time, plus the time for the turn. All of that with constant communication with the weapon via the Aft antenna. So as soon as the signal to the weapon is lost, hit the A ANT PB and behold the image returns.

Now, one important tip is to have the missile under constant watch for the last two minutes of flight. As in those 20nm you will be able to identify the target, and guide the missile for a good terminal guidance phase. So watch the WPN page, as the missile distance to target does down to about 30-35nm it's time to turn, depending on how much you need to turn, the AP will take about 60 seconds to make a 180 degree turn, in which time, you will not be able to receive any signals from the missile due to masking. Missile flies about 9nm per minute – which means it will be inside 25nm from the target when you level-out, which is a great distance to get your bearings and find the target. It is recommended to make this turn when the weapon is still on AP or is on TRANS mode, after you have visually found the target area, and the missile is stable. So let's turn back to waypoint 6 (our IP), this will keep us heading out of the target area, while keeping us within the 80nm range limit from the target (that is why the IP is 70-75nm away). If we reach our IP before missile impact, we will turn towards the target and use our forward antenna for guidance. But that will cause another 30 or so seconds of blackout. So try and plan ahead.

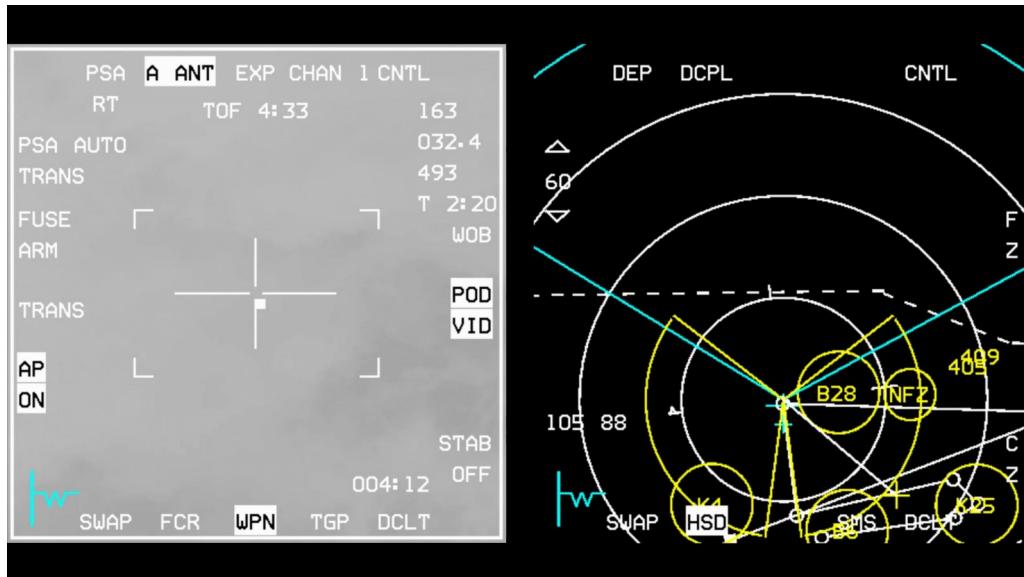
This timing is tricky, as you defiantly want to finish the turn towards the target before that 2 minutes to target mark. That is why the drop distance comes with experience, sometimes you will drop late to allow yourself a full guidance lag to the offset and back to the IP. Or drop at longer range and turn towards the target if the airspace will only allow 10-15nm offset. But for now, the offset allows us a good full run.

You don't have to turn at the 30nm mark, but judge to have about 4 minutes straight lag from where you are to the IP. Once the missile has only 3 minutes of flight, this will allow extra few minutes (as you push straight past the IP).

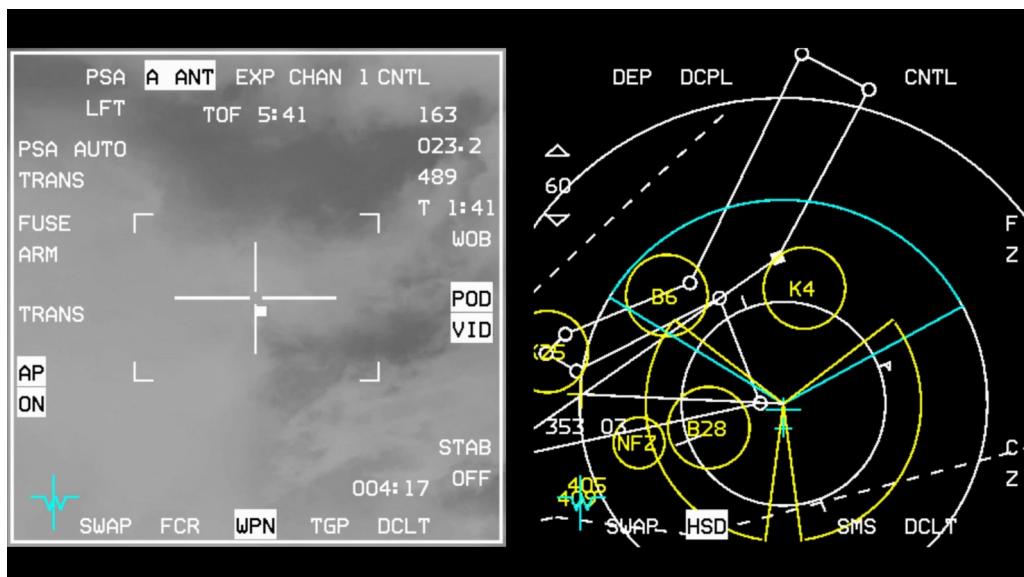




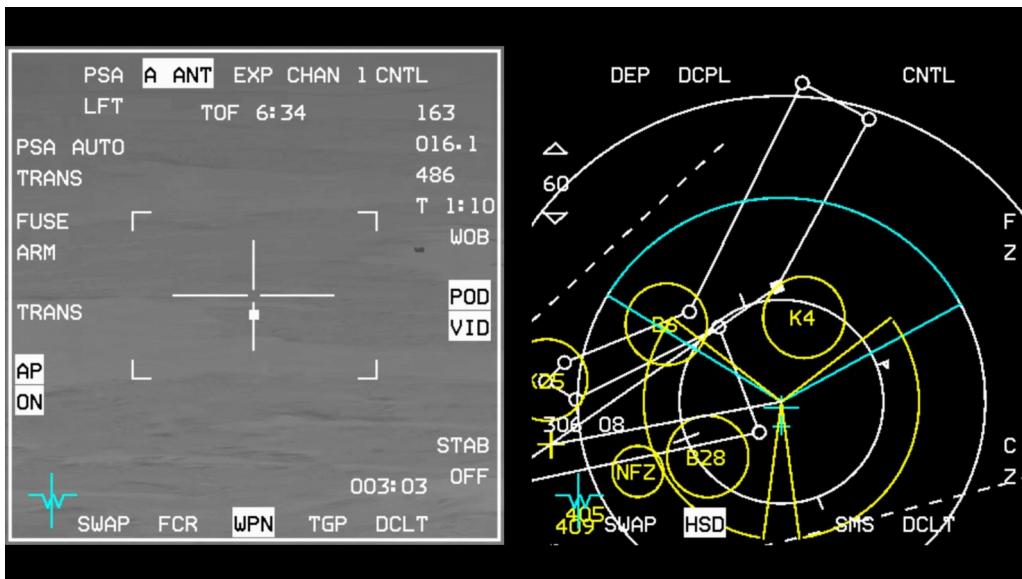
Just after drop, missile AP is turned on, FWD ANT.



Pre-turn – missile is 32.4nm out, target is hidden behind clouds.. it's a good time to turn.



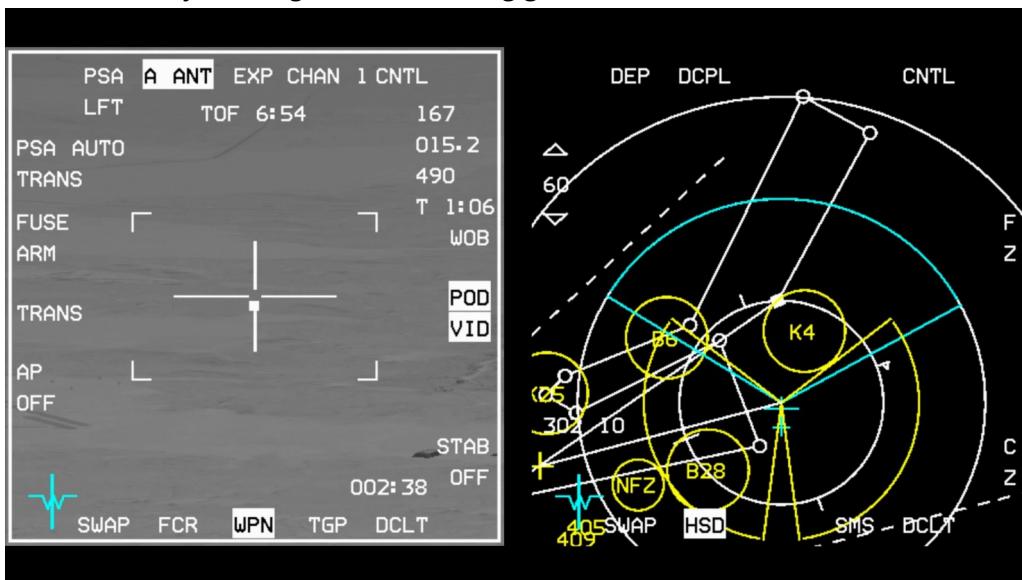
Post-turn – one minute and 10nm later, target is still behind clouds, but he have a long nice stretch to the IP.



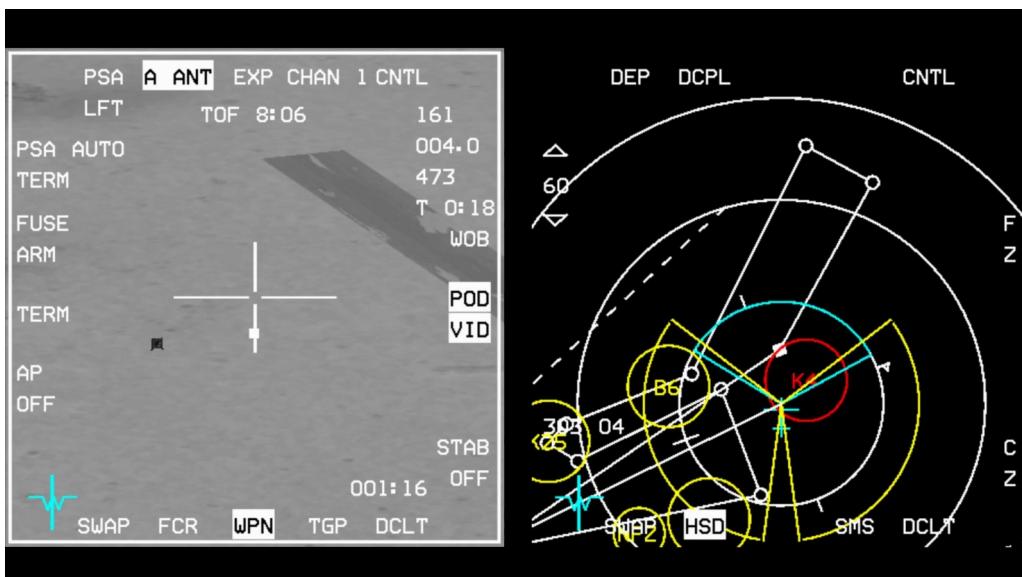
First glimps of the target range, the building on the right is the big building just east of our target.

As long as you can't see the target area, keep the missile on AP, once it moves inside 20nm from the target, assuming no cloud cover, you should be able to make out the target area, mainly the large building and the runway. Waypoint actually doesn't sit on the range, but slightly to the east, so the targets will show up right of the crosshairs. Once you have the target area in sight, and your ownship stabilized, disengage the weapon AP, and take control of the weapon. It will automatically change pitch a bit, but will stabilize quickly.

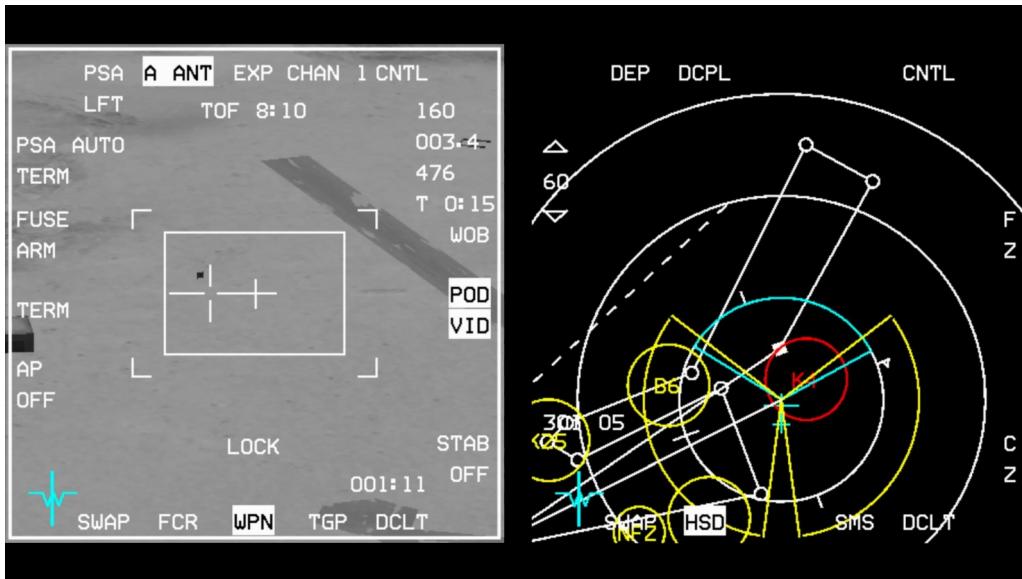
3<sup>rd</sup> Gen weapons will NOT maneuver at all in TRANS unless you give them an explicit order. So move the crosshair slightly RIGHT of the target, and pulse the TMS RIGHT. This will give the weapon the OK and it will turn to center the crosshairs, you can use this to move the weapon around a bit, giving to a slightly different course. Point the crosshairs at the end of the runway in the range and hit TMS RIGHT again. Missile will track right. Start looking for your target now, you should spot it as a little black dot on the TV missile or white on the IR version. You can verify by zooming in using EXP (or pinky switch). Once satisfied, and you feel confident in you have identified the target, press TMS UP and to TERM. Missile will maneuver immediately. For target this small using ground stabilized mode is recommended.



Manual control in TRANS, Missile steered right, you can see the runway on the left edge of the WPN feed.

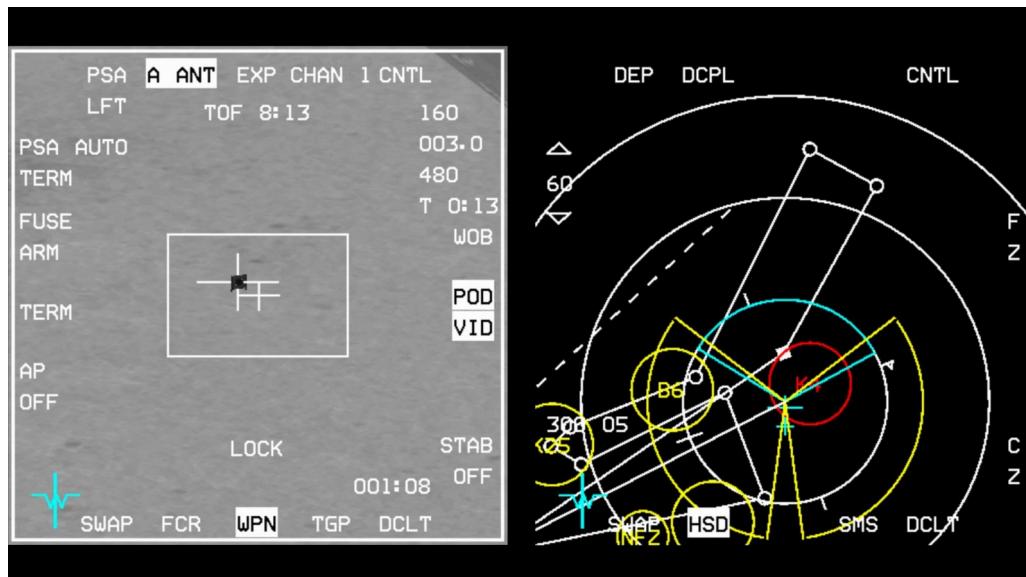


After using EXP to verify target – switched to TERM mode

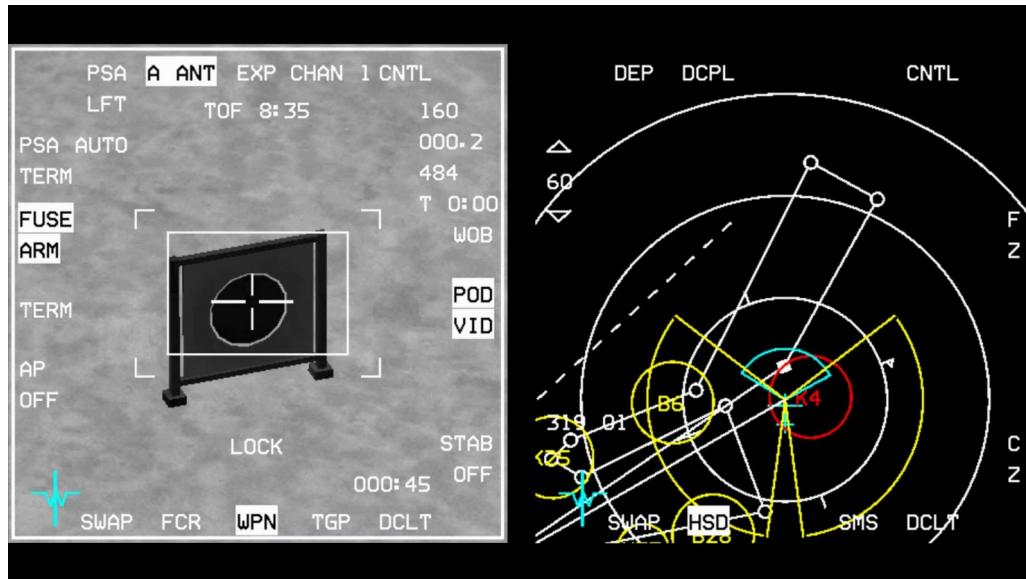


Switching to ground stabilized mode.

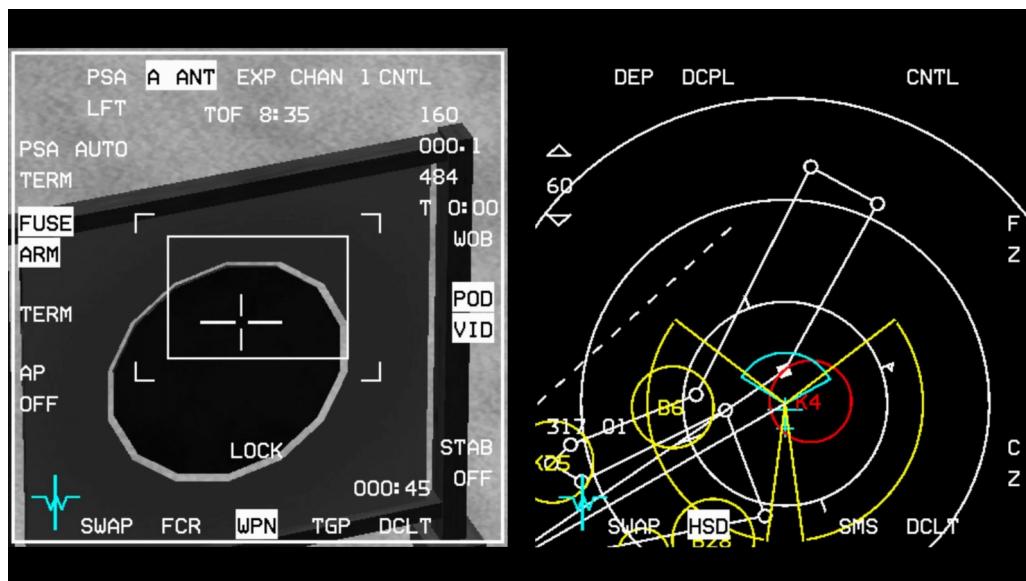
Hit TMS UP again to switch to ground stabilized indicated by the “LOCK” on the screen and the solid frame of the box. The slew will now move a small cursor. Place it on the center of the target and hit TMS UP. This will update the position of the aim-point and the missile will correct its flight. You can update the aim-point as much as you like, but make sure the last correction is far enough to allow the missile to correct in time. Now that we are sure the missile is heading to the correct target, it's time to ARM the fuse.



## Updating aim-point



Don't forget to ARM the FUSE – last chance to update aim-point



'nough said