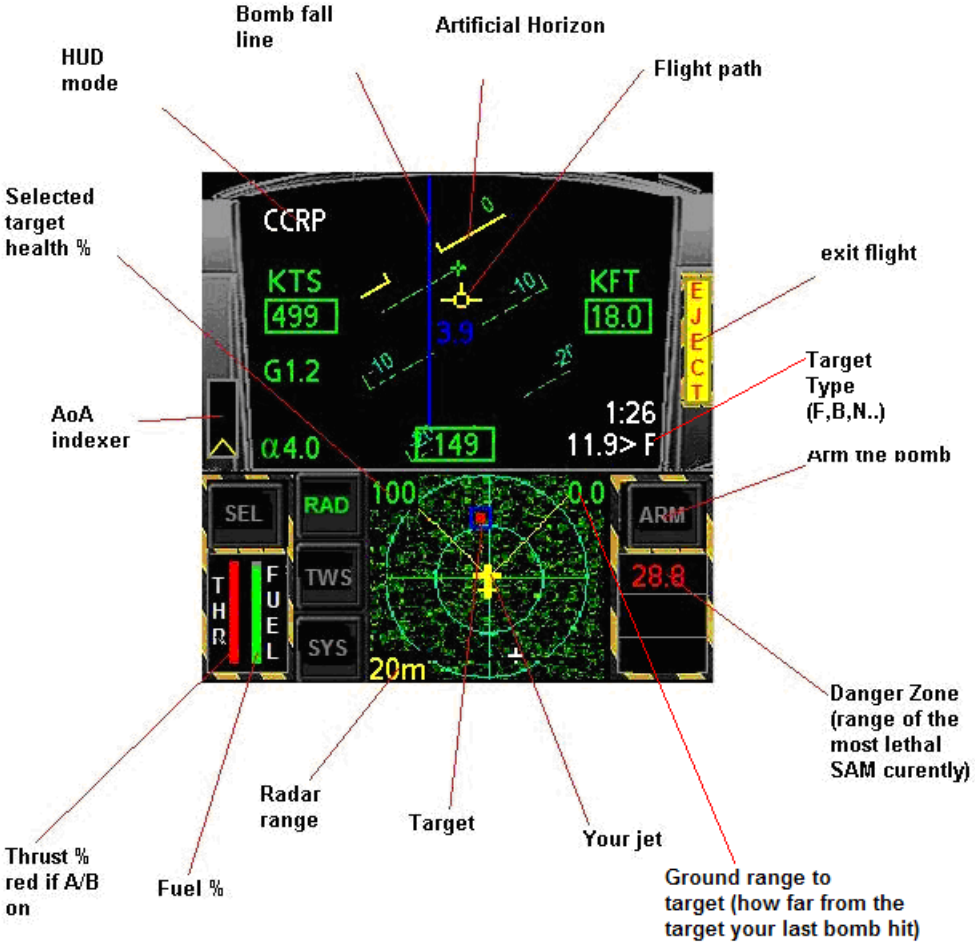
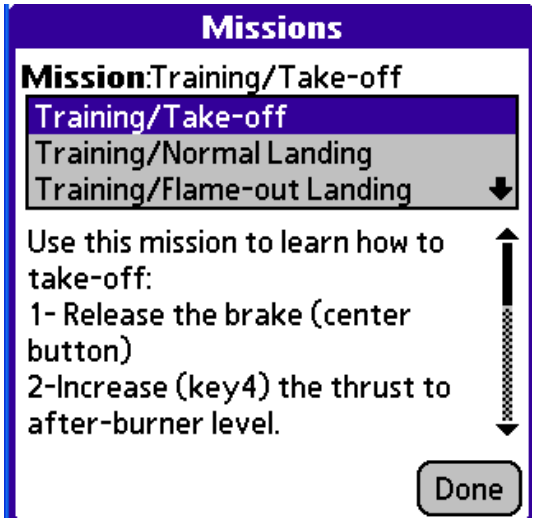
ViperOne 1.1b



Above figure: An example of hardware buttons on a Treo 755p (hard buttons locations varies with Palm device. Please experiment with your device to find what key do what.

Mission Descriptions:

The current version has 5 **training** missions and 1 **combat** mission. To succeed in the combat mission, you will need to take-off and land (yes sometimes with a dead engine!) and strike multiple targets during those missions. So it is critical to first learn on how to take-off and land your F-16 as well as how to use its weapon systems. This is what the following training missions are all about.



Game Options

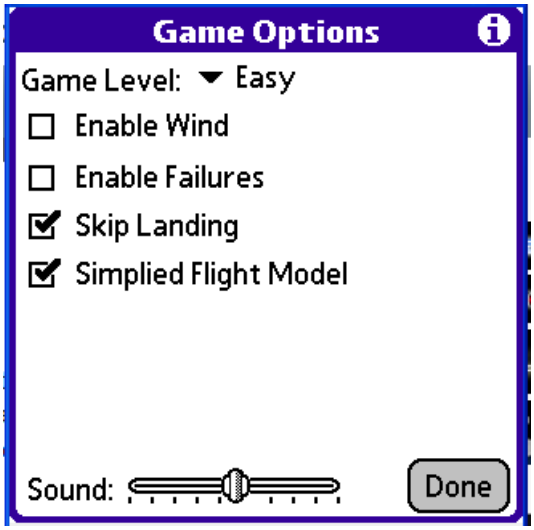
This window allows setting some important game options like game or sound level. You can also:

- Add wind effect. This will make flying and bombing more difficult. The wind will come from multiple random directions during the mission. The wind speed will depend on the game level you choose.

- Enable failures: Turn on to allow your jet sub-systems to fail during a mission

- "Skip landing": See combat mission below. Basically allows skipping landing during a combat mission. With this option on, re-arm/re-fuel by flying to within about 10 miles from your base after a bombing run.

- Simplified Flight Model: Turns off (when checked) the Beta slip angle calculation making the jet easier to handle.



Mission: Take-off

1- Close Airbrakes (also wheels brakes when on the ground) click the "brake" button or press the center button.

2- Increase engine throttle to Afterburner level (Press and hold button F4 on Palm) until Throttle indicator color goes red

3- Wait until you reach around 200 Knots (really depend on how much fuel and amounts of bombs you are carrying)

4- Pull back on the joystick: Press the down button (elevator control) until your gun cross reads about + 10 deg on the HUD pitch

5- Once you get of the ground, the flight path marker (FPM) will appear on the HUD (yellow little plane) The AoA indicator (i.e.: ~ **2.4**) will display the actual angle of attack (AoA)

6- If you hear a warning sound and see the message "Stall" on the HUD, it means you are too slow for the current pitch. Just wait a little until your speed increases or pitch down a little until your speed is high enough

7- Once you pass 500 feet altitude, the gear will go up and the "Gear" message on the HUD will go away

That's it! You can just press "eject" to exit this mission

Mission: Normal landing

IMPORTANT: This is a rather complex mission! We strongly suggest you skip this mission and try out the air-ground training bombing mission first. You can then come back to this mission after you have a good feel for the jet response.

1- Open Airbrakes (to slow the jet and have a better throttle control of the F-16)

2- Reduce engine throttle to idle (Press and hold button F3 on Palm) until Throttle indicator goes yellow

3- Change HUD to ILS mode by tapping on the HUD display. When you are within 10 miles of the runway (RNW number on the bottom right of the HUD) you will see the blue ILS bars.

4- Pull the plane up so that the gun cross (where the jet nose is pointing) is at +10 degrees on the pitch ladder

5- Your speed should slow and the flight path marker (FPM) should slowly drop below the horizon

6- Check your AoA (angle of attack) in the bottom left of the HUD. It is also displayed graphically on the AoA Indicator on the left side of HUD

7- Your ideal AoA should be around **13 degrees**. When there you should see the AoA indicator display a green circle. If below 13 degrees (too fast) then the indicator will show a half circle (12 degrees) or a yellow arrow when 11 and below. Same if you fly too slowly (top half circle show you at 14 degrees) A red arrow is an indication that you are at 15 or higher. This means you are too slow.

8- Try to keep 13 degrees but also make the sure you are on glide slope (horizontal blue line of the ILS)

9- IMPORTANT: Once you have set your nose (gun cross) on the 10 degree pitch ladder mark, try not to change your pitch angle (using the up/down 5 ways) but instead keep your AoA around 13 degrees (11-14 is ok) by using your engine throttle.

10- If you are too slow (AoA>13 then increase the thrust a little. If you are two fast (AoA<13) then decrease your engine thrust a little.

11- If you are really slow (AoA>15 degrees) then you can also close the airbrakes for few seconds to gain speed. Do not forget to close them again.

12- You should decend with a sink rate around 1000 feet/minute (or less) That will display as 1.0k (1000) or 0.6k (600 feet/min)

13- Keep an eye on the ILS bars. They should be centered on the FPM. That is your indication that you are on the correct slope toward the runway.

14- At about 4 miles from the runway, drop the gear (GEAR button)

15- IMPORTANT: Even if you descend with a low/high AoA, you need to touchdown with AoA between 11-15 degrees.

16- Make sure you set the radar range to "5 miles" The runway will appear as a small red vertical rectangle.

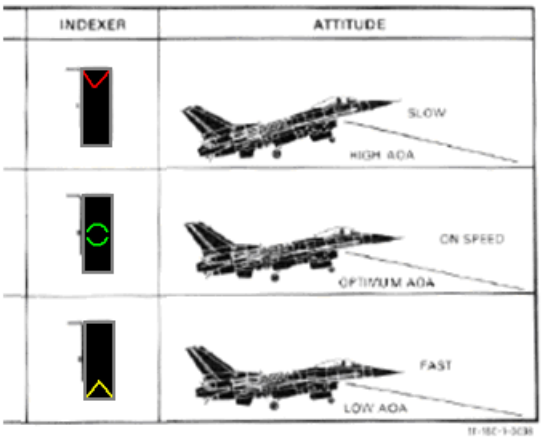
17- Once you reach the runway threshold the range displayed on the bottom right of the HUD will turn red. This is your indication that you are over the runway. The runway is 12000 feet (or about 2 miles) long so make sure the range display is red before setting your F-16 down.

18- The FPM will go away; you do not need it anymore. Your only flight path indication is now your gun cross. It should be going down in the pitch ladder as you slow down. Basically with the nose initially at 10 degrees, help with aero-breaking using the body of the F-16 in addition to the airbrakes.

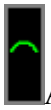
19- During the landing and once on the ground you will hear the sound of wheels brake and you will see that your speed is decreasing rapidly. The nose of the plane will slow go down from the normal +10 degrees pitch up. Once you touch down you will need to use your wheel brakes (same control as airbrakes) Bring your throttle to idle.

20- Once your speed reaches zero, the game will display a results window. This window will show you your landing distance and how many points you earned for your landing.

Here a good graphic to understand landing with a good AoA (optimum AoA)



 AoA >= 15 deg (too high = sink rate too high)

 A0A = 14 deg

 A0A =13 deg (optimal to land softly)

 A0A = 12 deg

 A0A = 11 deg (you are coming to fast)

Mission: Flame-out landing

IMPORTANT: This is a rather complex mission! We strongly suggest you skip this mission and try out the air-ground training bombing mission first. You can then come back to this mission after you have a good feel for the jet response.

Flame-out means that your engine has quit. It could be just because of system failure (yes, ViperOne will simulate system failures!) but it could simply means that your F1-16 was hit by enemy fire during a combat mission. Either way, you need to learn how to fly back home in an injured bird! The main difference from a normal landing is that the AoA needs to stay around **6 degrees** (versus 13 degrees) until 500 feet altitude where it becomes a normal landing. This means that the flight path marker should be around -11 degrees pitch. Here is the step by step process:

1- Switch HUD mode to ILS by tapping anywhere on the HUD display)

2- Close your Airbrakes if they are not yet closed….you do not need to lose anymore speed when your engine is dead!

3- Fly toward your air base runway (white cross)
4- Pitch down until your AoA is around 6 degree. The FPM should be around – 11 degrees (versus – 3 degrees in normal landing) Your flight path should be around -11 and -17 degrees to gain enough speed to keep you aloft (remember your engine is shot!)

5- Once 10 miles from the runway (and if the runway is inside the +/-45 degree yellow radar triangle) you will see the ILS vertical and horizontal steering indicators. Unlike the normal landing, the only important indicator is the vertical line (localizer: left/right steering) DO NOT follow the flight path horizontal line because that line will put you on the normal – 3 degrees flight path (versus -11 to -17 degrees when your engine has quit)

6- Please note that your graphical AoA Indicator on the bottom left side of the HUD is NOT useful at this time since it made only for normal landing (engine working) Future version of ViperOne will change that (to reflect that the optimal landing in flame-out landing is actually 6 degrees and not 13 degrees as in normal landing)

7- Your ideal AoA in a flame-out landing should be around **6 degrees**. When there you should see the AoA indicator display a green circle. If below 6 degrees (too fast) then just pitch up a little or open airbrakes for a second. If the AoA is higher than 6 degrees (too slow) then pitch down and close airbrakes, (if open, to gain speed.

8- Try to maintain 6 degrees but also make the sure you are flying toward the runway (vertical blue line of the ILS) The horizontal flight path (- 3 degrees flight path) is not helpful here and should not be followed. You should have your flight path marker seating between -11 and -17 degrees pitch (down) later version will make the flight glide horizontal ILS marker compatible with a flame-out landing.

9- Once you reach 500 feet altitude the gear will automatically drop down (with a sound and the red message "gear" on the HUD)

10- Start leveling off slowly to get to the normal 13 degrees AoA as in the normal landing.

11- From that point, follow normal landing procedure (see above)

12- Make sure you only land on the runway and not before reaching it. The runway (Home or H) range on the bottom right of the HUD will change from white to red to indicate that you are flying over the runway. The runway is 12000 feet long or about 2 miles. So once you reach the runway threshold (start of the runway) the range color will change to red. That is your indication that you can land at anytime. You will also see (if you set the radar range to 5 miles) a red little vertical rectangle on the radar display. This is the runway.

13- Once you touchdown and as in the normal landing, you will need to open your airbrakes (no need to bring your throttle to idle here since your engine is dead anyway!)

14- During the landing and once on the ground you will hear the sound of wheels and you will see that your speed is decreasing rapidly. The nose of the plane will slowly go down from the normal +10 degrees pitch up.

15- Once your speed reaches zero, the game will display a results window. This window will show you your landing distance and how many points you earned for your landing. Obviously you will get more point for a flame-out landing than for a normal landing (NOT YET implemented)

Mission: A-G Training Strike (no SAM)

In this mission, you will perform an air to ground bombing mission WHITOUT enemy surface to air missiles to worry about. In the next training mission (below), you WILL have to worry about those defenses!

An air-to-ground strike is the main element of the ViperOne combat missions. In this training mission you will learn how to use the F-16 weapon systems to strike at enemy ground targets such as:

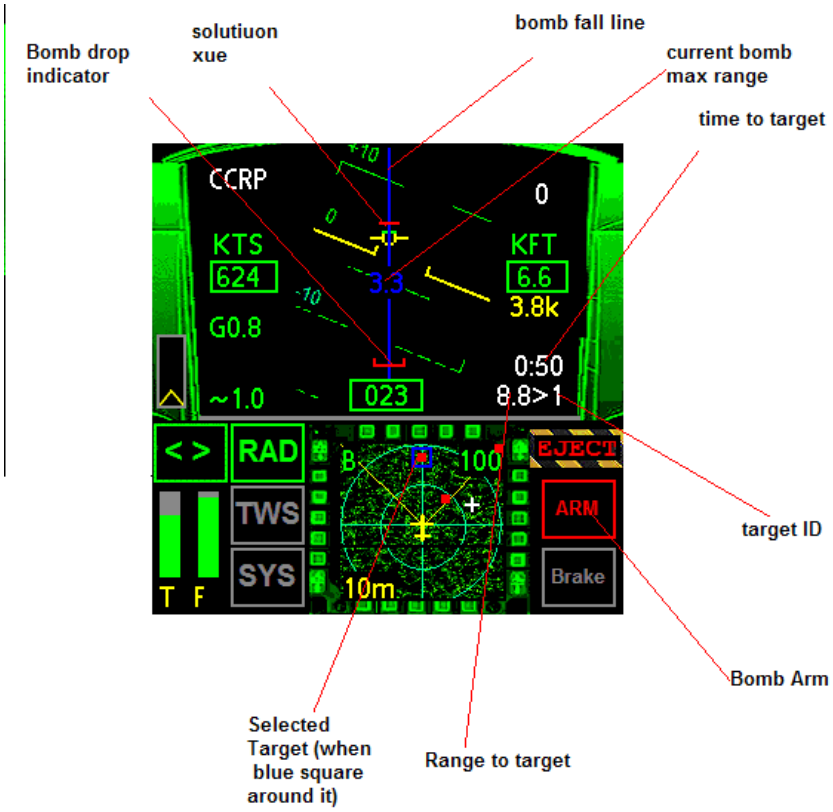
F: Factories used for the war effort
B: Strategic bridges that need to be destroyed to slow enemy movements
R: Enemy military runways
N: Nuclear facilities

For instance, a nuclear facility will bring you more game points than a regular facility. Of course, a nuclear facility will have stronger defenses (more SAM sites and AAA) to defend it than a regular military factory (this part…enemy air defense is yet to be implemented in ViperOne)

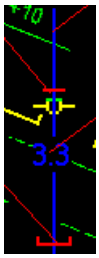
First and foremost, the real F-16 has many different air-to-ground attack modes. ViperOne implements one of them: CCRP

CCRP: Continuously Computed Release Point

Basically in CCRP mode, the F-16 Fire Control Computer (FCC) is in charge of figuring out **when** to drop a gravity bomb (i.e.: "dumb bomb") like a Mk 82. The FCC takes into account your F-16 speed, altitude and the target distance.



Your job is to fly toward the target and "consent" to drop the bomb. Note that the FCC will drop the bomb at the right time but it will need your consent (ARM on) to actually drop the bomb. To help you fly toward the target your F-16 FCC will display a bomb fall line (blue vertical line) This line is basically a steering line to guide you to the target. You will need to turn your F-16 toward this blue line. If the blue vertical line is on the right of the flight path marker (FPM) then bank to the right, bringing the FPM on top of the blue bomb line. Once you are about 10 miles from the target, a "solution cue" display will appear. This cue has two parts:



"Solution cue and bomb drop indicator"

- A small horizontal red line at the top of the blue bomb fall line (called the "solution cue")

- A U shape red line at the bottom of the bomb line called the “bomb drop indicator)
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Once you are around 10 miles from the target, the solution cue will appear. The solution cue will slowly drop toward the bottom of the bomb fall line. Once that small line reaches the bomb drop indicator, the bomb will actually be released and you will hear a "thump" sound (assuming the ARM button is enabled…i.e.: you consented to the dropping of the bomb)

Important: Please note that to see the blue bomb fall line on a selected target, the target has to be inside the +/- 45 degrees radar window (inside the inverted yellow radar triangle) If the CRRP HUD mode is red then it means that the target is outside the radar lock angle. Simply fly toward the currently selected target (the target with the blue square around it) The F-16 radar system cannot lock targets at all angles (behind the F-16 for instance) so it is important to orient the F-16 so that the target is within +/- 45 degrees of the nose of the jet (inside the inverted yellow triangle)

Here is the step by step process to lock and destroy a ground target:

1- In Radar mode, select the target you want by pressing the “SEL” (select) button on the cockpit display until the desired target has a blue square around it 

2- The target ID, range, and time to target will be displayed at the bottom right of the HUD display (i.e.: 14.5 > 2 means you selected target ID #2 which is at 14.5 miles from you)

3- Fly toward the target until it is inside the +/- 45 degree radar triangle. Once that happens, the blue vertical bomb fall line will appear on the HUD as well as the current range of the bomb if dropped right now. This range will depend on your current altitude, speed and attitude (pitch angle)

4- Once you are within 10 miles from the target the red “solution cue” and the “bomb drop indicator” will appear.

5- The solution cue will slowly drop as you approach the target. Keep your FPM on the blue bomb fall line to make sure you can hit the target. If the bomb fall line is left of your FPM, for example, then bank left until your FPM and bomb fall line are aligned

6- Arm your weapon by pressing the red “ARM” button. Without this step, the bomb will NOT be released. If you think that you will not hit the target (i.e.: you’re having hard time flying toward the target because of wind or enemy fire down below) then do not ARM the weapon. That way you could make another pass and the weapon will not be lost. Again the “ARM” button is really a “consent” button so if you feel that there is a chance that you would not hit target simply turn off the “ARM” button.

8- Once the "solution cue" (small red line) drops to the bottom and hist the "bomb drop indicator" then the bomb will drop (IF you gave your consent by pressing the ARM button)

9- After few seconds (10-30 depending on your dropping altitude) the bomb will hit the ground and you will hear an explosion sound effect.

10- Once the bomb is dropped, you are free to fly toward the next target if you choose to do so.

11- The radar display will show the damage (if any) inflicted to the selected target. The number on the top right of the radar display is the impact distance of the last bomb. The impact is considered a hit if the distance is below 3000 feet. If it is higher than 3000 feet (no hit) then the display will show **">3k**" The impact on the target health of course depends on how close the bomb hit. The number on the top left of the radar shows the target "health" percentage. The target is considered dead if its health is below 50% (the target color goes to white from red) If the target health is between 50% and 100 % then the color will be pink.

12- You can of course fly back and hit the same target again if you missed it (still at 100%) or it is not completely destroyed (50%<health<100%)

13- Currently you have 6 Mk 82 500 pound gravity bombs at your disposal. You can see the current weapon load by pressing "SYS" button then tapping on the "multi-function display" or MFD. The weapon display will show how many bombs you have left (future version of ViperOne will have different type of bomb like the Mk 84 which is a 2000 pound bomb with a bigger kill zone)

14- Since this is training mission, you can stop at anytime (eject) and see your performance (how accurate you were) by pressing the "Sortie" button. This will display the status of all the targets (5 for now) as well their "health" percentage. You will also be given your score for hitting those targets.

Important note 1: You need to fly the flight path marker (small yellow plane icon), NOT the gun cross (green cross), toward the blue bomb fall line. This is important because in case of gusting cross winds, the FPM will move around left or right. The blue line will also move with the FPM. The green gun cross is really only important when taking off and landing. In CCRP mode (bombing mode) the flight path marker, along with the bomb fall line, are the most important indicators.

Important note 2: In the A-G training mission, the single targets are extremely close to your air base (runway) This is to make it easier on you, so you do not need to fly a long time before reaching a target. ViperOne is a real-time simulator. This means that it will take you about the same time to reach a target as in real life. This also means that you

will have to manage your fuel carefully during combat missions; limit after burner for the sake of speed!)

Important note 3: ViperOne is a very close physic simulation of an actual F-16 fighter jet. This means that it has real tendency to stall easily. In the real jet, programmers had to design a very sophisticated flight control system. ViperOne also has a flight control system (PID based control) but obviously not as sophisticated as the real thing. This means that you need to be extra careful about not making the F-16 depart from its flight envelop (i.e.: stall) Stall can happen at any speed but usual happens when you are flying slow and nose high. There is a "stall" warning system (sound and display) If that happens, bring your nose down and try to gain speed. If the AoA is high enough, ViperOne flight control system will try to bring your nose down on its own! Also watch your angle of attack indicator (~) on the bottom left of the HUD. You may or may not be able to get out of a stall. If not, it is best to "eject" before you reach the ground. In future versions, the score will be based on how far you eject for your home base. You will also lose a lot of points if you actually crash versus eject. The Air Force will much prefer getting a pilot back alive than losing both pilot AND the multi-million dollar jet!

Mission: A-G Strike (with SAM)

This mission is "almost" the same as the previous (please read above) There is BIG difference! The enemy is allowed to kill you!

Enemy base defenses

In this mission, all the targets are protected by multiple SAM (surface to air missile sites. There are 3 types of SAM's

- Short range: Are able to defend air space up to 10 miles
- Medium range: 30 miles
- Long range: 50 miles

The missile speed (toward you) depends on the game level:

- Easy: Mach 1 (about 600 miles/hour)
- Medium: Mach 2 (about 1200 miles/hour)
- Difficult: Mach 3! (about 1800 miles/hour)

It is pretty easy to defeat a missile with the game level set to "easy". After all your jet can do up to Mach 2! It takes a lot of nerves and skills to defeat the missile!

Fortunately, your jet has as a sophisticated instrument called "TWS" or Threat Warning System. The instrument allows you to detect radar signals emitted by active radar missile systems and displays not only the direction and distance but also its altitude versus your plane. The threat display consists of multiple rings. You can adjust the detection range by tapping on the display itself. The choices are: 40, 20, 10 and 5 miles.

Each missile in the air (with your name on it!) is displayed as a number. The number represents the altitude difference with your jet in 1000's of feet. So for instance "-2" means the missile is about 2000 feet below your jet. Of course "+10" means that the missile is about 10,000 feet above you. The color also has meaning. The most dangerous missile (the closest to your jet) is displayed in red. The actual range (distance) is also displayed on the right of the screen below the "ARM" button. The other missiles are displayed in yellow. You need to worry about the missile in red first since it is the closest to you. Each missile has it own flight time. Once their fuel is spent and they havelost their energy, they will disappear from the TWS screen. You should not think that the worst is over! Each SAM battery has multiple missiles to launch and they will launch them at you if they get a chance!

Still, there is no need to panic if the missiles are 10 + miles from you. Depending on the game level and your altitude at the time of launch, they may simply fly toward and lose fuel/energy before they even get close enough to you. Simply watch them by keeping the Multi Function Display set on TWS mode. If one or more missiles are closer than 10 miles, you should drop everything you are doing (air-ground bombing) and avoid the missile(s) at all cost. This may mean using your engine after-burner (don't over do it since it will deplete your fuel rather quickly!) or do fast maneuvers. Once you defeated the missile(s) you can then come back to your primary mission which is to destroy the target(s)!

The Mission

This is the real thing! And what you trained so hard for. The goal of the mission is to destroy ALL targets and flight back home alive. Unlike the air-ground training strike missions, the number of targets depends on the game level you choose at the start of a new mission. This means that you will need to do the following for a successful mission:

1- Take-off from your air base
2- Fly toward one of the targets (any of them)
3- Destroy the target while avoiding being killed by a SAM
4- Go to the next target and destroy it as well
5- If you are out of fuel/bombs then fly back to your base and land** to refuel/re-arm
6- Go to step 1 until all targets are destroyed (all targets health < 50%)
7- Land** at your air base to complete the combat mission

** Because landing is a very demanding task (and takes time) There is an option (option menu window) where you can "skip landing" when performing a combat mission. If the "skip landing" checkbox is checked then you can simply fly back toward your base. When you are within 10 miles from the air base, the game considers you as landed and will refuel/re-arm your jet automatically. Simply acknowledge the message and you can go back to your bombing mission with a full tank of fuel and 6 more bombs. Of course you will not get the most points having the "skip landing" option checked but it beats not having any points if you fail your landing and crash! Once you feel comfortable landing your jet (use the landing training missions over and over) you can uncheck the box "skip landing" and you will get the most possible points for each combat mission. Remember that crashing while landing means zero points even if you destroyed all the targets and came back home victorious and tried to land and fail.

F-16 Sub-systems Failure Modes

To add more realism to the simulator, many of the critical sub-systems in your jet may fail at any time during a mission. The probably of failure depends on the game level you choose. Some failures may be annoying but not critical. Some are show stoppers. Here's a list of those possible failures:

- **FUL:** fuel leak. The fuel will be spent at much higher rate. Reduce your throttle until the fuel leak stops. If it lasts too long, I suggest turning around and getting it fixed at your air base.

  - ENG: The engine has quit! This is a show stopper if you are in the middle of a mission. Your only option is to return to base and either come 10 NM from the base (if you check the box "skip landing" in the options window) or attempt a "flame-out" landing (i.e.: dead engine) Of course you DID train on this right? If not, you better go back to the training mission called "flame-out landing"!!!

- A/B: You lost your ability to use your after burner. Can be critical if you are running away from a SAM!

- BRK: This one is bad only during landing when you need to slow your jet a lot. You can pitch up your jet to compensate. Still, it is much better to land with the airbrakes open so you have much better control of your descent. This fault won't stop you from continuing your mission.

- HUD: Loss of most critical info on the Heads-Up Display like speed, altitude and so on. It could be very bad if you are in the process of landing or you if are already low. At least you will not lose the artificial horizon display (your attitude) In the real jet, a loss of HUD is not super critical since they still have the analog instruments to land if need be. Of course doing a bombing run without HUD is almost impossible.

- TWS: You no longer can see where SAM missiles are coming from! The only good news is that closest missile distance is still displayed in red on the right of the cockpit. You will still be alerted if any new missiles are sent your way by the enemy. But it won't know where they are coming from.

- RAD: Now you've lost your radar! You won't know where the enemy is. The HUD (if you did not lose it also!) will still display the distance to targets as well as the approximate time to reach them at your current speed.

- **FCS**: The Flight Control System has mostly quit. The jet will be hard to control. Hopefully this is extremely rare and may not last long. If it does, then "eject" is the only action to take.

- AIL, ELV, RUD: ailerons, elevator or rudders surfaces are stuck at zero position. This is of course means that you can’t control the jet attitude any longer (BAD) For instance if the elevator is stuck, you will no long be able to pitch up or down. Hopefully this is also extremely rare and may not last long. Just keep your cool until the failt goes away (if you’re lucky!)

- WPS: Weapon System failure. You are no longer able to drop bombs! The blue bomb fall line will go away. If the failure lasts too long, there is no choice but fly back home to fix the problem.

You can also finally encounter a "FALSE ALERT", just check your SYS display and see that none of the warning lights are flashing red. If this case then it is only a false alert. Disregard!

Each time a sub-system failure happens, you will hear a loud horn sound and the message "WARN" will be displayed in red on the HUD display. You can acknowledge and stop the horn sound by simply tapping on the "SYS" button. The failure of course will remain (as well as the blinking WARN on the HUD) The SYS display will also tell you which system failed by blinking its code in red. The failure (or failures since more than one system can fail at the same time) stays on for a random amount of time. Some failures may last a very short time, some may last much longer! It is your job to decide if a failure warrants flying back home and getting a repair (as well as fueling and re-arm) For instance, if your engine is shot and does not seems to restart for a long time, your only option maybe to fly back to base to get a new jet.

Special effect

You will notice that sometimes the HUD (top part of the screen) will either go black or red. This is simply a way to simulate the loss of vision when pulling too many G's! If the HUD goes black, it means that you are pulling >9 positive G's. You can check it for yourself by going Mach 1+ and pulling hard on the stick (keep your finger on the down D-pad) After a while the top screen will go black. The reason is that all your blood is leaving your head and going down your body. Eventually you will lose consciousness. That's where the black-out comes from.

If you push the stick forward hard (up D-pad) the screen will go red. This is because you're pulling negative G's. All the blood is going up to your head and your eyeballs will be filled with blood. The end result is that the HUD will turn red. The red G's effect will be present with only -5 G's (there is really not much tactical need to pull too many negative G's)

Logbook and Scoring

The logbook allows you to monitor your flight performance over time. It allows you to track your total points, rank, flight time, number of missions, target destroyed and so on.

Scoring:

The score you get after each mission (training or combat) depends on how accurately your bombed the target (for bombing missions) or how well you landed (for landing training missions) The score also depends on the game level you set at the beginning of the mission as well the options settings. For instance, you will get more points if you check "wind" or "enable failures" The "Score" window will display your current mission results. The "logbook" window keeps track of your overall career in the Air Force!

The ranking is not done yet but you will eventually be promoted up to 4-star General as you progress in your Air Force career.

Rank Promotion

ViperOne keeps track of your mission points to calculate your promotions points during your Air Force career. The game uses those points to figure if you deserve a promotion! Please note that all mission points are created equal. For instance points won during a combat mission are valued more than the one won during training missions. There is no promotion point accumulated if:

- You are flying the "take-off" mission
- Your plane crash or get hit by SAM missile

To help you figure if you are close to a promotion click on the “LogBook” window. There, you will find a graph (next promotion) When the bar graph is fully green, you will get a prompt announcing the good news…a promotion!