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BY ORDER OF THE COMMAND
1st VIRTUAL FIGHTER WING

FALCON AF to BMS
TRAINING PROGRAM

Training Operations

Chris BRAMAGE Honke
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V1.37

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FALCON AF TO FALCON BMS CONVERSION GUIDE

Version 1.37 January 2012

BY BRAMAGE (1st VFW)

AUTHOR'S NOTE

A fond "hello" to our *Falcon* community! I wanted to take this opportunity to personally thank all those who have extended encouragement for this guide on the forums and by email, as well as to those who have sent thoughtful and considered feedback.

For those who may not know me a short introduction. Though known as Bramage at the 1st VFW I am more widely known as Mower around the 'net. As Mower I have been active in the F4 community from the start over at the infamous Delphi forums and then Frugalsworld, F4HQ, SIMHQ and countless others I cannot recall. Often outspoken, occasionally banned for calling it the way I see it, I have always been active in our community. I have also passed through a few Falcon VFWs over the past decade, searching for the ideal VFW which, happily, I found at the 1st VFW in Oct 2009.

I have been flying the Falcon series since 1988. I hear the F4 UI music in my sleep at times. I own all Falcon versions and possess 11 Falcon4 retail sim sets (but only 1 AF). Crazy? Perhaps.

As a long-time *Falconeer* I was never happy with Allied Force. Perhaps my disdain was related to my involvement in the ill-fated Falcon 4: Operation Infinite Resolve, the immediate pre-cursor to AF. Though AF was stable online -- its main claim to fame IMHO -- its graphics and avionics were frozen in 2005 and LP disappeared

from the scene after 2008 leaving Falcon abandoned.

Thus it was that I flew the unfinished Open Falcon, the leaked BMS Crew work from circa 2006. Imperfect and temperamental though it was, it was still a better sim IMHO than AF. And so we the OF fliers hunkered down and did our best with a broken sim. But all the while there were whisperings that BMS Crew had reformed.

I do not recall when exactly I had first heard of FBMS. But I had been in contact with members of the team for years prior to its release and, after years of correspondence and updates, eventually despaired we might never see it publically. Thus it was with unparalleled rapture to see FBMS released to the community in Sept 2011. I have enjoyed it immensely since. I am also very gratified to see how FBMS has united a community that was falling apart, divided and dying.

I am also honored and gratified to be able to play a small part in helping our community make that transition from yesterday's AF (and OF) to today's FBMS.

I think we as a community owe our heartfelt and eternal thanks to the BMS Crew for their tireless unpaid work, delivered to us for free and, above all, for not abandoning the Falcon dream.

On behalf of the 1st VFW, all the best and see you "up there".

INTRODUCTION

Welcome to your guide to discovering *Falcon-BMS* (hereafter FBMS). FBMS is a major leap forward for the virtual F-16 Driver from the days of *Falcon-AF* (hereafter AF) and exemplifies the BMS Team's commitment to realism in the Viper. With the substantially increased avionics and weaponeering fidelity of FBMS, you can expect the onset of helmet fire much more likely and often. Playing the piccolo will become even more intensive and require increased study to master. But then, as *Falconeers*, isn't that what we seek?

A bit of wisdom for those who dare
To build our dream sim of the air.
So gather round.
Come gather here
Learn how to please the Falconeer.
This is not for the weak, the bent, the bowed.
This is only for those who know their code.

So make it hard, don't skimp on that.
It should take newbies and squash 'em flat.
Checklists galore
For this work, not play.

--excerted from *The Falconeer, D. "Dada" Miller, 2001*

This document is not designed to replace the existing documentation but, rather, to point out the key elements of this upgrade and direct you towards the appropriate

documents, articles and training aids that already exist.

I would also strongly encourage all FBMS fliers to keep up to date with the BMS Official Forums.

This guide will evolve over time and thus is subject to change. Any feedback on errors or suggestions are encouraged and can be forwarded to f16.driver@rogers.com . **Please enter "1.37" in the subject line.** As well, I have included contributions from other learned members of our community where appropriate.

The minimum suggested reading list is as follows:

- The Falcon AF full manual here
- The Open Falcon Noob Guide here
- The BMS Dash-34 manual (from your FBMS install docs folder)

Be aware that the Dash-34 is a highly detailed and technical document that will require careful study as it covers all of the changes made in Falcon since AF. If ever RTFM applied it is with the Dash-34!

If you are an AF Driver then your first step is to read the **Open Falcon Noob Guide** to get up to speed on what has changed in Open Falcon (OF). This will help bridge the gap between AF and

FBMS. I cannot emphasize this enough, be sure to read that guide if you have never flown OF. As you move from OF to FBMS you will see many refinements in weaponeering, avionics and much better graphics.

Also take note that BMS has always had the Thrustmaster Cougar HOTAS in mind when designing their flavor of Falcon. That is because the Cougar mimics the real F16's HOTAS. So all of the FBMS switchology is geared towards that HOTAS.

Once again, welcome to a whole new world as a *Falconeer*! Let's get going!

Version 1.37 Notes

Since the original release of this guide, and its most recent update, v1.36, much new information has come to light and useful community feedback received. As well, as I go back and review the guide after a 2 month break, I see where I can flesh out and elaborate some key areas. I have also performed a general tidy up.

Rather than disturb the flow of the guide by highlighting these changes, I suggest just re-reading the entire guide as a refresher. Falcon is a curious animal: even after years of flying it myself, I need to review aspects of its operation from time to time as well.

As a transition guide, I think this document may have gone as far as it can. Time will tell. But I do not think there is anyone left flying AF.

As always check six. ☺

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So What's Changed?

A summary of changes from AF to FBMS includes:

- New weather modeling
- New hires 3d clickable cockpit
- Data Transfer Cartridge (DTC) implemented
- Avionics and weaponeering fidelity upgraded
- Your HSD no longer "automagically" populates with data
- Radios now behave closer to RL
- Radar and HUD symbology more realistic
- Helmet Mounted Cuing System (HMCS) implemented
- Improved Data Modem (IDM) for networking of jets that improves overall flight SA and target sharing
- RWR/EWS functionality increased
- Aerial refueling updated
- Online multiplay changes (improved from OF, dispensing with the Rapace Launcher)
- Substantially upgraded flight modeling (prepare to be wowed).

Check out the FBMS FAQ here for more detail.

Installation Considerations

The current version of FBMS is 4.32 as of January 2012. FBMS is a single installer that looks for the Falcon4.exe file that you will point it to. You do not have to install the old Falcon 4.0 sim itself as FBMS makes no registry checks, so you need either the file on your hard drive or you can have the Falcon 4.0 cd in your drive and point the FBMS installer to that. You cannot use the AF exe file, it must be the original Falcon4.exe. Thus only 2 items are needed for a full FBMS install: the Falcon4.exe file and the FBMS installer. You can get both items here. Also advisable is to download and install the new Weapon Delivery Planner, the latest version being crafted to specifically interact with FBMS. The WDP is a powerful new planning utility and is discussed in more detail later on.

Once installed, the Sim is started by clicking on **Launcher.exe** which brings up the main menu "Splash" screen:

Upon initial startup of the sim itself, you may get a black screen and then CTD. If that happens try running the Configuration editor from the initial main BMS menu and uncheck "play intro movie at start-up".

Note that FBMS is much more customizable than AF, the trick of course is not to alter anything that is multiplayer critical. The config file itself is called **falcon bms.cfg** (note the space in the file name!) and is located in **Falcon BMS 4.32\User\Config**.

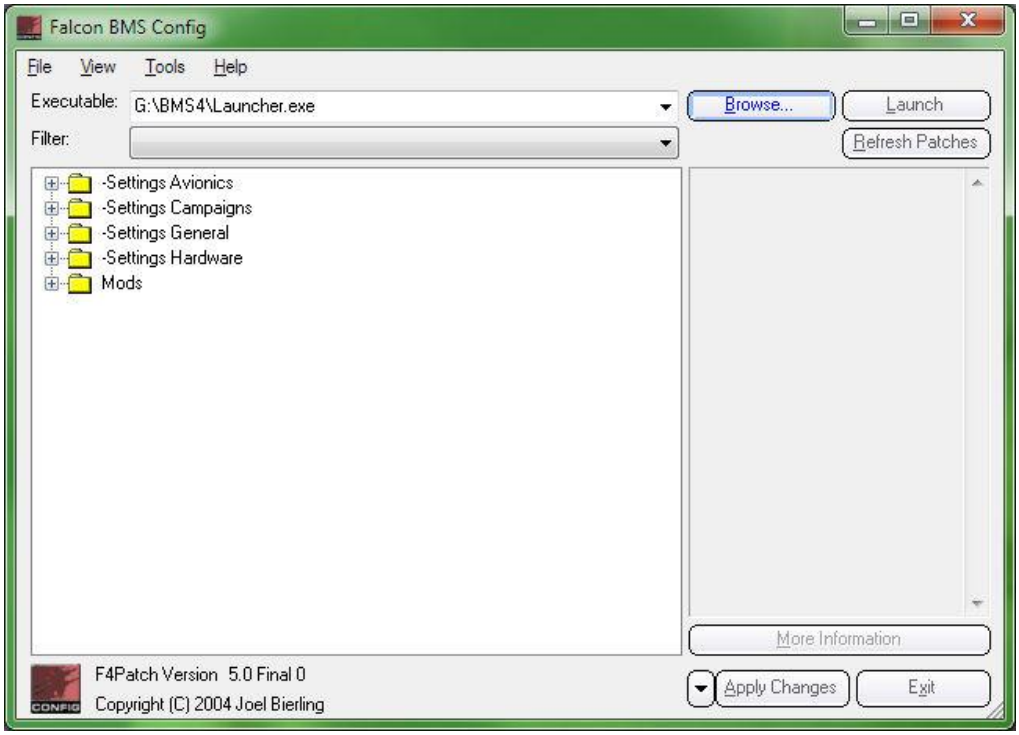
At the moment, FBMS was released with online play net packet logging enabled which can bloat quickly to gigs of useless files. There is also a known issue with clouds and data transfer. Per 1st VFW FBMS SOP do the following after installation:

> In your Falcon BMS folder -> User folder -> Config Folder -> Open the file Falcon BMS.cfg with Notepad
> Add these lines to the top of the config file (copy and paste) then save the file:
>
> set g_bShareMpClouds 0
> set g_bMessageStatistics 0
> set g_bEnableRakNetPacketLogger 0
>
> set g_bNoAAAEventRecords (change the value of **0** to **1**)

Also note this correction. Two lines in the config file have "=" (equal) signs that should not, remove the = signs from:

> set g_bEnableRandomFailures = 0
> set g_fMeanTimeBetweenFailures = 24.0

You are also provided with a User Interface that has been around a long time called F4 patch, accessible from the main FBMS “splash screen”. Be sure to click “apply changes” at the bottom right when finished. Version 5 looks like this:



Now, be aware that FBMS is going to tax your pc much moreso than AF. From within the sim graphics setup tab, key features that will affect FPS are the heat exhaust/blurring and HDL lighting effects. You can also try disabling the vertical sync unless graphical tearing occurs.

Sobad from the 72nd VFW had this very useful post on tweaking for FPS:

There are two places where you can configure graphics settings in Falcon-BMS. When you first start Falcon-BMS, a Windows appears that give you several basic options to choose from-- the first option is "Launch", which starts the Falcon-BMS software itself.

The second option is "Configuration", which opens a separate Falcon-BMS Config software app. This app has an expandable tree-base selection of options that allow you to configure many aspects of Falcon BMS's operation. The second from the bottom main option is "-Settings Hardware".

If you expand that option, it opens the following tree:

+Track IR Settings
Double resolution Cockpit Display (check this-- much more readable)
Low resolution for clouds (check this-- they still look amazing!)
Reduce particle system (check this-- the explosions are still amazing!)

+Shaders (uncheck this-- the visuals are still 10x better than Allied Force)

Triple Buffering (check this-- it only reduces FPS by 2 or 3 frames per second)

Note that checking features such as 'Jet Heat Exhaust' will cost you at least 5fps. 'Motion blur', the same. 'HDR Lighting' will cost you up to 15-20fps! Again, I emphasize, even with all of these features unchecked, BMS is 10x better looking than Allied Force, so you certainly don't LOSE anything in the transition.

When you finish tweaking your settings, be sure to click "Apply Changes" before exiting.

Going back to the main start window, now click the "Launch" option to start Falcon-BMS itself. At the upper right corner of the screen, select "Setup", and select the "Graphics" button. UN-check 'Multisampling' and UN-check 'Vertical Sync' (if you later have video 'tearing' glitches at high frame rates, recheck this option).

Object Density - As high as possible
Object Details - As high as possible
HDR settings -- As recommended
Advanced settings - As recommended

Now run a training TE or Instant Action. When in the 3d world, keypress <Ctrl>'Z' and then 'R' to show the frame rates at the top left corner of the screen.

Exit the 3d world, go back to the graphics

settings, and set the highest resolution possible that gives you acceptable frame rates. Hopefully, it will be the highest setting available.

The whole effect of these suggested settings is to give you a good frame rate for a moderate system. If you find you can increase some of the graphics settings, by all means do so and enjoy the amazing graphics of this all new engine. The point of this thread, however, is to make sure you are not so discouraged by low frame rates initially that you begin forming negative impressions that might tempt you to disregard this amazing upgrade. Hope this helps.

Thanks Sobad!

A good ongoing discussion about FPS is at the BMS forums here.

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New Keystroke Assignments

One word: confusion! Keystroke assignments between AF and FBMS are quite different. This is because LP (for whatever reasons) deviated from what the keystroke standard had been up to SP3. Within the sim controller setup, you will see 2 keystroke files, *BMS.key* and *keystrokes.key*. BMS advises to use BMS.key for maximum functionality. Using the BMS.key will need a major makeover of your AF-HOTAS. Now, unfortunately, while a key chart pdf is included in the BMS docs folder, it is outdated and inaccurate. Also, the BMS.key file itself has errors that could cause confusion for some. So, Wizard from the 72nd VFW is working on a new keyfile that attempts to resolve this. You can find it here, sorry you have to register on their forums. Of course, you use this key file at your risk; stay tuned for an update.

As well, to aid the AF flier in key changes, a working list of differences between AF and FBMS keystrokes has been compiled by Gipodiablo and will be updated as we know more:

FUNCTION	AF	BMS
GROUND HANDLING		
Alternate landing gear	**SH-CTRL-ALT-g**	**ALT-g**
ENGINE FUEL		
Fuel Door	**SH-CTRL-r**	**SH-r**
FLIGHT CONTROLS		

trim rudder left	ALT-cursor left	SH-ALT-cursor left
trim rudder right	ALT-cursor right	SH-ALT-cursor right
trim nose up	SH-ALT-home	ALT-cursor down
trim nose down	SH-ALT-end	ALT-cursor up
Trim roll left	SH-ALT-delete	SH-CTRL-cursor left
Trim roll right	SH-ALT-pagedown	SH-CTRL-cursor right
landing help	ALT-h	n/a
DEFENSIVE SYSEMS		
RWR unknown	SH-home	SH-ALT-CTRL-home
NAVIGATION		
HSD range increase	SH-F12	F12
HSD range decreas	SH-F11	F11
LIGHTS		
Landing lights	CTRL-ALT-L	SH-CTRL-ALT-L
other lights	not checked	not checked
HUD		
HUD color	SH-CTRL-ALT-c	ALT-h
ICP		
ICP list	SH-num9	CTRL-num*
ICP A/G	SH-num deletE	CTRL-num delete
ICP 2-ALOW	CTRL-num8	CTRL-num2
ICP 3	CTRL-num9	CTRL-num3
ICP 7 MARK	CTRL-num1	CTRL-num7
ICP 8 FIX	CTRL-num2	CTRL-num8
ICP 9 A-CAL	CTRL-num3	CTRL-num9
ICP DCS-REURN	CTRL-insert	CTRL-delete
ICP DCS-SEQ	CTRL-pageup	CTRL-pagedown
ICP RESET	CTRL-delete	CTRL-insert
ICP RECALL	n/a	CTRL-numdelete
RADAR AND RADAR SUBMODES		
AZIMUTH	F11	F8
LOCK PREVIOUS	DELETE	not found
LOCK NEXT	PAGEDOWN	not found
VIEWS		
Padlock EFOV AG	ALT-5	not found
Previous friend	SH-t	not found
Boresight friend	SH-y	not found

Tower camera	**ALT-0**	**n/a**
Previous enemy	**SH- [**	**n/a**
Boresight enemy	**SH-r**	**n/a**
AUDIO		
Sound Up	**ALT-n**	**n/a**
Sound down	**ALT-b**	**n/a**
COMMS		
Radio menu	**Tab**	**n/a**
Comm Switch L	**n/a**	**CTRL-o**
Comm Switch R	**n/a**	**CTRL-p**
Voice TX com1	**n/a**	**ALT-1**
Voice TX com2	**n/a**	**ALT-2**
Com1 sound down	**n/a**	**CTRL-ALT- [**
Com2 sound down	**n/a**	**SH-CTRL-ALT- [**
Com1 sound up	**n/a**	**CTRL-ALT-]**
Com2 sound up	**n/a**	**SH-CTRL-ALT-]**
SIMULATION		
Time acc dec	**CTRL-Capsloc**	**SH-Capslock**
Time acc inc	**SH-Capslock**	**SH-Capslock**

Gipodiablo has also continued to research these (unfortunately) confusing keybind issues and a good post to read is here. Really, follow the whole thread since the issue is much too complex for this summary guide. If anyone wants to finish this please email me your results. ☺

What I suggest for now is to use the *keystrokes.key* file and your AF profile and modify the responses in the sim controller setup. Otherwise stay in touch with the 1st VFW and the BMS forums. This is very fluid situation at present. I myself am using a modified *Speedo* AF Cougar profile.

Switchology changes

In his own conversion guide, SOBAD from the 72nd VFW has indentified some key HOTAS changes that all AF Drivers need to be aware of. The following write up is his:

HOTAS Setup

Regardless of which **HOTAS** system you use, there are a few **HOTAS** assignments that are now essential in **BMS** (in my opinion) as follows:

DMS Down – This allows you to switch from one MFD Sensor of Interest (SOI) to another. In **AF**, SOI switching was done 'magically' when you target-designated on your FCR, etc. In **BMS**, as in real life,you now have to switch between these displays with the **DMS Down** switch (<Shift>'**2**' on most keyboard layouts).

For instance, in **AF**, your HSD was not coded to operate as a SOI with a slewable display cursor. In **BMS**, it is (as it is in the real jet). And your HSD is also correctly coded now to utilize the 'Freeze' function, which is *very* handy once you realize its display flexibility. In order to use that function, you have to be able to make the HSD your active SOI, which is done with the **DMD Down** switch.
Also, with the new Targeting Pod system implemented, you must be able to quickly switch your SOI back and forth from your FCR radar display to the TGP display, and vice-versa.

Roll and Pitch Trim – **BMS** features load-out asymmetry flight modelling, so you need to be able to quickly and easily trim your wings if/when your load-out becomes asymmetrical.

Comm 1 Switch – Flight leads must be able to initiate IDM linking for his flight so that the packages can see each others' planes in their HSD (can also be done with keystroke Alt-o <.5s, author). Also, if you plan on using **BMS**'s built-in **IVC** communications feature, you will need quick no-look access to both the **Comm 1** and **Comm 2** switches.

Norm/Expand Display Options – In **BMS**, *all* Norm/Expand MFD options are now controlled with a single switch (normally the '**V**' switch on your keyboard). To reiterate, this applies to *all* the MFD displays: AG Radar, AA Radar, HSD, TGP, etc., so be sure to consolidate your Norm/Expand switch on your HOTAS to a single Norm/Expand button/switch.

SOBAD has also identified the following key assignment changes:

- The old **AF** bindings for HSD Incr/Decr were <Shift>F11/F12. In **BMS**, it's F11/F12.
- *All* SOI-FOV views (Norm/Expand or Wide/Narrow) are now universally handled by the '**V**' key.
- The default mapping for airbrakes was supposed to be the '**B**' key, but it was incorrectly assigned to the <Shift>'**B**' key in the *.key files. You need to either change the key assignment in the *.key file, or change the assignment on your HOTAS accordingly.

Thanks SOBAD!

Let me also note that in the external config utility there is an option

under hardware for “idle cutoff” whereby if you enable it you can set a detent for such on the throttle; how you mark that spot in the sim controller setup is to RIGHT mouse click the “set AB”.

One last item to add is that I have now dispensed with my sloppy Cougar in favor of a Saitek x65 which I much prefer for flying the Viper. The force sensing is very close to how a real F16 side stick would feel I imagine. Email me at f16.driver@rogers.com if you want the profile.

New Muliplayer

FBMS mimics AF's ease of online multiplay connections but is based upon a proven third party multiplayer system known as RakNet. Once in the sim go to the "comms" menu option along the top and in the window you enter the Server Name (optional), IP of the host (Connect to IP Address) and the appropriate bandwidth (Connection Bandwidth). The connection bandwidth will usually be decided by the host depending upon his connection speed.

Also vital are the 2 tick boxes for IVC (Internal Voice Communications, discussed later). If not using IVC, those boxes should be left empty. If using IVC (and doing so will be Wing Standard) check the boxes off and enter the relevant IP of the host underneath (not the URL, must be the IP). As in AF, if you are the host, enter 0.0.0.0 for the "connect to IP Address". For host bandwidth enter 75% of your upload and hit enter on the keyboard (be sure to hit enter!). If you are hosting IVC enter 127.0.0.1 (but read the IVC section below carefully for the details).

According to BMS, the ideal client bandwidth setting is 250, any lower and you may have lag and data loss. It is too early for this to be written in stone however and some learned folks are suggesting that 300 is ideal. But for now, assuming the 250 number, as the host, this means you could take your upload and divide by 250 to determine your maximum client number. For example, my upload is a paltry 1000 kbs so 75% of that is 750 (entered as my bandwidth setting), divided by 250 = 3 clients. ☹ As always with routers, set and test your port forwarding where appropriate. **Forward ports UDP 2934-2937 and 9987-9989.** To verify your ports are properly forwarded use http://portforward.com/. As well,

we are finding that anti-virus software, particularly Norton but others as well, are causing connectivity trouble so those should be disabled for the online session. We are getting reports at this time that the current release version of FBMS is not as stable online as the previous development version; BMS is aware of this and expected to resolve this soon. Stay tuned. Lastly, be aware that when leaving the lobby to enter an online mission, there is no set order: all players can enter simultaneously; this is new from both AF and OF where it was always advisable that only one player enter the online mission at a time.

To recap, 1st VFW standard online settings:

- Before you can fly online with us in BMS, you MUST do the following (we will check):
  1. **Ports**
     Forward port UDP 2934 and 2395 for F4, UDP 2936 and 2937 for IVC
  2. **Anti-Virus / Windows Firewall**
     Disable your anti-virus and turn off Windows Firewall
  3. **BMS Config File**
     In your Falcon BMS folder -> User folder -> Config Folder -> Open the file Falcon BMS.cfg with Notepad
     Add these lines to the top of the config file (copy and paste) then save the file:

```
set g_bShareMpClouds 0
set g_bMessageStatistics 0
set g_bEnableRakNetPacketLogger 0
```

set g_bNoAAAEventRecords (change the value of **0** to **1**)

Remove the "=" signs from these 2 files:

set g_bEnableRandomFailures = 0
set g_fMeanTimeBetweenFailures = 24.0

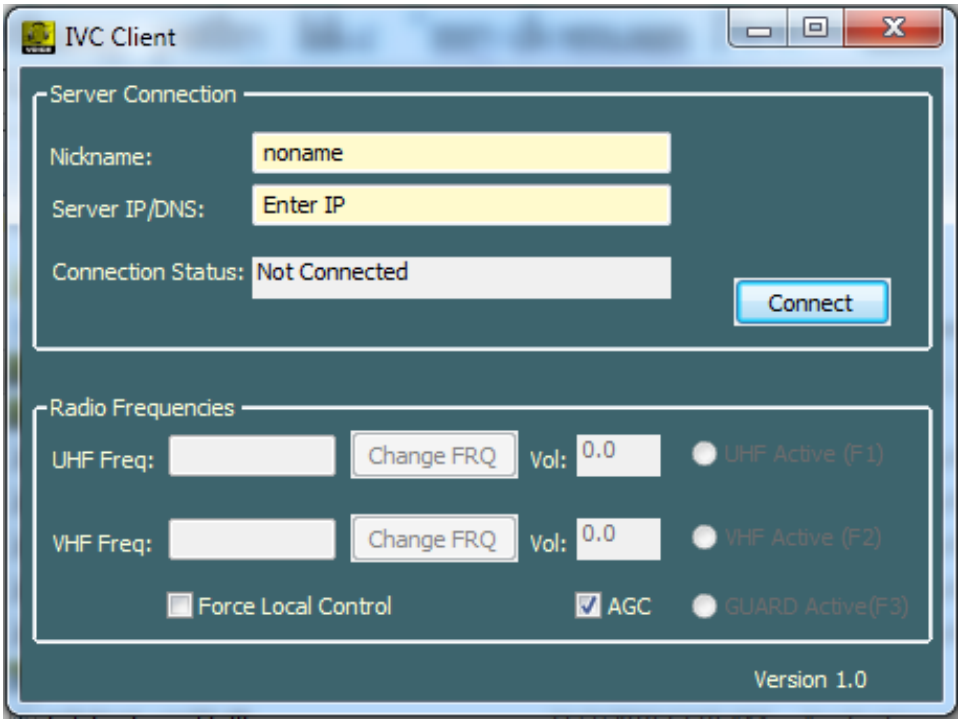
Internal Voice Communications (IVC)

The IVC has been around Falcon since Open Falcon 4.3. In the past it relied upon the now-discontinued Microsoft DirectPlay Voice system and was non-functional on Windows 7 based systems. The new IVC however uses a customized Teamspeak 3 SDK and is fully compatible with both Windows XP and 7, both 32 and 64 bit. What IVC does is integrates with the sim's radio systems and makes the use of 3d party comm software like TS unnecessary. While the background app driving IVC has changed, the IVC SOPs have not, being carried over from the 1st VFW Open Falcon IVC procedures. As we delve into the IVC usage, do not be discouraged if you need to re-read this section, it is a complex facet of FBMS. You will certainly need to study the Dash-34 starting from page 63 as well. **Be aware that it is best for the HOST to establish the IVC BEFORE launching the sim itself.** So let's outline the flow of events when using IVC.

Starting an online session with IVC enabled begins with the host clicking on the **IVC Host** from the Menu Splash Screen. A black DOS window will then open; nothing need be done with it but it will

give you info about who is on IVC so you can either ignore/minimize it or move it to a second monitor. As the host, be aware that IVC bandwidth requirements per connecting client should be assumed around 100kbs upload. Assuming an additional 250kbs for the sim itself (as discussed), fuzzy math says each client requires 350kbs upload. So, depending upon your upload bandwidth, it may make more sense for one person to host the IVC separately. Having said that, these numbers are a safe starting point right now while we continue to test so your mileage may vary.

All players can now go ahead and enter the sim and select comms as noted above. Ensure IVC is selected and enter all the relevant information, as discussed, and if you are the **IVC host remember to use 127.0.0.1 for the IVC IP**. The sim will tab out and the control window pictured below will then appear.



You need do nothing except ensure the top 2 fields, Nickname and Server IP/DNS have the correct data. Now go back to the sim.

Whether client or host, you are now ready to enter the sim and click on the Comms option. Everyone connected to this IVC Host should now be able to communicate with each other using the **<F1> (UHF)**, <**F2>(VHF)**, and **<F3>(GUARD)** keys. Test the comms and you are now ready to enter the online session itself. Any errors or problems at this stage from the IVC are likely from anti-virus, improperly forwarded ports, or incorrect IP addressing. It is also suggested at this time that leaving TS3 open while using IVC can cause IVC functionality problems. Again, nothing conclusive, our community is still researching this.

While in the 2d portion of the sim, including the UI main mission briefing screen and map as well as the pie screen, all IVC comms are initiated with the **<F1>**, **<F2>**, and **<F3>** keys as discussed. The moment you enter the cockpit though you are on the UHF and VHF radios!

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New Ground Handling

Notice anything odd about this F16? Seems to be leaning to its left. Look closer: it's a **flat tire**. Common causes of flat tires on your FBMS Viper are turning at too high a ground speed, say above 10 knots in a hard turn or 15 knots in a soft turn, or applying the brakes too much at high speeds. Should you get a flat, your mission is aborted and, worse, your ability to control the jet on the ground could be severely impaired.

Also implemented now is brake temperature modeling. Consequences of over-heating brakes are brake line failures, landing gear failure, hydraulic fires or even explosions. More

moderate and controlled use of brakes will be necessary to avoid over heating while taxiing: if you have over-heated brakes prior to take-off, your ability to safely abort at high speed on the runway (a rejected take-off) could be severely hampered. Likewise, in the case of a RTO, you would need to "rest" the brakes for random 5-9 minutes depending upon factors such as gross weights, speed and braking distance.

While the F16 has no brake temperature gauge to monitor, you can keep track of ground speed through the INS page or, as mentioned, use the mach readout in the HUD. Landing gear side loading is now modeled as well so go easy on the turns. Maximum ground speed, as in civil aviation, should never exceed 25 knots straight and 10 knots in a turn. The advised technique, as in RL, is to keep the throttle at idle once the jet is moving and use the brakes intermittently to control ground speed.

One other item to keep in mind now as well is that with brake behavior more accurately modeled, at liter gross weights the jet may have a tendency at idle thrust to roll on the ground when brakes are not applied or wheel chocks are out (chocks are discussed below). You therefore need to get into the habit of applying the parking brake whenever you are not anticipating moving for a few minutes. Otherwise keep your feet on the brake pedals!

As a final note, be aware that your wheels will now be chocked at ramp start and to remove them requires a call to Tower on the

correct frequency. What that means is that when you are ready to go and remove the chocks, be sure your brakes are applied or your parking brake set or the jet will likely begin to creep forward right away (depending upon weight, with liter jets tending to roll more easily).

An excellent power point presentation entitled Ground Operations can be found in the 1stVFW download section.

Take Offs, Landings and in Between

Real *Falconeers* always do a ramp start, right? Well a ramp start with your FBMS Viper is a wee bit more complex than AF's. All the required documentation can be found in **Falcon BMS 4.32\Docs\Checklists & Cockpit Diagrams\F-16 Checklists**. Of course your best option after reviewing those checklists is to get online and learn-by-doing with us.

As well though, a good guide by Wizard from the 72nd VFW is here…sorry, you may have to register to access it.

Wizard has also made a fabulous and detailed Ramp Start video guide you can find here.

Here is a pretty nice FBMS ramp start-up guide.

As well, Red Dog's excellent checklist for FBMS is here.

Heads up! Be sure to set the air source to "norm" or your avionics will overheat. This was never modeled in AF. The rotary is to the right of the Master Fuel switch.

In the past a Cat 3 loaded jet would be set to Cat 3 when you arrive in the pit. No longer: it may or may not be set to the correct category setting. Should the setting be incorrect for the current loadout the Master Caution will be illuminated. Resolve this by setting your Cat Switch to the correct setting and of course the light should extinguish. A good explanation of what exactly the Cat limiter does can be found here.

Your altimeter will now likely be inaccurate when you enter the pit: as in RL it needs to be adjusted to local pressure. You can get current altimeter QFE settings from the ATC menu and enter it into the Kollsman window with the dial, comms menu "t" twice…provided you are tuned to the correct ATC frequency. Or, if you're like me and prefer the Altimeter set to local ground elevation at home plate, rotate the dial until the window shows zero elevation as below.

Also note that in the UI arming screen, internal fuel load can be adjusted. The obvious advantage here is that, as in RL, you can save on fuel weight so more mud stores can be loaded, you then hit a tanker soon after take-off and top up.

Take offs have changed somewhat in that you will find the jet accelerates to rotate speed faster and often without lighting the "can". As always, be sure not to exceed 300 knots with the gear down, but do not retract it too early as that will raise the flaps as well, possibly causing instability in a heavy jet. Also note that in the ATC menu, "request takeoff" has been removed; when you

request taxi and are cleared, ATC will sequence you for a take off slot and call you with takeoff clearance.

In the air you will notice the jet now needs a lighter and more adept touch than previously. The heavy-handed yanking days of AF are gone as the jet may not react as you expect. You will also find turbulence is active, especially at lower altitudes and most apparent upon landing. As well, asymmetry is modeled as stores leave the jet, causing uncommanded roll, requiring you to trim much more often than in AF. The asymmetry is most noticeable at slow airspeeds so, for example, if you load only 1 HARM and leave the opposing hardpoint empty or with a liter munition, you will have to correct (trim) for this as soon as you are WOW (weight off wheels). Be prepared or you will get nasty surprises. As you speed up the asymmetry will ease off so another method is to deal with off trim until you accelerate enough for things to smooth out.

When landing the FBMS Viper, you will now find it wobbling quite a bit from the turbulence, much more “twitchy” over the threshold, and more of a challenge to keep the gun cross on the 10’ pitch to aerobrake. Having said that, wheel braking is more effective and so stopping distances are reduced. On a max weight jet, however, as previously noted, be careful not to overuse the wheel brakes at high speeds or bad things can happen. Even at liter gross landing weights the brakes can overheat with overuse so, as you should well know, it is always good form when landing the Viper to hold the 10 degree pitch line to aerobrake the jet until the nose drops on its accord to the ground. A good Viper Driver should only need the brakes to exit the runway.

It should also be pointed out that the speed brakes do not automatically retract to 40% when the landing gear is down as they do in AF. Bug or not, be aware of it. For as a good Viper Driver knows, you should have the speedbrakes extended on final soas to be able to keep the engine RPM up in case of a go around.

A detailed series of discussions of the new flight modeling is here.

Your New Office, say "bye" to the 2d Pit

Like it or not (and opinions vary) the 2d pit in FBMS is history, probably forever. Having said that, the new 3d pit has twice the resolution of OF's and much more so than the AF's. For a TIR user it's a whole new world of immersion. You will also notice that in the FBMS pit there is far more visibility of panels and substantially increased functionality of switches in the 3d pit from the old AF one. HUD text is also far easier to read. On a side note, BMS has hinted that the kneeboard may return in a future update. It is worth noting, however, that Red Dog has come up with a moving map of his own that may or may not suit your needs, but here is the link.

While the 2d pit is gone, BMS does offer a workaround with frozen "snap views" of the 3d pit that are activated with the 2 key. The default snap views should suit most flyer's needs and will likely be

most useful for some switchology scenarios.

Padlock has been altered for those who use it. Rather than a sidebar it now lives at the bottom left corner. I confess that I still use it from time to time to compensate for the lack of peripheral vision. The old 1 key MFD view has been replaced with a close-up HUD symbology view. For those who recall OF, the 3d pit HUD symbology distortion issues are resolved in 6DOF.

Speaking of 6DOF, if you use TIR (and if you do not and have some cash, get it, you won't regret it!) be sure to select "Enable Track IR Vector" in Controllers>Advanced>Views.

Also you may notice when you move the mouse cursor over the cockpit controls, the cursor "sticks" there to help with the switchology manipulation. As a TIR user I like it, but if you do not, it can be disabled with this switch in the *falcon bms.cfg* config file:

Set g_b3DClickableCursorAnchored **0**

A more detailed discussion of your new "office" is here.

The Radios

The radios now operate much more like RL. Thus for both UHF and VHF, distinct frequencies can be set and linked to preset channels. When transmitting on either UHF or VHF, that channel will highlight in the DED and in the HUD if DED is displayed there (like in RL). As discussed, FBMS includes the *Internal Voice Communications* (IVC) which mimics RL comms and makes Teamspeak unnecessary. Whether you use IVC or not (and it will be Wing Standard to use it) you will need to plan and setup the radios in the User Interface (UI) DTC. What this means is that in the pre-mission brief, as in RL, radio frequencies and procedures among pilots and flights are now an integral part of planning. Unfortunately, no tutorials exist as yet for the new radios so you will need to carefully read the Dash-34 from pages 62-72.

But, assuming that an online session with IVC has been successfully started and all flyers are in the lobby, here's how things will generally flow (thanks Demo):

- Before you start a flight that's going to use IVC, make sure all pilots have their sticks programmed for ALT+1 (Comm1 or UHF/broadcast) and ALT+2 (Comm2 or VHF/Local).
- After doing everything you described to get IVC in the User Interface (UI), you can test IVC by pressing and holding F1 or F2. BMS IVC sounds just like Teamspeak in the UI.
- When in the mission screen during the briefing, the mission commander needs to set a shared channel for UHF. We use VHF to communicate within our own flight and UHF to communicate with other flights, so UHF will be shared and

VHF won't. But also remember, while on the ground the flights will be on the Tower frequency.

- When doing a ramp start, the first things pilots should do, is turn the power on in the aircraft, turn the radios on by turning them to Both and Guard, and ***make sure you turn the Comm1 and Comm2 volumes knobs up***
- Now everyone in your flight will be able to check in (communicate) by pressing ALT+1 even with the jets turned off. The default channel I believe is UHF 6 on the backup radio before engine start.
- Another way to do it is that flight lead should specify a time when the radio check will happen. Everyone can get in the pit and do their ramp starts then Flight Lead will do a radio check in at a specific time that flight lead. For example "Falcon1, check in", then you check-in in flight order.
- Remember that in-game it's ALT+1 to transmit in UHF and ALT+2 for VHF. If you have problems, make sure your volume is up and you are on both and Guard. Make sure your UFC toggle is not set to backup (left panel tacan). If you are using a preset channel, check that you have the right channel. For example, if you are supposed to be on UHF 15 and that channel is supposed to be 292.30, press COMM1 then use the directional toggle on the ICP to navigate to the Preset channel and then enter 15 and press Enter. Now below it you will see what UHF 15 is set to and can confirm it's 292.30. An easier option is to just press COMM1 on the ICP then enter 29230 and press enter. You don't need to use presets.
- In BMS, if pilots transmit at the same time you will hear a weird noise [called a “block”]... that's normal and it's because people are transmitting at the same time. Because of that it's even more important you stick to brevity and when you finish a transmission, wait for the response or acknowledgement from the other pilots before transmitting again.

Now, basic radio setup in the FBMS cockpit goes as follows. You will have seen the following 2 radio panels in AF. Beginning with the UHF Radio Control Panel (Figure 1-43), the bottom left rotary

should be set to “BOTH”, and the bottom right rotary should be set to “GUARD”. Ignore the rest. On Audio1 Panel (Figure 1-44), rotate both COMM rotaries counter clockwise all the way (these control the volume for UHF and VHF channels), and to the right rotate MSL and THREAT counter clockwise all the way. Ignore the rest for now.

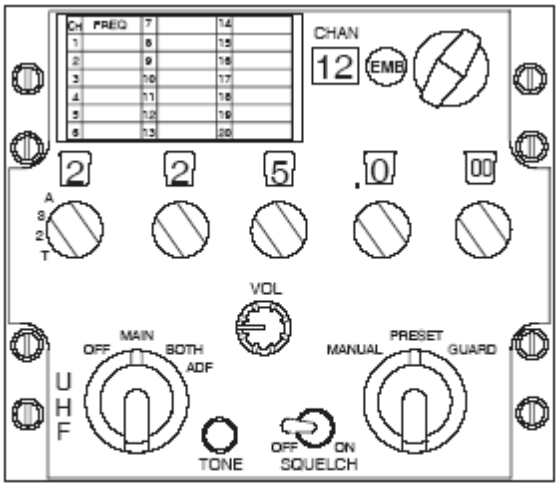


Figure 1-43 UHF Radio Control Panel

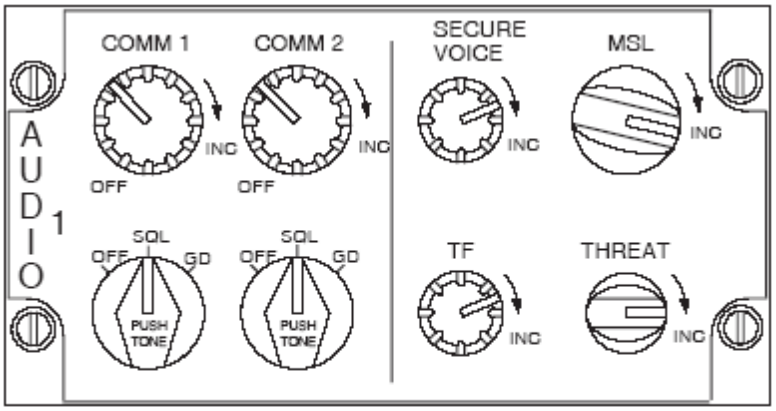


Figure 1-44 Audio 1 Panel

Two very important items not mentioned in the Dash-34 are this:

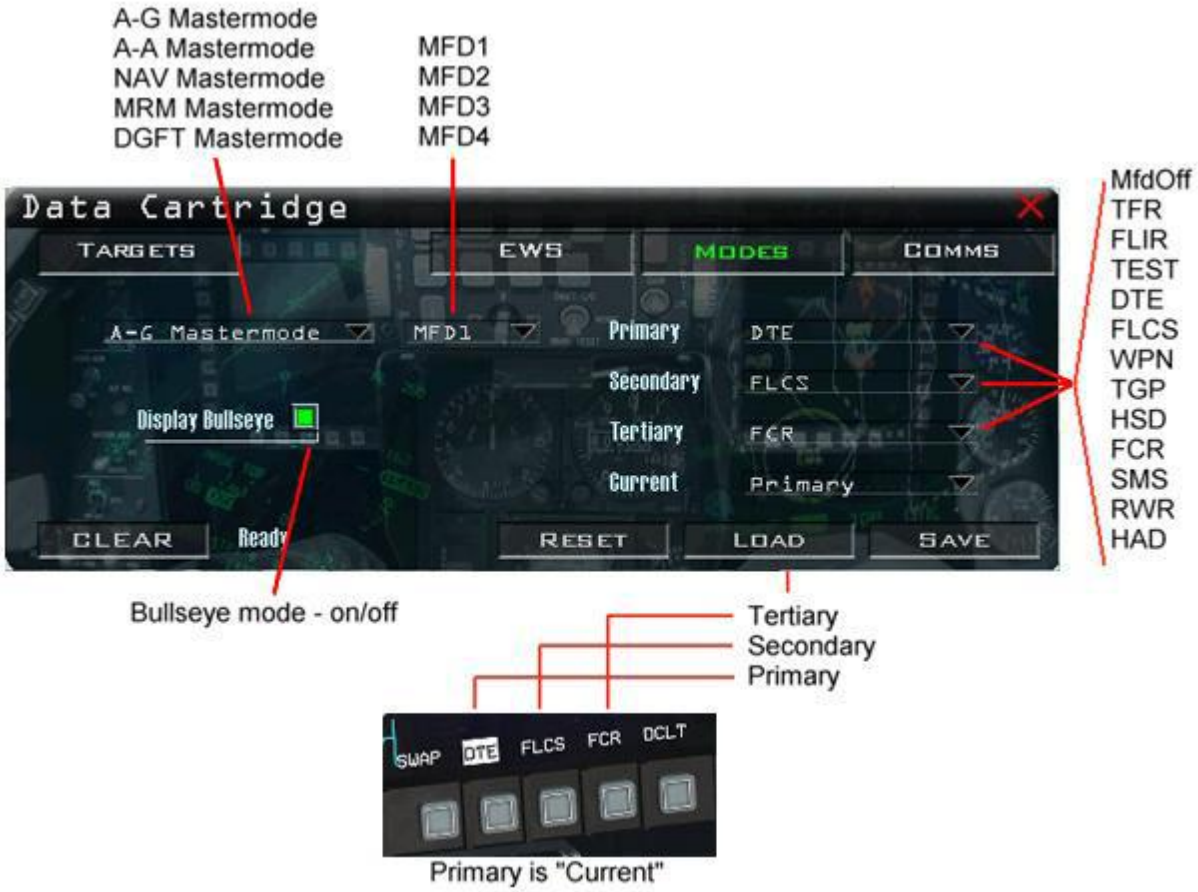
(1) The **"vol"** volume rotary on the above UHF Radio Control Panel controls AI versus IVC volume. When you adjust this rotary, the AI volume stays the same, but IVC (human) volume changes. If you hear AI voices covering up your human IVC comms, check this setting. **Right mouse clicking** will increase IVC (human) volume **but** the animation is not modeled yet! When flying online, best advice is to right click it to the max. You can also use the mouse wheels but you won't know what you are setting it to.

(2) The **intercom** rotary on the Audio 2 Panel. The intercom rotary is the master volume control for everything <u>electronic</u> that the pilot hears through his headset in the cockpit: RWR, VMS (Bitching Betty), the warning chimes and radios including the AI and human IVC. Finding your audio comfort zone is a trial and error process because this rotary is not animated either yet. So be aware that this rotary has 8 clicks and is **increased by left mouse clicking and decreased by right mouse clicking**. Or the mouse wheel but since you cannot see the rotary move why bother. My own experimentation finds a 4 or 5 setting the sweet audio spot.

Read the Dash-34 pages 68-72 for details on setting up the radios and manually changing frequencies. Also the OF Noob Guide pages 25-27 is worth reviewing

The Data Transfer Cartridge

In RL squadrons there are usually more pilots than jets. Therefore there had to be a way to temporarily customize the avionics of the jet for the pilot. As well, as mission planning moved to the computer age, it became possible to plan the mission on a pc and load the relevant data into a small memory cartridge for upload to the jet.



In AF this was somewhat simulated with the ALT C-L/S key combination when in the pit. What it was doing was saving this to <your-call-sign>.ini in the config folder. While handy it was very limited in its usefulness.

FBMS however, has modeled an actual DTC that is accessed from within the sim UI screen. Presented as a graphical interface, this DTC can be used to configure:

- **EWS & Chaff/flare settings** (Burst qty, burst interval, salvo qty, salvo interval, BINGO, REQJAM)
- **Default Mastermode**
- **MFD primary/secondary/tertiary setup per Mastermode** (A-A, A-G, NAV, DGFT, MSR OVRD)
- **Bullseye Mode** (on/off)
- **UHF & VHF preset channels**
- **HUD Setup** (HUD color, scales setup, FPM/pitch ladder, DED info, velocity and Alt setup)
- **Laser Start Time**
- **Master Arm selection**
- **Default cockpit view**

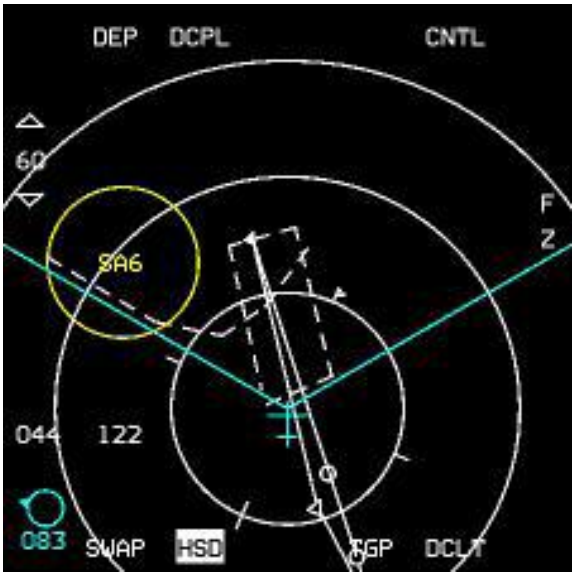
- **Target steerpoints** (stored in STPTs 1-24)
- **LINES steerpoints** (stored in STPTs 31-50 – 4 groups of 5 STPTs each)
- **Preplanned threats** (stored in STPTs 56-70)

This data is saved to <your-call-sign>.ini in the **Falcon BMS 4.32\User** folder. Be aware that **usage of the DTC is mandatory** so you will have to master it. Having said that, you will quickly learn to appreciate its power and flexibility!

When you fire up the DTC in the UI you will note 4 tabs along the top: Targets, EWS, Modes and Comms. A quirk of the DTC is

currently when you first fire it up in the UI, all the settings are blank. You will therefore have to either configure them all yourself or, easier to start out, for each such tab click RESET and the SAVE, and it will populate the settings with defaults for you.

The DTC is also important for marking threats on your HSD: in the past with AF all threats would magically appear on your HSD. This was never realistic. Now, YOU the pilot must determine from the UI map which air defense threats are going to be factors to YOU and add them on manually to the map, then saving to the DTC. The threats you choose will then appear on your HSD. Specific ground targets can be found in the UI Recon screen and linked to "target steerpoints" in the DTC. Also be aware that the FLOT will no longer appear by magic on your HSD, you must add that in as well from the UI map (adding the FLOT is optional). One final note is that you can also add custom marker lines and make boxes on your HSD. An example of what can be done on your HSD can be seen in the below picture:



Beyond that, advice for setting up your DTC is to always set the Home Plate Tower freq on channel 15 UHF (1-14 are used by the AI). Also never set the Tower to channel 0 (zero) because if you do and you ever change the UHF from channel 0 in the cockpit, you will be unable to raise the Tower again (known bug).

Once in the jet the DTC can be loaded either with the old ALT C/l or select the DTE option from your MFD main menu and then click load on the DTE page. To see your mission specific customizations from the DTC, you *MUST* load it as described here.

Again, the new WDP is fully capable of interfacing with all aspects of the DTC from outside the sim.

An excellent video on the setup and usage of the DTC is here.

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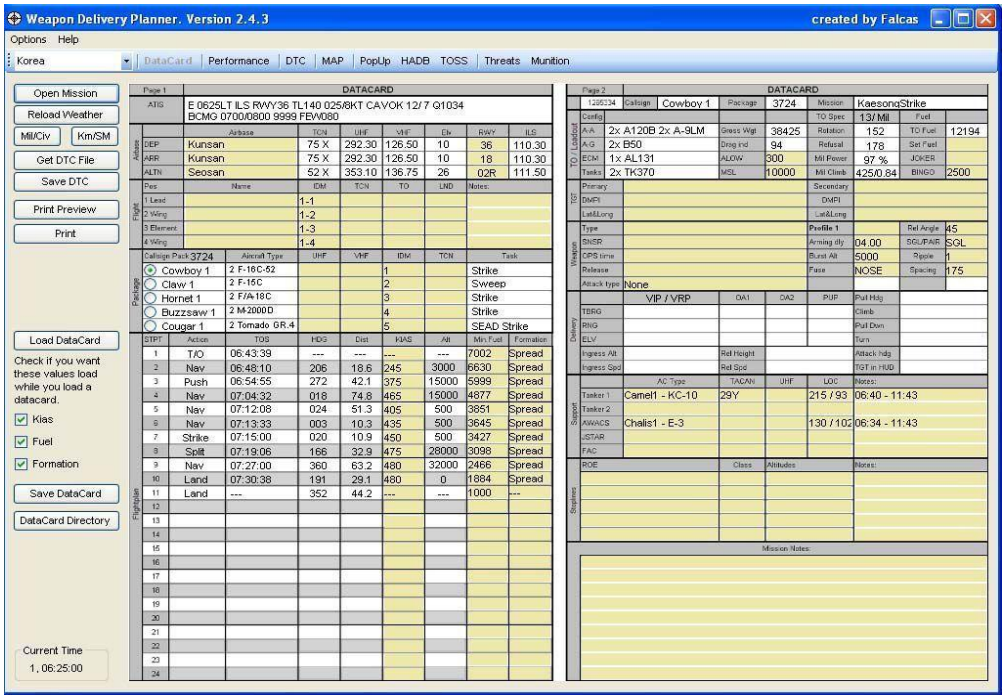
The Weapon Delivery Planner

While not a built-in part of FBMS, the WDP deserves some discussion. You may recall the WDP by Falcas from past times as a tool to plan A2G munitions deployment. The newest version is 2.5 and is designed to integrate directly with FBMS. It can pull any TE mission from the sim and allow you to make all kinds planning choices and save them to your DTC that you can then load into the sim from the UI screen. It can also generate a custom high-quality printable kneeboard/lineup card as you see below.

Get this excellent and essential utility here.

Recommended reading for WDP basics is here.



The Data Link (Improved Data Modem)

Welcome to the Information Age in the Viper. FBMS will allow you to increase your team's SA through inter-aircraft data linking.

Once again, Strikeout from the 72nd VFW has an excellent write up to start out with (found here):

> By default you will not see your wingmen on your HSD. Like in the real jet, you need to configure a datalink round to get this to work. Basically, flight lead needs to set his datalink to CONT (continuous) mode -- do this on the radar. Once he's done that, he initiates continuous datalink by pressing and holding the comm switch left [or CTL o] for > 1 second. You will then hear the datalink modem of each jet transmitting its location in turn over the UHF radio in your headset. You can hold comm switch left again to turn off continuous mode. Wingmen should always be in DMND (demand) mode.
>
> Flight lead can also assign radar targets to his wingmen over datalink. To do this, toggle the datalink to ASGN (assign) mode using the radar, then bug a target and choose a wingman number. The wingman will hear DATA - DATA and see the assignment on his radar. He can acknowledge the assignment with the WARN RESET switch.
>
> Pressing the comms switch left for < 1 second

toggles on/off the datalink symbology on your HSD (but does not toggle datalinking itself). Pressing the comms switch right datalinks the position of your A/G radar cursor to everyone in your flight.

Along with tracking your own flight, you can also track over datalink the position of another flight -- say, a tanker you are escorting, or the SEAD guys you're depending on. Everyone has a unique datalink ID number -- you can find yours on the DLINK page of the DED. If you move to the next page, you'll see a screen where you can add four more unique IDs to track. Unique IDs are two digit numbers, and the second digit is the person's number in the flight. So if your SEAD buddies have datalink IDs of 31, 32, 33, and 34, just add those to your DLINK pool and you'll see them on your HSD.

Thanks Strikeout!

Expanding upon this in detail, Stretch from the 72nd VFW has this useful post found here.

Well, with the help of Cowboy and Knight, I figured out why your flight members sometimes don't appear on datalink. The short answer is: **Everyone needs to have the same datalink settings.** In other words, if you've got 31, 32, 33, 34, and are also tracking 11, 12 and 21, 22, *everyone* has to have the same settings. Anyone who doesn't share lead's settings will not appear on the HSD.

To help everyone become familiar with datalink in BMS, I've written up a quick guide:

Technical Overview

Datalink is a method for aircraft to tell each other their positions. It works using a modem that transmits over the UHF radio. One person (it can be anyone, but usually is the flight lead) is elected the "leader" of a datalink pool. Every 8 seconds, this person's jet emits a short, steady high-pitched tone over the UHF radio. When other jets hear this tone, they quickly transmit their current position and the location of their radar target over the UHF channel using the modem. The combination of these two sounds produces the familiar "beep-ksssh" sound of the datalink.

Each jet is given a unique two-digit identifier, called an IDM number (IDM stands for Interlink Data Modem). This number is transmitted just before the jet transmits its position, so that other jets know which jet is transmitting. The first digit of this identifier is an arbitrary number assigned to the flight. The second digit is the aircraft's position in the flight ("3" for -3).

In real life, there are five levels of datalink information.

In real life, a datalink can operate in both analog and digital modes, over the UHF or VHF radio, and at different bandwidth settings, just like an Internet modem. In the game, all datalinks are set to digital transmission at 16 kHz bandwidth.

There are different datalink standards that support different levels of information. In real life, the F-16 uses the Link 16 datalink standard, with Link 22 support coming soon. Not all elements of Link 16 are supported in Falcon BMS, but the following are: location of flight and package members, location of bugged A/A targets, A/G cursor location, datalink-assisted assignment and sort, and datalinking steerpoint and PPT locations. Features of Link 16 not supported include datalinked AWACS contacts and JSTARS contacts and threat circles, locations of friendly ground units, 9-lines and messages from ground personnel, images recorded from the TGP (for BDA use by ground personnel), and intra-flight text messaging.

During Briefing

Flight lead should brief all pilots on the datalink settings. By default your datalink will be configured to track the members of your flight (N1 through

N4), where N is your flight's IDM number. To learn your flight's IDM number and the IDM number of other flights in your package, open the Briefing screen and view the list of flights in the package. The IDM number of the first flight in that list is 1, the second is 2, etc.

You cannot track flights outside your package on datalink.

In the Pit

All flight members should configure their datalink as briefed by flight lead. First hit LIST and ENTER to go to the datalink page on the DED. The first page is the A/G datalink page. On this page you can configure the A/G datalink (not all options are settable in BMS).

Hit SEQ to go to the second page (the A/A datalink page), which lets you add and remove flights to the datalink pool. Add any additional aircraft to the datalink pool as briefed by flight lead. If you have other than 4 members in your flight, set the LAST setting to the number of the last flight member. Other slots can be used for package members.

On the radar screen, the top right OSB sets the datalink mode. There are three modes:

DMD (demand): Responds to datalink inquiries from the pool leader; allows other flight members to assign you sort aircraft.

ASGN (assign): Manual activation of a datalink round; allows the pilot to assign targeted aircraft to different flight members.

CONT (continuous): Automatic activation of a datalink round every 8 seconds; allows the pilot to assign targeted aircraft to different flight members.

When Airborne

The datalink pool leader should activate the datalink rounds by holding the comms switch outboard for 1 second or more. If the leader is in ASGN mode, only a single datalink transmission will occur, and the symbology will disappear after 8 seconds. When in CONT mode, the datalinked aircraft will update their position every 8 seconds continuously.

Operation of the datalink is confirmed by noting the sound of the datalink modem transmitting over the UHF radio and the appearance of datalinked flights on the HSD. Flight lead can then call "dolly up" giving each flight member an opportunity to confirm that they have datalink operation as well.

In Flight

If the HSD and radar become too cluttered, flight lead can hide datalink symbology by pressing the comms switch outboard for less than 1 second. This hides datalink symbology until the comms switch is pressed outboard again.

To sort using the datalink, flight lead can bug a target and press the OSB on the radar representing the aircraft number he wants to assign the target to (numbers "1" through "4" down the right side of the FCR format). The aircraft will receive a "DATA-DATA" VMU message, ASSIGN warning on the HUD, and information about the assigne target on his radar.

When in A/G mode, pressing comms switch right transmits the location of the A/G cursors to other flight members.

When the HSD is SOI, pressing comms switch right transmits the location of the current steerpoint (or PPT) to other flight members. Each flight member's jet then creates an identical steerpoint with a number between 71 and 80, and displays the information on the DED.

Tim "Stretch" Morgan
72nd VFW; 617th VFS

To summarize then, what can you do with the DL? Plenty! You can assign air or ground targets to individual pilots in your flight, you can send markpoints or updated steerpoints. You can also see and get position updates from other package assets on your HSD. You can see the targets your wingmen are tracking/engaging.

And speaking of markpoints, BMS changes to them are here.

An excellent uTube video describing DL usage is here.

Read the Dash-34 pages 102-114 for the details **(remember there's no shortcuts to learning FBMS ☺)**

Having said that, recall from your reading of the OF Noob Guide (you DID read it first, right?) that a good beginner discussion of the DL setup and use is on pages 17-24.

A final note learned the hard way: only the flight lead should set his DL to "CONT": all other members of the flight should leave it set to the default "ASGN". If the current flight lead dies then the next flight member in sequence should switch to CONT and ALT o to reinitialize the DL. If this is not followed, target handoffs will not function correctly and weird things can happen with the DL on the HSD.

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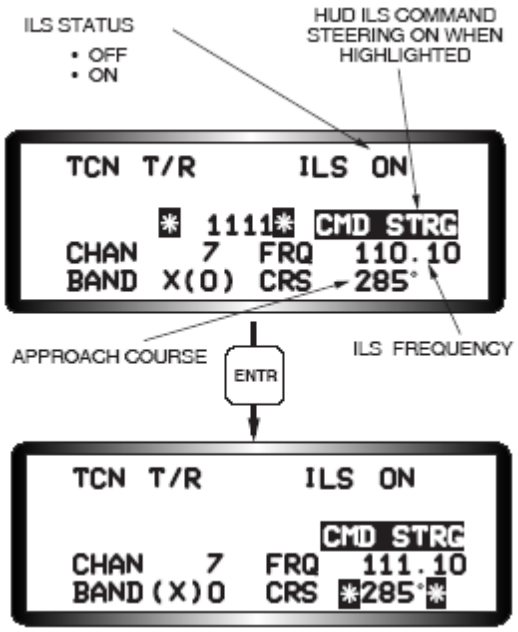
Instrument Landing System (ILS)

Some important changes here from AF, mainly (as expected) to increase the realism of the functionality. One item to note is that the DED is now an integral part of the ILS setup. "The system operates on VHF frequencies of 108.10 to 119.95 MHz. The ILS is turned on and off using the ILS volume control knob on the Audio 2 Panel on the left console."



"ILS cueing is presented on the HUD and the HSI. When the instrument mode selector is positioned to ILS/NAV, ILS cues are displayed on the HUD and selected STPT distance and bearing information is shown on the HSI. "

The BMS-34 pages 47-52 lays it all out.

A great read on FBMS ILS written by Mirv from the BMS Team is here.

The 1stVFW has a good document in the download section entitled Navigation and Instruments.

We at the 1st VFW are working on an internal-only ILS training guide and patch so 1st pilots stay tuned. ☺

The Radar and HUD

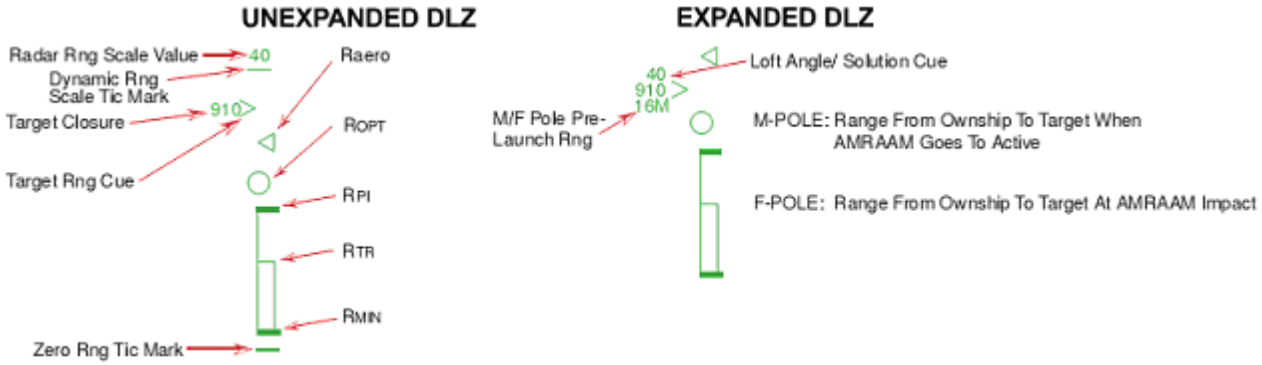
Key changes in the radar include increased functionality and more detailed and informative HUD and MFD symbology. These changes (and many more) are best explained in the Dash-34 itself, the HUD starting on page 72 and the FCR on page 81. Study these pages carefully. With learning these changes, there are no shortcuts.

But some key changes to note are:

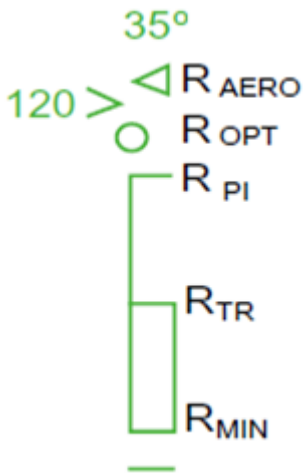
- RWS mode can now bug 2 targets at once: bugging a second target switches the radar to “TTS" or "Two Target SAM" mode, providing enhanced data about both targets and allowing a slammer to be fired at both simultaneously; in AF you could only bug one target at a time.
- TWS mode now tracks 10 targets instead of the 16 AF did.
- Missile data-linking will support 2 slammers in TTS or up to 6 in TWS.
- There is a 2 second delay from pickling to release, simulating the data transfer from FCR to missile. Hold the pickle until release.

Here is a picture from the Dash-34 showing the new DLZs for the

Slammer, sorry it is a little blurry but you get the idea of how much it has changed from AF:



The Slammer is of course the Viper's Big Stick, so it is worth noting some key HUD symbology changes. Here's how it has changed…



R_{AERO} (Range Aerodynamic): Represents the max kinematic range of the missile thus the longest range shot having a chance to hit the target. This is assuming the target won't maneuver, the pilot performs optimal loft/steering and will result in Nominal Termination Criteria.

R_{OPT} (Range Optimal): Basically the same as R_{AERO} but with High Termination Criteria this time.

R_{PI} (Range Probability of Intercept): Same as R_{OPT} but without having to loft or make azimuth change. We still assume the target is non-maneuvering.

R_{TR} (Range Turn and Run): Represents the max range shot assuming the target turns away from you aircraft to tail aspect at launch.

R_{MIN} (Range Minimum): Self-explanatory!

A-POLE: Range from your aircraft to the target when the missile will go active (HPRF).

M-POLE: Same as A-POLE but MPRF active.

F-POLE: Range from your aircraft to the target when the missile will impact the target.

DMC (Digital Maneuvering Cue): Represents the heading change the target has to make to degrade the AMRAAM from high termination criteria to nominal. This value will never exceed the AA (Aspect Angle) and the R_{TR} cue will grow up to this value.

The increased information available from these changes will fundamentally alter your BVR A2A tactics from what they may have been in AF.

One last note: when you first power up the jet and toggle the FCR switch on, the Radar will first run a BIT test.

An excellent uTube video on FBMS FCR/A2A usage is here.

Unguided Munitions Deployment

If you have read the OF Noob guide you will know of these 4 very important changes in unguided munitions deployment. But the changes are significant and so bear repeating.

(1) The targeting cue pipper marks the first point of impact for a ripple of bombs; this is different from AF where the pipper marked the middle of the ripple string.

(2) In CCRP, if the release does not occur at the HUD indicated drop time due to wind etc, release the pickle and then push the pickle again and they should drop off the jet.

(3) Also take special note that the gun has been removed from weapon rotary; you must now select the gun manually from OSB 2 on the SMS MFD page.

(4) Not mentioned in the Noob guide but also important is the default CBU burst altitude has changed from 500' in AF to 3000' in FBMS.

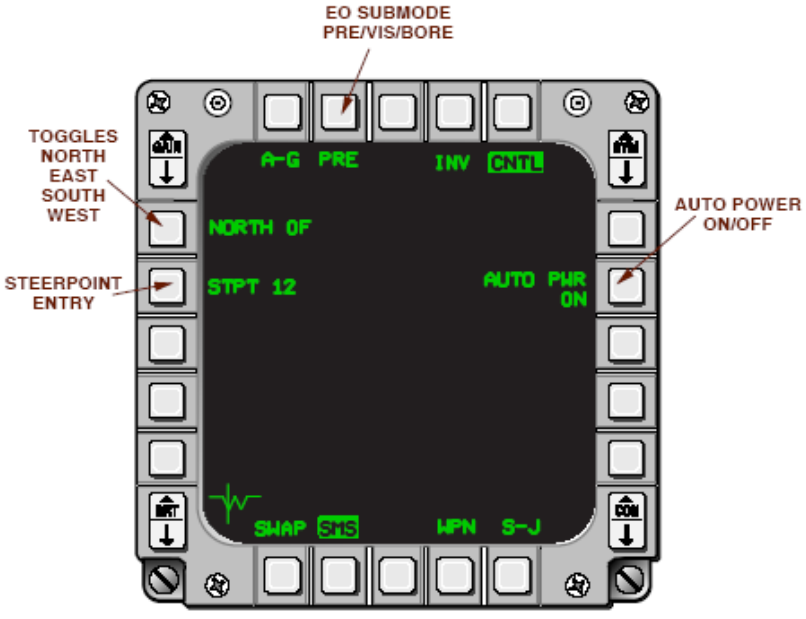
Mavericks

Rifle! (I love the Maverick!) ☺

Not too much has changed in their deployment from AF although the MFD video from the maverick is much better and the maverick WPN MFD is visible in the 3d pit. But always keep in mind that when you switch to mavericks you may have to change the SOI manually to the maverick WPN page and re-enable the cursor (TMS forward) before you can move the tracking gate. When locking an A2G target the SOI will automatically switch to the WPN

page (like AF) but remember to then hit TMS forward to enable the maverick tracking gate. Uncaging (removing the lens cover) with the “u” key remains the same. Sadly, slaving the maverick to the TGP is still non-functional. DCS A10 shows just how useful that ability is.

Maverick missile auto power on has been implemented in the maverick control page. The pilot can select the cardinal direction and the steerpoint number he wishes for the mavericks to power up at. The pilot must be within 2 nm and in the quadrant he selects in order for power to be applied automatically. For example, if the pilot is cruising west toward STPT 2 and has —WEST OF‖ —STPT 2‖ and AUTO PWR —ON‖, upon passing STPT 2, providing his a/c is within 2 nm of the steerpoint, auto power up will begin.



Also, be aware that when first powered up, **the maverick will now**

take 3 minutes before becoming active. In AF it would be available immediately, so plan ahead.

If you have read the OF Noob Guide there's not much else to add about A2G weaponeering, but the details of course are contained in the Dash-34.

An excellent article A2G FCR and unguided munition deployment is here.

The MAGNUM Kicks It Up A Notch!

Continuing from OF enhancements, the HARM deployment is now much more complex and has 3 active modes of targeting: Position Known (POS), HARM As Sensor (HAS), and the "classic" HARM Attack Display HAD method we know from AF. Toggling between the POS and HAS modes is done through the *cursor enable* button or OSB 2 on the HARM WPN page. The old HAD we all know is accessed as a separate MFD page.

Target selection with the HARM as the active weapon can be accomplished in one of two ways. The "classic" way of making the HTS the SOI and using the targeting cursors and TMS up to

designate. Or, new, can also be as follows:

HOTAS Controls:
- Cursor enable – toggles between POS and HAS modes.
- TMS Right – Selects first valid threat, a 2nd TMS Right steps to the next threat
- TMS Left – Toggles between threat tables
- Pinky Switch – POS Mode cycles the POS flight profile; HAS Mode cycles the FOV
- TMS Aft – Deselects the currently selected threat

Tim "Strikeout" Morgan of the 72nd VFW has done an excellent beginner write-up of the new HARM functionality that is worth quoting at length:

> HARMs: You now have three ways to locate radar targets with your HARMs: You can use the HTS (HARM targeting system), which shows the familiar HSD-like display we know from Allied Force, or you can use the HARM itself in one of two ways -- using a preprogrammed threat location, or using the HARM-as-sensor.
>
> Note that you can load an HTS onto your jet WITHOUT needing to load HARMs now -- this means you can get that wonderful HAD display even when you're not carrying HARMs!
>
> I'll skip the HAD cuz we all already know how to use it. To get to it, go to the HAD format on an MFD. If

you'd rather use the HARM itself to locate SAMs, use the WPN format on the MFD.

Once there, on the upper right, you can switch between POS (position known) and HAS (HARM-as-sensor) modes (or by using HOTAS cursor enable).

In POS mode you fire against preprogrammed threat steerpoints that you set up on the map page. Use TMS right to cycle between preprogrammed threats, and TMS left to cycle between threat tables (four threats per table). Once you've got the threat you want, choose a flight profile using the HOTAS pinky switch or the MFD (upper middle). Use EOM (equations of motion) for an off-axis, high confidence shot (high confidence meaning you're pretty sure the threat's still over your preprogrammed steerpoint). Use RUK (range unknown) for a low-confidence, off-axis shot. Use PB (pre-briefed) for a high-confidence, on-axis shot.

The horizontal line in POS mode separates information about the current in-flight missile (top) from the next missile (bottom). You can see the threat type ("2" for SA-2), the steerpoint it's over, the time of flight, and the time of impact.

The EOM/RUK/PB flight profiles determine how high the missile flies, how wide its seeker FOV is, and how long the delay is before it goes active. Use RUK for defensive shots -- the seeker has a wide FOV and activates immediately. It will home in on the first threat it detects while in-flight. Use EOM if you're sure the steerpoint is right over the threat, and PB if the threat is in the vicinity of the steerpoint.

> In HAS mode, you see a "Maverick-like" boresight view of what the HARM seeker sees in front of it. Above the boresight view is a growing list of the threats the seeker detects. The seeker will only detect up to 10 threats at a time. Toggle FOV (pinky switch) to reset the list and get a fresh view of threats. Four FOVs are available: wide, center, left, and right. You can filter out which threats you're interested in by clicking the "SRCH" OSB and toggling relevant threats.
>
> Hand-off a threat to the missile by slewing the cursor over it and pressing TMS forward. Wait five seconds for the handoff to complete (wait for "RDY"). Then Magnum!
>
> **Thanks Strikeout!**

A good BMS article describing the new HARM is here.

An excellent utube video explaining the new HARM deployment is here.

As a parting note on the new HARM employment, be aware that you can ignore all of its increased functionality and just continue to use the HAD as before.

One general issue to watch for and be aware of now is to

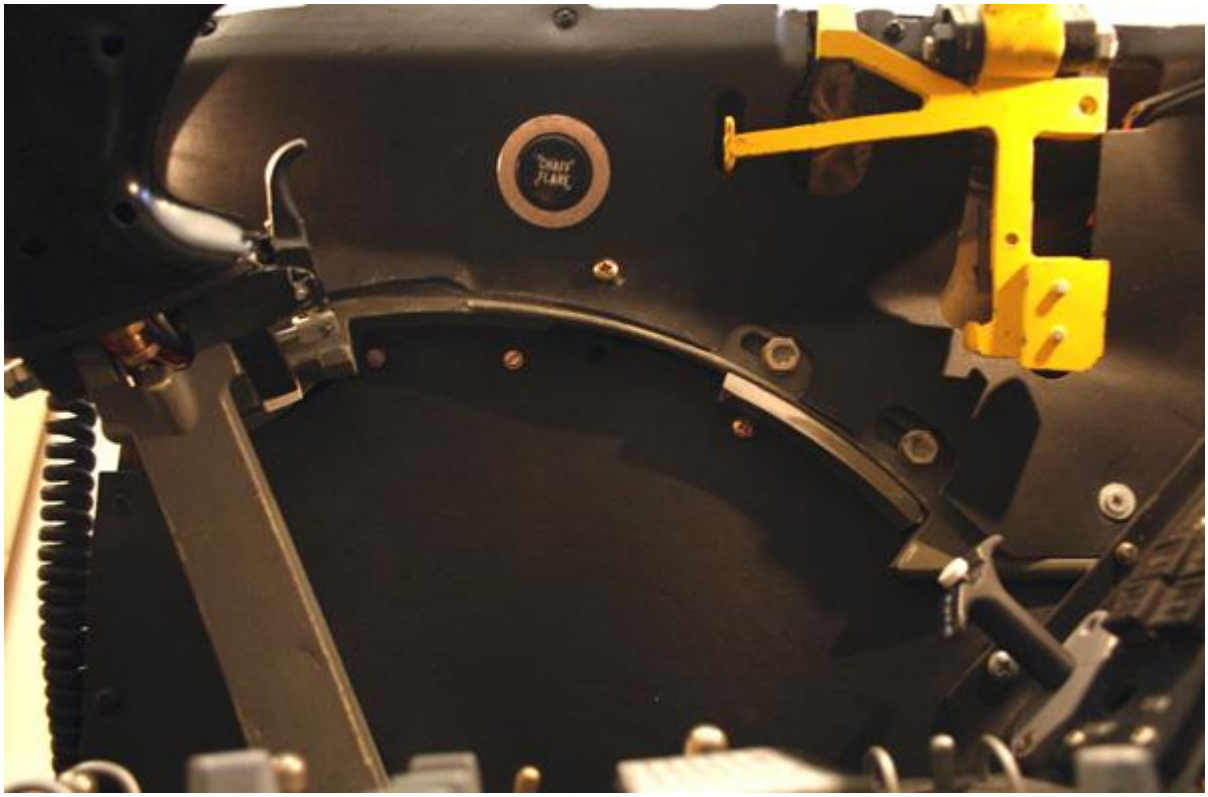
know at all times what your SOI is (Sensor Of Interest, pronounced "soy"); it does not always "automagically" change to the correct one like it did in AF. Also, remember if the cursors ain't moving to TMS forward.

EWS and CMS

To avoid pilot confusion with the many changes, your EWS and CMS switchology ought to be setup to mimic the RL setup as follows:

CMS Up: Run current countermeasures program.
CMS Left: Run countermeasures program 6.
CMS Down: ECM consent
CMS Right: ECM standby

As noted, you can extensively configure the CM settings through the DTC either in the UI screen or (preferred) the WDP. You can program chaff/flare dispensing with 6 presets with number 5 being a “slap switch”. A slap switch (pictured below) is a button “in the real jet is a big button that lives on the cockpit wall just outboard of and above the throttle grip” and is a quick way to spew countermeasures.

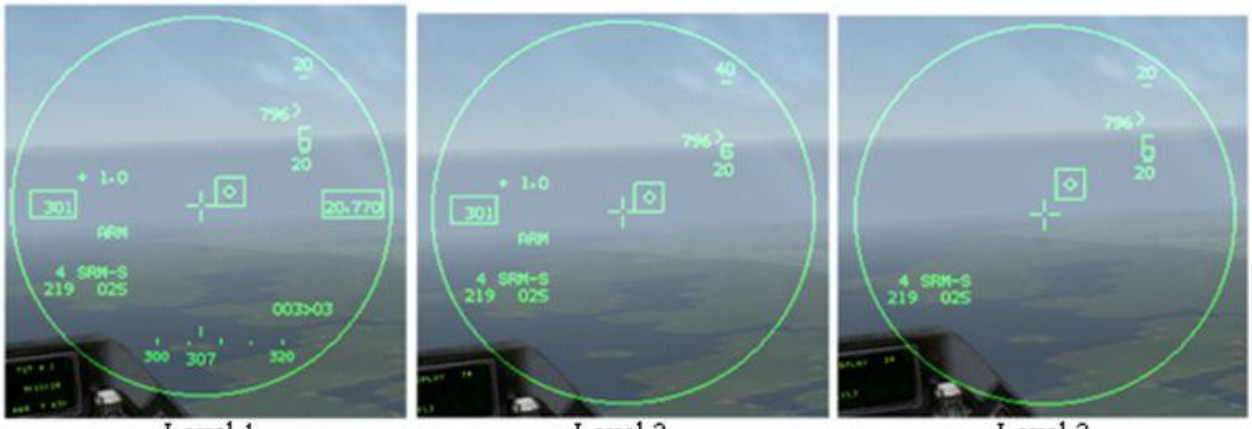


Read pages 114-116 in the Dash-34 very carefully as the way EWS functions is substantially different from AF. One crucial item to note is that now the jammer will actively jam at its own discretion depending upon whether you hit *CMS Down: ECM consent* or *CMS Right: ECM standby*. By setting your HOTAS up as noted, you will avoid the uncertainty of what your jammer is up to. I will tell you a little secret about what I set my CM to: I set the mode to bypass, that way whenever I hit CMS forward, I know it will dump exactly 1

chaff and 1 flare. Any other way and I find the Viper can run out of CMs very quickly. Also pay close attention in the Dash-34 to the RWR functionality.

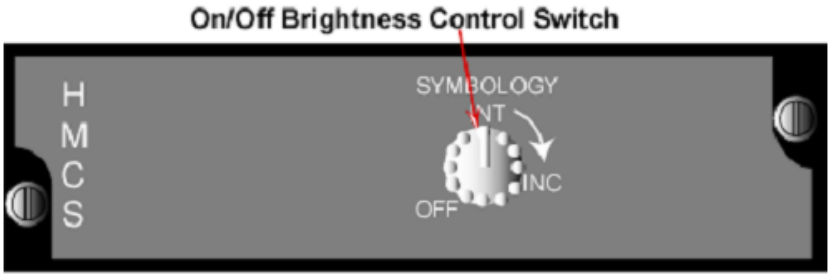
A good video tutorial on the RWS/ECM usage is here.

Helmet Mounted Cuing System (HMCS)



Level 1 Level 2 Level 3

FBMS brings the HMCS into play. It is an "Electro-Optical (E-O) device that serves as an extension of the HUD by displaying weapon, sensor, and flight information to the pilot. Combined with high off-boresight missiles, the system gives first look, first shot, first kill capability in the visual arena." It is controlled by this switch immediately to the left of your landing gear handle:



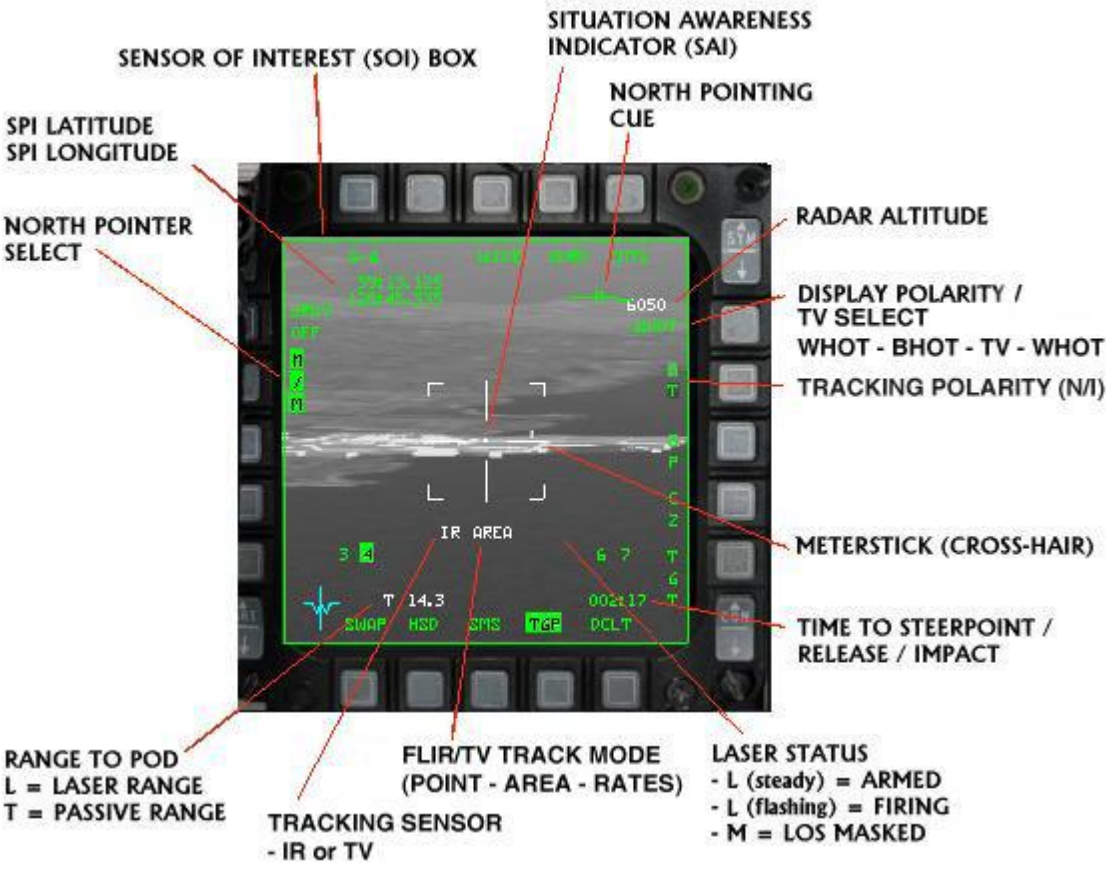
By default, the HMCS will be off; rotating the dial clockwise will activate it and increase its visual intensity. Obviously, it is most useful when combined with TIR. Your primary weapon for the HMCS will be the off-boresight-capable AIM 9X. Begin on page 100 of the Dash-34 for detailed operations. The HMCS can also be toggled off and on with **DMS down >0.5 seconds**. Ideally you will activate the HMCS at ramp start and set it to "standby" with DMS down. That way of course it is ready when you need it.

An excellent article on the FBMS HMCS is here.

A good video on its usage can be found near end of this video.

Sniper Advanced Targeting Pod

The Sniper XR pod is now modeled in FBMS. This targeting pod replaces the LANTIRN pod you have been using in AF.



One immediate visual difference you will notice is that the targeting pod video is much better; the AF “shades of green” are gone. Also (and this is significant), the TGP can now be used in an A2A mode and slaved to the FCR. The obvious advantage to that is you can do long-range visual identifications on bogies like the old Tomcats could.

When first going to the TGP MFD page, it will be in standby mode; you must click OSB 1 to begin its warming up. "Not timed out" will appear in the middle until ready.

There are two basic modes available for targeting.

Area Mode: Area mode is used when targeting stationary targets like bridges and buildings etc. The main difference from AF is that in Area mode you do not have to lock targets up. You just move the crosshairs over what you want to hit and they will stay in place. You can also adjust aim as the munition drops to the target if required. Whether you are targeting with the FCR or TGP as SOI you'll need to ground stabilize the crosshairs first with **TMS forward** on your stick or keystrokes **Num 0** or **Ctrl – Up Arrow**. Otherwise the crosshairs will not move. Using TMS forward and holding will command Area mode and subsequently releasing TMS will automatically go to Point mode and if there is a target that Point can lock onto, if not it will revert to Area mode. To command and stay in area mode use TMS right.

Point Mode: Point mode is used for smaller targets with well defined edges like vehicles or aircraft. Thus large targets and building etc cannot be locked in Point mode. A valid targeting box will follow the designated target and track it. You can either use the TGP as the SOI in Area mode and designate a moving target, or use the FCR to slave the TGP to a target and designate to Point mode when the TGP becomes the SOI. Note that there is a known issue with Point Track locking ground movers, the solution for now is to move the gate ahead of the target and let the target "drive into" the gate, then lock.

Of great interest is the current debate on slaving the mavericks to the TGP: while it is possible in RL (works fine in DCS A10C for

example), according to BMS the current sim SOI code does not permit this functionality. But some folks are stating that it *is* possible and so you can follow this discussion here.

The OF noobie Guide pages 28-33 gives a good introductory discussion, while the Dash-34 detailed descriptions appear from pages 86-95. A good uTube video on FBMS TGP usage is here.

Stores Management System (SMS)

The look and behavior of the SMS has been revamped. Beyond the minor appearance changes, the functionality is now more realistic. Many key changes were made to the Selective Jettison, changing what gets jettisoned and when. For example, S-J of mud stores no longer jettisons the ejector racks since in RL they are bolted on the hardpoint. As well the S-J is better at remembering the pilot configured jettison settings when switching to other modes and back. Also (as noted earlier) take special note that the gun has been removed from the weapon rotary; you must now select the gun manually from OSB 2 on the SMS MFD page.

Another change you will notice in the UI armament screen is that you can load the TGP and the HTS separately. Be aware though, that if you load a HTS without any HARM missiles and only have Mavericks on board for mud stores, you will not be able to select

the HAD as the SOI. Stay tuned for updates on that.

For the full skinny on the SMS, see pages 79-80 in the dash-34.

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Aerial Refueling (AR) Changes

Many changes. I will selectively quote directly from the Dash-34 just to give an idea of the flow. But in this case you are going to have study the Dash-34 AR section for yourself and just get up there and DO it. ☺

A major revision to the tanker queue management code now makes things work a little better for multiplayer. In particular, any player can call for fuel now, regardless of whether they are the host or even a flight lead. Any player calling for fuel will enqueue their *entire* flight. Enqueuing goes in #1, #2, #3 and then #4 order, skipping over any aircraft slots that are not populated (i.e., if wingmen are shot down or have landed). This follows current doctrine to give wingmen a little more fuel than flight/element leads since wingmen inherently use more fuel during ―formation keeping‖ and should be proof against any ordering problems with KIA or aborted aircraft in a flight.

Note the boom operator will not use much verbal communications during A/R as this was unrealistic.

Real-world pre-contact positions have been added for realistic mode. Player pilots must stabilize (reduce closure on the boom tip to near zero) in the pre-contact position before being cleared by the boom operator to contact position (the Forward light will activate and a radio call will be made). This position is approximately 2 feet

below the tip of the boom and 10-50 feet back from the boom tip, centered in azimuth.

Tanker Radio Calls

There are relatively few radio calls that you will hear from the tanker. This section presents a list of those and the meanings for them.

1. Unable: this means that the tanker is not yet on station or has left his station (RTB). In the case that the tanker is not yet on station, if you call again later he may reply one of the things below if he's reached his station. In the case that he's already RTB, all you will ever hear from him is "unable". Your flight is NOT queued when you hear "unable" and won't be unless you hear something other than "unable".

2. Vector to tanker: this means the tanker is on station but you aren't close enough. Get your flight within 10nm of the tanker and call again. I recommend that all jets you want to refuel in your flight be within 10nm of the tanker when you call again to ensure they all get queued properly.

3. Thirsty-11 Cleared to pre-contact: this means you as Thirsty-11 and the flight you are in are queued and the tanker expects you to join and take fuel. There is no need to call again or for any other players in your flight to call for fuel again at this point...the whole flight is queued and you should all just follow quick-flow formation procedure.

4. Cleared to contact position: this happens in two possible situations:

I. When you have already heard cleared to pre-contact and have

successfully closed to that position and stabilized there (i.e. you are at the pre-contact position more or less stationary relative to the tanker -- boomer wants to see that you are stable and in control and not likely to ram him); and

II. When there is a jet ahead of you on the boom, he tops off and clears and you are presently at the on-deck position and stable. Serious bonus points for any player that can FRAPS themselves hand flying the on-deck position well enough to get cleared direct to contact...I've only managed it one time and never in a turn. The AI flies formation well enough that they routinely get clear direct to contact.

5. Roger: this means you are queued. This can happen if you call and there's at least one jet from another flight ahead of you or if you are already in the queue. I don't recommend hitting y-1 a lot once you hear #3 above for your flight but should you happen to do that, the roger confirms that you are in line.

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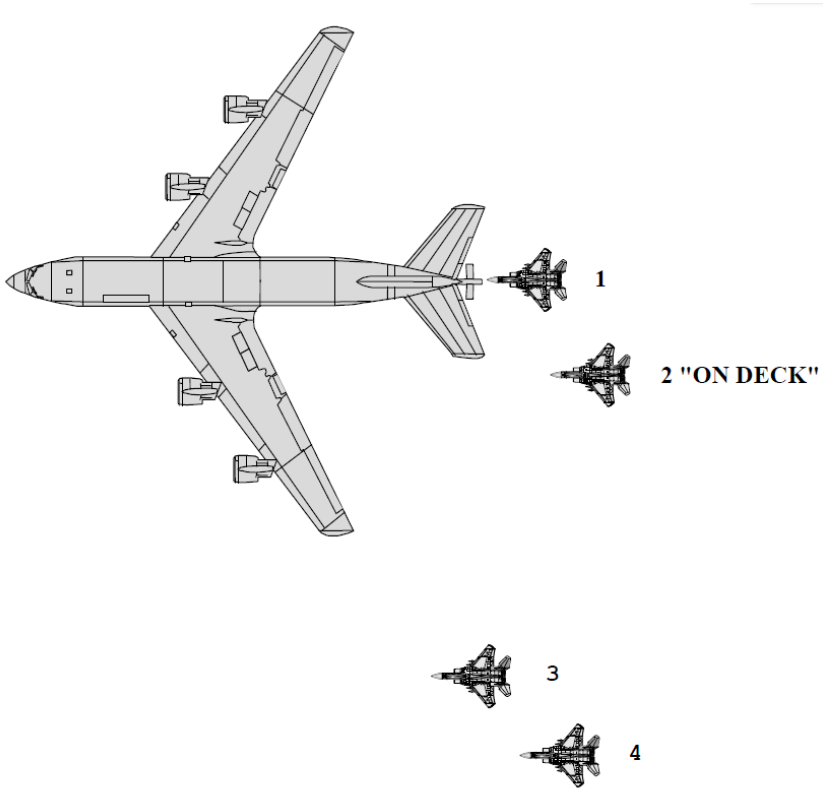

Quick Flow Air Refueling Procedures

Quick Flow procedures have been implemented to expedite air refueling operations. Quick Flow allows receivers to minimize refueling time with maximum fuel transfer. The code uses left echelon formation. The receiver flight will join on the tanker with the flight lead moving to the pre-contact position. Remaining aircraft will proceed to the left observation position. Once the flight lead commences refueling, the second aircraft in the air refueling sequence should move to the On-Deck position. The On-Deck position is normally flown as a route formation with approximately 10‘ spacing. The third and fourth receivers will go to the observation left position. When the lead jet completes refueling that aircraft moves to an observation position on the tanker‘s right wing. The second receiver moves from the On-Deck position to the pre-contact or contact position as directed by the tanker. With three or more receivers, the third receiver moves to the On-Deck position.

The left to right flow continues until all fighters have refueled.

Additional receivers arriving prior to the first flight completing refueling operations will remain in trail position until there is space at the left tanker observation position. There will only be a maximum of three jets waiting at left observation (including the On-Deck spot) at any one time any others waiting will be in trail until there is room for them to move up.

For departure from the tanker, the aircraft at left observation will descend 1000' and take up a loose echelon left formation with each jet stepped down 100‘ progressively to allow the outside jets to maintain sight. The aim point for this clearing maneuver is 1000‘ below the tanker's present altitude and 1 NM to the right of the tanker‘s horizontal position. Once the flight is approaching this aim point they will be cleared to return to waypoint mode.

AR SOPs for the 294 VFS/1st VFW are not yet available. So we will all participate in OJT. A 1st VFW training doc and patch are in the works.

But two things we do know already. **(1)** Your Master Arm be not be on and **(2)** The tanker’s buffet is much stronger now, so when approaching, keep below the tanker slipstream and pull up into the contact position.

Again, do not call the tanker for refuel unless within 10 miles.

Now for some good advice from Boxer (BMS Team) about how to get a “poke” in FBMS. Pay attention. ☺

Putting the FPM on the boom tip will place you too high for reliable clearance from pre-contact to contact...you are right at the top edge of the box that the boomer considers "safe" there. Use the gun cross and place it on the boom tip instead (actually I put the boom tip between the top of the HUD combining glass and the gun cross).

The only time you need "2" -- stabilized and ready -- is if you choose to kick yourself off the boom with the MSL STEP/AR DISC button...if you use that button then the tanker assumes you are done with refuel and waits for y-3 from you to clear the next guy. If instead you think better of it and want back on before the next guy in the Q gets a turn, then y-2 reinits the tanker boomer to be nice to you.

There is no truth to the idea that you need to be in NAV for AAR. Any mode will do. The code doesn't actually insist that you be nose cold but I could make it do that easily enough I suppose. Wouldn't have any effect on degree of difficulty though.

I don't bother doing the "heavy" approach to the tanker (start low and climb up to intercept). The jet wash isn't that bad. The main thing I do is totally ignore everything in the view except the tanker. I fly off that and nothing else for reference: is he getting bigger or smaller, is he drifting left or right, is he going up or down in my view, is his wing line matched to the FPM/pitch ladder. If any of those is going in the wrong direction, try to fix that. If more than one is going wrong, fix one first and then worry about the rest. This is sort of iterative until you get the hang of it but trying to fix closure and attitude and alignment all at once will just lead to PIO until you get the feel for what you need to do.

Using that technique I can usually drive right in, stop at pre-contact and then hit the center of the boom envelope and get plugged on the first try these days. That can be with the tanker in a turn, in a dive or climb, or like I ended up with over the weekend and descending turn...if you ignore the horizon and just fly good formation on the tanker, the rest will take care of itself, regardless of what the tanker is up to world-relative. In other words, learn to apply control inputs to hold what you see relative to the tanker in your field of view and then learn to apply control inputs to sweeten that picture until you have just what you need. Get myopic: the tanker is everything (umm, at least until you get good at this and then there are other things you should maybe pay attention to as well).

Other tip I got from one of the actual pilots we get help from: wiggle your finger and toes...helps relax you so you don't have a death-grip on the controls -- it's axiomatic that your fine motor skills are seriously degraded with your hands, arm and legs all tensed up.

It may not help but one observation having tried both: this is a lot easier for me using a force sensor based stick rather than a spring-and-gimbal stick. In fact formation flying in general is easier in my book. ~end.

Miscellaneous Updates Not Described In Detail

TACAN

Functionality has changed somewhat, mainly in that TACAN can now be used between F16s for positional updates etc. It is described very well in the Dash-34 pages 122-124 and an excellent discussion of how TACAN now functions in FBMS is here.

Speed Brakes

The speed brakes now have separate values for opening and closing rates. The defaults are specific to the F-16. It takes ~2 seconds to open them to 60 degrees and ~6 seconds to close them. These values were derived from multiple video examinations. I like the brakewind beep that has been around a long time (you will have to google it).

New Sounds

Both inside and outside the cockpit…discover them for yourselves! Heck the first time I hit Bingo I thought someone rang my doorbell.

CONCLUSION (for now)

Going forward we hope you have enough information to begin your journey of transitioning from AF to FBMS. Nobody said it was going to be easy. But we hope you find this transition fun, challenging and rewarding. As always, **CHECK SIX.** ☺

~Bramage.

LIST OF CONTRIBUTORS

Guides like this are not written in a vacuum; many other learned members of our *Falcon* community are researching this conversion as well and have made important discoveries and very useful documents. I have used some throughout this guide with their very kind permission.

Boxer BMS Forums

Demo 1st VFW

Gipodiablo 1st VFW

Sobad 72ND VFW

Stretch 72ND VFW

Strikeout 72ND VFW

Tyrspawn (uTube FBMS instructional videos)

Wizard 72ND VFW