

Falcon 4 – Allied Force to BMS

A transition guide for 72nd VFW Members

Preface

Over the past years, many ‘flavors’ of the original **Falcon 4** have been independently developed and released to (some might say ‘unleashed upon’) the public. Each has its unique set of advantage/disadvantages, and each has its own die-hard groupies. Some excelled at graphics, some at weapons/avionics, etc. **Falcon 4 – Allied Force** has held its own over the years not because it necessarily excelled at any one aspect, but because it had a good balance of graphics/realism/MP stability.

In early September 2011, however, Benchmark Sims released ‘**Falcon BMS**’ version 4.32 to the public. This release immediately generated a lot of strong interest worldwide because of major improvements in many areas, and also seemed to be MP-stable as well.

Major changes include:

- Modern graphics engine
- 3D clickable cockpit
- Terrain Engine
- Extensive weather modeling
- Very high fidelity flight/physics modeling
- Improved AI
- Stable MP code

The positive interest was so strong that the 72nd VFW staff held a public meeting on its **TS3** server in less than two weeks after release, and concluded with a commitment to transition from **Allied Force** to **BMS** as soon as possible.

This document is designed to help the current **AF** user transition to the **BMS** version more effectively. As such, its focus will be mostly limited to those aspects of the **BMS** version that will require adjustments by current **AF** fliers. *This document is NOT designed to be a general **BMS** manual!*

For current **AF** users, we will start at the beginning and work forward. So, we will first talk about how to obtain and install **Falcon BMS** (currently version **4.32** as of Sept. 2011). Then we’ll talk about initial setup tips/tricks, graphics settings, and other initial settings. Then we’ll talk about important conceptual differences between **AF** and **BMS**, such as the use of the Data Transfer Cartridge (DTC) in **BMS**, etc. You get the idea, right?

This document will always be an upgradable work-in-progress, especially during the first few months while all of us are discovering important things about **BMS** almost daily. So pay attention to additions, amendments, corrections, etc. from time to time. I hope you all find this document helpful.

...Rad ‘SoBad’ Delaroderie, 72nd VFW – 222nd VRS/XO (visit us at www.72ndvfw.org)

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Chapter 1 - Setup and Installation

To install **Falcon BMS 4.32**, you will need

- The original **Falcon 4.0** CD (NOT the **Allied Force** CD!)
- The **Falcon BMS 4.32** setup file

You can find the **Falcon BMS** setup file at www.benchmarksims.org

If you don't have the original **Falcon 4.0** CD, you can either buy it on Amazon, or get on the internet and get creative.

Note: You don't need to install the original **Falcon 4.0** on your computer, but the **Falcon BMS** setup file, when started, needs to be able to find either

- 1) the original **Falcon 4.0** CD in your CD drive, or
- 2) an installed **Falcon 4.0** folder on your hard drive.

*Cheat: Actually, the **Falcon BMS** setup file only looks for the **Falcon 4.0** executable file. If it can find that file in any folder on your computer, it will then proceed with the remainder of the installation process. With that in mind, I re-emphasize getting on the internet and getting creative.*

The installation process should be straightforward and uneventful.

Port Forwarding

You will need to add certain port forwarding assignments to your router's forwarding table as follows:

Ports **2934**, **2935**, **2936**, **2937**, **9987**, **9988**, and **9989** (UPD only). (Need help? <http://portforward.com>)

Weapon Delivery Planner Software

You will want to download and install the free 'Weapon Delivery Planner' software available at

www.weapondeliveryplanner.nl/download/index.html

Just take my word for now that, even if you don't have the slightest interest in a weapon delivery planner module, this software contains many others helpful features that will save you much planning and effort in setting up your cockpit MFDs, comm channels, EWS program setting, HUD displays, and much more. All of these configurations can be saved in your Data Transfer Cartridge (DTC), which elegantly replaces **Allied Force's** <Cntrl>'C' 'S'ave/'L'oad functions. Just trust me on this one, install it, and put the icon next to your **BMS** icon on your desktop—you'll thank me later. We will discuss this software in more detail later in this document.

Chapter 2 - Initial Configuration and Settings

There are several places where you will want to make some configuration changes right away.

The Falcon BMS configuration file

One of those places is a configuration file called **falcon bms.cfg**, which is located in your

<Primary BMS folder>\User\Config

folder on your hard drive. *Notice that this file name has a space between 'falcon' and 'bms'.*

This file is manipulated by the software in several places, but there are a few entries you need to make manually. To do so, open it with a plain ASCII text editor (such as notepad.exe) and be careful not to inadvertently enter tabs, unnecessary spaces, <Enter> keys, etc.

➔ By default, this initial version of **BMS** (v4.32) creates huge statistic and net packet log files that can quickly occupy literally many gigabytes of hard disk space. This ongoing logging function also adversely affects **BMS**'s performance in the 3D world. Hopefully, this will be addressed in an update. In the meantime, unless you are performing analyses that require these files, you can (and should) disable this unnecessary debugging function by adding the following lines in the **falcon bms.cfg** file:

```
set g_bMessageStatistics 0 //Prevents software from generating statistical log files
set g_bEnableRakNetPacketLogger 0 //Prevents software from generating netpacket log files
```

➔ By default, **BMS** reports every AAA shot fired at you in the debrief logs! (*Good grief! Are you kidding me???*) To disable this, find and change the following line:

```
set g_bNoAAAEventRecords (change the default value of 0 to 1)
```

➔ Finally, there are two lines where an '=' (equals) sign was incorrectly inserted between the variable and the associated value. These are

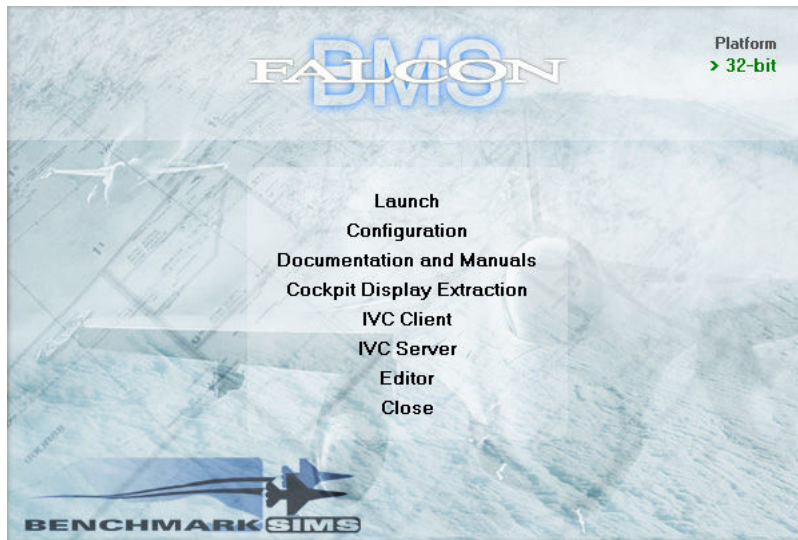
```
set g_bEnableRandomFailures = 0
set g_fMeanTimeBetweenFailures = 24.0
```

Be sure to delete the '=' (equal) sign in these two lines.

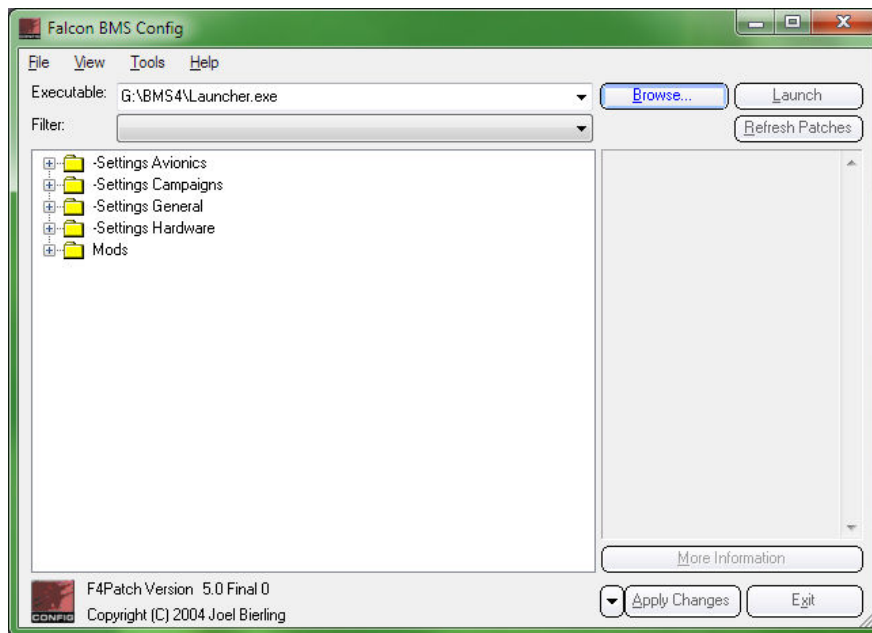
Be very careful about making any changes to the other existing lines. Many of them are edited via software settings. Some are harmlessly discretionary. Others can potentially have a very negative impact on your sim experience or your multiplayer stability.

Main Menu – ‘Configuration’ Option

When you double-click the **Falcon BMS** icon on your desktop, a ‘Splash Window’ appears that gives you a list of menu choices to select (see below). Second from the top is ‘**Configuration**’.



This will start a separate software program, called **F4Patch Version 5.0** by Joel Bierling (titled **Falcon BMS Config** in the Title Bar), that gives you access to many configurable options you can select from (see graphic below). From this point forward, we will refer to this as the **F4Patch** area. In terms of FPS graphics performance, the most important section of this tree is the ‘+Settings Hardware’ section. We will explore this area more later (see ‘**Graphics Setup**’).



If you have made any changes in the settings above, **be sure to click the ‘Apply Changes’ button before you exit!!!**

Main Screen – ‘Setup’ Option

When you double-click the **Falcon BMS** icon on your desktop, a ‘Splash Window’ appears that gives you a list of menu choices to select. The top option is ‘**Launch**’. This starts the **Falcon BMS flight simulator** software and opens the ‘**Main Screen**’. The **Main Screen** has several options across the top of the screen, one of which is the ‘**Setup**’ option. When you click this option, a ‘**Setup**’ Window appears that gives you access to four primary setup areas: **Simulation**, **Sound**, **Graphics**, and **Controller**.

Simulation Setup

Members of the 72nd VFW fly at full realism, so these settings should reflect that. Also, be sure that ‘Smart Scaling’ and ‘Display InfoBar’ is checked. Finally, increase the default ACMI file size to at least 50Mb or so—yesterday’s small hard disk space is no longer an issue.

Sound Setup

My experience has been that **Falcon BMS** does a good job at setting good default values for the various sound settings here. Season to taste.

Graphics Setup

First, the bad news: **Falcon BMS** easily pushes the limits of a ‘typical’, or moderately configured, desktop PC. With all possible graphics settings maxed out, **BMS** will bring many existing computers to their knees, with slideshow FPS rates. The few maniac machines out there that can handle it—you have my admiration. Most of us, however, will have to do a lot of trial-and-error experimentation with the various settings to find the best balance of graphics vs. decent FPS rates.

Now, the good news: Even with nearly everything turned down or off at minimal settings, **BMS** *still* looks and ‘feels’ 10x better than **AF**. Ambient lighting effects, sky coloring at various times of day, clouds/weather, night-time visuals, vastly improved explosions, more realistic persistent smoke damage effects, and so much more, make this a greatly enhanced visual experience over **AF**. When you add FPS-robbing eye candy extras such as heat blur, motion blur, rain effects, and so much more, you quickly realize that this is NOT your daddy’s Oldsmobile!

Depending on your current setup, the most effective hardware option to improve performance is probably an upgraded video card; next, more system RAM; finally, a hotter CPU. Whether you do all of none of these, the following is a good guide for finding your ‘sweet spot’ of graphics settings...

First, set your graphics card options to be ‘application controlled’ rather than forcing display options. Methods for doing this vary from card to card, but my ATI card, for instance, is controlled at the desktop level via a ‘Catalyst Control Center’ application.

Start with the default graphics settings that the **BMS** installation process set up for you, but select the display resolution you wish to work with. Then, start the Tactical Engagement – Training - ‘Takeoff’ exercise (-02-). When you are in the cockpit sitting on the runway ready for takeoff, press **<Ctrl>‘Z’** and then the **‘R’** key to display your frame rates at the top left of the screen. Using the displayed FPS value as a rough guide, start enabling/disabling graphics options until you find the combination of settings that work best for you. Remember that the **F4Patch** configuration utility mentioned earlier also controls major FPS options, and you need to work with all of these options together until you finally determine an acceptable balance of graphics vs. FPS. Be patient—this process can involve a lot of testing and take a long time.

Note the following:

- Consider disabling vertical sync unless you get ‘tearing’ at high frame rates
- ‘HDR lighting’ has a major negative effect on FPS
- ‘Heat Exhaust’, ‘Motion Blur’, and any of the ‘Rain’ options have a big negative effect on FPS
- One trick several have suggested in **F4Patch** is to uncheck ‘Shaders’, click ‘Apply Changes’, and then re-check ‘Shaders’, but go into the sub-options of ‘Shaders’, disable all of them, but choose “Per Vertex Lighting”. Then click ‘Apply Changes’ again. Seems to work for me.

Controller Setup

There are so many different joysticks, keyfile preferences, and individual tastes involved here that it is very foolish to tread too deeply here, but be sure to note the following:

BMS comes with two *.key files: keystrokes.key and BMS.key. Each has its own very small number of errors/omissions. **BMS** uses keystrokes.key by default. Please note the following:

- 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 wheelbrakes 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.
- The old **AF** binding to request taxi clearance from ATC has been changed to <T><5>. If you have this option assigned to your HOTAS, be sure to update it.
- **BMS** has done away with the ‘Request Takeoff’ ATC menu request. The ATC AI code has been revised so that when you request clearance to taxi the ATC will bring you all the way to the runway and give you clearance to take off.
- The Tower menu now has a second page with three options for requesting the barometric pressure reading (so that you can adjust your analog altimeter). For a reading at the runway, select the ‘Request QNH’ option (<T><T><1>).

Advance Controller Options

When you click the 'Advanced' button in the **Controller Setup**, a four-tabbed window appears that provides important options:

View Control Tab

Be sure that the 'Clickable 3D Cockpit Default' is checked (enabled).

If you have a **TrackIR**, there are some important settings you need to make here:

Enable 2D Cockpit TrackIR – This provides a unique TrackIR controlled 'Virtual 2D cockpit' that lets you snap-view around the cockpit with head movements, much like snap-views in the old **AF** 2D pit. If you don't want to use this feature, you can still snap-view around the pit with the viewing keys in this virtual 2D view mode (#2 across the top of your keyboard).

Enable 3D Cockpit TrackIR – This enables you to look around your environment with your TrackIR hardware.

Enable TrackIR Vector – This enables **6DOF** movement within the cockpit (in other words, it adds vertical up/down and horizontal forward/back movement if you have the appropriate **6DOF** TrackIR hardware).

Flight, Avionics, and Sounds Tabs

These three tabs provide access to options that let you decide whether to use your keyboard, mouse, or HOTAS to control various functions.

Other Settings...

Heard for many years: '***We want a fully clickable 3D pit!***' And with **BMS**, we now finally have it! **TrackIR** users, however, quickly found that adroitly mouse-clicking a button or knob can be a tricky coordinated movement between your head movement and your mouse. So by default, **BMS** makes the mouse 'stick' to a button when it gets close to that button, like two magnets getting close to each other. Some people don't like that feature. If you don't like it, you can add the following line to your falcon bms.cfg configuration file (preferably under the 'Misc' section of the file):

```
Set g_b3DClickableCursorAnchored 0
```

This will 'demagnetize' your mouse cursor!

The Data Transfer Cartridge

One major change **BMS** implemented is the use of a Data Transfer Cartridge (DTC) which more closely reflects the real-life utilization of this feature. In **AF**, some default cockpit configurations could be saved and loaded with keystroke combination when you entered your pit. In **BMS**, this function is **greatly** expanded to allow the pilot to load many options into a **DTC** during planning/pre-briefing, etc.

It is important for **AF** vets to note that use of the **DTC** feature is NOT optional—you will have to make the adjustment of using the **DTC** as part of the **BMS** experience. Once you bite that bullet, however, you will quickly learn to appreciate it and use it.

DTC Overview

You have a file in your **BMS** \User folder called <YourCallSignName>.ini. For instance, my *.ini file is SoBad.ini. This text file contains much (but not all!) of the **DTC** info. Other **DTC** info is kept in different files, and the **BMS** software brings most (but, again, not all!) of it all together in a multi-tabbed **DTC** window you can call up in any briefing screen. The method is as follows:

Enter any campaign or TE and go to the briefing screen. At the lower right corner of the screen, just above the 'Weather' icon, is an icon of a small metal box-looking thing. If you hover your mouse over it, 'Data Transfer Cartridge' will appear as a tooltip-text.

When you click this icon, a four-tabbed **DTC** window will appear that provides you with options you need to configure/confirm in order to proceed meaningfully with your flight. These four tabs, from left to right, are **Targets**, **EWS**, **Modes**, and **Comms**.

Initial Setup

VERY IMPORTANT NOTE: The very first time you create a pilot in your logbook, your basic **DTC** info is not provided with any info by default. So if you do not initially configure your **DTC** and go directly to your 3D cockpit, you will find that your MFDs are completely unprogrammed—going from one Master Mode to another will display nothing but blank MFD screens. I really don't think that's what **BMS** intended, but that's the way it is, at least right now.

THE SOLUTION: The first time you create a pilot in your logbook, be sure to go to any briefing screen (I suggest that you call up any TE) and click the **DTC** icon. Be sure to do this carefully:

- Click each tab
- Click Reset (this will populate the values in that tab with correct default values)
- Click Save (for that tab before you go to the next tab!!!)

Click each of the four tabs and do the above. THEN click load. NOW you have a valid **DTC** with commonly used values in them assigned to your *.ini file. For instance, the MFDs will display as you are used to seeing them in **AF**. The comm frequencies will be correct. The EWS programming will be set for programs 1 to 6 (yes, there are six of them).

From now on, you should not have to click the 'Reset' button ever again for any tab for your **DTC**, unless you accidentally screw it up so bad that resetting is the easiest option.

Setting the ATC Tower Radio Frequency (Yes, this is **DTC** related)

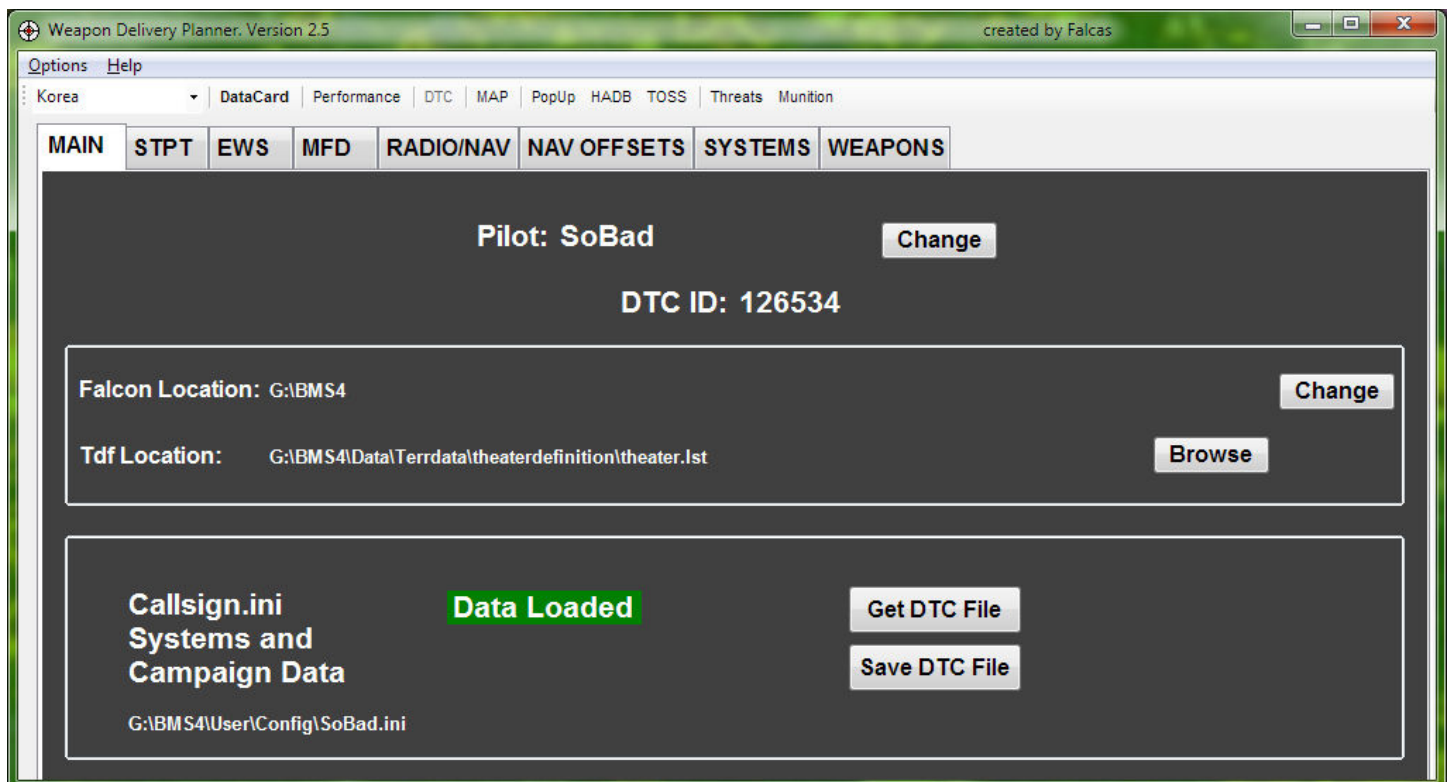
In **BMS**, the ATC tower frequency for a given flight is NOT automatically entered in your UFC Radio—you have to enter it yourself before committing to your pit (or else enter it in your UHF radio after you enter your pit. Fortunately, that is an easy **DTC** function. So, when you are in your briefing screen—before you commit to your pit— call up your **DTC** window, click the **Comms** tab, and do the following:

- switch to UHF Channel **15** (Do NOT use the default 'Channel 0')
- check the '**Default**' checkbox (to make UHF Channel **15** the default UHF channel displayed on your DED when you enter your pit)
- click the '**Set Tower**' button (this will automatically enter the correct tower freq for your airbase)
- click '**Save**, and then click '**Load**'

That's all there is to it! Now, your ATC Tower freq, along with your MFD, EWS, HUD display prefs, and other defaults will be automatically loaded into your viper's systems when you enter your pit.

Weapon Delivery Planning (WDP) Software

This software, mentioned earlier, accesses all of the functions handled by the **DTC**, including many functions that are not available in the **DTC** window. Used in conjunction with the **BMS** software, you can configure briefing steerpoints, target steerpoints, munitions planning, nav offsets, fill out a datacard, and much more. But even if you don't use it for anything but **DTC** maintenance, it's a real convenience and time-saver. See below for a screenshot (with the **DTC** tab at top selected).



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>‘Numpad 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 **DMS Down** switch.

Also, with the new Targeting Pod system implemented, you must be able to quickly switch your SOI from your FCR display on the left MFD to the TGP display on the right MFD, and vice-versa.

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

Comm Switch Left – Flight lead must be able to initiate IDM linking for his flight so that the pilots can see each others’ planes in their HSD (more on this later). 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** UHF/VHF radio 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.

‘Initial Settings’ - Summary

If you’ve gotten this far, you now have **BMS** installed, along with the **WDP** software. You have a configured viper that runs at a decent FPS, and a valid loaded **DTC** for use with your log-booked pilot. You know how to load your **DTC** and set ATC tower freq. for each flight. Your HOTAS has been modified to account for the changes between **AF** and **BMS**. You are now ready to get into your cockpit and actually do something fairly effectively. Like fly. And blow stuff up.

During the initial installation and setup, you’ve probably flown at least a little bit and noticed that the flight dynamics are much more realistic. The plane moves about more realistically by all the various small and large dynamic forces that affect it. It’s not quite as easy to control, particularly at low speeds, perhaps? Welcome to realism, folks. We wanted it, right? Well, we got a lot more of it!

Now let’s get into the many small (and some large) ways that **BMS** is different than **AF** when you get into the pit...

Chapter 3 - Committing (Going to the Pit)...

There are so many subtle differences in so many unrelated ways between getting into a **BMS** pit as opposed to getting into an **AF** pit that I can not come up with a well-organized explanatory sequence of differences. So if this section seems to ramble a bit, I apologize in advance. Understand, however, that this document assumes you already know how to do 'this and that' from your experiences with **AF**, so the focus is on things that are different and you must adjust for.

First entering the pit...

If you enter a **BMS** pit in Ramp Start, the first thing you might notice is that your wheels are chock-blocked, and the only way to remove them is to request Tower ('**T**', then '**8**') to remove them. Of course, you first need to get your UHF radio turned on and tuned in before you can do that!

IDM Data Linking – In multi-ship packages, the HSD is capable of displaying the position, altitude, and orientation of your fellow pilots. In **AF**, this was done automatically when you entered your pit. In **BMS**, this display must be set up manually when you enter your pit. Fortunately, it's a very quick and easy process.

First, be sure that your left MFD is displaying your AA Radar display. Note that OSB-6 shows an '**ASGN**' label. If you click this button, it will cycle through **ASGN / CONT / DMD** labels. One and only one pilot (usually the flight lead) should switch this function to read **CONT.**, and then press and hold their **Comm Switch Left** HOTAS button (<Ctrl>'**O**' on most keyboards) for >0.5 seconds. When the flight lead releases the switch, all pilots should then see each other's planes on the HSD, and hear a very short high-pitched beep every 8 seconds or so. See the **BMS** Manual, starting at the bottom of page 103, for much more information. To *disable* continuous HSD display auto-updates, the lead pilot can click the **Comm Switch Left** HOTAS button for <0.5 seconds (but why would you do that?).

HMCS – The more modern F-16 blocks have Helmet Mounted Cueing System (HMCS) technology installed. This allows you to look beyond the confines of the HUD display and still see a basic HUD-type display superimposed in front of you as you look around. If you have an AA radar lock on something, the **HMCS** will display a small square around it as you look toward it beyond your HUD display. Your current steerpoints will also be displayed on the HMCS outside the HUD. Very handy. However, you must turn the display on each time you enter your pit. It's a small knob just below your Chaff/Flare dispenser panel. I would suggest binding it to one of your HOTAS rotaries.

Config Stores Switch – If your Master Caution light is on when you initially enter your pit on a taxiway or runway, check your Config Stores Switch. Sometimes it is set to **Cat I** when your load-out dictates a **Cat III** setting. Set it correctly and this will extinguish the Master Caution light automatically.

Taxiing to Takeoff...

If you enter a **BMS** pit on the Taxiway or on the Runway, your viper's systems are already loaded with your **DTC** data. The moment you apply the slightest throttle, your jet begins to roll. Immediately return your throttle to idle. If you bring your jet to a full stop with the wheel brakes and release the brakes, you will discover that the jet will probably begin rolling again on its own at idle. As a matter of fact, it can get up to quite a bit of speed at idle—enough speed that you can tip your jet over if you are too heavy-handed with your nose-wheel steering (**NWS**). And you *will* notice that it is much easier to be heavy-handed with your HOTAS stick in all axes, by the way, so you will have to re-condition your muscle memory to be more 'gentle' with your stick from now on, particularly your rudder.

BMS recommends that you never exceed 25mph rolling straight, maintain ~15mph for soft turns, and ~10mph for hard turns. By the way, you can display your ground speed on the taxiway by monitoring your **INS** page on your **DED** (Click '**List**' and then '**6**'—the ground speed will be displayed at the lower right corner of your **DED**.)

Taking Off...

Make an effort to get *precisely* lined up on the runway, because making corrections with your **NWS** at speeds greatly than 30 knots can be tricky. As soon as your HUD displays a speed indication (~60 knots), be sure to turn off your **NWS** and use rudder authority for lateral corrections.

You will find that it is much easier to attain rotate/liftoff speed at Military Power (no A/B) now, even with a fairly substantial load-out. You will also find that that the jet reaches rotate/liftoff speed more quickly now (even without A/B), and that it takes a more gentle pull on the stick to leave the ground. So again—be more gentle than you were with **AF**. Retract gear as soon as your FPM begins to smoothly move up the pitch scale (which is almost immediately, depending on weight). Try to initially maintain a smooth positive pitch as you leave the runway area, then turn and proceed to Steerpoint 2.

In the Air...

As mentioned before, the flight dynamics in **BMS** are almost annoyingly realistic, and if you use your muscle memory from **AF**, you will find that you are yanking the jet all over the place. Have a glass of wine, take a nap, smoke a joint, get laid, hum a mantra—whatever it takes, chill out, bro...

Note that load asymmetry is modeled! Boy is it ever! More realism, right? So, as mentioned earlier in this document, you really need to assign roll/pitch trim controls to your HOTAS if you haven't already.

BMS's engine noise and external airflow audio feedback is also much more realistic and provides valuable clues regarding both the state of the engine and the speed of the plane, so pay attention to the subtle hints they provide at all times.

Landing...

As you approach for landing, you will find that the **BMS** Viper does not bleed off speed quite as quickly as the **AF** Viper did, so you might be coming in a little hot until you get used to the improved flight model behavior.

The feedback noise from extending your airspeed brakes is more subtle, but you can hear it and, with the improved flight model, you can almost feel it as well. As you lower your gear and slow down below 200 knots, you may find your plane gently wobbling about (random small crosswinds, ground-effect turbulence, etc.), requiring small constant corrections. When you touch down and attempt to maintain a 13 degree AOA for air-braking, you will find that it is very easy to over-rotate and damage your tail fins, so be gentle with your stick!

Brake heating effects is complexly modeled-- brake failure or a flat tire is very possible if you are hard on them, so avoid 'carrier landing' tactics! In fact, maintain air-braking as long as possible, and avoid using the wheel brakes until the plane is on all three wheels. Avoid engaging your **NWS** until your speed falls below ~30 knots unless absolutely necessary to stay on the runway.

The old **AF** habit of full-braking to slow down as soon as possible will get you in trouble with your brakes failing and your tires going flat in **BMS**— use what runway is available to you as much as possible to take full advantage of air-braking and minimal wheel-braking!

Switch to your **INS** page on your **DED (List-'6')** to confirm safe turning speeds as you approach a taxiway and find a parking spot.

Chapter 4 - The Comms Window

The Comms Window is a menu choice at the top of the **Main Screen** that provides you access to the multiplayer settings you need to configure in order to join others online in a multiplayer game. In **BMS**, the Comms Window *also* provides new settings to allow players to use **BMS's** built-in Internal Voice Comms (IVC) feature (IVC Setup Procedure is discussed in the next chapter).



Multiplayer Settings

The Comms window, lets you choose two basic multiplayer options:

- Join a multiplayer game as a guest (someone else is hosting)
- Host your own multiplayer game that other guests can join

BMS completely threw out the **AF** multi-player code and replaced it with a very stable open-source network gaming code suite developed by RakNet (www.jenkinssoftware.com).

When set up properly, the **BMS** multi-player experience so far seems to be at least as stable as it was using **AF**. Of course, there were occasional stability issues with **AF**, too, but nowhere near to the point of impractical playability.

The large box on the left side of the **Comms** Window, containing a list of multiplayer servers, will initially be empty until you start entering and adding your friends' **IPs** over time. To enter and save a new multiplayer server to this list, first click the '**New**' button. If you wanted to add me to your multiplayer server list, for instance, you would enter the following in the appropriate textboxes:

Server Name

SoBad <Tab>

Connect to IP Address

66 <Tab> 168 <Tab> 177 <Tab> 203 <Tab>

Connection Bandwidth

Please see the next heading ('**Bandwidth Settings**') for a detailed guide for the appropriate entry to make here.

If you are using TeamSpeak, Skype, or other external comms to communicate, be sure to **UN**check the two **IVC** checkboxes (more on using **IVC** later).

Now, here's the weird part, but it was recently confirmed by a **BMS** coder— if this is a new entry, you **MUST** either press the <Enter> key or the <Tab> key after every entry listed above **before** you click the '**Save**' and '**Connect**' buttons! I suspect this was a matter of poor coding, but there it is.

As noted above, if this is a new entry, be sure to also click the '**Save**' button before you click the '**Connect**' button.

To host a game, the steps above are identical except enter **0.0.0.0** for the **IP** address (again, see the section on '**Bandwidth Settings**' below for guidance).

Once you are connected, you will recognize the familiar windows used in **AF**, except: To see a 'Chat' window, click the '**Comms**' button at the top of the screen again.

Bandwidth Settings

In the **AF** era, this was always a subject of an endless variety of opinions, informed and otherwise! I often wonder if **AF**'s stable multiplayer code worked *despite*, rather than *because of*, the different settings we tried to use with it! With the RakNet code suite BMS uses for multi-player connections, it's much more of a 'science' than 'experimental art' or, more accurately, it's now just a matter of 'doing the math'.

There are several posts on the **BMS** forums that clearly explain how to determine bandwidth entries that lead to a stable multiplayer environment. Below is a consolidated summary of the practical processes you need to know, based on all of the information available via **BMS** and extensive professional testing by 72nd member Jay 'JayC' Daniel.

Joining a multiplayer game as a guest – **BMS**'s optimal upload requirements for a multiplayer guest is **250kbs**. Setting a bandwidth higher than that is a waste of bandwidth allocation. Overall multiplayer stability is better when all guests use the same bandwidth setting. *Note: guests can actually use a setting as low as 125, but their multiplayer experience will be 'laggy' and possibly a little jerky.*

Hosting a multiplayer game – if you wish to host a game, your bandwidth setting is determined by entering (in kbs) **75%** of your potential upload bandwidth. So, for instance, if you have a 4Mbs (or 4000kbs) upload capability, you would enter '**3000**' in the bandwidth setting. If all of your guests join using the recommended setting of **250kbs**, the number of guests that you can handle would be

(your setting / nominal guest setting), which in this case would be (3000 / 250) = 12 guests

Further, as a host, your computer needs to be able to sustain a nominal frame rate of **30FPS** or better. Finally, for an optimal multiplayer experience, your computer should have a fairly robust CPU.

So if you want to host a multiplayer game, you can quickly determine how many guests you can handle by running a bandwidth speed test and dividing the result by **250**.

If you want to host, but your upload bandwidth is limited, you can try to host guests at a lower rate than **250** (but certainly no lower than 125).

In summary, the bandwidth requirements for a multiplayer experience in **BMS** are higher than they were in **AF**, but the process is now definitively calculative (as opposed to the guesswork debates we used so much with **AF**). Further, the multiplayer code, in much testing around the world thus far, seems to be very stable.

IVC Setup Procedure

BMS has partnered with TeamSpeak to incorporate a TeamSpeak-based SDK module in the **BMS** code that allows fully implemented Integrated Voice Communications (IVC) that closely reflects the real-life radio comms procedures used by the military. Being a TeamSpeak SDK, it mirrors the voice quality we are all accustomed to with TeamSpeak 3.

For **AF** pilots transitioning to **BMS**, the **IVC** feature represents a steep learning curve in military based communications protocols, and you are strongly encouraged to review the documentation that is available in the **Falcon BMS** manual. This transition document will confine itself to helping you learn how to connect to a multi-player game using the **IVC** communications feature (later, this subject might receive more attention in this document).

My foggy crystal ball tells me that we will slowly (a few of us kicking and screaming, maybe) move from easy and straightforward TeamSpeak Comms that we are all familiar and comfortable with to the more complex **IVC** communications protocol that **BMS** offers. But in the long run, I believe we will find that this is a superior method that adds to the realism in a meaningful way.

Overview

To use the **IVC** feature, an IVC Server must be established (much like a Game Server must be established). While it is possible for one computer to host *both* a Game Server and an IVC Server, (and without going into the math) it better be a pretty beefy computer with a pretty hot internet connection! Most of the time, it is far better for one computer to host a Game Server, and some other computer host the IVC server. (That being said, a dedicated Game/IVC Server with a hot internet connection can handle the demands.)

IMPORTANT! If **IVC** Comms are going to be used in a multiplayer scenario, both the host and the players need to initiate their **IVC** connection *before starting the BMS game software* (Just like, if using TeamSpeak3, players must first initiate their TS3 software to establish comms before going into the **BMS** software). More on this on the next page. The setup details for each (host and players) is explained below. The procedure is admittedly complex, but should become second nature with practice:

Hosting an IVC Server

The TeamSpeak SDK used by **BMS** requires ~50-100kbs upload speed for each player to use. So if you, as one of the players, want to host an IVC Server for everyone, you need to have an upload speed that can handle your game connection requirements (250kbs) plus 100kbs for each player (including yourself) that intends to connect to your computer's IVC Server.

So, for instance, if you are hosting an IVC Server for **6** players (including yourself), you need to have an upload bandwidth of at least $(250 + (6 \times 100)) = 850\text{kbs}$. This does not include bandwidth overhead to run any other internet processes (that you may or may not be aware of) that might require upload bandwidth. So to host six players, it is probably a good idea to have at least a 1Mbs upload capability. For more than six players, do the math, but of course it will be higher.

So for cable connections of 1Mbs and up, you shouldn't have a problem, but if you are using an aircard, or a laggy DSL connection, etc., you might want to let someone with higher bandwidth host the IVC Server.

As host of an IVC Server, you must do *two things* before you go into the **BMS** sim itself—

- 1) Start an instance of the IVC Server. This will pop up a **DOS** window and initiate your computer to operate as an IVC Server. This is all you have to do. If you have a dual monitor setup, you can move this **DOS** Window to your secondary monitor, where it will provide continuous informational updates as the server is being utilized by everyone who is connected to your IVC Server. If you don't have a second monitor, you can minimize it to your taskbar if you wish.
- 2) Connect to your IVC Server. Yes, even the **IVC** host needs to connect to his own IVC Server! So start an instance of your IVC Client and then
 - In the 'Nickname' text field, enter your Callsign
 - In the Server IP/DNS, enter **127.0.0.1**
 - (this is a self-reference, since *you* are hosting the server)
 - Click the connect button.
 - If you have a second monitor, move the IVC Server window there.
 - You are now hosting an IVC Server *and* you are connected to that server.

Joining an IVC Server as a Client (player)

While it is possible to join an IVC Server as an **IVC** client from within the game itself in the **Comms** window, you are strongly encouraged not to do it that way. If you have tried it before, you may have found out that on many systems, joining the IVC Server from within the game itself will dump you out of the **BMS** screen without warning onto the desktop wondering what the heck just happened! **BMS** is still running, but it has been minimized to the desktop taskbar while the IVC Client is booting up and initializing. You have to go to your taskbar and click **BMS** back up to your screen. Not very elegant.

So, *after* the IVC Server has been initialized by the **IVC** host, but *before* you start the **BMS** game simulator, click the IVC Client menu choice, which will bring up your IVC Client window.

- In the 'Nickname' text field, enter your Callsign.
- In the Server IP/DNS, enter the IVC Server's IP# address
- Click the connect button.
- If you have a second monitor, move the IVC Client window there.

All **IVC**-connected participants should now be able to communicate with each other using the <F1>, <F2>, and <F3> keys, sorta' like you're using TeamSpeak!

Now that the IVC Server and IVC Clients have established and tested a valid **IVC** connection between all players before starting the game, everyone should be ready to start **Falcon BMS** and go through the procedures for hosting and joining a game, as described on the next page.

Starting an IVC-based Game

Now the Game Server host can start the game.

- Go to the **Comm** window, and enter **0.0.0.0** in the Game Server's IP# address text field.
- Be sure the two **IVC** checkboxes are checked.
- At the 'Dedicated IVC Server' text field, enter the IVC Server's IP# address.
- Click the 'Connect' button.

The rest of the players can also start the game.

- Go to the **Comm** window, and enter the Game Server's IP# address (and **250** for the bandwidth).
- Be sure the two **IVC** checkboxes are checked.
- At the 'Dedicated IVC Server' text field, enter the IVC Server's IP# address (unless you *are* the **IVC** server, in which case you would enter **127.0.0.1**).
- Click the 'Connect' button.
(but *after* the Game Server host has initiated a game server, of course)

Once all players are connected to the game server, all can talk again using the the <F1>, <F2>, and <F3> keys. These keys are operative in the Briefing Screen as well.

When you enter your cockpit in the **3D** UI, however, the <F1>, <F2>, and <F3> keys do not work anymore. You must use your plane's **UHF/VHF** radio channels to communicate, just like the real jet! (The default keyboard assignment for your **UHF/VHS** switches are <Alt>'1' and <Alt>'2'. It's probably a good idea to map the **UHF/VHF** switches to your HOTAS.

When you leave your **3D** UI cockpit and return to the **2D** UI, the <F1>, <F2>, and <F3> keys will work again.

IVC Comms – Summary

As you can see, the setup procedures for initializing **BMS's** **IVC** features are very tedious and not well implemented in this initial release of **Falcon BMS**, but the results are very realistic. Perhaps in their next release, **BMS** will make the **IVC** setup process a little more user-friendly.

As a practical matter, many pilots might keep a TeamSpeak 72nd VFW channel active for 'open' communications when using the IVC Comms feature-set. Instructional pilots and casual fliers in pickup flights or small packages of only one or two flights will usually prefer to continue to use the regular TeamSpeak software or Skype for ease and convenience.

But for more complex squadron-based flight night scenarios, or Large Force Exercises (**LFEs**), Force-on-Force scenarios and the like, we will probably be using the IVC Comm system more and more as we adapt to these communication protocols, so it's important to learn how to setup and use this feature-set now.

Chapter 5 - Avionics Considerations...

Falcon BMS has added and enhanced many avionic-related aspects of this sim, and **AF** pilots need to get up to speed with these new and improved features.

Sniper Advanced Targeting Pod (TGP)

In **AF**, the only time you used the **TGP** module was when you were carrying Laser Guided Bomb (LGB) munitions. Also, **AF** automatically strapped a **TGP** module to your jet when you put **LGBs** on your wings.

In **BMS**, you must manually attach the **TGP** to your fuselage in the loadout screen.

As in the real jet, it can now be used as a general observation and tracking device for any AA- and AG-based tracking and targeting. Also, it can be displayed on your **MFD** in any Master Mode (NAV, AA, AG) or override mode (**DF, MRM**, etc.)! Not only that, you can set up the **TGP** to automatically operate in different display modes depending on your current Master Mode! In other words, you can preset your **TGP** so that it automatically switches to an **AG** display when you are in **NAV** and **AG** Master Mode, and an **AA** display when you are in **AA, DF**, or **MRM** Master Mode!

In **AA**-based tracking, you can lock on and view an aircraft from many miles away, using an IR or a regular TV display, for identification purposes.

In **AG**-based tracking, in addition to using it in conjunction with **LGB** munitions (ala' **AF**), you can also track any moving objects or stationary objects.

The **MFD** OSB controls for the **TGP** display have also been considerably enhanced as well.

So it's important for **AF** pilots to know that, once you realize the greatly expanded usefulness of the **TGP** system in **BMS**, you will probably want to strap it on your jet for practically any mission you go on from now on, and keep the **TGP MFD** page as one of your three programmable pages on your right **MFD**.

The **BMS Manual** has an extensive section describing the operation and capabilities of the **TGP** system, starting on page 86. You are encouraged to carefully review it and take advantage of it!

HARM Targeting System (HTS)

In **AF**, the **AGM-88 Air-Ground Anti-Radiation Missile** could only be used in conjunction with a separate **HARM Targeting System (HTS)** strapped to the fuselage of the jet. When the **HARM** was called up in **AG** Master Mode, you could then use the **HTS** to call up a **HARM Attack Display (HAD)** on your right **MFD** display. In **AF**, the **HTS** was automatically strapped to your jet when you loaded **HARMS** on your wing(s).

In **BMS**, you must manually attach the **HTS** to your jet in the loadout screen to use with your **HARMS**. However, you can also attach the **HTS** even without any **HARMS** on board, if you only wanted to use it as a 'radar emitter' locator! You will also discover that the **HAD** display has been enhanced a bit.

So with or without **HARMS**, if you have a **HTS** strapped to your airframe, you can call up your **HAD** display anytime from your **MFD** Main Menu page (on that page, it is OSB#2).

Most **AF** players probably didn't realize that **HARMS** can be also used by many aircraft without an **HTS** module attached to find and display radar emitter sites, using alternate display and delivery modes. This lets aircraft that are not capable of mounting an **HTS** use the **HARMS** in SEAD missions.

The two alternate **HARM** delivery modes are

- Position Known (POS) mode, and
- HARM as Sensor (HAS) mode

These alternate methods are implemented in **BMS**. Each of these modes utilizes a different **MFD** display to find and manage radar emitter targets. Note, however, that these modes are considered to be inferior methods of utilizing the **HARMS** munitions compared to the **HTS/HAD** system. While 'study sim' enthusiasts might enjoy using these alternate modes, it should be understood that the primary and strongly preferred method of using **HARMS** is with the **HTS module/HAD display** system if your aircraft is capable of supporting that system (and the F-16 jet is **HTS** capable).

The **BMS Manual** has an extensive section describing the operation and capabilities of the **HTS/HAD** system, along with the **POS** and **HAS** alternate systems, starting on page 96. You are encouraged to carefully review it and become familiar with it!

Mavericks

Mavericks, of course, have their own built-in optics that can be displayed on the right **MFD**, and don't need or use a **TGP** module. Access to the Maverick's **MFD** display is via the **WPN MFD** page, which normally isn't set up as one of the three pre-programmed pages on your **MFD**, so you have to 'maneuver' to it using the OSB buttons. Once you've called up the **WPN** page, you still need to **UNCage** the Maverick (uncover the lens cover) just like in **AF**, so that hasn't changed.

NOTE: In **BMS**, once you fire a Maverick, your Sensor of Interest (SOI) switches back to the FCR **AG** Radar on your left **MFD**. You must uncage your next missile, switch your **SOI** back to the Maverick's optic page on your right **MFD** again, slew to your next target, designate, and fire again. With practice, this sequence can be done very quickly and efficiently. Also note that correct manipulation of the TMS Up/Down switch can be used to switch from Point Tracking to Area Tracking and so on. See the **BMS** manual for details.

Also, Mavericks now realistically take about 3 minutes to warm up, so plan accordingly. Related to that fact of life, **BMS** also now has a real-life 'Auto Power On' feature accessible via the **WPN-CNTL** page. It's really pretty cool. See the **BMS** manual, page 128, for complete details.

Ripple Bombing

The scenario: You want to ripple six BLU-107s at 250' spacing the length of a runway.

In **AF**, as you approach the runway, you would position your bombing piper in the middle of the intended bombing pattern (so, in this case, in the middle of the runway); when you release, the bombs would drop three before the piper and three after the piper, each 250' apart. Given real life physics, this quickly becomes problematic-- if you are coming in very low and very fast, a firing solution may not be possible using this method.

In **BMS**, you now position your bombing piper where you want the first bomb to land and the remaining ordinance will string out from that initial impact point in 250' increments.

AG Radar - Steerpoint / Snowplow Behavior

In **BMS**, if you switch your **AG** radar tracking mode from Steerpoint to Snowplow, the tracking cursors will re-center themselves on the **AG** radar display, but the cursor can not be moved until you **TMS**-up (Designate). In **AF**, this wasn't necessary, so don't forget to re-enable the cursors from now on. See page 82 of the **BMS** manual for more details on this feature.

Expanding on this example, if you ever find that you can't seem to move your tracking cursors, be sure that 1) the **SOI** of interest is the current **SOI** as well, and 2) **TMS**-up if necessary.

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Chapter 6 - The 'Dashboard'

BMS has literally hundreds of additional, changed, and enhanced features over **AF**— some large, most small, some requiring a shift in your understanding about protocols, switchology, implementation, and so on. This is especially the case with the 'Dashboard' area of your pit— the front area that includes the MFDs, the UFC, the DED, the HUD, etc.

This section of the document addresses those transitional issues in the dashboard area that you need to consider in moving from an AF pilot to a BMS pilot...

Sensor of Interest (SOI Issues)

In **AF**, **SOI** switching and cursor enabling between the MFDs, the HUD, etc., was always done automatically by the software, and manual switching was not a switched option.

In **BMS**, as in real life, **SOI** switching often must be manually activated, and the tracking cursors must sometimes be re-enabled as well. **SOI** switching is done with the **DMS**-down switch on your HOTAS, or by pressing <Shift><NumPad'2'> with the default keyboard settings.

AF pilots— did you know that the HSD is a **SOI** display with tracking cursors? In **AF**, as explained above, there was no way to manually switch to it. In **BMS**, now you can, and in so doing, you can now use the tracking cursors in the HSD display to designate a 're-centering' point with the now fully-implemented 'Freeze' function as described in the **BMS** manual on [page 127](#).

Steerpoint HUD info

In the second-from-bottom info line in the lower right corner of the HUD, **AF** displayed a countdown timer (TTG) indicating how much longer it would take to reach the designated point of interest (steerpoint, target point, etc.). In **BMS**, this line shows you the ETA by default instead. You can change this line to show the TTG by bringing up the CRUS page on DED and pressing the M-SEL button, if you wish.

Default Burst Altitude profile values

In **AF**, the default burst altitude for cluster-type munitions was set to an unrealistically low 500'. In **BMS**, it is set to 3000', which is considered to be a nominal 'sweet-spot' of damage/coverage effects for the cluster munitions we use on the F-16. Of course, you can adjust these values yourself in the pit via that weapon's 'CNTRL' page, if you wish. So if you never adjusted this value in **AF**, you will probably find that you will be scoring more ground kills now than you did in **AF**!

Chapter 7 - Misc Features...

Precision Steerpointing

In **AF**, if you wanted to assign a precision steerpoint to, say, a Fan Blow radar position, you would locate it on the Recon Window, write down the Lat/Long, and then adjust one of your steerpoints to that Lat/Long with your ICP/DED when you enter your pit for the mission.

Falcon BMS has added a very easy and convenient way of quickly assigning precision steerpoints to any objects listed in a Recon Window in the Briefing Screen, and without having to write down anything! You can adjust an existing steerpoint, or you can assign a unique steerpoint number to it (up to Steerpoint 24). See page 14 of the **BMS** manual for procedural details.

Fuel Management

Fuel management is now much more thoroughly modeled, with highly accurate management and consumption values. Dynamic Center of Gravity (CG) effects are modeled as well. As a result, your plane will go bingo fuel sooner than you are used to in **AF**, and flight dynamics are affected by current fuel status as well.

Speed Brakes

Speed brakes now take only 2 seconds to fully open and ~6 seconds to close, more closely reflecting the real-life behavior of this feature.

Instrument Landing System (ILS)

The **ILS** code has been totally rewritten and **BMS** says that the implementation is now fully realistic. See page 47 in the **BMS** manual for details.

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Document Summary

At this point in the document, we've hopefully been able to get your software installed, setup, and configured. We've pointed out the critical differences between **AF** and **BMS** that are required to get a **BMS** viper in the air and effectively operational. We've learned how to hook up on multiplayer, and how to use the **IVC** communications feature. With so many other improvements and additions to the avionics, HUD displays, comms, weapons systems, radar systems, RWR operation, this is just the bare beginning—but it's a good beginning!

The latest version of this document will always (hopefully) be available at

<http://www.metagaia.com/download/Falcon-AF2BMS.pdf>

I encourage everyone to

- Review the available docs in your installed **BMS** folder, including the manual, of course, and also the checklists and other document resources.
- Regularly review the posts on Benchmark Sims' forum, links to resources, etc. (www.benchmarksim.org)
- Regularly review the posts of our 72nd forum for information, links to resources, etc. (www.72ndvfw.org)
- If you see possible errors in this document, please contact me via the 72nd VFW forum and let me know.

Thanks to all for your support.

SoBad – 72nd VFW, 222nd VRS/XO

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