FalconBMS Quick Start Guide

Version	Date
v0.01	2019.07.20

What is FalconBMS

Falcon BMS (hereinafter BMS) is software developed based on source code leaked from MicroProse's flight simulator "Falcon 4.0" released in 1998.

Falcon 4.0 recreates the flight characteristics and avionics of the Lockheed Martin F-16C block 50/52, and has been widely adopted by combat sim users by the implemented dynamic campaign.

After the closure of the development studio due to the disappearance of the MicroProse brand, the volunteers of the community continued updating based on the leaked source code, and Falcon 4.0 has evolved into various versions and developed over approximately 20 years.

BenchmarkSims is the only survivor of such a volunteer development team, and develops and releases FalconBMS under the license of BillionSoft, the current owner of Falcon 4.0.

What is Dynamic Campaign

[WIP]

What BMS has been updated

Flight Model

- Performance: see HFFM manual 95% performance accuracy on the whole flight envelope:
- Turn Rate
- Turn Radius
- Energy Management
- Accel and Decel Performances
- Climb performances
- Drag indexes complex modeling
- Handling
- Real FLCS build in, including AutoPilot and TFR Tie In.
- Real stick responses curves built in
- Cruise gains, Landing Gains, Stand By gains, MPO
- Accurate aerodynamic departures: Roll , Pitch and yaw departures
- Aerodynamic modeling
- Complex aerodynamic coupling modeling: 30 couplings modeled
- Independent LEF and TEF model
- Ram drag model
- Buffeting model
- Flutter model
- Convective and mechanical turbulences
- Background Noise turbulences
- Jet Wash
- Wind Gusts
- Wind Aloft
- Mechanical Components
- Real time Gravity center management, (lateral and longitudinal), including fuel and weapons
- Real Time inertia matrix management, including fuel and weapons
- Fuel System: 7 tanks modeled with accurate pump system and transfer rates
- External tanks with 3 compartments model
- Trap fuel model
- Starve out model
- Complex gear modeling:
    - Stiffness
    - amortization

    - pre stressing
    - tire elasticity
- Brake temperature modeling
- Wing Flex: interacting with fuel, weapons and accelerations
- Canon recoil model
- FLCS Bit

Engine Modeling

- DEEC and SEC modelwith accurate RPM / NOZZLE / FTIT andspooling times
- Oil pressure / quantity model
- EPU model
- Hydraulic pressure model
- JFS fuel and heating model
- Accurate Fuel Flows in the whole flight envelope
- Realistic Engine faults: Hung starts / Hot starts / oilpressure default
- Realistic Air Start model

Damage Modeling

- Airframe damage model impacting performances andhandling
    - Engine inlet
    - Engine outlet
    - L/R wings
    - L/R elevators
    - Rudder / Tail
- Oil Leaks
- Fuel Leaks
- Hydraulics leaks
- FLCS faults

AI

BVR

[WIP]

SAM

[WIP]

ATC

[WIP]

IFF

[WIP]

- every IFF interrogation and reply might be intercepted by the enemy.

  > That can be by an enemy ground station - anything with a radar - or ELINT flights. It depends on the emitting aircraft altitude and ELINT item position. That will make the emitting aircraft spotted for a while. Be aware of this, whether on the transponder side (dont blast every mode all the time, especially in a NOE penetration), or the interrogator side (dont interrogate in SCAN every second if you want your teammates to stay discreet).

- there can be errors in the transmission, known as 'code garble'.

  > It happens especially at a distance or if multiple transponders are close together. That can result in a different code being perceived by the interrogator, a 'unknown' M4 reply, or no reply at all being seen. M4 is less prone to that. But it can be good practice to deactivate M1/M2/M3 when flying close together.

How to Install BMS

Do I need Falcon4.0?

Although BMS itself is not a MOD that overwrites Falcon 4.0, it is a stand-alone software that can be installed separately, but the user must own the original version of Falcon 4.0 since the code is a modification from Falcon 4.0.

Therefore, installing BMS requires installing Falcon 4.0 in advance.

BMS checks the installation of Falcon 4.0 at installation and application startup.

Where can I get Falcon4.0?

You can get Falcon4.0 at

Falcon Collection on GOG.com or Falcon4.0 on Steam

or you can install CD version of Falcon4.0

The title Falcon 4.0: Allied Force, released by Lead Pursuit in 2005, also exists, but it can not be used to install BMS.

Version Number

BMS will undergo major updates with a revision number of 0.01, such as 4.32 released in 2011, 4.33 released in 2015, and 4.34 released in 2019, with the next version expected to be 4.35.

Different versions of BMS are installed independently.

Also, minor update patches for each version will be released sequentially, and the same version of BMS will be overwritten and updated like "4.34 Update1" "4.34 Update2" "4.34 Update3".

Each upgraded version is also referred to as "4.34 U1" or "4.34.1".

Download

To obtain FalconBMS, register as a user on the forum of BenchmarkSims official site, download torrent files from each relevant thread of Releases & Updates, and obtain BMS installers and update patches via torrent.

BenchmarkSims

Forum account will be cleared automatically if no first post can be confirmed for a week after registration.

Install

After downloading of BMS installer via Torrent is complete, `"Falcon BMS 4.34 SETUP.zip"` will be saved in your specified folder.

If you extract this ZIP file, `"Falcon BMS 4.34 SETUP"` will be opened, and you will see `Setup.exe` and data folder in the middle.

Before launching `Setup.exe`, be sure to move this setup folder to a directory that you can remember other than the desktop and keep it there. You will need this folder for future updates and uninstalls.

Update

Download `Falcon_BMS_4.34_U1_Incremental.exe`(Not yet released 2019.07.20), move it directly under the setup folder (in the same place as Setup.exe exists) and execute it.

You will be prompted to specify the setup folder when you run it, so select the correct folder.

When this is done, a BSF file of update data is generated in the `data` folder.

Since the incremental installer automatically executes `Setup.exe`, if you want to continue applying the U2 and U3 patches, please cancel and proceed in the same way.

Finally, execute `Setup.exe` to update BMS.

Uninstall

When uninstalling BMS, please uninstall from `Setup.exe`.

If you uninstall BMS from the control panel without going through `Setup.exe`, the registry will not be cleared properly, and you will not be able to reinstall BMS until you manually delete the registry.

The registry will be at `HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\Benchmark Sims\Falcon BMS 4.34`

How to Setup BMS

Stock launcher or Alternative launcher

You can start BMS via stock launcher or you can install Alternative Launcher

Falcon BMS Alternative Launcher is a replacement for stock BMS launcher including key/axis mapping feature. It can configure and save BMS SETUP per Joysticks. When you launch BMS through this app, it auto-generates proper setup files and overwrites them for current device order before BMS find them changed and initialize your setup. You don't have to worry about SETUP mixing up DX order nor resets axis setups even if device sort or numbers have been changed.

However, this chapter will describe how to setup BMS with the stock launcher.

Window or FullScreen

Right-click the shortcut before launching BMS, open `Properties` and Add `-window` launch option to the link destination.

example: `C:\Falcon BMS 4.34\Launcher.exe -window`

It is a success if the notation of `window` appears in the upper right of the launcher. Remove the `Border` option on the `Main screen` from the `Cockpit Display Extraction` you can access from the launcher. This will start BMS in borderless window mode.

When starting BMS full screen with WINDOWS 10, Right-click the shortcut and open `Properties` then Open the Compatibility tab and `disable full screen optimization`. There is a bug that the resolution of 3D rendering is not reflected correctly.

SETUP page in BMS

Start BMS and you will see a main menu. Various settings can be done from `SETUP` on the menu screen.

The `SIMULATION` tab that appears first on the SETUP page allows you to set various simulation settings (such as the presence or absence of labels and the enabling / disabling of blackouts).

To change the resolution setting, **select the `GRAPHICS` tab and adjust the resolution to the monitor resolution.**

By default, the lowest resolution is set.

The antialiasing effect is also selected from `MULTISAMPLING` as well.

Joystick settings are done from the `CONTROLLERS` tab.

After changing the setting, press `APPLY` and then `OK`.

SETUP Joysticks

What to assign?

In BMS, F-16 can be operated by clicking on the switches and dials in the cockpit with the mouse cursor.

However, various HOTAS (Hands On Throttle and Stick) switches on the throttle and stick can only be operated via a device such as a joystick or keyboard.

Therefore, you need to make assignments so that the buttons on your joystick corresponds to the various switches on the F-16's control stick / throttle.

How to assign?

Key binding for various switches and axes is done from the `CONTROLLERS` menu of `Setup` page.

First select the `primary device` from the `CONTROLLER pull-down menu`.

The primary device is a control stick that inputs pitch and roll axes.

Once set, do the key assignment **without changing the selection of the primary device.**

Find the callback you want to assign from the `MAPPING` column of the `CURRENT KEYFILE` table, and click the `KEY` column in the same row. The character turns to blue. Then press the joystick switch or keyboard key you want to assign to the selected callback in this state.

To assign the minimum required callback for F-16 operation, search following sections from the list of KEY MAPPING

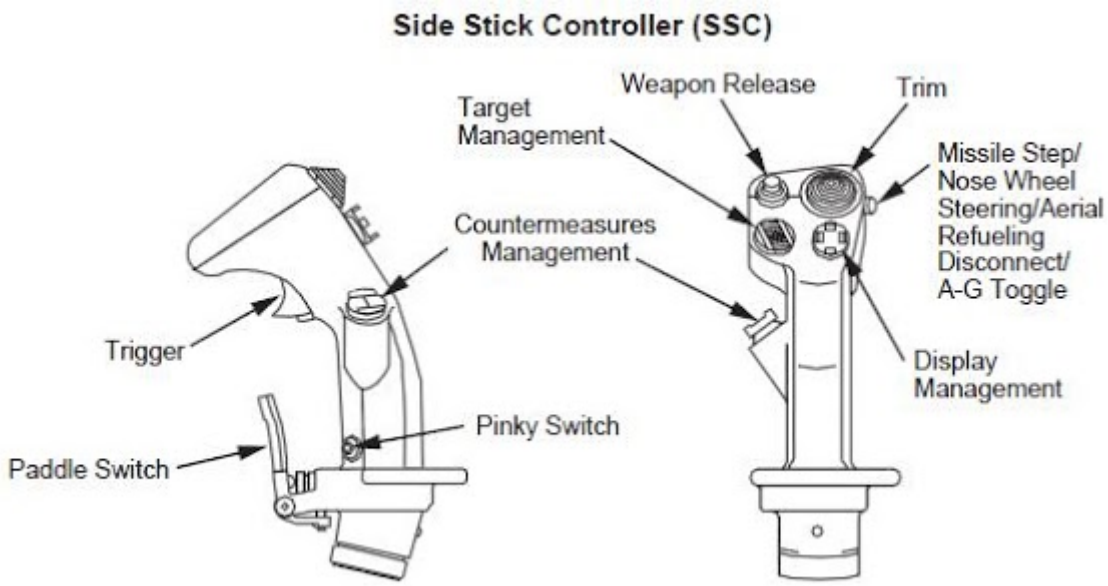
`2.19 THROTTLE QUADRANT SYSTEM`
`5.11 FLIGHT STICK`

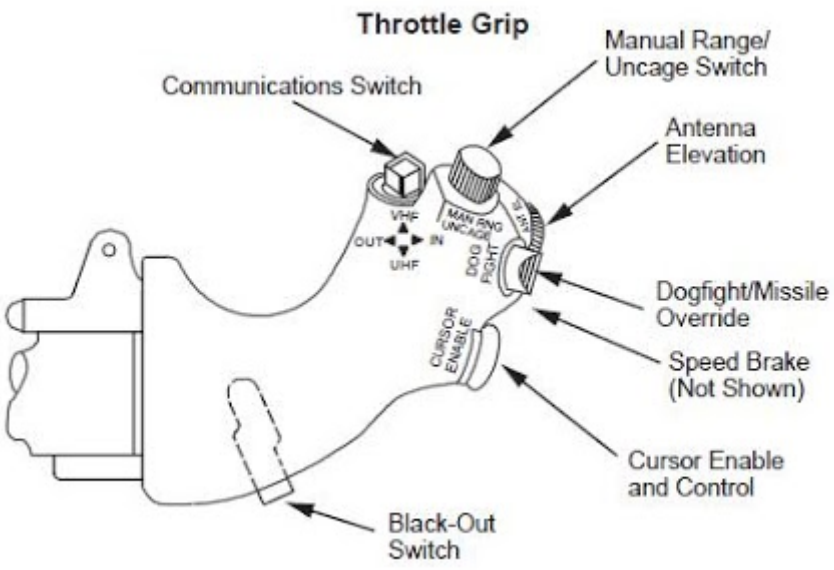
Find out the section and assign each HOTAS switch to your joystick button.

once you done the key assignment, click `ADVANCED` tab and assign axis from the new window.

Recomended Joysticks

- **HOTAS Warthog (+ FSSB R3)** or **HOTAS Cougar**
- **TrackIR**
- Any Rudder Pedals


Side Stick Controller (SSC)
Weapon Release
Trim
Target Management
Missile Step/ Nose Wheel Steering/Aerial Refueling Disconnect/ A-G Toggle
Countermeasures Management
Trigger
Pinky Switch
Paddle Switch
Display Management


Throttle Grip
Manual Range/ Uncage Switch
Communications Switch
Antenna Elevation
VHF
UHF
OUT
IN
MAN RNG UNCAGE
SLEW
DOG FIGHT
CURSOR ENABLE
Dogfight/Missile Override
Speed Brake (Not Shown)
Cursor Enable and Control
Black-Out Switch

HANDS- ON CONTROLS
AIR TO GROUND MISSION
SIDE STICK CONTROLLER
A-G (& NAV) MASTERMODE

DISPLAYS

Moves SOI From MFD to HUD
SimDMSUp

Cycles through LEFT MFD formats
SimDMSLeft

Cycles through RIGHT MFD formats
SimDMSRight

DMS

SimDMSDown
Moves SOI from HUD to highest priority MFD sensor or from MFD to MFD if allowed
If held ≥ 1/2 SEC toggles HMCS symbology (if active)

PINKY

Selects following RADAR, AGM-65 and TGP FOV's
GM= NORM EXP DBS1, DBS2
SEA & GMT= NORM, EXP
AGM - 65: WIDE, NARROW
TGP = WIDE NARROW, EXP
SimPinkySwitch
or
SimHotasPinkyShif (for DX shifting)

WEAPONS

WPN REL

Fires A/G missiles and releases bombs
Releases WPNs and TANKS in SEL JETT
Designates TGT in predesignate DTOS
Releases WPN at solution CUE in PD DTOS
SimPickle

MSL STEP
Cycles through CCRP, CCIP, DTOS When Missiles are not loaded.
Steps through stations loaded with the same type (AGM-65, IAM, HARM)
SimMissileStep

TRIGGERS

1st Detent: Fires laser
2nd detent: Fires GUN
SimTriggerFirstDetent
SimTriggerSecondDetent

TARGETING

SOI AGM-65: Commands WPN track upon release

SOI HUD: Designates TGT in DTOS and E-O VIS
Overfly point in VIP or VRP
HUD MARK

SNOWPLOW: Ground stabilizes Cursors

SOI FCR: Commands FTT in GM or SEA
Designates FCR MARK
Designates Sighting Point location & updates solution associated with Sighting point

(Designate)
SimTMSUp

SimTMSLeft
Change Polarity
AGM-65: COH & HOC
TGP: WHOT, BHOT, TV
HARM; Toggle threat table
MITL: Multiple Ops see Dash-34

SimTMSRight
Cycles through sighting Point Rotary Options
WPN SOI: Force correlation (AREA)
TGP SOI: GND stabilize in AREA
twice <0.5sec: Change PTR status
HARM: Selects valid threat in sequence
MITL: Multiple Ops see Dash-34
IFF: (FCR SOI) Commands IFF
SCAN interrogation round.

TMS

SimTMSDown
(Undesignate)
SOI FCR or AGM-65: Rejects any designated TGT and returns all sensors to SLAVE
SOI HUD: Rejects DTOS & EO-VIS TGTs and returns TD box to FPM.

ECM

MANUAL PGRM 1-4 RELEASE
(depending on CMDS PRGM knob position)
SimCMSUp

MANUAL PGRM 6 RELEASE
SimCMSLeft

ECM STBY
SEMI from AUTO
SimCMSRight

CMS

SimCMSDown
ECM ON Consent
SEMI / AUTO Consent

OTHER

SimAPOverride

PADDLE Switch

Disengage AUTOPILOT
Interrupts /Inhibits Flyup (TFR)

Trim nose down
AFElevatorTrimUp

AFAileronTrimLeft
Trim left wing down

AFAileronTrimRight
Trim right wing down

TRIM button

AFElevatorTrimDown
Trim nose up

HANDS- ON CONTROLS
AIR TO AIR MISSION
SIDE STICK CONTROLLER
A-A, MSL OVRD, DGFT

DISPLAYS

Selects HUD as SOI
SimDMSUp

Cycles through LEFT MFD formats
SimDMSLeft

Cycles through RIGHT MFD formats
SimDMSRight

DMS

SimDMSDown
Selects FCR, HSD or TGP as SOI
If held ≥ 1/2 SEC toggles HMCS symbology (if active)

PINKY

Selects RADAR/HSD normal or expand FOV
SimPinkySwitch
or
SimHotasPinkyShif (for DX shifting)

WEAPONS

WPN REL

Fires selected A/A missiles
If HELD ≥ 1SEC, fires AMRAAM
No delay for AIM-9
SimPickle

MSL STEP

Steps through stations loaded with the selected missile if held for < 0.5 SEC.
If held for ≥0.5 SEC steps to next missile type
SimMissileStep

TRIGGERS

1st Detent: Nothing
2nd detent: Fires GUN
SimTriggerFirstDetent
SimTriggerSecondDetent

TARGETING

Second activation:
STT in TWS or RWS

SOI HSD: Designates current steerpoint on HSD
Designate on PPT with Range Ring:
Selects PPT as current STPT.
Designate on decluttered PPT:
Displays PPT's Range Ring.

SOI TGP: Attempts POINT TRACK

SOI FCR: Designates TGT in RWS (SAM), Bugs TGT in TWS
Commands:
- SPOTLIGHT in RWS or TWS
- In ACM, commands BORESIGHT

SimTMSUp

SimTMSLeft
IFF: Short Press:
Commands SCAN interrogation round.
IFF: Long Press:
Commands LOS interrogation round.

SimTMSRight

TMS

SimTMSDown

HSD SOI: Removes cursor's PPT range ring

FCR SOI:
If HELD 1 SEC or less:
- Steps BUG
- In TWS - one or no System Track Files:
  Commands AUTO TWS
  BUGS first TRACK file
- In TWS - System Track Files:
  BUGS closest TRACK, Step BUG

If HELD more than 1 SEC:
- Selects TWS from RWS
- Selects RWS from TWS

In ACM Commands 30x20

FCR SOI: First activation: Drops any bugged TGT
Selects SAM from STT (RWS), TWS bug from STT (TWS)
In ACM, rejects locked-on TGT and commands 30x20 NO RAD

Second activation: Drops RWS/TWS BUG
In ACM, from 30x20 NO RAD, selects 10x60 RAD

Third activation: Selects RWS from TWS

ECM

MANUAL PGRM 1-4 RELEASE
(depending on CMDS PRGM knob position)
SimCMSUp

MANUAL PGRM 6 RELEASE
SimCMSLeft

ECM STBY
SEMI from AUTO
SimCMSRight

CMS

SimCMSDown
ECM ON Consent
SEMI / AUTO Consent

OTHER

SimAPOverride

PADDLE Switch

Disengage AUTOPILOT
Interrupts /Inhibits Flyup (TFR)

Trim nose down
AFElevatorTrimUp

AFAileronTrimLeft
Trim left wing down

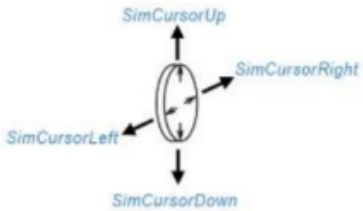
AFAileronTrimRight
Trim right wing down

TRIM button

AFElevatorTrimDown
Trim nose up

HANDS-ON CONTROLS
AIR TO GROUND MISSION
THROTTLE
A-G (& NAV) MASTERMODE

TARGETING

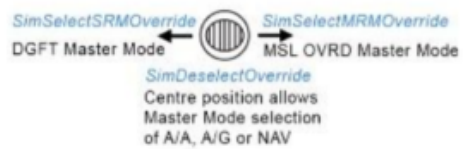


SOI FCR: Slews ground map cursors in A-G radar modes Except AGR
Slews radar videoin expanded FOVs
SOI HUD: Slews the slew-optimized symbol
Commands slew if AGM-65 selected
SOI WPN: Slews WPN LOS
SOI TGP: Slews TGP Cursors

CURSOR / ENABLE
or Analogue Cursor X
& Analogue Cursor Y

Note: *SimCursorStopMovement*
might be handy to stop cursor drift

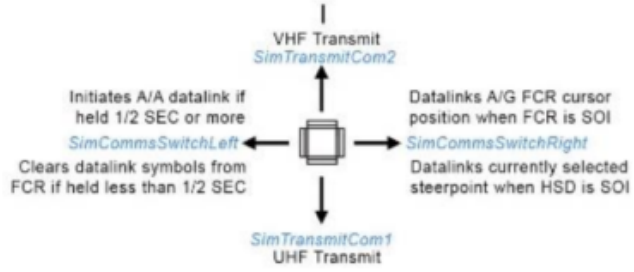
MASTER MODE



Centre position allows
Master Mode selection
of A/A, A/G or NAV

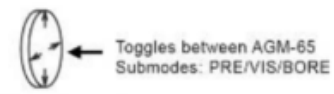
DGFT / MSL OVRD

COMM



RADIOSWITCH

WEAPONS



SimCursorEnable
CURSOR / ENABLE

Declutter HUD in NAV mode
Activates Gun in A-G Mode (Long press)
SimToggleMissileCage

Adjust GAIN in Ground MAP radar modes
Controls TGT GAIN in GMT
Controls FOV in TGP / TV mode

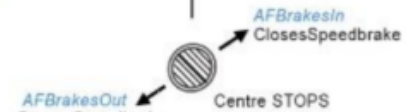
MAN RNG/ UNCAGE / GAIN / ENABLE
or Analogue Range axis

SENSORS

Controls Radar
Antenna elevation
No effect in AGR
SimRadarElevationCenter

ANT ELEV
or Analogue Antenna axis

OTHER



SPEED BRAKE

HANDS-ON CONTROLS
AIR TO AIR MISSION
THROTTLE
A-A, MSL OVRD, DGFT MASTERMODE

TARGETING

Bump range Up
SimCursorUp

Bumps 30° or 60° AZIMUTH
SimCursorRight

SimCursorLeft
Bumps 30° or 60° AZIMUTH

Bump range Down
SimCursorDown

In CRM, X/Y inputs slews Acquisition cursor

In ACM, X/Y inputs:
Commands slewable mode
Slews antenna Pointing Symbol

CURSOR / ENABLE

or Analogue Cursor X
& Analogue Cursor Y

Note: *SimCursorStopMovement* might be handy to stop cursor drift

MASTER MODE

SimSelectSRMOverride
DGFT Master Mode

SimSelectMRMOverride
MSL OVRD Master Mode

SimDeselectOverride
Centre position allows Master Mode selection of A/A, A/G or NAV

DGFT / MSL OVRD

COMM

VHF Transmit
SimTransmitCom2

Initiates A/A datalink if held 1/2 SEC or more
SimCommsSwitchLeft

Clears datalink symbols from FCR if held less than 1/2 SEC

Datalinks A/G FCR cursor position when FCR is SOI
SimCommsSwitchRight

Datalinks currently selected steerpoint when HSD is SOI

SimTransmitCom1
UHF Transmit

RADIOSWITCH

WEAPONS

IF HELD, selects BORE from SLAVE mode (in SLAVE mode)
In BORE seeker is slaved 3° Below the HUD Borecross or the HMCS (AIM-9)
6° below the HUD BoreCross for AIM-120

SimCursorEnable
CURSOR / ENABLE

Toggles AIM-9 Seeker between CAGE & UNCAGE
SimToggleMissileCage

SimRangeKnobDown

SimRangeKnobUp

MAN RNG/ UNCAGE / GAIN / ENABLE

or Analogue Range axis

SENSORS

SimRadarElevationUp

SimRadarElevationDown

Controls Radar Antenna elevation
No effect in ACM & STT
SimRadarElevationCenter

ANT ELEV
or Analogue Antenna axis

OTHER

AFBrakesIn
ClosesSpeedbrake

AFBrakesOut
Opens Speedbrake

Centre STOPS movements

SPEED BRAKE

Pinky Shift