

BFF Control Loader Software – Quick Start Guide

Introduction

The BFF Control Loader software consists of two separate applications. **BFF CL Settings** is used to configure and save configurations for individual aircraft or flight conditions. **BFF Control Loader** is the system driver software.

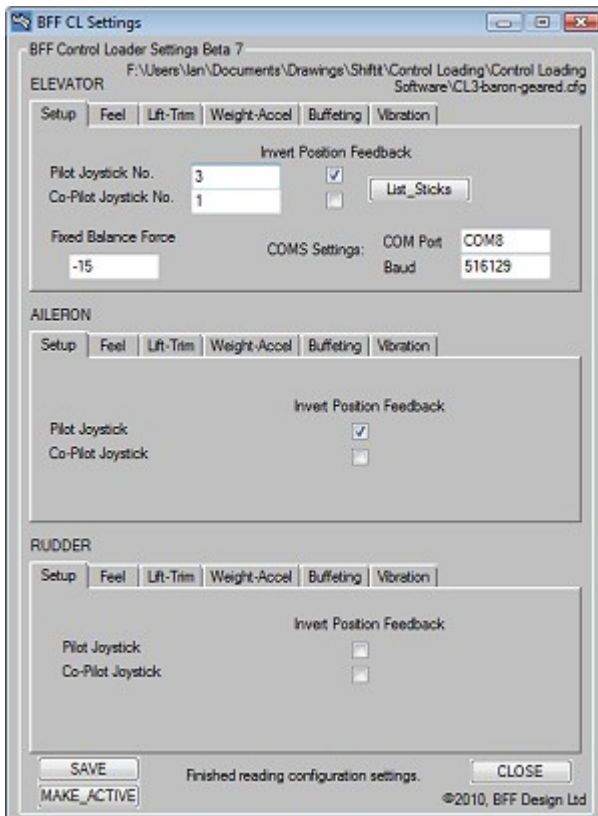
The system requires a registered version of FSUIPC to be installed for your version of MSFS. Most of the system will operate with unregistered versions of FSUIPC however the keystroke programming used to re-set the FS9/X elevator trim settings following AP disengage will not operate without a registered version. This is needed because FS9/X uses its internal elevator trim to control its AP vertical rate control and this can leave the stick zero position in the wrong place when the AP is disengaged.

To implement the elevator trim re-set feature add the following line to the [Keys] section of your FSUIPC.ini file (in the FS9/X Modules directory).

```
23=222,10,65706,1,65706,0
```

Configuration

The force feedback configuration settings can be saved for individual aircraft or flight setups in .cfg configuration files. The settings can be inspected and changed using the **BFF CL Settings** application.



Settings for each control axis are displayed separately in a tabbed layout.

Move the mouse over any input field in the Elevator settings area to see a pop-up help window for that setting.

To save the settings to a .cfg configuration file hit Save. Note that changes made to individual settings will not be saved until the Save button is used.

The Make_Active button will save the settings to a specified .cfg file AND instruct the BFF Control Loader to re-load those settings if it is active.

The Close button will close the application without saving.

Note that the COM port and baud for the force demand output is set in the Elevator settings area, as is the Pilot and Co-Pilot joystick numbers.

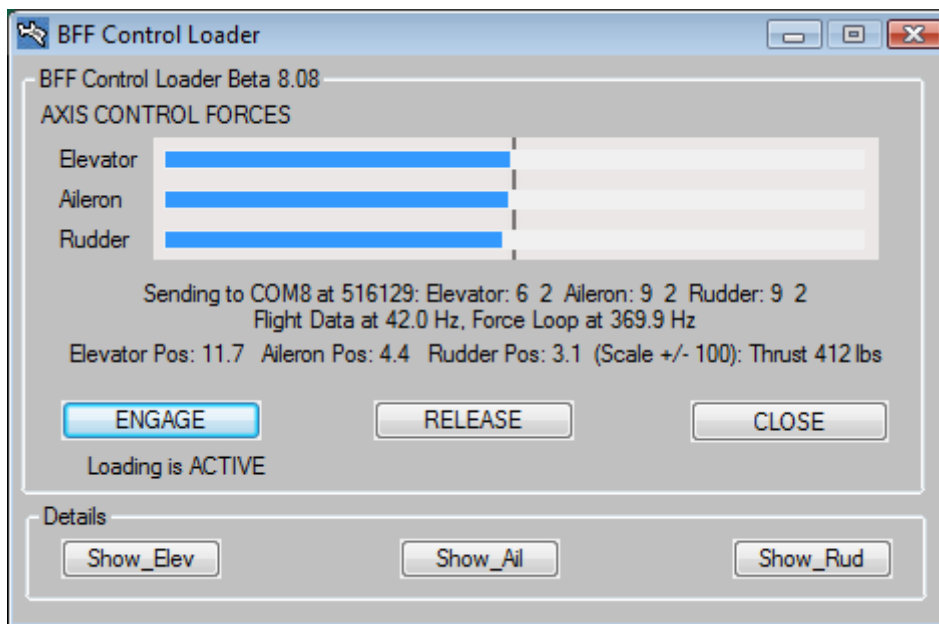
Operation

Operation of the CL driver is fairly straightforward. Double click the .exe and when prompted the .cfg configuration file can be selected. The principal settings of the driver are read from the .cfg file. Additionally the driver will read some advanced settings from the

PRY_S.cfg file in the driver's directory.

The PRY_S.cfg settings are as described in the file – do not alter these unless you are sure you know what you are doing. The setting you are most likely to need to change is the first line - "Loop delay time in ms". This defines the time delay inserted into each control loop to reduce the CPU consumption of the comms process. If this is set to zero the comms process will run as fast as your system allows, but it may make life difficult for other processes including the flight sim process. Set the delay value at a level to give around 500Hz for the force loop speed, whilst keeping the CPU consumption to within reasonable levels.

Note that for Windows XP systems there will probably be a minimum effective delay value of between 10 and 15 ms – ie any setting above zero but below about 10 will be treated as 10. This will substantially affect the level control you can have in XP systems over the comms process loop time. This is not an issue in Vista or W7 systems.



Buttons -

ENGAGE – make the force demand output active - force will ramp up to the active level.

RELEASE – release the controls – force will ramp down to zero.

CLOSE – release the controls and close the application.

Show_Elev, Show_Ail and Show_Rud – show detailed output windows for control axes. These can be used to see the individual force components vary in real-time. Each window also has an option to scope the force output, position and rate of position change for that axis.

The loop refresh rates are displayed in the main GUI for both the flight data (usually at the flight sim FPS and for the force loop.

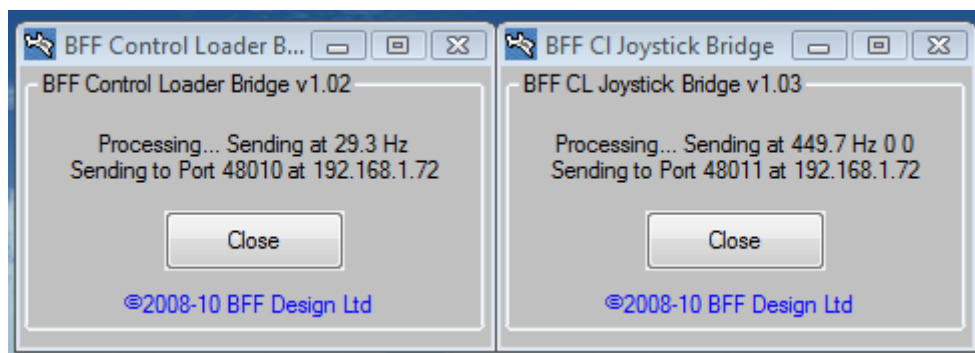
Keys Alt+S will display the output comms process, Alt+H will hide the comms process window. You will see that opening the comms process window will reduce the force loop refresh rate, so keep it closed when you don't need to see it.

LAN Operation

If you can not get satisfactorily fast force loop refresh rates with the control loader software running on the same PC as FS9/X then the CL software can be moved to a LAN PC.

To operate in LAN mode the BFF_CL_Bridge application must be installed and running on the flight sim PC. This application exports both flight sim data and joystick movement data across the network to the PC running the CL software. The CPU usage of the bridge processes is fairly small and it will be less affected by the CPU hogging tendency of FSX especially.

The BFF_CL_Bridge software is included in a zip package within the main CL zip download. Save the CL_Bridge files to a separate directory on the flight sim PC. Adjust the configuration settings in the CL_Bridge.cfg file to set the sender and receiver PC IP addresses and the pilot and co-pilot joystick numbers. Once FS9/X is running double click the BFF_CL_Bridge.exe application (NOT the BFF_PS_Bridge.exe) to start the data export.



The BFF Control Loader Bridge process handles the export of the flight sim data and it will automatically start the BFF Joystick Bridge process which handles the export of the pilot's joystick movement data across the network. Note that both processes run at different refresh rates and the rates can be controlled to some extent by the “delay” settings in the CL_Bridge.cfg file. The upper limit on the flight data refresh rate will usually be the frame rate of the flight sim. The joystick data export refresh rate should be around the 500Hz mark – use the delay parameter to slow the process down if the rates are well above 500Hz.

When the CL software is started on the LAN PC it will ask for confirmation to run in LAN mode and will then operate with received data from the bridge processes.

Note that the correct IP address and receiving port number must be set in your control loader config file using the Elevator-Setup tab of the CL Settings application.

The speed of the LAN network is important – best results will be achieved with a wired ethernet LAN rather than a wireless connection.

Control Loader Software Data Output Format

The software is able to export force demands in either 8 or 16 bit resolution. The 8 bit resolution requires fewer bytes to be transmitted and is therefore capable of faster comms and hardware processing time. However the 16 bit output will be better for smoother force feedback where better than 8bit motor controllers are used.

The output resolution is specified by setting the last line in the PRY_S.cfg file to “8” or “16”.

8 Bit Output

The force demand output from the BFF CL software in 8 bit mode is 6 bytes to the specified COM port at the specified baud.

The output is in the form of 1 ASCII qualifier byte and 5 raw data bytes

“A” b1 b2 b3 b4 b5

where

“A” - ASCII qualifier byte – letter A (raw value 65)

b1 - bits 0, 1 and 2 of b1 give the direction of channels 1, 2 and 3 respectively, where 1 = reverse, 0 = forwards

b2 – channel 1 (elevator) force demand 0 – 255

b3 – channel 2 (aileron) force demand 0 – 255

b4 – channel 3 (rudder) force demand 0 – 255

b5 – value of b2 repeated and provided as a simple check byte

16 Bit Output

The force demand output from the BFF CL software in 16 bit mode is 9 bytes to the specified COM port at the specified baud.

The output is in the form of 1 ASCII qualifier byte and 8 raw data bytes

“A” b1 b2 b3 b4 b5 b6 b7 b8

where

“A” - ASCII qualifier byte – letter A (raw value 65)

b1 - bits 0, 1 and 2 of b1 give the direction of channels 1, 2 and 3 respectively, where 1 = reverse, 0 = forwards

b2 – channel 1 (elevator) force demand MSB (0 – 255)

b3 – channel 2 (aileron) force demand MSB (0 – 255)

b4 – channel 3 (rudder) force demand MSB (0 – 255)

b5 – channel 1 (elevator) force demand LSB (0 – 255)

b6 – channel 2 (aileron) force demand LSB (0 – 255)

b7 – channel 3 (rudder) force demand LSB (0 – 255)

b8 – value of b2 repeated and provided as a simple check byte

The maximum output for a channel is $(MSB \times 256) + LSB$ and is capped at 65280. This is equivalent to an MSB of 255 and an LSB of 0. If required the MSB's only could be used to give an 8 bit range of 0 – 255.

Note

The data is refreshed at the force loop refresh rate which will typically be in the region of 500Hz. The baud rate can be set in the control loader configuration file and it will need to be kept high to allow the loop frequency to be kept high.

If you use your own hardware to process the force demand output then you will need to implement a baud rate of the order of 500 kbaud for the system to operate satisfactorily. The 64SPU-1 card available on the builtforfun web site runs at 519126 baud with its default programming.

For more details of the hardware set up see the system wiring diagram and accompanying notes.

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