

## Background Process

V 1.521 (from V 1.520)

- Updated to handle larger Neutral Position Shifts better. In this version the post-shift position feedback and display is corrected to ensure it fits the normal working range expected by FS and the CL software Show\_Conts display. Previously large neutral position shifts caused the position feedback to exceed normal range on the “longer” side of the stick movement, whilst it undershot normal range on the “shorter” side of the stick movement.

From V1.521 scaling is applied to ensure max stick displacement in either direction (even with neutral position shift) always matches the normal working maximum. This will now allow full position range in the FS controls when pot-less mode is active with a neutral position shift and the CL software feeds position via FSUIPC.

15/2/16

## **BFF CL Configuration Manager**

V1.10 (from V 1.01)

- Added Sim Avionics Mode (Heavy Jet Mode 2). Updated Tab 5 to suit. Added functionality for Tab 4 Item 1 (A/P following enable) & added Item 25 (A/P status offset), 26 & 27.
- Background settings will also now update automatically in running CL software when Make\_Active button in the Configuration Manager is used. Previously this required a manual CL software restart.
- Added Failure Mode Loading settings Tab 10.

## **BFF CL Loader for FS9/X/P3D**

V1.314 (from V 1.300)

- Added Heavy Jet Mode 2 – Sim-Avionics integration. Features also support ProSim 737 integration.
- Extended Use\_FSTrim parameter (Tab 5 Item 22) – if the value is made -ve the operating mode will include write out of trim positions to FSUIPC custom offset given in Tab 5 Item 26 of the Config Mngr.
- Added Failure Mode Loading

## **BFF CL Loader for X-Plane**

V1.314 (from V 1.300)

- Changes as per FSX version.....

## **Background Process**

V 1.520 (from V 1.502)

- Various changes to support the new features listed above for CL software V1.312.
- For CL\_SPU + BLDRV2-24 cards, slave station in electrically linked pair will always be in following mode when A/P following is NOT active. Updated electrical linking for

these cards in general.

- Background settings will now update when Make\_Active button in the Configuration Manager is used. Previously this required a manual software restart.
- Added EEPROM data to Ping logging for the new cards and updated other logging data.
- BLDRV2.ini file no longer used by main CL software – only by the BFF Driver Test App for EEPROM updates.

## **BFF Driver Test Application**

V 44

- Various updates and improvements, mainly for new CL\_SPU & BLDRV2-24 card operation....

3/2/16

## Configuration Manager

V 1.01 (from V 1.00)

- Corrected elevator position FSUIPC offset written to imported .cfg files when the Import button is used.

Previously offset 0x0BB0 was being added to old files which resulted in the elevator position writes to FS having no effect on the FS controls. The correct offset is 0x0BB2.

4/9/15

## **Background Process**

V 1.502 (from V 1.501)

- Corrected the adjustment to position output write to FS for aileron and rudder axes when a fixed position shift has been applied on those axes. The position shift is to move the neutral position of the physical controls whilst leaving the FS control zero position in the same place. The appropriate correction was not made in V1.501.

## **Configuration Manager**

Updated the default aircraft configuration files with the correct FSUIPC elevator position offset (0x0BB2). Previously they had 0x0BB0 which resulted in the elevator position writes to FS having no effect on the FS controls.

26/8/15

## **Background Process**

V 1.501 (from V 1.500)

- Corrected Auto Pilot following behaviour of Elevator axis. Previously the elevator axis was not switching into AP following mode properly when AP was engaged.

26/8/15

## **BFF CL Configuration Manager**

The new CL system Configuration Manager V1.00 has now replaced the CL Setup Application to bring all the system setup parameters into the same application.

## **BFF CL Loader for FS9/X/P3D**

V1.300 (from V 1.210)

- Updated to work with the new CL system Configuration Manager software.
- Added A/P position following offsets – see Configuration Manager Tab 4 Items 8 – 10.
- Added custom FSUIPC Offset locations for flight control position writes. See Tab 5 Items 12 – 14.
- Small changes to GUI text and logging.

## **BFF CL Loader for X-Plane**

V1.300 (from V 1.210)

- Changes as per FSX version.....

## **Background Process**

V 1.500 (from V 1.310)

- Various changes to support the new features listed above for CL software V1.300.
- Added support for new CL-SPU + BLDRV2 driver cards.

20/8/15

## BFF CL Loader for FS9/X

V1.210 (from V 1.122)

- [Pot-less mode](#) is now the default mode for the software and default configuration files. All BLDRV-12/24 driver cards are now supplied with pot-less mode configured. In this mode the flight control positions will be fed to FSX/X-Plane via the CL software using position data derived from the drive motor encoders. Position reporting potentiometers do not need to be fitted to the controls.

The flight control position feed to FSX can be disabled by manually setting parameter **WFS\_Inhibit=1** in the [WideFS] section of the config file. This will allow conventional joystick card potentiometers to be fitted if required whilst still allowing the simpler setup and operation of the CL system provided by pot-less mode.

- Added minimum trim airspeed setting (**Min\_Trim\_AirSpeed\_E, \_A & \_R**). This sets the minimum airspeed that will apply to the trim force calculations for each control axis. If the actual airspeed drops below this value the specified min value will be used. This allows an always-on component of trim force to be specified, even when the aircraft is at rest. Value is in Knots and must be set manually in the .cfg file in the relevant axis section (eg [Elevator], [Aileron] or [Rudder] sections).
- Added “Heavy Jet Mode 1” (**Use\_FSTrim=10**). See [Appendix D](#) of the online user guide for more details.

Heavy Jet Mode 1 provides elevator axis trim and A/P following behaviour to better suit heavy jet flying. It requires pot-less mode to be active to allow the CL software to control the feed of position data to FSX individually for each axis.

- Added “Neutral Position Offset” feature. This enables the natural “hands-off” position of the elevator axis to be shifted away from geometrical mid. See [Appendix D](#) of the user guide for more details.
- Added “Rudder Position Scaler” to enable the rudder axis position feed to FSX to be scaled down. See [Appendix D](#) of the user guide for more details.
- Changed Rudder axis A/P following behaviour in pot-less mode. Because FSX native A/P does not use rudder for A/P control the rudder axis is now always in normal loaded mode when A/P is engaged rather than in position following mode. Requires pot-less mode to be active. Requires card 20X2 chip firmware to be v35 or later, older firmware will continue to behave as before.
- Added [Show\_Conts] section to configuration file to allow the direction of the control and trim positions displayed in the Show\_Conts window to be reversed. See default cfg files for example.

...cont



## **BFF CL Loader for X-Plane**

V1.210 (from V 1.122)

- Changes as per FSX version.....

## **Background Process**

V 1.310 (from V 1.296)

- Various changes to support the new features listed above for CL software V1.210.

14/1/15

## **BFF CL Loader for FS9/X**

V1.122 (from V 1.120)

- Added USB Licence Key dongle feature. This provides registration portability between PC's.

## **BFF CL Loader for X-Plane**

V1.122 (from V 1.120)

- Changes as per FSX version.....

## **Background Process**

V 1.296 (from V 1.293)

- Small changes to Meastro servo card data export for trim indicators .

25/6/14

## BFF CL Loader for FS9/X

V1.120 (from V 1.111)

- Added initialisation splash screen for non-commercial use registered versions.
- Added helicopter cyclic control loading mode – See Appendix C in online user guide..
- Corrected breakout force enable checks – breakout settings were disabled on an axis if the Weight effects Balanced checkbox was ticked – this is inverted logic and is corrected.
- Updated code for new compiler.

## BFF CL Loader for X-Plane

V1.120 (from V 1.111)

- Changes as per FSX version.....

## Background Process

V 1.293 (from V 1.285)

- Added helicopter cyclic control loading mode – See Appendix C in online user guide..
- Added option to override joystick trim buttons using keyboard keys (back ground process settings – Line 47 = -1)
- Various code tidying.

## Config File Setup Application

V 1.10 (from V 1.09)

- Added helicopter cyclic control loading mode setting **Cyclic Trim But** to the elevator axis Tab1 Setup tab. – See Appendix C in online user guide..

23/1/14

## BFF CL Loader for FS9/X

V1.111 (from V 1.106)

- Added calibration report text to the main GUI for co-pilot station cards in dual electrically linked controls.
- Added additional data logging for FSUIPC data and electrical linking variables.
- Corrected pot-less control position feed to FSUIPC when AP following is disabled using the APF\_Enable parameter.

## BFF CL Loader for X-Plane

V 1.111(from V 1.106)

- Changes as per FSX version.....

## Background Process

V 1.285 (from V 1.25)

- Corrected position following direction for dual linked controls in pot-less mode.
- Other dual linking code improvements for pot-less mode including additional logging data.
- Improved pot-less control position reporting (removed intermittent position glitches).
- Added background process setting **Line 78: Slave movement invert** to enable position following movement inversion of the slave station in electrically linked dual systems using pot-less mode.

## Config File Setup Application

V 1.09 (from V 1.08)

- Added background process setting **Line 78: Slave movement invert** to enable movement inversion of the slave station in electrically linked dual systems using pot-less mode.

12/11/13

## **BFF CL Loader for FS9/X**

V1.106 (from V 1.105)

- Adjusted FSUIPC write timings when in “pot-less” mode to improve write efficiency

## **BFF CL Loader for X-Plane**

V 1.106(from V 1.105)

- Changes as per FSX version.....

## **Background Process**

V 1.25 (from V 1.24)

- Added additional background process settings to allow calibration of the FS control movements when the system is in “pot-less” mode.

These are Lines 75 to 77 in the setup application – background process settings. The settings allow the FS flight control movement around the mid-position region to be slowed or quickened with respect the movement of the real controls. This adjusts to sensitivity of the FS controls to movement of the real controls.

- Adjusted filtering present on the control position data sent to FS when in “pot-less” mode to remove the slight control movement lag previously present .

## **Config File Setup Application**

V 1.08 (from V 1.07)

- Added Lines 75 to 77 in the background process settings area.

12/9/13

## **BFF CL Loader for FS9/X**

V1.105 (from V 1.101)

- Miscellaneous changes to FSUIPC initialisation code to improve compatibility with WideFS and provide additional FSUIPC version data in log.
- Addition of various logging data to assist user system debugging.
- Adjusted loop timing when in Wide\_FS mode – slowed down the main CL process slightly when in LAN mode (WideFS returns data faster resulting in higher CL loop speed).
- Added config parameter **WFS\_Inhibit** to **WideFS** section of cfg file – this is a specialised option which switches off control position setting by the CL software via WideFS when in LAN mode.

## **BFF CL Loader for X-Plane**

V 1.105(from V 1.101)

- Changes as per FSX version.....

## **Background Process**

V 1.24 (from V 1.23)

- Added additional logging data.

## **BFF Driver Test Application**

V 29 (from V 28)

- Added additional logging data.

## BFF Driver Test Application

V 28 (from V 27)

- Added facility to display additional value in Ping return data. This is the fixed force component sense reverse enable flag. When set in the 20X2 firmware this will reverse the direction of any fixed force component output by the card/motor. Useful for customising programming for non-standard motors.
- Added code to manage minimum time delay between subsequent serial data exports. This is set at a minimum of 9 ms – faster than this and the driver card may not be able to process the serial data (equiv to max data export rate of 111Hz). Can affect 20X2 firmware v30+ cards.

This adjustment is already in the main CL software – so leaving it out of the test app was my oversight!

24/6/13

## **BFF CL Loader for FS9/X**

V1.101 (from V 1.100)

- Corrected another registration initialisation bug introduced in v1.10 which stopped v1.10 software recognising existing registrations. This version should work with existing registrations as originally intended....
- Adjusted WideFS mode control position reporting – now a change in position of at least 0.25% of full range is required before the CL software reports the new position to FSUIPC via WideFS.

## **BFF CL Loader for X-Plane**

V 1.101 (from V 1.10)

- Changes as per FSX version.....



## BFF CL Loader for FS9/X

V1.10 (from V 1.07)

- Corrected registration initialisation bug.
- Added “potentiometer-less” operation – see online user guide for details.
- Added parameter **zero\_ETrim\_soft** to **AP\_Gain** section of configuration file. This is the decay factor to be applied to the FS elevator trim each software loop to soft decay the FS trim to zero upon AP disengage events. Eg a value of 0.9 will decay the current trim 10% each loop. Increase the value towards 1.00 to slow the decay. Default is =0 which returns the trim to zero in a single step.
- Corrected bug which disabled breakout force settings for the rudder axis.
- Removed pop-up dialogue when local FS not found and operation is by LAN. This removes the need for user interaction to confirm LAN operation – the software will look for WideFS data automatically if no FS found running..
- Added additional logging data.
- Added code for experimental BFF AutoPilot Software.
- Updated code for dual control electrical linking (still beta).
- General code tidying.

## BFF CL Loader for X-Plane

V 1.10 (from V 1.07)

- cumulative changes as per FSX version.....
- Experimental Use\_FSTrim=4 setting added. This allows the CL system to be more closely integrated with internal X-Plane trim functions so that CL trim is driven by X-Plane trim allowing existing trim hardware to be retained, but requires the use of BFF AutoPilot software and a simple modification to the aircraft flight model. Interesting, but still needs more development work.....

## Background Process

V 1.23 (from V 1.15)

- Added “potentiometer-less” operation
- Added settings to select between internal or external Maestro servo card output. External exports the servo data by a process separate from the main CL software – this protects the CL system operation if the Maestro servo card hangs.
- Improved serial output code to ensure minimum elapsed time between successive serial writes to driver cards.
- Updated code for electrical linking of dual controls (still beta)
- Added code for use with experimental BFF AutoPilot Software

## Config File Setup Application

V 1.07 (from V 1.05)

- Added background setting for “potentiometer-less” operation
- Added setting for internal or external servo output

## **BFF Driver Test Application**

V 27 (from V 25)

- Added facility to pre-set valid driver cards to “potentiometer-less” power-up calibration (button **Change\_Calib\_Method**). See user guide for more details.
- Added display of control position from cards set for “potentiometer-less” operation. Set **Stick No = 0** to display....
- Added card drive formats for cards set for “pot-less” operation.
- Added specialised option for adjusting phase angle correction on motor commutation.

7/6/13

## BFF CL Loader for FS9/X

V1.07 (from V 1.06)

- Added Use\_FSTrim = -1 setting to the aircraft config file. This will cause the CL software to write the live CL trim positions to FSUIPC custom offsets 0x66FA, FC & FE (in same format as existing FSUIPC trim position offsets). These can then be picked up by other applications to drive servo cards etc. The parameter Cust\_TLoc=0x66FA can be altered to redefine the offset location to write the trim positions too. It defines the start location of the 6 bytes required for the data.  
NOTE: These custom offset values have NO effect on FS trim.
- Added option to enable different channel assignments to a 2<sup>nd</sup> PICAXE cable if one is specified using the COMPortB parameter. See the Config Setup App changes below...

## BFF CL Loader for X-Plane

V1.07 (from V 1.04)

- cumulative changes as per FSX version.....

## Background Process

V 1.15 (from V 1.13)

- Added option to enable different channel assignments to a 2<sup>nd</sup> PICAXE cable if one is specified using the COMPortB parameter. See the Config Setup App changes below...
- Altered Pololu Maestro servo output format to simple 8bit format for trim indicator position. This has little effect on the servo position resolution but does allow the mid-position and range settings available through the Pololu Maestro Control Center software to become active. These can be used to center and scale the physical movement of the servos.
- Added an elevator auto-trim direction indicator output to Maestro servo channels 4 & 5. This provides high/low outputs on those channels when they are set as digital outputs which can be used as logic signals to drive pot-based trim wheels during AP following. One or other output becomes active when the background calculated net elevator force moves out-with the dead-band amplitude set in the Pry\_S.cfg file line 69. For systems using elevator trim button (rather than potentiometers) the software can automatically adjust elevator trim during AP following.
- Added Elevator servo trim indicator output mapping parameters A, B & C to Pry\_S.cfg file. These allow non-standard indicator servo min, mid and max settings to be made.

## Config File Setup Application

#### V1.05 (from V 1.03)

- Corrected bug by which the “Line 58: Trim servo drive enable” value was saved as a +ve value even when read from the Pry\_S.cfg file as a -ve value. This had the effect of disabling the Pololu Maestro servo output for trim indication.
- Added additional setting in Background Process settings area – Comms Method section – Line 68: Cable Channel Allocation. This allows different channel assignments to a 2<sup>nd</sup> PICAXE cable if one is specified using the COMPortB parameter in the aircraft .cfg file. See the pop-up tool tip for the item in the application for more detail.
- Added “Line 69:Trim direction indicator deadband” parameter to the Background Process settings area – see the Background Process updates above.
- Added Lines 70, 71 & 72 – elevator trim indicator servo output mapping points.

14/1/13

## **BFF CL Loader for FS9/X**

V1.06 (from V 1.04)

- Added additional breakout force rate setting.. for BLDRV card latest programming only (20X2 beta23+, dsPIC beta29+)
- Added parameter APF\_Trim\_Zero=0 to [AP\_Gains] section of config file to allow the FSX internal trim to be set to a position other than zero when the CL system is active and FSX trim is disabled. The value is in the FSUIPC offset 0BC0 data range – ie +/- 16383 where 0 is mid.
- Corrected FSX trim re-zeroing logic for the various AP\_Follow and Use\_FSTrim settings.
- Disabled CL trim forces when Use\_FSTrim is +ve non-zero, ie when FSX trim is active.

## **BFF CL Loader for X-Plane**

Still at V1.04

- yet to be updated with V1.06 changes...

## **Background Process**

V 1.13 (from V 1.11)

- Added additional breakout force rate setting.. for BLDRV card latest programming only (20X2 beta23+, dsPIC beta29+)
- Corrected bug in LED display code.
- Tidied code for pinging BLDRV-12/24 cards for future features.

## **Config File Setup Application**

V1.03 (from V 1.03)

- Added additional breakout force rate setting.. for BLDRV card latest programming only (20X2 beta23+, dsPIC beta29+)

4/10/12

## **BFF CL Loader for FS9/X**

V1.04 (from V 1.01)

- Adjusted FSUIPC error reporting.
- Added feature to allow FS internal trim to be made active. Normally the FS trim is disabled by the CL system (see notes on trim in the online user guide), in some situations (mainly for heavy jet flying) it may be helpful to allow FS trim to remain active. To enable FS internal trim add parameter Use\_FSTrim=2 to the [Setup] section of the aircraft config file. Please note, doing so will affect the position behaviour of the flight controls. This will disable the CL trim completely and trim pots etc should be configured as normal FS inputs. Set Use\_FSTrim=1 to direct the CL trim inputs to the flight sim – ie to drive FS trim using trim pots/buttons configured as normal CL system trim inputs.
- Added pitch rate effects on elevator loading. This contributes to the loading arising from the longitudinal manoeuvring stability of the aircraft by adjusting the elevator angle of attack for pitch rate. It requires geometrical information to be added to the aircraft config file – please contact me for details. Only really relevant for aircraft with reversible controls.  
The effect contributes to elevator loading when the aircraft banks or pitches.

## **BFF CL Loader for X-Plane**

V1.04 (from V 1.01)

- As above.

## **Background Process**

V 1.11 (from V 1.00)

- Corrected bug in scaling applied to Pololu Maestro servo card output (for servo driven trim indicators). If you are already using the Maestro servo output you will need to re-adjust the scaling parameter in the Pry\_S.cfg file.
- Added AP following outputs to the background process GUI to assist debugging AP following issues.
- Added provision to allow aileron card to be driven from separate PICAXE cable from elevator card (contact me for details).
- Added alternative method for comms with BLDRV cards. This is mainly for future use. The software can communicate with the cards using USB rather than COM Port methods – it can do this using the normal PICAXE AXE027 cable or other FTDI chipset USB/TTL devices.
- Added further USB comms methods to use USB devices with designated serial numbers.

## **Config File Setup Application**

V1.03 (from V 1.00)

- Added additional data mode – for future features.
- Added setting for enabling FTDI USB API comms method with BLDRV-12/24 cards.

10/9/12

## BFF CL Loader for FS9/X

V1.01 (from V beta9.911)

- First non-beta release.
- Fixed strange loading behaviour when pitot tube freezes.
- Modified Alpha handling when aircraft does loops (why are you doing loops in a GA aircraft anyway?).
- Tidied some in-window display items.
- Experimental LAN operation via WideFS feature added – email me if you need more info.

## BFF CL Loader for X-Plane

V1.01 (from V beta9.911)

- As above – first non-beta release.
- Updated XPUIPCOffsets.cfg file.
- Note – I have not tested LAN operation with XPWide

## Background Process

V 1.00 (from V beta 4.98)

- Changed name to BFF\_CL\_Background

## Config File Setup Application

V1.0 (from V beta 110)

- First non-beta release.
- Added new button **Bck\_Grnd\_Set** to allow Pry\_S.cfg settings to be made through the setup application. Previously Pry\_S.cfg changes could only be made via a text editor.

19/7/12



## BFF CL Loader

V beta9.911 (from V beta9.88)

- Added configuration file name command line parameter to allow the file name to be specified at start-up. This bypasses the file selection interaction and is useful when the CL software is always run with the same configuration file. See the Operation section of the user guide for more details.
- Added display of control and trim axis positions used by the CL system. Click on the “**Show\_Conts**” button to toggle the display window on and off. If the rudder axis lift gains are disabled in the active configuration file then the rudder position and trim will be shown as zero.
- Added button to window to open log files in NotePad (button **Show\_Logs**). Both the BFF\_CL and BFF\_Pry log files will be displayed with their current contents. They must be closed and re-opened to display any new content that might have been written since the **Show\_Logs** was last clicked.
- Added a small yellow LED images to the window which will light whenever the background force calculation process refresh rate drops below approximately 40Hz or the sim FPS drops below approximately 15 FPS. This is to give some visual indication of PC system demand caused interruption to the smooth processing of the control force outputs.
- Added support for Lockheed Martin Prepar3D (requires FSUIPC).
- Fixed bug on FSX elevator trim automatic re-centering on AP disengage. Added auto-centering of simulator trims on CL software start-up (not for FS9).
- Improved start-up and shut-down management of background process.
- Added experimental dual yoke electrical linking functionality (contact me for details).
- Replaced Cessna 172 config file in zip package – original response way too stiff!
- Added checks on status of game controller joystick.

## Background BFF\_Pry process

V beta4.98 (from V beta 4.96)

- Added coding to support the experimental dual yoke electrical linking function (see above).
- Added code to support the control axis position display (see above).
- Fixed LED display window positioning bug.
- Added further data reporting to log file.
- Improved runway vibration generation.

## Config File Setup Application

V beta110 (from V beta 108)

- Added settings for dual yoke electrical linking (Co-pilot station COM port and pilot/co-pilot control swap toggle buttons).

27/6/12

## BFF CL Loader

V beta9.88 (from V beta9.87)

- Added experimental breakout force component. This is active only for fly-by-wire type configurations such as those in heavy jets. The breakout component magnitude is controlled by a new setting in the .cfg file. Use the Setup Application Vbeta108 or later – the setting is in the “Feel” tab. The functionality also needs recent BLDRV-12/24 card programming (beta19+ on the 20X2 chip, and beta22+ on the dsPIC chip if you don't have this on the dsPIC chip it will need to be replaced).

The breakout component will only become active if, A. a non-zero minimum spring stiffness has been set, B. Alpha or Beta gain is set to zero, and C. “balanced” ie no weight effects are set on the control axis.

The zero force position from which the breakout occurs moves with trim adjustment and is not fixed. The above conditions are required to allow the zero force position to be calculated reliably.

## Background BFF\_Pry process

V beta4.96 (from V beta 4.93)

- Corrected bug in communication of I and D terms for Rudder axis for position following mode.
- Added x10 resolution on exported fixed force component data to support the new breakout force feature. This provides higher resolution output for trim force adjustments to allow accurate calculation of the breakout force neutral position. To activate the x10 resolution add a new line (line 62) to the Pry\_S.cfg file with the value 1 (one) – see example in zip archive.

**DO NOT** activate this x10 resolution unless you have BLDRV-12/24 20X2 chip programming at beta19 or later.

- Added other data processing for the breakout force feature implementation.
- Adjusted data output to BLDRV-12/24 cards to qualify torque ripple compensation and breakout force settings – so that cards will only accept data from valid CL recent software versions.
- Improved PING return data handling.

## Config File Setup Application

V beta108 (from V beta 107)

- Added breakout setting to Feel tab.

- Removed some older settings valid only for non-brushless drive systems.

18/4/12

## **BFF CL Loader**

V beta9.86 (from V beta9.85)

- Corrected error in stormy weather propwash behaviour, and generally improved the propwash behaviour in FS9/X version. This may require you to re-tune the propwash settings in your configuration file – they may need to be increased to give the same net effect as before.
- In X-Plane version corrected propwash disable bug – disable check-boxes in the setup application weren't effective in disabling propwash effects.
- Confirmed function of X-Plane version with X-Plane V10. Note XPUIPC\_offsets.cfg file has been updated.
- Added preliminary Cessna 176 configuration file to zip package.

31/1/12

## **Background BFF\_Pry process**

V beta4.89 (from V beta 4.86)

- RC Servo type output to drive trim indicators – added support for Pololu Maestro Servo cards.
- Support for propwash behaviour improvements made in the above CL software revisions.
- Added motor cogging torque elimination capability – requires beta10+ card firmware and matching dsPIC controller chip programming. Useful feature for non-standard brushless motors.

31/12/11

## **BFF CL Loader**

V beta9.85 (from V beta9.83)

- Corrected demo mode runtime message error.
- Improved event logging to show safety related auto-release events more clearly in the log files.

2/1/12

## **Background BFF\_Pry process**

V beta4.85 (from V beta 4.83)

- Added RC Servo type output to drive trim indicators. The serial output is in Pololu format to drive Pololu Servo cards – servos 1, 2 and 3 on the card are elevator, aileron and rudder trim indicators. The set up is in the Pry\_S.cfg file – lines 58 to 61 – please read the notes in the Pry\_S.cfg file in the zip package. The COM port, baud rate, output frequency and output scaling settings are made in the file.

15/12/11

V beta4.86 (from V beta 4.85)

- Improved event logging to show safety related auto-release events more clearly in the log files.

2/1/12

## **BFF CL Loader**

V beta9.83 (from V beta9.82)

- Corrected bug which disengages AP when FFB is already in RELEASED state.
- Disable Show\_\* buttons when their associated details window is open.

## **Background BFF\_Pry process**

V beta4.81 (from V beta 4.80)

- Corrected LED window initial position bug.

4/10/11

V beta4.83 (from V beta 4.81)

- Updated BLDRV-12/24 card “Ping” data handling for newer card firmware versions. Ping data now reports additional card data for debugging for Firmware Beta7 or later card programming.
- Implemented feature for mixing the trim input methods. Previously the choice was either all trims from potentiometer input, or all trims from button inputs. Now potentiometer or button input method can be specified for each control axis separately. See notes in the Pry\_S.cfg file (lines 55 to 57) or the Trim section of the on-line user guide.

9/12/11

## **BFF CL Loader**

V beta9.82 (from V beta9.81)

- Added LED indicator lights window. This can be displayed and used during card power-up calibration to inspect the card calibration status in circumstances in which the card LED can not be seen from the pilot position.
- The software now remembers its last screen position when closed.
- -ve values for overall force gains are ignored - the absolute value will be used.

## **Background BFF\_Pry process**

V beta4.80 (from V beta 4.79)

- Implemented LED window functionality.

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## **BFF CL Loader**

V beta9.81 (from V beta9.79)

- Added warning and automatic RELEASE if the Ping data reports that the motor +ve drive direction and the joystick +ve displacement direction do not match on any active axis. See BFF\_Pry.log file for details of which axis is affected. This should protect against unstable drive away from centre during system initial setup.
- -ve Lift Gains not now permitted – to ensure the main control surface aerodynamic force always drives towards center not away from center.
- Added background process running checks.
- Added further settings config file integrity checking.
- Added items to status logging.

## **Background BFF\_Pry process**

V beta4.79 (from V beta 4.77)

- Added brushless motor drive sense to joystick sense reporting variable to Ping data – Grad\_Sign = 1 for sense match, = 2 for sense opposed. If =2 then the system will drive away from centre rather than towards centre. Added warning message to instruct user to reverse the feedback sense on the affected axis. Details shown in the BFF\_Pry.log file in the Logs folder.
- Added Pry\_S.cfg file integrity checking
- Added items to status logging
- Corrected bug in Aileron stall vibration frequency settings

## **Config File Setup Application**

V beta107 (from V beta 106)

- -ve Lift Gains no longer permitted. Now +ve lift gains with Grad\_Sign = 1 (see above) conditions are required for drive to be engaged. This is to reduce possibility of drive away from rather than towards center when system initially set up.

## BFF CL Loader

V beta9.79 (from V beta9.78)

- Added registration requirement – two options available: home use and commercial use. In unregistered mode the FFB is released after 10 minute running time.
- Added parameter APF\_Enable to .cfg file in AP\_Gains section. When = 0 this disables AP following. Needs to be changed manually in .cfg file as doesn't appear in the settings application.
- Improved FS9/X Alpha & Beta data at very low airspeeds.
- Added AS\_Exp parameter in .cfg file to allow adjustment of airspeed exponent used for control surface lift calcs. Normally =2, however can be adjusted for fly-by-wire systems in heavy jets for example.
- Improved **Zero** button UI.
- Other minor code tidies...
- Added XPUIPCOffsets.cfg file for X-Plane version (to be saved to X-Plane plugins folder. This sets up custom data items...
- X-Plane version reads stall warning AoA from X-Plane.

## Background BFF\_Pry process

V beta4.77 (from V beta 4.74)

- Removed quadratic curve extrapolation on Alpha, Beta and Air\_Speed data for brushless driver output mode – this is because the sim FPS and the Force calc CPS are very similar. Is retained for other fast looping output modes.
- Changes required for **Zero** button UI changes.
- Tidies on RELEASE coding.

## **BFF CL Loader**

V beta9.78 (from V beta9.75)

- Corrected bugs in Rudder axis which disabled Beta and lateral acceleration effects.
- Added status logging....
- Disabled drive on entering Slew mode
- Added trim by buttons as alternative to trim by pots (set in Pry\_S.cfg file)
- Added minimum soft spring return setting (set in setup application)
- LAN operation now not recommended – AP disengage by control movement requires CL software to run locally to the flight sim.

## **Background BFF\_Pry process**

V beta4.74 (from V beta 4.70)

- Added status logging.....
- Trim button implemented
- Minimum spring rate implemented
- General tidy...

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## **BFF CL Loader**

V beta9.75 (from V beta9.69)

- GUI more efficient to reduce CPU use. Now should run better when in same PC as flight sim software.
- Ping button added – forces check & display of brushless driver card status.
- Zero button added – to initiate automatic zeroing procedure to get more accurate AP following, and more sensitive movement induced AP disengage.
- Added axis position checking – sustained (10 secs) max deflection (> 90%) at high loads ( > 40%) will cause automatic disengage. To protect driver card from overheating due to high current load from non-rotating motor.
- -ve airspeeds disabled.
- AP following works over LAN – with up to date CL Bridge software only. However more efficient GUI should make the software run better on the flight sim PC.
- Added stick movement induced AP disengage. Sensitivities set in PRY\_S.cfg file. Should be used with Zero button function.
- Added adjustable AP following gains – in main .cfg file.
- Improved close-down coding.

## **Background BFF\_Pry process**

V beta4.70 (from V beta 4.65)

- Ping and Zero function implemented
- AP disengage movement thresholds implemented
- AP following adjustable trim scaling implemented
- Improved AP on/off transitioning
- Improved force disengage at close-down.