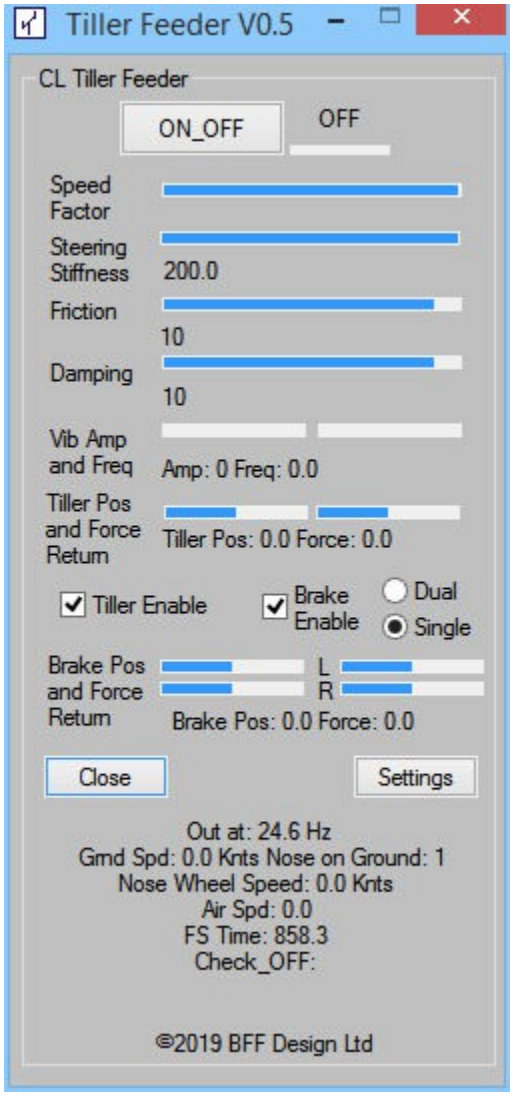
Tiller/Toe Brake CL Feeder – Quick Start



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1. Introduction

The BFF Tiller/Toe Brake Feeder App operates with the CL Controller App to provide control loading (force feedback) drive data for Tiller and Toe Brake control axes.

The Feeder app sends UDP command data to the CL Controller which in turn drives the CL_SPU_USB and BLDRV3 drive cards for the loading axes. The CL Controller therefore must run in UDP Data mode.

The App will run with FSX/P3D and X-Plane. It communicates via FSUIPC/XPUIPC so ensure these are installed. In the case of X-Plane/XPUIPC also insure the XPUIPCOffsets.cfg file provided in the Tiller Feeder directory is also installed. This is the same cfg file as found in the main BFF CL Software folder – it does not need to be installed twice.

IMPORTANT: The Toe Brake loading requires BLDRV3 firmware programming R50 Build 79 or later. This adds a unidirection mode which allows a zero position at one end stop, rather than bidirectional movement around a zero position at mid.

2. System Design and Setup

Tiller loading uses axis 1 and the toe brake loading goes to axes 2 (right) and 3 (left) on the BLDRV3 drive system. So the hardware design should reflect this card/motor arrangement.

The CL Controller can drive a single CL_SPU_USB card which is jumper set either as Pilot or Co-Pilot station. However, if the Tiller/Brake system is to run on the same PC as an existing main axis BFF CL drive (elevator, aileron and rudder) then it is suggested that the main CL drive CL_SPU_USB is jumper set as the Pilot station. And the CL Controller driven card as the Co_Pilot station.

The main CL software can then be set to ignore the Co_Pilot station by manually setting the following parameter in the Configuration Manager/Background.ini file

[Parameters]

CP_Ignore=1

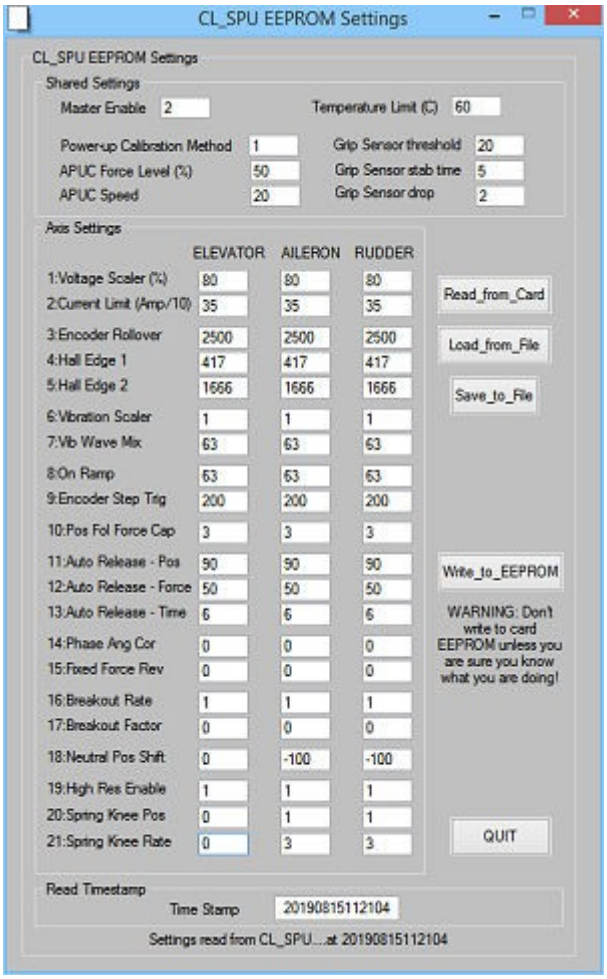
And the CL Controller can be set to drive only the Co-Pilot station by setting this parameter in the CL_Controller.ini file in the CL Controller folder.

[COMMS]

Force_CL_SPU=2

For the Toe Brake axes (2 & 3) additional CL_SPU_USB card EEPROM setting should be made to allow these axes to operate in a unidirectional mode which has the zero position at one end stop, and maximum displacement at the other.

IMPORTANT: These EEPROM settings require BLDRV3 firmware R50 Build 79 or



later to operate.

EEPROM settings are made using the Update_EEPROM button on the CL Controller.

Item 18: Neutral Position Shift = 100 or -100 will shift the zero position to one or other end stop. The driven axis will then always return to the end stop when a spring return force is programmed – this matches the normal action of brake pedals.

In addition Items 20 and 21 can be used to implement a 2 stage spring response on axes 2 & 3 if required. Read the pop-up help tips for these items (tips appear only for the Elevator axis settings column).

The 2 stage response can be used to implement a “soft” stop region near the end of displacement, or to define a soft start region with a fixed rapid stiffness response to follow.

Note also that Item 1: Voltage Scaler can be reduced to effectively define a force cap on the axis if the maximum force output on the 2nd stiffness stage is reached and is too high.

3. Software Settings – CL Controller

The CL Controller should be set to use UDP Input mode – see the CL Controller User Guide for details. Further information is also available on-line -

http://bffsimulation.com/Manual-CL-USB/Appendix_J_CL_Controller.php

When the Feeder app is running the UDP loading data from the Feeder App will be sent via the CL Controller to the drive cards.

4. Software Settings – Tiller/Brake Feeder App

The Tiller loading is modelled as a simple combination of spring return stiffness, damping and friction which changes with ground speed to generate loading that is heavier at slower ground speeds and lighter at higher ground speeds. The stiffness provides a return to center action and the damping and friction adds weight/resistance to the response.

The speed at which the response reduces to a minimum can be set, together with the ratio of the load reduction with increasing speed. The loading ratios can be set so that there is no change in loading with ground speed.

The Toe Brake loading is a simple combination of spring response, damping and friction. A fixed force component can also be added. Additionally the brake loading axes can be configured to give a 2 stage spring response – using the card EEPROM settings for those axes.

The configuration settings for the Feeder App are held in the Tiller_Feeder.ini file in the Tiller_Feeder folder.

The file can be opened with Note Pad and changed manually, or the file can be edited using the Settings button on the App.

The parameters are listed below:

[Setup]

;Delay in ms to insert each program loop - increasing will slow down the UDP packet export rate.

;At low values the flight sim frame rate may be the limiting factor.

Delay=15

;IPV4 IP address of Tiller_Feeder PC (network address to be used for data export)

IPAddress=127.0.0.1

;Port to be used for data export

Port=48020

;IPV4 IP address of CL Controller app (the target network address to which the UDP data will be sent)

IPAddressT=127.0.0.1

;Port on target address to send data too

PortT=48010

;Joystick number to use for engage/disengage buttons (0 to disable)

Joy_But=0

;Loading engage and disengage buttons

But_Drive=10

But_Hold=11

;Enable loading disengage when flight sim suspends

Pause_Enable=1

;Not used

ON_at_Startup=0

;FSUIPC offset to send tiller position data too..

;0x0C08 is the standard tiller position offset - but it is not active in some aircraft

;0x3BC2 can be used when PFC controls are not present - it requires to be assigned to tiller via the FSUIPC GUI and can then be calibrated using FSUIPC features

Tiller_Offset=0x3BC2

;Tiller_Offset=0x0C08

;And for brakes

L_Brake_Offset=0x0BC4

R_Brake_Offset=0x0BC6

;Tiller and Brake loading Enables

T_Enable=1

B_Enable=1

;Treat brakes as single or dual

B_Dual=0

B_Single=1

;NOTE: Tiller output is on card axis 1, brakes are on 2 & 3

;Inhibit write to FSUIPC - you can use your own pots for tiller/brake positions

WFS_Inhibit=0

;Axis position difference to trigger FSUIPC update, in %

Pos_Diff_Trig=5

[Master]

;Not used

Master_Gain=100

[Forces]

;For tiller - spring stiffness, damping and friction all vary with speed - the slower the ground speed

;the heavier the steering. Maximum and minimum stiffness/damping/friction must be set and loading will

;shift from max to min as the speed increases.

;Ground speed in knots at which loading component reduces to the minimum setting

SpeedatMin=20

;Maximum stiffness (at zero ground speed), 100 = spring rate that generates 100% force out at 100% tiller displacement

Spring_Rate_Max=200.0

;Minimum stiffness (at SpeedatMin), as percentage of Spring_Rate_Max

Spring_Rate_Min=25.0

;Maximum damping (resistance proportional to speed of tiller movement)

Damping=10

;Minimum damping as % of max

Damping_Min=25

;Maximum friction (resistance to movement of tiller)

Friction=10

;Minimum friction as % of max

Friction_Min=25

[Geometry]

;Position of nose wheel in front of aircraft center reference - in m, affects wheel speed when aircraft is turning

Nose_Pos=3.0

[Runway]

;Enable runway vibration

E_Gear_Enable=1

;Base amplitude for runway vibration (final amplitude increases with runway speed)

E_Run_Int=100

;Max vibration frequency (final frequency increases with runway speed)

E_Run_cps=25

;Runway speed at which vibration reaches maximum in knots

TO_Speed=70.0

;Amplitude factor when brakes are applied

Braking_Fact=1.3

[TouchDown]

;Enable individual gear TD detect (otherwise the single sim on-ground indicator is used for TD detect)

TD_Ind_Gear_Enable=1

;Aircraft pitch angle when on the ground

Pitch_Deg_OG=0.0

;Aircraft bank angle when on the ground (usually 0)

Bank_Deg_OG=0.0

;Pitch angle deviation from Pitch_Deg_OG to be used to determine nose wheel contact on touch down

TD_Pitch_Trig=2.0

;Bank angle deviation from Bank_Deg_OG to be used to determine 2nd wing wheel contact on touch down (not used)

TD_Bank_Trig=1.0

[Brakes]

;Brake loading is a simple combination of forces.

B_Fixed=0.0

B_Spring_Rate=25.0

B_Damping=10

B_Friction=10

;Note that the cards can be set for uni-direction mode, and for 2 stage stiffness response.

;This can allow simulation of a harder response after an initial displacement. See card EERPOM parameters.

Comms with the CL_SPU_USB will not commence until the CL_SPU_USB card is powered up.

Once the connection is made the USB Card Status area will display the connection and card status.

5. Operating Procedure

Once the system is set up the normal operating sequence is:

1. Power-up the Tiller/Brake CL_SPU and BLDRV3 cards.

2. Either start the CL_Controller and Tiller Feeder manually or run the Tiller_Auto_Run exe provided in the CL_Controller folder. The auto run script will start both apps.

3. Complete the power-up calibration of the cards (via the CL Controller), then

4. Engage/Disengage the loading using the Feeder App Engage/Disengage button.

   The CL-Controller ON/OFF will sync to the Feeder ON/OFF.

5. Tune the loading as required via the Feeder App Settings button.

Tiller and brake forces and positions are displayed on the Feeder App window.

The flow of UDP data to from the CL_Controller can be inspected using the Show_UDP button on the CL Controller.

Hit Alt-D to display force and position data returned from the CL-Controller to the Feeder App.

Card status and condition data is displayed on the CL-Controller GUI.