BFF Motorised Trim Wheel - Set-up

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Summary of Set-up Steps

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1. Install the BFF Trim Wheel Controller software.

2. Install the FTDI USB cable & drivers.

3. Use the STPDRV-1 card to center the indicator servo before assembly of the trim wheel – this will help the positioning of the indicator ring and cover later.

4. Build the trim wheel unit – but leave the trim wheel off the wheel hub. This will allow easy access to the fixing holes when you fit the unit to your cockpit, and also allow access for final positioning of the indicator ring and cover.

5. Fit the trim wheel assembly to your cockpit.

6. Fit the trim wheel to the hub.

7. Power up and adjust movement direction settings in the controller software to suit your set-up. Adjust other settings as required.

BFF Motorised Trim Wheel - Setup Details

INSTALL THE BFF TRIM WHEEL CONTROLLER SOFTWARE AND USB/TTL CABLE

1. The software is available by download from the BFF Simulation web site here:

    http://bffsimulation.com/BFF_Motorised_Trim_Wheel.php

    There is no installer – just unzip the files into a dedicated folder on your sim PC.

    NOTE: the trim wheel controller software uses FSUIPC/XPUIPC for communication with your FSX/X-Plane. When using X-Plane / XPUIPC make sure the XPUIPC custom offsets file provided in the trim wheel zip is installed for XPUIPC.

2. The supplied FTDI chipset USB/TTL cable requires to be installed on your PC with drivers in order for the virtual COM port used by the software to install properly. You can obtain the drivers directly from the FTDI web site here -

    http://www.ftdichip.com/Drivers/VCP.htm

    Please follow the installation instructions provided by FTDI on the web site.

    If you have a recent OS you may also find that your operating system finds and installs the drivers automatically.

    Once the cable is correctly installed go to Device Manager and note the COM port number of the USB Serial Port. Then open the **Trim_Wheel.ini** file with NotePad (or other text editor) and set the COMPort parameter to this COM port number.

    The COM port MUST be in the range COM1 to COM9.

3. The assembly of the position indicator ring and cover on the unit will be easier if the indicator servo is centered before it is assembled.

    Connect the USB/TTL cable to the STPDRV-1 card. Connect your indicator servo 5V supply to the card, and connect your indicator servo. Apply the 5V power.
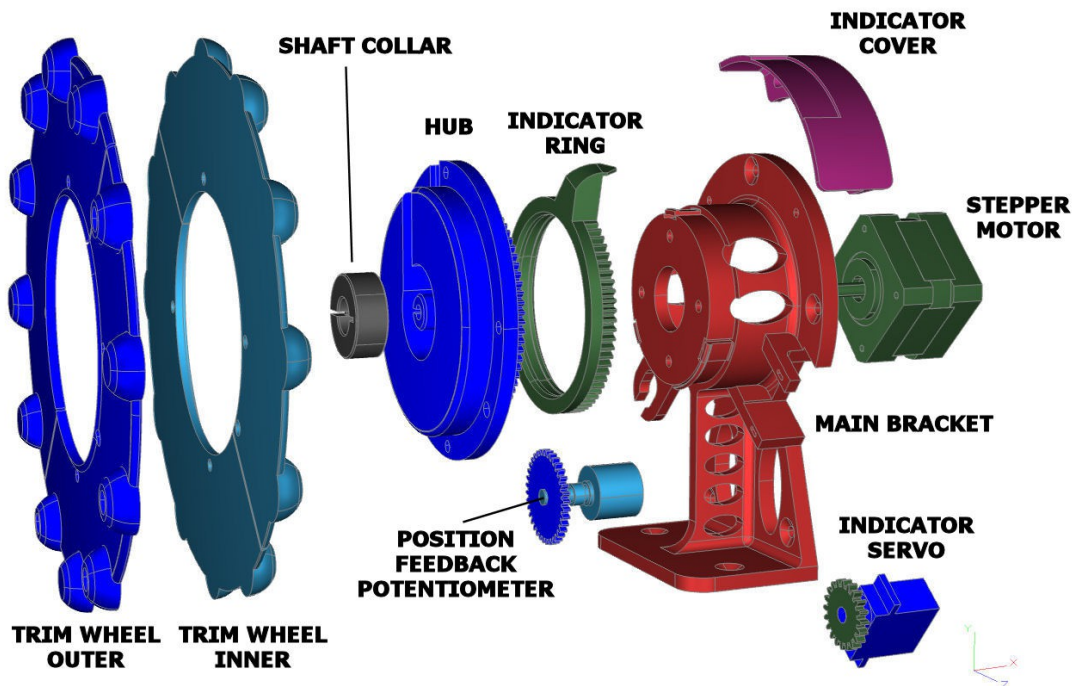
    Start the trim wheel controller software. Confirm from the software LED's that card comms is present. The STPDRV-1 will provide a 1.5ms pulse output for the servo which should center it.

    You can use the manual servo up and down buttons in the software settings area to confirm servo operation – but make sure you re-center the servo before powering down.

4. It is useful at this stage to set the correct output voltage for your stepper motor in the settings area.

    A 100% setting will use 100% of the 24V supply voltage to drive the stepper. This is usually too high for most small steppers. A value around 30% (7.2V) is adequate for the standard BFF Motorised Trim Wheel stepper.

TRIM WHEEL BUILD

SHAFT COLLAR
INDICATOR COVER
HUB
INDICATOR RING
STEPPER MOTOR
MAIN BRACKET
POSITION FEEDBACK POTENTIOMETER
INDICATOR SERVO
TRIM WHEEL OUTER
TRIM WHEEL INNER

5. Fit the stepper motor to the Main Bracket. Make sure to rotate the stepper to bring the phase wires out through the ventilation holes in a position that suits your installation.

   There is provision for 4 x M3 screws but the motor will be adequately secured if only two are used.

6. Fit the Indicator Ring to the main bracket. Make sure it rotates smoothly without snatching. The movement range is not large but it makes the servo's job easier if the ring rotates freely.

   Rotate the indicator ring to point to your desired position for mid trim.

7. Fit the servo gear to the centered servo, but do not secure it to the servo shaft yet.

   Position the servo and gear on the main bracket so that the teeth mesh NEATLY BUT NOT TIGHTLY with the indicator ring gear teeth. Secure the servo in position with its lower screw (the servo should have been supplied with two securing screws).

   To fit the upper securing screw you will probably need to carefully remove the servo gear. Do so, fit the upper screw, then re-fit the gear to the servo shaft – secure the gear with the shaft screw supplied with the servo.

   Do not try to force the servo to rotate via the gear – it is better to power the servo from the STPDRV-1 card and use the trim wheel software to test the servo/indicator ring movements.

8. Fit the indicator cover and rotate into position to suit the indicator centered position.

It is securing in position with a single M3 self-tapping screw into one of the holes provided in the bracket rear flange. Do not over tighten the screw or the self-cut threads may strip.

9. Fit the gear to the position feedback potentiometer. It is pressed onto the pot shaft to bring the gear flush with the shaft end.

10. Lay the assembly on its back (stepper shaft pointing up), and carefully press the Hub onto the motor shaft until there is approximately 1 mm clearance between the hub and the indicator ring.

    (If you have 3D printed your own parts make sure the hub center hole is drilled through 5 mm to provide the correct fit for the shaft.

    Fit and tighten the 12 mm shaft collar to the hub. This will allow the hub to grip the shaft more securely than the press fit alone. Do not over-tighten the collar.

11. Fit the pot to the main bracket, and position so that the gears mesh cleanly. Before finally tightening the pot retaining nut ensure the hub and pot turn freely with the gears meshing cleanly.

    Then tighten the pot securing nut.

12. Assemble together the four segments of the outer trim wheel. 8 x M3 screws & nuts are provided to tie the outer and inner halves. Make sure the two screwdriver access holes are aligned across the inner and outer parts. This requires the two halves to be rotated 90 deg with respect to each other for assembly.

    Don't fit the trim wheel to the hub quite yet.....

FIT TRIM WHEEL TO COCKPIT

13. At this stage you can locate the trim wheel assembly in your cockpit and secure it either through the rear or base flange screw holes.

14. Complete the wiring to the STPDRV-1 card and power supplies ready for testing. (See the card data sheet for more details of the wiring).

    Double check the polarity of your power supply connections before applying power to the card.

SOFTWARE SET-UP AND WHEEL TESTING

15. Connect the STPDRV-1 card to the USB?TTL cable and power the card.

    First run the software without the flight sim (or control loader system) running.

    Check the software status LEDs for working card comms and card power.

16. Each time the card is connected to USB and the logic side powers-up it will require to be initialised. The trim wheel software will indicate this condition.

    Click the Initialise button to start the trim wheel initialisation routine.

    The trim wheel should undertake a series of movements to determine the drive and position feedback directions and the working range.

17. Once initialisation has completed use the Step Up and Down buttons to check the stepper movement. Check also the indicator servo movements using the manual drive buttons in the settings area.

    The trim wheel can be used as a standalone wheel with FSX/X-Plane or as an integrated component of the BFF Control Loader system. The set up for these two modes is slightly different.

    However most of the settings in the trim wheel software apply to both modes. Please check the pop-up help tips for each setting for more details of the setting. To see the help tips hold the mouse over a setting for a few seconds – the tip will pop-up.

    See the Logs folder for log files – they may provide additional information if required for debugging.

Final Set-Up For Direct Connection To FSUIPC/XPUIPC

1. Start your flight sim software and select and start a flight.

   The trim control software should detect the flight sim and display an "FSUIPC Link Active" message below the main green status text.

   Manually move the trim wheel and check the position feed to FS trim is active and in the correct direction (watch the FS panel trim indicators); if not, invert the direction in the settings area of the trim wheel software.

   With A/P engaged (pitch control) check the following movement of the trim wheel is also in the correct direction – if not invert this in the settings area.

2. The elevator trim FSUIPC read and write offsets are set in the trim wheel software settings area. The default is the standard 0x0BC0 offset.

Final Set-Up For Direct Connection To BFF Control Loader

1. When the trim wheel is used with the BFF CL System it does not communicate directly with the flight sim via FSUIPC/XPUIPC. Instead it feeds trim position to the CL software which is used to adjust trim FORCE acting on the flight controls.

   To enable CL system / Trim Wheel integration please see the CL system Configuration Manager (V1.16+) Tab 7 Item 1. Please read the description details for the setting – the trim wheel will only become active in modes in which the CL system has elevator trim authority. If the system does not have trim authority the trim wheel will revert to its direct connection with FSUIPC/XPUIC and control elevator trim directly in FS.

   When the CL system is enabled to use the trim wheel the trim wheel software will display a "CL System Link Active" message below the main green status text.

   Then in manual flight the trim wheel will control trim tab deflection (which will control trim force).

   When A/P becomes active the trim wheel will move to trim out elevator axis forces arising from the main elevator axis position following the A/P control actions. This minimises the stick force on A/P disengage.

2. With a flight active in FS with aircraft airborne, the Trim Wheel Software running and the CL system active with loading ENGAGED...

   Adjust the trim wheel and confirm the trim force adjustment direction is correct. If not the trim wheel direction can be inverted using the trim wheel software settings.

3. Engage A/P to control pitch, then check that the resulting trim wheel A/P trim-out movement direction is also correct when A/P pitch changes occur. Elevator control nose-down movement (stick forward) should result in nose-down (forward) trim wheel movements.

   A quick way to check this is to engage A/P then pause the flight sim. Then manually move the stick forward – this should induce a nose-down trim movement at the trim wheel. Bringing the stick back (nose-up) should induce a nose-up trim wheel movement.

   If this A/P trim-out movement is wrong it can also be reversed in the trim wheel software settings.

4. If the CL loading is released whilst A/P is active the trim wheel automatic trim-out movements will be disabled and the wheel will return to mid.

5. NOTE if the CL software closes whilst the trim wheel software is active the trim wheel will revert to direct FSUIPC operation. However the trim and A/P following movement directions may not then be correct if they are set for CL system operation. This depends on your CL system build.

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