OPUSFSCTQ

Opus Software Limited

FSC Motorised / Non-Motorised TQ Driver

For MSFS 2020 and MSFS 2024 Simulators

User Guide

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Introduction

The **OPUSFSCTQ.EXE** program is supplied free of charge as part of the OpusMSFS24 addon software. The MSI installation file for the latest release / beta version of OpusMSFS24 can be downloaded via the following OpusFSI Downloads page,

http://www.opussoftware.co.uk/opusfsi/downloads.htm

After installing OpusMSFS24 into it's own root folder the latest release notes can be found in the OpusMSFS24_Release_Notes.txt text file.

Software Installation

Simply install the downloaded OpusMSFS24.msi (or OpusMSFS24_vXXXXX_Beta.msi) Microsoft Installation File into its default C:\OpusMSFS24 folder. Other install drives may be specified but always install both OpusMSFS and OpusMSFS24 into the same 'root' folder, do not install them in any sub-folder. Licensing requires the purchase and installation of OpusMSFS so do not remove OpusMSFS when you install the OpusMSFS24 addon.

Create a Shortcut

After installing the OpusMSFS24 software we recommend you create a shortcut on your desktop for the OPUSFSCTQ driver program. This shortcut will allow you to manually start your driver without too much fuss.

1. In Windows Explorer, navigate to your OpusMSFS24 installation folder and right-click on the **OPUSFSCTQ.EXE** program.

2. Select the **Show more options - Send to - Desktop (create shortcut)** option. Rename the shortcut to **MSFS24 FSCTQ**.

3. Right-click on the new desktop icon, select **Properties**, in the Shortcut tab check the program is configured to **Start In:** your installation folder (c:\OpusMSFS24). Select the **Shortcut** tab, click on **Advanced** and tick the checkbox to **Run as Administrator**.

The OPUSFSCTQ driver program accepts the following optional program arguments,

- **TEST** - Operates in test mode
- **MOTORISED** - Selects the Motorised operation (default)
- **NONMOTORISED** or **UNMOTORISED** - Selects the Non-Motorised operation

Unless specified, the driver program will always power up in the MOTORISED mode.

General Operation

The OPUSFSCTQ driver uses the PMDG SDKs and SimConnect interface to the MSFS 2020 and 2024 simulators to communicate with the aircraft.

The OPUSFSCTQ driver uses an assigned serial COM port to communicate with the FSC TQ.

Prior to using the driver you must ensure the **PMDG SDK** will communicate its data via SimConnect. To do this use Notepad to edit the **737_Options.ini** file that is located in PMDG's 737 persistent storage folder (similar additions will also be needed for the PMDG 777 aircraft).

For Microsoft Store distribution, this folder is located at,

%LOCALAPPDATA%\Packages\Microsoft.FlightSimulator_8wekyb3d8bbwe\LocalState\packages\pmdg-aircraft-737\work

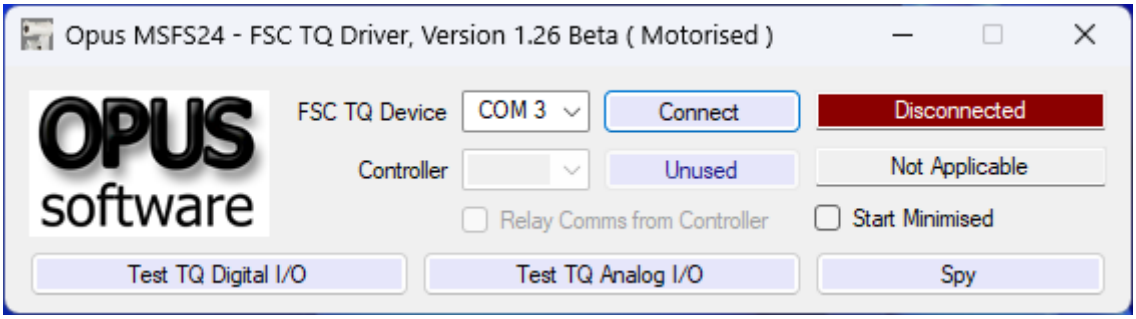
For Steam distribution, this folder is located at,

%APPDATA%\Microsoft Flight Simulator\Packages\pmdg-aircraft 737\work

Once this folder is open, add the following lines as required to the bottom of the file:

[SDK]
EnableDataBroadcast=1

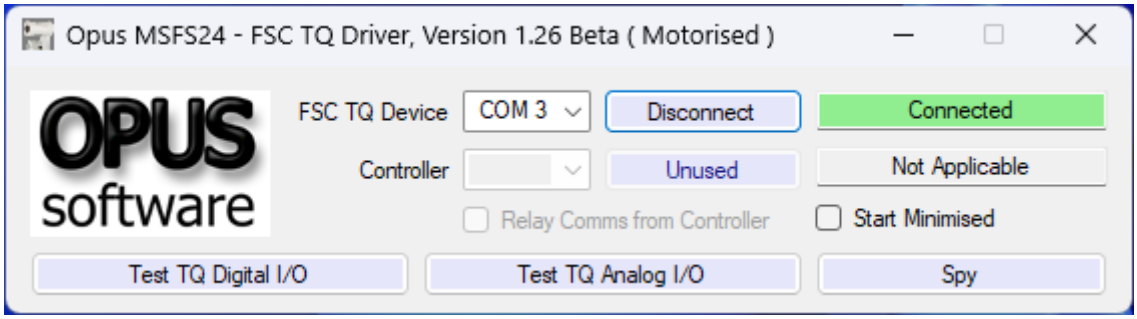
Now you are ready to run the OPUSFSCTQ driver via its desktop shortcut. Once activated, you will be presented with the following form (you may need to minimise or window the simulator's display if you have that running).



FSC Motorised TQ Driver Main Form

First Time Using the Driver

The first time you use the driver simply select the TQ's assigned serial COM port and click on the **Connect** button. If a good connection is made then the button's legend will change to **Disconnect** and the status box will turn green and display the **Connected** message.



FSC TQ Driver Main Form - Connected to the TQ

After connecting you should now use the **Test TQ Digital I/O** and **Test TQ Analog I/O** dialogs to check and calibrate the interface with the motorised / non-motorised FSC TQ.

N.B.

The driver software will remember your configured options and all positions of the displayed dialogs along with the position of the driver's main form.

All the greyed out items are options used 'in house' for testing and diagnostic purposes.

The driver will not establish its connection with the simulator if the simulator is Paused.

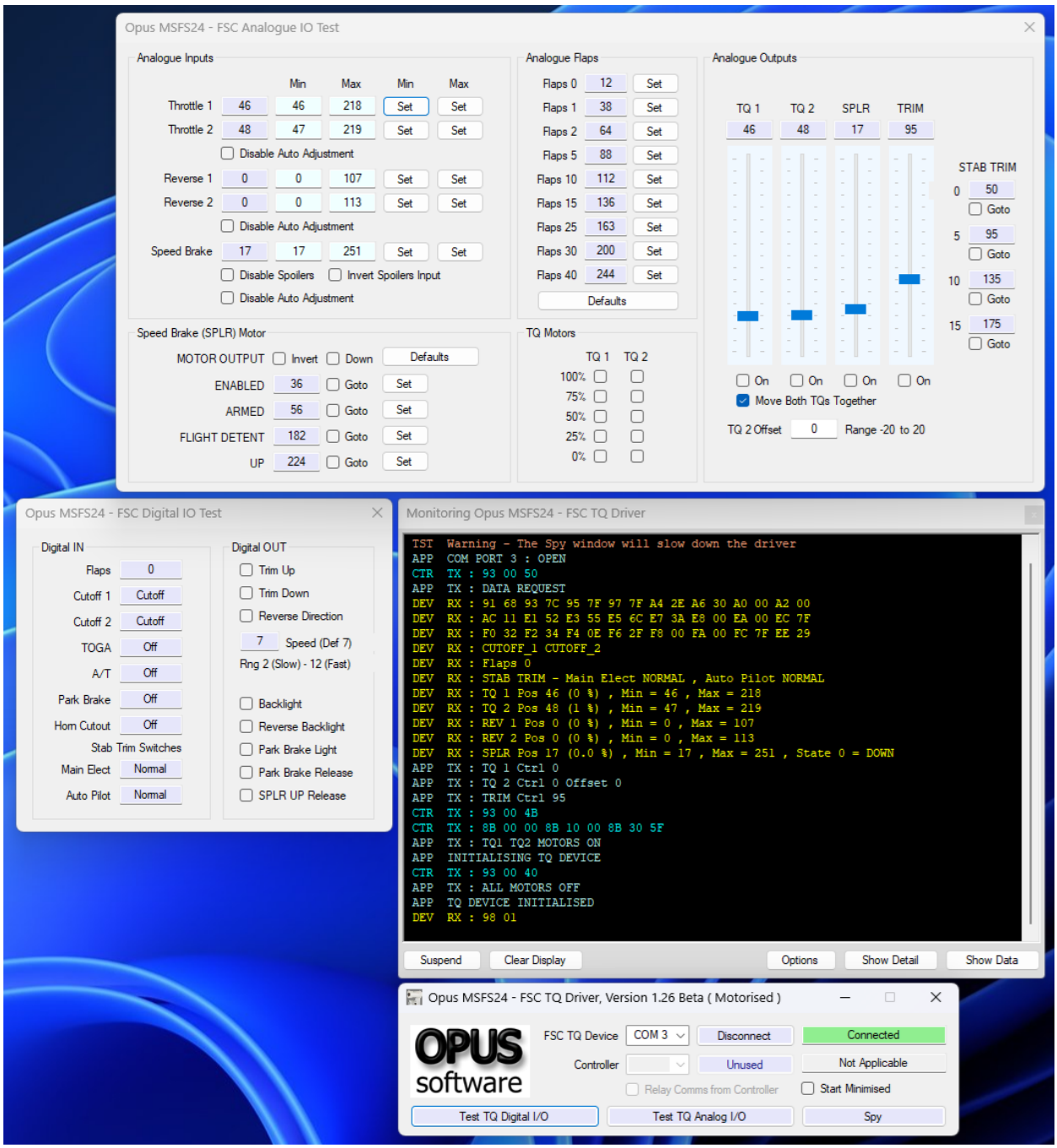
The driver will disable the simulator link and stop trying to connect to the simulator whenever either of the 'Test..' dialogs are open.

You do not need to run the simulator to configure the driver.

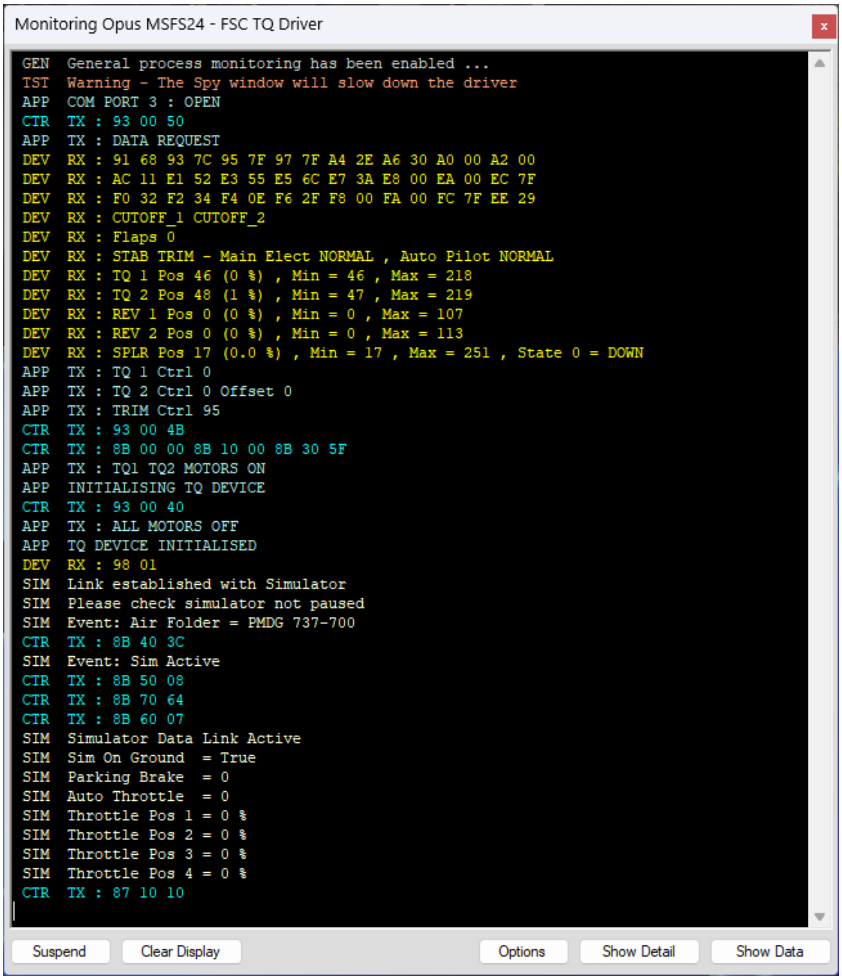
You should open, size and position the driver's Spy window; Open and position both of the 'Test..' dialogs prior to calibrating the interface via the 'Test..' dialogs.

After you have completed the above leave the Spy window open, shutdown and re-start the OPUSFSCTQ driver. If you are not running the sim then immediately open the two 'Test..' dialogs.

You should see something like the following messages within the displayed Spy window (see figure below).



FSC TQ Driver – Spy Window and Test Dialogs Open



The Initial Spy Window – Connected to Both Sim and FSC TQ

Note, using the Spy window will have an impact on the speed of the driver. Hence the warning, so the Spy window should not be left open in normal operations. Only open the Spy window and leave it open whilst testing and configuring the driver.

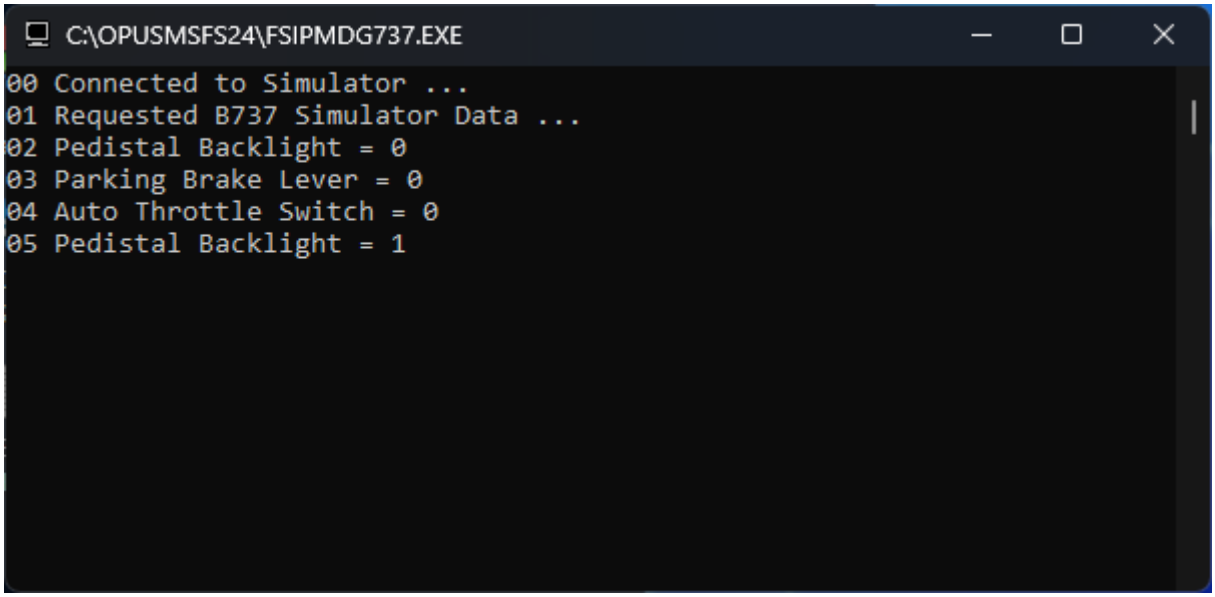
In the Spy window all messages marked as **TX** are actual transmissions to the FSC TQ, all messages marked **RX** are the actual received data from the FSC TQ.

The FSIPMDG737 Application

When the sim is running and a PMDG 737 (or 777) aircraft is selected the Opus FSIPMDG737 (or FSIPMDG777) interface program will be activated automatically. This console application is normally found minimised on the Windows Taskbar. These programs are responsible for interfacing with the PMDG aircraft via it's SDK. The console application can be restored to view any text reports relating to the communications with the PMDG aircraft.

At the time of writing this, the sim and PMDG SDK gives no indication when they are shut down. Hence, tou may have to close this console program manually.

There is also an FSIFLY console application for interfacing to the iFly 737 MAX aircraft via the iFly SDK. This interface is considered 'work in progress'.



FSIPMDG737 Application – The Opus Interface to the PMDG SDK

Test TQ Digital IO Dialog

The **Test TQ Digital IO** dialog allows you to test all digital inputs from and control outputs to the FSC Motorised and Non-Motorised TQs. The digital inputs are all self explanatory, simply operate the input or switch on the TQ and the signal should register in the dialog highlighted in a green colour.

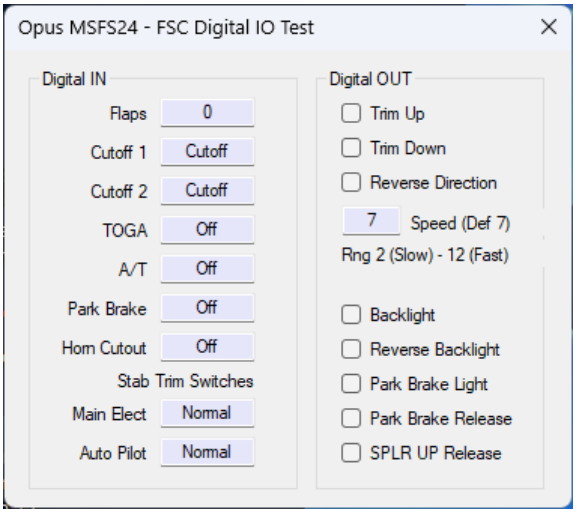
The **Trim Up** and **Trim Down** digital outputs operate the TQ's trim wheel, moving the wheel in a clockwise and anti-clockwise direction respectively (the Stab Trim indication will not change as this is a separate analogue control).

The FSC Trim Wheel **Speed** can be set from 2 (slow) to 12 (fast), the default is 7.

To check the **Park Brake Release** you must first set the parking brake; the dialog checkbox control will then release the brake lever.

To check the **SPLR UP Release** first move the Speed Brake lever to the **ARM** position, then tick the SPLR UP Release option (you should hear the SPLR motor lock release). You will now be able to move the Speed Brake lever all the way to the **UP** position. Move the lever back to **ARM**, turn off the SPLR UP Release option (you should hear another click) now the Speed Brake lever will only move to the **FLIGHT DETENT** position. This check can only be performed when the spoilers are enabled (**Disable Spoilers** checkbox not ticked) within the Test TQ Analog I/O dialog.

*N.B. separate **ENABLED** and **ARMED** Speed Brake calibrated positions allow the Speed Brake lever on the TQ to be raised out of the gate on take off without registering in the ARMED position. This enables the speed brake motor to be controlled during RTO operations in the 737 without generating a 737 Config warning (due to the Speed Brakes being ARMED) during the take off roll.*



FSC TQ Digital IO Test Dialog

Test TQ Analog IO and IN Dialogs

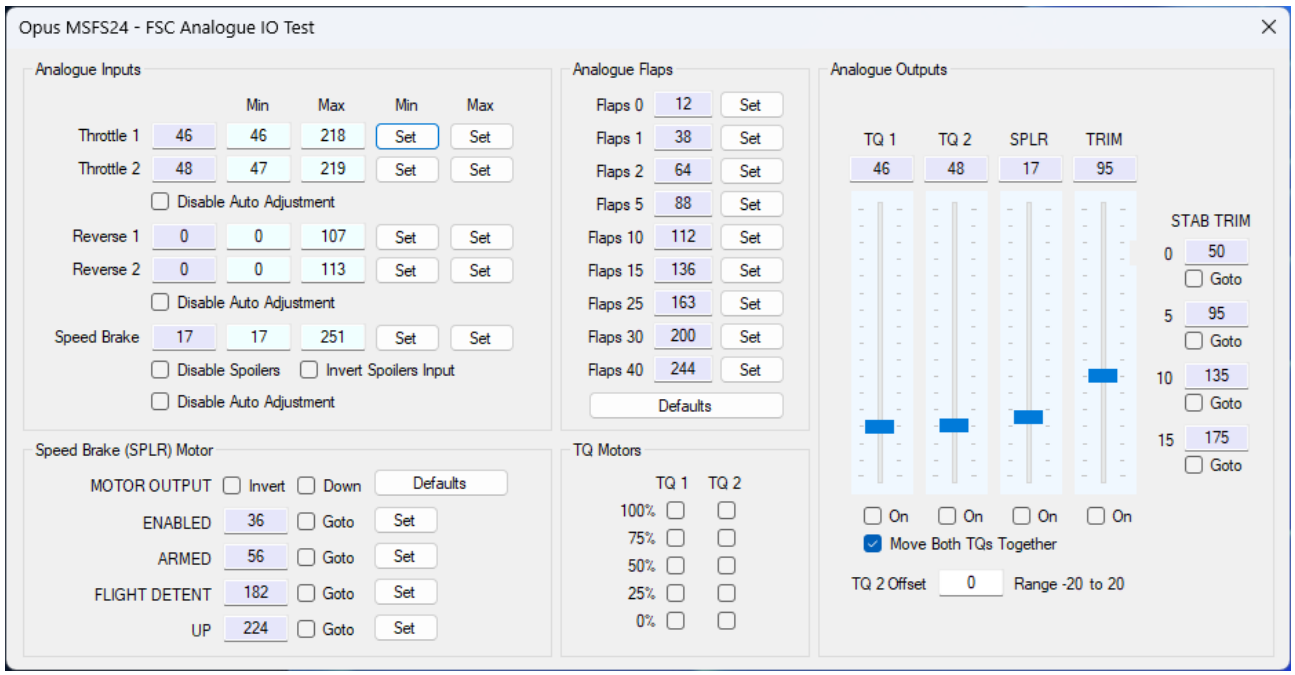
The **Test TQ Analog IO** and **IN** dialogs allow you to test all analogue inputs from and set-point (analogue control) outputs to the FSC Motorised and Non-Motorised TQs. This dialog is also used to set the required calibration data for your Motorised TQ and set the required flap calibration data (decoder values) for all newer Motorised and Non-Motorised TQs.

N.B. Older TQ models are not fitted with an analogue decoder for the flap lever, they instead detect each flap position digitally.

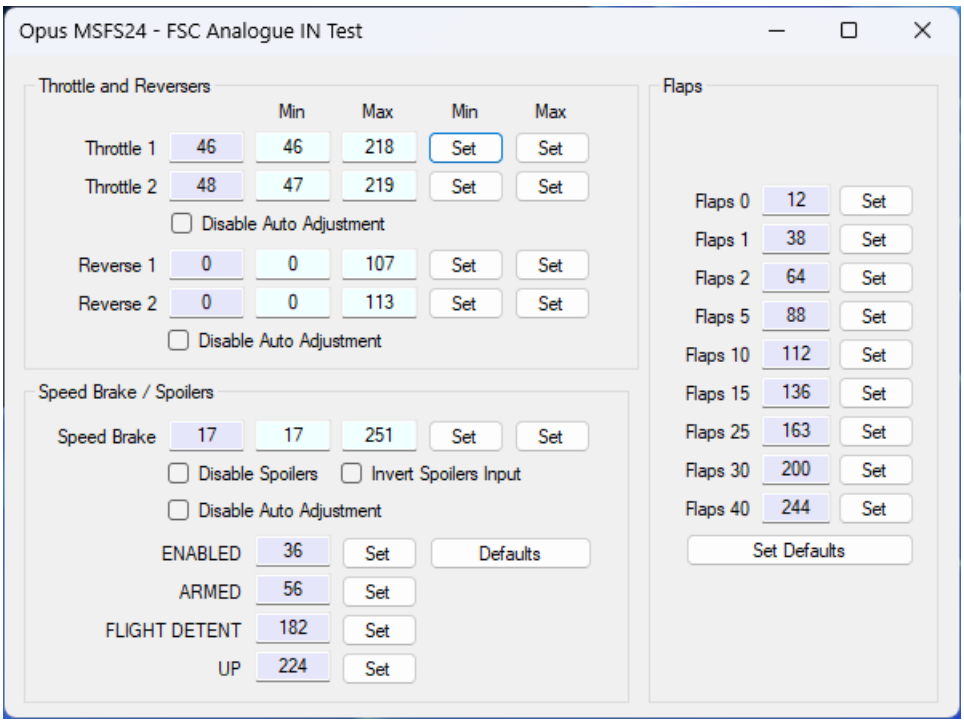
Unless the **Disable Auto Adjustment** options are ticked, the calibrated min and max values for the throttles, reversers, and speed brakes (spoilers) will be adjusted 'on the fly'. The set minimums will automatically be adjusted lower, and the set maximums will automatically be adjusted higher. These Min and Max values are used by the driver to determine the actual lever position (0 to 100%) based on the returned decoder value.

The Analogue Output motor controls should be used with caution. The individual motors can be enabled using the tick boxes below the relevant track bar. When the motors are enabled the position of the control can be adjusted using the sliders (the Min and Max calibrated values are not used to limit the control values) or by typing a value into the control text boxes above the track bars.

Do not enable or move the SPLR position when the Speed Brake lever is locked in the DOWN position. The Speed Brake lever cannot be moved when it is locked down!



FSC TQ Analog IO Test Dialog – For Motorised TQs



FSC TQ Analogue IN Test Dialog – For Non-motorised TQs

Calibrating Your TQ Flaps

The latest model of Motorised and Non-Motorised TQs all employ an analogue decoder to measure the flap lever position. Older TQ models measure the flap detent positions digitally and are not fitted with analogue decoders.

The flap lever on all newer models therefore need calibrating, this involves identifying the decoder value for each flap lever detent. To achieve this simply move the flap lever through each detent position and click on the relevent Set button to record the decoder value.

PMDG 777 Flaps

The B777 has different flap settings than the B737s, ranging from UP,1,5,15,20,25, and 30 as opposed to UP,1,2,5,10,15,25,30, and 40 on the B737. Whenever the FSC TQ is used flying the PMDG 777 the following flap mappings will be assumed,

737 Flap	777 Flap	
0	UP	
1	1	TQ positions 1 and 2 = Flaps 1 on the 777
2	1	
5	5	TQ positions 5 and 10 = Flaps 5 on the 777
10	5	
15	15	
25	20	TQ position 25 = Flaps 20 on the 777
30	25	TQ position 30 = Flaps 25 on the 777
40	30	TQ position 40 = Flaps 30 on the 777

Basically, 737 flaps 1 and 2 are both mapped to the 777 flap 1 setting, 737 flaps 5 and 10 are both mapped to the 777 flap 5 setting, and the last three TQ 737 detents are mapped to 777 flap settings 20, 25, and 30 respectively.

Calibrating Your Motorised TQ

First open and position both the **Test TQ Digital IO** and **Test TQ Analog IO** dialogs. All calibrations are done using the **Test Analog IO dialog** but the **SPLR UP Release** 'digital' control is needed to calibrate the Speed Brake lever.

Setting the Minimums

This is a simple process. Simply move all levers to their off position; Both throttles levers will be fully back, both reverser levers will be fully down, and the Speed Brake lever will be DOWN.

You can excersise each lever to allow the decoder values to settle or check for possible 'noisy' decoders. If the decoders and 'noisy' with the Min or Max registered values flickering with the slightest of touch, tick the **Disable Auto Adjustment** option and set the desired Min and Max values manually.

Now press the **Set** buttons under the **Min** label to assign the minimum input values.

Setting the Maximums

Exercise and move both throttles to the fully forward position. Then ARM the Speed Brake and click on the **SPLR UP Release** control in the Test Digital IO dialog. Now move the Speed Brake Lever fully back beyond the UP position.

Now press the **Set** buttons under the **Max** label to assign the maximum input values.

For the reverser levers, move both throttle levers fully back. Now raise both reverser levers fully up and down.

Press the **Set** buttons under the **Min** and **Max** labels to assign the reverser Min and Max input values.

Finally stow the reversers moving both levers fully down.

You have now completed the Max Calibration step.

Checking the Speed Brake Lever

This Motorised TQ check can only be performed when the spoilers are enabled, that is when the **Disable Spoilers** checkbox is not ticked.

First move the **Speed Brake** lever to the **ARM** position. Make sure you have released the spoilers by ticking the **SPLR UP Release** option in the Test Digital I/O dialog. The SPLR UP Release control allows full movement of the Speed Brake lever, without it the lever will not move beyond the **FLIGHT DETENT** position.

Starting with the **Speed Brake** lever in the **ARM** position and the **SPLR UP Release** control on;

Click on the **FLIGHT DETENT, UP,** and **ARM Goto** tick boxes to move the Speed Brake lever to each position. The default control values (analogue set-points) of 48, 184, and 224 can be modified to position your Speed Brake lever over the marked positions on the TQ.

When done simply close the Test dialogs.

All calibration data will be saved when you shutdown the OPUSFSCTQ driver program. If needed shutdown and restart the driver program to save all your calibrated data and preferred dialog positions.

Checking the Throttle Synchronisation

First ensure the **Move Both TQs Together** check box is ticked. Now use the **TQ Motors** TQ1 or TQ2 position ‘Goto’ boxes to command the throttles to various positions. If there is a slight mismatch of the throttle positions then adjust the value in the **TQ2 Offset** and repeat the ‘Goto’ tests until both throttle positions are aligned. The **TQ Offset** may range from -20 to 20.

Calibrating the Stab Trim Indicator

At present the Stab Trim Indicator calibration values are fixed within the driver as,

```
Stab Trim Position  0  =  50
Stab Trim Position  5  =  95
Stab Trim Position 10  =  135
Stab Trim Position 15  =  175
```

Calibration of these values will be included within a future version of the driver.

Standard Motor Settings

At present the OpusMSFS driver sets the following motor speed and timing settings,

```
Trim Wheel Speed                =  7  Range 2 to 12, slow to fast
Throttle Servo Motor Max Speed = 10  Range 80 to 5, slow to fast
Throttle Servo Motor Min Speed = 70  Range 80 to 5, slow to fast
Throttle Servo Motor Spin Time = 50  ms
```

Parking Brake Operation

The PMDG aircraft do NOT allow the parking brake to be reset via SimConnect or their SimConnect based SDK. Only the SET control is relevent to the PMDGs parking brake operation.

PMDG provides two parking brake operating modes (SIMPLE and REALISTIC) set within the FMCs PMDG Setup – Simulation options. You may use either option, however, we recommend setting the PMDG Simulation options to SIMPLE Parking Brake mode.

SIMPLE Mode Operation

Parking Brake is set by the lever.
Parking Brake is released by pressing both **Toe Brakes** (not the handle).

REALISTIC Mode Operation

Parking Brake is set by the lever whilst pressing both **Toe Brakes**.
Parking Brake is released by pressing both **Toe Brakes** (not the handle).

When the parking brake is released the solenoid in the Motorised TQ is used to automatically release the parking brake lever. On Non-Motorised TQs, the user must move the lever manually to the off position.