

A MANUAL FOR FORCECONTROL 5.

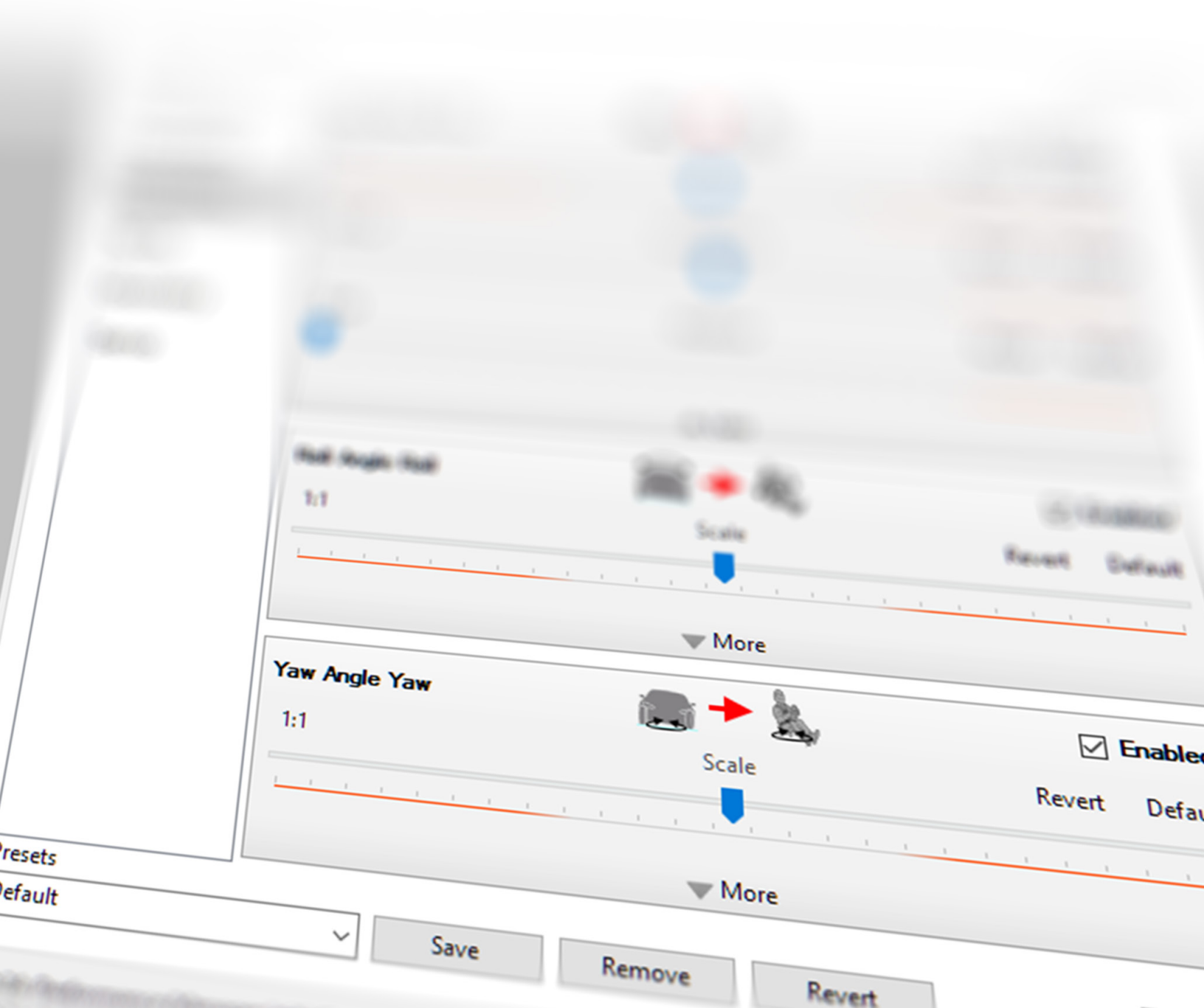


TABLE OF CONTENTS

INTRODUCTION 5

SO, YOU WANT TO USE FORCECONTROL?...	5
CONTACT	5

OVERVIEW 6

ARCHITECTURE	6
INSTALLATION	7
INITIAL CONFIGURATION	7

SETUP 7

UPGRADE FROM DUAL COMPUTERS	10
INTRODUCTION	15
GAME DATA OUTPUT SETUP	15

USING YOUR MOTION SYSTEM 15

AN EXAMPLE RUN CYCLE	16
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FORCECONTROL OVERVIEW 18

INTRODUCTION	18
THE MAIN WINDOW	18
MENU BAR	19
INPUT MANAGER	20
TELEMETRY	21
OVERVIEW	22
TERMS	22
CONTROLS	22

PLATFORM CONTROL PANEL 22

INTRODUCTION	24
HISTORY LOG	24
STATUS	24

PLATFORM STATUS BAR 24

FAULTS	25
POSITION INDICATOR	26
INTRODUCTION	27
OVERVIEW	27

PLATFORM CONFIGURATION 27

PLATFORM TAB	28
CONNECTION TAB	29
CONTROLLER BROWSER DIALOG	30
PROFILE TAB	31
PROFILE EDITOR: CATEGORY	32
PROFILE EDITOR: MAIN	32
PROFILE EDITOR: PRESETS	33
PROFILE EDITOR CATEGORIES: SIMPLE MODE	34
PROFILE EDITOR CATEGORIES: ACCELERATION	36
PROFILE EDITOR CATEGORIES: TRANSLATION	39
PROFILE EDITOR CATEGORIES: ORIENTATION	40
PROFILE EDITOR CATEGORIES: TACTILE	43
PROFILE EDITOR CATEGORIES: GEOMETRY	44
PROFILE EDITOR CATEGORIES: SERVO	46
MONITOR TAB	47
TERMINAL TAB	48
SERVICE TAB	49
SETTINGS TAB	50
INTRODUCTION	51

TURNBOX OVERVIEW 51

TURNBOX MAIN WINDOW	52
STATUS BAR	52
INTRODUCTION	53
OVERVIEW	53

TURNBOX CONFIGURATION	53
PLATFORM TAB	54
PROFILE TAB	55
PROFILE TAB: PRESETS	56
PROFILE TAB: EDITOR	57
MONITOR TAB	58
SETTINGS TAB: STEERING	59
SETTINGS TAB: PEDALS	59
SERVICE TAB	60
DEBUG TAB	61
INTRODUCTION	62
INSTALLATION	62
LEGACY FORCECONTROL SUPPORT	62

TELEMETRY RELAY	62
INTRODUCTION	63
INSTALLATION	63
SETUP	63

ANDROID APP	63
USING THE APP	64
CONTROLLING THE PLATFORM	64
ADJUSTING SETTINGS	65
SYSTEM PAGE	65

INTRODUCTION

SO, YOU WANT TO USE FORCECONTROL?...

...it'll come in handy for running your motion platform or Force Dynamics wheel. This manual will tell you how to do it, but make sure you also read your hardware manuals before diving in!

CONTACT

If you have questions or concerns, Force Dynamics will be happy to help. We can be reached by phone 9 a.m. - 5 p.m. EST, Monday through Friday.

Office phone ————— +1.607.546.5023

Email ————— info@force-dynamics.com

Physical mail ————— Force Dynamics
4995 Voorheis Road
Trumansburg, New York, 14886
USA

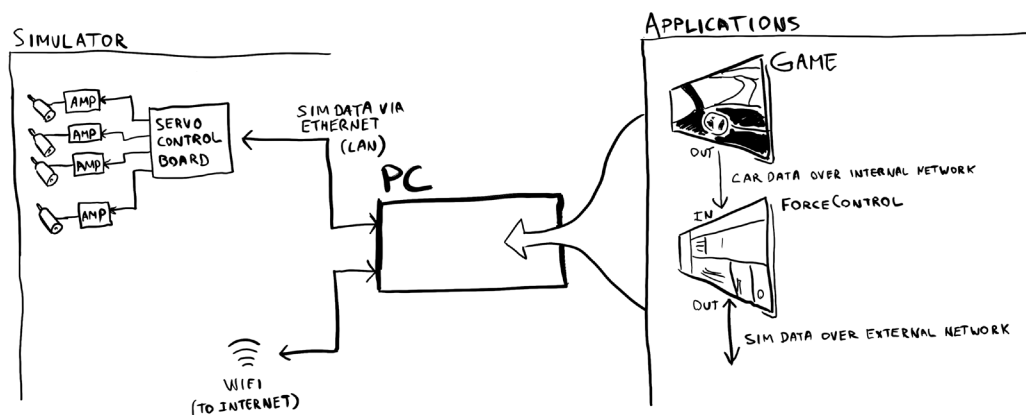
OVERVIEW

ARCHITECTURE

Before we start talking about how to use ForceControl, it makes sense to give an idea how the system goes together and how ForceControl talks to your hardware.

The first thing to know is that our software and hardware communicate via the LAN (Local Area Network). The second thing to know is that LAN communication isn't just over cables or via WiFi: It can also work between applications on a PC by sending to something called the LocalHost (also referred to by the IP address used as a shortcut for 'this computer': 127.0.0.1).

Here's a diagram of how the data flows in our simulators; take a look and then we'll track the data through the system, from the game until your simulator moves.



- 1** The game takes control inputs and decides what the vehicle is doing.
- 2** The game sends that data over an internal network connection to ForceControl.
- 3** ForceControl receives the data and decides how the simulator hardware should react in response.
- 4** ForceControl sends commands over the wired LAN to a servo control board.
- 5** The servo control board uses those commands to drive the motors that make the platform move.

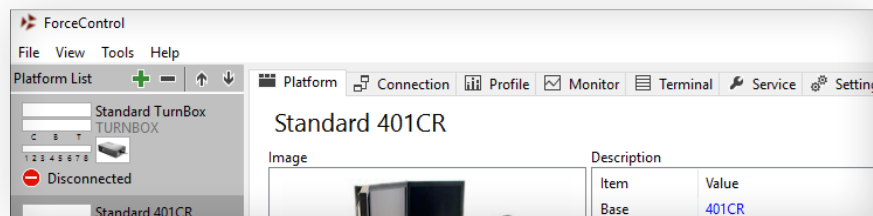
SETUP

INSTALLATION

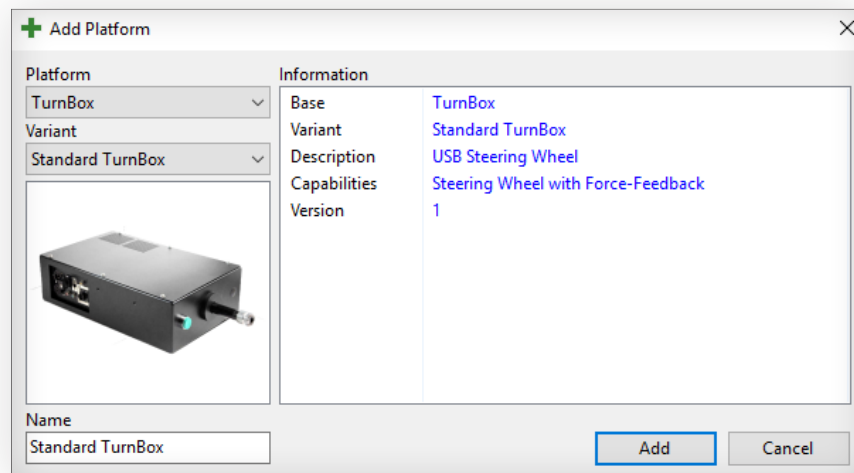
Run Setup.exe on the game computer, and follow the on-screen instructions. If a previous version is installed, it may be necessary to uninstall it if the installer version numbers are the same.

INITIAL CONFIGURATION

- 1 Run setup.exe on the game computer, and follow the on-screen instructions.
- 2 Run ForceControl from start menu or desktop shortcut. Add any devices present with **Add Platform** dialog by clicking the green + in the **Platform List**:

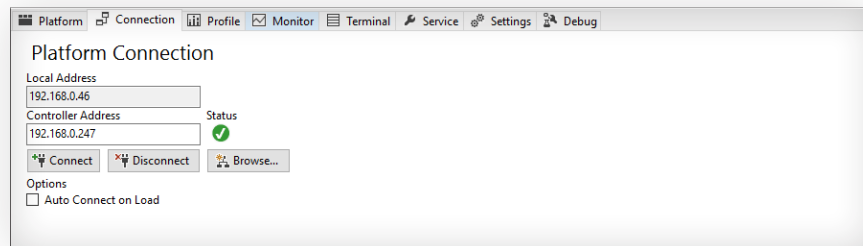


- 3 Select the device you want to add from the **Platform** dropdown in the **Add Platform** dialog, and click **Add**. With ForceControl 5, it can be a motion platform or another device like a steering wheel.

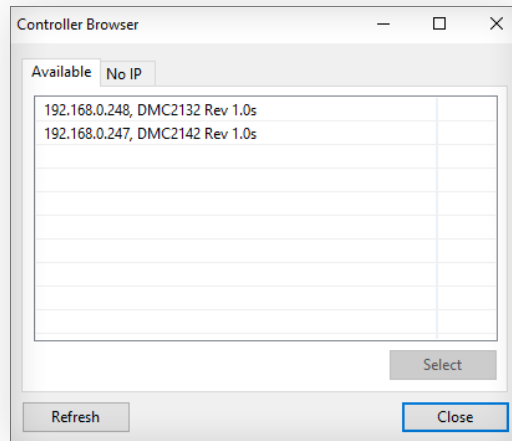


INSTALLATION

- 4** The main window will now show information related to that device or platform, along with a group of tabs on top. Select the **Connection** tab; then click the **browse** button and wait for enumeration to complete.



- 5** The Controller Browser will show a list of available platforms. Select the correct IP address of the target platform (unless you have more than one motion platform, it will be the only one in the list) then click **Select**.

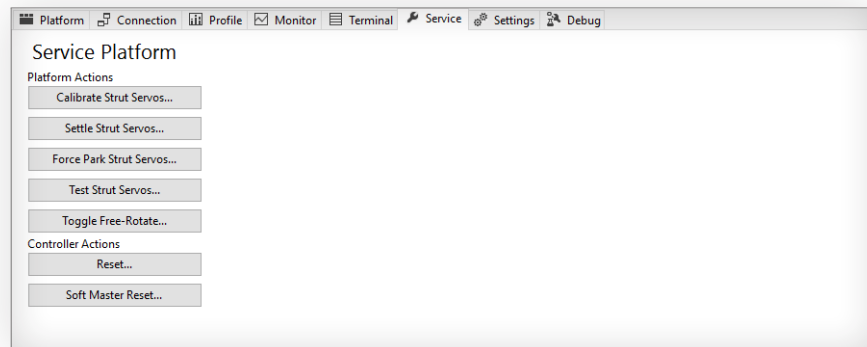


- 6** When you're back at the **Connection** tab, click **Connect** and wait for the connection to complete. You'll also probably want to make sure that **Auto Connect on Load** is checked; that way you won't need to reconnect to your simulator each time you start up ForceControl.

INSTALLATION

7

If this is your first time running ForceControl 5, you'll need to calibrate your machine from the Service tab to verify available mechanical strut length travel. Select **Calibrate Strut Servos...**, and follow the prompts.



8

You're ready to go! Enjoy your motion system!

INSTALLATION

UPGRADE FROM DUAL COMPUTERS

If you have a 401cr system that currently uses dual computers, you'll need to reroute some cables and change your network settings to switch to a single computer ForceControl 5 setup. Here's how to do it.

- 1** **Write down the servo controller IP Address**
This can be obtained by starting the older version of ForceControl on the control computer and viewing the saved controller IP address (in ForceControl 4 and earlier it's referred to as the Galil IP). You'll need the IP address to re-configure the controller later.

A **Wireless Network Setup (For systems with a switch or WiFi print server)**

- A1** Run a network cable directly from the Galil servo controller (in the main electronics area under the Force Dynamics panel) to the network port of the game computer. Disconnect the print server or switch.
- A2** Install a USB WiFi adapter in an available USB port on your simulator (either on the chassis or on the monitor frames) and check to ensure that a cable is run from the port to the game computer (You may need to reroute a cable from the control computer side).

**ALWAYS POWER OFF AND UNPLUG THE SIMULATOR WHEN
WORKING WITH ANY COVERS REMOVED!**

B **Wireless Network Setup (For systems with a USB WiFi adapter)**

- B1** Reroute the network cable that runs to the control computer's network port across the simulator, to the game computer's network port.
- B2** Reroute the USB cable leading from the WiFi adapter to the control computer into an available USB port on the game computer. If you have USB ports on a hub on the back of your monitors, you can move the WiFi adapter itself to one of those ports.

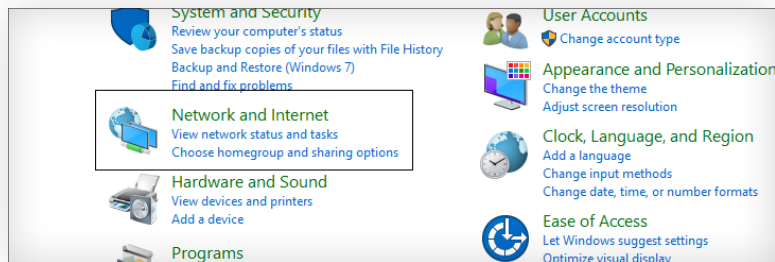
INSTALLATION

2**Connect to your wireless network**

You might need drivers to re-establish an internet connection on the game computer; these can be obtained from the internet and copied to the game computer with a portable drive.

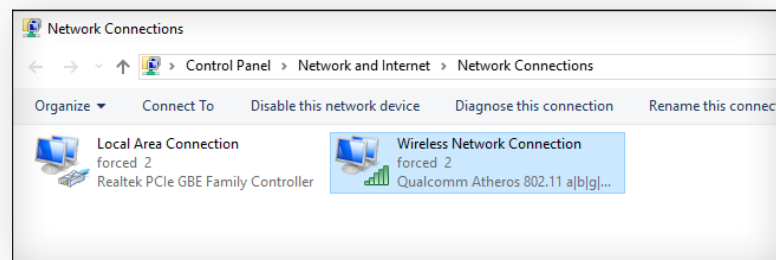
3**Write down wireless network IP address**

Once you've connected to the wireless network, it is important to make note of the IP address obtained from the local infrastructure: this will determine the correct servo controller IP address to avoid conflicting subnets. On the game computer, open the **Control Panel** and click on **View network status and tasks** under **Network and Internet**:



Now click **Change adapter settings** on the upper left of the **Network and Sharing Center** screen.

You should now see two adapters in **Control Panel > Network and Internet > Network Connections**:



Right click on **Wireless Network Connection**, click **Status**, and then click **Details....**

INSTALLATION

Description	Intel(R) Gigabit CT Desktop Adapter
Physical Address	68-05-CA-03-66-31
DHCP Enabled	Yes
IPv4 Address	192.168.0.33
IPv4 Subnet Mask	255.255.255.0
Lease Obtained	Wednesday, July 27, 2016 1:29:11 PM
Lease Expires	Friday, July 29, 2016 1:29:11 AM

You'll see the **Network Connection Details** box. Write down the **IPv4 Address**, and close the dialog.

4

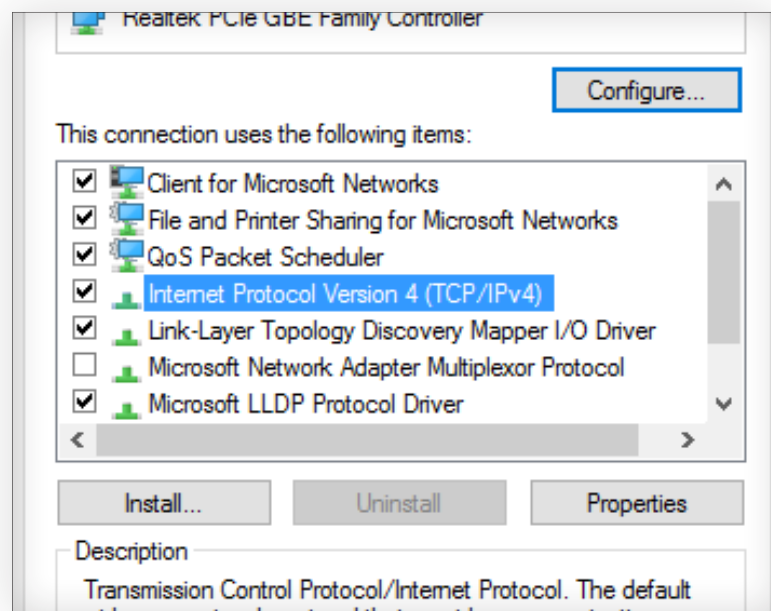
Assign local area network IP address

Using the IP address obtained in step one, we need to configure the network adapter to have a static IP on the same subnet as the servo controller. (This means we need the first three numbers in the IP address to match.)

To configure network adapters, go to:

Control Panel > Network and Internet > Network and Sharing Center
> Change adapter settings

Right-Click on **Local Area Connection*** and click **Properties**. In the list, choose **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.



INSTALLATION

4a Set the IP address to one that is on the same subnet as the controller's IP address, for example:

If the controller IP address is 192.168.0.101, you can use 192.168.0.2;

If the controller IP address is 192.168.5.101, you can use 192.168.5.2.

The **Subnet Mask** should be set to the default 255.255.255.0, and **Gateway** and **DNS** should be left blank.

Click OK, and OK again.

5 **Reconfigure the controller IP address**

If the wireless network IP address obtained in step 3 uses the same subnet (that is, the first three numbers of the addresses are the same) as the controller IP address subnet obtained in step 1, it is recommended to reconfigure the controller IP address to use a different subnet to avoid conflicts and dropouts. Otherwise, skip to step 6.

5a Install ForceControl 5 on the game computer if you haven't already done so.

5b Add the appropriate Platform and select the **Connection** tab. Enter the controller IP address obtained in step 1, or click the **Browse** button to scan the network for available controllers.

5c Once connected, click the **Service** tab and perform a **Soft Master Reset** on the controller.

5d After the master reset, we can now reconfigure the game computer's **Wired Network Adapter** to use a different IP address. To configure network adapters, go to:

Control Panel > Network and Internet > Network and Sharing Center
> Change adapter settings

Right click on the item named **Local Area Connection*** and click **Properties**.

INSTALLATION

5e In the list choose **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**. Set the IP address to one that is on the different subnet than the **Wireless Network** IP address. For example:

If the Wireless Network IP Address is **192.168.0.101**, you can use **192.168.5.2**.

Subnet Mask should be set to the default **255.255.255.0** and **Gateway** and **DNS** should be left blank. Click **OK**, and **OK** again; then return to ForceControl 5.

5f Click the **Connection** tab; then click the **Browse** button. The servo controller should now appear under the **NoIP** tab.

5g Assign a new IP using the game computer's new **Wired Adapter** IP address subnet, for example:

If the Game Computer's Wired Adapter is now **192.168.5.2**, you can use **192.168.5.3**.

Click **Apply**; you should see a confirmation that the IP address was applied successfully.

5h Select the new IP address (it should now appear under the **Available** tab in the **Browse** dialog) or close the **Browse** dialog and enter the IP address manually.

Press the **Connect** button.

6 (Skip this step if you just finished step 5.)

Install ForceControl5 on the game computer if you haven't already done so.

Add the appropriate **Platform** and select the **Connection** tab. Enter the controller IP address obtained in step 1, or click the **Browse** button to scan the network for available controllers.

Press the **Connect** button.

7 You're done!

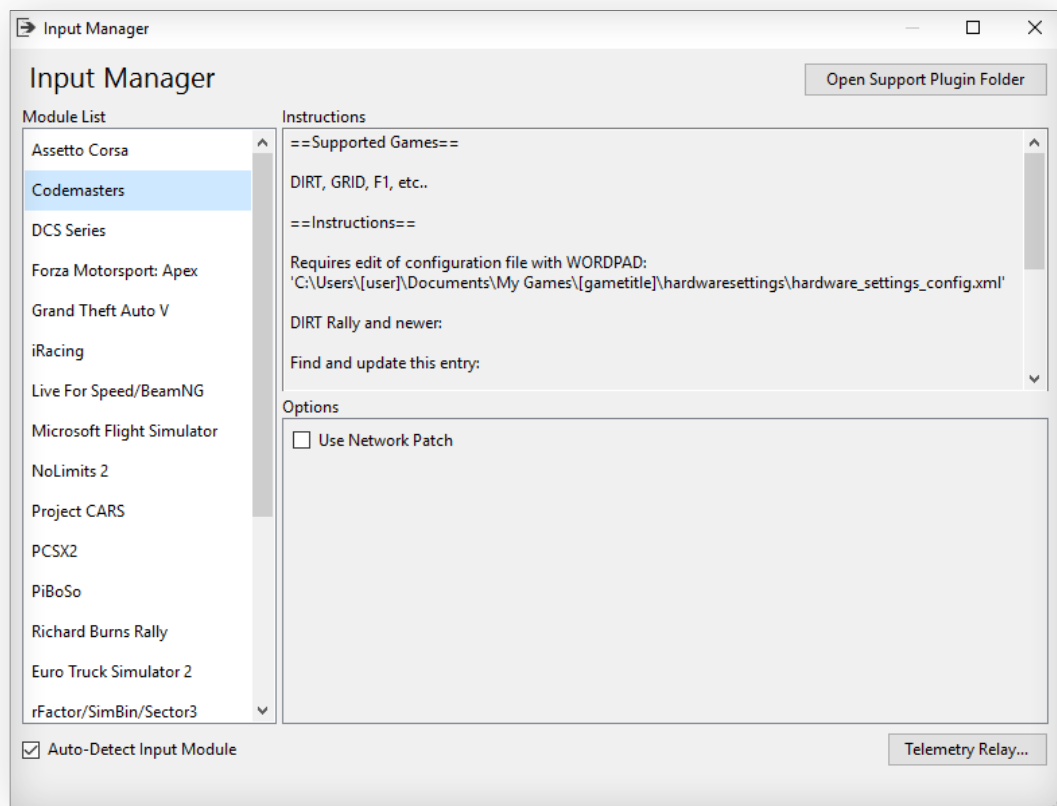
USING YOUR MOTION SYSTEM

INTRODUCTION

So, ForceControl is installed and ready, and your motion platform is set up and ready to go. What's next? To run your motion platform, you need a few things: The platform itself, ForceControl, and game software to send ForceControl the data.

GAME DATA OUTPUT SETUP

With ForceControl 5, ForceControl runs on the same PC as the game software. So it's easier than before to get your game connected to ForceControl and sending the data that makes your motion platform go. Once you've got ForceControl installed and talking to your motion platform, and your games installed and running, select **Tools → Input Manager** from the menu bar to open the **Input Manager**:



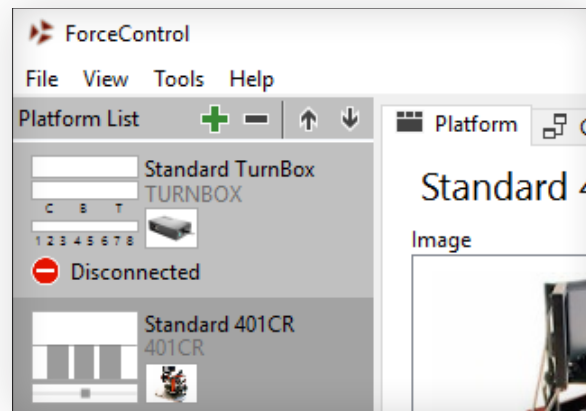
To configure a game, select it from the list on the left. Instructions for that game and options (if available) will appear on the right. When you're using a network based output (as in, for example, Live For Speed) with a game running on the local computer, set the output IP address to **127.0.0.1**.

USING YOUR MOTION SYSTEM

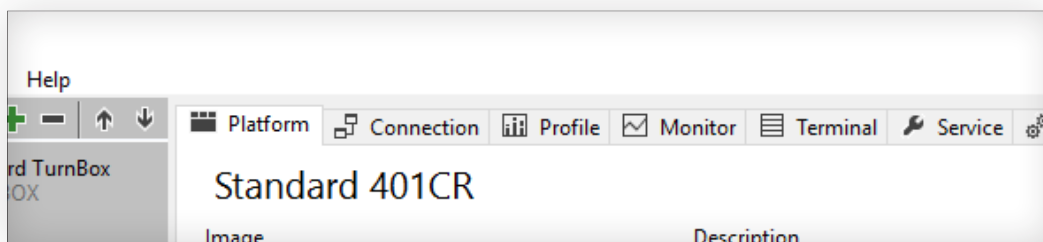
AN EXAMPLE RUN CYCLE

Let's say you want to run a session. Here's how to do it.

- 1 Start ForceControl. Either select the game you're planning on running from the Input Manager, or make sure that **Auto-Detect Input Module** is checked (it is by default).
- 2 Click on your platform on the Platform List to the left in the main ForceControl window...



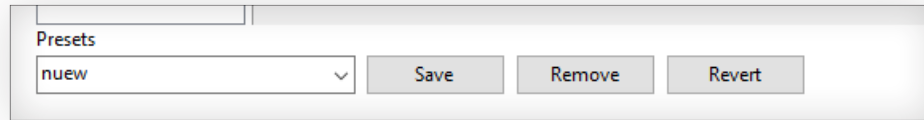
- 3 ...and click the **Profile** tab to the right:



USING YOUR MOTION SYSTEM

4

Once you're in the Profile tab, you can select an existing preset or make a new one. To select an existing preset, use the dropdown menu at the bottom of the Profile tab:



5

Now you're ready to go! Buckle your seat belt, shut the door, and run your game. When you're on-track and ready to go, press the green button and have fun!

6

All done? Press the green button again to stop motion and set the machine down. When the simulator stops moving, you can take off your belt and open the door.

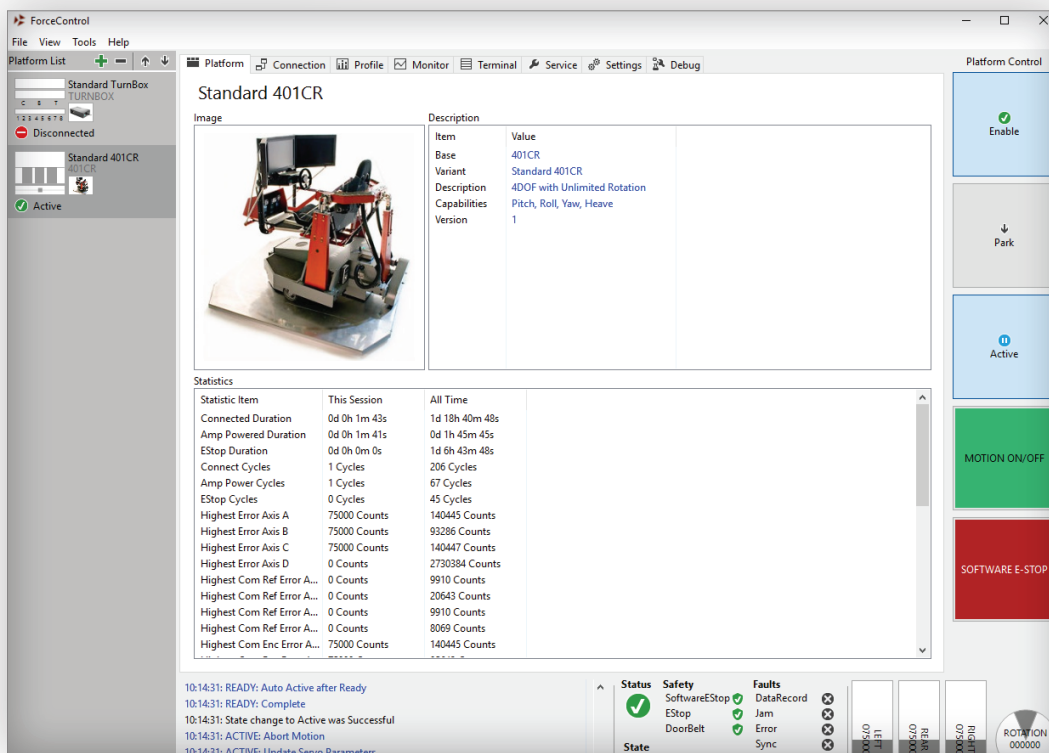
If you take off your belt or open the door before the machine has stopped moving, the machine will freeze in place. Shut the door or latch the belt, and press the green button, to tell the machine it's OK to keep going.

FORCECONTROL OVERVIEW

INTRODUCTION

Here's an overview of ForceControl's main screen, and a screen-by-screen description of ForceControl's main menus.

THE MAIN WINDOW



The main ForceControl window is divided into four sections. On the left, the Platform List shows the devices connected to ForceControl. These can be motion platforms, like the 401CR, or other devices like the TurnBox force feedback wheel. Click on a device to switch the main panel to show its controls.

In the middle, the main panel shows various tabs for showing information, setting up, or troubleshooting the selected device. (We'll go over those tabs separately later on.)

On the right, Platform Control (for motion platforms) lets you enable and disable motion and trigger a software e-stop to immediately halt machine motion.

In case of hardware failure, use the hardware e-stop to ensure a safe shutdown of power to the system; the software e-stop does not remove power completely!

On the bottom, you'll find status information for the selected device: On the left, a detailed log of system activity, and on the right, the current status of struts (or wheel and pedals).

FORCECONTROL OVERVIEW

MENU BAR

Here's a rundown of what you can do from the main menu.

File

Exit ForceControl	Turns off and disconnects from the simulator and exits ForceControl.
--------------------------	--

View

Input Manager	Displays the Input Manager, which allows you to select and configure telemetry input from different games.
----------------------	--

Telemetry	Displays the Telemetry window, which shows detailed information about input currently being received from the game.
------------------	---

Tools

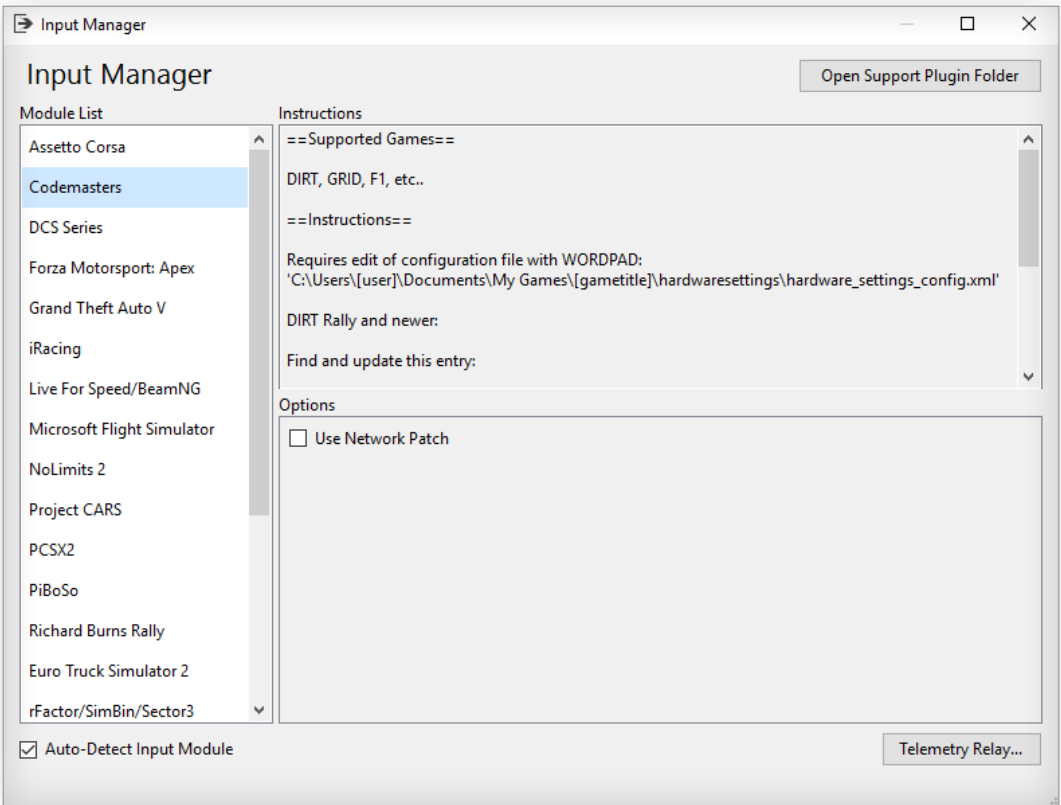
Settings	Displays the settings dialog. From this dialog you can enable or disable the Remote Control feature and see available HotKeys for use in-game.
-----------------	--

Help

About	Shows version information for ForceControl.
--------------	---

FORCECONTROL OVERVIEW

INPUT MANAGER



Open Support Plugin Folder Opens an Explorer window to the Support Plugin folder. Drag plugins from here to the appropriate game's plugins folder (as described in Instructions).

Module List The Module List shows a list of available input modules. Click on an input module to select it.

Instructions This window displays instructions for setting up the selected game.

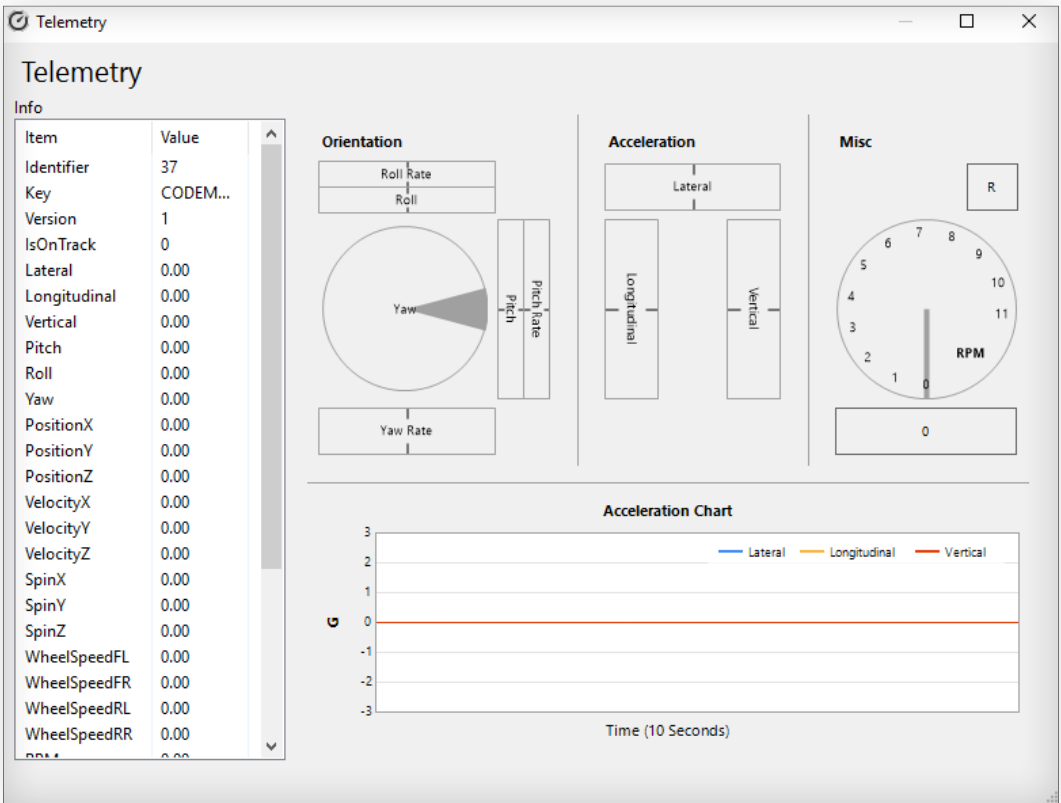
Options Shows options, if any, for setting up the selected input module.

Auto-Detect Input Module Checked by default. If checked, ForceControl will listen to input from any running game; if unchecked, ForceControl will only accept data from the selected input module.

Telemetry Relay... Opens the Telemetry Relay configuration window.

FORCECONTROL OVERVIEW

TELEMETRY



Info Displays detailed telemetry from the game. Not all games will send all types of data!

Orientation Shows the direction the vehicle is pointing, its orientation in space, and the rates of change of those elements.

Acceleration Lateral, longitudinal, and vertical accelerations of the vehicle.

Misc Other interesting information!

Acceleration Chart A 10-second strip chart of lateral, longitudinal, and vertical acceleration history, in Gs.

PLATFORM CONTROL PANEL

OVERVIEW

The Platform Control panel consists of five buttons on the right hand side of the main screen. These controls let you start and stop the platform, as well as set more specific states. You can activate the servo system without engaging motion, lift the platform to its center position, or disable motion without setting the platform down (as would happen automatically if the physical green button was pressed).

Generally speaking you won't need to use these buttons: You'll use the physical green button on the machine. But they're there if you want them.

TERMS

Here's a quick rundown of the terms we use to describe the platform's state, and what they mean:

Disabled	The servo system is powered off and the motor brakes are locked. The machine won't move.
Parked	The motion platform is level and at its lowest possible state.
Center	The motion platform is lifted to half its maximum height.
Active	The motion platform is centered and responding to game input.

CONTROLS

And here's a list of the buttons in the **Platform Control** area, and what they do:

Enable	Activates servo system and parks the platform.
Disable	Disables the servo system, stopping the machine in place.
Park	If not parked, parks the simulator at the bottom of its travel; otherwise, lifts the platform to its center position.

PLATFORM CONTROL PANEL

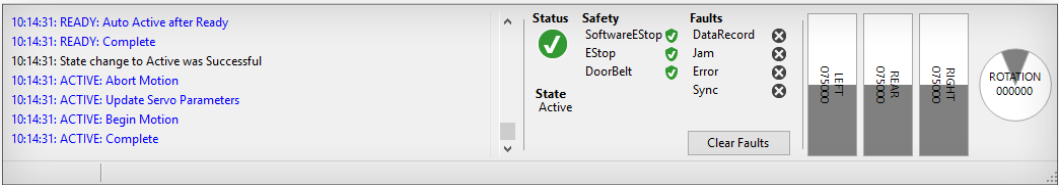
Active	If not parked, activates the platform so it responds to game input; otherwise, stops responding to game input and returns the platform to its center position.
Motion On/Off	Takes whatever steps are necessary to begin responding to game input. For example, if the machine is Parked, it's lifted and motion begins.
Software E-Stop	Stops motion and disables the motion-start button on the platform. Note that the Software E-Stop is not a substitute for the hardware E-Stop.

USE THE HARDWARE E-STOPPS IF THERE IS DANGER TO THE MACHINE OR THE RIDER!

PLATFORM STATUS BAR

INTRODUCTION

The status bar is divided into three sections that show what your simulator is up to. On the left, the event log shows a detailed history of what the machine has been doing; in the middle, current status, safety, and fault information is shown, and on the right, the current position of the three struts and (if applicable) rotation axis is shown.



HISTORY LOG

The history log shows a detailed list of events since ForceControl started up. If your machine has a fault while it's operating, you can check the history log to see exactly when the fault occurred and if any other faults happened before or since.

STATUS

The status and faults section displays the current status of the platform and any faults that have occurred. All **Safety** status items must be green in order for the machine to operate.

Status	A green checkmark if the platform is ready to use; a red minus if there's a problem.
State	The current state of the machine, whether active, inactive, or disconnected.
SoftwareEStop	Green if the software e-stop isn't engaged.
EStop	Green if the hardware e-stop isn't engaged; red if it is.
DoorBelt	Green if the belt is latched and the door closed; red if either are disconnected or open.

PLATFORM STATUS BAR

FAULTS

Note: A **latching** fault must be manually reset; a **non-latching** fault will automatically clear when the state that caused it is cleared (for example, the seat belt is latched or door closed).

DataRecord	Latching. This indicates a communication fault between the platform and ForceControl, or a problem within ForceControl or the platform's firmware. You may need to manually reconnect to the platform from the Connection tab.
-------------------	--

Jam	Latching. This fault may indicate a physical problem with the platform such as a jammed strut or the platform being blocked by an external object. Check for obstructions before proceeding. A log of simulator activity prior to the event will be automatically written to disk.
------------	---

If the error appears to have occurred erroneously and the machine seems to be working correctly, you can click **Clear Faults** to resume. However, if the fault occurs repeatedly, you should contact Force Dynamics with a copy of the servo logs even if the machine appears to be operating normally.

Error	Latching. This fault triggers when the servo systems 'falls behind' and can't keep up with commanded position. This could mean a hardware problem, or it could just mean that a sudden move (like a crash or fast spin) exceeded the capabilities of the motion system. A log of simulator activity prior to the event will be automatically written to disk.
--------------	--

If the error appears to have occurred erroneously and the machine seems to be working correctly, you can click **Clear Faults** to resume. If this error occurs repeatedly, it may just indicate that the motion preset being used is too aggressive for the vehicle and simulation. Try reducing motion settings. If the error still occurs, check with a default motion preset or a preset and car you know worked previously; if the fault triggers despite these checks, contact Force Dynamics with a servo log, as there may be a problem such as a slowly failing amplifier or stuck brake.

Sync	Latching. This fault occurs when the platform and ForceControl can't communicate reliably. Attempting to control a platform via a WiFi connection is a likely cause of this error; network cable problems or network saturation from another source are also possible causes. Double-check your network setup before continuing if the error occurs repeatedly.
-------------	--

E-Stop	Non-latching. This fault triggers if the hardware e-stop button is pressed or the external E-Stop connection is opened (either by the remote E-Stop box or other means). Reset the e-stop to clear the fault.
---------------	--

PLATFORM STATUS BAR

POSITION INDICATOR

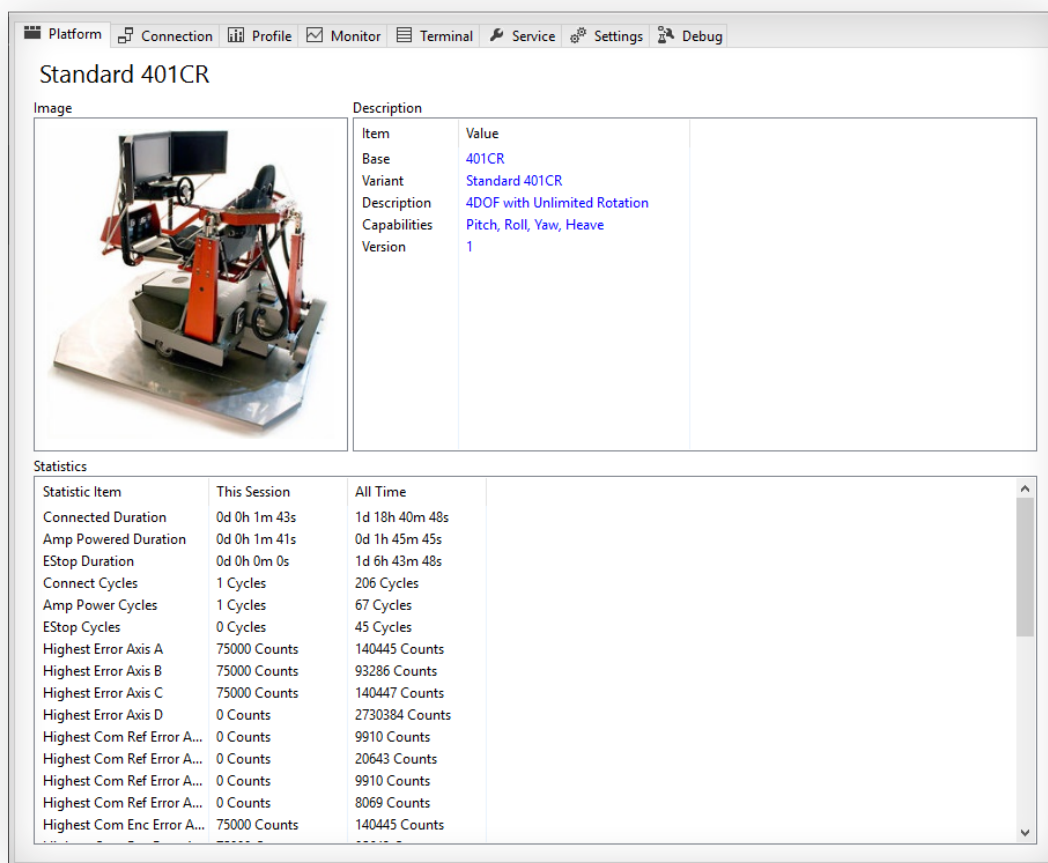
On the lower right, the position indicator shows the current strut positions and orientation of the platform. Note that the r-axis indicator may not consistently correspond to the platform's orientation, since it uses a relative angle detection mechanism that resets when ForceControl starts

PLATFORM CONFIGURATION

INTRODUCTION

ForceControl 5 has extensive options for setting up your motion system. We're going to go over what you can do in each screen in detail here. Note that depending on the variant of platform you have, some options might not be available (for instance, yaw settings on a 301).

OVERVIEW



The screenshot shows the ForceControl 5 software interface with the 'Platform' tab selected. The main window displays the configuration for the 'Standard 401CR' platform. The interface includes a top menu bar with options: Platform, Connection, Profile, Monitor, Terminal, Service, Settings, and Debug. The main content area is divided into two sections: 'Image' and 'Description'.

Image: A photograph of the Standard 401CR motion platform, which is a white and orange robotic system with a control panel and a monitor.

Description: A table with the following data:

Item	Value
Base	401CR
Variant	Standard 401CR
Description	4DOF with Unlimited Rotation
Capabilities	Pitch, Roll, Yaw, Heave
Version	1

Statistics: A table showing performance metrics for 'This Session' and 'All Time'.

Statistic Item	This Session	All Time
Connected Duration	0d 0h 1m 43s	1d 18h 40m 48s
Amp Powered Duration	0d 0h 1m 41s	0d 1h 45m 45s
EStop Duration	0d 0h 0m 0s	1d 6h 43m 48s
Connect Cycles	1 Cycles	206 Cycles
Amp Power Cycles	1 Cycles	67 Cycles
EStop Cycles	0 Cycles	45 Cycles
Highest Error Axis A	75000 Counts	140445 Counts
Highest Error Axis B	75000 Counts	93286 Counts
Highest Error Axis C	75000 Counts	140447 Counts
Highest Error Axis D	0 Counts	2730384 Counts
Highest Com Ref Error A...	0 Counts	9910 Counts
Highest Com Ref Error A...	0 Counts	20643 Counts
Highest Com Ref Error A...	0 Counts	9910 Counts
Highest Com Ref Error A...	0 Counts	8069 Counts
Highest Com Enc Error A...	75000 Counts	140445 Counts

When you select your motion platform from the Platform List, you'll see a tab group in the main window to the right. This is where you'll find configuration options for the selected platform or device.

Over the next few pages, we'll take a detailed look at each tab in turn. Here we go!

PLATFORM CONFIGURATION

PLATFORM TAB

Platform

Connection

Profile

Monitor

Terminal


Service

Settings

Debug

Standard 401CR

Image



Description

Item	Value
Base	401CR
Variant	Standard 401CR
Description	4DOF with Unlimited Rotation
Capabilities	Pitch, Roll, Yaw, Heave
Version	1

Statistics

Statistic Item	This Session	All Time
Connected Duration	0d 0h 1m 43s	1d 18h 40m 48s
Amp Powered Duration	0d 0h 1m 41s	0d 1h 45m 45s
EStop Duration	0d 0h 0m 0s	1d 6h 43m 48s
Connect Cycles	1 Cycles	206 Cycles
Amp Power Cycles	1 Cycles	67 Cycles
EStop Cycles	0 Cycles	45 Cycles
Highest Error Axis A	75000 Counts	140445 Counts
Highest Error Axis B	75000 Counts	93286 Counts
Highest Error Axis C	75000 Counts	140447 Counts
Highest Error Axis D	0 Counts	2730384 Counts
Highest Com Ref Error A...	0 Counts	9910 Counts
Highest Com Ref Error A...	0 Counts	20643 Counts
Highest Com Ref Error A...	0 Counts	9910 Counts
Highest Com Ref Error A...	0 Counts	8069 Counts
Highest Com Enc Error A...	75000 Counts	140445 Counts

The Platform tab displays a description and statistics for the currently connected platform.

- Image

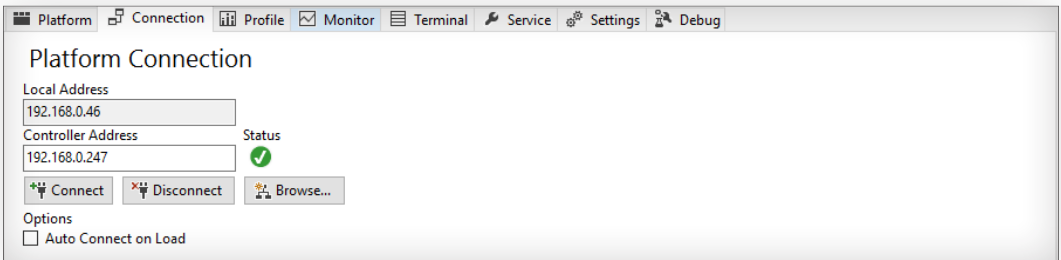
In case you aren't sure what your platform looks like, this will give you a rough idea.
- Description

Basic information and specifications.
- Statistics

This area displays detailed statistics about your machine's operation history, for the current session and for all time (or since the machine's last servo controller master reset). Think of it like an in-depth odometer for your simulator.

PLATFORM CONFIGURATION

CONNECTION TAB

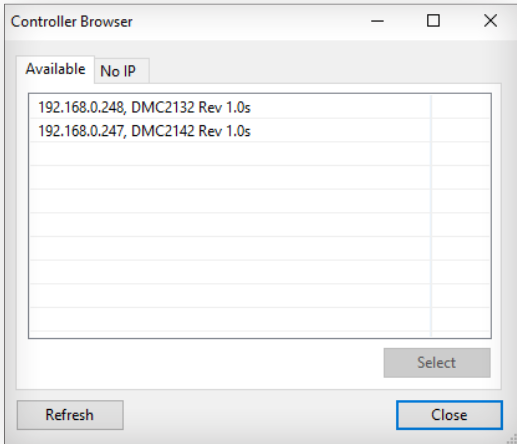


The connection tab lets you set up the PC's connection to the servo controller that makes your motion platform move.

Local Address	The current IP address of the PC. (Set this as the ForceControl address in Telemetry Relay.)
Controller Address	The IP address of the controller you're connecting to.
Status	A green checkmark if the servo controller is connected, a red minus otherwise.
Connect	Connects to the specified controller. If you're already connected, ForceControl will disconnect and reconnect again.
Disconnect	Disconnects from the controller.
Browse	Opens the Controller Browser dialog, which displays available servo controllers accessible on the current network.
Auto Connect on Load	Checked by default. When checked, ForceControl will automatically connect to the specified controller when it starts.

PLATFORM CONFIGURATION

CONTROLLER BROWSER DIALOG

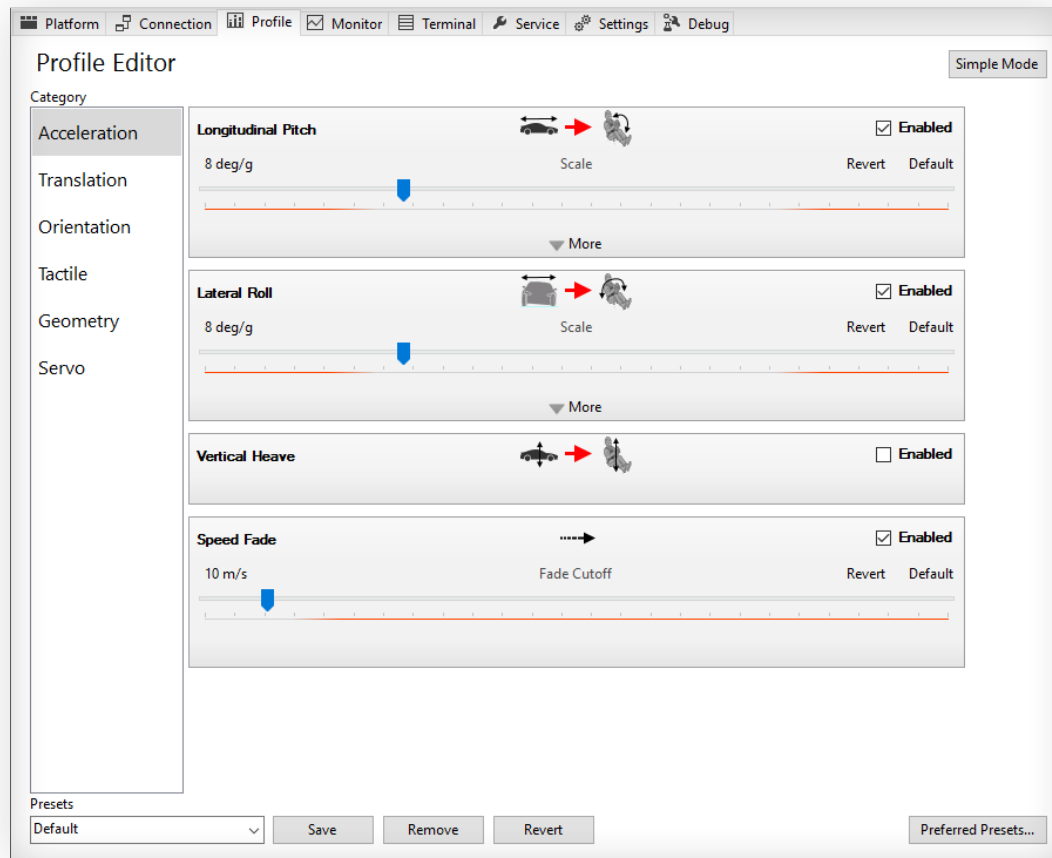


The **Controller Browser** lets you search for controllers (a 'controller' is the servo control board that tells the motors what to do, and talks to the PC) on the local network if they already have IP addresses, or assign IP addresses to controllers that lack them. A controller might lack an IP address if it's new or if you've just performed a master reset.

Available	This tab shows a list of available controllers on the local network. Click on a controller to highlight it and then click Select to select it.
No IP	This tab shows a list of controllers on the network without assigned IP addresses. You need to assign an address to a simulator's controller in order to use it. To do so, switch to the No IP tab, and select the controller by clicking on it. Type an available IP address into the box under the controller list and click Assign to assign it. You can then select the controller as normal under the Available tab.
Select	Click here to select the highlighted controller and return to the Connection tab.
Refresh	Refreshes the list of available controllers.
Close	Closes the dialog without selecting a new controller.

PLATFORM CONFIGURATION

PROFILE TAB



The profile tab is where you'll spend most of your time in ForceControl. It's where you specify the settings that ForceControl uses to transform raw data input about a vehicle's position in the world to cueing commands that make your platform move.

Because setting up cueing commands can be very complex, we've split the Profile Editor into two modes: **Simple Mode** and **Normal Mode**. In **Simple Mode**, many options are grouped together to let you quickly change settings and get on track without a lot of hassle. In Normal Mode, you can dive as deep as you want into the details of the settings that make the platform tick.

Because both modes use some common conventions, we're going to go over everything these modes share first — like presets, conventions for slider groups, and so on — before we get into the details of the modes and what the settings do in each.

Turn the page and let's get started!

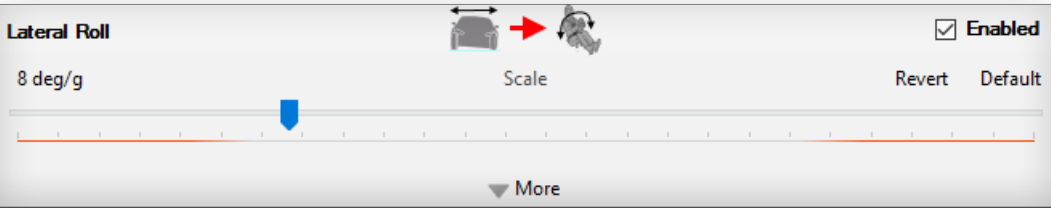
PLATFORM CONFIGURATION

PROFILE EDITOR: CATEGORY

In Normal Mode, the Category list lets you select different groups of settings that affect the performance of the simulator. They all behave the same way, and are divided mostly to make it quicker to select the setting you want to change. In Simple Mode, there's only one category. To work on settings within a given category, just click on it.

PROFILE EDITOR: MAIN

The main section of the Profile Editor shows a list of setting boxes for the current **Category**. Most of these boxes work basically the same way. Here's a brief description:

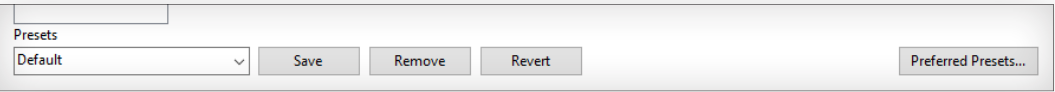


Lateral Roll	The name of the setting adjusted by this control.
Enabled	When checked, this kind of input (in this case, the amount of lateral acceleration on the vehicle) will have an effect on the final position of the simulator. When unchecked, the box will collapse to save space, and the simulator will ignore this input type.
8 deg/g	This label shows the current numeric setting of the slider — in this case, it means that the simulator will tilt 8 degrees for each G of lateral force on the simulated vehicle.
Slider	The slider changes the setting. Red zones show areas outside the recommended settings: You can use settings in the red area, but the machine may not perform optimally, or you might have to adjust elsewhere to compensate.
Revert	Reverts the slider's position to the previously saved setting.
Default	Sets the slider to its default value.
More	Expands the setting box to show additional options for the given setting type — for example, filtering, scale linearity, washouts, and so on. Click it again to retract the box to its default scope.

PLATFORM CONFIGURATION

PROFILE EDITOR: PRESETS

ForceControl lets you save and load presets so you can quickly get ready to run a specific game, or even a specific car type or track. You can also save **preferred presets** which will load automatically when a particular game is detected.



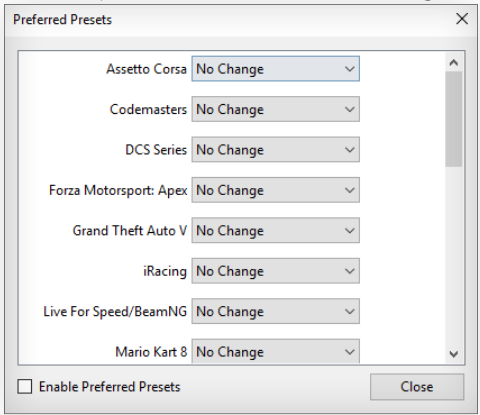
Dropdown Box Click the dropdown box to select and load a preset.

Save Saves any changes to the current preset.

Remove Deletes the preset.

Revert Reverts the preset to the last saved state.

Preferred Presets... Click to open the Preferred Presets dialog box:



Click on a dropdown menu corresponding to the desired game to change its default preset. If **No Change** is selected, the currently chosen preset will remain in effect when the specified game starts. To enable the feature, check **Enable Preferred Presets**. Click **Close** to close the dialog.

PLATFORM CONFIGURATION

PROFILE EDITOR CATEGORIES: SIMPLE MODE

Overall Sets the overall 'volume' of the motion platform.

Recommendations Start low (50%) when trying a new game. For general use, we suggest keeping this slider at 100% and adjusting other settings unless it's necessary to absolutely ensure a limit to platform motion to ensure rider comfort.

Acceleration Set higher for sharper response, lower for softer response.

Recommendations Different games will often respond best to different **Acceleration** settings. For example, Live For Speed has very smooth output and thus response well to high **Acceleration** settings, whereas DiRT Rally's rougher output can work better with a lower **Acceleration**.

Orientation Values greater than 100% mean the simulator rotates more than the real car for a given static position (for example, when stationary on banking). Values less than 100% mean the simulator rotates less.

Recommendations For road racing or rally, set to 100%. For oval racing on banked circuits, you may want to lower **Orientation** to prevent it from overwhelming the **Acceleration** feel.

Rotation Values greater than 100% mean the simulator will yaw (spin) more than the simulated vehicle as it corners; less than 100% means the simulator spins less.

Recommendations This setting should remain at 100% except under extreme circumstances, but you may find it useful to adjust downward if you're experiencing motion sickness or are driving a vehicle like a kart or formula car with very fast orientation changes.

PLATFORM CONFIGURATION

Vertical

Adjusts the amount the simulator moves in response to vertical motion of the vehicle — for example, hills, jumps, and curb hits.

Recommendations

Adjust to taste depending on preference and the type of game being played. Rally simulations may benefit from less **Acceleration** and more **Vertical**, for example.

Smoothing

Changes how much the overall output of the platform is smoothed. Lower values allow finer detail to come through; higher values provide a smoother ride.

Recommendations

Generally, use as little as possible while keeping the 'ride' comfortable. Faster cars with stiffer suspensions will benefit from a bit more **Smoothing**; slower cars will be more communicative with less **Smoothing**.

PLATFORM CONFIGURATION

PROFILE EDITOR CATEGORIES: ACCELERATION

Longitudinal Pitch	Adjusts the platform's response to vehicle acceleration and braking
Scale	Sets the number of degrees the platform will tilt for each G of longitudinal acceleration.
Accelerate boost	Multiplies the simulator output by the specified ratio when the vehicle is accelerating. Useful for low-powered cars that can decelerate much more rapidly than they can accelerate, where a single scale can make acceleration imperceptible. Ratios over 1:1 mean you feel more acceleration; ratios under 1:1 mean you feel less.
Decelerate boost	Multiplies the simulator output by the specified ratio when the vehicle is decelerating. Ratios over 1:1 mean you feel more deceleration; ratios under 1:1 mean you feel less.
Linearity	Negative linearity causes the force you experience in the simulator to build slowly relative to the force on the vehicle; positive linearity causes the force you experience to build more rapidly than the force on the vehicle.
Linearity Cutoff	Adjusts the breakpoint at which the simulated force matches the scale setting.
Smoothing	More smoothing will eliminate jerks, bumps, or noise inherent in the game's output; less smoothing will "let through" more sharp impulses and texture.
Washout	Returns the output of this element to zero over time when the input remains mostly constant. A short washout will only allow small, individual changes to be felt; longer and longer washouts allow longer and longer changes to affect the output of the cueing system.

Recommendations With longitudinal (forward/backward) acceleration, linearity adjustment can help damp out the throttle-bounce often experienced with powerful cars. But if you're only experiencing this at low speeds, try adjusting the **Speed Fade** slider first.

We don't suggest using **Washout** for ground vehicles, because you experience acceleration forces continually even if a car is accelerating at a steady rate, but it's there if you want to try it.

PLATFORM CONFIGURATION

Lateral Roll Adjusts the platform's response to vehicle cornering to the left or right

Scale Sets the number of degrees the platform will tilt for each G of lateral acceleration.

Linearity Negative linearity causes the force you experience in the simulator to build slowly relative to the force on the vehicle; positive linearity causes the force you experience to build more rapidly than the force on the vehicle.

Linearity Cutoff Adjusts the breakpoint at which the simulated force matches the scale setting.

Smoothing More smoothing will eliminate jerks, bumps, or noise inherent in the game's output; less smoothing will "let through" more sharp impulses and texture.

Washout Returns the output of this element to zero over time when the input remains mostly constant. A short washout will only allow small, individual changes to be felt; longer and longer washouts allow longer and longer changes to affect the output of the cueing system.

Recommendations Vehicles without a lot of downforce (street cars, GT cars) often benefit perceptually from having a higher lateral scale setting vs longitudinal setting.

Be careful when adjusting **Linearity** with lateral roll, since accurate perception of cornering forces is critical to car control!

We don't suggest using **Washout** for ground vehicles, because you experience cornering forces continually even if a car is cornering at a steady rate, but it's there if you want to try it.

PLATFORM CONFIGURATION

Vertical Heave Moves the platform vertically in response to vertical accelerations

Scale Sets the number of inches the platform will move vertically in response to a given vertical acceleration.

Smoothing More smoothing will eliminate jerks, bumps, or noise inherent in the game's output; less smoothing will "let through" more sharp impulses and texture.

Washout Returns the output of this element to zero over time when the input remains mostly constant. Short washouts only allow small, individual changes to be felt; longer and longer washouts allow longer and longer changes to affect the output of the cueing system.

Recommendations This setting is mostly deprecated by the more-accurate **Vertical Rate Heave** setting, but remains for legacy purposes.

Speed Fade Reduces response to acceleration forces when the vehicle velocity is low.

Fade Cutoff Adjusts the vehicle velocity under which acceleration forces will not be felt, in meters per second.

Recommendations Many simulations have a difficult time handling vehicle and tire models at low speeds, which can result in jerky motion while moving away from a stop. Speed Fade gradually fades in acceleration response as the vehicle goes faster.

We recommend keeping **Fade Cutoff** at around 10m/s, but for certain low-speed situations (for example, autocross) you may want to lower or disable it.

PLATFORM CONFIGURATION

PROFILE EDITOR CATEGORIES: TRANSLATION

Vertical Rate Heave Moves the platform vertically in response to vertical vehicle movements.

Scale Sets the number of inches the platform will move vertically in response to a given vertical acceleration.

Smoothing More smoothing will eliminate jerks, bumps, or noise inherent in the game's output; less smoothing will "let through" more sharp impulses and texture.

Washout Returns the output of this element to zero over time when the input remains mostly constant. Short washouts only allow small, individual changes to be felt; longer and longer washouts allow longer and longer changes to affect the output of the cueing system.

Integral Washout The effect of Integral Washout is difficult to describe, but generally speaking, a higher value results in tighter-feeling movements, and a lower value results in looser-feeling movements.

Recommendations This setting deprecates the old **Vertical Heave** setting. Essentially, it compresses the vehicle's vertical movement into the vertical space available on the motion platform, retaining small movements like dips and bumps while eliminating large motions like slow climbs.

You may want to change this setting around for different types of vehicles; for example, a rally stage with lots of jumps and large bumps will be better suited to a larger scale and longer washout time, whereas a relatively smooth oval circuit should prioritize small vertical motions that happen as a result of pavement fluctuations or suspension action.

PLATFORM CONFIGURATION

PROFILE EDITOR CATEGORIES: ORIENTATION

Pitch Angle Pitch	Tilts the platform in response to the vehicle's forward/backward tilt.
Scale	Sets the number of degrees the platform will tilt in response to a given number of degrees of vehicle tilt.
Smoothing	More smoothing will eliminate jerks, bumps, or noise inherent in the game's output; less smoothing will "let through" more sharp impulses and texture.
Washout	Returns the output of this element to zero over time when the input remains mostly constant. Short washouts only allow small, individual changes to be felt; longer and longer washouts allow longer and longer changes to affect the output of the cueing system.
Recommendations	<p>Pitch Angle Pitch changes the platform's position in response to the vehicle's simulated orientation — that is, if a car is parked on a steep hill, the platform will tilt correspondingly, in an amount set by the Scale slider.</p> <p>In general, we recommend keeping this setting at 1:1.</p>
Roll Angle Roll	Tilts the platform in response to the vehicle's left/right tilt.
Scale	Sets the number of degrees the platform will tilt in response to a given number of degrees of vehicle tilt.
Smoothing	More smoothing will eliminate jerks, bumps, or noise inherent in the game's output; less smoothing will "let through" more sharp impulses and texture.
Washout	Returns the output of this element to zero over time when the input remains mostly constant. Short washouts only allow small, individual changes to be felt; longer and longer washouts allow longer and longer changes to affect the output of the cueing system.
Recommendations	<p>Roll Angle Roll changes the platform's position in response to the vehicle's simulated orientation.</p> <p>In general, we recommend keeping this setting at 1:1. You may want to lower the Scale setting if, for example, you're simulating a vehicle on an oval circuit with very steep banking, where the scale limitations of the Lateral Roll setting and the platform's geometry result in Roll Angle Roll overwhelming the output of Lateral Roll.</p>

PLATFORM CONFIGURATION

Yaw Angle Yaw

Rotates the platform in response to the vehicle's orientation.

Scale

Sets the number of degrees the platform will rotate in response to a given rotation of the vehicle.

Smoothing

More smoothing will eliminate jerks, bumps, or noise inherent in the game's output; less smoothing will "let through" more sharp impulses and texture.

Washout

Returns the output of this element to zero over time when the input remains mostly constant. Short washouts only allow small, individual changes to be felt; longer and longer washouts allow longer and longer changes to affect the output of the cueing system.

Recommendations You won't usually need to change these settings. **Scale** should almost always be set to 1:1, and smoothing at its default of .5wt. For certain small, light cars or karts, you may want to try lowering **Smoothing** to improve responsiveness, but that may result in yaw wheel squeaking. With the 401cr, Washout is unnecessary unless you want to restrict the rotation range of the machine for testing.

Note that because there is no absolute position detection on the yaw axis, you cannot rely on a **Washout** setting to prevent the platform from rotating past a certain point. Always assume that the platform may rotate to any position at any time!

Pitch Rate Pitch (Aircraft)

Rotates the platform in response to the vehicle's change in pitch.

Scale

Sets the amount the platform will rotate in response to a given rotation speed of the vehicle.

Smoothing

More smoothing will eliminate jerks, bumps, or noise inherent in the game's output; less smoothing will "let through" more sharp impulses and texture.

Washout

Returns the output of this element to zero over time when the input remains mostly constant. Short washouts only allow small, individual changes to be felt; longer and longer washouts allow longer and longer changes to affect the output of the cueing system.

Integral Washout The effect of Integral Washout is difficult to describe, but generally speaking, a higher value results in tighter-feeling movements, and a lower value results in looser-feeling movements.

Recommendations Enable these settings for aircraft simulation requiring washouts; it's not recommended to use alongside the standard **Pitch Rate Pitch**.

PLATFORM CONFIGURATION

Roll Rate Roll (Aircraft) Rotates the platform in response to the vehicle's change in roll.

Scale	Sets the amount the platform will rotate in response to a given rotation speed of the vehicle.
Smoothing	More smoothing will eliminate jerks, bumps, or noise inherent in the game's output; less smoothing will "let through" more sharp impulses and texture.
Washout	Returns the output of this element to zero over time when the input remains mostly constant. Short washouts only allow small, individual changes to be felt; longer and longer washouts allow longer and longer changes to affect the output of the cueing system.
Integral Washout	The effect of Integral Washout is difficult to describe, but generally speaking, a higher value results in tighter-feeling movements, and a lower value results in looser-feeling movements.

Recommendations Enable these settings for aircraft simulation requiring washouts; it's not recommended to use alongside the standard **Roll Rate Roll**.

Yaw Rate Yaw (Aircraft) Rotates the platform in response to the vehicle's change in orientation.

Scale	Sets the amount the platform will rotate in response to a given rotation speed of the vehicle.
Smoothing	More smoothing will eliminate jerks, bumps, or noise inherent in the game's output; less smoothing will "let through" more sharp impulses and texture.
Washout	Returns the output of this element to zero over time when the input remains mostly constant. Short washouts only allow small, individual changes to be felt; longer and longer washouts allow longer and longer changes to affect the output of the cueing system.
Integral Washout	The effect of Integral Washout is difficult to describe, but generally speaking, a higher value results in tighter-feeling movements, and a lower value results in looser-feeling movements.

Notes A washed-out integral yaw response shouldn't be necessary with the large rotation ranges available in the 401 and 401cr, but the option is included here for completeness' sake.

PLATFORM CONFIGURATION

PROFILE EDITOR CATEGORIES: TACTILE

Slip Angle Roll Oscillator **Vibrates the platform when the slip angle exceeds a specified amount**

Magnitude Sets the magnitude of the vibration effect that occurs during a slide.

Frequency Period The length of each vibration cycle. Longer periods mean slower vibration; shorter periods mean faster vibration.

Start Slip Angle The minimum vehicle slip angle at which the effect will begin playing.

Notes While not realistic per se, this effect can be useful for understanding what a car is doing since it can provide distinct feedback about the vehicle.

ABS Pitch Oscillator **Vibrates the platform when the game indicates that ABS is active.**

Magnitude Sets the magnitude of the vibration effect that occurs when ABS is active in the simulated vehicle.

Frequency Period The length of each vibration cycle. Longer periods mean slower vibration; shorter periods mean faster vibration.

Notes Not all game input modules provide ABS feedback, so even if this effect is active, some vehicles with ABS may not trigger the effect if their games' input modules do not support this data type.

PLATFORM CONFIGURATION

PROFILE EDITOR CATEGORIES: GEOMETRY

Pitch Geometry		Defines the allowable pitch movement of the platform
Limit		Sets the maximum pitch rotation of the platform. This will usually be less than the technical maximum rotation available in order to allow this rotation to be combined with vertical travel.
Offset		Adjusts the 'zero pitch' offset. Usually zero. Useful if your floor is at an angle.
Center of Rotation		Adjust the longitudinal point around which the platform pitches up and down. If you have your seat far forward, you may want to move Center of Rotation forward to match, or you may just prefer a different position. To get a feel for what this setting does, turn off all cues except for Acceleration: Longitudinal Pitch and adjust it.
Notes		Defines the pitch used by the platform for all types of input combined — for example, changing Limit or Offset will affect the simulator's response to both Orientation and Acceleration cues.

Roll Geometry		Defines the allowable roll movement of the platform
Limit		Sets the maximum roll rotation of the platform. This will usually be less than the technical maximum rotation available in order to allow this rotation to be combined with vertical travel.
Offset		Adjusts the 'zero roll' offset. Usually zero. Useful if your head is at an angle.
Center of Rotation		Adjust the lateral point around which the platform rolls to the left and right. Since this makes left turns feel different than right turns, it isn't very useful for road racing, but it may be helpful for certain types of oval racing.
Notes		Defines the pitch used by the platform for all types of input combined — for example, changing Limit or Offset will affect the simulator's response to both Orientation and Acceleration cues.

PLATFORM CONFIGURATION

Heave Geometry**Defines the allowable vertical movement of the platform****Limit**

Sets the maximum vertical motion of the platform.

Offset

Adjusts the 'zero position' of the platform's vertical motion. This will generally be left at zero.

Notes

Offset may be useful in certain odd situations — for instance, if you need to operate the platform in a room with a low ceiling.

Strut Geometry**Defines the allowable movement of all struts****Usage**

Sets the maximum strut travel allowed.

Reccomendations

This should usually be set to 100%, but can be used as an overall 'volume knob' for machine motion if desired. For maximum fidelity, however, and to prevent clipping, we strongly suggest adjusting other settings before this one if you prefer to have less motion.

However, adjusting other settings down will still allow for the possibility of more machine motion under extreme situations such as crashes. If it's important for rider comfort to limit motion under all circumstances, this setting can be adjusted to do so.

PLATFORM CONFIGURATION

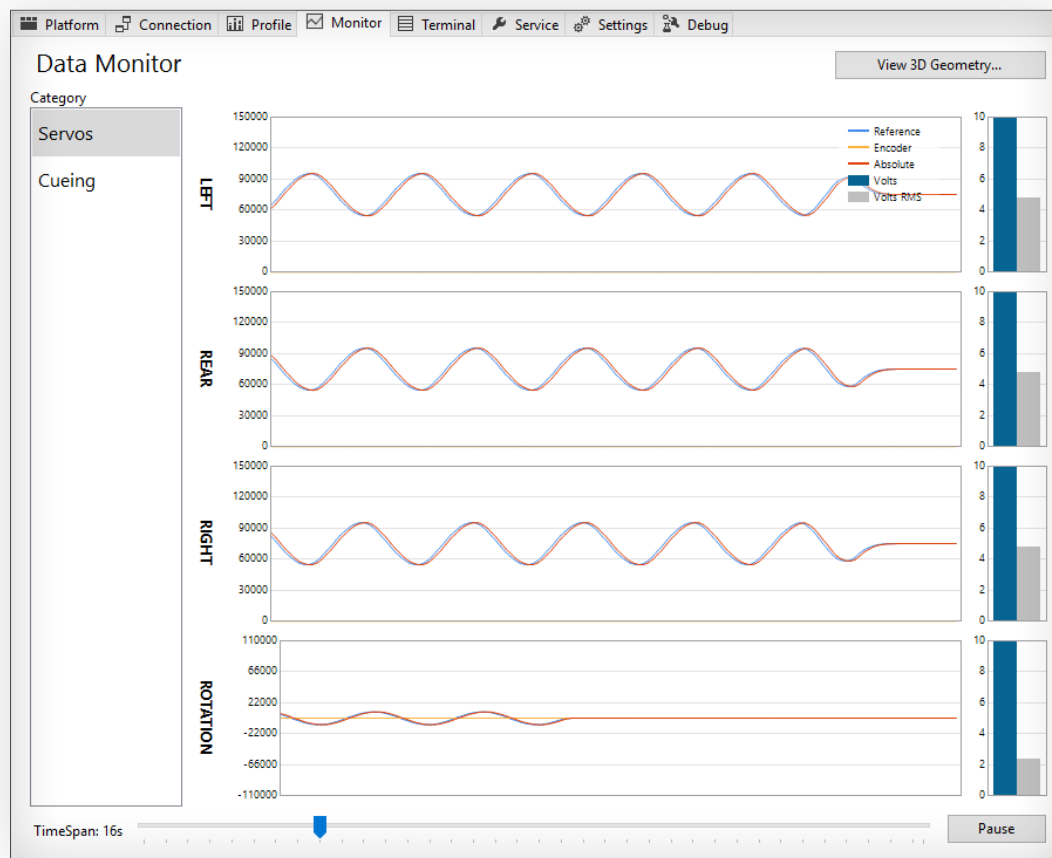
PROFILE EDITOR CATEGORIES: SERVO

Linear Servo	Configures advanced servo system setup for strut motion
Acceleration	Sets the maximum acceleration of the struts. Higher values give sharper response; lower values smooth things out.
Deceleration	Sets the maximum deceleration of the struts. Should be set equal to Acceleration .
Velocity	The maximum speed at which the struts are allowed to move. High Acceleration and low Velocity would result in sharp response but long transition times between positions. Setting Velocity too high can result in errors if the hardware can't keep up with commands.
Notes	Set Acceleration and Deceleration equally. Very low values of Acceleration/Deceleration or Velocity can result in Sync errors when individual struts aren't allowed to move fast enough to keep the platform in its target position.

Rotation Servo	Configures advanced servo system setup for the rotation axis
Acceleration	Sets the maximum acceleration of the r-axis. Higher values give better response to sharp cornering inputs, but if Acceleration is set too high, the r-axis drive wheel can slip, resulting in less actual motion. Optimal values will depend on the type of vehicle simulated and
Deceleration	Sets the maximum deceleration of the r-axis. Should be set equal to Acceleration .
Velocity	The maximum rotational speed of the r-axis. If this value is set too high, the axis can "fall behind" during repeated rotation events like tank-slappers, resulting in latency.
Reccomendations	The default values are sufficient for the vast majority of situations, but you may want to tweak Acceleration and Deceleration for cases where onset cueing is absolutely critical, such as VR.

PLATFORM CONFIGURATION

MONITOR TAB



The **Monitor** tab shows information about the motion platform's current position. You can use it to verify that it's responding as you expect, or to check how it's reacting to a given game.

You can double-click on the charts to zoom in one level, or use the mouse wheel to zoom in and out. Right click to reset the zoom level. Click and drag to reposition a chart inside its window.

View 3D Geometry...

Opens a popup window showing a 3D view of the platform. This view is generally meant for internal debugging, so it doesn't look like a motion platform; rather, it consists of elements that show certain restriction points or trigger areas for the internal code that drives the motion system.

Category

Selects between Servo view and Cueing view. In Servo view, the graph shows the current raw position of each servo motor; in Cueing view, the graph shows (extremely) detailed traces of ForceControl's internal cueing system data. If you want to get into the nuts and bolts of how your filter settings are affecting what you feel, this is the page for you!

PLATFORM CONFIGURATION

TimeSpan Adjusts the amount of data shown in all charts.

Pause / Resume Stop or continue updating the chart. The chart will automatically stop updating when motion is disabled.

TERMINAL TAB

Data Record		Terminal
Name	Value	^
header_0	135	:-58045, -77606, -77653, -2193
header_1	15	:
header_2	156	:-91943
header_3	0	
sample_number	25460	
input_bank_0	255	
input_bank_1	18	
input_bank_2	18	
input_bank_3	18	
input_bank_4	50	
input_bank_5	50	
input_bank_6	50	
input_bank_7	50	
input_bank_8	50	
input_bank_9	50	
output_bank_0	207	
output_bank_1	0	
output_bank_2	2	
output_bank_3	0	
output_bank_4	0	
output_bank_5	0	
output_bank_6	0	
output_bank_7	0	
output_bank_8	0	
output_bank_9	0	
error_code	42	
general_status	33	
s_plane_segment_count	0	
s_plane_move_status	16384	
s_distance	0	

The **Terminal** tab allows you to communicate directly with the motion platform's Galil servo controller.

**USING THE TERMINAL INCORRECTLY CAN DAMAGE
HARDWARE AND/OR CAUSE INJURY TO THE USER!**

You shouldn't use the terminal unless you're an expert user or Force Dynamics gives you direct instructions!

PLATFORM CONFIGURATION

SERVICE TAB

The **Service** tab allows you to perform various service operations on your platform. Click on a button to start the labeled procedure.

Calibrate Strut Servos...	Runs a full calibration sequence. This sequence checks limits, resets the zero position, and detects available strut travel.
----------------------------------	--

Settle Strut Servos...	Lets the struts drop slowly to rest on shipping blocks for transport or servo service.
-------------------------------	--

Force Park Strut Servos...	Lowers struts to their minimum length, overriding servo system errors. Use with caution!
-----------------------------------	--

Test Strut Servos...	Checks all servos by running them in each direction. Ensure that belts are removed before using!
-----------------------------	--

WARNING: THE STRUT SERVO TEST MUST BE DONE WITH BELTS REMOVED!

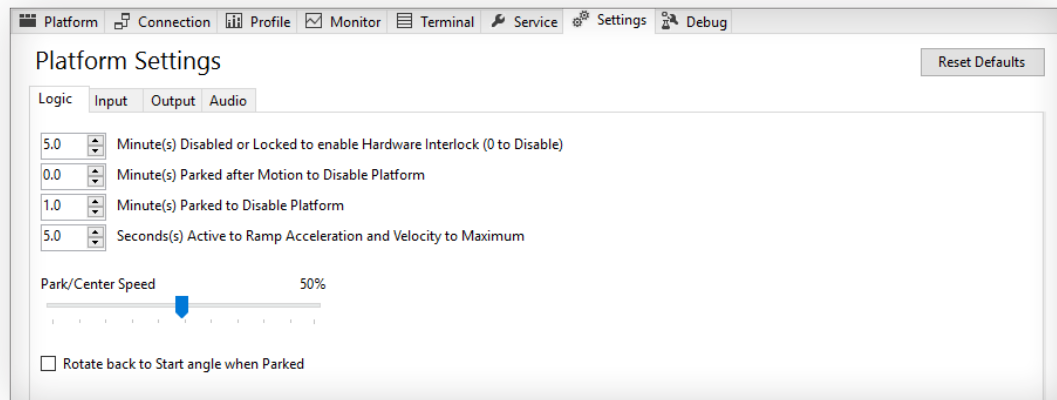
Toggle Free-Rotate...	Unlocks brake on r-axis motor so a 401 can be rotated by hand.
------------------------------	--

Reset...	Reboots servo controller.
-----------------	---------------------------

Soft Master Reset...	Clears memory and reboots servo controller. This will reset machine statistics, and the controller will need its IP address reassigned!
-----------------------------	---

PLATFORM CONFIGURATION

SETTINGS TAB



The Settings tab has several tabs of its own which let you configure various options you may (or may not) find useful. Click **Reset Defaults** to return these options to their factory settings.

Here's a rundown on each tab's functionality:

Logic

The four selection boxes let you choose the number of idle minutes before the hardware interlock is engaged, and the number of minutes after motion or park before the platform is put in disabled mode. You can also set the **Park/Center Speed** to speed up or slow down the lift and drop sequence that occurs when motion is started.

Input

This slider selects the sensitivity of the respawn detection, which prevents jerks when the vehicle is respawned within the game environment. A lower sensitivity might result in jerks when the vehicle is 'teleported' a short distance; a higher sensitivity might temporarily fade out motion during a crash or impact.

Output

As of the initial release of version 5, the **Output** tab is experimental, but will eventually allow communication of the platform state to other software or hardware that might find it useful, such as VR systems.

Audio

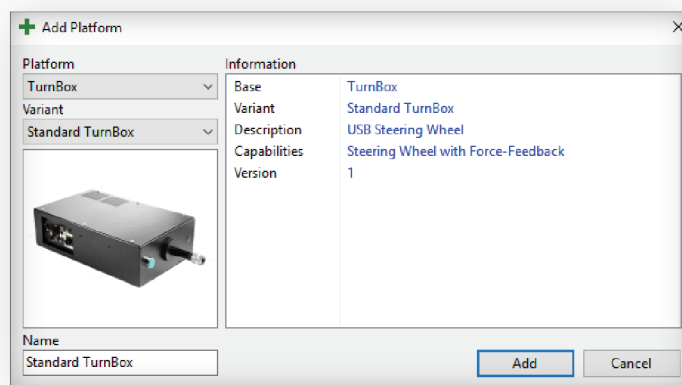
Allows you to enable soothing voice notifications of the platform state if a user attempts to activate it while the door is open or the belt is disconnected.

Also available is the option to make the machine go bong-bong-bong if the door is open, just like in a *real* car. Use the setting box to adjust the number of minutes of bonging, which is an option that your real car probably *doesn't* have.

TURNBOX OVERVIEW

INTRODUCTION

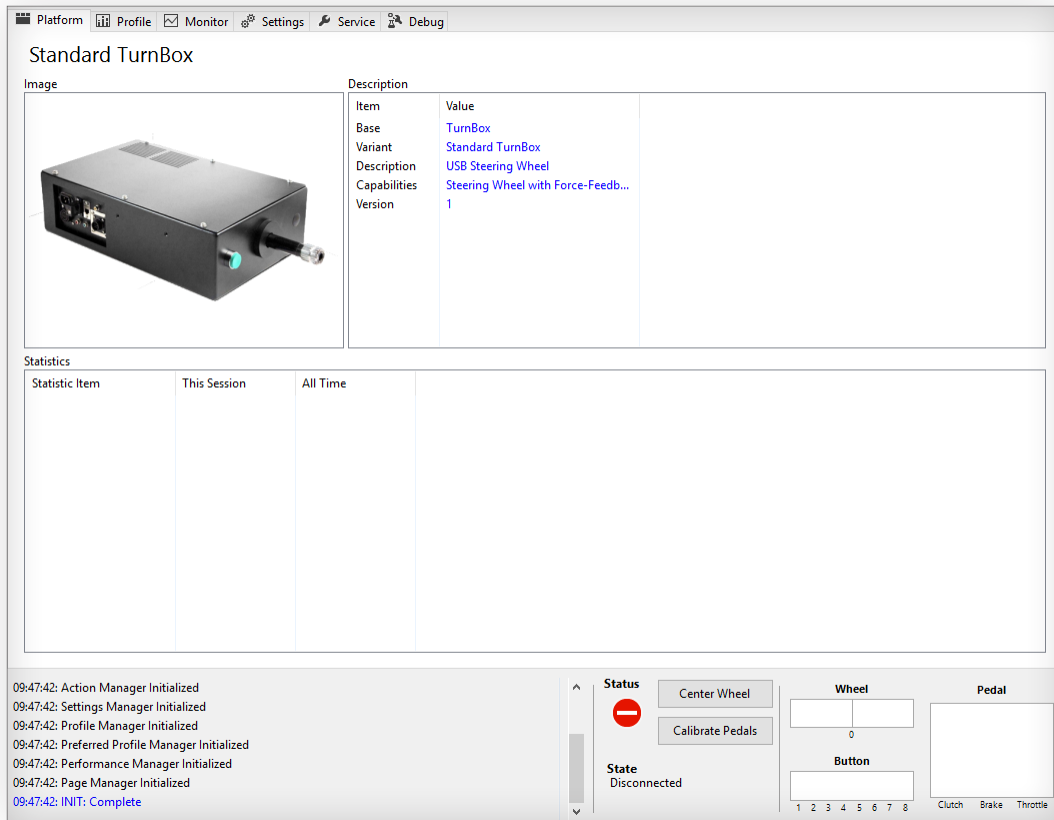
With ForceControl 5, you can control all types of Force Dynamics hardware right from ForceControl. To use ForceControl 5 to set up your TurnBox wheel, plug the wheel in and let Windows finish its installation. Then, click the + in the **Platform List** and select **Standard TurnBox** from the **Platform** dropdown list on the left:



Once you've added the TurnBox, click it in the **Platform List** to show its configuration options in the main window.

TURNBOX OVERVIEW

TURNBOX MAIN WINDOW



Whereas the **Platform** main window is divided into three sections, the TurnBox only needs two: It's always active, so there's no need for a control section to turn it on or off.

On the top, as with the **Platform** setup, a series of tabs lets you configure options. And down below, the status bar shows information about the state of your steering and pedals.

STATUS BAR

On the left of the status bar is a log of communication with the TurnBox. Most of this won't be of much interest unless something breaks; in that case, you'll want to let Force Dynamics know what it was, and the log can help figure out what's what.

In the middle, you'll see the current status of the wheel — whether it's connected, and whether it's functioning correctly if it is. There are also quick buttons to recenter the wheel and calibrate the pedals.

On the right, three boxes show the position of the wheel and pedals and the state of the buttons.

TURNBOX CONFIGURATION

INTRODUCTION

The TurnBox is a simpler device than the 301 and 401 motion platforms, of course, but there are still a few options and settings you can change to make it work the way you want. Here's how they work.

OVERVIEW

Platform

Profile

Monitor


Settings

Service

Debug

Standard TurnBox

Image



Description

Item	Value
Base	TurnBox
Variant	Standard TurnBox
Description	USB Steering Wheel
Capabilities	Steering Wheel with Force-Feedb...
Version	1

Statistics

Statistic Item	This Session	All Time
----------------	--------------	----------

When you select your TurnBox from the Platform List, you'll see a tab group in the main window to the right. This is where you'll find configuration options for the selected platform or device.

Over the next few pages, we'll take a detailed look at each tab in turn.


TURNBOX CONFIGURATION

PLATFORM TAB

Platform Profile Monitor Settings Service Debug

Standard TurnBox

Image



Description

Item	Value
Base	TurnBox
Variant	Standard TurnBox
Description	USB Steering Wheel
Capabilities	Steering Wheel with Force-Feedb...
Version	1

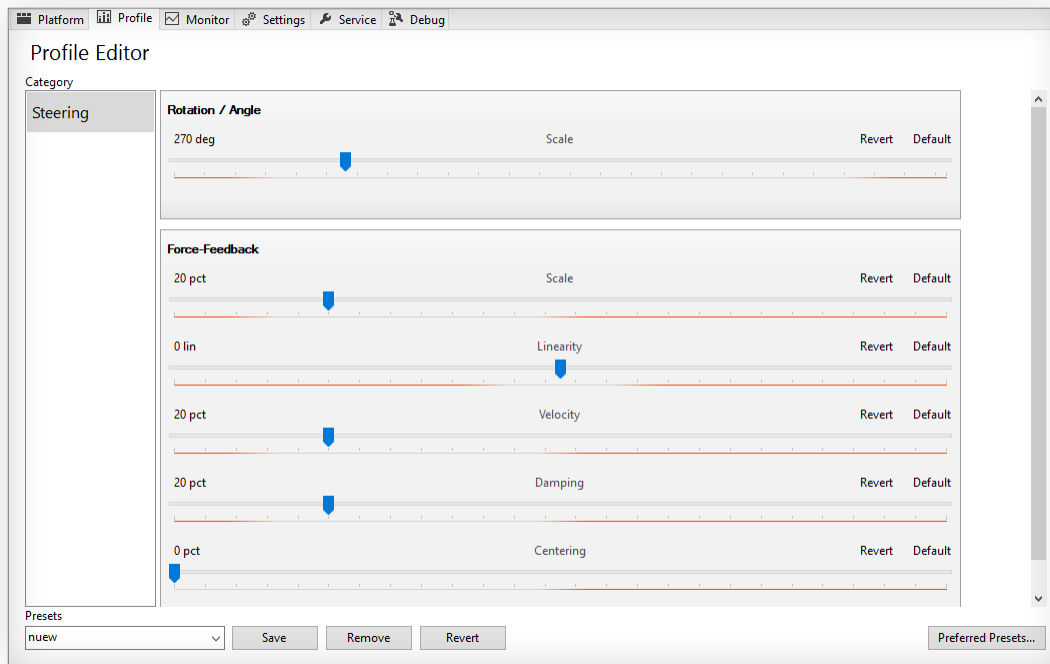
Statistics

Statistic Item	This Session	All Time
----------------	--------------	----------

The Platform tab is pretty simple: It has an image and a brief description of the device. Below those you'll find a **Statistics** box, but currently we haven't implemented statistics for the TurnBox. If we do, they'll show up here.

TURNBOX CONFIGURATION

PROFILE TAB

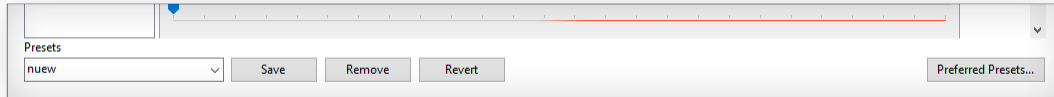


As with our motion platforms, with the TurnBox you'll be spending most of your time in the **Profile Editor**. Again, it's quite a bit simpler than its motion platform cousin. We'll cover **Presets** first, and then go over the profile setup.

TURNBOX CONFIGURATION

PROFILE TAB: PRESETS

ForceControl lets you save and load presets so you can quickly get ready to run a specific game, or even a specific car type or track. You can also save **preferred presets** which will load automatically when a particular game is detected.



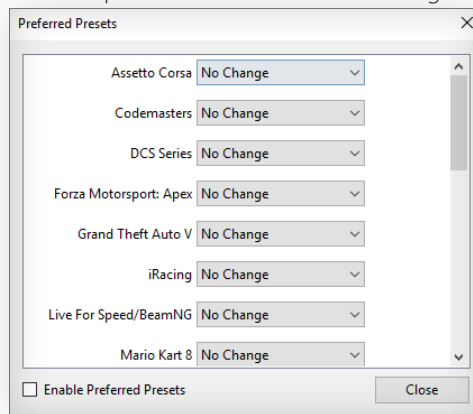
Dropdown Box Click the dropdown box to select and load a preset.

Save Saves any changes to the current preset.

Remove Deletes the preset.

Revert Reverts the preset to the last saved state.

Preferred Presets... Click to open the Preferred Presets dialog box:



Click on a dropdown menu corresponding to the desired game to change its default preset. If **No Change** is selected, the currently chosen preset will remain in effect when the specified game starts. To enable the feature, check **Enable Preferred Presets**. Click **Close** to close the dialog.

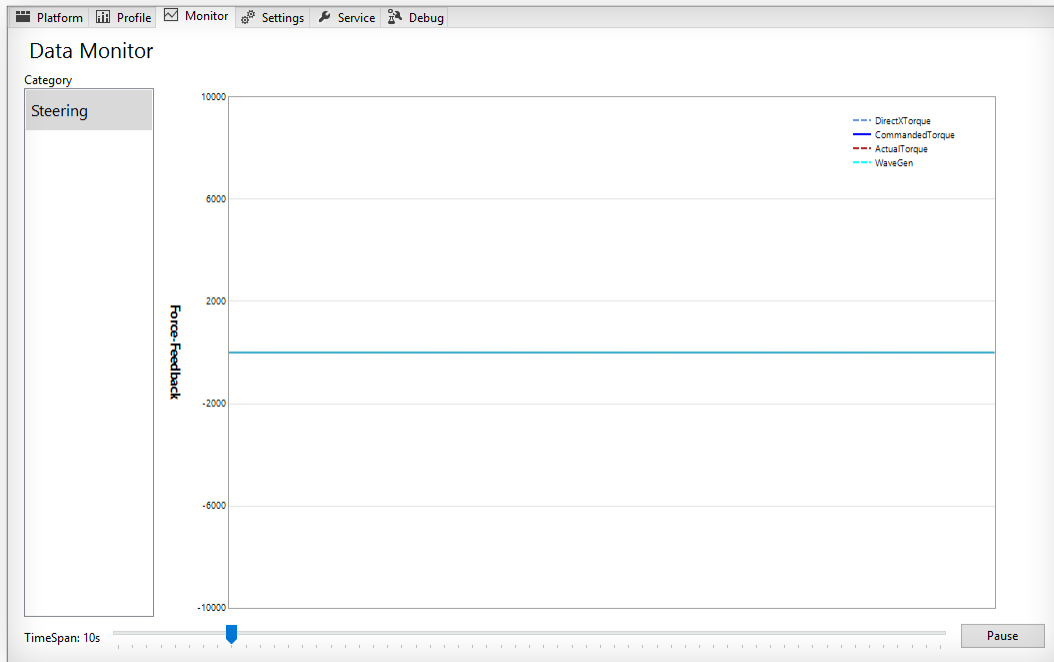
TURNBOX CONFIGURATION

PROFILE TAB: EDITOR

Rotation / Angle	Adjusts the maximum rotation range of the wheel
Scale	Sets the number of degrees the wheel will rotate, lock to lock. The wheel has a 'soft stop' at the end of this travel range.
Recommendations	<p>Some games such as iRacing will automatically adjust their internal settings to match the rotation range of the wheel when you configure controls in-game. So you can set your TurnBox to whatever rotation range you prefer, calibrate in-game, and the wheel will respond correctly when you drive the car.</p> <p>Other games 'expect' a certain wheel range, such as 270 degrees or 540 degrees, for the in-game wheel to match the TurnBox. In that case you'll want to set the TurnBox to the rotation range the game wants to see.</p>
Force Feedback	Adjusts the way the wheel responds to steering forces from games
Scale	Sets the overall strength of the force feedback. 50% is full scale for most games, and going over 50% can result in 'clipping' of high forces if the game outputs on a full scale. If the game's output is 'weak', however, you may want to increase Scale to compensate.
Linearity	At 0 lin, the wheel's output torque scales linearly with the game's output torque. Positive linearity gives you more response from the wheel when the game is sending a weak torque signal and less response when it's sending a stronger signal; negative linearity gives you less response when the game is sending a weak signal and more when it's sending a strong signal.
Velocity	Sets the maximum velocity the wheel will allow itself to spin at before it damps its own motion. Lower values mean the wheel won't 'go crazy' when you let go of it, but it might 'push back' when you countersteer rapidly.
Damping	An internal damping routine helps stop the oscillations inherent in digital FFB systems. If the wheel saws back and forth when you let go when the car is still or moving quickly on a straight, increase Damping to cure the problem.
Centering	Sets the strength of an always-on spring force that returns the wheel to its center position. Can be used with high Damping to provide a neutral feel for games whose feedback output is nonexistent or not working.

TURNBOX CONFIGURATION

MONITOR TAB

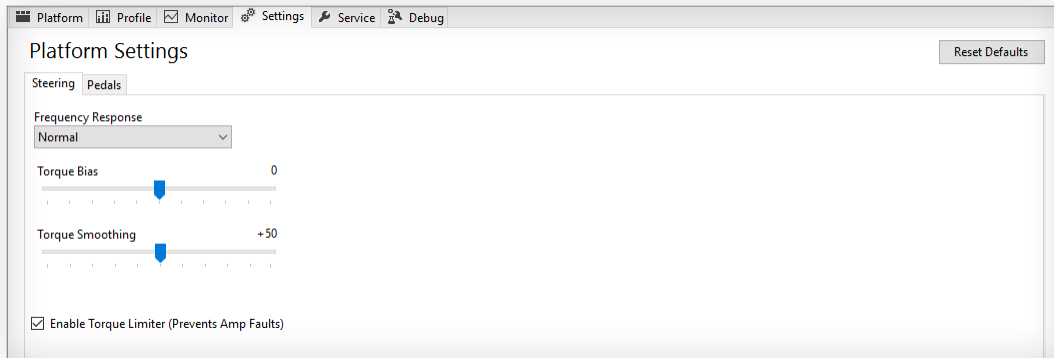


The **Monitor** tab contains a graph showing the recent history of torque commands sent to the wheel, and the wheel's resulting output. You can use this graph to check to see if you're getting clipping in-game (which will show up in the **DirectXTorque** line) or on the wheel's output side (which will show up in **ActualTorque** and **CommandedTorque**).

Use the **TimeSpan** slider to adjust the time covered by the graph. Click **Pause** to stop the graph from updating.

TURNBOX CONFIGURATION

SETTINGS TAB: STEERING



The **Steering** tab in **Platform Settings** offers a few adjustments you may find useful for setting up your TurnBox. These adjustments affect all wheel operations, so they're set once here rather than in individual profiles.

Frequency Reponse	Set to Very Loose , Loose , Normal , Tight , or Very Tight . This adjusts the response of the wheel to fine detail, and shouldn't normally need to be changed.
Torque Bias	Sometimes the servo system in the TurnBox can have a slight bias clockwise or counterclockwise. If you wiggle the wheel when it's idle and feel more pull to one side than the other, you can adjust Torque Bias to compensate.
Torque Smoothing	You can use this slider to filter noise or other transients out of the feedback signal. Some games expect the heavily-damped and not-very-responsive performance of consumer wheels, and might give sharp or uncomfortable responses with the TurnBox. Use Torque Smoothing to help get rid of this effect.
Enable Torque Limiter	Some of our wheels are shipped with modified hardware to handle very high continuous torque and adjusted firmware to allow the power systems to supply it. If you have such a wheel, you can disable the torque limiter to give full access to the wheel's output. If your wheel isn't specified for this performance, disabling the torque limiter will cause belt slippage and/or amplifier faults!

SETTINGS TAB: PEDALS

The **Pedals** tab currently has only one option: If you're using a third-party pedal set, you don't want the 'dead' inputs to ForceTorque reporting as floating axis inputs. Check **Disable Pedals** to prevent this from happening.

TURNBOX CONFIGURATION

SERVICE TAB



The Service tab is here for you to set up the basic functions of your TurnBox.

Center Wheel

Since the TurnBox doesn't have an encoder that tells it exactly where it's positioned, it assumes that it's centered when it starts up. If it wasn't, you'll end up driving with the wheel off to the side like with the old Escort you drove when you got out of college. To fix that, center the wheel and click **Center Wheel**. If only it had been that easy with the Escort.

If you're in-game, you can also do this by pressing the tiny red button on the left side of the TurnBox.

Calibrate Pedals...

Opens the pedal calibration dialog. Follow the instructions to calibrate your pedals. **You should do this before doing calibration in-game!**

Update Firmware...

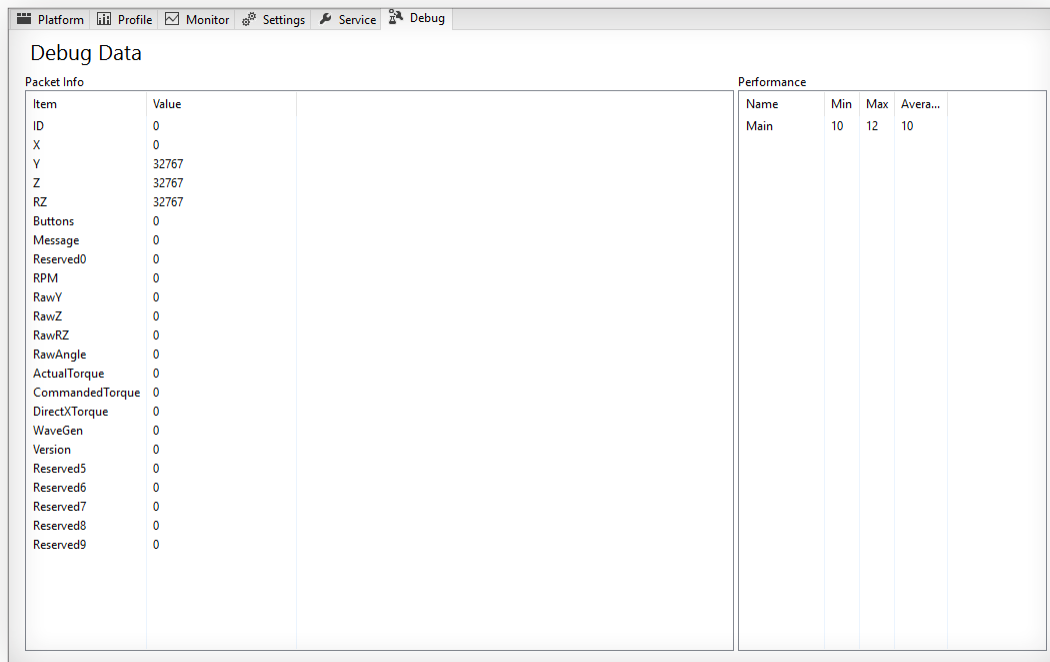
Opens the firmware update dialog. If there's new firmware available for your TurnBox, you can download it and install it here.

Reset...

Reboots the TurnBox controller. If your wheel stops responding or you have other inexplicable problems, try this first.

TURNBOX CONFIGURATION

DEBUG TAB



Packet Info		Performance			
Item	Value	Name	Min	Max	Avera...
ID	0	Main	10	12	10
X	0				
Y	32767				
Z	32767				
RZ	32767				
Buttons	0				
Message	0				
Reserved0	0				
RPM	0				
RawY	0				
RawZ	0				
RawRZ	0				
RawAngle	0				
ActualTorque	0				
CommandedTorque	0				
DirectXTorque	0				
WaveGen	0				
Version	0				
Reserved5	0				
Reserved6	0				
Reserved7	0				
Reserved8	0				
Reserved9	0				

The **Debug** tab shows detailed raw information about the internal state of the TurnBox. If you're having trouble with wheel or pedal calibration, or with some other aspect of your wheel (such as not being sure whether the pedal hardware is working or whether the calibration is just incorrect), Force Dynamics can use this information to help sort out what's going on.

TELEMETRY RELAY

INTRODUCTION

With ForceControl 4 and previous, two computers were recommended to operate our motion systems: The Game Computer would send vehicle data over the network to the Control Computer, and the Control Computer would send simulator control data over the network to the simulator's servo controller.

With ForceControl 5, only one computer is necessary. But if you're upgrading, you might want to keep using separate computers. Here's how to set it up.

INSTALLATION

- 1 Install ForceControl 5 on both computers you want to use.
- 2 On the game computer, run **Force Dynamics → Telemetry Relay** from the Start Menu.
- 3 On the control computer, start ForceControl.
- 4 In ForceControl, go to **View → Input Manager** and click on **Telemetry Relay...** to option the telemetry relay options.
- 5 Make sure that **Listen Port** is set the same as it is in Telemetry Relay on the game computer (the default is 32000; it shouldn't need to be changed).
- 6 Check **Enable Telemetry Relay** and click **Close**.

You should now be able to use the Input Manager in Telemetry Relay on the game computer in the same way you'd use it within ForceControl itself with a single-computer setup.

LEGACY FORCECONTROL SUPPORT

You can also use the Telemetry Relay to send game data to ForceControl 4 and earlier, if you want. In Telemetry Relay, check **Legacy ForceControl Output** to enable this feature, and make sure that you reconfigure games to send data to Telemetry Relay instead of your old ForceControl version.

ANDROID APP

INTRODUCTION

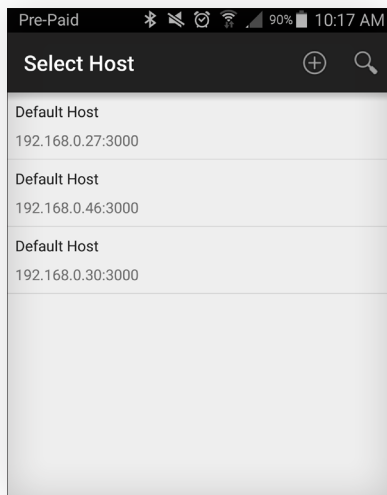
The ForceControl Android app lets you control most aspects of a 301 or 401 motion platform from your Android device.

Before you start, make sure that your device is on the same WiFi network as the computer running ForceControl.

INSTALLATION

To install the ForceControl Android app, visit the Play Store and search for ForceControl. The app is free, and there aren't even any in-app purchases! Once you've installed the app, start it up.

SETUP



When the ForceControl app is started, you'll see the **Select Host** screen. If this is your first time running the app, you won't see any hosts listed. To get started, tap the + if you know the IP address of the computer running ForceControl, or tap the magnifying glass if you'd like to search for it.

As long as ForceControl is running and your device is on the same network as the ForceControl PC, the app will be able to auto-discover it. The app will say that it's **Scanning For Hosts...**, and any hosts available will appear in a list below.

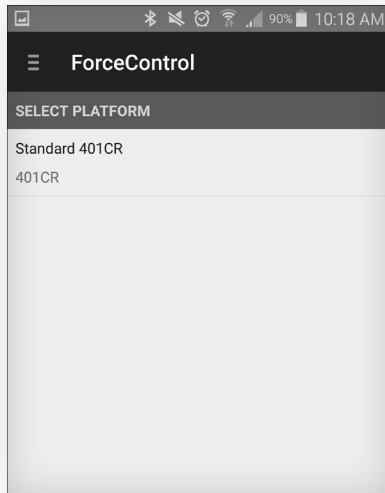
Tap the host you want to connect to (unless you have more than one computer running ForceControl, you'll just see one). You'll see the **Add Host** dialog, with the IP address and port for the host filled in automatically. You can tap on the name (**Default Host** by default) to change it, if you like.

Now tap **Add Host** (at the bottom of the screen), and your new host will be visible in the **Select Host** screen. Tap on it to connect!

TIP: YOU CAN DELETE HOSTS BY TAPPING AND HOLDING ON THEIR NAMES IN THE SELECT HOST DIALOG.

ANDROID APP

USING THE APP



Once you've selected a host, the ForceControl app will connect to it and display a list of available platforms and devices. If you have ForceControl set up with just a platform, you'll see it there as in this screenshot; if you've also added, say, a TurnBox wheel, you'll also see it and be able to access its configuration options.

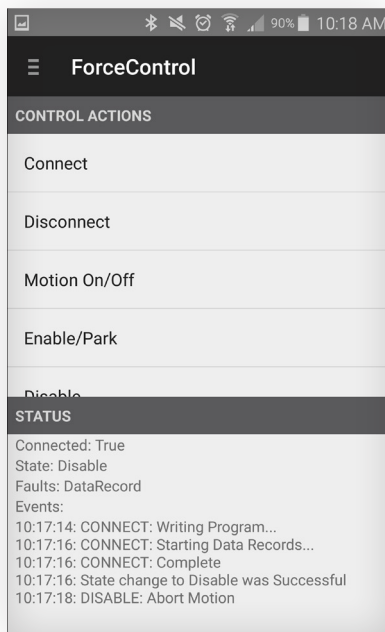
If you add more devices or upgrade ForceControl on your PC to add features, those devices and features will automatically become available in the app.

Once your device is available, tap it to select it, and a slide-out menu will appear on the left. This menu will have most of the same options available in ForceControl. Tap on a menu item to access its settings; as you adjust

them, they'll adjust in real time in ForceControl on the PC.

TIP: WITH THE APP, YOU CAN ADJUST SETTINGS EVEN WHILE IN-GAME.

CONTROLLING THE PLATFORM



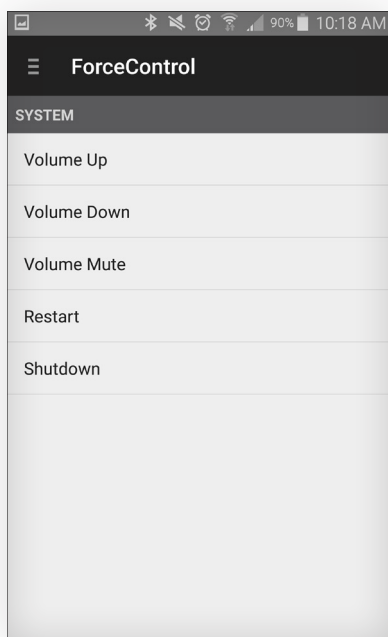
You can activate, deactivate, and perform other control operations on the motion platform from the ForceControl app. To do so, tap **Control** from the slideout list. Available actions will be shown on the top of the screen (drag up and down to show more) and the status of the platform will be shown at the bottom.

ANDROID APP

ADJUSTING SETTINGS

To change a slider setting, drag the slider left or right. To show additional options for a setting (for example, Longitudinal Pitch), tap the down arrow to the left of the slider. To reset changes to the slider, tap the undo icon on the right. You can also enable or disable a given cueing type by checking or unchecking the box to the right of the cueing setting's name.

SYSTEM PAGE



In addition to the settings available directly in ForceControl, the ForceControl Android app allows you to control a number of PC system settings remotely. Tap the settings to raise, lower, or mute the system volume, or to restart or shut down the PC. The **Restart** and **Shutdown** options require confirmation.

Note that once you trigger a restart or shutdown, the remote control app will not function again until the system has restarted and ForceControl is running!