



Lens and 3D Control for Manual Rigs

User Manual



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Intended Readers

Users, Operators

Subject

Care and feeding of the Technica Hand Controller for 3D

Document Version/Date

V 1.0 –

Applicable for Device Version

Technica Hand Control

Preface

This document contains instruction and reference information for the operation and use of the
Technica Hand Controller

Trademarks

Please tell me what I should fill in here.

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Federal Communications Commission (FCC) Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Class rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, which the user will be required to correct at his expense. To assure continued compliance follow the attached installation instructions and do not make any unauthorized modifications.



WARNING:

TO REDUCE THE RISK OF FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.

CAUTION:

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(b) The "Warranty Period" begins on the date the Equipment is delivered and continues for 12 months.

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The following information describes our current warranty support procedures. These procedures are subject to change without notice and are expressly excluded from the Limited Warranty.

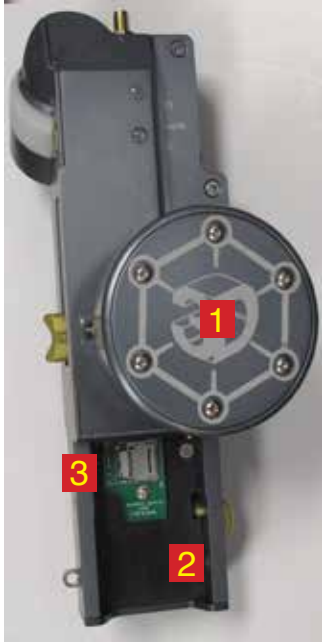
- Our Customer Support Representatives are available to provide telephone support during business hours (M-F, 9am-6pm Pacific Time), and after these hours for urgent "emergency" technical support.
- Customer Support will be provided only for products under warranty or those covered under a valid Support Agreement.
- Before returning the Product for repair, it is necessary to obtain a Return Merchandise Authorization (RMA) number by calling (818) 333-3000. You will be asked to provide the system's serial number.
- The non-functioning part should be properly packed and shipped pre-paid to 3ality Technica with the RMA number clearly displayed on the outside of the package and on the accompanying RMA form. We will refuse to accept any package without a valid RMA number.
- Repairs outside the scope of the Limited Warranty require a valid and valid Support Agreement prior to any repairs. 3ality Technica does not offer time and materials based repair services.



2. Introduction

3ality Technica's Hand Controller is a fully-customizable device for controlling Interaxial and Convergence for use creating Stereoscopic 3D. The Technica Hand Control (THC) can be used either with a manual rig system or an automated 3ality Technica TS system

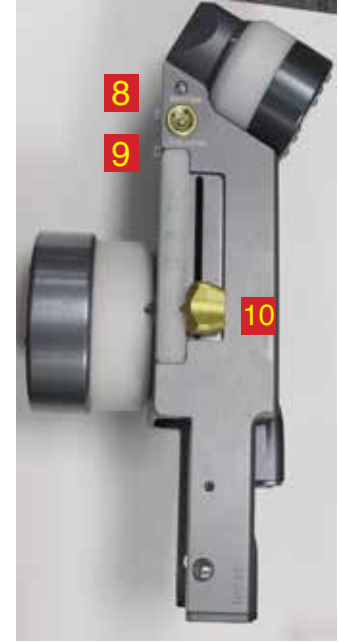
3. THC Anatomy



- 1. Convergence Wheel
- 2. Battery Compartment
- 3. MicroSD slot



- 4. IO or Zoom limit Button
- 5. Convergence or Focus Limit Button (start/stop when pressed together)
- 6. Vmount (optional)
- 7. Battery release



- 8. Battery Condition light
- 9. IO Selection Switch
- 10. IO Slider (when selected)



11. IO wheel (when selected)

16. Profile button (to activate lens profiling) (On some units this will say PROFILE. Units are physically identical, differentiated only by firmware)



- 12. Auxiliary Port: for TS rig connection
- 13. Wired Port: 4-pin Lemo CAN port for hard-wired communication
- 14. Initialize button
- 15. Battery/Cable toggle
- 16. Infinity button: to switch into User Calibration mode (On some units this will read PROFILE. Units are physically identical, differentiated only by firmware).

NOTE:

When using with a manual rig, only slider and large wheel are configurable.

When using with an automatic system, all three controls are user-assignable.

4. Configuration

4.1 Typical In-System Configuration: Manual Rig (Atom, Pulsar, Quasar)

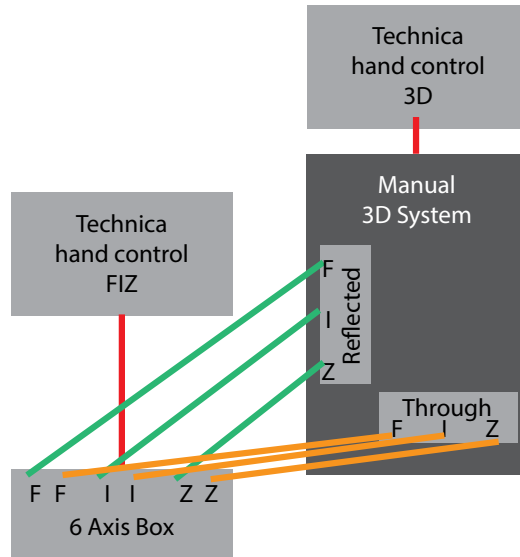


Figure 4.1a In-System Configuration for both 6-axis lens control and 3D control

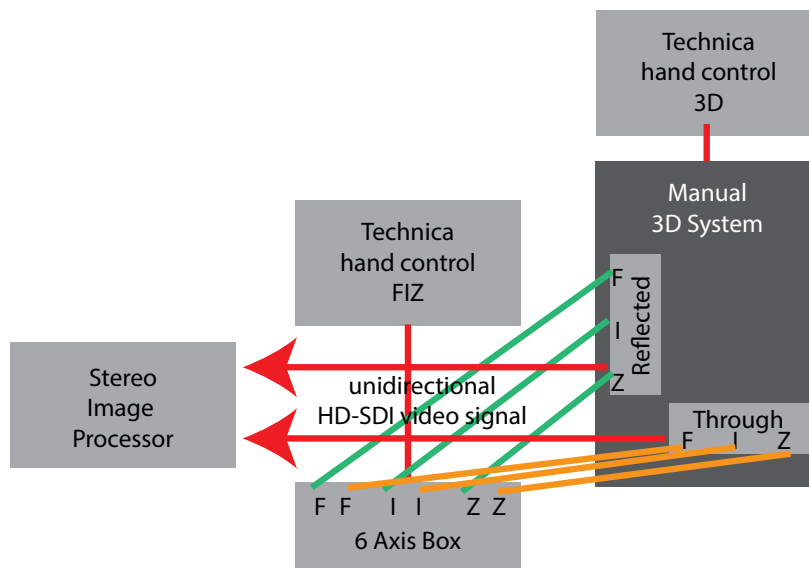


Figure 4.1b In-System Configuration with SIP for both 6-axis lens control and 3D control

4.2 Connecting the Hand Control to the Lens Control System – Manual Rig Configuration

For Wired configuration: Using 4-pin to 6-pin cable (T3D-C-THC-C100), Connect to RS232 port of 6-axis Control Box. When establishing a wireless connection to the system, the THC must first be connected to either the 6-axis control box or the 3D box before disconnecting for wireless communication.



Figure 4.2a Connect from Wired port on THC to CAN port on 6-axis box (can also use 232 or 232/422 ports).



Figure 4.2b T3D-C-THC-C100

4.3 Typical In-System Configuration: Automatic Rig

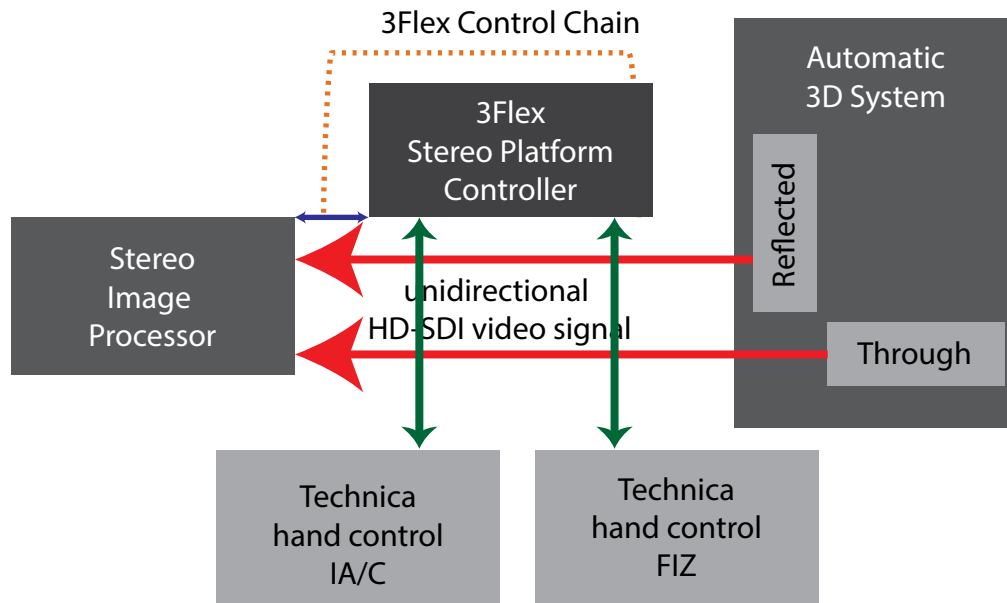


Figure 4.3a In-system configuration, with automatic rig (can also be used with analog broadcast controls)

Technica Hand Control connects to the FIZ1 and FIZ2 ports of the 3Flex SPC7000 or SPC7100, depending on your configuration. Port functionality for this configuration is assigned from within the 3Flex Control Center.

4.4 Typical In-System Configuration: Automatic Rig

Using a cable of desired length (T3D-C-232-6-C18i), connect the Aux port of the Hand Control to the Digital 1 or Digital 2 port of your SPC 7000 or SPC 7100.

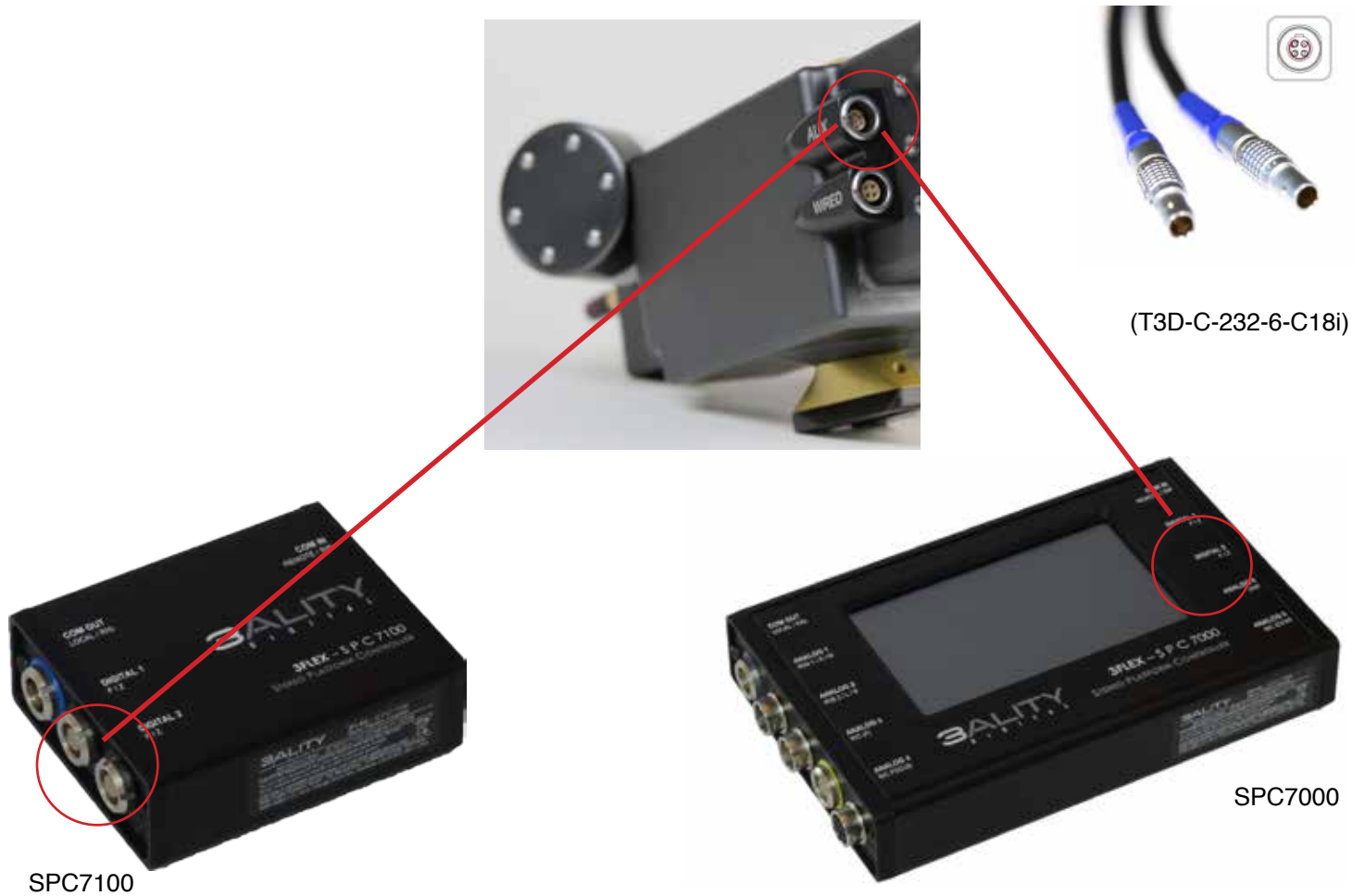


Figure 4.4a In-system configuration, with automatic rig (can also be used with analog broadcast controls)



5. Technica Hand Control Initialization

Initialize the Technica Hand Control to determine the complete range of travel for each configuration.

5.1 Wired Configuration Initialization

Manual rig system

Wired Port: The CAN bus provides communication and power to the Technica Hand Control when

Communication Range is 1600 ft

Cabled Power range is 500 ft.

Use a battery for power beyond 500 feet.

AUX: Port provides RS232 connectivity

Wireless: 2.4 GHz FHSS wireless.

Communication ranges from 1400ft to one mile, though real-world results may vary.

Automated rig system

RS232 Port provides the means of connecting to the SPC7000/7100.

Wireless connection is not yet implemented.

Establishing a Wired Connection

For Interaxial, activate either Thumb slide or small wheel. (HOW)

Manual rig:

1. Connect cable from Wired Port to 3D Control Module. (as above in Figure 2)
2. Power 3D control module by connecting 12-volt two-pin cable from PWR port to power source.
3. Initialization can begin when the LEDs turn off
4. Press Initialize (Initialize LED will flash)
 - a. Pressing and holding the button will affect all motors
 - b. A short press will initialize only those motors with unknown orientation.
5. Direct camera dovetail will travel left, right, and then reposition where the IO slide or wheel is set.
6. Check the system's responsiveness by moving your IO control
7. When complete, LED next to antenna will remain off.
8. After powering on, motors will initialize automatically when connected.
9. Information is stored for 14 hours.
10. Motors can be disconnected and reconnected before shut down with no adverse effects.

Troubleshooting:

If you notice less than full travel on the rig, check the following:

1. Cable Drag
2. Motors and Mounts positioned incorrectly
3. Dovetail friction, or starting when not parallel
4. Hard Stops not set correctly
5. Mirror box lens opening sliding incorrectly

Automatic rig:



Connect cable from Wired port to FIZ1 or FIZ2 port of 3Flex SPC7000 or SPC7100, depending on your configuration. (Port functionality for this configuration is assigned from within the 3Flex Control Center)

Lens control:

Connect to RS232 port of 6-axis controller box.

5.2 Wireless Configuration Initialization

To establish a wireless connection, the THC must first be connected to the Control Module, as described below:

The wireless control supports 42 channels of communication and two power levels.

Set power using the iPhone application (see appendix a)

Manual rig (wireless control from an Automatic rig is not yet implemented):

1. Connect THC (via Wired Port) to Control Module of powered Manual Rig
2. Connection process will complete after 5 seconds.
3. Disconnect cable.
4. Successful connection: LED next to antenna will remain a constant blue
5. Unsuccessful connection: LED next to antenna will continue flashing blue.



Troubleshooting an unsuccessful connection:

1. Cycle power from the hand controller by switching from cable to battery and back (or vice versa)
2. if still unsuccessful, repeat the process from the beginning
3. Once this connection is established, it does not have to be repeated..



6. Programming the THC for 3D

Using the Rig Controller application on the iPhone or iPad will give you 20 points of lens matching for both focus and zoom parameters. If you do not have an iPhone or iPad, however, the controller allows you to set a match for minimum and maximum focus and zoom.


Matching Focus

1. Push and hold the **Profile**  button for 4 seconds (LED will flash)
2. Rotate lens demand to Infinity
3. Push/Hold Focus button (FS or C), rotating demand to ensure only one lens is engaged.
4. Adjust the other lens to match.
5. Repeat for Minimum Focus.
6. Once both ends are matched, push the **Profile**  button once more, LED will turn solid.

Matching Zoom

1. Push and hold the **Profile**  button for 4 seconds (LED will flash)
2. Rotate lens demand to Telephoto
3. Push/Hold Zoom button (ZM or IO), rotating demand to ensure only one lens is engaged.
4. Adjust the other lens to match.
5. Repeat for wide end of the zoom.
6. Once both ends are matched, push the **Profile**  button once more, LED will turn solid.

Profiles remain in system through power cycles.

To Re-engage setting, press **Profile**  button

To cancel and make new settings, Press and hold **Profile**  button for four seconds.

Repeat above instructions.

limit buttons >

Setting Lens or 3D Limits

Move lens to one end of limit

Press and hold the corresponding limit button.

Move the Lens to the other end of your desired limit

Release the limit button

The limit will be set and enabled

The limit light will be illuminated

Toggle the limit by pressing the appropriate limit button



Locking Lens or 3D control

To Lock control, hold appropriate limit button for 10 seconds

LED will blink once ever second to indicate locked control

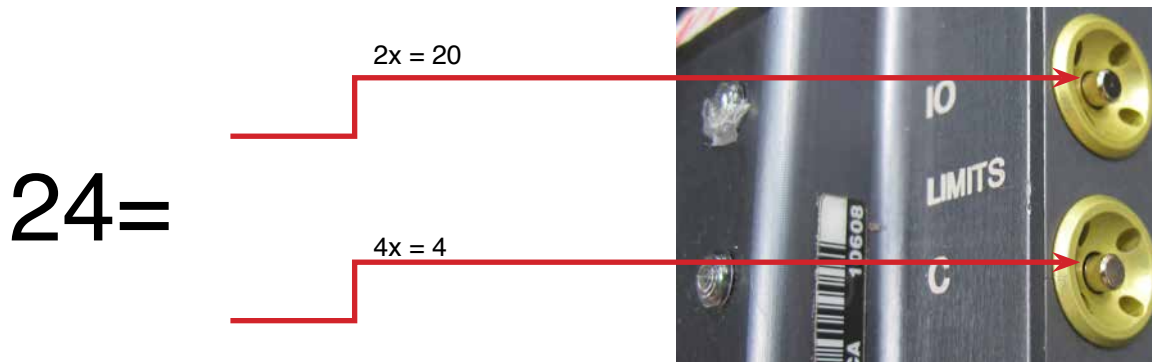
To Unlock control, hold appropriate limit button for 10 seconds

End Stop Buffers

A buffer is provided to ensure the motors do not drive the lenses to the end of travel
Use the Rig Control Application to set these buffer stops.

Motor Direction

Change motor direction by changing the direction switch located near the motor or...
Use the iPhone Rig Control Application.
The settings persist between reboots.





7. Channel setting

On THCs 42 communication channels are available on the Technica Hand Controller. (this is available only to THCs with RF controllers. Bluetooth controllers do not feature adjustable channels).

What you need: A cable to connect between the Wired (RS232) port and the 6-axis controller box.

To enter Channel Select Mode:

1. Remove battery
2. Set Battery/Cable Switch to Battery.
3. Using CAN RS232 cable, connect THC to Lens Controller
4. Switch Battery/Cable switch back to Cable,
5. While simultaneously pressing and holding Focus Limit Button.
6. With the Focus Limit button is depressed, the Focus Limit LED and Iris Limit LED blink alternately.
7. Release the Focus Limit button to determine the current channel:
 - a. The Focus Limit (IO) LED indicates the Tens
 - b. The Iris Limit (C) LED indicates the Ones

To change the channel:

Press the corresponding button the number of times that corresponds with your desired channel:

For channel 24: press IO 2x, and C 4x.

When you stop pressing, the hand controller will blink the current channel.

IO will blink twice;

C will blink 4 times.

When you complete the process, cycle the power and return the THC to its normal operating mode.

The blue light next to the antenna will illuminate, indicating the system is ready to operate.

8. Pulsar/Atom Alignment process in brief

Aligning the rig is the process of finding the cameras' point of rotation, axial or nodal point. Finding the nodal will allow you to maintain your convergence point while changing your interaxial distance. To accomplish this, you must find the point at which two targets -- one near and one far -- align when focussed on each. Finding the point requires that you start with the rig at a neutral position, with no angle on the cameras.

8.1 Ensure lenses are equidistant to mirror.

- You will have adjusted these during the mounting process.
- Reflected eye: Mount as close to mirror as possible without impeding travel of alignment module
- Through eye: ensure that convergence adjustments do not hit box.
- Look through mirror and check that lenses appear to be the same size. Be very sure there is no angle on the cameras
- Loosen through eye and move slowly along dovetail until images through mirror appear to be the same size

8.2 Null the rig

Using 9/64 allen key, slightly loosen alignment module (post 2011)

- Loosen the two locking allen bolts on the camera-left side of the alignment module. Do not remove.

Center all adjustment dials so plate is approximately halfway between all travel points.

- Center the Pitch and the Roll
- Open Z-Axis about half way: approx. equal to the lift of the Teflon pads

8.3 Set the Through Eye to Zero InterAxial

- Using hardstops (the small wheels on the side of the rig), move the Through eye to zero Interaxial
- Open hard stops to allow for max travel
- Focus on far target, use front knob to align far target
- Focus on near target, Use back knob to align near target (you will notice far target go out of alignment)
- Repeat this process until front and back targets are aligned. There will be a bit of a back and forth



8.4 Adjust mirror for pitch

- Unlock mirror
- Using 3/32 allen key, unlock two side locking screws. Loosen only slightly as to not lose the screw.
- Note that the screw is one of 3 visible from the side: use screw closest to back.
- Adjust mirror: set lens at wide so near and far targets are visible simultaneously.
- Carefully access adjustment screw through top of mirror box.
- Watching monitor, choose a far target with good horizontal details.
- With 5/32 allen key, carefully adjust mirror pitch until far targets are aligned.
- This is your beginning point.
- Lock the mirror and continue adjusting using Z and Pitch
- Continue to near target.



8.5 Adjust Height.

Focus on near target (can be at close convergence or nearer)

- Use Pitch to align near target
- Use Z to align far target.
- Repeat process until front and back targets appear aligned
- *If you reach the end of travel before either axis is aligned, readjust your mirror and begin again.

8.6 Adjust Rotation

- Adjust using roll knob.
- Check sides of frame for misalignment indicators.
- Once rotation is corrected, re-check verticals and make corrections as necessary.

8.7 Check Far target; Repeat

- If out of alignment, repeat vertical alignment adjustments until you are satisfied.
- When complete, proceed to User Calibration to align horizontals using Hand Control
- Once alignment is complete, lock alignment module. Tighten screws a little at a time so as to keep alignment true.



9. User Calibration -- Horizontal Alignment

Start the User Calibration process to align your horizontals.

- 1. Using your hands, move the hard stops so the Direct camera can travel to negative interaxial, while converged on infinity.
- 2. Lock the hard stops
- 3. After locking the hard stops, Initialize the rig.

Initiate User Calibration Setting Process

4. On the THC, hold the **infinity**  button down 2 seconds

- LED starts blinking, and AI no longer tracks convergence
- Use Interaxial slider to move camera horizontally -- for objects very close to mirror box
- Use Convergence knob to set an angle -- for objects at infinity

5. Re-Set your NULL point

- a. Using the interaxial slider on the THC, set interaxial near 0.
- b. Using the convergence knob, converge on the farthest point you can identify.
- c. looking through the mirror at the lenses, adjust your interaxial to overlap them as closely as possible.
This brings your interaxial as close to zero as visually possible.
- d. Once lenses are overlapped, look at a monitor and converge at the farthest point.
- e. Using the interaxial control, converge on a near target (you will notice your far target go out of alignment)
 - Repeat d. and e. until images overlap, indicating horizontal alignment

6. When images are aligned, hit infinity  button to lock User Calibration settings.

User Calibration settings are stored in memory and are saved between reboots.

To enable and disable these constants, press infinity button

To clear constants, hold infinity button for 10 seconds.



10. Metadata

What you need:

IO Box

Micro SD card for storing metadata (if desired)

10.1 Metadata formats:

3D motor controller box: Interaxial and convergence

Lens controller box: Focus, iris, zoom position

Formats:

raw motor encoder values (literally a number representing the position of the lens control motor).

metric data.

10.2 Extracting data from the system:

All metadata recording requires a valid timecode signal. IO BOXES must always be plugged into an external timecode generator to record metadata.

1) Recording from an IO BOX

Record metadata to a FAT-formatted microSD card.

Setup lens marks, make sure the IO box is connected to the lens and/or 3d controllers, connect timecode

Trigger recording to microsd with the start/stop system, regardless of whether you are using it to trigger camera start/stop.

2) serial stream from the IO BOX.

Metadata streams from the metadata port as an ASCII stream, 38400, 8 bits, no parity, 1 stop bit.

3) Recording onboard the Epic.

If you are using an IO BOX with a serial cable connected to the EPIC you can configure the EPIC to record the serial metadata into the R3D file. Once in the R3D file you can use the redline tool to extract the metadata from the R3D file. Consider streaming to the Epic, with a microSD card as backup.

4) using the iPhone app you can view (but not record) metadata.

5) Using the SDK/API you can query metadata directly from the 3D or Lens control box without needing any additional boxes. Record positional motor values,

11. Updating Firmware

11.1 What you will need for Firmware Update

- Technica Hand Controller or 6 axis lens control box
- MicroSD Card
- Power source
- Current firmware from the 3alityTechnica Activation Portal

11.2 Firmware Update Process

- Format the microSD card FAT 32 ONLY
- Copy firmware onto root directory of microSD card, DO NOT COPY INTO A FOLDER
- Power off Technica Hand Controller or 6 Axis Lens Control Box
- Insert microSD card into the microSD card holder located in the battery bay
- Power on the hand controller using rig power.
- the “BATTERY” LED will flash rapidly for about 15 seconds.
- Installation is complete when flashing stops.
- Power off and remove card.

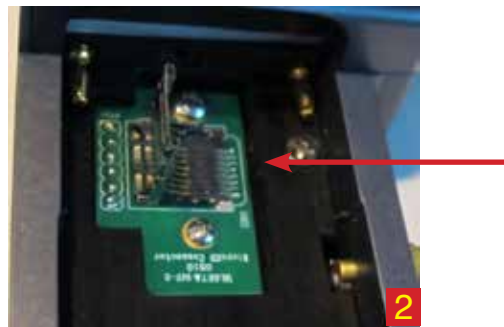


Figure 11.2a 1) Six Axis Box 2) Technica Hand Control 3) Rig

12. Cables



ET Hand Controller 4-pin to 4-pin Command Cable

CAN			CAN	
FGG.0B.304.CLAD52Z			FGG.0B.304.CLAD52Z	
Pin	Signal	Wiring	Pin	Signal
1	GND	1-1 2-2 3-3 4-4	1	GND
2	CANL		2	CANL
3	CANH		3	CANH
4	Vcc		4	Vcc

Part no. [T3D-C-THC-C5](#)

[T3D-C-THC-C50](#)

[T3D-C-THC-C100](#)

[T3D-C-THC-C200](#)

[T3D-C-THC-C300](#)

[T3D-C-THC-C500](#)

[T3D-C-THC-C1000](#)

[T3D-C-THC-C1250](#)

[T3D-C-THC-C1500](#)



ET Motor Control Box Power Cable

12V			MCB Power	
NC4MXX-B			FGG.1B.302.CLAD62Z	
Pin	Signal	Wiring	Pin	Signal
1	GND	1-1 4-2	1	GND
2	-		2	12V
3	-			
4	12V			

Part no. [T3D-C-MCB-P2](#); [T3D-C-MCB-P8](#)



