Paramount MKS 6000 Upgrade Kit
Supplemental Instructions

SOFTWARE BISQUE

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Introduction

The MKS 6000 upgrade kits contain the components necessary to upgrade your Paramount mount with the MKS 6000 telescope control system (TCS), including:

- MKS 6000 printed circuit board (PCB)
- Electronics Box to hold the MKS 6000 PCB
- Through-the-mount panel
- Instrument Panel PCB
- Instrument Panel housing
- Updated through-the-mount cables
- MKS 6000 power supply unit (required)

Minimum System Requirements

The MKS 6000 control system requires the following minimum hardware and software.

- **Paramount Requirements**: A Paramount MYT, MX, MX+, ME, or ME II model, or a gear-driven Paramount Taurus mount. See Table 1 below for details.
- **TheSky Professional Requirements**: TheSky Professional version 10.5.0 build 13655 or later.

Note that the Paramount MKS 6000 Upgrade Kit is *not* compatible with the Paramount GT-1100 or GT-1100 model mounts (shipped from 1996 to 2002).

MKS 6000 Upgrade Eligible Paramount Models

Table 1 lists the Paramount models that can be upgraded to the MKS 6000 telescope control system.

Table 1: Paramount Model History

Paramount Model	Dates Manufactured	Mount Identifiers
Paramount MYT	November 2014 – April 2023	C0001 – C00531
Paramount MX	July 2011 – July 2014	A00001 – A00499
Paramount MX+	August 2014 – July 2023	A00500 – A01299
Paramount ME II (motor-based encoders)	March 2013 – August 2023	B00001 – B00599
Paramount ME II (on-axis absolute encoders) [3]	March 2013 – August 2023	B00001 – B00599
Paramount ME Classic [1]	July 2001 – August 2012	N/A [2]
Paramount Taurus 400/500 Gear-Driven Models	November 2019 – April 2023	T00001 – T00060
Paramount Taurus 400 (on-axis absolute encoders)	November 2019 – April 2023	T00001 – T00060
Bisque TCS (with the MKS 3000, MKS 4000 or MKS 5000) [3]	July 2001 – April 2023	N/A [3]

[1] The MKS 6000 Upgrade Kit does not include a hand paddle. And the MKS 3000 and MKS 4000 hand paddle that came with the original Paramount ME mounts is not compatible with the MKS 6000. If you want to control an original Paramount ME (with an MKS 3000 or MKS 4000 control system), you must purchase the MKS 5000/MKS 6000 Hand Paddle separately.

[2] The original Paramount ME mount does not have a unique mount identifier; the mount's serial number was printed on the Paramount ME invoice from Software Bisque.

[3] The Bisque TCS product does not include a mount identifier or hardware serial number. See the Bisque TCS Identification document for details how to determine which MKS version your mount uses.

TheSky Professional Edition Requirements

Controlling a Paramount with the MKS 6000 requires the latest release of TheSky Professional edition. Step-by-step MKS 6000 getting started instructions (including the latest digital release of this document) are available at https://www.bisque.com/6k-getting-started.

If your annual software subscription is expired, visit www.bisque.com, then click **Support**, **Renew Subscription** and follow the instructions on this page, or click: How Do I Renew TheSky's Software Subscription? (digital PDF only) for subscription renewal details.

MKS 6000 Upgrade Kit Hardware

Figure 1 shows the model-specific hardware components that are included with the MKS 6000 Upgrade Kit (the internal cables and other accessories are listed in the Packing List section on page 6).
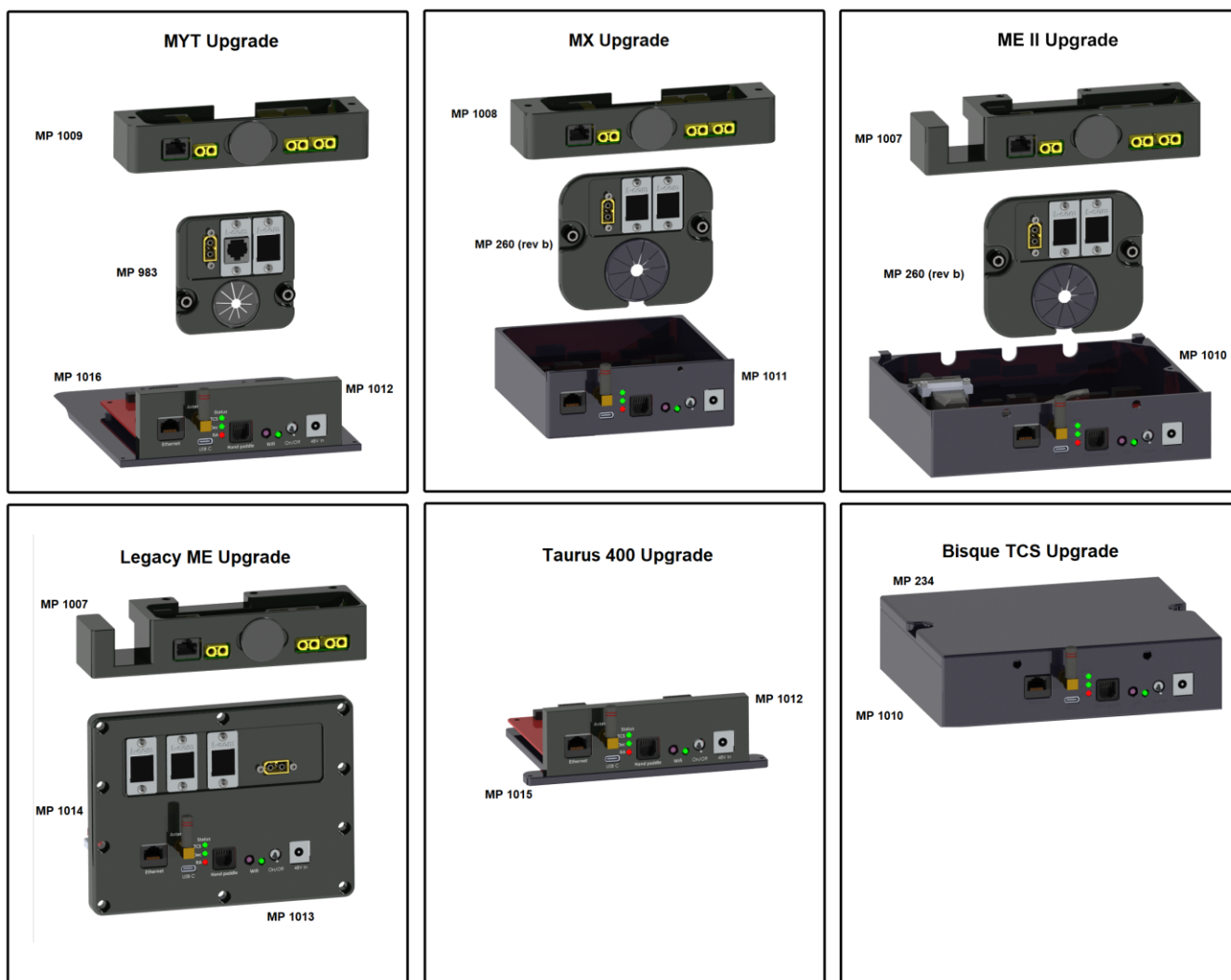
Packing List

Each upgrade kit includes the components that are required to upgrade your model Paramount with the MKS 6000 TCS. Table 2 lists the components that are common to every upgrade kit.

Common Upgrade Kit Items

The table below lists the included items that are common to every upgrade kit.

Table 2: Items that are included with all MKS 6000 Upgrade Kits

Quantity	Photo	Description
1	Figure 1: MKS 6000 PCB.	MKS 6000 control system electronics. For each upgrade kit, this component is attached to the electronics housing.
1		The Instrument Panel PCB. This component is attached to the Instrument Panel housing.
1		36 in. (91 cm) CAT6E Ethernet cable.
1		15 ft (4.6 m) USB-C cable.

Quantity	Photo	Description
1		USB-C to USB-A adapter.
1		Wi-Fi Antenna.
1		A printed copy of the Paramount MKS 6000 Upgrade Kit Supplemental Instructions (this document).

Paramount MYT Upgrade Kit

In addition to the components in Table 2, Table 3 lists the Paramount MYT specific components.

Table 3: Paramount MYT Upgrade Kit Components

Quantity	Photo	Description
1	 Figure 2: Paramount MYT electronics housing.	The electronics housing holds the MKS 6000 printed circuit board (PCB). See "Electronics Housing " on page 19 for cabling and component details.
1	 Figure 3: Paramount MYT Instrument Panel.	The Paramount MYT Instrument Panel.

Quantity	Photo	Description
1	Figure 4: Paramount MYT through the mount panel.	The Paramount MYT through the mount panel. See "Through-the-Mount Panel" on page 31 for details about this component.
1	Figure 5: Paramount MYT through-the-mount panel with cable.	36 in. (91 cm) XT60 power cable attached to the through-the-mount panel.
1		15 in. (38 cm) hour angle motor cable.
1		26 in. (66 cm) declination motor cable.

Quantity	Photo	Description
1		MKS 6000 power supply unit. *Note: The Paramount MYT MKS 5000 PSU uses a different connector that is not compatible with the MKS 6000. Please carefully read the "Important MKS 6000 Power Jack Notes" on page 27 about this new, required power supply unit.* Input: 100-240V ~ 1.5A at 50-60Hz Output: 48.0V ⎓ 1.88A, 90.2W The power out plug on the PSU is compatible with the MKS 6000 power in port.
1		6 ft. (1.8 m) NEMA 5-15P to C13 AC power cord that plugs into the back of the PSU.

Through-the-Mount Cables and the Instrument Panel

The hole in the center of the Instrument Panel Housing provides ample room for custom cables. When installing custom cables:

1. Remove the plastic cover from the center hole.
2. Remove the base of the Instrument Panel (Figure 6).
3. Run the cables through the center hole.
4. Replace the Instrument Panel base.

Figure 6: When adding cables, remove the Instrument Panel base and run the cable through the center slot (red arrow).

Paramount MX Upgrade Kit

In addition to the common upgrade kit components shown in Table 2, Table 3 lists the Paramount MX-specific components.

Table 4: Paramount MX Upgrade Kit Components

Quantity	Photo	Description
1	Figure 7: Paramount MX and MX+ electronics housing.	The electronics housing holds the MKS 6000 printed circuit board (PCB). See "Electronics Housing " on page 19 for cabling and component details.
1	Figure 8: Paramount MX and MX+ through-the-mount panel.	36 in. (91 cm) XT60 power cable attached to the through-the-mount panel.

Quantity	Photo	Description
1	Figure 9: Paramount MX Instrument Panel.	The Paramount MX Instrument Panel with the PCB attached.
2	Figure 10: One of the two Paramount ME and MX motor adapter cables.	6 in. (15 cm) Paramount ME and MX motor adapter cable. This cable adapts the plug on the end of the motor cable to the motor port on the MKS 6000. The female end of one cable is plugged into the HA motor connector and the male end into the MKS 6000 HA port. The second cable plugs into the Dec motor connector and into the MKS 6000 Dec port.
1		MKS 6000 power supply unit. *Note: The Paramount MX and Paramount MX+ MKS 5000 PSU uses a different connector that is not compatible with the MKS 6000. Please carefully read the "Important MKS 6000 Power Jack Notes" on page 27 about this new, required power supply unit.* Input: 100-240V ~ 1.5A at 50-60Hz Output: 48.0V ⎓ 1.88A, 90.2W The power out plug on the PSU is compatible with the MKS 6000 power in port.

Quantity	Photo	Description
1		6 ft. (1.8 m) NEMA 5-15P to C13 AC power cord that plugs into the back of the PSU.

Paramount MX+ Upgrade Kit

In addition to the common upgrade kit components shown in Table 2, Table 5 lists the Paramount MX-specific components.

Table 5: Paramount MX+ Upgrade Kit Components

Quantity	Photo	Description
1	Figure 11: Paramount MX and MX+ electronics housing.	The electronics housing holds the MKS 6000 printed circuit board (PCB). See "Electronics Housing " on page 19 for cabling and component details.
1	Figure 12: Paramount MX and MX+ through-the-mount panel.	36 in. (91 cm) XT60 power cable attached to the through-the-mount panel.
1	Figure 13: Paramount MX Instrument Panel.	

Quantity	Photo	Description
1		15 in. (38 cm) hour angle motor cable.
1		28 in. (71 cm) declination motor cable.
1		MKS 6000 power supply unit. *Note: The Paramount MX and Paramount MX+ MKS 5000 PSU uses a different connector that is not compatible with the MKS 6000. Please carefully read the "Important MKS 6000 Power Jack Notes" on page 27 about this new, required power supply unit.* Input: 100-240V ~ 1.5A at 50-60Hz Output: 48.0V === 1.88A, 90.2W The power out plug on the PSU is compatible with the MKS 6000 power in port.
1		6 ft. (1.8 m) NEMA 5-15P to C13 AC power cord that plugs into the back of the PSU.

Paramount ME Classic Upgrade Kit

In addition to the components in Table 2, Table 6 lists the Paramount ME Classic-specific components.

Table 6: Paramount ME Upgrade Kit Components

Quantity	Photo	Description
1	Figure 14: Paramount ME Adapter Panel replacement component. Figure 15: Paramount ME with MKS 6000 installed.	This component includes a flat aluminum plate upon which the MKS 6000 PCS is mounted, and the through-the-mount panel.

Quantity	Photo	Description
2	Figure 16: One of the two Paramount ME Classic motor adapter cables.	6 in. (15 cm) Paramount ME and MX motor adapter cable. The Paramount ME Classic-specific cable adapts the plug on the end of the motor cable to the motor port on the MKS 6000. The female end of one cable is plugged into the HA motor connector and the male end into the MKS 6000 HA port. The second cable plugs into the Dec motor connector and into the MKS 6000 Dec port.
1	See Figure 15	36 in. (91 cm) XT60 power cable attached to the through-the-mount panel.
1		MKS 6000 power supply unit. *Note: The MKS 5000 PSU uses a different connector that is not compatible with the MKS 6000. Please carefully read the "Important MKS 6000 Power Jack Notes" on page 27 about this new, required power supply unit.* Input: 100-240V ~ 1.5A at 50-60Hz Output: 48.0V $=$ 1.88A, 90.2W The power out plug on the PSU is compatible with the MKS 6000 power in port.
1		6 ft. (1.8 m) NEMA 5-15P to C13 AC power cord that plugs into the back of the PSU.

Paramount ME Hand Paddle Notes

The MKS 6000 Upgrade Kit *does not include a hand paddle*. And the MKS 3000 and MKS 4000 hand paddle that came with the original Paramount ME mounts is not compatible with the MKS 6000.

If you wish to control an original Paramount ME (with an MKS 3000 or MKS 4000 control system), you must purchase the MKS 5000/MKS 6000 Hand Paddle (SKU SB10228) separately. From www.bisque.com, in the **Search Products** field on the right side of the header, enter the SKU above, or type hand paddle, and then click the magnifying glass to find this product on the store.

Paramount ME Motor Adapter Cables

Figure 17 shows a Paramount ME with the both of the RA housing side panels removed. The electronics housing with the MKS 6000 PCB is also installed.

The RA motor adapter cable (Figure 16) is plugged into the MKS 6000 port labeled RA (Figure 30). The other end of the cable is plugged into the RA motor cable that is connected to the RA motor inside the RA housing. On later Paramount mounts, there's a white or gray dot on the RA motor connector that distinguished it from the Dec motor connector.

For the Dec axis, plug the motor adapter cable into the Dec motor cable. Do not plug the Dec motor cable into the RA motor port (and vice versa) as this will cause unexpected behavior!
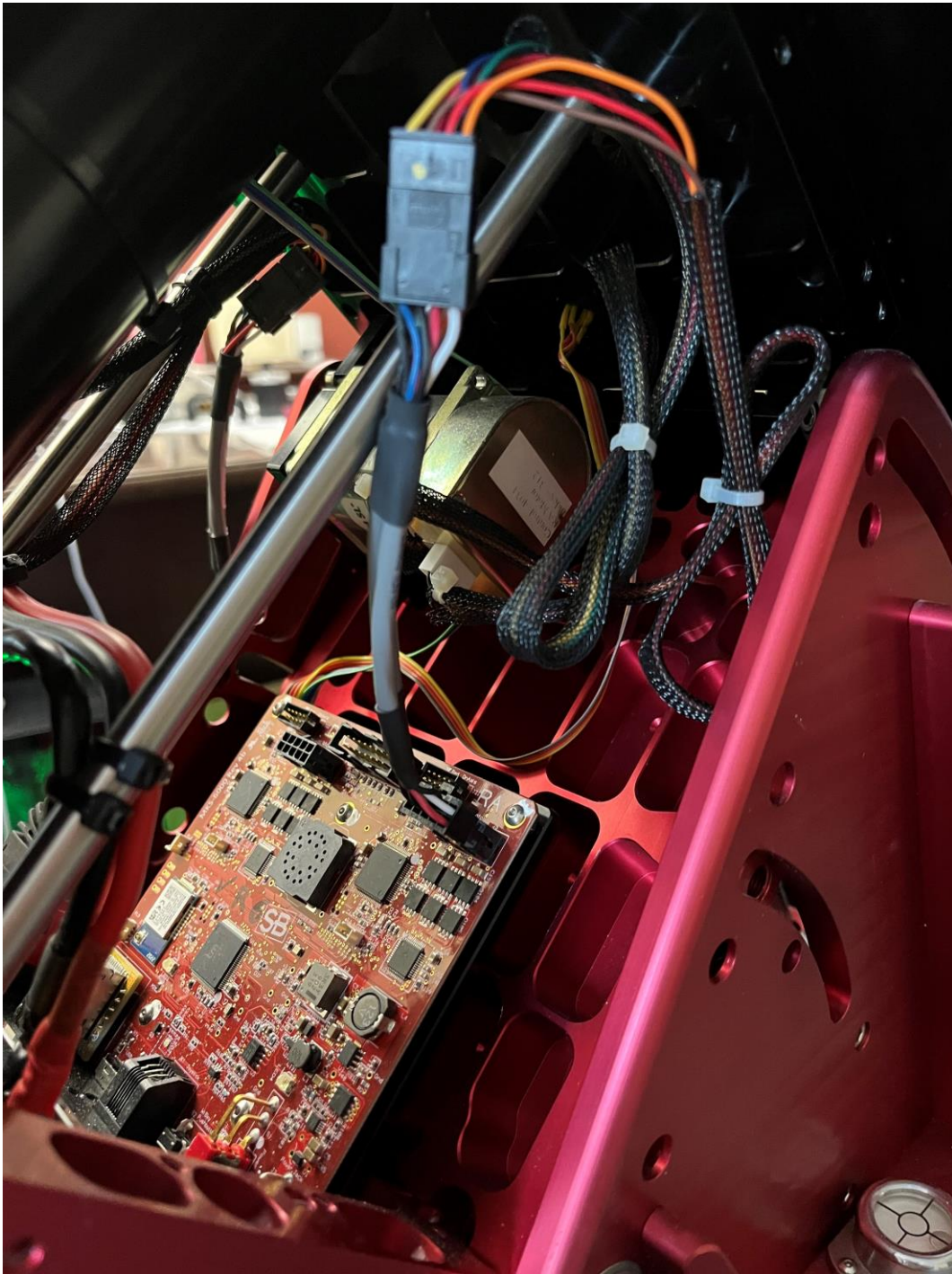
Figure 17: A Paramount ME with MKS 6000 installed and the HA motor cable plugged in.

Paramount ME II Upgrade Kit

In addition to the components in Table 2, Table 7 lists the Paramount ME II-specific components.

Table 7: Paramount ME II Upgrade Kit Components

Quantity	Photo	Description
1	Figure 18: Paramount ME II electronics housing.	The electronics housing holds the MKS 6000 printed circuit board (PCB). See "Electronics Housing " on page 19 for cabling and component details.
1	Figure 19: Paramount ME II Instrument Panel.	
2	Figure 20: Paramount ME Classic motor adapter cable.	6 in. (15 cm) Paramount ME Classic motor adapter cable. The Paramount ME Classic-specific cable adapts the plug on the end of the motor cable to the motor port on the MKS 6000. The female end of one cable is plugged into the HA motor connector and the male end into the MKS 6000 HA port. The second cable plugs into the Dec motor connector and into the MKS 6000 Dec port.

Quantity	Photo	Description
1	Figure 21: Paramount ME II PSU Kycon to MKS 6000 power cable adapter.	On the original 220W power supply unit that came with the Paramount ME II and the Taurus 400, replace the existing Kycon to MKS 5000 power connector cable with this cable to power the MKS 6000.
1	See Figure 15	36 in. (91 cm) XT60 power cable attached to the through-the-mount panel.

MKS 6000 TCS Components

The MKS 6000 Upgrade Kit's main components include the MKS 6000 PCB, electronics housing, instrument panel electronics and housing, a through-the-mount panel and the MKS 6000-compatible power supply unit.

Electronics Housing

Figure 22 shows a Paramount MX electronics housing with the harnesses attached to MKS 6000 PCB.
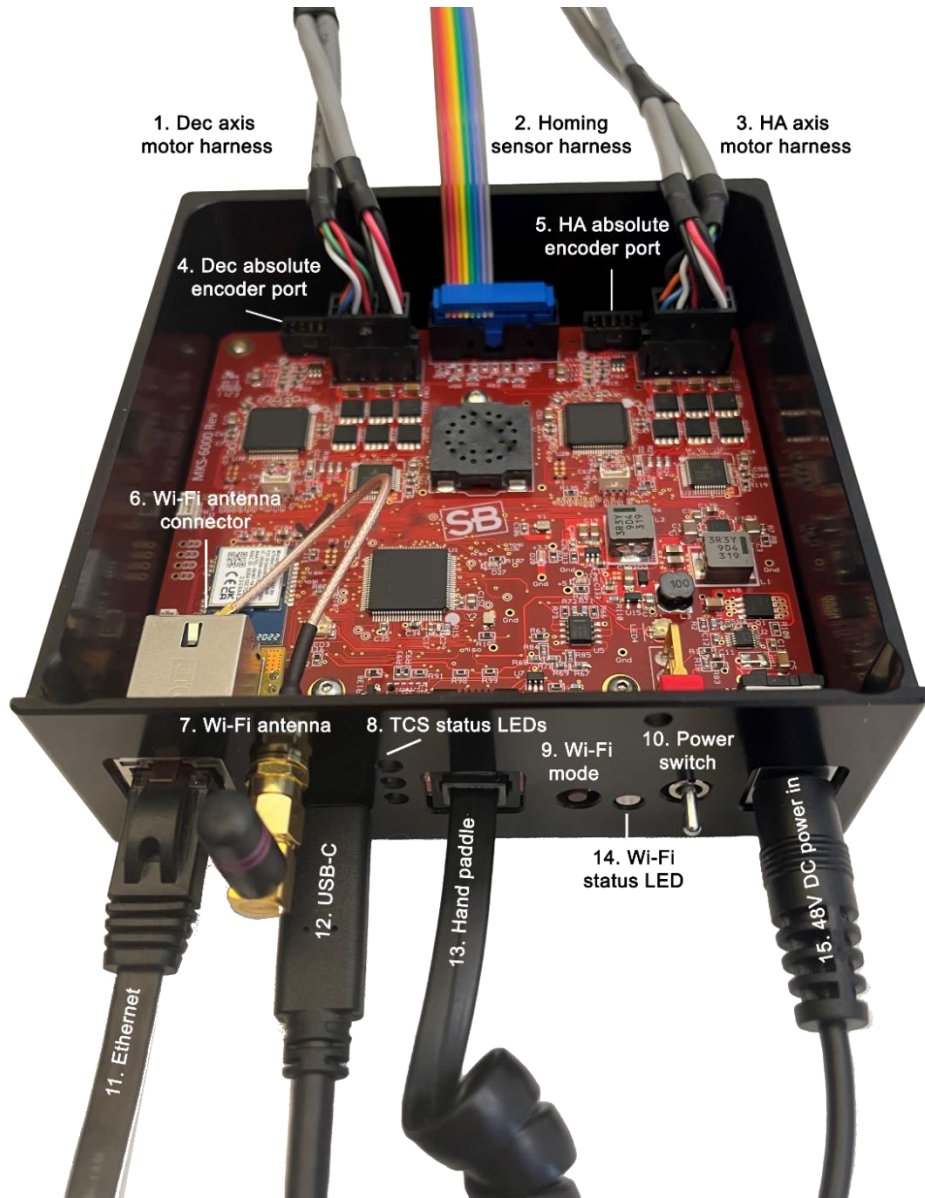
Figure 22: The Paramount MX/MX+/ME II electronics housing with the MKS 6000 PCB cables and components.
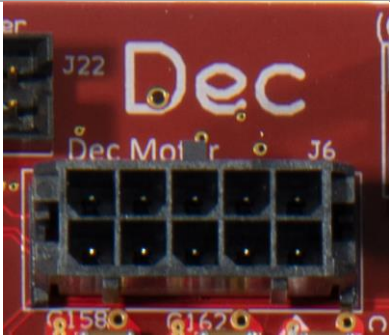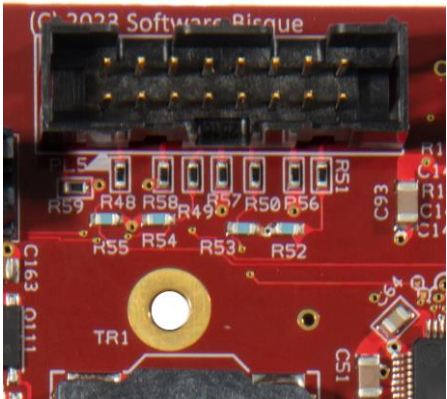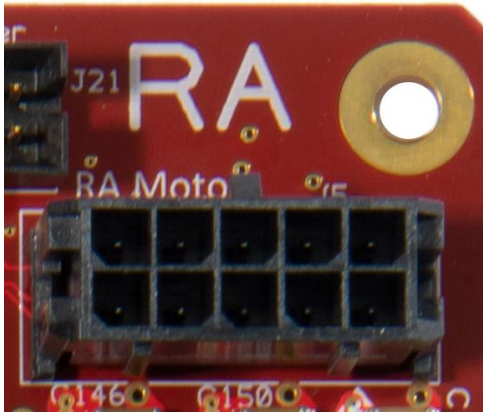
Figure 23: The Paramount ME electronics housing and thorough-the-mount panel.
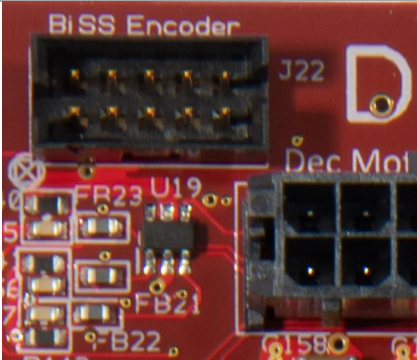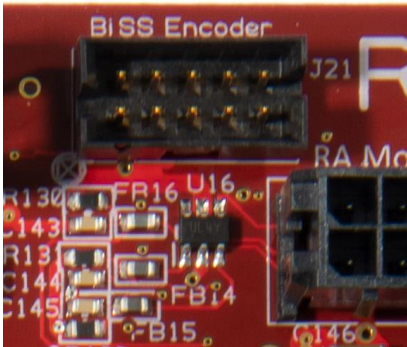
Table 8 lists each of the numbered components in Figure 22, describes each cable, and how to plug each cable into the MKS 6000 PCB.

Table 8: The Paramount Electronics Housing Components
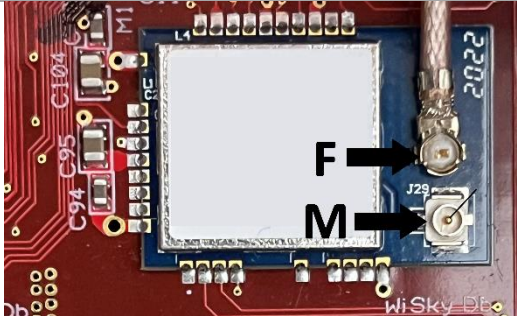
Number	Photos	Description
1	 Figure 24: The 10-pin dec motor extension cable connector plugs into the port labeled **Dec Motor**.	The 10-pin motor extension cable on the declination axis plugs into the MKS 6000 port labeled **Dec Motor** on the PCB (Figure 25). The 16-pin female connector (Figure 26) plugs into the declination axis motor harness (Figure 27).
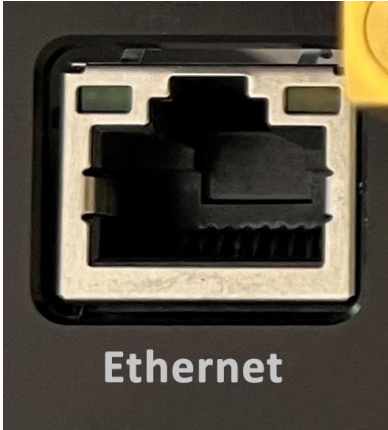
Number	Photos	Description
	Figure 25: The 10-pin declination axis motor plug. The tab on the male connector is oriented toward the top of the female connector in this photo. Figure 26: 16-pin female motor extension cable. Figure 27: 16-pin male motor harness connector.	
2	Figure 28: 16-pin homing sensor cable.	The homing sensor harness connects the HA and Dec homing sensors to the MKS 6000 home sensor port.
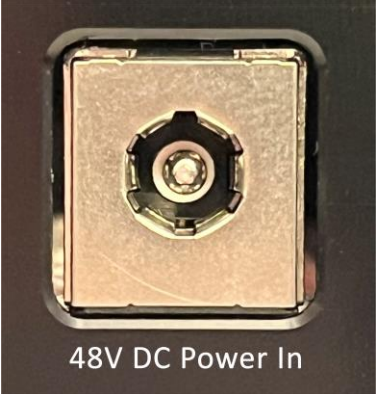
Number	Photos	Description
	Figure 29: 16-pin homing sensor cable plug.	
3	Figure 30: The hour angle (HA) axis is labeled RA, for right ascension, on the MKS 6000 PCB. Figure 31: The gray dot on the hour angle connector differentiates it from the dec motor extension cable connector.	The 10-pin hour angle motor extension cable connects the MKS 6000 to the hour angle motor.

Number	Photos	Description
4	Figure 32: 10-pin Dec axis BiSS absolute encoder port.	The 10-pin male **Dec** axis absolute encoder cable is plugged into the 10-pin female plug labeled **BiSS Encoder** on the PCB.
5	Figure 33: HA on-axis encoder plug.	The 10-pin male hour angle axis absolute encoder cable is plugged into the 10-pin female plug labeled **BiSS Encoder** on the PCB.
6	Figure 34: Wi-Fi antenna extension cable.	The external Wi-Fi antenna is connected to the Wi-Fi chipset using a short extension cable.

In Figure 35, the coaxial female connector labeled **F** must be rotated 180 degrees and then plugged into the coaxial connector on the Wi-Fi module labeled **M**. |

Number	Photos	Description
	Figure 35: Close up of the Wi-Fi antenna extension cable's small coaxial connectors.	
7		The right-angle Wi-Fi antenna screws into the Electronics Box faceplate.
8		The three Status LEDs provide visual feedback on the state of the TCS. LED normal operation: • TCS emits steady green • Dec LED emits steady red • RED LED emits steady red LED error condition: • TCS flashes green • Dec flashes red • HA flashes red
9 and 14		Press the circular **Wi-Fi Mode** button to toggle between five different Wi-Fi configuration modes. The color of the Wi-Fi status LED corresponds to the mode that was configured in TheSky Professional. See *TheSky Professional User Guide* for details about configuring MKS 6000 Wi-Fi and controlling the Paramount wirelessly.

Number	Photos	Description
10		The chrome-plated on/off switch controls power the TCS. Up is on, down is off.
11		The Ethernet port is used to control the TCS over a network using TCP/IP.
12		The USB-C port is used to communicate with the TCS using a serial command protocol.

Number	Photos	Description
13	Hand Controller	Plug the RJ12 on the end of the hand controller's curly coil into the hand controller port.
14	Wi-Fi Mode	The **Wi-Fi Mode** button and Wi-Fi status LED are described in number 9 above.
15	48V DC Power In	The 48V DC **Power In** jack. **Please read the "Important MKS 6000 Power Jack Notes" below about the new power supply unit included with the MKS 6000 Upgrade Kits.**

Important MKS 6000 Power Jack Notes

 Do not use the MKS 5000 power supply unit for the MKS 6000!

Never plug the MKS 5000 power supply unit should into the MKS 6000 Power In port.

Even though both plugs appear similar, the MKS 5000 PSU connector will have intermittent connection with the MKS 6000 center pin and may damage the MKS 6000 printed circuit board.

The MKS 6000 **Power In** DC jack is different from all earlier versions (MKS 3000-MKS 5000). While the power supply units for the MKS 6000 supply 48V DC, the new power supply units incorporate a different DC connector that is designed to properly mate with the MKS 6000 DC power jack. The new style connectors *do not use a locking collar*. They are designed grip firmly but allow pulling out if the cable inadvertently gets snagged and pulled.

Figure 36: The MKS 6000 PSU power connector.

Figure 37: Note that the MKS 5000 PSU plug is *not* compatible with the MKS 6000.

The newer style connector from Switchcraft, part number 760Z-765Z_CD (mouser.com), is also *not compatible* as it only makes momentary contact.

Figure 38: Do not use a Switchcraft connector for the MKS 6000 PSU.

Figure 39: The MKS 6000 PSU-compatible power connector. Note the two spring contacts inside the tip.

Figure 40: MKS 6000 power jack (DigiKey part number 839-1249-ND).

Figure 39 shows the correct DC plug for the MKS 6000 with spring contacts. The MYT/MX/ME Series 6 power supplies come with this connector. Note the two "spring" metal contacts in the center of the connector that are held in place by two rectangular grooves.

MKS 6000 DC Extension Cables

The standard length of the MKS 6000 PSU power out cable is 36 in. (91 cm). If you need a longer cable, so that, for example, the main part of the PSU can rest on the floor of the observatory, MKS 6000-compatible DC extension cables are available at Amazon for a reasonable price. Click the link below or enter the URL into your browser: https://tinyurl.com/6K-DC-Extension

Six-foot DC extension cables with the spring contacts are available from DigiKey and Tensility. The right-angle version with the additional cable covering is the better option.

Figure 41: DigiKey part number 839-1625-ND (mfg. #10-02221)

Figure 42: DigiKey part number 839-1249-ND (mfg. #10-01935)

Figure 43: Tensility part number: 10-02574.

Instrument Panel

The Paramount Instrument Panel includes a pass-through Ethernet port, three XT60 power out ports and a cover for the through-the-mount cable access hole. Remove this cover when running custom cables through the mount.

Figure 44: The Paramount MX Instrument Panel components.

Figure 45: The through-the-mount panel components.

Table 9: Through-the-mount panel components.

Number	Description
1	When connected to an external DC power source, the male XT60 plug supplies power to the three female XT60 connectors on the Instrument Panel. The DC power supply's output connector must be equipped with a female XT60 connector. See "XT60 Connectors" below for more information. XT60 port specifications: • Rated for 30A, 500V (15,000W maximum) • The internal cabling is 12 AWG. • The leads on the Instrument Panel are rated to carry 30A maximum.
2	This RJ-45 port accepts a CAT6 cable to provide pass-through Ethernet to the Instrument Panel's Ethernet port.
3	This is a customizable L-COM Keystone connector.
4	This access hole can be used to pass custom cables through the mount to the top of the declination axis.

⚡ ***The Paramount power connectors and through the mount cabling are intended to be used with direct current (DC) power sources only.***

Never attempt to power devices through the mount with an alternating current (AC) power source.

XT60 power connectors are commonly used for recharging batteries in e-bikes, RC cars and drones. They also excel at supplying power to astronomical equipment. Rated at 500V up to 30A (15KW maximum), they accept 12 AWG wires, and can provide sufficient power to all the direct-current astronomical devices on the telescope.

A variety of pre-made cables and cable adapters using these connectors are readily available and relatively inexpensive. The table below shows several pre-made cables that use XT60 connectors.

XT60 Cable Type	Example Photo
Input Power • XT60 Connecter Cable with DC 12V Battery Alligator Clips. • XT60 to O-Ring Terminal Cable,12AWG XT60 Male to O-Ring Connector Cable	
Power Cables • XT60 m/f to 2.1 mm m/f jack power adapter • XT60 m/f to 2.5 mm m/f jack power adapter • XT60 m/f to Anderson Powerpole™.	
Y-Splitters • M/F Y-splitters • M/F parallel adapters (bottom)	
Extension Cables • XT60 M/F to XT60 M/F cables	

XT60 Cable Type	Example Photo
Gender Changers and Extenders • M/F, F/F extenders	

The simple and robust XT60 connectors are exceptional for making custom DIY cables.

Jacketed XT60 Cables

The spacing between the Power Out 2 and Power Out 3 ports is based on the XT60 15.5 mm width specification. Third-party XT60 cables may have come with an extra jacket that makes the connector wider, about 19 mm total width. The extra width of the jacket prevents two of these cables from being plugged in to the Power Out 2 and Power Out 3 ports at the same time.

Figure 46: A wider jacketed XT60 connector.

If two jacketed connectors must be plugged in to Ports 2 and 3, plug a short female-to-female XT60 extender into one of the ports so that there is sufficient width for both jacketed cables to fit.

Figure 47: A female-to-female XT60 extender plugged into the Instrument Panel's Power Port 3.

L-com Keystone Panel Adaptors

The three L-com keystones on the front panel are designed to make through mount cabling easier to install, more accessible and simpler to connect and disconnect the through-the mount cables. The L-com webpage

(http://www.l-com.com/adaptors) offers cables, connectors and adaptors that can be used to customize the mount for your astro-accessories.

Installing the MKS 6000 Upgrade

The *MKS 6000 Upgrade video* demonstrates how to remove the existing MKS control system electronics from your Paramount. Once the original telescope control system is removed, the MKS 6000, internal cabling and new Instrument Panel be installed.

The upgrade video covers the following topics:

- Tools required for the upgrade
- Telescope and Counterweight Removal
- Electronics Box Removal
- Internal Cabling Installation
- Rear HA Panel Installation
- Instrument Panel and Versa-Plate Installation
- Hour Angle Worm Block Installation
- Declination Worm Block Installation
- Electronics Box Installation

The URL to view this video, go to https://www.bisque.com/6kvideo. Or scan the QR code below:

Figure 48: Scan the above code with your tablet or smart phone camera, then click on the link that appears to watch the MKS 6000 Upgrade video.

Once the upgrade installation is complete, the final step is to measure and save the motor index angles to the MKS 6000 as described below.

Connecting to TheSky Professional

Controlling a Paramount with the MKS 6000 requires the latest release of TheSky Professional edition. Step-by-step MKS 6000 getting started instructions (including the latest PDF revision of this document) are available here: https://www.bisque.com/6k-getting-started.

If your annual software subscription is expired, visit www.bisque.com, then click **Support**, **Renew Subscription** and follow the instructions on this page, or click How Do I Renew TheSky's Software Subscription for subscription renewal details.
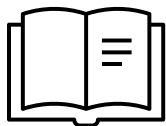
TheSky Professional User Guide
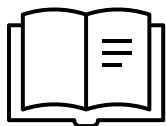
TheSky Professional User Guide can be downloaded as a PDF from the Software Bisque website.

To access this file, log in by clicking **My account**, **Log in,** and then enter: https://www.bisque.com/thesky-ug in your browser.

Paramount Series 6 User Guide

Use the camera on your tablet or smartphone to scan the code on the right and view the Paramount User Guide, or visit:

https://www.bisque.com/PS6UserGuide
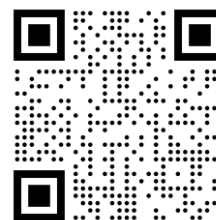
to download the PDF to your laptop or desktop.

Scan to view the Paramount User Guide.

Using TheSky to operate a Paramount mount with the MKS 6000 is essentially identical to earlier control systems.

- Click **Telescope**, **Telescope Setup**, **Mount Setup** and choose the same model mount you always have (Paramount MYT, Paramount MX+, or Paramount ME II). *Do not choose one of the options for the Paramount Series 6 models*.
- When connecting to the Paramount with the MKS 6000 USB port, installation of a separate USB driver is *not* required.

Step 1: Power and Connect the Computer to the Paramount

1. Securely attach the mount to a permanent pier or tripod.
2. Plug the power supply unit's (PSU) power out connector into the Electronics Box port labeled **Power In**.
3. Plug the PSU into a suitable power source.
4. Plug the USB connector of the supplied USB cable into the Electronics Box port labeled *USB*. See the Paramount User Guide for details on how to connect your mount to a computer using the Ethernet port or Wi-Fi.
5. Plug the other end of the supplied USB cable into a USB port on the computer.
6. Release the mechanical locking knobs, then flip the Paramount's **On/Off** switch to the on position (up).

The mount emits motor initialization beeps, and the three LEDs on the Electronics Box are illuminated.

The LEDs labeled *HA* (hour angle) and *Dec* (declination) should emit steady red light; the LED labeled *TCS* emits varying shades of purple to indicate the control system is operating nominally.

OS	Quick Start Configuration
	1. Make sure the Paramount is turned on so that the computer recognizes the Paramount USB port.[1,2] 2. From TheSky Professional, click **Telescope, Telescope Setup**. 3. On the **Imaging System Setup** window, highlight **Mount** in the **Imaging System** list. 4. Click **Mount Setup**, **Choose**, or double-click **Mount** in the **Imaging System** list. 5. On the **Mount Setup** window, expand **Software Bisque**, select your mount model, and click **OK**. 6. Click **Mount Setup, Settings**. 7. In the list of serial devices, select the port with the description **Software Bisque MKS 6000***. 8. Click the ***Connect*** command from the ***Telescope*** menu and then click the ***Close*** button on the ***Imaging System Setup*** window. The ***Telescope*** window's ***Status*** text shows the current state of the mount, which is *Not Homed*. On the **Telescope** window, click the **Tools**, **Find Home**. Once homed, the mount begins tracking at the sidereal rate, and can be slewed using the joystick on the hand paddle or with TheSky Pro.
	[1] By default, *Apple Silicon hardware* requires permission to connect to accessories. you have a Mac that uses Apple Silicon hardware (M1, M2, or M3 processor), click **Settings**, **Privacy**, **Allow Accessories To Connect**, and set to **Always** to change this default behavior. Figure 49: If prompted, click Allow to give Apple Silicon hardware permission to connect.
	[2] macOS will not recognize the MKS 6000 USB device under the following condition 1. The MKS 6000 is powered on with one end of a USB-C cable plugged into th port on the Paramount Electronics Box port labeled **USB-C**. 2. *With the mount turned on*, plug the other end of the cable into a ***USB-C*** por on the computer.

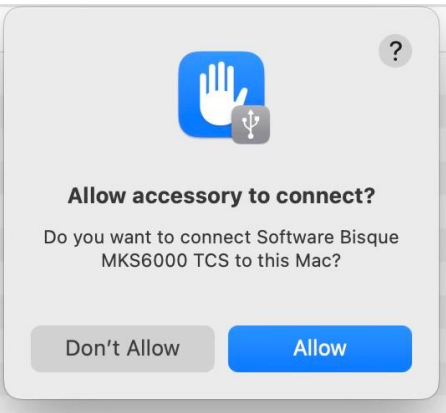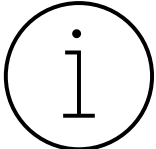| OS	Quick Start Configuration
	To have the Mac computer recognized the MKS 6000 USB device: 1. Turn off the mount. 2. Plug the USB-C cable into the Mac. 3. Turn on the Paramount. Or use a USB-C to USB-A adapter and plug the USB-A into an external hub that has a USB-A port (see Figure 51). Figure 50: USB cable with USB-C to USB-A adapter. Another workaround is to use the MKS 6000 Ethernet port for mount to computer communication.

For instructions on how control the Paramount mount with TheSky, see "Controlling the Paramount with TheSky Professional Edition" in the Paramount User Guide.

Motor Index Angles

The Paramount's hour angle and declination axis servomotors require a unique *motor index angle* that is required for motor initialization when the mount is turned on. These motor-specific motor index angles are normally measured and saved to the control system at the factory. For the MKS 6000, they must be measured and saved before the mount can operate normally.
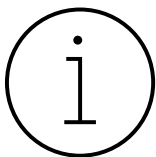
Follow the steps below to measure and save the motor index angles to the MKS 6000.

Important: After installing the MKS 6000 upgrade and powering the mount on for the first time, the control system may emit successive beeps because the mount's motor index angles have not yet been measured and saved to the MKS 6000 permanent memory.

The MKS 6000 uses a different convention for measuring motor index angles compared to earlier control systems. The measured motor index angle value for both the hour angle and declination axes will be approximately 200.

The MKS 6000 requires TheSky Professional version 10.5.0 build 13655 or later. If you have an active subscription, the latest release must be downloaded from www.bisque.com and installed. To do so, click **My account, Log In** to log in, then click **My account, My Downloads.** If your subscription has expired, you must renew it to access the latest release.

Measuring and Saving the Motor Index Angles

Use TheSky to measure and save the motor-specific motor index angles to the control system's permanent memory. This one-time initialization process is only required after installing a new control system, or after installing a replacement worm block assembly (with a new motor).

1. With the mount turned off, connect the supplied USB cable to the computer.
2. During the index angle measurement process, for a given axis, the MKS 6000 rotates the motor to find the motor index angle, and then reports the value. Note that the motors must be free to rotate, or the process will fail. Before proceeding, double-check the following:

    - Make sure to disengage the locking plungers in both axes on the Paramount MYT and Paramount MX mounts. For the Paramount ME II, be sure to remove the axis locking bolts so that both axes can rotate.
    - For the Paramount MYT, MX, MX+ and ME II mounts, the worm and gear must be disengaged by rotating the mechanical switch in both axes to the balance position.
    - For the Paramount ME and Paramount GT-1100S mounts, only, the motor drive belts must be removed before the motor index angles can be accurately measured.

3. Turn the mount on. The control system uses the factory default motor index angles to initialize the motors, and this may cause the motor initialization to fail. When motor initialization fails, the control system emits continuous audible beeps. Note that even if there are no audible beeps, you should still follow the steps below.
4. Launch the latest release of TheSky Professional Edition.
5. Click **Telescope**, **Telescope Setup**. Under **Imaging System**, double-click **Mount** and select the name of your original model mount. For example, choose *Paramount ME II* for the *Paramount ME II* mount, not *Paramount ME* or *Paramount ME Series 6*. Click **OK** and **Close** the **Imaging System Setup** window.
6. Click **Telescope, Connect**. When prompted if you want to slew the mount to the home position, click **No** (see Figure 51).
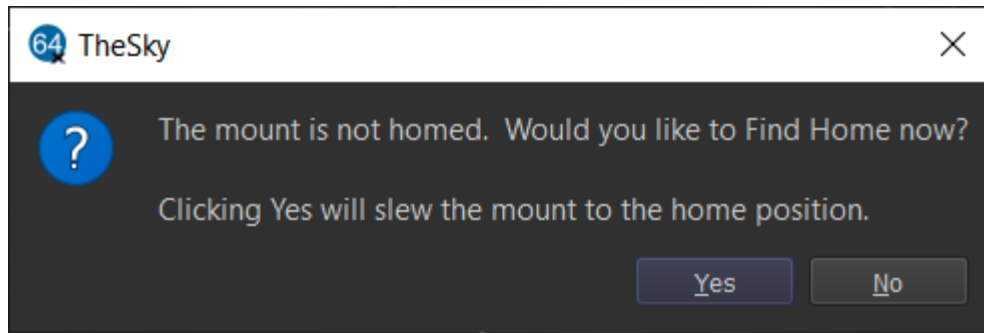
Figure 51: Slewing the mount to the home position is *not* required when measuring the motor index angles.

7. From the **Telescope** window, click **Tools**, **Bisque TCS**.
8. Click the **Utilities** tab and highlight the **Set Motor Index Angles** option on the left side of the window. The steps below are highlighted in Figure 53.
   a. **CRITICAL STEP**: Click the **Reboot To Measure Motor Index Angles** button and click **Yes** when prompted. Rebooting the MKS 6000 takes about 15 seconds or so.
   b. After double-checking that both axes are in the **Balance** position, click the **Measure HA Index Angle** button. When prompted, click **Yes** (Figure 54). The HA motor will rotate briefly as the motor index angle is measured, and a window showing the result is displayed.
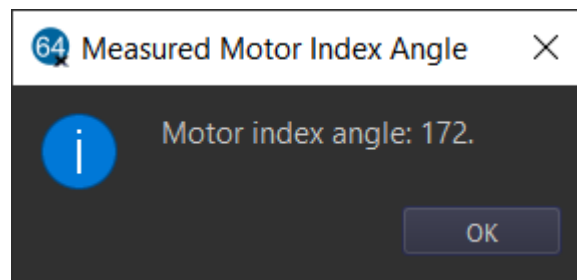

Figure 52: Enter the measured motor index angle into **HA** or **Dec Index Angle** text box.

   c. Enter this number into the **HA Index Angle** text box.
   d. Click the **Measure Dec Index Angle** button and wait for the result to be displayed.
   e. Enter this number into the **Dec Index Angle** text box.
   f. Click the **Save to Bisque TCS** button to permanently save these values to the control system.
9. Restart the mount or highlight the **Reboot/Update Firmware** option on the left side of the **Utilities** tab, then click the **Reboot Normally** button.

The motor index angles have now been permanently saved and the mount is ready for normal operation.
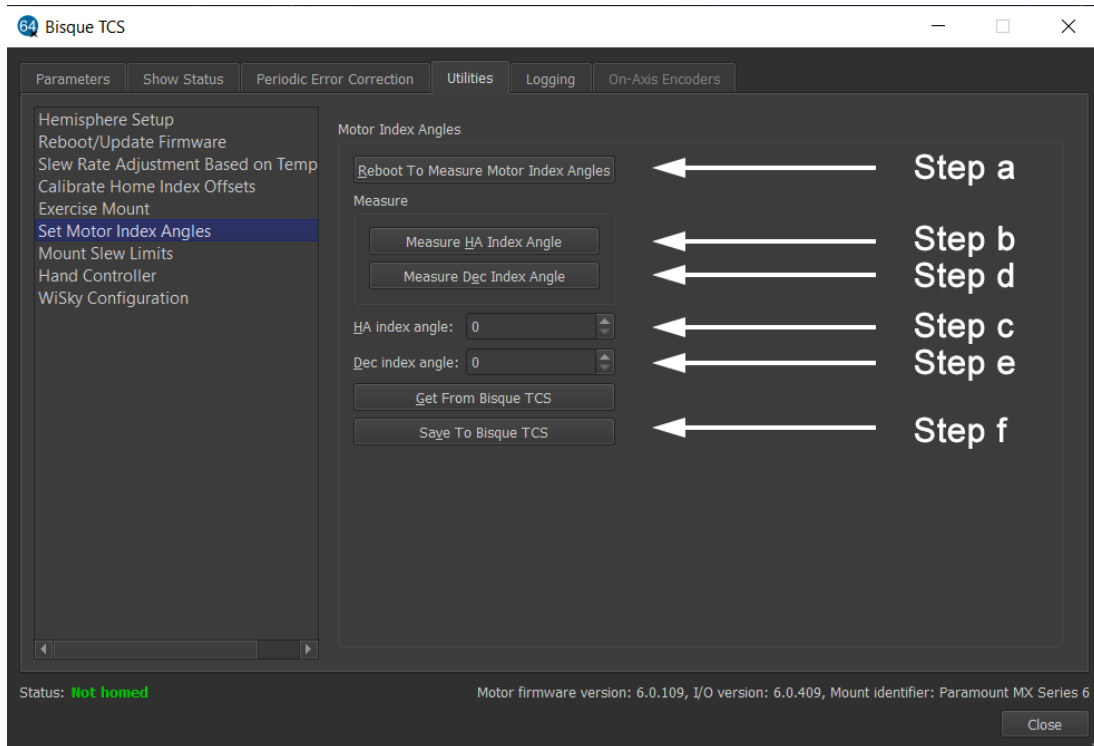
Figure 53: Follow Steps a-f to measure and save the motor index angles for both axes.
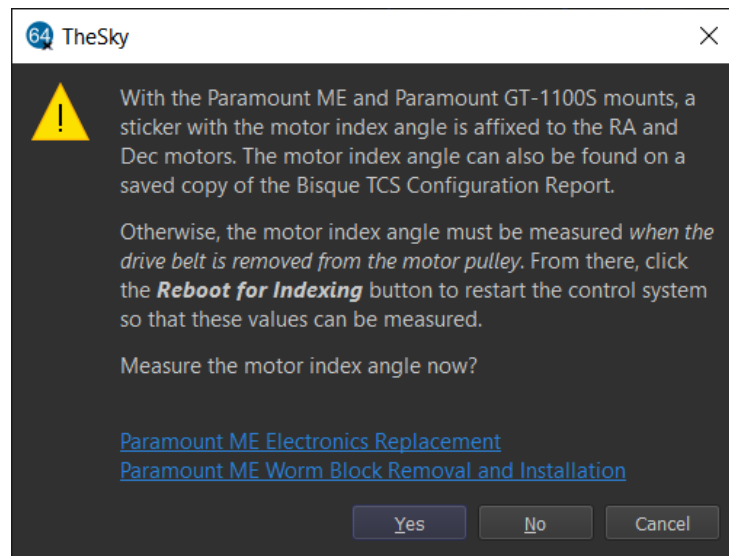

Figure 54: Prompt to measure the motor index angle.

Control System Firmware Updates

While every attempt is made to apply the latest firmware to the MKS 6000 control system before the mount is shipped, Software Bisque may periodically release a new firmware version. The motor firmware version that is used by the control system is listed on the bottom left of the Bisque TCS window.

Updating the Firmware (Update Firmware Button)

MKS 6000 firmware updates are included with the latest release of TheSky so there is no need to download firmware files.

Updating the MKS 6000 Firmware

TheSky for Windows is required to update the MKS 6000 firmware.

Do not update the MKS 6000 firmware using TheSky for macOS or TheSky for Linux.
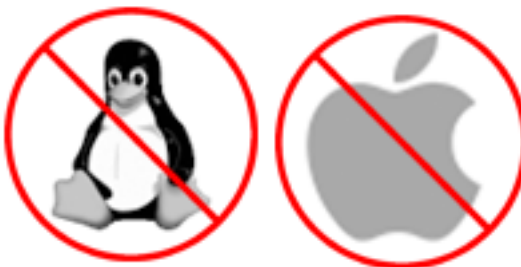
1. Download and install the latest TheSky for Windows (Version 10.5.0 build 13829 or later).
2. Click **Telescope**, **Connect**.
3. On the **Telescope** window, click **Tools**, **Bisque TCS**.
4. On the **Utilities** tab, click the **Update Firmware** button.
5. When prompted, click **Yes** to start the firmware update.

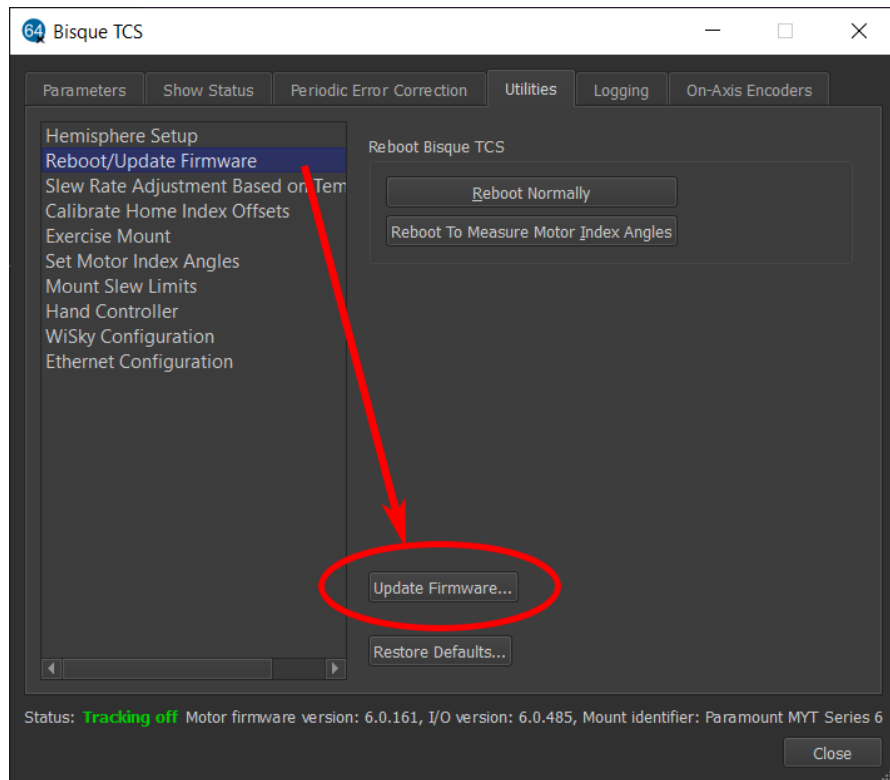Figure 55: Click the Update Firmware button to start the process.

The six-step firmware upgrade process takes about three minutes to complete and periodically reboots the MKS 6000. Please do not turn off the mount or the computer while the new firmware is being installed.
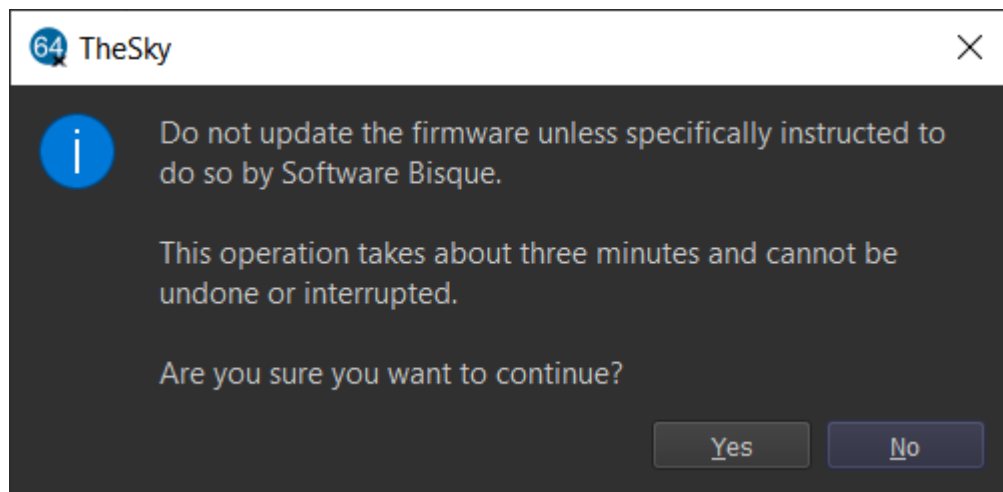

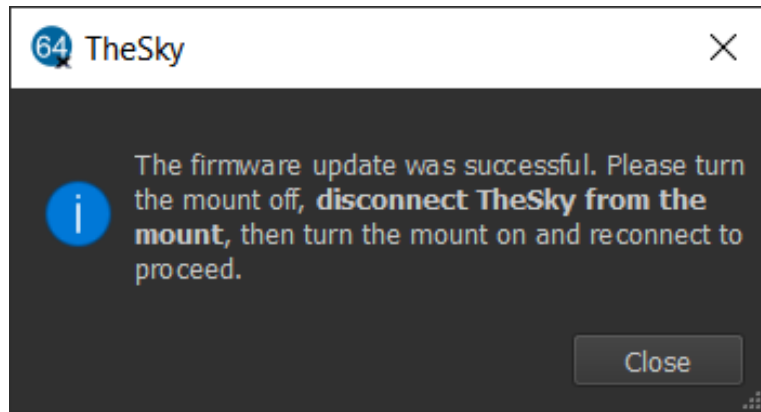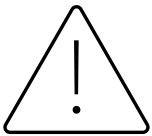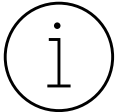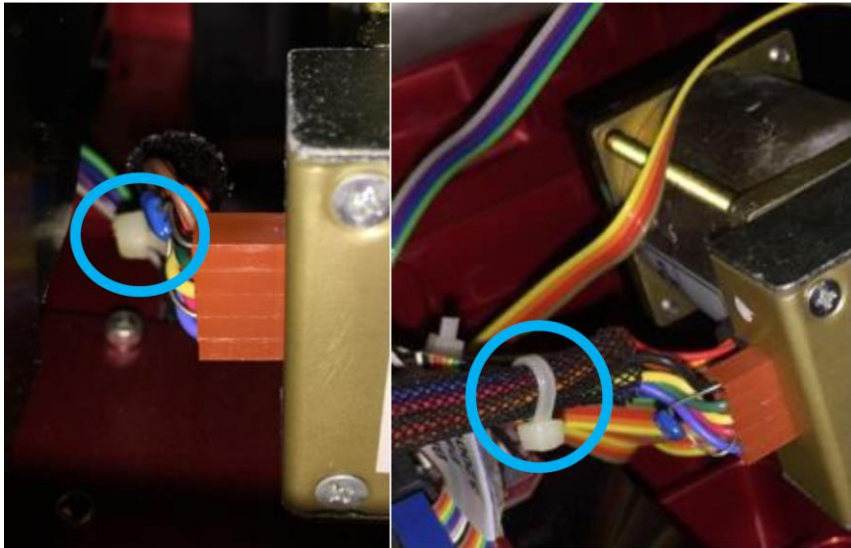Figure 56: Firmware update warning message.

Figure 57: This window is displayed when the firmware has been successfully updated.

TheSky is not automatically disconnected from the mount after the firmware has been updated. From Telescope window, click **Tools**, **Shutdown**, **Disconnect Telescope** before proceeding.

MKS 6000 Troubleshooting

The table below describes some common issues that can occur when upgrading a Paramount with the MKS 6000.

Problem Description	Solution
1. I need my mount's motor index angles. Where can I find them?	For the MKS 6000, you must measure then save the motor index angles to the control system's permanent memory. See "Measuring and Saving the Motor Index Angles" on page 38 for details.
2. After powering the mount, the MKS 6000 beeps continuously.	The motor index angles that are stored in the MKS 6000 are incorrect for one or both of the servo motors, so the motors cannot be properly initialized. 6000 control system. **Paramount ME Classic Mounts Only** Check to make sure there are no cable ties (usually white or black) around the DC servomotor cables. If there are, carefully remove them without cutting any of the motor wires (Figure 58). As the motors cable on all Paramount ME mounts that used the MKS 3000 control system were tied together in this manner, these steps are especially important when upgrading to the MKS 6000. Figure 58: Remove these motor cable ties to eliminate communication interference between the two Paramount ME motors. This issue is *not* present on any other Paramount model.

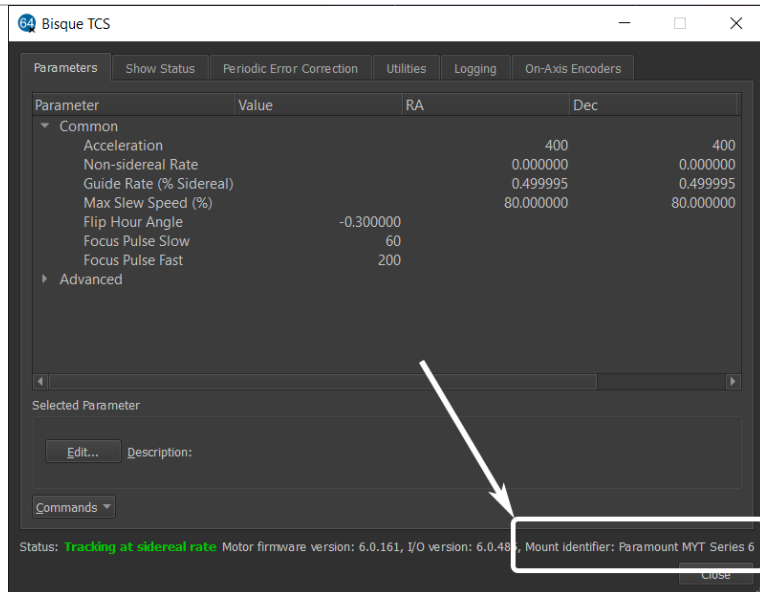|	
3. After issuing the **Find Home** command, the telescope status text shows *Not Homed* or homing the mount by double-tapping the button on the joystick fails.	**Solution 1: Calibrate the MKS 6000 Joystick Port** 1. Connect to the mount. 2. Choose the **Bisque TCS** command from the **Tools** pop-up menu on the **Telescope** window. 3. Highlight **Hand Controller** in the list on the left side of the **Utilities** tab on the **Bisque TCS** window. 4. Click the **Calibrate Joystick** button. 5. **Important!** Choose the **Save All Parameters** to the **Mount** command from the **Commands** pop-up menu on the **Parameters** tab of the **Bisque TCS** window. **Explanation**: The MKS 6000 control system has an internal sensor that detects input from the joystick on the hand paddle. Joystick calibration **should be** performed at the factory, and normally need not be calibrated again. However, if the joystick sensor was not calibrated at the factory, issuing the **Find Home** command may fail unexpectedly and the telescope status text on the **Telescope** window will show *Not Homed*. Note that the hand paddle *does not* need to be plugged in to the Electronics Box for successful joystick calibration. **Solution 2: Ensure both ends of the homing sensor cable are plugged in.** One end of the homing sensor cable plugs into the MKS 6000 PCB (Figure 53), and this cable splits into to two separate cables for right ascension and declination homing sensor. See the Paramount GEM Homing Sensor Cable Troubleshooting and Installation Use document (log in required) for reference on where to locate these sensors: http://tinyurl.com/3nnknenh Double-check that all three ends of the homing sensor cable are in place and that there is no grease in between either of the posts that separate the optical sensors.
5. After installing the MKS 6000, stars are always trailed in right ascension as if the wrong sidereal tracking rate is being used.	If your mount is exhibiting this behavior, the first step is to connect to the mount and verify that the **Mount Identifier** is correct for your model mount. 1. Click **Telescope**, **Connect**. 2. On the **Telescope** window, click **Tools**, **Bisque TCS**. 3. Verify the **Mount Identifier** in the lower right of the Bisque TCS window (Figure 59) matches your model mount.

Figure 59: Location of the Mount Identifier on bottom right of the Bisque TCS window.

Restoring the Paramount to Default Settings

If not, configure the MKS 6000 for your mount, as described below:

After installing the latest version of TheSky:

1. Launch TheSkyX Pro.
2. Click **Telescope**, **Connect**.
3. On the **Telescope** window, click **Tools**, **Bisque TCS**.
4. On the **Parameters** tab, click **Commands**, **Restore Defaults**.
5. **CRITICAL**: When prompted, **be sure to choose the correct model of your mount** (Figure 60).   If you own an earlier model Paramount mount, choose it from the list, not the **Series 6** option. Remember, upgrading a "classic" Paramount MYT, MX, MX+ or ME II mount with the MKS 6000 *does not make it a Paramount Series 6 mount*!
6. **CRITICAL**: Click **Commands**, **Save All Parameters To Mount** to permanently save these settings to the MKS 6000.
7. On the **Telescope** window click **Shut Down**, turn off the mount, reconnect, and verify that the **Bisque TCS** window shows correct **Mount Identifier**.
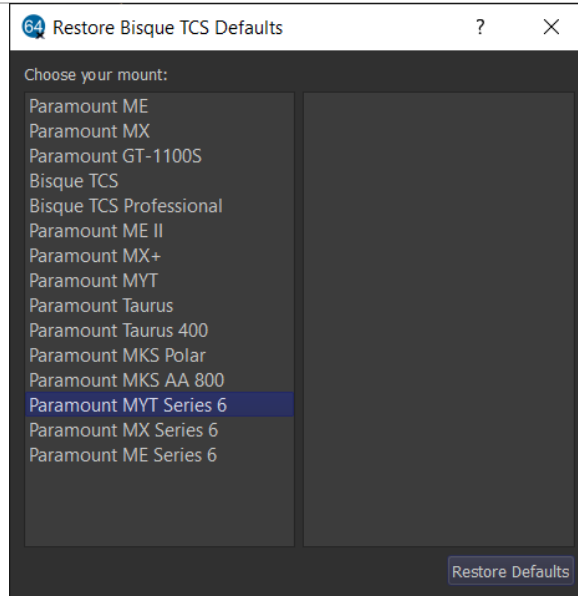
Figure 60: Choosing your Paramount model.

The Paramount will now track at the sidereal rate.

Appendix A: Revision History

The table below describes the changes in each revision of this document.

Revision Number	Changes
1.6	• Initial public release.
1.7	• Updated MKS 6000 LED status documentation
1.8	• Corrected number of pins on motor extension cable.
1.9	• Minor document formatting changes.
2.0	• Document latest firmware changes.
2.1	• Added photo of the Paramount ME electronics housing. • Added note about pre-MKS 5000 hand paddle compatibility.
2.2	• Added firmware update instructions.
2.3	• Added Paramount ME motor adapter cable connection instructions.
2.4	• Explain how to plug the motor adapter cables on a Paramount ME.
2.5	• Updated the packing lists. • Removed the PSU from the Paramount ME II Upgrade Kit. The PSU is not required or included with Paramount ME II Upgrade Kit. • Added Paramount MYT through-the-mount cable installation note.