WiSky Installation and Use

Revision 1.3, December 2017

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WiSky and the MKS 5000 Control System

The MKS 5000 is Software Bisque's fourth generation dual axis servomotor telescope motion control system and drives the Paramount ME II, Paramount MX, Paramount MX+ Paramount MᵧT Robotic German Equatorial Mounts, and the Paramount Taurus Model 400, 500 and 600 equatorial fork mounts. The standard MKS 5000 control system communicates with *TheSkyX Professional Edition* via an integrated USB 2.0 communications interface.

Software Bisque offers an optional MKS 5000-compatible plug in module, called *WiSky*, that provides tightly integrated, wireless mount control via Wi-Fi for *TheSkyX Professional Edition* (Mac, Linux, Windows) and TheSky for iOS.

Software Bisque offers optional absolute encoders for the Paramount ME II, and Paramount Taurus 400 (on-axis encoders are standard on the Paramount Taurus 500 and 600 models). The latest revision of the *WiSky* board, called the *WiSky++*, includes the electronics needed for both the Wi-Fi control option and absolute on-axis encoder control. For the purposes of this document, WiSky and WiSky++ are synonymous.

This document describes how to install the WiSky printed circuit board (PCB) on the MKS 5000 PCB and how to wirelessly control the Paramount with TheSky. An instructional WiSky installation video is available here: http://www.bisque.com/sc/media/p/95447.aspx.

Minimum WiSky System Requirements

Please make sure that your mount's control system, firmware, and TheSky software meet the minimum system requirements before proceeding.
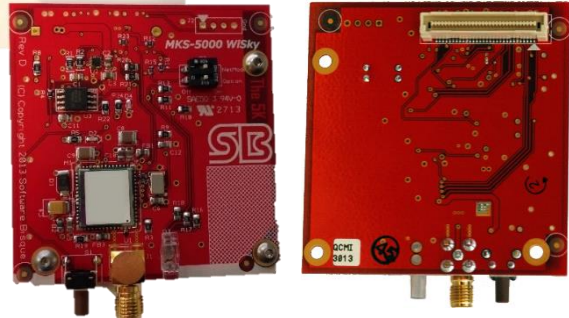
Hardware and Firmware Requirements

- The WiSky is compatible with MKS 5000 printed control board (PCBs) *only*. The WiSky is not compatible with earlier generation MKS 3000, MKS 3200 or MKS 4000 control systems.
- MKS 5000 motor controller firmware version 5.32.8 or later and I/O firmware version 5.22.1 or later must be installed. See "Step 1: If Necessary, Update the MKS 5000 Firmware" on page 5 for details.

Software Requirements

- **TheSkyX Professional Edition** version 10.3.0 and later (Mac and Windows) supports Wi-Fi control of the Paramount mounts.
- **TheSkyX Professional Edition** version 10.3.0 or later (Mac or Windows) is required to configure the WiSky module (for example, to use an ad hoc or infrastructure network).
- **TheSky for iOS** (TheSky HD or TheSky Mobile) version 1.1 or later also supports Wi-Fi Paramount control.

Packing List

Quantity	Component	Description
1		*WiSky++* PCB (front and rear view). The WiSky++ PCB is the second-generation board that also includes the electronics and LEDs for Paramount on-axis encoders. –OR–
		WiSky PCB (front and rear view). The WiSky PCB is the first-generation board that does not include the electronics and LEDs for Paramount on-axis encoders.
1		WiSky/WiSky++ antenna. The WiSky++ antenna, right, has a much shorter profile than the WiSky antenna, left. Both antennae can be interchanged with either unit.
2		4-40 x 5/16-in. hex standoffs.
1		WiSky and WiSky++* expansion bus cover (replaces the standard expansion bus cover). * *The expansion bus cover on the right includes six LED light tube holes that show the status for the absolute encoders and WiSky++ electronics.*

Step 1: If Necessary, Update the MKS 5000 Firmware

The WiSky control module requires the MKS 5000 motor controller firmware version 5.32.8 or later and I/O firmware version 5.22.1 or later to allow Wi-Fi control using the WiSky.

To determine the firmware versions installed on your MKS 5000:

1. From TheSkyX Professional Edition, click Telescope > Connect to connect to the Paramount mount.
2. On the Telescope window, click Tools > Bisque TCS.
3. When TheSkyX is connected to a Paramount mount, the motor controller and I/O firmware versions are displayed at the bottom right side of this Bisque TCS window.

The latest firmware is available on the Software Bisque web site. The latest software and, if necessary, the latest firmware, can be downloaded from the Software Bisque web site www.bisque.com. Click Downloads, then click the MKS 5000 link in the left column.

Updating the Firmware (Update Firmware Button)

MKS 5000 firmware updates, when required, can be downloaded from the Downloads page on the Software Bisque web site.

Step-by-Step *MKS 5000 Firmware* Update Instructions

1. Click the **Check for Updates** command from *TheSkyX Professional Edition's* **Help** menu and install the latest update or daily build if necessary.
2. Visit the Software Bisque web site at www.bisque.com and sign in.
3. If you have not already done so, register your Paramount serial number at: www.bisque.com/register. Registering your serial number gives your account permission to access to the MKS 5000 firmware downloads. Access is denied otherwise.
4. On the Software Bisque web site, click the **Downloads** link, then click the **MKS 5000** link in the left column (under the **Browse Downloads** text). Immediately beneath the **MKS 5000** link, click the **Firmware Updates** link. If these links are "missing," there is no Paramount serial number registered for the current Software Bisque web account. MKS 5000 firmware updates, when available, are listed in the center of the web page.
5. From here, follow the operating system-specific instructions below:

    Mac OS X Instructions

    a. Click the **Paramount MKS 5000 Latest Mac Firmware Installer** link under the **Name** column near the center of the page.
    b. Click the **Download** link on the left side of this page to download the **MKS 5000 Firmware Disc Image**. This file is saved to your *Downloads* folder.
    c. Open the Downloads folder, then double-click **MKS 5000 Firmware Disc Image** to open or "mount" this disc image.
    d. Double-click the **Install MKS 5000 Firmware** icon. Once completed, the latest firmware files have been copied to your computer.

Windows Instructions

  a. Click the *Paramount MKS 5000 Latest Windows Firmware Installer* link under the *Name* column near the center of the page.
  b. Click the *Download* link on the left side of this page to download the file named *MKS 5000 Latest Windows Firmware Installer.exe*.
  c. Double-click *MKS 5000 Latest Windows Firmware Installer.exe* to run to. Complete the installation process to copy the necessary firmware files to your computer.

6. From *TheSkyX Professional Edition*, choose the **Connect** command from the *Telescope* menu.
7. On the *Telescope* window, click the **Bisque TCS** command on the *Tools* pop-up menu.
8. On the *Bisque TCS* window, click the *Utilities* tab.
9. Highlight the *Reboot/Update Firmware* text in the left column of the *Utilities* tab.
10. Click the *Update Firmware* button.

The MKS 5000 motor controller firmware will now be updated to the latest version. Please verify this is so by comparing the firmware versions listed on the bottom of the Bisque TCS window with the firmware versions listed on the Paramount MKS 5000 Latest Firmware web pages. If the update was performed correctly, the versions *must be* identical.

Step 2: Access the MKS 5000 Expansion Bus

PCBs can be damaged by static electricity or electrostatic discharges (ESDs). Make sure to ground yourself before touching or handling the WiSky or MKS 5000 PCBs. To avoid ESDs, Software Bisque recommends using an anti-static wrist band or floor mat, which are available at most electronics stores.

The MKS 5000 PCB is housed inside the Paramount Electronics Box. The Electronics Box needs to be *partially* removed from the mount so that the WiSky board can be plugged into the MKS 5000 expansion bus.

1. Rotate the right ascension axis until the counterweight shaft is vertical and lock the axis in place.
   - **Paramount MʏT**: Rotate the Two Position Switch to the Balance position, then pull the Locking Knob on the right ascension axis outward, rotate 90 degrees clockwise and release so that the knob locks in place.
   - **Paramount MX**: Rotate the Three Position Switch to the Lock position.
   - **Paramount MX+**: Rotate the Two Position Switch to the Balance position, then pull the Locking Knob on the right ascension worm block cover outward, rotate 90 degrees clockwise and release so that the knob locks in place.

- **Paramount ME II**: Rotate the Two Position Switch to the Run position (this does not lock the axis, but keeps it from rotating during installation).

2. *Paramount MX/MX+ only*: Loosen the azimuth adjustment knobs until the threads are just visible.
3. Remove the two 4-40 screws for the External Power plug in with a 1/16-inch hex wrench (Figure 1 and Figure 3).
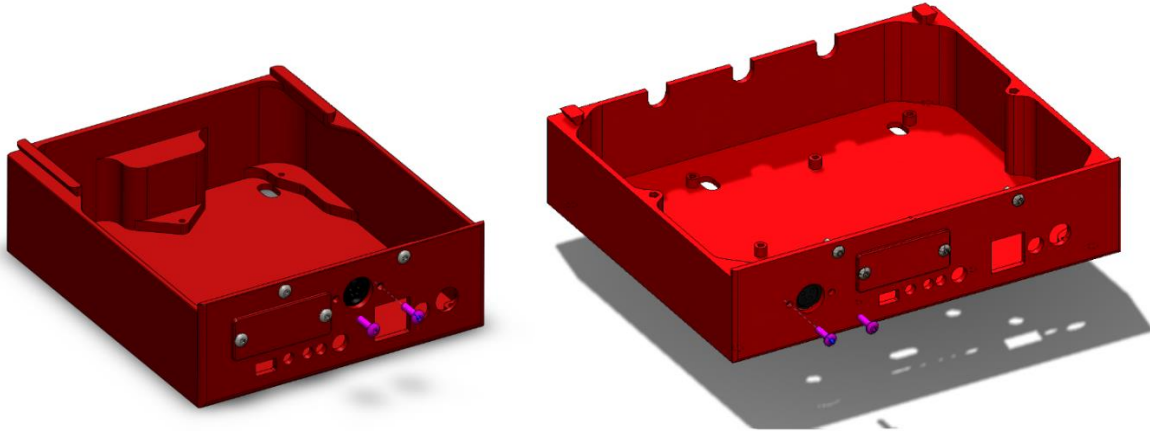

Figure 1: Removing the external power plug mounting screws (Paramount MX/MX+/MYT left, Paramount ME II right.)

4. For the Paramount MX/MX+, using a 1/16-inch hex wrench to remove the two 4-40 screws that attach the Electronics Box to the right ascension base. For the Paramount ME II, remove the two 6-32 screws with a 5/64 wrench. For Paramount MYT, remove the two 6-32 screws on both sides of the azimuth adjuster on the base using a 7/64 wrench (Figure 2) to free the electronics from the base. All shown in Figure 2.
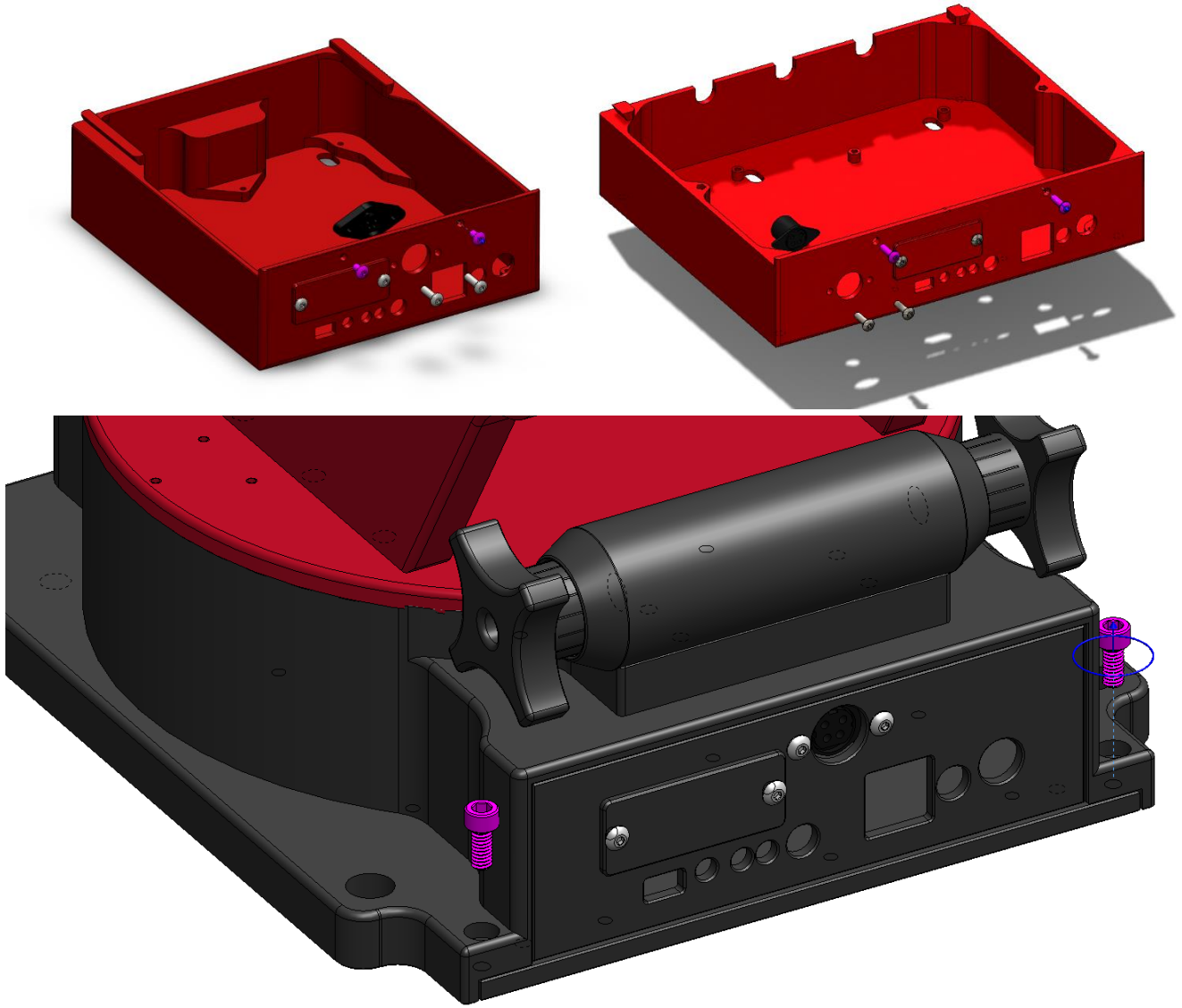
Figure 2: Remove the two Electronics Box mounting screws (purple). Paramount MX/MX+ (above, left), Paramount ME II (above, right), Paramount MʏT (below, center)
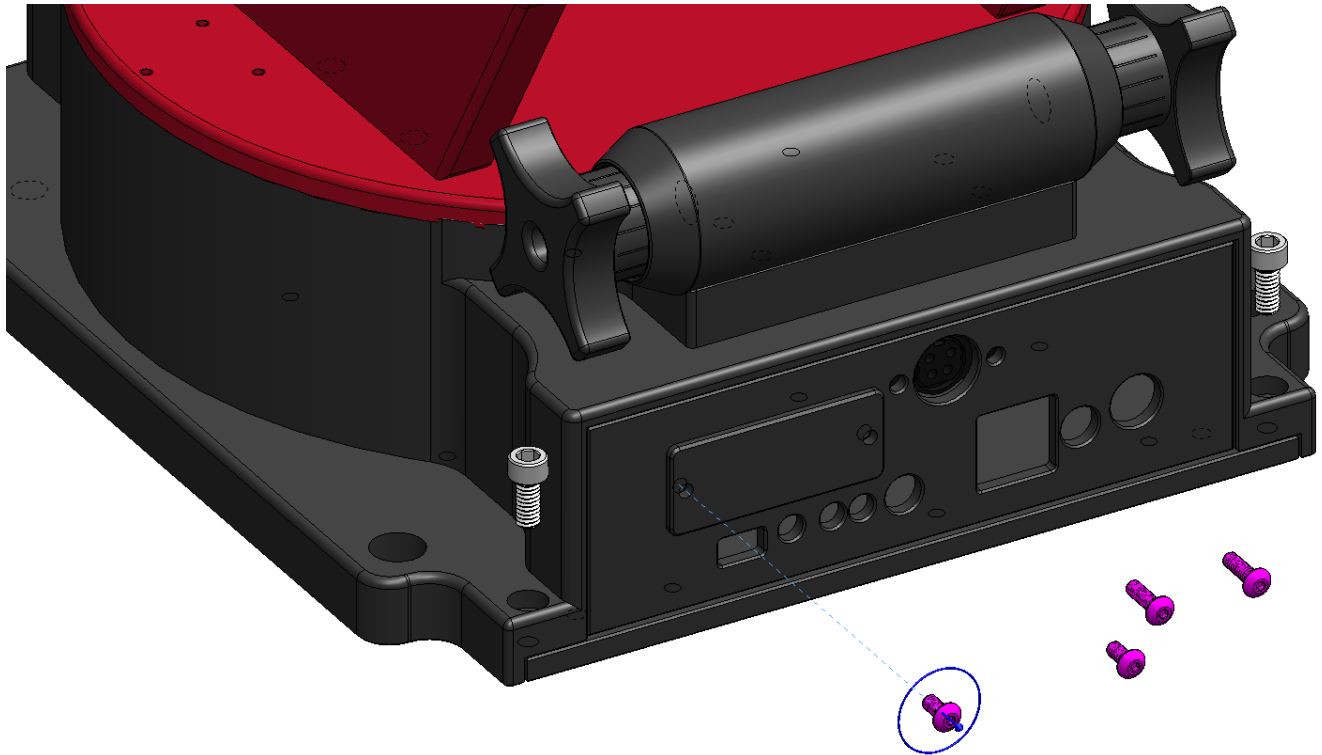
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Figure 3: Removing the Paramount MʏT external power plug screws and standard expansion bus cover screws

These diagrams show *isolated* views of the Electronics Box for illustration purposes. The Electronics Box does *not* need to be completely removed from the right ascension housing before the WiSky PCB can be installed. Once the mounting screws have been removed, you need only to slide the Electronics Box away from the right ascension housing until about the "front half" of the MKS 5000 PCB is accessible.

Also note that a male dove tail is machined into the top, rear of the Electronics Box. As the Electronics Box is pushed inside the mount, the dove tail mates the Electronics Box to the bottom of the right ascension housing.

When the Electronics Box is moved forward, it will separate from the right ascension housing and drop down a bit (Figure 7). The cables that are attached to the MKS 5000 PCB will prevent the box from falling onto the floor.

To avoid applying excessive tension on the internal cables, never pull hard when sliding the Electronics Box out of the mount. Take great care to gently and slowly pull the excess cabling from the right ascension access cable access holes until Electronics Box has been moved sufficiently away from the mount to clear the dove tail.

Once the Electronics Box has cleared the dove tail, it drops away from the right ascension base to provide access to the MKS 5000 PCB (Figure 10). You are now ready to install the WiSky module.

5. Remove the standard Electronics Box expansion bus cover by unscrewing the two 4-40 screws with 1/16-in. wrench. (Figure 4).
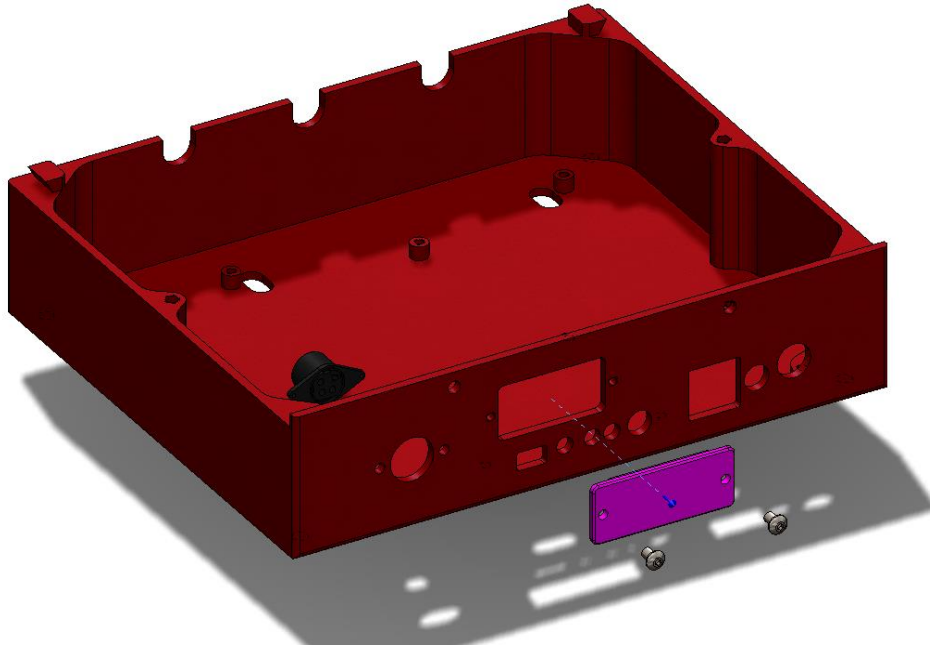

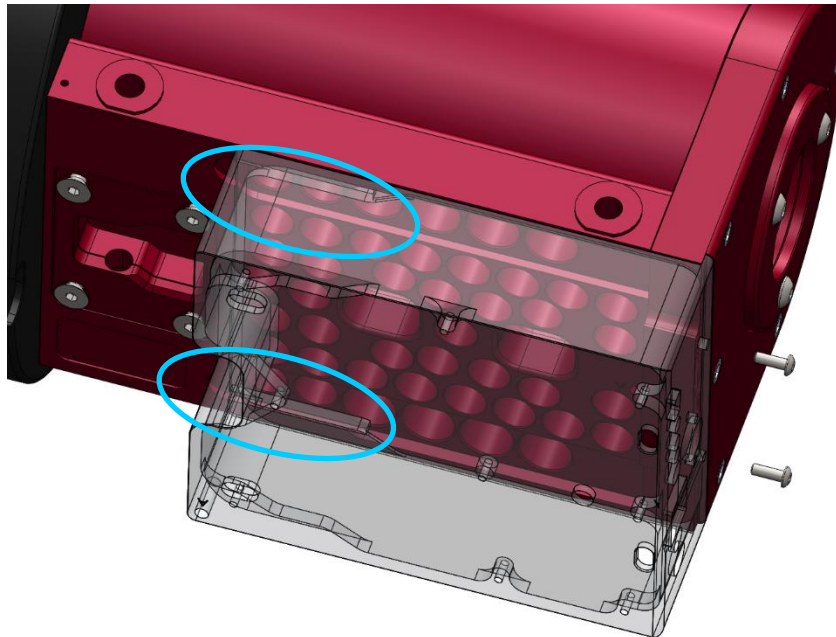**Figure 4: Removing the standard expansion bus cover.**
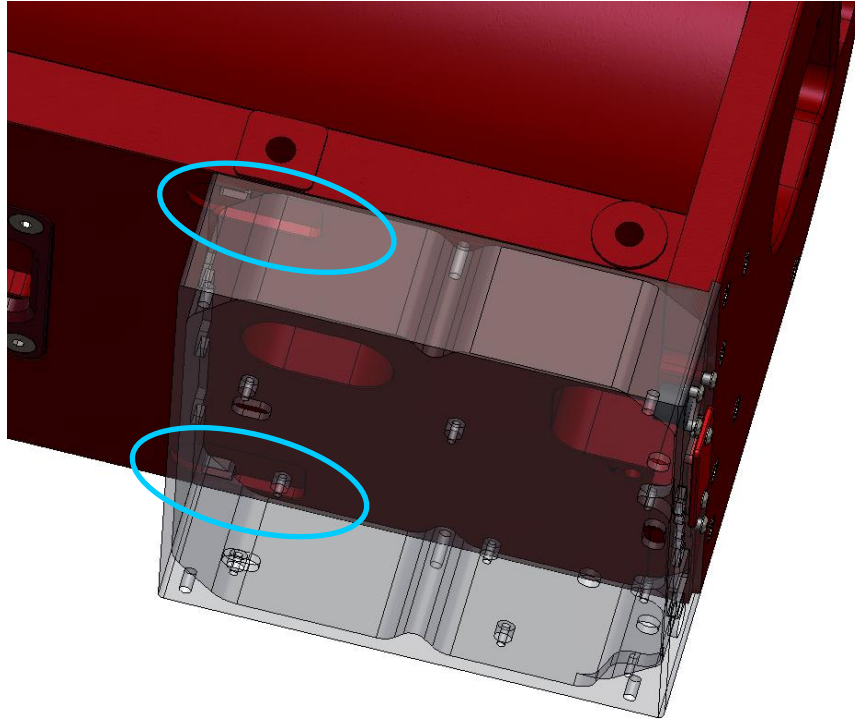

Figure 5: Paramount MX/MX+ dove tail.

Figure 6: Paramount ME II dove tail.
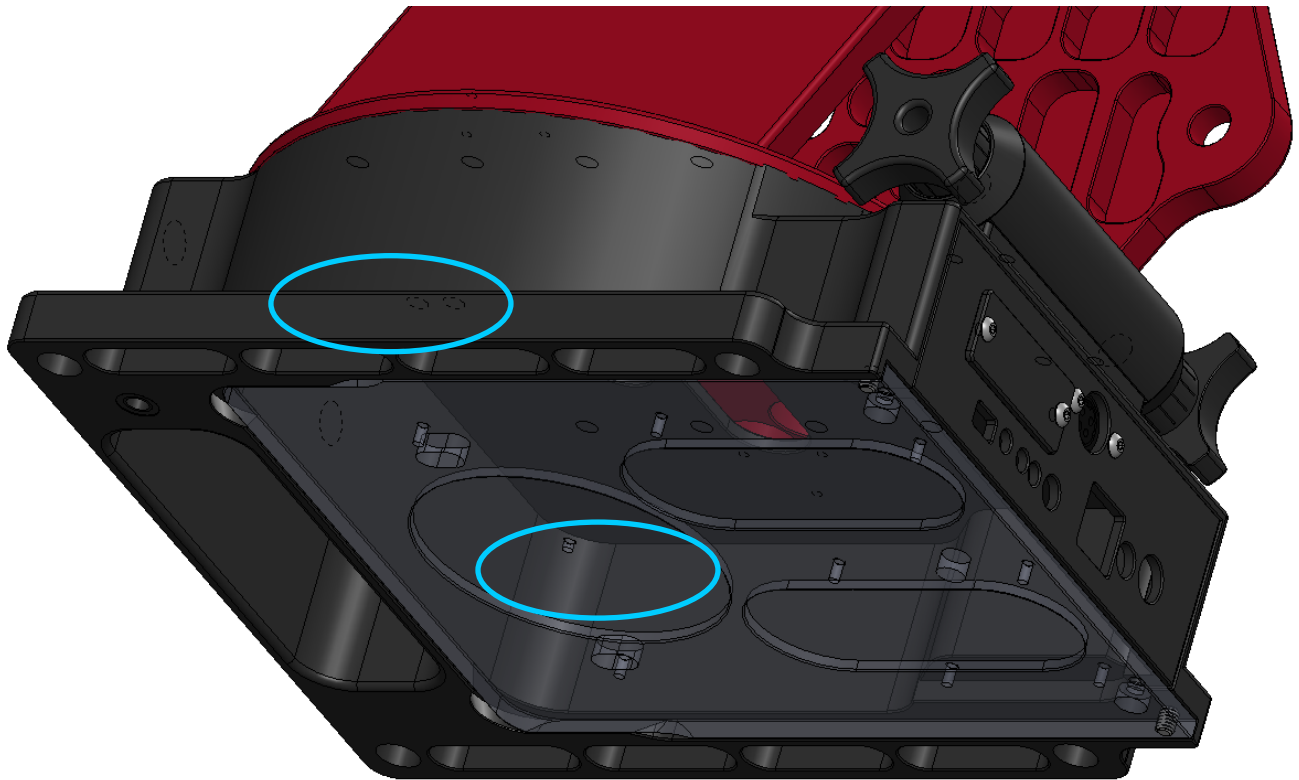

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Figure 7: Paramount MYT dovetail.
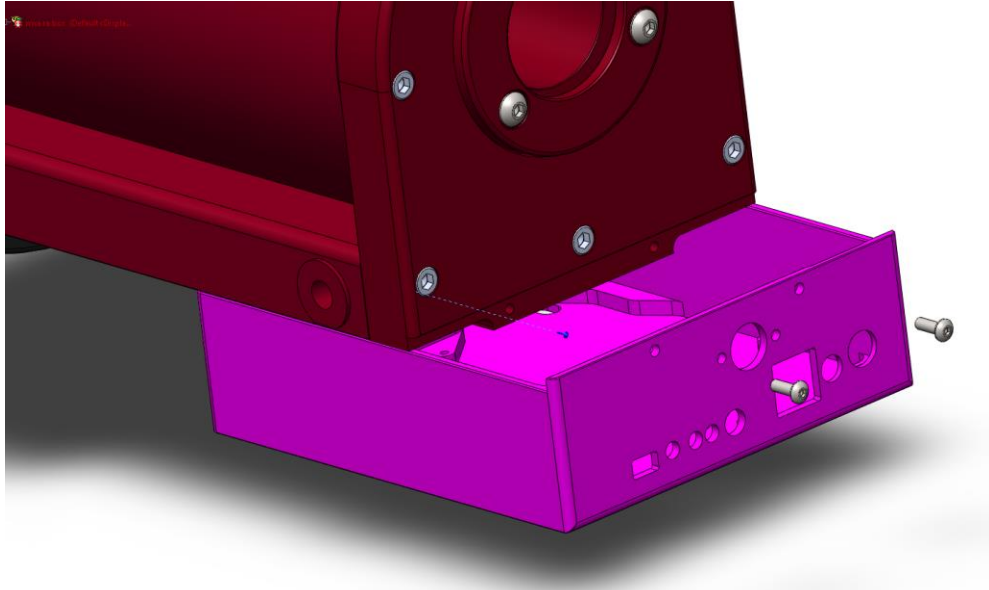
Figure 8: Removing the Paramount MX/MX+ Electronics Box.
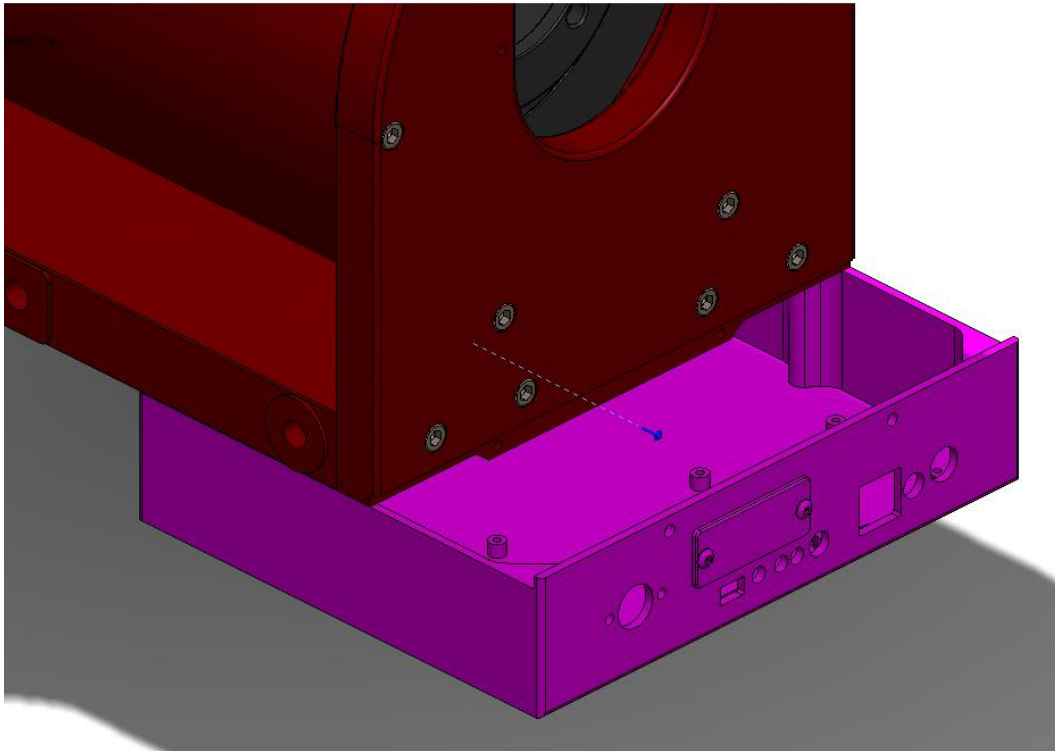
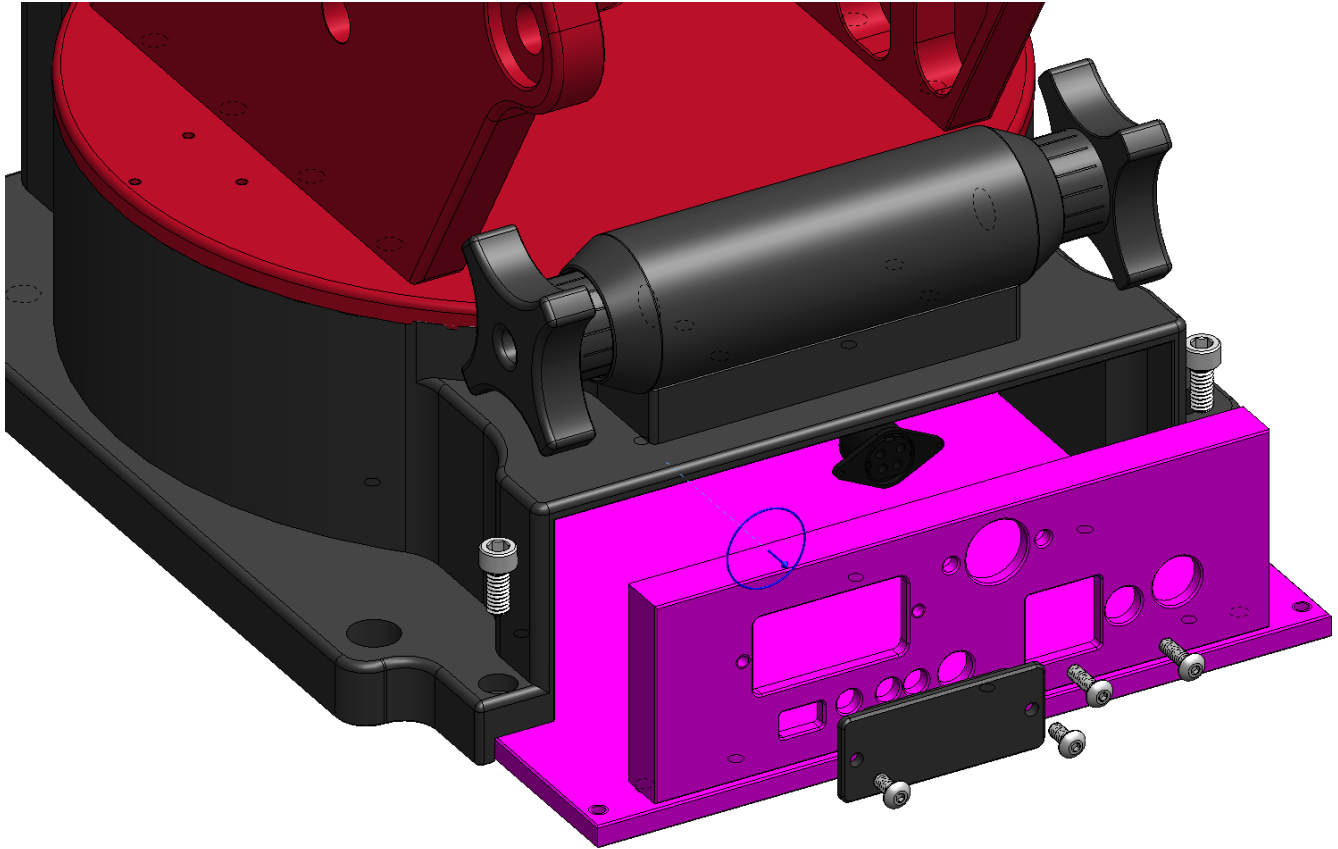**Figure 9: Removing the Paramount ME II Electronics Box.**

Figure 10: Removing the Paramount M��T Electronics Box.

Step 3: Installing the WiSky PCB

1. Remove the two 4-40 screws (circled in yellow in Figure 11) with a 1/16-in. hex wrench. Save these screws because they will be needed later. The expansion bus in which the WiSky PCB plugs into is highlight by a blue ellipse in Figure 11.
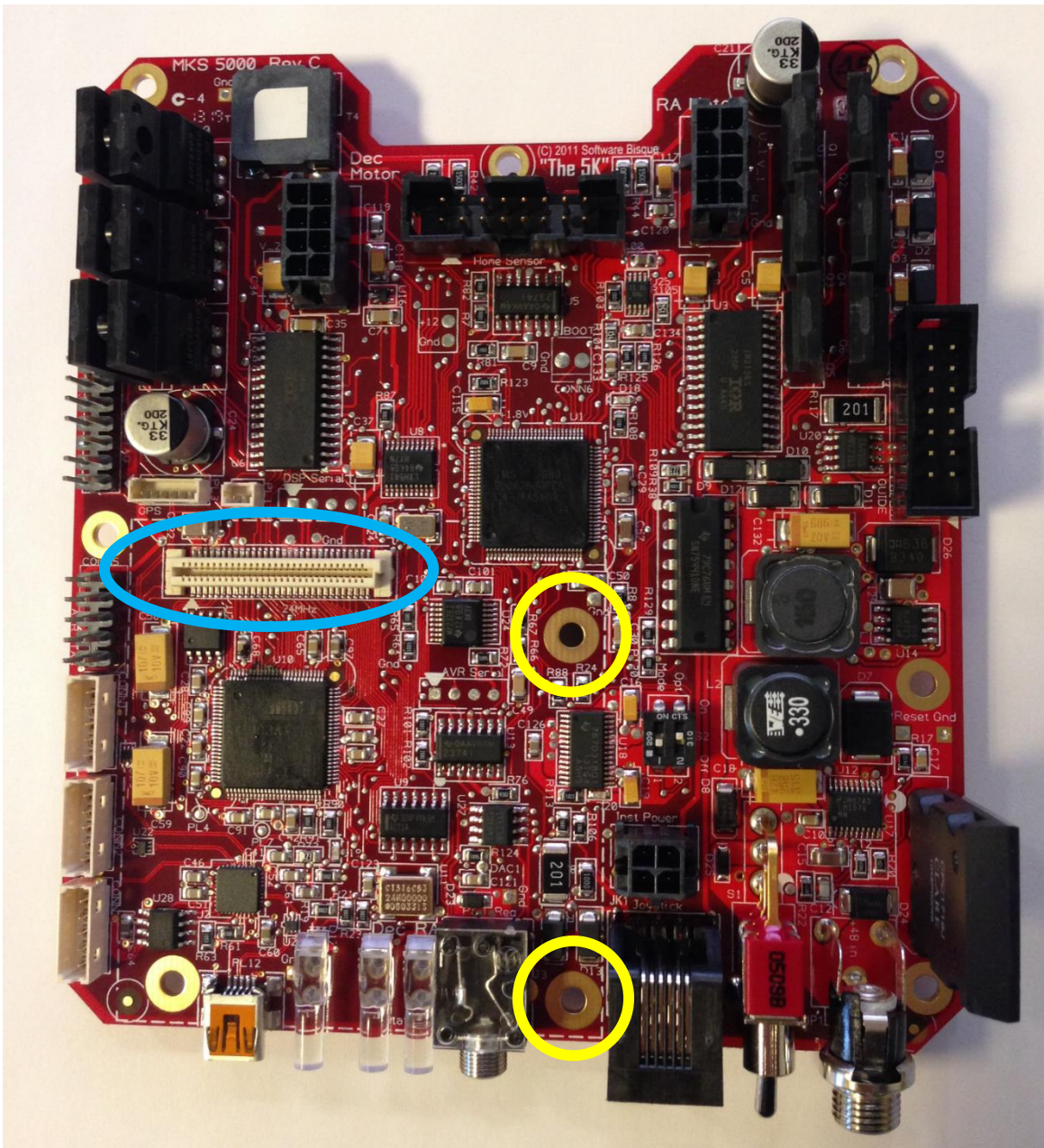
Figure 11: The top side of the MKS 5000 PCB with the expansion bus (blue) and screw removal* (yellow).

*For WiSky++, only the two screws on the right shown above need removed and replaced with standoffs.
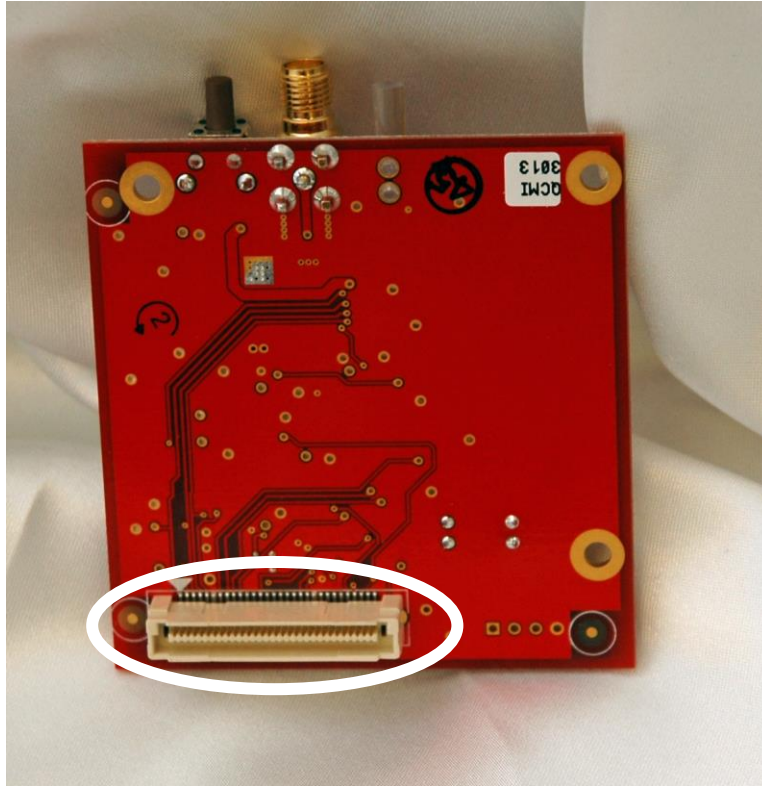
Figure 12: Bottom side view of WiSky PCB showing female expansion bus connector (white).

2. Replace the 4-40 screws removed with the hex standoffs that are included inside WiSky box. To make installation easier, stack the standoffs by screwing them in to each other, and or use a pair of pliers to screw them in all the way (Figure 13).
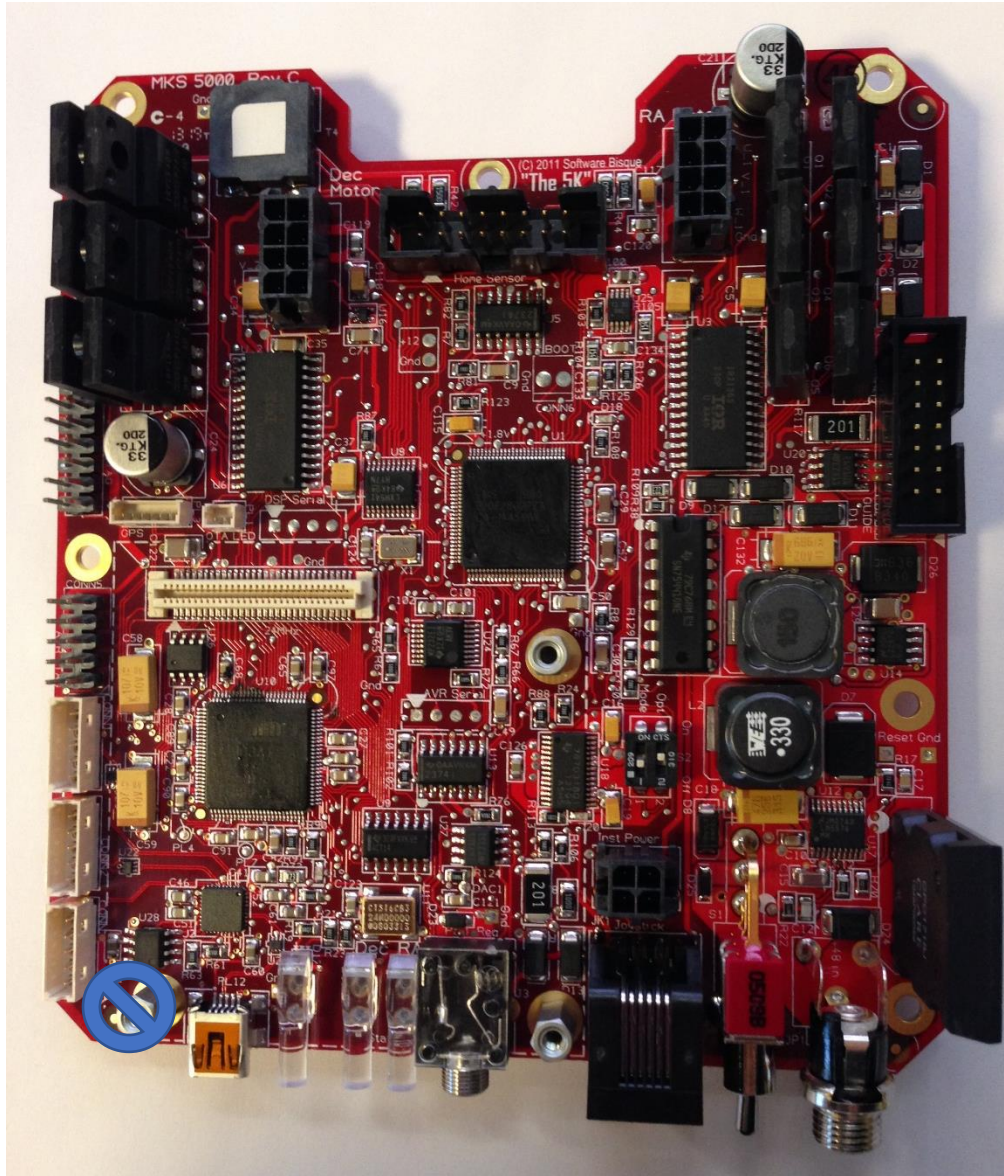
Figure 13: The MKS 5000 PCB with standoffs installed.

Note: The next several figures show differing Electronics Boxes; the process is identical for all models.

3. Insert the front edge of the WiSky board (with the antenna port, LED and button) through the expansion bus access hole, with the outer edge flush against the front of the Electronics Box (Figure 14). You might want to temporarily unplug the USB A and USB B cables (Figure 16) so they are not in the way. Do not forget to plug them back in once the WiSky PCB is plugged in!
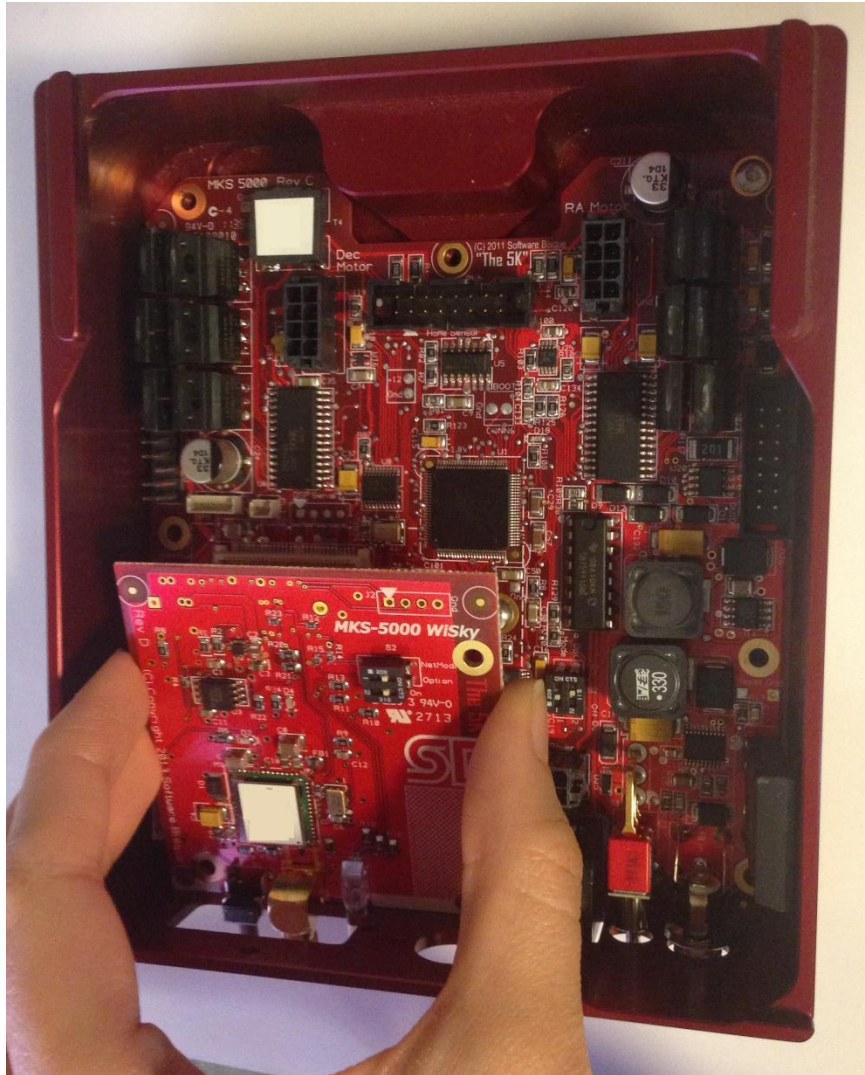

Figure 14: Installing the WiSky PCB.

4. Slowly lower the rear of the WiSky PCB to align the female bus connector on the back of the WiSky PCB with the male expansion bus connector (shown in Figure 11). Once aligned, gently and evenly press downward on the rear of the WiSky PCB so that it mates with the expansion bus. When installed correctly, the two boards should be parallel (Figure 15). Replace the removed 4-40 button heads to hold the board in place.

Figure 15: WiSky board installed on the MKS 5000 PCB with the antenna and WiSky expansion bus cover installed.
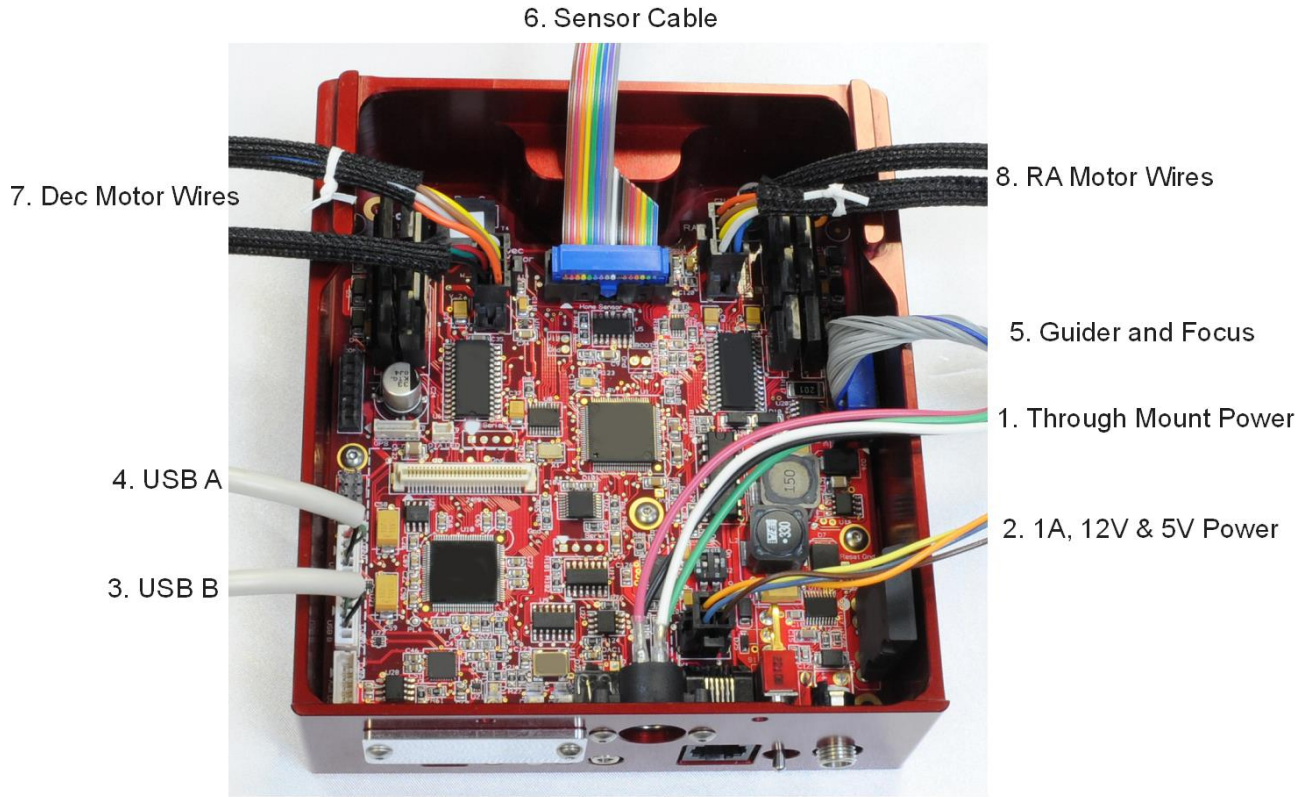
Figure 16: Photo shows where each cable plugs into the MKS 5000 PCB.

Step 4: Mount the Electronics Box

Now that the WiSky PCB is installed, the next step is to remount the Electronics Box to the base of the right ascension housing. Please carefully follow the procedure below to avoid damaging cables by pinching them between the box and the right ascension housing.

1. For the Paramount MX and ME II use your hand to reach through the back side of the mount (Figure 19) and insert as much of the excess cabling into the access holes on the bottom of the right ascension base as possible while maneuvering the Electronics Box into place.
   a. For the Paramount MYT, the access hole is in the bottom of the rotating base plate as shown in Figure 20. Reaching your hand through the back of the mount (Figure 19) still helps keep the cables in order however all the cables go through one hole up through the mount.
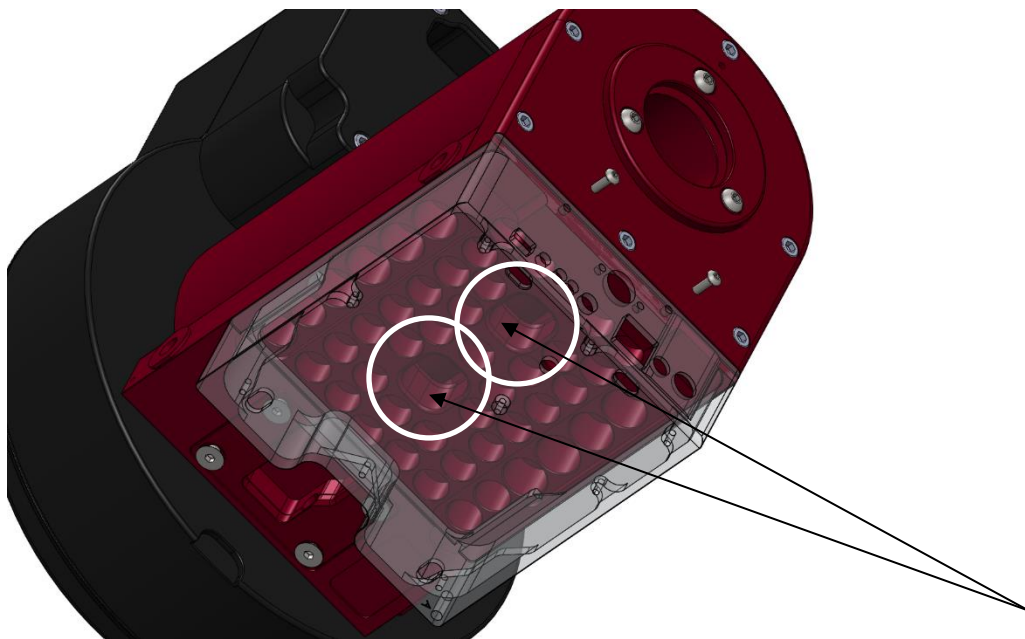

Figure 17: Location of the Paramount MX/MX+ through the mount cabling holes in the right ascension housing.
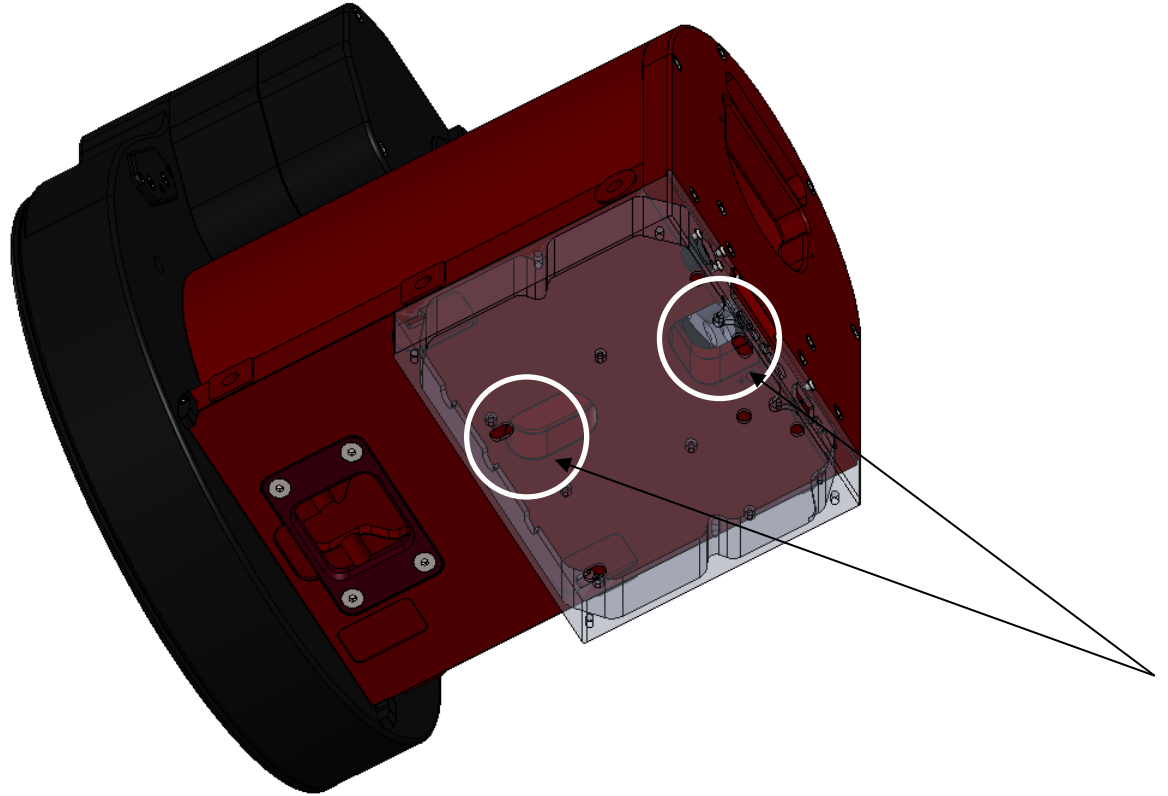
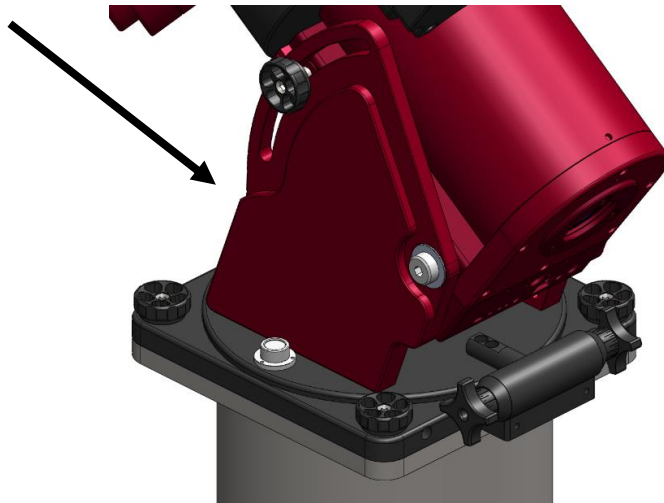**Figure 18: Location of the Paramount ME II through the mount cabling holes in the right ascension housing.**

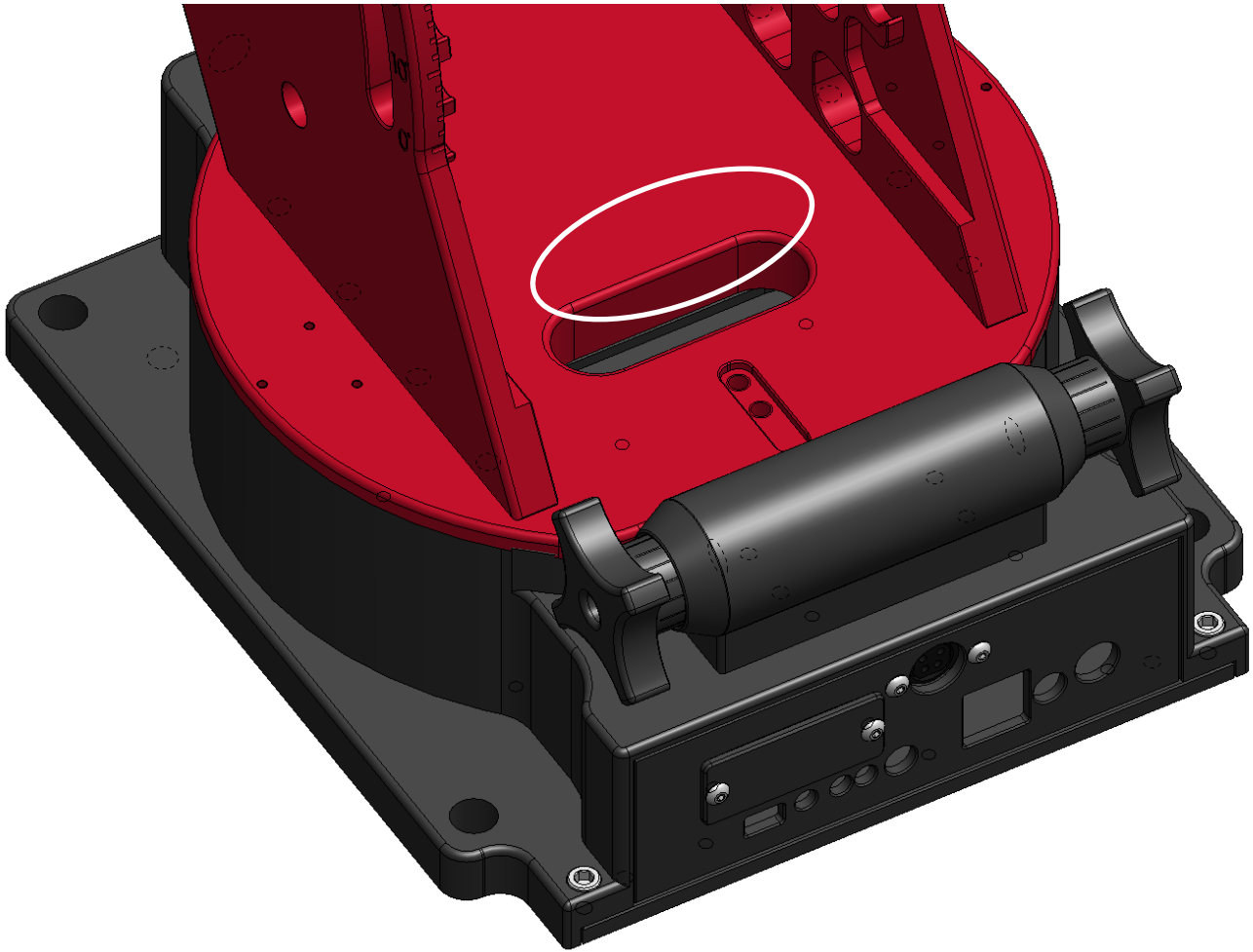**Figure 19: The rear of the Paramount (Paramount MX shown).**

Figure 20: Paramount MYT through the mount cabling hole in rotating base.

2. Orient the power cable connector so that the notch in the front of the connector is rotated toward the top of the Electronics Box and the flat part of the connector is on the bottom (Figure 23).
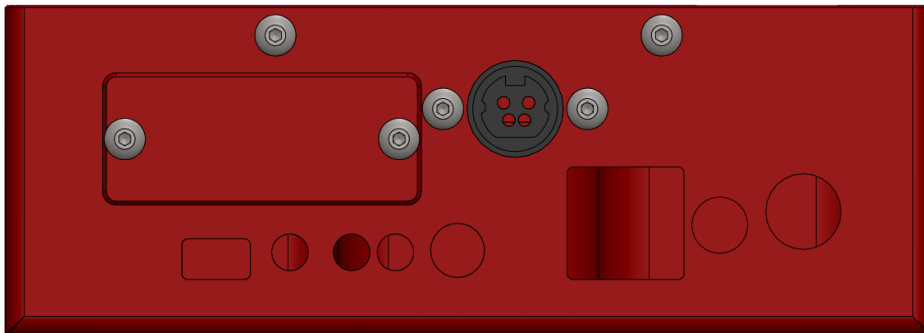

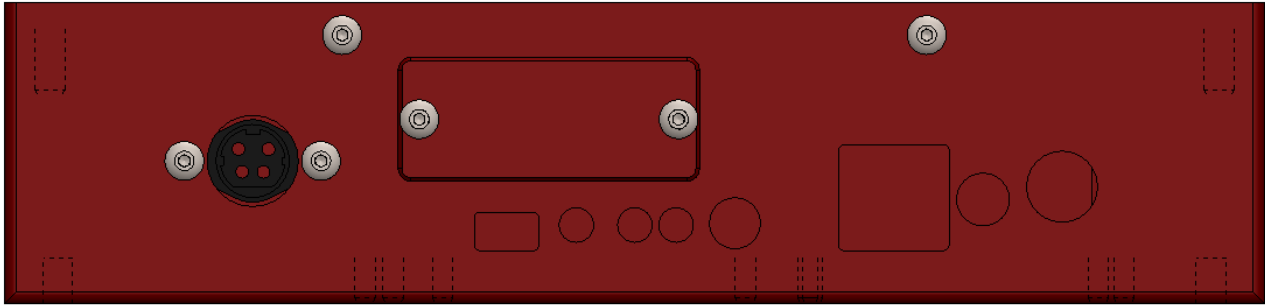**Figure 21: Orienting the Paramount MX/MX+ power cable connector.**

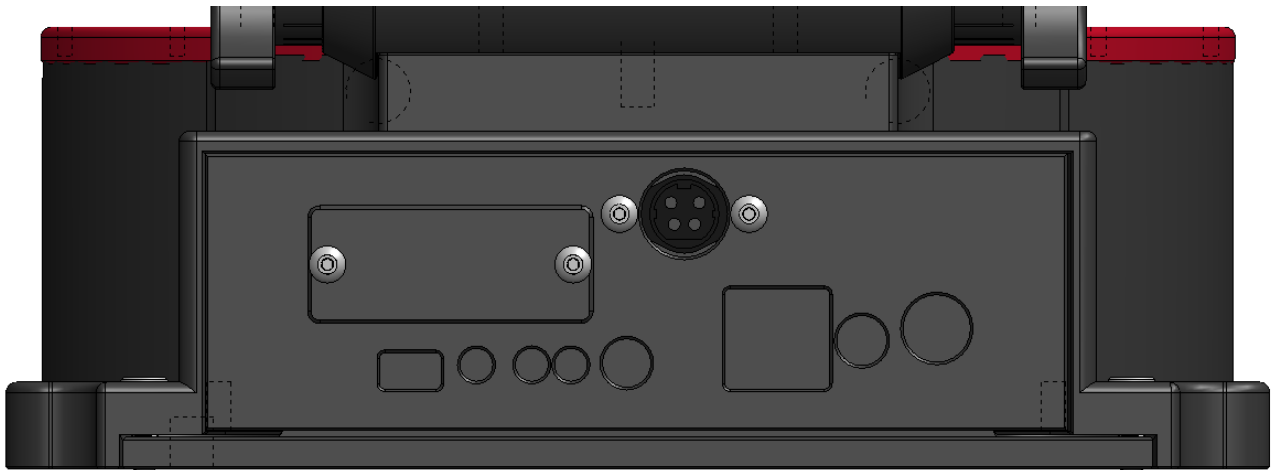**Figure 22: Orienting the Paramount ME II power cable connector.**

Figure 23: Orienting the Paramount MʏT power cable connector.

3. Place the cables in the box as flat as possible and rely on the "memory" of the wires to help guide them into their original positions. Start by making the top edge of the Electronics Box as close to flush with the bottom of the RA base as possible (the dovetails prevent it from being completely flush).
4. Slide the Electronics Box up, past the dovetails and right ascension axis cable access holes in order to ensure wires are completely contained within the Electronics Box.

To prevent wires from getting caught in the dovetail, watch from the back side of the mount and wiggle cables into position. Slide the Electronics Box forward until it is completely flush with the right ascension base. *Remember keep the **entire** Electronics Box as close to flush with the right ascension base as possible, especially the front of the box*.

The Electronics Box will be completely flush once it has reached the front of the dovetail. Look from the rear of the mount and line up the female dovetail on the right ascension base with the male dovetail on the Electronics Box. Once the box is completely flush, gently push the Electronics Box toward the back of the mount while ensuring you are engaging the dovetail. Also make sure that all wires and cables are tucked into the box and not getting pinched when sliding the Electronics Box along the dove tail.

5. Replace the two 4-40 screws on the front of the Electronics Box for the Paramount MX/MX+ and Paramount ME II (Figure 26) and the two 6-32 screws on the Paramount MYT (Figure 28).
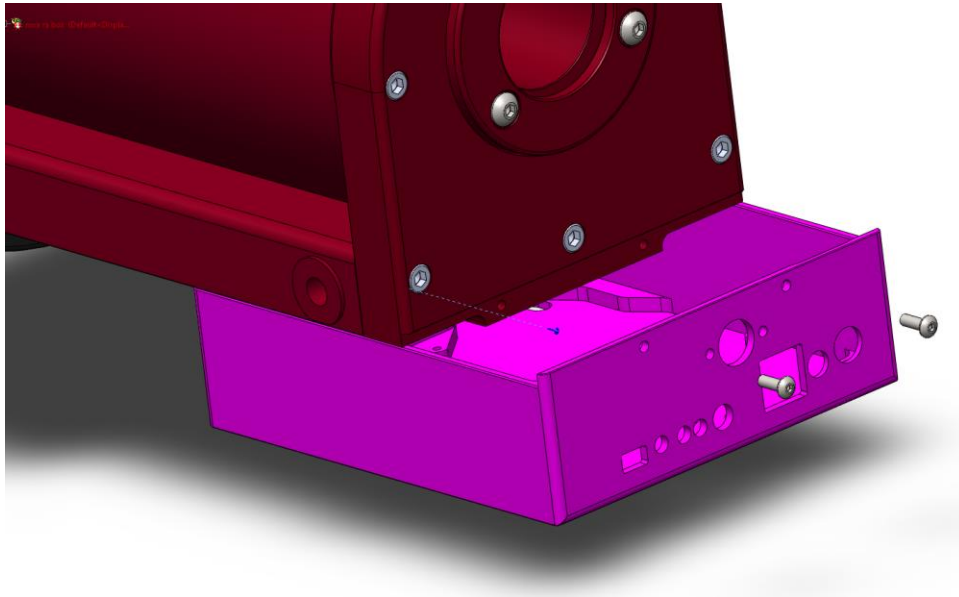

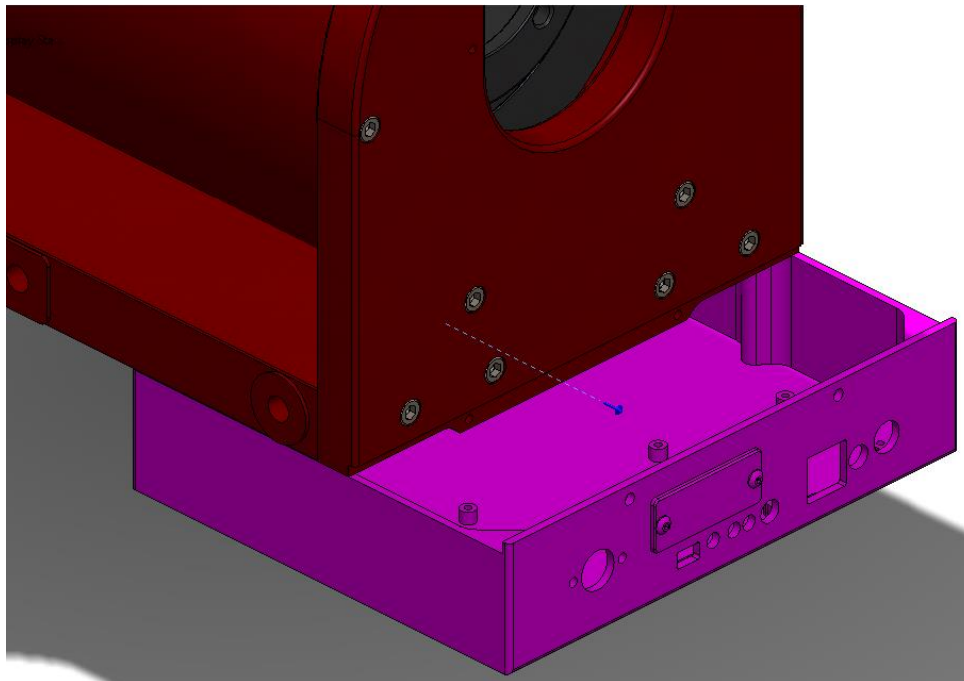**Figure 24: Figure 25: Replacing the Paramount MX/MX+ Electronics Box and mounting screws.**

Figure 26: Figure 27: Replacing the Paramount ME II Electronics Box and mounting screws.
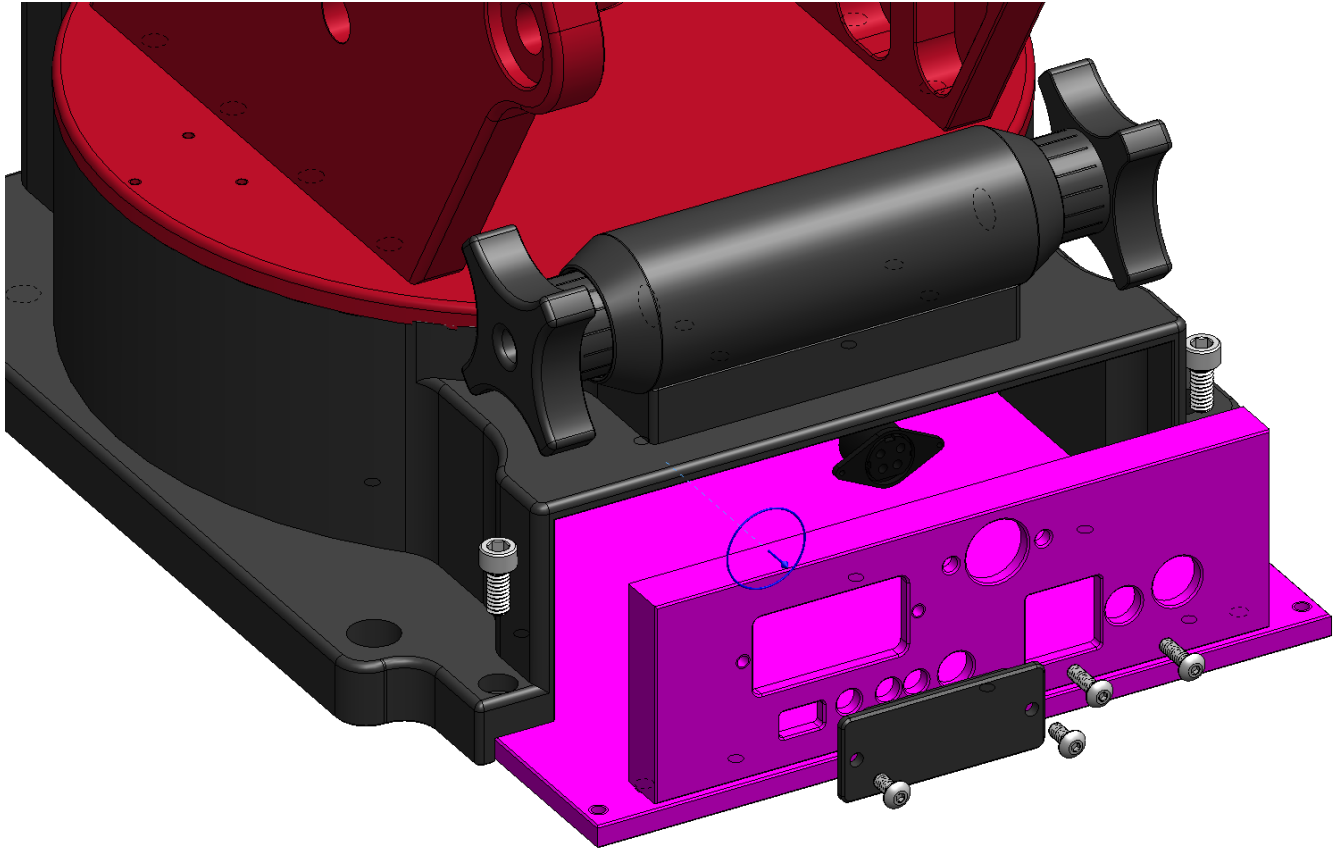
Figure 28: Replacing the Paramount MʏT Electronics Box and mounting screws.

Step 5: Install Cover and Antenna

Install the WiSky expansion bus cover and screw the antenna into the threaded, brass-color plug that protrudes from the WiSky expansion bus cover.

Step 6: Turn on Mount

Plug in the Paramount power cable and turn on the mount. The LED on the WiSky board will be blue, indicating the Wi-Fi ad hoc network is ready for use.

WiSky Installation Instruction Video

See the WiSky Installation Instruction Video here*: http://www.bisque.com/sc/media/p/95447.aspx

*Software Bisque began manufacturing the Paramount MʏT *after* this video was created. When installing the WiSky on a Paramount MʏT, follow both *video and the written instructions*.

WiSky Wireless Mount Control

The WiSky supports *ad hoc* and *infrastructure* networks. The more popular and default configuration is ad hoc, where the WiSky board creates its own network. TheSkyX Pro from your desktop or laptop computer, or *TheSky HD* for iPad, or *TheSky Mobile* for iPhone, can join this network and control the Paramount mount wirelessly.

Infrastructure networks allow the mount and device to communicate on an existing wireless network.

There is also an *inactive option* that can be used whenever you may not want wireless communication to be active, for example at a star party with wireless restrictions.

Each network connection setup is described below. The WiSky can use one of five different profiles based on your operating environment (permanent pier, portable, etc.).

Quick Start

Use the following quick start guide if you are familiar with TheSky, and setting up networks.

Connecting the Paramount Wirelessly to an iOS Device

The following instructions assume that you have a Paramount (MᴦT, MX, MX+, ME, or ME II) with the WiSky installed on the MKS 5000 PCB, and have purchased either *TheSky HD* for iPad or *TheSky Mobile* for iPhone (generically, *TheSky for iOS*) from the Apple App Store.

To control the Paramount with TheSky for iOS:

1. Turn on the Paramount.
2. Connect your iPad/iPhone to the WiSky's ad hoc network.
3. Set the iPad/iPhone's static IP address to 169.253.1.2 and subnet mask to 255.255.0.0.
4. Connect TheSky for iOS or TheSkyX Professional Edition to the Paramount.

Remember, when the iOS device is connected to the WiSky's ad hoc network, the device will not be connected to the Internet.

When TheSky for iOS is launched, you may encounter a warning message that your location cannot be determined.   If this happens, tap the **Where** button to enter this information manually.

Setup Instructions

The following instructions gives additional details on each step.

1. **Turn on the Paramount (WiSky must be installed)**
   The WiSky's default settings create an open, ad hoc network, named **SWBisqueMKS5###** where **###** are three unique digits. The WiSky's LED emits a blue color which means the ad hoc network is ready.
2. **Connect your iOS device to the WiSky network**
   From the iOS device, tap **Settings**, **Wi-Fi**, then tap **SWBisqueMKS5###** listed under **Devices**.
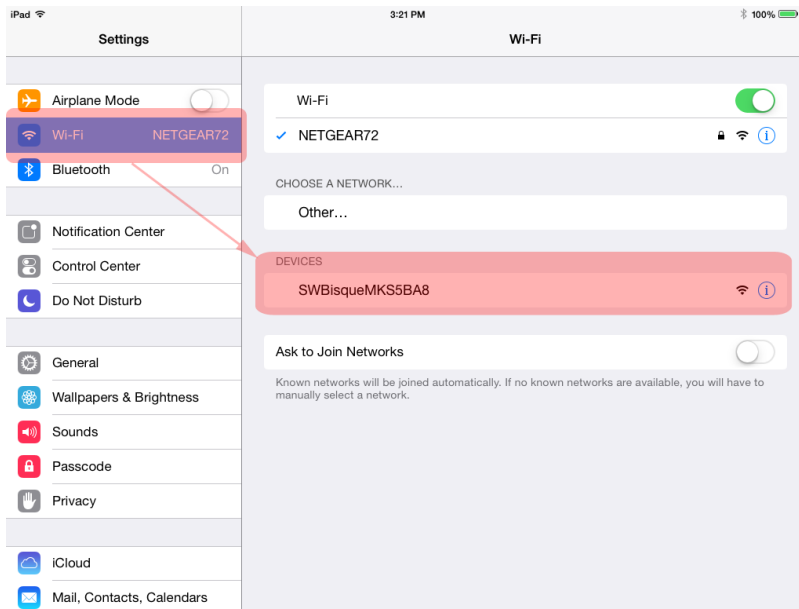
Figure 29: WiSky ad hoc network name (last three digits are unique.)

Tap the *Join Anyway* button when asked if you want to join a network that is not connected to the Internet.
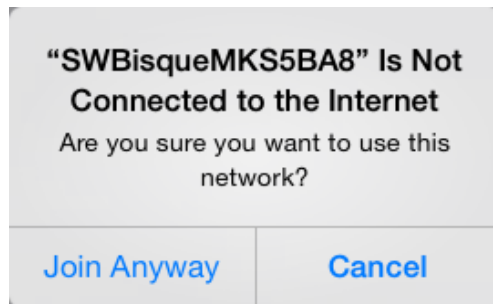

Figure 30: Join the WiSky's ad hoc network.

3. **Configure your iOS device's network to use the static IP address: 169.253.1.2**
   After joining *SWBisqueMKS5###*, tap the information button, tap the *Static* pane and type *169.253.1.2* for the *IP Address* and *255.255.0.0* for the *Subnet Mask*.
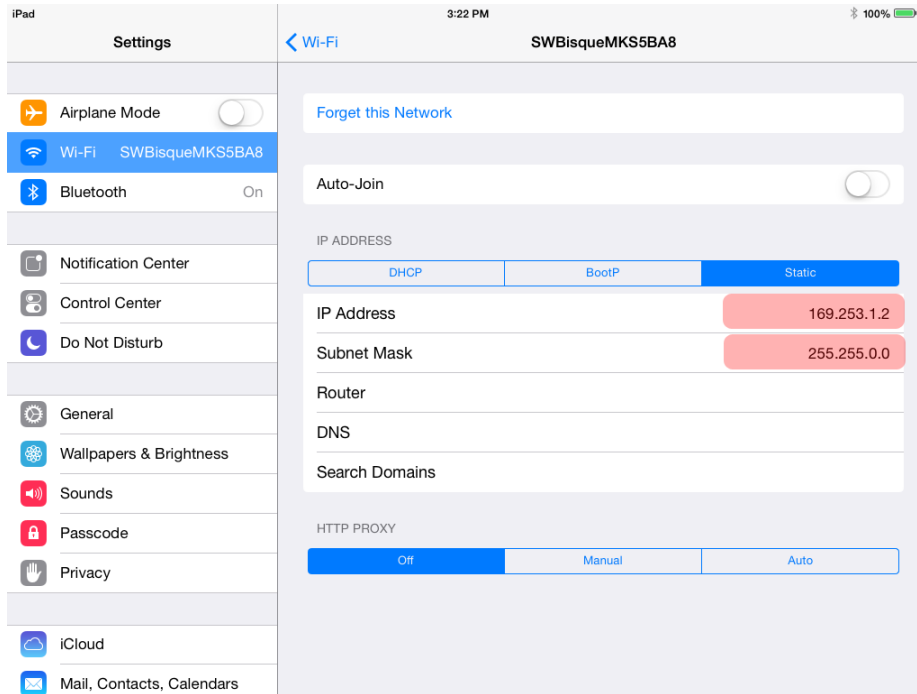
Figure 31: Enter the IP address and subnet mask shown above.

The device will now use the WiSky's default network so that the mount can "talk" to TheSky for iOS.

4. **Connect TheSky for iOS to the Paramount**
    a. Tap TheSky's icon to launch the app.
    b. Tap *Settings*, *Telescope Control*, then choose the appropriate Paramount model from the list and tap *Done*.
    c. Tap the *Scope* button.
        i. For *Scope IP* type *169.253.1.1* which is the IP address of the WiSky itself (note that this is not the same as the ad hoc network's IP address).
        ii. For the *Port Number* enter *2000*.
    d. Tap the *Connect* button.

TheSky should indicate a connection and show graphical arrows on the chart that can be used to move the telescope. Once the mount has been homed, identify an object then tap the *Slew* button to have the Paramount slew to that object.

Configuring the WiSky Control

To view the configuration settings of the WiSky board from TheSkyX, you must be connected to the Paramount via USB or wirelessly through the WiSky. The best practice is to connect via USB.

From the **Telescope** window, click **Tools** > **Bisque TCS** then click on the **Utilities** tab and highlight **WiSky Configuration**:
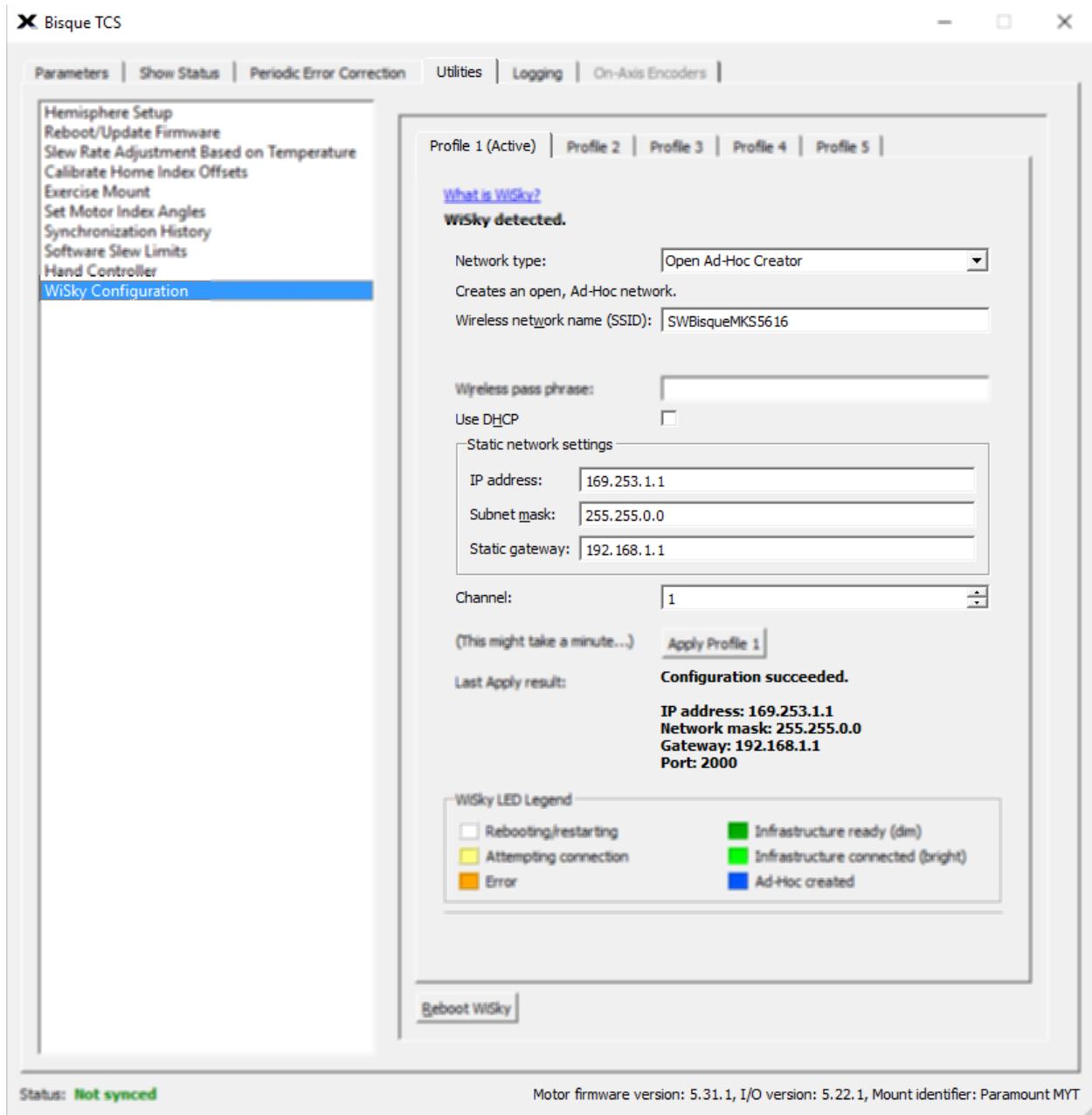

Figure 32: Profile 1 (Active) is shown here SSID SWBisqueMKS5616

By default, *Profile 1* is the currently active ad hoc network. The dark blue LED on the WiSky board right next to

the WiSky Antenna reflects this configuration. If the LED is any color other than dark blue, the WiSky PCB is not configured to set up an ad hoc network. The **WiSky LED Legend** describes the meaning of each LED color. Press the **Apply Profile 1** button to make the ad hoc mode active.

> *(i)* The last profile applied to the WiSky board is always be the default profile when the Paramount is turned on.

Click the **Reboot WiSky** button to restart the WiSky controller.

Figure 33 shows the location of the Status LED and button to cycle through each profile.

Figure 33: The WiSky's Profile LED glows with a steady dark blue when configured for the default ad hoc network profile.

Press the circular button next to the WiSky LED to cycle through each profile. The LED changes color based on the active profile chosen.

The default ad hoc network created by the WiSky board is named **SWBisqueMKS5xxx**, where XXX represents three numbers. The name will differ slightly in your list of available Wi-Fi networks.

When the WiSky board is in the active broadcast mode, you can then see the name of the ad hoc network in your list of available Wi-Fi networks within range.

Although Windows 10 shows this ad hoc network by name, (for example, SWBisqueMKS5616), you cannot simply click on this network to join. Doing so results in the error message *"Cannot Connect."*. Windows 10 users should refer to "*How to Connect Windows 10 to the WiSky's Ad Hoc Network*" for more information about ad hoc networks on this operating system.

Connecting the WiSky to a macOS Computer

The Paramount mount using the MKS 5000 control system coupled with the WiSky Wi-Fi adaptor can communicate wirelessly with any Wi-Fi enabled Mac computer.

The following describes how to configure the WiSky to use an ad hoc network, and configure a computer running macOS.

Minimum System Requirements for Wireless Control

Before getting started, make sure your system is capable of wireless telescope control. You'll need the following components:

- A computer running macOS version 10.7 or later
- A wireless network adaptor on the desktop or laptop computer
- TheSkyX Professional Edition version 10.3.0 Build 9334 or later: http://www.bisque.com/sc/media/p/47013.aspx.
- A WiSky Wi-Fi adaptor installed on the MKS 5000 PCB (see "Minimum WiSky System Requirements" on page 3).
- A USB cable to connect the MKS 5000 to the computer so that the WiSky can be configured properly.

Configuring the WiSky's Ad Hoc Network

The WiSky, by default, is configured to use an ad hoc network. If you have changed the default WiSky configuration (by clicking the button on the WiSky unit which toggles through each of five different configuration options, or changed the configuration using TheSkyX Pro), the following procedure must be performed when the Paramount is connected to the Mac using a *USB cable*, not the WiSky's Wi-Fi interface.

Step-by-Step WiSky Configuration (from TheSkyX Pro)

1. When the Paramount is connected to TheSkyX Pro using the USB communications interface, open the **Bisque TCS** window by clicking the **Bisque TCS** command from the **Tools** pop-up menu on the **Telescope** window.
2. On the **Utilities** page, highlight **WiSky Configuration**.
3. Click the **Profile 1** pane. The WiSky Wi-Fi interface can be configured to use five different profiles (Profile 1-Profile 5).
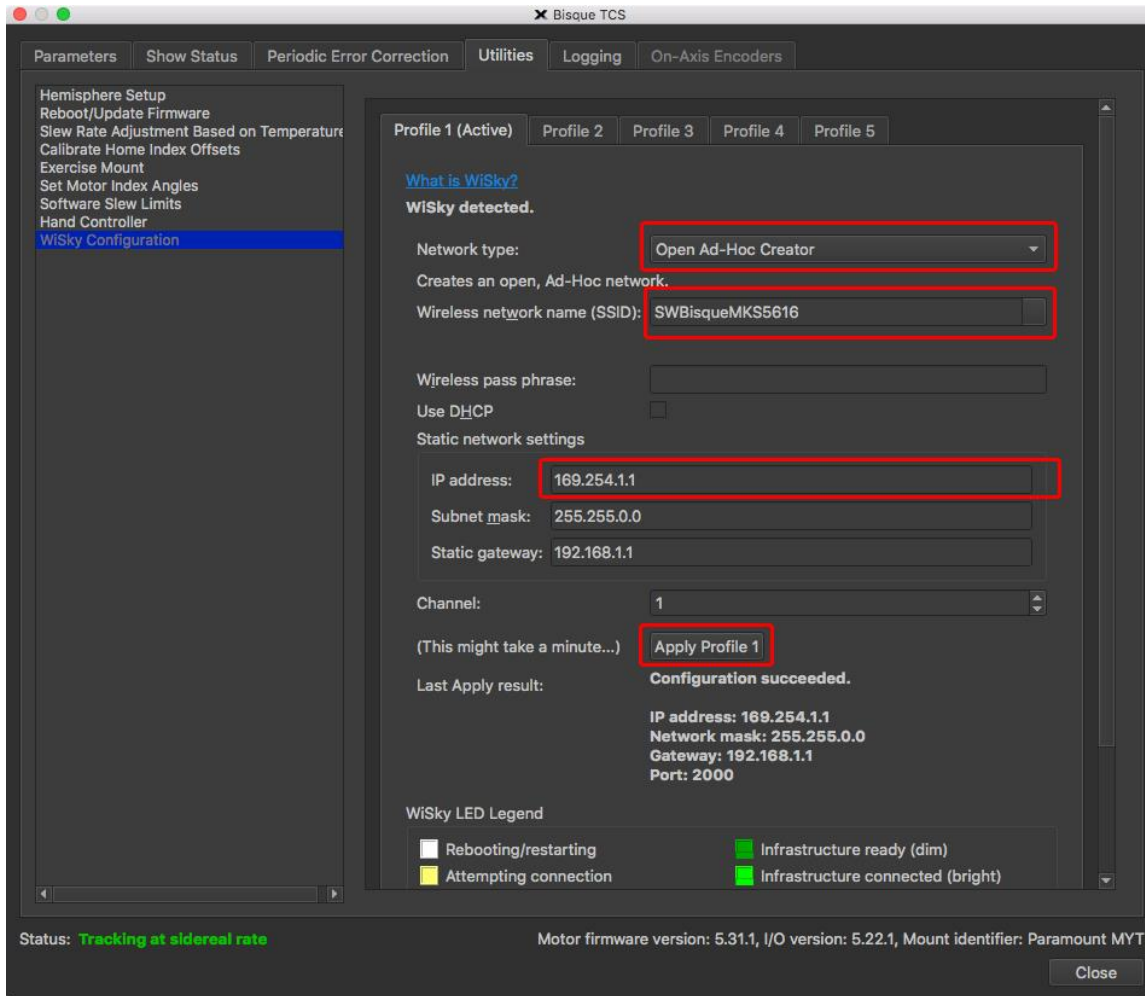
Figure 34: Configuring the WiSky's Profile 1 to setup and ad hoc network.

Ensure the following settings are selected for Profile 1:

- Network Type: Open Ad-Hoc Creator
- Wireless Network Name (SSID): SWBisqueMKS5616 (or any allowable network name can be entered here, make sure to remember the name you used, as it is required later)
- IP Address: 169.254.1.1

Once these options have been set, click the **Apply Profile 1** button near the bottom of the **Profile 1** pane (you may need to scroll down to see this button). When the configuration is complete, a pop-up window and the **Last Apply Result** reads, "*Configuration succeeded*" followed by the **IP address**, **Network Mask**, **Gateway** and **Port** used by the ad hoc network.

When **Profile 1** is active, the text **Profile 1 (Active)** appears as the title of the pane, and the LED on the WiSky emits a blue color. The WiSky is now configured to communicate wirelessly using a private, ad hoc network.

Configuring the Mac's Network Settings

The Mac computer's network settings must be configured correctly before connecting to the WiSky's ad hoc network.

Step-by-Step Mac Network Configuration

1. Make sure the Paramount is turned on, and the LED located between the profile button and the antennae is blue.
2. Click the **System Preferences** command from the **Apple** menu.
3. Double-tab the **Network** icon to access the computer's network settings.
4. Highlight Wi-Fi from the networks listed on the left side of the Networks window.
5. Turn on the computer's Wi-Fi by clicking the **Turn On Wi-Fi** button, if necessary.
6. Select the WiSky's ad hoc network (the default name is **SWBisqueMKS5616**; if you entered a different name when configuring the ad hoc network, select that name instead) as the **Network Name**.

When the computer is connected to an ad hoc network, access to the web or other networks is not possible.
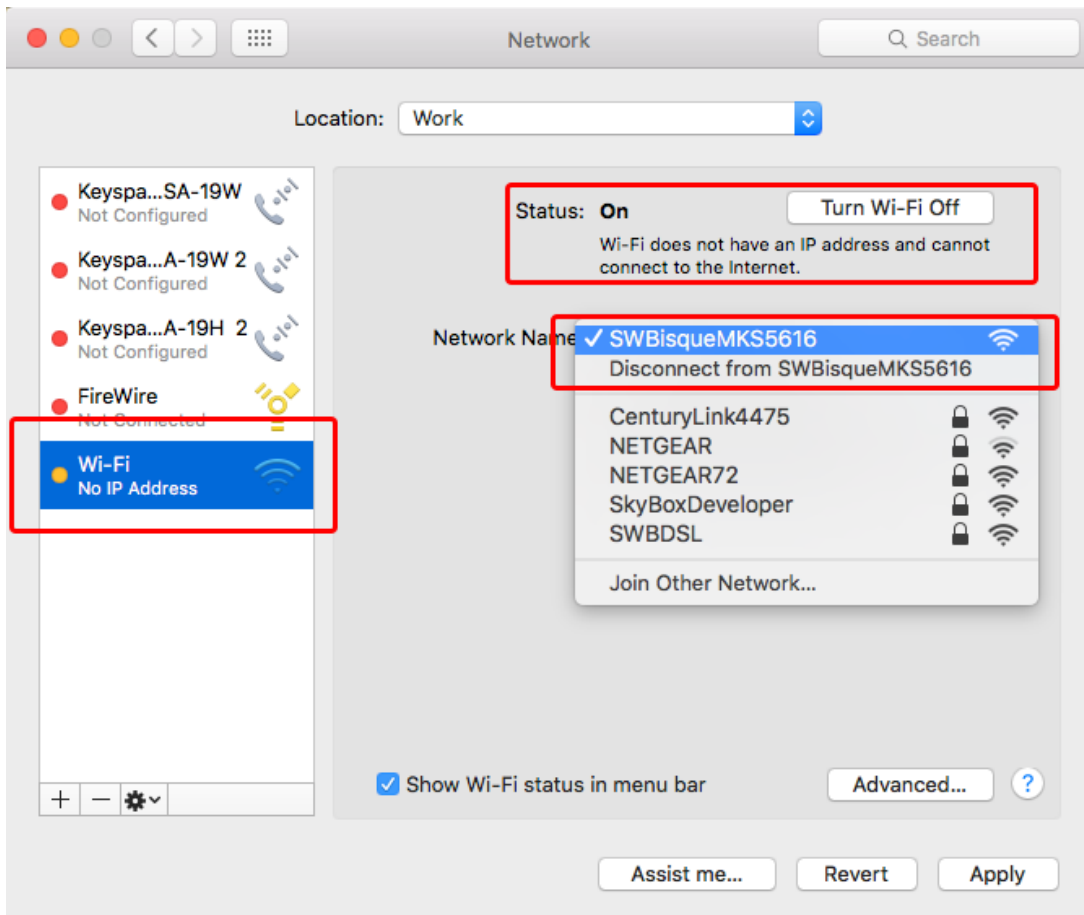
Figure 35: Connecting to the WiSky's ad hoc network from the Network settings window.

7. **Important!** Click the *Advanced* button on the *Network* window to manually configure the networks settings.
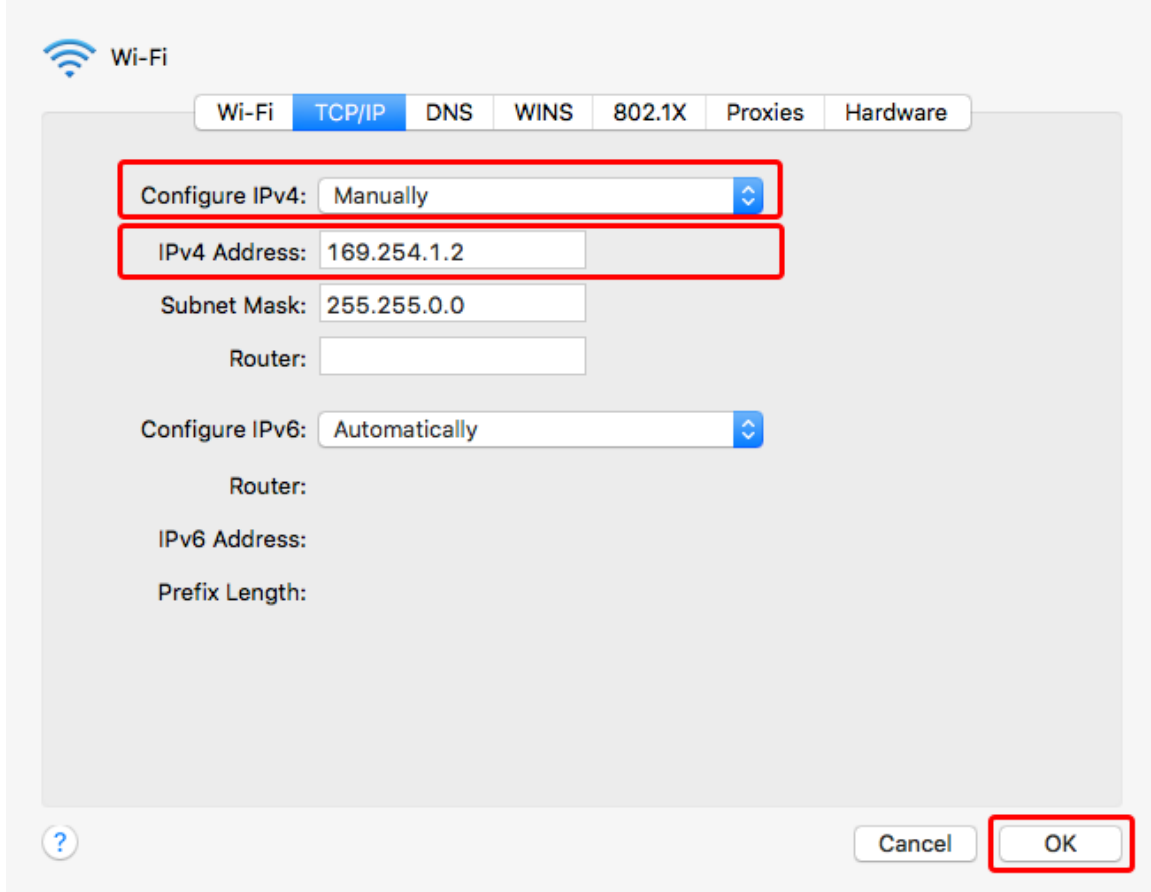
Figure 36: Manually configure the network's IP address.

    a. Choose *Manually* from the *Configure IPv4* pop-up menu.
    b. Enter *169.254.1.2* for the *IPv4 Address* and click *OK*.
8. Click the *Apply* button to join this ad hoc network.

Joining the ad hoc network can take several minutes. While the computer is connecting to the network, the *Status* text on the *Network* window reads, *Wi-Fi does not have an IP address and cannot connect to the Internet.*

Once connection is established, the status message reads, *Wi-Fi has the self-assigned IP address 169.254.1.2 and will not be able to connect to the Internet.*
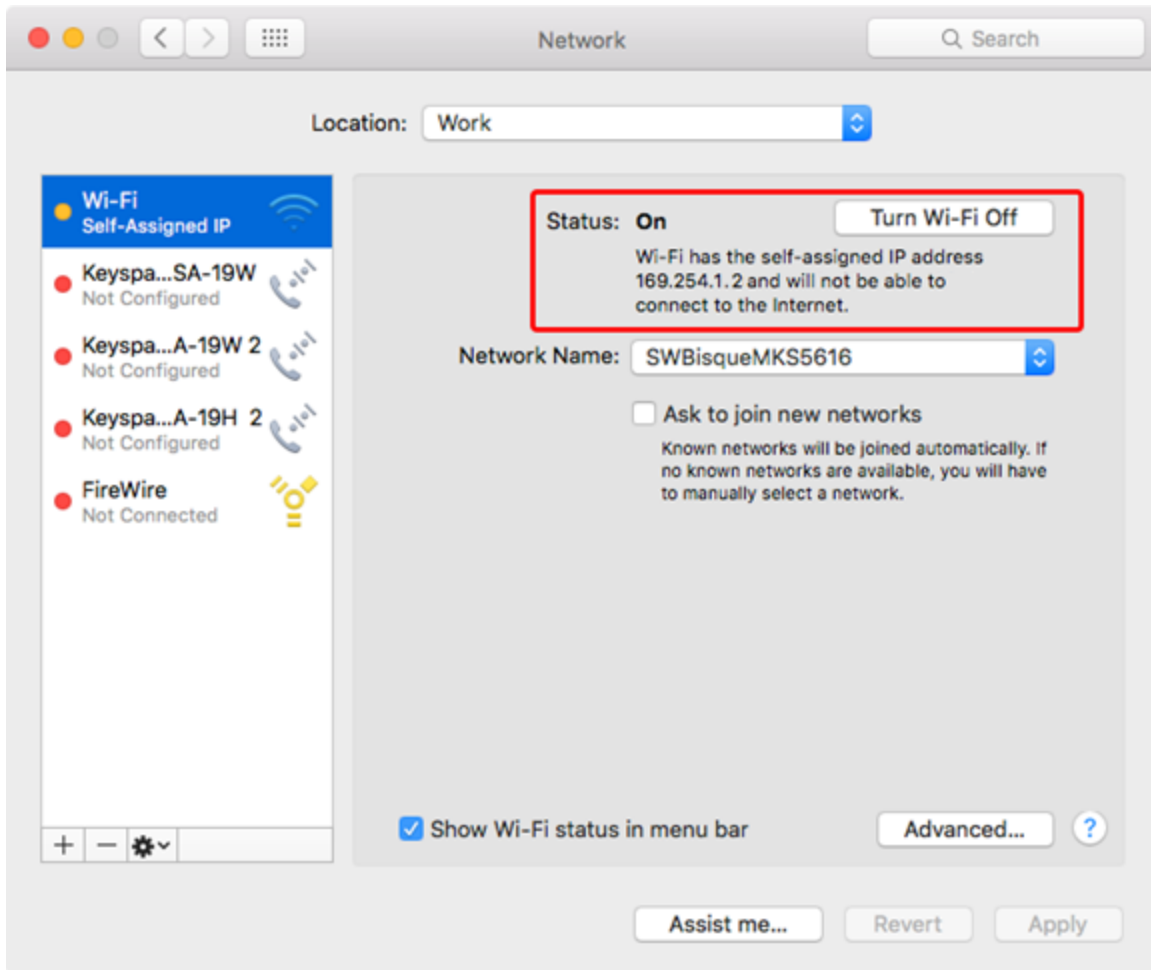
Figure 37: The Status text shows the IP address that is assigned to the ad hoc network.

The Mac is now successfully connected to the WiSky's ad hoc network. The next step is to configure TheSkyX Pro to communicate with the mount through the WiSky's IP address on this ad hoc network.

9. If necessary, from TheSkyX Pro, click the **Connect** command from the **Telescope** window to terminate the USB-based connection with the Paramount.
10. Click the **Telescope Setup** command from the **Telescope** window, then click the **Settings** command from the **Mount Setup** pop-up menu.
11. On the **Serial Device** window, choose **TCP/IP** from the **Serial Device** list.
12. For the **TCP/IP Host** enter **169.254.1.1** (a unique address on the ad hoc network; do not use the IPv4 address that was used to connect the Mac computer to the network), and enter **2000** for the **TCP/IP** port, then click **OK**.
13. Choose the **Connect** command from the **Telescope Setup** pop-up menu to connect to the Paramount wirelessly.

How to Connect Windows 10 to the WiSky's Ad Hoc Network

Joining an ad hoc wireless network is no longer directly supported on Windows 8.1 and later. This means that even if Windows detects an open ad hoc network, connection is simply refused with an error "***Cannot connect***".

Fortunately, there is a way around this and there are many good on-line articles on exactly how to make it work if you spend enough time searching for the answer.   The following document describes the necessary steps to connect a Windows 8.1 or Windows 10 PC to an ad hoc connection.

Now with a bit of effort including Google searches reveal the necessary steps to override ad hoc connection failures. This is the link to the web site I found as a resource.

The WiSky printed control board (PCB) comes with five profiles for different network connection options; "ad hoc" open - unsecure network is the first profile. There is no way to pre-configure the WiSky board for users with anything else other than ad hoc. Although you can ***directly connect*** to this ad hoc network easily using an IPad/iPhone, or the Mac, Windows 8.1/10 do not allow it.

When the Paramount WiSky board is in the ad hoc mode broadcasting an SSID there is a dark blue LED on the board next to the WiSky antenna lit up. This is how you know the mount is in the ad hoc mode. When the computer is connected to the mount from TheSkyX or TheSkyX HD, the dark blue LED turns a brighter and lighter color blue.

Ad hoc networks do not use DHCP to assign an IP address to the device. If you want to use DHCP, configure the WiSky to "Join" an existing Wi-Fi network that uses DHCP. For a secure network, you'll need to enter the network's password. WiSky lets you choose a profile as described under, "**Connecting the Paramount to a Wireless Infrastructure Network**".

Windows 10 Ad Hoc Executive Summary

To see all networks in range, including ad hoc, run this command from the command shell:

```
>netsh wlan show networks
```

Network Setup

The following must be done for each network.

1. Go to "Network and Sharing Center".
2. Click "Set up a new connection or network".
3. Double-click "Manually connect to a wireless network".
4. Enter the SSID of the ad hoc network (as shown by "`netsh wlan show networks`") into the "Network name" field.
5. Configure the security settings.
    a. Uncheck "Start this connection automatically" (important)
6. Click "Next", then "Close"

Run this command (important):

```
> netsh wlan set profileparameter <ssid> connectiontype=ibss
```

Replace <ssid> with the SSID of your network.

CONNECT

After setting up, run this command whenever you want to connect:

```
> netsh wlan connect <ssid>
```

Replace <ssid> with the SSID of your network.

Hovering over Wi-Fi icon in system tray will show the name of the network that you are currently connected to, even if it's an ad hoc network (the network picker will not show it if it's ad hoc). The name is also visible in "Network and Sharing Center" window.

DISCONNECT

To disconnect from the ad hoc network: connect to a different network, turn off wifi, or run this command:

```
> netsh wlan disconnect
```

CLEANUP

To remove the network profile from Windows, run this command:

```
> netsh wlan delete profile <ssid>
```

Replace <ssid> with the SSID of your network.

Step-by-step procedure with screenshots

To open a Command Prompt window, right-click on the Windows Start button, then click ***Command Prompt (Admin)***:
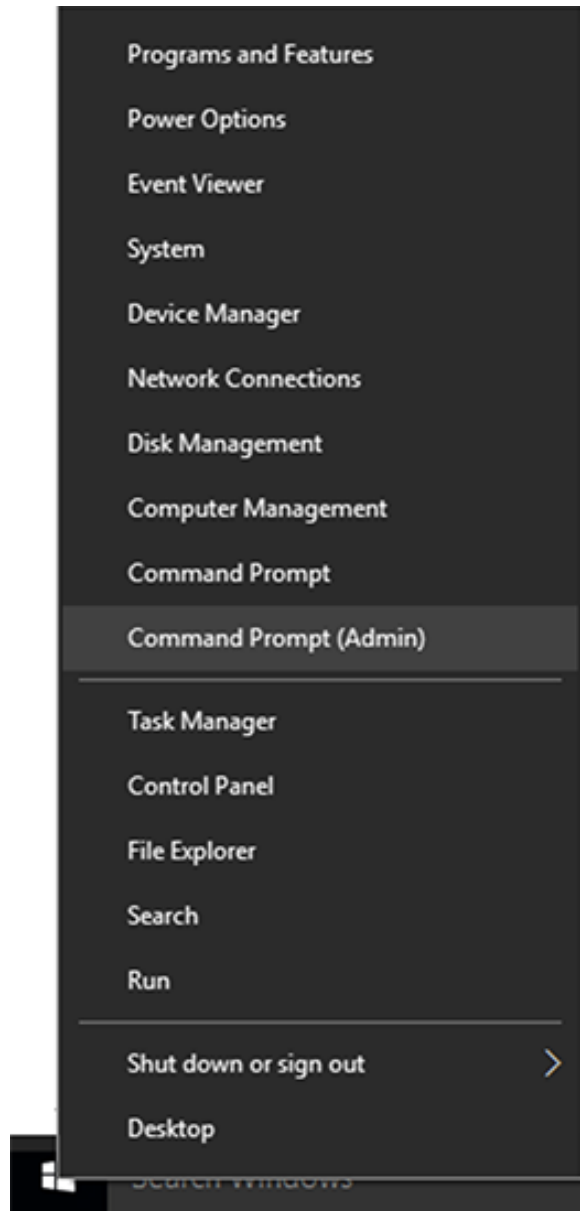
Figure 38: Open the Command Prompt as an Administrator.

Doing so gives the Command Prompt window *elevated administrator privileges* required when making network configuration changes.

Use the command:
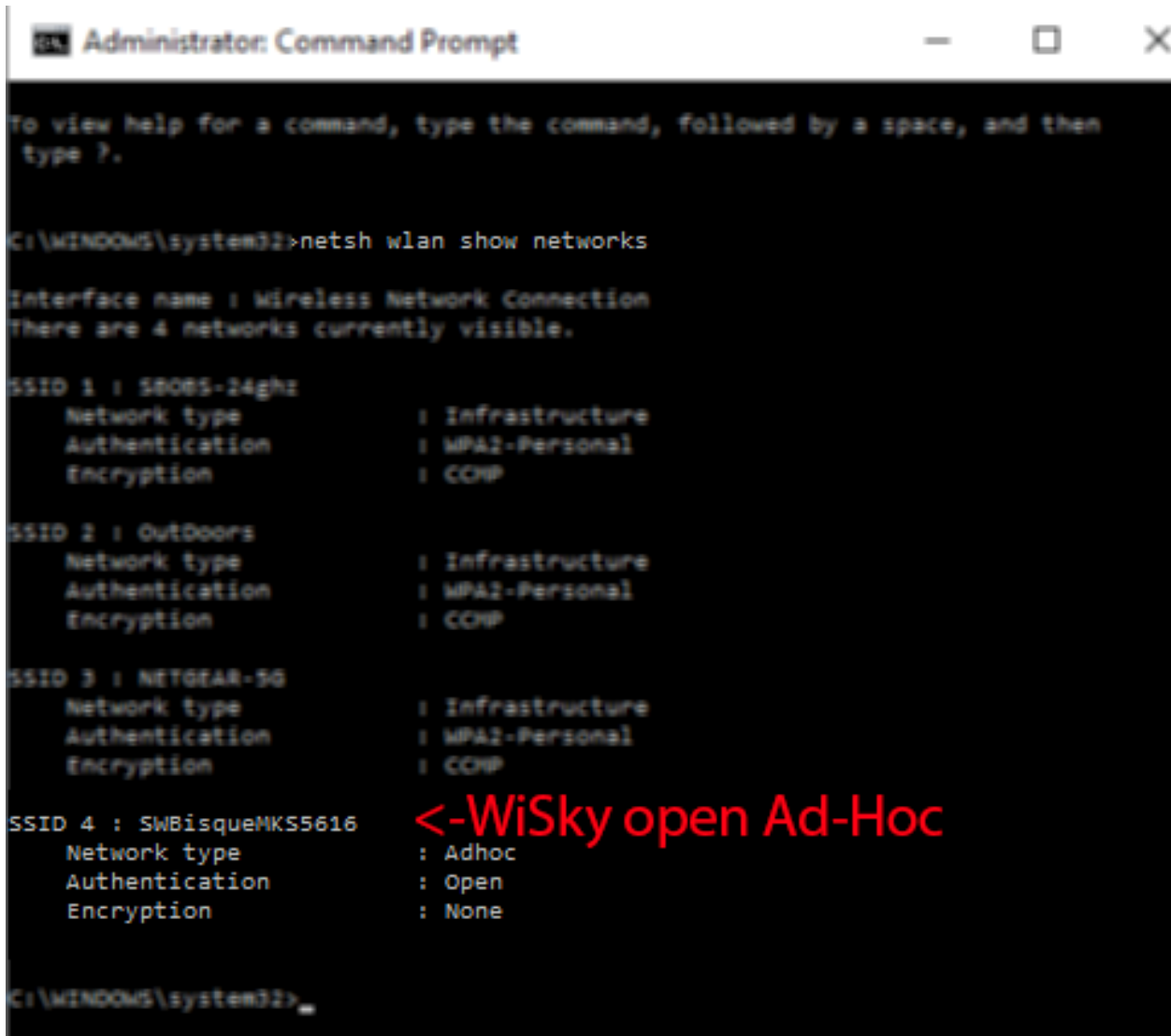
```
> netsh wlan show networks
```

to list all the networks in range.

You can highlight the text below, then click **Edit** > **Copy** to copy the line below to the Clipboard, then paste it into the Command Prompt as shown below:

Page **38** of **59**

`netsh wlan show networks` <- copy this text, then paste it to the Command Prompt window

The *netsh wlan* command shows networks displays networks and SSID:

Figure 39: Note the ad hoc network name is "SWBisqueMKS5616".

Step 1

From the "Network and Sharing Center" use the option to **"Manually Connect to a Wireless Network."** To get there note the "blue" "Network Settings" shown in Figure 40. Clicking it takes you directly to "Network & Internet" settings. From there, choose **Related Settings**, **Network and Sharing Center**.
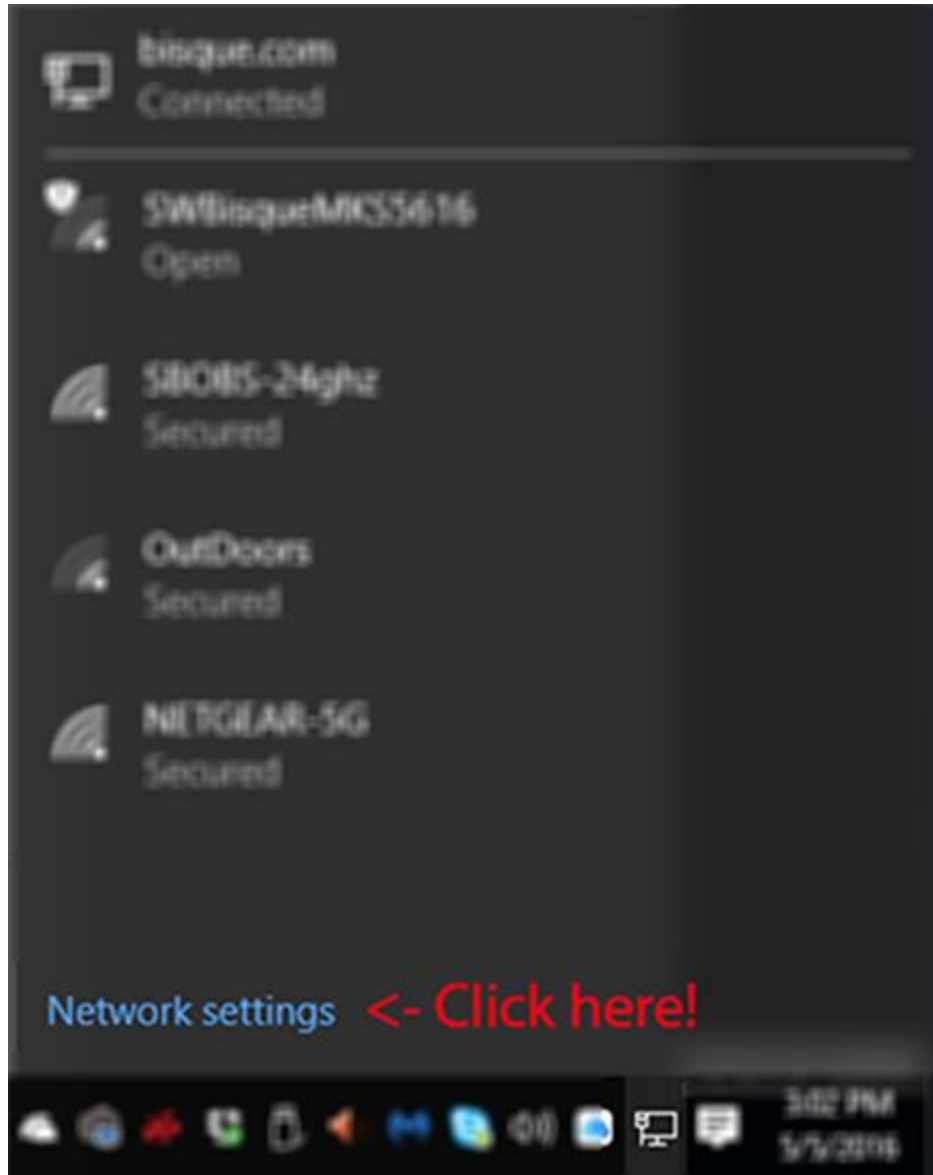
Figure 40: The Network settings link.

Step 2

Choose Network and Internet, then Related Settings>Network and Sharing Center:
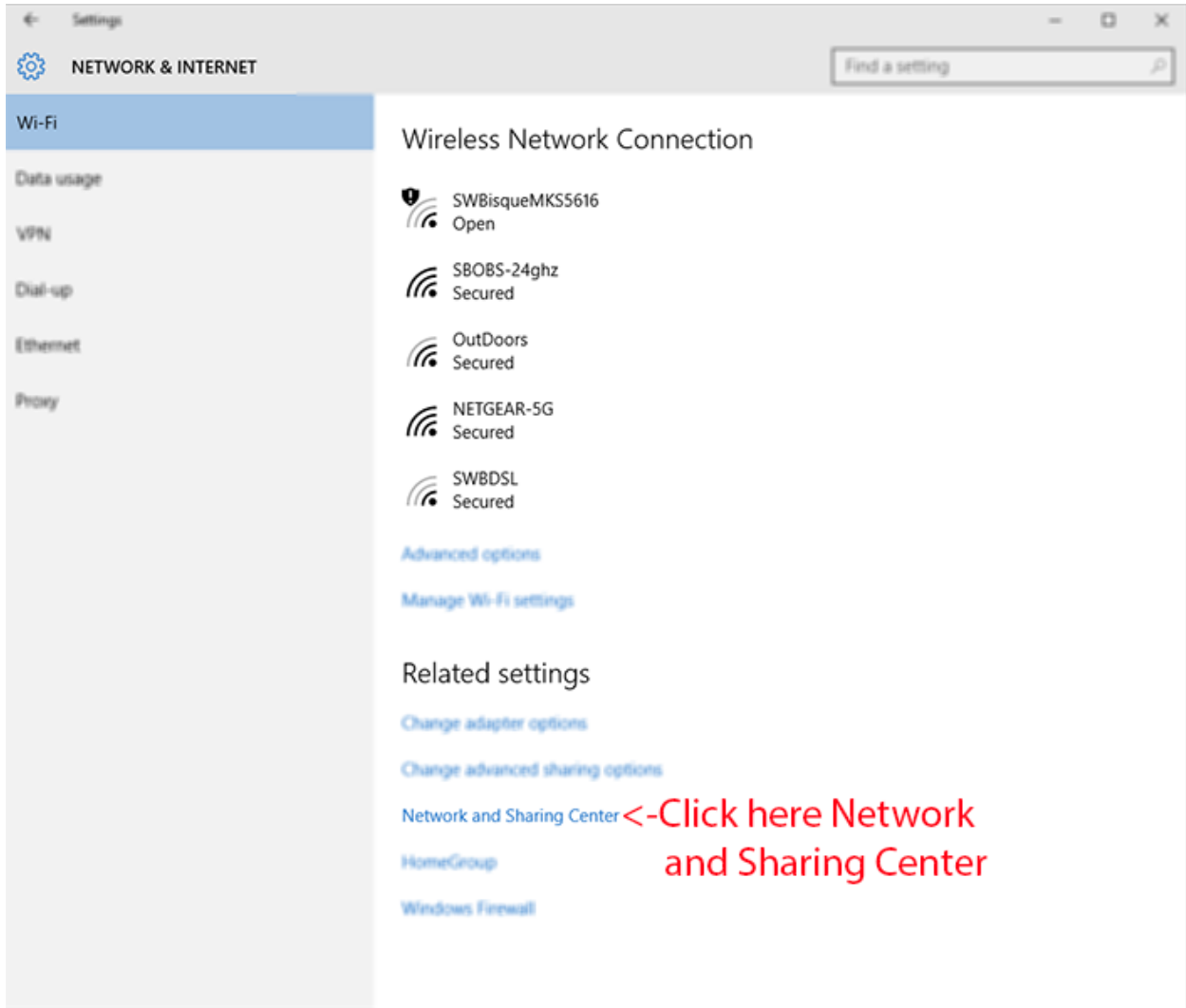
Figure 41: Next click on Network and Sharing Center.

Step 3

From the Network and Sharing Center, manually connect to a Wi-Fi network:
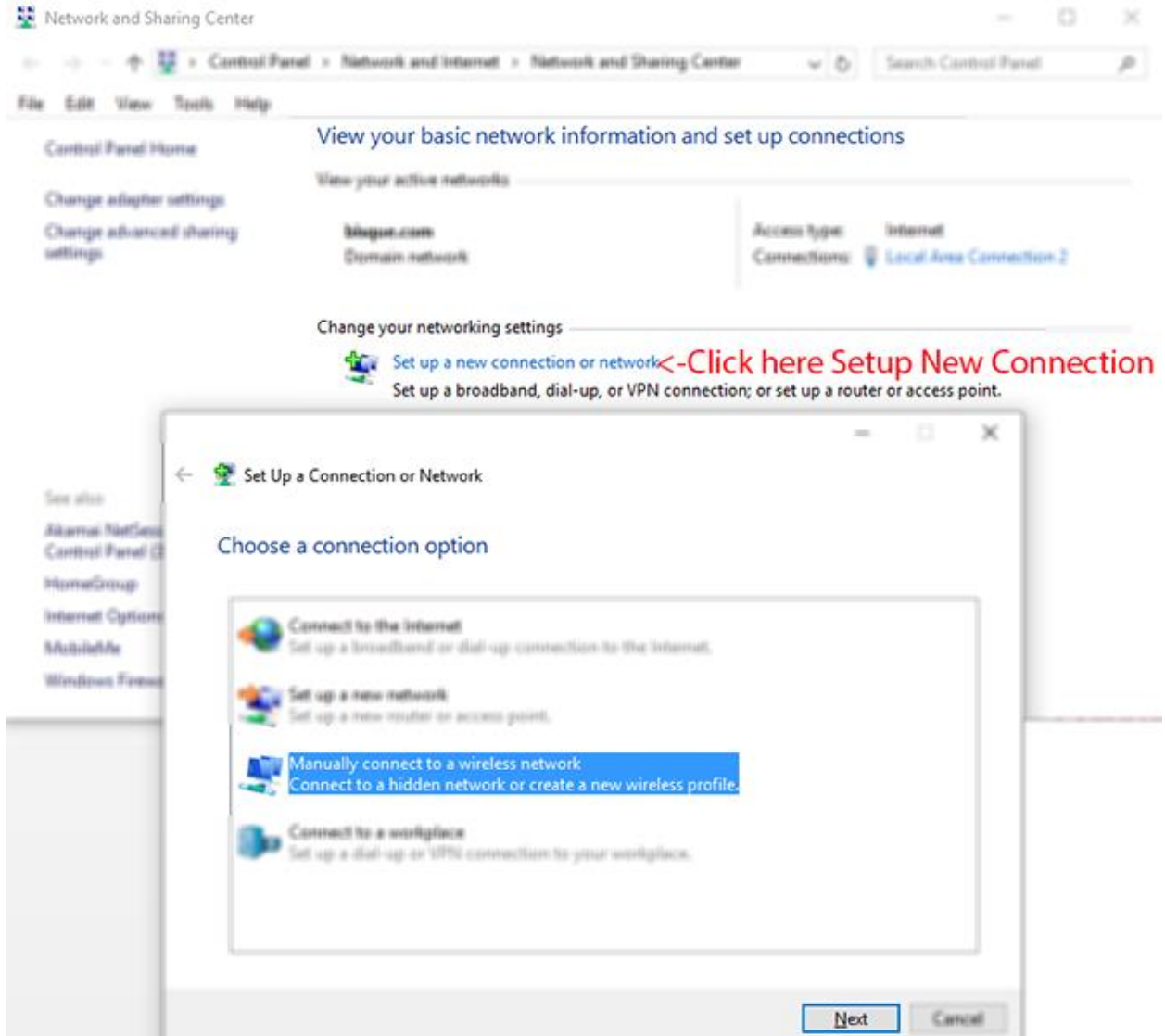
Figure 42: Setup a new connection or network.

Step 4

Manually connect to a wireless ad hoc network as shown in Figure 43.
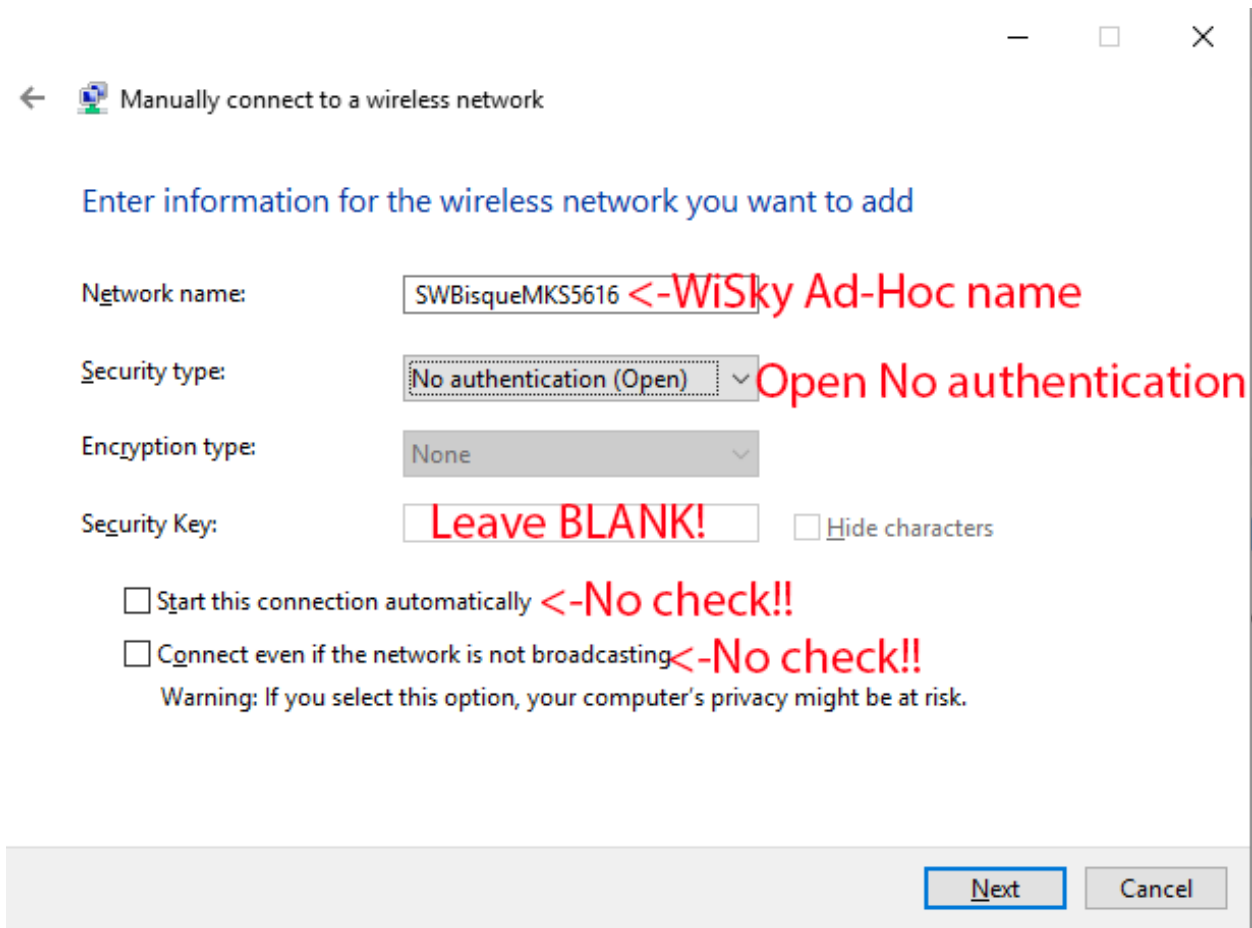
Figure 43: Steps to manually connect the ad hoc network.

You must use the correct ad hoc network name!

Step 5

```
> netsh wlan show networks
```
<--copy then paste this line to the Command Prompt

Type the following in the command prompt, or copy the text below, paste it to the command prompt, then change the ad hoc network name accordingly:

```
netsh wlan set profileparameter "<AdHocNetworkNameHere>" connectiontype=ibss
```

Where *<AdHocNetworkNameHere>* is the name of the ad hoc network. In this example, it should be "*SWBisqueMKS5616*". Quotes around the ad hoc network name are required if the name includes spaces, and are strongly recommended otherwise.
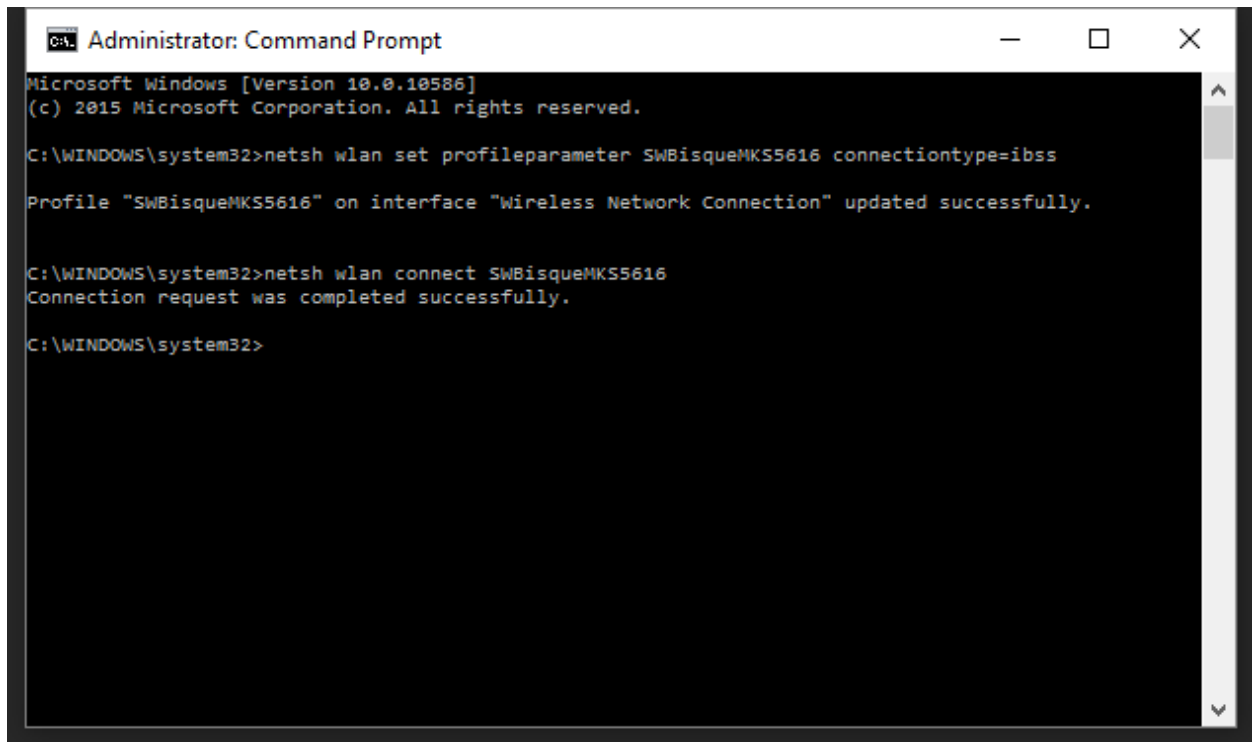
Step 6

Type the following in the command prompt, or copy and paste the text:

```
> netsh wlan connect SWBisqueMKS5xxx
```

Figure 44: Connect request successful!

Step 7

Now, review the list of networks:

bisque.com
Connected

SWBisqueMKS5616
No Internet, open **<-Connected!!**

SBOBS-24ghz
Secured

OutDoors
Secured

NETGEAR-5G
Secured

SWBDSL
Secured

Now you are connected to the Open Ad-Hoc WiSky Network!

Network settings

3:31 PM
5/5/2016
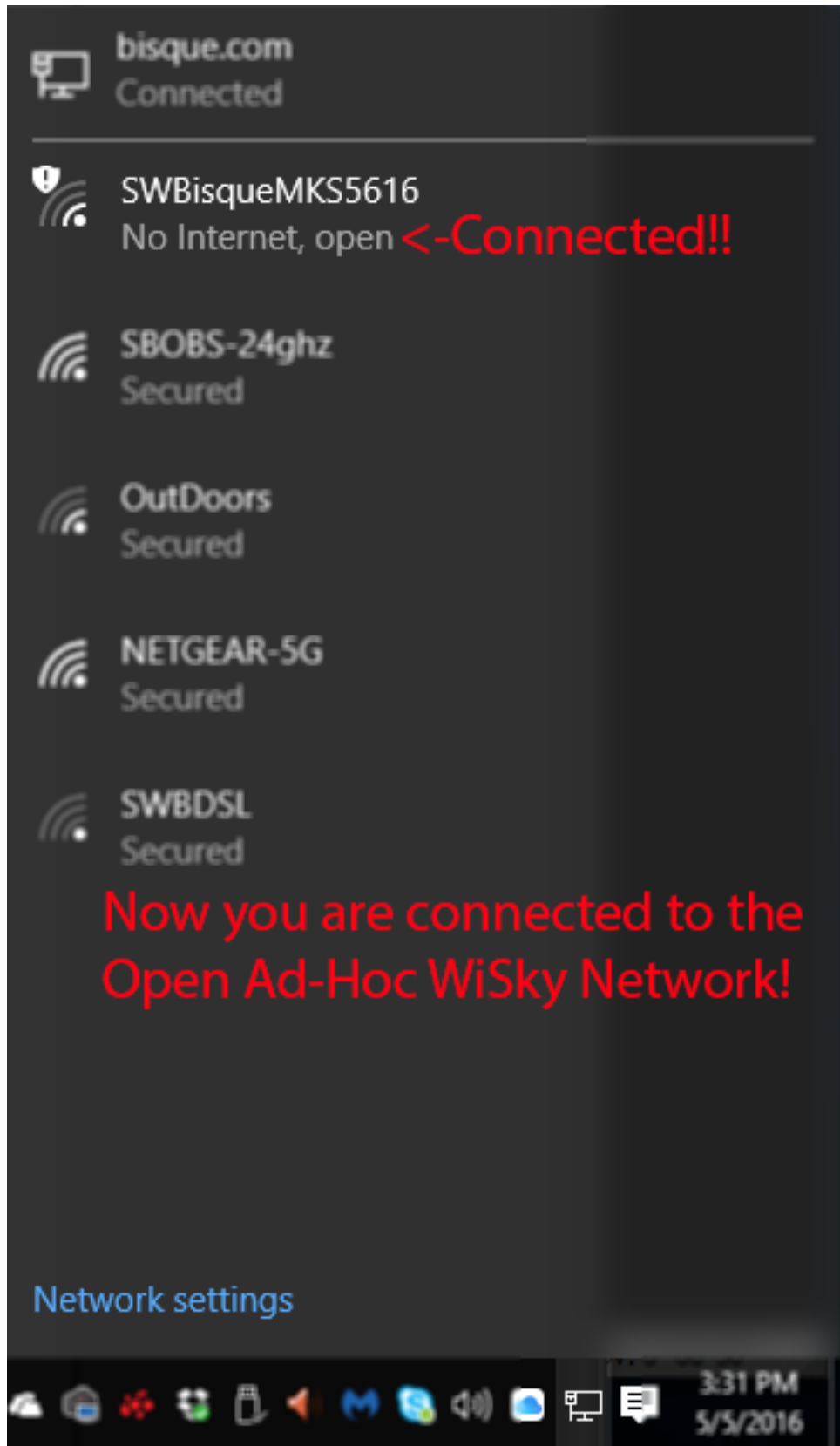
Step 8

Manually configure the IP address of the Wi-Fi adapter before you can connect to the WiSky ad hoc network.

The computer's wireless network adapter IP address must be properly configured to join the ad hoc network, or the connection will fail!

From the **Network and Sharing Center**, click on the name of the WiSky ad hoc network name on the right side of the window (Figure 45), or click on the **Change Adapter Settings** link.
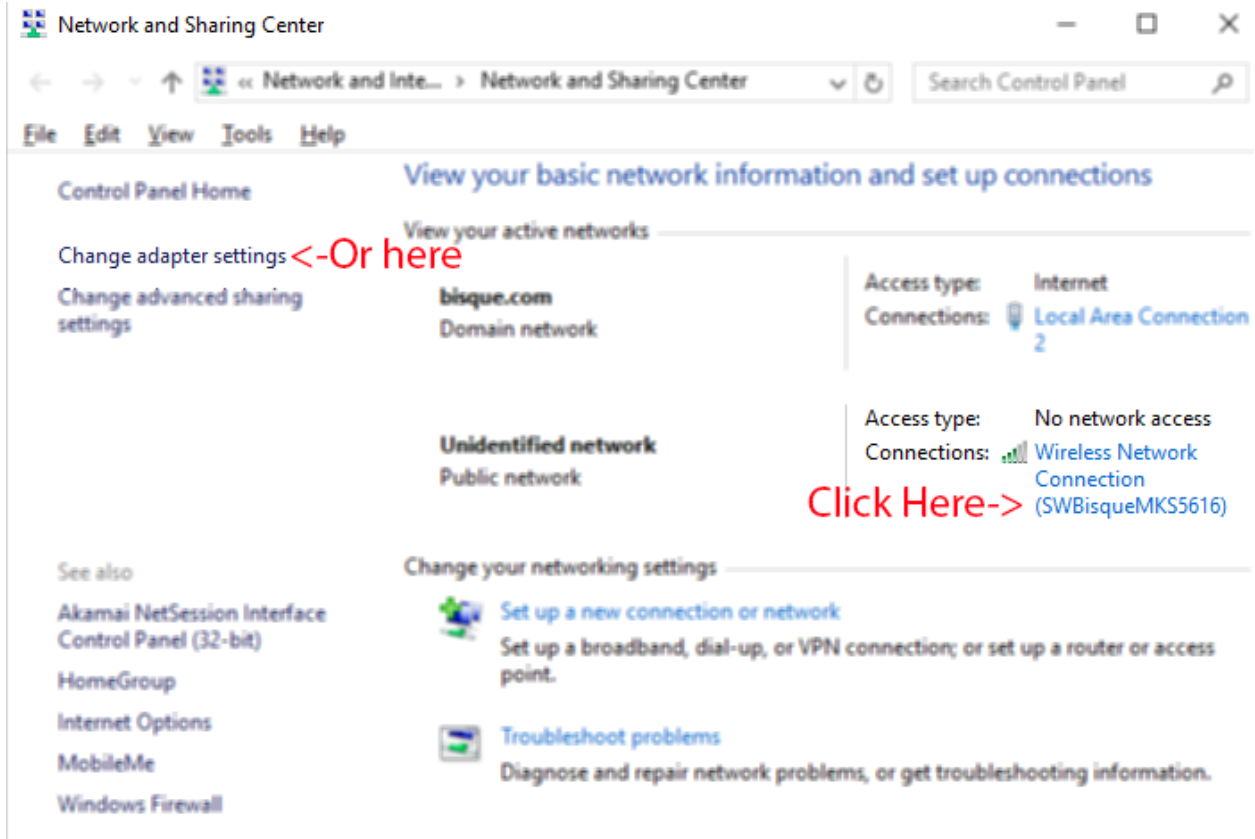
Figure 45: Connecting to the WiSky's ad hoc network on the Network and Sharing Center window.
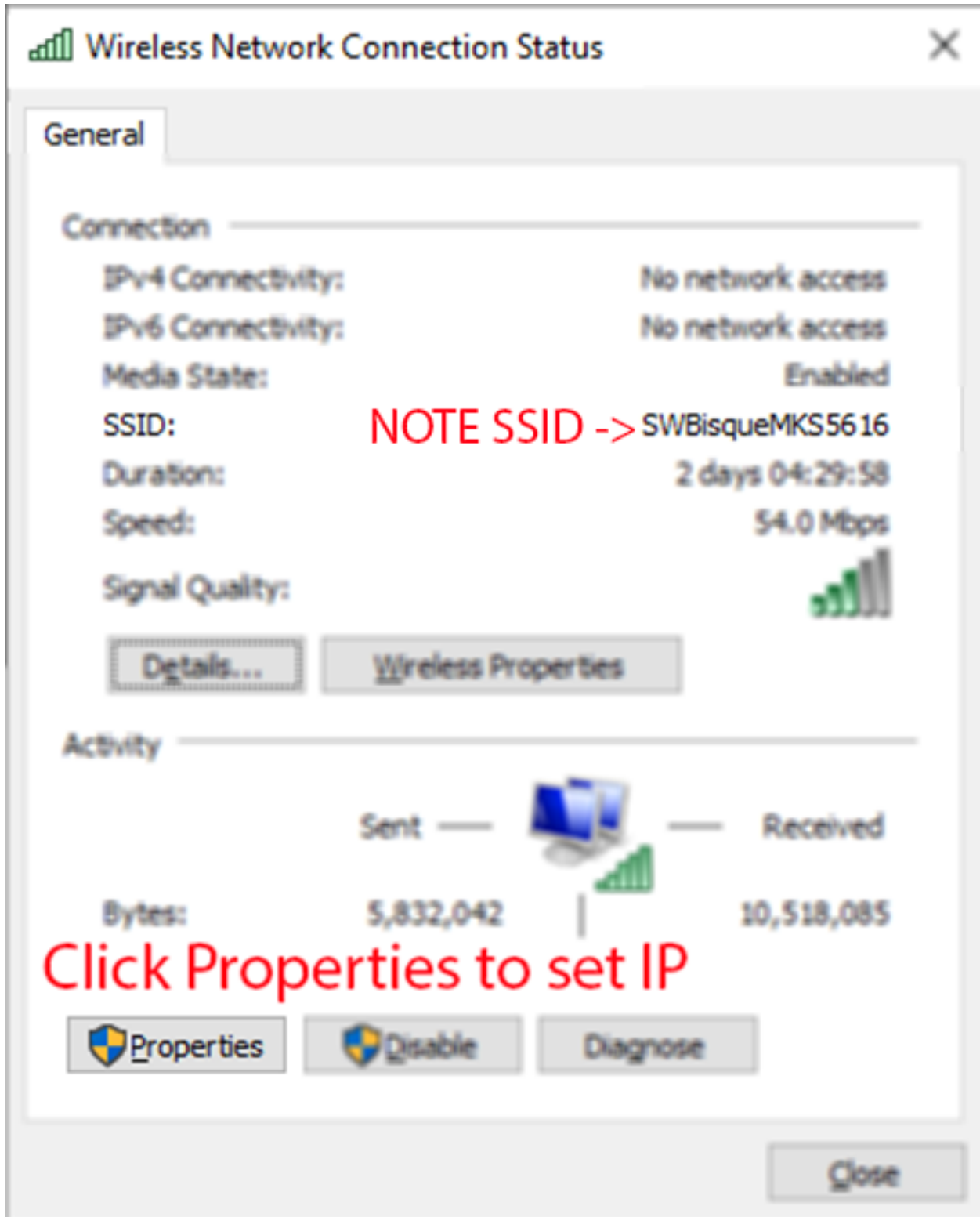
Figure 46: Critical: Change the network adapter's IP address.

Click on the **Properties** button to edit the IP address of the network adapter.

Use the IP address as shown Wi-Fi adapter settings on the PC (do not use DHCP):
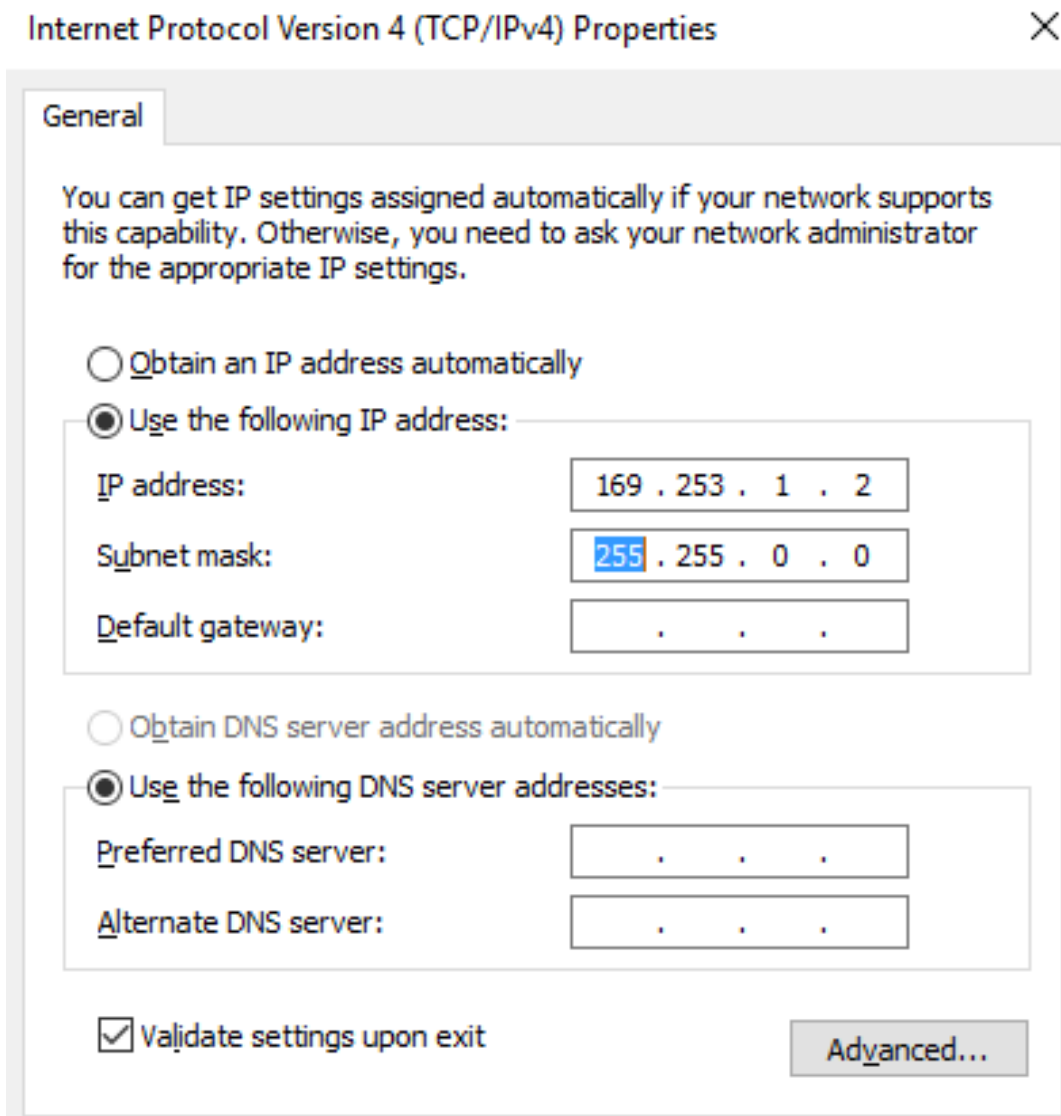

Figure 47: Make sure you are using 169.253.1.x, where "x" is any number between 2 and 255.

The default IP address for the *Paramount's ad hoc network* (the "network host") is 169.253.1.1. The IP address you assign above must be on the same network, and have a unique IP address. Since the IP address 169.253.1.1 is used by the host network, enter 169.253.1.2, or any number between 2 and 255 for the last digit.

TheSkyX Telescope Mount Setup settings

From TheSkyX's menu, choose the **Telescope Setup** command from the **Telescope** menu to show the **Imaging System Setup** window. Next, highlight **Mount** under **Imaging System**, then choose the **Settings** command from

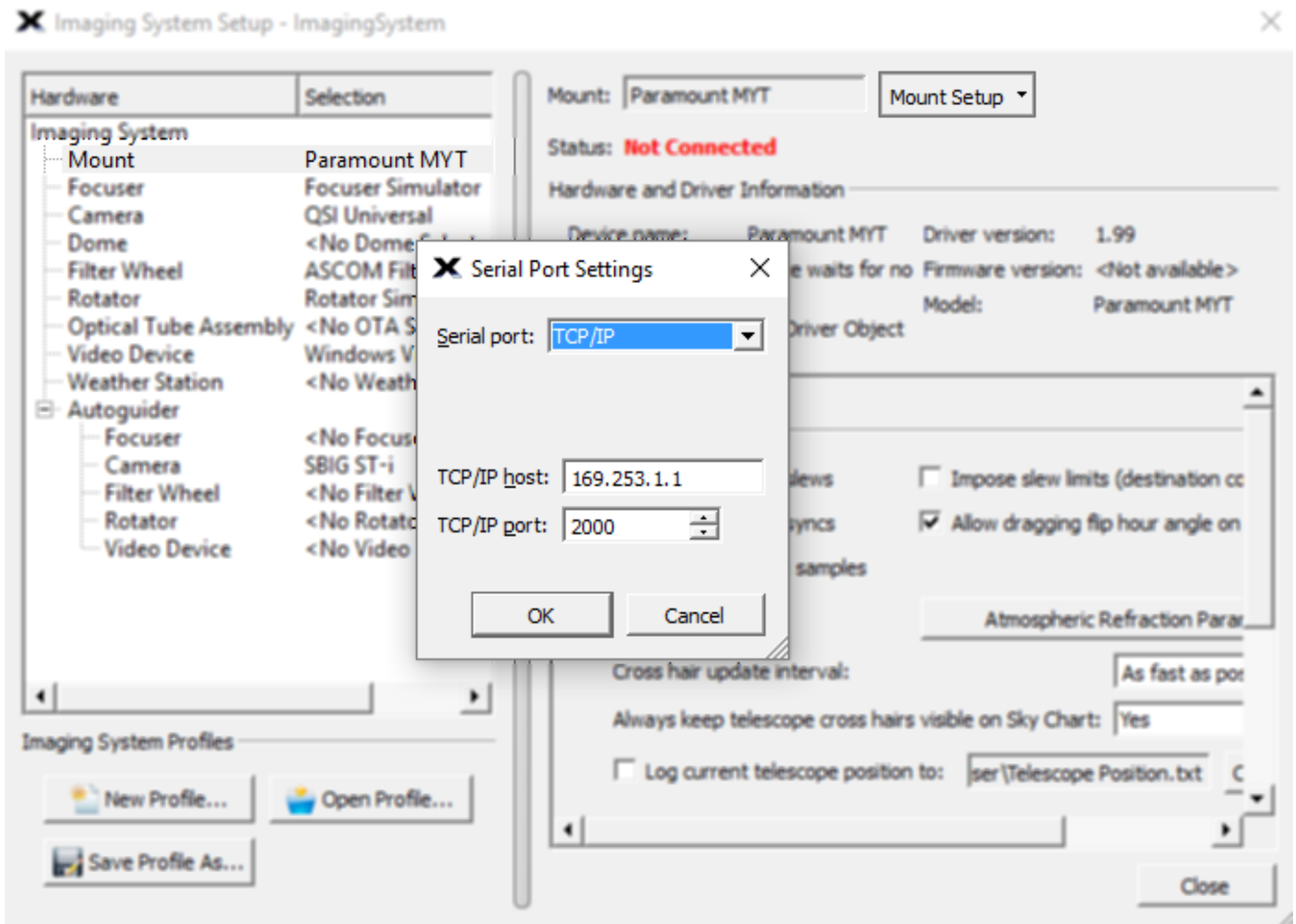the **Mount Setup** pop-up menu to show the **Serial Port Settings** window.

Figure 48: Selecting TCP/IP from the Serial Port Settings window.

Enter 169.253.1.1 for the **TCP/IP Host**, and enter 2000 for the **TCP/IP Port**.

Remember, the ad hoc default IP address created by the WiSky board is `169.253.1.1`.

Figure 49: The Open ad hoc profile network settings.

The IP address of your Wi-Fi network adapter has been configured for `169.253.1.2`, so you are ready to connect to the Paramount.
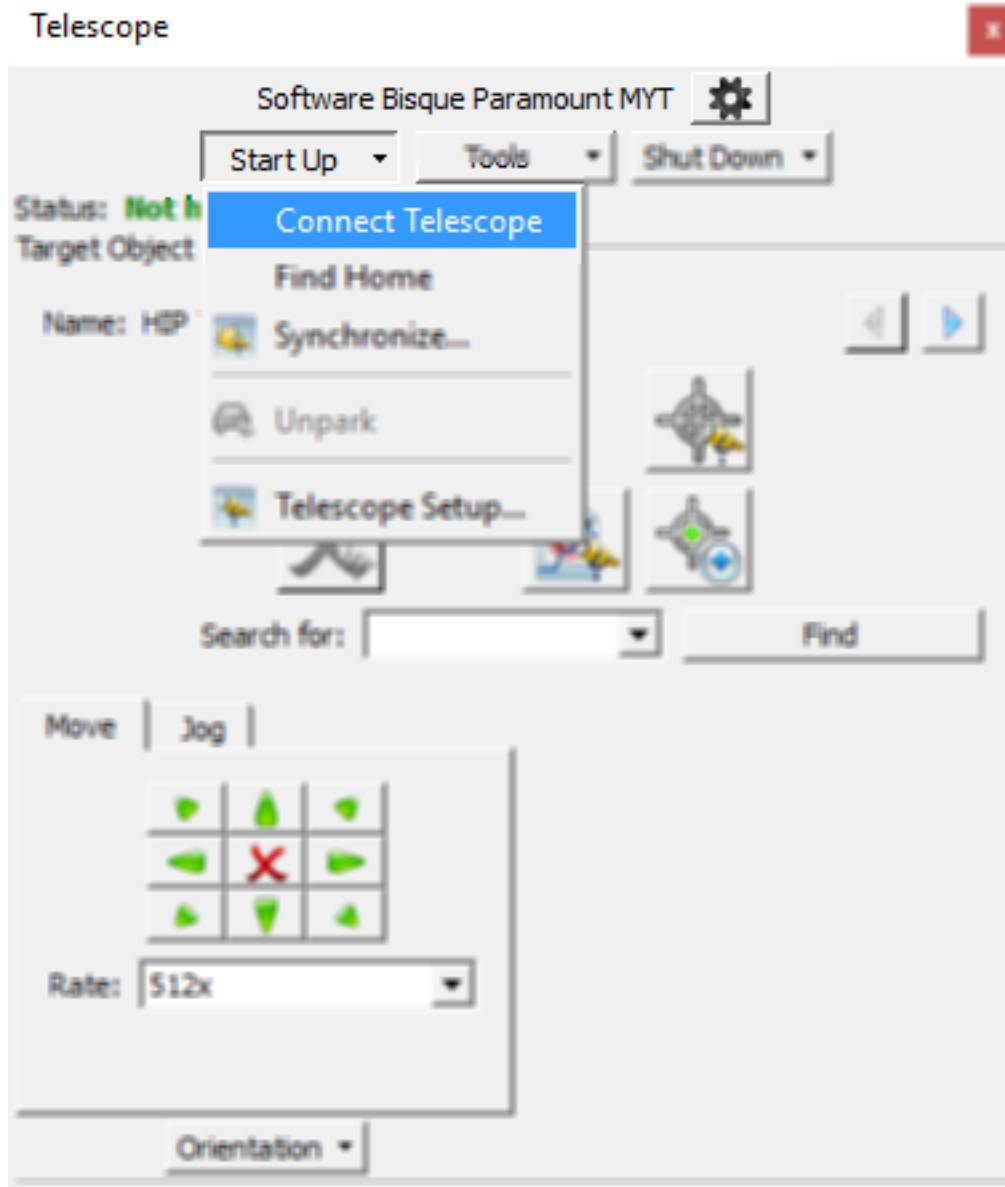
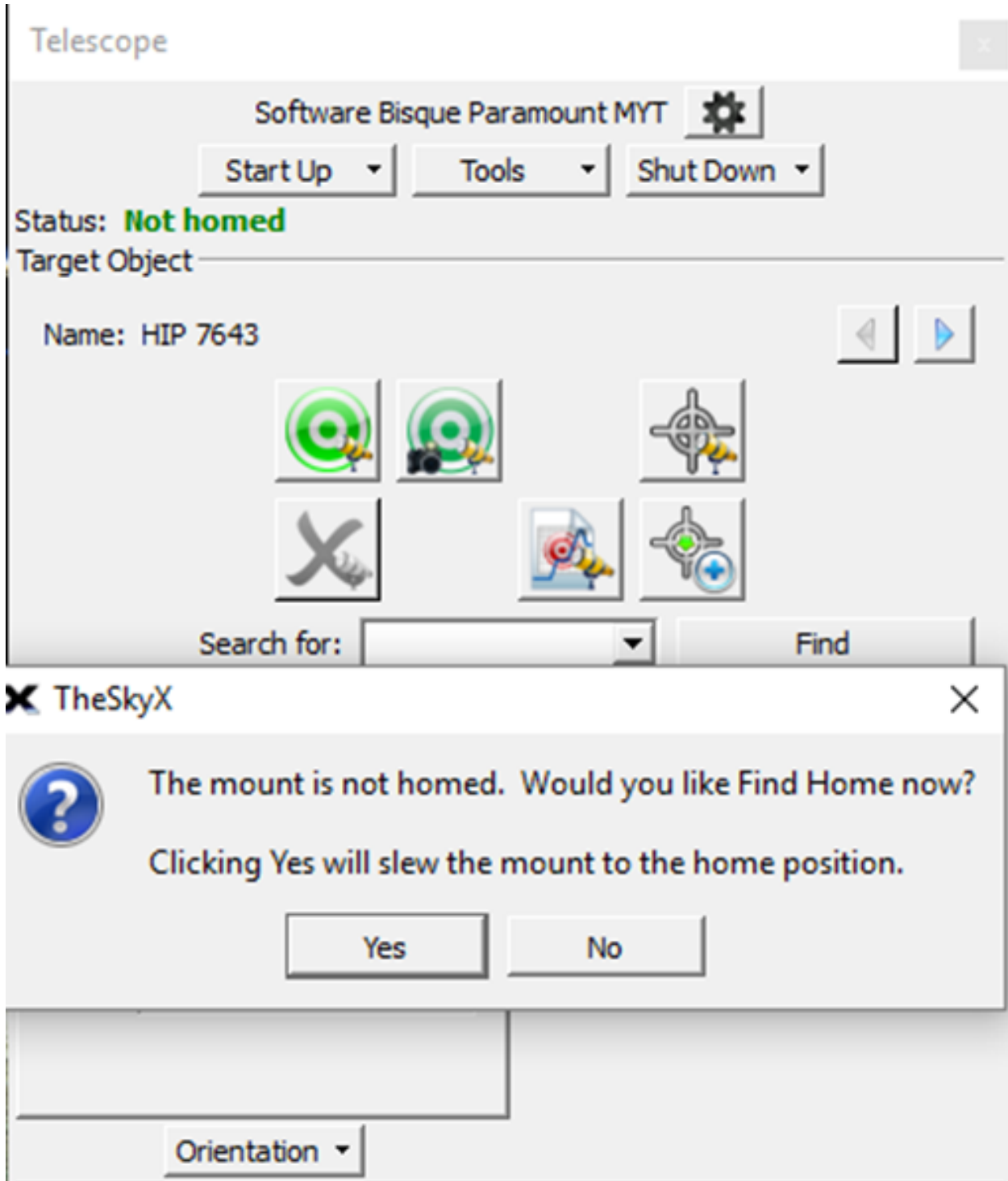**Figure 50: Connecting the Paramount wirelessly.**

Figure 51: Successful Paramount connection using an ad hoc network.

Connecting the Paramount to a Wireless Infrastructure Network

The following describes shows how to configure the WiSky to use an infrastructure network.

1. From the **Telescope** window, click **Tools** > **Bisque TCS** then click on the **Utilities** tab and highlight **WiSky Configuration**.
2. Choose **Infrastructure** from the **Network Type** pop-up menu.
3. Choose the **Wireless Network Name (SSID)**. Click the **Scan** button to rescan for networks if your network name is not listed.
4. For a secure network, enter the **Wireless Pass Phrase** (or password).
5. Click the **Apply Profile 2** button. The IP address and Port for this configuration is listed in a separate window when the configuration is finished (see Figure 52).
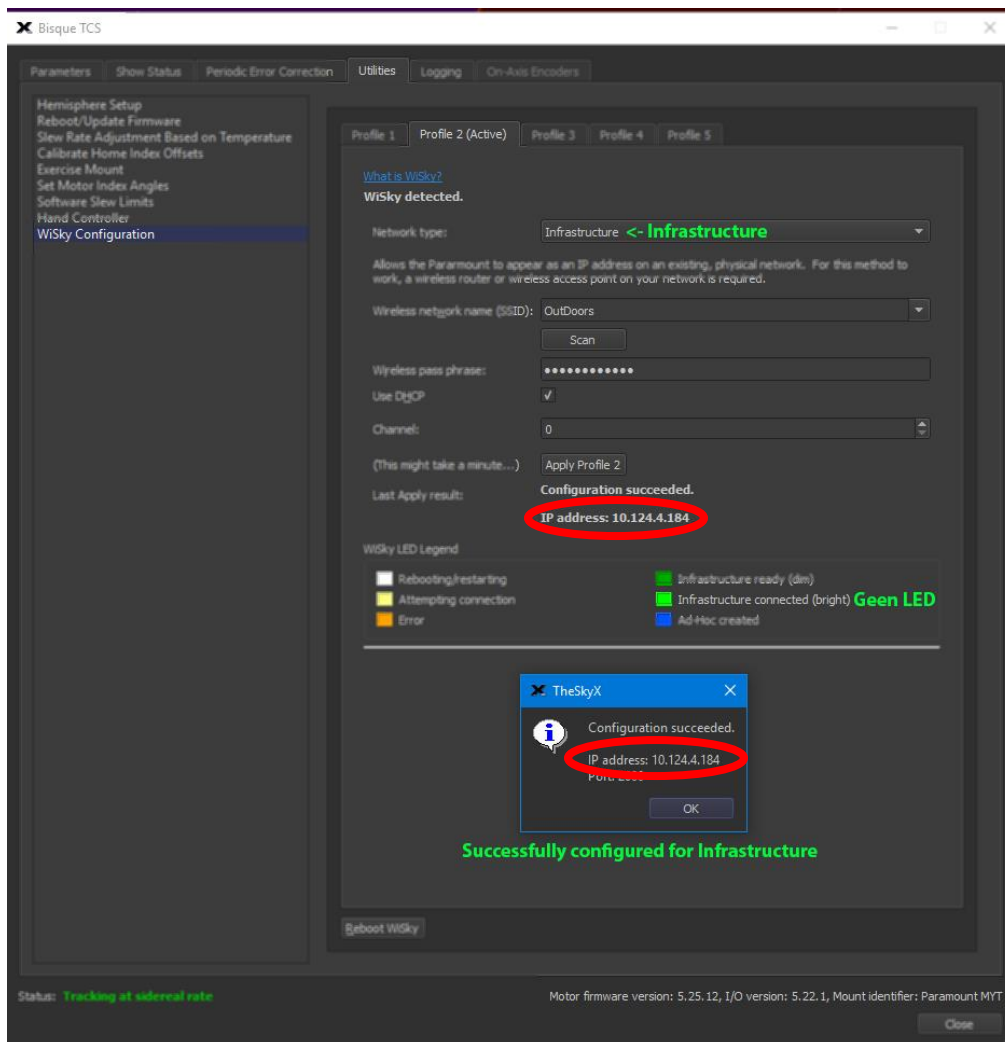

Figure 52: Configuring the WiSky to join an infrastructure network.

6. Navigate to the dialog shown on the left in Figure 53 by using TheSkyX's menu to choose the ***Telescope Setup*** command from the ***Telescope*** menu to show the ***Imaging System Setup*** window. Next, highlight ***Mount*** under ***Imaging System***, then choose the ***Settings*** command from the ***Mount Setup*** pop-up menu to show the ***Serial Port Settings*** window. See the TheSkyX Telescope Mount Setup settings section above for more detailed steps with figures.
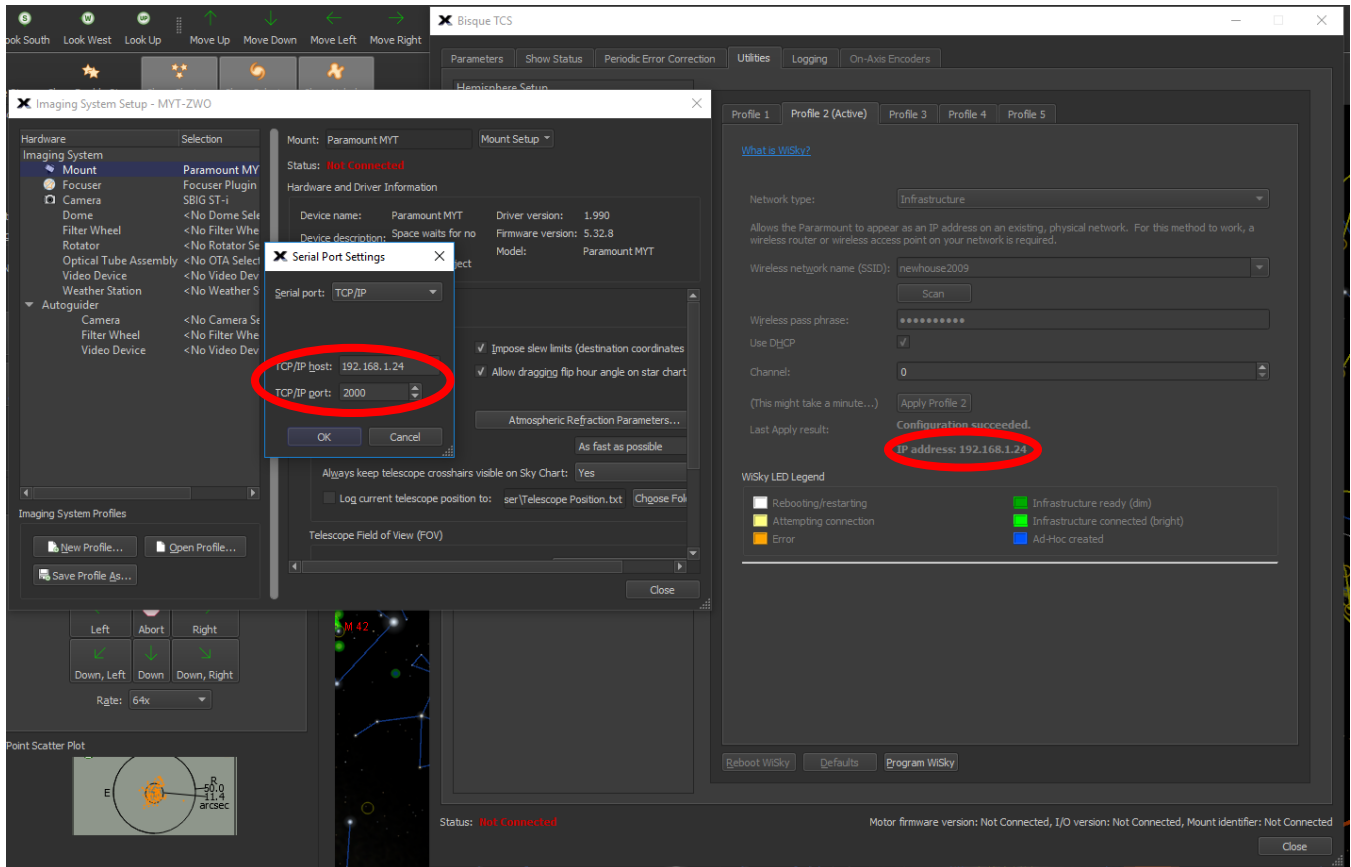

Figure 53: Configuring The SkyX to join the Paramount through an infrastructure network.

7. Enter 192.168.1.24 as shown in the Bisque TCS window for the ***TCP/IP Host***, and enter 2000 for the ***TCP/IP Port***.

Failed WiSky connection

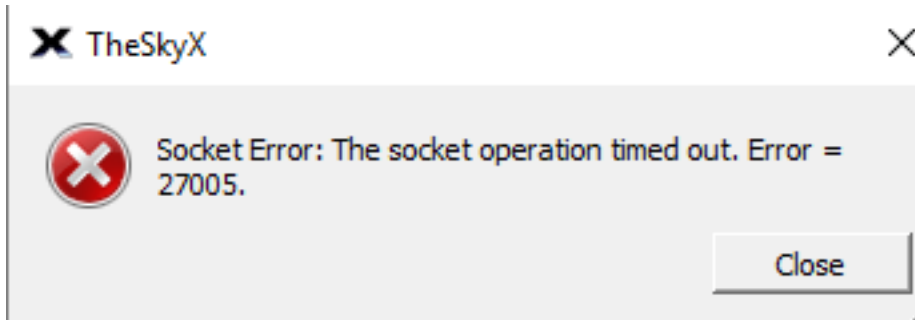The following error message means the connection failed.

Figure 54: Socket error 27005 means the connection failed.

> *If you do not manually change the device's wireless network adapters settings, or input the IP address incorrectly the connection will fail.*
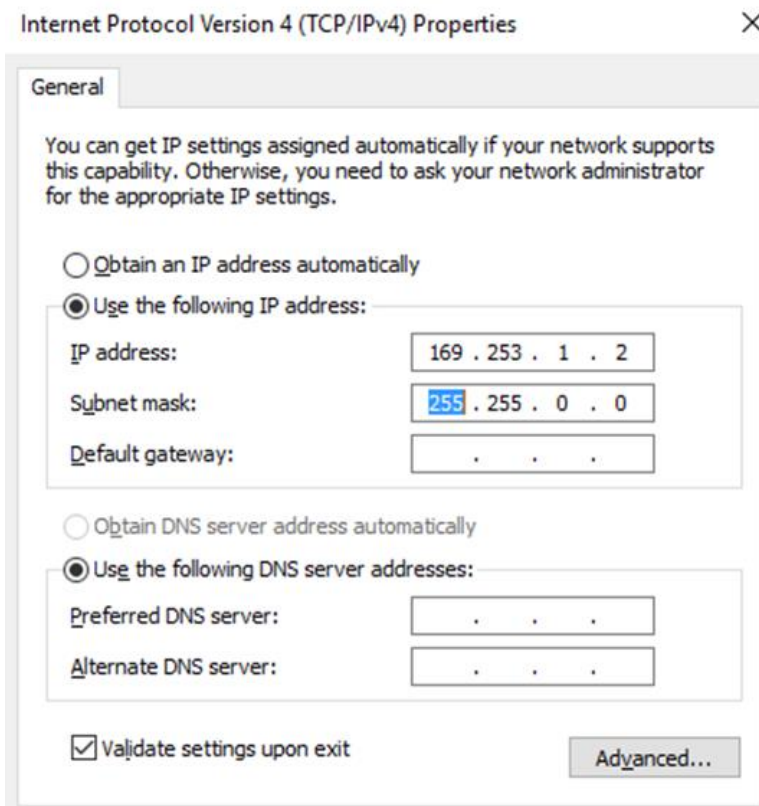

Figure 55: Triple-check the IP addresses.

> Make absolutely sure the TCP/IP settings for the Wireless network adapter have been properly configured.

Appendix: Revision History

Revision Number	Publish Date	Changes
1.3	December, 2017	• Clarified minimum system requirements regarding the MKS 5000 firmware. • Corrected typographical errors.
1.2	October, 2017	• Added information on joining an existing wireless network. • Added note on inactive profile for turning off wireless.
1.12	September, 2016	• Removed reference to the legacy Restore Default Settings button.
1.11	August, 2016	• Added specific instructions how to join the WiSky ad hoc network on Mac OS X.
1.10	May, 2016	• Appendix A corrections.
1.9	May, 2016	• Added appendix describing how to connect Windows 10 to the WiSky's ad hoc network.
1.8	January, 2016	• We no longer include three standoffs as it was causing issues with the WiSky board functions.
1.7	November, 2015	• Removed legacy MKS 5000 firmware update instructions.
1.6	November, 2015	• Include step by step instructions for installing the MKS 5000 firmware.
1.5	June, 2015	• Added information about the newest version of the board, called the "*WiSky++*" with the absolute encoder controller.
1.4	April, 2015	• Added a warning about PCBs and static electricity.

Revision Number	Publish Date	Changes
		• Added captions for each Paramount model photo to avoid confusion.
1.3	April, 2015	• Added references for the Paramount MYT.