

# **SkyRad™ User's Manual**

Astrometric Instrument's Telrad™ modification

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**SkyRad User's Manual**

## **Preface to the SkyRad User's Manual**

This document describes how to install and use Astrometric Instrument's SkyRad Telescope Accessory Controller.

### **Notes**

- ◆ Italicized words are names that are specific to the Astrometric Telescope Control System (ATCS). Italicized names are defined in Appendix 1: Glossary of terms.

### **Companion documents:**

- ◆ “SkyGuide User's Manual”: Describes how to use the Astrometric Telescope Control System (i.e. SkyGuide-Win, SkyWalker and Hand Paddle) in *System Mode*.
- ◆ “SkyWalker User's Manual”. Subtitle: “Using the Astrometric Telescope Control System in SkyWalker mode”. Provides complete instructions on using SkyWalker (1 or 2) as a “standalone” (i.e. no PC necessary) telescope controller.

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## **Chapter 1: Introduction**

### **What is SkyRad?**

SkyRad is a Telrad modified to provide tangle free connections to several accessories commonly found on telescopes. These accessories can be controlled from SkyWalker's handpaddle or from a PC running SkyGuide-Win. A single cable connects SkyRad to SkyWalker, reducing the number of boxes, cables and connections on the telescope.

SkyRad controls the following:

- ◆ Motorized (electric) focusers through 3.5mm mini jack connector.
- ◆ External cabled illuminated guide reticle through 3.5mm mini jack connector providing variable brightness and blink rate.
- ◆ Kendrick dew heaters via three phono jack connectors. Capable of controlling a total of 5.0Amps.
- ◆ Built-in Telrad dew heater.
- ◆ The Telrad's internal reticle with a variable blink rate.

SkyRad requires a HighDrive cable to connect to SkyWalker. This cable is available from Astrometric Instruments as either an individual cable or as part of the RetroKit motor and encoder cable harness.

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## **Chapter 2: Installing SkyRad**

To install SkyRad complete the following steps.

### **Install as a Telrad**

Follow the Telrad installation instructions (included with the SkyRad) to attach SkyRad to the telescope.

### **Attach *High Drive* cable to SkyWalker**

Attach the *High Drive* cable between SkyRad's HighDrive port (labeled "HD") and SkyWalker's *High Drive* port (also labeled "HD"). Note the orientation of the plugs on the ends of the *High Drive* cable.

**Important:** Verify that the *High Drive* cable is routed from SkyRad to SkyWalker in a manner that does not hinder telescope movement nor run the risk of "tangling" with telescope, mount or operator.

### **Attach any of the following accessories to SkyRad:**

- ◆ 9-volt electric focuser.

**Important:** To work properly the electric focuser should be designed to operate from 9-volts. If the focuser is designed to work with a lower voltage a series 1-watt resistor can be used to limit the current to a safe level. If the focuser is designed to work with a higher voltage then it may work fine but operate slower than nominal. SkyWalker can be configured to provide 12-volts for the focuser. Contact Astrometric Instruments for details.

- ◆ LED illuminated reticle eyepiece **or** 6-volt Pentax camera power.

SkyRad can be used to power an illuminated reticle eyepiece **or** provide 6-volt to run a Pentax camera. SkyRad is internally wired and shipped to either power an illuminated reticle eyepiece **or** provide 6-volt out of the port labeled "Reticle".

The standard SkyRad is wired to power an illuminated reticle eyepiece. The 6-volt version of SkyRad must be ordered special. SkyRad is a 6-volt model if a sticker with the letters "6v" is attached on the inside of the TelRad case, otherwise it is a standard model. The 6-volt model is being phased-out by Astrometric Instruments.

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Note: SkyRad's reticle port provides a nominal 8.3mA. This is the proper current for most LED illuminated reticle eyepieces. This is not sufficient current for "grain of wheat" light reticle eyepieces.

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- ◆ Dew Heaters: SkyRad provides ports for 3 dew heaters. The connector provided is a standard audio-style “phono jack” and is compatible with popular commercial dew heaters.

**Important:** SkyRad is designed to provide up to 5-amps (60-watts at 12-volt) of dew heater current. Never draw more than 5-amps from SkyRad's external dew heater ports. Damage to the unit, or at the very least a blown fuse, can result.

If SkyRad is connected to external dew heaters then it is necessary to provide an independent (i.e. not from SkyWalker) 12-volt dew heater power connection. SkyWalker's SkyRad cable option includes a cable to provide this independent 12-volt connection. This cable includes an in-line 5-amp amp fuse. Connect this cable from the 12-volt power supply (note: the center contact of the plug must be positive) to SkyRad's “Pwr” port.

**Important:** SkyWalker's power source and the power source used for the external dew heaters must meet one of these requirements:

- 1) They must be the same power source (i.e. same 12-volt battery or 12-volt power supply).                      ---- **or** ----
- 2) The ground connections of the SkyWalker power source and external dew heater power source must be common.

## **Chapter 3: Configuring and using SkyRad**

This chapter describes how to configure each of SkyRad's functions within SkyGuide.

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Note: even if SkyRad will only be used in *SkyWalker mode* (i.e. without an attached PC running SkyGuide) it is still necessary to configure SkyWalker to properly control SkyRad. This configuration is achieved in SkyGuide and then programmed into SkyWalker whenever *Land mode* is entered.

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SkyRad is controlled from SkyWalker via the *High Drive* cable that connects between SkyRad's and SkyWalker's *High Drive* (labeled "HD") ports. Complete details on how the *High Drive* port operates, and is configured, are provided in Chapter 17 of the "SkyGuide User's Manual" ("Control of Telescope Accessories from SkyWalker's HighDrive Port"). It is not necessary, however it is recommended, that Chapter 17 of the "SkyGuide User's Manual" is reviewed before configuring SkyRad.

The proper "output functions" to assigned to each of SkyWalker's *High Drive* outputs are described in the following sections. These "output functions" are set from the Settings/Control/HighDrives/BiDriveAssignments *Display Page* (figure 1) or from the Settings/Control/HighDrives/UniDriveAssignments *Display Page* (figure 2).

```
---/BiDriveAssignments---  
BiDriveA>FocusDrive  
BiDriveB>FocusDir
```

Figure 1: Settings/Control/HighDrives/BiDriveAssignments *Display Page*

```
--/UniDriveAssignments---  
UniDriveA>IndicatorDrive  
UniDriveB>PulseTrain1  
UniDriveC>PulseTrain2  
UniDriveD>PulseTrain3
```

Figure 2: Settings/Control/HighDrives/UniDriveAssignments *Display Page*

### **Controlling a 9-volt Electric Focuser.**

The "Focuser" port on SkyRad accepts a standard 3.5mm electric focuser plug. To enable the focuser function BiDriveA must be assigned to FocusDrive and BiDriveB assigned to FocusDir from the Settings/Control/HighDrives/BiDriveAssignments *Display Page* (figure 1).

There are two means of controlling the focuser:

1. From SkyWalker's handpaddle: depress the "Focus/Dome" output and use the Up or Down buttons for focus In or Out motion.

2. From SkyGuide's Actions *Console Tab*: click the Focus check box to enable the keypad for focus-in ("I") or focus-out ("O").

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Note: the amount of focus motion is reported from the bottom of SkyGuide's Actions *Console Tab*. This number is a sum of the total number of seconds of focus motion where focus-out is a positive number and focus-in is a negative number.

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Two focus speeds are provided. If the handpaddle's *Slew mode* is enabled then focus is "fast". Focus is "slow" if the handpaddle's *Slew mode* is not enabled. The relative speeds of fast and slow focus motion are set, on a scale of 1 to 15, from the Settings/Control/HighDrives/Focus *Display Page*.

The polarity of focus motion is also set from the Settings/Control/HighDrives/Focus *Display Page*. It will be necessary to toggle this polarity if "out" focus motion is "in" or vice versa.

### **LED Illuminated Reticle Eyepiece or 6-volt Pentax camera power.**

The port labeled "Reticle" provides drive for an LED illuminated reticle eyepiece (in the standard SkyRad) or provides 6-volt power for a Pentax camera. A given SkyRad can only provide one or the other function, not both.

For the standard SkyRad model, UniDriveA must be set (from the Settings/Control/HighDrives/UniDriveAssignments *Display Page*) to the "IndicatorDrive" assignment. SkyWalker will then provide a variable brightness signal to the eyepiece's LED. This allows for selection of the LED brightness over a range of 1 to 15. The brightness setting is accessible from the Settings/Control/HighDrives/Indicator *Display Page*.

The LED can also be pulsed with a selectable pulse "on-time" and period. These settings are also made from the Settings/Control/HighDrives/Indicator *Display Page*.

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Note: The LED (i.e. Indicator) brightness, pulse on-time and pulse period can be set from the handpaddle through use of the Indicator *Assignable Key* (see Chapter 4 of the "SkyGuide User's Manual" for more details).

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For the 6-volt SkyRad model, UniDriveA must be set (from the Settings/Control/HighDrives/UniDriveAssignments *Display Page*) to the "AlwaysOn" assignment. SkyRad includes an internal voltage regulator that provides 6-volts.

### **Controlling the TelRad's built-in "target" reticle**

SkyWalker's UniDriveD output controls the TelRad's built-in "target" (i.e. "bull's eye") reticle. The UniDriveD output can not change the brightness of the TelRad reticle (like the UniDriveA output does for an illuminated eyepiece) but if a PulseTrain assignment is provided for the UniDriveD output (from the Settings/Control/HighDrives/UniDriveAssignments *Display Page*) then a variable on-time and period "blink" is available.

For example, if the PulseTrain3 function is assigned to the UniDriveD output then the "blink" on-time and period can be set from the Settings/Control/HighDrives/PulseTrain3 *Display Page*.

## Controlling Dew Heaters

SkyRad can control up to four dew heaters: one internal heater is included for the Telrad diagonal window and three external heater connections are provided.

SkyWalker controls dew heaters by controlling the ratio between the amount of time that the dew heater is on to the amount of time it is off. SkyWalker's *High Drive* outputs can be assigned the PulseTrain function to accomplish this. Once the PulseTrain1,2 or 3 function is applied to a *High Drive* output, go to the Settings/Control/HighDrives/PulseTrain1,2 or 3 *Display Page* and set the output's OnTime and/or Period. The amount of heat that the dew heater puts out is proportional to the OnTime divided by the Period.

### The Telrad internal dew heater

The Telrad internal heater is connected to SkyWalker's UniDriveC *High Drive* output. To configure UniDriveC for Telrad internal heater control select the PulseTrain2 "output function". This setting is made from the Settings/Control/HighDrives/UniDriveAssignments *Display Page* (figure 2). Then go to the Settings/Control/HighDrives/PulseTrain2 *Display Page* and set the PulseTrain2 OnTime and Period until the proper Telrad internal heater power output is achieved.

### External dew heaters

SkyRad provides ports for 3 external dew heaters. These ports are all controlled by one *High Drive* output: UniDriveB.

To configure UniDriveB for control of external dew heaters select the PulseTrain1 "output function". This setting is made from the Settings/Control/HighDrives/UniDriveAssignments *Display Page* (figure 2). Then go to the Settings/Control/HighDrives/PulseTrain1 *Display Page* and set the PulseTrain1 OnTime and Period until the proper heater power output is achieved.



## **Appendix 1: Trouble Shooting**

**External dew heaters don't work:** verify that the SkyWalker and external dew heater power sources are the same (i.e. same 12-volt battery or 12-volt power supply) **or** that the ground connections of the SkyWalker power source and external dew heater power source are common.

**Illuminated reticle eyepiece does not light:** is it an LED illuminated reticle? SkyRad does not work with illuminated reticle eyepieces that use light bulbs for their light sources.

