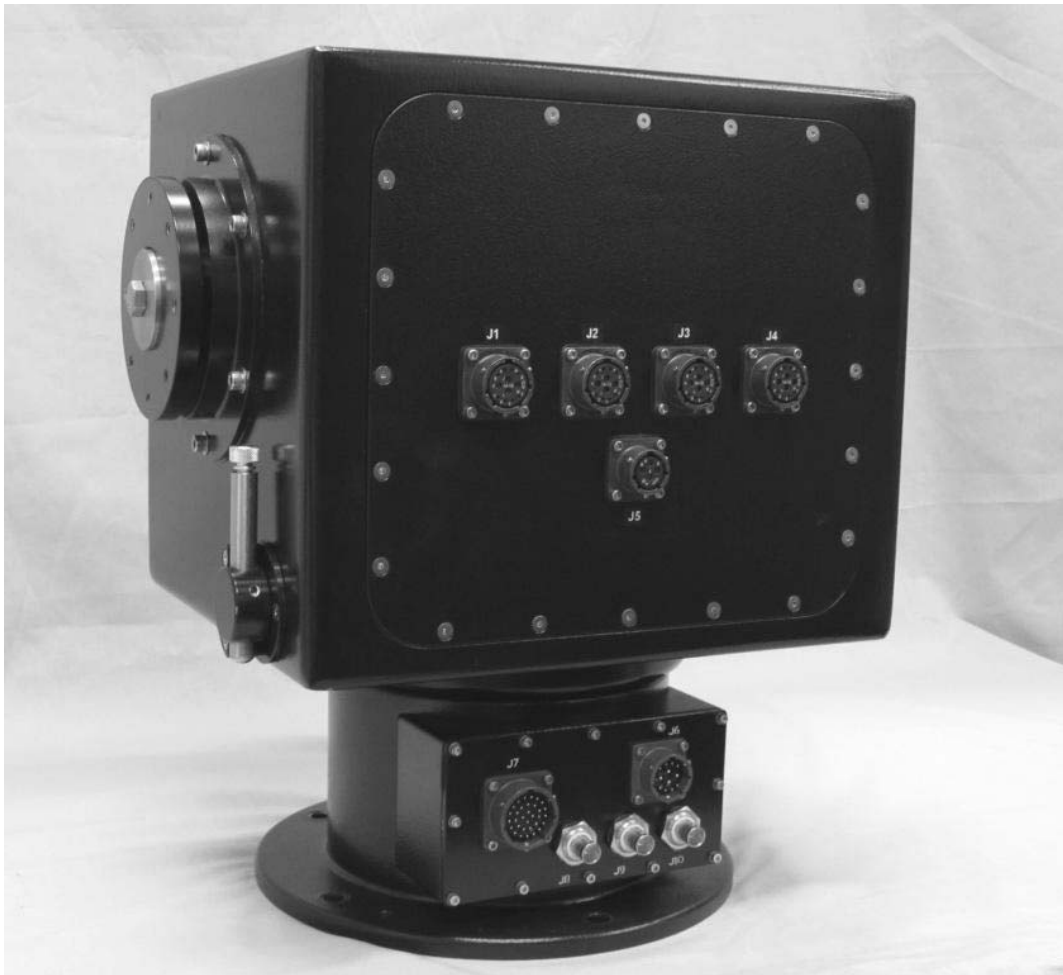


# PT150 POSITIONER OPERATORS MANUAL



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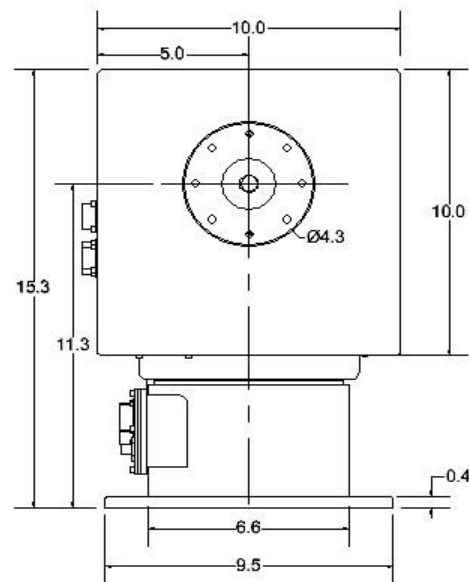
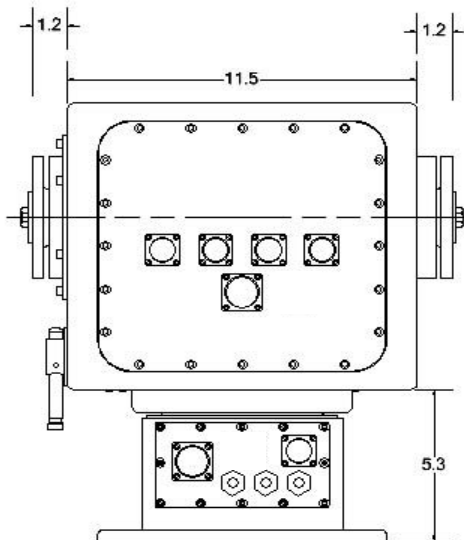
Revision A: Date 1/28/2011 Corrected minor typos

Revision B: Date 1/25/2012 Corrected tables on pages 14 and 15 - VERY IMPORTANT

# IMPORTANT SAFETY INSTRUCTIONS

Read these operating instructions carefully before using the PT150 Positioner. Follow the safety instructions on the unit and the safety instructions listed below. Keep these operating instructions handy for future reference.


- 1) Read these instructions.
- 2) Keep these instructions.
- 3) Pay attention to all warnings.
- 4) Follow all instructions.
- 5) Do not install this unit by suspending it.
- 6) Do not install this unit on its side.
- 7) While considering the weight of the PT150 and its payload, select an installation location which is level and without unevenness. The location must be able to withstand the mounting weight and be stable. Failure to properly secure the unit may result in the product falling with possible damage to the unit, injury or even death.
- 8) Bolts for securing the unit are NOT provided with the PT150. Select bolts which are sufficiently strong and made of a material which can withstand the outside environment.
- 9) The maximum payload of the PT150 is a 150 pound payload balanced and side mounted. An over the top payload is limited to 100 pounds.
- 10) The power must be off while installation or cable connections are underway.
- 11) Do not connect the serial I/O and power connector (J6) until checking for proper connections and the power being off.
- 12) Use water-proof connecting cables
- 13) Do Not turn the rotating parts of the PT150 by hand. This may cause excessive mechanical or electrical stress on the unit.
- 14) Make sure the elevation limits prevent the unit or its payload from contacting foreign objects.
- 15) Do not operate the control of the PT150 under any circumstances while installation is underway.



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# Table of Contents

<b>1.0 Introduction</b>	<b>6</b>
<b>1.1 Safety Precautions</b>	<b>6</b>
1.1.1 Grounding	6
1.1.2 Weight	6
1.1.3 Stow Lever	6
1.1.4 Operating Safety	6
<b>1.2 Product Configurations</b>	<b>7</b>
1.2.1 Payload Mounting Configurations	7
1.2.2 Control and Power Interface	7
1.2.3 Options	8
1.2.3.1 Standard Payload Mounts	8
1.2.3.2 Custom Payload Mounts	8
1.2.3.3 Slip Rings	9
1.2.3.4 Finish	9
1.2.3.5 Heater	9
1.2.3.6 Power Supplies	9
1.2.3.7 Shock Mounts	9
1.2.3.8 Protective Connector Caps	9
1.2.4 Included in Package	9
<b>2.0 Location and Function of Parts</b>	<b>10</b>
<b>2.1 Base Plate Mounting</b>	<b>10</b>
<b>2.2 Base Connectors</b>	<b>11</b>
2.2.1 Base Connectors	11
2.2.2 Base Connector Wiring	12
<b>2.3 Upper Structure</b>	<b>13</b>
2.3.1 Elevation Mounting Hub	13
2.3.2 Payload Bracket Attachment to Elevation Hub	13
2.3.4 Stow Lever	14
2.3.5 Sensor Connectors	14
2.3.6 Heater Connectors	17
2.3.7 Key Internal Parts	17
2.3.7.1 Elevation Electrical Limits/Stops	17
2.3.7.2 Servo Board Setup Switches	18

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# Table of Contents-Continued

<b>3.0 Installation .....</b>	<b>19</b>
<b>3.1 Basics .....</b>	<b>19</b>
3.1.1 <i>Lifting Safety</i> .....	19
3.1.2 <i>Location of the PT150</i> .....	19
3.1.3 <i>Obstructions</i> .....	19
3.1.4 <i>Tools</i> .....	19
3.1.5 <i>Install the PT150</i> .....	19
3.1.6 <i>Initial Cabling</i> .....	19
<b>3.2 Initial Test .....</b>	<b>20</b>
3.2.1 <i>Initial Power Up</i> .....	20
3.2.1.1 <i>Gurley Virtual Absolute Encoder</i> .....	20
3.2.1.2 <i>No Dithering at Power On</i> .....	20
3.2.2 <i>Control Source</i> .....	20
<b>3.3 Mechanical Adjustments .....</b>	<b>21</b>
3.3.1 <i>Adjusting the Elevation Electrical Limit/Stops</i> .....	21
3.3.1.1 <i>Adjusting the Up Limit</i> .....	21
3.3.1.2 <i>Verify the Up Electrical Limit/Stops</i> .....	22
3.3.1.3 <i>Adjusting the Down Limit</i> .....	22
3.3.2 <i>Mounting the Payload</i> .....	23
<b>4.0 Basic Specifications .....</b>	<b>24</b>

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## 1.0 Introduction

### 1.1 Safety Precautions

#### 1.1.1 Grounding

The safety ground, “Safety Gnd,” shown in the drawing on page 9 illustrates the location of the PT150 safety ground. A 1/4-20 tapped hole is provided for grounding the PT 150. A ground strap should be tied from this Safety Ground to an earth ground.

#### 1.1.2 Weight

The PT150 weighs 65 pounds and caution must be exercised in handling the unit. Two people should be used to manually move the PT150 from its packing crate to a transport cart. Caution needs to be used because the unit has a rotating base and a rotating elevation section which may cause a shift in weight when lifting. This shift may cause damage to the PT150 or injury to the mover.

#### 1.1.3 Stow Lever

The Stow Lever is located on the right side of the unit as shown in Figure 1.1.3 to the right. When the Stow Lever is in the up position, The stow mechanism is disengaged. When the Stow Lever is in the down position, the stow mechanism is engaged. The photo to the right shows the Stow Lever in the disengaged position. To move the Stow Lever, the lever must be pulled upward or away from its base and then moved fully to the engaged position (down) or to its disengaged position (up) and then the lever can be released.

Figure 1.1.3



**CAUTION: DO NOT OPERATE THE PT150 WITH THE STOW LEVER ENGAGED**

#### 1.1.4 Operating Safety


Care must be taken before operating the PT150 to ensure there are no obstacles present that will prevent the unit from panning continuously. Care should also be taken to make sure any elevation obstacles are outside of the elevation electrical limits and elevation software limits. See Section 3.3.1 on setting elevation electrical limits and the “Graflex PT Control GUI” Operating Manual for setting software limits.

Before operating the PT150, be sure no individuals are near the unit. No one should be close to the unit when it is operating due to potential injury from being struck by the PT150. The PT150 has speeds of up to 60 degrees/second and contacting a moving pan and tilt or payload is extremely hazardous.

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## 1.2 Product Configurations

There are several product configurations covering payload mounting, Control and Power Interfaces and Options.

### 1.2.1 Payload Mounting Configurations

There are two standard payload mounting configurations; side mounted and over-the-top-mount. The advantage of the side mount is the ability to carry a heavier load than the over-the-top configuration. The side mount and over-the-top configurations are shown in Figures 1.2.1-1 and 1.2.1-2 below. A custom payload mount may also be designed by the user or the engineers at Graflex.

Figure 1.2.1-1 Side Mount



Figure 1.2.1-2 Over-the-Top Mount

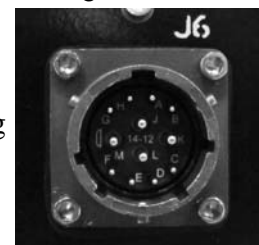


### 1.2.2 Control and Power Interface

The PT150 control and power enter the unit via connector J6 shown below in Figure 1.2.2. With power and serial interfaces entering on the same connector, there are two basic configurations available:

- **GUI Controlled:** External power supply providing +18 to +36 VDC of input power at 10 Amps maximum. The control being from a desktop or laptop computer. A Control GUI is supplied with the PT150 for computer control. The GUI is described in more detail in the “Graflex PT Control GUI” Operating Manual.
- **Control Panel Controlled:** External power supply providing +18 to +36 VDC of input power at 10 Amps maximum. A control panel is used to control the operation of the PT150. The commands from the control panel to the PT150 are the same as those from the GUI and the GUI is a helpful tool in checking out a control panel design. The commands are described in “PT150 Interface Protocol Manual”.


Figure 1.2.2



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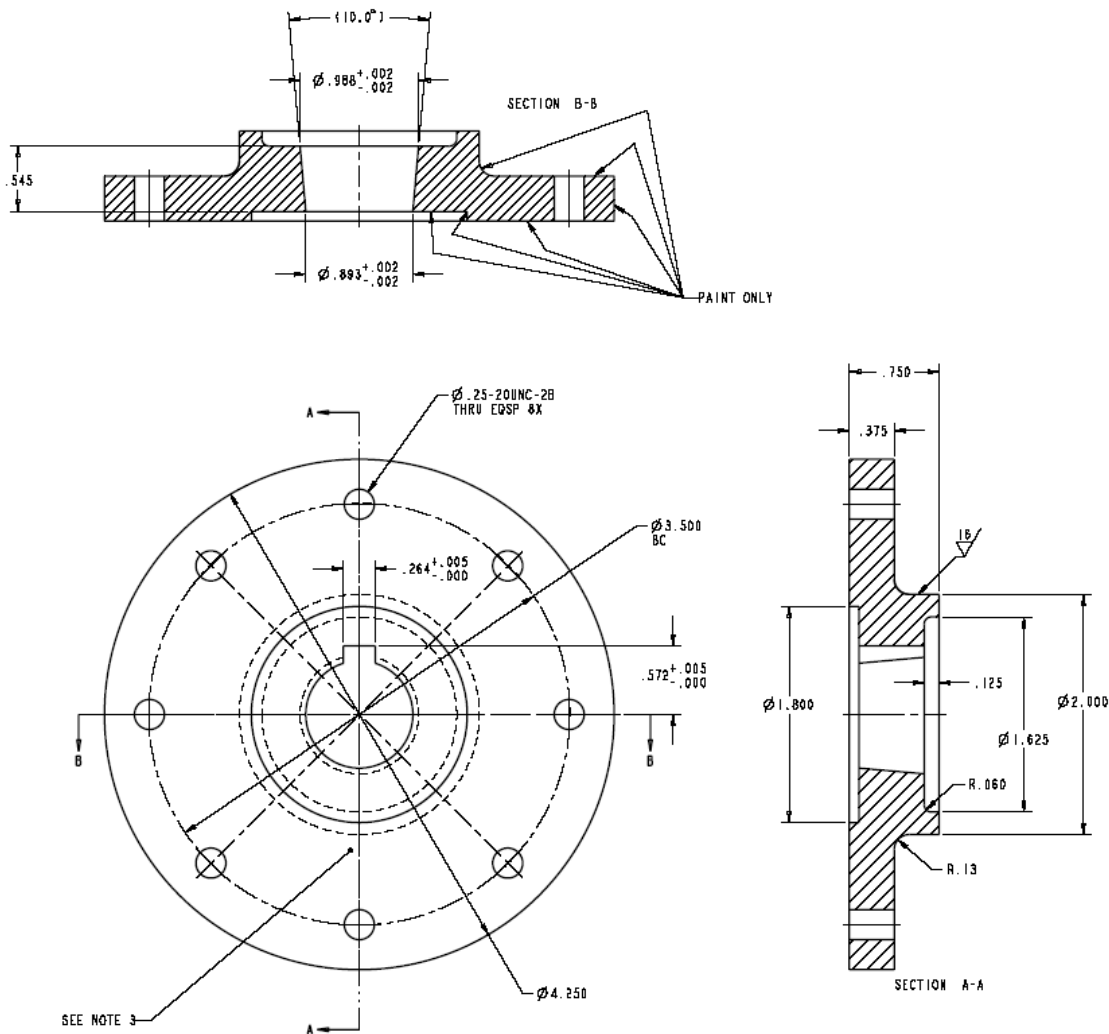
### 1.2.3 Options

Several options are available for the PT150 and they are listed below.

1.2.3.1 Standard Payload Mounts: As discussed in the previous section, side and over-the-top mounts are optionally available from Graflex.

1.2.3.2 Custom Payload Mounts: The payload mounting surfaces are hubs located on each side of the PT150 as shown in the Elevation Hub drawing. See the Elevation Hub drawing in Figure 1.2.3.2 below. The user or Graflex may design a custom payload mount per the user requirements.


Figure 1.2.3.2 Elevation



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### 1.2.3 Options (Continued)

1.2.3.3 Slip Rings: The PT150 comes with a standard medium density slip ring package. An optional higher density slip ring package is also available. The slip ring alternatives are shown in table 1.2.3.3 below.

Table 1.2.3.3 Slip Rings

<b>Slip Ring Available rings</b>	<b>Medium Density</b>	<b>Optional High Density</b>
<b>2 Amp rings</b>	13	19
<b>5 Amp rings</b>	N/A	8
<b>10 Amp rings</b>	8	N/A
<b>Coax rings</b>	N/A	3

1.2.3.4 Finish: There are several alternative finishes. The standard PT150 comes with a Polane T paint in black. Other finishes include: black anodize, white paint, tan paint, green paint or a customer specified finish.

1.2.3.5 Heater: An optional heater blanket is available. A heater blanket connector is located on the rear of the PT150 and provides a nominal +24VDC power to the heater blanket.

1.2.3.6 Power Supplies: Optional indoor and outdoor power supplies are available. Contact Graflex for details.

1.2.3.7 Shock Mounts: Shock and vibration isolation mounts are available for high shock and vibration environments. The shock and vibration design is dependent upon the user requirements. Contact Graflex for additional details.

1.2.3.8 Protective Connector Caps: Available as an option.

### 1.2.4 Included in Package


Included in the PT150 package are the following items:

- PT150 Positioner
- Operators Manual
- GUI: A software program to allow the PT150 to be controlled by a computer.

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## 2.0 Location and Function of Parts

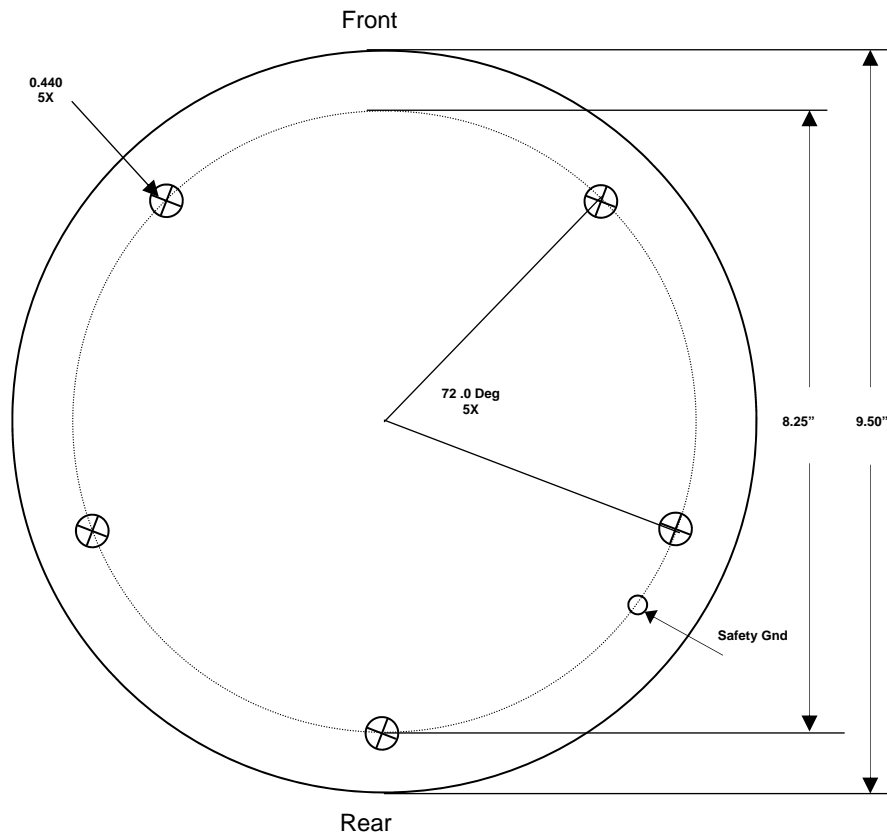
### 2.1 Base Plate Mounting

The location and spacing of the five mounting holes is shown in Figure 1.2 below. There are five equally spaced mounting holes which are designed to accept 3/8 inch mounting bolts. Do not use smaller diameter mounting hardware. The rear of the PT150 is where the base connector plate is located. This position is noted on the drawing below.

Make sure the mounting surface is adequately strong to support the 65 pound weight of the PT150 with the additional weight of up to 150 pounds of payload. The mounting hardware must be of a material strong enough to withstand the strong motion of the PT150 without failing.

The safety ground hole, "Safety Gnd," will accept a 1/4-20 bolt. This is to be used to secure a safety ground strap to the PT150. This provides an earth ground.


Figure 2.1 PT150 Base Mounting Holes



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## 2.2 Base Connectors

### 2.2.1 Base Connector Location and Part Numbers

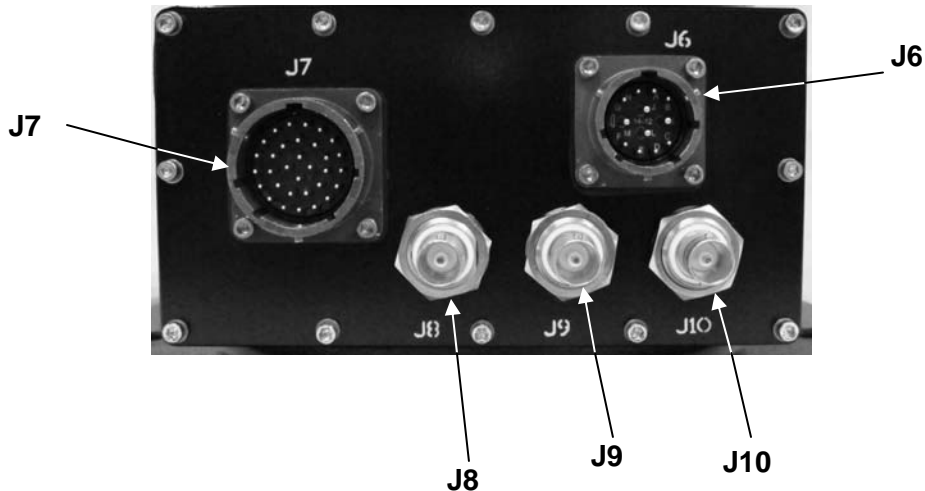
The base of the PT150 contains a connector plate with five connectors. These connectors provide the DC power input, the serial control signal, the pass through connections and the BNC connectors for video output. The location of each connector is shown in Figure 2.2.1 below.

Table 2.2.1 below lists the function and connector part number and mating connector for each of the connectors.

Table 2.2.1 Base Connectors

Connector #	Description	Part Number	Mating Connector
J6	Power & Serial Control Input	PT02E-14-12P	PT06E-14-12S
J7	Pass Through	PT02E-18-32P	PT06E-18-32S
J8	BNC Video	UBJ26-5	BNC
J9	BNC Video	UBJ26-5	BNC
J10	BNC Video	UBJ26-5	BNC


Figure 2.2.1 Base Connectors



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## 2.2.2 Base Connector J6 and J7 Wiring

Table 2.2.2-1 provides the wiring from the power/serial input connector, J6, to the standard slip ring. Table 2.2.2-2 provides the wiring from the pass through connector, J7, to the standard slip ring.

Table 2.2.2-1 J6 Standard Slip Ring Wiring

Pin #	Name	Amps	S/R Port	S/R No.	S/R Color
A	TX+	2	C	13	BLK
B	TX-	2	C	14	BRN
C	GND	2	C	15	RED
D	RCV+	2	C	16	ORG
E	RCV-	2	C	17	YEL
J	+24 VDC	10	A	1	BLK
K	+24 VDC	10	A	2	BRN
L	GND	10	A	3	RED
M	GND	10	A	4	ORG

Note: J6 Pins F, G and H are not used

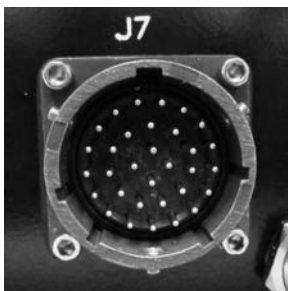
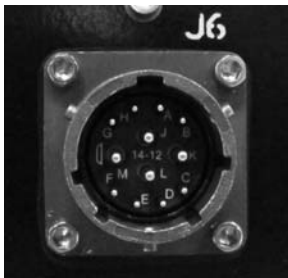


Table 2.2.2-2 J7 Standard Slip Ring Wiring

Pin #	Amps	S/R Port	S/R No.	S/R Color
A	10	A	5	YEL
B	10	A	6	GRN
C	2	C	18	GRN
D	2	C	19	BLU
E	2	C	20	VIO
F	2	C	21	GRY
G	2	C	22	WHT
H	2	C	23	W/BLU
J	2	D	24	W/BRN
K	2	D	25	BLK
L	2	D	26	BRN
P	2	D	29	YEL
R	2	D	30	W/BRN
W	2	D	33	RED
X	2	D	34	ORG
a	10	B	7	BLU
b	10	B	8	VIO
c	10	B	9	GRY
d	10	B	10	WHT
e	10	B	11	W/BLK
f	10	B	12	W/BRN

Note: J7 Pins M, N, S, T, U, V, Y, Z, g, h, & j are not used.

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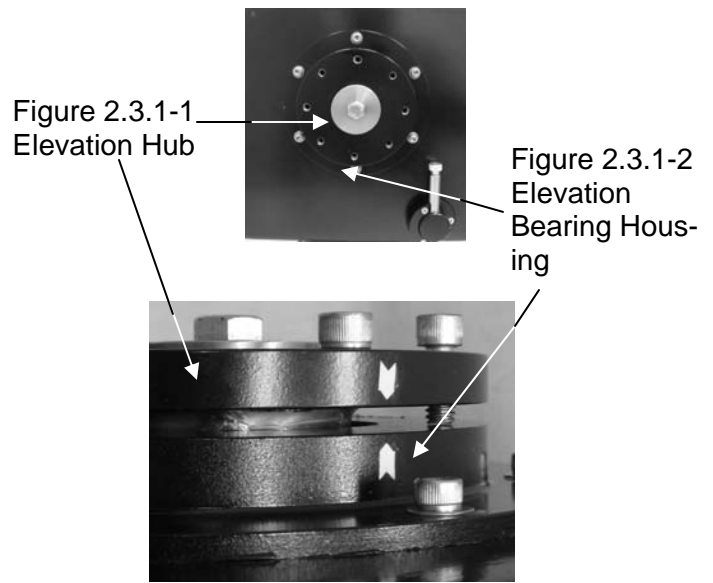
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## 2.3 Upper Structure

### 2.3.1 Elevation Mounting Hub

On either side of the PT150 are the mounting hubs for attaching payload brackets. Figures 2.3.1-1 and 2.3.1-2 to the right identify the right elevation hub and the elevation bearing housing. The elevation hub rotates on the elevation shaft causing a payload move accordingly. When the PT150 is delivered, the elevation position is at 0 degrees in elevation. This position can be verified by the two arrows at the top of the elevation bearing housing and elevation hub pointing at each other. See the photo below for a top view of the housing and hub arrows. The arrow on the elevation hub represents the top of the hub and should be used for locating the top of the hub for payload bracket attach-



### 2.3.2 Payload Bracket Attachment to Elevation Mounting Hubs

The payload mounting brackets should be mounted to the Elevation hubs with 1/4-20 bolts. These bolts must not protrude from the elevation mounting hub. If the bolts protrude enough to touch the elevation bearing housing, damage may occur to the housing, the hub or both. Figures 2.3.2-1 and 2.3.2-2 below illustrate the proper and improper thread penetration from the elevation hub.

The Elevation Hub drawing is shown in Figure 1.2.3.2 of paragraph 1.2.3.2 This drawing defines the exact hole locations and can be used to design a custom bracket.

Figure 2.3.2-1 Improper thread penetration

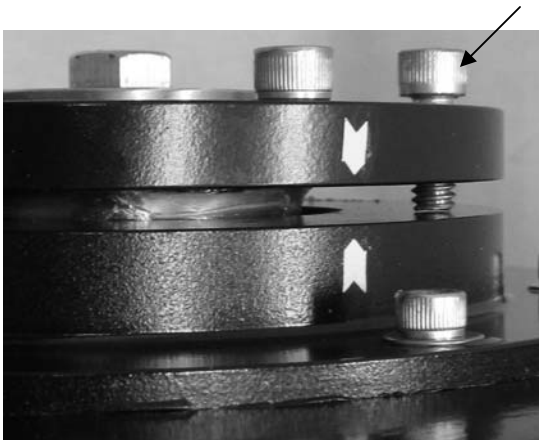
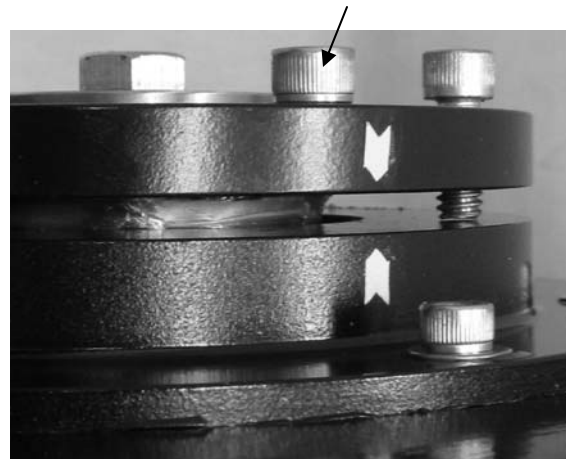



Figure 2.3.2-2 Proper thread penetration



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### 2.3.4 Stow Lever

The Stow Lever is located on the bottom, rear right side of the PT150 and is shown in Figures 2.3.4-1 and 2.3.4-2 to the right. The Stow Lever is mechanically coupled to both the elevation and azimuth shafts and pads are used as friction lock when the Stow Lever is in the stow position. Figure 2.3.4-1 shows the Stow Lever in the vertical stow position and Figure 2.3.4-2 shows the Stow Lever in the horizontal disengaged position.

Figure 2.3.4-1



To stow the PT150, the lever arm must be pulled up and away from the base and rotated to the horizontal position as shown in Figure 2.3.4-2 and released. To disengage the stow, the lever arm must be pulled away from the base and rotated to the vertical position as shown in Figure 2.3.4-1 and released.

Figure 2.3.4-2



The Stow lever must be in the disengaged, or operate, position before powering the PT150. Applying power to the PT150 while the Stow Lever is in the stow position may cause damage to the PT150.

### 2.3.5 Sensor Connectors

The top row of four connectors shown in Figure 2.3.5 are the sensor connectors. Each connector may be specially wired to a customer's requirement or may be wired as the standard Graflex sensor wiring. The customer wiring options include the following.

Figure 2.3.5



- Pass through of only signals from J7 on the base of the PT150.
- Use of the internal +12VDC for power in addition to the J7 signals.
- Use of Video signal connectors J8, J9 and J10 on the base of the in addition to J7 signals.

The connectors and there mating connectors are listed in Table 2.3.5-1 below.


Table 2.3.5-1 Sensor Connectors and their Mates

Connector #	Description	Part Number	Mating Connector
J1	Sensor Connector #1	PT02E-14-12S	PT06E-14-12P
J2	Sensor Connector #2	PT02E-14-12S	PT06E-14-12P
J3	Sensor Connector #3	PT02E-14-12S	PT06E-14-12P
J4	Sensor Connector #4	PT02E-14-12S	PT06E-14-12P

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## Graflex Standard J7 Slip Ring Wiring

Table 2.3.5-2 below assigns the signal lines from the J7 pass through connector to sensor connectors J1, J2, J3 and J4. On the next page Table 2.3.5-3 assigns the coax video signals and Table 2.3.5-4 assigns the +12 VDC internal power supply and ground.


Table 2.3.5-2 J7 Standard Slip Ring Wiring

P7 Pin #	Amps	Description	S/R #	J1 Pin #	J2 Pin #	J3 Pin #	J4 Pin #
A	10	Customer Pass Thru	A5	K			
B	10	Customer Pass Thru	A6	M			
C	2	Customer Pass Thru	C18	A			
D	2	Customer Pass Thru	C19	B			
E	2	Customer Pass Thru	C20	C			
F	2	Customer Pass Thru	C21	D			
G	2	Customer Pass Thru	C22		A		
H	2	Customer Pass Thru	C23		B		
J	2	Customer Pass Thru	C24		C		
K	2	Customer Pass Thru	D25		D		
L	2	Customer Pass Thru	D26			A	
P	2	Customer Pass Thru	D29			B	
R	2	Customer Pass Thru	D30			C	
W	2	Customer Pass Thru	D33			D	
X	2	Customer Pass Thru	D34				
a	10	Customer Pass Thru	B7		K		
b	10	Customer Pass Thru	B8		M		
c	10	Customer Pass Thru	B9			K	
d	10	Customer Pass Thru	B10			M	
e	10	Customer Pass Thru	B11				K
f	10	Customer Pass Thru	B12				M

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## Graflex Standard J7 Slip Ring Wiring (Continued)

Table 2.3.5-3 below assigns the video connections to from the three BNC connectors located on the base of the PT150 to the sensor connectors. Table 2.3.5-4 assigns the +12 VDC power to applicable sensor connector pins. Note that there are three Base BNC connectors (J8, J9 and J10) and they are assigned to Connectors J1, J2 and J3

*Note: Pins J, K, L and M on J1, J2, J3 and J4 should be used for Power and Video pins. They are larger wire size pins.*

Table 2.3.5-3 J7 Video Connector Wiring

BNC J8	Description	J1 Pin #	J2 Pin #	J3 Pin #	J4 Pin #
1	Video Signal	E			
2	Video Return	F			

BNC J9	Description	J1 Pin #	J2 Pin #	J3 Pin #	J4 Pin #
1	Video Signal		E		
2	Video Return		F		

BNC J10	Description	J1 Pin #	J2 Pin #	J3 Pin #	J4 Pin #
1	Video Signal			E	
2	Video Return			F	


Table 2.3.5-4 J7 +12VDC Internal Power Supply Wiring

Terminal Bd #3	Description	J1 Pin #	J2 Pin #	J3 Pin #	J4 Pin #
1	+12 VDC	J			
2	+12 VDC		J		
3	+12 VDC			J	
4	+12 VDC				J
5	Power Return	L			
6	Power Return		L		
7	Power Return			L	
8	Power Return				L

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### 2.3.6 Heater Connectors

Connector, J5, located below the top row of four connectors is the heater connector. The connector is pre-wired on all PT150 Positioners. If the heater option is provided, the heater blanket, heater plates, heater cable and thermostat are installed and tested. The heater option is only required for exceedingly cold locations.

The location of the heater connector is shown in Figure 2.3.6.

### 2.3.7 Key Internal Part Locations

There are two key internal part locations that may require user access during the initial setup of the system. They are the two Elevation Electrical Limits/Stops and the Setup Switches located on the Servo Board.

#### 2.3.7.1 Elevation Electrical Limits/Stops

There are two Elevation Electrical Limit/Stop blocks located behind the front panel of the PT150. To access the stop blocks, the front panel must be removed. The two Limit/Stop blocks may be moved around the Index Wheel to provide the elevation upper and lower electrical limits and mechanical stops. See Figure 2.3.7.1-1.

The Index Wheel is rimmed with 10-32 tapped holes. Each Stop Block has two 10-32 through holes that match the hole pattern on the Index Wheel. The two stop blocks are positioned to contact up or down limit switches when the elevation axis is at the appropriate limit. Just beyond the limit switch is a mechanical stop that will physically restrain the elevation axis from any further movement in that direction. A Single Elevation Stop Block is shown in Figure 2.3.7.1-2.

The Elevation Electrical Limits/Stops are to be used as a safety precaution against contacting external objects that may damage or be damaged by the elevation travel of the payload. Software limits are set to meet operational constraints and are always set within the electrical limit envelope.

More detail is provided on the setting of the electrical limits in paragraph 3.3.1 and the software limits are discussed in the “Graflex PT Control GUI” manual.

Figure 2.3.6 Heater Connector

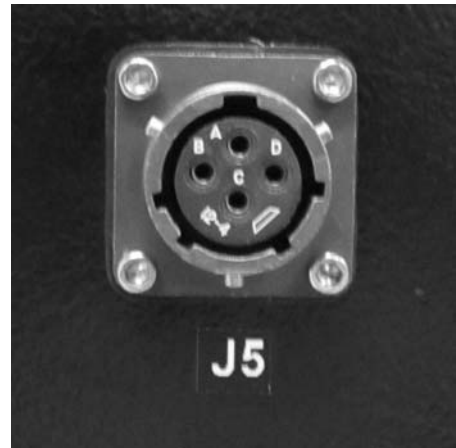


Figure 2.3.7.1-1 Index Wheel with Elevation Limit/Stop Blocks

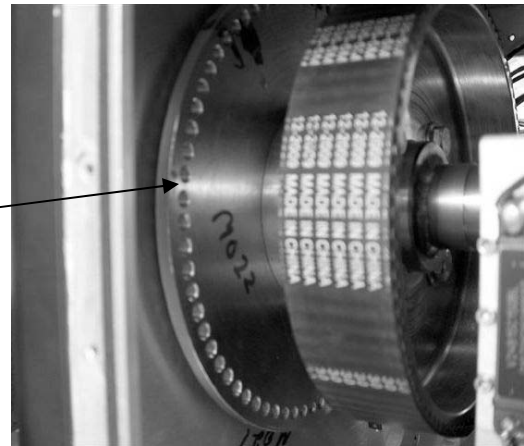



Figure 2.3.7.1-2 Stop Block-Top



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### 2.3.7.2 Servo Board Setup Switches

The setup switches are located on the Servo Board which is mounted on the underside of the top cover. To gain access to the Servo Board, the top cover must be removed to reveal the Servo Board. Figure 2.3.7.2 shows the Servo Board and the insert photo below it shows the PT150 setup switches.

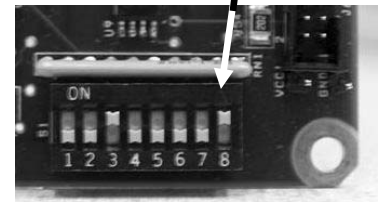
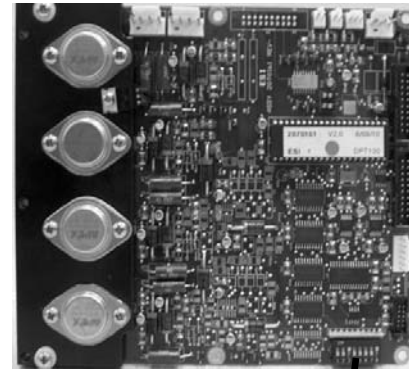
As seen in the photo to the left, setup switches 3 and 8 are in the “ON” position and all other switches are in the opposite position. The PT150 is delivered with the switches as shown.

Setup switch 8 selects the serial input format. ON is RS-232 and OFF is RS-422.

Setup switch 3 selects the Pulse Amplitude Modulation Mode. When switch 3 is ON, the PT150 is in the Pulse Amplitude Modulation Mode.

For a description of all Setup Switches see the 2.3.7.2 below. The descriptions in bold are the factory default positions.

Figure 2.3.7.2 Servo Board



Setup Switches


Table 2.3.7.2 Setup Switches

Switch	Description
<b>1</b>	On: PID is always enabled in Absolute Mode <b>Off: PID is disabled in Absolute Mode if position is 3000 or more counts from target</b>
<b>2</b>	On: No power on motion is generated <b>Off: Azimuth and Elevation move slightly at power on</b>
<b>3</b>	<b>On: Pulse Amplitude Modulation mode is enabled</b> Off: Pulse Amplitude Modulation mode is disabled
<b>4</b>	On: Exit Absolute Positioning Mode when at the desired absolute position. <b>Off: Remain in the Absolute Positioning Mode until a velocity command is received</b>
<b>5</b>	On: Azimuth travel is prevented from going through 180 degrees <b>Off: Azimuth travel is the closest direction toward the target position</b>
<b>6</b>	On: Not Used <b>Off: Not Used</b>
<b>7</b>	On: Not Used <b>Off: Not Used</b>
<b>8</b>	<b>On: Serial input format: RS-232</b> Off: Serial input format: RS-422

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## 3.0 Installation

### 3.1 Basics

#### 3.1.1 Lifting Safety

Be careful when removing the PT150 from its packing and when moving it to a cart or the installation location. It is recommended that two people lift and move the PT150. It weighs 65 pounds and may cause injury when trying to lift with one person. It is recommended that the Stow Lever be in the Down or STOW position before lifting the PT150

#### 3.1.2 Location of the PT150

While considering the weight of the PT150 and its payload, ensure the installation location is level and without unevenness. The location must be able to withstand the mounting weight and be stable.

#### 3.1.3 Obstructions

Make sure there are no azimuth obstructions and there is adequate clearance for the payload to rotate freely in azimuth. Any elevation obstructions must be outside the electrical limits. The elevation electrical limits are factory set at + 45 degrees and -45 degrees. Paragraph 3.3.1 will explain how to adjust the electrical limits.

#### 3.1.4 Tools

The following tools are required for the installation of the PT150.

- 3/16 inch Ball End Hex Wrench, Allen Wrench or T-Handle Ball End Hex wrench to remove the 1/4 20 bolts used on the elevation hub..
- 5/64 inch Ball End Hex Wrench, Allen Wrench or T-Handle Ball End Hex wrench to remove the screws securing the front and rear PT150 panels.
- 5/32 inch Ball End Hex Wrench, Allen Wrench or T-Handle Ball End Hex wrench to remove the limit stops.
- 3/8 inch mounting bolt wrench. This could be a 9/16 inch box wrench or open end wrench if 3/8 inch hex head bolts are used.

#### 3.1.5 Install the PT150

Locate the rear of the PT150. This is where the base connector plate is located. The sensor connectors should be in the same position as the base connectors. All connectors face the rear when the PT150 is pointed to 0.0 degrees in azimuth. Position the PT150 over the base mounting hole pattern shown in Figure 2.1 and secure the PT150 with 3/8 inch bolts. Attach the ground wire to the base flange with 1/4-20 hardware if required..

#### 3.1.6 Initial Cabling

Make sure the power supply is in the OFF position and move the Stow Lever to the disengaged position (the lever should be pointing up). Connect the power/serial control cable to base connector J6. Make sure the control device is not connected or if connected, not powered up. We want to power up the PT150 without any control device operational.

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## 3.2 Initial Test

### 3.2.1 Initial Power Up

Make sure the Stow Lever is in the up, or disengaged, position. Apply power to the PT150. The PT150 should move slightly up, down, right and left. This movement initializes the azimuth and elevation encoders.

#### 3.2.1.1 Gurley Virtual Absolute Encoder

The encoder for azimuth and elevation is a 20 bit Gurley Virtual Absolute Encoder. The “Virtual Absolute” means the encoder has a hybrid encoder technology that requires the PT150 to move slightly so the encoder is initialized and knows where it is. This is accomplished by the azimuth and elevation dithering at power on. This is normal and is the factory default setting. The PT150 will dither each time the power is applied.

If for some reason, the power on motion is not desired, the power on movement may be eliminated by putting Setup Switch #2 in the ON position. When the power on dithering is disabled, the encoders will not read accurately until a slight PT150 movement is performed in each axis.

#### 3.2.1.2 No Dithering at Power On

If the PT150 does not dither when power is initially applied, turn the power OFF and verify the following:

- The Stow Lever is in the up, or disengaged, position.
- Setup Switch # 2 is in the OFF Position. (See Table 2.3.7.2)
- The power/serial cable is securely attached to the PT150
- The power supply has the proper voltage output, +18 VDC to +36 VDC.
- The power/serial input cable is properly wired. (see Table 2.2.1-1)

After verifying the above, turn the power ON. If the system still does dither, contact the factory.

### 3.2.2 Control Source

With the power OFF, connect the control source and apply power to the control source. Turn the PT150 power ON. At power on, the PT150 should dither as described above. The control source is now in command of the PT150. If the control source is the “Graflex PT Control” Graphical User Interface (GUI), see its operational instructions in the “Graflex PT Control GUI” Operators Manual.


Perform simple commands to insure basic Positioner operation. Move the PT150 up, down, left and right a small amount. If the controller displays position feedback, there should be position change in accordance with the Positioner movement.

Move the azimuth until the base connectors and the sensor connectors are both together. This position should be approximately 0 degrees azimuth. Command the elevation to move to the position where the two arrows are pointing at each other as shown in Figure 2.2.3-2. The elevation axis is now positioned at approximately 0 degrees in elevation.

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### 3.3 Mechanical Adjustments

If the factory set elevation electrical limits of +45 degrees and -45 degrees are where desired for your installation, then skip paragraph 3.3.1

#### 3.3.1 Adjusting the Elevation Electrical Limits/Stops

To get access to the Limit/Stop blocks, the front and rear covers must be removed. Before removing the covers, verify the following:

- The power is OFF.
- The Stow Lever is in the disengaged or up position.
- There is no payload attached to the payload mounting brackets.

Now remove front cover with the 5/64 Allen wrench. The front cover can be completely removed and set aside. Leave the front cover off until all adjustments are made and remove the screws from the rear cover. The sensor connectors are mounted on the rear cover and therefore, the rear cover cannot be completely removed.

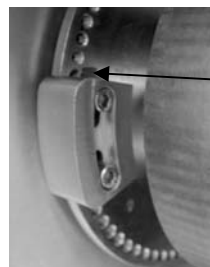
Turn the power ON. To remove the Limit/Stop blocks, go to the front of the PT150 and slowly move the elevation control on the control source. Keep moving the elevation axis until one of the Limit/Stops is accessible from the front opening. Remove the Limit/Stop block and continue moving the elevation axis with the control source until the second Limit/Stop block is accessible from the PT150.

##### 3.3.1.1 Adjusting the Up Limit

Carefully move the PT150 elevation axis with the control source until the desired up elevation limit position is reached. Figure 3.3.1.1 shows the up limit switch without the up Limit/Stop block. Mark the hole position nearest the up limit switch tape or erasable marker.

Move the elevation axis with the control source until the mark is easily seen from the front opening. Attach the Limit/Stop block with the hole closest to the up limit switch at the mark made that indicates the up limit position. Use the two 10-32 screws to secure the Limit/Stop block. The up Limit/Stop block is shown in Figure 3.3.1.2 as it should look after installation. Notice the mark made during the up limit positioning on both photos.

Figure 3.3.1.1 Up Limit Switch w/o Limit/Stop Block




Mark

Figure 3.3.1.2 Limit/Stop Installed

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### 3.3.1.2 Verify the Up Electrical Limits/Stop Position

To verify the electrical up limit position, position the elevation axis until it contacts the up stop. The up motion should now be disabled and only a down motion allowed. The new electrical up limit should be displayed on the control source position feedback display.

Figure 3.3.1.2-1 shows the up Limit/Stop nearing the up limit switch. The mechanical stop can be seen just to the left and below the limit switch contact.

Figure 3.3.1.2-2 shows the Limit/Stop block in full contact with the limit switch

Figure 3.3.1.2-1 Limit/Stop Block Nearing Up Limit Switch

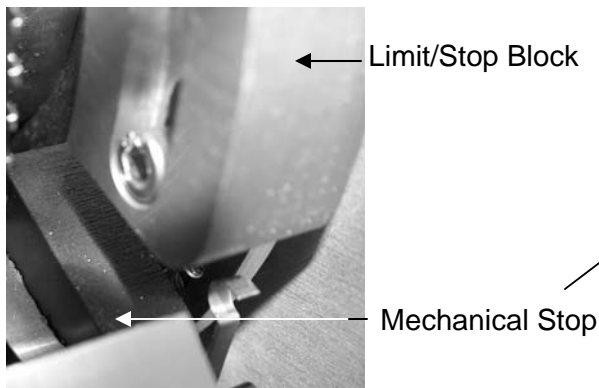
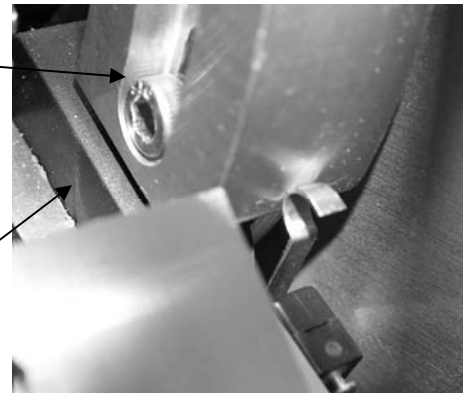


Figure 3.3.1.2-2 Limit/Stop Block at Up Limit Switch



### 3.3.1.3 Adjusting the Down Limit

Again, carefully move the PT150 elevation axis with the control source until the desired down elevation limit position is reached. Figure 3.3.1.1 shows the down limit switch without the up Limit/Stop block. Mark the hole position nearest the down limit switch.

Move the elevation axis with the control source until the mark is easily seen from the front opening. Attach the Limit/Stop block with the hole closest to the down limit switch at the mark made that indicates the down limit position. Use the two 10-32 screws to secure the Limit/Stop block.

The down limit verification is identical to the up limit verification except the elevation axis movement is down.

When limit/stop blocks are properly installed, remove the tape or marks from the Index Wheel and replace both the front and rear covers.


Figure 3.3.1.1 Down Limit Switch w/o Limit/Stop Block



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### 3.3.2 Mounting the Payload

Before actually mounting the sensor payload to the payload mounting brackets, do the following:

- Make sure the elevation axis is at 0 degrees and the payload mounting brackets are level with the ground. If it is not, use the control source to level the payload mounting bracket.
- Turn the power OFF
- The payload mounting brackets are securely fastened to the PT150.
- Put the Stow Lever in the down, or engaged, position

Mounting the sensors requires user supplied hardware and tools. A few tips to make installation easier and operation more efficient are listed below:


- Locate sensors on both sides of the PT150, if using side mounts.
- Determine the center of gravity of each sensor and balance the load forward and aft as well as possible.
- Balance the weight between the two side mounts as well as possible.
- Check for azimuth obstructions and eliminate any found.
- Make sure the elevation electrical limits are adequately adjusted. If not, readjust the up and/or down limits.

You are now ready to connect the sensor connectors and prepare for operation. Before turning the PT150 power on, put the Stow Lever in the up, or disengaged, position.

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## 4.0 Basic Specifications

### Characteristics:

Dimensions .....	14”(w) x 15.0 (h) x 10.0 (d)
Weight .....	65 Pounds
Base Dimension.....	9.5” Diameter
Construction .....	Aluminum and Stainless Steel
Color .....	Anodized or Painted
Brake .....	Stow Lever
Backlash .....	Negligible
Tilt Limits.....	Adjustable Electrical & Software
Drive Motor .....	DC Brush
Payload Inertia	
Azimuth .....	7.82 ft-lb-sec <sup>2</sup>
Elevation.....	4.78 ft-lb-sec <sup>2</sup>

### Electrical:

Travel	
Pan .....	Continuous
Tilt .....	+90 to -90 adjustable limits
Feedback.....	20 Bit On-Axis Encoder
Resolution.....	0.0004 Degrees
Repeatability.....	0.001 Degrees
Accuracy.....	0.0055 Degrees
Voltage .....	+18 VDC to +36 VDC

### Communications:

Interface:.....	RS-232 or RS-422
Sensor Pass Through .....	Two Slip Rings Choices
Control.....	GUI supplied

### Options:

Finish .....	Multiple colors and finishes
Payload Mount .....	Side or Over the Top
Heaters.....	Blanket, Heaters & Thermostat
Shock Mount .....	Contact Factory


### Environmental:

Operating Temperature.....	-30 Thru +70 C
Humidity.....	Mil 810E: Proc 507.00
Salt Fog.....	Mil 810E: Proc 509.00
Dust Wind.....	Mil 810E: Proc 510.00
Vibration.....	Mil 810E: Proc 514.4
Shock .....	Mil 810E: Proc 516.4

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