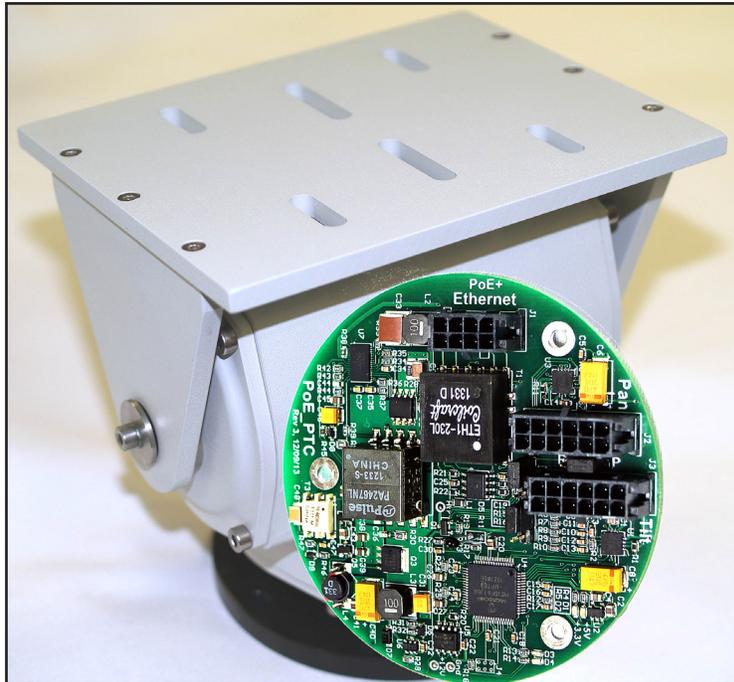




User Manual / Configuration Guide



JPTH-13MPoE PoE Powered IP Based Pan/Tilt Control System

Version 2.00 Sept 2019

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For Ver 1.26a.hex / Ver 1.10.bin firmware

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1.0 - INTRODUCTION

Congratulations on your purchase of the JPTH-13MPoE, PoE powered Pan-Tilt (P/T) control system (JPTH-13MPoE) This unique harsh environment P/T head was built to the highest quality standards and, with proper use and installation, will provide many years of service. It is **STRONGLY** recommended that you read this manual carefully and completely to fully understand the capabilities of the JPTH-13MPoE before attempting hook up, installation or operation.

CAUTION

The installation and setup of the JPTH-13MPoE may involve a number of potentially dangerous operations such as climbing, using man lifts, working with 120 or 220VAC power, handling heavy items above ground and working with a device that can be potentially remotely controlled by others.

The installation of the equipment should ONLY be done by those that are qualified to perform the needed work.

1.1 - Concept

The JPTH-13MPoE is a small, rugged, all-weather P/T head that is intended to be powered from a PoE or PoE+ switch or injector (802.3af/at compliant). The built in controller is an IP-based, 2-channel advanced motion controller designed for the proportional control of DC motors. It can be controlled over a LAN, wireless WLAN, or over the Internet from a Web browser using a built-in virtual joystick. It may also be controlled via a 3-wire cable connected to a joystick keyboard or a camera that outputs Pelco D across an RS-485 serial link. It was specifically designed to allow the positioning of a remote camera across an IP network (wired, wireless, or cellular). The controller features an advanced closed loop PID (proportional, integral, derivative) DC servo control system offering precise slow speed and variable speed control. Further, all the equipment that makes up this system has been designed for harsh duty environments (-30C to +70C operation or colder).

This system was designed to provide pan-tilt positional control for a camera, small antenna, small microwave radio, microphone, or IR light etc. The JPTH-13MPoE's built-in Web interface features a virtual joystick interface with proportional speed control for the P/T motions. Other features include visual and digital position feedback and display, DC supply voltage readout (important when running off a battery or solar system), ambient temperature display at board level, and Optional RS-485 Pelco D decoding.

The JPTH-13MPoE controls the P/T travel limits to prevent running beyond those points where mechanical travel must be prevented. Setting maximum and minimum travel limits for a P/T head is easily accomplished during the calibration (completed at factory) procedure in Open-Loop mode.

Further, when working with high magnification power zoom lenses such as a 320mm telephoto lens, very small P/T adjustments can be made using a unique "Jog" control. The Jog function results in an approximate 0.10 deg step movement.

Built in is a special impulse response function that allows tuning of the PID loop when non-standard mechanical loads are mounted. Using Microsoft's Excel spreadsheet, it is possible to plot the response of the PID loop to minimize overshoot and undershoot responses.

Seventeen user-defined settings, or “Presets” are available. Any of these Presets may be given a descriptive name and be included in an automated Patrol function with adjustable dwell times for each Preset in the Patrol program.

The JPTH-13MPoE Optionally accepts a general set of Pelco D commands to its RS-485 serial interface. This allows the controller to be controlled using a physical joystick, video server or IP camera that outputs RS 485 serial Pelco D protocol.

A special MiniPage control interface has been designed for easy integration with some video management software. The MiniPage contains a small version of the main joystick control panel as well as a compact “GoTo” Preset panel. These two panels can be displayed side by side, but can also be re sized to display one on top of the other if need be. The MiniPage also allows an easy way to update P/T coordinates for a highlighted Preset position, rename presets, create presets, and delete presets. It also displays the IP address and Host name of the controller, and features a Motion Hold function to suspend DC servo system operation in high wind environments.

The JPTH-13MPoE controller provides 2 PWM motor outputs when powered from a PoE or PoE+ Ethernet switch or PoE injector making this system ideal for both mobile and remote solar powered applications. It also provides real-time feedback of battery voltage.

The JPTH-13MPoE has been shipped with the DC servo control system pre-calibrated and set to its Closed-Loop mode; ready to operate.

The JPTH-13MPoE will function in both open and closed loop mode, but certain features only operate in the closed loop mode. Open Loop can result in physical damage to the P/T head as all soft travel limits are disabled - **CAUTION - DO NOT operate in Open Loop**

The JPTH-13MPoE has been designed to use both feedback from PWM Encoders (Std) and potentiometers (Opt). You can select either Analog Potentiometers or PWM Output Encoders on the I/O Config page. At the time of this manual, the JPTH-13MPoE can be special ordered with potentiometers which offers less resolution than the PWM Encoders.

Finally, the JPTH-13MPoE is completely Web browser based, allowing easy setup and configuration from a variety of standard web browsers. It requires no software plug-ins and uses advanced Ajax web interface programming so that no drivers are required on your computer for use. It has been tested with IE and Firefox.

NEW FUNCTION: As of Ver 1.22.hex firmware release, the JPTH-13MPoE controller now features a new Auto-Hold function. Auto-Hold is designed to provide rock-solid positioning and prevent any and all servo-loop jitter or hunting.

Once a Preset position or joystick command has reached the final (X,Y) position based upon servo loop feedback, the servo loop is disengaged and will hold the P/T head in a dynamic motor braked condition. This condition will be held until a new Preset is called, a new joystick position is commanded, or a gust of wind attempts to move the P/T head in its Pan axis. Once one of these commands or offsets is encountered, the servo loop automatically comes back into action and takes control of the P/T head.

1.2 - Unpacking & Handling

The JPTH-13MPoE system has been carefully packaged to provide protection during shipment. We suggest that you keep this packaging in the event that factory warranty service is ever required.

Please inspect and note the condition of the shipping containers before opening them. Punctures, tears, and crushed ends are indications of abusive treatment by the shipping carrier and should be photographed and reported to the carrier in the event any damage is found inside so a claim can be filed.

Record the JPTH-13MPoE's S/N and Date here: _____

1.3 - System Components

Your JPTH-13MPoE P/T system is shipped with the following items:

Standard Items

Qty 1 - JPTH-13MPoE P/T Control System (P/T Head with 7ft CAT5 cable)

Qty 1 - In-Line Waterproof RJ45 Coupler (black)

Optional RS-485 Serial Interface Items

Qty 1 - In-Line Waterproof Serial Cable Coupler (black)

1.4 - Before You Start

A successful installation can be expected if you carefully read the balance of this manual. The JPTH-13MPoE board is equipped with ESD protection devices, but it is still recommended that you follow accepted practices to prevent electrostatic discharge from your body to the end of the cable protruding from the JPTH-13MPoE.

Electrostatic discharge (ESD) can damage components on the internal PCB (printed circuit board) which will function for a while and fail at a later date. ESD damage is not covered under the warranty.

CAUTION

Always exercise extreme caution when working near power lines or live circuits to ensure that you, your ladder or other equipment does NOT come in contact with the power lines. Fatal shocks can occur.

2.0- POWERING THE P/T HEAD

The JPTH-13MPoE P/T head is designed to operate from any IEEE 802.3af/at compliant device such as a PoE Ethernet switch or DC to PoE injector.

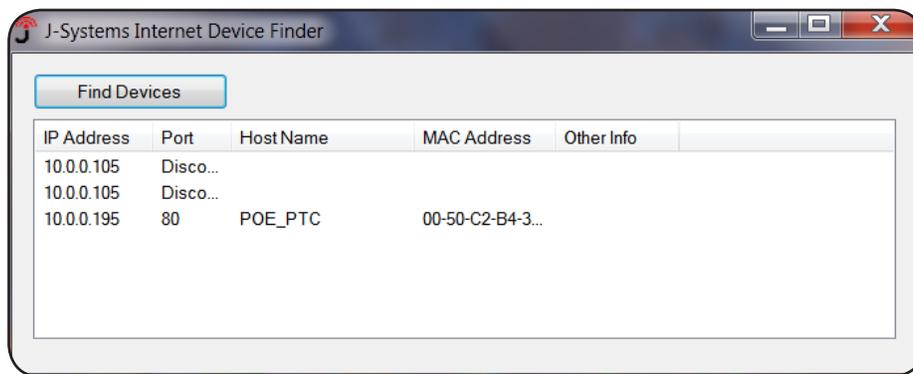
There is no other way to power this P/T head. In the event you do not have a PoE power source, you can call and we can assist you.

3.0 - CONFIGURATION

The JPTH-13MPoE controller board is shipped with DHCP turned on.

Once the JPTH-13MPoE is connected to a PoE switch, it will be necessary to execute the J-Systems Device Finder.exe (located on the USB thumb drive) on your local computer to find the JPTH-13MPoE's IP address as shown below. You can also just enter its Host name in the address bar without knowing its IP address: http://POE_PTC.

If your network has a router or server that automatically assigns IP addresses (DHCP), the device finder software will find and display the JPTH-13MPoE's IP address as shown below. In this example, the IP address of the controller turned out to be 10.0.0.195. The MAC address is also displayed along with the Host Name of POE_PTC.

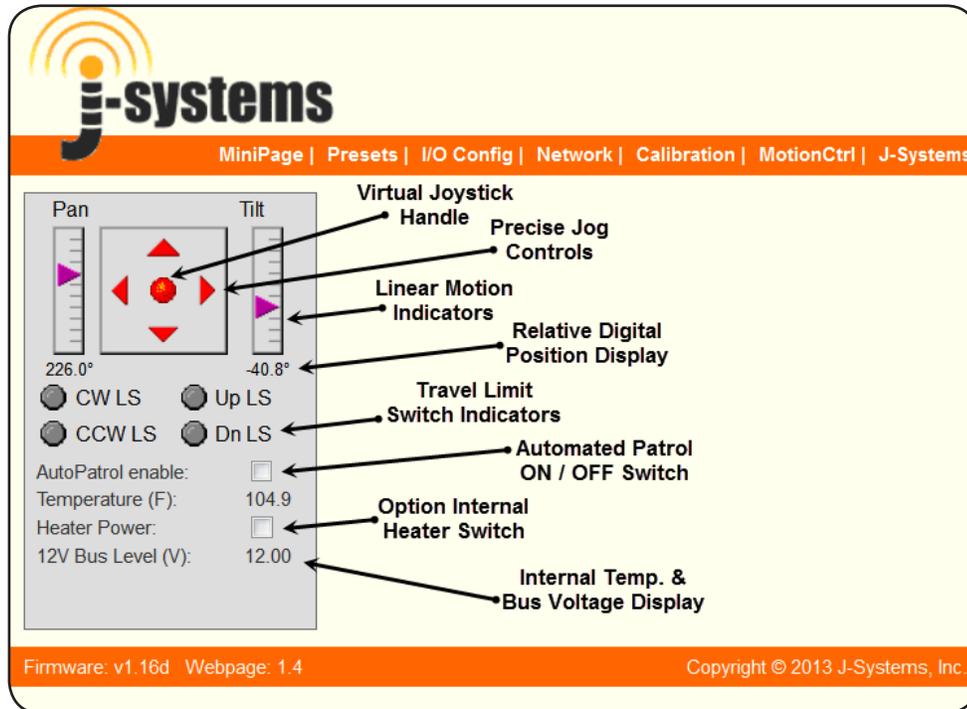


In the case where no DHCP server is present, the JPTH-13MPoE will automatically assign itself a "zero config" IP address which starts with 169.254.XXX.YYY. The device finder software will also find this address and display it.

You can then temporarily assign your computer to a similar network address such as 169.254.100.100 and a sub net mask of 255.255.0.0 . This will allow you gain access to the JPTH-13MPoE's web interface and change it's IP address to one that works on your network (please refer to the 4.0 Operation section on how to set the JPTH-13MPoE's IP address). Then, of course, set your computer back to it's normal IP address or DHCP.

4.0 - OPERATION

To gain access to the JPTH-13MPoE's web interface, simply enter the IP address for the controller into a Web browser such as <http://10.0.0.195>. Once you do this, the screen shown below will be displayed. (IE 9 or Firefox v26 or better)



Please note that the CW LS, CCW LS, UP LS, and Dn LS no longer function as physical limit switches have been removed from the JPTH-13MPoE unit.

The following is an overview of the user interface to gain an understanding of all the controls, how they operate, and menu selections that are available.

The top menu bar displays the following:

MiniPage: MiniPage is a compact version of the above virtual joystick interface with a list of 'clickable' Presets. For the MiniPage to work, the PID servo loop must be in the Closed-Loop mode. This compact interface is ideal for integration into VMS software applications. The MiniPage displays the controller's IP address, the Host name of the controller, and the remaining dwell time before proceeding to the next Preset when in Auto Patrol mode. It also allows Presets to be added and coordinates to be updated easily and features a Motion Hold function to prevent servo loop hunting in high winds. Clicking any Preset results in the JPTH-13MPoE going to that Preset position.

Presets: Used to define Preset positions for pan and tilt. It also allows any Preset to be included in an automated Patrol function and then define the Dwell time in seconds (the amount of time to stay at a preset location).

I/O Config Used to set parameters for the RS-485 interface. The Optional heater set point is defined in Degrees F (at what temp the heaters turn on) and the type of feedback your pan-tilt head utilizes; Analog Potentiometer or PWM Output Encoders. You can also select the Motor Current Limit which allows you to select either PoE or PoE+ power. Default User Name & Password are “ **admin** ”.

Network: Where all network settings are made and DHCP is turned on or off. The Admin Password can also be changed on this page. The Host Name may be used to identify a particular camera / view by name. The host name displays on the MiniPage along with the IP address of the controller. Default User Name & Password are “ **admin** ”.

Calibration: Sets the soft travel limits for the pan and tilt axes. Allows selecting between Open-Loop, or PID Closed-Loop motion control modes. Open-Loop is necessary when calibrating a new P/T head.

Also contains the Factory Default reset function. As a note, the P/T head uses limit switches so these can be set to provide travel limits. Default User Name & Password are “ **admin** ”.

Motion Ctrl: This advanced control page provides access to critical PID tuning parameters. **Appendix A describes how tune the PID algorithm.** Also allows an axis feedback potentiometer polarity to be reversed or Closed Loop mode to be enabled or disabled by axis. Default User Name & Password are “ **admin** ”.

J-Systems: An active link to the J-Systems web site for Support and Contact info.

The main Web interface control panel is the heart of the JPTH-13MPoE P/T head The following provides an overview of all these functions:

Pan-Tilt: The red ball in the center of the up-down-left-right red arrows is the joystick used to control motion. The red arrows are “Jog” controls which allow approximately 0.35 degs of movement when clicked. The linear pointer indicators on each side provide both a visual readout of movement as well as relative digital degree readings.

Limit Switch: The CW LS, CCW LS, Up LS, and Dn LS indicators only glow Green when the P/H head’s user adjustable limit switches are actuated. After calibration, these indicators should never light up.
NO LONGER FUNCTION - These switches can be ordered as an option

Auto Patrol: Clicking the check box turns Auto Patrol on and off (must be in Closed-Loop mode for this to work)

Temperature: Displays the ambient temperature approximately 1/2” above the (Degs F) controller PCB inside the P/T head. Accuracy +/- 3 degs

Heater Power: Turns Optional motor heater power on and off. The heaters are used to used to heat the DC motors inside. The heaters only turn on if the temperature is below the set point temperature defined on the I/O Config page.

12 Bus Level (V): Displays the value of the 12VDC supply voltage to the controller. Accuracy +/- 50mV. In general, since this voltage is derived from the PoE switch powering the P/T head, it should always be very close to 12VDC.

4.1 Control Panel Operation

The Control Panel on the main web interface page is the heart of the system. It was designed to be your primary interface with the P/T head, as well as other control functions and displays. Note that the MiniPage can serve as a control interface as well.

The following will provide more in-depth information about how to best use the virtual joystick, jog controls, and other features of the control panel.

Virtual JoyStick and Proportional PWM Control - this is a new type of joystick where you grab hold of the red joystick ball by clicking and holding down your left mouse button while over the red ball. You then drag the red ball with your mouse. Left and right controls Pan left and right, up and down controls Tilt up and down (diagonal movements work as well).

Pan and tilt speeds are directly related to the distance you move the red ball from it's center location. The further the red ball is moved away from center, the faster will be the motor speed. The linear pointer indicators will track your actions and also display the relative degree positions for both axes.

One way to operate the joystick is to move the red ball, watch the video from the camera and then simply release the red ball allowing it to re-center itself. This is not the intended way the joystick was designed to be used, but will work in this manner. This type of operation is analogous to driving a car 60 mph and then simply taking your foot off the gas pedal in hopes that it will stop right now - obviously the car doesn't stop on a dime.

A better way to operate. Instead of releasing the red ball to re-center itself, the ideal way to provide smooth, accurate control is to move the ball back to it's center position and gradually slow the axis movement until you have achieved the view you want. This is analogous to taking your foot off the gas pedal and then slowly applying some brake.

The red arrows around the joystick area are "Jog" controls and allow slight pan and tilt adjustment to be made when clicked with your mouse. Please note that the Jog functions only work when the controller is in the Closed-Loop mode. This movement for the P/T head amounts to approximately 0.35 degs with Analog potentiometers in the P/T Head. The Jog functions are particularly useful when using a large power zoom lens.

You will find exceptional slow speed control with this new joystick controller.

The virtual joystick will take some practice to get used to, but once you start to get the feel of it, you will find that it works exceedingly well. It is normal for some DC servo loop hunting to be observed during the first 3-4 seconds after moving to a new position. This is the settling time and is to be expected. It is the time that the PID loop error is moving to zero.

DC Servo Closed Loop Control System - This controller operates as a closed loop DC servo system offering precise control and Preset repeatability. If the camera head should happen to move due to high wind or jarring, the closed loop servo system will immediately return the pan-tilt head to its previous position.

Open Loop Control System - In the open loop mode, when the joystick is centered, the motor outputs are essentially shorted to each other resulting in a regenerative brake being applied. Once the joystick is moved, this short is immediately removed and the P/T head will start to move until the joystick is centered again.

Auto Patrol - This On-Off feature controls the automated Patrol function which will scan through a pre-determined list of pan tilt Presets. While a Patrol is in progress, you may still use the virtual joystick to move the P/T head, but as soon as the dwell time for that Preset has expired, the automated Patrol will automatically take control and proceed to move to the next Preset Position.

12V Bus Level - This display shows the 12VDC bus voltage accurate to +/- 0.050V. The range of this display is 8.00 to 15.00 volts.

Temperature - A thermistor temperature sensor is located approximately 1/2" above the PCB. It can be used to judge ambient temperature around the PCB and has a range of -40 to +200F with an accuracy of +/- 3degs.

4.2 MiniPage

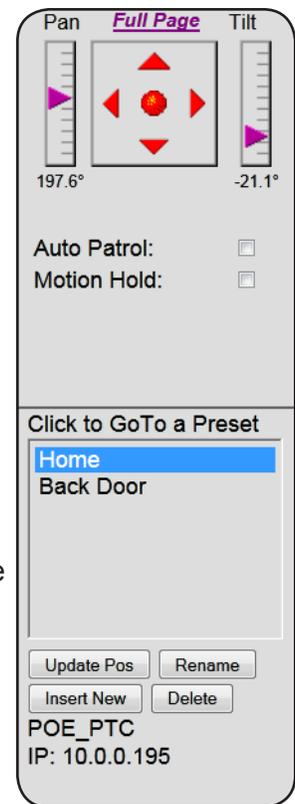
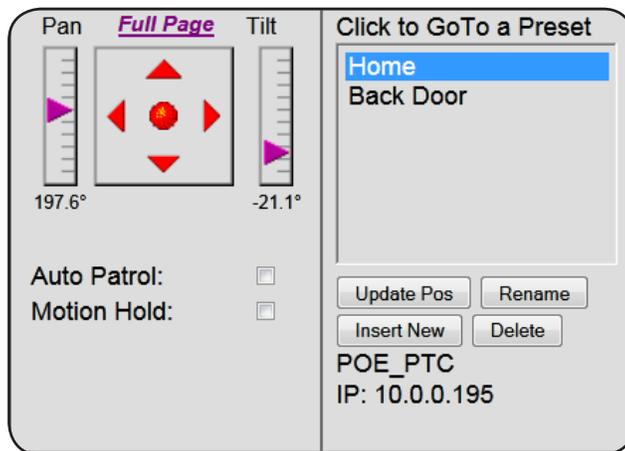
The MiniPage is a compact presentation of both the joystick control panel and the Preset page in a side-by-side or one on top of another layout. It was designed for easy integration of the controller's interface into VMS recording software applications such as Bosch VMS Video Client and Milestone's Smart Client. The MiniPage replaces the main controller page.

Simply clicking on a Preset name will cause the controller to move to that Preset location. You may also turn Auto Patrol On or Off from the MiniPage. When you click "Full Page", the MiniPage will close and be replaced by the normal main control panel. Also displayed is the Host Name (in this example it is POE_PTC) and the controller's IP address. When in Auto Patrol, the dwell time countdown is displayed below the IP address. This is the time left before Auto Patrol advances to the next Preset position.

You may modify a Preset by adjusting pan and tilt settings and then click the Update Pos button to establish these new preset values. Further, with any Preset highlighted, you may create a new preset by first adjusting pan and tilt and then click Insert New - you will be asked to provide a new preset name. You may also highlight a preset and click Rename to change that preset's name. A highlighted preset can be deleted by clicking the Delete button.

If you re size the browser window to make it more narrow, the "GoTo" Preset panel will slip down and beneath the control panel.

Please note that the MiniPage menu tab will not function when the PWM controller is in Open-Loop servo mode (go to Calibration page to select Closed-Loop).



Special Note About Motion Hold

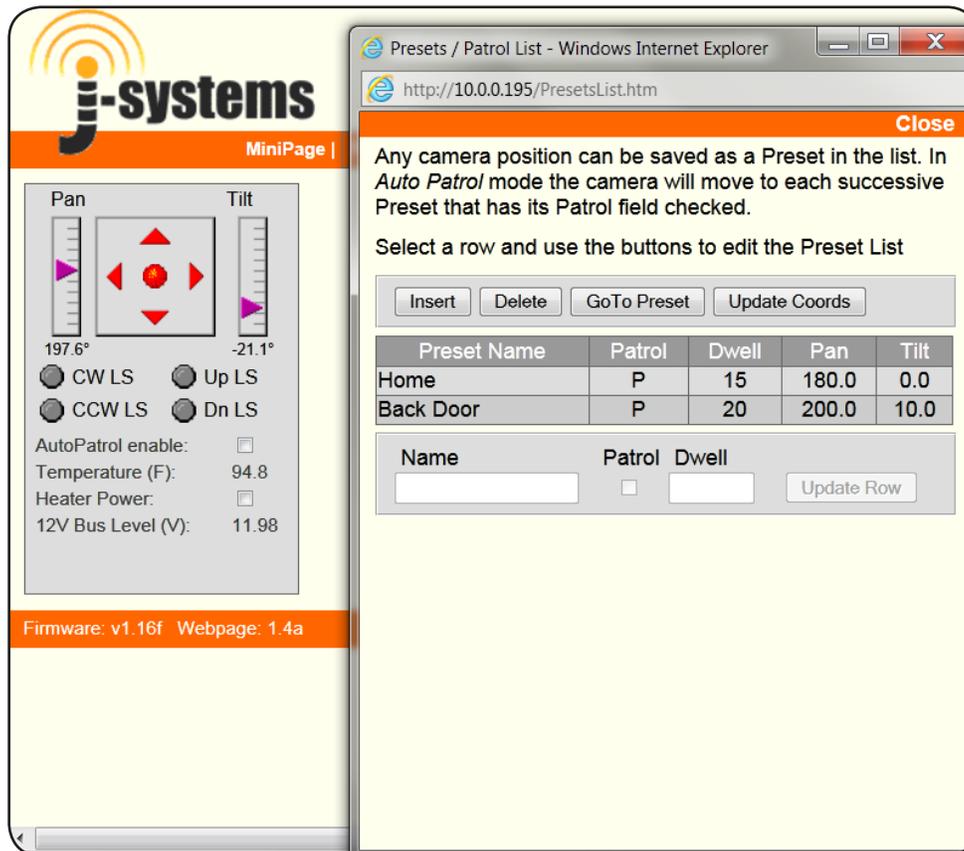
The Motion Hold function has been provided as a way of shutting off the Servo System when operating in a gusty / high wind environment. This stops the closed loop DC servo system from "hunting".

When Motion Hold is activated, "Full Page" is dimmed out and you cannot leave the MiniPage without turning Motion Hold off.

Motion Hold is dangerous as all soft travel limits have been disabled which could damage the P/T head if it travels too far and hits a physical object.

4.3 Presets

The Preset screen is displayed as a new popup browser window as shown below.



The Preset List is used to define up to 17 preset positions for pan and tilt. Each preset can bear a user defined name up to 15 characters.

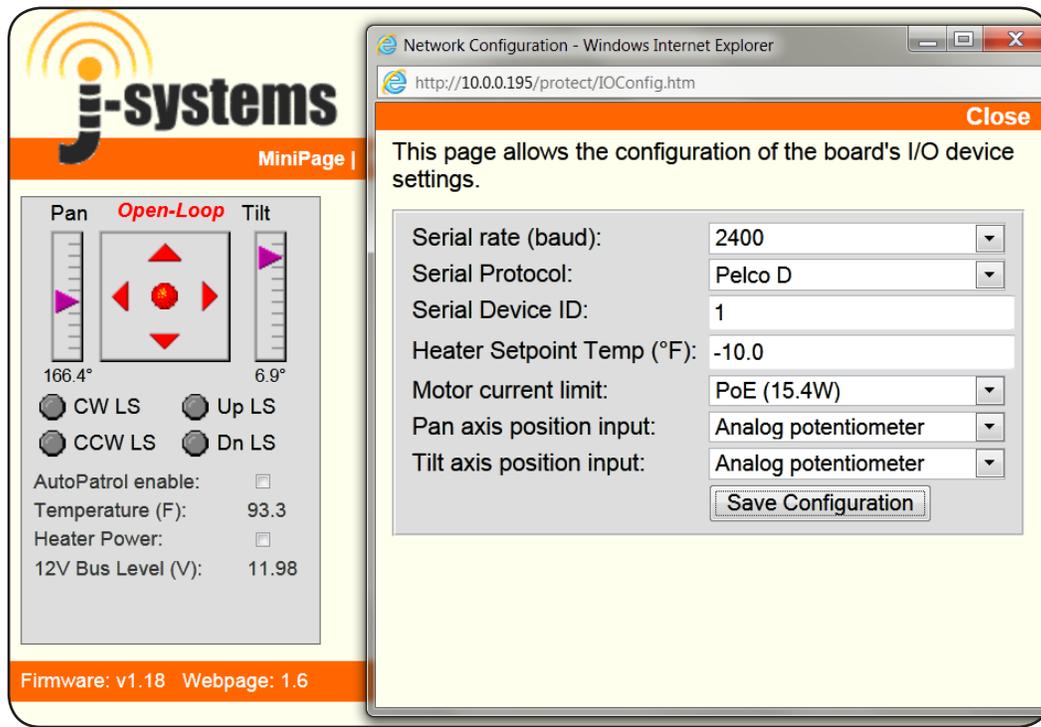
A preset is established by moving the P/T head for the desired view. Once this is done, click Insert to add a new preset. Highlight the new preset with your mouse so the background color is Yellow. Next click Update Coords. Lastly, enter a Preset Name and then click on Update Row to save that setting.

If you wish to include this preset position in the automated Patrol, again highlight that preset and click the check box under Patrol. You will also want to enter the number of seconds of dwell time. This is the time that the Patrol will stay at this preset position before moving on to the next preset position.

At any time, while a Patrol is not running, you can highlight a preset position and click GoTo Preset to cause the pan-tilt head and power zoom lens to go to that position.

4.4 I/O Config

The I/O Config screen is displayed as a new popup browser window as shown below.



Please note that the default and only serial input is RS-485.

The Serial rate (baud) drop down box allows you to select 2400, 4800 or 9600 Baud.

At the present time, the only Protocol available is Pelco D. The basic commands supported are as follows:

- Pan
- Tilt
- Presets (Set and GoTo presets)

Set the Device ID as required. Default is 01

The Pan and Tilt axis Position Inputs allow you to select either Analog Potentiometers or PWM-Output Encoders as the position feedback source.

The Default is PWM-Output Encoders

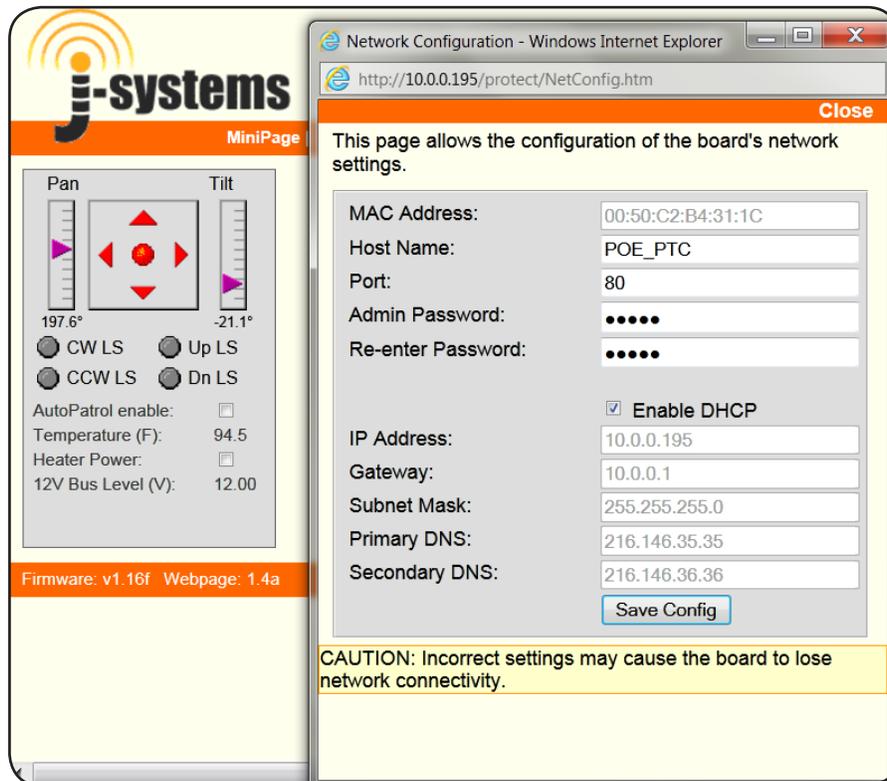
The Heater Setpoint Temp is the temperature that the optional heaters will turn on.

Remember that this is the temperature approximately 1/2 inch from the surface of the control board inside the P/T head.

The Motor Current Limit allows you to select either a PoE or PoE+ source. PoE refers to a low power PoE device that can deliver 15.4W and the PoE+ refers to a high power PoE device that can deliver 25.5W. For the JPTH-13M P/T head, you should select PoE 15.4W.

4.5 Network

The Network screen is displayed in a new popup browser window as shown below when the Network menu tab is clicked.



The Network page is used to make all needed network adjustments or simply leave it in DHCP mode. A Username and Password are required to access this page (default is admin, admin). You may change only the Password.

The top line displays the unique MAC address for the controller; you cannot edit this.

The default Host Name is POE_PTC and can be changed if necessary. It displays on Mini-Page. When you save a new Host Name, the controller will reboot.

You may also assign a new Admin Password if you like. Please be sure to record this Password in a safe place for later recall. The only way to recover a lost password is to perform a hard reset on the controller hardware.

If you are using DHCP then the Enable DHCP check box should be checked (default setting). On the other hand, if you plan to utilize a static IP address you will want to uncheck this box and enter your own static IP Address, Gateway, Subnet Mask, Primary DNS and Secondary DNS settings.

Then save your settings by clicking Save Config. Once this happens, the controller will validate the data, store it into EEPROM, and perform a self-reset after displaying the following Reboot web page.

The image shows a screenshot of a web browser window displaying a 'Reboot In Progress...' message. The browser's address bar shows the URL http://10.0.0.195/protect/reboot.htm?POE_PTC. The page content includes a status message, a location link, and a list of reconnection instructions.

Reboot In Progress...

Your settings were successfully saved, and the board is now rebooting to configure itself with the new settings.

Your board is now located at: http://POE_PTC/

Reconnection Instructions

- Did you change the hostname, IP or MAC address?**
It is necessary to clear the address caches in your web browser and OS. From the command prompt in Windows, enter "nbtstat -R" to clear the hostname cache, close your current web browser, open a new web browser, and then try to access the web address above.
- Did you try the IP address?**
Try accessing the board directly at the IP address shown using the 'Find PWM_Controller' application. If this fails, then the IP address you set is not reachable. Try the step below.
- Still not working?**
You can restore compile-time settings by clearing the board's EEPROM. Short the two pins on the thermistor connector, Rt1 while powering-up the board.

MiniPage

Pan: 197.6° Tilt: -21.1°

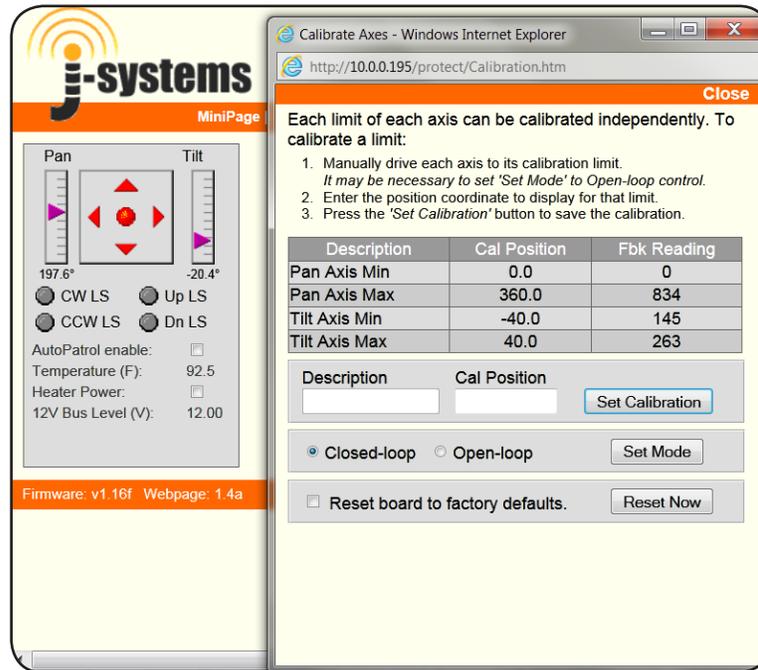
CW LS Up LS
 CCW LS Dn LS

AutoPatrol enable:
Temperature (F): 93.0
Heater Power:
12V Bus Level (V): 11.98

Firmware: v1.16f Webpage: 1.4a

4.6 Calibration

The Calibration screen is displayed in a new popup browser window as shown below.



The Calibration page is used to make all needed motion soft limit adjustments (pan and tilt). A Username and Password are required to access this page (default is admin, admin).

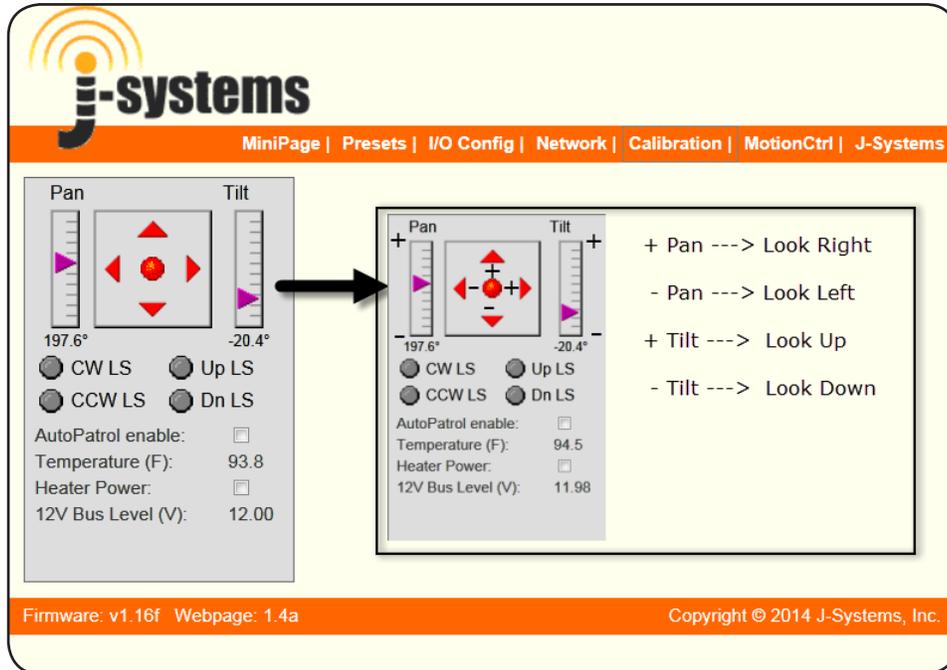
0 and 4096 for Fbk Readings represent the absolute limits of travel. Your system will probably not display 0 or 4096, but rather something like 60 and 3900.

If you need to re-calibrate the JPTH-13MPoE P/T head, please contact the factory for assistance.

NEVER OPERATE THE JPTH-13MPOE IN IT'S OPEN LOOP MODE!

Calibration:

When you receive the JPTH-13MPoE , it will be setup to function as shown below. For example, when you drag the Red Ball to the right, the P/T head should turn right as viewed from a camera's perspective. In a similar manner, when the Red Ball is moved up, the P/T head will tilt up.



The JPTH-13MPoE has been factory calibrated. If you need to re-calibrate the unit, please contact the factory for assistance.

In general, the following chart defines which direction of movement applies to which Description in the above chart: (+) and (-) signs refer to the previous page which defines what is (+) and what is (-).

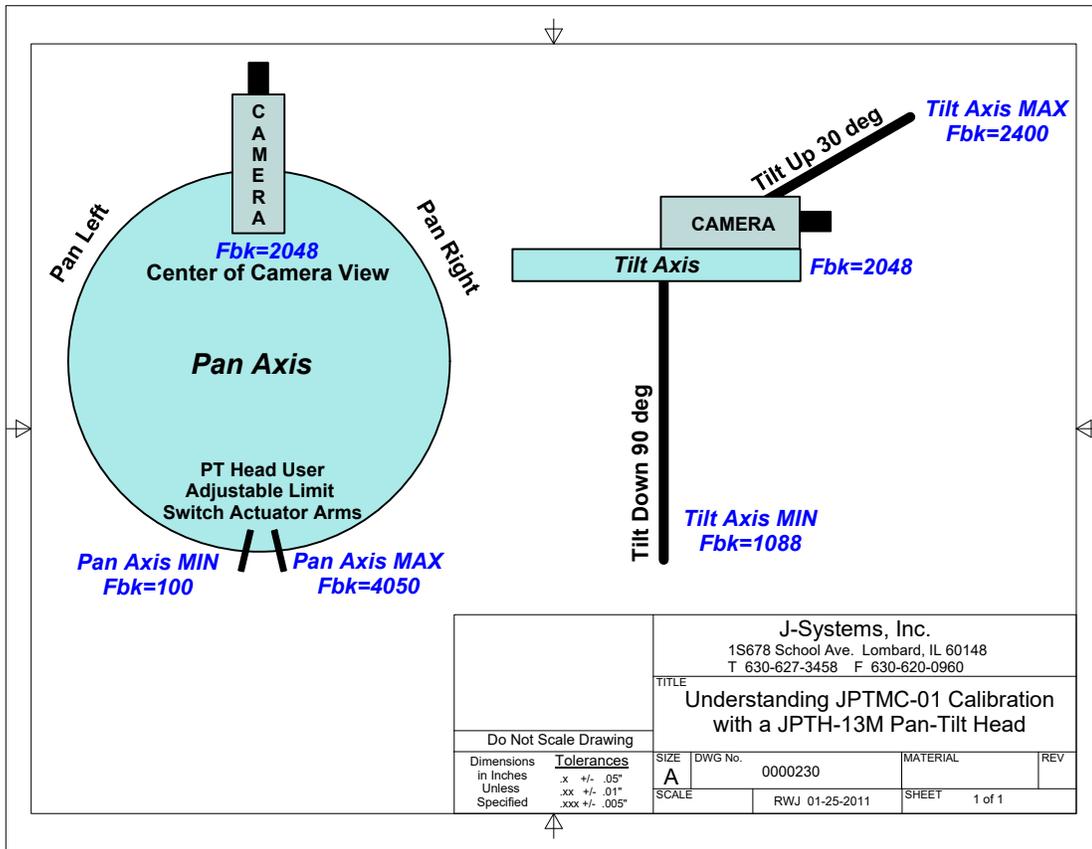
Pan Right (+) relates to Pan Axis Max Fbk Reading 358 deg will yield approx. ~4063 Fbk

Pan Left (-) relates to Pan Axis Min Fbk Reading 2 degs will yield approx. ~64 Fbk

Tilt Up (+) relates to Tilt Axis Max Fbk Reading 30 degs will yield approx. ~2300 Fbk

Tilt Down (-) relates to Tilt Axis Min Fbk Reading -90 degs will yield approx. ~1078 Fbk

(Drawing 0000230 on the next page will help to explain the calibration scheme in a more visual format).

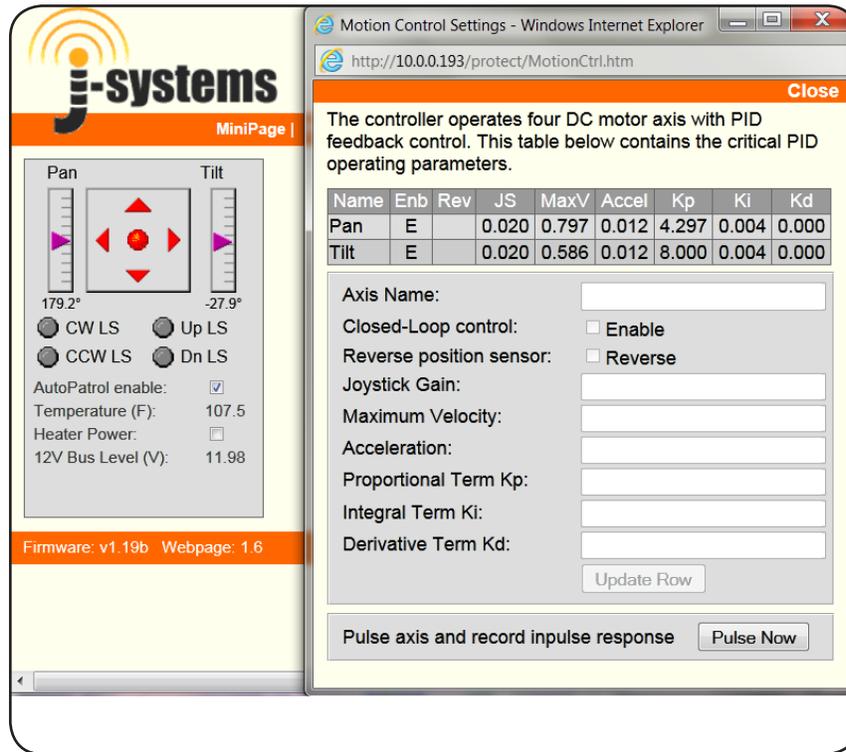


Please note that the Fbk Reading shown on this drawing are approximate.

Warning:
The reset option resets Calibration, Preset List, Motion Ctrl, and Control Panel functions that have already been set. It does NOT alter the settings on the Network page.

4.7 Motion Ctrl

The Motion Ctrl screen is displayed in a new popup browser window as shown below.



This page has not been designed for the casual user. It controls the PID (proportional, integral, derivative) terms along with other variables that control the overall functionality of the controller and P/T head. This has been pre-adjusted at the factory so you should not have to make any adjustments. The values shown are factory default.

This page also features a PID tuning aid that provides axis impulse response data which can then be plotted in Microsoft's Excel to show the overshoot / dampening for each axis. Please refer to Appendix A on how to use the PID tuning aid.

The Reverse Position Sensor check box is used to reverse the polarity of the feedback position sensor.

4.5 - J-Systems

The J-Systems menu item will take you to the J-Systems web site.

5.0 - Firmware Updates

From time to time, firmware updates will be made available. Applying these updates to your JPTH-13MPoE P/T system is relatively easy as shown below.

The first step is to take the Controller_vX.XX.hex file and MPFSImg2_vX.xx.bin file that you received or downloaded from the J-Systems web site and load that into a specific directory on your local computer (in this example we will store the files in c:\JPTH-13MPoE)

Updating the .HEX file

To up date the controller's Controller_vX.XX.hex file is relatively easy. If the controller is remote across the Internet your local computer must be connected to the Internet.

First open a command prompt window on your computer. Change disk (cd) to the directory where the two files are stored.

Example: cd c:\JPTH-13MPoE and depress <Enter>

Next, you will enter a line of code to send the updated file to the PWM controller.

Enter - " tftp xxx.xxx.xxx.xxx put Controller_vX.XX.hex " (where xxx.xxx.xxx.xxx is the IP address of the PWM controller) and depress <Enter>. The tftp protocol must be turned on in your computer for this to work. tftp stands for Trivial File Transfer Protocol and is available on all Window OS based machines. Once the process finishes, you will see a message indicating a successful transfer has taken place.

Updating the .BIN file

The next step is to update the MPFSImg2_vX.XX.BIN file on the controller. This is easier and very straight forward.

Simply enter " http://xxx.xxx.xxx.xxx/mpfsupload into a browser window while you are connected to the internet (where xxx.xxx.xxx.xxx is the IP address of the PWM controller) and depress <Enter>. A window will open prompting you to Browse to the MPFSImg2_vX.XX.bin file located on your computer.

Next, depress the Upload button. Once completed you will be informed of the success. You can click on the link to return to the main Control Panel page.

That completes the firmware update process.

6.0 TECHNICAL SUPPORT

Technical support is available for no charge during normal business hours.

Business Hours:

Monday - Friday 8:30AM to 5:00PM CST

Contact Information:

Tele: 630-627-3458

Fax: 630-620-0960

E-Mail: info@J-Systems.com

7.0 SUPPORT INFORMATION

7.1 Warranty Policy

The JPTH-13MPoE Controller carries a 1-year manufacturer's warranty. This warranty applies to failure of the product under normal operating conditions. Situations that are not covered by this warranty include, but are not limited to the following abnormal stresses:

- Lightning Strikes
- ESD (electrostatic discharge damage)
- Damage Due to Bullets or Other Projectiles
- Cable Damage Due to Animals
- Applied Voltage Greater Than Allowable Limits
- Overloading Electronic Components
- Attempted Repair By An Unauthorized Individual

Any other damage that in J-Systems, Inc.'s opinion have been caused as a result of abnormal or abusive use will also void the warranty.

To return a unit for repair, an RMA (Return Material Authorization) must be obtained prior to sending the unit back. Units received without a prior RMA being issued will be returned to the sender unopened.

When returning a unit for warranty or out of warranty repair, the cost of shipping back to the factory will be borne by the customer. Warranty repaired items will be returned to the customer postage free.

Call 630-627-3458 during normal business hours or e-mail info@J-Systems.com to obtain an RMA.

7.2 Specifications

The following are general specifications for the JPTH-13MPoE PWM P/T Head. These specifications are subject to change at any time.

Operating Voltage:	802.3af/at Compliant PoE or PoE+ power source
Operating Temperature:	-30C to +70C (-22F to 158F)
Power Consumption:	3 watts maximum when running both motors
Automatic Torque Limiting:	Dynamic torque limiting is firmware controlled
Control System:	Closed-Loop PID Controlled DC Servo w/ Virtual Joystick
Calibration Mode:	Open-Loop Servo System For Limit Calibration
Motor Control	2-Channels of Proportional PWM Speed Control (with soft start and stop - uses Trapezoidal Motion Profile)
Positional Accuracy:	+/- 0.35 deg
Position Indicators:	Linear Pointers with Digital Deg and % Displays
Jog Control:	Approx. 0.35 deg Movement for Pan, and Tilt
12VDC Bus DVM	Displays Voltage of Internal 12VDC Bus (Accuracy +/- .05V or 1%)
Temperature Readout:	Displays Temperature at PCB Level (Accuracy +/- 3 degs F)
Preset Positions:	Up to 17 Preset Position with User Defined Names (Stores pan, tilt)
Patrol Function:	Automated Patrol Function with Adjustable Dwell Times (1 sec. to 65,536 sec. max)
PID Tuning Aid	Built In (Excel spreadsheet needed to plot data - not included)
Connectors:	Male RJ45 into in-line waterproof connector
ESD Protection:	Every I/O Pin Protected
RS-485:	Built In Pelco D Protocol Translator.

The basic commands decoded and supported are as follows:

Pan

Tilt

Presets (Set and GoTo presets)

MiniPage:	Easy integration in Bosch VMS or Milestone's Smart Client and other video recording software applications.
Height:	5.800 in
Width:	6.210 in
Depth:	5.08 in with fitting
Materials:	Machined Alum w/ stainless steel fasteners, Anodized Alum Mounting Ring, Ball Bearings on Major Axes
Paint:	Powder Coat (Similar to RAL 9018)
Weight:	5 lbs
Braking:	Regenerative
Feedback:	Precision PWM Encoders
Speed:	Pan Approx. 28 degs/sec Tilt Approx 8 degs/sec
Capacity:	13 lbs max. at 6 inches above the center line of the tilt axis
Rotational Limits:	Pan 0-350 degs, Tilt -90 deg Down and +30 deg Up
Backlash:	Less than approx 0.15 deg
Maintenance:	None
Weatherproofing:	IP 68
Warranty:	1 Year (depot only)

APPENDIX A USING THE PID TUNING AID

A unique PID tuning aid has been built into the JPTH-13MPoE controller to allow easy tuning of the PID servo loop based upon your pan-tilt head, power zoom lens and the mechanical load mounted to the pan-tilt head.

First, it is important to understand what the various parameters on the MotionCtrl web page are all about.

Name	Enb	Rev	JS	MaxV	Accel	Kp	Ki	Kd
Pan	E		0.020	0.797	0.012	4.297	0.004	0.000
Tilt	E		0.020	0.586	0.012	8.000	0.004	0.000

Closed Loop Control: Allows for each axis to be included or excluded from the Closed Loop system. Necessary when using Preset Triggers. If no power zoom lens is present, the Zoom and Focus must be excluded from the Closed Loop system or the trigger will not work.

Rev: (Reverse) For those instances where, say, the Pan and Tilt potentiometers are wired with common +V and Gnd connections, and the wiper voltage on one of them moves opposite of the physical motion – then the Reverse box is checked to make the controller read the potentiometer wiper as if the wiper voltage moved correctly with the physical motion.

JS: (Joystick Gain) Scale factor for converting the virtual joystick position into motor speed control. A good rule of thumb for adjusting this value is to start at zero and keep increasing this value until the speed of the axis no longer increases with increasing values of JS. At that point the joystick control will be saturated. Then adjust the value of JS down to somewhat below the value where it saturates, or at the maximum speed desired for the axis – whichever is lower.

MaxV: (Maximum Velocity) This works somewhat like the Joystick Gain, except it applies to automatic movement such as 'GoTo Preset' instead of the joystick.

Accel: (Acceleration) During an automatic movement such as a 'GoTo Preset', this factor limits the rate at which velocity increases/decreases. This controller utilizes a proprietary Trapezoidal Motion Control algorithm.

PID constants – During calibration the potentiometers are read at known positions to establish the relationship between wiper voltage and user coordinates in space. In order to make the camera point at any one of the preset coordinates defined in the Presets page the motion control algorithm first measures the difference between the current position and the desired position and then applies the Kp, Ki, and Kd constants to determine what motor command voltage will bring the camera to the desired position as quickly as possible without “overshooting”, or going past the desired point and having to backup. Adjusting the Kp, Ki, and Kd parameters of a PID controller for optimum performance is referred to as “tuning”. Tuning a PID controller can be a complex process and is often left up to experts to perform.

If the PID parameters: Kp, Ki, & Kd are set incorrectly the motors can become unstable with the results that the camera can eventually be shaken apart or the motors and gears can wear out prematurely. If in doubt it is best to have the PID tuning performed at the factory.

An 'oscilloscope' feature has been built into the controller to measure the systems response to an impulse movement and then download the data so it can be plotted by a suitable program such as Microsoft Excel.

Kp: (PID Proportional Constant) The 'Error' is defined as the difference between the actual position of the potentiometers and what they would be when the camera is pointing directly at the desired Preset coordinates. The Kp parameter creates a motor voltage directly proportional to this error so that when the error is large a large voltage is applied to the motor to make it move quickly. As the camera moves toward the desired position the error becomes smaller and the voltage to the motor is decreased to keep it from overshooting the target. The Kp term is the single most important value for tuning the PID controller.

Ki: (PID Integral Constant) A controller using only the Kp term will quickly move towards zero error, but will often have trouble staying at zero because it takes a significant amount of error to create a significant amount of motor power. The Ki term causes the motor voltage to increase if there is even a small error *if that error persists for a significant amount of time*. Usually a small amount of Ki will help the controller to achieve final position more quickly and stay there more accurately.

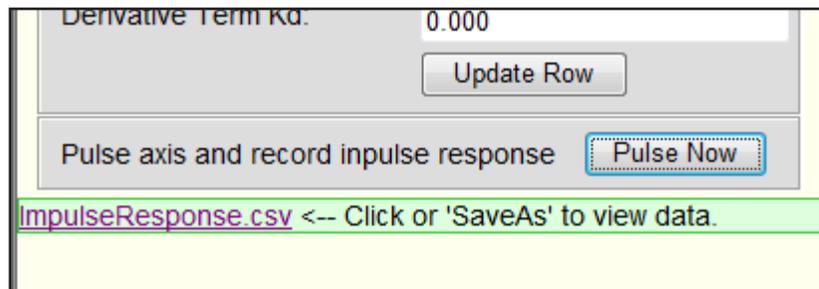
Kd: (PID Derivative Constant) The Kd term is for systems with almost no friction such that the controller has to actively reverse the motor power to keep from overshooting the target position. Almost all PTZ systems have enough gearing and friction to make this term unnecessary. It should be left at zero.

On the next page, we will show how to use the built in impulse tuning response aid and plot that data using Microsoft's Excel spreadsheet. PID tuning should be done with the full mechanical load that the pan-tilt head will carry mounted to the head.

PID tuning must of course only be done when the controller is in its Closed-Loop mode. Each axis will be tuned individually.

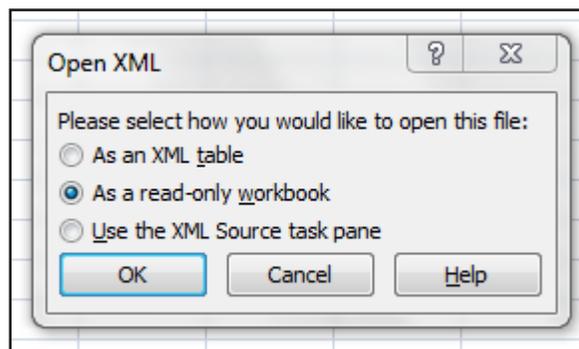
The following steps will guide you through the tuning process for the Pan axis of a JPTH-13M pan-tilt head. These steps will need to be repeated for all other axes.

1. While on the MotionCtrl page, select the Pan axis. The selected axis will be highlighted in yellow. Again, the PWM controller must be in the Closed-Loop mode (this can be checked on the Calibration page).
2. Click the “Pulse Now” button at the bottom of the MotionCtrl page. You will hear the pan-tilt head pan for a few seconds and stop. When the pan axis stops, the following message will appear at the bottom of the MotionCtrl page.



Right click your mouse over the ImpulseResponse.csv and select “Save Target As”. Create a new directory on you hard disk called PID-Data. Save the file to this new directory. Note that the file extension is actually XML and not CSV.

3. Next, open Excel and then open the file you just saved. When Excel sees the XML tag you will be asked to select an input type. Select “As a read-only workbook” and click OK.

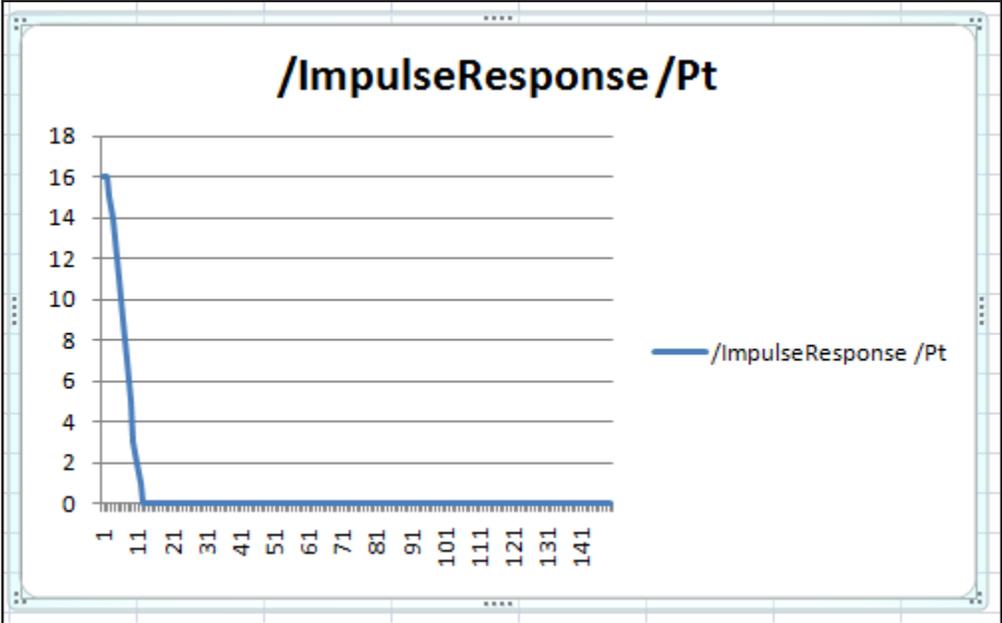


Once the date is read into Excel, it will be displayed in a single column in Col 1.

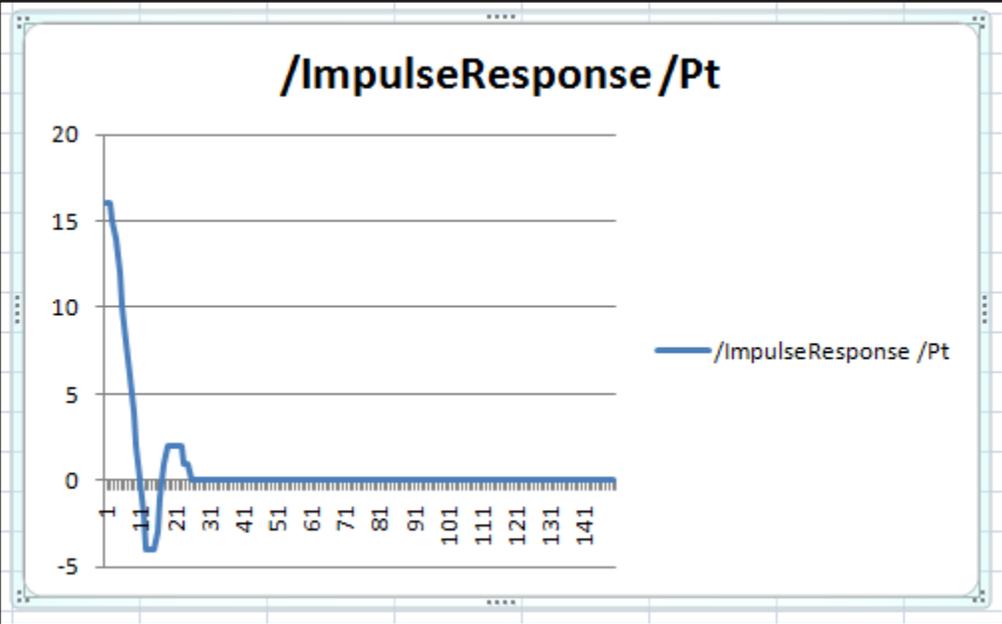
4. Next, select Insert from Excel’s top menu bar. The select Line for a line chart and then select a Line chart from the various types of Line charts. Once this is done, a plot of the Impulse Response data will be displayed.

The ideal response is a sloping line that provides a clean break where the line then extends horizontally to the right. The following examples will provide some added perspective and how to adjust Kp.

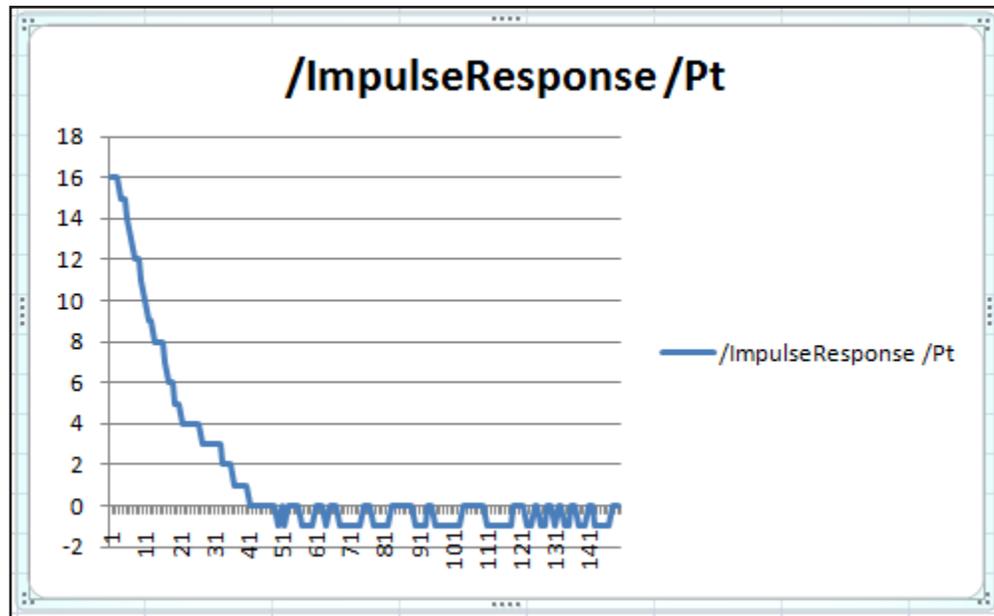
5. The following chart shows a Pan axis that is properly tuned. Notice how the sloped line transitions cleanly to the bottom and then traverses to the right. Kp for this pan axis is set at 0.0598.



6. Here is an example of a Kp value that is too high - it is set at 1.500. This value is too high resulting in oscillation which you can not only hear, but see in the plotted data.



7. Here's an example of too low a Kp value; it is set at 0.200. The Pan axis sort of coasts into in final setting position, but takes way too long to accomplish this. This is evidenced by the rounded transition point at the bottom of the plot and more long term oscillation as the pan axis tried to find the right point to stop. This causes "hunting" of the servo loop so that it never settles down.



8. Once you feel you have the axis PID loop tuned, repeat Steps 1 through 7 for the Tilt axis as well as the Zoom and Focus axes if you have a power zoom lens. If you change the mechanical load on top of the pan-tilt head by any significant amount, you will want to repeat the PID loop tuning procedures.

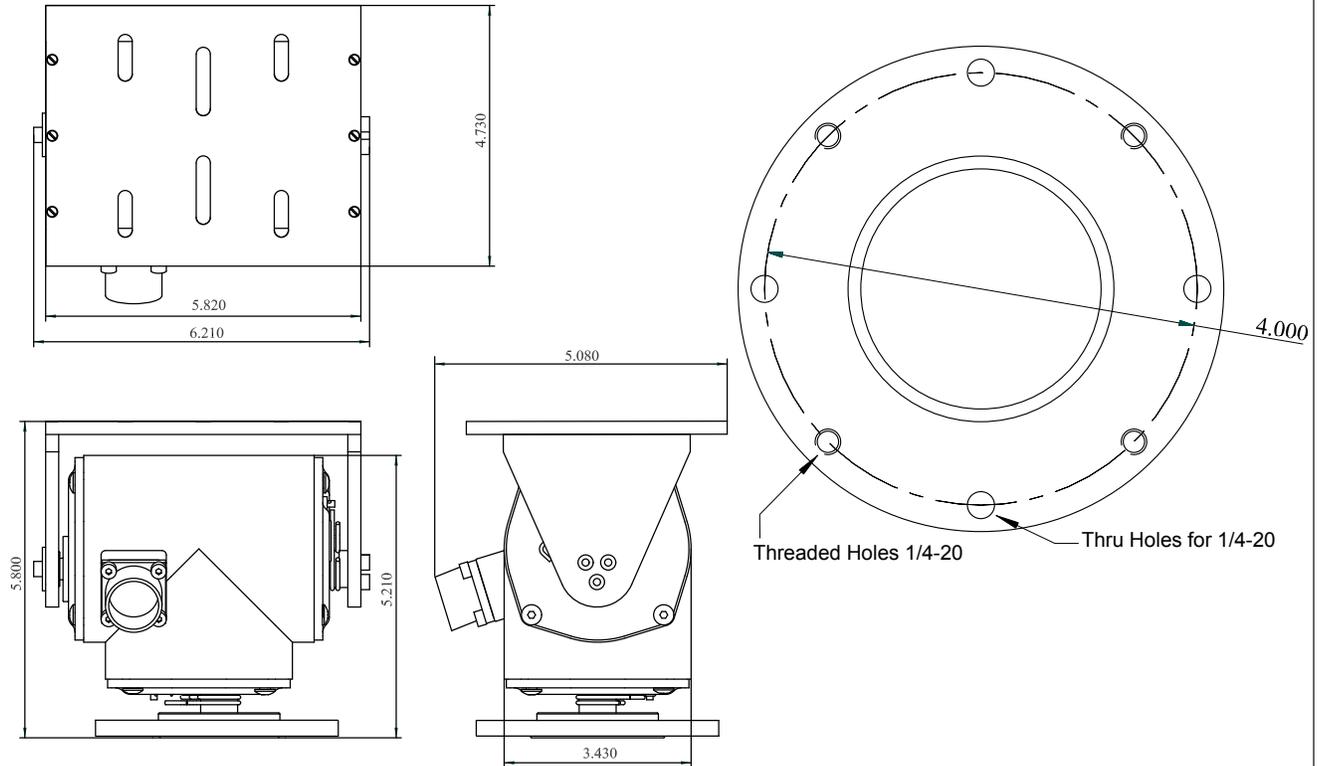
You may want to create a Excel macro to simplify the repetitive steps. The Macro will save lots of time and make plotting data go much quicker.

If you take the time to look at the Column of data points inside Excel, you will quickly become adept at looking at the data points and mentally determining is there is oscillation or undershoot.

If the pan-tilt head seems to move too slowly or exhibits some jitter when moving, please refer back to how to adjust the Joystick Gain. Generally increasing the joystick gain value a bit will result in the pan-tilt head picking up some speed.

APPENDIX B **JPTH-13MPoE ADJUSTMENTS**

The following provides a drawing for the JPTH-13MPoE pan and tilt head as well as various adjustments an end user can make.



MOUNTING A CAMERA ENCLOSURE to the PAN-TILT HEAD Top Plate

The camera mounting plate of the pan-tilt head is provided with slots. The slots are designed for $\frac{1}{4}$ " hardware or smaller to allow the mounting of a camera enclosure.

Appropriate locking hardware should be used to insure that the camera enclosure will not move as a result of wind gusts.

Please remember that the total weight of the camera and it's enclosure must not exceed 13 lbs.

Note:

Some cameras do not require a camera enclosure. Mounting brackets for these cameras may have already been designed; please consult the factory for your specific camera.

MOUNTING THE JPTH-13MPoE

The unit has a base which requires 3 x 1/4 20 bolts and split lock washers (supplied) in 4" bolt-hole pattern (see the drawing on the next page). When mounting a JPTH-13MPoE, please remember that a fully loaded pan-tilt camera assembly may weigh considerably more than 13 lbs.

The unit has been factory centered before being shipped.

CAUTION

Exercise extreme caution when mounting the pan-tilt head with attached camera enclosure. The assembly is heavy and difficult to hold in one hand. It should be secured with a safety line to prevent it from falling to the ground if dropped.

Make sure that you are wearing an appropriate safety harness and follow all applicable safety guidelines when working with ladders, man-lifts, scaffolds or bucket truck lifts. Those on the ground should be wearing hard hats as a minimum.

Installation should **ONLY** be accomplished by experienced personnel with proper safety training.

Substantial mounting brackets (strong and rigid) will be required to handle this mechanical load and allow for adverse weather conditions. Bad weather can result in ice and snow build up as well as high wind loading. Consult the factory if you are unsure as to what type of bracket to use or to purchase factory available brackets

Once the camera location has been specified the mounting bracket should be attached to the mounting surface with suitable heavy duty hardware to assure a safe and secure installation. Make sure the mounting surface is in good condition; crumbling bricks or cracked concrete are not to be used.

The camera enclosure must also be given sufficient clearance to ensure that it does not hit any obstructions when rotated. The motor and gearbox assemblies of the pan-tilt head are designed to be "stalled" but continuous abuse will cause damage which is not covered under the factory warranty.

CONFIGURATION

Please note that the limit switch actuators have been adjusted at the factory and require no adjustment unless you choose to re-calibrate the unit and set new travel limits. These are the Hard Limits; there are also Soft Limits adjusted during the Calibration process.

For the purposes of identification, the rear of the pan-tilt head is where the cable exits the head. When viewed from the top, clockwise movement is right, and counter-clockwise movement is left.

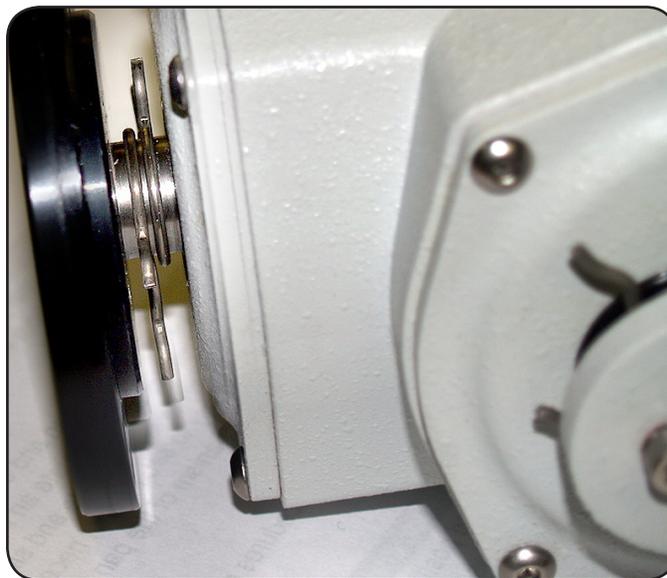
The JPTH-13MPoE contains internal pan and tilt limit switches that are controlled by shaft mounted actuators (2-per shaft). As the head rotates, one actuator trips an externally mounted switch lever arm which causes the pan-tilt head to stop moving in that direction. This system provides an accurate and simple method of applying pan and tilt limit stops. It is not necessary to power down or gain access to the inside of the unit to set limits.

Setting the Pan Limit Switch

(Limit Switches are no longer standard - can be ordered as an Option)

Drive the pan-tilt head to the extreme left hand position you require. Slide the top actuator until it engages and trips the switch lever arm. This is best done using a flat blade screwdriver (**keep your fingers out of this area**). This limit is now set. In a similar manner, drive the pan-tilt head to the extreme right hand position you require. Adjust the bottom actuator until it engages and trips the switch lever arm. This limit is now set. Drive the pan and tilt mechanism to the extreme limits of travel in both directions

Photo shows two limit switch actuators mounted on the pan shaft.



Setting the Tilt Limit Switch

Drive the pan-tilt head to the upper most position required (camera would be pointed upward). Slide the rear actuator until it engages and trips the switch lever arm. This is best done using a flat blade screwdriver (**keep your fingers out of this area**). This limit is now set. Drive the unit to the lowest point required (camera pointed downward) and slide the front actuator until it engages and trips the switch lever arm. This limit is now set. Drive the pan-tilt unit to the extreme limits of travel in both directions and check operation for the limit switches. Re-adjust if necessary.

Photo shows tilt actuator tripping the switch lever arm.

