

OPERATIONS MANUAL

for a

JVC DV-115

Pan/Tilt Head

Prepared for: **JVC Professional Products Company**
1700 Valley Road
Wayne, NJ 07470

Document No. D0155

Date: 18 November 2003

Rev: A

Due to design changes and device availability, the information and data presented in this manual are subject to possible change without prior notice.

Table of Contents

1. INTRODUCTION	4
2. PAN & TILT HEAD SPECIFICATIONS:	5
3. OPERATION	6
3.1 COMMAND SUMMARY	6
3.2 CONTROLLER	6
3.3 SYSTEM TEST	6
3.3.1 Power "ON" Test	6
3.3.2 Pan & Tilt Limit Adjustment	7
4. SWITCH PANEL, CONTROLS AND INDICATORS	8
4.1 CONTROLS	8
4.1.1 Power Switch	8
4.1.2 Setup Switch Pack	8
4.2 INDICATORS	9
4.2.1 Power Indicator-Green LED	9
4.2.2 Data Indicator-Red LED	9
5. CONNECTOR INFORMATION	10
5.1 CONNECTOR PANEL	10
5.1.1 Communications Interface	10
5.1.2 RS-422 Connector	10
5.1.3 Lens I/F Connector: NOT USED JVC Configuration	11
5.1.4 RS-232 Connector: NOT USED JVC Configuration	11
5.1.5 +15 VDC Power Jack	11
5.1.6 VIDEO	11
5.2 PAN & TILT TRUNNION CONNECTORS	11
5.2.1 Video in	11
5.2.2 DIN, 8 Pin Circular	12
5.3 DPT JUMPER INSTALLATION	13
6. INSTALLATION	14
6.1 TOOLS AND EQUIPMENT NEEDED	14
6.2 STANDARD INSTALLATION	14
6.3 DV-115 FOOTPRINT DRAWING	15
6.4 WALL MOUNT INSTALLATION	16
6.5 TRIPOD INSTALLATION	16
6.6 CABLING	17
6.6.1 Attach Video Cable, User Equipment	17

6.6.2	<i>Attach 18 Inch Coax Video Cable</i>	17
6.6.3	<i>Attach Interface Cable to Pan and Tilt</i>	17
6.6.4	<i>RS-422 Cable Installation</i>	17
6.6.5	<i>Power Cable Installation</i>	18
6.6.6	<i>Camera Control Cable</i>	18
7.	TROUBLE SHOOTING	19
7.1	PAN & TILT	19
7.2	CAMERA CONTROL.....	19
7.3	CABLES.....	19
7.4	PRESETS	19
7.5	TECHNICAL SUPPORT.....	20
8.	CABLE DRAWINGS	21
8.1	CAMERA CONTROL CABLE – 0991196.....	21
8.2	RS-422 CABLE - 0960379	21
8.3	MULTI-CAMERA SYSTEM	22
9.	GLOSSARY	23

1. INTRODUCTION

This document describes the operation and installation of the DV-115 Digital Pan and Tilt head. The DV-115 Digital Pan and Tilt head is designed for long distance remote control requirements in applications such as worship services, teleconferencing, university distance learning, tele-medicine and theater or auditorium presentations.

The DV-115 is designed to allow event videography by staff personnel with only a minimum of training. The pan & tilt head is a lightweight assembly designed to carry the JVC GY-DV300REM color video camera. The JVC GY-DV300REM is combination of a GY-DV300U camera and a SA-K300U remote adapter.

The DV-115 has a suite of features which enhance the video presentation. Among the features is a professional preset capability. Presets allow a predetermined pan, tilt, zoom and focus position to be stored in the DV-115 non-volatile memory. This stored position information may later recalled for accurately repeating the previously stored shot. With the resolution of the pan & tilt presets being 12 bits, the preset repeatability is 0.1 degrees in both pan & tilt. The preset data is stored within the pan and tilt head. In addition to basic pan, tilt, zoom and focus control, the DV-115 allows control of iris (automatic or manual), video tape recording controls, camera/bars selection, automatic or manual focus selection and, of course, presets.

To control all of these features, the companion Model DV-180 has been developed. A single Model DV-180 digital controller may control from one to four DV-115 Digital Pan & Tilt Heads. From the DV-180 control panel, the DV-115 and the GY-DV300 may be controlled.

2. PAN & TILT HEAD SPECIFICATIONS:

CHARACTERISTICS:

Operating Environment	Indoor
Temperature.....	40 to 104 degrees F. (0 to 40 degrees C.)
Pan Rotation	260 degrees with adjustable limit switches
Tilt Angle	+/- 45 degrees with adjustable limit switches
Pan Speed	Continuously variable to 15 degrees/second
Tilt Speed	Continuously variable to 7.5 degrees/second
Load Mounting.....	Side loading with alignment of image plane and center of rotation
Capacity	8 pounds

PAN/TILT CONTROL:

Pan/Tilt.....	0 to +12 VDC (DC coreless motor)
Presets	Yes
Max. distance between controller & p/t head.....	2,000 feet (Contact ESI for longer distances)
Interface to Controller.....	RS-422 differential over 4 wire cable
Special Functions	Externally accessible DIP switches

LENS CONTROL:

Focus	Auto and Proportional Manual
Zoom.....	Proportional
Iris	Manual & Auto
Presets	Zoom & Focus

PHYSICAL CHARACTERISTICS:

Size (surface mount)	4.5 (W) X 7.5 (H) X 3.5 (D) inches
Weight.....	5 Pounds
Mounting	4 mounting holes (1 15/16 x 4 15/16)

POWER INPUT REQUIREMENTS:

Voltage	+15 VDC unregulated
Current	0.8 Amperes
Power ON Switch	Located on Pan & Tilt base
Power ON Indicator	Located on Pan & Tilt base
Power Adapter.....	Supplied with Pan & Tilt head
Power Input	From either supplied power adapter or other appropriate DC power source

CONNECTORS:

RS-422 Serial Interface	4 conductor RJ-11 style
Power	DC Jack
Video.....	BNC

3. OPERATION

This section describes the operation of the DV-115. The DV-115 receives serial data commands from its companion controller, the DV-180. The pan and tilt unit will accept and return RS-422 level commands. A brief summary of these commands is presented in section 3.1.

3.1 COMMAND SUMMARY

Pan Left	Iris Auto/Manual	Full Auto On/Off
Pan Right	Store Preset	Video Tape Stop
Tilt Up	Preset 1	Video Tape Record
Tilt Down	Preset 2	Video Tape Rewind
Focus Auto/Manual	Preset 3	Video Tape Fast Forward
Focus Far	Preset 4	Video Tape Pause
Focus Near	Preset 5	
Zoom Tele (In)	Preset 6	
Zoom Wide (Out)	Preset 7	
Manual Iris Open	Preset 8	
Manual Iris Close	Bars/Camera	

3.2 CONTROLLER

A controller is a device designed exclusively to provide serial commands to the pan and tilt. These units generally have a joystick for up, down, left, and right direction commands. There will also be some form of seesaw or switch controls for zoom and focus. Switches will also be provided for preset control. The controller will transmit commands in RS-422 format to the P/T head. The DV-180 Controller is specifically configured to interface to and control the DV-115.

3.3 SYSTEM TEST

3.3.1 Power "ON" Test

Apply power to the pan and tilt electronics by activating the slide switch on the base of the pan and tilt. The power green power LED should illuminate indicating the unit has DC power. The red LED will flash once during power up.

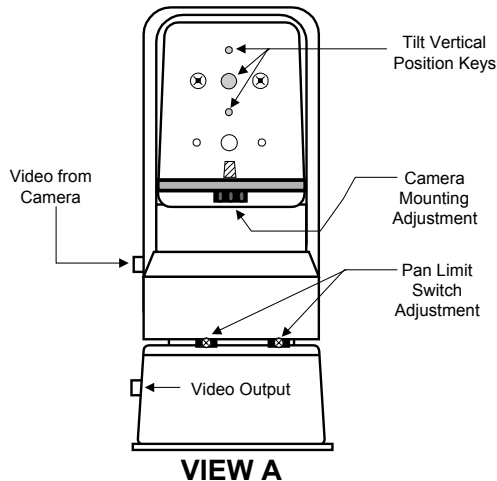
3.3.2 Pan & Tilt Limit Adjustment

The pan & tilt head has separate adjustments for limiting pan-left, pan-right, tilt-up and tilt-down. The adjustments of these limits are described below.

NOTE: These adjustments are to be made after the controller has been interfaced to the DV-115. The controller will allow one to move the pan & tilt head and check the pan & tilt limits.

Pan Adjustment

View A illustrates the location of the pan limit adjustments on the trunnion. To adjust the limit of pan travel, loosen the “Right Pan Limit Adjustment” screw and rotate the pan-right limit block to the desired position. Loosen the “Pan-Left Limit Adjustment screw and rotate the pan-left limit block to the desired position.

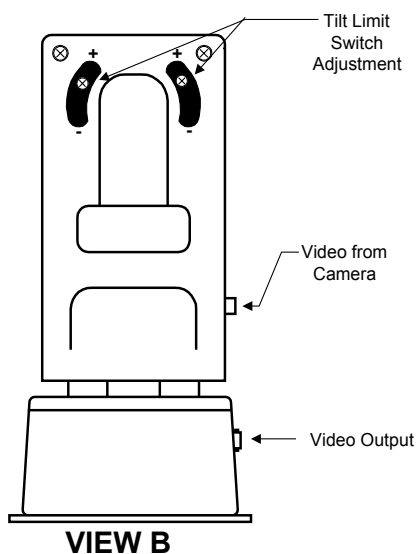


With the controller power “ON”, move the joystick in the pan position. Check the pan-right travel and the pan-left travel. If either limit is still not adjusted properly, repeat the adjustments described above.

NOTE: The pan limit switch adjustments are set at their maximum travel by factory.

Tilt Adjustment

View B illustrates the location of the Tilt Up and Tilt Down Limit Adjustments. With the camera mounted on the pan & tilt as shown in Figure 3, turn the system power “ON” and move the JOYSTICK up until the rear of the camera nears the bottom of the pan & tilt. Make sure the camera does not hit the pan & tilt when tilted fully up. If it does, DAMAGE COULD BE



CAUSED TO THE SERVO MOTORS IN THE PAN & TILT HEAD OR TO THE CAMERA/LENS ASSEMBLY. If the camera rear does hit the pan & tilt head when fully positioned upward, readjust the “Tilt Limit Switch Adjustment” until the camera rear does not touch the pan & tilt head.

Move the JOYSTICK down until the front of the camera nears the bottom of the pan & tilt. Make sure the camera does not hit the pan & tilt when tilted fully down. IF IT DOES, DAMAGE COULD BE CAUSED TO THE SERVO MOTORS IN THE PAN & TILT HEAD OR TO THE CAMERA/LENS ASSEMBLY. If the camera front does hit the pan & tilt head when fully positioned

downward, readjust the “Tilt Limit Switch Adjustment” until the camera front does not touch the pan & tilt head.

4. SWITCH PANEL, CONTROLS AND INDICATORS

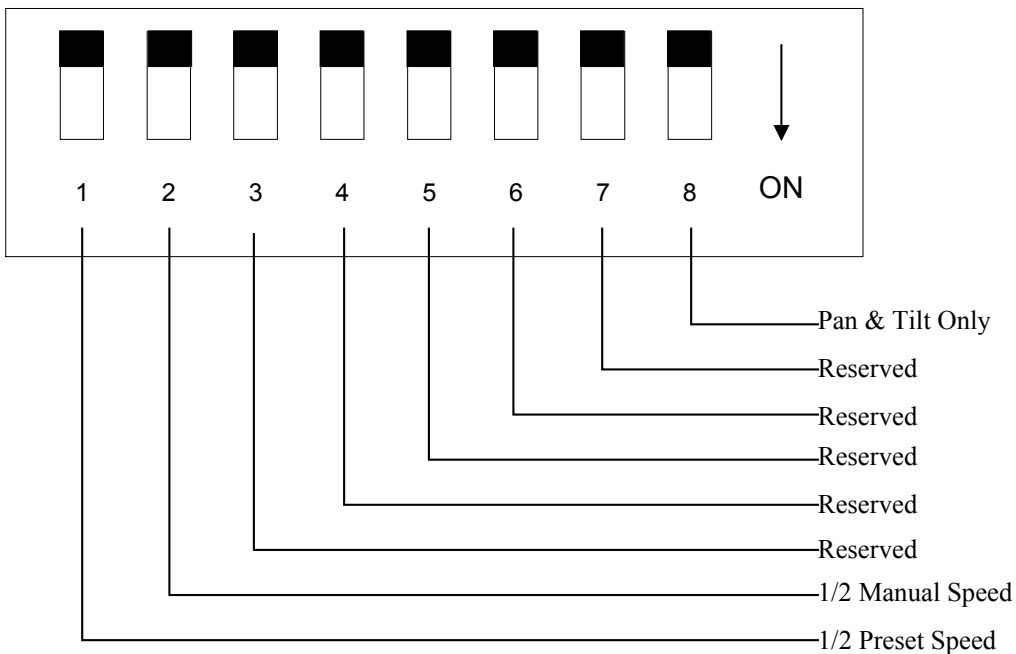
4.1 CONTROLS

4.1.1 Power Switch

A main power switch is provided at the switch panel of the pan and tilt head. When closed this small slide switch provides DC voltage from the pan and tilt power supply to the electronics located within the base of the head. The green “POWER” LED will illuminate indicating that power is applied to the pan and tilt head control electronics. The power switch is “ON” when it is in the up position.

4.1.2 Setup Switch Pack

The eight “SETUP” switches are located adjacent to the power indicator on the pan and tilt switch panel. These switches are labeled one through eight, the function of these switches are defined in the diagram below. Switches 3 – 7 are unused and available for special applications.



The Function of each of these switches is as follows:

- SW8: Pan & Tilt Only*
 - Up: Pan, Tilt, Zoom and Focus Presets are enabled
 - Down: Only Pan & Tilt Presets are allowed
- SW2: 1/2 Manual Speed*
 - Up: Pan & Tilt has maximum speed capability when manually controlled
 - Down: Pan & Tilt has 1/2 maximum speed capability when manually controlled
- SW1, 1/2 Preset Speed*
 - Up: Pan & Tilt has maximum speed capability when in Preset Mode
 - Down: Pan & Tilt has 1/2 maximum speed capability when in Preset Mode

4.2 INDICATORS

4.2.1 Power Indicator-Green LED

The Power LED is located adjacent to the power switch on the pan and tilt switch panel. When the “POWER” LED is illuminated, the power switch is closed and power is applied to the pan and tilt head control electronics.

4.2.2 Data Indicator-Red LED

The red Data LED is located adjacent to the power switch on top of the power LED on the pan and tilt switch panel. This indicator serves several functions. Upon power up the red LED will illuminate once indicating the micro-processor in the P/T head is operational. When the “DATA” LED is flashing rapidly, data is being sent to pan and tilt. If it is flashing at a lower frequency the pan/tilt is in the process of going to a preset.

5. CONNECTOR INFORMATION

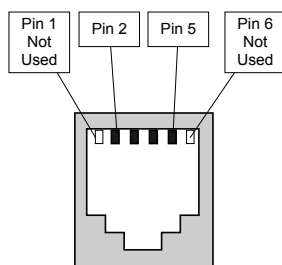
5.1 CONNECTOR PANEL

5.1.1 Communications Interface

Control of the pan and tilt is accomplished by sending packets of serial characters to the head. The standard communications protocol is 9600 baud, eight data bits, one stop bit, and no parity. These commands tell the head and lens which direction and at what rate to move. Preset related commands are also passed over the communication link between the head and the controller. The micro-processor in the pan and tilt head will automatically detect the communication type being received, and uses the pan and tilt commands or forwards the camera commands to the GY-DV300REM via the lens control cable that connects to the base of the camera.

5.1.2 RS-422 Connector

The connector labeled “RS422” on the connector plate is a six position, four conductor modular jack. This connector provides differential 0 to +5 VDC voltage signals to and from the digital pan and tilt head; this is the interface from the controller to the heads. Shown below is the pin-out for the RS-422 connector. The pin assignment for this connector follows:



The pin assignment for this connector follows:

Pin #	Description
2	P/T Data Out -
3	P/T Data Out +
4	P/T Data In -
5	P/T Data In +

5.1.3 Lens I/F Connector: NOT USED JVC Configuration

The connector labeled “LENS I/F” on the connector plate is an eight mini DIN female (socket) type. *DO NOT CONNECT ANYTHING TO THIS CONNECTOR. DAMAGE MAY OCCUR.*

5.1.4 RS-232 Connector: NOT USED JVC Configuration

The connector labeled “RS232” on the connector plate is a nine pin sub-miniature female (socket) “D” type. *DO NOT CONNECT ANYTHING TO THIS CONNECTOR. DAMAGE MAY OCCUR.*

5.1.5 +15 VDC Power Jack

This connector provides the DC power required to operate the pan and tilt head. The connector type is a Switchcraft 722 series. The outer conductor is for 15 VDC, the center conductor is ground from the power source. The pan and tilt head requires a power supply capable of a minimum of .8 amps at 15 DC. The power connection to the pan and tilt head is made via a 5.5 mm X 2.10 mm female DC plug located on the power supply. Caution: the center pin of this jack is ground. The DC voltage is applied via the outer ring of the DC plug.

5.1.6 VIDEO

The BNC type video connector provides a convenient means to connect the user’s equipment to the pan and tilt head. The video source originates at the camera’s system video connector (“VIDEO OUT”). This video is routed to the trunnion (rotating section of head) of the pan and tilt via a 18 inch seventy five ohm video cable. The video is routed to the base of the head using the pan and tilt’s cable wrap technique, which is internal to the rotating mechanism of the pan and tilt.

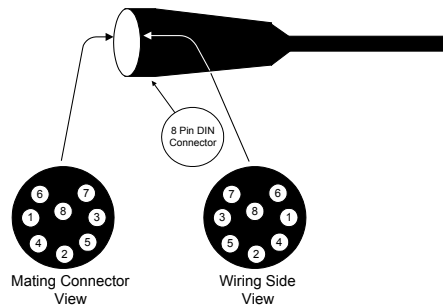
5.2 PAN & TILT TRUNNION CONNECTORS

5.2.1 Video in

This BNC type video connector located on the trunnion provides a means to connect the user’s camera to the pan and tilt head. Note that this connector is not labeled. The video source originates at the camera’s video connector (“VIDEO OUT”). This video is routed to the trunnion of the pan and tilt via a short 18 inch video cable and this connector. The video is routed to the base of the head using the pan and tilt’s cable wrap technique which is internal to the rotating mechanism of the pan and tilt.

5.2.2 DIN, 8 Pin Circular

This connector which is located on the trunnion adjacent to the video BNC connector provides a means to connect the camera control signals from the pan and tilt head to the camera assembly. The figure below illustrates the pin lay out for the eight pin circular DIN connector. Note that this connector is not labeled



The pin assignments schemes for GY-DV300REM configuration is shown in the table below:

DIN Connector	Signal Name
1	Not Used
2	Not Used
3	Not Used
4	Data from Camera
5	Not Used
6	Not Used
7	Ground
8	Data to Camera

5.3 DPT JUMPER INSTALLATION.

It will be necessary to disassemble pan and tilt mechanism from base of DPT unit to gain access to the configuration jumpers on the MPU PWA or to change the micro-processor chip. The MPU PWA is the top board and will be accessible as soon as the pan and tilt mechanism is removed. The following steps describe reconfiguring the jumpers. The equipment necessary for this procedure are a No. 2 Phillips screw driver a small pair of needle nose pliers and a 2" x 8" x 8" block of some type. Verify the DC jack providing power to the unit has been removed prior to proceeding.

1. Position the pan and tilt at the parked or normal position. This position is defined as the camera mounting plate being horizontal to the work surface and the two video BNC connectors on the pan and tilt being on the same side facing the individual working on the unit.
2. Remove the four Phillips head screws fastening the pan and tilt mechanism to the base.
3. Position the block directly behind the pan and tilt unit.
4. Remove pan and tilt mechanism by lifting slightly and rotating away from you, this step will leave the pan and tilt mechanism laying on the side away from the BNC connector behind the base.
5. The three position jumper posts and the micro-processor chip will now be accessible on the PWA.
6. To re-assemble:
7. Place the pan and tilt mechanism back on the base.
8. Replace the four Phillips head screws fastening the pan and tilt mechanism to the base.

6. INSTALLATION

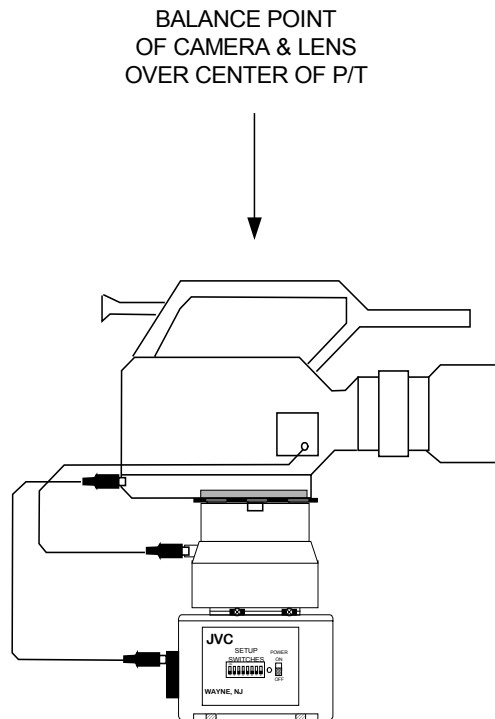
6.1 TOOLS AND EQUIPMENT NEEDED

- Screwdriver and Mounting Screws: The only tool needed to install the DV-115 is a screwdriver for securing the pan & tilt base to its mount.
- #2 Phillips Screwdriver: To be used if access into the Electronics module is required.
- Customer furnished video cable from pan & tilt head to the user monitor.

6.2 STANDARD INSTALLATION

To get optimum performance from any pan and tilt it is important to have the weight of the camera and lens balanced. This balance assures the pan and tilt will go in the up and down directions at the same speed. Returning to presets accurately is also achieved when the load on the pan and tilt is balanced.

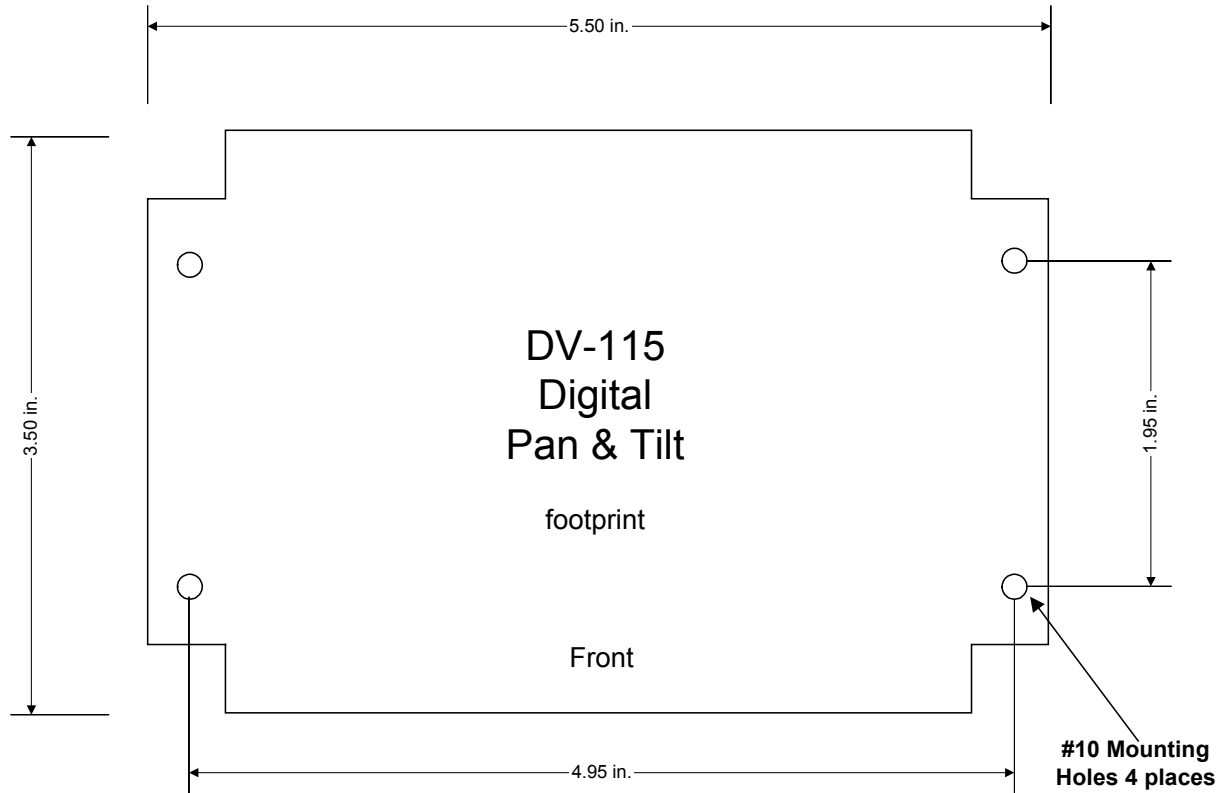
To balance the load, determine the balance point of the camera and lens assembly. Mark this point on the camera/lens with a small piece of tape. Position the camera and lens on the pan and tilt mounting plate as shown with the center point of the load positioned over the center point of the mounting plate. Note that in most cases the camera is mounted as far to the rear of the pan and tilt as possible.



6.3 DV-115 FOOTPRINT DRAWING

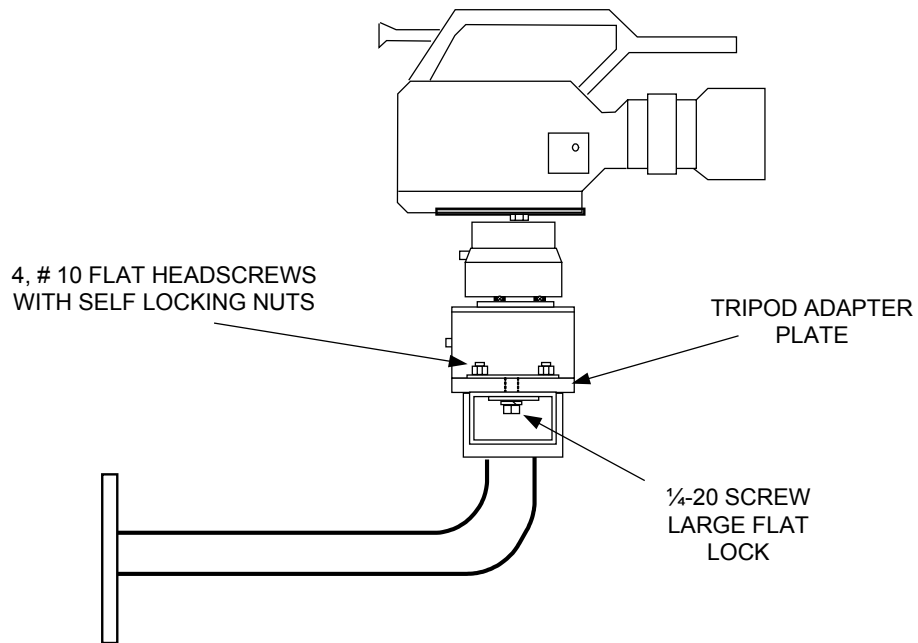
The required hole pattern for securing the pan & tilt head to a mounting surface is a symmetrical two-inch by five-inch pattern. Four (4) mounting screws are needed to mount the pan & tilt head. Care is to be taken to mount the pan & tilt in the proper orientation. Note the location of the connector plate on the base of the pan & tilt head. This surface is the rear of the pan & tilt assembly. The rear of the trunnion portion of the pan & tilt is the surface with the eight pin circular DIN connector and the upper of the two BNC (Video) connectors. The pan & tilt head is to be secured to it's mounting location using No. 6 or No. 8 screws consistent with the mounting material. The mounting screws and mounting surface are to be provided by the installer.

Shown below is the physical mounting dimensions for the pan and tilt head. The unit can be fastened to any flat surface using #8 or #10 wood or machine screws.

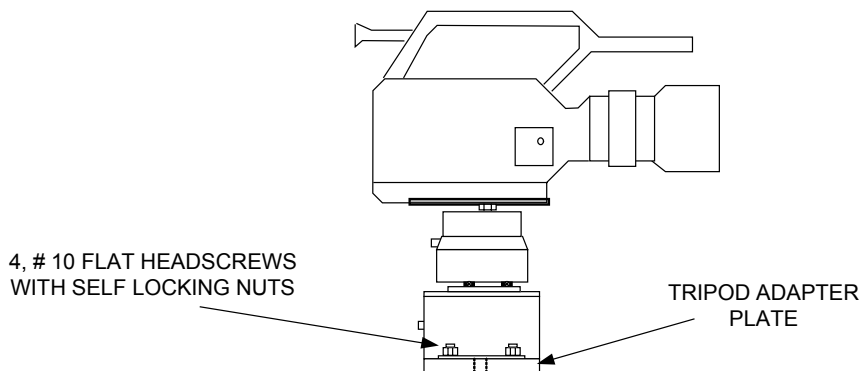


Make mounting holes without threads and large enough for a #10 screw

6.4 WALL MOUNT INSTALLATION



6.5 TRIPOD INSTALLATION



6.6 CABLING

6.6.1 Attach Video Cable, User Equipment

Attach the user's video cable to BNC on the pan and tilt base. This cable provides the video interface to the customer equipment from the pan and tilt/camera/lens assembly. This user provided cable is to be connected between the "VIDEO IN" connector on the customers equipment and the BNC "VIDEO" connector on the base of the pan and tilt head.

6.6.2 Attach 18 Inch Coax Video Cable

Attach the Video Cable (18 inch coax video cable) between the camera and the pan and tilt trunnion connectors. The trunnion connector on the rotating section of the pan and tilt head.



Figure 6-1: 18 Inch Video Cable

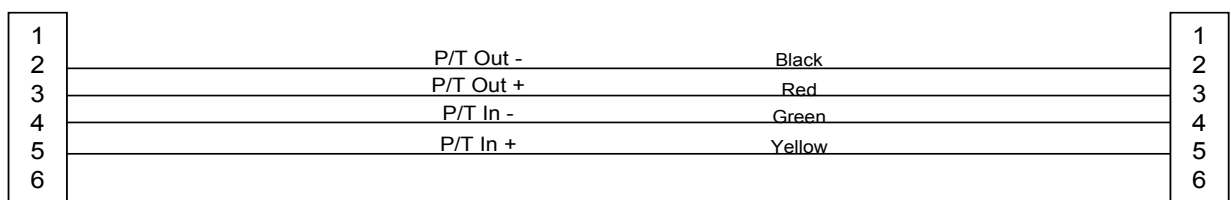
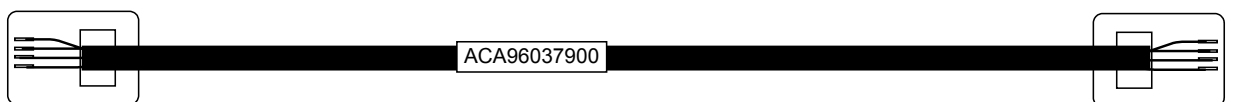
The 18 inch video cable (P/N ACA95018700) illustrated above provides the video interface from the camera to the pan and tilt trunnion assembly. This provided short video cable is to be connected between the "VIDEO OUT" RCA type connector on the side of the camera (located behind gray access cover) and the BNC connector on the trunnion (upper portion) of the pan and tilt head.

6.6.3 Attach Interface Cable to Pan and Tilt.

The interface between the controller or computer and the pan and tilt head is accomplished using a RS-422 interface cable. The pan and tilt head will automatically be configured for either voltage interface based on which connector and cable that it is receiving data from.

6.6.4 RS-422 Cable Installation.

This interface is the normal connection to the digital controllers. Figure 3-2 illustrates a typical RS-422 interface cable. Each camera station in the system must be connected to the controller via a RS-422 cable. Connect one end of RS-422 to the connector on the rear of the controller or computer interface. Connect the other end of the cable to the connector on the pan and tilt head labeled "RS422". Note: pins 1 and 6 are not used.

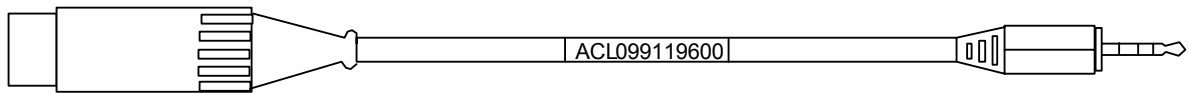


6.6.5 Power Cable Installation

Attach the power cord plug on the wall mount power adapter provided with the pan and tilt head (P/N APS99117900) to the DC jack on the connector panel of the pan and tilt labeled “POWER”.

6.6.6 Camera Control Cable

This cable (P/N ACL99119600) is used to pass the RS-232 level camera control commands to the GY-DV300REM camera. The eight pin DIN connector mates with the eight pin connector on the trunnion of the pan and tilt head. The four contact pin jack plugs into the rear end of the adapter plate located beneath the camera.



7. TROUBLE SHOOTING

7.1 PAN & TILT

Problem: No pan/tilt or camera/lens functions.

Verify proper power is supplied to head.

Verify data is being sent to head.

7.2 CAMERA CONTROL

Problem: No camera controls.

Verify camera control cable is plugged in pan and tilt head and the rear of Camera Adapter.

Verify camera is powered on.

Problem: No Video.

Verify camera is powered on.

Verify video cable between yellow video out connector on camera video connector on P/T trunnion is connected.

7.3 CABLES

Problem: No camera control functions.

Verify the camera is in the "REMOTE" mode. See the camera's operation manual.

Verify cable (P/N: ACL099119600) is attached to pin jack connector on the rear panel of the camera's Camera Adapter. Verify cable end with 8 pin circular DIN connector is connected to female 8 pin circular connector on trunnion of pan and tilt.

7.4 PRESETS

Problem: Camera does not return to preset locations consistently.

Verify camera assembly is balanced properly.

Verify cable assemblies do not restrict camera movement.

Problem: Red LED does not extinguish when going to a reset.

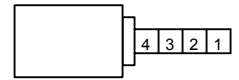
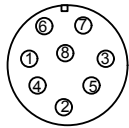
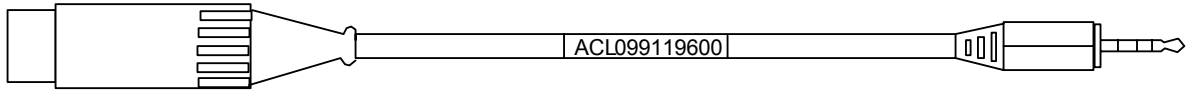
Verify camera and lens are balanced properly.

7.5 TECHNICAL SUPPORT

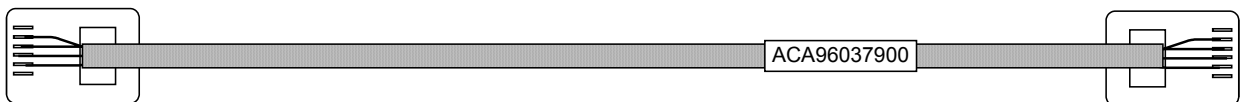
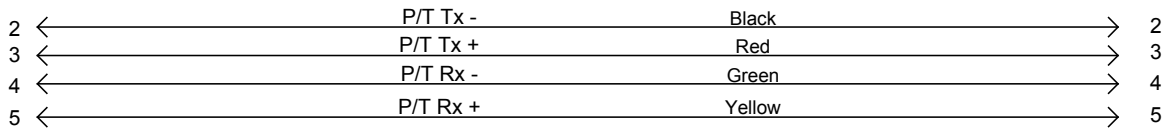
For technical assistance call (321) 956-0095 or go to web site at esi-inc.com. Have serial number of unit and description of camera and lens on pan and tilt head.

8. CABLE DRAWINGS

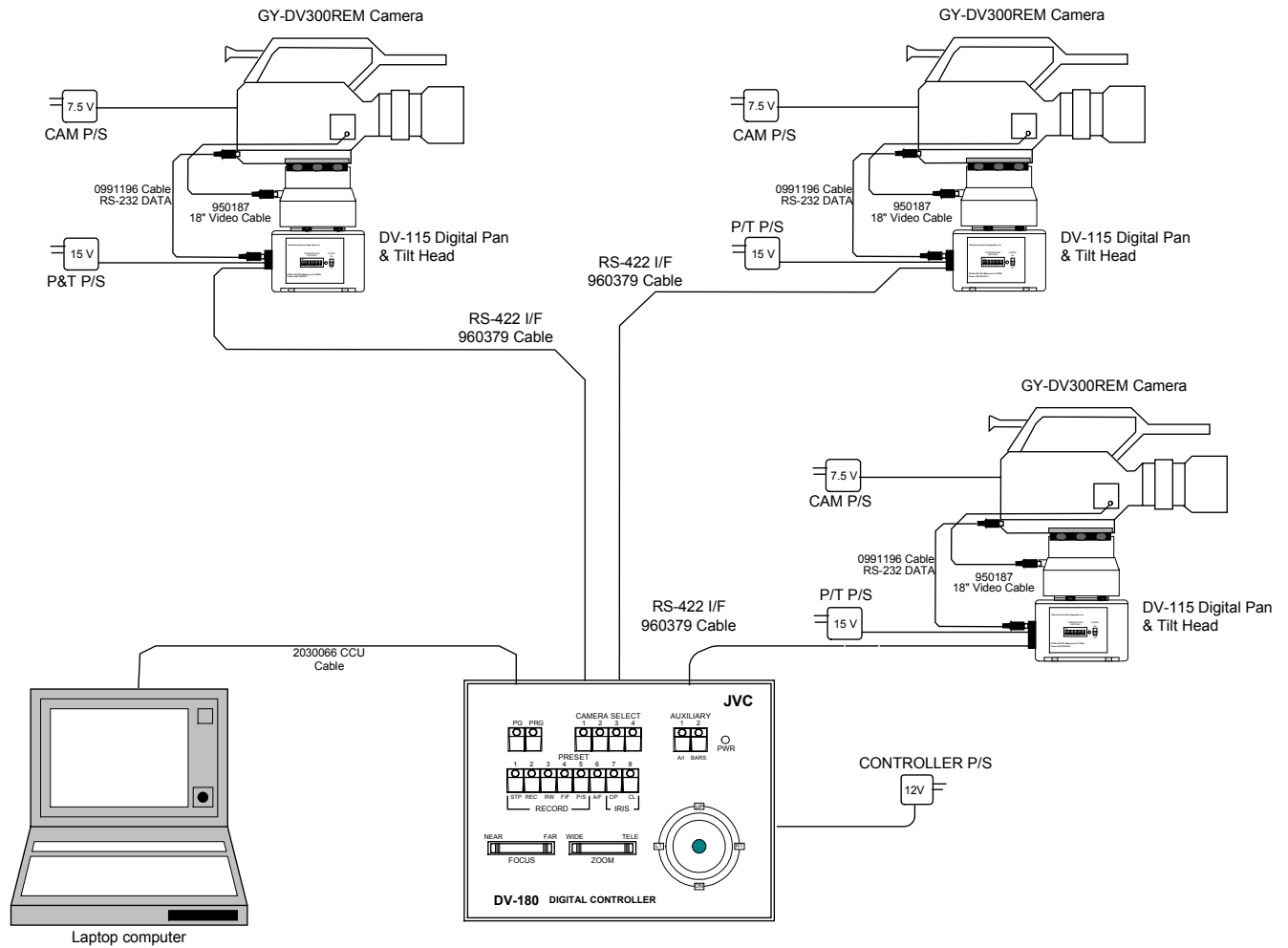
8.1 CAMERA CONTROL CABLE – 0991196



8.2 RS-422 CABLE - 0960379



8.3 MULTI-CAMERA SYSTEM



9. GLOSSARY

- ❑ Base: Bottom portion of the pan & tilt head which is stationary.
- ❑ BNC: A connector type used to interface video sources
- ❑ Camera Adapter: The special camera base required for cameras on pan and tilt systems to communicate via RS-232. This adapter is supplied as part of the GY-DV300REM package. This device is available from JVC Professional Products Company (P/N: SA-K300U).
- ❑ Controller: The DV-180 Pan & Tilt and Camera Controller.
- ❑ DIN: Large circular connector on the trunnion of the pan & tilt head. Mates to the large circular DIN connector on the ESI furnished W2 connector.
- ❑ LED: Light Emitting Diode.
- ❑ Limit Switch: Switches which disengage the electronic drive when the pan & tilt head reaches a predetermined maximum position.
- ❑ MINI DIN: A small circular connector commonly used on cameras. Miniature version of the DIN connector.
- ❑ Position Keys: Locators on the vertical face of the pan & tilt head which allows the “L” bracket to be located in either of two positions.
- ❑ TBD: To be determined
- ❑ Trunnion: Moveable top portion of the pan & tilt head.