4X2 or 2X2 Composite Video Switch Manual

(Rev E)

VAC #10-700-105-A (Two input switch)
VAC #10-700-106-A (Four input switch)

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Two Year Limited Warranty

All Video Accessory Corporation (VAC) products have a full two year limited warranty. Exclusions to the warranty include but are not limited to damage to external components, power LED failure where the product continues to function, and electrical damage due to lightning. The warranty shall be void if any alteration or repair of a VAC product is attempted by anyone not authorized by VAC. This warranty is expressly in lieu of all other warranties express or implied, including warranties of merchantability and fitness for use, and of all other obligations or liabilities on the part of VAC, and it neither assumes nor authorizes any other person to assume for it any liability in connection with the sale of this product. This warranty shall not apply to the product or any part thereof subjected to accident, negligence, alteration, abuse, or misuse. No warranty whatsoever is made with respect to accessories or parts supplied by anyone other than VAC, and this warranty shall extend only to the original purchaser of this product. The warranty provided in this article is exclusive and in lieu of, and buyer hereby waives, all other remedies, express or implied, arising by law or otherwise, including consequential damages, whether or not occasioned by negligence of VAC. This warranty shall not be extended, altered or varied except by written instrument signed by VAC and buyer, and shall only apply within the boundaries of the continental United States. Liability of VAC is limited to repair or replacement at the option of VAC. Warranty work is to be sent to VAC. Freight charges will be the responsibility of the purchaser.

Document History

REV	Date	Action
A	July 5, 2011	Original document
B	Jan. 11, 2012	Added detail on control options
C	Jan. 29, 2012	Added detail on Maintenance Mode commands
D	Nov.27,2012	Added detail in power section
E	May 5, 2016	Code updated to match the Rev B 299 PCB Removed power-on delay if no USB present Corrected OUT locations on package drawings

1.0 Basic Operation

The 10-700-105 (2X2) and 10-700-106 (4X2) are composite video matrix switches that are configurable to operate in several different modes of operation. These modes include basic switch functions, matrix switch functions, and automatic switch functions. Some modes can also provide a two output distribution function.

A USB port permits the user to change configuration parameters and store the changes into the internal Flash memory as the power up default settings.

The internal power supply is fully isolated to permit the user to control ground loops.

2.0 Basic Functions

Figure 1 shows a block diagram of the units. Video is detected by the output of the sync separators with the PIC looking at the timing of the sync signals.

The control mode for the units is selected by an Option number. Customers need to specify the control Option number they want when ordering these units. The Option selected by the customer will be used as the factory power up default mode. This eliminates the need for the customer to connect each unit to a laptop before it can be used. If the customer decides another Option is required, the default Option number can be changed via the USB port and the change stored in FLASH memory as the new power up default value. All Options are available on both units. This permits the user to use a 4 input unit as a 2 input unit as well as select 4 input Options for a 2 input unit (where Inputs 3 & 4 are not present).

The control port provides an internal voltage (current limited) and ground so an external power source is not required. The user can use an external voltage source and drive the control port opto isolator inputs to isolate grounds. Each of the sections explaining the different control modes provide electrical connection information for both contact closures and external voltage control.

The following shows the different modes the switch units can be configured for using the USB port.

10-700-105-A (2X2)

Option 11	2X1 switch (2 output DA)	Push button control (two buttons)
Option 12	2X1 switch (2 output DA)	Contact closure control (single contact)
Option 13	2X1 switch (2 output DA)	Push button control (single push button)
Option 21	2X2 matrix switch (two outputs)	Contact closure (contact per output)
Option 22	2X2 matrix switch (two outputs)	Push button control (button per output)
Option 23	2X2 matrix switch (two outputs)	Push button control (two buttons per output)

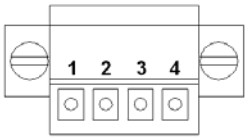
Option 31	2X1 auto switch (2 output DA)	Video detect with priority selection
Option 32	2X1 auto switch (2 output DA)	Video detect with priority override selection
Option 33	2X1 switch (2 output DA)	Internal Timer control (all inputs)
Option 34	2X1 switch (2 output DA)	Internal Timer control (active inputs)

10-700-106-A (4X2)

Option 41	4X1 switch (2 output DA)	Push button control (four buttons)
Option 42	4X1 switch (2 output DA)	Contact closure control (two contacts)
Option 43	4X1 switch (2 output DA)	Push button control (single push button)
Option 51	4X2 matrix switch (two outputs)	Contact closure (contact per output)
Option 52	4X2 matrix switch (two outputs)	Push button control (button per output)
Option 61	4X1 auto switch (2 output DA)	Video detect with priority selection
Option 62	4X1 switch (2 output DA)	Internal Timer control (all inputs)
Option 63	4X1 switch (2 output DA)	Internal Timer control (active inputs)

3.0 Power Requirements

These units have an internal switching supply that isolates supply power from the internal power. The units will operate correctly from 10-24 VAC or 10-32 VDC. Units are equipped with full wave rectification on the power front end, so power may be applied to Pin 1 & 2 using either polarity.



Pin 1 **Power IN1 (Supply Connection +V)**
Pin 2 **Power IN2 (Supply Connection –V)**
Pin 3 **Circuit Ground (Same as BNC/USB Shields)**
Pin 4 **Chassis Ground (Ground for ESD Protection)**

Internal Circuit ground (AGND/Pin-3) is the ground reference for the internal circuits. It is NOT the input voltage return path of pins 1 and 2. The user has the option of floating internal circuits, with respect to any system ground, by not connecting to this pin. The user also has the option to connect the circuit ground to the chassis ground or the input power ground (or both). This power connector pin-out permits the user to define the grounding environment the unit is used in.

Chassis ground (CGND/Pin-4) is connected to internal ESD protection devices. The chassis ground does not need to be connected for proper operation. Secondary ESD protection connections exist between the input and output video signals and internal circuit ground.

The power connector (J7) is a 4 pin 3.5mm center header (Phoenix Contact #1897267) and mating power plug (Phoenix Contact #1847071) with screw flanges for vibration and shock resistance.

The unit has a LED (green) to show power is connected and unit is operational.

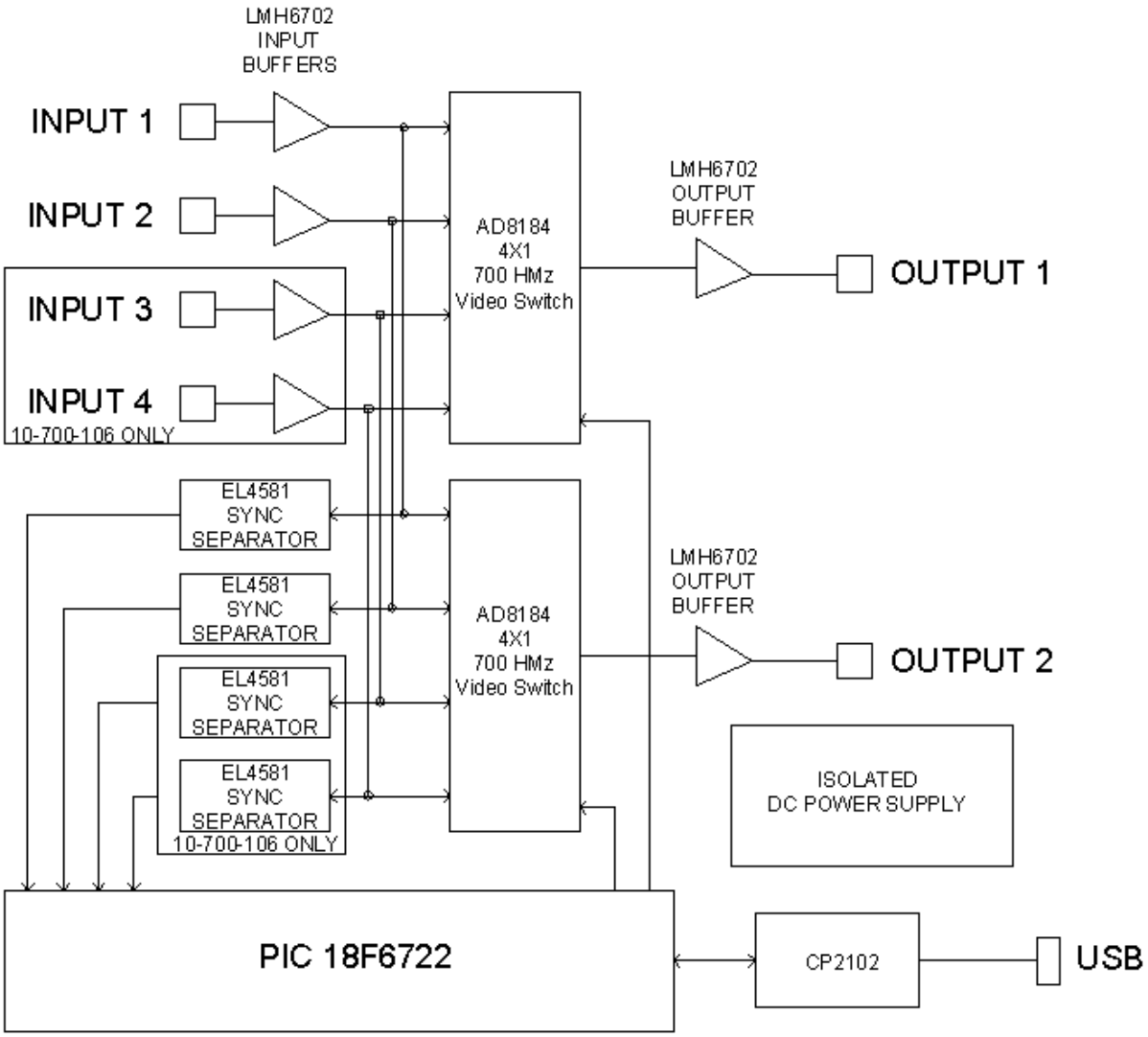


Figure 1 – Unit Block Diagram

4.0 Universal Serial Bus (USB) Maintenance Interface

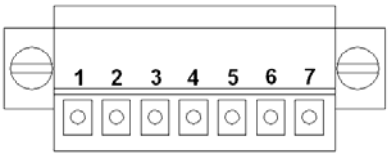
The Universal Serial Bus (USB) maintenance interface provides a terminal interface that permits the user to perform several functions: Selection of the control mode, setting configuration parameters, displaying status, and performing debug/maintenance. **Maintenance commands and functions are described at greater detail in *Section 6.***

The mini-USB port connects through a Silicon Labs CP2102 USB-UART bridge IC to communicate with the processor. A laptop and HyperTerminal[1] is used to view, enter, or modify configuration parameters. The configuration can be saved in non-volatile FLASH memory so the unit enters the correct configuration at power-up.

NOTE: USB shield is referenced to internal Circuit Ground. It is therefore possible for a ground "Sneak Path" to be created through the connected laptop computer. This will typically occur when the laptop or peripherals are connected to an external power source.

5.0 Control Port and Control Modes

Control Port operation is determined by the functionality or Option number specified by the user. The Option number is pre-loaded at the factory as the power-up default control mode. The default power-up Option and parameter values may be modified by the user. The modified values may then be stored into non-volatile memory (via the maintenance interface defined in *Section 0)* as the new power-up default.
Control port connectors are 3.5mm seven pin header (Phoenix Contact #1897296) and mating control plug (Phoenix Contact #1847107) with screw flanges for vibration and shock resistance.



Pin 1 Internal +5V (50mA limit)
Pin 2 Control Input 1
Pin 3 Control Input 2
Pin 4 Control Input 3
Pin 5 Control Input 4
Pin 6 Control Input Gnd
Pin 7 Internal Circuit Gnd (Same as BNC Shield)

Control inputs are optically-isolated from internal circuit ground. This permits control signals to be isolated from power and signal grounds. The Control port interface is a common cathode configuration. Control Input Ground (Pin-7) is common to the four control inputs of each control port. Voltage is applied or asserted onto the control input to generate an active input. Internal control port connections are shown in *Figure* 1.

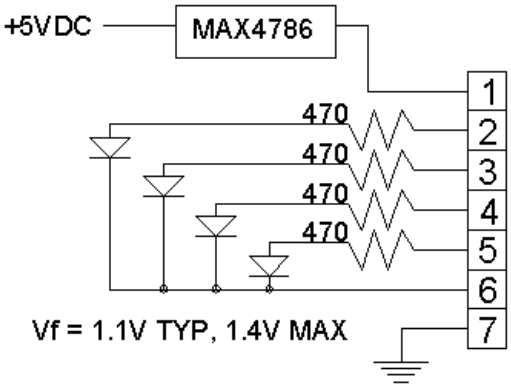


Figure 1: Control Port Electrical

[1] HyperTerminal is no longer a software component of post Windows-XP operating systems. Alternate terminal programs such as Hercules Setup may be considered.

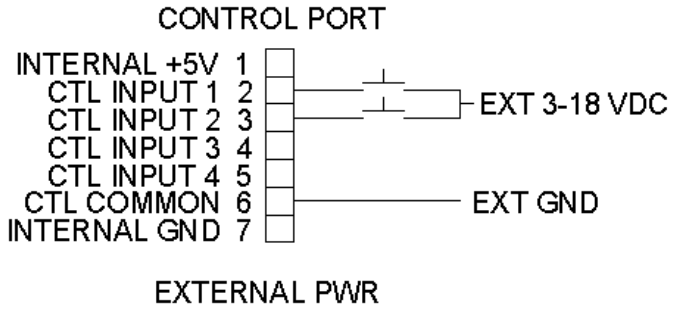
Either the internal current limited voltage source or an external voltage source may be used for control input activation. If the unit is being controlled by external electrical signals the signals must be between 3-18 VDC. Unused, open, or unconnected control input connections default to an OFF or logic ‘0’ level. An ON or logic ‘1’ level is made when the internal processor detects current through the corresponding control input pin. The internal processor code also contains a de-bounce routine to remove contact noise and prevent false switching.

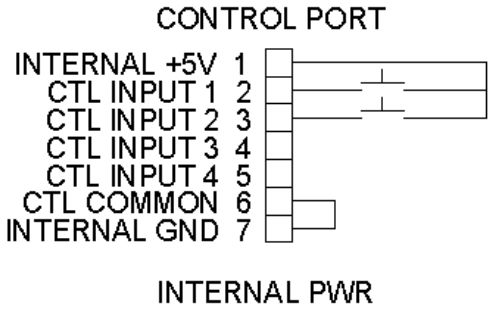
At power up, the unit will display the option number by using the bi-color LED. The green LED is used to show the most significant digit of the Option number by flashing the corresponding number of times to the most significant Option number digit. The yellow LED will flash the corresponding number of times to the least significant Option number digit. This provides a way for the user to know the Option number for the control mode at unit power up without the need to attach a laptop computer.

The following sections provide details on each of the Option modes.

5.10 Option 11 – 2X1 Push Button Control (push button or control voltage per input)

Option 11 control mode uses two control inputs, one for each input. The unit functions as a standard 2X1 switch with a two output distribution amplifier (DA) output stage (both outputs produce the same signal). At power up, video Input 1 will be selected. Control input 1 is used to select video Input 1 and control input 2 is used to select video Input 2. Between selection cycles, the internal uP must see both control inputs open circuit (no current through the opto input stage). If push buttons are used, either the internal voltage can be used or an external voltage source can be used (see diagrams below). If the unit is being controlled by external electrical signals the signals must be between 3-18 VDC (and the push buttons can be removed). The video selection is made when the internal uP detects current through the corresponding control input pin. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed. Once the internal uP detects current through one of the control input opto’s, no further actions will be taken until both opto inputs are detected to have no control voltages applied (no current).



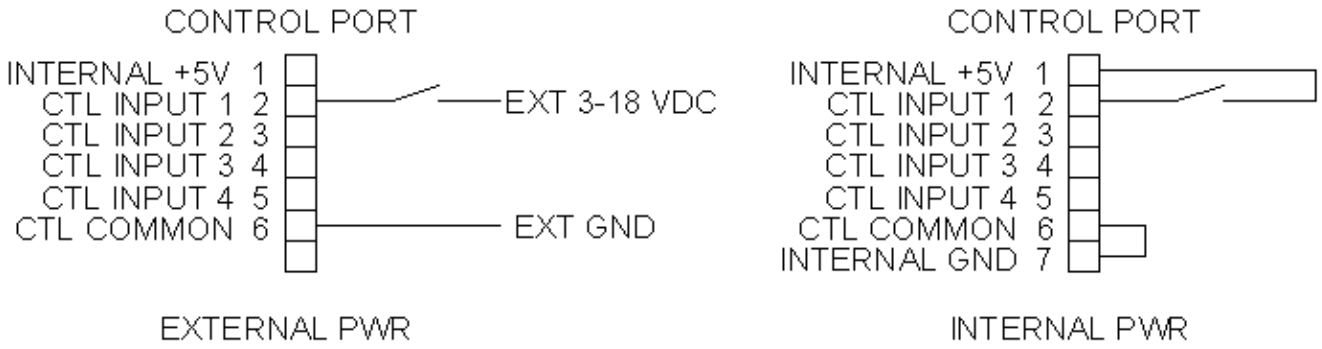


5.11 Option 12 – 2X1 Contact Closure Control (single contact or control voltage)

Option 12 control mode uses a single contact closure or control voltage. The unit functions as a standard 2X1 switch with a two output distribution amplifier (DA) output stage (both outputs produce the same signal). Control input 1 is used to control video selection. If control input 1 is open circuit (no current) video Input 1 is selected. If control input 1 have current flowing through it video Input 2 is selected. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed. For either video input to be selected, the correct selection state must remain on control input 1. The user can use a toggle switch or relay contact for mechanical switch control. A single control voltage can also be used. The following shows the basic control connections.

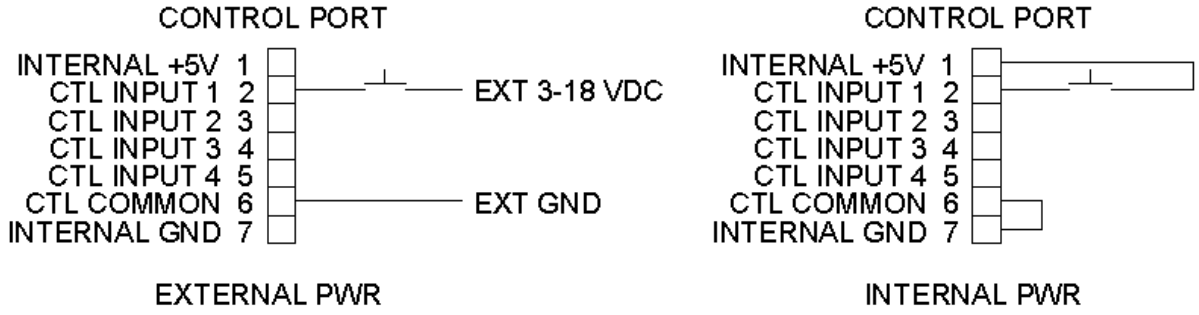
2x1 Switch

Select Video Input 1 Ctl IN 1 Open (no current)
Select Video Input 2 Ctl IN 1 Closed (current flowing through opto)



5.12 Option 13 – 2X1 Push Button Control (single push button or control voltage)

Option 13 control mode uses one control input. Each time the internal uP detects the control input to have current flowing through it, the new video input is selected. The unit functions as a standard 2X1 switch with a two output distribution amplifier (DA) output stage (both outputs produce the same signal). At power up, video Input 1 will be selected. Control input 1 is used to select between the two video inputs. Between selection cycles, the internal uP must see the control input open circuit (no current through the opto input stage). If a push button is used, either the internal voltage can be used or an external voltage source can be used (see diagrams below). If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC (and the push button can be removed). The video selection is made when the internal uP detects current through the control input pin. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed. Once the internal uP detects current through the control input opto, no further actions will be taken until the opto input is detected to have no control voltage applied (no current).

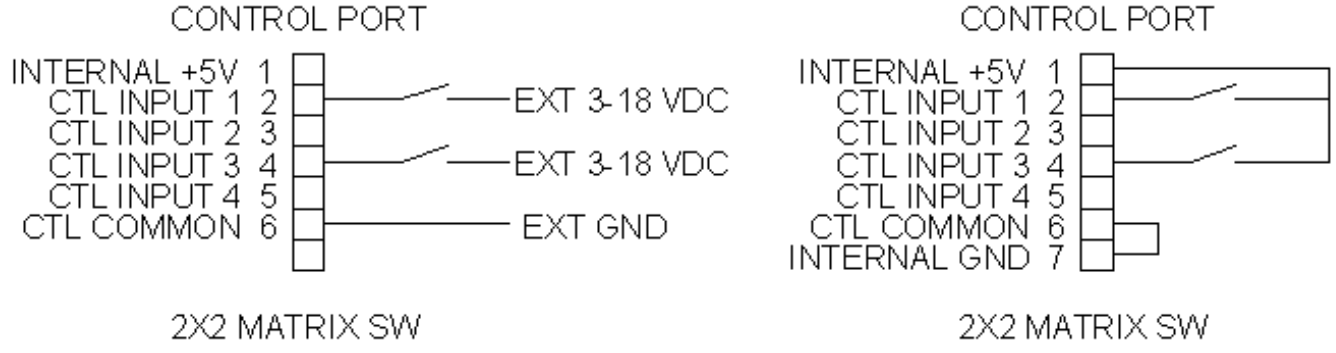


5.13 Option 21 – 2X2 Matrix Switch Contact Closure (single contact per output)

Option 21 control mode uses one control input for each output. The unit functions as a 2X2 matrix switch. For each output, video Input 1 is selected when no current is flowing through the corresponding control input, video Input 2 is selected when current is flowing through the corresponding control input. Either the internal voltage source can be used or an external voltage source can be used to isolate grounds. If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed.

2x2 Matrix Switch

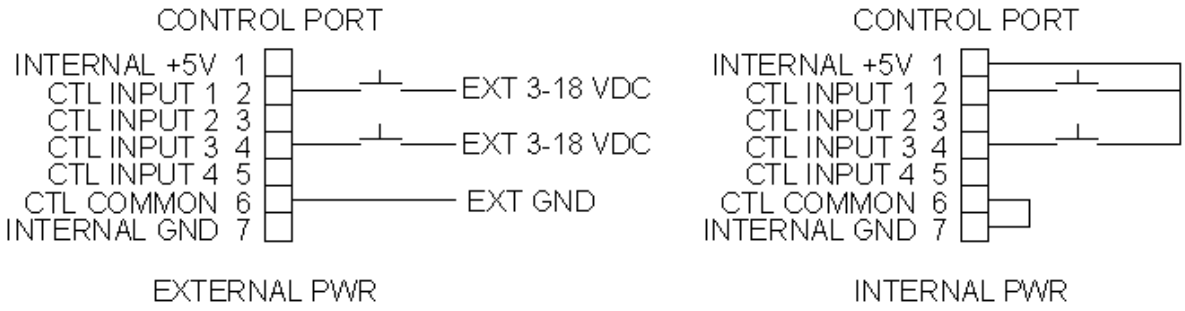
Output 1	Select Video Input 1	Ctl IN 1 Open (no current)
	Select Video Input 2	Ctl IN 1 Closed (current through opto)
Output 2	Select Video Input 1	Ctl IN 3 Open (no current)
	Select Video Input 2	Ctl IN 3 Closed (current through opto)



5.14 Option 22 – 2X2 Matrix Switch (single push button per output)

Option 22 control mode uses one control input for each output. The unit functions as a 2X2 matrix switch. For each output, a push button or control voltage is used to change the selected

video input. Either the internal voltage source can be used or an external voltage source can be used to isolate grounds. If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed. The video selection is made when the internal uP detect current flowing through the control opto. The uP must detect no current flow through the control input before another selection can be made. The two control inputs work independent of each other so if one push button is held down, the second control will still work correctly. At power up, video Input 1 is selected for both outputs.

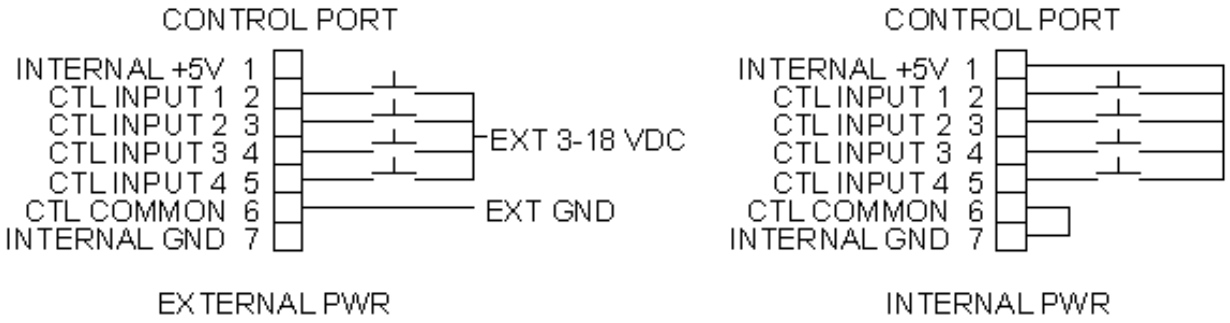


5.15 Option 23 – 2X2 Matrix Switch (two push buttons per output)

Option 23 control mode uses two control inputs for each output. The unit functions as a 2X2 matrix switch. For each output, two push buttons or control voltages is used to change the selected video input. Either the internal voltage source can be used or an external voltage source can be used to isolate grounds. If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed. The video selection is made when the internal uP detect current flowing through the control opto for a corresponding video Input. The uP must detect no current flow through the control input before another selection can be made. The two groups of control inputs work independent of each other so if one push button is held down, the second control group will still work correctly. At power up, video Input 1 is selected for both outputs.

2x2 Matrix Switch

Output 1	Select Video Input 1	Ctl IN 1 push button
	Select Video Input 2	Ctl IN 2 push button
Output 2	Select Video Input 1	Ctl IN 3 push button
	Select Video Input 2	Ctl IN 4 push button

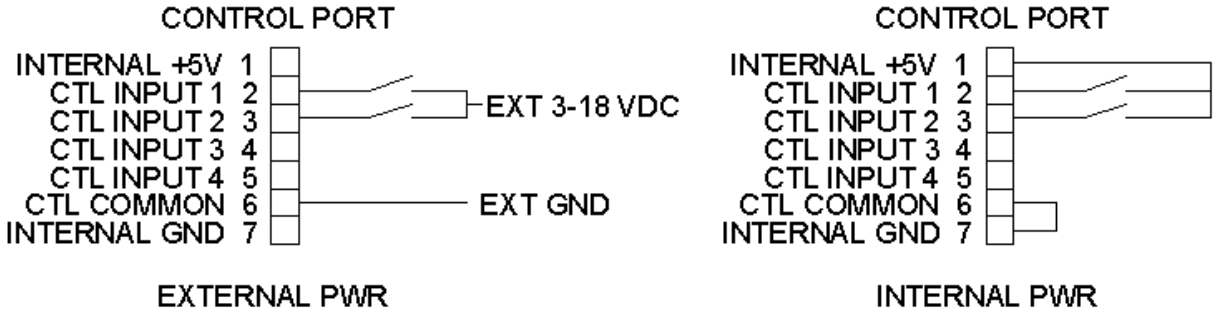


5.16 Option 31 – 2X1 Automatic Switch

Option 31 control mode uses two control inputs. The unit functions as a 2X1 automatic switch with a 1X2 DA output stage. Video Input 1 is the main input. If no active video is detected on Input 1, the unit automatically switches to video Input 2. If active video returns to video Input 1, the unit will automatically re-select video Input 1. The control port permits the user to place the unit into manual mode and select either video Input. Either the internal voltage source can be used or an external voltage source can be used to isolate grounds. If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed.

2x1 Automatic Switch

Control Input 1	Open Circuit (no opto current)	Automatic mode
	Voltage applied (opto current)	Manual mode
Control Input 2	Open Circuit (no opto current)	Video Input 1 selected (manual mode only)
	Voltage applied (opto current)	Video Input 2 selected (manual mode only)



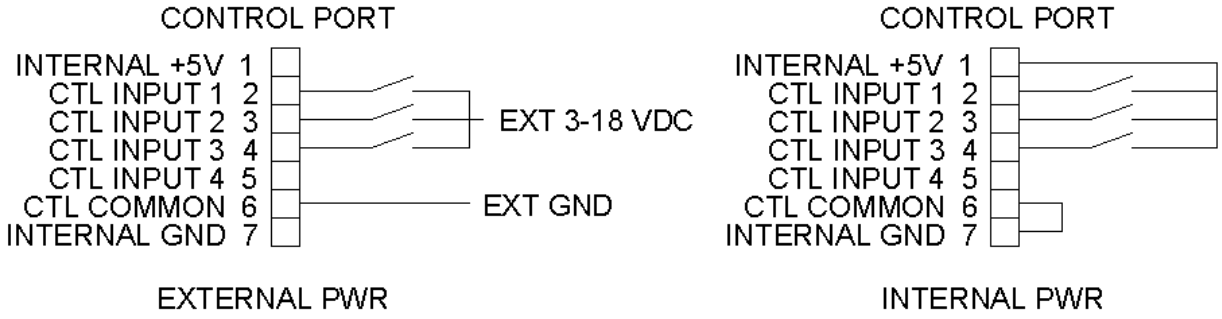
5.17 Option 32 – 2X1 Automatic Switch (with priority override)

Option 32 control mode uses three control inputs. The unit functions as a 2X1 automatic switch with a 1X2 DA output stage and a priority override input. The priority override can be used to

force the unit to switch to video Input 2 even if video is present on video Input 1. An example of where this feature could be used is where a 'Lock' or 'Stable' signal is available from a device like an RF receiver. The device may be putting out video but without a 'Lock' signal the quality could be poor. Video Input 1 is the main input. If no active video is detected on Input 1, the unit automatically switches to video Input 2. The unit is forced to video Input 2 if the override signal is present. If active video returns to video Input 1, and the override signal is not present, the unit will automatically re-select video Input 1. The control port permits the user to place the unit into manual mode and select either video Input. Either the internal voltage source can be used or an external voltage source can be used to isolate grounds. If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed.

2x1 Automatic Switch

Control Input 1	Open Circuit (no opto current)	Automatic mode
	Voltage applied (opto current)	Manual mode
Control Input 2	Open Circuit (no opto current)	Video Input 1 selected (manual mode only)
	Voltage applied (opto current)	Video Input 2 selected (manual mode only)
Control Input 3	Open Circuit (no opto current)	No override
	Voltage applied (opto current)	Override Input 1, select Input 2

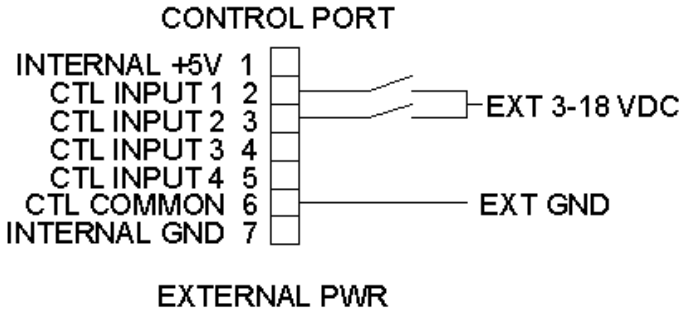


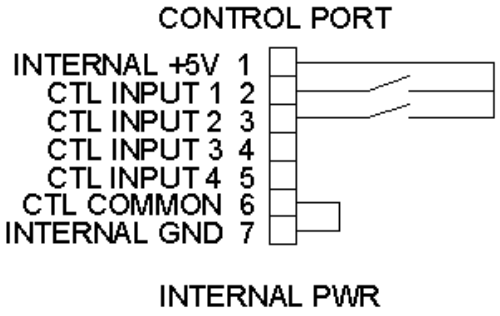
5.18 Option 33 – 2X1 Switch, Timed Switching Cycles

Option 33 control mode uses two control inputs. The unit functions as a 2X1 switch with a 1X2 DA output stage and a timed switch between video Inputs every 5 seconds (5 second factory default, time can be changed through the USB port). The control port permits the user to place the unit into manual mode and select either video Input. Either the internal voltage source can be used or an external voltage source can be used to isolate grounds. If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed.

2x1 Timed Switch Cycle

Control Input 1	Open Circuit (no opto current)	Timer Switch mode
	Voltage applied (opto current)	Manual mode
Control Input 2	Open Circuit (no opto current)	Video Input 1 selected (manual mode only)
	Voltage applied (opto current)	Video Input 2 selected (manual mode only)



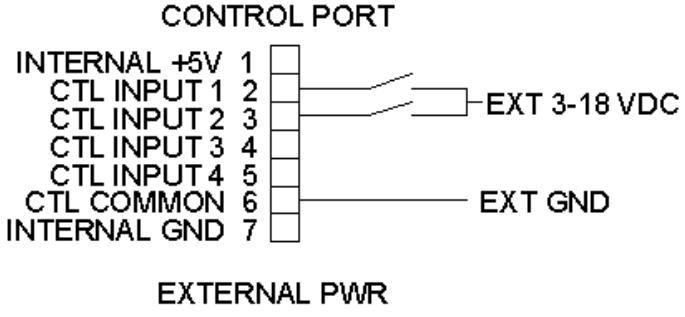


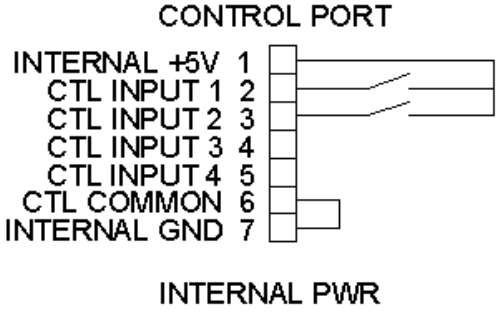
5.19 Option 34 – 2X1 Switch Using Timed Switching Cycles (only active video)

Option 34 control mode uses two control inputs. The unit functions as a 2X1 switch with a 1X2 DA output stage and a timed switch between video Inputs every 5 seconds (5 second factory default, time can be changed through the USB port). If the internal uP does not detect active video on an Input, it will not select that video Input. The control port permits the user to place the unit into manual mode and select either video Input. Either the internal voltage source can be used or an external voltage source can be used to isolate grounds. If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed.

2x1 Timed Switch Cycle

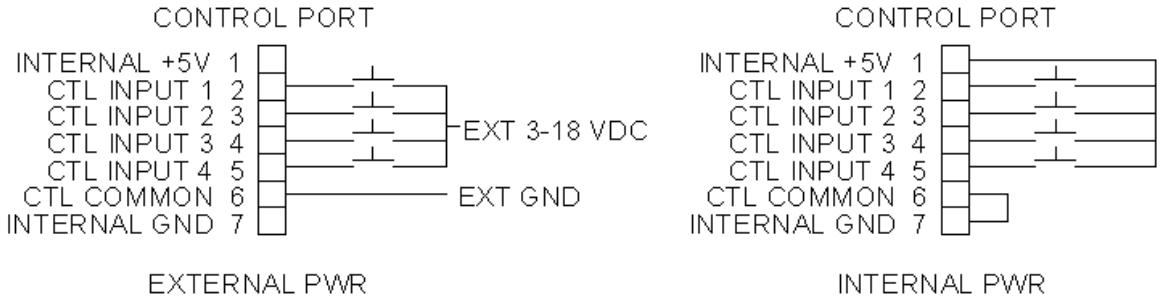
Control Input 1	Open Circuit (no opto current)	Timer Switch mode
	Voltage applied (opto current)	Manual mode
Control Input 2	Open Circuit (no opto current)	Video Input 1 selected (manual mode only)
	Voltage applied (opto current)	Video Input 2 selected (manual mode only)





5.20 Option 41 – 4X1 Push Button Control (push button or control voltage per input)

Option 41 control mode uses four control inputs, one for each input. The unit functions as a standard 4X1 switch with a two output distribution amplifier (DA) output stage (both outputs produce the same signal). At power up, video Input 1 will be selected. Control input 1 is used to select video Input 1, control input 2 is used to select video Input 2, control input 3 is used to select video Input 3, and control input4 is used to select video Input 4. Between selection cycles, the internal uP must see all control inputs open circuit (no current through the opto input stage). If push buttons are used, either the internal voltage can be used or an external voltage source can be used (see diagrams below). If the unit is being controlled by external electrical signals the signals must be between 3-18 VDC (and the push buttons can be removed). The video selection is made when the internal uP detects current through the corresponding control input pin. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed. Once the internal uP detects current through one of the control input opto's, no further actions will be taken until both opto inputs are detected to have no control voltages applied (no current).



5.21 Option 42 – 4X1 Contact Closure Control (two contacts or control voltages)

Option 42 control mode uses two contact closures or control voltages. The unit functions as a standard 4X1 switch with a two output distribution amplifier (DA) output stage (both outputs produce the same signal). Control input 1 and control input 2 are used to control video selection. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed. For a given video input to be selected, the correct selection state must remain on two control inputs. The user can use a toggle switch or relay contact for mechanical switch control. Two control voltages can also be used. The following shows the basic control connections.

4x1 Switch

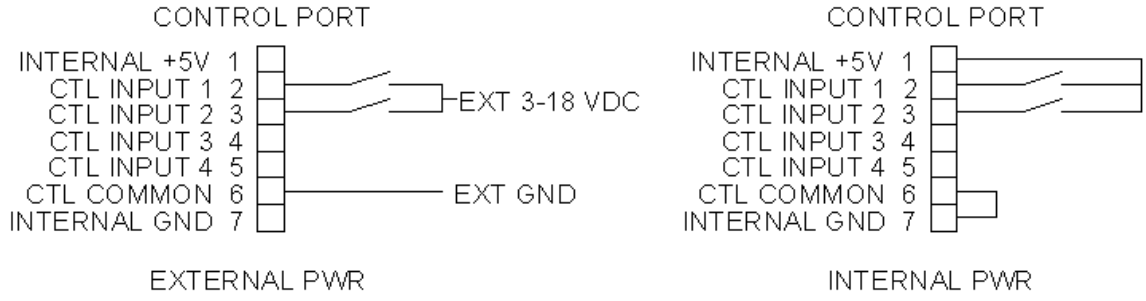
Select Video Input 1 Ctl IN 1 Open (no current)
Ctl IN 2 Open (no current)

Select Video Input 2 Ctl IN 1 has voltage applied (current through opto)

Ctl IN 2 Open (no current)

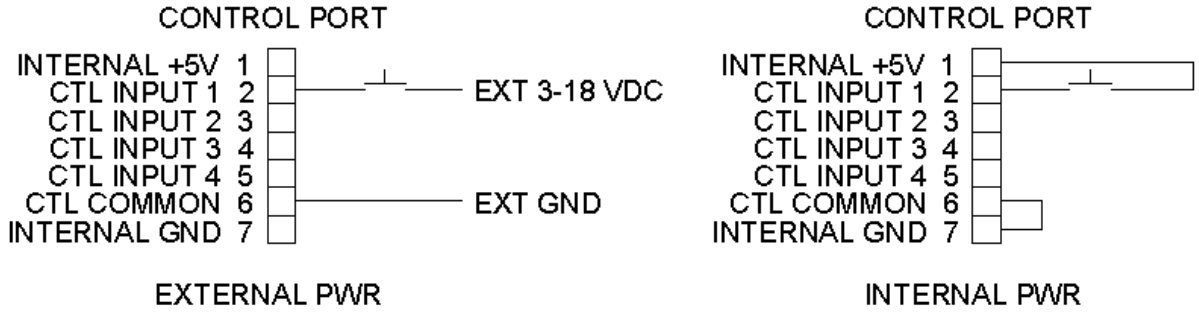
Select Video Input 3 Ctl IN 1 Open (no current)
Ctl IN 2 has voltage applied (current through opto)

Select Video Input 4 Ctl IN 1 has voltage applied (current through opto)
Ctl IN 2 has voltage applied (current through opto)



5.22 Option 43 – 4X1 Push Button Control (single push button or control voltage)

Option 43 control mode uses one control input. Each time the internal uP detects the control input to have current flowing through it, the next video input is selected. The unit functions as a standard 4X1 switch with a two output distribution amplifier (DA) output stage (both outputs produce the same signal). At power up, video Input 1 will be selected. Control input 1 is used to select between the four video inputs. Between selection cycles, the internal uP must see the control input open circuit (no current through the opto input stage). If a push button is used, either the internal voltage can be used or an external voltage source can be used (see diagrams below). If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC (and the push button can be removed). The video selection is made when the internal uP detects current through the control input pin. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed. Once the internal uP detects current through the control input opto, no further actions will be taken until the opto input is detected to have no control voltage applied (no current).

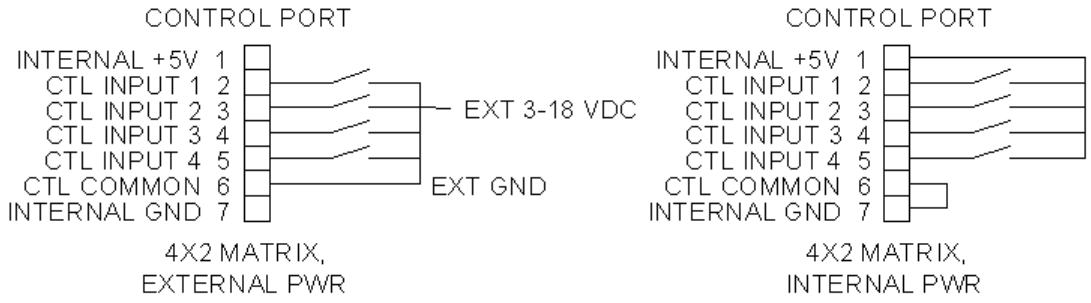


5.23 Option 51 – 4X2 Matrix Switch Contact Closure (two contacts per output)

Option 51 control mode uses two control inputs for each output. The unit functions as a 4X2 matrix switch. Either the internal voltage source can be used or an external voltage source can be used to isolate grounds. If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed.

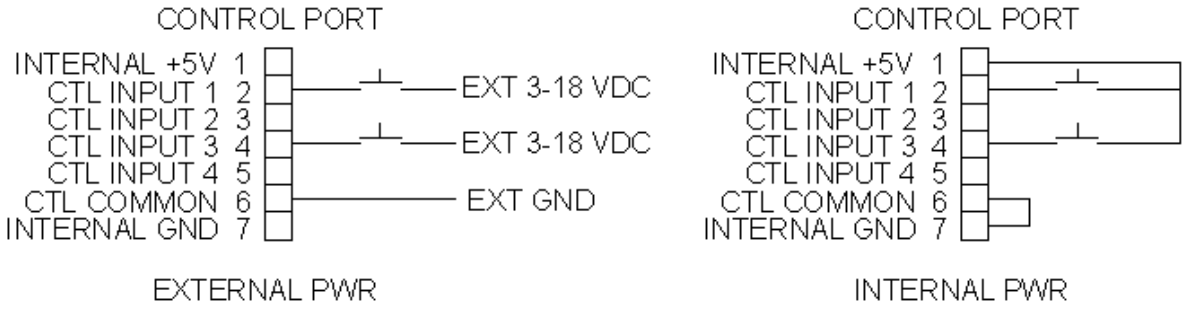
4x2 Matrix Switch

Output 1	Select Video Input 1	Ctl IN 1 Open (no current) Ctl IN 2 Open (no current)
	Select Video Input 2	Ctl IN 1 has voltage applied (current through opto) Ctl IN 2 Open (no current)
	Select Video Input 3	Ctl IN 1 Open (no current) Ctl IN 2 has voltage applied (current through opto)
	Select Video Input 4	Ctl IN 1 has voltage applied (current through opto) Ctl IN 2 has voltage applied (current through opto)
Output 2	Select Video Input 1	Ctl IN 3 Open (no current) Ctl IN 4 Open (no current)
	Select Video Input 2	Ctl IN 3 has voltage applied (current through opto) Ctl IN 4 Open (no current)
	Select Video Input 3	Ctl IN 3 Open (no current) Ctl IN 4 has voltage applied (current through opto)
	Select Video Input 4	Ctl IN 3 has voltage applied (current through opto) Ctl IN 4 has voltage applied (current through opto)



5.24 Option 52 – 4X2 Matrix Switch (single push button per output)

Option 52 control mode uses one control input for each output. The unit functions as a 4X2 matrix switch. For each output, a push button or control voltage is used to change the selected video input. Either the internal voltage source can be used or an external voltage source can be used to isolate grounds. If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed. The video selection is made when the internal uP detect current flowing through the control opto. The uP must detect no current flow through the control input before another selection can be made. The two control inputs work independent of each other so if one push button is held down, the second control will still work correctly. At power up, video Input 1 is selected for both outputs. Each time the push button is pressed the next video Input is selected (Input1 > Input2 > Input3 > Input4 > Input1 > ---). Control input 1 controls video Output 2, control input 3 controls video Output 2.



5.25 Option 61 – 4X1 Automatic Switch

Option 61 control mode uses three control inputs. The unit functions as a 4X1 automatic switch with a 1X2 DA output stage. Video Input 1 is the main input. If no active video is detected on Input 1, the unit automatically switches to video Input 2. If no active video is detected on video Input 2, the unit automatically switches to video Input 3. Video Input 1 has the highest priority, video Input 4 has the lowest priority. The internal uP monitors all of the video Inputs and selects the highest priority video Input that has active video. The control port permits the user to place

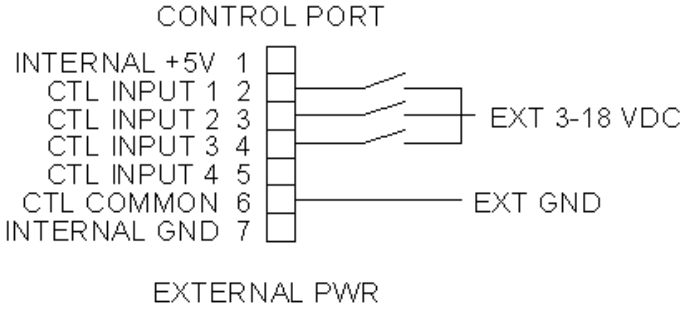
the unit into manual mode and select any video Input. Either the internal voltage source can be used or an external voltage source can be used to isolate grounds. If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed.

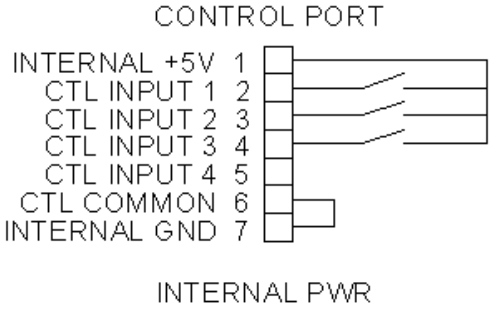
4x1 Automatic Switch

Control Input 1	Open Circuit (no opto current)	Automatic mode
	Voltage applied (opto current)	Manual mode

Manual Mode Only

Select Video Input 1	Ctl IN 2 Open (no current) Ctl IN 3 Open (no current)
Select Video Input 2	Ctl IN 2 has voltage applied (current through opto) Ctl IN 3 Open (no current)
Select Video Input 3	Ctl IN 2 Open (no current) Ctl IN 3 has voltage applied (current through opto)
Select Video Input 4	Ctl IN 2 has voltage applied (current through opto) Ctl IN 3 has voltage applied (current through opto)





5.26 Option 62 – 4X1 Switch, Timed Switching Cycles

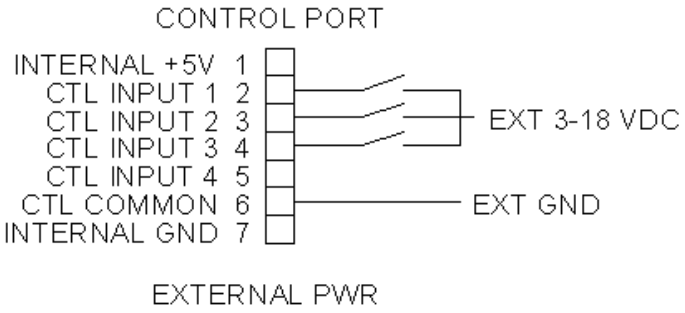
Option 62 control mode uses two control inputs. The unit functions as a 4X1 switch with a 1X2 DA output stage and a timed switch between video Inputs every 5 seconds (5 second factory default, time can be changed through the USB port). The control port permits the user to place the unit into manual mode and select either video Input. Either the internal voltage source can be used or an external voltage source can be used to isolate grounds. If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed.

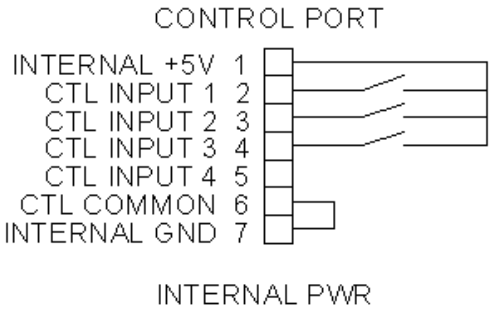
4x1 Timed Switch Cycle

Control Input 1	Open Circuit (no opto current)	Automatic mode
	Voltage applied (opto current)	Manual mode

Manual Mode Only

Select Video Input 1	Ctl IN 2 Open (no current) Ctl IN 3 Open (no current)
Select Video Input 2	Ctl IN 2 has voltage applied (current through opto) Ctl IN 3 Open (no current)
Select Video Input 3	Ctl IN 2 Open (no current) Ctl IN 3 has voltage applied (current through opto)
Select Video Input 4	Ctl IN 2 has voltage applied (current through opto) Ctl IN 3 has voltage applied (current through opto)





5.27 Option 63 – 4X1 Switch, Timed Switching Cycles (only active video)

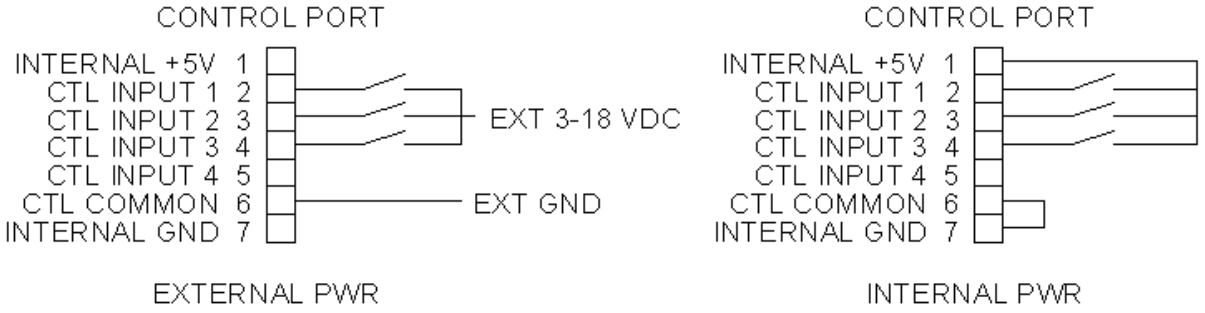
Option 63 control mode uses two control inputs. The unit functions as a 4X1 switch with a 1X2 DA output stage and a timed switch between video Inputs every 5 seconds (5 second factory default, time can be changed through the USB port). If the internal uP does not detect active video on an Input, it will not select that video Input and selects the next input. The control port permits the user to place the unit into manual mode and select any of the video Inputs. Either the internal voltage source can be used or an external voltage source can be used to isolate grounds. If the unit is being controlled by an external electrical signal, the signal must be between 3-18 VDC. The internal uP code contains a contact de-bounce routine so contact electrical noise is removed.

4x1 Timed Switch Cycle

Control Input 1	Open Circuit (no opto current)	Automatic mode
	Voltage applied (opto current)	Manual mode

Manual Mode Only

Select Video Input 1	Ctl IN 2 Open (no current) Ctl IN 3 Open (no current)
Select Video Input 2	Ctl IN 2 has voltage applied (current through opto) Ctl IN 3 Open (no current)
Select Video Input 3	Ctl IN 2 Open (no current) Ctl IN 3 has voltage applied (current through opto)
Select Video Input 4	Ctl IN 2 has voltage applied (current through opto) Ctl IN 3 has voltage applied (current through opto)



6.0 Maintenance Mode Commands

These units have a USB port to permit the user to retrieve information, change parameters, and select specific inputs for system debug. The intend of this port is for it to be connected to a laptop computer and use HyperTerminal to communicate with the internal processor. The USB ports uses a Silicon Labs CP2102 USB-to-UART (RS232) bridge IC. HyperTerminal must be configured as shown below using the virtual Comm port formed by the CP2102. The drivers for the CP2102 can be downloaded from the Silicon Labs web site.

8 bit data
9600 baud
1 stop
No parity
XON/OFF flow control

The XON/XOFF flow control is used during the download of new code so the data transfer can be stopped while the processor internal FLASH memory to loaded.

The unit should be powered up before the USB cable is plugged in. Once the laptop connects to the CP2102 HyperTerminal can be started and the comm port configured. At unit power up the used can enter the Maintenance Mode by entering NO when asked if the user wants to download new code. Once the unit is up and running, any key will indicate to the code that the user wants to enter Maintenance Mode. Two CR characters are required to enter the Maintenance Mode. If the two characters are not received within 30 sec., the unit will time out and jump back to the RUN mode. While in the Maintenance Mode, if no key activity is detected for 30 sec., the code will jump to the RUN mode.

The following shows the different commands available in Maintenance Mode. The commands are not case sensitive.

6.1 HELP Command Format > HELP<CR>

The Help command provides a list of the valid Maintenance Mode Commands.

6.2 INFO Command Format > INFO<CR>

The INFO commands provides the user with unit information like part number, serial number, code revision level, default Option number, default Timer number, and code CRC values.

6.3 RUN Command Format > RUN<CR>

The RUN command causes the code to jump to the main application and exit the Maintenance Mode.

6.4 OPTION Command Format > OPTION<CR>

The OPTION command permits the user to change the default Option Mode number. The units are shipped from the factory with the default Option number set to the customer's request (part of the original order to VAC). When the Option number is changed, it is changed in the internal FLASH as the new power up Option default. After the Option command is entered the user must enter a valid Option number (two numbers followed by <CR>) as defined in the product manual. The Option number is confirmed by printing out the new default number.

6.4 TIMER Command Format > TIMER<CR>

The TIMER command permits the user to change the default timeout number for the timed control modes. The units are shipped from the factory with the default Timer number set to 5 seconds. When the Timer number is changed, it is changed in the internal FLASH as the new power up Option default. After the Timer command is entered the user must enter a valid Timer number, 01 – 99 seconds (two numbers followed by <CR>). The Timer number is confirmed by printing out the new default number.

6.5 OUT1 Command Format > OUT1<CR>

The OUT1 command permits the user to select any of the Inputs and route it to Output 1. After the command is entered, the user must enter the Input number (1-4) followed by a <CR>.

6.6 OUT2 Command Format > OUT2<CR>

The OUT2 command permits the user to select any of the Inputs and route it to Output 2. After the command is entered, the user must enter the Input number (1-4) followed by a <CR>.

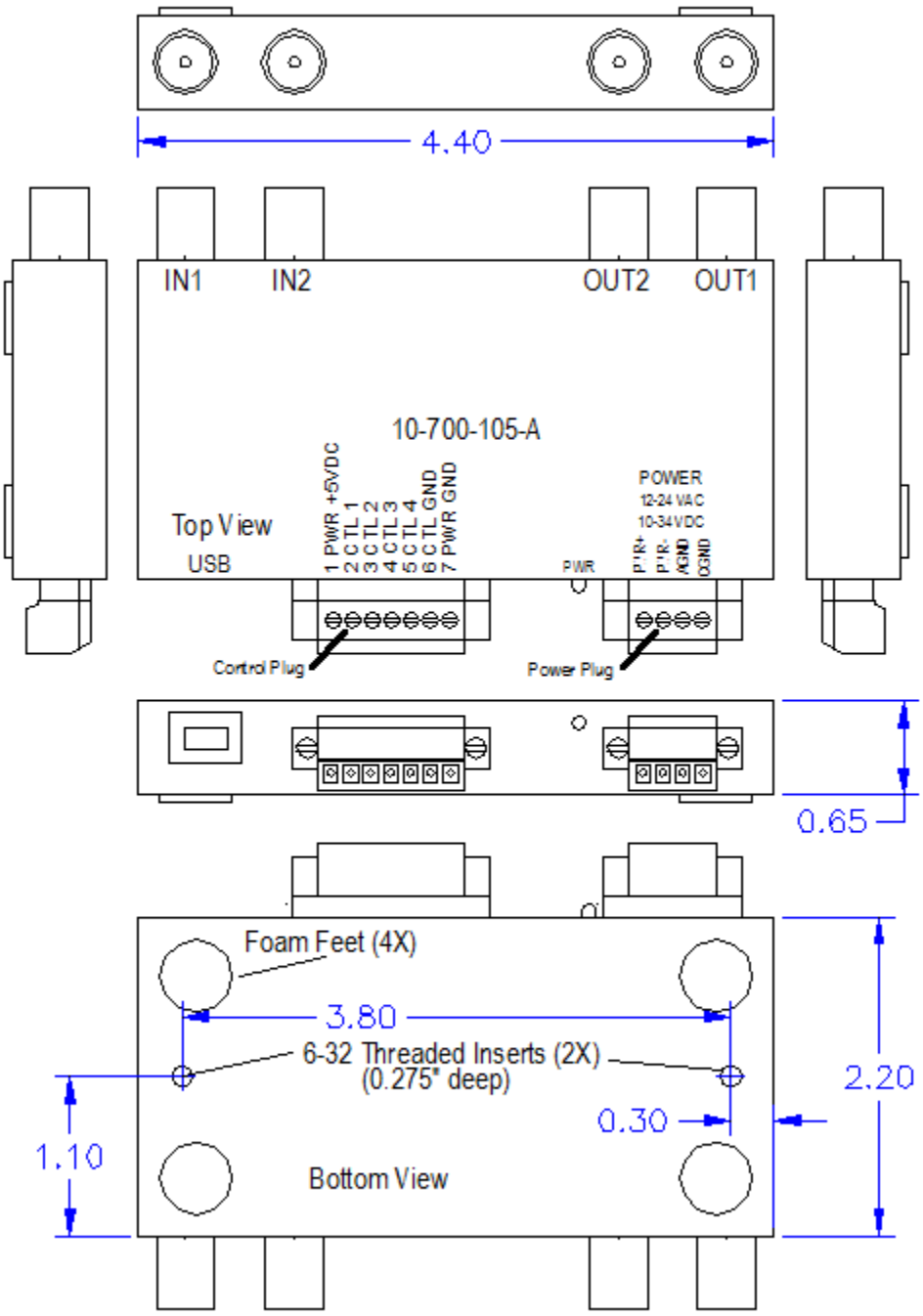
6.7 LOAD NEW CODE Command Format > LOAD NEW CODE<CR>

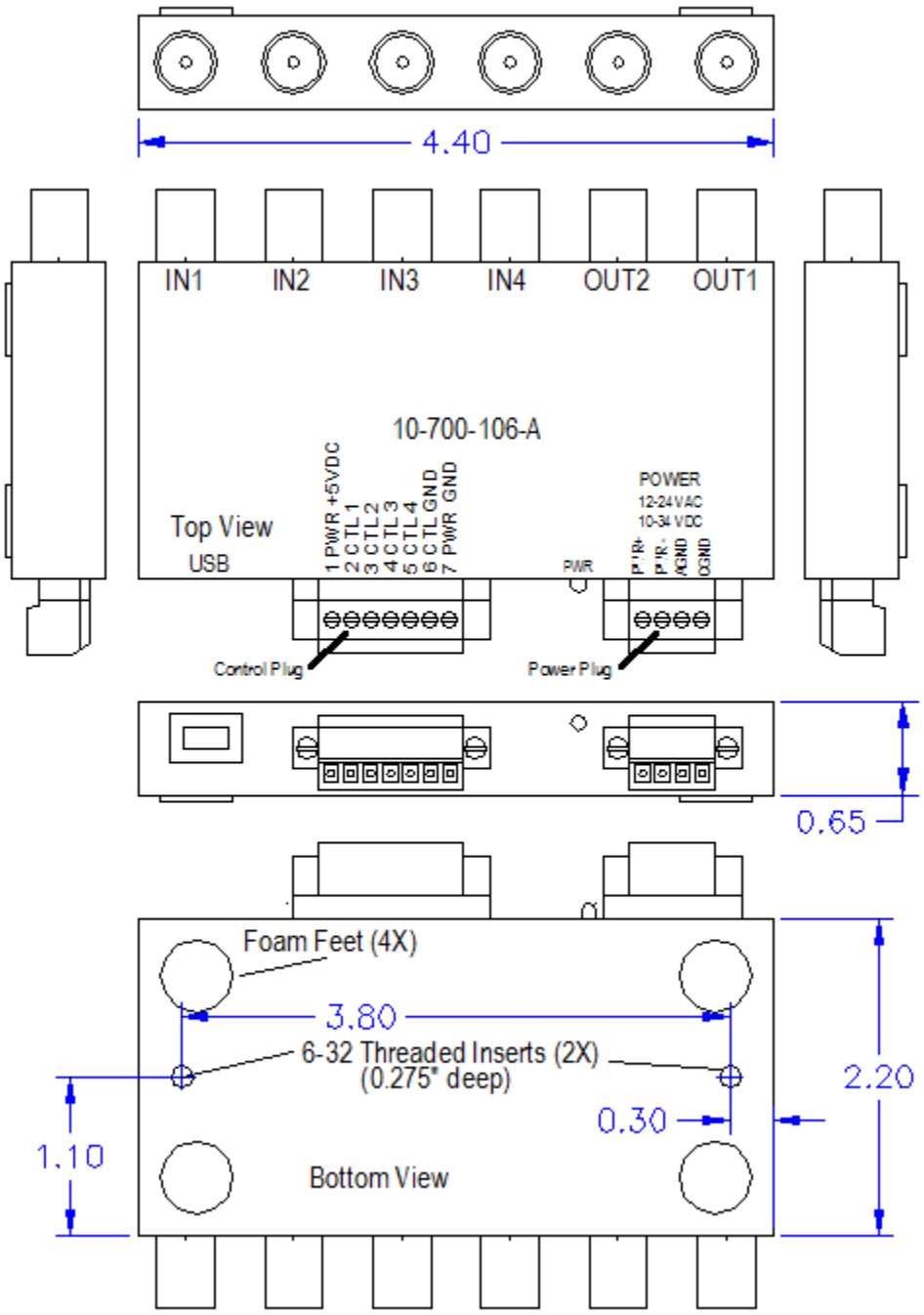
The LAOD NEW CODE permits the user to load a new revision of the processor code. The user must contact the factory for changes to the code and receive the required TXT file. Care must be taken when loading new code. Once the user answers YES to both questions the application FLASH is erased, new code must be loaded. It is the responsibility of the user to contact the factory before trying to load new code.

7.0 Overall Specifications

Video Formats:	NTSC or PAL	
Input Connectors	BNC's (two [105] or four [106])	
Input Termination	75 Ohms, DC coupled	
Output Connector:	BNC (two)	
Output Terminations:	75 Ohms (series), DC coupled	
USB Interface (ASCII data)	8 bit 9600 baud 1 stop No parity XON/OFF flow control	
Control Connector:	3.5mm 7 pin terminal block Mating plug	(Phoenix Contact #1843842) (Phoenix Contact #1847107)
Power LED:	Green (Indicates uP is running)	
Operating Temperature Range:	-40C to +85C	
Power:	10-28V AC, 10-32V DC (either polarity on PWR connector)	
Supply Current: (actual TBD)	<300mA at 12 VDC	
Power Connector:	3.5mm 4 pin terminal block Mating plug	(Phoenix Contact #1843813) (Phoenix Contact #1847071)
Package:	4.4" X 2.2" X 0.65"	
Mounting:	Two 6-32 threaded inserts	
Weight: (actual TBD)	7 oz.	

8.0 Packages


4.40
IN1
IN2
OUT2
OUT1
10-700-105-A
Top View
USB
1 PWR +5VDC
2 CTL 1
3 CTL 2
4 CTL 3
5 CTL 4
6 CTL GND
7 PWR GND
POWER
12-24 VAC
10-34 VDC
PWR
P1R+
P1R-
AGND
DGND
Control Plug
Power Plug
0.65
Foam Feet (4X)
3.80
6-32 Threaded Inserts (2X)
(0.275" deep)
2.20
0.30
1.10
Bottom View


4.40
IN1
IN2
IN3
IN4
OUT2
OUT1
10-700-106-A
Top View
USB
1 PWR +5VDC
2 CTL 1
3 CTL 2
4 CTL 3
5 CTL 4
6 CTL GND
7 PWR GND
PWR
POWER
12-24 VAC
10-34 VDC
P1R+
P1R-
AGND
DGND
Control Plug
Power Plug
0.65
Foam Feet (4X)
3.80
6-32 Threaded Inserts (2X)
(0.275" deep)
2.20
0.30
1.10
Bottom View