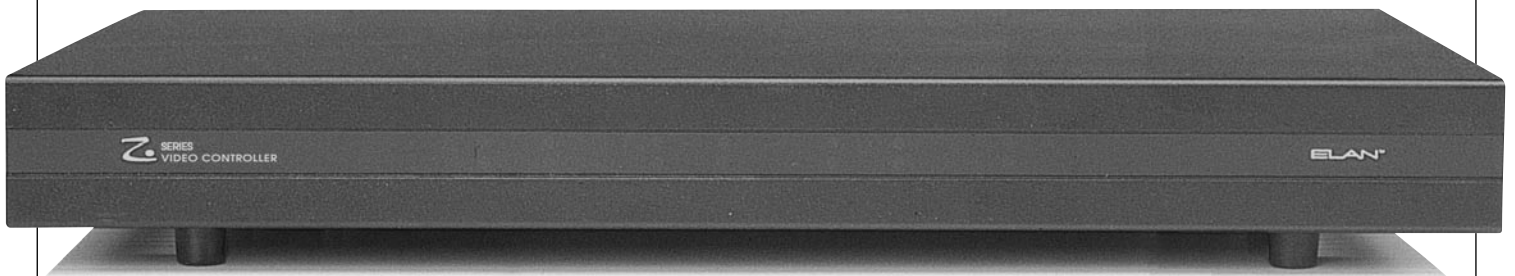


Z.880 VIDEO CONTROLLER

Installation Manual



CONGRATULATIONS AND THANK YOU

You have purchased the highest quality video controller on the market today - the Z•880 Video Controller. We at ELAN Home Systems are proud of this precision component and are pleased you have chosen this ELAN product as the cornerstone to your A/V system. Crafted to be the de facto standard in its class, the Z•880's circuit design, small footprint and robust performance are the latest in technology and should provide you with years of superior A/V performance. The Z•880 is also available in a rack mount version—the Z•881.

As a manufacturer, ELAN strives to provide you with excellent service after the sale. If you have any questions or comments concerning the performance, installation or features of the Z•880 Video Controller, please call the ELAN Service and Technical Support Department at 1(859)269-7760.

ELAN Home Systems designs and manufactures the industry's most complete line of multi-room audio/video systems and components. For free product information write us at:

ELAN Home Systems
Product Information
2428 Palumbo Drive
Lexington, Kentucky 40509
Email: elan@elanhomesystems.com

Look for these other Z•Series Products:

Z•630/631 PreAmp Controller
Z•600/601 Comm Controller
Z•660/661 Multi-Channel Power Amplifier
Z•300/301 Two-Channel Power Amplifier
Z•POWER Intelligent Power Controller
Z•FAN Modular Cooling Component
ZPAD Intelligent Keypads

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 **WARNING** 
RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the device or component.

WARNING: TO REDUCE THE RISK OF FIRE OR SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

IMPORTANT SAFETY INFORMATION

Read Information—All the safety and operating information should be read before the unit is operated.

Follow Information—All operating and use information should be followed.

Retain Information—The safety and operating information should be retained for future reference.

Heed Warnings—All warnings on the unit and in the operating instructions should be heeded.

Carts and Stands—This unit should be used with a stationary shelf. Do not use any mobile carts.

Wall Mounting—Mounting of this unit should be done only by an authorized installer.

Ventilation—This unit should be situated so that its location or position does not interfere with proper ventilation. This unit should never be placed near or over a radiator or heat register. This unit should not be placed in a built-in installation such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.

Non-Use Periods—Units that are left unattended and unused for long periods of time should be unplugged from the wall outlet.

Power Sources—This unit should be connected to a power supply only of the type described in the operating instructions or as marked on each unit. If you are not sure of the type of power supply to your home, consult your authorized ELAN dealer or local power company.

Grounding or Polarization—These audio products are equipped with a grounding-type alternating-current line plug. This plug fits only into a grounding-type power receptacle. This is a safety feature. If the plug receptacle does not fit, contact an electrician to replace your obsolete receptacle. Do not defeat the safety purpose of the grounding-type plugs.

Power Cord Protection—Power supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the units. Do not damage or deform the power supply cord. If it is damaged or deformed, it may cause electric shock or fire when used. When removing from the wall outlet, be sure to remove by holding the plug attachment and not by pulling the cord.

Telephones—Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electrical shock from lightning. Do not use a telephone to report a gas leak if the leak is in the vicinity of the ELAN electronic equipment because of risk of fire or explosion.

Cleaning—Unplug this audio product from the wall outlet before cleaning. Do not use liquid or aerosol cleaners. Use a damp cloth for cleaning.

Power Lines—An outdoor antenna should be located away from power lines. When installing an outside antenna system, extreme care should be taken to avoid touching power lines or circuits, as contact with them may be fatal.

Outdoor Antenna Grounding—If an outside antenna or cable system is connected to these audio products, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Section 810 of the U.S. National Electrical Code, and Section 54 of the Canadian Electrical Code, provide information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode. See the grounding diagram (right).

Overloading—Do not overload wall outlets and extension cords, as this could result in fire or electric shock. Do not use speakers with a rating of less than 4 ohms when in “nonbridged” mode or less than 8 ohms in “bridged” mode.

Object and Liquid Entry—Never insert objects of any kind through the openings of this unit, as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Care should be taken so that objects do not fall and liquids are not spilled into the unit through openings in the enclosure.

Servicing—Do not attempt to service this unit yourself, as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

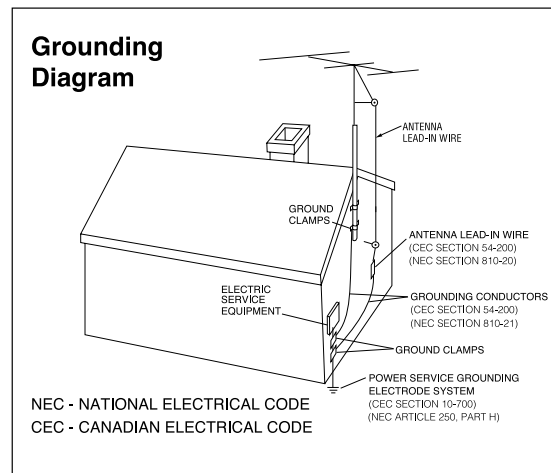
Damage Requiring Service—This unit should be serviced by qualified service personnel when:

- A power supply cord or a plug has been damaged or
- If liquid has been spilled into the unit or objects have fallen into the unit or
- The unit has been exposed to water or moisture or
- The unit does not appear to operate normally or exhibits a marked change in performance or
- The unit has been dropped or the enclosure damaged.

Replacement Parts—When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or that have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards. The Master Control Unit battery should be replaced only after turning the power off and only by an authorized installer.

Safety Check—Upon completion of any service or repairs to this audio product, ask the service technician to perform safety checks to determine that the audio product is in proper operating condition.

Lightning—For added protection for these audio products during an electrical storm, or when they are left unattended and unused for long periods of time, unplug them from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the audio products due to lightning and power-line surges.



FEDERAL COMMUNICATIONS COMMISSION (FCC) NOTICE:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

880 INTRODUCTION

The Z•880 is the most versatile high-performance composite video switcher on the market today. Its 8x8 matrix can independently select any one of 8 video sources in up to 8 video zones. Or with as many as three Z880s, 8x24 switching is possible.

HDTV-compatible wide band switch matrix and video line drivers are placed on a premium double-sided flooded ground plane circuit board, ensuring that the highest quality video and cross-talk performance specifications are maintained.

User/Installer-friendly LED readouts, selectable 75 ohm/Hi Z video inputs, and configurable RS-232 baud rates provide unsurpassed flexibility for almost any application. Additionally, control interfaces include front panel IR receiver, rear panel IR input for remote sensors, RS-485, RS-232, and ELAN HD Series serial control data links.

System Integration

The Z•880 is fully compatible with ELAN's Z• Series, S• Series and HD Series multi-source/multi-zone systems and can be integrated with RS-232 controllers such as a PC or touchscreen via its RS-232 serial communication port. It can also serve as a stand-alone video switcher for security/surveillance applications.

S• and Z• Series – the Z•880 interfaces easily with the System6 and Z•630 PreAmp Controller. In a Z• System, the Z•880 can switch up to 6 video sources into 3 zones (with 1 Z•630), 6 zones (when using 2 Z•630s), 9 zones (using 3 Z•630s and 2 Z•880s), or 12 zones (using 4 Z•630s and 2 Z•880s). The Z•880 and System6 or Z•630 enables Z•PADs, VIA! Touch Panels, or IR receivers in each zone to independently control both the system's audio and video sources.

HD Series – in an ELAN HD system, the MCU* and the Z•880 communicate via RS-232 serial communications. A dual 6-pin DIN Serial Interface cable is provided with the Z•880 and is used to link the RS-232 ports on the HD's Automation Control Card to the HD/RS232 serial port on the Z•880. RS-232 THRU ports on the Z•880 allow you to connect up to 3 Z•880s to the system, giving you a total of 8 video sources that are independently accessible in up to 24 zones. As with Z•Series integration, all keypads and/or IR receivers in an ELAN HD System will be able to control all audio and video sources.

NOTE: *MCU software revision 3900 or higher is required for HD/Z•880 interface.

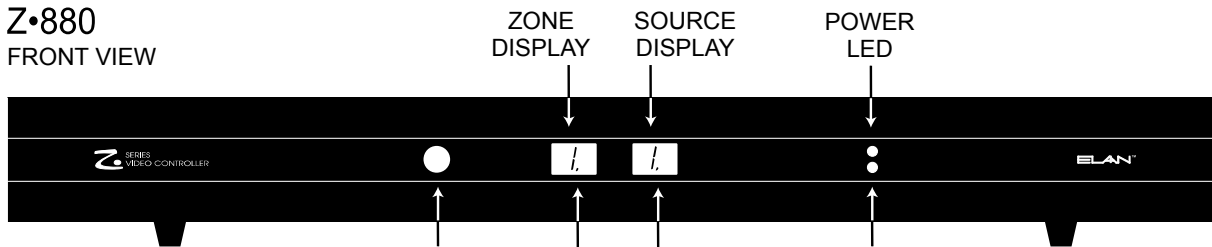
RS232 Controllers – the Z•880 can easily be integrated with systems that use PCs or touch screens as the main system controller. Once again, the RS-232 serial communication ports are used as the data link between devices. Selectable baud rates of 19,200 and 9,600 make the Z•880 compatible with most RS232 controllers on the market. A 9-pin DSUB to 6-pin DIN cable is included to make this connection. Easy-to-write Z•880 RS-232 protocol is provided at the back of this manual, and is available for download from our web site. (www.elanhomesystems.com).

Stand-alone – the Z•880 is the perfect choice for security and surveillance applications. Multiple CCTV cameras (up to eight!) can be independently selected and viewed in 8 different locations.

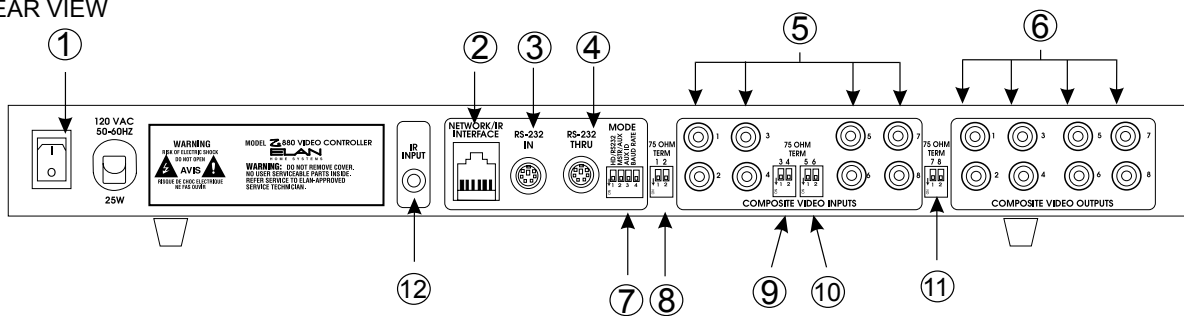
Sharing Video Sources – Have a home theater or media room and want distributed video throughout the house? The Z•880 eliminates the need to dedicate duplicate sources for both applications. Eight (one for each source) 75 ohm/Hi Z selectable dip switches allow any of the eight video sources connected to the Z•880 to be 'shared' with a surround sound processor or A/V receiver in the main media room or home theater - without any signal degradation.

Z.880 FEATURES

Z•880
FRONT VIEW



Z•880
REAR VIEW



1. Power ON/Off Switch
2. Z630 Network/IR Interface Jack (RJ-45)
3. RS232 Serial Port IN (6-pin DIN)
4. RS232 Thru Port (6-pin DIN)
5. Composite Video Inputs (8)
6. Composite Video Outputs (8)
7. Mode Selector
8. Impedance Selector, Inputs 1 & 2
9. Impedance Selector, Inputs 3 & 4
10. Impedance Selector, Inputs 5 & 6
11. Impedance Selector, Inputs 7 & 8
12. Hardwire IR input (tip=IR, sleeve=ground)

Z•038 Hand Held Remote Control

AUTO/MAN (Automatic/Manual)

System Applications:

Z - Pressing MAN disconnects the Z880 from Z630 network communications and allows you to manually access any of the video sources via the Source 1-8 keys. Typically, this feature would only be used to access sources 7 and 8 (i.e. front door and back yard cameras), as they are not part of the Z wholehouse system. Note that if manually selecting sources 1-6, Z system keypads and audio will not track. Pressing AUTO puts the Z880 back on the Z630 network and will re-sync the video to the audio selected on the keypad.

HD/RS232 Application: None

Stand-Alone Application: None

MUTE

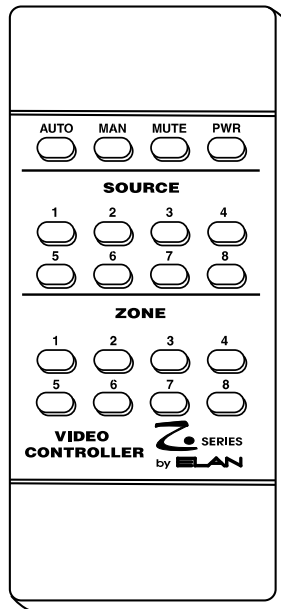
System Applications:

Z - 'Mutes' the video in a zone only when Z880 is in MANUAL mode

HD/RS232 - 'Mutes' the video in a zone

Standalone - 'Mutes' the video in a zone

(Note: when a video source is 'muted' from the hand-held remote, the TV screen will go blank, but system audio will remain on.



PWR

Power ON/OFF toggle (for Z880 only)

SOURCE 1-8

System Applications:

Z - Functional in MANUAL mode only. Use to view 7 & 8. Will also manually select sources 1-6, but keypads and audio will not track. To re-sync to Z630 press AUTO.

HD/RS232 Application: None

(Although you can select sources 1-8 with the remote, this feature is generally not used in an HD or RS232 controller application. In these systems, the HD's keypads or the RS232 controller (i.e. a touch screen) controls both audio and video switching. When selecting sources manually from the remote, keypads and audio will not track. Should you change sources with the Z880's remote, you would need to re-select the original source to re-sync the system [pressing AUTO will not do it])

Stand-Alone Application:

Selects video sources 1-8

ZONE 1-8

System Applications:

Z - Lets you visually check what source is being viewed in each zone; also lets you change sources in the zone selected (MAN mode only).

HD/RS232 - Same as above.

Stand-Alone - Same as above.

IMPORTANT NOTE: The Z038 Remote no longer ships with the Z880. However, it may be purchased as a separate item.

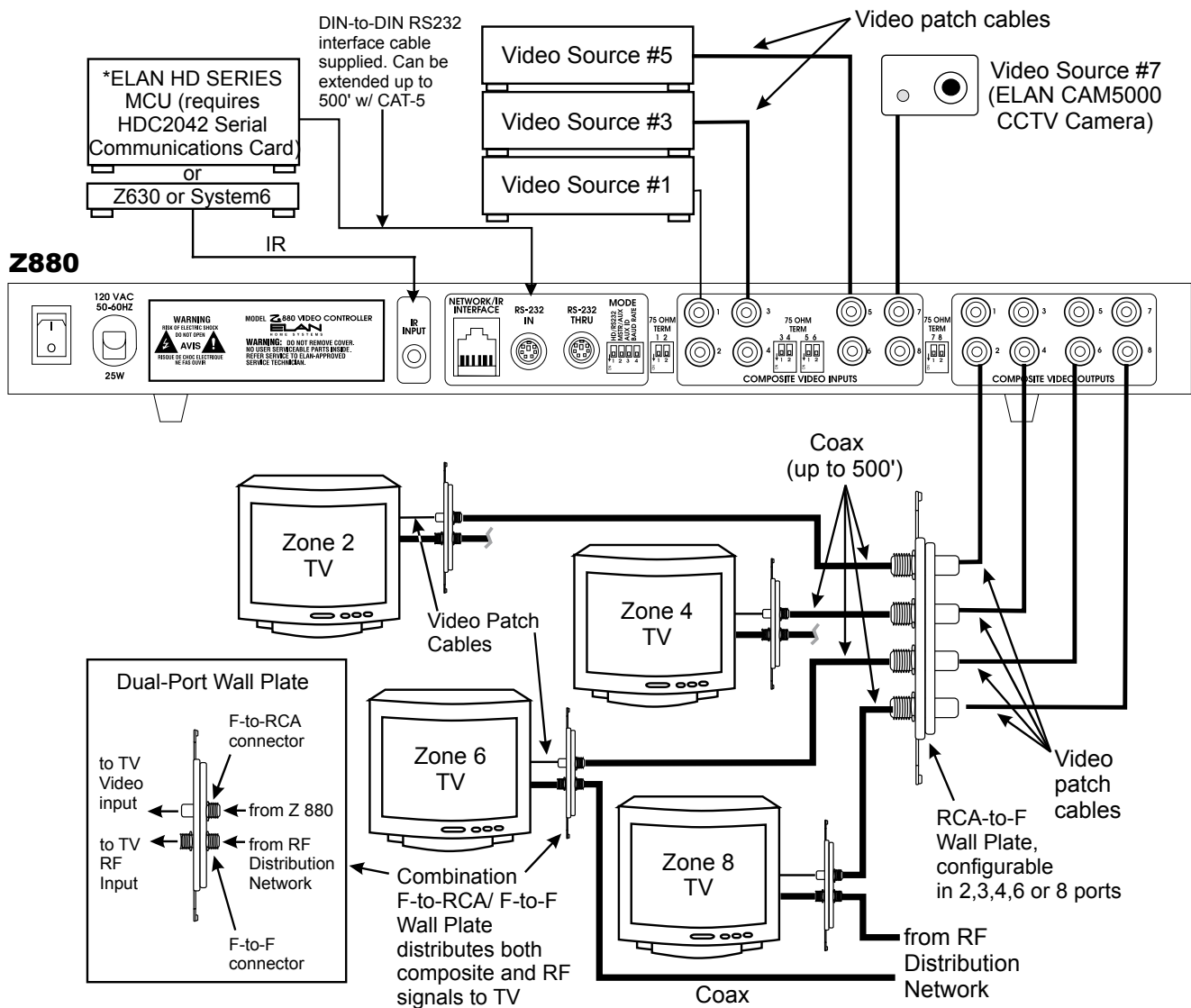
Z.880 SYSTEM OVERVIEW

The Z•880 can switch up to eight composite (base-band) video signals into eight zones and is fully compatible with ELAN S•, Z• and HD* Series systems—as well as for use as a stand-alone video switcher.

The Z•880 will require runs of RG6 or RG59 coaxial cable to be pulled to each video zone. Dual runs of coax are recommended so that multiple signals (i.e. Z•880 compos-

ite and distributed RF [cable/antenna] are available at each TV location. ELAN's new line of modular wall plates provide easy termination of your coax runs back at the head end—as well as TV-to-coax connections in each video zone. Use high-quality video interconnect cables between the sources and the Z•880 and also between the TV and the video zone's wall plate.

(Shown in this diagram - Video sources 1,3, 5 & 7. Video zones 2,4,6 & 8)



Z.880 IR CONFIGURATIONS - Z AND SYSTEM6

As many as three Z880s may be used at one time. ELAN-TOOLS! software provides discrete IR codes enabling Z880s to perform 8x8, 8x16, 8x24, or 15x16 matrix switching.

All routing is programmed automatically using the AUTO-BUILD feature. See the ELANTOOLS! Setup Software Reference Manual for details.

NOTE 1: When configuring a system using a System6 or Z630 Preamp Controllers - ELAN strongly recommends using IR to control the Z880.

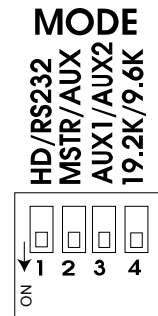
NOTE 2: An ELAN IRZ may be utilized to enable a single "IR ALL" port on a System6, Z630, or HD system to control of as many as THREE Z880s.

PLEASE SEE THE ELAN WEBSITE and download the Technical Bulletin titled "Z630/Z880 IR Distribution Methods" dated 1/3/03 for information detailing how to use an ELAN IRZ to drive multiple IR Emitters from a single "IR ALL" port.

Z.880 DIP SWITCH SETTINGS

MODE Dip Switch Settings

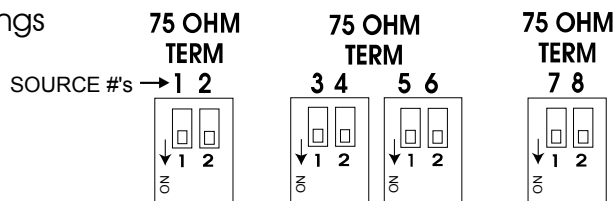
- HD/RS232** (Factory Default, HD - Down)
This dip switch will remain in the factory default down position at all times unless the Z880 is being used in a stand-alone application where the Z880 is being controlled by an RS232 device such as a PC or touchscreen controller. The dip switch would then be moved to the UP position.
- MSTR/AUX** (Factory Default, MSTR - Down)
In an ELAN HD system or RS232 controller application where more than 8 video zones are needed, this dip switch determines whether the Z880 is the **MASTER** unit (Zones 1-8) or one of the two possible **AUX**iliary units (Zones 9-16 and 17-24). If more than one Z880 is being used, this dip switch must be moved to the UP position on the 2nd and 3rd Z880s.
- AUX1/AUX2** (Factory Default, AUX1 - Down)
In a **MSTR/AUX** application, if the Z880 is the 1st **AUX**iliary unit (Zones 9-16) this dip switch will remain in the factory default DOWN position. If the Z880 is the 2nd **AUX**iliary unit (Zones 17-24), this dip switch must be moved to the **AUX2** (UP) position.
- 19.2K/9.6K** (Factory Default, 19.2K - Down)
This dip switch determines the baud rate (the rate at which RS232 devices communicate with the Z880). The factory default setting of 19.2K is the same rate as that of serial port on the HDC2040 Automation Control Card. When interfacing with other RS232 devices, confirm that unit's baud rate and move the dip switch to the 9.6K setting if necessary.



Factory Default:
All dip switches in the DOWN (ON) position

75 OHM Termination Dip Switch Settings

When the video output of a source is sent to multiple Z880s or shared with another device such as an A/V receiver or Surround Sound Processor, these dip switches (one for each source) must be moved to the UP position. Failure to set these dip switches correctly will result in poor picture quality.

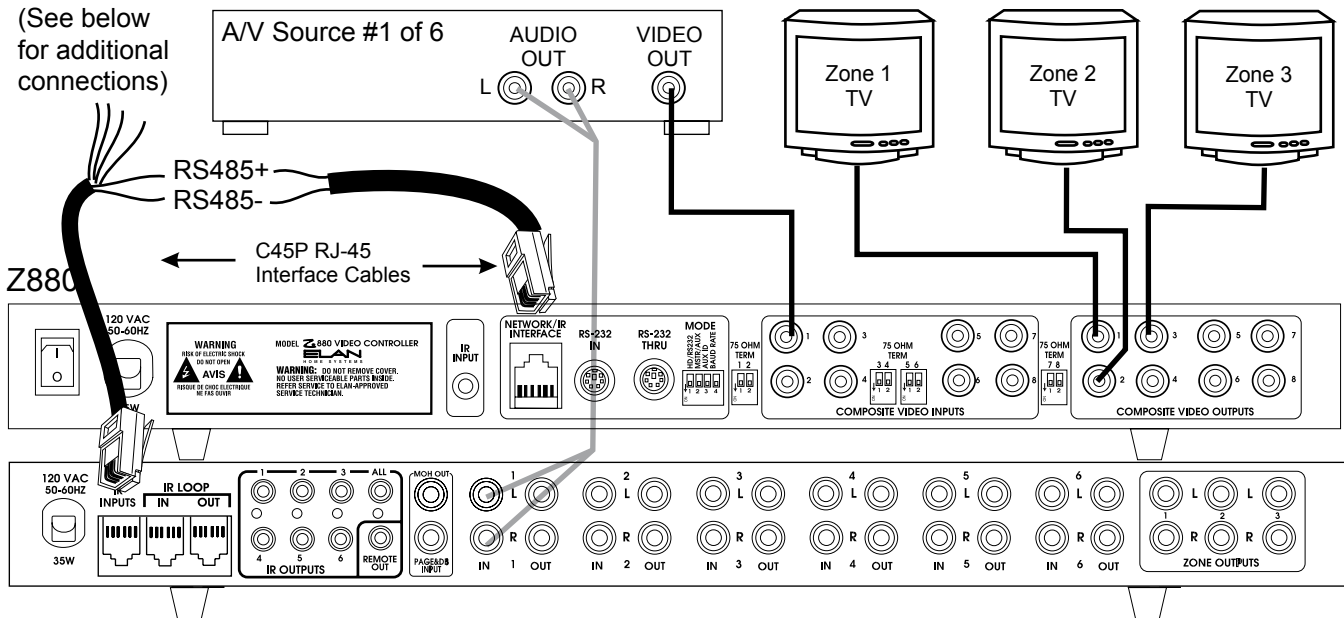


Factory Default: All dip switches on the DOWN (ON) position

Z.880 DIAGRAMS

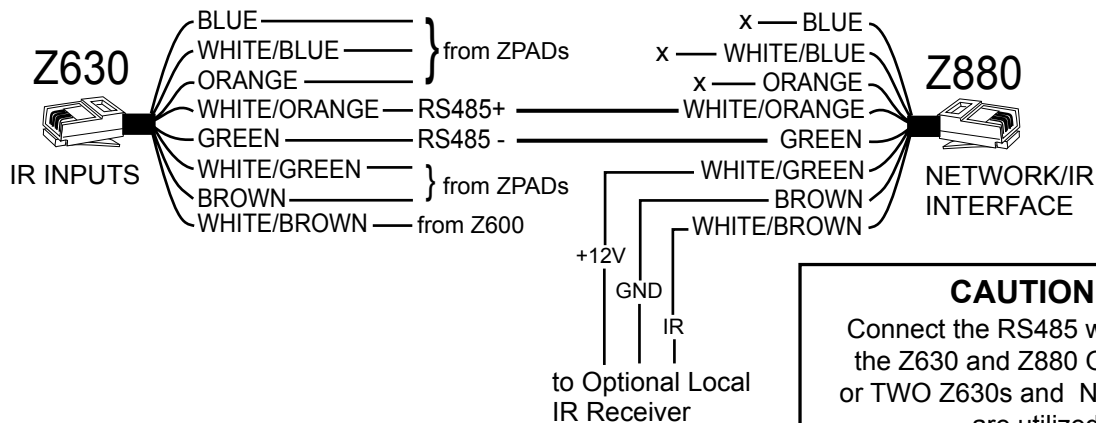
Z•880 to Z•630 PreAmp Controller Connections

Connecting the Z•880 to a Single (3-Zone) Z•630 PreAmp Controller



(see Z630 Installation Manual for complete Z630 installation and wiring instructions)

Z-880 to Z-630 RS485 Network Connections



CAUTION!!!

Connect the RS485 wires between the Z630 and Z880 ONLY if ONE or TWO Z630s and NO CAMERAS are utilized.

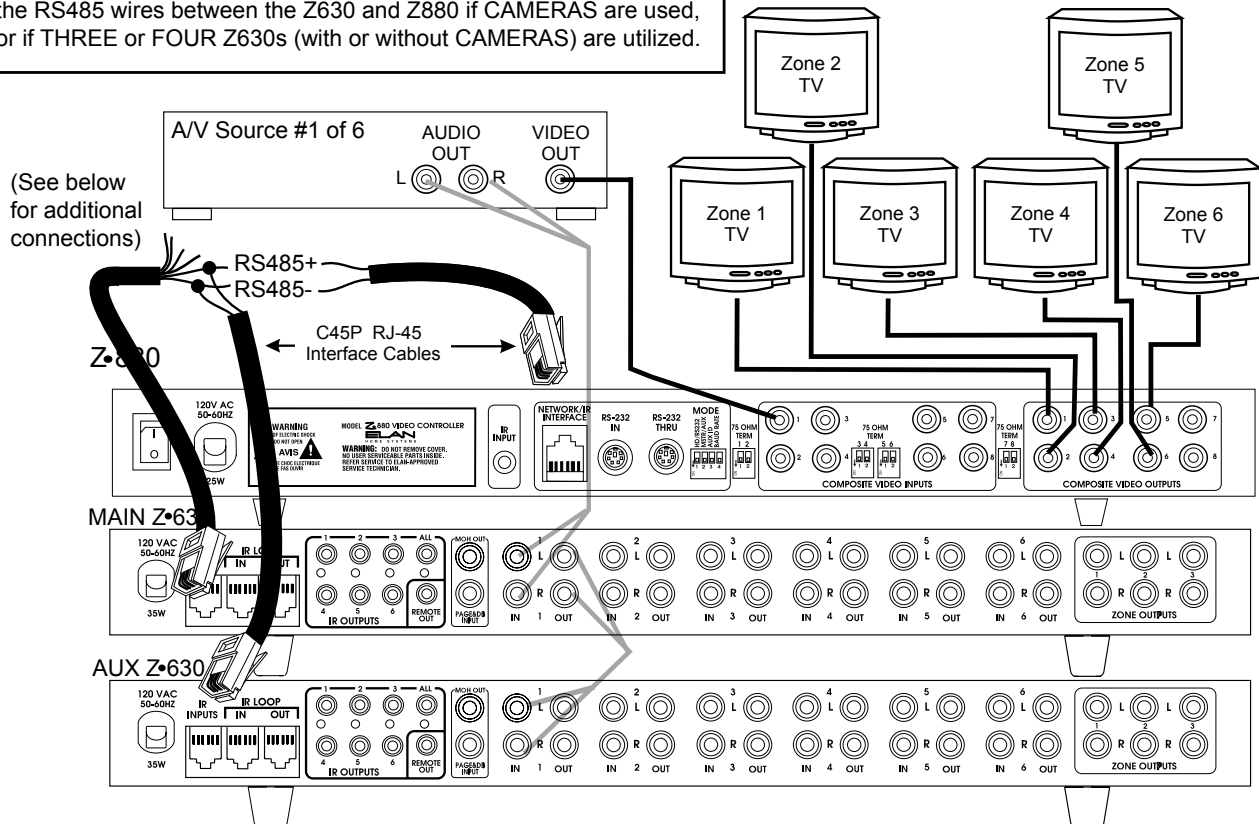
DO NOT

Connect the RS485 wires between the Z630 and Z880 if CAMERAS are used, or if THREE or FOUR Z630s (with or without CAMERAS) are utilized.

NOTE: When using the Z-880 in a Z-630 system, the Z-880's dip switches remain in the factory default setting (all down) unless you are sharing the video sources with another device such as an A/V receiver (see SHARING VIDEO SOURCES, Page 15 for details).

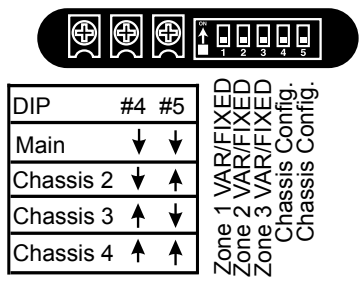
RS485 Connections between the Z•880 and twin Z•630s

CAUTION!!!
 Connect the RS485 wires between the Z630 and Z880 ONLY if ONE or TWO Z630s and NO CAMERAS are utilized. **DO NOT** connect the RS485 wires between the Z630 and Z880 if CAMERAS are used, or if THREE or FOUR Z630s (with or without CAMERAS) are utilized.

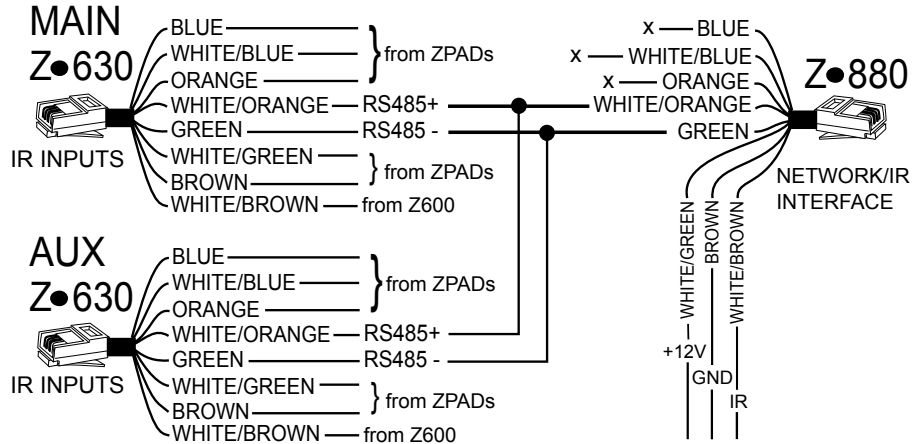


(see Z630 Installation Manual for complete Z630 installation and wiring instructions)

Z630 DIP Switches (front panel)



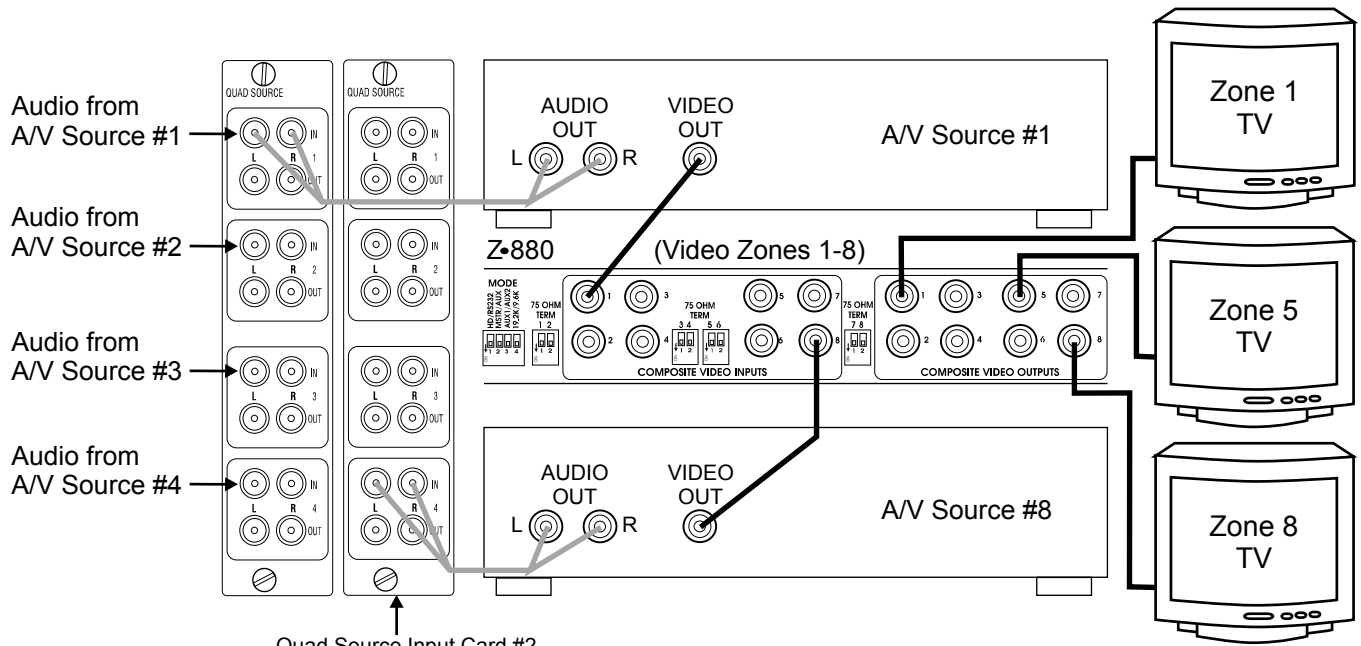
Z•880 to Dual Z 630 RS485 Network Connections



NOTE: When using the Z880 in a Z630 system, the Z880's DIP switches remain in the factory default setting (all down) unless you are sharing the video sources with another device such as an A/V receiver (see SHARING VIDEO SOURCES, page 15 for details).

HD Connections Using 1 Z•880 for a Maximum of 8 Video Zones

Shown: A/V Sources 1 and 8, Video Zones 1, 5, 8

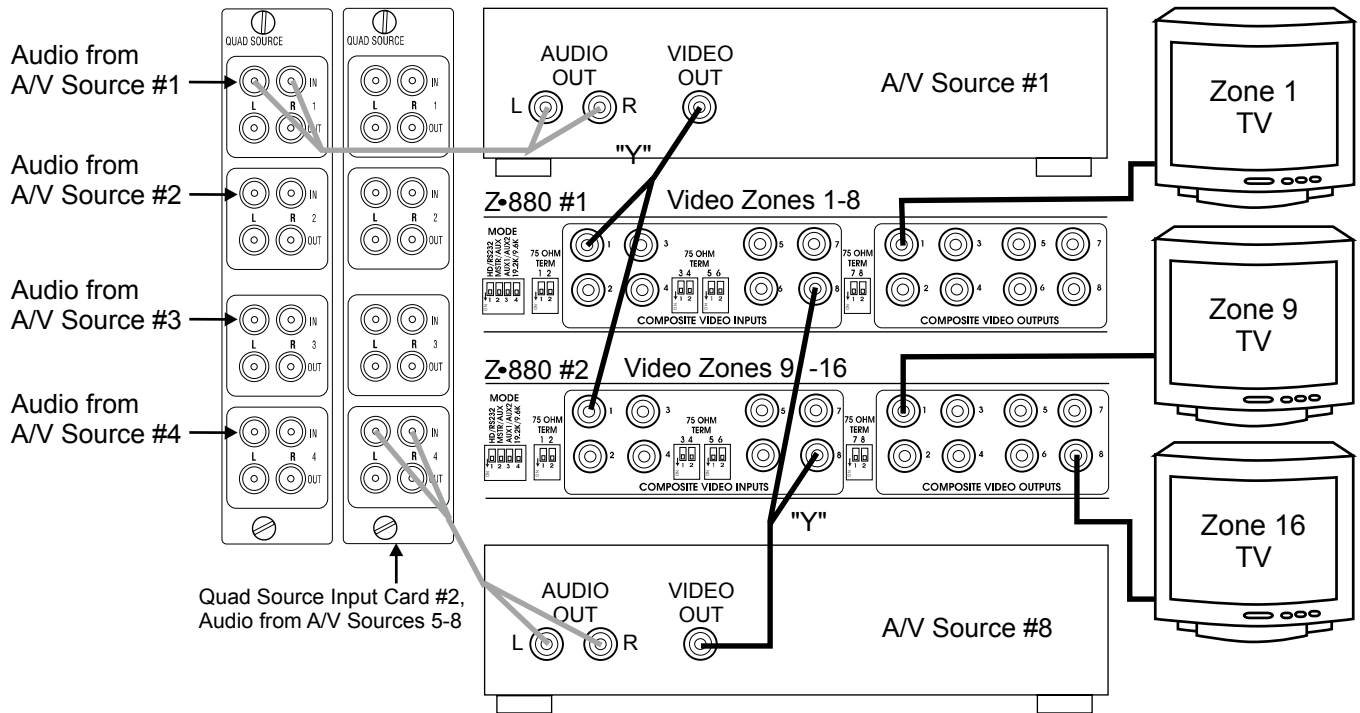


Quad Source Input Card #2,
Audio from A/V Sources 5-8

Z880 DIP SWITCH SETTINGS REMAIN AT FACTORY DEFAULT (ALL DOWN)

HD Connections Using 2 Z•880's for a Maximum of 16 Video Zones

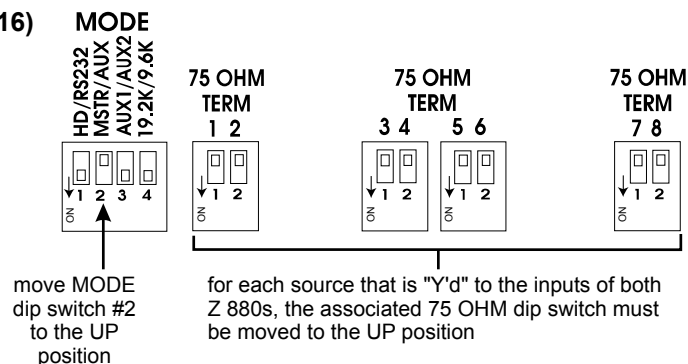
Shown: A/V Sources 1 and 8, Video Zones 1, 9, 16



Dip Switch Settings

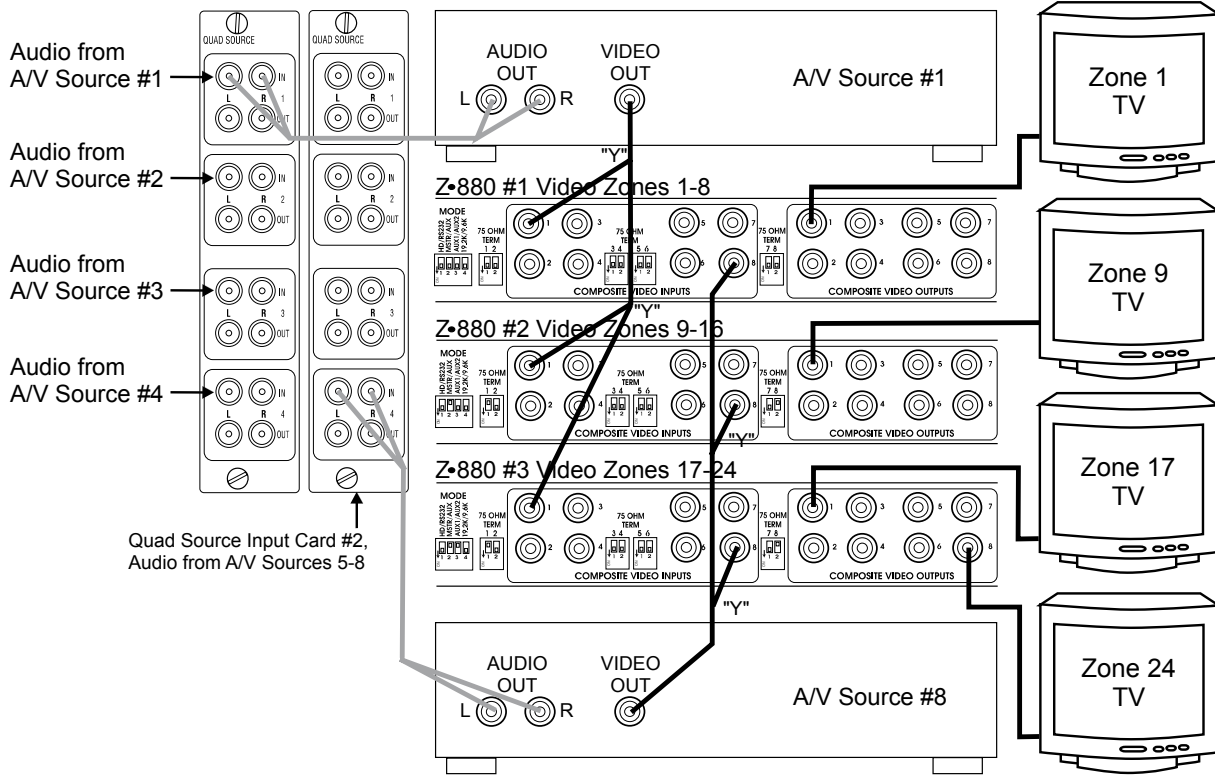
Z•880 #1 (MASTER, Video Zones 1-8) REMAINS AT FACTORY DEFAULT (ALL DOWN)

Z•880 #2 (AUX1, Video Zones 9-16)



HD Connections Using 3 Z•880's for a Maximum of 24 Video Zones

Shown: A/V Sources 1 and 8, Video Zones 1, 9, 17, 24



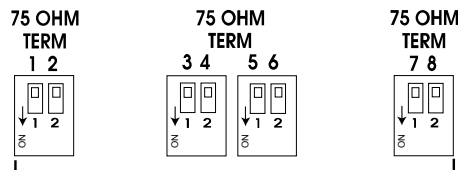
Z•880 #1 (MASTER, Video Zones 1-8) REMAINS AT FACTORY DEFAULT (ALL DOWN)

Z•880 #2 (AUX1, Video Zones 9-16)

MODE



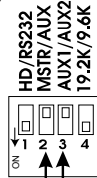
move MODE dip switch #2 to the UP position



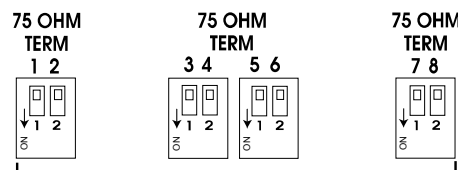
for each source that is "Y'd" to the inputs of both the Master and AUX1 Z 880s, the associated 75 OHM dip switch must be moved to the UP position

Z•880 #3 (AUX2, Video Zones 17-24)

MODE

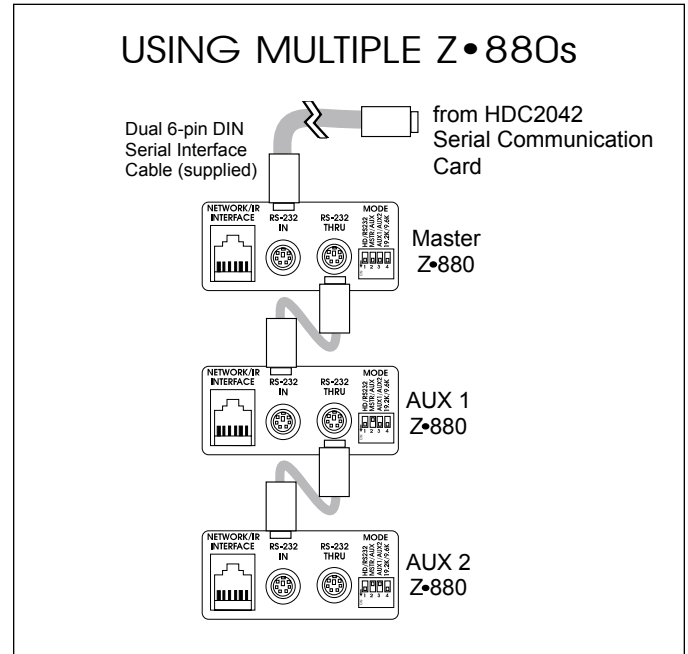
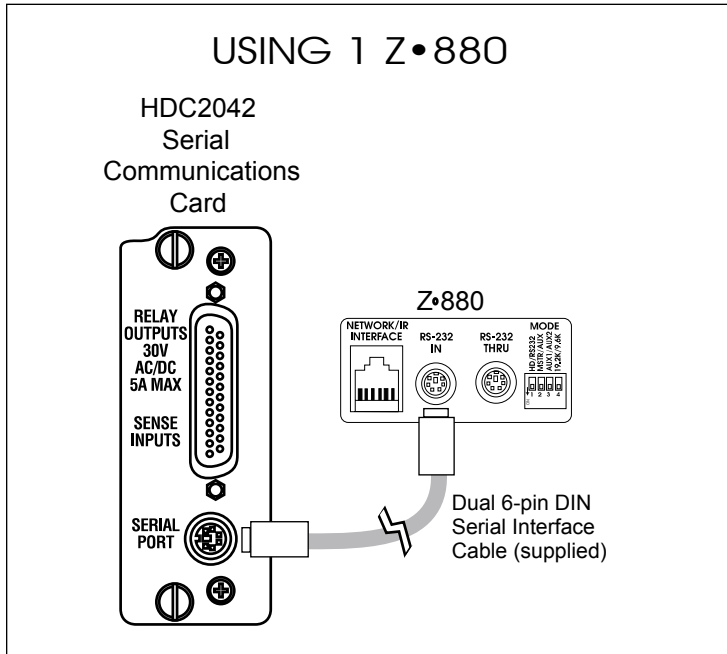


move MODE dip switches 2 & 3 to the UP position

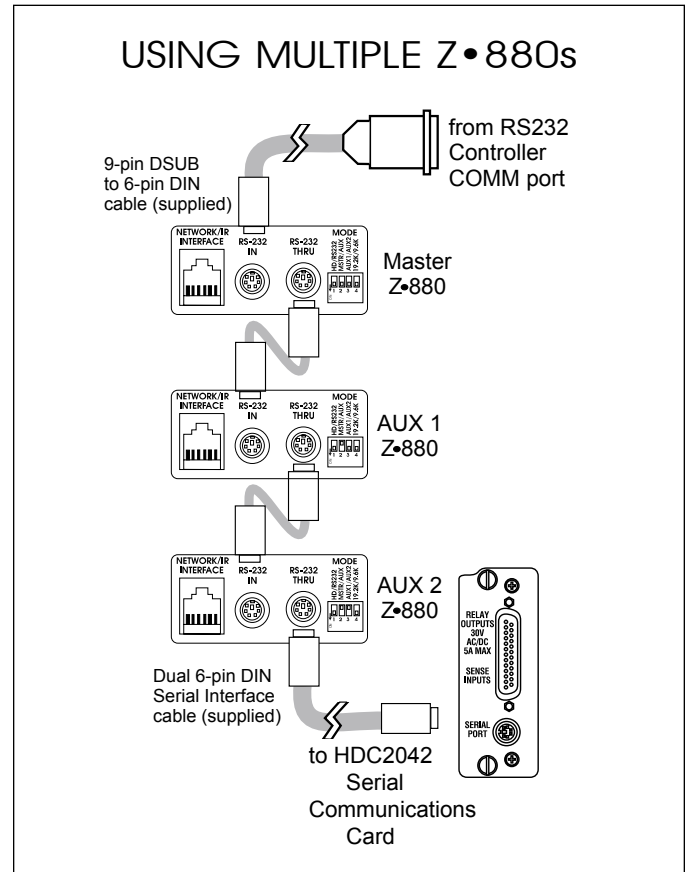
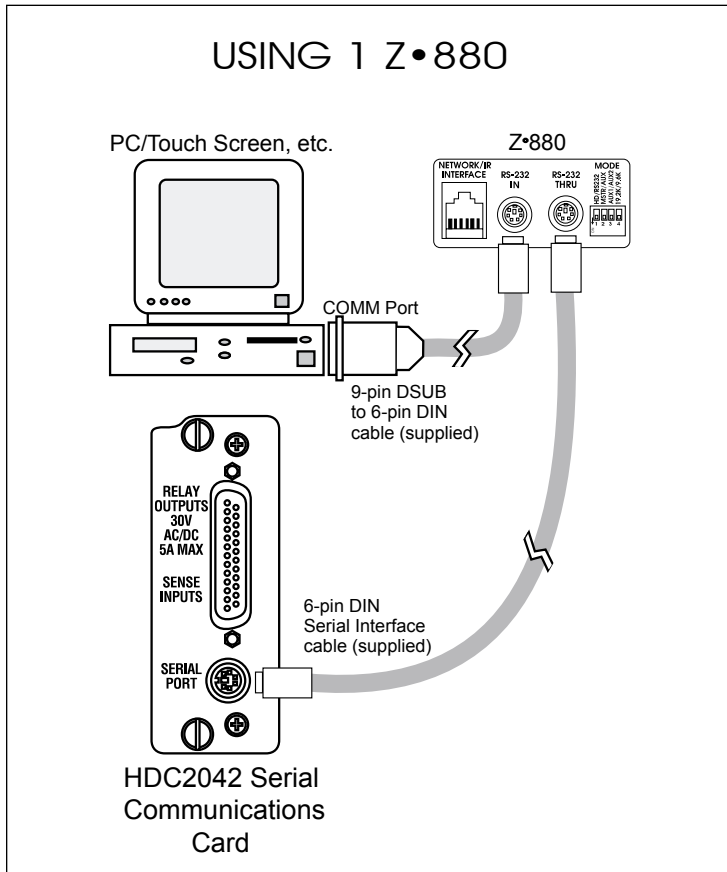


for each source that is "Y'd" from the AUX1 Z 880 to the AUX2 Z 880, the associated 75 OHM dip switch must be moved to the UP position

Z•880/HD Serial Port Connections

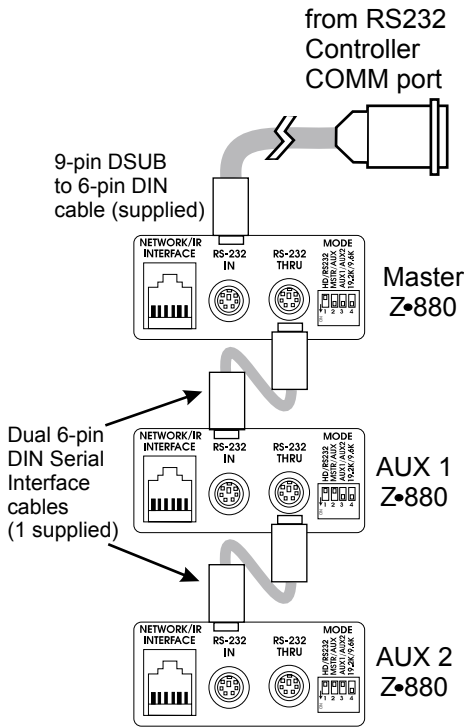


Z•880/HD + RS232 Controller Serial Port Connections



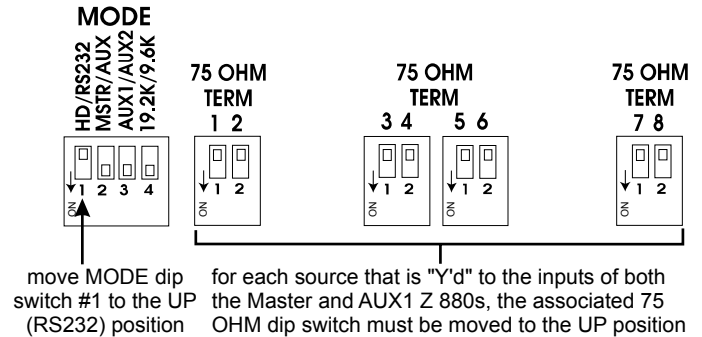
Stand-Alone RS232 Connections and Dip Switch Settings

STAND-ALONE RS232 CONNECTIONS

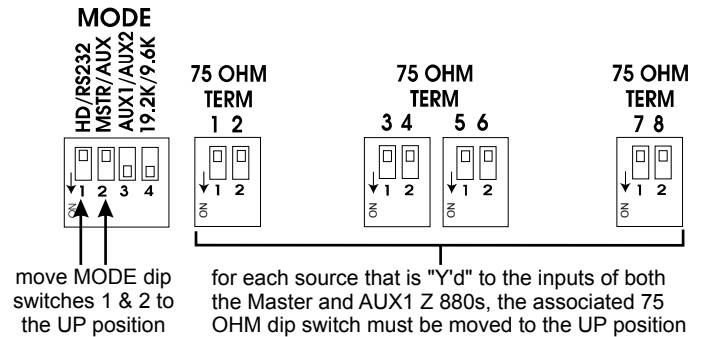


STAND-ALONE RS232 DIP SWITCH SETTINGS

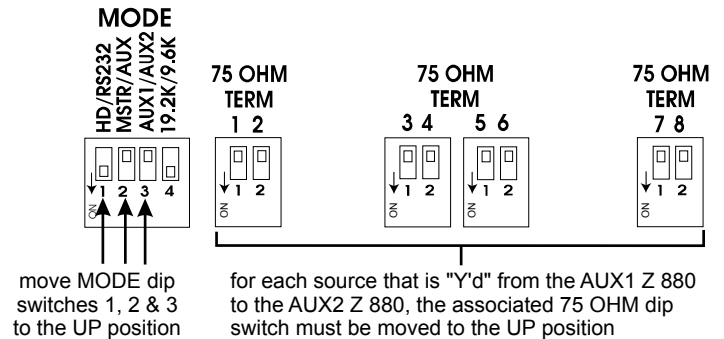
Z-880 #1 (MASTER, Video Zones 1-8)



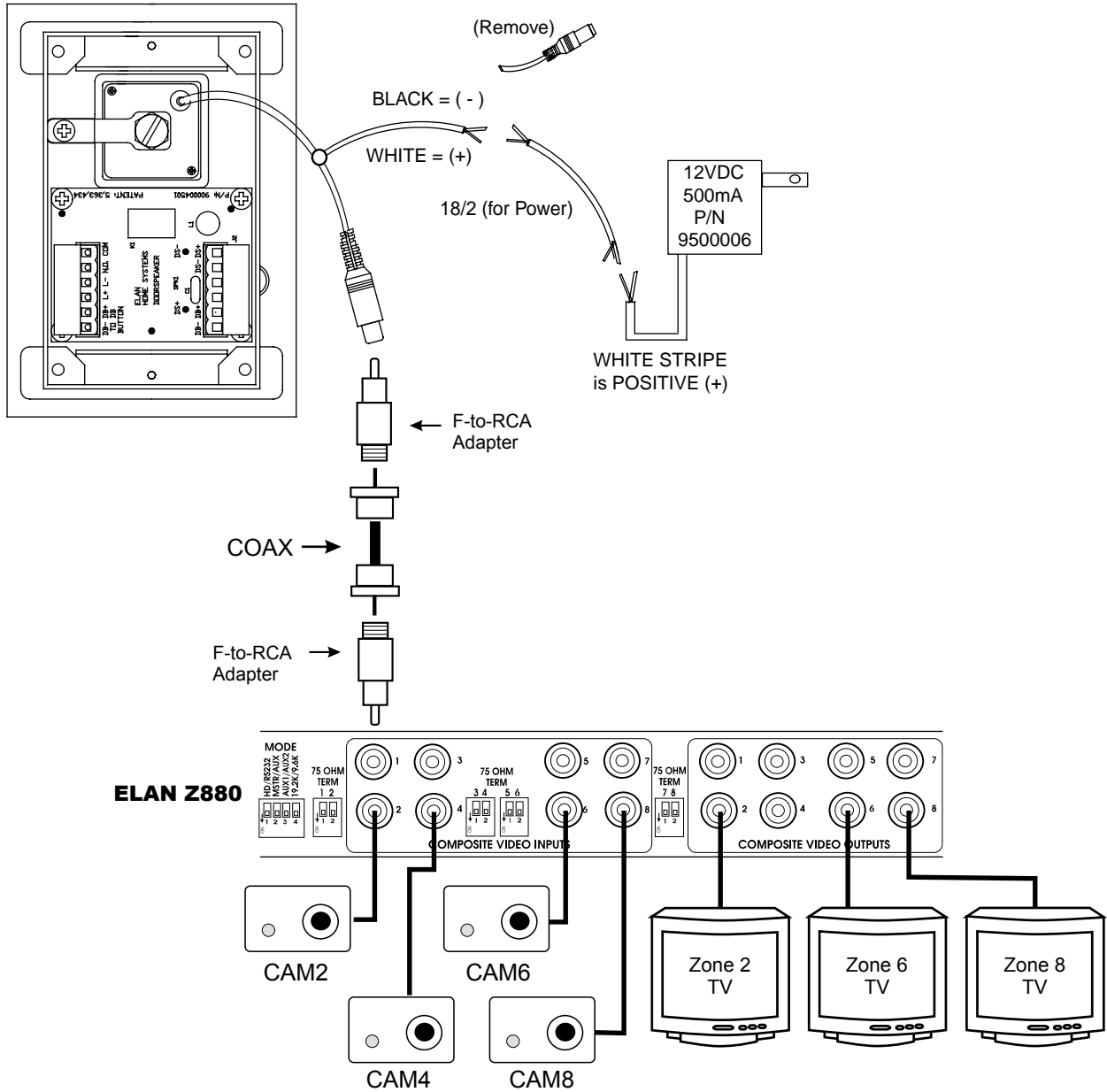
Z-880 #2 (AUX1, Video Zones 9-16)



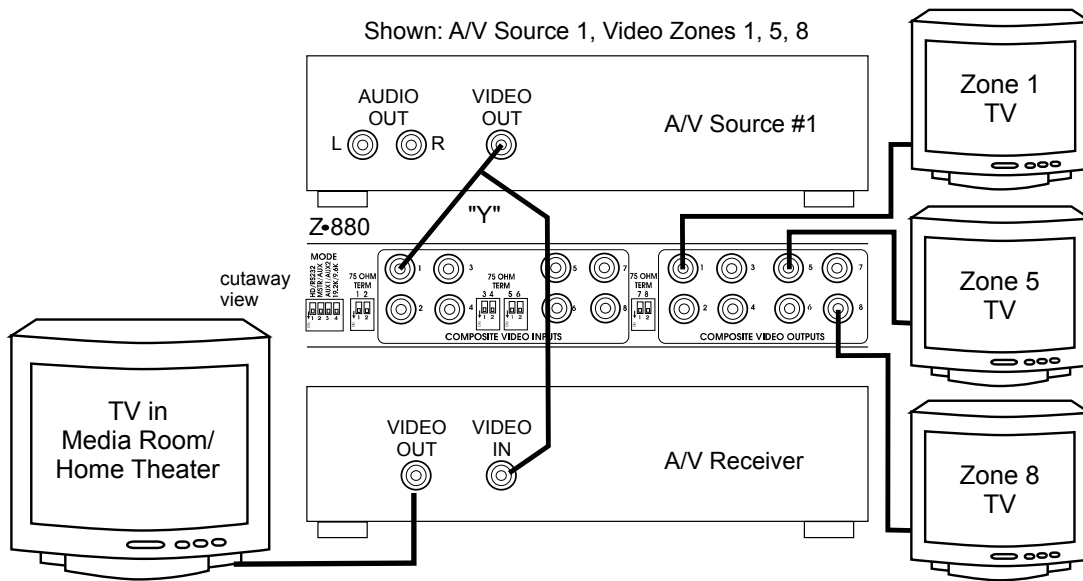
Z-880 #3 (AUX2, Video Zones 17-24)



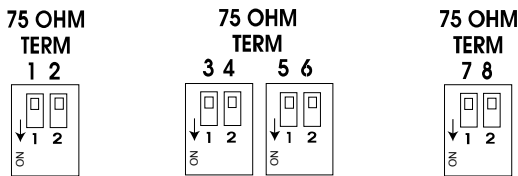
Z•880 Surveillance Application and CCTV Connections



Sharing Video Sources



75 OHM Termination Dip Switch Settings

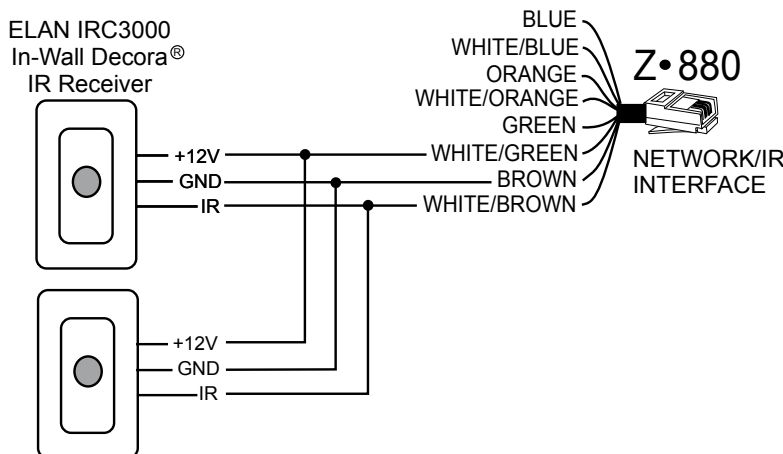


For each source that is "Y'd" to the inputs of both the Z880 and another device such as a A/V receiver or surround sound processor, the associated 75 OHM dip switch must be moved to the UP position.

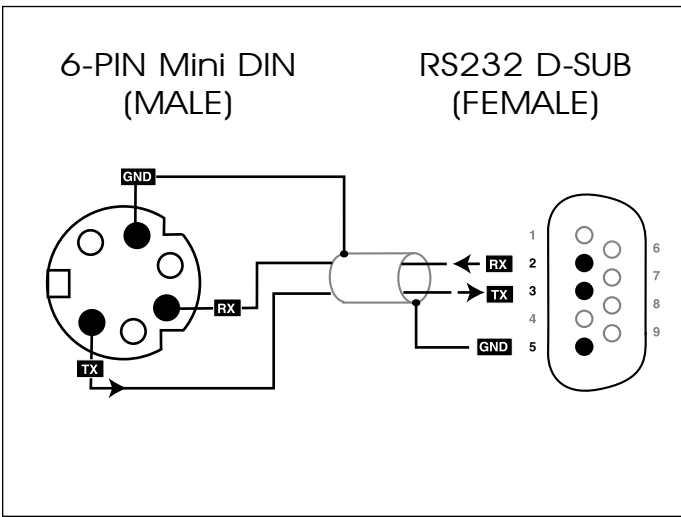
In an HD or stand-alone RS232 application where more than one Z880 is being used and the sources are being 'shared', the associated source 75 OHM termination dip switch on all Z880s (including the MASTER) must be moved to the UP position.

Z•880 External IR Receiver Connections

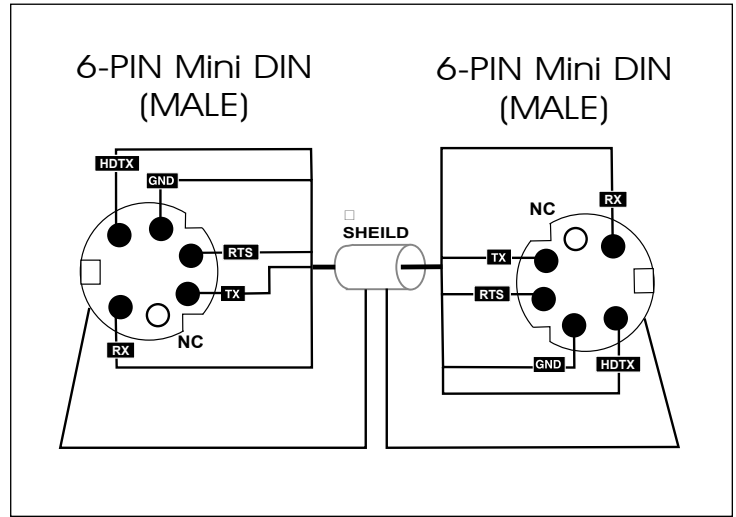
Up to 10 IR receivers can be connected in parallel to the Z•880



6-Pin DIN to 9-Pin DSUB Cable Extension

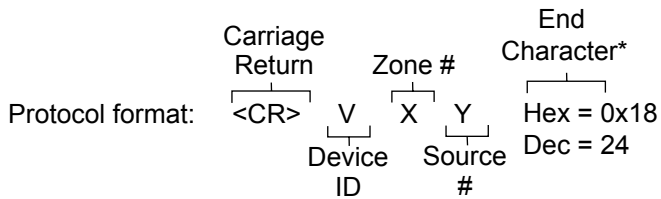


6-Pin DIN to 6-Pin DIN Cable Extension



Z•880 Standard Protocol

The Z880 Serial Port uses the following communication settings:
19,200 baud **No** parity **8** data bits **1** stop bit



*the End Character protocol is required only when the serial port of an HD Series Automation Control Card is being "looped through" the Z880.

PLEASE NOTE: All characters are UPPER CASE, and all command lines must be **preceded** by a carriage return (ENTER), i.e.

```

<CR> V X Y
ENTER V 1 1 = select ZONE #1/SOURCE #1
ENTER V 5 8 = select ZONE #5/SOURCE #8
ENTER V 7 0 = select ZONE #7/MUTE
    
```

General ASCII Commands

Zone #	X
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	A
11	B
12	C
13	D
14	E
15	F
16	G
17	H
18	I
19	J
20	K
21	L
22	M
23	N
24	O

Source #	Y
0	Zone Mute
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8

Z.880 FEATURES AND SPECIFICATIONS

INPUTS:

- 8 Composite Video, 1 V P-P Nominal
- Input Impedance: 75 Ohm or Hi-Z

OUTPUTS:

- 8 Composite Video
- Output Impedance:75 Ohm
- Video Gain:0 dB Nominal
- Freq. Resp.:+/- 1.0 dB, D.C. to 35 MHZ
- Bandwidth:DC to 35MHZ Minimum
- Chrominance to Lum. Delay:< 10 nSec
- S/N Ratio:>60 dB
- Differential Phase:< 1 Deg
- Differential Gain:< 1%
- Short Time Distortions:1 NRE
- Crosstalk:> 70 dB

CONTROL INTERFACES:

- Front panel IR Receiver and handheld remote control (Z•038). Z•038s can be purchased separately.
- Rear panel IR Input
- Rear Panel RS485 Input—compatible with Z•630 PreAmp 485 buss
- Rear panel RS232 Interface: 9600/ 19200 baud, dip-switch selectable
- Rear Panel HD Serial Control Input (Does not tie up the RS232 Serial Interface resource on the MCU)

GENERAL:

- Power Requirements:120VAC, 12W
- Dimensions:
 - Z•880 1.75" X 17.0" X 10" STD
 - Z•881 1.75" X 19.0" X 10" Rack

Z.880 VIDEO CONTROLLER

Limited Warranty

ELAN HOME SYSTEMS, L.L.C. ("ELAN") warrants the Z•880 Video Controller manufactured by it to be free from defects in materials and workmanship for two (2) years from the date of purchase. If within the applicable warranty period above purchaser discovers such item was not as warranted above and promptly notifies ELAN in writing, ELAN shall repair or replace the items at the company's option.

This warranty shall not apply (a) to equipment not manufactured by ELAN, (b) to equipment found to have been installed by other than an authorized ELAN installer, (c) to installed equipment which is not installed to ELAN's specifications, (d) to equipment found to have been repaired or altered by others than ELAN, (e) to equipment found to have been subjected to negligence, accident, or damage by circumstances beyond ELAN's control, including, but not limited to, lightning, flood, electrical surge, tornado, earthquake, or any other catastrophic events beyond ELAN's control, or to improper operation, maintenance or storage, or to other than normal use of service.

With respect to equipment sold by, but not manufactured by ELAN, the warranty obligations of ELAN shall in all respects conform and be limited to the warranty actually extended to ELAN by its supplier. The foregoing warranties do not cover reimbursement for labor, transportation, removal, installation, or other expenses which may be incurred in connection with repair or replacement.

Except as may be expressly provided and authorized in writing by ELAN, ELAN shall not be subject to any other obligations or liabilities whatsoever with respect to equipment manufactured by ELAN or services rendered by ELAN.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESSED AND IMPLIED WARRANTIES EXCEPT WARRANTIES OF TITLE, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.