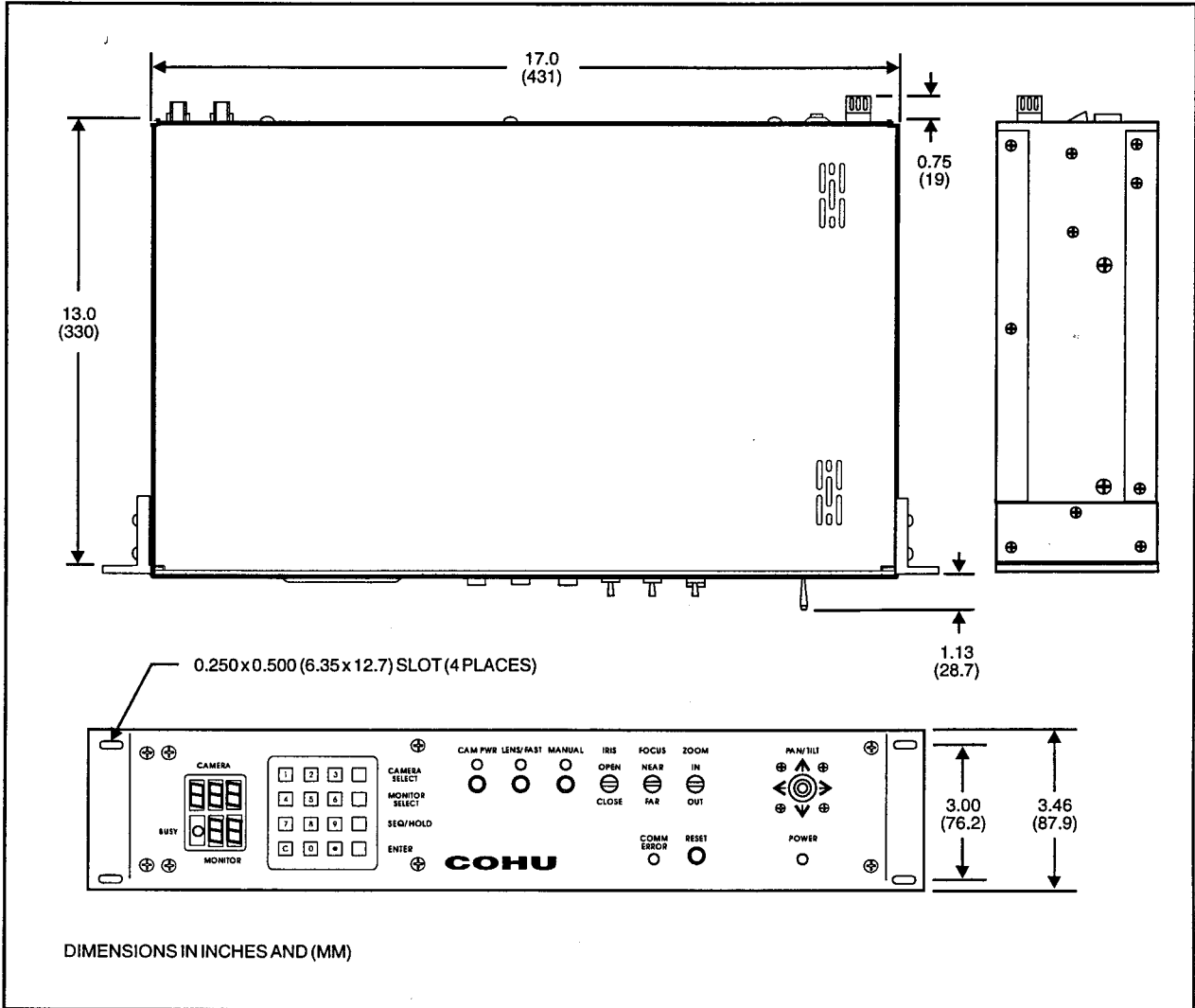


COHU, INC. Electronics Division

Installation and Operation Instructions



Dimensions

MPC MASTER AND REMOTE CONTROL PANELS

COHU
Cohu, Inc./Electronics Division

MPC CONTROL PANEL

OVERALL SYSTEM

The microprocessor camera control (MPC) system is composed of a Master Control Unit, Remote Control Units, and Control Receivers. These Units can be arranged to meet the needs of any CCTV control application.

The MPC transmits control signals over a single twisted pair of wires via RS-422 format (and/or optional DTMF). The transmitter is compatible with existing systems where receivers use either of these transmission formats.

A STD bus is used in the control unit so that standard modules may be employed. This modular design allows a system to be assembled from off the shelf components, yet meet the specific needs of any application.

The MPC system controls up to 254 cameras and/or pan-and-tilt units. Up to 32 control positions can be employed in the system (which then reduces camera capacity to 222).

Up to 10 Home (preset) positions for each pan-and-tilt unit are available as an option. These positions are programmed and selected from the preset control unit.

Receivers and remote controls may be located up to eight km (five miles) from each other in a daisy-chain arrangement, using Belden 9182 twisted pair wire. By using an RS-422 distribution unit, the receivers may also be hooked in a "star" pattern, with each point of the star having up to 32 receivers.

Control Panel

Control of the system is performed by an operator via the Master Control Panel or any of the Remote Control Panels. Front panel controls include a joy stick for control of pan-and-tilt; toggle switches for control of zoom in/out, focus near/far, power on/off, and lens speed fast/slow. Available as options are three auxiliary switch positions for operator defined control, a maximum of three relays and/or one analog output or special system control. Also included is a keypad for camera and monitor selection. There are LED displays to identify the camera selected and the monitor selected, and a busy light to show that the camera selected is being controlled by another operator.

There are LED displays for status of auto/manual iris, camera power on/off, lens speed fast/slow, and the three auxiliary functions. The remote control panel communicates with the Master Control Unit using RS-422 and/or DTMF signals over a shielded twisted pair cable.

Master Control Panel to Remote Control Panel Communication

The Master Control Panel communicates with the Remote Control Panels for operator input, processes these inputs, and sends data to the Control Receivers and video switcher, as appropriate.

Three access modes are available. They are:

1. Equal Access. Any operator can control any available camera at any time.
2. Priority Access. Each control panel has a priority number assigned to it and only the highest priority control panel has control if more than one operator has a site addressed. A front panel busy light indicates that control does not originate from that control panel.
3. Queued Access. Control is given in the order received, i.e., first come, first served.

An available option is partitioning software that assigns to each Master and Remote Control Panel only those cameras and monitors that are available to that panel. If an unallowed monitor number or camera number is entered, an error indication is displayed.

ELECTRICAL CHARACTERISTICS

See table for specifications.

MECHANICAL CHARACTERISTICS

The Master Control Panel and Remote Control Panel both mount in a standard 19-inch rack mount configuration requiring 3.25 inches of vertical rack space. Circuit boards mount within this chassis configuration. All operator controls mount on the front panel. All interconnections with the system occur on the rear panel of the chassis.

POWER REQUIREMENTS

A Control Panel can be internally wired for use with either 115 V ac power or 230 V ac power. For either power input, 50 or 60 Hz power can be used. Power is applied through a permanently attached line cord on the rear panel. This power routes through a fuse and EMI filtering to a front panel switch and then to a switching power supply.

Specifications

ELECTRICAL	
Control Functions	Camera Select, Monitor Select, Pan & Tilt, iris/focus/zoom, lens fast/normal, Iris manual/auto, and optional auxiliary relay closure functions. Relevant functions operator programmable
Typical Options	Auto scan, P&T presets (up to 10), white balance, bright-light limiter, peak/average, multiple RS-232 ports, video switching/sequencing
Communications	With Other MPC Equipment RS-422 (DTMF Optional, Master Only)) With Host Computer (Master Only): RS-232 With Video Switcher (Master Only): Parallel to Matrix 44; RS-232 versions available
Communications Distance	RS-422: Up to 5 miles (8 km) with shielded twisted pair. System options available for fiber optics, microwave, and other long-range methods
Standard Configuration Expansion Capability	223 Camera sites, 32 monitors, and 32 multioperator Master and Remote Control panels. Increased expansions available upon request
Input Voltage	105 — 130 V ac, 50/60 Hz or 210 — 260 V ac, 50/60 Hz internally configured
Input Power	20 watts
Surge Protection	Power line: 20 joules, peak current 2500 amps Data Line: 100 amps for 1 ms half value pulse width
MECHANICAL	
Dimensions	See figure
Weight	7 lb (3.2 kg)
Enclosure	19 inch rack mount, 3.25 inches vertical height
ENVIRONMENTAL	
Ambient Temperature Limits	Operating: 0 to 50 °C (32 to 122 °F) Storage: -40 to 85 °C (-40 to 157 °F)
Ambient Air Pressure	Sea level to equivalent of 10,000 feet (3000 meters)
Humidity	95% relative, no condensation
Vibration	5 to 30 Hz with 0.03 inch total excursion. From 30 to 1000 Hz, with peak random vibrations of 5 g's without damage or degradation
Shock	5 g's in any axis under nonoperating conditions, MIL-E-5400T, paragraph 3.2 and 1.24.6
<i>Cohu reserves the right to change specifications without notice</i>	

NOTE
<i>The new version of the Remote Control Panel uses a single Remote Camera Control board (9093-6). This board replaces the Processor board (9092-0), the Interconnection board (9087-8), and the Interface board (9087-6). Both versions are covered in this manual.</i>

MPC CONTROL PANEL

Model Number Interpretation

MPC	X	X	XX	XX/—/XX
	PANEL CONFIGURATION	INPUT POWER	FRONT PANEL OPTIONS	SYSTEM OPTIONS
	M Master	0 None	00 Basic	51 Preset
	R Remote	1 115Vac, 50/60 Hz	01 Bright Light Limiter (1 position)	(Master or Remote)
		2 230Vac, 50/60 Hz	02 BLL/Peak-Avg (2-positions)	52 RS-232 (Single) (Master Only)
			03 Auto Scan (1 position)	53 RS-232 (Dual) (Master Only)
			04 White Balance (3 positions)	54 Video Switching (Master Only)
			05 BLL/Pk-Avg/W Bal (3 positions)	55 DTMF (Master Only)
<i>Note: A front panel can have no more than three control positions</i>				

EQUIPMENT SUPPLIED

The following list does not include any optional or special-request items.

1. The Control Panel
2. Manual, Installation and Operation (6X-829(A))

EQUIPMENT REQUIRED BUT NOT SUPPLIED

The first five items listed below are the minimum required to make use of a Control Panel. In an absolute minimum configuration, only a Master Control Panel, a control receiver, a camera, a monitor, and the appropriate interconnection cables would be required. The preset panel, pan/tilt unit, and other items on the list are not required in a minimum operating configuration.

1. Control receiver
2. Camera
3. TV monitor
4. Interconnection cables
5. Preset panel
6. Pan and tilt unit
7. RS-422 distribution unit
8. Host computer
9. Video switcher
10. ID generator

DATA COMMUNICATIONS APPENDIX

Appendix A at the rear of this manual contains technical data detailing the RS-232 (publication 6X-5030) and RS-422 (publication 6X-5035) message formats.

WARRANTY

Refer to page 23 for the warranty.

UNPACKING AND RECEIVING INSPECTION

This unit was thoroughly tested and carefully packed in the factory. Upon acceptance by the carrier, they assume responsibility for its safe arrival. Should you receive this item in a damaged condition, apparent or concealed, a claim for damage must be made to the carrier. To return the unit to the factory for service, please contact the Customer Service Department for a Return Authorization Number.

If a visual inspection shows damage upon receipt of this shipment, it must be noted on the freight bill or express receipt and the notation signed by the carrier's agent. Failure to do this can result in the carrier refusing to honor the claim.

When the damage is not apparent until the unit is unpacked, a claim for concealed damage must be made. Make a mail or phone request to the carrier for inspection immediately upon discovery of the concealed damage.

Keep all cartons and packing materials. Since shipping damage is the carrier's responsibility, the carrier will furnish you with an inspection report and the necessary forms for filing the concealed-damage claim.

STATIC DISCHARGE PROTECTION

CAUTION

The Control Panel contains sensitive devices that can be damaged by static discharge. Use appropriate static control methods when working inside the control panel.

Components used in modern electronic equipment, especially solid state devices, are susceptible to damage from static discharge. The relative susceptibility to damage for semiconductors varies from low with TTL to high with CMOS. Most other semiconductors fall between TTL and CMOS in susceptibility to static discharge.

As a minimum, therefore, observe the following practices when working inside this or any other electronic equipment:

1. Use conductive sheet stock on the work bench surface.
2. Connect the sheet stock to ground through a 1 megohm or greater value resistor.
3. Use a wrist strap connected to ground through a 1 megohm or greater value resistor when working at the bench.
4. Maintain relative humidity of the room above 30 percent. This may require a room humidifier. Working on circuits with relative humidity below 30 percent requires extraordinary procedures not listed here.
5. Use anti-static bags to store and transport an exposed chassis, circuit boards, and components. Use new anti-static bags. Old, used bags lose their static protection properties.

This list serves as a reminder of the minimum acceptable practices. Be sure that all static discharge devices at the work bench are properly installed and maintained.

Standard grounding mats and wrist straps purchased for use at work benches are supplied with leads having current limiting resistors for safety. Never substitute with a grounding lead not having the resistor.

INSTALLATION PROCEDURE

Installation Summary

This section is intended as a general overview of the procedure for installing a control panel. It assumes the Control Panel may not be properly set up for use in the system. If this is the case, internal jumpers may have to be repositioned and some DIP switches may have to be reset.

After all initial settings are made, the panel is then turned on for a functional test.

Additional information about these procedures follows this summary of the installation procedure. Do not begin the installation without referencing the subsequent sections that provide detailed instructions about the installation. This list is merely a summary of the installation procedure.

Read the following six steps to obtain a general overview of installing the Control Panel. The figure shows a typical rear panel for a Master Control Panel. A typical Remote Control Panel would not have the PARALLEL connector. This connector appears only on Master Panels that must interface with a video switcher. A typical installation sequence is as follows:

1. Removing the top cover at an anti-static test bench and setting up internal jumpers and DIP switches for the desired operating conditions. Reinstalling the cover.
2. Installing the Control Panel in a 19 inch rack.
3. Connecting cables to the rear panel
4. Programming required parameters for the system—using the front panel keypad.
5. Performing a functional test using the Master Control Panel to operate the control receiver(s).
6. Release the Control Panel for use after successful completion of all performance tests.

This completes the summary description of a typical Control Panel installation. Note that either a control receiver or a Remote Control Panel can be connected anywhere in the system. The RS-422 distribution unit figure shows typical system interconnections using an RS-422 distribution unit. Note that using this distribution panel allows up to 10 separate daisy chained paths of control receivers and Remote Control Panels. The maximum number of addressed units in the system is limited to 255.

MPC CONTROL PANEL

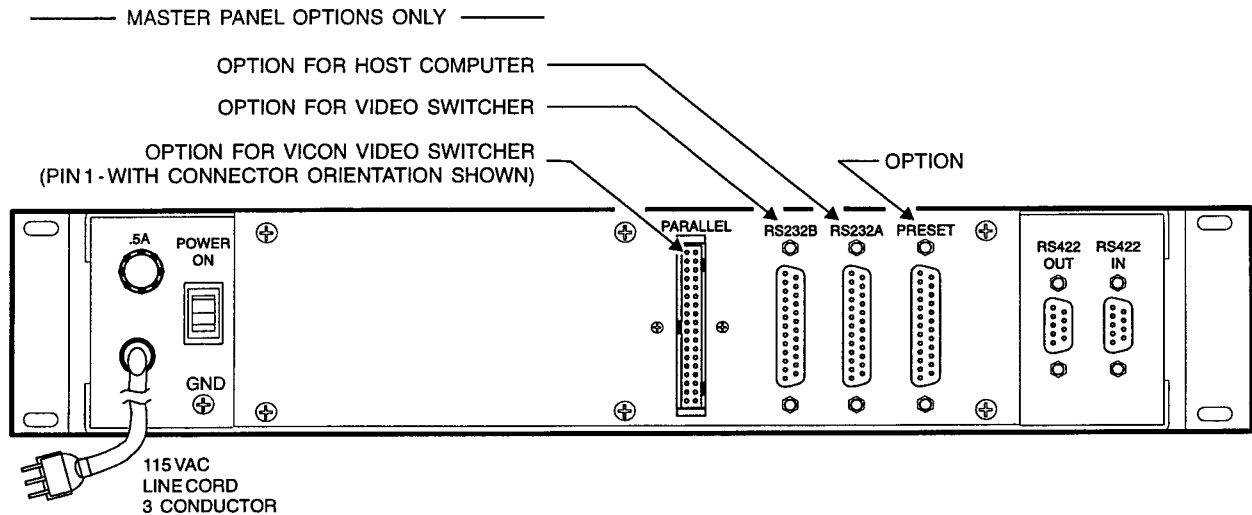


Figure 2-1. Connectors, Rear Panel

Power Input Line Cord

Plug the line cord into any standard three-wire grounded type 115 V ac 50/60 Hz outlet (or 230 V ac outlet if that option is being used). This input power is fused on the rear panel.

CAUTION

Do not apply voltage outside the recommended operating range of the CCU (115 V ac or 230 V ac $\pm 10\%$, depending on the option).

PARALLEL CONNECTOR

The PARALLEL connector allows a Vicon video switcher using a parallel interface to be connected to a Master Control Panel.

RS-232B CONNECTOR

This connector is typically used to connect a serial video switcher to a Master Control Panel. Special firmware is required depending on the switcher used.

RS-232A CONNECTOR

This connector is typically used to connect a host computer to a Master Control Panel.

RS-232 MESSAGE FORMATS

In appendix A is a description of the RS-232 interface. Also in appendix A is a description of the RS-422 interface.

PRESET CONNECTOR

Any Master or Remote Control Panel can be interconnected with an optional preset panel. A preset panel has 10 pushbutton switches that can be used to re-establish any of 10 previously locked-in positions of a pan/tilt unit a later time.

A preset panel switch is programmed to “remember” a pan/tilt position by setting its toggle switch to PGM (program) mode and then pressing the desired pushbutton switch. The toggle switch is then returned to its RUN position for the normal operating mode position.

RS-422 OUT CONNECTOR

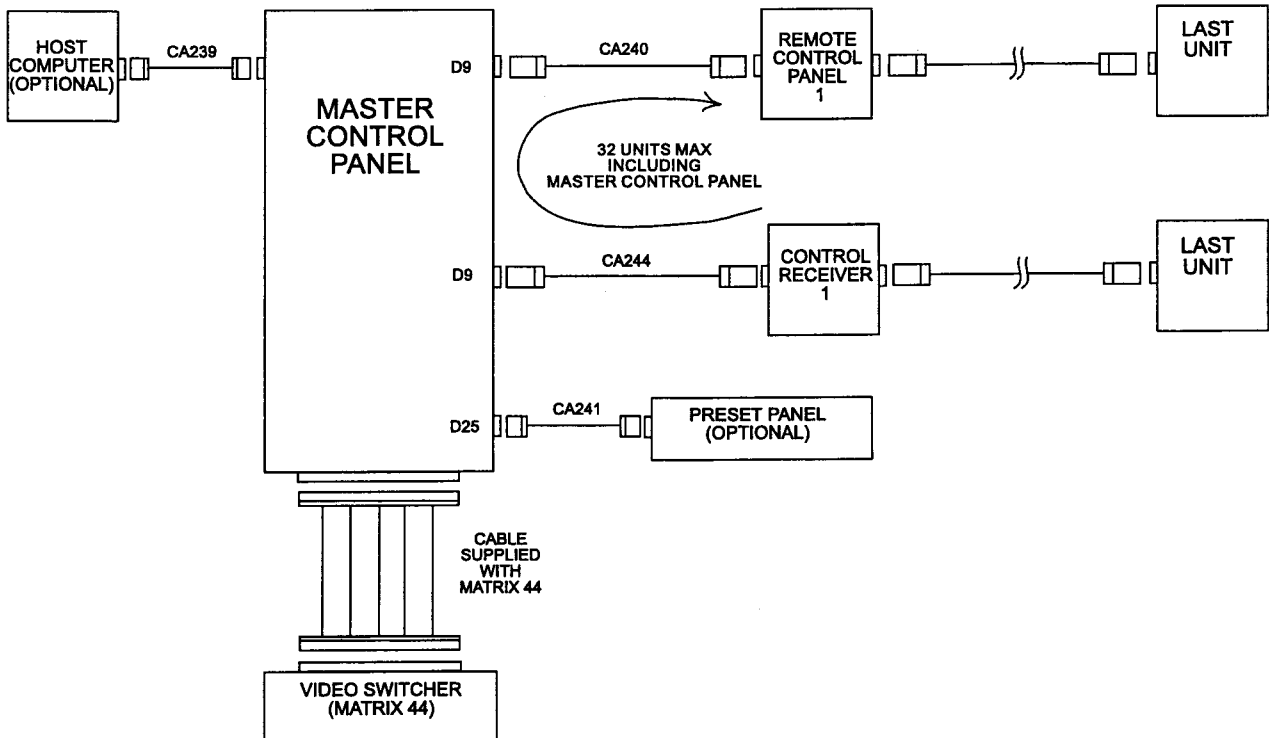
This connector is paralleled pin-for-pin with the RS-422 connector labeled IN. These two RS-422 connectors provide for a “daisy chain” cabling connection, such that the panel can be connected anywhere along a cable run.

RS-422 IN CONNECTOR

The RS-422 input connector provides an interface with other MPC equipment in the system. Signals in and out of this connector route through the data line surge protect board. This connector is paralleled with the RS-422 connector labeled OUT.

CONTROL PANEL ADDRESS (BINARY) SWITCH S1

Each item of equipment connected on the RS-232 and RS-422 lines must have a unique address. This address is established by an 8-pole DIP switch (S1) on the processor board inside both the Master Control



Typical Interconnection Cabling (without RS-422 Distribution Unit)

Panel and the Remote Control Panel. This switch setting is “read-in” by the Control Panel address circuit only during power up or reset. When setting the address, always turn power on and off or use a reset button to ensure that the address is read in.

To set the DIP switch, first remove the cover by loosening all nine screws around the cover. Refer to the figures for the location of switch S1. It is an eight-pole DIP-switch positioned on the processor board in the card cage located behind the front panel on the Master and the old style Remote, and on the

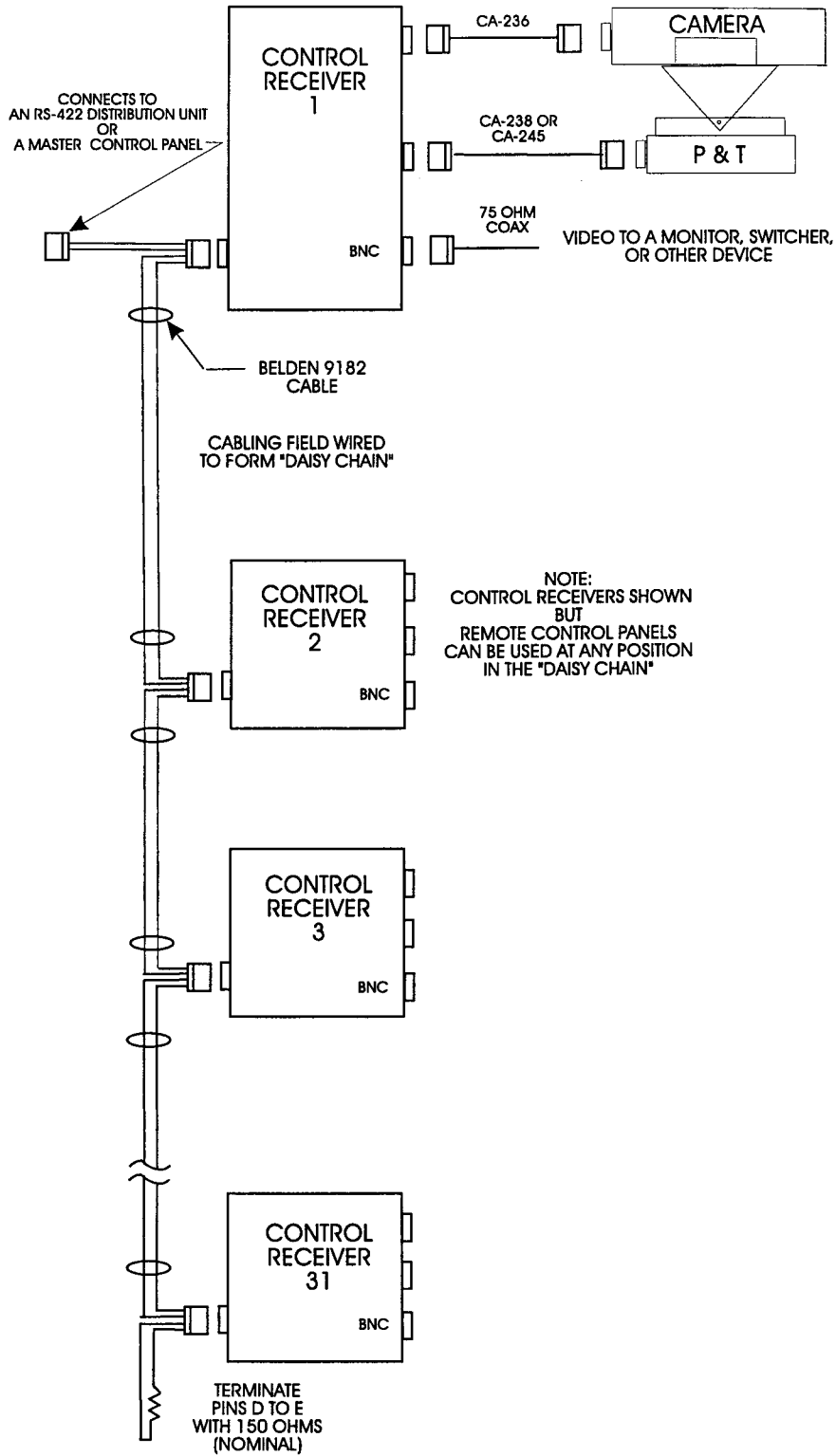
front right of the Remote Camera Control board in the new style Remote.

The default Control Panel address setup is 1. Refer to the Decimal-Hex-Binary Conversion table to determine the binary switch settings for the desired address.

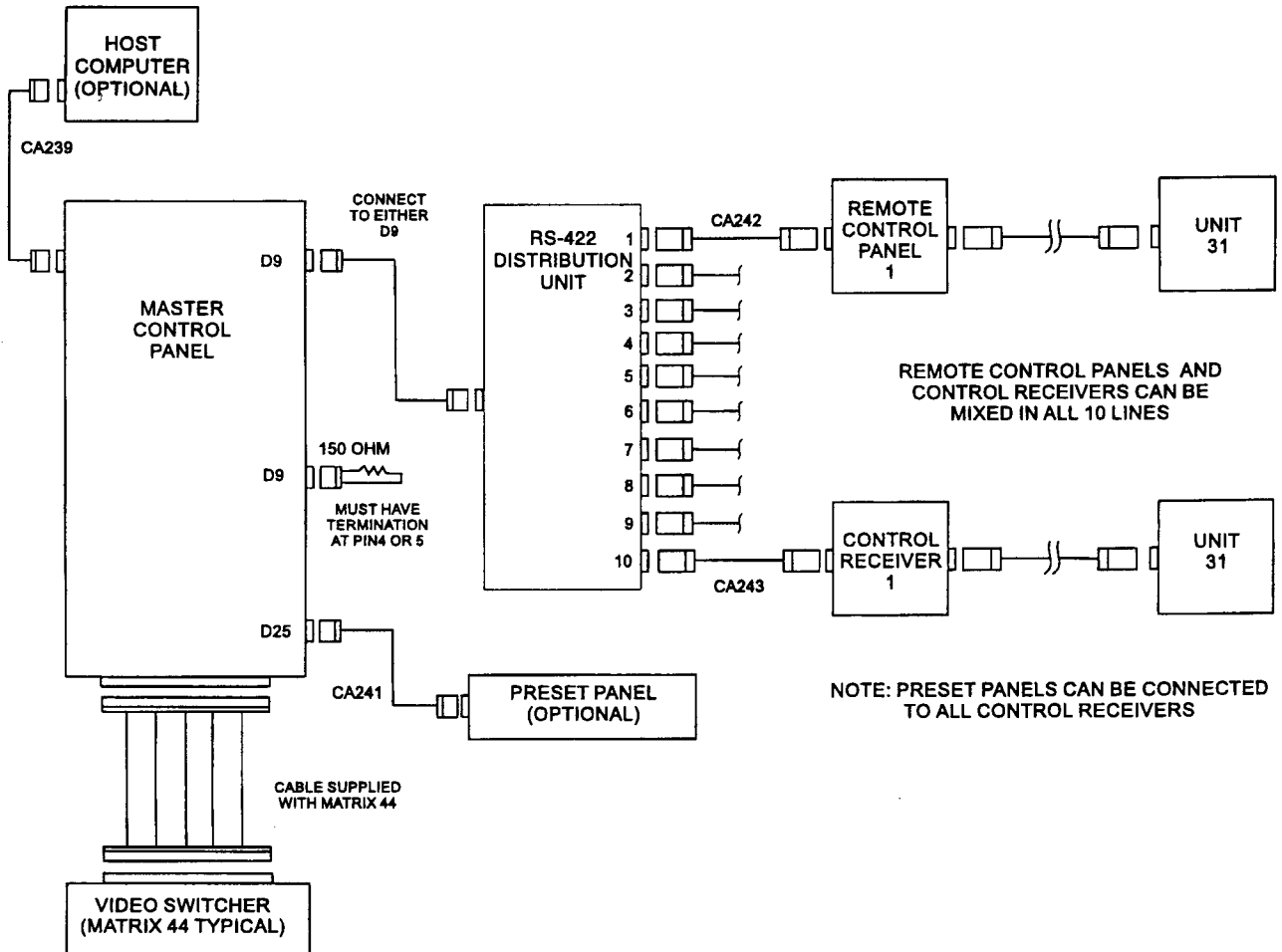
2-WIRE / 4-WIRE JUMPERS

In 2-wire mode, one twisted-pair is used for the RS-422 control signal. Communication is bi-directional over the single twisted-pair. In 4-wire mode, two twisted-pairs are used, one for transmitting data, and the other for receiving data. The

MPC CONTROL PANEL



Typical Control Receiver Interconnections



Typical System Interconnections, RS-422 Distribution Unit Connections

2W/4W jumpers are located on the Data Line Surge Protection board. The Remote Camera Control board in the new style Remote Panel also has 2W/4W jumpers. These should always be in the 2W position.

RS-232 COMMUNICATIONS BAUD RATE

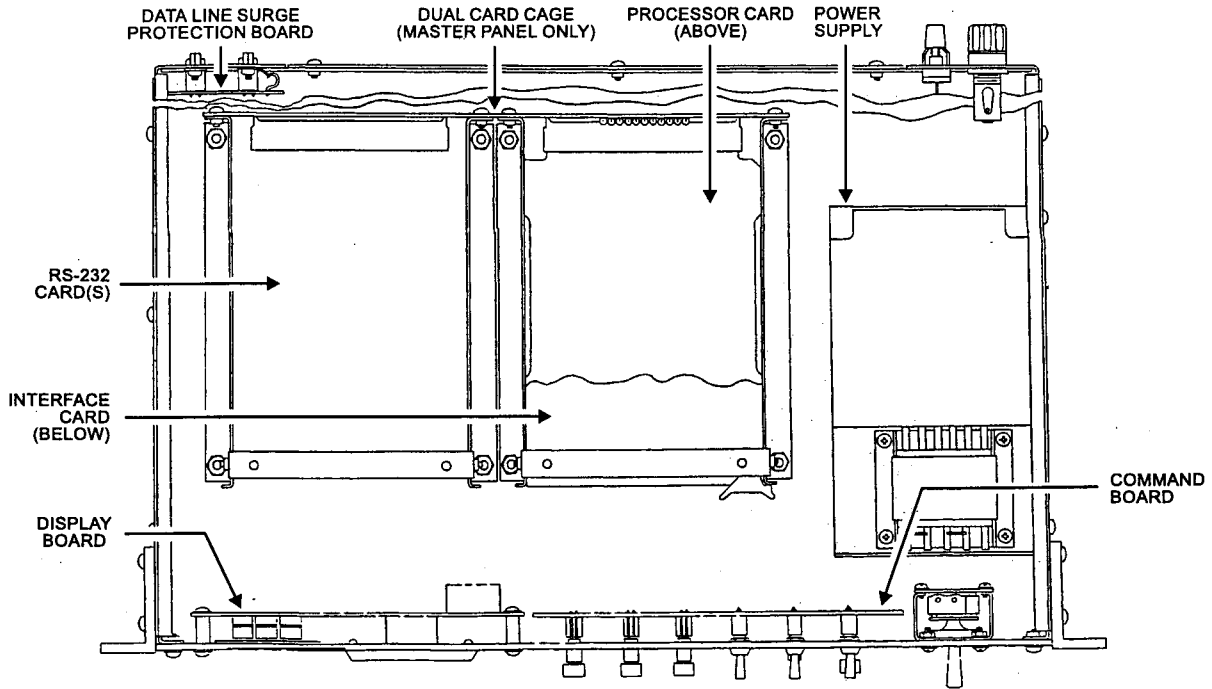
A Master Control Panel can be optioned with one or more dual-channel RS-232 cards. Each card provides two ports. Each communication port baud rate can be independently set from 150 to 19200 baud, as shown in the listing below. Baud rate is established by two 8-pole DIP switches on the RS-232

board inside the Control Panel. These switch settings are “read- in” only when the Master Control Panel is powered up or reset.

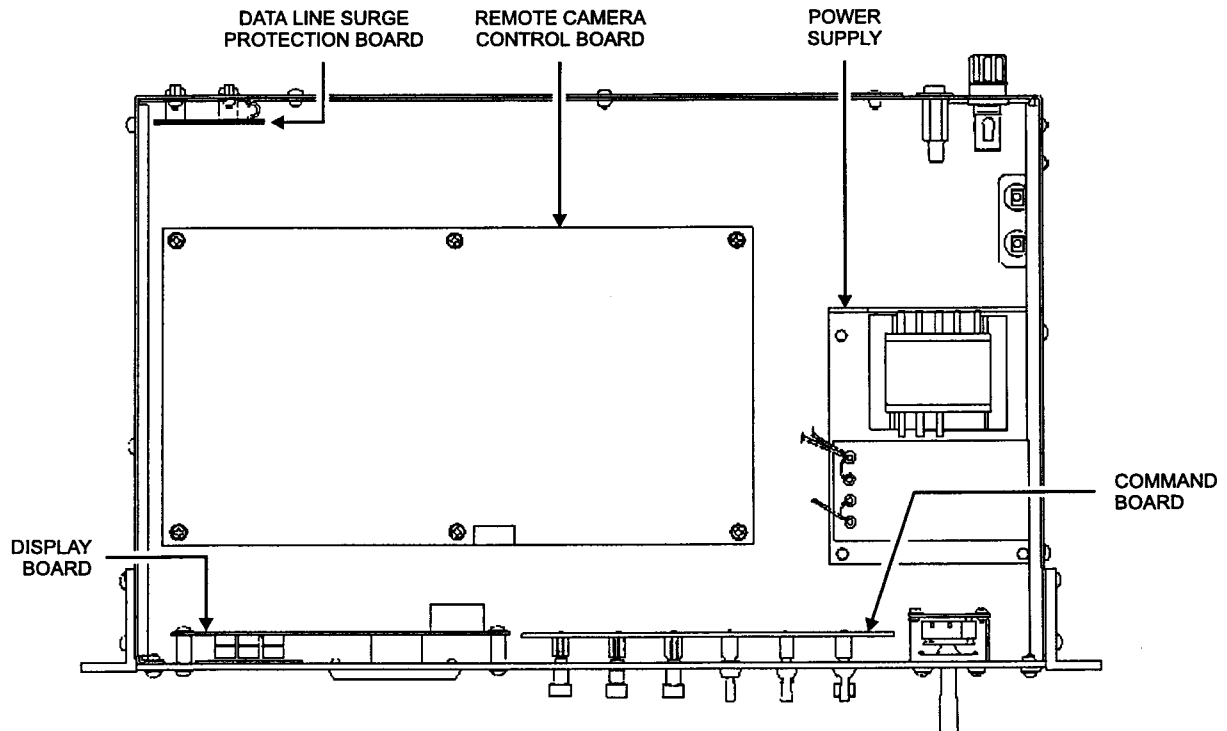
To set the DIP switches, first remove the cover by loosening all nine screws around the cover and lifting it off. Then locate the RS-232 board. It will be in the card assembly behind the front panel keypad and numeric display. The board will have two 8-pole DIP switches designated as channel 1 and channel 2. They are labeled with the following baud rates: 19200, 9600, 4800, 2400, 1200, 600, 300, and 150. The default CCU baud rate setup is 9600 for each bank.

MPC CONTROL PANEL

NOTES: Dual card cage typical of a Master Panel shown. Older Remote Panels have a single cage.
 See figure at bottom for the new Remote Panel. Remote Panels do not have RS-232 cards.
 Master Panel with RS-232 option typically has a single card.



Top View, Master Control Panel (Cover Removed)



Top View, Remote Control Panel (Cover Removed)

DIP Switch Settings, Master Control Panel

SWITCH	SETTING
1 thru 6	Not used (Set all to zero)
7	On
8	On

DIP Switch Settings, Remote Control Panel

SWITCH	SETTING
1 thru 5	Set the required address (0 = off)
With switch 6 off	Switches 1 through 5 set the remote address offset, which is added to EOH to form the Remote Panel address (01H - 1EH valid)
7	On
8	On

Programming Entry Codes

TO PROGRAM	USE ENTRY CODE
Highest Monitor Number	99
Highest Camera Number	98
System Baud Rate	97
Highest Address of Remote Control Panels	96
Communication Mode Select	95

PROGRAMMING THE PANEL

Several functions must be programmed before the Control Panel can be used. The tables list these functions and their corresponding code for entry into the programming mode. The tables also list the parameters that can be programmed and give an overview of the required procedures, the procedure for setting dwell time and the camera display sequence, and the programming steps for the type of communications required for the system. This is a Master Panel procedure only.

PARTITIONING

Partitioning is a firmware option that assigns the Master Panel and each Remote Panel only those cameras and monitors selected to be available to that panel. If a blocked-out monitor or camera number is entered, an error indication is displayed to the operator.

Three access modes are available:

1. Equal Access: Any operator can control any available camera at any time.
2. Each Control Panel has a priority number assigned to it and only the highest priority Control Panel has control if more than one operator has a signed address. The front panel busy light indicates that control does not originate from that Control Panel.
3. Queued Access: Control is given in the order received, i.e., first come, first served.

BOARD ASSIGNMENTS

The Board Assignments and Functions table lists the various circuit boards and subassemblies typically found in a Master or Remote Panel. Note that the middle column designates whether the feature is found in a Master Panel [M], a Remote Panel [R], or in both a Master and a Remote Panel [M/R]

SEQUENCING

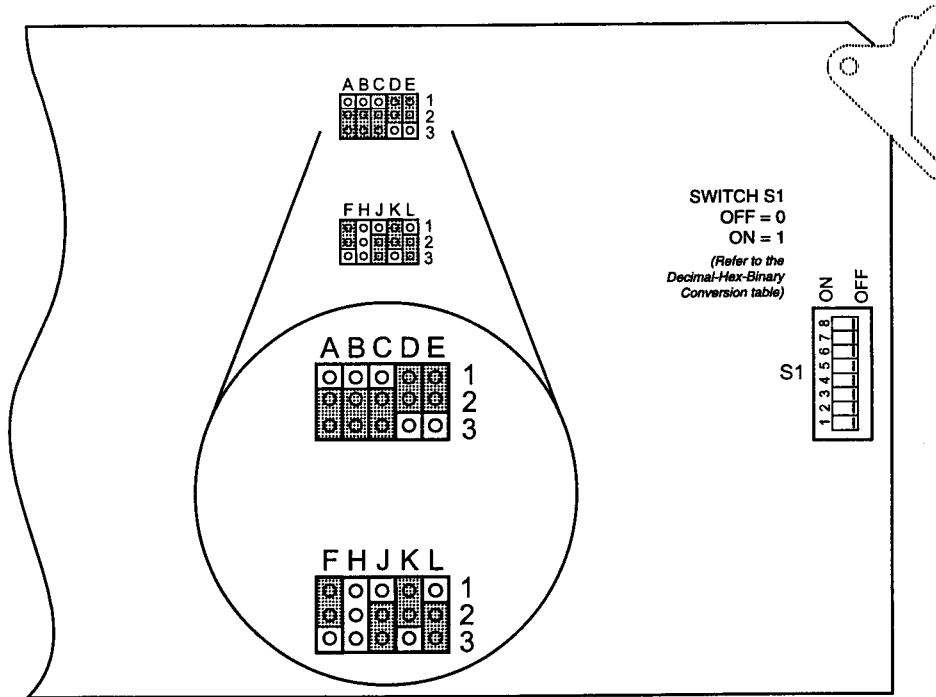
The sequencing feature requires that an optional video switcher be used with the system.

Sequence start and sequence stop (hold) is accomplished by toggling the sequence/hold key on the front panel of either a Master or a Remote Control Panel. Depressing this button while in the sequence mode will cause the Control Panel to revert to the hold mode. During sequencing, the BUSY lamp and command controls, including the pan-and-tilt controls are not functional.

The system is normally in the hold mode unless the operator wishes to sequence. In the hold (stop-sequence) mode, the camera display functions are updated for that particular camera. If the BUSY lamp is not lit and the camera number indicated is a legal camera number, the operator may exercise control of the camera.

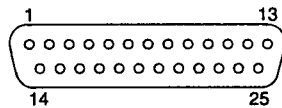
During the camera sequence mode, camera command functions are not functional: IRIS OPEN/CLOSE, FOCUS NEAR/FAR, ZOOM IN/OUT, and joystick PAN/TILT. The RESET switch, however, does remain active during sequencing.

MPC CONTROL PANEL



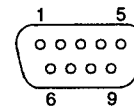
JUMPERS SHOULD BE LEFT
IN THE FACTORY PRESET POSITIONS

Adjustment Locations, Processor Board



PIN	FUNCTION	PIN	FUNCTION
1	Ground	14	N/C
2	TXD (Transmit Data)	15	N/C
3	RXD (Receive Data)	16	N/C
4	RTS (Request to Send)	17	N/C
5	CTS (Clear to Send)	18	N/C
6	DSR (Data Set Ready)	19	N/C
7	Ground	20	DTR (Data Term Ready)
8	N/C	21	N/C
9	N/C	22	N/C
10	N/C	23	N/C
11	N/C	24	N/C
12	N/C	25	N/C
13	N/C		

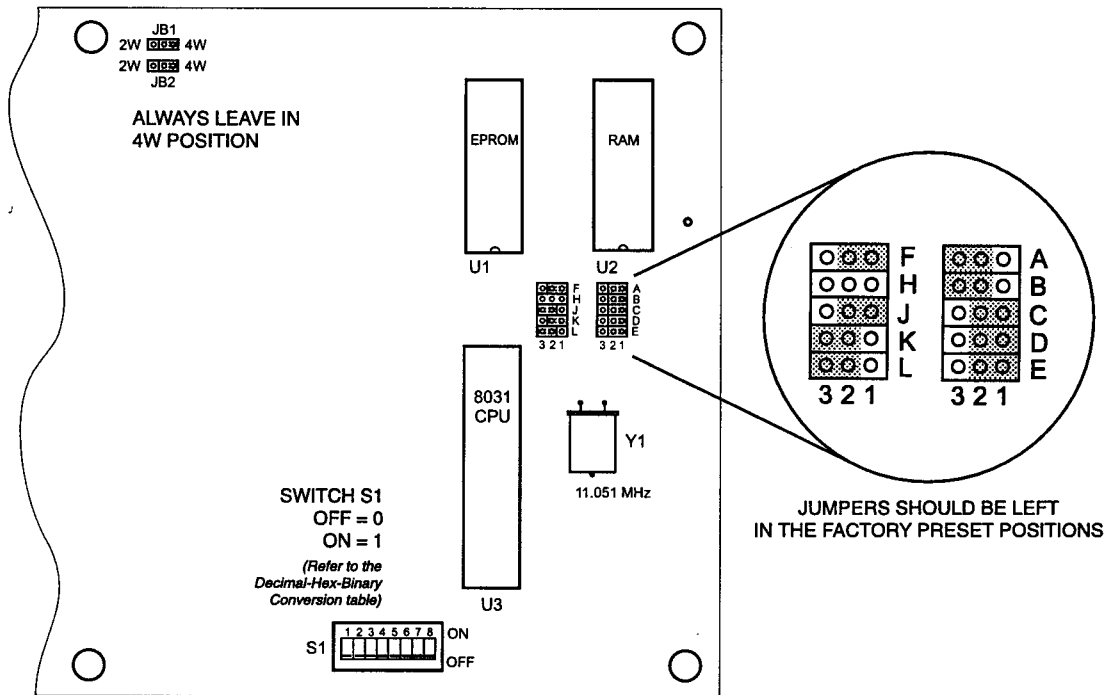
RS-232 Connector Pinout



PIN	FUNCTION
1	TXD
2	$\overline{\text{TXD}}$
3	Ground
4	RXD
5	$\overline{\text{RXD}}$
6	Ground
7	TXEN
8	$\overline{\text{TXEN}}$
9	Ground

RS-422 Connector Pinout

MPC CONTROL PANEL



Adjustment Locations, Remote Camera Control Board

Master Control Panel Parameter Setup

FUNCTION	STEP	ACTION	RESULT
ESTABLISHING DESIRED PROGRAM MODE	1	Press Monitor select key	Monitor display will begin flashing on/off with the existing number
	2	Press 99 (monitors) or 98 (cameras) or 97 (baud rate) or 96 (remote panels) or 95 (communications mode)	Monitor display will flash on/off with the entry code entered
	3	Press ENTER	Monitor display will show the number continuously
ENTERING THE DATA FOR THAT MODE	4	Press CAMERA SELECT	CAMERA display will flash on/off with the existing number
	5	Press highest monitor number or highest camera number or system baud rate ¹ (in 100's of Hz) or highest address of Remote Control Panels or communications mode	CAMERA display will flash on/off with the number entered
	6	Press ENTER	CAMERA display will show the number continuously
	7	Return to step 1 until all five sets of data have been entered	CAMERA display will show the number continuously
	8	Exit the program mode by pressing the period (•) key on the keypad	Panel returns to previous operating mode

¹Legal baud rate entries: 3, 6, 12, 24, 48, and 96 — for baud rates 300, 600, 1200, 2400, 4800, and 9600

MPC CONTROL PANEL

Dwell Time Settings and Camera Display Sequence

FUNCTION	STEP	ACTION	COMMENT
TO ENTER PROGRAM MODE (Choose monitor first)	Press CAMERA SELECT	Top display flashes on/off 00 Bottom display does not matter	
	Key in 999	Top display flashes on/off 999 Bottom display becomes 00 steady	
	Press ENTER	Top display shows dwell time in seconds steady Bottom display shows 00	
TO SET DWELL TIME	Press CAMERA SELECT	Top display flashes on/off 0	
	Key in desired dwell time (e.g., 2)	Top display flashes on/off 02 Bottom display shows 00 steady	60 seconds max per step
	Press ENTER	Top display shows 02 steady Bottom display shows 00 steady	
TO ASSIGN SEQUENCE OF UP TO 16 CAMERAS — DISPLAYED ON THE ASSIGNED MONITOR	Press ENTER	Top display shows steady number(s) Bottom display shows 01 steady	1 of 16
	Press CAMERA SELECT	Top display flashes on/off 0 Bottom display shows 01 steady	
	Key in first number to be assigned to the monitor (e.g., 13)	Top display flashes on/off 13 Bottom display shows 01 steady	
	Press ENTER	Top display shows 13 steady Bottom display shows 01 steady	
	Press ENTER	Top display shows a camera number Bottom display shows 02 steady	
	Press CAMERA SELECT	Top display flashes on/off 00 Bottom display shows 02 steady	2 of 16
	Key in Second Camera number to be assigned to the monitor (e.g., 12)	Top display flashes on/off 12 Bottom display shows 02 steady	
	Press ENTER	Top display shows 12 steady Bottom display shows 02 steady	
	Press ENTER	(Continue Sequence through 16)	3 of 16
TO EXIT PROGRAMMING MODE	Press the period (•) key		

Function 95 Programming

FUNCTION	STEP	ACTION
Camera by Camera Programming	1	Select monitor 95
	2	Select camera site to be programmed
	3	Select the type of communication desired: PRESS TO ESTABLISH CAM PWR 2-WAY RS-422 (most common mode) LENS/FAST 1-way RS-422 (Requires special firmware in the control receiver) MANUAL DTMF (Requires the option 56 (DTMF) model selection in the master control panel and the control receiver) All off None (Used for fixed-camera sites) <i>Note: If the camera site is not a controllable type site (It is a fixed site), pressing the button associated with the LED that is on will cause the LED to turn off. The site will be programmed as not requiring control.</i>
	4	Exit programming mode by pressing the period (•) key on the keypad
Global Programming	1	Select monitor 95
	2	Select camera 999
	3	Select the type of communication desired (See step 3 above) <i>Note: Because the program is executed by pressing a button, at least one button must be pressed to initiate this programming.</i>
	4	Exit programming mode by pressing the period (•) button on the keypad
<i>Note: The type of communication between the master control panel and the control receiver at each camera site must be established. This table summarizes the procedure for doing this. It may be done on a site by site basis or globally for all sites.</i>		

MPC CONTROL PANEL

Board Assignments and Functions

REF DESIG	MASTER/ REMOTE	FUNCTION
A1		Unassigned reference designation
A2	M/R	Plugs into the STD bus interconnection board (A4). Contains the microprocessor
A3	M/R	Plugs into the STD bus interconnection board (A4) to provide interfacing with the front panel command board and display board
A4	M/R	Provides the STD bus for interfacing with plug-in circuit boards
A5	M/R	Mounts to the front panel to provide the switches and related LED indicators for the operator
A6	M/R	Mounts to the front panel to provide 7-segment LED numeric readout for the operator
A7	R	Provides +5 V dc for remote panel circuits
	M	Provides +5 and +/-12 V for master panel circuits
A8	M	Optional. Plugs into the STD bus interconnection board (A4) to provide interfacing with the optional video switcher adapter board (A11)
A12	M/R	Optional cable and connectors for interfacing between the interface board (A3) and read panel
A13		Unassigned reference designation
A14	M/R	To protect input and output signal lines from transients
A15		Unassigned reference designations from A15 and on

Decimal-Hex-Binary Conversions

DECIMAL	HEX	BINARY	DECIMAL	HEX	BINARY	DECIMAL	HEX	BINARY
000	00	0000 0000	055	37	0011 0111	110	6E	0110 1110
001	01	0000 0001	056	38	0011 1000	111	6F	0110 1111
002	02	0000 0010	057	39	0011 1001	112	70	0111 0000
003	03	0000 0011	058	3A	0011 1010	113	71	0111 0001
004	04	0000 0100	059	3B	0011 1011	114	72	0111 0010
005	05	0000 0101	060	3C	0011 1100	115	73	0111 0011
006	06	0000 0110	061	3D	0011 1101	116	74	0111 0101
007	07	0000 0111	062	3E	0011 1110	117	75	0111 0101
008	08	0000 1000	063	3F	0011 1111	118	76	0111 0110
009	09	0000 1001	064	40	0100 0000	119	77	0111 0111
010	0A	0000 1010	065	41	0100 0001	120	78	0111 1000
011	0B	0000 1011	066	42	0100 0010	121	79	0111 1001
012	0C	0000 1100	067	43	0100 0011	122	7A	0111 1010
013	0D	0000 1101	068	44	0100 0100	123	7B	0111 1011
014	0E	0000 1110	069	45	0100 0101	124	7C	0111 1100
015	0F	0000 1111	070	46	0100 0110	125	7D	0111 1101
016	10	0001 0000	071	47	0100 0111	126	7E	0111 1110
017	11	0001 0001	072	48	0100 1000	127	7F	0111 1111
018	12	0001 0010	073	49	0100 1001	128	80	1000 0000
019	13	0001 0011	074	4A	0100 1010	129	81	1000 0001
020	14	0001 0100	075	4B	0100 1011	130	82	1000 0010
021	15	0001 0101	076	4C	0100 1100	131	83	1000 0011
022	16	0001 0110	077	4D	0100 1101	132	84	1000 0100
023	17	0001 0111	078	4E	0100 1110	133	85	1000 0101
024	18	0001 1000	079	4F	0100 1111	134	86	1000 0110
025	19	0001 1001	080	50	0101 0000	135	87	1000 0111
026	1A	0001 1010	081	51	0101 0001	136	88	1000 1000
027	1B	0001 1011	082	52	0101 0010	137	89	1000 1001
028	1C	0001 1100	083	53	0101 0011	138	8A	1000 1010
029	1D	0001 1101	084	54	0101 0100	139	8B	1000 1011
030	1E	0001 1110	085	55	0101 0101	140	8C	1000 1100
031	1F	0001 1111	086	56	0101 0110	141	8D	1000 1101
032	20	0010 0000	087	57	0101 0111	142	8E	1000 1110
033	21	0010 0001	088	58	0101 1000	143	8F	1000 1111
034	22	0010 0010	089	59	0101 1001	144	90	1001 0000
035	23	0010 0011	090	5A	0101 1010	145	91	1001 0001
036	24	0010 0100	091	5B	0101 1011	146	92	1001 0010
037	25	0010 0101	092	5C	0101 1100	147	93	1001 0011
038	26	0010 0110	093	5D	0101 1101	148	94	1001 0100
039	27	0010 0111	094	5E	0101 1110	149	95	1001 0101
040	28	0010 1000	095	5F	0101 1111	150	96	1001 0110
041	29	0010 1001	096	60	0110 0000	151	97	1001 0111
042	2A	0010 1010	097	61	0110 0001	152	98	1001 1000
043	2B	0010 1011	098	62	0110 0010	153	99	1001 1001
044	2C	0010 1100	099	63	0110 0011	154	9A	1001 1010
045	2D	0010 1101	100	64	0110 0100	155	9B	1001 1011
046	2E	0010 1110	101	65	0110 0101	156	9C	1001 1100
047	2F	0010 1111	102	66	0110 0110	157	9D	1001 1101
048	30	0011 0000	103	67	0110 0111	158	9E	1001 1110
049	31	0011 0001	104	68	0110 1000	159	9F	1001 1111
050	32	0011 0010	105	69	0110 1001	160	A0	1010 0000
051	33	0011 0011	106	6A	0110 1010	161	A1	1010 0001
052	34	0011 0100	107	6B	0110 1011	162	A2	1010 0010
053	35	0011 0101	108	6C	0110 1100	163	A3	1010 0011
054	36	0011 0110	109	6D	0110 1101	164	A4	1010 0100

Decimal-Hex-Binary Conversions (Continued)

DECIMAL	HEX	BINARY	DECIMAL	HEX	BINARY	DECIMAL	HEX	BINARY
165	A5	1010 0101	195	C3	1100 0011	225	E1	1110 0001
166	A6	1010 0110	196	C4	1100 0100	226	E2	1110 0010
167	A7	1010 0111	197	C5	1100 0101	227	E3	1110 0011
168	A8	1010 1000	198	C6	1100 0110	228	E4	1110 0100
169	A9	1010 1001	199	C7	1100 0111	229	E5	1110 0101
170	AA	1010 1010	200	C8	1100 1000	230	E6	1110 0110
171	AB	1010 1011	201	C9	1100 1001	231	E7	1110 0111
172	AC	1010 1100	202	CA	1100 1010	232	E8	1110 1000
173	AD	1010 1101	203	CB	1100 1011	233	E9	1110 1001
174	AE	1010 1110	204	CC	1100 1100	234	EA	1110 1010
175	AF	1010 1111	205	CD	1100 1101	235	EB	1110 1011
176	B0	1011 0000	206	CE	1100 1110	236	EC	1110 1100
177	B1	1011 0001	207	CF	1100 1111	237	ED	1110 1101
178	B2	1011 0010	208	D0	1101 0000	238	EE	1110 1110
179	B3	1011 0011	209	D1	1101 0001	239	EF	1110 1111
180	B4	1011 0100	210	D2	1101 0010	240	F0	1111 0000
181	B5	1011 0101	211	D3	1101 0011	241	F1	1111 0001
182	B6	1011 0110	212	D4	1101 0100	242	F2	1111 0010
183	B7	1011 0111	213	D5	1101 0101	243	F3	1111 0011
184	B8	1011 1000	214	D6	1101 0110	244	F4	1111 0100
185	B9	1011 1001	215	D7	1101 0111	245	F5	1111 0101
186	BA	1011 1010	216	D8	1101 1000	246	F6	1111 0110
187	BB	1011 1011	217	D9	1101 1001	247	F7	1111 0111
188	BC	1011 1100	218	DA	1101 1010	248	F8	1111 1000
189	BD	1011 1101	219	DB	1101 1011	249	F9	1111 1001
190	BE	1011 1110	220	DC	1101 1100	250	FA	1111 1010
191	BF	1011 1111	221	DD	1101 1101	251	FB	1111 1011
192	C0	1100 0000	222	DE	1101 1110	252	FC	1111 1100
193	C1	1100 0001	223	DF	1101 1111	253	FD	1111 1101
194	C2	1100 0010	224	ED	1110 0000	254	FE	1111 1110
						255	FF	1111 1111

OPERATION

All operating functions related to either a Master Control Panel or a Remote Control Panel take place on the front of the unit. The operator controls the system (or the part of the system assigned to a Panel) using these front panel controls.

FRONT PANEL CONTROL

The Control Panel is the operator's interface to the control system. The operator can observe the status of various functions associated with system operation. Front panel controls include a joy stick for control of the pan and tilt unit, toggle switches for control of zoom in/out, focus near/far, and iris open/close, and pushbutton switches for selection of camera power on/off, lens speed fast/slow, and auto/manual iris.

Available as options are three auxiliary switch positions for operator defined control, a maximum of three relays and/or one analog output for special system control. These switches are not shown in the front panel view nor listed in the controls table.

Also included is a keypad for camera and monitor selection. Two alpha numeric LED displays identify the camera and monitor selected. A BUSY light indicates when an attempt is made to select a camera that is being controlled by another operator.

Other LED's give status of auto/manual iris, camera power on/off, lens speed fast/slow, and the three auxiliary functions.

Tables are included that list all standard front panel functions, a typical camera select/deselect procedure, and a typical control panel select/deselect procedure.

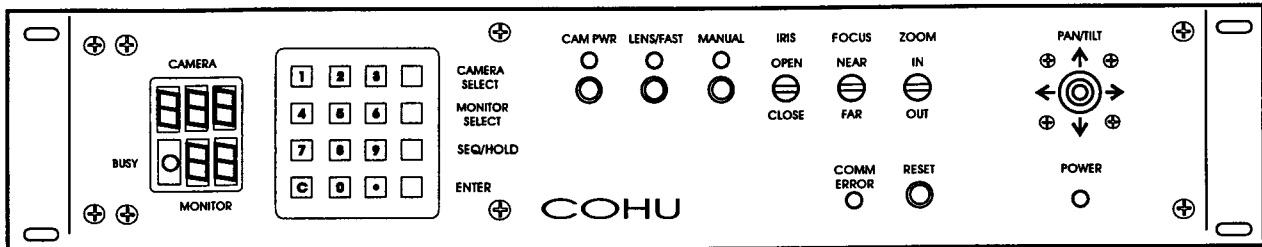


Figure 3-1. Operator Front Panel Controls

MPC CONTROL PANEL

Front Panel Features

ADDRESSING	Alpha-numeric display	CAMERA	Indicates which camera is currently selected for viewing and/or control
		BUSY	Indicates that camera selected is under control of another panel
		MONITOR	Indicates the monitor to which current camera output is directed to
	Pushbutton Keypad	CAMERA SELECT	Activates camera selection function
		MONITOR SELECT	Activates monitor selection function (table 3-2)
		ENTER	Completes the function of selecting a camera or monitor
		C	Clears a camera or monitor select error condition
		0 — 9	Used for numeric input of selected functions
	COMMAND/CONTROL	Switches and Indicators	CAM PWR switch & lamp
LENS/FAST switch & lamp			For addressed camera, the switch controls lens speed for focus and zoom functions. Lamp on indicates fast mode
MANUAL			For addressed camera, the switch controls automatic/manual iris selection. Lamp on indicates manual control mode.
IRIS: OPEN/CLOSE			For addressed camera, this switch opens and/or closes lens iris when the manual mode is activated
FOCUS: NEAR/FAR			For addressed camera, this switch focuses the lens closer to or farther from camera
ZOOM: IN-OUT			For addressed camera, the IN position has the effect of making the subject appear closer on the monitor, the OUT position causes the subject to appear farther away
COMM ERROR Lamp			A communication error exists when this lamp is glowing indicating improper communication to the selected camera control receiver. (This is a normal indication if camera is not a controllable camera.)
RESET Switch			Restarts the microprocessor
PAN/TILT Joystick			For addressed camera, moving the joystick to any position through a full 360 degrees activates the panning (right-left) and/or tilting (up/down) action indicated by the arrows
POWER Lamp			This lamp glows green when panel is supplied power to the system. (On-off switch is on rear panel.)

Monitor Select/Deselect Procedure

FUNCTION	ACTION	RESULT	
MONITOR SELECT	1. Depress MONITOR SELECT	MONITOR display will have a flashing 0 (zero)	
	2. Enter monitor number	MONITOR display will show the number entered	
	3. Depress ENTER	Either A or B occurs:	Possibility A
			MONITOR display stops flashing and
			CAMERA display will indicate the camera assigned to selected monitor
			(Command status display will indicate current camera site status)
			Possibility B
			MONITOR display will continue flashing and BUSY lamp will flash, indicating possible errors such as:
			Monitor number is out of range for this control panel, or Some other control panel has control of the selected monitor output
Clear MONITOR SELECT	4. Depress C	Monitor display will indicate the SELECT number that was indicated prior to depressing MONITOR SELECT	

MPC CONTROL PANEL

Camera Select/Deselect Procedure

FUNCTION	ACTION	RESULT	
CAMERA SELECT	1. Depress CAMERA SELECT	CAMERA display responds with a flashing 0 (zero)	
	2. Enter camera number (1 to 3 digits) on keypad	CAMERA display responds with the number just entered as a flashing display	
	3. Depress ENTER	Either A or B occurs:	Possibility A
			CAMERA display will stop flashing
			BUSY lamp will indicate busy status
			Command status display will indicate current camera site status
			Possibility B
			CAMERA display will continue to flash and BUSY lamp will flash, indicating an error condition (The error condition would normally be due to selection of a camera number not available to the control panel)
Clear CAMERA SELECT	4. Depress C	Camera display will have a flashing 0 (zero)	
	5. Depress C again	Camera display will indicate the number indicated prior to depressing CAMERA SELECT	

Control Panel Deselect/Select Procedure

FUNCTION	ACTION	RESULT
PANEL DESELECT	1. Select monitor number 0 (zero)	CAMERA display will blank
		MONITOR display will indicate 0 (zero)
PANEL SELECT	2. Select monitor using the procedure in the monitor select/deselect procedure	Panel becomes active. The monitor just selected is active. Control of the camera that had previously been selected is re-established

WARRANTY

Cohu, Inc., Electronics Division, warrants equipment manufactured to be free from defects of material and workmanship. Any part or parts will be repaired or replaced when proven by Cohu examination to have been defective within two years from date of shipment to the original purchaser for standard CCD cameras and one year from date of shipment to the original purchaser for intensified CCD cameras and all other Cohu manufactured products.

All warranty repairs will be performed at the factory or as otherwise authorized by Cohu in writing. Transportation charges to Cohu shall be prepaid by purchaser.

This warranty does not extend to Cohu equipment subjected to misuse, accident, neglect, or improper application, nor repaired or altered by other than Cohu or those authorized by Cohu in writing. **Television image pickup tubes, image intensifiers, lenses, and products manufactured by companies other than Cohu are warranted by the original manufacturer.** This warranty is in lieu of all other warranties expressed or implied. Cohu shall not be liable for collateral or consequential damages.

A Return Authorization (RA) number must be obtained from Cohu prior to returning any item for warranty repairs or replacement.

MPC CONTROL PANEL

COHU
Cohu, Inc./Electronics Division

September 17, 1995
Revision 1 Feb. 17, 1997
Revision 2 Mar. 4, 1998
Revision 3 April 4, 2002
Revision 4 Oct. 16, 2002
Revision 5 Nov. 19, 2002

APPENDIX A

MPC SYSTEM MESSAGE FORMATS

Two appendices follow this page. They describe the message formats for RS-232 and RS-422 signals used for communications with the Control Panels.

MPC CONTROL PANEL

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