MPC SYSTEM
RS-232 INTERFACE

1.1 GENERAL DESCRIPTION

The MPC Master Control Panel contains an 8031 microcomputer with on-board UART and RS-232 interface circuitry for communications with other MPC control panels, control receivers, and a Host Computer.

This section supplies the details necessary to understand RS-232 communications between the Host Computer and the MPC Master Control Panel as used in the Camera control system (figure 1).

1.2 MESSAGE FORMAT

Anytime a command message is sent from the Host Computer to the MPC Master Control Panel, the MPC Master will respond with an ACK or an NAK (figure 1). Data is transmitted using 1 start bit, 8 data bits, and 1 stop bit (no parity). The baud rate is set by a DIP switch located on the RS-232 board. It is typically set to 9600 baud.

The commands are sent using the command message format show in table 1. The various commands that may be transmitted are listed in table 2.

If the command message contains a latch function command, then the latch status response (table 3, Format of Latch Status Response) will be sent back to the Host Computer. If the command message contains a home function command, then the home status response (table 3, Format of Home Status Re-

sponse from MPC) will be sent back to the Host Computer.

If the command is a position message, the response will be as shown in table 4.

If the command message contains only a momentary function, no further response beyond the ACK or NAK will occur. If the command message contains a communications error (e.g., an address to an non-existent control receiver or a failure in the communications system), then the command error message response (in table 3, with B3 of byte 3 equal to 1) will be sent back.

Table 5 gives the RS-232 switch message format.

Table 6 gives the ID message format for communications from a host computer to the master control panel. An ACK or NAK is returned.
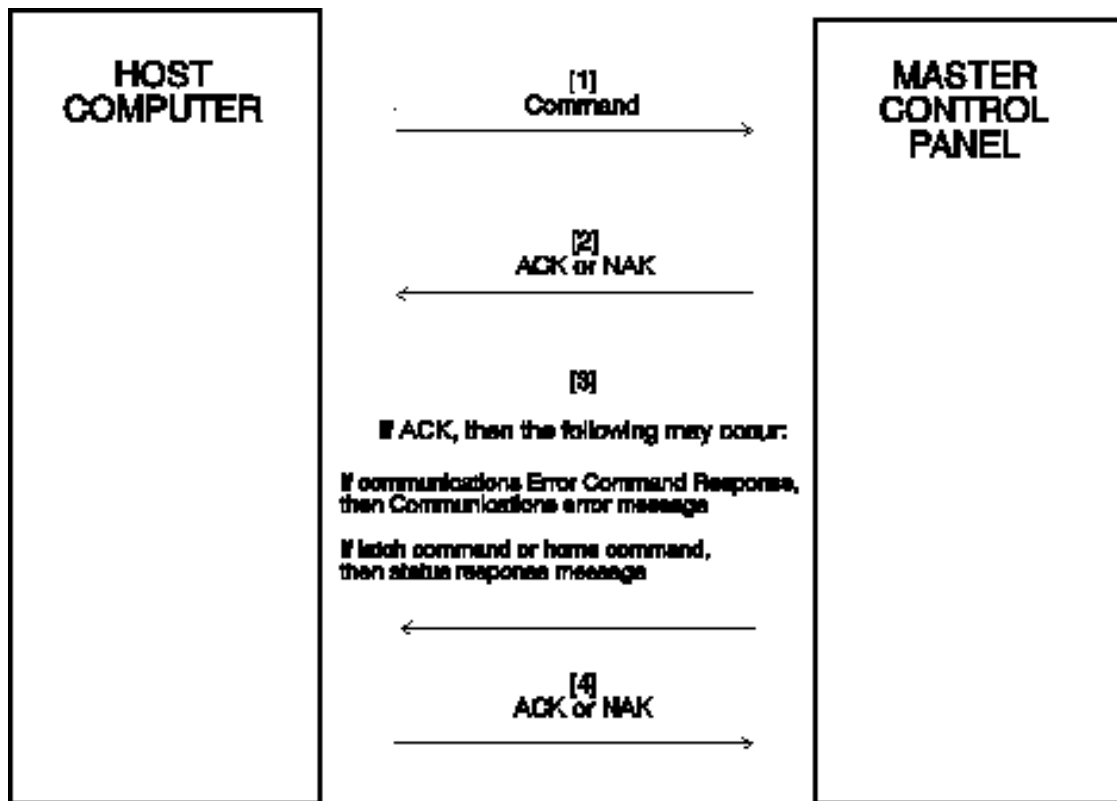
1.3 MAINTENANCE

No maintenance adjustments are required for the RS-232 circuits on the processor board.

1.4 PARTS LIST

Refer to the processor board for parts identifications.

1.5 SCHEMATIC DIAGRAMS

Refer to the processor board for the schematic diagram.

FIGURE 1. TYPICAL COMMUNICATIONS PROTOCOL

TABLE 1. RS-232 COMMAND MESSAGE FORMAT

BYTE	DATA	DESCRIPTION
0	STX	Start of message (02_H)
1	Address in hex	Camera address (01_H—DFH)
2 TO 2N+1	Command Data	See table 2
2N+2	CHECKSUM	80_H to $8F_H$ Least significant nibble is EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
2N+3	ETX	End of Message (03_H)
NOTE: N is the number of commands in the message		

TABLE 2. RS-232 COMMAND DATA

BYTE	DATA	DESCRIPTION
MOMENTARY		
RESET CONTROL RECEIVER	"rs"	DATA consists of the ASCII codes for the two letters shown:
PAN LEFT	"PL"	rs=ASCII codes for r and s
PAN RIGHT	"PR"	PL=ASCII codes for P and L, etc.
PAN STOP	"PS"	
TILT UP	"TU"	
TILT DOWN	"TD"	
TILT STOP	"TS"	
ZOOM IN	"ZI"	
ZOOM OUT	"ZO"	
ZOOM STOP	"ZS"	
FOCUS NEAR	"FN"	
FOCUS FAR	"FF"	
FOCUS STOP	"FS"	
IRIS OPEN	"IO"	
IRIS CLOSE	"IC"	
IRIS STOP	"IS"	
AUTO SCAN ON	"AS"	
AUTO SCAN OFF	"AO"	
P/T POSITION REQUEST	"P?"	See table 4 for position format
P/T GOTO COMMAND	"pA2A1A0E2E1E0"	
LENS POSITION REQUEST	"V?"	
LENS GOTO COMMAND	"vA2A1A0E2E1E0"	
LATCH		
MANUAL IRIS TOGGLE	"LM"	See table 3 for response format
CAMERA POWER TOGGLE	"LP"	
LENS SPEED TOGGLE	"LL"	
LATCH STATUS REQUEST	"L?"	
AUX FUNCTIONS (Option 1)	"L1"—"L3"	Toggles Aux 1, Aux 2, or Aux 3
COLOR BALANCE (Option 2)	"L1" "B1" "B2" "B0"	Select auto/manual mode Increase blue Increase red Balance stop
HOME		
HOME POSITION GOTO Preset 1—9	"H0"—"H9"	A home active "HA" will be immediate response. Later a home position "H0" to "H9" or home error "HE" will be generated
HOME POSITION STORE Program 0—9	"P0"—"P9"	
HOME POSITION STATUS REQUEST	"H?"	Will generate a home status response See table 3

TABLE 3. RS-232 RESPONSE MESSAGE

BYTE	DATA	DESCRIPTION
FORMAT OF LATCH STATUS RESPONSE FROM MPC		
0	STX	Start of message (02_H)
1	Address in hex	Camera address 01H to DF_H
2	"L"	Latch Status
3	30_H to 37_H or 38_H (Comm error)	LS NIBBLE is four bits of status **Bit Value 0/1** B0=Iris Auto Manual B1=Camera power Off/On B2=Lens Speed Slow/Fast B3=Communications Error No/Yes
4	"A"	Aux Status
5	30_H to 37_H	LS NIBBLE is four bits of status Bit Value 0/1 B0=Aux 1 B1=Aux 2 B2=Aux 3
6	CHECKSUM	80_H to $8F_H$ Least significant nibble is EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
7	ETX	End of message (03_H)
FORMAT OF HOME STATUS RESPONSE FROM MPC		
0	STX	Start of message (02H)
1	Address in hex	Camera address 01H—$_{DFH}$
2	"H"	Home Status
3	"0"—"9" or "A", or "I", or "E"	ie, 2=Home position 2 A=Home active I=Not-at-Home position, or active E=Home error—could not get to home position
4	Checksum	80_H to $8F_H$ Least significant nibble is EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
5	ETX	End of message (03_H)

TABLE 4. MPC POSITION MESSAGE

BYTE	DATA	DESCRIPTION
		FORMAT OF PAN/TILT POSITION MESSAGE
0	STX	Start of message (02_H)
1	Address in hex	Camera address (01_H to DF_H)
2	"P" or "p"	Upper case "P" is response; Lower case "p" is GOTO command
3	A2 (MS nibble)	
4	A1	Azimuth position (See Notes)
5	A0 (LS nibble)	
6	E2 (MS nibble)	
7	E1	Elevation position (See Notes)
8	E0 (LS nibble)	
9	CHECKSUM	80_H to $8F_H$ Least significant nibble is EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
10	ETX	End of message (03_H)
		FORMAT OF ZOOM/FOCUS POSITION MESSAGE
0	STX	Start of message (02_H)
1	Address in hex	Camera address (01_H to DF_H)
2	"V" or "v"	Upper case "V" is response; Lower case "v" is GOTO command
3	A2 (MS nibble)	
4	A1	Zoom position (See Notes)
5	A0 (LS nibble)	
6	E2 (MS nibble)	
7	E1	Focus position (See Notes)
8	E0 (LS nibble)	
9	CHECKSUM	80_H to $8F_H$ Least significant nibble is EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
10	ETX	End of message (03_H)

NOTES:
The 12-bit position data is contained in nibbles 0—2, with nibble 0=b_0—b_3, nibble 1=b_4—b_7,
and nibble 2=b_8—b_{11}. The nibble is then added to 30_H to produce a value from 30_H to $3F_H$

Example: Azimuth data b_0—b_3 is expressed as A_0 (azimuth nibble 0)

Table 5. RS-232 SWITCH MESSAGE FORMAT

BYTE	DATA	DESCRIPTION
0	STX	Start of message (02_H)
1	Address in hex	The remote control panel address in hex that the switch message will be displayed on. This remote will also be given control of the control receiver for the camera number in the switch message (if applicable). Binary 0 to 30 valid for remote control panels. Binary 31 refers to the master control panel. Data greater than 31 will provide for video switching only; no control panel is associated.
2	"S"	ASCII character for letter S
3	C100	ASCII character for the camera number. C100 is the hundred's digit, C10 is the ten's digit, and C1 is the unit's digit
4	C10	
5	C1	
6	M100	ASCII character for monitor number. M100 is the hundres's digit, M10 is the ten's digit, and M1 is the unit's digit
7	M10	
8	M1	
9	CHKSUM	CHKSUM is a hexadecimal number 80_H to $8F_H$. The least significant (nibble) is the EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
10	ETX	End of Message (03_H)

TABLE 6. ID MESSAGE FORMAT

BYTE	DATA	DESCRIPTION
FORMAT OF SELECT MODE MESSAGE		
0	STX	Start of Message (02_H)
1	Address in hex	Camera address (01_H to DF_H)
2	'd'	Display message
3	'M'	Mode select
4	'M' 'I'	Menu mode ID mode
5	CHECKSUM	80_H to $8F_H$ Least significant nibble is EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
6	ETX	End of Message (03_H)
FORMAT OF ID ENABLE/DISABLE MESSAGE		
0	STX	Start of Message (02_H)
1	Address in hex	Camera address (01_H to DF_H)
2	'd'	Display message
3	'I'	ID display
4	'D' 'E'	Disable ID display Enable ID display
5	CHECKSUM	80_H to $8F_H$ Least significant nibble is EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
6	ETX	End of Message (03_H)
FORMAT OF ID CLEAR SCREEN MESSAGE		
0	STX	Start of Message (02_H)
1	Address in hex	Camera address (01_H to DF_H)
2	'd'	Display message
3	'C'	Clear screen
4	CHECKSUM	80_H to $8F_H$ Least significant nibble is EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
5	ETX	End of Message (03_H)
Continued		
FORMAT OF SELECT ID TOP MESSAGE		

TABLE 6. ID MESSAGE FORMAT (Continued)

0	STX	Start of message (02$_H$)
1	Address in hex	Camera address (01$_H$ to DF$_H$)
2	'd'	Display message
3	'I'	ID display
4	'T'	ID at top
5	CHECKSUM	80$_H$ to 8F$_H$ Least significant nibble is EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
6	ETX	End of Message (03$_H$)
FORMAT OF SELECT ID BOTTOM MESSAGE		
0	STX	Start of message (02$_H$)
1	Address in hex	Camera address (01$_H$ to DF$_H$)
2	'd'	Display message
3	'I'	ID display
4	'B'	ID at bottom
5	CHECKSUM	80$_H$ to 8F$_H$ Least significant nibble is EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
6	ETX	End of Message (03$_H$)
FORMAT OF UPDATE LINE MESSAGE		
0	STX	Start of message (02$_H$)
1	Address in hex	Camera address (01$_H$ to DF$_H$)
2	'd'	Display message
3	'L'	Line of text
4	'1'-'<' (31$_H$ - 3C$_H$)	Line number (1-12) + 30$_H$
5	(ID text)	ASCII characters (up to 24) for the line starting with the leftmost character
N	CHECKSUM	80$_H$ to 8F$_H$ Least significant nibble is EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
N+1	ETX	End of Message (03$_H$)
Continued		
FORMAT OF ALARM DISPLAY MESSAGE		
0	STX	Start of message (02$_H$)

TABLE 6. ID MESSAGE FORMAT (Continued)

1	Address in hex	Camera address (01_H to DF_H)
2	'd'	Display message
3	'A'	Alarm message
4	'1'-'3' (31_H -33_H) 'B'	Display line number (1-3) + 30_H Blink alarm message
5	'E' 'D'	Enable alarm message Disable alarm message
6	CHECKSUM	80_H to $8F_H$ Least significant nibble is EXCLUSIVE-OR of all previous bytes (LS NIBBLE only) except STX
7	ETX	End of Message (03_H)
NOTE: For all messages from a host computer to the master control panel , ACK or NAK is returned.		

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NOTES