MPC SYSTEM
RS-422 INTERFACE

1.1 GENERAL DESCRIPTION

The MPC Master Control Panel contains an 8031 microcomputer with on-board UART for RS-422 communications with MPC Remote Control Panels and MPC Control Receivers—and RS-232 for communications with a Host Computer. (The RS-232 interface is described in publication 6X-5030.)

This section supplies the details necessary to understand RS-422 communications between the MPC Master and Control Receivers as used in the camera control system (figure 1).

1.2 MESSAGE FORMAT

Anytime a command message is sent from the MPC Master Control Panel to a Control Receiver, the Receiver 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 using the monitor 97 function as an entry code. It is typically set to 9600 baud. This process is described in the installation instructions of the Control Panel manual.

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 Master Control Panel. If the command message contains a home function command, then the home status response (table 3, Format of Home Status Response from MPC) will be sent back to the Master Control Panel.

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 ID message format for communications from the master control panel to a control receiver. An ACK or NAK is returned.

1.3 MAINTENANCE

No maintenance adjustments are required for the RS-422 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.

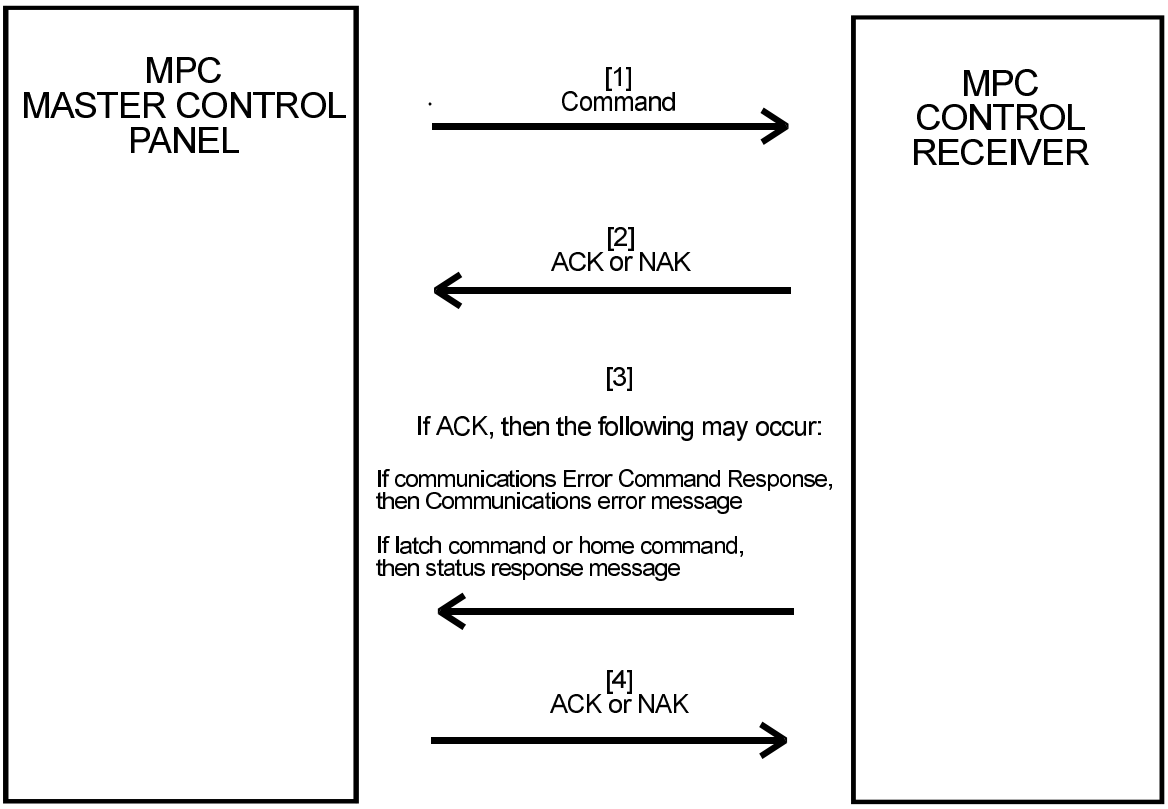

FIGURE 1. TYPICAL COMMUNICATIONS PROTOCOL

TABLE 1. RS-422 COMMAND MESSAGE FORMAT

BYTE	DATA	DESCRIPTION
0	$F8_H$	Autobaud character
1	Address in hex	Camera address (01_H to $DF_{H)}$
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 F8
NOTE: N is the number of commands in the message		

TABLE 2. RS-422 COMMAND DATA

BYTE	DATA	DESCRIPTION
MOMENTARY		
RESET CONTROL RECEIVER	“rs”	DATA consists of the ASCII codes for the two letters shown: rs=ASCII codes for r and s PL=ASCII codes for P and L, etc.
PAN LEFT	“PL”	
PAN RIGHT	“PR”	
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”	
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 0—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-422 RESPONSE MESSAGE

BYTE	DATA	DESCRIPTION
FORMAT OF LATCH STATUS RESPONSE FROM MPC CONTROL RECEIVER		
0	$F8_H$	Autobaud character
1	Address in hex	Camera address 01_H 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 F8
FORMAT OF HOME STATUS RESPONSE FROM MPC CONTROL RECEIVER		
0	$F8_H$	Autobaud character
1	Address in hex	Camera address 01_H to DF_H
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 F8

TABLE 4. MPC POSITION MESSAGE

BYTE	DATA	DESCRIPTION
FORMAT OF PAN/TILT POSITION MESSAGE		
0	$F8_H$	Autobaud character
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)	Azimuth position (See Notes)
4	A1	
5	A0 (LS nibble)	
6	E2 (MS nibble)	Elevation position (See Notes)
7	E1	
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 F8
FORMAT OF ZOOM/FOCUS POSITION MESSAGE		
0	$F8_H$	Autobaud character
1	Address in hex	Camera address (01H to DF_H)
2	"V" or "v"	Upper case "V" is response; Lower case "v" is GOTO command
3	A2 (MS nibble)	Zoom position (See Notes)
4	A1	
5	A0 (LS nibble)	
6	E2 (MS nibble)	Focus position (See Notes)
7	E1	
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 F8

NOTES:
The 12-bit position data is contained in nibbles 0—2, with nibble 0=b_0 to b_3 , nibble 1=b_4 to b_7 , and nibble 2=b_8 to 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 to b_3 is expressed as A_0 (azimuth nibble 0)

TABLE 5. ID MESSAGE FORMAT

BYTE	DATA	DESCRIPTION
FORMAT OF SELECT MODE MESSAGE		
0	$F8_H$	Autobaud character
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 F8
FORMAT OF ID ENABLE/DISABLE MESSAGE		
0	$F8_H$	Autobaud character
1	Address in hex	Camera address (01H 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 F8
FORMAT OF ID CLEAR SCREEN MESSAGE		
0	$F8_H$	Autobaud character
1	Address in hex	Camera address (01H 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 F8
FORMAT OF SELECT ID TOP MESSAGE		
0	$F8_H$	Autobaud character
1	Address in hex	Camera address (01H 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 F8

Continued

TABLE 5. ID MESSAGE FORMAT (Continued)

FORMAT OF SELECT ID BOTTOM MESSAGE		
0	$F8_H$	Autobaud character
1	Address in hex	Camera address (01H 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 F8
FORMAT OF UPDATE LINE MESSAGE		
0	$F8_H$	Autobaud character
1	Address in hex	Camera address (01H 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 F8
FORMAT OF ALARM DISPLAY MESSAGE		
0	$F8_H$	Autobaud character
1	Address in hex	Camera address (01H 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 F8
NOTE: For all messages from master control panel to control receiver, ACK or NAK is returned.		

NOTES