

PACOM 2030

Serial Communication Protocol

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INTRODUCTION

Intro

Any peripheral communicating with the PACOM 2030 controller needs to comply with the following protocol.

Bytes are grouped into packets as follows;

STX - Start of packet
HDR - Header
xxx - Data
.
.
.
xxx - Data
ETX - End of packet
CRC - Exclusive or of all bytes
including stx & etx.

An exception to above described packet is the structure of camera control messages which is defined as follows;

Pacom CCD

STX - Start of packet
ADDR - Address
OPP CTRL - Opposite Control
ADDR - Address
CTRL - Control
ETX - End of packet
CRC - Exclusive or of all bytes
including stx & etx.

Intercept CCD

STX - Start of packet
ADDR - Address
WORD3 - Camera Control
WORD4 - Camera Control
WORD5 - Camera Control
WORD6 - Camera Control
ETX - End of packet
CRC - Exclusive or of all bytes including stx & etx.

NOTE: See Camera Control Decoder Protocol for explanation of all bytes.

Each packet must be received and an acknowledgement(ACK) message returned to the sender unit or retransmit will occur. An NACK is returned if the sent package has been corrupted. IF no reply or a NACK is returned, then after a certain time out period (default 250ms) the message is retransmitted. This message could be retransmitted up to 3 times.

1.Package received without error - Reply --->
ACK ---> No retransmit.
2.Package received with crc error - Reply --->
NACK ---> Host Retransmit
3.Package not received -
No Reply ---> Host Retransmit
(up to 3 times).

Data transmitted or received is converted to either BCD or ASCII formats. It may also be left as a bit pattern when it does not fall into the control character range of values (namely, A0 to FF). An exception to this rule is the crc byte, which is sent as a hex value.

The standard values for bytes transmitted and received must comply with the following;

stx - A0,
hdr - B0 -> F7,
xxx - data either ASCII or BCD,
etx - AF,
crc - 00 -> FF

ack - A2
nak - AA

The response time should be no longer than 250 ms to prevent the system from retransmitting the message.

1. SEND CURRENT MONITOR ASSIGNMENT

Header 1
B1 hex**Function;**

To get information from the controller of current assignment for a selected monitor.

Format of message 1 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr1	B1 (hex)
3rd	mon	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Controller responses;

The controller usually responds with the camera logical number selected for this monitor and its status.

Controller Response: Response 1 or
Response 1A or
Error Responses

Format for Requested Monitor Assignment; Response 1 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr1	B1 (hex)
3rd	mon	packed BCD
4th	stat1	bit pat
5th	stat2	bit pat
6th	camhi	packed BCD
7th	camlo	packed BCD
8th	macrohi	packed BCD
9th	macrolo	packed BCD
10th	auxstatlo	auxstat low nibble
11th	auxstathi	auxstat high nibble
12th	etx	AF (hex)
13th	crc	block check

If the operator has requested assignment for monitor number 0, the controller responds with a sign **Off command**.

Controller response for monitor no 0 assignment; Format of Response 1A is:

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr1	B1 (hex)
3rd	mon	00 (hex)
4th	etx	AF (hex)
5th	crc	block check

The controller may also respond by issuing either of the following errors;

HDR 50, err10 - monitor denied,
HDR 50, err11 - monitor not present.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr	E2 (hex)
3rd	errno	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
	msg1	----->
Any equip		<----- rsp
	ack	----->

2. SWITCH CAMERA TO MONITOR

Header 2
B2 hex

Function;

Request to switch selected camera to nominated monitor.

Format of message 2 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr2	B2 (hex)
3rd	mon	packed BCD
4th	camhi	packed BCD
5th	camlo	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Controller response;

The controller will issue response 1 to the equipment for normal assignment of selected monitor and issue response HDR30 to video matrix to switch camera to monitor.

Controller Response: Response 1 and
Response 30 or
Error Message

Format for Requested Monitor Assignment; Response 1 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr1	B1 (hex)
3rd	mon	packed BCD
4th	stat1	bit pat
5th	stat2	bit pat
6th	camhi	packed BCD
7th	camlo	packed BCD
8th	macrohi	packed BCD
9th	macrolo	packed BCD
10th	auxstatlo	auxstat low nibble
11th	auxstat hi	auxstat high nibble
12th	etx	AF (hex)
13th	crc	block check

Format of message 30 sent to the matrix to switch a camera to a monitor is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr30	CE (hex)
3rd	pmon	packed BCD
4th	pcamhi	packed BCD
5th	pcamlo	packed BCD
6th	etx	AF (hex)
7th	crc	block check

The controller may also issue any of the following errors;

HDR49,err10 - monitor denied,
HDR49,err11 - monitor not present,
HDR49,err12 - camera denied,
HDR49,err13 - camera not present,
HDR8,oprno - operator busy, or
HDR12,oprno - monitor locked msg.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 or B8 or BC (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
	msg2	----->
any equip		<----- rsp1
	ack	----->
		<----- msg30
equ12(mtx)	ack	----->
OR		
	msg2	----->
any equip		<----- err
	ack	----->

3. VIDEO LOSS MASK/UNMASK

Header 3
B3 hex

Function;

To activate (when 'U' is sent) or deactivate (when 'M' is sent) video fail circuitry and video loss display for selected cameras.

Format of message 3 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr3	B3 (hex)
3rd	xxx	00 (hex)
4th	num	packed BCD
REPEAT HIGHLIGHT BLOCK		
5th	camhi	packed BCD
6th	camlo	packed BCD
7th	'M'or'U'	ASCII code
nth	etx	AF (hex)
n+1th	crc	block check

where:

'M' - video loss detector masked,
'U' - video loss detector active,
'XXX' - not used.
'BLOCK REPEAT' - block highlighted above repeated
num times, for up to 50 cameras.

Controller response;

The controller will send an ack as response to the message. A series of messages 21 to mask/unmask video fail circuits are sent to the matrix for all selected inputs.

Format of message 21 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr21	C5 (hex)
3rd	fnc	bit pat
4th	pcamhi	packed BCD
5th	pcamlo	packed BCD
6th	etx	AF (hex)
7th	crc	block check

where:

fnc = 00 (hex) unmask,
fnc = 01 (hex) mask.

Line protocol is;

Peripheral	Controller
Port	Data Data
any equip	msg2 ----->
equ(1-9999)	<----- ack
matrix	<----- msg21
(equ2/12)	ack ----->

4. START MACRO

Function;

Request to restart execution of current macro.

Header 4
B4 hex

Format of message 4 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr4	B4 (hex)
3rd	mon	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Controller response;

The controller will send response 1 either for normal monitor assignment or any of the following error messages.

Format for Monitor Assignment; Response 1 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr1	B1 (hex)
3rd	mon	packed BCD
4th	stat1	bit pat
5th	stat2	bit pat
6th	camhi	packed BCD
7th	camlo	packed BCD
8th	macrohi	packed BCD
9th	macrolo	packed BCD
10th	auxstatlo	auxstat low nibble
11th	auxstathi	auxstat high nibble
12th	etx	AF (hex)
13th	crc	block check

The controller could issue any of the following errors.

HDR50,err10 - monitor denied,
HDR50,err11 - monitor not present,
HDR49,err17 - Macro not present.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 or E2 (hex)
3rd	errno	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
any equip	msg4 ----->	
equ1-9999	<-----	rsp1
	ack ----->	
OR		
	msg4 ----->	
any equip	<-----	err
	ack ----->	

5. STOP MACRO

Header 5
B5 hex**Function;**

Request to stop execution of currently selected macro.

Format of message 5 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr5	B5 (hex)
3rd	mon	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Controller response;

The controller will send response 1 or one of the following error messages.

Format for Monitor Assignment; Response 1 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr1	B1 (hex)
3rd	mon	packed BCD
4th	stat1	bit pat
5th	stat2	bit pat
6th	camhi	packed BCD
7th	camlo	packed BCD
8th	macrohi	packed BCD
9th	macrolo	packed BCD
10th	auxstatlo	auxstat low nibble
11th	auxstathi	auxstat high nibble
12th	etx	AF (hex)
13th	crc	block check

One of the following error messages will be sent by the controller.

HDR50,err10 - monitor denied,
HDR50,err11 - monitor not present,
HDR49,err17 - macro not present.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 or E2 (hex)
3rd	errno	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
any equip	msg5 ----->	
equ1-9999		<----- rsp1
	ack ----->	
OR		
	msg5 ----->	
any equip		<----- err
	ack ----->	

6. STEP FORWARD TO THE NEXT CAMERA

Header 6
B6 hex

Function;

Request to switch next logical camera accessible by an operator to selected monitor.

Format of message 6 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr6	B6 (hex)
3rd	mon	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Controller response;

The controller will issue response 1 to the equipment for normal assignment of selected monitor and issue response HDR30 to video matrix to switch camera to monitor.

Controller Response: Response 1 and
Response 30 or
Error Message

Format for Requested Monitor Assignment; Response 1 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr1	B1 (hex)
3rd	mon	packed BCD
4th	stat1	bit pat
5th	stat2	bit pat
6th	camhi	packed BCD
7th	camlo	packed BCD
8th	macrohi	packed BCD
9th	macrolo	packed BCD
10th	auxstatlo	auxstat low nibble
11th	auxstathi	auxstat high nibble
12th	etx	AF (hex)
13th	crc	block check

Format of message 30 sent to the matrix to switch a camera to a monitor is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr30	CE (hex)
3rd	pmon	packed BCD
4th	pcamhi	packed BCD
5th	pcamlo	packed BCD
6th	etx	AF (hex)
7th	crc	block check

The controller may also issue any of the following errors;

HDR50,err10 - monitor denied,
HDR49,err11 - monitor not present,
HDR8,oprno - operator busy, or
HDR12,oprno - monitor locked msg.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E2 or E1 or B8 or BC (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
any equip	msg6 ----->	
equ1-9999	<-----	rsp1
	ack ----->	
matrix	<-----	msg30
(equ2/12)	ack ----->	
OR		
	msg6 ----->	
any equip	<-----	err msg
	ack ----->	

7. STEP BACKWARD TO THE PREVIOUS CAMERA

Header 7
B7 hex

Function;

Request to switch previous logical camera accessible by an operator to selected monitor.

Format of message 7 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr7	B7 (hex)
3rd	mon	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Controller response;

The controller will issue response 1 to the equipment for normal assignment of selected monitor and issue response HDR30 to video matrix to switch camera to monitor.

Controller Response: Response 1 and
Response 30 or
Error Message

Format for Requested Monitor Assignment; Response 1 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr1	B1 (hex)
3rd	mon	packed BCD
4th	stat1	bit pat
5th	stat2	bit pat
6th	camhi	packed BCD
7th	camlo	packed BCD
8th	macrohi	packed BCD
9th	macrolo	packed BCD
10th	auxstatlo	auxstat low nibble
11th	auxstathi	auxstat high nibble
12th	etx	AF (hex)
13th	crc	block check

Format of message 30 sent to the matrix to switch a camera to a monitor is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr30	CE (hex)
3rd	pmon	packed BCD
4th	pcamhi	packed BCD
5th	pcamlo	packed BCD
6th	etx	AF (hex)
7th	crc	block check

The controller may also issue any of the following errors;

HDR50,err10 - monitor denied,
HDR49,err11 - monitor not present,
HDR8,opr - operator busy, or
HDR12,opr - monitor locked msg.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E2 or E1 or B8 or BC (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
any equip	msg7 ----->	
equ1-9999	<-----	rsp1
	ack ----->	
matrix	<-----	msg30
(equ2/12)	ack ----->	
OR		
	msg7 ----->	
any equip	<-----	err msg
	ack ----->	

8. CAMERA CONTROL

Header 8
B8 hex

Function;

Request to send camera control message to the selected camera control decoder.

Format of message 8 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr8	B8 (hex)
3rd	camhi	packed BCD
4th	camlo	packed BCD
5th	ctrl	control code
6th	mon	packed BCD
7th	etx	AF (hex)
8th	crc	block check

Controller response;

The controller will send response 1 if the ctrl code sent requested control for an auxiliary function, or the controller sends Ack for remaining camera functions. i.e. zoom,iris,focus. A camera control message is also sent to selected camera decoder by the controller.

Controller Response: Response 1 and
Control Msg or
Error Msg

Format for Requested Monitor Assignment; Response 1 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr1	B1 (hex)
3rd	mon	packed BCD
4th	stat1	bit pat
5th	stat2	bit pat
6th	camhi	packed BCD
7th	camlo	packed BCD
8th	macrohi	packed BCD
9th	macrolo	packed BCD
10th	auxstatlo	auxstat low nibble
11th	auxstathi	auxstat high nibble
12th	etx	AF (hex)
13th	crc	block check

Format for CTRL message sent to INTERCEPT CCD is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	addr	80-8F (hex)
3rd	word3	0-7F (hex)
4th	word4	0-7F (hex)
5th	word5	0-40 (hex)
6th	word6	0-7F (hex)
7th	etx	AF (hex)
8th	crc	block check

NOTE: explanations for these bytes are provided in the section for Camera Decoder Protocol.

Format for CTRL message sent to PACOM CCD is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	addr	80-8F (hex)
3rd	opps	1F
4th	addr	80-8F (hex)
5th	ctrl	1F (hex)
6th	etx	AF (hex)
7th	crc	block check

where;

opps - is the control code that is opposite to the one that is used in the message.

NOTE: explanations for these bytes are provided in the section for Camera Decoder Protocol.

The controller may also issue any of the following errors;

HDR49,err12 - camera denied,
HDR49,err13 - camera not present,
HDR8,opr - operator busy, or
HDR12,opr - monitor locked msg.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 or BC (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;
For auxiliary control

Peripheral Port	Data	Controller Data
any equip	msg8 ----->	
equ1-9999		<----- rsp1
	ack ----->	
equ5(PACOM CCD)<----- ctrl		
OR		
any equip	msg8 ----->	
equ1-9999		<----- rsp1
	ack ----->	
equ9(INTERCEPT)<----- ctrl		
OR		
	msg8 ----->	
any equip		<----- err msg
	ack ----->	

where 'ctrl' is a control message sent to the particular decoder in the format described above.

OR the Line protocol is;
for other remaining camera control functions.

Peripheral Port	Data	Controller Data
any equip	msg8 ----->	
equ1-9999		<----- ack
equ5(PACOM CCD)<----- ctrl		
OR		
any equip	msg8 ----->	
equ1-9999		<----- ack
equ9(INTERCEPT)<----- ctrl		
OR		
	msg8 ----->	
any equip		<----- err msg
	ack ----->	

8a SEND BUSY

Function;

Controller busy response issued when the requested function is used by another operator.

Format of message 8a is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr8	B8 (hex)
3rd	opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Header 8
B8 hex

Line protocol is;

Peripheral Port	Data	Controller Data
any equip	msg8	----->
any equip		<----- msg8a
equ1-9999	ack	----->

9. CAMERA RELEASE

Header 9
B9 hex

Function;

Request to release selected monitor and camera control function from operator.

Format of message 9 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr9	B9 (hex)
3rd	camhi	packed BCD
4th	camlo	packed BCD
5th	mon	packed BCD
6th	etx	AF (hex)
7th	crc	block check

Controller response;

The controller will either send ack along with a camera control message to reset CCD or an error message as a response.

Format for CTRL message sent to INTERCEPT CCD is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	addr	80-8F (hex)
3rd	word3	0 (hex)
4th	word4	0 (hex)
5th	word5	0 (hex)
6th	word6	0 (hex)
7th	etx	AF (hex)
8th	crc	block check

NOTE: explanations for these bytes are provided in the section for Camera Decoder Protocol.

Format for CTRL message sent to PACOM CCD is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	addr	80-8F (hex)
3rd	opps	1F (hex)
4th	addr	80-8F (hex)
5th	ctrl	1F (hex)
6th	etx	AF (hex)
7th	crc	block check

NOTE: explanations for these bytes are provided in the section for Camera Decoder Protocol.

HDR49,err12 - camera denied,
HDR49,err13 - camera not present.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr49	E1 (hex)
3rd	errno	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
any equip	msg9	----->
equ1-9999		<----- ack
equ5(PACOM CCD)		<----- ctrl
OR		
any equip	msg9	----->
equ1-9999		<-----ack
equ9(INTERCEPT)		<----- ctrl
OR		
any equip	msg9	----->
equ1-9999		<----- err msg

10. MONITOR STATUS

Header 10
BA hex

Function;

To get information from the controller of current assignment for a selected monitor.

Format of message 10 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr10	BA (hex)
3rd	mon	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Controller responses;

The controller usually responds with the camera logical number selected for this monitor and its status.
Controller Response: Response 1 or
Error Responses

Format for Requested Monitor Assignment; Response 1 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr1	B1 (hex)
3rd	mon	packed BCD
4th	stat1	bit pat
5th	stat2	bit pat
6th	camhi	packed BCD
7th	camlo	packed BCD
8th	macrohi	packed BCD
9th	macrolo	packed BCD
10th	auxstatlo	auxstat low nibble
11th	auxstathi	auxstat high nibble
12th	etx	AF (hex)
13th	crc	block check

The controller may also respond by issuing either of the following errors;

HDR 50, err10 - monitor denied,
HDR 50, err11 - monitor not present.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr50	E2 (hex)
3rd	errno	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
	msg10	----->
Any equip		<----- rsp
	ack	----->

11. CAMERA LOCK

Header 11
BB hex

Function;

Request to lock selected monitor and camera control function to operator.

Format of message 11 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr11	BB (hex)
3rd	mon	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Controller response;

The controller will send ack or one of the following error messages as a response.

HDR49,err10 - monitor denied,
HDR49,err11 - monitor not present,
HDR49,err12 - camera denied,
HDR49,err13 - camera not present,
HDR8,opr - operator busy, or
HDR12,opr - monitor locked msg.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 or B8 or BC (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
any equip	msg11	----->
equ1-9999		<----- ack
OR		
any equip	msg11	----->
equ1-9999		<----- err msg

11a SEND LOCKED MESSAGE

Header 11
BB hex**Function;**

Camera locked response is issued by the controller when the requested camera is locked to another operator.

Format of message 11a is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr11	BB (hex)
3rd	opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
any equip		<----- msg11a
equ1-9999	ack	----->

12. CAMERA CLEAR

Header 12
BC hex**Function;**

Request to unlock or override previously locked monitor or camera control function.

Format of message 12 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr12	BC (hex)
3rd	fnc	hex value
4th	mon	packed BCD
5th	camhi	packed BCD
6th	camlo	packed BCD
7th	etx	AF (hex)
8th	crc	block check

where:

fnc = 01 (hex) for **unlock** function,
fnc = 02 (hex) for **cam lock override**
fnc = 03 (hex) for **mon lock override**

Controller response;

The controller will send ack or any one of the following error messages as a response.

HDR49,err10 - monitor denied,
HDR49,err11 - monitor not present,
HDR49,err12 - camera denied,
HDR49,err13 - camera not present,
HDR49,err40 - unlock denied,
HDR49,err42 - override denied,
HDR8,opr - operator busy, or
HDR12,opr - monitor locked msg.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E2 or B8 or BC (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data
any equip msg12	----->
equ1-9999	<----- ack
OR	
any equip msg12	----->
equ1-9999	<----- err msg

12a SEND LOCKED MESSAGE

Header 12
BC hex**Function;**

Monitor locked response is issued by the controller when the requested monitor is locked to another operator.

Format of message 12a is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr12	BC (hex)
3rd	num	0
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
any equip	<-----	msg12a
equ1-9999	ack ----->	

13. NETWORK FUNCTIONS

Header 13
BD hex

14. CAMERA CONTROL OVERRIDE

Header 14
BE hex

Function;

To get control of a selected camera when the requesting operator has a higher priority level than the currently controlling operator.

Format of message 14 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr14	BE (hex)
3rd	camhi	packed BCD
4th	camlo	packed BCD
5th	ctrl	control code
6th	mon	packed BCD
7th	etx	AF (hex)
8th	crc	block check

Controller response;

The controller will send ack as response and a camera control message to selected camera decoder.

Alternatively, controller may respond with one of the following error messages.

HDR49,err12 - camera denied,
HDR49,err13 - camera not present,
HDR50,err22 - system error,
HDR49,err42 - Override denied,
HDR11,lock - camera locked message.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E2 or B8 or BC (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
	msg14	----->
equ1-9999		<----- ack
equ5/equ9		<----- ctrl
OR		
	msg14	----->
equ1-9999		<----- err

15. CHECK CAMERA EXISTS

Header 15
BF hex

Function;

To get video loss mask information for the selected camera.

Format of message 15 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr15	BF (hex)
3rd	camhi	packed BCD
4th	camlo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

Controller response;

The controller will respond with the video loss mask status for the selected camera.

Format of response 15 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr15	BF (hex)
3rd	'M'or'U'	ASCII
4th	etx	AF (hex)
5th	crc	block check

where:

'M' - video loss detector masked out,
'U' - video loss detector active.

Response can be substituted by one of the error message as follows;

HDR49,err12 - camera denied,
HDR49,err13 - camera not present.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E2 or B8 or BC (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
	msg15 ----->	
equ1-9999	<-----	rsp15
	ack ----->	
OR		
	msg15 ----->	
equ1-9999	<-----	err

16. SEND CAMERA CONTROL MESSAGE

Header 16
C0 hex

Function;

Request from the variable speed keyboard (2020/30 VS) to send camera control information to the specified camera control decoder.

Format of message 16 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr16	C0 (hex)
3rd	mon	packed BCD
4th	camhi	packed BCD
5th	camlo	packed BCD
6th	Word3	0-7F(hex)
7th	Word4	0-7F(hex)
8th	Word5	0-40(hex)
9th	Word6	0-7F(hex)
10th	etx	AF (hex)
11th	crc	block check

Controller response;

The controller will respond with a camera control message to the selected decoder (Pacom Decoder or Intercept Decoder) and a header 1 response to the sender.

Format for CTRL message sent to INTERCEPT CCD is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	addr	80-8F (hex)
3rd	word3	(hex)
4th	word4 (hex)	(hex)
5th	word5	(hex)
6th	word6	(hex)
7th	etx	AF (hex)
8th	crc	block check

NOTE: explanations for these bytes are provided in the section for Intercept Camera Decoder Protocol.

Format for CTRL message sent to PACOM CCD is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	addr	80-8F (hex)
3rd	opps	(hex)
4th	addr	80-8F (hex)
5th	ctrl	1F (hex)
6th	etx	AF (hex)
7th	crc	block check

NOTE: explanations for these bytes are provided in the section for Camera Decoder Protocol.

Format for Header 1 response;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr1	B1 (hex)
3rd	mon	packed BCD
4th	stat1	bit pat
5th	stat2	bit pat
6th	camhi	packed BCD
7th	camlo	packed BCD
8th	macrohi	packed BCD
9th	macrolo	packed BCD
10th	auxstatlo	auxstat low nibble
11th	auxstathi	auxstat high nibble
12th	etx	AF (hex)
13th	crc	block check

Alternatively, controller may respond with one of the following error messages.

HDR49,err12 - camera denied,
HDR49,err13 - camera not present,
HDR8,busy - busy operator
HDR11,lock - camera locked.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 or B8 or BC (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
	msg16 ----->	
equ1-9999	<-----	rsp1
	ack ----->	
equ(9)	<-----	ctrl
OR		
	msg16 ----->	
equ1-9999	<-----	err

17. NETWORK FUNCTIONS

Header 17
C1 hex

18. NETWORK FUNCTIONS

Header 18
C2 hex

19. NETWORK FUNCTIONS

Header 19
C3 hex

20. VIDEO LOSS

Header 20
C4 hex

Function;

To inform controller that video fail is detected.

Format of message 20 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr20	C4 (hex)
3rd	pcamhi	packed BCD
4th	pcamlo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

Controller response;

The controller will send ack as response.

Line protocol is;

Peripheral Port	Data	Controller Data
	msg20 ----->	
equ1-9999	<-----	ack

21. OVERRIDE CAMERA CONTROL FROM VARIABLE SPEED KEYBOARD

Header 21
C5 hex

Function;

Request the controller to override camera control for camera.

Format of message 21 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr21	C5 (hex)
3rd	mon	packed BCD
4th	camhi	packed BCD
5th	camlo	packed BCD
6th	Word3	0-7F(hex)
7th	Word4	0-7F(hex)
8th	Word5	0-40(hex)
9th	Word6	0-7f(hex)
10th	etx	AF (hex)
11th	crc	block check

Controller response;

The controller will respond with either an error message or an ack.

HDR49,err12 - camera denied,
HDR49,err13 - camera not present,
HDR50,err22 - system error,
HDR49,err42 - Override denied,
HDR11,lock - camera locked message.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 or E2 or BC (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
	msg21	----->
equ1-9999		<----- ack
OR		
	msg21	----->
equ1-9999		<----- err

22. NETWORK FUNCTIONS

Header 22
C6 hex

23. NETWORK FUNCTIONS

Header 23
C7 hex

24. NOT USED

Header 24
C8 hex

25. KEYBOARD SPECIAL FUNCTIONS**Header 25**
C9 hex**Function;****Sends a request to the controller to execute special function.****Format of message 25 is;**

Byte	Mnemonic	Structure
1 st	stx	A0 (hex)
2 nd	hdr25	C9 (hex)
3 rd	fn	1-7 (hex)
if fn = 1 (Pacom 3170 decoder On/Off function) or fn = 4 (Switch idents On/Off)		
4 th	fix	1 (hex)
5 th	mon	packed BCD
6 th	etx	AF (hex)
7 th	crc	block check
if fn = 2 (Switch to next alternative camera)		
4 th	etx	AF (hex)
5 th	crc	block check
if fn = 3 (Step forward/backward monitor)		
4 th	dir	1-2 (hex)
5 th	mon	packed BCD
6 th	etx	AF (hex)
7 th	crc	block check
if fn = 5 (Control devices attached to video output)		
4 th	dev	1-2 (hex)
5 th	monhi	packed BCD
6 th	monlo	packed BCD
7 th	aux	0-7 (hex)
8 th	etx	AF (hex)
9 th	crc	block check
if fn = 6 (Control devices attached to video input)		
4 th	dev	1-2 (hex)
5 th	camhi	packed BCD
6 th	camlo	packed BCD
7 th	aux	0-7 (hex)
8 th	etx	AF (hex)
9 th	crc	block check
if fn = 7 (Switch to previous alternative camera)		
4 th	etx	AF (hex)
5 th	crc	block check

Controller response;

The controller will respond with a control message to selected device and a header 1 response to the sender. The responds to messages with functions 5 and 6 will be ack. The controller can issue an error message as response.

HDR12,lock - monitor locked,
HDR49,err7 - no free tie line,
HDR49,err12 - camera denied,
HDR49,err13 - camera not present,
HDR49,err14 - GPI denied,
HDR49,err15 - GPI not present,
HDR50,err47 - alternative camera not present.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 or E2 or BC (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
any equip	msg25	----->
equ1-9999		<----- rsp1
	ack	----->
controlled device		<----- control msg
	ack	----->
OR		
	msg25	----->
any equip		<----- err msg
	ack	----->

26. TEST PORT FUNCTION

Header 26
CA hex

Function;

Sends a test message to the controller. The controller responds to the sender with the same test message. It therefore tests the functionality of that port.

Format of message 26 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr26	CA (hex)
3rd	etx	AF (hex)
4th	crc	block check

Controller response;

The controller will send ack and Header 26 as response to the sender.

Format of response 26 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr26	CA (hex)
3rd	etx	AF (hex)
4th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
	msg26	----->
		<----- ack
equ1-9999		<-----res26

27. MATRIX

Header 27
CB hex

28. MATRIX

Header 28
CC hex

29. MATRIX/PACOM 3170

Header 29
CD hex

30. MATRIX

Header 30
CE hex

31. MATRIX

Header 31
CE hex

32. SEND CURRENT ARM NUMBER

Header 32
D0 hex

Function;

Controller informs the requesting equipment of the most recent arm/alarm function that was accessed by the equipment.

Format of message 32 sent to equipment is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr32	D0 (hex)
3rd	almhi	packed BCD
4th	almlo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
	<-----msg32	equ1-9999
	ack	----->

33. SEND TRIPPED ALARM

Header 33
D1 hex

Function;

Controller sends the currently triggered alarm number to the requesting equipment.

Format of message 33 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr33	D1 (hex)
3rd	almhi	packed BCD
4th	almlo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
	<-----msg33	equ1-9999
ack	----->	

34. MATRIX

Header 34
D2 hex

35. EQUIPMENT ACCEPT

Header 35
D3 hex

Function;

Controller checks its existing equipment list and either accepts or does not accept the requesting operator. This message is used as a response and will be sent only on request.

Format of message 35 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr35	D3 (hex)
3rd	fnc	bit pat
4th	etx	AF (hex)
5th	crc	block check

where:

fnc = 00 (hex) equipment not approved.
(PIN incorrect).
fnc = 01 (hex) equipment allowed.
(PIN Correct).

Line protocol is;

Peripheral Port	Data	Controller Data
	<-----msg35	equ1-9999
ack	----->	

36. PACOM 2023

Header 36
D4 hex

37. PACOM 2023

Header 37
D5 hex

38. SELECT ALARM INPUT FOR ARM/DISARM

Header 38
D6 hex**Function;**

To select an alarm input for arm and disarm function.

Format of message 38 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr38	D6 (hex)
3rd	almhi	packed BCD
4th	almlo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

Controller response;

The controller will reply by sending message 32 with alarm input number last accessed by this operator.

Controller response can be substituted by any one of the following error messages;

HDR49,err18 - alarm not present,
HDR49,err19 - alarm denied.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
	msg38 ----->	
equ1-9999	<-----	msg32
	ack ----->	

39. ARM ALARM INPUT

Header 39
D7 hex**Function;**

Request to arm a selected alarm input.

Format of message 39 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr39	D7 (hex)
3rd	almhi	packed BCD
4th	almlo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

Controller response;

The controller will send response 1 to the peripheral and message 63 to the alarm unit.

The controller could also respond with one of the following error messages;

HDR49,err18 - alarm not present,
HDR49,err19 - alarm denied.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
	msg39 ----->	
equ1-9999	<-----	rsp1
	ack ----->	
	<-----	msg63
equ1	ack ----->	

40. DISARM ALARM INPUT

Header 40
D8 hex

Function;

Request to disarm a selected alarm input.

Format of message 40 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr40	D8 (hex)
3rd	almhi	packed BCD
4th	almlo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

Controller response;

The controller will send response 1 back to the sender unit and message 63 to the alarm unit.

The controller can respond with one of the following error messages.

HDR49,err18 - alarm not present,
HDR49,err19 - alarm denied.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
	msg40	----->
equ1-9999		<----- rsp1
	ack	----->
		<----- msg63
equ1	ack	----->

41. STEP FWD/BACK ARMED ALARM INPUTS

Header 41
D9 hex

Function;

Request to step forward or backward through armed alarm inputs.

Format of message 41 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr41	D9 (hex)
3rd	fnc	bit pat
4th	etx	AF (hex)
5th	crc	block check

where:

fnc = 01 (hex) for step forward,
fnc = 02 (hex) for step backward.

Controller response;

The controller will respond by sending message 32.

Line protocol is;

Peripheral Port	Controller Data	Data
	msg41	----->
equ1-9999		<----- msg32
	ack	----->

42. FIND TRIGGERED ALARM

Header 42
DA hex

Function;

Request to obtain the most recently triggered alarm number.

Format of message 42 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr42	DA (hex)
3rd	etx	AF (hex)
4th	crc	block check

Controller response;

The controller will respond with message 33.

Line protocol is;

Peripheral Port	Controller Data	Data
	msg42 ----->	
equ1-9999	<-----	msg33
	ack ----->	

43. RELAY CONTROL

Header 43
DB hex

Function;

Request the controller to allow relay control (set/reset relay) or request for relay status.

Format of message 43 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr43 DB	(hex)
3rd	fnc	bit pat
4th	etx	AF (hex)
5th	crc	block check

where:

fnc = 01 (hex) toggle (set/reset) relay,
fnc = 02 (hex) require relay status.

Controller response;

The controller will respond with message 43, sending relay status back to the sender and a message to the alarm unit to set or reset the relay.

Format of response 43 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr43	DB (hex)
3rd	fnc	bit pat
4th	stat	bit pat
5th	etx	AF (hex)
6th	crc	block check

where:

fnc = 01 (hex) relay status response.
fnc = 02 (hex) busy response. Relay used by another operator.

where:

stat = opr if fnc = 02 i.e. busy.
stat = 1 or 0 if fnc = 01 i.e. relay status.
(1 -> relay set and 0 -> relay clear).

Line protocol is;

Peripheral Port	Controller Data	Data
	msg43	----->
equ1-9999	<-----	msg43
	ack	----->

44. STEP FWD/BACK TRIGGERED ALARMS

Header 44
DC hex

Function;

Request to step forward or backward through active alarm inputs.

Format of message 44 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr44	DC (hex)
3rd	fnc	bit pat
4th	etx	AF (hex)
5th	crc	block check

where:

fnc = 01 (hex) for step forward,
fnc = 02 (hex) for step backward.

Controller response;

The controller will send message 33.

Line protocol is;

Peripheral Port	Controller Data	Data
	msg44	----->
equ1-9999	<-----	msg33
	ack	----->

45. RESET ALARM

Header 45
DD hex

Function;

Request to reset selected alarm input.

Format of message 45 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr45	DD (hex)
3rd	almhi	packed BCD
4th	almlo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

Controller response;

The controller will send message 33 to the requesting equipment and responds with message 63 (alarm unit) with arm function if selected alarm input is still armed.

Response can be substituted by the following error message.

HDR49,err18 - alarm not present.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
	msg45 ----->	
equ1-9999	<-----	msg33
	ack ----->	
		<----- msg63
equ1	ack ----->	

46. ALARM INFO

Header 46
DE hex

Function;

To obtain information from the controller of any alarm input that was triggered.

Format of message 46 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr46	DE (hex)
3rd	etx	AF (hex)
4th	crc	block check

Controller response;

The controller will send response 46.

Format of response 46 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr46	DE (hex)
3rd	fnc	bit pat
4th	etx	AF (hex)
5th	crc	block check

where:

fnc = 00 (hex) if alarm present.
fnc = 01 (hex) if alarm not present,

Line protocol is;

Peripheral Port	Controller Data	Data
	msg46	----->
equ1-9999		<----- rsp46
	ack	----->

47. START/STOP ALARM SEQUENCE

Header 47
DF hex

Function;

Request to start or stop execution of an alarm sequence.

Format of message 47 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr47	DF (hex)
3rd	fnc	bit pat
4th	etx	AF (hex)
5th	crc	block check

where:

fnc = 00 (hex) to start sequence,
fnc = 01 (hex) to stop sequence.

Controller response;

The controller will send response 1.

Line protocol is;

Peripheral Port	Controller Data	Data
	msg47	----->
equ1-9999		<----- rsp1
	ack	----->

48. NOT USED

Header 48
E0 hex

49. SEND ERROR MESSAGE

Header 49
E1 hex**Function;**

Format of error message used by controller to respond to the sender.

Format of message 49 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr49	E1 (hex)
3rd	err	packed BCD
4th	etx	AF (hex)
5th	crc	block check

50. SEND FATAL ERROR MESSAGE

Header 50
E2 hex**Function;**

Used by controller to send an error message as a response.

Format of message 50 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr50	E2 (hex)
3rd	err	packed BCD
4th	etx	AF (hex)
5th	crc	block check

50a. RESET ALL ALARMS

Header 50
E2 hex**Function;**

Request to the controller to automatically reset all active alarms.

Format of message 50a is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr50	E2 (hex)
3rd	mon	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Controller response;

The controller will send series of messages 63 for all actually armed alarms to the alarm unit and sends response 1 to the requesting equipment.

Line protocol is;

Peripheral Port	Data	Controller Data
	msg50a ----->	
equ1-9999	<-----	rsp1
	ack ----->	
		<----- msg63
equ1	ack ----->	

51. MIMIC SWITCH

Header 51
E3 hex**Function;**

Request from the mimic panel interface to perform video switch.

Format of message 51 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr51	E3 (hex)
3rd	unit	00 (hex)
4th	but	packed BCD
5th	etx	AF (hex)
6th	crc	block check

where:

unit = 0,1,2 or 3 for the particular unit number.

Controller response;

The controller will send ack as response and the appropriate message to the video matrix.

Line protocol is;

Peripheral Port	Controller Data	Data
equ1-9999	msg51	-----> <-----ack

52. Program camera check.

Header 52
E4 hex**Function;**

Requests the controller to check a camera entered into a sequence by an operator.

Format of message 52 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr52	E4 (hex)
3rd	camhi	packed BCD
4th	camlo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

Controller response;

The controller will send ack as response or the appropriate error message as a response.

The controller can respond with one of the following error messages.

HDR49,err12 - Camera denied,
HDR49,err13 - Camera not present.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
	msg52 ----->	
equ1-9999	<-----	ack
OR		
	msg52 ----->	
equ1-9999	<-----	err

53. Program Monitor Check

Header 53
E5 hex

Function;

Request controller to check if valid monitor number was programmed.

Format of message 53 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr53	E5 (hex)
3rd	mon	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Controller response;

The controller will send ack as response or the appropriate error message as a response.

The controller can respond with one of the following error messages.

HDR49,err10 - Monitor denied,
HDR49,err11 - Monitor not present.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
	msg53 ----->	
equ1-9999		<----- ack
OR		
	msg53 ----->	
equ1-9999		<----- err

54. PROGRAM MACRO CHECK

Header 54
E6 hex

Function;

Request controller to check if macro can be programmed.

Format of message 54 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr54	E6 (hex)
3rd	macrohi	packed BCD
4th	macrolo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

Controller response;

The controller will send ack as response or the appropriate error message as a response.

The controller can respond with one of the following error messages.

HDR49,err16 - No more space for macros,
HDR49,err39 - Error, macro already defined.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Data	Controller Data
	msg54 ----->	
equ1-9999		<----- ack
OR		
	msg54 ----->	
equ1-9999		<----- err

55. GPI CONTROL

Header 55
E7 hex**Function;**

Request to perform GPI on/off or clear function.

Format of message 55 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr55	E7 (hex)
3rd	gpihi	packed BCD
4th	gpilo	packed BCD
5th	gpiauxpacked	BCD
6th	etx	AF (hex)
7th	crc	block check

Controller response;

The controller will send response 55 for gpi on or off command, or ack for clear command.

Format of response 55 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr55	E7 (hex)
3rd	gpihi	packed BCD
4th	gpilo	packed BCD
5th	gpiauxlo	bit pat
6th	gpiauxhi	bit pat
7th	etx	AF (hex)
8th	crc	block check

where:

gpino = 00 (hex) for clear command

Line protocol is;

Peripheral Port	Controller Data	Data
	msg55	----->
equ1-9999		<----- rsp55
	ack	----->

or for clear function;

Peripheral Port	Controller Data	Data
	msg55	----->
equ1-9999		<-----ack

Response could be substituted by one of the error messages;

hdr49,err14 - gpi denied,
hdr49,err15 - gpi not present,
or **gpi busy**, message 64.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

56. RELEASE MACRO

Header 56
E8 hex

Function;

Request to release macro from operator.

Format of message 56 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr56	E8 (hex)
3rd	mon	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Controller response;

The controller will send response 1.

Response 1 can be substituted by any one of the following error messages;

hdr49,err10 - monitor denied,
hdr49,err11 - monitor not present.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data
	msg56 ----->
equ1-9999	<----- rsp1
	ack ----->

57. SEQUENCE PROGRAMMED

Header 57
E9 hex**Function;**

To inform/update the controller with information of the sequence/macro that was programmed.

Format of message 57 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr57	E9 (hex)
3rd	macrohi	packed BCD
4th	macrolo	packed BCD
5th	steps	packed BCD

The following bytes are sent n times.

6th	mon	packed BCD
7th	camhi	packed BCD
8th	camlo	packed BCD
9th	dwell	packed BCD
10th	etx	AF (hex)
11th	crc	block check

where :

steps = no of steps programmed in a sequence.

n = according to the number of steps in the sequence.

Controller response;

The controller will send ack as response or the appropriate error message as a response.

The controller can respond with the following error message.

HDR49,err16 - No more space for macros,

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data
equ1-9999	msg57 -----> <-----ack

58. PACOM 2023

Header 58
EA hex

59. STEP FORWARD/BACKWARD MACRO

Header 59
EB hex**Function;**

Request to step to the next/previous macro.

Format of message 59 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr59	EB (hex)
3rd	fnc	packed BCD
4th	etx	AF (hex)
5th	crc	block check

where:

fnc = 01 (hex) for step forward,
fnc = 02 (hex) for step backward.

Controller response;

The controller will send message 62 as response.

Line protocol is;

Peripheral Port	Controller Data	Data
	msg59	----->
equ1-9999		<----- msg62
	ack	----->

60. MACRO REQUEST

Header 60
EC hex**Function;**

Select a macro for further control.

Format of message 60 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr60	EC (hex)
3rd	mon	packed BCD
4th	macrohi	packed BCD
5th	macrolo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

Controller response;

The controller will send response 1 or one of the following error messages.

Response could be substituted by one of the error messages;

hdr49,err17 - Macro does not exist,
hdr50,err10 - Monitor denied,
hdr65,opr - Macro already activated.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 or E2 or F1 (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
	msg60	----->
equ1-9999		<----- rsp1
	ack	----->

62. STEP FORWARD/BACKWARD MACRO

Header 62
EE hex

Function;

Response to controller for request to step to the next/previous macro.

Format of message 62 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr62	EE (hex)
3rd	macrohi	packed BCD
4th	macrolo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

63. ARM/DISARM ALARM INPUT

Header 63
EF hex

Function;

Request to the controller to arm/disarm alarm input.

Format of message 63 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr63	EF (hex)
3rd	fnc	bit pat
4th	almhi	packed BCD
5th	almlo	packed BCD
6th	etx	AF (hex)
7th	crc	block check

where:

fnc = 00 (hex) **arm** an alarm input
fnc = 01 (hex) **disarm** an alarm input.

Line protocol is;

Peripheral Port	Data	Controller Data
equ1-9999	msg63	-----> <-----ack

64. GPI BUSY

Header 64
F0 hex

Function;

Controller response to inform that selected GPI is used by another operator.

Format of message 64 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr64	F0 (hex)
3rd	opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

65. MACRO BUSY

Header 65
F1 hex

Function;

Controller response to inform that selected macro is used by another operator.

Format of message 65 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr65	F1 (hex)
3rd	opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

66. VIDEO LOSS INFORMATION

Header 66
F2 hex

Function;

Request to send last registered video loss.

Format of message 66 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr66	F2 (hex)
3rd	flag	bit pat (hex)
4th	etx	AF (hex)
5th	crc	block check

where:

flag = 1 (display send video loss).

flag = 2 (clear video loss).

Controller response;

The controller will send response 66 if flag is 1 or an ack as a response if the value of flag is 2.

Format of response 66 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr66	F2 (hex)
3rd	camhi	packed BCD
4th	camlo	packed BCD
5th	etx	AF (hex)
6th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
	msg66	----->
equ1-9999	<-----	rsp66
	ack	----->

OR

Line protocol is;

Peripheral Port	Controller Data	Data
	msg66	----->
equ1-9999	<-----	ack

67. NOT USED

Header 67
F3 hex

68. CHECK PIN

Header 68
F4 hex

Function;

Request controller to accept equipment.

Format of message 68 is;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdr68	F4 (hex)
3rd	fnc	01 (hex)
4th	pinhi	packed BCD
5th	pinlo	packed BCD
6h	etx	AF (hex)
7h	crc	block check

Controller response;

The controller will send message 35, i.e. pin correct, or any one of the following error messages as a response.

hdr35,0 - Pin incorrect,
hdr49,err17 - Macro does not exist,
hdr49,err16 - No more space for macro,
hdr65,opr - Macro already activated.

Format for the error message as issued by the controller;

Byte	Mnemonic	Structure
1st	stx	A0 (hex)
2nd	hdrno	E1 or E2 or F1 (hex)
3rd	errno/opr	packed BCD
4th	etx	AF (hex)
5th	crc	block check

Line protocol is;

Peripheral Port	Controller Data	Data
	msg68	----->
equ1-9999	<-----	msg35
	ack	----->

69. NOT USED

Header 69
F5 hex

70. NOT USED

Header 70
F6 hex

ERRORS

Errors

The format for error messages transmitted by the controller are provided in HDR49 and HDR50. The particular error is substituted in HDR49 or HDR50 and are sent to the requesting equipment.

err10 - monitor denied,
err11 - monitor not present,
err12 - camera denied,
err13 - camera not present,
err14 - GPI denied,
err15 - GPI not present,
err16 - no more space for macros,
err17 - macro not present,
err18 - alarm not present,
err19 - alarm denied,
err20 - fatal system error,
err21 - fatal system error,
err22 - fatal system error,
err23 - fatal system error,
err24 - fatal system error,
err25 - comms - modem,
err26 - comms - no interrupt,
err27 - comms - overrun,
err28 - comms - parity,
err29 - comms - framing,
err30 - comms - break,
err31 - comms - system error,
err32 - comms - retry max reached,
err33 - comms - IIR,
err34 - rx buffer overflow,
err35 - tx buffer overflow,
err36 - LPT buffer overflow,
err37 - tx flag lost - system error,
err38 - rx flag lost - system error.
err47 - alternative camera not present.

GLOSSARY**TABLE OF PIN NUMBERS FOR EQUIPMENT**

<u>EQUIPMENT</u>	<u>PIN NO.</u>
PACOM 2023	1
MATRIX PORT INPUT	2
NETWORK PORT	3
EXTERNAL PORT	4
PACOM CCD PORT	5
PC PORT	6
MODEM PORT	7
PACOM 2015 PORT	8
INTERCEPT CCD PORT	9
PACOM 3170 PORT	10
HIGH LEVEL PORT	11
MATRIX OUTPUT PORT	12
PACOM 3170 PC PORT	13
PACOM 3175 TIME&DATE PORT	14
PACOM 2033 PORT (for Pacom camera decoders)	15
PACOM 2032 PORT	16
PACOM 2013 PORT	17
CR-80 PORT	18
PACOM 2033 PORT (for Pelco camera decoders)	19
PACOM 2033 PORT (for video matrix)	20
PACOM 3170-DECODER PORT	21
VIDEO MATRIX PORT 2	22
PACOM 2033 PORT (for keyboard)	23
ROBOT VIDEO MULTIPLEXER PORT	24
MONTAGE VIDEO MULTIPLEXER PORT	25
GENEX VIDEO MULTIPLEXER PORT	26
DRAX VIDEO MULTIPLEXER PORT	27
RESERVED	30
PELCO 6700 PORT	31
VIDEO MATRIX PORT 3	32
RESERVED	33
PELCO KEYBOARD PORT	34
PACOM 2040 PORT	40
END of SCP FILE - MARK	99
KEYBOARD PORT	100

almhi - high order byte of logical alarm number

almlo - low order byte of logical alarm number

attr0 - ident display attributes byte 0

bit 76543210

00||||| Character brightness

|||000 - black

|||001

|||010

|||011

|||100

|||101

|||110

|||111 - white

||| Blinking section

||0 - no blinking

||1 - blinking

|| Character size

00 - size 1

01

10

11 - size 4

attr1 - ident display attributes byte 1

bit 76543210

||||| Background brightness

|||000 - black

|||001

|||010

|||011

|||100

|||101

|||110

|||111 - white

||| Background format

00 - no background

01 - black overlay

10 - square background

11 - solid background

| Display on/off

0 - off

1 - on

aux - number of auxiliary function

auxstathi - bit pattern of auxiliary status
bit 76543210
| | | | | | | x - auxiliary 0
| | | | | | 0 - padding
| | | | | 0 - padding
| | | | x - auxiliary 1
| | | x - auxiliary 2
| | 0 - padding
| 0 - padding
x - auxiliary 3
where:
x = 0 auxiliary off
x = 1 auxiliary on

auxstatlo - bit pattern of auxiliary status
bit 76543210
| | | | | | | x - auxiliary 4
| | | | | | 0 - padding
| | | | | 0 - padding
| | | | x - auxiliary 5
| | | x - auxiliary 6
| | 0 - padding
| 0 - padding
x - auxiliary 7
where:
x = 0 auxiliary off
x = 1 auxiliary on

Example: auxstathi(high nibble) = 89 (hex)
auxstatlo(low nibble) = 01 (hex)
Auxiliary value = D8 (hex)
i.e. Auxiliary buttons 1,2,4 and 5 are on.

blk - number attached as reference in series of messages
but - mimic panel button number
camhi - high order byte of logical camera number
camlo - low order byte of logical alarm number
camstat - bit pattern to represent camera controllability
bit 76543210
00000| | | Control function
| | x - pan
| x - tilt
x - lens
where:
x = 0 available
x = 1 not available

ctrl - camera control command byte

00 (hex)	- program preset 1
01 (hex)	- program preset 2
02 (hex)	- program preset 3
03 (hex)	- program preset 4
04 (hex)	- program preset 5
05 (hex)	- program preset 6
06 (hex)	- program preset 7
07 (hex)	- program preset 8
10 (hex)	- stop pan right
11 (hex)	- start pan right
12 (hex)	- stop pan left
13 (hex)	- start pan left
14 (hex)	- stop tilt down
15 (hex)	- start tilt down
16 (hex)	- stop tilt up
17 (hex)	- start tilt up
24 (hex)	- stop zoom out
25 (hex)	- start zoom out
26 (hex)	- stop zoom in
27 (hex)	- start zoom in
28 (hex)	- stop iris close
29 (hex)	- start iris close
2A (hex)	- stop iris open
2B (hex)	- start iris open
2C (hex)	- stop focus near
2D (hex)	- start focus near
2E (hex)	- stop focus far
2F (hex)	- start focus far
30 (hex)	- clear preset 1
31 (hex)	- clear preset 2
32 (hex)	- clear preset 3
33 (hex)	- clear preset 4
34 (hex)	- clear preset 5
35 (hex)	- clear preset 6
36 (hex)	- clear preset 7
37 (hex)	- clear preset 8
40 (hex)	- aux 8 off
41 (hex)	- aux 8 on
42 (hex)	- aux 7 off
43 (hex)	- aux 7 on
44 (hex)	- aux 6 off
45 (hex)	- aux 6 on
46 (hex)	- aux 5 off
47 (hex)	- aux 5 on
48 (hex)	- aux 4 off
49 (hex)	- aux 4 on
4A (hex)	- aux 3 off
4B (hex)	- aux 3 on
4C (hex)	- aux 2 off
4D (hex)	- aux 2 on
4E (hex)	- aux 1 off
4F (hex)	- aux 1 on

	50 (hex)	- move to preset 1
	51 (hex)	- move to preset 2
	52 (hex)	- move to preset 3
	53 (hex)	- move to preset 4
	54 (hex)	- move to preset 5
	55 (hex)	- move to preset 6
	56 (hex)	- move to preset 7
	57 (hex)	- move to preset 8
dir	- stepping directions	
	1 - forward	
	2 - backward	
dev	- controlled device	
	0 - normal (camera or monitor)	
	1 - VCR	
	2 - Video Multiplexer	
gpiaux	- gpi function number	
	00 (hex)	- release gpi from operator
	01 (hex)	- function 1 off
	02 (hex)	- function 2 off
	03 (hex)	- function 3 off
	04 (hex)	- function 4 off
	05 (hex)	- function 5 off
	06 (hex)	- function 6 off
	07 (hex)	- function 7 off
	08 (hex)	- function 8 off
	11 (hex)	- function 1 on
	12 (hex)	- function 2 on
	13 (hex)	- function 3 on
	14 (hex)	- function 4 on
	15 (hex)	- function 5 on
	16 (hex)	- function 6 on
	17 (hex)	- function 7 on
	18 (hex)	- function 8 on
gpilo	- low order byte of gpi number	
gpiho	- high order byte of gpi number	
ident	- ASCII byte for ident text	
mon	- monitor logical number	
monhi	- high order byte of monitor number	
monlo	- low order byte of monitor number	
opr	- operator logical number	
palmhi	- high order byte of physical alarm number	
palmlo	- low order byte of physical alarm number	
pcamhi	- high order byte of physical camera number	
pcamlo	- low order byte of physical camera number	
pinhi	- high order byte of equipment or operator PI number	
pinlo	- low order byte of equipment or operator PI number	
pmon	- monitor physical number	
sentlo	- low order byte of macro logical number	
senhi	- high order byte of macro logical number	
stat1	- system status byte 1	

```

        bit 76543210
        0|0|00|0 Meaning
          | | x - macro execution stopped
          | x - camera locked
          x - camera is controllable

stat2    - system status byte 2
        bit 76543210
        0||0|||| Meaning
          || |||x - alarm armed
          || ||x - alarm tripped
          || |x - new alarm switched
          || x - alarm sequence stopped
          |x - new alarm tripped
          x - video loss detected

txt       - ASCII byte for transmitted text

unit      - unit number assigned to alarm interface
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