CM9770-MXB vs. P Protocol
Software Developer's Guide

Release	Date	Reason for Issue
Preliminary	December 10, 2002	Review
Version 1.00	December 11, 2002	First Release
Version 1.01	March 18, 2003	Add STX (0xA1) description. Change the command structure of header 31 (0xCF), function 01 and 02. These would fix the dummy records problem.
Version 1.02	March 29, 2003	Add more description to Header 31 – Function 01 and 02
Version 1.03	November 13, 2003	Change start of transimmision byte from 0xA1 to 0xA0, and add 0xF5 as a stuffing byte.
Version 1.04	August 10, 2006	Added special on-screen features 9997, 9998, 9999 to Video Switch command.

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I) Introduction:

This document focuses on the P protocol commands that would be used between CM9760-CC1 and CM9760-MXB/CM9770-MXB communication. Although many P Protocol documents are existed in Pelco intranet network, some mistakes and errors are found after experiments are performed. Moreover, this document describes the new P protocol scheme that is used in High Density Matrix Bay, CM9770-MXB project.

This document serves as a command set description. It also describes the general purpose of the commands, the current CC1 to CM9760-MXB communication and command problems and the timing for transmitting and receiving those commands. It is a handy document for CC1 and CM9760-MXB/CM9770-MXB software developers.

The information in this document is archived from the following sources, 1) the current P Protocol and M Protocol documents in the Pelco intranet, 2) the source code of CM9760-VMC version 8.01, 3) the experiments that have been done and 4) data captured by BreakOut program.

For items that indicated with **, they are problems that existed in current CM9760-MXB and CM9760-CC1. Please pay attention to those items and changes may be made in order to fix those problems in CM9770-MXB.

II) CM9760-CC1 vs. CM9760-MXB/CM9770-MXB Communication Commands:

Below are the commands that will be used in CM9770-MXB. They are sorted by the header number. Additional commands header may be added.

2.1 Single Byte Control Characters

2.1.1 0xA0 (P_STX) – Start of transmission byte used in CM9760-MXB and CM9770-MXB.

Description:

- It is used to uniquely identify the start of a message.
- In CM9760-MXB, P_STX is always followed by a command byte, then optionally some data bytes, a P_ETX byte and a CKSM byte.
- In CM9770-MXB, P_STX is always followed by a stuffing byte, 0xF5 while the rest of the P frame is identical to CM9760-MXB. See section 2.1.7 and section 5.0 (mutilanguages support) for more details.

The P frame format in CM9760-MXB:

Byte	Mnemonic/Field	Description
0	P_STX (0xA0)	Start of transmission.
1	Command	Defines the full command header.
2	Data	A variable number of data bytes.
n	P_ETX (0xAF)	End of transmission, see section 2.1.6.
n + 1	CKSM	CheckSum, see section 2.1.8.

The P frame format in CM9770-MXB:

Byte	Mnemonic/Field	Description
0	P_STX (0xA0)	Start of transmission.
1	P_STUFFING (0xF5)	Defines new P frame scheme.
2	Command	Defines the full command header.
3	Data	A variable number of data bytes.
n	P_ETX (0xAF)	End of transmission, see section 2.1.6.
n + 1	CKSM	CheckSum, see section 2.1.8.

2.1.2 0xA3, 0xA4 to 0xA9, 0xAB, 0xAC, 0xAE – Unused Single Byte Control Character

Description:

- The 0xA3, 0xA4 to 0xA9, 0xAB, 0xAC and 0xAE bytes are currently not used as single byte control characters.

2.1.3 0xA2 (P_ACK) – Acknowledgment

Description:

- Used as a response to a command to indicate that it was received and that it had a correct CKSM. Normally called “ACKnowledgment".

The format of the message is:

Byte	Mnemonic/Field	Description
0	P_ACK (0xA2)	Acknowledgment.

2.1.4 0xAA (P_NAK) – Negative Acknowledgment

Description:

- Used as a response to a command to indicate that it was received incorrectly, i.e. that it had a incorrect CKSM. Normally called “Negative AcKnowledgment".

The format of the message is:

Byte	Mnemonic/Field	Description
0	P_NAK (0xAA)	Negative acknowledgment.

2.1.5 0xAD (P_FUL) – Receive Buffer is Full

Description:

- Might be used to indicate that a receive buffer is full. (This one byte command's existence was discovered by analyzing the source code for the CM9760 and there is no assurance that it is fully implemented.)

The format of the message is:

Byte	Mnemonic/Field	Description
0	P_FUL (0xAD)	Receive buffer is full.

2.1.6 0xAF (P_ETX) – End of Transmission

Description:

- Used to uniquely identify the end of a message. Normally called “End of Transmission”.

2.1.7 0xF5 (P_STUFFING) – Stuffing Byte for CM9770-MXB

Description:

- The stuffing byte represents new P protocol scheme and it is located right after the start of transmission byte (0xA0).
- This stuffing byte is existed in every P commands (excluding the acknowledgement) used between the CM9760-CC1 and CM9770-MXB communication.

2.1.8 CKSM – CheckSum

Command Description:

- A byte (or bytes) by which a receiving unit can determine if the message received is valid. That is, there has been no transmission error.
- In this protocol, the checksum consists of the bit-wise exclusive or of all bytes in the frame, including the P_STX and the P_ETX.

The P frame format in CM9760-MXB:

Byte	Mnemonic/Field	Description
0	P_STX (0xA0)	Start of transmission, see section 2.1.1.
1	Command	Defines the full command header.
2	Data	A variable number of bytes.
n	P_ETX (0xAF)	End of transmission, see section 2.1.6.
n + 1	CKSM	CheckSum, including the P_STX and P_ETX.

The P frame format in CM9770-MXB:

Byte	Mnemonic/Field	Description
0	P_STX (0xA0)	Start of transmission, see section 2.1.1.
1	P_STUFFING (0xF5)	Defines new P frame scheme.
2	Command	Defines the full command header.
3	Data	A variable number of data bytes.
n	P_ETX (0xAF)	End of transmission, see section 2.1.6.
n + 1	CKSM	CheckSum, see section 2.1.8.

2.2 Header 20, 0xC4 – Video Loss

2.2.1 General Description and Issues:

- The purpose of this command is to inform CC1 that video fail is detected.
- The dipswitch in VMC board and the "Vloss Alarm" configuration in MGR must be setup correctly in order to turn on this feature.
- Command(s) is sent from MXB to CC1.
- Command(s) is sent out periodically and/or at the time when video lost.
- Periodical video loss report is sent once every minute, it starts after power-up database are downloaded and processed.
- A command is sent for each video loss.
- NO video restoring command is sent from MXB to CC1.
- See file "Video Loss Report.html" or Appendix-A MXB item 76 to 93 for sample commands.

2.2.2 Format of Message Header 20 – Function C4; (CM9760-MXB to CM9760-CC1)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_VIDEO_LOSS	0xC4	Header 20, video loss.
2	PcamHi	Packed BCD	The physical location of the video input. In this case, range 0000 to 0511.
3	PcamLo	Packed BCD	
4	P_ETX	0xAF	End of transmission.
5	CKSM	Block check	CheckSum, exclusive OR of all bytes.

2.2.3 Format of Message Header 20 – Function C4; (CM9770-MXB to CM9760-CC1)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_STUFFING	0xF5	Stuffing byte.
2	P_VIDEO_LOSS	0xC4	Header 20, video loss.
3	PCamHi	Packed BCD	The physical location of the video input. In this case, range 0000 to 0511.
4	PCamLo	Packed BCD	
5	P_ETX	0xAF	End of transmission.
6	CKSM	Block check	CheckSum, exclusive OR of all bytes.

2.2.4 Acknowledgment

CC1 sends acknowledgment, P_ACK, 0xA2 as response if no error is found.

2.3 Header 27, 0xCB – Display Message

2.3.1 General Description and Issues:

- Command is sent from CC1 to MXB.
- Command is sent when CC1 needs to display message to the monitor. The message including, 1) alarm title, 2) broadcast message from MGR, 3) broadcast message from KBD, and 4) print message from macro, etc.
- The message length should be 24 characters long.
- ****Note that the 0x00 function should be used for clearing message. But the CC1 sends 0x01 function instead of 0x00 for space line (24 space characters) when user "Save and Send" a space line broadcast message though the MGR.**
- See files "MGR Broadcast Msg.html", "ALM Reset xx.html", or Table 2.3.1 and Table 2.3.2 for sample commands.

2.3.2 Format of Message Header 27 – Function 01; (CM9760-CC1 to CM9760-MXB)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_SHOW_MSG	0xCB	Header 27, show message.
2	fnc	0x00 or 0x01	Where 0x00 is clear; 0x01 is show.
3	mon	Packed BCD	The physical mon# (zero base) on which msg display.
4	ident[0]	ASCII char	If fnc = 0x00, this field (24 bytes) does not present. If fnc = 0x01, this is the text of the message in ASCII format up to 24 characters.
…	…	…	
…	…	…	
27	ident[23]	ASCII char	
28	P_ETX	0xAF	End of transmission.
29	CKSM	Block check	CheckSum, exclusive OR of all bytes.

2.3.3 Format of Message Header 27 – Function 01; (CM9760-CC1 to CM9770-MXB)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_STUFFING	0xF5	Stuffing byte.
2	P_SHOW_MSG	0xCB	Header 27, show message.
3	fnc	0x00 or 0x01	Where 0x00 is clear; 0x01 is show.
4	mon	Packed BCD	The physical mon# (zero base) on which msg display.
5, 6	ident[0]	Word	If fnc = 0x00, this field (48 bytes) does not present. If fnc = 0x01, this is the text of the message in wide character (word) format up to 24 characters.
…	…	…	
…	…	…	
51, 52	ident[23]	Word	
53	P_ETX	0xAF	End of transmission.
54	CKSM	Block check	CheckSum, exclusive OR of all bytes.

2.3.4 Acknowledgment

MXB sends acknowledgment, P_ACK, 0xA2 as response if no error is found.

Table 2.3.1: MGR Broadcast Message Sample Commands

CC1	MXB	Length	Dir	Data
	1	30	>>>	A0 CB 01 00 48 65 6C 6C 6F 20 31 32 33 20 20 20 20 20 20 20 20 20 20 20 20 20 AF B7
1		1	<<<	A2
	2	30	>>>	A0 CB 01 01 48 65 6C 6C 6F 20 31 32 33 20 20 20 20 20 20 20 20 20 20 20 20 20 AF B6
2		1	<<<	A2
	3	30	>>>	A0 CB 01 00 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 AF C5
3		1	<<<	A2
	4	30	>>>	A0 CB 01 01 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 AF C4
4		1	<<<	A2

Table 2.3.2: Alarm Set and Reset Sample Commands

CC1	N/A	Length	Dir	Data
1		7	<<<	A0 CE 00 00 00 AF C1
2		30	<<<	A0 CB 01 00 41 4C 41 52 4D 32 20 41 42 43 44 45 46 47 48 49 20 20 20 20 20 20 20 20 AF C5
3		6	<<<	A0 CB 00 00 AF C4
4		7	<<<	A0 CE 00 00 00 AF C1

2.4 Header 29, 0xCD – Time and Date Update

2.4.1 General Description and Issues:

- Command is sent from CC1 to MXB.
- CC1 sends this command only at the time when minutes update.
- This is a broadcast message, but acknowledgment is sent from MXB for online status checking purpose.
- MXB never request time and date info.
- See files "Update Time and Date.html", "VMC reset xx.html", or CC1 item 71 and item 90 in Appendix-A for sample commands.

2.4.2 Format of Message Header 29 – (CM9760-CC1 to CM9760-MXB)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_TIME_DATE	0xCD	Header 29, update time and date.
2	Ident[0]	ASCII Char	This is an ASCII string. The length of the string is depends on the time and date format being used. The string contains a '*' (0x2A) character in place of the seconds field and it is replaced by seconds in the MXB side.
…	…	…	
…	…	…	
n	Ident[n - 2]	ASCII Char	
n+1	P_ETX	0xAF	End of transmission.
n+2	CKSM	Block check	CheckSum, exclusive OR of all bytes.

2.4.3 Format of Message Header 29 – (CM9760-CC1 to CM9770-MXB)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_STUFFING	0xF5	Stuffing byte.
2	P_TIME_DATE	0xCD	Header 29, update time and date.
3, 4	Ident[0]	Word	This is an wide character string. The length of the string is depends on the time and date format being used. The string contains a '*' (0x00, 0x2A) wide character in place of the seconds field and it is replaced by seconds in the MXB side.
…	…	…	
…	…	…	
n-1, n	Ident[(n - 4) / 2]	Word	
n+1	P_ETX	0xAF	End of transmission.
n+2	CKSM	Block check	CheckSum, exclusive OR of all bytes.

2.4.4 Acknowledgment

MXB sends acknowledgment, P_ACK, 0xA2 as response if no error is found.

2.5 Header 30, 0xCE – Video Switch

2.5.1 General Description and Issues:

- Command is sent from CC1 to MXB to request video switching.
- One command per video switch.
- Note that CM9740 may use different command header (0xD0) for video switching.
- This may be the only command that need to be interpreted to M protocol.
- See most of the html files or CC1 item 58 to item 61 in Appendix-A for sample commands.

2.5.2 Format of Message Header 30 – (CM9760-CC1 to CM9760-MXB)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_VIDEO_SWT	0xCE	Header 30, video switch.
2	Pmon	Packed BCD	The physical mon location, 00 to 15 or 00 to 31
3	PcamHi	Packed BCD	The physical location of the video input. In this case, range from 0000 to 0255 or from 0000 to 0511.
4	PcamLo	Packed BCD	
5	P_ETX	0xAF	End of transmission.
6	CKSM	Block check	CheckSum, exclusive OR of all bytes.

2.5.3 Format of Message Header 30 – (CM9760-CC1 to CM9770-MXB)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_STUFFING	0xF5	Stuffing byte.
2	P_VIDEO_SWT	0xCE	Header 30, video switch.
3	Pmon	Packed BCD	The physical mon location, 00 to 15 or 00 to 31
4	PcamHi	Packed BCD	The physical location of the video input. In this case, range from 0000 to 0255 or from 0000 to 0511. Special on-screen features: 1. 9997 – software & hardware version info 2. 9998 – color bar 3. 9999 – blue raster
5	PcamLo	Packed BCD	
6	P_ETX	0xAF	End of transmission.
7	CKSM	Block check	CheckSum, exclusive OR of all bytes.

2.5.4 Acknowledgment

MXB sends acknowledgment, P_ACK, 0xA2 as response if no error is found.

2.6 Header 31, 0xCF – Matrix Update

2.6.1 General Description and Issues:

- Download all necessary information (database) from CC1 to MXB during start up.
- If CC1 is running and MXB is power up, MXB sends database request commands to CC1. Then CC1 replies to MXB with the database. See file "VMC Reset 03.html".
- If MXB is running and CC1 is power up, CC1 sends database to MXB automatically. See files "CC1 Reset 01.html" and "CC1 Reset 02.html".
- The database including camera logical number, camera title, monitor title, monitor assignment and their positions and attributes, etc.
- This is the only command that involves the version compatibility issue.
  a.) 3 bytes (6 BCD) are used for camera logical number in CC1 version 8.xx.
  b.) 2 bytes (4 BCD) are used for camera logical number in CC1 version 7.xx.
- There are six functions described in the P Protocol document, but it may be only three of them are used. They are 0x01, 0x02 and 0x08 functions.
- Note that there are five items (cameras or monitors) in each block, and each block has their own block number.
- It may be up to MXB for the order of the database would like to receive.
- **** MXB does not continuously sending the database request commands if CC1 does not reply. MXB should resend the request command until response is received.**
- **** MXB should check if the entire database has been received. If not, sends request database command.**
- See files "VMC reset xx.html", "CC1 Reset xx.html" or Appendix-A for sample commands.

2.6.2 Format of Message Header 31 – Database Request (CM9760-MXB to CM9760-CC1)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_MTX_UPDATE	0xCF	Header 31, matrix update.
2	Fnc	Bit Pattern	Where, fnc = 0x00 - For matrix poll, testing only (may not be used). 0x01 - For camera update. 0x02 - For monitor update. 0x04 - For alarm update (may not be used). 0x08 - For monitor assignment update. 0x10 - For video loss update (may not be used). Multiple types of updates can be requested in a single transmission by combining the bits in fnc. For example, to get all update, send 0x1F (never happens in html sample command files).
3	P_ETX	0xAF	End of transmission.
4	CKSM	Block Check	CheckSum, exclusive OR of all bytes.

2.6.3 Format of Message Header 31 – Database Request (CM9770-MXB to CM9760-CC1)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_STUFFING	0xF5	Stuffing byte.
2	P_MTX_UPDATE	0xCF	Header 31, matrix update.
3	Fnc	Bit Pattern	Where, fnc = 0x00 - For matrix poll, testing only (may not be used). 0x01 - For camera update. 0x02 - For monitor update. 0x04 - For alarm update (may not be used). 0x08 - For monitor assignment update. 0x10 - For video loss update (may not be used). Multiple types of updates can be requested in a single transmission by combining the bits in fnc. For example, to get all update, send 0x1F (never happens in html sample command files).
4	P_ETX	0xAF	End of transmission.
5	CKSM	Block Check	CheckSum, exclusive OR of all bytes.

2.6.4 Format of Message Header 31 – Function 01; Camera Update (CM9760-CC1 to CM9760-MXB)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_MTX_UPDATE	0xCF	Header 31, matrix update.
2	Fnc	0x01	Camera update: cam logical#, cam title, cam PTZ type, etc.
3	Blk	Packed BCD	Block number, five cameras each block, zero base. So, n is range from 0 to 4.
(n * 28) + 4	PcamHi	Packed BCD	Camera logical number, support up to 6 digits, 000000 to 999999. In CC1 version 7.xx, support up to 4 digits, 0000 to 9999.
(n * 28) + 5	PcamMid	Packed BCD	
(n * 28) + 6	PcamLo	Packed BCD	
(n * 28) + 7	CamStat	Bit Pattern	Represent camera controllability, where 0x01 – Pan 0x02 – Tilt 0x04 – Zoom 0x07 – Pan, Tilt and Zoom.
(n * 28) + 8	ident[(blk*5) + n][0]	ASCII Char	This is the text of the camera title in ASCII format up to 24 characters long.
…	...	...	
…	…	...	
(n * 28) + 31	ident[(blk*5) + n][23]	ASCII Char	
144	P_ETX	0xAF	End of transmission.
145	CKSM	Block Check	CheckSum, exclusive OR of all bytes.

2.6.5 Format of Message Header 31 – Function 02; Monitor Update (CM9760-CC1 to CM9760-MXB)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_MTX_UPDATE	0xCF	Header 31, matrix update.
2	Fnc	0x02	Monitor update: monitor title.
3	Blk	Packed BCD	Block number, five monitors each block, zero based. So, n range from 0 to 4.
(n * 24) + 4	ident[(blk*5) + n][0]	ASCII Char	This is the text of the monitor title in ASCII format up to 24 characters long.
…	…	…	
…	…	…	
(n * 24) + 27	ident[(blk*5) + n][23]	ASCII Char	
124	P_ETX	0xAF	End of transmission.
125	CKSM	Block Check	CheckSum, exclusive OR of all bytes.

2.6.6 Format of Message Header 31 – Function 01; Camera Update (CM9760-CC1 to CM9770-MXB)

- In CM9760-CC1 version 8.xx or below, CC1 sends dummy camera records to CM9760-MXB for even the cameras are not defined. This would waste communication time.
- In CM9760-CC1 version 9.xx or above, the problem of the sending dummy camera would be fixed. In order to fix it, here are the changes in the P command:
  1. The block number (Blk) would not be present in the command.
  2. Two bytes are added in packed BCD format to represent physical camera number. These two bytes are added right before the camera logical number of each camera.
- In CM9760-CC1 version 9.xx or above, CC1 encapsulates a maximum of five cameras data set in a command. For example, if user has defined total of seven cameras from the CM9760-MGR, CC1 would sends two commands (Header 31, Function 01) to CM9770-MXB. The first command carries five cameras data set and the second command carries 2 cameras data set.
- In the table below, 'n' can be any number from 0 to 4.

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_STUFFING	0xF5	Stuffing byte.
2	P_MTX_UPDATE	0xCF	Header 31, matrix update.
3	Fnc	0x01	Camera update: cam logical#, cam title, cam PTZ type, etc.
(n * 54) + 4	PhylCamHi	Packed BCD	Physical camera number, high byte and low byte. It is ranged from 0000 to 0512.
(n * 54) + 5	PhylCamLo	Packed BCD	
(n * 54) + 6	LogCamHi	Packed BCD	Logical camera number, support up to 6 digits, 000000 to 999999. In CC1 version 7.xx, support up to 4 digits, 0000 to 9999.
(n * 54) + 7	LogCamMid	Packed BCD	
(n * 54) + 8	LogCamLo	Packed BCD	
(n * 54) + 9	CamStat	Bit Pattern	Represent camera controllability, where 0x01 – Pan 0x02 – Tilt 0x04 – Zoom 0x07 – Pan, Tilt and Zoom.
(n * 54) + 10	ident[PhyCam][0]	Word	This is the text of the camera title in wide character format up to 24 characters (words) long.
…	...	...	
…	…	...	
(n * 54) + 56	ident[PhyCam][23]	Word	
274 if n = 4	P_ETX	0xAF	End of transmission.
275 if n = 4	CKSM	Block Check	CheckSum, exclusive OR of all bytes.

2.6.7 Format of Message Header 31 – Function 02; Monitor Update (CM9760-CC1 to CM9770-MXB)

- In CM9760-CC1 version 8.xx or below, CC1 sends dummy monitor records to CM9760-MXB for undefined monitors. This would waste communication time.
- In CM9760-CC1 version 9.xx or above, the problem of the sending dummy monitor would be fixed. In order to fix it, here are the changes in the P command:
  1. The block number (Blk) would not be present in the command.
  2. A bytes is added in packed BCD format to represent physical monitor number. This byte is added right before the monitor logical number of each monitor.
- In CM9760-CC1 version 9.xx or above, CC1 encapsulates a maximum of five monitors data set in a command. For example, if user has defined total of seven monitors from the CM9760-MGR, CC1 would sends two commands (Header 31, Function 02) to CM9770-MXB. The first command carries five monitors data set and the second command carries 2 monitors data set.
- In the table below, 'n' can be any number from 0 to 4.

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_STUFFING	0xF5	Stuffing byte.
2	P_MTX_UPDATE	0xCF	Header 31, matrix update.
3	Fnc	0x02	Monitor update: monitor title.
(n * 49) + 4	PhyMon	Packed BCD	Physical monitor number; 00 to 31.
(n * 49) + 5	ident[PhyMon][0]	Word	This is the text of the monitor title in wide character format up to 24 characters (words) long.
…	…	…	
…	…	…	
(n * 49) + 51	ident[PhyMon][23]	Word	
249 if n = 4	P_ETX	0xAF	End of transmission.
250 if n = 4	CKSM	Block Check	CheckSum, exclusive OR of all bytes.

2.6.8 Format of Message Header 31 – Function 08; Monitor Assignment Update (CM9760-CC1 to CM9760-MXB/CM9770-MXB)

In this case, CC1 sends (responses) with header 30, 0xCE command. This is actually the start up cameras that users setup in the MGR. Please refer to section 2.5 for description of header 30.

2.6.9 Acknowledgment

For the headers and functions mentioned in section 2.6.4 to section 2.6.7, which are commands sends from CC1 to MXB. MXB sends acknowledgment, P_ACK, 0xA2 as response if no error is found.

In header 31, 0xCF, even though the functions 0x00, 0x04 and 0x10 (Matrix Poll Testing, Alarm Update and Video Loss Update, respectively) may not be used, CC1 would send acknowledgment, P_ACK, 0xA2 to MXB as response.

2.7 Header 34, 0xD2 – Positions and Attributes Update

2.7.1 General Description and Issues:

- Positions and attributes update request is sent from MXB to CC1, while positions and attributes update information is sent from CC1 to MXB.
- Moreover, CC1 sends this command whenever it needs to change the positions and attributes for camera title, camera number, monitor title, alarm title, time and date and message.
- The same thing happens to header 31, 0xCF, Matrix Update, if CC1 is running and MXB is power up, MXB sends positions and attributes update request commands (header 34, 0xD2) to CC1. Then CC1 replies to MXB with the positions and attributes update information (header 34, 0xD2). See file “VMC Reset 03.html”.
- On the other hand, if MXB is running and CC1 is power up, CC1 sends positions and attributes update (header 34, 0xD2) to MXB automatically without MXB requesting. See files “CC1 Reset 01.html” and “CC1 Reset 02.html”.
- In CM9770-MXB, the size of the character is fixed while CM9760-MXB can change the size of alphanumeric. Everything else, like alphanumeric brightness and blinking, etc, should be matched with the current CM9760-MXB settings.
- Note that all monitors should have the identical alphanumeric positions and attributes.
- By using the “All Monitors” value (0x64), CC1 update the positions and attributes for all monitors at a time.
- The request all update function (fnc = 0x3F) send from MXB, CC1 always responses to MXB one command for each function.
- **** The number of positions and attributes update command is depends on who start the polling. If MXB starts polling (sent request to CC1), CC1 responses with six (6) update commands (header 34). If CC1 starts polling (CC1 just power-up), CC1 sends five (5) update commands (header 34) to MXB. For sample commands, please compare files “VMC Reset 03.html” and “CC1 Reset 01.html”.**
- **** There is a problem with the CC1 when using “Save and Send” from the MGR. The CC1 should use “all monitors” function to update the positions and attributes for all monitors, but it sends a set of commands for each monitor.**
- See file "Save and Send Attr from MGR.html", "VMC reset xx.html" or MXB item 66 and CC1 item 63 to 70 in Appendix-A for sample commands.

2.7.2 Format of Message Header 34 – Positions and Attributes Update Request (CM9760-MXB to CM9760-CC1)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_POS_ATTR_UPDATE	0xD2	Header 34, alphanumeric positions and attributes update.
2	fnc	Bit Pattern	Where, fnc = 0x01 – For camera title update. 0x02 – For monitor title update. 0x04 – For alarm update (may not be used). 0x08 – For camera number update. 0x10 – For time and date text update. 0x20 – For message update. Multiple types of updates can be requested in a single transmission by combining the bits in fnc. For example, to get all update, send 0x3F.
3	P_ETX	0xAF	End of transmission.
4	CKSM	Block Check	CheckSum, exclusive OR of all bytes.

2.7.3 Format of Message Header 34 – Positions and Attributes Update (CM9760-CC1 to CM9760-MXB)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_POS_ATTR_UPDATE	0xD2	Header 34, alphanumeric positions and attributes update.
2	mon	Packed BCD	Physical mon#, 00 to 15 or 00 to 31; 0x64 for all monitors.
3	fnc	Bit Pattern	Where, fnc = 0x01 – For camera title update. 0x02 – For monitor title update. 0x04 – For alarm update (may not be used). 0x08 – For camera number update. 0x10 – For time and date text update. 0x20 – For message update. Even MXB request all update (fnc = 0x3F), CC1 always responses to MXB one command for each fnc.
4	xpos	Packed BCD	Column where text starts. Range 00 to 24.
5	ypos	Packed BCD	Row where text starts. Range 00 to 11 while 00 is off-screen.
6	Attr0	Bit Pattern	See section 2.7.6
7	Attr1	Bit Pattern	See section 2.7.7
8	P_ETX	0xAF	End of transmission.
9	CKSM	Block Check	CheckSum, exclusive OR of all bytes.

2.7.4 Format of Message Header 34 – Positions and Attributes Update Request (CM9770-MXB to CM9760-CC1)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_STUFFING	0xF5	Stuffing byte.
2	P_POS_ATTR_UPDATE	0xD2	Header 34, alphanumeric positions and attributes update.
3	fnc	Bit Pattern	Where, fnc = 0x01 – For camera title update. 0x02 – For monitor title update. 0x04 – For alarm update (may not be used). 0x08 – For camera number update. 0x10 – For time and date text update. 0x20 – For message update. Multiple types of updates can be requested in a single transmission by combining the bits in fnc. For example, to get all update, send 0x3F.
4	P_ETX	0xAF	End of transmission.
5	CKSM	Block Check	CheckSum, exclusive OR of all bytes.

2.7.5 Format of Message Header 34 – Positions and Attributes Update (CM9760-CC1 to CM9770-MXB)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_STUFFING	0xF5	Stuffing byte.
2	P_POS_ATTR_UPDATE	0xD2	Header 34, alphanumeric positions and attributes update.
3	mon	Packed BCD	Physical mon#, 00 to 15 or 00 to 31; 0x64 for all monitors.
4	fnc	Bit Pattern	Where, fnc = 0x01 – For camera title update. 0x02 – For monitor title update. 0x04 – For alarm update (may not be used). 0x08 – For camera number update. 0x10 – For time and date text update. 0x20 – For message update. Even MXB request all update (fnc = 0x3F), CC1 always responses to MXB one command for each fnc.
5	xpos	Packed BCD	Column where text starts. Range 00 to 24.
6	ypos	Packed BCD	Row where text starts. Range 00 to 11 while 00 is off-screen.
7	Attr0	Bit Pattern	See section 2.7.6
8	Attr1	Bit Pattern	See section 2.7.7
9	P_ETX	0xAF	End of transmission.
10	CKSM	Block Check	CheckSum, exclusive OR of all bytes.

2.7.6 Attr0 – Ident Display Attributes Byte0

Bit	Field	Description
2, 1, 0	Character brightness.	Where Bit2, Bit1 and Bit0 = 000 – Black 001 – Less Black 010 – More or less Black 011 – Gray 100 – More or less White 101 – Off White 110 – White 111 – Bright White
3	Character blinking.	Where Bit3 = 0 – Off 1 – On
5, 4	Character size.	Where Bit5 and Bit4 = 00 – Size 1 01 – Size 2 10 – Size 3 11 – Size 4 In CM9770-MXB, the character size is fixed. So, this field can be ignored.
6	0	Reserved.
7	0	Reserved.

2.7.7 Attr1 – Ident Display Attributes Byte1

Bit	Field	Description
2, 1, 0	Background brightness	This field is not used, always set value to be 000. Where Bit2, Bit1 and Bit0 = 000 – Black 001 – Less Black 010 – More or less Black 011 – Gray 100 – More or less White 101 – Off White 110 – White 111 – Bright White
4, 3	Background format	This field is not used, always set value to be 00. Where Bit4 and Bit3 = 00 – No Background 01 – Black Overlay 10 – Square Background 11 – Solid Background
5	Display On/Off	Where Bit5 = 0 – Off 1 – On
6	0	Reserved.
7	0	Reserved.

2.7.6 Acknowledgment

MXB sends acknowledgment, P_ACK, 0xA2 as response if no error is found.

III) P Commands (Interbay) State Machine:

The states below are general P command parsing states that are used in CM9770-MXB:

1. Look for message
2. STX (0xA0) received
3. P_STUFFING (0xF5) received
4. Command header received
5. Function byte and/or data bytes Receiving
6. ETX (0xAF) received
7. Check Sum (CRC) received

IV) P Protocol vs. M Protocol Translation

4.1 Video Switch Command – Header 30, 0xCE

The video switch command (Header 30, 0xCE) may be the only one that has to be translated from P Protocol to M Protocol. Please refer to section 2.5.1 for the general description and issues for header 30.

4.1.1 Format of Message Header 30 (CM9760-CC1 to CM9770-MXB)

Byte	Mnemonic/Field	Structure	Description
0	P_STX	0xA0	Start of transmission.
1	P_STUFFING	0xF5	Stuffing byte.
2	P_VIDEO_SWT	0xCE	Header 30, video switch.
3	Pmon	Packed BCD	The physical mon location, 00 to 15 or 00 to 31
4	PcamHi	Packed BCD	The physical location of the video input. In this case, range from 0000 to 0255 or from 0000 to 0511.
5	PcamLo	Packed BCD	
6	P_ETX	0xAF	End of transmission.
7	CKSM	Block check	CheckSum, exclusive OR of all bytes.

4.1.2 Acknowledgment – MXB to CC1

MXB sends acknowledgment, P_ACK, 0xA2 as response if no error is found.

4.1.3 Format of M Protocol, Matrix Switches Broadcast Command, Group 0x07, Video Switches Sub-command 0x00 (VMC to VCC)

For more information on M Protocol, please refer to files “mcmds33.doc” and “M-sys 2.doc”, etc.

Byte	Mnemonic/Field	Structure	Description
0	PREAMBLE	0xFF	Preamble, start of transmission.
1	Ctrl	Bit Pattern	For 256 input system, use 0x00; For 512 input system, use 0x80.
2	Cnt	Unsigned Byte	Count Byte, the number of bytes in the expanded data. In this case, the value is 0x06.
3	destAddr	Unsigned Byte	Since this is a broadcast M command, the value is 0xFE.
4	srcAddr	Unsigned Byte	Since this broadcast M command is always sent out from master VMC, the value is 0x00.
5	MATRIX_SWTICHES	0x07	Command Group, 0x07 is the Matrix Switches command group. Note that there is a typing mistake in page 44 in file “mcmds33.doc”. It should be “MATRIX_SWITCHES” instead of “M_SYS_MGMT_CMDS”.
6	VIDEO_SWITCHES	0x00	Sub-command, 0x00 is the Switch Camera to Monitor Sub-command..
7, 8	McamNum	Unsigned Word	Physical camera number: For 256 input system, the value is ranged from 0 to 255 (0x0000 to 0x00FF). For 512 input system, the value is ranged from 0 to 512 (0x0000 to 0x01FF). This number is converted from Byte 4 and Byte 5 (PcamHi and PcamLo, 4 BCD) in

			section 4.1.1.
9, 10	MmonNum	Unsigned Word	Physical monitor number, range from 0 to 15 or from 0 to 31 in this case. This number is translated from Byte 3 (Pmon, 2 BCD) in section 4.1.1
11, 12	CheckSum	Unsigned Word	Check sum bytes; please refer to file "M-sys 2.doc" for details on how to calculate the check sum.

V) Multilanguage Support over P Protocol

5.1 General Description and Issues

One of the limitation of P Protocol which restricts the value in the data field to be smaller than 0xA0. In the other words, it allows one hundred and sixty (0x9F = 159) available value in a single data byte. This available value is not enough to support multilanguage capability since bigger value have to be send. In order to support multilanguage over the P Protocol, a few new schemes must be added.

5.2 14-Bit Decoding for Index Number

Instead of using single byte to represent a string character, 14 bits would be used to provide 16,385 (2^14 + 1) indexes. This number would be big enough to support multilanguage, including foreign languages, Chinese and future expansion. These 14 bits would be wrapped to be 2 bytes before sending with the P Protocol. Here is an example,

E.g. If index = 13547 (dec)
13547 (dec) = 00110100 11101011 (bin),
then shift the most significant 9 bits to the left by 1 bit, and set bit 7 to be zero, it becomes,
01101001 01101011 (bin),
which is equal to
0x696B (hex).
This hex value is legal in P Protocol's data section.

For command headers that described in section 2.0 above, wherever there are ASCII Char structure, each ASCII Char (one byte) would be replaced by this 2-Byte (14-Bit Decoding) scheme.

5.3 Use 0xF5 as a Stuffing Byte

In order to distinguish the new structure (14-Bit Decoding) from the old structure (ASCII Char), The stuffing byte, 0xF5 is append to the Start of Transmission Byte (P_STX) in each P command between CM9760-CC1 and CM9770-MXB communication. Therefore, CM9760-CC1 would be able to tell which MXB is being connected.

Moreover, the CM9770-MXB would be able to communicate with CM9760-CC1 version 8.xx, which is non-multilanguage support. Therefore, both of the structures (0xF5 with 14-Bit Decoding and 0xA0 with ASCII Char) have to be implemented in the CM9770-MXB. So, the CM9770-MXB is always backward compatible with CM9760-CC1 version 8.xx.
*Note: This backward capability is not currently supported in CM9770-MXB system.

5.4 The First Command from CM9770-MXB

After CM9770-MXB is power-up or reset, the first command sends out from the MXB to the CC1 must be the old structure (no stuffing byte; ASCII Char), since the MXB does not know the software version of the CC1 at that particular moment. Then, if the CC1 replies with the old structure, the MXB would stay with the old structure, otherwise, the MXB must switch to the new structure (with stuffing byte and with 14-Bit Decoding).
*Note: This is not currently supported in CM9770-MXB system.

5.5 CM9760-CC1 vs. CM9760-MGR

In order for the new system to be fully multilanguage support, the CM9760-MGR and CM9760-CC1 must be changed as well. The schemes that mentioned in section 5.2 and section 5.3 must be applied to these two units. In other words, the new CC1 software and MGR software must support those two schemes in their communication, which including flat files loading by using floppy disks.
*Note: This may not fully supported in both CC1 and MGR.

Appendix-A: MXB Power-Up or Reset Sample Commands and Sequence

In this section, data captured between CM9760-CC1 and CM9760-MXB communication will be attached. The BreakOut program is used to capture the communication data, then the data is converted to HTML files.

Sample MXB power up commands

MXB	CC1	Length	Dir	Data
1		5	<<<	A0 CF 01 AF C1
	1	146	>>>	A0 CF 01 00 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF D7
2		1	<<<	A2
	2	146	>>>	A0 CF 01 01 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF D6
3		1	<<<	A2
	3	146	>>>	A0 CF 01 02 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF D5
4		1	<<<	A2
	4	146	>>>	A0 CF 01 03 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF D4
5		1	<<<	A2
	5	146	>>>	A0 CF 01 04 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF D3
6		1	<<<	A2
	6	146	>>>	A0 CF 01 05 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20

				00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF D2
7		1	<<<	A2
	7	146	>>>	A0 CF 01 06 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 54 51 23 00 43 41 4D 20 35 34 35 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 05 46 00 43 41 4D 20 35 34 36 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 05 47 00 43 41 4D 20 35 34 37 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 AF 9A
8		1	<<<	A2
	8	146	>>>	A0 CF 01 07 00 05 48 00 43 41 4D 20 35 34 38 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 05 49 00 43 41 4D 20 35 34 39 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 05 50 00 43 41 4D 20 35 35 30 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 05 51 00 43 41 4D 20 35 35 31 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 05 52 00 43 41 4D 20 35 35 32 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 AF EC
9		1	<<<	A2
	9	146	>>>	A0 CF 01 08 00 05 53 00 43 41 4D 20 35 35 33 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 05 54 00 43 41 4D 20 35 35 34 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 05 55 00 43 41 4D 20 35 35 35 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 05 56 00 43 41 4D 20 35 35 36 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 05 57 00 43 41 4D 20 35 35 37 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 AF E3
10		1	<<<	A2
	10	146	>>>	A0 CF 01 09 00 05 58 00 43 41 4D 20 35 35 38 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 05 59 00 43 41 4D 20 35 35 39 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 05 60 00 43 41 4D 20 35 36 30 20 42 4C 41 43 4B 20 56 49 44 45 4F 20 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF C7
11		1	<<<	A2
	11	146	>>>	A0 CF 01 10 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF C7
12		1	<<<	A2
	12	146	>>>	A0 CF 01 11 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF C6
13		1	<<<	A2
	13	146	>>>	A0 CF 01 12 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E

				44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF C5
14		1	<<<	A2
	14	146	>>>	A0 CF 01 13 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF C4
15		1	<<<	A2
	15	146	>>>	A0 CF 01 14 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF C3
16		1	<<<	A2
	16	146	>>>	A0 CF 01 15 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF C2
17		1	<<<	A2
	17	146	>>>	A0 CF 01 16 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF C1
18		1	<<<	A2
	18	146	>>>	A0 CF 01 17 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF C0
19		1	<<<	A2
	19	146	>>>	A0 CF 01 18 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF CF
20		1	<<<	A2
	20	146	>>>	A0 CF 01 19 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44

				20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF CE
21		1	<<<	A2
	21	146	>>>	A0 CF 01 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF F7
22		1	<<<	A2
	22	146	>>>	A0 CF 01 21 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 AF F6
23		1	<<<	A2
	23	146	>>>	A0 CF 01 22 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 00 00 00 55 4E 44 45 46 49 4E 44 20 43 41 4D 45 52 41 20 44 41 54 41 20 20 20 20 00 06 25 00 43 41 4D 20 36 32 35 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 06 26 00 43 41 4D 20 36 32 36 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 06 27 00 43 41 4D 20 36 32 37 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 AF BE
24		1	<<<	A2
	24	146	>>>	A0 CF 01 23 00 06 28 00 43 41 4D 20 36 32 38 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 06 29 00 43 41 4D 20 36 32 39 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 06 30 00 43 41 4D 20 36 33 30 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 06 31 00 43 41 4D 20 36 33 31 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 06 32 00 43 41 4D 20 36 33 32 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 AF AE
25		1	<<<	A2
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