



PROGRAMMERS GUIDE

TO THE

CAM830

CONTROL ACCESS MODULE

FOR THE

MT830 SATELLITE RECEIVER

5/26/94

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TABLE OF CONTENTS

	<u>PAGE</u>
DATA FORMAT	1
ACKNOWLEDGE / NEGATIVE ACKNOWLEDGE	1
VALID CAM830 COMMANDS	2
(A) READ ALARMS COMMAND	3
(A) WRITE ALARMS COMMAND	4
(a) WRITE AUDIO SCAN COMMAND	5
(E) READ ECHO COMMAND	7
(G) READ GOTO COMMAND	8
(K) READ KEYS COMMAND	9
(L) READ LOCATIONS COMMAND	10
(M) READ MEMORY COMMAND	11
(M) WRITE MEMORY COMMAND	13
(O) READ OPTIONS COMMAND	14
(O) WRITE OPTIONS COMMAND	16
(P) READ PORTS COMMAND	17
(R) WRITE RESET COMMAND	18
(S) READ STATUS COMMAND	19
(S) WRITE STATUS COMMAND	20
(V) READ VERSION COMMAND	21
(v) WRITE VIDEO SCAN COMMAND	22
CAM830 DATA MEMORY LOCATIONS	23
WORKING CHANNEL DATA MEMORY LOCATIONS	24
HEADER DATA MEMORY LOCATIONS	25
TIMER DATA BASE MEMORY LOCATIONS	26
CAM830 DEFAULT SETTINGS	27
PROGRAMMING EXAMPLES	29
READING CURRENT WORKING CHANNEL DATA	29
CHANGING THE WORKING CHANNEL DATA	31
CHANGING FORMAT AND CHANNELS	33
SETTING THE CLOCK	34

CAM830 SERIAL COMMUNICATIONS

DATA FORMAT

All data is sent to the CAM830 using 1 start bit, 8 data bits, no parity and 1 stop bit. The BAUD rate is selectable from 300 through 19,200 from the CAM830 front panel. HEX data is always sent in ASCII HEX format (two ASCII characters to represent one HEX value). For example, to send 12H, first send an ASCII 1 then an ASCII 2 (31H 32H). The only exception is with the STX, ETX, ACK and NAK ASCII characters. They are each sent as one HEX byte. All data is sent using UPPER case letters except for commands with lower case letters.

Data is sent to the CAM830 using the following format;

STX ADDRESS R/W COMMAND DATA ETX

STX = ASCII START OF TEXT (02H) ADDRESS =
RECEIVERS 4 DIGIT ADDRESS R/W = R TO
READ OR W TO WRITE COMMAND = VALID
COMMAND A~Z OR a~z DATA = REQUIRED
DATA
ETX = ASCII END OF TEXT (03H)

The CAM830 replies to commands as follows;

STX ADDRESS DATA ACK/NAK ETX

STX = ASCII START OF TEXT (02H) ADDRESS
= RECEIVERS 4 DIGIT ADDRESS DATA =
REQUIRED DATA
ACK/NAK = ASCII ACKNOWLEDGE / NEGATIVE ACKNOWLEDGE ETX
= ASCII END OF TEXT (03H)

ONCE A COMMAND IS ISSUED BY THE COMPUTER, ANOTHER COMMAND MUST NOT BE ISSUED UNTIL AFTER THE ETX IS SENT BY THE CAM830 AT THE END OF IT'S REPLY MESSAGE.

ACKNOWLEDGE / NEGATIVE ACKNOWLEDGE -

ACK = 06H (NO EVENT) OR 86H (EVENT)

NAK = 15H (NO EVENT) OR 95H (EVENT)

AN EVENT IS DEFINED AS ANY OF THE FOLLOWING;

1. A TIMER HAS TRIPPED
2. A TIMER IS IN PRE- WARNING
3. AN ALARM HAS TRIPPED (AUX, C/N OR SIG)

When required, an ACK is sent if the command is successful.

An NAK is sent if the command is unsuccessful for any of the following reasons;

1. The command is not available in the CAM830
2. The R or W was not sent after the receiver address
3. R is issued on a Write only command
4. W is issued on a Read. only command
5. Read/Write Memory asks for more than 32 characters
6. Read/Write Memory command has an address above 7FFFH
7. Write Memory writes to a protected memory address.
8. Write Memory has an invalid checksum
9. Write Reset command does not contain a valid reset bit
10. Write Status command contains a format of 0
11. Write Status contains a format greater than the maximum in the receiver

VALID CAM830 COMMANDS -

All valid CAM830 commands are one ASCII letter a ~ z or A ~ Z. The following are valid commands;

A - ALARM (R/W)
a - AUDIO SCAN (W)
E - ECHO (R)
G - GOTO (W)
K - KEYS (R/W)
L - LOCATIONS (R)
M - MEMORY (R/W)
O - OPTIONS (R\W)
P - PORTS (R)
R - RESET (W)
S - STATUS (R/W)
V - VERSION (R)
v - VIDEO SCAN (W)

(R) = READ ONLY

(W) = WRITE ONLY

(R/W) = READ OR WRITE

(A) READ ALARMS COMMAND -

To read the alarm parameters, issue a Read Alarm command. The syntax is as follows;

STX ADDRESS R A ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVERS 4. DIGIT ADDRESS
R = ASCII R (READ)
A = ASCII A (ALARMS)
ETX = ASCII END OF TEXT (03H)

The receiver will reply with the following data;

STX ADDRESS AC AS RT RD AF ETX

SIX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVERS 4 DIGIT ADDRESS (0000 ~ 9999)
AC = ALARM C/N SETTING (00H ~ FFH dB)
AS = ALARM SIGNAL SETTING (00H ~ FFH dBm)
RT = RELAY TIME-OUT TIMER SETTING (00H ~ FFH SECONDS)
RD = ALARM DELAY SETTING (00H ~ FFH IN TENTHS OF SECONDS)
AF = ALARM FLAGS (SEE BELOW)

ALARM FLAGS -

BIT 0 - AUX INPUT, 1 = NORMALLY OPEN 0 = NORMALLY GROUNDED
BIT 1 - * INTERNAL ALARM CONDITION
BIT 2 - INTERNAL ALARM, 1 = ENABLED 0 = DISABLED
BIT 3 - EXTERNAL ALARM, 1 = ENABLED 0 = DISABLED
BIT 4 - INTERNAL RELAY, 1 = ON 0 = OFF
BIT 5 - INTERNAL RELAY FUNCTION, 1 = ALARM 0 = TIMER
BIT 6 - TIMER PREWARNING CONDITION, 1 = ACTIVE 0 = INACTIVE
BIT 7 - * INTERNAL ALARM CONDITION

* INTERNAL ALARM CONDITION -

BIT 1	BIT 7	ALARM CONDITION
0	0	NO ALARM CONDITION
0	1	AUX ALARM ACTIVE
1	0	C/N ALARM ACTIVE
1	1	SIGNAL ALARM ACTIVE

If more than one alarm is active, the AUX alarm has the highest priority, followed by the C/N alarm and finally the Signal alarm.

EXAMPLE:

To read the current alarm information from receiver with the address 1234, send;

02H 31H 32H 33H 34H 52H 41H 03H

The receiver replies with the following;

02H 31H 32H 33H 34H 0AH 32H 1EH 0AH 2CH 03H

0AH = 10 dB C/N

32H = -50 dBm SIGNAL

1EH = 30 SECOND TIME-OUT TIMER

0AH = 1.0 SECOND RELAY DELAY

2CH = NO ALARM CONDITION, NO TIMER PRE- WARNING, RELAY SET TO ALARM,
INTERNAL RELAY OFF, EXTERNAL ALARM ENABLED, INTERNAL ALARM
ENABLED, AUX INPUT SET FOR NORMALLY GROUNDED

2CH = 0> ALARM CONDITION

0 > TIMER PRE- WARNING

1 > RELAY FUNCTION

0 > INTERNAL RELAY

1 > EXTERNAL ALARM

1 > INTERNAL ALARM

0> ALARM CONDITION

0 > AUX INPUT

(A) WRITE ALARM COMMAND -

To write to the alarm parameters, issue a Write Alarm command. The syntax is as follows;

STX ADDRESS W A AC AS RT RD AF ETX

STX = ASCII START OF TEXT (02H)

ADDRESS = RECEIVER'S 4 DIGIT ADDRESS

W = ASCII W (WRITE)

A = ASCII A (ALARMS)

AC = ALARM C/N SETTING (00H ~ FFH dB)

AS = ALARM SIGNAL SETTING (00H ~ FFH dBm)

RT = RELAY TIME-OUT TIMER SETTING (00H ~ FFH SECONDS)

RD = ALARM DELAY SETTING (00H ~ FFH IN TENTHS OF SECONDS)

AF = ALARM FLAGS (SEE BELOW)

ETX = ASCII END OF TEXT (03H)

ALARM FLAGS -

- BIT 0 - AUX INPUT, 1 = NORMALLY OPEN 0 = NORMALLY GROUNDED
- BIT 1 -DON'T CARE
- BIT 2 - INTERNAL ALARM, 1 = ENABLED 0 = DISABLED
- BIT 3 - EXTERNAL ALARM, 1 = ENABLED 0 = DISABLED
- BIT 4 - * INTERNAL RELAY, 1 = ON 0 = OFF
- BIT 5 - INTERNAL RELAY FUNCTION, 1 = ALARM 0 = TIMER
- BIT 6 - DON'T CARE
- BIT 7 - DON'T CARE

* If the relay is set for ALARM, the alarm condition will take priority over that sent

The receiver will reply with the following data;

STX ADDRESS ACK/NAK ETX

- STX = ASCII START OF TEXT (02H)
- ADDRESS = RECEIVERS 4 DIGIT ADDRESS (0000 ~ 9999)
- ASCII ACKNOWLEDGE OR NEGATIVE ACKNOWLEDGE (SEE PAGE 1 & 2)
- ETX = ASCII END OF TEXT (03H)

EXAMPLE:

To set the C/N Alarm to 10 dB, the Signal Alarm to -50 dBm, the Relay Time-out timer to 30 Sec, the Alarm Delay to 1 Sec, the AUX input to Normally Ground, enable the Internal Alarm, Enable the External Alarm and set the relay to Alarm mode, in receiver with address 1234, send;

02H 31H 32H 33H 34H 57H 41H 30H 41H 33H 32H 31H 45H 30H 41H 32H
43H 03H

The receiver replies with;

02H 31H 32H 33H 43H 06H 03H

06H = ACKNOWLEDGE WITH NO EVENT ACTIVE

(a) WRITE AUDIO SCAN COMMAND -

To scan audio frequencies from 5.000 to 8.500 MHz in 0.1 MHz steps, issue this command. The receiver will automatically select the narrow audio filter and start the scan sequence for the selected audio subcarrier.

The syntax is as follows;

STX ADDRESS W a N ETX
STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVERS 4 DIGIT ADDRESS (0000 ~ 9999)
W = ASCII W (WRITE)
a = ASCII a (AUDIO SCAN)
N = SUB CARRIER NUMBER (1 ~ 3)
ETX = ASCII END OF TEXT (03H)

The CAM830 will reply with the following;

SS LL ETX
SS = STEP NUMBER (23H ~ 00H OR FFH)
LL = AUDIO LEVEL (00H ~ FFH)
ETX = ASCII END OF TEXT (03H)

When scan is complete, the receiver will send a step number of FFH and an audio level of FFH. Scan can be aborted at anytime by sending any character to the serial port. The receiver will acknowledge the abort by sending a step size of FFH and a level of FFH and ETX.

EXAMPLE:

Start scanning of audio 1 in a receiver with the address 1234 by sending the following;

02H 31H 32H 33H 34H 57H 61H 01H 03H

The receiver replies with the following (the level is 00 from all readings);

32H 33H 30H 30H 03H 32H 32H 30H 30H 03H 32H 31H 30H 30H 03H
32H 30H 30H 30H 03H 31H 46H 30H 30H 03H 31H 45H 30H 30H 03H
31H 44H 30H 30H 03H 31H 43H 30H 30H 03H 31H 42H 30H 30H 03H
31H 41H 30H 30H 03H 31H 39H 30H 30H 03H 31H 38H 30H 30H 03H
31H 37H 30H 30H 03H 31H 36H 30H 30H 03H 31H 35H 30H 30H 03H
31H 34H 30H 30H 03H 31H 33H 30H 30H 03H 31H 32H 30H 30H 03H
31H 31H 30H 30H 03H 31H 30H 30H 30H 03H 30H 46H 30H 30H 03H
30H 45H 30H 30H 03H 30H 44H 30H 30H 03H 30H 43H 30H 30H 03H
30H 42H 30H 30H 03H 30H 41H 30H 30H 03H 30H 39H 30H 30H 03H
30H 38H 30H 30H 03H 30H 37H 30H 30H 03H 30H 36H 30H 30H 03H
30H 35H 30H 30H 03H 30H 34H 30H 30H 03H 30H 33H 30H 30H 03H
30H 32H 30H 30H 03H 30H 31H 30H 30H 03H 30H 30H 30H 30H 03H
FFH FFH FFH FFH 03H

(E) READ ECHO COMMAND -

To check ALARM flags, ARCHIVE flags, Signal level, C/N level and KEY data, issue this command. The syntax is as follows;

STX ADDRESS R E ETX

STX = ASCII ETX (02H)
ADDRESS = 4 DIGIT RECEIVER ADDRESS
R = ASCII R (READ)
E = ASCII E (ECHO)
ETX = ASCII END OF TEXT (03H)

The receiver replies with;

STX ADDRESS AF AR SS CC KD ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)
AF = ALARM FLAGS
AR = ARCHIVE FLAGS
SS = SIGNAL LEVEL IN -dBm (00H ~ FFH)
CC = C/N LEVEL IN dB (00H ~ FFH)
KF = KEY FLAGS
ETX = ASCII END OF TEXT (03H)

ALARM FLAGS -

BIT 0 - AUX INPUT, 1 = NORMALLY OPEN 0 = NORMALLY GROUNDED
BIT 1 - * INTERNAL ALARM CONDITION
BIT 2 - INTERNAL ALARM, 1 = ENABLED 0 = DISABLED
BIT 3 - EXTERNAL ALARM, 1 = ENABLED 0 = DISABLED
BIT 4 - INTERNAL RELAY, 1 = ON 0 = OFF
BIT 5 - INTERNAL RELAY FUNCTION, 1 = ALARM 0 = TIMER
BIT 6 - TIMER PREW ARNING CONDITION, 1 = ACTIVE 0 = INACTIVE
BIT 7 - * INTERNAL ALARM CONDITION

***INTERNAL ALARM CONDITION –**

BIT 1	BIT 7	ALARM CONDITION
0	0	NO ALARM CONDITION
0	1	AUX ALARM ACTIVE
1	0	C/N ALARM ACTIVE
1	1	SIGNAL ALARM ACTIVE

If more than one alarm is active, the AUX alarm has the highest priority, followed by the C/N alarm and finally the Signal alarm.

ARCHIVE FLAGS -

- BIT 0 (R/W) - * TIMER DATABASE CHANGED, 1=YES 0=NO
- BIT 1 (R/W) - * DATABASE CHANGED, 1=YES 0=NO
- BIT 2 (R/W) - * CHANNEL CHANGED, 1=YES 0=NO
- BIT 3 (R/W) - * FORMAT CHANGED, 1=YES 0=NO
- BIT 4 - RESERVED
- BIT 5 - RESERVED
- BIT 6 - RESERVED
- BIT 7 - RESERVED

KEY FLAGS -

- BIT 0 - PROGRAM LED, 1 = ON 0 = OFF
- BIT 1 - TAKE LED, 1 = ON 0 = OFF
- BIT 2 - PREVIEW LED, 1 = ON 0 = OFF
- BIT 3 - ANTENNA POLARITY SWITCH, 1 = DISABLED 0 = ENABLED
- BIT 4 - VIDEO POLARITY SWITCH, 1 = DISABLED 0 = ENABLED
- BIT 5 - PROGRAM KEY, 1 = DISABLED 0 = ENABLED
- BIT 6 - PREVIEW KEY, 1 = DISABLED 0 = ENABLED
- BIT 7 - CHANNEL SWITCH, 1 = DISABLED 0 = ENABLED

EXAMPLE:

To issue the Echo command to a receiver with the address 1234, send;

02H 31H 32H 33H 34H 52H 45H 03H

(G) WRITE GOTO COMMAND -

This command is used to force the program to jump to a memory location and execute the routine located there. Before going to the requested address, the receiver address is loaded into internal ram locations 16H (high two BCD digits) and 17H (low two BCD digits). The routine must issue an ASCII ETX (02H) once initialized to complete the receiver's handshake back to the computer. The syntax is as follows;

STX W G LOCATION ETX
STX = ASCII START OF TEXT (02H)
W = ASCII W (WRITE)
G = ASCII G (GO TO)
LOCATION = LOCATION TO JUMP TO (0000H ~ 7FFFH)
ETX = ASCII END OF TEXT (03H)

The receiver will reply with the following:

STX ADDRESS ACK/NAK ETX

STX = ASCII START OF TEXT

ADDRESS = RECEIVER 4 DIGIT ADDRESS

ACK/NAK = ASCII ACKNOWLEDGE/NEGATIVE ACKNOWLEDGE

ETX = ASCII END OF TEXT (SENT BY ROUTINE AT GOTO LOCATION)

EXAMPLE:

To go to a routine at 5150H in a receiver with the address 1234 send;

02H 31H 32H 33H 34H 57H 47H 35H 31H 35H 30H 03H

The receiver replies with:

02H 31H 32H 33H 34H 06H 03H

06H = ASCII acknowledge without an event active.

(K) READ KEYS COMMAND -

To read the condition of the CAM830 keys and determine which are enabled or disabled, issue the this command. The syntax is as follows;

STX ADDRESS R K ETX

STX = ASCII END OF TEXT (02H)

ADDRESS = RECEIVERS 4 DIGIT ADDRESS (0000 ~ 9999)

R = ASCII R (READ)

K = ASCII K (KEYS)

ETX = ASCII END OF TEXT (03H)

The receiver will respond with the following;

STX ADDRESS R K ETX

STX = ASCII START OF TEXT (02H)

ADDRESS = RECEIVERS 4 DIGIT ADDRESS (0000 ~ 9999)

R = ASCII R (READ)

K = ASCII K (KEYS)

ETX = ASCII END OF TEXT (03H)

The receiver replies with the following;

STX ADDRESS KF ETX
STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVER 4 DIGIT ADDRESS
KF = KEY FLAGS
ETX = ASCII END OF TEXT (03H)

KEY FLAGS -

BIT 0 - PROGRAM LED, 1 = ON 0 = OFF
BIT 1 - TAKE LED, 1 = ON 0 = OFF
BIT 2 - PREVIEW LED, 1 = ON 0 = OFF
BIT 3 - ANTENNA POLARITY SWITCH, 1 = DISABLED 0 = ENABLED
BIT 4 - VIDEO POLARITY SWITCH, 1 = DISABLED 0 = ENABLED
BIT 5 - PROGRAM KEY, 1 = DISABLED 0 = ENABLED
BIT 6 - PREVIEW KEY, 1 = DISABLED 0 = ENABLED
BIT 7 - CHANNEL SWITCH, 1 = DISABLED 0 = ENABLED

EXAMPLE:

To read the current key information from the receiver with the address 1234, send;

02H 31H 32H 33H 34H 52H 4BH 03H

The receiver responds as follows;

02H 31H 32H 33H 34H 30H 30H 03H

KEY DATA = 00H > PREVIEW / PROGRAM / TAKE ALL OFF
ALL SWITCHES ARE ENABLED

(L) READ LOCATIONS COMMAND-

To read the locations of the internal CAM830 databases, issue this command. The syntax is as follows;

STX ADDRESS R L ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)
R = ASCII R (READ)
L = ASCII L (LOCATIONS)
ETX = ASCII END OF TEXT (03H)

The receiver will respond with the following:

STX ADDRESS WC TD FD FF CS ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVERS 4 DIGIT ADDRESS (0000 ~ 9999)
WC = ADDRESS OF THE 14 BYTES OF WORKING CHANNEL DATA
TD = ADDRESS OF THE TIMER DATABASE
FD = ADDRESS OF THE START OF THE FORMAT DATABASE
FF = ADDRESS OF THE FIRST FREE MEMORY AFTER FORMAT
CS = * CHECKSUM
ETX = ASCII END OF TEXT (03H)

* THE CHECKSUM BYTE IS CHOSEN SO THE LOWER 8 BITS OF THE SUM OF ALL DATA STARTING WITH THE CURRENT CHANNEL ADDRESS THROUGH AND INCLUDING THE CHECKSUM = 00H. THE DATA USED TO CALCULATE THE CHECKSUM IS THE HEX DATA, NOT THE ASCII HEX DATA. THE CHECKSUM ITSELF IS THEN SENT AS ASCII HEX DATA.

EXAMPLE:

To read the location information in a receiver with the address 1234, send the following;

02H 31H 32H 33H 34H 52H 4CH 03H

The receiver will reply with the following;

02H 31H 32H 33H 34H 30H 31H 32H 33H 30H 37H 38H 39H 35H
36H 37H 38H 38H 37H 36H 35H 39H 32H 03H

This data represents the following locations;

WORKING CHANNEL DATABASE = 0123H
TIMER DATABASE = 0789H
FORMAT DATABASE = 5678H
FIRST FREE MEMORY = 8765H
CHECKSUM = 92H

(M) READ MEMORY COMMAND -

Issue this command to read up to 32 bytes of data at any memory location. The syntax is as follows:

STX ADDRESS R M LL AAAA ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVERS 4 DIGIT ADDRESS (0000 ~ 9999)
R = ASCII R (READ)
M = ASCII M (MEMORY)
LL = LENGTH OF DATA TO READ (00 ~ 20H)
AAAA = ADDRESS OF MEMORY TO READ (0000H ~ 7FFFH)
ETX = ASCII END OF TEXT (03H)

The receiver will reply with the following;

STX ADDRESS LL AAAA 00 DD DD CS ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVERS 4 DIGIT ADDRESS (0000 ~ 9999)
LL = LENGTH (01H ~ 20H)
AAAA = MEMORY ADDRESS (0000H ~ 7FFFH)
00 = ASCII 00
DD ... DD = DATA BYTES (00H ~ FFH)
CS = * CHECKSUM
ETX = ASCII END OF TEXT (03H)

* THE CHECKSUM BYTE IS CHOSEN SO THE LOWER 8 BITS OF THE SUM OF ALL DATA STARTING WITH "LL" THROUGH AND INCLUDING THE CHECKSUM = 00H. THE DATA USED TO CALCULATE THE CHECKSUM IS THE HEX DATA, NOT THE ASCII HEX DATA. THE CHECKSUM ITSELF IS THEN SENT AS ASCII HEX DATA.

EXAMPLE:

To read 2 bytes at memory location 1000H from receiver with address 1234, send the following;

02H 31H 32H 33H 34H 30H 32H 31H 30H 30H 30H 03H

The receiver will reply with the following;

02H 31H 32H 33H 34H 30H 32H 31H 30H 30H 30H 30H 30H
30H 31H 32H 33H 43H 41H 03H

From this example, the data at locations 1000H and 1001H is 01H and 23H with a checksum of CAH.

(M) WRITE MEMORY COMMAND -

Issue this command to write up to 32 bytes into memory. The syntax is as follows;

STX ADDRESS W M LL AAAA 00 DD ... DD CS ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)
LL = LENGTH OF DATA TO WRITE (01H ~ 20H)
AAAA = MEMORY ADDRESS (0000H ~ 7FFFH)
00 = ASCII 00
CS = * CHECKSUM
ETX = ASCII END OF TEXT (03H)

* THE CHECKSUM BYTE IS CHOSEN SO THE LOWER 8 BITS OF THE SUM OF ALL DATA STARTING WITH "LL" THROUGH AND INCLUDING THE CHECKSUM = 00H. THE DATA USED TO CALCULATE THE CHECKSUM IS THE HEX DATA, NOT THE ASCII HEX DATA. THE CHECKSUM ITSELF IS THEN SENT AS ASCII HEX DATA.

The receiver will reply with the following;

STX ADDRESS ACK/NAK ETX
STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVERS 4 DIGIT ADDRESS
ACK/NAK = ASCII ACKNOWLEDGE / NEGATIVE ACKNOWLEDGE
ETX = ASCII END OF TEXT (03H)

If the memory write was successful, ACK will be returned. If not successful, NAK is returned. NAK will be sent when writing into protected memory, writing more than 32 bytes or writing above address 7FFFH.

EXAMPLE:

To write 11H to memory location 1000H in receiver with address 1234, send the following;

02H 31H 32H 33H 34H 57H 4DH 30H 31H 31H 30H 30H 30H 30H 30H 31H
31H 44H 45H 03H

The receiver replies with;

02H 31H 32H 33H 34H 06H 03H

06H = ACKNOWLEDGE WITH NO EVENT ACTIVE

(0) READ OPTIONS COMMAND -

To check the status of the options which may be installed in the MT830, the setting of switches, the archive flags or the current BAUD rate, issue this command. The syntax is as follows;

STX ADDRESS R 0 ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVERS 4 DIGIT ADDRESS
R = ASCII R (READ)
0 = ASCII 0 (OPTIONS)
ETX = ASCII END OF TEXT (03H)

The receiver replies with the following;

STX ADDRESS F1 F2 F3 F4 ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)
F1 = OPTIONS FLAGS 1
F2 = OPTIONS FLAGS 2
F3 = OPTIONS FLAGS 3
F4 = OPTIONS FLAGS 4
ETX = ASCII END OF TEXT (03H)

F2 - OPTION FLAGS 1 -

BIT 0 (R) - CMF70 PRESENT, 1=NO 0=YES
BIT 1 (R) - BANDPASS SWITCH LSB
BIT 2 (R) - BANDPASS SWITCH MID BIT
BIT 3 (R) - BANDPASS SWITCH MSB
BIT 4 (R) - CBP70 PRESENT, 1=NO 0=YES
BIT 5 (R) - 625 LINE PRESENT, 1=NO 0=YES
BIT 6 (R) - AUDIO 2 PRESENT, 1=NO 0=YES
BIT 7 (R) - AUDIO 3 PRESENT, 1=NO 0=YES

F2 - OPTION FLAGS 2 -

BIT 0 (R) - USER DE-EMP 2 PRESENT, 1=YES 0=NO
BIT 1 (R) - USER DE-EMP 3 PRESENT, 1=YES 0=NO
BIT 2 (R) - CUSTOM DE-EMP 2 PRESENT, 1=NO 0=YES
BIT 3 (R) - REVERSE ANT POLARITY, 1=NO 0=YES
BIT 4 (R) - REVERSE VID POLARITY, 1=NO 0=YES
BIT 5 (R) - CLAMP OFF, 1=NO 0=YES
BIT 6 (R) - LNB POWER PRESENT, 1=NO 0=YES
BIT 7 (R) - COMPOSITE DE-EMP OFF, 1=NO 0=YES

F3 - OPTION FLAGS 3 -

- BIT 0 (R) - INTERNATIONAL OPTION PRESENT, 1=NO 0=YES
- BIT 1 (R) - CUSTOM DE-EMP 3 PRESENT, 1=NO 0=YES
- BIT 2 (R) - MAX VIDEO FREQ, 0 = 1450 MHz 1 = 1750 MHz
- BIT 3 (R) - STOCK FILTER BANDWIDTH, 1=30 MHz /0=36 MHz
- BIT 4 (R) - CBP70 BANDWIDTH BIT 0
- BIT 5 (R) - CBP70 BANDWIDTH BIT 1
- BIT 6 (R) - CBP70 BANDWIDTH BIT 2
- BIT 7 - RESERVED

F4 - OPTION FLAGS 4-

- BIT 0 (R/W) - * TIMER DATABASE CHANGED, 1=YES 0=NO
- BIT 1 (R/W) - * DATABASE CHANGED, 1=YES 0=NO
- BIT 2 (R/W) - * CHANNEL CHANGED, 1=YES 0=NO
- BIT 3 (R/W) - * FORMAT CHANGED, 1=YES 0=NO
- BIT 4 (R/W) - BAUD RATE LSB
- BIT 5 (R/W) - BAUD RATE MID BIT
- BIT 6 (R/W) - BAUD RATE MSB
- BIT 7 (R/W) - CLAMP METHOD, 1 = SYNC TIP 0 = BACK PORCH

* - SET BY HARDWARE, CLEARED ONLY BY IBM PROGRAM

BANDPASS SW:	CBP70 BANDWIDTH:	BAUD RATE:
000 - AUTO	001 - 16 MHz	000 - 300 BAUD
001 - 16 MHz	010 - 18 MHz	001 - 1200 BUAD
010 - 18 MHz	011 - 22 MHz	010 - 2400 BAUD
010 - 18 MHz	100 - 25 MHz	011 - 4800 BAUD
011 - 22 MHz	101 - 31 MHz	100 - 9600 BAUD
100 - 25 MHz		101 - 19200 BAUD
101 - 31 MHz		
110 - 36 MHz		
111 - AUTO		

EXAMPLE -

To read the option flags from receiver with address 1234, send the following;

02H 31H 32H 33H 34H 52H 4FH 03H

The receiver replies with;

02H 31H 32H 33H 34H 33H 30H 42H 43H 34H 32H 35H 30H 03H

F1 = 30H - CMF70 PRESENT, BANDPASS SWITCH SET TO AUTO, CBP70 NOT PRESENT, 625 LINE DE-EMP NOT PRESENT, AUDIO 2 PRESENT AND AUDIO 3 PRESENT.

F2 = BCH - USER DE-EMP 2 NOT PRESENT, USER DE-EMP 3 NOT PRESENT, CUSTOM DE-EMP 2 NOT PRESENT, REVERSE ANTENNA POLARITY SWITCH OFF, REVERSE VIDEO POLARITY SWITCH OFF, CLAMP ON, LNB POWER PRESENT, COMPOSITE DE-EMP OFF.

F3 = 42H - INTERNATIONAL OPTION PRESENT, CUSTOM DE-EMP 3 NOT PRESENT, MAX VIDEO FREQUENCY = 1450 MHz, STOCK FILTER BANDWIDTH = 36 MHz, CBP70 BANDWIDTH = 16 MHz.

F4 - 50H - TIMER DATABASE UNCHANGED, FORMAT DATABASE UNCHANGED, CHANNEL UNCHANGED, FORMAT UNCHANGED, BAUD = 19,200.

(0) WRITE OPTIONS COMMAND -

To clear the archive flags or change the BAUD rate, issue this command. The syntax is as follows;

STX ADDRESS W 0 F4 ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = ASCII ADDRESS (0000 ~ 9999)
W = ASCII W (WRITE)
0 = ASCII 0 (OPTIONS)
F4 = OPTIONS FLAGS 4
ETX = ASCII END OF TEXT (03H)

F4 - OPTION FLAGS 4 -

BIT 0 (R/W) - * TIMER DATABASE CHANGED, 1=YES 0=NO
BIT 1 (R/W) - * DATABASE CHANGED, 1=YES 0=NO
BIT 2 (R/W) - * CHANNEL CHANGED, 1 =YES 0=NO
BIT 3 (R/W) - * FORMAT CHANGED, 1=YES 0=NO
BIT 4 (R/W) - BAUD RATE LSB
BIT 5 (R/W) - BAUD RATE MID
BIT 6 (R/W) - BAUD RATE MSB
BIT 7 - RESERVED

* - SET BY HARDWARE, CLEARED ONLY BY IBM PROGRAM

The receiver replies with the following;

STX ADDRESS ACK/NAK ETX

STX = ASCII START OF TEXT (02H)

ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)

ACK/NAK = ASCII ACKNOWLEDGE / NEGATIVE ACKNOWLEDGE ETX =
ASCII END OF TEXT (03H)

EXAMPLE -

To clear the archive flags and set the BAUD rate to 19,200 send;

02H 31H 32H 33H 34H 35H 30H 03H

The receiver replies with;

02H 31H 32H 33H 34H 06H 03H

06H = ACKNOWLEDGE WITH NOT EVENT ACTIVE

(P) READ PORTS COMMAND -

To read the receiver's signal and C/N, issue this command. The syntax is as follows;

STX ADDRESS R P ETX

STX = ASCII START OF TEXT (02H)

ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999) R =
ASCII R (READ)

P = ASCII P (PORTS)

ETX = ASCII END OF TEXT (03H)

The receiver replies with;

STX ADDRESS SS CC ETX

STX = ASCII START OF TEXT (02H)

ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999) SS =
SIGNAL LEVEL IN -dBm (00H ~ FFH)

CC = C/N LEVEL IN dB (00H ~ FFH)

ETX = ASCII END OF TEXT (03H)

EXAMPLE -

To read the port information from receiver with the address 1234, send;

02H 31H 32H 33H 34H 52H 50H 03H

The receiver replies with;

02H 31H 32H 33H 34H 33H 37H 30H 37H 03H

SIGNAL = 37H > -55 dBm

C/N = 07H > 7 dB

(R) WRITE RESET COMMAND -

After writing data to the CAM830 memory, issue this command to activate the changes. The syntax is as follows;

STX ADDRESS W R RF ETX

STX = ASCII START OF TEXT (02H)

ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)

W = ASCII W (WRITE)

R = ASCII R (RESET)

RF = RESET FLAGS

ETX = ASCII END OF TEXT (03H)

RESET FLAGS –

BIT 0 - UPDATE MT830 FROM RECEIVERS DATABASE

BIT 1 - UPDATE MT830 WITH WORKING CHANNEL DATA

BIT 2 - SAVE WORKING CHANNEL DATA TO RECEIVER DATABASE

BIT 3 - RESERVED

BIT 4 - RESERVED

BIT 5 - RESERVED

BIT 6 - RESERVED

BIT 7 - RETURN RECEIVER TO FACTORY SETTINGS

The receiver replies with;

STX ADDRESS ACK/NAK ETX

STX = ASCII START OF TEXT (02H)

ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)

ACK/NAK = ASCII ACKNOWLEDGE / NEGATIVE ACKNOWLEDGE

ETX = ASCII END OF TEXT (03H)

EXAMPLE -

New data has been loaded into the working channel area. To force the receiver with address 1234 to use this new data, send;

02H 31H 32H 33H 34H 57H 52G 30H 32H 03H

32H = RESET FLAG BIT 1 Set which updates the MT830 with the current working channel data.

(S) READ STATUS COMMAND

To check the current format and channel active on a receiver, issue this command. The syntax is as follows;

STX ADDRESS R S ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)
R = ASCII R (READ)
S = ASCII S (STATUS)
ETX = ASCII END OF TEXT (03H)

The receiver replies with;

STX ADDRESS FF TF CC TC ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)
FF = CURRENT FORMAT NUMBER (01H ~ 63H)
TF = TOTAL FORMATS IN THIS RECEIVER (01H ~ 63H)
CC = * CURRENT CHANNEL POSITION (00H ~ 62H)
TC = TOTAL CHANNEL IN THIS FORMAT (00H ~ 62H)
ETX = ASCII END OF TEXT (03H)

* The channel position indicates which channel is select from the current format. Channel position 0 is the first channel, position 1 is the second channel, etc. The actual channel number must be obtained by reading the working channel area.

EXAMPLE -

To find the status of receiver with address 1234, send the following;

02H 31H 32H 33H 34H 52H 53H 03H

The receiver replies with;

02H 31H 32H 33H 34H 30H 31H 30H 38H 30H 30H 31H 37H 03H

FORMAT = 01H > FIRST FORMAT

TOTAL FORMATS = 08H > 8 FORMATS IN THIS RECEIVER

CHANNEL LOCATION = 00H > 1st CHANNEL IN THIS FORMAT

TOTAL CHANNELS = 17H > 24 CHANNEL IS THIS FORMAT

(S) WRITE STATUS COMMAND-

To change the format or channel in a receiver, issue this command. The syntax is as follows;

STX ADDRESS W S FF CC ETX

STX = ASCII START OF TEXT (02H)

ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)

W = ASCII W (WRITE)

S = ASCII S (STATUS)

FF = FORMAT NUMBER (01H ~ 62H)

CC = CHANNEL LOCATION (00H ~ 63H)

[FEH = ONE CHANNEL LOWER, FFH = ONE CHANNEL HIGHER] ETX =
ASCII END OF TEXT (03H)

The receiver replies with;

STX ADDRESS ACK/NAK ETX

STX = ASCII START OF TEXT (02H)

ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)

ACK/NAK = ASCII ACKNOWLEDGE / NEGATIVE ACKNOWLEDGE

ETX = ASCII END OF TEXT (03H)

EXAMPLE -

To select format 2 and the 2nd channel on receiver with address 1234, send;

02H 31H 32H 33H 34H 57H 53H 30H 32H 30H 31H 03H

02H = FORMAT 2

01H = THE 2nd CHANNEL IN FORMAT 2

The receiver replies with;

02H 31H 32H 33H 34H 06H 03H

06H = ACKNOWLEDGE WITH NO EVENT ACTIVE

(V) READ VERSION COMMAND -

To find the version number of the BOOT routine, the MAIN FIRMWARE and the PC BOARD REVISION, issue this command. The syntax is as follows;

STX ADDRESS R V ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)
R = ASCII R (READ)
V = ASCII V (VERSION)
ETX = ASCII END OF TEXT (02H)

The receiver replies with;

STX ADDRESS BB FF R ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)
BB = BOOT VERSION NUMBER (01H ~ FFH)
FF = FIRMWARE VERSION NUMBER (01H ~ FFH)
R = PC BOARD REVERSION LETTER (ASCII A ~ Z)
ETX = ASCII END OF TEXT (03H)

EXAMPLE -

To find the versions of a receiver with address 1234, send the following;

02H 31H 32H 33H 34H 52H 56H 03H

The receiver replies with;

02H 31H 32H 33H 34H 31H 30H 31H 30H 41H 03H

10H = BOOT VERSION 1.0
10H = FIRMWARE VERSION 1.0
41H = PC BOARD REV "A"

(v) WRITE VIDEO SCAN COMMAND -

To scan through satellite frequencies for video, issue this command. The narrowest filter is selected automatically. When scan is complete, a step number of FFH and a level of FFH is sent. Scan is aborted by receipt of any character. When scan is complete or aborted, the current database information is loaded back into the receiver. The syntax is as follows;

STX ADDRESS W v FFFFF SSS NS ETX

STX = ASCII START OF TEXT (02H)
ADDRESS = RECEIVER 4 DIGIT ADDRESS (0000 ~ 9999)
W = ASCII W (WRITE)
v = ASCII v (VIDEO SCAN)
FFFFF = STARTING FREQ (00000H ~ F423FH > 00000.0 ~ 99999.9 MHz)
SSS = STEP SIZE (000H ~ FFFH > 0.1 ~ 409.5 MHz)
NS = NUMBER OF STEPS (00H ~ FFH)
ETX = ASCII END OF TEXT (03H)

The receiver replies with;

NN LL NN LL ... NN LL ETX

NN = STEP NUMBER (00H ~ FFH)
LL = LEVEL (00H ~ FFH)
ETX = ASCII END OF TEXT (03H)

EXAMPLE -

To scan starting at 1400.0 MHz, 5 steps of 1.0 MHz, send the following;

02H 31H 32H 33H 34H 57H 76H 30H 33H 36H 42H 30H 30H
30H 41H 30H 35H 03H

036B0 = 1400.0 MHz
00A = 1.0 MHz
05 = 5 STEPS

The receiver replies with (the level is 00 from all readings);

30H 34H 30H 30H 03H 30H 33H 30H 30H 03H
30H 32H 30H 30H 03H 30H 31H 30H 30H 03H
30H 30H 30H 30H 03H FFH FFH FFH FFH 03H

CAM830 DATA MEMORY LOCATIONS

The CAM830 contains several areas in memory where data is stored. These areas control the operation of the receiver. Using the various CAM830 commands, these locations can be modified thus controlling the operation of the receiver. The major data areas in memory are defined below.

WORKING CHANNEL DATA - These 14 bytes contains the data for the Channel currently selected.

HEADER DATA - These 28 bytes contain the format name, C-band L.O.'s and Ku band L.O.'s for the format currently selected.

TIMER DATABASE - This area holds the data for all 10 timers.

FORMAT DATABASE - This is the location where the CHANNEL DATA and HEADER DATA. is located for all formats and channels currently programmed into the receiver.

TIME OF DAY CLOCK - This is the area where the current time of day and current date information are found. These locations are automatically updated every 0.01 seconds.

THE FOLLOWING PAGES DESCRIBE THE DATA CONTAINED IN EACH OF THE ABOVE DATA AREAS IN MEMORY.

WORKING CHANNEL DATA MEMORY LOCATIONS

BYTE REFERENCED TO CURRENT CHANNEL DATA ADDRESS

- 0= BAND (1 BIT), CHANNEL INDICATOR (7 BITS)
- 1 = LOW PART OF VIDEO FREQ (8 BITS)
- 2 = MIDDLE PART OF VIDEO FREQ (8 BITS)
- 3 = CMF70 (3 BITS), VID DE-EMP (1 BIT), HIGH PART OF VID FREQ (4 BITS)
- 4 = VIDEO LEVEL (8 BITS)
- 5 = AUDIO 1 LEVEL (8 BITS)
- 6 = LOW PART OF AUDIO 1 FREQ (8 BITS)
- 7 = ULC LEDS (2 BITS), AUDIO 1 BW (2 BITS), AUDIO 1 DE-EMP (2 BITS),
HIGH PART OF AUDIO 1 FREQ (2 BITS)
- 8 = AUDIO 2 LEVEL (8 BITS)
- 9 = LOW PART OF AUDIO 2 FREQ (8 BITS)
- A = VID POL (1 BIT), AUDIO 2 BW (2 BITS), AUDIO 2 DE-EMP (3 BITS),
HIGH PART OF AUDIO 2 FREQ (2 BITS)
- B = AUDIO 3 LEVEL (3 BITS)
- C = LOW PART OF AUDIO 3 FREQ (8 BITS)
- D = ANT POL (1 BIT), AUDIO 3 BW (2 BITS), AUDIO 3 DE-EMP (3 BITS), HIGH
PART OF AUDIO 3 FREQ (2 BITS)

DETAILS OF EACH LOCATION

BAND: 0 = C BAND, 1 = Ku BAND

CHANNEL INDICATOR: 0 ~ 99

VIDEO FREQUENCY: VID FREQ = XXXX.X MHz WITHOUT THE DECIMAL POINT

CMF70: 001 = 16, 010 = 18, 011 = 22, 100 = 25, 101 = 31, 110 = 36 (INT)

VIDEO DE-EMP: 0 = 525, 1 = 625

VIDEO LEVEL: 0 ~ 255

AUDIO 1 LEVEL: 0 ~ 255

AUDIO 1 FREQ: $(F \text{ (kHz)} - 5000) / 5$

ULC LEDS: 00 = U, 01 = L, 10 = C

AUDIO 1 BW: 00 = W, 01 = M, 10 = N

AUDIO 1 DE-EMP: 00 = FLAT, 01 = 50, 10 = 75, 11 = J17

AUDIO 2 LEVEL: 0 ~ 255

AUDIO 2 FREQ: $(F \text{ (kHz)} - 5000) / 5$

VIDEO POLARITY: 0 = NORMAL, 1 = REVERSE

AUDIO 2 BW: 00 = W, 01 = M, 10 = N

AUDIO 2 DE-EMP: 000 = FLAT, 001 = 50, 010 = 75, 011 = 117, 100 = 256/USER
101 = SLIDE/CUSTOM

AUDIO 3 LEVEL: 0 ~ 255

AUDIO 3 FREQ: $(F \text{ (kHz)} - 5000) / 5$

ANTENNA POLARITY: 0 = VERTICAL, 1 = HORIZONTAL

AUDIO 3 BW: 00 = W, 01 = M, 10 = N

AUDIO 3 DE-EMP: 000 = FLAT, 001 = 50, 010 = 75, 011 = 117, 100 = 256/USER
101 = SLIDE/CUSTOM

HEADER DATA MEMORY LOCATIONS

THE FIRST BYTE OF THE HEADER IS LOCATED 28 BYTES BEFORE THE WORKING CHANNEL DATA LOCATION.

- * FORMAT NAME (16 ASCII CHARACTERS)
- ** C BAND L.O. VERTICAL
- ** C BAND L.O. HORIZONTAL
- ** KU BAND L.O. VERTICAL
- ** KU BAND L.O. HORIZONTAL

* ONLY THE FIRST 8 CHARACTERS ARE USED, FILL THE OTHERS WITH 20H

** 00000 ~ F423F (0.0 ~ 99999.9 MHz WITHOUT DECIMAL POINT)

TIME OF DAY CLOCK MEMORY LOCATIONS

ADDRESS	FUNCTION
400H	0.1SEC / 00.1SEC (BCD)
401H	10 SEC / 1 SEC (BCD)
402H	10 MIN / 1 MIN (BCD)
403H	DON'T CARE
404H	10 HOUR / 1 HOUR (BCD)
405H	DON'T CARE
406H	DAY OF WEEK (1~7)
407H	DON'T CARE
408H	10 DAY / 1 DAY (BCD)
409H	10 MONTH / 1 MONTH (BCD)
40AH	10 YEAR / 1 YEAR (BCD)

TIMER DATABASE MEMORY LOCATIONS

0= TIMER NUMBER (0 ~ 9) - LAST SELECTED TIMER ON CAM830 - OR -
- NUMBER OF TIMER IN PREWARNING - OR -
- NUMBER OF TIMER WHICH LAST TRIPPED

1 = TIMER PRE WARNING TIME (0 ~ 99 MIN)

2 ~ 10 = TIMER 0 DATA

2 = TIMER 0 DAYS - 0=0>DA TE 1>DAYS, 1 =SUN, 2=MON, 3=TUE
4=WED, 5=THR, 6=FRI, 7=SAT

3. = TIMER 0 MINUTES (BCD)

4 = TIMER 0 HOURS (BCD)

5 = TIMER 0 MONTH (BCD)

6 = TIMER 0 DA Y (BCD)

7 = TIMER 0 FORMAT NUMBER (0 OR 1 ~ 99)

8 = TIMER 0 CHANNEL LOCATION (0 ~ 99)

9 = TIMER 0 RELAY - BIT 0 > 0=OFF 1=ON

10 = TIMER 0 TRIP COUNTER (0 ~ 99) - BIT 7 SET IF THIS TIMER IS ON

11 ~ 19 = TIMER 1 DATA

20 ~ 28 = TIMER 2 DATA

29 ~ 37 = TIMER 3 DATA

38 ~ 46 = TIMER 4 DATA

47 ~ 55 = TIMER 5 DATA

56 ~ 64 = TIMER 6 DATA

65 ~ 73 = TIMER 7 DATA

74 ~ 82 = TIMER 8 DATA

83 ~ 91 = TIMER 9 DATA

CAM830 DEFAULT SETTINGS

FUNCTION	POWER UP	SIMPLE RESET	FULL RESET
INTERNAL RELAY	----	OFF	OFF
PRV MODE	EXIT W/O SAVE	EXIT W/O SAVE	EXIT W/O SAVE
PRG MODE	EXIT W/O SAVE	EXIT W/O SAVE	EXIT W/O SAVE
TAKE MODE	EXIT W/O SAVE	EXIT W/O SAVE	EXIT W/OSAVE
PRV KEY	----	ENABLED	ENABLED
PRG KEY	----	ENABLED	ENABLED
CHANNEL SELECTION	----	ENABLED	ENABLED
ANT POL SWITCH	----	ENABLED	ENABLED
VIDEO POL SWITCH	----	ENABLED	ENABLED
REMOTE LED	----	OFF	OFF
INTERNAL ALARM	----	OFF	OFF
EXTERNAL ALARM	----	OFF	OFF
TIMER PRE- WARNING	----	OFF	OFF
ALARM RELAY DELAY	----	OFF	OFF
RELAY TIME-OUT	----	OFF	OFF
MODE SCREEN	----	1ST	1ST
VIDEO LEVEL OFFSET	----	----	0
AUDIO 1 LEVEL OFFSET	----	----	0
AUDIO 2 LEVEL OFFSET	----	----	0
AUDIO 3 LEVEL OFFSET	----	----	0
CLAMP METHOD	----	----	SYNC TIP
TTL	----	----	DISABLED
EXT INPUT	----	----	NORMALLY OPEN
INT RELAY FUNCTION	----	----	TIMER
ACTIVE FORMAT	----	----	1ST
MAX VIDEO FREQ	----	----	1450 MHz
CLOCK TIME	----	----	1230 HOURS
DATE	----	----	6/15/1994
DAY OF WEEK	----	----	TUESDAY
SELECTED TIMER	----	----	1ST
TIMERS CONDITION	----	----	OFF
TIMERS MODE	----	----	DATE
TIMERS TIME	----	----	00/00/00
TIMERS DATE	----	----	00/00
TIMERS DAY	----	----	NONE SELECTED
TIMERS FORMAT	----	----	1ST
TIMERS CHANNEL	----	----	1ST
TIMERS RELAY ALARM	----	----	OFF
SIGNAL LEVEL ALARM	----	----	-62 dB
C/N LEVEL	----	----	1 dB
C/N CALIBRATION	----	----	+0 dB

CAM830 DEFAULT SETTINGS (continued)

FUNCTION	POWER UP	SIMPLE RESET	FULL RESET
SIG CALIBRATION	---	---	+0 dB
RECEIVER ADDRESS	---	---	0000
BAUD RATE	---	---	2400 BAUD
STOCK FILTER	---	---	36 MHz
CBP70 FILTER	---	---	22 MHz
PRV FORMAT	---	---	1ST
PRV CHANNEL	---	---	1ST
TIMER DB ARCHIVE	---	---	SET
FORMAT DB ARCHIVE	---	---	SET
CH CHANGE ARCHIVE	---	---	SET
FMT CHANGE ARCHIVE	---	---	SET
FORMAT NAME	DB	DB	DB
C BAND VERT L.O.	DB	DB	DB
C BAND HORZ L.O.	DB	DB	DB
Ku BAND VERT L.O.	DB	DB	DB
Ku BAND HORZ L.O.	DB	DB	DB
VIDEO FREQ	DB	DB	DB
CMF70 BDWTH	DB	DB	DB
CHANNEL	DB	DB	DB
U/L/C LED	DB	DB	DB
VIDEO DE-EMP	DB	DB	DB
VID POLARITY	DB	DB	DB
VID LEVEL	DB	DB	DB
ANT POLARITY	DB	DB	DB
BAND	DB	DB	DB
AUD 1 BDWTH	DB	DB	DB
AUD 1 FREQ	DB	DB	DB
AUD 1 LEVEL	DB	DB	DB
AUD 1 DE-EMP	DB	DB	DB
AUD 2 BDWTH	DB	DB	DB
AUD2FREQ	DB	DB	DB
AUD2LEVEL	DB	DB	DB
AUD 2 DE-EMP	DB	DB	DB
AUD3 BDWTH	DB	DB	DB
AUD3FREQ	DB	DB	DB
AUD 3 LEVEL	DB	DB	DB
AUD 3 DE-EMP	DB	DB	DB

DB = DATA FROM DATABASE --- = LAST VALUE IS RETAINED

SIMPLE RESET: HOLD LEFT/RIGHT KEYS AND TURN PWR ON. RELEASE KEYS **FULL RESET:** HOLD PRV/PRG/TAKE KEYS AND TURN PWR ON. RELEASE KEYS **FACTORY DEFAULT:** IS FULL RESET.

PROGRAMMING EXAMPLES

READING THE CURRENT WORKING CHANNEL DATA -

The first step in reading the current working channel data is to determine the location of the working channel data in the CAM830 memory. To do this, issue the Read Locations command for receiver with address 1234 as follows;

```
STX "1234" "R" "L" ETX
```

The actual HEX data sent to the receiver is as follows;

```
02H 31H 32H 33H 34H 52H 4CH 03H
```

The receiver will reply with the location information as follows;

```
STX "1234" 0123H 0789H 5678H 8765H 92H 03H
```

The actual HEX data received by the computer would be;

```
02H 31H 32H 33H 34H 30H 31H 32H 33H 30H 37H 38H 39H 35H 36H  
37H 38H 38H 37H 36H 35H 39H 32H 03H
```

The breakdown of this data is as follows;

```
0123H = WORKING CHANNEL  
DATA 0789H = TIMER DATABASE  
5678H = FORMAT DATABASE  
8765H = FIRST FREE ADDRESS AFTER FORMAT DATABASE  
92H = CHECKSUM
```

Now that we know the working channel data is at address 0123H, we can issue the Read Memory command to get the 14 bytes of working channel data. The data sent to the receiver with address 1234 is as follows;

```
STX "1234" "R" "L" 0EH 0123H ETX
```

The actual HEX data sent to the receiver is;

```
02H 31H 32H 33H 34H 52H 4CH 30H 45H 30H 31H 32H 33H 03H
```

The receiver replies with the following;

```
STX "1234" 0EH 0123H 00H 01H 50H 91H C0H 80H 64H 68H  
89H 64H 68H 09H 64H 68H 09H DFH 03H
```

The actual HEX data received by the computer would be;

03H 3IH 32H 33H 34H 30H 45H 30H 3IH 32H 33H 30H 30H 30H 3IH 35H 30H 39H 3IH
43H 30H 38H 30H 36H 34H 36H 38H 38H 39H 36H 34H 36H 38H 30H 39H 36H 34H 36H
38H 30H 39H 44H 46H 03H

The above data represents the following working channel data;

01H - C BAND, CHANNEL I

50H - VIDEO FREQUENCY = 3720.0 MHz

9IH

C0H - CMF70 = 36 MHz, VID DE-EMP = 525 LINES

80H - VIDEO LEVEL = 64%

64H - AUDIO I LEVEL = 50%

68H - AUDIO I FREQUENCY = 6.8 MHz

89H - CH ID = CENTER, AUDIO I BW = WIDE, AUDIO I DE-EMP = 75 uSEC

64H - AUDIO 2 LEVEL = 50%

68H - AUDIO 2 FREQUENCY = 6.8 MHz

09H - VID POL = NORMAL, AUDIO 2 BW = WIDE, AUDIO 2 DE-EMP = 75 uSEC

64H - AUDIO 3 LEVEL = 50%

68H - AUDIO 3 FREQUENCY = 6.8 MHz

09H - ANT POL = VERTICAL, AUDIO 3 BW = WIDE, AUDIO 3 DE-EMP = 75 uSEC

CHANGING THE WORKING CHANNEL DATA-

The first step in writing to the current working channel data is to determine the location of the working channel data in the CAM830 memory. To do this, issue the Read Locations command for receiver with address 1234 as follows;

```
STX "1234" "R" "L" ETX
```

The actual HEX data sent to the receiver is as follows;

```
02H 31H 32H 33H 34H 52H 4CH 03H
```

The receiver will reply with the location information as follows;

```
STX "1234" 0123H 0789H 5678H 8765H 92H 03H
```

The actual HEX data received by the computer would be;

```
02H 31H 32H 33H 34H 30H 31H 32H 33H 30H 37H 38H 39H 35H 36H  
37H 38H 38H 37H 36H 35H 39H 32H 03H
```

The breakdown of this data is as follows;

```
0123H = WORKING CHANNEL  
DATA 0789H = TIMER DATABASE  
5678H = FORMAT DATABASE  
8765H = FIRST FREE ADDRESS AFTER FORMAT DATABASE  
92H = CHECKSUM
```

Now that we know the working channel data is at address 0123H, we can issue the Write Memory command and send the 14 bytes of working channel data. If only one item changes, only the locations affected need to be modified. If all items change, all 14 bytes must be sent.

To increase the video level to 75%, send the new level ($96H = 75\% * 2$) to the working channel memory ($0123H + 4 = 0127H$). The following data would be sent to receiver with address 1234;

```
STX "1234" "W" "M" 01H 0123H 00H 96H 45H 03H
```

The actual HEX data sent to the receiver is;

```
03H 31H 32H 33H 34H 57H 4DH 30H 31H 30H 31H 32H 33H  
30H 30H 39H 36H 34H 35H 03H
```

The receiver would reply with the following;

```
STX "1234" ACK ETX
```

The actual HEX data received by the computer would be;

02H 31H 32H 33H 34H 06H 03H

06H = ACKNOWLEDGE WITH NO EVENT ACTIVE.

Please note that if the CHANNEL INDICATOR is changed, the actual channel being received by the receiver will not change, only the channel LED display. To change the channel, the video frequency and other affected parameters must be sent to the receiver.

Once the working channel data has been modified, the receiver must be told to act on the new data. To do this, issue the reset command to receiver with address 1234 as follows;

STX "1234" "W" "R" 02H 03H

The actual HEX data sent to the receiver would be;

02H 31H 32H 33H 34H 57H 52H 30H 32H 03H

The receiver replies with the following;

STX "1234" ACK ETX

The actual HEX data sent to the computer is;

02H 31H 32H 33H 34H 06H 03H

06H = ACKNOWLEDGE WITH NO EVENT ACTIVE

CHANGING FORMAT AND CHANNEL USING THE RECEIVER'S DATABASE-

Using the Write Status command, the format and channel can be changed. A new channel location within the current selected format data base can be selected or the next higher/lower channel can be selected. To select the first format and the 2nd channel location in that format, send the following to receiver with address 1234;

STX "1234" "W" "S" "01" "01" ETX

The actual data sent to the receiver is as follows;

02H 31H 32H 33H 34H 57H 53H 30H 31H 30H 31H 03H

The receiver replies with the following;

STX "1234" ACK ETX

The actual HEX data received by the computer is;

02H 31H 32H 33H 34H 06H 03H

06H = ACKNOWLEDGE WITH NO EVENT ACTIVE

SETTING THE CLOCK -

To set the clock to 12:00 on Sunday January 1, 1994, the following data must be sent to the clock memory.

400H = 00H DECIMAL SECONDS = .00
401H = 00H SECONDS = 00
402H = 00H MINUTES = 00
404H = 12H HOURS = 12
406H = 01H DAY OF WEEK = SUNDAY
408H = 01H DAY=01
409H = 01H MONTH = 01
40AH = 94H YEAR = 1994

Locations 403H, 405H and 407H aren't used and should be programmed with 00H.

Send the following using the Write Memory command to receiver with address 1234;

```
STX "1234" "W" "M" 0BH 0400H 00H 00H 00H 00H 00H 12H 00H 01H 00H
01H 01H 94H ETX
```

The actual HEX data sent to the receiver would be as follows;

```
02H 31H 32H 33H 34H 57H 4DH 30H 42H 30H 34H 30H
30H 30H 30H 30H 30H 30H 30H 30H 30H 30H 30H 30H
30H 31H 32H 30H 30H 30H 31H 30H 30H 30H 31H 30H
31H 39H 34H 03H
```

The receiver replies with;

```
STX "1234" ACK ETX
```

The actual HEX data received by the computer would be as follows;

```
02H 31H 32H 33H 34H 06H 03H
```

The clock is now set to the new data and the CAM830 display will immediately update to indicate the change.

READING THE CURRENT CLOCK DATA-

To read the current clock data, read the clock locations using the Read Memory command from receiver with the address 1234, send the following;

```
STX "1234" "R" "M" 0BH 0400H ET
```

The actual HEX data sent to the receiver is;

02H 31H 32H 33H 34H 52H 4DH 30H 42H 30H 34H 30H 30H 03H

The receiver replies with;

STX "1234" 0B 040000H 00H 00H 00H 00H 12H 00H 01H 00H 01H 01H 94H ETX

The actual HEX data received by the computer would be as follows;

02H 31H 32H 33H 34H 30H 42H 30H 34H 30H 30H 30H 30H 30H 30H 30H 30H
30H 30H 30H 30H 30H 30H 31H 32H 30H 30H 30H 31H 30H 30H 30H 31H 30H
31H 39H 34H 03H

The data would break down into the same time/date information as programmed above.

END OF DOCUMENT