Standard Communications
SATELLITE & BROADBAND
PRODUCTS DIVISION

MT930B

Programming the MT930B
Control Access Module
for the MT930B
Domestic & International
Satellite Receiver

SATELLITE BROADBAND

MT930B PROGRAMMER'S GUIDE

MT930B

PROGRAMMER'S GUIDE

This manual is intended for experienced application developers. The manual contains the information needed to understand the MT930B protocol. This protocol allows a control program running on a personal computer to manage multiple MT930B receivers. Changes that occur after the date of printing will be incorporated in supplemental bulletins or later editions of this manual.

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CHAPTER 1

INTRODUCTION

This chapter describes the communications protocol between a *control program* running on a personal computer and an MT930B receiver. The receiver firmware is designed to respond to the commands summarized in Table 1-1. All communications between the control program and receiver(s) occurs through one of the personal computer's serial communications ports. The control program transmits a *command stream* to the receiver, and the receiver returns a *response stream*.

BACKWARD COMPATIBILITY

The MT930 replaces the MT830 and MT830I series receivers with updated circuitry and features in a smaller package. Additional functions that previously had to be manually set are now included under microprocessor control and are now accessible to remote network control.

The MT930 is effectively "bilingual." A design requirement of the MT930B was to emulate the MT830 so that the MT930B could drop into existing networks and respond as the MT830 would. Any features not remotely configured in the MT830 would be unchanged in a MT930B by MT830 commands, but parameters such as format and transponder changes and clock settings that are controlled by MT830 commands could be similarly read and written in the MT930B. A copy of the MT830 Programmer's Guide is available from Standard Communications if needed.

A new protocol has been written for the MT930B to include the added features. That protocol is outlined in this document. All new programming efforts should utilize this protocol.

The MT930B automatically operates in MT830 protocol mode or in MT930B protocol mode. The MT830 architecture called for reads and writes directly to and from memory locations. When the MT930B receives a command to read or write directly to memory, it emulates the MT830 but controls its own memory. When the MT930B receives a command mnemonic as listed in this Guide, directing the receiver to perform the specified task, it operates in MT930B protocol mode.

DATA COMMUNICATIONS SETTINGS

Data communications use the following settings:

- 1 start bit
- 8 data bits
- No parity
- 1 stop bit

The receiver supports communications from 300 baud up to 38,400 baud. Normally, you set the baud rate to the highest rate that the personal computer and receiver can mutually support. Note that the receiver's baud rate and the personal computer's serial port baud rate must match.

RS-232C

Table 1-1. RS-232C Connector Pin Assignments

Pin Connector	Description
1	NC
2	Receive data
3	Transmit data
4	NC
5	Ground
6	NC
7	Request to send
8	Clear to send
9	NC

NC = No connection.

RS-485

Table 1-2. RS-485 Connector Pin Assignments

Pin Connector	Description
1	NC
2	NC
3	NC
4	IN (+); Noninverting Receiver Input
5	GND; Common Ground
6	OUT (+); Noninverting driver output
7	OUT (–); Inverting driver output
8	IN (–); Inverting Receiver Input
9	NC

Note: Some units with serial number less than 98U010400 have been wired with pins 4 and 8 reversed. Units with serial number 98U010400 or less have been inspected and/or corrected, and are marked with a small paper dot label (about 4 mm in diameter).

CHAPTER 2

REMOTE CONTROL PROTOCOL

COMMANDS AND RESPONSES

Command Streams

The receiver has the ability to read and respond to a single or batch of commands. This way, the user can selectively request a single or batch of parameters in just one computer/receiver transaction. Some command mnemonics may be batch commands by definition.

Table 2-1. MT930B Remote Command Streams

STX	ADDRESS	COMMAND	PARAMETER	; (semicolon)	ETX
1byte hex = 02H	4-character decimal: 0000 to 9999*	Up to three ASCII Characters	Command dependent may or may not be available.	Separator between commands. Not used if single command is sent.	1byte hex = 03H

*9999 is reserved as a default address in the BOOT routine

Note that the command mnemonic is case-sensitive, and all parameters must be represented in uppercase. Also, there can be only a maximum of 64 characters between the ADDRESS and the ETX symbol. Nor can the Video Scan command be combined with any other command.

ASCII – Each byte represents one ASCII character
ASCII HEX – Two ASCII characters represent one HEX byte
ASCII BCD – Same as ASCII HEX except each character must only be 0 to 9

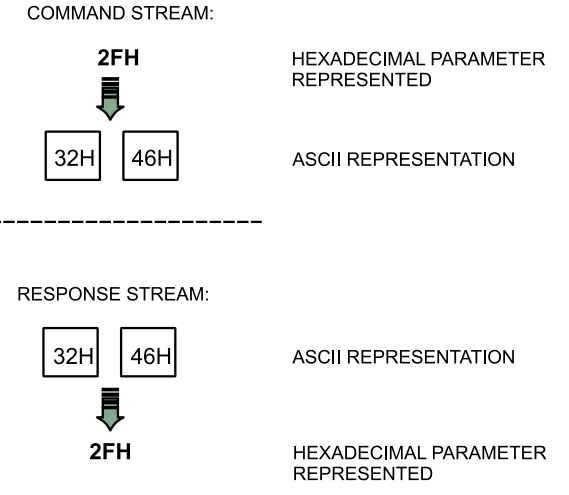

Figure 2-1. Data Representation

The command mnemonic is an up-to-three-character ASCII code that begins with the letter “R” for read or “W” for write. Read commands return information about the receiver such as flag settings and memory contents. In contrast, write commands include parameters that make changes to the receiver but do not return data. Instead, write commands return an acknowledgement or negative acknowledgment code, indicating whether the command was successful or not.

Table 2-2. Command Overview

Command Name	Command Mnemonic	Description
Read Alarms	RA(n)	Read the alarm parameters
Read Clock	RC	Read clock and Calendar data
Read Errors from Boot Routine	Re	Queries boot routine error log.
Read Keys	RKA	Read pushbutton LEDs if they are enabled or disabled.
Read Format Name	RN	Read format name
Read Ports	RP(n)	Read all A/D ports.
Read Local Control and Current PIN Number	Rp	Read current receiver control status and PIN number.
Read Relay	Rr	Read current relay status
Read Timer Data	RT(n)	Read internal timer database
Read Version	RVA	Read receiver boot, firmware, control and analog FPGA versions, data segment version, and active memory bank.
Read Transponder	RX(n)	Read current transponder data
Read Model/Serial Number	RZ	Read Model and Serial numbers
Write Alarms	WA(n)	Set the alarm parameters
Write Clock and Calendar	WC	Set clock and Calendar
Write Format Name	WN	Write new format name
Write Local Control and New PIN Number	Wp	Enable/Disable receiver local control and new PIN number.
Write Reset	WR	Activate changes written to the receiver memory.
Write Relay Status	Wr	Write relay status
Write Timer Data	WT(n)	Store timer data
Write Video Scan	Wv	Scan video frequencies reporting signal level for each frequency.
Write Status	WX(n)	Write receiver status

Commands begin with STX and end with ETX. The receiver address and command mnemonic immediately follow STX. Depending on the command, data parameters follow the command mnemonic.

STX RECEIVER ADDRESS COMMAND PARAMETERS ETX

Data Representation

In this manual, we represent command stream examples in the following format. Note that spaces are included for readability only. Actual command streams do not contain spaces. In this example, the command asks receiver 0001 to return the active format name.

STX 0001 RN ETX

Internally, the control program would generate the following hexadecimal bytes for this RN command:

02H 30H 30H 30H 31H 52H 4EH 03H

Let's examine the content of this command stream in detail:

STX = The STX control code is the one-byte hexadecimal value 02H. This control character is always the first character in a command stream.

0001 = This is the receiver address. Receiver addresses are decimal values in the range 0000 to 9999. Command streams represent these decimal digits in ASCII. That is, the ASCII characters 30H 30H 30H 31H represent address "0001". To represent address "0010," you would use the value "0010," not the ASCII representation of the hexadecimal digits "000A." Note that the address used in command streams must match the receiver's address. The address is always expressed in four digits with leading zeros.

RN = The command mnemonic. The first character is either 'R' or 'W'. The second character in any valid MT930B command letter. Command N requests the active format name.

ETX = The ETX control code is the one-byte hexadecimal value 03H. This control character is always the last character in a command stream.

Response Streams

The response stream is the data stream that a receiver returns to the requester. It is important to understand that receivers do not send messages unilaterally. Receivers must be explicitly requested to send information. Note that the control program must send a complete command before sending another command or a batch of commands. A receiver cannot respond to a command until it receives the ETX control code.

Response streams begin with the STX character and end with the ETX character. The receiver address immediately follows the STX character. Read commands return data, but write commands simply return an ACK or a NAK control code.

STX RECEIVER ADDRESS PARAMETERS ETX

For example, the following is the response stream for the RN command example in “Command Streams”:

STX 0001 ABCDEFGHIJKLMNOP ETX

In this example, the response stream returns the sixteen bytes that the RN command requested. In hexadecimal, this response stream would look like this:

02H
30H 30H 30H 31H
41H 42H 43H 44H 45H 46H 47H 48H 49H 4AH 4BH 4CH 4DH 4EH 4FH 50H
03H

Let’s examine the content of this response stream in detail:

STX = The STX control code is the one-byte hexadecimal value 02H. This control character is always the first character in a response stream.

0001 = This is the receiver address expressed as the ASCII representation of the decimal digits “0001.” The receiver address immediately follows STX.

ABCDEFGHIJKLMNOP = This is the current format name.

ETX = The ETX control code is the one-byte hexadecimal value 03H. This control code is always the last character in a response stream.

Acknowledge/Negative Acknowledge

Write commands return a response stream indicating whether the command was successful. However, all commands can return a negative acknowledgment. A negative acknowledgment is an error flag that the command was faulty. For example, the command contained syntax errors or other faults discussed in "Common Errors" in this chapter. Note that a negative acknowledgment does not contain an error code. It is the responsibility of the control program to diagnose the probable cause of the error.

Notation	Description
ACK	Acknowledge. The command was successful.
NAK	Negative Acknowledge. The command was not successful.

The ACK and NAK control codes indicate whether an event has occurred relative to the receiver.

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 prewarning
3. AUX, C/N or Signal alarm has tripped

Receiver Fails to Respond

Typically, a receiver responds to its commands within milliseconds. A receiver may fail to respond to commands if the receiver is offline, the communications link is disrupted or disconnected, commands address nonexistent receivers, the control program failed to send the STX control code, or the receiver failed to receive the ETX control code. It is important to understand that the receiver cannot respond to a command until it receives the ETX control code.

For example, suppose that three receivers are connected to a personal computer. The receiver addresses are 0200, 0400, and 0600. Under these circumstances, your control program will not receive a response to the following command, since a receiver with that address does not exist.

STX 0001 RS ETX

Polling

The programmer should create a custom command to get just the data needed, using multiple commands on one command line.

Common Errors

A negative acknowledgment may be returned for one of the following reasons:

1. The command is not available in the MT930B firmware. For example, the command name is expressed in lowercase characters instead of uppercase and/or uppercase/lowercase.
2. The character “R” or “W” did not immediately follow the receiver address.
3. The character “R” was used in the command mnemonic for a write-only command.
4. The character “W” was used in the command mnemonic in a read-only command.
5. The WR command contained an invalid reset bit.
6. The WS command referenced format 0. Note that format 0 is an invalid format number, since formats are numbered 1 to 99.
7. The WS command referenced a format number greater than the highest numbered format in the receiver database.

CHAPTER 3

COMMANDS AND RESPONSES

READ COMMANDS

Read command mnemonics with the letter R return information about the receiver settings and memory contents. A read command to the receiver does not invoke a local control lockout to the unit.

READ ALARMS – RA(n)

This command is used to read the alarm flags. When sending the following commands, the receiver responds as follows:

Table 3-1. RA(n) Command

Command	Response
RA*	Sends all data (A to H).
RAA	Sends receiver address and data A only.
RAB	Sends receiver address and data B only.
RAC	Sends receiver address and data C only.
RAD	Sends receiver address and data D only.
RAE	Sends receiver address and data E only.
RAF	Sends receiver address and data F only.
RAG	Sends receiver address and data G only.
RAH	Sends receiver address and data H only.

When sending the RA(n) command, the response string is shorter, allowing for a shorter communication time.

Table 3-2. Read Alarm Response Data String

Data	Description	Unit	Data Variable
*	Read all Alarm responses.	—	18 bytes total. See examples below.
A	C/N alarm setting.	dBc	2 byte ASCII HEX (06H – 19H, 05H = OFF)
B	Signal alarm setting.	dBm	2 byte ASCII HEX (14H – 3CH, 3DH = OFF)
C	Relay 1 hold setting.	sec	2 byte ASCII HEX (00H – FFH)
D	Relay 2 hold setting.	sec	2 byte ASCII HEX (00H – FFH)
E	Relay 1 alarm delay setting.	sec	2 byte ASCII HEX (00H – 19H)
F	Relay 2 alarm delay setting.	sec	2 byte ASCII HEX (00H – 19H)
G	Alarm Set up.	--	4 bytes ASCII HEX (0000H – FFFFH). Refer to Table 3-3.
H	Alarm flags.	--	2 byte ASCII HEX (00H – FFH). Refer to Table 3-8.

Table 3-3. Alarm Set Up

Bit	Description
1st BYTE	
0	Signal alarm ON (user sets trip level) = 1; OFF = 0
1	C/N alarm ON (user sets trip level) = 1; OFF = 0
2	Video alarm condition. Refer to Table 3-4.
3	Video alarm condition. Refer to Table 3-4.
4	AFC alarm ON = 1; OFF = 0
5	LNB alarm ON = 1; OFF = 0
6	AUX alarm ON = 1, OFF = 0. Refer to Table 3-5.
7	AUX alarm condition. Refer to Table 3-5.
2nd BYTE	
0	Relay 1 function. Refer to Table 3-6.
1	Relay 1 function. Refer to Table 3-6.
2	Relay 2 function. Refer to Table 3-7.
3	Relay 2 function. Refer to Table 3-7.
4	*Reserved*
5	Reserved
6	Reserved
7	Reserved

Table 3-4. Video Alarm Conditions

Bit 3	Bit 2	Description
0	0	Video alarm OFF (masked)
0	1	No Video detected.
1	0	Video ≠ 525
1	1	Video ≠ 625

Table 3-5. AUX Alarm Conditions

Bit 7	Bit 6	Description
0	0	AUX alarm OFF (masked)
1	0	AUX alarm ON HI = 5V
0	1	AUX alarm ON LO = 0V

Table 3-6. Relay 1 Function

Bit 1	Bit 0	Description
0	0	Relay 1 OFF
1	0	Timer
0	1	Alarm
1	1	Timer and Alarm

Table 3-7. Relay 2 Function

Bit 3	Bit 2	Description
0	0	Relay 2 OFF
1	0	Timer
0	1	Alarm
1	1	Timer and Alarm

Table 3-8. Alarm Flags

Bit	Description
0	Signal alarm active. Signal level below set limit = 1; OK = 0
1	C/N alarm active. C/N level below set limit = 1; OK = 0
2	Video alarm active = 1; OK = 0
3	AFC out of range = 1; OK = 0
4	LNB voltage out of range = 1; OK = 0
5	Relay 1 de-energized = 1; energized = 0
6	Relay 2 de-energized = 1; energized = 0
7	Reserved

Examples:

RA* - READ ALL ALARM PARAMETERS

Send: STX ADDR RA* ETX
Receive: STX ADDR 0A 2D 3C 3C 00 00 03 00 60 ETX

The data is the same as RAA through RAH below

RAA – READ ALARMS, C/N SETTING

Send: STX ADDR RAA ETX
Receive: STX ADDR 0A ETX
C/N alarm setting is set to 10 dBc (0A HEX = 10)

RAB – READ ALARMS, SIGNAL SETTING

Send: STX ADDR RAB ETX
Receive: STX ADDR 2D ETX
Signal alarm setting is set to -45 dBm (2D HEX = 45)

RAC – READ ALARMS, RELAY 1 HOLD TIME

Send: STX ADDR RAC ETX
Receive: STX ADDR 3C ETX
Relay 1 hold time is set to 60 Sec (3C HEX = 60)

RAD – READ ALARMS, RELAY 2 HOLD TIME

Send: STX ADDR RAD ETX
Receive: STX ADDR 3C ETX
Relay 2 hold time is set to 60 Sec (3C HEX = 60)

RAE – READ ALARMS, RELAY 1 DELAY SETTING

Send: STX ADDR RAE ETX
Receive: STX ADDR 00 ETX
Relay 1 alarm delay time is set to 0 Sec (00 HEX = 0)

RAF – READ ALARMS, RELAY 2 DELAY SETTING

Send: STX ADDR RAF ETX
Receive: STX ADDR 00 ETX
Relay 2 alarm delay time is set to 0 Sec (00 HEX = 0)

RAG – READ ALARMS, ALARM SETUP

Send: STX ADDR RAG ETX
Receive: STX ADDR 03 00 ETX

1st Byte

BIT	VALUE	FUNCTION
0	1	Signal alarm is ON
1	1	C/N alarm is ON
2	0 }	Video alarm OFF
3	0 }	
4	0	AFC alarm OFF
5	0	LNB alarm OFF
6	0 }	AUX alarm OFF
7	0 }	

2nd Byte

BIT	VALUE	FUNCTION
0	0 }	Relay 1 OFF
1	0 }	
2	0 }	Relay 2 OFF
3	0 }	
4	0	Reserved
5	0	Reserved
6	0	Reserved
7	0	Reserved

RAH – READ ALARMS, ALARM FLAGS

Send: STX ADDR RAH ETX
Receive: STX ADDR 60 ETX

BIT	VALUE	FUNCTION
0	0	Signal alarm NOT ACTIVE
1	0	C/N alarm NOT ACTIVE
2	0	Video alarm NOT ACTIVE
3	0	AFC alarm NOT ACTIVE
4	0	LNB alarm NOT ACTIVE
5	1	Relay 1 de-energized
6	1	Relay 2 de-energized
7	0	Reserved

READ CLOCK – RC

The RC command is used to read the clock and calendar data.

Table 3-9. Read Clock/Calendar Data Response String

STX	Address	DATA A	DATA B	DATA C	DATA D	DATA E	DATA F	DATA G	DATA H	ETX

Data	Description	Unit	Data Variable
A	*Hours*	–	ASCII BCD. (00 to 23)
B	Minutes	–	ASCII BCD. (00 to 59)
C	Seconds	–	ASCII BCD. (00 to 59)
D	Month	–	ASCII BCD. (01 to 12)
E	Day	–	ASCII BCD. (01 to 31)
F	Year	–	ASCII BCD. (00 to 99)
G	Day of week.	–	ASCII BCD. (01 to 07) 01 = Sunday; 02 = Monday; 03 = Tuesday; 04 = Wednesday; 05 = Thursday, 06 = Friday; 07 = Saturday.

Example:

RC – READ CLOCK

Send: STX ADDR RC ETX

Receive: STX ADDR 12 00 00 01 01 00 07 ETX

1st byte = 12 hours
2nd byte = 00 minutes
3rd byte = 00 seconds
4th byte = 01 month
5th byte = 01 day
6th byte = 00 year (2000)
7th byte = 07 day of week (Saturday)

READ ERRORS FROM BOOT ROUTINE – Re

This command is used to query the error log of the boot routine. The receiver returns 1 byte of data in ASCII HEX.

Table 3-10. Read Errors from Boot Routine

Bit	Description
0	1 = FPGA data in bank 0 FAILED. 0 = FPGA data in bank 0 OK.
1	1 = FPGA data in bank 1 FAILED. 0 = FPGA data in bank 1 OK.
2	1 = RAM memory BAD. 0 = RAM memory OK.
3	1 = EEPROM memory BAD. 0 = EEPROM memory OK.
4	1 = Firmware in memory bank 0 BAD. 0 = Firmware in memory bank 0 OK.
5	1 = Firmware in memory bank 1 BAD. 0 = Firmware in memory bank 2 OK.
6	1 = Flag, User requested to stay in BOOT routine.
7	Reserved

Example:

Re – READ BOOT ERRORS

Send: STX ADDR Re ETX
Receive: STX ADDR 00 ETX

BIT	VALUE	FUNCTION
0	0	FPGA data in bank 0 GOOD
1	0	FPGA data in bank 1 GOOD
2	0	RAM memory GOOD
3	0	EEPROM memory GOOD
4	0	Firmware in bank 0 GOOD
5	0	Firmware in bank 1 GOOD
6	0	User did not request to stay in Boot routine
7	0	Reserved

READ KEYS – RKA

The RKA command is used to read key or mechanical switch flags and pushbutton LEDs if they are enabled or disabled. This command returns a 2-byte parameter value, 00H to FFH.

Table 3-11. RKA Response

Bit	Description
0	Edit LED is ON = 1; OFF = 0
1	Save LED is ON = 1; OFF = 0
2	Left LED is ON = 1; OFF = 0
3	Right LED is ON = 1; OFF = 0
4	AFC Switch ON = 1; OFF = 0
5	AGC Switch ON = 1; OFF = 0
6	Meter switch condition. Refer to Table 3-12.
7	Meter switch condition. Refer to Table 3-12.

Table 3-12. Meter Switch Conditions

Bit 7	Bit 6	Description
1	0	Signal position.
0	1	C/N position.
1	1	Tune position.

Example:

RKA – READ KEYS

Send: STX ADDR RKA ETX
Receive: STX ADDR F0 ETX

BIT	VALUE	FUNCTION
0	0	Edit LED OFF
1	0	Save LED OFF
2	0	Left LED OFF
3	0	Right LED OFF
4	1	AFC switch ON
5	1	AGC switch ON
6	1	Meter switch set to TUNE
7	1	

READ FORMAT NAME – RN

This command reads the format name in the active channel. The receiver returns the format name as 16 ASCII characters.

Example:

Send: STX ADDR RN ETX
Receive: STX ADDR C-BAND ETX

Current format is CxBANDxxxxxxxxxx (16 character format name)

READ PORTS – RP(n)

This command is used to read all A/D ports and counters. Use this command to determine the receiver's signal level and C/N level. Refer to Table 3-13 for details.

Table 3-13. RP(n) Command

Command	Response
RP*	Sends all data in the response string per Table 3-14.
RPA	Sends receiver address and data A only.
RPB	Sends receiver address and data B only.
RPC	Sends receiver address and data C only.
RPD	Sends receiver address and data D only.
RPE	Sends receiver address and data E only.
RPF	Sends receiver address and data F only.
RPG	Sends receiver address and data G only.

Table 3-14. Read RP(n) Command Response String

STX	Address	DATA A	DATA B	DATA C	DATA D	DATA E	DATA F	DATA G	ETX

Data	Description	Unit	Data Variable
A	Calibrated signal level.	dBm	2 bytes ASCII HEX (14H – 3CH).
B	Raw signal A/D reading	–	4 bytes ASCII HEX (0000H ~ 03FFH)
C	Calibrated C/N level	dB	2 bytes ASCII HEX (05H – 19H).
D	Raw C/N A/D reading	–	4 bytes ASCII HEX (0000H ~ 03FFH)
E	LNB A/D value	–	2 bytes ASCII HEX (0000H ~ 03FFH). (Value x 0.01953 = voltage)
F	IF frequency counter value.	MHz	3 bytes ASCII HEX (MSB – LSB). 70 MHz = 109880 decimal, every 78 digits = 50 kHz frequency change.
G	Video frame line counter value.	lines	2 bytes ASCII HEX MSB ~ LSB.

Examples:

RP* - READ ALL PORT DATA

Send: STX ADDR RP* ETX
Receive: STX ADDR 22 022C 14 022C 039A 01AD38 0106 ETX

The data is the same as RPA through RPG, below

RPA – READ PORTS, CALIBRATED SIGNAL LEVEL

Send: STX ADDR RPA ETX
Receive: STX ADDR 22 ETX
Calibrated signal level is 34 dBm (22 HEX = 34)

RPB – READ PORTS, RAW SIGNAL LEVEL

Send: STX ADDR RPB ETX
Receive: STX ADDR 022C ETX
Raw Signal level is 556 (022C HEX = 556)

RPC – READ PORTS, CALIBRATED C/N LEVEL

Send: STX ADDR RPC ETX
Receive: STX ADDR 14 ETX
Calibrated signal level is 20 dBm (14 HEX = 20)

RPD – READ PORTS, RAW C/N LEVEL

Send: STX ADDR RPD ETX
Receive: STX ADDR 022C ETX

Raw Signal level is 556 (022C HEX = 556)

RPE – READ PORTS, LNB A/D VALUE

Send: STX ADDR RPE ETX
Receive: STX ADDR 039A ETX
LNB Voltage = 922 x 0.01953 => 18.01 volts (039A HEX = 922)

RPF – READ PORTS, IF FREQUENCY COUNTER

Send: STX ADDR RPF ETX
Receive: STX ADDR 01AD38 ETX
IF frequency = 70 MHz (01AD38 HEX = 109880)

RPG – READ PORTS, VIDEO FRAME LINE COUNTER

Send: STX ADDR RPG ETX
Receive: STX ADDR 0106 ETX
Video frame = 262 lines (0106 HEX = 262)

READ PIN – Rp

This command reads the unit's local control status and the current PIN (personal identification number).

The receiver returns status as one ASCII character (E = Enabled; D = Disabled) and the PIN as four ASCII characters.

Example:

Rp – READ LOCAL CONTROL AND CURRENT PIN NUMBER

Send: STX ADDR Rp ETX
Receive: STX ADDR E 1234 ETX
Local control ENABLED
PIN = 1234

READ RELAY – Rr

This command reports the relay status. The receiver returns two characters.

1st digit = Relay 1 is set to 0 = NORMAL, 1 = ON , 2 = OFF, 4 = BAND.
2nd digit = Relay 2 is set to 0 = NORMAL, 1 = ANTENNA POLARITY.

Example:

Send: STX ADDR Rr ETX
Receive: STX ADDR 00 ETX

1st digit = Relay 1 is set to 0 = NORMAL.
2nd digit = Relay 2 is set to 0 = NORMAL.

READ TIMER DATA – RT(n)

This command returns timer data stored or set in the MT930B.

Table 3-15. RT(n) Command

Command	Response
RT0	Returns the Timer data of timer 0.
RT1	Returns the Timer data of timer 1.
RT2	Returns the Timer data of timer 2.
RT3	Returns the Timer data of timer 3.
RT4	Returns the Timer data of timer 4.
RT5	Returns the Timer data of timer 5.
RT6	Returns the Timer data of timer 6.
RT7	Returns the Timer data of timer 7.
RT8	Returns the Timer data of timer 8.
RT9	Returns the Timer data of timer 9.

Table 3-16. Read Timer RT(n) Response Data String

STX	Address	DATA A	DATA B	DATA C	DATA D	DATA E	DATA F	DATA G	DATA H	DATA I	ETX

Data	Description	Unit	Data Variable
A	Byte 1; Day of week.	–	ASCII HEX **BIT** **FUNCTION** 0 SUNDAY* 1 MONDAY* 2 TUESDAY* 3 WEDNESDAY* 4 THURSDAY* 5 FRIDAY* 6 SATURDAY* 7 DATE MODE = 0, DAYS MODE = 1
B	Byte 2; Minute timer will trip.	Mins.	ASCII HEX BCD (00 TO 59)
C	Byte 3; Hour timer will trip.	Hours	ASCII HEX BCD (00 TO 23)
D	Byte 4; Month timer will trip.	Mos.	ASCII HEX BCD (01 TO 12)
E	Byte 5; Day timer will trip.	Days	ASCII HEX BCD (01 TO 31)
F	Byte 6; Format timer will select.	–	ASCII HEX (01 TO 63 or 00 for NONE)
G	Byte 7; Transponder timer will select.	–	ASCII HEX (00 TO 63)
H	Byte 8; Timer state, Relay setting	–	ASCII HEX (Bit 7 = 0 if timer disabled or 1 if timer enabled) (Bits 6 ~ 0 = 1 for no relay, 1 for relay 1 auto, 2 for relay 2 auto, 3 for relay 1 on, 4 for relay 1 off)
I	Byte 9, Timer warn time	Mins.	ASCII HEX (00H to 63H)

*Selected if 1 (used in DAYS MODE)

Example:

RTn – READ TIMER DATA (n is the timer number 0 to 9)

Send: STX ADDR RT0 ETX (read timer 0)
Receive: STX ADDR 7D 00 12 01 01 01 04 80 05 ETX

Timer 0 set as follows:

1st byte:

BIT	VALUE	FUNCTION
0	1	DAYS MODE
1	0	NONE
2	1	MONDAY
3	1	TUESDAY
4	1	WEDNESDAY
5	1	THURSDAY
6	1	FRIDAY
7	0	NONE

2nd byte: Clock minutes when timer will trip = 00
3rd byte: Clock hours when timer will trip = 12
4th byte: Month timer will trip = 01*
5th byte: Day timer will trip = 01*
6th byte: Format timer selects = 01 (1st format in the database)
7th byte: Transponder timer will select = 04

NOTE: Transponder numbers start with 00, so 04 is the 5th transponder in this format)

8th byte: BIT 7 = 1 => TIMER ENABLED; BITS 6 to 0 = 0000000 => NO RELAY SELECTED
9th byte: Warn time = 5 Minutes (05 HEX = 5)

*In DAYS mode, so not used.

READ VERSION – RVA

The RVA command returns the boot version, firmware version in bank 0, firmware version in bank 1, control FPGA version, analog FPGA version, data segment version, and active memory bank.

Table 3-17. Read Version (RVA) Response String

STX	Address	DATA A	DATA B	DATA C	DATA D	DATA E	DATA F	DATA G	EXT

Data	Description	Data Variable
A	Byte 1; Boot Version.	ASCII BCD
B	Byte 2; Firmware version in bank 0.	ASCII BCD
C	Byte 3; Firmware version in bank 1.	ASCII BCD
D	Byte 4; Control FPGA version.	ASCII BCD
E	Byte 5; Analog FPGA version.	ASCII BCD
F	Byte 6; Data segment version.	ASCII BCD
G	Byte 7; Active memory bank.	ASCII BCD (00 to 01)

READ TRANSPONDER – RX(n)

This command is used to retrieve the active transponder/channel information.

Table 3-18. RX(n) Command

Command	Response
RX*	Sends all data in the response string per Table 3-19.
RXA	Sends receiver address and data A only.
RXB	Sends receiver address and data B only.
RXC	Sends receiver address and data C only.
RXD	Sends receiver address and data D only.
RXE	Sends receiver address and data E only.
RXF	Sends receiver address and data F only.
RXG	Sends receiver address and data G only.
RXH	Sends receiver address and data H only.
RXI	Sends receiver address and data I only.
RXJ	Sends receiver address and data J only.
RXK	Sends receiver address and data K only.
RXL	Sends receiver address and data L only.
RXM	Sends receiver address and data M only.
RXN	Sends receiver address and data N only.
RXO	Sends receiver address and data O only.
RXP	Sends receiver address and data P only.
RXQ	Sends receiver address and data Q only.

Table 3-19. Read Transponder Command Response String

STX	Address	DATA A	DATA B	DATA C	–to–	DATA O	DATA P	DATA Q	ETX

Data	Description	Unit	Data Variable
*	Read all transponder parameters		Total of 46 bytes. See example, below.
A	Read transponder band and indicator	–	2 bytes ASCII HEX. Bit 7 = band (0=C Band, 1=Ku Band), Bits 6 to 0 = channel number (00 to 64)
B	Read RF frequency	MHz	6 bytes ASCII HEX, (MSB – LSB)
C	Read IF filter and video filter	–	2 bytes ASCII HEX. Refer to Table 3-20.
D	Read video level	–	2 bytes ASCII HEX (00H to C8H; each number is 0.5% step).
E	Read audio 1 level	–	2 bytes ASCII HEX (00H to C8H; each number is 0.5% step).
F	Read audio 1 frequency	kHz	4 bytes ASCII HEX. (MSB –LSB); 0.050 to 9.995 in HEX. Freq. in MHz ÷ 0.005
G	Read U/C/L, Audio 1 band-width and Composite de-emphasis		2 bytes ASCII HEX. Refer to Table 3-23.
H	Read audio 2 level	–	2 byte ASCII HEX (00H to C8H; each number is 0.5% step).
I	Read audio 2 frequency	kHz	4 bytes ASCII HEX. (MSB –LSB); 0.050 to 9.995 in HEX. Freq. in MHz ÷ 0.005
J	Read video polarity and audio 2 bandwidth.	–	2 bytes ASCII HEX. Refer to Table 3-26.
K	Read audio 3 level	–	2 bytes ASCII HEX (00H to C8H; each number is 0.5% step).
L	Read audio 3 frequency	kHz	4 bytes ASCII HEX. (MSB –LSB); 0.050 to 9.995 in HEX. Freq. in MHz ÷ 0.005
M	Read antenna polarity and audio 3 bandwidth	–	2 bytes ASCII HEX. Refer to Table 3-28.
N	Read composite video level	–	2 byte ASCII HEX (00H to C8H; each number is 0.5% step). C9 = Ganged with video level.
O	Read audio 1/2/3 de-emphasis	–	2 bytes ASCII HEX. Refer to Table 3-30.
P	Read local oscillator	MHz	4 bytes ASCII HEX. (MSB –LSB); 0 to 9999 in HEX
Q	Read video de-emphasis, RF port, and LNB voltage	–	2 bytes ASCII HEX. Refer to Table 3-34.

Table 3-20. RXC Response

Bit	Description
0	Reserved
1	Video low-pass filter BW selected. Refer to Table 3-21.
2	Video low-pass filter BW selected. Refer to Table 3-21.
3	Video low-pass filter BW selected. Refer to Table 3-21.
4	Reserved
5	IF bandwidth selected. Refer to Table 3-22.
6	IF bandwidth selected. Refer to Table 3-22.
7	IF bandwidth selected. Refer to Table 3-22.

Table 3-21. Video Low-pass Filter Selected

Bit 3	Bit 2	Bit 1	Description
0	0	0	Optional
0	0	1	4.2 MHz
0	1	0	5.0 MHz
0	1	1	5.5 MHz
1	0	0	6.0 MHz

Table 3-22. IF Bandwidth Selected

Bit 7	Bit 6	Bit 5	Description
0	0	1	16 MHz
0	1	0	18 MHz
0	1	1	22 MHz
1	0	0	25 MHz (C-band)
1	0	1	27 MHz (C-band)
1	1	0	36 MHz (Ku-band)

Table 3-23. RXG Response

Bit	Description
0	Reserved
1	Reserved
2	Reserved
3	Composite De-emphasis (0 = ON 1 = OFF)
4	Audio #1 bandwidth. Refer to Table 3-24.
5	Audio #1 bandwidth. Refer to Table 3-24.
6	Read Upper, Center and Lower transponder. Refer to Table 3-25.
7	Read Upper, Center and Lower transponder. Refer to Table 3-25.

Table 3-24. Audio 1 Bandwidth Selected

Bit 5	Bit 4	Description
0	0	440 kHz; Wide
0	1	330 kHz; Medium
1	0	150 kHz; Narrow

Table 3-25. Transponder Location; Upper/Center/Lower

Bit 7	Bit 6	Description
0	0	Blank
0	1	Lower
1	0	Center
1	1	Upper

Table 3-26. RXJ Response

Bit	Description
0	Reserved
1	Reserved
2	Reserved
3	Reserved
4	Audio #2 bandwidth. Refer to Table 3-27.
5	Audio #2 bandwidth. Refer to Table 3-27.
6	Audio #2 bandwidth. Refer to Table 3-27.
7	Video polarity. 1= Reverse, 0= Normal

Table 3-27. Audio 2 Bandwidth Selected

Bit 6	Bit 5	Bit 4	Description
0	0	0	880 kHz
0	0	1	440 kHz
0	1	0	220 kHz
0	1	1	110 kHz
1	0	0	55 kHz

Table 3-28. RXM Response

Bit	Description
0	Reserved
1	Reserved
2	Reserved
3	Reserved
4	Audio #3 bandwidth. Refer to Table 3-29.
5	Audio #3 bandwidth. Refer to Table 3-29.
6	Audio #3 bandwidth. Refer to Table 3-29.
7	Antenna polarity; 1= Horizontal, 0= Vertical

Table 3-29. Audio 3 Bandwidth Selected

Bit 6	Bit 5	Bit 4	Description
0	0	0	880 kHz
0	0	1	440 kHz
0	1	0	220 kHz
0	1	1	110 kHz
1	0	0	55 kHz

Table 3-30. RXO Response

Bit	Description
0	Audio #3 de-emphasis selected. Refer to Table 3-31.
1	Audio #3 de-emphasis selected. Refer to Table 3-31.
2	Audio #3 de-emphasis selected. Refer to Table 3-31.
3	Audio #2 de-emphasis selected. Refer to Table 3-32.
4	Audio #2 de-emphasis selected. Refer to Table 3-32.
5	Audio #2 de-emphasis selected. Refer to Table *3-32.*
6	Audio #1 de-emphasis selected. Refer to Table 3-33.
7	Audio #1 de-emphasis selected. Refer to Table 3-33.

Table 3-31. Audio 3 De-emphasis Selected

Bit 2	Bit 1	Bit 0	Description
0	0	0	Flat
0	0	1	50 µS
0	1	0	75 µS
0	1	1	J-17
1	0	0	Expander (Panda).

Table 3-32. Audio 2 De-emphasis Selected

Bit 5	Bit 4	Bit 3	Description
0	0	0	Flat
0	0	1	50 µsec
0	1	0	75 µsec
0	1	1	J-17
1	0	0	Expander (Panda).

Table 3-33. Audio 1 De-emphasis Selected

Bit 7	Bit 6	Description
0	0	Flat
0	1	50 µsec
1	0	75 µsec
1	1	J-17

Table 3-34. RXQ Response

Bit	Description
0	Reserved
1	Reserved
2	LNB voltage selected. Refer to Table 3-35.
3	LNB voltage selected. Refer to Table 3-35.
4	RF port selected. Refer to Table 3-36.
5	RF port selected. Refer to Table 3-36.
6	Video de-emphasis selected. Refer to Table 3-37.
7	Video de-emphasis selected. Refer to Table 3-37.

Table 3- 35. LNB Voltage Selected

Bit 3	Bit 2	Description
0	0	Off
0	1	13V
1	0	18V

Table 3-36. RF Input Selected

Bit 5	Bit 4	Description
0	0	Input 1.
0	1	Input 2.
1	0	Input 3.
1	1	Input 4.

Table 3-37. Video Format / De-emphasis Selected

Bit 7	Bit 6	Description
0	0	NTSC / 525 lines
0	1	PAL / 625 lines
1	0	AUTO

Examples:

RX* - READ ALL TRANSPONDER PARAMETERS

Send: STX ADDR RX* ETX
Receive: STX ADDR 0A 000F3C A2 78 C8 0550 05 C8 04D8 1C C8 04D8 AC C9 92 141E 08 ETX

The data is the same as RXA through RXQ, below.

RXA – READ TRANSPONDER, BAND & TRANSPONDER INDICATOR

Send: STX ADDR RXA ETX
Receive: STX ADDR 0A ETX

Bit 7 = 0 => C-Band
Bits 6 ~ 0 = 0A => XPDR 10 (0A HEX = 10)

RXB – READ TRANSPONDER, RF FREQUENCY

Send: STX ADDR RXB ETX
Receive: STX ADDR 000F3C ETX

RF frequency = 3900 MHz (000F3C HEX = 3900)

RXC – READ TRANSPONDER, IF FILTER AND VIDEO FILTER

Send: STX ADDR RXC ETX
Receive: STX ADDR A2 ETX

Bits 7 ~ 5 = 101 => 27 MHz
Bits 3 ~ 1 = 001 => 4.2 MHz

RXD – READ TRANSPONDER, VIDEO LEVEL

Send: STX ADDR RXD ETX
Receive: STX ADDR 78 ETX

Video level = 60% (78 HEX = 120 half percent steps)

RXE – READ TRANSPONDER, AUDIO 1 LEVEL

Send: STX ADDR RXE ETX
Receive: STX ADDR C8 ETX

Video level = 100% (C8 HEX = 200 half percent steps)

RXF – READ TRANSPONDER, AUDIO 1 FREQUENCY

Send: STX ADDR RXF ETX
Receive: STX ADDR 0550 ETX

Audio 1 frequency = 6800 kHz (0550 HEX = 1360, 1360 x 5 = 6800)

RXG – READ TRANSPONDER, U/C/L, AUDIO 1 BDWTH, COMP DE-EMP

Send: STX ADDR RXG ETX
Receive: STX ADDR 05 ETX

BIT	VALUE	FUNCTION
0	1	Reserved
1	0	Reserved
2	1	Reserved
3	0	Composite De-emphasis ON
4	0	Audio 1 bandwidth 440 kHz (Wide)
5	0	
6	0	U/C/L Blank
7	0	

RXH – READ TRANSPONDER, AUDIO 2 LEVEL

Send: STX ADDR RXH ETX
Receive: STX ADDR C8 ETX

Audio 2 level is 100% (C8 HEX = 200 half percent steps)

RXI – READ TRANSPONDER, AUDIO 2 FREQUENCY

Send: STX ADDR RXI ETX
Receive: STX ADDR 04D8 ETX

Audio 2 frequency = 6200 kHz (04D8 HEX = 1240, 1240 x 5 = 6200)

RXJ – READ TRANSPONDER, VIDEO POLARITY, AUDIO 2 BDWTH

Send: STX ADDR RXJ ETX
Receive: STX ADDR 1C ETX

BIT	VALUE	FUNCTION
0	0	Reserved
1	0	Reserved
2	1	Reserved
3	1	Reserved
4	1	Audio 2 bandwidth = 440 kHz
5	0	
6	0	
7	0	Video polarity NORMAL

RXK – READ TRANSPONDER, AUDIO 3 LEVEL

Send: STX ADDR RXK ETX
Receive: STX ADDR C8 ETX

Audio 3 level is 100% (C8 HEX = 200 half percent steps)

RXL – READ TRANSPONDER, AUDIO 3 FREQUENCY

Send: STX ADDR RXL ETX
Receive: STX ADDR 04D8 ETX

Audio 3 frequency = 6200 kHz (04D8 HEX = 1240, 1240 x 5 = 6200)

RXM – READ TRANSPONDER, ANTENNA POL AND AUDIO 3 BDWTH

Send: STX ADDR RXM ETX
Receive: STX ADDR AC ETX

BIT	VALUE	FUNCTION
0	0	Reserved
1	0	Reserved
2	1	Reserved
3	1	Reserved
4	0	Audio 3 bandwidth 220 kHz
5	1	
6	0	
7	1	Antenna polarity HORIZONTAL

RXN – READ TRANSPONDER, COMPOSITE VIDEO LEVEL

Send: STX ADDR RXN ETX
Receive: STX ADDR C9 ETX

Composite video level is 100.5% (C9 HEX = 201 half percent steps)

NOTE: 100.5% means the composite video is ganged with the video level, and is automatically set the same level as the video level.

RXO – READ TRANSPONDER, AUDIO 1/2/3 DE-EMPHASIS

Send: STX ADDR RXO ETX
Receive: STX ADDR 92 ETX

BIT	VALUE	FUNCTION
0	0	Audio 3 de-emphasis 75 µsec
1	1	
2	0	
3	0	Audio 2 de-emphasis 75 µsec
4	1	
5	0	
6	0	Audio 1 de-emphasis 75 µsec
7	1	

RXP – READ TRANSPONDER, LOCAL OSCILLATOR

Send: STX ADDR RXP ETX
Receive: STX ADDR 141E ETX

Local Oscillator frequency 5150 MHz (141E HEX = 5150)

RXQ – READ TRANSPONDER, VIDEO DE-EMP, RF PORT, LNB VOLTAGE

Send: STX ADDR RXQ ETX
Receive: STX ADDR 08 ETX

BIT	VALUE	FUNCTION
0	0	Reserved
1	0	Reserved
2	0	LNB voltage 18 Volts
3	1	
4	0	RF port 1
5	0	
6	0	Video de-emphasis NTSC/525 LINES
7	0	

Example:

RVA – READ VERSION

Send: STX ADDR RVA ETX
Receive: STX ADDR 10 10 11 10 10 10 00 ETX
Boot version 1.0
Firmware in Bank 0 version 1.0
Firmware in Bank 1 version 1.1
Control FPGA Version 1.0
Analog FPGA Version 1.0
Data Segment version 1.0
Active memory bank = 0

READ MODEL AND SERIAL NUMBER – RZ

This command reads the unit model number and serial number. The receiver returns the model number as 8 ASCII characters and the serial number as 9 ASCII characters.

EXAMPLE:

Send: STX ADDR RZ ETX
Receive: STX ADDR MT930B 01U010001 ETX

MODEL NUMBER ‘MT930B ’ (eight characters)
SERIAL NUMBER ‘01U010001’

WRITE COMMANDS

Write command mnemonics with the letter W includes parameters that set flags and change receiver settings. When the MT930B gets a write command, it does not return data or a parameter but instead responds with an acknowledgement code to indicate successful execution of the write command.

WRITE ALARMS – WA(n)

This command is used to set the features. When the WA command string is sent to a unit, the following conditions apply:

1. C/N value must be between 5 and 25. The C/N alarm is turned off if it is set to 5, and if > 25, it returns an error.
2. Signal must be between –61 and –20. If the signal is –61, it is turned off.
3. Relay hold settings can be any value between 0 and 255 seconds
4. Relay delay settings must be between 0 and 25 seconds.

See Table 3-2 for details of WAA–WAG.

Table 3-38. WA(n) Command and Response

Command	Response
WA*	Write data in a string.
WAA	Write data A only
WAB	Write data B only.
WAC	Write data C only.
WAD	Write data D only.
WAE	Write data E only.
WAF	Write data F only.
WAG	Write data G only. (Only the first byte is sent, and only bits 2 through 7 are used. Bits 0 and 1 are ignored.)

Examples:

WA* - WRITE ALL ALARM PARAMETERS

Send: STX ADDR WA* 0A 2D 3C 3C 00 00 03 ETX
Receive: STX ADDR ACK ETX

The data is the same as WAA through WAG, below.

WAA – WRITE ALARMS, C/N SETTING

Send: STX ADDR WAA 0A ETX
Receive: STX ADDR ACK ETX
C/N alarm setting is set to 10 dBc (0A HEX = 10)

WAB – WRITE ALARMS, SIGNAL SETTING

Send: STX ADDR WAB 2D ETX
Receive: STX ADDR ACK ETX
Signal alarm setting is set to –45 dBm (2D HEX = 45)

WAC – WRITE ALARMS, RELAY 1 HOLD TIME

Send: STX ADDR WAC 3C ETX
Receive: STX ADDR ACK ETX

Relay 1 hold time is set to 60 sec (3C HEX = 60)

WAD – WRITE ALARMS, RELAY 2 HOLD TIME

Send: STX ADDR WAD 3C ETX
Receive: STX ADDR ACK ETX

Relay 2 hold time is set to 60 sec (3C HEX = 60)

WAE – WRITE ALARMS, RELAY 1 DELAY SETTING

Send: STX ADDR WAE 00 ETX
Receive: STX ADDR ACK ETX

Relay 1 alarm delay time is set to 0 sec (00 HEX = 0)

WAF – WRITE ALARMS, RELAY 2 DELAY SETTING

Send: STX ADDR WAF 00 ETX
Receive: STX ADDR ACK ETX

Relay 2 alarm delay time is set to 0 sec (00 HEX = 0)

WAG – WRITE ALARMS, ALARM SETUP

Send: STX ADDR WAG 03 ETX
Receive: STX ADDR ACK ETX

1st Byte:

BIT	VALUE	FUNCTION
0	1	Reserved
1	1	Reserved
2	0	Video alarm OFF
3	0	
4	0	AFC alarm OFF
5	0	LNB alarm OFF
6	0	AUX alarm OFF
7	0	

WRITE CLOCK AND CALENDAR – WC

This command is used to set the clock and calendar.

Table 3-39. Write clock and Calendar Parameter Value

Byte	Description
1	Hours; ASCII BCD
2	Minutes; ASCII BCD
3	Seconds; ASCII BCD
4	Month; ASCII BCD
5	Day; ASCII BCD
6	Year; ASCII BCD
7	Day of week; ASCII BCD; Refer to Table 3-40.

Table 3-40. Day of the Week

Value	Description
01	Sunday
02	Monday
03	Tuesday
04	Wednesday
05	Thursday
06	Friday
07	Saturday

Example:

WC – WRITE CLOCK

Send: STX ADDR RC 12 00 00 01 01 00 07 ETX
Receive: STX ADDR ACK ETX
1st byte = 12 hours
2nd byte = 00 minutes
3rd byte = 00 seconds
4th byte = 01 month
5th byte = 01 day
6th byte = 00 year (2000)
7th byte = 07 day of week (Saturday)

WRITE FORMAT NAME – WN

This command clears the previous and writes the new format name on the active channel. The command is followed by 16 characters of ASCII data. Use spaces for blank characters.

Example:

WN – WRITE FORMAT NAME

Send: STX ADDR WN C_BAND _ _ _ _ _ _ _ _ _ _ (_ = spaces or characters) ETX
Receive: STX ADDR ACK ETX
Current format is C_BAND _ _ _ _ _ _ _ _ _ _ (16 character format name)

WRITE LOCAL CONTROL AND NEW PIN NUMBER – Wp

This command enables or disables local control and overwrites the current PIN. The Wp command is followed by E (enable) or D (disable), plus the 4-digit PIN from 0000 to 9999.

Example:

Wp – WRITE LOCAL CONTROL AND CURRENT PIN NUMBER

Send: STX ADDR Wp E 1234 ETX
Receive: STX ADDR ACK ETX

Local control ENABLED
PIN = 1234

WRITE RESET – WR

After changes are made to the Active Channel data (using the WX command), WR02 must be issued to make the receiver act on the changes.

Valid commands are: WR01 – Load Active Channel from receiver database data, WR02 – Update receiver with Active Channel data, WR80 – return receiver to factory defaults. Use this command to activate changes that you have written to the receiver's memory.

WRITE RELAY – Wr

Use this command to change the status of the relays. The Wr command is followed by two digits.

1st digit = 0 so Relay 1 is set to NORMAL (0=NORMAL, 1=ON, 2=OFF, 4=BAND)
2nd digit = 0 so Relay 2 is set to NORMAL (0=NORMAL, 1=ANTENNA POLARITY)

Example:

Wr – WRITE RELAY MODE

Send: STX ADDR Wr 00 ETX
Receive: STX ADDR ACK ETX
1st digit = 0 so RELAY 1 is set to NORMAL

2nd digit = 0 so RELAY 2 is set to NORMAL

WRITE TIMER DATA – WT(n)

STX	Address	WT(n)	DATA A	DATA B	DATA C	DATA D through DATA I	DATA J	ETX

Refer to Table 3-15 for DATA string explanation.

This command stores timer data to the MT930B.

Table 3-41. WT(n) Command and Response

Command	Response
WT0	Writes the timer data of timer 0.
WT1	Writes the timer data of timer 1.
WT2	Writes the timer data of timer 2.
WT3	Writes the timer data of timer 3.
WT4	Writes the timer data of timer 4.
WT5	Writes the timer data of timer 5.
WT6	Writes the timer data of timer 6.
WT7	Writes the timer data of timer 7.
WT8	Writes the timer data of timer 8.
WT9	Writes the timer data of timer 9.

Example:

WT(n) – WRITE TIMER DATA (n is the timer number 0 to 9)

Send: STX ADDR WT0 7E 00 12 01 01 01 04 80 05 ETX (write timer 0)
Receive: STX ADDR ACK ETX
Timer 0 set as follows:

1st byte:

BIT	VALUE	FUNCTION
0	1	DAYS MODE
1	0	NONE
2	1	MONDAY
3	1	TUESDAY
4	1	WEDNESDAY
5	1	THURSDAY
6	1	FRIDAY
7	0	NONE

2nd byte: Clock minutes when timer will trip = 00
3rd byte: Clock hours when timer will trip = 12
4th byte: Month Timer Will Trip = 01 (in DAYS mode so not used)
5th byte: Day Timer Will Trip = 01 (in DAYS mode so not used)
6th byte: Format timer will select = 01 (1st format in the database)
7th byte: Transponder timer will select = 04

NOTE: Transponder numbers start with 00 so 04 is the 5th transponder in this format)

8th byte: BIT 7 = 1 => TIMER ENABLED
BITS 6 to 0 = 0000000 => NO RELAY SELECTED
9th byte: Warn time = 5 Minutes (05 HEX = 5)

WRITE VIDEO SCAN – Wv

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

Command Syntax:

STX RECEIVER ADDRESS Wv FFFFF SSS NS ETX	
STX	The STX control code 02H. 1 byte.
RECEIVER ADDRESS	The receiver address. 4 bytes (0000 to 9999).
Wv	The ASCII command
FFFFF	Start Frequency (00000H to D423FH > 00000.0 to 99999.9 MHz).
SSS	Step Size (000H to FFFH > 0.1 to 409.5 MHz)*
NS	Number of steps (00H to FFH)
ETX	The ETX control code 03H. 1 byte.

*Frequencies are rounded to the nearest MHz (always set the 0.1 MHz digit to 0). When scan is complete or aborted, the receiver reloads the last data that was in the active channel memory (the data that were on Menu 1 before the scan started).

Response Stream:

NN LL ETX	
NN	Step number (FFH to 00H)
LL	Signal level (dBm)
ETX	The ETX control code 03H. 1 byte.

Note that the reply does not include STX.

WRITE TRANSPONDER DATA – WX(n)

The WX(n) command writes the receiver transponder data. The data string is the same as the Read Transponder command.

Table 3-42. WX(n) Command and Response

Command	Response
WX*	Writes all data in the response string.
WXA	Writes receiver address and data A only.
WXB	Writes receiver address and data B only.
WXC	Writes receiver address and data C only.
WXD	Writes receiver address and data D only.
WXE	Writes receiver address and data E only.
WXF	Writes receiver address and data F only.
WXG	Writes receiver address and data G only.
WXH	Writes receiver address and data H only.
WXI	Writes receiver address and data I only.
WXJ	Writes receiver address and data J only.
WXK	Writes receiver address and data K only.
WXL	Writes receiver address and data L only.
WXM	Writes receiver address and data M only.
WXN	Writes receiver address and data N only.
WXO	Writes receiver address and data O only.
WXP	Writes receiver address and data P only.
WXQ	Writes receiver address and data Q only.

Examples:

WX* – WRITE ALL TRANSPONDER PARAMETERS

Send: STX ADDR WX* 0A 000F3C A2 78 C8 0550 05 C8 04D8 1C C8 04D8 AC C9 92 141E 08 ETX
Receive: STX ADDR ACK ETX

The data written is the same as WXA through WXQ below.

WXA – WRITE TRANSPONDER, BAND & TRANSPONDER INDICATOR

Send: STX ADDR WXA 0A ETX
Receive: STX ADDR ACK ETX

Bit 7 = 0 => C-Band
Bits 6 ~ 0 = 0A => XPDR 10 (0A HEX = 10)

WXB – WRITE TRANSPONDER, RF FREQUENCY

Send: STX ADDR WXB 000F3C ETX
Receive: STX ADDR ACK ETX

RF frequency = 3900 MHz (000F3C HEX = 3900)

WXC – WRITE TRANSPONDER, IF FILTER AND VIDEO FILTER

Send: STX ADDR WXC A2 ETX
Receive: STX ADDR ACK ETX

Bits 7 ~ 5 = 101 => 27 MHz
Bits 3 ~ 1 = 001 => 4.2 MHz

WXD – WRITE TRANSPONDER, VIDEO LEVEL

Send: STX ADDR WXD 78 ETX
Receive: STX ADDR ACK ETX

Video level = 60% (78 HEX = 120 half-percent steps)

WXE – WRITE TRANSPONDER, AUDIO 1 LEVEL

Send: STX ADDR WXE C8 ETX
Receive: STX ADDR ACK ETX

Audio 1 level = 100% (C8 HEX = 200 half-percent steps)

WXF – WRITE TRANSPONDER, AUDIO 1 FREQUENCY

Send: STX ADDR WXF 0550 ETX
Receive: STX ADDR ACK ETX

Audio 1 frequency = 6800 kHz (0550 HEX = 1360, 1360 x 5 = 6800)

WXG – WRITE TRANSPONDER, U/C/L, AUDIO 1 BDWTH, COMP DE-EMP

Send: STX ADDR WXG 05 ETX
Receive: STX ADDR ACK ETX

BIT	VALUE	FUNCTION
0	1	Reserved
1	0	Reserved
2	1	Reserved
3	0	Composite De-emphasis ON
4	0	Audio 1 bandwidth 440 kHz (Wide)
5	0	
6	0	U/C/L Blank
7	0	

WXH – WRITE TRANSPONDER, AUDIO 2 LEVEL

Send: STX ADDR WXH C8 ETX
Receive: STX ADDR ACK ETX

Audio 2 level is 100% (C8 HEX = 200 half-percent steps)

WXI – WRITE TRANSPONDER, AUDIO 2 FREQUENCY

Send: STX ADDR WXI 04D8 ETX
Receive: STX ADDR ACK ETX

Audio 2 frequency = 6200 kHz (04D8 HEX = 1240, 1240 x 5 = 6200)

WXJ – WRITE TRANSPONDER, VIDEO POLAIRTY, AUDIO 2 BDWTH

Send: STX ADDR WXJ 1C ETX
Receive: STX ADDR ACK ETX

BIT	VALUE	FUNCTION
0	0	Reserved
1	0	Reserved
2	1	Reserved
3	1	Reserved
4	1	Audio 2 bandwidth = 440 kHz
5	0	
6	0	
7	0	Video polarity NORMAL

WXK – WRITE TRANSPONDER, AUDIO 3 LEVEL

Send: STX ADDR WXK C8 ETX
Receive: STX ADDR ACK ETX

Audio 3 level is 100% (C8 HEX = 200 half-percent steps)

WXL – WRITE TRANSPONDER, AUDIO 3 FREQUENCY

Send: STX ADDR WXL 04D8 ETX
Receive: STX ADDR ACK ETX

Audio 3 frequency = 6200 kHz (04D8 HEX = 1240, 1240 x 5 = 6200)

WXM – WRITE TRANSPONDER, ANTENNA POL AND AUDIO 3 BDWTH

Send: STX ADDR WXM AC ETX
Receive: STX ADDR ACK ETX

BIT	VALUE	FUNCTION
0	0	Reserved
1	0	Reserved
2	1	Reserved
3	1	Reserved
4	0	Audio 3 bandwidth 220 kHz
5	1	
6	0	
7	1	Antenna polarity HORIZONTAL

WXN – WRITE TRANSPONDER, COMPOSITE VIDEO LEVEL

Send: STX ADDR WXN C9 ETX
Receive: STX ADDR ACK ETX

Composite video level is 100.5% (C9 HEX = 201 half-percent steps)

NOTE: 100.5% means the composite video is ganged with the video level, and is automatically set the same level as the video level.

WXO – WRITE TRANSPONDER, AUDIO 1/2/3 DE-EMPHASIS

Send: STX ADDR WXO 92 ETX
Receive: STX ADDR ACK ETX

BIT	VALUE	FUNCTION
0	0	Audio 3 de-emphasis 75 µsec
1	1	
2	0	
3	0	Audio 2 de-emphasis 75 µsec
4	1	
5	0	
6	0	Audio 1 de-emphasis 75 µsec
7	1	

WXP – WRITE TRANSPONDER, LOCAL OSCILLATOR

Send: STX ADDR WXP 141E ETX
Receive: STX ADDR ACK ETX

Local Oscillator frequency 5150 MHz (141E HEX = 5150)

WXQ – WRITE TRANSPONDER, VIDEO DE-EMP, RF PORT, LNB VOLTAGE

Send: STX ADDR WXQ 08 ETX
Receive: STX ADDR ACK ETX

BIT	VALUE	FUNCTION
0	0	Reserved
1	0	Reserved
2	0	LNB voltage 18 V
3	1	
4	0	RF port 1
5	0	
6	0	Video de-emphasis NTSC/525 LINES
7	0	

WZ – WRITE MODEL AND SERIAL NUMBER
Send: STX ADDR WZ MT930B 01U010001 ETX
Receive: STX ADDR ACK ETX
MODEL NUMBER ‘MT930B’
SERIAL NUMBER ‘01U010001’

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