

CHAPTER 4  
REMOTE CONTROL

4.1 ST8000A REMOTE CONTROL SET-UP

Use of the ST-8000A remote control feature requires that the ST-8000A and the remote control terminal first be set-up so that parameters match. Set-up requirements are detailed in sections 2.5.5 (Data Rate), 2.5.6 (Address), 2.5.8 (RS-232/MIL-188), 2.5.9 (Terminations), and 2.6.3 (Cable Connections). Data rate and address are also discussed in the following sections.

4.1.1 Remote Control Data Rate

The REMOTE port on the ST-8000A can be used to control the ST-8000A with any ASCII terminal running the data rate set by Control Board DIP switch SW3. The character format for this port is 1 start bit, 7 data bits, one space parity bit, and 2 stop bits (11 bits total). The remote control terminal can send characters with any parity and 1 or 2 stop bits; the parity bit is ignored. Commands may be entered in upper or lower case; the echo is in the same case sent by the remote control terminal. Data rate set-up is shown in Table 4.1.

TABLE 4.1  
REMOTE CONTROL DATA RATE SET-UP

Switch SW3 1 2 3 4 5 6 7 8 -----	Remote Port Rate -----	
0 0 0 0 0 0 0 0	38,400 BPS	NOTE: X = CLOSED or ON O = OPEN or OFF
X 0 0 0 0 0 0 0	19,200 BPS	
0 X 0 0 0 0 0 0	9,600 BPS	
0 0 X 0 0 0 0 0	4,800 BPS	
0 0 0 X 0 0 0 0	2,400 BPS	
0 0 0 0 X 0 0 0	1,200 BPS	
0 0 0 0 0 X 0 0	600 BPS	
0 0 0 0 0 0 X 0	300 BPS	
0 0 0 0 0 0 0 X	110 BPS	

4.1.2 Unit Addressing

A single remote control terminal may control up to 9 ST-8000A modems using a special multi-connect cable. To address one modem, the channel select command, "Cxx", is sent. Subsequent commands will be processed only by the addressed modem for the

selected channel until the next "Cxx" command is sent. The channel address for each ST-8000A is set with Control Board DIP switch SW4 as shown in Table 4.2.

TABLE 4.2  
REMOTE CONTROL ADDRESS SET-UP

Switch SW4	Channel Select	Unit: Channel
1 2 3 4 5 6 7 8	[Cxx]	
-----	-----	-----
X 0 0 0 0 0 0 0	C01 / C02	Unit 1: DEMOD / MOD
O X 0 0 0 0 0 0	C03 / C04	Unit 2: DEMOD / MOD
O O X 0 0 0 0 0	C05 / C06	Unit 3: DEMOD / MOD
O O O X 0 0 0 0	C07 / C08	Unit 4: DEMOD / MOD
O O O O X 0 0 0	C09 / C10	Unit 5: DEMOD / MOD
O O O O O X 0 0	C11 / C12	Unit 6: DEMOD / MOD
O O O O O O X 0	C13 / C14	Unit 7: DEMOD / MOD
O O O O O O O X	C15 / C16	Unit 8: DEMOD / MOD
O O O O O O O 0	C17 / C18	Unit 9: DEMOD / MOD

NOTE: X = CLOSED or ON  
O = OPEN or OFF

#### 4.2 REMOTE CONTROL PROTOCOL

Remote control commands have the following limitations:

1. One or more commands may be included on a single line of up to 80 characters terminated with a CR (Carriage Return). All spaces and commas in the string are ignored, but count toward the 80 character limit. MARK and SPACE frequencies and BAUD rates may be entered as 1 to 4 numbers (e.g. M1234) or as 1 to 5 numbers with a decimal point (e.g. M1234.5) for one-half Hz entries. Leading zeros are not required since they are ignored.
2. Commands may be corrected using the BACKSPACE (BS) or DELETE (DEL) key before CR is entered to terminate the command string. If ECHO is enabled, the BS and DEL will be echoed as BS-SPACE-BS. If any command error is detected, an error message is sent to the remote terminal and the command parser continues to process the input command line after the error.

3. A status request command "G" is treated as a pseudo string terminator in that all commands up to the "G" are processed so that the status summary is correct. After the status display, any remaining commands are processed up to the terminating CR.

Note that the status could change based on these remaining commands.

4. When the ST8000A is turned ON, it returns to the state of operation when the power was last turned OFF. This state includes REMOTE ON and OFF.

5. If the REMOTE CONTROL BUSY IN control signal is turned OFF or pulled to -6VDC, the ST8000A completes any character being sent to the remote control terminal then stops sending characters. Character transmission resumes when the BUSY IN control signal is turned ON or pulled to +6VDC.

6. The UNIT BUSY OUT is ON or pulled to +6VDC when the ST8000A is ready to receive commands. This signal turns OFF or is pulled to -6VDC when the unit is busy. Characters sent to the ST8000A when UNIT BUSY is OFF may be lost.

7. The ST8000A will terminate all status and error responses with a CR character only when operating in echo OFF (X0) and short format (F0) mode. When echo is enabled (X1) the ST8000A terminates all status and error messages with a CR/LF pair.

### 4.3 CONTROL COMMANDS

Table 4.3 lists all of the available ST-8000A Remote Control commands. Note that the rules listed in section 4.2 must be followed and all commands must be entered exactly as described.

TABLE 4.3  
ST-8000A REMOTE CONTROL COMMANDS

COMMAND	DESCRIPTION
A0	Disable receive AMH
A1	Enable receive AMH
Bxxxx	Set BAUD rate
Cxx	Select channel (Optional: Cx. Leading 0 is ignored.)
D0	Disable DIVERSITY
D1	Enable DIVERSITY
E0	Disable 0.5 Hz increment

E1	Enable 0.5 Hz increment
F0	Enable short format response
F1	Enable long format response
G	Show Channel status
G1	Show Channel 1 status
G2	Show Channel 2 status
G3	Show Jumper and Switch settings
G4	Show Modem Status
G5	Show System Information
H0	Disable channel HOLD
H1	Enable channel HOLD

TABLE 4.3 (Continued)  
ST-8000A REMOTE CONTROL COMMANDS

COMMAND	DESCRIPTION
J0	Select FSK mode
J1	Select MARK ONLY receive mode (DEMOD ONLY)
J2	Select SPACE ONLY receive mode (DEMOD ONLY)
J3	Select FSK mode
Kxxxx	Set CENTER frequency [Optional: Kxxxx.0 / Kxxxx.5]
L/?	Show HELP page 1
L2	Show HELP page 2
L3	Show HELP page 3
Mxxxx	Set MARK frequency [Optional: Mxxxx.0 / Mxxxx.5]
N0	NORMAL channel polarity
N1	REVERSE channel polarity
P0	Setchannel 1 and 2 to factory defaults
P1	COPY channel 1 parameters into channel 2
P2	COPY channel 2 parameters into channel 1
Q0	Select MARK/SPACE display mode
Q1	Select CENTER/SHIFT display mode
R0	LOCAL mode
R1	REMOTE mode
Sxxxx	Set SPACE frequency [Optional: Sxxxx.0 / Sxxxx.5]
T	Show TEST status
T0	Stop all BIT tests
T1	Activate automatic BIT
T2	Transmit constant MARK tone
T3	Transmit constant SPACE tone
T4	Transmit alternating MARK/SPACE at BAUD RATE
T5	Enable analog loopback at 0 dBm
T6	Enable analog loopback at -20 dBm
T7	Enable analog loopback at -45 dBm
T9	Activate the BIT Menu
U0	Disable transmit tone MUTE
U1	Enable transmit tone MUTE

Vxxxx	Set SHIFT
W0	Select SYNCHRONOUS mode
W5	Select ASYNCHRONOUS mode, 5 bit chars
W6	Select ASYNCHRONOUS mode, 6 bit chars
W7	Select ASYNCHRONOUS mode, 7 bit chars
W8	Select ASYNCHRONOUS mode, 8 bit chars
X0	Disable remote port ECHO
X1	Enable remote port ECHO
Y0	Disable receive REGENERATION
Y1	Enable receive REGENERATION



#### 4.4 STATUS RESPONSES

The response to a status request command "G" is in one of two forms: Short Format (F0) or Long Format (F1).

##### 4.4.1 Long Format

In the long format, the status of the selected channel is displayed as shown in Table 4.4.

TABLE 4.4  
LONG COMMAND FORMAT

-----  
Demodulator (C01, C03, C05, C07, C09, C11, C13, C15)

Unit Type	HAL ST-8000A HF MODEM
Channel	DEMODULATOR STATUS
Unit # and Channel #	UNIT-x CHANNEL-1 (Cxx)
-----	
MARK Frequency	xxxx Hz / xxxx.5 Hz
SPACE Frequency	xxxx Hz / xxxx.5 Hz
CENTER Frequency	xxxx Hz / xxxx.5 Hz
SHIFT Frequency	xxxx Hz
BAUD Rate	xxxx Baud
MODE	FSK / MARK ONLY / SPACE ONLY
POLARITY	NORMAL / REVERSE
HOLD	ON / OFF
CODE	SYNC / ASYNC + x LEVEL
REGENERATION	ON / OFF
DIVERSITY	ON / OFF
AUTO MARK HOLD	ENABLED / DISABLED
CONTROL	LOCAL / REMOTE

Modulator (C02, C04, C06, C08, C10, C12, C14, C16)

Unit Type	HAL ST-8000A HF MODEM
Channel	MODULATOR STATUS

Unit # and Channel #	UNIT-x	CHANNEL-2	(Cxx)
MARK Frequency	xxxx Hz	/	xxxx.5 Hz
SPACE Frequency	xxxx Hz	/	xxxx.5 Hz
CENTER Frequency	xxxx Hz	/	xxxx.5 Hz
SHIFT Frequency	xxxx Hz		
BAUD Rate	xxxx Baud		
MODE	FSK		
POLARITY	NORMAL	/	REVERSE
HOLD	ON	/	OFF
MUTE	ON	/	OFF
CONTROL	LOCAL	/	REMOTE

#### 4.4.2 Long Format Examples

In the following examples, the command to the ST8000A is underlined.

##### C01G<CR>

HAL ST-8000A HF MODEM  
DEMODULATOR STATUS  
UNIT - 1    CHANNEL - 1    (C01)

-----  
MARK            = 1575 Hz  
SPACE           = 2425 Hz  
CENTER          = 2000 Hz  
SHIFT           = 850 Hz  
RATE            = 50 Baud  
MODE            = FSK  
POLARITY        = NORMAL  
HOLD            = OFF  
CODE            = ASYNC - 5 LEVEL  
REGEN           = OFF  
DIVERSITY       = OFF  
AMH             = ENABLED  
CONTROL         = REMOTE

##### C02G<CR>

HAL ST-8000A HF MODEM  
MODULATOR STATUS  
UNIT - 1    CHANNEL - 2    (C02)

-----  
MARK            = 1575 Hz  
SPACE           = 2425 Hz  
CENTER          = 2000 Hz  
SHIFT           = 850 Hz  
RATE            = 50 Baud  
MODE            = FSK  
POLARITY        = NORMAL

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HOLD           = OFF  
MUTE           = OFF  
CONTROL       = LOCAL

#### 4.4.3 Short Format

The short format is available for computer control applications where complete text responses are not required. The status returned is in the same form as the commands listed in Section 4.3. The short format is shown in Table 4.5.

TABLE 4.5  
SHORT COMMAND FORMAT

---

Demodulator (C01, C03, C05, C07, C09, C11, C13, C15)
CxxMxxxxSxxxxBxxxxJxNxHxYxDxAxRx<CR>
Modulator (C02, C04, C06, C08, C10, C12, C14, C16)
CxxMxxxxSxxxxBssssJxNxHxUxRx<CR>

#### 4.4.4 Short Format Examples

In the following examples, the command to the ST8000A is underlined.

C01G<CR>  
C01M1575S2425B0050J0N0H0W5Y0D0A1R1

C02G<CR>  
C02M1575S2425B0050J0N0H0U0R1

#### 4.4.5 Other Status Responses

The ST-8000A provides additional status information with other G commands. The responses to these commands are the same in long and short format. G command responses are shown in Table 4.6 and in the following examples.

TABLE 4.6  
G COMMAND RESPONSES

COMMAND	RESPONSE
G	- send selected channel status
G1	- show channel 1 status (DEMODULATOR)
G2	- show channel 2 status (MODULATOR)
G3	- show switch and jumper settings
G4	- show modem status
G5	- show firmware version

G Command Examples:

G3<CR>

HAL ST-8000A HF MODEM  
CONTROL OPTIONS  
PORT JUMPER SETTINGS

-----  
DATA I/O PORT INPUT [J2] = RS-232  
REMOTE CONTROL PORT [J7] = RS-232

CONTROL BOARD SWITCH SETTINGS

-----  
KEYLINE DELAY [SW1-SW2] = 0250 ms  
REMOTE CONTROL RATE [SW3] = 9,600 Baud  
UNIT NUMBER [SW4] = 1  
DEMODULATOR CHANNEL (CH 1) = C01  
MODULATOR CHANNEL (CH 2) = C02

Note: if an error is detected in the setup of any switch, an error message is included on the line. Errors include closing more than 1 switch position in SW3 or SW4. The error message is illustrated in the following example.

G3<CR>

HAL ST-8000A HF MODEM  
CONTROL OPTIONS  
PORT JUMPER SETTINGS

-----  
DATA I/O PORT INPUT [J2] = RS-232  
REMOTE CONTROL PORT [J7] = RS-232

CONTROL BOARD SWITCH SETTINGS

-----  
KEYLINE DELAY [SW1-SW2] = 02\_0 ms <<-- ERROR:INVALID SETTING  
REMOTE CONTROL RATE [SW3] = 9,600 Baud  
UNIT NUMBER [SW4] = 1  
DEMULATOR CHANNEL (CH 1) = C01  
MODULATOR CHANNEL (CH 2) = C02

G4<CR>

HAL ST-8000A HF MODEM  
SIGNAL STATUS

-----  
DATA I/O TXD INPUT = MARK  
DEMOM RXD OUTPUT = SPACE  
DATA I/O RTS INPUT = OFF  
REMOTE PORT BUSY IN = OFF  
  
RECEIVE SIGNAL LEVEL = -39 dBm  
LOSS OF SIGNAL (LOS) = ON

BIT: No Test Active.

G5<CR>

HAL ST-8000A HF MODEM  
SYSTEM INFORMATION

-----  
FIRMWARE VERSION = 1.7  
VERSION DATE =



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VERSION CHECKSUM =

RTS-CTS DELAY = 200 ms

DIVERSITY OPTION = NOT INSTALLED

4.4.6 HELP Page 1

The L or ? command will show the following HELP page, illustrated in Table 4.7.

Enter: L<CR> or L1<CR> or ?<CR>

TABLE 4.7  
HELP PAGE 1

HAL ST-8000A COMMAND SUMMARY		Page 1 of 3
-----		
CHANNEL	= Cxx	[01 - 16]
MARK / CENTER	= Mxxxx / Kxxxx	[300 - 3000]
SPACE	= Sxxxx	[300 - 3000]
SHIFT	= Vxxxx	[01 - 2700]
+.5 Hz	= Ex	[E0=OFF / E1=ON]
BAUD RATE	= Bxxxx	[30 - 1200]
FSK	= J0	(DEMODULATOR MODES)
MARK / SPACE	= Jx	[J1=MARK ONLY / J2=SPACE ONLY]
SYNCHRONOUS	= W0	
ASYNCHRONOUS	= Wx	[LENGTH = 5, 6, 7, or 8]
AUTO MARK HOLD	= Ax	[A0=DISABLE / A1=ENABLE]
COPY CHANNEL	= Px	[P1=CH1 / P2=CH2 / P0=DEFAULT]
DIVERSITY	= Dx	[D0=OFF / D1=ON]
HOLD	= Hx	[H0=OFF / H1=ON]
MUTE	= Ux	[U0=OFF / U1=ON]
POLARITY	= Nx	[N0=NORMAL / N1=REVERSE]
REGENERATION	= Yx	[R0=OFF / R1=ON]

NOTE: Enter L2<CR> or L3<CR> for more HELP.

4.4.7 HELP Page 2

The L2 command will show HELP page 2, Table 4.8.

Enter:            L2<CR>

TABLE 4.8  
HELP PAGE 2

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---

CHANNEL STATUS	=	G	[CURRENT CHANNEL]
CHANNEL 1 STATUS	=	G1	
CHANNEL 2 STATUS	=	G2	
CONTROL OPTIONS	=	G3	
SIGNAL STATUS	=	G4	
SYSTEM INFO	=	G5	
STOP ALL TESTS	=	T0	
AUTOMATIC BIT	=	T1	
SEND MARK TONE	=	T2	
SEND SPACE TONE	=	T3	
ALTERNATING M/S	=	T4	[AT CH 2 BAUD RATE]
ANALOG LOOPBACK	=	Tx	[T5=0 T6=-20 T7=-45 dBm]
BIT MENU	=	T9	
REMOTE DISPLAY	=	Qx	[Q0=M/S / Q1=CENT]
REMOTE ECHO	=	Xx	[X0=OFF / X1=ON]
REMOTE FORMAT	=	Fx	[F0=SHORT / F1=LONG]
REMOTE / LOCAL	=	Rx	[R0=LOCAL / R1=REMOTE]

NOTE: Enter L<CR> or L3<CR> for more HELP.

4.4.8 HELP Page 3

The L3 command will show HELP page 3, TABLE 4.9.

Enter:           L3<CR>

TABLE 4.9  
HELP PAGE 3

HAL ST-8000A KEYPAD TESTS

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---

TEST	KEYPAD SEQUENCE	PROMPT
AUTOMATIC BIT	2nd-BIT-ENTER	--
AUTOMATIC BIT	2nd-BIT-1-ENTER	--
SEND MARK TONE	2nd-BIT-2-ENTER	"/~~~"
SEND SPACE TONE	2nd-BIT-3-ENTER	"/___"
SEND MARK/SPACE	2nd-BIT-4-ENTER	"Alt "
LOOPBACK 0 dBm	2nd-BIT-5-ENTER	"LP 1"
LOOPBACK -20 dBm	2nd-BIT-6-ENTER	"LP 2"
LOOPBACK -45 dBm	2nd-BIT-7-ENTER	"LP 3"
REMOTE PORT ECHO	2nd-BIT-0.5-ENTER	"Echo"
REMOTE PORT QBF	2nd-BIT-REMOTE-ENTER	"Port"
CONTROL OPTIONS	2nd-BIT-CHAN-ENTER	--

NOTE: Enter L<CR> or L2<CR> for more HELP.

4.5 INTERNAL BIT

Internal Built-In-Test (BIT) options may be activated from the Remote Control port. When activated using the proper Tx command, a message is sent to the Remote Control terminal to confirm that the test is active. BIT is terminated with the T0 command.

A summary of the test confirmation messages follow for each Tx command: A typical T1 response is shown in Table 4.10.

Enter: T1<CR>

TABLE 4.10  
BIT T1 RESPONSE

```

HAL ST-8000A HF MODEM
BUILT-IN-TEST (BIT) SUMMARY
-----
1 .. Timer Frequency Test.... PASSED
2 .. EPROM Memory Test..... PASSED
3 .. RAM Memory Test..... PASSED
4 .. EEPROM Memory Test..... PASSED
5 .. Display Test..... PASSED
6 .. Loopback Test #1..... PASSED
7 .. Loopback Test #2..... PASSED
8 .. Loopback Test #3..... PASSED
9 .. Loopback Test #4..... PASSED
A .. Loopback Test #5..... PASSED
B .. Remote Port Test.....
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG'S BACK 0123456789
THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG'S BACK 0123456789
B .. Remote Port Test..... PASSED
C .. Deadman Timer Test..... PASSED

ST-8000A PASSED ALL TESTS.

```

Further Examples:

T2<CR>

BIT T2: Sending Constant MARK.  
Enter T0<CR> to End Test.

T0<CR>

T3<CR>

BIT T3: Sending Constant SPACE.  
Enter T0<CR> to End Test.

T0<CR>

T4<CR>

BIT T4: Sending Alternating MARK/SPACE.  
Enter T0<CR> to End Test.

T0<CR>

T5<CR>

BIT T5: Analog Loopback, 0 dBm.  
Enter T0<CR> to End Test.

T0<CR>

T6<CR>

BIT T6: Analog Loopback, -20 dBm.  
Enter T0<CR> to End Test.

T0<CR>

T7<CR>

BIT T7: Analog Loopback, -45 dBm.  
Enter T0<CR> to End Test.

T0<CR>

Two commands show the remote port user whether an internal test is presently active. The T command without a valid option number and G4 shows the current test status.

T<CR>

BIT T6: Analog Loopback, -20 dBm.

G4<CR>

HAL ST-8000A HF MODEM  
SIGNAL STATUS

-----  
DATA I/O TXD INPUT     =   SPACE  
DEMOD RXD OUTPUT       =   SPACE  
DATA I/O RTS INPUT     =   OFF  
REMOTE PORT BUSY IN    =   OFF  
  
RECEIVE SIGNAL LEVEL   =     0 dBm  
LOSS OF SIGNAL (LOS)   =   OFF

BIT T6: Analog Loopback, -20 dBm.

#### 4.6 ERROR MESSAGES

Error messages are displayed in either long or short format, depending on the current setup selection. When long format (F1) is selected, the text message shown below is reported followed by a CR or CR/LF pair. If short format (F0) is selected, the error response is the letter "E" followed by the error number and a CR or CR/LF pair. Long format errors responses are shown in Table 4.11.

TABLE 4.11  
REMOTE COMMAND ERROR RESPONSES

- 
- \* ERROR 0 - SYNTAX ERROR. \*  
Valid command letter is not followed by correct number,  
command ignored.
  - \* ERROR 1 - COMMAND / BOARD-TYPE MISMATCH. \*  
Command not suitable for selected channel, command ignored.
  - \* ERROR 2 - UNKNOWN COMMAND. \*  
Unknown command letter, command ignored.
  - \* ERROR 4 - UNIT IS NOT IN REMOTE MODE. \*  
Remote mode must be enabled, command ignored.
  - \* ERROR 5 - BAUD RATE IS TOO LOW. (30 BAUD MIN.) \*  
Baud rate is set to 30.
  - \* ERROR 6 - BAUD RATE IS TOO HIGH. (1200 BAUD MAX.) \*  
Baud rate is set to 1200.
  - \* ERROR 7 - FREQUENCY IS TOO LOW. (300 Hz MIN.) \*  
Frequency is set to 300.
  - \* ERROR 8 - FREQUENCY IS TOO HIGH. (3000 Hz MAX.) \*  
Frequency is set to 3000.
  - \* ERROR 9 - INPUT LINE TOO LONG. (80 CHARACTERS MAX.) \*  
Line is too long, entire line is ignored.



\* ERROR H - SHIFT FREQUENCY IS TOO HIGH. (2700 Hz MAX.) \*  
Command ignored.

#### 4.7 OPERATING PROCEDURES

The ST8000A is controlled either from the Front Panel or the remote control terminal.

##### 4.7.1 Local Operation

The front panel keypad is used for local operation. The commands may be entered in any sequence and saved by pressing the ENTER key. Each channel is selected by pressing the CHAN key until the desired channel is displayed. To clear an error in an entry, press the CLEAR key instead of the ENTER key.

##### 4.7.1.1 Standby Operation

The following function can place a channel in standby:

Enter AMH to select AUTO MARK HOLD for the selected channel. AMH sets the output to a steady MARK when the input signal level drops below the preset level.

##### 4.7.1.2 Shut-Down

The ST8000A does not require any special procedure to turn OFF power. The current operating parameters are stored in memory when power is removed.

##### 4.7.2 Remote Operation

##### 4.7.2.1 Start-up

When the ST8000A is turned ON, remote operation can be accessed by the local or remote command. Entering REMOTE from the keypad places the unit into remote operation and disables the keypad. Command "R1" from a remote terminal places the unit into remote operation when the unit is address. Any keypad entry, except for REMOTE, is ignored when the remote operation is enabled.

##### 4.7.2.2 Standby Operation

The following functions can place a channel in standby:

Enter "A1" on the remote terminal to select AUTO MARK HOLD for the selected channel. AMH sets the output to a steady MARK when the input signal level drops below the preset level.