

5.0 PROGRAMMING TERMINAL COMMUNICATIONS

Local monitoring of a Remote I/O module, Remote I/O Head, or Remote Drive Interface Head is performed with an ASCII terminal or a personal computer running terminal-emulation software connected to the RS-232 port on the faceplate of the module. Note that the Shark Interface module does not support the programming terminal functions.

The RS-232 port is factory-configured for a data rate of 1200 baud, 8 data bits per character in transmit and receive, 1 stop bit, and no parity. The AutoMax Programming Executive includes the Kermit communications software, which allows your personal computer to emulate an ASCII terminal. Refer to the Kermit Reference manual (J-3616) for instructions on using the Kermit software. Figure 5.1 illustrates an example in which the user monitors slave drop 1 status from a terminal or personal computer connected to the Remote I/O module in this drop.

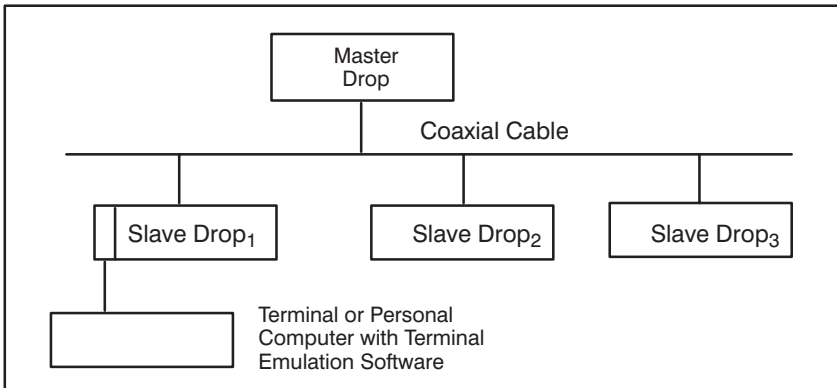


Figure 5.1 - Drop Status Monitoring

5.1 Remote I/O Module (M/N 57C416)

There are four commands from the terminal that are recognized by the Remote I/O module: T, S, R, and W. These commands are described below. All entries on the terminal must be made in capital letters.

5.1.1 Self Test (T)

This command is valid only if the Power Supply's keyswitch is in the Program position and the line is inactive, i.e., no communication is taking place on the Remote I/O network. Entering "T" initiates the power-up sequence and the self-diagnostic test of the Remote I/O module.

While the self test is executing, access to the dual port memory from the Multibus is inhibited. Any attempted accesses to the module will cause a bus error.

Therefore, if application tasks running on a Processor module in the master rack access variables on this Remote I/O module, you should stop the application tasks before doing the self-test to avoid shutting down the system with a bus error.

5.1.2 Status (S)

Entering "S" will display at the operator's console all the parameters associated with the module. All line statistic parameters will increase to 65535 and then roll over to zero. All drops will display the following status information:

```
SOFTWARE PART NUMBER 419451-0nnx
(nn is the part version number; x is the part revision number)
CHASSIS IS             ACTIVE or INACTIVE
LINE IS               ACTIVE or INACTIVE
MODE IS               PROGRAM, MEMORY PROTECT
                    (NORMAL), or SETUP
DROP NUMBER           0 through 7
MESSAGES RECEIVED:   n
  RECEIVE TIMEOUTS   n
  CRC ERRORS         n
  OVERRUN ERRORS     n
  ABORT ERRORS       n
MESSAGES SENT:       n
```

where:

MESSAGES RECEIVED is the total number of messages received by the module. While the line is inactive, this value will remain unchanged. While the line is active, it will constantly increase in value.

RECEIVE TIMEOUTS is the total number of timeouts that have occurred while the drop was waiting for a message to be received. While the line is inactive, the master module will indicate a value fluctuating between 0 and 3 and the slave module will indicate a value of 0.

CRC ERRORS is the total number of cyclic redundancy check errors that have occurred since the last reset of the module. This number should ideally remain equal to zero.

OVERRUN ERRORS is the total number of message overrun errors that have occurred since the last reset of the module. This number should ideally remain equal to zero.

ABORT ERRORS is the total number of message abort errors that have occurred since the last reset of the module. This number should ideally remain equal to zero.

MESSAGES SENT is the total number of messages transmitted by the module. While the line is inactive, this value for the master module will rapidly increase since "init request" messages are constantly being sent. For the slave modules, it will remain unchanged. While the line is active, this value will constantly increase.

The four error parameters (RECEIVE TIMEOUTS, CRC, OVERRUN, and ABORT) indicate coaxial line integrity (or lack of it). A few errors may accumulate over a period of time, such as hours or days, but when these parameter values increase consistently over a period of

seconds, there is a problem with integrity. Refer to chapter 6 for the troubleshooting procedure.

In addition to the above status information, the Status command will display the I/O configuration of the local rack for slave drops. The following column header will be displayed:

SLOT REGISTER I/O

where:

SLOT = 0-15

REGISTER = 0-31

I/O = INPUT - Register is READ ONLY
OUTPUT - Register is either READ ONLY or READ/WRITE

5.1.3 Read Slot (R)

This command is used to read the registers on an I/O module in the drop. When "R" is entered, you will be prompted for a slot number. When the slot number (followed by a carriage return) is entered, the data from that particular slot in the slave drop will be displayed. Data will be displayed in hexadecimal, decimal, and binary formats with the following headers:

REGISTER I/O HEX DEC BIN

5.1.4 Write Slot (W)

Entering "W" enables you to write or modify data in a register or an output module in a specified slot of the slave drop. The Power Supply keyswitch must be in the Program position and the line must be inactive, that is, no communication is taking place on the Remote I/O network. Data can be written in decimal (default format), in hexadecimal, or in binary.

WARNING

BEFORE PERFORMING THE WRITE SLOT COMMAND, THE USER MUST VERIFY THAT THE OUTPUTS ARE EITHER ELECTRICALLY DISCONNECTED OR WILL NOT CAUSE UNEXPECTED MACHINE MOTION IF ENERGIZED. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

You will need to respond to the following prompts:

WRITE SLOT: Enter the slot number followed by a carriage return.

REGISTER: Enter the register number (0 to 31) followed by a carriage return.

NEW DATA: Enter the new data in one of the three formats followed by a carriage return.

HEX: (Hexadecimal) Enter a leading 0, then any hexadecimal characters 0 through F. The data is right justified if less than four hexadecimal characters are entered.

DEC: (Decimal) Enter data using any digits 0 through 9.

BIN: (Binary) Enter a leading B, then any valid combination of 1s and 0s. The data is right justified if less than 16 bits are entered.

The WRITE function will then display the current values of all registers located at the specified slot with the following headers:

REGISTER HEX DEC BIN

5.2 Remote Heads (M/N 57C328, M/N 57C329, and M/N 57C330)

There are five commands from the terminal that are recognized by the Remote Heads: T, S, C, R, and W. These commands are described below.

5.2.1 Self Test (T)

Entering "T" initiates the power-up sequence and the self-diagnostic test of the Remote Head. This command is valid only if the line is inactive, i.e., no communication is taking place on the Remote I/O network. Therefore, it can be used to recognize a new drop number (using the thumbwheel switch) without cycling power to the Head.

5.2.2 Status (S)

Entering "S" will display at the operator's console all the parameters associated with the module. All line statistic parameters (other than PORT RETRIES) will increase to 65535 and then roll over to zero. All drops will display the following status information:

```
SOFTWARE PART NUMBER 419451-1nnx
(nn is the part version number; x is the part revision number)
LINE IS                ACTIVE or INACTIVE
DROP NUMBER            1 through 7
MESSAGES RECEIVED:    n
RECEIVE TIMEOUTS      n
CRC ERRORS             n
OVERRUN ERRORS        n
ABORT ERRORS          n
MESSAGES SENT:        n
LAST RESET:           zz
PORT RETRIES (P0, P1, P2, P3): n, n, n, n
```

where:

MESSAGES RECEIVED is the total number of messages received by the drop. While the line is inactive, this value will remain unchanged. While the line is active, it will constantly increase in value.

RECEIVE TIMEOUTS is the total number of timeouts that have occurred while the drop was waiting for a message to be received. While the line is inactive, the slave drop will indicate a value of 0.

CRC ERRORS is the total number of cyclic redundancy check errors that have occurred since the last reset of the drop. This number should ideally remain equal to zero.

OVERRUN ERRORS is the total number of message overrun errors that have occurred since the last reset of the drop. This number should ideally remain equal to zero.

ABORT ERRORS is the total number of message abort errors that have occurred since the last reset of the drop. This number should ideally remain equal to zero.

MESSAGES SENT is the total number of messages transmitted by the drop. While the line is inactive, this value for the slave drops will remain unchanged. While the line is active, this value will constantly increase.

LAST RESET is a non-volatile register that contains the cause of the latest software reset. Upon initial power-up, the “zz” parameter should be equal to “NONE”. If no software restarts occur during operation, the “zz” parameter will remain “NONE.” The other possible values of “zz” are:

- LE reset due to excessive line errors of any kind (Receive Timeouts, CRC, Overrun, Abort).
- UI reset due to “Unexpected Init” request message.
- PF reset due to a “Power Fail” interrupt that occurred while the line was active. Input power has to remain valid (i.e., the power failure must be a spurious interrupt, line notch or line dip) for this code to be stored and displayed.
- Pn reset due to a port (rail) fault detected during the most recent port I/O update cycle. “n” equals the port number (0-3) that experienced the fault. (M/N 57C328 and M/N 57C330 only).

PORT RETRIES (P0, P1, P2, P3) is the number of port operations retried on each port. These values will increase to 255 and then roll over to 0. Ideally, these values should remain equal to zero.

The five error parameters (RECEIVE TIMEOUTS, CRC, OVERRUN, ABORT, and PORT RETRIES) indicate high speed line integrity (or lack of it). A few errors may accumulate over a period of time, such as hours or days; but when these parameter values increase consistently over a period of seconds, there is a problem with integrity. See section 6.5 for the troubleshooting procedure.

In addition to the above status information, the Status command will display the I/O configuration of the local drop. The following column header will be displayed:

PORT REGISTER I/O

where:

PORT	=	0-3	
REGISTER	=	0-3	
I/O	=	'	- No rail exists
		'unknown'	- Rail exists but it has not been determined whether it is INPUT or OUTPUT (M/N 57C330 only)
		'INPUT'	- Rail exists and contains INPUT modules
		'OUTPUT'	- Rail exists and contains OUTPUT modules
		'INPUT/ OUTPUT'	- Rail exists (M/N 57C328 only)

5.2.3 Clear (C)

The Clear command is used to clear the two-digit LAST RESET code and the PORT RETRIES counters. When "C" is entered, "CLEARED" will be displayed for the LAST RESET and PORT RETRIES fields.

5.2.4 Read Port (R)

The Read Port command is used to read the registers on a rail attached to the Head. When "R" is entered, you will be prompted for a port number. When the port number (0-3, followed by a carriage return) is entered, the data from that particular port will be displayed. Data will be displayed in hexadecimal, decimal, and binary format:

REGISTER I/O HEX DEC BIN

5.2.5 Write Port (W)

Entering "W" enables you to write data to an output rail or an output register on a drive. This command is valid only when the serial line is inactive. Data can be written in decimal (default format), in hexadecimal, or in binary.

WARNING

BEFORE PERFORMING THE WRITE SLOT COMMAND, THE USER MUST VERIFY THAT THE OUTPUTS ARE EITHER ELECTRICALLY DISCONNECTED OR WILL NOT CAUSE UNEXPECTED MACHINE MOTION IF ENERGIZED. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

You must respond to the following prompts:

WRITE PORT: Enter the port number (0-3) followed by a carriage return.

REGISTER: Enter the register number (0 to 3) followed by a carriage return.

At this point, if the entered rail location cannot be written to because the register does not exist or the rail is an input rail, the appropriate error message will be displayed and the operation will be terminated.

If the entered rail location exists but has not yet been defined as INPUT or OUTPUT, the following prompt will be displayed (M/N 57C330 only):

This register has not been defined as INPUT or OUTPUT. If you continue and write data to this register, it will be defined as an output. Do you wish to continue and define this register as output? (Y/N)

If you enter anything other than "Y" (Yes), the operation will be terminated. If "Y" is entered, the register will be defined as OUTPUT and the operation will continue. You will be prompted:

NEW DATA: Enter the new data followed by a carriage return. The data can be entered in any one of the following formats:

HEX: (Hexadecimal) Enter a leading 0, then any hexadecimal characters 0 through F. The data is right-justified if less than four hexadecimal characters are entered.

DEC: (Decimal) Enter data using any digits 0 through 9.

BIN: (Binary) Enter a leading B, then any valid combination of 1s and 0s. The data is right-justified if less than 16 bits are entered.

The WRITE function will then display the current values of all registers located at the specified port using the following display format:

REGISTER HEX DEC BIN