Chapter 7
Test Mode Operation

GENERAL

Diagnostic tests are used to isolate faults in the communications path. Diagnostic tests will terminate after the period of time specified by *S18*. If *S18* is set to 0, the timer is disabled and tests will run continuously. Tests may also be terminated by the *&T* command. When in test modes without test pattern, issue the escape sequence +++ to return to command mode before terminating the test with the *&T* command.

☞ **Note**

   Local analog loopback with or without test pattern is the only test available in protocol mode.

Test Categories

Diagnostic tests fall into two categories: those with test patterns and those without. Refer to Table 7-1.

Table 7-1. Test Operating Mode Requirements

Test	Offline	Online
LAL (Local Analog Loopback)	X	X
LAL/TP (Local Analog Loopback with Self Test)	X	X
LDL (Local Digital Loopback)		X
RDL (Remote Digital Loopback)		X
RDL/TP (Remote Digital Loopback with Self Test)		X
TP (Test pattern)		X

☞ **Note**

   These tests do not apply to fax mode and should only be performed when the modem is configured for data operation.

LDL, RDL, and RDL/TP tests are initiated after making an online data connection in normal or direct mode only. LAL and LAL/TP are initiated while in offline command mode. These tests can be initiated by AT commands or by using the LCD front panel SELECT TEST menus. Refer to Table 7-2.

Table 7-2. Test Commands

Command	Operation
&T	Terminate any test
&T1	Initiate local analog loopback test
&T3	Initiate local digital loopback test
&T4	Grant remote requested digital loopback *
&T5	Deny remote requested digital loopback
&T6	Initiate remote digital loopback test
&T7	Initiate remote digital loopback with test pattern
&T8	Initiate local analog loopback test with test pattern
%T	Transmit test pattern

* default

Terminating a Test in Progress   &T

Tests can be terminated manually or automatically. The *&T* command terminates a test manually. The modem automatically goes to command mode during LDL, LAL/TP, and RDL/TP tests. Enter the *&T* command to terminate the tests.

For LAL and RDL, enter the escape sequence before the *&T* command to go to the command mode.

By preloading register *S18* with 1 to 255, each test mode automatically times out after the specified number of seconds and exits back to the command mode. Loading *S18* with 0 disables the auto timeout feature and the test will run continuously until manually terminated.

For example:

To   Run the self test analog loopback test for 30 seconds

Enter   ATS18=30&T8

The modem should respond with 000 after 30 seconds.

TESTING THE LOCAL MODEM

Test local operation with the modem offline in command mode. Use LAL and LAL/TP to test the local modem and the communications to the local DTE.

Local Analog Loopback   &T1

In Local Analog Loopback the modem transmitter connects to its receiver so the analog signal normally sent over the telephone line is received locally.

If operating on leased lines, the lines are terminated into 600 ohms (Table 7-1). If off hook on a dial-up line, the modem is forced on hook.
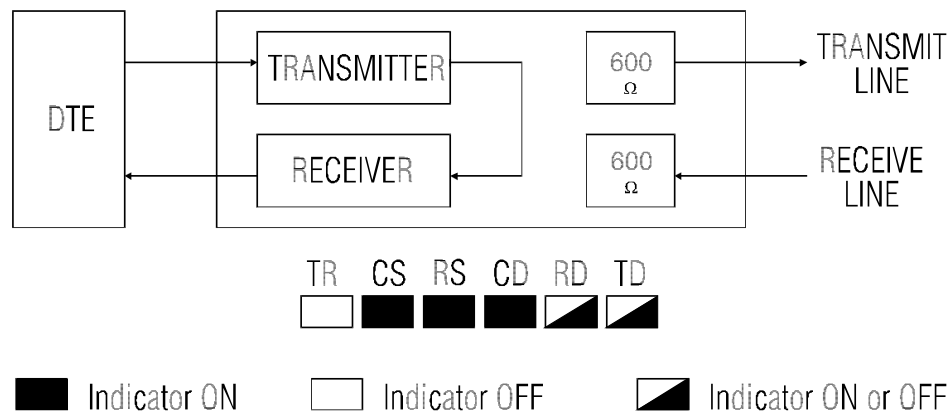
Figure 7-1   Local Analog Loopback
(4-Wire Operation and 2-Wire Operation)

For 2-wire operation, Analog Bilateral Loopback is invalid. In 4-wire operation, Analog Bilateral Loopback connects the receive line to the transmit line through a buffer amplifier.

☞ **Note**
Figures 7-1 through 7-5 include LED test indications.
These indications are valid when DTE options are set by
factory option set #1 and RTS is active from the DTE.
Where indicated, RD and/or TD may be on, off, or flashing
depending on the type of DTE and its operating state.

Test the local DTE and cable by entering the *&T1* command. Enter a test message and verify it is echoed on the screen. If the message is not returned exactly as entered, the terminal equipment or data cable is at fault.

To determine if the data cable is defective replace it with a properly configured cable with electrical continuity. If the cable checks out but the problem remains, the DTE is defective.

If all local equipment checks out, proceed to the Testing the Remote Modem section in this chapter.

Issue an escape sequence followed by *&T1* to exit analog loopback.

Local Analog Loopback with Self Test   &T8

When the modem is offline in command mode, enter the *&T8* command to put the modem in self test local analog loopback (Table 7-2).

The modem transmits a test pattern. The test pattern is looped back to the receiver and checked for errors. Entering the *&T* command causes the modem to exit self test analog loopback. The modem responds with a three digit value between 0 and 255 representing the number of errors during test pattern detection. If errors occur, repeat the test to verify the consistency of the problem.
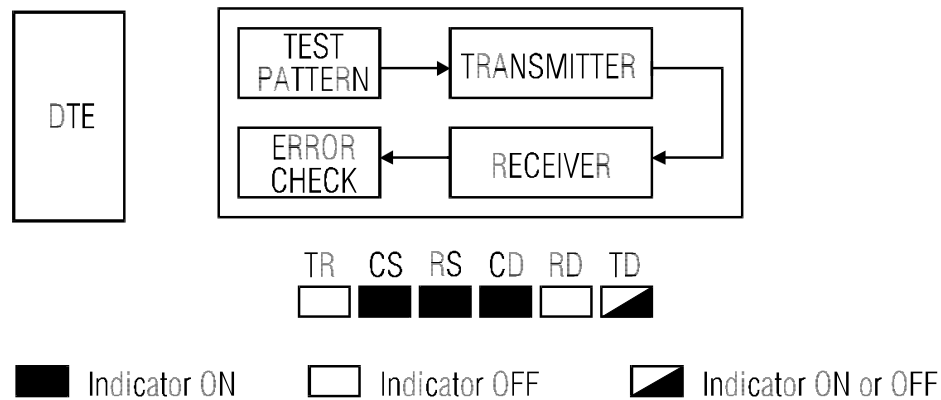
Figure 7-2 Local Analog with Test Pattern

TESTING THE REMOTE MODEM

Use LDL, RDL, and RDL/TP in the online data mode to test the remote modem and phone line. Enter the escape sequence after making a connection to return to command mode. The appropriate test command, *&T3, &T6,* or *&T7,* can then be entered to initiate an online test.

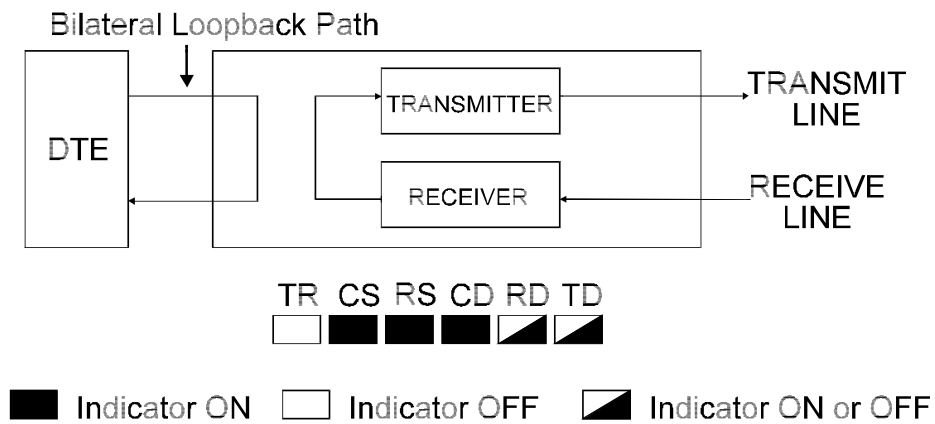## Local Digital Loopback   &T3

After making the data connection, enter the escape sequence to return to command mode. Entering *&T3* puts the local modem in digital loop-back. The remote operator can now send a test message which is looped back to the remote terminal screen.

If the test timer *(S18)* was loaded before issuing the *&T3* command the local modem exits the test after the specified number of seconds and returns to command mode. If not, enter *&T* to exit the test. Enter the command to return to online data mode.

The local modem receiver connects to its transmitter so received data is retransmitted to the remote site.

If Digital Bilateral Loopback is enabled locally, the local DTE is looped back to itself (Table 7-3). If disabled, the local DTE receives a constant mark.

Figure 7-3 Local Digital Loopback
with Bilateral Loopback Enabled

Grant/Deny RDL Request   &T4, &T5

Local operators can deny a request from the remote modem for remote digital loopback.

To   Allow your modem to be placed in RDL by a
   remote operator

Enter   AT&T4

To   Prevent your modem from entering RDL

Enter   AT&T5

Remote Digital Loopback   &T6

The initiating modem signals the remote modem to go to Digital Loop-back. The remote modem receives and then retransmits data back to the local modem. If Digital Bilateral Loopback is enabled on the remote modem, the remote DTE is looped back to itself (Figure Table 7-4).
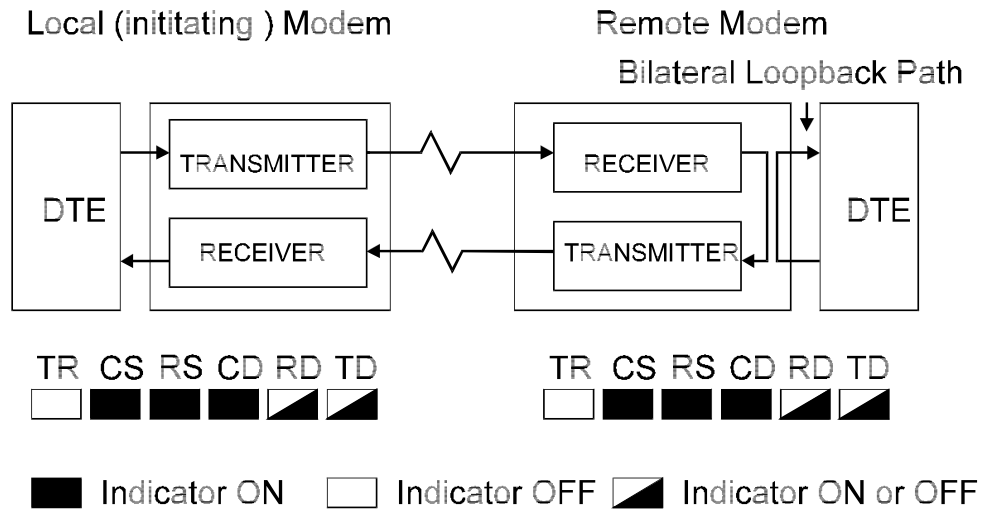
Figure 7-4 Remote Digital Loopback with
Digital Bilateral Loop Enabled at the Remote Site

After making the data connection, enter the escape sequence to return to command mode. Entering *&T6* places the remote modem in digital loopback provided the remote operator enters the *&T4* command to allow an RL request. Enter a test message and verify the message is being looped back to your terminal screen. If the message is incorrect, use the analog loopback tests on both modems to isolate the problem. If both modems run analog loopback without errors, the problem could be with the phone line.
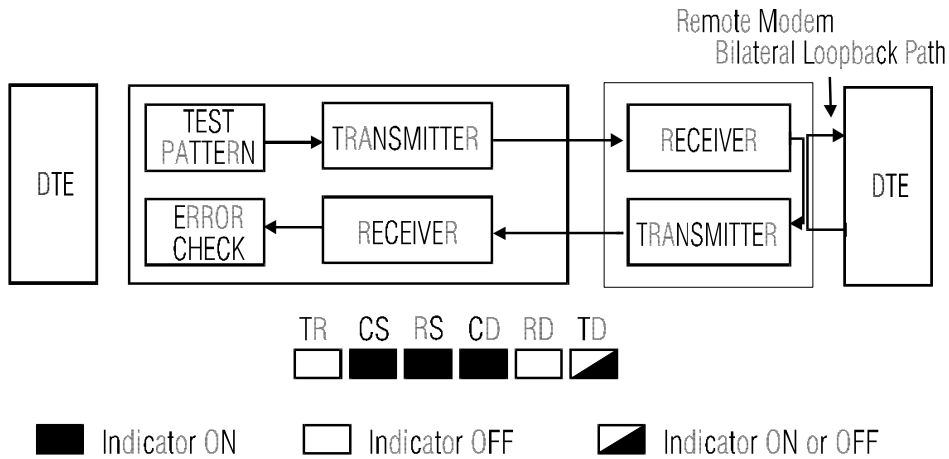
Remote Digital Loopback with Self Test   &T7

After making the data connection, enter the escape sequence to return to command mode. Entering *&T7* places the remote modem in digital loopback provided the remote operator enters *&T4* to allow an RL request. Once in RDL/TP, the local modem transmits a test pattern and

automatically verifies that the remote modem is looping the pattern back (Table 7-5). Enter *&T* to exit RDL/TP and return to command mode. Enter the O command to return online in data mode.

Exiting RDL/TP the modem responds with a three digit value between 0 and 255 representing the number of errors which occurred during test pattern detection. If errors occurred repeat the test several times to verify the consistency of the problem, then use the analog loopback tests to isolate the problem.

Remote Modem
Bilateral Loopback Path

| DTE | TEST PATTERN → TRANSMITTER | RECEIVER | DTE |
| | ERROR CHECK ← RECEIVER | TRANSMITTER | |

TR   CS   RS   CD   RD   TD

■ Indicator ON   □ Indicator OFF   ◪ Indicator ON or OFF

***Figure 7-5 Local Modem Initiating Remote Digital Loopback
with Test Pattern***

Test Pattern   %T
In Test Pattern, transmit data from the local DTE is blocked and replaced by a V.52 compatible test pattern. When the modem transmits the test pattern, it expects to receive the same pattern.

Bilateral Test Enable / Disable   *DG

Enable or disable bilateral test functions.

Command	Operation
*DG	Bilateral digital loop disabled *
*DG1	Bilateral digital loop enabled

* default

DTE Controlled Remote Digital Loopback (Pin 21)   *RD

To enable DTE controlled remote digital loopback, enter *RD1.
Enabled, the modem goes into remote digital loopback when it detects
an off-to-on transition of pin 21 while in the online data mode. Test
ends when it detects an on-to-off transition of pin 21 and then returns to
online data mode. To disable this function enter the *RD command.

Command	Operation
*RD	Ignore pin 21 *
*RD1	RDL enabled (pin 21)

* default

☞ **Note**

*If the test timeout option is enabled and pin 21 remains
high, the modem returns to online mode at the end of the test
timeout period and will not re-enter the test mode until an
off-to-on transition of pin 21 is detected.*

DTE Controlled Local Analog Loopback (Pin 18)   *LA

To enable DTE controlled local analog loopback test, enter *LA1.
Enabled, the modem goes into local analog loopback when it detects an
off-to-on transition of pin 18. Test ends when it detects an on-to-off
transition of pin 18. To disable, enter *LA.

Command	Operation
*LA	Ignore pin 18 *
*LA1	LAL enabled (pin 18)

* default

☞ **Note**

If the test timeout option is enabled and pin 18 remains high, the modem returns to idle mode at the end of the test timeout period and will not re-enter the test mode until an off-to-on transition of pin 18 has been detected.