BLACK BOX®

NETWORK SERVICES

CSU/DSU 56/64

FEDERAL COMMUNICATIONS COMMISSION
AND
CANADIAN DEPARTMENT OF COMMUNICATIONS
RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par le ministère des Communications du Canada.

FCC REQUIREMENTS FOR
TELEPHONE-LINE EQUIPMENT

This equipment complies with Part 68 of the FCC rules. The unit bears a label which contains the FCC registration number. If requested, this information must be provided to the telephone company.

[Where we have the information for a given product, include this paragraph here:] This equipment uses RJ-xxX plugs and jacks for network connection. The Facility I/F Code is xxxxx and the Service Order Code is x.xX. When you are ready to install this unit, contact your local Telephone Company and supply them with this information.

This equipment has an FCC-compliant modular jack. It is designed to be connected to the telephone network or premise wiring using compatible modular plugs and cabling which also comply with the requirements of the FCC Part 68 rules.

In the unlikely event that this equipment causes harm to the telephone network, the telephone company has the right to temporarily disconnect your service. The telephone company will try to warn you in advance of such disconnection, but if advance notice is not practical, it may disconnect the service first and notify you as soon as possible afterwards. In the event such a disconnection is deemed necessary, you will be advised of your right to file a complaint with the FCC.

From time to tme, the telephone company might make changes in its facilities, equipment, or operations that could affect the operation of this equipment. If this occurs, the telephone company is required to provide you with advance notice so you can make the modifications necessary to maintain uninterrupted service.

CERTIFICATION NOTICE FOR
EQUIPMENT USED IN CANADA

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications-network protective, operation, and safety requirements. Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single-line individual service may be extended by means of a certified connector assembly (extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized maintenance facility—in this case, Black Box. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION:

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.

2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.

3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.

4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El parato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equio eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

   A: El cable de poder o el contacto ha sido dañado; u

   B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

   C: El aparato ha sido expuesto a la lluvia; o

   D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

   E: El aparato ha sido tirado o su cubierta ha sido dañada.

Contents

1. Specifications

Speed—56/64 kbps

Interface—Loop interface: 4-wire, full-duplex, DTE interface: V.35, full- or half-duplex

Connectors—(1) RJ-45 female, (1) V.35 (M34)

Diagnostics—

*Network test center activated***:** CSU loopback on sealing current reversal in local loop, DSU loopback

*User activated***:** Self-test, Local loopback, V.54 activated remote loopback with 2047 test pattern or DTE data/data from external test set

Receiver Sensitivity—-45 dB

Temperature—Operating: 32° to 122° F (0° to 50° C), Storage: -4° to 158° F (-20° to 70° C)

Humidity—Up to 95% non-condensing

Power—115 VAC, 60 Hz, 2 W

Size—1.6"H x 6.5"W x 8.2"D (4.1 x 16.5 x 20.8 cm)

Weight—1.5 lb. (0.7 kg)

2. Introduction

2.1 General Description

The CSU/DSU 56/64 is a no-frills, high-performance Channel Service/Data Service Unit (CSU/DSU) that provides the interface between telco-provided Digital Data Service (DDS) and your Data Terminal Equipment (DTE). The CSU/DSU 56/64 supports both 56-kbps and 64-kbps loop service rates, with the DTE interface rate matching the selected loop rate. A synchronous V.35 interface is provided for the DTE interface. You can configure and set up the unit via a single eight-position DIP switch that is accessible from the back panel of the unit.

2.2 Physical Description

The DSU 56/64 is a single stand-alone unit designed to be used either on a desktop or mounted on a wall. The physical measurements of the DSU 56/64 are listed in **Chapter 1**.
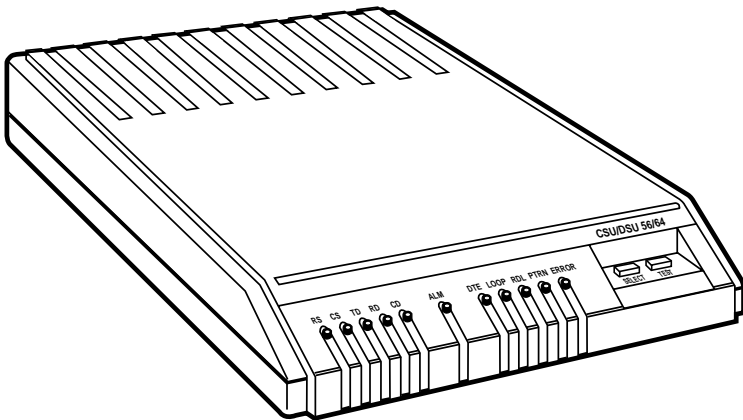
Fig. 2-1. CSU/DSU 56/64.

2.3 Front Panel

As shown in **Fig. 2-1**, there are eleven Light Emitting Diode (LED) indicators and two TEST buttons on the front panel of the CSU/DSU 56/64.

2.3.1 LED IDENTIFICATION

The LEDs display DTE interface, network, and test status.

DTE Status: GREEN Indicators

- RS—Request to Send from DTE

- CS—Clear to Send from DSU

- TD—Transmit Data from DTE

- RD—Receive Data from DSU

- CD—Carrier Detect from DSU

NOTE

The active state for the status indicators (RS, CS, and CD) is on, but the on state for the data indicators (TD and RD) represents a SPACE condition.

Network Status: RED Indicator

- ALM—On indicates a problem on the local loop or within the DDS Network. Off indicates normal loop and network conditions.

Test Status/Error: (YELLOW/RED) Indicators

- DTE—On solid indicates DTE interface test in progress. Flashing indicates that Loop Interface test (CSU Loopback) has been initiated by telco.

- LOOP—On solid indicates that loop interface test has been initiated from local DSU. Flashing indicates loop interface test (CSU or DSU Loopback) has been initiated by telco.

- RDL—On solid indicates that remote digital loopback test has been initiated from the local DSU. Flashing indicates that remote digital loopback test has been initiated from the remote DSU.

- PTRN—On solid indicates that integral pattern generator is being used for testing.

- ERROR—On indicates that errors are being detected during a test or that a test cannot be properly initiated.

NOTE

Tests defined by the above indicators are explained in greater detail in Chapter 4.

2.3.2 TEST BUTTONS

The front panel also has two push-button switches for selecting and controlling the various test modes for the CSU/DSU 56/64:

- SELECT—Each time this button is pushed, a valid test mode is indicated by one or more LEDs being turned on solid.

- TEST—Once the desired test mode is displayed on the test status indicators, the test is initiated by pushing the button. Pushing the button again terminates any test in progress.

2.4 Rear Panel

The rear panel of the CSU/DSU 56/64 is shown in **Fig. 2-2**. The 34-pin connector labeled PRIMARY V.35 provides the synchronous DTE interface. Connection to the DDS network is made via the eight-pin modular jack (RJ-45) labeled TELCO. The pin assignments for these connectors are described in **Network Connections, Section 3.4**, and **DTE Connector, Section 3.5**.
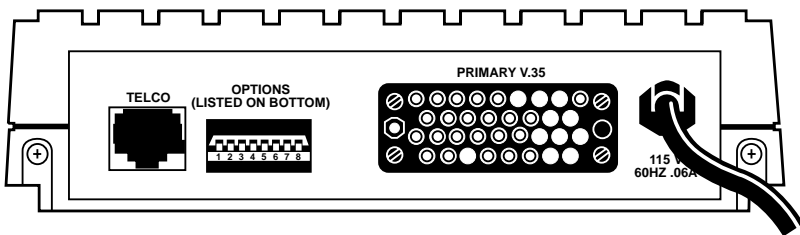
Fig. 2-2. CSU/DSU 56/64 Rear Panel.

Select all setup or configuration parameters for the CSU/DSU 56/64 via the eight-position DIP switch. You can access this switch, labeled OPTIONS, from the rear panel. The label also references the options chart located on the bottom of the unit. The individual options are explained in detail in **Configuration, Section 3.3**. The power cord on the rear panel of the DSU 56/64 is mechanically secured to the back panel and provides the connections to the integral power supply.

3. Installation

3.1 Unpacking

Carefully inspect the CSU/DSU 56/64 for any shipping damages. If damage is suspected, file a claim immediately with the carrier and then contact your dealer. If possible, keep the original shipping container for shipping the unit back for repair or for verification of damage during shipment.

Your package includes:

• CSU/DSU 56/64

• Network interface cable: 8-position modular to 8-position modular

• This user's manual

You must provide:

• DTE Cable

3.2 Power Up

The CSU/DSU 56/64 is equipped with a captive six-foot power cord that is terminated with a three-prong plug for connecting to a grounded power receptacle.

NOTE

Use a grounded, 115 VAC, 60 Hz receptacle to power the CSU/DSU 56/64.

When plugged into a source of AC power, the CSU/DSU 56/64 performs a self-test to verify all LED indicators plus various circuit blocks within the unit. See **Self-Test, Section 4.1**.

3.3 Configuration

The CSU/DSU 56/64 has eight options for controlling the operation of both the network and DTE interfaces. These options are selected by setting individual switches on the eight-position DIP switch that is accessible from the rear panel. A chart showing the options and switch settings is attached to the bottom of the unit.

3.3.1 CLEAR TO SEND (CS)—SW 1

DOWN—NORMAL

In the DOWN position, CS follows the RS lead with the selected amount of delay. The only exceptions to this occur when network or test conditions prevent data from being transferred over the DTE interface. During these conditions, CS is turned off.

UP—ON

CS is forced on all the time.

3.3.2 CLEAR TO SEND DELAY (CS DELAY)—SW 2

When the switch is in the DOWN—SHORT position, the RS-to-CS delay is 250 µs ±125 µs.

When the switch is in the UP—LONG position, the RS-to-CS delay is 10 µs ±125 µs.

3.3.3 ANTISTREAM—SW 3

The ANTISTREAM option is used to select the antistream timeout. The antistream timeout is the maximum time the CSU/DSU 56/64 is allowed to transmit data from the DTE into the network. This feature prevents one DTE device on a multi-drop network from continuously tying up the transmit circuit from a remote CSU/DSU back to the master CSU/DSU.

The antistream timer is reset to zero when RS transitions to the active state and is updated every second while RS is active. When the antistream timeout expires, the CSU/DSU 56/64 stops transmitting DTE data into the network. It does, however, continue to accept data. CS is maintained in the active state until the DTE deactivates the RS input.

When SW3 is DOWN—OFF, the ANTISTREAM timer is disabled.

When SW3 is UP—ON, the ANTISTREAM timer is enabled and set for 45 ±0.5 seconds.

3.3.4 CARRIER DETECT (CD)—SW 4

When SW 4 is DOWN—NORMAL, CD is on any time customer data is being received and off when the receive circuit is idle, not carrying customer data.

When SW4 is UP—ON, CD is forced on all the time.

3.3.5 DATA SET READY (SR)—SW5

When SW5 is DOWN—ON, SR is forced on all the time.

When SW5 is UP—NORMAL, SR is turned off only when the network is out of service or a test is in progress.

3.3.6 REMOTE DIGITAL LOOPBACK (RDL)—SW6

When SW6 is DOWN—ENABLE, the CSU/DSU 56/64 accepts the industry-standard V.54 RDL command from the far end of the circuit.

When SW6 is UP—DISABLE, the CSU/DSU 56/64 does not respond to the V.54 loopback command from the far end of the circuit.

3.3.7 RATE—SW7

When SW7 is DOWN—56 kbps, the network interface of the CSU/DSU 56/64 is configured for operation at 56 kbps.

When SW7 is UP—64 kbps, the network interface is configured for 64-kbps operation.

3.3.8 SCRAMBLER—SW8

For 64-kbps clear-channel operation, there is a possibility that the DTE data sequences might mimic network loop-maintenance functions and erroneously cause other network elements to activate loopbacks. To prevent this, the SCRAMBLER switch should be set to the DOWN (ON) position.

The SCRAMBLER ON option must be selected in both the local and remote CSU/DSU 56/64 units for the situation described above. This option is valid only when the 64 kbps rate is selected.

When SW8 is DOWN—ON, the scrambler is enabled.

When SW8 is UP—OFF, the scrambler is disabled.

3.4 Network Connections

This interface consists of four leads that are paired to provide separate transmit and receive circuits. The four leads are provided on the eight-position modular jack DSU RJ-45 labeled TELCO on the rear panel of the CSU/DSU 56/64. The pin assignments for the connector are shown in **Table 3-1**.

Table 3-1. DTE Pin Connection.

Pin	Function	Description
1	Transmit Data (R1)	From customer to network interface
2	Transmit Data (T1)	From customer to network interface
3-6	Not used	
7	Receive Data (T)	From network interface to customer
8	Receive Data (R)	From network interface to customer

3.5 DTE Connector

The Data Terminal Equipment is attached to the connector labeled Primary V.35 on the back of the CSU/DSU 56/64. **Table 3-2** shows the pin assignments for all pins used on this connector.

Table 3-2. DTE Pin Assignments.

Pin	CCIT	Description
A	101	Protective Ground (PG)
B	102	Signal Ground (SG)
C	105	Request to Send (RS)
D	106	Clear to Send (CS)
E	107	Data Set Ready (SR)
F	109	Received Line Signal Detector (CD)
R	104	Received Data (RD-A)
T	104	Received Data (RD-B)
V	115	Receiver Signal Element Timing (SCR-A)
X	115	Receiver Signal Element Timing (SCR-B)
P	103	Transmitted Data (SD-A)
S	103	Transmitted Data (SD-B)
Y	114	Transmitter Signal Element Timing (SCT-A)
AA	114	Transmitter Signal Element Timing (SCT-B)
U	113	External TX Signal Element Timing (SCX-A)
W	113	External TX Signal Element Timing (SCX-B)

4. Test Modes

In addition to a self-test mode, the CSU/DSU 56/64 has other extensive test modes which are designed to help isolate problems to specific components of the communications circuit. These various test modes are initiated and terminated from the front panel via the SELECT and TEST push buttons.

4.1 Self-Test

When the CSU/DSU 56/64 is powered on, all LEDs on the front panel turn on simultaneously for approximately two seconds. After the two seconds, all the LEDs turn off briefly. The LEDs then cycle on in pairs with a fan-out pattern away from the ALM indicator.

Next, the LEDs cycle off in pairs with a fan-in pattern back towards the ALM indicator. These patterns are repeated four times for visual verification that all LEDs are functioning properly.

When the LED test patterns are complete, the PTRN LED is on indicating that the DTE WITH TP test is being performed. This test is successful when the ERROR indicator does not turn on. If the DTE WITH TP test fails, the RS, ALM, DTE, PTRN, and ERROR indicators all flash.

If a PROM CHECKSUM failure is detected during self-test, the CS, ALM, PTRN, and ERROR indicators all flash at the end of the self test.

4.2 Near-End Tests

The local CSU/DSU 56/64 is capable of performing the following near-end tests.

1. DTE Only

2. DTE with Test Pattern

3. DTE and Loop (LL)

4. Loop Only (RT)

4.2.1 DTE ONLY TEST

The DTE ONLY test provides a method for testing both the DTE interface of the local CSU/DSU 56/64 plus its loop transmitter and receiver. For this test, the loop transmit data is connected to the loop receive data at a point close to the physical network interface. A block diagram illustrating the loopback point and the signal paths for this test is shown in **Fig. 4-1**.
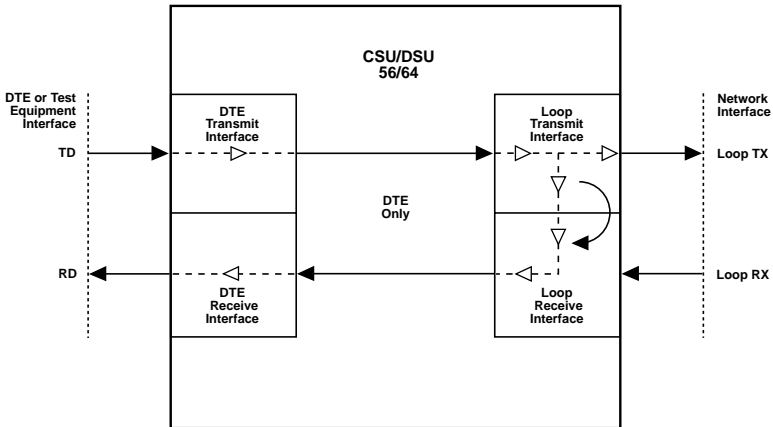
To initiate the DTE ONLY test, perform the following steps:

Step 1: Press the SELECT switch once to turn on the DTE test indicator.

Step 2: Press the TEST switch while the test indicator is on.

To terminate this test, press the TEST switch.

Test data from the terminal or test equipment is routed through the DTE section of the CSU/DSU 56/64 and then to the output of the loop transmitter section, where the signal is encoded for transmission. The output of the loop transmitter is coupled back to the loop receiver input. The received test signal is then decoded and returned to the terminal or test equipment, where it is checked for any bit errors.

Fig. 4-1. DTE Only Test Diagram.

4.2.2 DTE WITH TP (TEST PATTERN)

The DTE WITH TP (Test Pattern) test is similar to the DTE ONLY test previously described. It is initiated at the local DSU 56/64 and is used to independently test the operation of the DSU 56/64.

To initiate the DTE WITH TP test, perform the following steps:

Step 1: Press the SELECT switch twice to turn on both the DTE and PTRN test indicators.

Step 2: Press the TEST switch while these test indicators are on.

To terminate this test, press the TEST switch.

Instead of using data from the terminal or test equipment, this test uses an internal test-pattern generator and detector in the CSU/DSU 56/64. The loopback point and the data paths for this test are illustrated in **Fig. 4-2**.

The internal test-pattern generator and detector of the CSU/DSU 56/64 operate with a 2047 data pattern. When this test is initiated, the test-pattern detector examines the receive data stream until synchronization to the 2047 pattern is achieved. Once synchronized, the detector continues to check the receive data and reports any detected bit errors by turning on the ERROR LED.

Once a test is initialized with the internal test-pattern generator and detector, errors can be injected into the transmit data stream by pressing the SELECT button and observed by watching the ERROR LED turn on for a brief period of time.

As previously mentioned, the DTE WITH TP is automatically performed during the self-test sequence for the CSU/DSU 56/64.
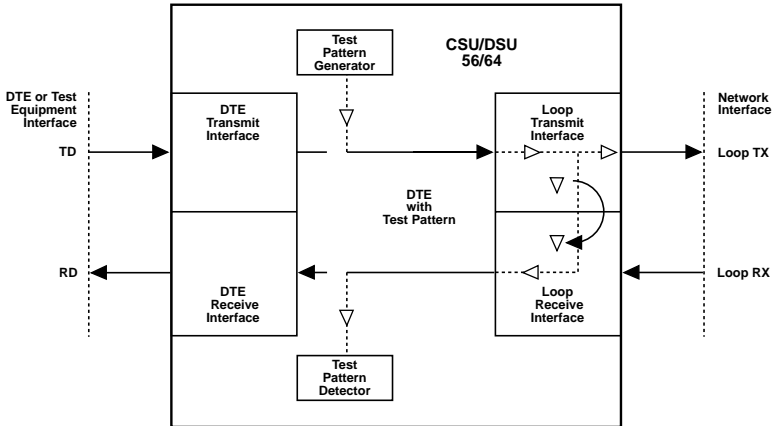
Fig. 4-2. DTE with TP Test Diagram.

4.2.3 DTE AND LOOP TEST (LL)

This test is initiated at the local CSU/DSU 56/64 and allows independent testing of the separate sections of the CSU/DSU 56/64. Testing includes 1) testing of the local DTE interface with data from the terminal or test equipment and 2) testing of the loop-interface section of the local DSU 56/64 from the remote site over the actual communications circuit. Testing from the remote end of the circuit is performed with test data generated by the remote DSU or terminal-type test equipment.

The DTE AND LOOP test splits the DSU 56/64 into separate DTE-interface and loop-interface sections and then loops the transmit data of each interface back to its respective receive data. **Fig. 4-3** illustrates the loopback points and the signal paths for this test.

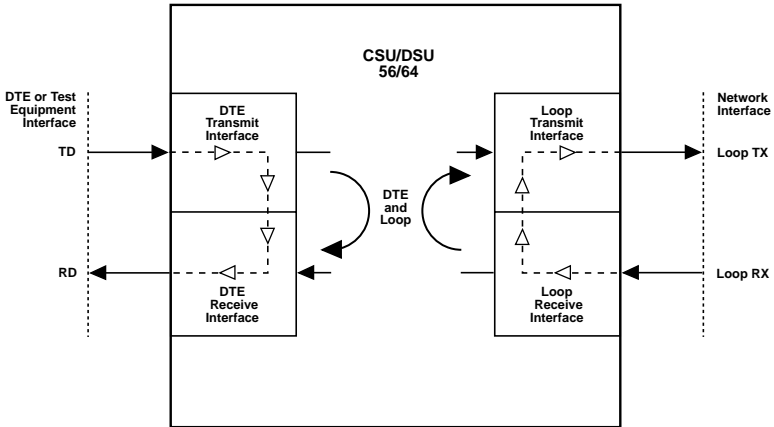To initiate the DTE AND LOOP test, perform the following steps:

Step 1: Press the SELECT switch three times to turn on both the DTE and LOOP test indicators.

Step 2: Press the TEST switch while these test indicators are on.

To terminate this test, press the TEST switch.

NOTE

The DTE and LOOP LEDs flash during initialization of the test and turn on solid once the test is in progress.

Fig. 4-3. DTE and Loop Test Diagram.

4.2.4 LOOP ONLY TEST

The LOOP ONLY test is used to test the loop interface and a major portion of the DTE interface of the local DSU 56/64 from the remote site over the actual digital data circuit.

For the LOOP ONLY test, the network receive data is looped to the network transmit data inside the DTE interface section of the 56/6 4 DSU. The physical DTE interface is ignored for this test. **Figure 4-4** is a block diagram illustrating the loopback point and the signal paths for this test.

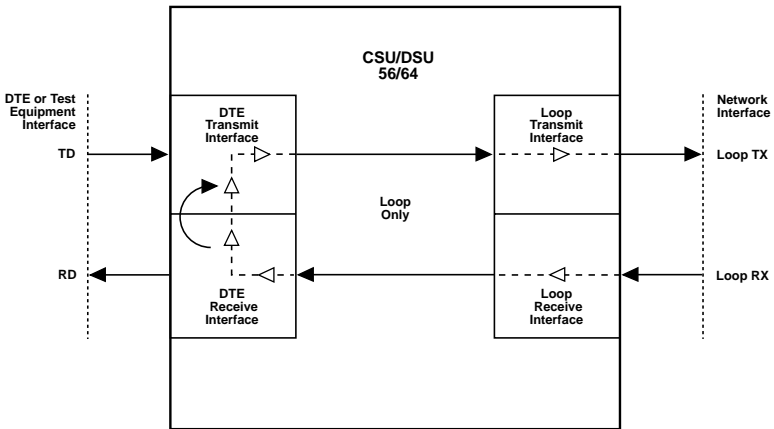To initiate the LOOP ONLY test, perform the following steps:

Step 1: Press the SELECT switch four times to turn on the LOOP test indicator.

Step 2: Press the TEST switch while this test indicator is on.

NOTE

The LOOP LED flashes during initialization of the test and turns on solid once the test is in progress.

To terminate this test, press the TEST switch.

Fig. 4-4. Loop Only Test Diagram.

4.3 Far-End Tests

4.3.1 REMOTE DIGITAL LOOPBACK (RDL)

When the RDL test is initiated at the local CSU/DSU 56/64, it commands the remote CSU/DSU into loopback with the industry- standard V.54 loopback pattern. The loopback point and the signal paths for the remote CSU/DSU are the same as the LOOP ONLY test for a local CSU/DSU, shown in **Fig. 4-5**. This loopback test is performed with data from the terminal or test equipment.

To initiate the RDL test, perform the following steps:

Step 1: Press the SELECT switch five times to turn on the RDL test indicator.

Step 2: Press the TEST switch while this test indicator is on.

NOTE

The RDL LED flashes during initialization of the test and turns on solid once the test is in progress.

To terminate this test, press the TEST switch.

4.3.2 RDL WITH TP

When the RDL WITH TP test is initiated at the local CSU/DSU 56/64, the local CSU/DSU commands the remote CSU/DSU into loopback with the industry standard V.54 loopback pattern. The loopback point and the signal paths for the remote DSU are the same as the LOOP ONLY test for a local DSU, see **Fig. 4-4**. This loopback test is performed with data from the internal test-pattern generator and error detector.

To initiate the RDL WITH TP test, perform the following steps:

Step 1: Press the SELECT switch six times to turn on both the RDL and PTRN test indicators.

Step 2: Press the TEST switch while these test indicators are on.

NOTE

The RDL and PTRN LEDs flash during initialization of the test and turn on solid once the test is in progress.

To terminate this test, press the TEST switch.

4.3.3 TEST PATTERN (PTRN)

When the PTRN test is initiated, the local CSU/DSU 56/64 uses the integral test-pattern generator to transmit a standard 2047 test pattern to the CSU/DSU on the far end of the circuit. The local CSU/DSU 56/64 then examines the received data for the standard 2047 pattern. Once this pattern is detected and synchronization is achieved, the ERROR indicator is turned off. The ERROR indicator turns on when errors in the receive data pattern are detected.

To initiate the PTRN test, perform the following steps:

Step 1: Press the SELECT switch seven times to turn on the PTRN test indicator.

Step 2: Press the TEST switch while this test indicator is on.

NOTE

The PTRN LED flashes during initialization of the test and turns on solid once the test is in progress.

To terminate this test, press the TEST switch.

4.4 Remotely Activated Tests

The CSU/DSU 56/64 responds to three remotely activated tests.

1. Remote Digital Loopback (RDL)

2. CSU Loopback (LL)

3. DSU Loopback (RT)

The RDL test is initiated by a remote CSU/DSU and causes the local CSU/DSU 56/64 to loop back. The loopback point is the same as the LOOP ONLY point. See **Fig. 4-4**. This test is run to test the end-to-end performance of the circuit.

Both the CSU LOOPBACK and the DSU LOOPBACK tests are activated from the telephone company's diagnostic test equipment and are used to isolate trouble on a circuit.

The CSU LOOPBACK, commonly called the LL test, has the same loopback points as the DTE AND LOOP test. It is used by the telephone company to test the integrity of the local loop.

The DSU LOOPBACK, commonly called the RT test, has the same loopback point as the LOOP ONLY test and is used by the telephone company to test the operation of both the local-loop and DTE-interface sections.