Chapter 3
Operation

GENERAL

After completing installation, the unit is ready for operation and config-
uration. Most configuration options are soft options and are selected by
the LCD and pushbuttons. Therefore, operation of the unit should be
understood prior to option selection. Hard options are described at the
end of Chapter 4.

The DDS/MR64 requires no start up procedure. After installation and
configuration, the DDS/MR64 will perform all configured functions.

DATA TERMINAL EQUIPMENT (DTE)

The DTE interface to the DDS/MR64 is through a 25-pin, D-type
connector. The sense levels and impedances conform to either EIA-232
or CCITT V.35 INTERFACE depending on the option switch selected.
The type of DTE interface selected in the unit is displayed on power-up.

DTE INTERFACE CONNECTORS

Pin functions of the DTE interface connector are listed in Table 3-1 and
Table 3-2.

Table 3-1. CCITT/EIA-232 Connector

Circuit Function	Pin	CCITT/ RS-232
Protective ground	1	101/AA
Signal ground	7	102/AB
Request to Send (RTS)	4	105/CA
Clear to Send (CTS)	5	106/CB
Data Set Ready (DSR)	6	107/CC
Received Line Signal Detector (RLSD)	8	109/CF
Test mode †	25	142
No signal †	12	110/CG
Rx data	3	104/BB
Rx clock	17	115/DD
Tx clock	15	114/DB

Table 3-1. CCITT/EIA-232 Connector (Continued)

Circuit Function	Pin	CCITT/ RS-232
Tx data	2	103/BA
External clock	24	113/DA
Remote loopback *	21	140
LL loopback *	18	141
RT loopback *	11	
Test Pattern *	22	
+12 V *†*	9	
- 12 V *†*	10	

*Can be disabled by front panel pushbuttons
† Selected by DTE interface dip switches

Table 3-2. V.35 Connector

Circuit Function	"D" Connector Pin	V.35 Connector Pin
Protective ground	1	A
Signal ground	7	B
Request to Send (RTS)	4	C
Clear to Send (CTS)	5	D
Data Set Ready (DSR)	6	E
Received Line Signal Detector (RLSD)	8	F
Test mode *†*	25	K and NN
No signal *†*	12	M
Rx data A	3	R
Rx data B	16	T
Rx clock A	17	V
Rx clock B	19	X
Tx clock A	15	Y
Tx clock B	13	AA
Tx data A	2	P

Table 3-2. V.35 Connector (Continued)

Circuit Function	"D" Connector Pin	V.35 Connector Pin
Tx data B	14	S
External clock A	24	U
External clock B	23	W
Remote loopback *	21	BB and N
LL loopback *	18	J
RT loopback *	11	EE
Test Pattern *	22	L
+12 V †	9	JJ
- 12 V †	10	KK

*Can be disabled by front panel pushbuttons
† Selected by DTE interface dip switches

Request to Send RTS

This signal goes on when the DTE wants to send data. When RTS is on, the DDS/MR64 is in transmit mode and responds by turning on Clear to Send (CTS).

Clear to Send CTS

This signal goes on when the DDS/MR64 is ready to transmit data and is in response to RTS going on. The normal RTS on to CTS on delay depends on the data rate (refer to Table 3-3). When CTS is off the DDS/MR64 ignores input data.

☞ **Note**

> *Once RTS is raised by the DTE, the behavior of CTS may*
> *depend on the status of the Circuit Assurance OPTion (CA*
> *OPT). Refer to Circuit Assurance in Chapter 4.*

Table 3-3. Normal CTS On Delay (Typical Values)

Data Rate	RTS-CTS Delay (ms)
2400 bps	7.4
4800 bps	3.2
9600 bps	1.7
19.2 kbps	1.0
56 kbps	0.6
64 kbps	0.6

Transmitter Clock TC

This signal goes on when the DDS/MR64 sends transmit timing infor-
mation to the DTE. The DDS/MR64 samples the transmit data during
the transition from space to mark of the transmitter clock. The time
between transition of the transmitter data line and the sampling transi-
tion of the transmitter clock must not be less than 25% of the nominal
bit time.

Transmit Data TD

This signal goes on when the DTE transmits data to the DDS/MR64.

External Clock

This signal goes on when the DTE sends transmit timing information to
the DDS/MR64. This option may be used in non-DDS applications or to
clock data into the buffer when the buffer option is enabled. When
external clock is used it must be within $\pm\,0.1\%$ of required frequency.

Received Line Signal Detector RLSD

Also known as Carrier Detect (CD). This signal goes on when the DDS/
MR64 is receiving a line signal that meets the requirements for data
transfer. RSLD is on when data is being received and can be forced on
regardless of line signals. RLSD goes off under any of these conditions:

- Reception of 3 consecutive "IDLE" characters

- Reception of 7 consecutive "Out-of-Service" characters
- Loss of signal.

When RLSD is off, Receive Data is held to a mark state.

Receive Clock RC

This signal goes on when the DDS/MR64 provides the DTE with continuous timing information for clocking received data. The DTE samples received data during the transition from space to mark of the receive clock.

Receive Data RD

This signal goes on when the DDS/MR64 provides the DTE with data received from the communications line. Transitions of this lead occur within $\pm 25\%$ of the nominal bit time. This signal is held in a mark state when RLSD is off.

Data Set Ready DSR

This signal goes on when line and equipment conditions are all set for data transfer. DSR must be on to transmit data and can be forced on regardless of conditions.

☞ **Note**

The behavior of DSR may depend on the status of the System Status OPTion (SS OPT). Refer to System Status in Chapter 4.

No Signal   NS

This signal goes on when the DDS/MR64 cannot identify a signal from the DDS line.

GROUNDING

Protective Ground

Protective/chassis ground is provided on the DTE interface connector.

Signal Ground

Signal ground provides a common reference for the interface signals. An optional strap connection provides chassis ground.

DTE INITIATED TEST SIGNALS

In addition to front panel initiation, tests can also be initiated by the DTE. The DTE pin numbers used to initialize these tests depend on the type of DTE interface used and are listed in Tables 3-1 and 3-2. This section describes sequential signal generation that activates these tests. Test signals are looped between the DTE, DCE, and the DDS network. When lit, the TM LED indicates test mode is selected and the LCD shows the status of the selected test.

Local Line Loopback   LL

When the DTE turns LL on, the DDS/MR64 logic transmitter and receiver connect internally to loop signals back to the DTE. The communications transmitter and receiver are also connected to loop signals back to the DDS communication line.

Remote Terminal Loopback   RT

When the DTE turns RT on, the DDS/MR64 loops data to and from the DDS line through the DTE interface. A bilateral loopback also provides a loopback path for connecting the DTE transmit and receive data.

Remote Loopback   RL

When the DTE turns RL on, the DDS/MR64 sends a command to the remote DDS/MR64 causing it to go into RT loopback. When RL is turned off, the DDS/MR64 sends a command to the remote DDS/MR64 canceling the RT loopback command.

Test Pattern   TP

When the DTE turns TP on, a 511 bit test pattern is sent to the DDS line. The data received is scanned for the same test pattern. Any error in the receive pattern causes the appropriate message to be displayed. If the DDS/MR64 is in LL when TP is on, the test pattern is transmitted through the DDS/MR64 transmit logic and looped back through the DDS/MR64 receive logic. This results in a self test.

Test Mode   TM

When the DDS/MR64 is in either remote or local test mode, TM lights.

DDS SYSTEM INTERFACE

Connection between the DDS/MR64 and the DDS system consists of four leads divided to form a receive data pair and a transmit data pair. The leads are on a miniature 8-position jack (RJ48) without a shorting bar as shown in *FCC Rules and Regulations Part 68, Subpart F, Figures 68.500(d)(1) and (d)(2)*. The remaining pins are not used. A mating connector is mounted on the DDS/MR64.

The sense levels, voltage levels, and impedances of these interface lines conform to *AT&T Technical Reference Pub 62310*. Pin assignments are listed in Table 3-4.

Table 3-4. Pin Assignments

Function	Direction	Line Pin Number	UDS Wire Color
Transmit Tip (T1)	DDS/MR64 to line	2 and 5	Orange
Transmit Ring (R1)	DDS/MR64 to line	1 and 4	Blue
Receive Ring (R)	Line to DDS/MR64	8 and 6	Slate
Receive Tip (T)	Line to DDS/MR64	7 and 3	Brown

The receiver incorporates an automatic line equalizer to compensate for any length DDS line.

SEALING CURRENT

When the DDS/MR64 is used as a Limited Distance Modem, the DDS/MR64 has the ability to source sealing current. A dip switch (Figure 3-1) on the stand alone unit PC board or the auxiliary jack along with the dip switch on the shelf mount unit provides this service. Do not use this switch or connect this jack if the unit is operating over the DDS network. This option should only be used at one end of an LDM-type circuit.

Dip Switch				Mode
1	2	3	4	
OFF	OFF	ON	ON	Normal DDS operation
ON	ON	OFF	OFF	Source sealing current

Figure 3-1
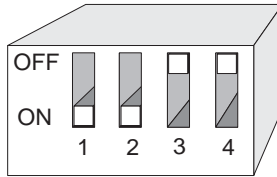***Typical DIP Switch***

To source sealing current on the stand alone unit, set the dip switch for Source sealing current. The 48 volts needed to source sealing current is provided internally. (On the shelf mount unit, the installer must supply 48 volts to the unit through the AUX jack.) Pin 1 of the AUX Telco should be ground and pin 8 should be -48 volts. If a positive voltage is used, pin 8 should be ground and pin 1 should be +48 volts. Voltages lower than 48 volts may be used, causing a proportional decrease in sealing current.) The sealing current will be between 4 and 20 mA, depending on line length.

FRONT PANEL INDICATORS

Pushbuttons

Configuration control is through the three pushbuttons on the front panel. The pushbuttons allow the user to configure the DDS/MR64 or select a test mode. The three pushbuttons are:

YES   Selects the displayed menu option

NO   Advances the displayed menu option

HOME   Switches between Data mode and Set mode

LCD

Configuration control through the front panel is known as soft strapping. The front panel ten character LCD displays the status or option changes resulting from push-button manipulation.

LED's

The six front panel LED's reflect status of the data interface signals resulting from modem operations or tests. The LED's are described as follows:

- TM   ON when the DDS/MR64 is in a Test Mode.

    Blinks at one half second rate when the DDS/MR64 is placed in RT loopback by the Telco.

    Blinks at one second rate when placed in RL by the remote DSU.

    Blinks at two second rate when placed in CSU local loop-back (CSULL) by the Telco.

- NS   ON indicates that there is No Signal from the DDS line.
- OS   ON means that a Telco Out-Of-Service code is received.
- CS   ON indicates that Clear to Send (CTS) is ON.
- TD   Indicates Transmit Data from the DTE. ON for a SPACE.
- RD   Indicates Received Data is going to the DTE. ON for a SPACE.

Power Switch

A rear panel power switch controls power ON/OFF.