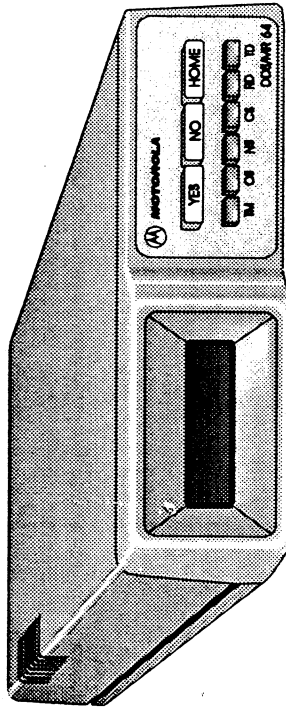


DDS/MR64

Multi-Rate Unit

DDS/MR64

Installation and Operation



User's Guide



Motorola
5000 Bradford Drive
Huntsville, AL 35805-1993
(205) 430-8000

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FCC REQUIREMENTS

This equipment complies with FCC Rules Part 68. Please note the following:

- When you order service, the telephone company needs to know the Facility Interface Code.

Type of Service	Facility Interface Code
2.4 kbps-DDS	04DU5-24
4.8 kbps-DDS	04DU5-48
9.6 kbps-DDS	04DU5-96
19.2 kbps-DDS	04DU5-192
56 kbps-DDS	04DU5-56
64 kbps-DDS	04DU5-64

- The Service Order Code: 6.0F
- The USOC jack required: RJ48S

In addition, if requested, please inform the telephone company of the make, model number, and FCC registration number, which are on the equipment label.

The telephone company may change technical operations or procedures affecting your equipment. You will be notified of changes in advance to give you ample time to maintain uninterrupted telephone service.

If you experience trouble with this telephone equipment, please contact

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USA
Telephone: (205) 430-8000

for information on obtaining service or repairs. The telephone company may ask that you disconnect this equipment from the network until the problem has been resolved. If your equipment continues to disrupt the network the telephone company may temporarily disconnect service. If this occurs you will be informed of your right to file a complaint with the FCC.

WARNING

This equipment uses, generates, and can radiate radio frequency energy interfering with radio communications if not installed and used in accordance with the instruction manual. It has been tested and complies with the limits for a Class A computing device according to FCC Rules, Part 15. Operation of this equipment in a residential area may cause interference. If it does, you must correct the cause of the interference. Shielded cables may be necessary with this unit to ensure compliance with the Class A limits.

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

PREFACE

This manual is written for users of the DDS/MR64. Please read the appropriate chapters before you change any option on the printed circuit board, change dip switches, or operate the unit. The manual includes the following:

Chapter 1	Introduction - Contains introductory information and equipment description;
Chapter 2	Installation - Contains installation and start-up instructions;
Chapter 3	Operation - Describes operation of the DDS/MR64;
Chapter 4	Configuration - Describes selectable options and how to apply them;
Chapter 5	Diagnostics - Describes test data loops and features;
Chapter 6	Troubleshooting - Describes tests and indications used to locate or isolate malfunctions;
Chapter 7	Non-DDS applications - Describes the use of the DDS/MR64 as a limited distance modem;
Chapter 8	Rate Adaption Option - Describes operating characteristics and options that are specific to rate adaption.
Chapter 9	Maintenance - contains maintenance information;
Appendix A	Specifications;
Appendix B	Abbreviations and Acronyms.
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STATEMENT OF APPLICATION

This manual supports both the standalone and shelf mount units. Operation and function of either unit is identical. Where necessary, this manual provides detailed information in support of the standalone unit. Detailed information in support of the shelf mount unit can be found in the shelf installation and operation manual.

**DDS/MR64
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GENERAL

The Motorola DDS/MR64 is a digital data unit that allows you to connect your computer or other DTE unit directly to the digital network without any other network access device. The unit pumps data at up to 64 kbps in point-to-point or multipoint applications. It combines the functions of a data service unit and a channel service unit (DSU/CSU) into a single compact unit.

In addition to offering Digital Data Service (DDS) operation, the DDS/MR64 can operate as a short haul modem providing full-duplex, serial data communications with either synchronous data from 2.4 to 64 kbps or asynchronous data from 2.4 to 19.2 kbps over a privately owned 4-wire, unloaded, twisted-pair cable system.

The DDS/MR64 is also capable of running asynchronous DTE rates of 38.4 kbps or 57.6 kbps over 56 kbps or 64 kbps lines, synchronous DTE rates of 19.2 kbps or 9600 bps over 56 kbps or 64 kbps lines, and a synchronous or asynchronous DTE rate of 1200 bps over a 2400 bps line.

PHYSICAL DESCRIPTION

The DDS/MR64 is a standalone desktop unit. The front panel (Figure 1-1) contains six Light Emitting Diodes (LED's), three pushbuttons, and an LCD screen. The rear panel (Figure 1-2) contains a power cord, power switch, fuse, DTE connector, and a standard 8-pin DDS jack. The DTE interface connects to the Data Terminal Equipment and the 8-pin jack connects to the DDS line. Internally the unit contains one printed circuit board.

FUNCTIONAL

The DDS/MR64 processes serial synchronous or asynchronous digital data from the DTE for transmission over the DDS network or other limited distance 4-wire, unloaded, twisted-pair cable systems. The receiver contains an automatic equalizer which compensates for the distortion and attenuation caused by the length of the line without any adjustments by the user.

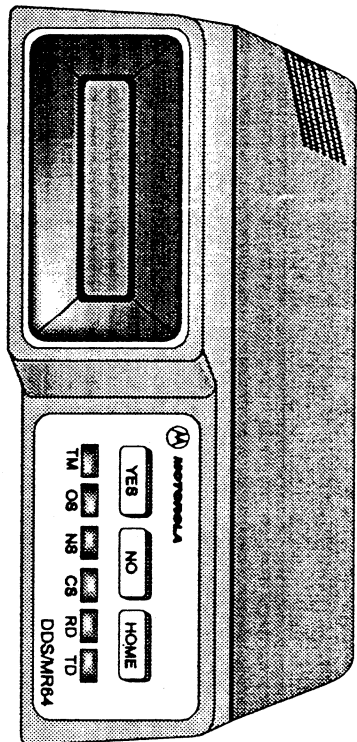


Figure 1-1
Front Panel

FEATURES

- Data rates from 2.4 kbps to 64 kbps synchronous and 2.4 kbps to 19.2 kbps asynchronous
- Direct connection to the DDS network
- Point-to-point or multipoint transmission
- Bipolar return to zero signaling
- LED indication
- Short haul modem capability up to 150,000 feet providing full-duplex operation on 4-wire private telephone lines.
- Full feature diagnostics
- Liquid Crystal Display (LCD) allow the operator to review or change settings
- Front panel pushbutton configuration and operation
- Nonvolatile memory for configuration storage
- RS232 or CCITT V.35 DTE interface can be selected by switches on the circuit board
- Asynchronous 38.4 kbps or 57.6 kbps DTE rates over 56 kbps or 64 kbps DDS lines.
- Synchronous 19.2 kbps or 9600 bps over 56 kbps or 64 kbps lines.
- Synchronous or asynchronous 1200 bps over 2400 bps lines.

COMPATIBILITY

Compatible with the Motorola DDS/MR series of products with the exception of running the DDS/MR1 or the DDS/MR56 at 64 kbps. Compatible with Bell 500 Series DSU and CSU equipment.

COMPLIANCE

Compliant with specifications listed in Bell publications 62310 and 41450.

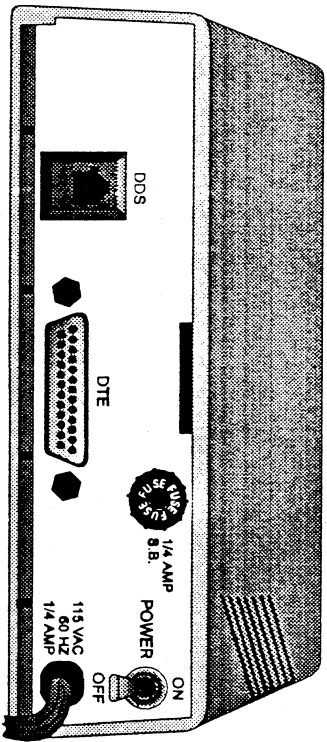


Figure 1-2
Rear Panel

Chapter 2 Installation

RECEIPT INSPECTION

After unpacking the equipment, check the contents against the packing list. Inspect the equipment carefully for damage that may have occurred in shipment. If there is damage or material shortage, contact the shipping agent and Motorola for advice and assistance. You should keep the shipping container and packing material for future shipment.

SITE PREPARATION

Install the unit within 6 feet of a 115 or 230 Vac grounded outlet as required for the specific model and no further than 50 feet from the terminal equipment.

The installation area should be clean, well lighted, and free from extremes of temperature, humidity, appreciable shock, and vibration. Allow sufficient space at the rear of the unit for signal line and interface cable clearance.

HARD OPTIONS

The PC card has two strap options that should be verified or changed prior to installation. These options are factory set for standard installations. The factory options are described in *Chapter 4, Configuration*. If a hard option requires changing, follow the instructions in *Chapter 4* before continuing installation.

INSTALLATION

Figures 2-1 and 2-2 illustrate typical installation.

- Connect the DTE cable to the 25-pin DTE connector. Secure the two screws to complete the connection.
- Connect the opposite end to the DTE port.
- Insert the 8-pin plug into the rear panel DDS DDS jack labeled DDS.
- Insert the opposite end into the TELCO DDS system.
- Plug in the ac power cord.

- Place the power switch ON.

The DDS/MR64 will now perform all functions as determined by option configuration (Chapter 4).

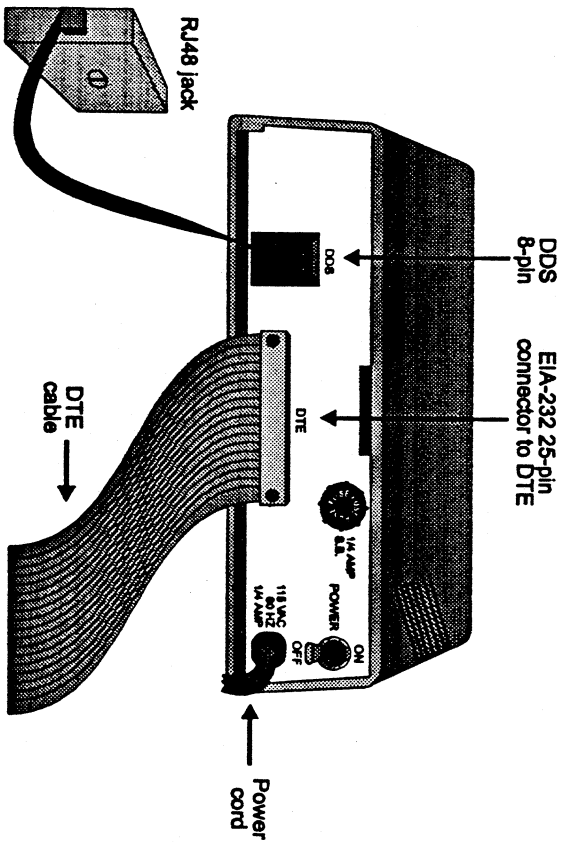


Figure 2-1
Connection Using the RJ48 Jack

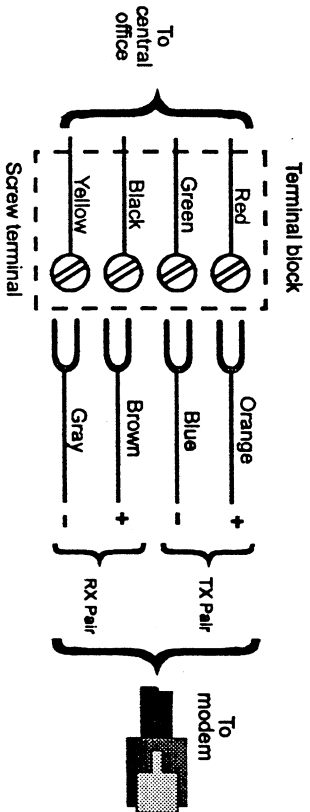
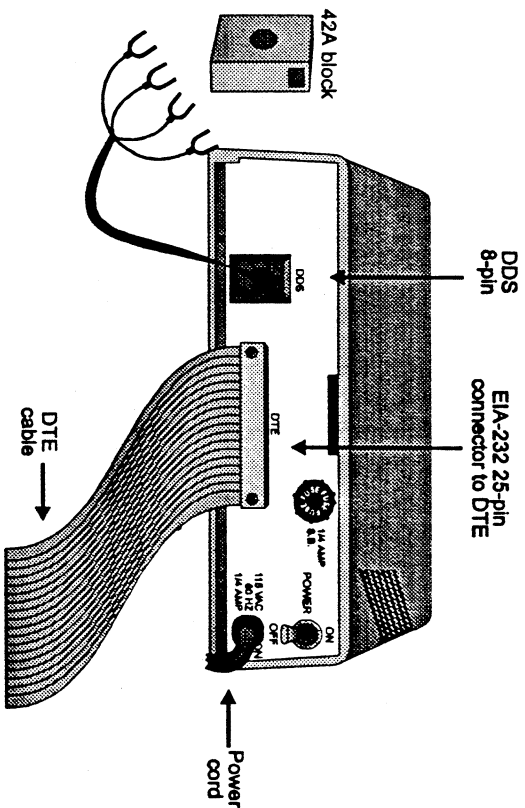


Figure 2-2
Connection Using the 42A Block

Chapter 3 Operation

GENERAL

After completing installation, the unit is ready for operation and configuration. 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 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
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
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

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).

RTS

Clear to Send

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.

CTS

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 information 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 transition 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	1	2	3	4	Mode
OFF	OFF	OFF	ON	ON	Normal DDS operation
ON	ON	ON	OFF	OFF	Source sealing current

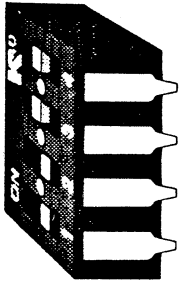


Figure 3-1
Typical DIP Switch

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 loopback (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.

Chapter 4 Configuration

GENERAL

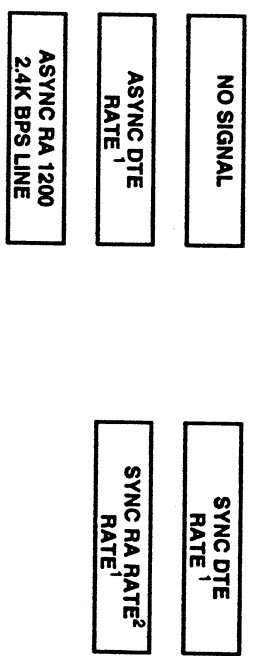
The configuration options allow you to select various operating features that program the DDS/MR64 to your network conditions.

Most configuration options are selected by front panel pushbuttons. Option descriptions state if an option is not available. For instance, if synchronous is selected, bits per word does not appear. Hard straps and a dip switch on the PC board configure signal ground and the DTE interface.

CONFIGURATION ON POWER-UP

After installation, turn the power on. The DDS/MR64 will perform a self test. If the test fails, the LCD displays ERROR. If an error occurs ensure it is consistent and then refer to Maintenance.

If no error occurs the LCD advances to one of three displays:



In the DDS mode, NO SIGNAL means there is no connection to the DDS network. When used as a limited distance modem, NO SIGNAL means there is no data connection to another modem. Press HOME. The LCD advances to the first option selection.

- 1 The word "RATE" does not actually display on the LCD. What displays is the programmed bits per second (bps) rate of the connection.
- 2 The word "RATE" does not actually display on the LCD. What displays is the programmed rate adapted rate.

CONFIGURATION OPTION DESCRIPTIONS

Configuration options available through the front panel are as follows:

Timing

Transmitter timing may be slaved to

- INTERNAL timing provided by the DDS/MR64 for LDM applications.
- DDS received data timing
- EXTERNAL timing provided by DTE

Normal operation uses DDS received data timing.

Rate

The rate option is selectable to 2.4, 4.8, 9.6, 19.2, 56 kbps, or 64 kbps clear channel.

Synchronous/Asynchronous

SYNC/ASYNC

The sync/async option is used to configure the DDS/MR64 to operate either synchronously or asynchronously.

Bits Per Word

BITSWORD

The bits/word option is used to select the asynchronous word size. The word size is computed by adding the number of data bits, the number of stop bits, the number of parity bits (0 to 1), and one start bit. The bits/word option can be 8, 9, 10, or 11. The previous option SYNC/ASYNC must be selected to ASYNC for this option. If SYNC is selected, this option does not apply and is not displayed.

Note: If the async data rate is 38.4 or 57.6 kbps, the 8 BITS PER WORD and 9 BITS PER WORD options will not be displayed.

RTS Control

RTS CONT

The RTS control options are as follows:

- Normal - Normal DTE controlled RTS.
- Permanent - Provides a permanent RTS and CTS.
- 35 sec AS - 35 second anti-streaming terminal disconnect. In this mode, if RTS is on from the DTE for 35 continuous seconds, the DDS/MR64 turns CTS OFF.
- SIM SW CR - Simulated switched carrier. Provides a permanent RTS to the DSU/CSU. CTS to the DTE is controlled by and follows RTS from the DTE.
- SIM SW CR A-STRM - Enables both the SIM SW CR option and the 35 sec AS option.

Note: The behavior of CTS once RTS is raised by the DTE may depend on the status of the Circuit Assurance OPTION (CA OPT). Refer to Chapter 4, Circuit Assurance.

Buffer

BUFF OPT

This option is used to buffer externally clocked transmitted data and can be enabled or disabled. The option is used mainly with a crossover cable in tail circuit applications. When enabled, transmit data from the DTE is clocked into the buffer using the external clock from the DTE. Data is clocked from the buffer to the DDS line using the clock from the DDS/MR64 (usually in DDS timing). The RTS CONT option should be set for normal. This option is intended for use in a polled system (RTS is toggled). If the TIMING option is selected for EXTERNAL, this option does not apply and is not displayed.

Loopback

LB OPT

The remote loopback (RMT LB) feature may be enabled or disabled to avoid accidental activation.

DSR

DSR OPT

DSR can be on or off during loopback modes.

System Status

SS OPT

With this option on, RLSD must be on for DSR to be on. This means that DSR will turn off while receiving Idle or Out-of-Service codes.

With this option off, DSR does not depend on the state of the DDS/MR64 receiver. This option can be used when the remote DDS/MR64 maintains a permanent RTS to verify a complete link.

Circuit Assurance

CA OPT

When on, RLSD must be on for CTS to be on. This means that CTS will turn off while receiving Idle or Out-of-Service codes. When this option is off, CTS does not depend on the state of the DDS/MR64 receiver. This option can be used when the remote DDS/MR64 maintains a permanent RTS to verify a complete link before sending data.

Note: When using DDS/MR64 units for multi-point links, the master unit must have both the CA and SS options disabled

RTS/CTS Delay

RS-CS DLY

Certain applications and DTE devices require longer RTS-CTS delay times than others. The approximate RTS on to CTS on delay time selections are:

- 25 ms
- 30 ms
- 60 ms
- Normal - The delay is dependent on the rate. Refer to Table 3-3.

64 k Scrambler

In 64 k clear channel operation, certain specific long patterns of data may be interfered with by the DDS network. Should this occur, the 64 k Scrambler option should be enabled. When the 64 k Scrambler option is enabled, the remote DSU/CSU must be a Motorola DDS/MR64 product with the 64 k Scrambler option enabled.

OPTION SELECTION

Front Panel Option Selection

The DDS/MR64 operates in either DATA or SET mode. DATA mode is for normal operation. SET mode allows the user to initiate tests or select soft strap configuration options. DATA mode displays one of the following:

Data line characteristics:

SYNC DTE Data Rate	ASYNC DTE Data Rate
ASYNC DTE 57.6 (ASYNC DTE 38.4) Data Rate	SYNC RA 19200 (SYNC RA 9600) (SYNC RA 1200) Data Rate
ASYNC RA 1200 2.4K BPS LINE	

Where Data Rate is equal to 2.4, 4.8, 9.6, 19.2, 56, or 64 Kbps LINE.

DTE Tests:

TEST PATTERN OK	REMOTE LOOPBACK UNRECEIVED
TEST PATTERN ERRORS	REMOTE TERMINAL
LOCAL LOOPBACK	REMOTE LOOPBACK RECEIVED

Remote Test:

TELCO INITIATED REMOTE TERMINAL	TELCO INITIATED LOCAL LOOPBACK
REMOTE INITIATED REMOTE TERMINAL	

To change from DATA mode to SET mode, press HOME. SET mode is divided into two sections:

- Front panel tests
- Configuration options

Front Panel Initiated Tests

"SELECT TEST?" is the first question of SET mode. If NO is pressed the DDS/MR64 proceeds to the configuration options menu. If YES is pressed the DDS/MR64 enters the test menu. Test choices are displayed with a question mark. To enter a desired test press YES.

The DDS/MR64 performs the selected test and the appropriate message is displayed. Press NO to bypass a test and HOME to return to data mode. Once a test is selected, YES or NO attempts to clear ERRORS, and HOME exits the test.. The following is a list of the available tests:

- RL/TP Remote Loopback with Test Pattern
- LL/TP Local Loopback with Test Pattern
- TP End to End Test Pattern Test
- RT Remote Terminal Loopback
- LL Local Loopback
- RL Remote Loopback

Chapter 5, Diagnostics provides further information.

Configuration Option Menu

To scroll through the option menu, answer the displayed questions with YES or NO.

When an option question is answered YES, that option becomes active. A list of option questions and option settings are shown in Table 4-1.

Table 4-1
Option Menu

MAIN MENU	LCD MESSAGES	SUBMENU	SUBMENU ITEM	PUSHBUTTON (S)
1	NO SIGNAL SYNC DTE RATE * ASYNC DTE RATE * SYNC RA RATE § ASYNC RA 1200 2.4K BPS LINE	(Press HOME to advance to MAIN 2) Shows programmed SYNC DTE and line rate Shows programmed ASYNC DTE and line rate Shows rate adapted sync DTE and line rate Shows rate adapted async 1200 bps DTE over 2400 bps line		
2	SELECT TEST?	REMOTE LOOPBACK WITH PATTERN? LOCAL LOOPBACK WITH PATTERN? TEST PATTERN?	TEST PATTERN OK TEST PATTERN ERRORS REMOTE LOOPBACK UNRECEIVED TEST PATTERN OK TEST PATTERN ERRORS TEST PATTERN OK TEST PATTERN ERRORS TEST PATTERN OK TEST PATTERN ERRORS	HOME YES,NO,HOME NO,HOME HOME YES,NO,HOME HOME YES,NO,HOME HOME YES,NO,HOME
3	SYNC DTE CHANGE? ASYNC DTE CHANGE?		REMOTE TERMINAL? LOCAL LOOPBACK? REMOTE LOOPBACK?	HOME HOME HOME NO,HOME
4	RATE ADAPTER ENABLED CHANGE? RATE ADAPTER DISABLED CHANGE?		CHANGE TO 64K? (programmed rate) CHANGE TO 56K? (programmed rate) CHANGE TO 19.2K? (programmed rate)	YES,NO,HOME YES,NO,HOME YES,NO,HOME YES,NO,HOME

* The word RATE does not actually appear on the LCD. The rate of the line that the DDS/MR64 is connected to is shown on the LCD.

§ The word RATE does not actually appear on the LCD. The programmed rate adapted rate is shown on the LCD

Table 4-1, continued
Option Menu

MAIN MENU	SUBMENU	SUBMENU ITEM	PUSHBUTTON (S)
5	CHANGE LINE RATE? (programmed rate) (continued)	CHANGE TO 9.6K? (programmed rate) CHANGE TO 4.8K? (programmed rate) CHANGE TO 2.4K? (programmed rate)	YES,NO,HOME YES,NO,HOME YES,NO,HOME
6	RATE ADAPTER 19.2K BPS CHANGE? 9.6K BPS CHANGE?		YES,NO,HOME YES,NO,HOME
7	CHANGE TIMING? (programmed timing)	CHANGE TO INT? (programmed timing) CHANGE TO DDS? (programmed timing) CHANGE TO EXT? (programmed timing)	YES,NO,HOME YES,NO,HOME YES,NO,HOME YES,NO,HOME
8	CHANGE DATA TIMING?	CHANGE TO INT? (programmed timing) CHANGE TO EXT? (programmed timing)	YES,NO,HOME YES,NO,HOME
9	CHANGE NETWORK TIMING?	CHANGE TO INT? (programmed timing) CHANGE TO DDS? (programmed timing)	YES,NO,HOME YES,NO,HOME
10	ASYNC DTE = 57.6K CHANGE? ASYNC DTE = 38.4K CHANGE?		YES,NO,HOME YES,NO,HOME
11	BITS PER WORD = 8 CHANGE? BITS PER WORD = 9 CHANGE? BITS PER WORD = 10 CHANGE? BITS PER WORD = 11 CHANGE?		YES,NO,HOME YES,NO,HOME YES,NO,HOME YES,NO,HOME

Note: Submenu 5 displays only 64 k, 56 k, and 2.4 k when the rate adapter option is enabled. If async is selected, Main Menu 5 cannot be accessed and line rate is automatically set to 2.4 kbps.

Note: Main Menu 6 can only be accessed if the rate adapter option is enabled and 56 k or 64 k line rate is selected.

Note: Main Menu 7 cannot be accessed if the rate adapter option is enabled.

Note: Main Menu 8 and 9 can only be accessed if the rate adapter option is enabled.

Note: Main Menu 10 and 11 can only be accessed if in Async.
* 8 and 9 Bits Per Word Menu cannot be accessed if 38.4 kbps or 57.6 kbps is selected

Table 4-1, continued
Option Menu

MAIN MENU	SUBMENU	SUBMENU ITEM	PUSHBUTTON (S)	
12	CHANGE CONTROL OPTIONS?	CHANGE RTS CONTROL? CHANGE SYNC BUFFER OPT? CHANGE REMOTE LB OPT? CHANGE DSR OPT? CHANGE SYS STATUS OPT? CHANGE CA OPTION? CHANGE RTS-CTS DELAY? CHANGE DTE RL OPT? CHANGE DTE LL OPT?	NORMAL RTS CHANGE? PERMANENT RTS CHANGE? 35 SEC ANTI-STRM CHANGE? SIM SW CR CHANGE? SIM SW CR A-STRM CHANGE? SYNC BUFFER DIS CHANGE? SYNC BUFFER EN CHANGE? RMT LB ENABLED CHANGE? RMT LB DISABLED CHANGE? DSR OPT ENABLED CHANGE? DSR OPT DISABLED CHANGE? SS OPTION ENABLED CHANGE? SS OPTION DISABLED CHANGE? CA OPTION ENABLED CHANGE? CA OPTION DISABLED CHANGE? RTS-CTS NORMAL CHANGE? DLY CTS 25 mSEC CHANGE? DLY CTS 30 mSEC CHANGE? DLY CTS 60 mSEC CHANGE? DTE RL ENABLED CHANGE? DTE RL DISABLED CHANGE? DTE LL ENABLED CHANGE? DTE LL DISABLED CHANGE?	YES,NO,HOME YES,NO,HOME