



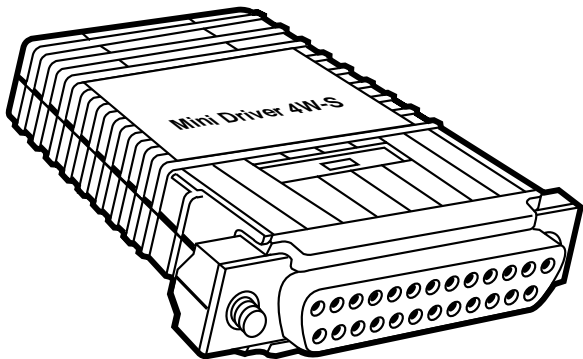
FEBRUARY 1996

ME753A

ME754A

ME756A

**Mini Driver 4W-S-CL**  
**Mini Driver 4W-S-CL/RJ-11**  
**Mini Driver 4W-S-CL/RJ-45**



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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.

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**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 aparato 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 conectado 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 física 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 equipo 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 líneas de energía.
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 objetos líquidos 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: Objetos 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.

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# 1. Specifications

**Transmission Format** — Synchronous, full duplex

**Transmission Line** — Two unconditioned twisted pairs 19-26 AWG

**Distance** —

<b>Data Rate</b>	<b>Wire Gauge</b>		
	<b>19</b>	<b>24</b>	<b>26</b>
19.200	7.5 mi (12.0 km)	3.5 mi (5.6 km)	2.5 mi (4.0 km)
9600	10.0 mi (16.1 km)	3.5 mi (5.6 km)	2.5 mi (4.0 km)
4800	10.0 mi (16.1 km)	7.0 mi (11.3 km)	4.0 mi (6.4 km)
2400	10.0 mi (16.1 km)	8.5 mi (13.7 km)	5.0 mi (8.1 km)
1200	11.0 mi (17.7 km)	8.5 mi (13.7 km)	6.0 mi (9.7 km)

**Interfaces** — EIA RS-232, CCITT V.24

**Data Rates** — 1200 bps to 19.2 Kbps

**Isolation** — Minimum 1500 V RMS via custom transformers

**Surge Protection** — 600 W power dissipation at 1 ms and response time of 1 picosecond

**Control Signals** — CTS turns on 8 or 53 mS (switch-selectable) after the terminal raises RTS; DSR and DCD are constantly on

**Connectors** — DB25 male or female on RS-232 side; RJ-11, RJ-45 or terminal block with strain relief on line side

**Power Supply** — None required; uses 6 VDC power from EIA data and control signals on pins 2, 4, 9, and 20

**Temperature Range** — 32° to 140°F (0° to 60°C)

**Altitude** — 0 to 15,000 feet

**Humidity** — Up to 95% non-condensing

**Size** — 2.6"H x 2.1"W x 0.7"D (6.7 x 5.3 x 1.9 cm)

**Weight** — 0.1 lb. (0.06 kg)



## 2. General Information

### 2.1 Description

The Mini Driver 4W-S-CL is a miniature, synchronous short-range modem that uses the latest in VLSI technology to combine high-quality data transmission with compact size. The Mini Driver does not need any AC power or batteries to operate, and communicates up to 11 miles (17.7 km) in point-to-point environments. For maximum flexibility, the Mini Driver supports three clocking options: internal, external, or receive loopback.

Twelve models are available:

- Mini Driver 4W-S-CL (5-Screw Terminal Block) (ME750A-M)
- Mini Driver 4W-S-CL (5-Screw Terminal Block) (ME750A-F)
- Mini Driver 4W-S-CL (5-Screw Terminal Block) with Surge Protection (ME753A-MSP)
- Mini Driver 4W-S-CL (5-Screw Terminal Block) with Surge Protection (ME753A-FSP)
- Mini Driver 4W-S-CL/RJ-11 (ME754A-M)
- Mini Driver 4W-S-CL/RJ-11 (ME754A-F)

- Mini Driver 4W-S-CL/RJ-11 with Surge Protection (ME754A-MSP)
- Mini Driver 4W-S-CL/RJ-11 with Surge Protection (ME754A-FSP)
- Mini Driver 4W-S-CL/RJ-45 (ME756A-M)
- Mini Driver 4W-S-CL/RJ-45 (ME756A-F)
- Mini Driver 4W-S-CL/RJ-45 with Surge Protection (ME756A-MSP)
- Mini Driver 4W-S-CL/RJ-45 with Surge Protection (ME756A-FSP)

Providing full duplex transmission over two twisted pairs, the Mini Driver accommodates seven switch selectable data rates from 1200 to 19,200 bps. The Mini Driver's custom VLSI chip uses a separate filter for each data rate, rather than a single "compromise" filter. Transformer isolation allows the Mini Driver to operate between buildings without data disruption because of ground- potential differences.

The -MSP and -FSP models are surge-protected versions of the Mini Driver, incorporating silicon avalanche diodes that provide 600 watts of protection per wire.

### 2.2 Features

- Supports point-to-point data rates to 19.2 Kbps
- Internal, external, or receive loopback clocking
- Transformer isolation guards against ground looping
- Range to 11 miles (17.7 km)
- Operates full duplex over two unconditioned twisted pairs
- Custom VLSI chip with separate filter for each data rate
- No AC power or batteries required
- Miniature size
- High speed surge protection and silicon avalanche diode surge protection (-MSP and -FSP models)

## 3. Configuration

The Mini Driver has six configuration switches that let you select clocking method, RTS/CTS delay, and data rate. This section describes switch locations and explains all possible switch configurations.

### 3.1 Switch Locations

For your convenience, all configuration switches are located on a SIP (single in-line package) mounted on the PC board. **Figure 3-1** shows the location of the SIP on the PC board. For instructions on opening the Mini Driver case, see **Section 4.1.2**.

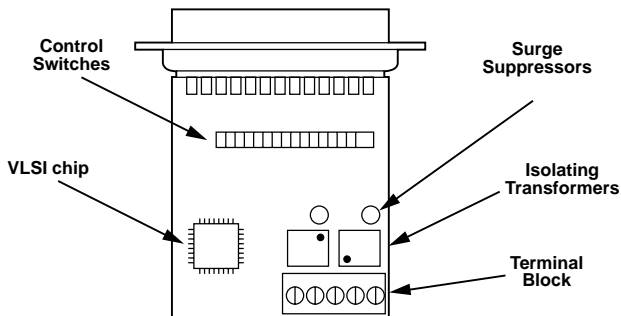


Figure 3-1. Mini Driver PC Board Showing Switches.

Figure 3-2 shows the orientation of the configuration switches, including the ON/OFF position.

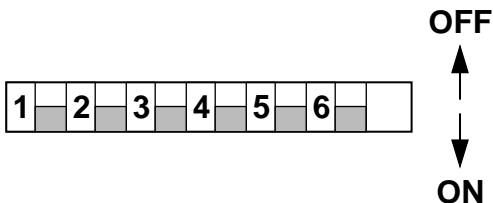


Figure 3-2. Close-up of Configuration Switches.

### 3.2 Switch Settings

All possible settings for the Mini Driver's configuration switches are presented in the summary table and descriptions below. If you have additional questions about configuration, call for technical support.

**Table 3-1. Switch Summary.**

<b>SWITCH SUMMARY TABLE</b>			
<b>Position</b>	<b>Function</b>	<b>Factory default</b>	
Switch 1	Transmit Clock	Off	Internal Clock
Switch 2	Transmit Clock	On	
Switch 3	RTS/CTS delay	On	7-ms delay
Switch 4	Data rate	On	
Switch 5	Data rate	Off	9600 bps
Switch 6	Data rate	Off	

## Switches 1 and 2: Transmit Clock

Switches 1 and 2 are used together to specify the clocking method. The Mini Driver can provide an internal clock (Pin 15), receive an external clock (from Pin 24), or loop back a received clock.

**Table 3-2. Settings for Switches 1 and 2.**

<u>Switch 1</u>	<u>Switch 2</u>	<u>Setting</u>
On	On	External Clock
On	Off	External Clock
Off	On	Internal Clock (default)
Off	Off	Receive Loopback

## Switch 1: RTS/CTS Delay

After request to send (RTS) is raised by the host terminal, the Mini Driver raises CTS after a slight delay in order to give the remote terminal time to receive an incoming signal. Depending on the type of environment, either 7 ms or 53 ms can be selected.

**Table 3-3. Settings for Switch 3.**

<u>Switch 3</u>	<u>Setting</u>
On	7 ms (Default)
Off	53 ms

## Switches 4, 5, and 6: Data Rate

Switches 4 through 6 are set in combination to allow the Mini Driver to be used at data rates from 1.2 Kbps up to 19.2 Kbps.

**Table 3-3. Settings for Switches 4, 5, and 6**

<u>Switch 4</u>	<u>Switch 5</u>	<u>Switch 6</u>	<u>Setting</u>
On	On	On	1.2 Kbps
On	On	Off	2.4 Kbps
On	Off	On	4.8 Kbps
Off	On	On	7.2 Kbps
On	Off	Off	9.6 Kbps
Off	On	Off	14.4 Kbps
Off	Off	On	19.2 Kbps
Off	Off	Off	19.2 Kbps



## 4. Installation

Once the Mini Driver is properly configured, it is ready to connect to your system. This section tells you how to properly connect the Mini Driver to the twisted pair and RS-232 interfaces, and how to operate the Mini Driver.

### 4.1 Connection to the Twisted-Pair Interface

The Mini Driver supports data-only communication between two RS-232 devices at distances to 11 miles and data rates to 19.2 Kbps. There are two essential requirements for installing the Mini Driver:

1. These units work in pairs. Therefore, you must have one Mini Driver at each end of a two twisted-pair interface.
2. To function properly, the Mini Driver needs two twisted pairs of metallic wire. These pairs must be unconditioned, dry, metallic wire, between 19 and 26 AWG (the higher-number gauges may limit distance somewhat). Standard dial-up telephone circuits, or leased circuits that run through signal-equalization equipment, are not acceptable.

For your convenience, the Mini Driver is available with three different twisted-pair interfaces: RJ-11 jack, RJ-45 jack, and terminal blocks with strain relief.

#### 4.1. TWISTED-PAIR CONNECTION USING RJ-11 OR RJ-45

The RJ-11 and RJ-45 connectors on the Mini Driver's twisted pair interface are pre-wired for a standard telco wiring environment. The signal/pin relationships are shown below:

<u>RJ-11</u>	<u>Signal</u>	<u>RJ-45</u>	<u>Signal</u>
1	—————GND <sup>1</sup>	1	—————N/C
2	—————RCV <sup>2</sup>	2	—————GND <sup>1</sup>
3	—————XMT	3	—————RCV <sup>2</sup>
4	—————XMT	4	—————XMT
5	—————RCV	5	—————XMT
6	—————GND	6	—————RCV
		7	—————GND
		8	—————N/C

<sup>1</sup>Connection to ground is optional.

<sup>2</sup>The Mini Driver models without surge protection are not polarity-sensitive.

**Figure 4-1. Signal/Pin Relationships for the RJ-11 and RJ-45 Connectors.**

When connecting two Mini Drivers, you need to use a “crossover” cable. **Figure 4-2** shows how a crossover cable should be constructed for an environment where both Mini Drivers use a 6-wire RJ-11 connector. Follow similar logic when using RJ-45 connectors or a combination of the two.

<u>SIGNAL</u>	<u>PIN#</u>	<u>COLOR</u> <sup>2</sup>	<u>COLOR</u>	<u>PIN#</u>	<u>SIGNAL</u>
GND <sup>1</sup>	1	Blue	White	6	GND
RCV <sup>3</sup>	2	Yellow	Red	4	XMT
XMT	3	Green	Black	5	RCV
XMT	4	Red	Yellow	2	RCV
RCV	5	Black	Green	3	XMT
GND	6	White	Blue	1	GND

<sup>1</sup>Connection to ground is optional.

<sup>2</sup>Standard color codes—yours may be different.

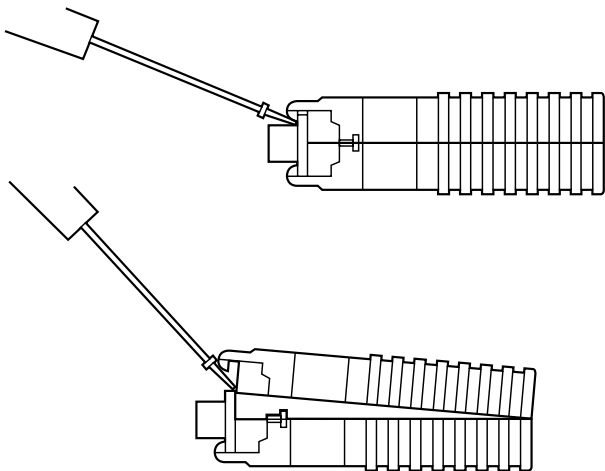
<sup>3</sup>The Mini Driver models without surge protection are not sensitive to polarity.

**Figure 4-2. Crossover Cable Construction.**

#### 4.1.2 TWISTED PAIR CONNECTION USING TERMINAL BLOCKS

If your application requires you to connect two pairs of bare wires to the Mini Driver, you will need to open the case to access the terminal blocks. The instructions on the following pages will tell you how to open the case, connect the bare wires to the terminal blocks, and fasten the strain-relief collar in place so that the wires won't pull loose.

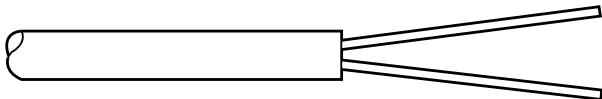
1. Open the unit by gently inserting a screwdriver between the DB25 connector and the lip of the plastic case (see **Figure 4-3**). You don't have to worry about breaking the plastic, but be careful not to bend the D-sub connector.



**Figure 4-3. Opening the Unit.**

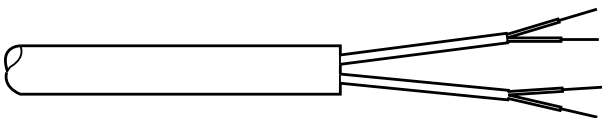
Once the unit has been opened, you will be able to see the terminal blocks located at the rear of the PC board.

2. Strip the outer insulation from the twisted pairs about one inch from the end.



**Figure 4-4. Stripping the Outer Insulation from the Twisted Pairs.**

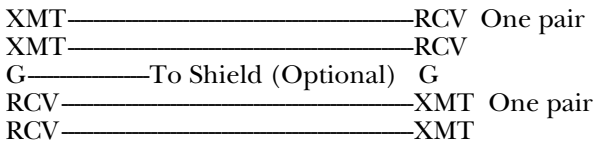
3. Strip back the insulation on each of the two twisted pair wires about 0.25".



**Figure 4-5. Stripping the Insulation on Each of the Twisted Pair Wires.**

4. Connect one pair of wires to the two XMT (transmit) poles on the terminal block, making careful note of which colors you use. The Mini Driver is not polarity-sensitive, so either wire may connect to either pole.
5. Connect the other pair of wires to the two RCV (receive) poles on the terminal block, making careful note of which colors you use. The Mini Driver is not polarity-sensitive, so either wire may connect to either pole.

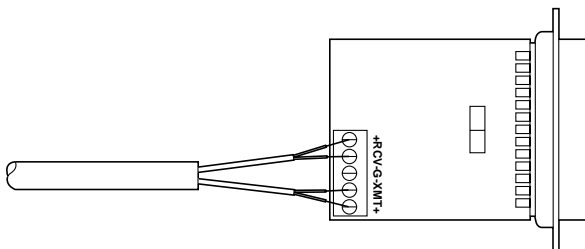
Ultimately, you will want to construct a two-pair crossover cable that makes a connection with the two Mini Drivers as shown in **Figure 4-6**.



**Figure 4-6. Two-Pair Crossover Cable Configuration.**

6. If there is a shield around the telephone cable, it may be connected to “G” on the terminal block. To avoid ground loops, we recommend connecting the shield at the computer end only. A ground wire is not necessary for proper operation of the Mini Driver.

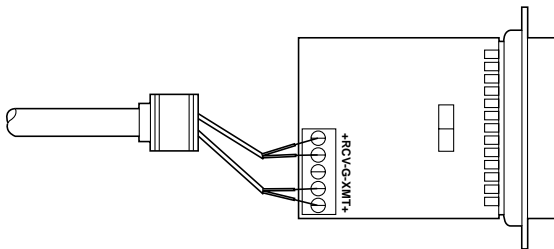
7. When you finish connecting the wires to the terminal block, the assembly should resemble **Figure 4-7**.



**Figure 4-7. Terminal Block with Wires Connected.**

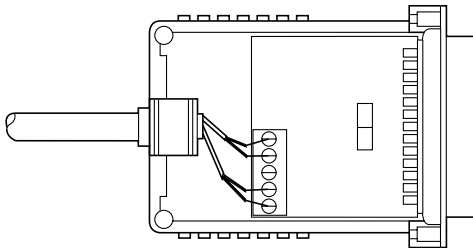


- Place the two halves of the strain-relief assembly on either side of the telephone wire and press together very lightly. Slide the assembly so that it is about two inches (5 cm) from the terminal posts and press together firmly.



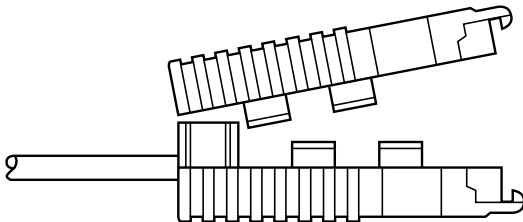
**Figure 4-8. Pressing Together the Two Halves of the Strain-Relief Assembly.**

9. Insert the strain-relief assembly with the wire going through it into the slot in the bottom half of the modem case and set it into the recess in the case.



**Figure 4-9. Inserting the Strain-Relief Assembly into the Modem Case.**

10. Bend the top half of the case as necessary to place it over the strain-relief assembly. Do not snap the case together yet.



**Figure 4-10. Placing the Top Half of the Case Over the Strain-Relief Assembly.**

11. Insert one captive screw through a saddle washer and then insert the entire piece through the hole in the DB25 end of the case. Snap that side of the case closed. Repeat the process for the other side. This completes cable installation.

## 4.2 Connection to the RS-232 Interface

Once you have connected the twisted-pair wires correctly, simply plug the Mini Driver directly into the DB25 port of the RS-232 device. After doing so, remember to insert and tighten the two captive connector screws.

### 4.2.1 CONNECTION TO A DTE DEVICE

The Mini Driver is wired as a DCE, and therefore wants to plug into a DTE such as a terminal, PC, or host. Because the Mini Driver is interface powered, a direct connection to the RS-232 DTE port is preferred. If you must use a cable to connect the Mini Driver to the DTE port, make sure it is a straight-through cable of the shortest possible length—we recommend 6 feet (1.8 m) or less.

### 4.2.2 CONNECTION TO A DCE DEVICE

Since the Mini Driver is wired as a DCE, you cannot connect it directly to another DCE such as a modem, multiplexor, or printer. If you need to connect the Mini Driver to another DCE device, you must use a null-modem cable wired according to **Figure 4-11**. We recommend that the cable be as short as possible, preferably 6 feet (1.8 m) or less.

Connection to Mini Driver <sup>1</sup> DB25 Pin. No.	Connection to DCE Device DB25 Pin No.
1	1
2	2
3	3
4	8
8	4
6	20
20	6
17	24
24	17
7	7

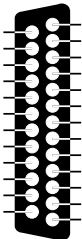
<sup>1</sup>When connecting to another DCE device, the Mini Driver should be configured for “external clock” (see **Section 3.2**).

**Figure 4-11. Null-Modem Cable Wiring.**

### 4.3 Operating the Mini Driver

Once the Mini Driver is properly configured and installed, it should operate transparently—as if it were a standard cable connection. Operating power is derived from the RS-232 data and control signals; there is no “ON/OFF” switch. All data signals from the RS-232 interface are passed straight through. All control signals from the RS-232 interface are looped back.

# Appendix: RS-232 Pin Configurations

DIRECTION	STANDARD "DCE" SETTING	DIRECTION
To Mini Driver	Transmitter Timing - 15 	To Mini Driver
To Mini Driver	Receiver Timing -17	From Mini Driver
To Mini Driver	Data Term. Ready (DTR) - 20	From Mini Driver
	1 - (FG) Frame Ground 2 - (TD) Transmit Data 3 - (RD) Receive Data 4 - (RTS) Request to Send 5 - (CTS) Clear to Send 6 - (DSR) Data Set Ready 7 - (SG) Signal Ground 8 - (DCD) Data Carrier Detect	To Mini Driver From Mini Driver To Mini Driver From Mini Driver From Mini Driver From Mini Driver

**Figure A-1. RS-232 Pin Configurations.**



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