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JULY 1994
ME792A
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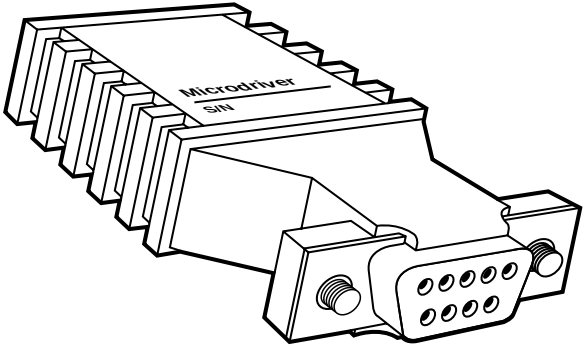
# DB9 Microdriver

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# FEDERAL COMMUNICATIONS COMMISSION AND INDUSTRY CANADA 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 Industry Canada.*

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

# Contents

# 1. Specifications

**Protocol —** Asynchronous

**Speed —** 300-19,200 bps (no strapping)

**Distance —**

| | Wire Gauge | | |
|---|---|---|---|
| Speed (bps) | 19 | 24 | 26 |
| 19,200 | 6.2 mi (10.0 km) | 3.7 mi (6.0 km) | 1.2 mi (1.9 km) |
| 9600 | 7.5 mi (12.1 km) | 4.9 mi (7.9 km) | 2.5 mi (4.0 km) |
| 4800 | 8.7 mi (14.0 km) | 5.6 mi (9.0 km) | 3.7 mi (6.0 km) |
| 2400 | 11.8 mi (19.0 km) | 8.0 mi (12.9 km) | 4.9 mi (7.9 km) |
| 1200 | 17.0 mi (27.4 km) | 11.8 mi (19.0 km) | 8.0 mi (12.9 km) |

**Surge Protection (SP models only) —** 600W power dissipation at 1 ms and response time of 1.0 picoseconds

**Control Signals —** CTS (Pin 8) turns ON immediately after the terminal raises RTS (Pin 7); DSR (Pin 6) and DCD (Pin 1) turn ON immediately after the terminal raises DTR (Pin 4)

**Operation —** 4-wire, full- or half-duplex

**Transmit Level —** 0 dBm

**Connectors —** RJ-11 or RJ-45 jack or 5-screw terminal posts (4 wires, 1 ground) and a strain relief insert; works well with data signals only

**Power —** No power required; uses ultra-low power (5 volts required, with current draw of 3 to 5 mA at 10 volts) from EIA data and control signals: Pins 3, 4, and 7 in DCE mode

**Size —** 2.5"H x 1.2"W x 0.7"D (6.4 x 3.1 x 1.8 cm)

**Note: The DB9 Microdriver must be used in pairs. The unit is compatible with the Mini Driver MP (ME771A-773A) and the CS Mini Driver-A (ME731A-733A).**

# 2. Description

The DB9 Microdriver lets two asynchronous RS-232 devices with DB9 connectors communicate at distances up to 17 miles (27 km). Operating full-duplex over two unconditioned twisted-pair wires, the Microdriver supports data rate from 300 to 19,200 bps. The unit draws all power from the RS-232 interface and requires no AC power or batteries.

The Microdriver connects directly to IBM® AT® compatibles, Unisys 6000/7000 Series, NCR Tower®, and other RS-232 machines with DB9 serial ports. Its tiny size lets the Microdriver fit in very tight installation spaces. And you can make twisted-pair connections using RJ-11, RJ-45, or terminal blocks with strain relief. For added flexibility, the Microdriver is compatible with the Mini Driver MP (ME771A-773A) and the CS Mini Driver-A (ME731A-733A).

The SP model uses the latest in bi-directional, clamping transient suppressors to guard itself and connected equipment from data line transients. Providing 600 watts per wire of transient protection, the SP model is recommended for environments prone to lightning storms, static discharge, and other forms of EMR.

## Features

- Full-duplex, asynchronous operation over 4 wires.
- Supports speeds from 300 to 19,200 bps.
- Supports a range of up to 17 miles (27 km) on 19 AWG wire @ 1200 bps.
- No AC power required. The Microdriver draws power from RS-232 signals.
- Small size.
- Twisted-pair connection via strain relief, RJ-11, or RJ-45.
- Compatible with the Mini Driver MP (ME771A-773A) and the CS Mini Driver-A (ME731A-733A).
- Made in the U.S.A.

# 3.0 Installation

The Microdriver is easy to install and requires no pre-configuration. This section tells you how to properly connect the Microdriver to the twisted-pair and RS-232 interfaces, and how to operate it.

## 3.1 Connection to the Twisted-Pair Interface

The DB9 Microdriver operates full-duplex in point-to-point environments. It passes both data and X-ON/X-OFF (software) handshaking signals. There are two essential requirements for installing the Microdriver:

1. You must use Microdrivers in pairs. You must have one unit at each end of a two twisted-pair interface.
2. You must use two twisted pairs of metallic wire. These pairs must be unconditioned dry, metallic wire, between 19 and 26 AWG (lower-number gauges allow greater distances). Do *not* use standard dialup telephone circuits or leased circuits that run through signal equalization equipment.

### 3.1.1 Twisted-Pair Connection Using RJ-11 or RJ-45

The RJ-11 or RJ-45 jacks on the Microdriver are prewired for a standard AT&T® wiring environment.

To be sure you have the right wiring, use the tables below as guides.

| RJ-11 | Signal |
|---|---|
| 1 | GND* |
| 2 | RCV- |
| 3 | XMT+ |
| 4 | XMT- |
| 5 | RCV+ |
| 6 | GND* |

| RJ-45 | Signal |
|---|---|
| 1 | N/C |
| 2 | GND* |
| 3 | RCV- |
| 4 | XMT+ |
| 5 | XMT- |
| 6 | RCV+ |
| 7 | GND* |
| 8 | N/C |

When you connect two DB9 Microdrivers, you must use a cross-over cable. The following diagram shows how a cross-over cable should be constructed for an environment where both Microdrivers use a 6-wire RJ-11 connector. Use similar logic when you use RJ-45 connectors or a combination of both.

| Signal | Pin # | Color** | Color | Pin # | Signal |
|---|---|---|---|---|---|
| GND* | 1 | Blue | White | 6 | GND* |
| RCV- | 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* |

* Connection to ground is optional.

** These are standard color codes. Your colors may be different.

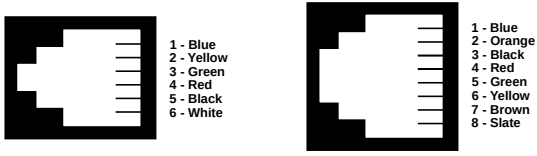



**Fig. 3-1. Standard AT&T color codes.**

### 3.1.2 Terminal Block Twisted-Pair Connection

If your application requires you to connect one or two pair of bare wires to the Microdriver, you'll need to get into the internal terminal blocks. Follow these instructions to open the case, connect the bare wires to the terminal blocks, and fasten the strain relief collar in place, so that the wires don't pull loose.

**Note: The terminal block configurations are different for the male (ME794A-M) and female models (ME794A-F).**

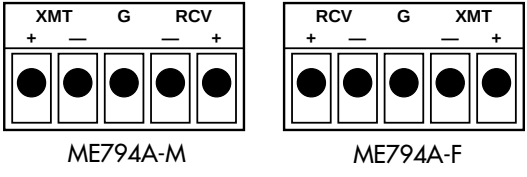
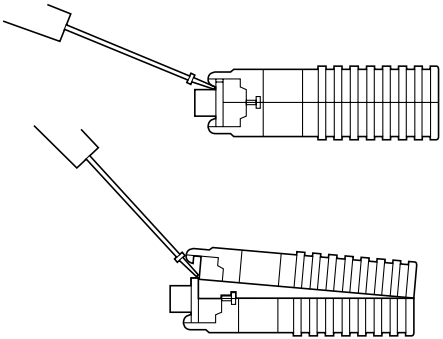


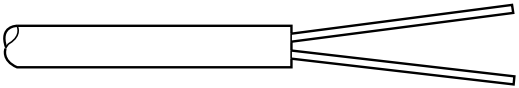

**Fig. 3-2. Terminal block configurations for ME794-M & ME794A-F.**

1. Open the unit by gently inserting a screwdriver between the DB9 connector and the lip of the plastic case. You don't have to worry about breaking the plastic, but be careful not to bend the D-sub connector.

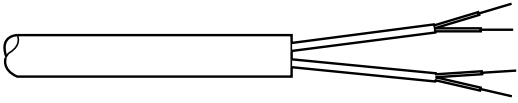


Once you've opened the unit, you'll be able to see the terminal block located at the rear of the PC board.

2. Strip the outer insulation from the twisted-pair wires about one inch (2.5 cm) from the end.



3. Strip back the insulation on each of the 2 twisted-pair wires about ¼ inch (0.6 cm).

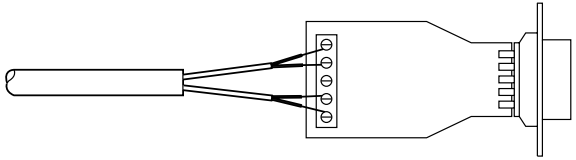


4. Connect one pair of wires to XMT+ and XMT- (transmit positive and negative) on the terminal block, making careful note of which color is positive and which color is negative.
5. Connect the other pair of wires to RCV+ and RCV- (receive positive and negative) on the terminal block, again making careful note of which color is positive and which color is negative.

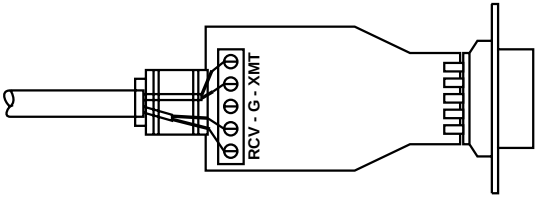
Ultimately you will want to construct a two-pair cross-over cable that makes a connection between the Microdrivers like this:

| | | | |
|---|---|---|---|
| **XMT+** | ---------- | **RCV+** | } One Pair |
| **XMT-** | ---------- | **RCV-** | } |
| **G** | ---------- **To Shield (Optional)** | **G** | |
| **RCV-** | ---------- | **XMT-** | } One Pair |
| **RCV+** | ---------- | **XMT+** | } |

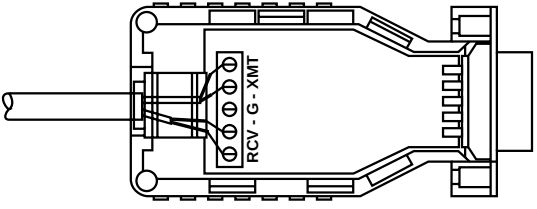
6. If there is a shield around the telephone cable, it may be connected to “G” on the terminal block. We recommend connecting the shield at the computer end only to avoid ground loops. A ground wire is not necessary to properly operate the Microdriver.
7. When you finish connecting the wires to the terminal block, the assembly should resemble the diagram below:



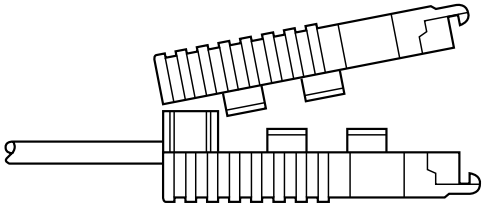
8. Place the two halves of the strain-relief assembly on either side of the telephone wires and press together very lightly. Slide the assembly so that it is about two inches (5 cm) from the terminal posts and press together firmly.




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



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



11. Insert one captive screw through a saddle washer and then insert the captive screw with the washer on it, through the hole in the DB25 end of the case. Snap that side of the case closed. Repeat the process for the other side.

The cable installation is now complete.

### 3.2 Connection to the RS-232 Interface

The female DB9 Microdriver is configured as a DCE and is designed to connect to the DB9 serial port of an RS-232 DTE (PC, laptop, host).
Since there is no universal standard wiring for the DB9 serial interface, we wired the Microdriver to either of the two common standards shown on the next page.

**Note: PC/AT is our normal wiring.**

| "PC/AT" Standard | | "Prime" Standard | |
|---|---|---|---|
| **DB9** | **Signal** | **DB9** | **Signal** |
| 3 | TD | 3 | TD |
| 2 | RD | 2 | RD |
| 7 | RTS | 4 | RTS |
| 8 | CTS | 5 | CTS |
| 1 | CD | 8 | CD |
| 4 | DTR | 6 | DSR |
| 6 | DSR | 9 | DTR |
| 5 | SG/FG | 1 | FG |
| | | 7 | SG |

**Note: If you must use a cable to connect the Microdriver to the DTE device, make sure that it is a straight-through cable of the shortest possible length. We recommend 6 ft. (1.8 m) or less.**

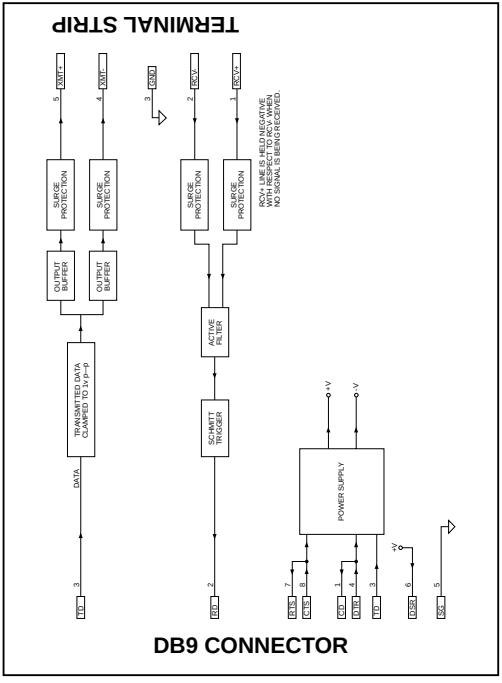
Should you wish to connect a DTE to a DCE using short-range modems (example: a PC/XT™ connected to a mux several hundred feet away), we recommend using a DB9 Microdriver for the DB9 DTE connection and a CS Mini Driver-A (ME731A, ME732A, or ME733A) for the DB25 connection. These two units are compatible. If you need to use a DB9 Microdriver on both ends, you must use a cross-over, RS-232 cable to connect to the DCE device. Call our Technical Support staff for more information.

### 3.3 Operating the DB9 Microdriver

Once you've installed the Microdriver, it should operate transparently—as if it were a standard cable connection. It derives operating power from the RS-232 data and control signals. There is no ON/OFF switch. All data from the RS-232 interface, including X-ON/X-OFF flow control information, is passed straight through. Any hardware flow-control signals are looped back at the interface and are not passed between the Microdrivers.

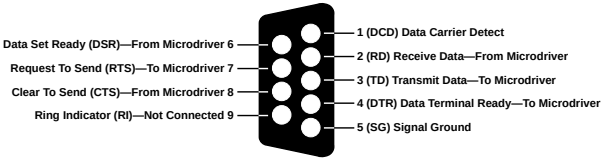
# Appendix A

## Block Diagram



# Appendix B

## Pinout of the DB9 Connector



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