BLACK BOX
NETWORK SERVICES

APRIL 2001
ME3004A-F

Multi Drop Isolator Line Driver

CUSTOMER SUPPORT INFORMATION

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FCC REQUIREMENTS FOR TELEPHONE-LINE EQUIPMENT

1. The Federal Communications Commission (FCC) has established rules which permit this device to be directly connected to the telephone network with standardized jacks. This equipment should not be used on party lines or coin lines.

2. If this device is malfunctioning, it may also be causing harm to the telephone network; this device should be disconnected until the source of the problem can be determined and until the repair has been made. If this is not done, the telephone company may temporarily disconnect service.

3. If you have problems with your telephone equipment after installing this device, disconnect this device from the line to see if it is causing the problem. If it is, contact your supplier or an authorized agent.

4. The telephone company may make changes in its technical operations and procedures. If any such changes affect the compatibility or use of this device, the telephone company is required to give adequate notice of the changes.

5. If the telephone company requests information on what equipment is connected to their lines, inform them of:

   a. The telephone number that this unit is connected to.
   b. The ringer equivalence number.
   c. The USOC jack required: RJ-11C.
   d. The FCC registration number.

Items (b) and (d) can be found on the unit's FCC label. The ringer equivalence number (REN) is used to determine how many devices can be connected to your telephone line. In most areas, the sum of the RENs of all devices on any one line should not exceed five (5.0). If too many devices are attached, they may not ring properly.

6. In the event of an equipment malfunction, all repairs should be performed by your supplier or an authorized agent. It is the responsibility of users requiring service to report the need for service to the supplier or to an authorized agent.

CERTIFICATION NOTICE FOR EQUIPMENT USED IN CANADA

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications-network protective, operation, and safety requirements. The Department 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 Canadian maintenance facility—in this case, your supplier. 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.

The LOAD NUMBER (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices, subject only to the requirement that the total of the load numbers of all the devices does not exceed 100.

Table of Contents

1.0 General Description

The Model ME3004A-F is a short haul modem designed for full-duplex asynchronous communications over two sets of twisted-pair wires. The Model ME3004A-F incorporates a carrier scheme so that other Model ME3004A-F's may be multi-dropped from the same sets of wires. Power is provided to the unit through the RS-232 interface. For full operation with regard to power, the modem requires only that Transmit Data and Ground be connected. The Model ME3004A-F contains an LCD display.

1.1 DataSpy™ Feature

Your new Black Box® product incorporates the Patent Pending DataSpy™ feature, an LCD display designed to assist with initial installation and check-out. Thereafter it can be used as a performance monitor. In the case of a system problem it provides information as to the status of the local link.

Figure 1: The DataSpy™ LCD display.

The display of TD and RD indicates that the unit is powered. The LCD display uses less than 1 milliwatt of power.

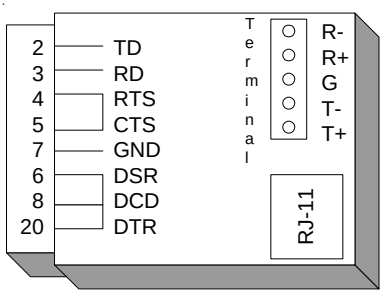
The data display on the LCD consists of graphical representations for TD (Transmit Data) and RD (Receive Data).

These signals are displayed the way a bit-change waveform would appear on an oscilloscope. Ordinarily, TD and RD are low (a minus voltage) in the quiescent state. When data is transmitted, the transmit signal is brought high to a positive voltage. These two signal states are displayed on the LCD by either a low segment or a high segment. The low segment represents the minus voltage (i.e., the mark condition) while the upper segment represents a positive voltage (i.e., the space condition). The vertical bar connecting the lower segment to the upper segment is always on when power is applied.

If the transmit signal is in the quiescent state (continuously low) only the lower segments and the vertical bar are illuminated. This is an indication of a constant negative state. If the transmit or receive inputs to the device are streaming (in the positive mode continuously), the LCD display shows the vertical segment and the upper segments only. For those cases where there is valid data transmission, both the upper and lower segments are displayed simultaneously. A variation in display intensity between lower and upper segments gives the user a perception of the amount of data being transmitted.

The LCD display also shows the status of the following control signals: CTS, RTS, DSR, DCD, and DTR. These signals are displayed as mnemonic symbols, composed of three letters each, on the bottom line of the display. The presence of the three-letter mnemonic indicates that the respective control signal is high (positive).

If the control signal is negative, the three-letter mnemonic is not displayed. For most full-duplex data-only modems, CTS and RTS are connected together while DSR, DCD, and DTR are connected together. For handshaking modems there is a relationship among the various control signals on both ends of the link. This relationship is dependent upon the control signals utilized.



2.0 Specifications

2.1 Interface
Conforms to RS-232 and CCITT V.24 specifications.

2.2 Connectors
RS-232: DB-25 Female

Analog: RJ-11 and five screw terminals

2.3 Data Rate
0 to 19.2 KBPS

2.4 Transmission
Asynchronous full duplex over four wires (two twisted pairs).

2.5 Transmission Controls
Data Carrier Detect (DCD) turns on after detecting the receive signal from the line. Data Set Ready (DSR) or Data Terminal Ready (DTR) will be a constant high depending on the setting of the DTE / DCE switch. For DTE, setting Clear-To-Send (CTS) turns on 40 msec after terminal rises Request-To-Send (RTS).

2.6 Switches
Each modem is equipped with a DTE / DCE switch to allow reversing the TD and RD signals on the RS-232 interface as well as the proper setup of the control signals.

2.7 Indicators
LCD display for data, five control signals and power.

2.8 Transmission Range
For 24 AWG wire: 2.8 miles at 1200-9600 BPS; 1.2 miles at 19,200 BPS.

2.9 Carrier Control
The carrier is selectable as continuous or switched. In the switched mode, the carrier is controlled by RTS.

2.10 Power
Power is derived from the interface. The unit will attempt to derive its power from any one of the control signals, which are expected to be at least +5.5V or -5.5V in the quiescent state. If there are no control signals available to the modem then power is derived from the data input pin. The data input pin must be at least -5.5V in the quiescent state.

2.11 Size
2" W x 4.15" L x .79" H
(50.8mm x 105.4mm x 20.1mm)

2.12 Environment
0° to 50° ***C***, 5% to 95% relative humidity, no condensation.

3.0 Installation

3.1 Digital Interface

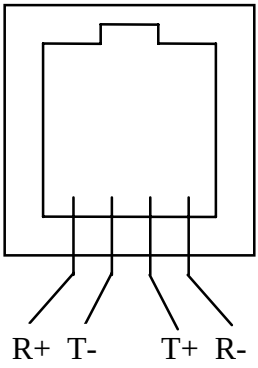
The digital interface for the Model ME3004A-F is a DB-25 female connector.

3.2 Analog Interface

Note: The four-wire line between modems must be two twisted pairs. On each modem, the wires marked T+ and T- must be members of the same twisted pair, R+ and R- must be members of the other.

3.2.1 Screw Terminals - The Model ME3004A-F is supplied with five screw terminals marked T+, T-, R+, R-, and GND. When connecting two line drivers together the T+ of one unit goes to the R+ of the other, while T- goes to R-.

3.2.2 Phone Plug - The Model ME3004A-F is equipped with a standard RJ-11 modular phone connector. Only four of the six positions are used. The designation of the wires is shown in the following diagram.



Female RJ-11
mounted on PCB

4.0 Operation

Connect the Model ME3004A-F to the device that contains the RS-232 port. The DTE / DCE switch on the Model ME3004A-F allows reversing of the input / output pins of the modem. When the switch is in the DCE position, Pin 2 of the modem is an input.

The other switch on the modem is labeled Carrier. This switch is used to allow the Request-To-Send (RTS) signal to control the transmitter when operating in a multi-dropped environment. For a standard point-to-point operation, the switch should be positioned in the “ON” position. For multi-dropped operation, position the switch into the “RTS” position.

5.0 Troubleshooting

The following is a list of possible problems that may arise during the installation and suggested solutions.

1. The data being received is garbled.

a) The DTE/DCE switches are not set properly (see section 4, "*Operation*").
b) The equipment that the Model ME3004A-F is connected to does not have the same communication parameters as the ME3004A-F.
c) T+ and T- are reversed going to R+ and R-.
d) One of the four wires is broken.
e) Wires are not paired properly: T+ and T- should be one twisted pair and R+ and R- should be the other pair.

2. No data is being received.

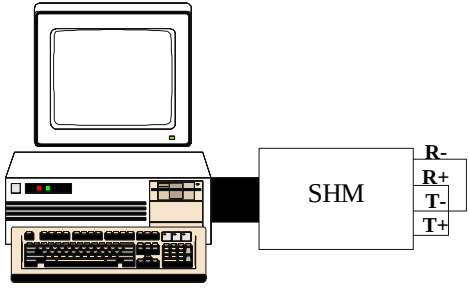
a) Customer equipment not connected to the ME3004A-F.
b) The DTE/DCE switches are not set properly (see section 4, "*Operation*").
c) One or more wires between the modems are open.
d) Link connection exceeds maximum specified distance.

If the unit is believed to be defective, operation can be verified if one of the devices to which the modems are attached is capable of operating in a full-duplex mode (such as a terminal or a PC using communications package such as Procomm).

Connect the ME3004A-F to the terminal via the RS-232 connector and make the following loopback connections at the analog interface.

T+ to R+ and T- to R-

If the modem is functioning correctly, any data entered on the keyboard should appear on the screen.



6.0 Connector Pin Assignments

Pin	EIA	CCITT	Name
2	BA	103	Transmit Data
3	BB	104	Receive Data
4	CA	105	Request to Send
5	CB	106	Clear to Send
6	CC	107	Data Set Ready
7	AB	102	Signal Ground
8	CF	109	Data Carrier Detect
20	CD	108.2	Data Terminal Ready

7.0 Power

The Model ME3004A-F can be powered in one of two ways. The first method attempts to derive positive power from Pins 4, 5, 6, 8 or 20 (if available) and negative power from the data input pin (must be at least -5.5V in its quiescent state). The second method derives power from the data input signal (must be at least -5.5V in the quiescent state). This method is used when devices that the ME3004A-F is connected to do not support control signals.

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