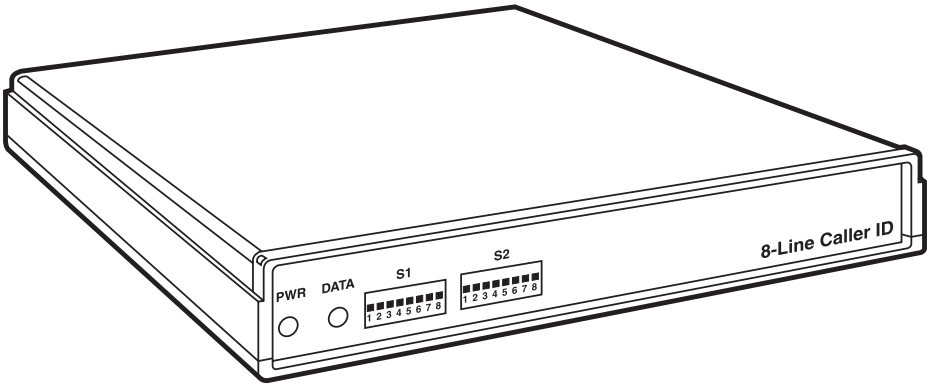
BLACK BOX®
NETWORK SERVICES

OCTOBER 2001
TE120A
TE121A

4- and 8-Line Caller ID



CUSTOMER SUPPORT INFORMATION

Order **toll-free** in the U.S.: Call **877-877-BBOX** (outside U.S. call **724-746-5500**)
FREE technical support 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**
Mailing address: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: **www.blackbox.com** • E-mail: **info@blackbox.com**

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.

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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 device must not be used on coin lines. Its use on party lines is subject to state tariffs; for more information, contact your state's public-utility commission or corporation commission.

2. If this device is malfunctioning, it might 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. If possible, they will notify you of this in advance. But if advance notice isn't practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC.

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 Black Box 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 device is connected to.

   b. The name and part number of this device.

   c. The ringer equivalence number (REN): 0.0 B.

   d. The service order code (SOC): 9.0F.

   e. The facility interface code (FIC): 02LS2, 02GS2.

   f. The USOC jack required: RJ-14C for TE120A, RJ-11C for TE121A.

   g. The FCC registration number.

   Items (c) and (g) 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 might not ring properly.

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

CERTIFICATION NOTICE FOR TELEPHONE EQUIPMENT USED IN CANADA

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications-network protective, operation, and safety requirements. Industry Canada 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 might not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility—in this case, Black Box. 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.

NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT

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 connectado 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 fisica 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 lineas de energia.

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 objectos liquidos 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: Objectos 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.

Contents

1. Specifications

Compliance:	EMI/RFI: FCC Part 15 Subpart J Class A, IC Class/classe A; Phone-system compatibility: FCC Part 68 (registration number 1LJUSA-18773-ND-N); Fire/electrical safety: Both units: ETL; TE121A only: CSA
Interfaces:	To the telephone network: Modular telco; To the DTE and for daisychaining: Proprietary variant of EIA/TIA RS-232 serial, pinned on DB9 according to TIA-574
Protocol:	RS-232: Asynchronous
Data Rate:	RS-232: 1200, 2400, 4800, or 9600 bps (user-selectable)
Data Format:	RS-232: 7 or 8 data bits and even, odd, or no parity (user-selectable); 1 stop bit (fixed)
Receive Level:	–10 to –33 dBm
Maximum Distance:	RS-232 cabling from Caller ID unit to DTE or to next daisychained unit: 50 ft. (15.2 m)
User Controls:	(2) Front-mounted 8-position DIP switches for signal handling, data format, data rate, and unit number
Indicators:	(2) Front-mounted LEDs for power and data activity
Connectors:	All rear-mounted; (1) DB9 female for output to daisychain or DTE; (1) DB9 male for input from daisychain; TE120A: (2) RJ-14C female for dual-line phone-network connections; TE121A: (8) RJ-11C female for single-line phone-network connections
Temperature Tolerance:	Operating: 10 to 120˚F (–12 to +49˚C); Storage: 0 to 150˚F (–18 to +66˚C)

Humidity Tolerance: 20 to 90% noncondensing

Enclosure: High-impact plastic

Power: From utility-power (mains) outlet, through external power-supply transformer:
- TE120A:
  - Input: 120 VAC, 60 Hz, at up to 300 mA;
  - Output: +23 VAC at 160 mA nominal;
- TE121A:
  - Input: 120 VAC, 60 Hz, at up to 120 mA;
  - Output:
    - +5 VDC at 380 mA;
    - +12 VDC at 180 mA;
    - –12 VDC at 180 mA

Size: TE120A: 1.9"H x 4.4"W x 7.5"D (4.8 x 11.2 x 19.1 cm);
TE121A: 1.9"H x 8.3"W x 9"D (4.8 x 21.1 x 22.9 cm)

Weight: TE120A:
- Net:
  - Unit: 1 lb. (0.5 kg);
  - Power supply: 0.8 lb. (0.4 kg);
- Shipping: 3 lb. (1.4 kg);

TE121A:
- Net:
  - Unit: 1.7 lb. (0.8 kg);
  - Power supply: 1 lb. (0.5 kg)
- Shipping: 4 lb. (1.8 lb.)

2. Introduction

2.1 Overview

The 4- and 8-Line Caller ID units (product codes TE120A and TE121A respectively) receive Caller ID (identification) data from the telephone company and send the data, in ASCII RS-232C format, to a printer, terminal, computer, or other DTE (data terminal equipment). As an interface, the Caller ID unit only receives, converts, and then resends the the Caller ID information to a DTE device (not included). Any printing or displaying of the data is done by the DTE.

The Caller ID unit is compatible with most key systems and PBXes, and is also compatible with most of the current C.O.-based message-waiting services. This device is single- and multiple-message compatible. Caller ID services are currently being offered by many telephone companies as a subscribed service (check for service availability).

The Caller ID units have one or two 8-position DIP switches on their front panels (shown in Figures 2-1 and 2-2 on the next page). These switches control the data rate, data bits, parity, voltage, and line or port specifications for configuring the unit to work with the DTE device.

The telephone-line ports are located on the rear panels of the Caller ID units (also shown in Figures 2-1 and 2-2 on the next page). You'll use regular modular phone cable to attach these RJ-14C (TE120A) or RJ-11C (TE121A) input jacks to the incoming telephone lines from the central office. You'll be using line splitters or cross-connects to attach the Caller ID units "in parallel" with the telephone devices associated with those lines (see **Chapter 4**).

The Caller ID unit's power-supply connector is also located on its rear panel. The power supply is an external AC-power adapter requiring a common AC outlet.

On the rear panel there are also two connectors, RS-232 IN and RS-232 OUT, which you can use to daisychain (interconnect) as many as eight Caller ID units in order to monitor up to 32 or 64 lines or ports with a single RS-232 connection to a DTE. (32 will be the maximum number of lines if you use any 4-port units; 64 will be the maximum if you use only 8-port units.)

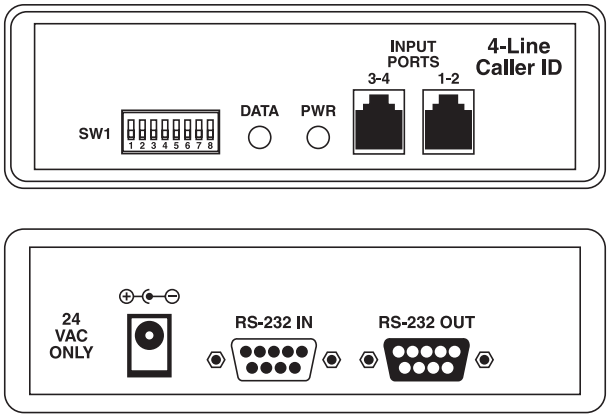

Figure 2-1. Front (shown at top) and rear (shown at bottom) panels of the 4-Line Caller ID (TE120A).

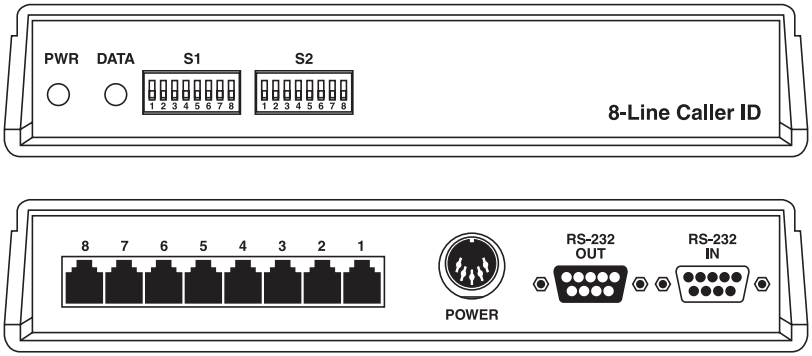

Figure 2-2. Front (shown at top) and rear (shown at bottom) panels of the 8-Line Caller ID (TE121A).

2.2 How the Caller ID Units Work

The Caller ID units receive calls on any of their modular phone-line ports, which you'll connect directly to the incoming central-office telephone lines in parallel with the telephone, key system, or PBX. After detecting the Caller ID data from the local telephone company, the Caller ID unit stamps this information with the port number, converts it into ASCII, and transmits it from its RS-232 OUT port to an attached PC, printer, or other RS-232 DTE. (The Caller ID unit will only indicate that data has been received if a DTE is connected to the RS-232 OUT port. It will light its "DATA" LED to indicate that it's sending data through its RS-232 OUT port.) The flow of the data in systems with a single Caller ID unit is shown in Figures 2-3 and 2-4 on the next two pages; the data flow in systems with multiple daisychained Caller ID units is shown in Figures 2-5 and 2-6 on the pages that follow.

What happens to the data after the Caller ID unit transmits it to the DTE is up to you. You could buy or write a software program to process it (this is often done in conjunction with a database). But any serial printer, terminal, or PC running a terminal emulator should be able to accept the data without requiring extra hardware or software if all you need to do is monitor the data as it's printed or appears on screen.

(text continues on page 16)

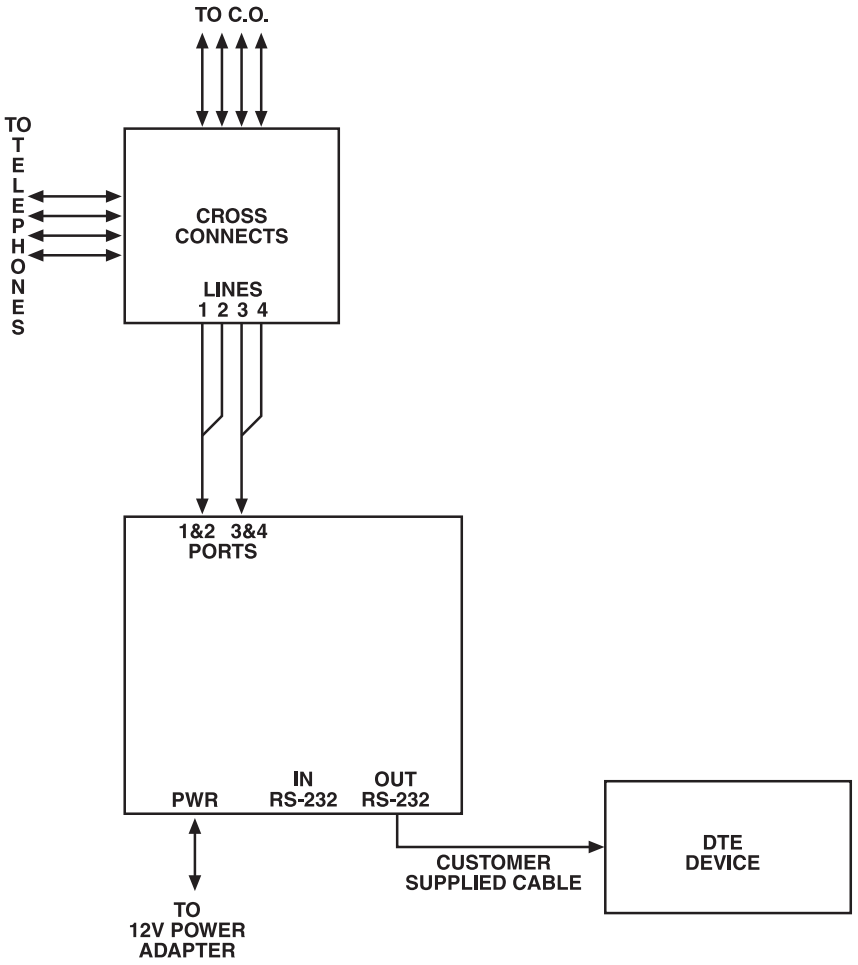

Figure 2-3. Signal flow with a 4-Line Caller ID (TE120A).

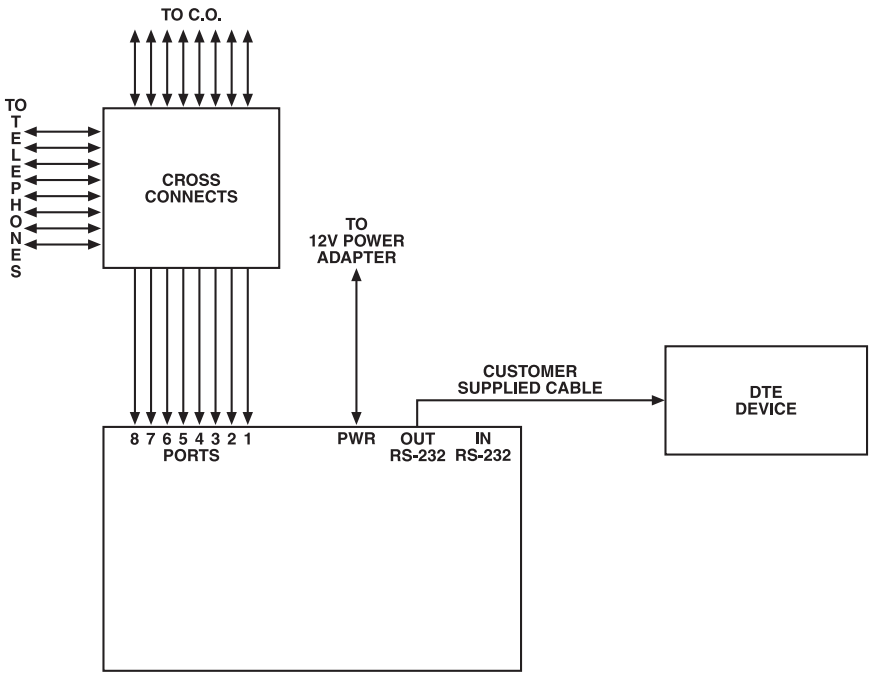

Figure 2-4. Signal flow with an 8-Line Caller ID (TE121A).

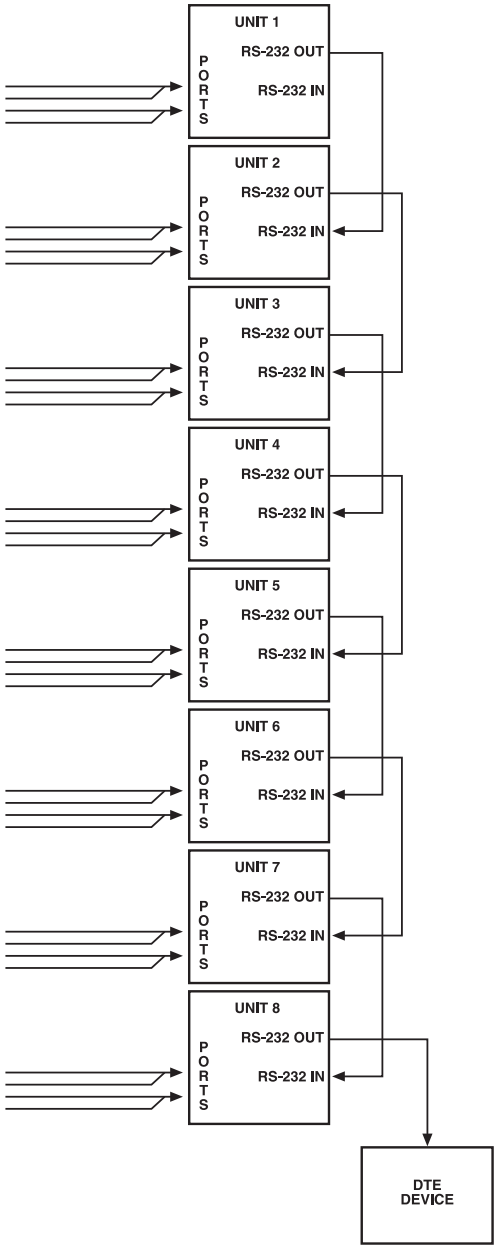

Figure 2-5. Signal flow with multiple 4-Line Caller IDs (TE120A).

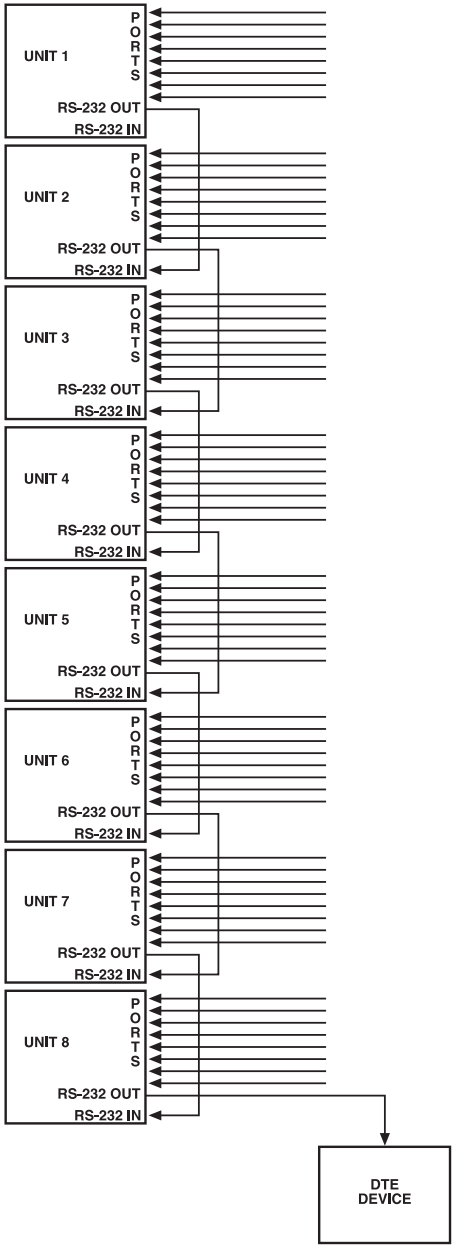

Figure 2-6. Signal flow with multiple 8-Line Caller IDs (TE121A).

(text continued from page 11)

2.3 Connectors and Pinouts

There are several connectors on the Caller ID units. Each 4-Line unit (TE120A) has two dual-line RJ-14C female telephone-line ports and a barrel-type power inlet. Each 8-Line unit has eight single-line RJ-11C female telephone-line ports and a 5-pin DIN female power inlet. The RJ-14C and RJ-11C pinouts look like this:

Pin	RJ-14C (TE120A) Signal	RJ-11C (TE121A) Signal
1, 6	[No connection]	[No connection]
2	2nd line (2 or 4) tip	[No connection]
3	1st line (1 or 3) tip	Tip
4	1st line (1 or 3) ring	Ring
5	2nd line (2 or 4) ring	[No connection]

Both 4- and 8-Line units have two RS-232 ports whose data rate, parity, data bits, and flow control are all user-selectable (see **Section 3.2**). The RS-232 OUT port is a DB9 female connector pinned as an RS-232 DCE port. (This means that it actually *transmits* data on its Receive Data lead, as a modem would.) It's designed to be connected to printers, terminals, PCs running terminal emulators, and other DTEs. (In daisychained applications, it can be connected to the RS-232 IN port of the next Caller ID unit in the chain.) The RS-232 OUT port is pinned this way:

Pin	Signal	Direction
1	Carrier Detect (CD)	Out (to other device)
2	Receive Data (RD)	Out (to other device)
5	Signal Ground (SGND)	N/A
6	Data Set Ready (DSR)	Out (to other device)
7	Request to Send (RTS)	In (from other device)
8	Clear to Send (CTS)	Out (to other device)
9	Busy	Out (to other Caller ID unit)

NOTES

Pin 7, RTS, must be pulled active (high) in order for the Caller ID unit to turn on its DATA LED when it receives Caller ID information from a telephone line.

Pin 9, Busy, is a proprietary signal used primarily for communication between daisychained Caller ID units, although it can be connected to Pin 22, Ring Indicator (RI), on a DTE with a DB25 serial port, as shown in Table 4-1 at the end of Chapter 4**.**

The RS-232 IN port is a DB9 male connector pinned as an RS-232 DTE port. It's only used when multiple Caller ID units are daisychained together; it receives information from units farther along in the chain. The RS-232 IN port is pinned this way (see the Note on the previous page about the Busy signal on Pin 9):

Pin	Signal	Direction
2	Receive Data (RD)	In (from other Caller ID unit)
5	Signal Ground (SGND)	N/A
7	Request to Send (RTS)	Out (to other Caller ID unit)
8	Clear to Send (CTS)	In (from other Caller ID unit)
9	Busy	In (from other Caller ID unit)

2.4 The Complete Package

Each 4-Line Caller ID comes with:

- (2) Condenser cables with two RJ-11C plugs at one end and one RJ-14C plug at the other end.
- Power supply.
- This manual.

Each 8-Line Caller ID comes with:

- (1) Standard phone cable with RJ-11C plugs at both ends.
- Power supply.
- This manual.

If anything is missing or damaged, call Black Box. Also notify the shipping carrier if any damage appears to have occurred during shipping.

3. Configuration

You'll configure your Caller ID units for your application using their front-mounted 8-position configuration DIP switches. Both models have a switch labeled S2 that controls RS-232 characteristics and unit number. The 8-Line model has an additional switch labeled S1 for signal handling.

3.1 DIP Switch S1 (TE121A Only)

DIP switch S1 controls the voltage and behavior of three of the pins/signals on the RS-232 OUT port (see **Section 2.3**) of the 8-Line Caller ID (TE121A), so that it will be compatible with your other RS-232 devices. (All of the possible settings of S1's switch positions that aren't listed below are invalid—do *not* use unlisted settings, because they could disable or damage attached equipment.)

Positions 1 and 2 govern how Pin 1, Carrier Detect (CD), is handled:

- **1 OFF, 2 OFF:** Pin 1 output is disabled (factory-default setting).
- **1 ON, 2 OFF:** Causes continuous +12 VDC output on Pin 1.
- **1 OFF, 2 ON:** Causes continuous –12 VDC output on Pin 1.

Positions 3, 4, and 5 govern how Pin 6, Data Set Ready (DSR), is handled:

- **3 OFF, 4 OFF, 5 OFF:** Pin 6 output is disabled (factory-default setting).
- **3 ON, 4 OFF, 5 OFF:** Causes continuous +12 VDC output on Pin 6.
- **3 OFF, 4 ON, 5 OFF:** Causes Pin 6 (DSR) output to follow Pin 8 (CTS) output.
- **3 OFF, 4 OFF, 5 ON:** Causes continuous –12 VDC output on Pin 6.

Positions 6, 7, and 8 govern how Pin 9, the proprietary Busy signal, is handled:

- **6 OFF, 7 OFF, 8 OFF:** Pin 9 output is disabled (factory-default setting).
- **6 ON, 7 OFF, 8 OFF:** Causes continuous +12 VDC output on Pin 9.
- **6 OFF, 7 ON, 8 OFF:** Causes Pin 9 output to follow Pin 9 input from the RS-232 IN port.
- **6 OFF, 7 OFF, 8 ON:** Causes continuous –12 VDC output on Pin 9.

3.2 DIP Switch S2

DIP switch S2 controls both the unit number (if you'll be daisychaining Caller ID units) and the serial communication characteristics of the RS-232 OUT and RS-232 IN ports (see **Section 2.3**) and the unit number (if you will be daisychaining Caller ID units). (All of the possible settings of S2's switch positions that aren't listed below are invalid—do *not* use unlisted settings, because they could disable or damage attached equipment.)

Use positions 1 and 2 to set the data rate of the RS-232 OUT port:

- **1 OFF, 2 OFF:** 1200 bps.
- **1 ON, 2 OFF:** 2400 bps.
- **1 OFF, 2 ON:** 4800 bps.
- **1 ON, 2 ON:** 9600 bps (factory-default setting).

Use position 3 to set the data bits of the RS-232 OUT port:

- **3 OFF:** 7 data bits.
- **3 ON:** 8 data bits (factory-default setting).

Use positions 4 and 5 to set the parity of the RS-232 OUT port:

- **4 OFF, 5 OFF:** No parity (factory-default setting).
- **4 ON, 5 OFF:** Odd parity.
- **4 OFF, 5 ON** or **4 ON, 5 ON:** Even parity.

Use positions 6, 7, and 8 to set the unit number: "1" for a single unit or "1," "2," etc., for daisychained units successively *closer to* the DTE. For example, if you have three 4-Line units in a daisychain, you must set the one *farthest from* the DTE as unit #1, the one in the middle as unit #2, and the one attached to the DTE as #3. (However, if you'll have 4-Line and 8-Line units in the same daisychain, see the Note at the start of **Chapter 4**.) The possible settings are:

- **6 OFF, 7 OFF, 8 OFF:** Unit is #1 (factory-default setting).
- **6 ON, 7 OFF, 8 OFF:** Unit is #2.
- **6 OFF, 7 ON, 8 OFF:** Unit is #3.
- **6 ON, 7 ON, 8 OFF:** Unit is #4.
- **6 OFF, 7 OFF, 8 ON:** Unit is #5.
- **6 ON, 7 OFF, 8 ON:** Unit is #6.
- **6 OFF, 7 ON 8 ON:** Unit is #7.
- **6 ON, 7 ON, 8 ON:** Unit is #8

4. Installation

To install a system of one or more 4- or 8-Line Caller ID units after you've configured them (see **Chapter 3**), take these steps, referring to the appropriate illustrations among Figures 2-3 through 2-6 in **Section 2.2**:

NOTE

If you want to install a daisychain that includes both 4-Line and 8-Line units:

1. Such a daisychain supports only 32 lines. If you'll need to monitor more lines than that, you'll need to chain 8-Line units only.

2. All of the 4-Line units must be installed "ahead" of the 8-Line units. That is, in the sequence of the daisychain, all of the 4-Line units must be closer to the DTE than any of the 8-Line units.

3. Such mixed daisychains need to be assigned unit numbers (see Section 3.2**) as if the 8-Line units take up two "slots." For example, if you were chaining three 8-Line units with two 4-Line units, you'd place one 8-Line unit at the end of the chain and number it "1"; then you'd place the two other 8-Line units in sequence and number them "3" and "5"; then you'd place one of the two 4-Line units and number it "6"; and you'd place the second 4-Line unit at the head of the chain, attached to the DTE, and number it "7."**

1. Attach line splitters or cross-connects to your site's phone-line jacks so that you can send the incoming phone signals to both your telephones and the Caller ID system. If it's not possible to plug cross-connects directly into your site's phone jacks, you'll need to use the standalone type of cross-connects and run standard phone cables from the phone jacks to them.

2. Run standard phone cable from one output of the line splitters or cross-connects to your telephones.

3. Place your Caller ID units close to AC-power outlets. The first unit must be within 50 ft. (15.2 m) of the DTE that will be receiving the Caller ID information; if you're daisychaining, each successive unit needs to be within 50 ft. (15.2 m) of the one before.

   4-Line units: A 4-Line unit can be mounted on a wall by hanging it from a pair of bolts or screws secured into a wall stud. If you want to do this, you might want to photocopy the mounting template in the **Appendix** and use it as a guideline for how much wall area you'll need and where you'll need to position the bolts/screws.

4A. *4-Line units:* 4-Line Caller ID units each have two RJ-14C two-line phone-input connectors; they're designed to be directly connected to two-line phone jacks. If your site has standard single-line jacks, and you need to attach three or four lines to any given 4-Line unit, you'll need to consolidate the extra lines by running the included two-to-one condenser cables from the other output of the cross-connects to the Caller ID's phone-input connectors. (If you ever need a replacement for one of these cables, please call Black Box for technical support.)

If your site *does* have two-line phone jacks, you can run standard phone cables instead.

4B. *8-Line units:* 8-Line Caller ID units each have eight RJ-11C single-line phone-input connectors; they're designed to be directly connected to standard single-line phone jacks. If your site has single-line jacks, run standard phone cables from the other output of the cross-connects to the Caller ID's phone-input connectors. Only one of these cables is included, for initial testing purposes; additional cables are available as product code EL04MS-MM.

If your site has two-line phone jacks, you'll need to use line splitters (not included) to put the lines on separate connectors.

5. Run an RS-232 cable (not included) from the DB9 female RS-232 OUT port of your single Caller ID unit or the first (highest-numbered) unit in your daisychain to an RS-232 serial port on the DTE that will be receiving the Caller ID information. If the DTE is a PC running terminal emulation, and you're connecting the Caller ID unit to one of its DB9 male serial ports, you'll need a straight-through-pinned (Pin 1 to 1, 2 to 2, etc) DB9 male-to-female cable (not included) such as product code EDN12H-MF. If you're connecting the Caller ID unit to an actual terminal, or to one of a PC's DB25 serial ports, you'll need a DB9 male to DB25 female cable pinned as shown in Table 4-1 on the next page. If for whatever reason you want to connect the Caller ID unit to a DCE, please call Black Box for technical support.

CAUTION!

To prevent noise problems, the Caller ID unit is grounded through this serial cable and the DTE, not through its own power supply; the DTE must, in turn, be grounded to your site's grounding system through its power cord or power supply. The grounding obtained through a standard 3-prong AC-power outlet and power cord should be sufficient, providing the AC outlet has been properly installed. Failure to properly ground the DTE might cause the DTE and/or the Caller ID unit to malfunction or be damaged, and also creates an electrical and fire hazard. Do *not* use AC isolation plugs.

6. *If you're daisychaining Caller ID units:* Run a straight-though-pinned (Pin 1 to 1, 2 to 2, etc) DB9 male-to-female cable (not included, product code EDN12H-MF) from the DB9 male RS-232 IN port of the highest-numbered unit in the chain (the one attached to the DTE) to the DB9 female RS-232 OUT port of the next-highest-numbered unit. Repeat this process for each additional unit in the daisychain, finishing by connecting the last such cable to the RS-232 OUT of unit #1. If you include only 8-Line units, there can be eight total units in your daisychain serving up to 64 total lines. If you include any 4-Line units, you can serve up to 32 total lines; the maximum number of 4-Line units in your daisychain will be eight minus twice the number of 8-Line units present:
   - No 8-Line units = eight 4-Line units.
   - One 8-Line unit = six 4-Line units.
   - Two 8-Line units = four 4-Line units.
   - Three 8-Line units = two 4-Line units.
   - If you use four or more 8-Line units, you can't include any 4-Line units.

7. Attach the output cord of each Caller ID unit's power supply to the Power connector on the back of the unit.

8. Plug each power supply's input cord into a working AC outlet. The corresponding Caller ID unit should power up immediately (it has no ON/OFF switch) and light its Power LED.

9. Plug in and boot up the DTE device attached to the (first) Caller ID unit. If the DTE is a PC, run its terminal-emulator program. Make sure the DTE or the terminal-emulator program are set to receive RS-232 data using the same data rate and data format that the Caller ID unit is set for (see **Section 3.2**).

Your Caller ID system should now be ready for continuous operation.

Table 4-1. Pinning of a DB9 to DB25 serial cable.

DB9M attaches to Caller ID's RS-232 OUT port:		**DB25F attaches to DTE's serial port:**	
Signal	Pin	Pin	Signal
CD	1 .....>.....8		CD
RD	2 .....>.....3		RD
SGND	5 7		SGND
DSR	6 .....>.....6		DSR
RTS	7 .....<.....20		DTR
CTS	8 .....>.....5		CTS
BUSY	9 .....>.....22		RI

5. Operation

NOTE

We recommend that the first time you start up your Caller ID system, you test it as described in Section 6.1**.**

5.1 LEDs

There are two LEDs on the front panel of each Caller ID unit. One is the Power LED, which lights as soon as the unit starts receiving power. The other is the DATA LED, which flashes to show that data is being sent from the Caller ID unit to the DTE. (A unit won't light its DATA LED unless it's connected to a powered DTE—specifically, it needs to receive Pin 7, RTS, active/high on its RS-232 OUT port.)

5.2 How the Unit Handles Caller ID Information

The Caller ID unit receives standard Caller ID information from the telephone company's central office as Bell® 202A modem tones, between the first and second rings of the phone call. The Caller ID unit takes this information, formats it as an ASCII text record (as shown in Figure 5-1), prefaces it with the number of the port on which the call was received, and sends it from its RS-232 OUT port to the DTE.

NOTE

If handshaking between the Caller ID system and the DTE is prolonged, data could be lost.

Figure 5-1. Sample Caller ID records produced by the Caller ID unit (not actual width—filler spaces compressed).

```
LINE DATE   TIME     PHONE NUMBER  L      NAME*
 08  3/24   9:15 AM    OUT OF AREA
 01  3/24   9:16 AM 1-724-555-3407          Jane Doe
 12  3/24  10:03 AM 1-205-555-4000 L      John Smith
 03  3/24  10:03 AM        PRIVATE
 10  3/24  10:06 AM       555-9818   Bednarski Motor
 03  3/24   8:00 PM       555-2549         Sam Jones
```

*Labels are shown here at the tops of the columns for clarity only. No such labels are sent to the DTE.

5.3 Message Format

The 72-character-long Caller ID records sent by the Caller ID unit will be automatically displayed by the attached terminal or printed by the attached line printer. These records' populated fields (shown in Figure 5-1 on the previous page) are all right-justified and (except for the **Name** field) followed by a filler containing five space characters. Except for the **Line** field, all of the information in these fields is included in the Caller ID data provided by the local phone company. Here's more information about them:

- **Line (2 characters):** Tells you which line the call was received on. This number is generated internally by the Caller ID system. In a system with all 4-Line units, ports "01 through "04" are ports 1 through 4 respectively on unit #1; ports "05" through "08" are ports 1 through 4 on unit #2; and so on. In a system with all 8-Line units, ports "01 through "08" are ports 1 through 8 respectively on unit #1; ports "09" through "16" are ports 1 through 8 on unit #2; and so on.
- **Date (5 characters):** The month and date (not the year) when the call was received. (For DTE-programming purposes, be aware that the Caller ID unit sometimes fills this field, the **Time** field that follows, and the filler between them with right-justified text such as "MESSAGE WAITING," "MESSAGE RETRIEVED," and "INVALID DATA.")
- **Time (8 characters):** The time of day (in [hour]:[minute] AM/PM format) when the call was received.
- **Phone Number (14 characters including dashes):** The first 11 digits of the phone number of the calling party. When you are called by someone whose phone number is not available, is blocked, etc., you will receive a corresponding word or phrase in this field (such as "OUT OF AREA" or "PRIVATE"), but the exact text will vary from one phone company to another.
- **Long Distance Indicator (1 character):** If the call originated from another area code, an "L" might appear in a column between the phone number and the name to indicate that it's a long-distance call. This tag is included in the Caller ID data provided by the local phone company.
- **Name (15 characters):** The first 15 characters (upper/lowercase is preserved) of the name of the calling party will appear in this field if "Multiple Message" format and "Call Name Delivery" service are available in your area, and if the local phone company sends the name information. Otherwise, this field will be blank.

The last two characters of each record are a carriage return (0D hex) and a line feed (0A hex) intended to move the DTE to the next line.

6. Troubleshooting

6.1 Testing

To test your Caller ID system, take these steps:

1. Go off-hook from an outside test line and dial the phone number of the Caller ID system line you want to test.
2. Between the first and second rings of the phone call, the Caller ID unit's DATA LED should flash and the Caller ID information should be displayed or printed by the DTE.
3. Hang up the test line.
4. Repeat steps 1 through 3 for all of the system's phone lines.

6.2 Things to Try

Here are some problems that can occur in a Caller ID system along with some possible causes/solutions you might want to investigate.

The Power (PWR) LED on a Caller ID unit doesn't light.

- Make sure the power supply is securely connected to the Caller ID unit and is plugged into a working AC outlet.
- Try to place a call to one of the lines attached to that Caller ID unit. If the system behaves normally otherwise, that LED is defective. If the call, or the Caller ID data, is delayed or lost, or if the unit doesn't respond at all, something else in the unit is defective. Call Black Box Tech Support as described in **Section 6.3**.

Caller ID data for some or all lines isn't printed or displayed at the DTE.

- Are the PWR and DATA LEDs of the Caller ID unit(s) attached to the affected line(s) lit/flashing? If not, see "The Power LED doesn't light" above.
- Make sure the cable between the DTE and the (first) Caller ID unit's RS-232 OUT port is properly pinned and securely connected.
- If you're daisychaining, make sure all of the system's RS-232 OUT to RS-232 IN cables are properly pinned and securely connected.
- Make sure that the data rate and data format settings of your Caller ID units match those of the DTE and each other (see **Section 3.2**).

Caller ID data for some or all lines is garbled.

- Make sure that the data rate and data format settings of your Caller ID units match those of the DTE and each other (see **Section 3.2**).
- If only one of the four or eight lines of a Caller ID unit is malfunctioning, check the unit's DATA LED to see if it flashes when data is sent. If it isn't, there might might be a problem with the RTS signal, or there might be a hardware fault somewhere.
- If you're daisychaining, make sure that the unit numbers of all of the Caller ID units are set correctly (see **Section 3.2**).

6.3 Calling Black Box

If you determine that your Caller ID unit is malfunctioning, *do not attempt to alter or repair it.* It is not user-serviceable. Contact Black Box Technical Support at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem;
- when the problem occurs;
- the components involved in the problem;
- any particular application that, when used, appears to create the problem or make it worse; and
- the results of any testing you've already done.

6.4 Shipping and Packaging

If you need to transport or ship your Caller ID unit:

- Package it carefully. We recommend that you use the original container.
- If you are returning the unit, include everything you received with it. Before you ship the unit back to Black Box for repair or return, contact us to get a Return Authorization (RA) number.

Appendix: Wallmount Template for 4-Line Unit

TOP (front panel)

NOTES

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