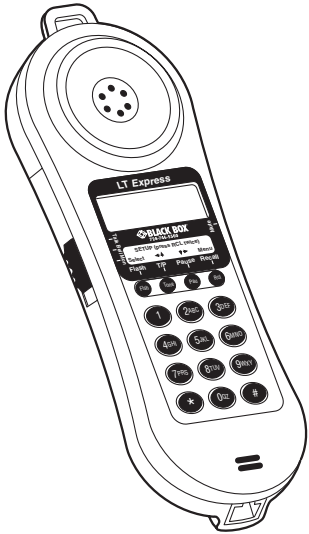
BLACK BOX
NETWORK SERVICES

JANUARY 2000
TS147A

LT Express



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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 B 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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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 classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

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.

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Any trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

DISCLAIMER

In no event will the manufacturer be liable for any incidental or consequential damages to this product.

Contents

Chapter **Page**

1. Specifications

Interfaces — Telephone system: Modular telco;
Headset: 2.5-mm cell-phone type

Ringer Equivalence — In BELL mode: 0.0 (no ringer load)

Pulse Dialing — Pulse rate: 10 pps ±10%;
Make/break ratio: 60% to 40% ±2%;
Interdigit interval: 820 ms;
Resistance during break: 120 kΩ

Tone Dialing — DTMF output into 600 Ω:
Tone-frequency error: ±1.5%;
Tone level:
High group: –6±2 dBm;
Low group: –8±2 dBm;
High vs. low difference: 2±1 dBm

Flash Duration — 600 ±50 ms

Pause Duration — Tone: 3 seconds;
Pulse: 3.4 seconds

Memory — Battery-backed-up memory stores (5) programmed phone numbers (up to 19 digits each) plus last-number redial; battery will typically maintain stored numbers in an unused unit for over 2 years

Return Loss — 14 dB at 600 Ω

Line-Current Range — 15 to 120 mA

Apparent Line Resistance — 275 Ω at 20 mA

MONITOR-Mode Impedance — Greater than 130 kΩ

Measurement — Voltage: 0 to 128 VDC ±5%;
Current: 10 to 140 mA ±5%;
Do *not* attach unit to electric-power lines

User Controls —
(1) Left-side-mounted TALK/BELL/MON slide switch for operating mode;
(1) Right-side-mounted microphone mute pushbutton (must be held down);
(4) Front-mounted pushbuttons for various options;
(1) Standard front-mounted 12-key phone keypad

Indicator — (1) Front-mounted 2-line x 16-character reflective super-twisted liquid crystal display (LCD) panel

Connectors — To telephone network: RJ-12 ("6-wire RJ-11") female;
To headset: 2.5-mm cell-phone headset jack

Power — From 9-VDC alkaline battery, typical:
BELL mode (timed out): 15 µA;
TALK mode:
CWCID OFF: 2 mA;
CWCID ON: 12 mA;
MON mode: 25 mA

Battery Life — For a typical 9-VDC, 450-mAhr alkaline battery:
Operating: 18 hours min., 225 hours max.;
Standby: 3.4 years;
Typical: 30 to 50 hours

Maximum Altitude — 10,000 ft. (3048 m) operating

Temperature Tolerance — Operating: 32 to 122˚F (0 to 50˚C);
Storage: –4 to +140˚F (–20 to +60˚C)

Humidity Tolerance — 10 to 90% noncondensing

Enclosure — High-strength ABS plastic

Size — Excluding lanyard (top hook):
7.3"H x 2.5"W x 1.7"D (18.5 x 6.4 x 4.3 cm)

Weight — With cord set: Less than 10 oz. (<284 g)

2. Introduction

2.1 General Overview

The LT Express (our product code TS147A) is a self-contained, self-powered, portable telephone test set for use by installers, repair technicians, and other authorized personnel. It's ideal for temporary communication and for servicing and installing telephone and data lines. It comes with a headset you can attach for hands-free operation.

The unit is designed for use with our standard LT Express cable set (our product code TS148) only. This cable set is approximately 5 ft. (1.5 m) long; it has a modular plug and strain-relief grommet on one end and self-piercing bent nose clips on the other. If you'd like a cable set that adds a bed-of-nails option in the clip, or one that substitutes alligator clips, we might be able to provide these on a quote basis—call Black Box Tech Support.

2.2 Features and Benefits

- Compact size with normal earpiece-to-microphone spacing; it's small enough to wear on your belt or carry in your pocket.
- Comfortable-to-hold shape.
- Its liquid crystal display shows a vast amount of information, including on-hook voltage and polarity in MONITOR mode, off-hook current and polarity in talk mode, numbers currently being dialed and how they're being dialed, and battery status.
- Detects and displays Caller ID information and faults, both while it's on hook and for Call Waiting Caller ID (CWCID).

- When the LT Express is set to its amplified MONITOR mode, you can listen to the line without loading it. Volume levels are comparable to those of an off-hook line. The unit has high impedance with small series capacitance, so there won't be any popping or clicking on the line when you attach the unit. The unit continues to display polarity indication while in this mode, and will light its "low battery" icon if power runs low. After 15 minutes of operating in this mode, the unit will automatically power down.

- It has a headphone jack and ear-mounted headset for hands-free operation. When you plug in the headset, it disconnects the speaker and microphone in the handset. The headset is compact enough to fit in your shirt pocket; it can be worn on the right or left ear, and can even be worn comfortably with a hard hat on.

- The LT Express continues measuring and displaying the current and polarity when it's off hook.

- Has a conveniently located microphone-mute button.

- Can do pulse and tone dialing.

- Performs last-number redial and can also store and recall as many as five other programmable numbers. Each of these phone numbers can be as many as 19 digits long; they are reliably stored in battery-backed-up memory.

  When the LT Express is set to pulse-dial, it can be switched to tone-dialing midway through the number.

  The unit supports embedded pauses in phone numbers for better compatibility with PBX systems.

- It's designed with maximum useability and safety in mind: It has a flash key to simulate hookflashing, an electronic ringer (turned OFF in MONITOR mode), a modular plug with strain relief for the cable-set or phone-cord attachment, overcurrent protection, and "DataAlert" electronics that will prevent it from going off-hook on low-voltage circuits.

2.3 The LT Express Illustrated

Figure 2-1 below shows the LT Express and indicates what its various controls and other components are for.

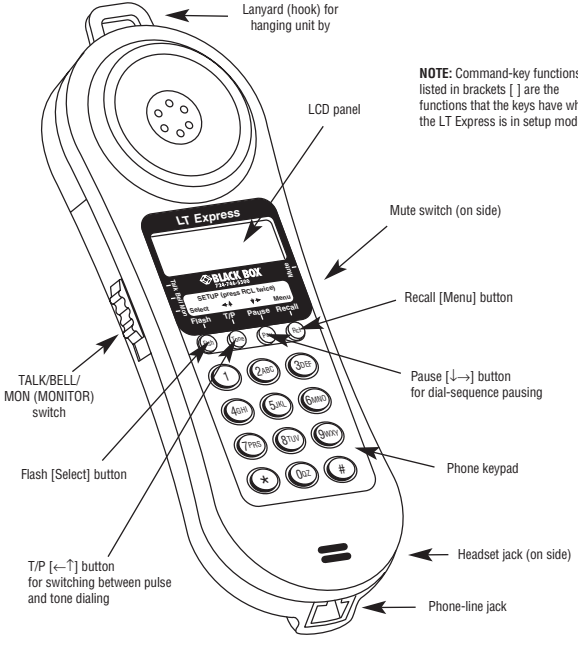

Figure 2-1. The physical components of the LT Express.

3. Installation and Battery Replacement

3.1 Connecting the LT Express to a Phone Line

The LT Express is designed with a standard RJ-12 ("6-wire RJ-11") modular jack for quick connection to a phone line, either directly or through our TS148 cable set. This jack is located at the base of the unit below its mouthpiece microphone. For a direct "temporary extension" connection, run a standard phone cable from this jack to a standard phone jack at your site.

To attach the TS148 cable set to the LT Express, unscrew the strain-relief screw on the back of the unit, then place the strain-relief terminal in that spot and screw the screw back in, as shown in Figure 3-1 on the next page. You can then attach the cable's RJ plug to the Express's RJ-12 jack. Clip the other end of the cable to your desired line (in a wiring-closet "66 block," for example) to establish a connection to that line.

To remove the cable set, detach it from the line and the jack on the LT Express. Unscrew the Express's strain-relief screw, pop out the cable set's strain-relief terminal, and screw the screw back in.

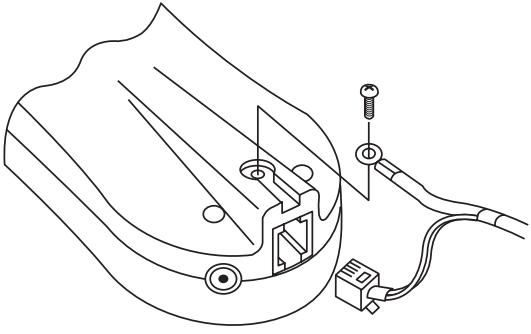

Figure 3-1. Connecting the cable set.

3.2 Connecting the Headset to the LT Express

You can use the included headset with the LT Express if you prefer hands-free or off-the-shoulder operation. Plug the 2.5-mm plug on the headset cord into the matching jack on the bottom of the LT Express, right next to the unit's modular phone jack. The headset can be used with either ear by rotating its microphone position by 90 degrees.

Note that as soon as you plug in the headset, the main speaker and microphone inside the LT Express handset are disabled.

3.3 Replacing the Battery

The LT Express comes with a battery installed, so you can use it right out of the box. But when the "low battery" icon comes on in the Express's LCD panel, you'll need to replace the current battery with another 9-volt alkaline battery. Take these steps *carefully*:

CAUTION!

When you swap in the new battery in step 3, you'll need to do it in less than 30 seconds, or you could lose all of the phone numbers in the unit's memory!

1. Remove the single screw at the top of the LT Express's back panel with a #1 Philips-head screwdriver, then remove the unit's battery door, as shown in Figure 3-2 on the next page.

2. Make sure that the LT Express is in BELL mode (see **Section 4.1.2**) and that the new battery is unpackaged and ready to install.

3. Disconnect the existing battery, then *within 30 seconds* replace it with the new battery.

4. Replace the battery door and screw the screw back in.

CAUTION!

Do *not* overtighten this screw—damage to the unit might result. If you have problems closing the battery door, confirm that the battery is properly seated and that the door is fully interlocked with the rest of the Express's case.

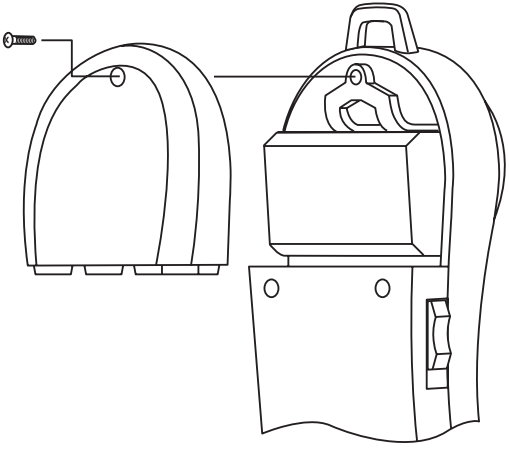

Figure 3-2. Replacing the battery.

3.4 Attaching the Belt Clip (Optional)

If you'd like to carry the LT Express on your belt instead of by hand or by a lanyard strap, you can attach the included optional belt clip. To install the clip, first unscrew the strain-relief screw on the back of the unit and put the cable set's strain-relief terminal back in that spot. Then place the washer and adapter knob packaged with the clip on top of the terminal, and screw them all down with the ½" panhead screw packaged with the clip, as shown in Figure 3-3 on the next page.

NOTE

Be careful not to overtighten this screw—doing so could damage the Express's case.

Once the belt clip is attached to the LT Express, you can clip the Express onto your belt this way: Squeeze the top of the clip to open it and slide the clip onto the belt. Then slide the adapter knob you just attached to the Express into the matching groove on the front of the clip.

To unclip the Express later, simply press the button at the top of the clip to release the adapter knob, then slide the Express off.

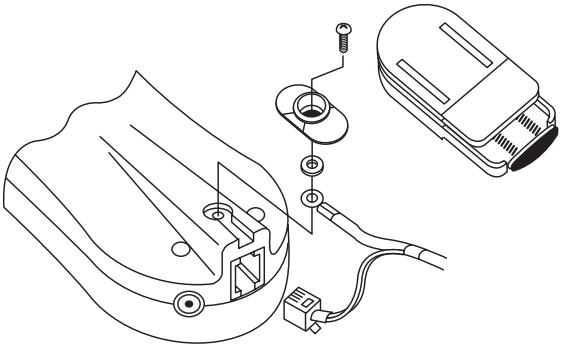

Figure 3-3. Attaching the belt clip.

4. Operation

4.1 Using the TALK/BELL/MON Switch

The TALK/BELL/MON switch is on the left side of the LT Express. The following subsections describe how the Express behaves in each of this switch's three settings.

4.1.1 The TALK Setting (TALK Mode)

The TALK or off-hook position (TALK mode) takes the LT Express "off hook" on a standard "POTS" ("plain old telephone system") voice phone line. The Express must measure 10 volts or more on the line it is connected to (a voltage level indicating a live but unused line) before it will go off hook. This stops the Express from interrupting data transmissions or voice calls already in progress. If the Express doesn't go off hook, it displays the line voltage it's measured for the line on its LCD panel, plus the string "In use??" and the "Flash to connect" prompt on line 2. If you still want to go off-hook despite this voltage reading, press the LT Express's Flash key and the Express will go off hook and attempt to operate normally. (Because its voice circuits are line-powered, they won't work if there's no power on the line.)

In its normal off-hook display, the LT Express shows dialing information on the top line and status information on the bottom line. The status information consists of the dialing type ("Tone" or "Pulse"), the measured line current in milliamperes, and the line polarity ("NRM" [normal] or "REV" [reversed]).

4.1.2 The BELL Setting (BELL Mode)

The BELL position (BELL mode) is the "off state" of the LT Express. The phone keypad is disabled and the Express is in its lowest power state except when ringing or displaying Caller ID information. If you leave the TALK/BELL/MON switch in this position when the Express is ringing, nothing will happen and the Express will power OFF again about 30 seconds after the end of ringing.

4.1.3 The MON Setting (MONITOR Mode)

The MON position (MONITOR mode) causes the LT Express to enable its amplifiers in such a way that you can listen to the line without loading it. On-hook Caller ID is also received in this mode; the information is displayed on the Express's LCD. Just after you switch to this mode, before there is any Caller ID information on the screen, the Express measures its battery voltage and

displays this, along with an estimate of the remaining battery capacity, for a short time. On Line 2, it displays the time remaining to automatic power-off, the measured line voltage, and the polarity.

4.2 Using the LCD Panel

The LT Express has a reflective type, super twisted liquid crystal display (LCD). The display has 2 lines of 16 alphanumeric characters each, plus a number of icon flags. The icons are used and defined as follows:

- Steady **ID** indicates displayed data is Caller ID information.
- Flashing **ID** indicates Call Waiting Caller ID (CWCID) detection is enabled. Enabling CWCID is an option in the setup menu (see **Section 4.6**).
- **PASS** appears with **ID** to indicate that Caller ID information was received with no errors detected.
- **FAIL** appears with **ID** to indicate that Caller ID information was received with errors. An error message will also be displayed.

- **SETUP** indicates that the LT Express is in setup mode.
- **S** indicates that the Express is scrolling through its list of stored phone numbers.
- **1** through **5** indicate which stored phone number you've selected.
- A **battery icon** indicates that the LT Express's battery needs to be replaced.
- A **"no bell" icon** indicates that the Express is in MONITOR mode and that the bell (ringer) is off.

4.3 Using the Mute Button

When you are off hook, you can mute the output from the LT Express's microphone to the line by pressing and holding down the mute button on the right-hand side of the Express. (It doesn't matter whether you're using the handset's internal mike or the headset mike.) While you hold this button down, the mike will be muted; as soon as you let go, it will resume operating normally.

4.4 Using the Command Keys

There are sixteen pushbutton keys on the front panel of the LT Express. Twelve of these are a standard phone keypad; the four at the top are the Express's command keys. The command keys each have two functions, depending on which operating mode the Express is in.

4.4.1 Command-Key Functions in Normal TALK Mode

In regular TALK mode, the labels in the black area just above the command keys describe their functions. (The abbreviations in parentheses in the paragraphs below are the actual labels on the keys themselves.)

- The **Flash (Flsh)** key breaks the phone-line connection for 0.6 seconds, simulating a phone "hookflash." Hookflashes are often used to transfer calls or to activate special PABX or central-office features.

- When dialing is not in progress, the **T/P (Tone)** key toggles the dialer between tone (DTMF) and pulse dialing. The current dialing mode is displayed on the bottom line of the LCD.

  While dialing is in progress, the **Tone** key can be used to switch from pulse to tone mode for sending tones after making a connection in pulse

mode. When you press the key to do this, a "T" will appear in the display along with the numbers you are dialing. If you are already in tone mode, pressing this key during dialing has no effect.

- When you dial a number, you can press the **Pause (Pau)** key between digits to add an extra 3.8 seconds to the usual interdigit delay between dialed digits. (You might want to do this, for example, to allow time for a PBX to answer and give you the option of dialing an extension.) When you do this, a "P" will appear in the display along with the numbers you are dialing.

- You can use the **Recall (Rcl)** key to recall a stored number or to enter either the setup mode or "scrolling stored-number recall" mode. (In these other modes, the command keys function differently, as described below.)

  To do these different things, you need to press the **Recall** key followed by a second key. The normal TALK-mode display is replaced with a message prompt to help you select the second key to press:

  If you press **Recall** and then press a number from **0** to **5** on the LT Express's phone keypad, the Express dials a phone number in its memory. Pressing **0** triggers "last-number redial" (the

Express dials the phone number you most recently dialed manually). Pressing **1** through **5** causes the Express to dial the phone number (if any) that you've stored in the corresponding slot in its memory.

If you press **Recall** and then press **Tone** or **Pause**, the Express enters scrolling-recall mode (see **Sections 4.4.2** and **4.5** for more information).

If you press **Recall** and then press **Recall** again, the Express enters setup mode—even if you're in MONITOR mode at the time (see **Sections 4.4.2** and **4.6** for more information).

If you press any other key than those already mentioned following **Recall**, the keypress will be ignored and the mode change will be aborted.

4.4.2 Command-Key Functions in Scrolling-Recall and Setup Modes

In setup and scrolling-recall modes, the labels in the white area farther above the command keys describe their functions. (The abbreviations in parentheses in the paragraphs below are the actual labels on the keys themselves.)

- Use the **Select (Flsh)** key to select the line that the ">" cursor symbol points at in setup mode, to select the currently displayed number for dialing in scrolling-recall mode, or to finish the entry of a stored phone number and return to the number-selection screen.

- Use the ←↑ **(Tone)** key to scroll (move the cursor) up or left.

- Use the ↓→ **(Pau)** key to scroll (move the cursor) right or down.

- Use the **Menu (Rcl)** key to go back one menu screen or to return to normal TALK mode from the first menu screen.

4.5 Scrolling-Recall Mode

To get into scrolling-recall mode from normal operation, press **Recall** followed by either **Tone** or **Pause**. When you place the LT Express in this mode, it will display the letter "S", the number of the starting storage slot, and either the stored phone number or the word "empty". (The starting slot depends on which button you pressed to get into scrolling-recall mode: It will be slot 1 on the left if you pressed **Tone [←↑]** or slot 5 on the right if you pressed **Pause [↓→]**.)

The Express's command keys now take on their scrolling-recall-mode functions/identities (see **Section 4.4.2**): You can review all stored phone numbers by pressing the ←↑ or ↓→ scroll key to move left or right in the list respectively. (Pressing ←↑ at slot 1 or ↓→ at slot 5 will cause the Express to "wrap" to the other end of the list.) Press **Select (Flsh)** to dial the currently displayed number, or press **Menu (Rcl)** to escape back to normal operation.

4.6 Setup Mode

To get into setup mode from TALK mode (normal operation) or MONITOR mode, press **Recall** twice. The LT Express then presents a list of options that can be modified, and the Express's command keys now take on their setup-mode functions/identities (see **Section 4.4.2**). You can use the ←↑ and ↓→ scroll keys to move the ">" cursor symbol around to point to different items. Press the **Select** key to choose a particular function:

- **Memory Dial Setup**. When you select this, the LT Express displays "Press 1–5". Pressing a number from **1** to **5** on the Express's phone keypad will cause the Express to display the current contents of the corresponding location in its memory. If there is already a phone number stored in that slot, the Express displays that phone number. If the slot is blank, the Express displays the word "empty" instead.

  At this point, you can press **Select** to exit back to the dial-setup menu, or **Menu** to exit back to the main setup menu, without making any changes; all currently stored numbers will be maintained unchanged. If instead you begin pressing keys corresponding to storable characters

(the numeric keypad digits plus **Pause [↓→]** and **Tone [←↑]**), any current number will be cleared and the character string you type in will become that slot's new stored phone number. (**Pause** corresponds to a 3.8-second pause embedded in the number, displayed as "P." **Tone** corresponds to an embedded switch from pulse to tone-dialing, displayed as "T".)

When you're finished typing in the new number, press **Select** to save it and exit back to the dial-setup menu, or **Menu** to save it and exit back to the main setup menu.

If you want to clear a stored number from memory, replace it with a "phone number" consisting of a pause or tone character. Once a slot has been assigned a phone number, there is no way to return it to "empty" status.

- **Call Waiting ID**. Use this screen to turn the LT Express's Call Waiting Caller ID (CWCID) feature ON or OFF. (The factory default is OFF.) Use the ←↑ and ↓→ scroll keys to move the cursor between ON and OFF, then press **Select** to choose the setting you've moved the cursor to. (You will automatically be returned to the main setup menu.)

  When you go into TALK mode with CWCID ON, the Express flashes its "ID" icon to indicate that CWCID is active. With CWCID ON, the Express draws considerably more battery current than when CWCID is OFF. To conserve battery power, we recommend leaving CWCID turned OFF when it's not being used.

4.7 Special Features

4.7.1 DataAlert

Each time you try to put the LT Express in TALK mode, it measures the voltage on the phone line. It will not connect (go off hook) if the measured voltage is less than 10 volts, which would normally indicate a dead line, a data line, or an in-use voice line. If this occurs, the measured voltage is displayed along with the messages "In use??" and "Flash to Connect". This gives you the opportunity to verify the line status before proceeding.

If you still want to connect, press the **Flash** key to connect. The voltage is constantly updated, so while the Express is in this mode, you can use the cable-set leads to search for a line with normal on-hook voltage.

4.7.2 Automatic Power-Off

The LT Express has automatic power-off for all functions to conserve the battery. The MONITOR mode is the Express mode with the highest power consumption; it times out and powers off in 15 minutes. Because this is a relatively short period of time, the time remaining is displayed on the screen in minutes. The TALK mode times out in approximately 60 minutes with CWCID (Call Waiting Caller ID) OFF and 30 minutes with CWCID ON. Once the Express times out and powers OFF, you'll have to move its TALK/BELL/MON switch to another position to wake up the Express.

4.7.3 Battery-State Information

For a short time after you place the LT Express in MONITOR mode, it displays the approximate percentage of life remaining in its battery. (If the Express is displaying Caller ID information when you switch to MONITOR mode, it will continue displaying that information for several seconds before displaying the battery-state information.)

4.7.4 Overcurrent Protection

If the LT Express senses a current on the attached phone line in excess of 120 mA, it displays the current measured and the message "CURRENT TOO HIGH", then automatically disconnects from the line. Periodically, the LT Express reconnects for a short time, measures the current and displays the results, then disconnects again if the current is still too high.

4.7.5 On-Hook Caller ID

While it's in BELL or MONITOR mode, the LT Express detects and displays on-hook Caller ID information. The Express doesn't block the first ring signal. If the Express or another phone on the line is taken off hook before the beginning of the second ring, the Caller ID information might not be properly received. Because the Express has a small screen, it only displays number and name information (when these are available). However, the Express is capable of receiving messages of any type and length (as long as they're formatted as per Bellcore® GR-30-CORE) and verifying their checksums. Besides name, number, "out of area," and "numbers blocked," the messages listed on the next page are displayed by the Express as required:

- "**Single Msg Type**"—The Express correctly received a Caller ID in single-message format, but the message was an unsupported type.

- "**Multi Msg Type**"—The Express correctly received a Caller ID in multiple-message format, but one or more sections of the message were unsupported types.

- "**Chksum=*xx*, Rx=*yy*"—The Express has detected a checksum error. The checksum *xx* was at the end of the message, but the Express calculated the checksum *yy* from the received data.

- "**Lost Carrier**"—The Express detected the Caller ID carrier, but lost it before the end of the transmission.

4.7.6 Call Waiting Caller ID (CWCID)

The LT Express handles Call Waiting Caller ID (CWCID) essentially the same way it does on-hook Caller ID, displaying the same information and errors. But instead of the first ring alerting the Caller ID circuitry, a special CPE Alerting Signal (CAS) tone is sent immediately after the usual Call Waiting alert tone. When CWCID is enabled, the Express detects this tone, mutes its audio circuits, sends an acknowledgment tone, and receives the data before re-enabling the audio circuits. Because the CAS-detection circuitry requires considerable battery power (about 6 times the normal TALK-mode battery power), the default setting for CWCID is "OFF." To enable CWCID, you'll need to access setup mode (see **Section 4.6**).

5. Maintenance

You can clean the LT Express with a damp cloth. If the unit is very dirty, you may apply a small amount of liquid soap to the cloth to assist in cleaning. Do *not* use solvents, scouring powders, or other abrasive cleaners — they might scratch the unit and/or cause malfunctions.

Cable sets should be periodically checked for shorts, continuity, or obvious signs of wear, such as fraying or loose/damaged test clips.

6. Troubleshooting

6.1 Calling Black Box

If you determine that your LT Express is malfunctioning, *do not attempt to alter or repair the unit.* It contains no user-serviceable parts. 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 (of the LT Express) that you've already done.

6.2 Shipping and Packaging

If you need to transport or ship your LT Express:

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