



# TS<sup>®</sup> 44PRO

## Test Set

### Users Guide

PN 3076096

June 2007

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# TS<sup>®</sup>44PRO Test Set

## Introduction

The TS44PRO Test Set is an analog test telephone used by installers, repair technicians and other authorized personnel to test copper wire voice subscriber lines. In addition to providing standard off-hook operations, such as dialing and voice communications, the TS44PRO model has an on-hook Monitor mode that lets the operator listen to the line without disturbing any voice or data signals present. The test set has a speaker for hands-free listening. The test set also has a speakerphone that allows two way conversations while freeing up the operator's hands for other tasks.

In today's telecommunications environment, a large number of subscriber lines carry data services. The data services are in the same distribution facilities as voice services. It is not always easy to tell the difference between data and voice services. The TS44PRO Test Set uses unique, patented circuitry that prevents disruption of digital data services if the test set is unintentionally connected to a data line.

## Registration

Registering your product with Fluke Networks gives you access to valuable information on product updates, troubleshooting tips, and other support services. To register, fill out the online registration form on the Fluke Networks website at [www.flukenetworks.com/registration](http://www.flukenetworks.com/registration).

## Contacting Fluke Networks



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- USA: 1-800-283-5853
- Anywhere in the world: +1-425-446-4519

Visit our website for a complete list of phone numbers.

## Safety Information

The following IEC symbols are used either on the test set or in the manual:

	Warning: Risk of personal injury. See the manual for details.  Caution: Risk of damage or destruction to equipment or software. See the manual for details.
	Warning: Risk of electric shock.
	Earth ground
	Do not put products containing circuit boards into the garbage. Dispose of circuits boards in accordance with local regulations.

### Warning

**Do not use the test set if it is damaged. Before you use the test set, inspect the case. Look for cracks or missing plastic. Pay particular attention to the insulation surrounding the connectors.**

**If this product is used in a manner not specified by the manufacturer, the protection provided by the product may be impaired.**

## Design Features

Design features of the TS44PRO Test Set include:

- DataSafe™ in Monitor mode
- Data detection and lockout in Talk mode
- Data lockout override
- High impedance in Monitor mode
- High voltage protection
- Last number redial up to 23 digits
- Microphone mute
- PBX pause key
- Continuous polarity indication in Talk mode
- Two-way speakerphone
- Receive-Only Loud Speaker
- Speed dialing for ten 23-digit numbers
- Tone and pulse dialing
- Hook flash
- Line voltage test
- Low loop current test
- Low battery indication
- Relocatable belt clip
- Field-replaceable belt clip, battery, and line cord
- Weatherproof case
- High voltage lockout in Talk mode

## Physical Characteristics

### Housing

See Figure 1.

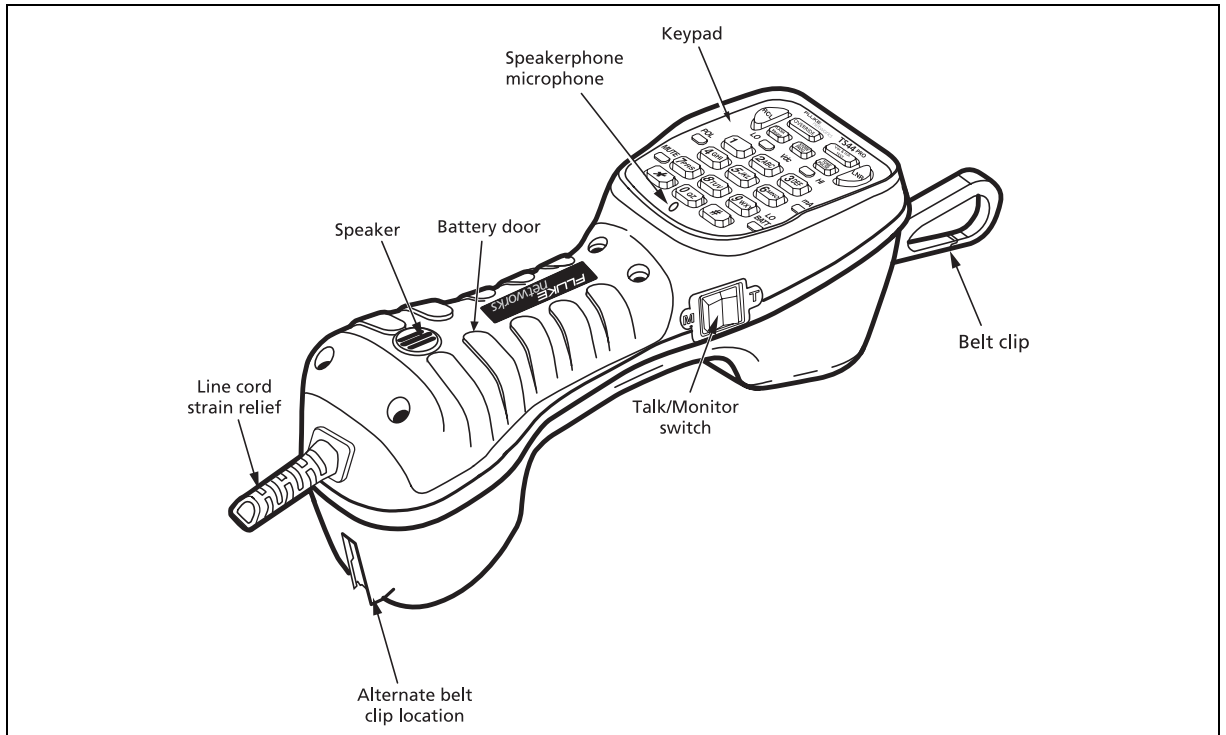
The TS44PRO Test Set housing is made of high-impact plastic. The test set provides rugged service and withstands the rough handling and shocks associated with field use. The housing permits operation in bad weather, such as heavy rain or dust storms.

### Belt Clips

See Figure 1.

The belt clip can be located at either or both ends of the housing. It has a spring-loaded, locking clip that assures a secure connection to belt loops and D-rings. Both forward folding and backwards folding versions of the belt clip may be installed. The test set can be hung by the belt clip in one of two ways: (1) with keypad and speakerphone facing the user for convenient access or (2) with the transmitter facing the user.

The belt clips may be replaced or relocated in the field. See "Replacing or Relocating the Belt Clip" on page 17.



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Figure 1. Physical Characteristics

## Line Cords

See Figure 1.

The test set has a field replaceable line cord. The line cord is attached through a rubber strain relief at the transmitter end of the test set. Several different configurations of line cords are available. See "Accessories (How to Order)" on page 19 for model numbers.

## Battery

See Figure 1.

### Caution

**Use caution when handling batteries. Do not let the terminals short together. Dispose of batteries properly to ensure terminals cannot short. Disposal may be restricted by local laws.**

#### Note

*If the test set fails to operate properly, first replace the battery and retest before sending the test set in for repair.*

A 9 V alkaline battery must be installed for the test set to operate. Do not use rechargeable batteries.

The battery performs two main functions:

- It powers the test set when on-hook.
- It supplies supplementary current to the speaker (if on) when the test set is off-hook.

When the **LO BATT** LED begins flashing, the battery, has anywhere from several hours to several days of life remaining depending on how often the speaker is used.

The test set's battery compartment makes battery replacement easy. See "Replacing the Battery" on page 16 for instructions on changing the battery.

If the test set stops working, remove the 9 V battery, wait at least 40 seconds, then replace the battery. This resets the test set. Use the same battery if you know it is good or use a new battery if you are not sure. If it still doesn't work, contact Fluke Networks Technical Support.

## Speaker and Speakerphone Microphone

See Figure 1.

The speaker and speakerphone microphone are located on the keypad side of the test set. The speaker draws more current than any other circuit in the test set. The battery lasts longer if the speaker is used in moderation.

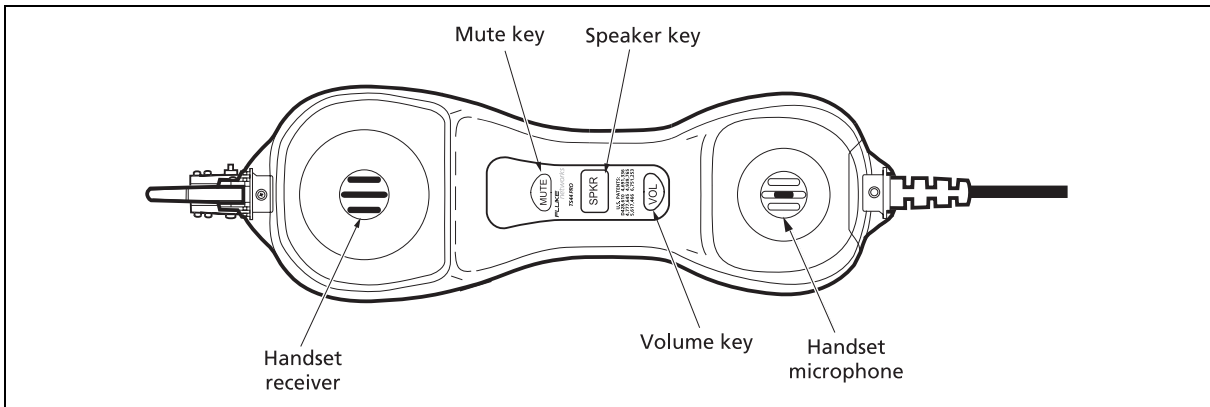
## Audio Controls

See Figure 2.

The three audio control keys are located on the inside handle of the test set between the handset receiver and the handset microphone. These controls let the operator switch between the handset and speakerphone, mute the active microphone, and control the volume of the received audio signal. Table 1 describes the audio control keys.

### Warning

**Never hold the speaker against your ear when it is on, or when turning it on or off. Sounds emitted by the speaker can be loud enough to damage your hearing.**



**Figure 2. Audio Control Keys**

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Table 1. Test Set Audio Control Keys

Key	Description (refer to Figure 2)
<b>MUTE</b>	<p>The <b>MUTE</b> key functions only when the test set is off-hook. When the test set is off-hook and being used as a handset, pressing the <b>MUTE</b> key shuts off the handset's microphone. This is useful in noisy environments such as near heavy traffic. With the mute on, ambient noise is not picked up by the test set's microphone and therefore not transmitted to the receiver. When the mute is on, it is easier to hear the person at the other end of the line and easier to hear static or noise on the line. Pressing the <b>MUTE</b> key again turns the microphone on.</p> <p>When the test set is off-hook and is in Speakerphone mode, pressing the <b>MUTE</b> key will shut off the speakerphone's microphone and will temporarily put the test set into a Receive-Only Loud Speaker mode. This is a better mode for troubleshooting because it prevents the speaker from cutting out when a medium to loud noise occurs in your vicinity. Pressing the <b>MUTE</b> key again will turn the speakerphone microphone on.</p> <p>The TS44PRO allows you to configure the test set to select the Receive-Only Loud Speaker mode as the default mode (see "Make Receive-Only Loud Speaker the Default" on page 14). If you configure the test set to enable the Receive-Only Loud Speaker mode, the Speakerphone will no longer be available. After selecting this option, any time you turn on the speaker, when test set is off-hook, the Receive-Only Loud Speaker will be activated rather than the Speakerphone. When the unit is configured this way, and the speaker is on, the <b>MUTE</b> key has no effect.</p> <p>When the mute is on, the <b>MUTE</b> LED flashes.</p>
<b>VOL</b> (Volume)	<p>Pressing the <b>VOL</b> key switches the active receiver's sound level between normal and high volume. This occurs in Monitor mode and Talk mode. The state of the <b>VOL</b> key is preserved when the active receiver is changed. For example, with the handset receiver volume set to high, if you switch to the speaker, it will also be set to high volume. The <b>VOL</b> key affects only the volume of received signals. It does not affect the volume of transmitted signals.</p>
<b>SPKR</b> (Speaker)	<p>The <b>SPKR</b> key turns the test set's speaker on and off. It functions in both Talk and Monitor modes.</p> <p>In Monitor mode, if the test set is being used as a handset, pressing the <b>SPKR</b> key turns on the speaker. This lets you monitor a line while working at a distance from the test set.</p> <p>If the test set is off-hook and is being used as a handset, pressing the <b>SPKR</b> key turns on the Speakerphone. The handset microphone and receiver are shut off and the speakerphone microphone and speaker are enabled. This mode is intended for two-way, hands-free conversation.</p> <p>You may also program the test set to operate exclusively in Receive-Only Loud Speaker mode (see "Make Receive-Only Loud Speaker the Default" on page 14). For a test set configured this way, if the test set is off-hook and is being used as a handset, pressing the <b>SPKR</b> key will turn on the Receive-Only Loud Speaker rather than the Speakerphone. Receive-Only Loud Speaker mode is intended for listening to the line, hands free.</p>

## Keypad Controls and Indicators

See Figure 3.

The keypad has 19 keys that are recessed into the housing. The recessed bezel protects the keypad and helps prevent accidental key presses. Table 2 describes the keys and other indicators on the test set.

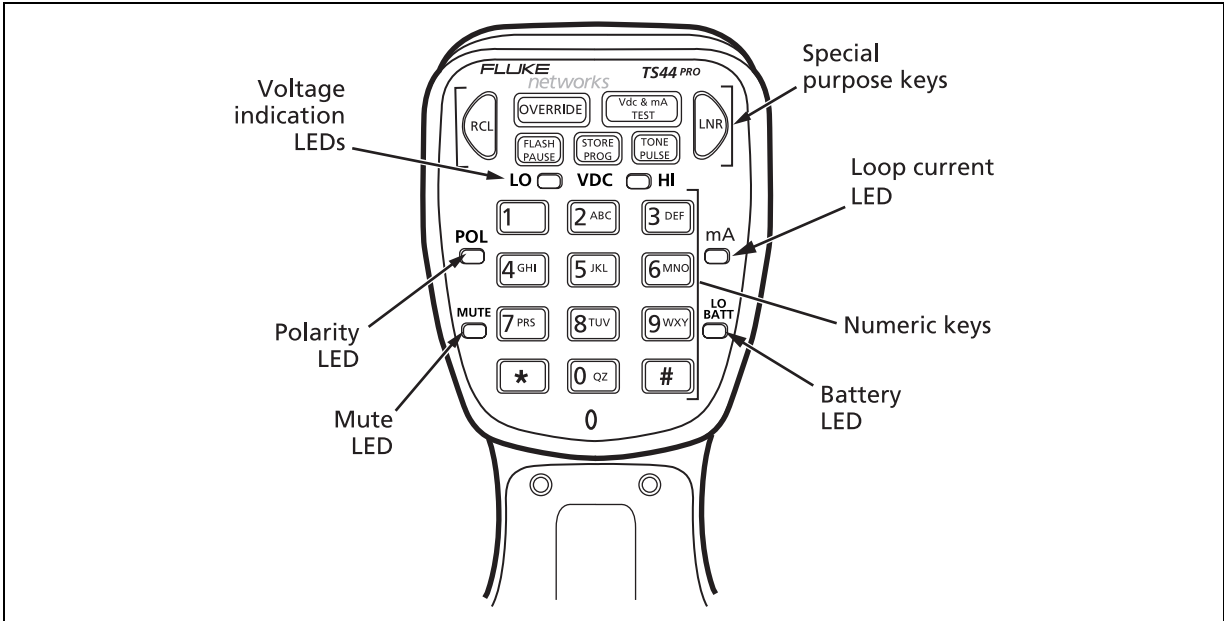


Figure 3. TS44PRO Keypad and Overlay

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Table 2. Test Set Keypad Control and Indicators

Key or Indicator	Description (refer to Figure 3)
Numeric Keypad	The numeric keypad is used to dial telephone numbers and make function selections. The numeric keypad includes 12 standard dialing keys including the star (*), and the pound (#) keys. The seven special purpose keys are described below.
<b>RCL</b> (Recall) key	The <b>RCL</b> key is used for the storing and recalling of repertory dialing numbers. See "Program Speed Dialing Numbers" on page 13.
<b>OVERRIDE</b> key	If you connect the TS44PRO to a telephone line carrying high speed data such as ADSL and you put the test set into Talk mode, the test set will detect the data, it will lockout, and refuse to go off-hook to protect the data. If you know for sure that you want to go off-hook anyway, you can override the lockout by pressing the <b>OVERRIDE</b> key.
<b>LNR</b> (Last Number Redial) key	The <b>LNR</b> key redials the number most recently dialed. See "Last Number Redial" on page 13.
<b>STORE/PROG</b> key	The <b>STORE/PROG</b> key is used for storing speed dialing numbers and for programming special test set functions.
<b>FLASH/PAUSE</b> key (Hook-Flash)	<p>This is a dual function key. It performs the <b>FLASH</b> function when the test set is in Talk mode. It performs the <b>PAUSE</b> function when the test set is in Monitor mode. Conversely, the <b>FLASH</b> function is not available in Monitor mode and the <b>PAUSE</b> function is not available in Talk mode.</p> <p>If the test set is in Talk mode and is off-hook and you press the <b>FLASH/PAUSE</b> key, the test set will generate a flash signal. The factory default flash duration is 600ms, however the duration of the flash signal can be varied by the user. For configuring the test set to generate a flash duration other than 600ms, see "Hook Flash Duration" on page 14.</p> <p>The <b>PAUSE</b> function is available when storing speed dial numbers in Monitor mode. When entering a speed dial number, if you press the <b>FLASH/PAUSE</b> key, a 4 second pause will be inserted into the number you are entering. This is useful when you want to use speed dialing to dial out through a PBX. To dial out through a PBX, typically you manually dial 9, then wait for the PBX to connect you to an outside line, then you manually dial the rest of the number. The <b>PAUSE</b> function removes the need to manually dial when dialing through a PBX. For example, if you have entered 9 PAUSE 2345678 into one of the speed dial memories, when you recall this number, the test set will automatically dial a 9, then it automatically waits for the pause duration of 4 seconds giving the PBX time to connect to an outside line, then it automatically dials the remaining digits 2345678. If you need a delay longer than 4 seconds, press the <b>PAUSE</b> key more than once when entering a number into memory. Example: if you press the <b>PAUSE</b> key two times in a row, you will get an 8 second pause.</p>
<b>TONE/PULSE</b> key	The <b>TONE/PULSE</b> key switches the test set between tone and pulse dialing. The <b>TONE/PULSE</b> key is active only when the test set is off-hook. Any time the test set goes off-hook, it is automatically set to tone dialing. Once off-hook, pressing the <b>TONE/PULSE</b> key changes the dialing mode to pulse dialing. Pressing the key again will switch back to tone dialing.

-continued-

Table 2. Test Set Keypad Control and Indicators (continued)

Key or Indicator	Description (refer to Figure 3)
<b>Vdc&amp;mA TEST</b> key	<p>When you press the <b>Vdc&amp;mA TEST</b> key, one of two tests is performed depending on the operating mode of the test set. If the test set is in Monitor mode and you press the <b>Vdc&amp;mA TEST</b> key, the Vdc test will be executed. If the test set is in Talk mode (off-hook) and you press the <b>Vdc&amp;mA TEST</b> key, the mA test will be executed.</p> <p>To run the Vdc test, put the test set into Monitor mode and connect it to Tip and Ring of the POTS line you want to measure. Then press the <b>Vdc&amp;mA TEST</b> key. The test set will measure the dc voltage across Tip and Ring and will display whether the dc voltage is high, low or normal by way of the HI and LO LEDs. The indications provided by the LEDs are described in this table under the "HI/LO VDC LED" section.</p> <p>To run the mA test, connect the test set to Tip and Ring of the POTS line you want to measure and take the test set off-hook. Then press the <b>Vdc&amp;mA TEST</b> key. The test set will measure the dc loop current that it is drawing from line. If the loop current is below 23mA, the mA LED will flash red; if the loop current is 23 mA or greater, the mA LED will flash green. If the red LED flashes there may be a problem with the line.</p> <p>The purpose of these tests is to allow you to make a quick assessment whether or not the line you are working on has normal CO battery voltage or normal loop current.</p>
Light Emitting Diodes (LEDs)	All LED indicators are located on the keypad inside the recessed area.
<b>MUTE</b> LED	The <b>MUTE</b> LED flashes when the mute function is activated.
<b>LO BATT</b> (low battery) LED	The <b>LO BATT</b> LED flashes when the 9 V battery is nearly discharged. The LED is active only in operating modes that use the battery.
<b>POL</b> LED	When the test set is off-hook on a telephone line, the <b>POL</b> LED will tell you the polarity of the dc voltage across the line's Tip and Ring wires. If the test set's red clip lead is connected to a more negative voltage than its black clip lead, the <b>POL</b> LED will illuminate green. If the test set's red clip lead is connected to a more positive voltage than its black clip lead, the <b>POL</b> LED will illuminate red.

Table 2. Test Set Keypad Control and Indicators (continued)

Key or Indicator	Description (refer to Figure 3)												
<b>HI/LO VDC</b> (high/low Vdc) LEDs	<p>When the TS44PRO is in Monitor mode, and the <b>Vdc&amp;mA TEST</b> key is pressed, the test set measures the dc voltage across Tip and Ring of the telephone line and indicates the measured voltage level as follows:</p> <table border="0"> <thead> <tr> <th><u>Voltage Range</u></th> <th><u>Indication</u></th> </tr> </thead> <tbody> <tr> <td>0 Vdc to 2 Vdc</td> <td>LO Vdc LED lights up red for 3 seconds</td> </tr> <tr> <td>2 Vdc to 42 Vdc</td> <td>LO Vdc LED flashes red</td> </tr> <tr> <td>42 Vdc to 53 Vdc (Normal CO battery voltage)</td> <td>Both the LO and HI LEDs flash green</td> </tr> <tr> <td>53 Vdc to 140 Vdc</td> <td>HI Vdc LED flashes red</td> </tr> <tr> <td>Above 140 Vdc</td> <td>HI Vdc LED lights up red for 3 seconds</td> </tr> </tbody> </table> <p>42 Vdc to 53 Vdc is the normal range for a Central Office Battery.</p> <p>If the LO Vdc LED lights up red, there is not enough voltage for the test set to go off-hook.</p> <p>If the HI Vdc LED lights up red for 3 seconds, there is a high voltage of 140 Vdc or more across the test set's clip leads. This is potentially dangerous to you. If you encounter this, carefully remove the test set's clip leads from the line. Be sure to hold the clip leads by their insulated boots and avoid touching the clip lead's metal parts with your hands. Be careful to avoid shorting the clip leads to each other. See the section called "High Voltage Lockout Operation" on page 12.</p>	<u>Voltage Range</u>	<u>Indication</u>	0 Vdc to 2 Vdc	LO Vdc LED lights up red for 3 seconds	2 Vdc to 42 Vdc	LO Vdc LED flashes red	42 Vdc to 53 Vdc (Normal CO battery voltage)	Both the LO and HI LEDs flash green	53 Vdc to 140 Vdc	HI Vdc LED flashes red	Above 140 Vdc	HI Vdc LED lights up red for 3 seconds
<u>Voltage Range</u>	<u>Indication</u>												
0 Vdc to 2 Vdc	LO Vdc LED lights up red for 3 seconds												
2 Vdc to 42 Vdc	LO Vdc LED flashes red												
42 Vdc to 53 Vdc (Normal CO battery voltage)	Both the LO and HI LEDs flash green												
53 Vdc to 140 Vdc	HI Vdc LED flashes red												
Above 140 Vdc	HI Vdc LED lights up red for 3 seconds												
<b>mA LED</b> (milliAmp)	<p>When the test set is in Talk mode (off-hook) and the <b>Vdc&amp;mA TEST</b> key is pressed, the test set measures the dc loop current drawn from the Central Office Battery. If the loop current is below 23mA, the mA LED will flash red; if the loop current is 23mA or greater, the mA LED will flash green. If the red LED flashes, the telephone line you are testing may not be able to supply enough loop current to power the customer's telephone devices and you may want to perform some additional testing on that line.</p>												
<b>Electronic Ringer</b>	<p>The electronic ringer is enabled while the test set is on-hook.</p>												

## Operation

The test set has two basic modes of operation: Talk mode and Monitor mode. Talk mode is used for off-hook operations (such as dialing verification, automatic number identification, and audio quality verification). Monitor mode is for audio monitoring of the Tip and Ring pair while on-hook. In Monitor mode, the test set has a high input impedance, which allows monitoring of the line without disrupting conversations or data, if present.

## Caution

**When testing circuits that are close to a battery source, clipping onto a line may cause loud pops in the receiver. Holding the receiver tightly against your ear may cause acoustic shock. The test set is designed to rest comfortably on the shoulder with some space between the receiver and the ear. It should be used in this position when working close to a battery source.**

**Shorting the Tip and Ring leads together while connected to a data line will disrupt data on the line.**

## Talk/Monitor Switch

See Figure 1.

The Talk/Monitor switch is a rocker switch located on the side of the test set. The **T** position puts the test set into Talk mode. The **M** position puts the test set into Monitor mode.

## Operating the Test Set in Monitor Mode

In Monitor mode, the test set is always on-hook. The test set draws no direct current from the line and it transmits no signals to the line. In this mode, the test set has a high ac input impedance, which allows listening for audio signals without disrupting conversations or data signaling that may be present. Either the handset receiver or the speaker can be used to monitor a line.

In the Monitor mode, the test set is typically used for one or more of the following procedures:

- Verification that a line is idle when looking for a line to borrow
- Listening for noise on the line
- Hunting for tracer tones
- Testing for dc voltage on the line by using the **Vdc&mA TEST** key.

## Operating the Test Set in Talk Mode

Right after moving the Talk/Monitor switch to **T**, the test set performs a brief test for high-speed data and it looks for talk battery on the line. If high-speed data is detected, the test set generates an audio alarm and remains on-hook. If high-speed data is not detected and talk battery is present, the test set goes off-hook. When off-hook, the test set operates like a standard telephone and is typically used to verify the proper operation of a voice telephone line or to establish temporary communications on a "borrowed pair".

## Originating a Call

- 1 Set the Talk/Monitor switch to **M**.
- 2 Clip the test set to Tip and Ring of a subscriber loop.

- 3 Monitor (listen to) the line to verify it is idle.
- 4 If not idle, disconnect the test set from the line.
- 5 If the line is idle, set the Talk/Monitor switch to **T**. The test set automatically tests for high-speed data and talk battery on the line.
- 6 If data is detected, the test set will not go off-hook (will lockout) and will alarm, indicating the presence of data. Try another line.
- 7 If there is no data and talk battery is present, the test set goes off-hook and draws dial tone.

### Note

*The test set will not go off-hook if the line voltage exceeds 140 Vdc.*

- 8 Dial the desired number.

## Disconnecting a Call

To disconnect a call, set the Talk/Monitor switch to **M** or remove the test leads from the line.

## Answering a Call

- 1 If a ringing signal is received, set the Talk/Monitor switch to **T**. The test set automatically tests for high-speed data on the line.
- 2 If there is no data and talk battery is present, the test set goes off-hook and draws dial tone.

### Note

*The TS44PRO will not go off-hook if the line voltage exceeds 140 Vdc.*

- 3 If data is detected, the test set will lockout and alarm, indicating data is present.
- 4 To go off-hook with data present, press the **OVERRIDE** key (see "Data Lockout Override Operation" on page 12).

## Ground Start

Ground start lines are typically found on PBX installations. To activate an idle ground start telephone line, do the following:

- 1 Set the Talk/Monitor switch to **M**, and connect the test leads to Tip and Ring of the ground start line. With a third wire, temporarily short the Tip side of the line to earth ground. A wire with an alligator clip at each end is often used for this. Do not allow clips to short network connections.
- 2 With the short to earth ground in place, set the Talk/Monitor switch to **T**. When dial tone is received, remove the third wire from earth. The circuit is now ready for dialing.

## Data Lockout Operation

With the increase in high capacity data lines in the distribution system comes the greater risk of disrupting data services when working on analog lines. The test set is designed to be used by Outside Plant and Central Office technicians to perform their normal duties while greatly reducing the possibility of accidentally disrupting data service.

Accidentally going off-hook on a data line while searching for talk battery or dial tone on an unmarked terminal block or cable splice could bring down a high-capacity data line. To prevent this, the test set provides an automatic data lockout function. When the test set, with its Talk/Monitor switch in the **T** position, is connected to a Tip and Ring pair, it automatically tests the line for high-speed data (data signals that are above the human audio range) before going off-hook. If data is detected, the test set locks out, preventing itself from going off-hook, and it provides a continuous audio alarm indicating it has detected data.

When the test set is locked out, it remains on-hook, it does not draw direct current from the line, and it presents a high ac impedance to the line to prevent disruption of data. The test set can detect and protect the following data services: ISDN BRI, ISDN PRI, 56k DDS, SW56, T1 and E1, HDSL, IDSL, SDSL, ADSL DMT, ADSL CAP, and ADSL LITE.

## Data Safe Practices

Always monitor the line for an audible signal before attempting to go off-hook to draw dial tone. The data detect circuitry on the test set is designed to detect data signals above the human audio range. To detect data signals within the human audio range, such as produced by voiceband modems and subrate DDS transceivers, you must listen to the line using the test set's audio monitoring capability. If you hear the hiss of a voice band modem or low frequency data transceiver, do not move the Talk/Monitor switch to **T**. If you do switch to **T**, the test set will not lockout because it does not detect low frequency data. It will go off hook and will interfere with the voice band modem or data transceiver. To avoid this, try another line or wait until the line is idle.

Data detection is a two part process. The first part requires listening to the line for audible data traffic in Monitor mode as described above. If the line is quiet, then the second part is to use the test set's data detect capability to determine if there is data above the human audio range on the line. This can be done as follows:

You can test for data by switching the Talk/Monitor switch to **T**. The test set automatically performs a brief test for high-speed data. If there is data on the line, the test set locks out, (remains on-hook) and generates a data warning alarm. If there is no data on the line, the test set goes off-hook.

When going from pair to pair searching for tracer tone or dial tone it is best to connect the test set to Tip and Ring of the pairs. Avoid the practice, either in Talk or Monitor mode, of clipping one lead of the test set to ground, and using the other lead to search for tracer tone or dial tone on a block. This may create an electrical imbalance on a data line that will disrupt service. Once you find the voice line you are searching for then it is OK to test Tip to ground or Ring to ground on that line.

Be careful not to short the test leads together when connecting to a data line (or any line for that matter), as this could bring down the service.

It is best to put the test set in Monitor mode when troubleshooting a line, searching for capacitance kicks, RF signals, craft provided tones, etc.

## Data Lockout Override Operation

Normally, when the test set detects data, it means the operator has accidentally connected to a high-speed data line and should immediately disconnect from the line to avoid disrupting the data service. But in some cases the operator must go off-hook on a specific line even though the test set indicates that the line is a data line.

The following are scenarios where the operator may wish to override a data lockout:

- When there is false data detection due to RF pickup on a line that is near an AM radio broadcast antenna. The RF induced in the line may appear to be data.
- When performing a ground start, the test set may generate the data alarm when the Talk/Monitor switch is in the T position. This is because ground start lines are unbalanced before startup and thus are prone to picking up a lot of noise which may appear to be data to the test set. If this occurs, use the override function to go off-hook on a ground start line.

Telephone lines near AM radio broadcast facilities, pick up the RF signals from the broadcast antennas. Normally this isn't a problem for the test set. If the line is well balanced, the test set will not see the RF signal because it is a common mode (longitudinal) signal. But if the line is unbalanced, part of the RF signal will be converted to a differential (metallic) signal. If the signal amplitude is high enough, it may be detected as high-speed data by the test set. If you know for sure you are on such a line, use the unit's override capability to go off-hook.

The data lockout override can be activated only when the Talk/Monitor switch is in the T position. To activate the override, press the **OVERRIDE** key. If dc voltage is present, the test set goes off-hook. To go back on-hook, unclip the test set's test leads from the line or put the test set into Monitor mode.

## High Voltage Lockout Operation

The TS44PRO is designed for use by Outside Plant and Central Office technicians in environments where analog voice lines co-exist with lines that carry high dc voltage.

Accidentally going off-hook on a line carrying a high dc voltage can damage the power supply feeding the line. To prevent this, the TS44PRO provides an automatic high-voltage lockout function. When a TS44PRO is connected to a Tip and Ring pair with its Talk/Monitor switch in the T position, it measures the voltage on the line before going off-hook. If the measured voltage exceeds 140 Vdc, the test set locks out, preventing itself from going off-hook.

The high-voltage lockout condition is indicated by a solidly lit HI Vdc LED. In the event of a high voltage lockout, the Talk/Monitor switch should be set back to the M position, and the test set leads should be carefully removed from the line.

### Caution

**Do not short the test leads to each other while it is connected to a line carrying high voltage.**

## Configuring Your Test Set

When you are programming speed dial numbers or setting operating parameters, the test set expects you to press keys in a specific sequence. The key sequences for each programming procedure are provided on pages 12, 13 and 14. If, during a programming procedure, you accidentally press a key that's out of sequence, the test set will abort the programming procedure and all you have to do is start the programming procedure over again. When you complete a programming procedure correctly, the test set will give you a confirmation tone. If you don't get a confirmation tone when you expect one, assume you made a programming error and just start the programming procedure over again.

## Last Number Redial

To redial in tone dialing mode, go off-hook and press the **LNR** key. To redial in pulse dialing mode, go off-hook, press the **TONE/PULSE** key, then press the **LNR** key. In either case, the test set will automatically redial the last number dialed.

If, after going off-hook, any dialing key is pressed, the LNR memory is cleared and the value of the pressed key is the first number stored in the cleared memory.

The dialing keys that may be stored in LNR memory include 1,2,3,4,5,6,7,8,9,0,\*, and #. The star (\*) and pound (#) keys will not be redialed when the test set is in pulse dialing mode even if the redial memory includes the star (\*) and pound (#).

## Program Speed Dialing Numbers

While in Monitor mode, the test set allows the storage of ten speed dialing numbers in ten memory locations (0 through 9). Each location stores up to 23 digits. If an attempt is made to store more than 23 digits, only the first 23 are stored. The **PAUSE** key is accepted as a dialing digit when storing numbers.

### Storing a Number When in Monitor Mode (Preferred Method)

- 1 Set the Talk/Monitor switch to **M**.
- 2 Press **RCL**.
- 3 Using the dialing keypad, enter the number to be stored.
- 4 Press the **STORE/PROG** key.
- 5 Press a number key (0 through 9) to select the desired memory location. The test set gives a confirmation tone.

## Putting a Pause in a Stored Number

### Note

*Each time the **PAUSE** key is pressed, it counts as one dialing digit.*

In some situations it may be necessary to put a pause between digits of a stored number, as when accessing a trunk through a PBX that requires a **9** to get an outside line. You can do this by pressing the **PAUSE** key at the point where the pause is required. For example, to store the number 9-555-1234, with a pause between the **9** and **5**, enter **9[PAUSE]5551234**. When the number is dialed out, there will be a pause between the **9** and **5**. You can insert a longer pause by pressing **PAUSE** more than once.

## Storing the Last Number Dialed

If you dial a number then go on-hook and then decide you want to save that number in speed dialing memory, do the following:

- 1 Set the Talk/Monitor switch to **M**.
- 2 Press **RCL**.
- 3 Press **LNR** (Last Number Redial).
- 4 Press the **STORE/PROG** key.
- 5 Press a number key (0 through 9) to select the desired memory location. The test set gives a confirmation tone.

## Storing a Number You are Calling

- 1 Connect the test set to a working telephone line, set the Talk/Monitor switch to **T**, and receive dial tone.
- 2 Dial the number.
- 3 Press the **STORE/PROG** key.
- 4 Press a number key (0 through 9) to select the desired memory location. The test set gives a confirmation tone.

### Dialing a Stored Number

- 1 Connect the test set to a working telephone line.
- 2 Set the Talk/Monitor switch to T.
- 3 When the test set goes off-hook, press **RCL** (RECALL) and then the number key (0 through 9) for the memory location. For example, to dial a number stored in location 5, press **RCL** and then **5**. The number will be automatically dialed.

### Hook Flash Duration

When the test set is off-hook, pressing the **FLASH/PAUSE** key causes a timed interruption of the loop current to occur. Some PBX setups or telephone office switches may use this signal to put a call on hold or to activate some special function. One flash is generated for each press of the key.

To change the flash duration value:

- 1 Set the Talk/Monitor switch to **M**.
- 2 Press the **STORE/PROG** key.
- 3 Press the **FLASH/PAUSE** key.
- 4 Press a number key to select a hook flash time (Table 3). The test set gives a confirmation tone when the entry is accepted.

Table 3. Hook Flash Times

Key	Hook Flash Time
1	100 ms
2	200 ms
3	300 ms
4	400 ms
5	500 ms
6	600 ms (default)
7	700 ms
8	800 ms
9	900 ms
0	1000 ms

### Make Receive-Only Loud Speaker the Default

On a TS44PRO fresh from the factory, if you take the unit off-hook and press the **SPKR** key, the Speakerphone will turn on. The Speakerphone allows you to have a two-way, hands-free conversation like with any desk top speakerphone. If now you press the **MUTE** button, the Receive-Only Loud Speaker will be enabled temporarily. When the Receive-Only Loud Speaker is enabled, the speakerphone microphone is shut off and the test set can only receive audio signals – it cannot transmit any audio signals. Receive-only is preferred when your main concern is to listen to the line and you don't want ambient noise such as caused by a passing car to switch the Speakerphone into transmit mode.

Quite a few users have requested that the Receive-Only Loud Speaker be made available on a more permanent basis. In other words, when they press the **SPKR** key on an off-hook unit, they want the Receive-Only Loud Speaker to be activated rather than the Speakerphone. The Receive-Only Loud Speaker suits their working style and they don't want to press the **MUTE** key every time they want to activate the Receive-Only Loud Speaker.

If you frequently have two way conversations, then you probably want the Speakerphone to be the default Loud Speaker mode. If you mostly listen when the loud speaker is on, then you may want the Receive-Only Loud Speaker to be the default Loud Speaker mode. You can configure the test set to make the Receive-Only Loud Speaker the default Loud Speaker mode instead of the Speakerphone by performing the following programming procedure.

To enable Receive-Only Loud Speaker as the default off-hook speaker mode (assuming the unit is presently set for Speakerphone):

- 1 Set the Talk/Monitor switch to **M**.
- 2 Press the **STORE/PROG** key.
- 3 Press the **MUTE** key. The test set gives a confirmation tone.

If you want to restore the Speakerphone as the default off-hook speaker mode, then repeat the steps above.

## Speaker Timeout

The speaker draws more current from the battery than any other circuit on the test set. The battery drains quickly when the speaker is left on continuously. To extend battery life, the test set has a timeout function that automatically turns off the speaker when the test set is on-hook. A timer starts whenever the test set is put on-hook. After the timer times-out, the speaker is automatically shut off.

If the test set is used as a handset in Monitor mode and if the test set's receiver has been set to high volume, the battery is drained quickly. To avoid this, the test set has a timeout function for the high volume state when in Monitor mode. After the timeout, the test set reverts to low volume. The timeout duration for the high volume Monitor receiver is the same as for the speaker.

The speaker timeout duration (Table 4) is programmable while on-hook and 240 minutes (4 hours) while off-hook. The off-hook timeout cannot be changed. Remember, the longer the selected timeout duration the shorter the battery life.

To change the speaker timeout duration:

- 1 Set the Talk/Monitor switch to **M**.
- 2 Press the **STORE/PROG** key.
- 3 Press the **SPKR** key.
- 4 Press a number key to select a timeout duration. The test set gives a confirmation tone when the entry is accepted.

**Table 4. Speaker Timeout Durations**

Key	Speaker Timeout Duration
1	2 minutes (default)
2	5 minutes
3	10 minutes
4	20 minutes
5	30 minutes
6	40 minutes

## Factory Defaults

The Restore Defaults function lets you restore all programmable features to their original factory settings. This function does not clear stored telephone numbers. The defaults are:

- Hook Flash: 600 ms
- Speaker timeout: 2 minutes
- Speakerphone: Enabled
- Receive-Only Loud Speaker: Disabled

To restore the factory default values:

- 1 Set the Talk/Monitor switch to **M**.
- 2 Press the **STORE/PROG** key.
- 3 Press the pound (#) key. The test set gives a confirmation tone when the entry is accepted.

## Maintenance

### Warning

Disconnect the test set's alligator clips from any metallic connections before performing any maintenance. Read all instructions completely and understand possible hazards to end user if repairs are not performed properly.

Batteries are hazardous to handle. Do not allow the terminals to be shorted together. Severe burns or explosion can result if not handled properly. Dispose of battery properly to ensure contacts cannot short. Disposal may be restricted by local laws.

### Caution

Do not use CRC Cable Clean® or any similar chlorinated solvent on the test set. Doing so will damage the test set.

## Replacing the Battery

See Figure 4.

To replace the 9 V battery:

### Caution

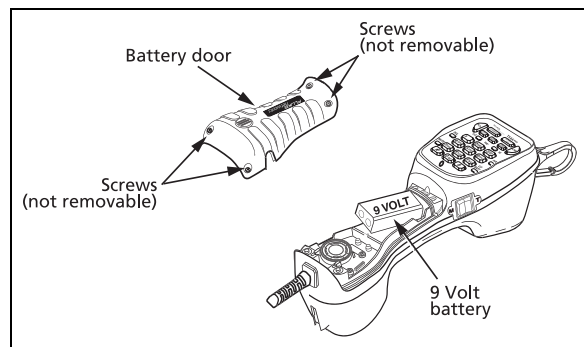
Be sure to account for all hardware removed. Loose or missing hardware could create a hazard for the end user. Be sure to replace the battery with a good 9 V alkaline or lithium battery or the test set will not operate properly.

- 1 Disconnect the test set from the line and place on a flat work surface with the battery cover up.

#### Note

*Battery cover screws are retained in the cover and will not come all the way out of the battery cover.*

- 2 Use a Phillips screwdriver to loosen only the four screws attaching the battery door cover to the back of the test set. Remove the battery door cover. Do not access or touch the printed circuit or other areas of the test set.
- 3 Remove the old battery and properly discard. Make sure the terminals cannot short.
- 4 Insert a new 9 V battery into the test set. When inserting batteries, observe the proper polarity.
- 5 Place the battery door cover on the test set and fasten the four screws securely. Do not over tighten the screws. The battery door screws should be torqued to a maximum of 0.904 N-m or 8 in-lb.



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Figure 4. Battery Replacement

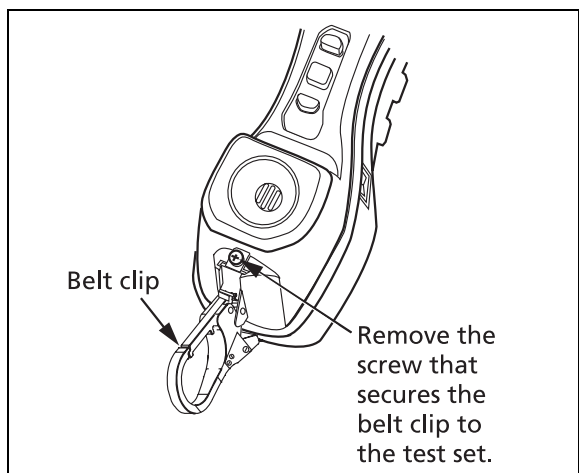
## Replacing or Relocating the Belt Clip

See Figure 5.

The belt clip assembly is field replaceable in the event of damage or prolonged wear. It also can be relocated to one of two locations. To order a replacement belt clip, contact your local Fluke Networks authorized distributor.

To replace the belt clip assembly:

- 1 Use a Phillips screwdriver to remove the screw that secures the belt clip to the test set housing.
- 2 Remove the old belt clip and replace with a new one. Secure the belt clip assembly to the test set housing with the original screw.



**Figure 5. Belt Clip Replacement**

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To relocate the belt clip:

- 1 At the unused belt clip slot, use a Phillips screwdriver to remove the screw holding the plastic insert to the case, then remove the plastic insert.
- 2 Use a Phillips screwdriver to remove the screw that secures the belt clip to the test set housing; then remove the belt clip.

- 3 Slide the belt clip into the slot at the previously unused location, and secure it to the case with one of the Phillips head screws.
- 4 Slide the plastic insert into the belt clip slot that is not being used and secure it with the remaining Phillips head screw.

## Replacing the Line Cord

A worn out or damaged line cord can be replaced by the user. To obtain a replacement line cord, contact your local Fluke Networks authorized distributor.

### Warning

**Read all instructions completely and understand possible hazards to end user if repairs are not performed properly.**

**Disconnect test set clips from any metallic connections before performing this maintenance.**

### Removing the Old Line Cord

To remove the old line cord:

### Caution

**Be sure to account for all hardware removed. Loose or missing hardware could create a hazard for the end user.**

*Note*

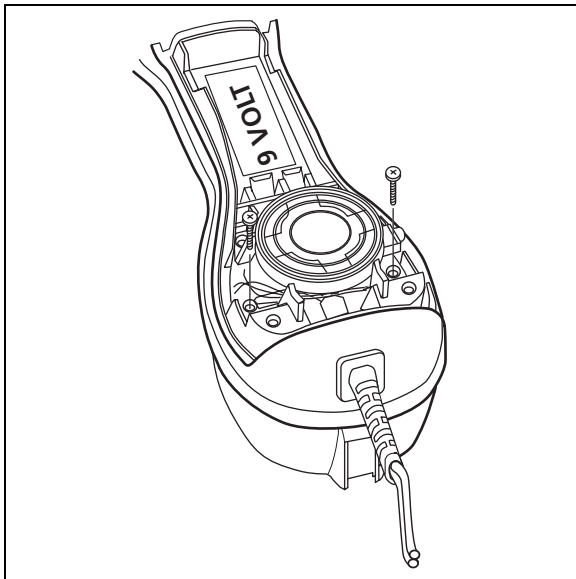
*Battery cover screws are retained in the cover and will not come all the way out of the battery cover.*

*Be careful not to damage or pinch the speaker wires, printed circuit faces or insulating materials.*

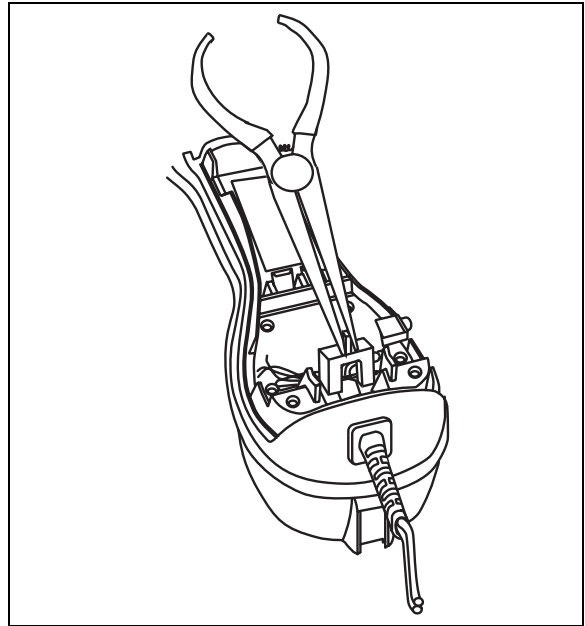
- 1 Use a Phillips screwdriver to loosen only the four screws attaching the battery door cover to the back of the test set (Figure 4).
- 2 Remove the battery door cover (Figure 4) and battery from the test set.

-continued-

- 3 Loosen the two screws that hold the line cord to the PCB (Figure 6).
- 4 Using needle nose pliers or one of the line cord clips, remove the two screws and washers from the line cord connectors.
- 5 Using needle nose pliers, remove the plastic clip (Figure 7) that holds the line cord strain relief in place.
- 6 Slip the line cord screw lugs (Figure 8) out through the hole in the end of the housing.



**Figure 6. Removal/Installation of Line Cord Screws**



**Figure 7. Removal/Installation of Plastic Clip**

### Installing a New Line Cord

To install a new line cord on either model:

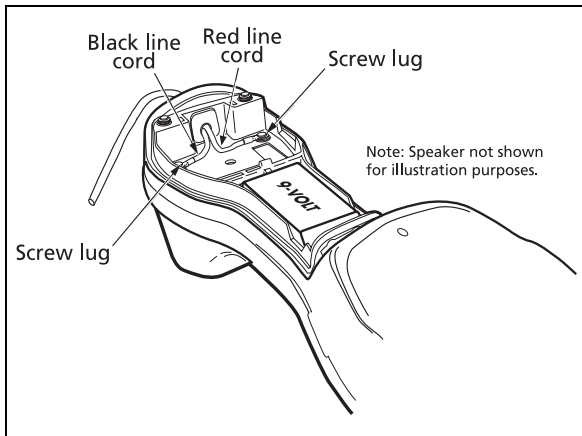
- 1 From the outside of the housing, slide the screw lugs of a new line cord through the hole in the end of the test set housing. Make sure the crimp barrel offset side of the screw lugs is up (Figure 9) and that the line cord screw lugs are flush against the circuit board.

#### *Note*

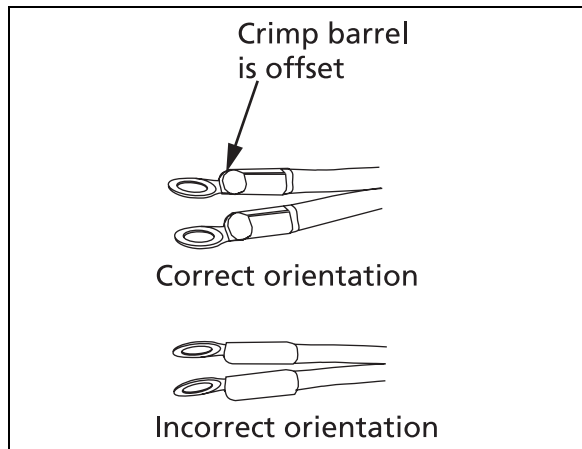
*Do not over tighten screws. Over tightening will strip the plastic.*

- 2 Fasten the red wire lug to the PCB (Ring) with screw and washer (Figure 8).
- 3 Fasten the black wire lug to the PCB (Tip) with screw and washer (Figure 8).

- 4 Insert the plastic clip over the line cord strain relief at the base of the test set housing (Figure 7) and press tightly into place. Inspect all work to ensure no pinched wires or areas where weather resistance and safe operation is affected. Reinstall the battery. Observe the proper polarity.
- 5 Place the battery door cover on the test set and fasten the four screws (Figure 4). Tighten screws to a maximum torque of 0.904 N-m or 8 in-lb.



**Figure 8. Removal/Installation of Line Cord Screw Lugs**



**Figure 9. Orientation of Line Cord Screw Lugs**

## Accessories (How to Order)

To order accessories, contact your local Fluke Networks distributor.

Description	Model Number
Belt clip, lockable (both ends)	P4080248
Belt clip, non-lockable (both ends)	P4080249
Standard Line Cord (STD) with Piercing Pin Clips	P4480001
Central Office Line Cord with 346A Plug	P4480004
Angled Bed-of-Nails Cord (ABN) and Piercing Pin Clips	P4480009
Angled Bed-of-Nails Cord (ABN) with Piercing Pin Clips and with RJ-11 Plug	P4480RJ9

## Specifications

Electrical	
Current Range (Off-Hook)	10 mA to 100 mA
<b>DC Resistance</b>	
Off-Hook	150 $\Omega$ nominal
On-Hook	>3 M $\Omega$
<b>AC Impedance</b>	
Off-Hook	600 $\Omega$ nominal; 300 Hz to 3400 Hz
On-Hook	>120 k $\Omega$ ; 300 Hz to 3400 Hz
<b>Rotary Dial Output</b>	
Pulsing Rate	10 pps $\pm$ 1 pps
Break/Make Ratio	60/40
Interdigit Interval	>300 ms
Resistance During Break	>100 k $\Omega$
<b>DTMF Output</b>	
Tone Frequency Error	$\pm$ 1.5 % maximum
Tone Level	-3 dBm combined (typical)
High versus Low Tone Difference	2 dB $\pm$ 2 dB
<b>Memory Dialing</b>	
Memory Capacity	10 speed dial memories plus one last number redial memory
Digit Capacity	23 digits per memory
PBX Pause Duration	4 seconds
Hook Flash Duration	User programmable; default of 600 ms
Automatic Speaker Shut Off Duration	User programmable; default of 2 minutes
Battery	9 V alkaline or lithium battery

Physical	
Measurement	10 in x 3.75 in x 4.25 in (254 mm x 96 mm x 107 mm)
Weight	Less than 1.5 pounds (0.68 kg) with one belt clip
Water Resistance	Designed to be rain and moisture resistant.
Environmental	
<b>Temperature Range</b>	
Operating:	29°F to 140°F (-34°C to 60°C)
Storage	-40°F to 150°F (-40°C to 66°C)
Altitude	To 10,000 ft. (3,000 m) max
Drop	Two 20-foot drops and twelve 12-foot drops onto concrete
<i>Note</i>	
<i>Specifications subject to change without notice.</i>	