Trilithic Company Profile

Trilithic is a privately held manufacturer founded in 1986 as an engineering and assembly company that built and designed customer-directed products for telecommunications, military and industrial customers. From its modest beginnings as a two-man engineering team, Trilithic grew over the years and broadened its offerings of RF and microwave components by adding broadband solutions to its product line. This was accomplished with the acquisition of components manufacturer Cir-Q-Tel and instruments manufacturer Texscan.

Today, Trilithic is an industry leader providing telecommunications solutions for major broadband, RF, and microwave markets around the world. As an ISO 9000:2001 certified company with over 40 years of collective expertise in engineering and custom assembly, Trilithic is dedicated to providing quality products, services, and communications solutions that exceed customer expectations.
Trilithic is comprised of five major divisions:

- **Broadband Instruments and Systems**
  Offers test, analysis, and quality management solutions for the major cable television systems worldwide.

- **RF Microwave Components**
  Provides components and custom subsystems for companies specializing in cellular, military, and other wireless applications.

- **Emergency Alert Systems**
  Leading supplier of government-mandated emergency alert systems used by broadcast TV, cable TV, IPTV, DBS, and radio stations.

- **XFTP**
  Offers a specialty line of field technical products for cable operators and technicians, as well as a line of products for installing electronics in the home of the future.

- **Network Services**
  Provides network data management and support services to safeguard and protect your network and data by employing certified, experienced, and dedicated network engineers.
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How this Manual is Organized

This manual is divided into the following chapters:

- Chapter 1, “General Information” provides Trilithic contact information and describes how this Operation Manual is structured.
- Chapter 2, “Introduction” introduces the equipment and features of the TR-3.
- Chapter 3, “Walkthrough” describes the components and features of the TR-3.
- Chapter 4, “Operation” describes how to use the features of TR-3.
- Chapter 5, “Specifications” shows the technical specifications of the TR-3.
Conventions Used in this Manual

This manual has several standard conventions for presenting information.

- Connections, menus, menu options, and user-entered text and commands appear in **bold**.
- Section names, Web, and e-mail addresses appear in *italics*.

A **NOTE** is information that will be of assistance to you related to the current step or procedure.

A **CAUTION** alerts you to any condition that could cause a mechanical failure or potential loss of data.

A **WARNING** alerts you to any condition that could cause personal injury.
Precautions

**WARNING**

*The battery MUST be charged with the AC to DC power adapter and battery charger provided with the TR-3. Using any other adapter/charger may damage the battery.*

**WARNING**

*The maximum input voltage to the meter is 100 V (AC or DC). A larger voltage will damage the meter.*

**WARNING**

*The accuracy of the meter may be affected when in a strong electromagnetic field.*

**WARNING**

*Do not use the TR-3 in any manner not recommended by the manufacturer.*
2. Introduction

What is the TR-3?

The TR-3 is an economical solution ideal for your basic HFC installation needs. This simple to use meter provides fast and efficient measurements including: analog signal levels with V/A level or digital power levels, 6 favorite channels and Tilt measurements to balance your system, and features an extended battery life. Weighing less than 1 pound, this simple to use, rugged little meter is convenient for one hand operation.

Features

The TR-3 supports the following functions:

- 46 to 1000 MHz Operation
- Single Channel Level Measurements
- Single Frequency Level Measurements
- (6) Favorite Channels
- Tilt measurement
- Analog levels or Digital power measurements
Equipment Supplied with Your TR-3

The TR-3 comes with the following:

• TR-3 Signal Level Meter with Protective Rubber Bumper
• Shoulder Strap
• AC Battery Charger
• Built-in 3.6V/2.5AH Ni-MH Battery
• Spare F-Type Connector
• Operation Manual
Accessories & Replacement Parts for Your TR-3

The following accessories and replacement parts are available for the TR-3:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0930156000</td>
<td>Channel Editor Software w/ Data Cable</td>
</tr>
<tr>
<td>2072105000</td>
<td>Data Cable</td>
</tr>
<tr>
<td>2131196000</td>
<td>Leather Case with Belt Clip</td>
</tr>
<tr>
<td>2131197000</td>
<td>Replacement Bue Rubber Protective Bumper</td>
</tr>
<tr>
<td>0090057000</td>
<td>Replacement Battery</td>
</tr>
<tr>
<td>2072122000</td>
<td>Replacement Charger</td>
</tr>
<tr>
<td>0200579000</td>
<td>Replacement F-type connector</td>
</tr>
</tbody>
</table>

For more information, please contact Trilithic at www.trilithic.com or 1-800-344-2412.
Chapter 3
Walkthrough

Now that you have your TR-3, take a few moments to look it over and become familiar with its controls.

The thin protective film layer placed over the display for protection during shipping should be removed.

Your TR-3 battery should be charged for 12 to 14 Hours for full charge.

NOTE

Meter Components

The TR-3’s keypad and backlit display are on the front panel. The charge socket is on the bottom of the meter.
Front Panel and Display

- RF Input
- LCD Screen
- Charge LED
Back of Meter

Shoulder Strap Attachment

Battery Enclosure
LCD

The following display functions are shown for Single Channel Measurement Mode.

1. Battery Status
2. Video Carrier
3. Digital Channel
4. Level
5. Units
6. $\Delta V/A$
7. Frequency
8. Channel Number
Keypad

Toggles between **Single Channel, Frequency** mode, and **Battery Voltage** function.

- **CH/F**

Pages through Favorite Channel measurements and **Tilt** mode.

- **FAV**

Power switch (ON / OFF).

- **①**

Selects active field and switches channels between Analog and Digital types.

- **②**

Increases channel or frequency.

- **④**

Decreases channel or frequency.
**LCD Backlight**

The LCD backlight is automatically enabled when any key (except power) is pressed. The backlight will shut off after 15 seconds to conserve battery power.

**Auto Shutdown**

The TR-3 will automatically power off when there has been no keyboard activity for 3 minutes. It will also power off when the battery is low.
Battery Charging

The TR-3 has a built-in 3.6V/2.5AH Ni-MH battery. When fully charged, it can be used for over four hours.

When the battery Voltage drops below 3.2V, the battery symbol at the top of the display screen will have no bars displayed. When the Voltage drops below 3.1 V, the TR-3 shuts off automatically to protect the battery. The battery will need to be recharged.

To charge the TR-3’s battery, connect the charge cube to the charge socket on the bottom of the meter and plug the charger into an AC outlet.

*WARNING*

_The battery MUST be charged with the Trilithic charge cube provided with the TR-3. Using any other charge cube may damage the battery._

While charging, the LED on the TR-3 front panel will have a RED light. The TR-3 should be charged for 12 to 14 Hours for a full charge.
Battery Replacement

To replace the TR-3 battery:

1. Remove the screw from the battery enclosure door on the back of the meter.
2. Lift off the door and remove the TR-3 battery pack.
3. Disconnect the battery plug from the socket.
4. Connect the new TR-3 battery and insert into the TR-3.
5. Replace the battery enclosure door and tighten the screw.

Only use the approved TR-3 replacement battery (P/N 0090057000) when replacing the battery on your TR-3.
Single Channel Measurement

Use the \textbf{CH/F} key to select Single Channel measurement.

The Single Channel Measurement screen shown to the right displays the selected Channel, Video frequency, Video level (dBmV), and $\Delta V/A$ (level difference between the Video and Audio carriers in dB).

The (TV) icon is also displayed above the channel number to indicate it is an analog channel. Use the \textbullet{ and }\textdownarrow{ keys to select the desired channel.

\textit{When the signal level is less than -32 dBmV, the display will indicate “Lo”.}
**Setting Digital Channels**

To change a channel from analog to digital channel, press the \[ \text{key} \] for 3 seconds.

The **QAM** symbol will appear at the top of the display to indicate a digital channel and the **(TV)** icon that indicates an analog channel will not appear.

Also, the frequency will change from the analog Video carrier frequency to the center frequency of the digital channel.

The TR-3 will measure the power over the bandwidth of the selected channel.

A channel may be switched back from a digital channel to an analog channel by the same method of pressing the \[ \text{key} \] key for 3 seconds.

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The setting of digital and analog channels are saved in memory

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**NOTE**
Frequency Mode

Use the \( \text{CH/F} \) key to select the Frequency mode.

The Frequency screen shown above displays the Audio frequency of the analog channel that was selected in the Single Channel mode. The level of the Audio carrier is also shown.

For a digital channel, the Frequency screen will display the center frequency of the channel and the level for the center frequency will be shown (not power level for the full channel bandwidth seen in the Single Channel measurement mode).

In the frequency mode, the TR-3 can be tuned to any frequency from 46 MHz to 1002 MHz. To change the frequency, press the \( \text{CH/F} \) key until the desired digit in the frequency is blinking and then press the \( \text{STEP} \) and \( \text{STEP} \) keys to select the desired value.

If the tuned frequency is 1000.00 MHz or higher, the leading “1” is not shown.

Example: 1,001.75 MHz is displayed as 001.75 MHz.
Battery Voltage Mode

Use the CH/F key to select the Battery Voltage mode.

In the Battery Voltage mode, the TR-3 will display the battery voltage.

Favorite Channel Measurement

Use the FAV key to select the Favorite Channel measurement mode.

The Favorite Channel Measurement screen shown to the right displays the first 2 of 6 favorite channels and the Video or digital power level for each.

P1 is displayed to indicate this is the first page (first 2 channels) of favorites.
Any channel may be selected for each favorite channel location:

- The “CH” symbol will blink for the selected channel that may be changed.

- To change the selected channel, press the key momentarily and the “CH” symbol will blink for the other channel so it can be changed.

- For the selected channel, press the and keys to tune to the desired channel.

**Digital Favorite Channels**

As in Single Channel Measurement mode, a (TV) icon will be displayed above the channel number to indicate it is an analog channel.

Also, the **QAM** symbol will appear at the top of the display to inform you if one or both of the favorite channels on the page is a digital channel.

In the example shown on the previous screen for Page 1 (P1) channels, the (TV) icon is not shown above Ch 2 so it is digital. The (TV) icon is shown above Ch 12 so it is an analog channel.

A channel may be changed between Analog and Digital in Favorites mode just as done in Single Channel mode:

- Select the channel to be changed by momentarily pressing the so the “Ch” symbol blinks for the desired channel.

- Press the key for 3 seconds to change the channel type between Analog and Digital.
Paging Through Favorite Channels

Press the FAV key again to page down to the next 2 favorite channels.

The Favorite Channel Measurement screen shows the second 2 of 6 favorite channels and the Video or digital power level for each.

P2 is displayed to indicate this is the second page (second 2 channels) of favorites.

Any channel may be selected for each favorite channel location as described for Page 1 favorites.

A favorite channel may be changed between Analog and Digital as described for Page 1 favorites.

In the example screen above for P2, both channels have the (TV) icon above the channel number to indicate they are both analog channels.
Press the FAV key again to page down to the last 2 favorite channels.

The Favorite Channel Measurement screen shows the last 2 of 6 favorite channels and the Video or digital power level for each.

**P3** is displayed to indicate this is the third page (third 2 channels) of favorites.

Any channel may be selected for each favorite channel location as described for Page 1 favorites.

A favorite channel may be changed between Analog and Digital as described for Page 1 favorites.

*In the example screen above for P3, the QAM symbol appears at the top of the screen and both channels do not have the (TV) icon above the channel number indicating they are both digital channels.*
Tilt Mode

Use the FAV key to select the Tilt mode after the third page (P3) of favorite channels.

The Tilt screen shown above displays the favorite channels with the lowest (top channel) and highest (bottom channel) frequencies.

The Video or digital power level is shown for the top (lowest frequency) channel.

The difference between the signal levels of the lowest and highest favorite channels (tilt) is displayed in the lower right side of the display (in dB).

**NOTE**

*In Tilt mode, as in Favorites mode, analog channels will be indicated by the (TV) icon above the channel number. Also, the QAM symbol will appear at the top of the display if either tilt channel is digital.*
Chapter 5
Specifications

Frequency

Range: 46 MHz to 1,000 MHz
Resolution: 50 kHz

Level Measurement

Range: -30 to 60 dBmV (Analog Level)
-20 to 50 dBmV (Digital Level)
Accuracy: ±2.0 dB @ 68 ± 9 °F (20 ± 5 °C)
Resolution: 0.5 dB

Battery

Rechargeable: 3.6 V, 2.5 AH Ni-MH Battery
Work Time: More than four (4) Hours with full charge
Charge Time: 12 to 14 hours (for full charge)

Miscellaneous

Dimensions: 6.65 x 2.80 x 1.61 in (169 x 71 x 41 mm)
Weight: 0.68 lbs (308 g)
Display: LCD with backlight
Operational Temperature: 14 to 122 °F
(-10 to 50 °C)
Warranty Information

Trilithic, Inc. warrants that each part of this product will be free from defects in materials and workmanship, under normal use, operating conditions and service for a period of one (1) year from date of delivery. Trilithic, Inc.’s obligation under this Warranty shall be limited, at Trilithic, Inc.’s sole option, to replacing the product, or to replacing or repairing any defective part, F.O.B. Indianapolis, Indiana; provided that the Buyer shall give Trilithic, Inc. written notice.

Batteries are not included or covered by this Warranty.

The remedy set forth herein shall be the only remedy available to the Buyer under this Warranty and in no event shall Trilithic, Inc. be liable for incidental or consequential damages for any alleged breach of this Warranty. This Warranty shall not apply to any part of the product which, without fault of Trilithic, Inc., has been subject to alteration, failure caused by a part not supplied by Trilithic, Inc., accident, fire or other casualty, negligence or misuse, or to any cause whatsoever other than as a result of a defect.

Except for the warranty and exclusions set forth above, and the warranties, if any, available to the Buyer from those who supply Trilithic, Inc., there are no warranties, expressed or implied (including without limitation, any implied warranties of merchantability of fitness), with respect to the condition of the product or its suitability for any use intended for it by the Buyer or by the purchaser from the Buyer.