

APPLICATIONS

Installation - Measure the length of a cable remaining on a spool or in a box prior to pulling a new run.

Trouble Calls - Identify the type of fault in a cable (short or open) and the location by measuring the distance to the fault.

Moves, Adds and Changes - Verify cable lengths are less than the maximum 100 meters allowed prior to connecting computers or network equipment.

Job Costing - Measure the actual length of cables being replaced or upgraded.

Cabling Management- Identify a wire pair on a punchdown block by locating the transmitted tone.

CABLETOOL™ MULTIFUNCTION CABLE METER USER'S GUIDE



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San Diego, CA 92120
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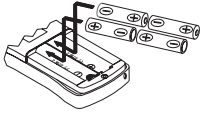
P/N 1005-0500-0000 Rev. C



BOX CONTENTS

- CableTool Multifunction Cable Meter
- Carrying Case
- User Guide
- Four AA Alkaline Batteries
- Two Banana Jack to Alligator Test Leads
- One Banana Jack to BNC Adapter
- One BNC to "F" Adapter

BATTERY



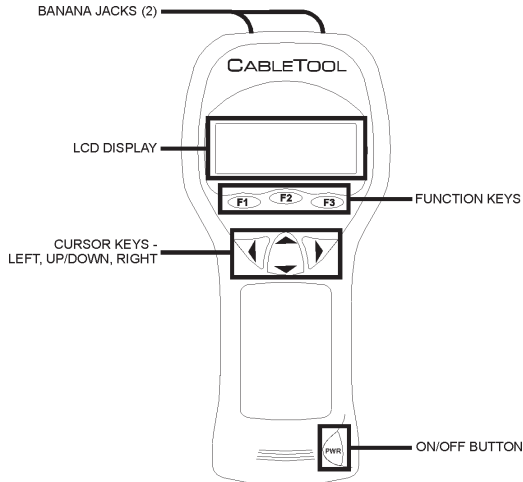
The CableTool operates on four AA alkaline batteries. Remove the battery cover at the back of the unit and insert the batteries with the orientation as shown. Battery polarity is marked inside the battery well for reference.

INTRODUCTION

The CableTool Multifunction Cable Meter electrically measures the length of a cable using Time Domain Reflectometry technology. The CableTool measurement begins by transmitting an electrical pulse into the connected cable. The electrical pulse travels along the cable until it hits a discontinuity (either a short or an open) and is then reflected back to the unit. The CableTool precisely measures the time between launching the pulse and receiving the reflected pulse. The time measurement is converted to distance using the cable NVP (Nominal Velocity of Propagation).

Additionally, the CableTool provides a continuous reading of any voltages present on the cable under test and features four different tone frequencies and patterns for tracing cables with a tone probe.

MECHANICAL FEATURES



UNDERSTANDING NVP

The CableTool makes a very precise measurement of the time it takes for an electrical signal to travel down a cable, hit a short or open and travel back to the unit. The time is converted into length based on the speed that the electrical signal travels along the cable being tested. Different cables have different electrical properties and the speed that the electrical signal travels will vary based on the NVP of the cable.

NVP (Nominal Velocity of Propagation) is the relative speed that an electrical signal will travel through a media. A vacuum is a perfect media with an NVP of 100. All cables have an NVP less than 100 and typically in the range of 50 to 80. Using the most accurate NVP available will provide the most accurate length measurements.

The NVP for electrical service cables (such as Romex, BX, UF-B) varies significantly between manufacturers and even between production lots from the same manufacturer. Data cables have special manufacturing processes that produce fairly consistent NVP values. The NVP of a cable can also be different if it is wound on a spool or laying flat (installed). Data cables have the least variation between wound and flat and some coaxial cables show significant variation. NVP is specified for many types of cable and may be printed on the cable spool or box. Contacting the manufacturer or checking their website can also be a good source of accurate NVP information. Using the Custom Cable Setup to determine the NVP of a known cable length provides accurate results. The NVP values prestored in the CableTool provide typical values for cable types from all manufacturers.

CABLE TYPE LIST ABBREVIATIONS

The prestored Cable Type List uses the following abbreviations:

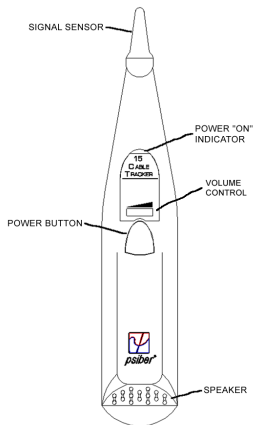
- NM - Non-Metallic (Romex)
- BX - Aluminum Armored Cable with Aluminum Ground
- MC - Aluminum Armored Cable with Copper Ground
- HC - Aluminum Armored Cable for Health Care Applications
- UF - Underground Feeder (Direct Burial Cable)
- SOOW - 600V Rubber Jacketed Portable Cord
- EXTEN - Outdoor Extension Cable (Typically Orange Color)
- W/G - With Ground Wire
- ZIP - Lamp Cord
- THHN xCDT - THHN Wire in Conduit
- CAT - Category
- PLNM - Plenum Grade
- UTP - Unshielded Twisted Pair
- STP - Shielded Twisted Pair
- COAX - Coaxial Cable
- SPKR - Speaker Wire
- TEL - Telephone Twisted Pair
- PIC - Plastic Insulated Conductor (Aerial Telephone Cable)
- THERM - Thermostat Wire

SAFETY

Always disconnect the test leads from any cable before opening the battery compartment cover.

CABLETRACKER 15 TONE PROBE (OPTIONAL) OVERVIEW

The CableTracker Model 15 Probe identifies cables and terminations by detecting a trace tone signal transmitted by the CableTool. When the Probe is near the correct cable pair or punchdown, it indicates detection by emitting an audible signal with the same pattern that is selected on the CableTool.



CABLE TRACING

Connect the CableTool to a cable. Turn on the Model 15 Probe by pressing and holding the button. Place the probe tip near the cable or termination to be identified and the Probe will emit an audible signal. The audible signal is loudest when the Probe is near the correct cable or termination point. The volume can be adjusted by rotating the thumbwheel located above the button. The Power "ON" indicator is illuminated when the unit is on and the battery has adequate voltage.

BATTERY

The CableTracker Model 15 Probe operates on one 9 volt alkaline battery. Remove the battery cover at the back of the unit, connect the battery to the battery snap cable, insert the battery in the battery well and replace the battery cover.

BATTERY LIFE

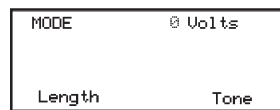
The Model 15 Probe will operate for approximately 16 hours on one 9 volt alkaline battery. When the battery is below the level required for the Model 15 to operate properly, the Power "ON" indicator will not illuminate.

OPERATION

Attach the test leads to the CableTool by inserting the safety banana plugs into the banana jacks at the top of the unit. Turn the CableTool on by pressing the "PWR" button. The startup screen is shown for a few seconds and then the Mode Screen is displayed. Clip one test lead to each of two conductors of the cable to be tested.

MODE SCREEN

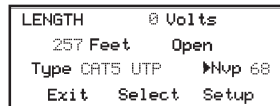
When the Mode Screen is displayed, the CableTool immediately starts measuring voltage and updates the reading several times per second. If more than a 6-8 volts are present on the cable, do not conduct a Length test or apply a Tone signal until the circuit is de-energized. The CableTool can withstand continuous input voltages of up to 250Vrms.



LENGTH SCREEN

Pressing the Length function key in the Mode Screen presents the Length Screen. The CableTool automatically starts measuring the distance to the fault (open or short) using the NVP of the Default Cable (see Default Cable Setup). Using the Up/Down Cursor key, any of the eight user selected cable types, the four custom cable types or a cable type from the prestored cable list can be selected and the length is corrected for the corresponding NVP. The length measurement is continuously updated.

When the NVP for a cable is known to be different than the displayed NVP, the NVP can be changed by pressing the Select function key to move the arrow to the NVP field and then pressing the Up/Down cursor key to modify the NVP. The NVP can also be modified and stored in Cable List setup.



RECOMMENDATION: Before starting a job with a new spool or box of cable that has a known length, make a length measurement with the CableTool to determine if the prestored NVP for that cable type provides the correct length. This is done by selecting a cable type that matches or is similar to the type of cable to be tested, press the Select function key to move the arrow to the NVP field and press the Up/Down Cursor key until the displayed length matches the known length printed on the box or spool. The modified NVP will only be used while making this length measurement, exiting the screen or turning off the power will reset the NVP to the original value. To store the cable type with the modified NVP see "Cable List Setup". The prestored NVP is a typical value and adjusting the NVP to the actual length will provide more accurate results. See "Understanding NVP" for more information.

tone screen

Pressing the Tone function key in the Mode Screen presents the Tone Screen and the CableTool begins transmitting the user selected tone pattern and frequency (see Tone Setup).

| | | |
|-------------|--------|-------|
| TONER SETUP | | |
| ►Pattern 1 | | |
| Band 3 | | |
| Exit | Select | Setup |

The CableTool provides four different tone patterns which can be changed by pressing the Up/Down cursor key. The tone frequency can be changed by pressing the Select function key to move the arrow to the Band field and then pressing the Up/Down cursor key to change the frequency band.

Setup

Pressing the Setup function key in any screen presents the Setup Screen.

| | |
|------------|--------|
| SETUP | |
| Configure: | UNITS |
| Exit | Select |

The Up/Down cursor key is used to display: 1) Units Setup 2) Default Cable Setup 3) Cable List Setup 4) Custom Cable Setup 5) Toner Pattern/Band Setup and 6) Power Down Setup. Press the Select function key to enter the displayed

setup screen.

UNITS SETUP

The Units Setup Screen is used to select the units used when displaying the length measurement in the Length screen.

| | | |
|-------------|------|-------|
| UNITS SETUP | | |
| ►Feet | | |
| Meters | | |
| Exit | Save | Setup |

The Up/Down cursor key is used to select Feet or Meters. Press the Save function key to store the selected units.

CABLE LIST SETUP

The CableTool has a prestored list of over 60 popular cable types with the typical NVP value for each cable. Cable List setup allows the user to store the most often used cable types at the top of the list for quick access and to modify the typical NVP when the actual NVP is known to be different value.

| | | |
|------------|--------|-------|
| CABLE LIST | | |
| ►Cable 4 | | |
| Type EMPTY | Nvp 42 | |
| Exit | Save | Setup |

Pressing the Up/Down cursor key scrolls between the eight storage locations. Pressing the Select function key advances the arrow to the Type field where any one of the prestored cable types can be displayed by pressing the Up/Down cursor key. Pressing the Select function key again advances the arrow to the NVP field which can be modified by pressing the Up/Down cursor key. Press the Save function key to store the information.

DEFAULT CABLE SETUP

Default Cable setup allows the user to store the most often used cable type as the default for the Length measurement in the Length screen. The Default Cable is used when the Length function is selected and length measurements begin.

| | | |
|---------------|--------|-------|
| DEFAULT CABLE | | |
| ►Cable 1 | | |
| Type EMPTY 1 | Nvp 65 | |
| Exit | Save | Setup |

Pressing the Up/Down cursor key scrolls between the eight storage locations. Press the Save function key to select the displayed cable as the Default for length measurements.

CUSTOM CABLE SETUP

Custom Cable Setup is used to measure and store the NVP of a cable of a known length. Connect the CableTool to a piece of cable that is between 50 and 100 feet long and is open at the far end. Cables less than 50 feet or longer than 100 feet may not give accurate NVP results.

Press the Up/Down cursor key to select one of the four Custom Cable storage locations. Press the Select function key to advance the arrow to the length field and then use the Up/Down cursor key to adjust the displayed cable length until it matches the known length. The NVP changes as the displayed cable length is adjusted.

Press the Save function key to store the information.

TONER SETUP

The CableTool has four different tone patterns and four different tone frequencies that can be used to trace a cable with a tone probe. The frequencies and patterns are compatible with tone probes from different manufacturers. The different patterns and frequencies allow multiple technicians to be working in the same area and still be able to uniquely identify the cable being traced.

Pressing the Up/Down cursor key scrolls between the four transmitted patterns. Pressing the Select function key advances the arrow to the Band field where one of four frequencies can be selected. Press the Save function key to store the displayed Pattern and Band as the Default for Toning.

CABLE LIBRARY SETUP

The CableTool has one cable library for general electrical applications and one for CATV installers. Pressing the Up/Down cursor key scrolls between the two libraries. Pressing the Select function key makes that library of cable types available for all length measurements.

POWER DOWN SETUP

The CableTool will automatically turn off after the time selected in the Power Down Setup screen. Settings available are five minutes, fifteen minutes, thirty minutes and on (must be turned off manually). Press the Save function key to store the selected setting.

| | |
|------------|------------|
| POWER DOWN | |
| Time: | 5 MIN. |
| Exit | Save Setup |

POWER

Duration - The CableTool will typically provide 10-12 hours of operation from a set of four AA alkaline batteries.

Auto Power Down - The CableTool will automatically turn off after the time selected in the Power Down Setup screen or will run continuously until manually turned off when "ON" is selected for Power Down.

Low Battery - When the batteries are below the level required for the CableTool to operate properly, a "LO BATT" message appears in the upper right hand corner of the display.