Model Three

Signal Level Meter

- 5 MHz to 1 GHz Frequency Range
- Full Scan, Single Channel, and Spectrum Modes
- Data Logging
- Digital Signal Measurements: Power, MER, Pre- and Post-FEC BER (Including Deep Interleave)
- Constellation Display (Optional)

Overview

The Model Three™ signal level meter is ideal for CATV installations - featuring a wide range of tests for analog and digital channel measurements. This rugged instrument can be customized, streamlining tests and making your installations and troubleshooting more efficient.

With the press of a single key, the meter performs a complete test of all channels in the selected user channel plan to specified limits. It can also be set to automatically perform Level, Spectrum, Tilt (Favorite), Hum, QAM, and Limit tests at programmed intervals, unattended.

Carrier amplitudes are displayed individually, grouped with up to 12 “favorites”, or in scan mode with five levels of magnification or full channel plan scan. This meter features a single-channel spectrum mode which displays interfering beats in addition to the carrier amplitudes. The meter also tests QAM channels, performs Hum measurements, provides data logging, includes a voltmeter, and much more.

Learned Channel Plans

The Model Three conveniently stores up to four user-defined channel plans customizing the meter for contractors that work in several systems with different channel lineups. Plans can be automatically learned (from eight base plans) at a cable drop, or downloaded from PC files using the optional ToolBox™ software. The operator can select favorite channels in each user plan to be included in a Tilt/Favorite channel plan.

Digital Channel Measurement

The Model Three can measure the channel power of QPSK and QAM channels when testing or troubleshooting your digital transmission system. This function also measures MER and pre- and post-BER of QAM channels (including deep interleave).

The Constellation display (optional) allows the operator to quickly analyze 64 and 256 QAM downstream channels verifying quality or identifying impairments. This feature is field-installable and can be added at the operator’s convenience.

Wide Channel Scans

The Model Three can display up to 126 channels in a single view or a total of 170 channels can be displayed in overlapping views. The settings for the active measurement mode can be accessed at the press of a single key, without going through nested menus. This allows the operator to quickly make changes in the settings and return to measurement mode saving valuable time.

Level Measurement

As an aid to troubleshooting, the operator can choose LIVE, MAX, or Δ P-P (variation) signal level displays.

Spectrum Measurement

In Spectrum mode the full spectrum or frequency spans from 2.5 MHz to 62.5 MHz can be displayed. The Δ MARKER function is included in Spectrum and Single-Channel Spectrum modes. MAX HOLD captures transient events. The Model Three also has an Average display function for Spectrum.

Model Three

Signal Level Meter

Hum

The Hum measurement function is used to troubleshoot interference that may result from a defective power supply or faulty or overloaded power inserters. This mode includes 60 Hz and 120 Hz (or 50 Hz and 100 Hz) and low pass (1 to 400 Hz) measurements.

Voltmeter

The Model Three is equipped with a built-in voltmeter function that can be used for troubleshooting power supplies or power drops. The measurement is displayed as a bar graph with a numerical readout and can accommodate AC or DC voltages up to 100 Volts.

User-Defined Tests

A significant time and cost savings feature of the Model Three is the capability to group tests into automatic tests that can be executed with a single keystroke. Several Auto-Tests can be stored in the meter and recalled as needed. These may include Level, Tilt, Spectrum, QAM, Hum, and Limit tests. Limit test data allows for test uniformity and flexible field storage, and may be automatically scored against specified limits and assembled into reports.

Automated Proof of Performance

At the press of a key, the Model Three performs FCC Part 76 level-related tests including: Visual Carrier Levels, Δ V/A, Max Δ Visual Carrier Levels, and Δ Adjacent Visual Carrier levels. Measurements can be executed immediately or programmed to occur at timed intervals, unattended, as an FCC 24-hour variation test. The test results can then be compared against FCC limits, or limits set by the user.

Flexible Data Storage

The operator can select and save the test data of the level, tilt, spectrum, scan, QAM, hum, limit, and auto-test measurements and recall them as needed. Scan, Spectrum, and Limit files can be viewed graphically. Any combination of up to 30 Level, Tilt, Spectrum, Hum, QAM, or scans, or up to 22 Limit test measurement files may be saved on the Model Three. These data records may be uploaded to a PC through the optional ToolBox software for reports, analysis, and printing.

Extended Battery Life, Fast Charging

The Model Three's battery provides five hours or more of continuous use between charges. One hour of fast charging from AC or vehicle power provides nearly two hours of extended operation.

INCLUDES THE FOLLOWING:

5 MHz to 1 GHz signal level meter
P/N 2011346000 (standard feature set)
P/N 2011346100 (with Constellation)

Protective rubber bumper

Carrying case

Shoulder strap

AC battery charger

User's manual

OPTIONAL ACCESSORIES:

CC-17 protective sleeve
P/N 2130856000

CC-18 holster with belt loop
P/N 2130854000

RELATED PRODUCTS:

ToolBox software (includes PC data cable)
P/N 0930149000

I/O-15 precision RF coaxial test cable
P/N 2071527048

USB PC data cable
P/N 2072084000

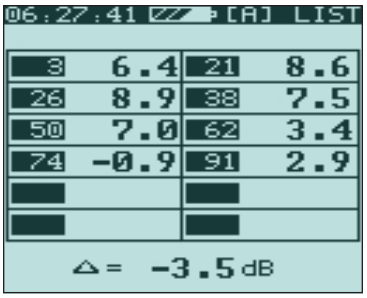
The Model Three signal level meter supports a variety of functions, including:

- Level measurement
- Tilt/Favorite group display
- Single-Channel display
- Scan display
- Spectrum display
- Digital channel measurements
- Data logging
- Limit test
- Auto-Test
- Voltmeter function
- Hum measurement
- Saves measurement files for viewing or uploading to optional ToolBox software

Model Three

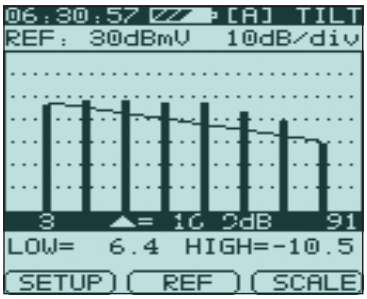
Signal Level Meter

File list

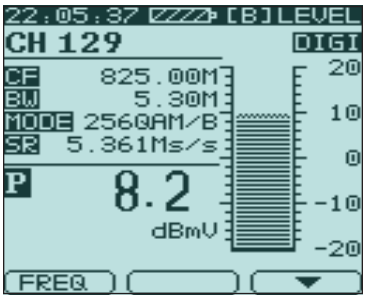


Favorite channel and Tilt display

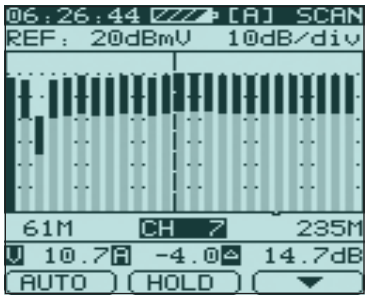
Auto-Test menu



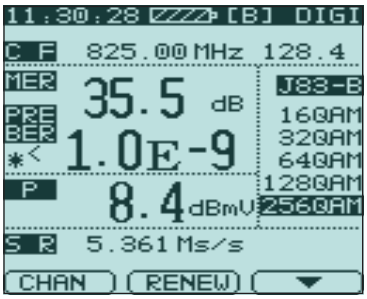
Favorite channels and Tilt displayed as a graph



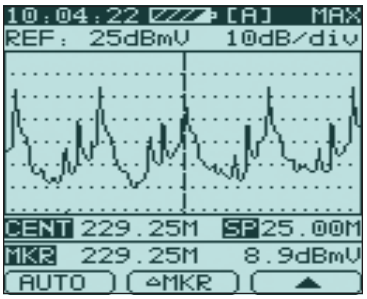
Level screen for digital channels



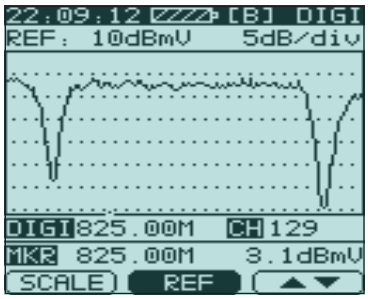
Scan display for multiple channels with 5 levels of magnification or full plan



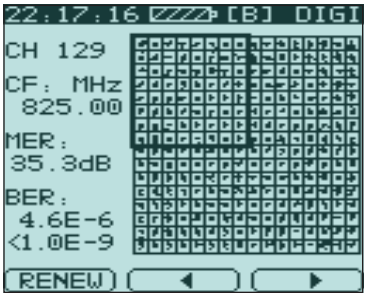
QAM measurement screen



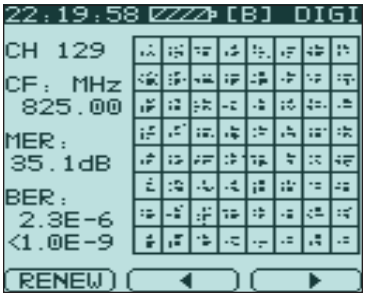
Display RF spectra with spans of 2.5 to 62.5 MHz, or full-span



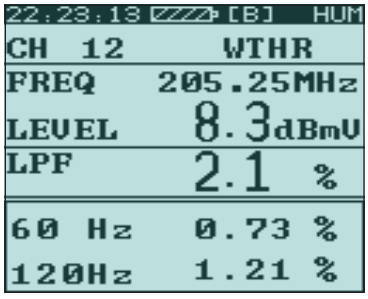
QAM Spectrum screen



QAM Constellation screen (optional)



QAM Constellation (magnification) (optional)



Hum measurement screen

Model Three

Signal Level Meter

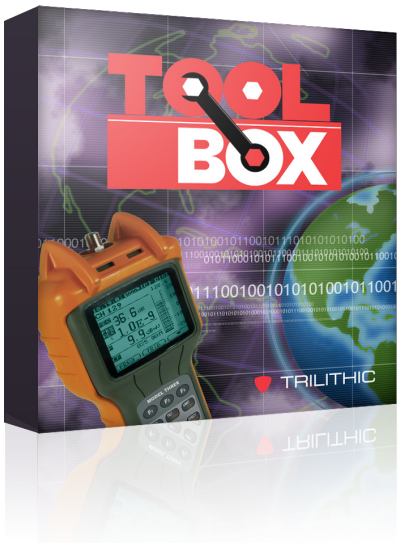
SPECIFICATIONS

Frequency	**Range:** 5 MHz to 1 GHz **Accuracy:** ±50 ppm @ 20° C ± 5° (68° F ± 9°) **Resolution:** 10 kHz
Channel Type	**Analog TV:** TV **Digital TV:** 16/32/64/128/256 QAM, QPSK, COFDM **FM channel:** Single frequency
Analog Level Measurement	**Range:** 5 MHz to 65 MHz (-42 dBmV to +60 dBmV) 65 MHz to 1GHz (-35 to +60 dBmV) **Accuracy:** > -25 dBmV: ± 1.5 dB @ 10° to 30° C (50° to 86° F) ± 3.0 dB @ -10° to +40° C (14° to 104° F) **Resolution:** 0.1 dB **Input impedance:** 75 Ω (unbalanced, BNC or F-type connector)
Hum	**Range:** 2 to 5% LPF, BPF **Accuracy:** ±0.5% (BPF)
Channel Scan	**Number of channels:** 170 (max) **Scanning speed:** 3 channels per second **Scale:** 1, 2, 5, 10 dB/div **Zoom:** 1x, 2x, 3x, 4x, 5x; five levels of magnification or full channel plan scan
Frequency Spectrum	**Bandwidth:** 2.5 MHz, 6.25 MHz, 12.5 MHz, 25 MHz, 62.5 MHz, and full span **Scale:** 1, 2, 5, 10 dB/div
Digital Channel	**Demodulation type:** ITU-T J.83 Annex A/B/C standard **Support:** 16/32/64/128/256 QAM, QPSK, COFDM **Symbol rate:** 4 to 7 MS/sec **Bandwidth:** 0.28 to 9.99 MHz **MER:** To 36 dB (QAM) **Accuracy:** ±2.0 dB **BER:** $1E^{-3}$ to $1E^{-9}$ before and after R-S decoding (QAM) **Power measurement type:** QAM, QPSK, COFDM
Digital Channel Power (Average)	**Level range:** -25 to +55 dBmV **Accuracy:** ±2.0 dB @ 10° to 30° C (50° to 86° F) ±3.0 dB @ -10° to 40° C (14° to 104° F) **Resolution:** 0.1 dB
Constellation (Optional)	**Display size:** 64 and 256 QAM Constellation with zoom capability
Tilt Measurement	**Number of channels:** 4 to 12 **Resolution:** 0.1 dB
Limit Test Parameters	Any of the following may be enabled: **Min video:** 40 to 119 dBµV (-20 to +59 dBmV) **Max video:** 41 to 120 dBµV (-19 to +60 dBmV) **Max Δ video:** 2 to 30 dB **Min Δ V/A:** 0 to 15 dB **Max Δ V/A:** 5 to 30 dB **Max Δ ADJ:** 0 to 20 dB **24-hour video dev.:** 0 to 20 dB
Auto-Test	**Number of programs:** 7 (max) **Tests:** Level, Tilt, Spectrum, QAM, Hum, and Limit (any or all tests may be used in an Auto-Test program) **Time intervals:** 1 to 23 hours **Test times:** 1 to 10 times
Trunk Voltage Measurement	**Input range:** 10 to 100 VAC or VDC **Accuracy:** ±2.0 V **Resolution:** 0.1 V
Power	11.1 V / 1.4 AH Li-Ion battery Provides 5 hours of continuous operation **Charger:** 100 to 240 VAC, 50/60 Hz, 15 VDC, 2 A (max) **Charge time:** Less than 3 hours
Display	128 x 128 backlit LCD
Communication Port	RS-232C (Converts to USB with data cable)
Storage	32 Kb of memory Up to 30 complete scan files (170 channels, max) or 22 complete Limit test files (170 channels, max); less if other files (Level, Tilt, QAM, Hum, Spectrum) are saved
Weight	1.76 lbs (800 g)
Dimensions (H x W x D)	8.52" x 3.74" x 1.93" (218mm x 95mm x 49mm) (dimensions do not include belt clip)

ToolBox

Companion software for the Model Three

- Setup Model Three Operating Parameters
- Upload, Configure, Save, and Download Channel Plans
- Upload Data Files for File Analysis
- Perform and Save Meter Measurements Via a PC



Trilithic's ToolBox™ support software for the Model Three™ signal level meter offers a range of functions that make your meters more versatile and easier to use.

With ToolBox software, the operator can configure meters, upload recorded data to multiple databases, and view data files from a wide variety of tests, including: Scan, Limit, Spectrum, Tilt, QAM, Hum, Level, and Auto Test measurements.

Model Three Setup

Using ToolBox, you can configure meter operational settings to specify Measurement units, Temperature Units, Backlight Time, Shutdown Time, Limit Test parameters, Frequency steps, Date, and Time.

Channel Editor

The Toolbox Channel Editor permits the user to Upload a learned channel plan from the meter or open a pre-stored plan from the library of base plans.

All parameters of the plan can be edited including: Frequency, BW, Channel numbers, Analog/Digital type, Enabled Channels, Favorite Channels, Modulation type, and Symbol Rate. A name can also be assigned to each channel.

Uploaded or configured channel plans can be saved and conveniently downloaded to multiple meters to ensure consistent operation.

File Analysis

Toolbox permits the user to upload all measurement data from the Model Three including Scan, Limit, Spectrum, Tilt (Favorite), QAM, Hum, Level, and Auto Test measurements.

Using the database manager, you can construct multiple named databases that match the geography of your system, division of responsibilities, or any other file criteria.

The File Analysis function allows the user to view any data record or several data records simultaneously for comparison.

Scan, Limit, Spectrum, and Tilt files may be viewed graphically or data may be listed in tabular form. QAM, Hum, and Level files are viewed as data lists.

The graphic view permits overlay of multiple files and data for each file is listed for selectable marker positions along with the relative value difference between each file for easy comparison.

Graphic data may be printed and individual data files may be printed or exported to spreadsheets.

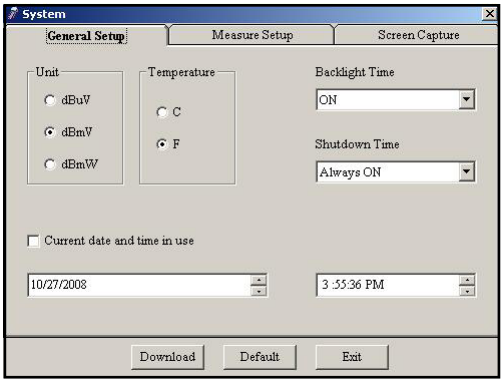
Remote Operation

Toolbox software can be used to remotely perform measurements when connected to the Model Three.

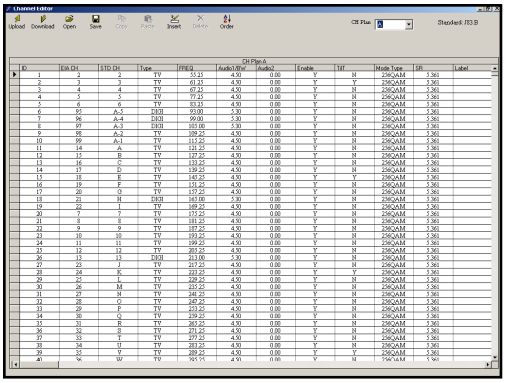
All remote measurements including Channel level test, Frequency level test, Spectrum scan, Channel scan, Tilt, QAM, and Hum may be monitored on your PC and may be saved or printed.

ToolBox

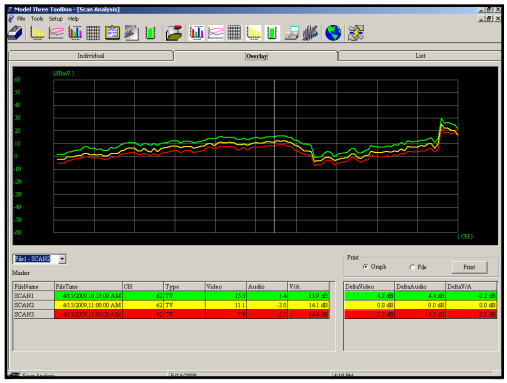
Companion software for the Model Three



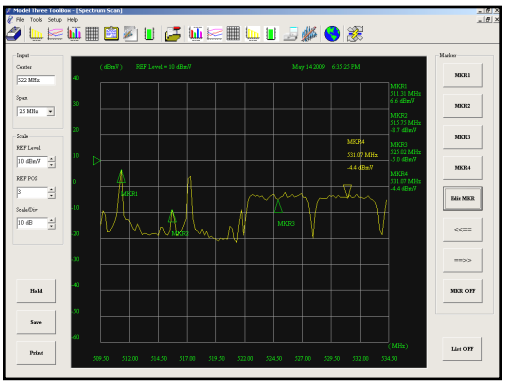
Setup meter to specify Measurement units, Temperature units, Backlight Time, Shutdown Time, Limit Test parameters, Frequency steps, Date, and Time.



Toolbox Channel Editor permits the user to Upload, Configure, Save, and Download channel plans for the Model Three.



File Analysis permits the user to upload all measurement data from the Model Three including Scan, Limit, Spectrum, Tilt (Favorite), QAM, Hum, Level, and Auto Test measurements.



Remote Operation can be used to perform Model Three measurements from your PC including Channel level test, Frequency level test, Spectrum scan, Channel scan, Tilt, QAM, and Hum.

SYSTEM REQUIREMENTS

To operate the ToolBox software, the following hardware is required:

- 200 MHz Pentium-II processor
- 64 MB RAM, 100 MB free disk space
- Windows 2000, XP, Vista, or 7
  Windows Server 2000, 2003, and 2008 also supported
- Color monitor running at 256 colors or higher, 1024 x 768 screen resolution
- Windows-compatible mouse
- Available USB 2.0 port
- Trilithic Model Three data cable (included with the ToolBox software)

Model Two

Signal Level Meter

- Verifies System Performance Using a Complete Range of Measurements
- Measures Analog and Digital Carrier Levels from 5 to 870 MHz
- 5 to 870 MHz Spectrum Analyzer Range
- Large, High-Resolution Display and Easy-to-Understand User Interface
- Ample Measurement Data Storage for Unattended Testing

Designed for the cable test environment, keeping the needs of the installer and field technician in mind, the hand-held Model Two™ signal level meter provides a full complement of measurement functions at an affordable price.

The large LCD display is highly readable in all conditions. The internal battery can operate up to six hours on a single charge and can be fully charged in three hours. One hour of fast charging from AC or vehicle power provides nearly three hours of extended operation. The meter features a built-in speaker.

Learned Channel Plans

As a convenience for contractors working with several channel lineups, the Model Two can retain up to five user-defined channel plans. Channel plans can be learned automatically at drops or can be downloaded from any PC running Trilithic's ToolBox™ software.

Special Tilt/Favorites Plan

The operator can select up to twelve key channels in each user plan to be included in a tilt/favorite channel plan, allowing for quick go/no-go testing and easy amplitude adjustments.

Informative Measurement Modes

The Model Two also performs direct power measurement of QAM signals and even displays the spectrum of the full reverse and forward paths. Amplitude measurements are fast and efficient. Carrier amplitudes are displayed individually, as a group (up to 12 favorites) or as a full-span display. It can also be set to automatically perform unattended level, spectrum, tilt (favorite), and limit tests at programmed intervals, with data logging. In addition, the meter supports a volt meter function.

Data Storage

The Model Two saves up to 35 level, tilt, spectrum, channel scan, limit test, and auto-test measurement data files. The operator may recall and display recorded data or upload it to a PC running Trilithic's ToolBox software.

Auto-Test Programs

Groups of tests can be assembled into automatic procedures that can be executed with one keystroke. Auto-test data can then be automatically scored against specified limits and combined into reports.

Automated FCC Proof of Performance Test with Data Evaluation

The Model Two performs all Part 76 level-related proof tests, including:

- Video carrier levels
- Relative video/audio carrier levels
- Difference between maximum and minimum video carrier levels
- Difference between adjacent video carrier levels
- 24-hour variation test

Tests can be executed immediately or can be programmed to perform at timed intervals. The Model Two has the ability to score test results against FCC limits or limits set by the user.

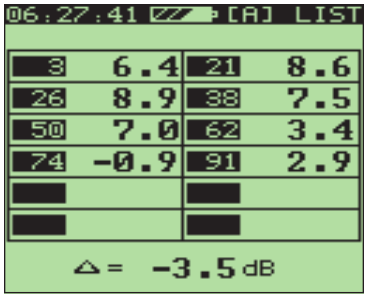
Reverse and Forward Spectrum Analysis

The Model Two can:

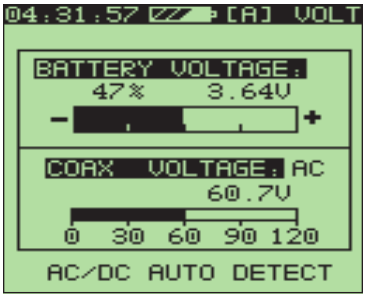
- Scan for ingress at ground blocks, down to -40 dBmV
- Scan the full forward spectrum to detect spurious and ingress
- Identify frequencies using the marker function

Model Two

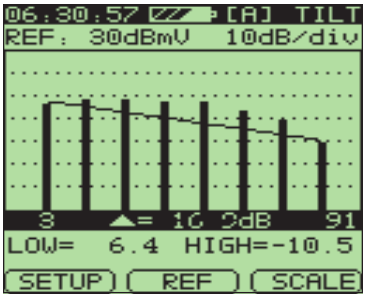
Signal Level Meter



Display favorite channels and tilt in tabular form

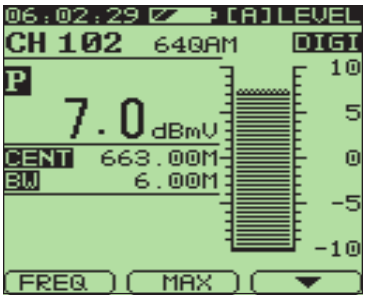


Measure up to 100 Volts, AC/DC

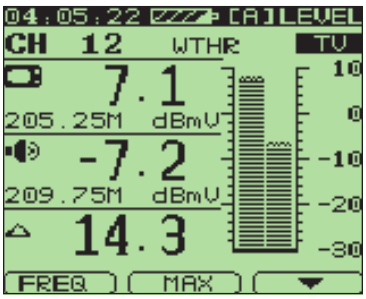


Display favorite channels and tilt as a graph

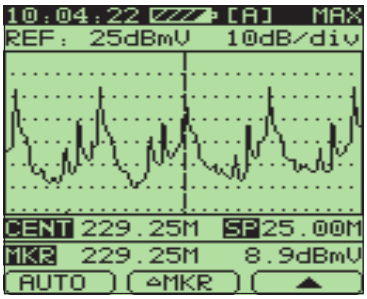
Simple, intuitive set-up screens



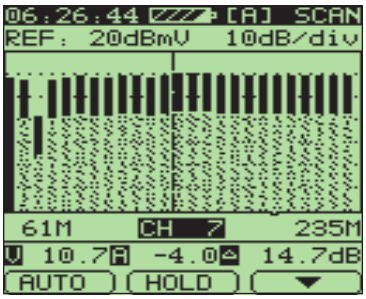
QAM Power available in numeric (shown) or graphic displays



Single channel display, with Δ V/A delta



Display RF spectra from 5 to 870 MHz



Scan all channels, and zoom in with five levels of magnification

Model Two

Signal Level Meter

SPECIFICATIONS

Frequency

Frequency Range	5 MHz to 870 MHz
Accuracy	±50 ppm (20° C ± 5°)
Resolution	10 KHz

Channel Type

Analog TV	TV
Digital TV	QAM, QPSK
FM Channel	Single frequency, dual audio channels

Level Measurement

Range	-30 dBmV to +60 dBmV (30 dBµV to 120 dBµV)
Accuracy (> -25 dBmV or 35 dBµV)	**Level:** ±1.5 dB, 10° to 30° C (50° to 86° F) ±3 dB, -10° to +40° C (14° to 104° F) **Scan:** ±2 dB, 10° to 30° C (50° to 86° F)
Resolution	0.1 dB
Input Impedance	75 Ω (unbalanced, BNC or F-type connector)
Number of Channels	150 channels max
Scanning Speed	2.75 channels / sec
Scale	1, 2, 5, 10 dB/div
Zoom	(5) levels of magnification (1x, 2x, 3x, 4x, or 5x) or full channel plan scan

Frequency Spectrum

Bandwidth	2.5 MHz, 6.25 MHz, 12.5 MHz, 25 MHz, 62.5 MHz, and full span
Scale	1, 2, 5, 10 dB/div

Digital Channel Power (Average)

Bandwidth	0.28 to 9.99 MHz
Center Frequency	5 MHz (plus ½ channel bandwidth) to 870 MHz (minus ½ channel bandwidth)
Digital Modulation	QAM, QPSK

Tilt Measurement

Number of Channels	4 to 12
Resolution	0.1 dB

Limit Test Parameters (any of the following may be enabled)

Min Video	-20 to 59 dBmV (40 to 119 dBµV)
Max Video	-19 to 60 dBmV (41 to 120 dBµV)
Max Δ Video	2 to 30 dB
Min Δ V/A	0 to 15 dB
Max Δ V/A	5 to 30 dB
Max Δ ADJ	0 to 20 dB
24-Hour Video Dev.	0 to 20 dB

Auto Test

Auto-test up to seven auto-test programs, each composed of any combination of level, tilt, spectrum, and limit.

Time Intervals	1 to 23 hours
Test Times	1 to 10 times

Test data storage: up to 35 complete scan files (150 channels max) or 25 complete limit test files (150 channels max); less if other files (level, tilt, spectrum) are saved.

Model Two

Signal Level Meter

Trunk Voltage Measurement

Input Range	1.2 to 100 VAC, 1.0 to 100 VDC
Accuracy	±1 V
Resolution	0.1 V

Other

Communication Port	RS-232C
Audio Output	Built-in speaker
Dimensions (H x W x D)	8.58” x 3.74” x 1.93” (218 mm x 95 mm x 49 mm) (excludes belt clip and RF connector)
Weight	1.45 lbs (658 g)
Display	128 x 128 LCD with backlight

Power Supply

Battery	3.6 V, 3.5 AH NiMH battery
Charger	AC 100 to 240 V, 50/60 Hz, 1.8A 7 VDC (max) *
Work Time	Average 6 to 8 hours (full charge)
Charge Time	Less than 3 hours

*Only the Trilithic charger with internal charging circuitry may be used (P/N 0610165000).

INCLUDES THE FOLLOWING:

5 to 870 MHz signal level meter
P/N 2010967000

Protective rubber bumper

Carrying case

Shoulder strap

AC battery charger

User’s manual

OPTIONAL ACCESSORIES:

CC-17 protective sleeve
P/N 2130856000

CC-18 holster with belt loop
P/N 2130854000

RELATED PRODUCTS:

CL-6 vehicle power adapter
P/N 2071483000

ToolBox software (includes I/O-11 PC data cable)
P/N 0930089000

I/O-11 PC data cable
P/N 2071351000

I/O-15 precision RF coaxial test cable
P/N 2071527048

ToolBox

Companion software for the Model Two

- Configure Your Model Two Meters
- Upload Data Log Records From Your Meters
- Save Records and View Data Logs Using Multiple Databases
- View and Print Data Logs in Text or Graphic Format
- Perform and Save Meter Measurements Via a PC

Trilithic's ToolBox™ support software for the Model Two™ signal level meter offers a range of functions that make your meters more versatile and easier to use.

With ToolBox software, the operator can configure meters, upload recorded data to multiple databases, and view data files from a wide variety of tests, including: level, tilt, spectrum, channel scan, limit test, and auto test measurements.

Easy to Set Up

Using ToolBox, you can develop and store SLM settings profiles, specifying measurement units, channel plans, modulation types, and other signal level meter parameters. These can then be retrieved and conveniently downloaded to all of your Model Twos to ensure their consistent operation. You can also upload and store the settings of one Model Two, then download them into other Model Twos.

Flexibility

The ToolBox software includes a set of functions for uploading measurement data records from Model Twos for storage and for displaying their contents. Using the database manager functions, you can construct multiple named databases that match the geography of your system, division of responsibilities, or any other criteria that you may choose. ToolBox's viewer functions make it simple to retrieve selected records from these databases and view them in numerical or graphical format.

ToolBox

Companion software for the Model Two

WITH THE MODEL TWO TOOLBOX SOFTWARE, YOU CAN DO THE FOLLOWING:

- **Configure your Model Twos**
  While the Model Two is completely configurable as a standalone unit, you can use the ToolBox to create and modify channel plans, set limits for Limit scan mode, choose units of measure, and set time and date. This feature is particularly useful if you are using several Model Twos in your organization and want to create and maintain standard configurations for all of them.
- **Upload data log records from your Model Two**
  You can upload information stored in the Model Two to the ToolBox software for processing or storage.
- **Save records to one or more databases**
  Uploaded information can be stored in one or more databases, making it easier to group data for analysis in several different ways.
- **View data logs from one or more databases**
  Once information from the Model Two has been stored, you can look at uploaded data logs from a variety of databases. This allows you to examine a single database or multiple databases to analyze and correlate information.
- **View and print one or more data logs in text or graphic format**
  The Model Two ToolBox software can display and print analyses in text or graphic format for maximum effectiveness.
- **Operate and save measurements made with your Model Two via the PC**
  The remote operation features let you connect a Model Two to a PC and then remotely control the unit. Information gathered by the Model Two can then be saved or printed.

SYSTEM REQUIREMENTS

To operate the ToolBox software, the following hardware is required:

- 200 MHz Pentium-II processor
- 64 MB RAM
- 100 MB free disk space
- Windows 98 (or 98SE), Me, NT 4.0, 2000, or XP
- Color monitor running at 256 colors or higher, 1024 x 768 screen resolution
- Windows-compatible mouse
- Trilithic Model Two serial cable (included with the ToolBox software)