Enabling Australia's Field Technicians to build, troubleshoot and maintain better communications networks.

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FREECALL 1800 680 680

CLI-1450 / CLI-1750

Combination Signal Level/Leakage Meters

- *Frequency agile leakage detection and measurement*

- *Headend video tagging option differentiates leaks in over-build situations*

- *Vehicle docking station option for quick vehicle antenna and powering connections*

- *Combination signal level and leakage meter, all in one box*

- *95% of all forward and reverse ingress and interference is located in the distribution and home network. Advanced ingress spectrum scan helps you locate the source fast and easy*

- *The HD-1 antenna combined with "Find & Fix" firmware version 6 or higher and advanced tagging capabilities provides the most comprehensive leakage test system available.*

- *User-friendly icon-based user interface used throughout the entire WWG product line; multi-language operator screens available*

- *Complete digital measurement solution for DTV and cable modem signals. digiCheck™ average power measurement including auto limit check*

Finding the Egress Helps Find and Fix the Ingress

RF signals leaking out of your system can also indicate RF signals leaking in. Repairing any potential points of ingress/egress will reduce or eliminate unwanted incoming and outgoing interfering RF signals. This not only translates to compliance with government or system leakage (egress) regulation, but also translates to reducing ingress noise that can affect reverse path services.

WWG has embraced the "Find and Fix" concept in the design of the CLI-1450 and CLI-1750 Combination Signal Level and Leakage Meter along with the HD-1 directional dipole antenna. With the HD-1 antenna and the firmware version 6 or higher, technicians can quickly identify and locate leakage sources. The Ingress Scan feature identifies ingress problems from the tap to the drop. In addition, the same reliable signal level meter functions found in the MicroStealth are in the CLI products, eliminating the need to carry multiple meters.

Faster "Find and Fix"

The CLI design enables installers to do their jobs faster and easier. First, all meters are lightweight and easy to carry, yet durable and water-resistant. Second, all have a user-friendly, icon-based user-interface. The simple icons are used in all CLI meters, and all other WWG field meters. This means less training and less downtime for field techs & installers. Finally, the user interface is also available in international languages, allowing for ease of use throughout the world.

Directional Hand-held Antenna HD-1.
The handheld dipole antenna improves the directionality and accuracy of pinpointing the leakage source. The HD-1 increases the CLI instrument sensitivity compared to the near field probe antenna. The HD-1's directivity dynamic range is approximately 10-20dB in an outside environment and approximately 5-10 dB in an indoor environment. It is easier to train new technical

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staff to understand and operate the CLI System because they will get significantly more directionality with the HD-1 and firmware V. 6.0 or higher. This hand-held dipole antenna picks up RF energy in a directional pattern. This pattern gives directionality that is crucial in locating leaks. With the PL-1 adjustable 10-ft. (3 m) pole and adapter the HD-1 can be used for calibrated leaks and FCC/CENELEC conformance testing.

Leakage Measurement. The flexible configuration menu allows customization of all leakage parameters. Frequency agility lets the user select any test signal from 115-140 MHz. Leakage alert threshold limits can be set for system or regulatory standards. Visual and audible alarms can be enabled to alert the operator when threshold limits are exceeded. When used with the **LT1000 Leakage Tagger,** a special tag alarm can be programmed for use in overbuild situations.
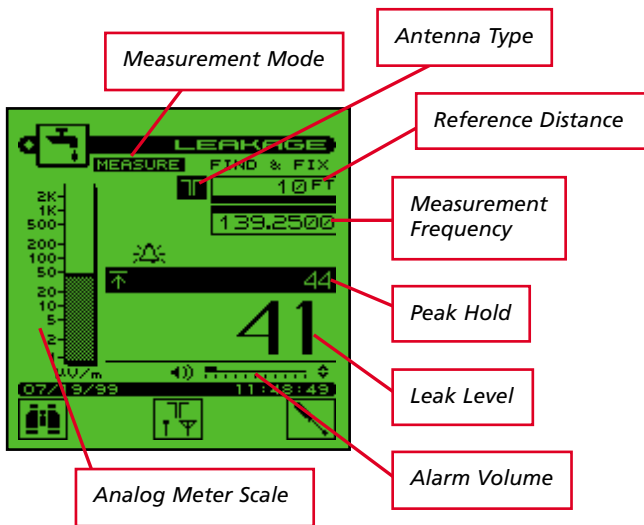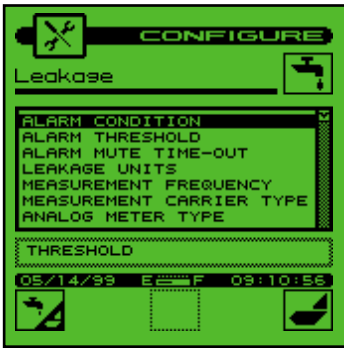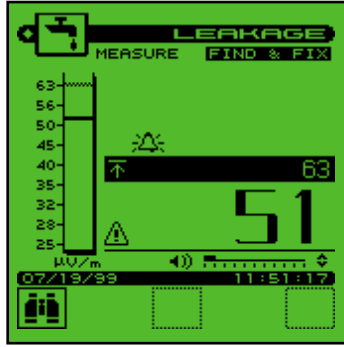
This fast mode is used for drop-to-subscriber and inside the home applications. The fast Find & Fix Mode assists in quickly guiding the technician towards the leak source. The large numeric readout is able to quickly update the leakage signal strength. The graph will do an auto rescale in the "find and fix" mode providing a graphical view of the leak response.

LT-1000 Leakage Tagger. The distinctive signal tagging from the LT-1000 assures the technician that detected leaks are not being generated from competing systems in overbuild situations. The Leakage Tagger modulates the video signal under test at user programmable rates, and improves detection sensitivity in noisy environments.

Ingress Scan. The innovative ingress scan mode finds forward and reverse ingress problems from the tap to the drop. Start/stop frequencies, resolution, and dwell time are programmable in the set-up menu. The operator can also set a limit threshold for simple identification of problem drops. To check for intermittent ingress, the meter can be adjusted to the peak hold mode to capture transient signals. Ingress scan displays can be saved for later printing or uploading to StealthWare software.

Testing the reverse path spectrum for sub-band signals being generated in the drop system improves the effectiveness of finding ingress sources and common path distortions.
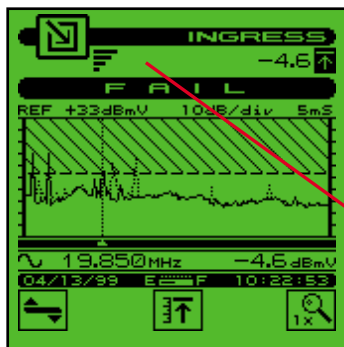
A display of the spectrum with clear pre-set limits allows the installer to easily identify ingress. All intermittent ingress is detected through flexible dwell-time setup.

Intermittent ingress captured by peak hold.

Measurement Mode

Antenna Type

Reference Distance

Measurement Frequency

Peak Hold

Leak Level

Alarm Volume

Analog Meter Scale

The Measurement Mode is used for "ride-out" driving applications, calibrated leaks, and FCC/CENELEC testing. A numeric readout and audible alarm quickly alert the user when leakage threshold limits have been exceeded. The leakage measurment is performed on active (unscambled) video carriers. This mode is more accurate but less sensitive than the Find & Fix mode.

Frequency Range	CLI-1450	CLI-1750
Standard Frequency Range	45-550 MHz	5-890 MHz
Optional Frequency Range	5-890 MHz	N/A

Level Measurement. CLI products provide a comprehensive single-channel display and a multi-channel display with pass/fail indicators. This quickly and clearly indicates if all channels are being received at the subscriber's drop at appropriate system design levels.

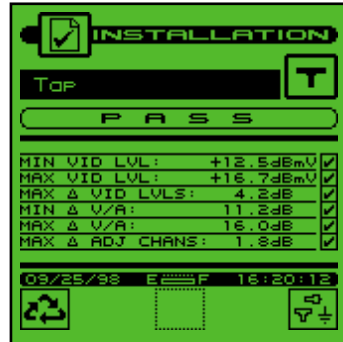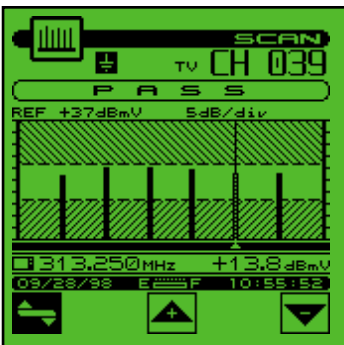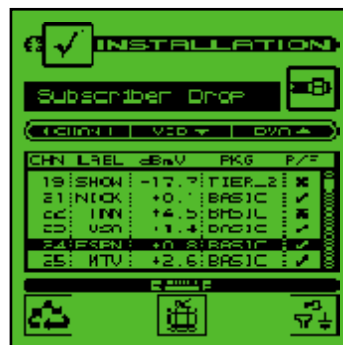**Installation Check.** Pressing the "✓" key provides an installation status check which allows users to verify that all levels are within user-defined limits. Up to four different limits can be configured: tap, ground block, subscriber drop, and custom. This feature can be used to determine if a subscriber connection meets cable networks or government specifications.

```
            LEVEL
 MTV
 DUAL   CH  078
+5       547.250MHz
+0           -12.0 dBmV
-5
-10      551.750MHz
-15          -18.7 dBmV
-20
-25      Δ  +6.7 dB
-30
-35      552.250MHz
             -28.1 dBmV
             ---.- dB
04/13/99  E====F  09:50:00
```

The single channel display shows the video and audio carrier levels and the difference between levels. Compatible with dual sound and NICAM.

```
            INSTALLATION
Tap                          T

      P  A  S  S

MIN VID LVL:       +12.5dBmV ✓
MAX VID LVL:       +16.7dBmV ✓
MAX Δ VID LVLS:       4.2dB  ✓
MIN Δ V/A:           11.2dB  ✓
MAX Δ V/A:           16.0dB  ✓
MAX Δ ADJ CHANS:      1.8dB  ✓

09/25/98  E====F  16:20:12
```

The results are displayed in a list indicating which parameters are out of tolerance. If all levels are within limits, a "✓" will be in the right far column. If any parameter is out of tolerance an "x" will be shown.

```
            SCAN
          TV  CH  039
      P  A  S  S
REF +37dBmV    5dB/div



313.250MHz    +13.8dBmV
09/28/98  E====F  10:55:52
```

The six-channel scan shows six different user-defined video carriers, with pass/fail indicator for user-defined limits.

```
       INSTALLATION
Subscriber Drop
  CHAN      VID     DVN
CHN LREL dBmV   PKG   P/F
19  SHOW  -17.7 TIER_2  x
21  NICK  +0.1  BASIC   ✓
22  TNN   +4.5  BASIC   x
23  USA   +1.4  BASIC   ✓
24  ESPN  +0.8  BASIC   ✓
25  MTV   +2.6  BASIC   ✓
             E====F
```

Pressing the "cycle" soft key provides more detail by bringing up a list of all channels. Passing channels have a "✓" in the right hand column.

```
            SCAN
       MTV
       DUAL  CH  078
REF +21dBmV   5dB/div    1x




MIN VID LVL:    -14.7dBmV  x
MAX Δ VID LVLS: 26.3dB     x
MIN Δ V/A:      NO AUDIO   x
MAX Δ V/A:      NO AUDIO   x
MAX Δ ADJ CHANS:22.5dB     x
04/13/99  E====F  09:41:32
```

*The Full Scan display shows all user-defined video carriers. The unique limit check feature quickly checks the results against user-defined analog **and** digital limits.*

```
       INSTALLATION
Subscriber Drop
  CHAN

         MTV
         DUAL  CH  002

  55.250MHz     +4.6dBmV
  59.750MHz     -5.8dBmV
  60.750MHz     -6.5dBmV

04/13/99  E====F  11:05:10
```
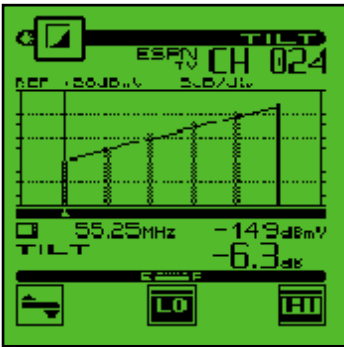
Pressing the "cycle" soft key provides a detailed view of what specific error is on the specific channel.

These results can be printed or downloaded into the PC for report generation using StealthWare™ Data Analysis Software.

Tilt Mode. Tilt measurement is a fast and effective method to balance line extenders and in-home amplifiers.

The tilt display provides a display of six channels that updates in less than a second.

Auto Test. To certify that the network termination and home network are within the specifications, or for proof-of performance compliance data, an auto-test can be performed. Tests can be executed immediately or scheduled over a period of time. When configuring an Auto Test, you can record information about the location at which the test is being performed. Files can be created for commonly tested locations so you need only enter the information once. You can print a test report for each interval, or a comprehensive 24 hour report that summarizes data collected from up to four intervals.

Auto Test results are time, date, and temperature stamped and can be stored, viewed, printed, or uploaded to StealthWare™ software.

Customized Channel Plans
Channel plans can be built, stored, and edited. This is convenient if you use the meter for more than one plant. You can quickly selelct the correct channel plan at which you are working. It's only necessary to build a chennel plan once. A "cloning" funtion makes it possible to easily transfer channel plans from one field instrument to the other. StealthWare™ software enables you to upload and download channel plans from your PC to the meter.
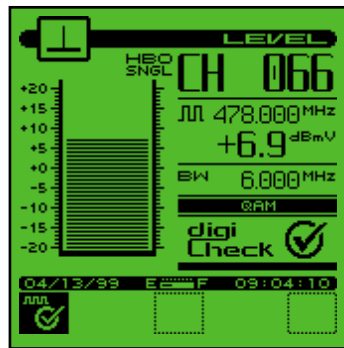
digiCheck™ Digital Signal Measurement.
Making accurate digital average power and performance measurements are addressed with the digiCheck™ measurement function. The digiCheck™ average power measurement takes small slices of the integrated RF-energy, summing them together to provide one total power reading. It takes into account the channel flatness of the digital carrier itself.
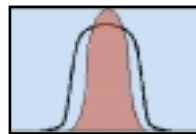

*Digital-TV and forward cable modem signal*

The digiCheck™ method of measuring the total integrated RF-power under the haystack is very reliable and accurate. All level readings are fully compensated for by the correct occupied bandwidth.

"Small-band" digital signals are like cable telephone carriers.

"Small-band" digital carriers, like cable telephony, require a different measurement technique. For that purpose, the digiCheck™ feature offers a time average as well. Even in this case, all level readings are fully compensated for by the correct occupied bandwidth.
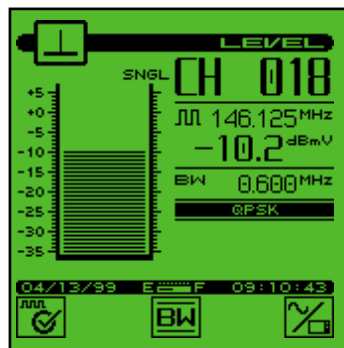
- *Single Channel Display and Six Channel Scan have Pass/Fail indicators for quick performance*

- *Installation Check: ensures FCC and CEN-ELEC compliance, reducing subscriber call-backs*

- *Scan Mode: shows all channel levels at once, graphically identifying problems quickly and easily*

- *Channel Plans: can be stored, built, edited*

- *Ingress Scan Mode: allows users to find forward and reverse ingress problems from the tap to the drop*

- *digiCheck™ Digital Signal Measurement: measures DVB, Digital TV, Cable Modem, Internet, and Telephony on-cable services*

- *International Languages: available on the LCD screen allowing the user to learn and read the meter in their local language:*
  - *~ Portuguese*
  - *~ Italian*
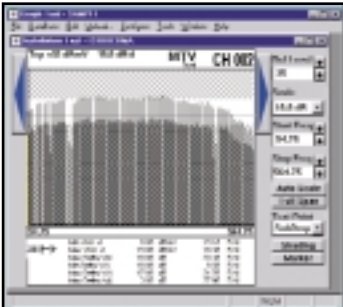 - *~ Spanish*
  - *~ German*
  - *~ French*
  - *~ Dutch*

Digital and Analog Limits. Cable networks have analog and digital carriers. The levels of analog and digital signal measurements are different according to standards and regulations. Digital signals are typically 6-14 dB below analog signals. Users can enter minimum and maximum digital channel level limits separately from analog limits. Scan Mode, Installation Check, and Auto Test will accurately measure both digital and analog signals. This allows easy identification of the pass/fail condition of both channel limits sets.


Limit sets for analog channels and a limit set for digital channels.

StealthWare™ Software: Signal level measurments can be uploaded for storing, viewing, and printing. StealthWare™ allows you to build channel plans and test locations which can be downloaded to the field meter.

Multi-Lingual LCD Screen. The user interface is now fully converted in the international language requested: French, Portuguese, German, Spanish, Italian, and Dutch.
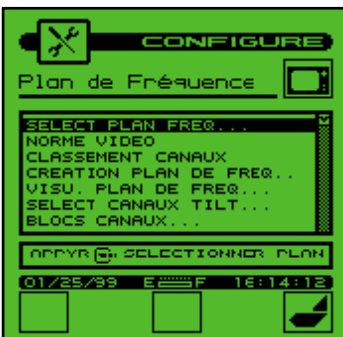
Mini-Sweep and Fault Locator. When paired with the CLI-1750, the optional model LST-1700 Transmitter adds 5-862 MHz Mini-Sweep and FDR Fault Locator for qualifying in-home wiring. The CLI-1450 can be upgraded for full compatibility with the LST-1700.

Ordering Information

Options and Accessories

Model CLI-1450 / CLI-1750

Includes a battery cartridge, one charger/AC adapter, a HD-1 handheld dipole antenna (includes 4 ft. [1.2 m] cable), operating manual, and "Monitoring and Measuring Signal Leakage" Booklet.

LT1000:	Leakage tagger differentiates leaks in overbuilt systems, increases detection range, and limits false alarms
HD-1:	Hand-held dipole antenna (with 4 ft. [1.2 m] cable included)
PL-1:	Adjustable 10 ft. (3 m) pole with HD-1 adapter (for calibrated leaks and FCC/CENELEC testing) including 12 ft. (4 m) BNC-cable
DS-1:	Vehicle mount "Docking Station" for quick antenna and auxiliary power connection in vehicle
DS-ARM:	Adjustable arm mount for docking station to enable viewing of display from driver's seat
VMA-3:	Magnetic vehicle mount 1/4λ whip antenna
MBC-4:	4-bay battery cartridge charger (CE compliant)
MSCLI Printer:	Portable serial thermal fusion printer kit
StealthWare:	Data management and analysis software (includes 1019-00-0469, CLI to PC cable)
CLI Bag:	Durable padded carrying case that fits in the docking station, with storage area for HD-1
1019-00-0479:	Battery cartridge
4010-00-0119:	Charger/Adapter, 120VAC to 12VDC
1019-00-0554:	European Charger/Adapter (CE Compliant)
1019-00-0558:	Charger/Adapter universal input, 12VDC output
1019-00-0557:	Cigarette lighter adapter
1019-00-0467:	MSCLI printer cable
1019-00-0468:	Generic serial printer cable; CLI to 25 pin male connector
1019-00-0469:	CLI to PC cable
1019-00-0470:	RS232 interconnect cable (included with LST1700)
1217-50-0216:	4 ft. (1.2 m) BNC-cable for HD-1
3010-16-0028:	Replacement HD-1 antenna elements
6510-60-0001:	"Monitoring and Measuring RF Signal Leakage" booklet
	"Monitoring and Measuring RF Signal Leakage" interactive CD training

Frequency
Range CLI-1450 . . . . 45 to 559 MHz
. . . . 45 to 890 MHz option
. . . . 5 to 45 MHz sub-band option
Range CLI-1750 . . . . 5 to 890 MHz
Accuracy. . . . . 10 ppm @ 25°C (77°F);
. . . . 20 ppm over temp.
Tuning Resolution. . . . . 25 kHz

Level Measurement
Range . . . . -20 to +50 dBmV
Resolution . . . . 0.1 dB
Accuracy . . . . ±0.75 dB Flatness,
. . . . ±0.75 dB Linearity @ 25°C (77°F)
Digital Average Power (optional) . . . . ± 2.0 dB (typical)

Scan Mode
Number of Channels 120
Scan Rate . . . . Approximately 6 carriers/second

Leakage Mode
Level Measurement
Input Sensitivity (with HD-1 dipole or VMA-3 mag mount)
Video Detection . . . . From 1 µV with LT1000
. . . . Leakage Tagger activated
. . . . (121 to 133.2625 MHz).
CW Detection . . . . From 0.5 µV typical with LT1000
. . . . Leakage Tagger activated
. . . . (121 to 133.2625 MHz).
Measurement . . . . From 1.4 µV (115 to 140 MHz).

Range. . . . . 0.5 to 2,000 µV (at input connector)
Accuracy
Measurement . . . . ±1.5 dB @ 25°C (77°F)
Find & Fix. ±2.25 dB @ 25°C (77°F)
Tuning Carrier
Frequency Range . . . . 115 to 140 MHz range (Video)
Accuracy. . . . . 10 ppm @ 25°C (77°F);
. . . . 20 ppm over temp.
Resolution . . . . 25 kHz
Tagger modulation for leakage . . . . Modulation frequency
. . . . 5 to 25 Hz

General
Dimensions. . . . . 4.25" (W) x 10" (H) x 2.5" (D)
Weight. . . . . 1.3 kg (2.9 lb.)
Operating
Temp. Range. . . . . -10 to +50°C (14 to 122°F);
. . . . ±3 dB drift, -10 to +50°C
Water Resistance. . . . . Meets or exceeds MIL-STD-810D
. . . . (Method 506.2)

Power
Battery Life . . . . 2.25 hours continuous (backlight off)
. . . . . . 2.25 hours continuous (backlight off) in leakage mode
. . . . replaceable battery cartridge
Charge Time . . . . 3 hour charge with unit "off"

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