User Guide

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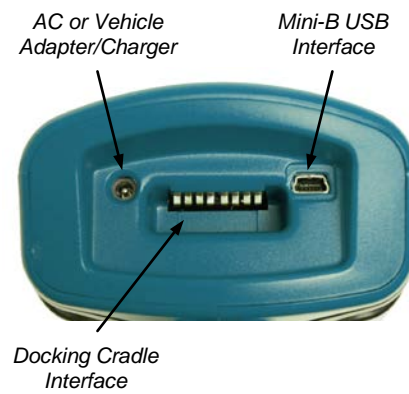
Introduction

The ComSonics' QAM Sniffer is a system which allows detection of CATV leakage in an all-digital system without reserving any bandwidth for a discrete leakage carrier.

- It is a CATV leakage detection system made up of two parts. The first part is a QAM Marker signal source which is installed at a headend or hub of a CATV system. The second part is the handheld/mobile QAM Sniffer unit.

- The QAM Sniffer unit is a handheld cable leakage detector with vehicle mounting capability. It is an attractive and easy to use tool. Five buttons on the display panel and a multifunction trigger type control, integrated into the handle, blend with the ergonomic contours of the device. The buttons allow control of the settings needed in normal use, such as; power, operational functions, backlight, and the loudness of our famous historic Sniffer warble tone. The unit has a built-in folding dipole antenna for handheld use.

- The QAM Sniffer unit uses sophisticated methods to detect and measure marker signal leaks within the CATV system. It can differentiate a true leak from general noise or signals originated by another marker in a co-located CATV system.

- The QAM Marker signal source, typically centered at 612 MHz, uses a unique modulation frequency for each CATV system to allow the QAM Sniffer units to detect leaks only from the CATV system to which they are matched. The QAM Marker source can be configured differently for up to three CATV systems in an overbuild area to distinguish leaks between the CATV systems. The QAM Sniffer units must be configured to match the appropriate marker signal source.

A Docking Cradle is available for use in a vehicle. With the Docking Cradle, the unit is powered from the vehicle and receives leakage signals from an external antenna. It also provides connections to a GeoSniffer Nexus Data Acquisition Unit.

A PC based Configuration Utility Application is available, as a download, to customize the QAM Sniffer to system specific parameters. A standard USB to mini-B communications cable is required (not supplied).

Unpacking - The QAM Sniffer, its charger, and any ordered accessories are included in a shipping container designed to provide the maximum protection during shipment. Upon receipt, inspect the container and contents for signs of physical damage. Notify the freight forwarder of any damage detected.

Battery Care - An internal Lithium Ion (Li-Ion) rechargeable battery pack powers the QAM Sniffer. Charge the battery for a minimum of 3 hours, especially before using for the first time. Make sure the QAM Sniffer is powered off to fully charge the battery. The QAM Sniffer automatically powers off when the charge condition is low to protect the battery from excessive discharge. Charge status is only available when the QAM Sniffer is powered on.

Caution! Failure to properly charge the battery may result in reduced battery life. Only use the included AC Charger, the Docking Cradle, or the Vehicle Charger to charge the QAM Sniffer. Use of other AC adapters or chargers may cause equipment failure, create a safety hazard, and void the warranty.

See the ComSonics publication titled *Rechargeable Batteries & Getting the Most from Them* for more information on battery maintenance.

General Operation

The QAM Sniffer display panel is equipped with five function buttons. Press the Power button momentarily to turn the receiver on or off. To change a function setting, press the desired button and select a setting with the Trigger Control, in the handle, by using a trigger up or trigger down action. The selected setting is activated 3 seconds after the last button press. The Trigger is the audio volume control when no other user setup function is active. A single press of the trigger or any function button activates the backlight for 10 seconds.
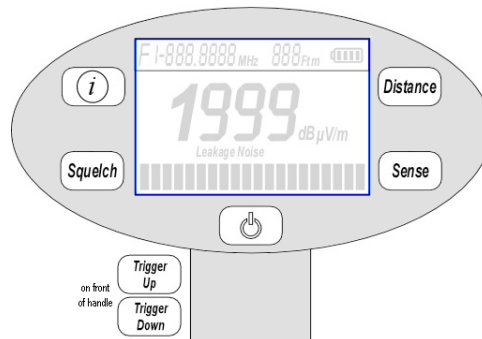
Audio Volume Control - trigger up to step the audio volume from the current setting up to step 5. Trigger down to step from the current setting down to step 0. The available steps are: 0 (audio off), 1, 2, 3*, 4, and 5 (maximum). The audio volume control is enabled only when no other setup function is active. The volume step is displayed temporarily in place of the distance setting.

i **Button -** (not implemented)

Squelch - Trigger up to cycle the squelch level from the current setting through the choices of: 0 µV/m (audio always on), 5 µV/m, 10 µV/m, 20 µV/m, 50 µV/m*, 100 µV/m, and 1999 µV/m (audio always off). Trigger down reverses the sequence. The Squelch setting is displayed temporarily in place of the level reading. Note: Equivalent Squelch level steps are used for other 'Units of Measure' settings.

Distance - Trigger up to cycle the distance setting from the current setting through the choices of: 1 foot, 10 feet*, 30 feet, 75 feet, and 150 feet. Trigger down reverses the sequence. Note: Equivalent Distance settings are used for meters.

Sense - Trigger up to cycle the bar graph sensitivity from the current setting through the choices of: x1* (1999 µV/m full scale), x10 (200 µV/m full scale), x20 (100 µV/m full scale). Trigger down reverses the sequence. The Sense setting is displayed temporarily in place of the level reading as: r1*, r10, or r20. Note: Equivalent scale ranges for other 'Units of Measure' settings.

Auto Power Off - The QAM Sniffer automatically powers off 30 minutes after the last button or trigger press. See the Vehicle Docking Cradle section for operation when docked.

Notes:
  The trigger function reverts to audio volume control 3 seconds after the last button press.
  The QAM Sniffer powers on in same functional state as when powered off.

* Factory default setting.

Display Panel

The Display Panel provides information on the marker, frequency, distance setting, battery charge, signal level, units-of-measure, signal type, and relative signal level.
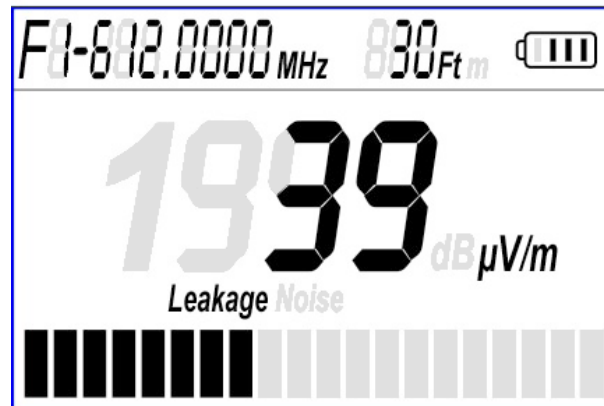
Marker Identifier - F1 - 612.0000 MHz is the standard marker (F1) and frequency (612 MHz) for monitoring QAM Marker leakage signals. The marker F1, F2, or F3 (default F1) and the frequency can be changed with the Configuration Utility Application. The QAM Sniffer marker setting (F1, F2, F3) must correspond to the Marker Identifier setting on the headend QAM Marker signal source (F1 for 1, F2 for 2, F3 for 3).

Distance - The distance compensation setting adjusts the signal level reading to approximate the equivalency of the measurement being made at a distance of 10 feet (3 meters). Press the Distance button and use the trigger to set the distance to a value correlating to the actual distance to the leakage source. The units-of-measure for distance is factory set to Feet. The Distance units can be changed to Meters with the Configuration Utility Application.

Battery Level - A fully charged battery is indicated by 4 bars. Each bar represents approximately 20% capacity along with the battery outline as the 'very low' charge indicator. The audio is muted when the battery outline begins to flash. The unit automatically powers off when the battery is low to prevent damage to the battery pack.

Signal Level - The signal level reading is the intensity of the received signal based on the distance setting. The units-of-measure for signal level is factory set to µV/m. The level units can be changed to dBµV/m or dBµV with the Configuration Utility Application.

Signal Validation - The QAM Sniffer contains methods to validate the received signal to be leakage or noise. *Leakage* is displayed if the received signal is the QAM Marker signal or *Noise* is displayed if the received signal is of a broad spectrum nature.

Bar Graph - The bar graph indicator displays the relative signal strength based on the current sensitivity setting for full scale of 100, 200, or 1999 µV/m. The indicator operates in a peak hold mode and resets the peak indication at pre-determined intervals. The peak hold reset interval is factory set at 1 second. The reset interval can be changed (0 to 60 seconds) with the Configuration Utility Application. Equivalent scale ranges are used for other units-of-measure.

Note: A battery fault condition is indicated, when charging, by the entire battery symbol flashing. Replace the battery or return the unit for repair.

Field Use Setup

The QAM Sniffer delivers optimum performance when the following settings and functions are tailored to the current measurement environment.

Distance Setting	*Squelch Setting*
Sensitivity Setting	*Audio Volume Setting*
Frequency	*Mode*

Distance Setting - The distance setting is designed to simulate typical distances encountered in cable leakage measurements: 10 feet is the normal distance, 30 feet is for street-to-suspended cable, 75 feet is for street-to-home, and 150 feet is for street-to-back easement. The distance setting changes the level reading and the bar graph to compensate for user to leak distances greater than the normal 10 feet but does not change the receiver's basic sensitivity. For example, if the level reading is 20 µV/m with the distance setting at 10 feet and the distance setting is changed to 30 feet, the level reading will then be 60 µV/m. If the distance setting is changed to 75 feet, the level reading will then be 150 µV/m. If the distance setting is changed to 150 feet, the level reading will then be 300 µV/m. The proper setting for the distance is the setting that matches closest the actual distance between the user and the leakage point. The level reading will then be approximate what it would be if the user was 10 feet from the leakage point.

For locating extremely high leakage levels, the 1 foot setting (uncalibrated) can be used.

Squelch Setting - The squelch setting determines the minimum displayed signal level required for the receiver to produce an audible warble tone. At squelch settings other than 0 or 1999 µV/m, the *Leakage* label must be on before the warble tone sounds. Selections for normal operation are: 5, 10, 20, 50, or 100 µV/m. Select 0 µV/m for audio always on or 1999 µV/m for audio always off. Press the Squelch button to review the current squelch setting.

Note: If the squelch is set for audio always off (1999 µV/m) and the displayed *Leakage* level shows 1999, the QAM Sniffer will turn on the warble tone.

Sensitivity Setting - The sensitivity setting changes the scale range of the bar graph display and the relative audio level. Setting x1 has the largest dynamic range of 2 to 1999 µV/m. Setting x10 has a range of 2 to 200 µV/m and setting x20 has a range of 2 to 100 µV/m. Select a setting that optimizes the visible movement of the bar graph and the audio warble loudness. Press the Sense button to review the current sensitivity setting. The sensitivity setting is displayed temporarily in place of the level reading as: r1, r10, or r20.

Audio Volume Setting - At signal levels greater than the Squelch Setting, the QAM Sniffer produces an audible warble tone when *Leakage* is indicated. The warble tone varies in loudness according to the volume setting and the bar graph indication. Use the Trigger Control, when no other setup function is active, to select a setting to optimize the warble loudness with variations in signal level.

Built-in Antenna

Handheld Operation
Unfold both antenna elements perpendicular to the body of the QAM Sniffer.
Maximum signal reception is from the front, back, top and bottom of the unit.
Minimum signal reception is from the right and left sides of the unit; the ends of the antenna elements.

antenna pattern shown for
illustrative purposes only
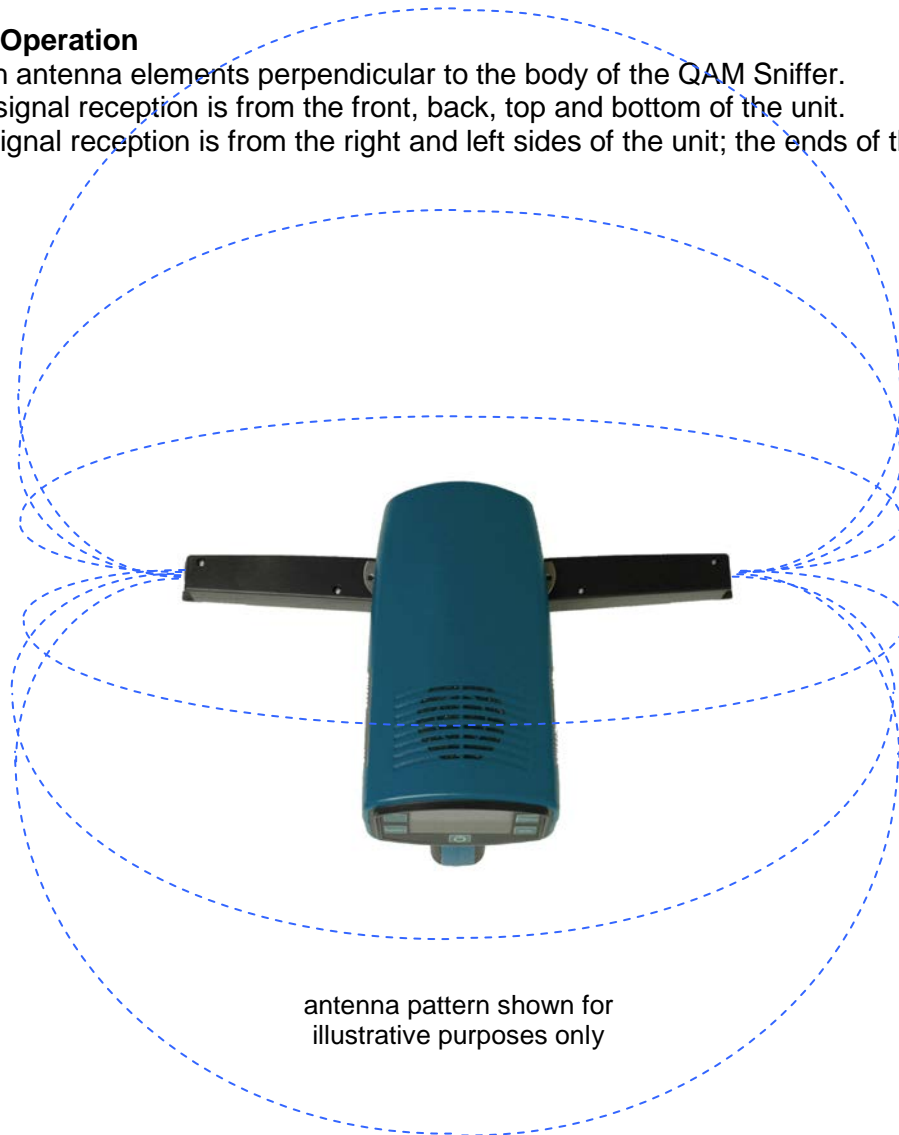
In situations requiring a near-field probe analysis, fold back both elements. This creates a narrow reception pattern to the front of the unit.
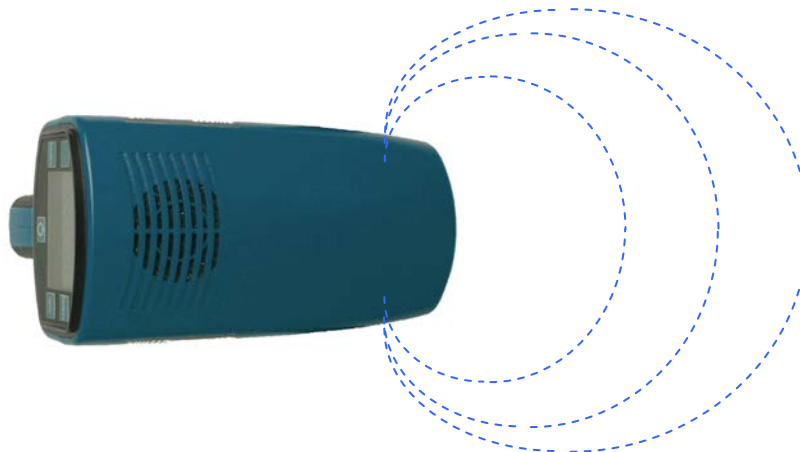
Vehicle Docking Cradle

The Docking Cradle is designed for the QAM Sniffer to be easily used in a vehicle. It provides a stable platform for holding the QAM Sniffer and features a flexible mount. Display visibility and access to the function buttons are greatly enhanced. Vehicle power is utilized for operation and battery charging. The Docking Cradle provides power to and connects the QAM Sniffer to an externally mounted vehicle antenna. It also facilitates a serial data connection to a GeoSniffer Nexus Data Acquisition Unit.

Note: The upper section of the QAM Sniffer Docking Cradle is BLUE in color. The flex and mount are BLACK in color.

Vehicle Operation - Make sure the built-in antenna elements are folded back. Gently insert the QAM Sniffer into the Docking Cradle to insure reliable operation. Press the Power button to turn the QAM Sniffer on. The back light remains on to indicate vehicle power and connection to the external vehicle antenna.

Check the proper setting for the leakage marker. Set the Distance to 30 feet for typical street-to-suspended cable areas. Set the Squelch, Sensitivity, and Audio Volume settings as needed. The vehicle speed should not exceed 30 miles per hour for optimum leakage monitoring.

When the QAM Sniffer is placed into a vehicle powered Docking Cradle, the operating mode is as follows:

- The QAM Sniffer operates from vehicle power.
- The back light is on.
- The built-in dipole antenna is automatically disconnected (internally).
- The external vehicle antenna is automatically connected.
- The internal battery pack charges from vehicle power.
- The QAM Sniffer automatically powers off 30 minutes after the vehicle is turned off if no buttons are pressed. Pressing a function button resets the 30 minute auto off timer. The docking cradle must be connected to a switched power source to enable the auto off feature *(for unit to power off 30 minutes after vehicle is turned off)*.

Vehicle Docking Cradle Installation

Mount the Docking Cradle in a convenient location, such as; the dash, floor, transmission hump, or engine cover. Secure the base to a suitable mounting surface with the supplied or other appropriate hardware.

Connect the RED lead to the vehicle (+12V) ignition or accessory fuse block circuit. Connect the BLACK lead to the vehicle ground. A safety fuse is used in the red lead.

Vehicle Antenna
Select a location for the vehicle leakage antenna away from nearby metallic objects, such as other antennas, booms, or ladders.

Note: The upper section of the QAM Sniffer Docking Cradle is BLUE in color. The flex and mount are BLACK in color.

For the magnetic base mount antenna, place it on a flat surface. Route the antenna cable flat to the vehicle to the point where it enters the vehicle. Use caution to prevent damage to the cable. Coil excess cable in a loose loop inside the vehicle. Secure the cable as needed.

For the fixed mount antenna base, follow the instructions supplied with the antenna. Use caution to prevent damage to the cable. Coil excess cable in a loose loop inside the vehicle. Secure the cable as needed.

Note: Periodically remove the magnetic base antenna to clean dust and grit from the vehicle surface and the bottom of the base to maintain performance and to reduce abrasion on the vehicle finish.

If using the QAM Sniffer with a GeoSniffer Nexus system; connect the data cable from the Data Acquisition Unit to the Docking Cradle. *(See the GeoSniffer Nexus User Guide for information on mounting, connecting, and operating the GeoSniffer Nexus system.)*
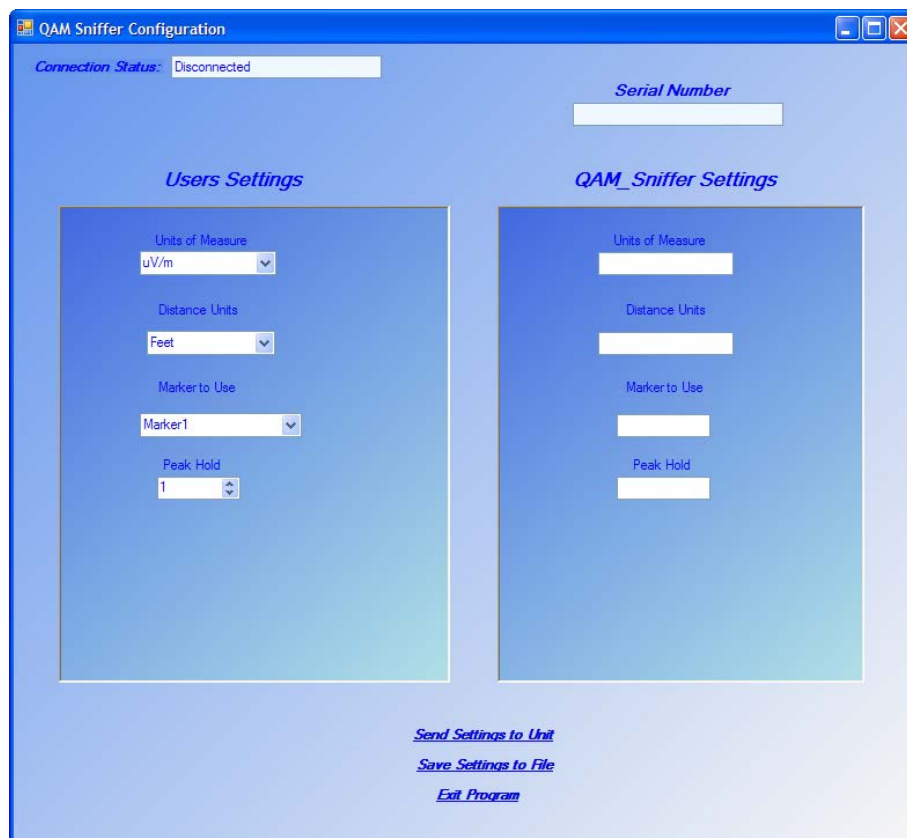
Configuration Utility Overview

The QAM Sniffer is factory configured to the settings indicated throughout this guide.
A Configuration Utility Application is used to reconfigure the QAM Sniffer. The utility application is available separately by download. The utility application requires a modern PC computer running MS Windows XP, Vista, or Windows 7; an available USB port, and a minimum display resolution of 1024 x 768. A standard USB to 5-Pin Mini-B USB cable is required (not supplied).

Configurable Functions:
- **Level Units of Measure:**
  µV/m*, dBµV/m, or dBµV
- **Distance Units of Measure:**
  feet* or meters
- **Marker to Use:**
  Marker 1: 1283 Hz*
  Marker 2: 1511 Hz
  Marker 3: 1663 Hz
- **Peak Hold Delay Reset Interval:**
  0 to 60 seconds (1 second*)

  (* Factory Default Setting)

Configuration Utility Operation

Start the Configuration Utility
Double-click the QAM Sniffer Configuration Utility desktop icon to start the application or from the Program list, select ComSonics,Inc > QamSnifferConfig.

Connect the Interface Cable
Plug the standard USB connector end of the interface cable into an available USB port on the computer. Plug the Mini-B USB connector end into the USB port on the QAM Sniffer. If the QAM Sniffer is off, press the power button. Make sure the QAM Sniffer's battery has sufficient charge or connect the AC charger when configuring the unit.

QAM Sniffer Settings
The right side panel is updated within a few seconds. The right side panel is blank without a powered QAM Sniffer connected or if there is a problem with the USB port.
Set User Settings as desired then click *Send Settings to Unit*.
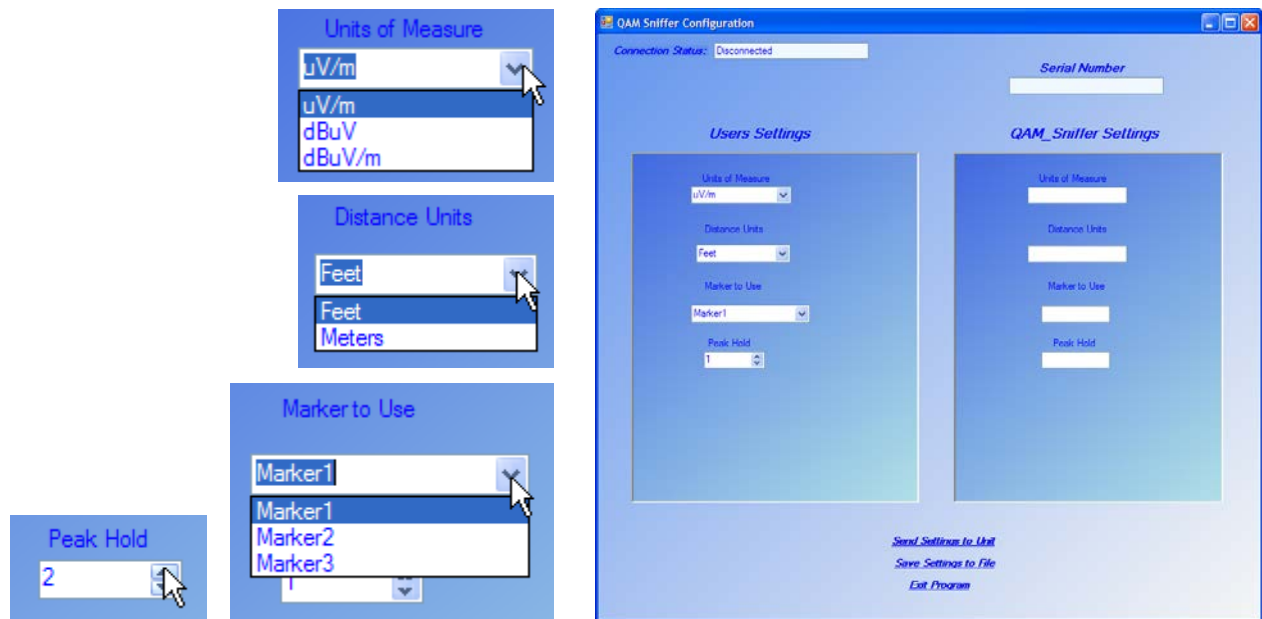
Click *Save Settings to File* to make the current settings the default.

Click *Exit Program* to close the application.

**Note:** The QAM Sniffer displays 'SEr' when connected to the computer.

Configuration Utility Installation

Important: Do not connect a QAM Sniffer to the computer before installing the utility.

(First time only.)
Install the Configuration Utility before connecting the QAM Sniffer unit.

1. Download and install the latest QAM Sniffer Configuration Utility Application.
   a. Open web browser and go to http://www.comsonics.com/downloads.shtml
   b. Download the QAM Sniffer Configuration Utility Version x.x.x.zip file.
   c. Locate the downloaded zip file and unzip the file into a known folder.
   d. Run the setup.exe file and follow the instructions.
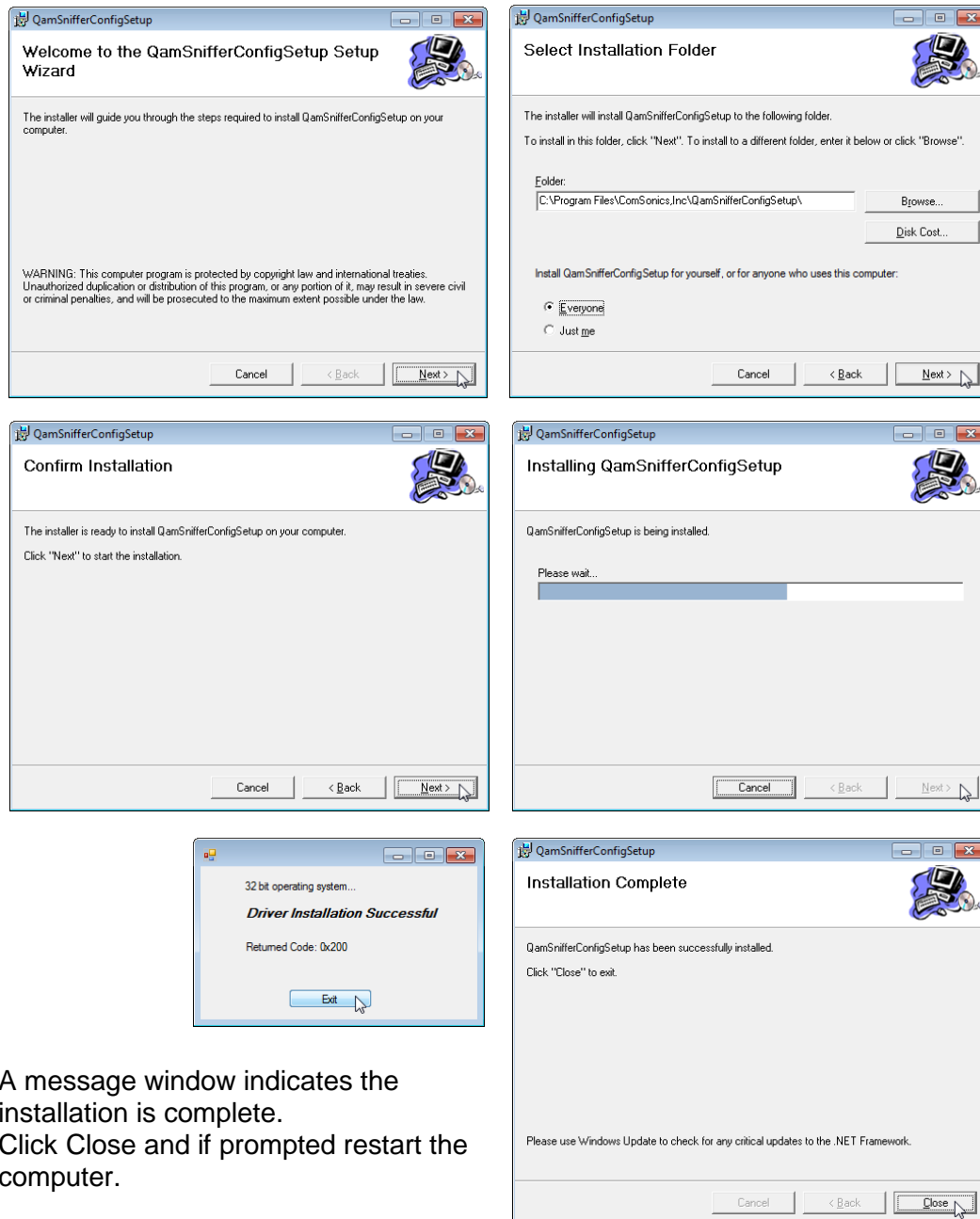
A message window indicates the installation is complete.
Click Close and if prompted restart the computer.

Important:

It is highly recommended to temporarily disconnect the computer from the Internet before a QAM Sniffer is connected the first time. This can be done by either removing the network cable from the computer or by disabling a wireless connection. This step is recommended to prevent Windows Automatic Updates from choosing an incorrect USB driver file. This recommendation only applies to the first time when a QAM Sniffer is connected to the computer.

Connect the Interface Cable

First, power the QAM Sniffer on. Plug the standard USB connector of the QAM Sniffer interface cable into an available USB port on the computer. Plug the Mini-B USB connector end into the USB interface on the QAM Sniffer.

QAM Sniffer USB Driver Installation

The USB drivers are automatically installed the first time the QAM Sniffer is connected to the computer.

Note: The QAM Sniffer displays 'SEr' when connected to the computer.

Verify the USB Driver Installation.
(optional)

Open the Device Manager located in 'Control Panel \ System'. Select the 'Device Manager'. Click on Ports (COM&LPT). The unit appears as 'USB Serial Port' (COMxx)' but only when the QAM Sniffer is connected.
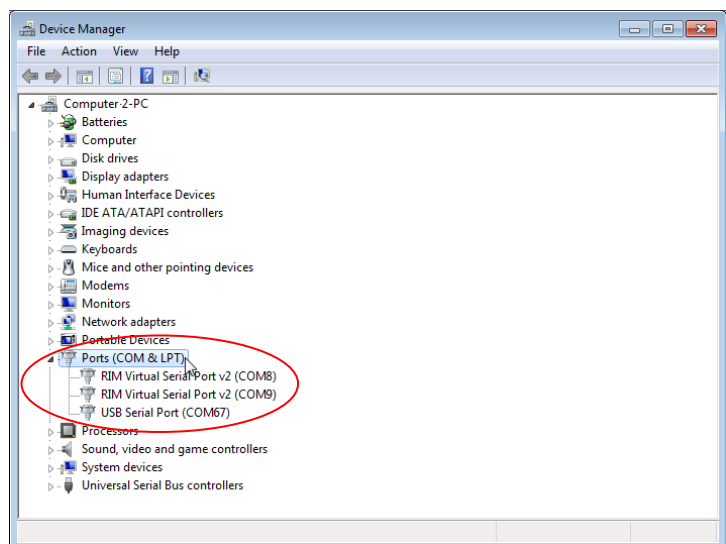
Battery Replacement

The QAM Sniffer is powered by a 7.2V lithium ion (Li-Ion) rechargeable battery pack contained in the handle. Everyday use of the unit and recharging will eventually require battery replacement.

To replace the QAM Sniffer battery, remove the screws holding the hand grips in place. Remove the hand grips. Note the placement and orientation of the original battery. The battery may vary from the illustration below. Carefully pull out the battery.

The battery is plugged into a connector on the trigger circuit board assembly. The battery connector is held in place with a latch.

Important:
Check the orientation of the latch tab on the battery connector before removing.

Press the latch tab on the connector and pull to remove.
Insert the new battery connector into the trigger board connector (observe latch tab position) and push until it latches with a click. *(Improper insertion will cause damage to the QAM Sniffer.)*

Insert the battery pack into the handle in the original placement. When the battery pack is fully seated, place the wiring as not to interfere with or be pinched by the hand grips. Position the hand grips and insert the screws. Do not over tighten the screws.

Note:
A new battery must be fully charged before the first use.
Charge the battery for a minimum of 3 hours before the first use.
If it is not fully charged before the first use, the lifetime capacity may be reduced.
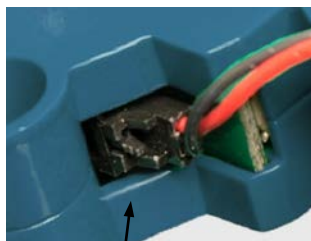
Latch Tab position

Battery pack may vary from illustration

Recycle or properly dispose of the old battery.

See the ComSonics publication titled *Rechargeable Batteries & Getting the Most from Them* for more information on battery maintenance.

Specifications

Frequency	612 MHz ±300 Hz
Marker Mode	F1*, F2, or F3
Receiver Sensitivity	-70 dBmV (-119 dBm)
Selectivity	1.5 Hz (Virtual)
Measurement Accuracy	< ±2.0 dB
Squelch Setting[1]	0, 5, 10, 20, 50*, 100, 1999 µV/m [0, audio on] [1999, audio off]
Bar Graph Sensitivity[1]	x1* (2,000 µV/m), x10 (200 µV/m), x20 (100 µV/m)
Distance Adjustment[2]	1, 10*, 30, 75, 150 feet
Level Units of Measure	µV/m*, dBµV/m, or dBµV
Distance Units of Measure	feet* or meters
Peak Reading Delay	0 to 60 seconds (1 second*)
Audio Output	90 dB at 3 feet, maximum level
Audio Volume Settings[3]	0, 1 (≈20%), 2 (≈40%), 3* (≈60%), 4 (≈80%), 5 (≈100%)
Leakage Data Output	Proprietary / RS-232 levels
Battery Pack	Rechargeable Li-Ion 7.2V, 2400 mAh
Weight	1.8 lb.
Operating Temperature	0ºF to 120ºF (-18ºC to 49ºC)
Storage Temperature	-20ºF to 150ºF (-29ºC to 66ºC)
Humidity	0 to 95% non-condensing, moderate rainfall

* Factory Default Setting
[1] Equivalency in dBµV/m and dBµV.
[2] Equivalency in meters.
[3] Percentages listed are for reference only and indicate that each step can
  reach a maximum loudness greater than the previous step.

Parts/Accessories

QAM Sniffer - Hand Held Device	101610-612
Vehicle Mount Docking Cradle	101680-001
*Vehicle Antenna Base - Magnetic Mount	ANT-MNT-MAG
*Vehicle Antenna Base - Trunk Lid Mount	ANT-MNT-TLM
*Vehicle Antenna Base - Bracket Mount - Fender	ANT-MNT-BRKT
Vehicle Antenna Element - Whip - 612 MHz	ANT-WHIP-612
AC Adapter - Charger 100-240VAC	101349-001
Holster - QAM Sniffer	101425-001
Configuration Utility Application (available by download)	101624-001
Configuration Cable only (PC - USB to mini USB)	CC-945
Battery - QAM Sniffer	101606-001
Vehicle Charging Adapter	101247-001
QAM Sniffer User Guide (available by download)	101623-001

* Vehicle Antenna Base requires Vehicle Antenna Element

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Exclusions: This warranty excludes:
- Damage to the physical surface of the product, including cracks or scratches to any part.
- Damage caused by misuse, neglect, improper installation or testing, unauthorized attempts to open, repair, or modify the product, or any other cause beyond the range of the intended use.
- Damage caused by accident, fire, power changes, other hazards, or acts of nature.
- Use of the product with any non-recommended device or service if such device or service causes the problem.

Any third party products, software or hardware, included with ComSonics products are not covered by this ComSonics warranty and ComSonics makes no representations or warranties on behalf of such third parties. Any warranty on such products is from the supplier or licensor of the product.

Exclusive Remedies: If a covered defect occurs during the warranty period and you notify ComSonics, your sole and exclusive remedy shall be, at ComSonics sole option and expense, to repair or replace the product. If ComSonics cannot reasonably repair or replace then ComSonics may, in its sole discretion, refund the purchase price paid for the product. Replacement products or parts may be new or reconditioned or comparable versions of the defective item. ComSonics warrants any replaced or repaired product for a period of ninety (90) days from shipment or through the end of the original warranty, whichever is longer.

Obtaining Warranty Service: The customer must contact ComSonics Technical Support or Customer Service within the applicable warranty period. Products or parts shipped by Customer to ComSonics must be sent postage-paid and packaged appropriately for safe shipment. ComSonics is not responsible for damage occurring in transit from the Customer to ComSonics. Repaired or replacement products will be returned at ComSonics' expense. All products or parts that are replaced become the property of ComSonics. ComSonics shall not be responsible for Customer's software, firmware, information, or memory data contained in, stored on, or integrated with any products returned to ComSonics for repair, whether under warranty or not.

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ComSonics, Inc.
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