Mini Scout

USER MANUAL

CE

⚠ CAUTION

WARNING - Maximum input voltage is 12VDC. Automotive voltages may exceed 12V causing damage to internal circuitry. Damage resulting from excessive input voltage is readily apparent and will not be covered under warranty. Units returned for warranty service that have damage resulting from excessive supply voltages will incur service charges.

WARNING - Maximum antenna input signal is +15dBm (50mW). Under no circumstances should the Mini Scout be directly connected to an RF transmitter or be used in close proximity to a radio transmitter of more than 5 watts. Damage to the input amplifier circuitry is readily apparent and will not be covered under warranty. Units returned for warranty service that have damage to the input circuitry will incur service charges.

This manual covers connection and operating instructions for the Optoelectronics Mini Scout™. The Optoelectronics Mini Scout™ is covered under U.S. Patent Number 5,471,402

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The Mini Scout is the latest advancement in hand-held frequency test instruments. It excels at finding Reaction Tuning® frequencies for security, law enforcement, commercial and recreational applications. Patented technology developed by Optoelectronics employs statistical analysis to filter out actual radio transmission frequencies from the background RF.

The Mini Scout is more than a test instrument in the traditional sense because it is useful for finding frequencies being used for two way radio communications. Designed to work with an antenna to pick up transmitted radio frequencies.

The counter circuitry produces a coherent and stable count when there is a single dominant signal 10 to 20 dB stronger than any other signal or the RF floor. An embedded microprocessor evaluates each measurement statistically to determine when an actual RF frequency is dominant.

Features include a signal strength bargraph, rapid charge internal NiCad batteries, Reaction Tuning®, and single range operation. The Mini Scout includes an AC-90 power adapter and NiCads.

Step 1 TURN THE MINI SCOUT ON

Set the POWER switch to the on position. On power-up, an LCD self-test will be displayed for two seconds, followed by the words Mini Scout for two seconds.

Step 2 SELECT COMMUNICATIONS LANGUAGE

There are two different communications settings for the Mini Scout.
AOR and CI-5

To change the communications language:
1. Make sure FILTER switch is in the ON position, or up.
2. Position the AOR/CI-5 switch in the up position for ICOM radios and in the down position for the AR8000 or AR8200

Step 3 SELECT NORMAL MODE

NORMAL mode is selected by placing the FILTER switch in the OFF position. In this mode the Mini Scout functions as a conventional free-running frequency counter, where frequency measurements are continuously displayed. The gate setting can be changed by pressing the GATE push-button switch on the front panel. The Min Scout has four different gate settings.

Step 4 REATION TUNE MODE

REACTION TUNE mode is selected when the FILTER switch is ON. The AOR/CI-5 switch should be set to the radio you are Reaction Tuning® (example CI-5: ICOM and OptoScan456/535 AOR: AR8000 AR8200).

External Connections

The Mini Scout has three external connections located on the top panel. The functions of each are briefly described below.

POWER

DC power is supplied to the Mini Scout through the POWER connector, a standard 5.5 mm o/d., 2.1 mm i/d. coaxial DC power jack located on the top panel (9-12 VDC, 500-1200mA max, center positive). The POWER input is used for operation of the Mini Scout from an external power source (AC-90 supplied) as well as for charging the internal NiCad battery.

RF INPUT

The RF INPUT connector is a BNC connector located on the top panel, which provides a 50 Ohm RF input to the Mini Scout. This input is intended for antenna input use.

CI-V

The CI-V jack is used to connect the Mini Scout to a receiver for the purpose of Reaction Tuning. Receivers capable of interfacing to the Mini Scout for the purpose of Reaction Tuning are: ICOM R10, R7000, R7100, R8500, R9000, and the AOR AR8000, AR8200. Also, the Radio Shack PRO 2005/2006 (with OS456 installed) and PRO-2035/ 2042 (with OS535 installed). The serial interface conforms to the ICOM CI-V interface standard. The TIP carries the TTL serial data, and the SHIELD provides the return.

The TTL connector is a subminiature (2.5 mm) phone jack also used to connect the Mini Scout to a computer for the purpose of datalogging (PC Only). It is necessary to interface the Mini Scout to the Optoelectronics Optolinx PC interface. The Mini Scout must be in AOR mode, and the Optolinx must be in Half Duplex Mode. Connect the Optolinx supplied CBCI-5 cable from the Mini Scout to the A, B, or C jack located on the front of the Optolinx. A Windows® Terminal Emulator program may be used for datalogging.

The Mini Scout has four front panel controls. The functions of each are briefly described below. A more detailed discussion of the functions of the front panel controls is given in the OPERATION section.

POWER
The POWER switch activates the Mini Scout. When the POWER switch is in the ON position, the Mini Scout is powered from the internal NiCad battery pack. If external power is present then a trickle charge cycle can occur. When the POWER switch is in the OFF position and the Mini Scout is powered from an external power source, the battery pack will charge automatically.

FILTER
The FILTER switch is used to select the operating mode of the Mini Scout. When the FILTER switch is in the OFF position, NORMAL mode is selected, and the Mini Scout functions as a conventional frequency counter. When the FILTER switch is in the ON position FILTER mode is selected and the Mini Scout is ready for Reaction Tune®.

CI-5/AOR
The RADIO select switch, allows to choose between CI-5 (up) or AOR (down).

GATE
The GATE push-button switch has one main function. When the Mini Scout is in NORMAL mode or FILTER mode, the push-button switch changes the gate time, and hence the measurement resolution. The Mini Scout has four gate settings. Each time the push-button switch is pressed, the next gate setting is selected. The currently selected gate setting is indicated by the position of the decimal point on the frequency display. The gate time, measurement time, and measurement resolution corresponding to each gate setting are summarized in Table 1.

LED
The light-emitting diode (LED) front panel indicator flashes each time a measurement is successfully completed. The rate at which the LED indicator flashes is dependent upon the gate setting and the operating mode.

RF SIGNAL STRENGTH BARGRAPH
The 16-segment bargraph display is a part of the Mini Scout LCD front panel display which provides a relative indication of RF signal strength. The bargraph indication at a given time does not necessarily reflect the signal strength of the frequency shown on the display, rather an aggregate signal level indication of all RF energy detected by the Mini Scout at that instant. It is important to note that the RF signal strength bargraph always provides a real-time signal level indication, whereas the frequency display may show a frequency which was detected at some time in the past. The RF signal strength bargraph is ideal for uses such as the location of nearby transmissions and antenna pattern testing.

POWER-UP

When the Mini Scout is turned on a display self-test is performed. The self-test consists of illuminating all front panel display segments and annunciators for approximately two seconds, followed by displaying Mini Scout for another two seconds. The Mini Scout begins operation in the operating mode selected by the FILTER switch. If the FILTER switch is in the up position the Mini Scout is ready for Reaction Tune®. If the FILTER switch is in the down position the Mini Scout is in NORMAL mode working as a free running frequency counter.

NORMAL MODE

NORMAL mode is selected by placing both the FILTER switch in the OFF position. In this mode the Mini Scout functions as a conventional free-running frequency counter. In NORMAL mode, frequencies are taken continuously and the result is displayed as long as there is an RF signal present. The moment a signal is no longer present a new measurement is started. The gate setting can be changed by pressing the GATE push-button switch on the front panel. Changing the gate setting changes the gate time, and hence the measurement resolution, of the frequency counter. The Mini Scout has four gate settings. The currently selected gate setting is indicated by the position of the decimal point on the frequency display. The gate time, measurement time, and measurement resolution corresponding to each gate setting are summarized in Table 1.

FILTER MODE

FILTER mode is selected by placing the FILTER switch in the ON position. FILTER mode is indicated by the FILTER annunciator on the LCD display. In this mode, random counting, noise, and false signals are reduced or eliminated. A unique digital filtering algorithm permits only meaningful measurements to be displayed. This makes using the Mini Scout much easier and makes frequency finding much more powerful, because distant or short duration signals can be picked out of the background clutter. In FILTER mode, as in NORMAL mode, frequency measurements are taken continuously. However, only those measurements which pass the digital filtering algorithm are displayed. Therefore the frequency display always shows the most recent successful frequency measurement result. Correspondingly, the LED indicator only flashes when a measurement passes the filter. The gate setting may be selected the same as in NORMAL mode.

Table 1 Mini Scout Gate Settings

GATE SETTING	GATE TIME	MEASUREMENT TIME	MEASUREMENT RESOLUTION	EXAMPLE (MHz)
1	800uS	8mS	10KHz	162.55
2	8mS	14mS	1KHz	162.550
3	80mS	90mS	100Hz	162.5500
4	800mS	810mS	10Hz	162.55000

REACTION TUNING

The Mini Scout can interface to the following receivers for Reaction Tuning: ICOM CI-5 R7000, R7100, R8500, R9000, R10, the OptoScan 456/Lite/535 and the AOR AR8000, and AR8200. No modifications are required to the receivers.

There are two different communications settings for the Mini Scout. After power up the words M Scout are displayed. Following is a list of the communications language and a brief description of wh to use each particular setting.

CI-5	For use when Reaction Tuning the following ICOM receivers: R10, R7000, R7100, R8500, and R9000. Radio Shack PRO 2005/2006 (wit OS456 installed) and PRO 2035/2042 (with OS535 installed).
AOR	For use when Reaction Tuning the AOR AR8000/AR8200.

CHANGING COMMUNICATIONS LANGUAGE

To change the communications language follow the procedure below.

1. Make sure that the FILTER switch is in the ON position (up).
2. Put the Radio switch in the up or down position depending on which radio is to be tuned. Up for CI-V and down for AOR.

CI-5

1. After setting the Mini Scout in FILTER mode, put the Radio switch in the up position (CI-5).

2. Following are the current CI-5 compatible receivers that the Mini Scout is capable of Reaction Tuning. ICOM R10, R7000, R7100, R8500 and R9000. Also, the Radio Shack PRO 2005/2006 (with OS456 installed) and Radio Shack PRO 2035/2042 (with OS535 installed). The ICOM R10 and R9000 require special default settings for Reaction Tuning with the Mini Scout.

   ICOM R10:   Baud Rate = 9600, TRN = ON, CI-V ADDRESS = 52
   ICOM R7100: Baud Rate = 9600, Transceive Mode = ON

3. Attach the 3.5mm portion of the CB-CI5 cable (optional) into the Radio Remote jack on the (R7000, R7100 and R9000), and the CI-V jack on the R10 and Radio Shack models. Attach the 2.5mm portion of the cable into the CI-V jack located on top of the Mini Scout.

4. Make sure the receiver is powered on before the Mini Scout. Then turn the Mini Scout on so that the initialization command may be sent to the receiver.

5. Key up any radio and the Mini Scout will automatically tune the receiver to the frequency of the radio.

AR8000/AR8200

1. After setting the Mini Scout in FILTER mode, put the Radio switch in the down position (AOR).

2. For the AR8000 attach the flat flexible end of the RT 8000 cable (optional) to the serial port underneath the battery compartment. Attach the 2.5mm portion of the cable to the CI-V jack located on top of the Mini Scout. For the AR8200 attach the broad end of the RT8200 cable (optional) to the serial port located on the side panel or the AR8200. Attach the 2.5mm portion the cable to the CI-V jack located on top of the Mini Scout.

3. Make sure the AR8000/AR8200 is powered on before the Mini Scout. Then turn the Mini Scout on so that the initialization command may be sent to the AR8000.

4. Key up any radio and the Mini Scout will automatically tune the AR8000/AR8200 to the frequency of the radio.

CHARGE OPERATION

The red LED on the top panel of the Mini Scout is the charge indicator. When plugged into the supplied AC-90 power adapter, the LED will illuminate to indicate when charging is in progress. If the LED does not illuminate, then charging is complete or a fault condition has occurred. If the battery pack is permitted to completely discharge, charging may terminate after only a few minutes. This is a safety feature to protect the battery pack, the Mini Scout and the user. If this happens, charging can be restarted by re-applying power (unplug the power adapter and plug it back in).

The Mini Scout will automatically shut down when the battery pack is discharged. If the battery is not recharged and is permitted to discharge even further, the charge circuit must be restarted several times before a complete charge will occur. Using the AC-90 adapter, charging the Mini Scout will take approximately 90 minutes. It is normal for the Mini Scout to become warm when charging is taking place. Make sure the ambient temperature is not excessive and that there is sufficient air flow to help cool the unit.

ANTENNAS

An antenna is not supplied with the Mini Scout allowing the user to choose which frequency band h will be monitoring.

DB32   140/440/800MHz
RD27   26-150MHz
RD150   144-165MHz
RD440   440-480MHz
RD800   500MHz-1GHz
TA100S   100-600MHz.

FILTERS

The N100 FM broadcast notch filter will remove the influence from local FM stations. The BHP800 pass filter, when used with the RD800 antenna will eliminate all frequencies below, and increase the up distance for those frequencies above 800MHz. Use the BLP70 low pass filter when your fo below 70MHz.

SERIAL DATA INTERFACE

The Mini Scout is equipped with a TTL interface (Transistor Transistor Logic). Interfacing the Scout with the Optolinx Universal Interface allows for real time datalogging. The Optolinx univers interface adapts for use with a wide variety of receivers, frequency counters and frequency recorder the purpose of computer control of a receiver. The Optolinx comes supplied with the CB-Cl5 c which is necessary in order to interface the Mini Scout to the Optolinx for datalogging. For more i mation on the Optolinx please contact Optoelectronics direct at, 1-800-327-5912.

PRODUCT WARRANTY

Optoelectronics, Inc. warrants all products and accessories for one (1) year against defects in materials and workmanship to the original purchaser. Products returned for warranty service will be repaired or replaced at Optoelectronics' option.

Specifically excluded are any products returned under this warranty that, upon examination, have been modified, had unauthorized repairs attempted, have suffered damage to the input circuitry from the application of an excessive input signal, have suffered damage to the charging circuitry or internal batteries from the application of excessive voltage, or show other evidence of misuse or abuse. Optoelectronics reserves sole right to make this determination.

No other warranties are expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Optoelectronics, Inc. is not liable for consequential damages.

WARRANTY

Products under warranty must be returned, transportation prepaid, to Optoelectronics' service center. All parts replaced and labor performed under warranty are at no charge to the customer.

NON-WARRANTY

Products not under warranty must be returned, transportation prepaid, to Optoelectronics' service center. Factory service will be performed on a time and materials basis at the service rate in effect at the time of repair. A repair estimate prior to commencement of service may be requested. Return shipping will be added to the service invoice and is to be paid by the customer.

RETURN POLICY

The Optoelectronics Service Department will provide rapid turnaround of your repair. No return authorization is required. Enclose complete information as follows:

1. Copy of sales receipt if under warranty.

2. Detailed description of problem(s).

3. Complete return address and phone number (UPS street address for USA).

4. Proper packaging (insurance recommended). Note: Carriers will not pay for damage if items are improperly packaged.

5. Proper remittance including return shipping, if applicable (Visa/MasterCard number with expiration date, Money order, Company PO, etc.). Note: Personal checks are held for a minimum of two weeks before shipment.

Address all items to: Optoelectronics, Inc.
Service Department
5821 NE 14th Avenue
Fort Lauderdale, FL 33334

If in question, contact the factory for assistance. Service Department: (954) 771-2050. Monday - Friday 8:30 AM to 5:00 PM Eastern Time.