

# Seeker BB-2 Leakage Detector

(Green Engineering)

## Operation Manual



*This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. See Page 2 for complete details.*



Industry  
Canada

Industrie  
Canada

*This equipment has been tested and found to comply with Industry Canada Standards. See Page 2 for complete details.*

think ahead.

 TRILITHIC



## Trilithic Company Profile

Trilithic is a privately held manufacturer founded in 1986 as an engineering and assembly company that built and designed customer-directed products for telecommunications, military, and industrial customers. From its modest beginnings as a two-man engineering team, Trilithic grew over the years and broadened its offerings of RF and microwave components by adding broadband solutions to its product line. This was accomplished with the acquisition of components manufacturer Cir-Q-Tel and instruments manufacturer Texscan.

Today, Trilithic is an industry leader providing telecommunications solutions for major broadband, RF, and microwave markets around the world. As an ISO 9000:2001 certified company with over 40 years of collective expertise in engineering and custom assembly, Trilithic is dedicated to providing quality products, services, and communications solutions that exceed customer expectations.

Trilithic is comprised of five major divisions:

- **Broadband Instruments and Systems**  
Offers test, analysis, and quality management solutions for the major cable television systems worldwide.
- **RF Microwave Components**  
Provides components and custom subsystems for companies specializing in cellular, military, and other wireless applications.
- **Emergency Alert Systems**  
Leading supplier of government-mandated emergency alert systems used by broadcast TV, cable TV, IPTV, DBS, and radio stations.
- **XFTP**  
Offers a specialty line of field technical products for cable operators and technicians, as well as a line of products for installing electronics in the home of the future.
- **Network Services**  
Provides network data management and support services to safeguard and protect your network and data by employing certified, experienced, and dedicated network engineers.

## FCC Part 15 Compliance



Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

Changes to this device that are not expressly approved by Trilithic, Inc. could void the user's authority to operate this device.

The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the device and receiver
- Connect the device into an output on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

## Industry Canada Compliance



Industry  
Canada

Industrie  
Canada

Operation of this device is subject to the following two conditions; This device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

To reduce potential radio interference to other users, the antenna type and its gain should be chosen so that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

# Table of Contents

<b>1. General Information</b>	<b>5</b>
Helpful Website	5
Where to Get Technical Support	5
How this Manual is Organized	6
Optional Software	6
Conventions Used in this Manual	7
Precautions	7
<b>2. Introduction</b>	<b>9</b>
What is the Seeker BB-2?	9
Features	9
Easy Frequency Configuration	9
Channel Tag Compatibility	10
GT Noise Discrimination	10
Vehicle Battery Protection	11
Equipment Supplied with Your Seeker BB-2	12
Optional Accessories for Your Seeker BB-2	13
Guided Tour	14
Front View	14
Rear View	15
<b>3. Operation</b>	<b>17</b>
Configure Settings	17
Data Upload Options	17
USB Flash Drive	17
Wi-Fi	18
Fleet Management System Integration	18
<b>4. Specifications</b>	<b>19</b>
Warranty Information	20

**THIS PAGE LEFT INTENTIONALLY BLANK**

# Chapter 1

## General Information

### Helpful Website

The following website contains general information which may be of interest to you:

<http://www.trilithic.com>

Trilithic's website contains product specifications and information, tips, release information, marketing information, Frequently Asked Questions (FAQs), bulletins, and other technical information. You can also check this website for product updates.

### Where to Get Technical Support

Trilithic technical support is available Monday through Friday from 8:00AM to 5:00PM EST. Callers in North America can dial 317-895-3600 or 800-344-2412 (toll free). International callers should dial 317-895-3600 or fax questions to 317-895-3613. You can also e-mail technical support at [techsupport@trilithic.com](mailto:techsupport@trilithic.com).

For quicker support response when calling or sending e-mail, please provide the following information:

- Your name and your company name
- The technical point of contact (name, phone number, e-mail)
- The version numbers for the Seeker BB-2 firmware and Seeker Setup software
- The version of Windows you are using (including any Service Packs and patches)
- A detailed description of the problem you are having, including any error or information messages

## How this Manual is Organized

This manual is divided into the following chapters:

- Chapter 1, “General Information” provides Trilithic contact information and describes how this Operation Manual is structured.
- Chapter 2, “Introduction” introduces what the Seeker BB-2 is and what it does. This chapter discusses the practical application and connections of the Seeker BB-2.
- Chapter 3, “Operation” describes how to configure and operate the Seeker BB-2.
- Chapter 4, “Specifications” shows the technical specifications of the Seeker BB-2.

## Optional Software

Although the Seeker BB-2 comes preconfigured and ready to use from the factory, the following software is required for advanced configuration of the Seeker BB-2:

- **Seeker Setup software** is used to configure the Seeker BB-2, enabling the operator to assemble files containing channel frequencies, squelch levels, and other settings. Users can efficiently download configurations to one or more leakage detectors. Includes capability to assemble Seeker BB-2 leakage data files in a format compatible with the CLT Aplas3i service and to forward records to the Aplas3i server for analysis and work order generation.

The following software is required for leakage data analysis using the Seeker BB-2:

- **Leakage Analysis Workshop (LAW)** is software that manages the storage and retrieval of leakage information collected by vehicle mounted Seeker BB-2 systems. Installed in a user-provided server, LAW receives leakage data uploads via the Internet/LAN or through a customer configured Wi-Fi wireless site. Data stored in LAW server may be displayed on maps or as text, used to generate leakage work orders, or downloaded to other Trilithic or third party applications.

## Conventions Used in this Manual

This manual has several standard conventions for presenting information.

- Connections, menus, menu options, and user entered text and commands appear in **bold**.
- Section names, web, and email addresses appear in *italics*.



***A NOTE is information that will be of assistance to you related to the current step or procedure.***



***A CAUTION alerts you to any condition that could cause a mechanical failure or potential loss of data.***



***A WARNING alerts you to any condition that could cause personal injury.***

## Precautions



***Do not use the Seeker BB-2 in any manner not recommended by the manufacturer.***



***A strong electromagnetic field may affect the accuracy of Seeker BB-2's measurements.***

**THIS PAGE LEFT INTENTIONALLY BLANK**

# Chapter 2

## Introduction

This chapter:

- Describes the Seeker BB-2's purpose
- Gives an overview of the Seeker BB-2's features
- Lists the Seeker BB-2's supplied equipment and optional accessories
- Gives a guided tour of the Seeker BB-2
- Discusses updating the Seeker BB-2's firmware

### What is the Seeker BB-2?

The Seeker BB-2 combines the features of the Seeker leakage detector and the Seeker MCA to provide a cost-effective instrument that is specifically designed for efficient distribution leakage management. The Seeker BB-2 is both a frequency agile leakage detector (109.25 to 110.5 MHz and 118.5 to 147.25 MHz) as well as an instrument that is used to store collected leakage data and to upload the same leakage data to the user's PC or laptop computer or the central server.

The Seeker BB-2 provides a cost-effective way to equip each vehicle in a fleet with GPS-based reporting capabilities. The Seeker BB-2 system consists of the Seeker BB-2 mounted in the user's vehicle and a GPS receiver. A hard-wired serial interface is provided for connecting to the GPS receiver. The leakage data can then be uploaded to the Leakage Analysis Workshop (LAW) using either the provided Wi-Fi connection or USB flash drive. Purchase a GPS receiver from Trilithic for use with the system, or use a Trilithic-approved GPS receiver.

### Features

#### Easy Frequency Configuration

The Seeker Setup software simplifies the configuration process. Instead of going to the factory to make hardware modifications, the user can use the Seeker Setup software to adjust frequencies.

## Channel Tag Compatibility

Compatibility with both the Trilithic CT-2 and CT-3 channel tag devices is another feature of your Seeker BB-2. Channel tagging refers to the process of adding frequency tags to a broadcast channel signal. Your Seeker BB-2 can be setup to detect a tagged leak and to ignore leaks that are not tagged. With this feature, you are saved from chasing false alarms from signals that do not originate in your system.

Channel tag values range between 10 Hz and 23 Hz and are configured using the Seeker Setup software.

## GT Noise Discrimination

Your Seeker BB-2 works with systems employing digital set top terminals that cannot tolerate “tagged” leakage carriers. Therefore, enhanced “false alarm” resistance can be provided without the use of a tagged leakage signal. The Seeker BB-2 analyzes the detected RF energy and detects noise and signals that are not caused by leaks from your system.

## Vehicle Battery Protection

### ***Overview***

The Seeker BB-2 is equipped with circuitry which automatically powers down the Seeker when the vehicle's ignition is turned off, only after all data upload processes have been completed. This feature allows the vehicle to be parked and left unattended for long periods of time without concern for depleting the vehicle's battery. Seeker BB-2s which feature battery protection circuitry are identified with a "Green Engineering" logo on the device.

This feature allows a vehicle equipped with the "Green Engineering" Seeker BB-2 to automatically upload leakage data to the LAW server application while parked and left unattended. Upon completion of the data upload (or after a user-programmed number of attempts to upload data), the Seeker BB-2 will automatically power down. The BB-2 will also stay on for a selectable time period to avoid any "cold start" delay required by the GPS receiver after a power down.

### ***Function***

Upon parking and shutting down a vehicle equipped with a "Green Engineering" Seeker BB-2, the Seeker will attempt to upload leakage data to the LAW server via the Wi-Fi connection. The Seeker BB-2 will then automatically power down after the vehicle timer delay has expired, provided that one of the following criteria is met:

- The vehicle is parked in the "home zone" and all leakage data has been successfully uploaded
- The vehicle is parked in the "home zone" and cannot upload all leakage data after a user-programmed number of attempts have been made
- The vehicle is parked outside of the "home zone" and the ignition is turned off

## Equipment Supplied with Your Seeker BB-2

The Seeker BB-2 comes with the following:

- Seeker BB-2 leakage detector
- Remote Wi-Fi antenna with 12' coaxial cable and magnetic mount
- DC power cable
- Two (2) USB flash drives
- Operation manual and hardware USB driver on CD
- Printed installation guide and installation checklist
- Mounting hardware:
  - Qty 4: #10-16 3/4" self-tapping screws with rubber washers
  - Qty 4: #12 x 0.093" rubber washers



NOTE

***The Seeker BB-2 requires a monopole antenna (not included) for use.***

## Optional Accessories for Your Seeker BB-2

Part Number	Description
2071707000	GPS receiver unit - RS-232
2071724001	USB flash drive
2071677001	Remote Wi-Fi antenna with 12' coaxial cable and magnetic mount
2071585018	Power cable
2071585004	Replacement mini-USB data cable
0930109002	Seeker Setup software
2011222000	Wi-Fi access point

To place an order, please call Trilithic at (800) 344-2412 or (317) 895-3600.

## Guided Tour

The Seeker BB-2 is used to store leakage data collected from the Seeker and to upload the same leakage data to the user's PC or laptop computer or the central server.



**Changes to the devices not expressly approved by Trilithic, Inc. could void the user's authority to operate the equipment.**

### Front View

#### MCA mini-USB connection

This Mini-USB connection is used to connect the Seeker BB-2 to a PC or laptop computer via the mini-USB data cable. This allows for configuration changes to the included Mobile Communications Adapter (MCA) using the Seeker Setup software.

#### Meter mini-USB connection

This Mini-USB connection is used to connect the Seeker BB-2 to a PC or laptop computer via the Mini-USB data cable. This allows for configuration changes to the included Leakage Detector using the Seeker Setup software.

#### DC power cable

This connection is used with the DC power cable to connect the Seeker BB-2 to the vehicle power supply. Permanently wire the DC power cable as follows:

- **Red wire** - Connect to an always-on positive (+) 12 Volt power supply between the vehicle battery and the vehicle key switch
- **White wire** - Connect to an ignition-switched positive (+) 12 Volt power supply
- **Both black wires** - Connect to ground or the negative (-) battery terminal



## Rear View

### **Power LED**

This LED is used to indicate that power is supplied to the Seeker BB-2.

### **Antenna input**

This connection is used to connect an external monopole antenna.

### **Serial GPS connection**

This connection is used to connect to a serial (RS-232) enabled GPS receiver.

### **USB connection**

This connection is used to connect a USB flash drive in order copy the leakage data to the USB flash drive and then is uploaded to the central server using a website on the internet.

### **Wi-Fi antenna connection**

This connection is used to connect a Wi-Fi antenna in order to transmit wireless data to a PC or laptop computer or the central server.



**THIS PAGE LEFT INTENTIONALLY BLANK**

# Chapter 3

## Operation

This chapter:

- Provides information on Seeker BB-2 operation
- Discusses the data upload options of the Seeker BB-2

### Configure Settings

You must configure the Seeker BB-2 settings using the Seeker Setup software. The Seeker BB-2 comes from the factory with default settings, but it is likely they will need to be customized. Detailed instructions can be found in the **Seeker Setup Software Operation Manual**.



NOTE

***For detailed instructions on how to update the Seeker BB-2 Firmware, see the Seeker Setup Operation Manual.***

### Data Upload Options

#### USB Flash Drive

The leakage data can be uploaded via a USB flash drive. The user places a USB flash drive in the Seeker BB-2 USB port, the leakage data is then copied to the USB flash drive and then is uploaded to the central server using a website on the internet.



CAUTION

***Do not cycle the vehicle's power OFF then ON with the USB flash drive connected. Doing so will put the Seeker BB-2 in an error state where the Seeker BB-2 will not record leakage data.***

## Wi-Fi

The leakage data can be uploaded via a wireless connection. Whenever the user's vehicle is parked for a user-determined duration in a user-determined upload position/zone within range of an authorized wireless hotspot, the leakage data is uploaded directly to the central server.



***The Seeker BB-2 supports up to 128 bit Wired Equivalent Privacy (WEP) and Wi-Fi Protected Access (WPA) security.***

## Fleet Management System Integration

For fleets equipped with GPS-based fleet management systems the real-time leakage data can be automatically uploaded directly to the central server through the truck's cellular connection.

# Chapter 4

## Specifications

- **Frequency range:** 109.25 to 110.5 MHz and 118.50 to 147.25 MHz, settable using Seeker Setup software.
- **Level range:** 2 to 2000  $\mu\text{V}/\text{M}$ .
- **Channel tag range:** 10 Hz to 23 Hz (excluding 16 Hz)
- **Other:**
  - Dimensions:** 11.00" x 8.00" x 2.15" (279mm x 203mm x 55mm)
  - Weight:** 3.10 lbs (1406.13 g)

## Warranty Information

Trilithic, Inc. warrants that each part of this product will be free from defects in materials and workmanship, under normal use, operating conditions and service for a period of two (2) years from date of delivery. Trilithic, Inc.'s obligation under this Warranty shall be limited, at Trilithic, Inc.'s sole option, to replacing the product, or to replacing or repairing any defective part, F.O.B. Indianapolis, Indiana; provided that the Buyer shall give Trilithic, Inc. written notice.

Batteries are not included or covered by this Warranty.

The remedy set forth herein shall be the only remedy available to the Buyer under this Warranty and in no event shall Trilithic, Inc. be liable for incidental or consequential damages for any alleged breach of this Warranty. This Warranty shall not apply to any part of the product which, without fault of Trilithic, Inc., has been subject to alteration, failure caused by a part not supplied by Trilithic, Inc., accident, fire or other casualty, negligence or misuse, or to any cause whatsoever other than as a result of a defect.

Except for the warranty and exclusions set forth above, and the warranties, if any, available to the Buyer from those who supply Trilithic, Inc., there are no warranties, expressed or implied (including without limitation, any implied warranties of merchantability or fitness), with respect to the condition of the product or its suitability for any use intended for it by the Buyer or by the purchaser from the Buyer.





**TRILITHIC**  
INNOVATIVE ENGINEERING

9710 Park Davis Drive  
Indianapolis, IN 46235  
(317) 895-3600  
[www.trilithic.com](http://www.trilithic.com)