

## Connections

Ensure that power and grounding are properly wired and installed before making additional connections. The included grounding hardware allows connection of a grounding lug to the M5 receptacle near the lower-left corner of the radio. Place the wave washer next to the head of the screw. Place flat washers on both sides of the grounding lug. Another grounding connection is available on the power injector.

After establishing the radio link, connect the Ethernet and T1/E1 (RJ-48C) services matching configurations made in the Exalt GUI. Use a ping test to verify connectivity across Ethernet. T1/E1 line or test equipment can verify T1/E1 connectivity.

## Indicators

The power injector has indicators to assist in determining status. The right LED on the POWER+DATA connector is solid green when proper power is applied. The left LED flashes when alarms are present on the radio, and is solid green under normal conditions.

## Register the Product

Products registered within 90 days of purchase receive 2 full years of warranty coverage for no extra charge. Unregistered products and products registered after the 90-day period, only receive a 1-year warranty. Register the product according to the instructions on the provided registration card. See the I&M Guide for the full warranty statement.

## For More Information

Refer to the I&M Guide, which can be downloaded from the radio or from the Internet at:

<http://login.exaltcom.com>

New users must register before logging into the support section of the Exalt website.

For post-sales support, contact Exalt Customer Care at:

Phone: (408) 688-0202  
Toll-Free (USA): (877) EXALT-01 (392-5801)  
Support email: [support@exaltcom.com](mailto:support@exaltcom.com)

Live support is provided from 7am to 4pm Pacific, Monday through Friday except designated holidays. Extended-hour support available, sold separately.

Sales email: [sales@exaltcom.com](mailto:sales@exaltcom.com)

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# ExtendAir® (TDD) Digital Microwave Radios Quick Start Guide



**Models:**  
r40xx & rc40xx Series  
r49xx & rc49xx Series  
r50xx & rc50xx Series

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Exalt and the Exalt logo are copyrights of Exalt Communications, Inc. ExtendAir is a registered copyright of Exalt Communications Inc. All other names are trademarks of their respective owners. The system has been tested and found to comply with the limits of 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. 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 of more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.
- Shielded cables and I/O cords must be used for this equipment to comply with the relevant FCC regulations.

Changes or modifications not expressly approved in writing by Exalt may void the user's authority to operate this equipment.

This Class B Digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte les exigences du Règlement sur le matériel brouilleur du Canada.

- this device may not cause interference, and
- this device must accept any interference, including interference that may cause undesired operation of the device.

Antennae associated with these devices must be mounted in a restricted area, at a designated minimum distance away from humans who may be subject to long-term or continuous exposure. Refer to the *Installation & Management Guide* for details.

## THIS PRODUCT MUST BE PROFESSIONALLY INSTALLED

Contact Exalt or refer to the Installation & Management Guide for a list of supported antennas and regional transmitter power requirements.

### Introduction



**Note:** Read this entire document before attempting to install Exalt digital microwave radios.

The reader is strongly encouraged to obtain a copy of the *Installation and Management Guide* (I&M) for this product. The I&M is embedded in the radio's graphical user interface (GUI) and can be saved locally (as described in this document). In addition, customers may request access to documentation (and software) by creating an account and logging in at:

<http://login.exaltcom.com>

This quick start guide (QSG) is intended to provide only a brief overview of the ExtendAir (TDD) radios. The reader must have experience with networking and RF. Refer to the I&M for full descriptions, **regulatory requirements**, **safety requirements** and troubleshooting information.



**Note:** It may be desirable to delay connecting the associated connector/spacer or Sync cables until antenna alignment is complete.

- Use UV-rated (outdoor) CAT5e or CAT6 cable, for all connections.
- **The outside radius of the cable must be between 0.25 and 0.31 inches to ensure a water-tight connection.**

To connect the port connector:

1. Place connector parts on the cable as shown in the following photos.

All connector parts can be placed on a terminated cable. The screw cap and beveled washer both allow the RJ-45 connector to pass through, and the rubber seal has a split slot to fit over the cable insulation.



2. Insert the RJ-45 connector until it clicks into place.
3. Adjust the position of the rubber seal into the connector receptacle.
4. Align the beveled washer on top of the rubber seal, and strongly hand-tighten the rear section of the connector.
5. Inspect the rubber seal to ensure that there is no deformation and it appears tight.

**The total length of the PoE cable, including the cable from the power injector to the connected network equipment must not exceed 100 meters.**

### Aligning Antennas

The received signal level (RSL) test point is on the SYNC/RSL connector. Use the included RSL cable to connect a volt meter during antenna alignment. DC voltage at the RSL port is related to the RSL level in dBm. For example, a value of 0.6VDC is roughly equivalent to an RSL of -60dBm and a value of 0.75VDC is roughly equivalent to an RSL of -75dBm. In this manner, voltage is inversely proportional.

Align antennas to the *minimum* possible voltage (0.6VDC is less than 0.7VDC, but represents a higher RSL level). Aim for an RSL within 1 to 2 dB of the value planned in the link design. Account for all transmission system gains and losses to confirm the designed value.

After the designed RSL is achieved, mechanically secure the antenna for both azimuth and elevation alignment. Carefully monitor RSL voltage while tightening the mechanics and ensure that the antenna remains in alignment.

Use the integrated alignment buzzer as an alternative or in addition to the RSL test point. On the GUI set the **Buzzer Timeout** parameter on the **Configuration>System** page to 10, 120, or ON to activate the buzzer for 10 or 120 minutes, or continuously. Select **Off** to disable the buzzer. Buzzer pitch relates to RSL; a higher pitch represents better RSL. A continuous tone indicates a successful link to the far end. A chirping (beeping) buzzer indicates that the radio is not locked to the far end. Note that RSL in dBm is displayed on the **Monitor>Performance** GUI page.

Initially mount the Radio A antenna by bearing and sight, and then align from the Radio B side first. Align the Radio B antenna until maximum RSL is achieved, secure the Radio B antenna, and then align the Radio A antenna until maximum RSL is achieved. Two or three rounds of alignment at each end are typically required to achieve the designed RSL. Start alignment with a slow steady sweep in azimuth, then an elevation sweep to help identify the antenna center beam while watching for the best RSL in both planes. RSL reporting is delayed by approximately 1 second. For fine alignment, make small adjustments, wait, take a measurement, and continue with small adjustments.

## Extracting the I&M Guide

Click the **Manual** navigation link. The browser displays the PDF file. Click the **Save** button in the PDF toolbar to save the manual on the local system.

## Reset to Critical Factory Settings

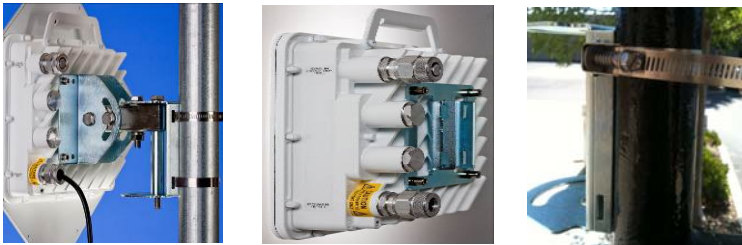
If required, the radio may be reset to the critical factory settings:

1. Remove power from the power injector (the DATA+POWER cable remain connected).
2. Hold the **RESET** button on the power injector while applying power.
3. Hold the **RESET** button down through the whole power cycle and monitor the DATA+POWER left LED on the power injector.
4. Release the **RESET** button only after the left LED is in a steady state. The button is held for approximately 1 to 3 minutes.

**Some previous configuration information will be lost** and replaced with the factory default settings, including the IP address (**10.0.0.1**), subnet mask (**255.0.0.0**) passwords (**password**), Endpoint Identifier (to Radio B) and VLAN enable (to disable). All other parameters are unchanged.

## Mounting

Use the enclosed mounting bracket kit. The mounting bracket is designed to support pole-mounting to a pole from 2 to 5" (5 to 13cm) in diameter using stainless steel band clamps. The r-version bracket (as shown on the left below) can also be mounted to a wall. Use the photos below as guidance for bracket mounting. The photo on the right illustrates optimum band clamp screw placement for 2-inch pole diameters. This screw placement can be on either side of the bracket, but snug to the edge of the bracket to provide enough force for tightening.



For washer placement, flat washers should be next to any bolt heads, wave washers should be next to any nuts with a flat washer on the opposite side of the wave washer. The bolts connecting the bracket to the radio require a 5mm hex wrench (not included).

## Cabling

Lightning arrestors are recommended near the radio for surge protection on all cabled interfaces. Use lightning arrestors on all cable egress points (where cables enter shelters or buildings) to protect against harm to humans and/or equipment collocated in the shelter or building. For the PoE connection, the following devices are approved:

- Polyphaser IXG-05 (metal case, terminal jack), with optional IX-POLE-KIT
  - Transtector ALPU Model 1101-959 (metal case, RJ-45), with optional 1000-1164 pole mount
  - Transtector ALPU-1000BT-R (plastic case, RJ-45), with optional 1000-1164 pole mount
  - Transtector ALPU Model 1101-898 (plastic case, RJ-45), with optional 1000-1164 pole mount
  - Transtector ALPU-EXLT (plastic case, terminal block), with optional 1000-1164 pole mount
- Do not use traditional PoE surge suppression on the PoE connection.**
- For multiple Ethernet port models, use any 100BaseT or 1000BaseT surge suppression for the additional Ethernet connections.
  - For T1/E1 interfaces, use any weatherproof T1/E1 surge protection.
  - **Use the included connectors. Maintain waterproof spacers on unused connectors.**
  - Use the SYNC/RSL connector for antenna alignment. The Exalt GUI RSL reading indicates the current RSL in dBm (see **Error! Reference source not found.**).

## Preparation

Complete a path analysis and link design prior to installation. Gather the following information in the design phase:

- Length(s) and type(s) of transmission system cabling and connectors (if any)
- Make and model of antennas
- Antenna structure requirements, antenna and radio mounting locations
- Cable routes and egress location
- Grounding plan, surge protection, grounding mechanics, power and wiring
- Critical radio settings: RF center frequency, transmitter output power, occupied channel bandwidth, mode selection, TDD frame length, and link distance setting
- Anticipated RSL
- Number of T1/E1 circuits enabled (if any)

Perform the following tasks before installing the radio terminals:

- Build antenna/radio structures and egress mechanics
- Mount antennas and transmission line (if any), lightning arrestor(s) and grounding
- Prepare and test interface and power cables

## Shipping Contents

Review the labeling and contents of all boxes and the physical condition of the shipping container and contents. Ensure that items are not damaged, and that part numbers and serial numbers match the original equipment order and shipping information. Each radio terminal box should contain the following:

- Radio terminal (configured as Radio B)
- Mounting kit (for pole or wall mounting)
- Accessory kit including RSL adapter cable
- Quick start guide (this document)
- Product registration card

The accessory kit contains the following items:

- Weather-seal tape (required for the RF connector on the rc models)
- RSL adapter cable
- Grounding hardware (M5 screw, M5 wave washer, 2 x M5 flat washers)

Generally, a link installation requires items that are sold separately:

- AC or DC Power-over-Ethernet (PoE) Injector (Exalt-specific)
- PoE and/or T1/E1 surge protectors (PoE is model-specific)
- Antenna (for -rc models)
- Outdoor-rated CAT5e or CAT6 cable.

For Ethernet connections, a maximum length of 100m applies to total length of cable between the radio terminal and the first network-aware connection, such as a switch or router. For the PoE connection, it should be straight wired Ethernet between the PoE injector and the radio.

## Getting Started

It is strongly advised to configure the radio system prior to physical installation. This step minimizes total installation time and aids troubleshooting that may be required during commissioning.



**CAUTION:** For the rc-models, the RF connection must be properly terminated into a 50-Ohm load (termination or attenuator) at all times. If this is not performed, the radio may be damaged by simply applying power. Also, there are human safety factors to consider regarding potentially harmful RF radiation. Alternatively, cable the port to the antenna system or back-to-back with the other terminal with at least 40dB of total attenuation between the terminals.

The radio requires a DC power source with proper output voltage and current-handling capacity, in accordance with the radio specifications. The DC power is delivered by a Power-over-Ethernet (PoE) injector that is connected with a straight-wired CAT5e or CAT6 cable. This is accomplished

through the use of PoE injector provided by Exalt, sold separately or in combination with the radio. Both AC and DC power solutions are available. The AC solution consists of an integrated AC-to-DC adapter/injector which provides proper power for the PoE solution. The DC solution consists of just a PoE injector for use with the customer-supplied DC source.



**CAUTION:** It is critical that only the Exalt-provided AC or DC PoE solutions are used with the radio. Do not use third-party sources and do not mix solutions from other Exalt products with the solution provided and compatible with the radio in use. For example, do not mix Exalt 1000BaseT PoE injectors with Exalt 100BaseT PoE injectors – always applying the proper injector to the radio. Likewise, the output voltage and current capacity of an AC adapter must be proper for the connected radio. ExtendAir PoE DC injectors can be identified by the location of the reset button on the top face.

It is strongly recommended that the AC mains supply or DC supply be fused or on a separate breaker to ensure against over-voltage and/or over-current and provide protection to the radio electronics and other devices connected to the same supply. Because mains power supplies are subject to significant spikes or variation, power conditioning is recommended. An Uninterruptible Power Source (UPS) or other form of battery-backed system protects against brownout and black-out conditions, and condition the power presented to the adapter.

1. Connect the straight-wired outdoor rated CAT5e or CAT6 cable to the ETH1/PoE connection on the radio side, and then to the DATA+POWER connection of the power injector.
2. Connect the network Ethernet connection to the DATA connection of the power injector.
3. Mount and ground the PoE injector, as necessary.
4. Apply appropriate AC or DC power (with proper current rating) to the input connector of the power injector.

### Configuration Overview

It is strongly advised to configure the radio system prior to physical installation. This step minimizes total installation time and aids troubleshooting that may be required during commissioning.

For proper communication, one radio terminal must be configured as Radio A (radios are configured as Radio B at manufacture). In addition, for some models, **a proper Regulatory Domain Key (RDK) is required before any system configurations are allowed.** Other configurations may also be necessary before completing installation. Use the Exalt browser-based GUI for configuration. Connect a CAT5e or CAT6 cable to the DATA connector on the power injector using either a straight or crossover cable meant for Ethernet connections. Connect the opposite end of this cable to the management computer's Ethernet port. Use a browser to launch the Exalt GUI on the radio.

The computer accessing the Exalt GUI must match the IP subnet of the radio. The radio's default IP address is **10.0.0.1**. Since all radios are configured with the same IP address at manufacture, change at least one radio's IP address to avoid an IP address conflict. Use the following procedure:

1. Change the IP address of the accessing computer to match the radio's subnet.
2. Select the Ethernet network adapter, and then select TCP/IP properties.
3. Select the static IP address option and change the IP address to 10.0.0.x (where, x does not equal 1 or any other address planned for either radio).

Alternatively, these radios also support limited DHCP addressing (if enabled). For this feature, the computer's Ethernet interface must be set to DHCP (listed as 'Obtain an IP address automatically' on the Ethernet adapter TCP/IP properties), and the radio and computer are connected during radio boot up. The radio maintains its IP address (10.0.0.1 factory default) and temporarily assigns the computer an address two digits higher (for example, 10.0.0.3). If using DHCP, it is still advised to change one radio IP address since they match initially.

### Using the GUI

A browser is required to access the GUI. Microsoft Internet Explorer 5.0 or greater is recommended. Firefox, Chrome and Safari are also supported. Use the following procedure to access the Exalt GUI.

1. Open a browser window and type the IP address of the radio (such as 10.0.0.1) in the address field, and press ENTER. A password dialog box displays.
2. Type **admin** into the User name field.

3. Type **password** into the Password field.
4. Press **Login**.

The GUI displays the Radio Information page. Use the navigation panel along the left side of the GUI to access the configuration and management tools.

To establish a working link:

1. On the **Administration Settings** page, enter any License Key purchased. The License Key is uniquely tied to the unit's serial number.
2. For models with the Regulatory Domain Key (RDK) feature, enter the RDK on the **Administration Settings** page. Each RDK is unique and is tied to the unit's serial number. The RDK may be found at [www.exaltcom.com/activate.htm](http://www.exaltcom.com/activate.htm).



- Note:** For models with the RDK feature, system configuration is impossible without proper RDK installation.
3. Change the radio's IP address, as desired, on the **Administration Settings** page and press the **Update** button.

**Note:** Pressing the **Update** button is required to accept any changes. If the IP address is changed, open a new browser window and navigate the GUI to the new IP address.

4. Select Configuration>System, and change the Endpoint Identifier (Radio A or Radio B) of one terminal to Radio A.

**Note:** Ensure that the Firmware Revision (on the Radio Information page) matches for both terminals in the link. Follow the instructions in the I&M to upgrade firmware. It is advised to upgrade radios to the latest firmware, which can be obtained from the Exalt website.

At this stage, all other configurations can remain at the factory default settings, and the link operates for back-to-back bench testing. However, for most installations, the following parameters must match the link design (at both ends of the radio link):

Administration Settings:	Link Security Key AES (option) enable/disable, & key
Configuration>System:	DFS enable/disable (where applicable) Radio Transmit Power Bandwidth Mode (Modulation) RF Frequency Link Distance TDD Frame Size Tx/Rx Throughput Ratio (opposite)
Configuration>Interface>Ethernet:	All settings
Configuration>Interface>T1/E1:	All settings

**Note:** Disable any T1/E1 interface not intended for use. Available throughput is allocated to the Ethernet interface.

**Note:** The Radio Transmit Power is usually set to the minimum level as a default. Based on path calculations and regulatory requirements, this value should be set to the proper level at installation.

**This product must be professionally installed. The Radio Transmit Power must be configured, prior to connection to the antenna system, in accordance to all government regulations that apply. The professional installer is responsible to ensure that the implementation is within legal limits.**

Configure all parameters on both radio terminals to match the requirements of the system design and verify that the radio link communicates properly during the back-to-back bench test. It can be extremely challenging, time consuming, and costly to troubleshoot a system that is not properly preconfigured and tested.