

QuadHopper™

MODEL 9000

**E1/DS1 SPREAD SPECTRUM 5.78 GHz
DIGITAL MICROWAVE RADIO SYSTEM**

VOLUME 2

Installation Instructions

This practice applies to the following equipment:

Model	Equip Issue	Model	Equip Issue
007-01794-000	1	041-02110-XXX	1
007-01794-001	1	5702-1	1,2,3,4
007-02068-000	1	5702-3	2
007-02078-000	1	7509-3	1
007-02078-001	1	9020-0	1
007-02079-000	1	9021-0	1
007-02079-001	1	9021-1	1
007-02109-000	1		



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FCC Notice

FCC ID:

The Federal Communications Commission (FCC) Rules define issues concerning radio frequency emissions. The Model 9000 equipment complies with FCC Part 15.247 which specifies the license-free operation of spread spectrum radio equipment within the 5.7000 to 5.8275 GHz band reserved for industrial, scientific, and medical (ISM) applications. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Professional Installation

The FCC type acceptance for this product requires professional installation to ensure that the equivalent isotropically radiated power (EIRP) meets FCC Part 15.247. Contact Larus Corporation for engineering assistance and recommended qualified installation contractors.

INDUSTRY CANADA Notice

CANADA RSS-210

Canada ID:

The Industry Canada Rules (Canada 210) define issues concerning radio frequency emission. The Model 9000 equipment complies with Canada 210 which specifies the license-free operation of spread spectrum radio equipment within the 5.7825 to 5.850 GHz band reserved for industrial, scientific, and medical (ISM) applications. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Professional Installation

The Industry Canada Rules type acceptance for this product requires professional installation to ensure that the equivalent isotropically radiated power (EIRP) meets Canada 210. Contact Larus Corporation for engineering assistance and recommended qualified installation contractors.

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Who Should Read This Manual

This manual is written for **craft personnel** who have an Associate of Arts degree in Electronics Technology (or equivalent vocational schooling, military training, or commensurate experience) and who are familiar with installing similar telecommunications radio equipment.

Organization of This Manual

This manual gives information and guidelines for installing a Larus Model 9000 *QuadHopper™* radio system. The information is organized as follows:

Section 1 contains information and procedures for receiving, inspecting, and unpacking the equipment, with instructions for reporting damage that the equipment may have suffered while in transit.

Section 2 describes the tasks and procedures for installing the equipment.

Section 3 has procedures for aligning the near-end and far-end antennas with each other.

Section 4 provides instructions for applying power to the equipment for the first time after it has been installed.

Section 5 presents a series of pre-installation and installation tasks which can be checked off as they are completed. These checklists provide a systematic guide to installing the Model 9000.

Section 6 offers Larus' standard warranty statement.

Section 7 lists the Model 9000 components and options.

Related Manuals

For a product description and specifications and for operating instructions, refer to the *QuadHopper™* Model 9000 System Description (Larus Practice 80-100-281).

For information and instructions regarding pre-installation requirements, refer to the *QuadHopper™* Model 9000 Site Planning and Preparation manual (Larus Practice 80-601-281).



DANGER

SHOCK HAZARD:

The Model 9000 uses a -24/-48 Vdc facility battery as its primary voltage source. Though not normally considered high voltage, the facility battery has more than the minimum power necessary to be a potentially fatal shock hazard. Be very careful when working around or connecting circuits energized by the facility battery.

General Safety Precautions

The following safety precautions apply to anyone working on or around the Model 9000 equipment. They are presented here for general review and are repeated throughout the manual before any procedural steps to which they apply.

1 Grounding

Safety of personnel is the main reason for grounding electronic equipment. The National Electrical Code and local and regional codes require the grounding of electronic equipment. The system uses a dedicated ground wire. (A ground must be connected if the tower or mounting pole does not meet the resistance requirement below.) Follow these guidelines in providing an earth ground for the Model 9000:

- The ground conductor must be connected to an earth ground or the main ground at the branch circuit power panel.
- The ground wire must be insulated and at least the same gauge as the power wires to the Model 9000.
- An electrical conduit must NEVER be used for a ground.

- A neutral of an electrical circuit must NOT be used for a ground; it may cause noise problems.
- The safety ground impedance from the Model 9000 back to the main service entrance must be less than 1 ohm.

2. Lightning Protection

The Model 9000 has internal circuits which provide secondary protection for the E1 interface connections from the effects of lightning. However, to ensure the unit is protected, the Model 9000 **must** have primary protection connected to earth ground.

Primary protection may be required in areas of high lightning activity and where the length of the indoor to outdoor cable exceeds 100 feet. Primary three element gas tube protectors used for E1 circuits are recommended. Refer to subsection 2.44.

3. Electrostatic Discharge Considerations

The Model 9000 assembly must be properly grounded. When grounded, electrostatic discharge (ESD) will not affect the operation of either unit. Use common, prudent antistatic precautions when working on or around the equipment.

4. Climbing Aloft on Tower or Other High Structure



DANGER:

Wear approved and inspected safety equipment when climbing aloft on any antenna tower or other antenna-mounting location where there is a risk of falling.

ALWAYS work with a line tender on the ground who can summon aid if you are injured.



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General

- 1.101 On delivery by a transit company, inspect and inventory the Model 9000 equipment. The receiving inspection includes steps to follow in the event the equipment has been damaged in transit. Tasks related to receiving the 9000 equipment include the following:

Inspect the shipping containers for external damage.

- Unpack the equipment.
- Inspect the equipment for hidden damage incurred during shipping.
- Repack the equipment for reshipping if required.
- Return the equipment for repair of damage incurred during shipping (as required).

- 1.102 This paragraph is reserved for future issue changes. Practice Issue applies to equipment listed in Equipment Issue Information, Section 7.

1.2 Inspecting and Unpacking Shipment

Before accepting delivery of Model 9000 equipment from a transfer company's carrier, carefully inspect the shipping container. If you find damage, note it on the waybill and require the transfer company's agent to acknowledge the problem by signing the waybill under the damage notation. **Notify the transfer company immediately to submit a claim for damages.**

- 1.202 Larus packages the Model 9000 for shipment "per end," where one set of shipping containers contains a single Controller/Radio Frequency (RF) assembly plus hardware and cables. Equipment components are packed separately in wood and corrugated shipping containers and cushioned by preformed shock absorbing packing material (refer to Figure 1-1). Unpack the equipment from the shipping containers with care; **do not destroy the containers to open them!** Larus recommends saving all packing materials for reuse if it is necessary to reship the equipment.

- 1.203 Inventory the contents of the shipping containers against the packing list to ensure all items are there. Contact Larus if any items are missing.

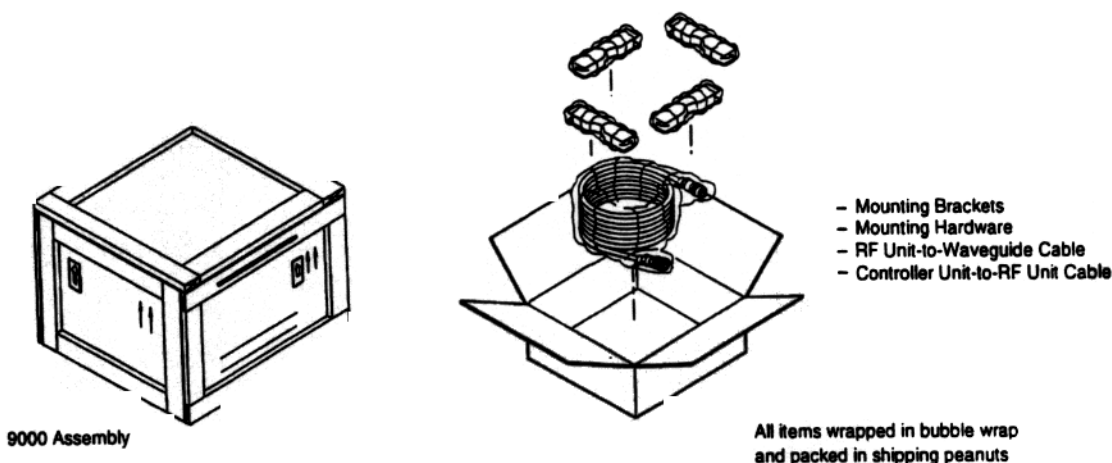


Figure 1-1. Model 9000 Shipping Containers

- 1.204 Notice which radio has the high transmitter (it should be marked Tx 5.801 or Hi Tx). Install this radio at the end of your link that has the greater urban density around it. Refer to your path survey for details (see Section 5).
- 1.205 Inspect the equipment components for damage that may have occurred during transit. If any is found, immediately notify the transfer company. Save all packing materials for the transfer company's inspection and file a damage report and claim with the transfer company.

1.3 Repair of Shipping Damage

- 1.301 Equipment is shipped Free On Board (F.O.B.) from our factory shipping dock in San Jose, California. Larus is not responsible for damage that occurs during shipping, nor will Larus repair such damage under the conditions of its warranty. All repairs for shipping damage will be billed to the customer. Prompt notification of damage will ensure claim validity and will help expedite payment from the transfer agent or its insurance carrier for the necessary repairs.



NOTE:

Call 1-800-999-9946 and ask Larus Customer Service for a return merchandise authorization (RMA) number before you return a unit damaged in transit.

1.4 Reshipping Equipment

- 1.401 Pack the 9000 equipment to prevent damage in transit before reshipping it either to the factory for repairs or to an installation site separate from the receiving facility. Use either the original shipping containers or equivalent packing adequate to prevent equipment damage.



NOTE:

Larus will invoice the purchaser for all repairs to equipment that has been damaged while in transit to Larus.

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2.1 Overview

- 2.101** Use the procedures in this section for installing a Model 9000 radio system. Refer to Section 5, Installation Checklists, for planning information you will need to have in hand.

**NOTE:**

Before proceeding with equipment installation, the installation site must be prepared according to the instructions in the Model 9000 Site Planning and Preparation manual (Larus Practice 80-601-281).

**NOTE:**

For the Model 9000 to operate properly, the path between the near and far ends must be greater than 1/2 mile. If your path length is less than this distance, contact Larus.

2.2 Tools Required

- 2.201** Installing the Model 9000 requires only common hand tools. In addition to a standard set of flat blade and cross-tip ("Philips") screwdrivers, you will need these tools:

- | | |
|-----------------------------|-----------------------------|
| 7/16 inch socket/nut driver | • 9/16 inch open-end wrench |
| 7/16 open-end wrench | • 3/4 inch socket |
| • 9/16 inch deep socket | • 3/4 inch open-end wrench |

- 2.202** You will also need an ohmmeter to check that the shelves and rack are properly grounded and a voltmeter to check the facility battery (-24/-48 Vdc).

2.3 Installing Equipment

- 2.301 The Model 9000 assembly is five rack units (5RU) high and installs in a standard 19-inch or 23-inch equipment shelf (refer to Figures 2-1 and 2-2). A typical mounting arrangement for the equipment is shown in Figure 2-3.
- 2.302 The following tasks must be performed to complete a 9000 installation:
- Connect plant battery and ground to the controller shelf. Ensure that the plant battery is not turned on until the complete system is cabled.
 - Connect shelf alarm outputs to facility alarm equipment.
 - Connect the E1/DS1 lines to the Control Module.
 - Connect a VT-100 (or compatible) terminal or terminal emulator to the controller for local maintenance access to the equipment.
 - Ground the control and RF modules as described in subsection 2.44. The cabinets must be connected to earth ground.
 - Interconnect the two units by running the furnished coaxial cable from J2 on the controller to INTERFACE IF on the RF module.
 - With reference to Figure 2-4, mount the antenna on a mast or tower. Ensure that the antenna mount is rigid and will not move in the wind. Make certain that the antenna and supports will withstand the wind loading commonly encountered at the location. Contact the antenna manufacturer to determine the maximum wind loading for the antenna installed.



DANGER:

Wear approved and inspected safety equipment when climbing aloft on any antenna tower or other antenna-mounting location where there is a risk of falling.

ALWAYS work with a line tender on the ground who can summon aid if you are injured.

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