TA3633-xx Transportable Repeater

User's Guide

MBD-00006 - Issue 01 - July 2024

1 Contents

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Preface

Scope of Manual

This user's guide provides information on the TA3633-xx Transportable Repeater and TA3633-xx Dual Battery Transportable.

Alerts

Please follow exactly any instruction that appears in the text as an 'alert'. An alert provides necessary safety information as well as instructions about the proper use of the product. This manual uses the following types of alert:

Warning This alert is used when there is a hazardous situation which, if not avoided, could result in serious injury or death.

This alert is used when there is a hazardous situation which, if not avoided, could result in minor or moderate injury.

Notice This alert is used to highlight significant information that may be required to ensure procedures are performed correctly. Incorrectly performed procedures could result in equipment damage or malfunction.

This alert is used to highlight significant information that may be required to ensure that you perform procedures correctly, or to draw your attention to ways of doing things that can improve your efficiency or effectiveness.

Associated Documentation

The following associated documentation for this product is available on the Tait Partner Portal website.

- Safety and Compliance Information supplied with each radio, the same information is included in this user's guide.
- MBD-00002-xx TB7300 Specifications Manual

The characters **xx** represent the issue number of the documentation.

Technical notes are published from time to time to describe applications for Tait products, to provide technical details not included in manuals, and to offer solutions to any problems that arise. Look for new or updated technical notes on the Tait Partner Portal website.

Acronyms

Acronym	Definition
AC	Alternating Current
Ah	Ampere-hour
DC	Direct Current
DMR	Digital Mobile Radio
EEA	European Economic Area
EU	European Union
IP	Internet Protcol
LED	Light Emitting Diode
PA	Power Amplifier
PAMR	Public Access Mobile Radio
PMR	Private Mobile Radio
PTT	Push To Talk
RSSI	Received Signal Strength Indicator
SLA	Sealed Lead Acid
VSWR	Voltage Standing Wave Ratio

Publication Record

Issue	Publication Date	Description
1	July 2024	First release

1 General Safety and Compliance Information

This chapter provides general information on safety precautions for operating the transportable base station/repeater.

1.1 Personal Safety

1.1.1 Explosive Environments

Warning Do not operate the equipment near electrical blasting caps or in an explosive atmosphere. Operating the equipment in these environments is a definite safety hazard.

1.1.2 High Temperatures

Take care when handling a repeater which has been operating recently. Under extreme operating conditions (+140°F [+60°C] ambient air temperature) or high duty cycles, the external surfaces of the base station can reach temperatures of up to +176°F (+80°C).

Warning If the unit is operated in a high duty cycle environment with the lid closed, the maximum output power should not exceed 15W.

1.1.3 LED Safety (EN60825-1)

This equipment contains Class 1 LED Products.

1.1.4 Proximity to RF Transmisions

To comply with the RF Field Limits for Devices Used by the General Public for (Uncontrolled Environment)[a], a safe separation distance of at least 12 feet (3.6 metres) from the antenna system should be maintained.

This figure is calculated for a typical installation, employing one 50W base station transmitter. Other configurations, including installations at multi-transmitter sites, must be installed so that they comply with the relevant RF exposure standards.

1.2 Equipment Safety

1.2.1 Installation and Servicing Personnel

The equipment should be installed and serviced only by qualified personnel.

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[a]Reference Standards Health Canada's Safety Code 6: *Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3kHz to 300GHz*

USA Federal Communications Commission OET bulletin 65 (47CFR 1.1310)

IEEE C95.1 2005: *Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300GHz*

1.2.2 Preventing Damage to the PA

The repeater has been designed to operate safely under a wide range of antenna loading conditions. Transmitting into a low Voltage Standing Wave Ratio (VSWR) will maximize the power delivered to the antenna.

Notice Do not remove the load from the Transportable Repeater while it is transmitting.

Load transients (switching or removing the load) can damage the PA output stage.

1.3 Environmental Conditions

1.3.1 Operating Temperature Range

The operating temperature range of the equipment is shown below.

Table 1.1 Operating temperature range and conditions

Operating Temperature Range	Operating Conditions
–22°F to +140°F (–30°C to +60°C)	Ambient temperature with external DC, battery isolated
–22°F to +122°F (–30°C to +50°C)	Ambient temperature with internal battery and AC input

Notice Ambient temperature is defined as the temperature of the air at the intake to the cooling fans.

1.3.2 Humidity

The humidity should not exceed 95% relative humidity through the specified operating temperature range.

1.3.3 Dust and Dirt

For uncontrolled environments, the level of airborne particulates must not exceed 100µg/m^3.

1.4 Regulatory Information

1.4.1 Distress Frequencies

The 406 to 406.1MHz frequency range is reserved worldwide for use by Distress Beacons. Do **not** program transmitters to operate in this frequency range.

1.4.2 Compliance Standards

This equipment has been tested and approved to various national and international standards. Refer to the latest issue of MBD-00002-xx, TB7300 Specifications Manual, for a complete list of these standards.

1.4.3 Unauthorized Modifications

Any modifications you make to this equipment which are not authorized by Tait may invalidate your compliance authority's approval to operate the equipment.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

1.4.4 Health, Safety and Electromagnetic Compatibility in Europe

In the European Community, radio and telecommunications equipment is regulated by Directive 2014/53/EU. The requirements of this directive include protection of health and safety of users, as well as electromagnetic compatibility.

Intended Purpose of Product

This product is a radio transceiver. It is intended for radio communications in the Private Mobile Radio (PMR) or Public Access Mobile Radio (PAMR) services, to be used in all member states of the European Union (EU) and states within the European Economic Area (EEA). This product can be programmed to transmit on frequencies that are not harmonized throughout the EU/EEA, and will require a license to operate in each member state.

Declaration of Conformity

You can download the formal Declaration of Conformity from https://www.taitcommunications.com/our-resources/compliance/declarations-of-conformity#base-stations-|-repeaters-link.

2 Introduction

The Transportable Repeater is a complete repeater mounted in a rugged Pelican case.

The Transportable Repeater consists of:

- two Tait TP9300 portable radios
- an external direct current (DC) supply
- an internal 12V, 12 ampere-hour (Ah), Sealed Lead Acid (SLA) battery
- a charge circuit for a DC supply or external DC adapter to charge the internal battery
- switching circuits for external DC or internal battery operation

Figure 2.1 Transportable Repeater

The Transportable Repeater can also be connected to a Tait Dual Battery Transportable which provides an additional 24Ah of portable external power.

Notice The Transportable Repeater and Dual Battery Transportable are designed to be waterproof when the case is closed. They should not be operated in the rain with the case lid open.

Warning Do not air freight the unit if it contains lithium batteries rated over 12Ah in capacity. Ship the batteries separately by road freight.

3 Features

The Transportable Repeater includes the following features:

- a low voltage warning
- a battery capacity meter to show battery charge state
- remote battery sensing
- an audible over the air low battery warning
- over the air battery or external DC supply voltage readings
- two LED status indicators:
    - Battery Status
    - Charge Status

The Dual Battery Transportable includes the following features:

- dual internal batteries
- dual battery meter to show battery charge state
- two LED charge status indicators, one for each battery

4 Configuration

The TA3633 portable repeater uses custom versions of the Tait programming software and radio firmware.

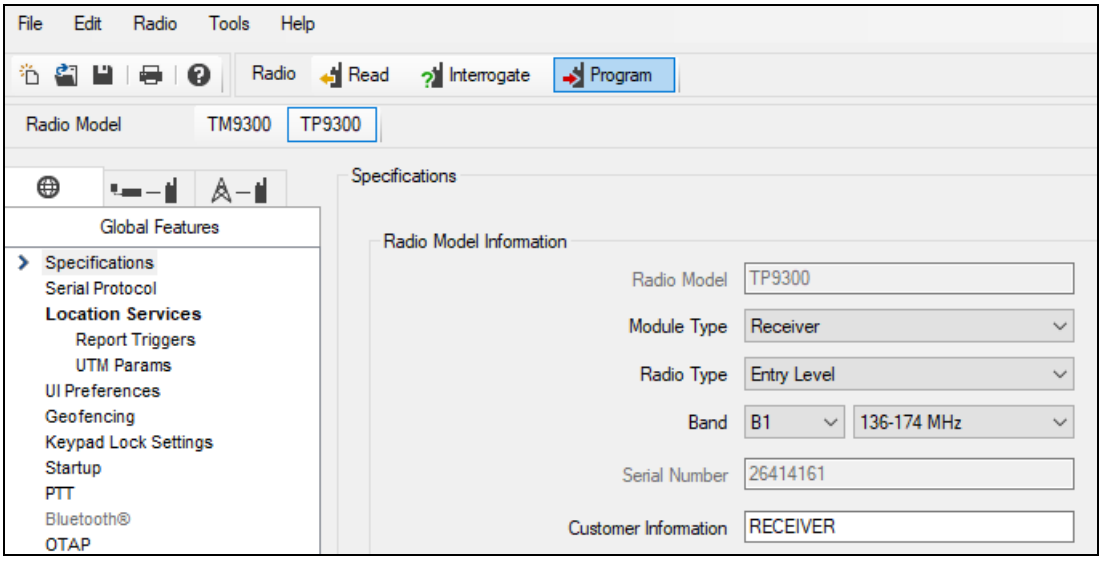
Notice The radios must have firmware version 3633A1xx installed and use version 3633A2xx of the programming software.

Please contact your Tait representative for the latest versions of the firmware and programming software.

4.1 Global Specifications

To define whether the radio is the receiver or transmitter:

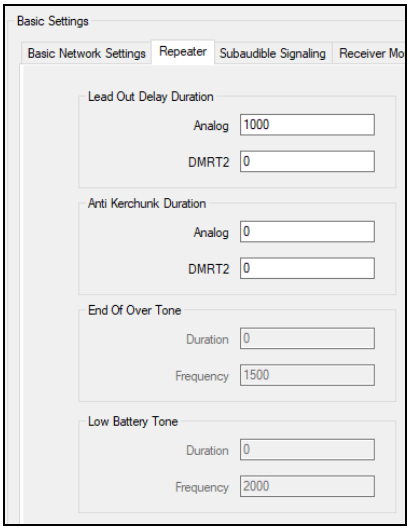
1. Navigate to **Global Features > Specifications**.
2. From the Radio Model Information window select one of the Module Types:
    - Receiver
    - Transmitter



4.2 Configuring the Receiver Radio

When configuring the receiver radio, Lead Out Delay Duration and Anti Kerchunk Duration values can be set from the **Basic Settings > Repeater** menu.

Lead Out Delay Duration



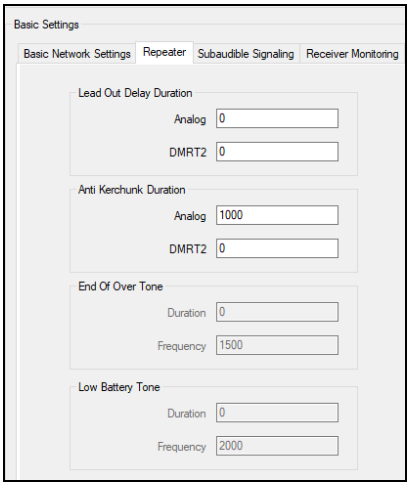
Lead Out Delay Duration is used to add a tail to the end of a transmission.

The duration can be set from 0 up to 5 seconds by entering the required duration value in the Analog field.

Lead Out Delay Duration time is set in Milliseconds (ms).

This option is only available in analog mode.

Anti Kerchunk Duration



This field is only set in the receiver module when it is configured as a TA3633-22 Link.

The Anti Kerchunk feature allows two analog repeaters to be connected to form a network without the two repeaters locking up in a constant transmit loop when the first repeater stops transmitting.

This can be set from 0 to 5 seconds by entering the required duration value in the Analog field. The duration will depend on the length of the configured tail in a repeater.

Anti Kerchunk duration time is set in Milliseconds (ms).

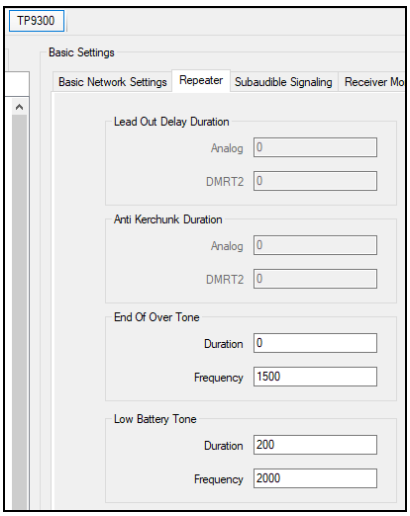
Notice This time should be set longer than the Lead Out Delay Duration tail time. When the repeater with a tail stops transmitting, the second repeater receivers anti kerchunk time will expire and prevent the repeater from transmitting.

4.3 Configuring the Transmitter Radio

When configuring the transmitter radio, End of Over Tone and Low Battery Tone values can be set from the **Basic Settings > Repeater** menu.

End Of Over Tone

> This option is not available in Analog mode.



On Digital Mobile Radio (DMR) channels an End Of Over Tone is available. This acts as a DMR tail, it is played on the DMR channel, and will alert all users to the to the end of a voice transmission.

In addition, it can indicate to a user if they are in range of the DMR repeater. The user will hear this tone when they release their Push To Talk (PTT) button and the repeater is in the process of ending the transmission.

The End Of Over Tone duration can be set from 0 to 5 seconds by entering the required duration value in the Duration field.

End Of Over Tone duration time is set in Milliseconds (ms).

The sound of this tone can also be configured by entering the required frequency value in the Frequency field.

> The default frequency setting of the End Of Over Tone is 1500Hz.

Low Battery Tone

The Low Battery Tone is a configurable over the air tone that will be played at the end of a transmission when the battery reaches a specific voltage.

> The Low Battery Tone voltage is set to 11.4V

The Low Battery Tone duration can be set from 0 to 5 seconds by entering the required duration value in the Duration field.

Low Battery Tone duration time is set in Milliseconds (ms).

The sound of this tone can also be configured by entering the required frequency value in the Frequency field.

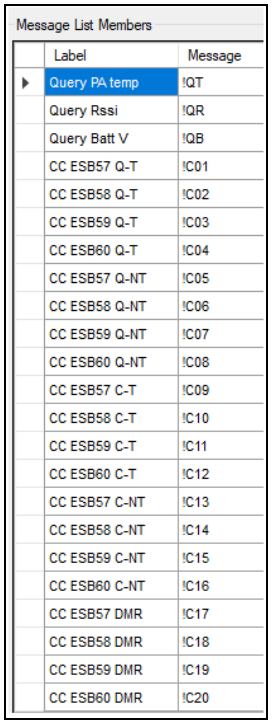
> The default frequency setting of the Low Battery Tone is 2000Hz.

4.4 Remote Control Short Data Messages

Remote control short data messages allow the user to remotely change the channel of the repeater and also query specific repeater information. This is achieved by sending a preset text message to the selected repeater. Examples of remote control short data messages include:

- query the Power Amplifier (PA) temperature
- query the last recorded Received Signal Strength Indicator (RSSI)
- query the battery voltage
- change the repeater channel

The remote control short data messages that are available via the radio menu are configured through the Tait radio programming application. This allows preset message options to be selected along with customization of the message label field.


Message List Members

	Label	Message
▶	Query PA temp	!QT
	Query Rssi	!QR
	Query Batt V	!QB
	CC ESB57 Q-T	!C01
	CC ESB58 Q-T	!C02
	CC ESB59 Q-T	!C03
	CC ESB60 Q-T	!C04
	CC ESB57 Q-NT	!C05
	CC ESB58 Q-NT	!C06
	CC ESB59 Q-NT	!C07
	CC ESB60 Q-NT	!C08
	CC ESB57 C-T	!C09
	CC ESB58 C-T	!C10
	CC ESB59 C-T	!C11
	CC ESB60 C-T	!C12
	CC ESB57 C-NT	!C13
	CC ESB58 C-NT	!C14
	CC ESB59 C-NT	!C15
	CC ESB60 C-NT	!C16
	CC ESB57 DMR	!C17
	CC ESB58 DMR	!C18
	CC ESB59 DMR	!C19
	CC ESB60 DMR	!C20

Example of the message options available.

To query the repeater or change the channel:

1. From the radio menu navigate to **Services > Text message > Preset message**.
2. Use the up and down keys to select a query or channel change.

As radios are configured to individual requirements, not all remote control short data message options may appear in the drop down list in radio menu.

1. Press the **Select** key when the required query is highlighted on the display.
2. When the query is selected the corresponding preset message code will be shown. Press the **Send** key.
3. The Send using menu will appear, select **Address book**.
4. Use the up and down keys to select the required repeater from the displayed list.
5. Press the **Options** key to display the option menu.
6. Select **Send** from the Options menu. A "Sending message to your chosen repeater" notification will be displayed followed by a "Message sent" confirmation if the send is successful.
7. A text message will be received on the radio containing the relevant query information.

5 Transportable Repeater Operation

To enable single repeater operation:

1. Erect and connect the antenna to the RF connector.
2. Turn the Transportable Repeater on by putting the switch into the ON position.
3. Press and hold the Push to Check Battery button to check battery level. If the bars indicate the battery is low, charge the unit.
4. Select the required channel by using the up and down arrow buttons on the radio.
5. Test the Transportable Repeater by calling base on the repeater channel . If the call is successful the Transportable Repeater is ready to use.
6. Turn the Transportable Repeater off after use and prior to transporting by putting the switch into the OFF (Battery Isolate) position.

5.1 LED Status Indicators

Two LEDs are used to indicate the status of the Transportable Repeater:

- Battery Status
- Charge Status

The Battery Status LED also indicates battery voltage during use and charging for both receive and transmit operations.

5.1.1 Charge status indicator

The Charge Status LED indicates the charge status of the battery.

Table 5.1 Charge status indication

Charge Status LED	Status
Red	The battery is charging
Red, flashing	The battery is on trickle charge
Green	The battery is charged
Off	The Transportable Repeater is in sleep mode or the battery has been removed

5.1.2 Battery voltage and radio mode status indicators

The battery voltage and radio mode status LED, labeled Battery Status, indicates battery voltage during use and charging for both receive and transmit operations.

Table 5.2 Battery voltage and radio mode indicators

Battery Status LED	Voltage during charging	Voltage during use	Radio mode
Green	>12.8V	>11.4V	Receive
Red	>11.7V	>10.7V	Transmit
Red, flashing	<12.8V, >11.7V	<11.4V, >10.7V	Receive
Off	<11.7V	<10.7V	Off

5.2 Over The Air Radio Indicators

5.2.1 Battery voltage level

An indicative voltage value for the Transportable Repeater battery, or an externally connected power source, can be accessed by:

- querying the Transportable Repeater with a data message. See "Remote Control Short Data Messages" on page 15
- displaying the value by enabling **Diagnostic > Supply voltage** on the transmit portable.

5.2.2 Low battery tone

If the battery level drops to where the Battery Status LED flashes red the Transportable Repeater will transmit an audible tone. See "Low Battery Tone" on page 14.

5.3 Battery Features

5.3.1 Battery power

The Transportable Repeater battery is rated at 12Ah. The battery should power the unit for over 48hrs with typical 5/5/90 operation.

Notice Operating time is based on the standby current of the unit being 210mA at 13.8V.

5.3.2 Battery control

Onboard battery control provides two main functions:

- charging the battery
- providing a low battery turn off to prevent over-discharge of the battery

The Transportable Repeater will turn off once the battery voltage drops below 10.7V and will turn on again if the battery voltage rises above 11.7V.

5.3.3 Battery check

To check the battery press and hold the Push to Check Battery button to give an indication of the battery charge. If the battery is fully charged the bar graph will light up with a bar next to F, full. If not then connect a power supply and charge the unit.

It takes approximately 24 hours to fully charge from flat, E, empty to F, full.

5.3.4 Charging the battery

An external DC power supply with an output between 10 and 30 volts, connected to the DC input socket, can power the radio and the charge the internal battery.

Do not exceed 30V on the DC input. Voltages in excess of this may permanently damage the unit.

The lid of the Transportable Repeater or Dual Battery Transportable case must be open while charging.

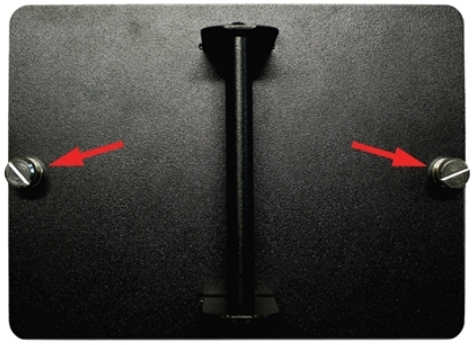
Methods of powering the unit and charging the battery are achieved through connection to one of the following:

- a Tait supplied external 15V power supply with a rated output of 6.67A/100W
- an external power supply using the supplied clip lead
- a car lighter socket using the supplied lighter socket lead
- a Tait external battery case using the DC Link power cable found inside the external battery case

5.3.5 Replacing the battery

Removing the Battery

1. Ensure that the ON/OFF switch is set to OFF (Battery Isolate).
2. Unscrew the two captive panel screws, as indicated by the red arrows in the image to the right, and carefully lift the battery out by its handle.



Inserting a New Battery

> Ensure you observe the orientation of the battery before installing. The correct orientation is defined by the white protruding connector block.

1. Carefully lift the new battery and place it in the battery slot.
2. Ensure the battery connector is fully engaged before tightening the captive panel screws. To do this, firmly push the battery using the handle and check that it is sitting flush with the outside rim.
3. Screw and tighten the captive panel screws.

5.4 Storage and Maintenance

Charge the unit every month to ensure it is fully charged and ready to be used.

Check the unit is fully complete and contains the following items:

- AC/DC Charger
- Dual Battery Transportable to Transportable Repeater DC Link power cable
- External Battery DC Alligator Clip Charger lead

6 Using a Dual Battery Transportable

The Transportable Repeater can be used with a Dual Battery Transportable that provides an additional power source to power or charge the repeater.

The DC output of the Dual Battery Transportable is connected to the DC input socket of the Transportable Repeater using the DC Link power cable

6.1 Dual Battery Transportable Operation

Check the battery level of each battery before use to make sure the Dual Battery Transportable is fully charged.

For each battery, A and B, press and hold the Check Battery button to check battery levels. If bars are low, charge the unit.

To charge the batteries in the Transportable Repeater:

1. Connect the Dual Battery Transportable DC Output to the repeater DC Input connector using the DC Link power cable found inside the external battery case.
2. Turn on the Dual Battery Transportable by putting switch into the ON position.
3. Confirm the Dual Battery Transportable is working correctly by checking the Charge Status LED on the repeater. This LED will light up red when charging or green when fully charged with the DC Link power cable connected.

4. Switch to OFF (Battery Isolate) to turn off after use and prior to transporting.
5. Disconnect and return the DC Link power cable to the Dual Battery Transportable when finished.

6.2 Charging the Batteries

To charge the batteries in the Dual Battery Transportable see "Charging the battery" on page 18.

6.3 User Functions and Indicators

Press and hold the Push to Check Battery button to give an indication of the battery charge. If the battery is fully charged the bar graph will light up with a bar next to F, full. If not charge the unit.

It takes approximately 24 hours to fully charge from flat, empty (E), to full (F).

The lid of the Dual Battery Transportable must be open while charging.

6.4 Charge Status of Each Battery

The Charge Status LEDs indicate the charge status of each battery in the Dual Battery Transportable.

Table 6.1 Charge status indication

Battery Status	Charge Status	Status Indicators
Green	Fully charged	
Red, flashing	Trickle charging	
Red	Charging	

6.5 Storage and Maintenance

Charge the unit every month to ensure it is fully charged and ready to be used.

Check the unit is fully complete and contains the following items:

- AC/DC Charger
- Dual Battery Transportable to Transportable Repeater DC Link power cable
- External Battery DC Alligator Clip Charger lead

6.6 Replacing the Batteries in the Dual Battery Transportable

To replace the batteries, follow the steps shown in "Replacing the battery" on page 19

7 Troubleshooting

Use the information in "Troubleshooting" below to help diagnose issues with the Transportable Repeater or Dual Battery Transportable.

Table 7.1 Troubleshooting

Issue	Solution
The unit does not power on	• press the FUSE (Push to Reset) button • make sure the battery is inserted and seated properly • make sure the switch is in the ON position
The Transportable Repeater is not repeating	• make sure the repeater and radios are on the same channel • make sure the antenna is connected securely
The Dual Battery Transportable is not charging	• make sure the charge link cable is connected securely from DC Output to the DC input on the repeater or link case • make sure the DC input cable is connected securely to external battery case