

Draft



TB7304 Transportable Mobile Repeater

User's Guide

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Preface

Scope of Manual

This user's guide provides information on the TB7304 Transportable Mobile Repeater (TMR). For full details on the operation of the repeater itself, refer to MBD-00001-xx TB7300 Installation and Operation Manual.

Document Conventions

Please follow exactly any instruction that appears in the text as an 'alert'. An alert provides necessary safety information as well as instruction in 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 death or serious injury.



Caution 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 information that is required to ensure procedures are performed correctly. Incorrectly performed procedures could result in equipment damage or malfunction.



This icon is used to draw your attention to information that may improve your understanding of the equipment or procedure.

Associated Documentation

The following documentation is also available for your Tait product, which can be accessed from the Tait Technical Support website (<http://support.taitradio.com>):

- Safety and Compliance Information—supplied with each radio. (The same information is included in this user’s guide.)
- MBD-00001-xx TB7300 Installation and Operation Manual

Publication Record

Issue	Publication date	Description
01	March 2019	First release.

1 General Safety and Compliance Information

This chapter provides general information on safety precautions for operating the transportable 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).

1.1.3 LED Safety (EN60825-1)

This equipment contains Class 1 LED Products.

1.1.4 Proximity to RF Transmissions

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 50 W base station transmitter. Other configurations, including installations at multi-transmitter sites, must be installed so that they comply with the relevant RF exposure standards.

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 Equipment Safety

1.2.1 Installation and Servicing Personnel

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

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 VSWR will maximize the power delivered to the antenna.

Notice Do not remove the load from the TB7304 while it is transmitting.

Load transients (switching or removing the load) can damage the PA output stage. See MBD-00001-xx TB7300 Installation and Operation Manual for recommendations.

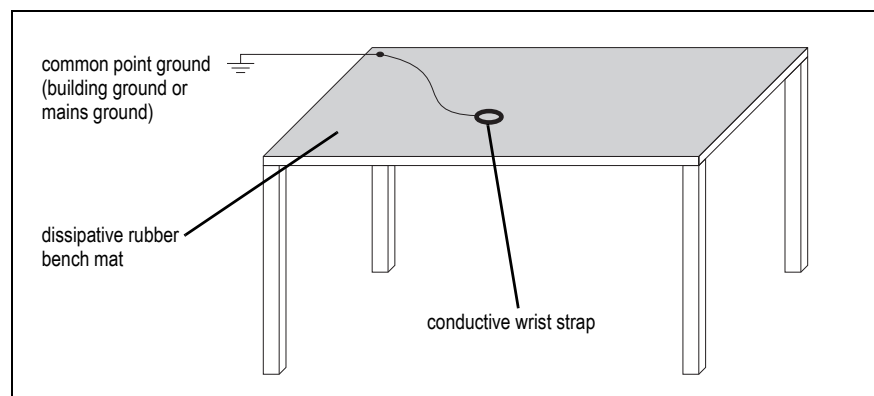
1.2.3 ESD Precautions

Notice This equipment contains devices which are susceptible to damage from static charges. You must handle these devices carefully and according to the procedures described in the manufacturers' data books.

We recommend you purchase an antistatic bench kit from a reputable manufacturer and install and test it according to the manufacturer's instructions. [Figure 1.1](#) shows a typical antistatic bench set-up.

You can obtain further information on antistatic precautions and the dangers of electrostatic discharge (ESD) from standards such as ANSI/ESD S20.20-1999 or BS EN 100015-4 1994.

Figure 1.1 Typical antistatic bench set-up



1.3 Environmental Conditions

1.3.1 Operating Temperature Range

The operating temperature range of the equipment is -22°F to $+140^{\circ}\text{F}$ (-30°C to $+60^{\circ}\text{C}$) ambient temperature. 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 $100\mu\text{g}/\text{m}^3$.

1.4 Regulatory Information

1.4.1 Distress Frequencies

The 406 to 406.1 MHz 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 the 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.taitradio.com/our-resources/compliance#European>.

1.5 Device and Network Security

If this radio network equipment is used for mission-critical applications, it is important to be able to ensure security and continuity of operation. For IP-network-connected equipment, it is also important to ensure that this equipment is not a means of compromising other equipment in the network.

All network elements should be physically secured, where possible. This includes the use of locked cabinets and locked rooms. Seals on connectors can also provide a visual indication of unauthorized tampering.

Tait recommends that all network and audio connectors should be sealed with the stick-on type of seal. The seal should reveal if any of the connectors have been unplugged, or if any unauthorized equipment has been plugged in.

The seals should be difficult to remove without breaking, and should bridge between the cable and equipment side (plug and socket) of the connection.

Seals should cover any unused network or audio sockets. This includes the Ethernet connector on any adaptor front panels, any spare switch ports, and the console port on the router and switch.

The seals should be difficult to reproduce. A sticker initialed or signed by the technician should satisfy this.

Seals must be replaced if they need to be disturbed during maintenance.

1 Introduction

The Transportable Mobile Repeater (TMR) is a complete transportable radio solution in a rugged case. It consists of:

- a TB7300 repackaged into a rugged pelican case with an internal AC supply
- an internal 12v SLA battery
- a charge circuit and switching circuits for external DC supply.

Notice TMR was designed to be waterproof, but do not operate it in the rain with the lid open.



An N-type antenna connector on the outside of the case enables a sturdy external antenna connection. An Amphenol screw-lock connector for the DC input is also located on the outside of the case.

Four LEDs are present to indicate the status of the repeater. Two further LEDs are located on the outside front of the case to indicate the status of the battery while charging.

2 Basic Operation

2.1 Battery Select Switch

Warning When shipping and charging the transportable, set the battery select switch to External DC/Battery Isolate to comply with safety regulations.

The battery select switch is protected with a raised red surround to avoid accidental switching on when the lid is closed.

Warning Risk of missing calls! Switching between Internal Battery and External DC/Battery Isolate will likely cause the transportable to restart!

When the switch is set to Internal Battery, the transportable runs from the internal battery (or mains supply if connected).

When the switch is set to External DC/Battery Isolate, the internal battery is disconnected from all circuitry in the transportable. In this situation, all the circuits in the transportable, including the repeater, can only run from an external DC supply. When connected to a mains lead, the charger circuitry is automatically switched on and connected to the internal battery.

2.2 Battery Power

With a fully-charged battery, an operating regime of 10% transmit at 15W, and 90% standby time will keep the transportable running for approx. 8 hours (with a new battery).

2.3 Battery Charging

Warning Risk of fire! The lid must be open when charging. The VRLA battery may vent when charged at a current greater than 3A. This does not occur during normal charging.

The transportable will shut itself down when the internal battery voltage drops too low. When that level of discharge has been reached, it will take up to 12 hours to recharge the battery using an AC mains connection. When

charging, press the recessed button located at the left of the Charge LED to turn charging off and on.

A DC input cable is supplied with the transportable for connection to external DC Supplies between 10 and 36 VDC.

Notice When the transportable is not in use, always switch the battery select switch to External DC/Battery Isolate.

2.4 LED Indication Details

2.4.1 Repeater

LED	Indication	Details
Repeater Power	green	repeater power is on
All LEDs/Alarm	flashing	power up sequence is in progress
Alarm	on	repeater is in offline mode
Alarm	flashing ^a	an alarm condition needs to be cleared
Receive	orange	receiver is receiving
Transmit	orange	transmitter is keyed

a. after the four power-up sequences

2.4.2 Status

This LED is only lit when an AC supply is connected.

LED	Indication	Details
Status	green	battery is fully charged or above 20% charged
Status	red, flashing	battery is low
Status	off	battery has been disconnected due to low voltage

2.4.3 Charge

This LED is only lit when an AC supply is connected.

LED	Indication	Details
Charge	red	battery is being charged
Charge	off	battery is fully charged

2.5 Antenna

The transportable is a 15W Repeater that requires a remote mounted antenna with a suitable ground plane. This antenna and internal duplexer must be tuned to the frequency of the Repeater. The transportable has an N-type antenna connector.

Caution Risk of harm from RF radiation! While the Repeater is operating (transmitting), you must ensure that there is always a distance of 0.9m between people and the antenna. This is the minimum safe distance.

2.6 Mains Socket Wiring

The repeater is shipped with a Schurter waterproof AC Mains socket this will need to be wired by an electrician or electrically registered person.

