

INSTRUCTION MANUAL

(UMTX-3B-1)

Everyday Wireless Model TX-3B UHF FM Data Transceiver Base Station



EVERYDAY WIRELESS LLC

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Thank you for purchasing the Everyday Wireless Model TX-3B UHF FM Data Transceiver. Before proceeding with the equipment installation, it is imperative that you read the following pages of notices and precautions. In order to ensure your equipment installation complies with FCC specifications and fulfills all warranty-related obligations, read comprehensively the IMPORTANT USER NOTICES and PRECAUTIONS sections below.

IMPORTANT USER NOTICES

- **FCC WARNING:** This equipment generates or uses radio frequency energy. Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.
- **FCC RF Exposure Requirements:** The antenna included with the Model TX-3b Transceiver must be installed to provide a separation distance of *at least 150 centimeters* from all persons, must not be co-located or operating in conjunction with any other antenna or transmitter, and must not exceed the antenna gain specified in the Antenna Use description below. Failure to observe these restrictions will result in exceeding the FCC RF exposure limits.
- **Antenna Use:** Various antennas are recommended, depending on customer requirements. A base station antenna should be chosen based on licensing restrictions (ERP limitations). Suggested antennas, depending on allowable ERP licensing, are as follows: Cushcraft CRX450B (7dBi, 450 – 470 MHz); Antenex 4507 (9.14 dBi, 450 – 460 MHz); Antenex 4607 (9.14 dBi, 460 – 470 MHz); RFS 455-6 (12.14 dBi, 450 – 460 MHz); RFS 455-7 (12.14 dBi, 460 – 470 MHz). **DO NOT** use any other antenna with the Model TX-3B Transceiver or modify the antenna / coaxial cabling without first consulting with Everyday Wireless or an Everyday Wireless qualified service organization.
- **Component Access:** There are no service accessory parts inside the transceiver. Do not try to open the transceiver without prior approval from Everyday Wireless. Opening the transceiver will void the warranty.
- **Service:** Only qualified service personnel must install or repair equipment.

PRECAUTIONS

- Do not modify the transceiver for any reason.
- Do not expose the transceiver to long periods of direct sunlight, nor place it near heating appliances.
- The Model TX-3B UHF FM Transceiver transmits data in the 450-470 MHz frequency band, which is regulated in the United States by the FCC. Because the FCC grants access to specific frequencies, and can grant access by multiple users to the same frequency, system performance may be affected by the presence of other nearby users of the frequency used by the owner of this transceiver.
- The United States Government is responsible for the operation, accuracy, and continued operation of the Global Positioning System (GPS). Accuracy and position fixes (latitude, longitude and altitude) can be affected by alterations made to the GPS satellites by the U. S. Government. Accuracy is subject to change in accordance with the U. S. Department of Defense civil GPS user policy and Federal Radio-navigation Plan. Positional accuracy and time to fix time can also be affected by poor view caused by

obstructions such as tall buildings, heavy foliage, and large cliffs or other obstructions where GPS satellite signals are blocked and poor satellite geometry conditions result.

DISCLAIMER AND LIMITATION OF LIABILITY

- Under no circumstances shall Everyday Wireless be responsible for any loss of data or any special, incidental, consequential, or indirect damages howsoever caused. Everyday Wireless assumes no responsibility for any damage or loss caused by deletion of data as a result of user error, malfunction, or repairs.
- Everyday Wireless LLC assumes no responsibility for any damages or loss resulting from the use of this product and user guide. Everyday Wireless LLC assumes no responsibility for any loss or claims by third parties that may arise through the use of this system.
- The contents of this User Guide are provided “as is”, except as required by applicable laws, no warranties of any kind, either express or implied, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose, are made in relation to the accuracy, reliability or contents of this user guide. Everyday Wireless reserves the right to revise this user guide or withdraw it at any time without prior notice. Everyday Wireless reserves the right to make changes and improvements to any of the products described in this user guide.

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Section 1 – Introduction

Note: Make sure you have read the IMPORTANT USER NOTICES and PRECAUTIONS sections before proceeding with the installation instructions.

1.1) Product Description and Basic Operation

The Everyday Wireless Model TX-3B is a synthesized UHF FM data transceiver designed to operate in the frequency range of 450 to 470 MHz. There are no user controls or adjustments.

The Everyday Wireless Model TX-3B is a half-duplex data communications device providing radio frequency (RF) data transmit and receive functions. The Model TX-3B transceiver is an all-inclusive unit containing a synthesized UHF data radio, GPS receiver, and supporting processing overhead to gather, compute, and transmit information in real-time. The Model TX-3B design is intended to be used for 12.5 kHz channel data telemetry applications.

Each Model TX-3B comes pre-programmed to a specific frequency licensed to each user. Reprogramming the unit to a different frequency can only be accomplished by the manufacturer.

The Model TX-3B processes vehicle information transmitted from Everyday Wireless Model TX-3 and TX-3M transceivers, and outputs this information serially through a DB25 connection. A DB25 to DB9 conversion cable is provided that allows the TX-3B to be plugged into any standard serial interface. In addition, the TX-3B transmits various commands to the Model TX-3 and TX-3M transceivers. Because data packets from the Model TX-3B burst (typically 25 msec.) in a proprietary time slot protocol, message collisions are avoided and higher throughputs are achieved.

The Model TX-3B has no user adjustments. Maximum output power is pre-set to 45 watts. The Model TX-3B Transceiver unit should only be opened by the manufacturer.

1.2) Technical Specifications

General	
Frequency Range	450 - 470 MHz (banded)
Channel Spacing	12.5 kHz
Frequency Stability	± 1.5 ppm
Supply Voltage	13.6 V DC $\pm 15\%$
Supply Current	
Transmit	< 7.5 A @ 13.6 VDC
Receive	< 100 mA @ 13.6 VDC
Size	5" wide X 3.25" deep X 1.75" high
Weight	approx. 1.5 pounds
Connectors:	
Power	2 position power connector
RF	SMA jack
GPS	MCX jack
Temperature (operating)	-25 deg. C + 55 deg. C
Temperature (storage)	-30 deg. C + 80 deg. C
Duty Cycle	Transmit: <10%
Antenna Impedance	50 ohms
Data Rate	Up to 9,600 bps
Transmitter	
RF Power Output	45 watts max.
Modulation / Emission Designator	11K3F1D
Rx to Tx Switching Time	<25 msec
Spurious and Harmonic Output	> 70 dBc
Receiver	
Sensitivity (12 dB SINAD)	< -113 dBm
Image Rejection	> 60 dB
Intermodulation Rejection	> 60 dB
Blocking	> 75 dB
Adjacent Channel	> 60 dB
Intermediate Frequencies	45 MHz and 455 kHz

Section 2 – Receiving, Inspection, and Installation

Note: Make sure you have read the IMPORTANT USER NOTICES and PRECAUTIONS sections before proceeding with the installation instructions.

2.1) Packing Contents and Inspection

Carefully unpack the transceiver and other installation items. Identify all of the items listed in the following table before discarding the packing material. If any items have been damaged during shipment, file a claim with the carrier immediately.

Supplied Accessories

Item #	Item	Part Number	Quantity
1	UHF Data Transceiver	Model TX-3B	1
2	Wall-plug power cable assembly with integral fuse (7.5 amp)	PCTX-3B-1	1
3	Low-loss RG-8 RF cable (50') with N connectors	RFC-3B-1	1
4	N to SMA adaptor connector	RFCON-NSMA	1
5	Low-loss RG58 GPS cable (50') with MCX connectors	GPSC-3B-1	1
6	Lightning Arrestor	LABH350NN	1
7	3.3 v active GPS antenna	39265-50	1
8	Mounting strap and screws	MSTX-3B-1	2
9	User manual	UMTX-3B-1	1

Antenna Options

Part No.	Antenna	Height	Frequency (MHz)	Gain	Wind Survival (mph)
CRX450B	Cushcraft CRX450B	4.3'	450-470	7 dBi	80
FG4507	Antenex FG4507	9.5'	450-460	9.14 dBi	125
FG4607	Antenex FG4607	9.5'	460-470	9.14 dBi	125
455-6	RFS 455-6	18.5'	450-460	12.14 dBi	125
455-7	RFS 455-7	18.5'	460-470	12.14 dBi	125

2.2) Installation

WARNING! VARIOUS ELECTRONIC EQUIPMENT IN YOUR FACILITY MAY MALFUNCTION IF THEY ARE NOT PROPERLY PROTECTED FROM THE RADIO FREQUENCY ENERGY WHICH IS PRESENT WHILE TRANSMITTING. CONSULT EVERYDAY WIRELESS OR AN EVERYDAY WIRELESS AUTHORIZED REPRESENTATIVES IF ANY INTERFERENCE PROBLEMS OCCUR.

Note: The following preparation instructions are for use by your EVERYDAY WIRELESS dealer, an authorized EVERYDAY WIRELESS service facility, or the factory.

Note: The antenna and transceiver require certain mounting surfaces and environments as described below. If no suitable mounting surface is available, please contact EVERYDAY WIRELESS for alternative hardware and mounting solutions.

Antenna and Transceiver Location

Choose a convenient, indoor location for the Model BS-3 Transceiver. This location must be accessible to wall power, within 100' of the computer that will receive messages, and 50' from the rooftop antenna location. Choose a remote location where the receiver will not be disturbed.

Antenna Installation

The rooftop antenna location should be at least 10 feet from nearby obstructions and at or near the highest point of the roof. The antenna can be mounted with a non-penetrating antenna stand or on an antenna mast. Please consult Everyday Wireless or an Everyday Wireless authorized representative to confirm that your desired installation configuration is acceptable.

1. Mount the approved antenna to the antenna stand/mast. Make sure the antenna is secured reliably.
2. Connect the provided lightning arrestor to the base of the antenna, ensuring that the orientation of the lightning arrestor is as described in the installation instructions provided with the lightning arrestor.
3. Connect a suitable grounding wire, 6 or lower gauge copper wire (not provided by Everyday Wireless), to the lightning arrestor and building ground. If no suitable building ground is available, run a ground wire down to the ground and secure to a grounding rod.
4. The 50' RG-8 coax antenna cable should now be connected to the base of the lightning arrestor and run to the indoor location of the TX3-B Transceiver. Care should be taken to ensure that the entrance point of the cable is adequately sealed as to prevent moisture to entering the facility. If the 50' RG-8 coax cable is not long enough to reach from the rooftop antenna to the TX-3B Transceiver location, consult Everyday Wireless before proceeding, as longer low loss cables are available for an additional fee.
5. Run the RG-58 coaxial GPS cable in parallel with the RG-8 RF cable.
6. Feed the antenna leads to the location where the TX-3B Transceiver is located.

Caution: Care should be taken to ensure that there are no kinks in the coaxial cables and that the cable will not be damaged by routing facility access and maintenance. Significant signal strength loss can occur if the antenna cable is subjected to sharp corners and care should be taken to avoid such circumstances.

TX-3B Installation

Note: Since there are no user adjustments necessary to operate the transceiver, mount the transceiver in a convenient, yet enclosed and secured location.

1. Connect the RG-8 antenna cable to the TX-3B Transceiver using the provided N to SMA adapter.
2. Connect the RG-58 antenna cable to the TX-3B's GPS antenna connector.
3. Secure the DB25 to DB9 adaptor cable to the TX3-B Transceiver.

4. Run the DB9 cable from the BS-3 Transceiver to the receiving computer and connect the cable to both the computer and transceiver.
5. Connect the provided wall source power plug to the TX3-B, preferably through a UPS device.

Section 3 – Maintenance

In order to ensure that the TX3-B is always ready for operation, it should be checked periodically so that potential problems may be discovered and corrected before they develop into any serious damage. A minimal preventive maintenance program will significantly increase the transceiver's lifespan.

This section describes the necessary preventive maintenance checks and tests the user can perform to easily identify most defects and problems. Any other defects or problems discovered during the normal operation of the system should be noted for future corrective measures.

CAUTION:

Stop the operation of the transceiver immediately if a problem is noted during normal operation that can otherwise damage the system.

This section also describes the corrective maintenance checks that can be performed on the transceiver.

3.1) Maintenance Concept

The maintenance concept for the transceiver is limited to the removal and replacement of the entire unit.

3.2) Preventive Maintenance Requirements

The following is a recommended timetable for performing preventive maintenance checks on the transceiver.

CAUTION:

Primary power to the transceiver must be turned OFF when performing preventive maintenance on the equipment.

Inspection

The transceiver should be inspected at least every three (3) months for defects or physical damage developed during operation. Inspect all the interface cables to and from the system for cracks, breaks, and proper seating with their mating connectors on the faceplate. Inspect all cables for frayed, broken, or damaged wires. In addition, inspect all transceiver connections for accumulation of dirt, grease, or any foreign material that can cause a non-connection. If a cable is found damaged or non-repairable, it should be replaced before operating the system again.

1. Confirm that the power cord plug is firmly locked into place at the transceiver unit.
2. Verify that the RF SMA connector is securely fastened.
 - a. Rotate the SMA connector clockwise to ensure the connection is tight.
3. Verify that the DB25 to DB9 adapter is firmly connected to the TX-3B transceiver's DB25 port and that the DB-9 cable is firmly connected to the adapter.

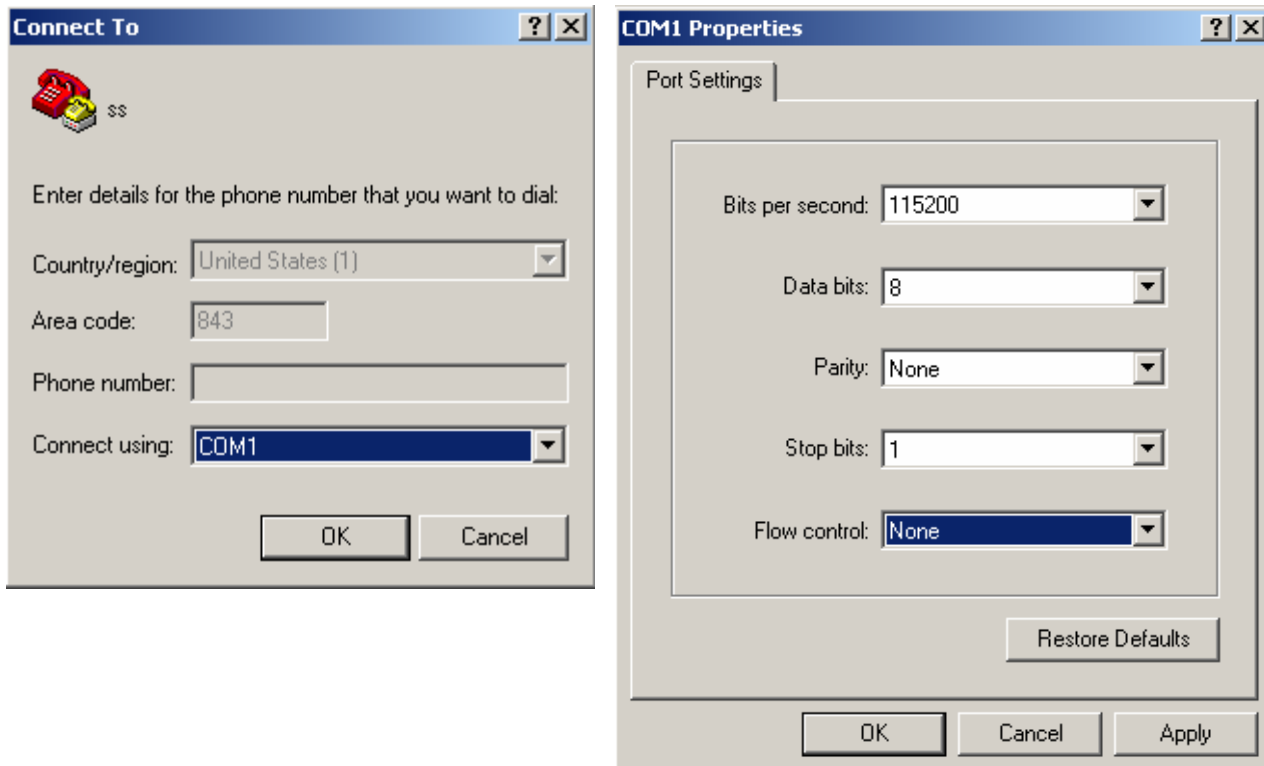
Inspection should be performed at least once every three (3) months. The frequency of inspection should be increased for transceivers exposed to dusty or heavy particulate environments.

Cleaning

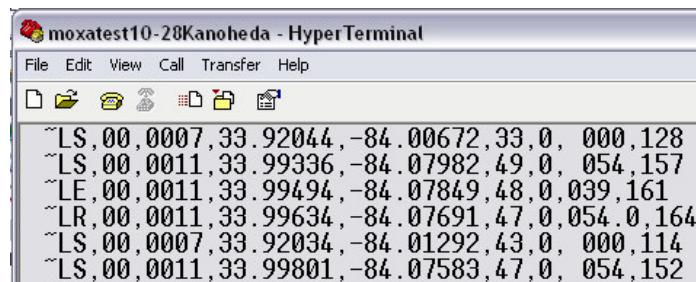
Clean the outside surfaces and areas around the connectors once a year. Clean the surfaces with a clean, soft, lint-free cloth. Clean the areas around the connectors with a soft bristle brush. To remove grease, fungus, or corrosion, use a cloth dampened with an appropriate electronics cleaning fluid. Cleaning should be done at least once every three months. The frequency of cleaning should be increased for units exposed to dusty or heavy particulate environments.

Section 4 – System Test

At the receiving computer, identify which COM port is receiving data from the DB-9 cable connected to the base station receiver. Open the Hyper-Terminal program, which is generally found by clicking the Windows Start Button – All Programs – Accessories – Communications. Name the connection “TX-3B Transceiver” and then select any available icon. When the ‘Connect To’ dialog box appears, select the appropriate COM port from the drop down list where it displays ‘Connect using’. Click ‘OK’ and the COM Properties dialog box will appear which should be set to the settings shown below.



Once the settings are entered and ‘OK’ is clicked, you will be connected to the COM port. If Hyper-Terminal does not allow you to connect to the correct COM port, another program may be using the port and it may be necessary to access Windows Task Manager to ensure that you have completely exited any potential conflicting software.



If buses are operating and within range of the base station antenna, data should begin to appear on the screen at intervals of 10 seconds for each vehicle (similar to the data shown above). In addition, the base station should be sending 'heartbeat' messages approximately once every 5 minutes. Data will appear as a series of comma delimited values.

If no data is visible in Hyper-Terminal for a considerable length of time and buses are confirmed to be in operation, it will be necessary to access the base station receiver. Check that the DB-9 cable is securely attached to the computer and base station receiver, and that the receiver power supply is plugged into a UPS or wall jack and that it is connected securely to the receiver. If all cabling and power supplies are connected properly and data is still not visible in Hyper-Terminal, contact Everyday Wireless for further support.