MTR3B-V4

"CURRAHEE" VERSION

Mountain Topper

"The original Miniature QRP Transceiver"

Operating Manual

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INTRODUCTION

Thank you for purchasing and using the new MTR3B-V4 "Currahee" Version Mountain Topper miniature three band High Frequency (HF) CW transceiver. The MTR3B-V4 is the latest of the "Mountain Topper" series of rugged, lightweight, miniature CW transceivers by LNR Precision - the manufacturer of "The original Miniature QRP Transceiver". It is an all-new design by Steve Weber (KD1JV) which has significant updates, but uses the same ultra lightweight, small form factor that was loved about the original.

As the name suggests, the MTR3B-V4 "Currahee" Version is designed for mountain top and backcountry use and is the ideal transceiver for Summits on the Air (SOTA), Parks on the Air (POTA), hiking, camping, and other outdoor adventures where size and weight are important.

FEATURES

The following are the main features of the MTR3B-V4:

- Miniaturized rugged design
- Tri-Band operation on 40, 20, and 15 meters
- CW mode (transmit and receive)
- Push button operation
- Color display
- Transmitter power of 5W
- DC supply voltage display
- Transmitter power output display
- Standing Wave Ration (SWR) display
- Sensitive receiver with a minimum detectable signal of around 0.1 uV
- Real Time Clock
- Three 62-character CW message memories
- Nine Frequence memories per band
- Adjustable Volume Control
- Adjustable Side Tone
- Distinctive "Currahee" color scheme and commemorative badge

MTR3B-V4 DISPLAY, CONTROLS, AND JACKS

The following sections describe the display, controls, and jacks, used to setup and operate the MTR3B-V4.

Front and Top Panels

Figure (1) shows the layout of the front panel of the MTR3B-V4 and figure (2) shows the top panel. Each control and jack are described below.
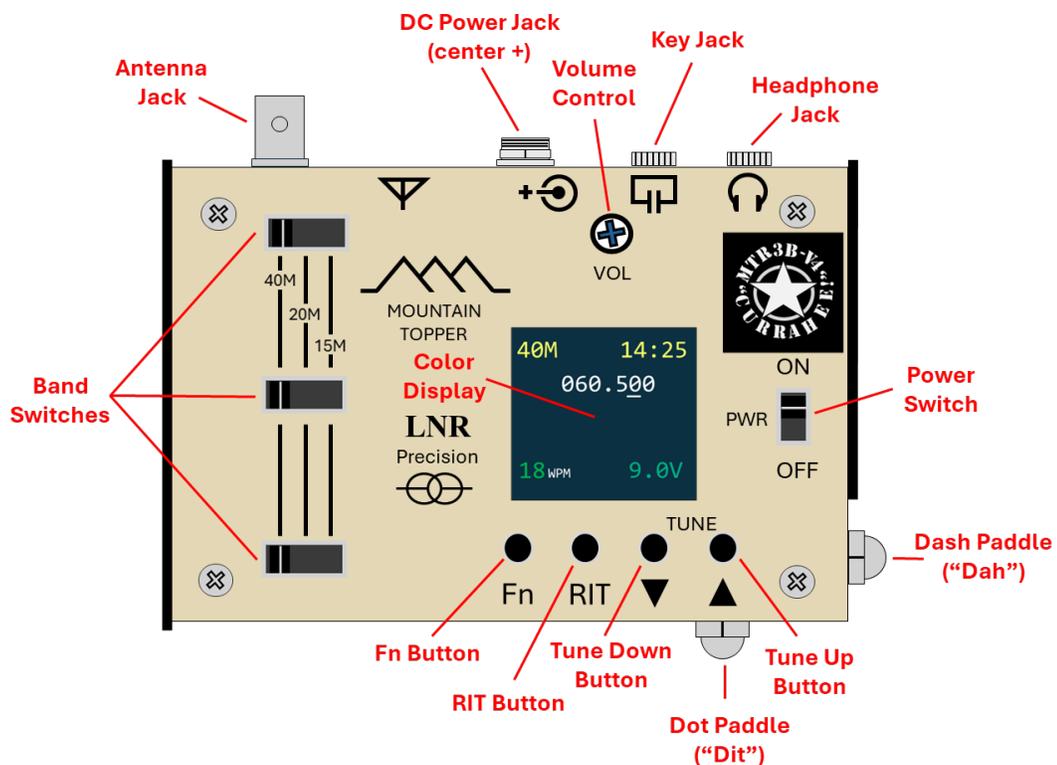

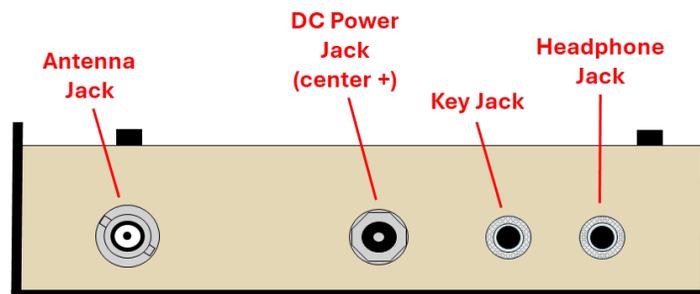**Figure 1. MTR3B-V4 Front Panel.**

Figure 2. MTR3B-V4 Top Panel.

1. **Antenna Jack** – The Antenna Jack is a BNC female connector for connection of an HF antenna with a nominal impedance of 50 Ohms.
2. **DC Power Jack** – The DC Power Jack is a 5.5mm X 2.1mm coaxial connector. The center pin is positive (+).
3. **Key Jack** – The Key Jack is a 1/8 in. (3.5mm) stereo jack. The Tip is the dot "dit" and the Ring is the dash "dah".
4. **Headphone Jack** – The Headphone Jack is a 1/8 in. (3.5mm) stereo jack wired with the tip and ring connected together. Either a stereo or mono headphone will work.
5. **Band Switches** – The three Band Switches are used to change bands between 40, 20, and 15 meters. All three switches <u>must</u> be in the same position.
6. **Color Display** – The Color Display is a 1.06 in. x 1.04 in. (27mm x 26.3mm) five line color display (see Color Display section for more information).
   Fn Button – The [**Fn**] Button is a multi-function button used to set code speed, measure power and SWR, store message memories, and store / load frequency memories. The five functions of the [**Fn**] button (in order) are: CS, TUNE, F-MEM, DFE, and K-MEM.
7. **RIT Button** – The [**RIT**] Button is a multi-function button used to recall and send CW messages stored in memories, activate Receiver Incremental Tuning (RIT), set the clock time, and enter CAL mode. The six functions of the [**RIT**] button (in order) are: RIT, SET TIME, BFO ADJ, REV PAD, CAL, and EE ERASE.
8. **Tune Down Button** – The Tune Down [▼] Button is used to increase the frequency by 50 Hz., fast tuning of +100 Hz, and really fast tuning of +1 KHz.
9. **Tune Up Button** – The Tune Up [▲] Button is used to decrease the frequency by 50 Hz., fast tuning of -100 Hz, and really fast tuning of -1 KHz.
10. **Volume Control** – The Volume Control is a recesses potentiometer that can increase and decrease the receiver volume using a small Philips screwdriver. Normally, this is set once and the volume changed during operation using an inline volume control.
11. **Dot Paddle** – The Dot Paddle is a capacitive touch knob used to send a Morse Code Dot ("dit").
12. **Dash Paddle** – The Dash Paddle is a capacitive touch knob used to send a Morse Code Dash ("dah").

13. **Power Switch** – The Power Switch turns the MTR3B-V4 On and Off.

Color Display

Figure (3) shows the layout of the MTR3B-V4 Color Display. Lines 1 and 2 always show the same information. The information shown on lines 3 – 5 depend upon the current function. The bottom of figure (3) shows an example of a menu on lines 4 and 5 and the menu buttons below.
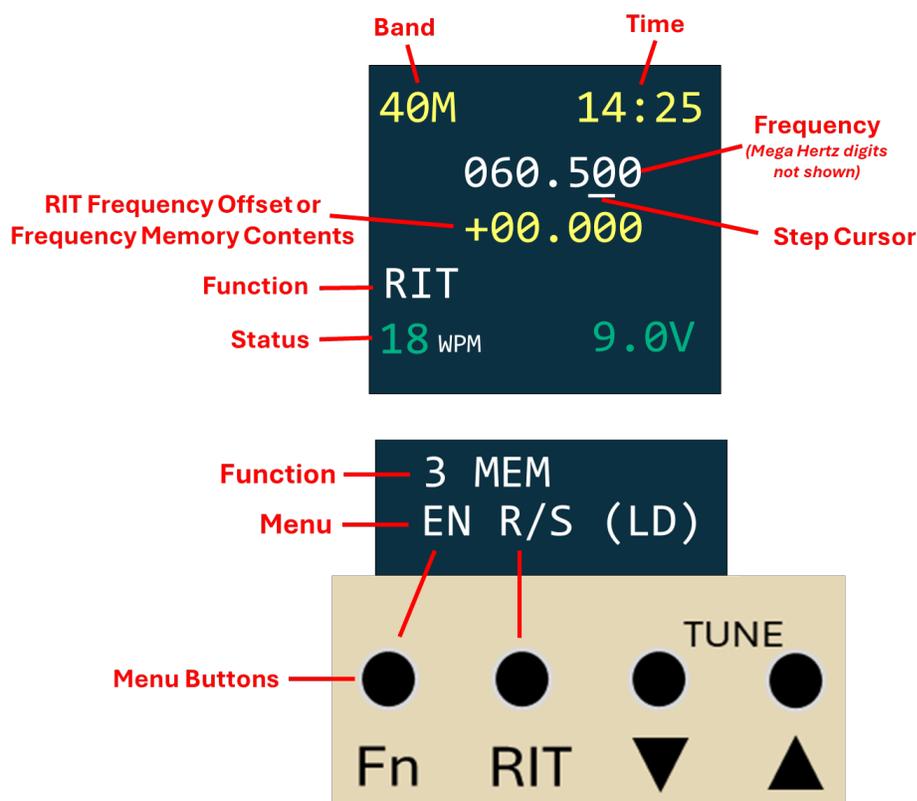

Figure 3. MTR3B-V4 Color Display.

1. **Band** – The Band display on Line 1 of the Color Display shows the band selected by the Band Switches.
2. **Time** – The Time display on Line 1 shows the current time in hh:mm format.
3. **Frequency** – The Frequency display on Line 2 shows the current operating frequency. The Mega Hertz digits are not displayed.   The first digit for the 40M band is "7". The first two digits for the 20M band are "14". The first two digits for the 15M band are "21".

4. **Step Cursor** – The Step Cursor shows which frequency digit the Tune Up [▲] / Tune Down [▼] buttons will change.
5. **RIT Frequency Offset or Frequency Memory Contents** – Line 3 of the Color Display shows either the RIT Frequency Offset or Frequency Memory Contents.

Function – The Function area on Line 4 shows the current operating function.

Menu or Status – Line 5 of the Color Display shows either menu options or two sets of transceiver status values. Status which can be displayed are: Code Speed and DC Voltage (green in safe voltage range) or RF Power and SWR. When Line 5 is used as a Menu, the buttons below the menu are used to select the matching menu item.

OPERATION

The following sections describe how to operate the MTR3B-V4.

Power ON / OFF

Move the Power Switch (marked "PWR") to the "ON" position to turn on the transceiver. Move it to the "OFF" position to turn off the transceiver.

Band Selection

To change bands, use the three Band Switches, as shown in figure (4). The manually operated Band Switches enable easy band changing without using relays or other complex circuitry.

1. Slide the top Band Switch to the desired band. Morse Code for the first digit of the selected band will be heard as confirmation.
2. Slide the middle filter Band Switch to the same position as the top switch.
3. Slide the bottom filter Band Switch to the same position as the middle switch.
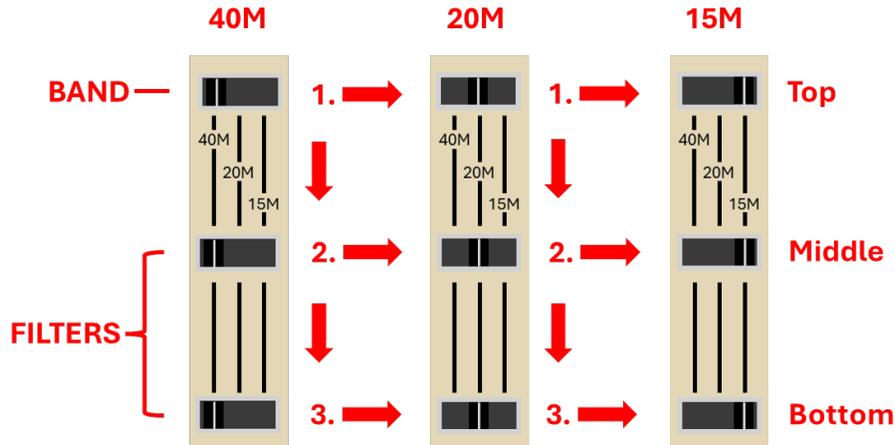
Figure 4. Band Switch Operation.

Band Switch Rules:

1. Always adjust Band Switches from top to bottom.
2. All three Band Switches <u>must</u> be switched to the same band (positioned along the vertical line corresponding to the selected band).
3. When selecting the 20M band (Band Switches in the middle position), start with all three Band Switches to the left (40M) or right (15M) and then slide them to the middle position going from top to bottom.

Frequency Selection

Manual Frequency Step Tuning

Manual Frequency Step Tuning is indicated by the Step Cursor positioned under the second to last digit (10 Hz digit) of the Frequency Display, as shown in figure (5).
To change frequency:

- Tap the TUNE Up [▲] button to increase the operating frequency by 50 Hz.
- Tap the TUNE Down [▼] button to decrease the operating frequency by 50 Hz.
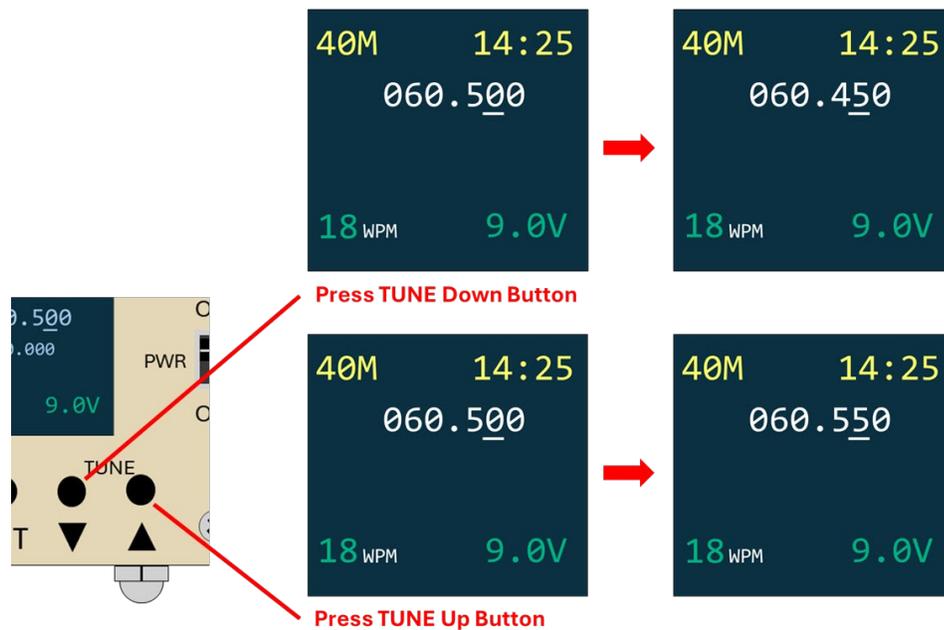
Figure 5. Changing Frequency.

Fast Frequency Step Tuning

Fast Frequency Step Tuning is indicated by the Step Cursor positioned under the digit to the right of the decimal point (100 Hz digit) of the Frequency Display.

To enter Fast Frequency Step Tuning:

- Press and hold either the TUNE Up [▲] or TUNE Down [▼] buttons.

To increase frequency:

1. Continue to Hold the TUNE Up [▲] button to auto-increase the operating frequency in 100 Hz steps.
2. Release the TUNE Up [▲] button to return to Manual Frequency Step Tuning.

To decrease frequency:

1. Continue to Hold the TUNE Down [▼] button to auto-decrease the operating frequency in 100 Hz steps.
2. Release the TUNE Up [▲] button to return to Manual Frequency Step Tuning.

Really Fast Frequency Step Tuning

Really Fast Frequency Step Tuning is indicated by the Step Cursor positioned under the digit to the left of the decimal point (1 KHz digit) of the Frequency Display.

To enter Really Fast Frequency Step Tuning:

- Tap the Function [**Fn**] Switch while in Fast Frequency Step Tuning.

To increase frequency:

1. Continue to Hold the TUNE Up [▲] button to auto-increase the operating frequency in 1 KHz steps.
2. Release the TUNE Up [▲] button to return to 100 Hz Fast Frequency Step Tuning.

To decrease frequency:

1. Continue to Hold the TUNE Down [▼] button to auto-decrease the operating frequency in 1 KHz steps.
2. Release the TUNE Up [▲] button to return to 100 Hz Fast Frequency Step Tuning.

Frequency Memory

The MTR3B-V4 has nine Frequency Memories for each band used to store favorite frequencies.

1. To access the Frequency Memories, push and hold the Function [**Fn**] Button until "F-MEM" is displayed on Line 4 of the Color Display. The functions will cycle through CS → TUNE → F-MEM.

Line 3 of the Color Display will show the contents of the currently selected memory location or the word "empty".

Line 4 of the Color Display will show the Memory Location and "MEM".

Select Memory Location

2. Tap the TUNE Up [▲] button to go to the next higher Memory Location. If the Memory Location is "9", tapping the TUNE Up [▲] button will roll it over to Memory Location "1".

3. Tap the TUNE Down [▼] button to go to the next lower Memory Location. If the Memory Location is "1", tapping the TUNE Down [▼] button has no effect.

Store Frequency Memory

The Store Memory function is used to enter and save a frequency into a specified memory location for future use, see example in figure (6).
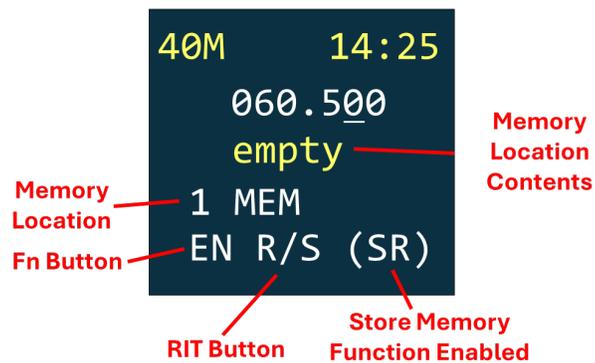

Figure 6. Store Frequency into Memory.

4. Press "R/S" ([**RIT**]) to change from Load Memory "(LD)" to Store Memory "(SR)".
Line 3 shows that Memory Location 1 is empty and Line 5 shows that the function enabled is Store Memory "(SR)".
5. Tap the Enter "EN" ([**Fn**]) button to store the frequency into the selected Memory Location. Line 3 of the Color Display will show the entered frequency. *Note: Once entered, Memory Location 1 contains the power on default frequency for the currently switched band.*
6. Tap the Enter "EN" ([**Fn**]) button to exit.

Load Frequency Memory

The Load Memory function is used to recall a frequency from the selected Frequency Memory and make that the new operating frequency, see example in figure (7). Line 3 shows that Memory Location 3 has a frequency of "040.000" (7040.000 KHz) stored in it and Line 5 shows the currently enabled function is Load Memory "(LD)".
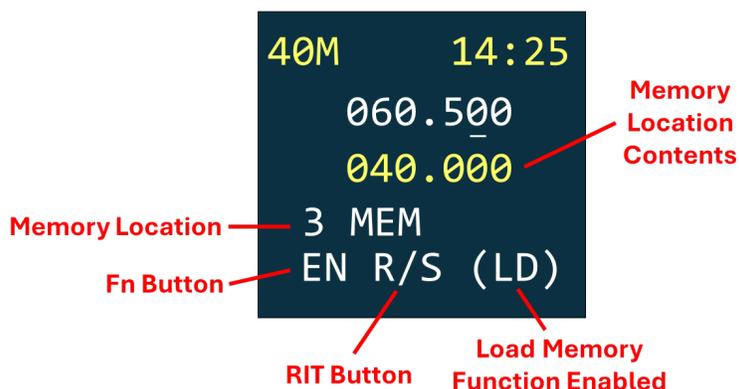
Figure 7. Load Frequency from Memory.

4. To load a frequency from the selected memory location, tap the Enter "EN" ([**Fn**]) button. Line 2 of the Color Display will show the new operating frequency. Note: If the memory location is empty, the operating frequency will not change.
5. Tap the Enter "EN" ([**Fn**]) button to exit.

Receiver Incremental Tuning (RIT)

The Receiver Incremental Tuning (RIT) function enables the received frequency to be offset from -60.0 KHz below the transmitting frequency to +99.0 KHz above. This is useful for operating split frequencies when working DX or just a slight frequency difference to avoid QRM.

1. To enable RIT, press and hold the RIT button until "RIT" appears on Line 4 of the Color Display. Line 3 will show the receive frequency offset, as shown in figure (3).
2. Press the TUNE Up [▲] button to increase the receive frequency.
3. Press the TUNE Down [▼] button to decrease the receive frequency.
4. Tap the Function ([**Fn**]) button to temporarily turn RIT off. "RIT R=T" will appear on Line 4 of the Color Display. Tap the Function ([**Fn**]) key again to turn RIT back on.
5. Press and hold the [**RIT**] button to exit the RIT function.

Direct Frequency Entry (DFE)

The Direct Frequency Entry (DFE) function allows you to directly enter a frequency via the Morse Code keyer paddle, which could be faster than using the tuning buttons. Firmware Version 1.08 or higher is required for DFE functionality.

1. Press and hold the Function ([**Fn**]) button until the function "DFE" appears on Line 4. The functions will cycle through CS → TUNE → F-MEM → DFE.
2. "---.-00" will be displayed on Line 3.
3. Use the Morse Code keyer paddle to enter the frequency. Full or cut Morse Code numbers can be used. The frequency will be entered from left to right (100 KHz digit, 10 KHz digit, 1 KHz digit, and lastly the 100 Hz digit), as shown in figure (8).
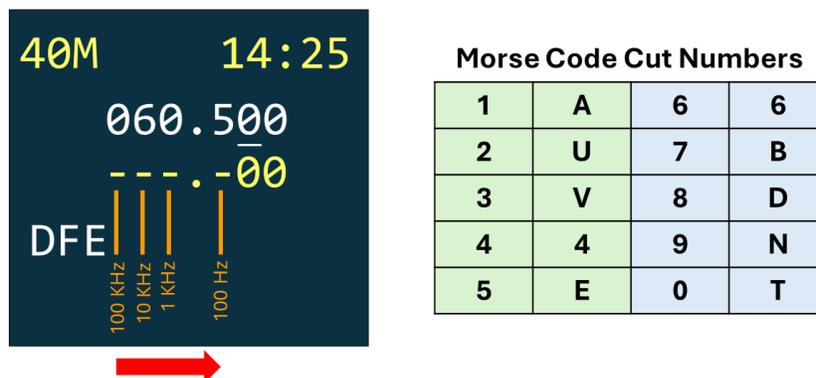

Morse Code Cut Numbers

1	A	6	6
2	U	7	B
3	V	8	D
4	4	9	N
5	E	0	T

Figure 8. Using DFE.

4. Once the 100 Hz digit is entered, the operating frequency will be updated after a 1/2 second delay.

DFE Rules:
1. If a frequency outside of band limits is entered, the invalid frequency will be cleared and you must start again.
2. Once the DFE function is enabled, a valid frequency in the current band must be entered to exit this function.
3. DFE is disabled in Straight Key mode.

Message Memory

Store Message Memory

The Message Memory function is used to store up to 62 Morse Code characters in each of the three memory locations. See figure (9) for the Message Memory menu options.

1. To enter the Message Memory function, press and hold the Function [**Fn**] button until the function "K-MEM" is displayed in Line 4. The functions will cycle through CS → TUNE → F-MEM → DFE → K-MEM.

2. Tap the "EM" ([**Fn**]) button to start the Enter Message mode. Line 4 will change to "ENT MSG".

3. Use the Keyer paddles to enter your message. A message memory can hold up to 62 characters (Morse letters, numbers, and special characters). Word spaces count as characters.

   Timing is used to determine the difference between a character and word spaces. The most critical aspect is character space timing. There needs to be three to seven dot time lengths between the elements of a Morse Code character to capture it. After a seven dot length pause, a word space is inserted. The most common mistake is to not leave enough time at the end of a character group (a word, number group, or prosign), so it runs into the next character group and it becomes a confusing run-on message. However, pausing too long results in a word space being inserted between characters in a group. Entering messages using the Keyer paddles may require some skill and practice.
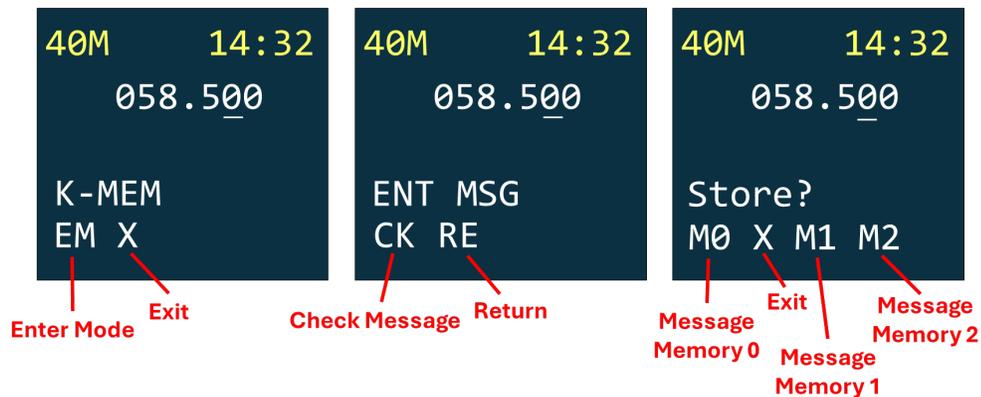

Figure 9. Keyer Message Memory Function.

6. If you make a mistake, tap the "X" ([**RIT**]) button to restart entering the message. An acknowledgement beep will be heard.

7. When you have finished keying in the message, tap the "CK" ([**Fn**]) button to check the message.

8. Tap "M0" ([**Fn**]), "M1" TUNE Down [▼], or "M2" TUNE Up [▲] buttons to store the message in Message Memory 0, 1, or 2, respectively, as shown on the right of figure (9).

9. Tap the "X" [**RIT**] button to exit.

Message Memory Storage Rules:

1. This function is not available while in Straight Key mode.

Recall Message Memory

To recall a Message Memory, perform the following steps:

1. Tap the [**RIT**] button.
2. Press the "M0" ([**Fn**]) button to recall Message Memory M0.
3. Press the "M1" (▼) button to recall Message Memory M1.
4. Press the "M2" (▲) button to recall Message Memory M2.
5. Press the "X" ([**RIT**]) button to exit.
6. Press the Dash paddle to pause message replay.
7. Press the Dot paddle to stop message replay.

Message Memory Recall Rules:

1. This function is not available while in Straight Key mode.

Keyer Speed

The keyer speed can be adjusted from 5 to 30 Words per Minute (WPM).

1. Press and hold the Function ([**Fn**]) button until the "CS" function appears on Line 4. The current Code speed value will be in yellow on Line 5 of the Color Display.

2. Tap the TUNE Up [▲] button or press the Dash paddle to increase the Code speed. A beep sounds when the speed is changed, and it will turn green.
3. Tap the TUNE Down [▼] button or press the Dot paddle to decrease the Code speed. A beep sounds when the speed is changed.
4. Tap the Function ([**Fn**]) button again to exit.

Figure 10. Keyer Speed Adjustment.

Tune Mode

Tune mode is used to measure and display transmitter power output and antenna Standing Wave Ration (SWR).

1. Press and hold the Function [**Fn**] button until the function "TUNE" is displayed on Line 4 of the Color Display. The functions will cycle through CS → TUNE.
2. Press the Dot Paddle.
3. The transmitter power output and antenna SWR will be displayed on Line 5 of the Color Display, as shown in figure (11).
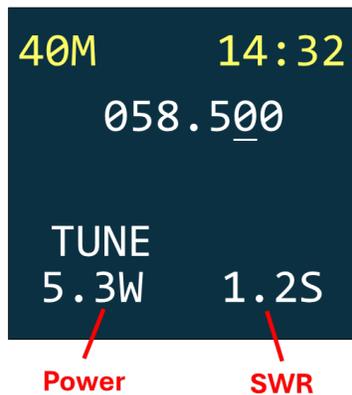4. Tap the Function [**Fn**] button again to exit.

Figure 11. Tune Mode Display.

Paddle Reverse

The Paddle Reverse function enables reversal of the Keyer paddle normal Dot / Dash assignment. This is needed because some other transceivers use the opposite wiring of the keyer jack. This feature requires at least Version 1.12c.

1. Press and hold the [**RIT**] button until the function "REV PAD" is displayed on Line 4 of the Color Display, as shown in figure (12). The functions will cycle through RIT → SET TIME → BFO ADJ → REV PAD.
2. Press the "TG" ([**RIT**]) button to toggle between "STD" and "REV".
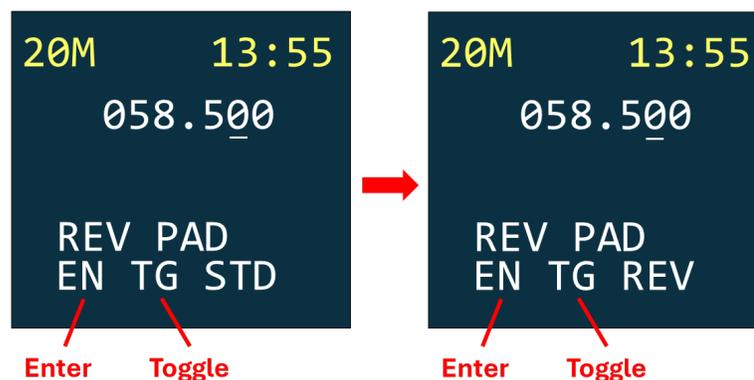3. Press the "EN" ([**Fn**]) button to exit.

Figure 12. Paddle Reverse Function.

Straight Key

The Straight Key mode disables the built-in electronic keyer and enables use of a hand key.

1. Press and hold the Function ([**Fn**]) button until "CS" appears on Line 4 of the Color Display.
2. Tap the [**RIT**] button. The Code Speed value will be replaced with "SK" on Line 5 of the Color Display.
3. Tap the Function ([**Fn**]) button to exit.

Note: The Straight Key mode is automatically entered if a mono plug is inserted into the Key Jack before the power is turned on.

Beacon

The Beacon function is used to repeatedly send a message memory until stopped by the operator. This is useful for calling CQ, for example. This feature requires at least Version 1.08.

1. Start sending a message (see Message Memory Recall section).
2. Press and hold the "X" ([**RIT**]) button until "BEACON 2S" is displayed on Line 5 of the Color Display, as shown in figure (13). This indicates the message will repeat after 2 seconds.
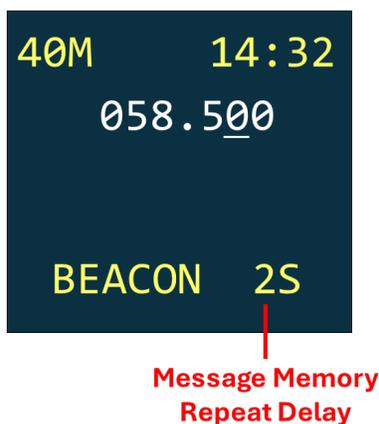

Figure 13. Beacon Delay time.

3. Between beacon replays, you can adjust the repeat delay time using the TUNE Down [▼] and Tune Up [▲] buttons. Repeat delay time can be adjusted in two second increments.

4. Press the Dash paddle to pause beacon replay.

5. Press the Dot paddle to stop beacon replay.

Audio Volume Adjustment

Normal audio volume adjustment on the MTR3B-V4 is accomplished using an inline analog volume control on a headphone or the volume control of an external amplified speaker. The maximum audio output is adjustable using the volume control, marked "VOL", on the front panel of the MTR3B-V4 above the Color Display, see figure (1). The volume control is a recessed potentiometer that accepts a small Phillips screwdriver. Carefully rotate the control to vary the audio volume level.

Side Tone Pitch Adjustment

The Side Tone Pitch Adjustment function allows you to set the receiver side tone to a comfortable pitch for the operator between 300 and 1,000 Hz (see figure [14]). This will affect both the received tone and the internally generated side tone. This feature requires at least Version 1.10.

1. Press and hold the [**RIT**] button until "BFO ADJ" appears on Line 4 of the Color Display. The functions will cycle through RIT → SET TIME → BFO ADJ.

2. Use the TUNE Down [▼] button to decrease the side tone frequency.

3. Use the TUNE Up [▲] button to increase the side tone frequency.

4. Tap the "EN" ([**Fn**]) button to save the new side tone frequency and exit.

15M   13:32
     035.0<u>00</u>

  BFO ADJ
  EN   650Hz

Enter   Sidetone
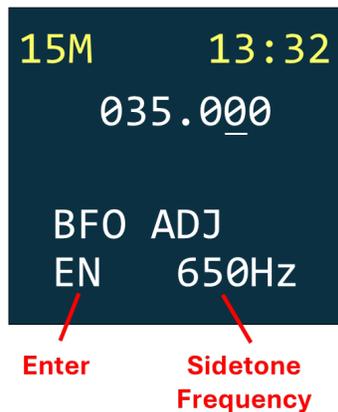   Frequency

Figure 14. Side Tone Adjustment.

Side Tone Volume

A trimmer resistor is accessed through a hole in the battery/jack board inside the case. Start by unscrewing the side screws of the enclosure and removing the black enclosure bottom. Locate the battery/jack board and notice the hole which reveals this trimmer resistor. Carefully rotate the trimmer resistor with a small non-conductive Phillips screwdriver to adjust the side tone volume level.

Set Time

The Set Time function is used to set the MTR3B-V4 real time clock.

1. Press and hold the [**RIT**] button until the function "SET TIME" appears in Line 4 of the Color Display. The functions will cycle through RIT → SET TIME. The clock numerals will turn red and "MIN" will be displayed on Line 5 of the Color Display, indicating set minutes mode (see figure [15]).
2. Use the TUNE Up [▲] button to increment the 1's digit of the minutes.
3. Use the TUNE Down [▼] button to increment the 10's digit up to 5.
4. Tap the "E" ([**Fn**]) button to go to hours. The clock numerals will turn blue and "HRS" will be displayed on Line 5 of the Color Display, indicating set hours mode (see figure [15]).

5. Use the TUNE Up [▲] button to increment the 1's digit of the hours.
6. Use the TUNE Down [▼] button to increment the 10's digit between 0, 1, and 2.
7. Tap "E" ([**Fn**]) to set the time and exit. The clock numbers will return to the normal yellow color, indicating the clock has been set.
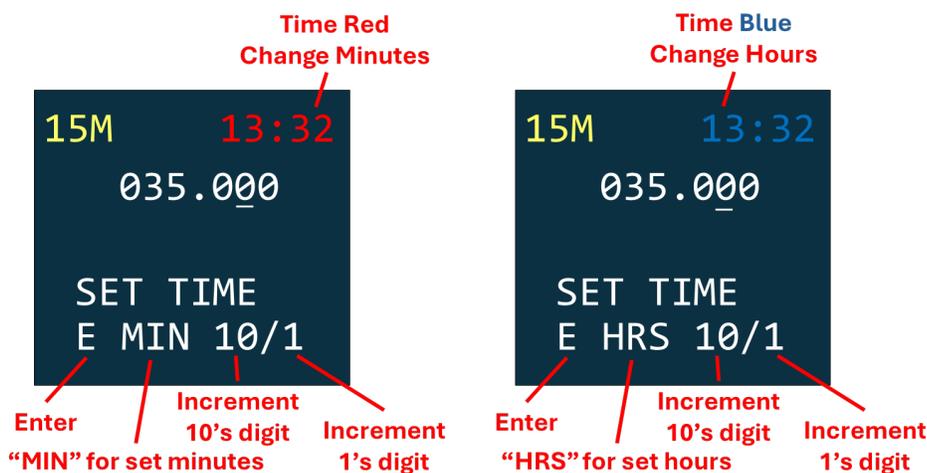

Figure 15. Set Time.

Morse Enunciation

The MTR3B-V4 uses Morse Code to enunciate the current function, operating frequency, and other settings using Morse Code. This feature is particularly useful to provide accessibility for vision impaired operators. The current function will automatically be enunciated upon selection. The current frequency is enunciated by tapping the Function ([**Fn**]) button. You must have at least Firmware Version 1.2a or 2.3a to use Morse Enunciation.   Morse Enunciation cannot be deactivated.

CAL

The Calibration function is used to calibrate the transceiver's local oscillator. This function is accessed by pressing and holding the [RIT] button until "CAL" is display on Line 4 of the Color Display. It is not intended for field operator use. Contact LNR Precision for technical support.

EE ERASE

The EE Erase function is used to clear the EEPROM data and all calibrations that are stored on the device. This function is accessed by pressing and holding the [RIT] button until "EE ERASE" is display on Line 4 of the Color Display. It is not intended for field operator use. Contact LNR Precision for technical support.

SPECIFICATIONS

- **Band Coverage:** 40, 20, and 15 meters
- **Mode:** CW
- **DC Power Range:** 9.0 to 14.0V
- **DC Voltage Display:** Green within specified range, red outside range. Accuracy +- 0.2V
- **Current Draw:** 80mA Receive, 800mA Transmit
- **Transmitter Power:** 5 Watts (typical) at 13.8V
- **Receiver sensitivity:** Minimum discernable signal ~0.1uV
- **RIT Tuning Range:** -60.0 to 99.0KHz
- **Weight:** 5.72 oz. (133.8g)
- **Dimensions:** 3.90 in. L x 2.63 in. W x 1.09 in. H (99.9mm L x 66.3mm W x 28.6mm H)
- **Color Display Dimensions:** 1.06 in. x 1.04 in. (27mm x 26.3mm)
- **Internal Battery:** CR2032 (supplied at purchase, replaceable with common brand)
- **Key Jack:** 1/8 in. (3.5mm) Stereo. Normal Keyer Wiring: Tip = Dot, Ring = Dash
- **Headphone Jack:** 1/8 in. (3.5mm) Stereo jack with Tip and Ring connected together for mono sound, Sleeve = Ground
- **Power Jack:** 5.5mm / 2.1mm coaxial. Center pin positive (+)
- **Antenna:** BNC, nominal 50 Ohm
- **CW Message Memories:** Three 62-character message memories
- **Keyer Speed:** 5 – 30 WPM
- **Sidetone Frequency:** 300 – 1,000Hz (requires Firmware 1.10)
- **Frequency Memories:** Nine memories per band

REVISION HISTORY

Version Number	Criticality	Description
1.06	Baseline	1. Changed certain Colors on LCD to prevent washout. 2. Corrected CW Messaging while in RIT mode. 3. Hardware design change and new jackboard. 4. Etched aluminum MTR3B V4 "Currahee" star badge. 5. Added foam padding/glue to SWR board to eliminate slippage during transport. If your unit is below version 1.06, it is recommended that you update the unit (see Contact Information).
1.08	Optional	1. Adds CW Message Beacon Mode 2. Adds Direct Frequency Entry (DFE)
1.10	Optional	Hardware and software update to add side tone adjustment.
1.11	Optional	Fixed an infrequent calibration memory read.
1.12c	Optional	Added reverse paddle functionality.
1.2a	Special Request	Adds Morse Enunciation for visually impaired operators.
2.3a	Special Request	1. Hardware design change (not for retrofit) affecting producibility only. 2. Adds Morse Enunciation for visually impaired operators. 3. The Operating Manual procedures and diagrams are based on this version
2.4	Special Request	1. Added Bar Graph to display SWR in addition to numeric value. The graph uses asterisks (*). 2. In keyer memory mode, the decoded letters are now scrolled across the display. Word space as shown as a "-". There is now a backspace button [BS] (Tune Up) which can be used to fix mistakes. 3. Keyer speed is now stored in EEPROM so it will power up with the last used keyer speed. 4. Tweak of power measurement routine to improve accuracy. Note: power measurement does increase slightly when first keyed before stabilizing on measurement. This is normal.

CONTACT INFORMATION

LNR Precision will perform Firmware updates free of charge for customers wishing to update their unit. If you wish to receive an update of your unit, please write a note indicating UPDATE and include your name, callsign, phone number and RETURN MAILING ADDRESS and send radio to:

LNR Precision, Inc.

435 E. Central Ave.

Asheboro, NC 27203

Any other questions should be directed to LNR Precision at:

https://www.lnrprecision.com/contact-us/