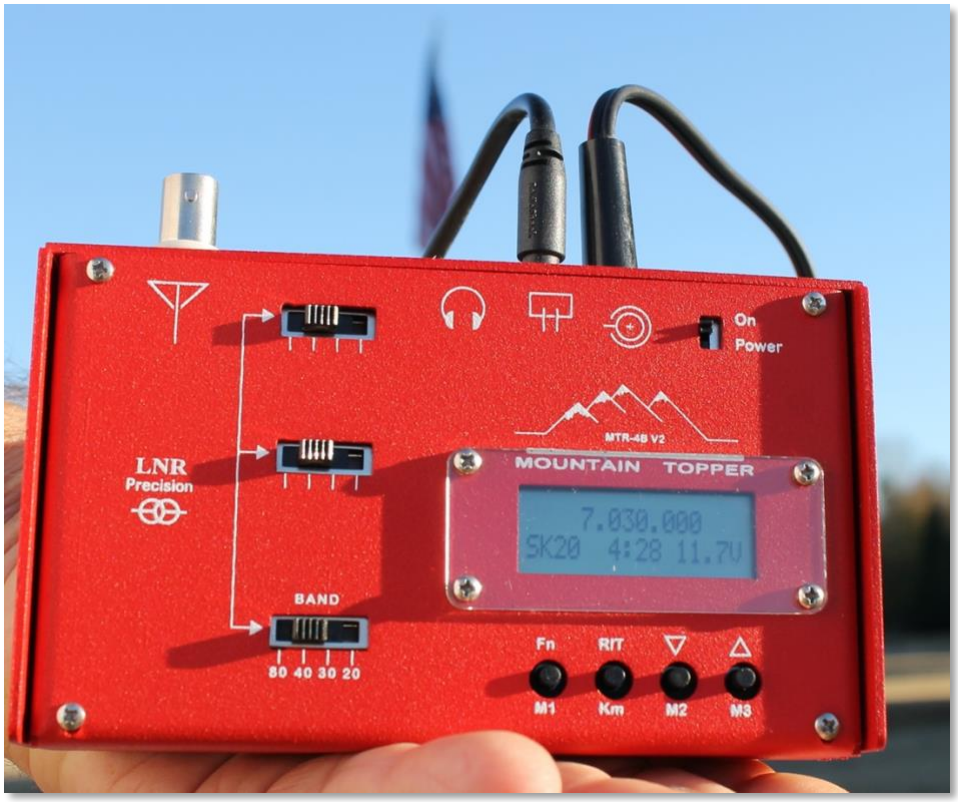
MTR-4B V2

"The Mountain Topper"



The LNR Precision MTR transceivers are designed to be efficient portable CW rigs. Whether climbing a mountain and operating SOTA or just out for an afternoon in the park, the MTR's small size, light weight and meager battery requirements makes it a great choice for these activities.

This is a newly re-designed version (V2) of the Original MTR4b. Now offered in a Deep Red Machined Aluminum Powder Coated enclosure that is much smaller and lighter than the original and includes a built-in SWR Meter!

Dimensions: 5.150″ Length x 3.0″ Wide x 1.075″ Thick

Weight: 7.95 oz

Features:

- Four bands - 80M, 40M, 30M and 20M
- Very low receiver noise floor
- Low current for maximum battery life
- Wide operating voltage range – 5.5V to 13V
- Full 5W “QRP” gallon with 12.0 Volt supply
- 2 line, back lighted LCD display
- SWR – RF Power display
- Built in Real Time Clock
- Internal Iambic B mode keyer, 5 to 31 WPM in 1 WMP increments.
- Three Morse message memories with beacon mode.

Specifications:

- 80 meter, 40 meter, 30 meter and 20 meter operation.
- Receiver sensitivity : ~ 0.5 uV
- Receiver audio bandwidth: ~ 400 Hz centered at 600 Hz.
- Receiver current: ~ 27 ma
- Transmit output power: 5 watts typical at 12.0 Volt input
- Transmit current: 750 ma Max with 5 watt output
- Transmit spurious outputs: -50 dBc or better
- Supply voltage 5.5 volts minimum, 13 volts maximum. 6 to 12 recommended.
- Antenna Jack: BNC
- Power Jack: 5.5mm with 2.5mm pin.

Operation:

Power:

A power on/off switch is located in the upper right corner. It may take a second or two for everything to get initialized and the display come on.

Band selection:

A column of three slide switches to the left of the display select the operating band. All three switches must be in the same position for proper operation. The easiest way to ensure this is to move each switch one position in sequence down the column. The bottom slide switch tells the processor which band is selected.

When the band is changed, a Morse number for the band selected will be sounded in the headphones. "8" for 80M, "4" for 40 meters, "3" for 30 meters and "2" for 20 meters.

On initial, first time power up the default operating frequency will be loaded. The defaults are the QRP calling frequency for each band. 3.560 MHz, 7.030 MHz, 10.118 MHz and 14.060 MHz. After first time power up, the last used frequency for the selected band is loaded.

Tuning:

The operating frequency is changed using two push button switches, labeled with up and down arrows.

- The tuning step is fixed at 50 Hz per step.
- A short click of a tuning switch will advance/decrement 50 Hz
- Holding a tuning switch closed for longer then one (1) second will start a fast auto stepping at a 100 Hz rate.
- While auto stepping, closing the Fn (function) switch will start very fast auto stepping for quickly moving up or down the band.

RIT: Receive Incremental Tuning.

RIT allows changing the receive frequency while locking the transmit frequency. The range is limited to +/- 2.000 kHz. When active, the bottom line of the display will show the offset (difference) between the transmit frequency and the current receive frequency.

- To active RIT, hold the **RIT** switch closed for one (1) second.
- To exit, again hold the **RIT** switch closed for one (1) one second.
- To check for activity on the transmit frequency, click the **Fn** switch. The offset display will be replaced by [R=T] to indicate the receive frequency is now the same as the transmit frequency.
- Click the **Fn** switch again to exit back to RIT offset.

The Fn (Function) switch:

Clicking and holding closed the Fn switch will cycle through the menu options. Release the switch when the desired function is displayed on the bottom line of the display. A Morse character is sounded in the headphones for each function as it comes up. Morse annunciation is sent at 20 WPM.

- "S" - [ADJ K SPEED] change keyer speed
- "D" - [DFE] – Direct Frequency Entry
- "M" - [ENTER MSG] Enter Morse message
- "T" - [SET TIME] Set the Real Time Clock
- "P" - [CONFIG] Enable/Disable Morse annunciation and display features.

Code Speed:

- A short click of the **Fn** switch enables the adjust keyer speed mode.
- Use the paddle or tuning up/down switches to change the keyer speed.
- The current code speed is shown on the bottom left of the display [csXX] default is 20 WPM.
- Straight key mode can be enabled/disabled by clicking the RIT switch.
- Exit by clicking the Fn switch again.

DFE:

This mode allows you to jump to a specific frequency using the paddle to enter the numbers. The frequency is entered with the 100 kHz digit first.

Display : Top line [xx.---.-00] where (-) indicates the digit to be entered.
Bottom line [EXIT RE LD]

- Click the **Fn** switch (under the "EXIT" label) to exit if this mode was enabled accidentally.
- Click the **RIT** switch (under the "RE" label) to clear and re-enter a frequency
- Click the **Tune Down** switch (under the LD label) to load the new frequency.
- Note: Clicking the **LD** switch before all four digits have been entered will fill the blank decades with zeros. If on the 80M band, the 100 kHz decade must have a 5-6-7-8 or 9 entered first or it will not pass the band limit test.

Enter Message:

This mode allows you to enter up to three Morse messages, each having a limit of 62 characters (including word spaces).

Display: Top line [ENTER MSG]
bottom line [EXIT CK RE BS]

- The characters entered via the paddle are displayed on the top line. This helps in getting the character and word space timing correct. Ideal timing is used to determine when all the elements of a character are entered or when to insert a word space. Three (3) dot time between characters, Seven (7) dot time between words. Word spaces are indicated by a star [CQ * CQ *].
- The (**Tune Up**) switch (under the BS label) can be used to back space to erase a miss sent

character or eliminate a word space.

- Once the message has been entered, click the (**RIT**) switch (under the CK label) to check the message and hear how it sounds.
- After the message has played, the display will change to [M1 RE M2 M3]
- If you wish to change the message, click the switch under the [RE] label (**RIT**)
- If you are satisfied with the message, store it in one of the three locations by clicking the M1, M2 or M3 switch.
- The display will show [STORING] and sound a beep when done.
- The display will return to the message entry mode so you can enter another message if you like
- If done, click the EXIT switch (**Fn**).

SET TIME:

This mode is used to set the Real Time Clock. The clock is not displayed until it is set. 24 hour mode is used for simplicity.

Display: Bottom line [SET T 0:00]

- Use the **Tune Down** switch to advance the Hours
- Use the **Tune Up** switch to advance the minutes.
- Click the **Fn** switch to enable the clock and exit.

Note: The clock timer is held in reset and the seconds counter cleared until the **Fn** switch is clicked. Set the time for one minute past the current time, then watch the seconds sweep on an accurate clock and click **Fn** when it hits 12. This will make the clock the most accurate.

CONFIG:

This mode allows turning on or off optional Morse features. You can choose to decode and display what your sending with the paddle. You can also choose to enunciate the operating frequency in Morse.

Display: [EXIT MD MA]

- EXIT (**Fn** switch)
- MD (**Tune down**) Morse Display. Toggle on or off. Morse annunciation – “ON” or “OFF”
- This mode enables the decoding and displaying of the Morse characters your sending via the paddle. This can be either helpful or annoying. Characters are written to the top line of the display. The frequency display will return after a pause in keying determined by current code speed, equivalent to a couple of word spaces. Characters will scroll across the display until the 62nd character is reached, then the buffer needs to be rest. Take a short pause and let the display clear.

- MA (**Tune up**) Morse Frequency Annunciation. Morse annunciation – “ON” or “OFF”
- This mode will enunciate the current operating frequency in Morse. Only the 100 kHz to 100 Hz decades are sent. Zeros are sent as a cut number “T”. This mode maybe helpful to the visually impaired.

- To read the frequency in Morse, click the Fn switch. Note that when this mode is active, the Fn switch will need to be held closed a bit longer then usual to enter the keyer speed adjust mode.

Straight key mode and SWR / Power readout.

SWR and power output is shown on the bottom line of the display while transmitting in straight key mode [1.0 SWR 5.0 W]

Straight key mode maybe enabled in two ways;

1. Using a MONO plug in the paddle jack (must be inserted when power is off)
2. By clicking the RIT switch when in ADJ K SPEED mode. This allows keying the transmitter with the DOT paddle if checking SWR or power output is desired.

Straight key mode is indicated by "cs" being replaced by SK in the speed display.

Note: When Straight key mode is enabled, only the ADJ K SPEED mode is available from the Fn mode switch. This is because DFE and Message functions require a paddle for input.

- Code speed can be changed in SK mode by using the tune up and down switches.
- Message memories can be used if previously loaded.
- Only "cancel message" is available. Pause is not implemented since it needs a Dash paddle input. See below.

Sending a stored Morse message:

- A message is started by first clicking the RIT switch, then within ½ second, push the M1 (Fn), M2 (Tune down) or M3 (Tune Up) switch to send the desired message.

Once a message has started sending, it can be paused or terminated with the paddle or set to Beacon mode. Paddles are sensed during letter spaces.

- To Pause: Close the Dash Paddle.
- To Terminate: Close the Dot paddle.

Beacon mode:

- To start the Beacon mode, while the message is sending, press the associated memory location switch. The switch will be sensed during a letter space.
- Display: [BEACON 2] where 2 is the time in seconds between repeates.
- The time between repeats can be set to between 2 and 9 seconds by using the up and down tuning switches. These are sensed during a letter space.
- Beacon mode is terminated by tapping the Dot Paddle.
- Message is paused by holding the Dash paddle closed.

Power supply options:

The MTR-4B V2 is designed to put out about 5 watts with a 12.0 V supply. This makes it a good match to a 3S Li-ion pack which produces a bit over 12V when fully charged.

A 2S pack can also be used, with reduced power output. But also with reduced transmit current draw, which will extend battery life. Operation is possible down to the minimum discharge voltage for the cells, about 6V, and still produce over 1 Watt of output power.

A 4S pack produces a bit too much voltage to safely power the rig, but a low dropout regulator can be added to bring the voltage down to one more suitable for the rig.

A 9V smoke alarm battery (once used in transistor radios) can power the MTR-4B for several hours. A tad expensive to do regularly though. But it is fun to see how many contacts you can make using one during a contest sprint. A 9 or 12V battery pack made of AA cells is more long lasting.

A 13.8V bench supply can be used, but this will bring the output power up to 6 to 7 watts. This is fine so long as the SWR is low. At 7 watts, the transmit current is near the maximum the PA FETs can handle and near the point at which the resettable internal fuse will trip (1 A). A high SWR will increase the current in the PA and either trip the fuse or damage the PA.

A simple way of making a 13.8V supply safe to use is to add two silicon rectifier diodes in series with the positive power lead, such as 1N4001 diodes. This will drop the supply voltage to the MTR by about 1.5 volts.

Battery back up:

A CR2032 battery is used to power the processor while main power is off. This keeps the clock running and retains the various settings stored in RAM.

Only a minuscule amount of current is used, just a few uA so the battery will last a long time. Even so, if the rig is not to be used for some time, it would be a good idea to disable the battery by slipping a piece of paper or plastic between the battery and the holder contacts.

Eventually, the battery will run down to the point the processor will not reliably run. If the rig “locks up” or otherwise behaves unreliably, it is time to change the battery.

Instructions for changing coin battery as well as video can also be found on www.LNRprecision.com