

CTR2-Max

Flex WiFi Mode Manual

v0.9.1



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Updated to firmware v0.9.1

Revised sections for this version are highlighted in yellow

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Introduction

CTR2-Max firmware is the descendant of a long line of microcontroller-based radio controllers from [Lynovation](#). If you're interested in its background, you can read the QEX and QST articles about the **CTR** series [here](#).

CTR2-Max firmware, like other CTR2 controllers, supports both **Flex WiFi** and **MIDI** modes. You can easily switch between the two firmwares in the [Settings](#) menu to fit your operating needs. You should refer to the **CTR2-Max MIDI Mode Manual** for information about MIDI operation.

This firmware only runs on **CTR2-Max** hardware with the 2.8" touchscreen.

MIDI Mode

When operating in **MIDI** mode, each knob, knob switch, and button function are assigned to specific MIDI commands. For instance, the first virtual dial control sends MIDI Change Command (CC) #100. The second dial control sends CC #101, etc. You can change the label assigned to each control. The real magic happens in the radio control app you connect **Max** to. Each MIDI command is mapped in the app to execute a certain function. In the case of CC #100, the app controls the radio's frequency based on the direction the knob is turned.

MIDI is a one-way protocol, so when using this mode, the radio control app provides the radio information.

Many apps are capable of receiving MIDI commands. These include Marcus' (DL8MRE) excellent SmartSDR/SDR-Control/FT-Control, TS-Control, and K4-Control for iOS and MacOS, AetherSDR, and RimuSDR, SDR-Console, and SparkSDR, to name a few. MIDI mode is also compatible with Remote Ham Radio and RemoteTx.



Flex WiFi Mode

Flex WiFi mode creates a custom WiFi controller specifically designed for the Flex 6000, 8000, and Aurora SDR radios. It is based on the popular **CTR2-Micro** controller's firmware. It utilizes the Flex Network API to monitor and control the Flex radio over an IP network connection. In addition, it provides real-time CW keying and PTT control over the network.

Because the Flex API is a two-way protocol, unlike **MIDI** mode, **Flex WiFi** mode is aware of the radio's operating state (frequency, mode, band, etc.) A [Dashboard](#) display provides easy access to many of the radio's functions.

When used as the only controller connected to the radio, **GUI** mode can be enabled in the **Settings** menu to enable a small panadapter in the Dashboard, as show here.



How to use this manual

This manual should be used as a reference manual. An expanded Help system if you will. Items in the Table of Contents link to their write up in the manual. I've tried to group things logically and have added hyperlinks so you can quickly jump to other sections.

As this document evolves, sections that have changed since the last update will be highlighted in yellow.

The version number of this manual will follow the latest released version number of the firmware.

Feel free to contact me if you have question about a certain feature or have ideas for future improvements. I love to get feedback on my work. My email address is good on QRZ.com.

Legal Notice

What would a manual be without a legal notice? Here goes...

- This is a hobby endeavor. Nothing is guaranteed! Use this device at your own risk!
- I will do my best to make sure you receive functioning hardware. I will work with you if there is a problem with your unit on arrival.
- I make no warranty that the firmware provided will perform up to your expectations or be suitable for your application. A lot of compromises had to be made to fit the small display so review this manual to be sure you're comfortable with the user interface.
- Software bugs are a fact of life and I try to find and correct all bug reports ASAP to the best of my ability.

- **CTR2-Max** requires a license key to be fully functional. License keys can be purchased separately if you build your own unit. A license key is included with your purchase of a **CTR2-Max** controller from Lynovation.com.
- License keys are tied to your call sign. This allows you to use the same registration key on as many CTR2 devices as you own. You are not allowed to include your license key on units you build to sell or give to others. They will need to purchase their own key.
- Contact me if you sell your CTR2 unit. I will create a new key from call sign of the new owner.

Change Log

v0.9.1: July 24, 2026

- Added a [Lock] button to the Dashboard in Flex WiFi mode
- Fixed a bug in the [Knob](#) menu – it was showing too many knobs

v0.9.0, July 17, 2026

- Beta firmware release

Changes to previous firmware versions can be found in [Appendix F](#)

System Overview

CTR2-Max is a custom-built radio controller that is designed specifically for the needs of amateur radio operators. It includes a large, 2.8" color touchscreen, with up to 5 knobs and 4 buttons that are dual-mode (turn and push-and-turn knob functions and short-press and long-press button actions). The unit also includes a 3.5mm (1/8") CW paddle input jack and a key/PTT input jack. For **Flex WiFi** mode users, a transformer-coupled sidetone audio interface board is available that allows you to patch **CTR2-Max's** keyer sidetone into the receive audio from your radio. The sidetone from the keyer is sinusoidal. It is generated by a codec and drives a large speaker with up to 1.2 watts output (it's loud!)

CTR2-Max firmware is compatible with Flex 6000, 8000, and Aurora model radios. It uses WiFi to connect directly to the radio's server over your IP network using the Flex API and provides a small but flexible control surface for your radio. Unlike controlling SmartSDR with a mouse, SmartSDR doesn't need to be "in focus" on your computer to use your **CTR2** controller. In addition, its small size allows you to conveniently locate it anywhere on your operating desk.

The unit can be powered by a user-installed 3.7-volt Lithium-Polymer battery. Batteries up to 10mm x 35mm x 55mm can be accommodated. A 2000 mAH battery will power the unit for about 12-hours. The built-in charge controller automatically ramps down the charge current as it approaches full-charge. A battery icon can be displayed that shows the estimated state of charge.

Since it connects directly to the radio it works with any Flex control app including [SmartSDR for Windows](#) and [SmartSDR for iOS/macOS](#), and the new [AetherSDR](#) and [RimuSDR](#) control apps.

CTR2-Max Flex WiFi mode provides the essential controls you need to operate your radio without any other control app. This is ideal if you just want to monitor a band or operate your radio in POR mode (i.e. Plain Old Radio) without booting your computer or iPad to use SmartSDR. When operating with just **CTR2-Max**, switching to **GUI** mode in the **Settings** menu enables a small "touch tunable" panadapter in the **Dashboard**.

CTR2-Max Flex WiFi mode includes a built-in keyer that produces a sidetone. It can also send both key and PTT inputs to the radio over the IP network. Using *Straight Key* keyer mode allows you to connect an external keyer or an app such as N1MM to the controller's **Key/PTT** jack to key the radio. A virtual PTT switch can be configured for momentary or latched PTT and you can assign any physical button as a PTT switch..

CTR2-Max Flex WiFi mode has two [user interfaces](#). You can use the one that works best for you.

Multiple Controllers / Two Modes

CTR2-Max can be used in parallel with any of the other CTR2 controllers. If you have an older CTR2 unit, you can continue to use it with **CTR2-Max**. You can use multiple CTR2 controllers in **Flex WiFi** mode, and if your app allows MIDI control, you can have one controller in **Flex WiFi** mode and the other in **MIDI** mode. You can never have too many knobs!

Switching Firmwares

To switch operating modes, open the [Settings](#) menu and navigate to the last page and select *Run Flex WiFi Mode* or *Run MIDI mode*, depending on which mode is enabled.

The diagrams below should give you an idea of how each firmware interfaces to your radio and your computer/iOS device.

When using the **CTR2-Max Flex WiFi** mode, the controller connects to, and directly controls the radio through the IP network using WiFi and the Flex Network API.



When using **CTR2-MIDI** mode, the controller connects to, and controls the 3rd party app that is controlling the radio.



Quick Start Guide

If you're like most hams, when you receive a new tool for your shack, you just want to plug it in and start using it.

Your **CTR2-Max** controller is not one of those tools!

As discussed in the previous section, your controller can run in two different modes, so you'll need to decide how you're going to use it.

When **CTR2-Max** is in **MIDI** mode, it uses Bluetooth or USB MIDI to control a 3rd-party app. The app controls your radio. The radio that you can control, and the functions you have available, are determined by the 3rd-party app. There is a separate **manual** available for **MIDI** mode. It has its own **Quick Start Guide** to get you going in that mode.

Flex WiFi mode, the subject of this manual, on the other hand, works exclusively with Flex 6000, 8000, and Aurora radios. Unlike **MIDI** mode, **Flex WiFi** mode provides a full-featured radio control system that is capable of controlling your radio without a 3rd-party app. The goal of this section is to give you a basic understanding of how **Flex WiFi** mode works, and get you connected so you can start learning about your **CTR2-Max** unit.

Basic Concepts

Let's start with how **Flex WiFi** mode works with the Flex radio.

CTR2-Max Controller

All of the dial and button controls are predefined in the firmware. Unlike **MIDI** mode, here is no need to map control functions to a 3rd-party app.

Unlike **MIDI** mode, **Flex WiFi** mode monitors your radio's settings. When it first connects to your radio, it loads and displays the radio's settings. This allows it to run in parallel with any version of SmartSDR. If you change anything in SmartSDR, it will be reflected in the **CTR2** controller, and visa versa. If **CTR2-Max** is the only controller connected to your radio, you can enable **GUI** (Graphical User Interface) mode. In this mode, a small panadapter is displayed in the **Dashboard**. The panadapter is not available in **non-GUI** mode.

Flex 6000/8000 Series Radio

[Flex radios](#) are basically computers with an RF interface. The computer-side has a built-in IP server that supports multiple IP device connections. Information about the RF interface is shared with all connected devices and each device can control the RF interface. Most control interfaces, like SmartSDR, are classified as GUI devices. These devices are the primary control interface. Other devices, such as **CTR2** units running in **Flex WiFi** mode, are classified as non-GUI devices. Non-GUI devices are *bound* to a GUI device, and basically work in parallel with the GUI device.

Initial Setup

There are a few tasks you must perform before the **Flex WiFi** mode will be ready to control your radio.

The first order of business is to power up your **CTR2-Max**. This is generally done by plugging it into a USB port on your computer. It can also be powered by a 5-volt phone charger, a USB battery, an optional **internal battery**, or by your iPhone or iPad (Apple devices with Lightning ports require an OTG adapter). Do not plug it into an unpowered USB hub. Unpowered hubs cannot provide the current the unit requires when it's using the WiFi radio.

When the unit boots, the flash screen will show the firmware title and version number. If your unit boots into **MIDI** mode, open the **Settings** menu, navigate to the last page and select **Run Flex WiFi Mode** on the menu. The unit will reboot into **Flex WiFi** mode.

Enter your Call and Registration Key

If your unit boots into *Demo Mode*, use this section to enter your call and registration key. Otherwise, skip to the next section.

CTR2-Max units ship with your call sign and registration key already entered. If you reset your unit to **Factory Settings**, or erased the flash memory during a firmware update, you'll need to enter your call and registration key again. Your call and registration key are written on the bottom label of your unit. If you can't find it, contact me for assistance.

NOTE: Registration keys are issued based on your call sign. Once registered you can use your key on any Lynovation CTR2 product that requires it. Contact me if you decide to sell your controller to another ham and I will create a key for their call. My email is in [QRZ.com](mailto:info@qrz.com).

The firmware will run in **Demo** mode until registered. In this mode, the unit will automatically power down after 15 minutes. You can edit the settings and labels on the unit but you can't save or export them.

To enter your registration key, use the **on-screen editor** by selecting **Enter Call & Key** on the last page of the **Settings** menu, or connect your unit to a dumb terminal program such as Tera Term or Putty (see [Appendix B](#) or [C](#), or to the terminal in your Mac, [Appendix D](#)), or. Once connected, press any key to start the terminal server on the unit. Next, press the **Del or Backspace** key on the keyboard. Enter the call sign you registered and the registration key you received from me. The registration key is 8 hexadecimal digits (0 to 9 and A to F). Once registered, your call sign will appear on the splash screen at boot up, the program won't shut down after 15 minutes, and you'll be able to save changes in the maps and import or export backup files. Your call will also be automatically inserted into a CW macro using the **^** prosign.

Factory assembled units have the unit's Bluetooth ID (CTR2_xxxx), your call, and your registration key written on the unit's bottom label. They are covered with a piece of transparent tape so they don't rub off. This way you'll have them if needed.

The dumb terminal or on-screen editor can also be used to edit the CW macros, your router's SSID and password, and your radio's IP address and IP port#.

Connecting to your radio

CTR2-Max Flex WiFi mode connects directly to your radio. The Flex unit must be on the same WiFi network. Network credentials (router SSID and password) can be entered from a [terminal](#) or directly by selecting **SSID:** and **PW:** on page 4 of the **Settings** menu.

In the on-screen editor, use the < and > buttons to change the selected character. Use the ^ and v buttons to change the character. *Ins* inserts a new character at the current position, and *Del* removes the selected character.



You will also need to set **Flex Adrs:** on the same page of the **Settings** menu. This can be found on the **Settings -> Radio Setup -> Network** tab in SmartSDR for Windows or on the **Available Radios** popup window in SmartSDR for iOS/macOS. The default IP port for the Flex radio is 4992. You can change this if it has been changed on your radio with the **Flex Port:** option.

CAUTION: The 3.5mm jack(s) on CTR2 units are for paddle, key, and PTT inputs only. They are not designed for output. Do not connect these jacks to your radio as this may damage the unit.

You can also use a dumb terminal such as [Putty](#) or [Tera Term](#) connected to the unit to edit text fields. This screen shot shows the WiFi settings menu.

Press **1** to **9** to edit CW macros.

Press **P** to select one of three WiFi profiles

Press **S** to select the slice to control

Select **A** through **D** to edit your WiFi credentials and radio IP settings. The SSID and password are case-sensitive.

```
COM3 - Tera Term VT
File Edit Setup Control Window Help
=====
CTR2-Max Flex WiFi Mode - v0.9.00
=====
WIFI SETTINGS MENU
-----
1 to 9) Edit CW Macro
P) WiFi Profile:      1
S) Connect to Slice:  A
-----
A) WiFi Router SSID: test
B) Router Password:  *****
C) Radio's IP Adrs:  10.0.0.10
D) Radio's IP Port:  4992
   (Default is 4992)
E) Connect to WiFi
-----
```

If you would like **Flex WiFi** mode to automatically connect to your radio when it boots, turn **AutoConn:** **ON** in the **Settings** menu. You can temporarily disable auto-connect by holding button 1, 2, 3, or 4 down during boot.

Once your WiFi credentials and the radio's IP address have been entered, select **Connect WiFi** on page 4 of the **Settings** menu to connect **CTR2-Max** to your WiFi system. Once connected, **CTR2-Max** can be used as a control surface for SmartSDR or it can operate your radio as a standalone controller.

The firmware connects to **Slice A** by default. Once connected you can change the **Slice** by touching the *Slice* caption in the Dashboard display. The firmware will then connect to the new slice setting each time you connect until you change the Slice setting again.

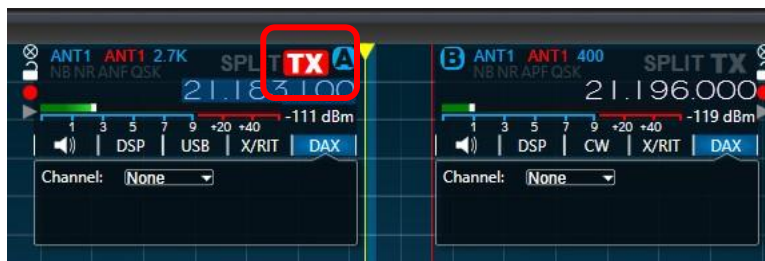
NOTE: Always connect **CTR2-Max** to your radio after starting SmartSDR so it binds to SmartSDR as a non-GUI client. If you connect it before starting SmartSDR v3.xx with **multiFlex** enabled, it will create a second GUI client and will work separately from SmartSDR. SmartSDR 2.xx will not be able to connect to your radio if **CTR2-Max** is already connected.

Multiple Clients

The server in your Flex radio supports multiple clients. This means that you can have several devices connected to, and controlling it, all at the same time. For instance, you can have SmartSDR for iOS connected as a GUI client, one or more **CTR2** units running in **MIDI** mode connected to your iPad controlling the SmartSDR app, and one or more **CTR2** units running in **Flex WiFi** mode connected to the radio as non-GUI clients. **CTR2** units running in **Flex WiFi** mode can be connected to the same slice or to different slices. Any change on any of the connected devices will be sent to all the other clients subscribed to that slice.

TX Enable

Flex radios support multiple slices, but only one slice can be designated as the transmit slice. On SmartSDR this is done by clicking on the **TX** button in the slice flag.



Flex WiFi mode allows you to toggle the transmit state of the slice using one of these methods.

- Touch the bottom-left **TX** button on the Dashboard's [TX](#) page.
- Touch the **Tx Enbl** button on page 2 of the [Buttons](#) menu
- Assign the **Tx Enbl** button to one of the knob switch functions or to one of the pushbutton actions.

When transmit is enabled on the slice that **Flex WiFi** mode is controlling, the caption on all pages will be displayed in red font.

When using multiple **CTR2-Max** controllers on different slices, this allows you to easily identify which controller is controlling the transmitter on your radio.



Configure the Keyer

Flex WiFi mode provides a CW keyer that keys your radio over the WiFi network. You can edit the keyer's type, sidetone pitch, and input jack wiring on page 2 of the **Settings** menu. Keyer speed, delay timing, sidetone frequency, sidetone volume, keyer type and breakin mode can be set in the [Keyer page](#) in the Dashboard. Speed, volume, frequency, and delay timing are also available in the [Dial menu](#). These can be assigned to knob functions in the [Knob menu](#).

NOTE: The keyer and sidetone in **CTR2-Max** are separate from the keyer and sidetone in the radio. The latency across the WiFi network makes it impossible for the radio to generate sidetone in real time. Because of this, the radio doesn't provide sidetone when it's keyed over the network. The **Speed, Sidetone, Monitor, and Delay Timing** adjustments in **CTR2-Max** do control these parameters on the radio if you choose to connect your paddles directly to the radio.

NOTE: By default, the CTR2 keyer overrides the radio's internal keyer. To release this override so you can use the radio's keyer instead of the CTR2 unit's keyer, set the keyer **Type** to **OFF** on page 2 of the **Settings** menu, or on the **Keyer** page in the Dashboard.

Change the Input Jack Mode

CAUTION: The 3.5mm jack(s) are for paddle, key, and PTT inputs only. They are not designed for output. Do not connect these jacks to your radio as this may damage the unit.

CTR2-Max units have separate **PDL** and **KEY/PTT** jacks. On these units, touching the **PDLs:** option in the **Settings** menu controls the normal and reverse wiring on these jacks as follows:

PDLs & KEY: Norm – both jacks are wired normally

PDLs: Reversed – The **PDLs** jack wiring is reversed and the **KEY/PTT** jack is normal

KEY/PTT: Reversed – The **KEY/PTT** jack wiring is reversed and the **PDLs** jack is normal

PDLs & KEY: Rev – Both the **PDLs** and **KEY/PTT** jack wiring are reversed

Using an External Keyer and/or Hardware PTT Switch

Many users may want to use an external keyer and/or an external PTT switch with their **CTR2-Max**. If your external keyer has a built-in sidetone you use the **TonVol** control on the Dashboard's **Keyer** page to turn the sidetone volume on **CTR2-Max** down.

On **CTR2-Max**, simply plug you straight-key, keyer, or PTT switch into the **Key/PTT** 3.5mm jack on the back of the unit. Wire the **Key** input to *TIP and SHIELD* and your **PTT** switch to *RING and SHIELD* of the plug.

NOTE: The *RING* on **CTR2-Max's** **Key/PTT** jack is hardwired to Switch 2 on the front panel. This means, that in order to use an external PTT switch with **CTR2-Max**, you must assign Switch 2 to PTT (see **SWx set to PTT** on page 5 in the **Settings** menu). Otherwise, your external switch will control the functions assigned to Switch 2.

Now that you have your hardware wired, configure the firmware as follows:

- Enable **TX** on the slice you're controlling – this can be done in the **Button** menu or in the **TX** page in the Dashboard
- To enable CW keying, select CW mode and enable **Breakin** in the dashboard's **Keyer** menu
- To enable PTT, select a voice mode in the dashboard's **Mode** menu

Time to Play!

With the basic configuration done, the best way to learn about the **Flex WiFi** mode is to use it. There are two user interfaces. The basic interface is similar to the user interface in other **CTR2** unit. It has separate menus for the [Dial control](#), [Buttons](#), [Knob\(s\)](#), and [PTT](#) controls. You can find more about this interface [here](#).

The second user interface utilizes a dashboard where you can view and control most of the functions with a minimum of touch gestures. You can find out more about this interface [here](#).

CTR2-Max's Features

CTR2-Max runs on a 2.8" capacitive touchscreen display with an integrated ESP32-S3 processor. The firmware includes the following features:

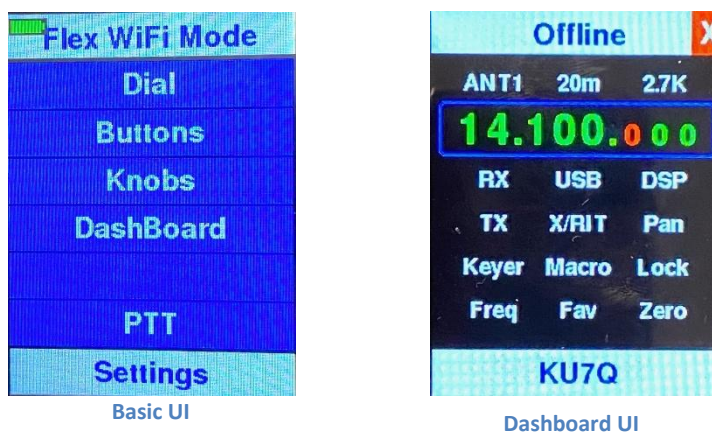
- WiFi connectivity – connects directly to the radio (both must be on the same LAN)
- Three WiFi profiles can be set up for users that operate from multiple networks.
- Multiple **CTR2** units running in **Flex WiFi** mode can be connected to the same radio, to the same slice or different to a different slice
- Works with any version of SmartSDR (Windows, iOS, MacOS, or Linux)
- **CTR2** controllers running in **MIDI** mode can be used at the same time in SmartSDR for iOS/MacOS apps while a **CTR2** unit running **Flex WiFi** mode is connected
- Works in standalone mode without SmartSDR – if **GUI** mode is enabled in the **Settings** menu, a panadapter will be displayed on the Dashboard. You can touch-tune the radio from the panadapter.
- Two [user interface](#) modes
 - [Menu pages](#) provide easy to use that can be assigned to the physical knobs and buttons.
 - [Dashboard pages](#) provide a small control surface for your radio with easy access to all functions
- 60 pre-defined virtual [button](#) controls for modes/bands/filters or page selection
- 30 pre-defined virtual [Dial](#) (wheel/slider) controls for tuning frequency, volume, RIT, XIT, etc.
- Five physical encoders (referred to as **Knobs**)
 - Knobs can be programmed in the **Knob** menu for two functions (turn and push-and-turn)
 - Selecting **<Dial>** for a knob function in the **Knob** menu allows that knob to be used to control the selected dial function in the **Dial control** and the selected control in the Dashboard page

- Knob push switches can be mapped to two virtual button functions using short and long-press
 - Four pushbuttons are provided – each of these can be programmed to any two button functions (using short and long-press) or be dedicated to control PTT.
 - [VFO Lock](#) control
 - 3.5mm (1/8”) stereo input jacks allow you to use your paddles to control the keyer, straight key, or PTT over the network connection
 - Nine [CW macros](#)
 - [Swipe](#) to change parameters in the **Dashboard** pages
 - Panadapter control – if connected to the radio in **GUI** mode, a panadapter is displayed in the Dashboard. You can touch-tune using the panadapter.
 - Control any slice, A through H, depending on radio’s capacity
 - Adjustable [filter controls](#) – adjust low-cut, high-cut, and offset independently
 - Speaker with volume control for sidetone
 - A virtual [PTT switch](#) or [hardware PTT switch](#). You can select any pushbutton (but not knob switches) as a dedicated PTT switch.
- NOTE:** Pushbutton #2 is hardwired to the RING input on the **Key/PTT** input jack.
- [Keypad](#) for direct frequency entry - press **Freq** on the Dashboard’s **Home** page
 - [Favorite frequency lists](#) for each band – press **Fav** on the Dashboard’s Home page
 - Speed sensitive frequency tuning controls
 - Adjustable virtual **Dial** sensitivity
 - Seven color themes and backlight control
 - Sleep and power down timers to save battery power
 - Press and hold two pushbuttons to initiate a power down sequence.
 - [Backup](#) **CTR2-Max**’ settings using the **Import** and **Export Settings** option
 - Easily switch between **Flex WiFi** mode and **MIDI** mode
 - [Multiple Power options](#)
 - Support for an internal 3.7-volt Lithium-Polymer battery – optional battery charge state icon can be enabled in the [Settings](#) menu
 - Sinusoidal sidetone with a 1.2-watt amp and speaker
 - Optional [sidetone audio interface](#) with Line-Out level control allows you to bridge the sidetone output from **CTR2-Max** to you PC’s sound card or high-impedance powered speaker
 - Options to send sidetone to the left, right, or both ears. You can also disable the internal speaker when using Line-Out.
 - [Multiple Power options](#)

User Interfaces

Flex WiFi mode supports two user interface models. The *Basic User Interface* (left screenshot) uses simple menus to select controls and buttons, similar to **CTR2-Dial** firmware running on M5Dial based **CTR2** controllers, and will be described in the next section. Use this interface when you just want to use your **CTR2** unit to control one or two parameters. The second user interface (right screenshot) is a fully functional dashboard that allows you to easily select and modify parameters. Go to the for a full description of this user interface.

NOTE: When using either UI, a knob should be set the **<DIAL>** in the **Knob** menu. This knob is then used to change the selected parameter on the **Dial** control and in the Dashboard.



Basic User Interface

CTR2-Max's Home page allows you to open the control pages in the basic user interface. This interface is the similar to the interface used on M5Dial based **CTR2** controllers.

- **Dial** opens the [Dial control](#). This is a virtual dial where you can select from 30 different parameters to control. Once selected, just swipe your finger around the perimeter of the virtual dial to change the parameter. To change the selected parameter, touch the control # above the center label to open the [Dial menu](#).
- **Buttons** opens the [Buttons menu](#) where you can select from 60 functions on five menu pages. Touch the page dot on the bottom button to move to that page.
 - You can assign a button function to any of the knob push switches or pushbuttons. To do this, find the button action you want to assign in the **Buttons** menu. Press and hold the knob switch or pushbutton you want control that action, then touch the button action on the menu to assign to that switch. The knob or button # will appear in the button's label. The first touch assigns it to the switch's short-press. Touch the button action on the menu, (while still holding the switch down) to set the long-press function. When set as the long-press function, the knob or switch # will be displayed with a "*" next to the button number.

- **Knob** opens the [Knob menu](#). Here, you can assign **Dial** controls to the knobs. This menu allows you to quickly change the **Dial** control assigned to a knob.
 - On **CTR2-Quad** units you can assign a turn and push-and-turn *Dial* function to each knob.
 - Knobs assigned to **<Dial>** will control the selected **Dial** control, or adjust the selected control on the Dashboard.
 - A knob assigned to **<Nav>** can be used to change menu pages (similar to how the gray knob on **CTR2-Quad** works).
 - A knob assigned to **<Step>** will change the tuning step
- **DashBoard** opens the [Dashboard](#) user interface that is described in [this section](#).
- **PTT** opens the virtual [PTT page](#). Here you can control PTT on your radio by simply touching the display. There are three modes on this page. They can be controlled by touching the bottom button in this display or in the **PTT** option in the **Settings** menu.
 - **Off** disables PTT control from this page, and from the external PTT input. It also disables PTT control on the **CTR2-Quad** if PTT is assigned to one of the pushbutton switches.
 - **Momentary** enables momentary PTT control. PTT is key up as long as you press the PTT switch and drops off when you release the switch.
 - **Latched** enables latched PTT. Touch and release the screen (or PTT switch) to key PTT. It will stay keyed until you touch and release PTT again.
- **Settings** opens the [Settings menu](#) where you can change the configuration of many of **CTR2-Max's** parameters.

Dial Control

The virtual **Dial** control supports 30 controls. Swipe your finger around the outer ring to adjust the control.

If a knob is set to **<DIAL>** in the [Knob](#) setting menu, turning the knob will adjust the value of the currently select control in the **Dial** control regardless of the page you're on.

Control options, if any, will be displayed at the bottom. In this VFO example, **v 100 ^** controls the frequency tuning step. Touch to the left or right of **100** to change the tuning step. You can touch a frequency digit to change the tuning step. Double-touch it to switch to ½ steps. You can also assign a knob in the Knob menu as **<Step>** and use that knob to adjust the tuning step.



The VFO display also has a **Zero** button just below the frequency display. Touch this button to zero the digits below the tuning digit.

Other controls such as **Volume**, **NB**, **NR**, **RIT**, and others have On/Off options. Touch the control at the bottom of the display twice to toggle the option.

The dots at the bottom of the display indicate which dial control is active. Touch this bar to select another dial control.

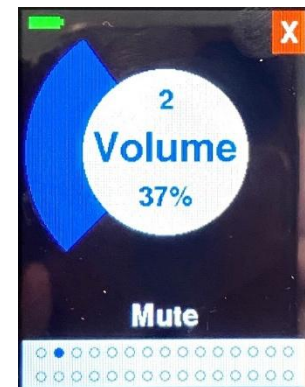
Dial Graphics

The **Dial's** background depends on the selected control.

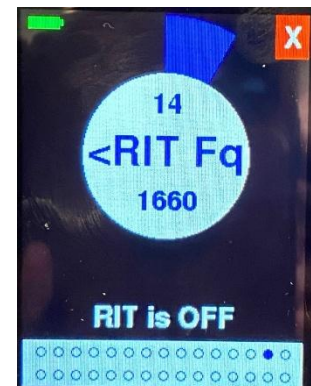
The lead photo in the **Dial Control** section shows a *tuning* control. Tuning controls are continuously variable and used for VFO tuning. The tuning ring is the background color of the selected theme. The label in the middle (in this case **VFO**) indicates the control function. Unlike **MIDI** mode, you cannot edit the control labels, these are fixed in firmware.

There are two other control displays. These controls are similar to potentiometers and have a minimum and maximum range.

For most controls like volume, squelch, etc., the outer touch ring on the **Dial** control represents a gauge with the level indicated by the filled portion. Like a potentiometer, the gauge starts at 0% on the lower left and progresses around the display to 100% on the lower right. The **Volume** control on the right is set to 55%.



Controls with positive and negative offsets, like **RIT**, **XIT**, **Hi Cut**, **Lo Cut**, and **Balance** controls use a slightly different display. The **Dial** graphic for this control displays the +/- offset referenced to the top of the dial. For negative offsets it grows to the left and for positive offsets it grows to the right from center. The amount of offset (in this case RIT frequency) is shown under the label. When the control is offset, touch the label to reset it to 0 offset. If a control has an enable/disable or zero option it will be displayed at the bottom of the dial. Touch this button to operate the control.

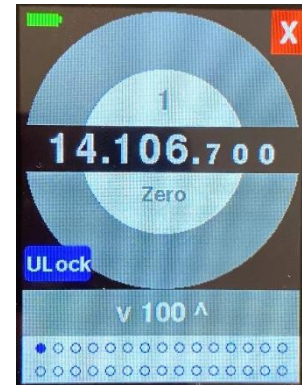


Shortcut: Touch to the top of the display to open the **Buttons** menu.

VFO Lock

Touch the **Lock** button on the VFO control to lock VFO tuning. When the VFO is locked, the frequency will be “grayed out” as shown here. Adjusting the tuning, or turning a knob assigned to the VFO, will post a message with instructions on how to reset the lock.

To unlock the frequency control, touch the **ULock** button.

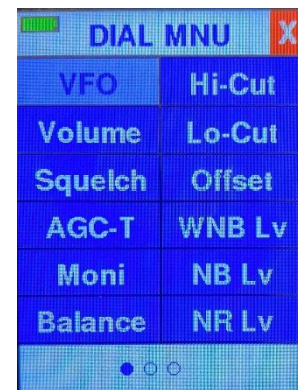


Dial Menu

Touching the dial # or the bottom button bar on a **Dial** control will open the **Dial** menu. The current dial setting will be highlighted (**VFO** in this example). Touch a button to select that function and return to the **Dial** control page.

Touch the selected function or the caption to return to the **Dial** control without changing the selection.

Dial functions are listed in the table below.



Page 1			Page 2		Page 3	
VFO	Slice freq control	ANF/APF	Auto Notch/Peaking	Speed	Keyer Speed	
Volume	Slice volume	RIT Frq	Rx Increment Tuning	Pitch	Sidetone freq	
Squelch	Slice squelch	XIT Frq	Tx Increment Tuning	Delay	CW Dropout Delay	
AGC-T	AGC-Threshold	PwrOut	Tx Power Out	Zoom	Panadapter Zoom	
Moni	Monitor level	TunOut	Tune Power Out	PanMax	Panadptr Max Level	
Balance	Left/Right balance	VOX	VOX Level	PanMin	Panadptr Min Level	
Hi-Cut	Filter high cut freq	Mic-Gn	Mic Gain	PanAvg	Panadptr Average	
Lo-Cut	Filter low cut freq	LnO-Gn	LineOut (Spkr) Gain	PanGn	Panadptr Gain	
Offset	Filter high/low offset	HPh-Gn	Headphone Gain	PanBlk	Panadptr Black Lvl	
WNB-Lv	Wide Noise Blanker					
NB-Lv	Noise Blanker Lvl					
NR-Lv	Noise Reduction Lvl					

Knob Menu

The **Knob** menu allows you to assign **Dial** controls to the knobs on the unit. The menu presents the knobs as they appear on the unit.

CTR2-Max supports dual-function knobs. Each knob has a *turn* and a *push-and-turn* function. Touch the caption at the top of the page or the **Next Pg** button to toggle between the **Knob Turn** and (Knob) **Push & Turn** menus.

Any knob on **CTR2-Max** can be assigned to the **<DIAL>** function. When this function is selected, that knob will control the parameter selected in the **Dial** control. Knobs assigned to **<DIAL>** will also control the selected parameter in the Dashboard.

Assigning a knob to **<NAV>** will allow that control to be used for menu navigation, similar to how the gray ring works on **CTR2-Quad**.

Assigning a knob to **<STEP>** allows that knob to be used to change the frequency tuning step.

Editing the Knob Menu

You can easily change the **Dial** control assignments in the **Knob** menus. Just touch a button to select it, then touch it again to edit it. The selected function and the bottom button will turn red. Turn any knob to scroll through the functions available in the **Dial** control menu.

Touch the **< Select >** button on the bottom or let the select timer timeout (3 seconds) to save the new setting.

Using a Knob

The *Knob control* display overwrites the current page anytime a knob is turned. The display is identical to the **Dial** control page but the colors are inverted. The current page re-appears 750 milliseconds after you stop turning the knob.



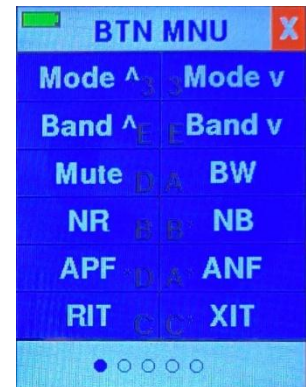
Buttons Menu

Open the **Buttons** menu to select from 60 button actions. Touching a button immediately sends that control to the radio (if the controller is online).

There are 5 pages of buttons with 12 buttons on each page. If a knob is set for **<NAV>**, turning it will switch menu pages. You can also touch a dot on the bottom button bar to jump to a page.

While it's hard to tell from this photo, if a knob switch or pushbutton is assigned to a button action, it's # will appear next to the label on this page.

Assigning knob switches and pushbuttons is covered [in this section](#).



Button Actions

Each button in the **Buttons** menu is pre-assigned to a specific action. The table below list each menu page along with the button's caption and action.

Page	Caption	Function	Caption	Function
1	Mode ^	Step to next mode	Mode v	Step to previous mode
	Band ^	Step to next band	Band v	Step to previous band
	Mute	Mute Rx	BW	Change bandwidth
	NR	Noise Reduction On/Off	NB	Noise Blanker On/Off
	APF	Auto-Peaking Filter On/Off	ANF	Auto-Notch Filter On/Off
	RIT	RIT On/Off	XIT	XIT On/Off
2	Tx Enab	Toggle Slice Tx Enable	TUNE	Tune Output On/Off
	ATU Tun	Start ATU	ATU Byp	Bypass ATU
	RxAnt:x	Change Rx antenna	TxAnt:x	Change Tx antenna
	WNB	Wide Noise Blnkr On/Off	Proc	Step Tx Processor
	AGC	Change AGC	RF Gn	Step RF Gain
	*KeyPad	Open Frequency Keypad	*FavFrq	Open Favorite Freq page
3	CW	CW mode	DIGL	Digital LSB mode
	LSB	Lower sideband mode	DIGU	Digital USB mode
	USB	Upper sideband mode	SAM	Synchronous AM mode
	AM	AM mode	*DialCtl	Open Dial Control page
	FM	FM mode	*BtnMnu	Open Button menu page
	RTTY	RTTY mode	*DashBd	Open Dashboard page
4	160m	160 meters	17m	17 meters
	80m	80 meters	15m	15 meters
	60m	60 meters	12m	12 meters
	40m	40 meters	10m	10 meters
	30m	30 meters	6m	6 meters
	20m	20 meters	Gen	General Coverage
5	2m	2 meters **	M1:	Send CW Macro #1
	1.25	1.25 meters **	M2:	Send CW Macro #2
	70c	70 centimeters **	M3:	Send CW Macro #3
	33c	33 centimeters **	M4:	Send CW Macro #4
	23c	23 centimeters **	M5:	Send CW Macro #5
			<STOP>	Stop sending macro

* These actions open pages

** These bands require a transverter

Assigning a Knob Switch or Pushbutton to a Button Action

Knob switches and pushbuttons have two actions: a short-press (less than 1 second) and a long-press (greater than 1 second).

Switch Short-Press Action

To assign a short-press button action to a knob's push switch or pushbutton, do the following:

- Open the **Buttons** menu and navigate to the page with the action you want to assign
- Press and Hold the *Knob* or pushbutton switch you want to set
- Touch and release the action button you want the switch to execute

Once you have assigned a function to a knob switch or pushbutton, the knob's letter or switch # will appear in that button's label. That action will be sent to the radio anytime you press that knob or pushbutton.

Switch Long-Press Action

To assign a long-press button action to a knob's push switch or pushbutton, follow the steps above for setting the short-press action, then while still holding the knob or pushbutton down, touch the desired action a second time. Buttons set to long-press actions will have a * appended to label on the button.

Clearing Button Assignments

To clear a knob or pushbutton assignment, hold that switch down and touch the selected button action on the **Buttons** menu again.

NOTE: You must clear the switch or pushbutton assignment from Button action you can assign that action to another knob or pushbutton.

NOTE: Changing the PTT assignment on **CTR2-Max's** pushbuttons (on page 5 of the **Settings** menu) automatically cancels all switch action assignments to all pushbuttons.

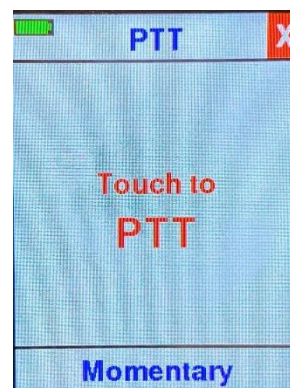
NOTE: Button switch actions are preset in the factory default. Feel free to edit them to fit your operating requirements.

PTT Page

The **PTT** page offers a virtual PTT button. There are three options to choose from on this page. Touch the bottom button to step from **PTT Off**, **PTT Momentary**, and **PTT Latch** modes.

When PTT is **Off** or the unit is offline, touching the screen, or operating an external PTT switch just pops up a warning.

When PTT is set to **Momentary**, touching the screen or operating an external PTT switch (if pushbutton #2 is assigned to PTT) keys the radio's PTT over the network. Lifting your touch or releasing the external PTT switch unkeys the radio.



When PTT is set to **Latch**, touching and releasing the touch keys the radio over the network. It will remain keyed until you touch and release the screen again or the three-minute timer expires.

NOTE: A pushbutton assigned to PTT will control PTT in any page or menu.

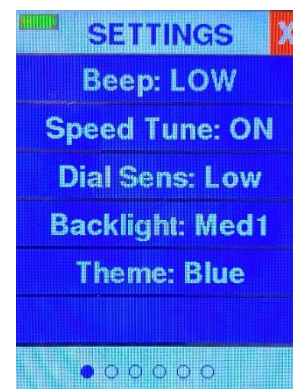
To use the external PTT input you must assign pushbutton #2 to PTT, otherwise, the external input will execute the button action assigned to pushbutton #2.

Settings Menu

To enter the **Settings** menu, press the **Settings** button at the bottom of the **Home** page.

The settings menu is divided into 6 pages with six buttons on each page. You must press a settings button twice to change its setting.

Touch the **SETTINGS** caption to return to the **Home** page.



This table summarizes each setting.

Page	Btn	Function	Description
1	1	Beep Mode	Changes the volume of CTR2-Max's button beeps. Range: Off, Low, Medium, and High. Sidetone volume is set through a small hole in the enclosure using a 1/8" (3.2mm) Phillips screwdriver.
	2	Speed Tune	When enabled, touch and hold the outer ring on the Flex for > 1 second to enter speed tuning mode. Valid for VFO control only.
	3	Dial Sens	Changes the sensitivity of the virtual Dial. Range: Low, Medium, High. Default is Medium.
	4	Backlight	Adjusts the backlight. Range: Low , Medium1 , Medium2 , and High . Lower settings reduce current draw on the unit.
	5	Theme	Select the color theme for the selected Map. Options include Dark, Light, Blue, Orange, Green, Red, and Violet.

	6	Future	
2	1	(Keyer) Type	Selects the internal <i>keyer type</i>. Options are OFF, Straight, PassThru, Iambic A, Iambic B, Ultimatic, and Bug – <i>does not change radio keyer</i>. Use Passthru for external keyers or PTT switches. Set to OFF to use the radio's keyer. NOTE: CTR2-Quad units have a separate <i>Key/PTT</i> input jack so there is no need to set the keyer to Passthru on these units.
	2	Pitch	Selects the sidetone frequency for the sidetone oscillator in CTR2-Max. Frequency range is from 500 Hz to 1000 Hz in 50 Hz steps. To turn off the sidetone, turn the sidetone volume control fully CCW. NOTE: This setting also affects the radio's audio bandpass filter in CW mode.
	3	Paddles	Selects Normal or Reverse wiring for the Paddle and Key/PTT 3.5mm jacks. Steps through each combination.
	4	Sleep	Sets a timer that turns off the display backlight after no activity for the set number of minutes to reduce current draw. Sleep mode does not close USB or Bluetooth connections. Range: Never, 1, 5, 10, 30, and 60 minutes.
	5	Pwr Off	Sets a timer to turn off the unit after no activity for the set number of minutes. Pwr Off mode reduces current draw to 14 microamps and closes USB and Bluetooth connections. Range: Never, 10, 30, 60, 120, and 180 minutes.
	6	Power Down	Immediately closes the WiFi connection and puts the unit to sleep, reducing current draw to 35 milliamperes. Touch the display to wake up the unit. You can trigger a power down sequence by pressing and holding any two pushbuttons. NOTE: If you are powering your CTR2-Max with an internal 3.7-volt battery you'll want to turn off the Battery switch to conserve battery power. Because of the ESP32-S3 display design, there is no way to put the unit into ultra-low power mode.
3	1	Fav Mode	Switches the Favorite Frequency list between all bands and the selected band.
	2	Export Settings	Backup CTR2-Max's settings by exporting them to a file on your computer. To do this, in Tera Term select <i>File->Transfer->XMODEM->Receive</i> then enter the name of the file you wish to save. Next, touch Export Settings to start the transfer. Once this file has been saved you can recover from a unintended memory erase when flashing new firmware by using the Import Settings option above.

3			NOTE: You can select to export just your unit's basic settings or the basic settings and all of the favorite frequency lists.
	3	Import Settings	Import settings from a previously exported setting file using XModem. In Tera Term select <i>File->Transfer->XMODEM->Send</i> and select a previously saved settings file on your computer. Next, touch Import Settings to start the transfer. See the Backing Up and Restoring Setting section for more information.
	4	WiFi Profile	This option allows you select one of three WiFi configurations. This is useful when you have more than one WiFi network that you use your CTR2 controller on. Profiles are numbered 1, 2, 3.
	5	AutoConnect	Enable or disable WiFi auto connect. When enabled, CTR2-Max will try to connect to the WiFi network when it is first powered up. <i>You can override this setting by pressing and holding the M5 button during boot.</i>
	6	Mode	Toggles between GUI and non-GUI connection mode. Use GUI only if this is the only connection to the radio. It provides a panadapter in the Dashboard. Normally you use non-GUI mode when using CTR2-Max with another control app like SmartSDR.
4	1	Connect/Disconnect WiFi	Connects or disconnects WiFi. You must have the router's SSID and password and the radio's IP address and IP port # set before connecting to the radio.
	2	SSIDx	Set router's SSID. Touch to open the screen editor or use a terminal program connected to CTR2-Max to set the SSID. NOTE: x= the profile # selected.
	3	PWx	Set router's password. Touch to open a screen editor or use a terminal program connected to CTR2-Max to set the password. NOTE: x= the profile # selected.
	4	Flex Adrs	Set the radio's IP Address. Touch to open the screen editor or use a terminal program connected to CTR2-Max to set the IP address. The address can be found in the <i>Settings -> Radio Setup... ->Network</i> tab in SmartSDR.
	5	Flex Port	Set the radio's IP Port. Touch to open the screen editor or use a terminal program connected to CTR2-Max to set the IP port #. This is normally 4992 but you can change if you're changed it on the radio or are connecting to the radio from outside your LAN.
	6	Flex Slice	Select the slice to connect to. Slices are numbered A to H. Not all radios support all slices.
	1	# Knobs	For CTR2-Max , this is set to 5 knobs and cannot be changed.
	2	PTT	Changes the PTT mode from Off -> Momentary -> Latch . This can also be changed on the PTT page by touching the bottom button.
	3	SW# set to PTT	This option steps through the four pushbutton switches to assign one of them to PTT.

5			NOTE: Pushbutton #2 is wired to the Ring terminal of the external PTT jack so it must be selected here for PTT if you plan on using an external PTT switch. NOTE: Changing this setting deletes the button action assignments for <i>all</i> buttons.
	4	Future	
	5	Rotate Screen	Rotates the screen 180 degrees for each selection. This allows for future CTR2-Max configurations.
	6	Battery Icon	Enables or disable the battery icon display. If you don't use an internal Li-Po battery, you can leave this turned off.
6	1	Run MIDI Mode	Select this option to switch to MIDI mode. This mode uses Bluetooth or USB MIDI to control a 3 rd party app such as Marcus' (DL8MRE) SmartSDR for iOS/Mac. It is <u>not</u> compatible with SmartSDR for Windows. For more information on MIDI mode refer to the CTR2-Max MIDI Mode Operation Manual .
	2	Restore to Start Up	This option allows you to reset your settings to what they were when you first booted CTR2-Max , <i>if you didn't choose to reset your call and registration key in Reset to Factory</i> . This is handy in case you want to "roll back" changes you made during the current session.
	3	Demo Mode: Edit Call & Key ----- Normal Mode: Reset to Factory	In Demo Mode: This option allows you to enter your call and registration key without using a terminal program. The text editor is covered here. ----- In Normal Mode: This option resets CTR2-Max's configuration back to the original factory settings. NOTE: You have the option of resetting your call sign and firmware registration key. NOTE: If you reset the configuration by mistake, <u>and didn't choose to reset your call and registration key</u>, execute the Restore to Start Up option to restore your settings <u>before</u> powering the unit down.

Dashboard

Flex WiFi mode includes a second method to control the radio called the **Dashboard**. To enter this mode, select **DashBoard** from the **Home** menu.

Dashboard Home Page

The Dashboard's **Home** page displays the frequency along with buttons to select various command groups.

The small inverted triangle above the red [X] in the top-right corner indicates that **Flex WiFi** mode is connected to WiFi and to the radio.

When online the caption will display the active slice. It will be displayed in red font, as shown here, if this slice is enabled for transmit. Touch the caption to open the [Panadapter](#) window to change the active slice.



Touch any element on this page to select or execute that item or open its associated menu.

You can lock the VFO frequency by touching the **Lock** button. Its caption will change to **ULock**. Touch it again to unlock the VFO.

The VFO frequency is always selected on the **Home** page as shown here. Turning the knob assigned to **<DIAL>** changes the frequency by the selected step digit (the red digit, 100 Hz in this example). You can change the step simply by *double-touching* another digit in the frequency. You can also assign a knob to **<STEP>**. To select the ½ step (5, 50, 500, 5000, etc.) using the touch method, touch the selected step digit again.

Knob Control

Any selected parameter in the Dashboard pages can be adjusted by either the swipe method (explained next), or by turning a knob assigned to the **<DIAL>** function.

Swipe Method

When you touch an adjustable parameter in a Dashboard page, the selection indicator around the that parameter turns red indicating that swipe adjustment is enabled. To change the parameter's value, simply swipe your finger to the *left* or to the *right* anywhere on the display. On the Dashboard **Home** page, swiping below the frequency is recommended so you can see the frequency as you swipe. You can raise your finger and swipe again as long as the select indicator is red. Swipe mode will automatically turn off after 3 seconds of inactivity.

To zero the digits below the selected tuning digit on the dashboard **Home** page, touch the **Zero** button.

NOTE: If the VFO is [locked](#), all frequency digits will be “grayed out” and the **Zero** function will be blocked. To unlock the VFO, press the **ULock** button.

To return to the controller's **Home** page, press red **[X]** in the top-right corner.

Touching the other buttons on this page will open their page. These pages will be described next.

Keypad Frequency Entry

CTR2-Max has a built-in keypad for direct frequency entry. To open the keypad, press **Freq** button on the bottom row of the Dashboard's **Home** page.

The current frequency will be displayed on the top of the display in Hertz,

You can edit the current frequency by just entering a new frequency. To just change the lower digits, touch the **[<]** button.

Touch the **[x]** button to clear the current frequency. You can enter the frequency in MHz, kHz, or Hz. Once you've entered the new frequency press the **[M]**, **[K]**, or **[H]** button to accept it.



Here are a few examples:

- Entering **10M** sets the frequency to 10 MHz.
- Entering **28.074M** sets the frequency to 28.074 MHz.
- Entering **28074K** also sets the frequency to 28.074 MHz (28074 kHz).
- Entering **2807400H** sets the frequency to 2.807400 MHz. Add another trailing 0 to make it 28.074 MHz.
- Entering **28074020H** sets the frequency to 28.074020 MHz.

Touch **Fav** on the bottom-left button to open the [Favorite Frequency](#) page from this page, or touch **Esc** to exit without saving the new frequency.

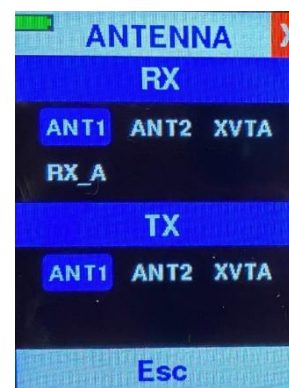
NOTE: If the VFO is [locked](#), this page is not available. Unlock the VFO by touching the **ULock** button on a frequency display page.

Antenna Page

The **Antenna** page allows you to select the antenna configuration on your radio. Simply touch the antenna option you want to use.

Selecting **XVTA** (or **XVTB** on dual SCU radios) enables **Transverter** mode. This mode adds the 2m, 1.25m, 70cm, 33cm, and 23cm bands to the [Band](#) page and compresses the frequency display to accommodate the additional digits.

The top half of this page displays the receive antenna options and the bottom half displays the transmit antenna options. Touch a button to select an option.

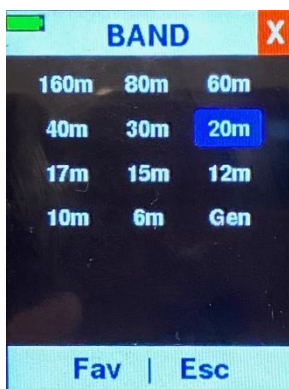


When you're done, touch the **Esc** button at the bottom of the page or the red [X] at the top to return to the dashboard's **Home** page.

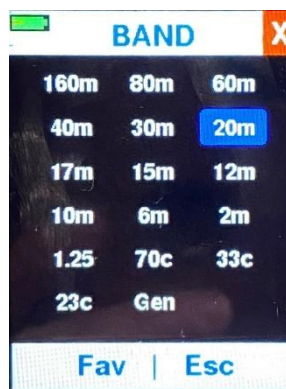
Band Page

The **Band** button (top-center of the dashboard's **Home** page) displays the current band setting on the radio. Touch this button to open the **Band** page.

When either the **XVTA** or **XVTB** transverter options are selected in the **Antenna** page the 2m, 1.25m, 70cm, 33cm, and 23cm bands are added to the **Band** page.



Normal Band Options



Additional Transverter Bands

Touch **Fav** on the bottom-left button to open the [Favorite Frequency](#) page from this page.

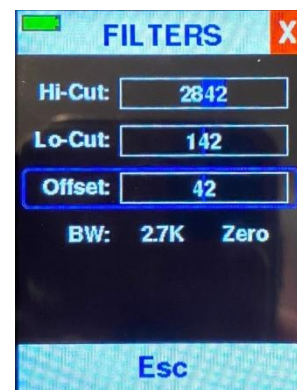
Touch the **Esc** button at the bottom of the page or the red [X] in the top-right corner to return to the dashboard's **Home** page.

NOTE: If the VFO is [locked](#) this page is not available. Unlock the VFO by touching the **ULock** button.

Filter Page

The current bandwidth is displayed in the top-right corner of the Dashboard's **Home** page. Touch this button to open the **Filter** page.

On this page you can change the **Hi-Cut** and **Lo-Cut** frequencies independently and change the filter **Offset** to move the filter within the pass band. The total bandwidth (**2.7K**) is indicated on a button at the center of the 4th row. Touch this button to step the bandwidth down to the next standard bandwidth for the selected mode. If the filter offset has been moved off-center (+42 Hz in this example) the **Zero** button will be displayed. Touch this button to remove the offset and reset the filter to its default settings.



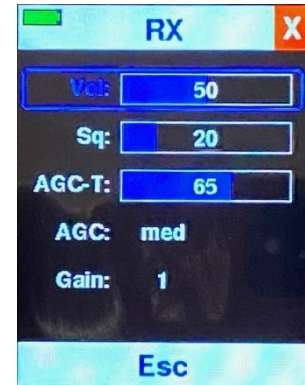
The selected control (with the blue square) can be adjusted with the knob assigned to **<DIAL>**. You can also enable swipe control by touching the selected control. The select indicator will turn red while swipe is enabled. In swipe mode, simply swipe your finger *left* or to the *right* to change the control.

RX Page

The **RX** page allows you to change several parameters related to the receiver.

Touch any control to select it. For variable controls, turn the knob assigned to **<DIAL>** to change the setting. You can also touch the selected control to enable swipe mode, then swipe your finger *left* or *right* to change the parameter. The select indicator will turn red while swipe is enabled. You can continue to swipe until swipe mode times out (in 3 seconds).

Touch the **AGC** or **Gain** settings to step through the settings for those controls.



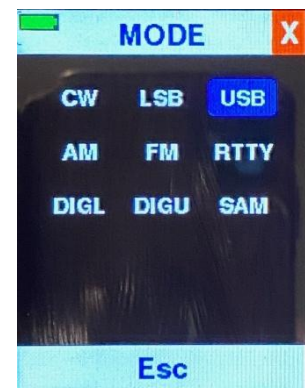
The Volume control has a Mute function. Touch the **Vol** label to toggle mute on and off.

Touch **ESC** or the red [X] in the top-right corner to return to the dashboard's **Home** page.

Mode Page

The **Mode** button (center of the dashboard's **Home** page, below the frequency) displays the mode setting on the radio. Touch this button to open the **Mode** page.

In the **Mode** page, touch a mode to switch the radio to that mode and return you to the dashboard's **Home** page. Touch **Esc** or the red [X] in the top-right corner to return without changing the mode.



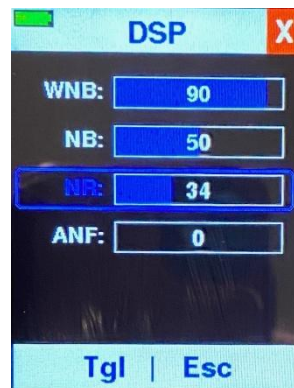
DSP Page

The DSP page allows you to adjust and enable or disable each DSP setting on the radio.

To adjust a setting, touch its gauge to select it then turn the knob assigned to **<DIAL>**. You can also use the touch to select then swipe method described earlier.

To enable or disable a control, touch the control's label. When enabled the control text will be inverted. **Noise Reduction** is enabled in this example. You can also select the control's gauge then touch the **Tgl** button to enable or disable that control.

Touch **Esc** or the red [X] in the top-right corner to return to the dashboard's **Home** page.



TX Page

Controls associated with the transmitter are accessed by touching the **TX** button on the **Home** page.

You can adjust the Power Out, Tune Out, and Mic Gain by selecting those gauges.

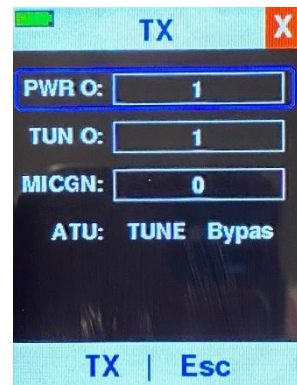
The knob assigned to **<DIAL>** can be used to adjust the selected parameter or you can enable [swipe method](#) to change it.

Both **ATU** buttons require one touch to select the tune function then a second touch (on **EXEC**) on the left-bottom button to execute it.

To toggle the **TX** enabled mode on the current slice, touch **TX** on the left-bottom button. The state of the **TX** mode is indicated by the caption of the page (**TX** in this example). When **TX** is enabled the caption on all pages will be red. When **TX** is disabled the caption on all pages will be the default background color.

You can also open the **Buttons** menu to change **TX** mode on the radio. If you use it a lot you can [assign the Tx Enbl button](#) on the **Buttons** page to one of the knob switches or pushbuttons.

Touch **Esc** or the red [X] in the top-right corner to return to the dashboard's **Home** page.



X/RIT Page

Enter the **X/RIT** page by touching the **X/RIT** button on the dashboard's **Home** page.

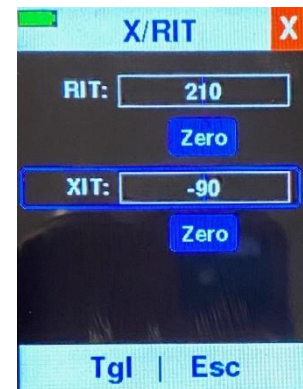
As with the other control pages, select a control then use the knob assigned to **<DIAL>** or the touch to select then [swipe method](#) to change the control's value.

Enable and disable the selected control by touching the control's label or by touching **Tgl** on the bottom button.

When a control is not set at 0 Hz, a **Zero** button will appear below its gauge. Touching this button sets the control to 0 Hz.

Touch **Esc** or the red [X] in the top-right corner to return to the dashboard's **Home** page.

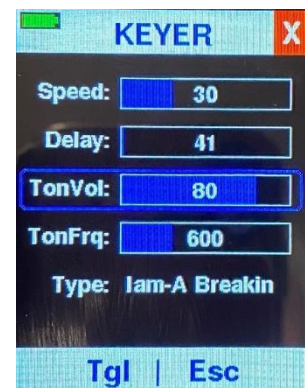
NOTE: If the VFO is [locked](#) this page is not available. Touch the **ULock** button to unlock the VFO.



Keyer Setting Page

Touch the **Keyer** button to open the keyer's settings page. As in the other dashboard pages you either use the knob assigned to **<DIAL>** or touch to select it then use the [swipe method](#) to change the value. Changing the **Speed**, **Delay**, **TonVol**, and **TonFrq** settings change these settings for both the internal keyer on the radio and the keyer in **CTR2-Max**.

NOTE: The radio's keyer is disabled when a CTR2 keyer is selected. To release this override so you can use your radio's keyer, set the keyer **Type** to **OFF** on this page, or on page 2 of the **Settings** menu.



The radio's sidetone can be enabled or disabled by touching the **TonVol** label or the **Tgl** label on the bottom button.

NOTE: The radio's sidetone is only available when your paddles are connected directly to the radio and you are using the radio's internal keyer. It is not available when keying the radio with **CTR2-Max** over the network.

The **Breakin** button controls the radio's breakin mode.

NOTE: To key the radio, you must have **Breakin** enabled (as shown in photo above), the radio in CW mode, and the controlled slice must have **TX** enabled. The caption will be red when **TX** is enabled.

The knob assigned to **<DIAL>** can be used to adjust the selected parameter or you can enable [swipe mode](#) to change it.

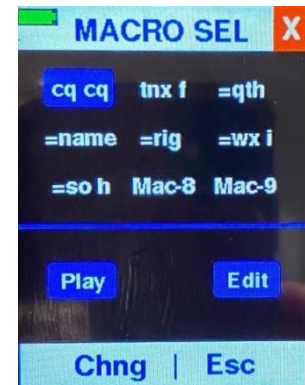
You can step through the keyer **Type** by selecting **Type** then pressing the **Chng** label on the bottom button or by pressing the **Type** label again once it is selected.

Marco Select Page

This page allows you to select, play, and edit one of the nine CW macros. Macros are listed using the first 5 characters of each buffer. Touch a macro to select it then touch **Play** to start it or **Edit** to edit it.

Once you start a macro the button options change to **Pause**, **Stop**, and **Add**. Touch each button as required. Once a macro has started you can leave this page and let it run.

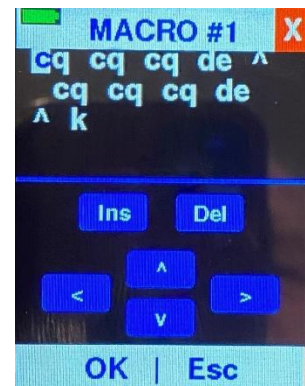
Touch **Esc** or the red [X] in the top-right corner to return to the Dashboard's **Home** page.



Macro Edit Page

Pressing the **Edit** button on the **Macro Select** page opens the editing page for the selected macro.

- Turn the knob assigned to **<DIAL>** or use the [^] and [v] buttons to change the selected character
- Touch the screen or use the [<] and [>] buttons to move the cursor to a new location
- Insert the ^ character to automatically insert your registered call into the buffer
- Use the **Ins** and **Del** buttons to insert or delete a character
- Touch **OK** to accept the changes or touch **Esc** or the red [X] in the top-right corner to exit without changing the buffer



NOTE: You can also edit the macros using a dumb terminal such as [Putty](#) or [Tera Term](#) on a Windows PC or the built-in [terminal program](#) in a Mac or Linux. Simply press the # of the buffer to edit (1 to 9) in the terminal.

Panadpt1/Slice Page

The **Panadpt1/Slice** page allows you to change the ranges used on the panadapter and select which slice you want **CTR2-Max** to control.

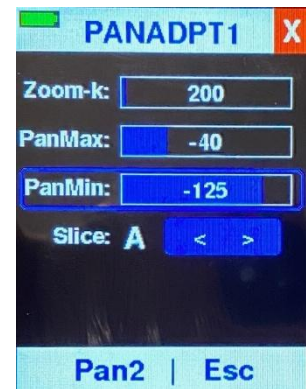
You can access this page directly from the dashboard's **Home** page by touching the caption on the **Home** page or by touching the **Pan** button.

The normal methods to change the selected value are available, i.e. turn the knob assigned to **<DIAL>** or touch then swipe.

To change the **Slice**, touch either the [**<**] or [**>**] button. The new **Slice** character will be displayed inverted. To accept the change touch **Chng** on the bottom button. The controller will disconnect from the radio and then reconnect to the new slice.

To move to the **Panadpt2** page touch the **Pan2** button on the bottom-left button.

Touch **Esc** or the red [**X**] in the top-right corner to return to the dashboard's **Home** page.



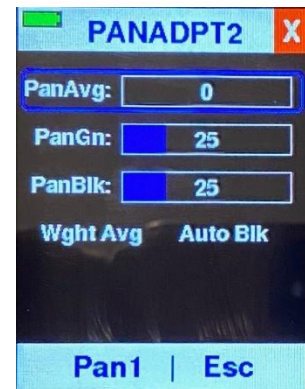
Panadpt2 Page

The second panadapter page allows you to control the **Average**, **Gain**, and **Black** levels on the panadapter and waterfall.

The two buttons on the 4th row allow you to toggle **Weighted Average** and **Auto-Black** functions.

These functions are also available on the virtual **Dial** control.

Touch **Esc** or the red [X] in the top-right corner to return to the dashboard's **Home** page.



Favorite Frequency Page

Access the **Favorite Frequency** page by pressing **Fav** on the Home page, [Keypad](#), or [Band](#) page. This page displays 16 frequencies that you have recently visited.

In the [Settings](#) menu you can select to save frequencies individual bands (20m is shown in this screenshot) or you can have a common favorited frequency list for all bands.

Frequency and modes are automatically added to the first unlocked bin on this list when you stop on a frequency for longer than 10 seconds. Modes are represented by their first letter, U=USB, C=CW, etc.

Lock a frequency bin by selecting it then touching **Lock** on the bottom-left button. Locked bins have an asterisk to the right of the mode character. Once locked the bin will not be overwritten by new frequency or mode data. This allows you to freeze your favorite frequencies and quickly return to them.

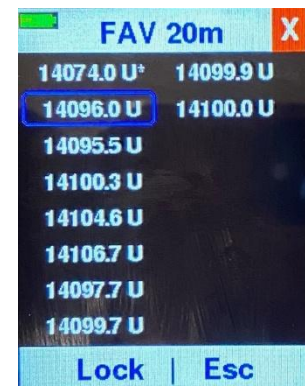
Unlock the selected bin by touching **UnLk** on the bottom button.

Touching any frequency bin will highlight that bin and automatically tune the radio to that frequency and mode (if **CTR2-Max** is online). The bin will be highlighted with a red outline for 3 seconds and **Move** will appear on the bottom left button. During this time, touching **Move** will move the selected bin to the top left position. This allows you to organize your frequency list.

Turn the knob assigned to **<DIAL>** to move to another bin. Favorite frequencies will be restored after a power cycle. Once all of the bins have been locked the list will not accept new frequencies.

Touching a frequency twice will return you to the dashboard's **Home** page.

Press **Esc** to return to the dashboard's **Home** page.



Backing Up and Restoring your Settings

Once you have your **CTR2-Max** setup the way you want it, go to page 3 on the **Settings** menu and **Export** your settings to a backup file on your computer.

CTR2-Max uses the XModem file transfer protocol to transport settings to and from backup files on your computer. XModem is an older protocol and not many dumb terminal programs support it anymore. Tera Term does and I'll use it in the document. Putty does not. To get XModem functionality with Putty you need to download and install [ExtraPutty](#). This program is a branch of Putty. You can download it from [here](#).

Before you can use the **Import Settings** option you must export the settings on your **CTR2** unit once you've made changes. If you want to just return to factory settings, select the **Reset to FACTORY** option in the **Settings** menu.

Export Settings

To export the current settings in **CTR2-Max**, connect Tera Term to your **CTR2** unit then open its XModem transfer utility. This can be found at *Files->Transfer->XMODEM->Receive...* option shown here.

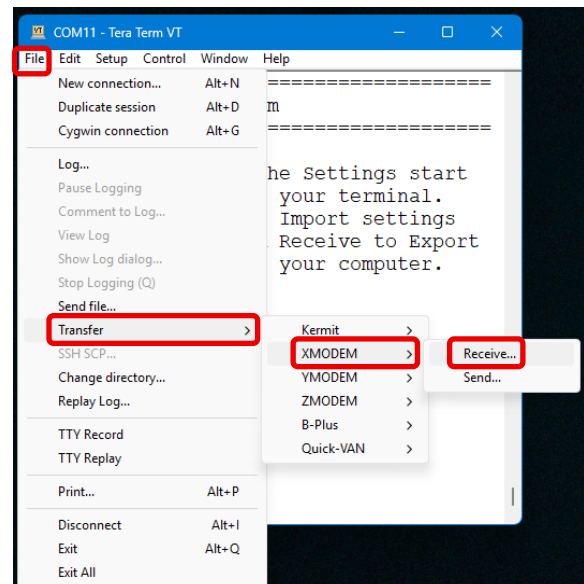
When you select this option Tera Term will ask you to enter the file name for the file you want to create. Navigate to the folder you want to save it in then give it a name. *I prefer to use the .txt extension but you can use any extension you want.*

NOTE: If you don't enter an extension, your file will not have one, which can confuse Windows.

When you click OK Tera Term will open the XModem transfer window and wait for the transfer to start. At this point, touch the **Export Settings** option in the **Settings** menu.

You can select whether to send just the basic configuration of you unit, or a full system backup that includes all of the radio and frequency information (including your WiFi credentials and radio address). If you plan on sharing your configuration with others, I recommend saving just the basic configuration.

The transfer should complete in a second or two and you should have a new file in your backup folder. You can view this file with a text editor. I don't recommend editing the values in this file because invalid values may cause problems with **CTR2-Max's** boot process.



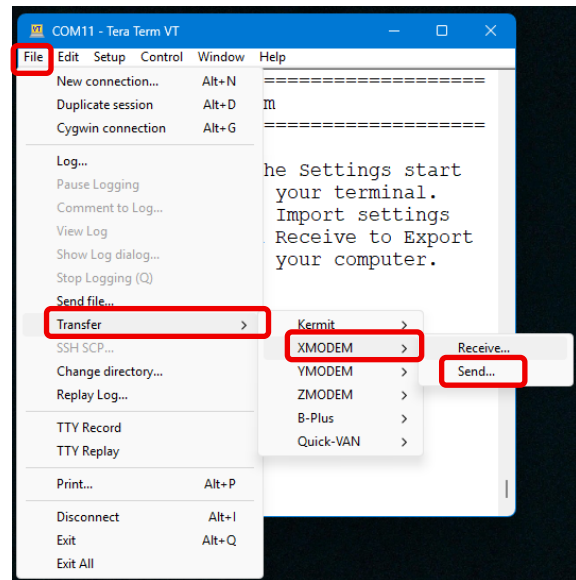
Import Settings

Now that you have a backup file of your settings (or have downloaded a configuration file from the [Lynovation](https://www.lynovation.com) web site) you can import them using the **Import Settings** option.

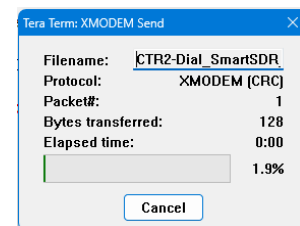
To start an import, touch the **Import Setting** button in the **Settings** menu. Next, in Tera Term, navigate to the **File->Transfer->XModem** and select the **Send** option. Tera Term will ask you to select a file. Select one of the files you previously exported, or a file from the [CTR2-Dial Configuration File](#) zip file. Tera Term will then open the file transfer window and transfer the file.

HINT: You can use the export and import settings functions to save and reload multiple versions of your settings. Perhaps you use **CTR2-Max** on more than two apps and have each app configured differently. You can export the settings for each of your apps then import them back in when you want to change apps.

This is also handy if you have more than one **CTR2** controller, or if you want to share your configuration with other users.

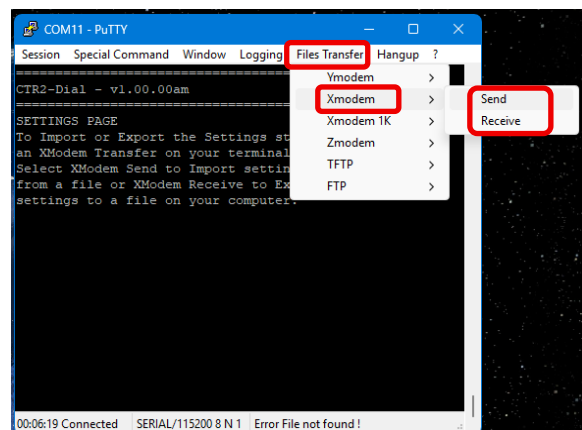


NOTE: If the file transfer stalls (as shown here), cancel the transfer in Tera Term and run it again. This seems to be a random bug in Tera Term as it doesn't happen all the time. The import function in **CTR2-Max** will timeout after 30 seconds if the transfer doesn't complete.



Using ExtraPutty

If you use the XModem transfer option in ExtraPutty as shown here, use the *Xmodem* option, not the *Xmodem 1K* option.



Flex Radio CW Zombie Mode

Occasionally the Flex radio exhibits an odd problem when keying over the network. The radio can go into what I call **CW zombie** mode. This happens occasionally when connecting and disconnecting multiple clients to the radio that send remote keying commands (at least I think that's what causes it).

In **zombie** mode the radio looks like it is transmitting CW, the light on the front panel turns red, the TX icon turns red, the MOX button turns blue *but **no RF carrier is generated or displayed on the panadapter***. The only way I have found to get the radio out of zombie mode is to disconnect all clients and power cycle the radio.

Appendix A: Installing or Updating CTR2-Max Firmware

CTR2-Max firmware is pre-installed and tested on your unit prior to shipping. You will want to occasionally update the firmware to keep current with bug fixes and new features.

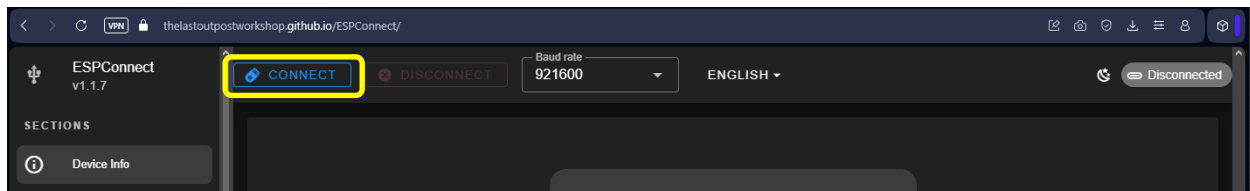
Before you begin, download the latest **CTR2-Max** firmware from my [web site](#). Unzip the firmware distribution zip file into a folder.

Installing Firmware using ESPConnect (Best Method)

By far, the easiest, and recommended method to install or update firmware on an ESP32 process is with [ESPConnect](#), an open source ESP32 management project.

ESPConnect is a browser-based tool that must be opened on a Chromium-based browser that supports Web Serial, such as Chrome, Edge, Brave, or Opera. It will run on a Windows PC or an Apple Mac. Unfortunately, Linux doesn't support Web Serial in any browser.

To start, open **ESPConnect** here: <https://thelastoutpostworkshop.github.io/ESPConnect/>



Next, plug your **CTR2** unit into a USB port on your computer.

NOTE: Do not connect it to an unpowered USB hub.

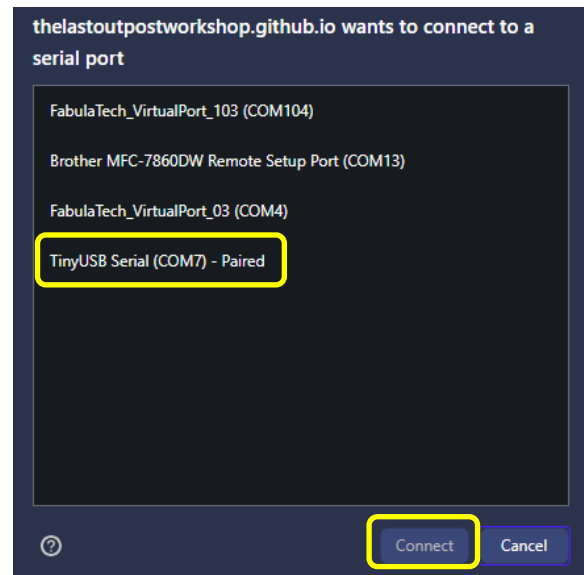
Click the **Connect** button.

A device list will pop up showing the available USB devices on your computer.

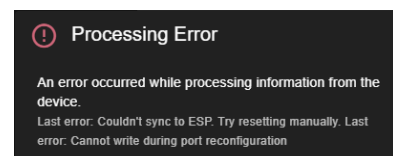
On a Windows PCs, all **CTR2** units will be shown as a **TinyUSB Serial** device, as shown here.

On Macs, **CTR2** units based on the ESP32-S3 will be listed as an **ESP32-S3-DEV** device.

Select the **CTR2** device and click the **Connect** button.



A popup warning will appear telling you that an error occurred. Some errors may tell you to press the BOOT button on the processor to put it into bootloader mode. You do not need to do this.



This is the normal response when trying to connect to a **Tiny USB serial** device.

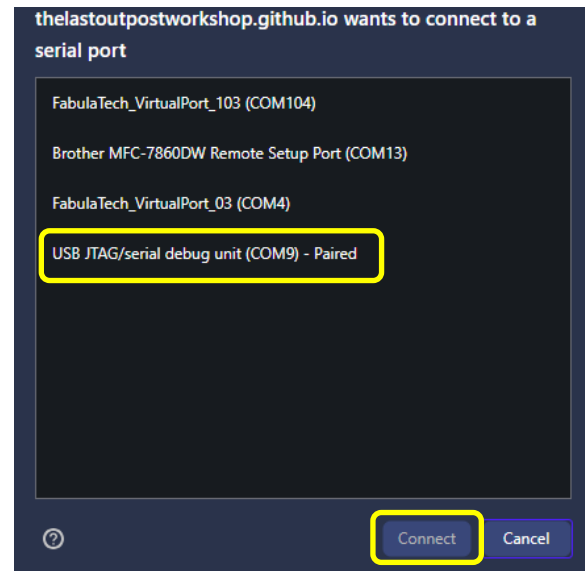
Click the **Connect** button on the home page again.

This time, the **TinyUSB serial** (or **M5STACK_DIAL** on Macs) will not be shown on the list. Instead, a new device, **USB JTAG/serial debug unit** will be shown (on both PCs and the Mac).

This is the bootloader port and the unit is now ready to program.

Select the **USB JTAG/serial debug unit** device then click **Connect**.

NOTE: Apparently, not all ESP32-S3 processors will enable the **USB JTAG** port automatically. If your's doesn't, you'll need to press the **BOOT** button while powering up the unit. It can be found next to the USB-C connector on the back of the unit.



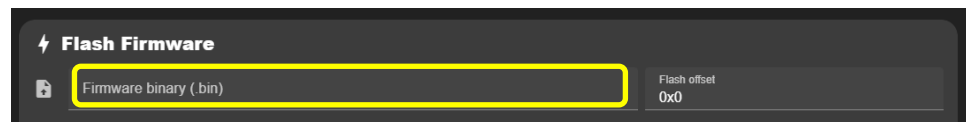
Once you're connected to your **CTR2-Max**, the left menu items on the page will be enabled.

<<< WARNING >>>

ESPConnect is a powerful device editor. Many of the functions can cause problems with **CTR2** firmware if you change them. If you don't know what a functions does, **DON'T CHANGE IT!**

Click on the **Flash Tools** menu item and scroll down to the **Flash Firmware** section.

Click the **Firmware binary (.bin)** text box.

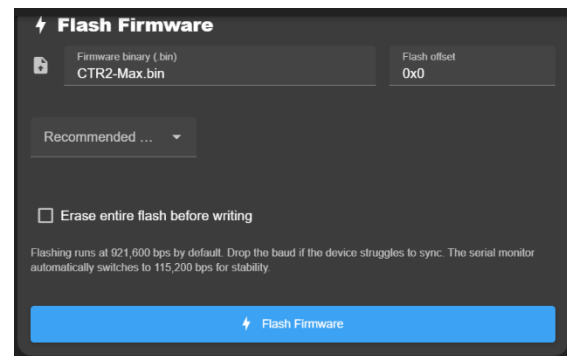


A file navigation screen will appear. Navigate to where you unzipped the firmware zip file from the **firmware update page** and click on the **CTR2-Max.bin** file.

Your display should now look like this:

Leave the **Flash offset** set to **0x0** and uncheck the **Erase entire flash before writing** checkbox.

Click the **FLASH FIRMWARE** button to start the flash process.



Once the process completes, cycle the power on your **CTR2** unit. The version # will be displayed when the unit boots. The version # should match the version # from the firmware zip file.

This completes the firmware update process.

Installing Firmware using EspressIF Flash Download Tool (Old Method)

The EspressIF Flash Download Tool is the original flash tool provided by the makers of ESP32 micro controllers. It's geared for developers and many find it difficult to use.

This section will describe the process of using this tool to update your ESP32-S3. I highly recommend using [ESPConnect, described above](#), instead.

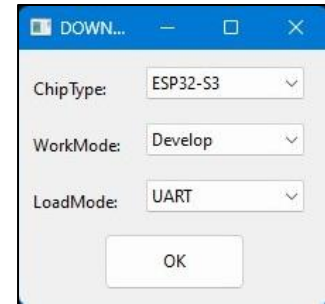
You must force the ESP32-S3 into programming mode before you can flash firmware to it. To do this, follow this procedure

- 1) The **BOOT** button is accessible from the back of the unit, next to the USB-C connector.
- 2) Using small flat-blade screwdriver, press and hold the **BOOT** button on the ESP32-S3 then apply power to **CTR2-Max**. The display will be blank when the unit boots into programming mode. If the unit is already powered up, press and hold the **BOOT** button then press and release the **RESET** button. You should hear a beep from your computer as it registers the new USB COM port and the display will be blank.
- 3) You can now use the procedure below with EspressIF Flash Download tool (on Windows) or [run the script \(on Linux and Mac\)](#), or try ESPConnect again, with the new COM port to flash the new firmware to the ESP32-S3.
- 4) Once the download completes, cycle the power on the unit to start the new firmware.



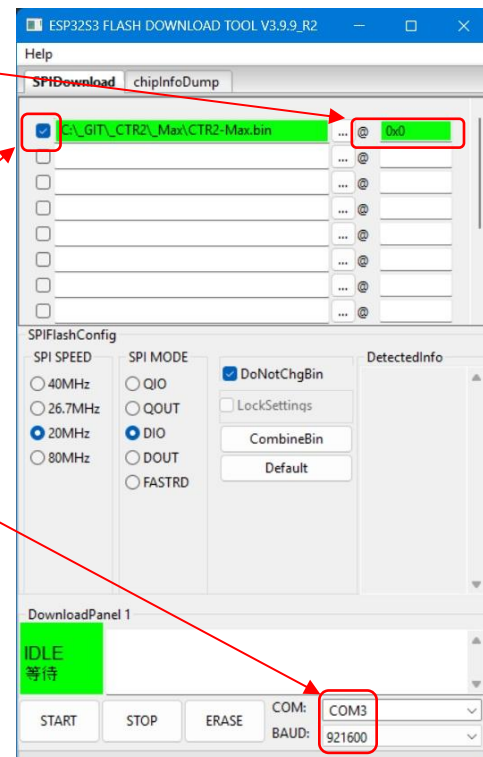
Now that you have the ESP32-S3 in programming mode, follow these steps to install or update to the latest **CTR2-Max** firmware:

1. Download and unzip the latest **CTR2-Max** firmware from **my web site**. Unzip that file into a different folder than where you store other Lynovation firmware update files.
2. Download and open the [EspressIF Flash Downloader Tool](#). When it starts, select the **ESP32-S3 Chip Type**. Leave **WorkMode** set to *Develop* and **LoadMode** set to *UART*.



3. Map the **CTR2-Max.bin** file that you unzipped from the **CTR2-Max_v1.xx.xx** firmware distribution file into the downloader tool and set the offset address to **0x0**.
4. Select the checkbox on the left of the **CTR2-Max.bin** filename as shown.
5. Set the **COM:** port to the port assigned to **CTR2-Max** and set the **Baud:** to 921600.

NOTE: You must use a [USB-C data cable](#). [USB-C charge-only cables](#) (supplied with many devices) will not work.



6. On new installs, click the **ERASE** button to clear the factory demo from the memory.

NOTE: If you erase the memory after running the **CTR2-Max** firmware you will need to re-enter your call sign and registration key, re-select the number of knobs on your unit, and re-enter your WiFi and radio settings the next time you start **CTR2-Max**. If you previously exported your settings, you can restore them using the [Import Settings](#) option in the **Settings** menu.

7. Click the **START** button to download the firmware.
8. Once the download is complete, cycle the power on the unit to start the new **CTR2-Max** firmware.

NOTE: The ESP32-S3 processor will revert back to its operating COM port after the reboot.

Installing using Linux or Mac

Mac users should use the [new method using ESPConnect](#), described above. Linux users have no other option, other than to follow the procedure below.

A script file is supplied in the firmware update zip file. This script file can be used in a Linux or Mac environment if you don't have access to a Windows computer.

Instructions for using this script file are include in the [CTR2-Micro Operation Manual](#) in **Appendix B**.

The firmware that allows USB MIDI control changes the way the virtual COM port works on the ESP32-S3. One COM port is used in the normal operating mode and another COM port is used for flashing the firmware. In order to flash new firmware to the unit you must force the ESP32-S3 to switch from the normal operating mode to programming mode.

To use the script file:

- 1) Force **CTR2-Max** into programming mode as described above.
- 2) Edit the COM port in the script to the programming port. This port will be different than the operating COM port.
- 3) Edit the path to the .BIN file in the script.
- 4) Run the script.

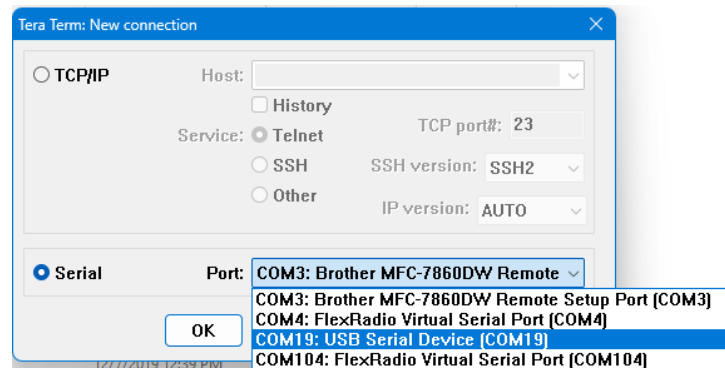
Appendix B: Configuring Tera Term

On Windows, Tera Term is the simplest terminal program to get running for a serial connection.

If you search for Tera Term you find a lot of garbage with malware attached to it. I've downloaded a clean copy of Tera Term v4.106 and posted it in the **CTR2 Group IO files section**. You can download it [here](#). As far as I know, Tera Term is only available for Windows.

When you first open Tera Term you'll be presented with the **Tera Term New connection** window. Simply select the **Serial** radio button, select the COM port Window's assigned to your Micro when you plugged it in, and click the **OK** button.

Since you are connecting to a USB serial port there is no need to set the baud rate. It will run at USB speed regardless of the baud setting.



That's it! Tera Term should now connect to **CTR2-Max**. Once connected, press any key to start CTR2-Max's terminal server.

You can change the terminal size in the **Setup** menu. Select **Terminal...** Set the **Terminal Size** to 41 x 20. **CTR2-Max's** terminal interface was designed for this size.

While in the **Terminal...** settings verify the **New-line** options are set to **CR** for both **Transmit** and **Receive** and the **Terminal ID** is set to **VT100**.

You'll probably want to change the font size and colors. These are also changed in Tera Term's **Setup** menu. Select **Display** to change the font and background colors to your liking. Select **Font** to change the font and font size. I like *Courier New, Regular*, and *14-point size*. Your preferences may differ.

Once you have the program configured the way you like, select the **Setup->Save Setup...** menu and save your configuration. If you use the default file name, TERATERM.INI the program will automatically start a Telnet session using the COM port you selected above when it opens. This provides one-click access to your **CTR2-Max** firmware.

Appendix C: Configuring Putty

Putty is a terminal program that can be configured for a variety of needs. **CTR2** controllers based on the ESP32-S3, only supports serial connections. This section describes how to configure the program to interface with **CTR2-Max**.

NOTE: Putty does not have XModem transfer capability. If you want to [export and import](#) backup files for **CTR2-Max's** settings, consider using Tera Term or install [ExtraPutty](#).

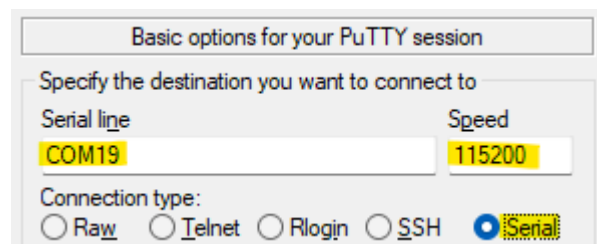
Download Putty for Windows from <https://www.putty.org/>. It's also available for Linux at <https://www.ssh.com/academy/ssh/putty/linux> and for Mac at <https://www.ssh.com/academy/ssh/putty/mac>.

You'll need to connect to **CTR2-Max** using its USB serial port in order to configure it. Make sure to use a USB data cable, not a "charge-only" supplied with many USB-C devices.

Serial Session

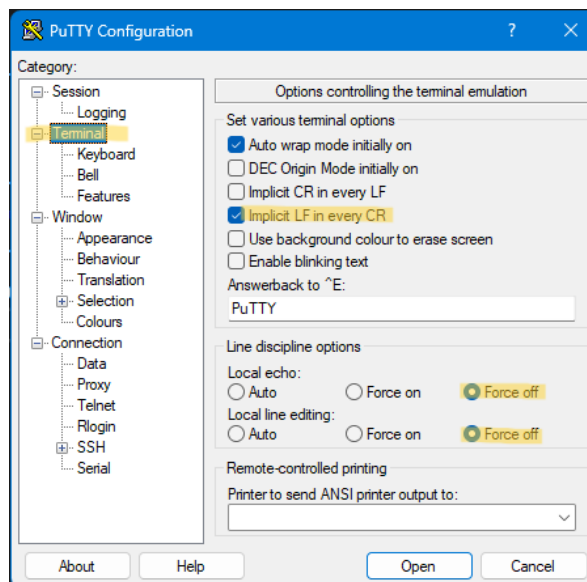
Select **Serial** then set the **Serial Line** to the COM port you found in the Device Manager and set **Speed** (Baud Rate) to 115200.

NOTE: Since this is a USB serial port the **Speed** (baud rate) doesn't matter. Data will be sent at USB speeds regardless of the **Speed** setting.

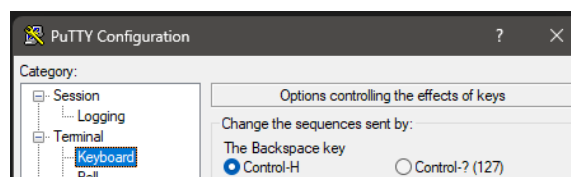


Next, select the **Terminal** item and set the **Implicit LF in Every CR** to on, and **Local Echo**, and **Local Line Editing** to **Force Off**.

You can change the window size under the **Window** item. Set the **Columns** to **41** and the **Rows** to **20**.

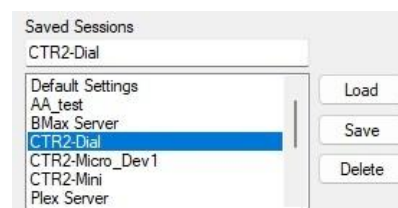


Next, select the **Keyboard** menu option and note the setting for the **Backspace key**. If **Control-H** is selected you will need to press **Ctrl+Backspace** to send the **Del** key (ASCII 127). If **Control-? (127)** is selected, press the **Backspace** key to send the **Del** key code.



Once this has been done, return to the **Session** menu item, enter a name for this session and click the **Save** button. This allows you to easily re-open this session with just a couple of clicks.

If you right-click on the Putty icon in the Windows toolbar the last few sessions you had open will be displayed. Just select the one you want to open it.



You can adjust the display colors on the **Windows->Colours** menu item. The Micro uses the **Bold** attribute to highlight the **hotkeys** and other items. I like to set the **Background** color to blue and the **Bold** color to yellow but you can find the colors that work for you. After you get a color combination you like return to the **Session** menu and **Save** the session.

Appendix D: Apple or Linux Terminal Programs

The Apple Mac and Linux have built-in terminal programs so there is no need to install a separate app. To connect your **CTR2** unit to a terminal session use the following process.

First, list your current serial ports without your **CTR2** unit plugged in.

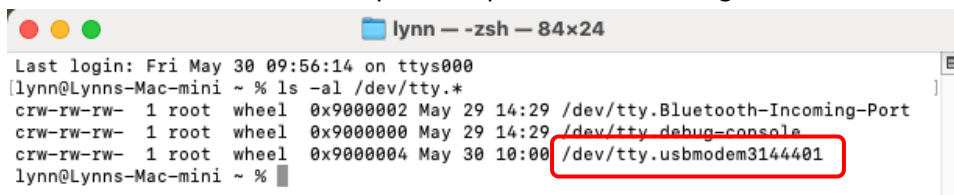
- On the Mac open **Applications/Utilities/Terminal.app**. On Linux open the terminal program supplied by your distro.
- On the Mac, enter `ls -l /dev/tty.usb*`, on Linux, enter `ls /dev/tty*` This will return a list of all known serial ports.
- Next, plug **CTR2-Max** into the computer's serial port and execute the command above again. This is easily done by pressing the *Up* arrow key.
- Compare the new list with the old list. **CTR2-Max's** serial port ID will appear on just the new list. For Mac users the serial port ID format will be `/dev/tty.usbserialxxxxx` where `xxxxx` is a unique device ID #. Linux users will see something like `/dev/ttyACMx` or `/dev/ttyUSBx`, where `x` is a unique # for that port.

NOTE: If a new virtual serial port is not created when you plug your **CTR2-Max** into your PC make sure you are using a USB-C cable that supports data. Many USB-C cables only provide power to the remote device.

Once you know your **CTR2** unit's USB serial port ID, write it on the label on the bottom of the unit using a fine-tipped permanent marker for future reference. Put a piece of transparent tape over the label to seal the ink so it doesn't rub off (it's not as permanent as you think). You can always remove the tape if you want to change what's written on the label.

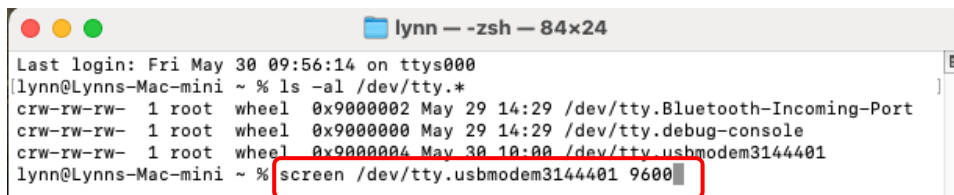
Once you have the serial port ID, enter the following: `screen {serial port ID} 9600`. Include the complete device description (i.e. `/dev/ttyxxxxxx`) for the **serial port ID**. This will open the serial port using 9600 baud in a terminal session. The following screenshots demonstrate these steps.

1. Get the list of serial devices on your computer. We're looking for the **usb** device.



```
lynn - zsh - 84x24
Last login: Fri May 30 09:56:14 on ttys000
[lynn@Lynns-Mac-mini ~ %] ls -al /dev/tty.*
crw-rw-rw- 1 root wheel  0x90000002 May 29 14:29 /dev/tty.Bluetooth-Incoming-Port
crw-rw-rw- 1 root wheel  0x90000000 May 29 14:29 /dev/tty.debug-console
crw-rw-rw- 1 root wheel  0x90000004 May 30 10:00 /dev/tty.usbmodem3144401
lynn@Lynns-Mac-mini ~ %
```

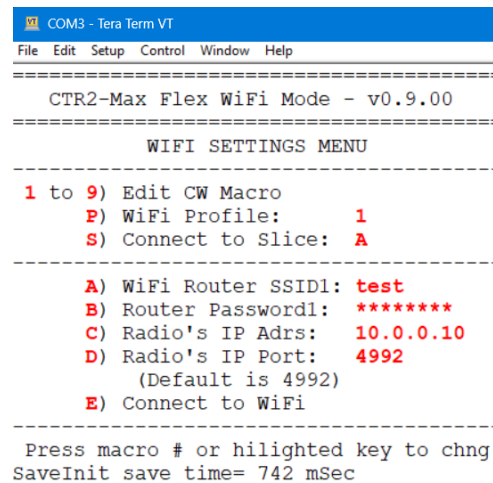
2. Open the **screen** utility using the **usbmodem31444-1** device. Your USB device will have a different numerical #.



```

lynn ~ -zsh - 84x24
Last login: Fri May 30 09:56:14 on ttys000
lynn@Lynns-Mac-mini ~ % ls -al /dev/tty.*
crw-rw-rw-  1 root  wheel  0x90000002 May 29 14:29 /dev/tty.Bluetooth-Incoming-Port
crw-rw-rw-  1 root  wheel  0x90000000 May 29 14:29 /dev/tty.debug-console
crw-rw-rw-  1 root  wheel  0x90000004 May 30 10:00 /dev/tty.usbmodem3144401
lynn@Lynns-Mac-mini ~ % screen /dev/tty.usbmodem3144401 9600
  
```

3. This is the **CTR2-Max Flex WiFi** mode's terminal display. The MIDI mode will be different. Press the indicated key to edit each field.



```

COM3 - Tera Term VT
File Edit Setup Control Window Help
=====
CTR2-Max Flex WiFi Mode - v0.9.00
=====
WIFI SETTINGS MENU
-----
1 to 9) Edit CW Macro
P) WiFi Profile:      1
S) Connect to Slice:  A
-----
A) WiFi Router SSID:  test
B) Router Password:   *****
C) Radio's IP Adrs:   10.0.0.10
D) Radio's IP Port:   4992
   (Default is 4992)
E) Connect to WiFi
-----
Press macro # or hilghted key to chng
SaveInit save time= 742 mSec
  
```

Appendix E: Internal Battery

CTR2-Max is designed to support an internal 3.7-volt Lithium-Polymer battery. The display board has a charge controller that will charge at approximately 300 mA until the battery reaches 4.2 volts, then it will reduce to 0 mA. The unit can monitor the approximate battery voltage. This is used to provide a relative state-of-charge via a battery icon that can be enabled on page 5 of the **Settings** menu.

The battery mounts in the base of the unit and has a strap to secure it. The enclosure a battery up to 55mm L x 35mm W x 10mm H. This allows a 2000 mAH battery to be installed. This battery will power the unit for about 12 hours.

Battery installation is covered in the **CTR2-Max Hardware Manual** available on my website.

Appendix F: Change Log

Changes applied to older firmware versions are documented here.