CTR2-Max

Flex Mode Manual

v2.00.01



Last Revision: October 28, 2026

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Updated to firmware v2.00.01

Revised sections for this version are highlighted in yellow

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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.
- Each **Max** is hand-built and uses a 3D printed enclosure. This means that there may be small cosmetic flaws on your unit.
- Units are not "plug and play". Be prepared for a learning curve, especially when mapping MIDI commands to your radio control app for the first time. There are videos on my YouTube channel that can help with this.
- 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.
- **Max** requires a license key to be fully functional. A license key is included with your purchase of a **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

v2.00.01 – October 28, 2026

- Fixed a bug that was causing intermittent lockups when connected to **AetherSDR's CTR2 Relay**
- Fixed a bug that blocked the knobs from working in the PTT page
- Fixed a bug that blocked the buttons for CW Macros 5 to 9 from working
- Added additional time to the latching PTT timeout timer
- Added the Battery icon back in. The internal battery is useful when operating with a battery-operated device such an iPhone or iPad. It powers Max without draining the device's battery.

v2.00.00 – October 26, 2026

- FCC rules forced the removal of the RF features in **CTR2-Max**. This was due to the display/ESC32-S3 used in **Max** is not FCC accepted for RF emissions. Because of this, **Max** only supports USB connectivity to radio control apps. Direct connection to Flex radios over WiFi, or Bluetooth connections are no longer supported.
- Added support for the new **CTR2 Relay** feature that has been added to **AetherSDR** v26.10.3
- Added support for **AetherCTR2**
- **CTR2 Relay** adds the ability to switch between **Max's** stock firmware and **AetherCTR2** with the touch of a button
- **CTR2 Relay** adds the ability to update **Max's** stock firmware or **AetherCTR2's** firmware.

Changes to previous firmware versions can be found in Appendix F

Introduction

CTR2-Max (referred to as simply **Max** in this document) 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.

Recent changes in FCC certification rules for RF emitters means that **Max**, unlike other **CTR2** controllers, does not support **WiFi** or **Bluetooth** RF modes. It only supports USB connections to the radio control apps you use. I know this is disappointing for many potential users, but I felt that it was best to comply with the regulations.

Max supports both USB MIDI control of your radio control app, and direct control of your Flex radio over USB using the new **CTR2 Relay** mode built into AetherSDR. In addition, the development team at **AetherSDR** offers another firmware called **AetherCTR2** that replaces the factory **Max** firmware and is supported by the **AetherSDR** developers. More about **AetherSDR** and **AetherCTR2** can be found in the CTR2-Max Flex Mode Manual.

You can easily switch between the two modes in the **Settings** menu to fit your operating needs. You should refer to the CTR2-Max Flex Mode Manual for information about **Flex** mode operation.

Max and **AetherCTR2** firmwares only run on **Max** hardware with the ESP32-S3 2.8" touchscreen.

Max is the most capable of all **CTR2** controllers. It has five dual-function knobs, four dual-function pushbuttons, a paddle jack, a Key/PTT jack, and an optional Sidetone audio interface board that allows you to patch the keyer's sidetone in **Flex** mode into your headphones, powered speaker, or PC sound card.

MIDI Mode

When operating in **MIDI** mode, each knob, knob switch, and button function are hardwired to specific MIDI commands, *not radio control functions*. 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 and you can change the physical knob or switch each control is assigned to in the **Controls** menu.



The real magic happens when you connect **Max** to a radio control app. Each MIDI command is first labeled in **Max** and then mapped in the control app to execute a that function. For instance, CC #100 is typically labeled "VFO" in **Max** and mapped to the VFO control in the app. This control is usually assigned to knob E (large knob) on the controller.

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, RimuSDR, SDRoxide, SDR-Console, and SparkSDR, to name a few. **MIDI** mode is also supported by several browser control apps like Remote Ham Radio, Online Remote Radio, and RemoteTx.

Flex Mode using AetherSDR's CTR2 Relay



Flex mode creates a custom Flex controller specifically designed for the Flex 6000, 8000, and Aurora SDR radios using the Flex API. It currently only works with the **CTR2 Relay** in **AetherSDR**. You can find this feature under **AetherSDR's Settings -> Controllers –> CTR2…** menu. To use this mode, connect **Max** to a USB port on the computer running **AetherSDR**, then start the **CTR2 Relay**. **AetherSDR** creates a non-GUI connection for **Max** to the radio it's currently controlling and then routes Flex API messages between **Max** and the radio over the USB connection**.** This mode provides real-time CW keying and PTT control. More information about **CTR2 Relay** can be found here.

Unlike **MIDI** mode, the Flex API is a two-way protocol, so **Flex** 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.

Max provides a dedicated CW keyer and sidetone in **Flex** mode because the latency from operating the paddles to keying the radio over the network is enough to disrupt your fist.

AetherCTR2 – Another Firmware for CTR2-Max



AetherSDR has graciously provided an alternative firmware program for **Max** called **AetherCTR2**. This firmware can be installed on **Max** over the **CTR2 Relay** USB link in **AetherSDR**. Once installed, you can run either **Max's** stock firmware or **AetherCTR2** with a touch of a button.

AetherCTR2 provides additional features not included in the factory **Max** firmware, such as S and power meters, CW decoding, and an audio spectrum display.

The developers at **AetherSDR** created **AetherCTR2** and provide support for it.

More information can be found in the AetherCTR2 for CTR2-Max section. You can download the **AetherCTR2** user manual here.

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) for a total of 18 physical controls. These can be assigned to any of the virtual dial and button controls.

Unlike the other **CTR2** controllers (**CTR2-MIDI, CTR2-Uno, CTR2-Duo,** and **CTR2-Quad**), the 2.8" display/ESP32-S3 controller used in **CTR2-Max** *is not* FCC certified for RF emissions. Therefore, the WiFi and Bluetooth RF modes have been disabled. **CTR2-Max** is a USB-Only device and must be connected to the device running your radio control software.

Knob and switch functions are displayed on the **Controls** menu. This page graphically represents the controls on the unit. The function assigned to each control can be easily changed to fit your operating situation.

Unlike generic MIDI controllers, all **Max** controllers include a 3.5mm (1/8") CW paddle input jack. The **Max-5** also includes a 3.5mm key/PTT input jack.

MIDI USB mode can be used with most radio control apps that support MIDI control. **Flex** mode currently can only be used with **AetherSDR using the CTR2 Relay** USB interface.

The remainder of this manual will describe the features available in **Flex** mode. Refer to the CTR2-Max MIDI Mode Manual for more information on that mode.

For **Flex** mode users, the sidetone from the keyer is sinusoidal and is generated by a codec. A 1.2-watt amplifier drives a large speaker, giving you plenty of sidetone volume. An optional transformer-coupled sidetone audio interface board is available that allows you to patch **Max's** keyer sidetone into the receive audio from your radio.

More information on the sidetone audio interface can be found in the CTR2-Max Hardware manual.

NOTE: The CW keyer, sidetone, and **Sidetone Audio Interface** board are not used in **MIDI** mode.

The unit requires a clean USB power source. **DO NOT** power the unit from an unpowered USB hub. A 3.7-volt Lithium-Polymer battery can be user-installed, but since the unit requires a USB connection to the control the radio control app, the internal battery only helps power the unit when connected to a laptop, iPhone, or iPad that's running on its internal battery. Batteries up to 10mm x 35mm x 55mm can be accommodated. A 2000 mAH battery will power just **Max** 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. Information for installing the internal battery can be found in the CTR2-Max Hardware manual.

Flex mode sends both key and PTT commands to the radio to the radio using the Flex API. 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 (**PTT** page) can be configured for momentary or latched PTT and you can assign any physical button as a PTT switch.

Quick Start Guide

When **CTR2-Max** is in **MIDI** mode, it uses 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 a its own **Quick Start Guide** to get you going in that mode.

Flex mode, the subject of this manual, on the other hand, works exclusively with Flex 6000, 8000, and Aurora radios using the **CTR2 Relay** feature built into **AetherSDR**. It is essentially a physical control surface for **AetherSDR**. Unlike **MIDI** mode, **Flex** mode provides a full-featured radio controller. The goal of this section is to give you a basic understanding of how **Flex** mode works, and get you connected so you can start learning about your **CTR2-Max** unit.

Basic Concepts

Let's start with how **Max's Flex** mode works with your Flex radio using the **AetherSDR's CTR2 Relay**.

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 **AetherSDR**. Parameter changes are sent to the radio over USB using the Flex API.

Flex 6000/8000/Aurora Series Radios

Flex radios are basically computers with an RF interface. The computer-side has a built-in IP network 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 **AetherSDR** are GUI (Graphical User Interface) devices. These devices are the primary control interface. Other devices, such as **CTR2** units running in **Flex** mode and connected to the radio through **AetherSDR's CTR2 Relay** feature, are classified as non-GUI devices. Non-GUI devices are *bound* to a GUI device, and basically work in parallel with the GUI device.

AetherSDR CTR2 Relay

Since the Flex radio only supports IP network connections, the **CTR2 Relay** feature in **AetherSDR** provides a network-to-USB bridge. Similar to how a radio repeater works, it listens for incoming traffic on the USB connection from **Max**, and repeats that traffic to the radio using a separate non-GUI client instance on the IP network. When the radio responds to that traffic, **CTR2 Relay** forwards that response back to **Max**.

Initial Setup

The first order of business is to power up your **CTR2-Max**. This must be done by plugging it into a USB port on the computer that is running **AetherSDR**.

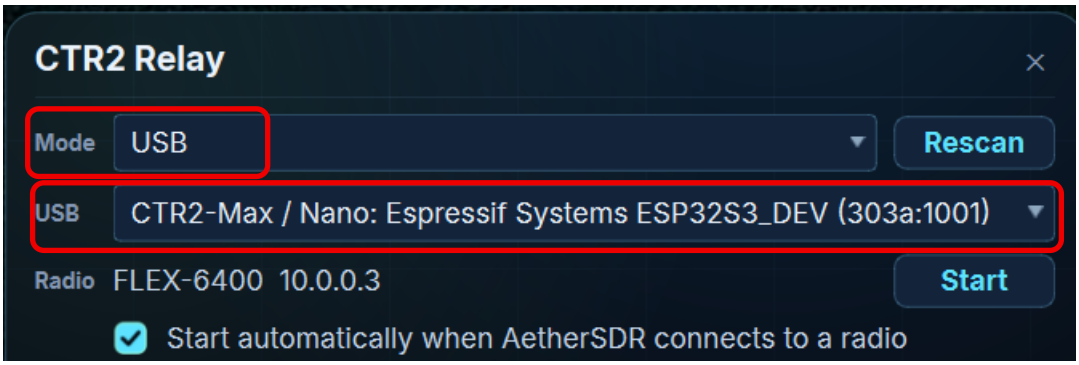
When the unit boots, the flash screen will show the firmware title and version number. If your unit boots into **MIDI** mode, open the **Settings** menu, navigate to the last page and select **Run Flex Mode** on the menu. The unit will reboot into **Flex** mode.

Connecting to your radio

To connect to your radio, open the **AetherSDR** app and connect it to your radio. Next, use the **Settings -> Controllers -> CTR2…** menu items to navigate to the **CTR2 Relay** panel.



Once the **CTR2 Relay** panel opens, select **USB** in the **Mode** list and select **CTR2-Max** in the **USB** list as shown below. If **CTR2-Max** isn't shown in the **USB** list box, make sure it's powered up, then click the **Rescan** button.



Next, click the **Start** button to connect **Max** to your radio. If all goes well, the Radio and CTR2 counters should start incrementing.

TX Enable

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



Flex 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** mode is controlling, the caption on all pages will be displayed in red font.

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



Configure the Keyer

Flex mode provides a CW keyer that keys your radio over the USB link. 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 USB/IP 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**.**

Configure the Input Jack Modes

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.

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 **Max**, simply plug your 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 **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 4 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** mode is to use it. There are two user interfaces. The basic interface is similar to the user interface in other **CTR2** units. It has separate menus for the **Dial control**, **Buttons**, **Controls**, 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.

Hardware

Max's hardware, including the sidetone interface board and internal battery options are covered in a separate manual. The hardware manual can be found here.

3.5mm Jacks on Max

CAUTION: The 3.5mm jack(s) on Maxs 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.

Internal Battery Option

Max is designed to support an internal 3.7-volt Lithium Polymer battery. I do not ship batteries with any **CTR2** unit, primarily due to postal regulations. You can purchase them from many suppliers. The CTR2-Max Hardware manual provides instructions for installing it.

NOTE: Since **Max** must be plugged into a USB port, the internal battery is only useful when the device you're connected to is running on its internal batteries too. **Max's** battery will keep **Max** from drawing current from your device's battery.

Battery Operation

The ESP32-S3 2.8" display used in **Max** was not designed for ultra-low power operation. The display and the screen touch sensor remain powered up, even when the processor is put into deep-sleep mode. Because of this, the unit draws 35 mA from the USB power or internal battery while powered down. This will discharge a 1100 mA battery in about 30 hours.

The workaround to this problem is to add a battery isolation switch. This switch is mounted on the side of the unit and is in series with the internal battery.

With the **Battery** switch In the ON position, the internal battery is connected to the display board. In this state the battery will be charged when the unit is plugged into a USB power source. A battery icon can be enabled in the **Settings** menu to monitor the battery's relative state of charge.

NOTE: If you power down the unit from the **Settings** menu, and leave the battery switch ON, the unit will discharge the battery if the unit is not connected to USB power.

With the **Battery** in the OFF position, the internal battery is isolated from the unit and the unit will turn completely off when USB power is removed. The battery will not charge and no current is drawn from the battery. With the **Battery** switch OFF you can store **Max** for long periods of time.

Sidetone Audio Interface Option

An optional interface is available that provides a transformer-isolated Line-Out level output from the sidetone oscillator. This output can be connected to your headphones, amplified speaker, mixer, or your computer's soundcard input. It has DIP switches that allow you to choose which ear to send the audio to (Tip or Ring of the output stereo connector). You can also enable or disable the line-output or internal speaker output as needed.



To use the sidetone Line-Out, connect it in parallel to audio source you want to add the sidetone too. This is easily done using a "Y" cable with the appropriate connectors, such as the cable shown here. Connect one plug to the Amplified Speaker jack on your Flex, and the other plug to **Max's Line-Out** jack. Plug your speakers, headphone, mixer, or PC sound card into the jack on the cable. These cables are readily available on Amazon and other online suppliers. This one can be found here. You can choose others with the connectors to fit your needs.

Switching Operating Modes

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

When using the **Flex** mode, the controller must connect to **AetherSDR** over USB. **AetherSDR** in turn, bridges **Max** to your radio over your IP network through its **CTR2 Relay** feature.



CTR2-Max's Flex Mode Features

CTR2-Max is a USB-only device and runs on a 2.8" capacitive touchscreen display with an integrated ESP32-S3 processor. The firmware includes the following features for **Flex** mode:

- Requires **AetherSDR** running its **CTR2 Relay** feature to provide a USB to IP network bridge to your radio
- 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
- Up to 72 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 **Controls** menu for two functions (turn and push-and-turn)

    - Selecting **<Dial>** for a knob function in the **Controls** 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
- Supports four pushbuttons – each of these can be programmed for 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
- Adjustable virtual **Dial** sensitivity
- Seven color themes and backlight control
- Sleep and power down timers
- 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** mode and **MIDI** mode
- Support for an internal 3.7-volt Lithium-Polymer battery – optional battery charge state icon can be enabled in the **Settings** menu. This battery can power **Max** while it's connected to a computer, iPhone, or iPad that's running on batteries.
- Sinusoidal sidetone with a 1.2-watt amp and speaker
- An optional sidetone audio interface with Line-Out level control allows you to bridge the sidetone output from **Max** to your PC's sound card or high-impedance powered speaker.
- Other **CTR2** controllers running in **MIDI** mode can be used at the same time in **AetherSDR** while **Max** is running in **Flex** mode

User Interfaces

Flex mode supports two user interface models. The **Basic User Interface** (left screenshot) uses simple menus to select controls and buttons, similar to the **CTR2-Dial** firmware running on M5Dial based **CTR2** controllers. It will be described in the next section. Use this interface when you just want to use **Max** 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 with one or two screen touches. Go to the Dashboard UI section 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 UI



Dashboard UI

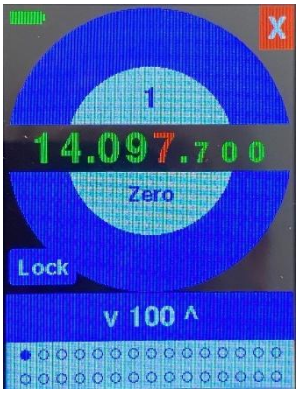
Basic User Interface

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 control 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, or touch dots on the bottom button to open the **Dial** menu.
- **Buttons** opens the **Buttons** menu where you can select from 72 functions on 6 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.
    - This is best done in the **Controls** menu.
    - To do this in the **Buttons** menu:
        - 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
        - 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 again, 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.
- **Controls** opens the **Controls** menu. Here, you can assign **Dial** functions to the knobs and **Button** functions to the knob switches and pushbuttons. This menu allows you to quickly change the function assigned to each control.
    - Touch one of the controls in the menu. It will turn red for 6-seconds
    - Turn any of the knobs to change the function assigned to that control
    - Knobs assigned to **<Dial>** will control the current **Dial** control. **<Dial>** controls can also be used to 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 when the VFO is selected
- **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 changed by touching the bottom button in this display or by changing the **PTT:** option on page 4 of the **Settings** menu.
    - **Off** disables PTT control from this page, and from the external PTT input. It also disables PTT control if PTT is assigned to one of the pushbutton switches.
    - **Momentary** enables momentary PTT control. PTT is keyed 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, or the 20-minute timer times out.
- **Settings** opens the Settings menu where you can change the configuration of many of **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 that 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. In addition, 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 when the VFO is visible. I like to use Knob E's push-and-turn function for step control.

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

Several controls, such as **Volume**, **NB**, **NR**, and **RIT** 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 open the **Dial** menu and select another dial control.

Dial Graphics

The **Dial's** image 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 tuning ring is not animated like the other dial controls. 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 is animated and 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 to the right is set to 37%.



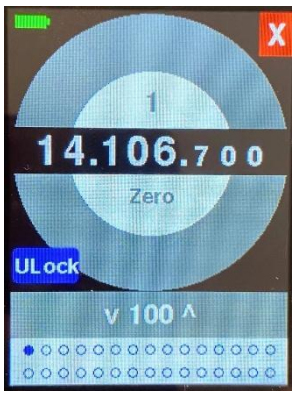
Controls with positive and negative offsets, like **RIT**, **XIT**, **Hi Cut**, **Lo Cut**, and **Balance** use a slightly different display. The **Dial** graphic for this control displays the +/- offset referenced to the top of the dial. For negative offsets it grows to the left and for positive offsets 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 that control.



Shortcut: Touch the top of the display twice 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 to reset the lock.



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

Dial Menu

Touching the dial # or the bottom button bar on the **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.
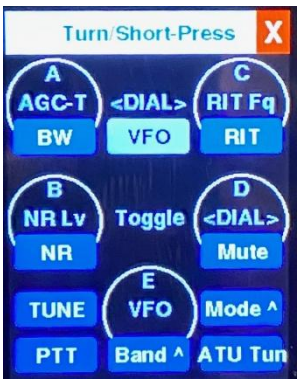


Touch the selected function or the caption to return to the **Dial** control without changing the selection. To switch pages, touch one of the dots on the bottom button.

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				

Controls Menu



Max supports dual-function knobs and switches. Each knob has a *turn* and a *push-an-turn* function and each switch (knob switches and pushbuttons) have a short-press and a long-press function.

The **Controls** menu provides a graphical representation of the physical controls on **Max**. The function assigned to each knob and switch for the indicated mode (Turn/Short-Press or Push & Turn/Long Press) are displayed.

The caption indicates which mode is displayed. The **Turn/Short-Press** mode is displayed here. Touch the caption or the **Toggle** button to switch to the **P&T/Long-Press** (Press & Turn) mode.

Labels in the circles show the function of each knob. The switches are displayed as label buttons.

The exception is the button under the **<DIAL>** label. This button displays the dial currently selected **Dial Control** function. You can edit this setting on this page.

Control States

Each control has two states. For knobs, it's either **Turn** or **Push & Turn**. For knob switches and pushbuttons, it's either **short-press** or **long-press**.

NOTE: While the **Controls** menu is displayed, the physical controls respond based on the selected page. If the **Turn/Short-press** page is displayed, the controls work as normal. If the **P&T/Long-Press** page is displayed, the control state is inverted… i.e. turning a knob executes its **P&T** function, and pressing and turning a knob executes its **Turn** function. The same is true for the switches. Short-pressing a switch executes its **Long-Press** function, and long-pressing a switch executes its **Short-Press** function.

Editing Knob and Button Assignments



You can easily edit the control assigned to each knob or switch.

To do this, simply touch the control you want to change. The control's background will turn red and **DELETE** will be displayed in the center of the display. This example shows **Knob A** selected for editing.

To change the assignment, turn any of the knobs on the unit until you reach the control function you want. Touch the control again to accept the change. **Edit** mode will time out after 6-seconds and revert back to the original setting.

PTT Assignment

If a pushbutton is assigned to PTT (pushbutton 2 in this example), you cannot change or delete its assignment on this page. This must be done on page 4 in the **Settings** menu.

Deleting an Assignment

To delete the assignment on the highlighted control, touch **DELETE**. The label on switch controls will go blank, indicating that switch is no longer active. A knob control will go to **<DIAL>**, indicating that that knob will control the dial selected in the **Dial Control** page. To re-assign a function to a control, touch it again to enter **Edit** mode, then turn a knob.

NOTE: The **DELETE** function is not available for the **<DIAL>** function.

<DIAL> Function

The **<DIAL>** function can be selected for any knob. When a knob is set to **<DIAL>** (as is Knob D in this example), it will control whatever dial function is selected in the **Dial Control**, or the selected parameter in the **Dashboard**. **<DIAL>** can be assigned to more than one knob.

<NAV> Function

The **<NAV>** function can also be assigned to any knob. When a knob is set to **<NAV>** it acts as a navigation control, and can be used to switch pages in the **Settings** menu or select another dial control in the **Dial Control** page.

<STEP> Function
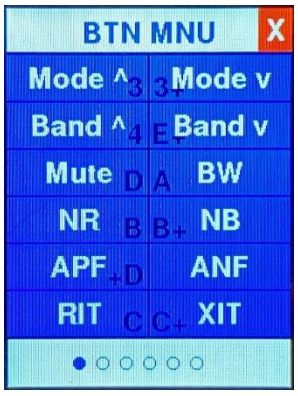
The **<STEP>** function can be assigned to any knob. This function changes the frequency step used by the VFO tuning control. Typically, this function is assigned to the **Press & Turn** function of the knob assigned to the VFO.

Buttons Menu

Open the **Buttons** menu to select from up to 72 button actions. Touching a button immediately sends that control to the radio (if the controller is online).

There are 6 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.

Assigning knob switches and pushbuttons is best done in the Controls menu.



Button Actions

Each button in the **Buttons** menu is pre-assigned to a specific action. These assignments cannot be changed. The table below list each menu page along with the button's on that page.

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	FM	FM mode
	LSB	Lower sideband mode	NFM	Narrow FM mode
	USB	Upper sideband mode	DFM	DFM mode
	AM	AM mode	DIGL	Digital Lower Sideband mode
	SAM	Synchronous AM mode	DIGU	Digital Upper Sideband mode
	RTTY	RTTY mode	Future	
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

The **Controls** menu provides the easiest way to assign knob switches or pushbuttons to button functions. This can also be done in the **Buttons** menu, as outlined below.

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 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 virtual button you want that switch or pushbutton to execute

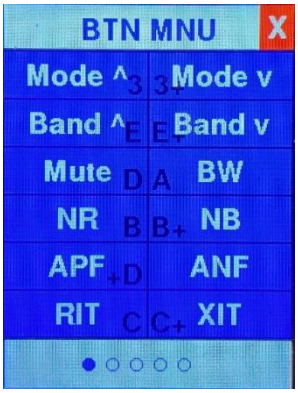
Once you have assigned a virtual button to a knob switch or pushbutton, the knob's letter or switch # will appear in that button's label. That function will be sent to the radio anytime you press that knob or pushbutton.

Switch Long-Press Action

To assign a long-press 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 virtual button a second time. Virtual buttons set to long-press actions will have a **+** appended to label on that virtual button.

Switch Assignments

This photo shows the **Buttons** menu on **Max.** Knob C's short-press action is set to the **RIT** virtual button and its long-press action is set to the **XIT** virtual button. Pushbutton 3's short-press action is set to **Mode ^** and its long-press action is set to **Mode v**.



Clearing Button Assignments

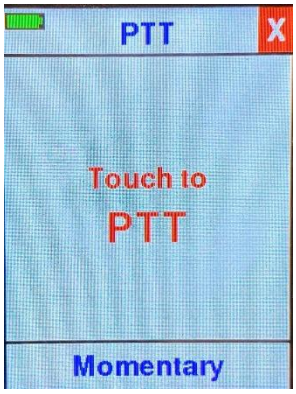
To clear a knob or pushbutton assignment, hold the knob switch or pushbutton down and touch the selected virtual button assigned to it again.

NOTE: You must clear the switch or pushbutton assigned to a virtual button before you can assign that virtual button to another knob or pushbutton.

NOTE: Changing the PTT assignment on **CTR2-Max's** pushbuttons (on page 4 of the **Settings** menu) automatically cancels all virtual button assignments to all pushbuttons.

NOTE: Virtual button knob/switch assignments 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.

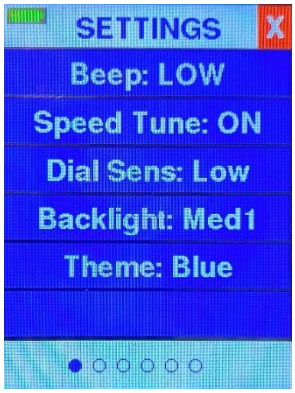
When PTT is set to **Latch**, touching and releasing the touch keys the radio over the network. It will remain keyed until you touch and release the screen again or the three-minute timer expires.

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

To use the external PTT input on **Max-5** you must assign pushbutton #2 to PTT, otherwise, the external input will execute the button action assigned to pushbutton #2.

To use an external PTT switch on **Max-1** and **Max-2** units, select the **Passthru** keyer **Type** and wire your PTT switch to the RING and SHIELD terminals of a 3.5mm (1/8") stereo plug and insert it into the **Paddle** jack on the unit.

Settings Page



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 or the red [**X**] 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.
	2	**Future**	
	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.

1	**5**	**Theme**	Select the color theme for the selected Map. Options include Dark, Light, Blue, Orange, Green, Cyan, and Violet
	6	**Future**	
2	**1**	**(Keyer) Type**	Selects the internal *keyer type*. Options are **OFF**, **Straight**, **PassThru**, **Iambic A**, **Iambic B**, **Ultimatic**, and **Bug** – *does not change the radio keyer type*. Use **Passthru** for external keyers or PTT switches. Set to **OFF** to use the radio's keyer. **NOTE: Max** units have a separate *Key/PTT* input jack so there is no need to set the keyer to **Passthru** on these units.
	2	**Speed**	Sets the keyer's speed. Also sets the keyer speed in the radio if it is online. Steps: 5, 10, 15, 20, 25, 30. Precise speed can be controlled in the **Dial** control.
	3	**Sidetone**	Adjusts the volume of the keyer's sidetone. Also sets the sidetone level on the radio if it is online. Steps Off, Low, Med1, Med2, and Loud. Precise volume can be controlled in the **Dial** control.
	4	**Pitch**	Selects the sidetone frequency for the sidetone. Also sets the sidetone frequency on the radio if it is online. Frequency range is from **500 Hz** to **1000 Hz** in 50 Hz steps. **NOTE:** This setting also affects the radio's audio bandpass filter in CW mode.
	5	**Paddles**	Selects **Normal** or **Reverse** wiring for the **Paddle** and **Key/PTT** 3.5mm jacks. Steps through each combination.
	6	**Future**	
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 *File->Transfer->XMODEM->Receive* 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. **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 *File->Transfer->XMODEM->Send* 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	**Future**	
	5	**Slice**	Select the slice that you would like **Max** to control when you connect to **CTR2 Relay**
	6	**Run AetherCTR2**	Reboots into **AetherCTR2** if it's installed. If it's not installed, **AetherCTR2 n/a** will be displayed. See the **Install or Update AetherCTR2 Firmware** for instructions to install it.

4	**1**	**# Knobs**	On five-knob **Max** units, this is fixed to 5 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. **NOTE:** Pushbutton #2 is wired to the Ring terminal of the external PTT jack so #2 must be selected for PTT if you plan on using an external PTT switch. **NOTE:** Changing this setting deletes the button actions assignments for *all* buttons.
	4	**Info**	Displays the firmware version and registration information
	5	**Rotate Screen**	Rotates the screen 180 degrees for each selection. This allows for future **CTR2-Max** configurations.
	6	**Battery Icon**	Toggles the battery icon on/off. The internal battery is useful when operating with a battery-operated device such a laptop, iPhone, or iPad. It powers Max without draining the device's battery.
5	**1**	**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.
	2	**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.
	3	**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, turn off the **Battery switch** to conserve battery power when you power down. Due to the display's design, there is no way to put the unit into ultra-low power mode – *it always draws 35 mA when powered off*.
	4	**Run MIDI Mode**	Select this option to switch to **MIDI** mode. This mode uses Bluetooth or USB MIDI to control a 3rd party app such as Marcus' (DL8MRE) SmartSDR for iOS/Mac. It is not compatible with SmartSDR for Windows, but will work with RimuSDR and AetherSDR. For more information on **MIDI** mode refer to the CTR2-Max MIDI Mode Operation Manual.
	5	**Restore to Start Up**	This option allows you to reset your settings to what they were when you first booted **CTR2-Max**, *if you didn't choose to reset your call and registration key in* ***Reset to Factory***. This is handy in case you want to "roll back" changes you made during the current session.

	6	**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, and didn't choose to reset your call and registration key, execute the **Restore to Start Up** option to restore your settings before powering the unit down.

Dashboard UI

Flex mode includes a second user interface 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** 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 menu 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 **<DAIL>** or **VFO** in the **Controls** menu changes the frequency by the selected step digit (the red digit, 10Hz in this example). You can change the step simply by *double-touching* another digit in the frequency. To select the ½ step (5, 50, 500, 5000, etc.) using the touch method, touch the selected step digit again. You can also assign a knob to **<STEP>** to control the tuning step.

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

Touch the [**x**] button in the lower-left 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.

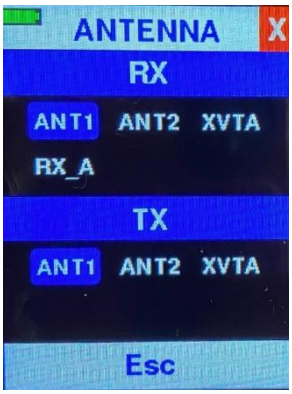
Here are a few examples:

- 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.

NOTE: Max does not support frequencies above 4 GHz.

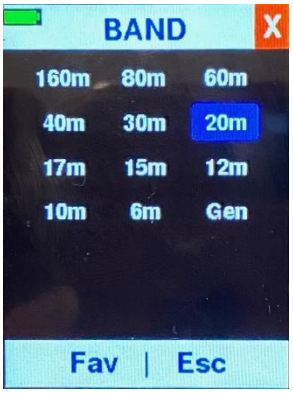
The top half of this page displays the receive antenna options and the bottom half displays the transmit antenna options. Touch a button to select an option.

When you're done, touch the **Esc** button at the bottom of the page to return to the dashboard's **Home** page.

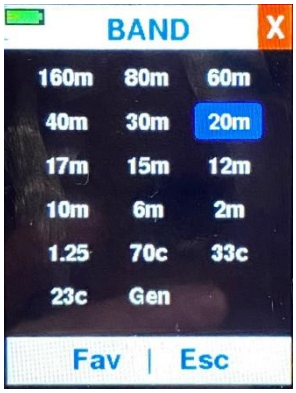
Band Page

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



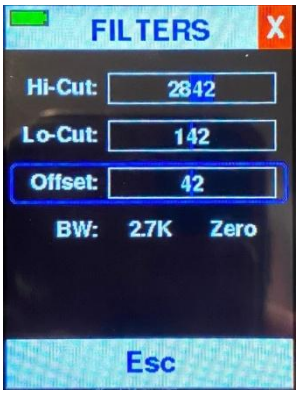
Additional Transverter Bands

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 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

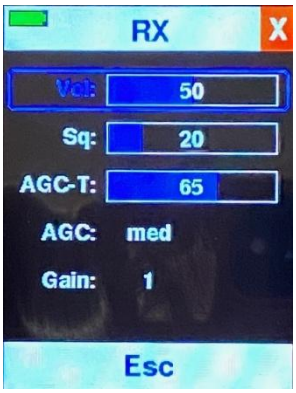


The current bandwidth is displayed in the top-right corner of the Dashboard's **Home** page. Touch this button to open the **Filter** page.

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 on the display either to the *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 (Mute is off in this photo).

Touch **ESC** to return to the dashboard's **Home** page.

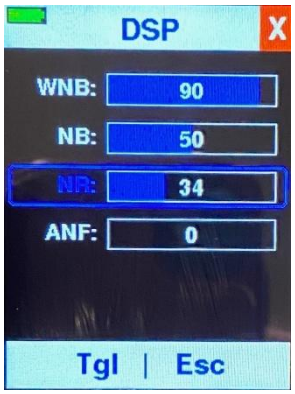
Mode Page



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 selected mode to return without changing the mode.

DSP Page



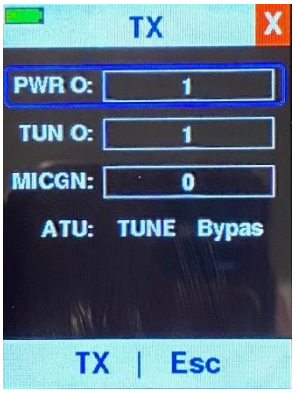
The DSP page allows you to adjust and enable or disable each DSP setting on the radio.

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** 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.

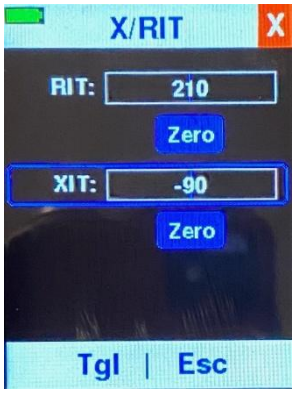
Both **ATU** buttons require one touch to select the tune function then a second touch (or **EXEC**) on the left-bottom button to execute it.

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** is off 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 as shown in this example.

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** menu to one of the knob switches or pushbuttons.

Touch **Esc** 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.

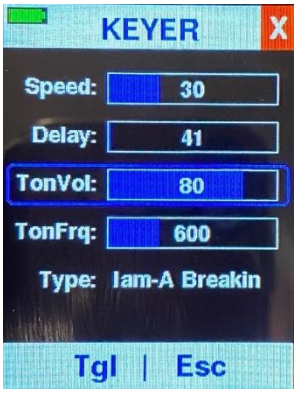
Enable and disable the selected control by touching the control's label or by touching **Tgl** on the bottom button while **RIT** or **XIT** are selected.

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** 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**, side**TonVol**, and side**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 keyer **Type** other than **OFF** 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 when **TonVol** is selected.

> **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 **Max** over the network.

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

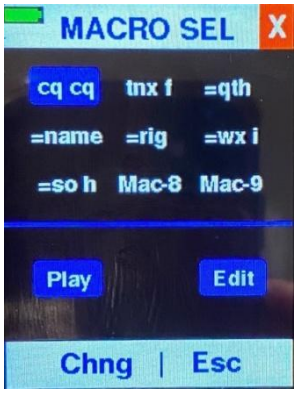
NOTE: To key the radio, you must have **Breakin** enabled (as shown in photo above), the radio in CW mode, and the controlled slice must have **TX** enabled. The caption will be red when **TX** is enabled.

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.

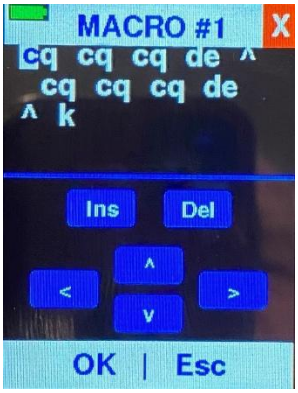


Once you start a macro the button options change to **Pause**, **Stop**, and **Add**. Touch each button as required. Once a macro has started you can leave this page and let it run.

Touch **Esc** to return to the Dashboard's **Home** page.

Macro Edit Page

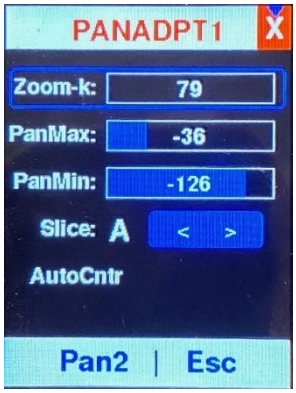
Pressing the **Edit** button on the **Macro Select** page opens the editing page for the selected macro.



- 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
- Enter the **^** character in the buffer 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** 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.

Zoom-k adjusts the bandwidth of the panadapter.

PanMax adjusts the top level of the panadapter. Raising the (-) value of this setting increases the sensitivity of the panadapter display.

PanMin adjusts the reference for the bottom of the panadapter. Lowering the (-) value of this setting reduces the noise floor of the panadapter.

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.

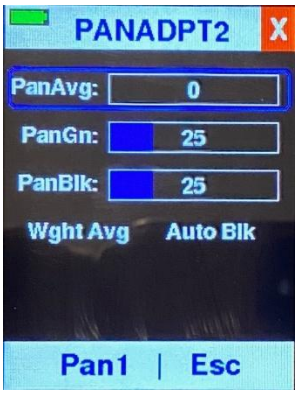
AutoCtnr toggles the *panadapter auto-center while tuning* feature. When auto-center is enabled, tuning may appear choppy because the panadapter recenters on every tuning step.

NOTE: Max cannot control two slices at the same time.

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

Touch **Esc** 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.

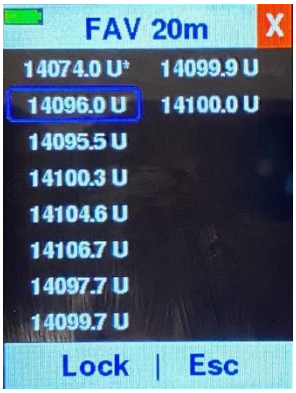
PanAvg adjusts the sample average time. The higher the number the more samples are averaged and the response of the panadapter slows down.

The other functions on this page control the panadapter in **AetherSDR**.

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

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

Favorite Frequency Page



The **Favorite Frequency** displays the last 16 frequencies you have recently visited.

Access this page by pressing **Fav** on the Home page, Keypad, or Band page.

In the **Settings** menu you can select to save frequencies for individual bands (20m is shown in this screenshot) or you can select a common favorite 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 15 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 **ULock** on the bottom button.

Touching any frequency bin will highlight that bin and automatically tune the radio to that frequency and mode (if **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



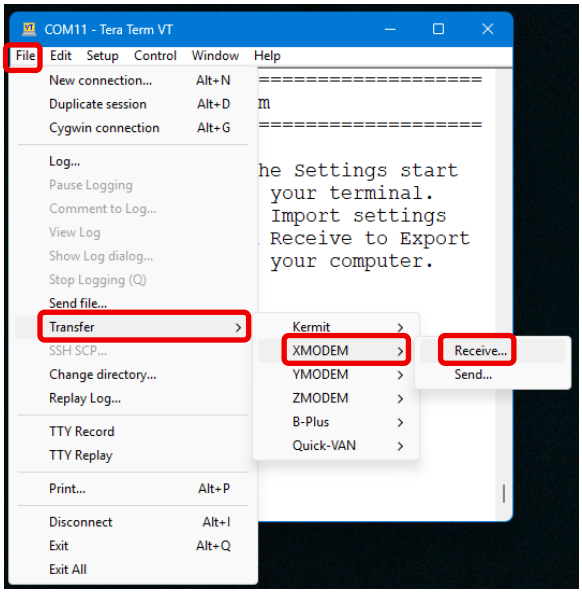
Once you have your **Max** setup, you'll want to back up your settings to your PC.

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 nowadays. 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. I haven't found a terminal program for Apple or Linux that support XModem.

Before you can use the **Import Settings** option you must export the settings on **Max** 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, connect Tera Term to **Max** 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* ***.ctr2*** *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.

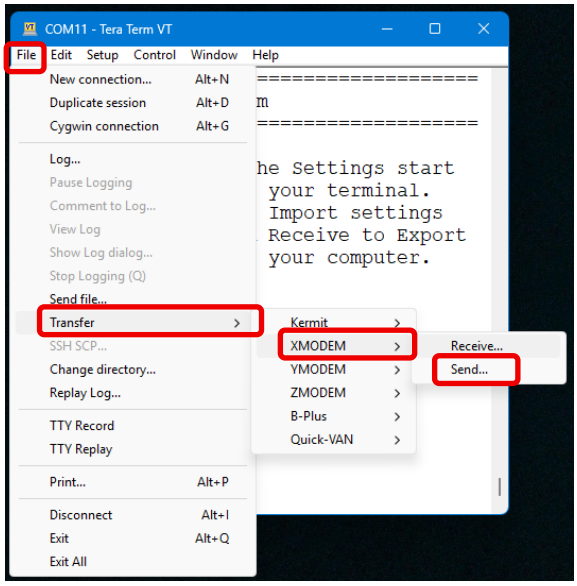
You can select whether to send just the basic configuration of you unit, or a full system backup that includes all of the radio and frequency information (including your WiFi credentials and radio address). If you plan on sharing your configuration with others, I recommend saving just the basic configuration.

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 **Max's** boot process.

Import Settings

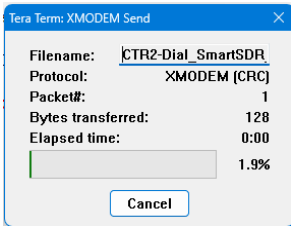
Now that you have a backup file of your settings (or have downloaded a configuration file from the Lynovation web site) you can import them using the **Import Settings** option.

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-Max Configuration File zip file. Tera Term will then open the file transfer window and transfer the file.



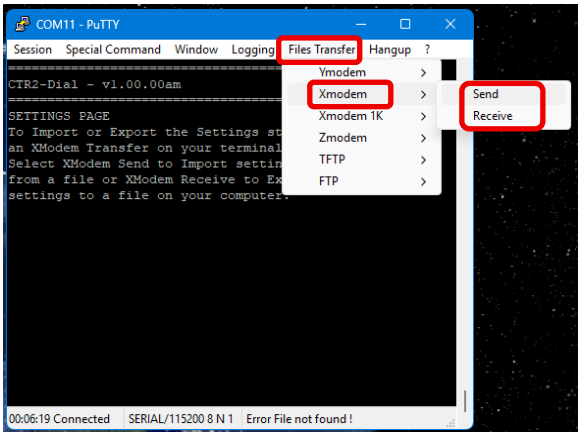
HINT: You can use the export and import settings functions to save and reload multiple versions of your settings. Perhaps you use **Max** on more than two apps and have each app configured differently. You can export the settings for each of your apps then import them back in when you want to change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

AetherCTR2 for CTR2-Max



When the **AetherSDR** project developed **CTR2 Relay**, they also developed a companion app named **AetherCTR2** that runs on **Max's** hardware, to test it with. This app provides the developers a testbed to test advanced features that they want to add to **CTR2 Relay** without waiting for me to get them working in **Max**.

AetherCTR2 has a slick, modern, intuitive user interface. A couple of the features that **Max** doesn't currently support are the S and Power meters, CW decoding display, and an audio spectrum display, that works on both received and transmitted audio.

AetherCTR2 is free for all registered **Max** owners and comes pre-installed on all **Max** units shipped after October 23, 2026.

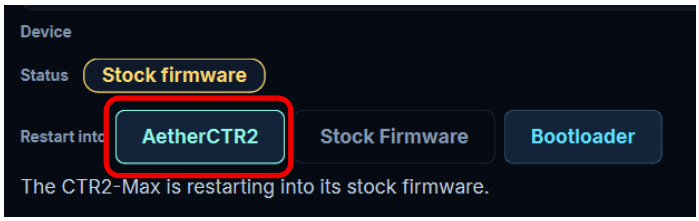
You can download the **User Manual** for **AetherCTR2** here.

Starting AetherCTR2

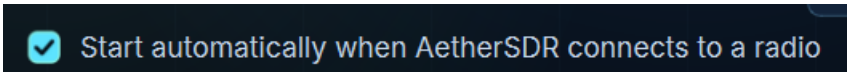
If **AetherCTR2** is installed on your **Max**, go to page 3 of the **Settings** menu and select **Run AetherCTR2**. **Max** will reboot into **AetherCTR2.** If it's not installed, this entry will show **AetherCTR2 n/a**. Instructions to install it can be found in the Install or Update AetherCTR2 Firmware section below.



AetherCTR2 can also be started from the **CTR2 Relay** panel by clicking the **AetherCTR2** button at the bottom of the panel. You can easily switch between the two firmwares by just clicking on the active button in the **Restart Into** row of buttons.



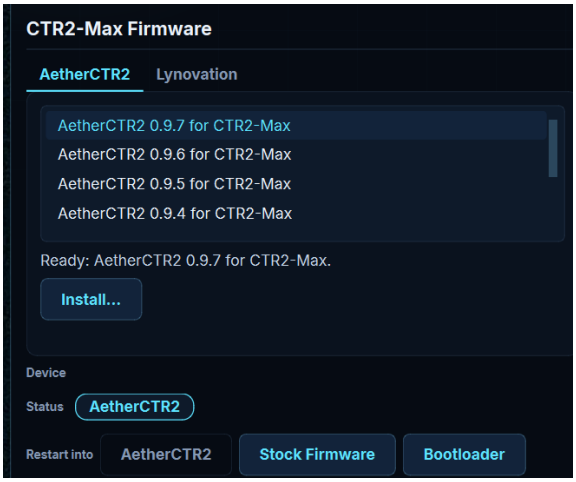
If you want **CTR2 Relay** to start automatically when you open **AetherSDR**, click the checkbox at the top of the **CTR2 Relay** panel:



Install or Update AetherCTR2 Firmware

If **AetherCTR2** is not installed on your **Max**, or you want to upgrade the firmware, you can easily do this in **CTR2 Relay**.

1. Plug **Max** into your computer and open **AetherSDR**
2. In **AetherSDR**, navigate to **CTR2 Relay** using **Settings -> Controllers -> CTR2…**
3. In **CTR2 Relay**, select the **AetherCTR2** tab in the **CTR2-Max Firmware** section and select the version of **AetherCTR2** firmware you wish to install

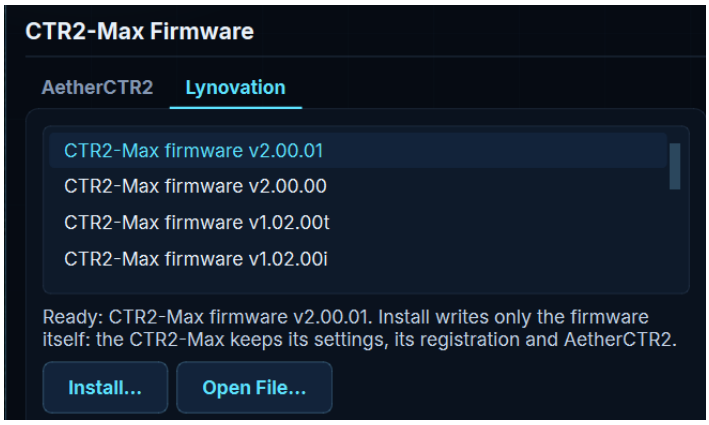


4. Click **Install…** to install the firmware. If the upload fails to start, cycle the power on **Max**, then click the **Bootloader** button for force it into bootload mode, then click the **Install…** again.
5. **AetherSDR** will save a copy of **Max's** entire flash memory to a backup file on your computer then install **AetherCTR2**. You can always restore your unit from the backup file in the **Lynovation** tab if you want to revert to the previous configuration.
   NOTE: AetherCTR2 v0.9.7 should only be installed when running **AetherSDR v26.10.4** and above.

Update CTR2-Max Firmware with CTR2 Relay

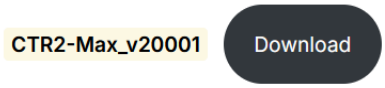
CTR2 Relay also allows you to easily update the **CTR2-Max** firmware without using a separate flash upload tool. This process is similar to installing or updating **AetherCTR2** firmware on your **Max**.

To start, click on the **Lynovation** tab under **CTR2-Max Firmware**.



A list of known firmware update files will be shown, along with any backup files. If you haven't used this feature before, the list will be empty.

To add firmware files to the list, first go to the CTR2-Max Firmware page at Lynovation.com and download the firmware ZIP file to your Download folder.



Once you have the ZIP file, click the **Open File…** button and navigate to your Download folder. Select the ZIP file you just downloaded. There is no need to unzip this file. **CTR2 Relay** will find the correct .BIN file and add it to the list.

Next, select the version you want to install on the list and click **Install…** If your computer fails to find **Max** after it enters bootload mode, cycle **Max's** power then click the **Bootloader** button in the **Restart Into** section at the bottom of the **CTR2 Relay** panel. Once it's in bootload mode, click **Install…** again.

> **NOTE:** If you can't get **Max** into bootload mode using the **Bootloader** button in **CTR2 Relay**, you'll need to manually force it into boot mode by pressing-and-holding the **Boot**** button next to the USB connector, then press-and-release the **Reset**** button.
> ** These buttons are mounted on the display board, so push them UP toward the display to activate them.

CTR2 Relay backup the entire flash memory in **Max** and then flash the new firmware. Once it reboots, it will automatically connect to **CTR2 Relay** again, if you've checked the **Auto Connect** checkbox at the top of the panel.

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.

AetherSDR added a new firmware update feature to **CTR2 Relay**. This feature makes updating your firmware nearly painless. Go to the Updating CTR2-Max Firmware with CTR2 Relay to find out more about this new feature.

You can also use the **ESPConnect** to update your unit.

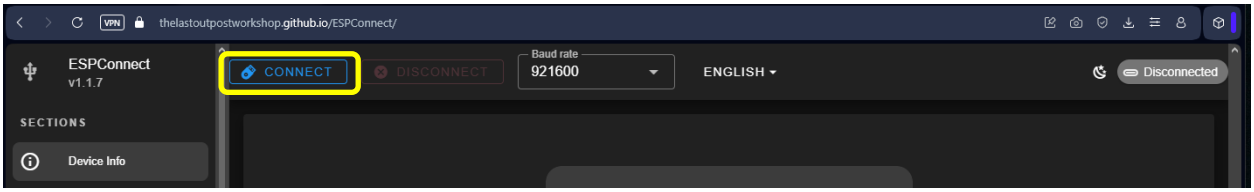
Before you begin, download the latest **CTR2-Max** firmware from my web site. Unzip the firmware distribution zip file into a folder.

Installing Firmware using ESPConnect

By far, the easiest, and recommended method to install or update firmware on an ESP32 processor 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, Firefox, Safari, and all Linux browsers don't support Web Serial.

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.

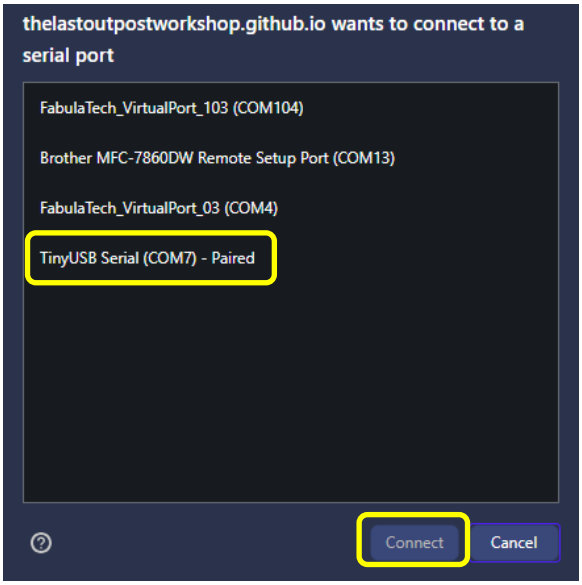
Click the **Connect** button.

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

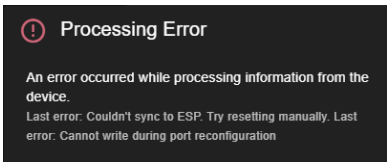
On a Windows PCs, all **CTR2** units will be shown as a **TinyUSB Serial** device, as shown here.

On Macs, **Max** will be listed as an **ESP32-S3-DEV** device.

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



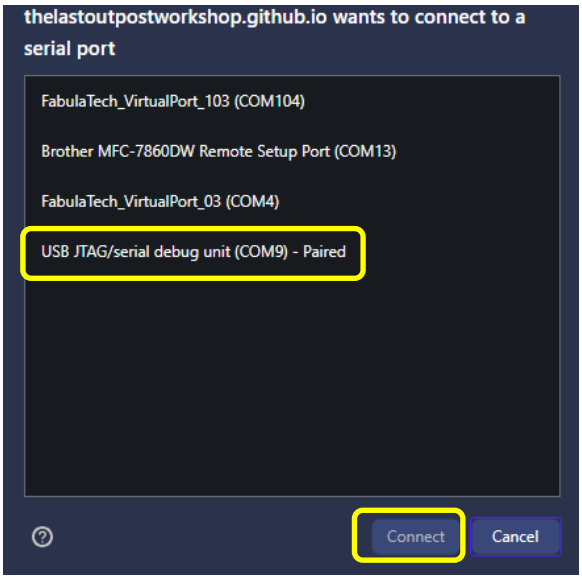
A popup warning will appear telling you that an error occurred. Some errors may tell you to press the BOOT button on the processor to put it into bootloader mode. You do not need to do this.



This is the normal response when trying to connect to a **Tiny USB serial** device. You'll notice that **Max** is frozen at this point because it acutally did enter boot mode!

Do not power cycle your unit. Click the **Connect** button on the home page again.

This time, the **TinyUSB serial** (or **ESP32S3_DEV** 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 force it into boot mode. Do this by pressing and holding the **Boot** button on the back of **Max**, then press and release the **Reset** button.

Once you're connected to **Max** in Boot mode, 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 **Max's** 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.

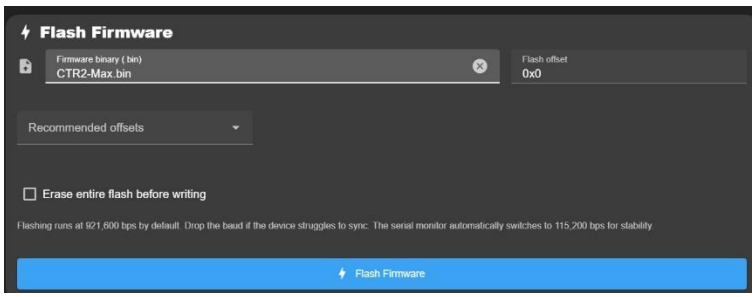


A file navigation screen will appear. Navigate to where you unzipped the firmware zip file from the firmware update page and click on the **CTR2-Max_v1.01.xx.bin** file (the version # is now part of the .BIN file's name).

Your browser's display should now look like this:

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

WARNING: If you check the erase box, you'll need to re-enter your call and registration key and reconfigure your unit.



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

Once the process completes, cycle the power on **Max**. If your unit has an internal battery, turn the **Battery** switch OFF then disconnect **Max** from the computer's USB port. Next, plug it back into the computer. 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.

Re-enter your Call and Registration Key

If you erase the flash when re-flashing your unit, your unit will start in **Demo** mode and you'll need to re-enter your call and registration key.

Your call and registration key are written on the label on the bottom of the unit. It's also in the order confirmation email. Contact me if you can't find it.

NOTE: The registration key is an 8-digit Hex number. It only uses characters 0-9 and A-F. If your unit refuses to register your key, verify you are entering the correct digits. Sometimes my handwriting can be questionable!

There are two ways to enter your registration credentials.

1. Connect your unit to a terminal program such as Tera Term or Putty (see Appendix B or C, or to use the terminal in your Mac, Appendix D). 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.
2. Use the on-screen editor to enter your registration credentials. Select **Enter Call & Key** on the last page in the **Settings** menu. Use the [^] and [v] buttons to change the letter and the [<] and [>] buttons to advance to the next letter position. [Ins] and [Del] allow you to add or delete characters. Press the [OK] button to accept. The input sequence starts with your call and advances to your registration key once your call has been entered.

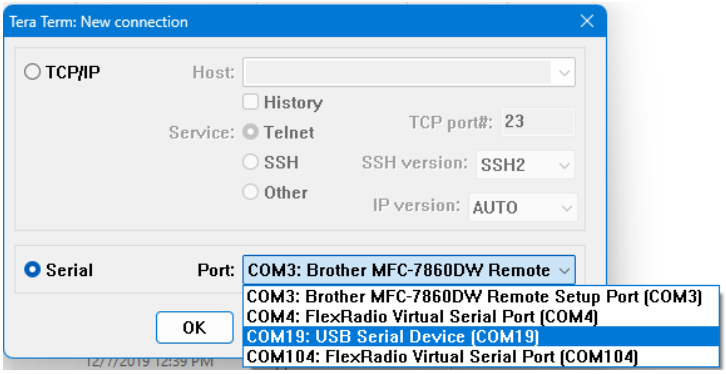
Once registered, your call sign will appear on the splash screen at boot up, the program won't shut down after 15 minutes, and you'll be able to save changes in the maps and import or export backup files. Your call will can also be automatically inserted into a CW macro using the **^** prosign.

Appendix B: Configuring Tera Term

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 will connect to **Max**. Press any key to start **Max's** terminal server.

You can change the terminal size in the **Setup** menu. Select **Terminal…** Set the **Terminal Size** to at least *41 x 20.* **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 **Max**.

Appendix C: Configuring Putty

Putty is a terminal program that can be configured for a variety of needs. **CTR2** controllers only support serial connections. This section describes how to configure the program to interface with **Max**.

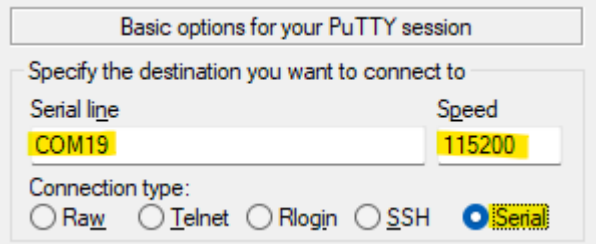
NOTE: Putty does not have XModem transfer capability. If you want to export and import backup files for **Max's** settings consider using Tera Term or install ExtraPutty.

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 **Max** using its USB serial port in order to configure it.

Serial Session

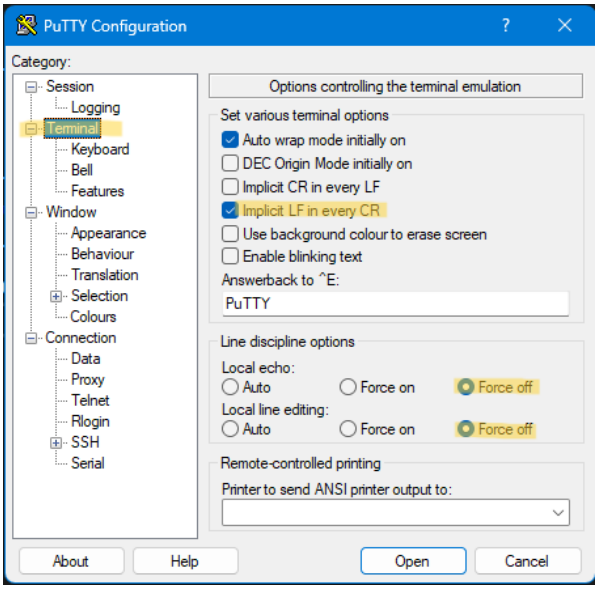
Select **Serial** then set the **Serial Line** to the COM port you found in the Device Manager and set **Speed** (Baud Rate) to 115200.



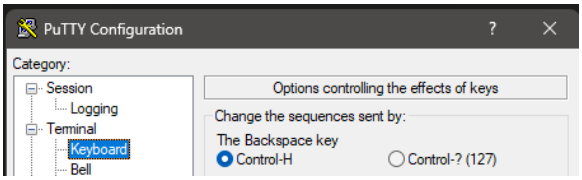
NOTE: Since this is a USB serial port the **Speed** (baud rate) doesn't matter. Data will be sent at USB speeds regardless of the **Speed** setting.

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 **Max** to a terminal session, use the following process.

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

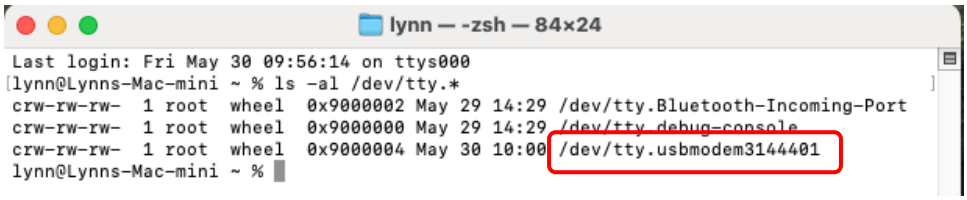
- On the Mac open **Applications/Utilities/Terminal.app**. On Linux open the terminal program supplied by your distro.
- On the Mac, enter ***ls -l /dev/tty.usb****, on Linux, enter ***ls /dev/tty**** This will return a list of all known serial ports.
- Next, plug the *Flex* into the computer's serial 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. The *Flex'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 **Max** into your PC, make sure you are using a USB-C cable that supports data. Many USB-C cables that come with consumer electronics only provide power to the device.

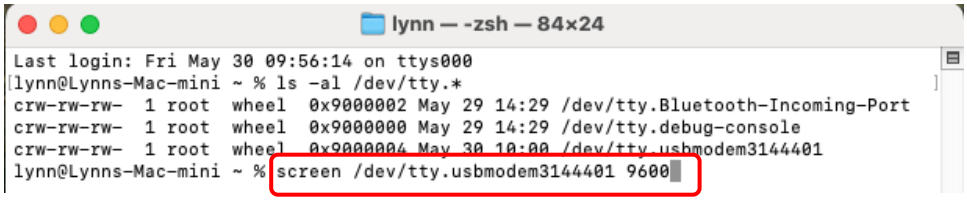
Once you know **Max's** USB serial port ID, write it on the label on the bottom of the unit using a fine-tipped permanent marker for future reference. Put a piece of transparent tape over the label to seal the ink so it doesn't rub off (it's not as permanent as you think). You can always remove the tape 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/ttyxxxxxxx**) for the **serial port ID**. This will open the serial port using 9600 baud in a terminal session. The following screenshots demonstrate these steps.

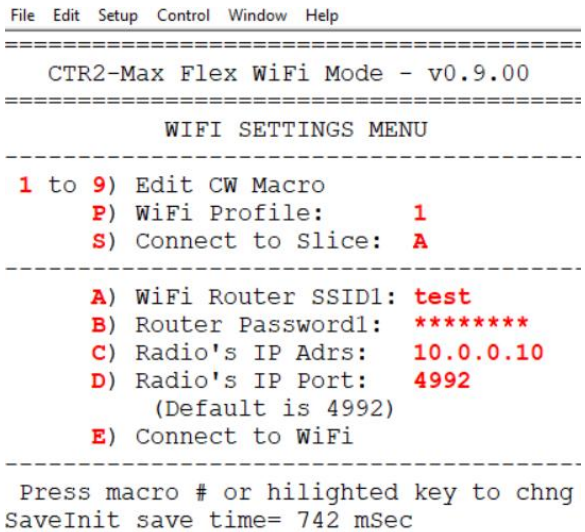
1. Get the list of serial devices on your computer. We're looking for the **usb** device.



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



This is **Max's** terminal display. Select a dial control or button to edit that control's label.



Appendix E: Internal Battery

NOTE: Since the ability to operate **Max** untethered from USB has been removed, the internal battery is only of use when operating **Max** with a laptop, iPhone, or iPad that is operating in battery mode. **Max's** battery will power it so that it doesn't draw power from the device running the radio control app.

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.

On a **Max** unit, the battery mounts in the base of the unit and has a strap to secure it. The enclosure fits 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.

v1.01.03 – September 30, 2026

- Fixed a bug I injected into v1.01.01 that erased the map name in **MIDI** mode

v1.01.02 – September 29, 2026

- Removed RADE mode that was added yesterday in v1.01.01. It cannot be selected via Flex API commands. It must be selected manually in AetherSDR.
- Added the UNKN label for modes the radio reports that **Max** doesn't support
- Removed processing for API *transmit frequency* reply. This is typically the repeater offset frequency and isn't currently used in **Max**. It's only valid during transmit when the controller's turning is blocked.

v1.01.01 – September 28, 2026

- Fixed RTTY bug – **Max** was not decoding the RTTY mode from the radio – instead it was staying in CW mode. This caused the frequency to jump when tuning **Max** because it had the carrier frequency, not the RTTY Mark frequency.
- Added support for NFM and RADE modes along with default filter options for these modes
    - These new modes were added to the Buttons menu, replacing the functions that opened the **Dial**, **Button**, and **Dashboard** displays.
- Added the "&" character to the supported character list for users that have this character in the WiFi router's password
- Added better detection for transverters
- Added AutoCenter option to Pan1 page. This option allows you to toggle whether the panadapter auto-centers while tuning

v1.01.00 – September 14, 2026

- Replaced the **Knobs** menu with a new **Controls** menu
- Changed the recommended file extension for **CTR2** configuration files from **.txt** to **.ctr2**. They are still text files; this just makes the easier to identify.

v1.00.02 – August 15, 2026

- Renamed the **Mode: non-GUI/GUI** to **Client: non-GUI/GUI**
- Added additional information on using the Sidetone Audio Interface board
- Other minor bug fixes in **MIDI** mode – these are covered in its manual

v1.00.01 - August 9, 2026

- Initial product release