CTR2-Dial Flex Mode Manual

v3.00.00



Last Revision: November 15, 2026
Copyright 2025-26 by Lynovation.com
All rights reserved
Updated to firmware v3.00.00

Revised sections for this version are highlighted in yellow

Table of Contents

Clearing up the confusion 4
Adding more confusion… 4
Simplifying the options… 4
How to use this manual 5
Legal Notice 5
Change Log 6
v3.00.00: November 15, 2026 6
System Overview 6
Flex Mode 6
Multiple Controllers / One Firmware 7
Quick Start Guide 7
Basic Concepts 7
Initial Setup 8
Connecting to your radio with AetherSDR CTR2 Relay 8
Connecting to your radio with WiFi 9
Multiple Clients 10
TX Enable 10
Configure the Keyer 11
Change the Input Jack Mode 11
Using an External Keyer and/or Hardware PTT Switch 12
Time to Play! 13
Flex Mode Features 13
Hardware 14
3.5mm Jacks on CTR2 Units 14
User Interfaces 14
Basic User Interface 15
Dial Control 16
Dial Graphics 17
VFO Tuning Control 17
Potentiometer Control 17
Centered Control 17
VFO Control 18
VFO Lock 18
Ring Control Options 18
Dial Menu 21
Knob Menu 21
Editing the Knob Menu 22
Controls Menu 22
Knob Turn Menu 22
Knob Push-and-Turn Menu 23
Switch Short-Press Menu 23
Switch Long-Press Menu 23
Editing Control Assignments 23
Buttons Menu 24
Button Actions 24
Assigning a Knob Switch to a Button Action 25
PTT Page 26

Using a Hardware PTT Switch 26
Settings Menu 27
Dashboard 31
Dashboard Home Page 31
Keypad Frequency Entry 32
Antenna Menu 33
Band Menu 33
Filter Menu 34
RX Menu 34
Mode Menu 34
DSP Menu 35
TX Menu 35
X/RIT Menu 36
MISC Menus 36
Keyer Setting Menu 36
Marco Select Menu 37
Macro Edit Menu 37
Panadpt1/Slice Menu 38
Panadpt2 Menu 38
Favorite Frequency Menu 38
Backing Up and Restoring your Settings 39
Export Settings 39
Import Settings 40
Flex Radio CW Zombie Mode 41
Appendix A: Installing or Updating CTR2-Dial Firmware 42
Installing Firmware using ESPConnect (New Method) 42
Re-entering you Call Sign and Registration key 44
Selling your CTR2 Controller 44
Installing Firmware using EspressIF Flash Download Tool (Old Method) 45
Installing using Linux or Mac 47
Appendix B: Configuring Tera Term 47
Appendix C: Configuring Putty 48
Appendix D: Apple or Linux Terminal Programs 50
Appendix E: Power Requirements 51
Appendix F: Change Log 52

Clearing up the confusion



Over the years, **CTR2** controllers based on the M5Dial controller from M5Stack, have undergone a series of iterations. First, I released **CTR2-Dial**. This unit supported Bluetooth and USB MIDI control and only supported the CW paddle interface on the single-knob version. Next, the **CTR2-Flex** unit was added to the product line. It too was based on the M5Dial, and was designed to control Flex radios over WiFi. I added additional I/O to this unit so the dual-knob version supported the CW paddle interface, the knob(s) gained a push switch, and it provided an internal keyer with sidetone. It could run the original **CTR2-Dial** MIDI firmware, or the newer **CTR2-Flex** WiFi firmware. Eventually, I merged **CTR2-Dial** and **CTR2-Flex** firmware into a single binary and (unfortunately) kept the **CTR2-Flex** name for the combined firmware.

Adding more confusion…

In an effort to reduce confusion, I retired the **CTR2-Dial** and **CTR2-Flex** single and dual-knob hardware units, and came out with **CTR2-Uno**, **CTR2-Duo**, and **CTR2-Quad** units. These units had 1, 2, or 4 knobs respectively. They all ran the new **CTR2-Flex** combined firmware that supported both **MIDI** and **Flex WiFi** control modes. Unfortunately, within the combined **CTR2-Flex** firmware, I kept the **CTR2-Dial** name for the MIDI control firmware and the **CTR2-Flex** name for the Flex control firmware. So instead of simplifying my product line, I complicated it even more.

Simplifying the options…

In an effort to (hopefully) reduce confusion, I've decided to rename the firmware that runs on M5Dial controllers back to **CTR2-Dial**. I've also removed the **CTR2-Dial** and **CTR2-Flex** mode designations within the firmware and now call them simply **MIDI** and **Flex mode**. This aligns with how these options are defined in **CTR2-MIDI** and **CTR2-Max** firmware. This manual has been edited to reflect these changes.

CTR2-Dial firmware runs on any M5Dial based **CTR2** controller including **CTR2-Uno**, **CTR2-Duo**, **CTR2-Quad**. It also runs on the older **CTR2-Flex**, and **CTR2-Dial** hardware.

MIDI mode turns your M5Dial based **CTR2** controller into a MIDI controller that's custom designed for ham radio operators. It works with a wide variety of radio control apps like Marcus' (DL8MRE) SmartSDR for iOS/MacOS, AetherSDR, RimuSDR, Thetis, among others. **MIDI** mode is a one-way controller. It has no idea what the radio is doing. It only sends MIDI commands to the control app. The manual for this mode can be found here.

Flex mode creates a custom WiFi controller specifically designed for the Flex 6000/8000/Aurora SDR radios. It is based on the popular **CTR2-Micro** controller firmware. It utilizes the Flex Network API to directly monitor and control the Flex radio over an IP network connection. In addition, it provides real-time CW keying and PTT control over the network. **CTR2-Dial** v3.0 firmware adds support for the new **CTR2 Relay** USB mode in AetherSDR. This mode allows **Flex** mode to connect to your radio over a USB connection on your computer, instead of using WiFi, when running AetherSDR.

Because the Flex API is a two-way protocol, **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, and a new **Controls** menu for **CTR2-Quad** makes it easy to see how each control on your controller is configured.

NOTE: If **Flex** mode is selected on the older dual-encoder **CTR2-Dial** hardware unit you must select either **# Knobs: Two** or **# Knobs: Swap A/B** in the **Settings** menu, otherwise the encoder on **Port B** will continually key the internal keyer.

If you're anxious to get your **CTR2** controller online, jump to the Quick Start Guide.

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 that you receive functioning hardware. I will work with you if there is a problem with your unit on arrival.
- I make no warranty that the firmware provided will perform up to your expectations or be suitable for your application. A lot of compromises had to be made to fit the small display so review this manual to be sure you're comfortable with the user interface.
- Software bugs are a fact of life and I try to find and correct all bug reports to the best of my ability ASAP.
- **CTR2-Dial** requires a license key to be fully functional. License keys can be purchased separately if you build your own unit. They are included with any purchase of any M5Dial based **CTR2** controller from Lynovation.com.
- License keys are tied to your call sign. This allows you to use the same key on as many devices as you own. You are not allowed to include your license key on units that you build to sell or give to others. They will need to purchase their own key.

Change Log

v3.00.00: November 15, 2026

- Renamed **CTR2-Flex** firmware to **CTR2-Dial** to better identify that this firmware is designed for the M5Dial. All references to **CTR2-Dial mode** have been changed to **MIDI mode**, and all references to **CTR2-Flex mode** have been changed to **Flex mode**
- Added a new **Controls** menu for **CTR2-Quad** hardware
- Added support for **CTR2 Relay** USB mode in AetherSDR

Changes to previous firmware versions can be found in Appendix F

System Overview



CTR2-Uno, **CTR2-Duo**, and **CTR2-Quad** utilize the M5Dial from M5Stack. The M5Dial is small, rugged controller based on the ESP32-S3 processor. It includes a 1.28" round color touchscreen display and an integrated encoder (the gray ring). It can be powered from a USB connection, an external 6-to-36-volt battery, or from a 3.7-volt Lithium battery. The current versions of **CTR2** M5Dial based units use USB for power. The user can upgrade their unit to use these other power sources if desired.

CTR2-Dial firmware runs on any M5Dial based **CTR2** controller (including the discontinued **CTR2-Dial** and **CTR2-Flex** hardware) and supports both Bluetooth and USB MIDI control (**MIDI** mode), and Flex radio API control over WiFi or **CTR2 Relay** USB in AetherSDR (**Flex** mode).

MIDI mode is covered under a separate manual that can be downloaded here. This manual will focus on **Flex** mode.

Flex Mode

Flex mode is compatible with Flex 6000/8000/Aurora radios. It uses WiFi or AetherSDR's **CTR2 Relay** to connect directly to the radio over your IP network. It uses the Flex Network API. Your **CTR2** controller provides a small but flexible physical control surface for your radio with a smooth tuning knob, and additional knobs that can be programmed to almost any function you need. Unlike controlling the control app (SmartSDR, AetherSDR, RimuSDR, etc.) with a mouse, the control app doesn't need to be "in focus" on your computer to use your **CTR2** controller.

WiFi mode requires far less configuration than **MIDI** mode. In **WiFi** mode, you enter your WiFi router's SSID and password, along with the radio's IP address. **MIDI** mode requires you to label the controls on your **CTR2** unit to match the MIDI mapping in your control app. It can be daunting for a new user.

WiFi mode also provides the essential controls you need to operate your radio without any control app. This is ideal if you just want to monitor a band or operate your radio in POR mode (i.e. Plain Old Radio) without booting your computer or iPad to use SmartSDR.

The drawback to WiFi control is that the radio and the **CTR2** controller must be on the same network (LAN) and it does not work over SmartLink.

AetherSDR's **CTR2 Relay** is the simplest mode of all. There is nothing to configure. Just plug your **CTR2** unit into a USB port on your computer, open **CTR2 Relay** in AetherSDR, and click **Start**. **CTR2 Relay** connects your **CTR2** unit to your radio through the USB port. This mode works well when controlling a remote radio over SmartLink or a VPN.

Flex mode includes a built-in keyer with sidetone, on all M5Dial based **CTR2** controls (with the exception of the older **CTR2-Dial** hardware). It sends both key and PTT inputs to the radio over the IP network. Using *Straight Key* keyer mode allows you to connect an external keyer, PTT switch, or app such as N1MM to the controller's CW paddle jack to key the radio. In addition, the virtual PTT switch can be configured for momentary or latched PTT.

Flex mode has two user interfaces and you can use the one that works best for you.

Multiple Controllers / One Firmware

As mentioned previously, three versions of hardware using the M5Dial are available. Which unit you choose depends on your use case. You can easily switch between **Flex** and **MIDI** mode on the last page in the **Settings** menu.

Quick Start Guide

Flex mode is much easier to set up than **MIDI** mode.

Basic Concepts

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

> *Flex 6000/8000/Aurora Series Radio*
> Flex radios are basically computers with an RF interface. The computer-side has a built-in IP server that supports multiple IP client connections. Information about the RF interface is shared with all connected clients and each client can control the RF interface. Most control interfaces, like SmartSDR, AetherSDR, and RimuSDR, are classified as "GUI" clients (Graphical User Interface). These clients are the primary control interface. Other clients, such as **CTR2** units running in **Flex** mode, are classified as "non-GUI" devices. Non-GUI clients are "bound" to a GUI client, and basically work in parallel with the GUI client.

Your **CTR2** controller running in **Flex** mode is a pre-configured to work with your Flex radio. Unlike **MIDI** mode, there is no need to map control functions to a 3rd-party app.

Flex mode monitors your radio's settings. When it first connects to your radio, if loads and displays the radio's settings. This allows it to run in parallel with any version of SmartSDR. If you change anything in SmartSDR, it will be reflected in the **CTR2** controller, and visa-versa.

Initial Setup

The first order of business is to power up your **CTR2** controller.

If you will be using your **CTR2** controller with **CTR2 Relay** in AetherSDR, you must plug the controller into a USB port on the computer running AetherSDR using a USB-C data cable.

If you'll be using WiFi instead, you can power the controller from any USB power source (computer, cell charger, USB battery, etc.)

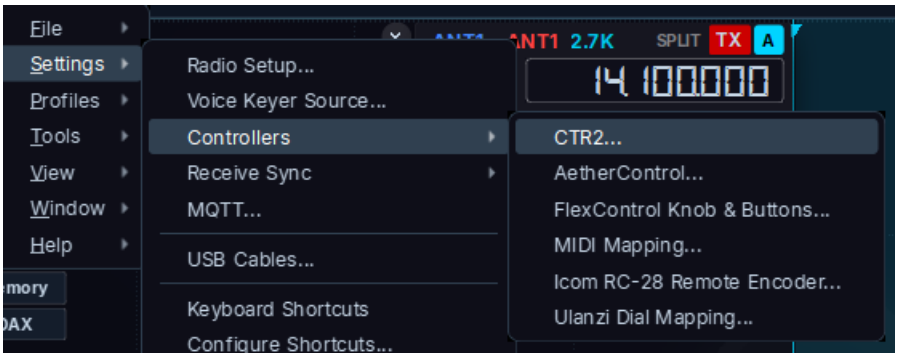
WARNING: Do not use an unpowered USB hub to power the controller. Unpowered hubs cannot provide the current required to run the controller reliably.

When the unit boots, the flash screen will show the firmware title, operating mode (**MIDI** or **Flex**), 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 with AetherSDR CTR2 Relay

If you're running AetherSDR, connecting your **CTR2** controller to your radio requires only a few mouse clicks.

First, in AetherSDR, navigate to **CTR2 Relay** using **Settings -> Controllers -> CTR2…**



CTR2 Relay will open in a separate panel.

If your **CTR2** controller is running **CTR2-Dial** v3.0 firmware, is connected to the computer running AetherSDR, and powered up, the **Mode** list box should automatically be set to **USB** and your **CTR2** controller should appear in the **USB** list box. All **CTR2** units based on the M5Dial will appear as shown. Next, check the **Start automatically when AetherSDR connects to a radio** checkbox then click **Start**. That's it! You should see the **Radio** and **CTR2** counters start to increment and after a few seconds, your **CTR2** controller will be connected to your radio. To disconnect, press the **Stop** button or power down your controller.



Connecting to your radio with WiFi

Connecting to your radio using WiFi is a little more complicated, but not by too much. The advantage of using WiFi over **CTR2 Relay** is that WiFi works with any Flex radio control app. The only restriction is that the **CTR2** controller and the radio must be on the same physical network (LAN), so it doesn't work with SmartLink.

To connect, enter your router's credentials (SSID and password) on page 7 and your radio's IP address on page 8 of the **Settings** menu. Alternatively, you can connect a dumb terminal to your **CTR2** controller and use it to enter this data. See Appendix B, C, or D for instructions on connecting a dumb terminal.

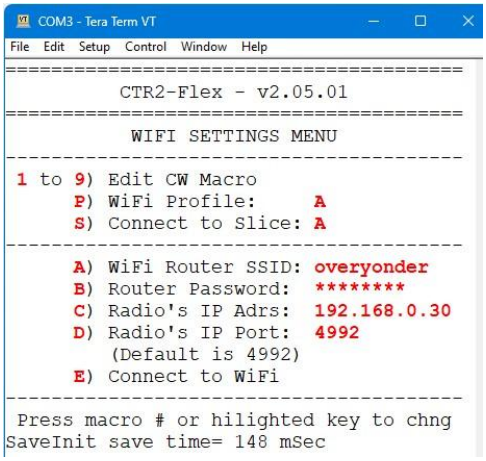
Built-in Text Editor



To enter settings in the built-in text editor, select the setting you want to enter from the **Settings** menu. This screenshot shows the SSID selected. Turn **Knob A** to select a character then touch the **Next** button to advance to the next character. Your radio's IP address can be found on the **Settings -> Radio Setup -> Network** tab in SmartSDR for Windows or on the **Available Radios** popup window in SmartSDR for iOS/MacOS. The default IP port for the Flex radio is 4992. You only need to change this if it has been changed on your radio.

Dumb Terminal Entry

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



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

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

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

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

If you would like **-Flex** mode to automatically connect to your radio when it boots, set **AutoConn: ON** in the **Settings** menu. You can temporarily disable auto-connect by holding the **M5** button on the M5Dial down during boot.

Once your WiFi credentials and the radio's IP address have been entered, select **Connect WiFi** on page 7 of the **Settings** menu to connect your **CTR2** controller to your WiFi system. Once connected, your controller can be used as a control surface for any Flex radio control app, or it can operate your radio as a standalone controller.

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

NOTE: Always connect your **CTR2** unit to your radio after starting your Flex radio control app so it binds to the current slice as a non-GUI client. If you connect it before starting your Flex control app with **multiFlex** enabled, it will create a second GUI client and will work separately from your control app. Radio's running SmartSDR 2.xx will not be able to connect to your radio if your **CTR2** controller is already connected.

Multiple Clients

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

TX Enable

Flex radios support multiple slices, but only one slice can be designated as the transmit slice. On the Flex control app, 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 pushbuttons on a **CTR2-Quad**).

When transmit is enabled on the slice **CTR2** is controlling, the caption on all pages will be displayed in red font. (I know, it looks orange here… trust me, it's red)

When using multiple **CTR2** controllers 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 network. You can configure the keyer's type and sidetone pitch on page 5 of the **Settings** menu. Keyer speed and timing are set with the **Dial** control.

> **NOTE:** The keyer and sidetone in **CTR2** are separate from the keyer and sidetone in the radio. The latency across the network makes it impossible to control the radio's keyer (and sidetone) in real time. Because of this, the radio doesn't provide sidetone when it's keyed over the network. However, the **Speed** and **Sidetone** adjustments in **Flex** mode do control the radio's keyer speed and sidetone 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's** keyer, set the keyer **Type** to **OFF** on page 5 of the **Settings** menu, or on the **Keyer** menu in the **Dashboard.**

Change the Input Jack Mode

If you plan on using the keyer, you can just plug your paddles into the 3.5mm stereo **PDL** jack on your unit. This jack has multiple functions.

On single and dual-knob **CTR2** controllers, the function of the **PDL** jack is controlled by the **Keyer Type**. You can select one of the available keyer types, and reverse the **PDLS** wiring on page 5 of the **Settings**

menu. To use the **PDL** input jack for a straight key and an external PTT switch, select **Keyer Type: PassThru**. In this mode, the Tip-to-Shield of the paddle jack controls the CW carrier and the Ring-to-Shield controls the MOX on the radio. You can use the **PDLS:** option to reverse this if needed.

CTR2-Quad units, on the other hand, have separate **PDL** and **KEY/PTT** jacks, so there is no need to set the keyer to **PassThru**. 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** unit. If your external keyer has a built-in sidetone you can use a small Phillips screwdriver to turn the sidetone volume on the **CTR2** unit down (there's a small hole on the side of the controller).

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

> **NOTE:** The *RING* on **CTR2-Quad's Key/PTT** jack is hardwired to Switch 1 on the front panel. This means, that in order to use an external PTT switch with **CTR2-Quad**, you must assign Switch 1 to PTT (see **SW1** on page 4 in the **Settings** menu). Otherwise, your external switch will control the functions assigned to Switch 1.

To use an external key/keyer or PTT switch on **CTR2-Uno**, **CTR2-Duo**, and on the older **Flex** and **Dial** hardware, do the following:

- Wire the external keyer (or straight key) to the *Tip* and *Shield* of a 3.5mm (1/8") stereo plug
- Wire the external PTT switch (foot switch, hand switch, etc.) to the *Ring* and *Shield* of the same stereo plug
- In the **Settings** menu:
    - On page 2 select **Momentary** or **Latch** for **PTT:** - this determines the PTT action
    - On page 5 select **Passthru** for the (paddle) **Type:** - this passes the paddle jack's *Tip* input to the *CW Key* function and the *Ring* input to the *PTT* function

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 **Misc-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 your **CTR2** unit is to use it. There are two user interfaces. The basic interface has separate menus for the **Dial control**, **Buttons**, **Knob(s)** (or **Controls** on the **Quad**), 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.

Flex Mode Features

CTR2-Dial Flex mode runs on the M5Dial from M5Stack. The M5Dial features an ESP32-S3 processor, a 1.28" color touchscreen, and a built-in selector ring and hardware pushbutton. The firmware includes the following features:

- Support for AetherSDR's **CTR2 Relay** for a plug-and-play connection to your radio
- WiFi connectivity – connects directly to the radio
- Three WiFi profiles can be set up for users that operate from multiple networks.
- Multiple **CTR2** units running in **Flex** mode can be connected to the same radio, to the same slice or different to a different slice
- WiFi Works with any version of SmartSDR (Windows, iOS, or MacOS, AetherSDR, RimuSDR, etc.)
- **CTR2-MIDI** or **CTR2-Dial** controllers in **MIDI** mode can be used at the same time in SmartSDR for iOS/MacOS apps while multiple **CTR2** units in **Flex** WiFi mode are also connected to the radio
- WiFi works in standalone mode without a Flex radio control app
- Two user interface modes
    - Menu pages provide easy to use controls if you just want to control one or two items
    - Dashboard pages provide a small control surface for your radio with easy access to all functions
- A **Controls** menu included for **CTR2-Quad** controllers allow you to visualize knob and button functions
- 60 pre-defined virtual button controls for modes/bands/filters or page selection
- 30 pre-defined virtual Dial (wheel/slider) controls for tuning frequency, volume, RIT, XIT, etc.
- Assign the gray Ring encoder on the M5Dial display to any of the available **Dial** controls
- Up to four optional physical encoders (referred to as **Knobs**)
    - You can map 6 of the **Dial** controls to each **Knob** on **CTR2-Uno** and **CTR2-Duo** units
    - On the **CTR2-Quad** unit:
        i. Knobs and their push switches can be programmed with two functions (turn and push-and-turn for knobs, short-press and long-press for push switches)
        ii. Knobs in the **Controls** menu can be assigned to **<DIAL>** types. These control the selected **Dial** control on the **Dial** page and the selected control in the dashboard page
- Two pushbuttons are provided on the **CTR2-Quad** – each of these can be programmed to any two button functions (using short and long-press) or be dedicated to control PTT. They can be programmed in either the **Controls** or **Buttons** menus.

- The gray ring on the M5Dial can be configured as a fine-tuning control (to make fine adjustments to the selected *Dial* function), it can be assigned to always control the selected *Dial* function, or it can be assigned to always control any of the *Dial* functions in any page.
- VFO Lock control
- 3.5mm (1/8") stereo input jack allows you to use your paddles to control the keyer, straight key, or PTT over the network connection
    - Separate jacks are provided on **CTR2-Quad** for paddles and key/PTT
- Nine CW macros
- Swipe tuning for parameter adjustments on the **Dashboard** pages
- Panadapter control
- Control any slice, A through H, depending on radio's capacity
- Adjustable filter controls – adjust low-cut, high-cut, and offset independently
- Piezo speaker with volume control for sidetone
- A virtual PTT switch or hardware PTT switch. On **CTR2-Quad** you can select either pushbutton as a dedicated PTT switch.
- Keypad for direct frequency entry (press **Frq** on the dashboard **Home** page)
- Favorite frequency lists for each band, or a common list for all bands
- Speed sensitive controls
- Adjustable virtual **Dial** sensitivity
- Seven color themes and backlight control
- Sleep and power down timers to save battery power
- Manual power down
- Multiple Power options
- Backup the controller's settings using the **Import** and **Export Settings** option
- Easily switch between **Flex** and **MIDI** mode

Hardware

Hardware is covered in separate manuals for each model. Click the following links to open the hardware manual page for each unit: **CTR2-Uno** **CTR2-Duo** **CTR2-Quad**

> **NOTE:** To reduce confusion, the older **CTR2-Dial hardware** is being depreciated and the original one and two knob **CTR2-Flex** units have been rebranded to **CTR2-Uno** and **CTR2-Duo**. All units run **CTR2-Dial** firmware.

3.5mm Jacks on CTR2 Units

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

User Interfaces

Flex mode supports two user interface models. The *Basic User Interface* (left screenshot below) uses simple menus to select controls and buttons, similar to **CTR2-Dial** firmware, and will be described in the

next section. Use this interface when you just want to use your **CTR2** unit to control one or two parameters. The second user interface (right screenshot) is a fully functional dashboard that allows you to easily select and modify parameters. Go to the Dashboard section for a full description of this user interface.

NOTE: When using either UI, **Knob A** is used to change the selected parameter on **CTR2-Uno**, **CTR2-Duo**, and on the older **CTR2-Flex** and **CTR2-Dial** hardware. On **CTR2-Quad**, any knob set to **<DIAL>** in the **Controls** menu will control the selected **Dial** parameter.



Basic UI



Dashboard UI

Basic User Interface

Flex mode's **Home** page allows you to open the control pages in the basic user interface. This interface is the same interface used in **MIDI** mode, with the addition of the **DashBrd** button.

- **Dial** opens the **Dial** control. This is a virtual dial where you can select from 30 different parameters to control. Once selected, just swipe your finger around the perimeter of the display to change the parameter. To change the selected parameter, turn the gray ring on the M5Dial or touch the control # above the center label to open the **Dial** menu.
    - If the **Ring** option in the **Settings** menu is set for **Ring: Fine-Tune**, touching the outside ring on the display enables *Ring fine-tuning mode*. In this mode, turning the ring will adjust the selected control by one count per ring click. Fine-turning will turn off after 3 seconds.
    - If the **Ring** option in the **Settings** menu is set for **Ring: Sync2Dial**, it disables ring navigation (switching pages or **Dial** controls with the ring) and adjusts the selected control in the *Dial* page as you turn the ring on any page. To navigate between pages with the ring in **Sync2Dial** mode, touch the page #s at the bottom of each page, or touch the control # in the **Dial** control to open the **Dial** menu
- **Buttons** opens the **Buttons** menu where you can select from 60 functions on ten menu pages. Turn the gray ring on the M5Dial to change menu pages or touch the page #s at the bottom button to switch pages.
    - You can assign a button function to any of the knob pushbuttons (or pushbuttons on **CTR2-Quad**) on your unit. To do this, find the button function you want to program in the **Buttons** menu. Press and hold the pushbutton you want to assign, then touch the button control to assign to the switch. The knob (or button # on **CTR2-Quad**) will appear in the button's label. The first touch assigns it to the switch's **short-press**.

Touch the button again, (while still holding the switch down) to set the **long-press** function. When set to a long-press function, the switch # will be displayed with a "+".

- On **CTR2-Quad** units, you'll find it easier to assign buttons to knob switches and pushbuttons using the **Controls** menu

- **CTR2-Uno and CTR2-Duo** units have a **Knob** button on the **Home** page. The **Knob** menu allows you to assign **Dial** controls to the knobs.
  - Select from 6 different **Dial** controls for each knob.
  - Easily change the **Dial** controls in the list to fit your needs.
- **CTR2-Quad** units have a **Controls** button instead of a **Knob** button on the **Home** page. It contains four pages that allow you to:
  - Modify the **Dial** control assigned to each knob's **push** and **push-and-turn** function.
  - Modify the **Button** assigned to knob switches and pushbuttons **short-press** and **long-press** function.
- **DashBrd** opens the Dashboard user interface that is described in this section.
- **PTT** opens the virtual PTT page where you can control PTT on your radio by simply touching the display. There are three modes on this page. They can be controlled by touching the bottom button in this display or in the **PTT** option in the **Settings** menu.
  - **Off** disables PTT control from this page, and from the external PTT input. It also disables PTT control on the **CTR2-Quad** if PTT is assigned to one of the pushbutton switches.
  - **Momentary** enables momentary PTT control. PTT is key up as long as you press the PTT switch and drops off when you release the switch.
  - **Latched** enabled latched PTT. Touch and release the screen (or PTT switch) to key PTT. It will stay keyed until you touch and release PTT again.
- **Settings** opens the Settings menu where you can change the configuration of many of **Flex** modes 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** or **Controls** setting menu, turning that knob will adjust the value of the currently select control in the **Dial** control.

If the gray ring on the M5Dial is in navigation or fine-tune mode, turn the ring to switch dial controls. Otherwise, touch the dial # (**1** in this example) to open the **Dial** menu where you can select a dial function from 5 pages of menus.

If the ring is in fine-tune mode (*Settings* -> **Ring: Fine-Tune**), touching the outside ring (the blue ring in this photo) enables fine-tune mode and **<RING>** will be displayed in the page caption. Turning the ring while in this mode adjusts the current control's value. Fine-tune mode times out after 3 seconds of inactivity.

NOTE: When the **Dial** control is in VFO mode, as shown above, the push-and-turn function of **Knob A** is used to change the frequency step.

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.

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

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

Dial Graphics

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

VFO Tuning Control

The lead photo in the **Dial Control** section shows a *tuning* control. Tuning controls are continuously variable and used for VFO tuning. The tuning ring is the background color of the selected theme. The label in the middle (in this case **VFO**) indicates the control function. Unlike **CTR2-Dial** firmware, 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.

Potentiometer Control

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



Centered Control

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



Shortcut: Touch to the *left* of the **DIAL** caption at the top to open the **Knob** menu. Touch to the *right* of the **DIAL** caption to open the **Buttons** menu. Similar options are provided on the **Knob** and **Buttons** menus.

VFO Control



When the VFO control is selected the frequency and frequency step will be displayed in the center of the control. Touch any digit in the frequency to select that digit as the tuning step. The step digit will turn red. Touch it again to select the *half-step*.

For example, touching the 100's digit (1) in the example at the left switched the frequency step from 100 Hz to 500 Hz. *Half-steps* are indicated by highlighting the digit to the left in magenta.

You can also press and hold, then turn **Knob A** while in this control to change the frequency step. You can also touch the left or right side of the bottom **^ xxx v** button twice to change it.

Pressing the **Zero** label in this control will zero all of the digits below the frequency step digit.

Hint: You can quickly change to the **Button** or **Knob** menus from the **Dial** control by swiping across the center of the display either left or right. Swipe from the *left* to open the **Knob** menu or from the *right* to open the **Buttons** menu.

VFO Lock



To lock VFO tuning to prevent inadvertent changes simply long-press the frequency on the VFO dial control or on the Dashboard **Home** page. When the VFO is locked, the frequency will be "grayed out" as shown here. Adjusting the tuning, or turning a knob assigned to the VFO, will post a message with instructions on how to reset the lock.

To unlock the VFO, long-press the frequency digits.

Ring Control Options

The encoder used in the gray ring control on the M5Dial display is a detent (bumpy) encoder with 12 "clicks" per rotation. Because it isn't very sensitive, and somewhat difficult to turn, it has only been used for selecting dial controls and menu pages (i.e. navigation).

By user request, beginning with v2.02 I've added the ability to choose from several ring control options with the **Settings** menu's **Ring** option on page 8.

- **Navigation** mode – (default) – use the ring to select dial controls and menu pages.
- **Fine-Tune** mode – while in the **Dial** control page, touching the outside ring on the display enabled fine-tune mode. **<RING>** will be displayed in red on the page caption and turning the gray ring will increment or decrement the current control's value by one count per click. Fine-

tune mode times out after 3 seconds of inactivity. When fine-tune mode is not active, the ring operates in navigation mode.

- **Sync2Dial** mode – the ring adjusts the dial control selected in the **Dial** menu. This works in any page, similar to how the knobs work.
- **Selected Dial Control** – the ring adjusts a dial control that you select from the **Ring Ctl** menu. This also works from any page.

NOTE: When **Sync2Dial** or **Selected Dial Control** modes are enabled, you must use the on-screen navigation controls to move between menu pages. While in the **Dial** control you must touch the control # (above the center label) to open the **Dial** menu in order to select a different dial control

The following screenshots should help explain the process of selecting a ring control option on page 10 of the **Settings** menu.

Navigation mode



The screenshot at the right shows that the ring is in the default **Navigation** mode.

In this mode, turning the ring will change menu pages or the selected control on the **Dial** control page.

The antenna icon at the top of the page is solid.

Double-touch the **Ring: Navigation** button in the **Settings** menu to switch to **Fine-tune** mode.

Fine-Tune mode



In **Fine-Tune** mode, the antenna icon has a single line through its middle.

In this mode, the gray ring on the display can be used as a fine-tuning control for the selected dial control. To enable fine-tuning, touch the outside ring on the **Dial** control page. **<RING>** will be displayed in the page's caption. Turning the ring will now increment or decrement the current dial control's value by one count. Fine-tune mode will time out after 3 seconds on inactivity.



Double-touch the **Ring: Fine-Tune** button in the **Settings** menu to switch to **Sync2Dial** mode.

Sync2Dial mode



In **Sync2Dial** mode the M5Dial's ring controls the currently selected **Dial** control from any page, similar to how the **Knob** controls work.

In this mode, two lines are displayed in the antenna icon at the top of each page.

NOTE: While **Sync2Knob** mode is active, you must use the onscreen navigation controls to switch menu pages. On the **Dial** control, you must touch the control # above the center label to open the **Dial** menu to select another dial control.

Touch the **Ring: Sync2Dial** button to open the **Ring Control** menu.

Ring Control Menu



The **Ring Ctl** menu appears when you double-touch the **Ring** option in the **Settings** menu while in **Sync2Dial** mode. It is similar to the **Dial** menu and is used to assign one of the dial controls to the **Ring** control. There are 5 pages of menus. You must use the **Next** button on the bottom to step to the next page because the ring mode is still in **Sync2Dial**. Touch a control label to assign that control to the **Ring** control. In this example, the **AGC-T** control is selected.

Pressing **Esc** will exit this menu and reset the ring mode to **Navigation** mode.

Selected Dial Control Mode



Once you select a control in the Ring Control menu you will return to the **Settings** menu and the **Ring:** option will show the selected control (AGC-T in this example).

Note that there are now three lines in the antenna icon at the top of the page in this mode.

NOTE: While **Selected Control** ring mode is active, you must use the onscreen navigation controls to switch menu pages. On the **Dial** control, you must touch the control # above the center label to open the **Dial** menu to select another dial control.

To return to ring **Navigation** mode, touch the **Ring:** button in the **Settings** menu again.

Dial Menu



Touching the dial # on a **Dial** control will open the **Dial** menu. The current dial setting will be highlighted (**VFO** in this example). Touch a button to select that function and return to the **Dial** control page. Touch the selected function to return to the **Dial** control without changing the selection.

If the gray ring on the M5Dial is in **Navigation** or **Fine-Tune** mode, turn the ring to switch menu pages. Otherwise, touch to the left or right on the footer button that is showing the menu page you are on (**<1/5>**).

The caption button (**DIAL MNU**) is a two-function button.

- Touch the *left* side to switch to the **Knob** menu.
- Touch the *right* side to switch to the **Buttons** menu.

Dial functions are listed in the table below.

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

Hint: Quickly change to the **Knob** or **Buttons** menus by swiping across the center of the display either *left* or *right*. Swipe from the *left* to open the **Knob** menu or from the *right* to open the **Buttons** menu.

Knob Menu



The **Knob** menu is used with **CTR2-Uno** and **CTR2-Duo** units. It allows you to assign **Dial** controls to the knob(s) on the unit.

CTR2-Quad units provide a more advanced **Control** menu that allows you to assign **Dial** and **Button** controls to the knobs and switches on the unit.

The caption at the top of the page is a dual-function button.

- Touch the *left* side to switch to the **DIAL** control.
- Touch the *right* side to switch to the **Buttons** menu**.**

If the gray ring on the M5Dial is in navigation mode, turn the ring to switch pages on **CTR2-Duo** units. You can also just touch the footer button.

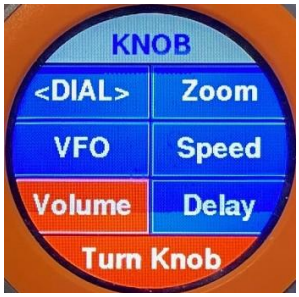
Each knob can be assigned to one of 6 functions. **Duo** units have a menu page for each knob.

The first option always displays **<DIAL>**. When this option is selected, turning the **Knob** on any page will change the control selected in the **Dial** control page.

Selecting one of the other five functions on this page assigns that function to the **Knob** and it will be controlled independently from the **Dial** control.

Editing the Knob Menu

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



Touch the button again or let the select timer timeout (6 seconds) to save the new setting.

NOTE: On **CTR2-Uno** and **CTR2-Duo** (and older Flex and Dial hardware) the first function (**<DIAL>**) cannot be changed.

Controls Menu

The **Controls** menu on **CTR2-Quad** allows you to assign **Dial** and **Button** controls to the knobs and switches on your unit.

The controls on **CTR2-Quad** support dual-function knobs and switches. Each knob has a **turn** and a **push-and-turn** function and each knob switch and pushbutton has a **short-press** and **long-press** function.

There are four pages in this menu.

Knob Turn Menu

The **Knob Turn** menu displays the four knobs on **CTR2-Quad** in their relative position. Each label displays the knob's letter, A, B, C, or D.



Touch the caption to step to the next page, or touch the left or right side of the bottom **<- Page ->** button to go to the previous or next page. You can also turn the gray ring to navigate between pages.

Knob Push-and-Turn Menu



The **Push/Turn** menu allows you to set the **Push-and-Turn** function of each knob. Each label displays the knob's letter, A, B, C, or D, with a **+** to identify it as a push-and-turn control.

NOTE: While this menu is displayed, the **Turn** and **Push-and-Turn** functions are reversed. In other words, turning a knob while this page is open sends the displayed **Push-and-Turn** function.

Switch Short-Press Menu



The **Switch Short** menu allows you to edit the **short-press** button functions assigned to the knob switches and pushbuttons on **CTR2-Quad**.

Pushbuttons #1 and #2 are shown with dimmed labels and have 1 and 2 on their labels. The knob switches appear in their relative locations and have A, B, C, and D on their labels.

Switch Long-Press Menu



The **Switch Long** menu allows you to edit the **long-press** button functions assigned to the knob switches and pushbuttons on **CTR2-Quad**.

Pushbuttons #1 and #2 are shown with dimmed labels and have 1 and 2 on their labels. The knob switches appear in their relative locations and have A, B, C, and D on their labels with a **+** to identify it as a long-press control.

NOTE: While this menu is displayed, the **Short** and **Long-press** functions are reversed. In other words, pressing one of the switches or button on the unit, while this page is open, sends the displayed **long-press** function.

Editing Control Assignments

Edit the knob assignments the same way you do in the **Knob** menu. Touching a control to enable editing turns that control label red. While editing is enabled, turn any knob to scroll through the available functions for that control. Touch the control's label again, or wait for editing to time out to accept the change.

Buttons Menu



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

There are 10 pages of buttons with six buttons on each page. The last three buttons open pages on the controller. If the gray ring on the M5Dial is in navigation or fine-tune mode, turn the ring to select a page, otherwise, touch the *left* or *right* side of the bottom label to decrement or increment the page #.

If a knob switch or pushbutton is assigned to a button action, it's # will appear next to the label on this page. Long-press actions will have a "**+**" appended to the button #. In this example, short-press knob **A** increments the Mode and long-press knob **A** decrements the Mode.

Touch the caption or press the **M5** button on the orange ring to return to the **Home** page.

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 buttons on that page.

Page	Left Caption	Function		Right Caption	Function
1	Mode ^	Step to next mode		Band ^	Step to next band
	Mode v	Step to previous mode		Band v	Step to previous band
	Mute	Mute Rx		BW	Change bandwidth
2	RIT tgl	RIT On/Off		TUNtgl	Tune Output On/Off
	XIT tgl	XIT On/Off		ATU Tun	Start ATU
	AGC	Change AGC		ATU Byp	Bypass ATU
3	WNB tgl	Wide Noise Blnkr On/Off		APF tgl	Auto-Peaking Filter On/Off
	NB tgl	Noise Blanker On/Off		ANF tgl	Auto-Notch Filter On/Off
	NR tgl	Noise Reduction On/Off		RF Gn	Step RF Gain
4	CW	CW mode		AM	AM mode
	LSB	Lower sideband mode		SAM	Synchronous AM mode
	USB	Upper sideband mode		RTTY	RTTY mode
5	FM	FM mode		DIGL	Digital LSB mode
	NFM	Narrow FM mode		DIGU	Digital USB mode
	DFM	DFM mode		Future	
6	160m	160 meters		40m	40 meters
	80m	80 meters		30m	30 meters
	60m	60 meters		20m	20 meters
7	17m	17 meters		10m	10 meters
	15m	15 meters		6m	6 meters
	12m	12 meters		Gen	General Coverage
8	2m	2 meters *		33c	33 centimeters *
	1.25	1.25 meters *		23c	23 centimeters *
	7c	70 centimeters *		Tx Enbl	Tx Enable On/Off

9	M1:	Send CW Macro #1		M4:	Send CW Macro #4
	M2:	Send CW Macro #2		M5:	Send CW Macro #5
	M3:	Send CW Macro #3		<STOP>	Stop sending macro
10	RxAnt:x	Change Rx antenna		*DashBd	Open Dashboard page
	TxAnt:x	Change Tx antenna		*KeyPad	Open Frequency Keypad
	Proc	Step through Tx processor		*FavFrq	Open Favorite Freq page

* These actions open pages

** These bands require a transverter

Assigning a Knob Switch to a Button Action

Knob switches, and pushbuttons on **CTR2-Quad**, have two actions: a short-press (less than 1 second) and a long-press (greater than 1 second).

Switch Short-Press Action

CTR2-Quad users can use the switch pages in the **Controls** menu to set knob and pushbutton assignments.

To assign a short-press action to a knob push switch (or pushbutton on a **CTR2-Quad**), do the following:

- Open the **Buttons** menu and navigate to the page with the action you want to assign
- Press-and-hold the knob switch (or pushbutton on the **Quad**) 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 on a **Quad**), follow the steps above for setting the short-press action then while still holding the knob switch or pushbutton down, touch the desired virtual button a second time. Virtual buttons set to long-press actions will have a "**+**" appended to the label on that virtual button.

Switch Assignments

This photo shows the **Buttons** menu on a **CTR2-Quad.** Knob A's short-press action is set to the **Mode ^** virtual button and its long-press action is set to the **Mode v** virtual button. Pushbutton 2's short-press action is set to **MUTE** and its long-press action is set to **BW**.



Clearing Button Assignments

To clear a knob or pushbutton assignment, hold that switch down and touch the selected virtual button it is assigned to 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-Quad's** pushbutton SW#1 or #2 (on page 4 of the **Settings** menu) automatically cancels all virtual buttons assigned to both switches.

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**, touching the screen, or operating an external PTT switch has no effect.

When PTT is set to **Momentary,** touching the screen or operating an external PTT switch 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: An external PTT switch will control PTT in any page or menu.

Using a Hardware PTT Switch

To configure an external hardware PTT switch, see Using an External Keyer and/or Hardware PTT Switch.

Settings Menu



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

The settings menu is divided into 11 pages with three buttons on each page. You must press a settings button twice to change its setting.

Press the **M5** button or touch the **SETTINGS** caption to return to the **Home** page**.**

If the **Ring** on the M5Dial is in navigation or fine-tune mode, turn the ring to select a settings page, otherwise, touch the *left* or *right* side of the bottom label to decrement or increment the page #.

The table below summarizes each setting.

Page	Btn	Function	Description
1	1	**Beep Mode**	Changes the volume of **CTR2-Dial's** button beeps. Range: Off, Low, Medium, and High. Sidetone volume is set through a small hole in the enclosure using a 1/8" (3.2mm) Phillips screwdriver.
	2	**Speed Tune**	When enabled, touch and hold the outer ring on the **Flex** for > 1 second to enter speed tuning mode. Valid for VFO control only.
	3	**Dial Sens**	Changes the sensitivity of the virtual Dial. Range: Low, Medium, High. Default is Medium.
2	1	**PTT**	Changes the PTT mode from **Off** -> **Momentary** -> **Latch**. This can also be changed on the **PTT** page by touching the bottom button. This option also controls keying PTT with a hardware PTT switch.
	2	**Theme**	Select the color theme for the selected Map. Options include Dark, Light, Blue, Orange, Green, Red, and Violet.
	3	**Backlight**	Adjusts the backlight. Range: **Low**, **Medium1**, **Medium2**, and **High**. Lower settings reduce current draw on the unit.
3	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 14 microamps. Touch the display to wake up the unit. **NOTE:** If you are powering your **CTR2** controller with a 3.7-volt battery you will need to press and hold the **M5** button on the orange ring for > 10 seconds to wake the controller up from sleep mode.

4	**1**	**# Knobs**	Selects the number of external knobs your unit is equipped with. (One and two knob configurations cannot be detected in the firmware.) For **CTR2-Uno**, **CTR2-Duo**, (and older **CTR2-Flex** and **CTR2-Dial** hardware) you have the following options: **None**, **One, Two**, or **Swap A/B** (for two knob units) • When this firmware is running on **CTR2-Dial** hardware the paddle jack is only available in the **None** and **One** options. **CTR2-Quad** hardware is automatically detected and this setting is fixed to **# Knobs: Four**
	2	**Knob/Knob A Or SW1 Setup**	On **CTR2-Uno**, **CTR2-Duo**, (and older **CTR2-Flex** and **CTR2-Dial** hardware) this option selects either Normal or Reverse direction for *Knob A*. The default is **Normal**. On **CTR2-Quad** this option toggles the PTT setting of pushbutton #1. When PTT is enabled, you can use this switch instead of the virtual PTT page or an external PTT switch to key your radio. **NOTE:** Toggling this setting resets any button switch actions that were assigned in the **Buttons** menu.
4	**3**	**Knob B Or SW2 Setup**	On **CTR2-Duo**, (and older **CTR2-Flex** and **CTR2-Dial** dual-knob hardware) this option selects either Normal or Reverse direction for *Knob B*. The default is **Normal**. This option is not available on single knob units. On **CTR2-Quad** this option toggles the PTT setting of pushbutton #2. When PTT is enabled, you can use this switch instead of the virtual PTT page or an external PTT switch to key your radio. **NOTE:** Toggling this setting resets any button switch actions that were assigned in the **Buttons** menu.
5	**1**	**(Keyer) Type**	Selects the internal *keyer type*. Options are **OFF**, **Straight**, **PassThru**, **Iambic A**, **Iambic B**, **Ultimatic**, and **Bug** – *does not change radio keyer*. Use **Passthru** for external keyers or PTT switches. Set to **OFF** to use the radio's keyer. **NOTE: CTR2-Quad** units have a separate *Key/PTT* input jack so there is no need to set the keyer to **Passthru** on these units.
	2	**Pitch**	Selects the sidetone frequency for the sidetone oscillator in **CTR2** units with sidetone capabilities. This option has no effect on older **CTR2-Dial** hardware. Frequency range is from **500 Hz** to **1000 Hz** in 50 Hz steps. To turn off the sidetone, turn the volume control fully CCW. **NOTE:** This setting also affects the radio's audio bandpass filter in CW mode.
	3	**Paddles**	Select **Normal** or **Reverse** paddle wiring

6	**1**	**Fav Mode**	Switches the Favorite Frequency list between all bands and the selected band
	2	**Xvtr Mode**	Indicates whether transverter mode is On or Off. Transverter mode is automatically enabled when **XVTA** or **XVTB** are selected in the dashboard's **Ant** menu. When transverter mode is enabled 2m, 1.25m, 70cm, 33cm, and 23cm bands are added to the **Band** menu and the frequency display is slightly compressed to display the additional digits.
	3	**WiFi Profile**	This option allows you select one of three WiFi configurations. This is useful when you have more than one WiFi network that you use your **CTR2** controller on. Profiles are numbered 1, 2, 3.
7	**1**	**Connect/ Disconnect WiFi/CTR2 Relay Online**	Connects or disconnects WiFi. You must have the router's SSID and password and the radio's IP address and IP port # set before connecting to the radio. If the unit is connected to AetherSDR's **CTR2 Relay**, *CTR2 Relay Online* will be displayed here.
	2	**SSID**	Set router's SSID. Touch to open the screen editor or use a terminal program connected to **CTR2-Dial** to set the SSID.
	3	**PW**	Set router's password. Touch to open a screen editor or use a terminal program connected to **CTR2-Dial** to set the password.
8	**1**	**AutoConnect**	Enable or disable WiFi auto connect. When enabled **CTR2-Dial** will try to connect to the WiFi network when it is first powered up. *You can override this setting by pressing and holding the **M5** button during boot.*
	2	**Flex Adrs**	Set the radio's IP Address. Touch to open the screen editor or use a terminal program connected to **CTR2-Dial** to set the IP address. The address can be found in the *Settings -> Radio Setup… ->Network* tab in SmartSDR.
8	**3**	**Flex Port**	Set the radio's IP Port. Touch to open the screen editor or use a terminal program connected to **CTR2-Dial** to set the IP port #. This is normally **4992** but you can change if you're changed it on the radio or are connecting to the radio from outside your LAN.
9	**1**	**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.
	2	**Export Settings**	Backup **CTR2-Dial'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.

9	**3**	**Info**	Displays version #, call sign, and registration key. If the unit is connected to WiFi the RSSI is displayed too.
10	**1**	**Ring Mode**	Selects the operating mode of the gray ring on the display. See Ring Control Options for a complete discussion on *Ring* modes.
	2	**Rotate Screen**	Rotates the screen 90 degrees for each selection. This allows the screen to be aligned for various M5Dial mounting configurations.
	3	**Touch Delay**	Enables or disables a 120-millisecond delay on touch input. This can be used to reduce unintended touch events and occasional randomly generated touch events from the M5Dial touch sensor.
11	**1**	**Run CTR2-Dial**	Select this option to switch to **CTR2-Dial** firmware on your unit. **CTR2-Dial** 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. For more information on **CTR2-Dial** refer to the *CTR2-Dial Operation Manual*.
	2	**Restore to Start Up**	This option allows you to reset your settings to what they were when you first booted **CTR2-Dial**, *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.
11	**3**	**Demo Mode: Edit Call & Key** **Normal Mode: Reset to Factory**	**In Demo Mode:** This option allows you to enter your call and registration key without using a terminal program. To enter text, use the ring encoder on the M5Dial or turn Knob A to select a character and touch the display or press and turn Knob A to move to the next character. Press **OK** to accept. You can also connect a terminal program and use the terminal keyboard to enter your call and registration key. **In Normal Mode:** This option resets **CTR2-Dial'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

Flex mode includes a second method to control the radio called the **Dashboard**. To enter this mode, select **DashBrd** 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 caption indicates that **CTR2-Dial** is connected to WiFi and to the radio.

When online the caption will display the active slice. 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 *long-pressing* any of the frequency digits. Unlock the VFO using the same method.

The VFO frequency is always selected on the **Home** page as shown here. Turning the knob assigned to **<DAIL>** changes the frequency by the selected step digit (the red digit, 1 kHz in this example). You can change the step simply by *double-touching* another digit in the frequency or by pressing and holding **knob A** then turning it CW or CCW. To select the ½ step (5, 50, 500, 5000, etc.) using the touch method, touch the selected step digit again.

Knob Control

The selected parameter in the Dashboard can be adjusted by either swipe method (explained next), or by turning any knob assigned to the **<DIAL>** function in the **Knob** or **Controls** menu.

To use the knob on a **CTR2-Uno** (and older single-knob **CTR2-Flex** or **CTR2-Dial**) hardware, the knob must be set to **<DIAL>** in the **Knob** menu. On **CTR2-Duo** (and older dual-knob **CTR2-Flex** and **CTR2-Dial**) hardware, **Knob A** is generally used as the dashboard parameter control knob, unless you've changed its default setting from **<DIAL>** in the **Knob A menu**. On dual-encoder units, **Knob B** can be set to **<DIAL>** in the **Knob B menu** and used as a dashboard parameter control knob.

On **CTR2-Quad** hardware, any knob can be assigned to the **<DIAL>** function in the **Controls** menu and then be used to control a Dashboard parameters.

Swipe Method

When you touch an adjustable parameter in the dashboard, the selection indicator around the that parameter turns red indicating that swipe adjustment is enabled. To change the parameter's value, simply swipe your finger to the *left* or to the *right* anywhere on the display.

On the Dashboard's **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, double-touch the **Zero** button on the bottom of the page.

NOTE: If the VFO is locked (by long-pressing the VFO frequency digits), all frequency digits will be "grayed out" and the **Zero** function will be blocked. To unlock the VFO, long-press the frequency digits.

To return to the controller's **Home** page, press the **M5** button on the M5Dial's orange ring.

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

Keypad Frequency Entry



Flex mode has a built-in keypad for direct frequency entry. To open the keypad, press **Frq** on the left side of the bottom button on the Dashboard's **Home** page.

The current frequency will be displayed on the top of the display in Hertz with the keypad below.

You can edit the current frequency by pressing the **<** button to delete digits and replacing them with new digits. In this mode you must enter all digits to 1 Hz and press the **H** button to accept the new frequency in Hz. Be sure to add any trailing 0s needed.

To enter a new frequency, touch **x** or enter a digit to clear the current frequency and enter the new frequency. You can enter the frequency in MHz, kHz, or Hz. Once you've entered the new frequency press the **M**(Hz), **K**(Hz), or **H**(z) button to accept it. Use the **<** button to delete the last digit in the frequency.

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 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.

NOTE: If the VFO is locked (by long-pressing the VFO frequency digits), this page is not available. Unlock the VFO by long-pressing the frequency digits.

Antenna Menu



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

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

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

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

Band Menu

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** menu.

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 long-pressing the frequency digits.

Filter Menu



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

On this menu 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 (**3.3k**) 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 (40 Hz in this example) the **Zero** button is 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. Swipe mode automatically turns off after 3 seconds of inactivity. Touching an unselected control selects it. Touch it again to enable swipe.

RX Menu



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

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

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

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

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

Mode Menu



The **Mode** menu (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** to return without changing the mode.

DSP Menu



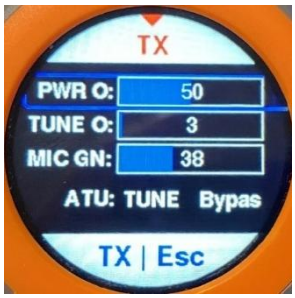
The DSP menu allows you to adjust and enable or disable each DSP setting on the radio.

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** on the bottom button to return to the dashboard's **Home** page.

TX Menu



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

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

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

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

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

You can also open the **Buttons** menu to change **TX** mode on the radio. If you use it a lot you can assign the **Tx Enbl** button on the **Buttons** menu (or Controls switch menu in **CTR2-Quad**) to one of the knob switches.

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

X/RIT Menu



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

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

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

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

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

NOTE: If the VFO is locked this page is not available. Unlock the VFO by long-pressing the frequency digits.

MISC Menus

The **Misc** menu contains several sub-menus. These menus include the **Keyer Settings**, **CW Macro Selection**, **Panadapt1/Slice Settings**, and **Panadapt2** menus.

Touch **PG>** on the bottom button (if available) or turn the gray ring on the M5Dial to move to the next page.

These menus will be described next.

Keyer Setting Menu



The keyer's settings can be changed in this menu. As in the other dashboard menus you either use the knob assigned to **<DIAL>** or touch to select a parameter then use the swipe method to change its value. Changing the **Speed** setting changes the speed for both the internal keyer on the radio and the keyer in **CTR2-Dial's Flex** mode.

NOTE: The radio's keyer is disabled when a **CTR2** keyer is selected. To release this override so you can use your radio's keyer, set the keyer **Type** to **OFF** on this menu, or on page 5 of the **Settings** menu.

The radio's sidetone can be enabled or disabled by touching the **SdTone** label or the **Tgl** label on the bottom button. This sidetone is only generated when you connect paddles directly to the radio. There is a physical volume control on **CTR2-Dial** hardware to adjust its sidetone volume.

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

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

A 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 touching the **Chng** label on the bottom button or by pressing the **Type** label again once it is selected.

When **SdTone** and **Type** are not selected, touch **Pg>** on the bottom button to open the **Panadapter/Slice** page. You can also turn the gray ring on the M5Dial CW to move to the next or previous page if the **Ring mode** is not in **Sync2Dial** or **Selected Control**.

Marco Select Menu



This menu 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 menu and let it run.

Touch **Pg>** on the bottom button or turn the gray ring on the M5Dial CW to open the **Panadapter/Slice Settings** menu or turn it CCW to open the **Keyer Settings** menu.

Touch **Esc** on the bottom button or the **M5** button on the orange ring to return to the Dashboard's **Home** page.

Macro Edit Menu



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

- Turn the knob assigned to **<DIAL>** to change the selected character
- Touch the screen to move the cursor to that location
- The **^** character is used to 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 **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 Menu



The **Panadpt1/Slice** menu allows you to change the ranges used on the panadapter and select which slice you want **Flex** mode to control.

You can access this page directly from the Dashboard's **Home** page by touching the caption of the **Home** page.

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

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

To move to the **Panadpt2** page touch the **Pg>** button or turn the gray ring on the M5Dial CW. To move back to the **Macro Sel** page, turn the gray ring CCW. You can also use the gray ring on the M5Dial.

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

Panadpt2 Menu



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

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

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

Favorite Frequency Menu



Access the **Favorite Frequency** menu by pressing **Fav** on either the Keypad or Band page. This menu displays the last 10 frequencies that you have visited.

In the **Settings** menu you can select to save frequencies from all bands to one list (shown in this screenshot) or you can have a favorite frequency list for each band.

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

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

Touching any frequency bin will highlight that bin and automatically tune the radio to that frequency and mode (if **Flex** mode 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 or press **Esc** to return to the Dashboard's **Home** page.

Backing Up and Restoring your Settings

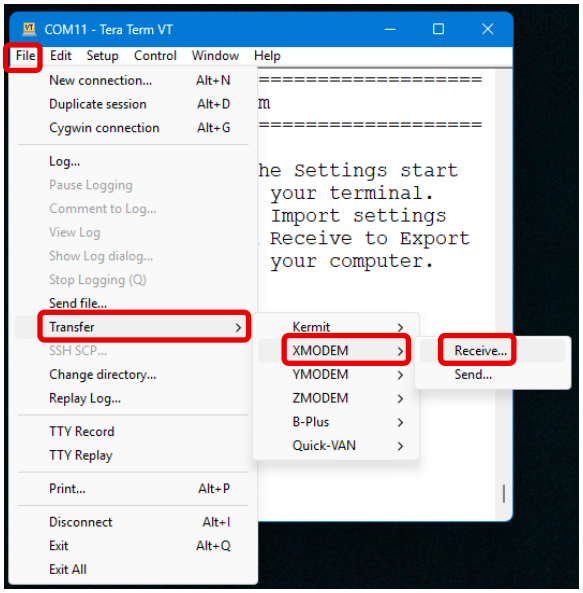


Once you have your **CTR2-Dial's Flex** mode setup the way you want it, go to the **Settings** page and **Export** your settings to a backup file on your computer.

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

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

Export Settings



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

When you select this option, Tera Term will ask you to enter the file name for the file you want to save. Navigate to the folder you want to save your data in and give your file 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.

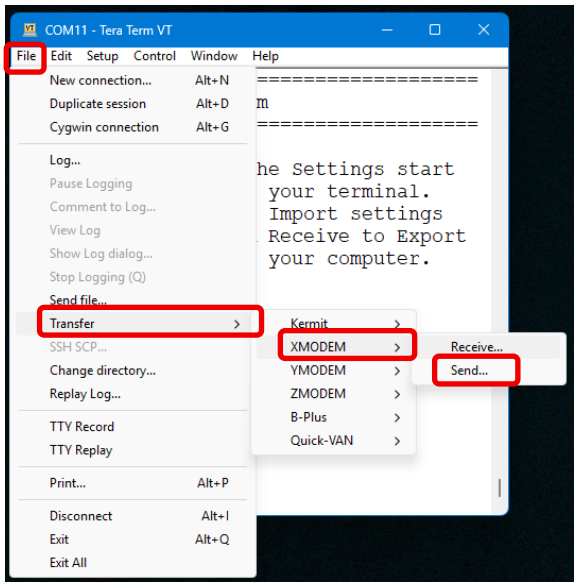
You can select whether to send just the basic configuration of you unit, or a full system backup that includes all of the radio and frequency information.

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

Import Settings

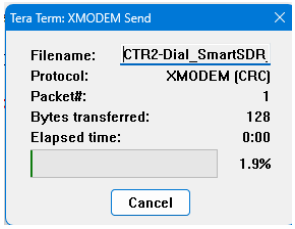
Now that you have a backup file of your settings (or have downloaded a **.CTR2** configuration file from the Lynovation web site) you can import it using the **Import Settings** option.

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 **.CTR2** file from the CTR2-Dial Configuration File zip file. Tera Term will then open the file transfer window and transfer the file.



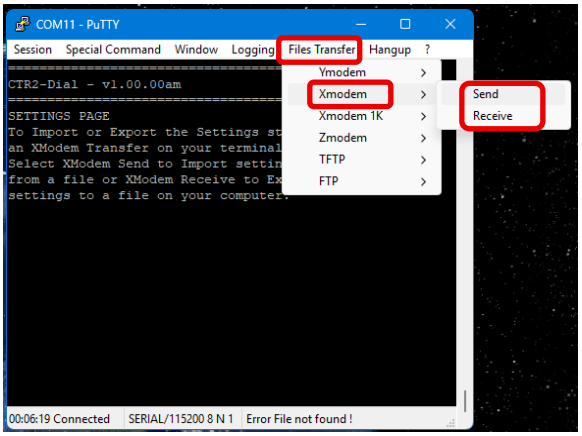
HINT: You can use the export and import settings functions to save and reload multiple versions of your settings.

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



Using ExtraPutty

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



Flex Radio CW Zombie Mode

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

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

Appendix A: Installing or Updating CTR2-Dial Firmware

CTR2-Dial firmware is pre-installed on assembled **CTR2** units supplied with the M5Dial controller.

CTR2-Dial firmware is distributed as a single BIN file. This simplifies the installation process and reduces the possibilities of entering the wrong offset address for individual BIN files. The address of the single BIN file always starts at **0x0**. Instructions for switching between the two firmwares can be found here.

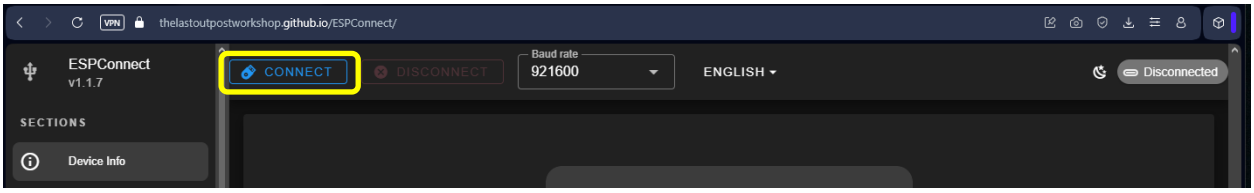
Before you begin, download the latest **CTR2-Dial** firmware from my web site. Unzip the firmware distribution zip file into a folder.

Installing Firmware using ESPConnect (New Method)

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

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

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



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

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

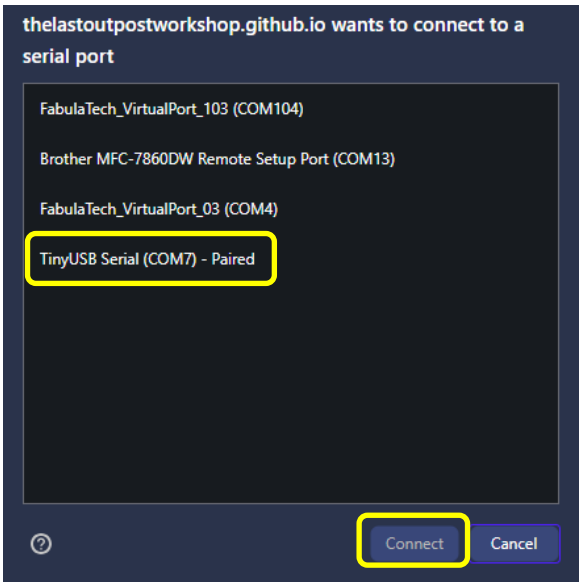
Click the **Connect** button.

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

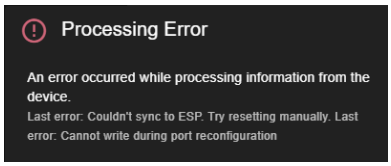
On a Windows PCs, all **CTR2** units will be shown as a **TinyUSB Serial** device, as shown here.

On Macs, **CTR2** units based on the M5Dial will be listed as an **M5STACK_DIAL** device.

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



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



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

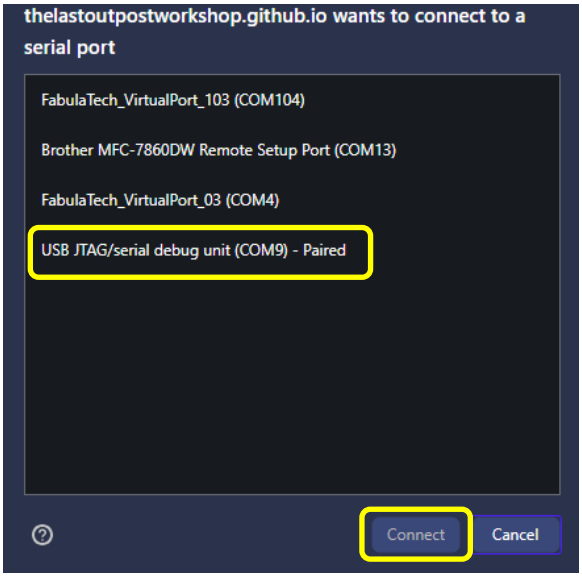
Do not cycle the power on CTR2. Click the **Connect** button on the home page again.

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

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

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

NOTE: Apparently, not all ESP32-S3 processors will enable the **USB JTAG** port automatically. If your's doesn't, you'll need to open the enclosure an press the **Programming** button on the back of the M5Dial.



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

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

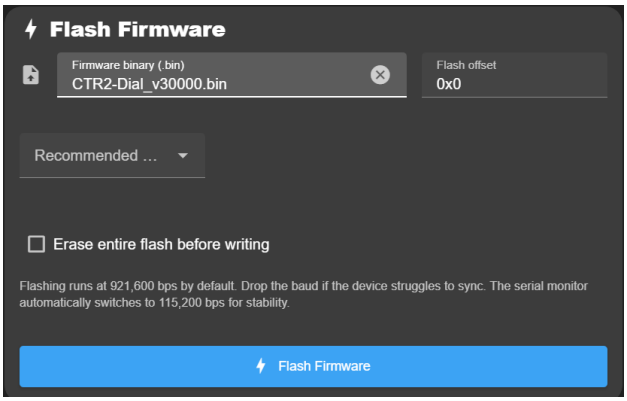
Click on the **Flash Tools** menu item and scroll down to the **Flash Firmware** section.

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



A file navigation screen will appear. Navigate to where you unzipped the firmware zip file from the firmware update page and click on the **CTR2-Dial_v3xxxx.bin** file.

Your display should now look like this:



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

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

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

This completes the firmware update process.

Re-entering you Call Sign and Registration key

If you clicked the **Erase entire flash before writing** button, you'll erase your call and registration key and your unit will start in Demo mode. You'll need to enter your call sign and registration key before configuring your unit. Your call and registration key are written on the label on the bottom of the unit. It's also included on the original confirmation email I sent when you ordered your unit. You can contact me if you can't find it.

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 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. *The registration key is 8 hexadecimal digits (0 to 9 and A to F).*
2. Use the on-screen editor to enter your registration credentials. Select **Enter Call & Key** on the last page in the **Settings** menu. Turn **Knob A** to change the letter and touch the screen (or press and **Next** button) to advance to the next letter position. 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.

Selling your CTR2 Controller

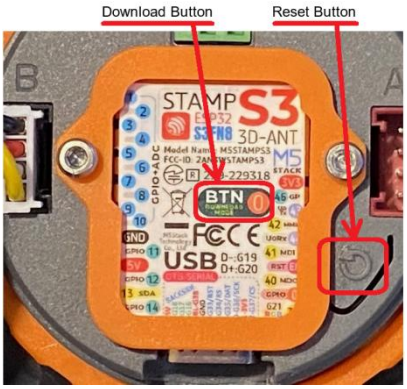
Your registration key is based on your call sign, so it is the same for any **CTR2** controller you own. If you sell your controller, have the new owner contact me for a registration key based on their call.

Installing Firmware using EspressIF Flash Download Tool (Old Method)

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

This section will describe the process of using this tool to update your M5Dial. I highly recommend using **ESPConnect**, described above, instead.

You must force the M5Dial into programming mode before you can flash firmware to it. To do this, follow this procedure

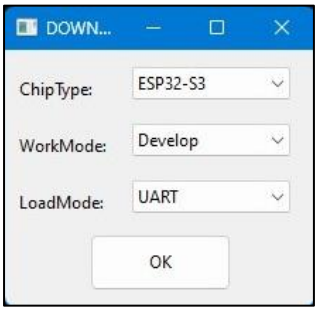


1) Open the enclosure and locate the back of the M5Dail
    a. On 3D printed enclosures remove the four screws holding the base to the shell with a 2mm Allen wrench
    b. On the New Age enclosure remove the four rubber feet on the bottom by pulling them off then remove the four Phillips screws under the feet
2) Press and hold the **DOWNLOAD (BTN)** button on the M5Dial then apply power to **CTR2-Dial**. The display will be blank when the unit boots into programming mode. If the unit is already powered up, press and hold the **DOWNLOAD** button then press and release the **RESET** button. You should hear a beep from your computer as it registers the new USB COM port and the display will be blank.
   NOTE: If you have problems getting the **DOWNLOAD** button to work its lever may have slipped off the button on the board. Remove the label and flick the lever back onto the button. Thanks Joe, KO8V for the tip!
3) You can now use the procedure below with EspressIF Flash Download tool (on Windows) or run the script (on Linux and Mac) with the new COM port to flash the new firmware to the M5Dial.
4) Once the download completes, cycle the power on the unit to start the new firmware.

Now that you have the M5Dial in programming mode, follow these steps to install or update to the latest **CTR2-Dial** firmware:

1. Download and unzip the latest **CTR2-Dial** firmware from **my web site**. Unzip that file into a different folder than where you store other Lynovation firmware update files.

2. Download and open the **EspressIF Flash Downloader Tool**. When it starts, select the **ESP32-S3 Chip Type**. Leave **WorkMode** set to *Develop* and **LoadMode** set to *UART.*

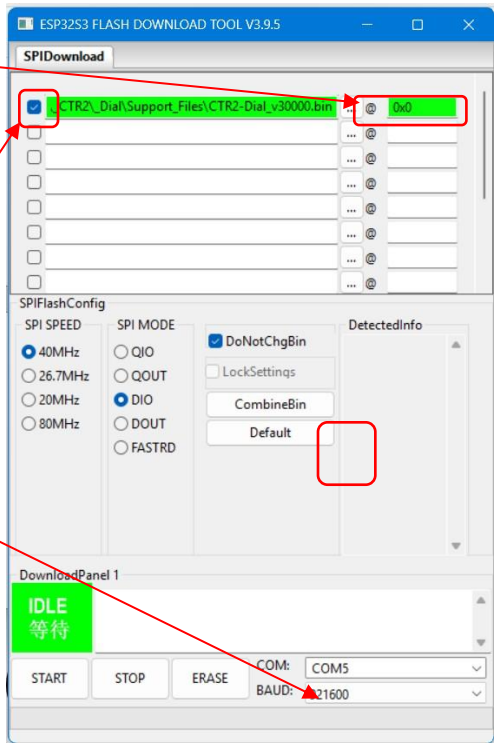


3. Map the **CTR2-Dial.bin** file that you unzipped from the **CTR2-Dial_v3.xx.xx** firmware distribution file into the downloader tool and set the offset address to **0x0**.

4. Select the checkbox on the left of the **CTR2-Dial_vxxxx.bin** filename as shown.

5. Set the **COM:** port to the port assigned to **CTR2-Dial** and set the **Baud:** to 921600.

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



6. On new installs, click the **ERASE** button to clear the factory demo from the M5Dial's memory.

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

7. Click the **START** button to download the firmware.

8. Once the download is complete, cycle the power on the unit to start the new CTR2-Dial firmware.

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

Installing using Linux or Mac

Mac users should use the new method using ESPConnect, described above. **ESPConnect** doesn't run on Linux, so Linux users have no other option other than to follow the procedure below.

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

Instructions for using this script file are include in the CTR2-Micro Operation Manual in **Appendix B**.

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

To use the script file:

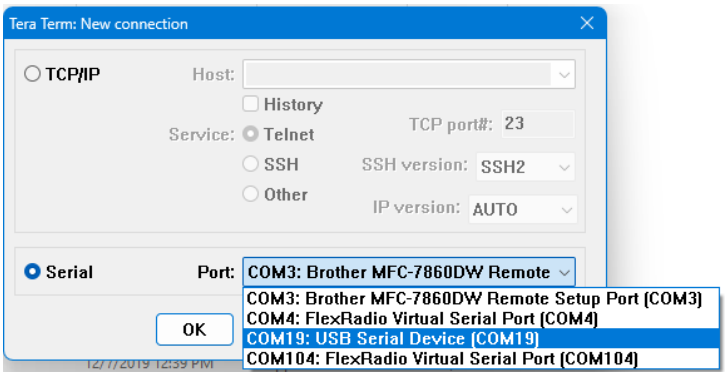
1) Force the M5Dial into programming mode as described above.
2) Edit the COM port in the script to the programming port. This port will be different than the operating COM port.
3) Edit the path to the .BIN file in the script.
4) Run the script.

Appendix B: Configuring Tera Term

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

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

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



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

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

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

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

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

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

Appendix C: Configuring Putty

Putty is a terminal program that can be configured for a variety of needs. **CTR2** controllers based on the M5Dial only supports serial connections. This section describes how to configure the program to interface with **CTR2-Dial**.

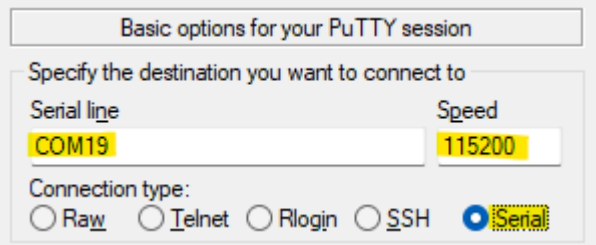
NOTE: Putty does not have XModem transfer capability. If you want to export and import backup files for **CTR2-Dial's** settings, consider using Tera Term or install ExtraPutty.

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

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

Serial Session

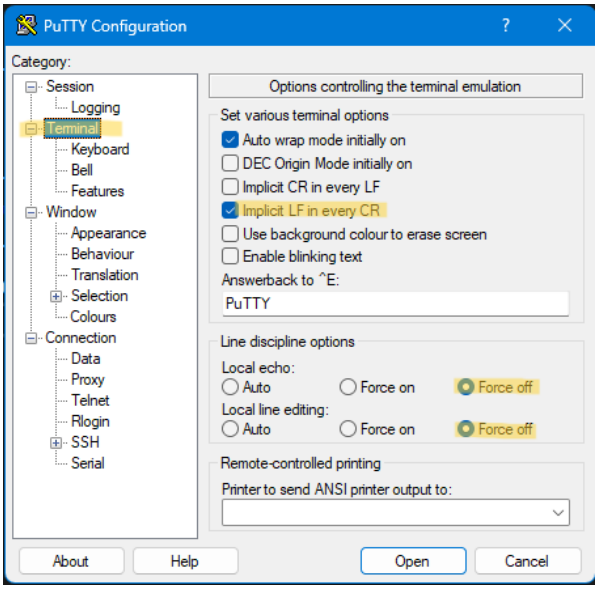
Select **Serial** then set the **Serial Line** to the COM port you found in the Device Manager and set **Speed** (Baud Rate) to 115200.



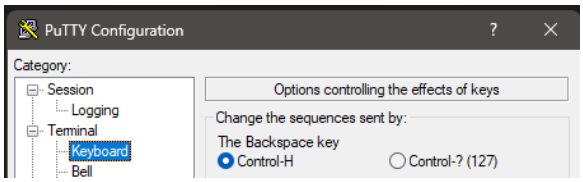
NOTE: Since this is a USB serial port the **Speed** (baud rate) doesn't matter. Data will be sent at USB speeds regardless of the **Speed** setting.

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

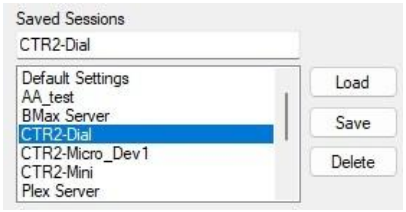
You can change the window size under the **Window** item. Set the **Columns** to at least *41* and the **Rows** to at least *20*.



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



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



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

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

Appendix D: Apple or Linux Terminal Programs

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

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

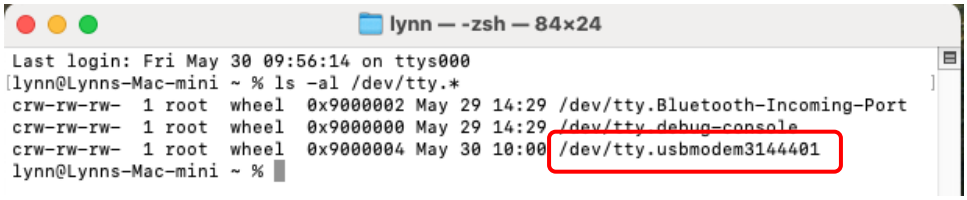
- On the Mac open **Applications/Utilities/Terminal.app**. On Linux open the terminal program supplied by your distro.
- On the Mac, enter ***ls -l /dev/tty.usb****, on Linux, enter ***ls /dev/tty**** This will return a list of all known serial ports.
- Next, plug **CTR2-Dial** into the computer's serial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

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

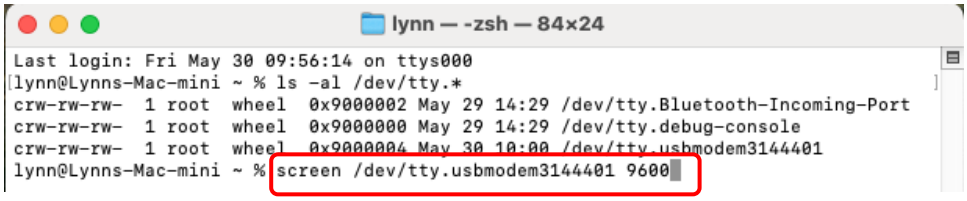
Once you know your **CTR2** unit's USB serial port ID, write it on the label on the bottom of the unit using a fine-tipped permanent marker for future reference. Put a piece of transparent tape over the label to seal the ink so it doesn't rub off (it's not as permanent as you think). You can always remove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

Once you have the serial port ID, enter the following: **screen {serial port ID} 9600**. Include the complete device description (i.e. **/dev/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 #.



3. This is **CTR2-Dial's** terminal display. Press the indicated key to edit each field.



Appendix E: Power Requirements

The approximate current on an M5Dial equipped **CTR2** unit's USB connection is shown below for various configurations. If you've installed the 3.7-volt lithium battery option, these numbers will help you determine the length of time your unit will run on the battery. The M5Dial doesn't have the hardware necessary to monitor the battery's state of change, so you won't know when the battery is about to be depleted.

WiFi Mode	Backlight	Current
On	High	170 mA
	Medium 2	152 mA
	Medium 1	133 mA
	Low	115 mA
Off	High	121 mA
	Medium 2	105 mA
	Medium 1	82 mA
	Low	70 mA

Appendix F: Change Log

Changes applied to older firmware versions are documented here.

v2.05.06: September 30, 2026

- Fixed a bug I injected into v2.05.04 that erased the map name in **MIDI** mode

v2.05.05: 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 **CTR2-Flex** doesn't support
- Removed processing for API *transmit frequency* reply. This is typically the repeater offset frequency and isn't currently used in **CTR2-Flex**. It's only valid during transmit when the controller's turning is blocked.

v2.05.04: September 28, 2026

- Fixed RTTY bug – **CTR2-Flex** was not decoding the RTTY mode from the radio – instead it was staying in CW mode. This caused the frequency to jump when tuning **CTR2-Flex** 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
- Changed the marker for long-press button assignments in the **Buttons** menu from "~" to "+" to make them more visible

v2.05.03: August 17, 2026

- Fixed a bug in **CTR2-Flex** mode that prevented the band map from saving correctly
- Added the profile# to the SSID and Password settings in **CTR2-Flex** mode
- Changed the default **CTR2-Flex** import/export configuration file names from the .TXT extension to the **.CTR2** extension.
- Fixed a bug in **CTR2-Dial** mode that was preventing saving updates from the text editor

v2.05.02c: August 2, 2026 *(Manual updated only)*

- Simplified manual – removed most of the **CTR2-Dial** references – for **CTR2-Dial** firmware, download its manual here.

v2.05.023b: July 17, 2026 (Manual updated only)

- Minor editing changes to manual

v2.05.2a: July 12, 2026

- Changed WiFi Profile from alpha-numeric to numeric notation

v2.05.02: July 5, 2026

- Fixed a bug in that caused all four knobs on CTR2-Quad to control the selected parameter in the Flex Dashboard
- Clarified knob use in the Dashboard

v2.05.01b: May 25, 2026

- Added a note about disabling the keyer override so you can use your radio's keyer instead of the CTR2 keyer

v2.05.01a: April 15, 2026

- Added additional information and a warning about the Paddle/Key/PTT jack's function

v2.05.01: March 17, 2026

- Fix bug in that blocked saving the # of knobs in older CTR2-Dial hardware
- Fixed bug that caused the unit to toggle between CTR2-Dial and CTR2-Flex firmware when waking a unit up that is running on battery
- Fixed bug that was blocking knob A from moving the cursor in the text editor
- Added **TUNEtgl** to **CTR2-Flex's** Button menu. This action will key the radio in tune mode for tuning external tuners. Press button to toggle on/off.
- Added a button function table to the **Button** menu
- Added a Quick Start Guide to this manual

v2.05.00: March 4, 2026

- Updated the information in Import Settings section
- No changes to the **CTR2-Flex** firmware.
- Several changes were made in **CTR2-Dial** firmware. See the CTR2-Dial firmware manual for those updates.

v2.04.01: February 12, 2026

- Updated Appendix A: Installing or Updating CTR2-Flex Firmware to include ESPConnect as the primary method to flash firmware to the M5Dial on PCs and Macs (sorry, not Linux).
- Fixed the text editor page so pressing and turning knob A moves the editor cursor – previously it was executing the function assigned to knob A's switch.
- Removed the second page of Dial functions for the **Uno's Knob** menu. Only 6 functions are available for the knob now.
- Extensive changes were made to **CTR2-Dial** firmware. It it's firmware manual for details.

v2.04.00a: January 30, 2026

- Revised this manual to focus on **CTR2-Flex** firmware. Hardware references have been moved to the **CTR2-Uno**, **CTR2-Duo**, and **CTR2-Quad** hardware manuals. Click the links to open these manuals.
- A new **configuration repository** has been added for **CTR2-Dial** users. to the Lynovation web site under Download -> Configuration Files. The **CTR2-Flex** is pre-configured and doesn't require user configuration, other than setting the WiFi credentials and radio IP address, as covered here.
- **CTR2-Dial** firmware is covered under a separate manual. This manual can be found here.
- The following new features have been added to this version:

- Support for **CTR2-Quad's** four knobs, two pushbuttons, and separate input jacks for paddles and key/PTT
- Added Ring: Fine-Tune mode to the **Settings** menu
- Support for three WiFi profiles for users that use their controllers on more than one WiFi network
- Added the option to export just your unit's basic settings or its basic settings and all of your favorite frequency lists. Export just the basic settings when sharing your unit's configuration with others.

v2.03.06: December 26, 2025

- Additional work on paddle debouncing to eliminate random code elements

v2.03.05: November 10, 2025

- Firmware is now released as a single .BIN file instead of four .BIN files
- Added information on switching between CTR2-Flex and CTR2-Dial firmware modes
- Added paddle release debounce to fix issues with cheaper paddles adding extra code elements
- Improved keyer Bug mode so it works properly now
- Fixed several bugs in the Export and Import Settings functions

v2.03.04: October 9, 2025

- Fixed a bug that caused Dial/Flex modes to switch when running unit on lithium batteries
- Fixed a bug that caused the frequency display to appear whenever a VFO knob is turned
- Added CW Macros 1 to 5 and Macro Stop to Flex mode's Button menu
- Removed Keyer Weight in Flex mode (not used) – replaced with Sidetone Pitch control

v2.03.03: September 16, 2025

- Added Touch Delay On/Off to **Setting** menu to enable or disable the 120-millisecond delay on touch events that was added in v2.03.02
- Display selected Rx antenna on the dashboard home page

v2.03.02: September 10, 2025

- Added 120 mSec debounce to screen touch – Some M5Dials send random touch events
- NOTE: v2.02.01 was released for one day but had bugs in the debounce code

v2.03.00: September 4, 2025

- **Fixed major bug causing radio to reset when disconnecting CTR2-Flex from WiFi**
- Added option to save favorite frequencies per band or for all bands
- Added Edit Call & Key option to Setting menu – allows you to enter your registration credentials without a terminal program

v2.02.00: August 18, 2025

- Added **Ring Control** options – you can now assign a dial function to the gray ring encoder on the display
- Removed the **Mono** option on the **Dial** menu and replaced it with **LnO-Gn** (Lineout Gain) to set external speaker drive.

- Documented how to set up you CTR2-Flex to use an external keyer and/or hardware PTT switch on the Paddle Input jack.
- Added a VFO Lock option

v2.01.01: August 10, 2025

- You can now choose if you want to reset your call and registration key in the Reset to Factory option.

v2.01.00: August 7, 2025

- Added extended frequency support for transverters. Selecting **XVTA** or **XVTB** on the Antenna page in the dashboard adds 2m, 1.25m, 70cm, 33cm, and 23cm bands to the Band page.
- Fixed a bug that was causing unpredictable control states on radios with **multiFlex** enabled.
- Removed the **Knob A** double-click to toggle the radios' TX mode and now allow the switch on **Knob A** (and **Knob B** on dual-encoder units) to be assigned to execute any **Button** function.
- Rearranged the Antenna, Band, and Mode pages in the dashboard.
- Added a new link to download Tera Term. Get it from the CTR2 Group IO File folder here.

v2.00.00: July 24, 2025

- Combined CTR2-Dial firmware with CTR2-Flex firmware
    - Firmwares are independent of each other
    - If you migrate from CTR2-Dial v1 to CTR2-Flex v2 firmware your settings from CTR2-Dial v1 will be applied to CTR2-Dial v2 and be available when you switch to CTR2-Dial mode
    - This manual covers the CTR2-Flex firmware – see the CTR2-Dial Operation Manual for CTR2-Dial firmware information
    - Select which firmware to run in the **Settings** menu
    - This firmware is compatible with both CTR2-Dial and CTR2-Flex hardware
    - Added toggle **TX** control of the current slice to the CTR2-Flex **Dashboard – Tx** page

v1.01.00 – July 21, 2025

- Added additional information to Appendix A on preparing CTR2-Flex to flash firmware

v1.01.00 – June 28, 2025

- Added Favorite Frequency page to Keypad and Band pages
- Start on WiFi Connect when starting without WiFi AutoConnect enabled
- Bumped v1.00.09 to v1.01.00 since Favorite Freq is a feature addition

v1.00.08 – June 16, 2025

- Added formatted frequency display to Dial VFO control
- Added double-click to toggle TX enable mode on/off
- Darkened Orange and Green theme colors for better contrast

v1.00.07 – June 9, 2025

- Added **Panadapter Page 2** to the **Misc** pages to add controls for the panadapter and waterfall – these are also included in the virtual **Dial** menu
    - Added **Average**, **Gain**, and **Black** level controls
    - Added **Weighted Average** and **Auto-Black** buttons

- Added a **Mute** function to the **Volume** control

v1.00.06 – June 4, 2025

- Added a Breakin button to the Keyer menu to control breakin mode
- Caption now shows if transmit is blocked because TX is not enabled or keyer is not in breakin mode
- Bug fix: not saving radio settings when changing slices

v1.00.05 – June 3, 2025

- Don't force keyer mode on radio to Straight if not in CW mode or TX is not enabled

v1.00.04 – June 1, 2025

- Fixed bug that was causing multiple controllers to follow the frequency of the slice that had Tx enabled
- Added **Tx Enable** control to enable Tx in the selected slice
    - Added **Tx Enbl** to page 4 of the **Buttons** menu
    - Press and release **Knob A** to toggle **Tx Enable** on any screen
    - The screen caption text turns red when TX is enabled

v1.00.03a – May 30, 2025

- Added Appendix D with information on using the **screen** command in Mac and Linux for a terminal interface

v1.00.03 – May 23, 2025

- Fixed bug in reverse Knob A/B so press & turn Knob A changes frequency step
- Display selected slice as caption in Dashboard Home page
    - Touch Dash Home page caption to open Panadapter page to change selected slice
- The parameter values now follow changes made in SmartSDR

v1.00.02 - May 18, 2025

- Fixed bug in v1.00.01 that was blocking WiFi connection

v1.00.01 –May 17, 2025

- Fixed bug in Dashboard Panadapter controls – swipe to change wasn't working

v1.00.00 – May 15, 2025

- Fixed bugs with **Swap A/B** option when using it on CTR2-Dial hardware

v1.00.00aq – May 10, 2025

- Allow Knob B to change knob functions in the **Knob** menu.
- Added hint on getting to Programming Mode

v1.00.00ao/ap – May 3, 2025

- Added Backspace key to start registration entry and added note about DEL key mapping in Putty
- Automatically enable swipe tuning when selecting a frequency digit in the **Dashboard** Home page.
- Added double-touch to turn on swipe adjustment mode on **Dashboard** pages to accept swipe actions

- Added [Knobs: Swap A/B] option

v1.00.00am – May 1, 2025

- Added left/right swipe to the **Dial** control and the **Dial, Knob**, and **Buttons** menus to switch between pages.

v1.00.00al – April 28, 2025

- Updated all control graphics to match new control graphics in CTR2-Dial
- All controls are now speed sensitive
- Added a new keypad for direct frequency entry to the Dashboard

v1.00.00ae - March 30, 2025

- Added on-screen editing for WiFi SSID, password, radio IP address and IP port
- Display virtual dial when changing settings in dashboard
- Moved dashboard Keyer page in front of Macro Select page
- Can use encoder to select keyer macro to edit – turn to change, press to edit
- Added an **Info** button to the **Settings** menu. It displays version #, call, and registration key

v.1.00.00ac – March 11, 2025

- Added touch & hold to dashboard VFO to unselect it so knob can be used for other settings

v1.00.00aa – March 9, 2025

- Added a new Filter page to the dashboard
- Swapped bandwidth and mode button locations on Dash Home page

v1.00.00 – March 5, 2025 – Initial Alpha Release

- First alpha release on CTR2 user group