ZUMRadio

M5Stack smart CAT/CIV display

The M5Stack smart CAT/CIV display that is Bluetooth connected to, and displays in real-time the current information from your Icom and Yaesu radios. It currently supports the Icom IC-7100, IC-7300, IC-9700 and IC-705 radios. It also supports the Yaesu FT-710, FT-991 and FT-DX10 radios.

It displays information such as the tuned frequency, mode, filters, S/SWR/ALC/COMP/ID/VD/PO meters as well as several other concurrent settings.

The display and software are designed to allow for easy future firmware upgrades.

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M5Stack Smart CAT-CIV Display specifications:

- M5Stack Basic Core module
- 2.0 inch LCD screen
- 110mAh battery
- Supports with the Icom IC-7100, IC-7300, IC-9700 and IC-705 radios
- Supports the Yaesu FT-710, FT-991 and FT-DX10 radios
- Displays real time information including:
    - tuned frequency
    - mode
    - filters
    - S/SWR/ALC/COMP/ID/VD/PO meters
- Icom IC-705 is supported via Bluetooth built into the radio
- Other Icom and Yaesu radios are supported via separate purchase Bluetooth adapters

Kit includes:

- M5Stack Smart CAT-CIV display and stand
- 5V-3A USB-C power supply
- USB-C firmware programming cable
- 1 Year Warranty

Software libraries used:

The M5Stack Smart CAT-CIV Display uses portions of two open-source projects. License information can be found at the links below.

- **FreeType Project**
    - o Portions of this software are copyright © 2022 The FreeType Project (www.freetype.org). All rights reserved. (https://gitlab.freedesktop.org/freetype/freetype/-/blob/master/docs/FTL.TXT)
- **LZ4 Library**
    - o Copyright (c) 2011-2020, Yann Collet All rights reserved. (https://github.com/lz4/lz4/blob/dev/lib/LICENSE)
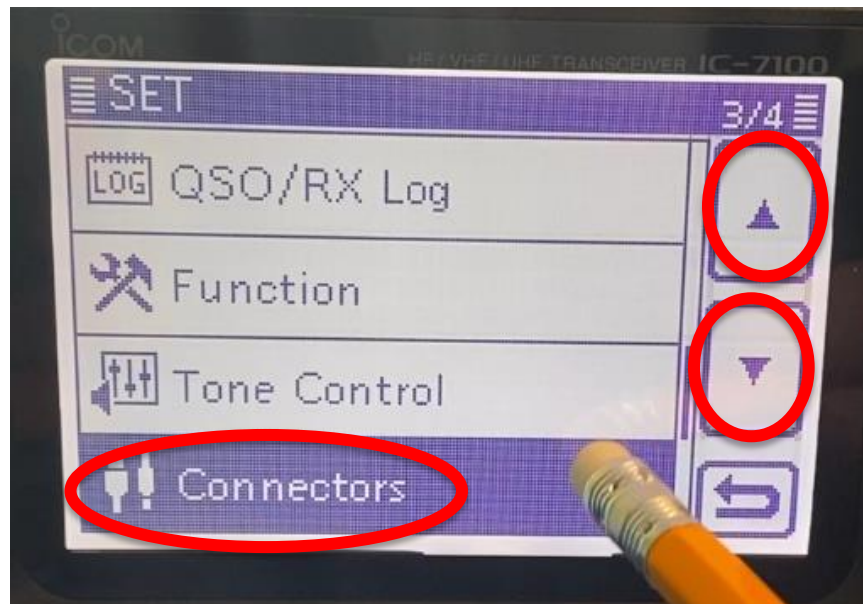
Radio setup:
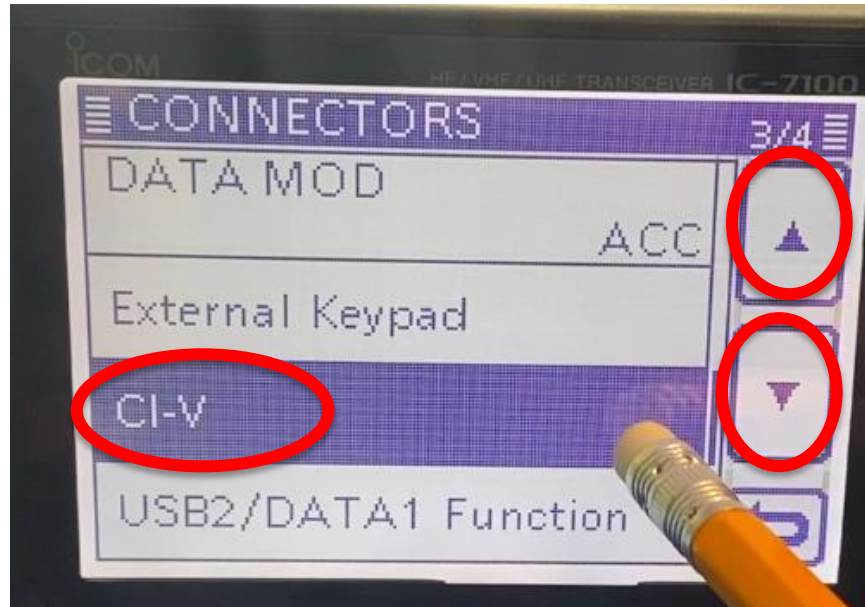
Icom IC-7100 setup:

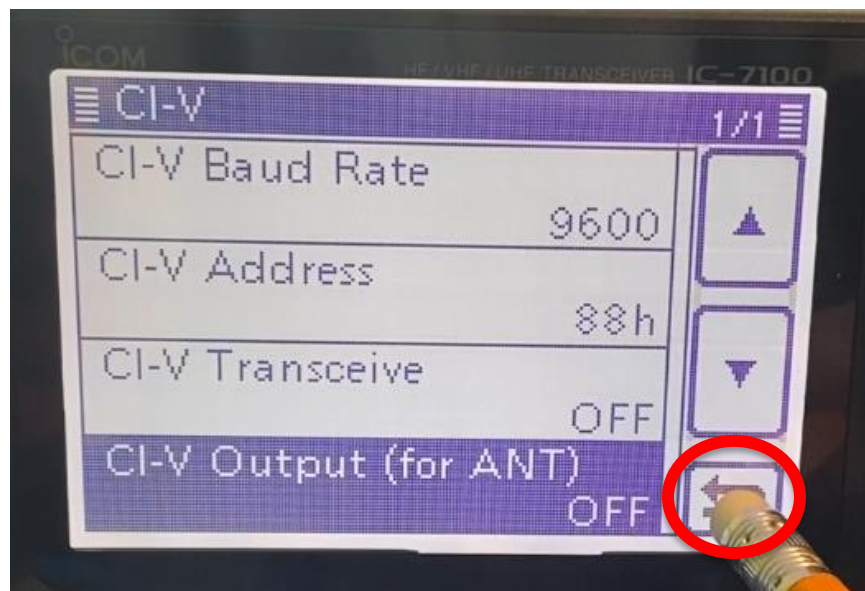Press the "**SET**" button to enter the configuration menus.

Use the **UP** and **DOWN** arrows to scroll through the options and then press the "**Connectors**" button.

Use the **UP** and **DOWN** arrows to scroll through the options and then press the "**CI-V**" button.

Ensure the "**Baud Rate**" is set to **9600**, the "**Address**" is set to **88h** and the "**Transceive**" is set to "**OFF**". Press the back button a number of times to return to the radio main screen.

Ensure power is turned off to the radio. Next, connect the BT-7100/7300 Bluetooth adapter to the back of the IC-7100 radio as shown in this image.

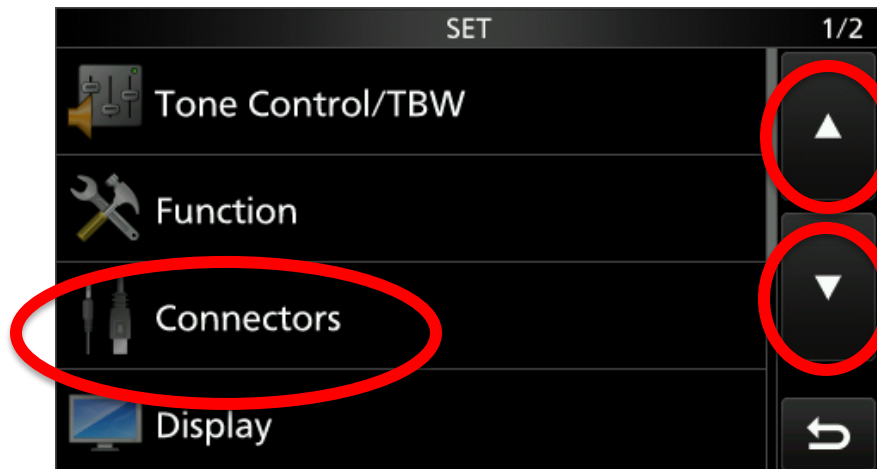You can watch a YouTube video showing the same steps here:
https://youtu.be/T5bGWe-m2nY

Icom IC-7300 setup:

Press the "**MENU**" button on the front of the radio.

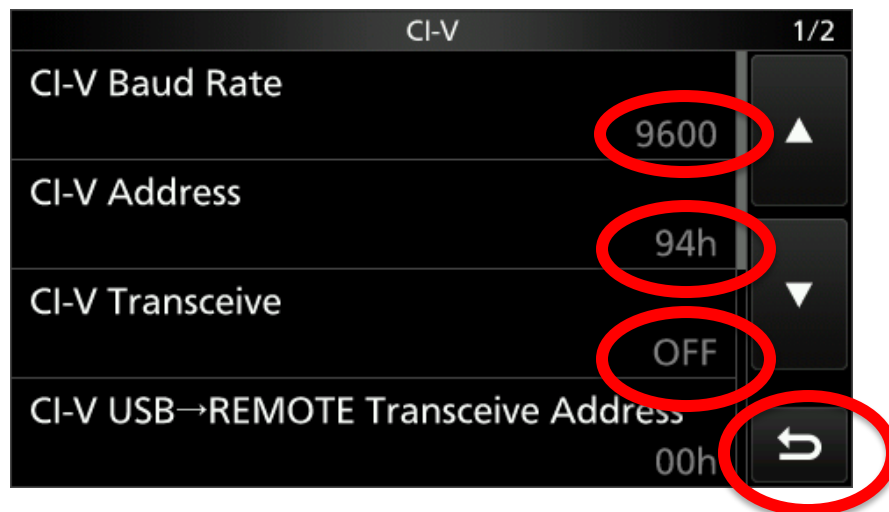Next, press the "**SET**" button.

Use the **UP** and **DOWN** arrows to scroll through the options and then press the "**Connectors**" button.

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Use the **UP** and **DOWN** arrows to scroll through the options and then press the "**CI-V**" button.
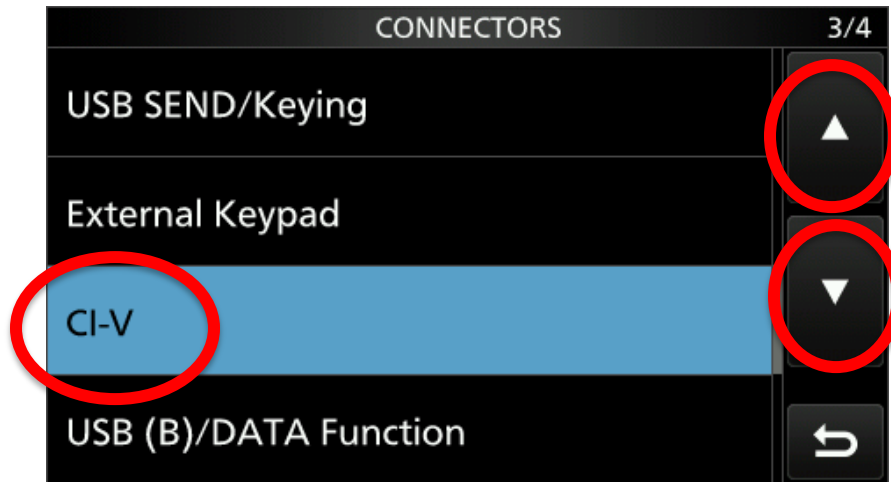
Ensure the "**Baud Rate**" is set to **9600**, the "**Address**" is set to **94h** and "**CI-V Transceive**" is set to "**OFF**". Press the back button a number of times to return to the radio main screen.

Ensure power is turned off to the radio. Next, connect the BT-7100/7300 Bluetooth adapter to the back of the IC-7300 radio as shown in this image.

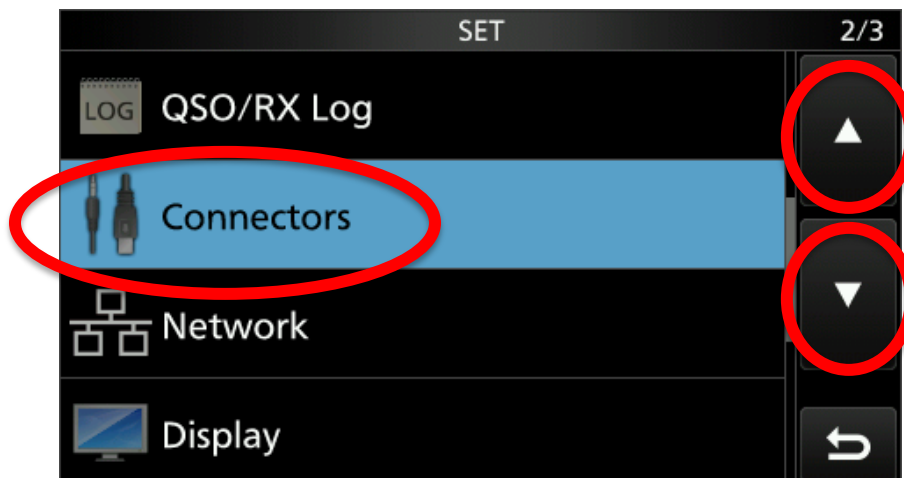You can watch a YouTube video showing the same steps here:
https://youtu.be/mk3XrnPRTdI

Icom IC-9700 setup:

Press the "**MENU**" button on the front of the radio.
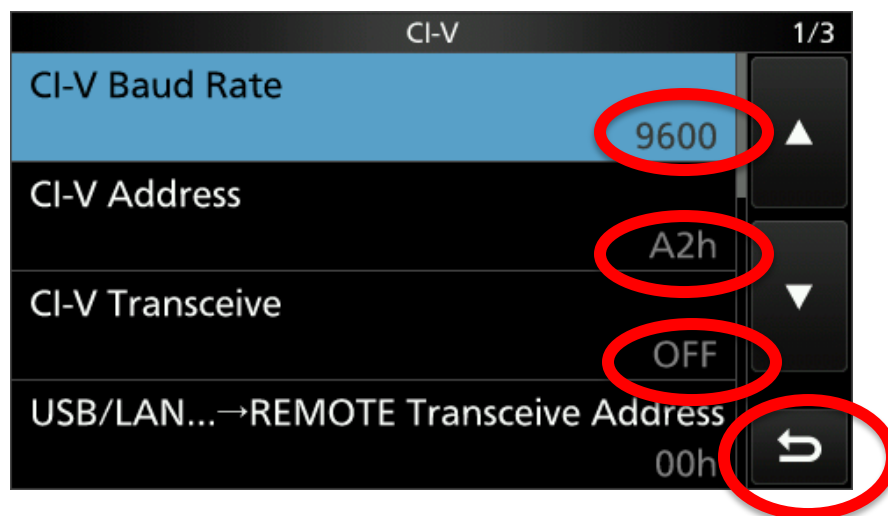

Next, press the "**SET**" button.

Use the **UP** and **DOWN** arrows to scroll through the options and then press the "**Connectors**" button.

Use the **UP** and **DOWN** arrows to scroll through the options and then press the "**CI-V**" button.
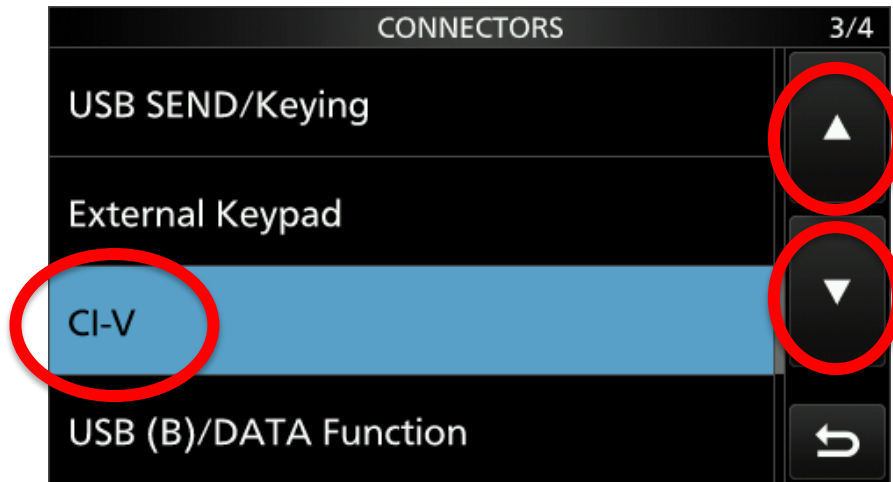
Ensure the "**Baud Rate**" is set to **9600**, the "**Address**" is set to **A2h** and "**CI-V Transceive**" is set to "**OFF**". Press the back button a number of times to return to the radio main screen.
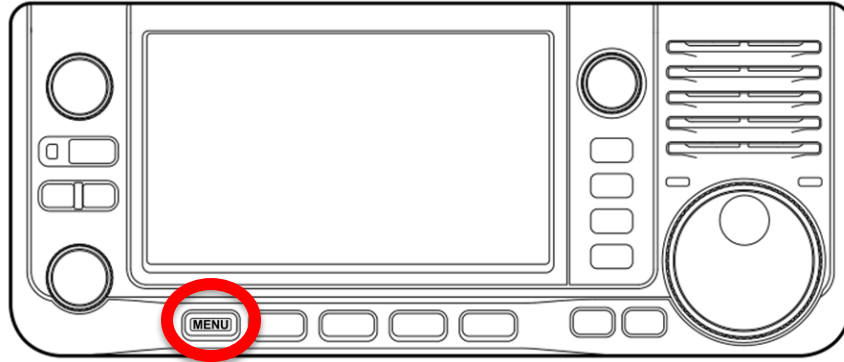
First, make sure power is turned off to the radio. Next, connect the BT-9700 Bluetooth adapter to the back of the IC-9700 radio as shown in this image.

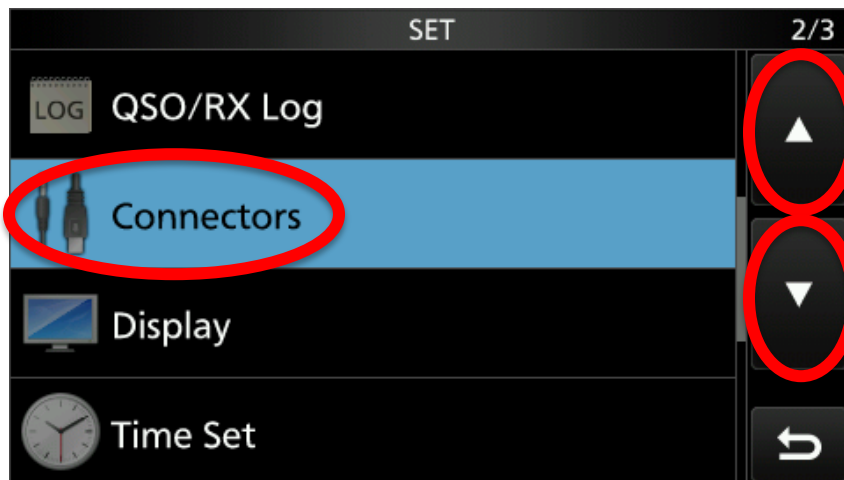You can watch a YouTube video showing the same steps here:
https://youtu.be/lLcgeCNjJWo

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Icom IC-705 setup:

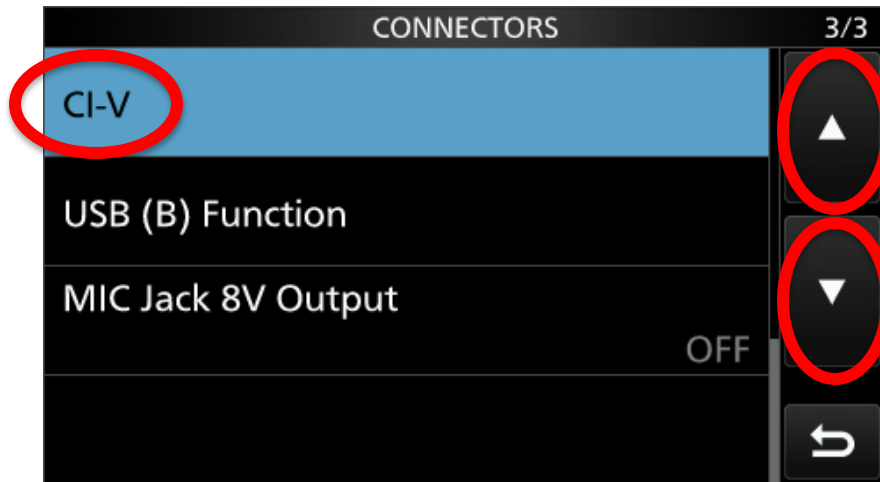Press the "**MENU**" button on the radio.

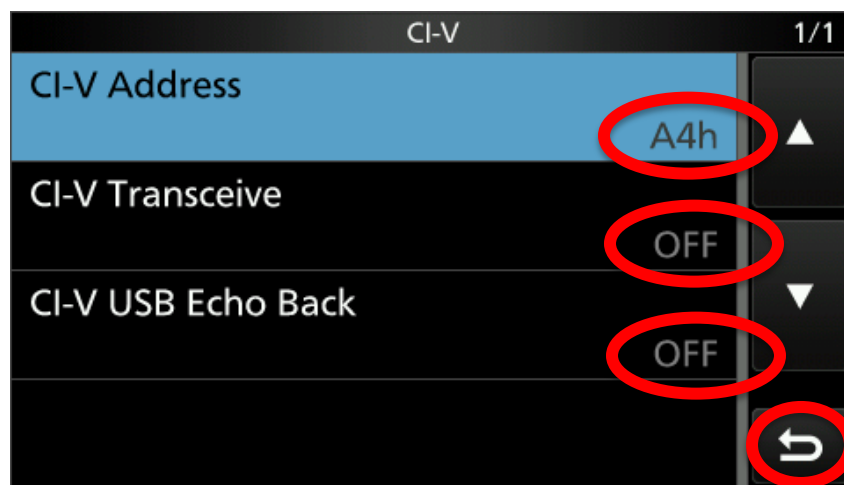
Next press the "**SET**" button.

Use the **UP** and **DOWN** arrows to scroll through the options and then press the "**Connectors**" button.

Use the **UP** and **DOWN** arrows to scroll through the options and then press the "**CI-V**" button.
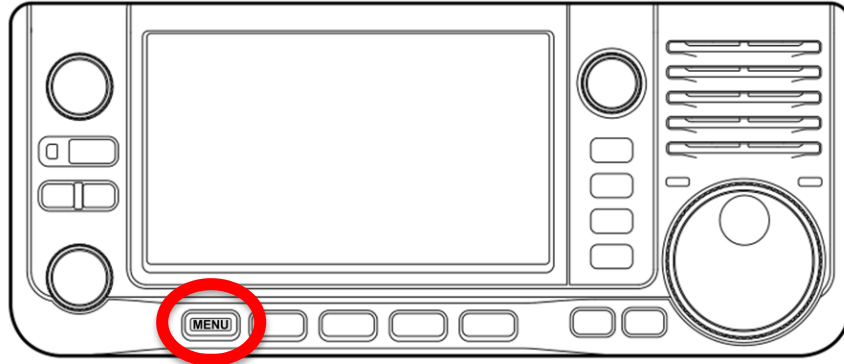

Ensure the "**CI-V Address**" is set to **A4h**, the "**CI-V Transceive**" is set to "**OFF**" and the "**CI-V USB Echo Back**" is set to "**OFF**". Press the back button a number of times to return to the radio main screen.

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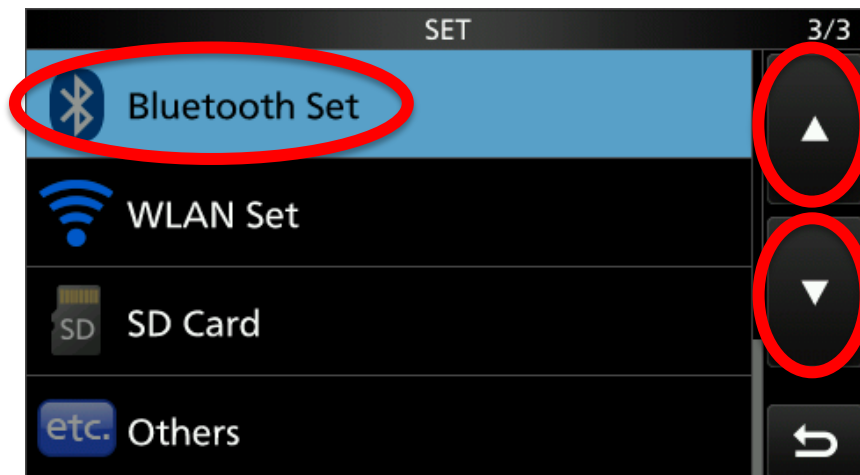## Icom IC-705 first time pairing to M5Stack:
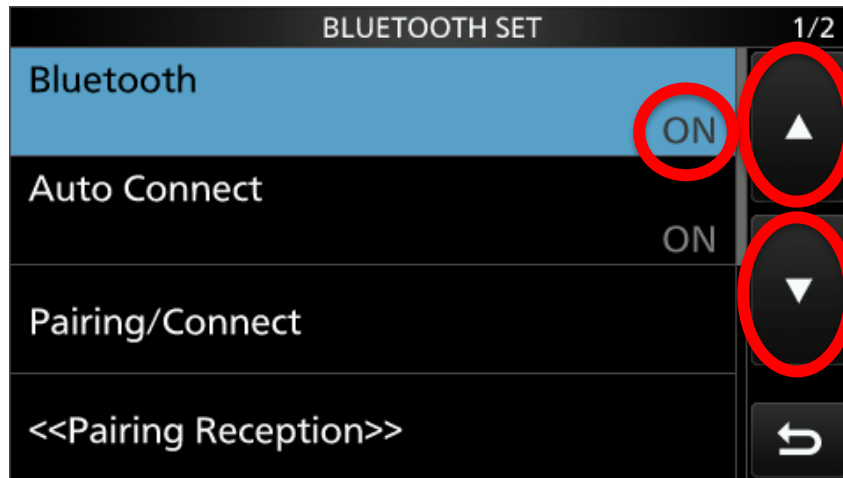
Press the "**MENU**" button on the radio.

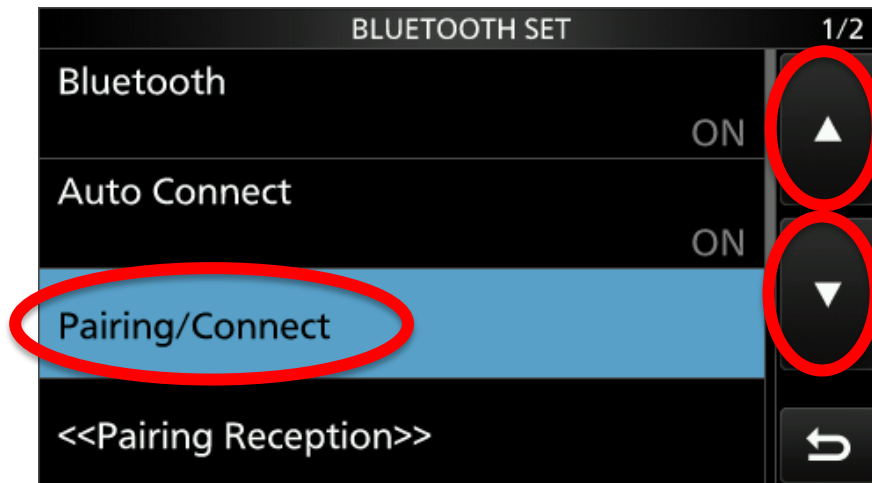Next, press the "**SET**" button.

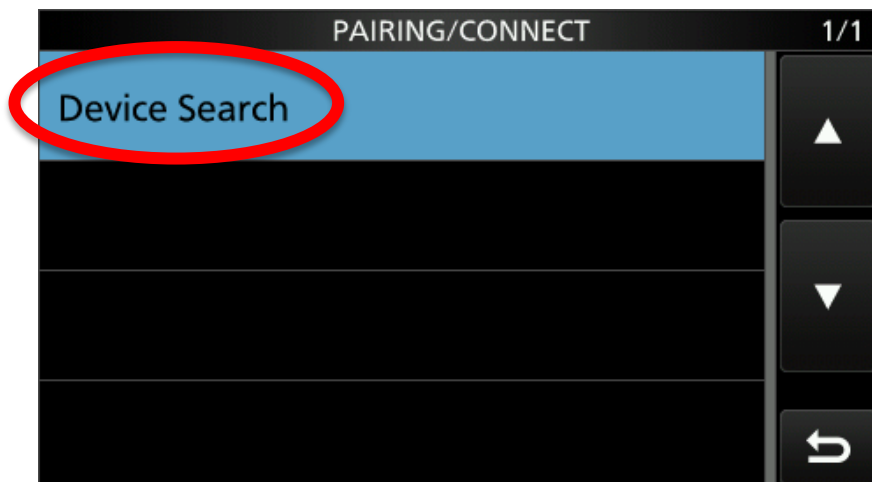Use the **UP** and **DOWN** arrows to scroll through the options and then press the "**Bluetooth Set**" button.

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Use the **UP** and **DOWN** arrows to scroll through the options and ensure "**Bluetooth**" is "**ON**".
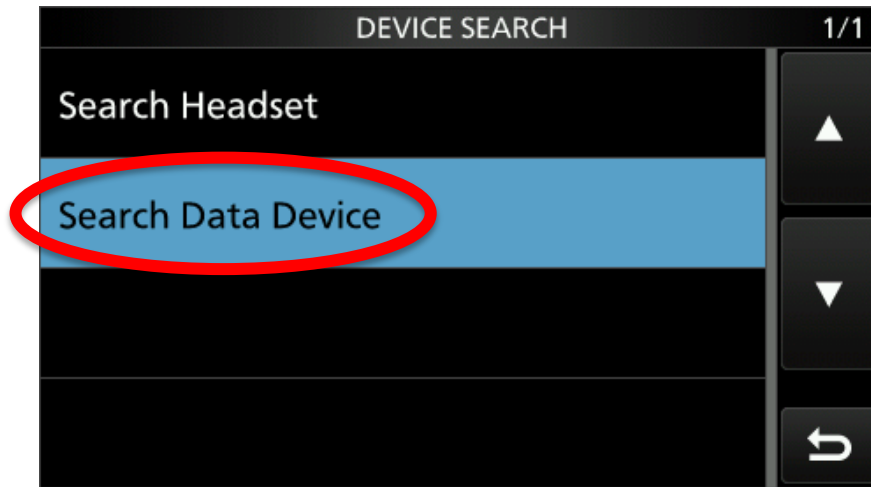

Use the **UP** and **DOWN** arrows to scroll through the options and press the "**Pairing/Connect**" button.
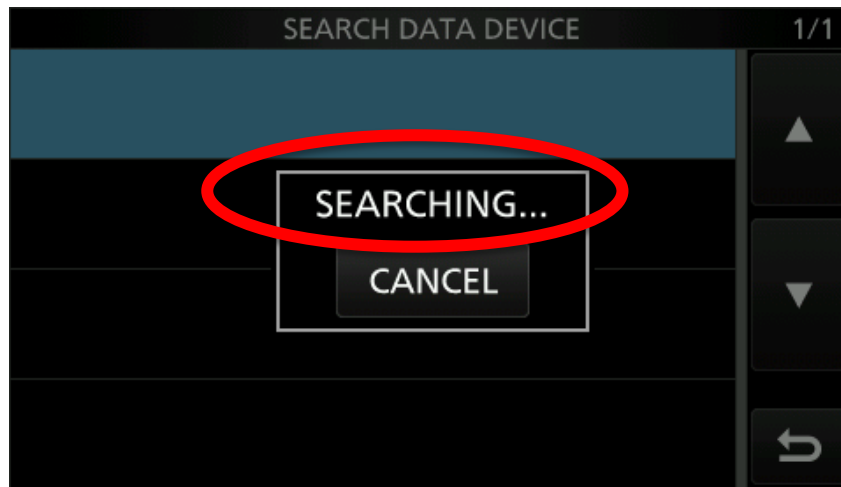

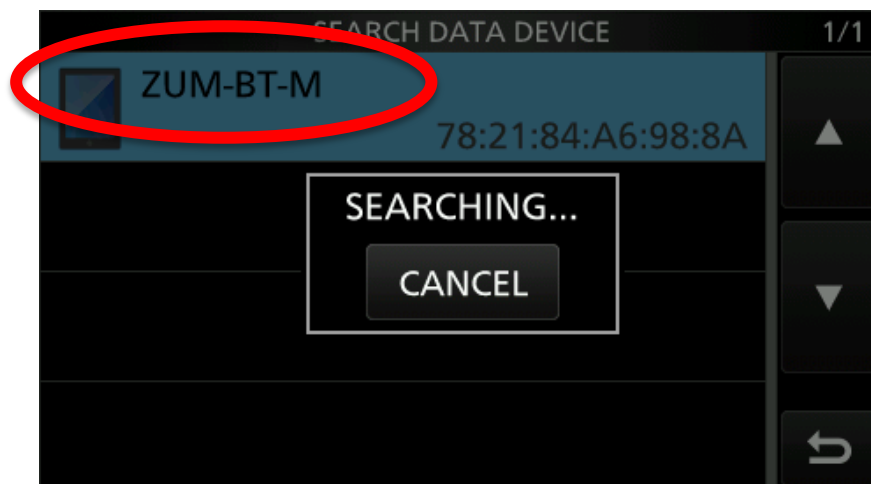Next, press the "**Device Search**" button.

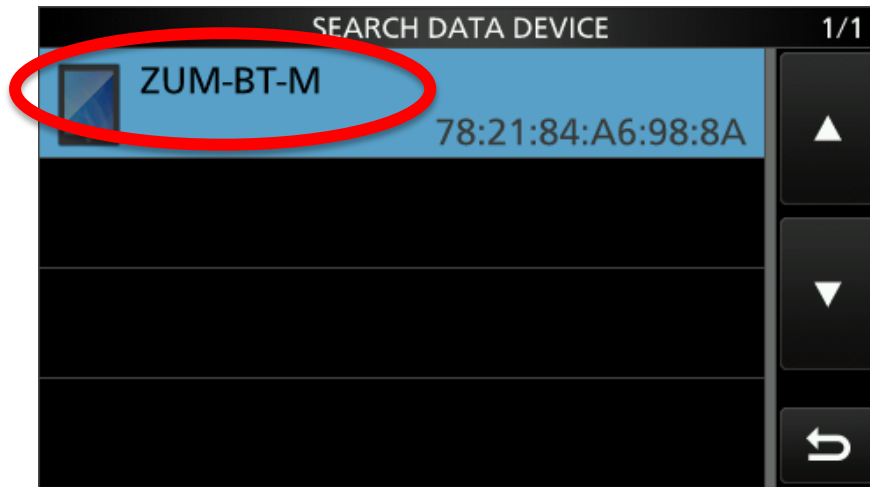Next, press the "**Search Data Device**" button.

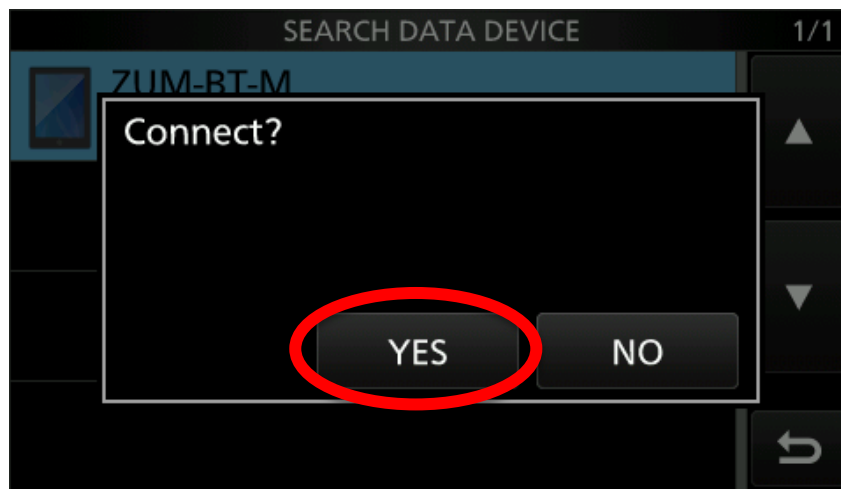The IC-705 will take a few seconds to find all the available Bluetooth devices nearby.

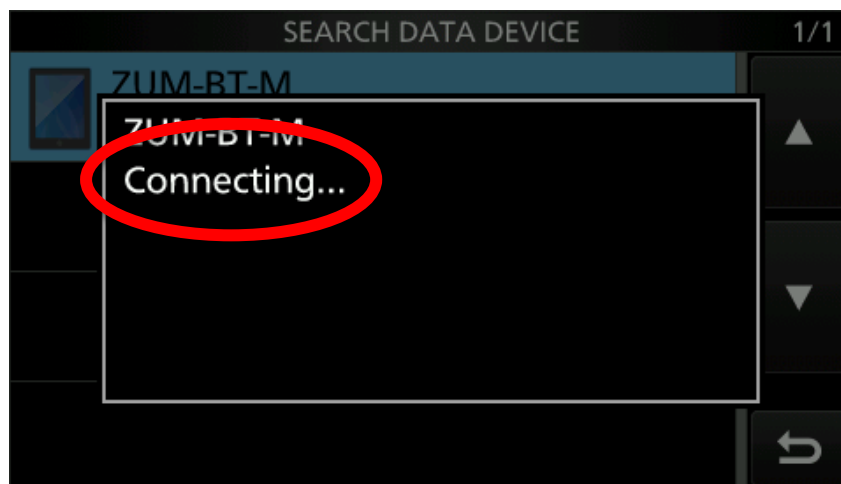
It should find the device called "**ZUM-BT-M**"

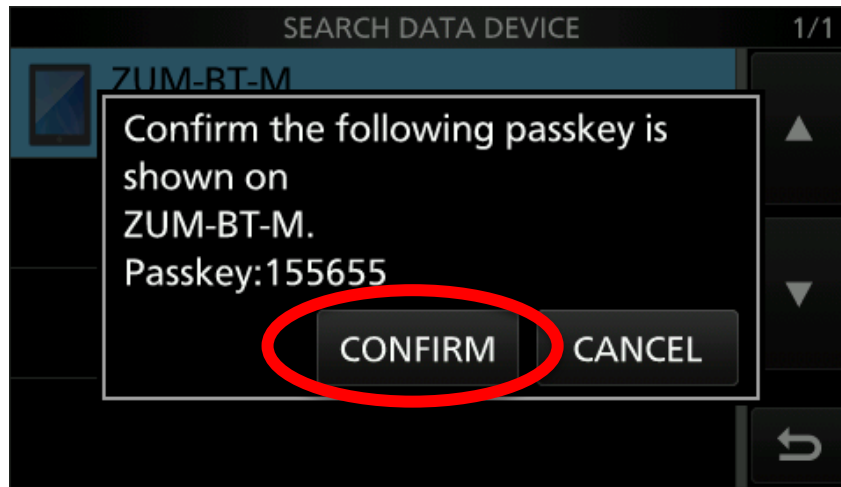Wait for the search to complete and press the "**ZUM-BT-M**" device from the list of Bluetooth devices.

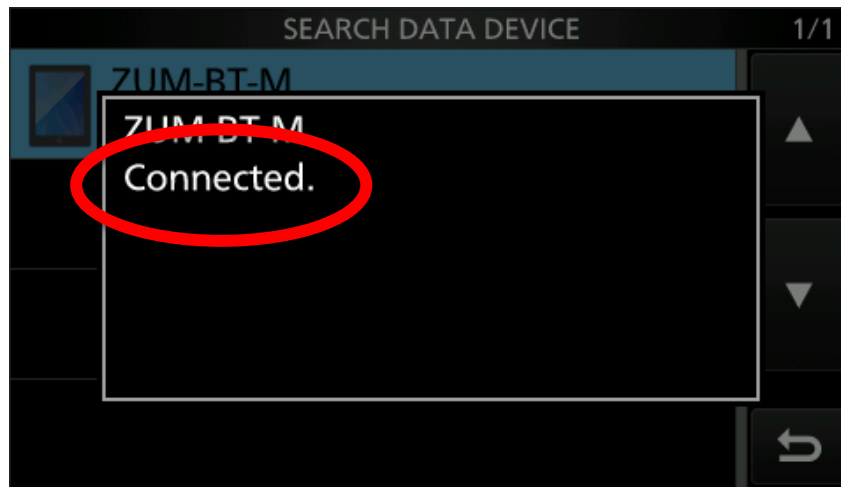Press the "**YES**" button when asked if you want to connect the radio to the Bluetooth device.

It should show "**Connecting…**" for a few seconds.

Next, confirm the passkey. This number is random. Press "**CONFIRM**" to continue.

After a few more seconds the IC-705 should now show that it is "**Connected.**" to the display.

It should show "**Connect**". Press the back button a number of times to return to the radio main screen.

Icom IC-705 - Subsequent pairing to the display

Press the "**MENU**" button on the radio.

Next press the "**SET**" button.

Use the **UP** and **DOWN** arrows to scroll through the options and press the "**Bluetooth Set**" button.

Ensure "**Bluetooth**" is "**ON**".
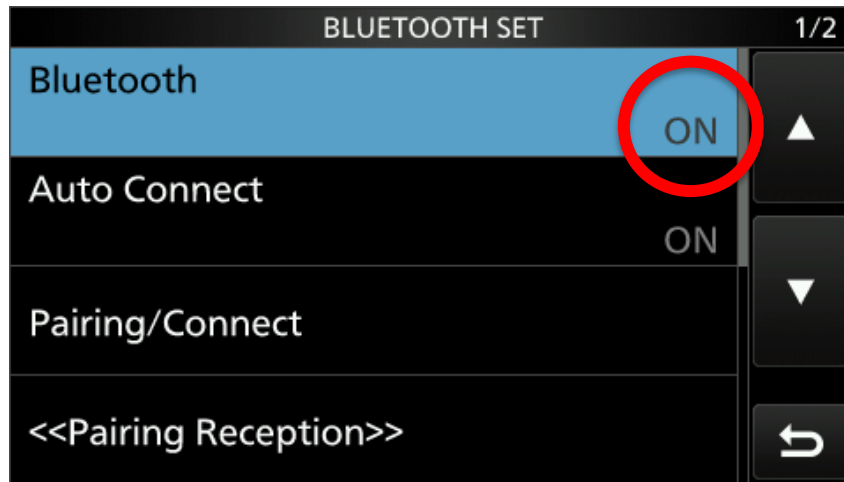
Use the **UP** and **DOWN** arrows to scroll through the options and press the "**Pairing/Connect**" button.
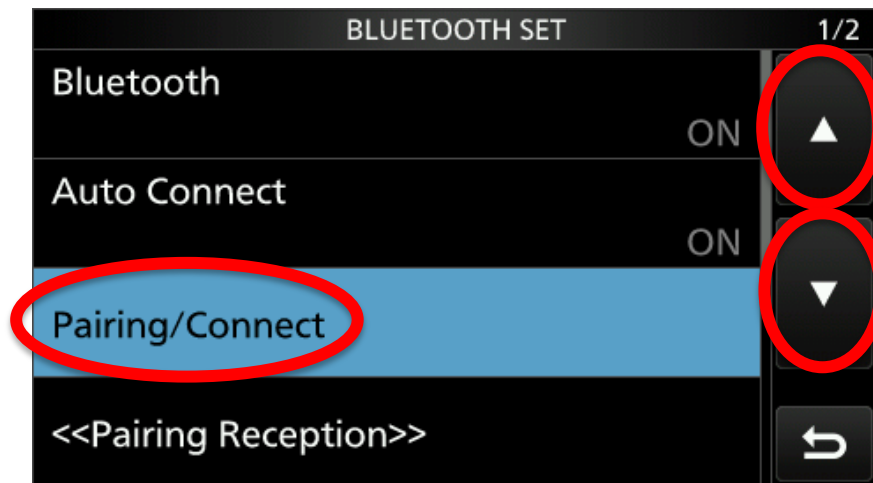
Next press the "**ZUM-BT-M**" button to start the pairing.
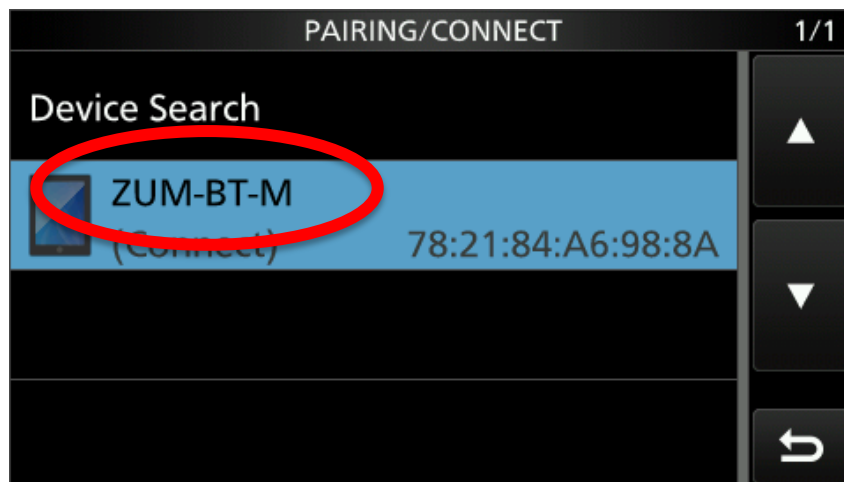
Press the "**YES**" button when asked if you want to connect the radio to the Bluetooth device.
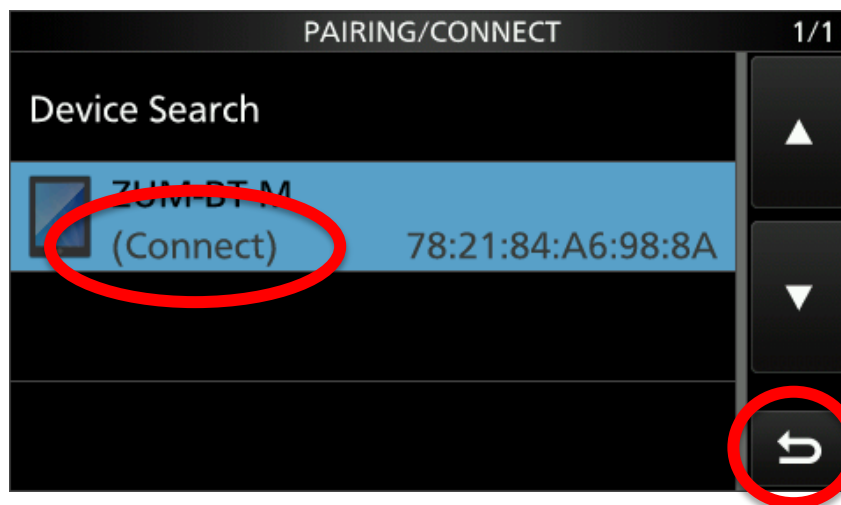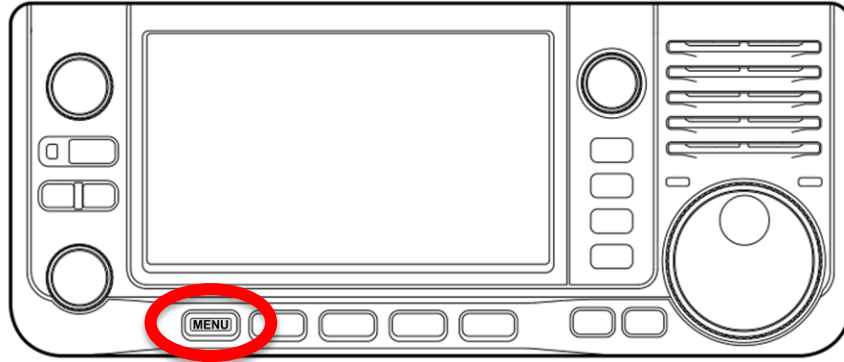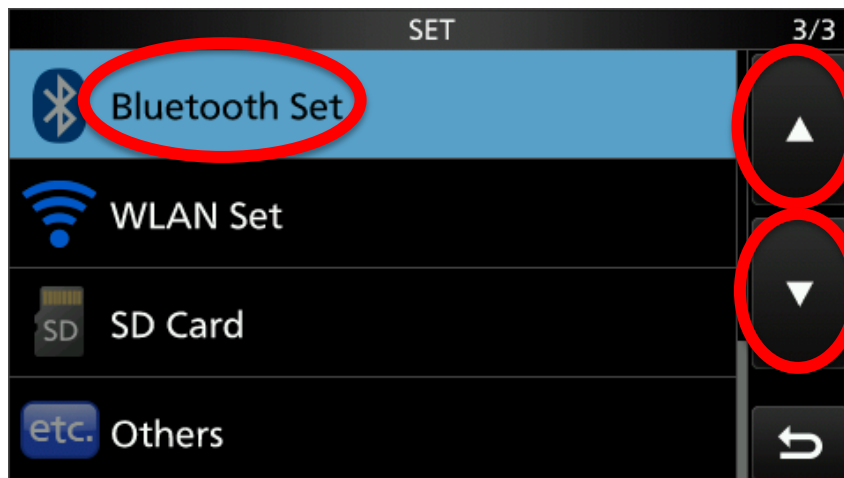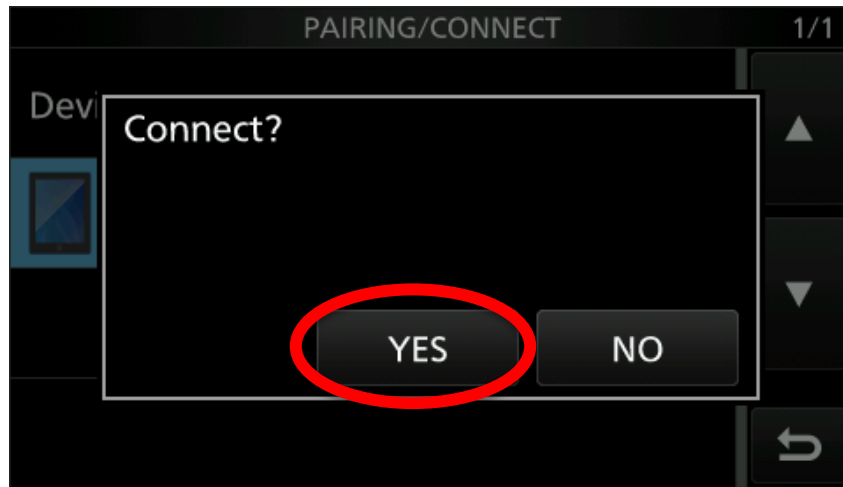

It should show "**Connecting…**" for a few seconds.
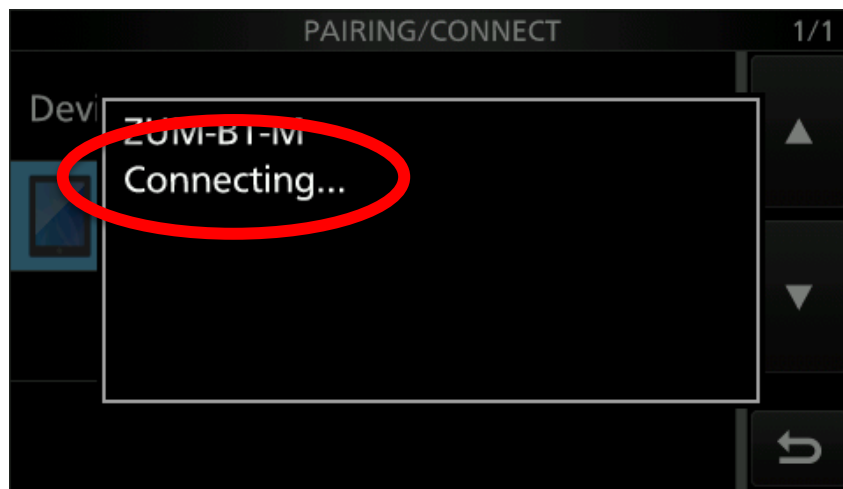
It should show "**Connect**". Press the back button a number of times to return to the radio main screen.
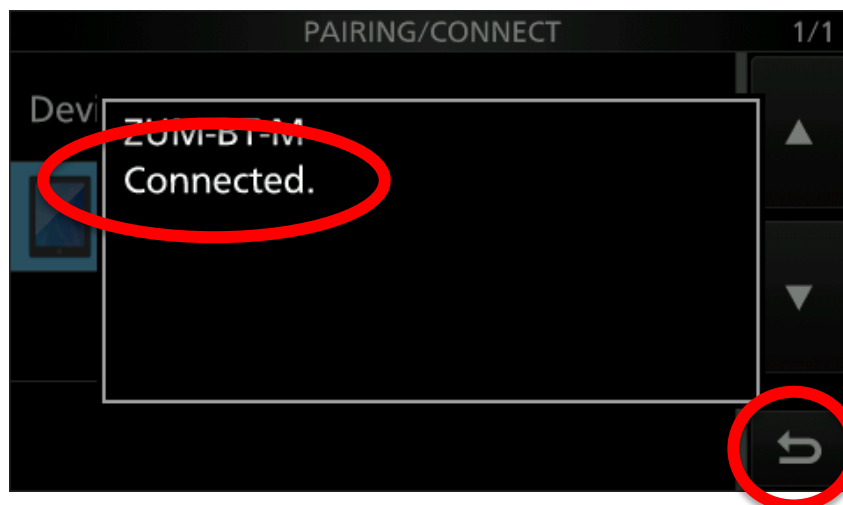
Icom IC-705 - Automatic Bluetooth pairing

After the radio has been sucessfully paired to the display, it should automatically connect each time the radio is powered on. Assuming the display is on and ready to pair, it should give the "**ZUM-BT-M Connected.**" message.

Yaesu FT-710 setup:

Press the "**FUNC**" button on the radio.

FUNC knob
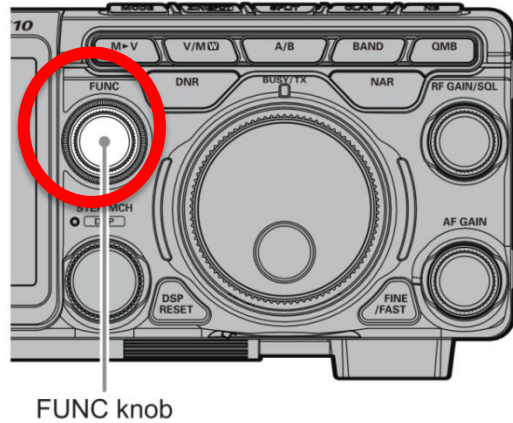
Next press the "**OPERATION SETTING**" button.

Next press the "**GENERAL**" button and ensure the **TUL/LIN PORT** is set to "**CAT-3**".
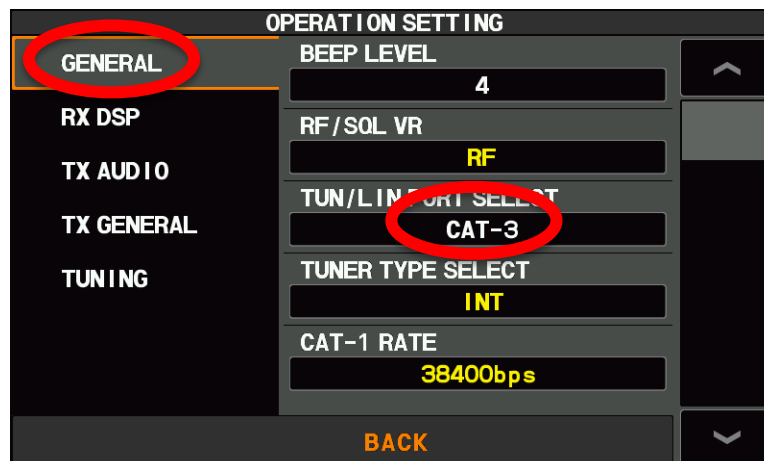
Use the **UP** and **DOWN** arrows to scroll through the options and ensure "**CAT-3 RATE**" is set to "**9600bps**" and "**CAT-3 TIMEOUT TIMER**" is set to "**10msec**". Lastly press "**BACK**" a number of times to return to the main screen.
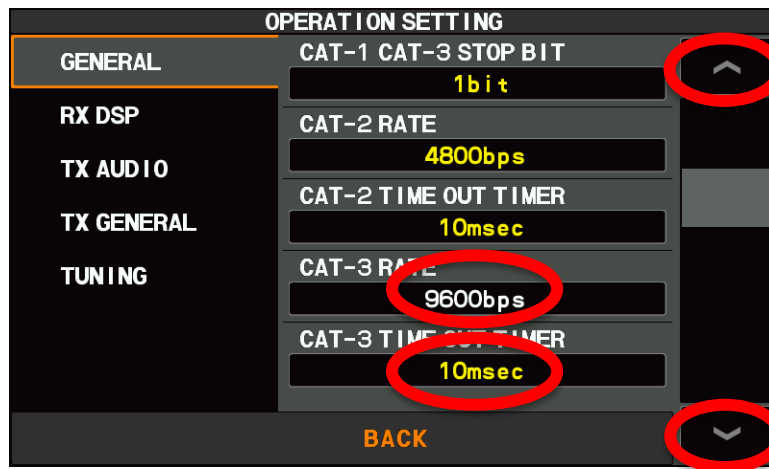
Ensure power is turned off to the radio. Next, connect the BT-710 Bluetooth adapter to the back of the FT-710 radio as shown in this image.

You can watch a YouTube video showing the same steps here:
https://youtu.be/hCFvZN2RZHw

Yaesu FT-991 setup:

Press the "**MENU**" button on the radio.

MENU(SETUP) button

LCD
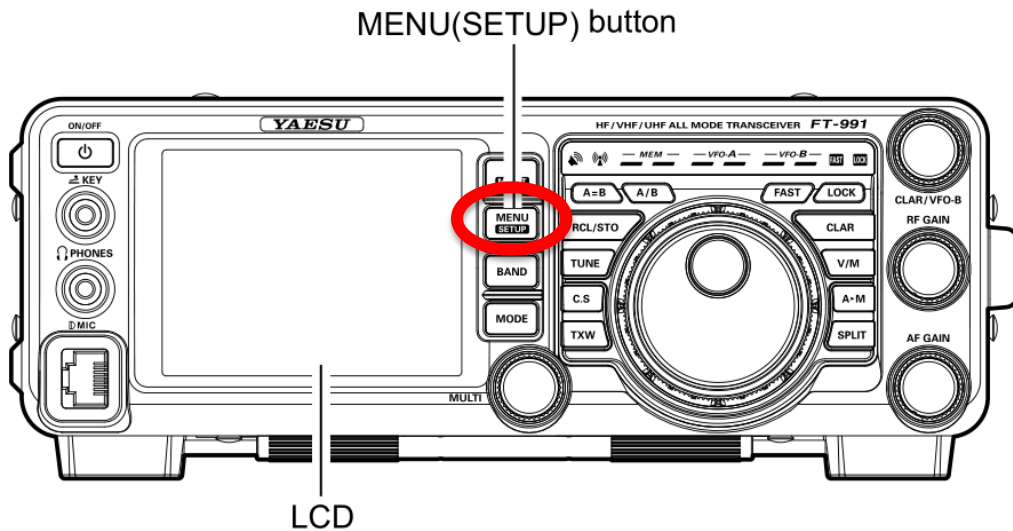
Use the "**MULTI**"-wheel to scroll to menu items "**031**", "**032**", and "**033**". Ensure that "**CAT RATE**" is "**9600bps**", "**CAT TOT**" is "**10msec**" and "**CAT RTS**" is "**DISABLE**". Next, press the "**MENU**" button to return to the main screen.
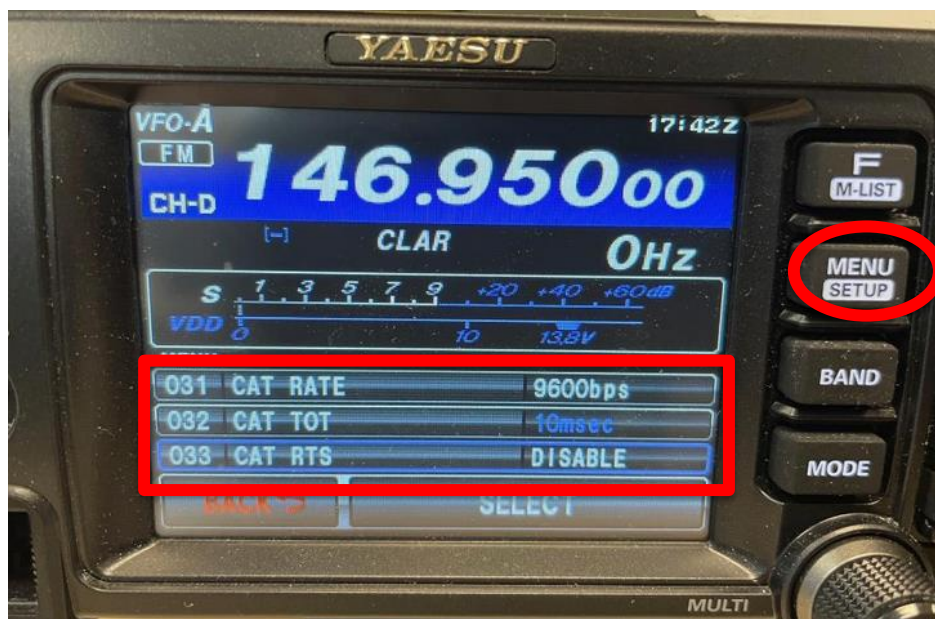
Ensure power is turned off to the radio. Next, connect the BT-991/DX10 Bluetooth adapter to the back of the FT-991 radio as shown in this image.

Yaesu FT-DX10 setup:

Press the "**FUNC**" button on the radio

Next, press the "**OPERATION SETTING**" button.

Next press the "**GENERAL**" button, and use the UP and DOWN arrows to scroll through the options and ensure "**CAT RATE**" is set to "**9600bps**", "**CAT TIMEOUT TIMER**" is set to "**10msec**" and "**CAT RTS**" is set to "**OFF**". Next press the "**BACK**" button a number of times to return to the main screen.
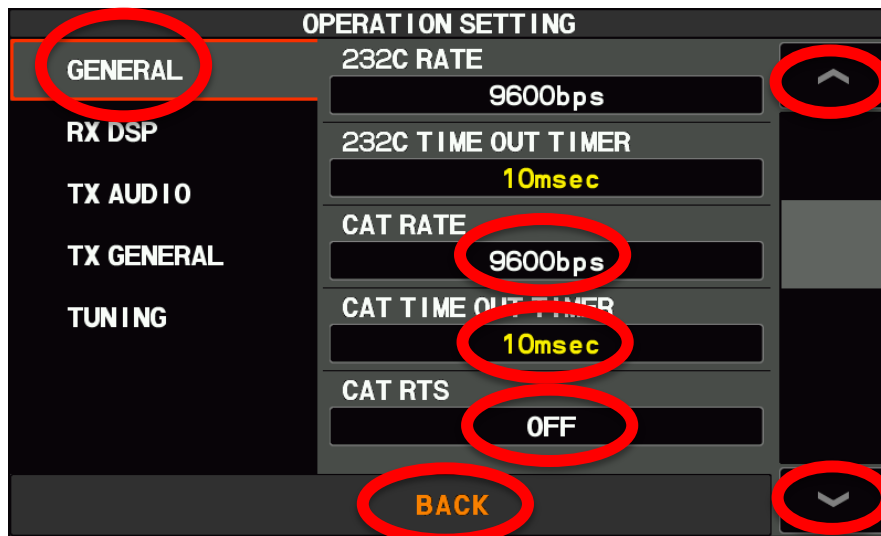
Ensure power is turned off to the radio. Next, connect the BT-991/DX10 Bluetooth adapter to the back of the FT-DX10 radio as shown in this image.


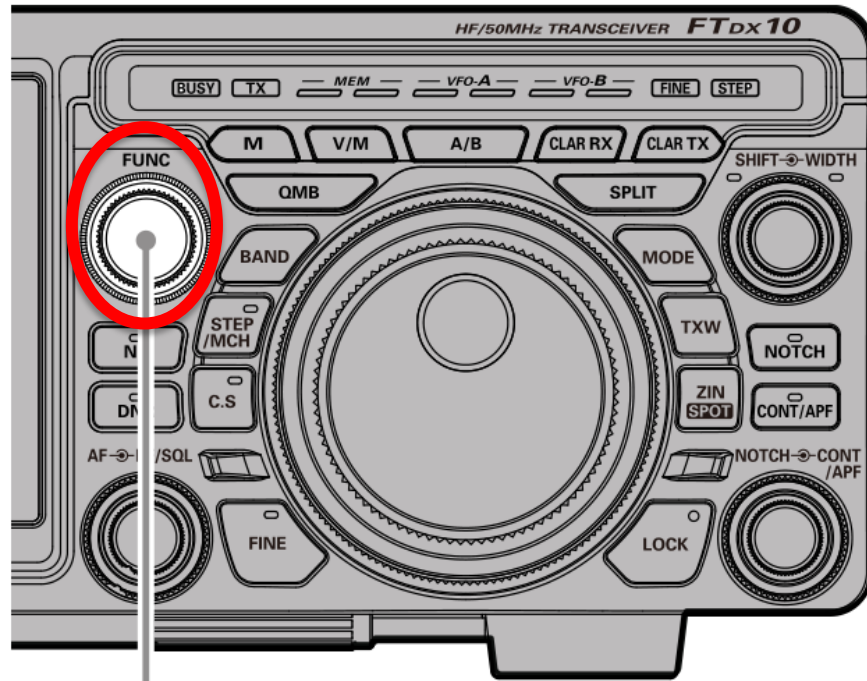You can watch a YouTube video showing the same steps here:
https://youtu.be/pYIl9uVuTOA

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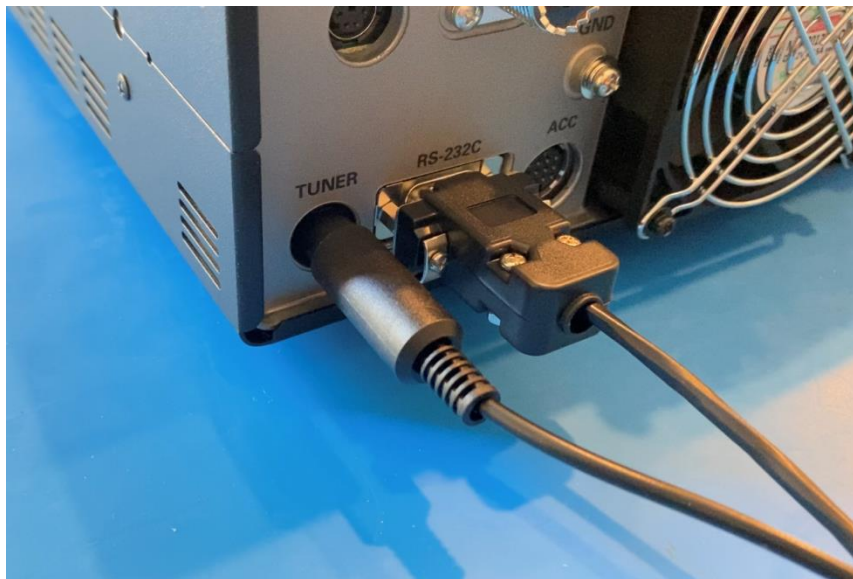
Display Settings:

The display has three buttons called "Button A", "Button B" and "Button C". The function for each button can change for each screen.

On the side of the display, there is a red reset button which is right above the USB-C connector which supplies the power.

First startup:

Each time the display is powered on, it will show the splash screen which includes the firmware version number.
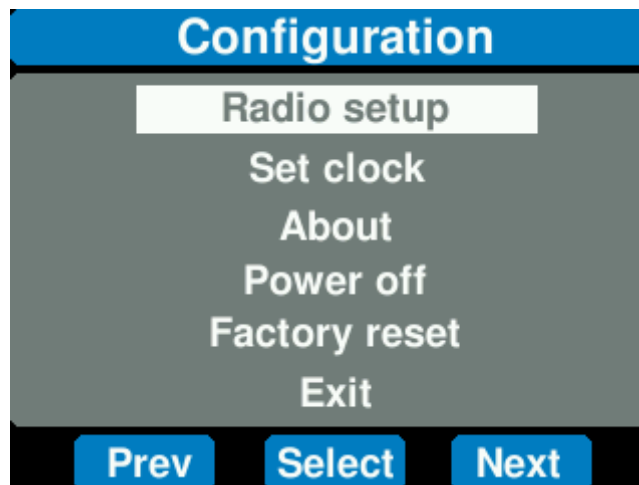

The first time the display is powered up, it will automatically go to the **Configuration** screen after the splash screen. Here you can select the make/model/ID of your radio. You can also set the clock, power off the display or reset the display back to factory settings.

Radio Setup for Icom radios:

From the Configuration screen, use "**Prev**" and "**Next**" buttons to move the cursor over "**Radio setup**" and then press the "**Select**" button .
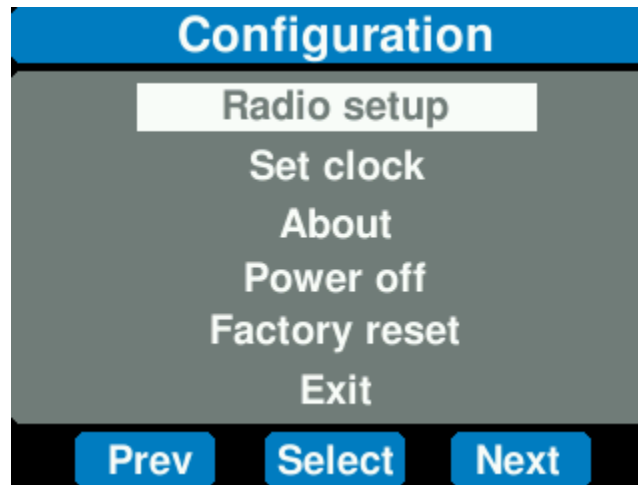
The "**Prev**" and "**Next**" buttons are used to switch between "**Icom**" and "**Yaesu**" radios. Press the "**Select**" button to confirm configuration will be done for an Icom radio.

The "**Prev**" and "**Next**" buttons are used to switch among the supported Icom "**Radio model**". Press the "**Select**" button to confirm the selected radio model.

The "**Prev**" and "**Next**" buttons are used to change the "**Radio addresses**". Make sure the address displayed matches the address configured in your Icom radio. Press the "**Select**" button to confirm the selected radio model. This will return to the main menu.

From within the Configuration menu, press the "**Select**" button to return the display to run mode.
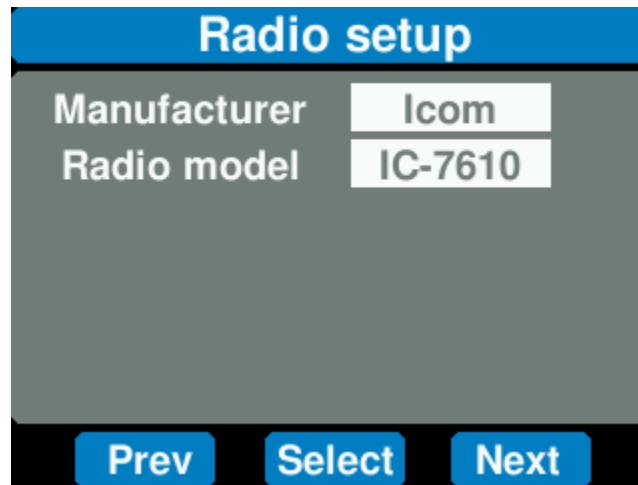
Configuring Yaesu radios:

From the Configuration screen, use "**Prev**" and "**Next**" buttons to move the cursor over "**Radio setup**" and then press the "**Select**" button .
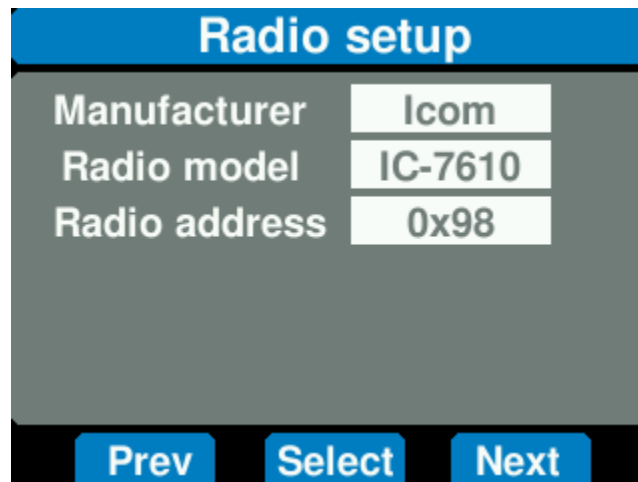

The "**Prev**" and "**Next**" buttons are used to switch between "**Icom**" and "**Yaesu**" radios. Press the "**Select**" button to confirm configuration will be done for an Yaesu radio.
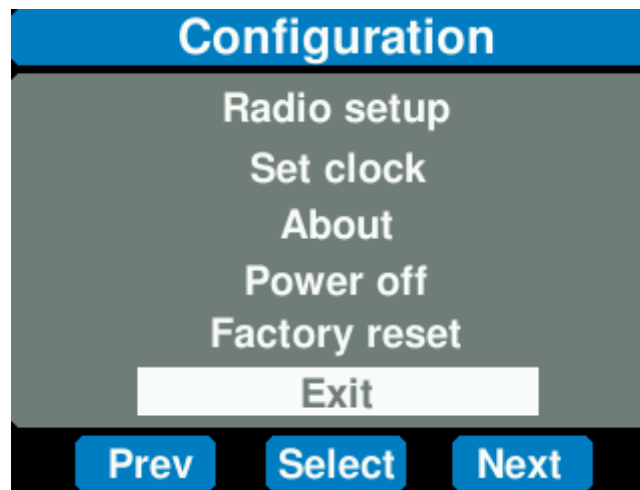
The "**Prev**" and "**Next**" buttons are used to switch among the supported Yaesu "**Radio models**". Press the "**Select**" button to confirm the selected radio model. This will return to the main menu.

Radio setup
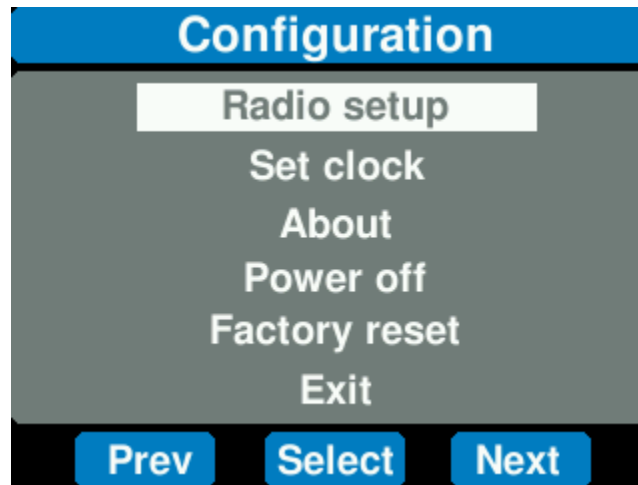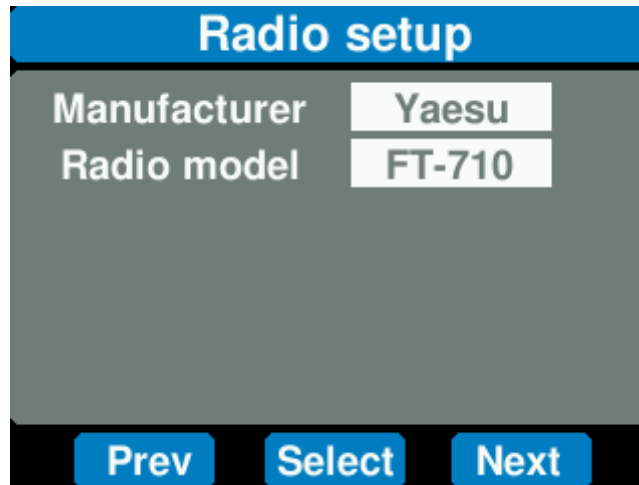
| Manufacturer | Yaesu |
| Radio model | FT-710 |

Prev   Select   Next

From within the Configuration menu, press the "**Select**" button to return the display to run mode.

Configuration

Radio setup
Set clock
About
Power off
Factory reset
Exit

Prev   Select   Next

Set clock:

The Display hardware does not have a built-in Real Time Clock. It will not be able to retain the set time after power is removed.

From the Configuration screen, use "**Prev**" and "**Next**" buttons to move the cursor over "**Set clock**" and then press the "**Select**" button .
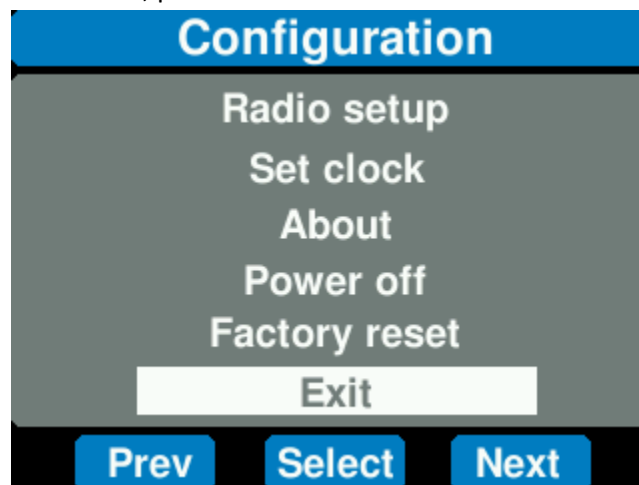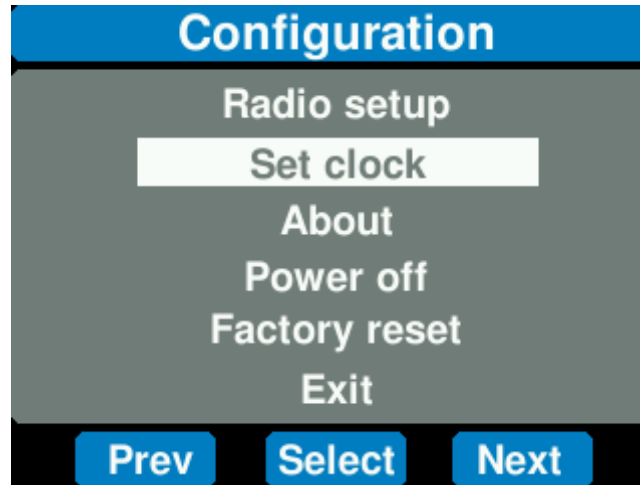

The display will change to the "**Set clock**" screen. Use the "**Prev**" and "**Next**" buttons to toggle between having the clock "**Enabled**" and "**Disabled**". Press the "**Select**" button to continue.
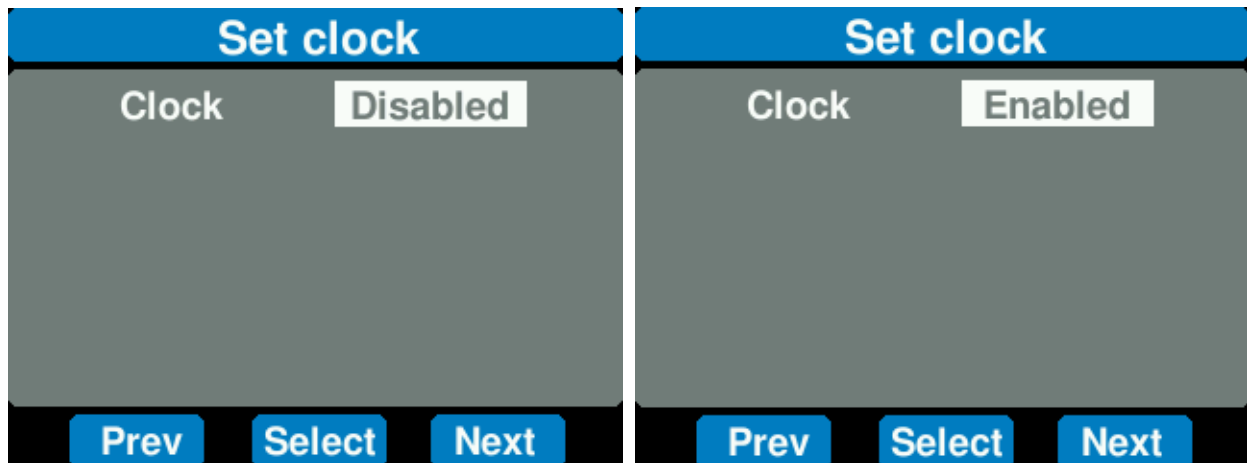
The "**Prev**" and "**Next**" buttons are used to change the "**Hour**" value for the clock. Press the "**Select**" button to confirm the hour.

The "**Prev**" and "**Next**" buttons are used to change the "**Minute**" value for the clock. Press the "**Select**" button to confirm the minute.

The "**Prev**" and "**Next**" buttons are used to change the "**Second**" value for the clock. Press the "**Select**" button to confirm the second. This will return to the main menu.

From within the Configuration menu, use"**Prev**" and "**Next**" buttons to move the cursor over "**Exit**". Press the "**Select**" button to return the display to run mode.
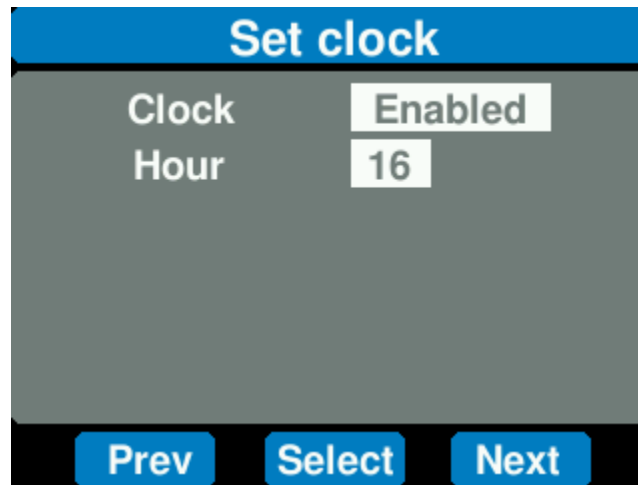
About:

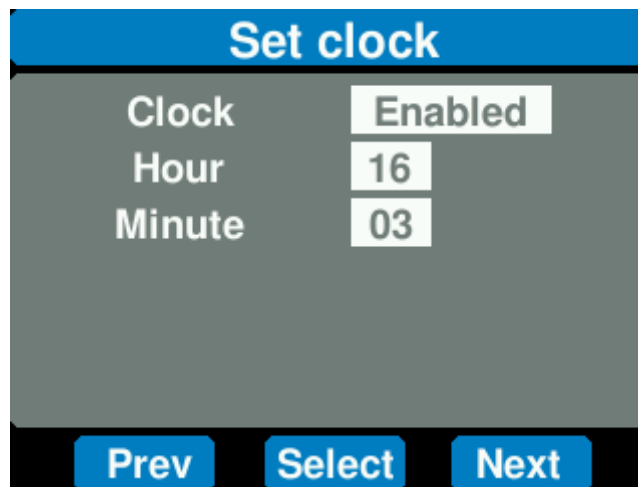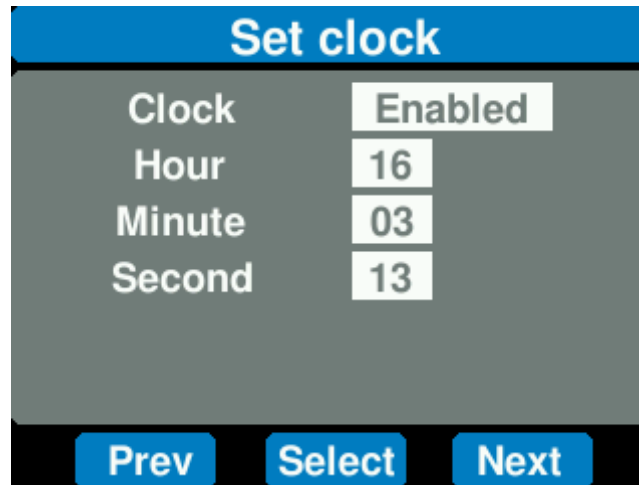From the Configuration screen, use"**Prev**" and "**Next**" buttons to move the cursor over "**About**" and then press "**Select**". The display will change to the About screen with software version information as well as copyright information.
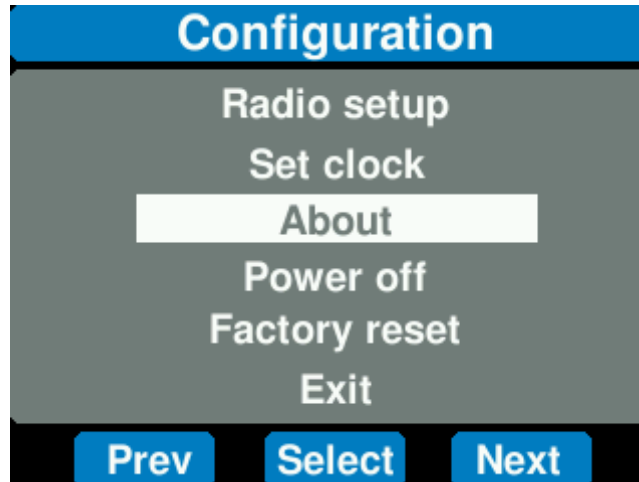
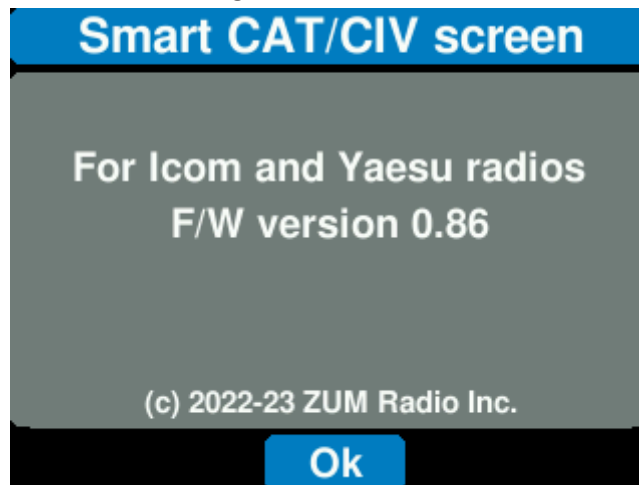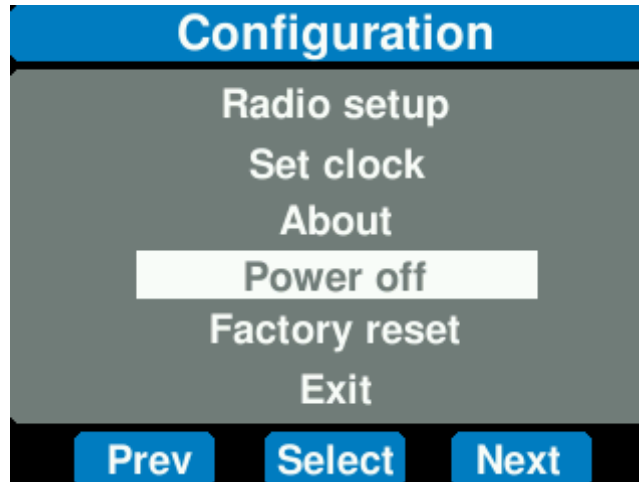Press the "**Ok**" button to return to the Configuration screen.

Power off:

From the Configuration screen, use the "**Prev**" and "**Next**" buttons to move the cursor over "**Power off**" and then press the "**Select**" button. The display will turn off immediately. You can wake the display by either pressing the **Reset** button or **ButtonA**.


Factory reset:

From the Configuration screen, use the "**Prev**" and "**Next**" buttons to move the cursor over "**Factory Reset**" and then press the "**Select**" button. It should reboot to the spash screen in a few seconds and then return to the Configuration screen. The configured manufacturer/model/ID values will be reset to the unconfigured state.
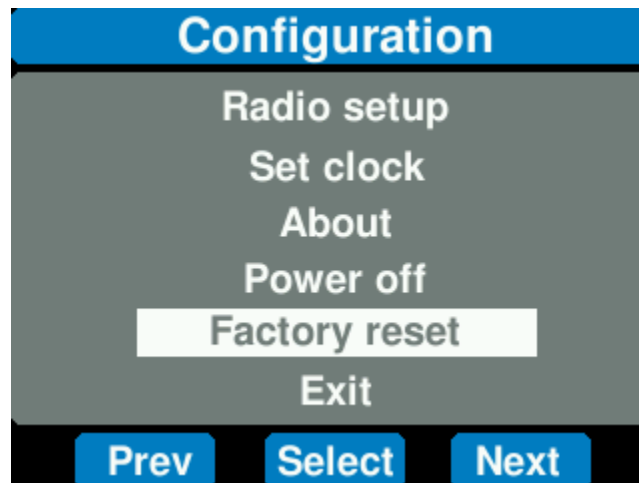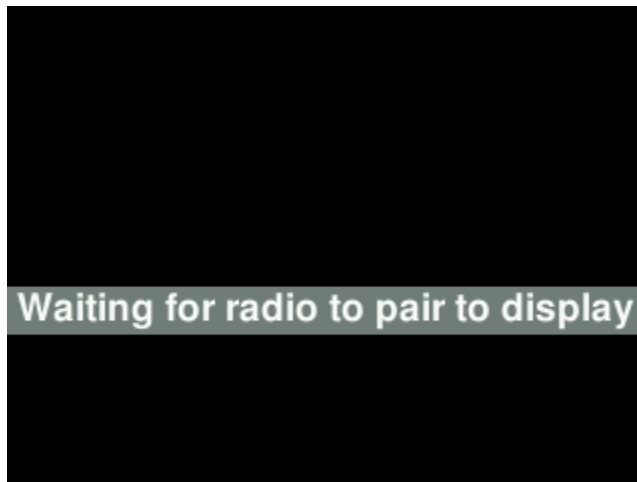
Pairing progress:

Once the Display is configured for a specfic radio (other than the IC-705), it will attempt to pair to the Bluetooth adatper connected to the radio. Once connected, it will then show the CAT/CIV screen.
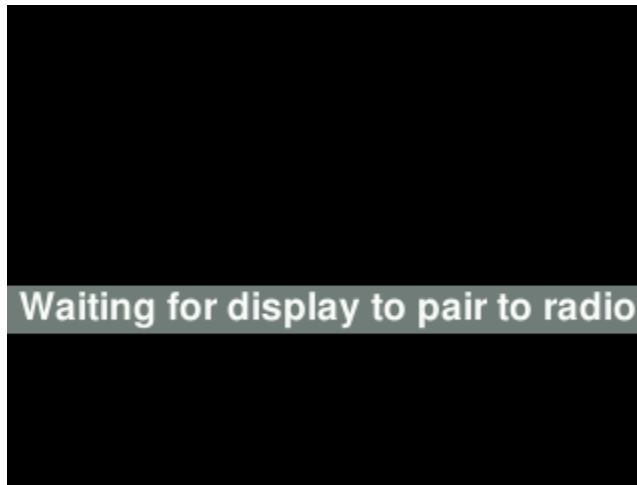
The Display will show that it is waiting for the IC-705 to pair to it

When the Display detects that it has become disconnected from radio, an error message and progress message will be shown on the screen.
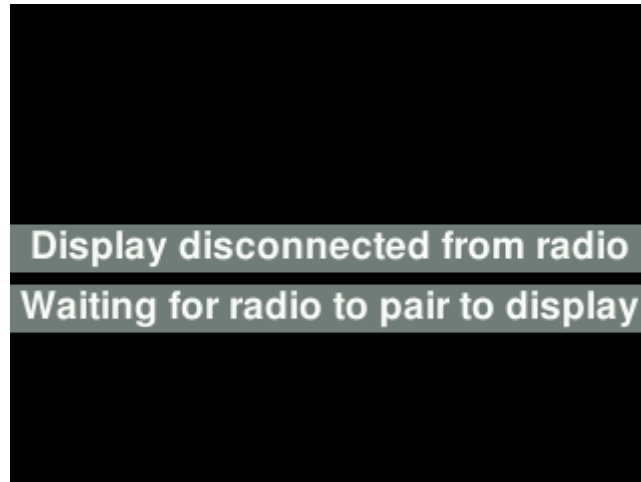
When the Display detects that the IC-705 has become disconnected, an error message and progress message will be shown on the screen.

Operating Display:

Switching between two VFOs:
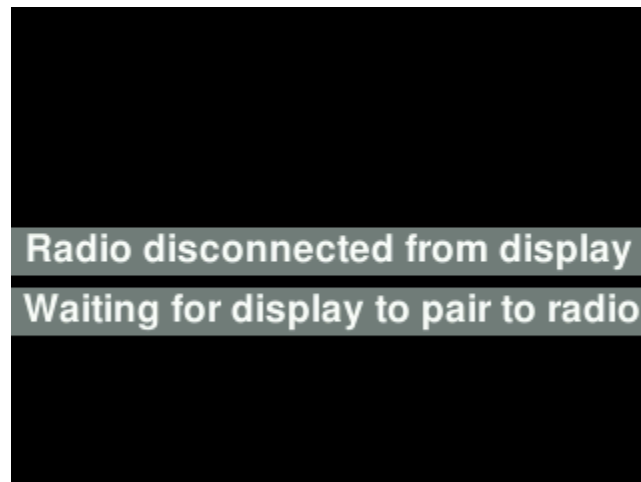Each time **ButtonC** is pressed, the display switches between showing the two VFOs in the radio if there are two. If not, it remains showing the single VFO frequency.

Returning to Configuration screen:
ButtonB is used for returning to the main menu. Also, during booting, you can force the Display to enter the Configuration screen by holding down **ButtonB**.

Selecting Icom meter:
Each time **ButtonA** is pressed, the display changes the meter shown. It first cycles through all the needle meters (SWR, Po, Vd, Id, ALC and COMP) and then to the bar graph meter. It then goes back to the needle meters.

Selecting Yaesu meter:

Each time **ButtonA** is pressed, the display changes the meter shown. It first cycles through all the needle meters (SWR, ID, PO, VDD, ALC and COMP) and then to the bar graph meters (SWR, ID, PO, VDD, ALC and COMP). It then goes back to the needle meters.

Troubleshooting:

Display no longer responds to FT-710 radio:
This is a known issue with the FT-710. After a long period of inactivity, the radio appears to turn off the CAT port where the Bluetooth adapter is plugged. The only know solution is to turn off the FT-710 radio and then turn it on again.

Display no longer responds to IC-7100 radio:
This is a known issue with the IC-7100. After a long period of inactivity, the radio appears to turn off the CAT port where the Bluetooth adapter is plugged. The only know solution is to turn off the IC-7100 radio and then turn it on again.

IC-705 displays "Connection Failed" message:
A few things to check on the radio
- Make sure the "ZUM-BT-M" adapter is visible in the list of found Bluetooth adapters
- Press the reset button on the side of the display, right above the power connector
- Delete the "ZUM-BT-M" adapter from the list of known devices on the radio. Then complete the initial pairing steps again.

Display reboots to menu screen:
After pressing the reset button the display should show the splash screen for a few seconds and then begin the Bluetooth pairing process. If the display end up on the menu screen then try to move the cursor to exit and press the select button.

IC-705 is unable to find ZUM-BT-M device when scanning for Bluetooth devices
A few things to check:
- Rescan for devices on IC-705
- Look for the "Waiting for radio to pair to display" message on display, showing that it is waiting for IC-705 radio to connect to it.

IC-705 connection failure:
If the radio is unable to connect to the display, it will show the "Connection failed." error message. Try:
- Press the reset button on the Display and restart the pairing on the IC-705
- Rescan for devices on IC-705

ZUMRadio
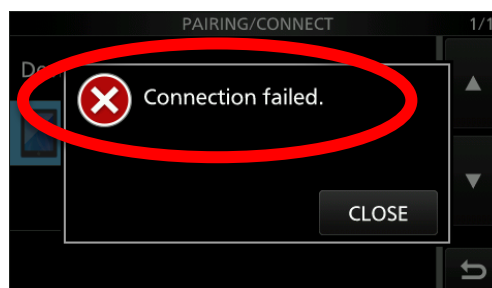
Updating firmware:

Plug the M5Stack into your computer using the short USB programming cable that was included with your purchase.

Using **Device Manger**, find the **COM** port number for your M5Stack.
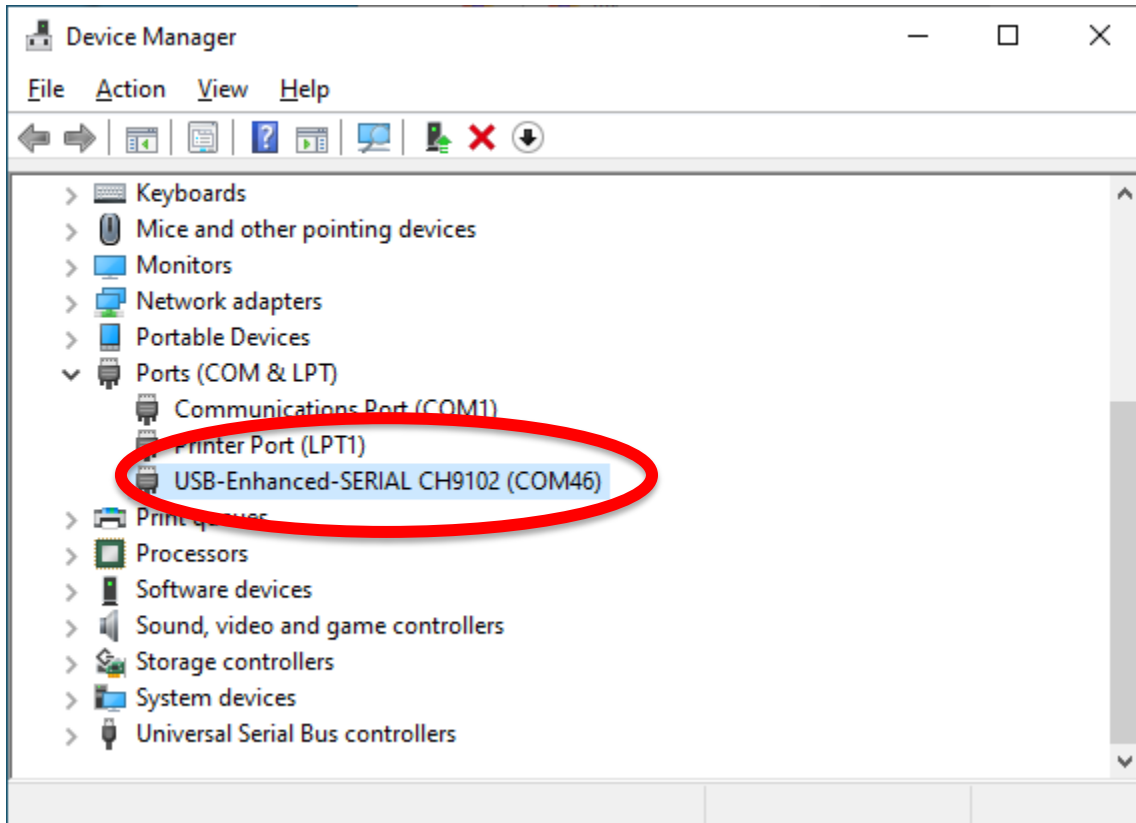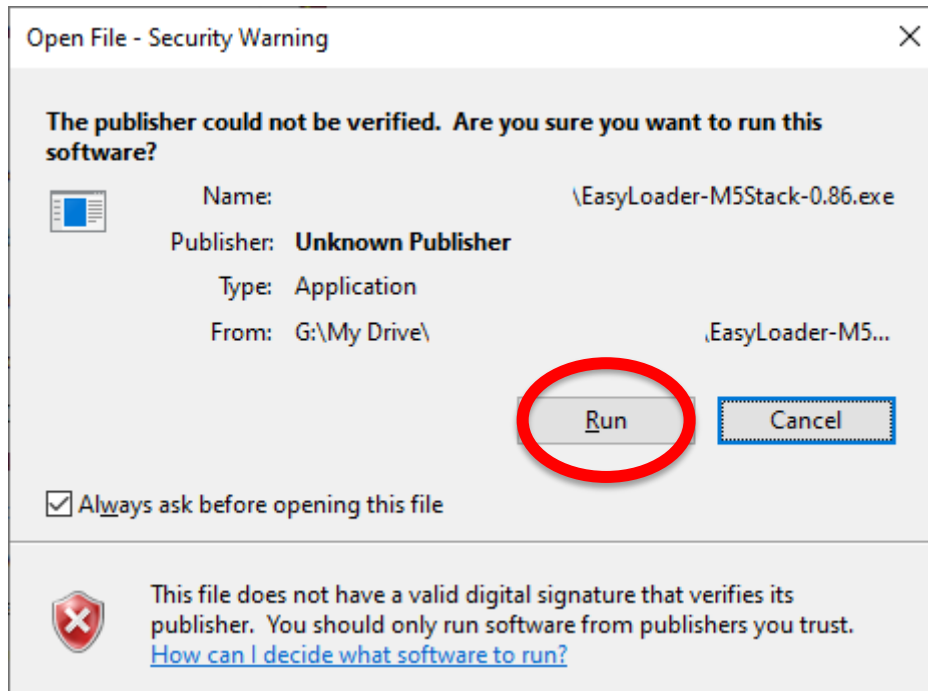

Download the M5Stack Display firmware from the ZUM Radio website:
https://zumradio.com/downloads.html#precompiled It will have a file name similar to this:
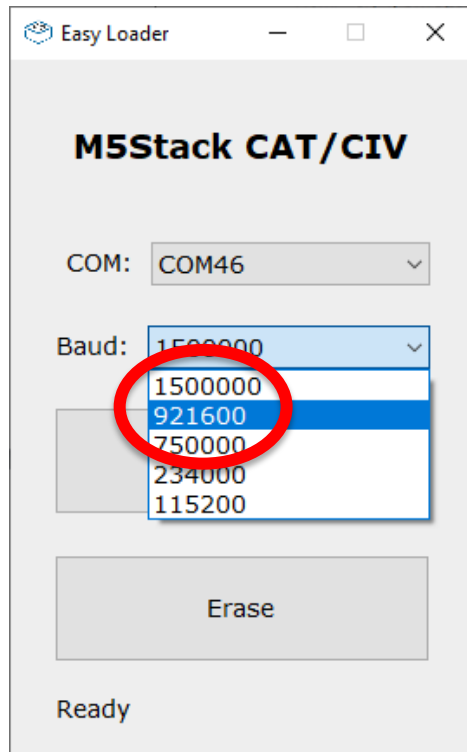**EasyLoader-M5Stack-0.87.exe**

Run the program from your Windows computer. You may see an "**Unknown Publisher**" warning from Windows. Press the "**Run**" button to continue.
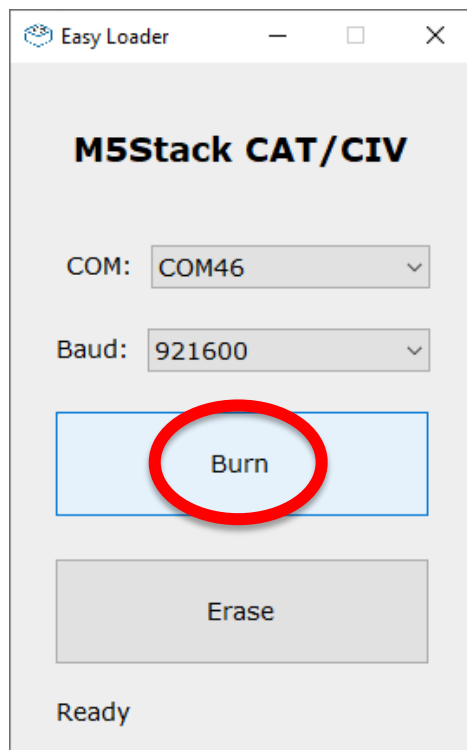

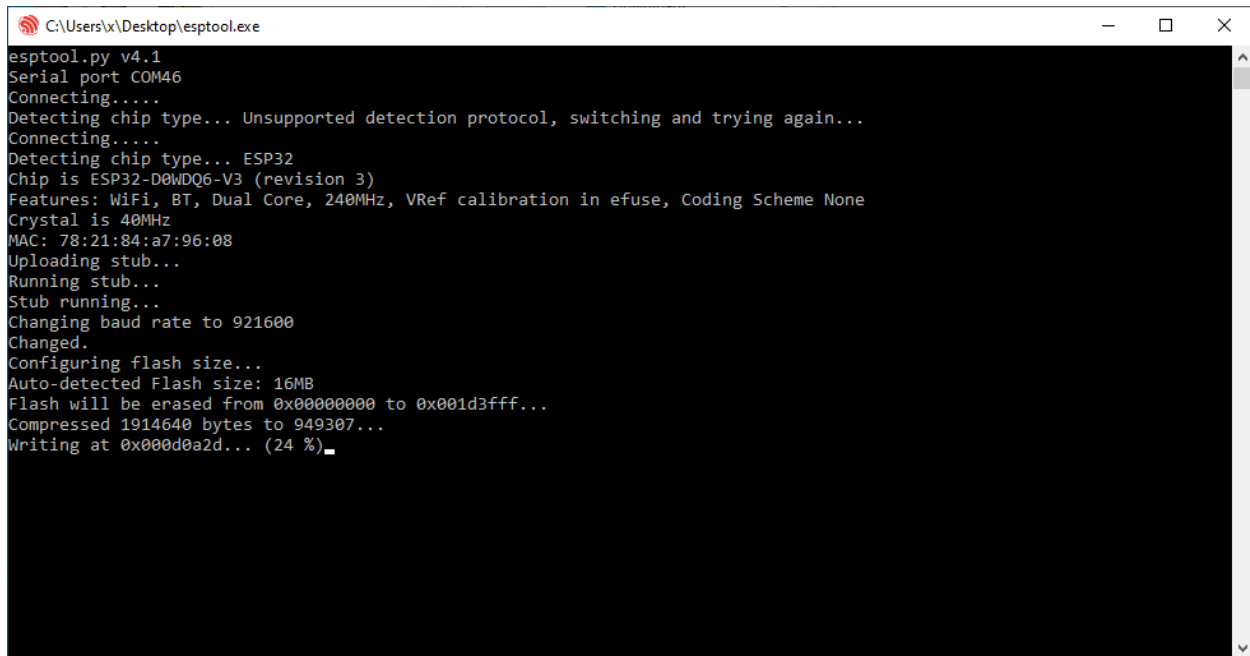Select the COM port number you found using **Device Manager.**
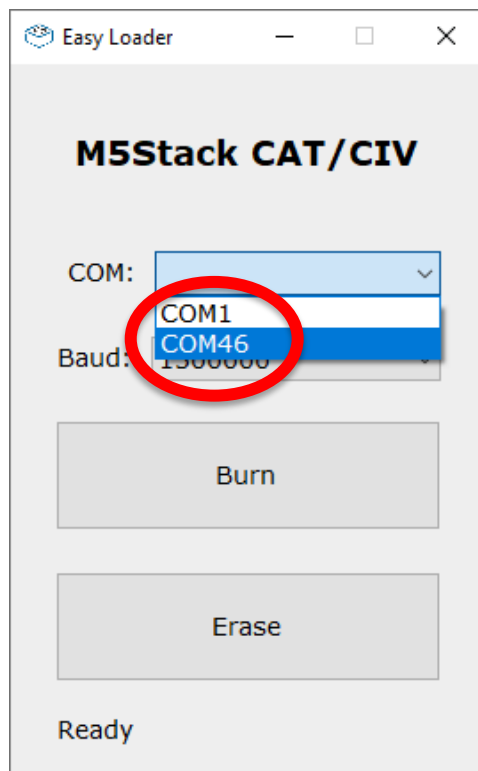
Set the "**Baud**" rate to "**921600**"

Finally press the "**Burn**" button. This will start the flashing process. You may see another "**Unknown Publisher**" warning from Windows. If son, press the "**Run**" button to continue.

A new window will open and display the flashing progress. It should take about a minute to complete.

ZUMRadio

Support:

The primary location for support for ZUM Radio products is via the ZUM Radio Facebook support group: https://www.facebook.com/groups/249802742395450/