



*Morse Made Easy™*



# MMX Nomad HF Morse Radio Station

## QUICK START GUIDE

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## I. Getting Acquainted

Figure 1 is a labeled diagram of the **Nomad** transceiver:



**FIGURE 1**

### **LCD Panel**

At the center is the 3.5" color LCD display, which is also a touch screen input device.

### **Keyboard**

This is a built-in mini keyboard for entering text and commands

### **LED Panel**

The LED panel contains 6 color LED's as follows:

**Power LED:** This red LED is lit when the power is turned on.

**Charging LED:** This yellow LED blinks while the batteries are being charged. Blinking will stop and the LED will be solid yellow if charging is complete. Note: charging complete is only indicated when power is turned on. That means that the. Blinking will continue forever even when charging is completed in power off mode.

**CW Out LED:** This blue LED displays the outgoing Morse code when the

transceiver is in transmit mode (either with or without the internal transceiver engaged).

**Enabled LED:** This green LED indicates when you have set the frequency to one you are allowed to transmit on, based on the license level you have specified in local station setup. If the unit is in External Mode, the LED is always lit, and it is up to you to manage your external rig frequency setting when transmitting..

**CW In LED:** This green LED indicates what the computer is seeing as Morse code input. It represents the considered opinion of a complex set of analog and digital signal processors, and is a very accurate representation of the incoming Morse code signal. This LED is used to assist tuning the receiver to center on the frequency of the sender.

**Tone LED:** This yellow LED indicates the output of just the analog portion of the signal processing system. This LED is normally flickering from noise, as well as lighting brightly during a strong Morse signal. This LED is helpful for adjusting the decoder gain correctly. Decoder gain is controlled from the keyboard.

Figure 2 shows the rear panel details:

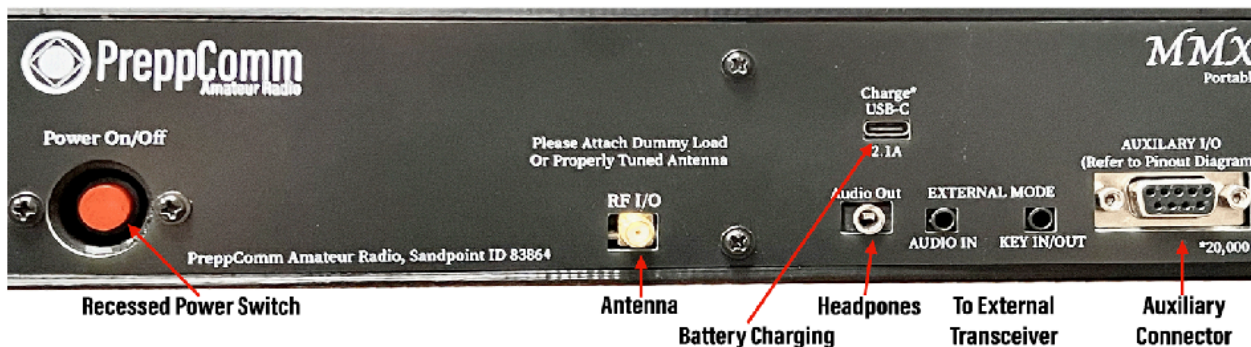


FIGURE 2

### Power On/Off

This is a recessed push-on/push-off power switch for controlling the power to the unit.

### Antenna Connector

The antenna connector is a female SMA connector.

### Battery Charging USB C Connector

The internal 20,000 mah battery is charged via this connector from any 5V USB source, such as the included solar panel, the included AC wall wart, any 5V battery bank, and of course any USB connector.

### Headphone Jack

The headphone 3.5mm jack is located on the rear panel of the transceiver. Headphone volume is adjusted from the keyboard.

### External Transceiver: Audio In Jack

The Audio In jack is used to connect the audio output from an external rig to the internal decoder (External Mode).

### **External Transceiver: Key In/Out Jack**

This is a stereo 3.5mm jack that has one channel dedicated to Key Out, when used with an external transceiver (External Mode). The other channel is dedicated to support a Morse Code key for manual code entry for training and on-air use, if desired. See **Appendix X** for a wiring diagram.

### **Auxiliary Connector**

This connector includes a number of useful pins that are useful for control of external devices, such as linear amplifiers (switching between transmit/receive along with the internal system) and other functions useful for the blind and/or deaf. In addition, a serial port outputs all of the commands sent to the 3.5" LCD screen, and a serial in port accepts keyboard input, These two functions will be exploited via an application on the PC and Mac in the future.

### **Ground Connector**

The auxiliary connector includes two screws which can be used as ground connectors. Any radio transceiver or transmitter requires a good ground to operate properly, and to prevent RF (Radio Frequency) energy from backing up to the unit and the shack. Be sure to properly ground your transceiver before using it with anything other than a dummy load. A good antenna with a low SWR (Standing Wave Ratio) will generally eliminate any RF in the shack issues.

**WARNING: Operating the transmitter without a properly installed antenna or dummy load may damage your transmitter, and will void your warranty.**

Two setup methods:

There are two ways to use the MMX Nomad:

1. Stand-alone QRP Morse Radio Station
2. Companion or assistant for decoding/encoding for your existing transceiver

In this Setup Guide, we will first cover setting up the Nomad itself for operation, followed by Electrical Setup and then Operation for each of the two modes in separate sections.

## **II. MMX Nomad Computer Setup**

The Nomad start up in **External Mode**, or Companion Mode, and is discussed in detail in Section II. This is displayed in the Frequency Button. In Figure 1 below, the Frequency Button shows a 40M frequency.

**1. Open the lid, and press the recessed power button on the rear panel.** The *Splash Screen* will display for approximately 3 seconds, followed by the *Main Screen then is displayed*, as shown in Figure 3 below.

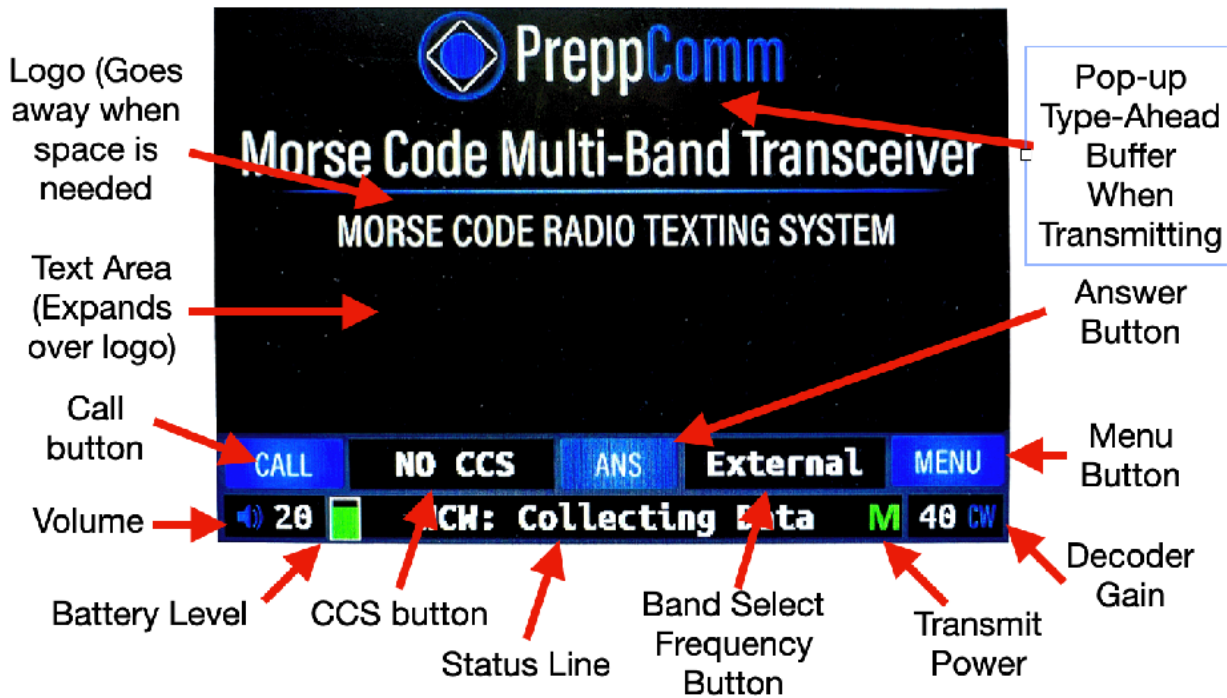


FIGURE 3: MAIN SCREEN

Spend a few moments to review the screen tags above. Take particular attention to the **CCS Button** (CCS = Captured Call Sign) and the **Frequency Button**, which at first power on reads **External**. Volume is set to 20 in this image, the maximum level, and the Decoder Gain is set to 40, its maximum gain. Note: normally, the Volume is set much lower for actual stations being decoded..

**2. Press the Menu Button, and the Main Menu screen will display, as shown in Figure 4 below.**

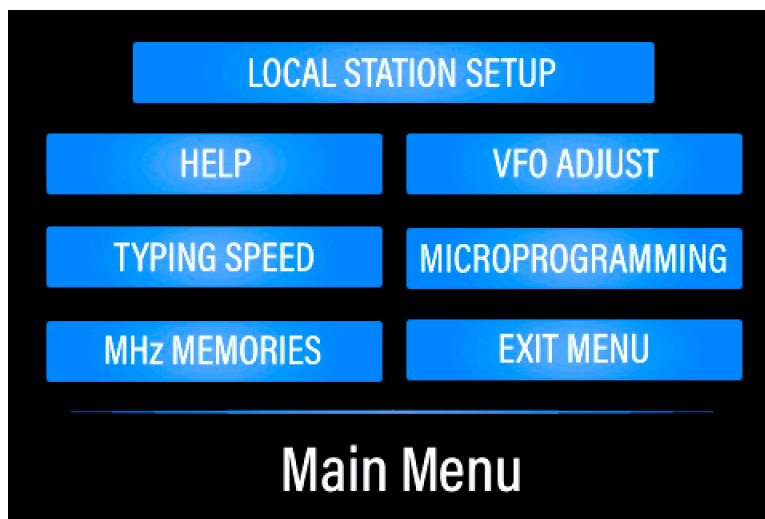


FIGURE 4: MAIN MENU

Note that Graphics and Firmware version numbers are now displayed in the lower bottom corners of the Main Menu (not shown here).

**3. Press the LOCAL STATION SETUP button** at the top of the menu. The *Call Letters* entry screen will display, as shown in Figure 5 below:

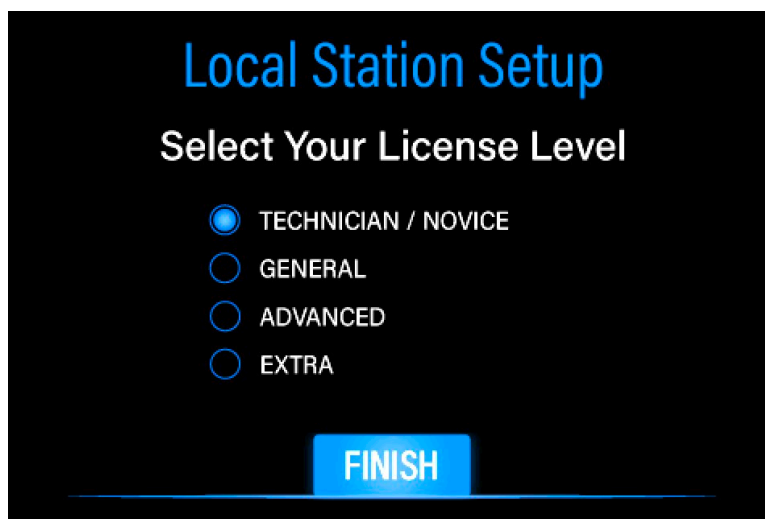


**FIGURE 5: CALL LETTERS ENTRY SCREEN**

**4. Enter your call letters assigned to you by the FCC.** Use backspace or delete to edit if you make a mistake. Note: you do not have to hold down the caps key - all caps is automatic. Press the **NEXT** button to continue.

**5. Using the NEXT buttons, proceed through a series of screens and enter the required information:** a) Name, or in ham radio lingo, your Handle, such as JOHN; b) Location, or QTH in ham lingo, such as CHICAGO, IL; Rig Type MMX NOMAD; Antenna Type. The antenna you are using, or DUMMY LOAD.

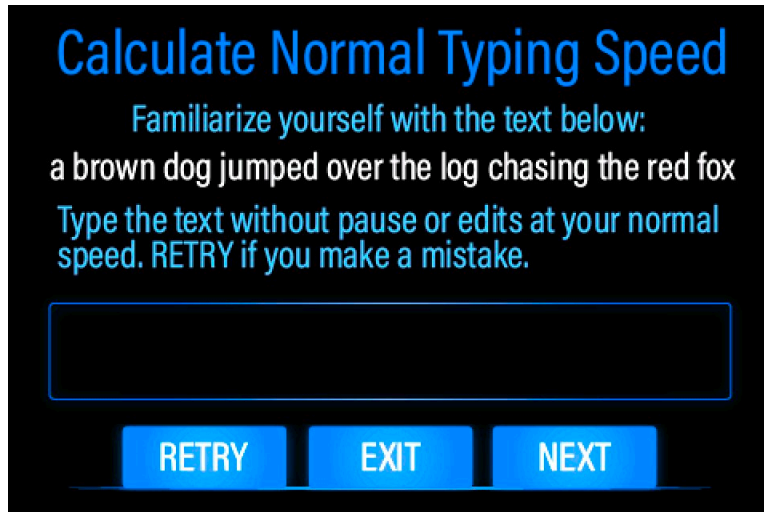
6. Press NEXT one more time and you see the License Level entry screen, as shown in figure 6 below



**FIGURE 6: LICENSE LEVEL ENTRY SCREEN**

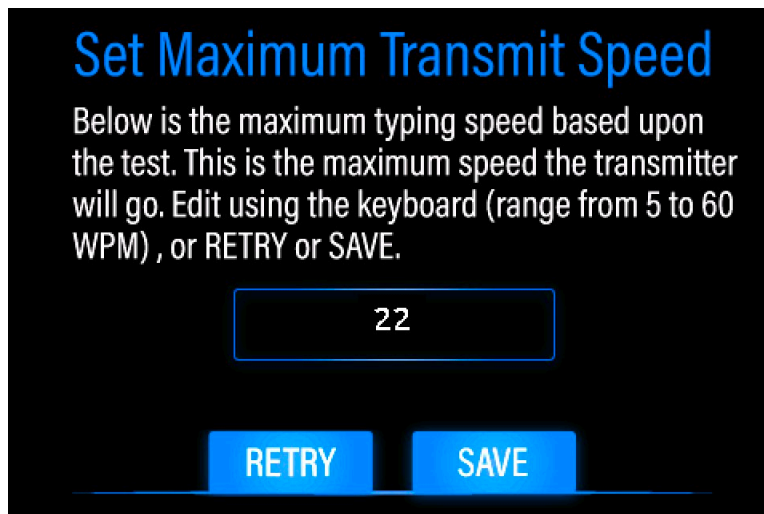
**6. Press the FINISH button on the License Level Screen.** You will be returned to the *Main Screen*. You have now completed initial setup of your MMX transceiver.

**7. Press the Menu button again, followed by the Typing Speed button.** You will see the Typing Test screen shown in Figure 7 below. Why are we taking a typing speed test now? Because you want to establish the upper limit of how fast the transmitter should be allowed to transmit Morse code, right at the start. Normally, the encoder typing speed is set by the decoder, based on the speed of the other station. However, if you can't send as fast as the other station, you need to let the computer know, so it will limit the WPM (Words Per Minute) based on your ability to type. This is important to enable well-formed Morse communications. If the transmitter is running too fast, it will end up pressing you to type faster, making more mistakes, not to mention not having fun. So take the time now to do this important setup step, unique to PreppComm Morse transceivers. Follow the directions on the screen as shown in Figure 7 below.



**FIGURE 7: TYPING SPEED TEST**

The result? Your transmit speed will match the other station unless it is going too fast, at which point your speed will be set to the maximum allowed. Once you complete the test, you will see this:



**FIGURE 8: TRANSMITTER MAXIMUM WPM**

The value you see on this screen is the maximum WPM the transmitter will transmit. To be clear, for MMX ZERO, this means the maximum WPM of the Morse Encoder, so the maximum transmit speed of the external transceiver. This is a computed value, based on a number of factors. Go with it for now - you can always come back and edit it. Press **SAVE** to complete the setup.

**8. Initial setup of the Nomad is now complete.**

### III. Learning Auto-CALL and ANS

In this section we are going to familiarize you with using the four different call and answer functions built into the MMX. These work the same for both external and internal transmitters.

**If not in External Mode already, press the Frequency Button until it shows External.** Then, follow the following steps.

1. **Press CALL**. On the status line, you will see the question **SET CALL WPM = ?** Asking you to specify how fast to transmit, as there is no history to base that on at this first transmission, and the **CALL** button will turn **RED**.
2. **Press SPACE BAR** to set the default 20 WPM. You can change the default later if you wish. If you are not hearing tone output, adjust your volume control and check your wiring. If all else fails, exit CALL by pressing ESC and press K, and try pressing CALL again. K toggles the tone output on/off. ESC is the instant, emergency exit from transmit mode. ESC has a number of other functions not covered here.
3. **Watch** as the MMX transmits the general call or CQ, using your call sign.
4. **Press CALL** to end the call. The current repeat continues until complete, and ends with a **K** appended. The **CALL** button will turn **AMBER** during the ending of the call. **K** means "Come Back (anyone)." Note that the general call will repeat until you end it. Typically you will run it for 30 - 90 seconds when on the air.
5. **Press NO CCS button** and enter the call letters of a station you would like to call. **Press SPACE or FINISH** to complete and return to the *Main Screen*.
6. **Note** the **CCS** Button now has the new call sign you just entered loaded. Normally, the decoder will fill the CCS button from a received station ID.
7. **Press CALL again** to start a directed call. Note it will automatically use 20 WPM from recent history, your call sign, and the call sign you entered into CCS.
8. **Watch** as the MMX calls the specified station. Press **CALL** again to end the directed call. Note that **KN** is appended at the end, which means "come back, only the station I am calling."
9. **Press the ANS Button twice, quickly**. The first press will result in a **RED** button, the second press will result in an **AMBER** button. Ignore the Type-Ahead Buffer Pop-Up for now.
10. **Watch** as the MMX transmits the answer-validate sequence. This is a short station ID used when you are responding to another station's CQ (general call) to attempt to establish a 2-way communication. If they answer you, then a 2-way has been established, and communication can begin. Answer Validate is not required if you make a call and someone answers you. In this case, you are using a CCS you entered. Normally, the CCS would have been set by the station calling CQ.
11. **Press ANS once**. The button turns **RED**, and a Type-Ahead Buffer pops up.
12. **Type a tilde (~) character, then press ANS again**. The button turns **AMBER**.
13. **Watch** as the MMX sends the initial station ID, followed by the **INFO text message**, which is generated when you type in a tilde character. The Type-Ahead Buffer goes away as soon as the

tilde is read out. The final station ID back to the other station completes the transmission, with a KN.

The key in this step is to understand the use of ANS pressed once, and using the tilde character to send the INFO message automatically from your information previously entered. You can create your own INFO message with microprograms later.

14. **Think up a short message**, such as "HI, BOB. HOW ARE YOU TODAY?"
15. **Press ANS and IMMEDIATELY type your message**. You should be able to type at least part of the message during the initial auto station ID, and then your message will begin to transmit.
16. **Press ANS again** to indicate to the computer that your typing is complete. Your message will first appear in the Type-Ahead Buffer, until the initial auto station ID has completed, and then your message will be read out one character at a time, and reappear as transmitted text in the main text area. Finally, since you pressed ANS the second time, it completes the transmission with another station ID.

The use of ANS to go back and forth with another station is very easy and simple, but it does mean an auto ID at beginning and end of each transmission. You can change this easily with simple microprograms. You can also "press" the CALL and ANS buttons using function keys (or press YOUR call and answer function), also using microprograms.

These built-in microprograms (CALL, ANSWER, and INFO) can be customized and controlled from function keys using RPL (Rig Programming Language) in our microprogramming system. There are 12 user-defined microprograms. Watch our YouTube video on microprogramming to get the "starter set" to play with. The starter set is also described in Section 18-10 of the **MMX Reference Manual**.

**17. You now have a basic idea of how to use the four main transmit functions:**

1. General Call
2. Directed Call
3. Answer-Validate
4. Answer

**This completes the basic training of the automated CALL-ANS functions.**

## IV. Choose your mode of operation

There are two more sections to the Guide:

1. **QRP Transceiver**: Getting started using your Nomad as a QRP (low power) Transceiver. This is referred to as the "**Transceiver Mode**." **Go to Section III below.**
2. **External Transceiver Decoder/Encoder**: This is for when you want to connect your Nomad to your base station transceiver to use as a CW decoder/encoder. This is referred to as the "**External Mode** or **Companion Mode**." This mode enables use of the internal computers for decoding and encoding, and uses the receiver and transmitter inside your base or portable station transceiver. This allows the decoder and encoder to operate on any band your base station operate on, and at a higher power level, set by your base station. This is also the MMX ZERO mode **This mode is covered in detail in the Nomad Reference Manual.**

## V. QRP Mode Electrical Setup

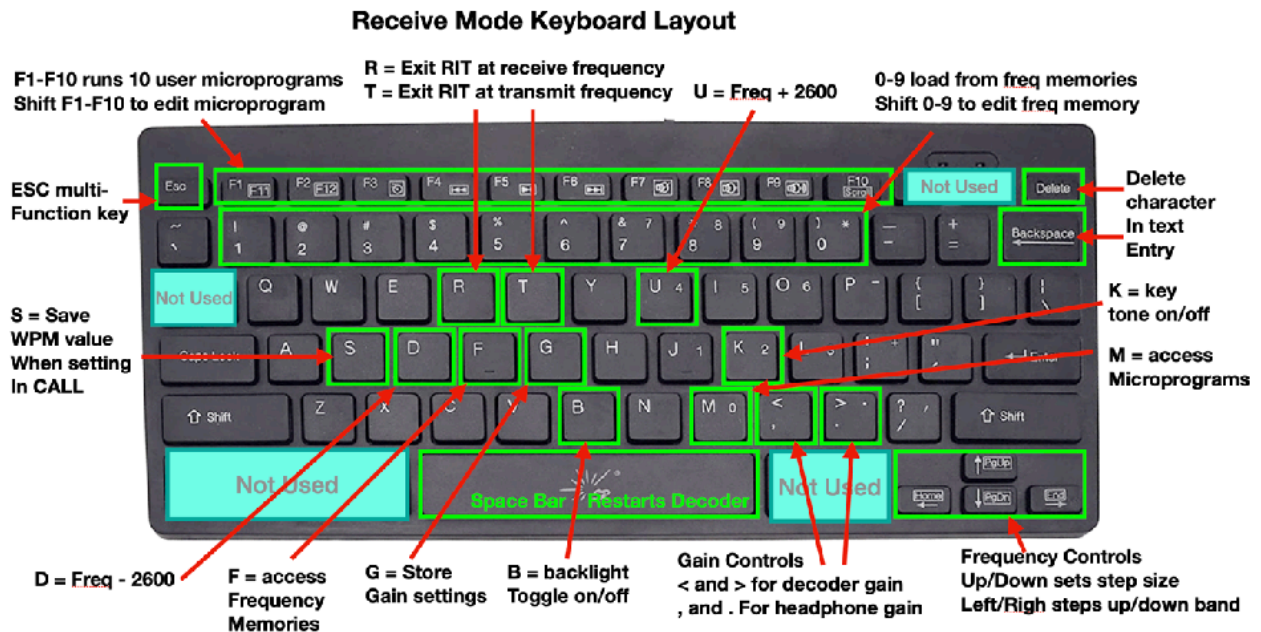
1. Wow, this step is easy! The Nomad contains all of the pieces you need - all pre-wired and ready to go! You only need a dummy load or an antenna connected to the antenna connector on the rear panel. Once that is done, you are all set up!

**WARNING: NEVER OPERATE THE TRANSMITTER WITHOUT A LOAD ON THE ANTENNA CONNECTOR. DOING SO CAN VOID YOUR WARRANTY FOR ANY DAMAGE CAUSED BY AN UNLOADED TRANSMITTER.**

### 2. Turn on the transceiver using the recessed RED power switch on the rear panel.

If you plan to use a key to transmit, this will be covered at the end of this section. The Nomad start up in External Mode, or Companion Mode, and is discussed in detail in Section IV. Pressing the External Mode button on the LCD Display (Band Select Frequency Button in Figure 3) switches to the 80 meter QRP calling frequency. Pressing repeatedly will cycle through the available bands (80M, 40M, then 20M, all at the QRP calling frequency) and External Mode.

The Receive Mode Keyboard for the Nomad is shown below. There is a large version for printing out in Appendix VI of the Nomad Reference Manual. It is a good idea to print out a copy so you can refer to it as you learn the keyboard receive mode commands.



**FIGURE 9: MMX RECEIVE MODE KEYBOARD COMMANDS**

Here are a few things to take note of at this time:

1. The < and > keys (unshifted, so the comma/period keys) control the speaker volume, or a powered speaker or headphone plugged into the headphone jack.
2. Delete and Backspace work the same - they delete the previously entered character, if it is still available to be deleted.

3. The Space Bar restarts the decoder, and causes the Speed and Hand Algorithms to be run after collecting data. This is a CRITICAL FUNCTION to run at the beginning of any new CW code stream!
4. The B backlight toggle: use this to turn on/off the backlight. There is a 3-minute auto-turn off after no activity, and it is still there, and when you turn the backlight back on, a new 3-minutes timer begins (when no activity is on the screen). Any activity will also restart this timer.
5. There are two “hidden” commands not shown in the diagram:

**SHIFT-H:** This toggles between the Medium Power mode (green M in status line) and the High Power mode (red H in the status line). We recommend keeping it at M most of the time to save battery power. The difference between 3 and 5 watts is not much at the other end, but can make a difference in difficult situations (if they are giving you a low signal rating, go to H).

**SHIFT-T:** This command enters the TUNE mode. The screen changes to the tune screen, where a bar shows the amount of power returned to the transmitter from the antenna, This is a critical measurement which is often converted into a SWR (Standing Wave Ratio) value.

The screen in TUNE mode looks like this:

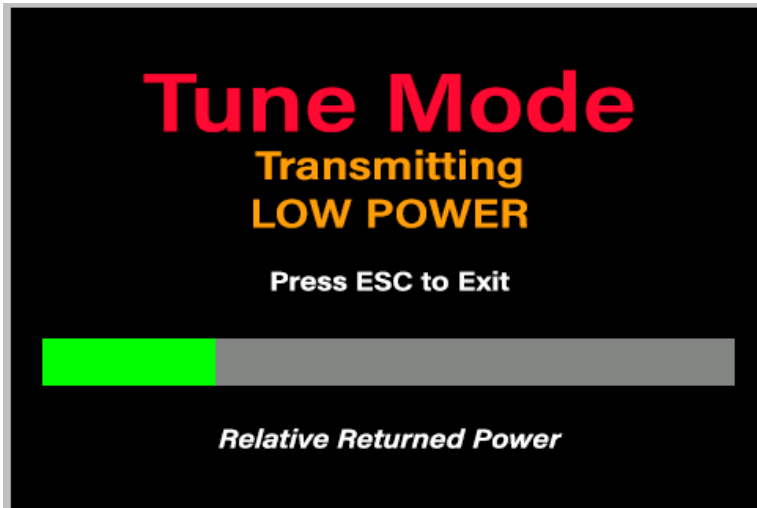


FIGURE 10: TUNE MODE SCREEN

Here, we see a 25% value on the bar. If the bar overflows, it turns red. Tune your antenna until you have the lowest green value (lowest SWR). Note: in TUNE mode, there is very little power going out of the transmitter. Once you have completed tuning the antenna, press ESC to return to the main screen.

Next we will look at using the receiver.

## VI. QRP Mode: Using the Receiver

NOTE: For this section, you will need a real antenna, and the **Frequency** button should show a frequency value, not External. Press the button to switch to an available band, which turns on the transceiver inside the MMX.

### 1. Background

Obviously, the first thing you need to do to tune in a station is... remove the dummy load (if you used one) and connect to a real antenna. A good antenna is a critical aspect of any radio station. Since you are running QRP (Low Power), a good antenna is truly a MUST.

One one level, tuning in a station is fairly simple: you scan up or down the band looking for a signal, and stop and adjust around the signal so that it is decoding correctly. On the other hand, it can be quite daunting.

Why can it be daunting? There are several reasons that you need to be aware of. First and foremost is the "band condition." The band can be "open" or "closed." It depends primarily on the sunspot cycle, the current sunspot activity, and time of day. If you hear nothing on the band, the band is probably closed, or, as they say, DEAD. Try later. However, a dead band does not mean you can't connect with someone nearby (local). If you have a scheduled time and frequency to meet, even if the band is dead, i.e., long distance communications is out, local can still work quite well, depending on your antenna. Typically, the 40 meter band opens in early to mid afternoon, and is open at various distances - ever growing farther and farther away - until very early morning. By that I mean oh-dark-thirty. It's all about the ionosphere and its height above the earth. It rises at night, and thus your "skip" distance increases.

### 2. Antenna Tuning

If your antenna is tunable - that is, there is some adjustment you can make to adjust its tuning - then the next step is to tune the antenna. This is done using the TUNE function

**SHIFT-T** on the keyboard enters TUNE mode at the current band setting (even in External Mode, where there is no transmitter output). Follow the procedure outlined above in section **V. 5**.

### 2. Receiver Incremental Tuning

After transmitting, that the **Frequency** Button changes to show **RIT +0**. RIT stands for Receiver Incremental Tuning. This decouples the receiver frequency from the transmitter frequency. The transmitter frequency remains constant, but you can make minor adjustments to the receiver frequency, as needed. Specifically, when another station comes back to you the first time, their frequency may be slightly off, and you may need to adjust the receiver frequency for optimal decoder operation. More on that below.

### 3. Receive Mode Keyboard Commands

Figure 8 above is a diagram showing the receiver keyboard commands. You can tell that you are in Receive Mode because both the **CALL** or **ANS** Button are **BLUE**. Press **MENU / HELP / RECEIVE** for a summary of these commands. The commands are on two separate screens, which you can access via the **NEXT** and **PREVIOUS** buttons. The **EXIT** button or the keyboard ESC will return you to the *Main Screen*.

Note that on the *Help Screen*, there is also help for **TRANSMIT** and **MICROPROGRAM** commands, as well.

There is a large version of this layout in **Appendix VI** of the **Nomad Reference Manual** you can use print out and as a guide. The diagram is also shown in Figure 9 of this Guide. For now, just note the following keys:

- a. the 4-way Receiver Frequency Control keys (bottom right)
- b. the Gain Control keys, (to the left of the frequency controls)
- c. the Restart Decoder (space bar) key.

Note that the initial frequency display shows the QRP Calling Frequency for the selected band, and the initial frequency step size of 1 Hz. 7.03 MHz is the small signal calling frequency for 40 meters, for example.

### 4. Volume Controls

There are two separate volume or gain controls on the Nomad. One controls the audio volume going to the speaker, or the headphone jack if something is plugged into it. The other controls the signal gain to the decoder. The default values are 10 and 30, and are shown at the bottom left and right of the *Main Screen* (see Figure 3).

Try adjusting both now, using the keys with or without the shift key down, watching the values change on-screen. For weak signals, increase the decoder gain to 40. For strong signals, you may need to reduce below 30. Audio setting is for your preference.

### 5. Tuning Practice

1. **Press the right arrow key**. Note the frequency has increased 1 Hz. You have increased the receiver frequency by 1 Hz.
2. **Press and hold the right arrow key**, and after 1 second, auto-repeat on the keyboard kicks in. Now you see the frequency step up in 1 Hz intervals.
3. **Press the up arrow key once**. You have now increased the step size to 10 Hz. Note that the last digit has become a small zero. This is the visual indicator of the step size. Repeat steps 1 and 2 with 10 Hz steps.
4. **Press the down arrow key once**. The step size has returned to 1 Hz steps.
5. **Note**: Typically, you will scan the band for a station by using 100 Hz or 1000 Hz steps. Do that now by pressing the **up arrow** key twice (two small zeros for 100 Hz steps), or one more time for 1000 H

steps, and holding the **right arrow** key down.

6. **Test:** See if you can return to the QRP calling frequency on the **Frequency** Button. Practice moving around. If you have a real antenna connected, check out 10 MHz or 5 MHz for WWV. Hint: Go to 10,000 Hz steps to get there quickly. Note that outside the ham band the status line displays **SW Listening** for Short Wave Listening. Naturally, you can't transmit there, but you can receive SSB, AM and CW.
7. ***If you hear a Morse Code signal***, adjust the frequency until you see the **CW IN** LED light up and track the signal. Using 10 Hz steps, move up and down in frequency steps to find approximate center of where the LED lights up. Adjust the decoder gain down if the **CW IN** LED is staying on between Morse Code tones (very strong signal), or up if the decoder is missing some tones (weak signal) using the Decoder Gain keys.

**If you don't hear any signals**, try again later in the day when the band is open.

8. When you first tune into a new station, with CW IN LED blinking, **press the SPACE bar to restart the decoder**. The decoder will start collecting data, and when it has enough, it will determine the sender's speed and measure 5 different factors related to the specific style of the sender's code, or hand. The decoder will then use that information to fully decode the captured signal, and then continue in real time.

Always restart the decoder when tuning in a different station to ensure proper capture of the sender's code.

9. Any decoded Morse Code will appear on the screen in GRAY letters. If a transmitting station call sign is detected, it will be captured automatically, and it will show up in place of the NO CCS (Captured Call Sign) text in the **CCS** Button.
10. Do not be surprised by strange decodings. If you have not tried, it is hard to focus on sending with your hand and thinking about what is the next letter in the word, and thinking what is the next word... Sounds easy, but It is not, although practice makes perfect. Also, there are a lot of stations that send what appears to be gibberish. Often it is weather or other digital information. Look for conversations that sound like two or more people talking, or call CQ. Also, a lot of abbreviations are used to speed communications, so check out the abbreviations list in Appendix VII in the **MMX Reference Manual**.

## 6. Calling CQ

1. If you can't find anyone calling CQ, find a quiet spot on the band to transmit. Make sure the Green **ENABLED LED** is lit up. This tells you that your license allows you to transmit on this frequency. You can't transmit if that LED is not lit.
2. Use the **CALL** Button to do at least a 30 second general call.
3. Listen for at least 30 seconds to see if anyone replies. Repeat. If you get no response after 5 or 10 calls, try longer calls. Maybe the band is dead, or your antenna is not working properly?

4. If someone answers, use the **left-right arrow keys** to adjust the frequency of the receiver for best decoder operation (you will be in RIT Mode automatically).
5. When they pass back to you, use the **ANS** Button. You are one your way!
- 6.

## 7. The Tuning Rule: Before You Answer a CQ

Calling CQ and having someone answer you automatically means you and they are on the same frequency. You do not have to worry about the Tuning Rule. But if you are answering someone else's CQ, you need to make sure you are on the correct frequency.

There are actually TWO frequencies where you can hear another station and have the CW LED flashing and the decoder happily operating. For example, if the other station is transmitting at 7.03 MHz, you can tune them in at 1300 Hz higher or lower, or 7.031300 MHz or 7.028700 MHz. Just to keep things sane, we subtract 1300 Hz from the receiver frequency, so it shows 7.03 MHz when tuned to a 7.03 MHz station with a 1300 Hz tone, but you can also tune the station 2600 Hz higher, at 7.032600 MHz and get the same tone. Sound complicated? Well, OK. So just follow the **Tuning Rule**.

## 8. The Tuning Rule

1. If you made the call and someone answered, skip this - no rule required.
2. If you want to answer a call: If increasing your frequency one step makes the received tone go DOWN in frequency, skip this.
3. If the tone went up, Press the **D** key to drop down 2600 Hz, and adjust your frequency slightly to receive the other station accurately (make sure you are within the decoding frequency bounds).

**NOT using the Tuning Rule is the cause of many missed QSO's (ham lingo for an on-air conversation). Do not forget to do this step!**

Experiment with this process by tuning in stations, then applying the Tuning Rule.

## 9. Getting it Right

Learning the ropes is a slow process. The best way to become comfortable with the process is to practice. Practice practice practice! There are two major areas to practice:

1. **Operating the Nomad:** This is the easy part. Use the Nomad Reference Manual. There is so much more the Nomad can do we have not touched on.
2. **Tuning and Doing QSO's:** This is harder, because there is much to learn: what are the best frequencies to use? What is the best time of day to operate? How to identify different styles of operation? How to establish your own style? How to use microprogramming to support your own style? This is the more time-consuming part, but especially if you are a prepper, do it NOW, and do it FREQUENTLY so if the S does HTF, you will be comfortable operating your communications safety net!