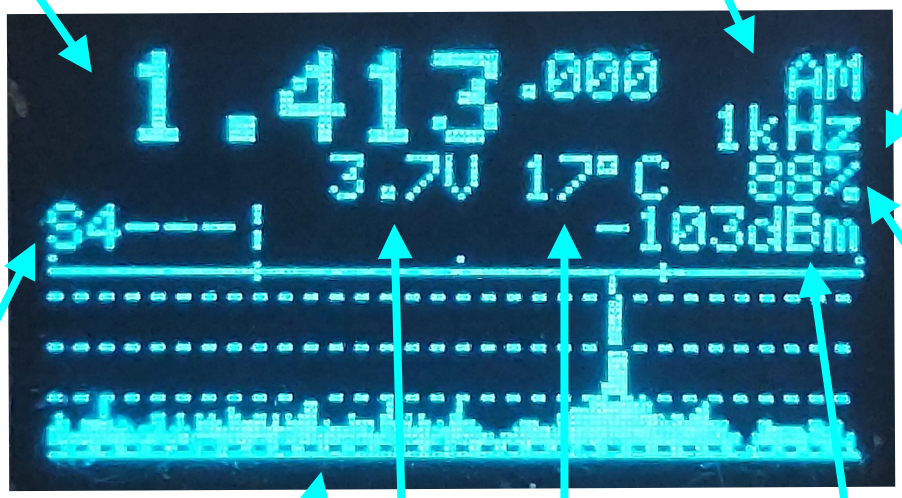
# Pi Pico Rx

# User Manual


**Revision 1**

# Default Home Screen




Mode (LSB/USB/AM/FM/CW)

Tuning Frequency

Tuning Step

CPU load

Signal Strength Meter
(S Units)

CPU temperature

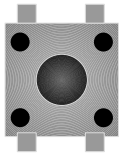
Spectrum Display

Signal Strength
(dBm)

Battery Voltage

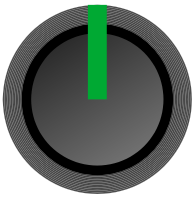
# Home Page Actions

Menu



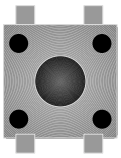
press

Encoder



press

Back



press

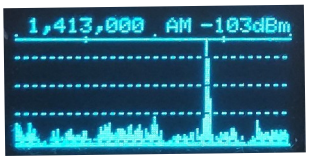
## Enter Menu



...

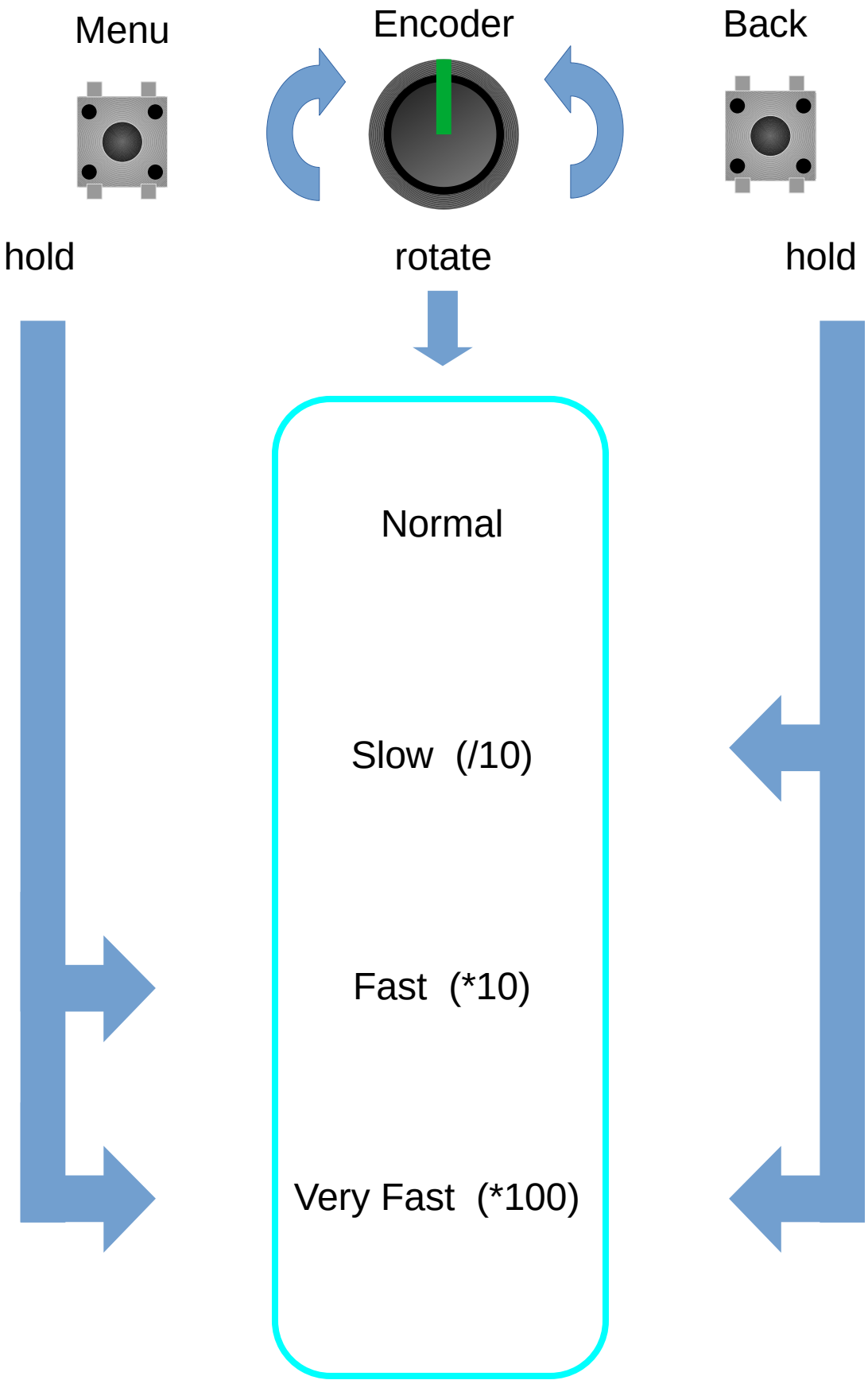
## Memory Recall


## Change View

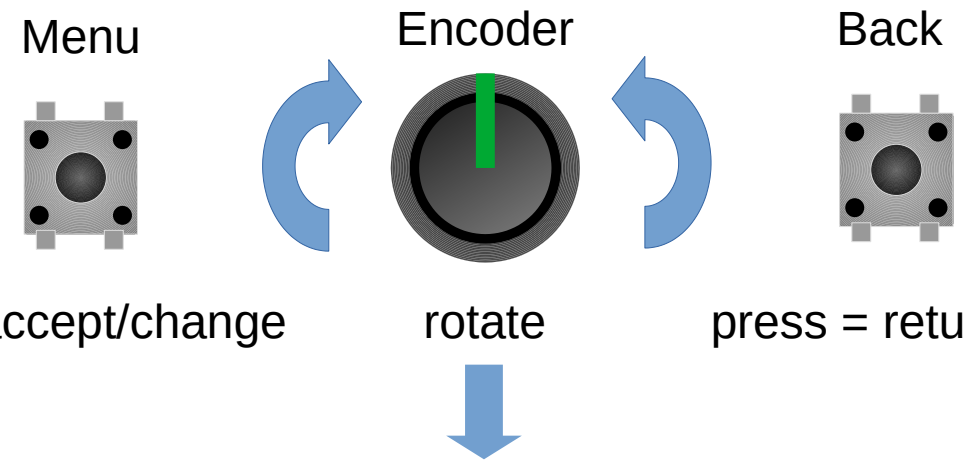





# Tuning


Menu
Encoder
Back
hold
rotate
hold
Normal
Slow (/10)
Fast (*10)
Very Fast (*100)

# Main Menu




- Frequency
- Memory Recall
- Memory Store
- Volume
- Mode
- AGC Speed
- Bandwidth
- Squelch
- Auto Notch
- Band Start
- Band Stop
- Frequency Step
- CW Tone
- HW Config

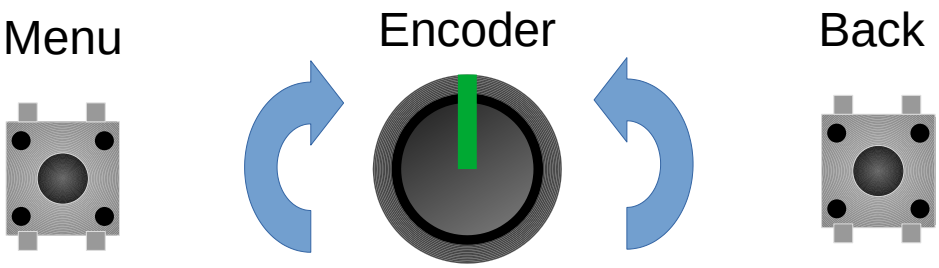
# Menu Settings – Part 1

| Setting | Range | Description |
|---|---|---|
| Frequency | 0-30 MHz | Manual Frequency Entry. Selecting a frequency outside the current band will reset the band limits to allow free-tuning across the full frequency range. |
| Memory Recall | 0-511 | Select One of 512 memory channels<br>(A channel can be a single frequency or a band of interest) |
| Memory Store | 0-511 | Save the current frequency, mode etc. in one of 512 memory channels |
| Volume | 0-9 | Audio Volume 0=mute |
| Mode | | Receiver mode (AM, FM, LSB, USB, CW) |
| AGC Speed | Very Slow - Fast | Automatic gain control adjusts the gain so that weak and strong stations have a similar volume level. Fast settings respond quickly to changes in signal level, slow settings change more gradually. A slow setting might prevent adjustments to gain during gaps in speech. |
| Bandwidth | Very Narrow – Very Wide | Adjust the filter bandwidth, a narrow setting reduces background noise and can improve intelligibility of weak signals. A wider settings allows through a greater range of frequencies giving better sound quality for strong signals. |
| Squelch | S0 - S9+30dB | The squelch function gates background noise. The signal is muted unless the signal strength reaches a defined level. Squelch can be adjusted to allow signals to be audible when active, but remove background noise when inactive. |
| Auto Notch | On/Off | The automatic notch filter can be used to remove interfering tones. If stable interference is detected consistently at the same frequency, a narrow notch is enabled to automatically suppress the interference. |

# Menu Settings – Part 2

| Setting | Range | Description |
|---|---|---|
| Band Start/Band Stop | 0-30MHz | The band-start and band-stop settings define the tuning range of the current band. The band-start and band stop settings are stored in memory channels allowing memory channels to hold bands as well as individual frequencies. |
| Frequency Step | 10Hz-100kHz | Set the default tuning step. Note that fast and slow tuning from /10 to *100 the nominal frequency step can be achieved by holding the menu/back buttons. |
| CW Tone | 100Hz - 3000Hz | When received, the CW signal has a very narrow bandwidth close to DC, lower than the range of human hearing. The CW tone increases the frequency of the CW signal to a frequency that can be heard comfortably A frequency between 500Hz and 1000Hz is typical. |
| HW Configuration | | The Pi Pico RX is designed to be as flexible as possible to allow different configurations and experimentation by constructors. A separate hardware configuration menu is provided to configure the hardware. |

# Hardware Configuration Menu




press = accept/change

rotate

press = return/cancel

Display Timeout

Regulator Mode

Reverse Encoder

Swap IQ

Gain Cal

Flip OLED

OLED Type

Display Contrast

USB Upload

# Hardware Configuration Settings-Part 1

| Setting | Range | Description |
|---|---|---|
| Display Timeout | Never, 5 seconds – 4 minutes | Display turns off after a period of inactivity. This can be useful for power saving when running from batteries. This may also help prevent noise being generated by the display being received. |
| Regulator Mode | FM/PWM | The Pi Pico contains a switched-mode regulator. Under light loading, the regulator can switch into a FM mode to save power, this does however increase supply ripple. The PWM setting reduces supply ripple. |
| Reverse Encoder | On/Off | This allows the direction of the encoder to be reversed (clockwise/anticlockwise). This allows for variations in hardware construction where the encoder is wired in a different configuration. |
| Swap IQ | On/Off | Swap the I/Q ADC input channels. Can be used to correct for a difference in wiring of the LO inputs, or IQ inputs. It causes the received spectrum to be reversed so that positive frequencies become negative and vice-versa. This is also useful for checking image rejection. |
| Gain Cal | 1-100dB | Specifies the gain of the receiver, this is used by the software to calculate the signal strength for the S-meter and dBm signal strength. The breadboard version of the receiver with default components has a gain of 57dB. Constructors may use alternative gain values, additional filters or preamplifiers. This setting also allows the S-meter to be calibrated so that it reads the correct signal strength with a known input signal. |
| Flip OLED | On/Off | Allows the display to be flipped horizontally, this may be useful to constructors who need to place the display in a different orientation. Only landscape orientations are supported. |
| OLED Type | SSD1306 /SH1106 | Allows different types of OLED display to be used. I2C OLED displays using SD1306 and SH1106 driver chips are supported. |

# Hardware Configuration Settings-Part 2

| Setting | Range | Description |
|---|---|---|
| Display Contrast | 0 to 15 | Allows contrast of OLED display to be adjusted. Lower values reduce power consumption, higher values improve readability in bright surroundings. |
| USB Upload (Memory) | | Allows user specified memory channels to be loaded in bulk via USB replacing the default memory channels. A simple Python utility can be used to upload settings from a CSV files via USB serial interface. |
| USB Upload (Firmware) | | Places Pi Pico into USB firmware upload mode. The device appears as a USB drive, and can be upgraded by dropping writing a .uf2 firmware image. This is equivalent to holding the pico push-button during power on. |