ADX-MINI Firmware

Document Revision 0.02 – Preliminary --

November 17, 2022

Acknowledgement: The ADX-MINI is derived from the ADX, and ADX-UNO projects by WB2CBA. More info about the ADX project can be found here: https://antrak.org.tr/blog/adx-arduino-digital-transceiver

This firmware update is based on ADX-UNO firmware. The main difference is adding band encoding so that more than 4 bands can be supported without requiring the user to reprogram the radio.

It is recommended for builders of the ADX-MINI to also download the ADX-UNO manual which can be found here: https://github.com/WB2CBA/ADX-UnO-V1.3

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Changes from ADX_UNO Firmware

Band Encoding

The ADX radio has a simple UI with 5 status LEDs. In the original code 4 of these LEDs are used for indicating both the 4 supported modes (WSPR, JS8, FT4, and FT8) and 4 bands (80m, 40m, 20m, and 17m). Other bands are supported but require the user to change the source code in order to choose a different 4 bands.

The main purpose of this new firmware version is to add all band support and the only way to do that is by encoding the band selection. The encoding is listed in the appendix of this document.

Factory Reset

This is a new feature. By pressing the “<” pushbutton during power-up, the ADX will use the factory default user settings for mode, band, and si5351 calibration.

I usually use this feature when programming a new radio. If you press both the “<” and “>” pushbuttons during power up, you will enter calibration mode with factory reset values.

Manual TX

Manual TX is not something that the user does (except during Antenna tuning or bench-mode power measurements) and it can potentially damage the PA if the TX button is accidentally pressed. Therefore this firmware version requires a long-press of the TX pushbutton in order to activate a manual TX.

Calibration

The calibration steps are:

1) Connect a scope or frequency counter to the CLK2/CAL testpoint
2) Power OFF and press “<” and “>” (or just “>”) **** and then power ON
3) After the WSPR and FT8 LEDs flash release the pushbutton(s)
4) Now you are in calibration mode and “<” and “>” can be used to adjust the CLK2/CAL frequency to exactly 1 MHz
5) Press the TX switch to save the calibration and exit calibration mode

**** NOTE**
When calibrating a new radio it is recommended that you press both “<” and “>” pushbuttons during power up. This will enter calibration mode with factory reset values. If subsequent calibration is required then you should press only the “>” pushbutton to enter calibration mode while preserving the previous cal settings.

Operating

Warning: Never operate the ADX-MINI without a band module in place or without a suitable antenna or dummy load. The class-E PA is susceptible to damage under these conditions. In other words, it you press the TX button without the proper band module installed you will surely let the magic smoke out of the BS170 PA FETs.

Digital Mode Selection

The ADX powers up in this mode. While in this mode a short click of “<” or “>” will cycle through the 4 supported digital modes:

- Digital Mode 1 = WSPR
- Digital Mode 2 = JS8
- Digital Mode 3 = FT4
- Digital Mode 4 = FT8

A short click to the TX pushbutton will save the current radio mode to eeprom.
A long press of the TX pushbutton will activate a manual TX (for tuning).
A long press of either the “<” or “>” pushbutton will enter the band select mode.

Band Selection

While in band select mode, a short click of “<” or “>” will cycle through the bands: 160m, 80m, 60m, 40m, 30m, 20m, 17m, 15m, 12m, 10m, and 6m. Refer to the band encoding table in the appendix of this document.

A short click to the TX pushbutton will save the current band to eeprom.
A long press of the TX pushbutton will activate a manual TX (for tuning).
A long press of either the “<” or “>” pushbutton will exit the band select mode.

Appendix

Band Encoding Table

	WSPR LED	JS8 LED	TX LED	FT4 LED	FT8 LED		
160m	1	1	x	1	1	Group 3	Band 3
80m	1	1	x	1	0	Group 3	Band 2
60m	1	1	x	0	1	Group 3	Band 1
40m	1	1	x	0	0	Group 3	Band 0
30m	1	0	x	1	1	Group 2	Band 3
20m	1	0	x	1	0	Group 2	Band 2
17m	1	0	x	0	1	Group 2	Band 1
15m	0	1	x	1	1	Group 1	Band 3
12m	0	1	x	1	0	Group 1	Band 2
10m	0	1	x	0	1	Group 1	Band 1
6m	0	0	x	1	1	Group 0	Band 3

Note: This band encoding was designed so that at least two LEDs are ON for any band which helps the user differentiate band selection from radio mode selection, since during Radio mode selection only one LED is on for each radio mode (WSPT/JS8/FT4/FT8).