RELEASE NOTES FOR MSNA FIRMWARE VERSION 5.00

2016-04-01

This MSNA firmware release more than quadruples the data buffer size, adds several new major features, a number of minor features/enhancements, a new context menu scheme, some additional diagnostic aids, and a few minor bug fixes. The major features include the following:

- Rotary Encoder support for Signal Generator tuning.
- Frequency Counter functions.
- Frequency Offset for Local Oscillator functions
- Segmented Scans for better coverage of wide frequency ranges and harmonic scanning.
- Automatic scaling and zoom functions.

MSNA VERSION 5.00

Firmware Version 5.00 includes the following changes since the previously released version (V4.21):

1. Moved dBm row on sig gen screen up 4 pixels to avoid overrunning the green + rectangles.

2. Tweaked vertical scaling to reduce possibility of trace going into permanent button area.

3. Added support for rotary encoder plugged into serial port jack.

4. Added dump$ and $ as a "hidden" diagnostic function to display RAM contents and made changes in map to protect the variables and some of the FAT buffer used by the loader.

5. Added dump# and # as a "hidden" diagnostic function to save a binary image of the content of the RAM to a file.

6. Added the DOS partition type code to the splash screen.

7. Added frequency offset to sig gen specified in macro data sheet with screen display.

8. Added tweaking indicators to sig gen screen for Reference Clock and Frequency Offset.

9. BUG-FIX - Cleared the files array before reading the directory to get rid of old file names which could be selected if in partially used directory sector.

10. Added 1 ms delay per loop in checkSDstatus to extend time out to 1 second to handle slower SD cards.

11. BUG-FIX - Buffer refresh was using the background color from the first column for the entire row which messed up background color when editing only part of a row.

12. Double-spaced the remaining few menus that were still single-spaced.

13. Implemented opmode.freqctr for frequency counter mode, un-scaled input up to about 17 MHz.

14. Added second freqctr mode with 8:1 pre-scalar that works up to 40 MHz.

15. Rearranged timers to free up one to do one second timing for frequency counter. Side tone now included in 0.5 ms timers.

16. Implemented LC meter.

17. Implemented auto-scaling of horizontal (frequency scale) for band pass plots to center plot and reduce span to an integer multiple (x2 to x8) of the pass band. This function is very useful for setting up parameters for crystal testing and sorting and for LC measurements.

18. Changed band pass plot classification criteria to only requiring two roll-off points in the plot area.

19. Changed start mode to toggle between automatic and manual when 'A' is entered and got rid of the 'M' and 'T' hot keys in PLX mode.

20. Changed siggenInit to not render + and - buttons and step bar indicators when not used.

21. Moved NUMPAD to lower-right corner to show more of the opmodes info.

22. Added progress indicator to plot screens.

23. BUG FIX - Switching between function key menus was not working in Terminal mode. Also, entering CTRL-M was closing context menu.

24. Revised sweepdds to speed it up.

25. Added support for scanning harmonics with measurement receiver.

26. Changed dataPoints from doubles to ints x 100 to reduce RAM usage

27. Changed calibrationData from doubles to ints x 100 to reduce RAM usage

28. Dropped .freq from segments and changed .dBm_hi and .dBm_lo to ints x 100 to reduce RAM usage

29. Changed calibration buffer size to 200 to reduce RAM usage

30. Increased dataPoints array size from 1 K ints to 4 K ints.

31. Added Segment Scans to better represent very wide scans (e.g., 1 to 61 MHz).

```
32. Added cursors to segment scans and implemented a zoom function
    which scans the frequency range between the two cursors.
```

Notes:

Items 1, 2, 11, 12, 18, 19, 20, 21, and 23 are cosmetic changes that have no effect on functionality and features.

Item 3 supports a rotary encoder plugged into the same connector used for the serial interface. It allows tuning the signal generator frequency with a knob and is covered in detail in the MSNA Quick Reference for Version 4.21 dated 2015-12-20.

Items 4 and 5 implement undocumented tools intended to support fault diagnosis by giving access to the content of the dsPIC's RAM. The RAM content may be displayed on the MSNA display or dumped to a file named "RAM" on the SD Card.

Item 6 displays the type code of the primary DOS partition of the SD Card on the splash screen. The MSNA application reads this code but will attempt to use the SD Card no matter what the type code is. The boot loader will not attempt to use an SD Card with a partition type code other than "04", "06", or "0E".

Item 7 adds the ability to specify a frequency offset as a convenience for using the signal generator function as a local oscillator/VFO for testing, tuning, and operating rigs using frequency conversion techniques. See the MSNA Quick Reference for Version4.21 dated 2015-12-20 for details. The frequency offset is specified in a macro data sheet line formerly labeled "CUSTOM CELL-3". When the firmware is installed on new MSNA hardware or the EEPROM is reset (SCROLL-LOCK > ~) this line label will be set to the new default "FREQ OFFSET". When the firmware is installed as an upgrade, the line label will remain unchanged. The user can manually change the line label by editing the Macro DE Template (SCROLL-LOCK > RIGHT-ARROW > F).

Items 7 and 8 add reference information to the Signal Generator screen to indicate when there is an offset specified by the macro and when the frequency line is displaying something other than the RF OUT frequency (i.e., reference clock, frequency offset, or virtual frequency).

Item 9 fixes a problem related to selecting files from the DIR listing using the touch screen. The file name list used to select a file by tapping the DIR line on the screen was not getting cleared. When the last directory sector was displayed, entries following the Dir End entry were left over from the previous sector and could be selected in error by tapping a blank line. There is still a related, known issue here; pressing Enter, Tab, or Back Space on the keyboard will also select a DIR line. The solution for this minor issue will have to wait for a future release.

Item 10 extends a time out used to sense when the SD card fails to respond to a status query. This extends the timeout from about 20 ms to about one second allowing us to use older, slower SD Cards.

Items 13, 14 and 15 implement two frequency counter modes. The low-frequency mode works from 1 Hz up to 17 MHz and the high-frequency version works from about 1 MHz up to 40 MHz. Operation will be covered in a new tutorial.

Item 16 implements an LC Meter which measures capacitance and inductance using a frequency sweep through a serial LC network consisting of one known capacitor and one known inductor and one unknown capacitor or inductor. Operation is covered in ***Tutorial 7 - LC Measurements***.

Item 17 adds convenience when setting up the plot area for crystal sorting and to improve resolution of the LC Meter.

Item 22 adds a green bar under the display title that lengthens during frequency scans to graphically show progress.

Item 24 speeds up the frequency scan such that a 600-point scan completes in about 0.38 seconds.

Items 25 and 31 are two versions of segmented scans that allow scanning and plotting very wide frequency ranges with small steps. Normally these new functions will be used with a measurement receiver and the frequency step size will be set to smaller than the MR's IF pass-band filter band width.

Items 26, 27, 28, and 29 were implemented to free up enough RAM to allow the data buffer to be increased to 4,000 points (item 30). This is enough to hold 1 MHz worth of data with a 250 Hz step. Operation is covered in ***Tutorial 9 - Measurement Receiver Segmented Scans and Harmonics***.

Item 32 provides the ability to position two cursors on segmented scan plots and displays the power level and frequency at both cursors and the frequency difference between them. A zoom hotkey will initiate a scan across only the frequency range between the cursors.