W8TEE / K2ZIA Antenna Analyzer

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PCB sold on QRPGuys.com

Forum at https://groups.io/g/SoftwareControlledHamRadio

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Antenna Analyzer – Features 1

VSWR measurements for continuous scans for any amateur band frequency between 1-30MHz (60 MHz).

Predetermined US band edges for quick entry of scan start and end points – all lower and upper band limits serve as default scan points, fully adjustable with a simple turn of the encoder. Band edges can be changed for other countries.

Large (3.5" x 2.125") color TFT display for scan plots – a 262,000 color display with 480x320 pixel resolution.

Save scan data. An optional 2Gb SD card allows you to save over 9000 scans.

Scan data export. The scan data are saved in the popular CSV format and can be exported via the USB port for use in other programs (e.g., Excel, graphics package, text editor, etc.)

Antenna Analyzer – Features 2

You can have overlays. Run a scan and save it to the SD card. Now make a change to the antenna, and run another scan and immediately overlay the previous scan plot to the current scan plot to assess the impact of your change on the antenna.

100 scan point resolution regardless of scan spread.

Fast scans, typically less than 5 seconds for a 100 step scan.

Portable use with 9V battery or use a 9V wall wart when grid power is available; perfect for in the field or home use.

Simple two control user interface...and one of those is the power switch.

High quality PCB that simplifies connections to the Arduino Mega2560 Pro Mini board and the TFT display.

Antenna Analyzer – Schematic



Antenna Analyzer – Wheatstone Bridge



Wheatstone bridge circuit diagram.

The unknown resistance Rx is to be measured;

resistances R1, R2 and R3 are known and R2 is adjustable.

If the measured voltage VG is 0, then R2/R1 = Rx/R3.

Antenna Analyzer – SWR Bridge



Antenna Analyzer – PCB 1



Antenna Analyzer – PCB 2

- www.QRPGuys.com PCB \$10
- Website also has users manual, assembly manual, software source file
- PCB contains a voltage regulator, bias / dropping resistors, and the SWR bridge



Antenna Analyzer – Arduino

- Model "Mega 2560 Pro Mini"
- \$10-15 from Ebay



Antenna Analyzer – Arduino



Antenna Analyzer – Arduino

Key Features

- Completely compatible with original Arduino Mega2560
- Pin pitch: 0.1 inch
- Size: 5.42cm*3.68cm
- With Atmega16U2 chip as the USB to Serial converter
- Working voltage: 5V
- Input Voltage: 7-12V
- Analog Input Pins: 16
- Digital I/O pins: 54

The Mega2560 Pro Mini board has all the IOs of Arduino Mega2560 R3, following are the parameters.

- Microcontroller ATmega2560
- Operating Voltage 5V
- Input Voltage (recommended) 7-12V
- Input Voltage (limits) 6-20V
- Digital I/O Pins 54 (of which 15 provide PWM output)
- Analog Input Pins 16
- DC Current per I/O Pin 40 mA
- DC Current for 3.3V Pin 50 mA
- Flash Memory 256 KB of which 8 KB used by bootloader
- SRAM 8 KB
- EEPROM 4 KB
- Clock Speed 16 MHz

Antenna Analyzer – LCD

- \$10 off Ebay. Had to buy 2, first one arrived cracked.
- With micro-SD memory card !



Antenna Analyzer – Frequency Generator

• \$25 DDS

- Analog Devices AD9851 Direct Digital Synthesis Integrated Circuit Good up to 60 MHz
- PCB is probably a copy of a development / demonstration board



Antenna Analyzer – Card stack 1



Antenna Analyzer – Card stack 2



Antenna Analyzer – In case



Antenna Analyzer – Cost

Item	Cost	Quantity
DDS	24.59	
Cap assortment	7.99	(1000)
BNC	1.01	(5)
Knobs	3.76	(5)
6 pin header	2.84	(5)
4 pin header	2.16	(5)
Encoder	2.82	(2)
Jumpers	1.24	
Inductor	1.09	(4)
LCD	9.99	
Regulator	0.99	(4)
1N400 Diode	11.58	(10)
Bipolar MSA amplifier	5.48	(5)
Switch	3.99	(5)
Resistors	9.08	(1000)
1N34A Diode	0.99	(4)
LM358 Op Amp	2.49	(5)
Mega	15.66	
40 pin header	1.77	(5)

Total

99.52 – with lots of spare parts

Antenna Analyzer – Boot Screen

Milford Amateur Radio Club Antenna Analyzer Upgraded Software Version 03.3.1 Original Design By Jack-W8TEE & Farrukh-K2ZIA Nodified Software By John-WA2FZW & Edwin-PE1PWF Additional Testing Bu Jim-G3ZQC, Dick-K2RH & Glenn-VK3PE Using A09851 008

Antenna Analyzer – Menu 1



Antenna Analyzer – Menu 2

View Table Plot>Serial View Mins	Analysis	View/Save Save Scan View Plot Overlag	Maintenance	_
		View Table Plot>Serial View Mins		

Antenna Analyzer – Menu 3

Analysis	View/Save	Maintenance
		Delete File
		Delete All
		Reset Seq #
		Clear Mins
		Erase EEPROM
		EEPROM>Serial
		Mount SD
		Freq Cal
		Main Menu

Antenna Analyzer – Band



Antenna Analyzer – Lower Limit



Antenna Analyzer – Upper Limit



Antenna Analyzer – Multi Band Antenna



Antenna Analyzer – Problem?



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Next Steps:

Improvements to increase usable frequency to 6 Meter

Put in a case. Find out how to download competed scan data over serial port. Calibrate frequency generation. Re-assemble Hustler 5BTV and test. Find out if my G5RV is "off a bit" due to coax feed line too close to twinlead section.

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Has Bill of Materials, Assembly directions, Operating instructions, and Software Downlods.

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Has updates, improvements, discussions, assistance....