



Fox Delta

Amateur Radio Projects & Kits

AAZ-0914A 50MHZ Antenna Analyzer Testing Guide by Tony / I2TZK

SWR Analyzer - 4 steps for a quick test

	Step	What to do	Expected result	What to do if test fails	Component tested
1	<i>Visual inspection</i>	Carefully looking at SWRA board verify that all components are present, soldered at right place and right value. See paragraph "Visual inspection"	Board is accurately assembled		
2	<i>Power on the board</i>	Power on SWRA board connecting to a USB port or to a +5V power supply.	LED next to the BNC connector lights up. A 10MHz signal is present at the BNC connector.	Verify all voltages, see paragraph "Voltage measurement" See paragraph "Signal at BNC"	Pic 18F2550 AD9850/51 DDS generator
3	<i>USB channel</i>	Connect to a PC USB port and run "SWR Analyzer.exe"	LED starts a sequence of 3 rapid blinks then a pause.	See paragraph "USB Communication channel"	Pic USB module
4	<i>SWR test</i>	Select "Generator" mode and connect a 50ohm resistor	SWR measurement must change		AD8307 Detector

1 Visual Inspection

➤ Carefully looking at your SWRA board first go through the KIT PART LIST and check that **all required components are installed, soldered and no one is missed.**

➤ For each component:

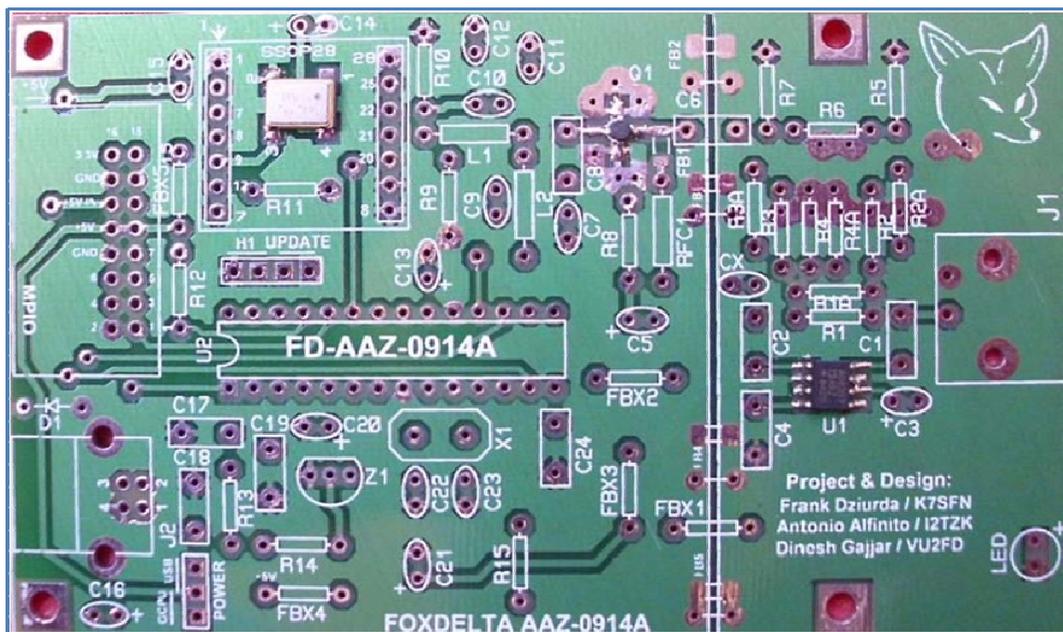
- Verify that his **value** is the one indicated by the PART LIST
- Verify that it is **positioned** at the right place as shown by the COMPONENT SIDE SILK, in doubt use the board's picture to compare with

AAZ – 0914A KIT Parts List:

Quantity	Part ID	Part Details
1	U2	PIC18F2550 FW V6.01
1	AD9850 Adapter	AD9850 & SMT Caps
1	U1#	AD8307 SO8 Pre-Soldered on Board
1	OSC#	125MHZ SMT OSC 3.3V SMT
1	X1	20MHZ Crystal HC49
1	LED	3mm LED
1	Q1#	SGA3486
1	IC Socket	28PIN DIP
1	PCB	FD-AAZ-0914A DSPTH PCB
1	Z1	LM385-2.5V
1	U3#	AMS1117 – 3.3V
2	L1, 2	HF LPF Inductors 0.22uH
4	FBX1, 3, 4, 5	Ferrite Bead Inductors
2	RFC1, FBX2	100uH RFC
1	J2	USB Socket, R/A, PCB Type
5	FB1#, 2, 3, 4, 5*#	Ferrite Beads 1206 SMT
1	FRC16 R/A Socket	Multi-Purpose Input Output Extension
1	J1	BNC R/A PCB
2	"Update" & H1	2PIN Header
1	D1	1N4148 Diode (Polarity Protection)
All Resistors ¼ W 5%		
1	R5	300 Ohms
1	R6	18 Ohms
1	R7	270 Ohms
8	R1/A, R2/A, R3/A, R4/A	100 Ohms
1	R8	33 Ohms
1	R9	24 Ohms
1	R10	51 Ohms
2	R12, 13,	10K
1	R11	5.6K
1	R14	3.3K
1	R15	680 Ohms
Capacitors		
1	C24	0.47uF
2	C17, 19	.001uF Poly
6	C1, 2, 4, 6, 8, 18,	.1uF Poly
6	C3, 5, 15, 13, 16, 21	1uF Tantalum
2	C23, 22	18pf
2	C20, 14	10uF Tantalum
1	C7	82pf Ceramic
2	C10, 9	15pf Ceramic
1	C12	47pf Ceramic
1	C11	100pf Ceramic

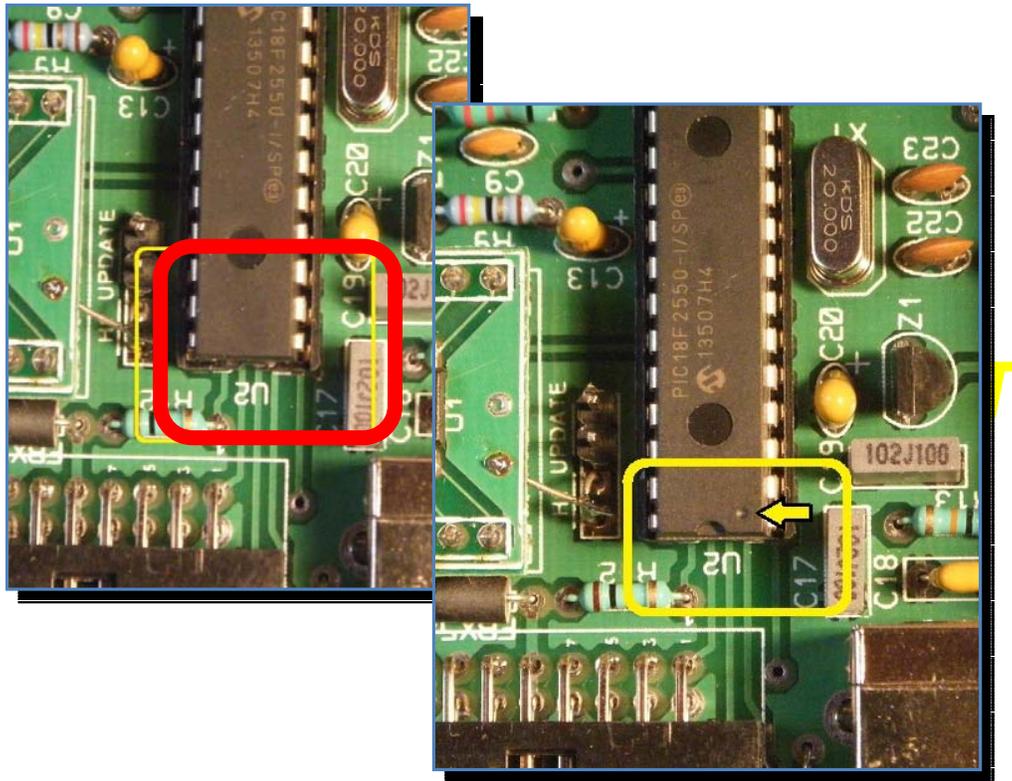
Note:

1. "Update" = Firmware Update Header
2. # = Parts Pre-soldered
3. * = FB1 is 1206 SMT Bead. FB2-FB5 may be STND beads or SMT

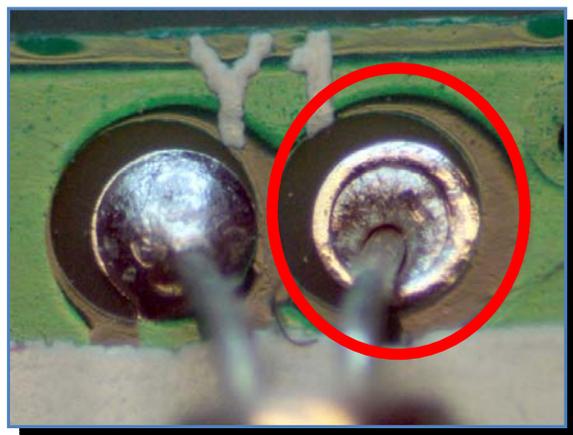


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- Verify that the position of **pin nr 1**, if any, indicating the component **insertion sense** is corresponding to the one shown by the COMPONENT SIDE SILK, in doubt use the board's picture to compare with.



- Carefully looking at the solder side of the board verify that there are NO **COLD or MISSED solders**, NO vias **short or interruption**.



- Carefully looking at the electric schema and technical documentation verify that all required **header and jumper** are at right place shorted or open as needed. Refer to "AAZ-0914A Tech info document" and "AAZ-0914A Schematic"

SWRA AAZ-0914A uses the following jumpers:

- POWER selection: refer to paragraph Voltage measurement
- UPDATE: no short cap, let it open
- H1: AD9850/51 selection, short =AD9850, open=AD9851

If any assembling error is discovered, please fix-it and redo this step.

2 Voltage measurement

To make this test you need a multi-meter (DVM)
or an analog voltage meter.



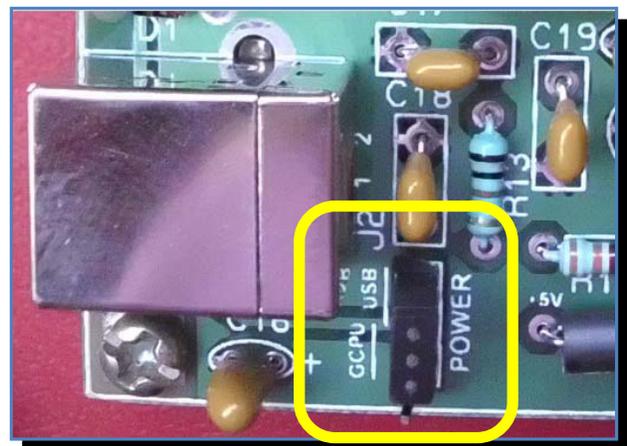
You should verify the following voltages

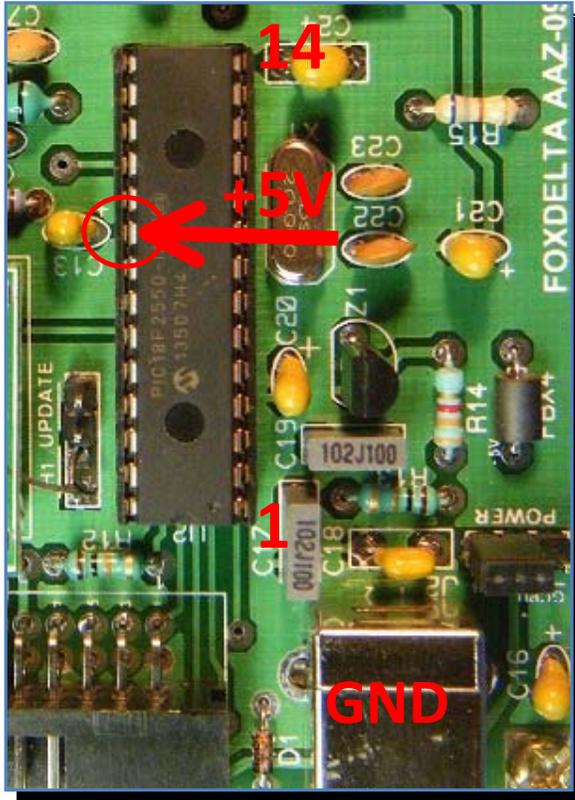
- Pic 18F2550 U2
- Small board Ad9850/51 DDS adapter
- RF Amplifier Q1
- Detector AD8307 U2

➤ Power on the board.

Depending on the header "POWER" selection you need an external power supply or a USB cable connected to the PC.

If the board is powered by the USB, do **NOT run** the Windows program "SWR Analyzer.exe" this time, it is not necessary for this test.





- Measure the voltage between the pic 18F2550 pin20 and GND you should read about +5V.

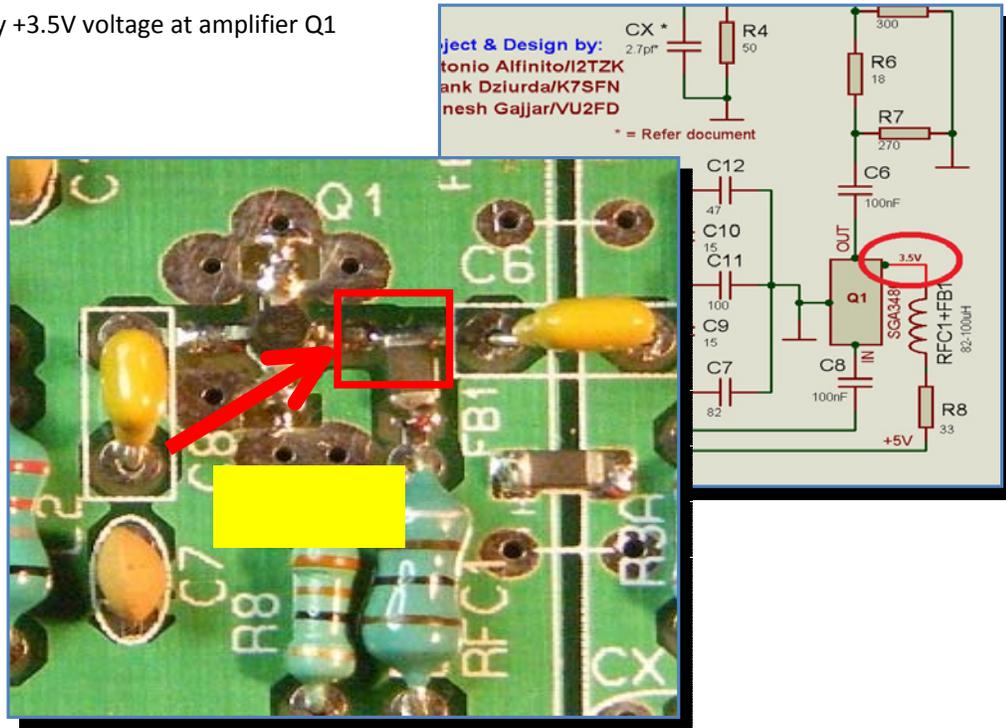
NB. Measured **voltages can differ +/-10% from the target value**, this is acceptable.

Do not use as GND one of the 4 cap screws, screws are isolated by the ground layer, use instead the metallic case of the USB connector.

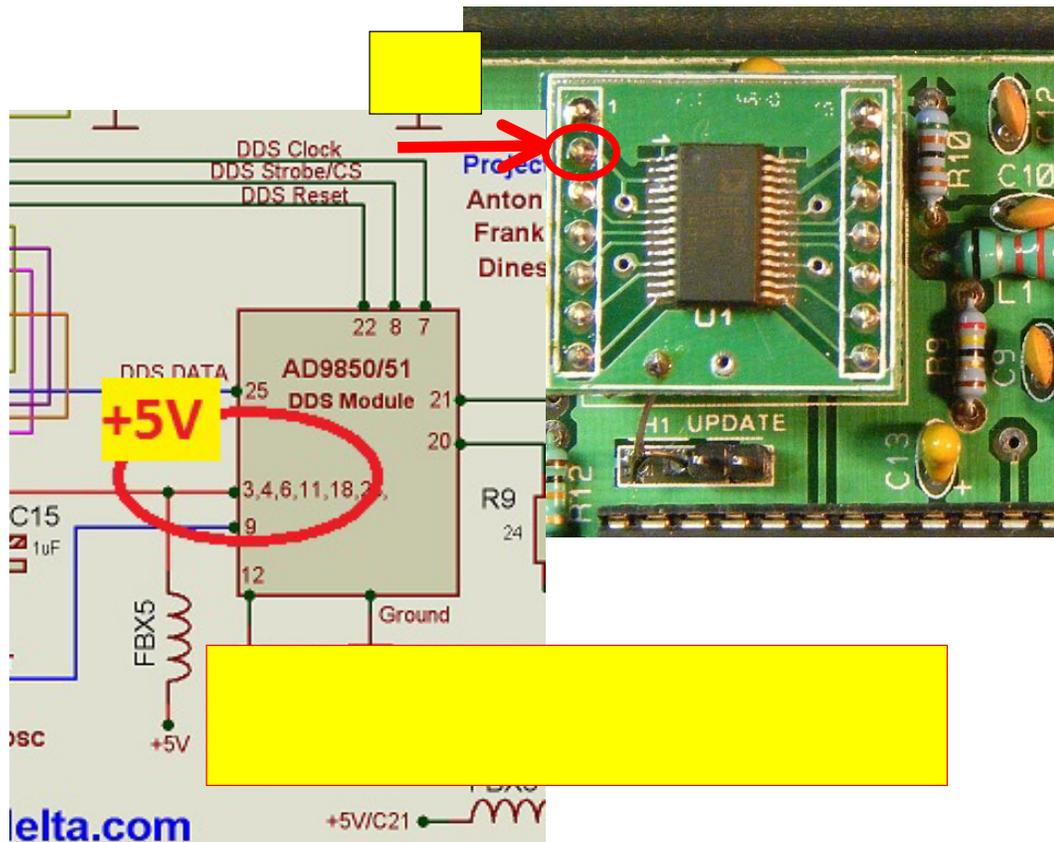
If +5V are present at pin 20, does LED next to BNC connector light up ? If NO:

<p>LED has been correctly polarized ?</p> <p>NO: replace the led with a new one and carefully verify the insertion sense.</p>	
<p>Is 18F2550 pin nr 1 in the right position?</p> <p>NO: turn pic 180°</p>	
<p>18F2550 has been programmed ?</p> <p>NO: see "SWRA User Guide" , you need a pic programmer to burn the file: Swr Analyzer vX.XX FULL.hex</p>	<p>FoxDelta kit includes a pic already programmed</p>

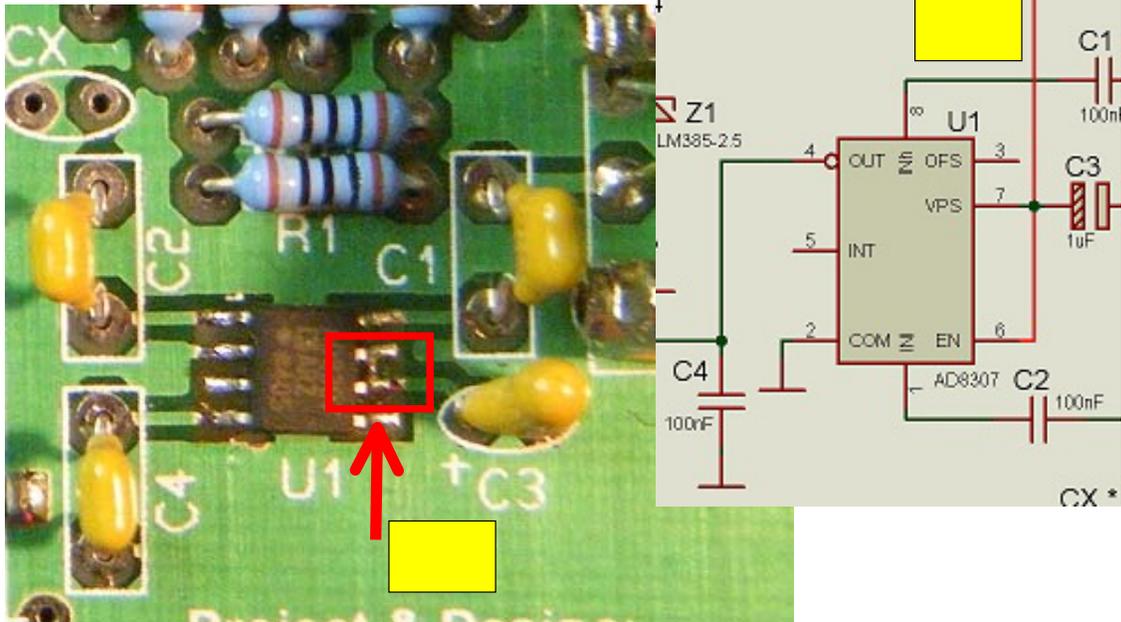
- Verify +3.5V voltage at amplifier Q1



- Verify +5V at DDS board adapter *pin 2*



Verify +5V at U1 AD8307 *pin 2*



3 Signal at BNC

To make this test you need a Frequency Counter or an Oscilloscope or a Receiver

- Power on the board.

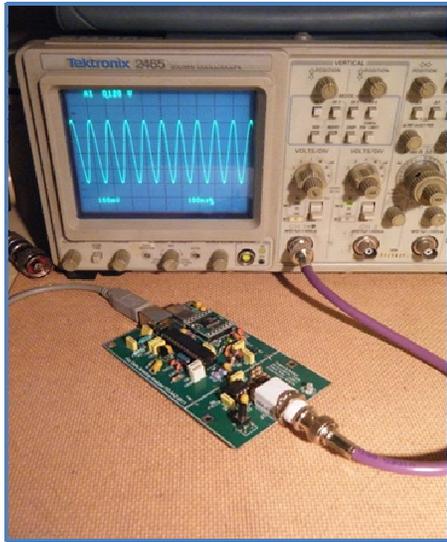
Depending on the header “Power” selection you need an external power supply or a USB cable connected to the PC. Refer to paragraph “Voltage measurement”.

If board is powered by the USB, do NOT run the Windows program “SWR Analyzer.exe” at this time, it is not necessary for this test.

Option 1 – Frequency Counter

Connect the Frequency Counter, you should read a frequency very close to 10MHz.





Option 2 – Oscilloscope

Connect the Oscilloscope to the SWRA BNC possibly use the 50ohm input of your oscilloscope or load the SWRA with 50 ohm terminator.

You should see a good sine wave very close to 10MHz.

Option 3 – Receiver

Position the SWRA close the receiver antenna or connect a short piece of wire to the antenna and put it close the SWRA board, ***DO NOT connect this wire to the SWRA BNC, you could damage your receiver.***

Power on the board, tune your receiver at 10MHz ***AM mode***, search for an unmodulated carrier around this frequency. If found power on/off the SWRA to be sure the carrier comes from SWRA.

➤ If the 10MHz signal is present at SWRA BNC:

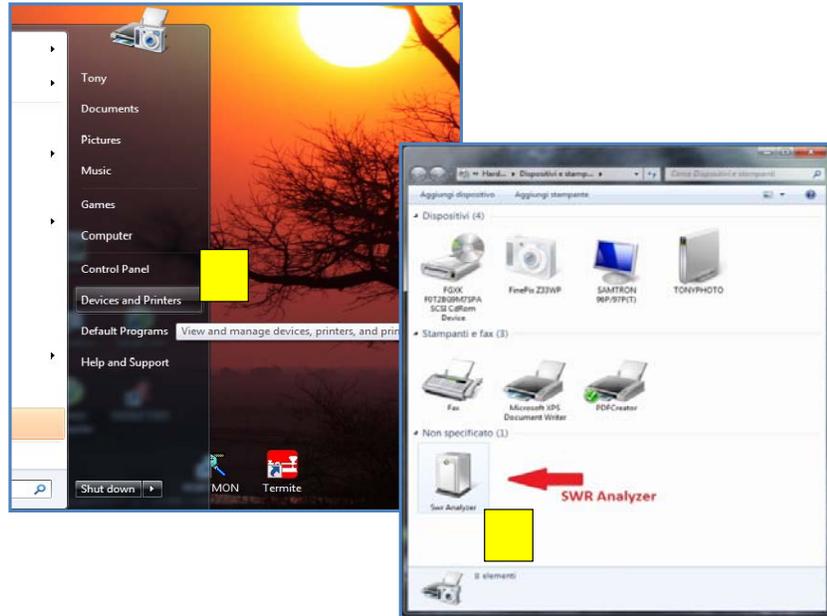
- run the windows program “SWR Analyzer.exe”.
- Select the GENERATOR tab, change the frequency and verify that SWRA does generate a frequency very close to the one selected.
- Repeat the test for few frequencies in the range 3-30MHz.

4. USB Communication channel

Connect the SWR Analyzer board to PC by the USB cable, the LED next to the BNC connector must light on. If LED doesn't light on, refer to paragraph "Voltage Measurement".

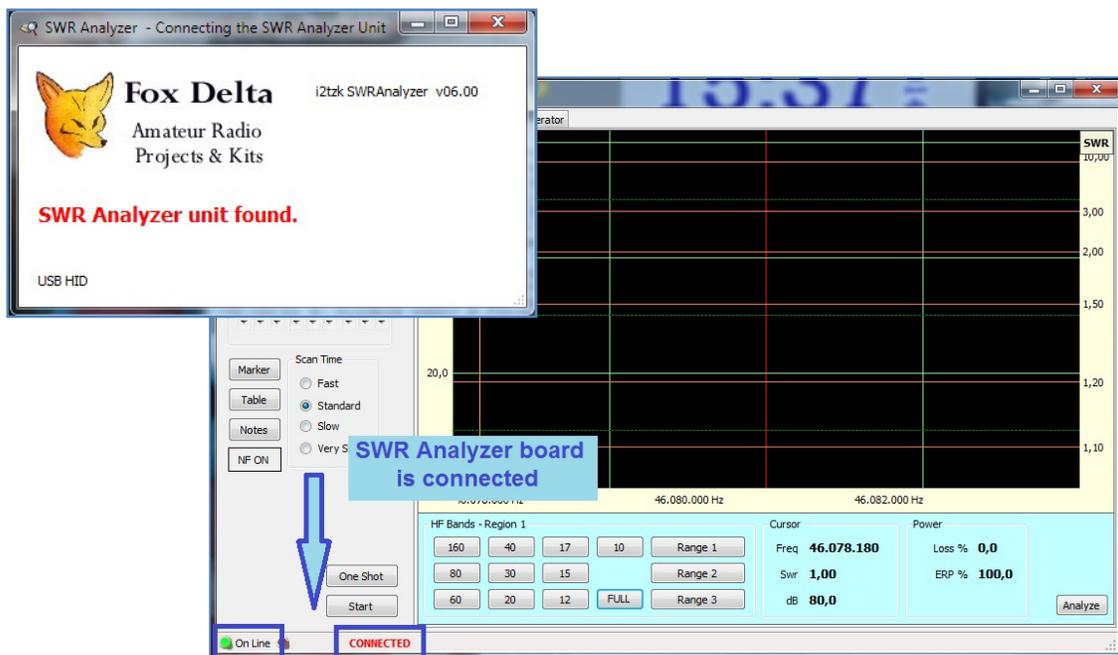
Carefully look at your pc and verify that USB drivers are properly installed by the operative system.

Please Refer to the "SWRA User Guide" paragraph "Connecting the hardware" if the "SWR Analyzer" icon is not listed in the devices window.



This assures you that the pic 18F2550 USB module is initialized.

Run the program "SWR Analyzer.exe"

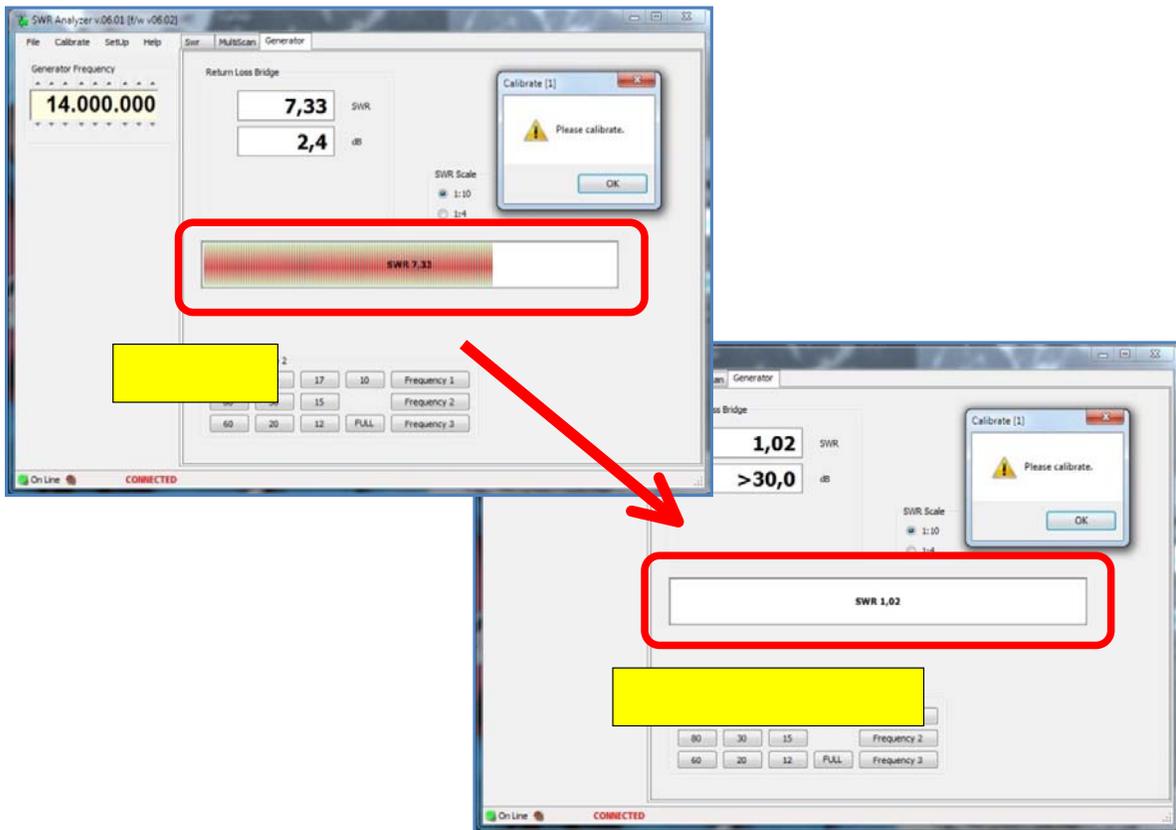


You must notice the following effects:

- LED next to the BNC starts a sequence of 3 rapid blinks then a pause.
- Program Status bar shows a green led “On Line” and the red label “CONNECTED”.
- The pop up message asking for the board calibration could be shown.

4 SWR test

Run “SWR Analyzer.exe” and select the tab “Generator”, choose any frequency:



Connecting a resistor to the BNC (any value between 25 and 75 ohm works fine) **you must see an SWR variation, it doesn't matter the SWR absolute value, your SWR Analyzer it is not calibrate**, you must only notice that the SWR value changes.

This assures that the AD8307 signal detector is working.

You're ready now to analyze your antenna, proceed to calibrate the board as detailed by the “User Guide”,

73s / Tony/I2TZK