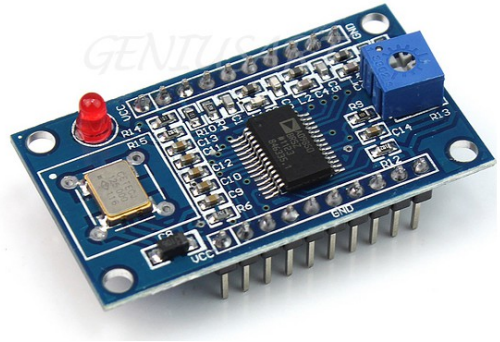
Build Your Own Antenna Analyser for under $50

Beric Dunn K6BEZ

Inspiration

AD9850 DDS

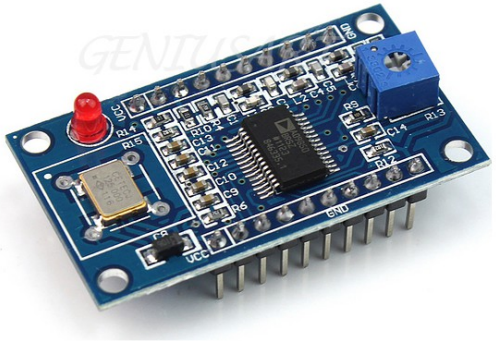


- $4 on Ebay
- DC - 40 MHz
- DIL package - no Surface Mount Soldering

What to do with it?

- Audio generator?
- General Purpose Signal Source?
- LO for something or other?

Idea!



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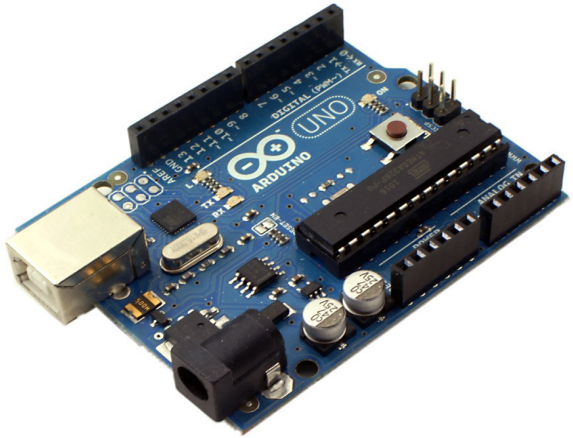

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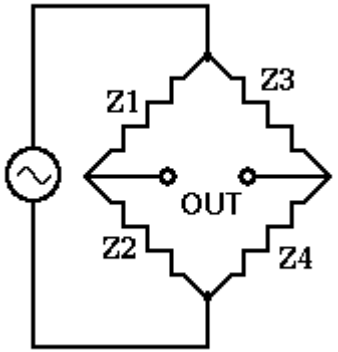


= Cheap Antenna Analyser?

What is an Antenna Analyser?

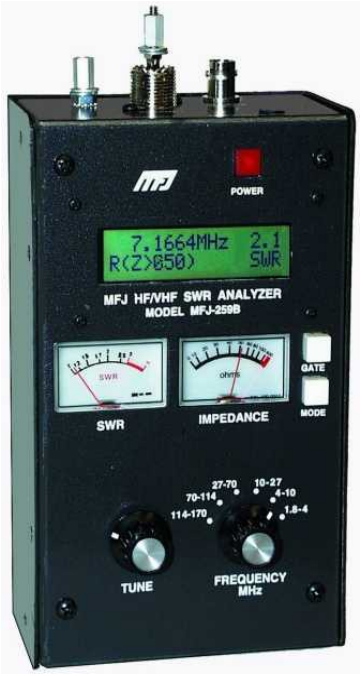
Something that tells you...

- What Frequencies will this piece of wire resonate on?
- Will it damage my rig if I key up?

Commercial Options

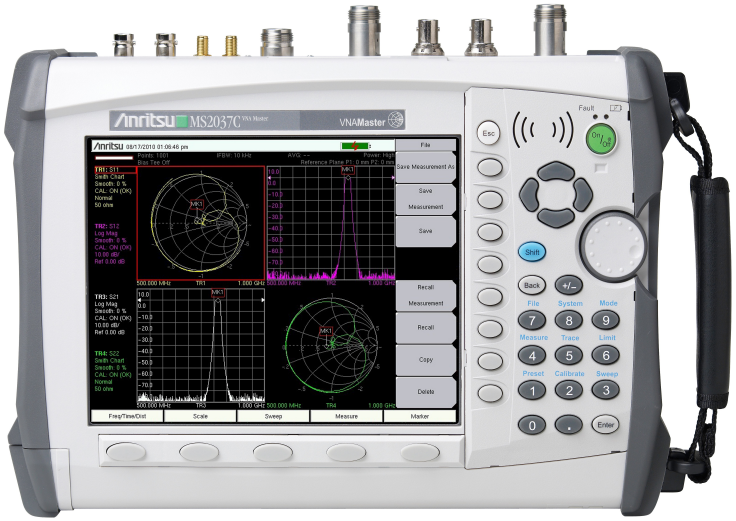
MFJ-259B

- Gold Standard for Hams
- Does Not Sweep



Anritsu VNA Master

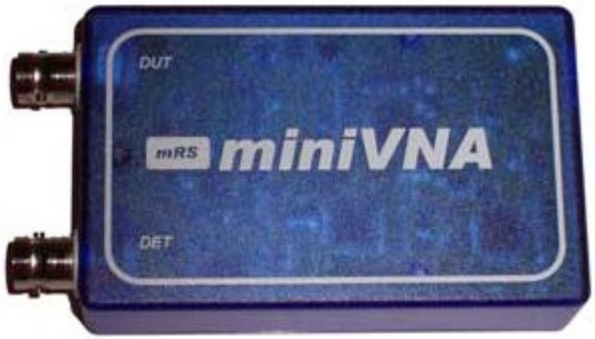
- Wide Frequency Range
- Bargain Priced at $40,000



Other Commercial Options

RigExpert

MiniVNA



Why DIY?

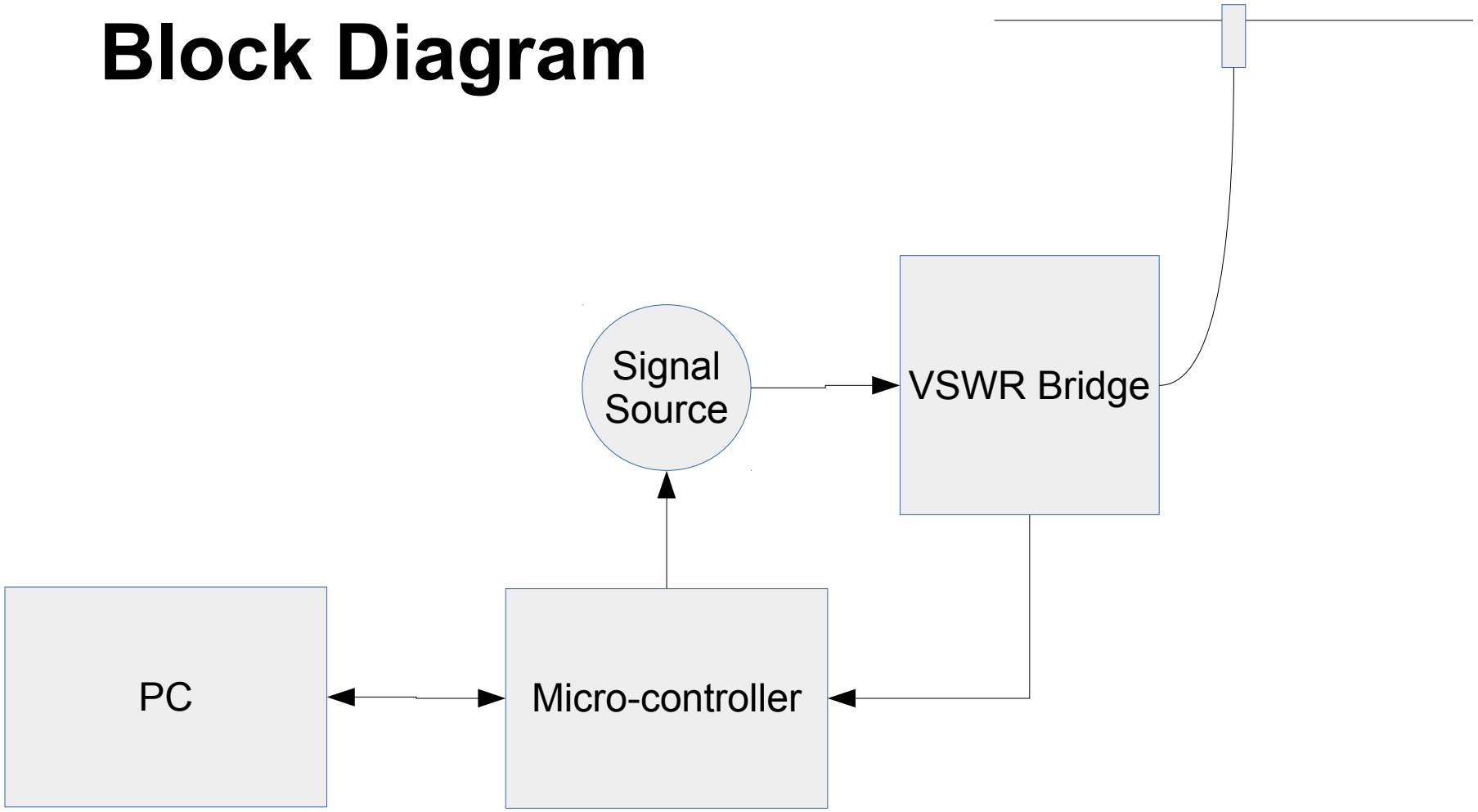
Cheaper

Ham License

- ...wireless experimentation & self-training...

Because We Can

Block Diagram



Micro-Controller Design

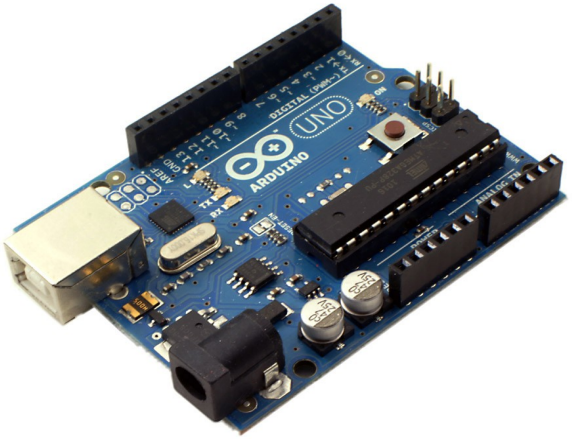
Accept sweep parameters from PC

For each sweep point

- Configure the DDS
- Read the detector voltage
- Send the frequency and voltage to the PC

Micro-Controller

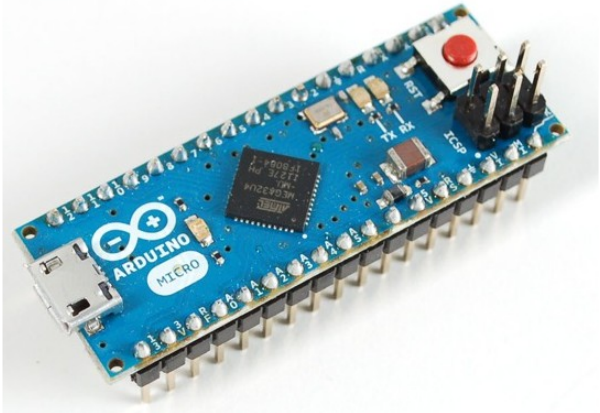
Arduino Uno



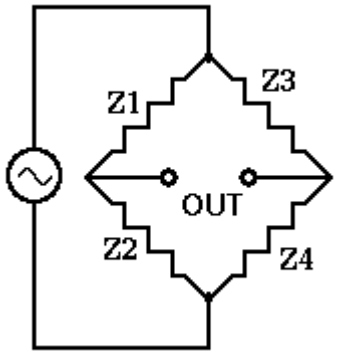
- Hacker Favourite
- Easy to get going
- Plenty of online support
- Pin spacing not useful for Vector-board

Arduino Micro

- DIL 0.1” pin spacing

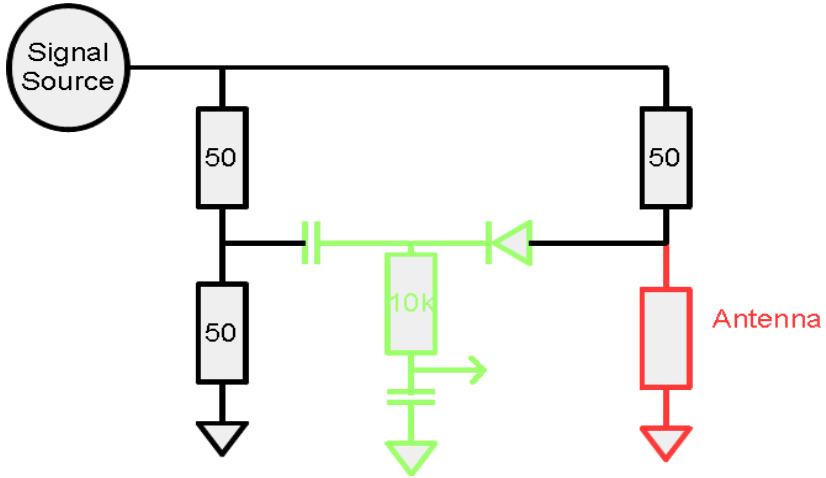


VSWR Bridge



Resistive Bridge

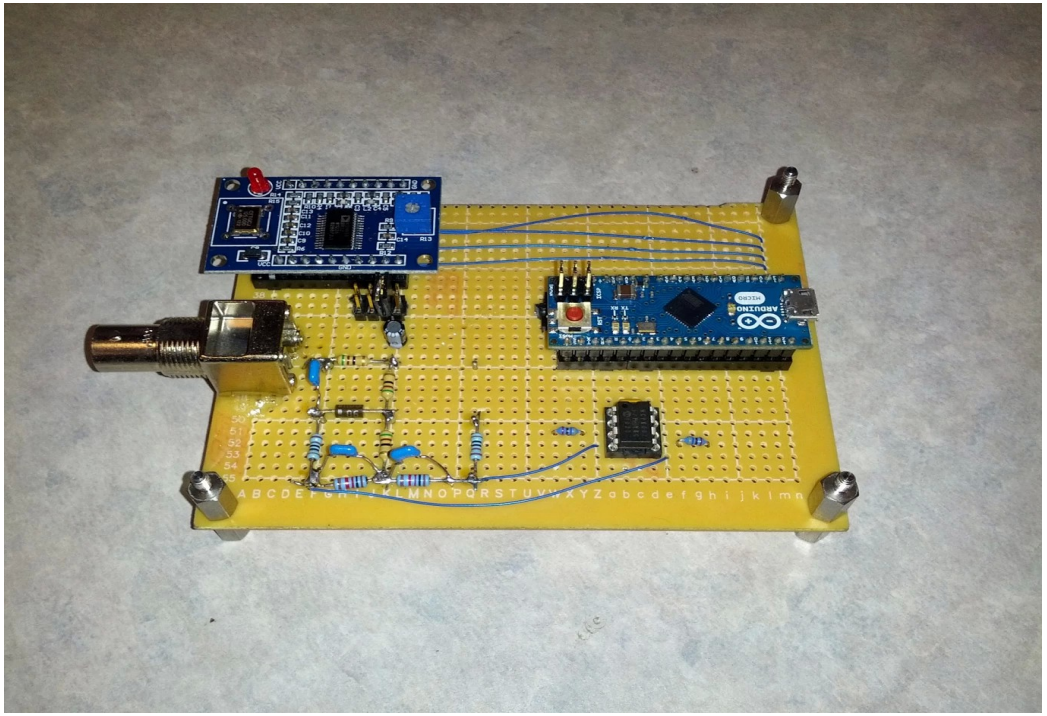
- Used in many commercial products
- Cheap
- Can work to few GHz



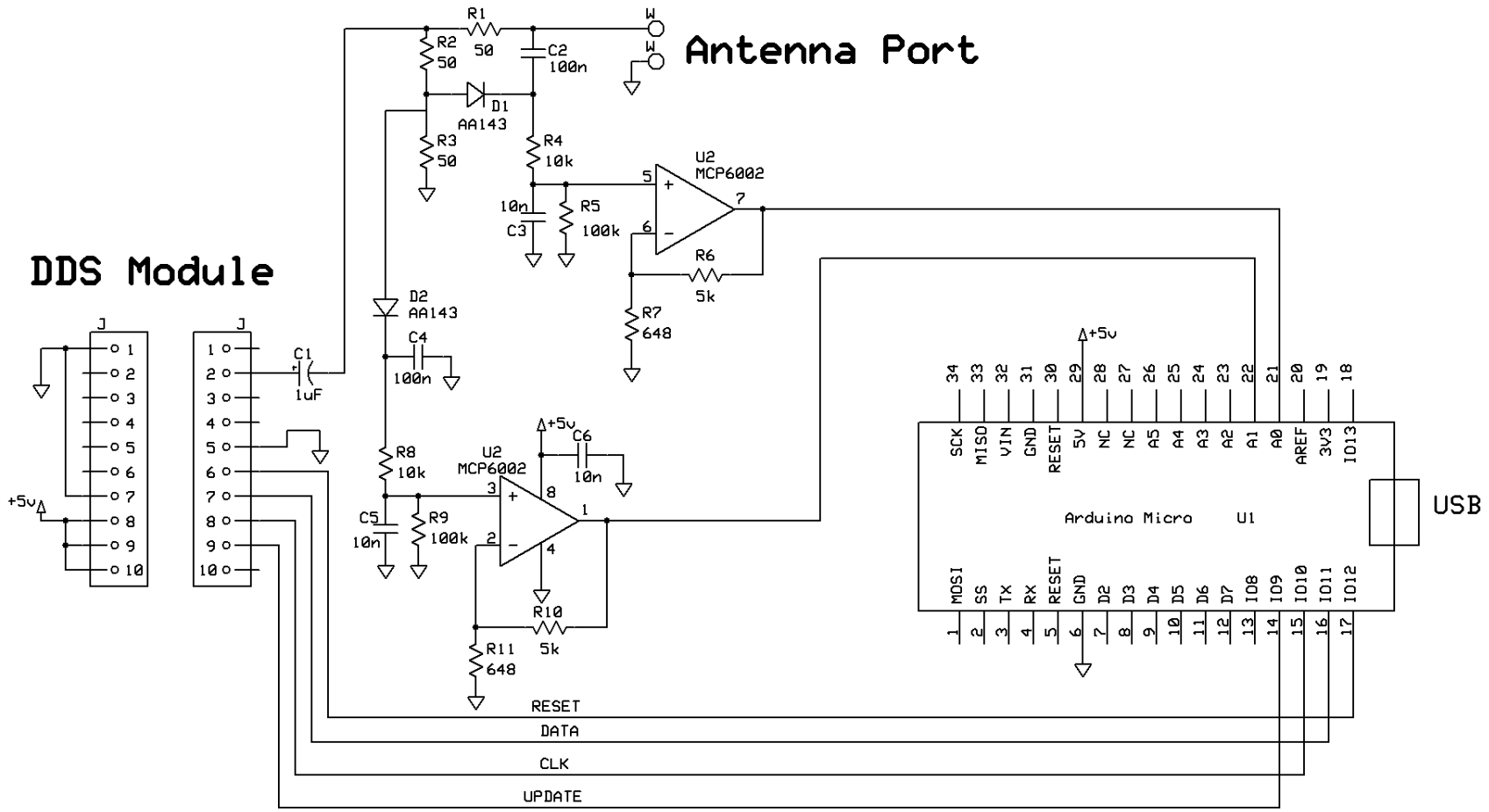
PC

- Considered “Free”
- Windows 7
- Visual Basic
  - Free Edition from Microsoft
  - Very easy to get a program up and running
- Could have also been written in Java
  - Cross Platform

Arduino Solution



- Arduino Micro $35
- MCP6002 $1
- AD9850 Board $4
- RF Connector $1
- Vector Board $4
- Bridge componenents < $2
- Total About $50



$50 Antenna Analyser		
Arduino Micro Version		
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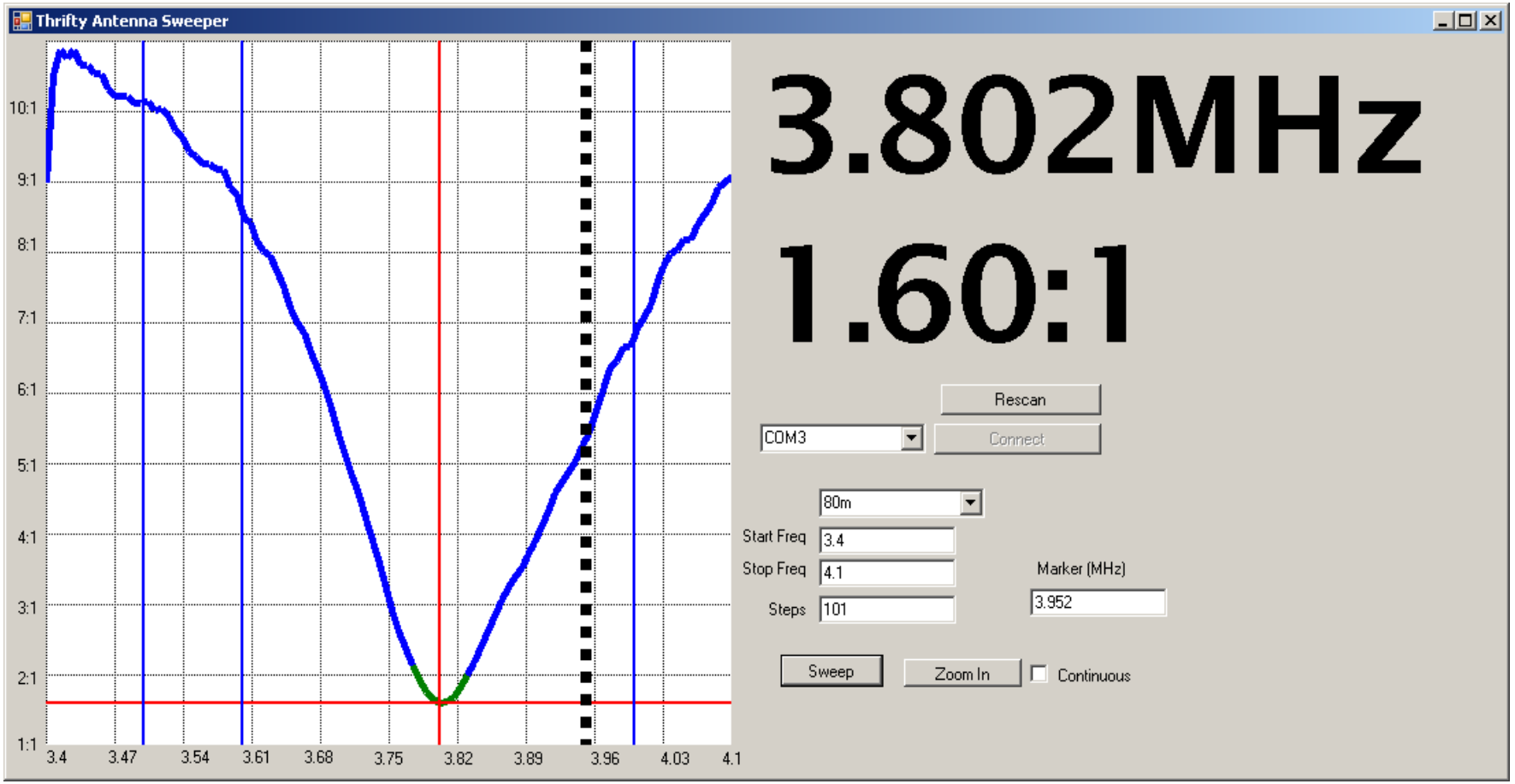
PC Software


Thrifty Antenna Sweeper
10:1
9:1
8:1
7:1
6:1
5:1
4:1
3:1
2:1
1:1
3.4
3.47
3.54
3.61
3.68
3.75
3.82
3.89
3.96
4.03
4.1
3.802MHz
1.60:1
Rescan
COM3
Connect
80m
Start Freq
3.4
Stop Freq
4.1
Steps
101
Marker (MHz)
3.952
Sweep
Zoom In
Continuous

“What about a PIC Processor?”

Cheaper than Arduino

How do I program them?

- Assembler
- C
- BASIC

Basic, huh?

- Swordfish Basic = Free download

Build Your Own Antenna Analyser for under ~~$50~~ *$20*

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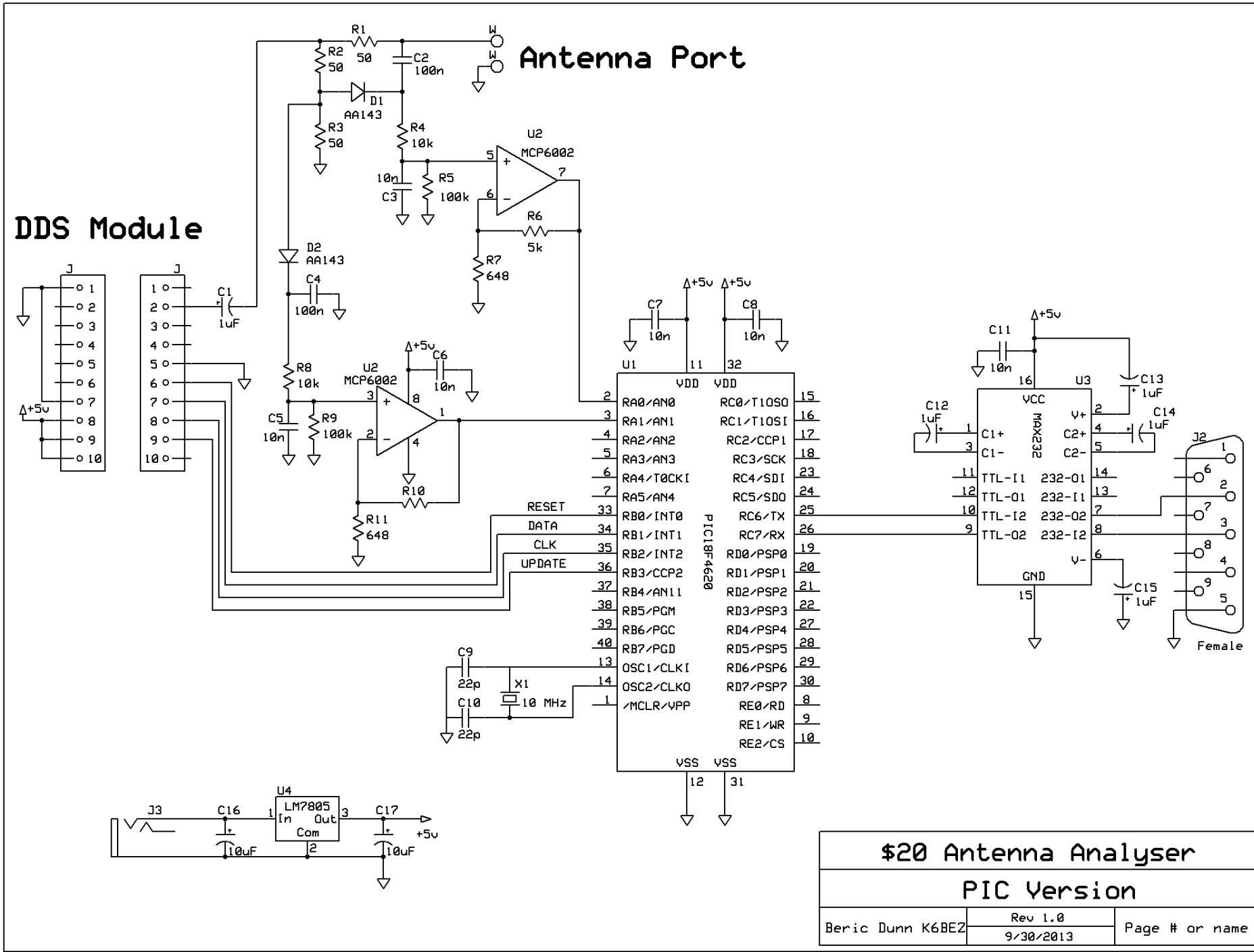

$20 Antenna Analyser		
PIC Version		
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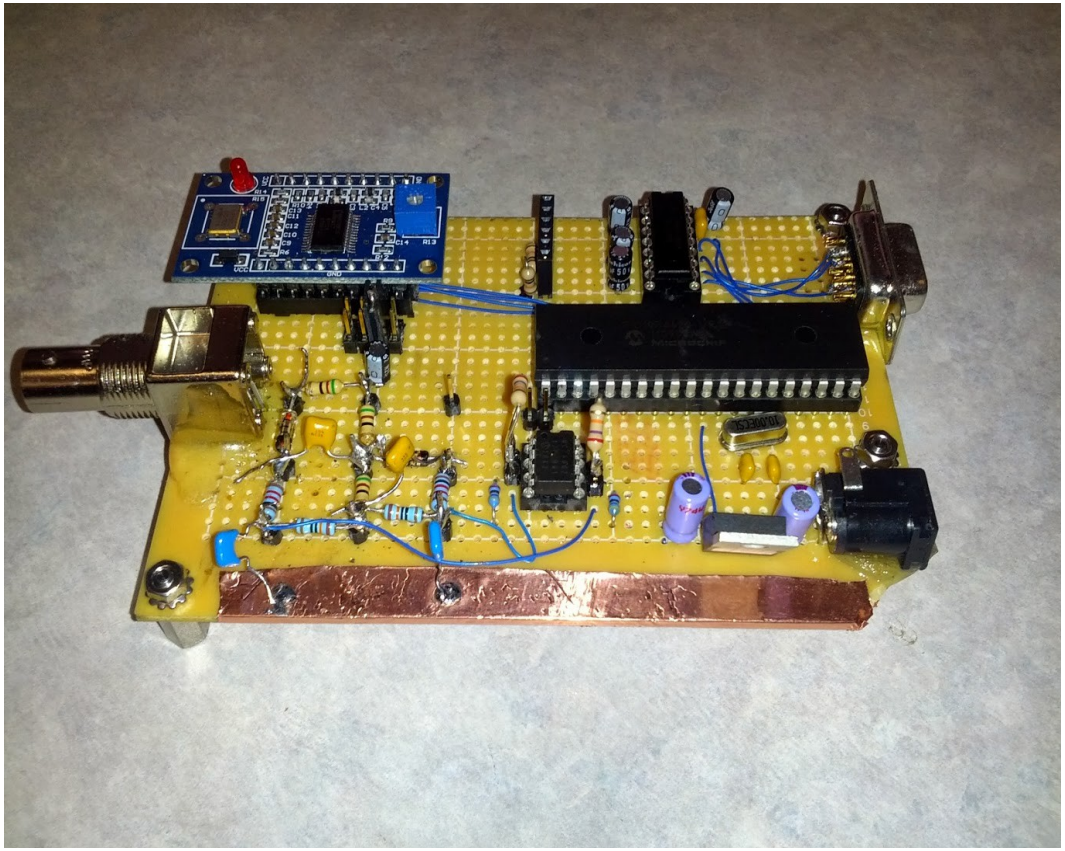
PIC Solution

- PIC Processor $5
- MAX232 $1
- MCP6002 $1
- AD9850 Board $4
- RF Connector $1
- Vector Board $4
- Power Regulator $1
- Bridge componenents < $2
- Total About $20

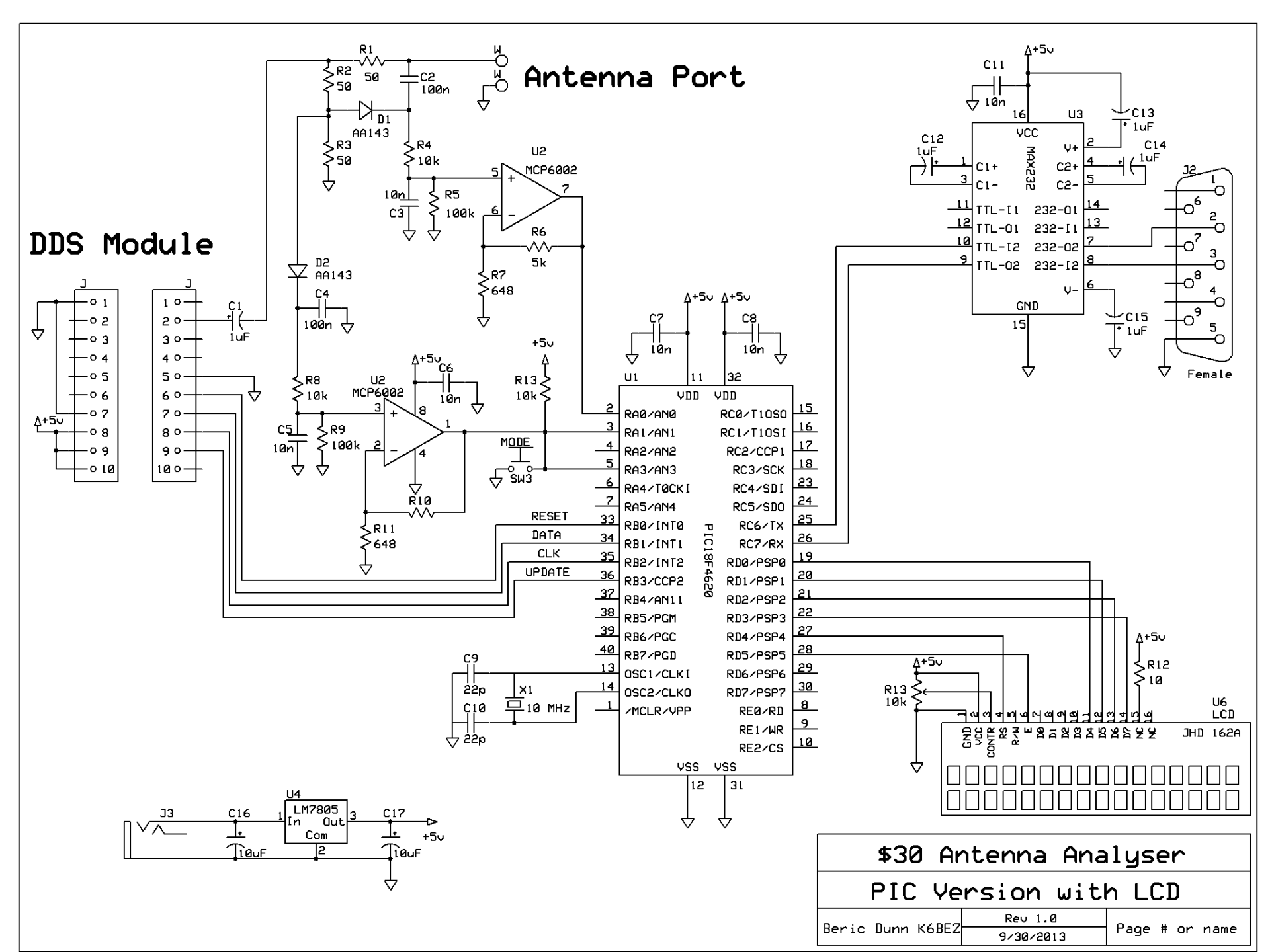


“How Well Does it Work?”

“But I Don't Have A Computer”

Add an $8 LCD Display

Total: About the same price you paid for your Pacificon ticket



$30 Antenna Analyser

PIC Version with LCD

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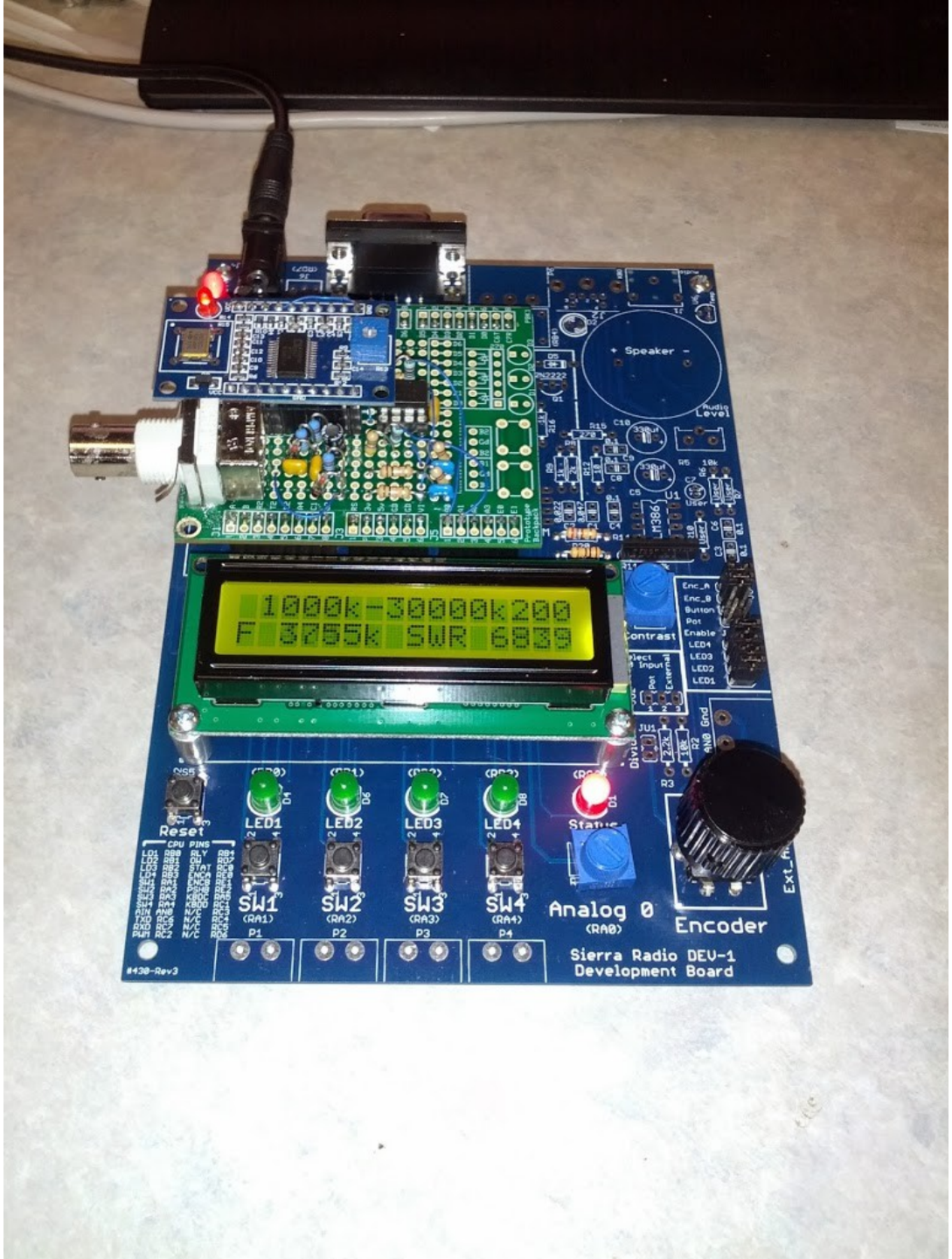
1000k-30000k200
F 3755k SWR 6839
+ Speaker -
Audio Level
Contrast
Reset
LED1
LED2
LED3
LED4
Status
SW1
SW2
SW3
SW4
(RA1)
(RA2)
(RA3)
(RA4)
P1
P2
P3
P4
Analog 0
(RA0)
Encoder
Sierra Radio DEV-1
Development Board
#130-Rev3

What Next?

For accurate VSWR needs more power

- *Add Amplifier ($1)*

Tablet instead of PC?

- *Bluetooth Serial Module ($7)*

Higher Frequencies?

- *Silicon Labs Si5xx ($13 - $35)*

Scalar Network Analyser?

- *Add another connector and detector ($2)*

...

Where can I find out more?

Come and see me at the Bay-Net stand outside Exhibit Hall

Schematics and code can be downloaded from the Hamstack Project Gallery:

http://www.hamstack.com/project_antenna_analyzer.html

Presentation on Bay-Net website:

http://www.bay-net.org/articles.html

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