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!

= 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

PC → Micro-controller → Signal Source → VSWR Bridge
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 components < $2
- Total About $50
PC Software

3.802 MHz
1.60:1
“What about a PIC Processor?”

Cheaper than Arduino

How do I program them?

- Assembler
- C
- BASIC

Basic, huh?

- Swordfish Basic = Free download
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$20
PIC Solution

- PIC Processor $5
- MAX232 $1
- MCP6002 $1
- AD9850 Board $4
- RF Connector $1
- Vector Board $4
- Power Regulator $1
- Bridge components < $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
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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