SDR and Contesting – The Future is Now

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Additional contributions by:
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Contest Forum
Dayton Hamvention, May 2008

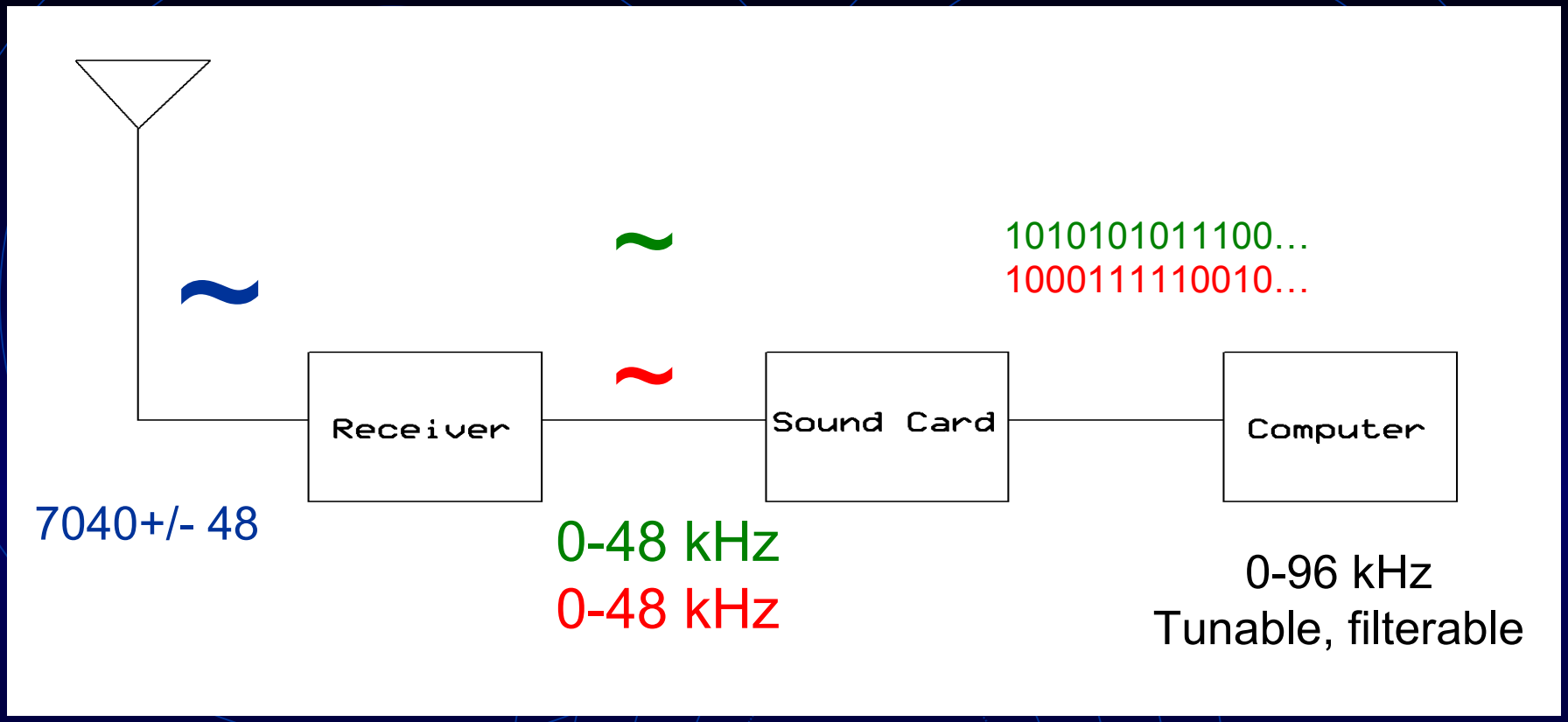
Outline

- What is SDR all about?
  - SDR demo
- What is this “Skimmer” thing?
  - Demos
- Issues

SDR for the rest of us

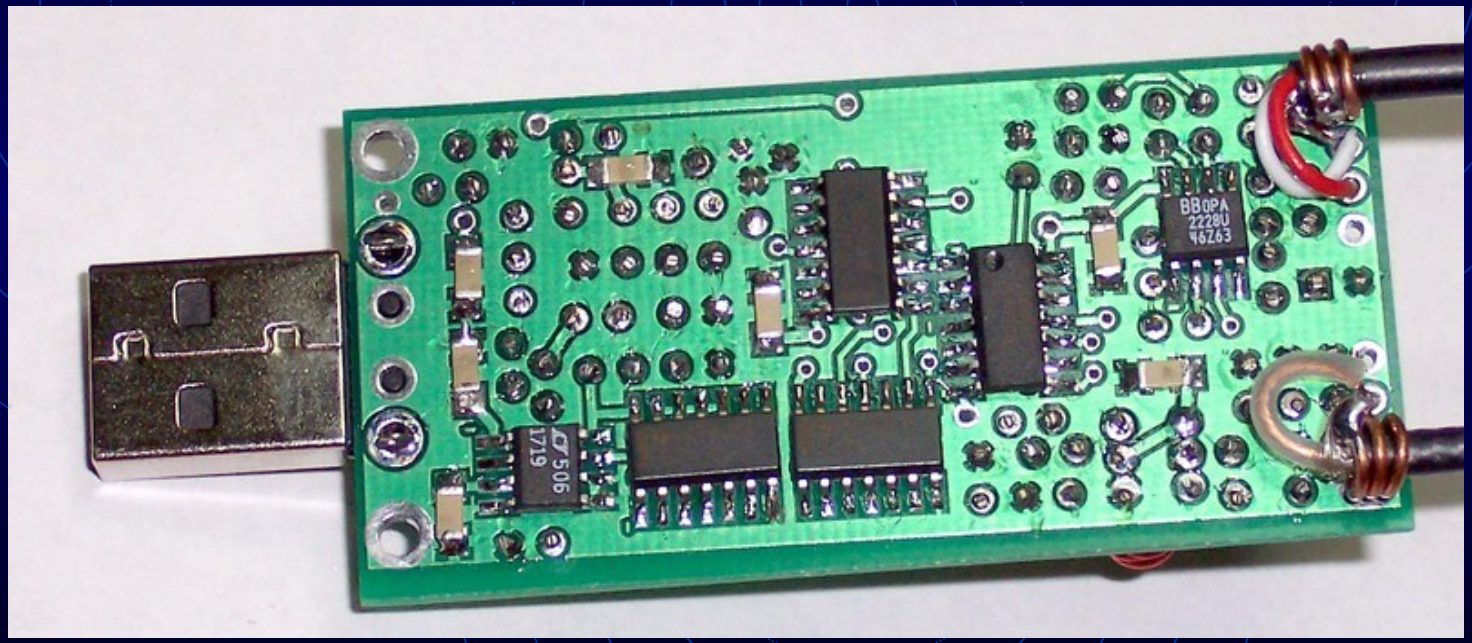
- Down-convert RF to base-band
- Perform analog-to-digital conversion
- Use *software* to *define radio* receiver selectivity, other features

- Requires hardware and software (and a PC)

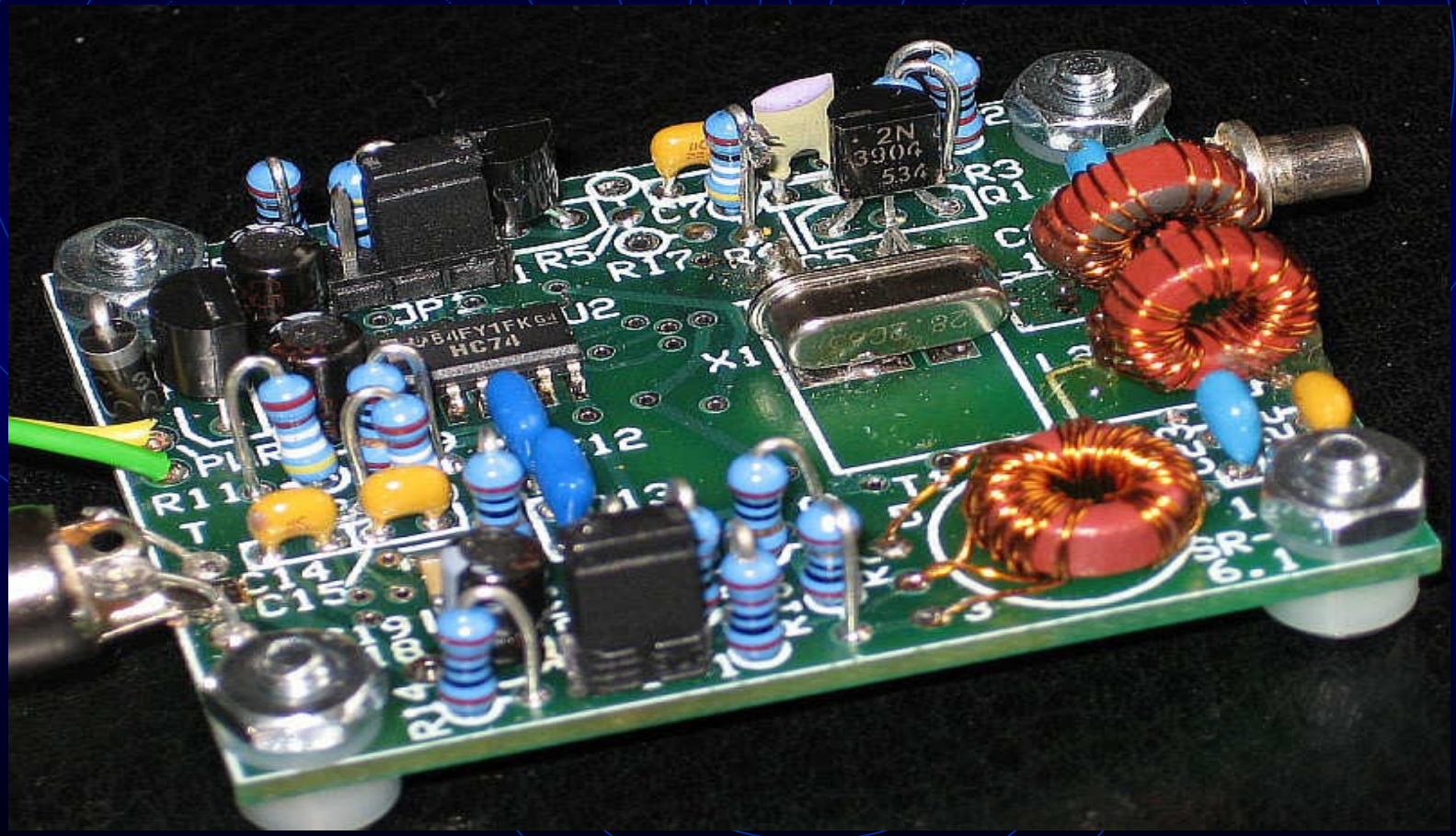


Most SDR receivers use “I/Q” (quadrature) downconversion to move the RF band to near DC.
Sound card Right/Left channels are used for “I” and “Q”.
A 48 kHz bandwidth (96 ksps) sound card will handle 96 kHz of R

Softrock-40



Softrock 6.1



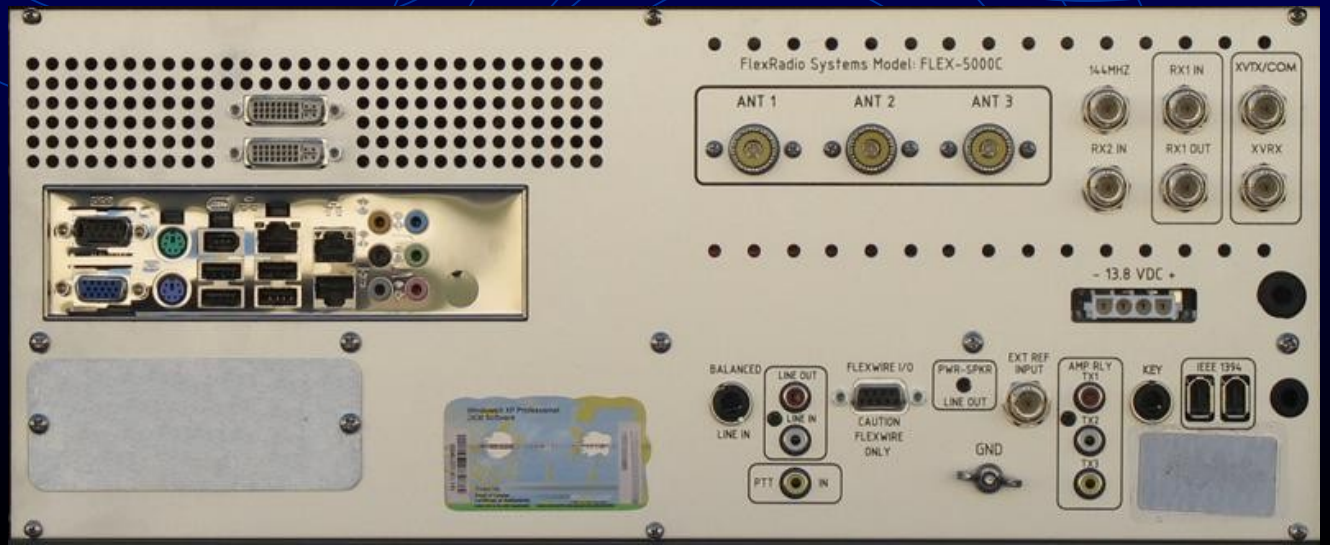
RFSpace SDR-IQ

Microtelecom Perseus

(used to make one demo recording)

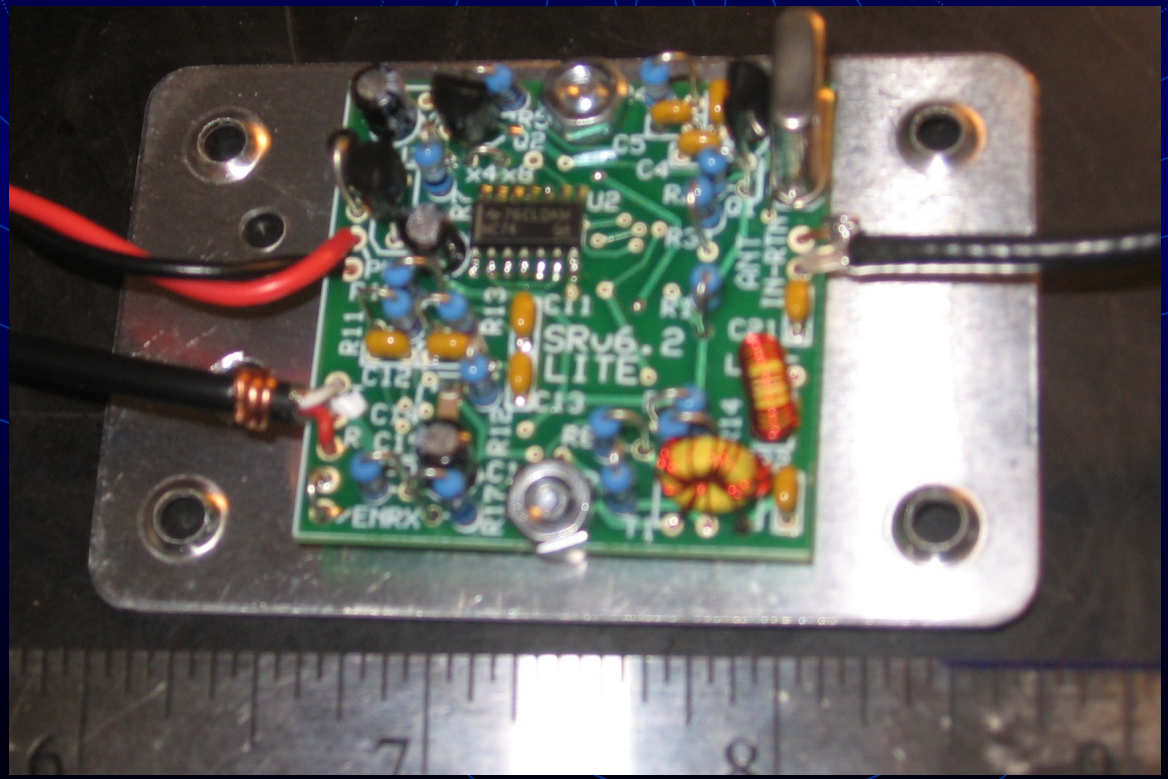
FlexRadio Flex-5000A

FlexRadio Flex-5000C



N4ZR's First Baby Step

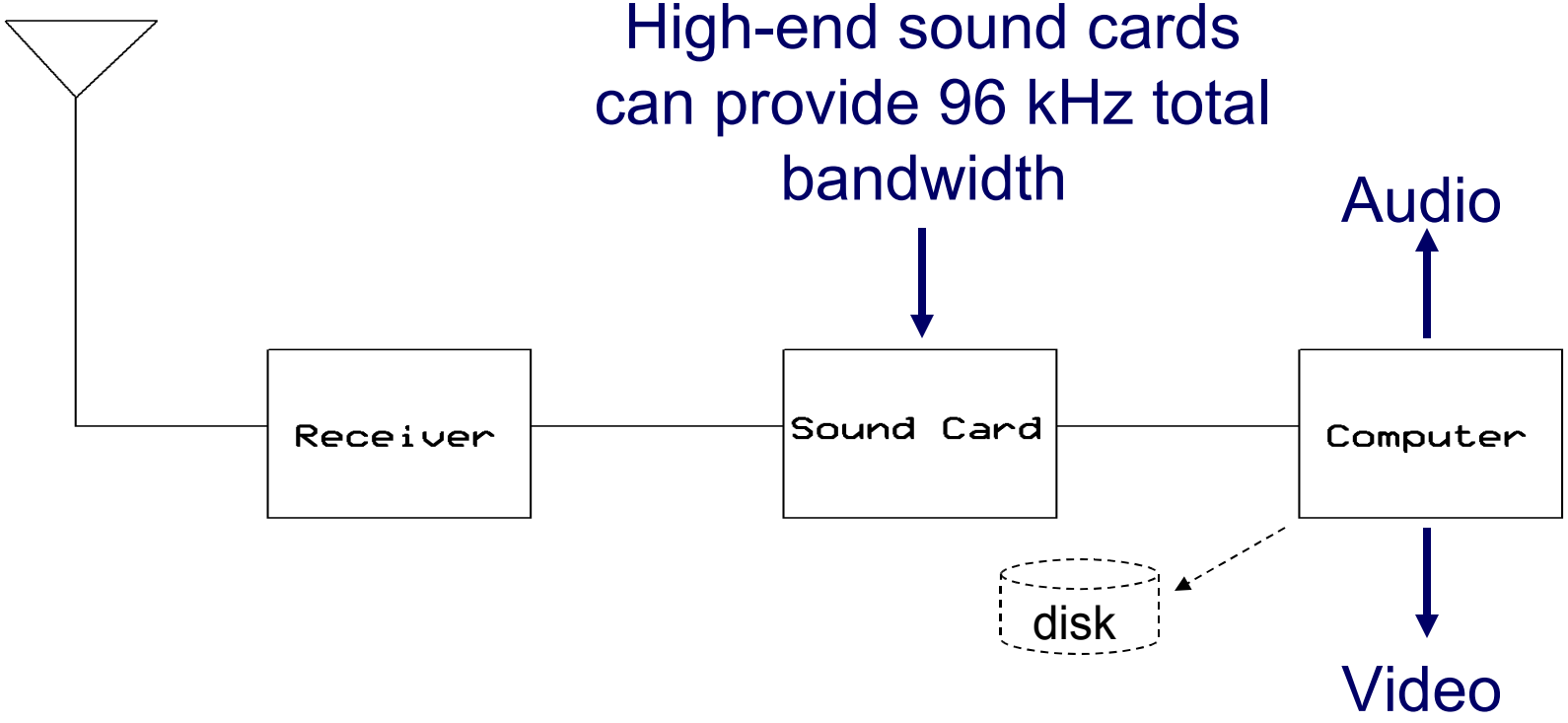
- A $13 SoftRock Lite Receiver Kit
- Used for one of today's demo recordings



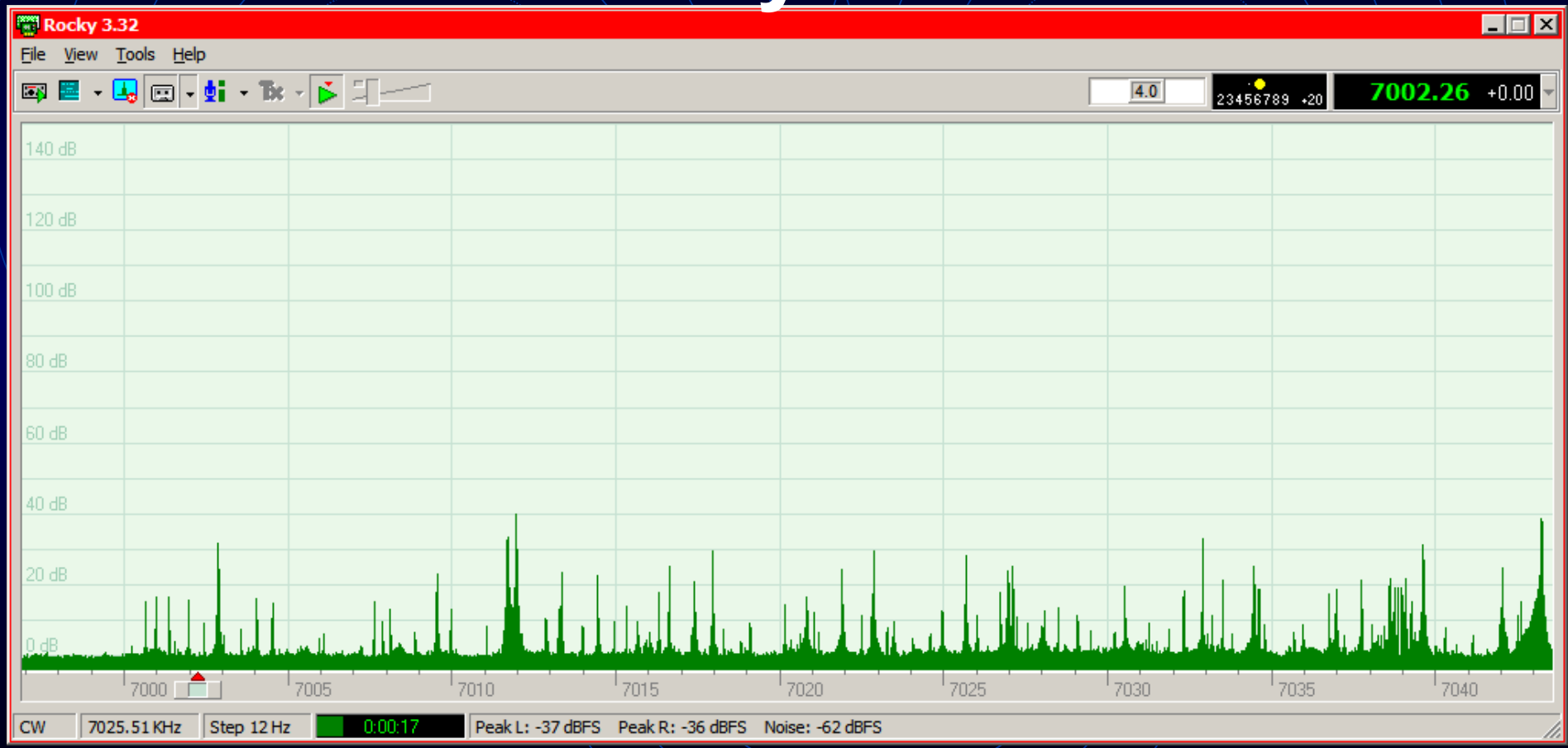
Hooking It Up

- Tapped directly into receive antenna loop of second radio
- Stereo audio fed to on-board sound chip in my PC – gave 48 KHz coverage
- Added M-Audio sound card to extend frequency coverage – 13996 – 14092 KHz

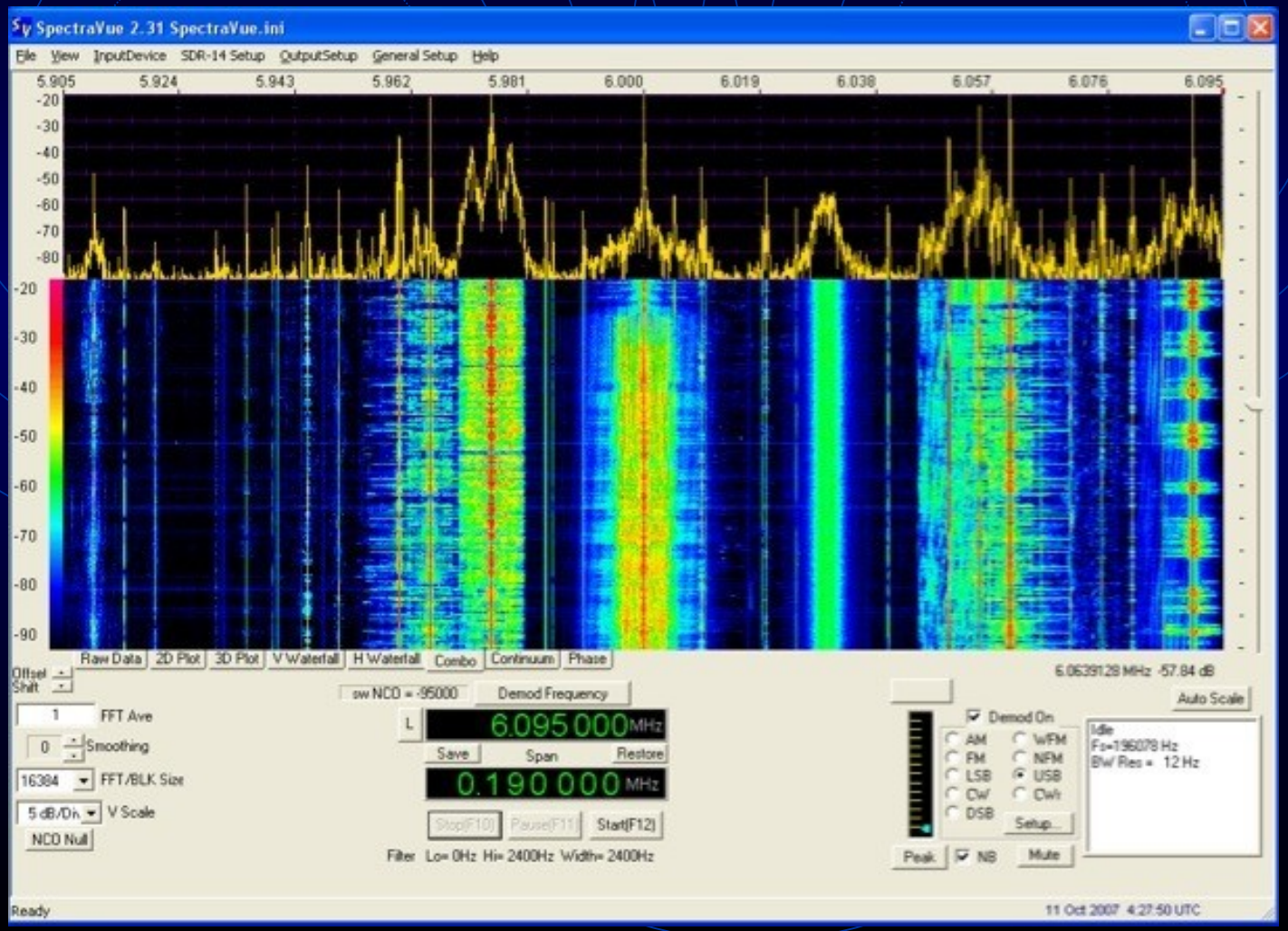
High-end sound cards can provide 96 kHz total bandwidth



Video Display – Bandscope Style



Combo Bandscope & Waterfall



WinRad demo

- Playback of a 10 min. recording made with a Perseus SDR
- Captured low end of 20m (~ 122 kHz wide)
- Antenna: 5 ele 20m yagi, 42’ boom
- Instructions at http://www.kkn.net/~n6tv
  - WinRad Software: 1.4 MB
  - Recording: 500 MB (300 MB zipped!)
  - A full 48-hour contest would require ~150GB

Advantages of the “Waterfall” Display

- Scan a band with your eyes instead of your ears
- You can see faint signals and “new” signals
- You can find “holes” where you can call CQ
  - Or call in a pileup
- Clicking is faster than turning a knob
- Significant improvement over legacy “band scopes”

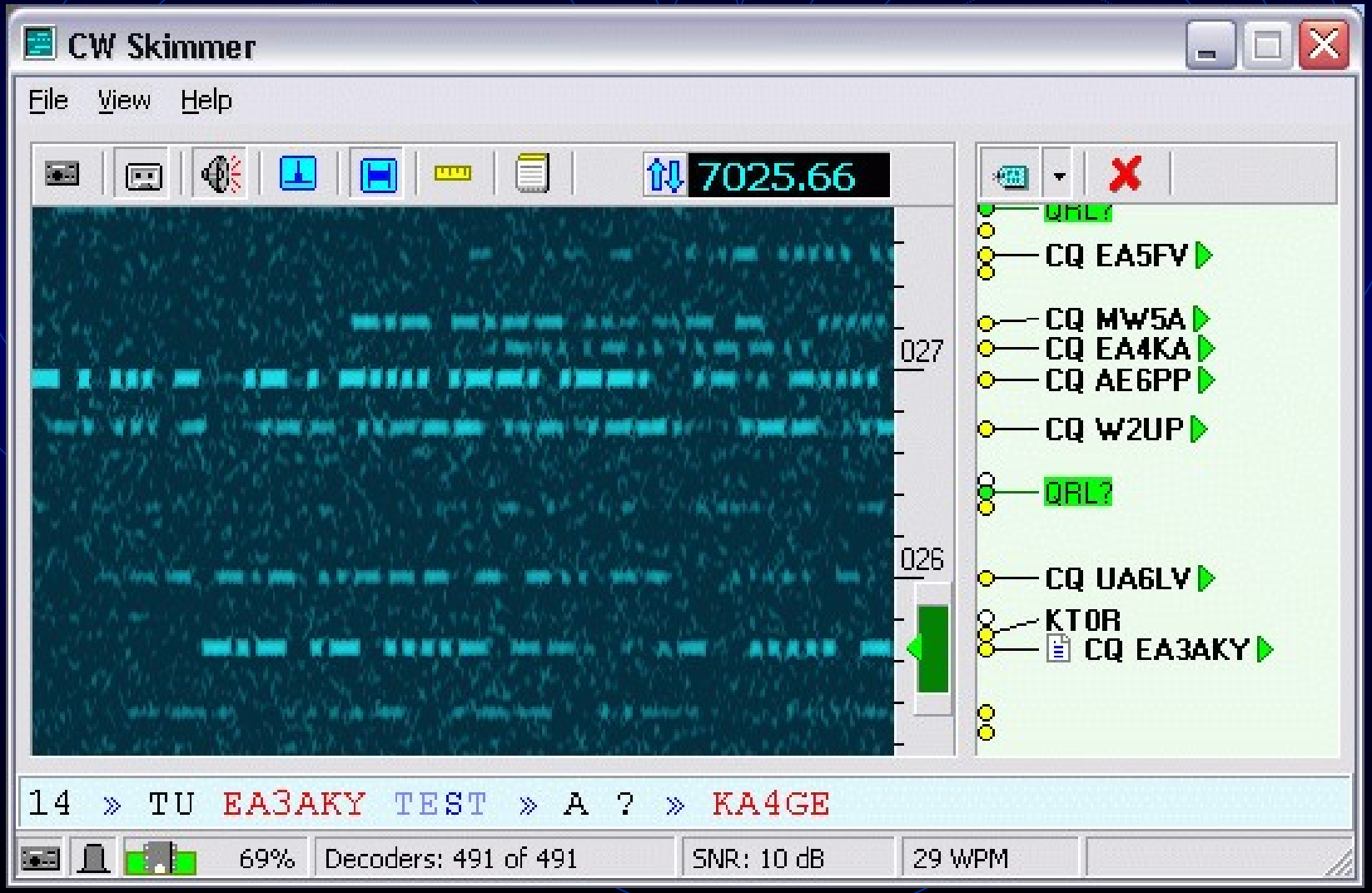
What is Skimmer?

- A software program written by VE3NEA
- Downloadable at dxatlas.com
  - Free for 30 days, then $70
- Requires PC with sound card
- Requires either audio or SDR-type radio driving sound card

What can Skimmer Do?

- Wideband CW decoding – up to 700 decoders over a 96 KHz bandwidth
- Automated recognition of which stations are running (callsign plus “CQ” or “TEST”)
- Transfer of decoded callsigns and frequencies to logging software or Internet

CW Skimmer Display



Three demos today

- Skimmer in “3 kHz Mode” listening to audio from N6TV’s **Winrad** recording
- Skimmer in “48 kHz mode” listening to 40M CW in 2008 ARRL DX Contest
  - Skimmer will find 157 callsigns in 1:45
- Skimmer in “3 kHz Mode” listening to KCDXC 2007 pileup contest

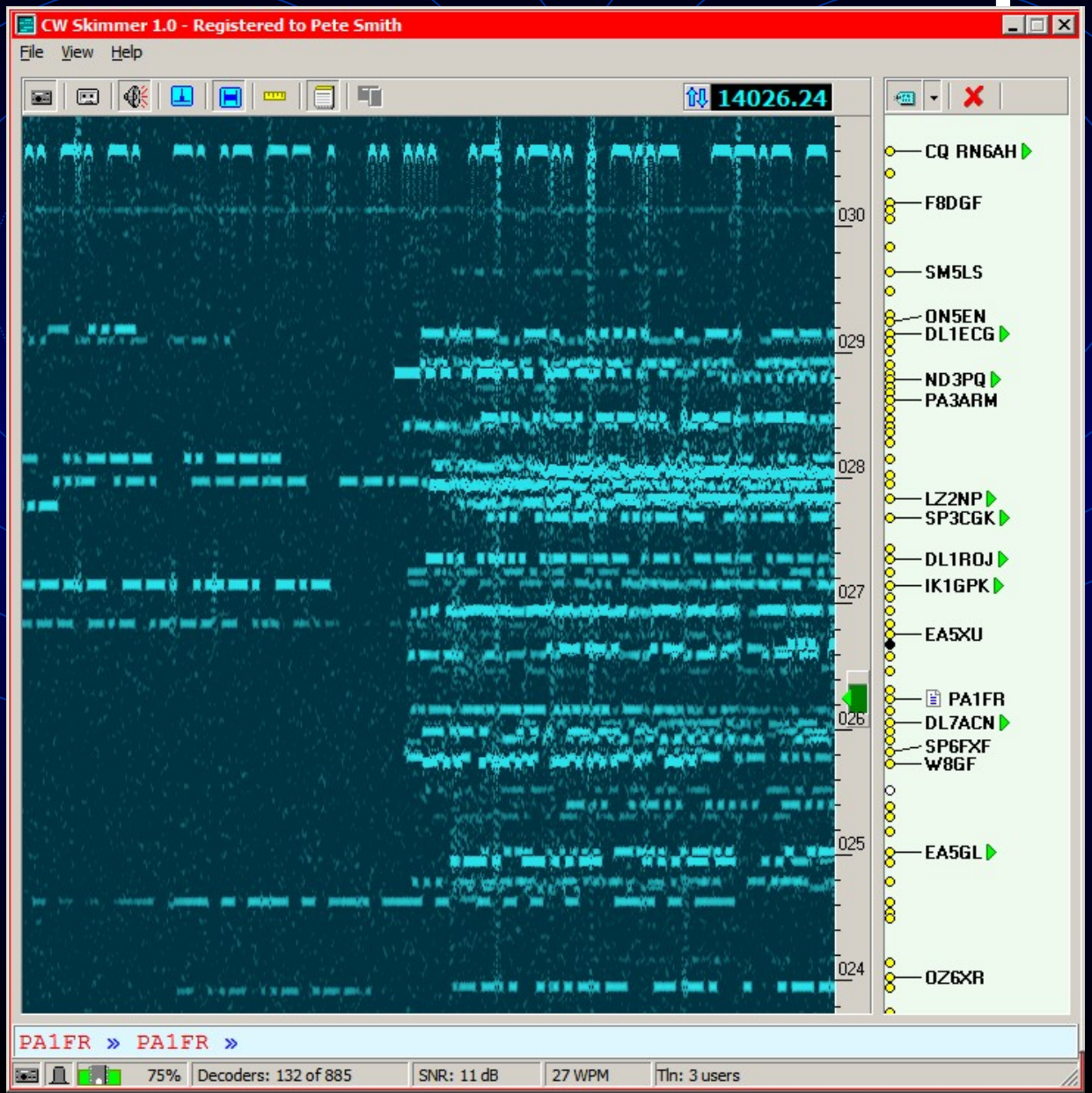
Segue to demo….

KCDXC 2007 Pileup Results

- VE3NE 59
- N2AA VE3DZ K4BAI K5ZD KL2A 54
- W9WI 53
- G4BWP 52
- K1AR 51
- AA1K KE3Q G3SXW 50
- N2NC W4PA 49
- N5RZ 48
- UT5UGR W5ZL KH6ND VE7ZO 47
- W1VE K1VR UA3AGW 46

In five tries, Skimmer scored 43, 42, 49, 38, and 45

Now That's a Pile-Up



Cute, But What Good Is It?

- Originally designed as a DX assistant
- Callers can use it to find where a DX station is listening, by watching who the DX answers and finding his call on the bandmap
- DX station could use it to manage a big pile-up by picking up 25 or 30 call-signs at once and working through them in sequence

“Reverse Beacon”

- Network of Skimmer receivers worldwide
- Hub server receiving and managing spots
- Data retrieval and display limited only by imagination and programming

Examples

- Where am I being heard now?
- Where is [rare DX] being heard now – and on what bands?
- What is being heard in [location]?
- Graphical display (spot map, open paths,etc.)
- Accumulation of data for propagation studies

Use by Contesters (N4ZR comments)

- Some contests – especially Sweep-stakes – will be decided by who has Skimmer and who doesn't
- "That thing is worth 100 mults in CQWW"
- SO2R with Skimmer will be 4-5 times as productive as without

The CW Skimmer Controversy – N6TV's view

- Can single-ops legally use a local CW Skimmer in a contest?
  - Code readers are not prohibited
  - Band scopes are not prohibited
  - A local CW Skimmer is not a spotting net
  - Nothing in ARRL rules seems to prohibit it
  - CQ WW rules *may* prohibit it *if* K3EST says CW Skimmer counts as "other DX Alerting Assistance"

Editorial Opinion (N6TV)

- CW Skimmer represents a major advance in the radio arts
- It is far from perfect – banning them now seems premature
- Let the radio arts advance
- We never banned tape recorders, memory keyers, computer sent CW, computer logging, super check partial windows, pre-fill databases, code readers, band scopes, etc., so what's the big deal?

Implications for Contest Rules

- Technological progress is irreversible
- Skimmer (and whatever the next generation is…) WILL be developed and WILL be used
- “If you outlaw Skimmers, then only outlaws will have Skimmers”

- Various petitions and surveys have sprung up