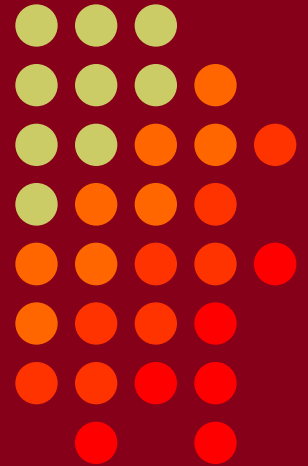


The Advantages of Waterfall Displays for Contesting and DXing

Presented by N6TV

n6tv@arrl.net



• CTU •
CONTEST
UNIVERSITY



Presentation Overview

- Legacy “Panadapters”
- Waterfall scope in CW Skimmer
- Latest radios with waterfall displays
- Waterfall display advantages & disadvantages
- How to use waterfall displays while contesting or DXing
- Q & A

Legacy Panadapters



- Kenwood SM-230 Station Monitor (25, 100, or 250 KHz):



UR

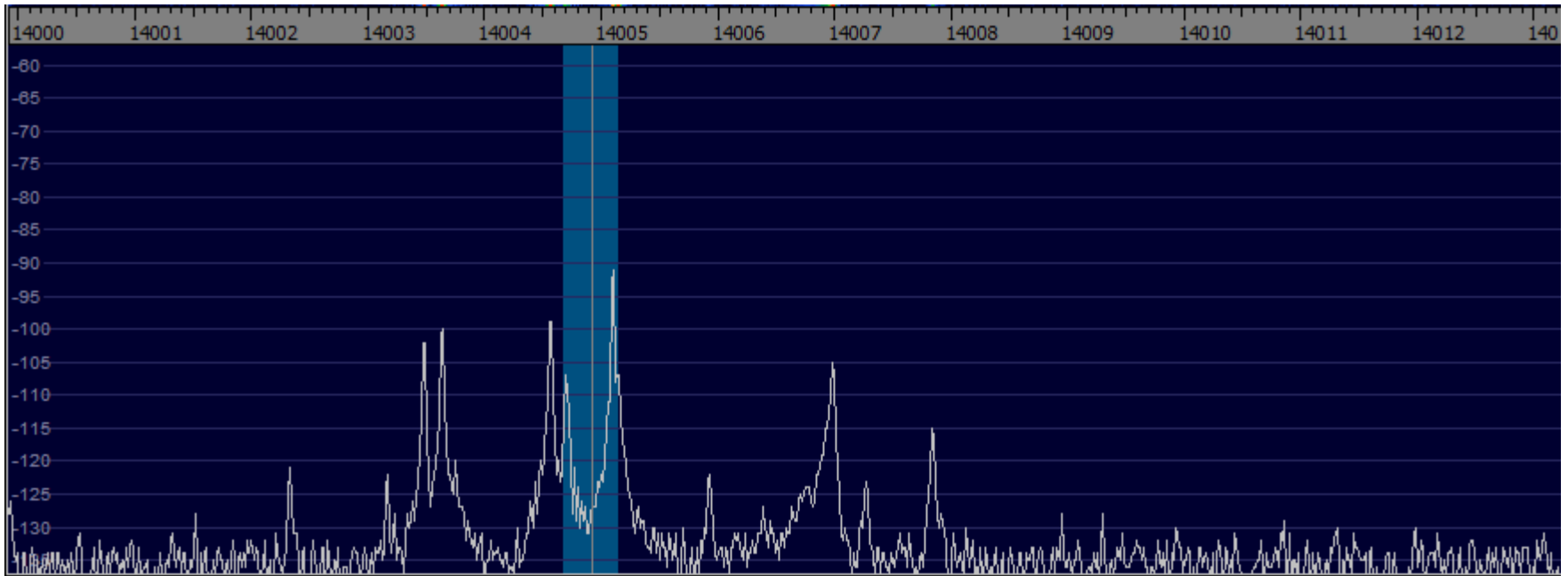
Legacy Panadapters



- “Band Scopes” in Icom IC-781, IC-756ProII, IC-7600, IC-7800, IC-7700 (before new firmware)



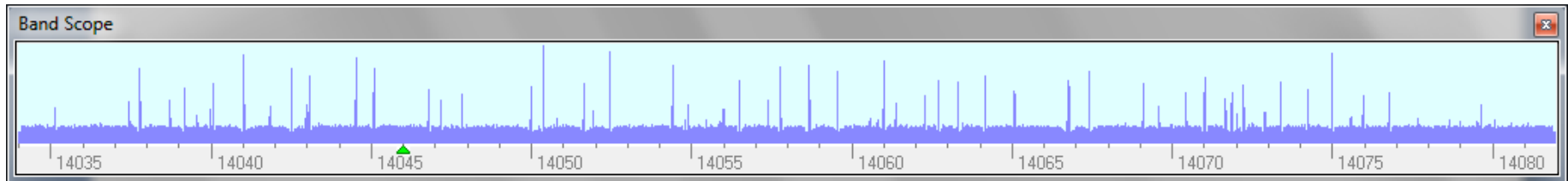
Spectrum Displays Hide Weak Signals



CW Skimmer's Band Scope



- From the CW Skimmer menu, select View → Band Scope



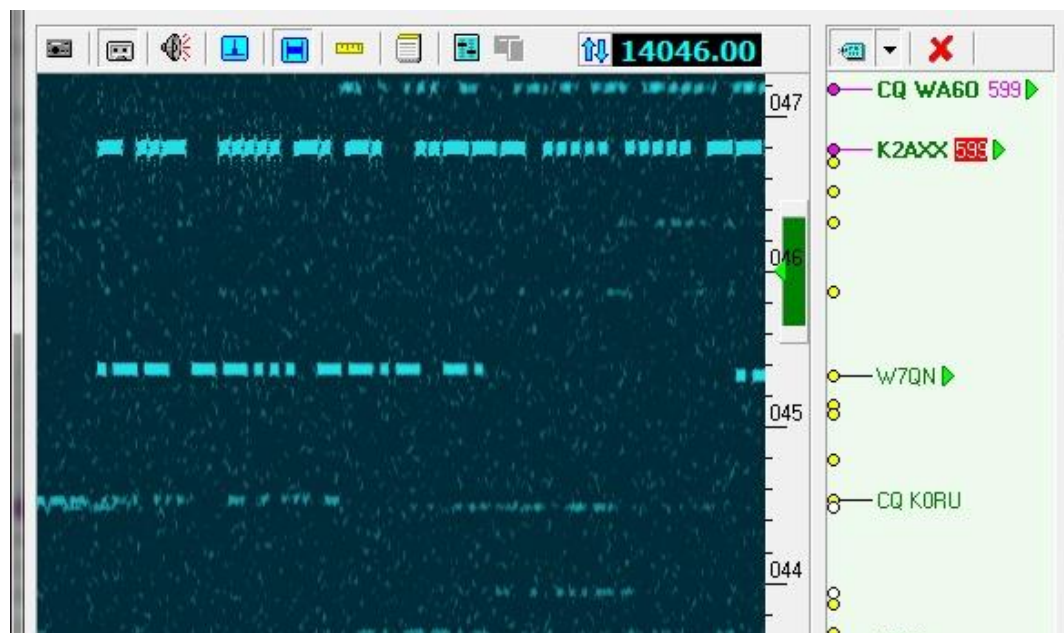
- Much better resolution, but display is very jumpy
- No “peak signal” memory
- Not useful on SSB

Legacy Panadapter Limitations



- Big signals dominate the display
- Weak signals very difficult to spot
- Signal peaks disappear, no history
- Difficult to find “clear spots” on a crowded band
- Limited zoom in or out
- Display jumpy, distracting
 - Signal averaging helps, but it also hides things

CW Skimmer Waterfall Limitations



- You only see 10 - 15 kHz of the band at most
- Scale is **fixed**, cannot “zoom” in or out, or tune smoothly
- Narrow 500 Hz CW filter – *not* usable on phone

Better Waterfall Displays



- The Elecraft P3 Panadapter



- Major improvement over legacy designs

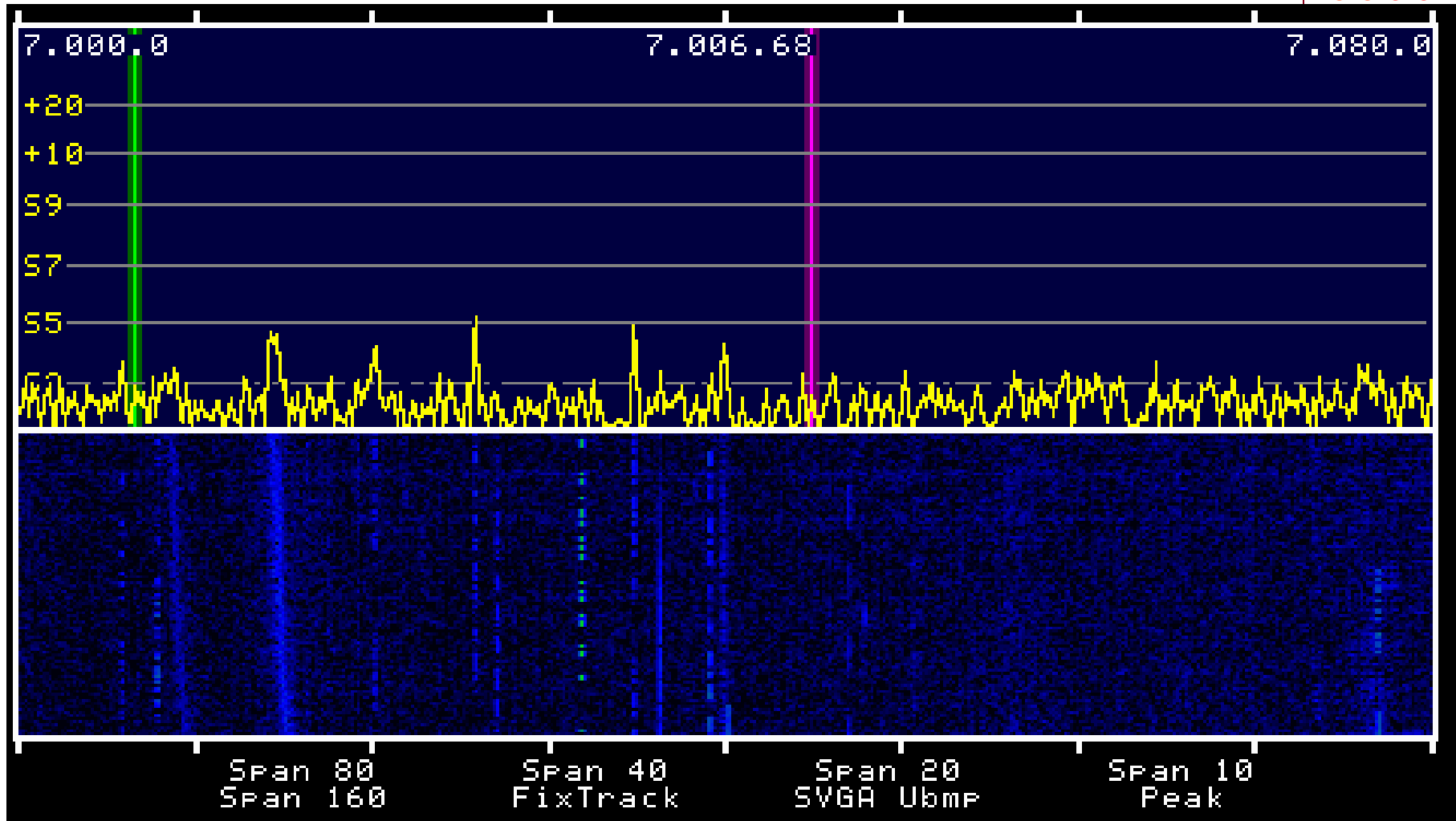
Elecraft P3 + P3SVGA Option



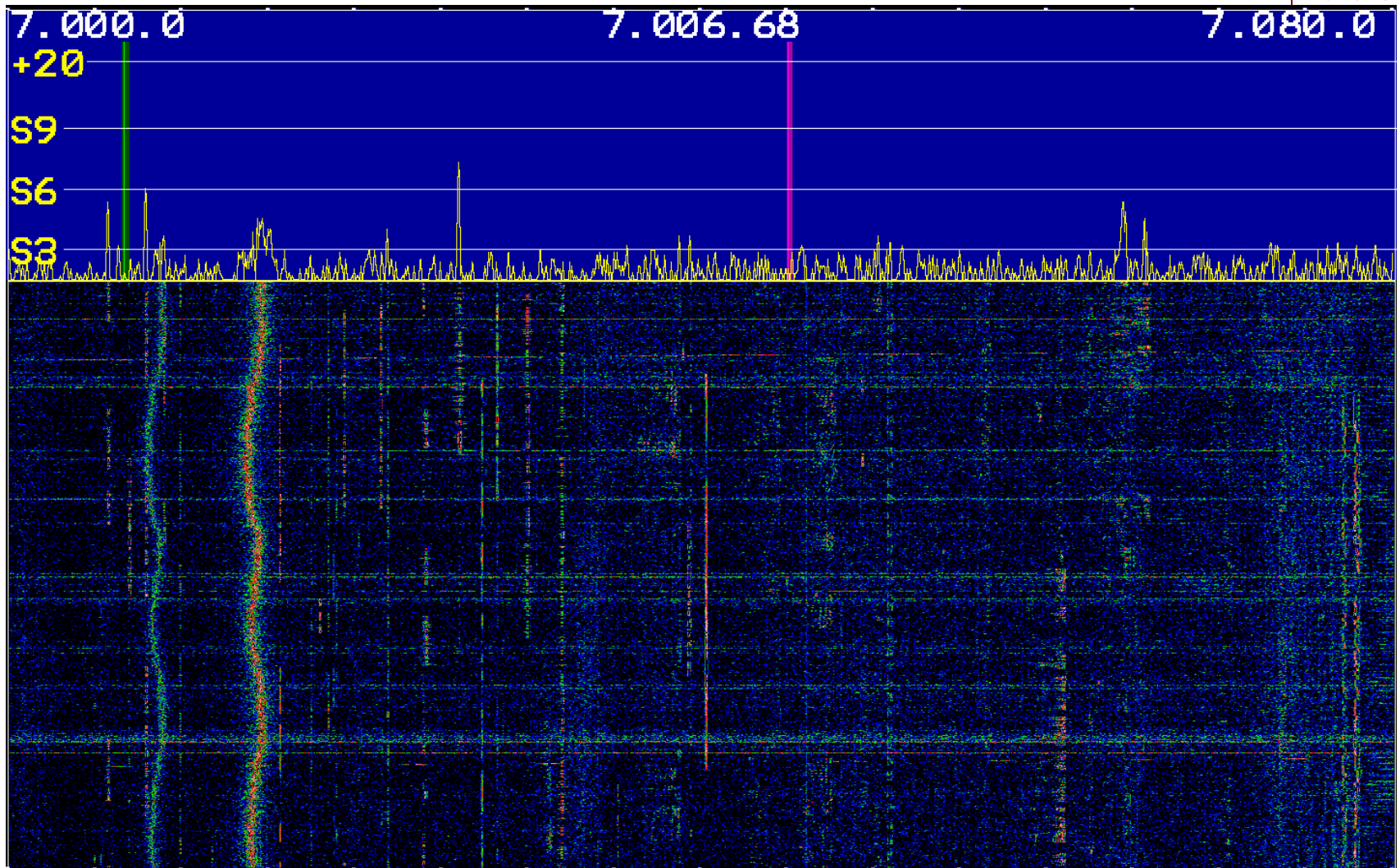
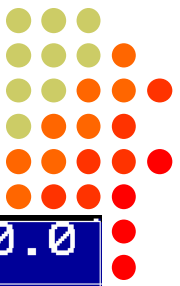
- P3 resolution only 480 x 272 pixels
- P3SVGA: internal SVGA Large Screen Adapter
 - 1024 x 768
 - 1280 x 1024
 - 1440 x 900
 - 1920 x 1080
- Displays far more signals



P3 Built-in Display at 480 x 272



P3SVGA at 1440 x 900



Old Icom IC-7800 firmware



Icom IC-7800 with V3.0 firmware

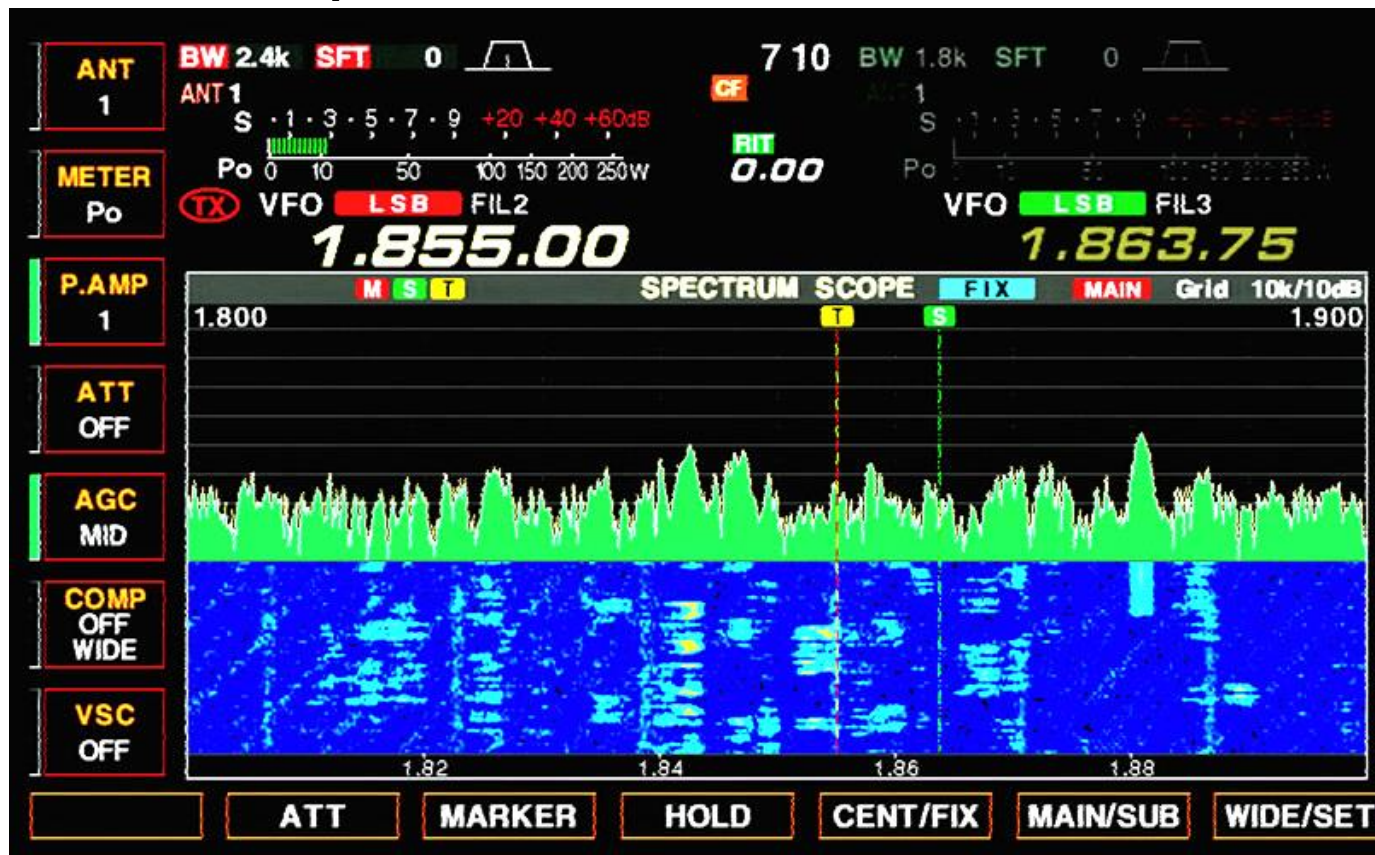


IC-7800 V3.0 Screen Shot



IC-7600, IC-7700 V2.0 Also Supports Waterfall

- 800 x 480 (with or without external monitor)



IC-7850 / 7851 – *Huge Improvement*



- Fast, 800 x 600, MAIN only, or MAIN + SUB
- “Click to tune” with USB mouse



New IC-7300 has fast waterfall too!



- With touch screen



New IC-7610 with dual band waterfall



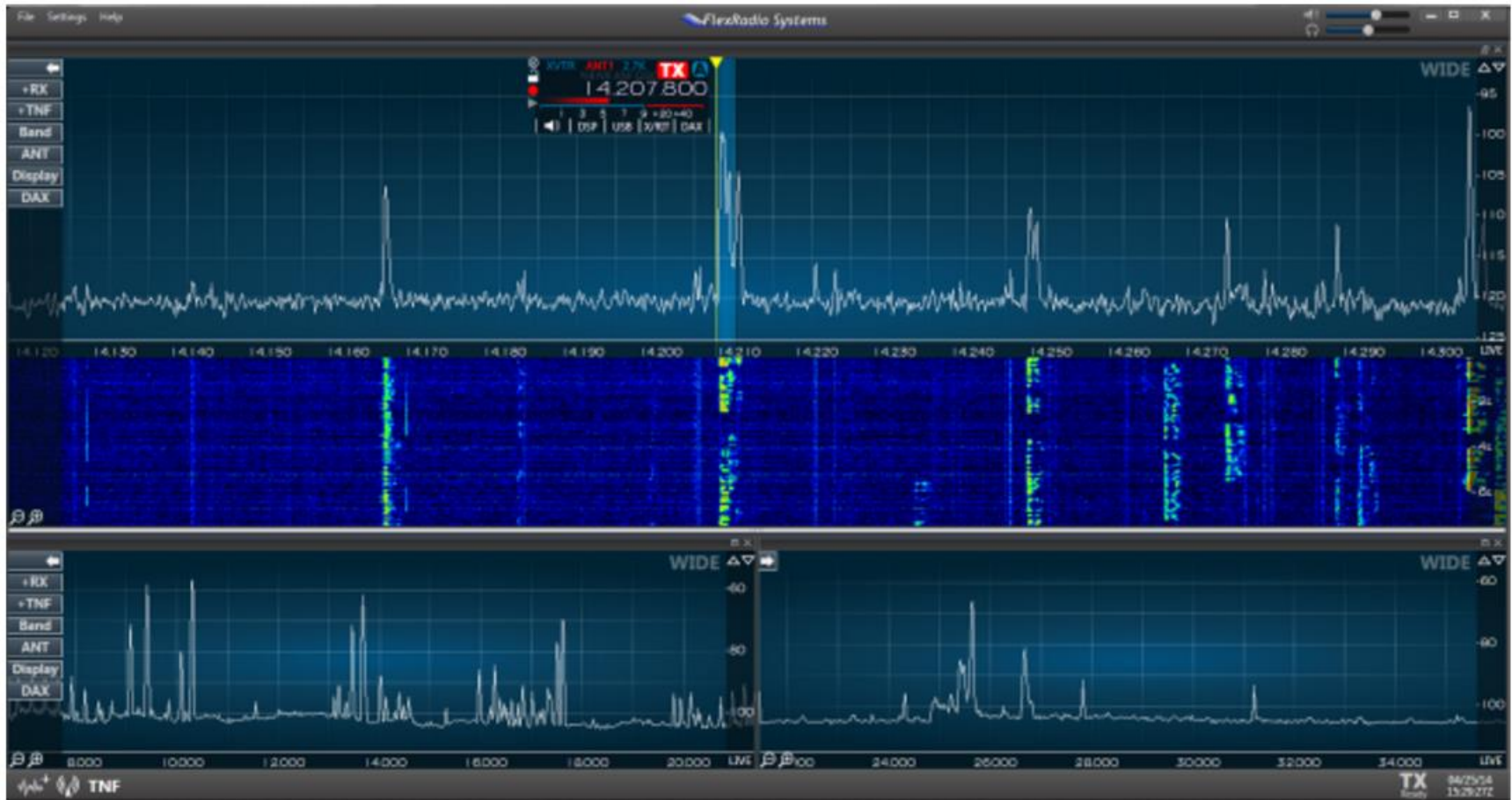
Kenwood TS-990S



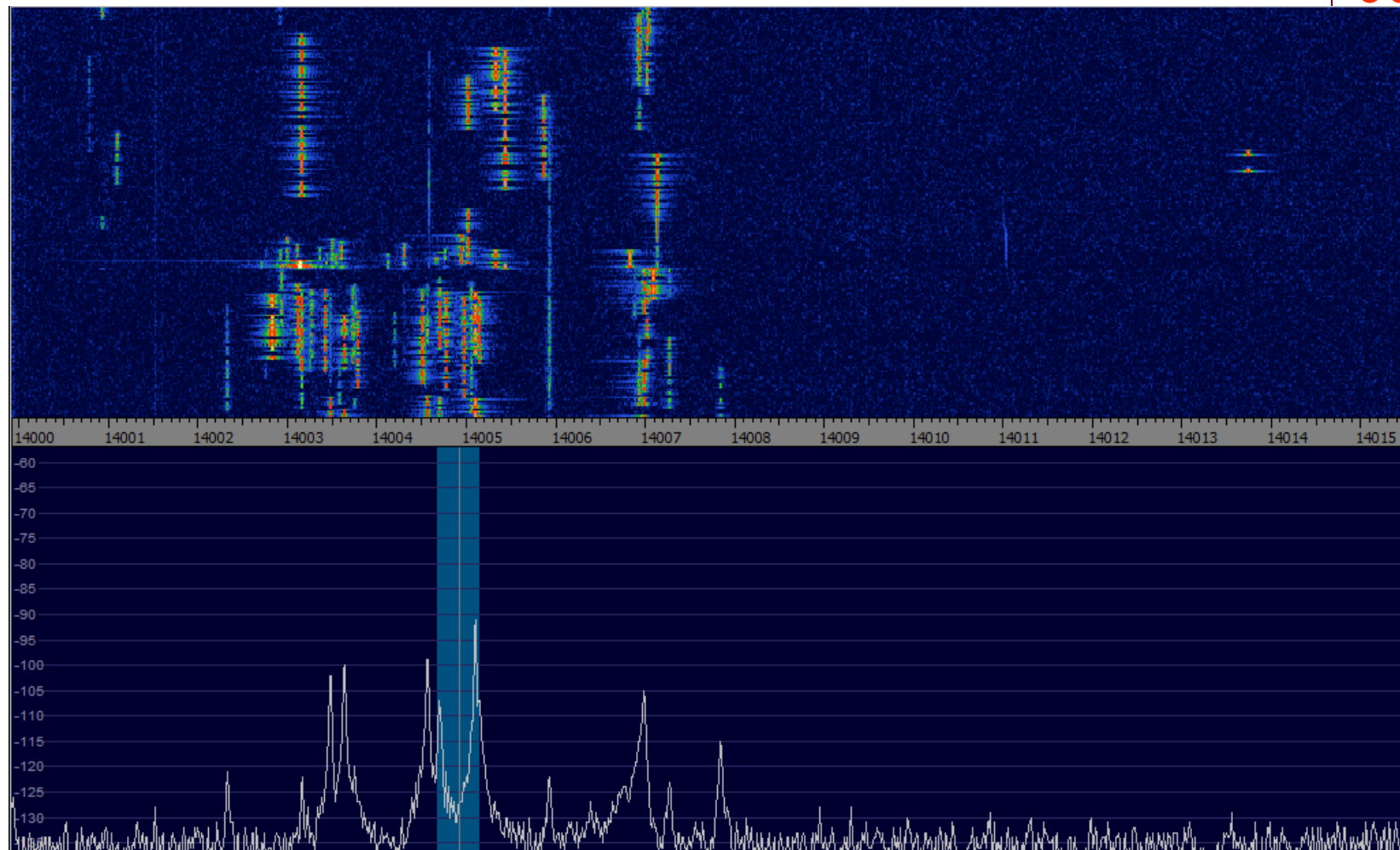
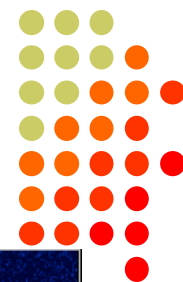
FlexRadio FLEX-5000™, FLEX-6700™



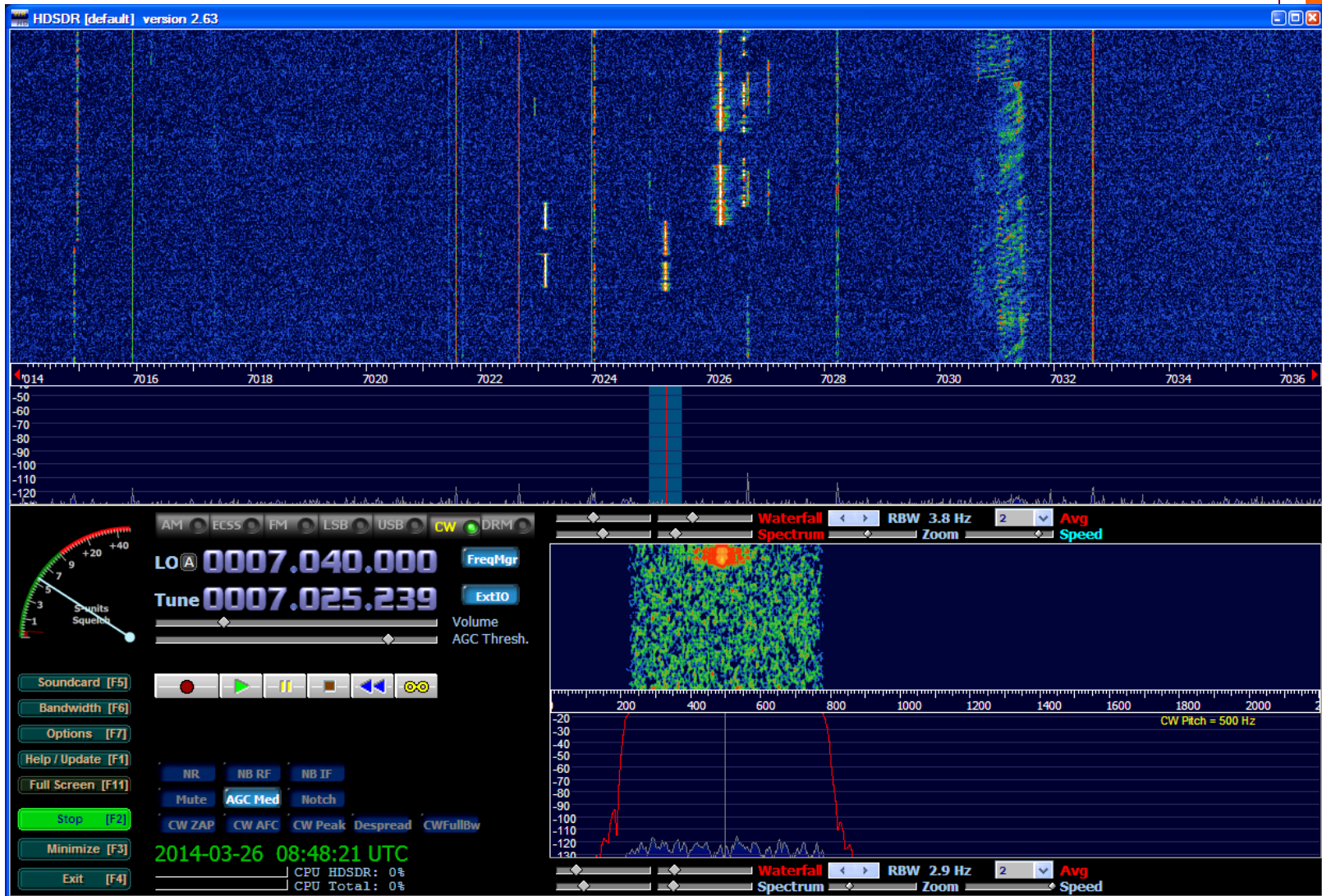
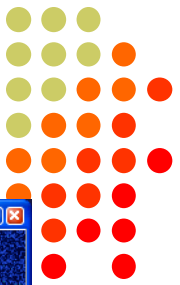
FlexRadio Systems® SmartSDR



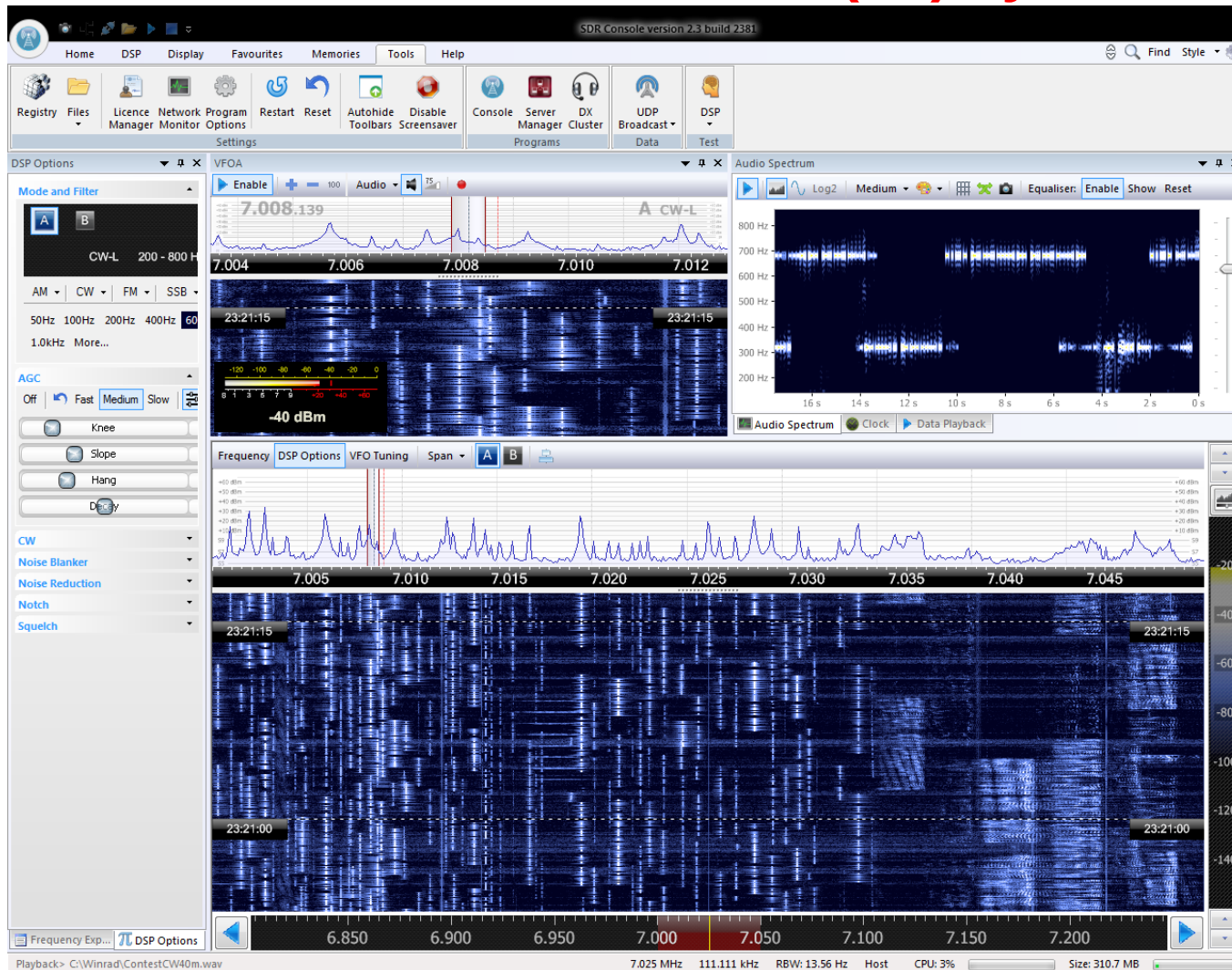
Winrad Software



HDSDR Software



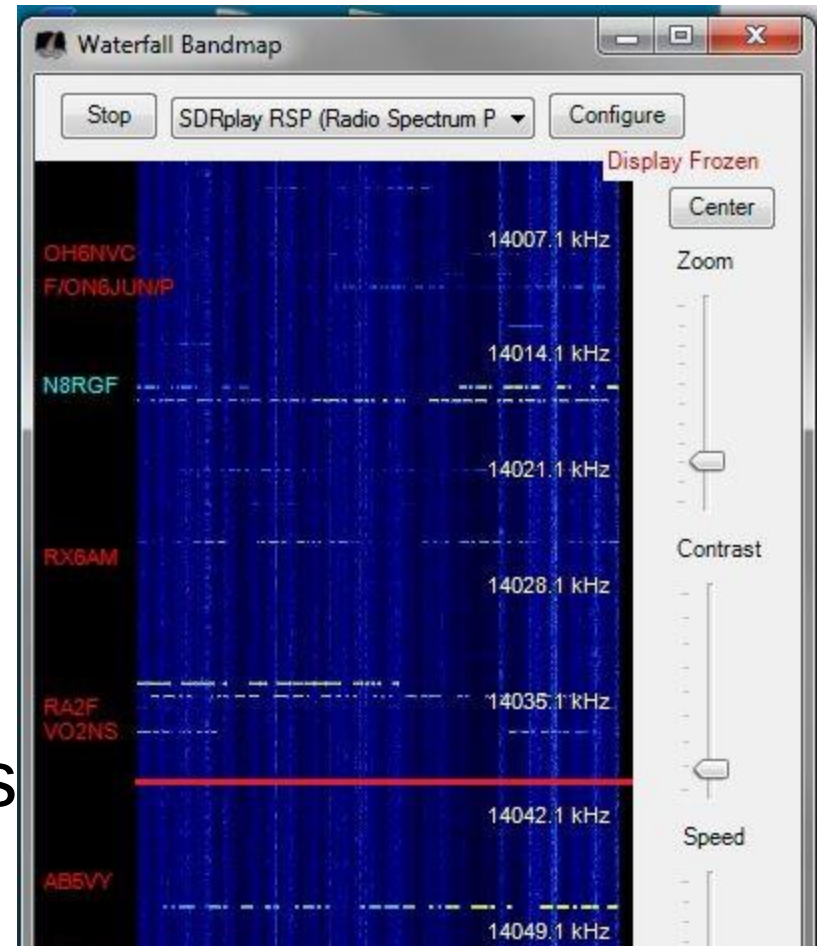
SDR-Radio.com SDRConsole (V2) by HB9DRV



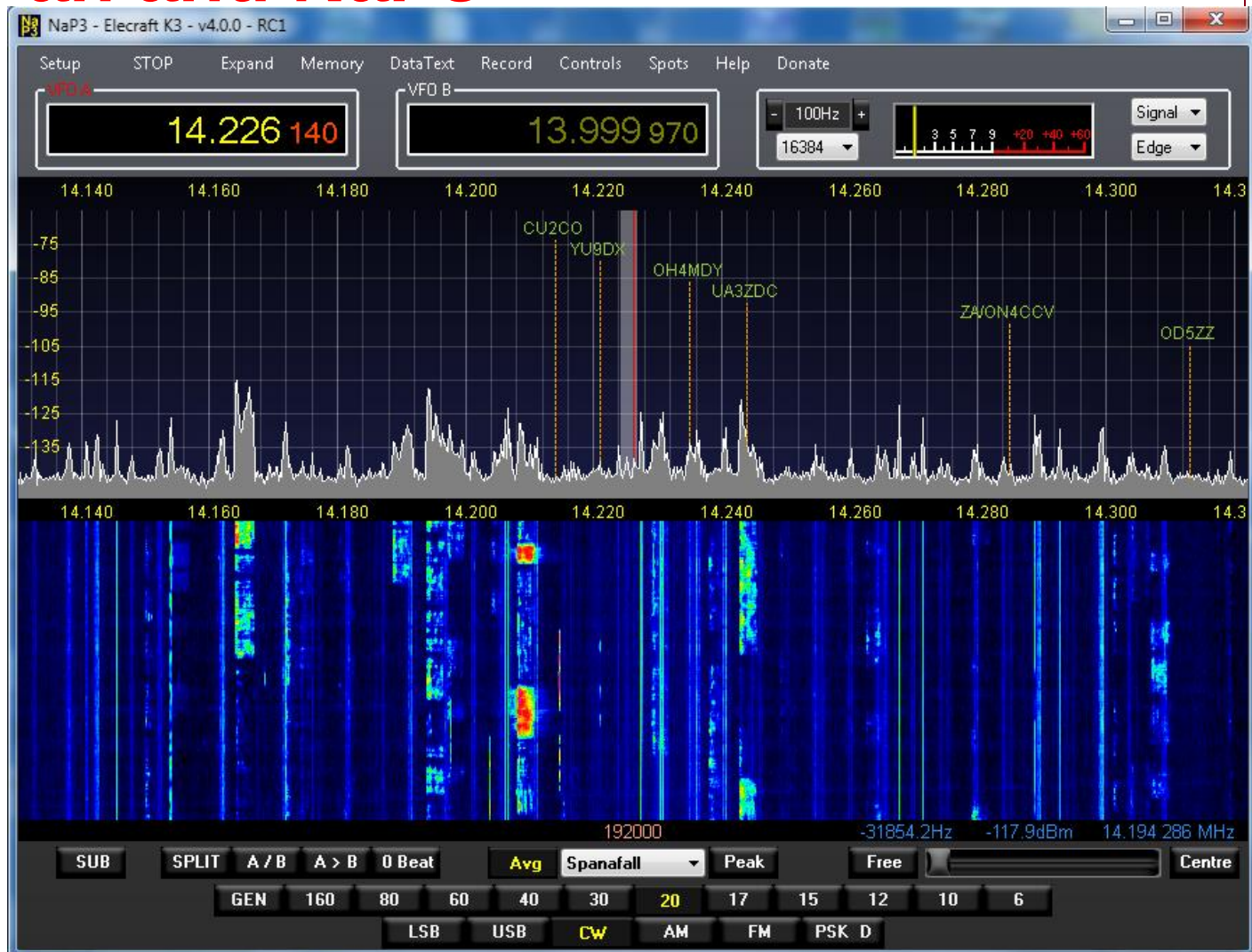
Waterfall Bandmap by N2IC (for N1MM+)



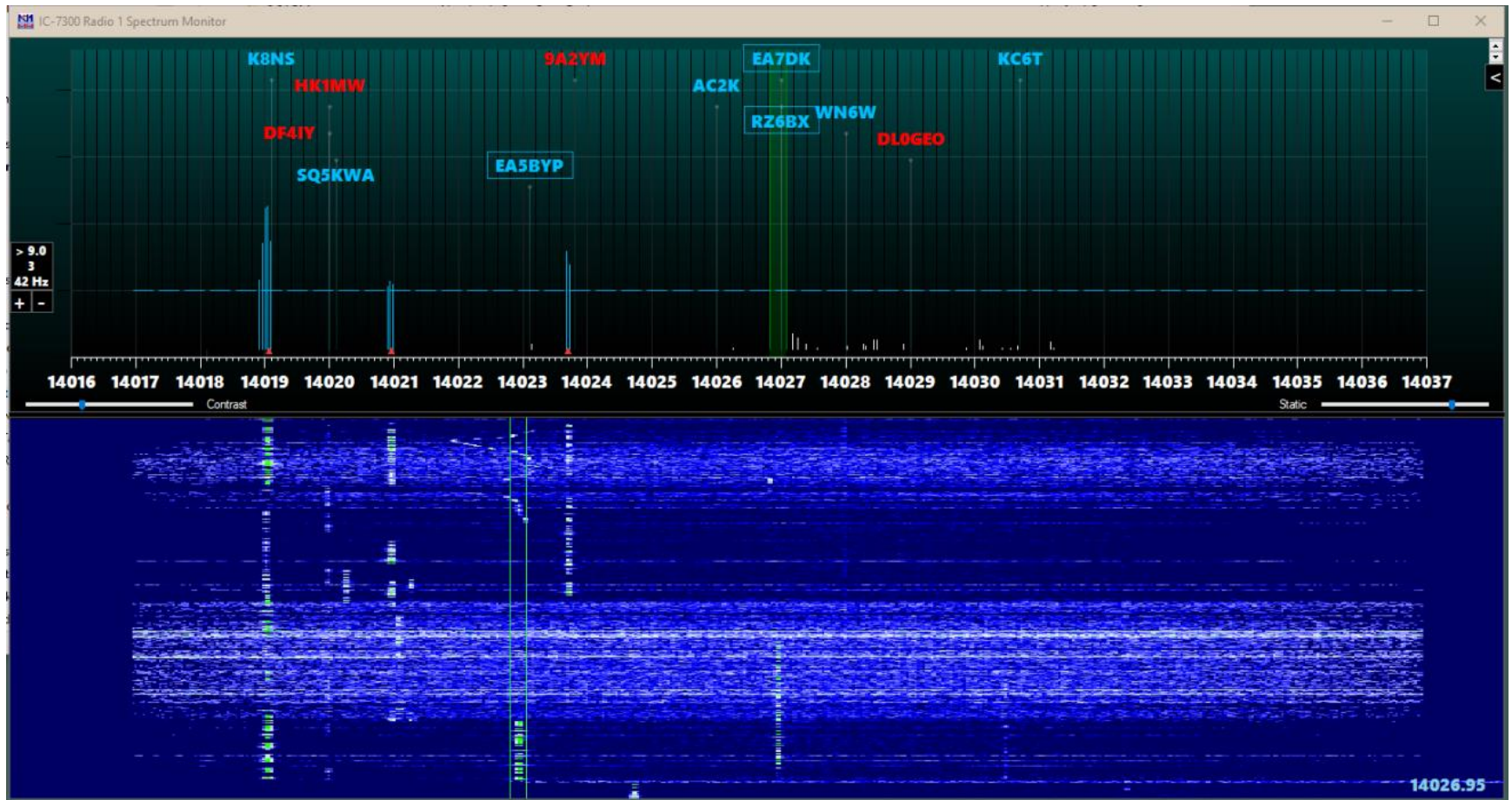
- Combines **cluster spots** from Internet or Skimmer with waterfall from local SDR
- Zoom Feature
- Click to tune feature
- Potential to support other logging programs



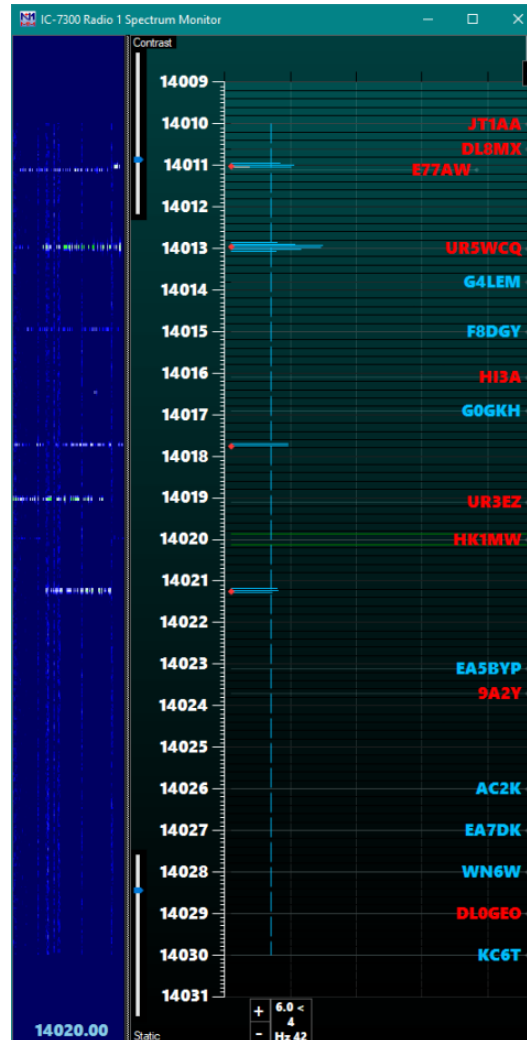
LP-Pan and NaP3



N1MM+ Spectrum Display Window



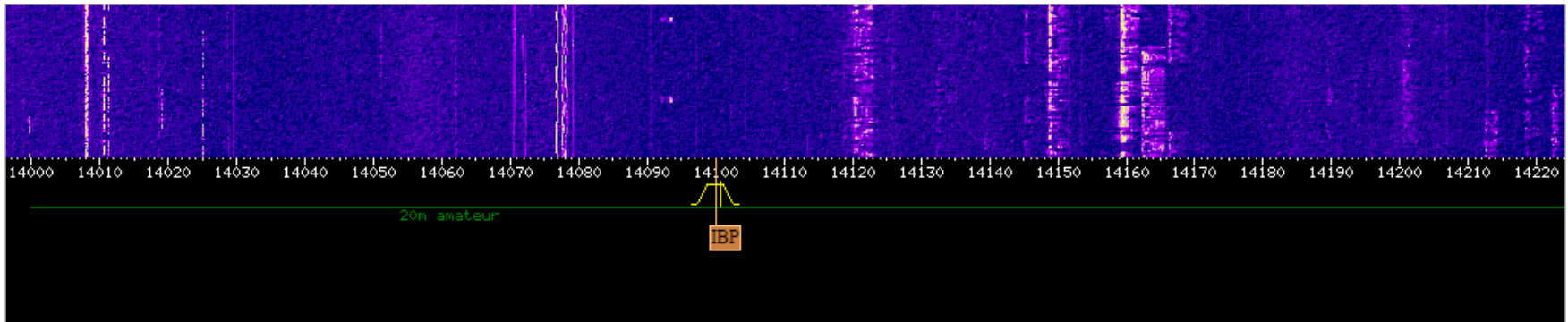
N1MM+ Vertical Spectrum Display Window



WebSDR: Waterfalls on the Web



- <http://websdr.ewi.utwente.nl:8901/>

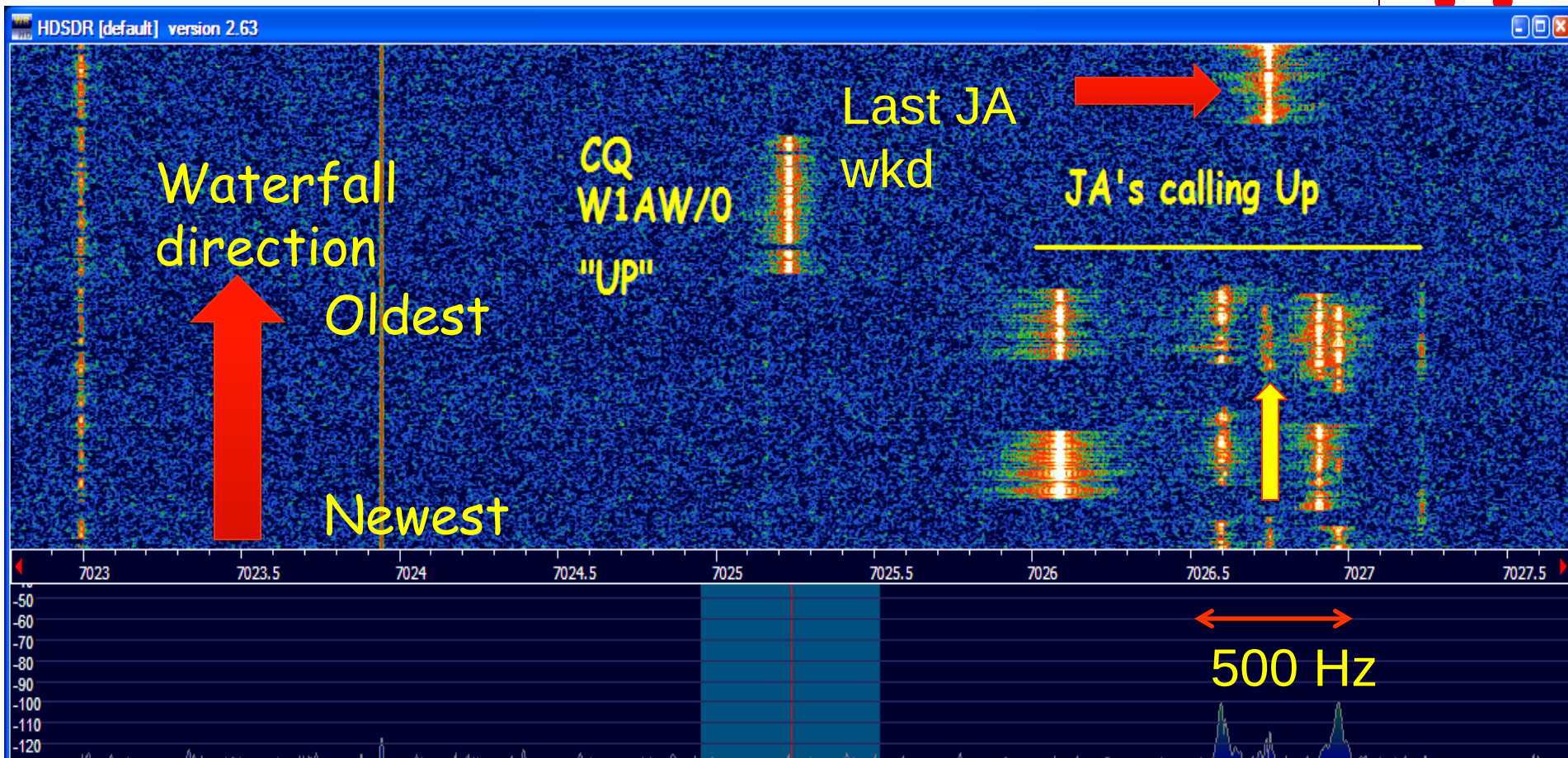
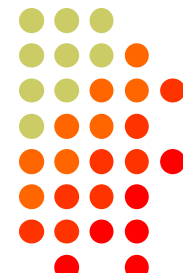


Waterfall Display Advantages



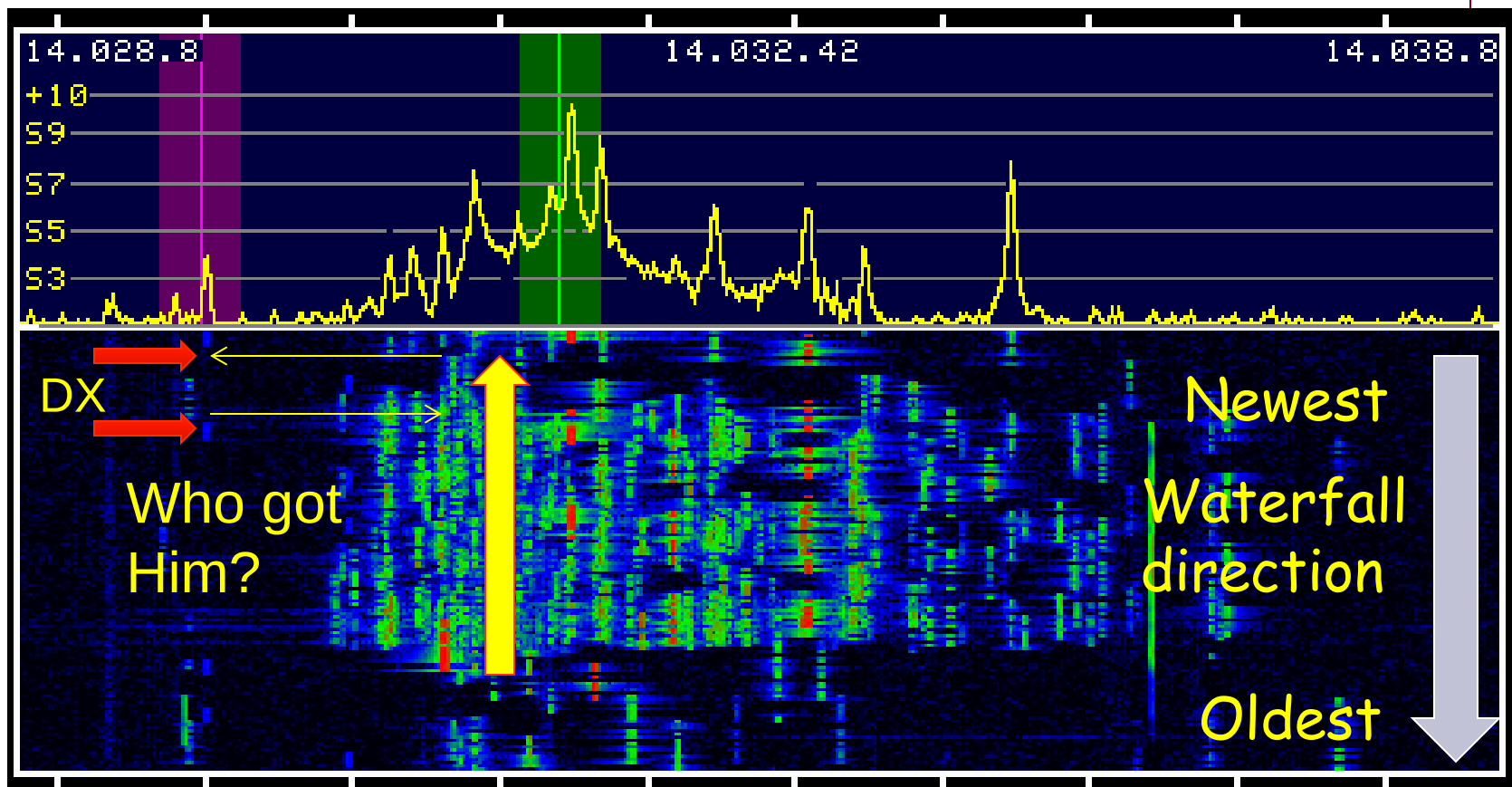
- “Click to Tune” – direct access using a mouse or tap
 - IC-7300, IC-7610, IC-7800 V3.0, IC-7851, Flex/SmartSDR, HDSDR, SDRConsole (but *not* Elecraft P3)
- Jump to Next Signal (N1MM+ Spectrum Display)
- Find “fresh meat” (unidentified signals)
- Weak signals easy to spot (faint traces)
- Many zoom levels: 5, 10, 30, 60, ..., 800 KHz+
 - Watch the whole band at once, or a small slice
- Find clear frequencies *fast*
- Find who the DX just worked, *fast*
- Spot the gaps in a crowded CW pileup

Listening “Up”? Not a problem



Who will W1AW/0 answer next?

E30FB CW Pileup on P3 display



Where will he listen next?

Advantage: Waterfall



- Find “good spots to call” in a CW pileup
- Find clear spots to call CQ
- QRM? You can **see** where to move your VFO to minimize it
- During S&P, find the “next” signal **fast** (no more slow and careful tuning)
- Position VFO B or 2nd receiver without having to *listen* to it
 - S&P while CQing, “SO2V” (single-op, two VFOs)
- Monitor overall band activity
- Keep an eye on the local competition

Waterfall Display *Disadvantages*



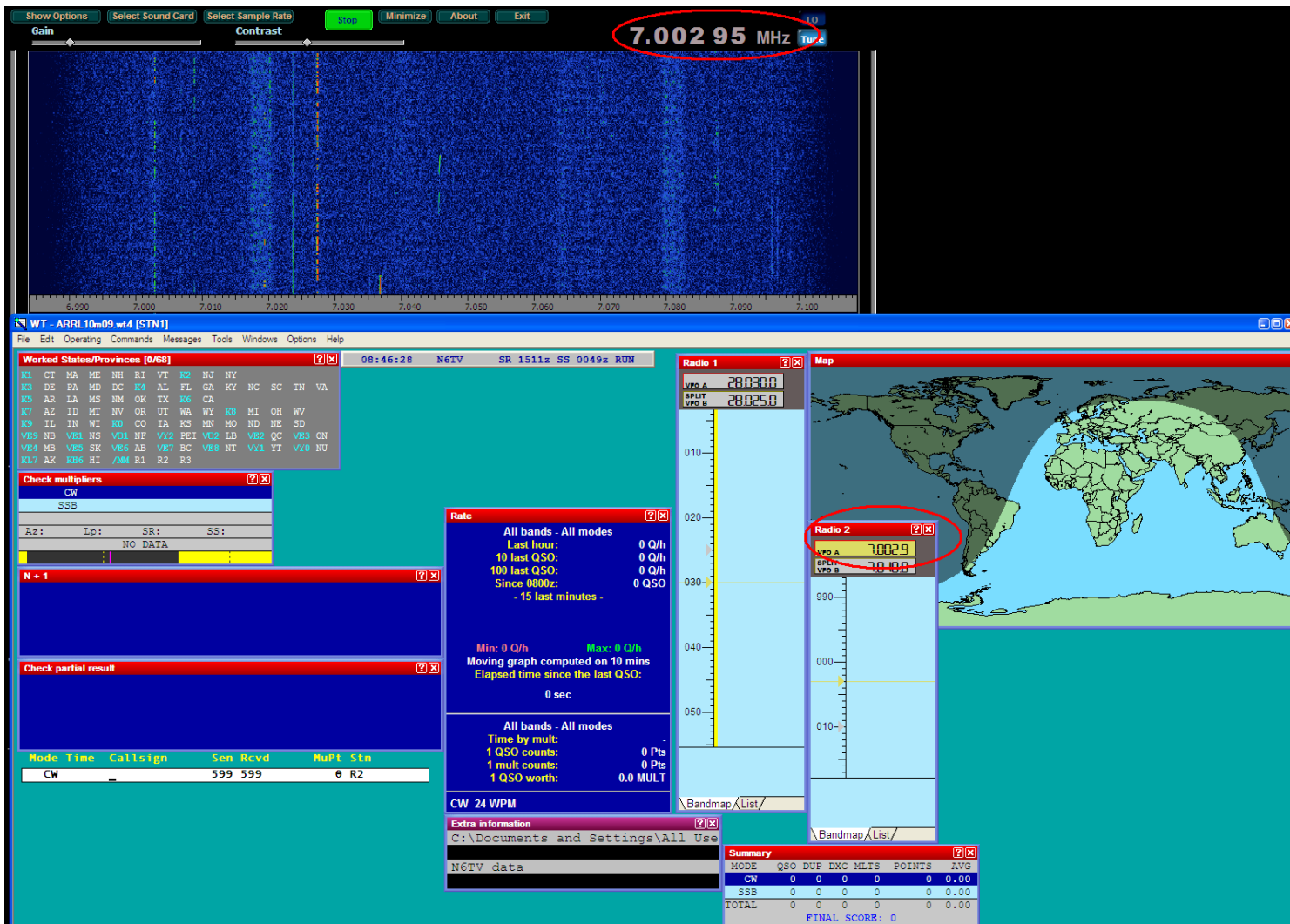
- Most radios don't automatically tune from signal-to-signal like CW Skimmer
 - Exception: New N1MM+ Spectrum Display
- Clicking on a signal with the mouse not as precise as tuning with VFO, must still fine tune
- Contest software loses focus when you click on waterfall
- Some find it visually distracting
- Cumbersome to adjust scope width and band edges
- **But, if you're *not* using a waterfall display in a contest, you're really operating "blind"**
- **A waterfall display is really the "killer app"**

Recommendations While Contesting

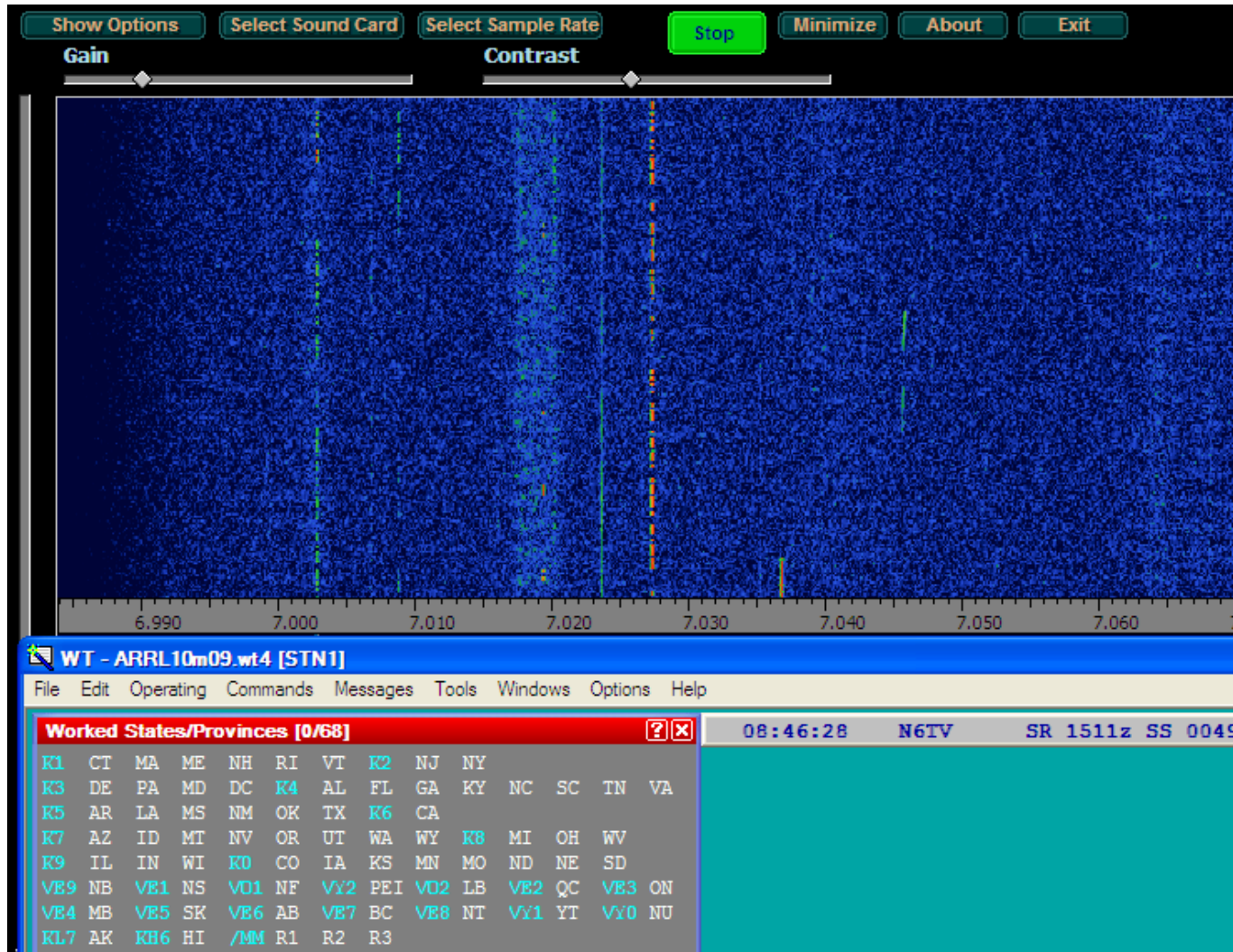


- Always enable the waterfall
- **Use Fixed Mode** (never “Center” mode)
 - You want the VFO cursor to move, not the scope
- Use narrow 5 - 20 kHz span for CQ, running
- Use wider 40 -100 kHz span for S&P, tuning
- Logging software can and should automate this:
 - In Win-Test, type **SPAN20** [Enter] to set a 20 kHz scope span, limited to band edges
 - See <http://bit.ly/wtscripts> - Win-Test Scripts
P3scripts.zip, IcomScripts.zip, includes source code

Winrad on Top, Win-Test on Bottom



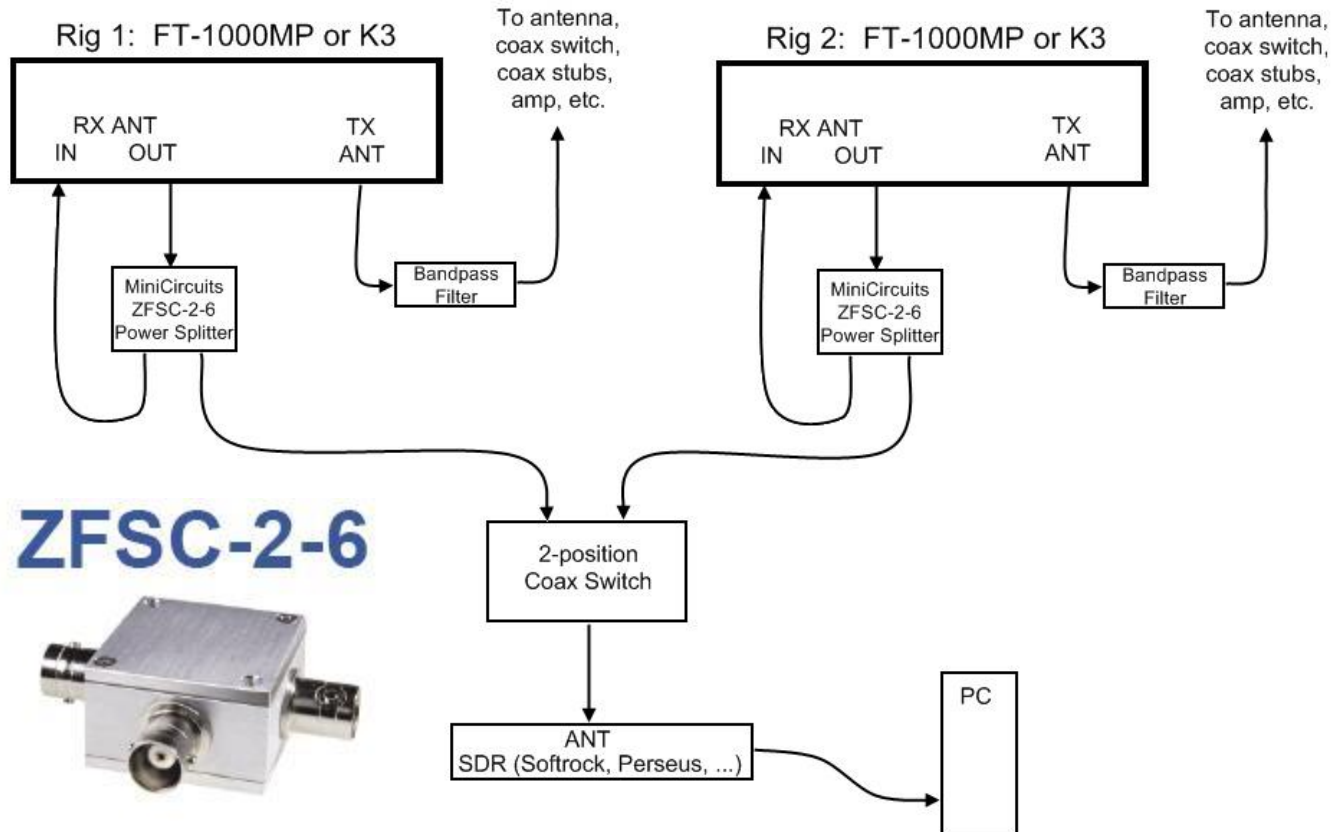
Winrad & Win-Test (zoomed)



Click-To-Tune with a “Legacy” Transceiver + SDR

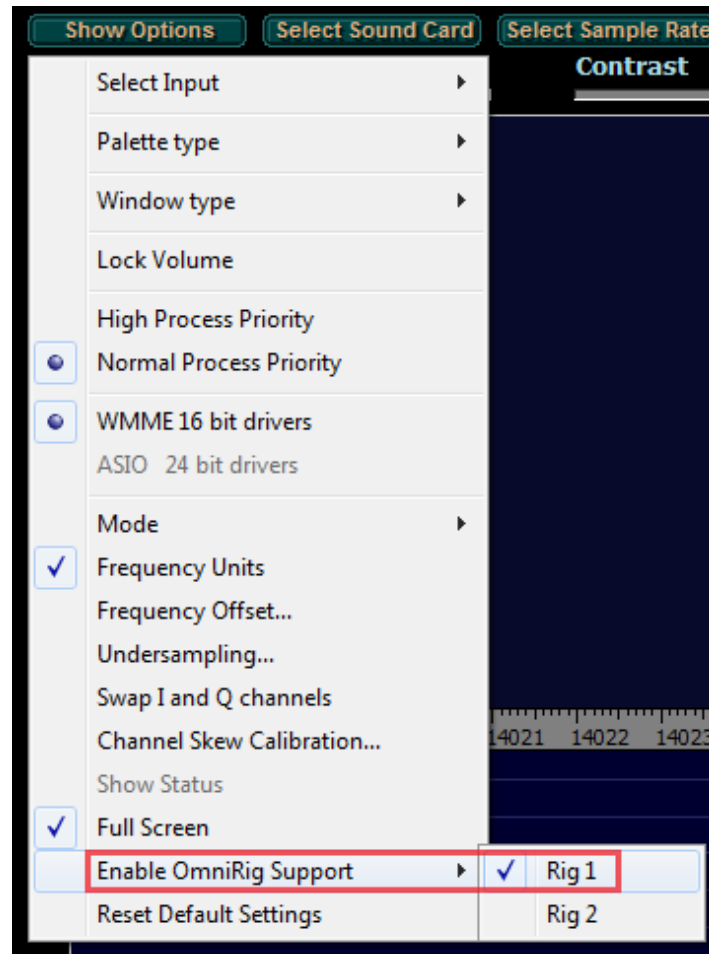


Adding a Software Defined Radio (SDR)
to an SO2R Station



Drawing by N6TV@arri.net 31 May 2008

Use Omnirig support in Winrad or HDSDR to sync freq. with any transceiver





Try Winrad Waterfall Demo

- Perseus SDR used to make a wideband recording (122 KHz for 10 minutes = 300 MB)
- Demo will play back that recording and others
- To try the demo yourself, follow instructions at
 - <http://www.kkn.net/~n6tv>

Click-To-Tune, IF OUT to LP-PAN 2, NaP3, LP-Bridge



Rig: K3 shown



Power, 11-16VDC
120mA

Sound card: ASUS Xonar U7
USB shown



Headphone or
Powered
Speaker

Headphone & Line In
jacks are
1/8" / 3.5mm
Stereo

USB to PC
on Rear

Q Output (Right/Red)

I Output (Left/White)

LP-PAN 2



Mute Input-
short to mute
Usually not needed

1/8" : 3.5mm
Mono Plugs

Questions?



- <http://www.winrad.org> - Winrad software
- <http://http://www.hdsdr.de/> - HDSDR software
- <http://sdr-radio.com/Software> - SDRConsole
- <http://n1mm.hamdocs.com/tiki-index.php?page=Spectrum+Display+Window> – N1MM+ Spectrum Display setup
- <http://www.kkn.net/~n6tv> - Winrad demo file
- <http://www.telepostinc.com/LP-PAN.html>
- <http://www.qrz.com/db/n6tv> - Links to this and other presentations