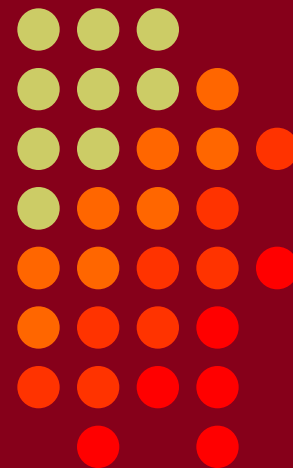


# Using Waterfall Displays as a Contesting Advantage

Presented by N6TV

[n6tv@arrl.net](mailto:n6tv@arrl.net)



• CTU •  
CONTEST  
UNIVERSITY

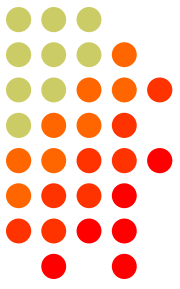


# Presentation Overview



- Legacy “Panadapters”
- CW Skimmer’s SDR waterfall
- Current radios with waterfall displays
- Waterfall display advantages
- How to use waterfall in a contest
- Q & A

# Legacy Panadapters



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



UR

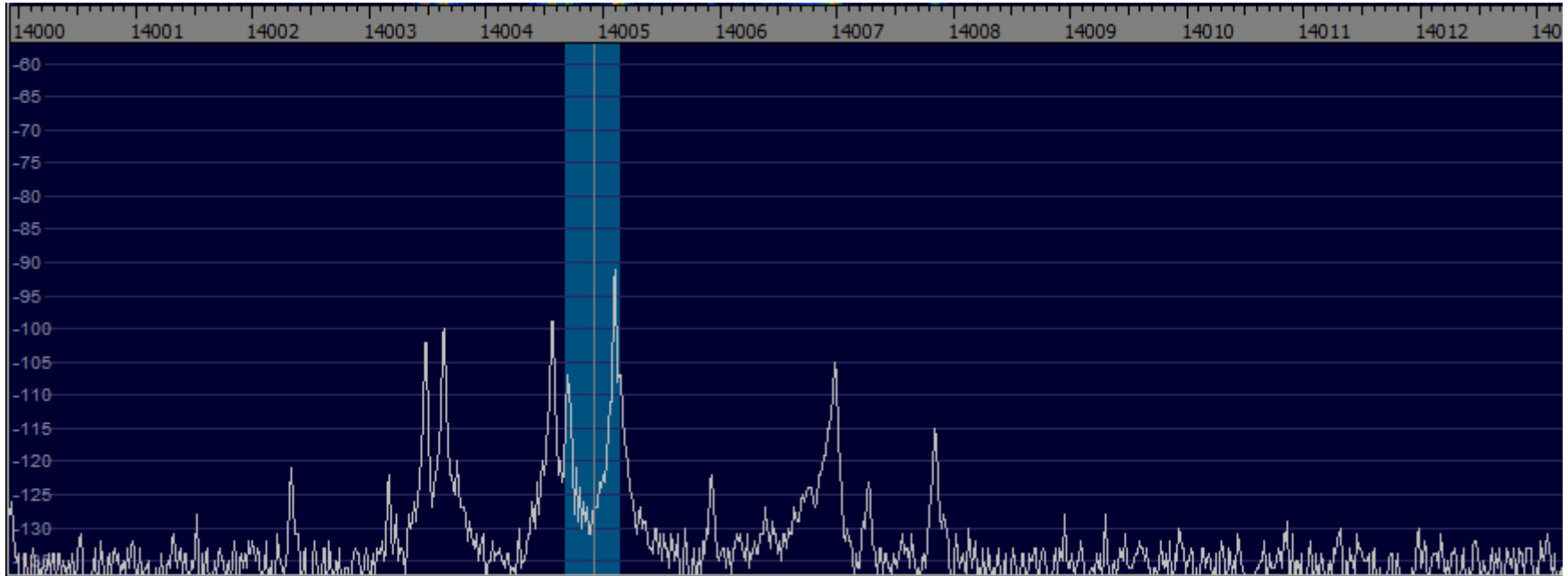


# Legacy Panadapters

- “Band Scopes” in Icom IC-781, IC-756ProII, IC-7800 (before V3.0), IC-7700, etc.



# Spectrum Displays Hide Weak Signals



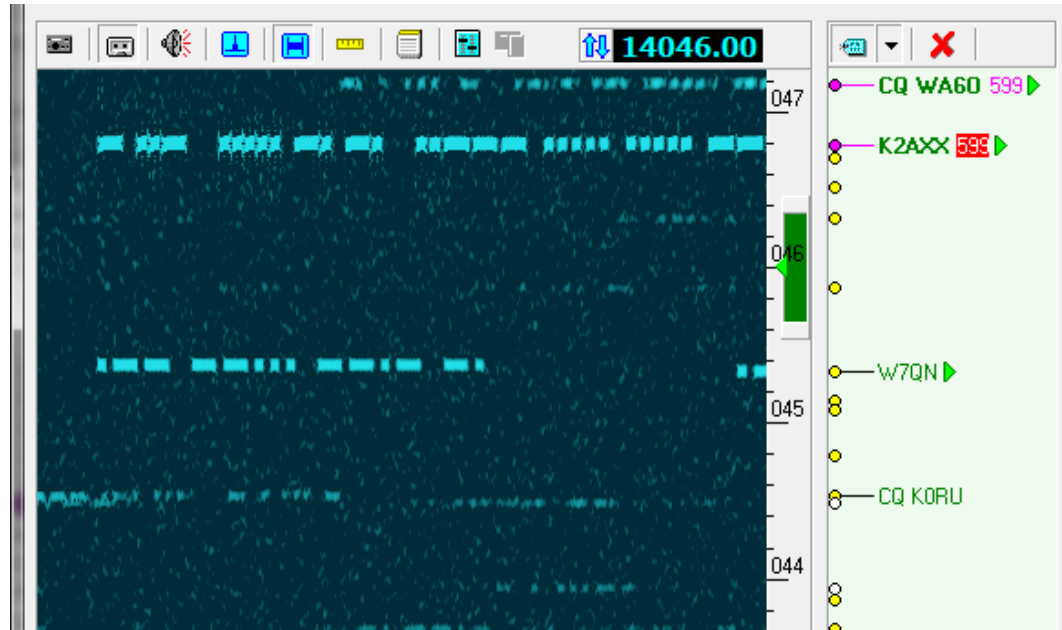
# Legacy Panadapter Limitations



- 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* useable on phone

# Better Waterfall Displays



- The Elecraft P3 Panadapter



- Major improvement over legacy designs



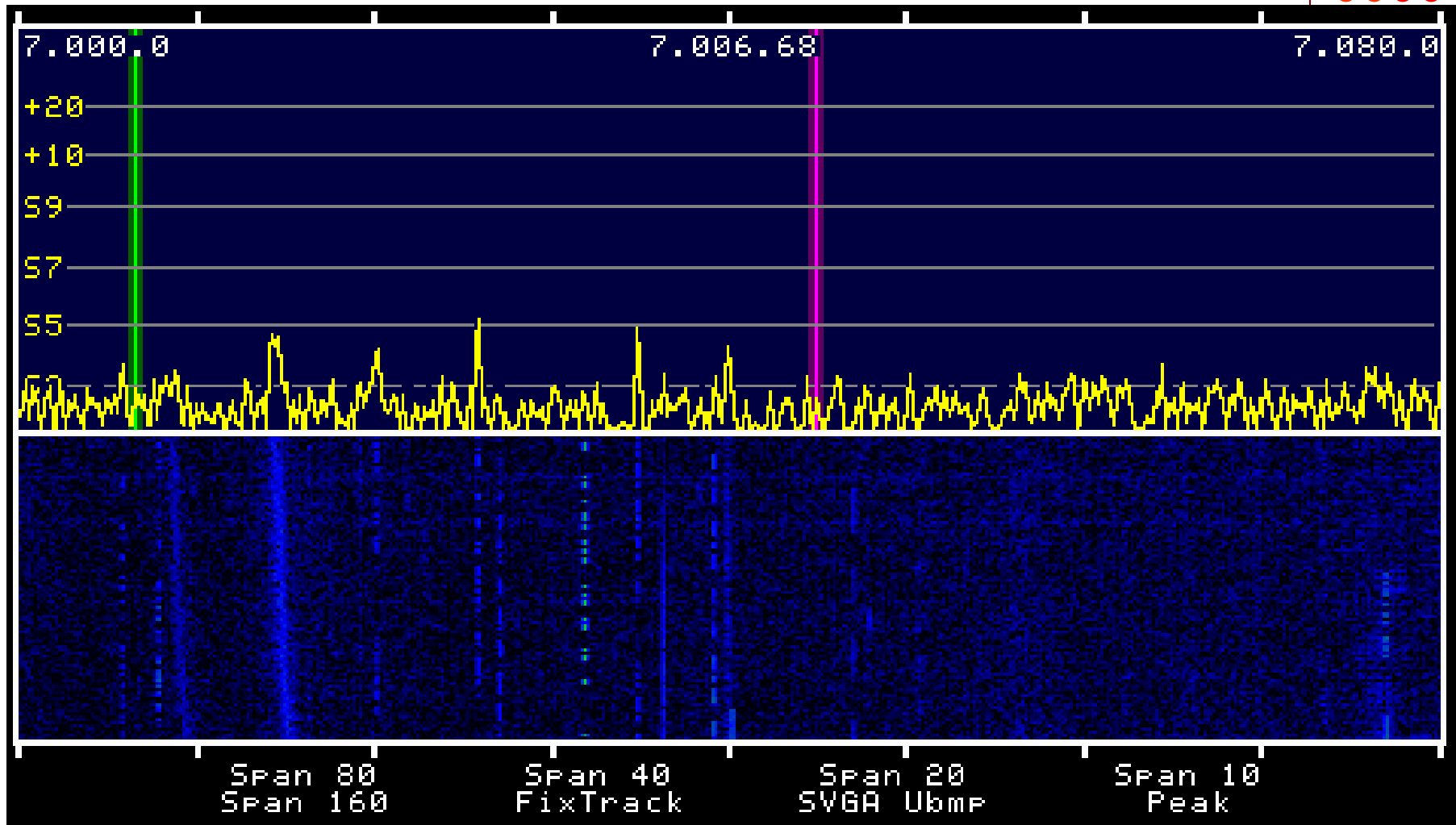
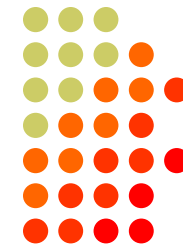


# Elecraft P3 + P3SVGA Option

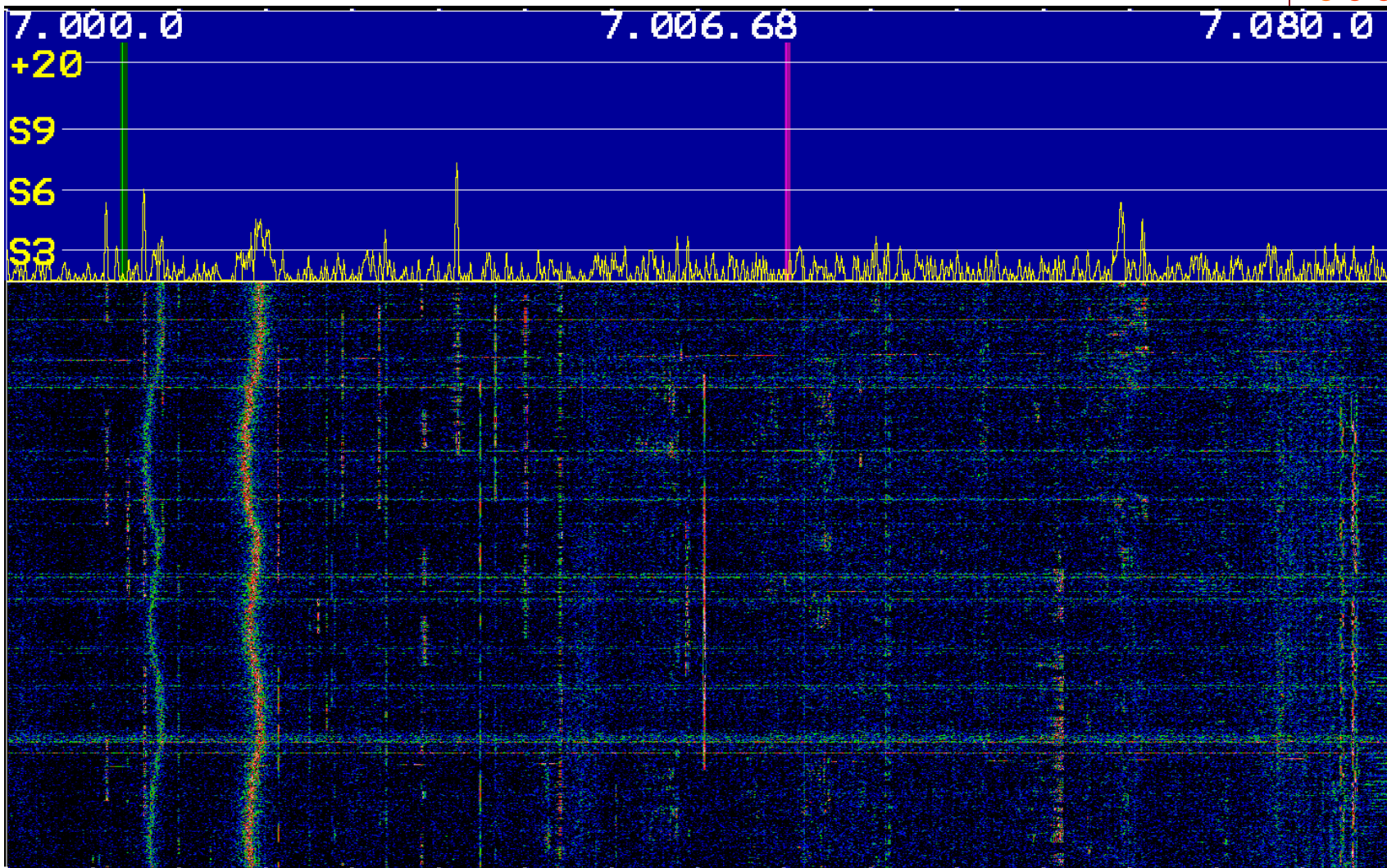
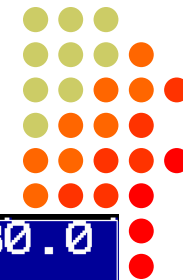
- P3 resolution only 480 x 272 pixels
- P3SVGA: internal SVGA Large Screen Adapter
  - 1024 x 768
  - 1280 x 1024
  - 1440 x 900
  - 1920 x 1080
- Displays far more signals



# P3 Built-in Display at 480 x 272



# P3SVGA at 1440 x 900



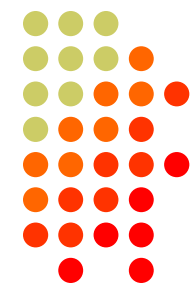
o CTU o

# Old Icom IC-7800 firmware



# Icom IC-7800 with V3.0 firmware

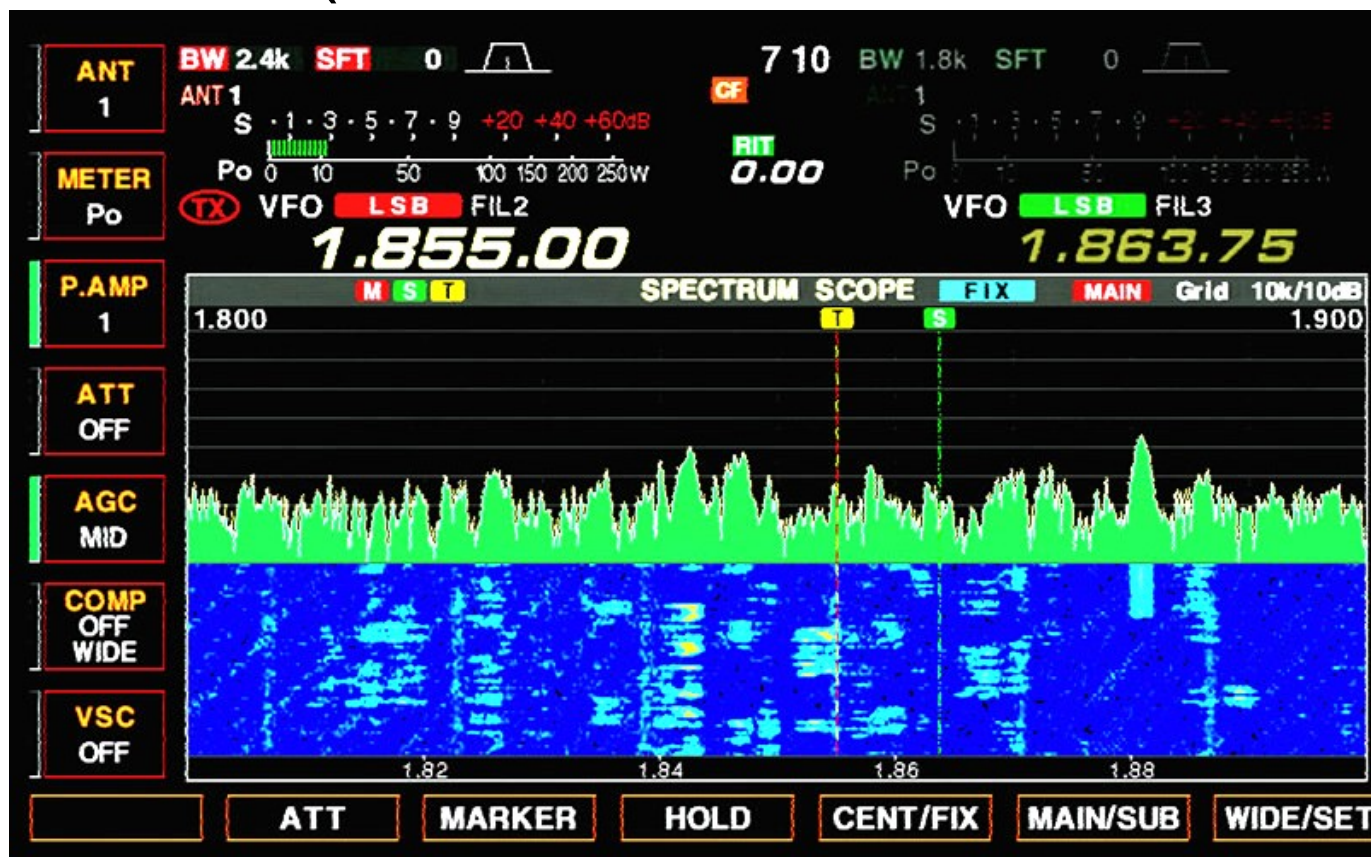




# IC-7800 V3.0 Screen Shot

IC-7700 V2.0 Also Supports Waterfall Feature

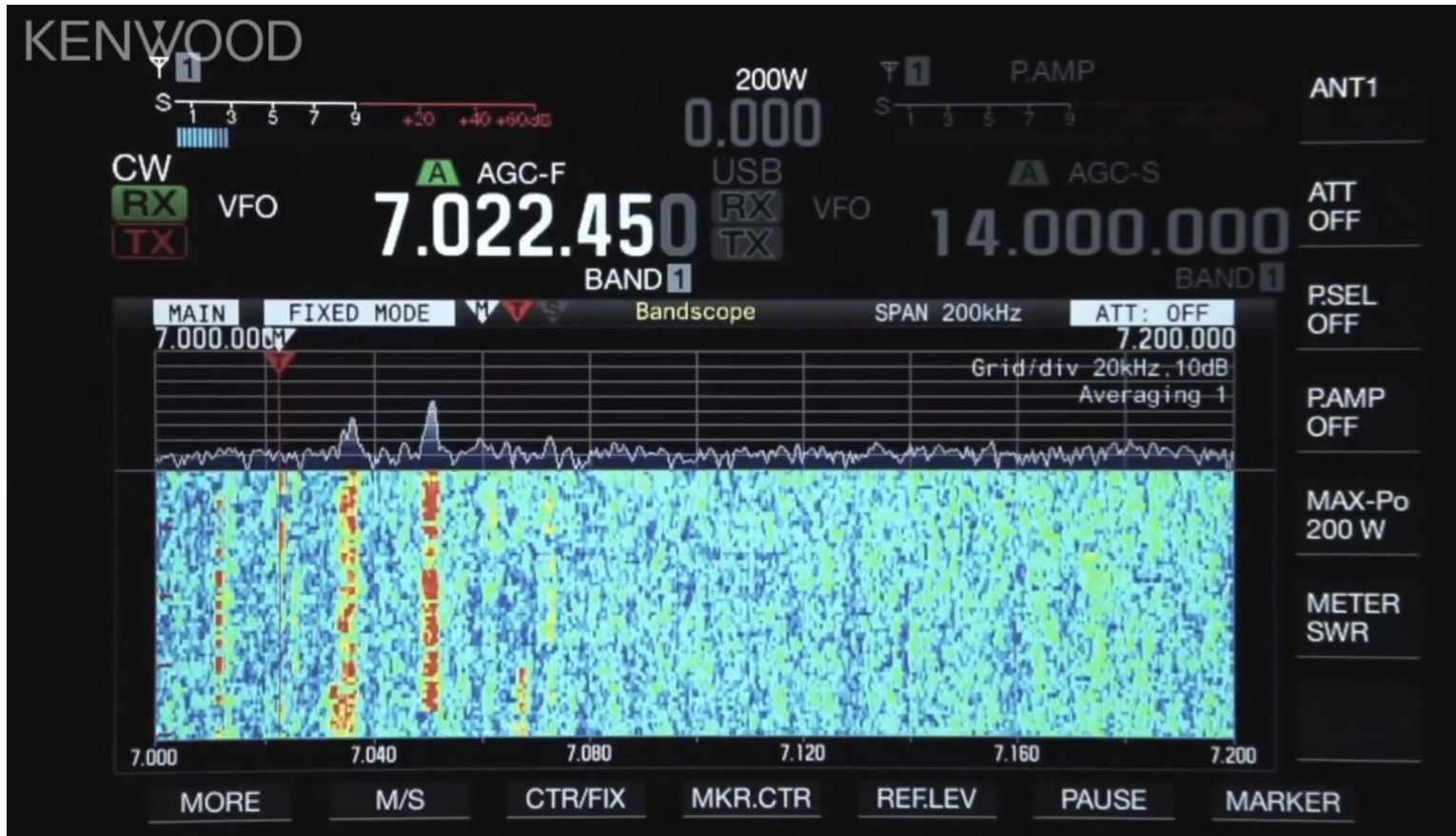
- 800 x 480 (with or without external monitor)



# Kenwood TS-990S



# TS-990S screen shot

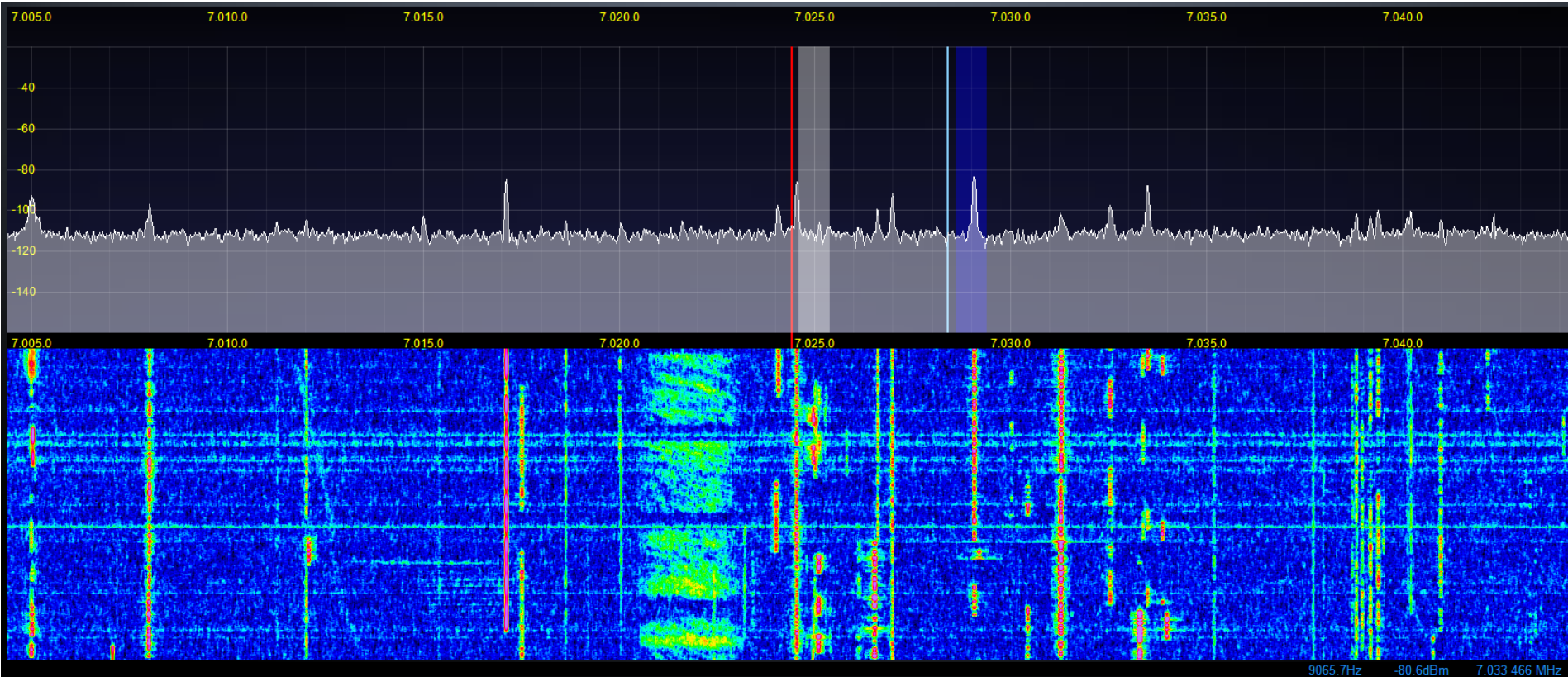




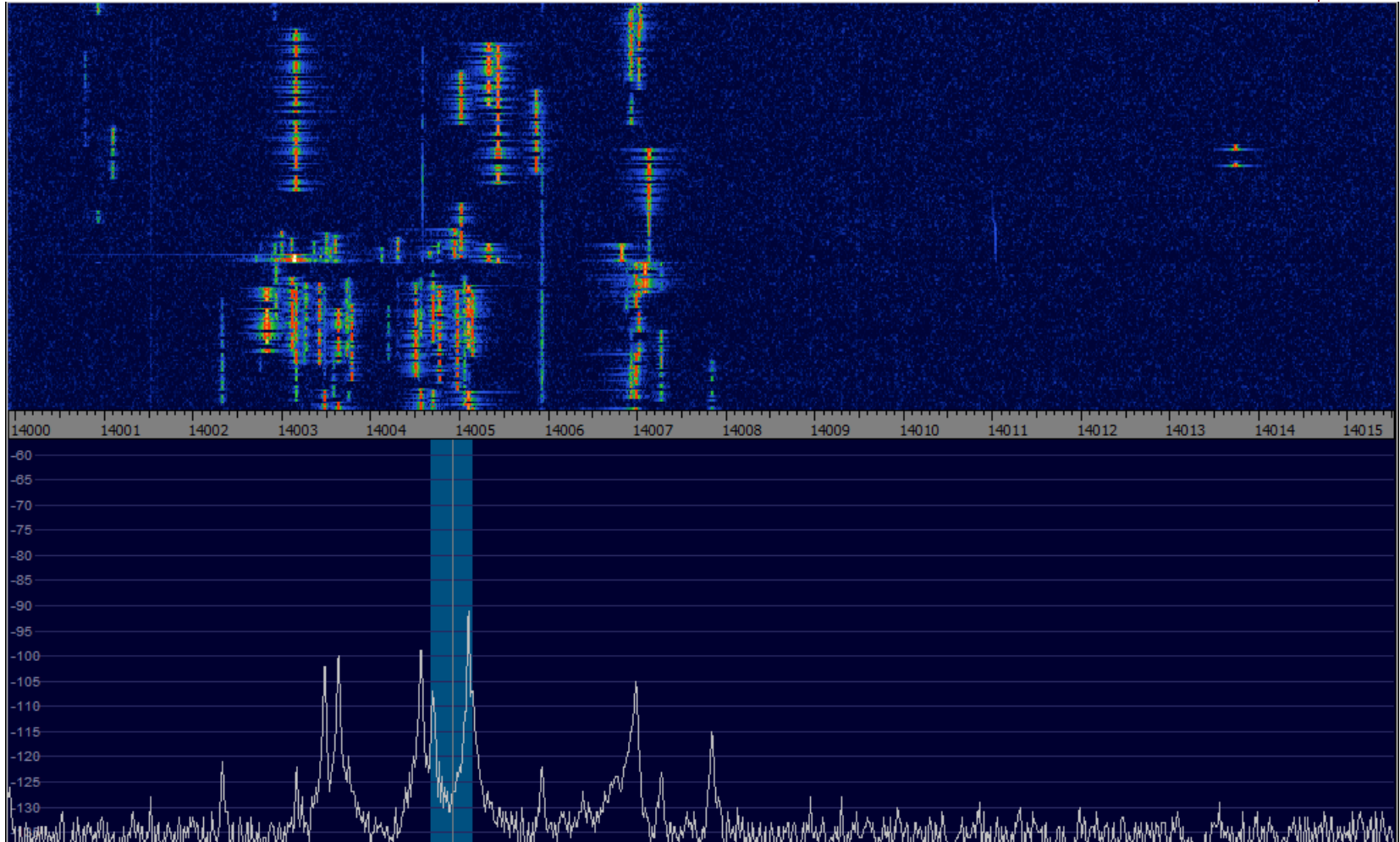
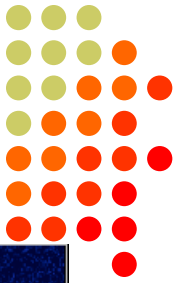
# FlexRadio FLEX-5000™, FLEX-6700™



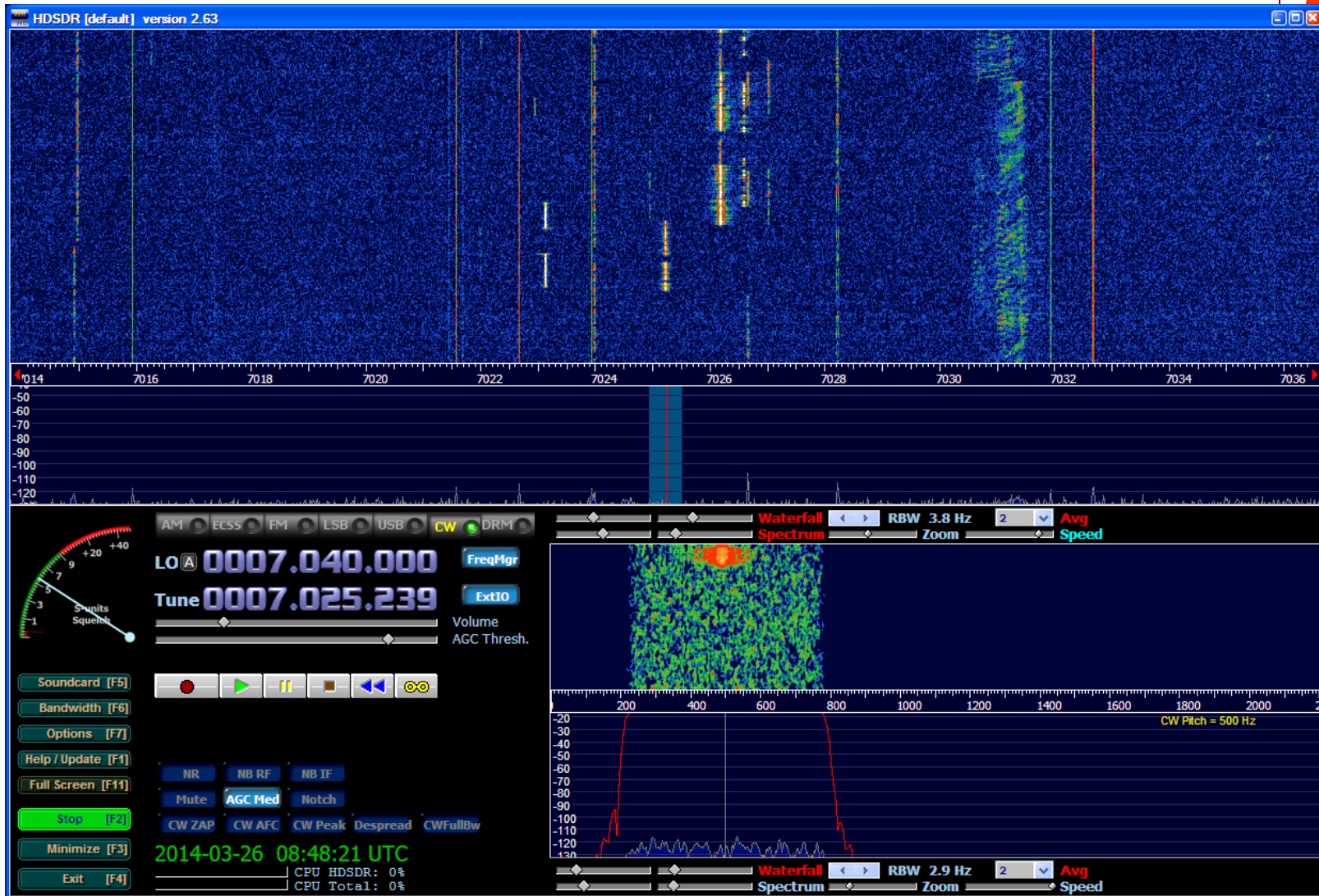
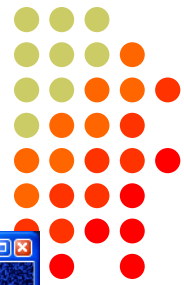
# PowerSDR™ Software for FlexRadio

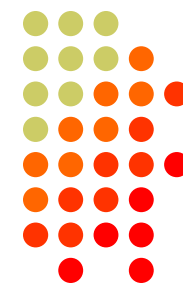


# Winrad Software



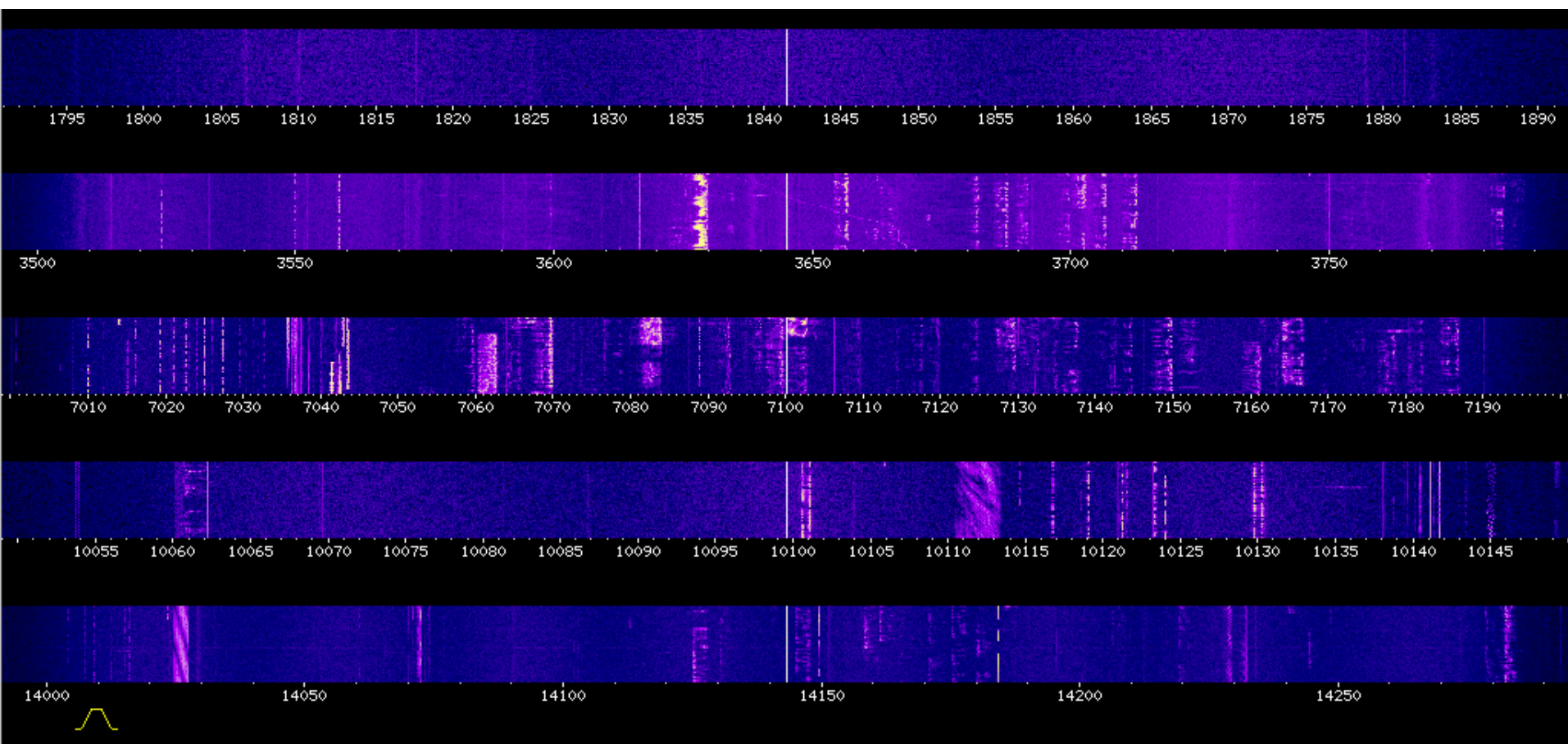
# HDSDR Software





# WebSDR: Waterfalls on the Web

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

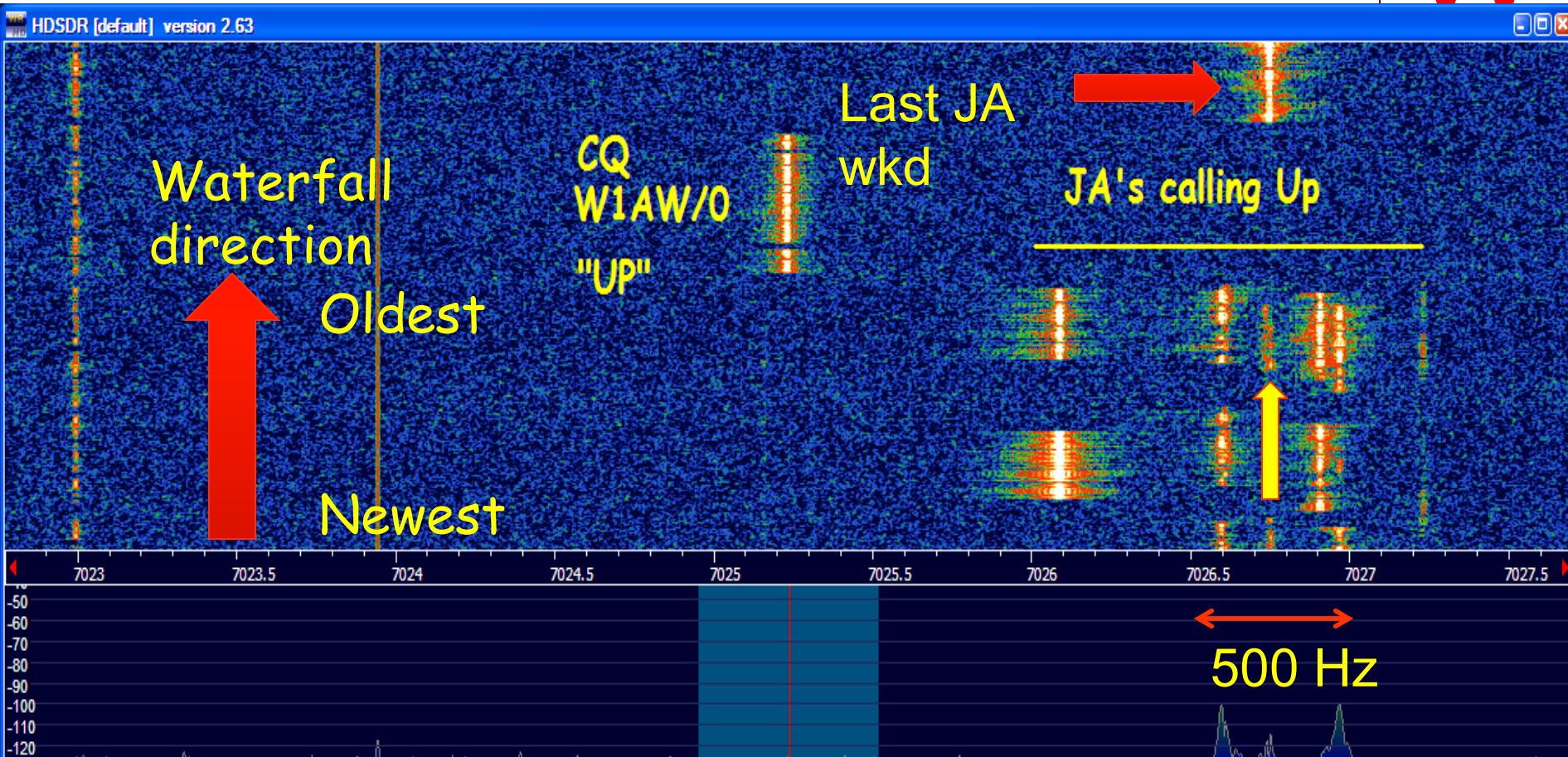


# Waterfall Display Advantages



- “Click to Tune” – direct access using a mouse
  - IC-7800 V3.0, PowerSDR, HDSDR (but not K3/P3)
- Weak signals easy to spot (faint traces)
- Many zoom levels: 7.5, 15, 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?

# Using Waterfall in a Contest



- Find clear spots to call CQ
- QRM? You can *see* where to move your VFO to minimize it
- Find “good spots to call” in a CW pileup
- During S&P, find the “next” signal fast (no more slow tuning)
- Position VFO B or 2<sup>nd</sup> 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



# Winrad on Top, Win-Test on Bottom

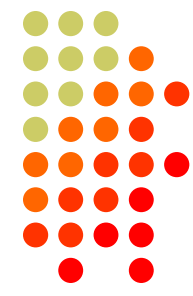


The screenshot displays two software windows. The top window, Winrad, shows a waterfall plot with a frequency marker at 7.00295 MHz. The bottom window, Win-Test, is divided into several panels:

- Worked States/Provinces [0/68]:** A list of US states and provinces with checkboxes.
- Check multipliers:** A panel for CW and SSB multipliers.
- Rate:** A statistics panel showing QSO counts for various time periods.
- Map:** A world map showing the current location and signal strength.
- Radio 1 and Radio 2:** Frequency and mode settings for two radios.
- Summary:** A table summarizing QSO counts and points for different modes.

MODE	QSO	DUP	DXC	MLTS	POINTS	AVG
CW	0	0	0	0	0	0.00
SSB	0	0	0	0	0	0.00
TOTAL	0	0	0	0	0	0.00

FINAL SCORE: 0

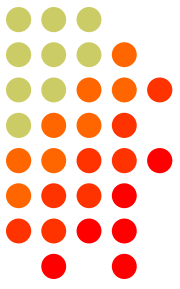


# Winrad & Win-Test (zoomed)

The screenshot shows the Winrad software interface. At the top, there are buttons for 'Show Options', 'Select Sound Card', 'Select Sample Rate', 'Stop', 'Minimize', 'About', and 'Exit'. Below these are sliders for 'Gain' and 'Contrast'. The main display is a waterfall plot with a frequency axis ranging from 6.990 to 7.060 MHz. The plot shows a dense blue background with several vertical lines of varying colors (yellow, green, blue) indicating signals. Below the plot is a menu bar with 'File', 'Edit', 'Operating', 'Commands', 'Messages', 'Tools', 'Windows', 'Options', and 'Help'. A window titled 'Worked States/Provinces [0/68]' is open, displaying a list of states and provinces with call signs. The window also shows a timer '08:46:28', a call sign 'N6TV', and a score 'SR 1511z SS 0049'.

Worked States/Provinces [0/68]												08:46:28	N6TV	SR 1511z SS 0049			
K1	CT	MA	ME	NH	RI	VT	K2	NJ	NY								
K3	DE	PA	MD	DC	K4	AL	FL	GA	KY	NC	SC	TN	VA				
K5	AR	LA	MS	NM	OK	TX	K6	CA									
K7	AZ	ID	MT	NV	OR	UT	WA	WY	K8	MI	OH	WV					
K9	IL	IN	WI	K0	CO	IA	KS	MN	MO	ND	NE	SD					
VE9	NB	VE1	NS	VO1	NF	VY2	PEI	VO2	LB	VE2	QC	VE3	ON				
VE4	MB	VE5	SK	VE6	AB	VE7	BC	VE8	NT	VY1	YT	VY0	NU				
KL7	AK	KH6	HI	/MM	R1	R2	R3										

# Waterfall Display *Disadvantages*

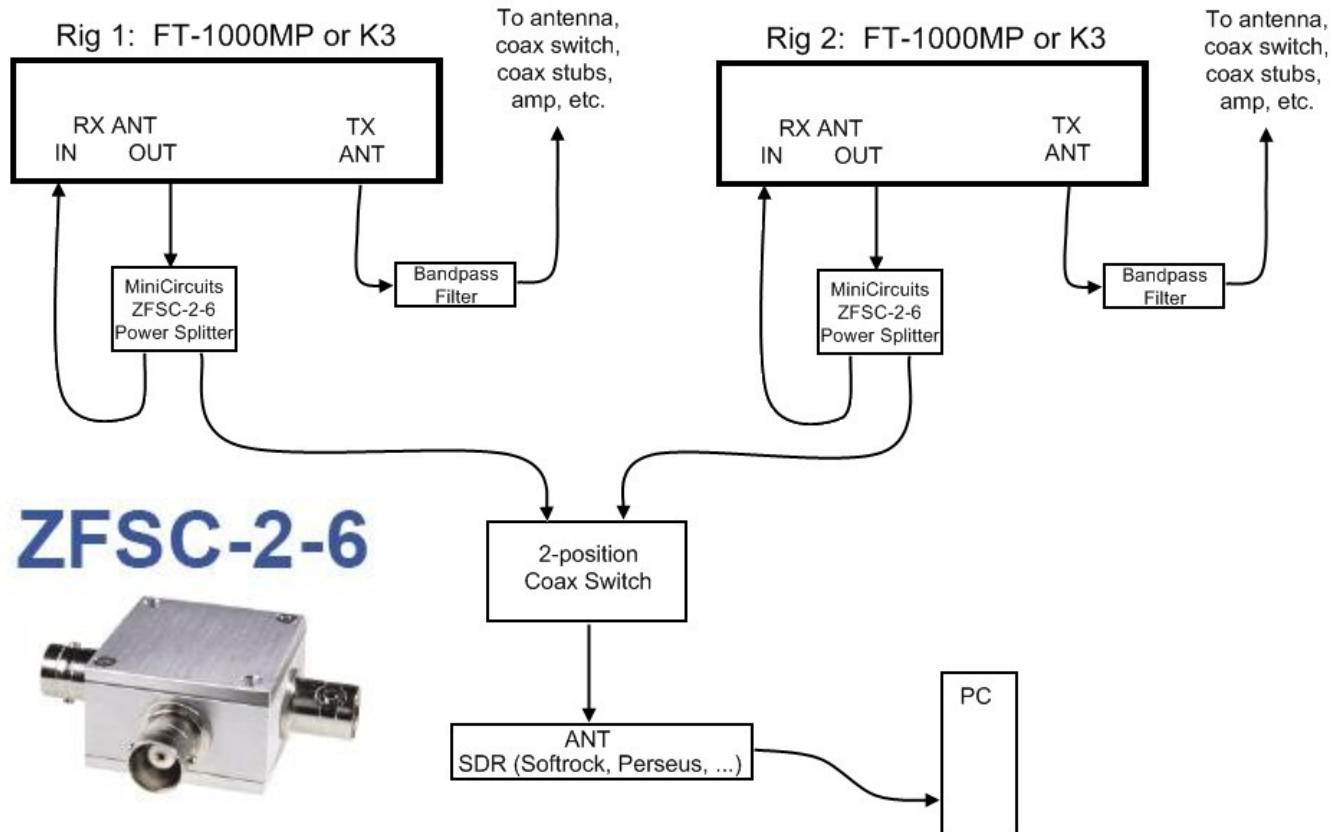


- Radios don't automatically jump from signal-to-signal like CW Skimmer (yet)
- Clicking on a signal with the mouse not as precise as tuning with VFO, must still fine tune, contest software loses focus
- Can be visually distracting to some
- **But, if you're *not* using a waterfall display in a contest, you're really operating "blind"**
- **A waterfall display is really the "killer app"**

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

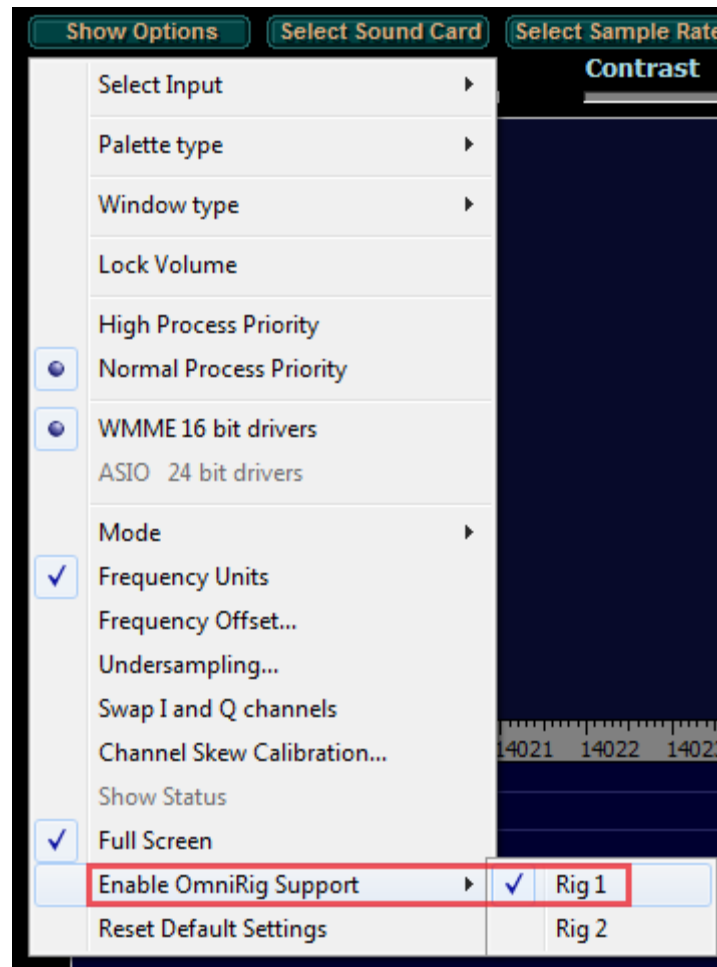
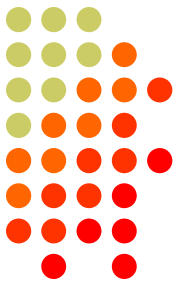


Adding a Software Defined Radio (SDR)  
to an SO2R Station



Drawing by N6TV@arrl.net 31 May 2008

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



# Demo of Winrad's Waterfall



- 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>

# Questions?



- <http://www.winrad.org> - Winrad software
- <http://http://www.hdsdr.de/> - HDSDR software
- <http://www.kkn.net/~n6tv> - Winrad demo file
- <http://www.qrz.com/db/n6tv> - Links to this and other presentations