Latest from HF Signals

Feb 2026

Gordon Gibby KX4Z

At the end of 2024:

- I had put IRF520s in my V2 sBitx
- JJ had released 64-bit code for 64-bit operating system sBitx
- Zbitx “5+ watts” released
- I had learned how to use a transverter to get sBitx onto 2 meters

Review for 2025:

- Success of my IRF520’s
- Very significant sBitx strengths with updates from JJ W9JES
- Using sBitx to help me succeed at “Poor Man’s Satellite Station”
- Problems (and solutions) with zBitx
- Production stop with zBitx to retool better edition
- Low-Low Cost LARCSET released
- Havoc with the Tariffs!
- LARCSET becomes experimenters’ paradise

Success of my IRF520’s

Finally blew a 50V Z24N

- For the first time, I had blown a IRFZ24N MOSFET (50V Vds rating)
- Debated on whether to drop to IRF510’s (20W) or IRF520’s (40W)
- Both 100V (drain-source) devices; both HEXFET
- 520 bigger channel, bigger gate capacitance
- My V2’s built for larger gate capacitance…..
- Elected to go with the IRF520’s and keep higher 80m output

100V IRF520 vs IRF510

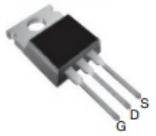
VISHAY
www.vishay.com

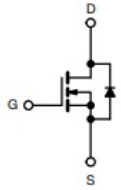
IRF520

Vishay Siliconix

Power MOSFET

TO-220AB





N-Channel MOSFET

FEATURES

- Dynamic dV/dt rating
- Repetitive avalanche rated
- 175 °C operating temperature
- Fast switching
- Ease of paralleling
- Simple drive requirements
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Available
RoHS* Available
HALOGEN FREE Available

Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

PRODUCT SUMMARY		
V_{DS} (V)	100	
$R_{DS(on)}$ (Ω)	V_{GS} = 10 V	0.27
Q_g max. (nC)	16	
Q_{gs} (nC)	4.4	
Q_{gd} (nC)	7.7	
Configuration	Single	

DESCRIPTION

Third generation power MOSFETs from Vishay provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-220AB package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 W. The low thermal resistance and low package cost of the TO-220AB contribute to its wide acceptance throughout the industry.

ORDERING INFORMATION	
Package	TO-220AB
Lead (Pb)-free	IRF520PbF
Lead (Pb)-free and halogen-free	IRF520PbF-BE3

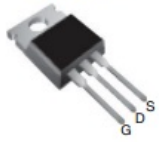
VISHAY
www.vishay.com

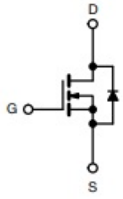
IRF510

Vishay Siliconix

Power MOSFET

TO-220AB





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PRODUCT SUMMARY		
V_{DS} (V)	100	
$R_{DS(on)}$ (Ω)	V_{GS} = 10 V	0.54
Q_g max. (nC)	8.3	
Q_{gs} (nC)	2.3	
Q_{gd} (nC)	3.8	
Configuration	Single	

DESCRIPTION

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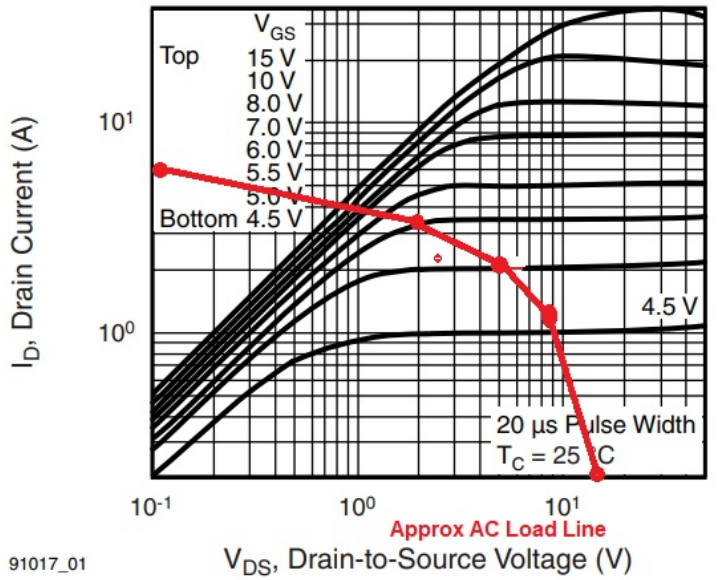
ORDERING INFORMATION INFORMATION	
Package	TO-220AB
Lead (Pb)-free	IRF510PbF
Lead (Pb)-free and halogen-free	IRF510PbF-BE3

Result:
IRF520: Good power output!

FREQ	100% Output	hw_settings	Comment
3.5	32W	0.0037	
7.	33.3	0.0028	
10.1	22.6	0.0028	(Z24N ~21W)
14	16	0.0032	
18.1	9.33	0.0061	(Z24N 11-12W)
21	16.6	0.0054	(Z24N 15W)
24.9	12.3	0.0063	(Z24N 10W)
28	11.5	0.0063	(Z24N 8 W)

Note MY IRFZ24N system had 5W Zeners – so probably worse higher end performance



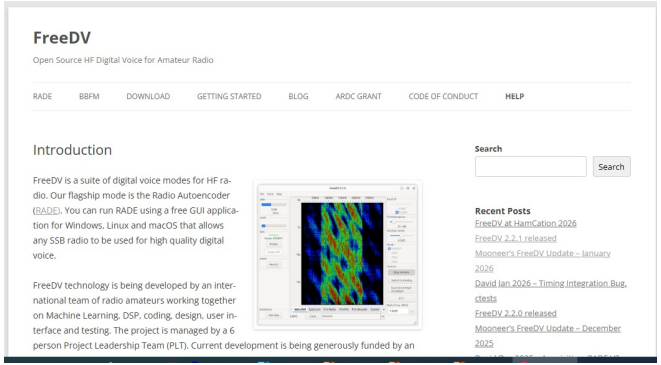
https://www.vishay.com/docs/91017/irf520.pdf

Success!!

- Ended up with changing out MOSFETS in both sBitx V2's
- Changed to Al-nitride insulators in both at same time
- At least one unit went to TVS diodes
- Both units used whenever needed throughout year (not really heavy use because I'm BUSY)
- One unit is now the primary radio in our Black Mountain (NC) family vacation home
- NO PROBLEMS – despite various "goofs" that happen to all of us, both units are trouble-free and still functioning! (No SWR foldback yet on these units)

FREE DV

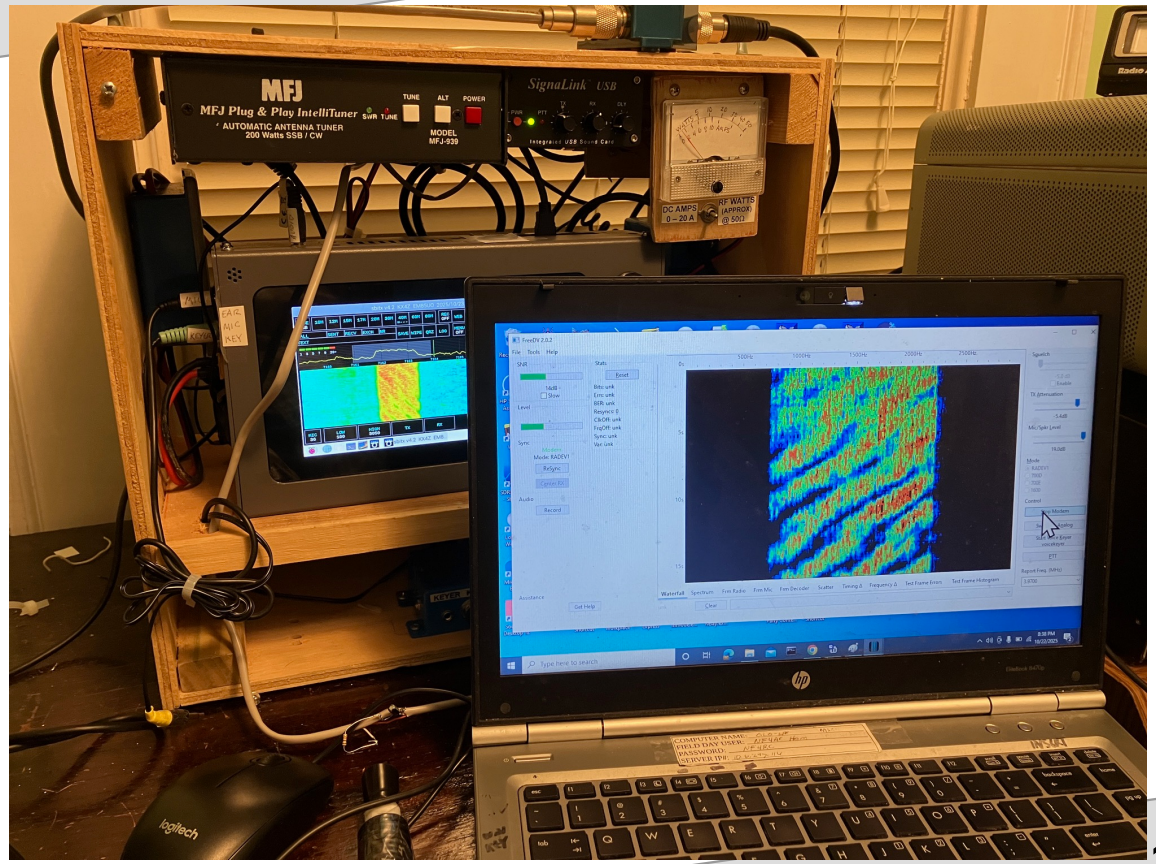
https://freedv.org/



- RADEV1 released during the year
- FREEDV development due to greatly increased funding
- DIGITAL HF VOICE
- 100% duty cycle digital signals – 1.6 kHz wide
- **Approx >6dB improvement** (my estimations…..)
- **Truly amazing voice quality** and quite workable setup to find other stations
- **Looks like the wave of the future for voice**
- Expect years to be widely adopted of course

Fully digital signal

- 100% duty cycle
- NARROW
- Probably a way to do this on the sBitx without needing an external computer –
- Brighter people than me will get it going!



Freedv on the sBitx

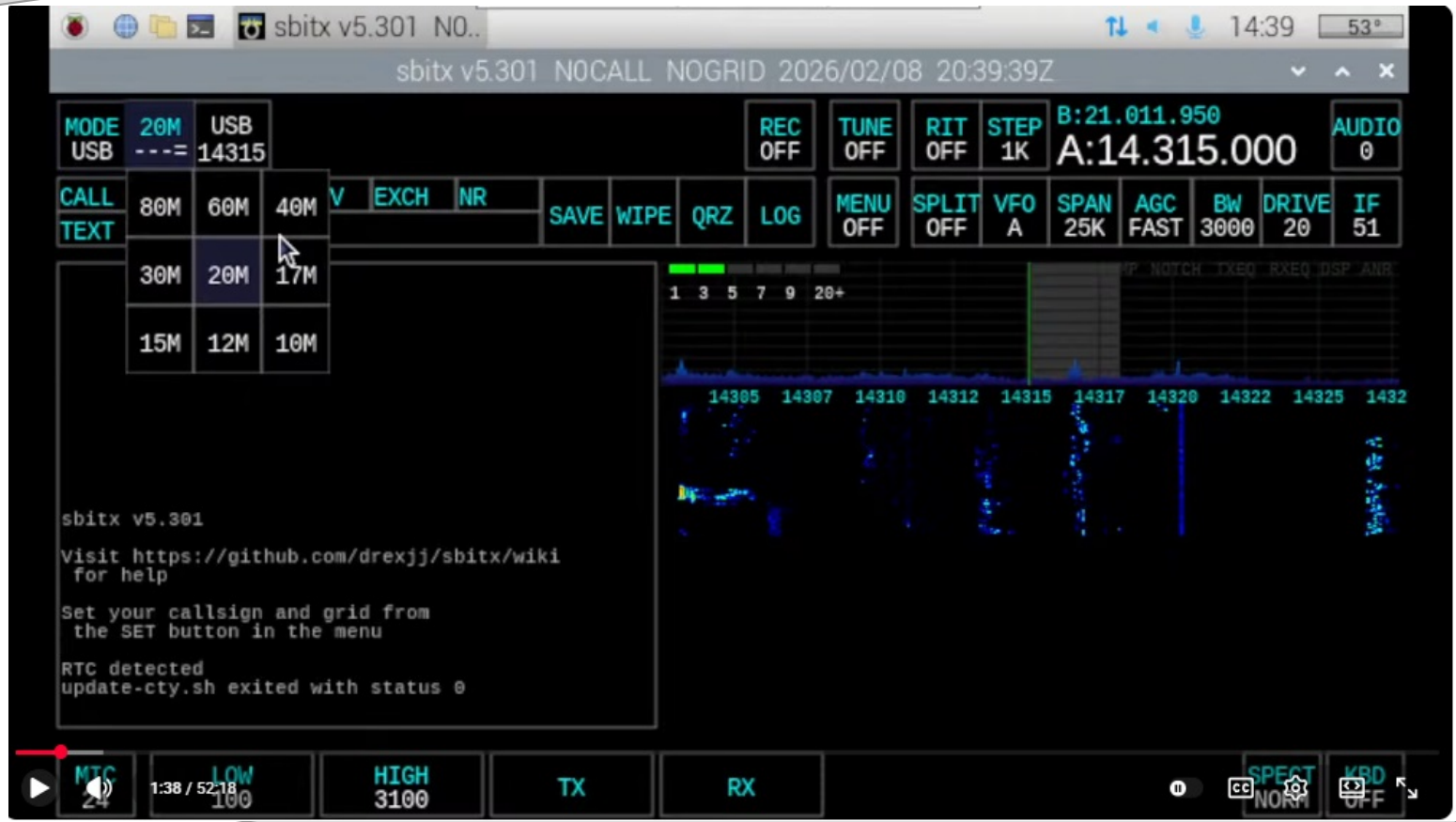
- Sbitx handled nicely!!
- I kept the sBitx at somewhat modest power levels
- Grateful for the Al-nitride insulators!! (Heatsinks heat up nicely!)
- Amplified with SB-200 572-B amplifier to get 100-200 watts output
- GREAT FUN with our Alachua County Crew (from Black Mountain NC)

Sbitx Strengths With JJ Upgrades

- W9JES
- Discord Server
- Entire 3rd Party group dramatically improved stock software originating from single author Ashhar Farhan

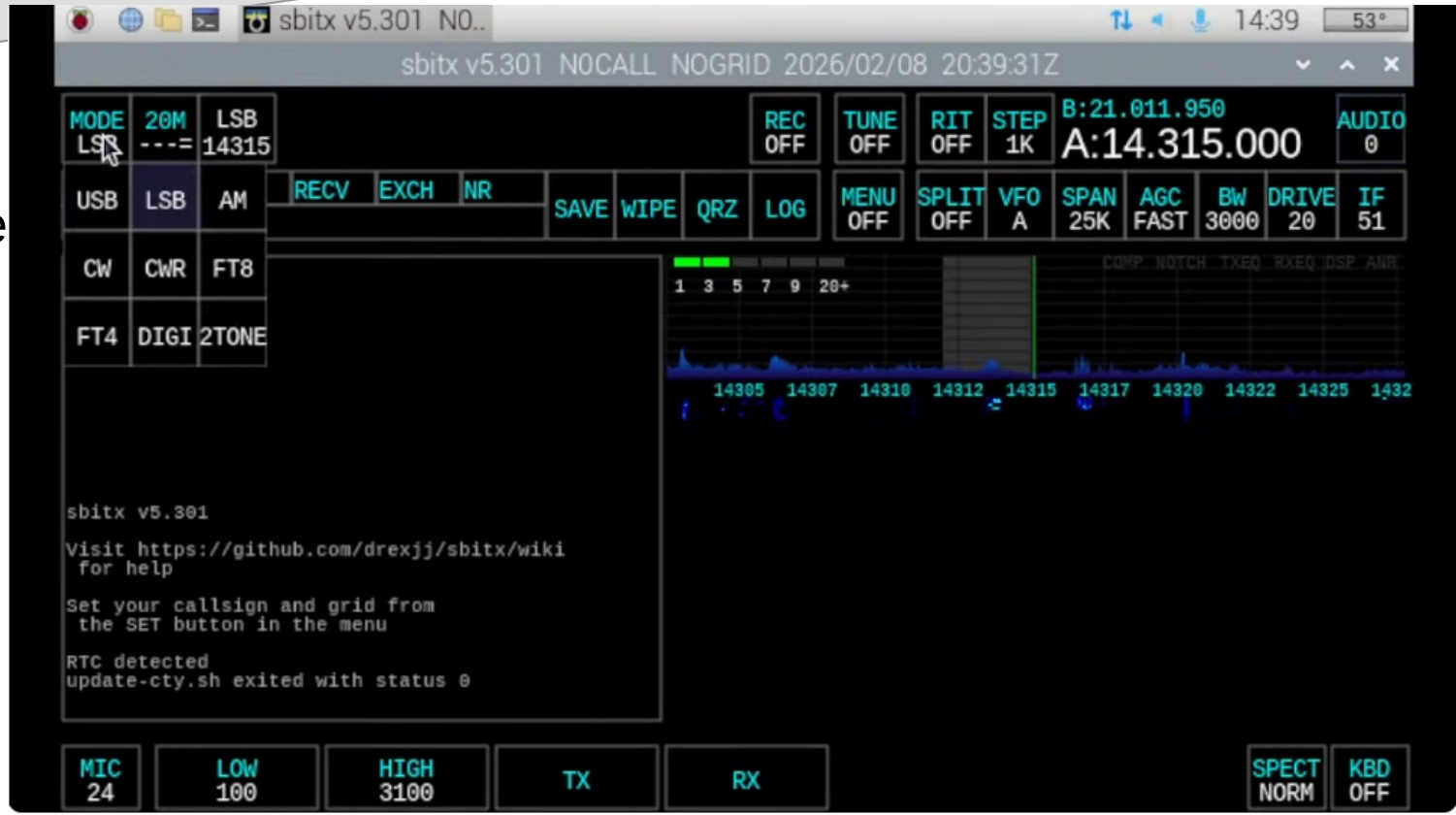
Combo Box Update

- BAND



Combo Box Menus

- MODE
- Screen real-estate savings!
- Easier on the eyes



02/26/26

Big Improvement I noted in earlier 5.x update: LSB/CW no need to re-tune to join SSB net!

5.3 Updates

Basic RF hardware now stable; attention turned to maximizing the potential of the raspberry pi software

New UI & usability goodies:

- Drop-downs for Band/Mode/Bandstack/Span/Menu → better touchscreen use
- Bigger font (10–40 pt) for console/CW decode: \bigfont xx
- Persistent console across modes/resizes
- CW tune option + decode while TX + toggle (\decode on|off)
- Auto Peak Filter in local interface
- Quick Options menu (hold both encoders 2s)
- Full screen toggle button
- Voltage/Current near VFO with INA260 module installed
- Power/SWR readout with decimals
- High SWR auto power cut (default 3:1, \maxvswr)
- \cal hardware calibration, \snap for screenshots

Version 5.301 updates

- JJ W9JES (group: thousands of hours of software development)
- Same combo box applies to many other items (bandstack, menu, span, AGC, etc)
- Increased persistence to material in “console”
- \bigfont option to increase font in “console” (\bigfont off to stop)
- “fullscreen” option available (also available as command line startup)
- “Quick Options” menu (press both controls 2 sec)
- INA260 module: voltage & current display
- SWR protection available (auto-foldback on “drive”) (auto set to 3:1)
- Adjustable: e.g. \maxvswr 2.3

5.301 cont’d

- Full spectrum width now available (moves console to bottom)
- \decode off (stop cw decoding)
- CW decode now works in “transmit” as well
- Key menu buttons highlighted on
- CW auto “peak filtering”
- FT4 supported
- Better handling of non-standard call signs (cq “token”)
- TX pitch (position in band) more easily adjustable now
- RR73 now works (instead of RRR)
- FT now looks up countries for stations

5.301 (cont'd)

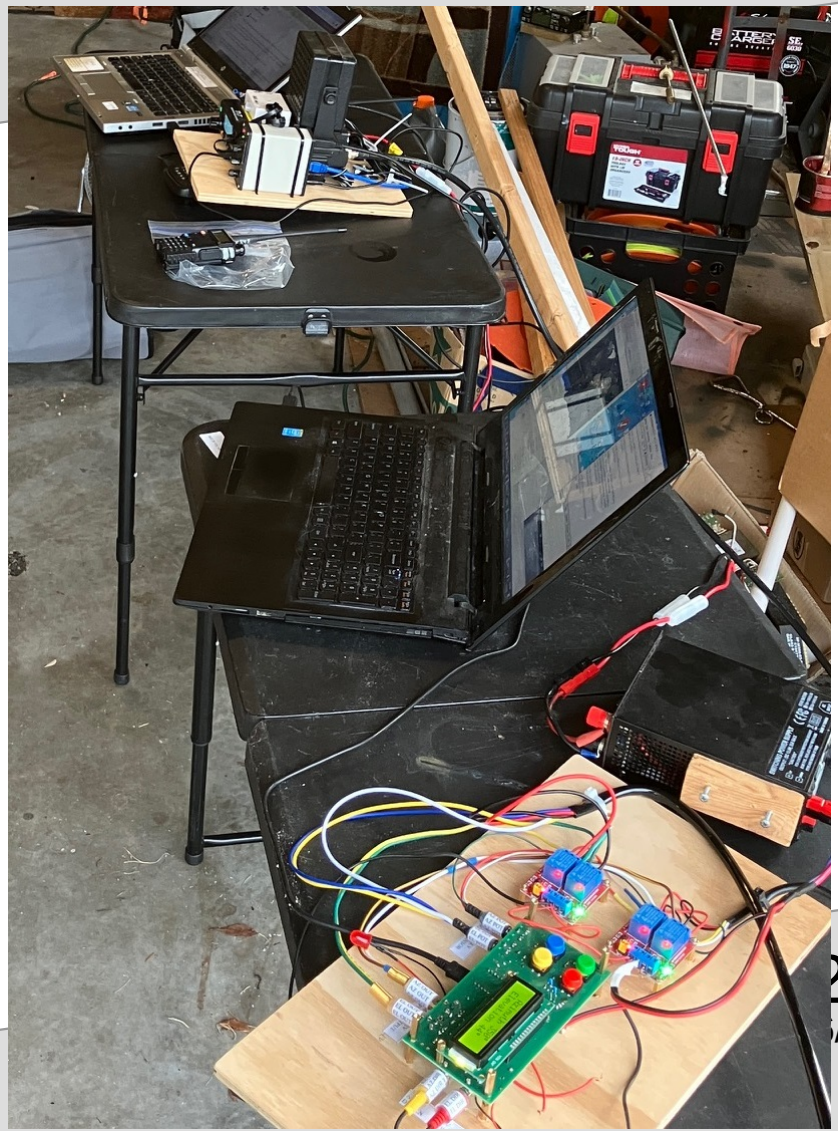
- FT – allows switching "slot" (odd/even)
- Able to send POTA/SOTA/IS FT statements & log park, etc
- Different macros available for POTA / SOTA etc.
- Color coding of FT stations (orange = new; new grid = amber)
- FT auto-responder priority rules
- Now able to connect to external (3rd party) logging systems (UDP logging, similar to how WJST-X works)
- GridTracker integration
- Built-in power setting calibration for bands \cal
- \snap (snapshot the screen to folder "screenshots" .png files)

Sbitx and Poor Man’s Satellite Station

- With TRANSVERTER, sBitx' panoramic display is a **huge help**
- **Especially to a beginner like me!**
- With a linear amplifier, a transverter output could work….but easier to use existing VHF/UHF SSB/FM transceivers
- **Such JOY to SEE YOUR SIGNAL** on the panoramic display!!! CW dits or dahs make it very easy to see...

Lots of gear!

- Entire series being published in NFL Section newsletter
- Article by article as I build this station



Zbitx Problems / Solutions

- 5watt, extremely portable self-contained transceiver
- Powered by 2 lithium batteries
- (design <= 9V)
- Announced Dec 24 2024 – shipments began in 2025

Tough Design

- Pick and Place Construction
- RF printed circuit board design is fraught with traps!
- Shielding is difficult and expensive
- Digital circuits near high sensitivity RF circuits – hazards!
- Ashhar keeps RF signals at low level throughout receiver to MAXIMIZE DYNAMIC RANGE (trade offs are the rule in receiver design)

→ Complicated radio!

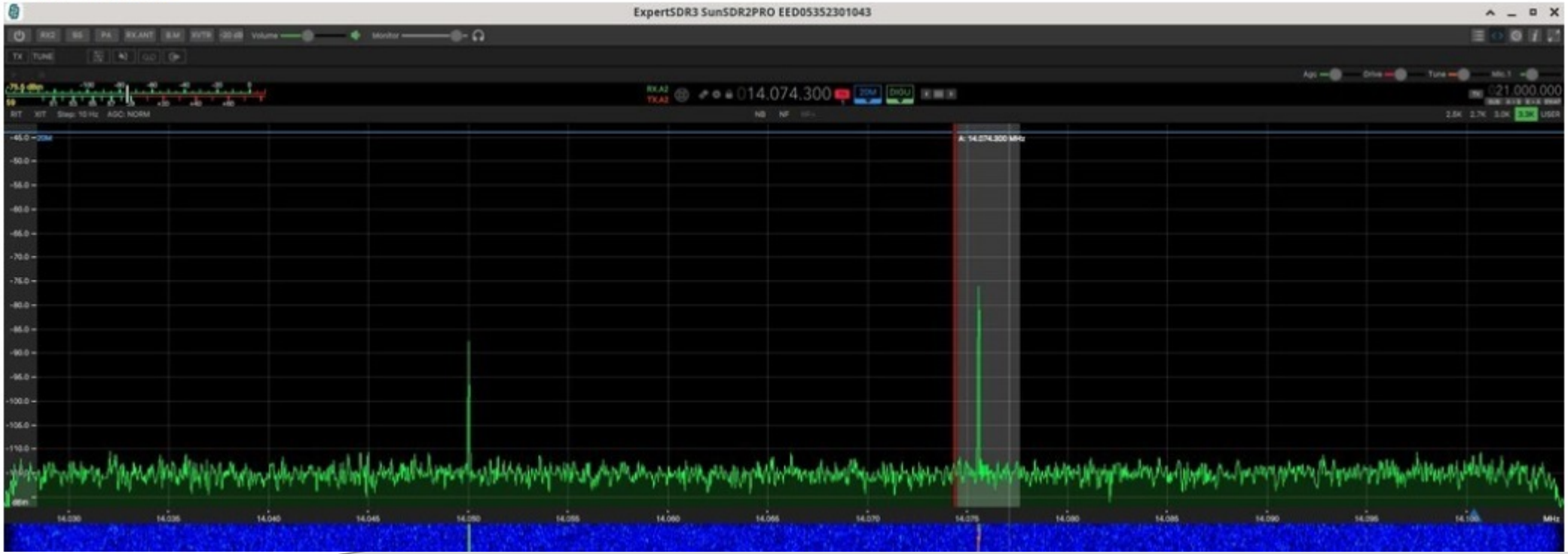
- Separate microprocessor to handle DISPLAY (isolated from external connection)
- Makes updating each one very difficult, since only ONE has I/O exposed to the external world
- Difficult to properly “shutdown”
- Many examples of damaged memory cards….but an unwillingness to recognize the risk.

Non compliant 25 kHz spur

- IMHO – BIGGEST ISSUE
- First detected around July 2025
- Took a LONG TIME (IMHO) to get attention paid to the non-compliant spur
- System uses an offset IF centered on 25kHz – so natural concern that oscillator is leaking through to output
- Discoverers were doubted, experimental setup critiqued
  - But they saw no such spur in other radios, same measurement system
- Originally blamed on known “crosstalk” within the Si5351 chip (disproved)

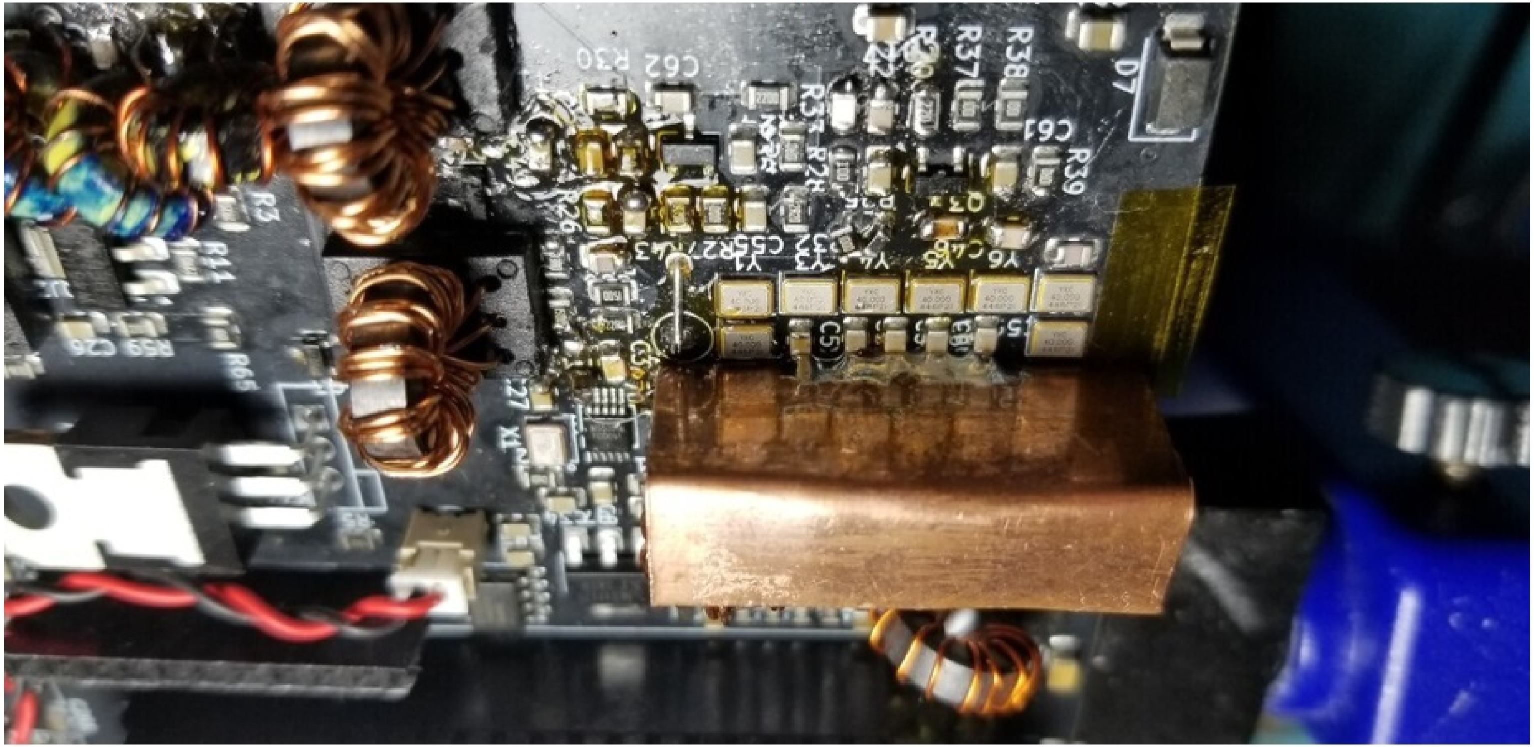
25kHz Spur

Chris - M0KNF



Needed Shielding!!

Here's a picture showing the shield soldered in place. Before soldering the shield in, I put a piece of Kapton tape over the PCB traces at the edge of the circuit board to insure they would not short out with the shield. Also note that I bent the top of the shield over to cover the two toroid transformers, and toroid inductor L15.

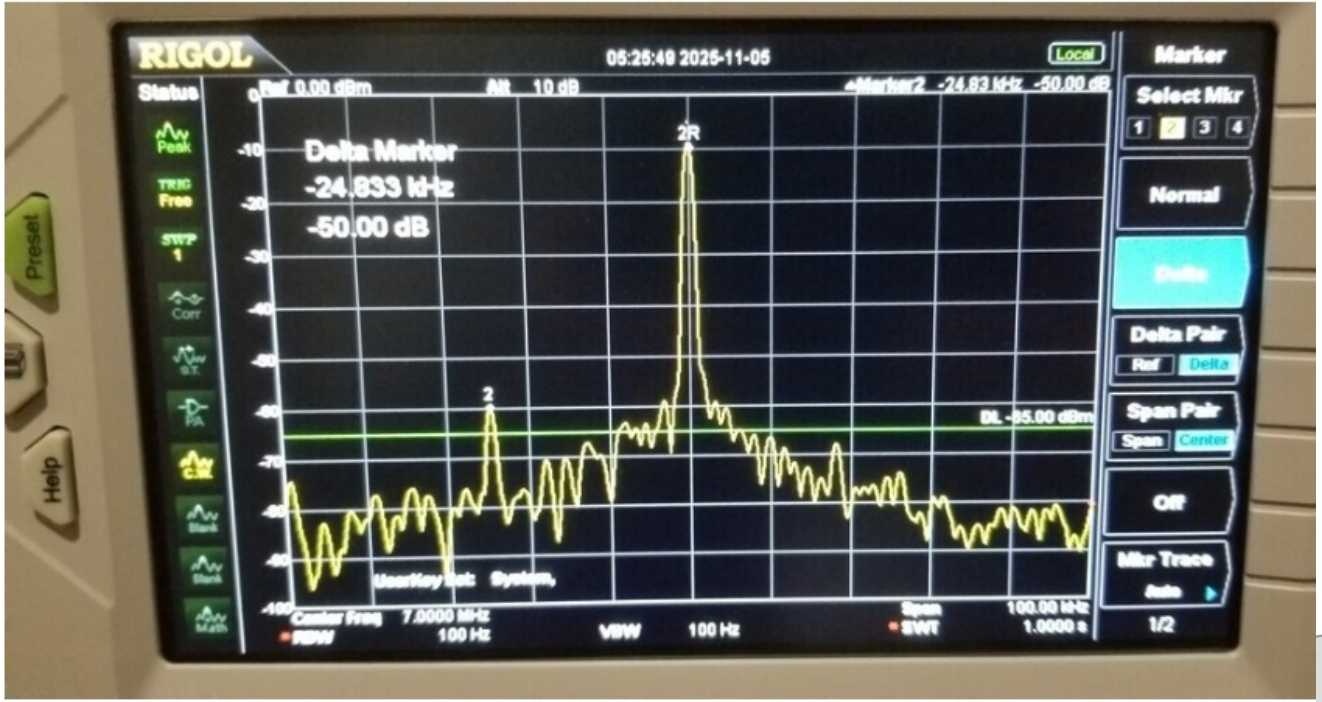


Steve Beckman N3SB

https://groups.io/g/BITX20/message/121569

FIXED!

Here's the result - the spur at -24 KHz from the carrier is down -50 dB, and no longer a problem.



Steve Beckman N3SB https://groups.io/g/BITX20/message/121569

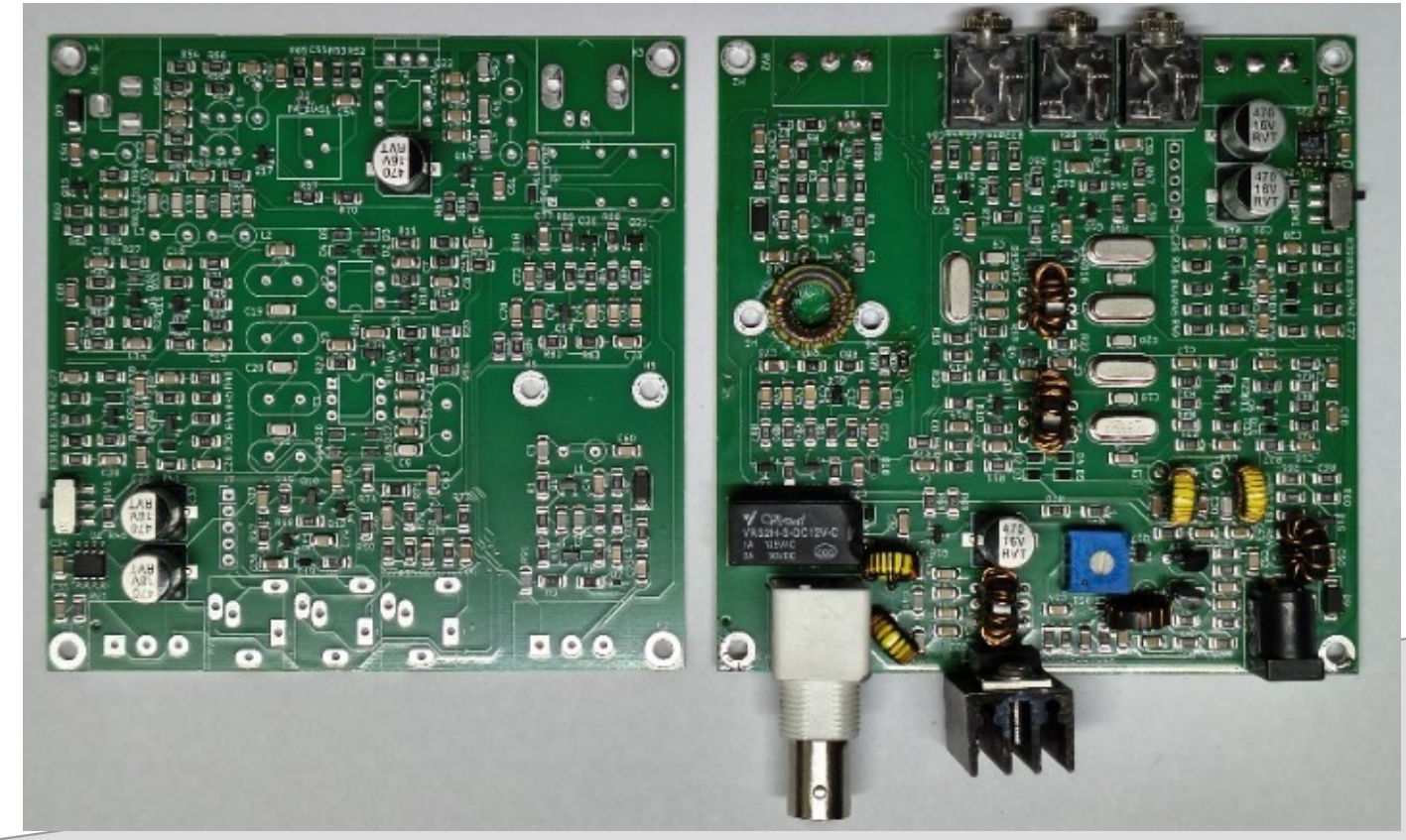
Hopefully, revision…

- Alternate fix: dramatically reduce coupling from oscillator.
  - Reduces output, not optimal in my view
- Zbitx currently in revision, not available
- Suggest improved PCB layout to reduce the problems with crosstalk!
- Manufacturing variation is a real issue
- Pre-marketing testing is a tough nut but IMPORTANT!!
- **Expect next version to be better!**
- **Normal improvement over time in products**
- Recommend shielding or drive reduction in existing units.

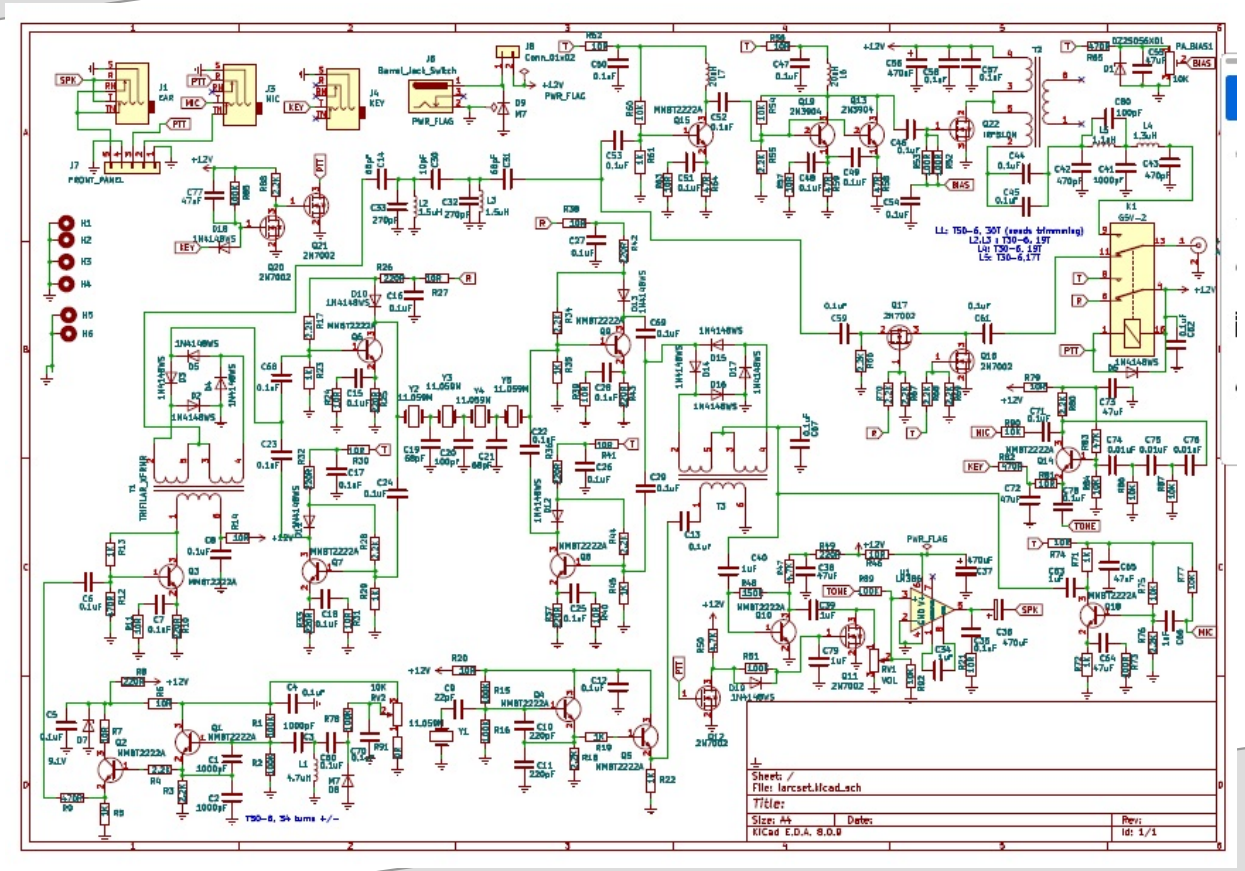
LARCSET released

LARCSet Kit – The 40 meter all analog SSB/CW radio ($39)

Very modest work for kit completion



Everything is public!



Even including the printed circuit board design!!

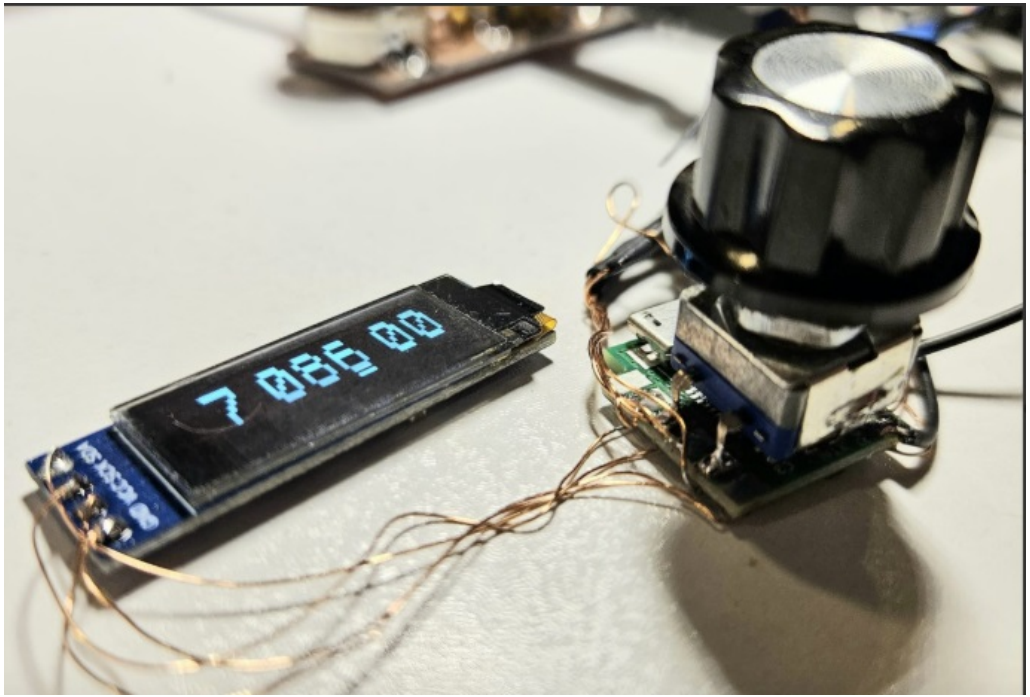
Tariff-lolapalooza!

Confusion!

- Trump’s Tariffs and India’s purchases of Russian Oil collided to make a real mess!
- Typically $15 administrative fee PLUS tariff costs for US purchases
- Dramatic reduction in pricing advantage of HFSignals
- Solutions?
  - LARCSETs now packed in huge numbers and shipped to Chicago, paying tariffs and much less administrative fees (DHL)
  - Then individually shipped to US purchasers
  - GREAT SOLUTION from Ashhar & friends!

LARCSET Experimenters' Paradise

QRPLabs VFO



Made to work with the LARCSET
Multiple oscillators (allows multi bands)
Easily reprogrammed
Includes Hamlib-based CAT control
Even 3Dprinted Bezel available
$23
Full Manual:
https://qrp-labs.com/images/digivfo/DigiVFO_1_00.pdf

CONCLUSION

- **Mixed year for HF Signals**
- **Sbitx series now solid & great 64-bit software, Ashhar has engendered a strong external group of software designers (as he had hoped)**
- **Zbitx had problems, should get better!**
- **LARCSET is a great radio for learning!**

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