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2018 Dayton Hamvention Kenwood Forum

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Kenwood Forum Committee

Mark Gilger – WB0IQK
Jan Servaites – N8CBX
Peter Shilton– VE6PS
Jeff Covelli – WA8SAJ

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- Agenda:
  - Help with Parts, Documentation & Service
  - Hybrid Net Repeat Questions
  - Hybrid Net Statistics
  - Hybrid Relays
  - SDR integration into the Legacy line.
  - Questions and Answers

1 How many people attended last years 2017 forum?

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2. How many people have a Kenwood Hybrid?

3. How many people operate their Kenwood Hybrids regularly?

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Serial Number Data Base

4. How many people still have their Hybrid purchased back in the 70 & 80’s?

5. I’m looking for Serial Numbers, Original Purchase dates and where purchased.

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Serial Number Data Base

CALL	MODEL		S/N	DATE	Full Date	Purchased From:
	SM-220		4120085	1984	10/2/84	
N0BCZ	SM-220		8010013	1987	4/24/87	Delaware Amateur Supply
WF4B	VFO-820		640497	1979		
KK4JPF	VFO-820		730375	1973		
WF4B	SP-820		661413	1979		
WF4B	AT-230		3010185	1980		
	AT-230		4120018	1984	10/2/84	
WA9NJR	TS-520		231093	1975	9/1/75	Electronic Center
WA2GTT	TS-520		260563	1975	12/31/75	
WB2KNR	TS-520		520720	1977	3/12/77	Hamtronics
K3MYK	TS-520		520762	1977	3/20/77	Hamtronics
	TS-520S		560574	1977	7/23/77	Henry Radio, Butler MO
K8YXB	TS-520S		620269	1977	10/1/77	
KI5PM	TS-520S		732175	1978	6/13/78	Webster Radio
WA3GPU	TS-520S		730328	1978		
N9JR	TS-530S		1110561	1981	11/28/81	Ham Radio Center, St. Louis, MO
W3VVV	TS-530S		2020774	1982	7/1/82	Long's Electronics
KOPSA	TS-530S		2040084	1982		
W2AQY	TS-530S		2010330	1982	2/10/82	
KK3H	TS-530S		3080401	1983	9/1/83	
K7TGL	TS-530S		4030123	1984	1/1/84	Ros Electronics

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Serial Number Data Base

KK4JPF	TS-820		730718	1973		
WA6YOU	TS-820D		411101	1976	10/15/76	
WF4B	TS-820		641383	1978		
VA7ZR	TS-820		650993	1978	3/18/78	Glenwood Tradinig Co.
K4DTR	TS-820S		822347	1979	6/20/79	Henry Radio Center, St. Louis, MO
WD8OSJ	TS-830S		1110554	1980		
KD8TNF	TS-830S		1050440	1981	1/16/81	Universal Radio
	TS-830S		1092083	1981	4/28/81	Omar Electronics
	TS-830S		1092168	1981	4/15/81	
KA2SJH	TS-830S		2010433	1981		Adirondack Radio
W8RMV	TS-830S		2020522	1981	8/21/81	RSE Electronics
	TS-830S	Gold	2050066	1981	2/5/81	
	TS-830S		2080386	1981		
K4LXY	TS-830S		2050741	1982	11/27/82	AES
K9SID	TS-830S		2050774	1982	2/12/82	Hoosier Electronics
W0NTA	TS-830S	Gold	2050832	1982	1/15/82	
	TS-830S		3010323	1982	9/19/82	R&L Electronics
WA3GPU	TS-830S		3010827	1982	9/4/82	
	TS-830S		3040122	1982		
WD8OSJ	TS-830S		3080247	1982		
KA4AQM	TS-830S		3080084	1983	5/3/83	HAM RADIO CENTER
KK3H	TS-830S		3110099	1983		
WD8OSJ	TS-830S		4020054	1983		
KC3CIP	TS-830S		4020154	1983	10/12/83	HRO
WC2C	TS-830S		4030220	1983	3/23/85	Harrison Electronics

Request for information…

1. Suggestions for future Forum subjects.
2. Future Forum presenters needed.

Send information to WB0IQK@ARRL.NET

KENWOOD My Web Site at: www.wb4hfn.com

WB4HFN Home Page

Kenwood Net Home Page

Brochures and Flyers

Articles & Information

Equipment Manuals

Designed QSL Cards

Magazine Advertisments

Dayton Hamvention Forum

Kenwood Hybrid Radio Nets:

Saturday - 7.235 MHz @ 3:30 EST/EDT

Sunday - 14.316 MHz @ 18:00 GMT

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Supporting user interest and needs for Legacy Kenwood Equipment

- Kenwood Hybrid Legacy Radio Nets
  - Saturday, 7.235 mhz @ 3:30 pm Eastern
  - Sunday, 14.316 mhz @ 18:00 z
  - Yahoo Kenwood Group
- Hybrid Net Web Site:
  - **www.wb4hfn.com**
- Yahoo Kenwood Group
  - https://groups.yahoo.com/neo/groups/TS-520_820_530_830/info

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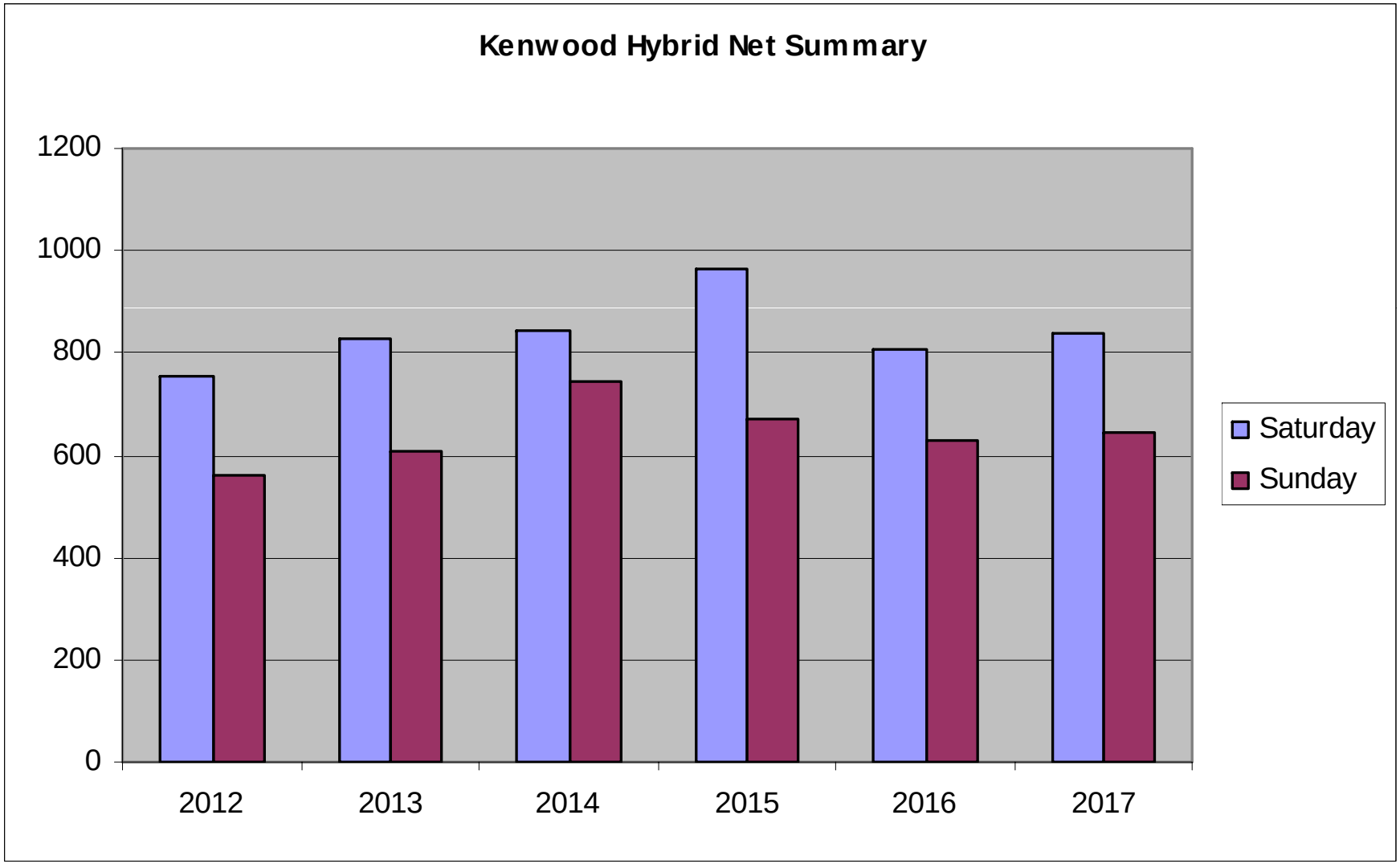
Kenwood Hybrid Net



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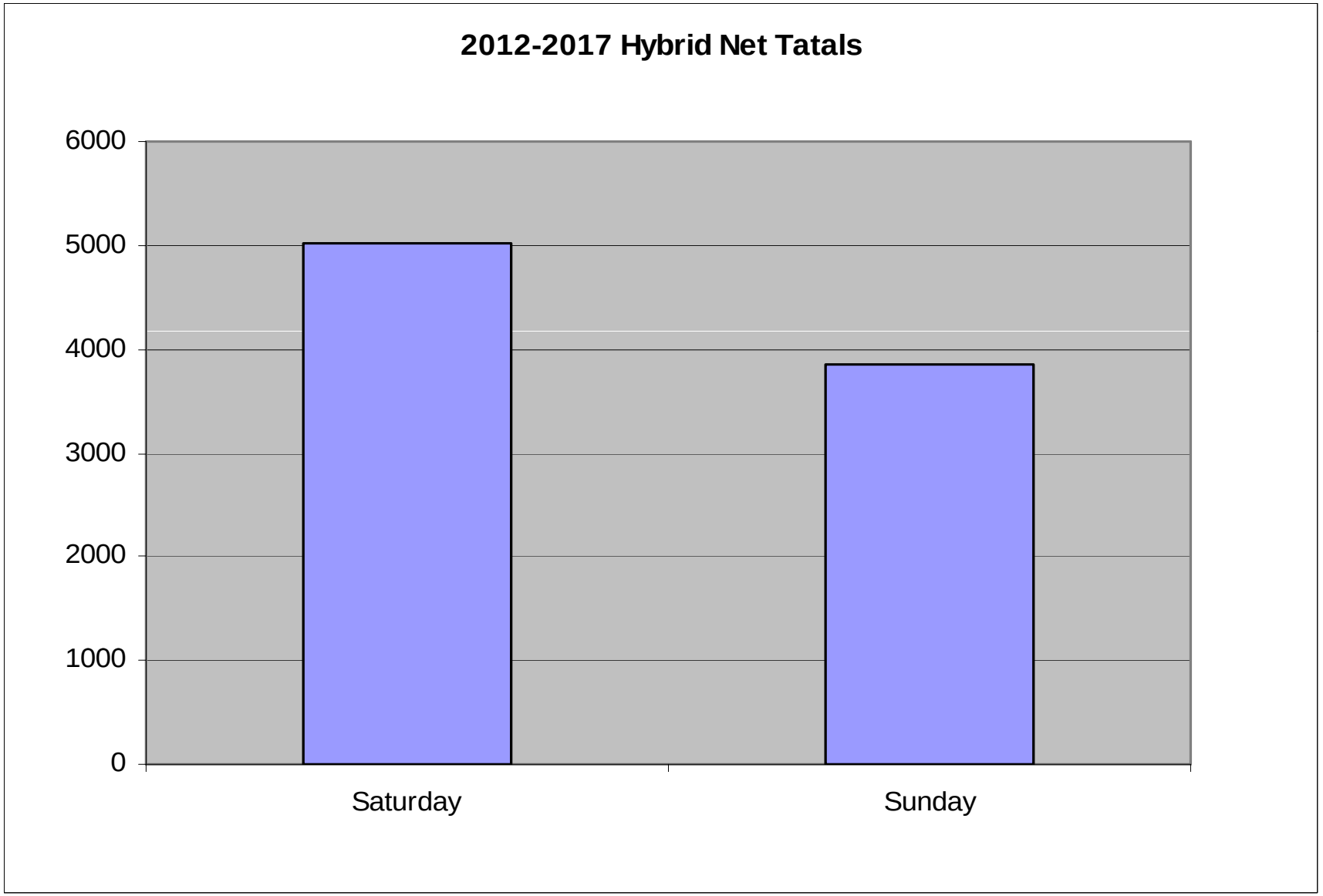
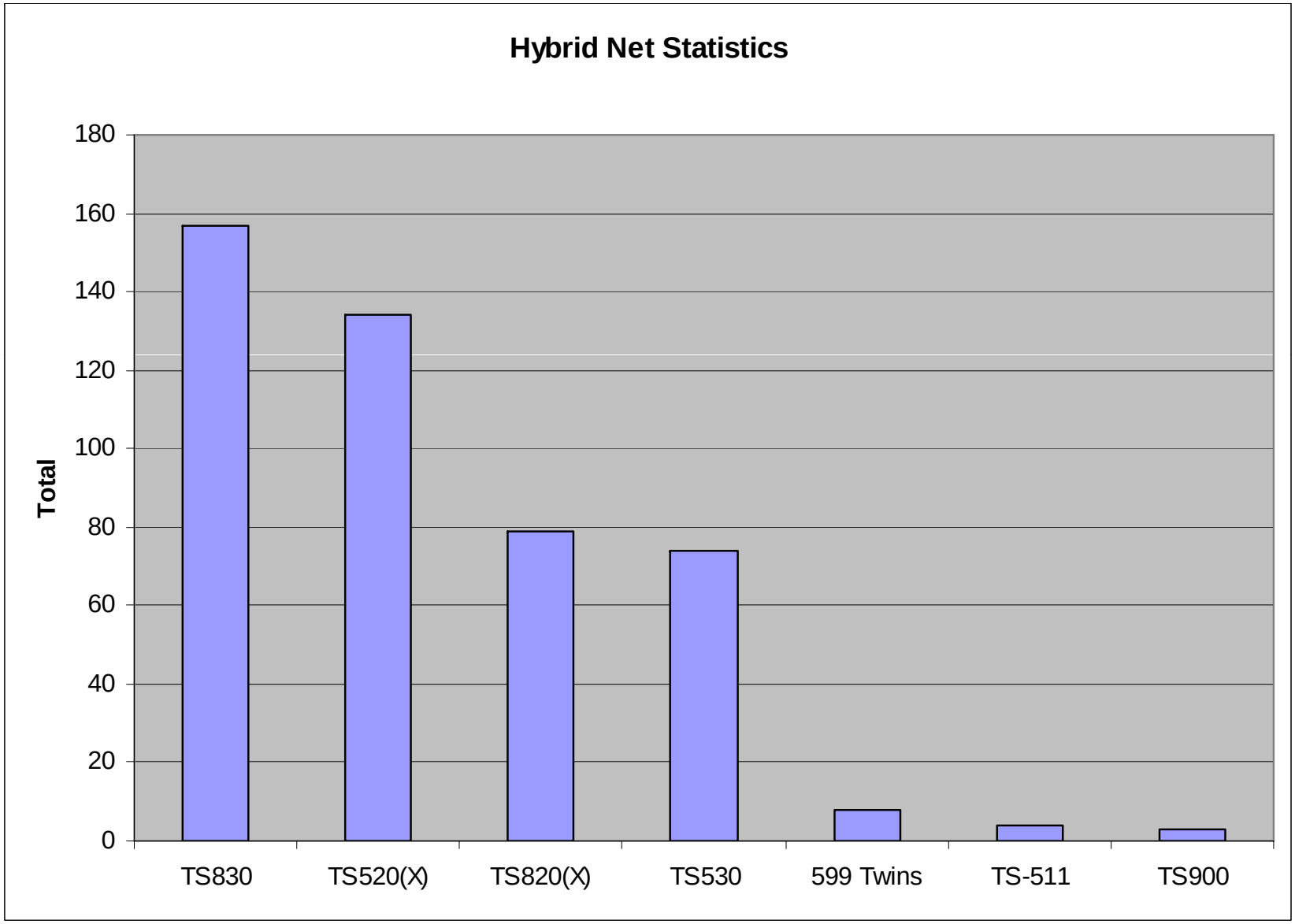
Kenwood Hybrid Net Totals



Hybrid Net Check-in By Radio Statistics



M.V.G. May 2016

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Kenwood Trivia

- The K-2000 linear amplifier was built to match the TS-520 and T-599A radio's and was introduced in 1975 QST, Henry Radio advertisement.

WA8SAJ

2 KW Amplifier FOR TS-520 Circa:1975

Kenwood K-2000
Pair of Eimac
8873 Conduction
Tubes

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Kenwood Trivia

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Kenwood Trivia

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Kenwood Trivia

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TS-801 TRIO

No Technical Details Available

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TS-801 TRIO

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TS-801 TRIO

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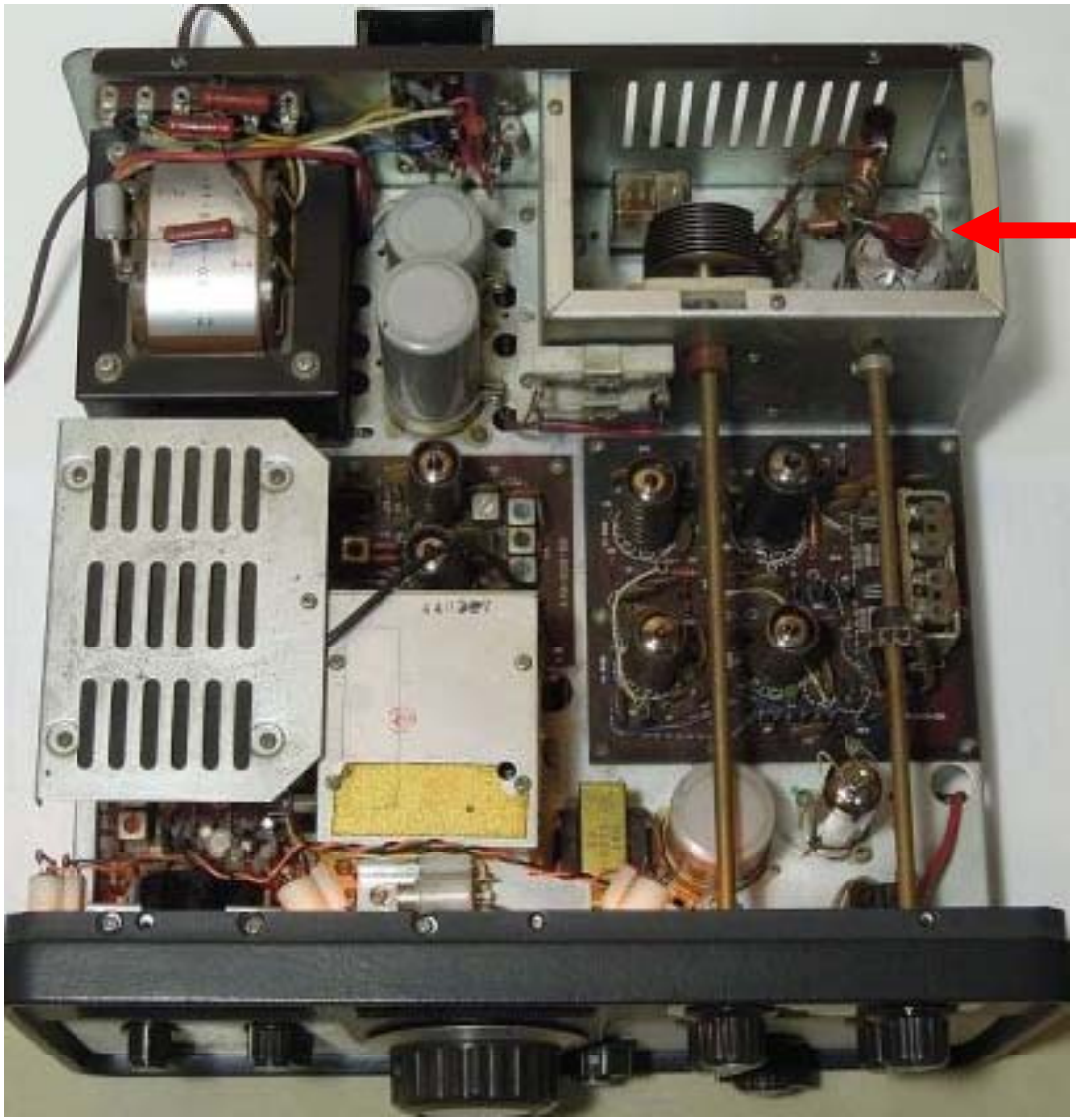
TS-801 TRIO



50 watts with a single 6146

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TL-911 Amplifier

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TL-911 Amplifier

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TL-911 Amplifier

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TL-911 Amplifier

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TL-911 Amplifier

- TL-911 Covers 80-10 meters.
- Valves / Tubes 6: 6CW5 6LQ6 6LQ6 6LQ6 6LQ6 6LQ6
- Semiconductors (the count is only for transistors) 3:
- AC supply: 100 / 117 / 220-240 Volt
- Coverage 3.5–29.7 MHz in 5 bands; Modes: SSB, CW; Input power max. 2.0 kW PEP for SSB, 1.2 kW for CW.
- Net weight : 56 lb 2.7 oz

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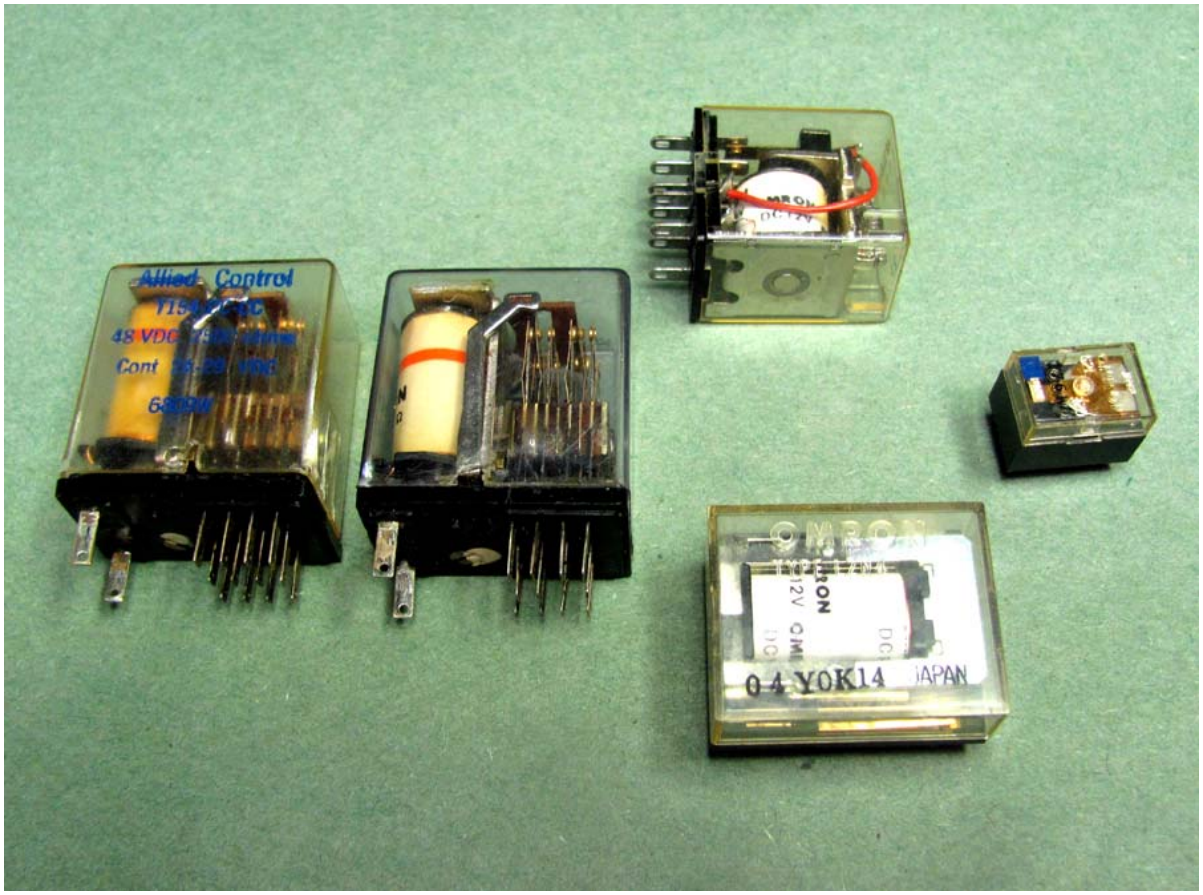
Relays in the Kenwood Radios

Speaker – Mr Jan Servaites (N8CBX)



Topics in this lecture:

- Brief introduction
- General comments & tips on each model
- Repairing the TS530 Antenna Relay

Hamvention Forums 2018
Kenwood Hybrid Radio Legacy
Rm 5, 10:30am – 11:30am
Saturday, May 19, 2018

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Relay Problems

- Relay Problems:
  - **Plastic cover doesn't seal where it joins the relay body**
  - **Moisture, oxygen, contaminants are free to enter & exit the relay**
  - **Moisture in the air is the main enemy**
  - **They work well, but suffer from long periods in storage, especially in a humid environment**.

- 530/830 series has sealed signal relay, but they go bad
  - **They are being used beyond maximum current specification**
  - **Problem caused by repeated discharging of a charged capacitor on one of the contacts**
  - **A large instantaneous current is produced that exceeds this relay's current rating**

- 530 antenna relay is light duty
  - **Not as tough as the 830 antenna relay**
  - **It Is not replaceable like the 830; Its soldered in place**
  - **No replacements available; Modification using NTE relay is viable**

- Early Kenwoods (520, 820, 599 Twins) use two identical relays….**But different coils!**
  - **Easy to mix-up when servicing; One closes faster than the other to operate in a sequence during TX/RX changeover**

- Vendors come to the rescue
  - **Ken Kemski, K4EAA**
  - **Jim Showker, The Hybrid Store**

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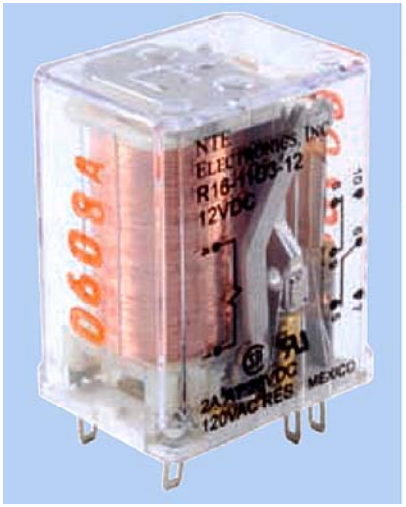
Early Kenwood

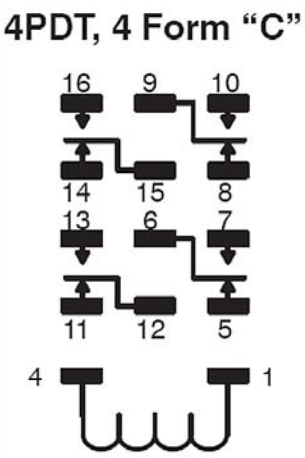
Used in 520, 820, 599 Twins
•OMRON “Plug-in” type MH4P (4PDT, 4 Form “C”, 12vdc)
•Sequential Making & Breaking of contacts to avoid “Hot Switching”
•**300 ohm used as Antenna Relay** and switches faster
•**385 ohm used for Signal Switching** and switches a little slower
•Used in many other hybrids at that time!

Replacements – The Hybrid Store

Possible Replacements: NTE R16-17D5-12; Tyco R10-E1X4-V185; Magnecraft W67RCSX-7…(They show a mounting stud that MH4P doesn’t have and a coil impedance of 185 ohms. More testing is needed)

NTE R16-17D5-12





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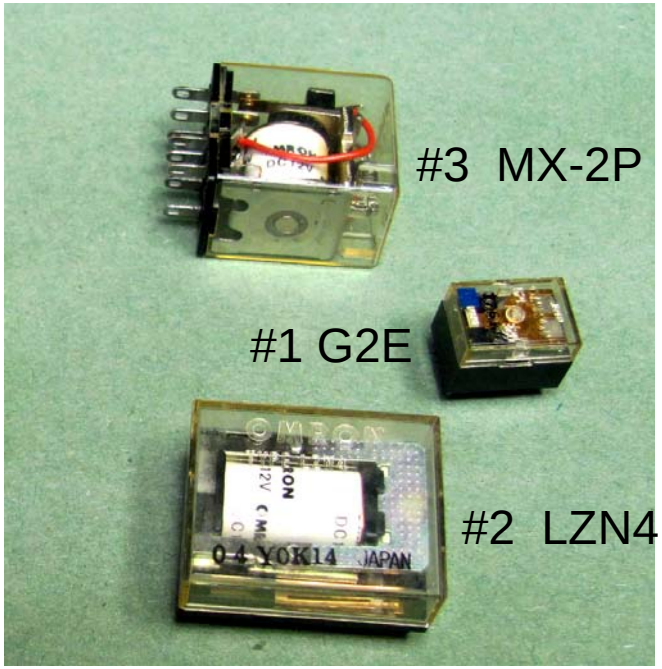
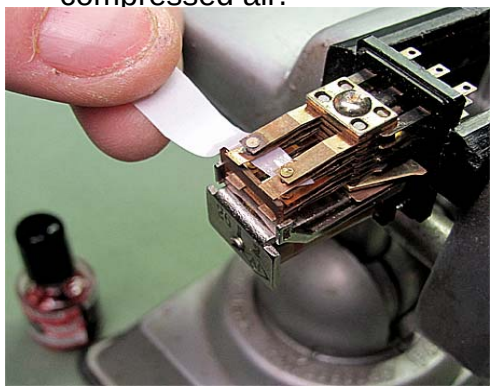
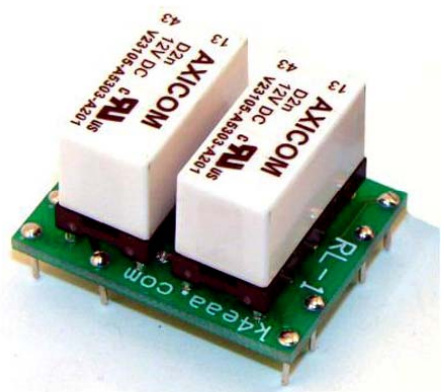
TS-830S – all labeled “RL-1”



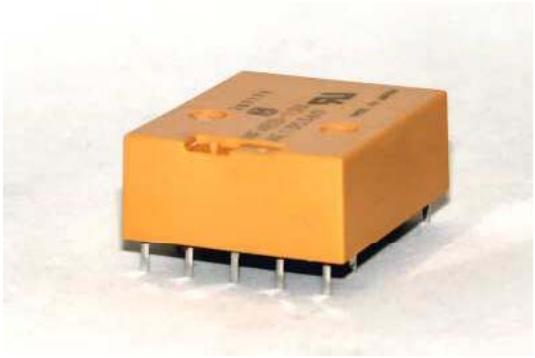
- TS-830S – Three relays and all labeled “RL-1” in schematic
  - **#1, Soldered in Rectifier Unit is a SPDT Relay (G2E)**
  - **#2, Soldered in AF Unit does final bias, RIT, XIT, exciter gain is a 4PDT (LZN4)**
  - **#3, Plug-in-socket does Antenna, Xverter, Remote, is a DPDT (MX-2P)**
- LZN4 problems concern the intermittent or **unstable ALC** and/or poor recovery of **receive sensitivity** after transmitting. It can impact several areas, but is most noticeable when switching from receive to transmit, and then back again.
- ***Can RL-1 be repaired?*** Possibly, try cleaning them.
  - Be careful, these are small, delicate relays, and are easily damaged. Usually, they can be cleaned with a strip of printer paper and wetted with “Deoxit”. Blow dry with compressed air.





Ken, K4EAA sells a replacement for the “LZN4” used on the TS-530 IF Unit and TS-830 AF Unit boards (These same relays are also used in the TS-120 and TS-130 transceiver on the IF and Filter boards)

Obsolete Replacement: Panasonic NF4EB-12v



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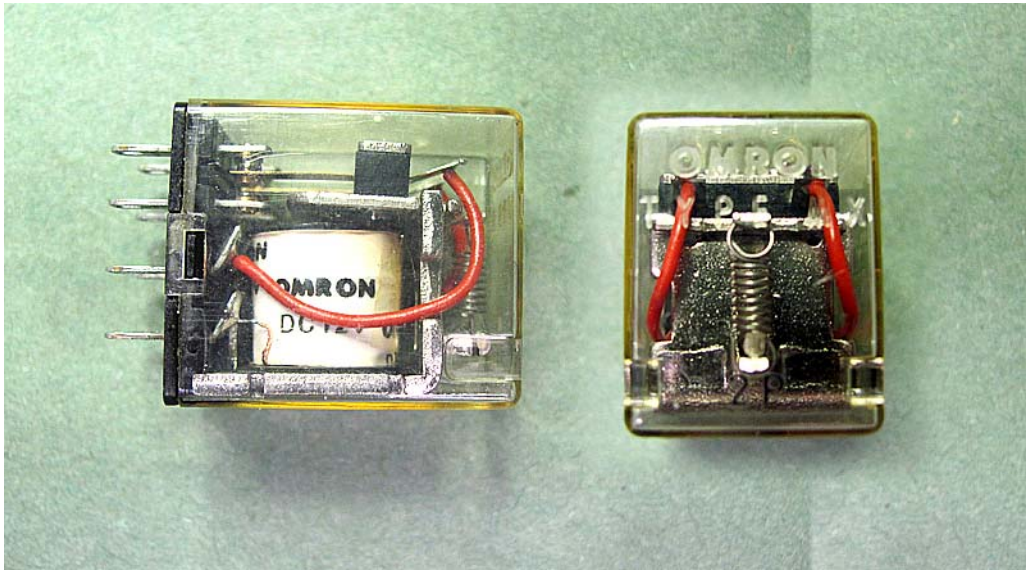
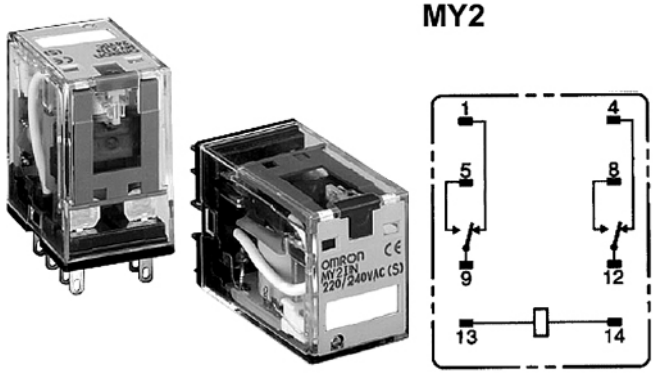
TS-830 Antenna Relay

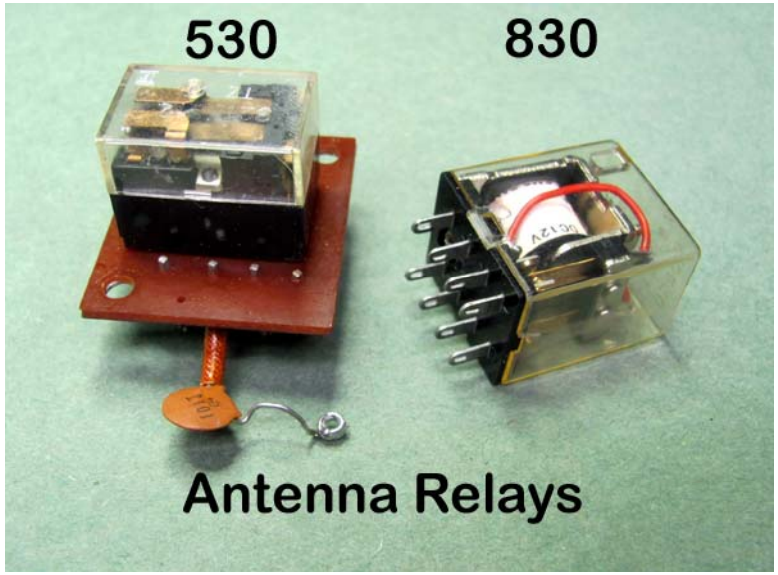


- **TS-830S – “RL-1”#3, OMRON Model MX, General Purpose Relay**
  - Specs: **MX2P**, 125 ohm coil, 5A, 15mS operate/release times
- **Replacement –** The Hybrid Store
- **Possible Replacement –** Omron has a new “MY” series of relays, but might have a different pin-out.
- **OMRON “MY2N”,** 160 ohm coil, 5A, 20mS operate/release times

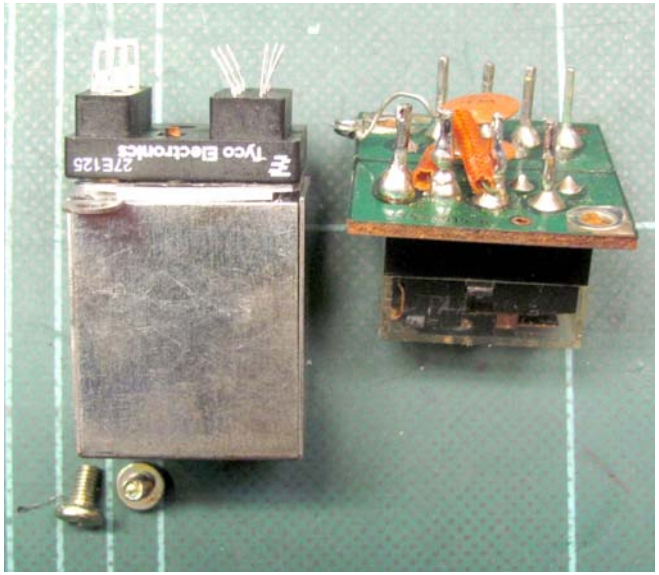


KENWOOD **Repairing the Kenwood TS-530S Antenna Relay**

530 and 830 Relays



530 Repair Using NTE Relay



Replacement: NTE R16-11D5-12 (relay) and NTE R95-103 (socket)

Repairing the Kenwood TS-530S Antenna Relay

Buy these: NTE R16-11D5-12 (relay) and NTE R95-103 (socket)

12VDC DPDT 3A PC Mounted Relay
NTE R16-11D3-12P

Spec Sheet

Price: $15.23

Add To Cart **discontinued**

12VDC DPDT 5A Relay
NTE R16-11D5-12

Compatable 10 Pin Socket:

- Panel Mount: R95-103
- PC Mount: R95-102

Spec Sheet

Price: $22.73

Add To Cart

10 Pin Blade Socket
NTE R95-103

Features:

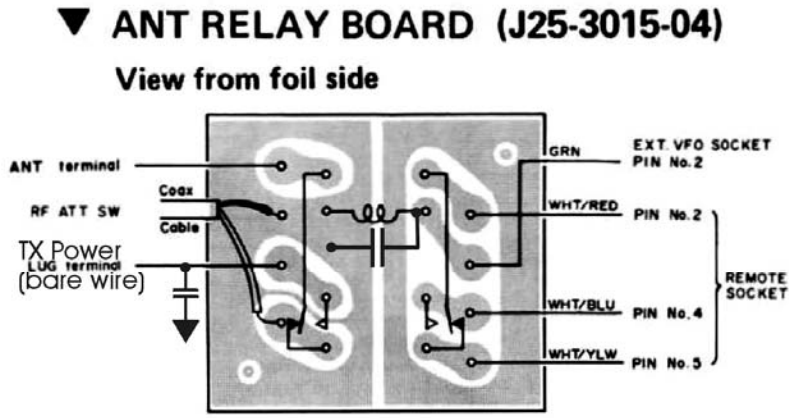
- Panel Mount
- Solder Terminals
- Accepts .187" Blade Terminals
- Electrical Rating: 300 Volt, 5 Amps

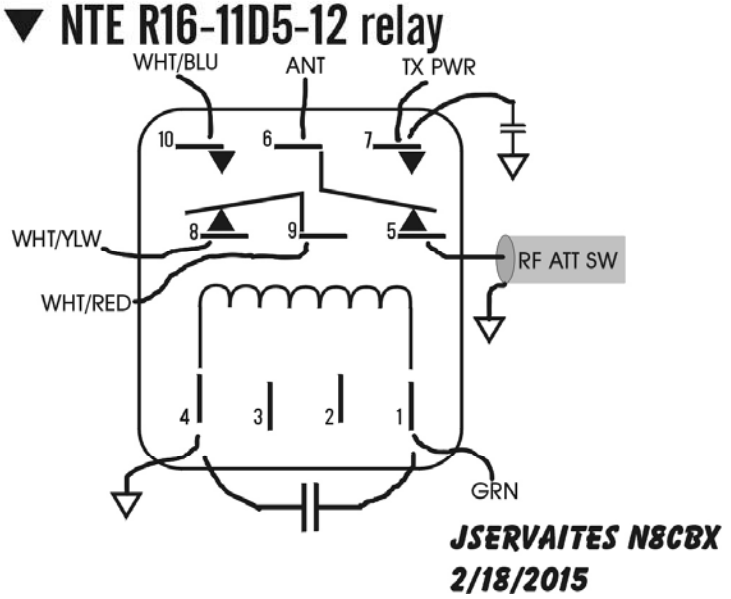
Spec Sheet (PDF)

Price: $4.48

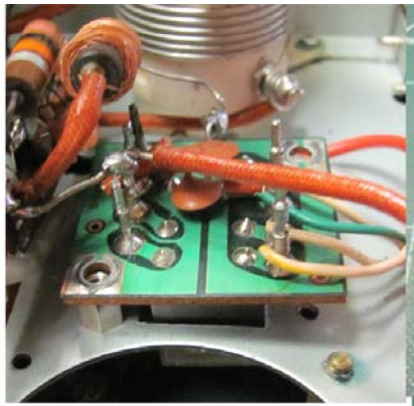
Add To Cart

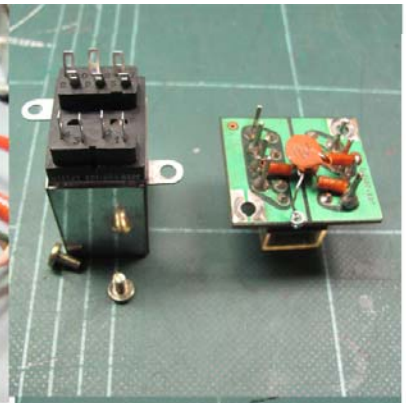
Minute Man Electronics
http://www.minute-man.com/
www.newark.com



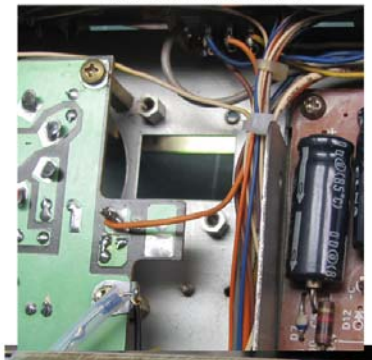


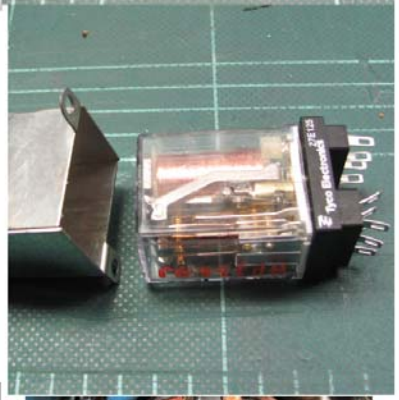
Repairing the Kenwood TS-530S Antenna Relay

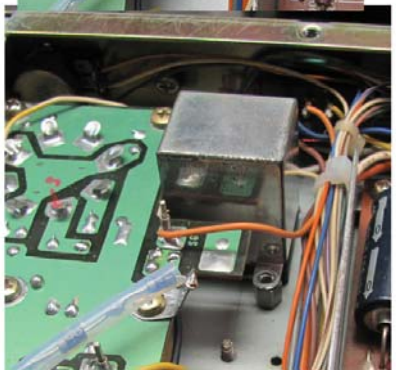


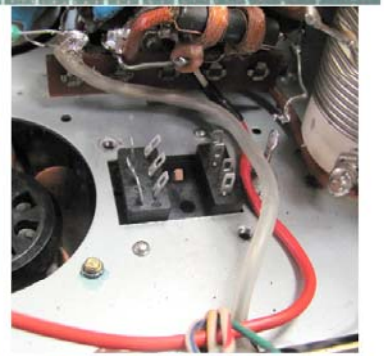


Mount screws on inside



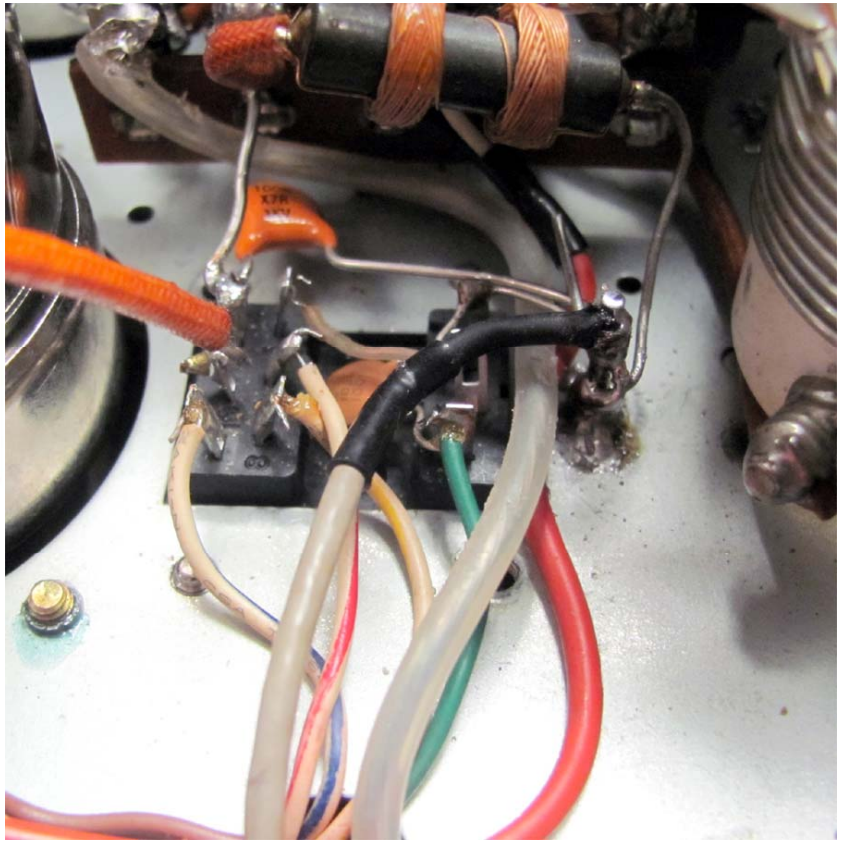






Relay installed (below)

Follow my wire layout for the best fit;
Installed two new capacitors too



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References

- The Hybrid Store; Relay Problems and how to Solve; *http://www.hybridrestore.com/359-2/*
- K9TW Hybrid Service; MH4P Relays Correct Location; *https://drive.google.com/file/d/0B5NBmwIA2pskb2Fkd2lBb3RBSU0/view?usp=sharing*
- K4EAA; Testing a Suspected Bad Relay; *http://www.k4eaa.com/faq.htm; http://www.k4eaa.com/RL-1.htm*
- W5RKL; Replacing the 830 Relay; *https://forums.qrz.com/index.php?threads/help-me-for-replace-relais-ts830.259812/*
- Newark Element 14 Co.; R16-11D5-12 - Power Relay; *http://www.newark.com*
- Richard L. Measures AG6K; Circuit Improvements and Maintenance Procedures for the TS-830S; *http://www.somis.org/830.html*

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- SDR INTIGRATION INTO THE HYBRIDS

  - Jan Servaites N8CBX
    - (2014 softrock Presentation)

  - Alan K2QU Using SDRPlay

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SDR Integration into the Legacy line

Presenter: Mr Jan Servaites N8CBX

Getting Started

- Kenwood provides 8.83mhz IF output on some models. The SM 220 owner's manual gives guidance on IF cable installations.

- Might need to attenuate the IF signal (a step attenuator with 20db capability).

- HF band SDR receiver (SoftRock kits from Tony Parks KB9YIG, fivedash.com).

- PC computer's soundcard (typically 48khz, stereo line input).

- Running HDSDR.exe and free download.

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SDR Integration into the Legacy line

Presenter: Mr Jan Servaites N8CBX

Operating Hints & Tips

•"Softrock Ensemble-II Rx" has built in VFO. Frequency controlled by PC....(BEST!).
• "Softrock Lite" ($25 kit w/8.812 MHz crystal. Fixed LO frequency).

• 48khz sound card works great; 96khz & 192khz s/c available & expensive.

• Many nice features in HDSDR; All modes, recording, spectrum/waterfall, filter widths, noise blanker.

• Panadapter capability adds a new dimension to the older radios. Can revitalized a vintage radio to newer standards, and the hobby enjoyment!

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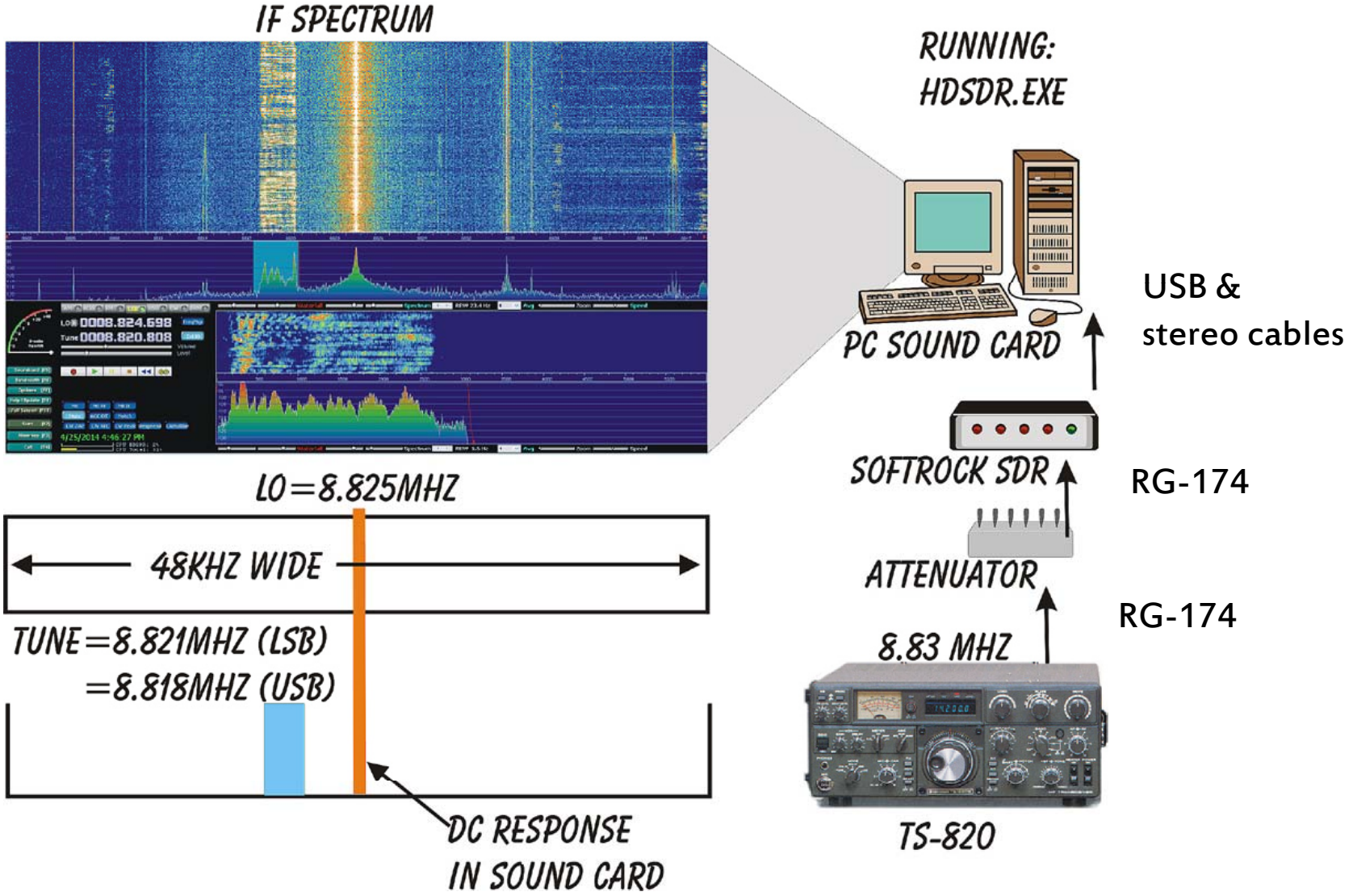
SDR Integration into the Legacy line

SDR PANADAPTER SYSTEM



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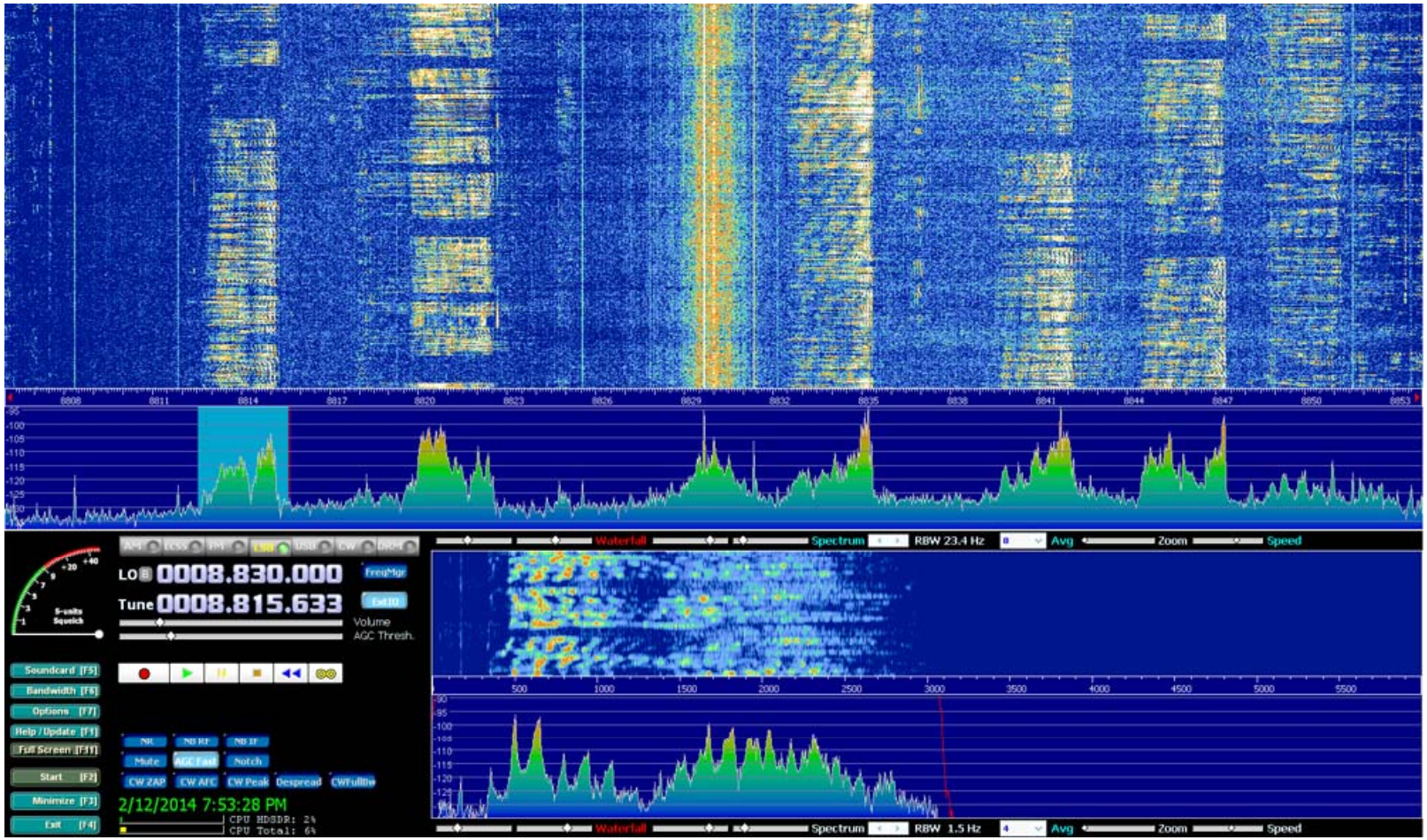
SDR Integration into the Legacy line

“Softrock Lite”, w/8.812mhz xtal

Listening window is fixed, as pictured below

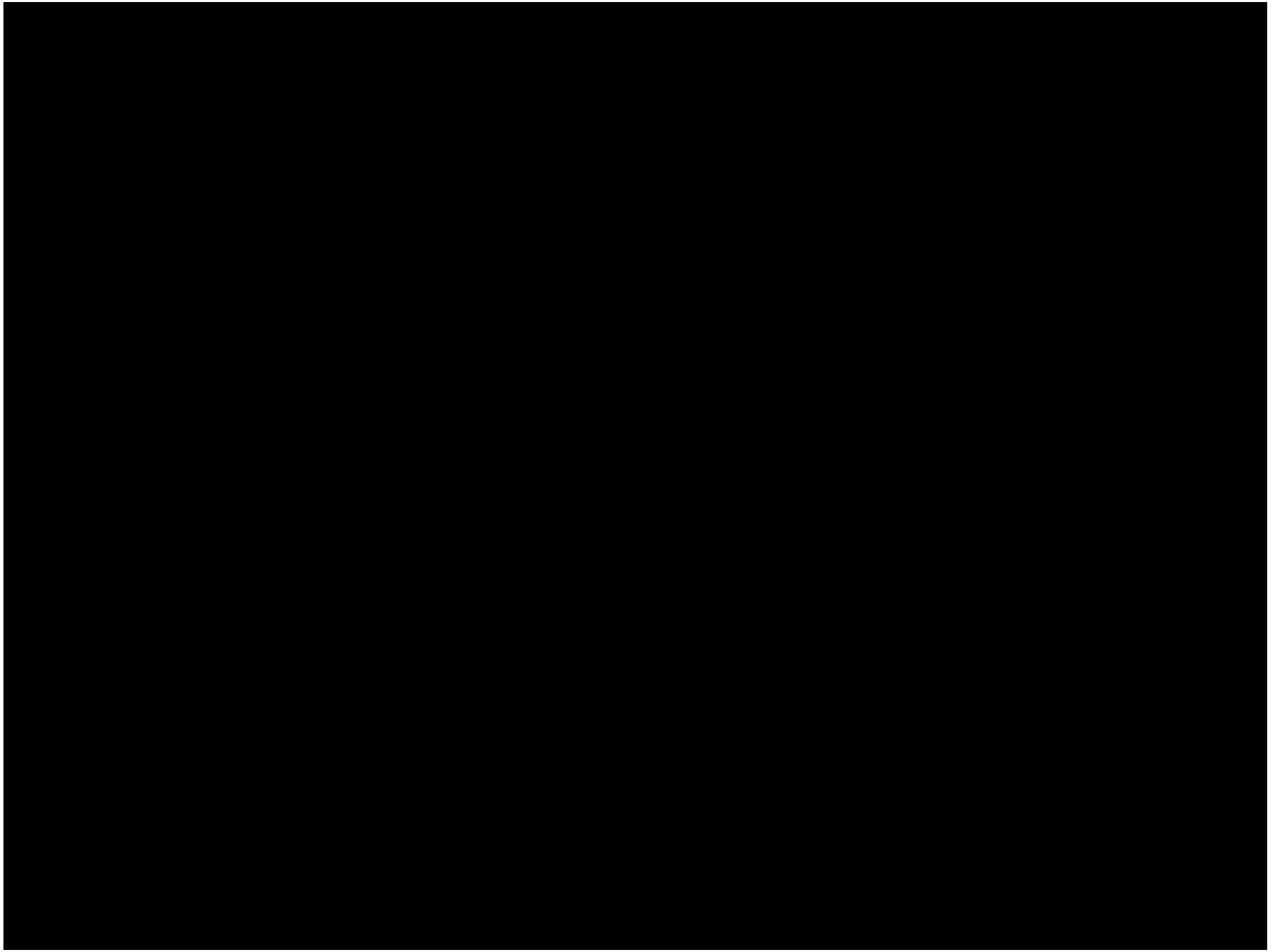


Connecting SDRplay to a Kenwood TS-830S

Alan K2QU

December, 2017

Please advise K2QU of improvements!



Hardware Connections

RS232 DB9
Pin 5 is
ground

Computer
HDSDR software
USB

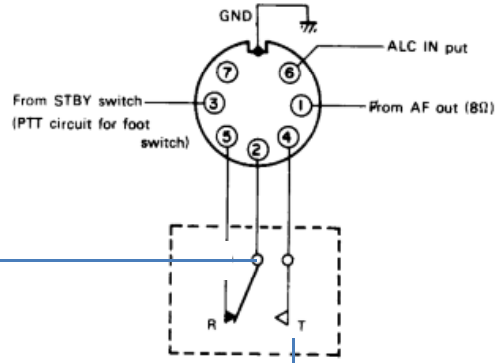
USB to DB9
Com converter

Pin 1 (DCD) or 8 (CTS)

12VDC
+ -

470µF

TS830 remote
connector



USB
SDRplay 1
ANT

shielding

Relay coil

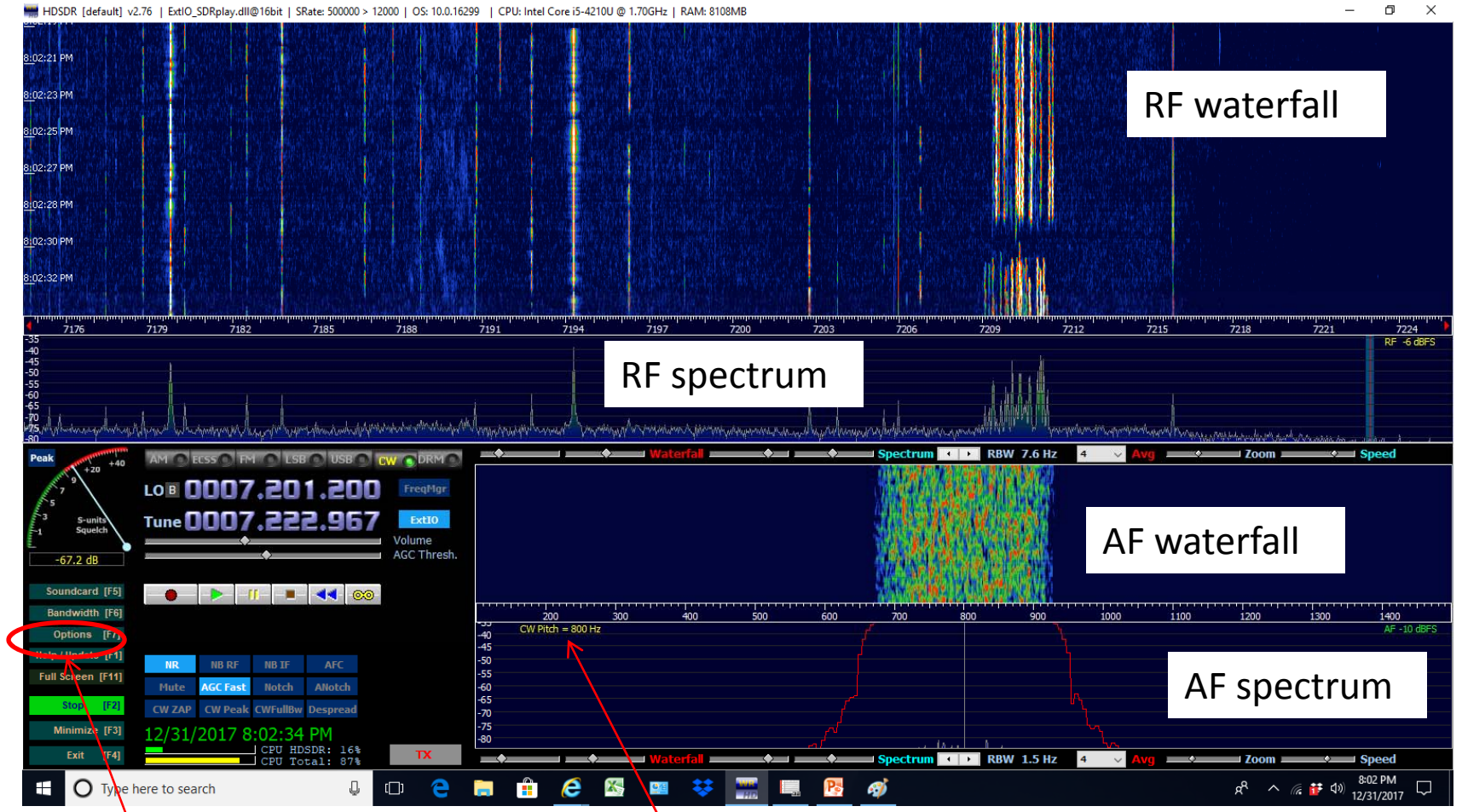
Norm closed rcvr
Common
DowKey Relay
Norm open xmit

Antenna connector
TS 830
IF 1 output

Shorting plug

Shorting plug minimizes RF from getting into SDRplay

HDSDR Screen Layout

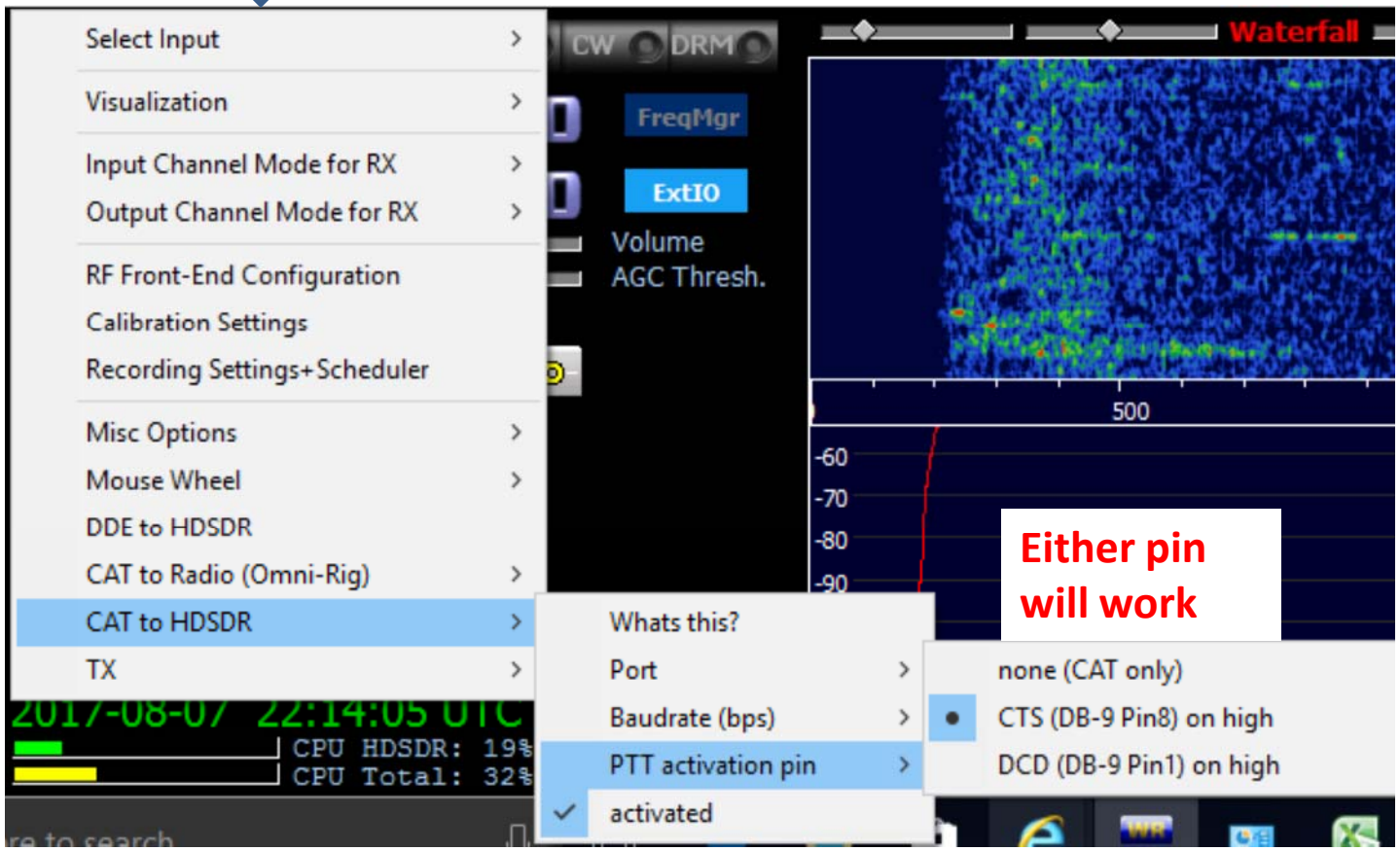


Click to set CW tone to **800Hz to match KW**

Options menu selection for setting SDRplay to work with KW Hybrid

Software Set-up to Activate T/R in HDSDR via COM port

Options menu selection



Software Set-up to Activate T/R in HDSDR via COM port

About 'CAT to HDSDR'

From options menu

HDSDR can get controlled over a serial/CAT interface.
HDSDR understands a small subset of Kenwood's CAT protocol:

FA00000000000; // set tune frequency [Hz]
MD1; ... MD5; // change mode [1=LSB, 2=USB, 3=CW, 4=FM, 5=AM]
TX; and RX; // switch RX/TX - only if the active ExtIO supports TX
For controlling HDSDR from another software with CAT support
(f.e. WSJT, Fldigi, MultiPSK, MixW amonst others),
you can use serial port emulator like 'com0com' or 'VSPE'.

For RX/TX switching you can also use 'high level' on CTS or DCD pin.
In the controlling software you have to configure RTS (instead CTS)
or DTR (instead DCD) for PTT control when you are using a Null-modem cable.
com0com uses such a Null-modem wiring as default. Prefer using 'CAT' as 'PTT method' when available.

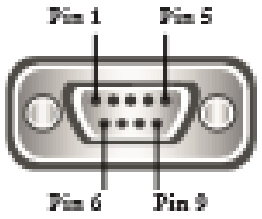
Configure '8 Data Bits', 'No Parity', '1 Stopbit' and 'No Handshake' in controlling software.

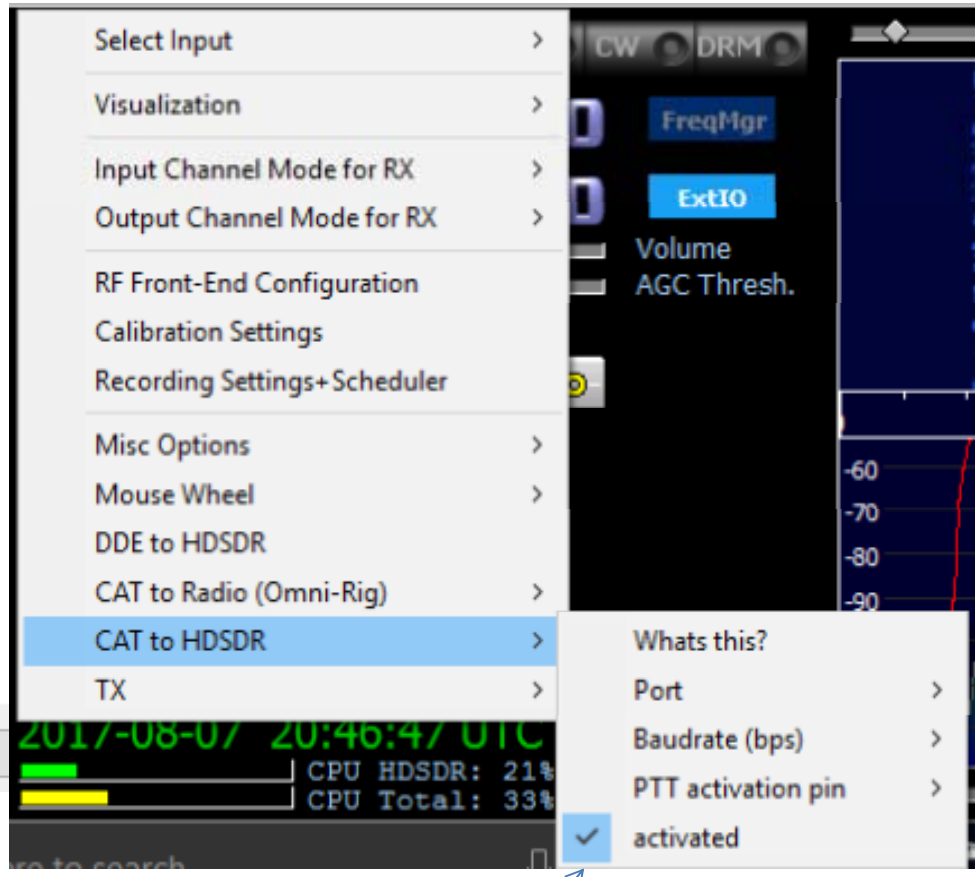
OK

Port Male

Pin 1	DCD
Pin 2	RXD
Pin 3	TXD
Pin 4	DTR
Pin 5	GND
Pin 6	DSR
Pin 7	RTS
Pin 8	CTS
Pin 9	RI

RS232 Pinout (9 Pin Male)

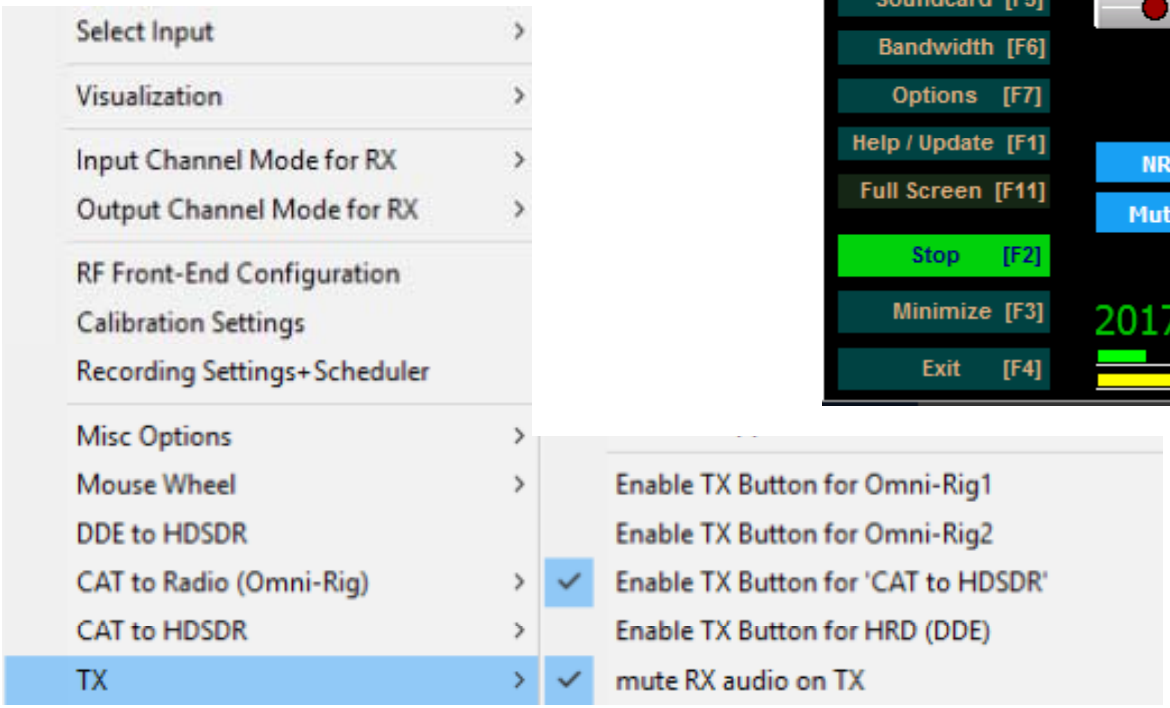




Note: For my configuration, this T/R ONLY mutes audio, it does NOT put the RSP1 into standby!

Software Set-up to Activate T/R in HDSDR via COM port

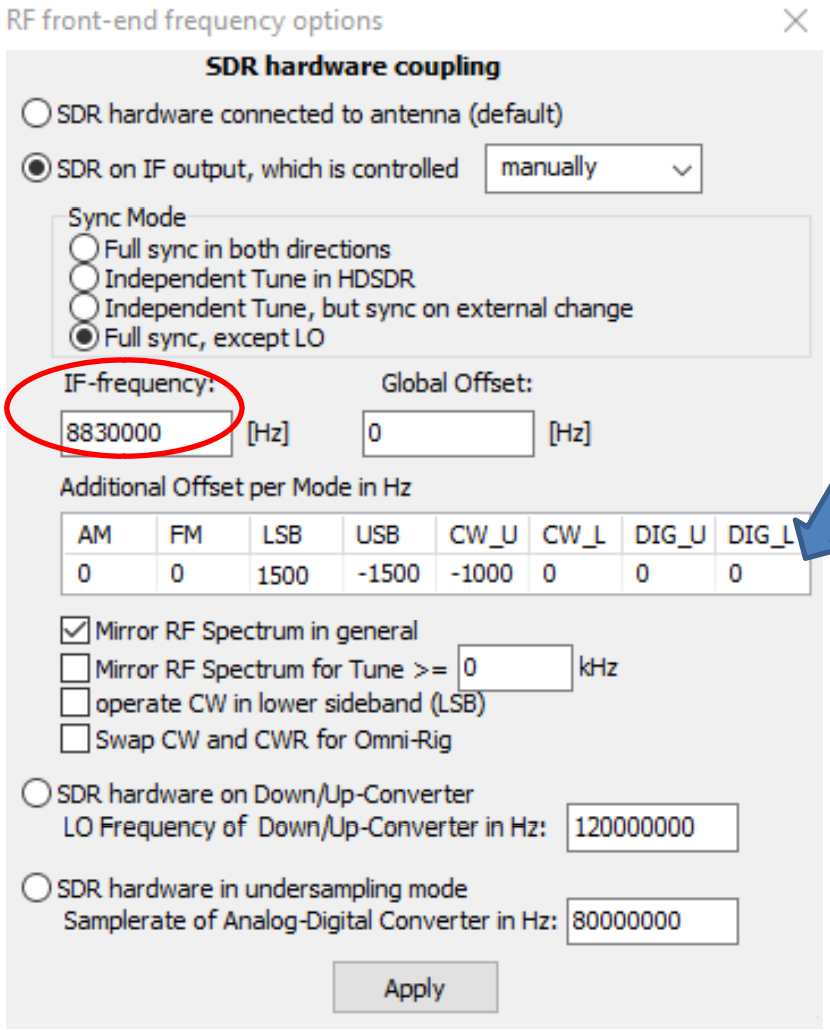
From options menu



Confirms TX button is active; Button turn **red** when DB9 pin goes high in transmit

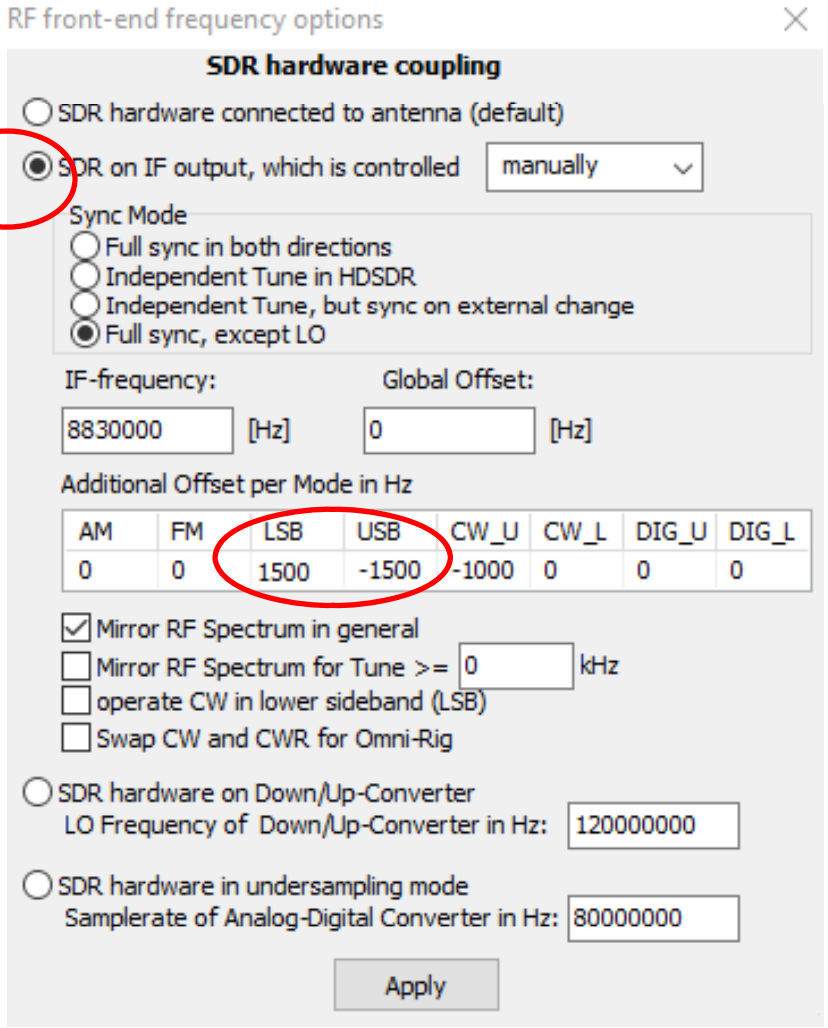
Software Set-up for Synchronized Kenwood and SDRplay Tuning – IF set Exactly to KW

Options Menu: RF Front-end configuration



- The 1500 Hz SSB offsets are consistent with the TS830 IFshifts – slight adjustments will fix any TX/RX offset
- The -1000Hz CW makes the KW xmit frequency aligned exactly with rx zero beat (for my 830).
- The next slide shows how to determine the values for your hybrid
- You can also slightly offset the IF frequency if needed and then all other offsets will need to be changed, too.

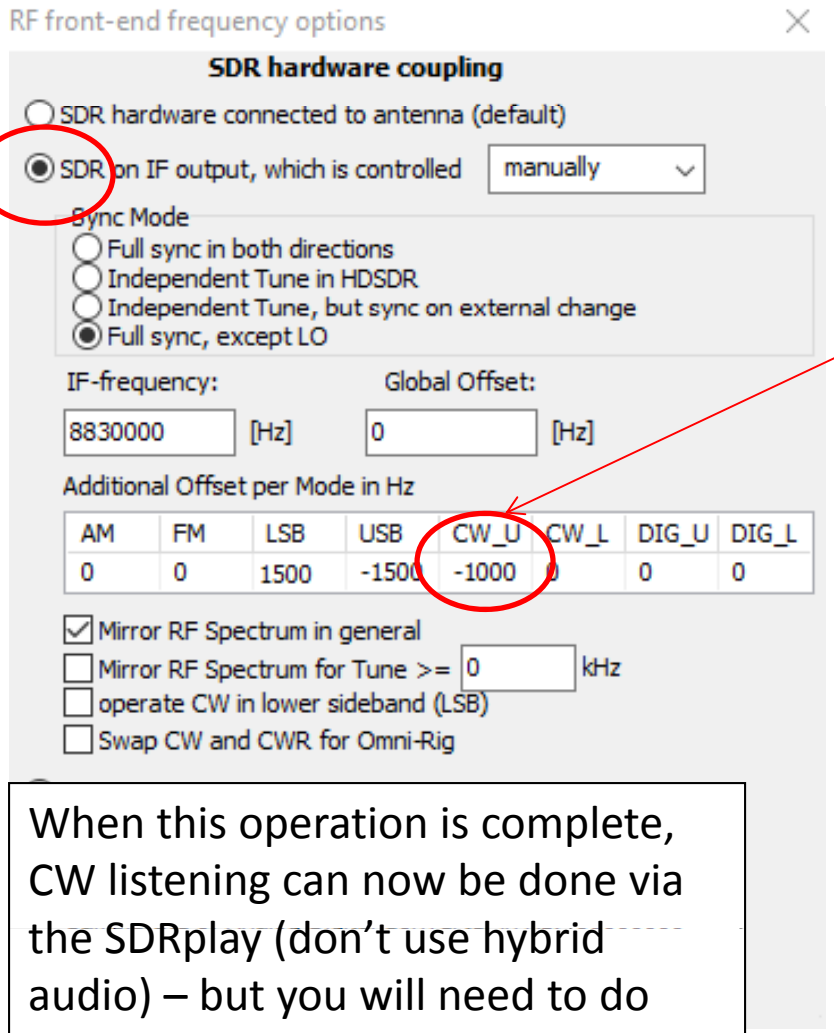
How to Determine the SSB Offsets for Your Hybrid

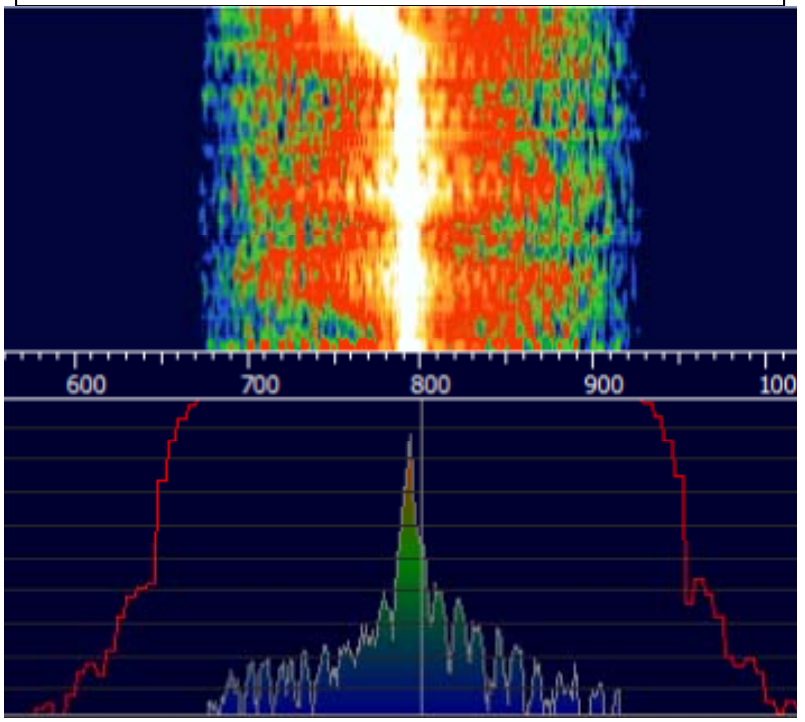


- LSB and USB offsets: 1. Adjust main tuning on hybrid to a SSB station – listening on the hybrid. 2. Then, adjust offset until the station sounds the same listening on the SDRPlay.
- 3. This approach will get you very close. Since I only use the SDRPlay as a bandscope for SSB, if I am off a bit, it is not a big deal.

Determine the CW Offset for Your Hybrid

1. Set the CW tone on the HDSDR software to 800Hz, matching the hybrid Tx/Rx CW offset.
2. Find a CW station of known frequency (e.g. W1AW 3.5815MHz) – or calibrator.
3. Set hybrid to receive that station (main tuning 3.5815MHz-800Hz = **3.5807**MHz)
4. Set CW_U so that SDR audio is aligned at 800Hz

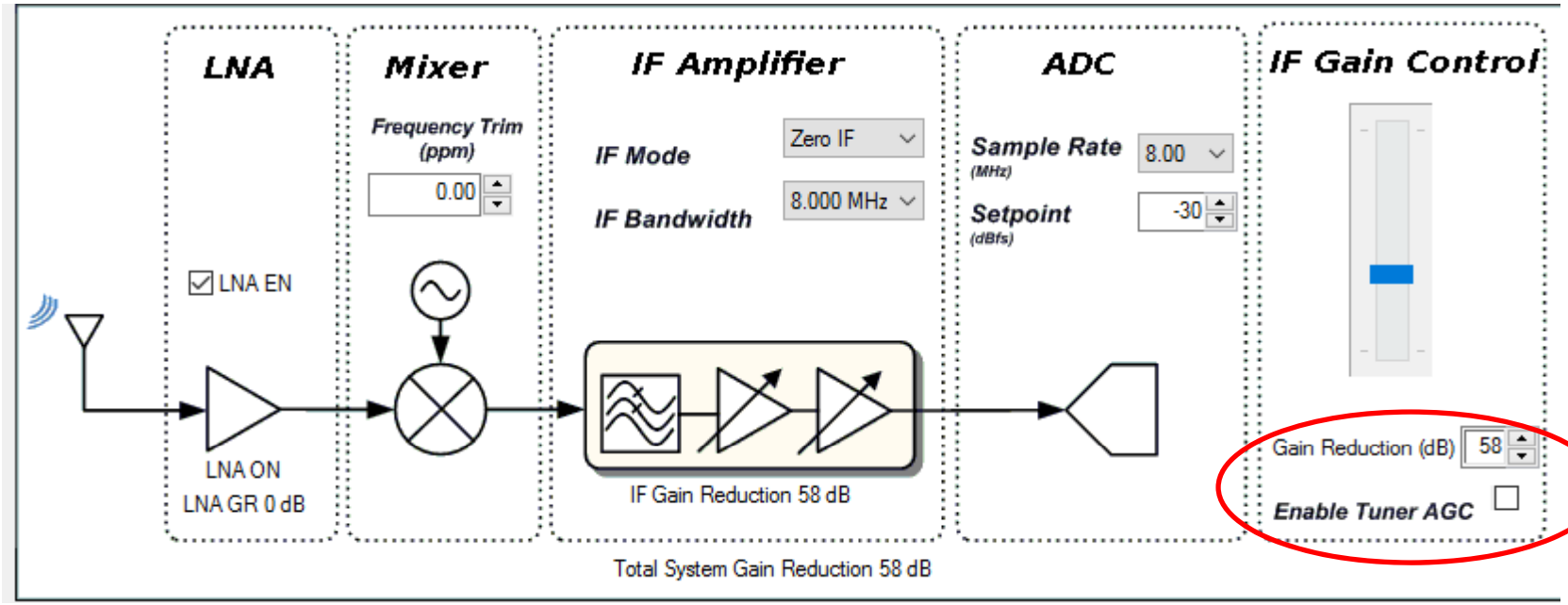




When this operation is complete, CW listening can now be done via the SDRplay (don't use hybrid audio) – but you will need to do something if you want a side tone!

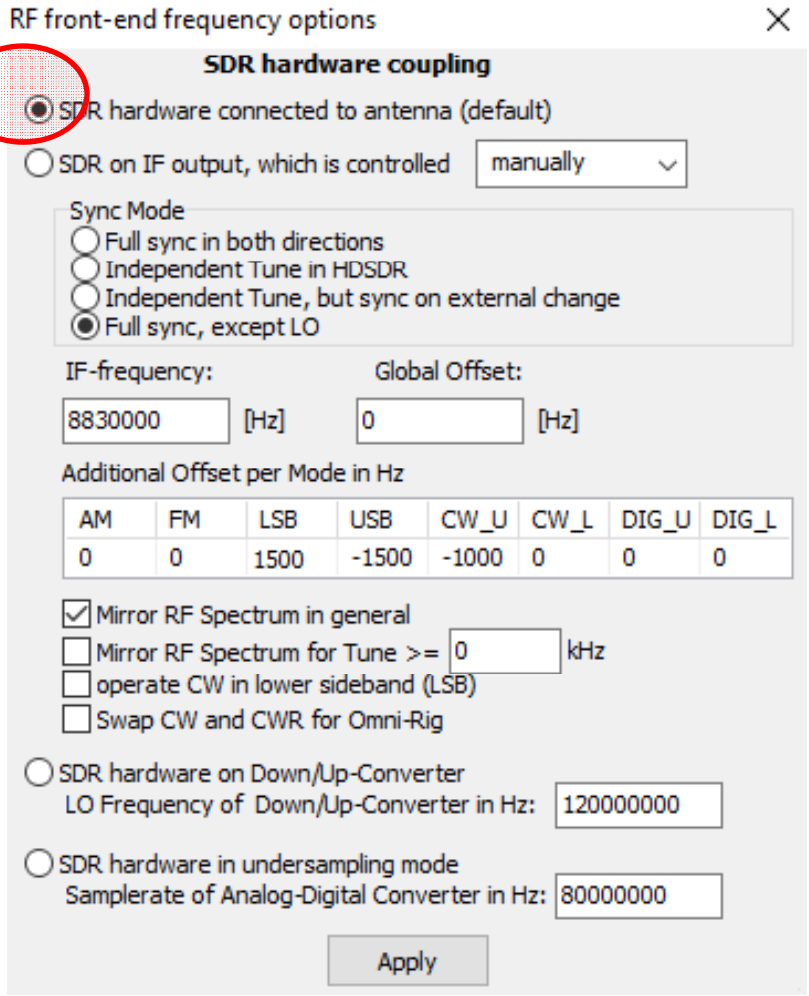
ExtIO for Use with the Kenwood IF

Click to open ExtIO



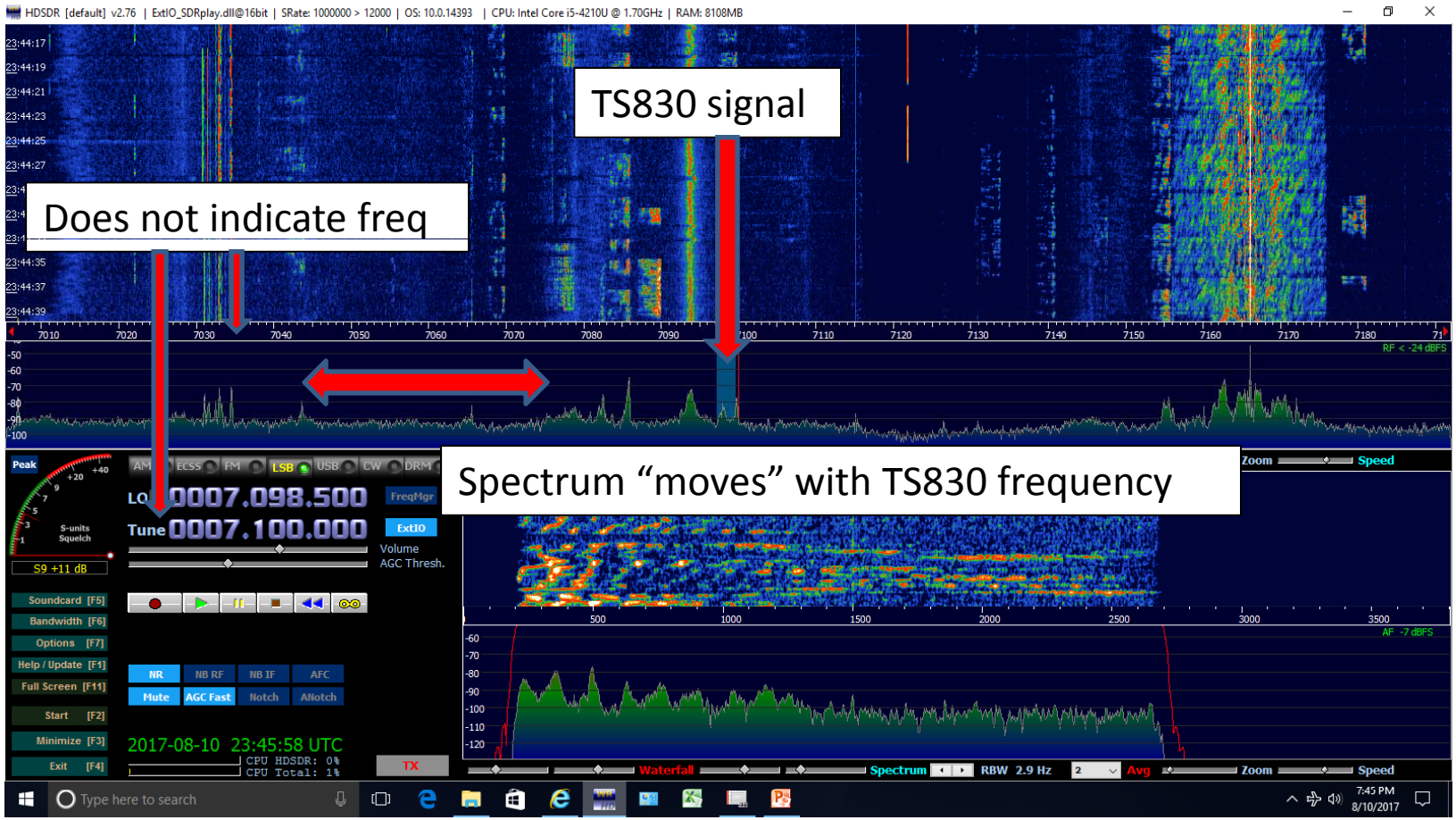
- IF Tuner AGC: select based on band condx for KNWD (checked for non-KNWD use)
- IF Gain Reduction: set for comfortable operation – depends on noise floor.
- The other setting are not too critical

Software Set-up for Independent Kenwood and SDRplay tuning

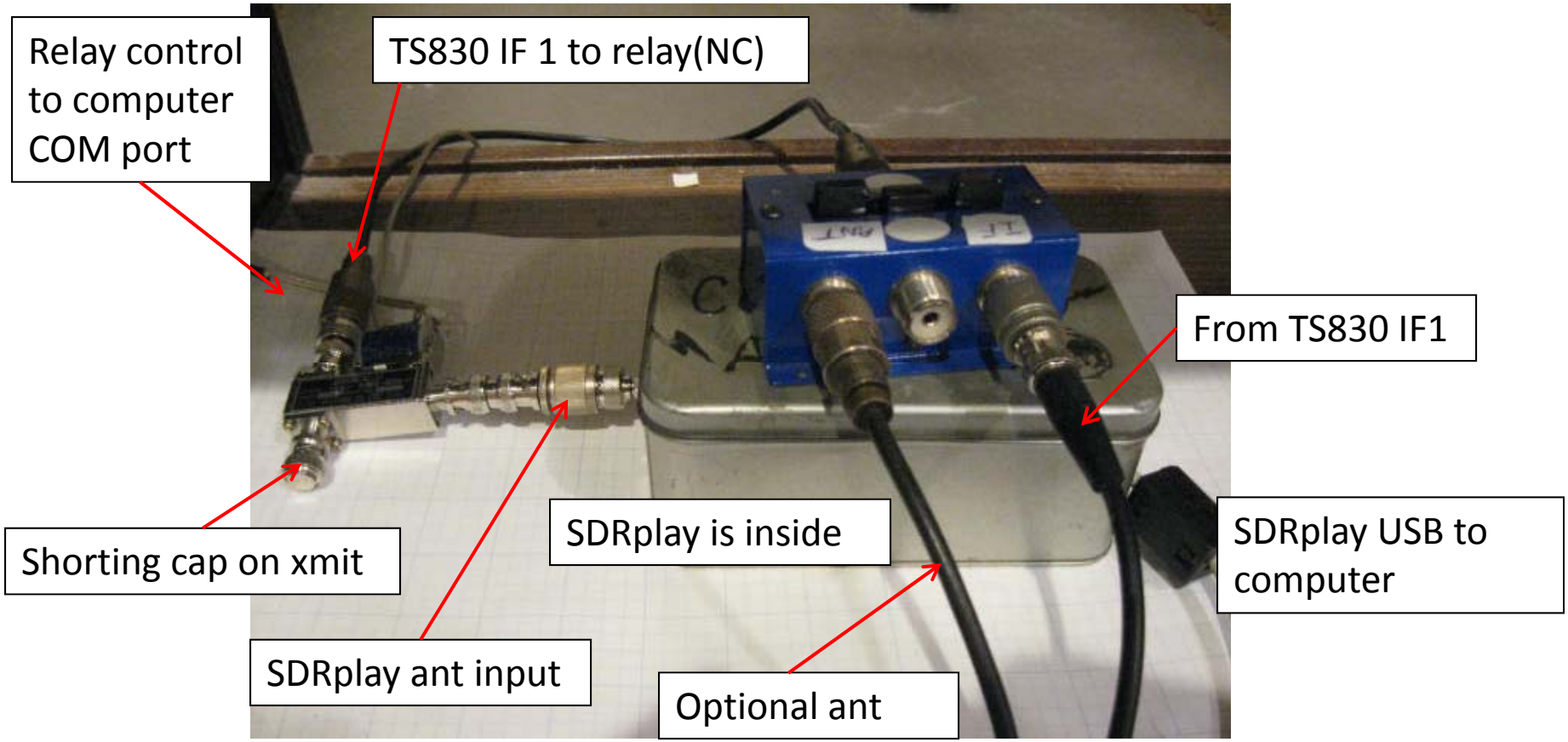


- With this option checked, none of the other settings are relevant.
- The “Full sync” , IF and Offsets have no impact.
- The SDRplay operates as it normally would with an antenna connected directly to it. However, the SDRplay will also work in this mode with the TS830 IF1 output connected to the SDRplay antenna input – reduced sensitivity.

HDSDR with Sync to TS830



Relay Connections to SDRplay

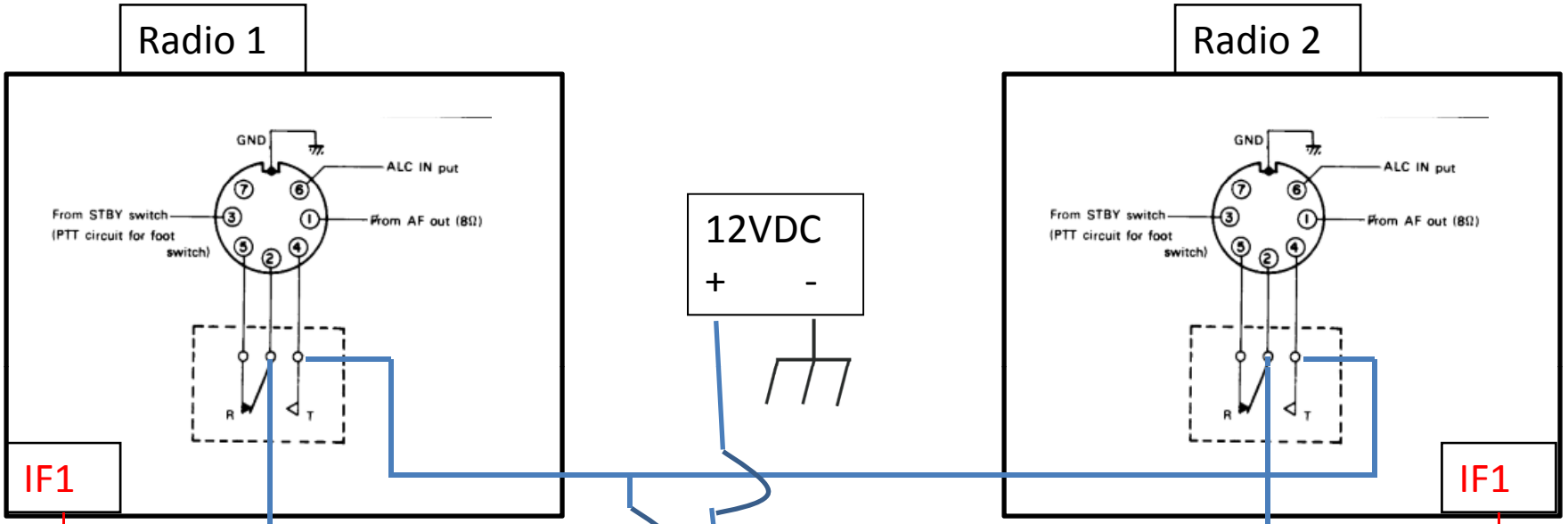


Connecting Multiple Radios to SDRPlay

- What's needed:
  - A-B switch to select which Radio is connected to the antenna – which you would have if you have multiple radios
  - A-B switch to select IF1 output of each radio to SDRPlay

- Hardest part is wiring the 7-pin Din plugs for the accessory sockets
- I suggest to terminate the cable from each accessory socket to a terminal strip
- The next slide shows the wiring
  - **KW Radio relays are wired in parallel to switch 12VDC Dow Key relay**
    - Optional LED paralleled with Dow Key coil to confirm operation (not shown(
  - Manual A-B switch to select Radio IF (low power; coax switch)
  - For clarity, diagram omits the connection to the RS232 – but it is just the switched 12VDC
- The method can be extended to more than 2 radios – with A-B-C-D switch!!

Connecting Multiple Radios to SDRPlay



IF A-B Switch to select radio

Relay coil

Antenna A-B Switch to select radio required

Norm closed rcvr

Common

DowKey Relay

Norm open xmit

SDRPlay

Shorting plug

Connecting SDRplay to a Kenwood TS-830S

Alan K2QU

December, 2017

Please advise K2QU of improvements!

Summary

- Hardware
  - TS-830S aux relay shorts SDRplay input and mutes HDSDR audio on transmit
  - SDRplay RSP1 (and optional shielding mitigates xmit RF)
  - DowKey Relay & COM port (RS232)
    - Alternate to a DowKey: DXE RTR-2 or MFJ-1708SDR
    - One of those devices is needed to short SDRplay antenna input during transmission.
    - I used a FTDI-A36 USB to DB9 COM converter to mute SDRplay during transmission
  - 12VDC supply & 470µF capacitor (may not be needed)
- Software: HDSDR V2.76

KENWOOD

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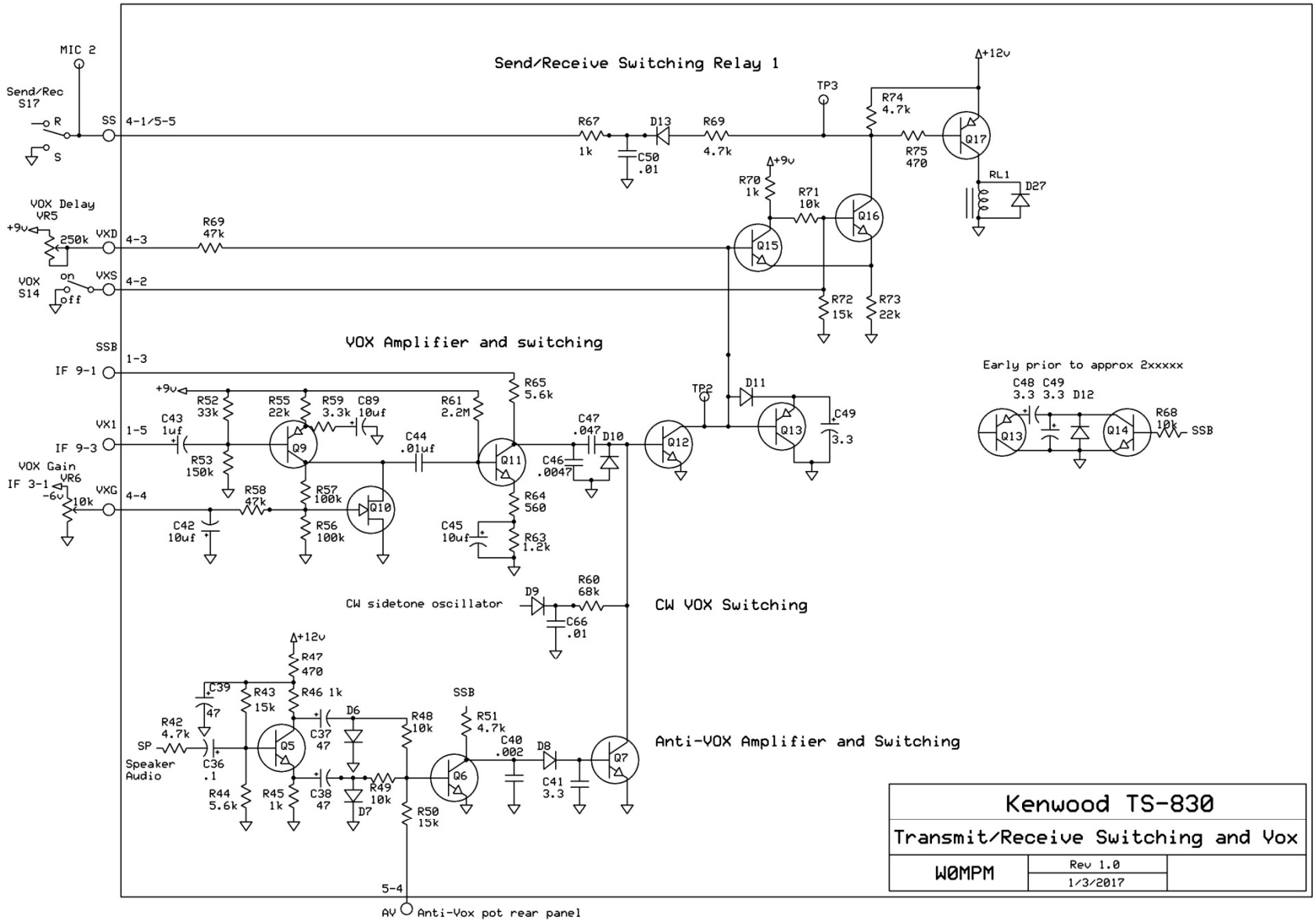
TS-830S VOX – BY: John, W0MPM

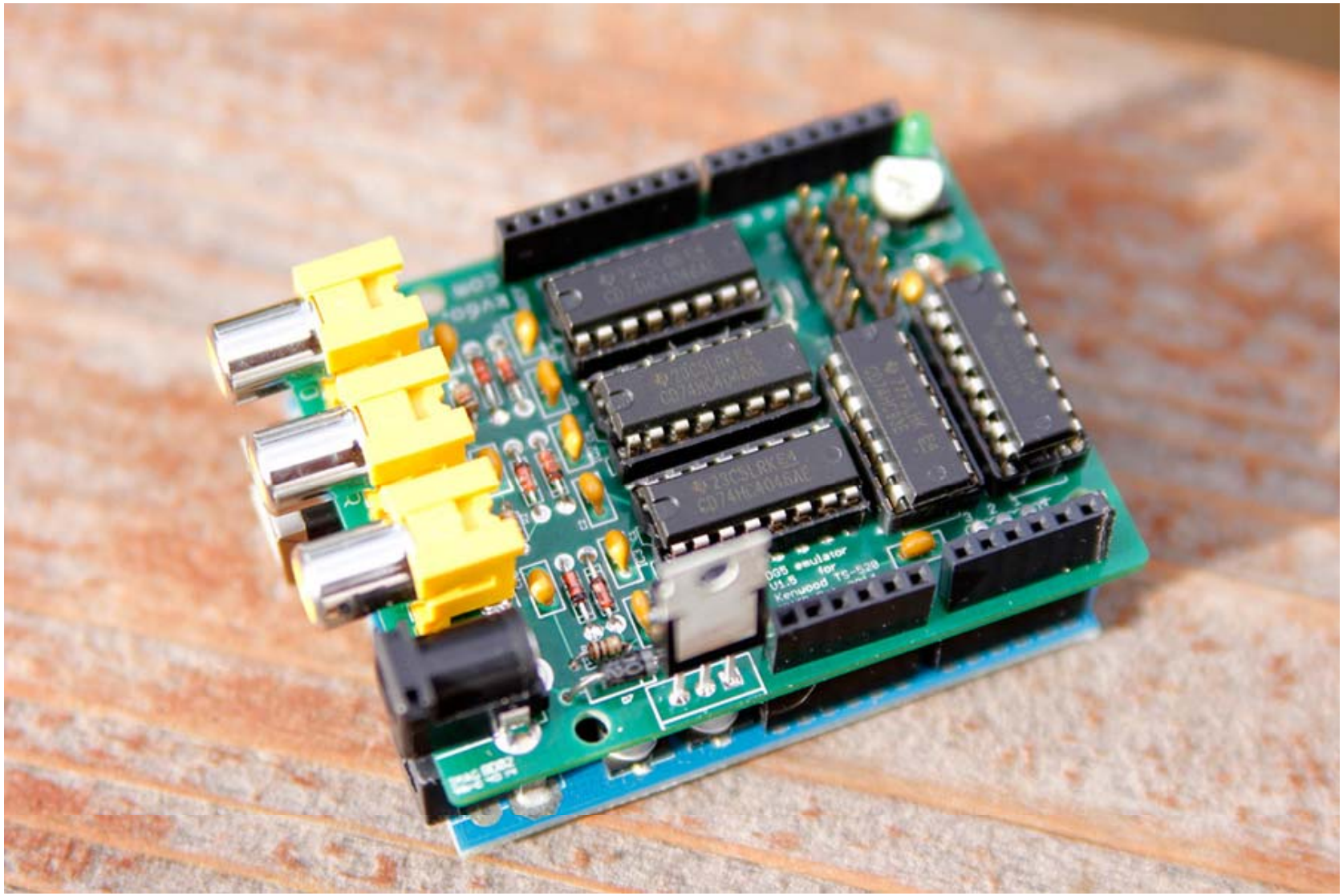


KENWOOD

DG5 Emulator By: KV6O

KENWOOD

DG5 Emulator By: KV6O



KENWOOD

KENWOOD

Questions & Answers