INTERNATIONAL RADIO, INC.

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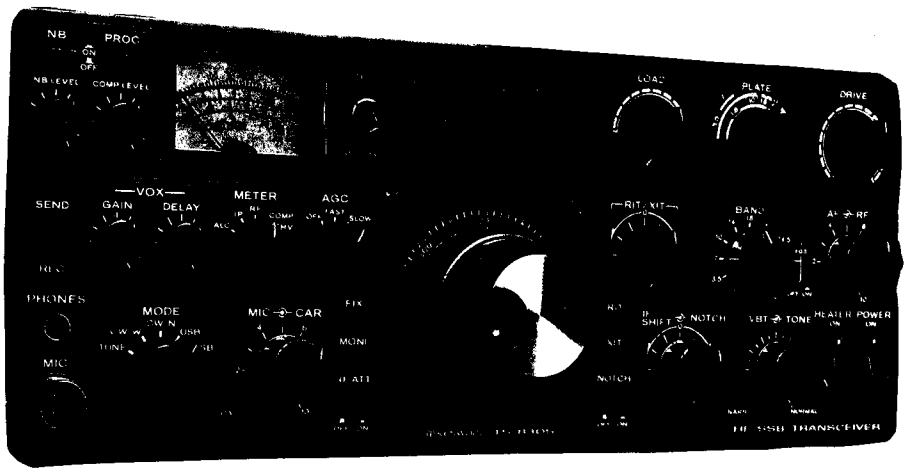
Trio•/Kenwood• TS-830S User's Supplement



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April, 1987

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THE USERS INTERNATIONAL RADIO CLUBS REVIEW THE TS-830S

The TS-830S weight is 29.8 lbs 7.6lbs less then the TS-820S, the dimentions are about the same, except for height the TS-830S is about 1/2"shorter. The maximum output power measured into a 50 ohm load and a Bird 43 wattmeter were as follows; 1.8 -125W, 3.8-145W, 7.3-140, 14.2-140W, 21.3-135W, 28.3-130W, 28.7-130, 29.2-130W, 29.7-130W. Output power was not measured on 10,18 or 24MHz bands as they were disabled,as supplied from Trio/Kenwood. However these bands can be enabled on transmit by a simple modification outlined in the ops manual. (final Bias in SSB was 60Ma.)Transmit frequency response was 400Hz to 2600Hz (-6db down) power output center frequency 1500KHz. A note within the manual states; During transmit you may occassionally hear a small popping sound or High Voltage arcing sound. this will be the 6146B power tubes and is considered normal. Final plate and load tuning should be completed within ten seconds. If more time is required return to receive for more than 20 seconds. (The 830 under test did arc a few times). The 830 covers the following frequencies 1.8-1.435/2.079MHz, 3.5-3.435/4.079MHz, 7-6.935/7.579, 10-9.935/10.579MHz, 14-13.935/14.579, 18-17.935/18.579, 24-24.435/25.079, 28-27.935/28.579, 28.5-28.435/29.079, 29-28.935/29.579, 29.5-29.435/30.079MHz. Note that you can listen to the high end of the broadcast band. Receive Sensitivity measured in SSB mode (10dB S/N) 1.8-.20uv, 3.8-.16uv, 7.3-.14, 14.2-.11, 18.1-.12, 21.3-.11, 24.5-.12, 28.2-.15, 28.7-.16, 29.2-.14, 29.7-.15uv. on 14.2MHz 60uv produced a S9 signal and 1.5uv S1. The noise floor was -136dBm.

Reviewing the front panel controls the RIT covers +2.1KHz and -1.9KHz, the XIT range is the same. A small LED light tells you when these functions are enabled. The plate tuning is vernier and has small markings for each band to help one find the approximate setting. The plate load does not have a vernier and is quite fast in tuning. As other Pi net circuits these controls interact and must be set carefully for maximum power output. The Drive control peaks both the receiver and transmitter simultaneously. The Notch filter performance was measured to be about 40db, this means a S9+40dB hetrodyne coule be reduced to approximately S9. The notch control pot. is very sensitive to adjustment and requires careful adjusing for maximum attenuation. The notch is a bridged T-filter type, a Q-multiplier circuit was added to increase the notch sharpness. The notch proved to be quite effective in reducing hetrodyne and interfering CW signals. A LED light above the digital readout tells you when this function is enabled. The IF shift works as usual and is also quite effective. The VBT (Varible Bandpass Tuning) control has a 21 position detent control, when the control is all the way Clockwise (normal) the bandpass is 2.4KHz, With the control set about the 12 o'clock position the bandpass was about 1.4KHz (6db) and 2.7KHz at 60db, at the full CCW position (narrow) the bandwidth was 600Hz at 6db and 2.0 at 60db at this narrow setting it was noted that the receiver gain dropped about one S unit. Using the notch, IF shift and VBT provides the operator with numerous aids to combat QRM. The examples given in the operators manual to use these controls are easily understood. The noise blanker was very effective eliminating ignition type noise pulses.

Tuning in a Loran signal on 1.9MHz which was producing an S-9 signal provided the following results; Setting the NB level fully CCW reduced the loran signal to S4, increasing the NB level fully CW reduced the signal to S-zero. However it was noted that if the NB level control was left in the FULL CW position strong stations operating nearby caused a buckshot type noise in the audio. Turning the NB level CCW or off eliminated the situation. The RF processor is of the Clipper variety and is very effective,all signal reports received indicated increased voice power with the processor on. The receiver RF attenuator reduces incoming signals by 20db. a small LED light comes on above the digital readout when this function is enabled. The AGC switch provides off, fast and slow control of the receive AGC. The main tuning control is smooth and one revolution provides about 25KHz change. The digital and analog readings tracked nicely. The VOX gain and delay are conveniently located on the front panel. The VOX ON switch is located on the VOX gain switch, turning the VOX gain switch full CCW turns the VOX off. The VOX circuitry is also used in the CW mode for semi-break in operation. The Monitor switch works the same as the 820 and allows the operator to hear his transmit audio. The Tone control allows the operator the convenience of adjusting the receive audio for a comfortable listening quality. The following controls are located on the rear of the 830; Final bias control, RF voltmeter gain control, Anit-VOX control, External speaker, EXT VFO connector (8-pin DIN plug), Transverter connector (8 Pin DIN plug), Remote connector (7 Pin DIN plug), TWO IF output jacks (Phono type), CW key connector, Final tube Screen Grid on/off switch, Antenna output connector (SO-239), AC line fuse (6-AMP), a TWO wire AC power line cord. A very

quiet exhaust fan to cool the finals, the fan is always on even with the front panel filament switch off. Other notes the microphone input impedance is 500 ohms to 50,000 ohms, the receive input power is 32 watts (filaments off) the transmitt power is 295 watts. The frequency stability after 1 minute warm up, was measured at -800 Hz after 1 hour. Please take note that the TS-830S is for 120VAC 60Hz (modifiable to 220VAC) ONLY. No provisions have been made for 12vdc operation! Also there are no phone patch in/out jacks as on the 820, however there are two spare holes for phono jacks and the operators manual provides information to wire them for phone patch operation. The 830 operators manual contains 36 pages and covers, Specifications, Installation, Controls and Functions, Operation, Optional Accessories, Maintenance and Alignment, Troubleshooting, Block Diagram and Internal views. The main schematic is very readable. I would also recommend purchasing the 63 page TS-830S Service Manual, it covers the 830S, VFO-230S, DS-2 (W type only),AT-230 and SP-230 accessories. This manual is available thru Trio/Kenwood Dealers or direct from the Distributor in Compton,CA. CONTINUED NEXT MONTH "WHATS INSIDE THE 830?"

DX'ers

WHATS INSIDE THE TS-830S!

All that is required to remove the 830 top cover is a phillips screwdriver. When all the screws are removed slide the top cover to the back. Once the cover is loose from the radio the speaker lead should be unplugged at the speaker and set it aside. The first item I noticed was felt tape around the sides of the cabinet and a rubber strip on the RF final amplifier top cover which are probably used to dampen any audio resonance that may occur from the built in speaker. This probably accounts for the high quality audio that is developed from the built in speaker. Your attention is then brought to a copper strap around a very husky power transformer and then to two well insulated electrolytic capacitors.

There are three large PC boards located on the top of the chassis.The Counter Unit (X54-1540-00) is located above the VFO and is connected to the rest of the radio with 5 white multi pin connectors.The heart of the display unit is a Toshiba TC5070P Large Scale Integrated (LSI) chip, it is a presettable 6 digit BCD counter which incorporates a 6 digit latch, 6-digit dynamic drive digital counter and seven segment decoder/driver. There are eight other IC's on this board which control and decode the TC5070P.

The second PC board is the RF-Unit(X44-1360-00)it has three ganged dual varible capacitors that are used for receiving and transmitting tuning. The capacitors are individually chain driven, and work very smoothly. This board is where the Auxillary band coil packs would be installed for the Aux band position. To add another band in the Aux band position, the RF board would have to be removed for the addition of the coil pack. This would also involve removing the chain link drives and the plate and load control capacitor shafts that run over the top of the board. The manual states that a coilpack (receiver front-end) and PLL components must be installed for the specific RECEIVE frequency range desired. This information is available from the manufactuer. The driver tube (12BY7A) is also located on this board. The third board is the IF Unit which is where the optional filters are installed. At this time please note that the instructions supplied in the operators manual page 24 are incorrect Step 3 should read...Remove the eight screws holding the IF unit (X48-1290-00) and maneuver the board to the left side of the radio(front panel facing you) and up. I had to remove a few of the small white multi pin connectors to actually get the board free enough to rotate it in position for the optional filter installation. you should carefully mark all the connectors you remove because although the PC board is marked with a circled number the connectors are not! This PC board has so many wires cabeled over the top that following the simple instruction in the manual is not possible! The optional filters come in two sizes the YK88C/CN are the same size as the installed YK88S filter and the YG-455C /CN filters are roughly twice the thickness of the YK88S and about 3/4" longer. The reason they are much larger is because they operate at a center frequency of 455KHz. The list price of the YK-88C or CN is $59.95 and the YG-455C or CN is $85.00 and $125.00 respectively. The following list might help you decide which filters to select.

Optional Filter(s) Installed	Total BandPass	Receiver Characteristics
None	2.4kHz	Same as SSB and wide CW. Variable bandwidth tuning (VBT) adjusts passband from 2.4kHz to 500Hz, retaining shape factor of built-in 2.4kHz filter in first (8.83MHz) IF and second (455kHz) IF.
YK-88C (500Hz) in 1st IF	500Hz	General Purpose CW filter. VBT not fully effective.
YK-88CN (270Hz) in 1st IF	270Hz	Narrow CW filter with general purpose shape factor. VBT not fully effective.
YG-455C (500Hz) in 2nd IF	500Hz	Very sharp CW filter. VBT not fully effective.
YG-455CN(250Hz) in 2nd IF	250Hz	Very sharp, very narrow CW filter. VBT not fully effective.
YK-88C and YG-455	500Hz	Excellent Selectivity and narrow bandpass. Maximum VBT flexibility which adjusts passband from 500Hz to 150Hz. Best overall combination.
YK-88C and YG-455CN (not reccommended)	250Hz	Excellent selectivity and narrow bandpass but VBT not flexible. (too narrow on one side of bandpass.)
YK-88CN and YG-455CN	250Hz	Optimum selectivity, most sharp and narrow bandpass, lowest noise floor, best dynamic range. However, greatest filter insertion loss and very little VBT range (adjusts no wider than 250Hz). Not good for contest operation or "tuning around" but excellent for high-speed CW schedules requiring narrowest, sharpest passband.

The front panel is plastic however behind the plastic there is steel. The 830 is well shielded even the S-meter has a steel cover around it. To remove the RF final amplifier cover, you must remove the bottom cover of the 830 and then all the screws holding the cover in place. The 830 uses Two General Electric 6146B/8298 tubes. A metalic spring material presses against the the metal base of the 6146's providing additional shielding. The final Pi-net is wound on a porcelain form with silver plated wire, the 10meter tank coil is of larger wire size. The final amplifier plate choke is also wound on a porcelain form. The fan assembly is located here, the rear shaft fan motor bearing is easisly accessible for lubrication as outlined in the manual, however lubricateing the front bearing will require removal of the fan finger guard.

The bottom of the 830 chassis contains Four PC boards. The audio AF Unit(X49-1140-00)board contains an intergrated circuit amplifier (HA1368R)which can supply about 1.5Watts of power to the built in speaker, enough audio to fill a large room. A 12volt and 9 volt regulator supply are also located on this board. The second PC board is the Phase Lock Loop(X50-1680-00) board, ciruitry on this board eliminates the need for hetrodyne crystals for each band. A Motorola MC4044P is used as a phase comparator in the PLL. There are six Voltage contolled oscillators(VCO) to cover all bands. The loop filter is made up of discreet components in an effort to minimize spurious radiation. The third PC board is the Rectifier Unit(X43-1370-00)located next to the power transformer and contains all of the high voltage rectifiers and tube bias components. The fourth PC board is the RF amplifier,Final Unit(X56-2773-03)and contains components for the final amplifier. The pins on the tube sockets are accessible for measurements. Other observations; The 830 VFO is the same VFO as in the TS-130S. The receiver RF amplifiers 3SK73 are a new release and are high gain low noise devices and look like a 4 pin mini dip IC. Their is plenty of room in the 830 for homebrew or commercial assemblies. The RF processor is of the Clipper variety and offers the most gain with the least amount of distortion. There are no provisons for FSK as in the 820 however AFSK is possible. There are no provisions for 12VDC operation in the American TS-830, However there is a 12vdc option available for the Japanesee 830 perhaps some enterprising indivdual might try wiring in the 820 DS-1 converter and rewire the filament section. The 830 has a convenient carrying handle and the opposite side has four rubber feet to protect the cabinet. The Notch filter is very sharp and sensitive to adjustment, additionally the notch can be set at the edge of desired passband to further sharpen the bandpass. The bottom line is that this is another fine Trio/Kenwood product which has the typical Hi-Fi type audio quality on both transmit and receive. This radio should provide many troublefree operating hours based upon our User's Questionaire.

TS-830S FILTER CASCADING

In My TS-830S, I'm using both the 8.3 MHz/500 Hz and the 455 KHz 250 Hz filters. If these are installed according to the manual (moving connector terminal on IF board to terminal CW-4) you will cascade both filters in the CW-N position of the mode switch and have no CW filter in the CW-W setting. I prefer to have the 500 Hz filter in the CW-W position.

SELECTIVITY FOR THE TS-830S (Part I)

This is part 1 of a series on upgrading the selectivity of the Kenwood TS-830S transceiver. This part provides a basic description of the 830 IF system, and its advantages and limitations. Later parts will describe and evaluate four alternatives to improve TS-830S SSB and CW selectivity.

The TS-830 represents an economical combination of some excellent features borrowed from earlier Kenwood rigs. The receiver is largely borrowed from the R-820. The level of selectivity, and the flexibility of control of that selectivity are among the best in the industry, and surely the best available in any rig selling for less than $1000 but can be even better. The 830 uses two SSB filters, one in the 8.83MHz first IF, and one in the 455kHz second IF. The two filters have the following characteristic according to Kenwood literature:

Filter type	8.83mHz Crystal	455kHZ Ceramic
6dB bandwidth	2.7kHz or more	2.7kHz or more
60dB bandwidth	5.0kHz or less	4.5kHz or less
80dB bandwidth	6.8kHz or less	---N/A---
Guaranteed attenuation	80dB or more	60dB or more

Kenwood specifies the rigs to have an IF bandpass of 2.4kHz at -6dB, and 3.6kHz at -60dB. Ultimate rejection is not specified, but should be below -100dB, considering that two filters with ultimate rejection totaling over 140dB are used (in-circuit rejection will never equal filter specifications because of leakage.) The IF shift control effectively moves the filters (both simultaneously) across the signal to move a nearby signal out of the passband. With the VBT in use the shape factor suffers because each skirt is formed by just one filter in the important -6 to -60 dB region. The VBT and IF shift can be used simultaneously.

The filtering system has several advantages, each with some limitations:

-0- With VBT not use the filters are superimposed, and provide steep skirts down to the ultimate rejection level. However, the passband is a bit wide at -6dB (>2.4kHz), and though respectable at -60dB (<3.6kHz) could stand improvement.

-0- With VBT in use during SSB operation, the -6dB passband is reduced markedly, and the passband at -60dB and below is reduced moderately. The shape factor thus suffers. Also, rejection of signals within a half kHz or so of the passband are not rejected so well because in this region there is essentially single-filter ultimate rejection instead of dual filter ultimate rejection.

-0- The VBT can be used to bring the passband down to 500 Hz (or less if the desired signal can accommodate some attenuation) for CW use. However, the shape factor becomes quite poor in this mode of operation, and the poorer rejection of signals within a kHz of the passband is a nuisance.

Though the two filters used in the rig do not have impressive specification, the performance of the rig is quite good, but it can be improved. Later parts of this series will explore the following modificiations (listed in order of increasing costs.)

1. Replace the 8.83MHz IF filter with a 2.1kHz 8 pole crystal filter.
2. Add a second (8 pole crystal - 2.1kHz) filter in cascade with the 8.83MHz filter (receive mode only).
3. Replace the 455kHz ceramic filter with a high quality 2.1kHz crystal filter, or cascade this filter with the ceramic filter.
4. Replace both standard filters with 2.1kHz 8 pole crystal filters.
5. Do some combination of 1, 2, and 3.

The performance and cost effectiveness of these options will be explored in the next several articles in this series. (Thanks, Harrison, KA2R)

TS-830S SELECTIVITY IMPROVEMENT - PART 2

This is Part 2 in a series. The first part appeared in the March, 82 newsletter, and provided a basic description of the 830 filtering system along with its advantages and limitations. This part describes selectivity improvement by straightforward replacement of both SSB IF filters with high quality, high performance 8 pole crystal filters. The two filters used for the upgrade were 2.1 kHz SSB filters with the following guaranteed specifications: 2100 Hz or more at -6 dB, 3700 Hz or less at -60 dB, ripple less than 2 dB, and insertion loss less than 6 dB. The interested reader should compare these specifications with the stock Kenwood filter specifications (see March, 82 newsletter). The replacement filters are 600 Hz narrower at the -6 dB point. The 8.83 MHz IF filter is 1300 Hz narrower at -60 dB which the 455 kHz filter is 800 Hz narrower at the -60 dB point. Note the 455 kHz F/T filter has guaranteed attenuation 20 dB greater than the stock ceramic filter it replaces.

First, the technical results. Measurements were made with a frequency counter (reading to 1 Hz) on EXT. VFO pin 1 (VFO frequency), and the S meter (calibrated by an attenuator pad in the signal generator line). Signal sources were a signal generator and the built-in calibrator. The passband readings before and after the filter changes are as follows:

Measurement	--1--	--2--	--3---	--4--	--5--	--6--	--7--
Filters	2x2.7	2x2.1	2x2.7	2x2.7	2x2.1	2x2.7	2x2.1
VBT Setting	Out	Out	1890(2)	500	500	300	300
Shape Factor	1.37	1.21	1.49	2.74	2.38	3.32	2.91
- 6dB BW	2420	1890	1892	478	481	318	341
-60dB BW	3305	2290	2814	1268	1143	1106	993
-80dB BW	3380	2450	3000	1540	1290	1395	1133
High side (1)	755	490	1490	2820	1810	2995	2000
Loss (3)	0	0	0	5	0	10dB	1dB

1. Distance (Hz) from USB upper -6dB point to point where audio from S-9+10dB carrier becomes inaudible (measure of close-in ultimate rejection, or 'shoulder' effect of VBT).
2. VBT set for about same bandwidth as 2x2.1 filters provide with VBT full clockwise.
3. Insertion loss due to use of VBT.

The total insertion loss of the replacement filters was no greater than that of the original filters. Precise ultimate rejection measurement was beyond the capabilities of my equipment, but the better rejection of the replacement 455 kHz filter was evident in listening tests ('shoulder' effect was reduced, particularly above USB signals, and below LSB signals).

The results of the measurements are pretty much self-explanatory. Several observations are:

1. The SSB bandpass has a much better shape factor, particularly when VBT is used to bring stock bandpass down to something comparable to that of the 2.1 kHz filters (compare columns 2 and 3).
2. The 300 Hz setting of the VBT with the original 2.7 kHz filters is not very useable due to the large insertion loss and very peaked passband.
3. The replacement filters have more squared-off passband corners making the narrower VBT settings useful for CW operation.
4. With the 2.1 kHz filters installed, the 500 Hz BW setting of the VBT actually provides a much better shape factor than the optional Kenwood 500 Hz 8.83 MHz CW filter, and approaches that of the Kenwood 500 Hz 455 kHz filter.

5. With the 2.1 kHz filters installed, and the VBT set for 300 Hz, selectivity approaches that of the optional Kenwood 250 Hz 8.83 MHz CW filter.
6. The 'shoulder'effect with VBT in use is significantly diminished. Note greater attenuation of close-in signals as shown by 'high side' attenuation observations.

Other less quantitative observations include the following:

1. Though not producing the 'Hi-Fi' audio quality the Kenwood is known for, the modified TS-830S produces quite acceptable communications quality audio as indicated by on-the-air tests.
2. The audio produced (receive and xmit) is much better than my 820 provided when equipped with a 1.8 kHz filter (in cascade with normal 2.4 kHz filter).
3. My on-the-air experience indicates the effectiveness against QRM is more dramatic than would be indicated by the bandpass tests above.
4. The adjustment of the USB and LSB carriers is quite critical with the 2.1 filters installed, and some adjustment may be necessary depending on the operator's voice characteristics and present carrier settings.
5. I find use of my MC-50 mic (instead of my Shure 444D) helps restore some of the lost 'Hi-Fi' quality (though the 444 and narrow bandpass are very effective in a competitive situation <pile-up>).
6. With the tighter bandpass of the 2.1 filters, the processor clipping level can be run a notch or two higher without excessive loss of audio quality.
7. I found the VBT and the original filters adequate only for casual CW operation. I installed a 250 Hz CW filter in the 455 kHz IF, and highly recommend it. However, I expect all but the most serious CW operator would find the two 2.1 kHz filters to provide adequate CW performance.
8. The steeper skirts make the IF Shift very effective. VBT use becomes necessary only when there is QRM on both sides of the desired signal.

I have found this modification to make 20 meters a more useable band than before. Adjusting to the modest loss of audio quality was not at all difficult. Any loss of audio quality was more than offset by improved QRM rejection. Transmit audio is affected as well as receive audio. However, the carrier frequencies can be adjusted for best audio quality (favor lows), best punch (favor highs), or a compromise.

I chose to examine the simple replacement of both original SSB filters before any of the other options listed in Part I of this series because I felt this option was likely to be the optimum modification considering ease of installation, cost, and performance. Only with two matched filters will the VBT be fully effective. The excellent ultimate rejection characteristics and steep skirts down to and beyond the 80 dB points of the 2.1 kHz filters will only be realized if these filters are installed where the circuit leakage past the filters is minimized. This will only be achieved if the filters are located in the filter positions provided by Kenwood.

Installation of the filters is straightforward. The new filters are larger than the originals, but there is plenty of room above the IF board in the TS-830S for them. Some double-stick tape, 8" of mini coax, and four .01 caps are all that are required (aside from the two filters). The mounting locations and other details are included in a detailed set of instructions, sketches, etc. available from the club.* The instructions detail the trimming of the carrier oscillator to optimize performance with the narrower filters installed (a simple adjustment - does not even require removing TS-830S case).

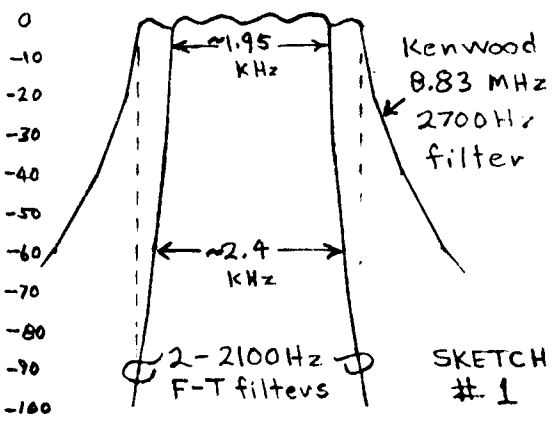
TS-830S SELECTIVITY IMPROVEMENT - PART 3

This is part 3 in a series exploring alternatives for improving the selectivity of the TS-830S transceiver. Though the results presented here are derived from experiments using a TS-830S, the results are equally applicable to the R-820 receiver and the new TS-930S transceiver. The first two parts in this series (see March and April newsletters) apply also to the R-820 and TS-930S. This part presents results of some experiments with cascading of SSB filters in the 8.83 MHz and 455 kHz IF's.

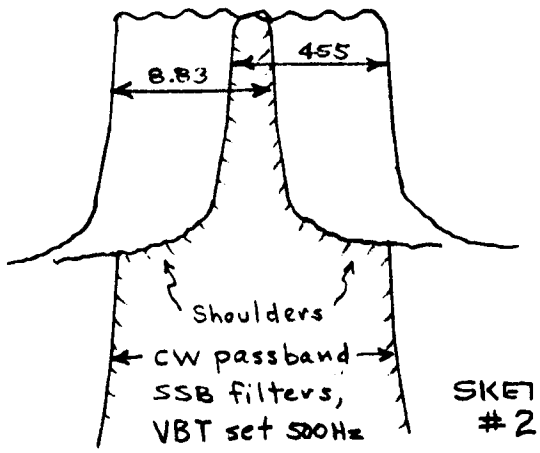
It would be possible, and perhaps practical, to cascade the existing filters with similar units from Kenwood. There would be a noticeable improvement in performance. In particular, the VBT would be more effective. However, to significantly improve selectivity, narrower filters with improved shape factor must be used. Hence, the question is, is cascading worthwhile when applying high performance filters such as those tested in Part II of this series.

For some months now I have been using the TS-830S with two Fox-Tango 2100 Hz IF filters installed. I have been very pleased with performance of the receiver. I did not apply one of the optional installation approaches that leave the original Kenwood SSB filters operational in the transmit mode, so I have also been transmitting through the narrower passband. The only comment critical of my transmitted audio occurred before I properly set the carrier oscillators to match the new bandpass. All reports since that time indicate at least "good" audio quality.

Since performance was so good, I felt no need to look at cascading. However, to be sure I wasn't missing a bet, I recently put the original SSB filters back in the circuit in cascade with the F-T SSB filters. There was no noticeable or measurable improvement. The reason is clear when one considers that with the two F-T filters installed, the bandpass is just over 2400 Hz wide at -60db. The original Kenwood SSB filters are greater than 2700 Hz at -6db! Hence any narrowing of the passband that they provide occurs somewhere below -80db (sketch #1), and is just not detectable. Also, they contribute to passband ripple, and any amplifiers added to compensate for the loss they introduce are going to contribute to receiver noise.



SKETCH #1



SKETCH #2

I had hoped that the cascading would help reduce the "shoulder" effect (sketch #2) that occurs when the VBT is used to bring the passband down into the CW range (300 to 500 Hz). I now understand this problem better, and can see why cascading does not extend the improvement provided by the F-T filters (the F-T filters eliminate one shoulder, but leave the other). The problem is due to circuit board leakage around the 8.83 MHz filter, and lack of stopband attenuation in the 455 kHz ceramic filter. The F-T 455 kHz crystal filter solves the problem in the 455 kHz IF, but the F-T 8.83 MHz filter cannot reduce board leakage in the 8.83 MHz IF (the 8.83 MHz shoulder attenuation is limited to about 80db by this leakage).

Based on the above, it is my opinion that cascading the original Kenwood filters with the Fox Tango 2100 Hz SSB filters is not worthwhile. The best overall performance results when the Kenwood filters are simply replaced by the narrower and better shape factor F-T filters.

Harrison Clark, KA2R

TS-830S SELECTIVITY IMPROVEMENT - PART 4

This is the fourth segment in a series exploring alternatives for improving the selectivity of the Kenwood TS-830S transceiver. The results apply equally to the R-820, TS-830S, and TS-930S since all use basically the same IF filter system. This segment presents results of some experiments exploring the replacement of just one or the other of the two IF filters in the TS-830S. See March, April, and September 1982 newsletters for parts 1, 2, and 3 respectively.

The two replacement filters used in the experiment were the Fox Tango 2100 Hz filter for the 8.83 MHz IF (#2809/YF88H2.1), and the Fox Tango 2100 Hz filter for the 455 kHz IF (#2809R/YF455H2.1). These are both conventional design 8 pole discrete-crystal filters. As supplied by Kenwood, the TS-830S has a monolythic crystal filter in the 8.83 MHz IF, and a ceramic filter in the 455 kHz IF. The advertised characteristics of the Fox Tango and Kenwood filters were presented in parts 1 and 2 of this series.

The first trial consisted of replacement of just the 8.83 MHz IF filter. The result was a shape factor reduction from 1.37 to 1.33. The -6db passband was reduced from 2420 Hz to 2030 Hz. The VBT still works, but behaves more like the IF Shift control until it is in about 3 detent postions. Since the VBT is 'lopsided' the IF Shift has to be used to compensate for this effect (unless the QRM is on the side that is first affected by the lopsided VBT action). Because ultimate rejection in the 8.83 MHz IF is limited by leakage on the IF board, changing the 8.83 MHz filter does not improve stopband attenuation. However, this leakage problem is only detectabe when the VBT is in use, and is most troublesome when the SSB filters (and VBT) are used for CW operation.

The second trial consisted of replacement of just the 455 kHz IF filter. The result was a shape factor of 1.30, and a -6db passband of 2090 Hz. The VBT action is the same as described above. Because the stopband attenuation of the 455 kHz IF is limited by the ceramic filter in the stock TS-830S, replacing this filter with the crystal unit does increase stopband attenuation in the rig. However, when the VBT is in use, the close-in stopband attenuation ('shoulder effect') is improved on only one side of the passband. This filter gives slightly better audio quality than the 8.83 mHz filter because of its wider -6db passband.

Due to manufacturing tolerances, the observed results will not be exactly the same from rig to rig when the above changes are made. However, it is my conclusion from the above outlined experiments that those not wishing to install both filters, but wanting improved selectivity, should consider the lower cost 8.83 MHz filter. It does not perform as well as the 455 kHz filter, but has to be considered a "best buy" on a cost-benefit basis.

Though not a "best buy", the 455 kHz filter does have some advantages over the 8.83 MHz filter if only one filter is to be changed. However, since the price of this filter alone is close to the price of a 2 filter kit, those owners considering installation of the 455 kHz filter should also consider installing both filters. I strongly recommend paying the difference and getting both filters. The combination of the two filters provides performance and operating enjoyment that far exceeds that provided by changing just one filter or the other (my tests and observations on performance of the TS-830S with both filters replaced by 2100 Hz units was presented in the April newsletter). (Thanks, Harrison Clark, KA2R)

TS-830S DIGITAL HOLD (DH) SWITCH WIDE/NARROW SSB MODIFICATION

The Users International Radio Club is pleased to announce, a new TS-830S modification kit Model DH 830. This modification kit will allow 830 users that already installed Kenwood CW filters the opportunity to add a matched pair of SSB 2.1kHz Fox-Tango filters, that can be switched in or out, using the front panel Digital Hold switch. During transmit, regardless of what selectivity you choose, the original Kenwood SSB filters, will be switched back in automatically.

This modification requires no removal of existing filters,adjusting or re-alingmnet of your radio for installation.
After modification your 830 will become more effective handling QRM, this is because of the improved selectivity. You will also notice that the the VBT and IF shift controls will become much more effective.
(See UIRC Kenwood Newsletter #22,23,24,etc.)

The Model DH-830 includes, Two Prewired and tested UIRC PC boards, interfaced to a matched set of 2.1kHz filters, and complete instructions. Plus shipping and handling USA-$5.00; CAN & MEX-$10.00; Elsewhere $13.00. The UIRC PC boards may be purchased separately if you already have the filters. The Model DH-830K is priced at $33.0 plus shipping & handling. USA-$5.00; CAN & MEX-$10.00; Elsewhere-$13.00. The DH-82-30K includes two prewired and tested PC boards and instructions.

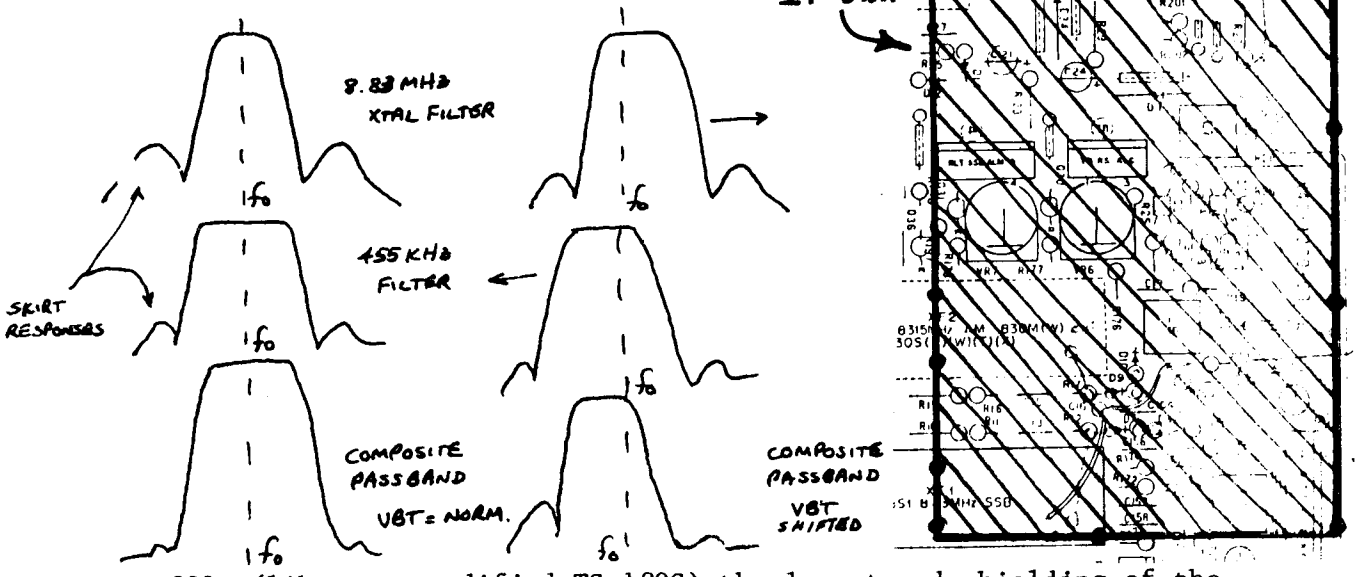
SKIRT SELECTIVITY MODIFICATION FOR THE TS-830S

Although I dearly loved my two TS-180S transceivers, I became convinced of the superior features in the TS-830S when I tested one for front-end performance (as good as the TS-180S with N6BV mods). The availability of cascaded CW filters (2-500 Hz filters with some VBT are outstanding), the vastly superior speech processor, and the improved transmit audio (more on this later) finally convinced me to spring for two TS-830S transceivers for my own. I sorely miss the instant band changing solid-state final of the TS-180S, but have learned to live with this "backward step" in technology.

Two aspects of the TS-830S bothered me: first, the skirt selectivity on SSB with VBT anywhere but fully clockwise ("normal") was definitely inferior (same problem as unmodified TS-180S), and secondly, the AGC was very rough, yielding poor-sounding receive audio on strong signals as compared to the TS-180S.

I. Skirt Selectivity Problem: When the VBT control is set at "normal" (fully clockwise) the passband of the 8.83MHz first IF crystal filter and the 455KHz second IF filter are aligned in cascade. Any deficiencies in skirt selectivity of either filter is masked by the rejection of the other filter.

However if the VBT control is used to narrow the receive passband, the the passbands of the 8.83MHz and 455KHz filters are essentially moved in opposite directions. The "nose" passband is where the responses of the two filters overlap, but the composite skirt selectivity now becomes a function of the skirt selectivity of one filter for higher frequencies and the other filter for lower frequencies removed from the center "nose" response.



In the TS-830S (like an unmodified TS-180S) the layout and shielding of the first 8.83MHz crystal filter is poor enough that skirt selectivity of the fitter is seriously compromised beyond about 50db down. This can be verified quite easily by taking the second filter out of the circuit by bridging a .01 microfarad capacitor across the 455KHz SSB filter and tuning across the calibrator signal.

The skirt selectivity is quite poor, it will be found, and a close examination of the PC layout in this area will reveal why: the input and output of the 8.83MHz filter are within one inch of each other! Connector IF01 (1) (IF Output 1), L3 and L4, and the filter output terminals are right next to each other, in fact, with only a thin ground PC land separating them.

Incidentally, when I first bought a TS-830S I put it side by side with a TS-180S (with N6BV mods) and compared them "A-B" with instantaneous switching capability. With VBT at "normal" I was impressed with the sound of the new rig: it sounded more natural. Now, the TS-180S I was comparing with had the optional second 8.83MHz SSB filter, rated at 2.4KHz bandwidth (like the TS-830S specs), however the TS-830S has a wider frequency response. I measured the 6db audio response of the TS-180S as 1.9KHz, and the TS-830S (VBT max clockwise: normal) at 2.4KHz. It turns out that the TS-180S SSB filter is rated at 2.4KHz bandwidth at 6db down, and the TS-830S SSB filters are rated at 2.7KHz bandwidth at 6db down.

The composite passband of two cascaded TS-180S filters is narrowed to 1.9KHz, while the TS-830S composite passband is wider because the filters are both wider. When I tried to use the VBT control on the TS-830S to narrow down the passband in heavy QRM I discovered the skirt selectivity deficiencies. In transmit, with a wider audio passband, the TS-830S consistently received more favorable audio quality reports (processor on or off) than the TS-180S.

The solution to the compromised filter skirt selectivity problem in the TS-830S is very similar to that for the TS-180S: a small copper shield is added under the IF PCB to shield the 8.83MHz filter output. Bypass capacitor C17 (center tap bypass for L6) is moved and its leads are shortened. (This capacitor and its placement under the PCB by Kenwood looks to me to be a half-hearted attempt to help the filter blow-by problem by finding a "magic" ground point at the filter.) C17 is grounded to the one of the grounds of the coil L6 can. The copper flashing shield covers the output of XF1, XF2 (if added) optional CW filter all the way to the input of the optional 455KHz CW filter. The ground land at the rear of the board (next to label "X48-1290-00") is scraped and tinned to ground the bent-down edges of new shield. See drawing.

Skirt selectivity of the 8.83MHz SSB filter is dramatically improved with the addition of this shield, and the VBT now works properly. The 455KHz SSB filter doesn't appear to need further shielding.

Since adding the shield covers up access to the areas where optional filters are added, obviously it is a good idea to mount optional filters before the shield is added! **(THANKS R. DEAN STRAW, N6BV)**

USER'S REVIEW OF A TS-830 DH KIT

Thought I would drop you a note on the UIRC TS-830S DH switch Wide/Narrow SSB mod. Since I just put the mod in yesterday, I haven't had much operating practice. Tried it out today and it got the baptism of fire on 20 meters with QRM. The SM220 scope looked like a corn field on the Pan-display, a corn field overgrown with weeds! It was jammed. Since the UIRC DH Kit allowed me to easily switch from the Kenwood stock filters to the Fox Tango filters, a pretty good comparison is in order. There is absolutely no doubt the Fox Tango filters are superior. I have no other filters except the original T/K, no CW options and don't plan on it now as the Fox Tango filters really do a super job on CW and there ultimate rejection makes a big difference. Do a lot of RTTY and they will pay off there, I know.

Also have a TS-180S with both T/K optional filters. Before the mod on the 830 it was really a tossup between the 180 and the 830. Because of the better ultimate rejection of the 180, it was often better, even without the VBT, now the 830 wins EVERY TIME. (Thanks to Donald C. Bennett, WB4ONI)

HE LIKES THE DH-830 FILTER SWITCHING KIT

Just a note to let you know I received the DH 830 Kit. Guess the holiday workload with Parcel Post caused a slight delay. Installed the kit and am very pleased with the results. Really handles 20m QRM. Certainly improves VBT and I/F shift. (Thanks, Dick, KC1A)

TS-830S 250Hz FILTER REVIEW

I have been using this filter for 10 months now, and marvel at its performance every time I put the mode switch in CW. I find it is ideal for today's crowded bands. The filter in-circuit performance appears to be very close to the advertised specifications (250Hz at 6 dB, 500 Hz at 60 dB, 800 Hz at 80 dB, ultimate rejection over 80 dB.) There appears to be no circuit leakage in the TS-830S 455kHz I-F to degrade filter performance. I have used 250Hz filters in other rigs, but none compare with this setup. The filter has only a trace of the usual "hollow" sound characteristic of such filters, and the insertion loss relative to the SSB filter is negligible. Frequency stability in my 830 is more than adequate for use of a 250 Hz filter. However, the RIT does come in handy to keep the other fellow's signal in the passband if he is drifting more than a few Hz, and to find a station answering your CQ just off your frequency.

VBT is not useful with just a single filter installed, but the bandpass is so narrow that touch of the I-F Shift control is all that I have ever needed to separate two signals. The skirts are so steep that an interfering equal strength signal just 50 Hz from the desired signal can be eliminated! Two 500 Hz filters (one in each I-F) can be set to less than 250 Hz using VBT, but do not provide nearly the shape factor (i.e., steep skirts) that this filter does, and are thus not nearly as effective when so used. I considered adding the 270 Hz 8.83 MHz I-F filter to further improve selectivity, and make the VBT effective. However, I really didn't need more selectivity, and felt that ringing ("hollow" sound) might be objectionable with two very narrow filters. The 250 Hz filter and light touch on the tuning knob are ideal for scanning a crowded band. When things are not so crowded, I shift to SSB with VBT set for 500 to 1000 Hz to find a clear spot or a desired station, then shift back to CW (and 250Hz). At just over $100.00, I feel the single 250 Hz filter in the 455kHz I-F offers exceptional value to the CW operator. (Thanks to Harrison, KA2R)

USE CW FILTER ON RTTY WITH TS-830's

1. Buy a small SPDT switch from Radio Shack which will fit the hole in the rear panel.
2. Remove the top cover.
3. On the I.F. board, locate diodes D-46 and D-47. (They activate the SSB filters in receive.)
4. Remove the screws holding the IF board down, and tilt it up just like you did when you put in the CW filters. Unsolder Diodes D-46 and D-47 anodes. (Be careful.)
5. Wire the center of the new switch to punching CW1.
6. Wire one side of the switch to the twisted leads of diodes D-46 and D-47. Insulate this connection when you are done.
7. Wire the other side of the switch through a diode (anode to switch) to CW-2, CW-3 or CW-4 for the filter combination you have on your rig.
8. Now in LSB, if you put the switch one way, you have SSB filtgers, and the other way, you have CW filters.
9. To operate normal SSB, the switch must be in the SSB position or the CW filter will be active on SSB.
10. Transmit not affected as it is activated through Diodes D-56 and D-57.
11. To speed up the fan, take off the bottom cover and move the red wire from 100V punching on power transformer to 120V punching.

(Thanks, Walt Amos, K8CV)

TS-830/530S/130 CB BAND COVERAGE

To listen to the CB Band simply disconnect wire going to Pin 2 marked C on the PLL board. This board is located under the top cabinet cover. A small switch to break this circuit will provide the extra coverage.

When the 29 MHz band is selected and the .5MHz switch is depressed, the coverage will be 27.5-28.0 MHz; with the .5MHz switch out, coverage will be 27.0-27.5MHz.

When the 28MHz band is selected and the .5MHz switch is in, coverage will be 26.5-27.00MHz.

Other bands may be experimented with by disconnecting similar wires on the PLL board. Let's hear what other coverage can be obtained. This info is also applicable to the TS-530S and TS-130. (Thanks, Bruce Hitner)

HOW ABOUT A TRANSVERTER FOR YOUR TS-830S

Yaesu Manufactures a transverter for VHF and UHF bands that interfaces very easily to the Kenwood TS-830S. The transverter matches the appearance and size of the Kenwood line very well. The unit comes equipped standaed with a 2 meter transverter module. One may optionally add 6 meter and 70 cm. plug-in's. Therefore, one can cover all of 6 meters, all of 2 meters and 430-440 mhz with one "box". Yaesu was very clever in their switching arrangement. Built in repeater offsets of +/- 1 Mhz. or +/- 600 Khz. are provided for 6 meter and 2 meter repeater operations (if an FM tranceiver is used) Also one may connect an external receiver to the transverter to allow full duplex (cross band) operation for satellite access. One may select: 2 meters up,10 meters down (straight thru);

2 meters up, 70 cm. down;

70 cm. up, 2 meters down (needs minor mod for Phase III)

RF power output is 10-12 watts rated at 50% duty cycle.

The following describes how to connect a Yaesu FTV-901R transverter to the Kenwood TS-830S transceiver. No modifications to the 830 or the 901 are required for basic operation. Two cables need to be made:

1) Main cable - from 830S to/from Xverter
2) External receiver cable - required only if full duplex satellite operations are desired

Note that it is imperative to use good quality shielded cable for this hookup. Also be extremely careful not to short out any pins on the 830S Xverter plug to ground. It is a very crowded situation when wiring this plug.

Cable1:

TS-830S Xverter plug (8 pin DIN)		FTV-901R		
Function	Pin #	Connector	Pin #	Function
Ground	1,3,shell	J2	shell	RFout ground
		J4	shell	RFin ground
		J5	shell	ACC ground
XMIT(+12v)	2	J5	3	+12v. on XMIT
XVERTER on	4 (ground to pin 3)	N C on transverter		
RF input	5	J2	center	RF output
RF output	7	J4	center	RF input

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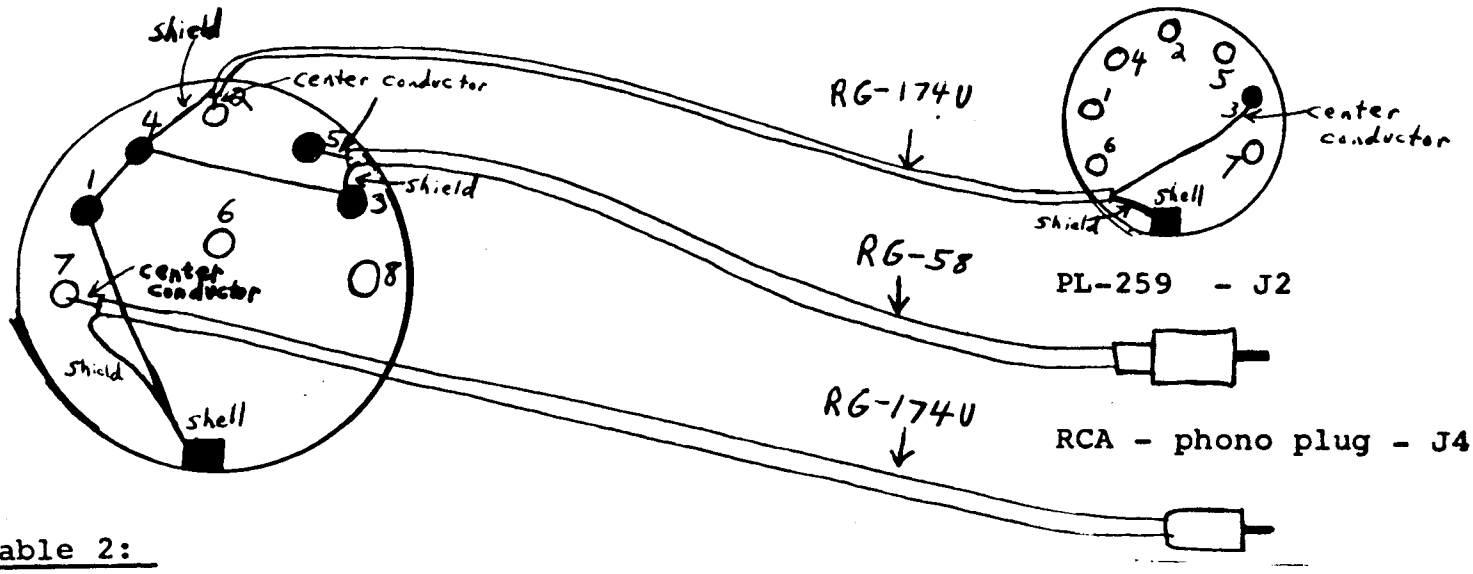
TS-830S Xverter Connection

Back view - 8 pin DIN plug

FTV-901R - plug connections

Back view - 7 pin DIN plug-J5



Cable 2:

FTV-901R

J3 - RCA phono plug

External Receiver

Antenna connector (PL-259)

or

Auxilliary Rx input

For my external receiver. I am using the Kenwood Ts-430S transceiver. I chose to go into the Xverter plug on the 430 to protect the xverter in case I accidently hit the XMIT switch on the 430. * Connecting the 430 as shown below will disable the RF power output from the 430. If one wants this always enabled, simple do not connect pin #4 on the Xverter plug.

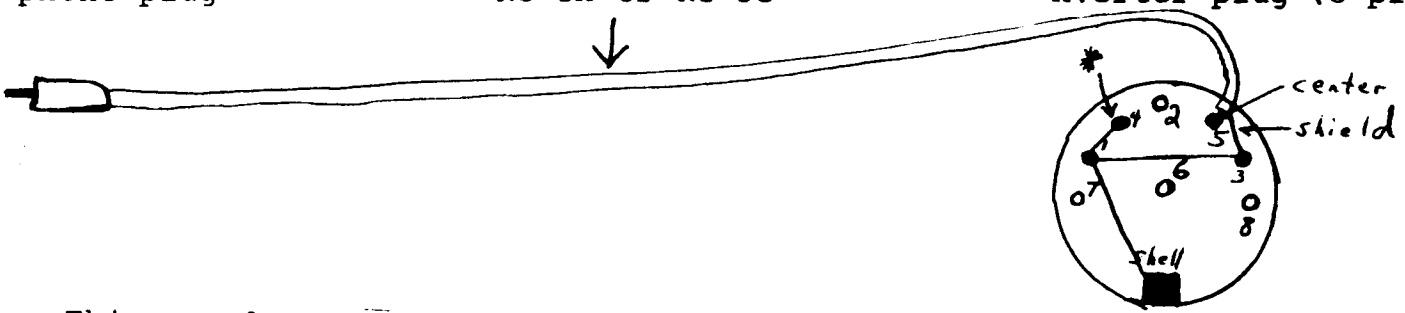
J3

RCA phono plug

RG-8X or RG-58

TS-430S

Xverter plug (8 pin



This completes the interface. Again it is very important that one doesn't short any pins. I accidently shorted pin 2 on the 830S Xverter plug to ground. this burned out Q17 on the AF board in the 830. That transistor controls the main T/R relay. If this happens

almost any PNP switching transistor will do the job. Just make sure that MAX IC is more than 200 ma. and arrange the leads correctly. Leads for that transistor are (e,c,b) when looking at the flat side.

Other Kenwood can be interfaced to the Yaesu transverter. For instance, the 430S can be interfaced but one must modify the Xverter ALC amplifier circuit to reduce the attenuation. The 430 doesn't put out as much RF at the Xverter port as does the 830. The Xverter needs about 3 volts RMS (unmodified) to be driven.

Yaesu also makes other versions of this Xverter - FTV-107R,FTV-707R (maybe others?) . These are slightly different in their input circuits and T/R switching arrangement. Simple mods to these are required to make them function with the Kenwood line. Also these units do not match the appearance of the Kenwood line as well as the 901R does. Good luck - I'll see you on 2 meters M.S.

P.S. A simple mod is required to the Xverter to make it uplink on the correct portion of 70 cm. for phase III oscar. This will be described in the near future.

N1BQF -
Jeff Moore

TS-830 FAN MOD

Since I do a lot of listening with my tube heater switch in the OFF position, I couldn't see having the cooling fan running for no reason, so I cut the wire coming from the 100V tap on the transformer to the fan. I found that only one side of the heater switch is being used so I ran the 100V wire to the switch, and a wire from the switch to the fan, so now the fan only runs when the heater switch is in the "ON" position. I also wired in a red (very small) LED to the heater switch and mounted this in the front panel just to the right of the "AF/RF" lettering on the panel, which lights up when in "ON" position.
Kenwood says it's OK to run the right with the fan shut off. The fan mod could also be used on other rigs like 520, 530, etc. (Thanks, Bob, WB1ENL)

TS-830S 16.6 KHZ RIT/XIT MOD

Changes RIT to +2.1kHz and -12.5 kHz range.

1. Remove top and bottom covers.
2. Install 160 ohm 1/4 watt resistor in parallel with R17 (6.8K) which is located at the rear of the RIT-XIT control potentiometer.
3 Remove screws from AF Board. Install a 2.7K 1/4 watt resistor in parallel with R87 (10K). This can be done by using the unused hole in C.B. marked TPG, push resistor lead thru C.B. foil and solder. Reinstall board. Now solder other lead of resistor to the rear terminal of VR2.
4. Recalibration - With RIT turned OFF, using the analog scale, set VFO to the center of any band (250 kHz). Adjust VR2 until digital display also reads 250 kHz. You'll now find that the RIT-O is now located at 3 o'clock position (on the + side). RIT will now be +2.1 kHz and -12.5 kHz. I could not get the + and - kHz spread to be equal, nor the RIT center back to -0-. If anybody can improve on this, I would like to hear about it. Thank you. (Thanks, WB1ENL, 533 Lombard St., New Haven, CT 06513)

TS-830S FINAL-AMPLIFIER CURRENT MONITORING

The reason for monitoring individual tube currents of paralleled tube final amplifiers is to ensure that one tube is not loafing and the other doing all the work. Parallel-tube final amplifiers should have near equal (with 10%) currents flowing through them at all times. All the transceivers I've owned have not provided a means of ensuring this was happening. The manufacturer simply specified that the tubes should be balanced and connected in parallel, and provided a means for monitoring the total cathode current drawn by both tubes. The TS-830S is no exception. After many months of hard use, I noticed the power output of the rig had decreased, and cathode current readings (Ip on the meter) led me to believe one of the tubes was "goofing off." Investigation proved this to be true and prompted me to alter the cathode current monitoring circuit.

Remove the top and bottom covers of the tranceiver, the final-amplifier cage cover and the two final-amplifier tubes. Turn the rig upside down. Remove the blue wire to the pin labeled DRV (driver input), and also remove the seven screws securing the final-amplifier pc board to the stand-offs. Invert the board; locate R4, R5, R6 and J2. Using a low-wattage iron (25 W) and wicking material, remove those components.

On the foil side of the board, solder R4 and R5 between V2 pin 2 foil and the ground foil. (one resistor lead may be placed into the hole previously occupied by J2.) Solder a length of wire to V2 pin 4 and another wire to the V1 pin 1 foil at the hole vacated by R6. Solder the short end of R6 to the IPM ("plate" current meter) foil. Replace the final-amplifier pc board, securing it with six screws; do not replace the screw near the J1/L2/R8 foil yet. Resolder the blue wire to the DRV pin. Mount a small, four-lug (three-isolated, one ground) terminal strip to the pc board at the mounting hole near the J1/L2/R8 foil; wue a lockwasher beneath the screw head.

Wire the circuit as shown in Fig. 1 S1 is a miniature spdt toggle switch (Radio Shack 275-613) mounted in one of the pre-punched 1/4-in. (mm = in. x 25.4) holes on the rear panel. Route the wires from the terminal strip across the rear of the chassis and up through the clearance hole behind the PLL unit board. Use of two or three tie wraps will make the installation of the wires neat in appearance. Before replacing the covers, make certain you know which position of the switch is used for which tube, and label the switch. You'll now be able to spot easily any imbalance between the tubes and to take corrective measures early. (Thank you Paul K. Pagel, N1FB, ARRL Hq.)

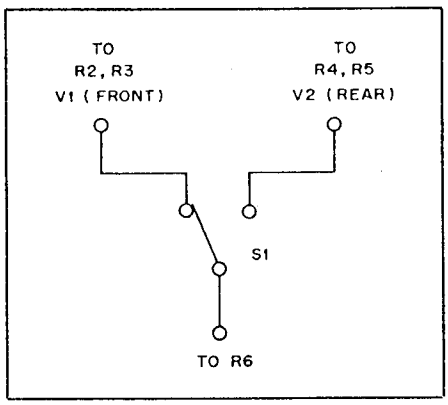


Fig. 1 — Current in each final-amplifier tube of the Kenwood TS-830S can be monitored by installing the switching arrangement shown here. Paul K. Pagel, N1FB, *QST* New Products editor, suggested this modification. It permits the operator to observe any tube imbalance.

RFSK RTTY CONNECTIONS FOR TS-830

Recently I modified my TS-830S to interface with my RTTY equipment. It may be of use to some of your readers. Keep up the good work!!!
With the addition of a shielded lead from Pin 1 on the MIC jack (front panel) to Pin 7 on the remote jack (rear panel), a single cable can connect the '830 to a RTTY interface. This includes audio (In and Out), PTT and relay contacts. If a liner is used, relay contacts may be routed to a rear panel "RCA" Phone jack. (Thanks, Don Bowman, K1FEV)

PROTECTING TS-930/830 FRONT END

During my 1985 pilgrimage to the Dayton Hamvention, I heard a lot of operators (primarily contest types) singing the blues over having wiped out the front ends of their receivers due to excessive RF being radiated from another nearby transmitter. This is often the case when you operate several stations from the same physical location (such as a field Day set-up or during a multi-operator multi-transmitter contest effort). The receive antennas are often very close to the transmit antennas for another band and they pick up so much directly radiated RF that the resulting voltage is more than your front end can

PROTECTING TS-930/830 FRONT END (Continued from Pg. 15)

stand so it rolls over and plays dead.

It would be nice if all of our receivers could switch their receive antennas to ground whenever another nearby station was transmitting but that would make receiving rather difficult at best. However, there is another way which is proving to be quite effective. That way is to install a passive limiter across the RX ANT input line so that whenever an excessively high level of RF is present the RX ANT, the limiter will function to prevent the high RF level from reaching your front end. As a result of having developed a solid state 1500W QSK system for any QSK transceiver-non-QSK amp. combination, Design Electronics Ohio (DEO), 4925 South Hamilton Road, Groveport, OH 43125, (614) 836-3929, has developed a passive receiver front end protector called the Receiver Guard 2000.

The Receiver Guard 2000 circuitry, while simplicity in itself (why didn't I think of it then), does just what it is designed to do. RF passes through a "fusible link" consisting of a low voltage (hence low impedance) panel lamp and is coupled through low impedance to back-to-back diodes to ground and through another low impedance to its output. Under normal conditions, the RF passes directly from INPUT to OUTPUT (since the diodes don't see enough RF voltage to turn on). However, when an excessive RF level appears on the RX ANT line, the diodes conduct and shunt the high RF level to ground through the fusible link. Extremely high RF inputs may cause the fusible link to open up (rather than blowing the front end). Fusible links are #12 lamps and available from DEO or through your local parts house. The Receiver Guard 2000 is available in three configurations:

1. In a cast aluminum box with two UHF (SO-239) connectors.
2. In a cast aluminum box with two BNC connectors.
3. Uncased (PC board and guts only - SPECIAL ORDER ONLY).

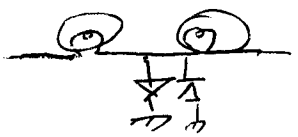
The first two options are, of course, designed for mounting external to the receiver-transceiver and in the case of your TS-930/830, can be neatly installed by making use of the XVTR DIN jack on the rear of the transceiver (Pin 8 = INPUT and Pin 2 = Output). This jack (when the matching plug is used) will permit the RX ant. line to be opened and the protector to be automatically installed in the line when the DIN plug is inserted into the jack. Conversely, the RX ant. line will be automatically closed when the DIN plug is removed (therefore you can remove the Receiver Guard 2000 and still have your rig operate normally without ANY rewiring). You can also change the fusible link by opening the die cast box and replacing the plug-in lamp.

The third option (uncased PC board) can be installed permanently inside your TS-930S (maybe your '830 too) in the trough on the bottom-rear end of the chassis. All you need to do is break the main RX ANT line coming from the XVTR switch (mounted ON the XVTR DIN jack) and insert the PC board (INPUT (A) pad to the switch, OUTPUT (B) pad to the receiver, GROUND to chassis ground). While I like this installation better than an "external" type, it will require you to open the rig up to change the fusible link if it opens up.

An "internal" installation may not be for everyone, BUT an installation of this protection in some form will help to ensure that your receiver is still there at the end of the day.

NOTE: Be sure to install ANY front end protector AHEAD of any other electronics in the receiver line (pream, etc.) to ensure that everything is protected. Having your receiver's front end go south at the wrong time will make you wish you had installed some means of protection BEFORE you had to replace other not so easily replaced components.

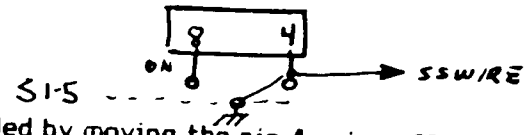
(Thanks, Tom Hammond, NOSS



TS-830S TV-506 INTERFACE MOD

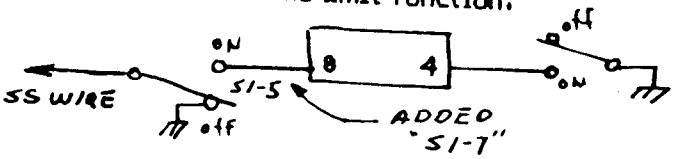
I'm informing you of the adaptation of the TV-506 6m xvrtr to the TS-830S. I have found your basic instructions for the 502S to be directly applicable, including the AVR board TX mod, which is exactly identical to the 502S's AVR board. The additional mod I had to perform involved the unused portion of the 506's on-off switch. Unlike the 502S, there is no provision for the grounding of pin 4 in the 506 when the unit is turned on. This is necessary to shut down the screens in the 830S. In fact, pin 4 is shorted to ground when the 506 is off!! Also, when the 506 is on, pins 4 and 8are interconnected; pin 8 is the + 12V on Xmit terminal:

Before:



There is no "S 1-7", it is added by moving the pin 4 wire off of the SS terminal on the AVR board, adding a short piece of wire to extend the pin 4 wire to the wafer on-off switch. Use the closest SPDT tabs to the front and side panels (they are fully isolated). Ground the wiper tab. Connect the pin 4 wire to the "on" tab to ground it when unit is on. Meanwhile, S 1-5 is left to handle the xmit function:

After:



Bingo!! It works fine! I am presently waiting for the 12-pin plug from Kenwood to prepare the patch cable to slave the 506 to the 502S. The cable will be the same as the main cable less the screen voltage feed and return lines (not used). (Thanks, Steve, KE1K)

TS-830S PROBLEM

I have a TS-830 which up to recently has been tops. Recently, however, it has developed a bug in the band-switch. The switch requires "juggling" the knob slightly off the detent on 3.5 and 28 MHz to operate. (In other words, to get any output without advancing the carrier control away up in the tune position, or any output at all in the operate position.) Once "juggled" it works fine. Have you had other queries re this problem? I hesitate to dig into the switch. I am still in a state of shock after taking off the covers and examining the switch assembly. (Thanks, Syd Sheard, VE3BCL) ED Note - we wrote Syd, mentioning that this is not a typical TS-830S problem. We indicated his problem would either be a poor solder connection on the band switch PC board or a defective switch contact. Anyone else have any suggestions? N8RT Rob.

A NEED FOR FSK IN THE TS-830S

If the current or back issues do not contain any information of modification for the TS-830S for FSK, do you think any of the consultants might help? The factory will not address the question, saying to use AFSK. (Thanks, D. L. McMullon, K0DM)

TS-830S/TS-930S NOTCH FINE TUNE

Would you like a REAL DEEP notch on your TS-830S/930S, then read on! Both the TS-830S and the TS-930S Notch filter can be optimized to at least an 80 dB notch (two times specifications). To make the adjustments a very stable RF signal source will be required (or another transmitter into a dummy load could be used as an RF source). Allow plenty of time for your RF signal source to stabilize. Use SSB mode and any band, on the TS-830S/TS-930S.

Adjust the Signal source to provide approximately a 20-25 dB over S9 on the S-meter. Follow the simple procedure outlined in your TS-830S Operators Manual and adjust the two controls until the S-meter nulls to S-Zero. Keep adjusting one, then the other, until you achieve the lowest S-meter reading S-Zero. (If the meter changes by itself, your RF source is probably drifting.)

On the TS-930S, adjust L167 and VR28 on the Signal Unit for S-Zero. That's it!! Enjoy a Super Notch Filter Second to NONE!!! (Thanks, UIRC Labs)

TS-830S RECEIVER IMPROVEMENTS

SSE Super Selectivity kit, two matched sets, 2.1kHz 8 pole crystal filters (8.8MHz and 455kHz), all parts and instructions (see T/K Newsletter 22 and 23 for details) $150.00....1.5 Hrs. labor (UIRC price $187.50). After installation, many users have commented that the CW mode was so much better that there was no need to purchase separate CW filters!!

As above, but allows you to use the Digital Hold switch (after modification) to switch between original Kenwood filters and the new ones installed. No reason to remove original Kenwood filters. Transmissions are always through the Kenwood filters to maintain good transmit audio quality. No adjustments are required to the 830 with this modification. Complete kit, including two crystal filters, printed circuit board and instructions. DH-830 kit $180.00....1.5 hours labor (UIRC price $217.50). PC Board and instructions only $30.00...1.5 hours labor ($67.50).

CW Super Selectivity Kit, two matched sets, 400Hz 8 pole crystal filters (8.8MHz and 455kHz), all parts and instructions. This modification will provide the 830 with ultimate CW selectivity, the VBT and IF shift will become more effective. $150.00...1.5 hours labor (UIRC price $187.50).

DFC-230 TS-830S MEMORY HOLD

If you apply 12-14 volts DC to Pin 8, then DFC-230 will hold memory. I applied 12-14 VDC to pin 8, but TS-830 digital display remained lit up! If you unhook the wire on Pin 8, you will solve this problem, and hold memory.

I imagine this information is also applicable to the TS-120.130 and TS-530. On the 120/130, you would leave the power supply turned on, memory will hold. The 120 will require the mod listed in the owners manual.

I rigged up two external cables so I can change from the TS-120 to the TS-830 without reaching behind the rig. I made the mod on my cable and not in the DFC-230 or 830. But could be done in either by adding a couple of wires with the appropriate male female plugs, could be hooked up to run external 12V to memory or through rig.

I am using an old 12v battery charger at the present time, but any 12v adapter with 400MA capacity would work. This is needed to supply DFC-230 lights on display. DFC-230 needs 13.8VDC at 380MA (from transceiver or external and 13.8VDC at 10MA) which equal 390MA. Radio Shack has a 12VDC 500MA Adapter Model 273-1652 for $9.95 which would do the job very nicely.

This modification has certainly provided me with a lot more operating versatility. I hope other Club Members will enjoy it too. (Thanks, Marv Lowman, WB8NQB)

A NEW CW SCHEME FOR TS-830 USERS.

I feel that one 270Hz and one 500Hz filter should NEVER be purchased or VBT will not function as it should. Two 270Hz filters should be purchased instead. Heres why, I usually use one 270Hz filter but when the CW copy gets difficult (QRM) I switch in the second 270Hz filter. Heres how I did it; The DH (digital hold switch) is generally a useless switch for most users, totally so for people like myself having a remote VFO. The switch is a DPDT switch that can be modified to fit the users needs. My use was in having the CW selectivity of the receiver further selectable. The two wires to the DH switch were simply removed and left permanently open.(Insulate ends with tape).

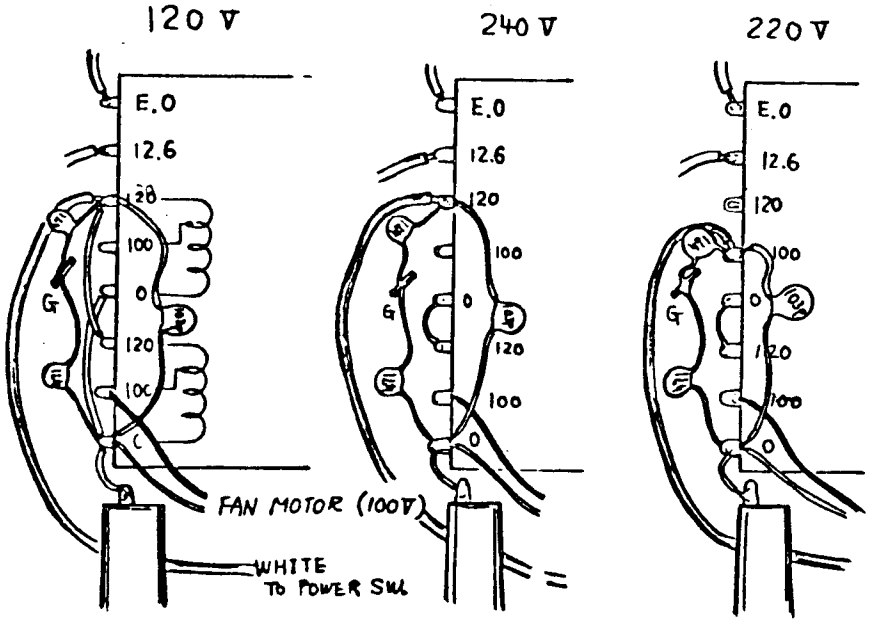
I have both 270Hz CW filters installed. The modification allows selection of just the 8.830.7 filter or the 8.8 and 455kHz filters together.(The single 8.8 270Hz filter provides 1100Hz bandwidth at 60dB, both filters provide better than 480Hz bandwidth at 60dB). I find that in most cases the single 8.8 270Hz filter is very adequate! But when the QRM gets heavy I can switch in the 455kHz 270Hz filter with the DH switch and continue my contacts by optimizing selectivity. The wide CW mode is fine for tuning and no QRM contacts, while the narrow CW is better for QSO's in QRM or contest work. The SSB filters of course are still there for the rare CW contact using this very wide bandwidth. The VBT is only fully operatioal with both CW or both SSB filters in use.

The wiring changes are simple! Just wire the DH switch to allow for switching of the connector wire from the CW2 terminal or the CW4 terminal. The Manual plus added CW filter info shows the action of the CW2/CW4 selection(described above). Since this mod only requires one pole of the DH switch, something similar could be done fo SSB if more Narrow filters become available. Again I'd recommend both 270Hz filters, with the above modification, to anyone considering adding CW filters to the 830 rather than the 500Hz filters. (Thanks to Wm. Hohnstein, K0HA)

TS-830S OPERATION ON 240V AC

To operate the Ts-830S on 240V AC, the power transformer split primaries must be rewired from parrallel to series connection.

1. Unplug the AC power cable.
2. Remove the bottom cover.
3. Remove the jumper wires between the two ⌀ terminals and two 120 terminals on the bottom of the power transformer.
4 Connect the adjacent 120 and ⌀ terminals at the middle of the transformer. This will provide 240V AC operation.
5. Change the Ac fuse from 6A to 4A. Tag the power cord at the back of the radio to indicate that the transformer is strapped for 240V AC, and the power fuse should be 4A, and not 6A.
6. Replace the bottom cover and reconnect power to verify your work.



TS-830S NOISE BLANKER OPTIONAL IMPROVEMENTS

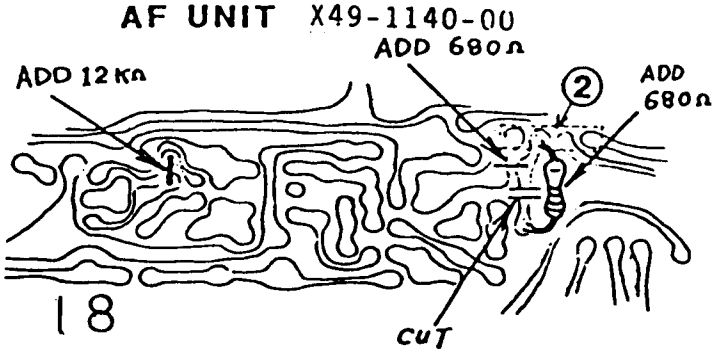
Receiver Cross-modulation while using the noise blanker may be improved by these optional component changes and additions. Realignment is not required.

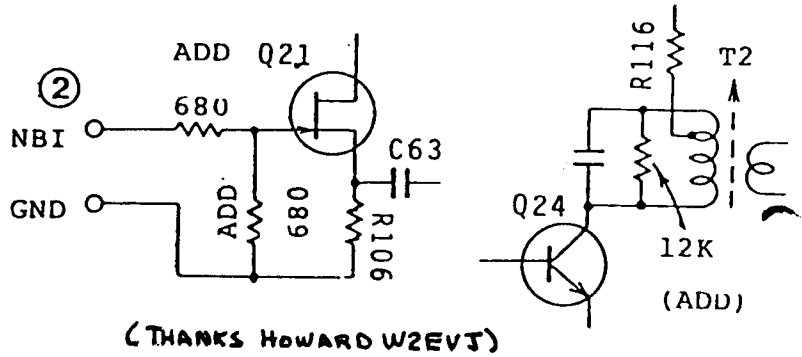
At the noise blanker level control VR8, change R19 from 22ohm to 15 ohm (RD14BB2E150J).

On the AF AVR unit X49-1140-00 (vicinity of Q20) change: D22 from an MV-13 to an MV-203 (V11-3379-16) R96 from 2.2kohm to 820ohm (RD14CB2E821J) (vicinity of Q24)

R112 from 47Kohm to 56Kohm (RD14CB2E563J): Across T2, (fig. 1) add a 12Kohm (RD14CB2E123J): At Q21 (fig. 2,3) add 2 pcs. 680ohm (RD14CB2E681J)

NOTE: 1. Applies to any unit before serial: 2010000, 1120950, 1112058.
2. These changes may be performed at the owners option and may not be performed in-warranty.





(THANKS HOWARD W2EVJ)

TS-830S OPERATION WITH TV-502/S and TV-506

The TS-830S was not designed to operate with the older TV-502S and TV-506 series transverters. These units require -100V DC to operate the protection, ALC and FET bias circuits. The TS-830S has the -100V supply, but no direct connection to the X-verter port. This can be provided through an added RCA connector in one of the predrilled holes on the TS-830S rear panel.

The transverter will require a minor modification to the TX changeover circuit. Originally supplied to transmit when open-circuited, the TX line must be inverted to transmit only when powered from the transceiver.

Connectors

TS-830S X-verter 8 pin DIN part#E07-0851-05
TV-502/S, TV-506 X-verter 12 pin part# E09-1271-05
You may either modify the original cable supplied with the X-verter, or fabricate a completely new cable using the connectors listed.

Connector pin-outs

TS-830S

Pin 7. Output: TX drive, approx 0.7V across 75ohm.
1. O/P: TX drive ground.
4. Input: Screen grids OFF when grounded at X-verter ON..
2. O/P: 12.5V DC in TX.
5. I/P: RX ANT into the TS-830S. At X-verter ON, RX I/P. At X-verter OFF, HF ANT must be bridged from pin 8.
8. O/P: HF Ant through-connection. At X-verter OFF, must connect to pin 5. At X-verter On, no connection.
3. O/P: HF ANT ground.
6. I/P: ALC input to the X-cvr from the X-vrtr.

Metal Shell: Common ground.
Switch functions are automatic when the X-verter plug is installed.

TV-502/S

Pin 1. O/P: ALC to the Xcvr
2. No connection.
3. I/P: Xcvr screen grid voltage, NOT USED.
4. O/P: Ground at X-vrtr ON, opened at X-verter OFF.
5. I/P: -100V DC 5ma bias.
6. O/P: At X-vrtr OFF, HF Ant through-connection from pin 7, At X-vrtr ON, X-vrtr O/P to X-cvr RX I/P
7. I/P: HF Ant from the X-cvr.
8. I/P: Standard - Must be grounded to RX, opened to TX.
   Modified - Opened to RX, +12.5V DC to TX.
9. I/P: Ground.
10. O/P: X-cvr final screen grid return, NOT USED.
11. I/P: Ground.
12. I/P: Ground.

Modifications

TS-830S

-100V DC must be supplied to pin 5 on the X-verter connector. Install an RCA jack in one of the predrilled holes on the X-cvr rear panel. Connect the center conductor to the Rectifier unit X43-1370-00, -C line. Use and RCA plug to deliver this voltage to the X-vrtr cable, or directly to pin 5 on the X-verter.

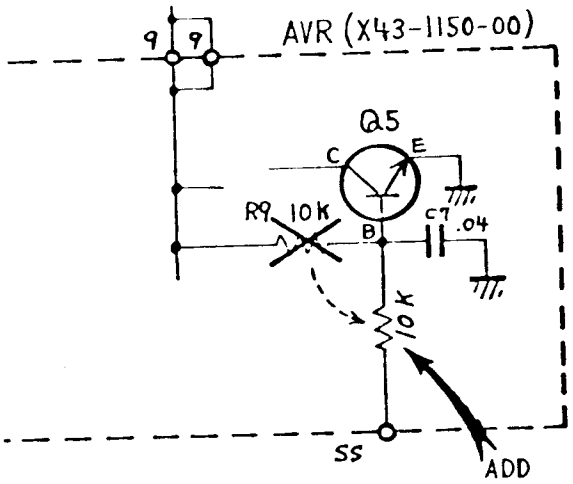
TV-502/S, TV-506

TX relay control, pin 8 on the X-vrtr connector must be grounded to RX, and opened to TX. The TS-830S X-vrtr connector pin 2 supplies just the opposite, 0V in RX, 12.5V DC in TX. Modify the X-verter AVR unit X43-1150-00 at Q8 as shown on the accompanying schematic to reverse this function. Break the 9V DC line by removing R9. Reinstall R9 in the SS line (from X-vrtr pin 8).

Interconnection

TS-830S to TV-502/S, TV-506

Pin 7	TX I/P jack signal
1	TX I/P jack ground
4	4
5	6
8	7
3	11,12
6	1
2	8
Metal Shell to 9	



Alignment, X-verter

The X-verter ALC and Protection circuits may need "touch-up" alignment. Refer to the X-verter Service Manual for alignment information. (Thanks Trio/Kenwood Inc.)

MISSING PHONE PATCH JACKS ON TS-830S By Harrison Clark, KA2R

I needed an additional mic input connection to the TS-830, and found that either the IF IN or IF OUT jack could be readily used for this purpose. I disconnected the IF coax lead (inner conductor only) from one of the jacks, and put an RG-174 coax line from that jack to the input of Q19 on the IF unit (X48-1290-00). I located the attenuator resistors (see manual page 25) on the IF unit board (foil side), though I would locate them at the jack on the back panel if I were going to do the job again. This would make installation less tedious, and allow easier changing of the attenuation if necessary. By the way, my manual calls out Q32 as the input point for the phone patch. The correct transistor is

TS-830S FREQUENCY JUMP AND UNSTABLE FREQUENCY READOUT

If you are experiencing frequency jump and unstable readout on your TS-830S, try this; Tighten all of the screws holding the AF-AVR Unit (X49-1140-00) These screws also provide grounds to the PC Board VIA metal spacers, tightening the screws provide a better ground. The problem has not occured on my 830 again. (Thanks Stu Mount K2OA)

TS-830S INSTALLATION OF A PHONE PATCH

Kenwood TS830S owners wishing to install phone patch in their units should be aware of the following: Instructions relative to the installation of a phone patch input as shown on pg. 25 of the Kenwood instruction manual furnished with the TS830S are in error. The manual calls for the installation of a fixed divider at the input of Q32 on the IF board X48-1290-00. The transistor should be identified as Q19 and the 100K and 10K resistors installed as shown, at it's input. (Thanks to J. Neuner W3AGT)

TS-830S LOW S-METER READING ON 10 METERS

If your TS830S S-meter reads low on 10 meters, see pg. 42 of the manual and check coil L9 to be sure it is peaked for maximum. (Kenwood Net)

TS830 - INCREASE VOX DELAY

Remove C48 and parallel with C49. Add 10mfd. where C48 was. This will allow longer time delay. (Ron KA1FPW)

TS-520/S/SE, TS-820/S, TS-830S, TS-530S, HEAVY DUTY TUBE REPLACEMENT

RCA or GE Type 6293 tube is a direct replacement for the 6146 tube pin for pin. No neutralizing should be required. This tube is a very heavy duty replacement and is normally used in pulse radar applications and has a hard instead of soft glass envelope. (Thanks Gene WD4MAE)

ENABLE WARC IN TS-130/530/830

Many requests have been made for details of allowing the following models to transmit on the new proposed amateur frequencies. With 10MHz allocation fast approaching the following information is applicable.

	TS-130	TS-830	TS-530
10MHz	D8	D4	D4
18MHz	D9	D5	D5
24.5MHz	D10	D6	D6
Board No.	X44-1380-00	X44-1360-00	X44-1360-00

* For individual bands cut or remove diodes on RF unit.

TS-830S LOW VOLTAGE SUPPLY OPTIONAL IMPROVEMENTS

Power supply drift and stability may be improved by these optional component changes and additions.

On the AF AVR unit X49-1140-00 (vicinity of Q27-Q30), change: R124 from 10k ohm to 1.5k ohm (RD14CB2E152J).* R127 from 470 ohm to 390 ohm (RD14CB2E391J).* R130 from 47k ohm to 33k ohm (RD14CB2E333J).# D25 from WZ-061 to XZ-053 (VII-4101-60).*

*This will improve temperature drift from a maximum of about 100mV to a maximum of 10mV, and may be applied to any unit before serial #201XXXX.

Add two 22k ohm 1/4W resistors (RD14CB2E223J), one each across Q33 and Q34, collector to emitter.#

#This will improve overall stability and may be applied to any unit before serial #105XXXX.

NOTE: These changes are at the owner's option and may not be performed in-warranty. (Thanks, Trio/Kenwood Communication, Inc.)

MICROPHONE ATTENUATOR FOR THE TS-830S

The Kenwood TS-830S Manual (Page 5 and Fig. 2-1) advises installation of a microphone attenuator if you find a MIC gain setting of less than about 12:00 o'clock necessary. I added the attenuator, and, in fact, reduced the shunt resistor and increased the series resistor to more than double the attenuation, but found that my MIC gain setting for full ALC was only increased from about 9:00 to 10:00. However, the move turned out to be very beneficial. After adding the attenuation, the MIC gain control was not nearly so 'touchy'. Originally it took a careful touch to set the MIC gain. Now, any setting between about 9:45 and 10:15 puts the ALC up where it belongs. (Thanks, Harrison Clark, KA2R)

TS-830S AGC FIX

As stated in a previous article in the January, 83 T/K Newsletter covering Skirt Selectivity mods for the TS-830S, when I first got the unit, I compared it with my TS-180S, and by and large was considerably impressed with the '830. However, I did find that the AGC action for strong signals was very rough, yielding poor sounding audio whenever the S-Meter indicated over S9.

Now, so far as good sounding audio goes, the TS-180S is a tough act to follow, because the '180 is a very smooth machine. The attack characteristics are short, with no terrible "thump" at the start of a transmission, and the audio level rises very little from the threshold of AGC action up to the level where signals pin the S-meter.

A stock TS-830S has a decent enough AGC attack characteristic with no bad initial "thump", but the audio quality is raspy and rather unpleasant for strong signals. In fact, the audio for such signals sounds as though they were all using just a bit too much speech processing....some were, of course, but not everybody abuses their speech processors!!

In the process of ferreting out the causes for this problem, I found that apparently Kenwood has been fooling with the circuit for some time now! I have identified at least three different factory mods in the AGC circuity, depending on the age of the unit. There may be more, but I have identified three. Those of you who choose to modify their own rigs should carefully inspect them. Don't trust the operator's manual because it may or may not reflect the level of modifications actually in your radio.

The basic problem in the TS-830S AGC circuitry (as compared to the TS-180S) is that the amount of filtering of audio components that appear on the AGC bus is insufficient to prevent what is called "inverse modulation".

In this phenomenon, low frequency Intermodulation Distortion products inherent in any peak envelope detector, such as the AGC detector, are not bypassed enough on the AGC bus. For example, if at some instant in time the SSB signal happens to contain just two tones at 1000 Hz and 1200 Hz (these are the signal frequencies that appear after they are product-detected), the envelope detector will not only generate a D.C. signal proportional to the peak envelope level, but will also create the sum and difference frequencies of 2200 Hz and 200 Hz (as well as a host of other combinations).

Let us assume that the amount of capacitance on the AC bus is sufficient to bypass the higher frequency components but not the lower ones. The 200 Hz second order IMD product will thus try to "inverse modulate" the incoming signal by means of the AGC bus. That is, the IMD products will try to remodulate the incoming signal. The upshot of all this is that the signal that hits the linear product detector will contain IMD products, and will sound distorted.

In our simplistic case above the third order IMD products will appear at 800 and 1400 Hz, and the second order IMD products will appear at 800 and 1400 Hz, and the second order IMD products will be at 200 and 2200 Hz.

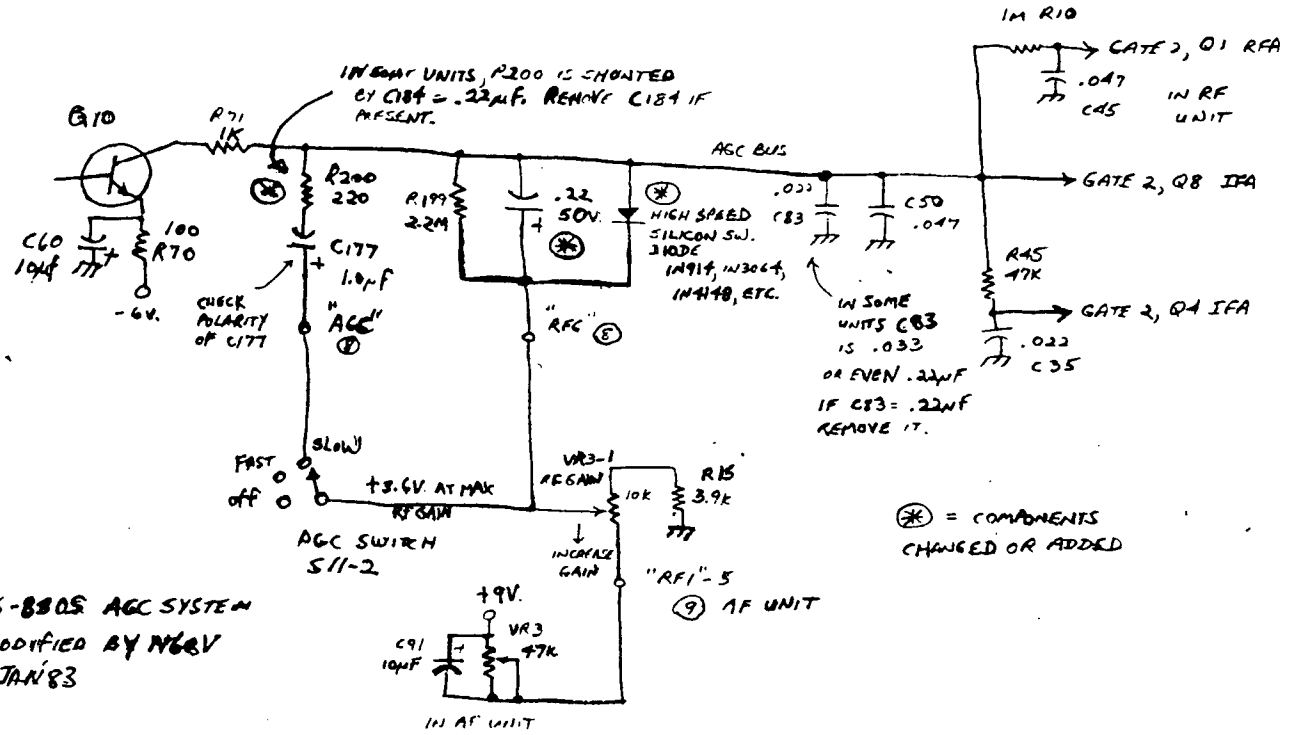
The solution for this problem is to increase the amount of bypassing on the AGC line, in a manner that doesn't materially goof up the time constants chosen either for attack or decay characteristic. In the '830 the attack time constants are carefully staggered for each stage where AGC is applied, in order to prevent AGC loop instability. Such instability can occur on the edges of the passband of very steep skirted filters, where the phase delay through the filter becomes quite unpredictable.

The AGC voltage for the RF Amplifier (Q1 on the RF UNIT) is delayed in time by the series 1 megohm resistor R12 and shunt 0.047 microfarad capacitor C45, with a time constant of 47 msec. AGC to the 455kHz IF amplifier Q4 is delayed in time by the 47k ohm resistor R45 and the .022 microfarad capacitor C35 for a time constant of 1 msec. As stated before, these machinations are necessary to prevent the AGC servo loop from becoming unstable under strong signal conditions off frequency on the passband edges. Adding enough capacity to the AGC line to prevent inverse modulation doesn't thus really foul up the attack characteristics compared to the other time constants that get into the act. The addition of .22 microfarads to the AGC line has been found sufficient to make the inverse modulation problem quite manageable, while at the same time making the "fast" AGC time constant more acceptable for both CW and SSB operation, at least to my ears. The series 10 kohm resistor R200 on the IF UNIT is meant to prevent the 1.0 microfarad "slow" AGC capacitor C177 from charging up too fast on noise pulses and thereby hanging up the AGC. It was found necessary to lower the value of this resistor all the way to 220 ohms to get rid of the residual amount of inverse modulation IMD apparent when critically listening to the '830 compared to the '180. The hang up problem from noise pulses is not objectionable with this value for R200.

Another irritant found the in stock '830 is the way the RF GAIN pot operates. When the gain is manually reduced with the RF GAIN control the S-meter moves quickly upscale and when rotation of the control is stopped, the meter will continue to drift slowly upwards for several seconds. This is caused by the fact that the AGC capacitors are being discharged by the RF GAIN control through the 2.2 megohm R199 resistor. This minor irritant can be fixed easily by putting a high speed silicon switching diode across R199. Some versions of the TS-830S had a .22 microfarad capacitor C184 across R200, apparently in an attempt to get a dual time constant for the attack characteristics. Some units had a .22 microfarad capacitor for C83; some had a .022 microfarad capacitor for C83, and others had a .033 microfarad capacitor for C83!

I have found that either a .22 or a .033 microfarad capacitor for C83 will work just fine. However, if a .22 microfarad capacitor is at C83, it should be removed. (It may be used to go across R199, along with the silicon switching diode.) If C84 (.22 microfarad) is in your radio, you should remove it. Check also to see the C177 is polarized properly in your radio. Some versions of the schematic show C177 backwards.

See the following schematic, where added components are marked with an asterisk to flag them. The proper values for the other components that should be checked are labelled on this schematic also. All changes are on the IF UNIT in one small area.
I think you will be pleased with the audio quality of your TS-830S with this very simple modification.
(A note on the previous article on skirt selectivity modifications in the Jan. 83 TK Newsletter: the labels for the "455kHz" and "8.83 MHz" filter responses in the drawing were accidentally reversed. Also, the "composite passband" drawing should be centered around the "fo" dotted line.) Thanks to N6BV

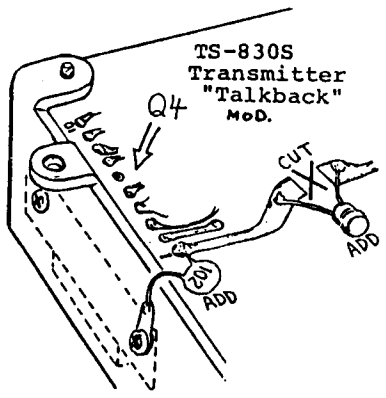


TS-830 FLUCTUATION IN OUTPUT POWER

My TS-830S was showing slight fluctuation in output power. Problem was traced to antenna coax connector retaining nut being loose. This nut was further found to be stripped. Problem was solved by installation of a better quality retaining nut. (ED NOTE: We have seen this happen on a number of Kenwood transceivers, particularly if you do a lot of connecting and unconnecting of antenna.) (Thanks, Curt Bowles, VE3ZN)

TS-830S TRANSMITTER TALKBACK

Transmitter "talkback", either with or without a linear amplifier, may be eliminated by adding a filter at the receiver audio power amplifier. On the AF unit X49-1140-00 at Q4, cut the 12V DC B+ line between R47 and C28, and add a 1uh choke (L40-1092-02) in-line. Add a .01uF cap. (C52-1710-36) from the IC pin 1 to ground, as shown using a 3mm lug (E23-0015-04) under the IC mounting screws on the heat sink.
(Thanks Trio/Kenwood)



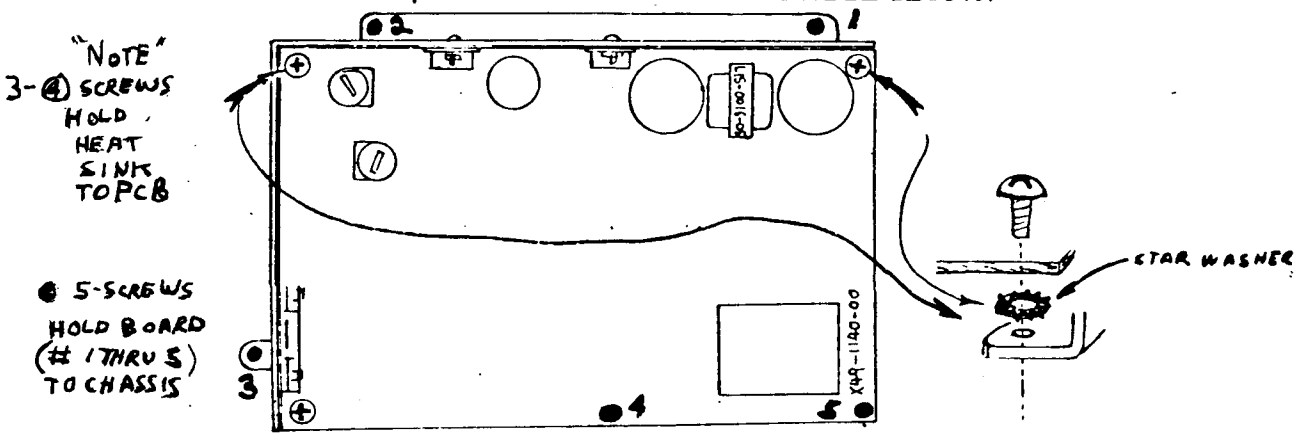
TS-830S FREQUENCY SHIFT

Some users may report an intermittent shift in display and operating frequency. This may typically be a 1 to 4KHz random shift. Cause will be a loose screw on the AF-AVR unit heat sink.

On the AF-AVR unit X49-1140-00, there are three self-tapping screws holding the aluminum heat sink to the PCB. These also supply the ground connection to that section of the board. Between the heat sink and PCB foil, add a toothlock washer N17-1030-41 at the two self-taping screws shown, and tighten all screws for this board. (The remaining screw already has a tooth-lock washer).

PROCEDURE:

1. Remove the top cover (8 screws) and unplug the speaker.
2. Remove the bottom cover (8 screws)
3. Remove 5 screws holding the AF-AVR unit; 3 screws hold the heat sink to the chassis, and 2 screws hold the PCB (those with nylon spacers). BE CAREFUL HERE, the PCB also has five screws. If they are removed and an attempt is made to lift the board (with the heat sink still attached to the chassis) the leads of transistors attached to the sink may break off. Make sure to lift the whole assembly including the heat sink. Swing the board over . Leads do not have to be unplugged. (Thanks to K.J.Deskur K2ZRO for clarifing this step)
4. Add two tooth-lock washers as shown.
5. To reassemble, reverse steps 3-1. (Thanks to TRIO/KENWOOD SB#840)



TS-830S (and others)SSB/CW PLATE CURRENT DIFFERENCE

On the Kenwood Users Net a question was brought up about the idling current change when in SSB vs CW. A few users indicated differences. This situation was investigated by W4CG and he found the difference on his 830 to be due to changes in the screen voltage. If a key jack is inserted and unkeyed, the idling current (Ip) will be slightly higher in CW. (Thanks to Bill Thomas, W4CG)

TS-830S SPEAKER TALK BACK ON 10 METERS

If you are experiencing talk back on receive audio on 10 meters with your TS-830S, try this: connect 100pf capacitors at the back of the mic connector to ground. Also connect a braided ground strap between the capacitor ground point and the rear panel ground post. (Thanks to Lloyd, NA4D)

TS-830S MOBILE OPERATIONS

Frank W80K mobile checked into the Kenwood Net using his TS-830S. We were surprised to hear that this AC only rig could be used mobile. Well, Frank told us how! He purchased a 300 Watt Model 22-130 Radio Shack inverter, and now can use his TS-830S as a base station, portable or mobile.Thanks Frank W8OK.

TS-830S INTERMITTENT OUTPUT

If you are experiencing intermittent RF output with your TS-830S try this. Resolder all connections on relay. (RL-1 on the AF unit board). Thanks to Alay ZS1CZ, Kenwood Net

STABILIZING THE TS-830S/130S/530S

After living with and being annoyed by the drift in my 830 VFO (although within specifications), I decided to try changing C13 and/or C14 in the VFO module as suggested in a Users International Radio Club Newsletter, Issue 17, Sept. 1981, Page 6.

I found it best to remove both top and bottom covers before attempting removal of the VFO. You can then see the VFO unit on the bottom of the radio and keep from damaging other leads. The VFO unit itself requires removal of 4 screws on the front panel. A 3mm metric hex wrench is required. I bought a set from Sears for $1.50. After the 4 screws are taken out, the entire VFO will slide out of the front panel easily. Then disconnect a rear connector on the VFO and slide off 2 pilot lights on VFO bracket. The unit can now be worked on easily. Next remove 5 screws (one on end) holding the shield cover in place. Remove a shield. Now the PC board and circuitry are accessible.

In my case, I picked the easier capacitor first, C14 connected from the bottom end of the coil and grounded to the variable condenser. Observe the color code. Mine was marked 10pfd and had a black spot on one edge. This signifies zero compensation or NPO. I replaced it with a 10pfd orange spot which was a negative 150ppm/degree C or N150.

Let me back track for a moment and tell you that my 830 drifted 500 cycles low the first half hour from a cold start. After an hour, the drift was 700 cycles low. Changing to a negative temperature coefficient capacitor of N150 reduced the drift to 200 cycles low for a half hour, 300 cycles low for an hour. I might add that this check was made with the VFO connected by its leads but not installed, VFO shield in place but not screwed down, no signal input. It doesn't matter whether the heater is on or off.

Deciding to go a little further, I changed C14 from 10pfd. N150 to 10pfd. N220 which has a yellow spot or dot to indicate it is 220ppm/degrees centigrade.

Beginning again from a cold start, VFO drift was now 100 cycles low for the first half hour and remained -100 cycles until 2 hours later when it drifted back (100 cycles high) to its original beginning frequency. I used 14300 hertz as a guide.

After 3 hours there was no change, so I felt that I had what I thought was a desirable improvement. It would also be possible to change C13, 22pfd. but it was connected to the solder side of the PC board and somewhat difficult to get to. C13 in my 830 already had a negative temperature coefficient with a red spot, or dot. This indicates a negative temperature coefficient of 80ppm/degrees C.

I did notice the analog dial was off calibration a small amount and tried to correct it by tweaking the trimmer through the hole in the shield but was only able to bring it to within a couple degrees of the digital readout. However, I rarely use the analog dial for frequency checking and felt that a dial off by 2 degrees was nothing to worry about. It just indicated that the 10pfd capacitor I used was slightly high in capacitance. These 2 capacitors were impossible to obtain locally. Finally I wrote to Kenwood and they kindly supplied my needs for which I am grateful.

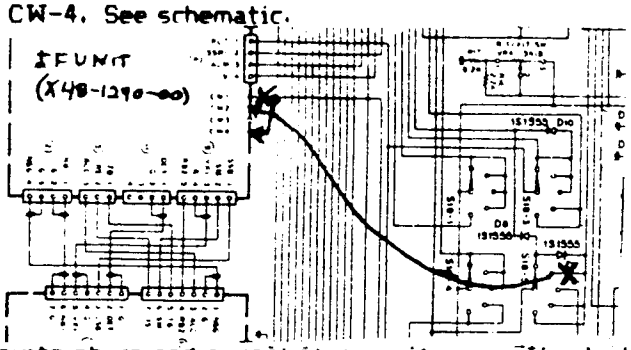
I might suggest anyone attempting to reduce VFO drift the way I did should first check to see what color spot the C14 or C13 capacitors have. You will need to increase the negative temperature to a greater degree (higher value) to cut down the negative (low in frequency) drift. Here is temperature code for capacitors: 0 or NPO is black; N80 is red; N150 is orange; N220 is yellow; N330 is green; N470 is blue; N750 is violet.

I hope the above information can help to serve as a guide for other Users who would like to further improve their radios. (Thanks to George McKinley, W4OSI) (ED Note: This mode is applicable to the TS-130S/530S, also the analog and digital dials can be lined up as follows: After 1 hour warm-up, rotate tuning dial to 250 and adjust TC1 on VFO until analog and digital readout are the same.)

MORE INFO ON TS-830 FREQUENCY JUMP AND UNSTABLE FREQUENCY READOUT

If you are experiencing frequency jump and unstable readout on your TS-830S, after trying the mod suggested in the February Issue No. 11, try this. Remove the AF-AVR Unit (X49-110-00) carefully, then remove the aluminum heat sink from the board. Using an ink eraser carefully clean the PC board where the aluminum heat sink contacts the board and the aluminum heat sink itself. This totally resolved my frequency jump and shift problem.

To do this, you must remove and tape the wire attached to mode switch (S18-5) CW-W terminal. Add a wire from that switch terminal to CW-2 on IF board. Move the existing connector on the IF board to CW-4. See schematic.



The cascaded filters are quite sharp and a real pleasure to use. I've had no leakage problem or loss of gain. If you want wider CW reception, you can use the USB position of the mode switch. Of course, you can't transmit CW except in either of the CW positions. (Thanks to Frank W80K)

TS-830 DOMESTIC (Japan)

The Trio TS-830's made for domestic (Japan) use are 100VAC input only. However, this is not a big problem if you have a Variac or wire a 12/24 VAC filament transformer in series with the primary to give you 110-125 volts. I bought the one I have while visiting Japan. Intersting enough the Domestic (Japan) and English (USA) owner's manual, both show a 100, 120, 200 and 220 AC input configuration. Not so on the domestic version, 100 VAC ONLY! When I got mine home and opened it up to install the CW filter and rewire the transformer, Surprise!! As it turns out, there may be an advantage to Japanese version. It can be used mobile/portable (12vdc) with the addition of the DS-2 DC-DC converter. This cannot be done with the USA 830 version as I understand it. (Thanks to Jack Davis, WA4EJR)

NEW TS-830S

We noticed a major difference in the most current TS-830's, Serial # 1042218 (we don't have the lowest serial # at this time). The later TS-830's now work on 12VDC, the optional DS-2 converter must be added to the rear of the radio, and the input power cord rewired. The AC cord now has a plug on the end, similar to the TS-820. The new TS-830S Operator's Manual contains all the details Part #B50-2740-00(G). (Thanks, UIRC LABS)

TS-830S FREQUENCY EXPANSION

The coverage of the TS-830S can be extended downward 500KC on some bands by connecting a 1k resistor from Pin #3 to Pin #6 on the VFO socket. Got this information from Bob, W4MB. PLL wouldn't lock on some bands. (Probably could be "tweaked"). No change on 10 Mtrs, but a "real live" 500KC down shift complete with correct digital display on some others! Maybe you would like to experiment with this. Wouldn't it be great if we could get some general coverage performance. (Read a book on SWL'ing the other day and after 27 years of hamming, I am now getting interested!!) (Thanks, H. Russ Tower, K1DOW)

TS-830 GENERAL COVERAGE MOD

Do you know of any way to convert my Kenwood TS-830S to a general coverage short wave receiver? (Thanks, Paul Adler, KW1L, 83 Lamplighter Lane, Fairfield, CT 06430) (ED NOTE: Have no knowledge of this mod at this time, sorry. Drake or Clegg used to make an external converter but they went out of the Ham Radio business. Does any subscriber know of such a mod?)

ERRATIC LOAD CONTROL ACTION IN TS-830S

Any forward pressure on the LOAD control on my TS-830S would cause large erratic plate currents to flow. The cause of the problem was a loose screw on the back of the variable load capacitor in the final compartment. The problem screw was the one that aligns the rotor plates of the capacitor with the stator plates. The solution was to scrape off the locking cement, tighten the screw, and reapply locking cement (I used epoxy). Thanks to Harrison Clark, KA2R)

ALIGNMENT AND USE OF THE TS-830S NOTCH

The alignment instructions for the notch filter in the TS-830S call for alternately adjusting L10 and VR1 for lowest audio output with the rig set to 1.8985 MHz (USB) and the calibrator on. I found these adjustments far too sensitive to achieve the desired calibration. I found the following procedure to be more effective:

1. Set L10 so that the calibrator signal is attenuated by the notch with the notch control close to 12 o'clock ("O").
2. Adjust VR1 for minimum audio output (maximum notch depth).
3. Reset the notch control for minimum audio output.
4. Set VR1 for minimum signal.
5. If the notch control is not close to "O", move L10 a very, very small amount and repeat steps 1-4.
6. Repeat the above steps until the notch control is near "O" when the notch is on a 1500Hz tone, and notch depth is maximized.

I have found that a VOM across the speaker leads (ACvolts position) gave a far better indication of notch action than my ears. I also found that careful setting of L10 and VR1 would give far more than the specified notch depth.

The notch in the TS-830S is very sharp, and a bit difficult to adjust. Also, even the slightest drift in the 830, the offending station, or the notch filter setting will move the notch off the offending carrier. My solution to this problem is to quickly set the notch close to the offending carrier with the notch control, but not take time to get the notch square on the carrier. With the notch close to the carrier, the main frequency control knob can then be moved ever so slightly to put the carrier right on the notch frequency. The large knob allows faster and more precise matching of the carrier and notch frequencies than can be achieved with the notch control. The change in frequency required for this action is usually only 10 or 20 Hz, and will likely go unnoticed by other stations on the frequency when you next transmit. (Thanks to Harrison Clark,KA2R).

—NOTES —

adj voice quality ~~[illegible]~~ by slightly adj
slug in 455 [illegible] xformer on sp processor
[illegible] listen on another receiver -
(K. [illegible])