KENWOOD

Technical Information Exchange

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Circuit Improvements for the TS-430S

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Note: The component locater information is correct with the operator facing the front of the radio.

Problem: Poor noise-blanker [NB] performance on pulse noise. This is caused by an over-enthusiastic NB AGC which causes the NB to shut down prematurely. **Fix**: Change R81 on the RF unit from a 10K Ohm to a 24 -30K Ohm. R81 is near the front of the board between connectors #7 and #16.

Problem: Lack the transmit capability on non-amateur frequencies. **Fix:** On the RF Unit , remove connector #10 and remove pins #2 and #3 by pressing the release tabs on the side of the connector with a small jeweler's screwdriver and sliding the pins in the direction of their wires. The loose pins should be covered with insulating tubing so they won't short out to the other circuits.

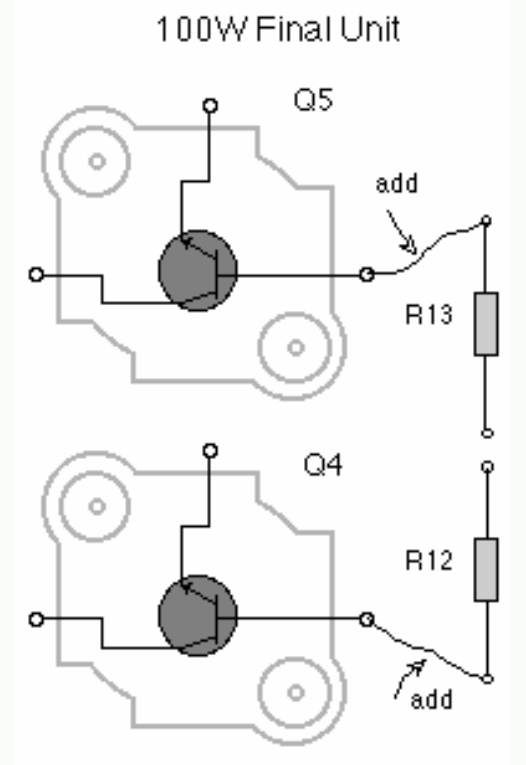
Problem: 9.5db of treble roll-off at 2800Hz in the receive audio. This makes the audio sound muffled and hard to understand. **Fix**: On the IF Unit, between L4 and connector #24, change C42 from a .033µF to a .003µF - .0047 µF non-inductive capacitor. A disc ceramic capacitor or a non-inductive Mylar unit will do the job. **Note**: To prevent operator fatigue, after this modification is made, the RF Gain control should not be operated any higher than is necessary to just begin to hear the sky-noise on the particular band being used. In this way, weak stations can still be heard, but the background sky-noise will not become annoying.

Problem: Lack of crispness in transmit audio. This can be due to the carrier oscillators periodically needing adjustment as the components in the radio age. The adjustment is made on the Control Unit. Two, small ceramic trimmer capacitors are located next to two crystals in the lower left hand corner of the board. The designators are TC3 and TC4. The capacitor nearest the front of the radio adjusts LSB. The other capacitor TC4 , adjusts USB. With the IF shift on "0" , these adjustments can be set "by ear" while listening to a broadcast station tuned to zero -beat. The carrier oscillators can also be adjusted by transmitting into a wattmeter/dummy load while feeding about a milli-volt of audio into the microphone jack. As the audio frequency varies, the power output will fall off at the edges of the crystal filter passband, or "window". Set the audio frequency to 1000Hz and adjust the microphone gain to produce 40 watts output. Lower the frequency to about 300Hz . Adjust the carrier oscillator to produce 10 watts. The rest of the problem is caused by a 4.5db roll-off at 2800Hz in the microphone amplifier. **Fix**: Change C96 on the IF Unit, next to connector #10, from .015µF to a .001µF [1000pF/1nF] disc-ceramic capacitor.

Problem: Noisy Transmit/Receive Relay. Cutting R28 {2.2k Ohm, 1/4 W} on the X41-1470 Switch Unit , behind the ATTN Switch , will reduce the noise to less than 1/2 by stopping the ATTN Relay from activating on transmit. In late serial number TS-430S', it is easier to cut the only white wire that goes to the Switch Unit than to cut R28.

Problem: Intermittent ALC during transmit and/or intermittent reduction or loss of power output. The power output can sometimes be restored to normal by turning up the microphone gain or by dropping the radio a few inches. Signal reports of intermittent transmit audio distortion are normal.
Note: If the radio continues to be operated after displaying these symptoms, the eventual result is often catastrophic failure of Q2, Q3 [RF driver-transistors], and Q7 [bias-transistor] on the 100W Final Unit.
Why: This problem is caused by repeated thermal expansion and contraction of the cheap, phenolic printed circuit board [PCB] which eventually breaks the two, plated-through the circuit board connections between the output of the 10W driver stage and the input [base] connections to the 100W RF final transistors, Q4 and Q5. When the break occurs, the RF from the drivers does not reach the input [bases] of the final transistors, so there is no load on the driver output transformer, T2. Without a load on its secondary, the peak RF voltage across the primary of T2 runs

wild and breaks down the collectors of the driver transistors. When the driver transistors fail and short,, they destroy the bias transistor, Q7, as well. Changing these components is an unpleasant and uncheap job. Worse than that, the same components will most likely fail again unless the real problem on the PCB is taken care of. **Fix**: On the component side of the 100W Final Unit circuit board, install a jumper wire between the (outer) end of R12 that is nearest to the base of Q4 and the base lead of Q4. Install a jumper wire between the (outer) end of R13 that is nearest to the base of Q5 and the base lead of Q5. These two jumper wires make sure that the driver RF arrives at the final amplifier transistors, whether or not the plated-trough connections are are doing their job.
Another method of fixing the problem is to solder Z-wires in the plated through holes. [a Z-wire is a wire that is passed through the board and whose ends are bent in opposite directions so that it will stay in place during soldering]



Problem: AGC / S-Meter overshoot. This affects the receive audio, causing it to loose volume for about 2 seconds after switching from transmit to receive when a >S9 signal, is on frequency. When this problem occurs, the S-meter will temporarily zoom up to 30db above the real signal level. Turning the RF Gain control down is no help. **Fix**: Most of the trouble is caused by R32 on the IF Unit. R32 is located behind the CW filter space on the circuit board. R32 should be changed from a 390K Ohm to 2.2M Ohm - 3.0M Ohm. The lesser part of the problem is caused by R40 on the RF unit - which is between connectors #4 and #15. R40 is changed from a 470K Ohm to a 20K Ohm - 47K Ohm.

Problem: Complaints of buckshot or splatter from other operators who are using adjacent frequencies. This problem can be caused by improper bias setting for the driver and the final in the 100W Final Unit. The Service Manual describes a simple method of setting the two bias adjustments. A much more common reason for causing splatter is excessive ALC. Here's why: The TS-430S has a sluggish ALC metering circuit and an ALC characteristic that needlessly delays the ALC attack [throttle-down] time. The ALC meter barely moves when there is already an abundance of ALC activity taking place. So, if the ALC meter indicates a mid-scale / normal amount of ALC, the radio is being overdriven. Under this condition, due to the built-in too-lengthy ALC attack characteristic, the radio will produce power output peaks of 140W at the beginning of loud syllables. These peaks can be observed accurately on an oscilloscope. Most power meters are not capable of observing the <2mS overshoot. 140 watts of PEP output may sound good, but it is beyond the linear output power capabilities of the final transistors. The net result is rotten splatter. To reduce splatter, the microphone gain should be adjusted so that the ALC-meter barely moves on loud voice peaks. For those operators who like to see the meter jump whilst talking into the microphone, operating the radio correctly is going to cause emotional stress. This problem can be alleviated by increasing the sensitivity, full clockwise, of the ALC meter adjustment, VR11, on the IF Unit. This will make the ALC meter indication quite lively and some operators quite happy. VR11, which is located on the right/front of the board, is very close to, and easy to confuse with, VR12 which should not be adjusted except per the directions in the Service Manual.