

Note that this is a combined issue for November and December. I am doing this since extensive travel will prevent me from preparing two issues. Thanks!

I am no longer taking renewal or new subscriptions for S/1 NEWS. The amount of information available does not support a monthly publication anymore. For those who have subscriptions running into next year I will continue to publish information that is available as it is available. For example I have in progress a complete listing of interchangeable semiconductors for the CX7's.

I will continue to make available all past information such as the Trouble Guide; Voltage and Test Procedure charts; etc.

I want to thank all of you who have taken the time to write and help me with this project .. like I said I will continue to publish issues as information warrents.

Now for some items of interest from Phil, W9XX:

1. The installation of the MFJ CW filter as described in a previous issue of S/1 NEWS can be improved by the following: Rather than connecting the filter at the audio input, connect wiper of volume control to the filter and the filter to the lead removed. In this manner, the SPOT signal is not affected by the filter.
2. The previous suggestion to tear down the final amplifier, enlarge the BeO thermal link hole and clean the thermal compound and renew is well worth the time. (The old compound becomes dry and is a poor thermal conductor .. ed)
3. The addition of a 2000uf capacitor at the input of the +15 volt regulator (on modified supplies ..ed) reduced hum which occurred when the line voltage dropped (every time the neighbor's air condition cut in..!)
4. The "speed up" capacitor for the built-in keyer as described in a previous issue of S/1 NEWS can vary widely in value. We suggested approximately .003uf. In this case, the keyer wanted 680pf.

Paul, WA7QEX, recommends replacing Q1 and Q2 on the front-end board with 3N204's. These devices are very low noise units. Paul notes better overload characteristics and improved sensitivity over the original units.

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W7FS sends along a couple of comments relative to modifications to the PTO's as described in S/1 NEWS, Volume III, Number 9: He notes that on both PTO's, C18 and C17 were reversed. The resistor feeding the zener, R2, is right alongside and partially under the oscillator transistor so simple jumper it out and add the 150-ohm unit on the terminal on the back of the PTO assembly. With these changes, Keith reports that PTO drift is less than 100 hz in an hour from a cold start.

Also from W7FS: While troubleshooting for those spurs on 80-meters (+ 100 Khz from signal) he noted that C35 and C37 had broken loose from the AGC board. After cleaning the leads of C35 and C37 and resoldering, the spurs were eliminated.

FROM W8CXS:

REMOVAL OF THE SCREEN CURRENT THROUGH THE THERMAL DELAY RELAY MODIFICATION

In some units, accidentally keying a dot while the initial 60 second warmup is in progress on boxes that have the screen fuse and screen current going through the thermal time delay relay (1 Meg resistor across contacts) modifications will cause the plate current to go full scale and then drop to 1/2 scale when the key is released. Plate current continues until the time delay relay finally operates.

The screen voltage, with open ground return or a 1 Meg resistor across the relay goes to 600 volts (or higher) and stays there. Releasing the key restores the -60 volt bias from the -25 volt operate value, but it is not enough to cut the tube off again. This theoretically should happen to every 8072 tube but only some do this trick. Note that the actual power supply voltage stays at +300 volts.

See QST, September, 1977, Page 38 for info by Bill Orr, W6SAI, of Eimac. Also the spec sheets on the 8072 caution you about screen operation but don't exactly spell out what happens if you don't follow their recommendations.

Because of the overheating and possible screen bypass capacitor damage, I recommend that this modification be removed. A blown screen fuse will destroy the tube.

If you wish to retain the screen fuse, a resistance must be installed between the screen side of the fuse and ground. A 100 K, 2 Watt resistor seems to be enough to stabilize the tube although a lower resistance value may be used. Due to the increased power supply current, R4 on the power board must be changed to Zero the screen current meter reading again. About a 33K resistor works on boxes with Nixie tube counters. If the fuse blows, a ground path still exists.

Reference to my September, 77 S/1 news on the LED counter / plate current overshoot, The screen load resistor should be placed from the screen side of the fuse to ground. Every thing else is correct. This takes care of both troubles.

On the modification to reduce AGC popping on AGC Detector Board A9

The 6800 Ohm resistor was to be added between the Collectors of transistors Q-12 and Q-13. On old model boards, just cutting the foil and tacking in the new resistor does the job nicely. However on late model boards, the foil connection to C11/C12 goes to Q-13 first. Two foil cuts and a jumper are required. This might explain why some people didn't notice any improvement?

Also from W7FS:

-3-

Receiver loading on 160 is caused by suckout by the final amp. Receiver volume drops sharply as the final is tuned through resonance. This is due to the fact that transmitter impedance is quite a bit lower than the receivers. The cure is to change receiver input impedance. This can be done by opening the jumper between 3.5Mhz and 1.8Mhz on the first tuned circuit (S7D on the front end board). (from preselector capacitor where it runs from terminals 1 thru 3). Add a small powdered iron core choke large enough to shift the rf tuning dial from 11½ to about 8. This is not a cure but it helps alot. Also removing the bandpass filter from the receiver antenna circuit helps on 160 unless you have a broadcast station nearby. The choke mounts between pins 1 and 2 on S7D.

PILOT LAMPS: They are available from the Radio Shack outlets and Lafayette has them under catalog number 760, page 137. They are 12 volt units instead of 5 volts but 12 volts is available off the 13 volt lead to the final cage. A 22-ohm resistor in series results in the correct brightness.

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Trouble: S-meter will not return to zero but hangs at S-3 with no signal on receive.

Solution: (by W4BCV/N4XM) This can be caused by the 8072 not getting biased off with the -60 volts during receive. (after the time delay relay closes). Problem was a bad 2N5184 on the A3 power supply board (Q9). Paul points out that there were no other symptoms of this failure since the auxiliary receive antenna was being used and relay control was not used.

Also from W4BCV/N4XM: Be sure to check ALL the transistors associated with the +34 volt supply if you have a failure in this area. Usually more than one is bad!

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Additional information from Mark, K6BE, concerning PTO mods as published in the September issue: When Mark works on PTO's he connects (using 3-feet of RG-174) to the counter output for measurements. However output is measured at the I.F. terminal. An RF voltmeter is required - adjust R7 for as close to but not less than .12 volts at center of PTO range. R7 usually ends up around 220-ohms. If PTO output is too high, spurious emissions will result. Nominal in radio output (that is, the load as seen in service) will result in .1 volt. The BREAK TIMING circuit prevents (in the A/TO mode) abrupt drop in PTO output at the end of a dit or dah, to allow shaping circuits to function properly.

What follows is also from W8CXS (a major contributor to this newsletter) and concerns replacement toroid cores for the final:

Replacement toroid cores for the CX-7 transmitter power amplifier are the same as Amidon Assoc. number T-200-2. These are 2" outside diameter, #2-Mix, Red color code, Iron Powder Toroidal Cores.

Two of these cores are glued together for the large size tapped coil in the CX-7 lower PA cage assembly. To fit over the bandswitch, two slots must be filed with a 1/4" round file as the originals were. Two layers of #27 glass tape cover the toroid. Formvar enamel wire sizes are #12, #14, & #18. The taps are #18 bare wire and the splices are wrapped with #26 bare wire before soldering and covered with heat shrink tubing.

A bad toroid shows up as very low power output on 1 or more of the low bands although the 10 meter power is normal. The coil windings will be discolored in the area where the toroid core has overheated and cracked.

The lower PA cage disassembly would appear to be a formidable task, but can be done in 1 hour, not counting the time to make many sketches of the layout.

The cause of many of the early serial number boxes not having a positive snap detent action of the bandswitch is caused by having too many washers or nuts on the long screws that hold the bandswitch together inside the lower PA cage. This causes the switch to bind by distorting the front switch frame. In some cases, partial relief can be obtained by loosening all the lower PA cage mounting screws and inserting 4 washers, or better yet, thin metal pieces with 2 holes drilled at the rear screw locations to move the cage slightly forward. The shaft coupling will have to be readjusted also. Otherwise the whole cage must be removed for access to the nuts. A straight edge across the open rear of the lower PA cage can be used to insure that last nut of the screws holding the band switch together are even with the rear panel before reassembling.

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W8CXS notes that the Heathkit IG-57A (TV sweeper) or the new IG-5257 has all the sweep frequencies required for CX7 alignment and one of the PTO's can be used for markers; the 10th harmonic falls in the IF band.

With reference to Paul's comments above concerning toroid replacement, he indicated that he can be contacted directly if anyone has specific problems in this area: Paul Kollar, W8CXS, 29317 Bonnie Drive, Warren, Michigan, 48093.

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W8CXS info:

PROBLEM: Nixie tubes glowing slightly blue or the Range decimal point will not go out.

SOLUTION: R22, R23, R24, R25 on counter board decreased in value. Replace and space away from board to avoid future problems. While you are at it, check R38 and R26 for proper value. Mount these away from board also.

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PROBLEM: Unit locks in Transmit

SOLUTION: (by WA9NGP) Replace Q8 on counter board (MPS3702)

By the way, concerning those resistors noted above in W8CXS's solution: If any of them INCREASE in value, the nixie digit will become very dim. Replace in the same manner (Thanks to WA8BHR .. ed)

Notes from Harry, W7IV:

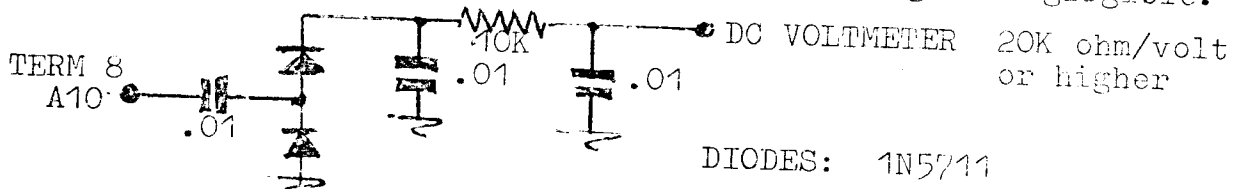
**PROBLEM:** After replacing power transformer, unit has tendency to blow fuses on initial turn-on

**SOLUTION:** Initial surge current blows fuse. Slow-blow fuses do not have a surge rating; they are just rated to stand a 200% overload for 12 seconds. Problem can be cured by placing a 1-ohm, 10-watt resistor in series with the AC power line. At full transmitting load, line voltage drops by about four volts. The resistor could be shorted out after a few seconds by a switch or Amperite thermal time delay. (Harry placed the resistor in his station master control box, not in the CX7 .. ed)

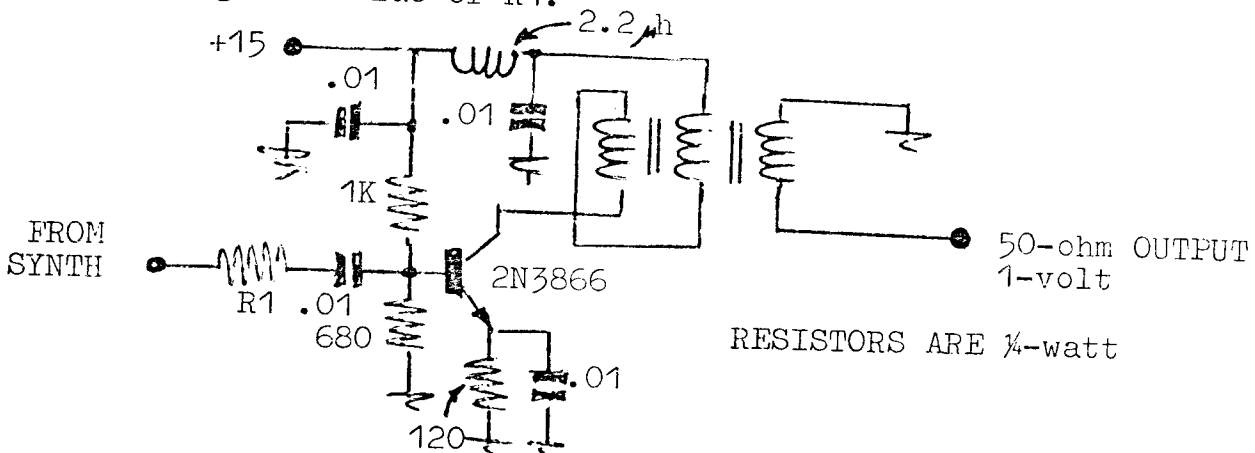
**PROBLEM:** After unit is on for a few minutes, noise level would suddenly increase and the sensitivity decrease.

**SOLUTION:** Front-end crystals are being pulled slightly too far and are on the edge of stable oscillation. Replace crystal or use the W7IV synthesizer!

**NOTE:** When trouble-shooting the transmitting chain, it is convenient to disable the 8072. This can be done by removing the jumper between pins 2 and 3 of J5. Then, the RF DRIVE to the PA, readily accessible at terminal 8 of A10, is used as an indication of proper operation up to that point. For full output, the peak RF voltage should be equal to the DC bias on the 8072 (for example, if -24 volts results in 100ma resting current,  $24 \times .707 = 17$  volts rms is required for full power without grid current.) A simple diode rectifier and DC voltmeter can be used to measure this voltage. See circuit below. It will read peak to peak RF volts! Divide by two to get peak volts and by 2.8 for RMS. Loading is negligible.



Harry's synthesizer requires a bit of amplification for best conversion gain. See circuit below for a solution. This will give 1-volt into 50-ohms. The output transformer consists of 12 tri-filar turns on a CF102-Q1 core. Each tri-filar conductor is three strands of #32, tightly twisted. Output is adjusted to 1-volt by selecting the value of R1.



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CX7B LED COUNTER BOARD  
INSTALLATION INSTRUCTIONS

1. Remove outside dust cover from radio.
2. Remove perforated cover from counter board housing.
3. Carefully disconnect all Amp connectors from Nixie counter board.
4. Un-solder wire #402 (purple wire) from C46 (feed-thru capacitor located on rear panel of counter board housing).
5. Remove four mounting screws holding old counter board to the standoffs and remove board from radio.
6. Place new LED counter board in position and connect the Amp connectors to the board as shown. If wires are not long enough to reach the pens, they will have to be extended by splicing a wire to them.
7. Screw down the new LED board to the four mounting standoffs and replace perforated cover.
8. Replace 6 volt meter lamp with new 12 volt lamp. The white wire connected to the left hand lamp terminal may be removed from the radio or its end covered with tape or sleeving. From this terminal run a new wire to C6, filament feed-thru capacitor located on upper power amplifier compartment. Remove black wire from right lamp terminal that goes to meter ground. Install 22 ohm 1/2 watt resistor from lamp's right terminal to meter ground.
9. Remove R4 (47K) from power supply board.
10. Replace CR13 and CR15 (located on power supply board) with 3 amp diodes.
11. Remove R29 from power supply board and install 7.5 ohm 10 watt resistor in its place.
12. Install 100 MF capacitor across the 7.5 ohm resistor installed in step 11. The capacitor's "-" lead is connected to pen 175.
13. Remove Q8 from power supply board. Ground wire #66 (connected to pen 138 on power supply board).
14. Remove Q3 (TIP 29A with the brown lead located on the radio's back panel) and replace with a MC7805 voltage regulator integrated circuit. Do not insulate the mounting tab, however, cover the mounting tab with thermal conductive compound. Re-solder the brown wire to the IC's output pen (same pen as TIP 29's emitter). Solder wire #66 to center pen and wire #67 to input pen (same pen as TIP 29's base pen).

### CX7B LED COUNTER

