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QST Issue: Dec 1979
Title: More on Solid-State Conversion of BC-221/LM Frequency Meters
Author: Floyd Peck, K6SNO

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☐ As an alternative to W5FR's suggestion for curing an inactive S meter on an SB-101 (April 1978 *QST*), I prefer to use 91-percent isopropyl alcohol to clean the relay. I use a cotton swab to apply the alcohol to the base and contacts of the relay. A four-ounce bottle of the alcohol is available at many drugstores. This grade of isopropyl alcohol is preferred for cleaning magnetic heads on tape transports and disc drives in computers. Do not use the common 70-percent rubbing alcohol which will leave a troublesome residue. I've found that the problem described by W5FR is also responsible for a malfunction of the alc when the SB-101 is in the transmit mode. — *Harlan Bercovici, WØMYN, Littleton, CO*

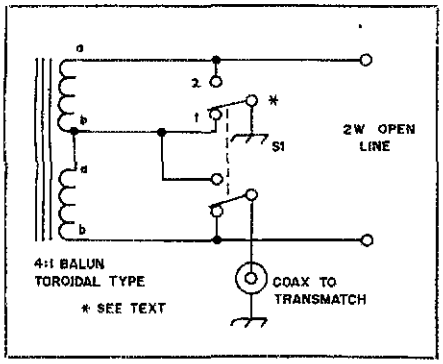
☐ When a transmitting capacitor arcs over, a small spot is often left which makes the capacitor susceptible to further arcing. This spot is easily removed with an ignition file, a useful tool in any radio amateur's tool box. — *Mike Marmer, KB8GH, Dayton, OH*

☐ To avoid solder bridges to adjacent turns on coils being equipped with taps, I thread a small piece of aluminum foil into the coil on one side of the tapped turn and back out through the other side. The solder does not adhere to the aluminum, which is removed easily after installing the tap. — *Leland S. Lovell, W8JXI, Newaygo, MI*

☐ I remember reading a Hint and Kink some two years ago about preventing coaxial-cable braid from fraying by wrapping it with small-gauge bus wire. I've successfully used burglar alarm window foil instead of the wire. It works especially well with RG-8/U. — *Robert Doane, K1EMU, Newtonville, MA*

SWITCHING ARRANGEMENT FOR BALANCED OPEN-WIRE-FED ANTENNAS — 10 TO 160 METERS

A switching arrangement can be added to the standard 4:1 toroidal balun that will allow almost any balanced open-wire-fed antenna to work from 10 to 160 meters in conjunction with a Transmatch. See the accompanying diagram. S1 is a dpdt ceramic wafer switch. Position 1 of the switch provides the normal 4:1 balun configuration. For 160-meter operation, the switch is placed in position 2. In this position, one half of the antenna performs as an inverted L with the other half as a grounded counterpoise. — *Richard B. Stevens, W1QWJ, Ashuelot, NH*



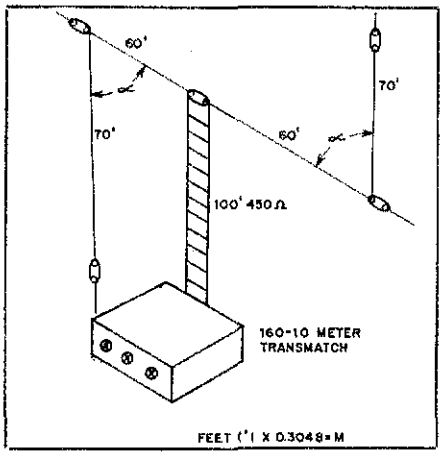
A modification for using a balun with open-wire-fed antennas from 10 through 160 meters. Information was supplied by W1QWJ.

A "Z" ANTENNA FOR THE 10-160 METER BANDS

One of my interests in ham radio is designing and constructing antennas for both general amateur use and for the Army MARS system. For the amateur who has limited space, I have designed a "Z" antenna that covers the bands from 10 through 160 meters. It is easily constructed from wire. Spreaders for the transmission line are fabricated from Lucite strips or Plexiglas rods. (Refer to the yellow pages of telephone directories for the names of dealers who handle Plexiglas or the equivalent.) For two no. 14 wires, a 2-inch (51-mm) spacing is adequate.

Although a height of 100 feet (30 meters) is indeed desirable for this antenna, hams who settle for elevations between 30 and 50 feet (9 and 15 meters) will still obtain good results. The angles α between the wire segments will depend on individual situations such as the placement of trees or other supports. Generally, the wider the angle, the better the performance.

W1NH, the New Hampshire SCM, who is really into antennas, says my design is "FB." My evaluation of the antenna is that the "aerial" is great. — *John N. MacInnes III, WB1FPD, ADN1JD, Hampton, NH*



A 10- to 160-meter horizontal Z antenna. Inexpensive no. 14 copper-clad (electric fence) wire may be used. For complete information on open-wire transmission lines, see *The ARRL Antenna Book*, any recent edition.

MORE ON SOLID-STATE CONVERSION OF BC-221/LM FREQUENCY METERS

Although I've converted several BC-221 frequency meters to solid state following the guidelines set by R. S. N. Rau's February 1977 *QST* article, I admit that finding octal plugs posed one problem. As an alternative, appropriate metal tubes were dismembered and conversion parts mounted in the tube shells.

Later, an LM-II with built-in modulation and 77, 6A7 and 78 tubes was encountered. In this case, some old 5, 6 and 7-pin tubes were broken from their bases and those bases employed to mount conversion parts. Bare, tinned hookup wire was soldered into the appropriate pins and cut off even with the top of each tube base. The JFET leads were then soldered (bug style) to the respective wires from the pins. To prevent microphonics, a small glob of clear silicone cement similar to that used for bathtub sealer, was placed between the top of the leads and the inside wall of the tube base. This prevented any "guitar effect" from the rigid wires. An alternative is to saw off the tube-base cylinder and mount the components as close as possible to the tube pins in order to avoid mechanical movement.

Anyone attempting to convert a BC-221 or an LM frequency meter for the first time will do well to convert one stage at a time, isolating any problems if and when they occur. There may be a substandard FET or one could become overheated from soldering. Start with the audio stage first: It's the easiest!

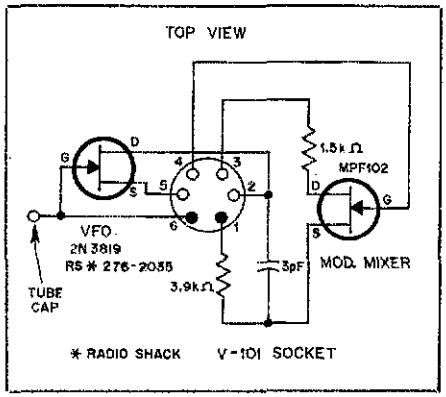
Next, isolate the B+ from the stage. Temporarily connect the 9-V battery in its place. There should be almost as much audio from the solid-state stage as there was from the tube stage. Following this, modify the crystal oscillator and converter stages.

Once the VFO has been converted, check the calibration points. If some are too weak or missing, put a potentiometer in place of R2 and R3 and adjust for best output. (See Fig. 2 in Rau's article.) Install appropriate fixed-value resistors in place of the potentiometer. Keep in mind that not all FETs respond alike.

No method could be found for direct-coupling the modulator to the VFO stage. The tube version used suppressor-grid modulation. Therefore, I added a mixer or converter stage, using light coupling from the source lead of the mixer to the drain of the VFO JFET. If source-to-source coupling is used, the VFO stage is detuned to the extent that the corrector capacitor will not bring it back into calibration. With drain modulation, the error is small and easily corrected. The circuit for this state is shown in the accompanying illustration.

Disconnect the lead to pin 6 of V101. Pin 1 remains as is to provide the source return to ground. R105 in the mixer gate load should be shorted out. R114 provides proper loading for the gate return since it holds the modulation level to about 80 percent.

R115, in series with audio choke L104, should be shorted out and R103, the high-voltage regulator resistor also should be shorted when converting to the 9-V supply. This particular LM drew only 1.7 mA with all stages functioning. The rf output, however, was only about 25 percent of that normally produced by BC-221s. Still, that's an adequate signal for alignment work. The small physical size of the LM and the modulation feature provides advantages over the BC-221 instrument. — *Floyd K. Peck, K6SNO, Hemet, CA* QST



K6SNO uses this arrangement for modifying the VFO/Mod. Mixer of an LM-II frequency meter. Q1 is a 2N3819 or Radio Shack 276-2035 JFET while Q2 is a Motorola MPF102 JFET. Connections are shown in relation to the V101 socket.