Jeffry Blackmon W2YI
7714 Lindbergh Avenue
Niagara Falls NY 14304

CB to 10

—part IX: a pair of Radio Shack rigs

In 1966, I converted a tube-type CB rig to ten meters and put it in my 1950 Desoto. It was fun to operate, but, unfortunately, there were not very many local hams to work. I took the rig out and eventually scrapped it and forgot about ten meter AM.

My interest in ten meters was rekindled at the Amateur Radio Association of the Tonawandas' September, 1976, "Show and Tell" meeting. Bill WB2MAM brought a pair of CB walkie-talkies which he had converted to ten. I got thinking about ten meters again.

In early 1977, Radio Shack sent out a flyer advertising the five-Watt TRC-11 for $29.95, so I bought one. While in the store, I spotted the TRC-74 100 mW walkie-talkie and decided to try my hand at converting it also. It seemed a natural to take along to hamfests and to use for emergency situations where inexpensive QRP rigs would be needed for QRM-free short-range communications.

The conversions are quick and require a minimum of test equipment. You can get by with an rf probe, a VTVM, and a dummy antenna, but a signal generator capable of ten meter operation is very helpful. An swr bridge could be used in place of the rf probe for the TRC-11 alignment. One word of caution: The adjustable coils and transformers are sealed in place. The larger coils are painted in place and are easily moved, but some of the smaller adjustments are sealed with a wax-like substance. If a coil or transformer is wax-sealed above the slug, very carefully remove the wax sealer before making any adjustments. I was lucky—only one coil suffered damage due to my overtorquing on its slug.

$$\text{Transmit crystal frequency (kHz)} = \frac{\text{output frequency (kHz)}}{3}$$

$$\text{Receive crystal frequency (kHz)} = \frac{\text{output frequency (kHz)} - 455\text{ kHz}}{3}$$

Example:
To transmit on 28.805 MHz:

$$\text{Transmit crystal frequency (kHz)} = \frac{28805\text{ kHz}}{3} = 9601.667\text{ kHz}$$

To receive 28.805 MHz:

$$\text{Receive crystal frequency (kHz)} = \frac{28805 - 455\text{ kHz}}{3} = \frac{28350\text{ kHz}}{3} = 9450.00\text{ kHz}$$

Fig. 1. Crystal information. Note: All crystals are 3rd overtone.

Crystals

Both rigs are single-conversion superhets and use the same crystals. Crystals are third-overtone types, and their fundamental frequency in kHz is easily determined, as Fig. 1 illustrates. I ordered my crystals from JAN Crystals and have been pleased with their performance. They cost $3.75 each, with an additional 25¢ each for postage (air mail) and handling, for a total of $4.00 per crystal. JAN had advised me that it might take up to a month to deliver them, but the crystals arrived two weeks after I mailed my order.

Converting the TRC-11

Receiver modification is simple. The oscillator starts up easily and has no adjustment. Refer to Fig. 2 for the following adjustment locations. Inject a ten meter AM signal through the antenna connector and adjust T1 and T2 (the input and output transformers, respectively, for the rf amplifier stage) for maximum output voltage across the speaker voice coil. This completes receiver alignment. My 455 kHz stages were tweaked, and the receiver gain came up a bit. Check yours before proceeding to transmitter alignment. By the way, the TRC-11 has a ceramic filter in the emitter lead of the first i-f transistor.

Transmitter alignment is a bit more complicated. Connect the rig to a dummy antenna, and put the rf probe across the antenna connector. Output may be monitored by inserting an swr bridge between the dummy antenna and the transceiver. Depress the microphone button and adjust T9, the oscillator output coil, until the oscillator starts, as indicated by a very weak output. Adjust T10 for increased output. Similarly, adjust L5 and L6 for maximum output. Go over these adjustments several times, until maximum output is obtained. T9 may need to be adjusted if dc input voltage varies and the rig has no output. Using Heathkit's rf probe and

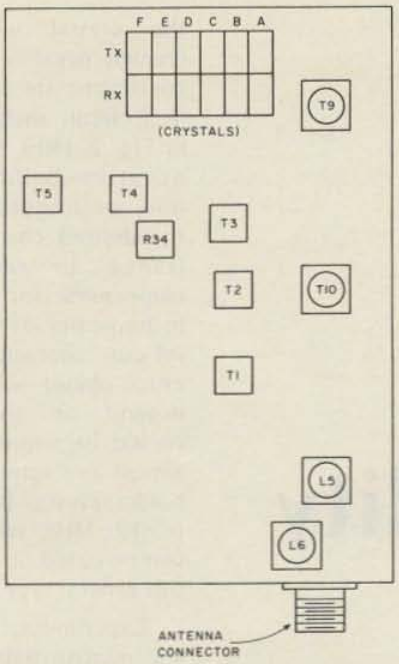

Fig. 2. TRC-11 adjustments layout.

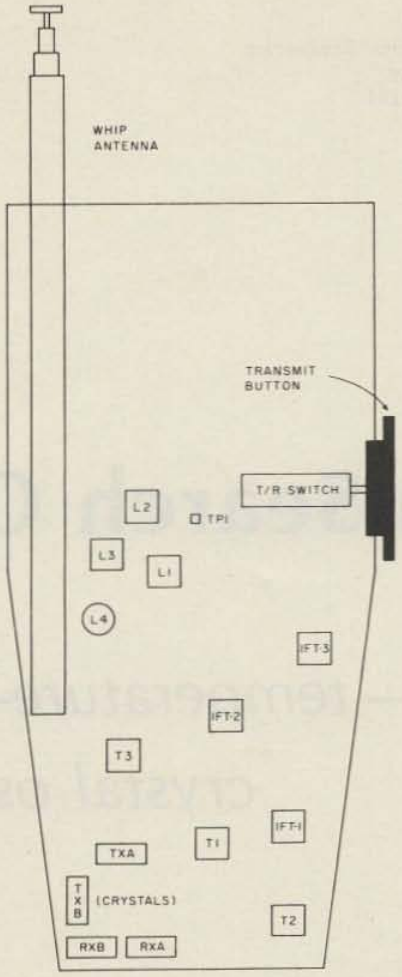

Fig. 3. TRC-74 adjustments layout.

VTVM, I measured one-tenth of a volt less rf output at 28.6 MHz than I originally had at CB channel 9, 27.065 MHz.

TRC-74 Walkie-Talkie Conversion

Refer to Fig. 3 for adjustment locations. The receiver converter stage may not oscillate right away, so adjust the slug of T2 outward until it does. This can be determined by listening for noise through the speaker. It should pick up when the oscillator starts. An alternate method is to inject a ten meter AM signal and adjust T2 until the signal is heard. After oscillations begin, adjust T1, the input rf transformer, for maximum signal strength. This may be measured across the speaker voice coil. At this time, readjust T2 for best signal. Cycle the rig on and off several times to be sure the oscillator will start right off. T2 may be tweaked as necessary. The 455 kHz transformers may be tweaked at this time, if you'd like.

The transmitter is equally simple to get operating on ten. First, extend the whip antenna full length. Connect the rf probe to TP1, directly adjacent to the TR switch. TP1 is connected to the base of the antenna loading coil, L1. The signal at TP1 may be too weak to measure with an rf probe. A ten meter receiver may be substituted. Depress the T/R switch and adjust T3 for output. After the oscillator is running, adjust L3 and L2 for maximum output. Place the rf probe on the antenna, or continue monitoring with the receiver gain reduced to prevent overloading, and adjust L1 for maximum output. Go through the adjustments several times. T3 may have to be offset slightly to assure oscillator turn-on every time the transmit button is pushed.

Antennas For the TRC-11

In my pickup truck, I use a Hustler mobile antenna with an RM-10 mobile resonator. It gives very fine results. The truck has quite a lot of ignition noise, and the engine must be shut off for best operation. Also, this makes driving a stick-shift vehicle safer.

At home, I use a Radio Shack 21-901 quarter-wave ground-plane antenna mounted three feet above ground. It cost $16.00 ($14.95 plus $1.05 tax). I've pruned five inches off the vertical element and the radials, and the swr, at 28.6 MHz, is about 2 to 1. I'm not trimming it further until western New York's hams decide on final frequencies. At present, I operate on 28.6 and 28.805 MHz with WB2MAM, WB2NFZ, and a few other fellows.

Results

Here in the Falls, I've about a ten-block range between the 100 mW hand-held unit and the mobile 5 Watter. The receiver noise problem in the mobile limits the range. If the truck were suppressed, I feel the range would nearly double.

Between hand-helds in Buffalo, Bill WB2MAM and I worked about six blocks.

Before I installed the ground plane, I used a hastily-built sloping dipole only 4 feet off the ground and received a 5 x 7 signal report from New Jersey. Reports should become better when the ground plane antenna is up around twenty-five feet.

Comments

Ten meter QRP AM operation is fun and fairly inexpensive. Ten meters offers an alternative to two meters and could very nicely augment it for emergency situations. Range between five-Watt rigs is good, and the band is usually interference-free.

Radio Shack puts out very good service manuals for these rigs. Their stock numbers are 21-139/141 for the TRC-11 and 21-174 for the TRC-74.■