

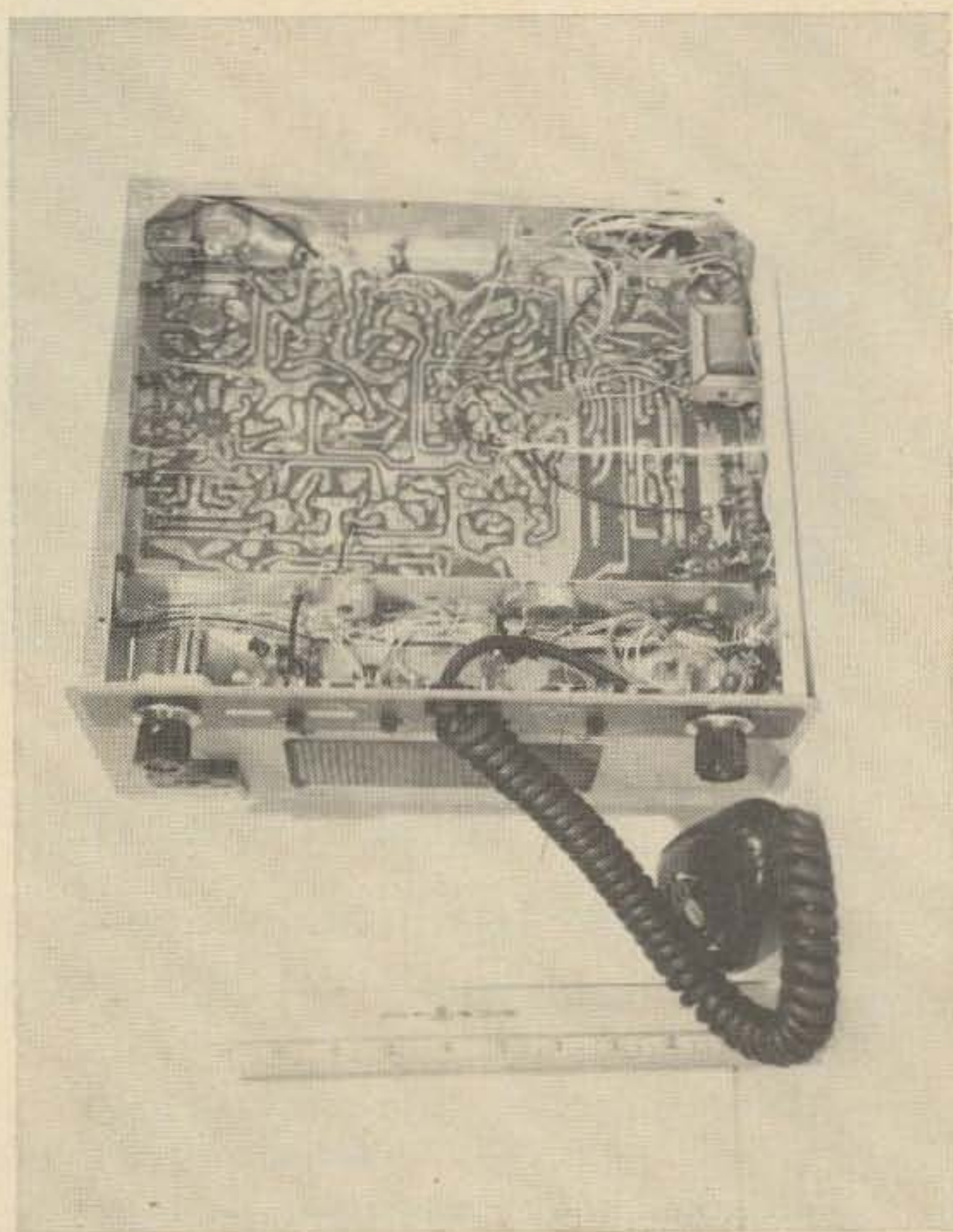
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# Heathkit HW18-3 160 Meter SSB Transceiver



Toledo has always been a town that was active on 160 meters. This goes back to the very early days when mobile operation was not permitted except on 5 meters. W8HSW and several others got together during this time and put a 160 meter rig in an automobile. The whole amateur fraternity of Toledo was really shook when they proceeded to come on the air one Saturday morning and moved all over town operating as a portable. Someone got so upset they called the FCC in Detroit to complain only to find out that W8HSW had written the FCC as required and advised that they would be operating portable from about 20 different street intersections.

As soon as the 160 meter band was opened for mobile operation, Toledo was quick to do something about it. It was easy to get the car BC receiver to tune to 1800 and not lose too much of the broadcast band. A simple two or three tube transmit-



ter crystal controlled was easy to build. The end result was that Toledo had an awful lot of mobiles on 1812 kHz plus at least 5 boat mobile to say nothing of the home rigs that could operate on 160.

With this interest on 160 it was only natural that I should be interested when Heath Company announced they were going to put out a 160 meter Single Side Band transceiver. Very few of the SSB exciters covered 160. Down converters to go from 40 meters to 160 seemed such a waste of power. The kit was a little longer coming than I had planned and arrived a couple of days before we were to leave on four weeks vacation on our boat. I took the kit along so I could work on it on a rainy day and in the evening when all was quiet. I can now have great sympathy for those fellows who put a kit together in an apartment. I am used to a large work bench in the basement so this was a new experience for me. Pick up all the parts and put them away when Virginia had lunch ready, put them all away when we got ready for bed and be sure to store them real good so they would not upset in rough seas on the next day's run. Anyhow it went together in the usual fun way that all Heathkits have a habit of doing.

Sometime along the way the FCC changed the portions of the band that could be used



in various areas and also changed the input power limits in many cases by a considerable amount. As a result of this, interest in 160 has increased. I'll bet there are people on 160 that haven't been on since before World War II.

I was glad that I had the HW18-3 because I was in there with the rest of them with no trouble at all. The SSB or AM feature was sure good too. The two crystal control frequencies were OK but too often the other station would not be transmitting on same frequency as he was receiving. When it was explained that you were crystal controlled, it was no problem to get him to zero beat your frequency. The clarifier could then take care of any slight drift. It was surprising though how many of the fellows were crystal control, especially the mobiles.

It didn't take me long to find out that a VFO would make operation real fun. It also took even less time to find out the LMO in the SB100 tuned the exact range of frequencies needed for the VFO in the HW18-3. A simple coax cable with a crystal socket on one end and an RCA plug on the other and I was in business with a real fine VFO. The only drawback here was that the dial runs backward but you can easily get used to this. Any VFO that tunes 5.2 MHz to 5.4 MHz will work very nice. The instruction book tells all that is re-

quired for a VFO and anyone who wants to go this route should have no trouble.

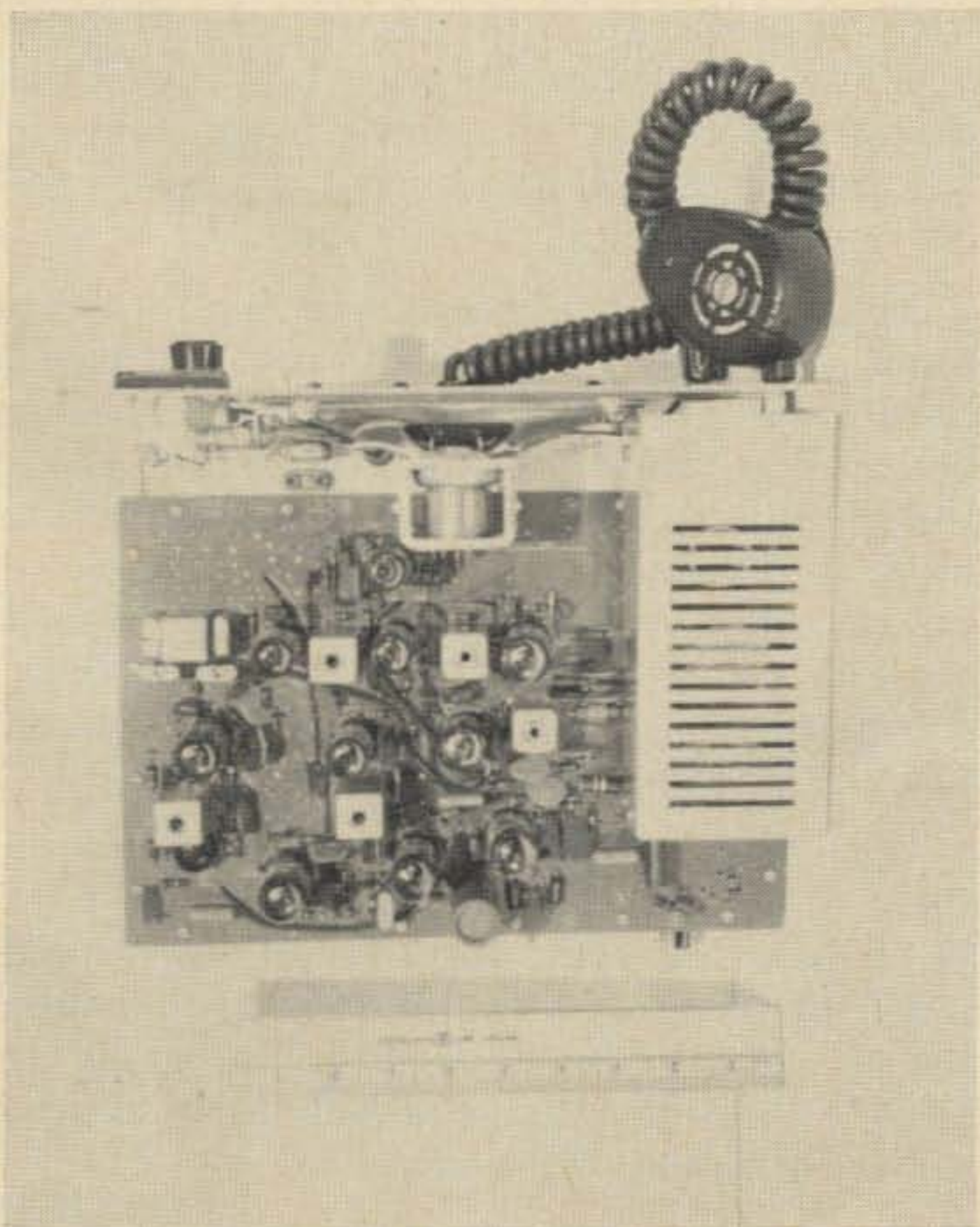
Operating was real fun and contacts were made like back when I first got my ticket many years ago. Actually with sideband it didn't seem so crowded. Maybe this was due to the sharp crystal filter in the HW18-3. Enough of the operation of the rig, so now on to the technical.

Enough has been said in the past on the ease of construction of a Heathkit that I won't go into it here. No trouble was encountered in tuning and adjusting. The only trouble was that the HW18-3 takes 250 volts on the low side and both my power supplies were wired for the 300 volts. Since I wanted to use the same supplies for both rigs a switch was installed in both the ac and the dc supplies. By the way, a newer HP23A supply has the switch already installed.

One point that sticks out is that there is no relay used to go from receive to transmit. It's like magic, no relay clatter, the receiver goes dead and as soon as you talk into the microphone the meter swings. This is accomplished with several diodes. The first of which is a clever T-R switch in the antenna circuit where the diode is back biased to cut off so no rf can get to the receiver in the transmit position, but in receive the diode is like a short circuit. I checked with a calibrated signal and found no difference with the diode shorted out or with it in the circuit. While transmitting, the unused portion of the receiver is also biased quite high so that it is completely cut off. A T-R amplifier tube is controlled by the PTT switch on the microphone and this places the high positive bias on the T-R diode. This same portion of the PTT switch also control the negative bias on the receiver tubes, which are cut off when transmitting.

Except for the control system mentioned above, the circuitry is pretty much a standard dual conversion filter type transceiver. The *if* is the usual Heath 3395 kHz. A four crystal lattice filter gives good selectivity of about 2.1 kHz.

The transmitter ends up in a pair of 6GE5 beam power tubes. "Sylvania News" tell us that these tubes can be run in SSB service 1.25 times their regular rating which would be about 175 watts for one of them. Since Heath only runs them at 100 watts (200 PEP) they are not working too hard.





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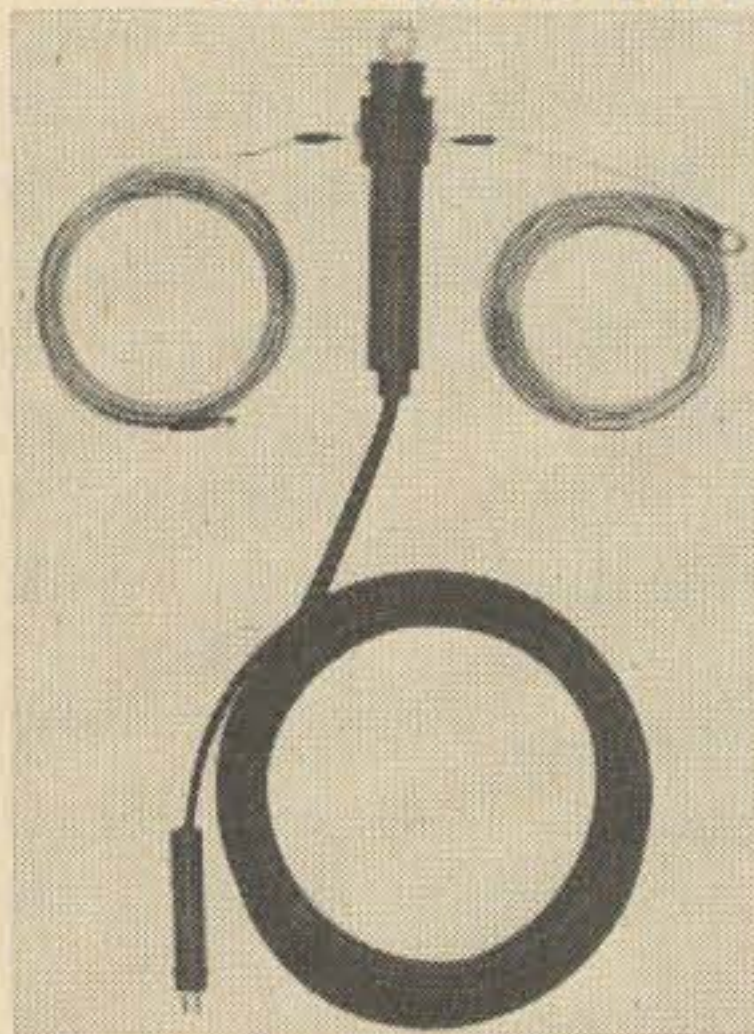
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Provision is made to run in the AM mode by a front panel switch. In the AM position a minimum of 40 watts is run in the final and this is single sideband with carrier so that it appears much stronger than 40 watts of straight AM. The ALC action is a bit stronger here than on SSB.

As mentioned above, ALC is incorporated. This is accomplished by picking off any positive audio swing of the grids of the final caused by too much grid drive. The audio is rectified and filtered and used to control the transmitter *if*, mixer and driver tubes. The same circuit was high negative bias applied in the receive position which effectively cuts off the transmitter.

The tune up and alignment was so simple you wouldn't believe it. Adjust the slugs in the *if* coils for highest S meter reading and that is it for the receiver. The transmitter was just as easy. Set the bias, adjust a couple of slugs, then adjust the carrier null.

There is no final adjustment for the transmitter as this is all pretuned to match a 50 ohm antenna.

Checking the output on SSB showed that with a single tone signal, the unwanted sideband was down 47 db and the carrier was 46 db down after the balanced modulator was touched up just a bit. The output was just a bit over 105 watts PEP. On AM with no modulation the output was 20 watts and the modulation increased it. Good on the air reports were received from everyone when using either mode and, of course, the SSB signal was much more potent.

The receiver performance is really something, I thought that the all band receiver I have been using was good but this one is better. You would be surprised at how much the noise is reduced with the sharp 2.1 kHz filter. I didn't think it possible that the 4 crystal filter would be this sharp but I couldn't prove any different. The sensitivity was better than the 0.5 microvolts that Heath claimed by about .01 microvolts.

With the new FCC changes for 160 meters there should be a lot of activity this year. Here is quick easy way to get there and much better than a transverter. My antenna leaves a lot to be desired so I'm going to have to do something about that, maybe a vertical on top of the tower.

... W8QUR