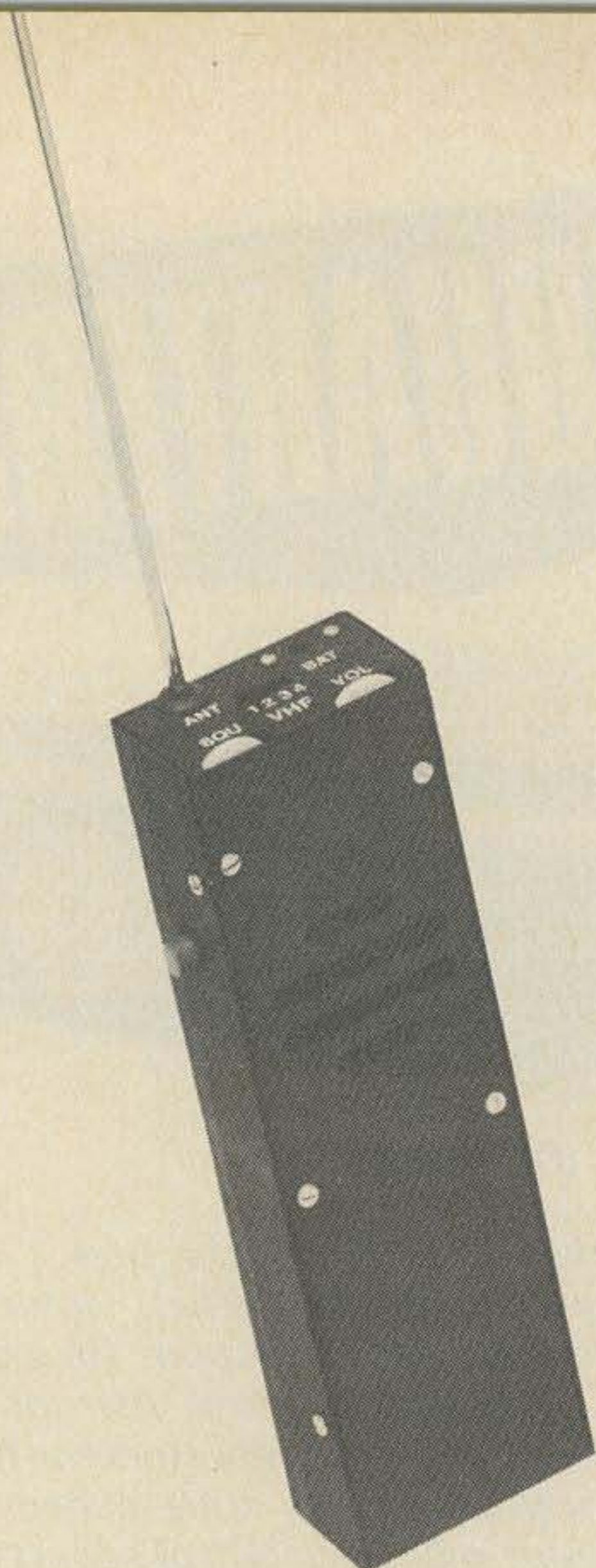




The New HT-144B Hand Held

2m FM has produced some drastic changes in amateur radio. No longer is the radio amateur limited to communication from his home station or from his car. By using small hand held units on 2m, the amateur can carry on communications from areas which were inaccessible in the past from a communications standpoint. Communication via hand held units is not only useful from a "rag chew" standpoint, but is extremely valuable in times of emergency or disaster. Because of the heavy participation of hams in times of emergency it has become the goal of most amateurs who operate 2m to own some type of hand held equipment. Unfortunately, most of the equipment in this category is somewhat costly being in the \$200 and up range and the majority of the HTs are made outside the country. In addition most of the hand held units cannot be maintained by the average ham. In cases where a problem develops, the unit must go back to the factory. Since the units are foreign made, it is difficult to obtain spare parts or vital subassemblies. For these reasons, a large

number of 2m operators have put off the purchase of that desirable "HT."

VHF Engineering in Binghamton NY has introduced a low cost hand held kit for 2m which almost every 2m amateur should be able to afford. This kit provides a simple, inexpensive answer to 2m FM operation. The unit is designated the "HT-144B" and is described in detail in this article.

Specifications

The HT-144B is manufactured by VHF Engineering in Binghamton NY and is available in kit form through the manufacturer or through dealers across the nation. The kit is very complete and includes all parts except the nicad batteries and the charger. These items are available as accessories. One set of crystals is included, your choice of 94-94, 52-52, or 34-94.

The transmitter puts out a minimum of 2W on one of four crystal controlled channels at 2m. Modulation is accomplished by using a speaker/mike into an amplifier driving a varactor modulator. Netting

trimmers are provided for all four channels.

The receiver is rated at $.35\mu\text{V}$ for 20dB quieting and puts out .5W of audio, .25 squelch/sensitivity. A pair of crystal filters provides adjacent channel rejection of 60dB.

While four channels may not seem to be enough, most HT owners that I talk to say that four channels are sufficient. But no matter how many channels you have, you wish you had more. By limiting the number of channels to four, the manufacturer has kept the cost of the unit to less than \$130. This is a remarkable buy in these times of inflation.

Construction

The HT-144B consists of a main PC board on which all components are mounted and a tiny PC board for the crystals and the crystal switch. The main PC board is made of epoxy glass and has the parts layout silk screened on the top. By using a silk screened board, the manufacturer has simplified parts placement and the overall construction of the unit. Parts layout is good and not crowded.

The case is made of black, wrinkle-finish aluminum and is very rugged. The case is large enough for the boards and the batteries and has a considerable amount of room left over to house PL tone encoders and the like. The outside of the case is smooth and has enough area to hold a small touch tone pad. There is a jack on the top for use with the optional battery charger. The HT-144B comes with a telescoping antenna. However, an external antenna or a stubby flexible antenna may be used by mounting a BNC connector in the 95mm (3/8") hole provided.

The HT-144B is very easy to build and can be constructed by anyone who has had minimal experience building kits or ham equipment. This kit, however, is not for the arm chair amateur as it requires some knowledge of schematic diagrams and the ability to solder with a low wattage soldering iron. The only tools needed are a soldering iron (26W preferably), solder, screw drivers, pliers and wire cutters. Construction time for the average ham should run about 7 to 12 hours. The instruction manual is clear and concise.

Theory of Operation

The transmitter consists of 7 transistors in a unique design. A speaker/mike drives a 4 transistor cascaded amplifier which in turn modulates a crystal oscillator with a varactor diode giving true FM. The oscillator uses 18MHz crystals and quadruples to 72MHz. The second stage doubles to 144MHz and drives the 2N5389 to 2W output. Both the oscillator and driver use the readily available, inexpensive 2N3866. The output stage is somewhat under rated and because of this does not need a heat sink. All stages are optimized to conserve battery current.

The receiver uses a MOSFET front end, 3N204, and has more than enough gain for the first mixer, a 2N5222. The first mixer feeds a pair of high quality 2-pole crystal filters at 10.7MHz. The second mixer is a 4 transistor cascaded limiter/i-f stage feeding a ceramic discriminator at 455MHz. The audio output IC is a readily available MFC6070. The squelch circuit consists of a noise amplifier which amplifies high frequency noise. The presence of noise causes a MPS5172 switch to cut off the MFC6070. The absence of noise, such as when a signal is present, causes the MFC6070 to be turned on. Squelch operation is smooth and reliable with this circuit.

Switching is accomplished with a double-pole double-throw switch mounted on the side of the main PC board. Both antenna and battery voltages are controlled by this switch.

Performance

I built my unit without benefit of an instruction manual since I managed to scrounge a pre-release unit so I could write this article. The only problems that I had were one bad solder joint and one misplaced component. These problems were found quickly with the help of a 10MHz scope once the batteries were connected to the unit. In practice, a scope or other sophisticated tool should not be needed if a little care is taken with component placement and soldering. The PC board has the placement of all components marked clearly, so it is next to impossible to make a mistake unless you rush as I did.

Tune up is very simple. The instructions call for the use of a signal generator to tune up the receiver. I don't think that the signal generator is really necessary, since I found that even in the untuned condition I could copy signals several miles away. So, I tuned my receiver up on the air.

Tuning up the transmitter is also very simple. Merely connect a wattmeter or a light bulb (#47 bulb) to the output connection and tune for maximum output. A voltmeter is useful to help tune some of the coils, but may not be necessary in all cases.

My HT-144B measured 2.2W out on a Bird termiline wattmeter. The meter measured .3 μ V for 20dB quieting and the squelch opens at .2 μ V. I have used this rig in the Hartford area for several months now with excellent success. I have owned other HTs in the past and I feel that this unit will equal anything on the market today. The unit meets all advertised specs as far as I can determine. The only complaint that I have is that the transmit audio is slightly bassey, but not to an objectionable degree. This is typical of HTs using a speaker/mike.

Up to 6 kc deviation has been provided showing quite an improvement over the earlier HT-144.

Conclusions

After having built and operated my VHF Engineering HT-144B, I am very pleased and feel that it is a best buy in HTs at this time. You can't even come close for less than \$199.00. I do offer a few cautions however. Schematic reading ability is not an absolute requirement for building this kit. However, the ability to properly solder is. You must be able to solder without dropping globs of solder all over the board and without applying too much heat to the components on the board.

After building this HT kit you will have an inexpensive, well performing unit that you can repair yourself. I recommend it highly.

...W1HCI

CRYPTOGRAM

ZSEDSF USZZQVS CDKU MJYXOG
SXJFKD: ZBQLS HL KD SOZS! FSOO FBS
XQUYSX CEE ABQF GKH FBJYM DS
LDKCLKZSXDSVZ.

Joseph A. Kramer WA9DJR
14 East Jackson Blvd.
Chicago IL 60604

TVI FIXIT

Recently I purchased one of those "gizzards in a box" transistorized TV sets for the XYL and paid enough to get that commercial linear. When I stayed on CW I was in the clear but when AM or SSB, that TV tuned as broad as a barn and a high pass filter didn't help. I knew my rig was clean and two black and white sets had no interference. What to do?

I made up a three wire short line cord. Four feet long, to be exact, and covered it with the braid from a piece of coax. The plug I used had a two screw metal clamp and the braid was placed just under the metal ring. Green wire to green plug terminal, white to white, etc. At the other end I attached one of those noise filters that are quite plentiful in surplus, white and black to the input and the braid soldered to the case. I cut the TV cord short (about 9 inches) and soldered it to the output terminals of the filter. The interference filter was attached to one of the back screws that hold the back firm at chassis. Another wire grounded the power supply and the set chassis. While I was at it I put a small fan underneath the cabinet to carry off some of the heat, since I was surprised how hot the wood cabinet was when operating.

No TVI, and what a beautiful picture improvement. Fantastically true colors, a new revelation in color TV. Not to mention a happy XYL, and the OM can operate again!

...WA9DJR