

Classic Radio

The Heathkit DX-40 and Hallicrafters S-38: Faithful Old Friends

The Heathkit DX-40

The DX-40 transmitter first appeared in Heathkit advertising in 1958. It sold as a kit for \$64.95. That would be \$574.56 in today's dollars. It was the perfect transmitter for a beginner because it included an AM phone modulator. It featured 75 W of input power with three switch-selected crystal positions. Later, after earning a General-class license, I added a VFO to operate on AM phone.

The circuitry of this transmitter was a combination of cost- and complexity-saving innovations. It consisted of a power supply, three RF stages, two dual-triode audio stages, and an RCA-6146 amplifier. An antenna tuner wasn't necessary because the Pi network output coupling could match a range of antenna impedance from 50 to 1,000 Ω. Later, I purchased a Heathkit SWR bridge to make tuning more accurate and convenient.

Controls were similar for all transmitters of that era. There was a key jack, a function switch, a band switch, grid drive control, a pilot light, final amplifier tuning, antenna tuning, and a meter switch. The microphone connector, crystal switch, output connector, VFO input, and auxiliary power socket were on the rear chassis apron.

Always seeking ways to make use of inexpensive components and less complex circuits, the engineers at Heathkit

came up with some very clever and unusual designs. One was to run the 5U4GB full-wave rectifier above its maximum-rated plate voltage. Heathkit had tested this, and there weren't any problems. Also, power to the oscillator and buffer circuits were run in series directly from the 600 V supply, thus making a low-voltage supply unnecessary.


Heathkit took into consideration that these kits would be built by beginners. The manual stated, "The step-by-step instructions in this manual have been covered in considerable detail. Read each step completely through and be sure it is understood before proceeding. This will assure that a complicated step is performed in the proper sequence."

This advice helped me throughout my ham career as I built Heathkits ranging from the venerable 6-meter Benton Harbor Lunchbox to the HW8 QRP transceiver, the SB-200 600 W RF amplifier, and a very complex dual-



Dennis, W4DNN, operates this vintage station with the addition of the Vibroplex Bug.

phone 5 w transmitter 50



HEATHKIT By Dynatron

DX-40 PHONE AND CW Transmitter KIT

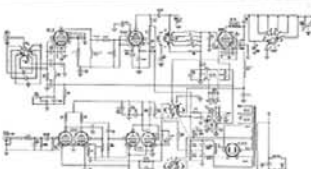
FEATURES

- 6146 final amplifier for full 75-watt plate power input.
- Phone and CW operation on 80, 40, 20, 15, 11 and 10 meters. Pi network output coupling.
- Switch selection of three crystals—provision for external VFO excitation.
- On/Off movement panel meter indicates final grid or plate current.

\$64.95 MODEL DX-40

SPECIFICATIONS

Power Input	75 watt CW, 100 watt peak envelope
Output Impedance	50-1000 Ω
Output Capacity	40-1000 pF
Operating Frequency	Crystal VFO, CW, Phone
Band Selection	80, 40, 20, 15, 11, 10 meters
Tube Complement	6146 Final Amplifier, 6X4 Rectifier, 6BE6 Detector, 6X4 Buffer, 6X4 AF Amplifier, 6X4 AF Amplifier, 6X4 AF Amplifier, 6X4 AF Amplifier, 6X4 AF Amplifier, 6X4 AF Amplifier
Power Requirements	117 volts AC, 60 cycles, 1 1/2 amps
External Bus	1/2" x 1/2" x 1/2" 1/2" x 1/2" x 1/2"
Net Weight	11 lbs.
Shipping Weight	15 lbs.



The DX-40 is an entirely new transmitter, featuring increased power, clean tuning characteristics and stability made possible by the efficient circuit design. An ideal rig for the novice who intends to operate on phone as soon as he gets his general-class ticket, yet needs a CW rig on the meantime. Experienced hams also will find the DX-40 appealing since it provides the phone and CW facilities desired in a low-power rig.

The plate power input of the model DX-40 is 75 watts on CW, and peaks to 100 watts with controlled-arc phone modulation. It covers 80, 40, 20, 15, 11 and 10 meters with single knob bandwidthing. Pi network output coupling is employed for easy antenna loading. The antenna coupling is also featured between the buffer circuit and the final amplifier thus improving stability and attenuating the higher order harmonics, reducing the possibility of interference. A line filter is incorporated to prevent RF radiation through the power line. The efficient oscillator and buffer circuit provides adequate drive to the 6146 amplifier from 50 to 10 meters even with an 80 meter crystal. A drive control adjustment provides excellent modulation to minimize driver requirements. A line-position function switch provides an extra "tune" position, allowing you to switch on the oscillator without the final amplifier being on, so the operator can locate his own signal on the band. Turning the buffer stage to proper drive level before the final is an also prevents the possibility of damage to the final amplifier tube.

The tube lineup features a 602-B Colpitts oscillator, 6X4 buffer, 6146 amplifier, 12AX7 dual-triode speech amplifier, 6BE6 modulator, and a Peaky-duty 6X4GB rectifier. The modulator circuitry features an audio frequency shaping network allowing a higher average output level on voice frequencies where it is required. Provision is made for three crystals. A four-position switch selects any of the three crystals or a jack for external VFO. The crystal sockets are easily accessible through a "rear door" in the base of the cabinet. An external VFO (variable frequency oscillator) can also be used to excite the transmitter for the general or advanced class ham. Power for the VFO is available at a socket on the rear apron of the chassis.

Top-quality components are used throughout. The transformers are potted types, ceramic sockets are used in the final RF circuit, all coils are pre-wound, etc. The circuit features liberal shielding and careful physical placement of components and leads for stable operation. The circuit design has been extensively tested "on the air" with excellent results, assuring you of the best operating performance. Besides being carefully designed both electrically and physically, the styling of the DX-40 is outstanding. Two large knobs on the front panel control antenna and final tuning. Between them is a switch for the easy-to-read front-panel meter with a 1/2" movement that indicates final grid or plate current. The function switch is at the lower left, providing selection of all, tune, identify, phone and CW. The drive control is in the center. The key jack is at the extreme left, and a pilot light is at the extreme right. Its attractive and professional appearance is in keeping with the fine operation it can provide for you in your home shack. You can build this rig yourself and be proud to show it off to your fellow hams. Assembly instructions are complete in every respect. The manual contains complete step-by-step instructions that are laid-out clearly with large pictorial diagrams, to prevent costly mistakes. Assembly proceeds smoothly from start to finish even for an individual who has never built electronic equipment before. Whether you are a neophyte or an old timer, you will find the DX-40 a very worthwhile addition to your home shack. 10" x 10" x 10" 1/2" x 1/2" x 1/2" 1/2" x 1/2" x 1/2"

An advertisement for the DX-40 in a 1958 Heathkit catalog.

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trace oscilloscope. It was so sad to see this great resource bite the dust.

The Hallicrafters S-38

For many hams, the S-38 was their first introduction to the magic of the shortwave bands, foreign broadcasting, and then ham radio. When it first made its appearance in advertising in 1946, it was priced at \$47.50 (\$655.69 in today's dollars). I purchased mine for about \$25.

This entry-level receiver was an ac/dc radio, which was very common at the time. That makes it a dangerous radio to mess with because there is no transformer to isolate the metal chassis from the power line. The S-38's six tubes function as a converter, an IF amplifier, a combination detector/AVC/AF, a BFO/ANL, an audio output, and a rectifier.

The S-38 could receive the AM broadcast band, shortwave, and amateur radio (with a band-spread dial to make tuning easier). It could receive CW with a fixed-frequency BFO (beat frequency oscillator), which was activated by a switch on the left side of the panel. Audio was heard from either a built-in speaker or plug-in headphones. The receiver could be silenced with the **RECEIVE/STANDBY** switch on the left side of the panel.

A very obvious downside to trying to navigate today's bands with an entry-level vintage receiver is lack of selectivity. While not as evident during the bottom of the solar cycle, the bands can be packed with signals during good conditions. An outboard DSP or audio filter is a must.



An ad for the RCA-6146 amplifier tubes.

Operating a Vintage Station

To operate my vintage station today, I use the transmitter, receiver, and an antenna T/R relay. An old Dow Key relay toggles the antenna between transmitter and receiver, and it also has contacts that can put the receiver into standby mode during transmission. The receiver audio provides a side-tone to hear my transmit keying. The relay grounds the antenna during transmit, and before transmitting, I manually turn down the gain.

To use crystal control, I call CQ on one of my crystal frequencies and listen for a reply, or I listen and wait to transmit when I hear a nearby station. Adding the VFO is a game changer. If I hear a station calling CQ, I only need to switch the VFO to **TUNE**, and rotate the dial to zero beat his frequency. If the transmitter is tuned for this part of the band, I just hit the key and transmit.

Tuning a Vintage Transmitter

If the transmitter is not set up for the band I want to work or is not close to my desired frequency, I need to switch the transmitter from **STANDBY** to **TUNE**, switch the meter to **GRID**, and adjust grid current for maximum. Then I switch the meter to **PLATE CURRENT**, and adjust the final tuning control to minimum plate current. This adjusts the final tank circuit to resonance. I then increase the antenna tuning or loading control. The plate current will rise. I dip the plate control again to minimum plate current. I repeat this two-handed operation until any further increase in the antenna loading control can no longer be dipped, around 125 mA. Now the transmitter is ready to go. With practice, this whole procedure can be done in a few seconds. It sure makes an old ham appreciate today's carefree transceivers.

Trying the Classics

Getting on the air with a vintage station can be a rewarding challenge, especially when using gear that is older than you. Many old transmitters and receivers are worth trying out, especially the old Heathkits that come at a modest cost. Ham radio is never boring. There is always something new to try. In this case, something new can be something old.

Going places (AGAIN)
hallicrafters

3 GREAT RECEIVERS designed and priced for hams who are going places, too

Model SX-42 Described by hams who have operated it as "the first real power receiver." One of the finest CW receivers yet developed. Greatest continuous frequency coverage of any communications receiver—from 500 kc to 110 Mc, in six bands. FM-AM-CW. 15 tubes. Matching speakers available. **\$275.00**

Model S-40A Function, beauty, unusual radio performance and reasonable price are all combined in this fine receiver. Overall frequency range from 500 kc to 45 Mc, in four bands. Nine tubes. Built-in dynamic speaker. Many circuit refinements never before available in medium price class. **\$89.50**

Model S-38 Overall frequency range from 500 kc to 50 Mc, in four bands. Self-contained speaker. Compact and rugged, high performance at a low price. Makes an ideal quantity receiver for hams. CW pitch control is adjustable from front panel. Automatic noise limiter..... **\$47.50**

A 1947 Hallicrafters receiver ad.