

Heathkit of the Month #25:
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Heathkit AT-1
Introductory CW Ham Transmitter

Introduction:

We briefly touched on this Heathkit back when the DX-40 was covered (see the April 2008 RF - HoM #3). However, the AT-1 was the first ham transmitter offered by Heathkit and deserves an article of its own.

Heathkit introduced the AT-1 in 1951 when ham radio was in a simpler time. This coincided with the FCC implementing a new ham radio licensing structure which included a new introductory class, the Novice. Novices were allowed privileges in small CW segments of the 80 and 11 meter ham bands. They could run up to 75 watts input power but the transmitter had to be crystal controlled. The AT-1 is shown in figure 1 as it appeared in a 1951 Heathkit flyer.

The AT-1 offered an inexpensive transmitter for the novice that could allow him or her to use

additional features after upgrading to a higher license. The three tube AT-1 ran 35 watts input, CW only with crystal control. The AT-1 did have connections for an external VFO and an AM modulator. Heathkit introduced the VF-1 VFO in 1952, but never offered a modulator, per say. The AT-1 sold for \$29.50.

Circuit Description:

The AT-1 circuit consists of three sections, the power supply, an oscillator - multiplier section and the output amplifier - doubler section; each uses one tube. A schematic of the AT-1 is shown in figure 2.

The transformer power supply section uses a 5U4GB rectifier tube in a simple full-wave, capacitor - choke - capacitor circuit. The transformer provides 860 volts AC center tapped, 5 VAC for the rectifier filament and 6.3 VAC for the other two tube filaments and the accessory socket. Each filter capacitor provides 4 µF by series connected 8 µF capacitors. A pair of series bleeder resistors complete the supply. The standby switch opens the secondary HV center tap lead to remove voltage from the oscillator and amplifier when receiving.

The oscillator uses a 6AG7 metal octal pentode as a grid-plate Colpitts crystal oscillator. The

Heathkit AMATEUR TRANSMITTER KIT

Here is the latest Heathkit addition to the ham radio field, the AT-1 Transmitter Kit, incorporating many desirable design features at the lowest possible dollar-per-watts price. Panel mounted crystal socket, stand by switch, key click filter, AC line filtering, good shielding, etc. VFO or crystal excitation — up to 35 watts input — single knob band switching — pre-wound coils — built-in power supply, 52 ohm coaxial output, all represent outstanding Heathkit features. Built-in power supply provides 425 volts at 100 ma. Amazingly low kit price includes all circuit components, tubes, cabinet, punched chassis, and detailed construction manual. (Crystal not supplied.)

NEW HEATHKIT ANTENNA COUPLER specifically designed for the Heathkit AT-1 Transmitter. Can be used with any 52 ohm coaxial input — up to 75 watts power. Low pass filter with a cut-off frequency of approximately 36 mc — L section tuning network — neon tuning indicator — rugged compact construction — transmitter type variable condenser and high Q coil are featured. The AC-1 has both inductance and capacity tuning for maximum operating versatility. Shipping wt. 3 lbs., cabinet 8 1/8" wide x 4 3/4" high x 4 1/2" deep. **\$14.50**

SPECIFICATIONS

Range.....80, 40, 20, 15, 11, 10 meters
 6AG7.....Oscillator multiplier
 6L6.....Amplifier doubler
 5U4G.....Rectifier
 105-125 volts AC 50/60 cycles 100 watts
 Dimensions.....8 1/8" high x 13 1/8" wide x 7" deep

MODEL AT-1
\$29.50
 SHIP. WT. 16 LBS.

Figure 1 - Ad from 1951 Heathkit Flyer

plate circuit can be either untuned or tuned and when tuned the stage may operate as a multiplier. The frequency of the crystal used depends upon band as shown in Table 1.

Freq.	Xtal Range		Band	Osc.	Multiplier	
Band	Low	High	Sw.	Out	Osc.	Amp.
80 M	3500	4000.0	80 M	3500	x1	x1
40 M	3500	3650.0	40 M	3500	x1	x2
20 M	3500	3587.5	20 M	7000	x2	x2
20 M	7000	7175.0	20 M	7000	x1	x2
15 M	5250	5362.5	10 M	10500	x2	x2
11 M	6740	6807.5	10 M	13480	x2	x2
10 M	3500	3712.5	10 M	14000	x4	x2
10 M	7000	4000.0	10 M	14000	x2	x2
10 M	14000	14850.5	10 M	14000	x1	x2
Band in Meters (M) – Others in KCPS [kHz]						
Table 1 – AT-1 Freq. Multiplier Chart						

The amplifier stage uses a 6L6 metal octal tube. On 80 meters it runs straight through and on the other bands, depending on the crystal used acts either as a doubler or runs straight through. The output stage does not offer a Pi-network, which is not yet well known; instead it is link coupled and loading for best output requires an antenna tuner, such as the AC-1 (see the Feb 2009 *RF* - HoM #13). Though the ad says 35 watts input, the Heathkit manual more realistically specifies the AT-1's input power at 25 - 30 watts.

TVI:

Television was finding its way into homes in the early fifties and TVI became a dilemma for many hams. The AT-1 took a series of precautions to help prevent TVI. The AC power line leads were bypassed, shielding was used throughout the AT-1 and the manual included a chapter on TVI including how to build a low pass filter for the transmitter, a high-pass filter for the TV and an RF line filter for the AC line.

Controls:

The T-1 is simple to operate. The front panel is laid out in three rows. The top row just has a basic meter that measures grid or plate current. The second row has the **Driver** tuning control (0 - 10), the **Band Switch** (80M - 40M - 20M - 10M) (the 10M position is also used for 11 and 15 meters), and the **Output** tuning control (0 - 10). The third row has the Crystal socket, power **OFF - ON**, meter switch marked **Current (Grid - Plate)**, **Plate-on - Standby** switch, and a 1/4" **Key** jack.

On the rear, left to right is an octal socket for an external modulator, the power line cord, an SO-239 antenna connector and a second octal socket for an external VFO. The modulator socket requires an external octal plug that shorts pins 3 and 4 for normal operation when no modulator is in use.

AT-1 Specifications	
RF Amp Power Input	25 - 30 watts
Output Connection	52 ohm Coaxial Cable
Oscillator Operation	Crystal (VFO can be used)
Band Coverage	80, 40, 20, 15, 11, 10 Meters
Tube Complement	
5U4G	Rectifier
6AG7	Oscillator - Multiplier
6L6	Amplifier - Doubler
Power Requirements	105-125V 50/60 Cycle, 100W
Cabinet Size	8-1/8"H x 13-1/8"W x 7"D
Net Weight	13 lbs.

Conclusion:

The Heathkit AT-1 was manufactured through 1956. By then the higher power DX-100 (see the Sept. 2008 *RF* - HoM #8) had become very popular with advanced hams and bred the DX-20 and DX-35 as replacements for the AT-1.

Many new hams, starting as Novices in the early fifties, used the AT-1 as their first transmitter. The AT-1 can still be found on eBay. They sell on the average of \$100 each in prime shape and a collector grade unit can go for over \$300. Ones in less than prime shape can be had for under \$30.

