Heathkit of the Month:
by Bob Eckweiler, AF6C

The Heath HD-1424 Active Antenna

Introduction:

An active antenna is a handy addition to the shack if you have a second receiver that you use as a monitor, or if you enjoy doing some shortwave listening. This is especially true if you only have one antenna and must switch it to the spare receiver, or worse unplug the antenna and move it to the other radio. When you need to fire up the rig in a hurry usually the antenna is connected to the wrong device. Things gets worse if you transmit before you find the antenna is disconnected! Also, if you restore communications receivers, an active antenna can be a really handy tool.

The Active Antenna:

So what is an active antenna? It is a short vertical whip, much like one on a portable radio that is directly connected to a powered amplifier (hence the term active). The output of the antenna is a 50 Ω connector that connects to the receiver via a short length of coax.

From antenna theory we know that a short vertical has a very low radiation resistance and is highly capacitive. Since its radiation resistance is very low, any series resistance or ground loss severely deteriorates the antenna efficiency. The active antenna provides electronics right at the base of the antenna that is designed to efficiently match the very low impedance of the antenna and amplify signals to the point where they are at a reasonable level. The signal is then matched to a 50 ohm load and sent via standard 50Ω coax to the receiver. The active antenna is a receive only antenna. transmitting into it would cause damage and probably smoke!

The HD-1424(A):

The Heathkit HD-1424 Active Antenna was first sold in 1985. It came in a brown cabinet with black screw heads and white silkscreening. The word Heathkit on the front was in red. This scheme was in line with much of the ham gear of that day such as the HW-9 QRP radio. In 1989 a newer HD-1424A replaced the original model. It appears to be identical except for a new cabinet. In a service note Heath wrote: *The communications products are changing from a brown to a black/gray color scheme.* The Heath logo on the new scheme was in pale yellow instead of red. Little ham equipment was manufactured with the new colors because Heath was starting to get out of the kit business. In early 1992 it offered its last non-educational kit. The HD-1424 Active Antenna cost $49.95 in early 1987. In the Winter 1990 Catalog the 'A' model sold for $59.95.

Electronically, the HD-1424 contains two cascaded FET source followers to increase the low impedance signal from the attached 24-inch collapsible whip antenna. The input of the first source follower is tuned with a simple LC circuit. Inductors are switched in to cover 300

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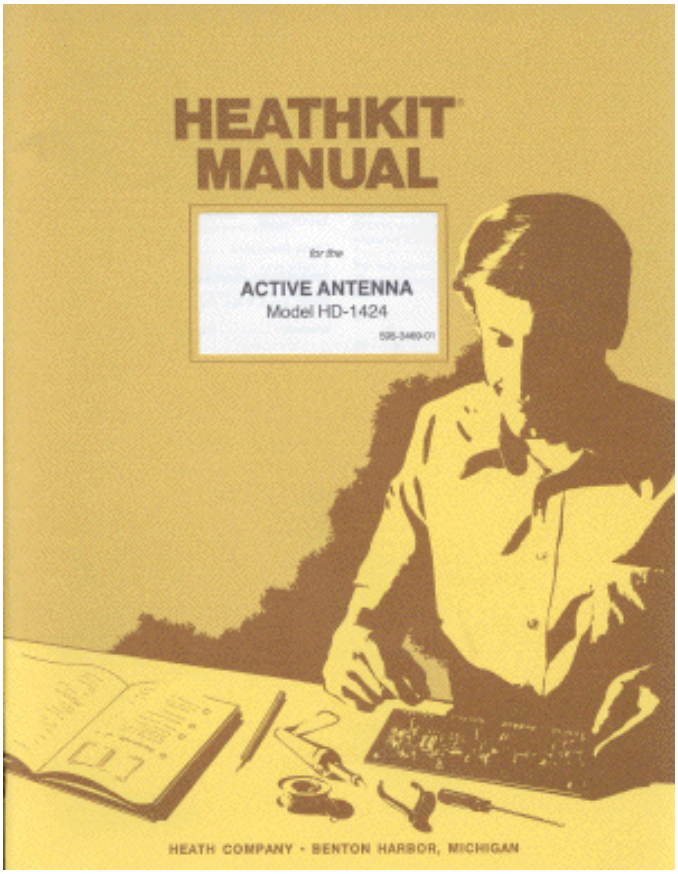
KHz to 30 MHz in five bands. Besides the TUNING and BAND knobs on the front panel, there is also a GAIN control that adjusts the signal level between the second source follower and an output amplifier that drives the 50Ω output to the receiver's antenna input. An OFF-ON slide switch applies power and switches the active antenna into the circuit. When off, the attached vertical whip and external antenna connector are directly connected to the output to the receiver. An LED power indicator is also on the front panel. Heath's design is well laid-out and the circuit remains stable independently of the gain and frequency settings.



The HD-1424 can also be used as a receiver preamplifier with a regular antenna. With the tuned circuit it helps eliminate images in older single conversion receivers, such as an old HQ-129X that used to haunt the shack. It also gives older receivers better sensitivity, especially on the higher frequencies where it is most needed.

Power for the HD-1424 is supplied by an internal 9-volt transistor battery (NEDA #1604). An unconventional mini-phone jack on the rear allows external power to be applied (6 - 14 VDC @ 45 ma). Using a mini-phone plug for the power can easily result in a short when inserting the plug into the HD-1424 or when unplugged and left on a cluttered workbench. Why Heath chose this type plug for power is a mystery. Heath sold the PS-2350 separate wall-wart battery eliminator for $7.95.

HD-1424 Specifications (from the Manual).

Frequency Range:	300KHz to 30 MHz.
Antenna Provision:	Collapsible 24-inch (supplied), or external 50 Ω.
Power Rqmts:	9-volt alkaline battery or external 6 to 14 volt (45 mA) source. Model PS-2350 power cube recommended.
Dimensions:	2-1/4"H x 5-1/8"W x 5"D.
Weight:	1.4 lbs.

Performance:

To give some idea of the performance one can expect with the HD-1424 Active Antenna my R-2000 receiver was tuned to KNX during daylight hours. With the active antenna turned off so the receiver is just using the supplied 24" whip, KNX was audible with a lot of noise and no deflection of the S-Meter. When the HD-1424 is turned ON the signal immediately becomes noise free and the S-meter indicates S9 + 40 dB. This is with the GAIN set at half scale and the BAND and TUNING peaked for the receive frequency. In a similar test, WWV on 20 MHz showed an increase from S0 to S9 + 10 dB with an impressive decrease in noise.

An active antenna works well on the workbench too. It is easy to take out to the garage when you are tuning up an old receiver, or pack up and take along when traveling. SWL'ers who live in areas that limit antennas can still get decent reception without an outdoor antenna.

SUMMARY:

While the Heathkit HD-1424A is no longer being manufactured, other models are available from sources such as MFJ and RF Systems.

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You can still find The HD-1424/A on eBay, though they are one of the more cherished kits and usually command a good price The HD-1424 is one Heathkit that doesn't sit in the closet until needed. It is in use on almost a daily basis with my R-2000, 51J4 and SB-303 auxiliary communications and ham receivers.

73, from AF6C

Remember if you come across any old Heathkit Manuals or Catalogs that you do not need, please pass them along to me.
Thanks - AF6C

This article originally appeared in the July 2008 issue of RF, the newsletter of the Orange County Amateur Radio Club - W6ZE.

SCHEMATIC OF THE HEATHKIT® MODEL HD-1424 ACTIVE ANTENNA

NOTES:

1. All resistors are rated at 1/4-watt and have a 5% tolerance unless otherwise noted. Resistor values are in ohms (k = 1,000; M = 1,000,000).
2. Capacitor values are in µF (MICROFARADS) unless otherwise noted (pF = PICOFARADS).
3. ○ This symbol indicates a connection to the circuit board.
4. ⏚ This symbol indicates chassis ground.
5. ▽ This symbol indicates circuit board ground.
6. ⬭ This symbol indicates a DC voltage taken with a high- input impedance voltmeter from the point indicated to chassis ground (voltages are ± 20%).
7. Refer to the "X-Ray View" for the physical locations of parts on the circuit board.
8. Switch SW1 is shown in the OFF position.