

## HEATHKIT - The Early HI-FI Years

by Charlie Kittleson

### POST-WAR HI-FI IN THE US

Hi Fi for the home really got a boost in the years immediately after World War II. Returning GIs got their first taste of live classical music while stationed in places like Italy and France. They enjoyed the experience and liked what they heard. But when they returned to the States after the war to play back such recorded performances, they found most of the audio equipment available at the time to be mediocre at best.

Many of the early audio enthusiasts had military training in electronics or were radio enthusiasts who were able to construct their own amplifiers and speakers using old radio parts and war surplus electronics and following plans published in enthusiast publications like *Radio Electronics* magazine.

In Great Britain, about the same time, similar trends were developing. Then, in 1947, a monumental event occurred in the world of audio. D.T.N. Williamson developed the famous Williamson Amplifier circuit and published the plans with a schematic in *Wireless World*, a British electronics publication. The Williamson design was one of the first amplifiers to effectively combine feedback, a high quality output transformer, specially-designed front-end topology and the British high performance valve — the KT-66. The front-end circuit consisted of a voltage amplifier, a split-load inverter and a non-inverting differential pair. It produced 15 watts RMS.

D.T.N. Williamson's creation delivered performance that was nothing short of sensational. It was the first post-war amplifier design to be widely accepted. Within a few years, several UK and US companies introduced complete "Williamson" type amplifiers such as the Altec-Lansing A-323, Brook 12A3, H.H. Scott 210A and RadioCraftsmen C-500. Many of the American electronics magazines published amplifier plans and schematics based on the Williamson design. American versions of the Williamson amp typically used 6L6 or 807 type output tubes, dual 6SN7 front-end tubes, and a high-quality output transformer such as the UTC LS-55 and LS-57 or similar designs from Chicago,



## Build it YOURSELF

### Heathkit HIGH FIDELITY PREAMPLIFIER



MODEL WA-P2

formance and most attractive in appearance. Fulfills every requirement for true high fidelity performance. Shpg. Wt. 7 lbs. .... **\$19.75**

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Model W-5M consists of main amplifier and power supply on single chassis with protective cover. Shpg. Wt. 31 lbs. **\$59.75**

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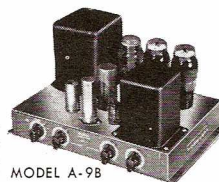
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### HIGH FIDELITY 20 WATT AMPLIFIER

This particular 20 watt Amplifier combines high fidelity with economy. Single chassis construction provides preamplifier, main amplifier and power supply function. True hi-fi performance  $\pm 1$  db, 20 cps to 20,000 cps. Preamplifier affords 4 switch-selected compensated inputs. Push-pull 6L6 tubes used for surprisingly clean output signal with excellent response characteristics and adequate power reserve. Full tone control action. Extremely low cost for real high fidelity performance. Shpg. **\$35.50**

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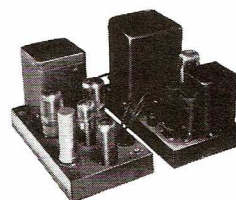


MODEL A-9B

## HEATHKIT High Fidelity "BUILD IT YOURSELF" amplifier kits

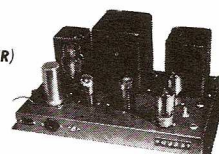
### Heathkit WILLIAMSON TYPE (ACROSOUND TRANSFORMER)

This dual-chassis high fidelity amplifier kit provides installation flexibility. It features the Acrosound "ultra-linear" output transformer, and has a frequency response within 1 db from 10 cps to 100,000 cps. Harmonic distortion and intermodulation distortion are less than .5% at 5 watts, and maximum power output is well over 20 watts. A truly outstanding performer. W-3M consists of main amplifier and power supply. Shpg. Wt. 29 lbs., Express **\$49.75** only. Model W-3 consists of W-3M plus WA-P2 Preamplifier listed on this page. Shpg. Wt. 37 lbs., Express **\$69.50** only.



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This hi-fi amplifier is constructed on a single chassis, thereby affecting a reduction in cost. Uses new Chicago high fidelity output transformer and provides the same high performance as Model W-3 listed above. An unbeatable dollar value. The lowest price ever quoted for a complete Williamson Type Amplifier circuit. Model W-4M consists of main amplifier and power supply on single chassis. Shpg. Wt. 28 lbs., Express **\$39.75** only. Model W-4 consists of W-4M plus WA-P2 Preamplifier. Shpg. Wt. 35 lbs., Express only. .... **\$59.50**



### COMBINATION W-5M and WA-P2



# HEATH COMPANY

A SUBSIDIARY OF DAYSTROM, INC.

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Peerless or Stancor. Properly restored, these amps still have excellent sound.

### THE BEGINNINGS OF HEATH COMPANY

Edward Heath, the company's founder and first president, was originally in the aviation and related parts business. Heath introduced the "Parasol," one of the first airplane kits in the early 1930s. Unfortunately, Mr. Heath was killed in an airplane crash in 1934.<sup>1</sup> The second president, Howard Anthony, carried on the airplane business until after the war. Anthony was very involved in aviation, but always had a strong interest in radio and electronics. When the military contracts for airplane parts dried up, Anthony decided to get into the booming post-war electronics' business. Heath began bidding on war surplus lots and secured millions of pounds of aircraft parts and electronics. Another company bought the airplane parts and Heath kept the electronics. Heath began re-marketing war surplus electronics and selling electronic test equipment through a monthly flyer.

Heath's first kit was an oscilloscope (O-1), they then introduced other types of electronic test equipment including VTVMs, audio oscillators, signal generators, tube testers, capacitor checkers and other units. The kits were meant for anyone, with skills from a novice to an expert, who was interested in electronics. Lots of Heathkits were sold to high schools and colleges to be used by budding future electronic engineers. The kits came with a thorough and well-illustrated assembly manual, with exploded views and large blueprint-like schematics, punched and finished chassis and all the parts needed to complete the project.

### THE FIRST HEATH AMPLIFIERS

In 1947, Heath began selling amplifier kits under the Heathkit name. These were primitive-looking units with all of the components mounted on a single chassis formed from piece of sheet metal. Heath's first amplifiers (A-1, A-2, A-3 and A-4) were developed from circuits found in the *Radiotron Designer's Handbook*. They typically employed a pair of surplus metal type 6L6 or 6V6 outputs and a potted output transformer (probably a Chicago unit). Apparently, not very many of these were sold and few have survived. During the early Fifties, Heath also sold kit tuners including the FM-1 and

FM-2 tube FM tuners. They also featured the BC-1, a mono AM tuner.



A-5

The A-5 (1951) was a 10 watt amplifier featuring a pair of 6L6s and an all octal front end. Note the variable tap power transformer, a surplus unit. It was finished in light silver hammertone. The output iron appears to be a potted Chicago unit. A similar unit, the A-6, followed the A-5 1952.

### HEATH WILLIAMSON AMPLIFIER YEARS



W1-A1

Heath decided to get serious about their audio products during the early Fifties Hi-Fi craze. Responding to the Williamson amp popularity, Heathkit introduced the W1-A1 amplifier kit (\$49.95) in 1952. It was offered as a two-chassis amplifier with the power supply on one chassis and the amplifier on the other. The separate power supply design was used to reduce hum, improve installation flexibility and was connected by an umbilical cord. It was rated at 15 watts RMS. Tube complement included two 6SN7 octal dual triodes for the driver and phase inverter, a pair of 807 transmitting type tetrodes connected in triode for the push-pull output, and a 5U4G full-wave rectifier. A high quality Peerless 16258 output transformer was used. The power supply utilized a potted choke and a potted power transformer, both manufactured by Chicago. The amplifier and power supply chassis were

finished in gray hammertone metallic paint.



W-2M

The W1-A1 was replaced by the W-2M (\$49.95) in 1953. This was a similar design, except for the use of the 5881 beam tetrode introduced by Tung-Sol in 1953. The 5881 was a compact and ruggedized version of the 6L6G. It was capable of more plate voltage (400+) and featured a gold-plated control grid for better stability and longer life. This amp could be configured either triode-connected or pentode connected through the use of additional primary winding taps on the output transformer. The W-2M featured the same two chassis layout as the W1-A1, but the output transformer was an Altec Lansing 20-20 Peerless 16277 and the rectifier was the 5V4G. The chassis were finished in the same gray metallic hammertone paint. The W-2M was discontinued in 1955. Over 8,000 W-2Ms were sold.



WA-P1

Heathkit also introduced the WA-P1 (\$19.95), a compact phono/line stage preamp. The preamp was powered from the power amp (WM-1 or 2) through an umbilical cord. The WA-P1 was a flat, unobtrusive unit that was finished in gray hammertone enamel. It employed a 12AU7 and a 12AX7 in the circuit. Note the extended control shafts which were scored to be cut at half-inch intervals for custom installations.





W-3M

The Heathkit W-3M (\$49.95), introduced in late 1953, was identical to the W-2M except for an Acrosound TO-300 high quality output transformer. This transformer was designed and produced by Herb Keroes and David Hafler of Acrosound Corporation, Philadelphia, Pennsylvania. It featured the famous Ultralinear circuitry that reportedly gave tetrode power with triode sound. Having owned several W-2Ms and W-3Ms, I can tell you that they sound distinctly different. The Peerless unit on the W-2M has a euphonic and romantic sound, while the Acrosound unit on the W-3M is brighter, has better controlled bass and seems more detailed. For a while, in the early 1950s, the W-2M and W-3M were offered in the same catalogs. The W-3M featured the gray hammertone-finished chassis in early versions, and was later sold with a gold metallic finish from 1959 to 1962. The W-3M was a very popular amplifier for its day. Over 12,000 of them were sold.

### HI FI ON A BUDGET

In the early Fifties, the Hi-Fi craze was gaining momentum. Several companies began to offer high-quality amps. When you consider that the average weekly wage was about \$50 to \$60 a week, a \$200.00 amplifier cost a month's salary. To get more music lovers into Hi-Fi, Heathkit introduced the A-7, A-8 and A-9 integrated amplifiers. None of these amplifiers were of the Williamson design, but were similar to circuits found in the *Radiotron Designer's Handbook*.



A-7D

The A-7 (\$15.50, 1952) employed push-pull 6V6s for 6 watts in the output

W-4AM



stage with Chicago power and output iron. The chassis was finished in baked gray hammertone enamel. The front end was all octal. Sold through the early 1960s, there were four variants of the A-7: A-7, A-7B, A-7C and A-7D (shown).

Another integrated amplifier, the A-8, was made from 1952 thru 1954. It featured an all octal front end with 6L6 outputs. The chassis was finished in baked gray hammertone enamel. The audio transformer was a non-potted Peerless unit. The A-8 was the forerunner for the A-9 series.



A-8

Introduced in late 1953, the A-9A (\$35.50) was also an integrated amplifier featuring 20 watt 6L6G push-pull output stage. Preamp and front-end tubes were miniature 9 pin 12AX7 and 12AU7. The chassis was finished in baked gray hammertone enamel. The power transformer was a smaller Chicago potted unit and the output was a small non-potted Peerless unit similar to the A-8 amp. First introduced in 1954, the A-9 featured a larger potted Chicago power transformer and a potted Chicago audio transformer. In 1955, the A-9B was introduced; it featured minor

styling changes including different knobs. The last variant of the A-9 was the A-9C, introduced in 1957. The A-9C had minor styling updates. Early 1960s versions of the A-9C were finished in baked gold enamel.



A-9

Trying to penetrate the beginner audio enthusiast market, Heath introduced the W-4M (\$39.95) in 1954. The tube complement and circuitry were similar to the W-3M, except that the entire amplifier was on one chassis. In addition, the output transformer was a high-quality Chicago Transformer potted unit instead of a premium Acrosound or Peerless. These changes saved the buyer about \$10.00 (about a day's pay in 1954).

The amplifier was rated at 20 watts RMS, but actually put out about 17 watts RMS. The first versions of the W-4M were finished in gray hammertone metallic paint. Another variant was the W-4AM (1955-59), which was the first to feature stenciled lettering on the chassis. The W-4AM, featuring either a gold or gray enamel chassis, was introduced in late 1959. The W-4B, featuring a slide type power switch on



**W-5M**

the front panel was introduced in 1961. The last version of the W-4 amp was the AA-71, sold in the early 1960's. It was similar to the W-4B, except for the black enamel finish. We estimate that over 25,000 kit and factory assembled W-4s were produced.

#### MID-FIFTIES HEATHKITS

Perhaps the amplifier that most of us associate with early Heathkit is the W-5M (\$59.95). Introduced in 1955, it was accepted almost immediately by the audiophiles of the time. It was truly a "high-end" amplifier for a budget price tag. The amplifier was and still is a beautiful audio artifact. Finished in bright gold metallic lacquer and topped off with a complete cage finished in black wrinkle, it featured the famous Williamson design, this time with premium British-made Genalex KT-66 output tetrodes. Front-end design featured two 12AU7 dual triodes for the phase inverter and driver circuits.

**WA-P2 Preamp and FM-3 Tuner**

A 5R4GY dual-diode full-wave type rectifier was employed. The power supply featured an abundance of filter-capacitor stages and a higher voltage (450v+) potted power transformer with

potted choke. The power rating of the W-5M was 25 watts RMS, but some sets test at more than 30 watts RMS.

Through 1957, W-5Ms featured the larger Peerless 16458 output transformer. From 1957 through 1963, the newer design and smaller 16309 Peerless output transformer was employed. Though more common, the 16309 is no slouch. It has exceptional characteristics and performance. Some Heath experts claim that the 16309 Peerless has more extended highs.

**W-5M with large Peerless 16458**

The W-5M also featured a patented "tweeter saver" and an easy to use "Bias Balance" bias adjustment. A properly restored and calibrated W-5M with fresh vintage KT-66 valves can outperform \$1000+ modern amplifiers. Heathkit's W-5M is probably the most popular American version of the Williamson design. It is estimated that over 30,000 W-5M kits were sold.

As a companion to the W-5M, the WA-P2 mono phono and line preamp (\$19.95) was introduced. It was not self-powered, obtaining power from an umbilical cord plugged into the power

amp. It featured Mullard ECC82 (12AU7) and ECC83 (12AX7) dual triodes and was finished in gold enamel. The XO-1 tube electronic crossover was also introduced in 1955. It was finished in gold enamel and featured a black tube cage. The compact gold finished FM-3 mono FM tuner and BC-1A AM tuner were introduced in 1956.

**XO-1 Electronic Cross-over**

Without question, the rarest and most exotic of all Heathkit amplifiers is the W-6M (\$109.95), introduced in 1957. Generating over 70 watts RMS and 140 peak music watts, it was Heathkit's most powerful mono tube amplifier. It was a large unit with a gold enamel chassis and a small, black metal tube cage, mounted directly over the tubes. Bias, variable damping, power switch and meter were located on the front panel. The output tubes were the famous Tung-Sol 6550s. Tung-Sol introduced these tubes in 1955 specifically for audio use. Properly driven and biased, with a 600v+ plate voltage, a pair of 6550's could produce 100 watts RMS in Class AB1. They featured gold-plated grid wire for bias stability and long life.

The W-6M was the first Heathkit power amplifier to feature silicon diode rectification. The heart of this unit was a massive and extremely high-quality potted Peerless 16431 output transformer. This transformer tests as having one of the widest bandwidths and best square wave response of any Hi-Fi transformer available then and now. It can easily handle 140 watts RMS. The driver and phase inverter circuit feature one 12AX7, one 12AU7 and one 12BH7. There are also bias and input level adjustments as well as a bias meter on the front panel.

Although one of the few consumer amplifiers to use cathode-follower-driven output tubes, the W-6M was marred by design flaws: too much current drawn through the 12BH7, making the bias very dependent on the age of the 12BH7, and insufficient bias adjustment range. The result was that





W-6M

the W-6M could not bias many perfectly good 6550s. Perhaps as a result of this, the W-6A, replacing the W-6M and produced from 1960 to 1962, had additional bias controls and input level controls on the front panel.

Over 90% of amplifiers sold during the mid-Fifties produced 30 watts RMS or less. It is obvious that the W-6M was designed for the audiophile who needed the "ultimate" amplifier. Some experts estimate that less than 2000 W-6M amps were ever sold. That would make the W-6M and W-6A the most collectable of the Heath tube amplifiers.

In 1957, the Heath Company was sold to Daystrom, which expanded the production facilities and increased capacity. Later that same year, the UA-1, a small mono 12 watt power amp using push-pull EL-84s in the output stage was introduced for \$22.95.

Numerically, the last of the Heathkit Williamson amplifiers was the W-7M (\$54.95). Introduced in 1958, it was the first "a dollar-a-watt" high-powered amplifier. It was not really a Williamson design, but resembled a Mark II Dynaco. The front-end circuit consisted of a pentode driving a split-load inverter. It was rated at 55 watts RMS from a pair of Mullard EL-34s. The driver/phase-inverter stage was a single 6AN8. Rectification was handled by silicon diodes. The chassis was baked gold and clear-coated enamel. The W-7M was equipped with a louvered black wrinkle cage covering the entire amp.

A later variant of the W-7M was the

AA-91, available in the early 1960s. It featured a black enamel chassis and a gold painted cage.

#### ENJOYING AND RESTORING YOUR HEATH AMPLIFIER

Properly restored Heath Williamson type amplifiers can sound great with the right speakers. If you plan to use an early Heathkit amplifier in your system, carefully plan your project and take the time to do a good job. Vintage tube Hi Fi restoration involves: removing dust and grime, detailing, replacement of coupling, bypass and filter capacitors (both paper and electrolytic), tube socket cleaning, tube testing, tube replace-

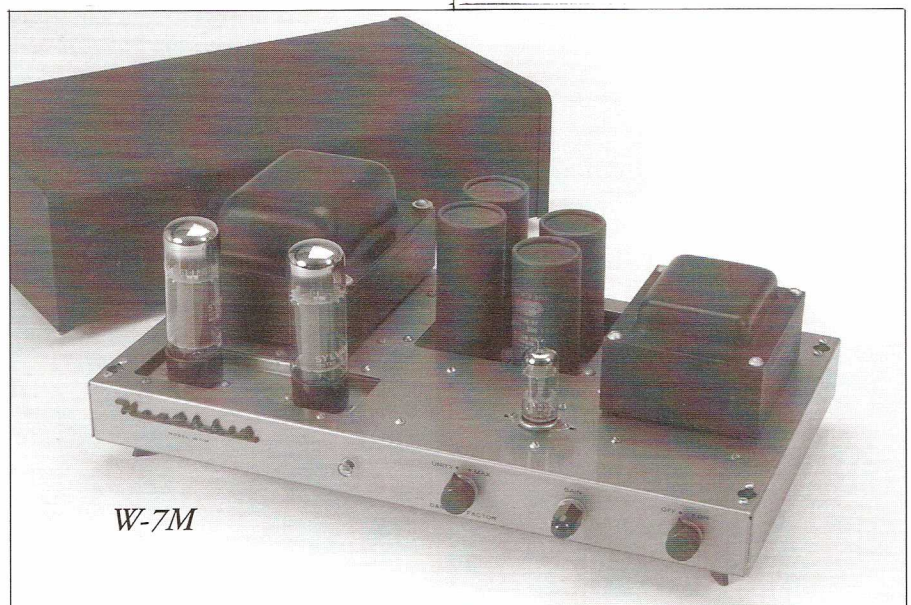
ment, overall circuit inspection, and repair. Some collectors will not pay top dollar for restored amplifiers, insisting that all components must be original. It is a good idea to save all original resistors and capacitors in a plastic bag to be installed later if you sell the unit to a collector. When replacing capacitors and resistors, be accurate and thorough. Use exact values and equal or greater voltage ratings for capacitor replacement. Check all soldering joints and re-solder as needed. Remember, many of these were kits assembled by neophytes who were just learning to solder! Remember to enjoy your work, take your time and do a quality job!

#### CONCLUSION

This article covered the early tube mono Hi-Fi years of Heath Company. The Heath - Daystrom and Heath - Schlumberger tube Hi-Fi era, 1957-64, will be covered in a future issue of VTV. Production figures listed for Heath equipment are estimates. We welcome your comments and/or substantiated corrections to this article.

*Special thanks to Bill Short of Edmonds, Washington and Ken Wilson of San Jose, California for their assistance with this article.*

<sup>1</sup> *Heath Nostalgia*, 1992, Terry Perdue, 4320 - 196th S.W., Suite B-111, Lynwood, WA 98036-6754 (This is an excellent book on the history of Heath Company.)



W-7M