
The History of the Heath Companies and Heathkits: 1909 to 2019

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The genesis of the Heath companies can be traced to ideas preceding the founding of the E. B. Heath Aerial Vehicle Company in 1909 by Edward Bayard Heath. Although Edward Heath was primarily a figure in the very early days of aviation, he recognized that meeting people's needs and giving them a sense of participation greatly enhanced outcomes. He was widely known as a pilot, instructor, barnstormer, and manufacturer in his day, and as the progenitor of the kit concept for airplanes, his influence on the later Heath Company that sold Heathkits extended well beyond his death in 1931. This paper covers the history of the Heath companies from inception in 1909 to the present day. Built on the tenets of "hands-on learning," a "build-it-yourself" approach, "cost savings," and "customer service," Heath Company became the largest manufacturer of electronic kits in the world. Photographs and information on a select number of individual early kits are included to assist in understanding the post-WWII days of rapid changes and the growing pains the company experienced at the start. From 1947 to 1992, the Heath Company sold millions of electronic kits. The factors responsible for this success and its decline are discussed. Some of the key factors that led to its decline were beyond its control—for example, the company was sold many times to owners with varying degrees of interest in supporting the company. As of December 2018, the Heath Company was located in Santa Cruz, California, for design and manufacturing, and Ottsville, Pennsylvania, for operations.

Introduction

Edward Heath founded the E. B. Heath Aerial Vehicle Company in Chicago, Illinois, in 1909. Then in 1931, it was moved to Niles, Michigan, and renamed International Aircraft Corporation. In 1935, Howard Anthony purchased International Aircraft Corporation assets, changed the name to Heath Aircraft Company, and moved the operation to Benton Harbor, Michigan. By 1947, Howard Anthony had changed the name to Heath Company. From 1947 to 1992, the Heath Company sold many millions

of electronic kits under the Heathkit trade name, and it became the world's largest provider of electronic products in kit form. The Heath Company's success stems from a rich history of kit building extending back to before WWI. The name, location changes, and other key events in the life of the Heath companies are summarized in Table 1.

The story of the Heath Company has been noted before both in print and online, but none has focused on the larger picture of the forces at work that resulted in such a long period of

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successes, the multiple reasons for these successes, and the reasons for its decline. Several excellent sources have emphasized specific Heathkit product lines such as test equipment, amateur radio products, and hi-fi and stereo products. Three excellent documents by Chuck

Penson describe the individual characteristics of hundreds of specific models.¹ The intent of this treatise is to review the history of the Heath companies and examine the factors that led to the success and eventual decline of Heath Company.

Table 1. Key events in the in the history of the Heath companies.

Year	Key Events for the Heath Companies: 1909–1995
1909	Edward Heath organizes the E. B. Heath Aerial Vehicle Company in Chicago.
1912	Edward Heath buys the Carl L. Bates Aeroworks in Chicago.
1919	Edward Heath uses term “knockdown machines” for airplane kits.
1926	Edward Heath designs the famous Parasol high wing airplane.
1931	Edward Heath dies in an airplane crash on Feb. 3, 1931; his mother inherits the business and puts it up for sale.
1931	By May 1931, E. B. Heath Aerial Vehicle Company is sold to General John V. Clinnin and brother Walter.
1931	The operation is moved from Chicago to Niles, Michigan, and renamed International Aircraft Corporation.
1933	International Aircraft Corporation sells stock to raise cash; stockholder complaints lead to seizure by IRS.
1935	Howard Anthony purchases International Aircraft Corporation assets at an IRS auction for \$300. He changes the name to Heath Aircraft Company and moves the operation to Benton Harbor, Michigan.
1947	Howard Anthony buys WWII government surplus parts and uses them to produce the first Heathkit, the O-1 Oscilloscope.
1947	Filing for the “Heathkit” trade name submitted to the U.S. Patent and Trademark Office by the “Heath Company” on April 18, 1947.
1954	Howard Anthony dies in an airplane crash on July 23, 1954; his wife, Helen, puts the Heath Company up for sale.
1955	The Heath Company is sold to Daystrom for \$1.8 million.
1962	Schlumberger buys Daystrom to get Weston Electrical Instrument Corporation and acquires the Heath Company in the process.
1974	Heathkit Educational Systems established.
1979	Schlumberger is forced to put the Heath Company up for sale in order to acquire Fairchild.
1979	Zenith acquires Heath Company from Schlumberger for \$64.5 million.
1989	Zenith sells major components of the Heath Company to Groupe Bull of France.
1992	Production of Heathkits ends.
1995	The Heath Company is sold multiple times.

To properly understand the history of the Heath companies, one must consider the forces acting upon the origin and organization of the company: the early products that presaged the future, the personalities of the decision makers, and the key decisions that influenced the direction of the companies. The environmental and technological influences that made Heath Company and Heathkits successful, and much later led to its decline, must also be considered. Certainly, all these factors are interrelated and came to play important roles over time. A recent presentation on this topic was given by the authors at the 2018 Antique Radio Club of Illinois “Radiofest” event.²

An important part of the “Heathkit experience” was assembling a quality kit and a useful product with one’s own hands—and saving money, getting satisfaction, and learning something useful in the process. Many Heath customers went on to pursue a career in electronics that can be traced to an interest sparked by building a Heathkit. Many were radio amateurs who loved their test instruments, receivers, and transmitters. For example, Steve Jobs, who co-founded Apple Inc. in 1976 recalled, “When I was a kid, both my dad and the Heathkits made me believe I could build anything.”³

Personal Experiences with Heathkit

The first Heathkit I ordered was a Heathkit All-Wave, battery powered radio in 1948. Heath Company sent an AC version instead, which I had to return since we had no electricity at the time on the

ranch in South Dakota where I grew up. I blamed myself, thinking I had made an error in the order, but I now believe that the company never actually sold a battery powered All-Wave radio. The reasons for this conclusion will become evident later. This unfortunate experience was quite singular, and was probably caused by too many demands on too few employees at that time. Over time I have been quite happy with virtually all my Heathkits.

Undaunted, the first Heathkit I actually assembled was an M-1 Handitester in the fall of 1949 while a junior in high school (see Fig. 1). I still recall the thrill of opening the box, unpacking the parts, assembling the tester, and finding that the finished M-1 multimeter actually worked! Without electricity, I heated a small soldering iron with a blowtorch. I have since collected and assembled scores of Heathkits over the years, as has my coauthor, Michael Mack.



Fig. 1. Erich Brueschke, currently KC9ACE, as he appeared in 1949 holding his first Heathkit, an M-1 Handitester. (Author’s photo)

Heathkits and the technical skills I learned helped me earn my first amateur radio license with the call sign WØBPS. I received help and encouragement from the local light plant owner, Jerome Payne, WØLMC. In 1940s South Dakota, each town large and small had its own electrical generating plant, but no electricity was available to farmers and ranchers in the surrounding area. We never felt disadvantaged, since almost everyone else in rural farms in America was in the same predicament. Later my dad installed a 32-volt battery system, which was a blessing. As an aside, the 32-volt battery system was charged using a small gasoline engine, which was needed only one or two times each week. I used an inverter to provide 110 volts AC for my rig, a Hallicrafters S-38 communications receiver, and for my home-brew transmitter.

Without doubt, Heathkits were a major factor in my decision to leave the family ranch and pursue engineering as a career. With the encouragement of Jerome Payne and my Heathkit experience, I went on to pursue a degree in electrical engineering in 1951 at the South Dakota School of Mines and Technology in Rapid City, South Dakota. My parents did what they could to help me with college expenses, but it was the hands-on technical experience from Heathkits that prepared me for my dream, part-time, college job of repairing radios at a local radio and records store. I built several Heathkits for the store to round out its service capabilities—a C-3 Condenser Checker, an SG-7 Signal Generator, a V-6 Vacuum Tube Voltmeter (VTVM),

and a TS-3 TV Alignment Generator. It is likely that I would have also built a Heathkit tube tester, such as the Heathkit TC-2, but the radio store already had a commercial Hickok tube tester.

So, Heathkits also helped me to earn the funds toward my degree, which I received in May 1956. While I was a senior in the electrical engineering curriculum, a senior project using magnetic amplifiers helped me obtain my first full-time job as an engineer at Hughes Aircraft Company in Culver City, California. I believe that many others had the same experience as I had with Heathkits, which influenced them directly or indirectly to pursue technical career paths.

Edward Bayard Heath and the First Heath Kit

When we think of the term “Heathkit” as it relates to the myriad of kits that Heath Company produced, which were virtually all electronic in nature until the 1990s, the role of someone named Heath rarely arises. In fact, the namesake of Heath Company and the term Heathkit are derived from a real person named Edward Bayard Heath (see Fig. 2).⁴ However, while Heath sold airplanes in kit form, they were characterized in their ads as “Heath construction kits,” not as Heathkits. The name Heathkit was not used in trade until three months after Heath Company filed a registration for the trade name “Heathkit” on April 18, 1947.⁵

Edward Heath was born to Clark and Ada Heath on November 17, 1888, in Brooklyn, New York. Edward’s father, who was employed as a machinist, died



Fig. 2. Edward Bayard Heath, designer of the first Heath airplane kits. (Peek, *The Heath Story*, 2003, p. 11)

when Edward was only three years old.⁶ His mother remarried to a salesman, causing the family to travel a great deal. Edward Heath is said to have attended over thirty schools in his early years. He was fortunate to attend Chicago's Lane Technical High School, one of the premier technical institutes at the time. Heath was an insatiable reader with an unending interest in mechanical things. He liked motorcycles and the new field of aeronautics.⁷

In 1909 at the age of 21, Heath designed and built his own airplanes and earned money from stunt flying and other appearances.⁸ Prior to WWI, Edward Heath was well known and had a very good reputation as a "barnstormer" who used his airplane for sightseeing flights with a passenger or for performing exhibition stunts. Certainly, he was more than that. He was a great advocate of flying and felt that more people should learn to fly in their own airplanes,

especially in rural areas. His enthusiasm was such that he established his own flying school and built airplanes. Chet Peek recounts Heath's extreme flying experience in his book.⁹

Edward B. Heath's E. B. Heath Aerial Vehicle Company was organized in 1909.¹⁰ Edward Heath's company subsisted mainly by manufacturing aircraft parts that were sold primarily to builders of homemade airplanes. In 1912, Heath bought the Bates Aeroworks, which was founded in 1907 and owned by Carl S. Bates. Heath then began manufacturing complete aircraft for private and commercial use. He also designed and manufactured complete airplanes to custom specifications. The E. B. Heath Aerial Vehicle Company of Chicago was the oldest airplane manufacturing firm in Illinois.¹¹

Edward Heath's keen interest in flying continued, as did his desire to interest others in flying. During World War I, his business expanded. He taught flying and designed and built an airplane he named the "Feather," a light biplane intended for resale. But when the war ended in 1918, the U.S. government sold many surplus airplanes to the public, effectively ending the market for Heath's "Feather."

After WWI, Heath continued in the airplane business by selling war surplus items related to aviation and instructing others to become pilots. In a 1919 Heath Company catalog, an ad using the term "knockdown machines" reads: "The parts are so made that anyone with ordinary ability can readily put them together, thereby gaining the gratification of creation, and at the same time

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saving money. With each set we send complete blue prints and detailed constructional literature. All materials in these sets are of the same high-quality workmanship and finish that is used in our assembled machines.”¹²

Heath designed other airplanes as well, and in 1926 he designed what was to become his famous high-wing airplane, which he named the “Parasol.” Heath converted Henderson motorcycle engines for use in his designs. In keeping with his interest in making flying more readily available to all, he sold blueprints to people so they could construct the Parasol themselves. He also sold fully assembled Parasols of several types, as well as kits consisting of parts, directions, and design blueprints, which became the first airplane kit (see Fig. 3). Full sized plans were \$99, and he made a variety of kit configurations up to a fully assembled plane for less than \$1000. The seaplane version of the Parasol shown in Fig. 4

cost a little more. It was available with wheels, skids, and floats. In December 1930, Heath published a series of “How-to-Build” articles in *Popular Aviation*. These articles, which comprised 40 pages of plans and instructions for building the new Model V Parasol, ran for a number of months. This was intended to increase the mail order business for Heath airplane kits, supplies, and motors—and it did. A “Lindbergh Boom” resulted in a strong interest in aviation when on May 27, 1927, a young Charles A. Lindbergh crossed the Atlantic and landed in Paris after a solo flight.

Edward Heath died in February 1931 at the age of 43 when an aluminum wing strut collapsed on a low wing plane he was test flying, and he crashed on a farm near Morton Grove, Illinois, close to what is now O’Hare International Airport. Soon after Heath’s death, his mother sold the company to General John V. Clinnin, a wealthy Chicago lawyer, and his brother,

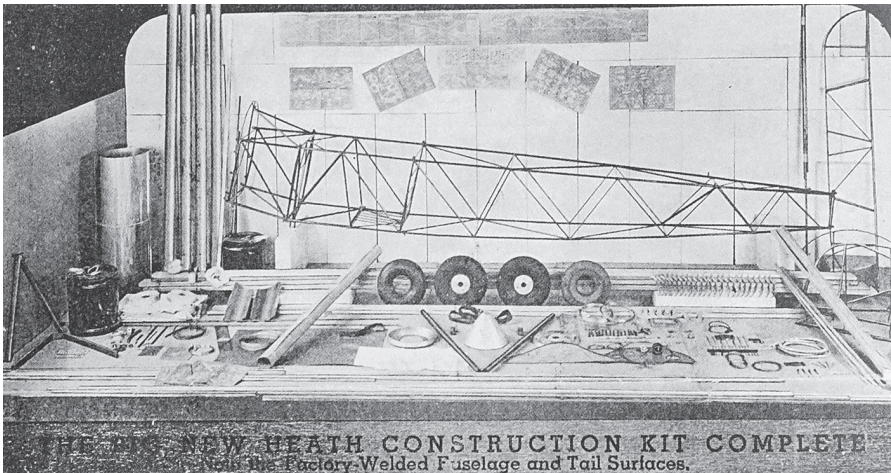


Fig. 3. The first complete Heath construction kit was for a Heath Parasol airplane, Feb. 28, 1927. (Peek, *The Heath Story*, 2003, pp. 47 and 98)

Walter Clinnin, who took over on May 1, 1931. With the inducement of a rent-free building, the entire operation was moved to Niles, Michigan. A reduced workforce of about 12 people also made

the move. In 1934, the company was reorganized as the International Aircraft Corporation. Due to management and other problems, it did not do well and went bankrupt in 1934.

ALL ROADS ARE OPEN TO THE
Heath Seaplane Parasol
OVER NATURE'S ENDLESS AIRDROME

Attractive Economical
Fast Convenient

\$1175 — READY TO FLY

Build It Yourself for **\$228**

HEATH AIRCRAFT CORPORATION
Formerly HEATH AIRPLANE COMPANY

LENDON 6156-6197 1721-29 Sedgwick Street Chicago, Illinois

Fig. 4. Ad for a Heath Seaplane Parasol "ready to fly" for \$1,175 or in a kit to "build it yourself" for \$228. (Author's collection)

Howard Anthony Purchases the Heath Assets at an IRS Auction in 1935

By way of background, Howard E. Anthony, whose portrait appears in Fig. 5, was the modern originator of Heathkits as we know them. He was born in Dowagiac, Michigan, on February 9, 1912, and at an early age, he became interested in electronics and flying. At the age of 12, he built and flew his own airplane.¹³ He was attracted to the nearby International Aircraft Corporation located in Niles, Michigan, which was engaged entirely in the aircraft business—having built the famed Parasol airplane in kit form in the mid-1920s. He graduated in engineering from Hillsdale College in Hillsdale, Michigan, and he operated a radio sales, service, and custom design shop during the period 1932–35. This practical experience gave him a great appreciation for the radio serviceman's problems and highly influenced his efforts in later years.

Shortly after the bankruptcy in 1934, the IRS contacted Howard Anthony to make an inventory of the International Aircraft Corporation assets.¹⁴ After doing so, he then purchased the International Aircraft Corporation at auction for \$300, including all assets and rights to the Heath name. About this time, Howard Anthony courted Helen Ballard, who was John Clinnin's secretary before International Aircraft

Corporation went bankrupt in 1934. They married and managed the company together. Howard Anthony changed the name of the company to Heath Aircraft Company, and in 1935 he moved to Benton Harbor, Michigan.

The new company began to sell aircraft radios designed and made by Meissner Manufacturing Company and others—but no kits. An example of a transmitter and receiver made by Meissner is shown in Fig. 6. Much of the Heath Company business during the years of World War II was based on U.S. Government contracts. The company did well during World War II but after the war, government contracts dropped off, and private flying was in a slump. However, there was a great deal of surplus aviation and electronic equipment, which presented another business opportunity.

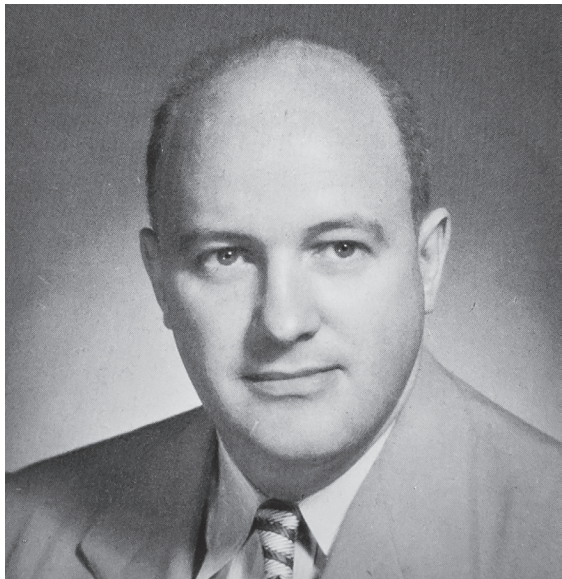


Fig. 5. Howard E. Anthony, known as “Mr. Heathkit.” (Heathkit Catalog for 1955, p. 2)

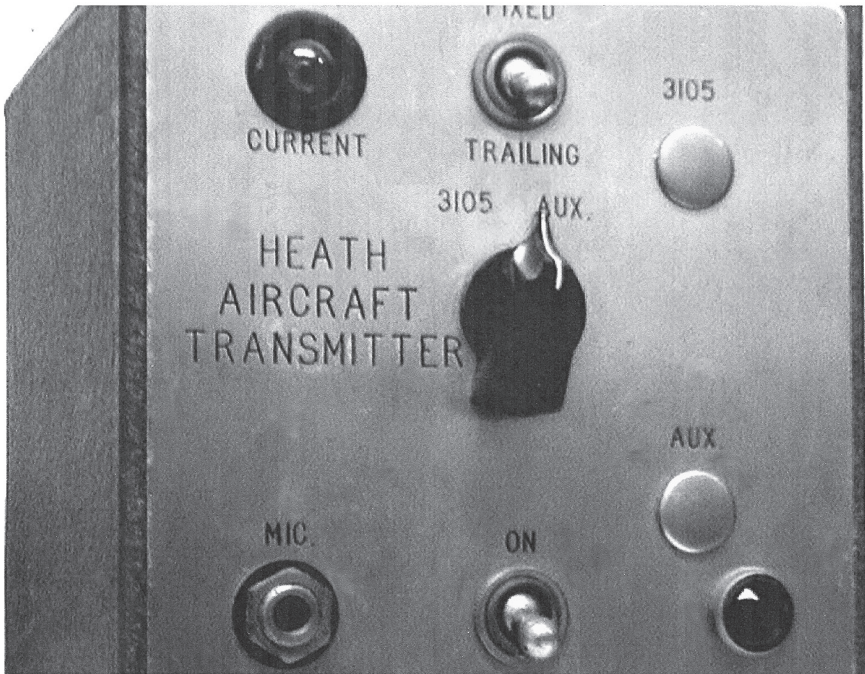
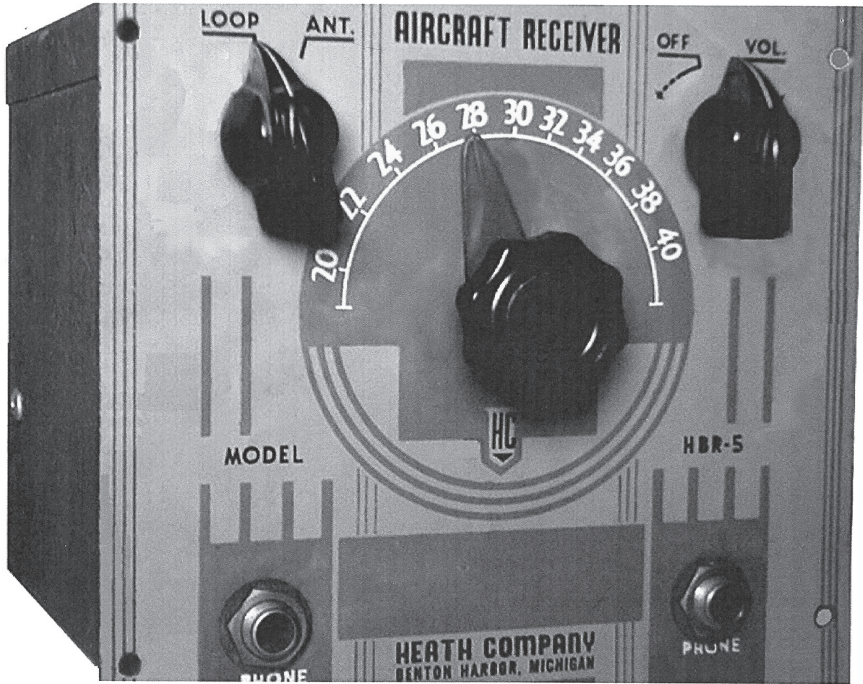


Fig. 6. A Meissner-made Heath aircraft receiver and aircraft transmitter. (Jay Whipple Jr. collection)

Howard Anthony Buys World War II Surplus and Designs the First Electronic Heathkit

Unlike the problem that Edward Heath had in the aftermath of WWI, when war surplus airplanes became a problem for marketing his “Feather” airplane, the aftermath of WWII became an opportunity for Howard Anthony. Not only were there vast quantities of electronic surplus equipment available at ridiculously low prices, but the environment had changed. There was tremendous pent-up consumer demand for almost everything, fueled by the shortage of many items during WWII, including electronic products. The economics of the postwar boom included the GI Bill that provided a program for millions of returning veterans to make available affordable mortgages, cash payments for tuition in vocational schools and colleges, and low interest loans to start businesses.

These factors created an environment ready to respond to Heath products to meet the demand for technological products. Another factor was the removal of the restrictions placed on amateur radio operators during WWII, which prohibited them from being active. This restriction was removed after the war ended in 1945. These factors, coupled with the availability of surplus electronic components, gave a tremendous boost to the Heath company. Certainly, Howard Anthony deserves credit for recognizing what could be done with the serendipitous war surplus electronics. Howard Anthony was eager to move forward and the timing was right.

On the advice of a friend, Anthony

began bidding on war surplus at U.S. government auctions. Anthony used the surplus items to build an entirely new Heath company. He succeeded in filling several warehouses with millions of pounds of aircraft parts and electronic components. Anthony’s original idea was to resell the components, receivers, and transmitters, an idea that is reflected by the absence of any references to kits in ads and flyers. In 1946, with a vast amount of surplus electronics, Howard Anthony found himself in a position to enter the electronic kit market, which became Heathkits as we know them.

Anthony was undoubtedly influenced in his decision to enter the kit market, not only by the history of the Heath company with airplane kits, but also by the experience of other companies that were successful in marketing electronic kits. The rich tradition of selling electronic equipment in kit form dates back to the pre-WWI years. Perhaps one of the earliest companies to sell electronic equipment in kit form was Hugo Gernsback, who began to sell wireless transmitter and receiver sets through his Electro Importing Company in kit form in 1905.¹⁵ In the years that followed, the number of kits offered in the E. I. Co. catalogs grew in number and complexity. Other companies such as Adams Morgan competed with E. I. Co. in the sale of radio kits in the pre-WWI years. In the post-WWI years of the 1920s, larger companies, such as Montgomery Ward and Sears Roebuck, published electrical catalogs offering “knock down” radio receiver kits to “listen in” on radio broadcasts. Atwater Kent Company provided

numerous parts to build a radio on a flat board referred to as “breadboards.” Other companies specializing in electronic equipment joined in on the boom in the sale of radio equipment in both assembled and kit formats. For example, the 1936 Allied Radio catalog had four pages of radio kits including the Knight-Kit short wave radios and an 8-tube radio kit. The 1939 Burstein-Applebee Company radio catalog had 164 pages of radios, test equipment, and parts, including four pages of Meissner receiver kits.

So, what was the catalyst that convinced Howard Anthony to depart from his business plan focusing on reselling war surplus parts, to a plan of developing and selling knockdown kits? The question was unexpectedly answered in a post on

July 28, 2018, in a technical forum on QRZ.com by Dave Ellison, W7UUU, who recently came into possession of a number of *Radio News* magazines from Howard Anthony’s personal collection.¹⁶ Incredibly, included in the group of magazines was an October 1946 issue of *Radio News* with Anthony’s handwritten note on a schematic of an oscilloscope that appeared on page 41 of an article entitled “Build the 5” Cathode-Ray Oscilloscope.”¹⁷ This article was written by one Lyman E. Greenlee, who placed an image of the oscilloscope he constructed on the title page (see Fig. 7). This article described how the amateur could build a 5-inch oscilloscope for as little as \$35, a fraction of the cost of comparable factory-built models, by using mainly war surplus

Build this 5" CATHODE-RAY OSCILLOSCOPE

By
LYMAN E. GREENLEE

*Details for construction of
cathode-ray oscilloscope.
Government salvage tubes and
parts are now available.*

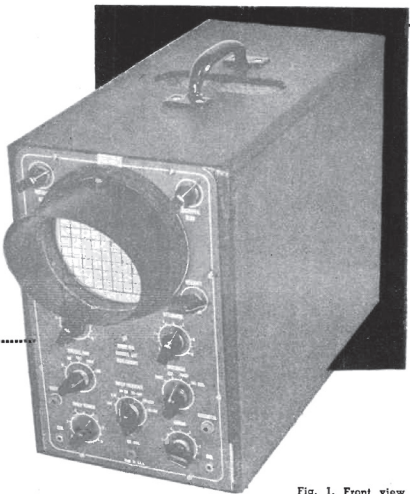


Fig. 1. Front view of home constructed 5 inch oscilloscope.

Fig. 7. This article appearing in the *Radio News* provided the inspiration for Howard Anthony to offer his first Heathkit oscilloscope in kit form using WWII surplus parts. (*Radio News*, Vol. 36, Oct. 1946, pp. 40–42, 110, 112, 114)

parts. Note the tagline on the title in the figure: “Details for construction of cathode-ray oscilloscope. Government salvage tubes and parts are now available.” The oscilloscope panel pictured in the article appears to be a factory-built oscilloscope, but it does not look exactly like the first Heathkit oscilloscope. An explanation for the difference in appearance is provided by Author Greenlee in the second sentence: “A metal front panel salvaged from another oscilloscope was used in building the instrument shown in the photographs.”

When we compared the schematic in the article by Greenlee with the Heathkit O-1 oscilloscope schematic in an *AWA Review* paper by the author,¹⁸ they appear to be nearly identical, except for the power supply. Although Anthony had indicated he wanted to build electronic

kits, as evidenced by his prewar discussions with Hickok Electrical Instruments Company, the 1946 article by Greenlee was apparently the catalyst for him to offer an O-1 oscilloscope using World War II surplus parts and many of Greenlee’s ideas, including the design.

The first ad for the Anthony’s Heath oscilloscope, yet unnamed, appeared in the July 1947 issue of *Radio News* at the bottom of a one-third page ad on page 122 (see Fig. 8). No picture appeared in this ad entitled “Heath Electronic Surplus Bargains,” but the price was \$39.50, about half the price of a comparable factory-built oscilloscope. Note the name of the company in this July 1947 Heathkit ad was now “Heath Company.” A small ad in the September 1947 issue of *Radio News* on page 89 entitled “The Best in Surplus” showed the first picture of a

Fig. 8. First ad for the first Heath electronic kit, the O-1 oscilloscope. Note the two small images of what appears to be two Parasol airplanes, which evoke the airplane heritage of the Heath Company. (*Radio News*, July 1947, p. 122)

Heathkit 5" oscilloscope that would later be designated Model O-1 (see Fig. 9). The orders came quickly.¹⁹ The tremendous response to an initial trial of 100 oscilloscope kits encouraged him to pursue this phase of operation—thus Heathkits as we know them were born.

The first ads were followed by the ad shown in Fig. 10, which appeared in the November 1947 issue of *Radio News* on page 102 showing a picture of the O-1 oscilloscope and the parts making up the

“complete kit.” The last ad for the O-1 oscilloscope was January 1948. Thus, the O-1 was advertised for seven months, and it was followed by the O-2 oscilloscope still at \$39.50. A paper in the *AWA Review*, Volume 23, 2010, described the first ten years of Heathkit production during the period 1947–1956.²⁰ The entire series from the O-1 through the O-12 oscilloscope is described in a paper in a later *AWA Review*, which provides details on individual sets.²¹

The
BES

HEATHKIT 5" OSCILLOSCOPE



Complete kit to build a beautiful 5" scope, cabinet, chassis and panel punched, formed and lettered. Every part supplied, including tubes with 5BP1, cased power transformer, oil condenser. Frequency compensated amplifier, 15 to 30 M cy. sweep, all controls, blueprint and instructions. This kit makes an excellent training course.

Complete **\$39.50**

Fig. 9. The first ad showing the Heathkit 5" oscilloscope. (*Radio News*, Sept. 1947, p. 89)



Fig. 10. Ad showing the Heathkit O-1 oscilloscope and parts. (*Radio News*, Nov. 1947, p. 102)

A photograph of the author's Heathkit O-1 oscilloscope appearing in Fig. 11 illustrates the excellent design and symmetry of the O-1 oscilloscope and shows the location of its controls. Most of the parts, including the binding posts, are unique World War II surplus items. An underside view of the interior of the author's O-1 oscilloscope is shown in Fig. 12. The massive war surplus transformer with ceramic insulators accounts for most of the 55 pound weight of the O-1.

The first ad for the Model V-1 VTVM, reproduced in Fig. 13, appeared in the December 1947 issue of *Radio News*. The set pictured in the ad is identical to the author's



Fig. 11. First electronic Heathkit, the O-1, a 5" oscilloscope showing details of the front panel and controls, July 1947. (Author's collection)

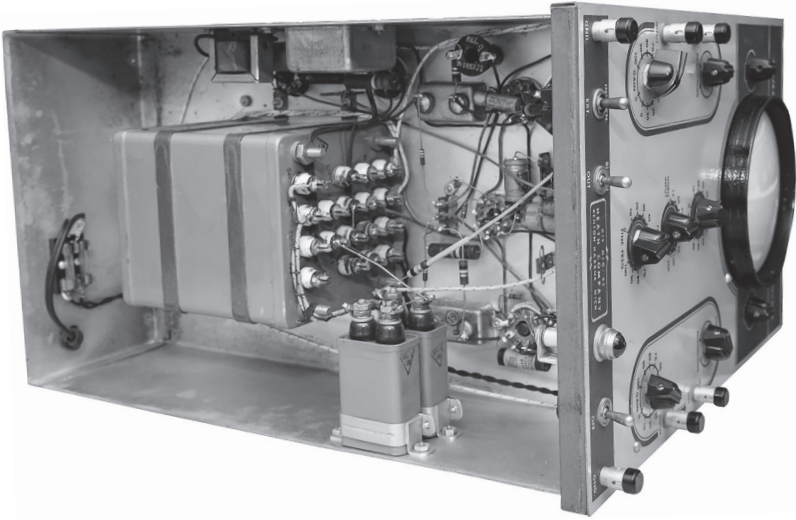


Fig. 12. Underside of the O-1 chassis with the cabinet removed showing a view of components and a large and heavy war surplus power transformer. (Author's collection)

The **WORLD'S FINEST**

THE NEW HEATHKIT VACUUM TUBE VOLT METER KIT

The most beautiful VTVM ever offered now available in kit form. Every part supplied: all punched, lettered and formed.

A balanced bridge circuit, 11 megohms input resistance, measures both AC and DC electronically. Ranges 3-30-100-300-1000 volts AC or DC. Ohmeter .1 ohm to 1000 megohms. Includes DB scale. Complete with tubes, 500 microamp meter, cabinet, blueprints, and instructions. Shipping Wt., 8 lbs.

TELEVISION CONDENSER

VITREOUS RESISTOR
Five and ten units.
15 FOR

BUILD IT YOURSELF AND SAVE 2/3 COST

\$24.50

Fig. 13. Ad showing the first Heathkit V-1 VTVM; this image is reversed from left to right—not unusual for Heathkit ads. (*Radio News*, December 1947, p. 80)



Fig. 14. The author's V-1 VTVM, Type I with five ranges. (Author's collection)

VTVM shown in Fig. 14. There were three different types of the V-1 VTVM—this type, with the early brown handle and the toggle switch, being Type I.²² The first ad for the G-1 Signal Generator was in the January 1948 issue of *Radio News* on page 80 (see Fig. 15). This ad also included the first high fidelity amplifier, the A-1 priced at \$14.95, and the first transmitter priced at \$19.50. There is no evidence that the transmitter appearing in this ad was ever produced.

Howard Anthony was responsible for providing the management, production expertise, and marketing that contributed to the success of O-1 oscilloscope and other Heathkits to follow. He recognized that the most expensive component of electronic equipment at the time was the cost of assembly, and by reducing or eliminating this cost, the selling price could be cut in half. The

**HEATHKIT
AMPLIFIER KIT**



\$14.95

Build this beautiful push pull 25 Watt amplifier and save two-thirds of the cost. Every part supplied. RCA power transformer, oil filled condensers, 4 tubes (one dual type). Tone control, output transformer, etc., excellent fidelity, phase inverter, and chassis punched and formed. This amplifier is ideal as public address set or high quality phonograph radio amplifier. Add postage for 20 pounds.

**HEATHKIT
SIGNAL GENERATOR KIT**




Complete kit to build a fine service instrument. Supplies fundamentals 150 KC to .30 MC. Complete with beautiful panel, cabinet, tubes, controls, coils, blueprints and instructions. Supplies RF, modulated R.F., and AF. Build it yourself and save two-thirds the cost. Add postage for 8 pounds **\$19.50**

**HEATHKIT
TRANSMITTER KIT**

A best buy in an amateur transmitter kit. Circuit uses latest post war improvements, can be assembled to cover 80-40-20-10 meters with 25 Watt output. Comes complete with 80 meter crystal, speech amplifier, 80 meter coil, four tubes, cabinet, beautiful panel and all additional parts needed less power supply. Blueprints and instructions included. Power supply kit \$10.00 additional. Add postage for 20 pounds, 8 pounds for power supply.



**Complete KIT
\$19.50**



The HEATH
BENTON HARB

Fig. 15. Ad showing the first Heathkit amplifier, signal generator, and transmitter. (*Radio News*, Jan. 1948, p. 80)

first airplane kit by Heath proved that kits could be used to promote a desired end—in the case of Edward Heath, it was promoting the popularity of flying. In the case of Howard Anthony, it was electronic technologies that addressed the interests of a broader class of consumer and industrial customers. For an expanded discussion of the Heath Company's early days, including this first Heathkit oscilloscope, an excellent reference book is *Heath Nostalgia* by Terry Perdue,²³ which recounts statements made by a number of the original engineers and technicians who worked at the company in the early days.

Increases in Electronic Heathkit Design and Production

Based on the popularity of the first oscilloscope, the O-1, and the V-1 VTVM, Heath introduced a myriad of electronic equipment, which resulted in more than 33 products by the end of 1948. It is important to note that from the beginning, all AC powered Heathkits used a power transformer. This made them much safer than the typical electronic devices of the day, which were directly connected to one side of the AC power line at a time when the plugs were not polarized.

Howard Anthony's first serious effort to produce amateur radio equipment was in 1947, when he manufactured an amateur transmitter kit with 25 watts output covering the 80–40–20–10 meter amateur radio bands. The ad for this transmitter kit is shown in Fig. 15. The power supply was \$10.00 extra, and the base price was \$19.50 for the complete kit. The ads were in *Radio News* from January through March of 1948 and were rated "A Best Buy." Even though it was advertised for three months, the transmitter kit was never sold. Due to design problems, the Heath Company was unable to transition from the prototype stage to production.

It was not long before Howard Anthony and his small group needed more help. There was a backlog of customer letters requiring responses, and there was a need for a licensed amateur radio operator with electronics service experience. One such qualified individual was Gene Fiebich, who had met Howard when he visited his radio service

shop in 1950. He was hired as employee number 48, and it took him only two weeks to clean up a backlog of 200 letters. Within two years, his talent was such that he was acting as Chief Engineer at Heath.

The first Heathkit radio, the 3-tube All-Wave shown in Fig. 16, later known as the K-1 in instruction sheets and schematic drawings, was advertised in *Popular Mechanics* in the April 1948 issue on page 297. We now recognize that this image is a reversed photo of a prototype that was never produced or sold. It was priced at \$5.95, but with batteries, headphones, and speaker priced separately. Note that a battery type was advertised at \$5.95 in this figure. This version of the K-1 and the battery type were never produced. The production model of the K-1 All-Wave radio shown in Fig. 17 appeared in a July 1948 ad in *Radio News* on page 83. The speaker is on the right and has a regular grille—not holes that were present in the prototype. A K-1 All-Wave radio from the author's collection is shown in Fig. 18. A K-2 model was offered later with an optional vernier tuning condenser, a cabinet, and two additional coils for short waves.

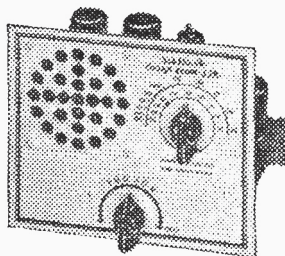
About this time (circa 1951), the FCC authorized a new class for amateur radio—the novice class, which was limited to CW transmissions. The test for this class required five words-per-minute in Morse code, and transmitters required crystal controlled frequencies. Both voice and code for the 145–147 MHz transmissions were allowed. These requirements changed over time. Gene Fiebich, who had let his license lapse in 1934,

HEATHKIT 3-TUBE ALL-WAVE RADIO

110-volt AC-DC operation

\$5.95

An ideal way to learn radio. This kit is complete ready to assemble, with tubes and all other parts. Operates from AC or DC. Simple, clear detailed instructions make this a good radio training course. Covers regular broadcasts and short wave bands. Plug-in coils. Regenerative circuit. Operates loud speaker. Battery model for use where no AC house current is available. Add postage for 3 lbs.



- | | |
|--|---------------|
| Heathkit Beginners' Radio 110-volt type..... | \$5.95 |
| Heathkit Beginners' Radio, battery type
(2 tubes, no rectifiers)..... | \$5.95 |
| Headphones for either type HS 30 per set..... | \$1.00 |
| 2½" permanent magnet loudspeaker for either type.. | \$1.95 |
| Batteries, complete kit for battery type set..... | \$3.25 |

Fig. 16. First ad for the first Heathkit radio, an All-Wave prototype version, for \$5.95; note that the photo in the ad is reversed. (*Popular Mechanics*, Apr. 1948, p. 297)

thought that amateur radio products would be an important and profitable area, so he looked for a licensed amateur radio operator in 1952 with experience and interest in amateur radio transmitters. Fiebich offered an applicant, Roger Mace, the job. A number of companies offered transmitters that required coil changing, and the price varied from \$100 to more than \$140. These prices were too high for most amateurs; in 1952, \$50 was nearly a month's rent. Mace was aware that a basic circuit for a small transmitter could be found in readily available handbooks—and he had a warehouse full of war surplus components that Anthony had purchased earlier. As a result, the AT-1 crystal controlled transmitter shown in Fig. 19 was made available from 1952–1956 at the low price of \$29.50. It was a 6-band transmitter

with single knob band switching and a built-in power supply. Provisions for adding a modulator and variable frequency oscillator (VFO) made it attractive for a later upgrade. Many other Heathkit

HEATHKIT 3-TUBE ALL-WAVE RADIO

110-volt AC operation

\$8.75

An ideal way to learn radio. This kit is complete ready to assemble, with tubes and all other parts. Operates from AC. Simple, clear detailed instructions make this a good radio training course. Covers regular broadcasts and short wave bands. Plug-in coils. Regenerative circuit. Operates loud speaker. Battery model for use where no AC house current is available. Add postage for 3 lbs.

Heathkit Beginners' Radio 110-volt type.....	\$8.75
Heathkit Beginners' Radio, battery type (2 tubes, no rectifiers).....	\$8.75
Headphones for either type HS 30 per set.....	\$1.00
2½" permanent magnet loudspeaker for either type	\$1.95
Batteries, complete kit for battery type set...	\$3.25

Fig. 17. Likely the first ad for a production K-1 All-Wave Heathkit showing a price increase to \$8.75. (*Radio News*, July 1948, p. 83)



Fig. 18. Heathkit K-1 All-Wave radio, May 1948. (Author's collection)



Fig. 19. First all-Heathkit amateur radio transmitter, the AT-1, a 6-band CW transmitter, produced between 1952 and 1956 for \$29.50. (Author's collection)

The History of the Heath Companies and Heathkits: 1909 to 2019

transmitters followed, including the DX-100 AM transmitter.

The first two general coverage receivers were the AR-1 offered between 1949 and 1951 at \$23.50, and the AR-2 offered between 1952 and 1955 at \$25.50. The first Heathkit general coverage receiver, the AR-1, was a barebones receiver since it had no built-in speaker, no beat frequency oscillator (BFO) for CW reception, no phone jack, and no automatic volume control (AVC). The second Heathkit general coverage receiver, the AR-2, had an expanded frequency coverage from 535 kHz to 35 MHz, a built-in speaker, a bandspread control,²⁴ BFO, RF gain control with AVC, and a headphone jack. The AR-2 was briefly advertised as the perfect companion for the AT-1 amateur radio transmitter, but it had poor selectivity and poor

stability, which made it a poor choice to use with the AT-1 transmitter. The AR-2 receiver shown in Fig. 20 was the first true Heathkit amateur radio communications receiver.

Published Studies of Heathkits

There have been several published histories of the Heath Company, but they are generally limited in duration and limited to specific products such as test equipment, amateur radio products, and audio hi-fi equipment. The three books on Heathkit products by Chuck Penson are excellent and well-researched,²⁵ but they were not intended to provide a broad-based study as to how and why the company prevailed over generations.

Since the Heath Company was sold a number of times, the information on much of the early history of Heathkit



Fig. 20. The first Heathkit true amateur radio communications receiver, the AR-2, produced between 1952 and 1955 for \$25.50. (Author's collection)

instruments, such as when they were introduced and sold, has been discarded or otherwise lost. However, there is a significant amount of information on Heathkits available from ads in *Radio News* and *Heath Flyers*, so information from these publications was gathered covering the period from 1947–1956. Subsequently, an article was published on this topic in the 2010 *AWA Review*.²⁶ While most Heathkit employees, even in the 1960s, had little understanding or knowledge of the early days, one notable exception is Terry Perdue, K8TP, who was employed by Heath in 1973. The interviews that appear in his book, *Heathkit Nostalgia*, have a great deal of information about the company's heritage and its people.²⁷

A number of peculiarities in the literature review added to difficulties in understanding the Heath Company's history, especially in the early years. These problems with early Heathkit sources, which were identified previously in the author's 2010 *AWA Review* article,²⁸ were later reduced or eliminated. It is appropriate to reiterate those problems here:

1. Items sold but never advertised—for example, the V-2A VTVM.
2. Items were advertised but it appears they were never sold—for example, the battery powered All-Wave, the V-3 battery powered VTVM, and the first amateur transmitter.
3. Major changes were made but the panel remained unchanged—for example the V-5 and V-5A VTVM.
4. Prototypes used in advertisements—for example the TC-1 Type 1 Tube Checker that had a different roll chart configuration in the early advertisements, and the All-Wave radio ads in which a prototype appears that is different from the model that was sold.
5. A series of sets that may or may not be the same type of instrument—for example, the V-Series (V-1, V-2, etc.) are all vacuum tube voltmeters, whereas the G-Series are all different types of instruments.
6. Heath Flyers were not identified by month or year—for example, stating only "Fall Flyer."
7. Heath did not identify instrument model numbers in their early ads.
8. Heath dated kit schematic drawings for the first year or so, and then stopped.
9. Heath would use an old version of the ad—for example, the January 1949 Heath Flyer has information on the new V-2 VTVM, but shows a picture of the V-1 VTVM (which has 5 ranges), whereas the V-2 has 6 ranges.
10. Sometimes an ad showed a reversed image (left to right) of the device.

The V5-A uses a different tube and circuit than the V-5, and the assembly manual says V-5A, but the panel still has the V-5 designation.

This caused problems in distinguishing early radios such as the K-1 All-Wave from prototypes; the first several All-Wave ads showed only prototypes.

The Heath Company ran an amazing number of ads in *Radio News* (later renamed *Radio and Television News*). For example, beginning in the 1955, Heath ran twelve full pages of advertising every month for nearly a year. It was rumored that Heath must have owned all or part of *Radio News*. Despite the large number of ads that appeared, one cannot rely on advertising in magazines alone to reconstruct an accurate history of the Heath Company. It is also necessary to consider Heath flyers and catalogs, schematics, assembly manuals, parts lists, sets in collections, and personal recollections.

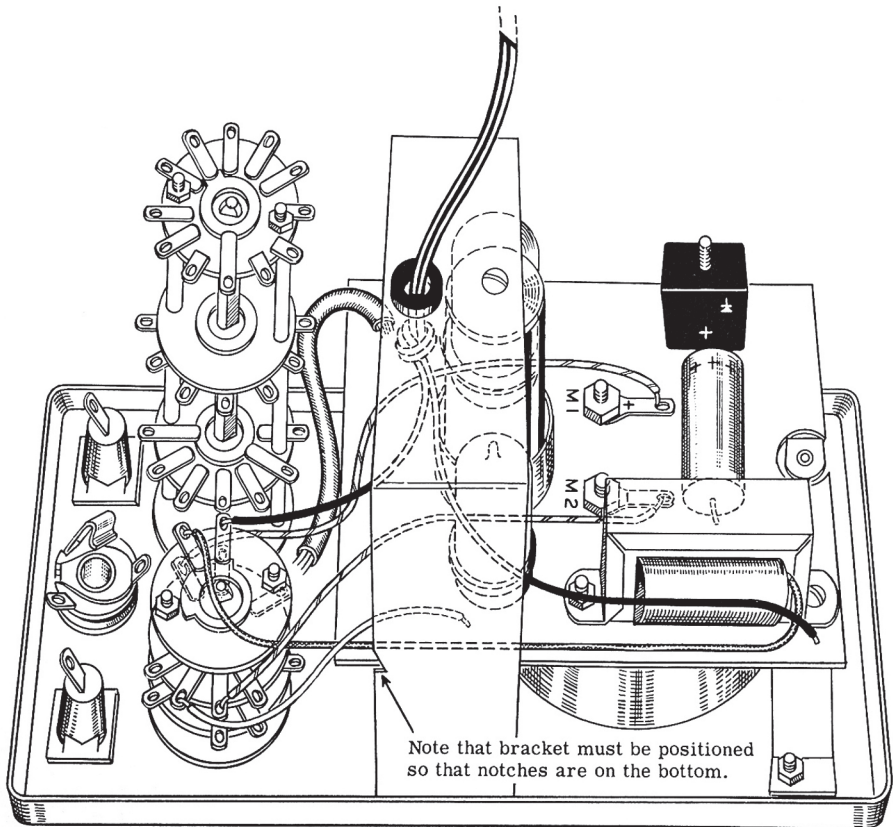
Heathkit Assembly Manuals

The development of assembly manuals was an iterative process beginning with the humble one-page instruction sheet for the first Heathkit O-1 oscilloscope. In the beginning, manuals were written by the design engineer and consisted of one or more mimeographed pages of text without step-by-step instructions, but they were accompanied by blueprints of the schematics and a pictorial of basic parts layout. Later manuals included beautiful pictorials and step-by-step instructions with check-offs for each step—and in some cases, large foldout pictorials and schematics. Using the V-7A vacuum tube voltmeter as an example, Heathkit instructions entitled “Assembling and Using Your Heathkit

Vacuum Tube Voltmeter Model V-7A” has virtually all the contents of an excellent assembly manual. This was one of the most popular VTVMs, which was made between 1954 and 1961 and sold for \$24.50. This manual has 34 pages that provides component color code information to help identify individual parts, parameter values, schematics, numerous beautiful illustrations such as the VTVM circuit board shown in Fig. 21, a check-off box to indicate if a part should be soldered (S) or not soldered (NS), and a box to check only if the step has been done.

After months of internal debates, engineers persuaded Heath’s management on the merits of printed circuits, which were first used in the V-7 VTVM.²⁹ Heath claimed that the printed circuit board cut construction time by fifty percent. Engineers felt that they had perfected the circuit, and the design was used in all subsequent VTVMs. The V-7A was released in early 1955 with the only difference being the thickness of the printed circuit board, which at 1/8 of an inch in the V-7, was prone to breakage. So in the V-7A, it was increased in thickness by fifty percent to 3/32 of an inch. The V-7A was produced from 1955 to 1961 and was priced at \$24.50. Early on, management was apparently concerned that a printed circuit would reduce the kit building experience, but this was not the case.

Various sections of the assembly manuals covered specifications, theory of operation, parts placement, wiring, preliminary testing, calibration, in-case-of-difficulty techniques, replacement of



METHOD OF CIRCUIT BOARD INSTALLATION AND DRESS OF 8 WIRE CABLE.

Fig. 21. Pictorial drawing of V-7A VTVM circuit board installation from 1956. (Author's collection)

parts, a complete parts list, a detailed circuit description, and a how-to-use section. Heath also provided excellent service follow-up consistent with their motto "we won't let you fail." Over the years the company worked diligently to improve the manuals and keep its high standards. These manuals were part of how Heath achieved unparalleled customer loyalty. Profusely illustrated instruction manuals and a strong commitment to customer service helped to

pave the way for success and gathered a customer following of unshakeable loyalty that competitors were not able to achieve.

The Death of Howard Anthony and the Sale of the Heath Company

An airplane crash on July 23, 1954, tragically ended the life of Howard Anthony. Anthony was, for all practical purposes, the originator of Heathkits as we know them. The first four pages

of the Heathkit Catalog in 1955 were essentially a tribute to the influence and accomplishments of Anthony, whom they described as “Mr. Heathkit.”³⁰ He had taken the International Aircraft Corporation from bankruptcy and turned it into the Heath Company, which had warehouses and freight cars full of war surplus CRTs and other electronic parts, and made it highly successful by designing and manufacturing a multitude of Heathkits.

Anthony’s wife Helen had been active in the business, and she took over after Howard’s death. Numb with grief, her heart was not in it, and so she put the Heath Company up for sale. She was careful to interview only companies who would retain the existing staff. She accepted an offer from Daystrom, a holding company, for about \$1.8 million, and in 1955, Daystrom bought Heath. As a holding company, Daystrom did not manage companies they acquired. One of Helen’s last duties was to promote Gene Fiebich to Director of Engineering.³¹ He took over with a soft touch, and held the job for 19 years.³²

Daystrom quickly drew up plans for a very large new facility in St. Joseph, MI, (a twin city of Benton Harbor, located across the St. Joseph River). Construction began in 1957 on a building located on Hilltop Road, which was finished in early 1958, just before the company moved there. A post office was established at Benton Harbor. Daystrom established Heath distribution centers in Canada, Germany, and England. Heath’s sales had increased many times over prior to the sale to Daystrom, and it continued to

expand after the sale. It took Daystrom less than a year to recover the \$1.8 million they invested in purchasing the Heath Company. Daystrom turned out to be a good thing for the company.³³ They invested heavily in Heath to encourage growth of new products. In late 1961, new Heathkits by Daystrom were introduced that were sometimes essentially the same as Heath counterparts but with enhanced styling and manuals. These kits were labeled with both the Daystrom and Heath Company names.

Heath Company saved money by reverse engineering products of other competitors to determine how they worked, then designed Heath products with some improvements and additional features. Apparently, Heath Company reverse-engineered a Viking II transmitter to develop the Heathkit DX-100 AM transmitter. The Viking II sold for \$100 more than the Heath DX-100 at \$189.50. Extra effort was put into the Heath instruction manuals. The DX-100 was wildly successful and enabled Heath/Daystrom to buy five full-page ads in *QST* each month and to hire graduate engineers so that Heath could abandon the reverse engineering of other manufacturer’s products and develop original designs of its own.

Schlumberger Buys Daystrom and Acquires the Heath Company in the Bargain

In the early 1960s, Schlumberger Corporation became interested in acquiring an electronic instrument company to help them in the manufacture of advanced electronic equipment used in their main

business, which was exploration for oil. The company was particularly interested in highly sensitive and precise instruments. The Weston Electrical Instrument Corporation, known for its high-quality meters and related items, was one such company that fit their needs. Weston was owned at the time by Daystrom. The history of Weston was colorful in that it was founded by Edward Weston in 1888 in Newark, New Jersey, and then it was acquired by the Sargano Electric Company, which in turn was purchased by Daystrom in 1954. In 1962, Schlumberger bought Daystrom in order to get Weston and got Heath as well. Interestingly, the Daystrom name did not disappear from Heath catalogs until about 1964.

Schlumberger had no particular interest in the Heath Company, but supported Heath since it was highly profitable. Schlumberger helped Heath in expanding Heathkit test equipment, amateur radio, and high-fidelity audio amplifiers, which in turn helped Heath compete with major manufacturers in the radio amateur field, such as Collins and Hallicrafters. This they did with great success. After Schlumberger bought Daystrom, it established retail stores for Heathkits throughout the United States and established Veritechnology Electronics Corporation (VEC) to operate the centers. The 1960s and 1970s were golden years for the Heath Company. More complex products, integrated circuits, and the computer business were emphasized with help from technical people at Schlumberger.

Starting in 1963, Heath Company

developed a special series of fully assembled products referred to as the Heath/Malmstadt-Enke Electronics, Education and Research Instrumentation Series. They were developed with Dr. Howard Malmstadt of the University of Illinois and Dr. Christie Enke of Princeton. In 1965, Heath advertised the Berkeley Physics Laboratory, which was somewhat similar to the Malmstadt-Enke series. Berkeley Physics Lab was developed by University of California Professor A. M. Portis circa 1964 to teach the basic concepts of physics by using modern instrumentation and electronics. The Berkeley Physics Laboratory provided a basic laboratory course completely independent of lecture sessions. Heathkit developed a complete set of factory-assembled instruments to be used with the Berkeley Physics Lab course, which was marketed to colleges and universities for student use. The Berkeley Physics Laboratory instruments disappeared from the catalog in 1970. References to the name Heath/Malmstadt-Enke disappeared from the series in 1974, and the series was subsequently called Heath/Schlumberger. In 1974, Heathkit Educational Systems, offering educational materials for schools, and so forth, was established.

Gene Fiebich had decided to retire in 1973. One reason he gave for retiring at that time was that offshore competition was increasing, and that it would spell trouble for Heath in the future. After 23 years at Heath, he decided it was time to go. The quality foundation was beginning to crumble. He passed away 22 years later in 1995.

Heath Company in the Computer Age
Amateur Radio Equipment Became too Difficult to Assemble

By the early 1970's it became apparent that technology had advanced to the point where electronic kits were becoming more difficult to assemble. One example of the increasing difficulty in building Heathkits was the SB-104 SSB/CW Transceiver (sold between 1974 and 1977 for \$699.95). It used 275 solid-state devices including 31 ICs and hundreds of capacitors, resistors, coils, crystals and so on. Parts tolerances turned out to be more critical than had been envisioned. Random sampling of parts to see if they met specifications was not good enough for the SB-104, and quality assurance required testing of all parts in advance. Even that was not enough. It appeared that the SB-104 would not function reliably because of parts variability. Many were sent back to Heath several times and still would not work right. Virtually none of the SB-104s could meet specifications.³⁴ Also, the customer did not have sophisticated test or alignment equipment that was becoming needed for the complex systems. The Heath prime directive had been that the customer has limited knowledge and does not have sophisticated test or alignment equipment.

Heath Company Develops the Personal Computer

Heath began to develop the personal computer at about the same time that others did, such as Apple and Radio Shack. This was early-on recognition of the potential for the computer. Heath

recognized that this was not just a passing fad but deserved a major effort. They began work on a pair of computer products, the H8 and the H11. This effort would unleash the very products that would lead to Heath's decline. These two units were released in 1977. They were not what we would expect today—namely, a *complete* personal computer. Despite being an incomplete unit, computer nerds were enthusiastic. The base price for the Heathkit H8, which was available in the fall of 1977, was \$379, but this included only the chassis and the CPU card. To complete the H8, a Heathkit H8-1 memory board with 4K of RAM was needed, in addition to other Heath Company components. The H8 used a 16-button keypad. The CPU board came preassembled, but everything else was available in kit form. Sales of the H8 and peripheral products infused considerable cash into Heath Company. Heath's gross sales were approaching \$100 million. Most of the money came from televisions, stereo amplifiers, test equipment and computers, but amateur radio products, which once accounted for 40 percent of sales, had dropped to 25 percent.

In the fall of 1978, Schlumberger, which still owned Heath, became interested in acquiring Heath's main source of semiconductors, Fairchild Electric. The Federal Trade Commission (FTC) opposed this acquisition. If Schlumberger were to acquire Fairchild, it would have control of both the semiconductor sources and the devices in which they were to be used. If Schlumberger wanted to acquire Fairchild, the FTC required

Schlumberger to sell Heath. Recall that Schlumberger wanted Weston and got Heath as part of the package. Even though Schlumberger had invested heavily in Heath's expansion, they were willing to sell Heath in order to purchase Fairchild. By December 1978, Heath was up for sale at what would be a nice profit for Schlumberger. One can only imagine how much this shocked the staff and management of the Heath Company.

By January 1979, Heath computer activities were doing well and expanding. Their third computer, an H89 "complete" computer had a keyboard, display screen, and a floppy disk drive, all built into an attractive cabinet. However, it was not completely a kit. The disk drive, the terminal interface boards, the keyboard, and the CPU boards were preassembled and tested by Heath. The kit builder was left with building the power supply and putting together the various subassemblies. The H89 was released in Heath's summer 1979 catalog with a price of \$2,000, depending on the options selected. The H89 was popular and very successful. A number of other corporations began to realize they should respond to this new computer market by designing their own. Among the group was the Zenith Corporation.

Zenith Acquires Heath Company from Schlumberger for \$64.5 Million in Late 1979

Zenith realized they could bypass the computer development phase if they could acquire a company that had a successful computer product line and it was for sale. Heath Company management

was not in favor of the selling the company, but they were owned by Schlumberger, who had to divest itself from Heath in order to get approval for acquiring Fairchild. Not surprisingly, the needs of both Zenith and Schlumberger were in alignment and had priority over the wants and needs of Heath. Heath was a victim of its owner. Zenith had no particular interest in the non-computer kit product line, to put it mildly, but to make the deal it had to buy all of Heath, and did so for \$64.5 million. Zenith then established Zenith Data Systems in the fall of 1979, and was instantly in the computer business—and Heath was in trouble.

Only the Heath computer capability was of interest to Zenith. Nothing else at Heath mattered—nothing! The staff of the Heath Company picked up on this and felt they were regarded with contempt by Zenith. Budget cuts and layoffs of 15% every year began in 1980. Zenith began drawing off large amounts of cash and resources. The employees of a great, successful company were fearful of the ongoing reduction in support and were facing an uncertain future. While Schlumberger had a limited interest in Heath, they had supported the company with money and technology to build a great future.

Things Were Changing Due to Smaller Parts and Increased Complexity

In early 1980, cheap mass-produced electronics made Heath products less competitive. During the 1980s, the increasing competition from Japanese

equipment makers, the wide use of automated manufacturing techniques, and increasingly complex designs made it much more difficult to produce kits that were easy to construct, had numerous features, and could be sold at competitive prices.

As an example, Heath was having trouble with its SS-8000 transceiver due to complexity and parts density. For the average person, assembling the rig looked almost impossible. Heath eventually redesigned the kit form of SS-8000 and replaced it with the fully assembled rig, SS-9000, in 1982, which sold for \$2,795. Competing transceivers cost half as much. Only about 2,000 SS-9000 rigs were made. This, along with a series of layoffs in 1982, contributed to the demise of the amateur radio group. The HW-5400 was to be the last major product. Heath made it for one year from 1983–1984 and sold it for \$499.95.³⁵ It took about 100 hours to put together. It had 14 circuit boards, and so demanding was the assembly that near the end of production the units were shipped preassembled.

The amateur radio group faded away as budget cuts continued and employees were laid off or transferred. Only a handful of the amateur radio group remained. They worked on electronic Christmas tree ornaments, light dimmers, and the like. By 1985, all new product development ceased. By 1986, the Heath Company we knew and respected was gone. Some efforts remained to manufacture components for former competitors such as Yaesu and Telex. Heath began to produce models that were unavailable in kit form such as the SS-9000 all solid-state transceiver.

Other Causes for Heath Company's Decline besides Zenith

There were multiple causes for the decline of Heath—not just Zenith's purchase, which has already been addressed:

1. The transistor and other solid-state devices caused a revolution in electronics, which helped Heath provide innovative products but set the stage for smaller components making kit assembly very difficult for humans but easy and inexpensive for machines. This factor eliminated one key advantage of Heathkits—the cost of assembly was shifted to the customer.
2. Machine assembly almost eliminated the cost of assembly, which reduced the price of factory-assembled equipment, thus removing the price advantage of kits. Later machine assembly made it possible to build devices which were nearly impossible for humans to build because of small, densely packed parts.
3. Devices became so complex that the ordinary customer did not have the knowledge and equipment to align and test the product.
4. There was international competition from countries with less expensive labor but also with a talented technical staff working with ever advancing automated manufacturing capabilities.
5. Kit design, including the instruction

manual, became a complex and time-consuming activity, which made Heath less responsive to changing technical advances and customer preferences. Non-kit companies did not have the cost and schedule impact associated with designing assembly manuals for use by the customer, and they could respond rapidly to changing technology.

6. The customer base changed due to aging and changing interests.
7. The repeated sale of the company brought new owners with little interest in the Heathkit operation other than computers.
8. Customer loyalty to a given company today is not as great as it was for Heathkit customers, who bought kits only from Heath year after year.

Later, as the market for these products dried up for a number of reasons, the company sold other products, and many were not in kit form. In 1982, Heath introduced the Hero-1 Robot kit assembled for \$2495 or in kit form for \$999. This was intended to teach the principles of industrial robotics.³⁶

Around 1988, Heath management decided it could reduce overhead by moving kit manufacturing to the Far East. A small company called Heath Prokit was formed in Hong Kong. They handled sourcing and packing of all Heath products as well as limited design work. Delays of up to a year were experienced for less popular items.

Zenith Sells Major Components and Heath Company to Groupe Bull of France in 1989

A combination of planning and management problems at Zenith, still owner of the Heath Company at the time, spelled additional trouble for Zenith. Such problems, combined with intense competition in the personal computer market, caused a significant sales decline, which resulted in cash flow problems. In response, Zenith Electronics Corporation split off a subsidiary named Zenith Data Systems. As things got worse for Zenith, they put up Zenith Data Systems and Heath for sale. In late 1989, cash strapped Zenith Electronics and Zenith Data Systems sold Heath and Veritechnology to Paris-based Groupe Bull with revenues of more than \$1 billion.³⁷ The following Heath entities were part of the purchase: the Heath Zenith lighting and security business, Heathkit Educational Systems, Veritechnology (which operated Heath's retail stores), and Prokit, based in Hong Kong. Heath Company at this time was phasing out the Heathkit business and Veritechnology. All Heathkit production stopped in March 1992.³⁸

The Heath Company Is Sold Multiple Times

In 1995, Groupe Bull sold Heath to H.I.G. Capital, LLC, a management company headquartered in Miami, Florida, which managed Lighting and Security, Prokit, Heathkit Educational Systems and various buildings in Benton Harbor. Zenith Data Systems was not part of the deal, but it was later sold to Packard Bell. In February 1998, H.I.G.

sold the Lighting and Security unit of Heath as well as Prokit to DESA International of Bowling Green, Kentucky. DESA filed for bankruptcy in December 2008. In 2008, Heathkit Educational Systems sold a large portion of its collection of kit schematics and manuals to Don Peterson of Data Professionals. As the authors understand it, the remaining part of the business, the Educational Group, continued to use the term Heathkit and the Heath Company name.

Meanwhile Heath management decided to drop its remaining product lines and focus on education and home security. In February 1999, H.I.G sold Heath/Zenith, a Division of its portfolio company, DESA, LLC, to a private investment group. The Heathkit Educational Group filed for bankruptcy in 2012.

Parts of the Heath Company Still Exist

Over the next several years, the remains of the Heath Company were again sold multiple times. For years there was a paucity of information on the individuals or groups who were willing or able to create a new Heath Company from the remnants left over from its numerous previous sales. Apparently, companies that had bought pieces of the Heath Company sold them to the new entities. The final owner bought the Heathkit name, the Heathkit logos, slogans such as “we will not let you fail,” all manuals, and designs including every last bit of Heathkit intellectual property. They merged several assets into one Heath Company circa 2015.

There were numerous individuals who were ready to buy another

Heathkit to rekindle the feelings they had when they built Heathkits years ago. A company has emerged with control of much of the intellectual property of Heath Company, which stopped making Heathkits in 1992 but continued as a company in one form or another. The Internet is replete with “Whatever happened to Heathkit?” We don’t know how the present company came into being after H.I.G. sold Heath in 1999.

In the December 2015 *QST* amateur radio magazine, an ad for new Heathkit products stated, “We missed you too” and showed three items, one of which was the Heathkit Explorer Jr. TRF AM Radio Receiver Kit (see Fig. 22). The magazine also stated, “it had been a couple of decades since Heath ads had been seen.” The current entity is located in Santa Cruz, California and in Ottsville, Pennsylvania.³⁹

Their flagship product is the Heathkit Explorer Jr. TRF radio. There are two models for the Heathkit Explorer Jr. One is Model GR-150, which is “solderless,” meaning that all components are attached to the printed circuit board with nuts, bolts, and lock washers. The other is Model GR-152, which requires soldering. One can assume that the solder-less GR-150 is designed for use in the educational environment such as schools and colleges. With rare exception, connections in early kit radios used solder to connect resistors and capacitors. The early Atwater Kent TRF radios in the 1920s use a combination of binding posts on breadboards and soldered connections on the underside. All Heathkit amateur radio, test equipment, and others used

We missed you too.



Here just in time for the holidays:
The legend continues. Shipping now.



The world's best kits.
Heathkit.® We won't let you fail.™
www.heathkit.com

Fig. 22. Heathkit advertisement in the December 2015 *QST* magazine. (*QST*, Dec. 2015, p. 114)

soldered connections. It is apparent that soldering requires some skill and that nuts and bolts assembly was easier to learn. There are some reviews online, but they were all for the solderless, nuts-and-bolts type—the GR-150. We do not know how long they were sold.

Neil Shapiro, W2NLS, wrote a very fine study covering his experience with buying and building an Explorer Jr. GR-150 TRF AM radio receiver.⁴⁰ His article was well illustrated, but aside from the thrill of building a new Heathkit, he felt that the price of \$150.00 was excessive and that the parts kept in place with screws, washers, and nuts was distracting. He felt that the quality was good, but the assembly manuals had several errors, and

he felt that Heath could have done better. Included were 78 posts and 55 individual user feedback reviews. The response from the reviews was uniformly negative. The most consistent theme from the reviewers was disappointment.

Problems noted by many of the mainly amateur radio reviewers include:

1. The price of \$150.00 seemed excessive for what you get.
2. The main tuning dial had no markings of any kind to assist in tuning the radio. It was felt that even a 0 to 100 calibration would be better than nothing.
3. Selectivity was poor as would be expected from a single stage TRF (tuned radio frequency) receiver. In the past, three stages were typical in the 1920s when TRF receivers were popular. (Author's note: We don't believe that the original Heath Company ever made a TRF radio.)
4. Poor sensitivity and weak output.
5. Nuts-and-bolts construction caused frequent lead breaking.
6. The online reviewers were in an age group that was familiar with soldering techniques and were put off by nuts-and-bolts assembly. However, the target group of younger individuals might not be put off.
7. There were errors in the assembly manual.

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8. Plastic ties were used to secure the battery pack to the circuit board. Some online reviewers received plastic ties that were too large to pass through the circuit board requiring a search for a local replacement.
9. Missing parts not properly described to foster non-Heath replacement such as Zener diodes and the like.
10. Additional tools were needed for assembly such as such as a side cutter.

In light of the mainly negative reviews for the Heathkit GR-150 from radio amateurs as noted, we felt we should obtain a GR-152 solder-type Explorer. In October 2018, we ordered one for \$168.95 including shipping from the Heathkit design and manufacturing facility in Santa Cruz, California. It was shipped from their operations facility with the address P.O. Box 15, Ottsville, Pennsylvania. Enclosed with the package was a letter signed by the President “Andy” dated May 2016.

The package contained numerous envelopes of parts (see Fig. 23). The outer case of the radio has a small Heathkit GR-152 “First Production” tag, which is shown in Fig. 24. A detailed assembly and operations manual with 64 pages appears to have the usual high-quality product. It had a nice eight-page introduction covering skills needed, soldering technique, inserting components, a parts list with drawings of key parts and quantities, with some actual parts numbers for components. It looked like a real attempt to have the manual serve

a construction and educational function. A section on “tools” on page 8 shows nice drawings of assembly tools you would need to make many steps easier. It did come with five small hex wrenches (a.k.a., Allen wrenches), which were the only tools that came with the solder-less GR-150 kit as well.



Fig. 23. Packaging and parts for the Heathkit Explorer GR-152 with 17 envelopes, two boxes, and a 64-page assembly manual; purchased in 2018 from Heath. (Author’s collection)

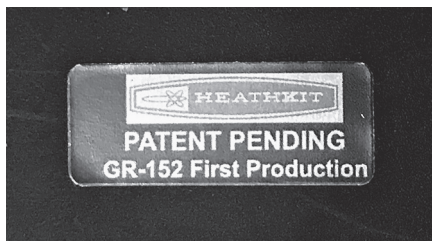


Fig. 24. Small tag on the case for solder-type Heathkit Explorer Jr. GR-152, first production; purchased in 2018 from Heath. (Author’s collection)

The packing list on page 5 identifies the envelopes and general contents. Resistor color codes are given on page 7 with explanations. Soldering techniques are covered on pages 9 and 10. A nice explanation of inserting components into the printed circuit boards with practical educational suggestions appears on page 11. The section on solder bridges on page 12 seems somewhat unnecessary since the PCB used had the circuit itself sandwiched in such a way as to not be visible. There are good detailed parts lists that would be helpful for inventory and missing parts on pages 13–18. The step-by-step assembly section on pages 18–32 is very detailed. Information on winding and installing the tuning coil is well described on pages 33–37. An

envelope with the magnet wire for the tuning coil is included (Envelope 348–3), yet it is nowhere to be found on the parts listing. The mechanical assembly section on pages 38–43 has high-quality assembly drawings. Operations on pages 44–50 has very good educational content as did the “Theory of Operation” pages 51–60, which included numerous circuit diagrams. The final pages 61–64 include care of the radio and a helpful “In Case of Difficulty” section with a “Troubleshooting Chart.” Despite the quality of the product and the real value of the educational description of how radios and circuits work, the price of \$150.00 may not be competitive for younger or inexperienced builders. The complete GR-152 Explorer is shown in Fig. 25.



Fig. 25. Heathkit Explorer Jr. GR-152 TRF AM radio receiver kit (solder-type), purchased in 2018 from Heath. (Author's collection)

A notable recent development in the electronic kit market was the introduction of the Murania AM Radio, a broadcast band receiver kit by the Four State QRP Group, which is somewhat similar to the Heathkit GR-152. Like the GR-152, it is battery operated, about the same physical size, has a modest number of parts, includes a schematic and parts list, and uses surface mount soldering technique. The Murania overcomes many of the deficiencies in the GR-152 in that it is more selective, more sensitive, and has an internal speaker. It is also priced significantly less at \$35.00. However, the Murania has only a 16-page downloadable instruction manual compared to the 64-page detailed instruction manual included with the GR-152. Importantly, the Murania was favorably reviewed in the January 2019 issue of *QST*, the ARRL amateur radio magazine, by the *QST* editor Steve Ford WB8IMY on pages 59–60. More information about the Murania may be obtained at www.4sqr.com.

Conclusion

It appears that recent efforts to revive Heath are still ongoing, although the actual status is unclear. The performance of the present Heath Company certainly does not match that of the legacy company with the illustrious history that positively affected millions around the world and is still to this day viewed with amazement and affection.⁴¹

Appendix:

Number of Heathkits Sold

What Heathkit builders remember about the Heath Company depends to some extent on personal interests, be it amateur radio, test equipment, or the special Heathkit that was enjoyed the most. We feel that the Heath Company was best known for amateur radio products, especially for radio amateurs. The number of amateur products manufactured is not a good indicator of popularity overall, since amateur radio products were not introduced until about six years after the first electronic Heathkit in 1947, the O-1 oscilloscope. Although some may debate this, the first amateur radio products, per se, were the AR-2 general coverage receiver (1952–1955) for \$25.50 and the AT-1 6-Band CW Transmitter (1952–1956) for \$29.50. For the first six years or so, the main products were test equipment and hi-fi kits, starting with the A-1 Audio Amplifier. The A-1 was only introduced a few months after the first Heathkit, the O-1 oscilloscope. The three wonderful books by Chuck Penson covered in the main body of the article did not include the many important items that were other than test equipment, radio amateur radio products, and hi-fi products. Not included were the DF-1 six-transistor radio direction finder.⁴² Actually, only the first ten years of Heathkits have been studied in detail, with the results first published, in 2010;⁴³ this reference provides information on dates when products were introduced and discontinued. Nevertheless, the invaluable effort by Penson gives us a good idea of Heathkit production in most areas.⁴⁴



Fig. A-1. HW-101 5-Band Transceiver manufactured between 1970 and 1983, priced at \$399.95. (Penson, *Heathkit: A Guide to the Amateur Radio Products*, 2003, p. 171)

According to Penson,⁴⁵ exact sales figures for Heath are essentially non-existent, since that data and much of the history of the Heath Company was destroyed when the company discontinued Heathkit production in 1992. Penson used information using the Fiebich Papers from the estate of Gene Fiebich, the former Director of Engineering. He also used many obscure sources found in catalogs, and estimates based on the size of the giant automated warehouses built in 1957–1958 after Heath was purchased by Daystrom. Also, he inferred production numbers indirectly by the numbers of pages of ads in *Radio News*, which were routinely nine full pages, and by 1957 the page numbers had grown to 16 full continuous pages.

Also according to Penson, Heath

developed and sold many hundreds of kit products over the years, including 150 amateur radio kits, 400 different test equipment products, and numerous amplifiers, televisions, and home improvement kits.⁴⁶ Heath sold more than 40,000 HW-101 transceivers (see Fig. A-1), more than 500,000 VTVM's in its first ten years, and possibly two million VTVM's by the early 1990s. Heath designed more than 60 models of oscilloscopes and sold hundreds of thousands. In his book on hi-fi products, Penson estimated that nearly 200 hi-fi products were designed and sold since the four-tube 25-watt A-1 amplifier was first advertised in *Radio News* for \$14.95 in 1947.⁴⁷ Starting with simple amplifiers, the company progressed to the legendary Williamson type amplifiers

starting in 1951. Although many companies designed and sold Williamson type and ultra-linear amplifiers, Heath ran circles around its competition with lower prices, the enjoyment of assembling do-it-yourself kits, its legendary assembly manuals, and its outstanding customer support.

A pre-amp was offered in 1958 and a stereo power amplifier in 1960. In 1962, many earlier units were updated in design and appearance, and solid-state products began to appear. Rapid expansion of the audio line took place until the blockbuster product, the AR-15, was produced in substantial numbers. For example, the Heath Company listed over ten pages of audio amplifiers in their 1960 catalog from pages 14 to 24.

After ten years of success, the end came rapidly, which was caused by a number of factors but especially the sale of the Heath Company to Zenith Corporation by the then-owner Schlumberger. As already noted, to the chagrin of employees in other Heath divisions such as Amateur Radio, Audio, and Test Equipment, Zenith made it clear they were mainly interested in the computer area. They showed this by budget cuts and layoffs in those other divisions. By Christmas 1985, according to Penson, it was all over in the hi-fi and stereo products after 38 years. In a final effort, the Heath Company made a last-ditch agreement with Harmon-Kardon to produce some parts in semi-kit form for certain of their products, which were rebranded as Heathkits. These were not really Heathkits, and therefore were not listed in Penson's books. By 1988, Heath

could no longer manufacture or package audio kits. In 1989, the last remaining product, the AA-18 monophonic amplifier, which was introduced in 1968, was retired.

As tribute to a company that survived so long and produced so many excellent products, it should be noted that there are 4,000 to 5,000 Heathkit related items that are listed for sale on eBay on any given day. This is amazing for a company that stopped kit production in 1992, almost thirty years ago.

Endnotes

1. Chuck Penson, WA7ZZE:
— Penson (2003): *Heathkit – A Guide to the Amateur Radio Products*, (CQ Communications, Inc., Hicksville, New York, 1st Edition; 1995, 2nd Ed. 2003). This is an excellent resource on early Heath and the evolution of specific products. Also included is detailed information on all Heathkit amateur radio products with photographs and descriptions of each.
— Penson (2014) *Heathkit Test Equipment Products*, (Published by the author, Tucson, Arizona, 2014, 1st Ed.). Privately printed but readily available at WA7ZZE@gmail.com. This is an excellent resource on the history of Heathkit, but especially the hundreds of Heathkit Test Equipment products covering the full range of every product in hundreds of pages in a complete and authoritative manner. Well indexed and a joy to read and use as a reference source.
— Penson (2018) *Heathkit Hi-Fi and Stereo Products*, (Published by the author, Tucson, Arizona, 2018). This is an excellent, complete, and authoritative book covering all 200 Heathkit hi-fi and stereo products made 1947 to 1985. Also included is a technical description of advanced audio circuits.
2. Erich E. Brueschke and Michael Mack, "The History of Heathkits;" this paper is an expansion of our presentation at the Antique Radio Club of Illinois "Radiofest" on Aug. 25, 2018.
3. Walter Isaacson, *Steve Jobs - A Biography*, (Simon & Schuster, 2011, 1st Edition) p. 37.
4. There is some confusion in the literature

- concerning the spelling of Heath's middle name. His middle name is spelled Baird in a few documents, such as on his draft registration form for WWI. Terry Perdue, who was a long-time employee at Heath, spells it Bayard in his book *Heath Nostalgia*, and that is the spelling that appears in most publications.
5. United States Patent and Trademark Office; Registration No. 0520346, Filing date: Apr. 18, 1947; Registration Date: Jan. 31, 1950.
 6. Chet Peek, *The Heath Story*, (Three Peaks Publishing, Norman, Oklahoma, 2003, 1st ed.) p. 2. This book provides a detailed history of Edward Baird Heath from his birth on November 17, 1888 in Brooklyn, New York to his death in an airplane crash near Morton Grove, Illinois, on February 1, 1931 at the age of 43. The book is profusely illustrated with details on his flying experiences and details on the many airplanes he designed and built as well as his strong interest in teaching flying and supplying airplanes at modest prices, especially his famous Parasol airplane which he also sold in kit form. It is more directed to the airplane and flying enthusiast but contains invaluable information on Heath's desire for high-quality, low-priced airplanes to enhance interest in flying by the general public. His concepts of "learn by doing" are well illustrated and carried on by Heath.
 7. Ibid.
 8. Ibid.
 9. Ibid.
 10. David Young and Neal Callahan, *Fill the Heavens with Commerce - Chicago Aviation 1855-1926*, (Chicago Review Press, Chicago, 1981) p. 56.
 11. Howard L. Scamehorn, *Balloons to Jets - A Century of Aeronautics in Illinois: 1855-1955*, (Southern Illinois University Press, 2000) p. 69.
 12. Ibid, p. 4.
 13. Howard E. Anthony (a.k.a., Mr. Heathkit), Heathkit Catalog for 1955, p. 2.
 14. Peak, p. 95.
 15. "Modern Electrics," Catalog No. 4, (Electro Importing Company, 3rd ed. 1908) p. 59.
 16. <https://forums.qrz.com/index.php?threads/howard-e-anthony-first-electronic-heathkit-hand-rendered-in-the-margins-of-radio-news.622073/>
 17. Lyman E. Greenlee, "Build This 5" Cathode-Ray Oscilloscope," *Radio News*, Vol. 36, No. 4, Oct. 1946, pp. 40-42, 110, 112, 114.
 18. Erich E. Brueschke, The Earliest Heathkits and a Database for 1947-1956, *AWA Review*, Vol. 23, 2010, p. 102, Figure 9.
 19. Penson, 2014, p. ii.
 20. Brueschke, 2010.
 21. Erich E. Brueschke, "The First Heathkit, the O-1 Oscilloscope and the Series O-1 Through O-12," *AWA Review*, Vol. 26, 2013, pp. 95-112.
 22. For a discussion of the three different types of the V-1 VTVM, see Brueschke (2010), pp. 90-91.
 23. Terry Perdue, "Heathkit Nostalgia," (Privately printed but widely available, Jan. 1992). A brief history of the Heath companies, including photographs of the Heath Parasol airplane and interviews of many early persons responsible for Heathkit. A must-read for anyone with interests in Heathkit collecting and the persons who made it all possible.
 24. A bandspread control is a secondary tuning control that allows accurate tuning of closely spaced frequencies of a radio band.
 25. Penson, 2003, 2014, and 2018.
 26. Brueschke, 2010.
 27. Perdue, 1992.
 28. Brueschke, 2010.
 29. Penson, 2014, pp. 20-07, 20-08.
 30. Heathkit Catalog for 1955, p. 2.
 31. Penson, 2003, p. 14.
 32. Penson, 2003.
 33. Ibid., p. 17.
 34. Ibid., pp. 33 and 226.
 35. Ibid., p. 178.
 36. Steve Leininger, "Heath's HERO-1 Robot, *BYTE*. Vol. 8 No.1, Jan. 1983, p. 86: Quotation from article: "Imagine having the charter to design a robot that demonstrated virtually all principles of automation and robotics."
 37. Lawrence M. Fisher, "Plug Is Pulled on Heathkits, Ending a Do-It-Yourself Era," *New York Times*, March 30, 1992, <https://www.nytimes.com/1992/03/30/business/plug-is-pulled-on-heathkits-ending-a-do-it-yourself-era.html>
 38. Ibid.
 39. The website for the current Heath Company can be found at <https://shop.heathkit.com/page/homepage>.
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42. Brueschke, 2015, pp. 233-242.

43. Brueschke, 2010.

44. Penson, 2003, 2014, and 2018.

45. Penson, 2003.

46. Penson, 2003, 2014, and 2018.

47. Penson, 2018.

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Photo Credits

Items shown in the Figures are in the collection of the authors, except as noted. All photos were taken by Susan E. Golebiowski.

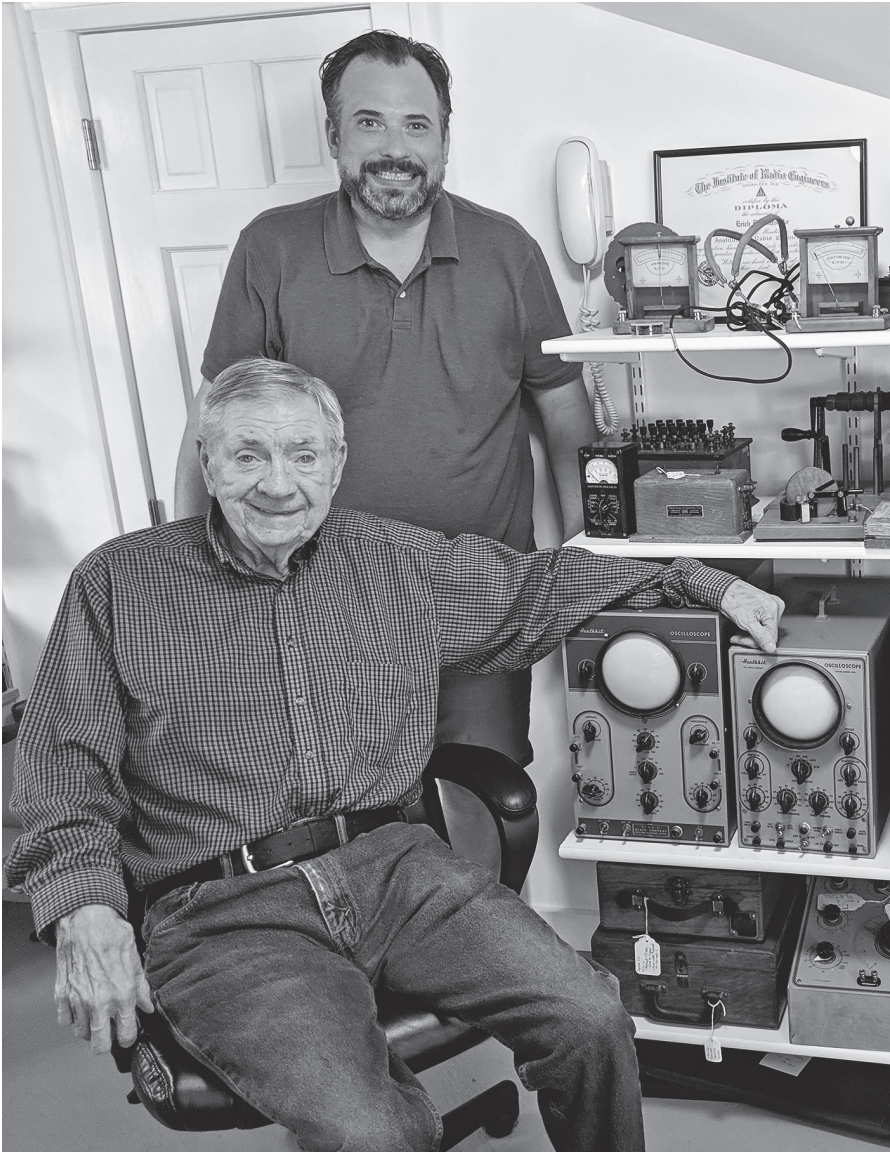
About The Authors

Erich E. Brueschke, BSEE, M.D., KC9ACE is a current holder of the Extra Class amateur radio license. In

high school, he held the call WØBPS in 1948. After graduating from the South Dakota School of Mines and Technology with a B.S. in Electrical Engineering, he went on to work for the Hughes Research and Development Laboratories in Culver City, California, for five years. There he specialized in magnetics and the effects of high vacuum on components. His last work there focused on the Surveyor spacecraft in 1961-1962, which landed on the moon in 1966. He left Hughes to attend medical school at Temple University School of Medicine in Philadelphia, Pennsylvania. After completing his medical training, he was appointed a Captain in the United States Air Force Medical Corps at the Aerospace Medical Research Laboratories at Wright-Patterson Air Force Base in Dayton, Ohio. Subsequently he practiced family medicine in California. He is a Charter Fellow of the American Academy of Family Physicians. He joined the Illinois Institute of Technology Research Institute in Chicago, Illinois, where, as Director of Medical Engineering Research, he worked on artificial internal organs, including powering the artificial heart, for seven years. He then joined Rush Medical College in Chicago in 1976, where he was Chairman of Family Medicine, Professor of Family Medicine, and Professor of Physiology and Molecular Biophysics. He subsequently became Dean of Rush Medical College for six years. He retired as Dean in 2000. He is currently the Distinguished Professor of Medicine at Rush Medical College at Rush University in Chicago. He has two patents issued

and has published numerous papers in engineering, medical and scientific literature, and is a member of a number of professional societies. He has previously published articles in the *AWA Review* in

2010, 2012, 2013, 2014, and 2015. His major collecting and restoration interests are early scientific educational apparatus, crystal sets, early battery radios, and Heathkits. He has collected, preserved,



Erich E. Brueschke and Michael Mack

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and restored radios and scientific devices for over 35 years. He has been a member of the AWA for 27 years, is a member of the ARCI, the Radio Club of America, and the ARRL. He is a Master Mason in Lodge 934 and a lifetime member of the American Medical Association. He invites correspondence and comments at eeb44@hotmail.com.

Michael Mack has been a computer and electronic hobbyist for most of his life and radio and vacuum tube collector for the past 10 years. He has a keen interest in the history of radios. He is a member of the IEEE, AWA, and ARCI. He is currently working in the aerospace/defense industry as a systems engineer. Both authors reside in suburban Chicago.