

A BRIEF HISTORY OF HEATH

THE BASIC IDEA

Prior to about 1960, this is mostly how electronic equipment got made: You paid someone to sit at a workbench with a screwdriver and a soldering iron and slap together whatever it was. An oscilloscope. A vacuum tube voltmeter. A signal generator. Whatever. One piece at a time. As a result, the single most expensive component in any piece of electronic equipment was the labor of putting it together—accounting for nominally half the cost of the product.



RADIO NEWS, DECEMBER 1946

But what if you gave the customer a box of parts and some instructions that explained how to assemble them? A *kit*. That would be much less expensive because the cost of assembly is shifted to the customer. In the early years of the 20th century, dozens of manufacturers toyed with this idea, but the concept never gained serious traction until 1947, when a fledgling company named Heath decided to give it a try.

Wait. There's more. Another important factor in the equation of assembling electronic equipment has nothing to do with money. Whether Heath understood this in 1947 is not clear, but it would become clear very soon after. For inventors, tinkerers and ham radio operators in the years between, say, WWII and Sputnik, saving money on electronic equipment was only part of it. The other part was the simple pleasure derived from building a kit.



COURTESY CHUCK HUDSON

For many—perhaps most—it was the rush they got from building it and plugging it in and flipping the switch and *having it actually work*, that sealed the deal with Heath. The equation worked well for Heath and its customers for about 30 years. Then, not so much. It is worth taking some time to explain some of the dynamics of what was arguably one of the most influential companies in the history of electronics. The following, then, is a very brief history of Heath. How it started. How it grew. How it took the ball and ran. And finally, how it was undone. For clarity, it is important to understand that the name of the company is Heath, not Heathkit. Heathkit is a registered trademark of the Heath Company in the same way, for example, that Band-Aid is a registered trademark of Johnson & Johnson. Heathkits are the products made by Heath.

THIS PART DOESN'T MATTER

Edward Heath founded the Heath Airplane Company, in Chicago around 1910. Heath built, sold and raced airplanes, and in those barnstorming days, business was brisk. Around 1919, Heath began offering airplanes in kit form in an effort to reduce the cost. He called them “knock-down” airplanes.

COURTESY TERRY PERDUE



Aviation pioneer Ed Heath, circa 1930.

The kits seemed like a good enough idea and he sold a number of them. Then, 1931, Ed Heath was killed when the plane he was flying crashed during a test flight. This was, understandably, bad for business. The company was taken over by others, renamed the International Aircraft Corporation and moved to Niles, Michigan. Things went slowly downhill from there, and the company went bankrupt in 1934.^{1,2}

All of this is mostly irrelevant to the story of what was to follow. Other than the name “Heath,” there is really no connection between Ed Heath’s company and the Heath Company we came to know and love. But, just so you have a little of the backstory.

Skipping ahead.

HOWARD ANTHONY

In discussions of the history of Heath, Howard Anthony, the man who would make the company famous beyond all expectations, is almost universally described as an engineer. A better description might be *self-made* engineer, because Anthony had no formal education in engineering, aviation, or electronics.

Anthony was born in 1912 in Dowagiac, Michigan. His parents owned a dairy.³ He graduated from high school in 1929, the year of the infamous stock market crash and the start of America’s Great Depression. After graduation he attended Hillsdale College in Hillsdale, Michigan. Hillsdale is a private, conservative, four-year college offering courses in the liberal arts, with Bachelor of Arts and Bachelor of Science degrees. While Hillsdale offers courses in chemistry and physics, for example, it has no engineering program.⁴ Moreover, Anthony attended Hillsdale for only two years.⁵ The best he could have left college with is what we would now call an Associate Degree, the equivalent of completing two years at a community college, for example.

While Anthony’s interest in flying is fairly well documented, his interest in electronics is a little less



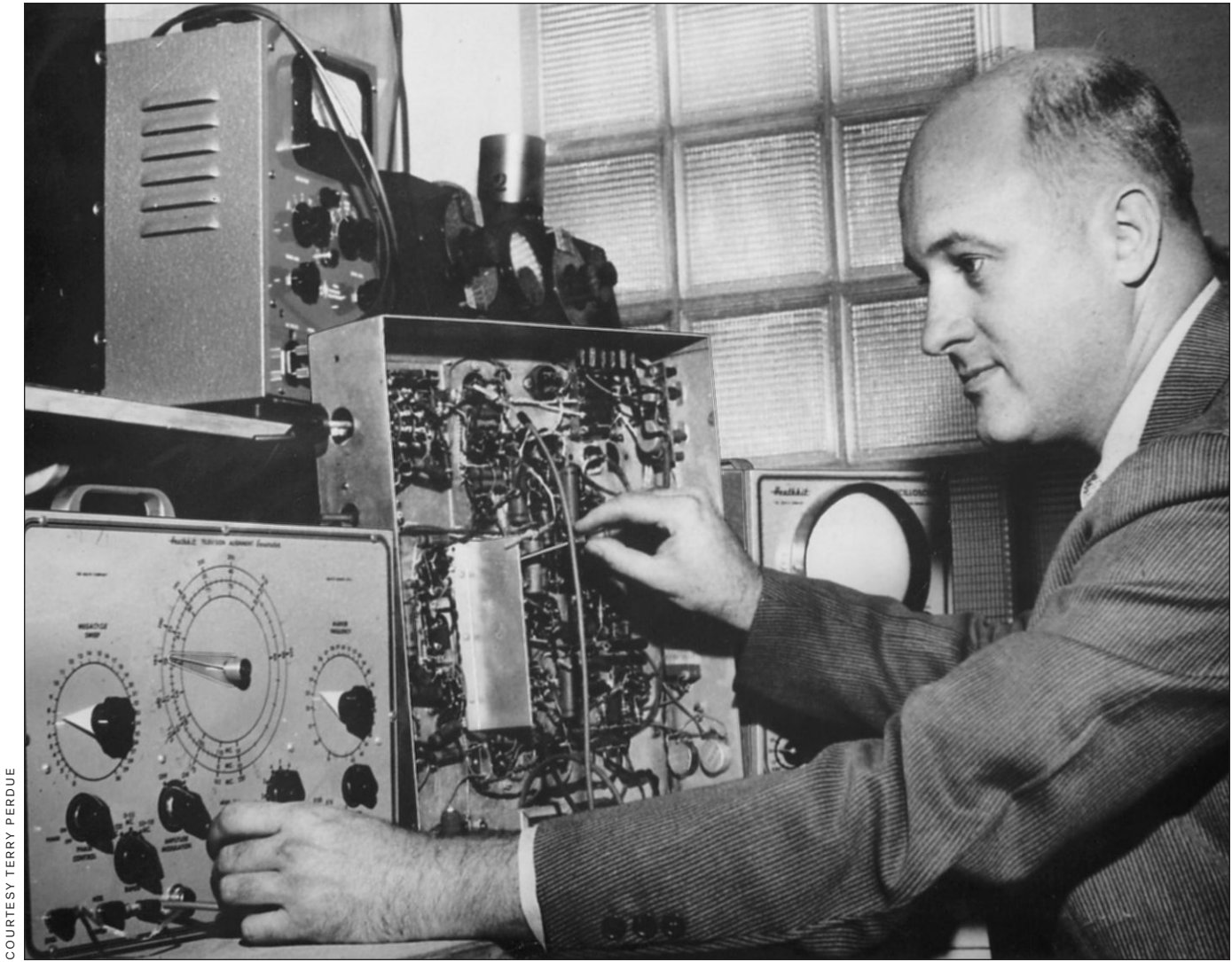
COURTESY TERRY PERDUE

Howard Anthony, circa 1950.

clear. Robert Paxson, a boyhood friend of Anthony, relates what he admits is hearsay about how Anthony made and sold a dozen or so radios while in high school.⁶ And an early Heath employee, Bjorn Heyning, relates a similar story, but admits it too is based on second hand information,⁷ perhaps something he heard from Paxson.

There are conflicting accounts of Anthony’s activities between the time he left Hillsdale college in 1932 and the time he purchased the remnants of the Heath Aircraft company in 1935. For example, according to a brief obituary in a 1954 Heath catalog, in his years after college, Anthony operated a “radio sales, service and custom design shop.” But newspaper stories paint a different picture. An article in 1941, reporting on Heath’s aircraft business, cryptically notes that Anthony had “previously been employed by a nationally known radio company,”⁸ while an earlier story from 1937, reporting on Heath’s arrival in Benton Harbor, describes Anthony as “a veteran aircraft designer and builder.”⁹

It is at least conceivable that Anthony may have worked briefly for Hickok Electronic Instruments Company, located not too far away in Cleveland, Ohio,



COURTESY TERRY PERDUE

Howard Anthony, probably 37 in this publicity photo, using a Heath TS-1 television alignment generator, seen at left. The TS-1 was introduced in 1949.

based on the aforementioned oblique newspaper reference, and a note by Bjorn Heyning in *Heath Stories* number 5, page 2: “It is rumored that years before the war Howard had talked to Hickok Instruments and suggested putting test equipment in kit form.” Another reference to Hickok can be found in *Heath Stories* number 13, adapted from a “Store Tech Seminar,” in 1974. Authorship is unknown.

One thing known with certainty is that Anthony never held an amateur radio license.¹⁰ This seems just the least bit curious for a man with a supposed keen interest in electronics.

In accounts of Heath’s activities before the electronic kits era, which began in 1947, Anthony appears to have had little or no interest in electronics, other than aircraft radios. Even then, a fully assembled aircraft receiver sold by Heath was designed and manufactured by others.¹¹ During the electronic kits era, a number of photos of Anthony using Heath test equipment products were taken, but they are clearly staged, and were used solely for publicity.¹² Anthony subscribed to some popular

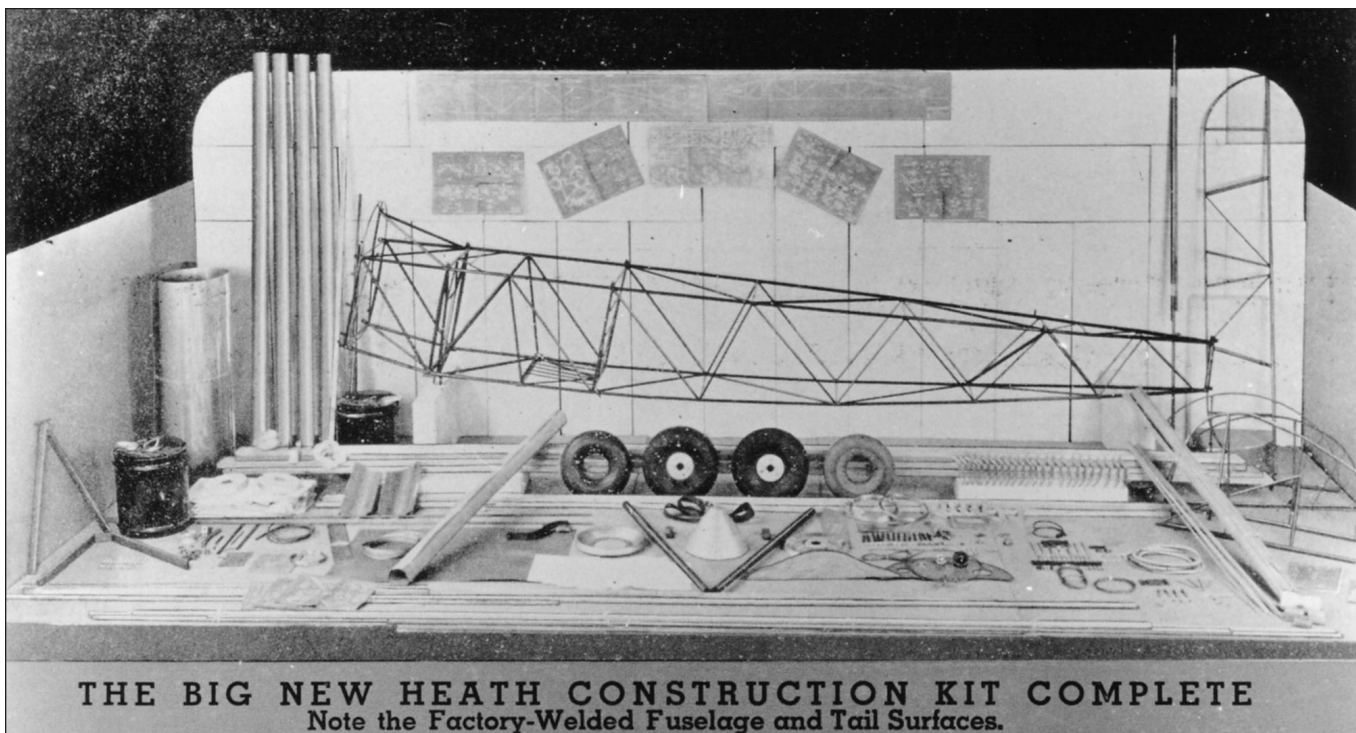
magazines devoted to electronics, but how much actual tinkering he did himself is unknown. He may or may not have assembled an oscilloscope based on a construction article appearing in a magazine, but from the very beginning, he hired others to design and build electronic products for him.^{13, 14, 15, 16, 17}

Moreover, if Anthony had any deep and abiding interest in electronics, then his seemingly abrupt turn to aviation is difficult to explain.

We simply do not know what Anthony did in the years from 1932 to 1935. But whatever his activities, they would seem more likely to have been related to aviation than to electronics, because for reasons still unexplained, it was Anthony the Internal Revenue Service called upon to do an inventory of the bankrupt International Aircraft Corporation.¹⁸

HEATH COMPANY VERSION 2.0

Upon completing the inventory, Anthony made a decision to purchase the International Aircraft Corporation at auction in 1935. He paid \$300, having



THE BIG NEW HEATH CONSTRUCTION KIT COMPLETE

Note the Factory-Welded Fuselage and Tail Surfaces.

A portion of an ad for the Parasol, a kit airplane originally designed by Ed Heath. Anthony's company continued to sell these into the late 1930s.

borrowed the money from his wife, Helen.^{19, 20} That is about \$5700 in 2020, adjusted for inflation. Anthony changed the name back to the Heath Aircraft Company. Why exactly Anthony chose the Heath name (as opposed to the Anthony Aircraft Company, for instance), is not

entirely clear, as he had no direct relationship with Ed Heath or his company. The name change may have been to avoid association with International, the flameout of which had created some bad publicity,²¹ or conversely, to trade on the well known and established Heath brand.

New HEATH ITEMS Now AVAILABLE

HEATH PRODUCTS SAVE YOU MONEY... ORDER NOW

Keep a Clear View Ahead

Install a **HEATH LIFETIME WINDSHIELD** with **NO DRAFT VENTILATION**... **\$35.20**

Yachtcraft Tandem Yarns... **\$39.60**

Blind Flight Plastic Material... **\$1.50**

For Soft Landings - HEATH TAILSPRING... **\$3.75**

HEATH LIFETIME TAILWHEELS... **\$18.50**

Why Run the Risk of Power Failure?

HEATH MA-4B RADIO... **\$17.50**

HEATH MA-4B RADIO RANGE FILTER... **\$54.50**

HEATH LOOP DIRECTION FINDER... **\$129.50**

LANDING GEAR SHOCK RINGS

SNAP VENTS!... **\$2.50**

Conserve Those Rubber Shock Rings!... **\$2.50**

Use HEATH CANVAS COVERS... **\$2.50**

INSTRUCTORS! Save Your Voice With HEATH AIRPHONES!... **\$7.25**

Your Best Wind Insurance! A HEATH TIE-DOWN KIT... **\$5.95**

An Ideal Gift! LEATHER LOG BOOK... **\$2.50**

HEATH COMPANY

PARK STREET, BENTON HARBOR, MICH.

PHONE 5-1175

HEATH ACCESSORIES Available at a Heath Distributor Near You. Write for Name of Distributor in Your Vicinity.

By 1941 Heath had developed a wide variety of (mostly) inexpensive accessories for both CPTP and general aviation. Note the address on Park Street, prior to expansion at 305 Territorial Road. This image is a portion of a direct mail advertisement.

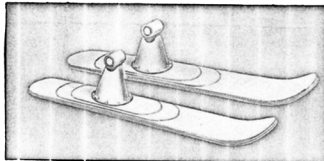


STREAMLINED PLYWOOD SKIS

The response from the operators and ship owners to our announcement of the new Plywood runner, flat bottomed Skis certainly indicates that a number of planes will be flying all winter, no matter how deep the snow may be. Many of the operators took our suggestion and specified future shipping dates, which of course, is appreciated - it gives us a better chance to schedule production and order materials.

This new product has outstanding features; the sturdy 15 ply Birch plywood runner will last a long time. Furthermore, when the runners do wear down, it isn't necessary to buy a new set of skis, just order a pair of runners and when they arrive, remove the bolts from the pedestal, slip on the new runner and you're ready to go again. The one piece streamlined durable cast pedestal will last the life of your ship. Rubber insulated axle mounting cuts down landing shocks.

EQUIP YOUR
PLANE FOR
WINTER FLYING!
OPERATE IN
DEEP SNOW.



INSTALL A
PAIR OF
HEATH PLYWOOD
FLAT BOTTOMED
SKIS!

Remember, each pair of Heath Skis comes complete with all attaching cables, ready to install immediately. No other costly extras to buy - no fussing and measuring shock cords to fit your ship - all guesswork eliminated!

Also, available for sod fields and light snows are the metal tubular type skis. Introduced by Heath last year. Will also operate efficiently on ice. Is not recommended for gravel or cinder runways.

Analyze your needs immediately and send in your order. We will gladly accept orders for any specified delivery date. Just state the date you want your skis and we will arrange to have them in your hands by that time.

METAL TUBULAR or ONLY **\$49.50**
PLYWOOD FLAT BOTTOMED TYPE
(Breaker strips optional -
no extra charge)

Complete with
Attaching cables.
(Discounts to Operators)

"HEATH SUPPLIES THE MAN WHO FLIES"

HEARD THROUGH THE KEYHOLE

Our engineering department has been giving a lot of thought to the idea of producing a pre-fabricated plywood hangar for lightplanes. While details are still on the drafting board, a hangar - reasonably priced - all ready to bolt together, painted the color you desire - when it arrives at the field, is not an impossibility. Any ideas or suggestions will be appreciated.

While flying over Indiana and Ohio on a recent trip, we passed over two score of cities and towns. Believe it or not, we could find only four marked so that we could identify them. There is plenty of opportunity for all aggressive flying clubs to put on a campaign to have cities and towns in their respective areas marked. Sure would help the cross-country flyer.

In response to many requests, we now have available a new Windshield Cleaner and Wax for all types of airplane windshields. In the past, we have been unable to recommend any cleaner since most of them contain strong solvents that soften the windshield materials. However, this new cleaner is guaranteed not to harm the material in any way and besides being a cleaner which quickly softens bugs and other foreign matter, covers scratches, it also contains a wax that leaves your windshield clean and shining. It also acts as a repellant to dust that collects and hinders your vision. This new product, for all windshield materials, is sold in large pint bottles at only \$1.00.

Here's good news - at last we are going to have a transmitter! Our radio engineer has it in the last stages of development and we hope to have it ready within four weeks. The details will be incorporated in a new folder that we will soon have ready. Those who requested a folder previously will receive one and we shall be happy to send it to anyone desiring further information. So, if you are interested - drop us a line and we'll keep you posted.

If any of your friends would like to receive the Beacon, just let us know and we shall be glad to place their names on our mailing list.

IMPORTANT-READ THIS

We are taking the liberty of calling to your attention a very vital article appearing in the November issue of Air Facts, entitled, "In Defense of Private Flying." No one can read this story without the sudden realization that the rumors that have been circulating about the possible curtailment of Private Flying are true.

This article points out that there are three groups - and mind you they aren't insignificant ones either - supposedly behind this movement to stop us from flying. The reasons that they use for argument are (1) Private Flying is causing too much of an air traffic problem. (2) Lightplane manufacturing diverts vital materials away from military requirements. (3) Private planes offer a great opportunity for espionage and sabotage!

Why penalize all Private Flying just because two dozen major airports are jammed. On our recent trip through two states, we didn't see a single plane in the air - is that a traffic jam? Just how much material does the manufacture of flyover planes divert from Army Planes? According to our information not so much. Can you imagine any lightplane flying over a military object and dropping bombs? Just who wouldn't be able to spot any ship being rigged up for this purpose?

Well, that's the situation - and what should be done about it? We make two suggestions; First Co-operate with Air Facts on their plan. It has two parts. They want to send their story to every private and student pilot in the country, together with a suggested letter that these pilots should send to their legislators. As they state, we may uncover in either the Senate or the House, a new Champion for our cause - and he might really help us out. Air Facts is doing this - if we all co-operate. They want just one dollar from each of us - ours has already gone in.

Second Suggestion: We should get these large flying clubs and Pilots Associations to unite and pool their talents - and boy - they've got 'em - to cope with the Washington Situation. Just imagine, such a combined organized effort could speak for over 50,000 airmen! They wouldn't be ignored. Right here - we know that AOPA would be one of the finest outfits to lead this campaign, for we've seen instances where they have really done yeomans service for Private Flying. Remember - "In Union There Is Strength" so let's all pitch in and do our part.

In addition to more formal looking direct mail ads, Heath also produced a monthly flyer, called the Heath Beacon, similar to those later mailed in the electronic kits era. While these flyers did contain advertisements for Heath's products, they read much more like a club newsletter. Shown are two pages from November 1941 containing a story noting that on a recent flight Howard could only positively identify two towns, as all the rest were (visually) unmarked, and a call to action on rumors that the government was contemplating the banning of private flying. The name "Beacon" refers to the lighted rotating beacons used extensively through the 1960s to mark airports and flying routes, but now used only at airports.

It is worth noting that Anthony was just 23 years old when he bought International.

Howard Anthony was an interesting man, described by those who knew him as instantly likable, energetic, persuasive, and generous. By all accounts, a kind and honorable man. That such a young man as Anthony was able to make Heath prosperous is remarkable all by itself, but that he did so during the height of the Great Depression makes his accomplishments even more impressive. Charting Anthony's financial trajectory for the first ten years of the Heath Company is enlightening.

Tales from his early years suggest that it was rough going at Heath for a while. There are accounts that for a time, around 1935, Anthony was forced to beg, borrow, or literally steal food.²²

The newly re-formed Heath Company continued to make knock-down aircraft and other "airships," as airplanes were often referred to then, for a short time, including a batch of 20 or so for export to England.²³

In January 1936, Anthony moved Heath's operations from Niles, Michigan to a building at 304 Park Street in Benton Harbor, 35 miles up the road on the shore of Lake Michigan. The reason for the move is unknown, but as



Heath's compact aircraft receiver, made for Heath by Meissner.



COURTESY TERRY PERDUE

Heath's original building was on Park Street, seen here as the building with the many rooftop ventilators. 305 Territorial Road is the building in the center foreground.

with all things business, it almost certainly had to do with money.²⁴ A cheaper space perhaps, and more of it.

Then, around 1940, and not yet 30 years old, Anthony got a huge break by landing a government contract to provide equipment in support of the Civilian Pilot Training Program (CPTP).²⁵ The stated goal of CPTP was to train as many as 20,000 civilian pilots yearly. The real intent of the program was essentially to pre-train pilots for a possible U.S. entry into World War II and to counter similar programs in Nazi Germany. At its peak, more than 1000 educational institutions and about 1500 flight schools were participating in CPTP.²⁶

At this point, Heath shifted production from airplanes to airplane parts and accessories not only to supply CPTP, but for the private pilot as well. Among these were pontoons to facilitate water landings and skis for landing on snow. These products were made with "non defense materials," meaning "not metal," and in this case were fabricated from plywood. The company also made one-piece non-yellowing acrylic replacement windshields for a variety of light planes.²⁷ Other products included an aircraft receiver made to Heath's specifications by Meissner and a transmitter of the company's own design.

By the end of 1941 Heath was said to be the largest manufacturer of airplane tail wheels in the United States,²⁸ and Anthony was doing well enough to start construction of a home in Benton Harbor.²⁹

Anthony seems to have accumulated great wealth in a very short time. In 1942 he expanded the company, buying an adjacent building at 305 Territorial Road.³⁰ In December that same year, the Benton Harbor *News-Palladium* reported that Heath had done business totaling \$150,000, noting that the figure represented a 300 percent increase over the previous year.³¹ The number is almost certainly gross income, and the net figure far less. Still decent money by the standards of the day, but not enough to make someone rich.

What really made Anthony rich were shrewd investments in oil.^{32, 33} In 1941 he established the Anthony Oil Company in Shreveport, Louisiana with the goals



COURTESY TERRY PERDUE

305 Territorial Road would be Heath's home until the move to Hilltop Road in 1958.

of exploration, drilling and production. He is credited with the discovery of deep production in the Greenwood oil field, not far from Shreveport.³⁴ The venture was phenomenally successful. Within a month of the issuance of its first drilling permit, the company was actually pumping oil.^{35, 36} What prompted Anthony to make this investment is unknown. How much this investment cost, or where the money came from, is also not known, but it does not appear that Anthony had any partners in the company.

By 1943, Anthony owned at least two airplanes, could afford to provide Blue Cross/Blue Shield insurance free for all employees, and hosted company parties by renting a local restaurant.^{37, 38} And in 1945 he bought a new home on North Shore Drive, an upscale neighborhood in Benton Harbor.³⁹

In 1949, at 37, he commissioned Frank Lloyd Wright to build a new home in Benton Harbor.⁴⁰ By the end of his life (just five years later) Anthony, in addition to his duties at Heath, was also president of the Regal Plating Company, president of the Anthony Oil Company, a partner in the States Oil Company, the chairman of the airport board, director of the Farmers and Merchants National Bank, director of the chamber of commerce, a trustee of Hillsdale College, and vice-chairman of Mercy Hospital's board of trustees.^{41, 42} He also owned more than 80 acres just outside the Benton Harbor city limits east of town.^{43, 44}

By 1945 Heath had grown to about 120 employees. But when the war ended in August that same year, the government contracts disappeared and took virtually all of Heath's business with them. The company shed all but about 8 workers.⁴⁵ But by this time, oil and the war had made Anthony a very wealthy man.

Casting about for a new business model, on the advice of friends, Anthony began to bid on war surplus materials. He bought lots of stuff, and much of it had nothing to do with airplanes. A lot of it was electronics. Not only military surplus radio equipment, but crates and pallets full of discrete parts. Transformers. Capacitors. Resistors.



HEATH

NOVEMBER FLYER

ELECTRONIC SPECIALS...

With this issue our flyer takes on a different appearance. Our family of customers has outgrown a mimeographed sheet. We are very glad to change, as it allows the use of pictures in the flyer, and it is especially appropriate because we are to show you the latest Heath Kit -- the precision vacuum tube voltmeter, acclaimed by all who have seen it the most beautiful radio test instrument on the market.

The HEATHKIT VACUUM TUBE VOLTMETER in KIT FORM

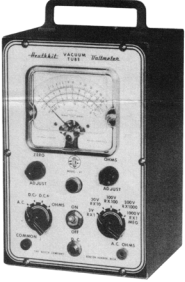
More and more of you are realizing that assembling your own test and laboratory equipment not only saves two-thirds the cost, but gives you valuable knowledge of the construction and use of test instruments. This VTVM is in our opinion the most pleasant kit to assemble ever offered. It has been on test for months, and even our engineers are amazed at the extreme accuracy of this inexpensive test instrument.

The full scale ranges are 0-3, 30, 100, 500, 1,000 volts A.C. or D.C. on a linear scale. Both A.C. and D.C. are electronic. The ohm ranges, with 10 ohm center scale, are scale times 1, 100, 1,000, 10K and 1 megohm allowing readings from .1 ohm to 1,000 megohms.

The meter movement is 500 microamperes with a clear unobscured plastic case with simple and easy zero adjust. The scale is extremely easy to read and the 28 scale is in red. The circuit is a balanced bridge type, using a 6XRT. The A.C. rectifier uses a 6BE6. The transformer power supply uses a 6BE6 rectifier. It includes a means of calibrating the D.C. instrument with the kit, eliminating the need for securing precision standards.

The best quality of materials is supplied -- aluminum cabinet, beautiful two color panel, 500 microamp meter, ceramic switches, glass enclosed precision voltage divider resistors, and every required part right down to the hook-up wire. Detailed blueprints and instructions make the assembly pleasant and simple. Average construction time is less than four short hours, and you have the best and most useful test instrument available.

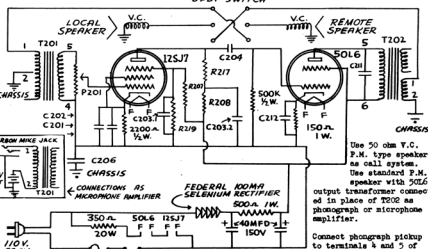
Add postage for 8 pounds, complete with tubes.




Nothing Else to Buy

\$24.50

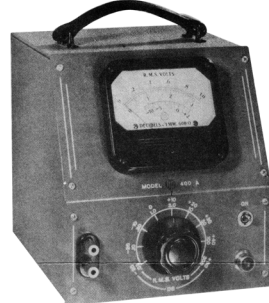
Converting THE BC605 INTERPHONE AMPLIFIER



So many good suggestions have come in for using the BC 605 that we are including the conversion data below. Customers are using these as electronic help systems (a remote speaker near the crib and the amplifier in the kitchen or neighbor's house, so that any cry or sound in the nursery is heard immediately), call systems between shop and house, barn and house, house and tenant, up and down stairs, between neighbors, etc.

When the original parts are used, they are the same number as on the bottom diagram of the BC 605. Additional needed parts are called out by their description. This is an A.C. - D.C. conversion with one master station and only one remote. However, by suitable switching additional units may be added. We have a few used BC 605's left at \$2.95.

\$2.95



GENERAL ELECTRIC BC375 150 WATT TRANSMITTER

So many of you ordered these from the October flyer that we purchased the remaining WA stock and can continue to supply these brand new 150 watt transmitters less tubes and tuning units. (The antenna terminal strips are broken on these, but are easily replaced and are otherwise perfect.)

Only \$9.95

TUBES FOR BC375

New 211 tubes (four required)..... **89¢ ea.**
and 10T (one required) either type.....

LABORATORIES and SCHOOLS

We have secured a small quantity of REMITT PACKARD MODEL 400A VACUUM TUBE VOLTMETERS brand new. These laboratory instruments have full scale ranges of .05, .1, .5, 1, 5, 10, 20, 100, and 500 volts with a frequency range of 10 c.p.s. to 1 Mc. on a linear scale. These are probably the least of the precision equipment available from war surplus, and we are selling them at a small fraction of the factory price. They are brand new with seven tubes, regulated power supply ready to operate. Add postage for 20 pounds.

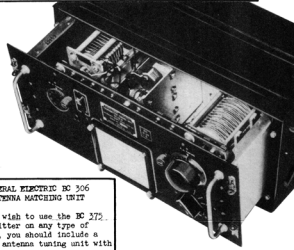
\$129.50

BC 375 TUNING UNIT

The BC 375 transmitter tuning units are without doubt one of the best buys that will ever be offered in war surplus. We have secured a quantity of brand new ones with black crackle cabinets. This cabinet, 16 3/4" wide - 7 3/4" high - 7 3/4" deep, is ideal for receiver or transmitter cabinet and is not usually included by other companies.

There have been articles in RADIO NEWS on converting these units to a transmitter, and also to a transmitter-receiver and we have reprinted these articles and include the complete data with each one. The tuner contains three excellent transmitting tuning condensers, a National Valvet vernier dial (worth \$2.00), ceramic switches, transmitting mic, transmitting tank coils and other valuable parts, which would cost over \$25.00 if purchased separately. The complete tuner with cabinet and conversion articles is priced at only.

Add postage for 20 pounds.



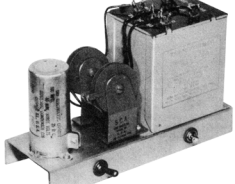
BC 375 TUNING UNIT

If you wish to use the BC 375 transmitter on any type of aerial, you should include a BC 306 antenna tuning unit with your order.

Add postage for 20 pounds. **\$2.95**

Brand NEW

\$2.49



For KIDS AND DADS

Using surplus parts, we have developed a D.C. power supply kit to operate our \$2.95 miniature 24 volt electric motor from regular 110 V.A.C. current. With this power supply, which includes a reversing switch, the motor makes an ideal unit for powering all kinds of models and toys, electric trains, window displays, small fans, etc. The power supply comes in kit form with punched chassis, line cord and assembly instructions. Motor power supply complete

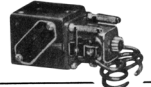
Add postage for 6 pounds. **\$2.49**

The Miniature MOTOR

ONLY 1 1/2" x 1" x 2" INCLUDING SHAFT

Add postage for 1 pound

Only \$2.95



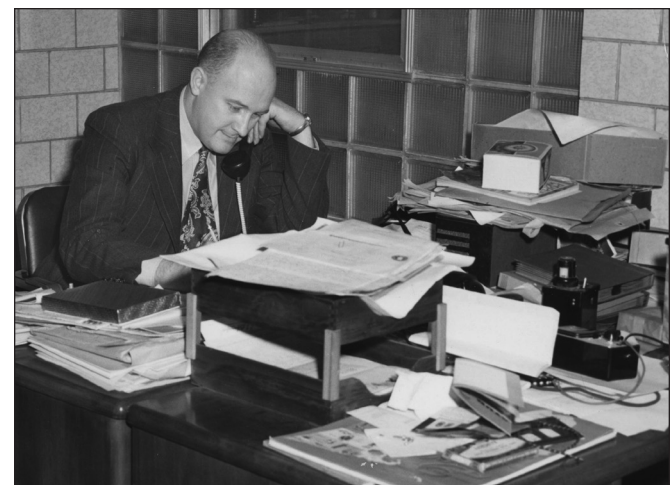
Heath "Flyers" first appeared in November 1947, at the beginning of the electronic kits era. War surplus items loomed large.

And tubes. Including, almost prophetically, hundreds of cathode ray tubes. Exactly how much stuff he bought is unclear. Various references cite everything from a few box cars full to several warehouses.⁴⁶ Tons of surplus, in any case, and perhaps millions of pounds. At first, Anthony's plan was to sell these parts outright through a storefront location, and also to resell them in bulk to commercial clientele with whom he was well connected.⁴⁷ Later, he would sell them by mail order:

THE HEATHKIT REVOLUTION

The idea that Anthony's electronic kit products scheme was somehow inspired by Ed Heath's kit airplanes is a common theme in discussions of the company's history, but there isn't much evidence to support it. As far as can be determined, the two men were not friends and probably had never met each other: Ed Heath died four years before Anthony bought the company, and there is no record of any relationship, meeting or correspondence between the two prior to that time.

It seems more plausible that he came to the kit idea on his own. He may have entertained the idea of kit electronics products at some point before WWII, possibly before his purchase of International/Heath in 1935, and even earlier pitching the idea to Hickok.⁴⁸ Kits were not a new concept. They had been around in one form or another almost since the dawn of radio. By the early 1920s kits had already become a "thing" (to use modern



Howard Anthony in his office at the Territorial Road plant. The BT-1 battery tester on his desk (at lower right), dates this photo between the summer of 1952 and the summer of 1954.

vernacular), and many companies offered them. Anthony could have been inspired by any number of sources, and throughout the 1930s, every radio and electronics magazine was filled with kits. After WWII, mountains of surplus electronic parts and equipment brought many players into the kit business. Anthony may have found the idea of kits to be intrinsically captivating. All he needed was a supply of parts, and by 1946 that problem had been solved. Now, maybe all he needed was a reminder:



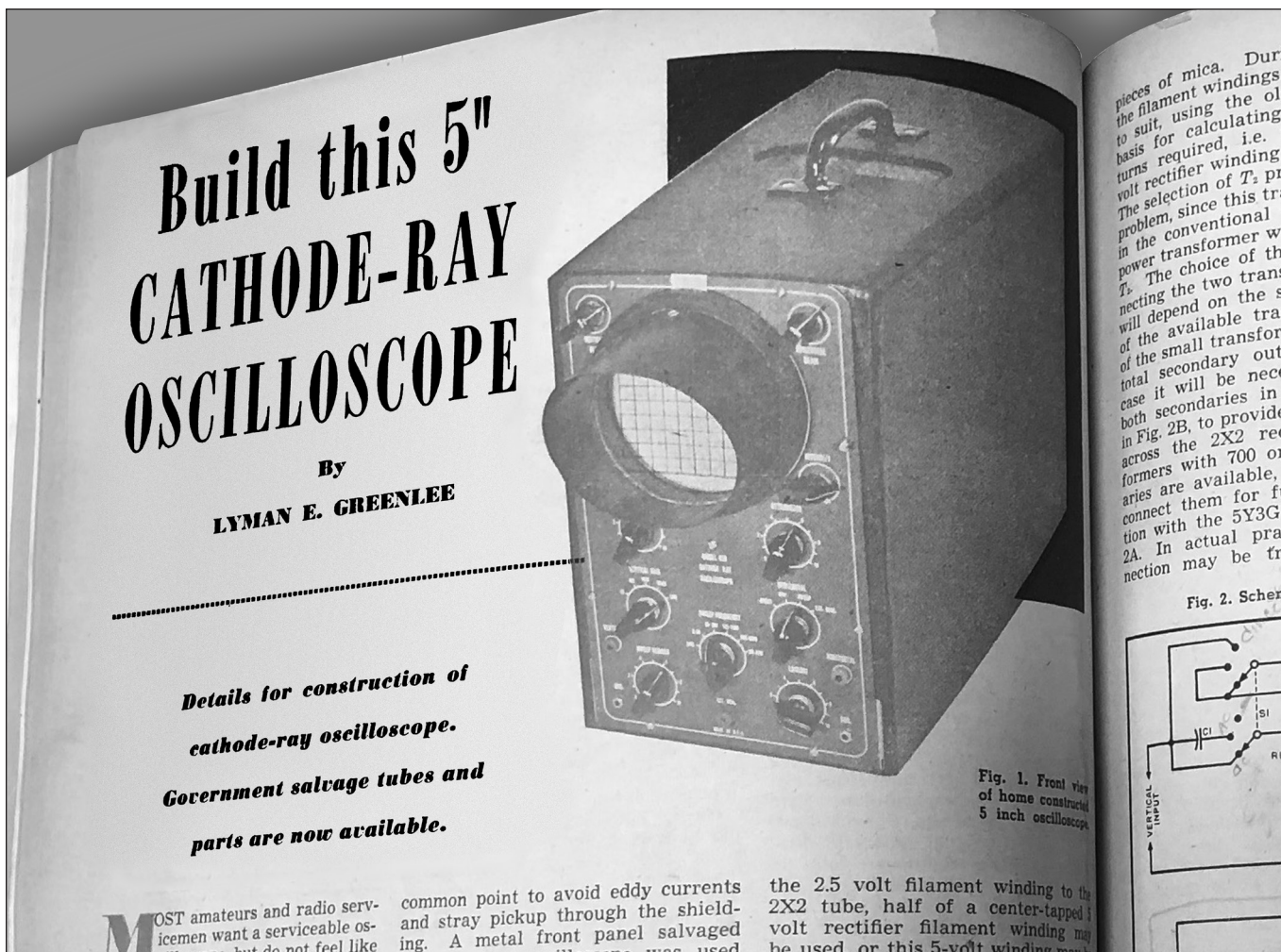
Radio News magazine was immensely popular. Each issue contained many construction projects. This issue appeared two months after Heath's first kit.



The mailing label on the October 1946 issue of Radio News.

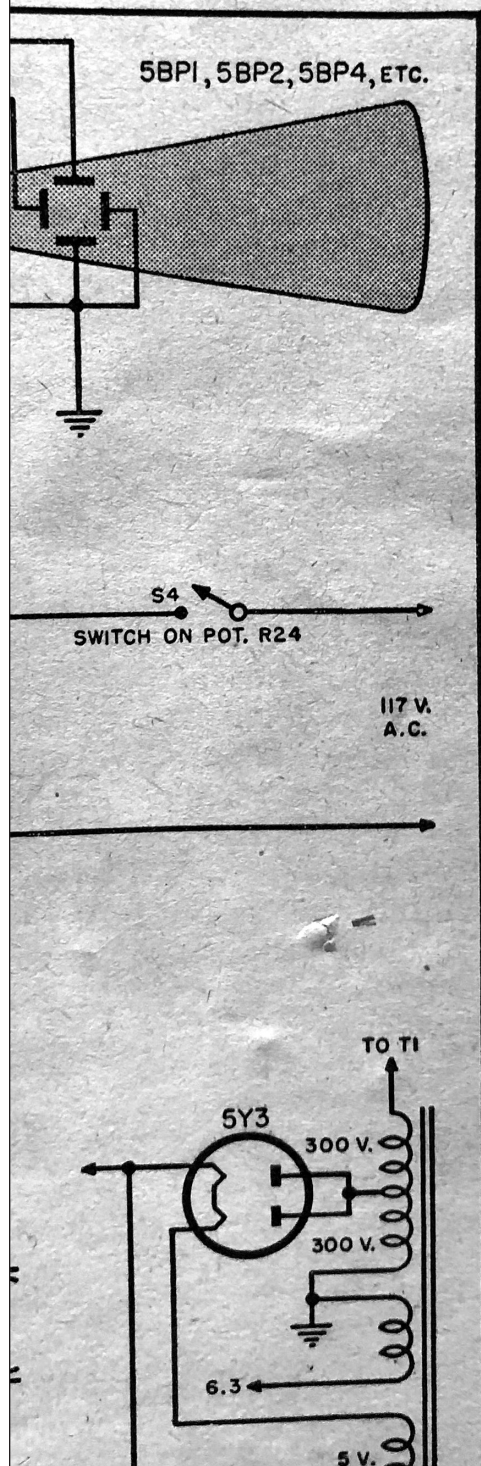
Anthony subscribed to a number of trade and popular magazines of the day, among them, *Radio News*. In the October 1946 issue there appeared a construction article titled, "Build this 5-inch Cathode Ray Oscilloscope." A tag line for the article read, "Government salvage tubes and parts are now available." We can't know Anthony's reaction, but it is easy to image him turning around in his chair and looking at crates of cathode ray tubes next to crates of power transformers next to crates of every other kind of parts you can imagine, and thinking to himself, "Hmmm."

This article, from the October 1946 issue of Radio News, is believed to have inspired Anthony to develop Heath's first electronic kit product, the O-1 oscilloscope.



potentiometer, K_{17} , is the focusing control. Its purpose is to move the image up and down on the cathode-ray tube screen.

explained in text.



See page 130 May 1947 R.H.

A slice from the oscilloscope article that caught Anthony's attention. His hand-written note in the margin refers to a 1947 article in which improvements to the scope were described.

On a whim, I submitted Howard's brief margin note to an expert in handwriting analysis. I will admit that I regard handwriting analysis as only one step removed from astrology. Still, it was inexpensive and I thought it would be an interesting experiment.

I provided absolutely no details about the writer. Gender. Age. Occupation. Interests. Nothing. Not even where the sample came from. The sample of handwriting was insufficient for any kind of detailed study, but the analyst was able to make the following observations.

"This is an analytical thinker, good listener, with a fluid / creative mind. Probably liked to talk, could argue a point while keeping the emotions under control."

Maybe there's more to this than I imagined...

We know Anthony saw the 1946 scope article because in that issue of the magazine (with his name and address on the mailing label), he wrote a note to himself (or perhaps to someone else) on the margins of the page. What may have happened is this: He built the scope (or had someone build it for him) and found that it didn't work very well, at which point he put it on a shelf and moved on. Then in May 1947, a follow-up article appeared suggesting changes to improve the scope's performance. He took the scope off the shelf, added the modifications and found that it now worked pretty well. What we know for a fact is that two months later, in July 1947, Heath was advertising a five-inch oscilloscope kit, and at \$39.50, it was at least half the cost of anything else on the market.

It is believed that Heath sold about 100 of these oscilloscopes.⁴⁹ They sold very quickly, and right away Anthony knew he was onto something big. He just could not have imagined how big. A vacuum tube voltmeter kit soon followed. Then a signal generator. Each new kit, it seemed, sold faster than the last. It was an incredibly simple idea. By shifting the cost of assembly to the customer, Heath was able to sell electronic instruments at about half the price of ready made products. This was the dynamic that would propel the company to fame and fortune. And it wouldn't take long. A box of parts and some instructions. Anthony would call these products "Heathkits." And with that, the Heathkit revolution was on.

A GAME CHANGER

In the post-war boom of the late 40s and 50s, the nation's appetite for electronic equipment was almost insatiable, driven in part by the G.I. Bill. Officially known as the Servicemen's Readjustment Act of 1944, the G.I. Bill ("G.I." was taken from the phrase "government issue" and was used affectionately to refer to anyone in the armed services) provided a wide range of benefits to virtually all servicemen returning from World War II.

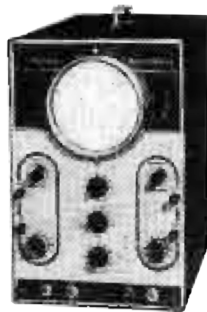
A tiny announcement at the bottom of this ad was the first mention of Heath's oscilloscope kit. That anyone actually noticed is something of a miracle. Reproduced here at actual size. Radio News, July 1947.

HEATH ELECTRONIC SURPLUS BARGAINS

General Radio Variable Inductors 107M, 1 1/2 to 55 Mh.	\$36.95
Ohm meters Bendix-Scintilla 0-200, 0-100M ohms	9.95
OIL FILLED CONDENSERS	
Solar—4 MFD, 500 V.D.C.	\$1.89
Tobe—5 MFD, 500 V.D.C.	1.99
Aerovox #10—2 MFD—6 MFD, 1000 & 800 V.D.C.	2.49
Tobe—5 MFD, 500 V.D.C.	1.99
Westinghouse—8 MFD, 300 V.D.C.	2.29
Micamold—2.5—2.5—5 MFD, 600 V.D.C.	1.99
Sprague—8-8-8 MFD, 600 V.D.C.	4.99
G. E. Pyralol—4 MFD, 1000 V.D.C.	1.89
Industrial Cond.—8 MFD, 1000 V.D.C.	2.29
Aerovox—8-8 MFD, 1000 V.D.C.	2.99
Westinghouse Inertan—8 MFD, 2000 V.D.C.	5.49
Sprague—4 MFD, 2000 V.D.C.	3.29
Aerovox—2 MFD, 2500 V.D.C.	3.89
Sprague—3 MFD, 4000 V.D.C.	3.80
Aerovox—.05 MFD, 7500 V.D.C.	3.29
MICA CAPACITORS	
Aerovox—.002 MFD, 6000 V.D.C.	\$2.49
W.—.002 MFD, 5000 V.D.C.	2.49
Micamold—.01 MFD, 5000 V.D.C. Test.	1.49
Sangamo—.002 MFD, 2500 V.D.C. Working.	.89
Publite—.005 MFD, 2500 V.D.C. Test.	.25
Sangamo—.02 MFD, 1200 V.D.C. Working.	.69
Sangamo—.08 MFD, 600 V.D.C. Working.	.99
Sangamo—.02 MFD, 600 V.D.C. Working.	.25
Aerovox—.01 MFD, 600 V.D.C. Working.	.49
Electromotive—47 MMFD, 500 V.D.C. 3 for	2.25
Electromotive—200 MMFD, 500 V.D.C. 3 for	2.25
Electromotive—270 MMFD, 500 V.D.C. 3 for	2.25
Electromotive—470 MMFD, 500 V.D.C. 3 for	2.25
Micamold—.022 MFD, 400 V.D.C. 2 for	2.25
Micamold—.02 MFD, 400 V.D.C. 2 for	2.25
Tobe—.006 MFD, 400 V.D.C.	2.25
C.D.—.001 MFD, 400 V.D.C. 3 for	2.25
Tobe Molded Paper—.01 MFD, 200 V.	.09
Mica Condenser Kit—12 All Different—All Marked	.99
PAPER TUBULAR CONDENSERS	
Illinois Cond.—.05 MFD, 600 V.D.C. 3 for	.25
Sprague and Amcon—.01 MFD, 600 V.D.C.	.25
Signal Corps Laboratory Receiver BC-186 built by ALLEN DUMONT LAB. Dry battery operated with Weston dual range voltmeter to check, plug-in coils covering 2400-3700 KC included complete with tubes	\$14.95
POWER TRANSFORMERS	
Gen. Tran. Corp. 115V 60 cy PRI. Sec. 500 VCT 25 MA. 6.3 V-3.25 A. 5V. 2A.	\$1.49
Hammarlund 117V. 60 cy PRI. Sec. 485VCT at 160 MA with ext. tap 300 V. at 11 MA. 6.3V at 7A. 5V at 3A. 5V at 2A	4.49
Signal Generator Power Transformer 117V 60 cy PRI. Sec. 295V at 80 MA 6.8V at 3.2A and 4.8V at 1.9 amps.	.99
FILTER CHOKES	
No. 2704P—10 henrys, 200 MA Cased.	\$2.49
No. 2705P—20 henrys, 50 MA Cased.	1.49
POTENTIOMETERS	
General Electric—600 ohm 4 watt	
W.W. 1" shaft.	29c 4 for 99c
General Electric—5000 ohm 4 watt	
W.W. 3/4" shaft.	29c 4 for 99c
Western Electric—10,000 ohm 4 watt	29c 4 for 99c
W.W. 3" shaft.	29c 4 for 99c
C.T.S.—10,000 ohm Carbon 3/8" shaft	29c 4 for 99c
General Electric—20,000 ohm 4 watt W.W. 1" shaft.	29c 4 for 99c
Western Electric—20,000 ohm 4 watt W.W. 1 1/2" shaft.	29c 4 for 99c
C.T.S.—25,000 ohm Carbon Spdt Switch 1/2" shaft	39c 3 for 99c
Clarastat—40,000 ohm 3 watt W.W. 1 1/2" shaft.	29c 4 for 99c
Centralab—100,000 ohm carbon 2" shaft.	29c 4 for 99c
Clarastat—200,000 ohm carbon 1" shaft.	29c 4 for 99c
Allen Bradley—1 Meg. Spst Switch 1 1/2" shaft	39c 3 for 99c
Potentiometer Kit—2 each of above.	22 for \$3.99
GOLD BAND 5% RESISTORS 1/2 & 1 WATT	
1,000 ohms, 1,250 ohms, 4,700 ohms, 5,000 ohms, 10,000 ohms, 15,000 ohms, 68,000 ohms, 75,000 ohms, 100,000 ohms.	5c each 25 for 99c
Resistor Kit—1/2-1.2 Watt Excellent Sizes	100 for \$1.95
Power Rheostats—25 and 50 watt six different sizes for	2.95
Socket Kit—Miniature Octal—Locat.	.25 for .99
Microswitches—Assorted Types	.3 for .99
Amphenol Connector Kit—50 male and female Locking Military Type.	4.99
Headset—Miniature Type Two Receivers similar to hearing aid phones, used on mine detectors complete with headband and cord	.99
AMMETERS	
Weston Type—205P 0-60 Amps DC Ext. Shunt Incl. 2 1/2" dia.	\$2.95
Westinghouse—0-240 Amps DC Ext. Shunt Incl. 2 1/2" dia.	2.95
General Electric—50-0-50 Amps DC 3 1/2" dia.	2.95
Weston Voltmeter Switch—one pole nine position	.99
BAKELITE SHEET AND ROD	
Bakelite Sheet—Fabric Base size 40" x 50" in 3/8-1 1/4 thickness	lb. \$0.59
Bakelite Rod—2" diameter app. 3 foot long	lb. .59
Anglo Tubes No. 1121228 F 3 High Voltage Low Amp Flash Tubes	4.95
SWITCHES	
Heinman Circuit Breaker Switches CB-41 One Amp 110 Volts	\$1.79
Cutler Hammer Toggle Spdt Momentary One Side	.29
Cutler Hammer Toggle Spdt Momentary	.19
Cutler Hammer Toggle Spdt	.39
OSCILLOSCOPE KIT	
Complete 5" Oscilloscope Kit includes punched and formed steel case, chassis, lettered panel, all tubes, oil filled condensers, cased scope transformer, frequency compensated amplifiers, 15-30,000 cycle sweep generator, every part supplied complete with diagram and instructions and excellent training course	\$39.50
NO ORDERS UNDER \$2.00	
WE WILL SHIP C.O.D.	
WRITE FOR COMPLETE LIST	

HEATH COMPANY
BENTON HARBOR, MICHIGAN

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 5B1, 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**

An actual photo of the scope did not appear until September, 1947. Note the use of "M" in the sweep specification "15 to 30 M cy.". Heath used "M" in the sense of "mil," meaning one thousand. The company also used the "M" notation on its first four VTVMs. Also note that this ad used the word "Heathkit" for the first time. Radio News, September 1947.

Among other things, these benefits included low interest loans for homes or to start a business, and direct payments to attend school.⁵⁰

During the war, many G.I.s were trained in the field of electronics, and when they left the service, they took the skills they had learned and, with help from the G.I. Bill, opened their own TV and radio service shops,



For historical perspective, Bell Laboratories invented the transistor in December 1947, just six months after Heath's first kit product. Ironically, these tiny devices were the seeds of Heath's undoing. The smallness of these devices would eventually facilitate technologies and manufacturing techniques that worked against Heath's business model. It would take about 25 years before the consequences of "solid-state" would begin to make themselves apparent to Heath.

electronic manufacturing businesses, and other ventures in electronics. What these people needed more than almost anything else was access to *affordable* electronic instruments. Oscilloscopes. Vacuum tube voltmeters. Signal generators. All of the same stuff Heath was selling. And affordability was Heath's stock in trade. By pure chance, Anthony had figured out the kit business at the same time record numbers of people were looking for his products. The serendipitous confluence of kits and ex-G.I.s supercharged a business that would probably have done pretty well in any case. Moreover, the rapid development of an enthusiastic subculture of kit builders would quickly evolve into a fiercely loyal customer base, further accelerating the growth of the company and sustaining it for more than 30 years.

The kit idea was a game changer. Howard Anthony never looked back.

FIRST STEPS INTO HAM RADIO

Every month, magazines like *Radio News* were packed with radio service and amateur radio construction projects. You didn't have to design anything. It was all in there for the taking. And at least in Heath's early years, that is pretty much what happened.

Virtually every month, *Radio News* featured some kind of construction project Heath could use. Generally speaking, company engineers did not directly copy projects like these. They were used as starting points. Add a feature here, and a couple of changes there, and presto—another kit.⁵¹ Even a decade later, Heath engineers were still combing through magazines and other sources for ideas. For example, Heath's CB-1 citizens band radio, released in 1959, was almost an exact copy of a radio described in a construction article appearing just months earlier in an issue of *Radio and TV News*.

Additionally, there was a lot of reverse engineering going on at Heath. Engineers, whether on the payroll or acting as contractors, would routinely take the products of other manufacturers, and use them as the basis for new Heath products.⁵² Reverse engineering was inexpensive, and saved a lot of time.

Anthony seemed to understand instinctively that amateur radio had a place at Heath. While he was not a radio amateur, he knew a market when he saw one, and from his vast stock of surplus parts he searched

**HEATHKIT
TRANSMITTER KIT**

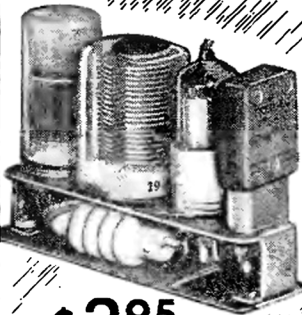
A best buy in an amateur transmitter kit. Circuit uses latest post war improvements, can be assembled to cover 80-40-20-10 meters with 25 Watt output. Comes complete with 80 meter crystal, speech amplifier, 80 meter coil, four tubes, cabinet, beautiful panel and all additional parts needed less power 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**

Heath's first amateur transmitter kit, advertised briefly in 1948, failed to materialize. What went wrong is not known.

**Midget
AMATEUR
TRANSMITTER KIT**



The hit of the year, using army Walkie-Talkie parts. Easily assembled into a 1 Watt 80 meter CW transmitter. Comes complete with 80 meter crystal, tube, chassis, tank coil, tuning condenser, all other small parts and complete instructions. The only other parts required are key and batteries listed below. An ideal beginner's station with range up to 500 miles. Lowest cost ever offered. Add postage for 2 lbs.

\$3.95

ACCESSORIES

KEY
(add postage for 2 lbs.) **\$1.00**

KIT OF BATTERIES
(add postage for 4 lbs.) **\$3.25**

This tiny QRP transmitter kit was made from army surplus walkie-talkie parts. It sold for a few months in 1948.

constantly for opportunities to market to hams.

Initially, Anthony seemed content to sell war surplus communications equipment and just point out that much of it could be converted for amateur use. In flyers and magazine ads he cited conversion articles in *QST* and other popular publications.

Then, sometime in 1947, Anthony asked one of his test equipment engineers to come up with a small amateur radio transmitter.⁵³ A prototype was developed and enough progress was made to warrant running an ad for the unit, which first appeared in the January 1948 issue of *Radio News*.

The design of a small transmitter should have been a no-brainer. Circuits for this kind of thing appeared regularly in *QST* and elsewhere, including the *Radio Amateur's Handbook*, published yearly by the American Radio Relay League. What exactly went wrong is not known, but problems with the transmitter persisted and eventually the project was shelved.⁵⁴ The transmitter never had a name or model number, and as far as can be determined, none were ever sold.

After this failed attempt, Anthony returned to the idea of surplus conversion. For a few months in 1948, for example, Heath advertised a "Midget Amateur Transmitter Kit," using parts from army surplus walkie-talkies. For \$3.95 you could cobble together a one-watt, crystal-controlled, 80-meter CW transmitter "with a range of up to 500 miles." If you also purchased the optional key and battery set, you could get on the air for just under \$10.

Then, starting in 1949, war surplus parts, which had been Heath's life blood, began to disappear from advertising. By early 1950 they were gone entirely. Either the company had burned through most of it, or Anthony had made the decision that it was no longer profitable enough to bother with. The latter seems more likely, given



While it was a huge success, Roger Mace's AT-1, released in 1953, really served as a kind of trial balloon in the amateur radio market.

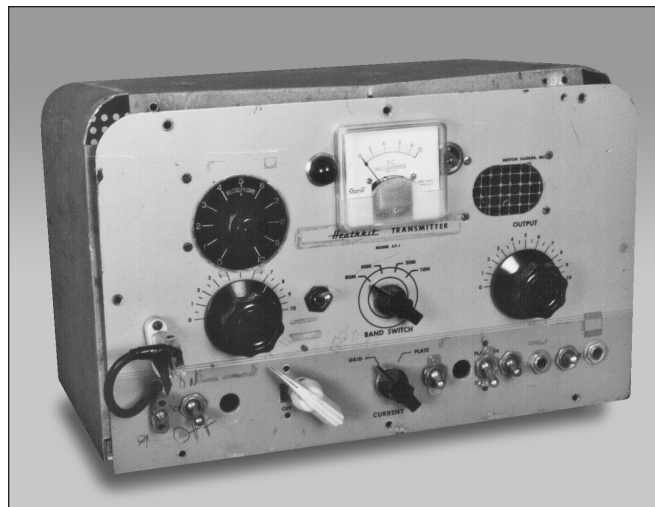
that the kit side of the business was, by this time, growing exponentially.⁵⁵

Heath did not attempt another transmitter until about five years later, in 1953. The impetus for the project was the creation of the novice class amateur radio license in 1951. The novice class would bring an entirely new crop of operators into the fold, and many, perhaps most, of these people could be young and of limited means. A quick survey of small amateur radio transmitters available at the time revealed an opening for an inexpensive kit-form product. Taking no chances, Anthony approved the hiring of an actual ham radio operator, Roger Mace, to give it a shot.

This time, things went a lot better. Mace, who had been hired in January, dived into the project. He designed the transmitter and took the project from a prototype to a finished product in just a couple of months. The transmitter, designated the AT-1, was first advertised in Heath's Spring 1953 flyer and on the pages of *QST* in July that same year. The AT-1 was quickly followed by a receiver, the AR-2, also designed by Mace. These were instantly successful, and Mace wasted no time in coming up with another project: a *big* transmitter.

A specific culture of engineering developed pretty quickly at Heath. Essentially, anyone with an idea for a product could develop it into a prototype without getting anyone to sign off on it first. Engineers had free access to all the parts they needed and a machine shop to crank out chassis, front panels and cabinets. Heath even encouraged engineers to work on pet projects at home, and most were happy to do so. That kind of enthusiasm was commonplace at the time and taking advantage of it was just smart business—the company got a lot of free engineering. When an engineer had a working prototype, they could then present it to management, which would say yea or nay.⁵⁶

Maybe it was because there were no hams in management in those days, or maybe it was because the



Heathkits have a reputation for being easy to modify—sometimes with stupefying results. Can you find the AT-1 in this picture?

company had become comfortable raking in easy money from test equipment and high fidelity products and had developed some tunnel vision about new products, but there was always more than a little skepticism about new products, and especially, it seemed, for amateur radio gear. So it was with Mace's proposed big transmitter. Mace could not convince management that a big transmitter would be a best seller.

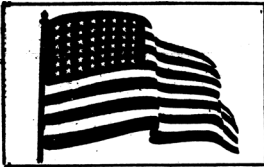
Management argued that it would be too expensive, and that there were too many big players in the market already. Undeterred, Mace designed and built a prototype on his own time at home. The rig was patterned on the Johnson Viking II, which had been released in 1952, and it only took a couple of months to get it running.^{57, 58} Mace called it the DX-100. "DX" just sounded good, and "100" may have been a reference to its input power—or its weight.

Once accounting had run all the numbers, they figured they could sell the DX-100 for about \$190. That was \$90 less expensive than the Viking II. The company reasoned that it could make some decent money if it sold more than a few hundred units. Anthony gave it the green light.

TRAGEDY AND TRANSFORMATION

In the summer of 1954, about midway between the release of the AT-1 and the DX-100, Anthony decided it was time to look around for a new company airplane to replace its non-pressurized Aero Commander.⁵⁹ On Friday, July 23, he, a pilot and four other passengers took flight in a twin-engine de Havilland Dove, headed for Miami on a demonstration ride and a little time off. All was well until just after 2 PM when the group ran into bad weather. In the storm, the plane experienced some kind of catastrophic failure and crashed in a mountainous area of Tennessee, some 40 miles north of Chattanooga.⁶⁰ All aboard were killed. Howard Anthony was just 42 years old.

At some earlier point in Heath's history, an accident



The News-Palladium

Michigan's Biggest Buy . . . For Reader And For Advertiser

FINAL EDITION

BENTON HARBOR, MICH., SATURDAY, JULY 24, 1964

16 PAGES PRICE 5 CENTS

WEATHER FORECAST

Mostly fair tonight. Partly cloudy Sunday.

TEMPERATURES

Readings from 7 p.m. to 10 a.m.
10 p.m. 72° 1 a.m. 68°
7 p.m. 71° 4 a.m. 67°
9 p.m. 69° 3 a.m. 66°
12 m. 61° 12 n. 77°

Around Town

Looks After Choppers

Tunes Well Received

Corn Man's Challenge

And Other Local Tales

A young dental student who has a way with kids is in charge of looking after the "choppers" of 400 Benton Harbor youngsters.

Ted Touman, 22-year-old senior at the University of Michigan, is one of 40 dental students and hygienists spread throughout the state as part of summer programs set up by the State Department of Health.

While many other cities have tried the program before, this is Benton Harbor's first experience. Touman is now handling about 70 youngsters daily at the Sterne Brunson school. Previously, he had carried on his dental checkups at Betty McCord and at Britain. He will later move on to the Morton and Bard schools to finish his work. The native of Port Huron will leave here August 27. He started here June 14.

The program, he says, is sponsored by the health department and supplies all equipment. Children in the second, fifth and eighth grades are cared for at a small charge. Each is given four treatments.

The program, he said, will be continued next year under a similar arrangement. This way, every youngster will have a chance to get dental care at least once every three years.

Touman says he finds working with youngsters "a lot of fun." He plans to finish off his fourth year of advanced dental school next June, and will then take a commission as second lieutenant in the army.

Eventually, he plans to open his own practice.



Big Craft May Have Exploded

Eyewitnesses Tell Mountain Peak Disaster

Civil Aeronautics Authority (CAA) officials today were combing debris on the side of rugged Brayton mountain in west Tennessee trying to determine what caused yesterday's plane crash which claimed the lives of five Benton Harbor area people and a Pontiac pilot.

Killed in the crash were: Howard Anthony, Benton Harbor industrialist; Laurel Brown of Lawrence and his wife, Florence; Gordon Paxson, Benton Harbor engineer-designer; Lawrence (Larry) Durham of Benton Harbor; Anthony's private pilot; and Gordon Wyeth, Pontiac pilot and plane salesman.

CAA investigation from Chattanooga, 30 miles from the crash scene, were considering two possibilities.

Victims Of Tennessee Crash



Killed With 5 Others

Gordon Paxson, Lawrence Pair, B. H. Pilot Die

A shattering airplane explosion over the hills of western Tennessee near the town of Dayton yesterday afternoon blasted to death six persons, five of them from Benton Harbor and adjacent areas.

Instantly killed when the De-Haviland Dove plane, a twin-engine, British-built aircraft, lost one engine and exploded in mid-flight, were:

HOWARD E. ANTHONY, 48, Benton Harbor, president of the Health company, chairman of the Twin Cities Airport board; director of the Farmers & Merchants National bank; director of the Chamber of Commerce and vice-chairman of Mercy hospital's board of trustees.

GORDON PAXSON, 42, artist and designer, a resident of St.



SCATTERED WRECKAGE marks the spot where a twin-engine private plane crashed near Dayton, Tenn., yesterday, carrying five Benton Harbor area residents.

The news hit with a thunderclap. The investigation determined that mechanical failure was the cause of the crash, not an explosion as was first thought.



A de Havilland Dove similar to the type that claimed the life of Howard Anthony and five others.

of this magnitude might have stopped the company in its tracks. But by this time Heath had developed such tremendous momentum that it was essentially unstoppable. That didn't make the pain any more bearable, however. Anthony's wife, Helen, had worked closely with her husband from the very beginning in 1935. While Howard was consumed with new ideas, Helen kept the finances on track and served as a check against her husband's more impulsive side.⁶¹ After Anthony's death, Helen took the helm and continued to run things for a



The News-Palladium

Michigan's Biggest Buy . . . For Reader And For Advertiser

FINAL EDITION

BENTON HARBOR, MICH., TUESDAY, NOVEMBER 23, 1964 16 PAGES PRICE 5 CENTS

WEATHER FORECAST

Clear or some light clouds. Wednesday cloudy, cooler, scattered snow. Thursday, Friday, Saturday, clear.

TEMPERATURES

Readings from 7 a.m. to 10 a.m.
7 a.m. 24° 10 a.m. 24°
9 a.m. 24° 4 a.m. 24°
12 m. 24° 12 n. 24°

HEATH CO. SOLD TO DAYSTROM, INC.

Union Rites Slated For Tomorrow

Many Benton Harbor Churches Set Other Holiday Services

James H. Heath, president of the Heath company, will be in the city today to meet with the union representatives of the Heath company. The union is expected to be organized by the end of the year.

Charge St. Joe Postal Clerk Filched Funds!

BERRIEN'S JUDGES SWORN IN

Kenneth J. Watt Named In Warrant

Scheduled To Be Arrested Today



B. H. Factory Sale Price Is \$1,850,000

Eastern Company Will Continue Operation Here

ANNOUNCES DEATH SALE: Mrs. Helen C. Anthony is seen in conversation with a group of people during a private interview when she announced the sale of the Heath company to Daystrom, Inc., of Elizabeth, N. J. With Mrs. Anthony is Daystrom Vice-President Robert E. Daystrom. Other people present are Mrs. Anthony's son, Howard, and her daughter, Helen.

The deal went down in February 1955, and \$1.85 million later, Heath was officially a part of Daystrom.

while, but numb with grief and loss, her heart just wasn't in it. She put the company up for sale just a month or two after the crash. On November 23, four months to the day after Anthony's death, it was revealed that a buyer had been found.

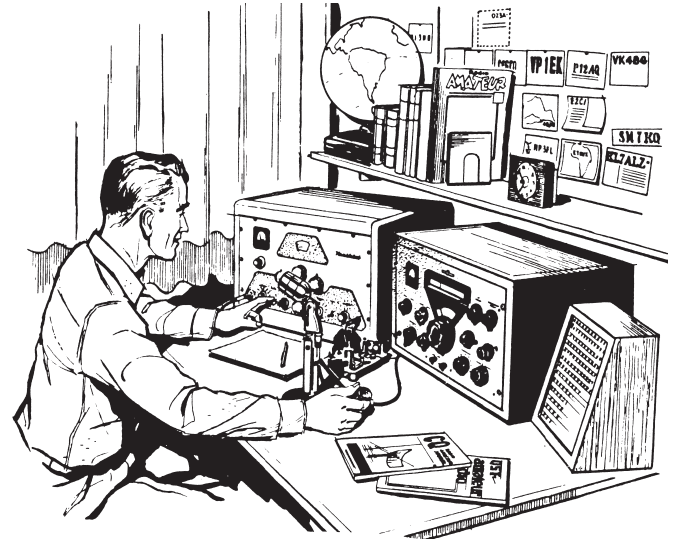
There were a number of offers, including one from Allied Radio, home of the Knight-Kit. But Helen seemed most impressed with a conglomerate called Daystrom, a holding company with interests in everything from printing equipment to electronics to furniture. The

company would eventually build missiles and nuclear reactors. And soon after its acquisition of Heath, Daystrom would also buy Weston, a maker of high-end electronic instruments and meters.^{62, 63, 64, 65}

New owners are always scary, but Heath's employees were soon convinced Helen had made the right choice. Almost immediately, Daystrom began pumping money into Heath. It also established a buy-on-credit system permitting customers to buy now and pay later. This made Heath's more expensive products accessible to a wider base of customers, and it had an immediate effect on sales. Daystrom also established Heath distribution centers in Canada, England and Germany, and began the creation of a network of dealers across the U.S. The company would eventually open a Heath manufacturing facility in England.^{66, 67}

By early 1955 Roger Mace's DX-100 was ready to go. One hundred pounds of get-on-the-air. It landed with a splash on the pages of *QST* in May, and was another instant hit. The DX-100 was a pivotal product, and can be credited as the kit that established Heath as a force to be reckoned with.

The unbridled success of the DX-100 opened the floodgates at Heath and sent a message to the company's



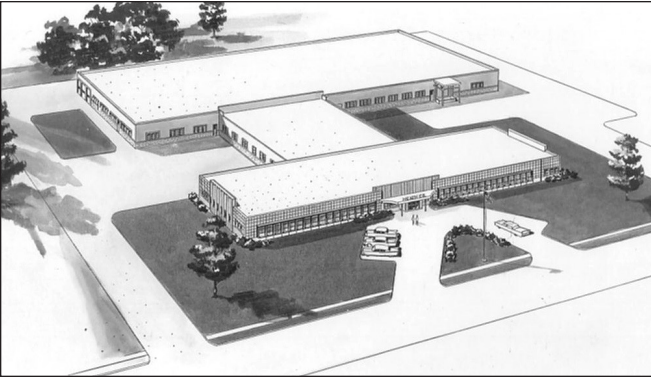
COURTESY ARLL

An illustration from a QST magazine ad featuring the DX-100. As Heath did not yet have a receiver of its own, the company used a Collins 75A-3 to complete the scene. The speaker appears to be home brew, as the ad also pre-dates Heath's own AK-5 speaker. A side note: Editors at QST must have failed to notice the operator's copy of CQ magazine on top of theirs! QST, December 1956.

Senior ham engineer Roger Mace leans on a DX-100 while trading notes with engineer Reggie Sears, seen here working on an AT-1.



COURTESY TERRY PERDUE



Architect's rendering of the original 150,000 square foot facility as completed in 1958. View to the northeast.



An additional 100,000 square feet of space was added to the north end of building in the mid 1960s. View to the southwest, with Lake Michigan visible at upper right.



The stacker warehouse (upper right, with raised roof) was added in 1967. This brought the building to almost 500,000 square feet. View to the northwest.



Heath's computerized "stacker," installed in 1967, was a kind of robotic fork-lift. It could efficiently store and retrieve inventory by means of punched cards.

competitors: There's a new player in town. Moreover, the huge sums of cash delivered by the DX-100 bought additional advertising might and, more importantly, it bought engineers. Graduate engineers. Guys like Al Robertson, Joe Shafer, Dar Evans and nine others with the power to move Heath away from reverse engineering and into a series of innovative products of its own design.

EXPANSION

For some time it had been clear that Heath was running out of space.⁶⁸ Early in 1954, Anthony had been planning to build a new plant. He had purchased considerable acreage just east of Benton Harbor specifically for that purpose. That land, however, was not part of the deal when Daystrom bought Heath from Helen Anthony.⁶⁹

In 1955, after acquiring Heath, Daystrom leased several additional buildings in an effort to keep up with the company's growth.⁷⁰ But running parts, equipment and people between these sites was inefficient, and the company began to consider its options.

In June 1956, Daystrom unveiled plans for a brand new facility for Heath, and larger than anything Howard Anthony had envisioned. Anthony had proposed spending \$500,000 on a new plant.⁷¹ Daystrom's plan was



Using punched cards, a worker prepares to send the stacker on a mission. The cards contain the part or model number and location of the inventory to be retrieved.

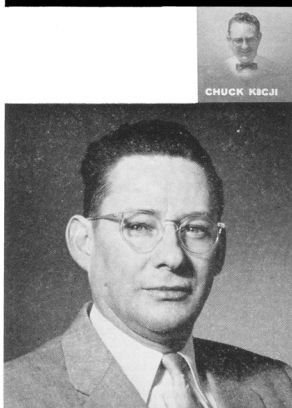
for a 150,000 square foot "ultra-modern" engineering, manufacturing and warehouse complex located across the river in St. Joseph, on Hilltop Road, overlooking Lake Michigan. The price tag was about \$1.5 million.⁷²

Heath would outgrow this mega-building several



All of these licensed radio amateurs make important contributions to the Heath line of fine ham kits. In a sense, they are your personal representatives within the company, because their design ideas and performance preferences reflect not only their own "on-the-air" experiences, but those of the amateur fraternity with which they are in constant contact. With this kind of representation in Benton Harbor, you can continue to rely on high-performance Heathkit amateur radio equipment designed by hams, for hams!

HEATH hams work to bring you



ROGER MACE (W8MWZ)
SENIOR HAM ENGINEER
HEATH COMPANY

HEATHKIT 50-WATT CW TRANSMITTER KIT

MODEL DX-20
\$35⁹⁵



If high efficiency at low cost in a CW transmitter interests you, you should be using a DX-20! It employs a single 6DQ6A tube in the final Amplifier stage for plate power input of 50 watts. The oscillator stage is a 6CL6, and the rectifier is a 5U4GB. Single-knob band-switching is featured to cover 80, 40, 20, 15, 11 and 10 meters, and a pi network output circuit matches antenna impedances between 50 and 1000 ohms to reduce harmonic output. Designed for the novice as well as the advanced class CW operator. The transmitter is actually fun to build, even for a beginner, with complete step-by-step instructions and pictorial diagrams. All the parts are top-quality and well rated for their application. "Potted" transformers, copper-plated chassis, and ceramic switch insulation are typical. Mechanical and electrical construction is such that TVI problems are minimized. If you desire a good clean CW signal, this is the transmitter for you! Shpg. Wt. 19 lbs.

HEATHKIT "APACHE" HAM TRANSMITTER KIT

- Newly Designed VFO—Provision For S.S.B. Adapter
- Modern Styling—Rotating Slide Rule Dial

MODEL TX-1
\$229⁵⁰

Shipped motor freight unless otherwise specified. \$50.00 deposit required on C.O.D. orders.

Fresh out of the Heath Company laboratories, the brand-new "Apache" model TX-1 Ham Transmitter features modern styling and is designed as a handsome companion to the also-new Heathkit "Mohawk" receiver. The "Apache" is a high quality transmitter operating with 150 watt phone input and 180 watt CW input. In addition to CW and phone operation, the "Apache" features built-in switch selected circuitry providing for single-sideband transmission through the use of a plug-in external single-sideband adapter. These Heathkit adapters will be available in the near future. A compact, stable and completely redesigned VFO provides low drift frequency control necessary for single-sideband transmission. An easy-to-read slide rule type illuminated rotating VFO dial with vernier tuning provides ample bandspread and precise frequency setting. Simple band-switching control allows flip-of-the-wrist selection of the amateur bands on 80, 40, 20, 15 and 10 meters (11 M with crystal control). The "Apache" features adjustable low level speech clipping and a low distortion modulator stage employing two of the new 6CA7/EL-34 tubes in push-pull class AB operation. Time sequence keying is provided for "chirpless" break-in CW operation.



The final amplifier is completely enclosed in a perforated aluminum shielding for greater TVI protection and transmitter stability. Cabinet comes completely preassembled with top hatch for convenient access without taking chassis out of cabinet. Die-cast aluminum knobs and front panel escutcheons add to the attractive styling of the transmitter. Pi network output coupling matches antenna impedances between 50 and 120 ohms. Incorporates all the refinements necessary with many "plus" features for effective and dependable communications. Shpg. Wt. 115 lbs.

...top quality at lowest prices!

HEATHKIT "MOHAWK" HAM RECEIVER KIT

- All Critical Circuits Prewired and Aligned
- Crystal Controlled Oscillators for Drift-Free Reception

MODEL RX-1
\$274⁹⁵

Shipped motor freight unless otherwise specified. \$50.00 deposit required on C.O.D. orders.

Outstanding results can be expected with the new "Mohawk" receiver which is designed to combine all the necessary functions required in a high quality communications receiver. A perfect companion for the Heathkit "Apache" transmitter, the "Mohawk" features the same wide-band slide rule type vernier tuning and covers all of the amateur bands from 160 through 10 meters on seven bands with an extra band calibrated to cover 6 and 2 meters using a converter. External receiver powered, accommodations are available for these converters which will be available in Heathkits soon. The "Mohawk" is specially designed for single-sideband reception with crystal controlled oscillators for upper and lower sideband selection. A completely preassembled, wired and aligned front end assures ease of assembly. All critical wiring is done for you insuring top performance. This 15-tube receiver features double conversion with IF's at 1682 kc and 50 kc. Five selectivity positions from 5 kc to 500 CPS. A



bridged T-notch filter is employed for maximum heterodyne rejection. Complete accuracy is obtained with the use of a built-in 100 kc crystal calibrator and the set features 10 db signal-to-noise ratio at less than 1 microvolt input. S-meter and many other fine features built-in for top-notch signal reception. Shpg. Wt. 90 lbs.

HEATH COMPANY

A Subsidiary of Daystrom, Inc.

BENTON HARBOR 9,
MICH.

Heath introduced the "Apache" and "Mohawk," as well as the "hams at Heath" in the August 1958 issue of QST.

times in the years that followed, requiring a series of expansions that topped out around 500,000 square feet by 1980.^{73, 74, 75, 76, 77, 78} By contrast, the average Walmart Supercenter is about 180,000 square feet.⁷⁹

Ground breaking on Hilltop Road occurred in early 1957 and the plant was fully operational in less than a year.^{80, 81, 82, 83}

In 1967 Heath's Hilltop Road plant, as it came to be known, was outfitted with a multi-story computerized "stacker" that permitted the storage and retrieval of inventory on a scale previously unimaginable.⁸⁴

And in 1969 Heath announced the purchase of another 16 acres of land just across the road from its main plant. The construction of another building there would make more room for some of the company's operations.⁸⁵

In the span of a few years, Heath had been fundamentally transformed from a small company doing pretty well to a big company doing *phenomenally* well.

A NEW KIT EVERY MONTH

With the new amateur radio division now firmly established, new kits began to roll out the door with

some regularity between 1955 and 1957. Initially, many of these were smaller gizmos. For example, the DX-20, 35 and 40 transmitters were developed as refinements of the AT-1, and a series of accessory products included a VOX adapter, an SWR bridge, a field strength meter and a Cold War alarm gadget designed to "preclude the possibility of your station being the recipient of a guided missile." Work also began on larger projects, like a refinement of the DX-100, and a matching transmitter-receiver pair of products called the TX-1 and RX-1. These two kits would reflect a growing awareness of industrial design based on the idea that a product should look as good as it works.

The TX-1 and RX-1 were the first Heath products finished in two-tone green—colors that would quickly establish the company's signature look. The "green machines" helped distinguish Heath's products from the rest of the pack, and the color scheme would be used for the next 25 years.

The TX-1 and RX-1, nicknamed the Apache and the Mohawk respectively, hit the catalog in 1958. Both were huge successes. The Indian names were a nod to Roger Mace's wife, a Native American.⁸⁶ Indian names would

COURTESY TERRY PERDUE



Al Robertson calls CQ on the company's new TX-1/RX-1 station. These rigs began to establish Heath's signature look. Robertson took over as chief ham engineer when Roger Mace left late in 1959.



The lunch box series, which included units for 10, 6, and 2 meters, all released in 1960, began with the CB-1 citizens band radio (at upper left) in 1959. The "Sixer" and "Twoer" lasted until 1971.

be used in several other kits until Mace's failing health forced him to leave the company late in 1959.⁸⁷

The next five years were enormously productive, with no fewer than 60 new amateur kits from 1958 to 1962—an average of one new kit every month for five straight years. Mobile and VHF equipment appeared along with new novice gear, power supplies, CB radios, and accessories of all description.



The simplicity of the lunch boxes made them frequent targets for modification, to the extent that it seems a little unusual to find one that is unmodified.

In 1960, Heath introduced a series of three small transceivers based on a citizens band radio it had released the previous year. In size and shape these units bore a striking resemblance to the small metal boxes full of sandwiches and coffee carried to work by millions. Designed for operation on 10, 6, and 2 meters, Heath called them the Tenner, the Sixer and the Twoer. Everyone else called them lunch boxes. Heath didn't use that name until late in 1964, when they referred to the radios as "Benton Harbor Lunch Boxes" in the Christmas catalog.

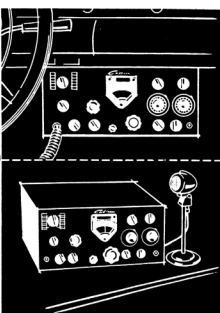
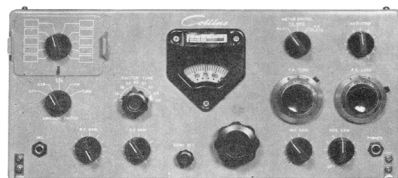
Heavy and sustained sales of the lunch boxes surprised the company, and they remained in the

NEW

from Collins

FIRST

Mobile SSB
Mobile Transceiver



KWM-1

for complete Mobile, Fixed use

NEW and FIRST — that's the best description of the revolutionary KWM-1, the first mobile transceiver and the first to offer SSB. And this 14-30 mc 200 watt package is equally adaptable to fixed use with simple removal from a convenient mounting tray under the dashboard.

Utilization of common components in both transmitting and receiving functions results in a saving of both space and cost and, in the case of frequency-determining components, assures exact coincidence of transmitted and received signals. Frequency stability and readability is comparable to that of the KWS-1/75A-4. The panel meter serves as an S-meter during receive and multi-meter during transmit. Break-in CW using VOX

*PEP Input

circuits is built-in, as is a side tone for monitoring CW. Ten 100 kc bands are available anywhere in the 14-30 mc range.

These are a few of the features in the all-new KWM-1. Ask your Collins distributor for details. Limited quantities available in August.

NET PRICES

KWM-1 Transceiver	\$770.00
516E-1 12 vdc Power Supply	248.00
516F-1 115 vac Power Supply	103.00
312B-2 Speaker Console with directional wattmeter	146.00
312B-1 Speaker in cabinet	25.00
351D-1 Mobile Mounting Tray	22.00

Collins

CREATIVE LEADER IN COMMUNICATION



The Collins KWM-1 substantially raised the bar for amateur radio equipment, and planted the seeds for Heath's SB series. QST, May 1957.

catalog until 1971, by which time they seemed hopelessly outdated. When first released, these simple radios provided an inexpensive way to explore VHF, then regarded as the final frontier. It is impossible to say how many were sold, but they continue to show up in large numbers at swap meets and online auction sites.

THE SB SERIES

Collins Radio, in Cedar Rapids, Iowa, had an outsized influence on just about everyone in amateur radio. As a major supplier of communications equipment to the military, Collins radios were exceptional in both design and cost. A Collins rig was the envy and desire of almost every ham.

In May 1957, Collins ran an ad for a new product, the KWM-1. It was the very first of a new breed of radios. The company called it a transceiver—a transmitter and a receiver in one smallish package. Collins promoted it for mobile use, but hams quickly discovered it was *way* too good to leave in the car. But at \$770, plus \$100 for an AC power supply, or \$250 for a mobile power supply, the KWM-1, like all Collins equipment, was out of reach for most hams.

Heath took notice, and engineers began talking about designing a low-cost look-alike. Everyone agreed it

would be an expensive project, but thought it could be reasonably profitable. The idea of a station that looked like Collins and had near Collins-like performance at say, a third of the price, might appeal to a lot of ops. But the guys in amateur group were busy with a lot of other projects including a new transmitter, the HX-10 “Marauder,” designed in the big/heavy style of the TX-1 and DX-100, that would operate in a mode called single sideband (SSB). SSB had been getting a lot of attention (Collins used it in the KWM-1), but it hadn't yet gone mainstream. So for the time being, the Collins look-alike thing remained on the back burner.

Then, in February 1958, Collins advertised a new transmitter, the 32S-1. Stylish and modern in appearance, it was like nothing else on the market. And it was designed for single sideband operation, the mode of the future. Collins had thrown AM out the window. The following month, an ad appeared for a matching receiver, the 75S-1, and hinted at a new linear amplifier. None of these units were available yet, but orders were being taken.

Like the KWM-1, these new rigs were not inexpensive. The 32S-1 transmitter was \$555, plus \$135 for the power supply, while the 75S-1 receiver was priced at \$495. So the whole station would cost \$1185, or about \$10,600 adjusted for inflation in 2020.

TIPPING POINT

In November, Al Robertson opened the latest issue of QST and saw something that pushed him over the edge. It was another ad for Collins. But it was no ordinary ad. It was a *four-page full-color insert*, officially introducing the “S/Line.” The S/Line included the 32S-1 transmitter, the 75S-1 receiver, a linear amplifier and a group of accessories, all designed in sleek gray matching cabinets. They looked modern. They looked stylish. They looked rugged. Al Robertson had seen the future, and it looked like the Collins S/Line.

Al showed the ad to his co-worker, Joe Shafer. Shafer studied the ad for a few minutes and replied simply, “We could do that.”⁸⁸

This was the tipping point. In that instant, the days of big, heavy radios were over.

The development of a series of products to rival the S/Line would be the most complex and expensive project ever attempted by Heath up to that time. Quickly, it became clear that the informal process of kit development Heath had used up to this point would not work with a project this large. Building a constellation of related products required a plan. A *strategic* plan. A plan that meant a lot more people would have to be involved than in the past, when it was mostly the engineers who made the decisions.

In addition to the engineers, this new project would require input from people in management, marketing, advertising, accounting, industrial design, graphic design, and tech writers. Even the guy from personnel got involved.⁸⁹

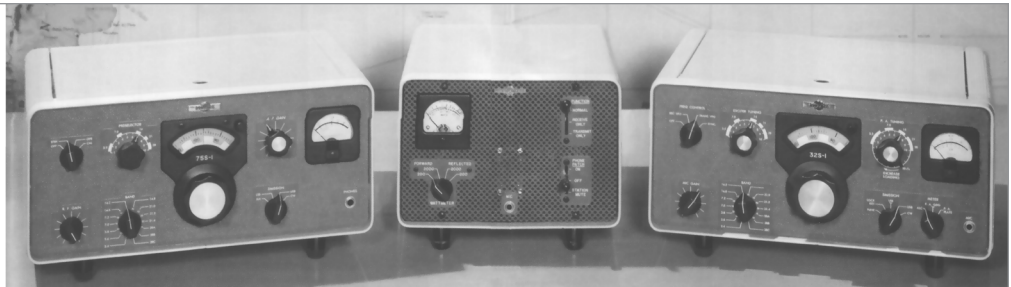
Inevitably, this led to conflicts.

COURTESY TERRY PERDUE



Engineers discuss a prototype of the company's new single sideband HX-10 transmitter. From left: Bjorn Heyning (head of the instrument group), Gene Fiebich (head of engineering), and engineers Bill Hannah, Carl Phlegar, Joe Schafer, and Ray Freridge. Note photo of Howard Anthony on the wall. 1962.

INTRODUCING COLLINS **S**/LINE OF SSB AMATEUR EQUIPMENT



COLLINS S/LINE — HALLMARK OF SUPERIORITY IN SINGLE SIDEBAND

To its distinguished series of single sideband amateur radio systems, Collins now adds the S-Line. This attractive, completely new line combines the quality and performance of the KWS-1, 76A-4 and KWM-1. Individual S-Line units on which several system configurations can be built are the 32S-1 Transmitter, 75S-1 Receiver, 30S-1 Linear Amplifier, 516F-2 Power Supply, 312B-4 Speaker Console and 312B-5 Speaker.

32S-1 TRANSMITTER
The 32S-1 Transmitter has a nominal output of 100 watts for SSB or CW operation on all amateur bands between 3.5 and 29.7 mc; input power is 175 watts PEP on SSB or 160 watts on CW. The 32S-1 may also be used without modification to excite the 30S-1 Linear Amplifier. The transmitter covers the entire spectrum from 3.5 to 30 mc except for the 5.0 to 6.5 mc range. Crystal sockets, crystals and band switch positions are provided for 10 200 kc bands, with the standard amateur configuration equipped for: 3.4-3.6, 3.6-3.8, 3.8-4.0, 7.0-7.2, 7.2-7.4, 14.0-14.2, 14.2-14.4, 21.0-21.2, 21.2-21.4, 21.4-21.6. Crystal sockets and band switch positions also are provided for three 200 kc bands between 28 and 29.7 mc, with a crystal supplied for 28.5-28.7

mc. A fourteenth position, corresponding to the WWV position on the receiver, can be used for one additional 200 kc band in the 9.5-15.0 mc range, if desired.

The 32S-1 features: Mechanical Filter type of sideband generation; stable, permeability tuned VFO; crystal controlled high frequency oscillator; RF inverse feedback for improved linearity; automatic load control for higher average talk power; and provision for switching to transceiver operation with the 75S-1 Receiver controlling the transmitter frequency.

The associated 516F-2 Power Supply is housed separately in a matching cabinet with ample room for additional station accessories. Power supplies for 115 v ac KWM-1 Mobile Transceiver may also be used for the 32S-1.

32S-1 Price \$590.00 (Less Power Supply)

75S-1 RECEIVER

The 75S-1 provides SSB, CW and AM reception on all amateur bands between 3.5 and 29.7 mc. It is capable of coverage of the entire HF spectrum between 3.5 and 30 mc by selection of the appropriate high frequency heating crystals.

The standard amateur configuration includes crystal sockets, crystals and band switch positions for: 3.4-3.6, 3.6-3.8, 3.8-4.0, 7.0-7.2, 7.2-7.4, 14.0-14.2, 14.2-14.4, 21.0-21.2, 21.2-21.4, 21.4-21.6. Crystal sockets and band switch positions are also provided for three 200 kc bands between

28 and 29.7 mc with one of the sockets equipped with a crystal for 28.5 to 28.7 mc. A crystal and band switch position is also provided for 14.8-15 mc for reception of WWV and WWVH for time and frequency calibration data.

Features incorporated in the new receiver include: dual conversion with crystal controlled first beating oscillator; bandpass first IF; stable, permeability tuned VFO; RF amplifier designed to minimize cross modulation products; Mechanical Filter; product detector; excellent AVC characteristics for SSB reception with full RF gain; 150 volt B+ for vacuum tube plates; silicon diodes for KWM-1 may be utilized, as with the transmitter, and a power connector at the rear of the 75S-1 disables the internal supply when the external supply is used.

75S-1 Price (21 kc Filter only) .. \$485.00

30S-1 LINEAR AMPLIFIER

The 30S-1 is a single tube, grounded grid linear amplifier with frequency coverage consistent with the 32S-1 and 75S-1. It provides the full legal power input for SSB (1 kw average) or 1 kw

input for CW, requiring 70 to 100 watts excitation (from the 32S-1 or KWM-1, for example). The amplifier tube is the Eimac 4CX1000A.

RF inverse feedback is employed for better linearity, and automatic load control voltage is fed back to the 32S-1 or KWM-1.

The power supply for the 30S-1 is located in the lower portion of the cabinet. There is also a compartment for the 516F-2 Power Supply used with the 32S-1.

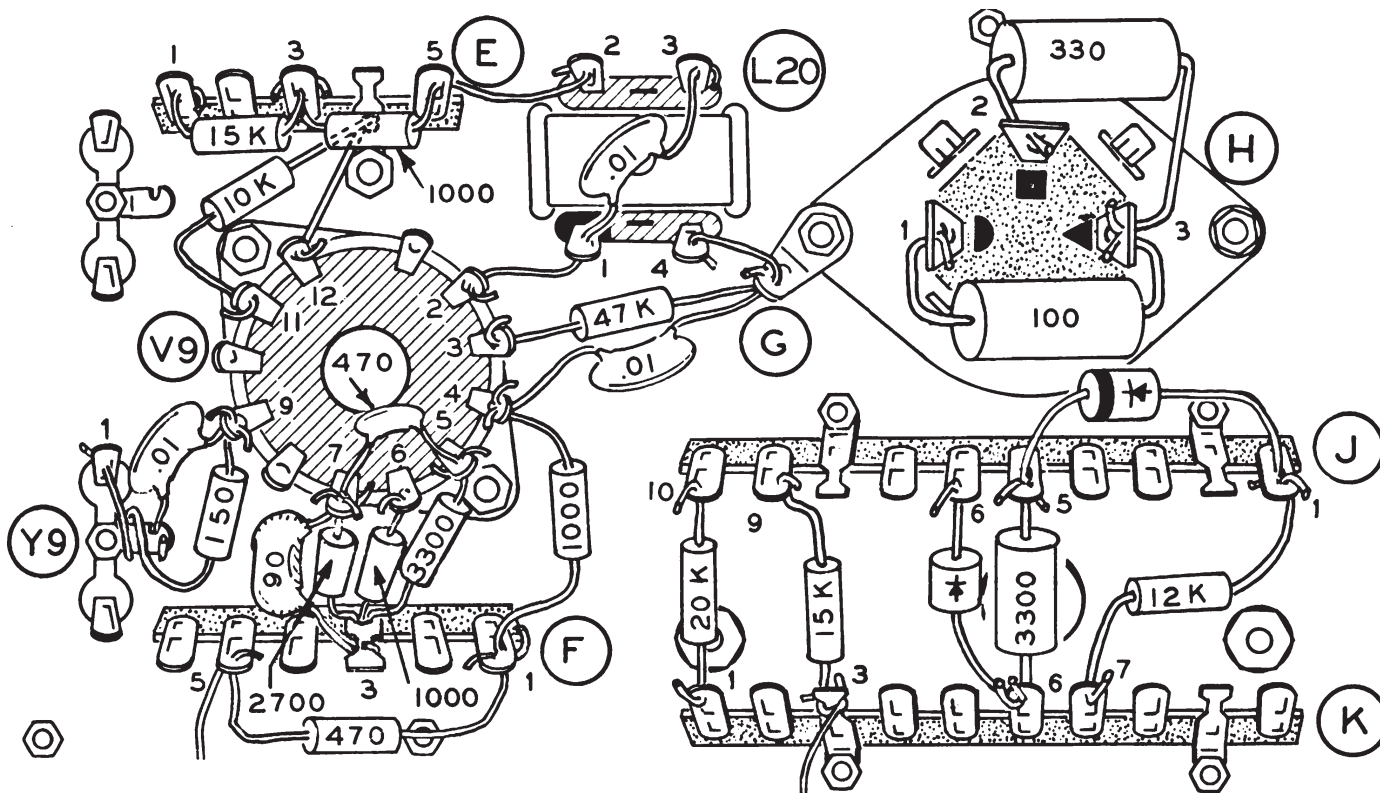
FULL LEGAL INPUT ON SSB, 1 KW ON CW



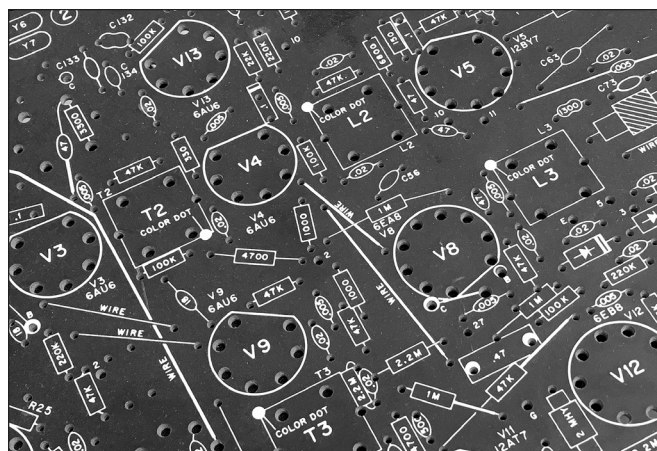
S MONTH—NOVEMBER 6—DECEMBER 8

COURTESY ARRL

A portion of the Collins ad that inspired Heath's SB series. QST, November 1958.



Point-to-point wiring, shown here, was time consuming, error prone, and sometimes frustrating. Over the years, illustrations like this one were constantly refined in an effort to leave absolutely no question about what got connected where.



In spite of whatever misgivings some in upper management may have had, printed circuits revolutionized kit building. They made it possible to design kits of far greater complexity while cutting assembly time in half and greatly reducing the chance of error.

There were squabbles over just about everything. Part of the battle would be about cost, of course. There were pieces of these radios that could not be made in-house.

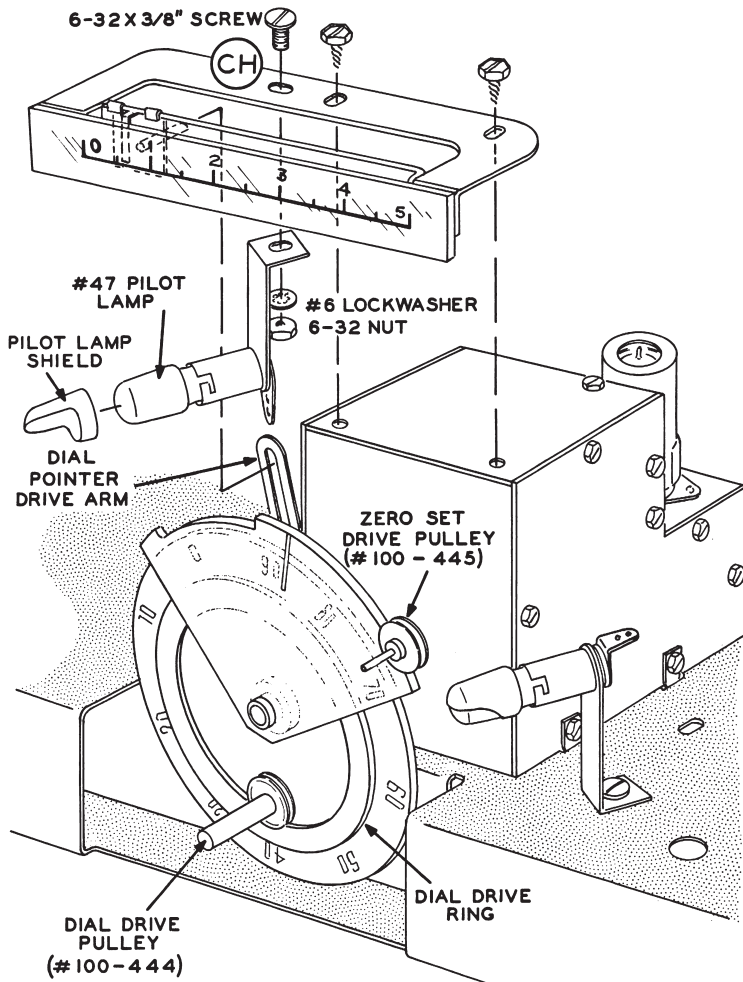
The cabinets, for instance. But there were also fights over just about everything else from the style of the knobs to the color of the cabinets to whether or not to use printed circuits. Yes. Someone in upper management believed that printed circuits were unnecessary, had no future in electronics, and would ruin the kit building experience.⁹⁰ The on-again-off-again project took more



A graphic artist working on illustrations for Heath's T-3 signal tracer. That dates this photo to 1952.

than a year just to get authorized. Robertson assigned Shafer as the lead engineer, and he was anxious to get started.

Engineering on the new hush-hush project began in earnest early in 1960, starting with the receiver, which Shafer thought would be the easiest to tackle. The challenge was to make the rig's performance similar to Collins, but to sell it for one third the price. There were many obstacles to overcome. The VFO, for example. Even if Collins had been willing to sell upstart Heath its permeability tuned oscillator (PTO), the cost would have been prohibitive, so Shafer designed his own version,



Mechanical assembly was another critical task for which illustrations played a crucial role. Together with step-by-step instructions, drawings like this SB-300 LMO assembly made it easy to understand how each part fit with the others.

which he called the LMO, or linear master oscillator. The LMO used capacitive tuning but with some twists to make it ultra-linear. Still, it was complex enough that the average ham would not be able to assemble and align it. So, like the cabinets, it went to a subcontractor. The same was true for the crystal filters. To ensure specifications, the filters would have to be preassembled. In an effort to keep costs down, Shafer worked to standardize parts and subassemblies. All products in the series would use the same LMO, filters and cabinets, and as many other parts as possible.⁹¹

Heath's goal was to provide a counterpart for everything Collins had in the S/Line, and maybe a few additional pieces. The plan was to call it the "SB" series. "SB" as in "sideband," because the rigs would be designed specifically for single sideband, leaving amplitude modulation behind. Shafer designed the basic circuits, then handed off specific products to other members of the team.

A primary goal was to make the radios as easy to assemble as possible, so no more complicated mechanical linkages like in the TX-1 with its springs, gears and

pulleys. And no more point-to-point wiring—as much of the circuit as possible would be on printed circuits.

By this time, Heath's manuals department had honed the instruction books to a razor's edge. Over the years, and working with the old axiom that "you are never as clear as you think you are," Heath's manuals had evolved to become virtual works of art, with illustrations suitable for framing. So clear and so precise were the instructions and drawings, that the company felt entirely safe in saying "we won't let you fail."

Meanwhile, Heath's all-time best-selling amateur radio kit was being invented almost by accident. One day, in 1961, Robertson and Shafer needed a dummy load, and there were none to be found. It might have been that the two or three loads they had in the lab were already in use, or maybe someone had taken them to work on a project at home. Working with materials close at hand, they hit upon the idea of using a bunch of inexpensive two-watt resistors in parallel. The resistors could be sandwiched between two metal plates. The issue of cooling the resistors briefly presented a problem, but was quickly solved by submerging them in a small bucket full of transformer oil. They finished the project in an afternoon, and the whole thing worked marvelously. Simple. Cheap. Effective. It occurred to them that such a device might make an excellent kit.⁹²

Management thought it might have been the stupidest idea they had ever heard.

"Undaunted" is a word that could be used frequently in the history of Heath. Engineers just would not take "no" for an answer. Time and again, having had their projects turned down, they went back to the lab to distill and refine an idea until they had something that management could not refuse. Such was the case with Al and Joe's dummy load. They replaced the handful of resistors with a single large 50 ohm element, and the bucket with a standard one gallon paint can. But the best part might have been the name. They called it the Cantenna.⁹³

Over the next 30 years (yes, 30 years) Heath sold an average of 18 Cantennas every day, seven days a week.



The Cantenna. This unassuming black can became Heath's best selling amateur radio product, and perhaps the company's best selling product of any kind. Ever.



The "single banders" foretold Heath's new direction both electrically and in styling. These radios would soon be added to the company's best seller list.

Former Heath vice president Chas Gilmore estimated the company sold more than 200,000 altogether, worth about \$33,500,000, adjusted for inflation. The Cantenna is ubiquitous. If you go to a hamfest and don't see at least one, you aren't looking hard enough.

In addition to the SB series, a line of three simpler and less expensive transceivers was being developed simultaneously. These sideband-only units were designed for fixed or mobile operation, and each of the three covered a single band—80, 40 or 20 meters. They would sell in vast numbers. Hams immediately began to use the term "single banders" in referring to these new rigs.

Heath did not initially use that name, but quickly adopted the phrase.

Like the lunch boxes, the single banders were given model numbers beginning with the prefix "HW." This prefix generally denotes a lower cost alternative to some other product, but no one seems to remember how these letters were chosen, or if they had any specific meaning. No matter, in the amateur community the phrase "hot water" (as in "I'm running a Hot Water 12") caught on fast, and stuck. The styling of the single banders was also new, and hinted at Heath's future direction.

A GOLDEN DECADE

Schlumberger (pronounced schlum-ber-ZHAY) is the world's leading provider of technology for oil exploration, oil field characterization, drilling, production, and processing. In 1961 it began looking for a company to help in the design and manufacture of the sophisticated and arcane instrumentation required for its operations. The company identified Weston Instruments as a good prospect and in August that same year began negotiations with Daystrom, Weston's parent company.⁹⁴

By January 1962, a deal had been reached. Schlumberger purchased Daystrom, thus acquiring Weston.⁹⁵ For Schlumberger, getting Heath as part of the deal was just icing on the cake. Prior to its interest in Weston, Schlumberger probably didn't even know Heath existed, but once the company saw Heath's books, it realized Heath was a making a lot of money.

Under the deal, which was done entirely in stock

an announcement of significance to all amateur radio operators

The Heath Company takes pleasure in introducing on the following pages, the first of a complete series of fully integrated SSB amateur radio equipment that will set new standards for value, quality, style, and performance. To be designated the Heathkit SB Series, these products represent a major step forward in amateur radio SSB equipment. Now, the best in SSB design features are combined with Heathkit's leadership in electronic kit techniques to bring maximum performance and operating convenience to amateurs at modest prices.

What design features are essential or desirable for the best SSB performance? Some of the more important ones are high mechanical and electrical frequency stability achieved only by employing crystal-controlled heterodyne circuitry with low frequency variable frequency oscillators, optimum receiver selectivity and minimum transmitted signal bandwidth obtainable by means of the excellent shape factors exhibited only by crystal or mechanical filters, linear tuning with 1 kc dial calibration, smooth anti-backlash dial, automatic level control, small size, and light weight. The SB Series has all these plus the several improved and unique features listed below.

To provide even better performance plus maximum ease of assembly, these new Heathkit SSB products also feature linear dials providing 500 kc frequency coverage per bandswitch position while maintaining 1 kc calibration marks spaced approximately 1/4" apart, a high frequency bandpass IF (4-8.9 mc) for improved image rejection and suppression of spurious responses, preassembled and prealigned LMO (linear master oscillator), circuit boards and wiring harnesses, plus specially tooled cabinet, knobs, dial mechanism, and LMO components. When the transmitter and receiver are operated in the transceive mode, in addition to the usual practice of employing a common VFO and high frequency oscillator, the receiver BFO is used as the transmitter carrier oscillator to prevent even minute frequency changes between transmit and receive due to crystal tolerances. This attention to detail is typical of the careful, thorough engineering behind the Heath SB Series.

Only Heathkit experience and know-how can provide the engineering and manual skills necessary to bring such quality and performance to kit-form SSB equipment. Despite this background, Heath engineers spent over two years in the design of the equipment, and the developing and specifying of the critical components (such as the LMO, crystal filters, and dial mechanism). Only the most capable manufacturers have been selected to supply the special components and, as always, only the highest quality parts are employed throughout.

Carefully read the features and specifications of the SB-300 SSB Receiver described on the next two pages. The entire SB Series will exhibit all these fine performance characteristics using the same basic critical components in equipment covering all amateur interests.

HEATH COMPANY
Benton Harbor, Michigan

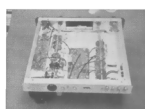


the deluxe HEATHKIT® SB-300 SSB RECEIVER



\$264.95
deluxe
features for
finest
performance

Precision-built Linear Master Oscillator (LMO) is completely assembled and calibrated, ready to install; specially designed dial assures accurate bandswitch and smooth frequency control.



Two heavy-duty 120" circuit boards and pre-cut, color-coded wiring harness maintain a clean, uncluttered layout for fast, easy assembly, years of faithful performance.



All adjustments are conveniently made from the top of the chassis; chassis covering clearly identifies coil and tube locations, etc. Rating top of ventilated cabinet opens for easy access.

SB-300 features

- Complete coverage of 80 through 10 meter amateur bands with all crystals furnished, plus provision for VHF converters
- Crystal-controlled front-end for same tuning rate on all bands
- 1 kc dial calibrations—180 kc per dial revolution provides band spread equal to 10 feet per megacycle—tuning knob to dial ratio approx. 4:1
- Provision for transceive operation with matching SB-400 Transmitter (available soon)
- Prebuilt linear master oscillator (LMO), wiring harness and two heavy-duty circuit boards for fast, easy assembly
- Professional styling and features throughout for finest HF and VHF amateur band communications

Experienced amateurs will especially appreciate the careful attention to detail behind the design of the SB-300. Its many features include a crystal controlled front-end that provides the same tuning rate on all bands, a prebuilt Linear Master Oscillator (LMO) for linear tuning with 1 kc dial calibrations, built-in crystal calibrator and 2.1 kc crystal-lattice bandpass filter, a smooth, non-backlash vernier dial drive mechanism, and a beautifully styled cabinet and panel. Cabinet top opens completely for easy access to top chassis components. Optional AM and CW filters are low-cost and easily installed; their steep-sided bandpass eliminates, not merely attenuates, adjacent interfering signals for exceptional reception.

Circuit features include a high frequency I.F. for maximum I.F. and image rejection, audio inverse feedback, fast-throw-off AGC control, stability of 100 cps after warmup, and a host of other deluxe features that assure finest communications results. Order your SB-300 now for 60% savings over comparable factory-built receivers! A matching Transmitter, 1 KW Linear Amplifier, and an All-Band SSB Transceiver will be available soon!

Kit SB-300... 17 lbs.,... no money dn. \$25 mo. \$264.95
SBA-300-1 CW Crystal Filter (400 cps)... 1 lb. \$19.95

Check the superb specifications below and see what a tremendous dollar value the SB-300 represents!

Frequency Range (coverage): 1.8 to 4.0, 7.0 to 7.5, 14.0 to 14.5, 17.0 to 21.5, 24.5 to 28.0 to 30.0, 35.0 to 50.0, 60.0 to 75.0, 100 to 150, 200 to 300, 400 to 500, 600 to 700, 800 to 900, 1000 to 1500, 2000 to 3000, 4000 to 5000, 6000 to 7000, 8000 to 9000, 10000 to 15000, 20000 to 30000, 40000 to 50000, 60000 to 70000, 80000 to 90000, 100000 to 150000, 200000 to 300000, 400000 to 500000, 600000 to 700000, 800000 to 900000, 1000000 to 1500000, 2000000 to 3000000, 4000000 to 5000000, 6000000 to 7000000, 8000000 to 9000000, 10000000 to 15000000, 20000000 to 30000000, 40000000 to 50000000, 60000000 to 70000000, 80000000 to 90000000, 100000000 to 150000000, 200000000 to 300000000, 400000000 to 500000000, 600000000 to 700000000, 800000000 to 900000000, 1000000000 to 1500000000, 2000000000 to 3000000000, 4000000000 to 5000000000, 6000000000 to 7000000000, 8000000000 to 9000000000, 10000000000 to 15000000000, 20000000000 to 30000000000, 40000000000 to 50000000000, 60000000000 to 70000000000, 80000000000 to 90000000000, 100000000000 to 150000000000, 200000000000 to 300000000000, 400000000000 to 500000000000, 600000000000 to 700000000000, 800000000000 to 900000000000, 1000000000000 to 1500000000000, 2000000000000 to 3000000000000, 4000000000000 to 5000000000000, 6000000000000 to 7000000000000, 8000000000000 to 9000000000000, 10000000000000 to 15000000000000, 20000000000000 to 30000000000000, 40000000000000 to 50000000000000, 60000000000000 to 70000000000000, 80000000000000 to 90000000000000, 100000000000000 to 150000000000000, 200000000000000 to 300000000000000, 400000000000000 to 500000000000000, 600000000000000 to 700000000000000, 800000000000000 to 900000000000000, 1000000000000000 to 1500000000000000, 2000000000000000 to 3000000000000000, 4000000000000000 to 5000000000000000, 6000000000000000 to 7000000000000000, 8000000000000000 to 9000000000000000, 10000000000000000 to 15000000000000000, 20000000000000000 to 30000000000000000, 40000000000000000 to 50000000000000000, 60000000000000000 to 70000000000000000, 80000000000000000 to 90000000000000000, 100000000000000000 to 150000000000000000, 200000000000000000 to 300000000000000000, 400000000000000000 to 500000000000000000, 600000000000000000 to 700000000000000000, 800000000000000000 to 900000000000000000, 1000000000000000000 to 1500000000000000000, 2000000000000000000 to 3000000000000000000, 4000000000000000000 to 5000000000000000000, 6000000000000000000 to 7000000000000000000, 8000000000000000000 to 9000000000000000000, 10000000000000000000 to 15000000000000000000, 20000000000000000000 to 30000000000000000000, 40000000000000000000 to 50000000000000000000, 60000000000000000000 to 70000000000000000000, 80000000000000000000 to 90000000000000000000, 100000000000000000000 to 150000000000000000000, 200000000000000000000 to 300000000000000000000, 400000000000000000000 to 500000000000000000000, 600000000000000000000 to 700000000000000000000, 800000000000000000000 to 900000000000000000000, 1000000000000000000000 to 1500000000000000000000, 2000000000000000000000 to 3000000000000000000000, 4000000000000000000000 to 5000000000000000000000, 6000000000000000000000 to 7000000000000000000000, 8000000000000000000000 to 9000000000000000000000, 10000000000000000000000 to 15000000000000000000000, 20000000000000000000000 to 30000000000000000000000, 40000000000000000000000 to 50000000000000000000000, 60000000000000000000000 to 70000000000000000000000, 80000000000000000000000 to 90000000000000000000000, 100000000000000000000000 to 150000000000000000000000, 200000000000000000000000 to 300000000000000000000000, 400000000000000000000000 to 500000000000000000000000, 600000000000000000000000 to 700000000000000000000000, 800000000000000000000000 to 900000000000000000000000, 1000000000000000000000000 to 1500000000000000000000000, 2000000000000000000000000 to 3000000000000000000000000, 4000000000000000000000000 to 5000000000000000000000000, 6000000000000000000000000 to 7000000000000000000000000, 8000000000000000000000000 to 9000000000000000000000000, 10000000000000000000000000 to 15000000000000000000000000, 20000000000000000000000000 to 30000000000000000000000000, 40000000000000000000000000 to 50000000000000000000000000, 60000000000000000000000000 to 70000000000000000000000000, 80000000000000000000000000 to 90000000000000000000000000, 100000000000000000000000000 to 150000000000000000000000000, 200000000000000000000000000 to 300000000000000000000000000, 400000000000000000000000000 to 500000000000000000000000000, 600000000000000000000000000 to 700000000000000000000000000, 800000000000000000000000000 to 900000000000000000000000000, 1000000000000000000000000000 to 1500000000000000000000000000, 2000000000000000000000000000 to 3000000000000000000000000000, 4000000000000000000000000000 to 5000000000000000000000000000, 6000000000000000000000000000 to 7000000000000000000000000000, 8000000000000000000000000000 to 9000000000000000000000000000, 10000000000000000000000000000 to 15000000000000000000000000000, 20000000000000000000000000000 to 30000000000000000000000000000, 40000000000000000000000000000 to 50000000000000000000000000000, 60000000000000000000000000000 to 70000000000000000000000000000, 80000000000000000000000000000 to 90000000000000000000000000000, 100000000000000000000000000000 to 150000000000000000000000000000, 200000000000000000000000000000 to 300000000000000000000000000000, 400000000000000000000000000000 to 500000000000000000000000000000, 600000000000000000000000000000 to 700000000000000000000000000000, 800000000000000000000000000000 to 900000000000000000000000000000, 1000000000000000000000000000000 to 1500000000000000000000000000000, 2000000000000000000000000000000 to 3000000000000000000000000000000, 4000000000000000000000000000000 to 5000000000000000000000000000000, 6000000000000000000000000000000 to 7000000000000000000000000000000, 8000000000000000000000000000000 to 9000000000000000000000000000000, 10000000000000000000000000000000 to 15000000000000000000000000000000, 20000000000000000000000000000000 to 30000000000000000000000000000000, 40000000000000000000000000000000 to 50000000000000000000000000000000, 60000000000000000000000000000000 to 70000000000000000000000000000000, 80000000000000000000000000000000 to 90000000000000000000000000000000, 100000000000000000000000000000000 to 150000000000000000000000000000000, 200000000000000000000000000000000 to 300000000000000000000000000000000, 400000000000000000000000000000000 to 500000000000000000000000000000000, 600000000000000000000000000000000 to 700000000000000000000000000000000, 800000000000000000000000000000000 to 900000000000000000000000000000000, 1000000000000000000000000000000000 to 1500000000000000000000000000000000, 2000000000000000000000000000000000 to 3000000000000000000000000000000000, 4000000000000000000000000000000000 to 5000000000000000000000000000000000, 6000000000000000000000000000000000 to 7000000000000000000000000000000000, 8000000000000000000000000000000000 to 9000000000000000000000000000000000, 10000000000000000000000000000000000 to 15000000000000000000000000000000000, 20000000000000000000000000000000000 to 30000000000000000000000000000000000, 40000000000000000000000000000000000 to 50000000000000000000000000000000000, 60000000000000000000000000000000000 to 70000000000000000000000000000000000, 80000000000000000000000000000000000 to 90000000000000000000000000000000000, 100000000000000000000000000000000000 to 150000000000000000000000000000000000, 200000000000000000000000000000000000 to 300000000000000000000000000000000000, 400000000000000000000000000000000000 to 500000000000000000000000000000000000, 600000000000000000000000000000000000 to 700000000000000000000000000000000000, 800000000000000000000000000000000000 to 900000000000000000000000000000000000, 1000000000000000000000000000000000000 to 1500000000000000000000000000000000000, 2000000000000000000000000000000000000 to 3000000000000000000000000000000000000, 4000000000000000000000000000000000000 to 5000000000000000000000000000000000000, 6000000000000000000000000000000000000 to 7000000000000000000000000000000000000, 8000000000000000000000000000000000000 to 9000000000000000000000000000000000000, 10000000000000000000000000000000000000 to 15000000000000000000000000000000000000, 20000000000000000000000000000000000000 to 30000000000000000000000000000000000000, 40000000000000000000000000000000000000 to 50000000000000000000000000000000000000, 60000000000000000000000000000000000000 to 70000000000000000000000000000000000000, 80000000000000000000000000000000000000 to 90000000000000000000000000000000000000, 100000000000000000000000000000000000000 to 150000000000000000000000000000000000000, 200000000000000000000000000000000000000 to 300000000000000000000000000000000000000, 400000000000000000000000000000000000000 to 500000000000000000000000000000000000000, 600000000000000000000000000000000000000 to 700000000000000000000000000000000000000, 800000000000000000000000000000000000000 to 900000000000000000000000000000000000000, 1000000000000000000000000000000000000000 to 1500000000000000000000000000000000000000, 2000000000000000000000000000000000000000 to 3000000000000000000000000000000000000000, 4000000000000000000000000000000000000000 to 5000000000000000000000000000000000000000, 6000000000000000000000000000000000000000 to 7000000000000000000000000000000000000000, 8000000000000000000000000000000000000000 to 9000000000000000000000000000000000000000, 100 to 15000000000000000000000000000000000000000, 200 to 300, 400 to 500, 600000

SEASON'S GREETINGS FROM THE HEATHKIT HAMS
meet the men who design Heathkit gear!



JOE SHAFER K8DCE
Senior Amateur Radio Engineer



BILL DENK WB8UH



DAR EVANS K8ADS



DOYLE STRANGLUND W8CGD



NEAL LITAL K8NVR



PAT DUFFNER W8CXY



BUD SOUKER K8RFC



LARRY HOUGHTON K8ZYF



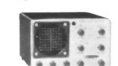
HEATHKIT DELUXE SSB RECEIVER: 80 thru 10 meter coverage. Linear tuning with features for finest reception!
Kit SB-300 ... 17 lbs. ... no money dn., \$25 mo. ... **\$264.95**



HEATHKIT "MARAUDER" SSB TRANSMITTER: Deluxe features & performance make it the most versatile ham transmitter. 180 WATTS SSB & CW 80 thru 10 meters.
Kit HX-10 ... 95 lbs. ... no money dn., as low as \$22 mo. ... **\$334.95**



HEATHKIT SSB SINGLE-BAND TRANSCEIVERS FOR 80, 40 OR 20 METERS: Perfect for "mobile" or "fixed" amateur communications! 200 watts P.E.P. input. 15 lbs. ea.
HW-12 (80-Meter), HW-22 (40-Meter), HW-32 (20-Meter) ... **\$119.95 ea.**



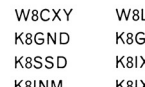
HEATHKIT MONITOR SCOPE: Displays envelope, AF & RF trapezoid transmitted patterns, and received envelope patterns. Simple to install. Use on 160 thru 6 meters.
Kit HO-10 ... 11 lbs. ... no money dn., \$6 mo. ... **\$59.95**



W8CX



W8LV



K8SY



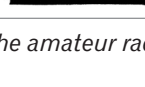
K8GND



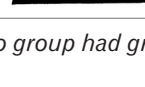
W8QFO



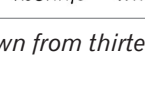
K8JGZ



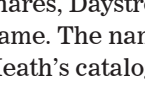
W8SSD



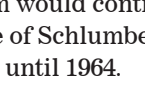
K8XS



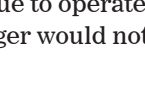
K8HYV



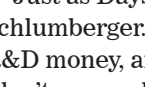
K8INM



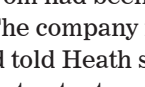
W8UVK



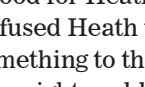
K8LZY



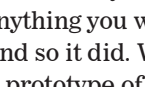
K8SAJ



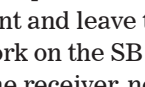
W8YRW



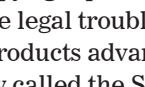
WA8BTK



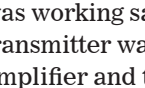
K8DKY



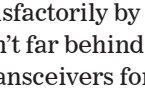
WA8KEW



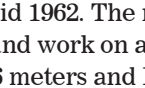
WA8KEV



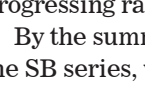
K8MBI



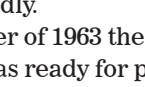
K8WJS



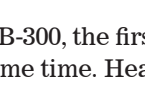
W8DEJ



K3GHR/8



WN8IFJ



... and more

HEATHKIT HX-30 6-METER SSB TRANSMITTER: Operates SSB upper/lower sideband, AM & CW. Completely self-contained. A tremendous value for the VHF amateur!
Kit HX-30 ... 46 lbs. ... no money dn., \$18 mo. ... **\$189.95**

HEATHKIT 6-METER LINEAR AMPLIFIER: Perfect companion for HX-30 transmitter! Provides extra power for extended-range communications. 125 watts P.E.P. input SSB, 75 watts DC input AM.
Kit HA-20 ... 38 lbs. ... no money dn., \$10 mo. ... **\$99.95**

HEATHKIT DX-60 PHONE & CW TRANSMITTER: 90 watts input phone or CW on 80 thru 10 meters. An excellent rig for the novice amateur! Beautifully designed throughout for easy assembly.
Kit DX-60 ... 24 lbs. ... no money dn., \$8 mo. ... **\$79.95**

HEATHKIT NOVICE HAM BAND RECEIVER: Tunes SSB, AM & CW signals 80 thru 10. Ham band coverage only for maximum stability & accuracy! An ideal first receiver with pre-built, aligned front-end!
Kit HR-10 ... 20 lbs. ... no money dn., \$8 mo. ... **\$79.95**



AL ROBERTSON K8BL
Amateur Radio Product Manager

Drop Al a line with your comments on Heathkit amateur radio products along with new product suggestions. And use the attached coupon to add your name to our mailing list for early announcements of the many new ham products coming from Heathkit.

HEATHKIT
by Daystrom

HEATH COMPANY,
Benton Harbor 9, Michigan 49023

☐ Enclosed is \$_____ plus postage. Please send model _____

☐ Please send free 1964 Heathkit catalog.

NAME _____

Address _____

City _____ State _____ Zip No. _____

The amateur radio group had grown from thirteen guys in 1958 to more than 50 just five years later. QST, December 1963.

shares, Daystrom would continue to operate under that name. The name of Schlumberger would not show up in Heath's catalogs until 1964.

Just as Daystrom had been good for Heath, so to was Schlumberger. The company infused Heath with a lot of R&D money, and told Heath something to the effect of, "don't worry about patent or copyright problems, build anything you want and leave the legal troubles to us." And so it did. Work on the SB products advanced quickly. A prototype of the receiver, now called the SB-300, was working satisfactorily by mid 1962. The matching transmitter wasn't far behind, and work on a linear amplifier and transceivers for 6 meters and HF were also progressing rapidly.

By the summer of 1963 the SB-300, the first piece of the SB series, was ready for prime time. Heath bought three pages in the October issues of QST, CQ, and 73, with a headline reading "An announcement of significance to all amateur radio operators." The following pages were replete with photos and specifications extolling the virtues of the receiver, and, as anticipated, the similarity to Collins was not lost on anyone. Heath was quickly inundated with orders. And in addition to hams, Heath got a lot of business from industry and government as

well. NASA, for example, bought dozens of SB-300s, though no one at Heath ever learned why.⁹⁶

The SB-400 transmitter was released in June 1964, and the SB-200 linear amplifier followed in August. The SB-200 would go on to become one of Heath's most successful kits. According to Chas Gilmore, during the SB-200's twenty-year production life, it outsold all other amplifiers combined.



For 20 years the 1200-watt SB-200 outsold all other amplifiers combined. It's as good a value today as when it first hit the catalog. Maybe better.

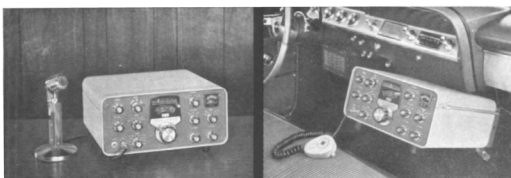
Introducing... The HEATHKIT® SB-100



180-Watt, 80-10 Meter SSB Transceiver. \$360.00

• Full five band transceive SSB & CW operation, 80-10 meters
• 180 watts P.E.P., SSB-170 watts CW • Switch selectable Upper/Lower sideband/CW operation • Operate PTT & VOX
• VOX-operated CW with built-in sidetone • Can operate crystal control in the transmit mode with variable tuning of receiver or can operate crystal-controlled transceive mode—excellent for net control • Separate offset CW carrier crystal for clear, pure CW note • Triple Action Level Control™ • Built-in 100 kc crystal calibrator • Enclosed relays for quiet, trouble free operation • Heath SB-Series LMO (Linear Master Oscillator) provides truly linear tuning with 1 kc dial calibration—less than 100 cps per hour drift after warm-up—400 cps accuracy • Perfect companion for HA-14 KW Compact or SB-200 final amplifiers • Fixed station operation with HP-23 power supply—mobile with HP-13 & SBA-100-1 mobile mount for quick plug-in/quick disconnect mobile installation • Fast circuit board assembly • Simple alignment—requires only a VTVM with RF probe, a dummy load and a broadcast receiver

If you are considering the purchase of an SSB transceiver, we urge you to read every word on the next two pages before deciding.



Heathkit SB-100—The SSB Rig You've Been Waiting For

The Newest And The Hottest Of The SB-Series! Here's a complete 80 through 10 meter 180-watt SSB transceiver. It includes all of the high-performance features you've read, heard talked about, or experienced on the already famous Heathkit SB-Series Amateur Radio Equipment . . . plus 5-band coverage with fast, simple band-switching and tune-up . . . alternate "remote" power supplies for fixed or mobile operation . . . new Heathkit Switch-Board™ coil and band-switch assembly . . . and a new ALC control circuit (TALC™) that allows even greater variation in speech level. All this and more in the new SB-100!

Here's Engineering That Sets The Pace For The Industry! The Heath SB-Series crystal filter features a 6 pole lattice filter (6 individual crystals) to produce a superior 2 to 1 shape factor for sharper receiver tuning . . . greater sideband suppression. The filter pass-band is symmetrical . . . for identical characteristics on both upper and lower sideband signals . . . and for optimum SSB reception with steep skirts for adjacent signal rejection. What's more, the entire filter assembly is hermetically sealed to retain its published specifications just as they were when "checked out" at the time of production. Compare these specifications with any other SSB filter on the market! Improved Heathkit Techniques Produce Better Than Factory Assembled Result! The new Heathkit Switch-Board™ coil and bandswitch assembly virtually eliminates the troublesome point-to-point wiring of tuning circuitry . . . eliminates the critical job of "lead dressing" required in "wired" circuitry. Here the assembly procedure is simplified further by a removable switch shaft which enables easy "stacking" of the individual Switch-Boards. Switch-Board construction is a new step forward in achieving electronically stable circuit construction, plus ready accessibility to tuning coils.

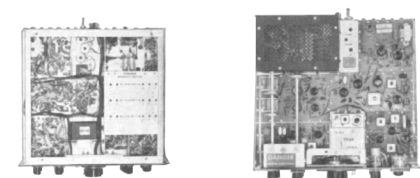
Power Consistent With Maximum Versatility, 180 watts P.E.P. is the best transmitter power level for most hams. This power level permits using the right tubes for the job and does not require eliminating useful features to pay for increased power. The SB-100 produces a "bare-foot" signal comparable to the higher power transceivers and is ideally suited for driving a grounded grid linear for a really big signal without the problems of excessive drive.

TALC™ (Triple Action Level Control) Sets New Standards For Automatic Level Control. Control from three separate circuits is combined in TALC™ to provide greater speech compression . . . allow for even more variation in speech level . . . and boost the performance of the SB-100 still higher.

Operating The SB-100 Is A Pleasure . . . Like Driving A Fine Automobile! Select the band, dial the frequency, peak-up the preselector, and tune. Receiver and transmitter bandswitching is simultaneous. The preselector control peaks up the driver. Final tuning is quick, sure, and positive. And for CW op's who prefer headphone listening, there is a separate headphone level control to adjust the headphone audio level independently of speaker volume. In addition, the transmitter and receiver are always on the same frequency . . . no "leap-frogging" around the frequency when you're working round tables.

Order The SB-100 For The Best Value In SSB Transceivers . . . Regardless! We invite comparison of the complete SB-100 specs on the next page with those of any other make SSB transceiver. Also consider circuit design as related to inherent stability, use of quality components and fine mechanical construction, cost of companion power supplies and linear amplifiers, band coverage in view of increasing 10 and 15 meter activity, ease of circuit familiarization with regard to possible maintenance, and resale value. You will agree that the SB-100 is the best investment you can make in amateur radio equipment. (Recommended for hams with previous electronic or kit construction experience.)

Kit SB-100, 23 lbs., \$36.00, \$33.00 . . . \$360.00
SBA-100-1, Mobile Mounting Kit, 6 lbs. . . . \$ 14.95
GH-12, Mobile PTT Mike, 2 lbs. . . . \$ 6.95
HP-21, Communications Microphone, 4 lbs., no money dn., \$5 mo. . . . \$ 29.40
KIT HP-13, DC Power Supply, 7 lbs., no money dn., \$6 mo. . . . \$ 59.95
KIT HP-23, AC Power Supply, 19 lbs., no money dn., \$5 mo. . . . \$ 59.95



Better than factory assembled—sectionalized circuit board construction, a minimum of point-to-point wiring, the use of pre-assembled wiring harnesses, plus the personal care given to kit assembly assure the quality you demand.

Just how hot can an SSB transceiver be?—Heath SB-Series leads in amateur radio electronics. Modern circuitry, select components, ample shielding, and the rock-solid Heath LMO give the SB-100 pace-setting high performance.

SB-100 SPECIFICATIONS—Receiver section: Sensitivity: Less than 1 microvolt for 15 db signal plus noise-to-noise ratio for SSB operation. SSB selectivity: 2.1 kc minimum at 5 db down, 5 kc maximum at 40 db down—2.1 nominal noise floor—4-6 db input impedance. Low impedance for unbalanced coaxial input. Output impedance: Unbalanced 8 and 600 ohm speaker, and high impedance headphone. Power output: 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **Transmitter section:** DC power input: SSB, 180 watts P.E.P. continuous voice, CW, 170 watts—50% duty-cycle. RF power output: 180 watts on 80 through 15 meters, 80 watts on 10 meters 50 ohm impedance load. Output impedances: 50 ohms to 25 ohms with less than 2.1 SWR. **Oscillator feedthrough or mixer products:** 55 db below rated output. Harmonic radiation: 35 db below rated output. **Transmit-receive operation:** SSB: Push-to-talk or VOX. CW: Provided by operating VOX from a keyed tone, using grid-block keying. CW side-tone: Internally switched to speaker in CW mode. Aural: 1000 cps tone. **Microphone input impedance:** High impedance. **Carrier suppression:** 50 db down from single tone output. **Unwanted sideband suppression:** 55 db down from single-tone output at 1000 cps reference. **Third order distortion:** 30 db down from two-tone output. **Noise level:** At least 40 db below single-tone carrier. **RF compression (TALC™):** 10 db or greater at 1 ma grid current. **General:** Frequency coverage: 3.5 to 4.0, 7.0 to 7.5, 14.0 to 14.5; 21.1 to 21.5; 28.3 to 29.0, 29.0 to 29.5, 29.5 to 30.0 MHz. Frequency stability: Frequency stability: Less than 100 cps per hour after 20 minutes warmup from normal ambient conditions. Less than 100 cps for $\pm 10\%$ line voltage variations. **Modes of operation:** Selectable upper or lower sideband (frequency carrier) and CW. **Dial accuracy—"heathability":** Within 200 cps on all bands. **Electrical dial accuracy:** Within 400 cps after calibration of received 100 kc point. **Dial mechanism:** Heatsinks: Less than 50 cps. Calibration: 100 kc crystal. Audio frequency response: 350 to 2450 cps ± 3 db.

Front panel controls: Main LMO tuning dial, Driver tuning and Preselector, Final tuning, Final loading, Mic and CW level Control, Mode switch, Band switch, Function switch, VOX, Mode switch, Meter switch, Gain control, Audio Gain control. **Internal controls:** VOX Sensitivity, VOX Delay, Auto-VOX, Carrier Null Control and capacitor, Meter Zero control, CW Side-Tone Gain control, Relative Power Meter Adjust control, P.A.—Bist, Phone Vol, Headphone Volume, Neutralize, Near Aural sensitivity, CW Key lock, 8 ohm output, 600 ohm output, ALC input, Power and accessory plug, RF output, Antenna switch, Receiver Antenna. **Power requirements:** 700 to 800 volts at 250 ma; 200 volts at 150 ma—110 volts at 10 ma; 12 volts at 4.76 amp. Cabinet dimensions: 14" W x 6" H x 13" D.

Buy Now—Use This Order Blank

Heath Company, Dept. 9-12
Benton Harbor, Michigan 49023

☐ Please send FREE 1966 Heathkit Catalog.

☐ Enclosed is \$_____ plus shipping.

Please send model(s)_____

Name_____

Address_____

City_____ State_____ Zip_____

Ship Via: ☐ Parcel Post ☐ Express Collect ☐ Freight

☐ 20% included, C.O.D. ☐ Best Way

All prices & specifications subject to change without notice.

AM-160

The SB-100 single sideband transceiver. The crown jewel of the SB series. QST, December 1965.

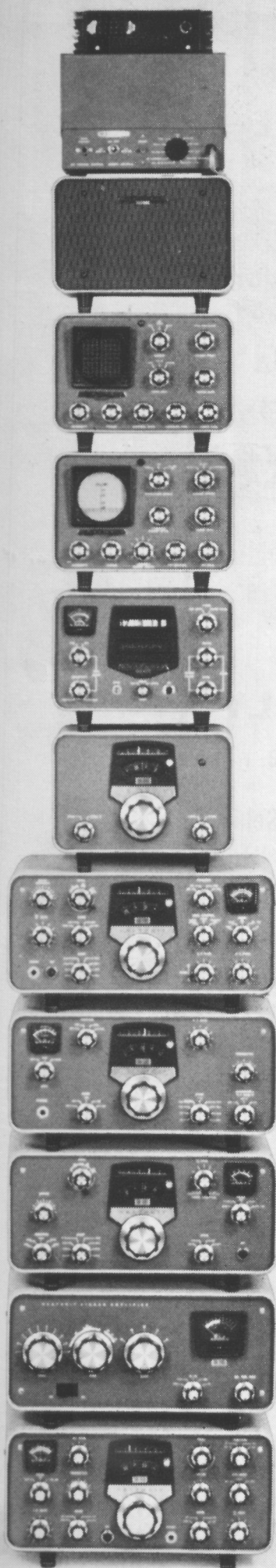
All 13 Heath transceivers late in 1968.
The HW-100 (at right, second row from top) and its successor, the HW-101 (not shown) may hold the record for the most popular transceivers ever made.



Others are (from top, left to right): SB-101, SB-110A, HW-100, HW-17, HW-18-1, HW-18-2, HW-18-3, HW-12A, HW-22A, HW-29A, HW-32A, HW-16, and HW-30. QST, September 1968.

This image was used in several print ads in 1968 and 1969. From top: HP-13, HP-23, SB-600, SB-610, SB-620, SB-630, SB-640, SB-101, SB-301, SB-401, SB-200 and SB-110. The only pieces of the SB series that are missing are the SB-220 two-kilowatt amplifier, SB-310 shortwave band receiver (not actually an amateur radio product), SB-303/313 solid-state receivers, SB-500 two-meter transverter, and SB-650 digital frequency display, all introduced after this photo was taken. QST, November 1968.

COURTESY ARRL



COURTESY ARRL

The crown jewel of the SB series, the SB-100 transceiver, was released just before Christmas in 1965. A series of SB accessories, including a matching speaker, a monitor scope, a station console, a panadaptor, and a remote LMO soon followed.

At last, Heath had a complete S/Line cover, and sales were white hot. For a while in the late 60s, it seemed as though every other person you heard on the air was using a “sugar baker” rig. Heath had succeeded beyond its wildest expectations. In 1970 Heath began referring to the SB-100 series transceivers as “the world’s best rig,”⁹⁷ and “the most popular sideband rig ever produced.”⁹⁸ The company had, in effect, built a radio for the rest of us, to borrow a phrase from Apple.

These successes were soon followed by others, notably, the SB-101 and the even-more-popular SB-102, both refinements of the SB-100, and the SB-220, Heath’s big two-kilowatt amplifier.

But the biggest success of all came in 1968 with the release of the HW-100, the lower cost alternative to the SB-101. The HW-101, an improved version of the HW-100, was released two years later in 1970. The HW-100 and 101 sold for a combined total of 16 years.

Beginning in the January 1981 catalog (volume 852), Heath advertised that more than 30,000 HW-101s had been sold worldwide. (This figure probably refers to the combined total of HW-100 and HW-101 sales.) The company did not subsequently update the figure, but the HW-101 continued to sell for another 18 months. It is entirely possible then, that sales ultimately topped 35,000 units. That’s an average of six units every day, seven days a week, for 16 years.

It seems likely that together, the HW-100 and 101 hold the record for the most transceivers ever sold by a single company—including Collins—before or since. A record that probably stands even today.

MISSTEPS

In the years from 1963 to 1972, Heath could do no wrong. It was a halcyon decade for the company, especially so for the amateur radio group, with the SB-102 and HW-100/101 representing the high water mark. But times and technologies were changing fast, and never again would Heath enjoy so much success, at least in amateur radio.

In the late 1960s it became clear to Heath that transistors and their progeny, integrated circuits, were the way of the future. The transistor, once regarded as a curiosity, was finding its way into everything, and driving the pace of technologic change faster with each passing year. Indeed, the era of the vacuum tube was rapidly drawing to a close.

The company had some experience with solid-state. The transistorized GC-1(A) “Mohican” shortwave receiver released in 1959, for example. But among the engineers, there seemed to be a general lack of comfort with transistors. After the GC-1A, the company returned to vacuum tubes for a series of shortwave sets that lasted a full decade.



The fully solid-state GC-1 "Mohican," a superb receiver, was delivered in 1959, but Heath's engineers seemed uncomfortable with transistors.



Hallicrafters' mostly solid-state FPM-200. Announced in the August 1957 issue of QST as "Coming from Hallicrafters laboratories," it was not a true transceiver. The unit shown was apparently a prototype as a very different looking finished product was announced almost two years later. QST, August 1957.

Nevertheless, by the late 1950s solid-state equipment was quickly becoming technologically—if not financially—feasible. For example, the Hallicrafters FPM-200, first announced in August 1957, was a mostly solid-state transmitter-receiver with dual VFOs that permitted transceiving. It used 41 transistors, 49 diodes, and 5 tubes. By any measure, the FPM-200 was a technological breakthrough. It took until May 1959 before it was actually offered for sale, but it proved that solid-state had a future. It worked well but failed to catch on because of its \$2660 price tag—nearly \$24,000, adjusted for inflation. Hallicrafters regarded the FPM-200 as mostly experimental, and estimates of units produced range from 50 to 200.⁹⁹

In 1962, just three years after the FPM-200, Sideband Engineers (SBE) introduced what is generally regarded as the first commercially successful, predominantly solid-state transceiver, the SB-33. The unit used 19 transistors, 14 diodes, and 3 tubes. It covered four bands and had a



The Sideband Engineers SB-33, introduced in 1962, proved that solid-state transceivers were possible, practical, reliable—and affordable—years before most manufacturers made the leap to transistors. QST, December 1962.



Heath's solid-state SB-303 was released in 1970. It worked well but was not an engineering marvel.

built-in power supply. Priced at just \$389.50, the SB-33 had a lot of appeal.

But vacuum tubes were tried, true, and comfortable for Heath, and the company dragged its feet on solid-state gear.

It wasn't until 1967 before there was general agreement that the company would need to deliver a solid-state replacement for the SB series. Eventually. What Heath did not fully understand was how much time it had—or, more to the point, didn't have—to do this. The SB series was still selling extremely well, and as a result Heath felt no particular urgency to get solid-state equipment into the catalog. This was a strategic misstep, because it delayed development of a new line of products longer than was prudent.

The SB-303, Heath's first fully solid-state SB product wasn't released until October 1970, seven years to the day after the introduction of the SB-300, the vacuum tube version it replaced.

The SB-303 was by no means an engineering marvel. It was essentially an SB-301 in which the tubes had been replaced with transistors. A solid-state version of the SB-400 transmitter, designated the SB-403, was on the drawing board, but was scrapped after the company concluded—correctly—that transceivers were the way of the future.

In 1970 work also began on the SB-103, a solid-state

The suitcase Yaesu.

Next time you hit the road, take the world with you.

That means taking the FT-101 with you. The solid-state portable rig that fits in a suitcase. 260 W PEP, 180 W CW and 80 W AM maximum input power, 0.3 microvolts receiving sensitivity for 10 db signal-to-noise ratio... in a thirty-pound package that even includes built-in 12 VDC and 117 VAC power supplies.

Whether you're cruising a turnpike or weekending in a mountain cabin, all you need is 12 VDC, or 117 VAC and an antenna to work the world via any band from 80 meters through 10 meters.

10 FET's, 3 IC's, 31 silicon transistors, and 38 silicon diodes and computer-type plug-in modules make it all happen. Add to that a built-in VOX, 25 KHz and 100 KHz calibrators, the WWV 10 MHz band, a high Q permeability tuned RF stage, and a ± 5 KHz clarifier. These considerations mean home base type operation no matter how far you are away from home.

For in-car operation, there's a built-in noise blander — to pick out noise spikes, leaving behind only clean signal copy.

About those plug-in modules — if one of them ever should give you trouble, just send it in to us and we'll rush you a new card by return mail. The Yaesu FT-101 is guaranteed fully for one year.

Want to get away from it all? Get away with the FT-101. And keep the world in a suitcase. Only \$499.95.*

SPECTRONICS WEST

1491 E. 28th, Signal Hill, Ca. 90806 / Phone: (213) 426-2593

SPECTRONICS EAST

Box 1457, Stow, Ohio 44224 / Telephone: (216) 923-4567

☐ Please send new color catalog of all Yaesu products.

☐ Enclosed find \$_____

Please send model(s) _____

Name _____

Address _____

City _____ State _____ Zip _____

All prices F.O.B. Signal Hill, Ca.



*Suitcase not included

If Heath had started development of a solid-state rig in 1968, this might have been what it ended up with. The fully assembled Yaesu FT-101 spelled trouble for Heath. The rig was essentially unbeatable (even if the suitcase wasn't actually included) and Heath knew it. The company didn't attempt to copy it, opting instead to develop the SB-104. It didn't end well. QST, December 1970.

replacement for the SB-102, Heath's top-of-the-line transceiver. The SB-103 was a modest design, and like the SB-303, could be characterized as a copy of the SB-102 wherein the tubes had been replaced with transistors—except for the finals. Transistors in the final cage were regarded as a bad idea because in those days transistors were not as rugged or reliable as they are today. Engineers often referred to the “purple plague,” a condition in which transistors would fail, and no one could explain why.

Work on the SB-103 had advanced to the prototype stage when disagreements over how the project was progressing caused its principal designers to quit, taking most of Heath's solid-state know-how with them. The SB-103 was subsequently put on the back burner.

Then, in December 1970, there was something of a replay of events 12 years earlier, when Al Robertson opened an issue of QST and saw an ad for the Collins S/Line. This time it was a full-page ad for the Yaesu FT-101 transceiver. The FT-101 was a compact, fully

assembled, feature-laden transceiver with modular construction and a built-in power supply. Except for the finals, it was fully solid-state. And at just \$500, it was aggressively priced. It could have been Heath's SB-103. Once again, Al Robertson had seen the future, only this time it looked like trouble.

Heath, once comfortably ahead of the curve, suddenly found itself struggling just to keep up.

THE SB-104

It is worth taking a close look at the SB-104, Heath's first fully solid-state transceiver, because this troubled project speaks volumes about the kind of challenges that were rapidly closing in on the company.

About the same time Heath was busy developing the SB-103, Rockwell International was busy buying Collins. Many employees at Collins were very upset about the sale in general and about how Art Collins was treated in particular, so many began looking through the help-wanted column of the Cedar Rapids paper. Among them was Mike Elliot, who noticed an ad placed by Heath seeking engineers. Long story short, Elliot sent a resumé and was offered a job.

His first assignment was the development of a small VHF amplifier, the HA-202. His talent with solid-state quickly caught the eye of management, which asked him if he would be so kind as to have a look at the SB-103 and provide an assessment of the project. Elliot saw a lot of potential in the 103, but noted that the unit's design failed to take advantage of many of the capabilities that were inherent to solid-state. The SB-103 had a preselector, copiously tuned circuits, a complicated band-switching scheme, and a traditional pi network output. It also had very low receiver dynamic range, high power consumption, low efficiency, poor stability, and so on.

Based on Elliot's assessment, and sizing up the task and the challenges in front of it, Heath opted to scrap the SB-103 altogether and start over again. This may have been another misstep, because it put the company even further behind the curve.

Because of the length of time it would take to get the new rig, now called the SB-104, in the catalog, it was decided to take some technological leaps, so that the rig would still be leading edge by the time it debuted—a plan not without its risks.

Mike remembers the SB-104 as taxing the limits of



Problems with the SB-104 were a harbinger of things to come.

his know-how. Beyond simple solid-state, the rig would employ, among other things, digital technology and broadband tuning; both concepts were new to Heath, and both would give engineers their biggest challenge yet. And in addition, it was decided to go for solid-state finals.¹⁰⁰ A major obstacle in developing the SB-104 was the prime directive Heath had established early on. Specifically, that any given kit must be able to be successfully built by a customer with limited technical knowledge and nothing more than simple tools, and must be able to be checked and aligned with little more than a VTVM. These criteria made for some difficult engineering considerations that would never be required with equipment coming off an assembly line.¹⁰¹

And there were other challenges. The SB-104 required a tremendous number of parts. That meant that the odds of a bad part showing up in any given unit were high. For example, if the rig used a thousand parts and you were willing to settle for 0.1 percent bad parts, the odds are that one bad part would exist in the rig. Depending on exactly which part, a customer with limited knowledge and test equipment may or may not be able to troubleshoot the problem. And even if all the parts were good, as the parts got smaller and the parts density got higher, the chance for error—solder bridges and so on—went way up.¹⁰²

It is not clear if all of these considerations were apparent to Heath engineers at the onset of the project, but the company was determined to push forward. As a result, several other products, including a digital display for the SB-102 and synthesized two meter transceivers, were initiated. What is clear, at least in hindsight, is that solid-state technology substantially raised the stakes for the kit engineer as well as for the kit builder.

GROWING PAINS

In addition to all the other headaches, there was another more subtle problem. By 1970 Heath had become a big company and was beginning to experience the kinds of problems big companies have. The most significant of these was higher employee turnover. It was increasingly difficult to keep the same people on a project from start to finish. The result was a lack of continuity that hampered product development, added to a growing overall level of employee frustration, and started a slow but pervasive erosion of morale. By the early 70s, the “family” atmosphere that Howard Anthony had worked so hard to foster was beginning to evaporate, and it was starting to show. For example, 1971 was unique in Heath’s history—no significant amateur products were released that year. A reflection, perhaps, not only of the problems Heath was having with products already under development, but of internal strife as well.

Heath’s test equipment group had released the company’s first low-cost digital product, the IB-101, a digital readout frequency counter, in 1970, which signaled the start of the company’s transition to digital instruments. Here, then, there was a nascent but growing



The IB-101, released in 1970, was Heath's first low-cost digital product.

knowledge base for transistor-transistor-logic (TTL) and the like, within the company.

It took the amateur group a while longer, but in April 1972, while still wrestling with the SB-104, Heath released its first digital product for amateur radio, the SB-650—a digital frequency display for the SB-102. The \$200 SB-650 worked well, created a sensation within the ham community, and was warmly received by reviewers.

But compared to the SB-104, the 650 was child’s play—a simple frequency counter based on a couple dozen TTL chips and Nixie readout tubes. Still, it was the kind of success Heath needed, providing a little boost in morale.

Two other significant products also hit the market in 1972. The first was the HW-7 QRP transceiver. It has been said that the HW-7 was the result of casual lunch-time experiments with low power. This may be true, but it is likely that there was much more motivation than simple tinkering. The HW-7 was probably inspired by the Power Mite PM-1, a small solid-state 80 and 40 meter QRP transceiver introduced by Ten-Tec. By the time Heath released the HW-7, Ten-Tec had developed the \$50 PM-1 into several other more sophisticated products sufficiently more expensive to allow Heath to price the HW-7 at \$79.95 and still be competitive. The two-watt,



The Nixie tube-based SB-650 was the amateur group's first digital product.



The HW-7, released in 1972. It was the first of three QRP transceivers.

three-band HW-7 proved very popular and quickly became a best seller.

The other significant product released in 1972 didn't come out of the amateur division. The general products group had been tinkering with digital circuits themselves and had discovered a clock chip manufactured by Mostek. The result was the GC-1005—a six-digit digital clock in a stylish wood-grained plastic cabinet. It was the first digital clock kit, and one of the very first digital clocks on the market. At \$75 the clock was not cheap, but was substantially less expensive than any other digital clock available at the time.

Sometimes a little product like this takes everyone by surprise—even those who designed it.

The GC-1005 practically exploded out of the catalog. Some reports suggest Heath sold more than 50,000 units per year—almost 140 a day. Because it displayed seconds and could be set accurately, it was very popular with hams as a shack accessory. To say that Heath made a killing with the GC-1005 would understate its profits.

Fifty thousand units may seem like an impossibly large number, but Heath was accustomed to selling large volumes of kits. The vacuum tube voltmeter provides a splendid example. In a span of ten years between Heath's first VTM, the V-1 in 1947, and the V-7A in



The GC-1005 digital clock. To call it successful would be a gross understatement.



The HW-202, introduced in 1973, put Heath on two meters in a big way.

1956, Heath had sold more than 500,000 units. That's an average of 50,000 per year. Early on, sales of specific kits in quantities of tens of thousands per year came to be routine for Heath.¹⁰³

As if trying to go “one up” on the general products group, the amateur group fired back with a killer of its own. In April 1973 it released the HW-202 two-meter transceiver: Heath wanted badly to tap the soon-to-be-booming two-meter market but didn't want another HW-17 on its hands. It had been three years since Heath took the ill-fated HW-17 off the market.

This time, Heath had done its homework. The engineers knew what it would take to crack the market and they knew how to do it. The HW-202 was a straightforward, crystal-controlled, solid-state rig—a superb piece of engineering in those early days of two-meters. The unit sold so well that Heath had trouble keeping up with orders. Heath was successfully into VHF at last—big time. In spite of these achievements, however, Heath would never venture higher in frequency than two-meters.

Perhaps the most significant event of 1973 was the retirement of Gene Fiebich.¹⁰⁴ Gene had managed engineering with a gentle hand almost from day one. He was a visionary and a tireless champion of the amateur division, and fought hard for many important projects. It was he, for example, who persuaded senior management to OK the SB series project back in 1958.

Gene said he decided to retire because he “could see the handwriting on the wall.” He could see the off-shore competition in the wings, he could see the direction the industry was taking, and he could see the way Heath had changed over the years. So after 23 years at Heath, Gene decided it was time to go. His departure was, in a way, symbolic of what was happening to Heath—the foundation was beginning to crumble. Meanwhile work on the SB-104 dragged on. As a prototype, the rig was unstable, quirky, and erratic. The biggest problem with the SB-104 can be summed up in two words—cutting edge. The SB-104 was a very complex rig involving lots of new technologies. It was the expression of Heath's desire



This image is from a QSL card Heath provided with the SB-104. It is oddly emblematic of the problem-prone rig—the time on the clock reads 88 88 88, and more to the point, the frequency shown reads 26.600 MHz.

to recapture its steadily eroding market share with a product that would be regarded not just as state of the art but as ahead of its time.

The reliability of parts was a major source of heartburn. For example, it was discovered that depending on the batch of diodes used in the balanced modulator, you may or may not be able to get it to balance. The 104 used more than 275 solid-state devices including 31 ICs. There were, of course, hundreds of capacitors, resistors, coils, crystals, and so on, and parts tolerances turned out to be more critical than had been anticipated. Further, there was no easy or inexpensive way to ensure that any given part was within tolerance. For rigs coming off an assembly line, parts could have a wider tolerance. But for kit building, engineers needed to ensure that the rig would land on its feet with a minimum of tweaking. Random sampling of parts wasn't good enough for the 104. As a result, the cost of quality assurance rose substantially, which in turn added to the cost of the rig.¹⁰⁵

In the end, the SB-104 was indeed ahead of its time, but only in the sense that Heath had rushed the project for a Christmas release. The rig could have used another six months on the bench. When the SB-104 finally



Detail of the frequency shown on the SB-104 display from Heath's SB-104 QSL card. What band is that?!

shipped, it was little more than a prototype.

The SB-104 hit the catalog for Christmas in 1974. It was a sleek rig with a modernized but recognizable design relationship to the SB-102. The big selling points were these: broadband/no tuning, a digital display, and solid-state finals.

To call the SB-104 a complete failure would not be fair, but it was a rig so fraught with problems, they cannot

all be listed here. Almost immediately, customers began complaining.

Rather than pull the rig out of the catalog, Heath began to include fixes on the fly, shipping new boards and other components to customers as soon as problems could be identified and solved. The company suffered with the 104 for three years before finally releasing the improved SB-104A in 1977. The new version pretty much worked right, but it remained touchy. Word on the street spread that the 104 was “iffy.” Sales flattened out then slowly started down.

THE COMPUTER ERA

A discussion of Heath’s computer products may seem entirely unrelated to its amateur radio products, but computers, while incredibly profitable for Heath, would have a profound effect on every part of the company, and not for the better. It is important, therefore, to understand how computers changed the company’s basic structure and flight path.

In 1976, while the SB-104 was still providing engineers plenty of indigestion, Heath began development of two new and revolutionary products—a series of personal computers and the SS-8000 transceiver. Both would prove to be of great significance, but in very different ways.

Heath can be credited with exceptional vision in the realm of computers. For perspective, the Radio Shack TRS-80 Model 1 and Apple’s Apple II computers were still a year in the future. For most people, computers were still very much a curiosity. Heath understood that personal computers were not going to be a passing fad, but would, in fact, be revolutionary.

The company tooled up quickly for the development of a pair of computer products—the H8 and H11. Ironically, in developing these computers, Heath was unleashing the very products that would lead to its undoing. Both computers were released in August 1977 (within a month of the Apple II and TRS-80) with an advertising campaign that included, among other things, a 16-page full color insert in the August issue of *Interface Age* magazine.

These two computers did not in any way resemble computers as we have come to know them. The H8 was a true nerds-only box based on the 8-bit Intel 8080A



The H11 used DEC’s LSI-11 microprocessor. The H11A used the lower cost “half-sized” LSI 11/2 processor. Unlike the H8, this system was aimed at business users.

microprocessor. It had only a keypad on the front panel for programming, and sold for \$375.00. Fortunately for Heath, there were vast numbers of nerds who had waited their whole lives for a gizmo like this, and they wasted no time in placing their orders.

The H11 was even more inscrutable. It was a white box without any front panel controls at all except for an on-off switch, and a switch cryptically labeled “run-halt.” The H11 was based on Digital Equipment Corporation’s LSI-11 processor, ran the company’s PDP-11/40 instruction set, and was offered with options for an 8- or 16-bit bus. It was a much more powerful machine than the H8, as reflected in its price—\$1295 in kit form or \$2000 fully assembled.

These two products were *immensely* profitable. Heath’s gross sales for 1977 totaled nearly \$100,000,000. Most of the money, however, was not coming from amateur radio products. Historically, Heath’s single largest revenue stream was from test equipment



The H8 used Intel’s 8080A processor and was designed for the hobby user. It could be upgraded to as much as 64K of RAM. Who would ever need more than that?



The H89 was only partly a kit. The CPU and terminal interface boards were preassembled, as was the keyboard and floppy disk drive. Assembly was limited to construction of the power supply, mounting the boards and plugging in some connectors. The H89 was also available without the computer board and disk drive, and sold as the H19 “smart terminal.”

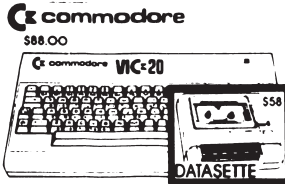
Monday thru Friday 9-10
Saturday 9-9, Sunday 10-6

Kmart
The Saving Place®

We Honor
VISA MasterCard Shoppers Charge

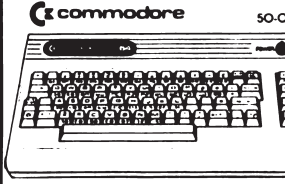
FRIDAY THRU SUNDAY

PRICEBREAKERS

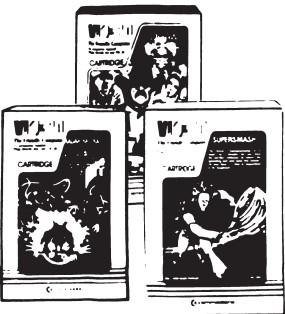


\$88 Sale Price
Commodore® Vic-20™ Home Computer
Full-featured computer with graphics, music and more! Commodore® Datasette To Store Programs On Tape...\$58

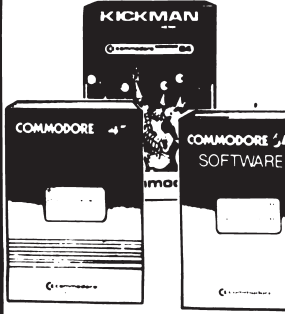
BLUE LIGHT NIGHT FRIDAY NIGHT 7 TO 10 P.M. BLUE LIGHTS EVERY 15 MINUTES



\$199 Sale Price
Powerful Commodore® 64 Home Computer System
Value-priced expandable computer with 64K random access memory and typewriter-style keyboard.



Sale Price Ea
\$10 To \$14
Commodore® Vic-20™ Computer Software
Variety of video games for arcade fun at home.
Rader Rat Race \$10
Super Smash \$10
Money Wars \$10
Draw Poker \$10
Pinball Spectacular... \$14



Sale Price Ea
\$14
Commodore® 64 Computer Software
Action-packed games and teaching cartridges.
Bonus Pack \$14
Kickman \$14
Visible Solar System \$14
Music Machine \$14

The Commodore VIC-20 computer neatly characterizes the speed at which computer technology was advancing in the late 70s and early 80s. The VIC-20 was introduced in the summer of 1980 and sold for \$299.95. Just three years later it

was possible to buy one for only \$88. By the late 80s it was clear that computers had become something of a commodity, like corn or soybeans. Making money in such an environment is difficult, as Zenith would soon discover.

products, which accounted for about 40 percent of gross annual sales.¹⁰⁶ This changed for a while from the late 1960s to about 1971, when amateur radio products brought in as much. But beginning with the introduction of the SB-104, profitability began to shift back to test equipment and stereo products. Then in 1977, the profit stream shifted again following the cash generated from computers.

In 1979 Heath released another computer, the “all-in-one” H89. This was a machine that anyone would recognize as a computer, even today, though the 89’s styling has “70s” written all over it. Heath called it an all-in-one computer because, unlike its predecessors, the processor, a display screen, a keyboard and a floppy disk drive were all contained in a single box. The H89 used not one, but two Mostek Z80 microprocessors, one of which was dedicated to the display. It sold for about \$2000 depending on the options you bought. Heath sold zillions of them.

In developing its line of computers, Heath realized that virtually no one would be able to successfully assemble and, if necessary, troubleshoot one. So at the very start of the endeavor the decision was made that computer products would be mostly preassembled. Assembly left to the customer was limited to relatively simple tasks like wiring the power supply. The internal circuit cards were all preassembled.

Computer products had the advantage of requiring

relatively little in the way of in-house engineering. Heath could just pick up the phone and order boards and other components made to its specifications. Heath engineers had only to fill in the blanks and connect the dots.

THE BEGINNING OF THE END

The late 70s and early 80s saw the proliferation of small computers on a scale that was dizzying then, and hard to comprehend now. Dozens of models could be found in popular magazines devoted to the subject, with new types seeming to appear monthly. Computers were everywhere. For a time, it was possible to buy computers at Walgreens, a national chain of drugstores. This period in the history of computing is vaguely reminiscent of the barnstorming days of Ed Heath in the 1920s, when everyone seemed to be making airplanes.

It soon became clear to anyone paying attention that a lot of money could be made by selling computers.

The frenzy eventually caught the attention of some of the old guard of the electronics industry, among them, Zenith Electronics. Zenith had been around since the 1920s and was involved in a wide array of electronic products and services, doing work for both government and civilian consumption. Its products included electronic components and consumer products, most notably, radios and televisions. The company is generally credited with co-inventing FM stereo broadcast technology and the invention of the TV remote control.

Zenith became a leader in the design and manufacturing of television picture tubes.

In 1974, frustrated with losing much of its market share of televisions to Japan, Zenith sued most of the major Japanese television and electronics manufacturers, charging them with violating U.S. anti-trust and anti-dumping laws. The suit dragged on for more than a decade, with Zenith losing appeal after appeal. The matter was ended in 1986 when the U.S. Supreme Court declined to get involved. Zenith had lost its case, spending itself into considerable debt in the process.

In 1978, in the middle of its fray with the Japanese, Zenith began to explore its options, and made the calculation that large profits could be had quickly in the new and exciting business of computers. The idea was to bypass the research and design phase and get right into manufacturing and sales by acquiring a company already in the computer business.

At about the same time, Schlumberger had determined that among all of its operations, including Weston, Daystrom, and Heath, it was spending millions of dollars annually on semiconductors, and that having its own in-house source for these components would be far less expensive. Schlumberger didn't have to look very far to find a company to buy. Heath, as it turned out, was buying millions of dollars of semiconductors annually all by itself from a company called Fairchild, and Schlumberger concluded that Fairchild would be a logical acquisition. In buying Fairchild, Schlumberger would control not only the source of the semiconductors, but also the products in which they were used. Sweet.

Unfortunately, that's exactly how the Federal Trade Commission (FTC) saw it. Who could have imagined ever hearing the words "Heath" and "anti-trust" in the same sentence?

The FTC explained to Schlumberger that its actions might—at the risk of putting too fine a point on it—be illegal. The Commission told Schlumberger that if it wanted Fairchild, it would have to sell off one of its other companies. If there was any doubt about Schlumberger's loyalty to Heath, it didn't last long. Heath was the least important part of Schlumberger's holdings, relative to its core mission (technology for oil exploration). Time to move on. By the end of 1978 Heath was up for sale. Employees tried to be optimistic about the news. After all, they had been through this twice before and it had worked out well on both occasions. But things were different now. The company was struggling with the effects of foreign competition, morale was low, and there was a general feeling of unease plant-wide, especially in the amateur radio group.

The whole affair was well-timed for Zenith. The convergence of Heath being put up for sale and Zenith's desire to acquire a computer company fit together like hand in glove. Negotiations with Schlumberger began early in 1979, and the deal was completed that summer. Zenith was now in the computer business, and Heath was now in trouble.

Zenith formed a subsidiary company, Zenith Data Systems (ZDS) to operate its computer business.

TIMING IS EVERYTHING

Beginning in 1976, in parallel with its development of computers, Heath set in motion the design of a super-advanced microprocessor-based transceiver that could be computer controlled. Initially called the SB-105, the model number was changed to SS-8000 after the marketing department suggested that the "SB" nomenclature had been tainted by the SB-104.

In the late 70s, the idea of controlling a transceiver

Zenith Buying Heath Company!



HEATH COMPANY HEADQUARTERS, HILLTOP ROAD, ST. JOSEPH

Heath Co., the Twin City area's fourth largest industrial employer, is in the process of being sold to Zenith Radio Corp., Glenview, Ill. Photo shows Heath headquarters and plant on Hilltop Road, St. Joseph. Zenith and Schlumberger Ltd. announced Monday they have reached agreement in principle for Zenith to buy Heath from Schlumberger for \$64.5 million. Zenith had no comment on reason for acquisition or future

plans for Heath. But a securities analyst in Chicago said it appeared to be a move by Zenith to enter the home and small business computer market. Heath recently began to market assembled small computer systems and related video display terminals and printers along with its established lines of do-it-yourself kits for stereos, televisions and other electronic products. Richard Singer, with Chicago's Mesirov & Co.,

said "I think Zenith may be after something other than Heath's radio and television business." Zenith's announcement noted that in each of the last three years Heath has been profitable with sales in excess of \$80 million annually. The sale has been approved by boards of directors of both companies but is subject to the negotiation and signing of a definitive purchase agreement and compliance with the Hart-Scott-Rodino Act which

permits review by the Federal Trade Commission and Justice Department of an acquisition. Heath was acquired by Schlumberger in 1962. Heath employment was reported at 960 in St. Joseph for the last quarter of 1978 by Michigan Employment Security Commission. Heath products are marketed in the U.S., Canada and Europe by mail order and through Heathkit retail stores. (Staff photo)

NEWS-PALLADIUM, JULY 17, 1979

The announcement of Heath's sale to Zenith in July 1979 was something of a jolt, but people remained optimistic. For a while.



The SS-8000 could be controlled with a computer, but lacked the new WARC bands and was regarded as too difficult for the average builder to assemble. The unit shown, owned by former Heath engineer Bob Sumption, N8RS, is thought to be the only operational SS-8000 in existence.

with a computer was a possibility that most hams had not yet even dreamed about. The SS-8000 would truly be ahead of its time. Serious work on the SS-8000 began in the summer of 1977.^{107, 108}

In September 1979, while the SS-8000 was approaching the finish line, the World Administrative Radio Conference (WARC) convened in Geneva, Switzerland. WARC is a technical conference of the International Telecommunication Union (ITU).¹⁰⁹ The conferences are attended by delegates from ITU member countries and are used to review, amend, and revise radio regulations and spectrum allocations. Meetings of WARC are held at irregular intervals and are generally precipitated by the regulatory and spectrum requirements created by advancements in existing communication technologies, or to address technologies that did not exist when the previous conference was held. Not all ITU conferences concern amateur radio. Some deal with specific subsets of radio communication—international broadcasting, maritime, aeronautical, and space, for example.

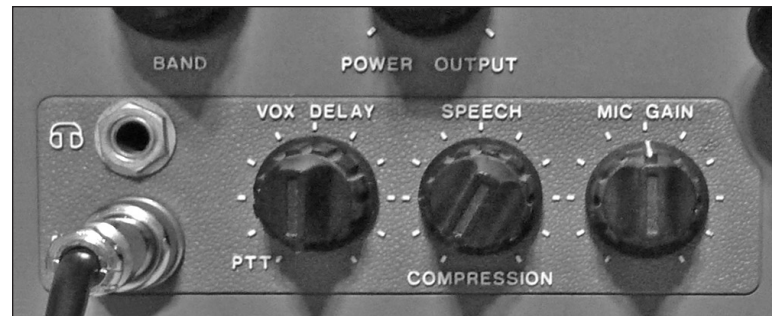
WARC conferences are of tremendous significance to the amateur radio community, because at each conference there is the possibility of revisions—including both cuts and additions—to amateur radio frequency allocations.

The previous “all services” WARC conference, which included amateur radio, had been held in 1959. Much had changed in the 20 years since.¹¹⁰

Plans for WARC-79 had been announced much earlier, in 1972. The events of WARC-79 were highly anticipated by the amateur radio community, and amateur radio advocates, including the American Radio Relay League (ARRL), had delegations present at the proceedings. Coverage in popular magazines, including *QST*, was extensive and detailed.

Anyone with a financial stake in the outcome of WARC-79, like Heath, should have been paying close attention, because changes in amateur frequencies have a direct and profound effect on their products. As it turned out, Heath might not have been paying attention.

WARC-79 was a ten week conference that began September 24 and concluded on December 6.¹¹¹ The big



The SS-8000's gray front panel and raised-textured details around some of the controls gave it a vaguely Collins-like appearance.

news out of WARC was the addition of three new amateur high frequency allocations near 10, 18 and 24 MHz.

The timing for Heath could not have been worse.

By the time WARC-79 was over, the SS-8000 was far down the road to completion and it did not include any of the new WARC bands. The new bands should not have come as a surprise to Heath. Late in 1974—well before design of the SS-8000 had started—the Federal Communications Commission disclosed it would be supporting new amateur frequency allocations near 10, 18 and 24 MHz.¹¹² And between 1976 and 1979 *QST* magazine had published no fewer than 40 articles related to WARC-79. Other manufacturers took notice. For example, in December 1977—two years before the details of WARC-79 were finalized—Yaesu announced its FT-901D transceiver, which made provisions for new WARC bands.¹¹³

How could Heath have been blindsided? Zenith gets blamed for a lot of Heath's troubles, but it probably wasn't the cause in this case. The design details of the SS-8000 had been worked out long before Zenith took over. There are several possible explanations for what happened. First, as mentioned earlier, through the 1970s, turnover in personnel was becoming a serious problem, and as a result it was increasingly difficult to keep the same people on a project from start to finish.¹¹⁴ This may have caused critical details to become lost in the disarray. It is also helpful to remember that by this time, Heath was being squeezed hard by foreign competition, a serious distraction all by itself. Second, it is possible Heath was aware of the possibility of new bands but did not believe they would actually happen. A third explanation is that no one was paying attention.

Whatever the cause, the lack of WARC bands in the SS-8000 was a strategic error with far-reaching consequences.

The timeline of what followed the WARC-79 announcement in November 1979 is a little fuzzy, and people who worked on the SS-8000 project cannot recall the exact sequence of events. Still, it is possible to piece together the most likely scenario.

December 1979: The marketing department insists that the SS-8000 be redesigned to include the new WARC bands. This is a fateful and costly decision. The WARC bands would not be legal to use for at least another two years, so there was no real need for a rush to include them. The SS-8000 could have been released on schedule, with the WARC bands included in a future “A” version of the rig.

January 1980: Work on Heath’s Spring catalog begins. A process that will take about two months to complete. A decision on whether or not to include an ad for the SS-8000 must be made soon.

February 1980: Engineers are still working on the WARC band fix.

March 1980: Unsure about when the fix will be ready, Heath hedges its bets and decides to include only a teaser ad for the SS-8000. The Spring catalog is mailed.

April 1980: The Spring catalog arrives in mailboxes and includes the teaser ad for the SS-8000—“See it here in your next Heathkit catalog.” The next catalog was mailed in late July, but nothing more is heard about the SS-8000.



This teaser ad for the SS-8000 appeared on the cover of the Spring 1980 catalog (catalog number 849). The inset at upper left shows the H19 “smart” terminal, rather than the H89 computer. Subsequent ads were curiously ambiguous about computer control.

April 1980: Ten-Tec announces the Delta transceiver that includes the new WARC bands.¹¹⁵ Other manufacturers quickly follow suit.

May 1980 and beyond: Building the WARC bands into the SS-8000 turns out to be the least of Heath’s problems. Proof-build versions of the SS-8000 reveal that it is far too complex for the average kit builder to assemble. A decision is made to

redesign the 8000 and make the radio available as a fully assembled product. The new designation is SS-9000. This is a process that would take another two years and at least another million dollars to complete.

September 1982: The SS-9000 is announced in the Christmas catalog, which lands on people’s doorsteps late in September. It was advertised in the November issue of *QST*.

While Heath had missed being the first with a WARC band rig, it had nevertheless achieved an historic first—the SS-9000 was the first computer controlled amateur transceiver on the market. Signal/One had announced the milspec 1030 in January that same year claiming computer control, but it used a crude BCD signalling system and required an optional interface with an odd 60-pin connector that would not actually be available

until “early 1983.” And Yaesu announced the FT-980 (in Germany but not the U.S.) with its CAT System in December 1982—three months *after* the SS-9000—yet claiming to be the first with computer control.

In Heath’s SS-9000, computer control was standard equipment, and, unlike competitors, it used a standard RS-232 connection. A variety of operating parameters were controllable from a terminal like Heath’s H19, or a computer like its H89. But Heath did a poor job in promoting the feature it seemed to care most about. While the SS-9000’s debut ad in *QST* made clear that the rig used a microprocessor, to learn that it had the capability to actually operate under computer control required reading a considerable distance into the fine print. Not until the following month did Heath include a visual cue with respect to computers. The SS-9000 may have been a victim of poor marketing more than anything else.

With the “special introductory price,” the SS-9000, together with its matching speaker/power supply, cost about \$3000. Nearly \$8000 in 2020, adjusted for inflation.

Heath got its wish for a transceiver that was ahead of its time, but at a cost that put the rig well out of reach for



Yaesu claimed its FT-980 was the first computer controllable transceiver, but lagged the SS-9000 by three full months.

COURTESY RIGPIX.COM

Heathkit®

More Transceiver than ever before.

Introducing the transceiver of the decade... Heath's new SS-9000

Contest or rare DX – the world is waiting to hear from the new breed of HF operators who'll have the power of a microcomputer at their instant command. Introduction of the Heath SS-9000 signals a new era in Amateur Radio communications. An era full of exciting promise. Challenge. And opportunity...

Anticipating the future, the Hams at Heath have created a remarkably advanced HF transceiver based on microprocessor logic. And with it, they open an entire universe of innovation and potential to the serious, active ham.

MORE WORLD HORIZONS
In the SS-9000, Heath met a major design goal: provide the highest level, most versatile transceiver possible. Our objective? Nothing less than setting the pace for transceiver performance in the next decade. And transforming the whole state-of-the-art in amateur telecommunications.

As a microprocessor-controlled, nine band (including WARC) Transceiver the SS-9000 pioneers the revolution in computer-enhanced hamshacks – with advanced design applications yet to be imagined. At your command under direct mode, RS-232C terminal or computer control, it could break all known records for station performance.

MORE TOTAL TALK POWER
Even without a command terminal, Heath's SS-9000 will be the best transceiver your club or QTH ever aired. The superbly sensitive front end is mated to a transmitter providing 1W QRP or 100W PEP output on SSB/CW/RTTY. At any level, dedicated operators who appreciate the finest and expect great results will discover it to be a hot Q2 and DX magnet.

The SS-9000 features push-button up or down band scan and

RIT with a rotary tuning dial that utilizes an optical encoder (plus quartz PLL-synthesized BFO, HFO and a VFO linked to separate readouts). This gives you digitally-precise tuning with ±100 Hz resolution in 10 selectable scan rates. Our dual fluorescent display is not just an advance in panel design... it's a quantum leap forward in T/R flexibility! Now you can write, recall and shift a total of 27 separate frequencies (3 per band) around the dual display and work simplex operation on one or two frequencies, split operation on different T & R frequencies or cross-mode on either or both displayed frequencies. The unseen frequency stored in memory remains available for instant exchange and

display, offering you speed and advantage that was undreamed of until now.

MORE MICRO CONTROL
Harness the SS-9000 to a video terminal, ASCII teletype, or home computer. You'll have an unbeatable team to travel the airwaves. Using built-in ROM (Read-Only Memory) commands, the Terminal Interface within each SS-9000 acts as a control/monitor with battery backup to handle a wide variety of tasks the user may define. This unique feature lets you write-in and display (or change) the operating and memory frequencies for each band, set T/R if activity on each readout, toggle between and alternate either one freely with the memory frequency.

Key board command also allows you to set and switch the band, mode, pause-band shift, band and scan rates, plus switch to one of five band-matched antennas. One on-board F8 CPU raises switching efficiency to the highest limit.

MORE FOR YOUR MONEY
Try one for the most exceptional capability ever offered. More QSO action for a lot less than you'd expect to pay. Rehearse the SS-9000. See how it's perfectly matched to the PS-9000 AC Power Supply that has an in-cabinet speaker and two digital 12 or 24-hour clocks. Both units benefit from thermal and over-current protection with high VSWR cutback. Ahead of their time, the SS-9000 and PS-9000 are not kits. They come to you fully assembled, calibrated and aligned with a one year limited warranty.

MORE IN STORE FOR YOU
Your local Heathkit Electronic Center is eager to demonstrate the SS/PS-9000 team – our first intelligent rigs. Ready for the future of Amateur Radio, they're here, today! Get a hands-on tryout at your nearby Heath Ham Headquarters.

MORE IN CATALOG, TOO
For complete details and specs, get a copy of your FREE Heathkit catalog. Write: Heath Company, Dept. 009-954, Benton Harbor, MI 49022.

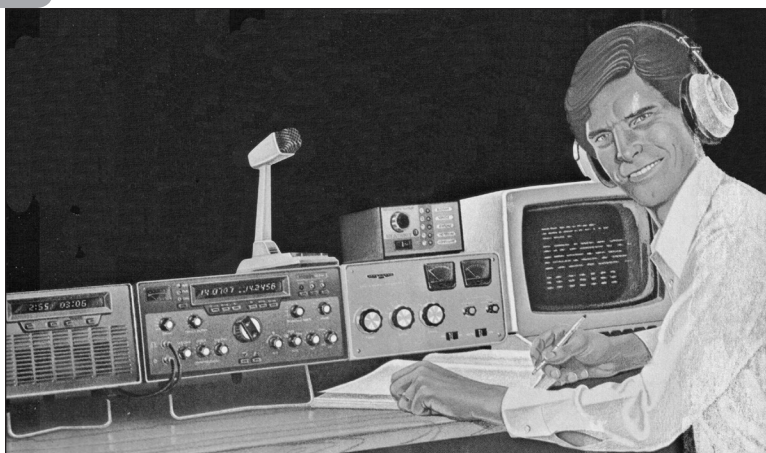
Units of Veri-Technology Electronics Corporation in the U.S.: a subsidiary of Zenith Radio Corporation.

In keeping with Heath's ongoing policy of product improvement, specifications are subject to change without notice or obligation.

Heathkit
Heath Company

AM-032

SS-9000 debut ad in the November 1982 issue of QST. For all Heath's emphasis on computer control, it is not obvious at first glance that the rig supports it. Not until the next month would the SS-9000 be shown alongside Heath's H89 computer or H19 terminal.



A detail from Heath's revised SS-9000 ad in the December 1982 issue of QST. It is interesting that the ad does not specifically mention the H89 computer in the text, and that the operator shields a view of the right side of the device, which would reveal whether it was indeed the H89 computer or simply the H19 terminal. A sub-heading of the ad uses the phrase "terminal controllable."

most hams. In spite of its computer controlled features, the SS-9000 sold poorly—estimates range from 350 to 2000 units—before Heath pulled the plug in 1985.^{116, 117}

THE LAST STAND

Seeming not to have learned any lessons from the SB-104 and SS-9000 debacles, Heath made an attempt to recapture some of its former glory with a yet another new and complex kit-form transceiver, the HW-5400.

The original plan for the 5400 was to offer it as a kit version of the Kenwood TS-120S. The idea of "kit-izing"



The fully assembled SS-9000 worked well and could be controlled from a computer or terminal, but its price tag was too rich for most hams.

someone else's products had been done before with some success. Heath had done it the early 60s with the Thomas electronic organ and with a Bally pinball machine, for example, and would do it again in the future with the Ameritron AL-80A, as the SB-1000 linear amplifier, and AEA's PK-232, as Heath's HK-232 terminal node controller.

Turning a ready made product into a kit had the advantage of significantly reducing both engineering time and costs. And at a time when Heath's amateur radio group was being systematically dismantled by Zenith, the concept was pretty attractive.

Unfortunately, negotiations with Kenwood went nowhere, and the idea was shelved. Heath then decided to go it alone, using the TS-120S as a road map, while adding changes and additional features that would make it uniquely Heath. The project was plagued by foreign competition and excessive engineering and design costs,



The HW-5400. Heath's last stand. Complicated and expensive. It lacked computer control, but included the WARC bands.



For about the same price, you could buy the fully assembled and similarly equipped Icom IC-730.

and was troubled by persistent assembly and alignment problems.

Heath got the HW-5400 into the Spring-Summer 1983 catalog, priced at \$750, not including the \$200 speaker-power supply or the \$60 frequency entry keypad. To go all in on the 5400 would set you back just about \$1000. The 5400 was also enormously complex and proved challenging even for the veteran kit builder, requiring more than 100 hours to assemble.

By this time, manufacturers like Icom, Kenwood, Yaesu, and others were literally flooding the market with top notch, feature-rich, *fully assembled* rigs, most of which were priced in the same general range. It was fundamentally impossible to counter rigs like these with a kit-form product. The parts were so small and the parts density so high, that only machines could assemble them with the precision required to make sure they worked and met specifications. Any manual assembly was done by labor so inexpensive, it amounted to only a tiny fraction of the total cost.

You didn't even have to look at the specifications or features of these rigs. A quick comparison of the front panels alone would tell you that Heath was now well out of its league.

Many customers wondered aloud, why would anyone



The little brown boxes were the end of the line for Heath's amateur radio group. They required relatively little in the way of engineering, and were inexpensive and easy to assemble.

buy of box full of headaches when they could get something far better off the shelf? Indeed, the Heath dynamic had turned upside down. The cost of assembly—Heath's *raison d'être*—had essentially disappeared, and had taken the company's business model with it. There was really no way to recover from this turn of events, which had been sneaking up on Heath for years. Whether anyone in the company was willing to admit it or not, Heath was on the road to oblivion.

By Christmas, about six months after its introduction, the HW-5400 had been cut to \$600. Shortly thereafter it went to \$550. The "last call" was in the Summer 1986 catalog. Heath had been burned for the last time. It was out of the HF transceiver business, never to return.

Zenith's endless budget cuts had ravaged Heath's amateur radio group, severely limiting its capabilities. As a result, after the introduction of the HW-5400, Heath's ambitions became much smaller, as reflected by the introduction of a succession of products casually referred to as the little brown box series, so called because, well, they were all made in little brown boxes. The little brown boxes were all small, relatively low cost accessories that were easy to engineer, and were about all the withering amateur radio group could muster.

The first of the little brown boxes were the HM-9 QRP wattmeter, the HFT-9 QRP antenna tuner, and the HD-1418 active audio filter, all released late in 1983.

Over the next two years, the little brown box series would grow to include about a dozen products. They were important products that all sold fairly well (relatively speaking), worked as advertised, and gave Heath a continued presence in amateur radio. But it wasn't enough.

There would be other brief flashes of success in the early 80s, but not from the amateur group. The Hero robots beginning in 1982, the Most Accurate Clock in 1983, and the Advanced Weather Computer in 1987, for example. But these flashes did not occur with sufficient frequency or magnitude to make any real difference for the company in financial terms. Especially so when the

The GC-1000 "Most Accurate Clock."



The ID-5001 "Advanced Weather Computer."



These were Heath's last real successes.

company was being disassembled piece by piece.

Almost from the moment Zenith took over, it began to syphon cash, personnel, space and other resources for use in its pursuit of computers. All other products took a back seat, and budget cuts came quickly.

The first round of layoffs occurred in the summer of 1982, and included 50 salaried positions and 70 hourly jobs. This amounted to about 8% of Heath's total workforce of 1450 people.¹¹⁸ Zenith explained the layoffs as "a general belt tightening." Departmental budgets had been cut 15% each year since 1979.¹¹⁹ In July, Zenith cut the work week to only three days, so that lagging orders could catch up with production.¹²⁰ Predictably, these events had a serious effect on morale. And as an indication of how far the company culture had changed, a few days later, it was revealed that a former secretary from Heath had been charged with embezzling more than \$11,000 by forging signatures on cash advance requests for business trips.¹²¹

Advances in technology and foreign competition were not the only factors weighing on Heath. Zenith was wreaking havoc from within. Heath was being transformed from a company making and selling kit products into a manufacturing facility for Zenith. A newspaper article put it in exactly those terms, referring to Heath as "the manufacturing arm of Zenith."¹²²

But for all the damage it inflicted on Heath's legacy business, Zenith seemed to be doing pretty well. Early in 1984 Zenith reported its earnings had risen by 68%.¹²³ And no wonder. Starting in 1983, Zenith began winning



In 1985 Zenith's \$2500 ZF-158-42, which did not include a video card or a monitor, found itself up against newcomers like the Leading Edge Model D, which had both, and sold for only \$1495.

— Professional-Level — Power —

Consumer Reports says:

"The Best Buy among the IBM-compatibles is the Leading Edge Model 'D'. It comes with a high-resolution monitor and the circuitry necessary to

display very sharp text as well as monochrome and color graphics. And it has enough ports and expansion slots to build just about any computer system you might want in the future."

\$1495



— at a — — Price for Everyone —

— The Leading Edge Model "D" Personal Computer —

— Full IBM Compatibility. \$1495. Complete. —

The Model "D" is available at most fine computer stores. Call us for the one near you. 1-800-343-6833 or (617) 828-8150. Leading Edge Hardware Products Inc., 225 Timpklee Street, Canton, MA 02021

Leading Edge is a registered trademark of Leading Edge Products, Inc. IBM is a registered trademark of International Business Machines, Inc.

The Leading Edge Model D computer, one of many so called IBM PC "clones" which began to flood the PC market starting in the mid 1980s. These kinds of computers cut deeply into Zenith's profits. Family Computing magazine. June 1986.

multimillion dollar contracts, primarily from the government. In October 1983 Zenith was awarded a contract worth almost \$29 million to supply computers, mostly for the military.¹²⁴ In 1984 it won another contract worth \$100 million.^{125, 126} In 1985 Zenith landed a government deal for computers worth nearly \$30 million. In February 1986, the IRS awarded the company a contract in the amount of \$27 million and days later, Zenith announced it had won another government contract worth an astonishing \$242 million for 90,000 computers, to be manufactured at Heath.^{127, 128}

It was curious then, to read a headline in March 1986 saying, “Zenith Hopes New Contract Will End Loss.” For the year 1985, Zenith reported a loss of \$7.7 million.¹²⁹ The company attributed the loss to “unusually large price declines for consumer electronic products, and significantly lower sales of power supplies and cable products.”¹³⁰ While Zenith’s computer business was doing well, its consumer electronics division (televisions, video cassette recorders, camcorders and so on) was bleeding cash, and contributing to losses overall.¹³¹

Additionally, offshore competition in the computer business was rapidly eating away at Zenith’s newfound source of wealth. A good example of this can be found in the Leading Edge Model D computer; an IBM PC clone introduced in July 1985 by South Korean conglomerate Daewoo. The machine featured an Intel 8088 processor running at 4.77 MHz, dual floppy disk drives, 256K RAM and a monochrome monitor for \$1495.¹³² The similarly equipped Zenith ZF-158-42 that did not include a video card or monitor cost \$2500.¹³³

QRT

The story of amateur radio at Heath ends in 1985. Wilting under the enormous strain from the increasingly toxic fallout of Zenith’s quest for profits, the amateur group or, more precisely, what was left of it, did the best it could. All of the old-guard engineers had left, and most of the company’s ability to design and manufacture kits had been eviscerated.

In 1985 the company released the HW-99 (more or less a solid-state version of the HW-16), the HW-5404 monitor scope, and a series of little brown boxes. Of course, these were all products that had been in the pipeline for some time. For all intents and purposes new designs had ceased a couple of years before.

After 1985 the only amateur radio products delivered were versions of other manufacturers’ products: the SB-1000 linear amplifier, a kit version of the Ameritron AL-80A; the SB-1400, a fully assembled HF transceiver based on the Yaesu FT-747GX; and a series of fully assembled handie-talkies provided by Standard and others.

Through 1987 the news was mixed. ZDS planned a major expansion of its distribution warehouse facility at the same time its parent company was reporting significant losses.^{134, 135, 136}

Early in 1988, based on an article that had appeared in *Business Week* magazine, rumors began to circulate



The HW-99, released in 1985, was one of the last amateur radio products the company made. It was viewed as expensive, featureless, and drifts. It sold poorly and survived only 18 months.



In a final effort to maintain a presence in amateur radio, Heath offered versions of equipment from other manufacturers. Top: The SB-1000, a kit version of the Ameritron AL-80A. Above: The SB-1400, a fully assembled rig made for Heath by Yaesu and based on the FT-747GX.

that ZDS was for sale after the company reported a loss of more than \$19 million for the previous year.¹³⁷ Zenith had no comment, and pressed on with expansion plans.¹³⁸

Zenith began a series of cost cutting measures in September 1989 which resulted in the loss of about 50 jobs in Heath’s operations.^{139, 140}

In November, Zenith announced it had been awarded a contract with the U.S. Government (more specifically,

PHOTO BY JOE VERAS, COLLECTION OF HERMAN CONE III

Detail from the new Home Automation catalog. Who could have imagined that Heath would end up selling, among other things, an electronic cat door?

Electronic door gives your cat greater freedom and independence

Let the cat in, let the cat out. Lock the door, unlock the door. Kitties like to come in and go out of the house when they're in the mood, but it may not always be when you're in the mood—or even there to open the door. And for your cat, waiting around is no more fun than it is for you. Little doors for pets have been around for a long time, but the Staywell 21 Electronic Cat Door adds a new dimension of security and convenience to the concept. The swinging door releases only when a cat wearing a special electronic key is nearby, keeping other animals out. It's your cat's private entrance. After you've installed the Electronic Cat Door in a desired location, just attach the supplied electronic key to

your cat's collar. The Electronic Cat Door constantly monitors the area and releases its protective latch only when your cat approaches. You can set the door for two-way passage or one-way passage (in or out), or lock it altogether when needed. The 8 3/4" square unit requires an opening of about 6 7/8" square and fits doors or walls up to 1 3/4" thick. It comes complete with mounting hardware and two collar keys. The supplied 12-volt power supply plugs into any 110-volt outlet. Now, even your kitty can benefit from Heath home automation! Give your cat the freedom and safety it deserves with the Electronic Cat Door.

CH-120 (3 lbs.) \$149.95



Lightweight electronic key fits snugly on standard cat collars.



for the U.S. military) for an incredible \$534 million. It was primarily for software, service, training, and a few peripherals, but not new hardware. On December 27, Zenith announced a three-day plant shutdown, idling 600 workers.¹⁴¹ Happy holidays.

It is neither useful or necessary to go into all the details of the Zenith implosion. It is a now-familiar story of mismanagement and misadventure. Many of the same forces dragging on Heath were pulling down Zenith as well. In particular, foreign competition was slamming the U.S. electronics industry. General Electric, RCA, Sylvania and many other household-name manufacturers had long ago given up making televisions and other consumer electronic products, or had been driven out of business trying to do so.

The rumors, it turned out, were true. The very next day, December 28, 1989, people in Benton Harbor awoke to the news that Zenith had sold Zenith Data Systems and Heath to a French computer company, Groupe Bull, for \$605 million.¹⁴²

After doing considerable market research, Bull concluded that electronic kits were no longer a sustainable business model, and decided to exit the kit business altogether. Sales of kits continued until existing stock was depleted. All kits combined, there was enough inventory to last about a year.

Instead of kits, Heath would concentrate on home study and continuing education courses, and branch out into a line of home automation and security products, almost entirely imported.

To a customer browsing through a catalog, Heath's turmoil was not readily apparent. And unless you were paying close attention, you may not have noticed that through the late 80s, the catalog began to change. Slowly. One by one, genuine Heath products disappeared and were replaced by imported third-party products. Or

not. Computers, computer accessories, and education products began to dominate.

The first real clue that things were about to go in a very different direction came in the 1990 holiday catalog, volume 222, which included a catalog insert titled "Home Automation." This insert featured a variety of fully assembled third-party products, notably infrared motion sensing security lights, and a series of X-10 home automation devices.¹⁴³

By this time, Heath had become scattered over several locations in the St. Joseph and Benton Harbor areas. So in March 1991, to save money, improve efficiency, and to untangle itself from ZDS, Heath decided to move all of its operations into a renovated former K-Mart building in Benton Harbor, leaving ZDS behind on Hilltop road.^{144, 145}

Insiders had seen the end of the road coming for quite a long time, but for customers, the end of kits came suddenly. In the spring of 1991, two catalogs were issued in quick succession. The first, volume 224, was titled "Heathkit" with the word "Sale!" scribbled underneath in a handwritten fashion. In this catalog, the company did not specifically say, "We're getting out of the kit business," even though that's exactly what was happening. On the back cover, though, the lines "...place order now for best selection. Some quantities are limited and some products are close-outs," should have been a clue.

The second catalog, issued about a month later, was titled, "Home Automation by Heath," with a note at the bottom reading "premier issue." It probably left many customers thinking, "Wait. What?!" On the inside of the front page, Heath recounted its early years and many successes, then concluded with, "Today, as we turn much of our attention to what we call 'home automation,' we welcome this opportunity to introduce you to a whole new concept in home convenience."

This new catalog looked a little more like something

Heath Alive and Well

Shifts Business Focus from Kits to Education

BENTON HARBOR, Mich. — Recent articles in the New York Times and Forbes Magazine notwithstanding, Heath Company is alive and well, and thriving here in Benton Harbor, Michigan, its home for over half a century.



Mark Twain

Bill Johnson, president of Heath Company and longtime Heathkit builder, puts it this way: "To paraphrase Mark Twain, the rumors of our demise are greatly exaggerated. Contrary to what you may have heard, we are not," he emphasizes, "not going out of business. We are, however, changing our focus from the rapidly shrinking electronic kit business to the burgeoning electronics education market."

"Times have changed, consumer needs have changed," says Johnson, "and for a number of reasons, folks just aren't buying and building very many kits anymore."

Johnson goes on to explain that the current nature of electronics no longer lends itself to kits. The diodes, resistors, capacitors and other components that used to make kit building so fascinating and challenging have been replaced by integrated circuits on printed circuit boards. "It's really pretty hard to come up with a challenging electronic kit any more," he says.

Additionally, Johnson notes, modern manufacturing technologies have driven the price of assembling electronic products so low that it's virtually impossible to save any money with a kit nowadays.

"Add to this the realities of less discretionary time for most people — and more ways to spend that time," Johnson points out, "and it's not hard at all to see why electronic kits have lost their attraction."



Bill Johnson

"LAST CALL" CLOSEOUT FOR HEATHKITS AND HOME AUTOMATION PRODUCTS

BENTON HARBOR, Mich. — Heath Company is holding a "Last Call" closeout for discontinued kits and home automation products featured in its most recent catalog.

In making the announcement, Chas Gilmore, Heath vice president, noted that the closeout is a direct result of Heath's recently announced decision to phase out of electronic kits and focus its attention and energies on growing its electronics education business.



Chas Gilmore

"In keeping with a longstanding tradition at Heath, we want to give our regular customers the first chance to purchase the last build-it-yourself Heathkits we'll probably ever make," said Gilmore.

Also included in the closeout is a wide selection of home automation products which, according to Gilmore, will no longer be advertised in the Heathkit mail order catalog.

"In fact," he added, "everything in the catalog — except for education products on page 59 — is subject to the special quantity discounts offered during the 'Last Call' closeout. But because this is a special, one-time promotion," he said, "we can only accept orders paid for by check, money order or credit card."

And when the special sale merchandise is gone, it's gone, say the folks at Heath. So now's the time to act — while discounts of 25% to 50% on selected items — and up to 20% for multiple item orders — are being offered. (See inside special cover for details.)

Heath's last catalog. Spring 1992.

from Brookstone or an inflight SkyMall catalog found in the seat pockets of a 737. The only legacy products remaining were the GC-1000 "Most Accurate Clock," and the ID-5001 "Advanced Weather Computer." Significantly, both were offered only as fully assembled. For diehard Heathkit fans, this was a stunning turn of events.

The "whole new concept in home convenience" lasted about a year. In the spring of 1992, Heath issued what proved to be its last catalog. The catalog's arrival very nearly coincided with a news release that Heath was dropping all of its consumer products.^{146, 147} Titled "Heath," and "The Best in Home Automation," the catalog came in a wrapper designed to resemble the front page of a newspaper. The headline was, "Heath Alive and Well," with a subheading that read, "Shifts Business Focus from Kits to Education." Two "articles" quoted Heath president Bill Johnson and vice president Chas Gilmore, each remarking in his own way about Heath's change in direction.

Alive and well notwithstanding, this was, in fact, an

everything-must-go close-out catalog. It contained a surprising number of legacy products (not seen in the previous catalog), many of which were already sold out by the time the catalog arrived in customers' hands. While about a dozen legacy test equipment products were listed, only four amateur radio products remained. These were the SB-1000 linear amplifier, the HD-1780 "IntelliRotor," and two code practice oscillators—the classic HD-1416 and the bare bones SK-102. Interestingly, all were offered in kit form.

Under Zeinth's ownership, several semi-separate business groups had been created within Heath. There was, of course, the kit business, but also the Heath Educational Systems group, the Heath-Zenith lighting and security group (whose products were sold under the brand name Reflex), Veritechnology (which ran Heath's network of stores), and Prokit—a Hong Kong-based unit that designed, manufactured and packaged many of Heath's last kits, and assembled the lighting and security products.

By late 1991, the entire Heathkit line of kits had been discontinued. Remaining stock would be sold off over the next few months, and Veritechnology was dissolved. At that point the Heath umbrella covered only Heath Educational Systems and Heath-Zenith lighting and security products. ProKit then became the manufacturing arm of Heath-Zenith.^{148, 149}

Then, in 1995, Groupe Bull sold Heath to HIG Capital Management Incorporated, based in Miami. The deal did not include Zenith Data Systems, which was retained by Bull.¹⁵⁰

In 1998, HIG sold the Heath-Zenith lighting and security group and the Heath name to DESA International, based in Bowling Green, Kentucky. HIG retained the last remaining piece, Heath Educational Systems.¹⁵¹ While the sale included the Heath name, it did not include the Heathkit trademark. This allowed the Heath Educational Systems group to continue, but the name was changed to Heathkit Educational Systems, and the company operating it was now called the Heathkit Company.^{152, 153, 154}

In 1999 HIG sold Heathkit to a private investment firm.¹⁵⁵

In 2005 the company was purchased by a former Heath employee. Heathkit continued in the creation and sale of education products aimed both at the industrial and vocational education markets, but the business was not thriving. Heathkit depended primarily on state and federal funding for schools, and as that funding shriveled, so did Heathkit. In an effort to keep cash flowing, in 2011 the company announced plans to re-enter the kit business.¹⁵⁶ Ultimately, this was too little too late, and in 2012 Heathkit declared bankruptcy, and its assets were sold at auction.¹⁵⁷

EPILOGUE

Zenith is often cited as the principal reason for Heath's demise, probably because Zenith was the most visible component of Heath's troubles, and because

we have all come to expect the worst from corporate takeovers. But the reasons for Heath's troubles are more complex than that.

Technologic and social changes also figure prominently in the problems Heath experienced in its later years, and together they formed a domino-like series of events that ultimately toppled the company. In this light, Zenith can be seen as hastening the inevitable.

The many events and circumstances leading to Heath's undoing overlap and interlock in myriad ways and can't be neatly divided with clear boundaries. A summary of the six basic elements that conspired to sink Heath follows, very roughly in the order in which they occurred.

(✓) Solid-state

It was the humble transistor, invented in 1947—just a few months after the introduction of Heath's first kits—that signaled the beginning of the end for Heath, though this was not understood until much later. These tiny devices started a revolution in electronics that made possible all of the electronic devices that today we take for granted.

While the transistor permitted Heath to build some of its most clever and innovative products, it also set the stage for the company's eventual demise.

The fundamental reason for buying a Heathkit was that it was considerably less expensive than buying a ready-made equivalent product. Prior to transistors, there was no inexpensive way to assemble an electronic product. You had to pay someone to sit at a bench with a soldering iron and plod away. Assembly by hand was time intensive. And time is money.

But with a Heathkit, *you* provided the labor for assembly.

The small size and rugged nature of transistors (and later, integrated circuits) coupled with advances in the photographic techniques required to make printed circuits by the zillions, made feasible the idea to build machines that could both assemble and solder.

Moreover, the same smallness that would make transistors easy for machines to handle had exactly the opposite effect for humans, as anyone with bifocals will attest. The ever-decreasing size of parts made them difficult to handle and frustrating to assemble. Additionally, the smallness of parts made it possible to cram more of them into a given space, further complicating the matter for anyone with fingers.

(✓) Automated Assembly

Once machines took over the time-consuming task of assembly, the cost of assembly (largely the stuffing and soldering of PC boards) fell to something approaching zero. Over time, machines would take on other types of assembly as well, reducing costs even further. All this meant machines could produce electronic devices at a cost equal to—and later, less than—that of a kit. Automation had the effect of exploding Heath's business model.

(✓) Foreign Competition

Japan is a country with a rich culture of tinkering in electronics. After World War II, groups of experimenters flourished in Japan, essentially kick-starting the country's electronics industry. By 1950 many of these groups had coalesced into small companies, a few of which went on to become some of the familiar industrial giants we know today. Companies like Sony, Hitachi, Mitsubishi, Toshiba and others, were quick to see the potential in solid-state electronics, and were among the very first to purchase licenses to manufacture transistors. From there, it was only a short step from fabrication of discrete parts to the manufacturing of complete products. In retrospect, it is easy to see how the Japanese took the ball and ran.

With a huge pool of talented engineers, cheap labor, and sophisticated industrial automation, these companies produced an avalanche of inexpensive, clever, feature-laden, stylishly designed, reliable and *fully assembled* products. It quickly became possible to buy a gizmo with more bells and whistles than a kit for a lot less than the cost of a kit—and one that worked the first time you turned it on.

It didn't take long for people to do the math, and customers rapidly turned away not only from Heath, but from other U.S. manufacturers as well.

(✓) Rapid Advances in Technology

By the early 1970s, technology had begun to advance in powers of ten. Those who did not live through this era may find it difficult to comprehend the pace of change. Those who did will recall that new kinds of integrated circuits were being announced almost weekly. Every month, hobby magazines were full of new and wonderful projects, and companies like Poly-Pak sold the latest solid-state devices to throngs of eager experimenters. Everyone owned wire wrapping tools and lots of "breadboards."

The process of designing a kit, even a simple one, takes time. For a complex kit like the SB-100, for example, it could take years.

In the days of vacuum tubes, the relatively slow pace of change gave Heath the time it needed to design kits. Two or three years of development was perfectly acceptable. But when technology begins to change almost overnight, time becomes a luxury kit engineers cannot afford. A project started in 1971 would be obsolete long before it hit the catalog three years later. Kit design is a process that cannot be hurried, and problems resulting from a crush of time and technology became unavoidable for Heath.

(✓) Changing Customer Base

Very early on, Heath picked up a large and devoted base of customers. At first, these people bought kits for the savings, but quickly got hooked on the thrill of kit building.

Unfortunately, as the decades passed, Heath did not continue to pick up new customers to replace the early adopters. As the old customer base aged out, young people were not taking their place.

In an age of instant gratification, young people seemed to lack the time, patience, and innate interest required for kit building. Additionally, the age of computers brought with it an entirely new field of interest to absorb what little time young people could give to a hobby of any kind. People who, in an earlier time, might have been attracted to amateur radio, for example, became interested in computers instead.

For all of Heath's other troubles, fundamental interest in kit building began to fade.

(✓) Zenith

Heath was already suffering by the time Zenith came sniffing around. Zenith was an old-guard, generally mismanaged, industrial leviathan that saw a future in computers but did not have the wherewithal to jump into the game. Instead, it saw Heath as its ticket to ride. Unfortunately, Zenith's short-sighted vision quickly eviscerated what remained of Heath's vitality.

Without the Zenith debacle, Heath might have hung on a while longer, but by 1980 or so, the only products making any money for the now struggling company were computers, and we all know how that ended. Remember Ohio Scientific? Sinclair? The TI-99? Even a shrewdly run company like Radio Shack eventually threw in the towel on computers.

CAN HEATHKIT RISE AGAIN?

That would be great, wouldn't it?

About a year after Heathkit's bankruptcy in 2012, a restructuring was announced, and in 2013 the company re-launched its website. As of this writing, the company is headquartered in Ottsville, Pennsylvania, with manufacturing and warehouse space in Santa Cruz, California. In 2014 the company announced its first new kit product, the GR-150 "Explorer Jr.," a tuned radio frequency (TRF) AM receiver. This tiny battery powered radio has no speaker and is designed for use with earbuds. It is offered primarily as a solderless kit, the components being installed with small screws and nuts.



Heathkit's GR-150 "Explorer Jr." AM radio.



The GC-1006

Reviews were mixed, but at \$149, it seems very expensive for what it is.

A second kit, the GC-1006 electronic clock was released in 2016. It is modeled after Heath's famous GC-1005. Unlike the AM radio, the clock is a traditional solder-it-together kit.

In 2017 Heathkit announced a third kit, the HM-1002 digital RF wattmeter. It appears to be built into the same cabinet as the GC-1006 clock. As of this writing it is not clear if any have actually been sold or shipped.

Since then, the company has clearly struggled to find its footing. The company's website appears to have changed very little since about 2018.

We would all like to see the new Heath succeed, of course, but the factors that forced the original Heath Company out of business have not gone away, and cannot be denied. The winds of automated assembly, foreign competition, and rapidly changing technologies have only intensified with the passage of time, and show no signs of abating.

To succeed in the 21st century will require a reimagining of what it means to be Heathkit.

The time of selling kits—at least the kind of kits we think of when we think of Heathkits—has largely passed. But, importantly, there will always be a contingent of people, albeit a smaller group than in Heath's heyday, for whom the lust for kits still burns brightly.

MAKERS

At some nebulous time around the turn of the 21st century, there slowly evolved a DIY movement that has become known as "maker." At first, this was just a loose-knit group of people, mostly young, who began to coalesce, mostly online.

The definition of a maker is almost as ambiguous as its origins. Obviously, anyone who makes something can be called a maker. But in the context of kit building, the maker culture is generally construed to be an extension or subculture of DIY that leans toward technology. Not just the making of technology, but the use of technology in making things.



The interests of makers may have been inspired by the general notion of hacking, but lean more toward tinkering with hardware than software, as the term “hacking” often supposes. Fueled by small, fast, cheap microprocessors like Arduino and Raspberry Pi, and technologies like 3D printers and laser cutters, the maker culture rapidly gained momentum in the early 2000s.

By 2005, a magazine, *Make*, had arisen to serve what by then had become the maker movement. By 2006, maker fairs were being held across the country and around the world to bring these people together into a physical space to share ideas and help spread the gospel.

For the purposes of this discussion, the most important thing to understand about makers is this: had they been born in the 1950s, *they would have become lifelong Heathkit fanatics*. And they still could, except that Heath is not there for them.

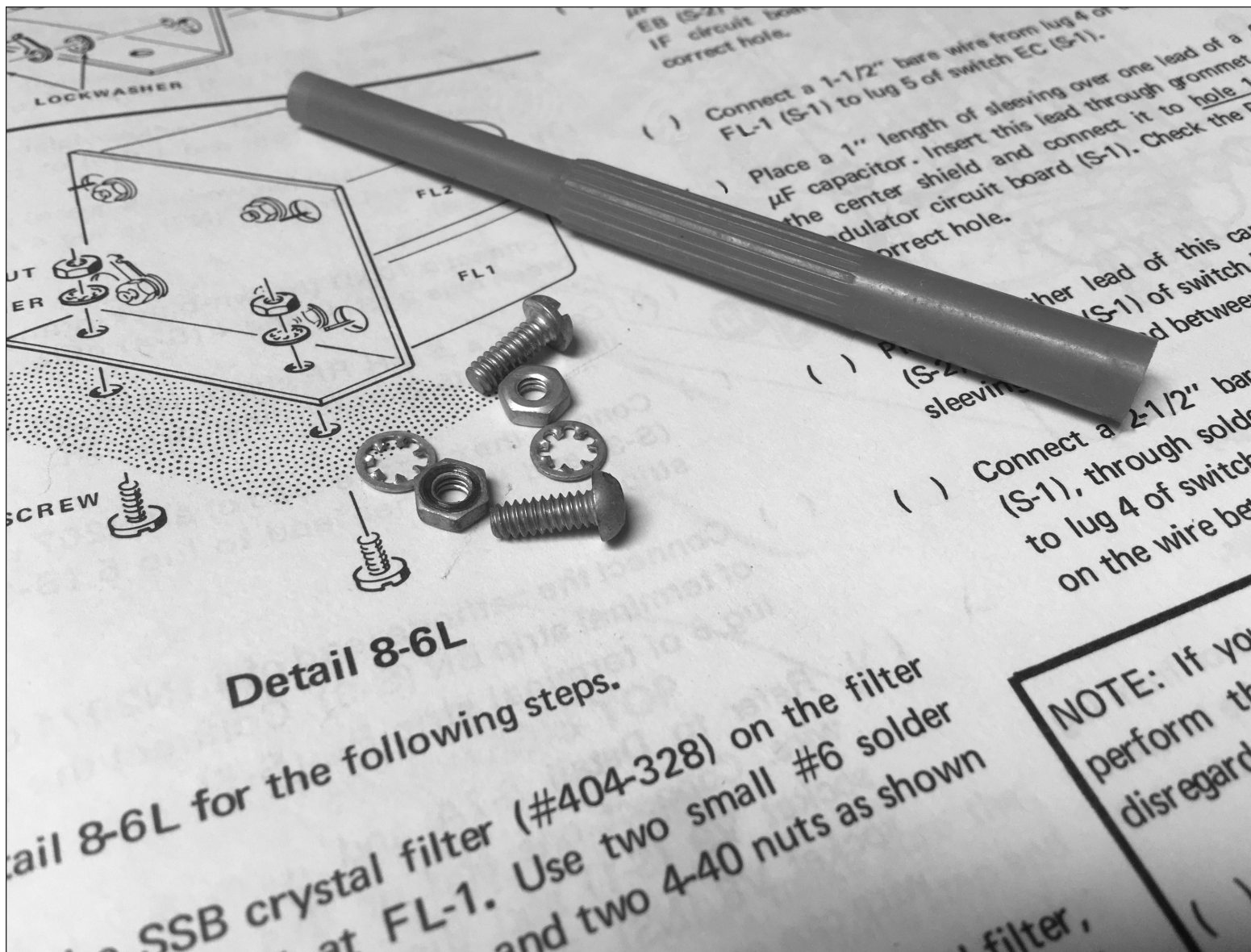
Around the turn of the 21st century, at the same time makers were beginning to invent things both wondrous and wacky, Heath was too busy cranking out home study

courses to notice that the world around it was changing in a way that had “Heathkit” written all over it.

For all practical purposes, Heath invented DIY. The maker movement was theirs for the taking. We may never know exactly why this didn’t happen. It could have been a failure of time, energy, or money, or maybe just a failure of imagination.

But it may not be too late. The maker culture shows no signs of slowing down.

Heath must reimagine itself as a company that provides parts, pieces, ideas and support for the maker culture. It must define itself as the *Whole Earth Catalog* of the maker movement, except with merchandise.¹⁵⁸ Yes, there will always be a small market for kit clocks and RF watt meters, and Heath should continue to develop those products. But there is now a much larger market for a company that provides something philosophically more like building blocks than oscilloscopes. Something makers can use to design and build their



own kits, and maybe their own future as well.

Given the maker movement and, more broadly, the interest in STEM (science, technology, engineering and math) education, there is clearly an opportunity for some alchemy—the transformation of Heath’s 20th century legacy into a 21st century brew of maker-inspired inventiveness.

For a company like Heath, there are a couple of points that should not be overlooked. 1) Makers are on to something big, and 2) *Make* magazine might be the new *Radio News*.

Lightning *can* strike twice.

The most important thing for the new Heath to understand about the old Heath is this: Heath didn’t invent the oscilloscope, it invented a way for people to get one. In other words, don’t make *things*. Make things *possible*. Unless or until the magic happens, about the best we can do is dream about the way it used to be. The muffin pan full of hardware. The packing box cut to hold resistors and capacitors. The tubes, the

transformers, the terminal strips—and the steps.

Isn’t this how it worked? We rushed home after work, ate a quick dinner (or maybe not), headed for the shack and followed the steps. Exactly. To the letter. We worked eagerly but patiently. Time passed quickly. Is Jack Paar on already? I’ll be up in a few minutes, honey.

It was a great ride while it lasted.

And so it has come to this. A couple of empty Heath packing boxes in the basement and a few red plastic nut starters in the junk box. These are all that remain to tell the tale.

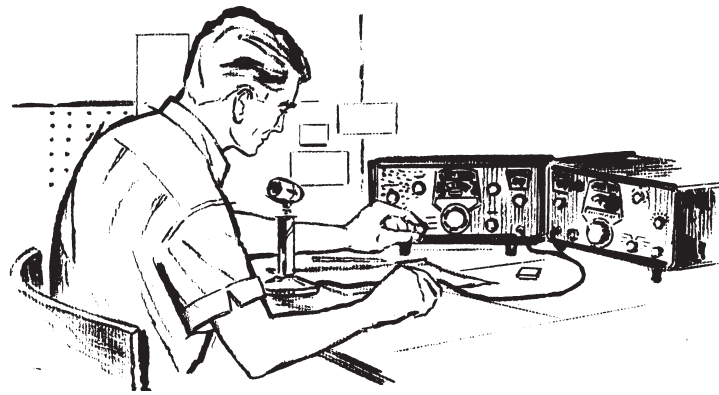
These and a few memories and the scar on my right index finger from when, during the construction of an HW-100, I picked up my soldering iron from the wrong end.

There is a phrase at the end of just about every assembly manual Heath ever wrote. A phrase that has a very different meaning now than it did back then. It read simply, “This completes the assembly.”

Yes. I guess it does.

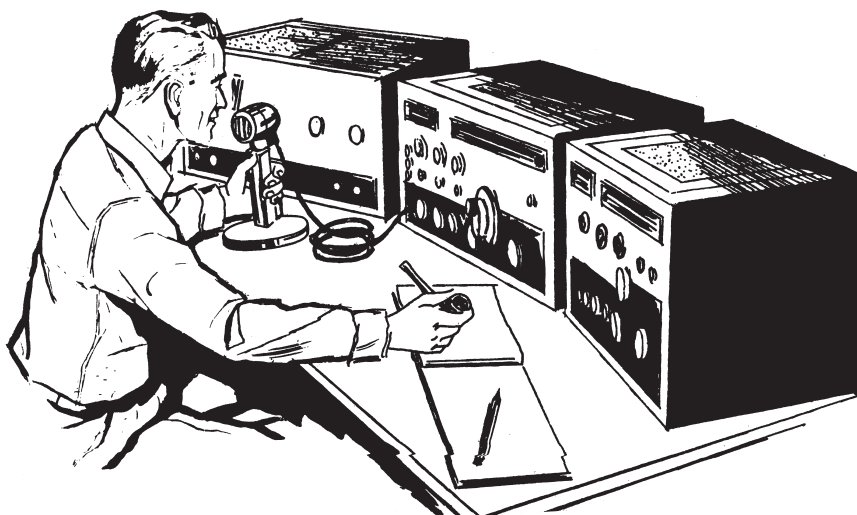
END NOTES

- 1 Terry Perdue, *Heath Nostalgia* (self published, 1992), p. 2.
- 2 Chet Peek, *The Heath Story* (Three Oaks Press, 2003). This book provides a detailed history of the Heath Airplane Company. The very short section involving Howard Anthony is devoid of citations, and reads as though Peek may have gotten most of that information from *Heath Nostalgia*.
- 3 Dar Evans, former Heath engineer, interview.
- 4 <https://www.hillsdale.edu/about/mission/>. (Accessed Nov 2020.)
- 5 Bjorn Heyning, editor, *Heath Stories*, number 2, p. 3.
- 6 *Heath Stories*, number 58, p. 3.
- 7 *Heath Stories*, number 2, p. 3.
- 8 "War Brings Rush Orders to Heath Co.," *Herald-Palladium* (Benton Harbor, MI), Dec 31, 1941, p. 93.
- 9 "Heath Aviation Company," *Herald-Palladium* (Benton Harbor, MI), Jan 1, 1937, p. 121.
- 10 Gene Fiebich, former Heath engineer, interview.
- 11 *Heath Stories*, number 1, p. 2.
- 12 Heath catalog, *New Heathkits for 1955*, pp. 2-3, for example.
- 13 *Heath Stories*, number 1, p. 2.
- 14 *Heath Stories*, number 3, p. 2.
- 15 *Heath Stories*, number 53, p. 2.
- 16 *Heath Stories*, number 6, p. 1.
- 17 *Heath Stories*, number 52, pp. 1-3.
- 18 *The Heath Story*, p. 95.
- 19 *Heath Stories*, number 1, p. 2.
- 20 *Heath Nostalgia*, p. 3.
- 21 *Ibid.*
- 22 *Heath Stories*, number 3, p. 1.
- 23 "Build Planes Here For England," *Herald-Palladium* (Benton Harbor, MI), Jul 11, 1936, p. 1.
- 24 "Heath Aviation Company," *Herald-Palladium* (Benton Harbor, MI), Jan 1, 1937, p. 121.
- 25 "B.H. Aircraft Accessories Plant Grows," *Herald-Palladium* (Benton Harbor, MI), Nov 26, 1941, p. 1.
- 26 https://en.wikipedia.org/wiki/Civilian_Pilot_Training_Program. (Accessed Oct 2020.)
- 27 "B.H. Aircraft Accessories Plant Grows," *Herald-Palladium* (Benton Harbor, MI), Nov 26, 1941, p. 1.
- 28 "War Brings Rush Orders to Heath Co.," *Herald-Palladium* (Benton Harbor, MI), Dec 31, 1941, p. 93.
- 29 "Indian Hills is Popular," *Herald-Palladium* (Benton Harbor, MI), Dec 31, 1940, p. 71.
- 30 "War Brings Rush Orders to Heath Co.," *Herald-Palladium* (Benton Harbor, MI), Dec 31, 1941, p. 93.
- 31 *Ibid.*
- 32 "Heath Company Sold to Daystrom," *News-Palladium* (Benton Harbor, MI), Nov 23, 1954, p. 1.
- 33 *Heath Nostalgia*, p. 48.
- 34 "Victim Was Frequent Visitor to Shreveport," *The Times* (Shreveport, LA), Jul 24, 1954, p. 1.
- 35 "Arkansas Permits," *The Times* (Shreveport, LA), May 18, 1941, p. 26.
- 36 "Standard is Laying Line to New Well," *The Times* (Shreveport, LA), Jun 22, 1941, p. 26.
- 37 *Heath Stories*, number 3, p. 1.
- 38 *Heath Stories*, number 4, p. 2.
- 39 "Howard Anthony Buys Home," *Herald-Palladium* (Benton Harbor, MI), Apr 2, 1945, p. 3.
- 40 "Frank Lloyd Wright Designed-Home Unique," *News-Palladium* (Benton Harbor, MI), May 23, 1950, p. 11.
- 41 "C.A.A. Probes Cause of Anthony Plane Crash," *News-Palladium* (Benton Harbor, MI), Jul 24, 1954, p. 1.
- 42 Heath catalog, *New Heathkits for 1955*, p. 2.
- 43 "Heath Co. Sold to Daystrom," *News-Palladium* (Benton Harbor, MI), Nov 23, 1954, p. 1.
- 44 Accounts regarding the exact number of acres vary, but between 78 and 86 acres. Also see reference 69.
- 45 *Heath Stories*, number 5, p. 1.
- 46 *Ibid.*
- 47 Heath Company advertisement, *Herald-Palladium* (Benton Harbor, MI), Aug 26, 1947, p. 10.
- 48 *Heath Stories*, number 5, p. 2.
- 49 Heath catalog, *New Heathkits for 1955*, p. 3
- 50 https://en.wikipedia.org/wiki/G.I._Bill. (Accessed Oct 2020.)
- 51 Fiebich, interview.
- 52 *Ibid.*
- 53 *Ibid.*
- 54 *Ibid.*
- 55 *Heath Nostalgia*, p. 54.
- 56 Evans, interview.
- 57 *Ibid.*
- 58 Al Robertson, former Heath engineer, interview.
- 59 *Heath Nostalgia*, p. 50.
- 60 "C.A.A. Probes Cause of Anthony Plane Crash," *News-Palladium* (Benton Harbor, MI), Jul 24, 1954, p. 1.
- 61 *Heath Stories*, number 58. p. 4.
- 62 "Heath Company Sold to Daystrom," *News-Palladium* (Benton Harbor, MI), Nov 23, 1954, p. 1.
- 63 "Daystrom Has Plans for Merger," *News-Palladium* (Benton Harbor, MI), Mar 30, 1955, p. 19.
- 64 "Daystrom Awarded Nuclear Reactor," *News-Palladium* (Benton Harbor, MI), Jun 16, 1956, p. 1.
- 65 "Daystrom to Produce Missiles," *News-Palladium* (Benton Harbor, MI), Dec 17, 1959, p. 24.



- 66 "Daystrom Opens Plant in Britain," *News-Palladium* (Benton Harbor, MI), Dec 12, 1959, p. 8.
- 67 *Heath Nostalgia*, p. 7.
- 68 "Heath Growth Rapid," *News-Palladium* (Benton Harbor, MI), Dec 31, 1955, p. 41.
- 69 "Agree to Sell College Land," *News-Palladium* (Benton Harbor, MI), Dec 3, 1955, p. 1.
- 70 "Heath Growth Rapid," *News-Palladium* (Benton Harbor, MI), Dec 31, 1955, p. 41.
- 71 "C C Board Annexation Study OK'd," *News-Palladium* (Benton Harbor, MI), Jul 16, 1954, p. 1.
- 72 "Heath Eyes Move to St. Joe," *News-Palladium* (Benton Harbor, MI), Jun 26, 1956, p. 1.
- 73 "Local Heath Company Plant to Expand Warehouse Space," *News-Palladium* (Benton Harbor, MI), Sep 9, 1960, p. 12.
- 74 "Heath will Increase SJ Plant Size 60%," *News-Palladium* (Benton Harbor, MI), Sep 7, 1967, p. 3.
- 75 Heath Expansion Site (photo and caption), *News-Palladium* (Benton Harbor, MI), May 7, 1969, p. 43.
- 76 "Heath Buys Expansion Site," *News-Palladium* (Benton Harbor, MI), May 18, 1969, p. 1.
- 77 "Heath Starts Big Expansion in St. Joseph," *News-Palladium* (Benton Harbor, MI), May 22, 1973, p. 1.
- 78 "Heath Asks Tax Break on \$2 Million Addition," *News-Palladium* (Benton Harbor, MI), Mar 10, 1981, p. 3.
- 79 <https://corporate.walmart.com/our-story/our-business>. (Accessed Oct 2020.)
- 80 "Plan Ground Breaking for Heath Plant," *News-Palladium* (Benton Harbor, MI), Mar 15, 1957, p. 1.
- 81 "Heath Co. Has Ground Breaking," *News-Palladium* (Benton Harbor, MI), Mar 28, 1957, p. 3.
- 82 "Heath Company" (photo and caption), *News-Palladium* (Benton Harbor, MI), Aug 24, 1957, p. 7.
- 83 "Heath Company Holding Open House Thursday," *News-Palladium* (Benton Harbor, MI), Aug 11, 1958, p. 7.
- 84 *Heath Nostalgia*, p. 8.
- 85 "Heath Expansion Site" (photo and caption), *News-Palladium* (Benton Harbor, MI), May 7, 1969, p. 43.
- 86 Robertson, interview.
- 87 "Engineer Promoted," *News-Palladium* (Benton Harbor, MI), May 8, 1959, p. 7.
- 88 Robertson, interview.
- 89 *Ibid*.
- 90 Evans, interview.
- 91 Robertson, interview.
- 92 *Ibid*.
- 93 *Ibid*.
- 94 "Daystrom Merger is Revealed," *News-Palladium* (Benton Harbor, MI), Aug 29, 1961, p. 1.
- 95 "Daystrom, Dutch Merger Approved," *News-Palladium* (Benton Harbor, MI), Jan 11, 1961, p. 28.
- 96 Fiebich, interview.
- 97 *QST* magazine, Apr 1970, p. 122.
- 98 *QST* magazine, Jun 1970, p. 112.
- 99 Chuck Dachis, *Radios by Hallicrafters* (Atglen, PA: Schiffer Publishing Ltd, 1996), p. 97.
- 100 Mike Elliot, former Heath engineer, interview.
- 101 *Ibid*.
- 102 *Ibid*.
- 103 *Heath Stories*, number 17, p. 4.
- 104 "Heath Official Retires Dec 1 After 23 Years," *News-Palladium* (Benton Harbor, MI), Nov 10, 1973, p. 3.
- 105 Joe Shafer, former Heath engineer, interview.
- 106 Fiebich, interview.
- 107 Bob Sumption, former Heath engineer, interview.
- 108 Ron Dillion, former Heath engineer, interview.
- 109 https://en.wikipedia.org/wiki/World_Administrative_Radio_Conference. (Accessed Oct 2020.)
- 110 A complete list of ITU conferences may be found here: <https://www.itu.int/en/history/Pages/CompleteListOfRadioConferences.aspx>. (Accessed Oct 2020.)
- 111 <http://handle.itu.int/11.1004/020.1000/4.101>, *World Administrative Radio Conference* (Geneva, 1979). (Accessed Oct 2020.)
- 112 *QST* magazine, Dec 1974, p. 9
- 113 *QST* magazine, Dec 1977, p. 189.
- 114 Dillion, interview.
- 115 *QST* magazine, Apr 1980, p. 115.
- 116 Sumption, interview.
- 117 Dillion, interview.
- 118 "Heath Cuts 50 Salaried Jobs, Lays Off 70 Hourly," *News-Palladium* (Benton Harbor, MI), Aug 11, 1982, p. 3.
- 119 Shafer, interview.
- 120 "Heath Cuts Back to 3-Day Weeks," *News-Palladium* (Benton Harbor, MI), Jul 12, 1982, p. 17.
- 121 "Ex-Heath Secretary Accused of Embezzling," *News-Palladium* (Benton Harbor, MI), Jul 14, 1982, p. 3.
- 122 "Siljander Probes Claim That ZDS Farming Out St. Joe Work to Mexico," *News-Palladium* (Benton Harbor, MI), May 7, 1985, p. 1.

- 123 "Zenith's Earnings Up 68.7%," *News-Palladium* (Benton Harbor, MI), Apr 26, 1984, p. 30.
- 124 "Zenith Get 829 Million SJ Contract," *News-Palladium* (Benton Harbor, MI), Oct 4, 1983, p. 1.
- 125 "Heath May Get Huge U.S. Contract," *News-Palladium* (Benton Harbor, MI), Oct 1, 1984, p. 1.
- 126 "Siljander Forming Business Network," *News-Palladium* (Benton Harbor, MI), Nov 3, 1984, p. 3.
- 127 "Heath to Play Role in 27 Million Job For IRS Computers," *News-Palladium* (Benton Harbor, MI), Feb 27, 1986, p. 1.
- 128 "Zenith Wins \$242 Million Contract," *News-Palladium* (Benton Harbor, MI), Mar 1, 1986, p. 1.
- 129 "Zenith Hopes New Contracts Will End Loss," *News-Palladium* (Benton Harbor, MI), Mar 4, 1986, p. 12.
- 130 *Ibid.*
- 131 "Zenith Chief Says Japan Dumping TVs," *News-Palladium* (Benton Harbor, MI), Apr 25, 1986, p. 18.
- 132 https://en.wikipedia.org/wiki/Leading_Edge_Model_D. (Accessed Oct 2020.)
- 133 Heath catalog 201, Winter 1986.
- 134 "Zenith-Heath Complex Keeps Growing," *News-Palladium* (Benton Harbor, MI), Jan 20, 1980, p. 3.
- 135 "Heath Plans Big Addition in SJ Twp," *News-Palladium* (Benton Harbor, MI), Apr 24, 1987, p. 12.
- 136 "Zenith Corp. Reports Net Loss for 3rd Quarter, First Nine Months," *News-Palladium* (Benton Harbor, MI), Oct 3, 1987, p. 11.
- 137 "Zenith Isn't Commenting on Report Division, Company Up For Sale," *News-Palladium* (Benton Harbor, MI), Apr 2, 1988, p. 18.
- 138 "Zenith Will Expand in St. Joe," *News-Palladium* (Benton Harbor, MI), Jul 20, 1988, p. 3.
- 139 "Zenith Cutting Costs to Offset Quarterly Loss," *News-Palladium* (Benton Harbor, MI), Sep 9, 1989, p. 1.



- 140 "High Inventory Spurs Local Layoffs," *News-Palladium* (Benton Harbor, MI), Sep 6, 1989, p. 1.
- 141 "Three-Day Plant Shutdown Idles 600," *News-Palladium* (Benton Harbor, MI), Dec 27, 1989, p. 1.
- 142 "Zenith Computer Sale OK'd," *News-Palladium* (Benton Harbor, MI), Dec 28, 1989, p. 1.
- 143 For an explanation of X-10, refer to: https://en.wikipedia.org/wiki/X10_industry_standard. (Accessed Dec 2020.)
- 144 "Heath Co. Begins Renovation Work," *News-Palladium* (Benton Harbor, MI), Oct 17, 1990, p. 21.
- 145 Randy Keading, former Heath technical writer, interview.
- 146 "Heath Company to Drop Consumer Products Business," *News-Palladium* (Benton Harbor, MI), Feb 7, 1992, p. 1.
- 147 There were subsequent catalogs, but these focused entirely on Heath's education business. Consumer products (and Heathkits) were entirely gone.
- 148 "Catalog Signals Heath Shift," *News-Palladium* (Benton Harbor, MI), Mar 22, 1991, p. 16.
- 149 "Heath Catalog Highlights Home Items," *News-Palladium* (Benton Harbor, MI), Sep 4, 1991, p. 23.
- 150 <https://www.heath-zenith.com/about>. (Accessed Oct 2020.)
- 151 *Ibid.*
- 152 Keading, interview.
- 153 "Heath Co. Consumer Products to be Sold," *News-Palladium* (Benton Harbor, MI), Jan 15, 1998, p. 17.
- 154 After the sale, the name of the company, as it appeared in newspaper "help wanted" ads, for example, was changed from Heath Company to Heathkit Company.
- 155 Keading, interview.
- 156 "They're Putting the Kit Back in Heathkit," *News-Palladium* (Benton Harbor, MI), Aug 25, 2011, p. A1.
- 157 "Disassembly Complete: Heathkit Is No More," *News-Palladium* (Benton Harbor, MI), Jul 19, 2012, p. A1.
- 158 *The Whole Earth Catalog*, first published in the late 1960s, was a kind of do-it-yourself reference book and manifesto. It reviewed and recommended products, but sold none itself. See https://en.wikipedia.org/wiki/Whole_Earth_Catalog. (Accessed Oct 2020.)