HEATHKIT®

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A Guide to the Amateur Radio Products

BY CHUCK PENSON WA7ZZE

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Electric Radio Press, Inc.
DURANGO, COLORADO

Product photos by Chuck Penson or from the Heath catalogs, except where noted.

Cover art is from a the cover of a 1961 Heathkit log book.
Back cover art is from a Heathkit SB-110 assembly manual.
Author photo by Jim Yunker, Minneapolis, Minnesota.
Editorial assistance provided by Kathryn Bevacqua, Minneapolis, Minnesota.

Book design by David Steinlicht, St. Paul, Minnesota.
Book was assembled using Quark XPress. Photos retouched using Adobe Photoshop.

Book text is Adobe New Century Schoolbook.
Captions are Monotype Grotesque Bold Condensed.
Headlines are Monotype Grotesque Bold Extended.
Display type is based on the typeface Hellenic.

First Printing: October 1995.

For Dad

For Kathryn

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Foreward

Researching the Heath Company's past has not been an easy task. Very few people with firsthand information from the earliest years, prior to 1955 or so, remain to tell the tale. To further complicate matters virtually all the records documenting Heath's past were thrown out in the mid '80s, when Heath began its unfortunate and unceremonious departure from the kit business. Those records included everything from engineering notes, advertising photos, and sales records, to product manuals and catalogs. Almost nothing survived. A few precious artifacts were quite literally rescued from the dumpster by employees looking for items of either cash or sentimental value, but most of the Heath's recorded history is now entombed somewhere in a landfill. This is a tragic loss indeed. That the recorded history of a company playing such an important role in the development of both electronics and amateur radio could be tossed away without a thought is beyond comprehension.

Yet people who know the story of Heath, or at least who know their part of it, are out there, and many of them have contributed in significant ways to this book. Those who were kind enough to spend time talking with me about the Heath story include many current and former Heath managers, engineers, and technicians. Among them, Chas Gilmore; Al Robertson, K8BLL; Dar Evans, K8ADS; Gene Fiebich, Ron Oxley, WM8Z; Tom Woods, WAØRBW; Chuck Babbit, Terry Perdue, K8TP; Ray Nelson, Bill Denk, W8LUH; Norm Harvey, W8RTY; Randy Kaeding, K8TMK; Jerry Tolsma, W9GPB; Bob Knapp, WA2CKY; Mike Elliot, W8KRR; and Bob Groh. My thanks to all of these folks for their time, patience, and memories.

A number of friends were instrumental in the process of writing this book. They include Bill Schmitt, KEØXE, for all those back issues of *Electronics* magazine, Courtney Anne Nieman and Morgan L'Argent, KBØQEJ, who helped sift through all the old ham radio magazines; and Paul March, KBØMAN, owner of the Amateur Radio Consignment Center, in St. Paul, Minnesota, who let me take photos of a number of pieces at his store. Also of assistance were Kathryn Bevacqua; David Steinlicht; Jim Yunker; Anne Welsbacher; John Desmond, KØTG; Gene Kaari, WØUZS; Art Edhlund, KAØZHZ; and Steve Raymer of the Pavek Museum of Broadcasting.

Additionally, fellow collectors Nick England, KD4CPL; Dave Ishamael, WA6VVL; Jim Lockwood, KM6NK; Mike Sewell, KØCRX; and Chuck Maas, WØIUH, provided a lot of detail that I never would have found without their assistance.

Of course *Electric Radio* editor Barry Wiseman, N6CSW, who provided a great deal of support and encouragement, can not go unacknowledged.

And lastly, a very special thanks to former Heath engineer Joe Shafer, K8DCE; former Heath production schedule manager Helen Holland; all of the members of the Heath Golden Oldies club; and of course to the Heath Company, without whose cooperation this book would not have been possible.

This book is intended to be a kind of field guide, or spotter's guide if you prefer. It is a book to keep in your backpack while roaming flea markets, a book to keep in your shack for handy reference when you work someone running an HW-12A, and a book to help you interpret the *Yellow Sheets* or classified section in *Electric Radio*. Additionally, this book will serve to familiarize the collector with the 160 or so principal amateur radio products the Heath company produced from 1952 to 1991. The book does not go into great technical depth, but should provide sufficient detail about the piece of equipment you are looking at and what you may be getting into should you decide to buy it.

For those who own or who once owned Heathkit equipment (that's just about everyone, isn't it?) and for those who remember Heath fondly and mourn its passing, this book will provide an opportunity to browse, as you once did for hours, through the Heathkit catalog. Finally, I hope this book will ensure that history records the accomplishments of a remarkable company on the shores of Lake Michigan and the equally remarkable people who worked there.

A History of the Heath Company

My earliest recollection of the Heath company dates from about age 6 (1958), when my father bought and assembled an AR-3 shortwave receiver. I don't recall the construction of the radio, but I do remember with great clarity when he brought it down into the living room, set it up on an end table, threw a short length of wire out the window, and tuned in WWV. I remember being thoroughly astonished. It was at that moment that my interest in radio and in the Heath company began. I spent hours listening, spellbound, to WWV and all the other strange beeps and buzzes emanating from that AR-3. Sometime later my dad gave my brother and me a CR-1 crystal radio which, from the perspective of my youth, appeared to defy the laws of physics. When I was about 10, I received a pair of GW-21 100mw walkie-talkies. Although they worked very well and provided endless hours of enjoyment, I was, by that time, old enough to attempt to "make them work better." It is a miracle any of those early kits survived my efforts. The AR-3 made it to the present. The crystal radio and walkie-talkies weren't so lucky.

It is likely that most people familiar with the Heath Company have similar stories to tell—growing up with the smell of solder smoke, the howl of a heterodyne, and the occasional electric shock or exploding electrolytic.

(✔) HEATHKIT'S EARLY YEARS

Most hams are at least vaguely familiar with the history of the Heath company. Heath recounted the story of its humble beginnings in several product catalogs, and one of the best "thumbnail" versions is on the back cover of the 1968 general catalog number 610. Around the turn of the century Edward Heath founded the Heath Aeroplane Company. Business was brisk and in 1926, Heath offered an airplane in kit form. Heath was killed in 1931 when the plane he was flying crashed during a test flight. After Heath's death the company floundered and eventually went bankrupt. In 1935 a young engineer named Howard Anthony purchased the Heath company at auction. After World War II Anthony got the idea that there might be some money to be made in the war surplus electronics market and purchased a large quantity of material. Exactly how much surplus he bought is the subject of some disagreement—anywhere from a single boxcar to several entire warehouses full depending on which account you read—but there is no doubt that it was a very large quantity. These surplus parts were the building blocks Anthony would use to assemble an entirely new Heath company.

Anthony's original idea was simply to sell his surplus parts outright. Early advertisements and flyers listed everything from military transmitters and receivers to meters, chokes, dynamotors, and condensers. Often mixed in with the ads were diagrams and schematics suggesting alternative uses or modifications for the items being sold. On occasion, these schematics showed devices for which Heath didn't even sell parts! The idea to offer electronic products in kit form had occurred to Howard almost 10 years earlier, but now, armed with a vast stock of raw material, he found himself in a position to test the kit market. In 1947 the Heath Company offered its first kit product—a five-inch oscilloscope. The idea to offer a scope was a logical one—among the items acquired in Anthony's surplus buy were several thousand five-inch CRTs. On the strength of a single ad in *Electronics* magazine orders poured in by the hundreds, and the rest, as they say, is history. Then in 1954, as though history were repeating itself, Howard Anthony was killed in a plane crash. Anthony's wife continued to run the company until 1958 when she sold it to Daystrom, a large holding company.

The first Heath ad in Electronics magazine, August 1947, and an ad from November 1948.

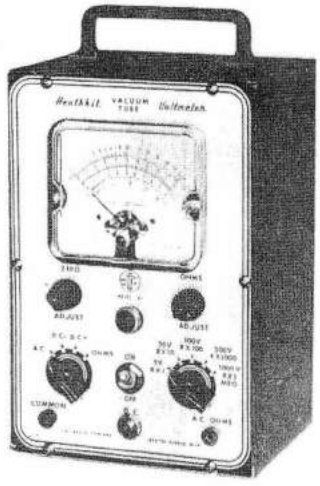
Those interested in a more thorough discussion of Heath's early years are referred to Terry Perdue's excellent *Heath Nostalgia* (1992), which examines the history of the Heath company through the remembrances of many who worked there.

Anthony's idea to offer electronic products in kit form was based on the fact that the single most expensive component in electronics equipment was the cost of assembly, and that if you could do away with that expense, you could sell equipment at around half the usual price. Anthony firmly believed that anyone—even someone who didn't know the first thing about it—could build a piece of electronics equipment if given clear enough instructions. This belief would become Heath's guiding principle—a kind of "prime directive."

By the end of 1947 it had become clear that Anthony was right. Based on the popularity of its oscilloscope, Heath unleashed a flurry of test equipment kits and, by the end of 1948, had more than two dozen products in its flyer. Test equipment was easy to design and in the post-war boom of the late '40s, it was in huge demand. Heath's fledgling engineering staff often lifted its designs directly from circuits published in popular hobbyist magazines, or "reverse engineered" popular test equipment from other manufacturers. The result was an almost endless list of equipment. Some of the first kits offered included an RF signal generator, a signal tracer, an audio generator, a VTVM (designed for Anthony by RCA), a condenser checker, and an electronic switch to go along with the scope. In addition to test equipment, Heath was also an early pioneer in hi-fi and TV products including an audio amplifier, an FM tuner, and a seven-inch television kit Heath offered through a deal struck with Belmont Raytheon. The TV was offered with a rather candid warning to potential buyers. Heath cautioned that although the set included the manufacturer's service manual and a copy of Howard Sams service data but did not come with an instruction manual or pictorial wiring diagram, it should not be attempted by anyone except an experienced radio technician. The deal was offered in only one flyer in 1947. Apparently Heath did not have many takers.

Heath's test equipment products were enormously successful because they provided high-quality products at prices almost anyone could afford. It can be argued that Heath was responsible for jump-starting tens of thousands of electronics careers, which in turn jump-started thousands of business large and small, from mom and pop radio and TV repair shops to large electronics manufacturing firms. It is also likely that tens of thousands of hams earned their tickets while huddled over a Heath VTVM. The

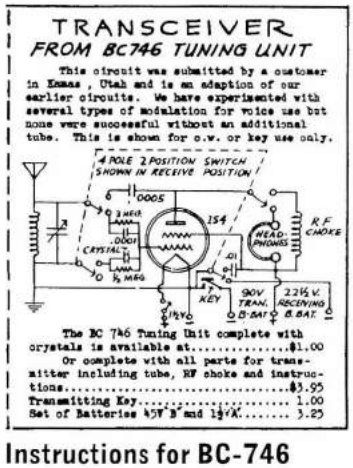
VTVM was, perhaps, the most successful and enduring of Heath's test equipment products. In the 30-year span from 1947 to 1977 Heath produced 24 models of the vacuum tube volt meter. By the time Heath released the V-7A in 1956, over 500,000 units had been sold. But more than anything else, Heath loved to build oscilloscopes. Over the years Heath designed and sold more than 60 models of oscilloscopes—not including those scopes made for radio amateurs. Since no sales figures are available, we can only guess that the total number of scopes sold by Heath must number in the millions. Anyone who has ever been to a hamfest swapmeet can attest to the seemingly endless variety of test equipment that poured out of Heath. For more than 40 years, test equipment would remain a mainstay for Heath.



Heath V-1 VTVM

(✔) A HINT OF HAMMING

The first suggestion of an interest in amateur radio appeared in Heath's February 1948 flyer. Heath offered a BC-746 tuning unit along with plans and parts to convert it into a one-watt, 80-meter CW transmitter. The ad noted that a companion receiver also using the 746 was in the works and plans for the unit would be published soon. Sure enough, in the March flyer Heath published plans to convert the 746 into a receiver along with a correction to the transmitter diagram of the previous month. In June 1948 Heath offered a CW transceiver kit built around the BC-746, giving credit for the circuit to an unnamed customer in Kamas, Utah. There was also a curious little three-tube "All Wave Receiver."


TRANSCEIVER
FROM BC746 TUNING UNIT

This circuit was submitted by a customer in Kamas, Utah and is an adaption of our earlier circuits. We have experimented with several types of modulation for voice use but none were successful without an additional tube. This is shown for c.w. or key use only.

4 POLE 2 POSITION SWITCH SHOWN IN RECEIVE POSITION

.0005 .3 MEG .0001 CRYSTAL ½ MEG 154 .01 .01 R.F. CHOKE HEAD PHONES KEY 90V TRAN. 22½ V. RECEIVING B BAT. B BAT.

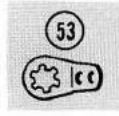
The BC 746 Tuning Unit complete with crystals is available at.....$1.00
Or complete with all parts for transmitter including tube, RF choke and instructions.....$3.95
Transmitting Key..... 1.00
Set of Batteries 45V B and 1½V A..... 3.25

Instructions for BC-746

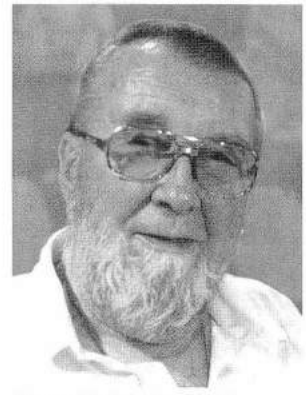
But a serious interest in the amateur radio market wouldn't happen until 1951.

By 1950 the Heath Company found itself swimming in a sea of black ink—and in a huge backlog of customer technical correspondence. Howard Anthony went looking for help.

(✔) ENTER GENE FIEBICH



Gene Fiebich grew up in Detroit, graduated from high school in 1930, and found himself unqualified to do anything. Gene had a ham license and an interest in radio so he decided to take a two-year night school course in radio service. He found service work but was injured on the job less than a year into it. This, combined with the death of a close friend, caused Gene to become discouraged with Detroit, and he began to look around for a new place to call home. Fiebich, who was nothing if not analytical, did a careful study of the midwest looking for a place with both good radio reception (remember this is 1933) and a stable economy. He settled on Benton Harbor, Michigan, because there were no large deposits of minerals to interfere with reception, and because it had a good balance between industry and agriculture. Gene reasoned that both of these economic bases were unlikely to crash at the same time and that one of them would always be healthy. He opened up a radio shop and found that business was good. Good enough, in fact, to make it through those very lean years during WWII.



Gene Fiebich, 1994

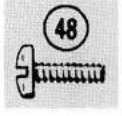
Gene meet Howard Anthony in 1948. Howard Anthony was a frequent visitor to Gene's shop and the two became friends, but Gene had no interest in working for a "surplus outfit" and declined Howard's offers to join the company. Still, Howard knew talent when he saw it and kept the offer open. When he learned of Howard's plans to expand the kit business, Gene was intrigued enough to sell his shop and come on board at Heath. The year was 1950. Gene remembers being employee number 48.

Gene's first assignment was to clean up that backlog of technical correspondence. This involved helping customers with problems, sending out replacement parts and so on. Gene

was pretty good at it, finishing up the last of 200 letters in about two weeks time. Howard was impressed. Seeing that Gene's talents were not being used to the fullest, Howard put Gene in charge of the consulting engineers, and very shortly after that, he put him on the design bench drawing up new kits and refining older ones. Within a year Gene was acting as chief of engineering for the entire company, though he did not actually hold that title.

About this same time the FCC was making a lot of noise about a new class of amateur radio license—the Novice class. Howard had been thinking about expanding into amateur radio. One of his instrument engineers even tried to design a small transmitter, but the project went nowhere because no one then at Heath knew much about transmitters. Gene wasn't much help either. He had let his license lapse back in 1934. Yet Howard remained convinced that ham radio could be a profitable market to get into and gave Gene the green light to hire a ham to get a product going. The year was 1951.

(✔) ENTER ROGER MACE



We don't know very much about Roger Mace. Fresh from the Navy, Mace was an active ham with no formal degree in electronics. He was however, an inveterate electronics tinkerer and a man of great self confidence. Even before he had a job offer, Mace was so confident he could land a job that he moved his family from Cleveland to Benton Harbor. Fiebich remembers being very impressed with him, and from a purely pragmatic point of view, Mace's lack of formal training made him a bargain. Gene had a hunch about Roger and offered him the job.

Roger Mace, ca. 1959

Now about that proposed transmitter. All it needed to be was something simple, inexpensive, and rock bound. Something with a low financial risk—just in case it flopped.

In retrospect, it's easy to see why a small transmitter might do well. Browsing through a *QST* from 1952, it's clear that there wasn't much to choose from in inexpensive transmitters. The Elmac A-54, for example, was expensive—$140 without a power supply—and it used a VFO. Same with the Gonset Commander. But Novices had to be rock bound. The Harvey Wells Bandmaster Senior was nice, if not somewhat cumbersome. It was also a bit pricey for the novice—$110 with a power supply. The B&W 504 was a spartan little rig, but you had to swap coils to change bands, and it didn't include a power supply—a princely $85. For that kind of money you could get a Lettine model 240, which was about as nice and came with a power supply. The Globe Scout, the Meissner 2-CW, and the Sonar SRT-120 were all decent rigs but missed the mark for various reasons.

Even when companies got it right with the features, they still missed on the price. The Eldico TR-75-TV, for instance, was an attractive transmitter and was intensely marketed to the novice, but even in kit form it sold for $60. The WRL Trotter was on the right track too, but sold for $90. Remember, we are talking about 1952 here, when $50 was nearly a month's rent.

After a little homework sizing up the competition, Mace quickly realized that anyone who could make and sell an attractive, well-engineered novice transmitter for, say, $30 could clean up.

Mace knew that the basic circuits for a small transmitter could be had from any handbook. Thus, the engineering costs of developing a transmitter would be very low. He also knew that Heath's warehouse full of war surplus parts had virtually everything needed to make lots of small transmitters. Thus, the cost of parts would be very low. In addition, Heath already had a great metal shop and painting facilities.

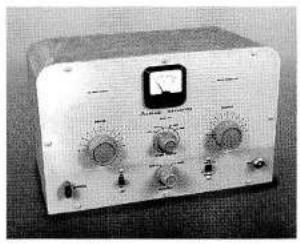
Right away, you can see where this is going.

Work on the transmitter probably began early in 1951, a few months before the Novice license was made official. The result was the AT-1—Heath's first serious venture into ham radio. Costing just $29.50, the AT-1 was released just in time for Christmas in 1951 and quickly began showing up in shack photos on the pages of *QST*.

Here was a nice looking, six-band transmitter featuring single knob band switching, full metering, plenty of power, and a built-in power supply. While the unit was advertised and sold primarily as a Novice transmitter, Mace knew better than to limit the AT-1's appeal. The rig's non-novice frequency coverage and provisions for a modulator and VFO made the AT-1 attractive to higher-class license holders while giving the novice a clear "upgrade path."

Heath had done everything right with the AT-1, yet the transmitter was less a marvel of

engineering than it was a marvel of common sense and marketing savvy—qualities that would become the Heath Company's stock in trade. The AT-1 was sold for only four years, but it set the stage for one of the most remarkable stories in ham radio and laid the groundwork for what would become the most extensive amateur radio product line ever assembled by a single company—more than 200 amateur kits, not counting the test equipment, stereo and TV lines, CB radios, marine products, and more.

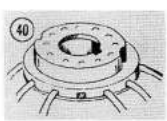


The AT-1

With the AT-1 Heath was able to establish that a market existed for low-cost, kit-form ham equipment. But was there a market for more expensive gear? Mace suspected that Heath could make virtually any amateur product in kit form—and even add a few more features—and still be able to sell it for less than a ready-made product.

Feeling that he now had the ball rolling and anxious not to lose the momentum gained from the AT-1, Mace immediately began planning Heath's next product. Mace used the same strategy he had used with the AT-1—he looked at the competition, thumbing through back issues of *QST* to see what was missing. Receivers might have been a possibility but there were a number of good ones on the market already. Besides, receivers were tricky, and designing one would take more time than Mace thought Heath had. To keep things moving, Heath needed another product quickly.

(✔) THE DX-100: HEATH'S TICKET TO RIDE



Again, the answer was transmitters. Strange—there were almost no affordable AM transmitters on the market. There was the B&W 5100S. A mere $467. There was also the WRL Globe King—500 watts in a cabinet 31 inches tall. In a box that big you would think they could have found room for a VFO. Especially for $675. Well, try the Elenco 77 on for size. It had a VFO and a respectable 300 watts on AM. The price tag was respectable too—almost $700. The Collins 32-V series was in the same neighborhood, out of reach for most hams. Mace had to wonder what was going on. Couldn't anyone make a nice AM transmitter with a few features and a little muscle and sell it for less that a 1954 Buick four-door sedan? Mace didn't have to sniff very hard to smell a market here.

No affordable AM transmitters? Well, there was one. It ran around 100 watts AM and CW on 160 through 10-meters. It was built into a nice-looking cabinet and weighed an easy-to-lift 65 pounds. And at only $280, it was on the high side of affordable. It was offered fully assembled or as a kit, and as far Roger Mace could see, it had only one weakness—no VFO. This was the rig (and the market) to go after. The rig was the Viking II and in a very short time the E.F. Johnson Company would find itself looking down the barrels of Heath's large caliber engineering and marketing guns.

But not so fast. In spite of the modest success of the AT-1, management at Heath was reluctant to spend the money needed to develop the new transmitter, arguing that it was too expensive. After all, they said, there were some big players in the ham radio market, and it would be hard to go up against them. Heath had become real comfortable with its test equipment and Hi-Fi product lines. No, they said, too much money—too risky.

But Mace knew he was right. He knew the market was there. And he knew Heath could make a pile of money in amateur radio. At least, he hoped it could, reminding himself that the AT-1 was doing well. Undaunted, Mace took on the project himself. On his own time he would prototype the transmitter in his living room.

In spite of its many successes, and contrary to the public image it portrayed—that of a company enthusiastically designing new amateur products—Heath would remain skeptical about products not related to test equipment. To be fair, this reluctance was common to many companies at that time. Heath engineer Dar Evans recalls conversations with many of his counterparts at companies like Collins, Hallicrafters, and others, all of whom told similar stories. It wasn't that management would not accept new ideas, but that they had to be thoroughly sold on them, sometimes to the extent of having the product and a bill of materials handed to them on a silver platter. And to some degree management's hesitancy was justified. Tool-up costs for new products were expensive, as was the investment in inventory. With time and future successes, Heath's apprehension would dissipate a little, but its basic reluctance about new products never changed.

On the other hand Heath, made it easy for anyone with a product idea to build a prototype—on his own time. Heath's parts stock and

metal working shops were open for use by engineers 24 hours a day. Heath also allowed its engineers to take the parts they needed and work with them at home. And why not? After all, that kind of time and effort was worth a lot of money, and at the time, most of Heath's engineers were happy to work on pet projects at home or after hours. For Heath to take advantage of that kind of enthusiasm was just plain smart management—it was just another way of saving money.

It was now early in 1954. Heath's test equipment line was flourishing, as was its hi-fi equipment. Soon it would be expanding its amateur radio line. Indeed everything Heath touched seem to turn to gold. The company was booming. Then came the news. Howard Anthony was dead. Killed in a plane crash. The mastermind who had taken the Heath Company from bankruptcy to a thriving enterprise on the strength of a freight car full of surplus CRTs was gone. A stunned company ground nearly to a halt. Howard's wife Helen, who had been active in the business, now took the helm. But her heart wasn't in it. Numb with grief, she lost interest in everything and put Heath up for sale. But not to just anyone. It would have to be a company that treated its employees well. There were numerous offers, including one from Allied Radio, home of the Knight-Kit. But Helen liked a company called Daystrom. Daystrom was a holding company with interests in everything from lumber to furniture, but was best known in electronics circles as the parent company of Weston, a manufacturer of high quality meters. She accepted Daystrom's offer of about 1.8 million dollars.

Johnson Viking II

One of Helen's last duties at Heath was to promote Gene Fiebich to Director of Engineering. Gene had pretty much been doing this job anyway, but now he had the title. Helen told Gene that Howard trusted him more than anyone else and had said to her on many occasions that if anything ever happened to him, Gene was the man to take charge of engineering. And take charge he did "with a soft touch." For the next 19 years Gene would be the guiding light in engineering. Company presidents would come and go, products would rise and fall, and Heath itself would change hands, but Gene was always there. Former Heath engineers remember Gene fondly as a man on whom they could always depend. A fair, honest, honorable person who would always go to bat for the engineering staff.

Daystrom turned out to be very good for Heath. Among other things, Daystrom pumped a lot of development money into Heath and encouraged new product growth. Daystrom almost immediately drew up plans for a huge new facility and in 1956, moved Heath into a new building on Hilltop Road across the river in St. Joseph. Was business good? It took Daystrom less than a year to recover its original 1.8 million dollar investment.

But I digress.

It took Mace only a couple of months to complete the prototype transmitter—now dubbed the DX-100 (DX seemed like a good idea). The rig was designed to give the Johnson Viking II some genuine competition. It would have everything the Viking had—plus a VFO. Target price: $100 less than the Viking. When management finally saw the rig they said, with some reluctance, "Well, OK."

Heath DX-100

To fully appreciate the DX-100, one must have an understanding of the times. The DX-100 was designed at a time when "big and heavy" was synonymous with "good and stable." Prior to 1958 it was axiomatic that if a rig weighed less than 50 or 60 pounds, it couldn't be very well designed. A big heavy radio is what everybody wanted. It was also assumed in those days that a rig should be designed—or more precisely, overdesigned—to withstand any peril that might come its way. Apparently a lot of military-like thinking went into these radios. Hence, huge transformers, heavy resistors, heavy gauge metal fabrication, and over-rated parts of all description found their way into the circuits. Hey, we are talking "red menace" here and these rigs had to be tough enough for "the big one." One might be tempted to counter that in those days parts were cheap. Certainly chokes and coils for 35 cents and high voltage air variables for two bucks sound cheap, but two bucks was a lot of money in 1953. When viewed in terms of 1950s dollars, parts were, with very few exceptions, no cheaper than they are today. The Heath Company, like other manufacturers, was very much a product of its times and bought into

VIKING II FROM THE COLLECTION OF MIKE SEWELL. DX-100 FROM THE COLLECTION OF JIM LOCKWOOD.

much of the over-design theory of construction.

Over-designed or not, Heath had to come in on budget. In addition to its well-oiled manufacturing facilities and its remaining stockpile of so-cheap-as-to-be-free surplus parts, Heath had another trick for saving money.

Can you say "reverse engineering?"

This was a simple strategy Heath had discovered years earlier. Here's how it works. Find a successful product, buy a few, take them apart to see how they work, then design your own version with a few improvements and added features. All you need are a few veteran home-brewer types—graduate engineers need not apply. You save big money. Swell idea, eh? Reverse engineering had been extremely effective when Heath applied it to test equipment products. Did Heath do it with the Viking? Only God and Roger Mace know for sure, but it seems a likely scenario given the similarities in design and layout of the Viking II and the DX-100.

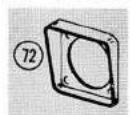
When all the dust had settled, the two-tone gray DX-100 weighed in at an even 100 pounds and had "stable" written all over it. The rig ran 125 watts AM and 140 on CW, used 15 tubes and, and yes, it had a VFO. Sticker price: $189.50—a full $100 less than the Viking. Even before it went out the door, Heath felt like it had a winner but was quick to realize it didn't matter how good the DX-100 was if no one could put it together. To win at this game would take a crystal clear, understandable assembly manual. While engineers like Mace were still writing the basic step-by-step instructions, Heath hired a few graphic artists to help with the illustrations and a few editors to help make sense of the engineer's often over-technical style. In fact, there was now an entire "manuals department." The quality of its products notwithstanding, it was Heath's manuals that would eventually make it the only serious player in the kit market.

And did the DX-100 sell? While the records of these early years are gone, we can deduce by looking at Heath's advertisingthat it was a phenomenally popular product. Prior to the DX-100, Heath bought only small ads in *QST* focused primarily on test equipment. But by 1956, less than a year after the release of the 100, Heath began buying three full pages of advertising in selected issues of the popular hobby magazine. By 1958 the company was buying five full pages every month. That kind of advertising takes money—lots of money—and there can be little doubt about where that money came from. It came from the DX-100.

The DX-100 was more than just a wildly successful transmitter. It was a pivotal product in Heath's development. Indeed, it was Heath's ticket to ride. The revenue generated by the 100 bought more than just advertising. It bought "know how"—it bought engineers. Graduate engineers. Al Roberston, Joe Shafer, Dar Evans, and nine others with the power to move Heath out of the reverse engineering mode and into a series of innovative products of its own design.

In the years that followed, as we shall see, Heath would have many successful products, many even more successful than the 100. But because of what it was, when it happened, and what it did for Heath, few Heathkits will be remembered more fondly—or by so many—as the DX-100.

(✔) FULL SPEED AHEAD



On the strength of just two products, the AT-1 and DX-100 transmitters, the Heath company had established itself as a major player in the amateur radio marketplace, and one to be taken seriously. Again not wanting to lose any momentum and now emboldened by the huge financial gains made with the DX-100, Heath's engineers quickly began planning their next amateur products.

While the AT-1 and the DX-100 were well-designed products from an electrical point of view, they weren't much to look at because they had been developed primarily to see what kind of market existed for kit form amateur radio products. Nevertheless, the DX-100 was selling better than anyone ever could have imagined. So rather than replace it with a new rig, Heath decided that a refinement of the 100 offered as a "high end" product would give customers a choice of rigs while giving Heath a greater share of the overall market. This low-end versus high-end strategy proved so exceptionally effective that Heath would go on to use it again and again with future products. Additionally, Heath knew that if it were to compete aggressively, it would need a decent receiver in its product line. Heath also reasoned that designing the new products as a matched pair would not only be attractive from a consumer marketing perspective, it would enable the company to use many of the same parts for both units, thus saving money. The "economics of scale" was a concept on which Heath had a firm grasp.

Heath turned its attention first to developing a receiver, since the receiver would be far more complex to design than the transmitter and

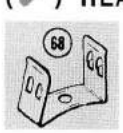
would take much longer to get to a prototype stage.

There were, by the late '50s, lots of companies cranking out transmitters, but there wasn't much in the way of competition with respect to *affordable* ham-band-only receivers. Prior to 1958—the year Heath released the receiver—the vast majority of commercially available receivers were general coverage units with a band spread added for the ham bands. High quality ham-band-only receivers were pretty scarce, and the few that were on the market were pretty expensive. In designing the RX-1, Heath looked carefully at five or six of the better receivers of the day to get a feel for what features a decent communications receiver might include—and how much it might cost.

The Hallicrafters SX-101 was a completely average receiver that ran about $400. The Hammerlund HQ-110 was a thoroughly unremarkable radio for $230 (the somewhat more remarkable HQ-170 didn't arrive until 1958). National had a couple of very professional receivers priced accordingly: the HRO-60 cost just under $500 and the NC-300 went for about $350. Then of course there was the Collins 75A4 which, at $650, was affordable only by the military and a few of the more affluent hams. These receivers, Heath figured, would be the ones to compete with.

A quick analysis found that most of the better receivers on the market had a few things in common. Virtually all were dual conversion superhet designs and most had slide rule dials, which were regarded as a sign of quality. Additionally most had adjustable selectivity, some kind of notch filter, a crystal calibrator, and a tunable front end. So with a laundry list of features and specifications in hand, Heath turned, as it had for its previous amateur products, to chief engineer Roger Mace. The challenge was to combine all the features of the best receivers in a stylish cabinet and sell it for say, under $300.

(✔) HEATHKIT'S GREEN MACHINES



The physical design of the new receiver, dubbed the RX-1 "Mohawk," was realized by Heath's in-house industrial designer, Stu Sizer, hired after Heath decided to get serious about cosmetics. The RX-1 would be about the same physical size as the DX-100 but would be finished in a glossy two-tone green paint, fitted with attractive escutcheons, and garnished with shiny die-cast aluminum knobs. We will never know with certainty why Heath settled on green, but we do know there was great interest in an attempt to distinguish Heath products from the ubiquitous gray and wrinkle black boxes of its competitors. While there may have been some industrial psychology involved, it is more likely that given the alternatives of red, blue, and yellow, green may simply have been viewed as the only real choice. In any case it wasn't long before the color green became synonymous with Heathkits. Indeed, the color scheme proved so popular Heath would go on to use it in virtually every amateur product it made until the early '80s.

Building a device as complex as a communications receiver is a daunting task under the best of circumstances. The assembly of the RX-1's dial drive mechanism, for example, was enough to intimidate a watch maker, and the point-to-point wiring required a much smaller iron and a much steadier hand than many ops were accustomed to. Heath developed a number of strategies to help the builder cope with the intricacies of the work, including improved instructions, detailed graphics, and diagrams in the manual; the use of color-coded wiring harnesses; and that simple but ingenious tool, the plastic nut starter. But it was the pre-assembled and tuned front-end sub-chassis that really made the RX-1 possible in kit form. Heath's engineers recognized the complexities of aligning such a unit and wisely decided that providing the front-end already assembled and tuned would avoid a lot of headaches later on—both for themselves and for the consumer. Without a pre-assembled and tuned front-end, the alignment of the receiver would have been a painful and time-consuming task, beyond the capabilities of many ops and/or their test equipment. Heath knew that to sell receivers it would have to make the construction both practical and possible. Heath contracted with Sherwood Electronics in Chicago to build the front-end assembly. Whether Roger Mace designed the unit himself or farmed it out to Sherwood is not known, but the entire front-end module was, at the very least, assembled and aligned by Sherwood and included the RF and HF oscillators, the mixer stages, and the band switch unit. All the kit builder had to do was attach it to the main chassis with a few screws and plug in a couple of cables. With the IF frequencies established, the tune-up procedure could be done using nothing more that the RX-1's built-in crystal calibrator and S-meter.

In designing products this way Heath was establishing for itself a kind of golden rule: To be successful in the kit market, a product must be designed so that it can be assembled by a person

with limited skill and aligned without complicated or expensive test equipment. This principle was a major step forward in the kit product concept because it would bring kit building within the grasp of tens of thousands who would not otherwise be able to handle it. Ironically, two decades later this same principle would play a significant role in Heath's undoing.

By late 1957 the RX-1 had already been designed and prototyped and was coming along nicely. But Mace knew that he was going to need a little help with the project if he was going to get both the receiver and the transmitter out the door on time. Enter Al Robertson, a young man in the right place at the right time.

Heath RX-1

A Michigan native, Al Robertson graduated from Michigan Tech in 1955 holding a degree in Electrical Engineering with a Communications Option. In those days the big corporations were hiring E.E.s as fast as they could, so Al had no trouble landing a job with General Electric in Utica, New York, working in the area of military avionics. After only a few of months with General Electric, ROTC called him up for a couple of years of active duty and stationed him at Wright Paterson Air Force Base in Dayton, Ohio. When his stint with the Air Force was over, Al decided that working for a government contractor wasn't much fun, that the military didn't thrill him all that much either, and come to think of it, that Michigan wasn't such a bad place after all. So with resume in hand Al headed back to his home state. While interviewing with an electronics company near Benton Harbor, Al stopped by to visit an old Michigan Tech friend who'd taken a job in Heath's audio division. Al had picked up his ham license in the service and thought that a career in ham radio might be interesting. He must have walked in the door just about the same time Roger Mace was saying "You know, I sure could use some help here." Al was hired on the spot.

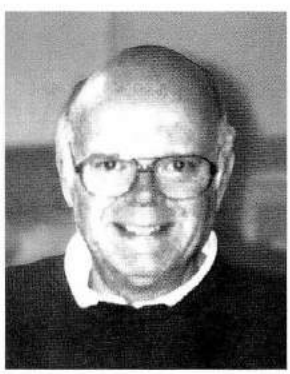
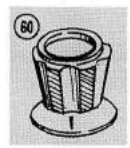


PHOTO COURTESY AL ROBERTSON

Al Robertson, ca. 1990

(✔) THE TX-1: SPRINGS AND GEARS AND PULLEYS, OH MY!



Heath's new transmitter was designated the TX-1 "Apache." The Indian names were Mace's idea. He had a special affection for Native American themes as his wife was a Native American. The practice of using Indian names continued until Mace's failing health forced him to leave Heath in 1960. The "Mohican" solid-state general coverage receiver, designed during Mace's tenure, but not released until 1961, was the last product to be named with an Indian theme.

Robertson's first assignment was to build the TX-1 into a box that matched the RX-1 receiver. This sounded simple enough—but there was a hitch. Since the RX-1 had been designed from scratch, its front panel controls were placed pretty much wherever they needed to be. But the TX-1 had to match, and that meant its front panel control positions had to be in places corresponding to those on the RX-1—whether those were the best locations or not. The implication of all this is that connecting the TX-1's front panel knobs to their associated controls on the chassis often required some complicated linkages. One of the most elaborate of these linkages was in the VFO band switching mechanism. The VFO oscillator ran at one of three frequency ranges (1750-2000 kHz, 7000-7175 kHz, or 7000-7425 kHz) depending on what band was selected. Since these three ranges served all five bands, the VFO didn't need to change frequency ranges every time the band switch was turned. Al had to invent a mechanically interrupted switch assembly to choose the correct range with each turn of the band switch. Robertson admits he was no mechanical engineer, but since he knew he hadn't been around long enough to argue he had to come up with something. He describes his solution as "a real Mickey Mouse lash up" and adds that he was never very proud of it. But he is also quick to note that it ended up working quite well and proved extremely durable.

Heath TX-1

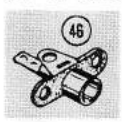
The dial drive assembly was another of Heath's famous (or infamous) Rube Goldberg mechanisms and had been designed for the RX-1 before Al arrived. Not wanting to re-invent any wheels, Robertson chose to use the exact same unit in the TX-1. It was a collection of springs,

gears, pulleys, and string that gave pause to even seasoned home brewers. Several entire pages of the assembly manual were devoted to its construction, and it likely took a couple of evenings to complete. Exactly who was responsible for its design is not known, but in the end, it too proved to be a very good design, being both durable and mechanically stable.

The actual electronics of the TX-1 were very much easier to design and build. More than just a DX-100 in a new box, the TX-1 was a refinement of the 100 and included several distinct improvements and additions. Particular attention was given to the VFO. While Heath used the old favorite 6AU6 Clapp oscillator, Robertson designed it as a sub-assembly to enhance frequency stability. To allow for sideband operation, the TX-1 made provisions for direct connection to the SB-10 single sideband adapter, which was also under development. The SB-10 was supposed to be ready for the DX-100 and was to be called the DX-10, but the fellow in charge couldn't get it working—even though it was a direct copy of an adapter made by Barker & Williamson. Eventually that fellow lost his job over the project and the SB-10 was turned over to Robertson, who though also had problems with it, but finally got it going. A pair of SO-239s on the TX-1's rear panel permitted a front panel control to put the SB-10 in the RF path between the driver and the final amplifier. Heath wanted to use the SB-10 to hedge its bets on the popularity of SSB. At the time there was a lot of discussion (sometimes heated) about the future of SSB. Many ops swore (occasionally on the air) they would never use it. The strategy of providing an optional adapter ensured that Heath would not lose out whatever the final verdict on sideband turned out to be.

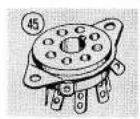
The TX-1 and RX-1 hit the market together in June 1958 and were met with rave reviews. Heath introduced the pair with five full pages of advertising in *QST*.

(✔) A SEA OF GREEN

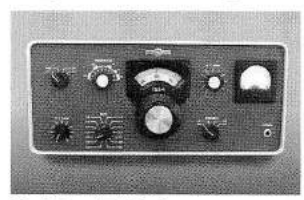


While the AT-1 and DX-100 marked Heath's official entry into amateur radio, they served primarily as a kind of "proving ground"—a couple of low-risk products to see if a market existed for kit form ham equipment and to determine the difficulties involved in bringing such products to market. The release of the TX-1 and RX-1 was different. These shiny, stylish, professional looking machines were the result of a new-found conviction to pursue the amateur radio market based on the unbridled success of its first two products. Now, for the first time, amateur products were not an experiment. Heath committed serious design, engineering, and marketing muscle to the Apache/Mohawk project and began planning a long-range strategy for its emerging product line. This shift in attitude marked the beginning of a truly phenomenal era for Heath. It was as though Heath had hit resonance. New products practically flooded out the doors. To complement the Apache and Mohawk, Heath developed two linear amplifiers, the ill-fated KL-1 "Chippewa," and the very successful HA-10 "Warrior." Work was started on an SSB transmitter (the HX-10 "Marauder") and an extensive line of VHF products. It was also during this time that Heath designed its legendary "DX" family of small novice class transmitters, mobile HF gear, a line of accessory products, and more. No one, not even those who worked for Heath, could have imagined what was in store for the company. Indeed, Heath was on a roll that would last more than 20 years.

(✔) THE DAY THE RADIO UNIVERSE CHANGED



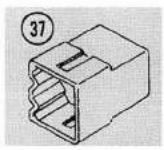
Collins was an influence on just about everyone in ham radio. Exceptional in both design and expense, Collins rigs were the envy and desire of almost every ham. This fact was not lost on Heath. Since the introduction of the KWM-1—a compact (by the standards of the day) transceiver—Heath had been thinking that it could go after the Collins market with a low-cost, look-alike, work-alike rig. Mace and Robertson reckoned there might be some money to be made if people thought they could get something like Collins performance in a package that looked something like a Collins. Then one day in November 1958, only five months after Heath unveiled the TX-1 and RX-1, Al Robertson opened the latest issue of *QST* and saw something that gave him pause. It was a new receiver. With a modern design that made it appear both stylish and rugged, it was small and gray, had just seven knobs, and weighed only 20 pounds. While many of the industry's leading manufacturers failed to grasp the meaning of what they saw in this ad (a failure that would cost them dearly), the instant Robertson saw it



Collins 75S-1

he understood as clearly as a 40 over nine signal that the days of the big heavy radio were over. Indeed, Heath had seen the future, and it looked like a Collins 75S-1. Al showed the ad to his co-worker Joe Shafer, who had been hired just after he had. Studying the ad carefully Joe replied simply, "We could do that."

(✔) THE BIG PLAN

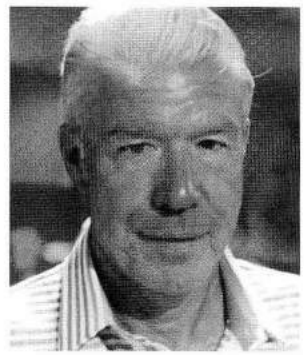


In a very short time, Collins had designed and marketed a series of products that quickly became the desire of just about everyone with a ticket: the 75S-1 receiver, the 32S-1 transmitter, the 30S-1 linear, the KWM-2 transceiver, and a series of refinements over the next couple of years. Hams lusted after these rigs but lust was all most could do. Collins came with a price tag that put the gear way out of reach for all but the most well-healed of hams. Heath had taken on the likes of Johnson, National, Hallicrafters, and Hammerlund, but Robertson, Shafer, and Mace knew that Collins was the real challenge and that going after them was where the real money was. Together they hatched a simple but ambitious plan. They would design a series of products to compete with everything Collins had on the market—a receiver, a transmitter, a linear, and a transceiver—and sell them for one-third the price. And while they were at it, they would go one up and design a few things Collins didn't have.

It was about this same time that Roger Mace's health began to falter, forcing him to retire. Al Robertson was promoted to replace Roger and was quick to make Joe Shafer the point man for the new project. Shafer was a brilliant young engineer just 26 years old when he came to Heath—considerably younger than most of his fellow engineers. Joe had been kept busy with a number of small projects, but his first major role was in the redesign of the KL-1 "Chippewa" linear. His job was to turn it into the HA-10 "Warrior." Shafer had a remarkable talent for being able to look at engineering problems and reduce them to their fundamental components. Joe was a "hot shot" in the true sense of the term, the perfect match for Collins.

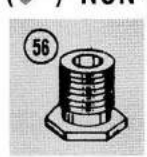
Both Al and Joe knew that a series of products made in an entirely new style was the right move to make, but they never anticipated the fight they would get from management. From the moment they proposed it, there was trouble.

It all started with money. The series of products Al and Joe envisioned would be expensive to design, but the pot of money Heath had set aside for new product design was limited. Additionally, all departments were competing for those same product development dollars. If any one department took too much, the others would suffer. To the guys in Instrumentation, General Products, and most of the others, it looked like the Amateur group was asking for a lot of loot. There were protests. And that was just for starters. For virtually all previous products, the physical design, style, and layout of the front panel had come first—with no thought whatsoever of the engineering consequences. As a result, the "Apache," "Mohawk," and others contained rather complicated control linkages. The engineers were always being forced to make the insides fit the outsides. By the time Al and Joe got to thinking about the new product line, they were saying, "Enough is enough, already!" Needless to say, this didn't sit well with Heath industrial designer, Stu Sizer. Among other things Stu believed that all of Heath's products should share some common design element—the way automobiles did. Year after year for example, Buicks always looked like Buicks. For Stu it was the knobs. He thought that all Heath products should use those big shiny cast knobs. "No," said Al, "the knobs are big, clunky, old-fashioned, and everyone is tired of them. We want small knobs—with skirts." And that wasn't all. There were squabbles over the color, the VFO escutcheons, the VFO design, the filters, the tooling costs, and the cabinets, and even if the rigs should use PC boards, to name just a few. Suddenly it seemed like everyone was in on the debate—even the guy from Personnel. Personnel? "What the heck does he have to say about anything," Robertson wondered aloud. What indeed.



Joe Shafer, 1994

(✔) NON-STOP HITS



In spite of the turmoil, energy ran high in the engineering department, and the early '60s were very productive years for Heath.

In 1960 Heath released the KL-1 "Chippewa" amplifier and the GC-1 "Mohican" solid-state SWL receiver. The GC-1 was the first ever kit shortwave receiver on the market and

the only one to use standard "C" batteries. The combination of compact size (by the standards of the day), price, and the use of commonly available batteries made it very popular, especially with people traveling overseas. Because demand for the "Mohican" persisted, Heath continued to sell this "unadvertised special" for more than five years after it was withdrawn from the catalog.


The GC-1 "Mohican"

Also in 1960 Heath introduced the "Shawnee" and "Pawnee," six- and two-meter transceivers designed by Heath's ace VHF man, Dar Evans. And it was Evans who was also responsible for one of the most phenomenally successful products (at least in terms of units sold) that Heath ever made—the Benton Harbor Lunch Box. Actually the Lunch Box story does not begin with Dar Evans and the Amateur group; it all started in the General Products division and with the creation of the Citizens' Band in 1958.

Heath's General Products Division instantly recognized CB as a potential gold mine and quickly designed a simple, single-channel, CB transceiver to tap the market. The truth of the matter is that Heath's design was based largely on a design that appeared in an article in one of the hobby electronics magazines. Heath called its version of the unit the CB-1. It used a crystal-controlled AM transmitter and a tunable regenerative receiver, built into an aluminum cabinet about the size and shape of a lunch box—complete with a handle. The CB-1 was an instant success. The Amateur Radio division concluded that General Products was onto something and figured that a 10-meter version of the CB-1 would do as well. Someone then suggested that while they were redesigning it, perhaps a six-meter version might also be popular.

Redesigning the CB-1 for 10-meters would require almost no work at all. And it was just a short putt to six-meters. So from an engineering standpoint these were a couple of products pretty much free for the taking. Swell idea, eh?

Leaning on the "economies of scale" principle that had served Heath so well with other products, the new ham versions were designed to be identical in virtually every way to their CB cousin. Cosmetically, the rigs were almost indistinguishable from each other, and electrically, the units differed from each other only by a few coils and capacitors. Although officially designated the "Tener" and the "Sixer," Heath nicknamed these little gems "Benton Harbor Lunch Boxes" and put them in the catalog early in 1960. They sold for $39.95.

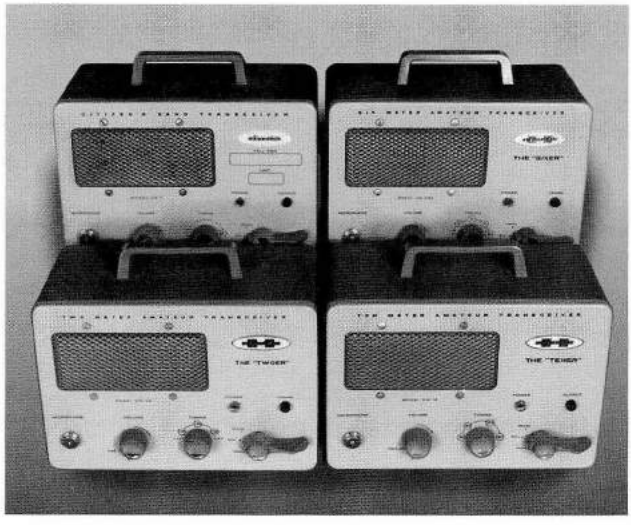
At this period in Heath's development, there really was not much in the way of market research to determine the viability of any given product suggestion. Basically, if an engineer could convince the chief engineer that a product might sell, he was given the go-ahead to design and build a prototype. Once the prototype was working, the product would be fully developed and put into the catalog. This was a simple but fundamentally flawed process—sooner or later this "shoot from the hip" approach to product development was bound to go wrong. In the case of the Lunch Box series, Heath had incorrectly interpreted the success of the CB-1. The popularity of the CB-1 was based solely on the popularity of CB as an essentially license-free means of getting on the air—not on the "lunch box" concept itself. Hams, on the other hand, having many other means to work 10-meters, were not impressed with the Tener, so while the CB-1 sailed to success, the Tener floundered—badly—and was pulled from production in 1962.


Dar Evans, 1994

While it was not a particularly expensive mistake (these were not particularly expensive products), Heath had learned a valuable lesson in marketing—and one it would not forget.

But wait just a minute! The Sixer was selling like bargain basement 3-500s. The amateur community had discovered the Sixer as an inexpensive vehicle with which to explore VHF—in those days, the final frontier. Perhaps a two-meter Lunch Box would be equally popular. And hey, it sure would be a great way to use all those boxes made up for the Tener. Besides, it was another of those engineering freebies. Yes, indeed. A two-meter Lunch Box was sounding like a great idea. Production began immediately, and the Twoer proved as popular as the Sixer. Both units sold extremely well. Indeed, VHF was the key to success for the Lunch Box transceivers.

By the late '60s, six- and especially two- meters had begun to define clear technologic directions for themselves. Channelization, band plans, repeaters, solid state, and especially the intro-



"Benton Harbor Lunch Boxes"

duction and widespread use of FM began to take their toll on the Lunch Boxes series. With the passage of time, the Sixer and Twoer became increasingly anachronistic, and sales declined steadily through the '60s. By 1970 "lunch time" was pretty much over, and Heath pulled the plug on both units.

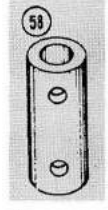
The early '60s saw several other success stories. In 1961 the HA-10 "Warrior" amplifier became a best seller—and the first amateur product to be offered fully assembled. In '62 Heath introduced the HO-10 monitor scope, HX-30 six-meter transmitter, and HA-20 six-meter amplifier. Yet the title of the most remarkable product to be released in the early '60s clearly goes to the humble HN-31 dummy load. Developed in 1961—almost by accident—the "Cantenna" was undeniably the longest running, most successful product Heath ever made. Selling for 30 years and spanning more than three quarters of Heath's amateur radio life, it is impossible to say how may zillions of Cantennas were put together. Other products came and went, but the Cantenna remained. It is difficult not to wax nostalgic over this humble Heathkit.

The Cantenna was invented one day late in 1960, almost by accident, when Heath engineers Joe Shafer and Al Robertson decided —for some reason now forgotten—that they had to have a dummy load. Wanting to keep it as simple as possible and working with materials close at hand, they decided to use a whole bunch of cheap and plentiful two-watt resistors and run them in parallel by sandwiching them between two metal plates. Realizing these the resistors would need to be kept cool led to a little head scratching. A paint can full of transformer oil, they concluded after some thought, would be perfect! What a great idea for a kit! Management, believing that absolutely no one would pay for something as simple as a paint can full of resistors, was a bit less enthusiastic. Undaunted and confident they had a winner, Robertson and Schaffer managed to persuade Heath that because the dummy load was cheap enough, if it didn't sell, Heath wouldn't really be out anything. And so, taking its name from the standard one gallon paint can in which it was built, the Cantenna was introduced in January 1961 for $9.95 and roared out the door so fast it had smoke behind it.

The HN-31 "Cantenna"

FROM THE COLLECTION OF PAUL MARCH

(✔) THE "SB" SERIES

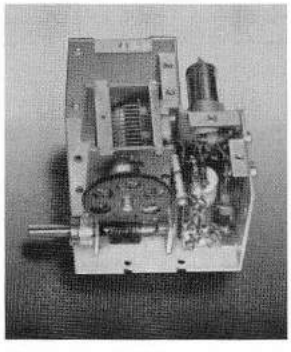


Through all of these successes, work proceeded on Heath's revolutionary hush-hush product line. Of major concern to management was that the design of these new products relied heavily on outside vendors to provide a lot of things Heath had traditionally done in-house. Take the VFO for example. It was a great design but would be tricky to build and next to impossible for Joe Ham to align. Shafer wanted to farm it out. And the sleek rounded cabinets couldn't be made in Heath's metal shop. They would have to be done outside as well. Even the knobs would have to be done outside. Management saw the price tag and suffered an attack of sticker shock. Not only did the project almost not make it off the drawing board, it almost never made it out of the conference room. Eventually though, thanks to the efforts of Al and Joe—strengthened by the backing of Gene Fiebich— compromises were made, deals were struck, agreements were reached, and the on-again off-again project was on again. Stu got his common design element, the color green; Al got his small knobs—with skirts; Shafer got his VFOs pre-assembled and aligned; and nobody knows what the guy from Personnel got.

The new line imagined by Al and Joe included an entire family of products—transmitters, receivers, transceivers, amplifiers, and a host of accessories. Everything from 160 to two-meters.

And since the emphasis was to be on single sideband, which they both believed had a big future in ham radio, they agreed that "SB" might be a nice designator for the whole product line. Joe was anxious to get moving on the project and felt that time was of the essence—the battle to get the new series approved had taken a full year. Work began in earnest early in 1960, starting with the receiver, which Joe thought would be the easiest piece to design.

The challenge was to make the rig's performance similar to the Collins but sell it for about one third of the price. Since Collins was not about to sell upstart Heath its permeability tuned oscillator (PTO) or mechanical filters, Shafer had to figure out a way to accomplish the same thing in more traditional ways. It was probably for the best that Collins wouldn't sell to Heath since Collins was expensive. Its PTOs and filters would have at least doubled the cost of the new series. Several number two lead pencils later, Joe had cranked out the basic circuit and specifications for his version of the Collins PTO. The Shafer version used conventional capacitive tuning but with a number of twists designed to make it ultra-linear. And let's give it some new name other than a VFO (after all, PTO had worked for Collins). Shafer called it the "linear master oscillator," or LMO. The LMO would become the heart of all of Heath's new rigs. Elrad Engineering of Chicago, the low bidder, was given the contract to supply the LMO. As time passed and demand grew (and to keep any one vendor from getting too greedy) Heath also began to get the LMOs from other vendors. In the end it was TRW that made the lion's share of the LMOs, which came complete with a stern warning about opening up or tinkering with the sealed unit.



Shafer's LMO.

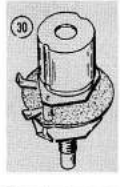
The filter was the next problem. Collins had a very nice filter. With some thought, Shafer was able to design a crystal filter with performance characteristics very comparable to the Collins. And it was a fairly simple design. But again the decision was made to provide the customer with a pre-assembled unit—to guarantee specifications. Midland of Kansas did the originals. Later James Knight of Illinois and Blackhawk Engineering out of Janesville, Wisconsin, also provided filters. Blackhawk, in fact, had also provided filters for the HX-10.

The IF frequency took some thinking as well. Shafer's original design called for an IF of 3400 kHz, but in initial tests, this frequency kept mixing with the 100 kHz crystal calibrator, with birdies landing all over the place. A simple solution was to go down 5 kHz to 3395 kHz—the frequency that became Heath's standard.

Having designed the basic circuits, Joe began to hand off the actual design and layout of the individual products to other members of the team. Bill Denk got the receiver, now designated the SB-300.

One of the most important considerations in the new series was to avoid the complicated control linkages found in earlier products. To achieve this, Denk worked closely with Stu Sizer to come up with a physical layout that would look very much like the Collins and would be simple to put together. Denk also designed the PC boards. All of the engineers knew that PC board construction was essential. Heath had quite a bit of previous experience with PC boards—having used them in the HX-30 transmitter, the V-7 VTVM, and the CG-1 "Mohican" receiver, to name only a few. And there was plenty of data to prove that PC boards would make the products less expensive and easier to assemble correctly. Nevertheless there was considerable resistance to the use of PC boards from upper management. One of the upper echelon who had joined Heath recently was in a position to make noise about this issue and proceeded to do so. He did not believe that PC boards were needed or that they had a future in electronics. As you can imagine, the engineers began thinking either they had missed something or this guy was a loon. There ensued another skirmish.

(✔) MEANWHILE...



Other products were still hitting the catalog. In January 1963, Heath introduced the Marauder, its first SSB rig—still in the old big-heavy- stable style. In April the company introduced HX-20 and HR-20 mobile rigs (small but amazingly heavy) and ran an ad looking for more engineers. June saw the release of the legendary "Singlebanders"—a series of three single-band transceivers, one each for 80, 40, and 20-meter SSB. The Singlebanders were in fact low end spin-offs from the SB project and were designed in a style that seemed to foretell Heath's new design concepts.

FROM THE COLLECTION OF MIKE SEWELL

Then in October, just in time for Christmas gift giving, hams all over the world opened their *QST*s and saw a receiver that did to them what the 75S-1 had done to Al Robertson four years earlier. Here was the SB-300. Maybe it wasn't a Collins, but it looked a lot like one, and it seemed to have very similar specs. And even though it wasn't a Collins, the SB-300's $250 price tag was enough to sway all but the most ardent of Collins fans. The SB-300 was a high quality "next generation" receiver within reach of tens of thousands of hams, many of whom couldn't open their checkbooks fast enough. Heath had succeeded in designing a receiver "for the rest of us" —to borrow a phrase from Apple—and in doing so succeeded beyond its wildest expectations. Heath was quickly in inundated with orders for the 300. In addition to orders from hams, industry and the government were buying as well. NASA for example, seeing the SB-300 as a very sweet deal, bought dozens, though Heath never found out what for .

The SB-300

The SB project had been a big investment but it was about to pay off—big time. While no one at the company could have been aware of it at the time, the SB-300 marked the beginning of the Heath's golden years—a decade from 1963 to 1973 during which the company could do no wrong.

The exhilaration resulting from the success of the 300 seemed to supercharge everyone and put company pride and spirit at an all-time high. Work on the 300's matching transmitter went into high gear, as did work on a variety of accessories. The SB-400 transmitter was released June 1964. Designed to compete with the $590 Collins 32S-1, the SB-400 came in at just $325, and with the release of the SB-200 linear amplifier the following month, Heath had a complete station on the market. The SB-200 sold for $390, which—while still a chunk of money—was a bargain when compared to the Collins 30L-1 at more than $500, and would, in fact, go on to become one of most successful products in Heath's history. Yet as phenomenally successful as these products were, the best was yet to come.

Meanwhile, in a corporate office in a galaxy far away...

Schlumberger (pronounced Schlum-ber-'zhay) Corporation was interested in acquiring some electronics companies to help in the manufacture of sophisticated equipment used in the exploration of oil, its principal occupation. In particular it was interested in instrumentation, and guess who seemed to have exactly what Schlumberger needed? Weston. Weston, you will recall, is owned by Daystrom, who also owns Heath. All of a sudden lawyers were meeting, talks were happening, agreements were being signed, and the next thing you know Schlumberger owned Daystrom, acquiring Heathkit as part of the package. Schlumberger was not really interested in Heath but hung on to it because Heath was making a ton of money. The deal turned out to be a good deal for Heath. Not only did Schlumberger start pumping lots of R&D money into Heath, it told Heath something like "Hey, don't worry about patent and copyright problems, you just build anything you want and leave any legal troubles to us." And so it did. This was October 1964.

Now then, back to the booming business of ham radio.

Engineer Neil Litreal had been working what seemed to be day and night on what was arguably the most ambitious and potentially the most lucrative piece of the SB project—the transceiver. As with the other SB rigs, Shafer had designed the transceiver to look like a Collins. In this case, like the Collins KWM-2A. When he saw the ad for the original KWM-2 back in 1959, Shafer was confident that he could design a transceiver that could compete with it. In 1959 the KWM-2's $1150 price was affordable only by the Pentagon—which was in fact the principal consumer of Collins radios. And the KWM-2A, released two years later in 1961, was a hundred dollars more. Shafer felt certain that being able to sell a transceiver for a third of that, say around $400, would be like having a license to print money.

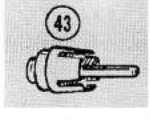
There was intense interest in keeping the transceiver on schedule for a Christmas 1965 release. Heath had learned long ago that releasing a product just before Christmas meant a guarantee of heavy initial sales—a quick way to recoup some investment money. Meanwhile, upgraded versions of the 300 and 400 were already being started, and in spite of the hectic schedule, new products kept showing up in the catalog. In May 1965 Heath released the HA-14 "Kompact Kilowatt" mobile linear amplifier. This SB-200 spin-off was designed and sold primarily as a mobile unit but was offered with an optional AC supply and was pictured in the catalog on a desktop alongside one of the singleban-

ders. In August the SB-110 six-meter transceiver hit the catalog with a splash, and in November the HD-10, Heath's first electronic keyer, was a big hit. Then in December, right on schedule for a Christmas introduction, Heath unveiled the SB-100, a five-band transceiver designed to match the rest of the SB series—and the KWM-2A. As anticipated, the similarities were not lost on Joe Ham. The price tag was just $360, less power supply. Engineering had a feeling the SB-100 was going to be hot, and they were correct. Shafer had put a lot of clever engineering into the 100 and was particularly proud of the rig. He would remember it as one of his favorites.

The SB-100

With the introduction of the SB-100, Shafer and Robertson had, at last, realized their vision of a complete line of Collins look-alikes. But rather than throttle back and let the money roll in (which it did in large quantities), the next year was spent working on refinements and developing some accessories to round out the line. The SB-610 monitor scope (an updated version of the HO-10) and the SB-630 station console were released in 1966. These two products would themselves become best sellers. But the most important work was on refining the SB-100, which had now become the fastest selling radio in amateur history. To capitalize further on the success of the SB-100, work was also begun on a low-cost version of the transceiver, designed to give buyers a choice and tighten Heath's grip on the market.

(✔) THE SUMMER OF LOVE: 1967.



Hippies, Haight Ashbury, and flower power. Indeed. It was the summer hams fell in love with Heath in unprecedented numbers. By mid-1967 amateur radio sales had grown to account for fully 40 percent of Heath's total sales, eclipsing Heath's mainstay products—test equipment—for the first time ever. In 1967 Heath released the SB-301 and SB-401. These refinements of the original 300/400 transmitter/receiver combo sold even better than the originals, but the biggest seller was the new SB-101. The 101 was everything you loved about the SB-100 plus a CW filter and out-of-the-box compatibility with the SB-640 remote LMO ("available soon"). Can you say, "I'll take one?" By 1968 it seemed like everyone you worked on the air was using Heath equipment, and in just about every shack photo on the pages of *QST* could be seen at least one piece of Heath equipment. But the real indicator of just how popular Heath had become could be seen in Heath's *QST* advertising. Beginning in January 1968 Heath started buying color advertising for the first time. And what's more, it bought inside back covers of the popular magazine, locations favored by industrial giants like RCA, Amperex, and others. And as if that weren't enough, Heath bought this location every month for two solid years, all the while bringing more products to its swiftly growing line. These included the SB-620 "Scanalyzer" (a modernized HO-13) with its bright yellow CRT; the SB-640 remote LMO; the HW-16, a wildly popular CW novice transceiver; and the not so wildly popular HW-18 special HF purpose transceivers.

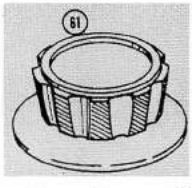
Heath also began to realize the potential of VHF in 1968. In the late '60s not many hams knew much about two-meters or FM. But VHF in general, and two-meters in particular, were gaining some popularity. A lot of Heath's engineers were eager to get going on a two-meter project, but Joe Shafer was not convinced that the market for two-meter gear was there, and he needed to make sure any given amateur product would pay for itself. There was fierce competition for product development money company-wide, and if he was going to go after a chunk of money he needed to be sure that there would be a pay-off—a product failure would make it harder to get development money later on. In addition, two-meters had not really coalesced into the set standards we know today. AM or FM? Channelized or VFO? Simplex or repeaters? What kinds of splits? It has also been suggested that Joe just wasn't personally enthusiastic about anything above 10-meters. In any case, Joe had resisted the idea of two-meters for a couple of years but capitulated in late 1968, in the face of mounting pressure from management, who wanted to know why Heath wasn't working on a two-meter product. Heath's first serious two-meter product, the HW-17, was not entirely successful. The 10 watt AM rig suffered from a variety of small problems any one of which would not have been a big deal. But put them all together and you had a kit full of headaches. Low transmitter audio, poor AGC, a noise blanker that didn't work, microphonics, poor receiver sensitivity, and on and on. Owners were offered two separate mods directed at fixing the

problems, but try as they might, Heath's engineers never completely solved all the troubles with the problem-plagued HW-17. The FM adapter never worked very well either. In the end, Heath was lucky to get its money out of HW-17—in spite of heavy advertising—and pulled the plug on the rig soon as it did. Back to the drawing board. It would take another three years to do the job right. Nevertheless, Heath had sold thousands of the HW-17 and had made a great deal of noise related to two-meters, establishing a VHF name for itself.

Never mind the problems. All was about to be forgiven because 1968 was the year Heath would make ham radio history. Remember that low-cost version of the SB-100 Heath had begun designing back in '66? Heath designated it the HW-100—and it was ready to ship. In designing this low-cost version, Shafer had reused as much as possible from the SB-100—right down to the metal chassis—while cutting some of the SB-100's very expensive corners. The cabinet for the low-cost version, for example, was designed so that it could be fabricated in-house. And the expensive LMO was replaced with a more conventional tuning system. Put the SB and the HW side by side—the front panels are virtually identical. The layout and design are the same, too—including the printed circuit boards.

Given the phenomenal sales of the SB-101, it is hard to imagine anything selling faster or in greater numbers. But the HW-100, the low-cost little brother of the SB-100/101, was running roughshod over the competition.

(✔) THE HOT WATER 100



There was a general agreement that the HW-100 could do well, but it is unlikely that anyone could have imagined exactly how popular it would become. In retrospect it is clear that the 100 was going places. First of all the HW-100 had superb references—it was made by Heath. Secondly, it was well-designed, well- behaved, and very good looking. Thirdly, it had just about all the features you could ask for. And then of course there was the $250 price tag—which gave the 100 the market impact of a high yield tactical nuclear weapon. Indeed, the HW-100 was about to become the most popular radio of all time.

When the HW-100 first appeared in March 1968, it was an instant success. Within months, Heath was advertising the 100 as the "world's fastest selling transceiver," a claim that was no exaggeration. The so-called "Hot Water" 100 was one of those rare in-the-right-place-at-the-right-time products and was destined to become a classic.

By 1969 Heath was comfortable enough with its overall product line to begin to throttle back just a little bit. The only significant product to appear in '69 was the SB-500 two-meter converter. One reason no other major products came out in 1969 is because Heath was busy refining its biggest sellers—the SB-101, the SB-301, and the HW-100. These were, of course, priority products, and Heath did not want to rest on its laurels.

The HW-100

The introduction of the SB-220 linear amplifier was the high point of 1970. It had been more than six years since Heath had put the 1KW SB-200 on the market, and many folks had wondered when Heath would bring out a 2KW amp—indeed the author of a *QST* review of the SB-220 wondered aloud about the cause of the delay. It had taken so long to get the SB-220 on the market because Heath was determined to bring out a full two-kilowatt amp but didn't like the selection of tubes that were available in the early '60s. The old reliable 811 and 813 wouldn't handle enough power unless you put a bunch of them together, and then they wouldn't fit into a cabinet of reasonable size. Tubes that would handle the power were either too big, too expensive, or lacked the right physical or electrical operating characteristics. Then early in 1968 Eimac introduced the 3-500. Here at last was the tube Heath had been looking for. A pair of these guys would handle 2KW with ease, were small enough to work with, were relatively inexpensive, and seemed to have all the right characteristics. With the right tubes in hand, it didn't take long for Heath to get a product together. By 1970 Heath was shipping the SB-220 by the truckload. The 220, and later the 221, would join the SB-200 as one of Heath's most enduring products.

In January 1970 Heath changed its *QST* advertising by dropping the inside back covers in favor of a multi-page layout within the magazine primarily because of the cost. Heath was redirecting some resources to begin development of an entirely new product—a fully solid-state transceiver. This new project was being drafted at the same time Heath was introducing its revamped big sellers. In April 1970 the

SB-102 was unveiled. The 102 incorporated a new solid-state LMO and a couple of other minor refinements but was otherwise essentially unchanged—relying on vacuum tubes for the bulk of the circuits. It sold better than ever.

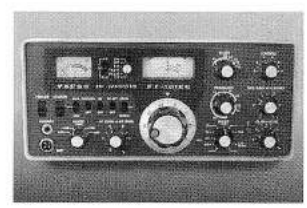
Then, just in time for Christmas 1970, Heath released the HW-101—a refinement of the already legendary HW-100. The HW-100 and 101 will live forever as the world's most popular radios. In their combined 14-year production life, Heath sold almost 40,000 Hot Water 100/101s. Nearly 3,000 per year. About eight rigs every day. It was a sales record that has never been broken. Not even the Collins KWM-2 and KWM-2A could match the HW-100/101 in unit sales. But the 101 holds another distinction—it was Heath's last vacuum tube design. Heath could see the writing on the wall and it said "solid state." Indeed, the age of vacuum tubes was rapidly coming to a close. It wasn't so much that Heath had a lot of interest in solid state. Indeed, Heath did not really believe that transistors—especially for use in the PA—would ever amount to much. But the market was rapidly turning in that direction. Transistors, once regarded as a curiosity, were finding their way into everything, and the speed of technological change was accelerating with each passing day. Heath realized that if it were to survive, it would have to meet solid-state technology head on. Heath also would have to face another challange head on—rapidly mounting competition from the Japanese and others who were bringing solid-state gear to the market with astonishing speed. So the decision to develop a solid-state rig wasn't made because Heath was interested in being on the cutting edge. It was much more a market-driven decision.

(✔) INSTALL Q1 AS SHOWN

The necessity of delivering a solid-state rig had occurred to Heath much earlier—late in '67. Indeed there was agreement to market a full line of solid-state products to replace the vacuum tube SB series, but heck, the vacuum tube rigs were still selling extremely well. So while it was decided to proceed with designing a solid-state series, the SB/HW series would be played out first. This may have been a strategic misstep because it delayed the process of design a bit longer than may have been prudent. The SB-303 receiver, Heath's first fully solid-state rig, wasn't released until October 1970—seven years to the day after the introduction of the vacuum tube receiver it replaced—SB-300, Heath's first SB series rig. By this time, several other manufacturers had solid-state receivers already on the market. Although the SB-303 proved to be a superb analog design which sold exceptionally well, it was really just an SB-301 with no tubes and did not provide much in the way of solid-state experience. A solid-state version of the SB-400, called the SB-403, was on the drawing board but plans to produce it were scrapped because Heath decided—correctly—that transceivers were the way of the future. Solid state made possible the building of small, highly functional transceivers for less than the cost of a separate transmitter and receiver.

The new solid-state transceiver envisioned by Heath engineers wasn't much of an engineering marvel either. The SB-103 was a modest design and, like the SB-301, could be characterized as a copy (in this case of the SB-102) wherein the tubes had been replaced with transistors—except for the finals. Finals in the PA were regarded as a bad idea because in those days transistors were not nearly as rugged or reliable as they are today. Engineers often referred to the "purple plague"—a condition in which transistors would simply fail, and no one could figure out why.

The 103 had been designed and developed through the prototype stage when, because of disagreements over how the project was developing, its principle designers quit. And when they left, most of Heath's solid-state experience went with them. The SB-103 was shelved.



Yeasu FT-101

Then in December 1970 there was something of a replay of the events of 12 years earlier when Al Robertson opened his *QST*, saw the 75S-1, and was inspired to design the SB series. We do not know who saw it first, but someone at Heath opened the December *QST* and must have taken a deep breath. In this case it was not an ad for Collins but for Yeasu, and the rig in question was the FT-101. This remarkable little transceiver was fully solid-state except for the finals, and was replete with a load of features that made for a very attractive and desirable rig. And oh yes—it was fully assembled and aggressively priced. There can be no doubt that the Yeasu FT-101 upped the ante and put Heath under tremendous pressure to deliver a clearly superior rig at a clearly competitive price. But could it do it?

(✔) ACT 104, SCENE 1

We need to take a little side trip to Cedar Rapids, Iowa, home of Collins Radio. About the same time Heath was busy developing the 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 these people was Mike Elliot, who noticed an ad placed by the Heath Company seeking engineers. To make a long story a bit shorter, Mike sent a resume and was offered a job.

Mike's first assignment was the development of a small VHF amplifier, the HA-202. Mike's solid-state talents quickly caught the eye of management who asked Mike if he would be so kind as to have a look at the SB-103 and provide an assessment of the project. Mike saw a lot of potential in the 103, but noted that the unit's design failed to take advantage of some of the capabilities that were inherent to solid-state. The 103 had a preselector, copious tuned circuits, a complicated band-switching scheme, and a very traditional pi-network PA, etc., etc. It had very low receiver dynamic range, high power consumption, low efficiency, poor stability, and so on. Mike's decision was an easy one—start over from the ground up. About all Mike's new design would save was the frequency scheme, since Heath had a lot of previous experience with 3395 kHz crystal filters. Up-conversion was considered briefly but was rejected as too complex for a kit form rig.

Mike Elliot, 1995

Given the length of time it would take to develop the new rig—now called the SB-104—it was decided to take a giant technological leap. Mike knew that by the time the rig hit the market, its technology would not be considered cutting edge unless they really stretched its design. Mike remembers the SB-104 as taxing the limits of 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. Oh, did I mention that Mike wanted to use solid-state finals?

A major obstacle in developing the 104 was in fact the prime directive Heath had established early on. Specifically, any given rig 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 at VTVM. These criteria made for some difficult engineering considerations that would never be required with equipment coming off an assembly line.

When you stop to think about it, trying to explain to someone how to assemble an electronic device of any kind (let alone something as sophisticated as a transceiver) is a formidable task. If you don't believe this, try writing a set of instructions detailing the operation of a transceiver by someone who hasn't the faintest idea of how to use it. Remember, you can't say a word or lend a hand in any way—you must rely on the clarity of your written instructions. Now extend the exercise to the complete assembly of your transceiver and you begin to get an understanding of the complexity of the task. Heath had to work out instructions for everything from simple soldering to the assembly of complicated dial and tuning mechanisms, to alignment and tune-up procedures, all the while assuming very little in the way of test equipment and technical expertise. That Heath had mastered the instruction process was a most remarkable feat all by itself. Without a doubt, Heath's superbly written and profusely illustrated manuals, finely tuned over the years, were responsible in large measure for the company's success. After all, why have the best product on the market if no one could put it together?

And there were other challenges. The SB-104 required a tremendous number of parts. And that meant that the odds of a bad part showing up in any given SB-104 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 was at fault, a customer with limited knowledge and test equipment may or may not be able to troubleshoot the problem himself. And even if all the parts were good, as the parts got smaller and the parts density got higher, the physical room for error—solder bridges and so on—went way up. 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 in digital electronics. As a result, several other products, including a digital display

for the SB-102 and a synthesized two-meter transceiver, 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

And as if that were not enough, there was another more subtle problem. 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 corrosion of morale. Indeed, the "family" atmosphere that Howard Anthony had worked so hard to foster was beginning to evaporate.

The year 1971 was unique in Heath's history —no significant amateur products were released that year. A reflection, perhaps, of the problems Heath was having with products already under development.

In April 1972, while still wrestling with the SB-104, Heath released its first digital product, 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. The unit was based on a couple dozen TTL chips, a double-sided PC board, and Nixie neon readout tubes.

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, 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 commercial digital clock kit, and one of the very first digital clocks to appear on the market. At $55 the clock was not cheap, but was substantially less expensive than any other digital clock on the market. Sometimes a little product like this takes everyone by surprise—even those who designed it. The 1005 practically exploded out of the catalog. It may be hard to believe but Heath sold more than 50,000 units per year—almost 140 a day...seven days a week. 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.

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. 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 offshore 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. Gene Fiebich passed away early in 1995.

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 rig pushing every edge of the envelope. A very complex rig involving lots of new technologies, it was the expression of Heath's desire 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 frustration. 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 were turning out to be more critical than had been imagined. Further, there was no easy or inexpensive way to ensure that any given part was within tolerance. Again, 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. Remember the prime directive—the customer has limited knowledge and doesn't have sophisticated test or alignment equipment. 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.

(✔) SCENE 104 ACT 2

At last, just in time for Christmas 1974, Heath rolled out the SB-104 with a full-color fold-out ad in *QST*. The ad featured the complete 104 series product line including the SB-230 linear amplifier, the SB-634 station console, the SB-644 remote LMO, the SB-614 station monitor scope, and the SB-604 station speaker. There were also extensive product notes written by Joe Shafer, extolling the many virtues of the 104. A 2KW linear amplifier, the SB-240 (using a pair of 3-500s) had also been developed through the proof-built stage, but at the last moment the unit was canceled because of safety concerns. There were fears that because of the rig's layout the customer would be threatened by high voltage. About 14 units were actually built. Several were destroyed and the rest ended up with employees.

The SB-104

Sales of the SB-104 were good, but almost immediately, customers began calling with problems. Most of the problems turned out to be related to mistakes in assembly and tune up. There can be little doubt the 104 was a good solid rig, but it quickly became clear that alignment of the 104 was critical to the success of the rig and left almost no margin for error. Additionally, the sheer complexity of the assembly process was testing the limits of even experienced kit builders. Unknowingly, Heath had stepped over the line, violating the prime directive. But it was also clear that there were some design problems as well. The CW wave form was much too abrupt, the TR switching was not very clean, and the digital display had the jitters, to name only a few of the 104's troubles. Heath's initial strategy was to handle these one at a time, but in a short while, it became clear that a bigger fix was in order. One solution was to begin to pre-assemble some of the more complex boards, including some of the RF boards. That solved some of the problems but, of course, it ate substantially into the profits.

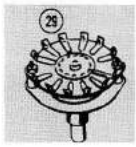
The SB-104 wasn't Heath's only headache. Late in '75 the company had released its replacement for the venerable HW-202 two-meter transceiver—the HW-2026. The 2026 was a synthesized unit on which the frequency was set with thumbwheel switches. The 2026 had given its designers about as much trouble as the 104 had provided for its crew. Almost as soon as the first units went out the door, customers began calling with complaints that they were bringing up repeaters other than the one intended as well as putting in good signals on law enforcement frequencies, whenever the 2026 was put on the air. Some quick checking revealed that the transmitter had some significant spurs. The problem was not really a design flaw. In designing the 2026 Heath had looked at the Clegg FM-27. The engineers had noticed some significant spurs on the 27's signal but concluded that if the spurs weren't a problem for Clegg they shouldn't be a problem for Heath. Unfortunately for Heath, the spurs from the 2026 landed in all the wrong places. Heath had designed the 2026 to conform to CCIR specifications, and in fact, the 2026 actually performed better than the CCIR specs by a good 10 db. The problem was that the CCIR specs were flawed. And to make matter worse, a quick fix was not in the cards. For the first and only time in its history, Heath

issued a product recall. Customers were offered their money back or a trade-in for one of Heath's other new products that year, the HW-2021 walkie- talkie. Unfortunately for customers who chose the walkie-talkie, satisfaction proved somewhat elusive. While the 2021 was a good basic design, its shear compactness reduced the odds of assembling the unit without errors.

There was at least one success in 1975—the HD-1410 electronic keyer. The physical design of the HD-1410 was patterned after the Ten-Tec KR-20 and a keyer sold by Palomar Engineers, both of which first appeared late in 1969. The 1410 replaced the very successful HD-10 (the first kit keyer on the market), which Heath had released 10 years earlier. The 1410 was more compact and more easily adjustable that its predecessor, and employed a vastly improved switching scheme. It sold extremely well.

Heath also had some luck with the HW-104, the low-end version of the SB-104. The HW version replaced most of the complicated digital circuits with analog designs. For example, the HW-104 used a traditional tuning scheme with a dial readout more akin to the SB-102. The HW-104 worked quite well because of these changes, but still suffered in sales as a result of guilt by association. It was also being torn to shreds by the competition. The rig would last only two years.

(✔) ENTERING THE COMPUTER AGE



Still reeling from the HW-2026 recall and still pulling out its hair over the SB-104, Heath pressed on, working on an improved version on the 104 and beginning work on an entirely new transceiver, the SS-8000. At the same time, development also began on an entirely new product—the personal computer. Heath can be credited with some real vision in this area. It was still a year or so before the first Apple and the Radio Shack computers would appear. Heath recognized the value and potential of the computer very early on. For most people, computers were still very much a curiosity. Heath understood that personal computers were not some passing fad, and that they were, in fact, the next major growth industry. Heath quickly tooled up for a major effort, enthusiastically beginning work on a pair of computer products—the H8 and the H11. Ironically, by starting development of the computers, Heath was unleashing the very products that would lead to its demise.

In November 1976, exactly one year after the release of the ill-fated HW-2026, Heath released its replacement, the HW-2036—an entirely redesigned two-meter transceiver. To help eliminate any lingering suspicions about the new rig, the ad in the catalog was complete with charts detailing its spectral purity. This time Heath had gotten it right and the rig was a hit. Sales took off and never slowed down. You could almost hear Heath's collective sigh of relief. It had been a long, hot, frustrating, and expensive summer for engineering. Getting the bugs out had not been easy.

The first of two significant releases in 1977 was the H8 personal computer. The H8 did not in any way resemble personal computers as we have come to know them. The H8 was a nerds-only 8080A-based product with a convenient front panel keypad for programming. As luck would have it, there were plenty of nerds who had been waiting their whole lives for a product like this. They wasted no time putting in their orders—heck, only $300, less any kind of I/O. The H11, Heath's other computer, was somewhat more imposing—it was a plain white box with no front panel controls at all. The H11 was based on the DEC PDP-11/03 and was available with an optional eight or 16-bit bus. This machine was a bit more pricey than the H8—$1200 in kit form, $2000 wired, less I/O. Nevertheless, the two computers proved both popular and lucrative. Sales of the H8, H11, and their peripheral products quickly infused a great deal of cash into the company. While Heath's gross sales were rapidly approaching $100 million annually, the bulk of the money wasn't coming from amateur products. Heath was pulling in money from television and stereo products, and from test equipment as well as from computers. Amateur products, which 10 years earlier had accounted for 40 percent of Heath's sales, had shrunk to less than 25 percent. And to make matters more uncomfortable, engineering costs in the amateur division were very high.

The second significant release in 1977 was the improved SB-104. It had taken a lot of re-engineering, but in July 1977, Heath re-released the SB-104 as the 104A. Most of the problems had been solved but the rig remained touchy. True to its customers, Heath worked diligently to keep everyone happy and, for the most part, customers were happy. But the word was out that the 104 was "iffy" and that getting it to work could be a problem. Sales flattened out, then slowly started down. But Heath wasn't standing still. Development of the 104's replacement, des-

ignated the SS-8000, was moving slowly forward. Among other things, Heath had developed an ambitious plan to provide for computer control of the new transceiver. There was nothing else like it on the market. A computer-controlled HF station was something that only a handful of hams had even dreamt about.

In 1978 Heath released the HW-8, a replacement for the HW-7 QRP rig. The HW-7 had been very popular but had been criticized for a number of minor problems and limitations. The HW-8 addressed all of those problems and added a few nice touches. The HW-8 would turn out to be one of the most popular of the three versions Heath made—attaining a kind of cult status—and one of the most popular QRP rigs ever marketed. In that same year, Heath replaced the very successful HW-2036 two-meter box with the new digital readout VF-7401. The 7401 was nice and had lots of power and features, but the unit had cost a bundle to design, and sales were never as high as Heath had hoped for. It isn't that anyone thought poorly of the 7401, but by this time, the off-shore competitors were turning up the heat on Heath—and it hurt. It is likely that Heath lost money on the 7401. The VF-7401 is a significant product in Heath's history, however, as it was the last kit-type two-meter product Heath ever made. By this time off-shore competition in the exploding two-meter market was so ferocious it was clear that Heath could not compete. Heath walked away from VHF and never came back—at least not with its own equipment.

(✔) 1978—THE BEGINNING OF THE END

In 1978 Schlumberger (remember Schlumberger? it owned Heath?) decided that it would be nice to have an "in-house" source of semiconductors and began looking around for a nice semiconductor manufacturer to swallow. It didn't have to look very far. Heath was buying literally millions of semiconductors every year from a company called Fairchild. Heath was, in fact, Fairchild's single largest consumer of both discrete and integrated devices. Additionally, Schlumberger owned a lot of other companies that used semiconductors, and it used a lot itself. This, it reasoned, could be sweet deal. By acquiring Fairchild, Schlumberger would control not only the source and the devices, but also the products in which they were used. Funny...that is exactly how the Federal Trade Commission saw it. Who could have imagined that we would ever hear the words "Heath" and "antitrust" in the same sentence?

The Federal Trade Commission explained to Schlumberger its actions might—at the risk of putting too fine a point on it—be construed as, well, illegal. The Commission told Schlumberger that if it wanted Fairchild it would have to sell Heath. Sorry. If there was any doubt about Schlumberger's loyalty to Heath, it didn't last very long. Schlumberger had purchased Heath for a song and now, while it wasn't exactly what it had planned, had the opportunity to sell it for something much more like a symphony. It saw the chance to make a great deal of money very quickly and it took it. By December 1978, Heath was up for sale. It is hard to say what kind of effect this news had on employees at Heath or on the administration. But there can be no doubt that a shock wave swept through the plant. A clue about the intensity of this shock wave can be found in the pages of *QST*. Heath had no ad in the February 1979 issue of *QST*. This small event was spoke volumes: it was the first issue Heath had missed in more than 20 years or advertising.

By January 1979 Heath had completed development of its third computer product—the H89 "all-in-one" computer. The H89 used not just one but a pair of the new Mostek Z80 microprocessors and was a most remarkable product. It was not some inscrutable box with a keypad; it had a keyboard, a display screen, and a floppy disk drive built into one very attractive cabinet. It was however, only partly a kit. The main CPU and terminal interface boards were fully assembled and tested, as was the keyboard and the disk drive. During development of the H89, Heath quickly realized that almost no one could successfully assemble and—if necessary—troubleshoot one of these things. Assembly then, was limited to construction of the power supply and the putting together of all the sub-assemblies. The H89 first appeared in Heath's Summer 1979 catalog and listed for about $2000, depending on what options you added. The 89 was enormously successful. Heath sold zillions of them.

At about this same time, the idea that personal computers could be worth a lot of money was beginning to occur to a number of large corporations, many of which began to explore the idea of designing their own computer products. Among these was the Zenith Corporation. Zenith had the idea that it might be possible to bypass much of the expensive and time-consuming design phase and get a head start on the competition by buying a company already making computers.

Zenith began looking around for some small computer company it could easily acquire and it didn't take long for its corporate gaze to fall upon Heath. From Zenith's perspective Heath was very attractive. It was reasonably priced and had an excellent computer product line on the market and more in development. Negotiations began early in 1979, and the deal was completed by fall. Zenith was now in the computer business—and Heath was now in trouble.

(✔) THE END IN SIGHT

The Zenith buyout was a nasty piece of business by all accounts. Many people at Heath thought Zenith would be good for business. After all, Zenith was a consumer electronics company. It was logical to assume that Zenith might bring with it a lot of marketing muscle and know-how that would be very beneficial to Heath. Zenith, however, had other ideas. Zenith was interested only in Heath's computer line. Nothing else mattered. Nothing. In fact employees began to feel that Zenith regarded them and Heath's products with contempt. They were probably right. Budget cuts and layoffs were quick to follow. Zenith cut the budgets of all of Heath's departments by 15 percent every year beginning in 1980. All departments except computers, that is. Additionally, Zenith began siphoning huge amounts of cash and resources from Heath.

Al Robertson wasn't having much fun. For him, the Zenith buyout was only part of it. He had been transferred to marketing a couple of years earlier, and he wasn't doing the things he really loved. He looked around one day and couldn't see the Heath company he had originally come to work for. Time to go. Al called it a day—and retired. His departure, like Gene Fiebich's, was a harbinger of things to come.

Needless to say, the takeover, the budget cuts, the lay-offs, and all the rest, were very disruptive and very distracting. And none of these corporate high jinks helped the Amateur group, who had been having plenty of trouble with the SS-8000 even before the Zenith problems. Nevertheless, work had progressed well into the proof-built stage by this time, giving Heath enough confidence to run a teaser ad in the Spring 1980 catalog. The ad displayed the SS-8000, major portions of which were hidden by a large banner reading "space reserved for revolutionary new SS-8000." Text in an inset stated "see it here—in your next Heathkit catalog." In another inset was a picture of the new H19 smart terminal (not the H89), implying that the SS-8000 could be computer controlled.

It had become increasing clear over the course of its development that given the complexity and parts density of the SS-8000, it would be very difficult, perhaps impossible, for the average builder to successfully assemble and align the rig. Heath found itself in a bind. It had two choices—both bad. To proceed with the rig in kit form meant endless problems for the customer and lots of bad PR. To offer the rig fully assembled meant a working rig and a happy customer, but would double the cost, making it unaffordable. No matter what it decided, Heath was in trouble.

Still smarting from its experiences with the SB-104, Heath made the decision to offer the SS-8000 as a fully assembled product and not as a kit. Of course by the time this determination was made, a fully operational model—no longer a prototype—had been completed. It is important to remember here that it had taken most of five years to develop the 8000 to this point. Now it would take another three years to redesign the rig for sale as a pre-assembled unit. This would prove to be the single most costly decision ever made at Heath because the SS-8000/9000 was the single most expensive product Heath had ever designed. Most estimates put the development costs of the 8000/9000 project at around 3 million dollars, and probably more. The SS-9000 hit the market for almost $2800 in the face of competition costing half of that. Bells, whistles, and computer-control notwithstanding, it never really had a chance. Only a couple of thousand units were ever sold. The project was an immense financial loss from which the company never fully recovered.

The HW-5400, Heath's last hope of success in the kit market, did little better. It sold for only a year and a half, and while it was less expensive to develop, Heath lost a bundle on it as well. It originally had sold for $750. The power supply was another $175; the frequency entry keypad was another $60; and so was the "deluxe" SSB crystal filter. The whole package was just over a $1000, and for almost everybody, it just didn't add up. Not when compared to rigs from Kenwood, Yeasu, and others. And comparing was what everyone was doing.

By the time the SS-9000 hit the catalog in 1982 it was crystal clear to everyone Heath could no longer stand up to off-shore competition. There was some talk of having the SS-9000 and HW-5400 built overseas. Engineers made several trips to Korea to meet with manufactur-

ers and explore this idea, but nothing came of it. Meanwhile Icom, Kenwood, and Yeasu were putting new products on the market at the rate of almost one a month, and by the middle of 1982, Heath's Amateur group essentially caved in under the under the now crushing weight of foreign competition. The SS-9000 and the HW-5400 were to be the last big products. Another factor contributing to the demise of the Amateur group was the layoffs of 1982. Until that time, the Amateur group had really been trying to hold things together. The layoffs were the last straw for Joe Shafer. Drake had been courting Joe for several years and this seemed like a good time to make a run for it. He did. At the same time, management was deciding that it had had enough of ham radio and that it was time to go QRT. For all intents and purposes, the Amateur group was out of business.

The effects on the Amateur group of these layoffs are clearly visible in the products that came out of the department after '82. These products were either extensions or refinements of existing products or were relatively simple in nature. Concentration on these "downsized" products was a reflection of the increasingly limited resources available to the Amateur group and Heath's inability to compete in other product areas.

The "little brown box" series, which began to appear in 1985, provides the best example of a company struggling to maintain a presence in amateur radio. The little brown box series was a group of accessory products that did not require any sophisticated or innovative engineering and which could be marketed very inexpensively. The group encompasses most of the high four-digit "HD" series of products and includes the HD-1418 Active Audio Filter, the HD-1420 VLF Receiving Converter, the HD-1422 Antenna Noise Bridge, the HD-1424 Active Antenna, and several others. There was at least one gem in this otherwise unremarkable series of products: the extraordinary HD-8999 "UltraPro" CW keyboard. This microprocessor-based keyboard featured memories, practice sessions, a type-ahead buffer, built-in side-tone, complete control of all operating parameters, and the ability to key any transmitter ever made.

But products like these are not enough to make a living on. Especially when your parent company couldn't care less about them.

The end did not come quickly. No one came in one day and said "That's it. No more ham products." Instead, the Amateur group slowly withered away. As budget cuts continued, people once working for the Amateur group were transferred to other areas, laid off, or replaced by marketing types. By 1984 only a handful of people were left in the Amateur group and they were not designing amateur products. They worked on products like electronic Christmas ornaments, light dimmers, and motor speed controls.

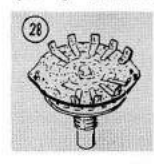
By 1985 all new amateur product development had ceased. Only a few products were released after '85 and all of them had been developed earlier. The budget cuts, transfers, and layoffs continued, and although a number of ham products lingered in the catalog, by 1986 the Heath company we once knew and loved was gone.

During the late 80s and early 90s Heath made a few more attempts in amateur radio by striking deals with other companies to make equipment using the Heath name. Heath went to Ameritron and came back with the SB-1000 linear amplifier. It went to Standard for HTs, to Yeasu (ironic, isn't it?) for a transceiver (the SB-1400), and to Telex for a rotator. With the exception of the SB-1000, Heath made very little money with this strategy, and the concept was abandoned in short order.

Ultimately, the splitting up of Zenith itself, and its subsequent sale to Group Bull, a French conglomerate, left Heath directionless and in disarray. Bull had no interest at all in Heath and immediately put the company on the block. Heath experimented with the home security market for a while, acting as a reseller for products designed and built off-shore. It was a short-lived exercise. It also began to experiment with home-study products, selling educational videos and workbooks on subjects related to electronics and computers. This market proved more profitable and Heath continues to expand into the home study market.

Group Bull was finally successful in selling Heath in February 1995. As of this writing little is known about the buyers—said to be a group of investors from Florida—or their intentions for the company. It appears as though as least one more chapter of Heath's history awaits writing.

(✔) WHAT HAPPENED TO HEATH?



People often attribute Heath's difficulties to off-shore competition in the early '80s. To be sure, that was a major factor. People also point to the Zenith buyout and subsequent budget cuts. It is true that Zenith did not help matters. But the off-shore competition and Zenith were not the causes of Heath's demise. They

served only to hasten the inevitable.

It is clear that Heath's problems really began much earlier, in the late '60s. After 20 years of rock solid products, things began to unravel. This difficulty is seen first in the SB-104 and is evident in many subsequent products. What is less clear is why things began to unravel. I have talked to many former Heath employees and I have heard their technical explanations of what happened, for example, to the SB-104, HW-2021, SS-9000, and others. They cite, among other things, the cutting-edge nature of technologies being used and the complexity of the projects undertaken. But these explanations do not fully account for the problems, and the turn of events that must have begun about 1969—about the time development of the SB-104 began. Gene Fiebich may not have been able to put it into words, but it is clear that he felt things changing, and that by 1973 the atmosphere had, for him, become intolerable.

I submit that Heath had difficulty coping with the dramatic growth it experienced through the '60s. This high-speed growth resulted in its crossing a kind of threshold around 1969, at which point Heath began to suffer from the same things that plague many large companies—poor internal communication, high employee turn over, corrosion of morale, and especially the loss the "family" feeling that had served Heath so well in its earlier years. The family feeling is, I think, what Gene missed most. This kind of scenario is not unique. It is experienced by lots of companies in their formative years. The difference for Heath is that it had to contend not only with its own growth, but with the growth of a rapidly changing market and the growth of a rapidly changing technology. The combination of these forces, combined with the ravaging effects of a corporate takeover, would have driven a lesser company to spontaneous combustion. To its credit, Heath was able to cope, at least to some extent, with all of these changes.

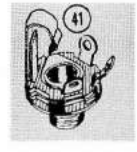
The inability to adapt to change is a major problem plaguing many big companies. As companies grow, there is a tendency to become mired in bureaucracy and its attendant problems. Decision making becomes difficult because too many signatures are required and/or there is too much fear of making important decisions—no one wants to take responsibility. By the early '60s, electronics technology was changing at a rate that began to outpaced Heath's ability to adapt. The cycle time for bringing a kit to market had lengthened from two or three years to more than five years because of the growing complexity and speed of technologic change. The cycle time was lengthening at a time when the ability to adapt quickly was becoming more critical with each passing day. At some point technology began to cycle with an interval shorter than the cycle time for completing a kit. The result was that half way through development of a given kit, Heath could find itself working on an outmoded product.

The density of parts was also playing a roll. As kits became more sophisticated, greater skill was required by the builder. With the SS-9000, Heath finally exceeded the average kit builder's ability to successfully assemble a kit. Parts quality was a problem as well. Greater numbers of parts increased the chances of a bad part appearing in a product too sophisticated for the average builder to troubleshoot.

Additionally, as manufacturing processes became increasingly automated, the cost of assembly—Heath's very reason for being—began to approach zero, and the savings once possible in kit form vanished. By the late '60s it was possible to buy a fully assembled and tested product for the same or less than the cost of a kit. And in the end, it must be recognized that people began to change. Heath's original customer base was getting older and the younger generation seemed to have neither the time nor the interest required to assemble a kit. Instant gratification had come of age.

What happened to Heath? There is no one simple answer. It is clear that a constellation of events and circumstances converged on Heath and that their combined weight simply crushed the company.

(✔) CAN IT HAPPEN AGAIN?



Thomas Wolfe said it best. "You can't go home again." The Heathkit phenomenon was a result of the right person, in the right place, at the right time in history, with the right idea, for the right price. The Heathkit phenomenon happened at a time in history when the leisurely pace of technologic change permitted the time-intensive process of kit design, and when the economics of electronics manufacturing provided a cost-effective alternative process for the acquisition of electronic technology. The Heathkit phenomenon happened at a time in history when electronics was a great deal simpler than it is today, when it was realistically possible for Joe Ham and his 50-watt, half-inch chisel tip

soldering iron to put a kit together and have a good chance of being successful.

Can Heath rise again? Short answer—no. Long answer—few businesses successfully weather both the economic changes and the corporate shenanigans that tossed Heath around like a three-element quad in a thunderstorm. Even without those factors, the technologic and social climates that allowed Heath to flower are gone—never to return. Can anyone make a living from kits? Doubtful. Kits could figure into a mix of products like they do for Ten-Tec and Ramsey, for example, but no one is likely to survive very long on kits alone.

I guess all we can do is dream about the way it was. 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. Ah, the steps...

Refer to Pictorial 5-5 and Detail 5-5A for the following steps.

( ) Connect one end of a 2-½″ green wire to lug 1 (S-2)

( ) Connect a .01 µfd disc capacitor from lug 10 of tube socket V9 (S-2) to solder lug X (S-4)

( ) Install a metal coupling on the shaft of switch D. Use a 6-32 x ¼″ screw.

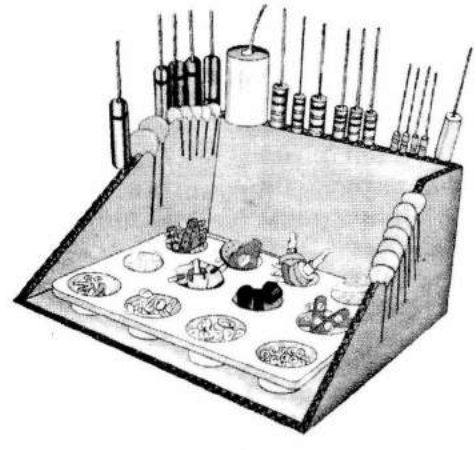
( ) Connect a 20 KΩ (red-black-orange) resistor between lugs 2 (NS) and 3 (NS) of terminal strip A.

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. Carefully. 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.

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 index finger from when, during the assembly of an HW-100, I picked up my soldering iron from the wrong end.

There is a phrase in the back 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.

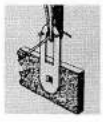


FROM HEATHKIT SB-110 ASSEMBLY MANUAL

Most kit builders find it helpful to separate the various parts into convenient categories. Muffin tins or molded egg cartons make convenient trays for small parts. Resistors and capacitors may be placed with their lead ends inserted in the edge of a piece of corrugated cardboard until they are needed. Values can be written on the cardboard next to each component. The illustration shows one method that may be used.

Buying and Collecting Heathkits

(✔) FLEA SPEAK



Flea markets may be the best possible way to buy and collect any kind of electronic equipment, but you have to know the subtleties of buying and selling and the protocols involved in a transaction. Usually the best way to acquire the necessary skills is just to get in there and get some practice. Start with some nickel-and-dime junk and work your way up to the expensive stuff. Perhaps the most important aspect of "fleaing" is understanding the language. Flea markets have a language all their own and it is vital that you be able to speak and understand it. It is important to be able to interpret what the person behind the flea market table is saying about the equipment s/he has to sell. To make your task a bit easier, I have compiled a list of a few possible answers to the simple question "Does it work?"

ANSWER	TRANSLATION
Absolutely!	**Maybe**
Yes	**Maybe**
I don't know	**No**
No	**No**
It did the last time I plugged it in.	**No**

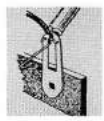
At the flea market.

The point I am trying to make here is that there is a risk inherent to buying anything at a flea market, and with Heathkits the risk is somewhat higher. Heathkits were, after all, *kits*. Someone, not the factory, put them together, and that person may or may not have had the skills required to do the job correctly. It is prudent, therefore, to be a bit extra cautious with Heathkits. It would pay to inspect the piece with a careful eye, to turn all the controls, to look for evidence of modification or abuse. There is a good reason why Heathkits picked up the nickname "Griefkits."

(✔) GET THE BOOK

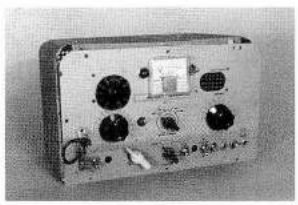
Heathkits are subject to the ravages of time and use just as any other equipment. Contacts oxidize, caps dry out, PC board traces crack, and on and on. (By the way, Heath's troubleshooting tips said that 90 percent of all problems can be traced to poor soldering.) But unlike most other rigs, Heathkits are relatively easy to troubleshoot—if you have the manual. I can not emphasize enough the importance of having the manual. The best situation, of course, is to get the book when you buy the product. Often as not though, the book has long since disappeared. There are a number of small companies offering copies of many of Heath's manuals for a fee. Their names and address can often be found in the classified ad sections of the popular ham radio hobby magazines. Collectors will often make copies of their manuals for you, usually for a couple of bucks, sometime for free, or a return favor someday. The Heath Company has also begun to advertise copies of their manuals for sale. Their number is 616.925.5899. Be prepared to wait on hold—and on your nickel. The cost of their service varies with the product in question. I checked the price of a book for the AT-1 and for the GR-64. Both were $25 plus postage.

(✔) MODIFICATIONS



It is likely that no other amateur radio products were subjected to more modification than were Heathkits. Over the years, hundreds of modifications have been published in the popular magazines. In addition, many well-meaning hams put in all sorts of mods of their own. Pity. One of the most heart-breaking stories I can relate is that of the AT-1 I spotted at a hamfest. From a distance it appeared to be pristine. Sadly, upon close inspection I discovered that the rig was indeed pristine—not a scratch to be found—except for a pilot light added to the front panel.

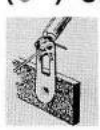
For the collector, of course, modifications reduce the value of the kit—no matter how rare—to something very close to zero. But even if you are just looking for an older rig as a backup, modified Heathkits should be avoided. Once the owner started deviating from the manual, heaven knows what went on. What you see on the front panel is only the tip of the iceberg.



Can you find the AT-1 in this picture?

Mods do not occur only on the front panel however. The rear panel may sport extra connectors and so on, and inside the rig there may be mods that are difficult or impossible to spot with casual inspection. Regardless of your reason for buying, Heathkits with mods (except those sanctioned by the factory) should be regarded as useful only for parts.

(✔) UNBUILT KITS



Unbuilt kits are the Holy Grail for Heath collectors. Though rare, unassembled kits can and do show up at fleas and they are not always easy to spot. Sometimes they are disguised as just another junk box. If you find one and buy it, you will be faced with a terrible decision—whether or not to put it together. The answer is simple—don't. Rare or not, there are plenty of examples of whatever you have found that are already assembled. An unassembled kit, on the other hand, is an artifact frozen in time. Unassembled kits are finds of historical significance because they are direct links to the past. When assembled, the link is irretrievably broken. Unlike assembled pieces which endure, unassembled *kits*, once assembled, are lost forever. Without them, the idea of Heath "kits" becomes a mere abstraction.

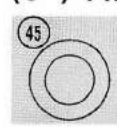
(✔) PRICES

Vintage radios are in many ways no different from antiques of any other kind. Their value is highly subjective and depends on many factors. How rare is the piece? What condition is it in? Does the seller know what s/he has? How skillful are you in bargaining? How badly do you want it? These are only a few of the variables that figure into the price of any given piece. By carefully reading the classified ads in *Electric Radio*, the *Yellow Sheets*, and various other publications, you can begin to get a sense of the high, low, and average price for any given piece in a particular condition. If you intend to collect seriously you had better do your homework. Familiarize yourself with the market.

(✔) COLLECTING ON THE CHEAP

You don't necessarily have to spend tons of money to build an impressive collection. Try collecting small stuff. For example, you could collect an entire series of related products like the AM-2 and all the other products built in that same size cabinet. Collect all the grid-dip meters, all the VTVMs, all the substitution boxes, all the "little brown boxes," or any of the dozens of small products Heath made. For a little more you could collect all the novice-class transmitters. How about a collection of the early test equipment products prior to the gear in gray cabinets. Those gizmos can be had for a song—even if they are in mint condition. Assembling a collection of Heath's oscilloscopes could be a life-long endeavor. After all they made about 60 different models. These too can be had for next to nothing. Many pieces of Heath hi-fi equipment can be also found inexpensively. If you really like scrounging through junk boxes, you may enjoy collecting Heathkit panel meters. Without trying very hard I have managed to collect a number of these—often for less than a dollar each. Complete collections of very specific products or components can be as rewarding as they are inexpensive.

(✔) PRE-SALE CHECKLIST



The value of any piece of equipment lies in the details. If you are buying via the classifieds you do not have the luxury of seeing the equipment and must take sellers at their word with respect to its con-

dition. It is very rare to be intentionally deceived, but for a variety of reasons sellers may not themselves know if what they have is in good working order and fitted with original parts. Buying at flea markets, however, is a different matter. It is very important to carefully inspect the unit in question before you hand over your hard-earned money. In the excitement of finding a Heathkit you want (especially a rare one) it is easy to overlook a problem. When you spot, for example, a VX-1 and your heart rate doubles, it is possible not to see that extra toggle switch on the front panel, or that the mic connector has been replaced with a non-original. I once discovered a beautiful Mohawk at a flea market. The unit appeared to be perfect and was priced accordingly. Upon careful inspection however, I observed that the main tuning knob was not original. It had been replaced by something similar. Finding an original knob is not impossible but could be both difficult and expensive.

Once you have your hand on a piece of equipment you have the right of first offer. No one is going to take it away from you. Relax. Take your time. Here is a check list you can use to make sure you are buying a good piece of gear, Heath or otherwise.

CHECK FOR:

- ( ) **Rust**
- ( ) **Dents**
- ( ) **Scratches**
- ( ) **Original knobs**
- ( ) **Extra holes in top/sides/back of cabinet**
- ( ) **Extra front panel controls/connectors**
- ( ) **Extra rear panel controls/connectors**
- ( ) **All connectors are original type**
- ( ) **Feet are present and original**
- ( ) **All paint is original**
- ( ) **All painted surfaces intact (no worn spots)**
- ( ) **Dial and front panel legends original and intact**
- ( ) **Dial window glass/plastic intact**
- ( ) **Meters original and not stuck**
- ( ) **Controls operate smoothly through ranges**
- ( ) **Slide rule dial pointers operate smoothly over entire length**
- ( ) **Dial drums not cracked**
- ( ) **Fuses present and not burned out**
- ( ) **Wiring is neat**
- ( ) **Soldering is expert**
- ( ) **All tubes present and intact**
- ( ) **Evidence of internal modifications**
- ( ) **Chassis corrosion**
- ( ) **Battery corrosion (where applicable)**
- ( ) **Evidence of overheated/burned components**
- ( ) **Assembly and/or operating manual present**

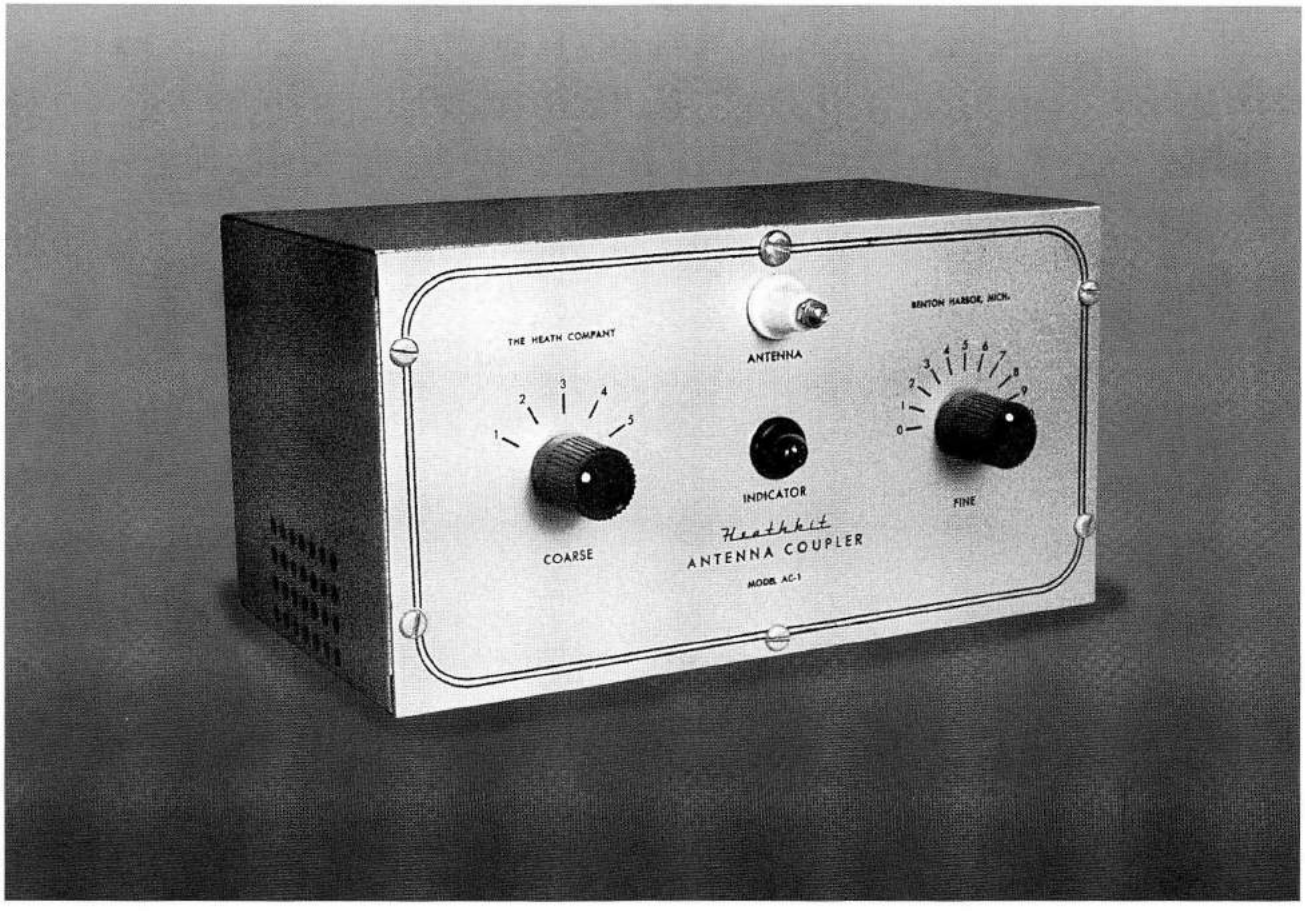
These steps represent that fabled "ounce of prevention." And given the weight of the average "boat anchor," they may be worth much more than the fabled "pound of cure."

There is a great deal more that could be said about collecting, restoring, and using vintage radio equipment—most of it well beyond the scope of this book. The potential collector has a great deal to learn and there are many good sources to learn from. Hamfests offer an opportunity not only to collect, but also to connect with collectors, most of whom are only too happy to share their knowledge and experiences. Users of the Internet have access to a wealth of information about vintage radios. In addition to the Usenet newsgroups such as REC.RADIO.SWAP there is a listserve dedicated to the discussion of vintage radios. To subscribe send a post to "boatanchors@gnu.ai.mit.edu".

Owning and using vintages radios is a great joy I hope many people will experience, and the fraternity of collecting has many rewards.

FROM THE HEATH CATALOG

A Guide to the Amateur Radio Products

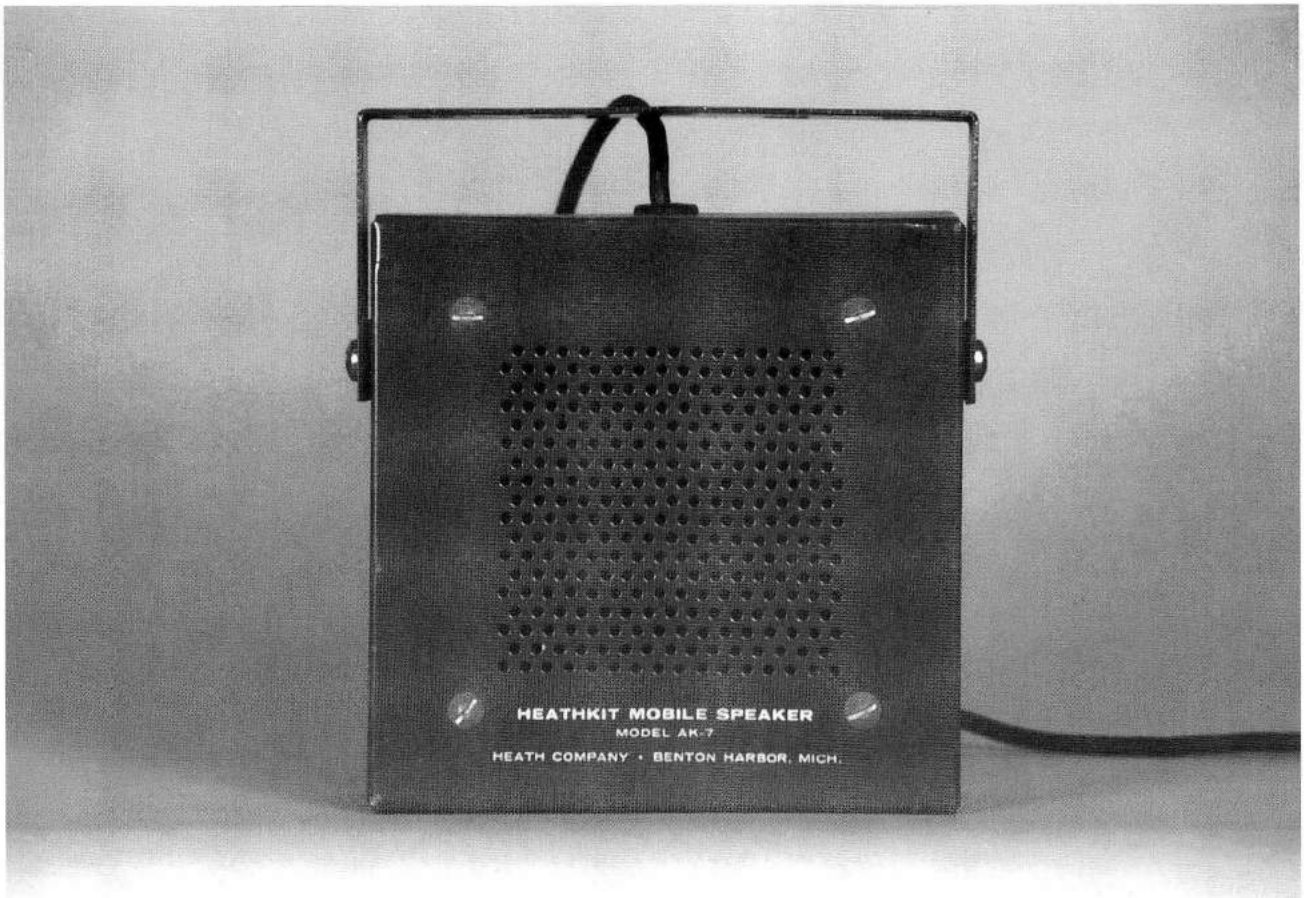


Antenna Coupler

Manufactured: 53-56
Price: $14.50

Comments: The AC-1 is a simple "match box" and was released as a companion product for the AT-1 transmitter (see listing). It is designed to work with random wire antennas (at least 75 feet long) from 80 through 10 meters and contains an L-section-tuning network. The unit features a tapped inductor for coarse adjustment, a variable capacitor for fine adjustment, a neon lamp tuning indicator, and a 36 MHz low-pass filter. The AC-1 will handle 75 watts, has a rear panel SO-239 input connector, and a front panel porcelain stand-off binding post for the output. Two versions of the AC-1 have been noted. The earlier version uses black Collins-like knobs and dial markings including complete circles. Later versions used small gray knobs and dial markings without the complete circles. The silver paint style matches the AT-1. Both versions are very rare.

Weight/Size: 3 lbs; 8″ wide x 4.25″ high x 5″ deep
Related Products: none

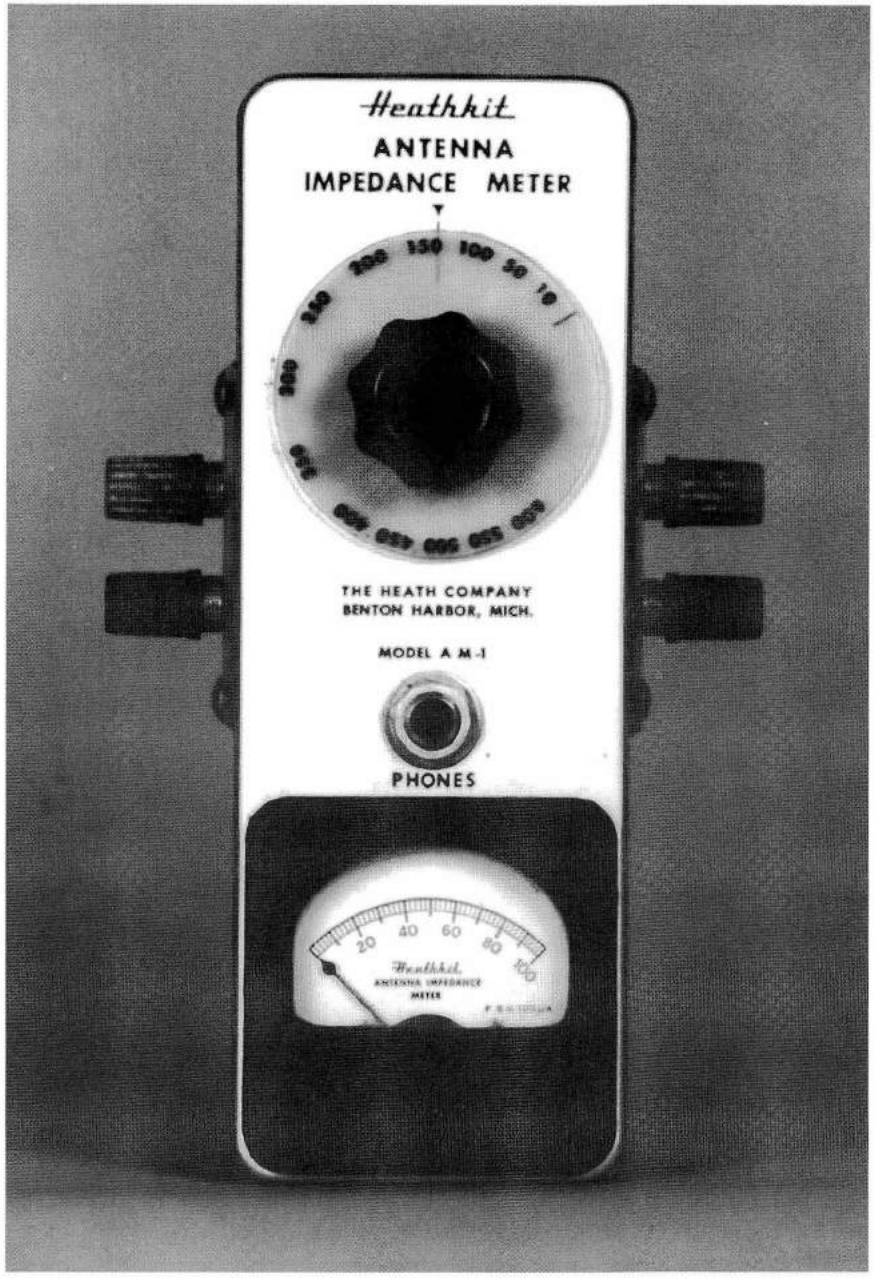


Mobile Speaker

Manufactured: 59-63
Price: $5.95

Comments: The AK-7 was designed for use with the MR-1 (Comanche) receiver, but was compatible with a variety of other Heath products. The simple square box contains only an 8 ohm speaker. It was sold with a mobile mounting bracket and should not be considered complete without it. The unit is finished with a smooth finish green paint. Very rare.

Weight/Size: 1 lbs; 5″ wide x 5″ high x 2.5″ deep
Related Products: MR-1

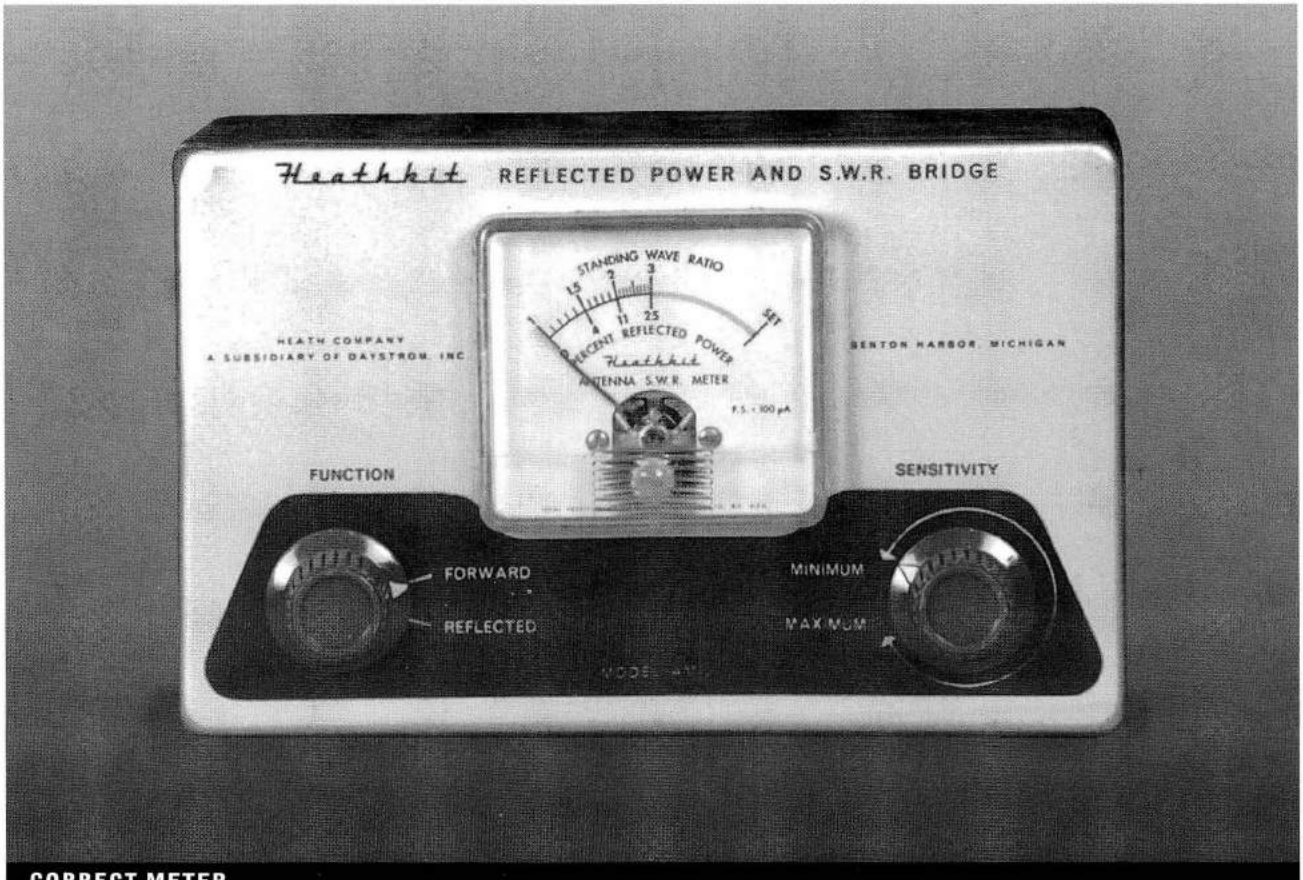


Antenna Impedance Meter

Manufactured: 52-60
Price: $14.50

Comments: The AM-1 was introduced in Fall 1952 and was designed primarily as a companion device for use with the GD-1 series grip dip meters. It is, in fact, built into the same size box as the GD-1. The AM-1 is essentially a resistance type SWR bridge in which one arm of the bridge can be varied. When used with a small RF source (like the GD-1), the AM-1 may be used to determine the impedance and resonant frequency of an antenna, as well as transmission line impedance. By connecting headphones, the AM-1 also can be used as a monitor for AM transmissions. It also can be used as a field strength meter when high sensitivity is not required. The AM-1 will measure impedance from 0 to 600 ohms and has a frequency range from 0 to 150 MHz. There isn't much to go wrong with the AM-1—its only active component is a diode. CAUTION: Do not use the AM-1 with an RF source exceeding a half a watt. CAUTION: Remove the bottom cover first to avoid damage to the front panel when opening the unit for inspection. The small assembly manual for the AM-1 contains detailed instructions for use of the unit in a wide variety of applications and would be handy to have. There are two very similar but distinctly different versions of the AM-1. Early units had the impedance calibration numbers screened onto the front panel, and employed an AT-1 style pointer knob; but by at least 1956 (and perhaps much earlier), these had been replaced with a round knob attached to a circular plastic disk on which the numbers rotated. While both types are rare, the earlier version is much more so. The paint style matches the QF-1, et al—a silver gray front panel with a gray wrinkle box. Although Heath sold the AM-1 for almost nine years and undoubtedly sold thousands of them, AM-1s are very rare regardless of condition.

Weight/Size: 3 lbs; 2.5″ wide x 3″ high x 7″ deep
Related Products: GD-1(A)(B)

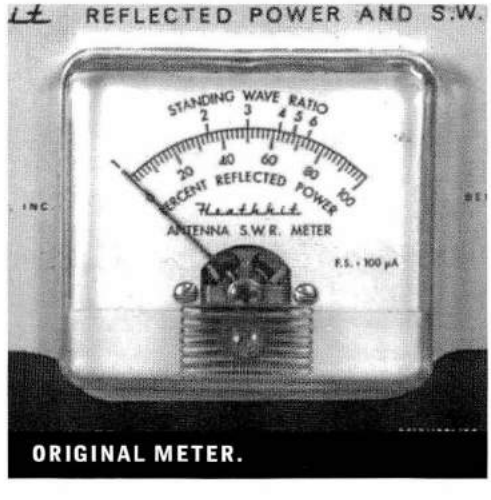


CORRECT METER.

SWR Bridge

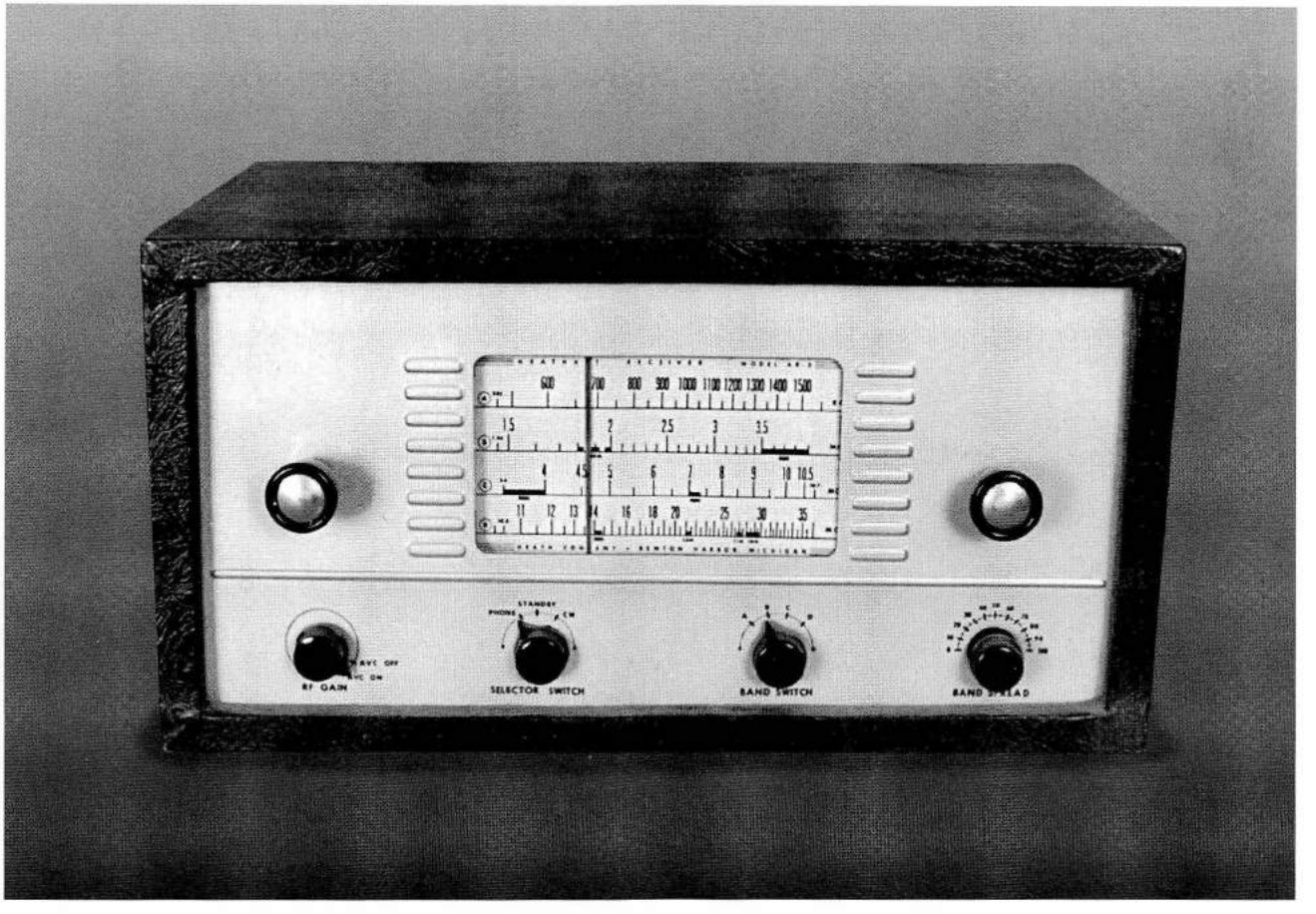
Manufactured: 57-62
Price:$15.95

Comments: The AM-2 was Heath's first SWR meter (the AM-1 was an antenna impedance bridge). The AM-2 was designed to match all the DX series gear, using the silver and gray paint scheme. The unit will handle "well over 1 kilowatt" of power, can operate with 50 or 72 ohm lines, and covers 160-6 meters. Late-model units have an all plastic meter similar to the DX-40 with a red area above the 3:1 mark and are calibrated to 25 percent reflected power. Earlier units have been found in which the meter is calibrated all the way to 6:1 with no red area, and in which the reflected power scale is calibrated all the way to 100 percent. Very early units used black bakelite meters like those used in the GD-1 series grid dip meters, but these units are very rare. Additionally, the meters in many early units are marked so that a 3:1 SWR corresponds to 50 percent reflected power which is, of course, wrong. This is one of the more obvious mistakes Heath let sneak out the door. In all other respects the meters of the two versions are identical. Having all three versions in your collection would be great. In 1962, Heath "updated" the AM-2 with the classic green paint finish and called it the HM-11. The insides didn't change. The AM-2 is not too rare and shows up at swap fests with surprising frequency.



ORIGINAL METER.

Weight/Size: 3 lbs; 7.25″ wide x 4.75″ high x 4.25″ deep
Related Products: HM-11, HM-15, HM-102



General Coverage Receivers

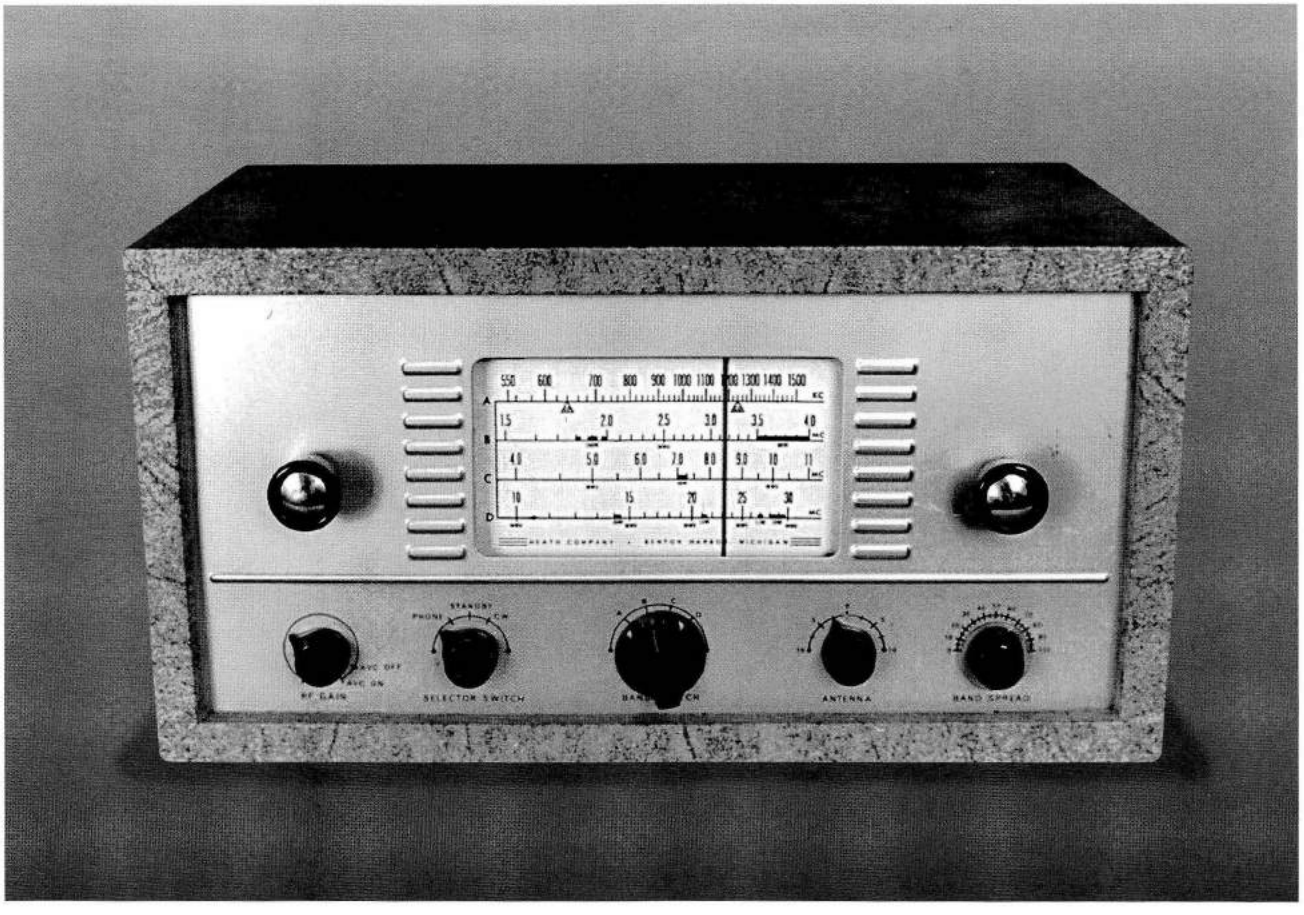
Manufactured/Price:

AR-1	**49-51**	**$23.50 (less cabinet)**
AR-2	**52-55**	**$25.50 (less cabinet)**

Comments: These were Heath's first serious SWL receivers, preceded only by the Heath K-1 and K-2 "all wave" radios (not listed). The AR-1 and AR-2 are 6 tube superhet designs and employing both octal and miniature tubes. Outwardly, these radios are virtually identical. Electrically they differed from each other in substantial ways. The AR-1 is a bare-bones receiver and first appeared in Heath's 1949 Christmas flyer. It is a six-tube unit covering 550 kHz to 20 MHz in three bands using a 455 kHz IF. It features a transformer power supply and a tone control. There is also a "phono/radio" switch. It has no built-in speaker—that was optional. It also does not have a BFO, bandspread, phone jack, or AVC switch. Sensitivity was advertised as 15 uV or better on all bands. It was also offered with an *optional* gray metal cabinet and front panel combination—$4.50. The AR-2 also uses six tubes, but its frequency coverage has been expanded, covering 535 kHz to 35 MHz in four bands. Again, the IF was 455 kHz. Heath also had added a few amenities missing on the AR-1: a built-in speaker, a bandspread, BFO, RF gain control with AVC, a headphone jack, and a noise limiter, and took off the tone control and "phono/radio" switch. Advertised briefly as the "perfect companion" for the AT-1 novice transmitter, the AR-2's poor selectivity and stability would have made it a dismal choice for that purpose. By this time Heath had replaced the optional metal cabinet with an optional gray fabric-covered plywood cabinet — still $4.50. Overall, the AR-1 and AR-2 worked about as well as any receiver of the genre. Unlike the AR-3, these units do not have lighted dials. Designed for 120VAC, 50/60 Hz operation. Both the AR-1 and AR-2 have become quite rare.

Weight/Size: 9 lbs; 11.5″ wide x 5.75″ high x 6.75″ deep

Related Products: AR-3, GR-54, GR-64, GR-78, GR-81, GR-91, SW-717, SW-7800, QF-1

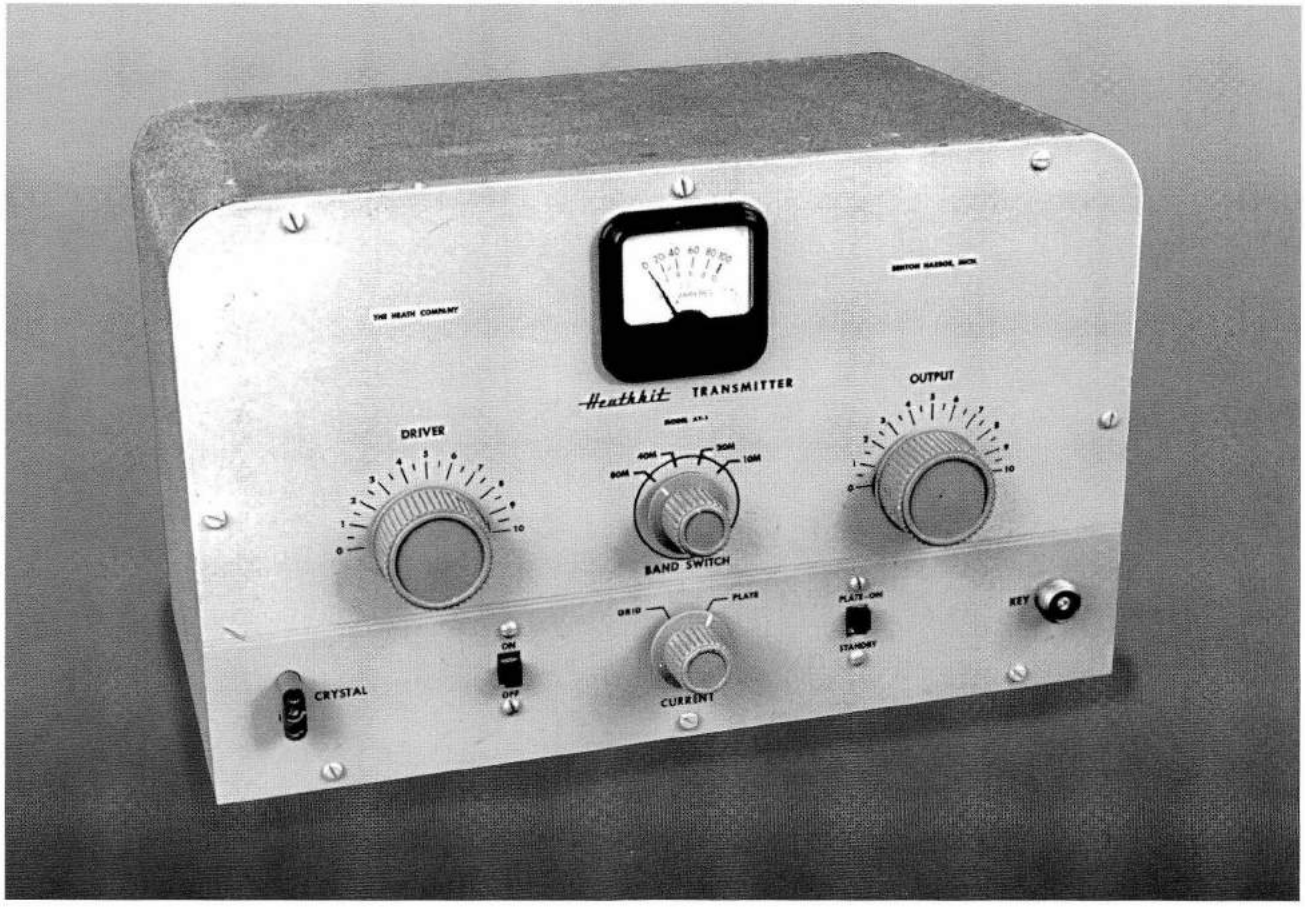


General Coverage Receiver

Manufactured: 56-61
Price: $29.95 (less cabinet)

Comments: Unlike the AR-1 and AR-2 (see listings), the AR-3 uses only five tubes, though advertising was sometimes unclear or inaccurate on this point. The 12BA6 BFO was removed and the circuit redesigned so that the 12AV6 (2nd detector, AVC, and first audio amp) could also act as the BFO. The front panel layout changed a bit, now including an antenna trimmer control and a band switch with a larger knob located in the middle of the unit. Also, the frequency coverage differed slightly—550 kHz to 30 MHz in four bands, with a 455 kHz IF. The selectivity has been improved with the use of new slug-tuned high Q coils and better IF transformers. These changes did nothing to improve the unit's stability, which was still poor. The AR-3 also includes an octal accessory socket to supply power for a Q-mulitplier, which could improve considerably the AR-3's selectivity, although Heath's QF-1 Q-mulitplier didn't arrive until 1959. The AR-3 uses a transformer power supply and features an electrical bandspread, separate RF and AF gain controls, an AGC and BFO, noise limiter, headphone jack, and an internal speaker. The gray fabric-covered plywood cabinet was still an extra $4.50. Unlike the AR-1 and AR-2, the AR-3 features a lighted dial. Designed for 120 VAC, 50/60 Hz operation. The AR-3 is quite rare.

Weight/Size: 9 lbs; 11.5″ wide x 5.75″ high x 6.75″ deep
Related Products: AR-1, AR-2, GR-54, GR-64, GR-78, GR-81, GR-91, SW-717, SW-7800, QF-1

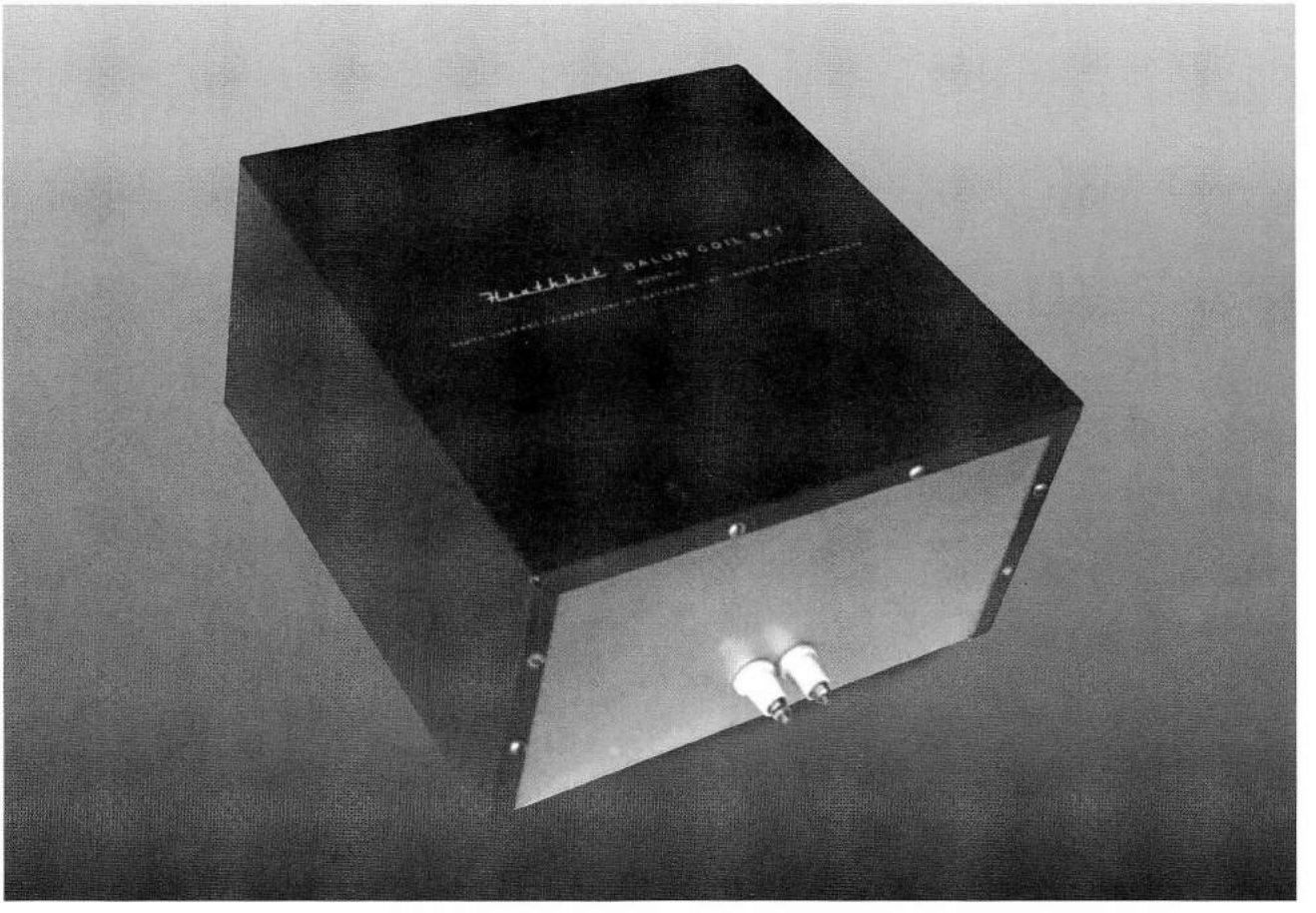


6 Band CW Transmitter

Manufactured: 52-56
Price: $29.50

Comments: The AT-1 was Heath's first serious entry into ham radio and as a result, it is highly sought after by collectors. Inspired by the creation of the Novice class license only months earlier, this radio stormed the novice market and set Heath on a course for fame and fortune. While it was just a basic three-tube design (5U4, 6AG6, 6L6), Heath packed a lot of nice features into the AT-1. For example, there were provisions for a modulator (though Heath never made one) and a VFO. The AT-1 also included an internal power supply, was built on a copper plated chassis, and incorporated single-knob band switching—no need to swap coils. The final input power is from 25 to 35 watts, depending on which ad you read, with coverage from 80 through 10 (including 11) meters. Early units were fitted with black "Collins-like" knobs while later models used gray DX-20 style knobs (sans pointers.) With respect to the meter, it is important to note that the panel meter used on the AT-1 is not the same one used on the DX-20 or DX-35 transmitters. The AT-1 meter has no zero adjustment, has a small "hump" that covers the pivot point, and does not say "Heathkit." It is not uncommon to find AT-1s with other meters installed. There were, however, variations in the crystal socket and key connector used in the rig. Beware the high voltage across the key contacts. In 1957, the AT-1 was replaced by the DX-20. The DX-20 was in turn replaced by the HX-11, which was the last of the line, in 1961. Heath didn't make another CW-only transmitter until 1979 (the HX-1681). The AT-1 is designed for 120 VAC, 50/60 Hz operation. AT-1s in good, unmodified condition are very rare.

Weight/Size: 13 lbs; 13″ wide x 8.5″ high x 7″ deep
Related Products: VF-1, AT-1, DX-20, HX-11

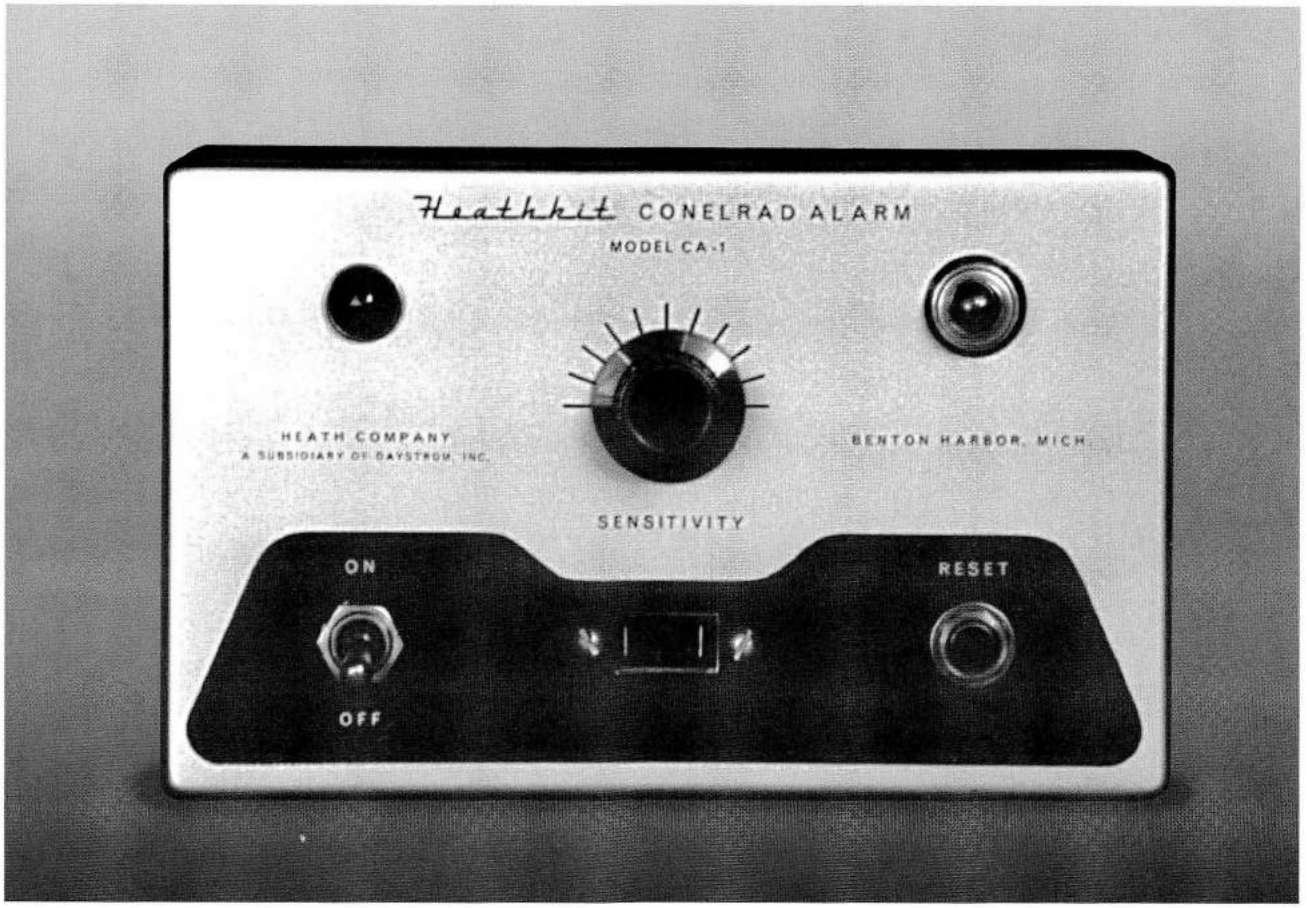


Balun Coil

Manufactured: 57-63
Price: $8.95

Comments: The B-1 covers 80 through 10 meters and handles up to 200 watts. It matches coaxial cables to 75 ohms or 300 ohm balanced line and will provide a 1:1 or 4:1 match. It was sold as an accessory for AT-1 and DX series. The unit is painted with the familiar dark gray color of the classic series test equipment. The B-1 is medium rare.

Weight/Size: 4 lbs; 9″ wide x 9″ high x 5″ deep
Related Products: none



CONELRAD Alarm

Manufactured: 57-60
Price: $13.95

Comments: The Cold War was a treasure trove for manufacturers offering all kinds of "protective" devices, and Heath was no exception. In addition to geiger counters and dosimeters, Heath sold this clever gizmo designed to shut down your station at the first hint of "incoming." The CONELRAD system was designed to thwart attempts by enemy aircraft to home in on broadcast stations. This was how the Japanese had found their way to Pearl Harbor. CONELRAD is an acronym for CONtrol of ELetromagnetic RADiation. In times of war, hams and most broadcast stations had to go off the air. The assembly manual rather matter-of-factly mentions that having the CA-1 connected to you transmitter "precludes the possibility of your station being the recipient of a guided missile which is using your antenna for a homing device." The CA-1 is placed in the line between the power receptacle and equipment to be controlled. It was then attached to any AC or DC broadcast band radio, provided the radio had an AVC. When the monitored broadcast station went off the air (this is how the CONELRAD system worked) the CA-1 would cut power to whatever it was connected to, and would light a red warning light. It features a thyratron tube, a 6-amp relay, and an internal power supply. The front panel contains a on/off toggle switch, a "reset" push button, a pilot light (clear), an alarm light (red), and a sensitivity control. Note that the panel lights are of diferent styles. The rear panel contains the line cord and a cable for connection to the receiver. The unit is finished with the silver and gray paint and matches the DX series and other small accessories. It is designed for 120 VAC, 50/60 Hz operation. The CA-1 is an extremely rare product.

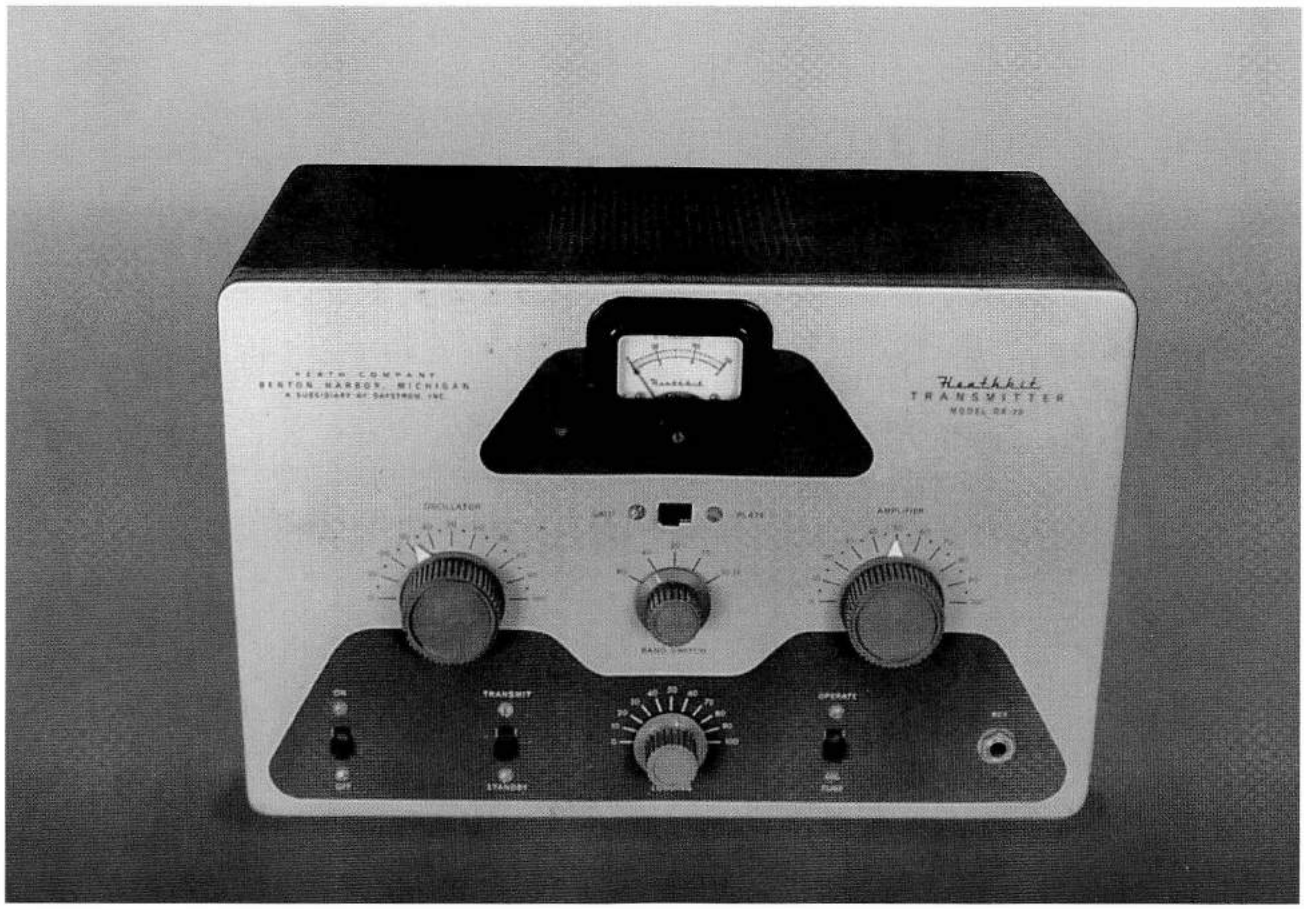
Weight/Size: 3 lbs; 7.25″ wide x 4.75″ high x 4.25″ deep
Related Products: AM-2, QF-1, VX-1

Code Practice Oscillator

Manufactured: 59-67
Price: $7.95

Comments: The first of three code practice oscillators, this transistorized, battery-powered unit didn't match any other Heath amateur product in size, shape, or paint scheme. The unit is enclosed in the same black plastic box used with the small resistance substitution boxes as well as the CR-1 crystal radio. The CO-1 has a white front panel and a cloth grill over the speaker. It is powered by two "C" cells, was supplied with a key and features a switch-selectable tone or blinking light. In 1967 Heath completely redesigned the CO-1, enclosing it in a metal box with classic green paint. The result was the HD-16. Still later the HD-16 was downsized into a plastic box (it was cheaper) and called the HD-1416. In spite if its long production run the CO-1 is very rare.

Related Products: HD-16, HD-1416(A)



6 Band CW Transmitter

Manufactured: 57-60
Price: $35.95

Comments: The DX-20 was the replacement for the AT-1 (see listing) and was arguably one of the most successful transmitters Heath ever made. It was more than just an AT-1 in a new box; it was redesigned from top to bottom. It was still a three-tube design, but its 6CL6 gave it a more stable signal, and its 6DQ6 gave it twice the power of the AT-1—about 50 watts. The DX-20's Pi-network output allowed the user to match anything from 50 to 1,000 ohms and gave it the reputation of being able to load into bed springs. Its two-tone gray styling made it look like a miniature DX-100. Access to its single crystal is through a pull-out metal plug on the left side of the cabinet. The DX-20 covers from 80 through 10 (including 11) meters. While the DX-20 can be used with the VF-1 VFO, there are no provisions for getting power to it as with the AT-1. And unlike the AT-1, the DX-20 makes no provisions for a modulator. These features were eliminated in an effort to "sell you up" to the next level—the DX-35 (see listing), which had been introduced about a year before the DX-20. Particular attention should be paid to the panel meter as it is often found to have been replaced with a non-original. Note that the DX-20 uses a black iron vane meter with a zero adjust, and has the Heathkit logo printed on the meter face. This is the same meter used in the DX-35, but is not the same one used on the AT-1. It is hard to say how many DX-20s were sold, but it was probably several times the number of AT-1s. In 1961 the DX-20 was replaced by the HX-11 (see listing). The DX-20 is designed for 120 VAC, 50/60 Hz operation. Good condition, unmodified DX-20s are very rare but still turn up at swap meets now and then.

Weight/Size: 13 lbs; 13″ wide x 8.5″ high x 7″ deep
Related Products: VF-1, AT-1, DX-35, DX-40, DX-60(A)(B), HX-11

6 Band AM/CW Transmitter

Manufactured: 56-57
Price: $56.95

Comments: The DX-35 was on the market for fewer than two years and was Heath's first low-end AM (or "phone" as it was referred to then) rig. The DX-35 uses the DX-20's silver-and-gray paint scheme, black meter, and gray knobs, and telling them apart is very difficult—especially at a distance. The 35 is a six-tube design covering 80 through 10 (including 11) meters. It includes an electron-coupled Pierce oscillator, a three-stage RF section, a screen modulator, and a single 6146 as the final amp. No neutralizing is required. The 6146 is a hefty tube and permits the DX-35 to run 65 watts on CW and 50 watts on AM. When running phone, maximum modulation is about 60 percent. The 35 also uses a Pi-network output circuit and will load anything between 50 and 1000 ohms—very forgiving. The DX-35 features single-knob band switching and switch selection (on the back panel) of three crystal frequencies or a VFO. Crystals are accessible via a door on the back panel of the transmitter. The DX-35 has an internal power supply. Particular attention should be paid to the knobs and the panel meter as these are often found to have been replaced with non-original parts. Note that the DX-35 uses a black iron vane meter with a zero adjust, and has the Heathkit logo printed on the meter face. This is the same meter used in the DX-20, but is not the same one used on the AT-1 or DX-40. Also take care to note the presence and condition of the black plastic Heath insignia under the meter. In 1958 the DX-35 was replaced with the DX-40 (see listing). Good, clean, DX-35s are, because of their short production life, very rare. The 35 is designed for 120 VAC, 50/60 Hz operation.

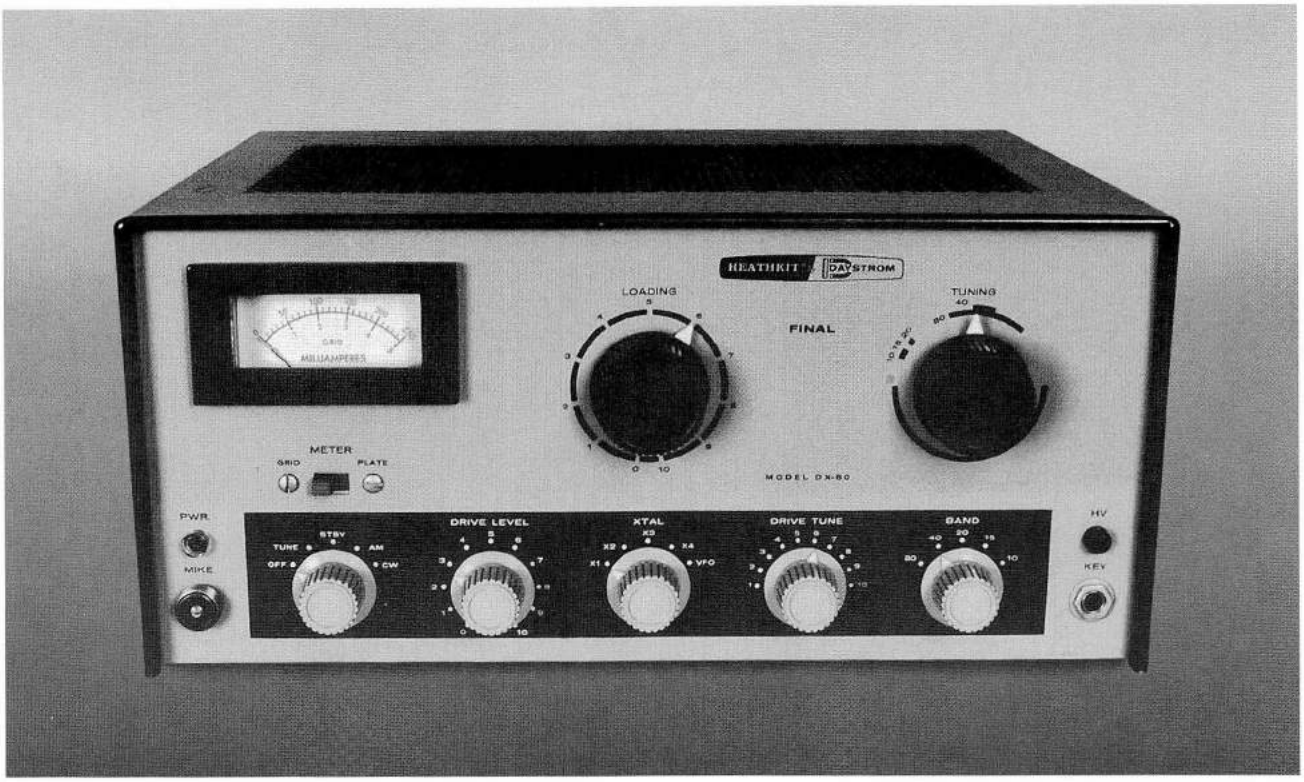
Weight/Size: 25 lbs; 13″ wide x 8.5″ high x 9″ deep
Related Products: VF-1, AT-1, DX-20, DX-35, DX-40, DX-60(A)(B)

6 Band AM/CW Transmitter

Manufactured: 58-60
Price: $64.95

Comments: Outwardly, the DX-40 is almost identical to the DX-35 (see listing). There are, however, two notable differences. The most obvious of these is the meter. The old iron-vane meter of the DX-35 has been replaced with a modern plastic cased D'Arsonval type. The D'Arsonval meter wobbled much less than the iron-vane type and made tuning easier and faster. Note that the meter has the Heathkit logo printed on the face. The other obvious change is in the function switch—it now has a "tune" position. Changes inside include a new tube line up. Most of the 12-volt tubes have been replaced with 6 volters. Only the 12AX7 speech amp remains the same. The oscillator has been changed to a hot-cathode Colpitts type, and the unit employs cathode keying. Heath also took the opportunity to goose the output power a bit. The DX-40 runs 75 watts on CW and 60 on AM using screen modulation and has much better average modulation compared to the DX-35. Other features—including power supply, frequency coverage, crystal selection, and so on—remained the same as in the DX-35. Particular attention should be paid to the knobs and the panel meter as these are often found to have been replaced with non-original parts. Also take care to note the presence and condition of the plastic Heath insignia under the meter. This silver colored insignia replaced the black plastic version found on the DX-35. The DX-40 was the last of the pre-classic "DX style" of ham gear and was replaced in 1961 by the DX-60, which reflected a new, "modernized" design. Heath also made a British version of the DX-40 called the DX-40U. The only difference between the two is the front panel styling. The DX-40 is designed for 120 VAC, 50/60 Hz operation. Clean DX-40s are rare.

Weight/Size: 25 lbs; 13″ wide x 8.5″ high x 9″ deep
Related Products: AT-1, DX-20, DX-35, DX-60(A)(B), HX-11

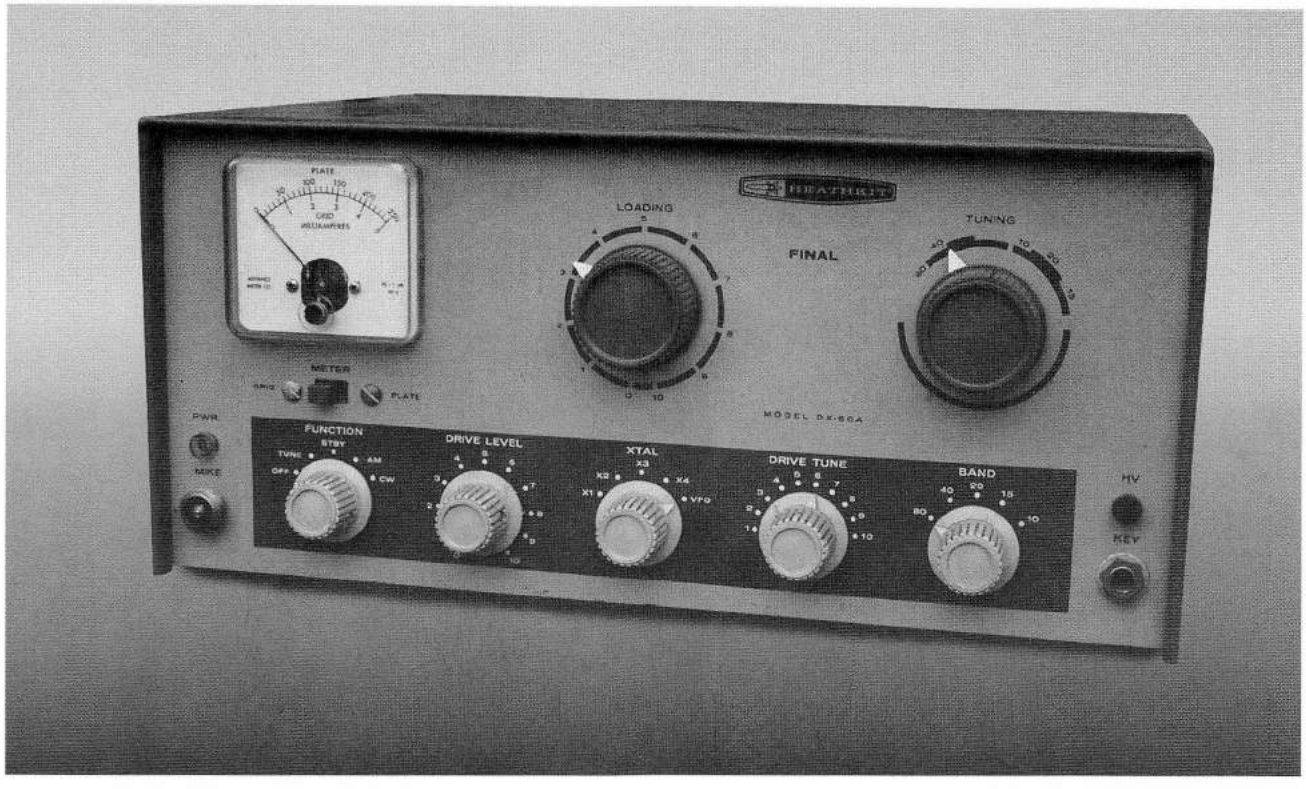


5 Band AM/CW Transmitter

Manufactured/Price:

DX-60	**62-64**	**$79.95**
DX-60A	**65-67**	**$79.95**
DX-60B	**68-76**	**$124.95**

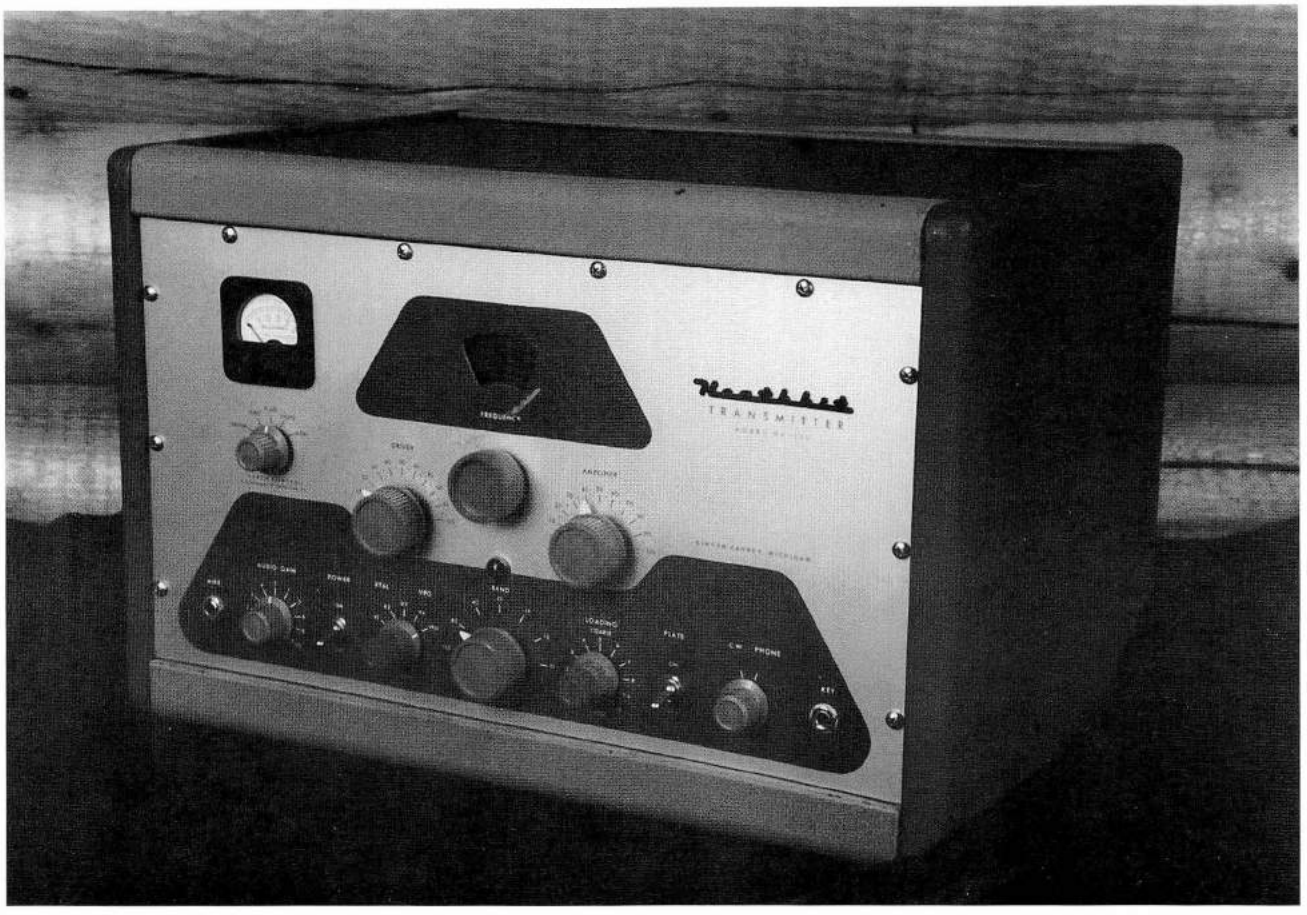
Comments: The DX-60 series was the last and most successful of the "DX" line—it was on the market for 14 years. Completely re-styled and wearing the "official" Heathkit two-tone green paint, externally the DX-60 bears no resemblance to its predecessors. Electronically there are a few similarities, but the DX-60 is much more than a DX-40 in a new box. First, the DX-60 uses a solid state power supply. And though the basic 5-tube audio and RF tube line-up is almost identical to the DX-40, the actual RF circuit is a return to that used in the DX-35—an electron coupled Pierce oscillator—with a number of distinct improvements. For example, the 6146 is now fully neutralized, and there is a pot for controlling the grid drive. The DX-60 also uses grid block keying and is rated at 90 watts phone using screen modulation (about 65 percent max.) and CW, 80 through 10 meters. The Pi-network output circuit is now followed by a built-in low pass filter—a welcome feature, although the trade-off is that the unit will match loads only from 50 to 75 ohms. The front panel has a full range of controls, full metering, connectors for a mic and key, and two pilot lights ("ON" and "HV"). Features include switch selection (from the front panel) of four crystals or an external VFO and an octal accessory socket providing power for a VFO and an TR relay. Crystals are held in a compartment on the rear panel. Differences in the A and B versions are largely cosmetic. For example the smooth paint finish of the original and A version was replaced with a wrinkle finish on the B. Perhaps the most obvious difference between the three versions is the style of the panel meter. The nice recessed illuminated meter of the first version was too costly and was replaced with a panel-mounted, non-illuminated type. On the A version, this meter most often has rounded corners and a yellowish face. On the B version, the meter usually has square corners and a black section covering the movement. Subtle variations in meter style have been seen in both the A and B versions, but the meter always says "Heathkit." Additionally, very early B versions used A style meters. Other changes include crystal socket location, addition of a socket to provide for crystals with .050 diameter pins, minor changes to the driver and tank circuits, and knobs of a darker shade of green on the B version. All versions are designed for 120 VAC,



50/60 Hz operation. DX-60 series transmitters are not rare, though the A version is seen much less frequently. Many are still on the air.

Weight/Size: 24 lbs; 13.75″ wide x 6.5″ high x 11.5″ deep
Related Products: AT-1, DX-20, DX-35, DX-40, HX-11, HR-10(B), HG-10(B)

FROM THE COLLECTION OF MIKE SEWELL.



FROM THE COLLECTION OF JIM LOCKWOOD

6 Band AM/CW Transmitter

Manufactured/Price:

DX-100 ▲	**55-57**	**$189.95**
DX-100B ▶	**58-60**	**$189.95**

Comments: The two-tone gray DX-100 and 100B (there was no A version) were the first of Heath's "big guns" and the first in the "DX" series—and were immensely popular. These massive 15-tube transmitters were typical of the construction of the era—big and heavy. The 100 is built on a copper-plated chassis with a clear lacquer coating; the B version is built on a zinc-plated chassis with no coating. Both versions feature a built-in illuminated VFO (indentical to the one used in the VF-1), modulator, power supply, and illuminated PA meter. Both the original and the B are rated at 100+ watts phone (plate modulated) and 120+ watts CW, and cover from 160 through 10 (including 11) meters. They use push-pull 1625s in the modulator and a pair of 6146 finals. The 6146 had just come onto the market and Heath quickly settled on it as the amplifier of choice, using it in most future transmitters. The 100 and 100B also used Pi-network interstage and output coupling. There are some significant differences between the 100 and 100B. The 100 provides for selection of four crystals or the VFO from a switch on the front panel. In the B version there is only one crystal available—from a switch inside the cabinet. The 100B is pre-punched for two SO-239s (not included) for those wanting to modify it for use with the SB-10 SSB adapter (see listing). The 100 uses a combination of stepped loading (for coarse adjustment) and variable capacitor loading (for fine tuning). This scheme was replaced in the 100B with a larger gear-driven variable cap less prone to arcing; a modification kit was offered for DX-100 owners. Also, there are subtle changes in the styles of the knobs. The 100 knobs used white lines for pointers. On the 100B the pointers are little white triangles. The most obvious change in the B version is the cabinet. The multi-piece cabinet of the 100 was replaced with a one-piece formed cabinet with a hatch in the top, through which one gains access to the crystal and makes other adjustments. There also are some minor changes in the loading and crystal circuits and

FROM THE COLLECTION OF JIM LOCKWOOD

in the output circuit. The original can match from 50 to 600 ohms. The B will match only from 50-72 ohms. Heath made a "British" version of the 100B called the DX-100U. It was electrically identical (except for some tube designations) but had a different paint scheme. The British version also uses a plastic panel meter similar to the DX-60A. Neither the DX-100 nor the 100B are too rare, although very clean units in nice unmodified condition are becoming harder to find and originals are more plentiful than B versions. Both units are designed for 120 VAC, 50/60 Hz operation.

Weight/Size: "100"—120 lbs; 20.75″ wide x 13.75″ high x 16″ deep
Weight/Size: "100B"—107 lbs; 19.5″ wide x 11.5″ high x 16″ deep
Related Products: SB-10

General Coverage Receiver

"Mohican"

Manufactured/Price:

GC-1	**60-62**	**$99.50**
GC-1A	**63-68**	**$89.50**

Comments: The GC-1 was Heathkit's first solid state SWL receiver and the first ever commercially available, fully solid-state SWL receiver on the market. It was not, however, Heath's first foray in solid state. Heath had a number of less ambitious transistorized kits already in production. The GC-1 and 1A receivers are portable, 10 transistor, 6 diode, single conversion, superhet design units with a 455 kHz IF. They cover from 550 kHz to 32 MHz in five bands. Most of the electronics are on a printed circuit board. Originally priced at $99.95, the 1A went to $109.95. But by 1968, Heath had sold so many that they were able to reduce the price to only $89.50, having recouped their development costs many times over by then. The receiver features a bandspread for each ham band and the 11 meter Citizen's band, a BFO, an AVC, a noise limiter, and a dial light switch, and sports a gigantic 54-inch telescoping antenna. There also are connections for muting, external antenna, and headphones. The GC-1 and 1A are rated at 10 uV on the broadcast band and 2 uV elsewhere. There are only minor circuit differences between the two versions; both worked very well. The Mohican's flywheel tuning gave it a very smooth, solid feel and its heavy gauge metal cabinet lent to the overall feeling of a rugged piece of gear. The GC-1 and 1A came standard with a battery power pack requiring 8 "C" cells and was offered with an OPTIONAL 120 VAC adapter. The battery pack and the AC adapter are interchangeable and fit into a compartment on the receiver's rear panel. It is very rare to find both power packs with the units. In the author's opinion, the Mohican is the best SWL receiver Heath ever made—tube or transistor—surpassed only by the SB-303 and 313 (which were not general coverage), and maybe the SW-7800. The unit's compact size (by the standards of the day), battery power supply, and its use of commonly available batteries, made it very popular, especially with those traveling overseas. The Mohican was so popular in fact that sales of it continued for almost five years after it was withdrawn from the catalog. The GC-1 and 1A are "Heath Green" in color. Early units where supplied with brushed chrome knobs. Later units had polished chrome knobs. These receivers are medium rare.

Weight/Size: 20 lbs; 12″ wide x 6.75″ high x 10″ deep
Related Products: AR-1, AR-2, AR-3, GR-54, GR-64, GR-78, GR-81, GR-91, SW-717, SW-7800

FROM THE HEATH CATALOG

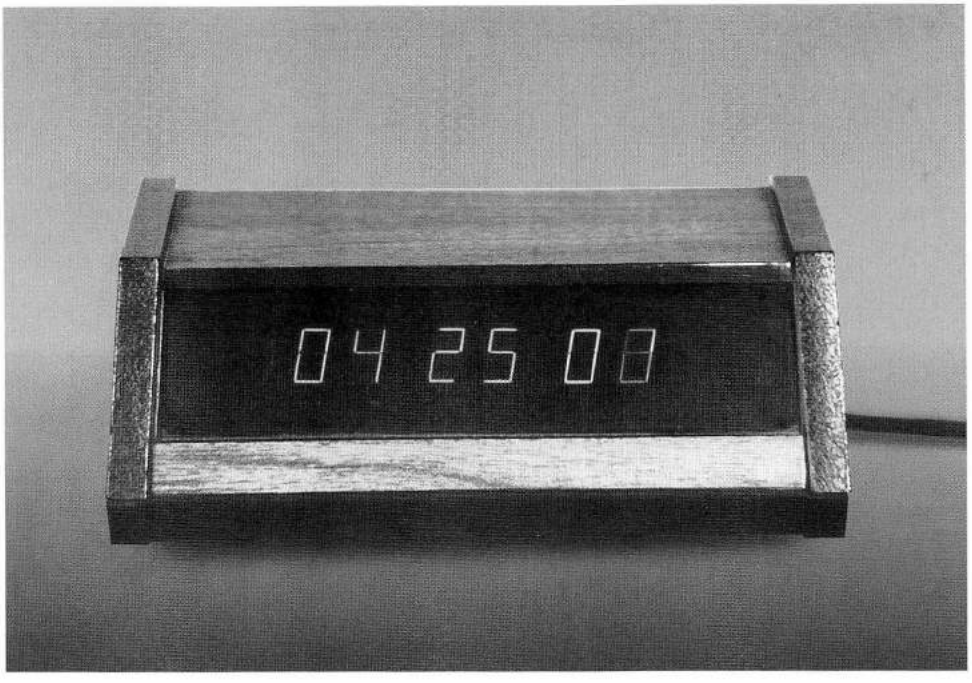
Digital Clock

"Most Accurate Clock"

Manufactured: 83-92
Price: $249.95

Comments: The Most Accurate Clock is included here because was and still is a very popular shack accessory. The GC-1000 uses a scanning receiver to lock onto and synchronize with WWV (with a wiring option for WWVH) at 5, 10, or 15 MHz—whichever is strongest. The clock runs on its own when signals are not available and is guaranteed accurate to within 10 milliseconds when synchronized—referred to as "hi spec." Most of the electronics in the GC-1000 are contained on four PC boards: display, tone decoder, receiver, and main circuit board. The receiver board is factory assembled, tested, and aligned. The receiver is an AM heterodyne, single-conversion type with a tuned RF amp, rated at 1 uV sensitivity. It is user programmable to any one of the 24 standard time zones, propagation delays of up to 18.75 milliseconds, 12- or 24-hour format, and daylight savings time. The GC-1000 also can display UTC1, which compensates for variations in the Earth's motions. A 3.6 MHz signal output is provided on the back panel and can be used as a reference standard. The Most Accurate Clock has a removable, built-in, 54-inch telescoping antenna; a BNC connector for an external antenna; and a volume control for listening to the receiver. Front panel LEDs indicate which frequency is being received, if WWV is locked in, if data is being received, and if the clock is in "hi-spec" mode. If the clock has not calibrated itself in the previous 24 hours, the 10th-second digit will be dimmed. The GC-1000 was offered with an *optional* RS-232 output to provide data to a computer (for example) from 110 to 9600 baud. Look for the rear panel RS-232 connector to check for the presence of the option. Released just in time for Christmas 1983, the CG-1000 was one of Heath's most popular and enduring kits. It's hard to say how many tens of thousands of GC-1000s Heath sold. The clock was available in kit form or wired and was one of the last kits Heath sold—offered right up to the end. The GC-1000 uses 120/240VAC or 12VDC power. 12 volt power consumption is 750 ma (150 ma with display turned off). NOTE: The GC-1000 may take as long as 45 minutes to synchronize when it is first turned on. During this time the main display will not light; don't panic. The GC-1000s are rarely seen because they are still in very high demand and sell quickly.

Weight/Size: 7 lbs; 9″ wide x 4″ high x 6.25″ deep
Related Products: none

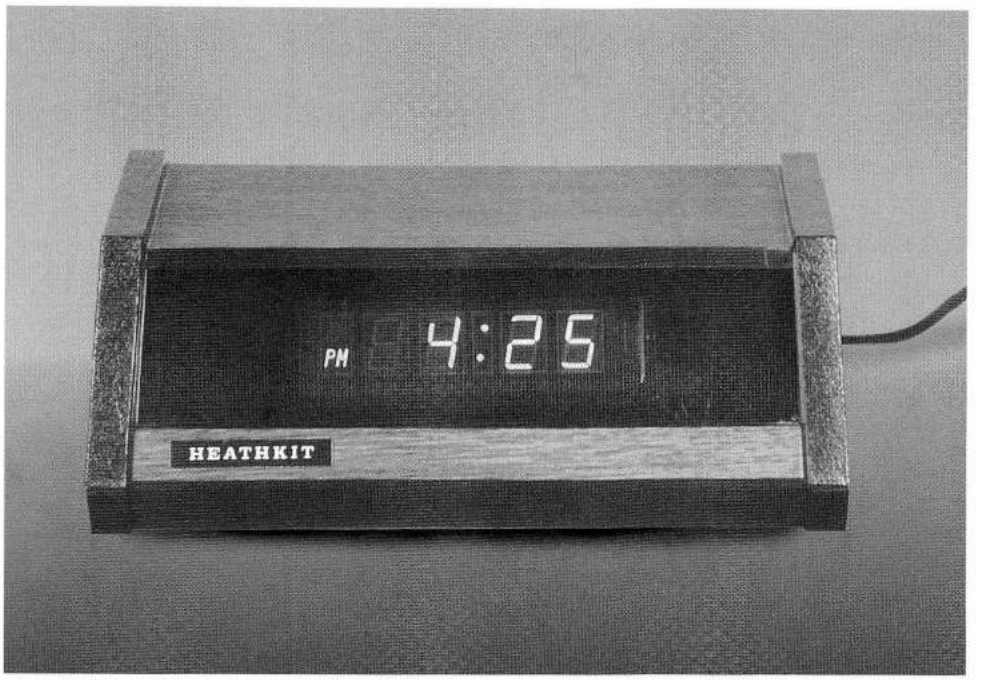


Digital Clock

Manufactured: 73-77
Price: $74.95

Comments: The GC-1005 is another of Heath's most successful products and is included here because it was a very popular accessory in the shack and was one of the first true digital clocks on the market. This 6-digit clock uses 7-segment neon glow tubes in the display, reading hours, minutes, and seconds in a 12- or 24-hour format. The 12/24 option is selected during assembly but is easy to change later—it's a single jumper wire. The clock features an alarm function with a somewhat raspy (though not unpleasant) beep-beep sound. There is also a "snooze" function that shuts off the alarm for 7 minutes (not user adjustable) and can be hit repeatedly for up to an hour. The alarm is 24 hour smart (e.g., setting at 7 a.m. will not sound at 7 p.m.). Both the time and the alarm are set with four slide switches on the bottom and can be set exactly to the second. If power is lost for more that a few seconds, the display reads 88 88 88 upon power-up until reset. The GC-1005 derives its accuracy from the power line frequency, so the time may drift back and forth by up to several seconds. This shouldn't be a big problem for anyone but the most obsessive time keepers, and they should invest in a GC-1000 (see listing). Also known as GC-1094, the clock evolved into the GC-1107 (see listing) in late '77 and into the GC-1108 (not listed) in 1985. Heath made a series of weather instruments designed to match the GC-1005 (see related products below), and they made a very nice set. Collect them all. The GC-1005 can be identified by carefully examining the display. The 1005 has 6 digits; the GC-1107 has only 4. Also, the 1005 has 4 slide switches on the bottom. The 1107 has only 3. Designed for 120/240VAC 50/60 Hz operation. No battery backup. The GC-1005 is housed in a black plastic box with wood-grained contact paper. Early units may suffer from one or more flickering digits. This is the result of an internal timing error, and while it may be a bit irritating, it is not a serious problem. Heath fixed the problem in later units. Another common but easily solved problem with the GC-1005 is that one or more segments of individual digits may be inoperative and appear to be burned out. In fact the problem is almost always mechanical, not electronic. The readout tubes connect the PC board with tiny plug and socket connectors. Over time the plug/socket junctions may oxidize causing an individual segment to fail. Simply re-seating the readout tubes will almost always correct the problem. GC-1005s are quite rare and almost never show up at hamfest flea markets in spite of the fact that during the peak of its sales, Heath sold an unbelievable 50,000 clocks per year.

Weight/Size: 2 lbs; 7″ wide x 3″ high x 5″ deep
Related Products: GC-1107, ID-1390, GC-1029A, GC-1029D, ID-1490, ID-1590, ID-2295, ID-1795



Digital Clock

Manufactured: 77-84
Price: $29.50

Comments: The GC-1107 is included here because of its populaity as an accessory in the shack. When the GC-1005 became too expensive to sell, Heath completely redesigned the clock around a vacuum fluorescent readout. Going to the new display allowed Heath to cut the parts count by around 80 percent. The new product was called the GC-1107, was packaged in the same cabinet as the 1005, and had similar features. The most obvious differences are the color of the display (green instead of orange) and the lack of a seconds display. The clock will operate in either a 12 or 24-hour format. The 12/24 option is selected during assembly but is easy to change later—it's a single jumper wire. The clock features an alarm with a "snooze" function that shuts off the alarm for 9 minutes (not user adjustable), and can be hit repeatedly for up to an hour. The alarm is 24-hour smart (e.g., setting at 7 a.m. will not sound at 7 p.m.). Both the time and alarm are set with three slide switches on the bottom. When the alarm is armed, the colon will flash. As assembled, the time on the GC-1107 cannot be set to the second—plus or minus 30 seconds is about the best you can do. However, a simple modification can be done to allow for setting of the seconds. This mod was described on page 49 of the January 1982 issue of *QST* magazine. The clock derives its accuracy from a power line. The result is that the unit will drift with the line frequency. This shouldn't be a big problem for most users. There is no battery backup. If power is lost for more that a few seconds, the clock will begin "ticking" from a random time upon power-up, and in 12-hour mode the AM/PM indicator will flash until reset. The display brightness adjusts to ambient light level. In 1985 Heath put the clock into a new cabinet and called it the GC-1108 (not listed), which was still in producion in 1993. At a flea market, GC-1107 can be identified by carefully examining the display. The 1107 has only 4 digits; the GC-1005 has 6. Also, the 1107 has only 3 slide switches on the bottom. The 1005 has 4. See comments on related products under GC-1005. Designed for 120/240VAC, 50/60 Hz operation. Housed in the same plastic and wood grained box as the GC-1005. GC-1107s are not rare and show up often at flea markets. Don't pay too much.

Weight/Size: 2 lbs; 7″ wide x 3″ high x 5″ deep
Related Products: GC-1107, ID-1390, GC-1029A, GC-1029D, ID-1490, ID-1590, ID-2295, ID-1795

Grid Dip Meter

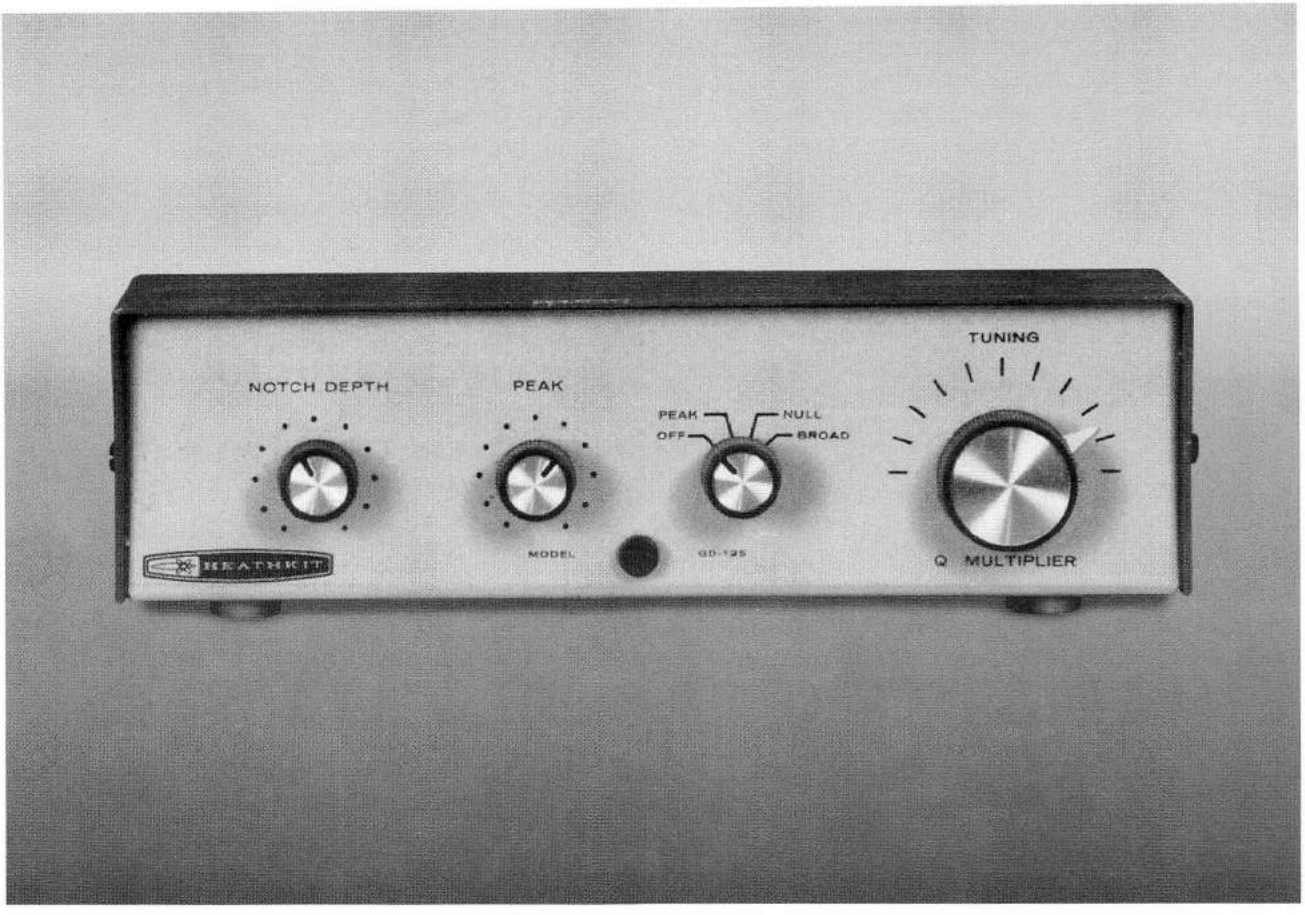
Manufactured/Price		
GD-1	52-52	$19.50
GD-1A	53-53	$19.50
GD-1B	53-60	$19.50

Comments: Along with the Cantenna and the HW-100, the GD-1 series of grip dip meters rank right up there among the most popular products Heath ever made. While the successful nature of the Cantenna and the 100 are obvious, the popularity of the GD-1 reflects the rich home-brew past of amateur radio. The grid dip meter can be used in a variety of applications: to check relative power of transmitter stages; for checking neutralization; for locating parasitics and spurious radiation; for measuring the C, L, and Q of components; for determining the resonant frequency of tuned circuits; and for the alignment of traps, filters, if stages, and so on. With headphones attached, the GD-1 series can be used to monitor an AM transmitter. Heath went through three quick iterations of the GD-1, arriving at the GD-1B early in 1953. The basic circuit is a simple Hartley oscillator using either a 6AF4 or a 6T4 depending on what Heath had on hand. The unit covers from 2 to 250 MHz with the coils supplied, and with optional coils can be extended down to 350 kHz. The optional coils were a set of 2 and included dial correlation curves. A similar set of two 3-pronged coils was sold for the 1B. Each version of the grid dip meter was a refinement in stability, sensitivity, and RF output level, though each is a very satisfactory product. While there were subtle changes in the circuitry of each version, the most obvious internal change is that the 1B is built on a copper-clad chassis. Although most of the changes were internal, there are some outward differences worth noting. Most obvious among these is the paint color. All versions are housed in a gray wrinkle finish box, but the front panels of the GD-1 and 1A are styled to match the color of the Heath's early test equipment—a color best described as very light gray with a hint of green, while the 1B wears the familiar dark gray color of the classic style test equipment. Additionally, the 1 and 1A use jacks for the plug-in coils that have 3 holes (2 actual connections), while the 1B uses a jack with 4 holes (3 actual connections). Finally, while all versions used a paper disk printed with frequency markings taped to the underside of a plastic wheel, the 1B added a

plastic window with a hairline reticule for improved accuracy. If the tape has dried out and the paper dial markings have fallen away from the plastic disk it is a simple matter to reattach them, assuming the paper disk is still in good condition. With the aid of a computer and the appropriate software, it even would be possible to make a new paper disk. The units were originally supplied with spare blank dial scales for custom use, though few of these have survived. CAUTION: Remove the bottom cover first to avoid damage to the front panel when opening the unit for inspection. The GD-1 series features a solid state power supply, a sensitivity control, and a rear panel switch to de-energize the oscillator and permit operation as an absorption wave meter (500 uV required for full scale reading). The GD-1 was supplied with 6 plug-in coils, while the 1A and 1B were supplied with only 5. These coils are stored in a nice maroon-colored cardboard box and the meter should not be considered complete without both the coils and the box. Perhaps the most remarkable thing about the GD-1, 1A, and 1B is the sheer number of them Heath sold. In the first two years on the market, Heath sold more than 15,000 grid dip meters. Based on the number of them that show up at swap meets it is likely that the total number sold in the ensuing six years may have been several times that. The most common version seen these days is the 1B. 1As are much more scarce, and the original GD-1 is very rarely seen. All three in your collection make a fine set. Look for the matching AM-1 (see listing) to complete the line.

Weight/Size: 4 lbs; 2.5″ wide x 3″ high x 7″ deep
Related Products: AM-1

FROM THE HEATHKIT CATALOG

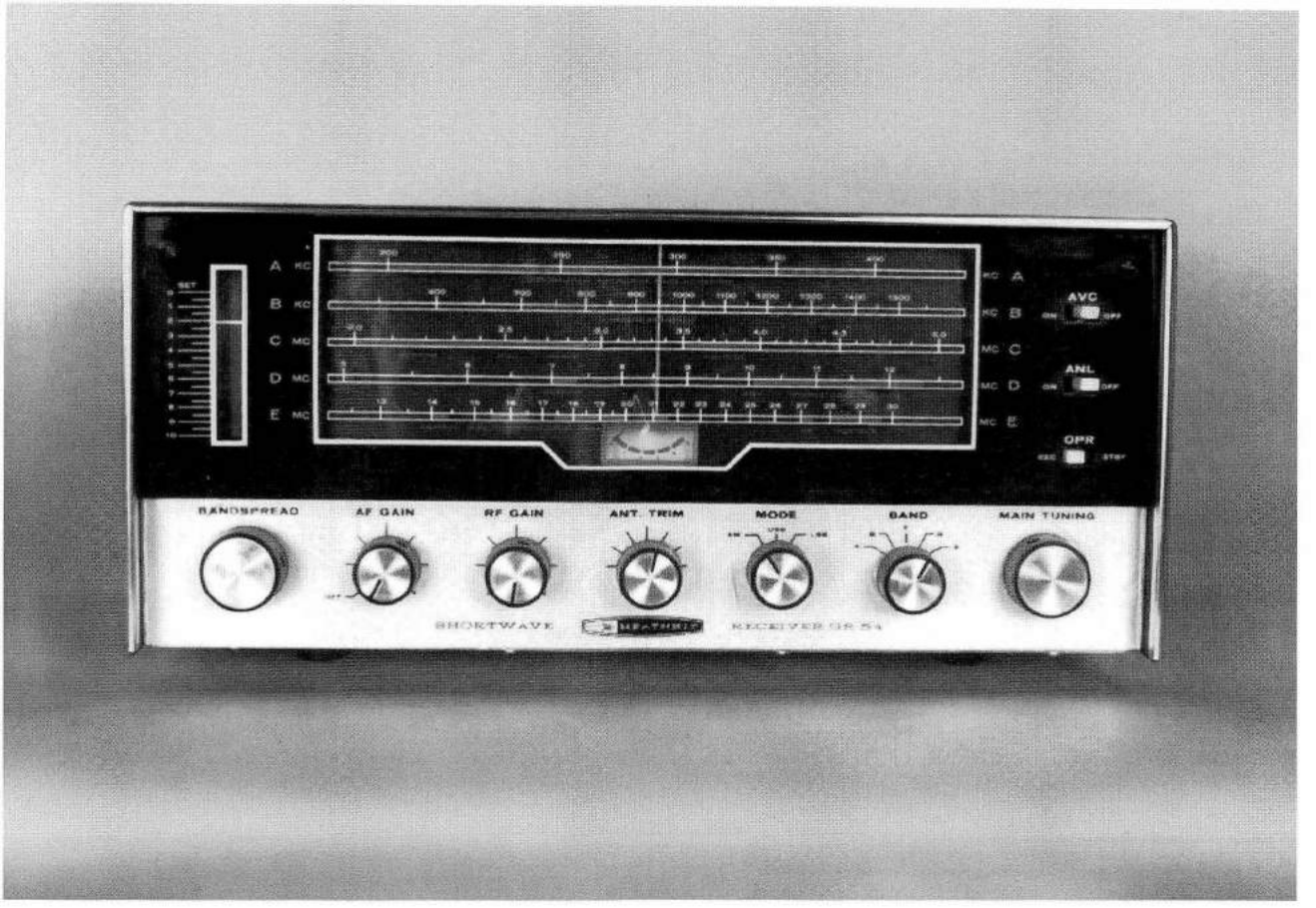


Q Mulitiplier

Manufactured: 66-71
Price: $14.95

Comments: The GD-125 is mostly a repackaged QF-1. Its 2-tone gray paint distinguishes it from SB series accessories like the HD-15 that were packaged in the same box. The GD-125 was designed for use with Heath general coverage receivers including the GR-64 (see listing) and other receivers with IFs from 450-500 kHz. Note that the 125 cannot be used with the GR-54 (see listing) because of that receiver's incompatible IF. The GD-125 is designed to improve the selectivity of inexpensive receivers and works very well. It has an effective Q of 4000 and provides a notch for adjacent signal rejection. Like the HD-11, the GD-125 includes a built-in power supply and is designed for 120/240VAC, 50/60 Hz operation. The GD-125 is medium rare.

Weight/Size: 2 lbs; 9.25″ wide x 2.5″ high x 3.5″ deep
Related Products: QF-1, HD-11

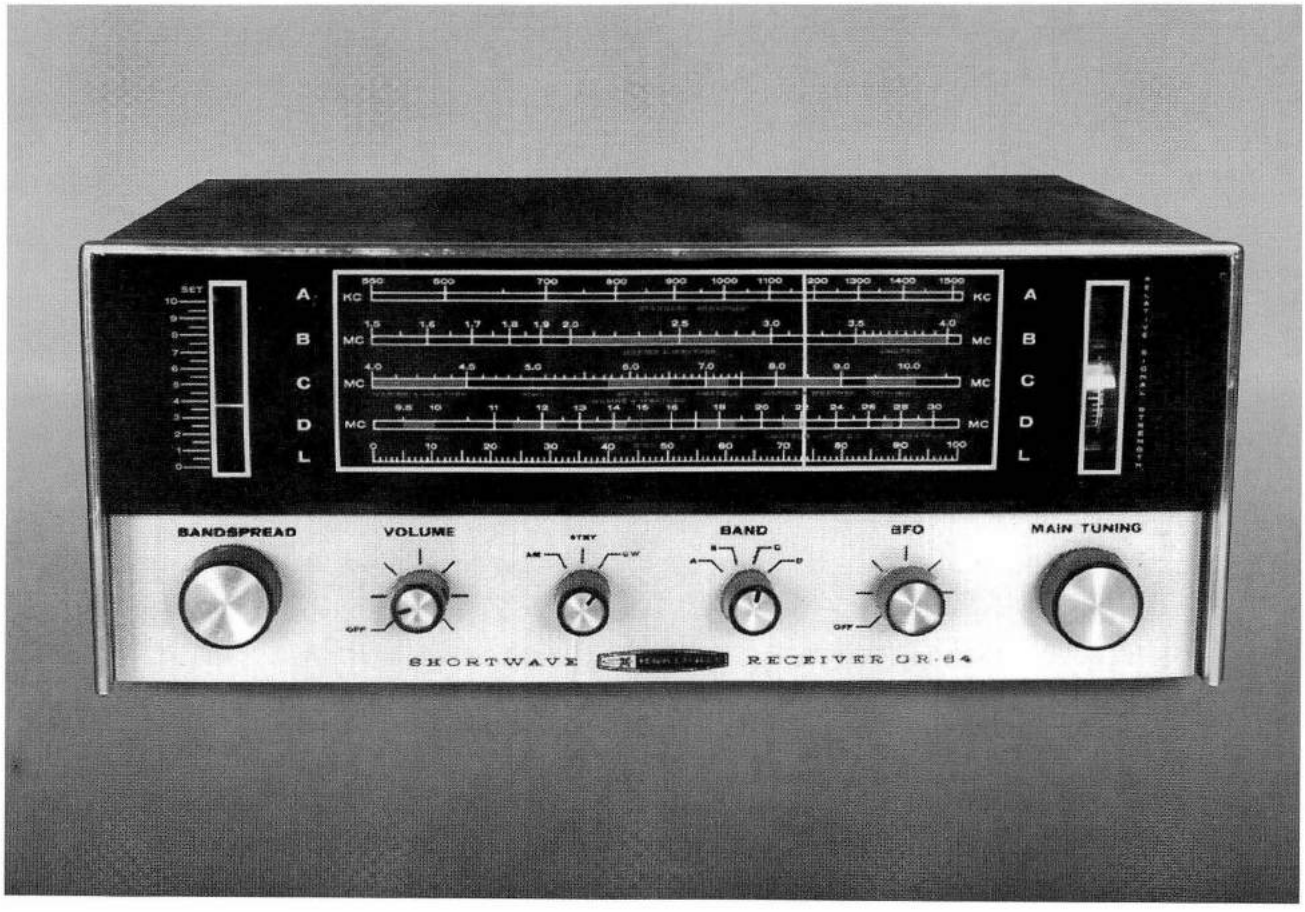


General Coverage Receiver

Manufactured: 65-71
Price: $84.95

Comments: The GR-54 was released about six months after the GR-64 and was the last of the "GR" family of receivers. The 54 was Heath's top-of-the-line slide-rule dial type receiver and the best receiver of the series. It is a 5-band, 6-tube, 6-diode (not including the power supply), superhet radio built on a single PC board. The GR-54 covers from 180 to 420 kHz, from 550 to 1550 kHz, and from 2 to 30 MHz. The 54 uses a 1682 kHz IF and has a load of features: a tuned RF-stage, crystal-filter, separate product detector for SSB/CW reception; switchable upper/lower sideband; an S-meter; an electrical bandspread; a lighted dial face; and a solid-state transformer type power supply. Selectivity is enhanced with a crystal filter rated for 3 kHz minimum at minus 6 db and 7.5 kHz maximum at minus 20 db. Depending on the band, the sensitivity varies from as good as 1 uV to as bad as 8 uV, but this kind of sensitivity is typical of the genre. The 54's stability was also typical of the genre—which is to say that is was pretty drifty. The GR-54 features an ANL, an AVC, an antenna trimmer control, a built-in ferrite rod antenna for broadcast band reception, a built-in 4x6 speaker, a headphone jack, and a built-in code practice monitor and code key jack. To practice code, tune in a weak AM station with the BFO turned on. The resulting heterodyne can be used as the tone source and can be keyed from the key jack. The 54 is alignable with or without instruments and is designed for 120/240 VAC, 50/60 Hz operation. The receiver is housed in a gray cabinet and has white-and-green band markings. Note that the GR-54's 1682 kHz IF makes it incompatible with Heath Q-multipliers such as the QF-1, HD-11, and GD-125. CAUTION: The plastic front panel cracks easily. The GR-54 was replaced in 1971 by the solid state SW-717 which was, in terms of features, closer to the GR-64. GR-54s in good condition are medium rare.

Weight/Size: 25 lbs; 14.5˝ wide x 6.5˝ high x 11˝ deep
Related Products: AR-1, AR-2, AR-3, GC-1(A), GR-64, GR-78, GR-81, GR-91, SW-717, SW-7800



General Coverage Receiver

Manufactured: 64-71
Price: $39.95

Comments: Released for Christmas in 1964, GR-64 was the first of two receivers featuring Heath's new "low-boy" styling. Its companion, the GR-54 (see listing), was released about six months later. The GR-64 is a basic, no-frills, 4-band, 4-tube, superhet receiver built on a single PC board. The 64 is designed with a 455 kHz IF and covers from 550 kHz to 30 MHz. Features include a BFO for CW/SSB reception, electrical bandspread, an S-meter, a lighted dial face, built-in speaker, headphone jack, and a solid-state transformer type power supply. Sensitivity varies depending on mode and frequency but generally is good and typical of the genre. Stability is another matter. There is also an input for the GD-125 Q-mulitplier and a connector for an external antenna. The receiver is alignable without instruments and is designed for 120/240 VAC, 50/60 Hz operation. The 64 is housed in a gray cabinet and has white-and-green band markings. CAUTION: The plastic front panel cracks easily. In 1971 the GR-64 was replaced by the fully solid state SW-717 (see listing). GR-64s in good condition are medium rare.

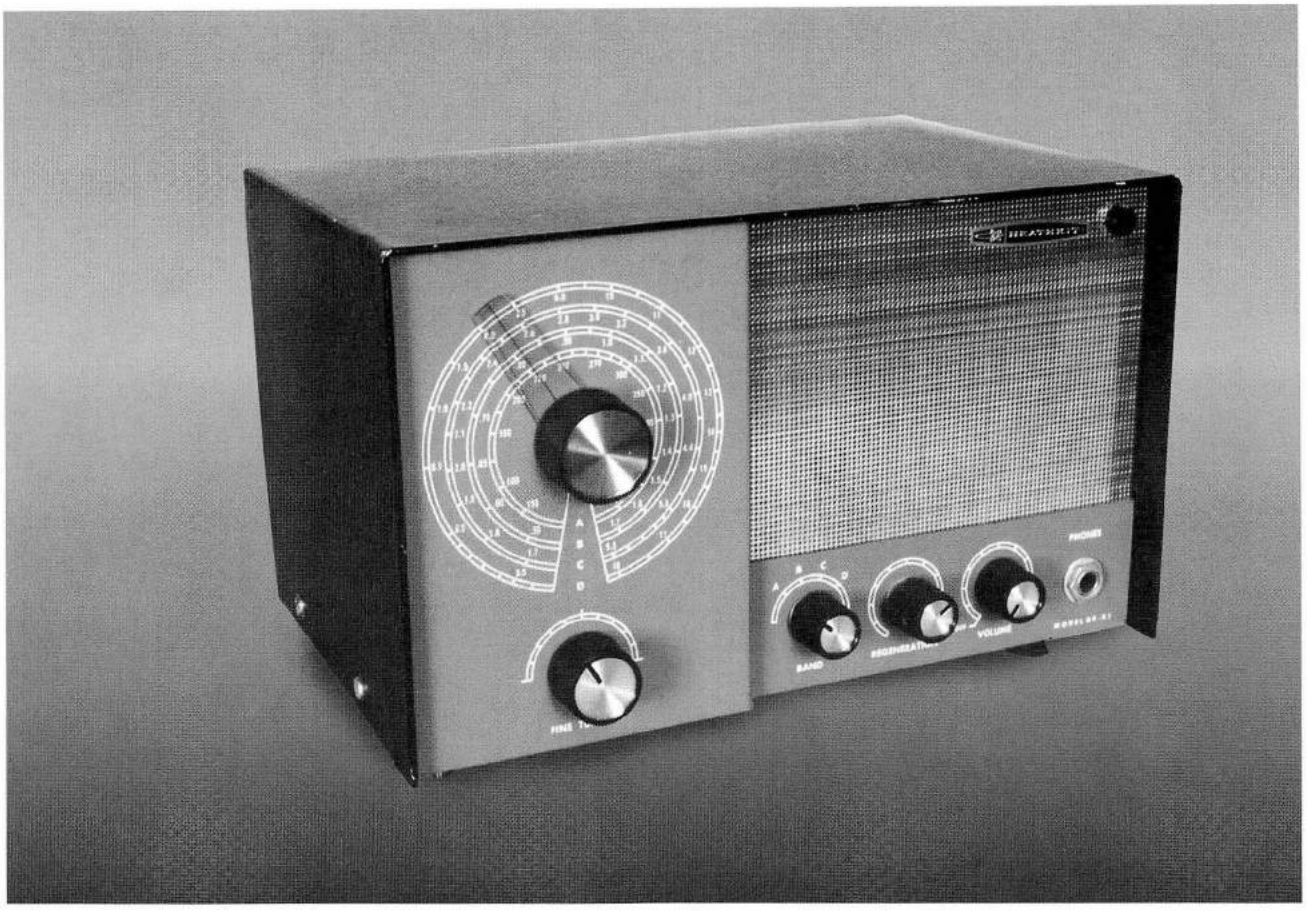
Weight/Size: 15 lbs; 13.5″ wide x 6″ high x 9″ deep
Related Products: AR-1, AR-2, AR-3, GC-1(A), GR-54, GR-78, GR-81, GR-91, SW-717, SW-7800, QF-1, GD-125

General Coverage Receiver

Manufactured: 69-76
Price: $141.91

Comments: In 1969 Heath decided it was time to update the venerable GC-1A "Mohican" receiver. The result was the GR-78, a receiver that was smaller and lighter than its predecessor but worked every bit as well and perhaps a bit better. The GR-78 is a portable solid-state superhet unit with double conversion above 18 MHz and a lot of features packed into a small cabinet. Its frequency coverage is 190 kHz to 30 MHz in 6 bands. The 78 uses 11 transistors, 5 FETs, and 7 diodes and has four ceramic IF filters. The IF below 18 MHz is 455 kHz; above 18 MHz, Heath employs double conversion using a first IF at 4.034 MHz and a second IF at 455 kHz. Features include a built-in 500 kHz crystal calibrator, an electrical bandspread, a lighted dial and S-meter, an ANL, and an AVC. The GR-78 provides switch selection of AM, CW, and SSB, and a receive/standby switch, receiver muting connection, and headphone jack. The receiver comes with a built-in speaker, telescoping antenna, external antenna connector, and carrying handle. Sensitivity varies depending on mode and frequency but generally is good and typical of the genre. Stability is very good. The 78 is built on 6 PC boards, 4 of which plug into a main board. The unit will operate from 120/240 VAC or 12-15 VDC. It also will run on internal Nicads kept charged from a built-in charger. The batteries are trickle charged (at 20-25 ma) whenever the unit is plugged in to an external power source. The Nicads may be dead, but if you're handy you can figure out a modern-day replacement. Before you buy a GR-78 it would be worth your time to remove the bottom cover to see if the battery has been leaking. NOTE: Unscrewing the whip antenna will cause internal hardware to fall off. The GR-78 is housed in a charcoal gray cabinet, and the front panel varies from light gray to light green, depending on vintage. GR-78s are not very common.

Weight/Size: 14 lbs; 11.5″ wide x 6.25″ high x 9″ deep
Related Products: AR-1, AR-2, AR-3, GC-1(A), GR-54, GR-64 GR-81, GR-91, SW-717, SW-7800

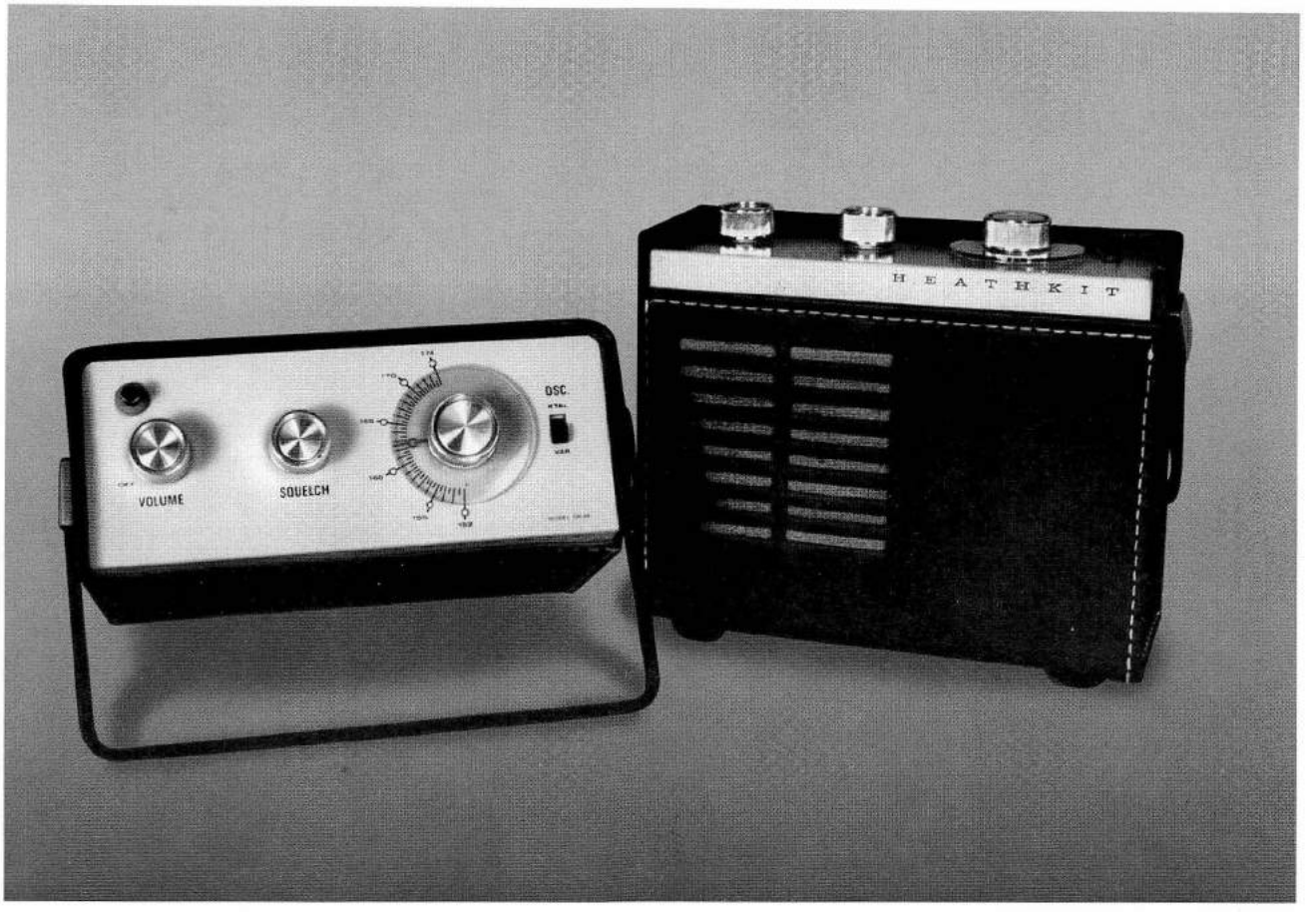


General Coverage Receiver

Manufactured: 61-72
Price: $29.95

Comments: It's hard to say why the GR-81 lasted 11 years—maybe because it was inexpensive, and was an easy project for beginners. The 81 is a simple 3-tube superegenerative unit covering from 140 kHz to 18 MHz in 4 bands. Regenerative receivers are a little fussy and take some getting used to—the regeneration control must be set just so. As long as you keep your expectations down you won't be disappointed with its performance. The GR-81's selectivity, sensitivity, and stability are awful. As if trying to reassure the wary consumer, Heath advertised the GR-81 as having a "shock free" transformer power supply. The 81 includes a built-in speaker and comes equipped with a headphone jack and provisions for both long and short antennas. The GR-81 is designed for 120 VAC 50/60 Hz operation and is fuse protected. The pilot light comes on only after the rig has warmed up—be patient. The cabinet is beige and the front panel is green with white dial markings. Although Heath probably sold zillions of these, clean GR-81s are fairly rare.

Weight/Size: 12 lbs; 10″ wide x 7″ high x 7″ deep
Related Products: AR-1, AR-2, AR-3, GC-1(A), GR-54, GR-64, GR-78, GR-91, SW-717, SW-7800



VHF Receivers

Manufactured/Price:

GR-88	**69-77**	**$54.95**
GR-98	**69-76**	**$54.95**

Comments: These 16 transistor portable VHF receivers work surprisingly well. They have reasonable sensitivity and are quite stable and drift free. The units feature a 6-to-1 vernier tuning drive ratio; squelch control; a VFO-XTAL switch with provisions for 1 crystal channel; and an internal telescoping antenna. The receivers have a built-in speaker and a jack for an external 50-75 ohm antenna. The IF on both versions is 10.7 MHz. The sensitivity was advertised at 2 uV for the 88 and 1.5 uV for the 98. The selectivity was advertised as plus or minus 40 kHz @ 6 db down. Frequency coverage for 88 is 152-174 MHz and 108-136 MHz (the aircraft band) for the 98. Both versions use PC board construction and feature a factory assembled and aligned tuner. The units can be powered by six "C" cells or from 125 VAC with optional AC power supply. The optional AC supply is built into a small metal box and fits inside the case of the receiver. The presence of the optional power supply can be determined by looking for the "cheater" type connector on the bottom right side. If you see the two connector pins, the power supply is installed. The units are housed in a leatherette case and have handles that double as a tilt-stand. Flea market advice: Check for battery leak damage. (Remove from case by removing handle and handle mounting screws. To remove handle, put handle in vertical position and push down on each side.) The GR-88 and 98 are medium rare.

Weight/Size: 5 lbs; 8.75″ wide x 7.5″ high x 3.5″ deep

Related Products: none

General Coverage Receiver

Manufactured: 61-64
Price: $39.95

Comments: This general coverage receiver is the forerunner to the GR-64. Its specifications and frequency coverage are similar—500khz to 30MHz in four bands. It features an illuminated "slide rule" dial, an S meter, an electrical bandspread, and a transformer power supply. It includes a BFO, an internal speaker, a headphone jack, an ANL, a noise limiter, and is built on a single PC board. Also included is a rear panel connector for Q-multiplier like the GD-125 (see listing). Sensitivity varies depending on mode and frequency but it is generally good and typical of the genre. The GR-91 is designed for 120VAC 50/60 Hz operation, and has a beige cabinet with a beige and green front panel and white and red dial markings. Rare.

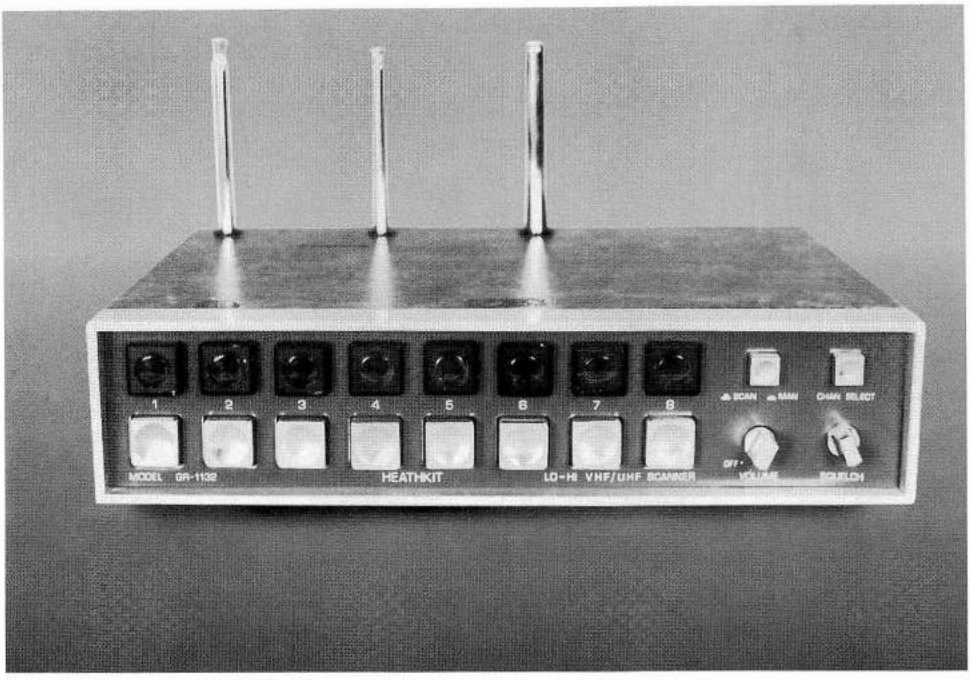
Weight/Size: 1 lb; 12.25″ wide x 5.5″ high x 8.25″ deep
Related Products: AR-1, AR-2, AR-3, GC-1(A), GR-54, GR-64, GR-78, GR-81, SW-717, SW-7800, QF-1, GD-125

VHF Scanning Monitor

Manufactured: 73-76
Price: $119.95

Comments: This very successful radio was Heath's first venture into scanners. It is a crystal-controlled 8 channel unit, using 29 transistors, 8 ICs, and 17 diodes. The GR-110 covers any 9 MHz band segment between 146 and 174 MHz and scans at 17 channels per second. The 110's sensitivity is rated at better than .5 uV (1 uV for 20 db of quieting). The 10.7 MHz IF employs crystal filters. Features include a priority channel (channel 0), a 4-second scan resume delay (not adjustable or defeatable), a manual override channel step switch, and 8 push buttons to select or de-select each channel. One unique feature is the single digit channel readout—an incandescent, seven-segment device, type 8015A. Downside: If a segment of this readout burns out, the entire device must be replaced, and these days the readout device may be very hard to find. It is important to note that the radio will continue to function normally even with burned out readout segments. The technically inclined user could replace this device with a seven-segment LED. During assembly, the builder could choose one of two modes of operation. In one mode, the channel readout runs continuously. In the other mode, the channel indicator lights only when the squelch opens. The GR-110 comes with a built-in speaker, mounting bracket, external speaker jack, and two power cables—one for 120 VAC, 50/60 Hz operation, and one for 12 VDC operation. The unit has a phono type connector for a 50 ohm antenna—there is no built-in antenna. Crystal frequency formula: (operating frequency in MHz - 10.7) / 3. Some units may make a faint ticking sound while scanning, and some units may make a distinct "pop" each time the priority channel is sampled. The popping sound is a little irritating but can be eliminated by turning off the priority channel. The 110 has a black and gray front panel with chrome trim and a wrinkle black case, though some may have been supplied with light green cases. Heath sold a ton of these scanners. They were popular for monitoring local repeaters and local law enforcement, etc. In the end, the GR-110 proved too expensive and was replaced with a more conventional-looking scanner—the GR-1130 series (see listing). The GR-110 is medium rare. Don't try to align it without the book.

Weight/Size: 9 lbs; 8.25″ wide x 3″ high x 9.75″ deep
Related Products: GR-1130 series



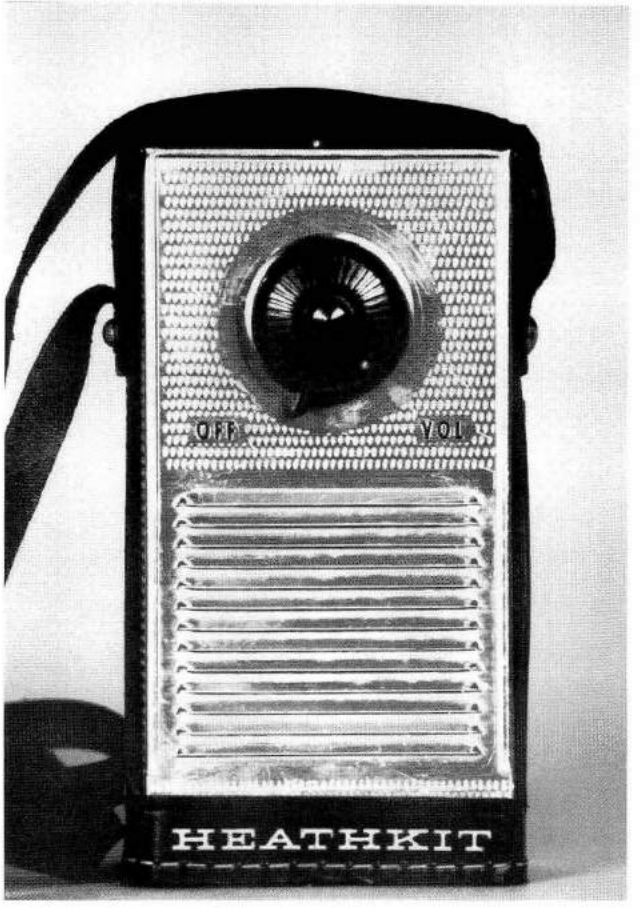
VHF/UHF Scanning Monitors

Manufactured/Price:

GR-1131	**76-78**	**$89.95**
GR-1132	**76-79**	**$139.95**
GR-1133	**see text**	
GR-1134	**76-77**	**$99.95**
MR-1134	**76-77**	**$99.95**

Comments: In 1976, Heath replaced the GR-110 (see listing) with the GR-1130 series of scanning receivers. It was a matter of economics—the digital display of the GR-110 was too expensive and unreliable. On the outside, the GR-1130 series is more conventional in that the channel display is a row of lights that scan from left to right with push buttons under each light that lock each channel in or out. Inside, however, the circuit isn't very much different from the GR-110. The 1130 priority channel is channel 1 and is sampled every 4 seconds when it is selected. The radios feature a scan resume delay of about a half a second that is not adjustable or defeatable. The GR-1131 and MR-1134 are VHF high band units covering any 8 MHz band segment from 146-174 MHz. They appear to be identical, being marketed in separate parts of the catalog to separate interest groups—the MR-1134 being targeted as a marine channel scanner. The GR-1132 is a LO/HI/UHF unit. It covers any 10 MHz segment from 30 to 50 MHz, any 8 MHz segment from 146 to 174 MHz, and any 8 MHz segment from 450 to 500 MHz. All versions have a rated sensitivity of better than .5 uV for 12 db SINAD, and all use a 10.7 MHz IF with a 4 pole crystal filter. An 8 pole filter was available as an *option*. The GR-1132 has three separate built-in antennas while the other units have only one. All versions have external antenna jacks on rear panel and versions feature a built-in speaker but make no provision for external speaker. All use PC board construction and are designed for 120 VAC, 50/60 Hz, or 12 VDC operation and come with an AC cable. For DC operation Heath supplied only a plug—you had to make your own cable. Some units may make a faint ticking sound while scanning and some units may make a distinct "pop" each time the priority channel is sampled. The popping sound is a little irritating but can be eliminated by turning off the priority channel. Crystal frequency formula for all units: VHF LO, channel frequency + 10.7 MHz; VHF HI, (channel frequency - 10.7) / 3; 450-470 MHz, (channel frequency - 10.7) / 9; 470-500, (channel frequency - 10.7) / 10. The GR-1130 radios have brown wood-grain metal cabinets, and brown or gray front panels. The MR-1134 has a beige cabinet and a green front panel. Even though they worked OK, no one was real impressed with these scanners, and in the end, Heath eliminated them with big price reductions. The GR-1133 was to be an aircraft band scanner. Although in the Christmas 1977 catalog it was advertised as being available in January '78 the GR-1133 never came to pass. The GR-1130 series scanners are medium rare.

Weight/Size: 8 lbs; 11″ wide x 3.25″ high x 8.5″ deep
Related Products: GR-110



10 Meter Hand-Held Transceiver

Manufactured: 60-62
Price: $32.95

Comments: The GW-30 was Heath's first walkie-talkie. The unit uses 4 common socketed transistors and an output power in the vicinity of 100 mw. Though advertisied for 10-meters, units have been found with CB frequency crystals installed and to which FCC Citizen's Band transmitter identification cards have been affixed. The GW-30 uses a crystal controlled transmitter and a socketed 3rd-overtone crystal with wire leads (type ML18). The receiver is a fixed frequency superregenerative unit whose frequency is determined by a simple tuned circuit. The receiver frequency is matched to the transmitter frequency by positioning the transmitter crystal near the tuning coil and adjusting the coil for minimum hiss. Receiver sensitivity is about 4 microvolts. The transmitter is peaked with a special low power light bulb (type unknown). All electronics are contained on a single PC board. The only controls are the PTT switch—a large red push button on the side of the cabinet—and the on/off/volume control on the front panel. The unit is powered by a 9 volt battery, Eveready type 246 or equivalent, though many units may be found to have been modified to accomodate AA cells or other types of batteries. Note that while type 246 batteries are not standard transistor batteries they can still be found at better electronics shops. Current drain is 22 mA during transmit and 12 mA while receiving. The range of the GW-30 in an urban environment is typically two or three blocks at best. Out in the open and away from electrical noise the range may be as far as half a mile—though Heath claimed as far as one mile between two units was possible. The GW-30 is housed in a two piece steel cabinet with a textured front panel and a louvered speaker grill. This design is unique among Heath products. Original equipment included a black leather carrying case with a shoulder strap, and a 40 inch telescoping antenna, though these items—especially the antenna—are rarely found with the unit. Leather cases that have survived to the present may be extremely dry and fragile and should be removed with great care. Historical note: GW-30s have a form on the back certifying their compliance with FCC part 15 regulations. These forms are dated with the month and year of sale, and are signed by Gene Fiebich, Heath's director of engineering, as well as the builder. Also, Heath's Al Robertson wrote to *QST* magazine suggesting ways in which the GW-30's performance could be inproved. Al's notes on the subject were published in the February 1961 issue of *QST* in the "Hints and Kinks" column. The GW-30 is very rare.

Weight/Size: 2 lb; 3.25″ wide x 6.25″ high x 2.25″ deep
Related Products: none

Five Band HF Linear Amplifier

"Warrior"

Manufactured: 61-65
Price: $229.95 kit; $330 wired

Comments: The HA-10 was Heath's first real success in a linear amplifier and the first Heath product ever to be offered as a kit or fully wired. It was designed to complement the TX-1, RX-1, HX-10 (see listings) family of products and to replace the too big, too heavy, and much too expensive KL-1 "Chippewa" (see listing) and its equally big, heavy, and expensive power supply, the KS-1. In the HA-10, Heath combined the amp and its power supply into a single cabinet the size of the Chippewa amplifier section alone—and sold it for about half the price of the KL-1/KS-1 combination. The HA-10 uses two 866As in its power supply (which runs around 1300 volts key down and fully loaded) and four paralleled, fan-cooled, 811As running class B in the RF deck. Together, they developed around 1000 watts PEP/CW and about 400 watts AM—a respectable signal by anyone's definition—requiring only 50-75 watts of drive. The HA-10 covers 80 through 10 (but not 11) meters and operates AM, SSB, and CW. The amplifier is built on a 16-gauge steel chassis with an 1/8-inch thick aluminum front panel. It is enclosed in a one-piece welded copper clad TX-1 style cabinet painted in the now familiar two-tone green colors. The HA-10's broadband input circuit will match from 50 to 70 ohms. The output circuit is a variable Pi-network with an impedance of 50 to 75 ohms to an SO-239 RF connector. There is also a monitor scope output with a level control. The front panel meter reads grid, plate, relative power, and high voltage. The HA-10 is designed for 120 VAC 50/60 Hz operation. Rare in good condition.

Weight/Size: 100 lbs; 19.5″ wide x 11.5″ high x 16″ deep
Related Products: TX-1, RX-1, HX-10, KL-1

UNIT HAS NON-ORIGINAL POWER SWITCH.

Five Band HF Linear Amplifier

"KW Kompact"

Manufactured: 65-68
Price: $99.95

Comments: The HA-14 is essentially an SB-200 (see listing) without an internal power supply. It was released about a year after the SB-200 and is designed primarily for mobile use, although it also was promoted for use in a fixed station. The KW Kompact uses a pair of 572B (T-160L) tubes and covers 80 through 10 (but not 11) meters. It uses a pre-tuned broadband input and provides 1000 watts input PEP with 100 watts of drive. The advertising didn't say anything about CW operation but did say the duty cycle was 50 percent for SSB. The meter reads relative power and SWR from its built-in bridge. Power requirements: 2000 VDC at 500 ma, minus 110 VDC at 60 ma, and 12.6 volts AC or DC at 4 amps. These voltages can be provided by two *optional* power supplies: the HP-14 (not to be confused with the HP-13) mobile supply or the HP-24 (not to be confused with the HP-23) 120 VAC supply. The HA-14 is finished in the classic SB series green wrinkle paint. These are very rare in good condition.

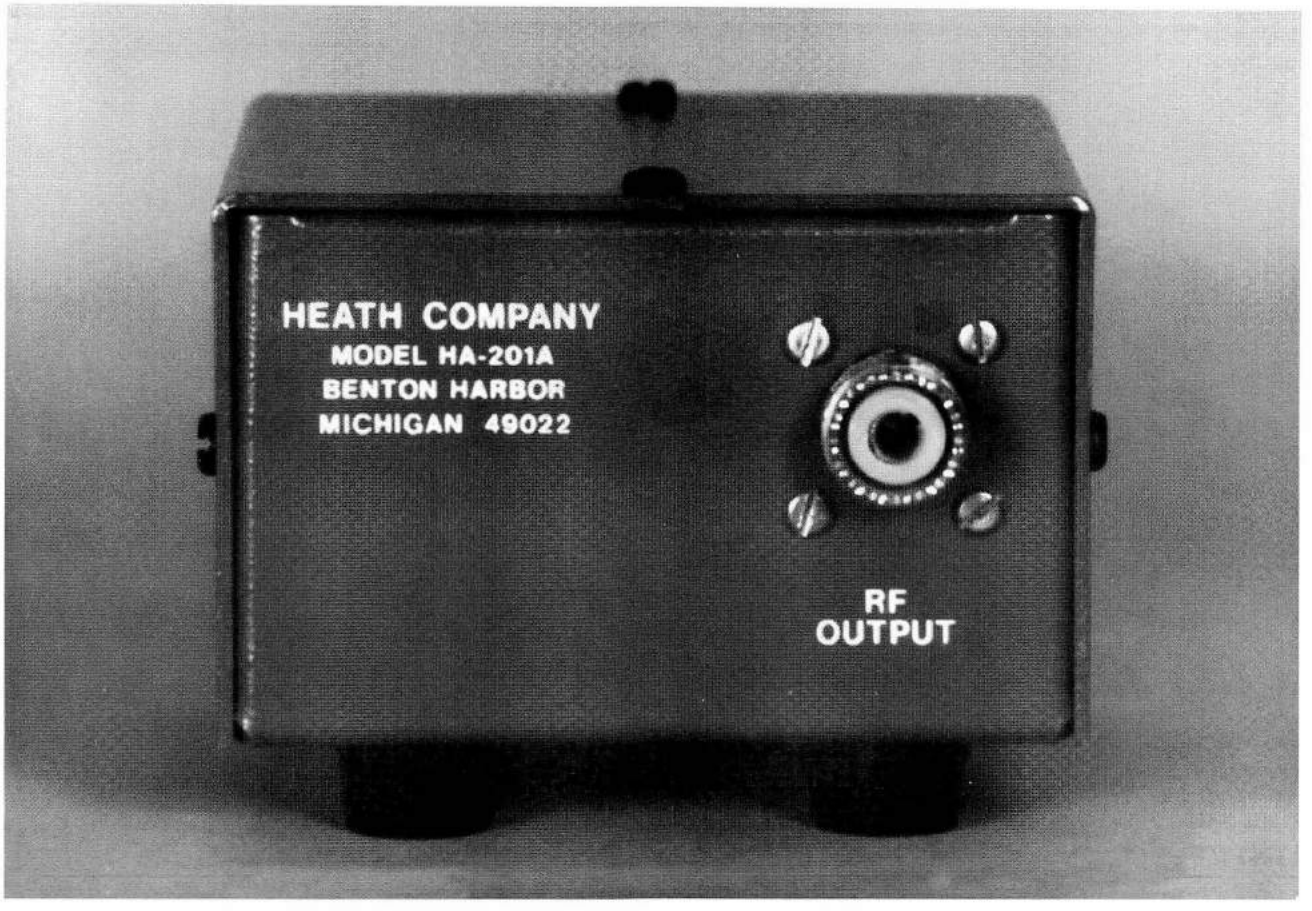
Weight/Size: 10 lbs; 12.25″ wide x 3.25″ high x 10″ deep
Related Products: HP-14, HP-24, SB-200

6 Meter Linear Amplifier

Manufactured: 62-64
Price: $99.95

Comments: The HA-20 was released just a few months after the HX-30 (see listing) and was designed specifically to give the HX-30 a little more punch. The HA-20 uses a pair of 6146s in push-pull to produce 125 watts input PEP SSB or about 75 watts on AM, and requires from 2.5 to 10 watts of drive. The HA-20 looks like a miniature version of the HA-10 (see listing) and is designed to match the HX-30. The only tube other than the finals is an OA2 regulator—the built-in power supply is solid state. Features include forced-air cooling, extensive shielding, a multi-function meter, a 50 ohm tuned grid input, a link-coupled output, and stub neutralized finals. Front panel controls include coupling, loading, tune, power on/off, meter function, band, and meter adjust. There also is a pilot light on the front panel. The meter reads grid and plate current, plate voltage, and relative power. The HA-20's panel meter is unique in that it is the only one to use a black face with a white scale prior to the introduction of the SB series. There is a rear panel control for bias adjustment. Rear panel connections include SO-239s for RF input and output and a ground post. The output circuit matches 50-75 ohm antennas. Power requirements: 120 VAC 50/60 Hz. The HA-20 is enclosed in a one-piece copper clad steel cabinet and is painted in two-tone green to match HX-30, TX-1, etc. The HA-20 is very rare in any condition.

Weight/Size: 38 lbs; 16.5″ wide x 10″ high x 10″ deep
Related Products: HX-30

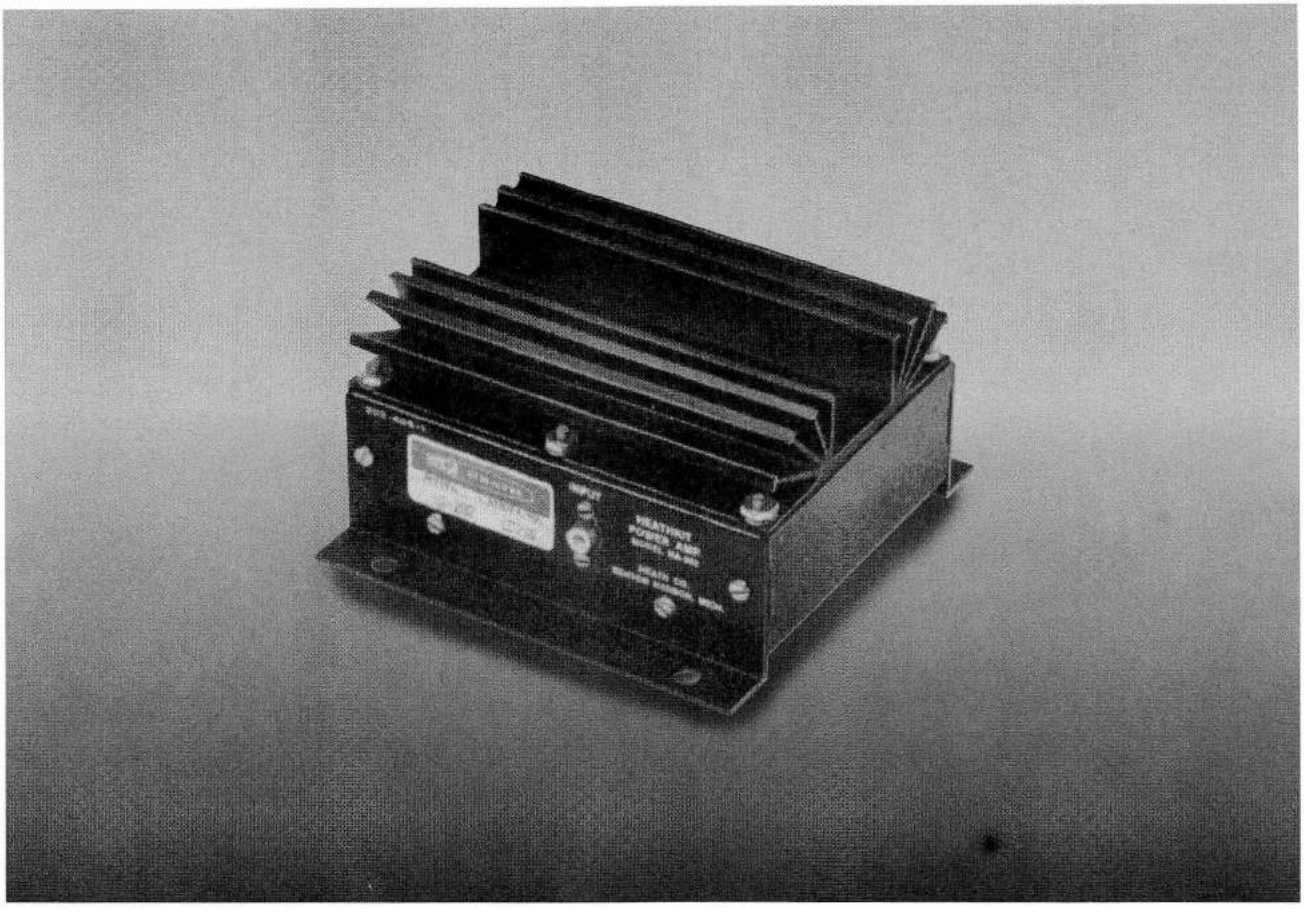


2 Meter Amplifier

Manufactured/Price:
HA-201 74-77 $29.95
HA-201A 78-83 $39.95

Comments: Released on the heels of the popular HA-202, this tiny amp was designed mostly to boost the signal from a handy-talkie. It provides about 8 watts of output with 1 to 3 watts of drive. The HA-201(A) is fully solid state—no mechanical relays are used in switching. The amplifier will withstand infinite VSWR without failure but is not indestructible and can be damaged by excessive drive. CAUTION: Do not exceed 3 watts of drive or you may damage the final (2N6081 or CTC B12-12). Another tip: The length of cable used to connect the amp to your HT should be cut to odd multiples of 1/4 wavelengths of the frequency you use most often. It is also important to note that there is no RF bypass around the HA-201(A) when its power is off. If the amp is in the RF line it must be powered up or no RF will get through. The HA-201(A) tunes up with a VTVM or SWR bridge, a dummy load, and a broadcast band receiver (to listen for oscillations). The A version was a major redesign that reduced the possibility of instability, simplified tune-up, and replaced the RCA type connectors with SO-239s. Both versions, however, work very well, and are easy to fix. Input/output impedance: 50 ohms nominal. The HA-201(A) requires 12-16 VDC at 2.2 amps maximum and is painted one-color green. Heath sold zillions of these amps and they show up at swap meets with regularity.

Weight/Size: 3 lbs; 3.5″ wide x 2.75″ high x 5″ deep
Related Products: HA-202(A), HWA-202-1, misc VHF accessories



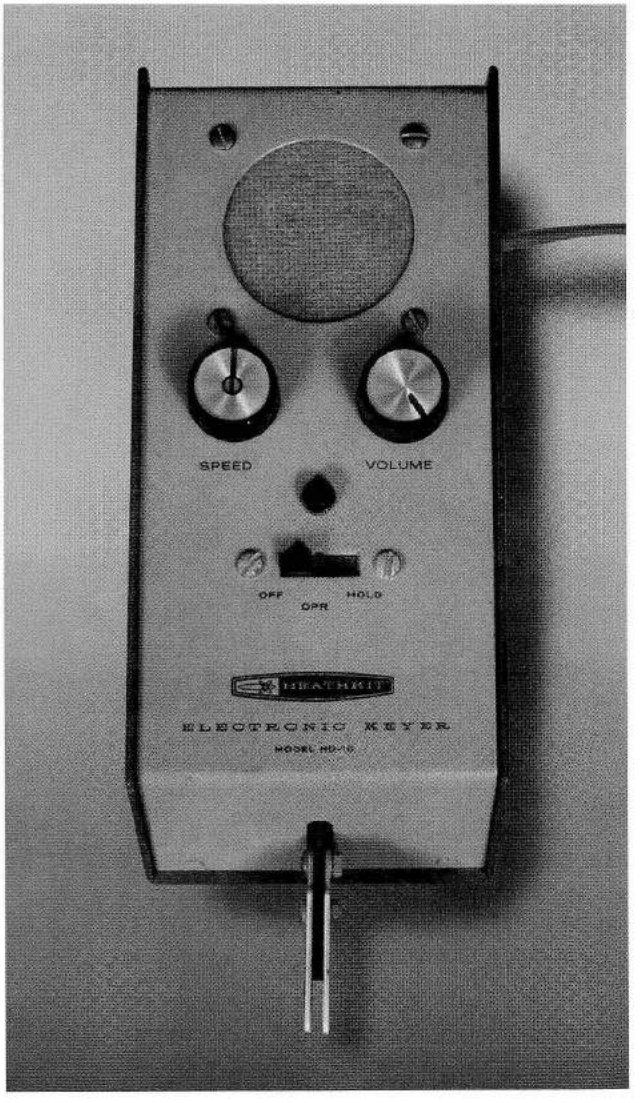
FROM THE HEATH CATALOG

2 Meter Amplifier

Manufactured/Price:
HA-202 73-77 $64.95
HA-202A 78-84 $79.95

Comments: The HA-202 was designed and sold primarily for mobile operation but works equally well in fixed station use. It will cover any 1.5 MHz portion of the band between 143 and 149 MHz. Power output depends on drive: 20 W @ 5 in, 30 W @ 7.5 in, 40 W @ 10 in, and 50 W @ 15 in. A pair of 2N5591s in push-pull will withstand up to 3:1 SWR and rely on a big heat sink to keep them cool instead of "exotic sensing circuitry." Tuned input/output is 50 ohms nominal. The HA-202(A) tunes up with a VTVM or SWR bridge, a dummy load, and a broadcast band receiver (to listen for oscillations). The A version was a major redesign that reduced the possibility of instability, simplified tune-up, and replaced the RCA type connectors with SO-239s. Both versions, however, work very well and are easy to fix. Requires 12-16 VDC at 7 amps maximum. Black in color. Medium rare.

Weight/Size: 4 lbs; 4″ wide x 3″ high x 5.5″ deep
Related Products: HW-201(A), HWA-201-1, misc VHF accessories

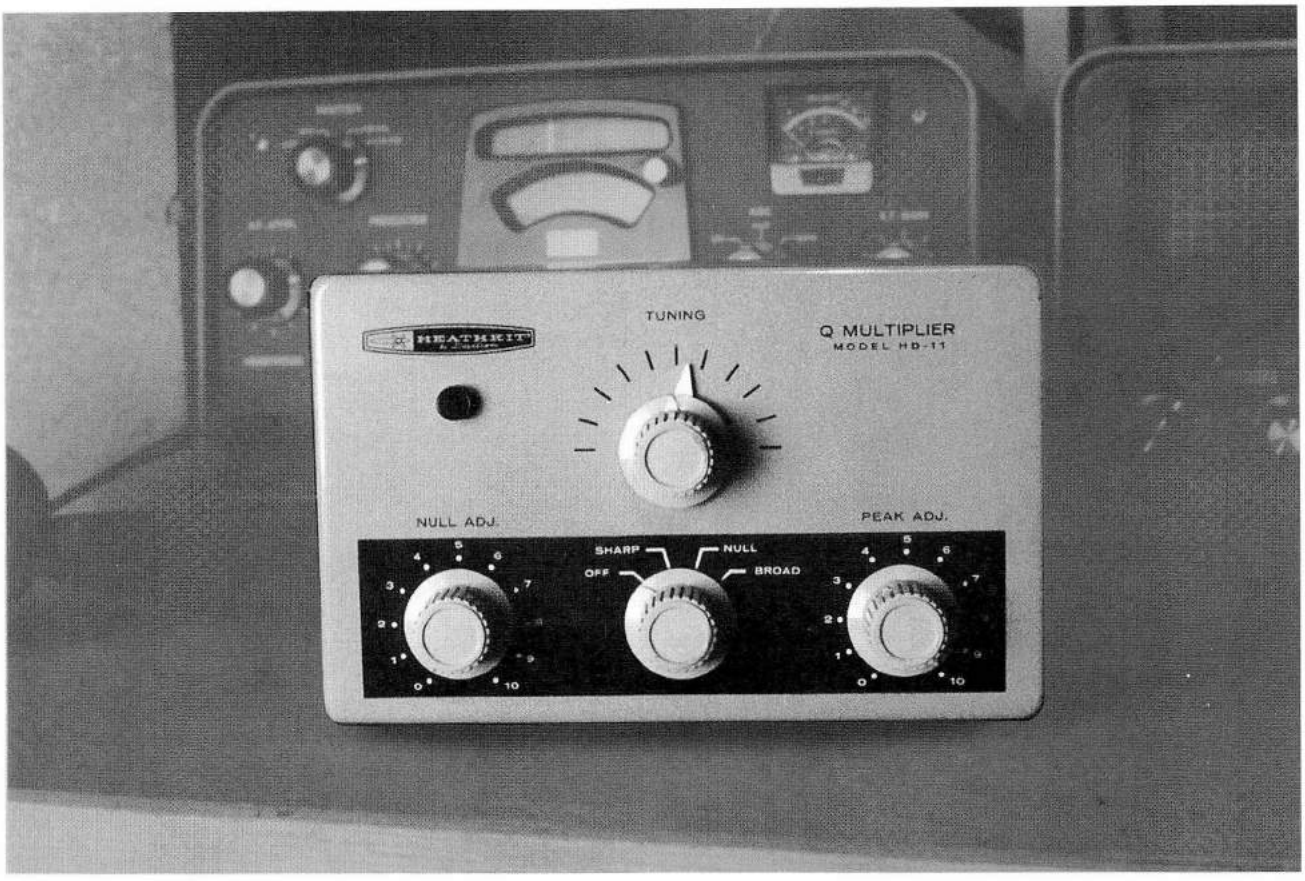


Electronic Keyer

Manufactured: 65-74
Price: $39.95

Comments: The HD-10 was Heath's first keyer and the first keyer kit on the market. While it sold extremely well, it was, in retrospect, not a very good design. It lacked adjustability once assembled, had a poor dot/dash weighting scheme, had way too much paddle travel to make it comfortable to use, and made about as much noise as a Vibroplex semi-automatic. Nevertheless, it was on the market for nine years, and Heath sold tens of thousands of HD-10 keyers, so the model must have seemed like a good idea at the time. The HD-10 is a simple device and employs a pair of microswitches on either side of the paddle arm. Moving the paddle back and forth clicked the switches—simple as that. It is not an iambic device. The unit uses 11 transistors and has a built-in transformer operated solid-state power supply. It features a built-in sidetone speaker and has controls for sidetone volume, speed, and weighting. There is also a "hold" switch for tuning. During assembly, the builder could choose one of two speed ranges—10-20 WPM or 15-60 WPM. The keyer can also be wired for left-hand operation. The HD-10 is for use only with transmitters using grid-block keying. Keying output: keyed line to ground. Polarity: negative to ground only. Maximum open circuit or spike voltage: 105 volts. Key-closed current: 35 ma maximum. Connections on rear panel include the keyed line, receiver audio, 45 volts battery input, 22.5 volts battery input, and external key/paddle input. The HD-10 is designed for 120 VAC, 50/60 Hz, or from a battery supply—45 volts with tap at 22.5 volts, 14 ma. The unit is finished in two-tone green wrinkle paint. HD-10s are not rare and show up at flea markets on a regular basis—often with problems.

Weight/Size: 6 lbs; 3.75″ wide x 4.5″ high x 10.5″ deep
Related Products: HD-1410, SA-5010(A), HD-8999

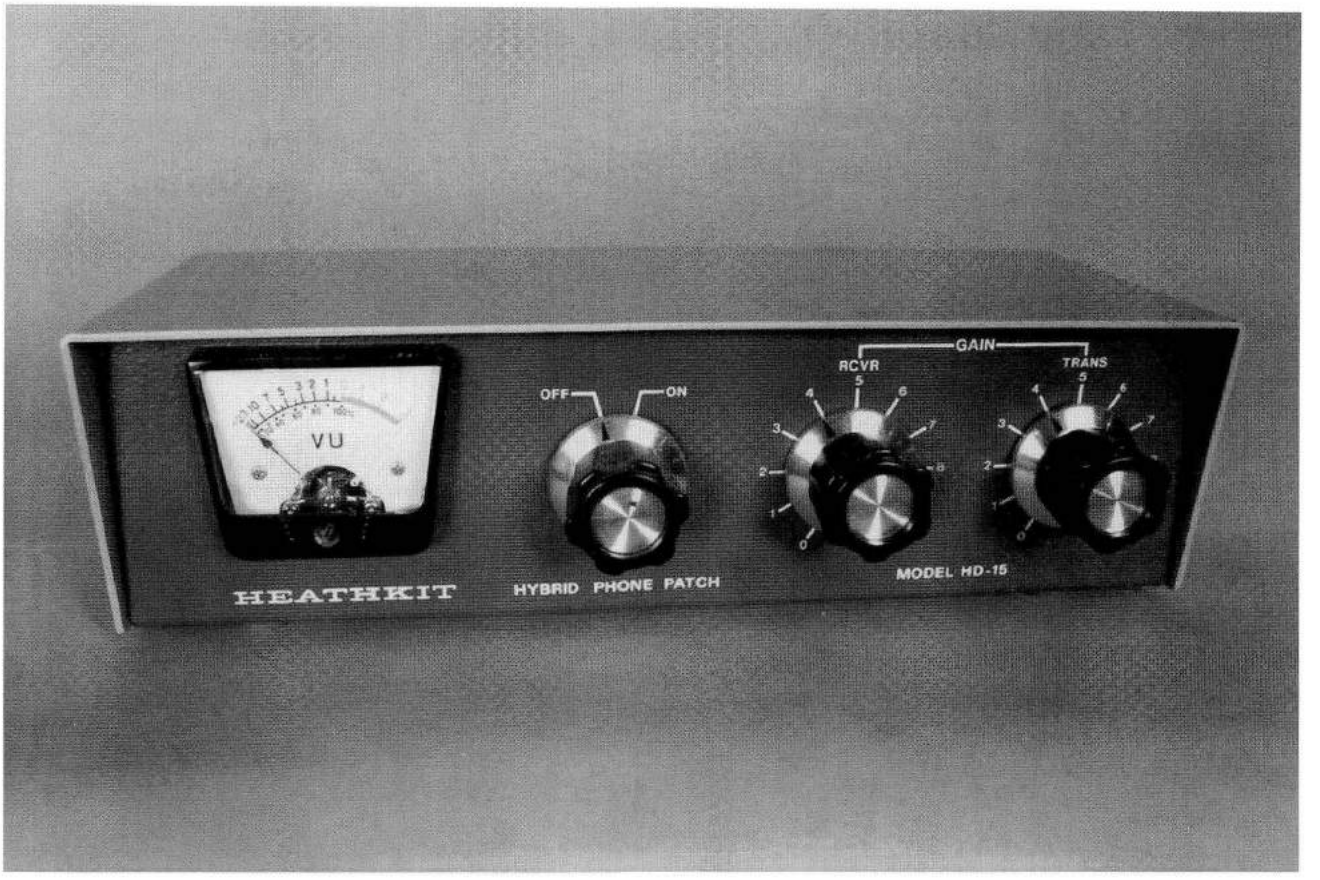


Q Multiplier

Manufactured: 61-64
Price: $14.95

Comments: The HD-11 is essentially the same Q-Mulitplier as the older QF-1 but with the addition of a built-in power supply, a pilot light, and the classic Heath two-tone green paint scheme. For additional details and specifications, see listing under QF-1. Also see listing under GD-125—the product into which the HD-11 would eventually evolve—still the same basic design.

Weight/Size: 3 lbs; 7.25″ wide x 4.75″ high x 4.25″ deep
Related Products: QF-1, GD-125

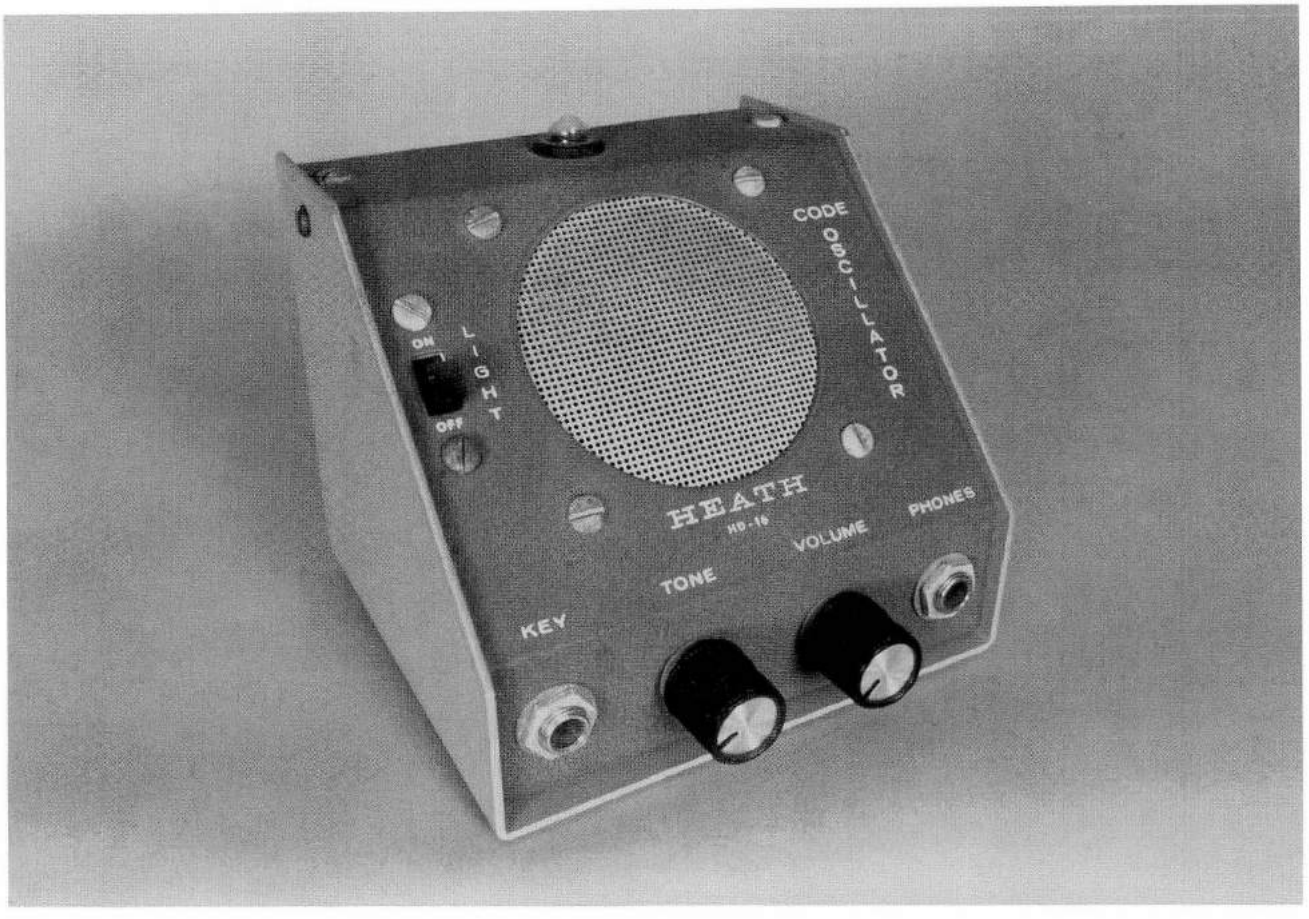


Phone Patch

Manufactured: 66-83
Price: $24.95

Comments: This is a just a restyling of the famous HD-19 phone patch and was done to bring the unit into line cosmetically with the SB series. Electronically the HD-19 and the HD-15 are virtually the same device. Other than the cabinet change to Heath's "low boy" style, the most obvious change is that the station mic does not connect to the phone patch, as in the HD-19. Instead, the mic is connected to the transceiver in the normal way, and the patch connects to jacks provided on the back of the SB series transmitters and transceivers. For additional details and specifications, see listing under HD-19. The HD-15 is a simple device and works very well. There is very little to go wrong. It is easy to install, adjust, and use. The HD-15 was a very successful product and was on the market for 17 years. It was replaced by the HD-1515—becoming part of Heath's "little brown box" series. HD-15s are not rare and frequently are seen at flea markets. Two-tone green wrinkle.

Weight/Size: 3 lbs; 9.25″ wide x 2.5″ high x 3.5″ deep
Related Products: HD-19, HD-1515

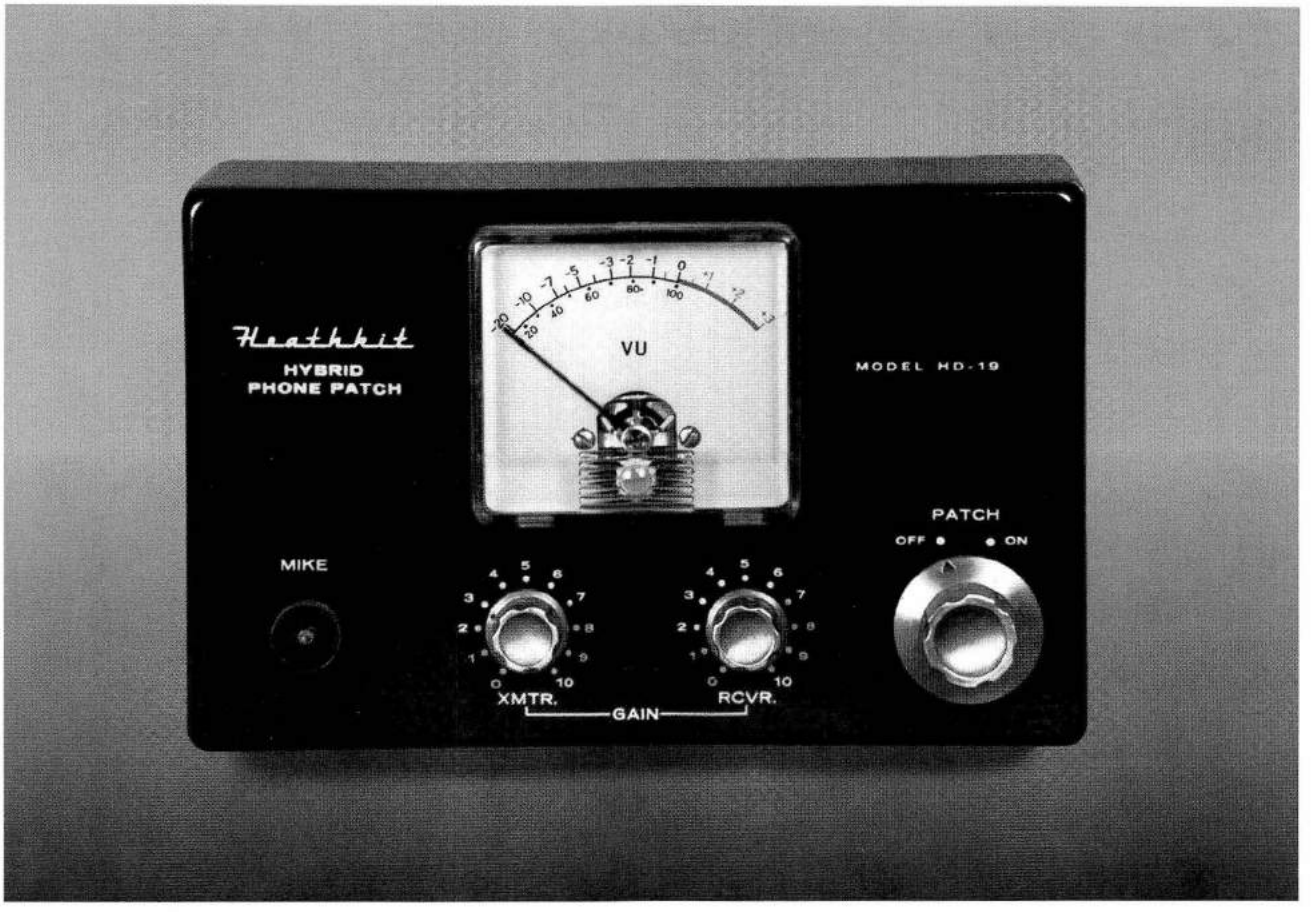


Code Practice Oscillator

Manufactured: 67-74
Price: $8.95

Comments: The HD-16 is a real classic and a battleship of a CPO. Heath must have thought it would be subjected to some abuse by frustrated would-be novices trying to learn the code, so it over-designed the HD-16 in every way. Today the metal cabinet would be worth more than $20 all by itself. The HD-16 featured separate volume and tone controls, a built-in speaker, key jack, and headphone jack. Heath—apparently not wanting to miss the scouting merit badge market—even built in a light that could be flashed. The HD-16 replaced the older CO-1, uses a unijunction transistor, and is powered by two 9 volt transistor batteries and one "C" cell for the light. Eventually reality (and economics) caught up with Heath and the HD-16 was replaced with the plastic-cased HD-1416(A) (see listing). Too bad. The HD-16 is finished in classic SB two-tone green wrinkle paint. Be sure to check for battery damage—but don't necessarily let it stop you from buying. Assuming the outside of the unit is in good shape, the battery holders can be replaced. The HD-16 was originally supplied with a key, but the key is seldom found with the units today. While thousands were sold, HD-16s show up at flea markets much less often than one might suspect.

Weight/Size: 3 lbs; 4.75″ wide x 4″ high x 4.25″ deep
Related Products: CO-1, HD-1416(A)



Phone Patch

Manufactured: 60-65
Price: $34.95

Comments: The HD-19 was Heath's first phone patch. It uses a special hybrid transformer to achieve very high isolation between the receiving and transmitting lines. The HD-19 allows both VOX and manual operation and is placed in operation by a single switch. The HD-19 features separate controls for transmit gain, receive gain, and patch on/off. A VU meter provides levels and permits a convenient check for null depth. The patch is designed to operate with a standard telephone line impedance of 600 ohms, and provides a null depth of 30 db minimum between receive and transmit lines. Receiver impedance: 3-16 ohms. Transmitter impedance: 600 ohm or high impedance output. Eventually Heath redesigned the HD-19 to bring it in line with the SB series, rereleasing it as the HD-15. This was pretty much a matter of cosmetics, as the insides didn't change much at all. The HD-19 has a green front panel and a light green or gray cabinet. The panel meter is most often seen with a yellowish face, though white-faced meters have been observed. Rare.

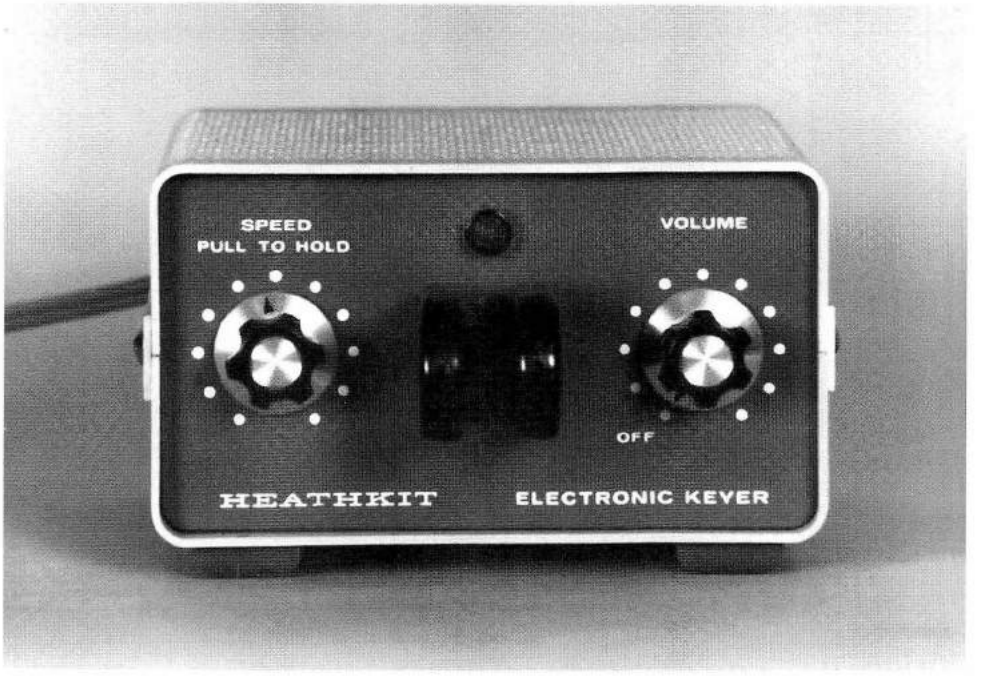
Weight/Size: 3 lbs; 7.25″ wide x 4.75″ high x 4.25″ deep
Related Products: HD-15, HD-1515.

Crystal Calibrator

Manufactured: 60-67
Price: $14.95

Comments: $14.95 was a lot of money in 1960, but the HD-20 sold very well. Inside this little box are a 100 kHz crystal, a single transistor oscillator, and a 9 volt battery. The HD-10 puts out accurate markers from 100 kHz to more than 54 MHz and calibrates to WWV with a small trimmer on the back. Many of these have been user modified for external power. The binding post cap originally was red and early units were fitted with metal TX-1-style knobs. Later models used a small gray plastic knob of the style shown on the AC-1 elsewhere in this book. Be sure to check for battery damage (the back is open). Finished in two-tone green Rare.

Weight/Size: 1 lb; 2.5″ wide x 4.25″ high x 2.75″ deep
Related Products: PM-2

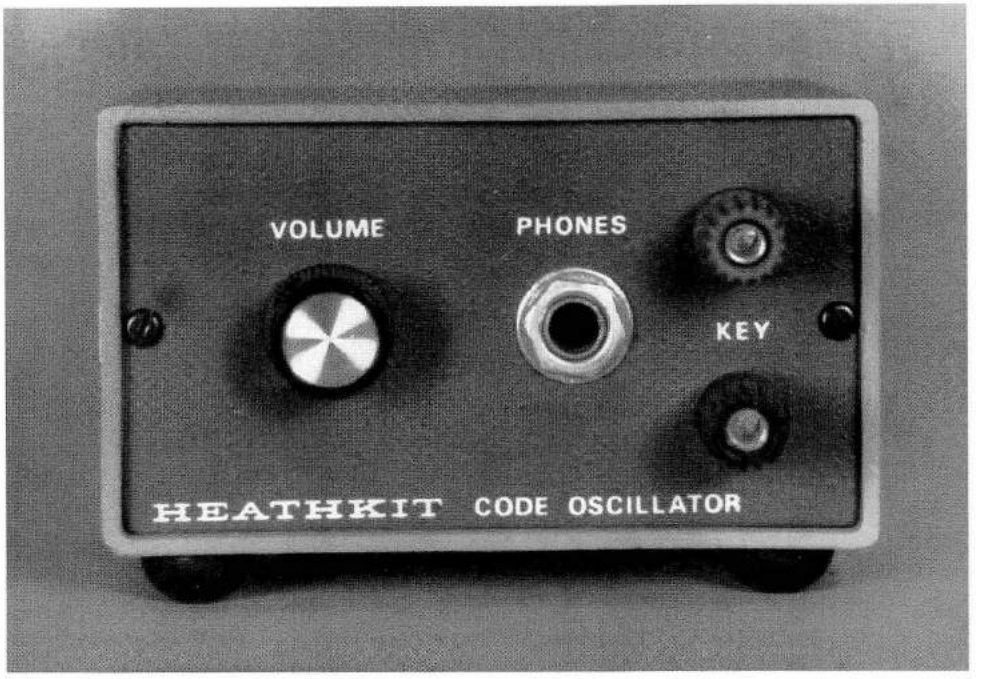


Electronic Keyer

Manufactured: 75-84
Price: $59.95

Comments: Unlike its predecessor, the HD-10, the HD-1410 is a very nice keyer and features self-completing, iambic operation. The keyer's mechanical action is easily adjusted (from inside) and has a nice action because it uses contactors, not microswitches. The 1410 is fully solid state and can be wired for one of two speed ranges (from under 10 to over 35 WPM or under 10 to over 60 WPM), as well as right- or left-hand operation. The dot/dash weighting is good but is not adjustable. The front panel includes a pilot light and controls for on/off/volume and speed. The speed control pulls out to provide a "tune" mode. Features include a built-in 120 VAC power supply, a built-in speaker, and adjustable sidetone frequency (inside). The keyer provides negative and positive line to ground keying. Positive line to ground keying is 300 volts 200 ma maximum. Negative line to ground is 200 volts 10 ma maximum. Rear panel connections include 12 VDC power in, keyer out, headphones, receiver audio in (routed to headphones), and external key (straight key, not paddle). Designed for 120 VAC, 50-60 Hz or 10-14.5 VDC 150 ma operation. The two-tone green wrinkle cabinet is nicely weighted for mechanical stability. The HD-1410 was the most popular of Heath's keyers and arguably one of the most popular keyers ever made by anyone. They are frequently seen at swap meets and many of them are are still on the air.

Weight/Size: 5 lbs; 5″ wide x 3″ high x 7.5″ deep
Related Products: HD-10, HD-8999, SA-5010(A)



Code Practice Oscillator

Manufactured/Price:
HD-1416 75-86 $24.95
HD-1416A 87-88 $24.95
HD-1416H 88-91 $24.95

Comments: Compare the HD-1416 to its predecessor the HD-16 (see listing) and you will be astonished to find that the last year it was sold, the HD-1416—a simple three transistor CPO in a tiny plastic box—cost about three times what the HD-16 did. Now that's economics for you. The HD-1416 features a built-in speaker, volume control, tone control (on back), headphone jack, and binding posts for the key (included). It also could be used as a sidetone oscillator for transmitters using grid-block keying (400 volts negative maximum), though it is doubtful that many were ever used in this way. The HD-1416 operates from a single 9 volt battery. The original 1416 had a gray cabinet and a green front panel. The only differences in the versions are a new style knob and the color. The original is green, the A is brown, and the H is black.

Weight/Size: 2 lbs; 4.25″ wide x 2.5″ high x 4.25″ deep

Related Products: CO-1, HD-16, HD-1426

Active Audio Filter

Manufactured: 83-91
Price: $49.95

Comments: One of the first in the "little brown box" series, the HD-1418 is a very useful gizmo that works quite well. Just plug it in between your receiver audio output and your speaker and filter out QRM. The 1418 features 12 total poles of filtering that can be combined in various ways to make better copy out of closely packed AM, SSB, or CW signals. The 1418 features separate high and low pass filters that are a 5-pole tunable elliptical type with a 300-3500 Hz range at -6 db. The notch/peak filter is a 2-pole tunable type creating a notch as narrow as 200 hertz and as deep as 30 dB. Input impedance is Hi-Z, 5000 ohm minimum. Nominal gain is unity. The audio amplifier output is 1 watt into 4 ohms. Input/output connections are RCA phono jacks. "Tape out" is at -20 dB. Note that the headphone jack is a mono connector and that you'll have to use an adapter if you use stereo phones. When the HD-1418 is switched off, signals are bypassed around it. The HD-1418 uses 22 common ICs and requires 7-13.5 VAC or 9-18 VDC at 400 ma maximum. The unit is designed for standard "power cube" operation and is enclosed in a brown cabinet. Lots of these are still in service. Medium rare.

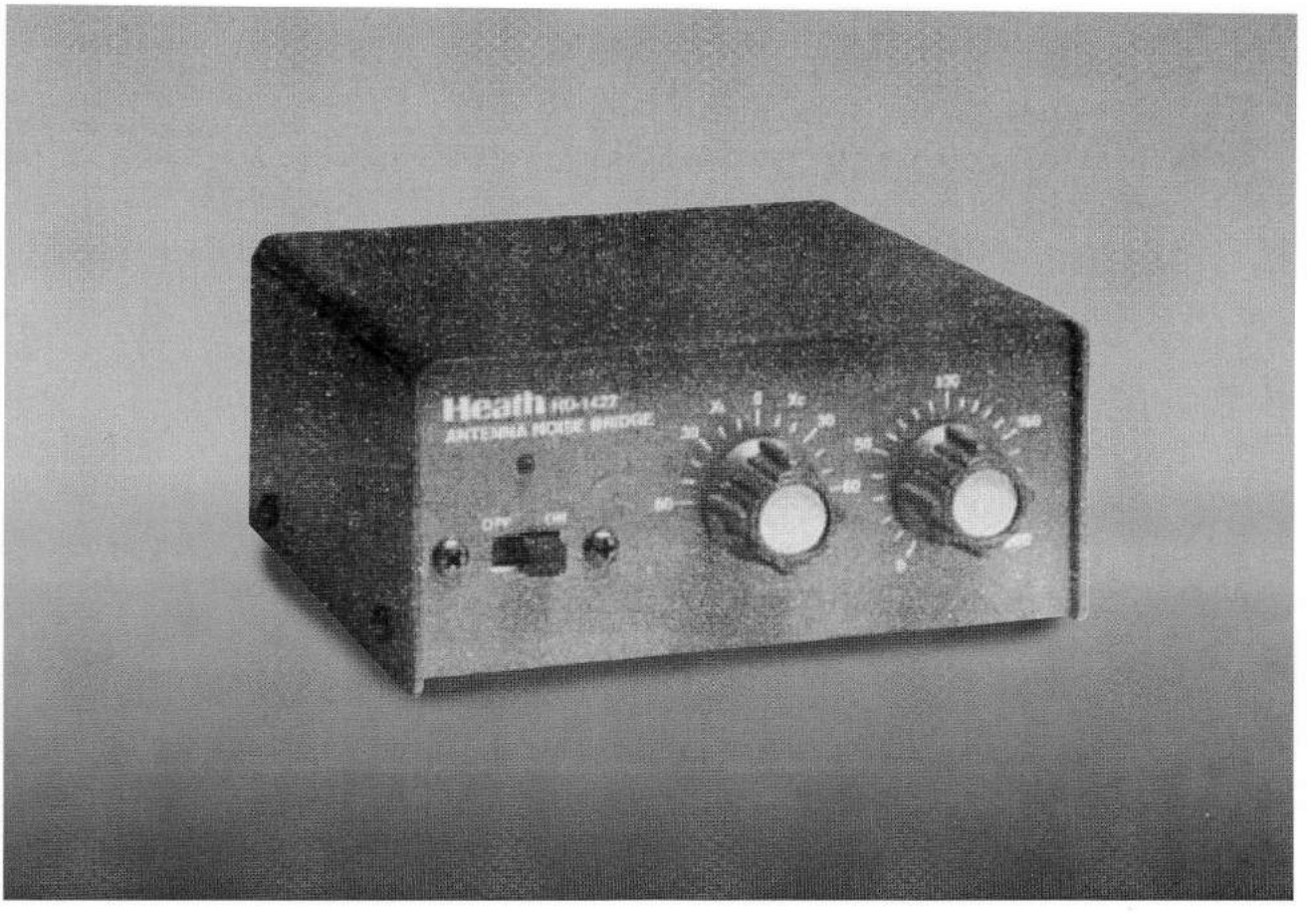
Weight/Size: 3 lbs; 9″ wide x 2″ high x 6.5″ deep
Related Products: Little Brown Box series

VLF Receiving Converter

Manufactured: 85-91
Price: $49.95

Comments: The HD-1420 is another "little brown box" product. Connected between your antenna and receiver, the HD-1420 lets you tune in VLF signals between 10 and 500 kHz. These signals are fed from the converter to your receiver and appear between 3510 and 4000 kHz. The actual frequency of the VLF station being received is the dial frequency shown on your receiver minus 3500 kHz. The HD-1420 is about as simple a device as one could ask for. There is no alignment or tuning to be done. The front panel contains only a pilot light and a single control—the on/off switch. Just connect the box and turn it on. Rear panel connections include only the power connector and two SO-239s (input from antenna and output to receiver). When unit is switched off, signals are bypassed around it. A few tips on use: Any long wire antenna will do—the longer the better. Also, be sure to use a shielded cable between the converter and your receiver. This will cut down on 80 meter interference. The unit works quite well but a good antenna is essential—and a vertical one is best, followed by a long random wire. WARNING: If you use the HD-1420 with a transceiver of any kind be sure to remove the converter from the RF line before transmitting. Failure to do so will result in destruction of the converter. The 1420 uses one IC and two transistors and runs on one 9 volt transistor battery, or 6-14 VDC at 20 ma, and is enclosed in a brown cabinet. Medium rare.

Weight/Size: 1 lb; 5″ wide x 2.25″ high x 5″ deep
Related Products: Little Brown Box series



FROM THE HEATH CATALOG

Antenna Noise Bridge

Manufactured/Price:
HD-1422 85-89 $49.95
HD-1422A 89-91 $49.95

Comments: The HD-1422 Antenna Noise Bridge is a very useful, though little understood, gizmo. Valuable for the serious antenna experimenter, it may be of little interest to the average "appliance operator," and Heath probably didn't sell many of these. Unlike an SWR bridge, which tells you how well an antenna is matched to your transmitter, a noise bridge tells you what is causing any mismatch. The HD-1422 is a tone-modulated, broadband noise generator coupled to an impedance bridge. Using your station receiver, the impedance bridge measures the resistive and reactive components of your antenna. The 1422 may also be used to pre-tune an antenna tuner, to tune quarter wave transmission lines, and to find the value of unknown capacitors and inductors. All in all, a handy device—for the serious HF antenna person. Having the instruction book would be very helpful in learning to use the HD-1422. Resistance range: 0-200 ohms. Capacitance range: plus or minus 60 pF. Operating range: 1-30 MHz. Front panel includes power on/off and pilot light and controls for resistance and reactance. The rear panel has two SO-239 connectors (marked "unknown" and "receiver"), a ground lug, and a standard DC external power connector. The unit can be calibrated using your station receiver. The HD-1422 is designed to run on one 9-volt battery or 9-11 VDC at 45 ma external power. As far as I can determine, there is no difference between the 1422 and the 1422A. Enclosed in a brown cabinet. You don't see many of these since not too many were sold and most people who bought them still use them.

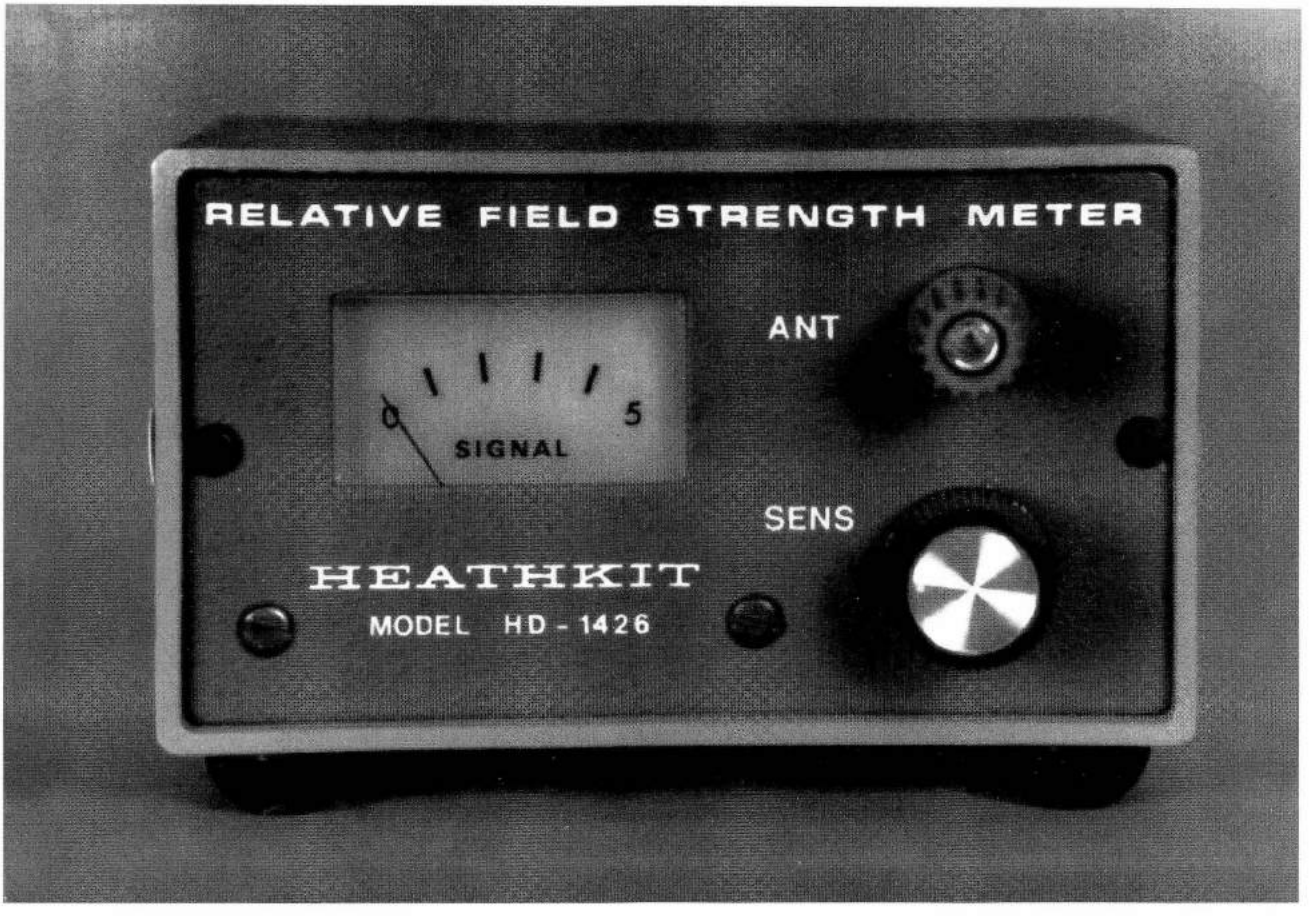
Weight/Size: 2 lbs; 5″ wide x 2.25″ high x 5″ deep
Related Products: Little Brown Box series

Active Antenna

Manufactured/Price:
HD-1424 85-89 $49.95
HD-1424A 89-91 $59.95

Comments: Essentially an antenna pre-amplifier, the HD-1424 can be used with very short wire antennas (only a few feet long) or its own telescoping antenna to provide good reception of signals between 300 kHz and 30 MHz. It also can be used as a pre-selector and pre-amplifier for both indoor and outdoor antennas. The 1424 uses a simple three-transistor circuit. The front panel includes a pilot light and controls for power on/off, gain, band, and tuning. The rear panel has two SO-239s (input for antenna and output to receiver) and a standard DC power connector. The telescoping antenna connects to a terminal on the rear panel. Tip: Don't run the gain too high or receiver overloading may occur. Also, oscillations may occur if gain is run too high. This is especially a problem when used with receivers having plastic cases. The unit is designed to run from a single 9 volt battery or 6-14 VDC external power. The HD-1424 is a useful accessory for the SWL and works very well. As far as I can determine, there is no difference between 1424 and the 1424A. Enclosed in a brown cabinet. Fairly common.

Weight/Size: 2 lbs; 5″ wide x 2.25″ high x 5″ deep
Related Products: Little Brown Box series

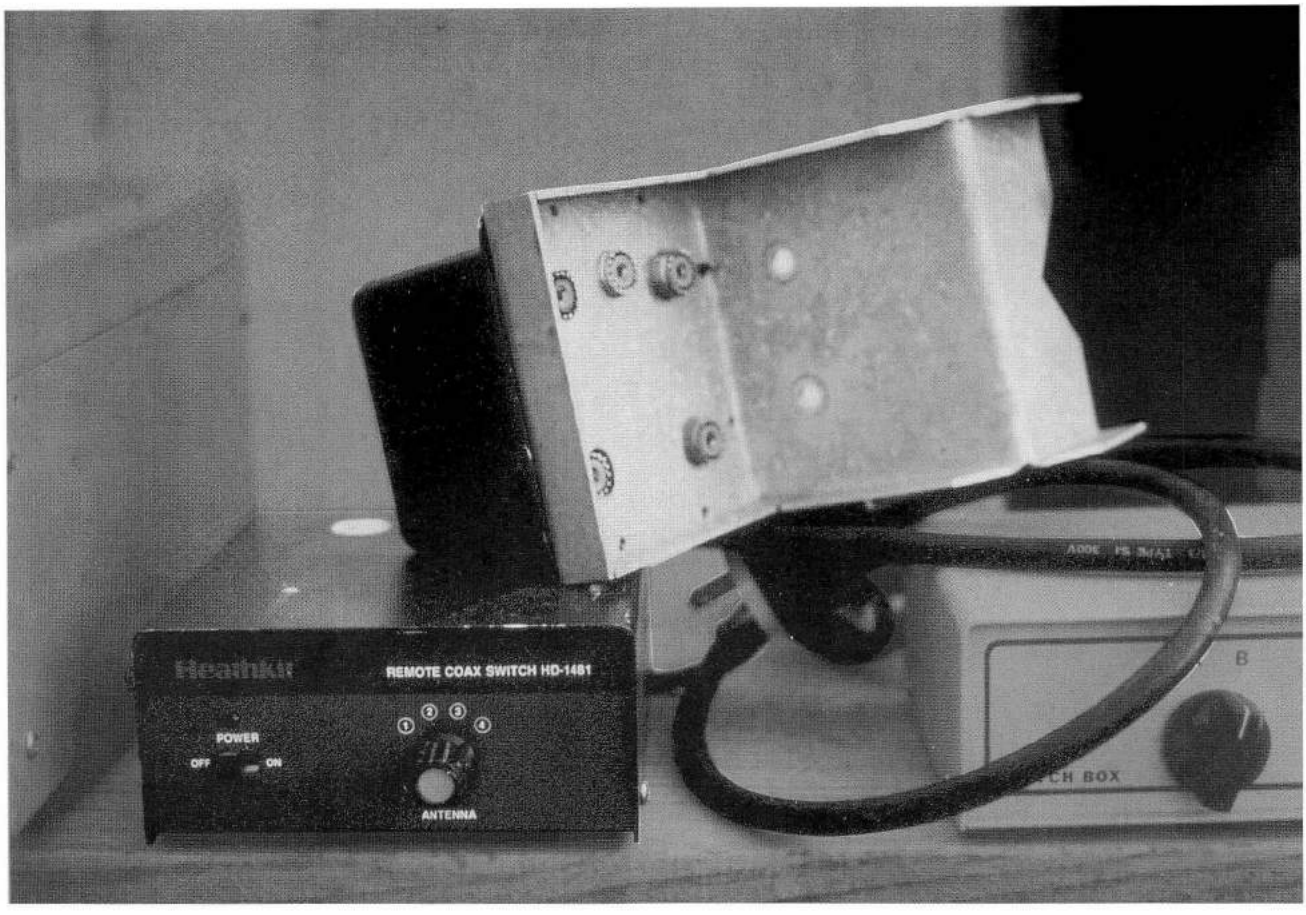


Field Strength Meter

Manufactured: 77-80
Price: $12.95

Comments: Until Heath released the HD-1426, it hadn't had a field strength meter in its product line since the PM-2 in 1967. The HD-1426 is a simple self-powered accessory useful in transmitter and antenna adjustments. It features a built-in printed circuit antenna, a binding post for a whip antenna, and a sensitivity control. Its useful frequency range is 1.8-250 MHz and it is designed for transmitter outputs from 1 to 1000 watts. The HD-1426 was a short-lived product, and Heath probably didn't sell very many. Cabinet is gray; front panel is green. Rare.

Weight/Size: 2 lbs; 4.25″ wide x 2.5″ high x 4.25″ deep
Related Products: PM-1, PM-2, HD-1416

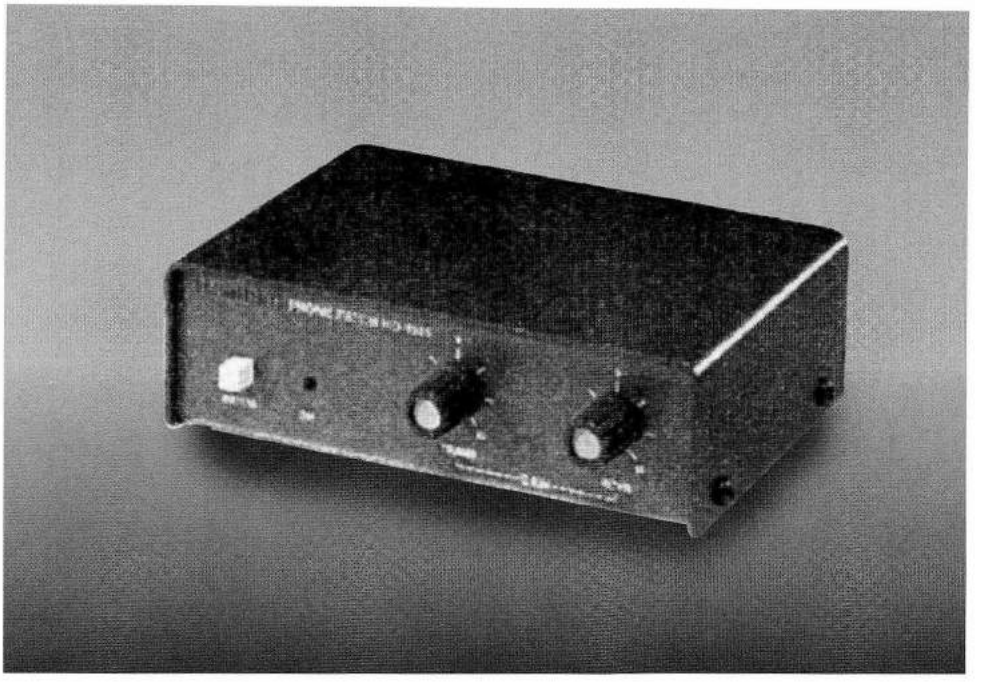


Antenna Switch

Manufactured: 84-91
Price: $89.95

Comments: The HD-1481 replaced the SA-1480 (see listing), but for a brief time these two products were on the market together. Like the SA-1480, the HD-1481 is a device for the remote switching of antennas sharing a common feedline to the shack. Unlike the SA-1480, the HD-1481 control unit (which contains the power supply) uses the station RF coaxial cable to route switching signals to the relay switch box mounted on the tower, or wherever. The 1481 can select up to four antennas. The switch will handle up to 2000 watts PEP with a VSWR of 1.15 :1 or less below 30 MHz. CAUTION: A VSWR higher than about 3:1 (even momentarily) can damage the control unit. The 1481 is designed for 120 VAC, 50/60 Hz operation and is enclosed in a brown cabinet. The units are medium rare and still are very much in demand.

Weight/Size: 5 lbs; control unit 5″ wide x 2.25″ high x 5″ deep
Related Products: SA-1480, Little Brown Box series



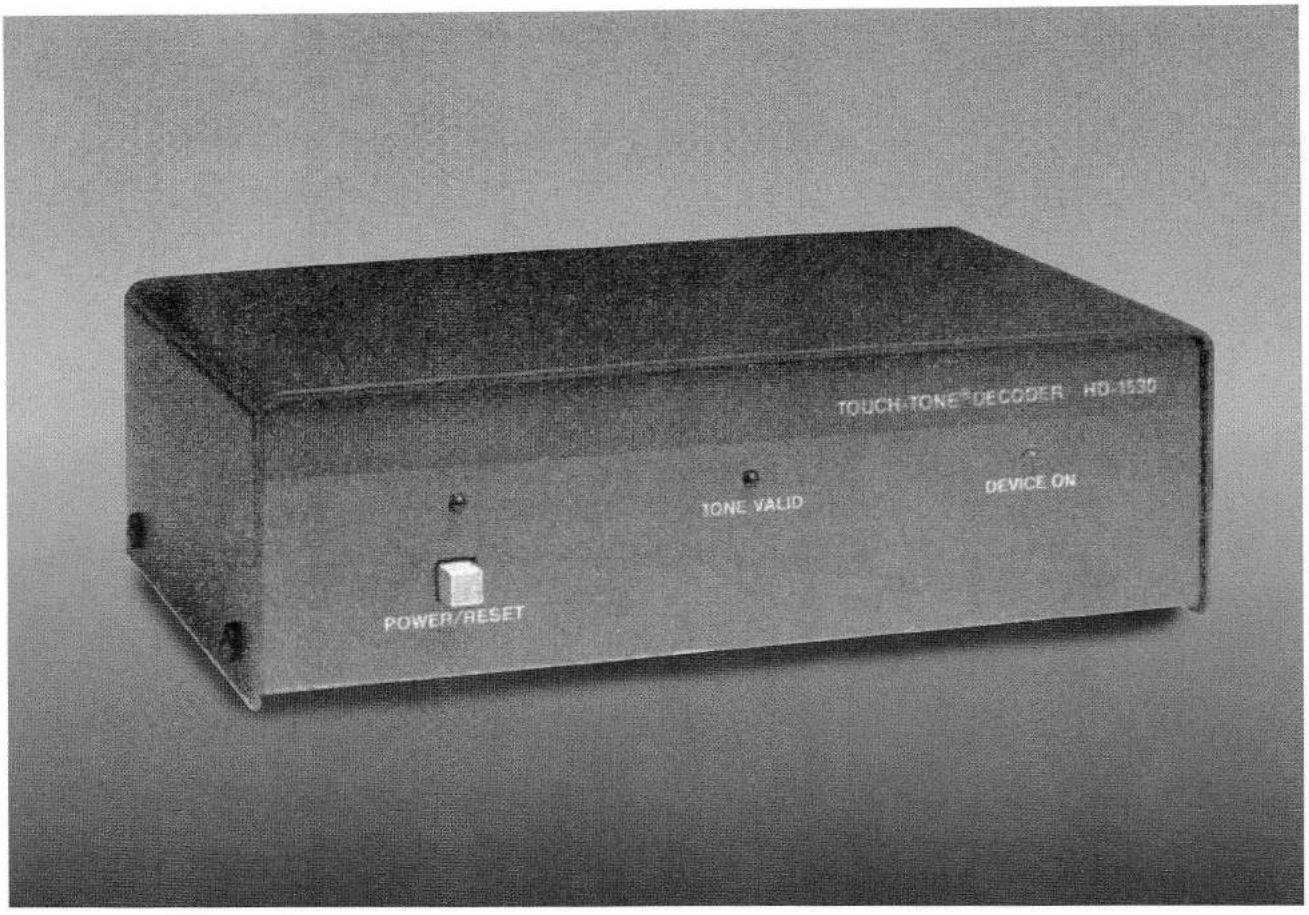
FROM THE HEATH CATALOG

Phone Patch

Manufactured: 85-87
Price: $49.95

Comments: The HD-1515 is a fully solid-state device that utilizes an integrated active speech and transmission circuit. Direct connection to the phone line is made possible through a built-in active low voltage polarity-protection interface circuit. The HD-1515 derives its power directly from the phone line but may be battery operated with phone lines exhibiting low voltage conditions. Special speech transmission circuits replace the conventional hybrid transformer and perform the 4-wire to 2-wire radio-to-phone line conversion. Front panel controls include power on/off, transmit gain, and receive gain. Connection to phone line is made via a standard modular connector on rear panel. The rear panel also provides access to line null controls. Features include an 8-pole filter, PTT or VOX operation, and a built-in detector circuit for adjustment with a VTVM or VOM. Telephone loop input impedance: 600 ohms, polarity protected. Receiver output to phone line: not to exceed -9 dBm (278 mV). Transmitter output to radio: 25 mV into a 22 k ohm load at 1000 hertz. Receiver input impedance: 3-50 ohms. The 1515 is powered by phone line or internal 9 volt battery. IMPORTANT: DO NOT install a battery unless it is needed. The HD-1515 works well enough but is a good example that more technology is not always better. Brown in color. Not a big seller. Not seen very often.

Weight/Size: 2 lbs; 5.75″ wide x 1.75″ high x 3.75″ deep
Related Products: HD-15, HD-19, Little Brown Box series



FROM THE HEATH CATALOG

Touch-Tone Decoder

Manufactured: 85-90
Price: $79.95

Comments: The HD-1530 was a nice idea, but it didn't do very much and it was relatively expensive. Basically, the HD-1530 connects between your receiver audio output and a speaker. It then keeps the speaker muted until it hears the correct Touch-Tone code—your basic tone-calling scheme. The HD-1530 also can provide a contact closure for single function control of a repeater or autopatch (or anything else for that matter) upon receipt of the right code. The operative phrase here is "single function." You have to have an HD-1530 for each function you want to control. The only front panel control is the on/off push button. Three front panel LEDs indicate power on/off, receipt of tone, and device on/off. A user programmable two-digit Touch-Tone sequence toggles the unit on and off. The 1530 can be set to turn off the device automatically under control after 8 minutes. It uses 7.5-11 VAC or 11-16 VDC. Enclosed in a brown cabinet. Rare.

Weight/Size: 2 lbs; 7″ wide x 2.25″ high x 5″ deep
Related Products: Little Brown Box series

FROM THE HEATH CATALOG

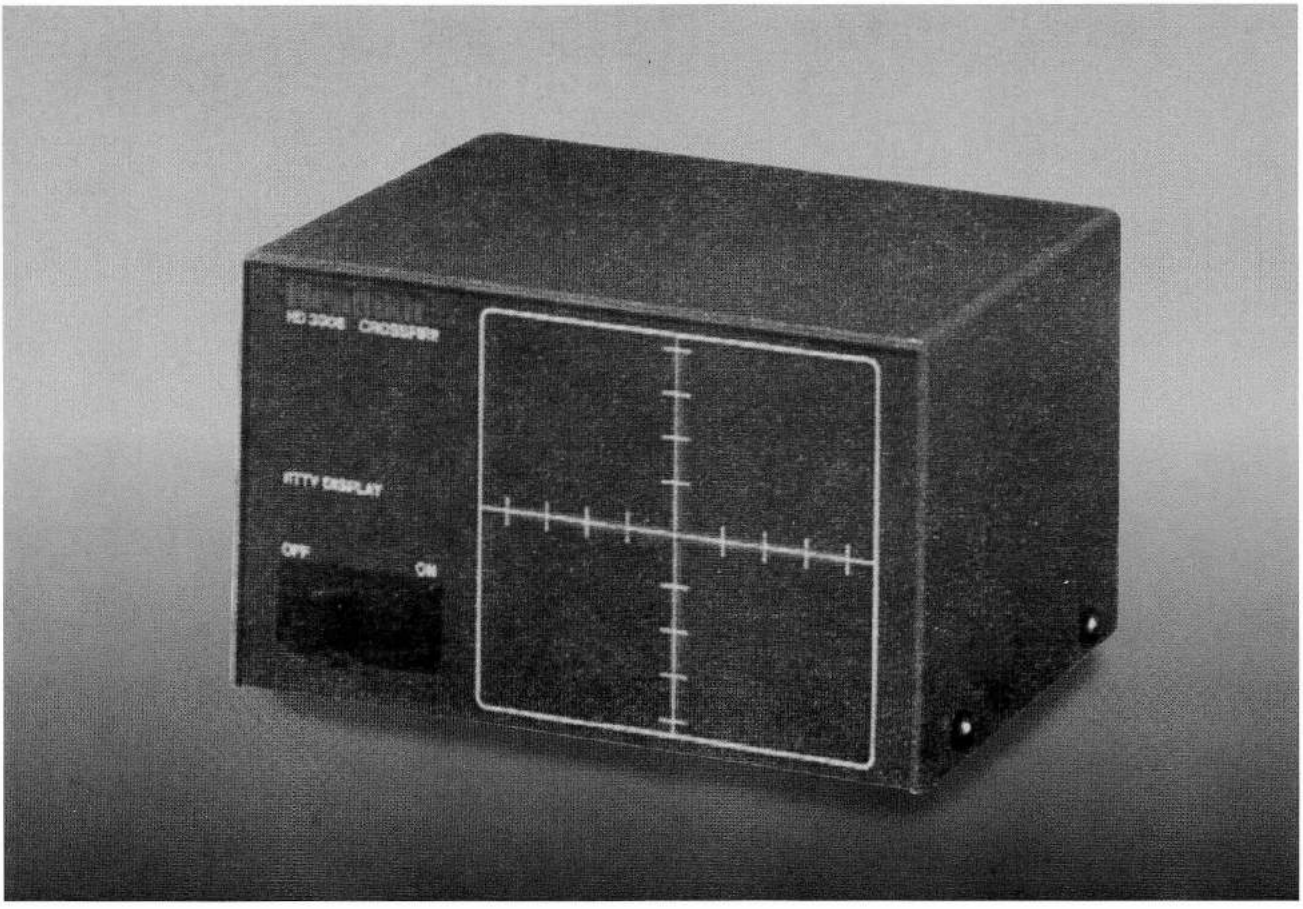
Antenna Rotator

"IntelliRotor"

Manufactured: 90-92
Price: $279.95 (excluding rotator motor and cable)

Comments: Available in kit or assembled form, the HD-1780 is compatible with many popular rotators including all Ham-M (series 3,4,5 and 6), Ham-II, Ham-III, Ham-IV, CDE, TR-44, CD-45 (series 2), and M2. The QWERTY keyboard lets you swing the antenna based on entry of callsign prefix, grid square, latitude and longitude, bearing in degrees, or first few letters of the country. The unit has a ROM database of 400 countries and allows you to add 10 headings of your own. The 1780 also can be connected to and controlled by your PC (with supplied software) and can report headings in 20 WPM morse for visually impaired users. Features include motor pulsing, automatic brakes, and initial back-rotation to protect brakes from locking due to wind loading. A special 120 VAC power supply module connects via cable; specifications are not available. Made off-shore and designed by Heath for Telex as on OEM product. Make sure you get the instruction book. Also, if you want to control it with a PC, you *must* have the software. Caution: The HD-1780 is a nice gizmo, but if it ever goes down, chances of getting it fixed are remote. Rare.

Weight/Size: 6 lbs - dimensions not available
Related Products: none



FROM THE HEATH CATALOG

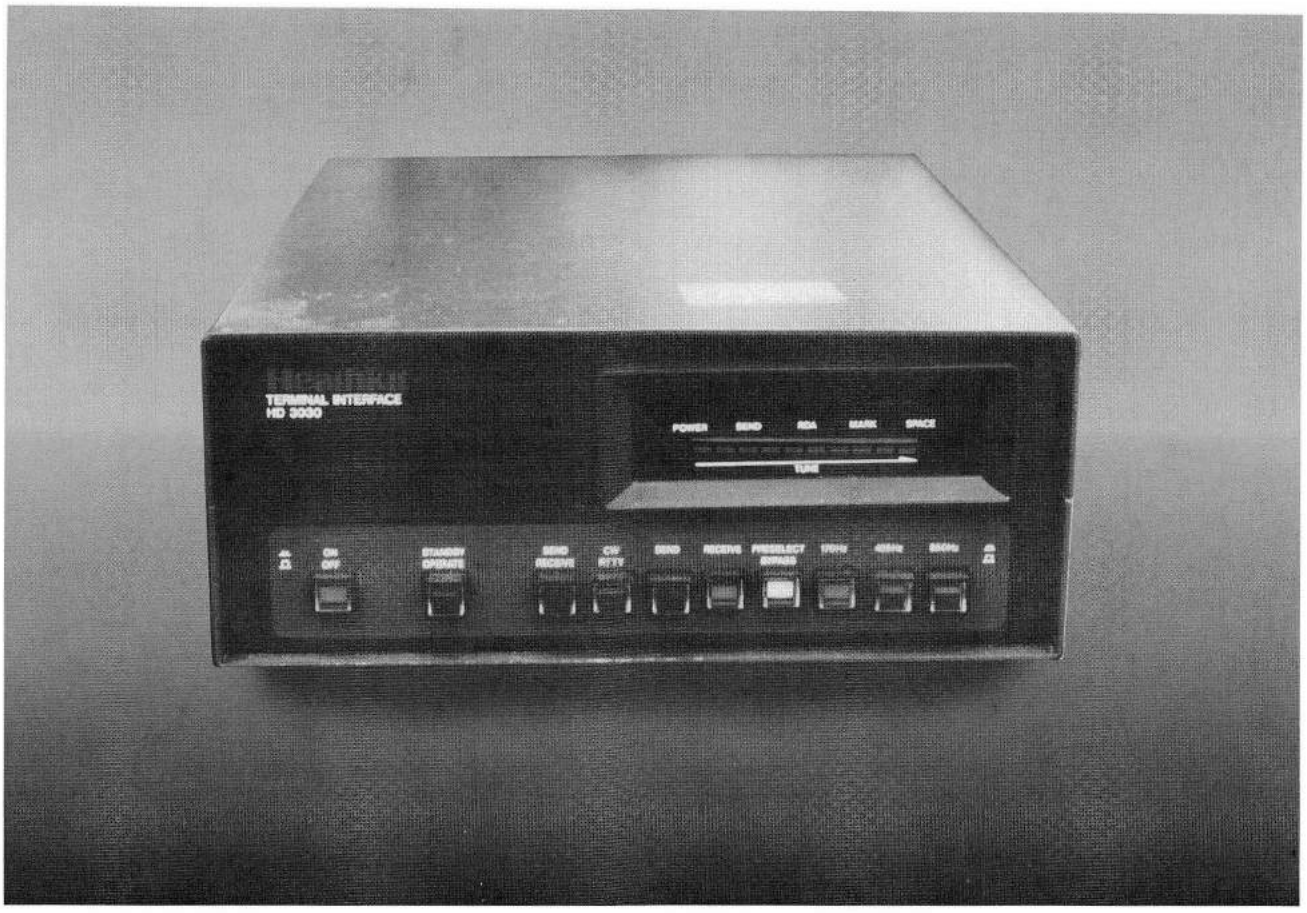
RTTY Tuning Indicator

"Crossfire"

Manufactured: 84-86
Price: $59.95

Comments: The HD-3006 was on the market only two years. The idea was to replace the oscilloscope—the traditional means of tuning in a RTTY signal—with a tiny, low cost, solid-state device. The HD-3006 uses 16 LEDs to indicate correct tuning. Eight vertical LEDs indicate mark strength, and 8 horizontal indicate space strength. Just tune the receiver for maximum vertical and horizontal display. The unit has a wide voltage range and is compatible with almost any interface or terminal unit with a scope output for tuning. Input level threshold: .3 volts RMS AC or .5 volts DC. Maximum input: 15 volts RMS AC or 15 volts DC. Each axis requires about 14 dB no-signal-to-signal voltage ratio (5:1) for full width display. Runs on 8-16 volts AC/DC. Brown. Medium rare.

Weight/Size: 3 lbs; 5″ wide x 3.25″ high x 4″ deep
Related Products: Little Brown Box series



FROM THE HEATH CATALOG

RTTY Terminal Interface

Manufactured: 84-87
Price: $249.95

Comments: The HD-3030 can send and receive ASCII and Baudot RTTY, as well as CW, and is designed with eight plug-in PC boards and a mother board. Features include 6-pole active pre-select filtering, data rates up to 300 baud, TTL and RS-232C I/O, and a built-in 20/60 ma loop supply for old-style terminals. Also features crystal controlled AFSK generator, capability for full FSK with equipped transmitters, and true mark/space detection. An autostart function energizes an AC receptacle on rear panel. The front panel has LEDs for power, send, RDA, mark, and space and a 10-segment bargraph tuning indicator. Front panel controls include flag-type pushbuttons for power, operate/standby, send/receive, CW/RTTY, send/receive (reverse shift), preselect/bypass, and 170, 425, and 850 hertz (independent and interlockable shifts). Preselect filters for 170 hertz is *optional*. An *optional* 425/850 Hz filter/shift board provides a 425 or 850 shift, but not both. This option is chosen during assembly. Rear panel connections include a loop jack input (100 VDC @ 20 or 60 ma), 25-pin DB-25 I/O connector for TTL and RS-232C computers, terminal and printers, 120 VAC 340 watt autostart outlet, and ground post. There also are provisions for scope tuning output. The CW demodulator center frequency is 750 Hz. -3 dB bandwidth is 70 Hz. -20 dB bandwidth is 240 Hz. Without the manual, you could be sorry. Brown. Medium rare.

Weight/Size: 8 lbs; 7.5″ wide x 3″ high x 10″ deep
Related Products: HD-3006, Little Brown Box series

TWO UNITS SHOWN.

Terminal Node Controller

Manufactured: 85-87
Price: $199.95

Comments: The HD-4040 was Heath's first packet product. It has most of the features one would expect in a TNC, including a mailbox, a beacon mode, and a repeater mode. Features include 32K of ROM as 4 x 2764 and 8K of RAM as 1 x 6264 expandable from 2K to 16K RAM or ROM and RS-232C interface baud rates from 50 to 4800 (optional to 19,200). A parallel port provides controller channel and command channel, diagnostic signal port, and a PROM programmer port. The modem input is filtered prior to demodulation and the filter constant can be changed by a plug-in header. Modulator is 1200 baud. An external modem can plug in to completely bypass the internal modem for faster baud rates. Operating commands can be stored in non-volatile RAM —128 4-bit locations. Protocols: AX.25 and VADCG. Operating modes: command, conversation, and transparent. The HD-4040 came with both an assembly manual and a user manual. It would be very handy to have them both. 120 VAC 50/60 hertz. Brown. Rare.

Weight/Size: 5 lbs; 13.75″ wide x 2.5″ high x 7.75″ deep
Related Products: HDA-4040-1, HK-232

CW Keyboard

"UltraPro"

Manufactured: 83-88
Price: $249.95

Comments: The UltraPro is a microprocessor based CW keyboard that was very popular and is still highly sought after. It is built largely on two PC boards and is a really fun toy—absolutely loaded with features. It has a professional quality, pre-assembled, full-stroke keyboard with key legends that won't wear off. There are 10 variable length text storage buffers (which can be linked together for added flexibility), a 64 character type-ahead buffer with a 3-color LED monitor, and a 4-digit LED display to indicate operating parameters, all of which are selectable from the keyboard. Three different 4-level code practice modes will send random length or 5-charactor groups with 3,000 characters sent before the sequence repeats. The UltraPro also has a built-in sidetone oscillator and speaker. There also is a self-diagnostic function: if a chip fails, the chip number will light up on the display. This function also is used during initial testing. The HD-8999 uses CMOS memory with battery backup to save buffer text. Speed range is 1-99 WPM in 1 WPM steps with selectable weighting. The 8999 also features auto serial numbering from 1-9999. Total text buffer capacity is 495 characters. About the only complaint heard is that the prosign AA is missing. Keyer output is +25 volts @ 100 ma, and -200 volts @ 40 ma. Power requirements are 7.5-11 VAC or 11-16 VDC @ 450 ma maximum. The HD-8999 is a real gem. Very rare.

Weight/Size: 7 lbs; 15.5″ wide x 3″ high x 8″ deep
Related Products: HD-10, HD-1410, SA-5010(A)

External VFO

Manufactured/Price:

HG-10	**61-66**	**$37.95**
HG-10B	**67-76**	**$37.95**

Comments: The HG-10 was released in 1961 just a few months after the DX-60 (see listing). Designed as a matching accessory for the DX-60, the HG-10 is calibrated to cover 80-2 meters but will provide drive on 220 MHz and 440 MHz as well. The HG-10 and 10B are two tube units using a series-tuned Clapp oscillator (a variety of Colpitts) and a cathode-follower isolation stage, and will provide 5 volts RMS output (to an open circuit). The HG-10 is designed for transmitters using grid-block keying (like the DX-60 series) and most transmitters using cathode keying (like the DX-40). Load impedance: 50,000 ohms or higher. Output frequency: 3.5 to 4 MHz, 7 to 7.425 MHz, and 8 to 9 MHz. Features include a 28:1 dial drive turns ratio, a "spot" switch for off-the-air tuning, and an illuminated dial window. Front panel controls include off/spot/operate, frequency, and band. Rear panel connections include an RCA phono RF output jack, a 1/4 inch jack for a key, and a cable for B+ and filament power. Power requirements: 108 VDC at 25 ma and 6.3 VAC or DC at .74 ma. The HG-10(B) can derive its power directly from the DX-60, 60A and 60B, and the HW-16. CAUTION: Most HG-10s you find will have been wired specifically for the DX-60, et al; however, it is possible for it to have been used with other transmitters as well. Before you plug it in, make sure you know where it's been. The manual details changes that are needed to make it work with non-Heath transmitters. Differences between HG-10 and the 10B (there was no A version) are purely cosmetic. For example both versions are two-tone green, but the smooth finish of the 10 was replaced with a wrinkle finish on the 10B. And on the B version the knobs are a darker shade of green. The HG-10 and 10B are common, turning up at flea markets with great regularity, though B versions are seen more often.

Weight/Size: 12 lbs; 9.5″ wide x 6.5″ high x 9.25″ deep

Related Products: DX-60(A)(B), HW-16

FROM THE HEATH CATALOG

Terminal Node Controller

Manufactured/Price:
HK-232 87-88 $279.95
HK-232A 88-91 $279.95

Comments: Released in the fall of 1987, this was an major overhaul of the HD-4040. The HK-232 is a multimode TNC providing for HF and VHF packet, RTTY, CW, AMTOR, and WEFAX. It supports HF packet rates to 300 baud and VHF packet to 9600 baud, although rates beyond 1200 baud require an external modem. The TNC-to-computer baud rate can be as high as 9600 baud and the CW speed range is from 5-99 WPM. The 232 supports all common Baudot RTTY and ASCII rates. A special "SIGNAL" command causes the HK-232 to determine the mode being received and will preset the baud rate and mode. It also will invert the signal if required. Lots of front panel LEDs display the current operating mode and system status. Features include two independent, selectable rear-panel connectors for interchangeable HF/VHF operation, an 8-pole bandpass filter followed by a limiter discriminator with automatic threshold correction, and a built-in front-panel LED bar-graph tuning indicator. An answer-back memory permits auto answer in both Packet and RTTY. No data is available on the differences between the 232 and the 232A, although it is likely there are no differences. Power requirements: 12 VDC at 750 ma. Gray. Medium rare.

Weight/Size: 5 lbs; 8.25″ wide x 2.5″ high x 11″ deep
Related Products: HD-4040

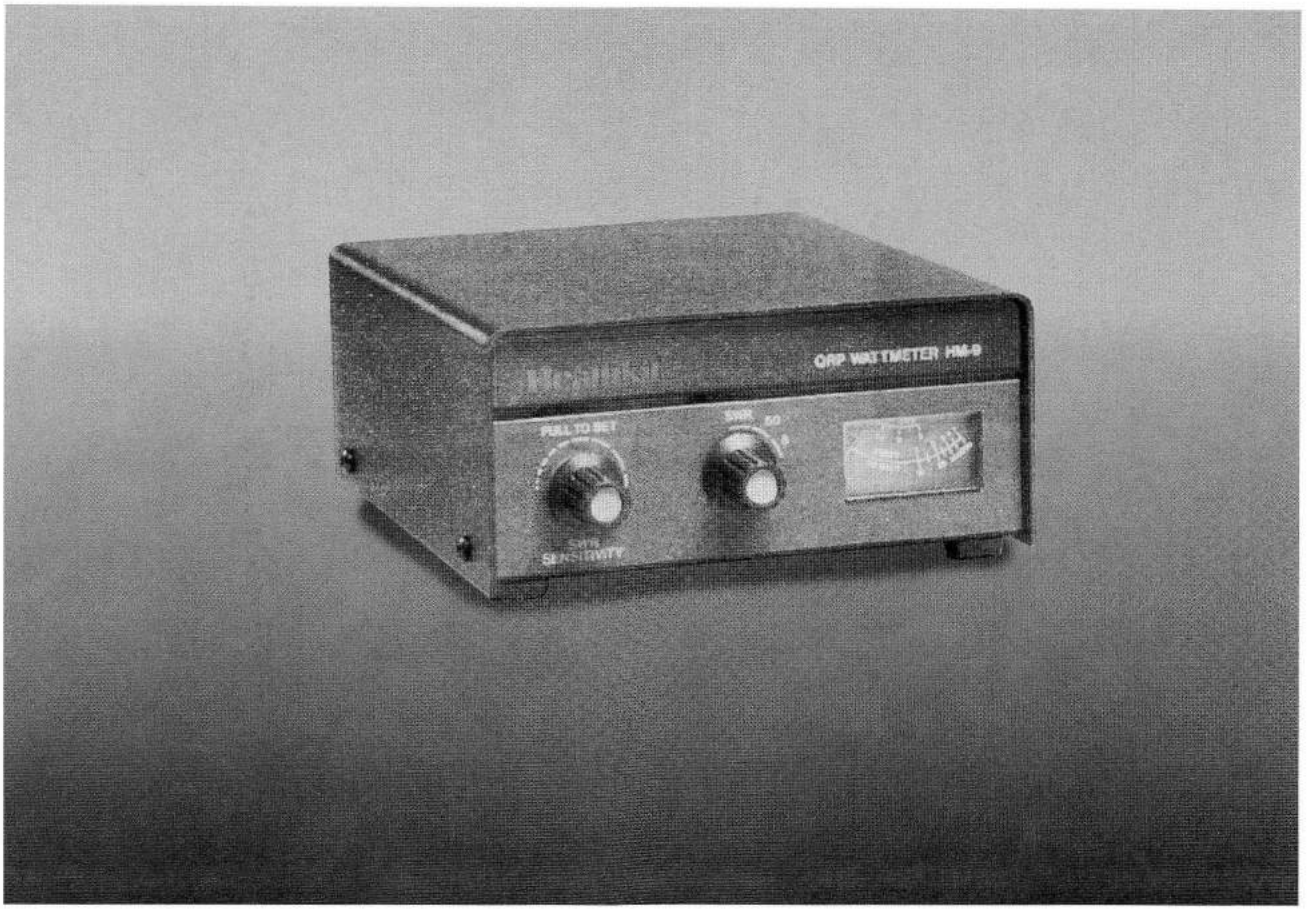
FROM THE HEATH CATALOG

4 Band HF Linear Amplifier

Manufactured: 83-84
Price: $849.95

Comments: In the spring of 1983 the venerable SB-221 (see listing) was replaced by the HL-2200—the last of the genuine Heath amplifiers. With almost no added features the 2200 was basically an SB-221 in a cabinet designed to match the ill fated SS-9000 and the HW-5400 (see listings). The price tag may have been the most substantial change—the HL-2200 cost $250 more than the SB-221. Like the 221, the 2200 uses a pair of 3-500Z finals and covers 80, 40, 20, and 15 meters. The 2200 requires 100 watts of drive and has a duty cycle of 100 percent for SSB and CW and 50 percent for RTTY (maximum of 10 minutes key down or RTTY transmit time). The HL-220 will tolerate an SWR of 2:1 or less and has an input/output impedance of 50 ohms (unbalanced). Front panel controls include tune, load, band, amplifier in/out, meter function, power, and CW/SSB. The multi-function meter reads grid current, relative power, and high voltage. There is a separate meter for plate current. Rear panel connections include phono type connectors for antenna relay and ALC, SO-239s for RF input and output, and a ground post. Power requirements: 120 VAC, 50/60 hertz at 20 amps maximum, or 240 VAC, 50/60 hertz at 10 amps maximum. The unit is protected by two 10-amp breakers. The 2200 is housed in a brown cabinet. Although it was as reliable as its predecessor, the HL-2200 was met with the scowls of hams who viewed it as something of a rip-off. It lasted only a year and a half. The HL-2200 was the last true Heath HF amplifier—the SB-1000 (see listing) was not designed by Heath. Heath never sold very many 2200s, and because of its short production life, it is not seen very often.

Weight/Size: 68 lbs; 15″ wide x 8.25″ high x 14.5″ deep
Related Products: SB-220, SB-221



FROM THE HEATH CATALOG

QRP Wattmeter

Manufactured: 83-91
Price: $49.95

Comments: The HM-9 is another product designed for the QRP and VHF markets. It is a 50 watt power meter and SWR bridge that can be wired for one of three frequency ranges: 1.8-30 MHz, 50-54 MHz, or 144-148 MHz. The range is chosen during construction. It is built on a single PC board and features two ranges: 0-5 watts and 0-50 watts. Accuracy is plus or minus 10 percent of full-scale reading. The SWR sensitivity is less than 1.5 watts and the unit is fitted with SO-239 connectors. The HM-9's broad frequency range made it very popular, and when Heath closed them out in 1991, they practically flew out the door. Many—if not most—are still in service. Before you buy one, make sure you know what frequency it has been wired for. It is difficult (but not impossible) to re-wire—assuming you have the manual. Brown. Medium rare.

Weight/Size: 3 lbs; 5.5″ wide x 2.5″ high x 7″ deep
Related Products: HFT-9, Little Brown Box series

SWR Bridge

Manufactured: 62-65
Price:$15.95

Comments: In 1962, Heath "updated" the AM-2 with a more modern looking meter and the classic green paint finish and called it the HM-11. The insides didn't change. See listing under AM-2 for details and specifications.

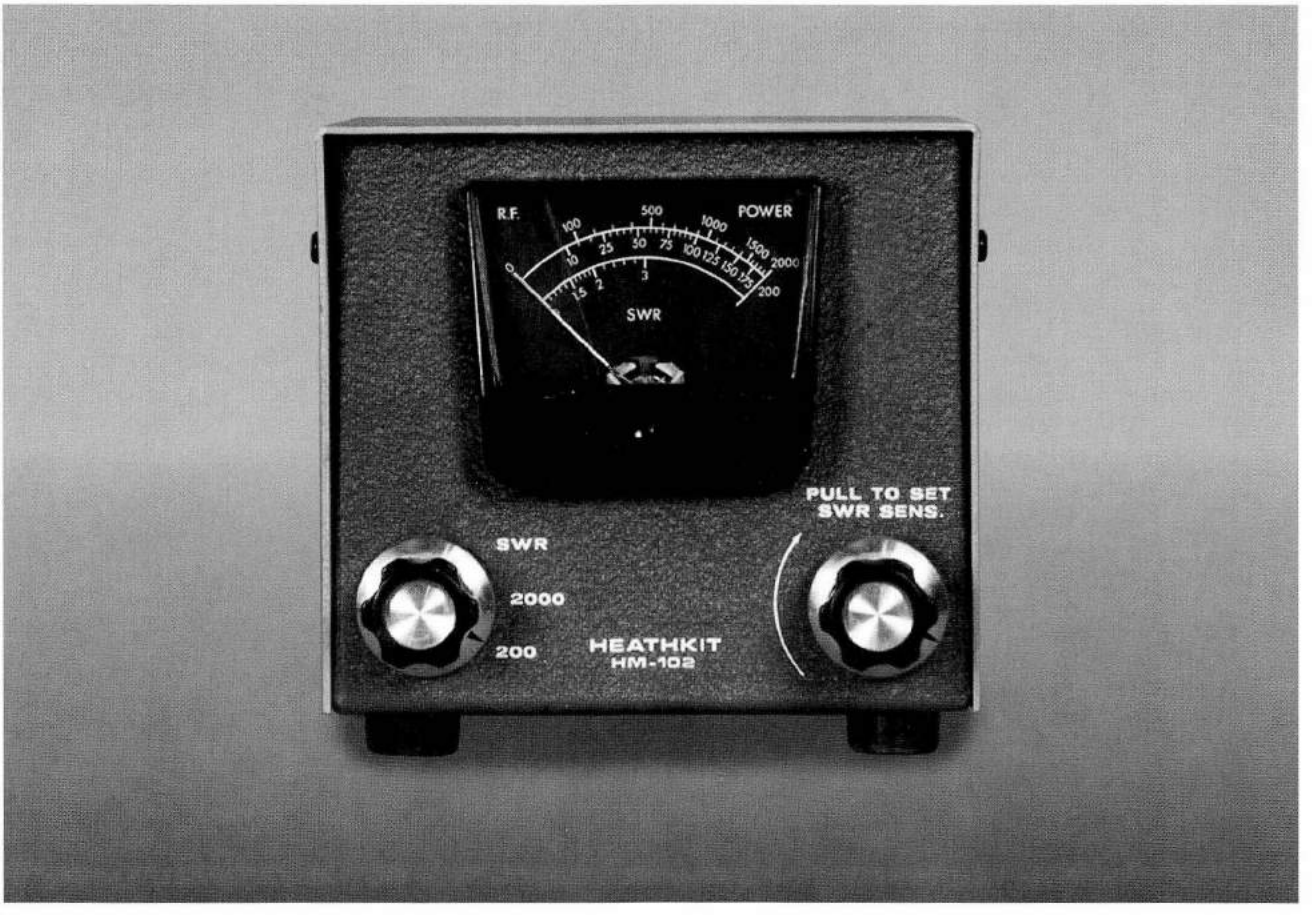
Weight/Size: 3 lbs; 7.25″ wide x 4.75″ high x 4.25″ deep
Related Products: AM-2, HM-15, HM-102 .

SWR Bridge

Manufactured: 66-70
Price: $14.95

Comments: The HM-15 is the third incarnation of an SWR bridge that was born as the AM-2 in 1957. In 1962 the AM-2 was given a new paint job and called the HM-11. Then in 1966 the HM-11 was put in to a new "low boy" cabinet, painted to match the SB series, and renamed the HM-15. It will handle up to 2000 watts PEP and will operate from 160-6 meters. It also will operate with 50 or 75 ohm lines depending on the pick-off resistors chosen during construction. For a little more history on this unit, see listings under AM-2, HM-11. In 1970 the HM-15 would itself be changed into the HM-102—the last of the line. The HM-15 has a light green cabinet and an SB green wrinkle front panel. The HM-15 is another of Heath's most popular products, turning up at flea markets all the time. Heath must have sold zillions of them. Not rare.

Weight/Size: 3 lbs; 9.25″ wide x 2.5″ high x 3.5″ deep
Related Products: AM-2, HD-11, HM-102, HD-15

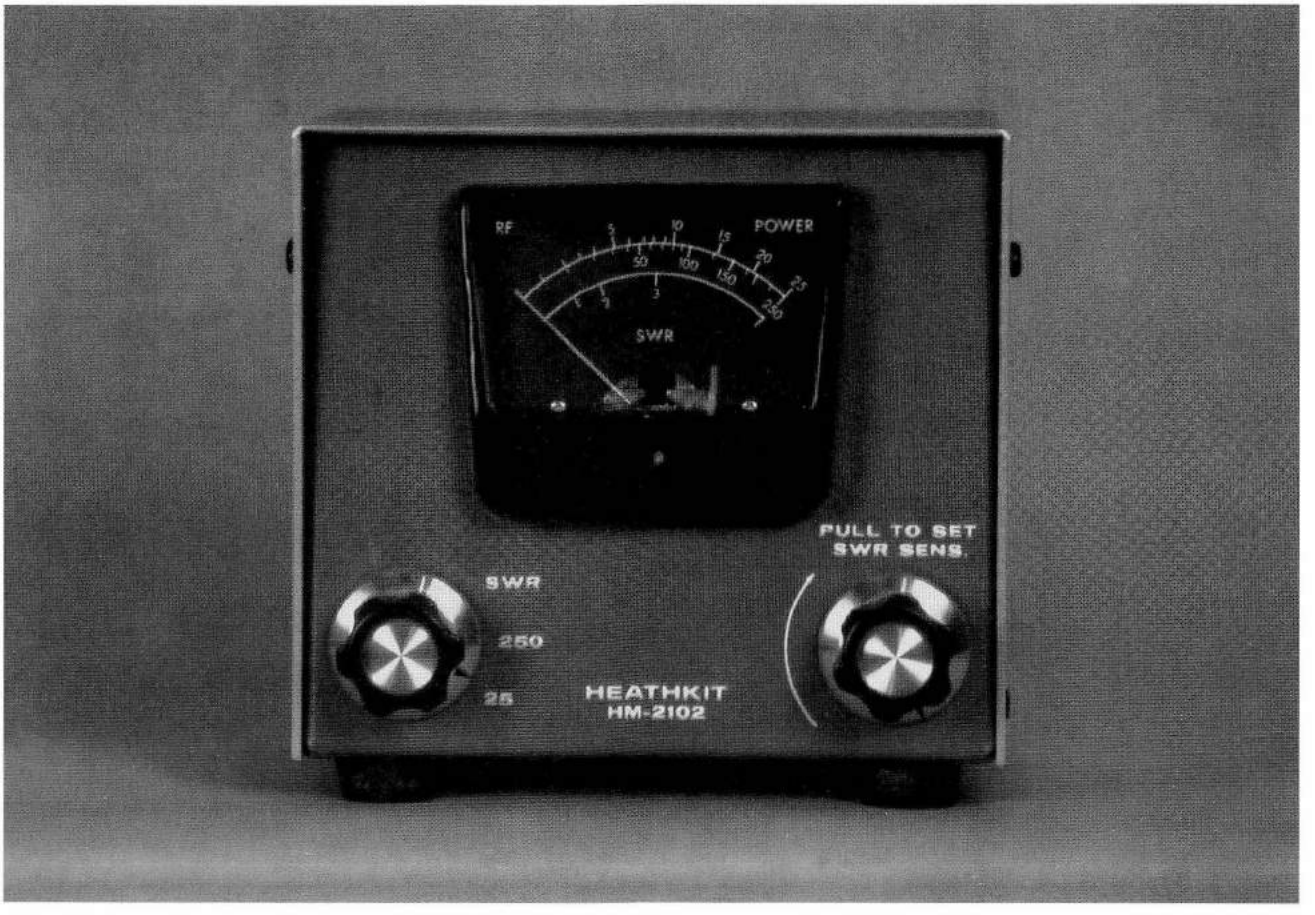


HF Wattmeter

Manufactured: 70-81
Price: $34.95

Comments: This is the last and most successful of the line of SWR meters that began with the AM-2 in 1957. In this final iteration Heath added a wattmeter and built it all into a smart-looking cube adorned with the SB color scheme. In 1970, a low-cost wattmeter was pretty much an oxymoron. When Heath released it, the HM-102 went out the door so fast Heath could hardly keep up. The 102 has two switch-selected ranges—0-200 watts and 100-2000 watts—and features a built-in calibrator permitting 10 percent accuracy throughout the 80-10 meter bands, low-loss torroidal circuitry, and a removable remote sender unit that permits the meter to be placed up to six feet away . The HM-102 is designed for continuous duty, has an impedance of 50 ohms, has a working frequency range of 3-30 MHz, and is fitted with SO-239 connectors. In 1973 Heath released a matching VHF unit—the HM-2102 (see listing). The HM-102 has a light green cabinet and an SB green wrinkle front panel. Zillions sold. These are not rare but are still in demand and tend to sell quickly.

Weight/Size: 3 lbs; 5.25″ wide x 5.25″ high x 6.5″ deep
Related Products: AM-2, HM-11, HM-15, HM-2102

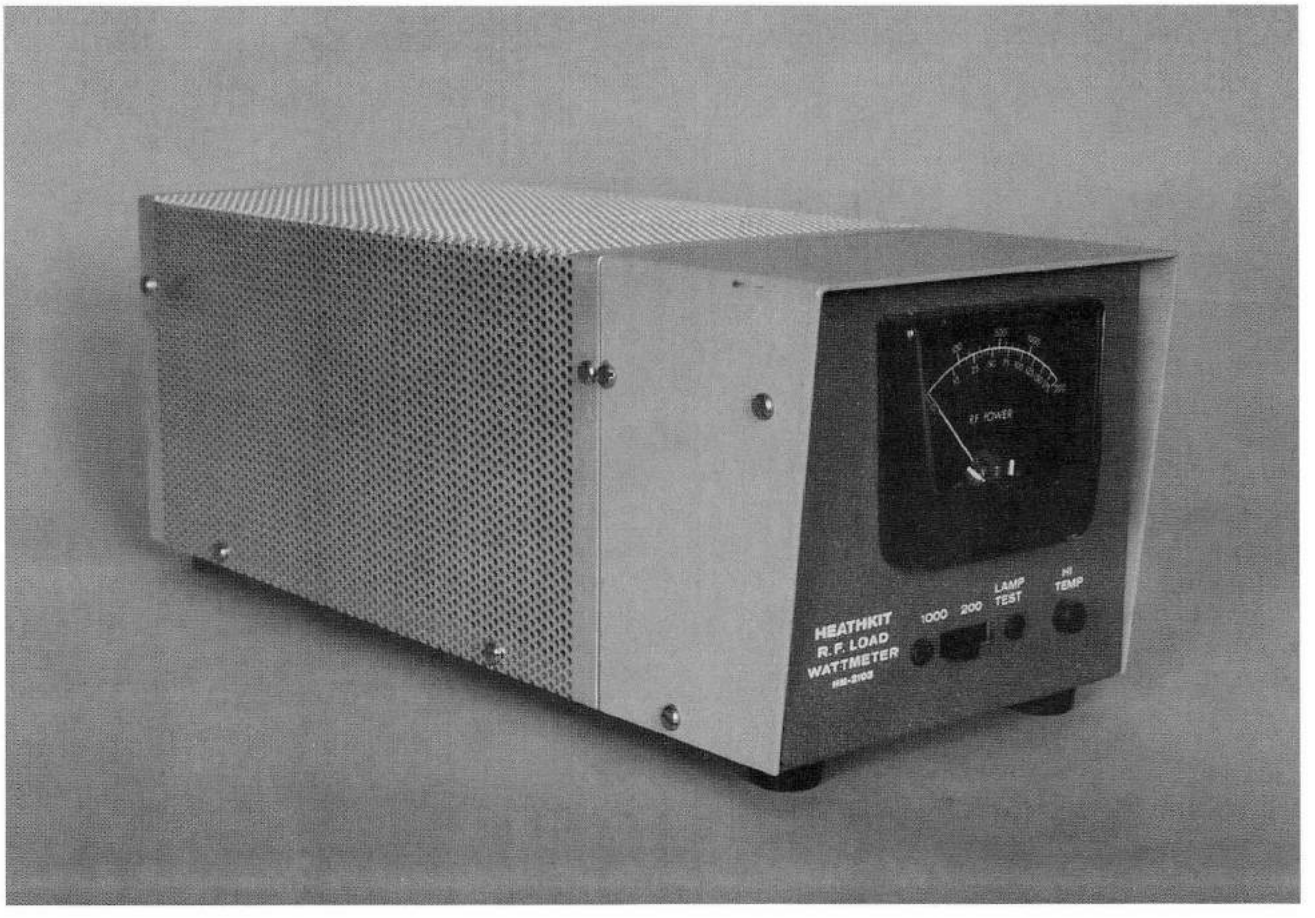


VHF Wattmeter

Manufactured: 73-81
Price: $34.95

Comments: The HM-2102 was released in time for Christmas in 1973. It was a big hit because low-cost VHF wattmeters were almost unknown at the time. It was designed to match the popular HM-102 HF wattmeter and has a frequency range of 50 to 160 MHz, a maximum power rating of 250 watts, and a built-in SWR bridge. There are two switch-selectable ranges—1 to 25 watts and 10-250 watts. Accuracy is 10 percent of full scale. SWR sensitivity is less than 10 watts. Other features include a removable remote sender unit that permits the meter to be placed up to six feet away. The 2102 may be placed in the line permanently with "little or no loss." The unit is fitted with SO-239 connectors and has a light green cabinet with green wrinkle front panel. The unit is designed for 50 ohm antennas. At a distance the HM-2102 is indistinguishable from HM-102 making it easy to overlook. The HM-2102 is much more difficult to find than the HM-102. They are still in demand and sell quickly. Medium rare.

Weight/Size: 3 lbs; 5.25″ wide x 5.25″ high x 6.5″ deep
Related Products: HM-102

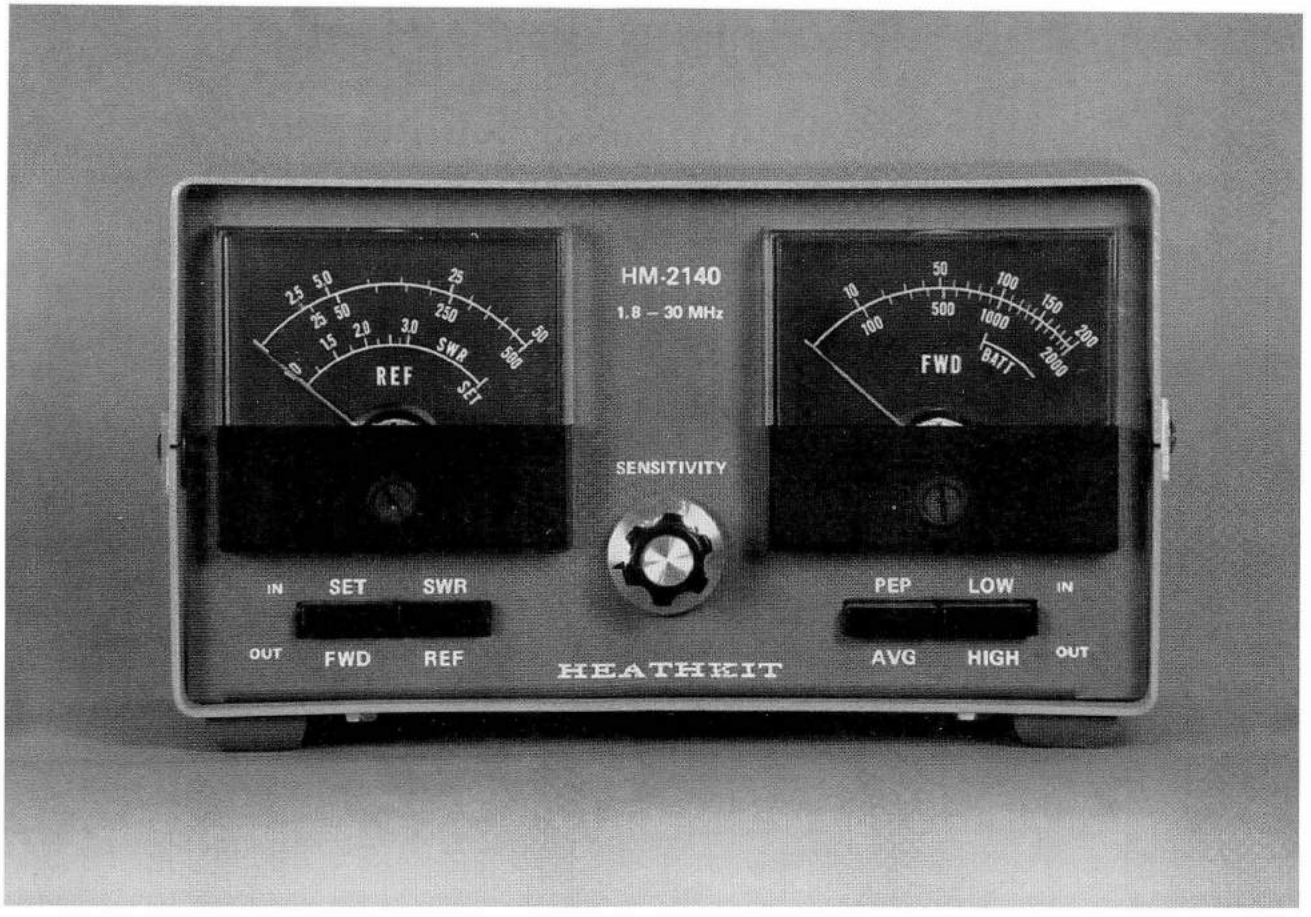


HF Load/ Wattmeter

Manufactured: 73-75
Price: $69.95

Comments: It is not clear why Heath made this little gem for only three years. The HM-2103 is a wattmeter and a dry dummy load in one package. It was (and still is) a very useful product. Designed for HF use, its operating range is from 1.8 to 30 MHz. It will provide a 50 ohm non-reactive load with 1.2:1 SWR over the full range. The load resistor will handle 175 watts continuously, 500 watts for 5 minutes, and 1000 watts for 2.5 minutes. An overload indicator light warns of high temperature conditions. This circuit is activated by a thermal switch and requires a 9 volt battery. A front panel switch selects two power ranges (0-200 watts and 0-2000 watts) and a high-temp indicator lamp/battery test. NOTE: the HM-2103 does not contain an SWR bridge. The 2103 cabinet is light green and the front panel is wrinkle green. These are highly sought-after units, and on the rare occasions they show up at a flea market, they sell in an instant. Very rare.

Weight/Size: 6 lbs; 5.25″ wide x 6″ high x 13.75″ deep
Related Products: HM-102



HF Wattmeter

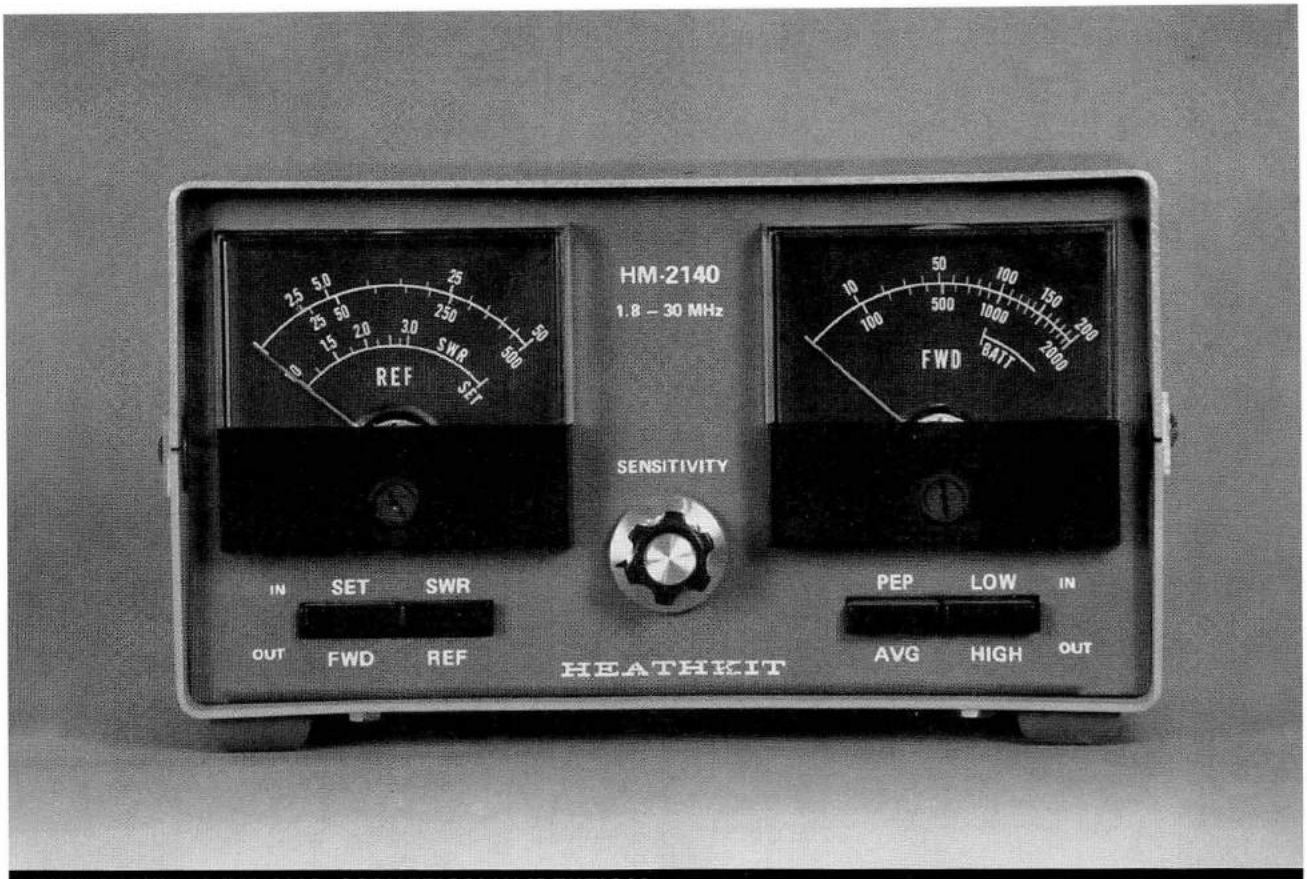
Manufactured/Price:

HM-2140	**79-83**	**$74.95**
HM-2140A	**84-91**	**$99.95**

Comments: This handy little kit was on the market right to the end. The HM-2140 provides simultaneous indication of both forward and reflected power by means of two separate meters, and will read PEP or average power. In addition, the instrument contains an SWR bridge. It has a usable frequency range from 1.8 to 30 MHz and will handle forward power up to 2000 watts and reflected power up to 500 watts. Front panel push buttons select power ranges (0-200 watts and 0-2000 watts), PEP/average, SWR set/forward/reflected, and battery test, while a control combines SWR sensitivity and on/off function. The 2140 has a forward accuracy of plus or minus 5 percent and a reflected accuracy of plus or minus 7.5 percent. The insertion SWR is less than 1.05:1. The removable sensor unit is factory assembled and calibrated and can be mounted up to 6 feet away from the readout box. The HD-2140 requires a 9 volt battery and a jack is provided for use with a power cube. The only difference between the 2140 and the 2140A is the paint color. The 2140 is two-tone SB green. The "A" version was painted brown to match the rest of the "little brown box" series. Heath also took the opportunity to raise the price $25. Just a few months after its release in '79, Heath came out with a VHF version—the HM-2141. Tens of thousands of 2140s were sold. Many are still in use. They show up frequently at flea markets but don't seem to sell all that quickly. The HM-2140 and the HM-2141 are indistinguishable from a distance and are easily confused. Not rare.

Weight/Size: 3 lbs; 7.5″ wide x 4.25″ high x 6.5″ deep

Related Products: HM-2141



UNIT SHOWN IS HM-2140, COSMETICALLY IDENTICAL.

VHF Wattmeter

Manufactured: 79-83
Price: $79.95

Comments: Not as successful as its HF cousin, the HM-2141 lasted only four years. The 2141 is functionally identical to the HM-2140 except that it covers from 50 to 175 MHz with a forward maximum of 300 watts and a reflected maximum of 100 watts. There are two power ranges: 0-30 or 0-300 watts forward and 0-10 watts or 0-100 watts reflected. See listing under HM-2140 for other functions and specifications—they are identical. Requires a 9 volt battery. No brown colored "A" version was ever made. The 2141 is finished with the classic two-tone SB green wrinkle paint. The HM-2141 and the HM-2140 are indistinguishable from a distance are are easily confused. The 2141 is very rare compared to the HM-2140.

Weight/Size: 3 lbs; 7.5″ wide x 4.25″ high x 6.5″ deep
Related Products: HM-2140(A)

FROM THE COLLECTION OF PAUL MARCH.

RF Load

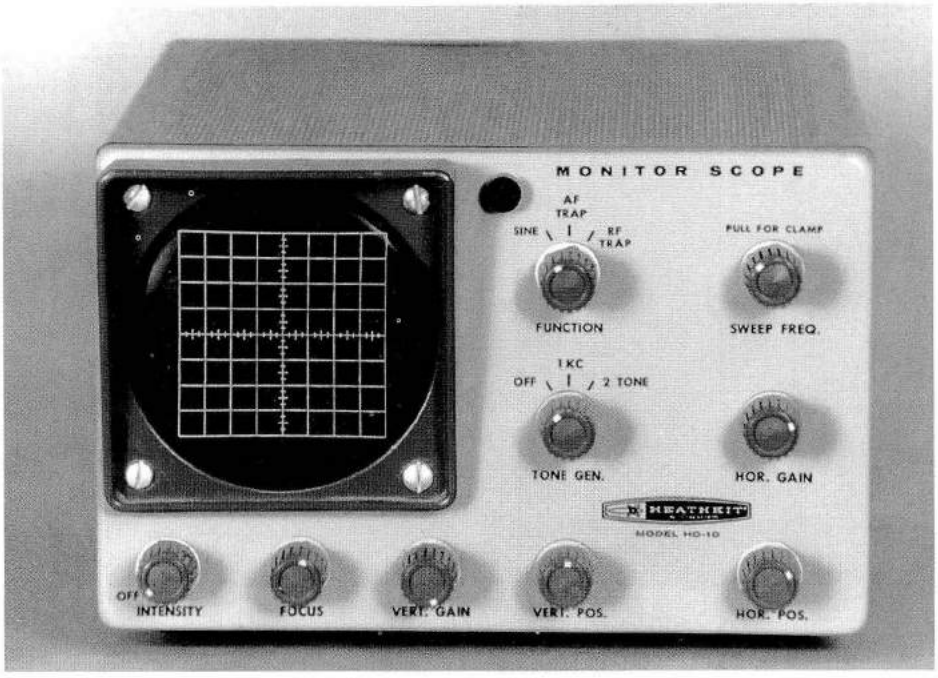
"Cantenna"

Manufactured/Price:

HN-31	**61-83**	**$9.95**
HN-31A	**83-91**	**$24.95**

Comments: The Cantenna RF Load is undeniably the longest running, most successful product Heath ever made. It sold for 30 years and spanned more than three quarters of Heath's amateur radio life. It is impossible to say how many gazillions of these were put together. Other products came and went, but the Cantenna remained. It is difficult not to wax nostalgic over this humble product. Housed in a standard one gallon paint can and sold for $9.95, it remained plain black until 1969 when it was adorned with the familiar Heath logo and a derating curve diagram. The original Cantenna came topped off with a small aluminum mini-box with an SO-239 and a phono jack DC pick-off for relative power measurements. In 1983, the box and the phono jack were removed and the SO-239 was mounted through the lid of the can. At the same time, Heath removed the printing from the can and replaced it with a flashy three-color stick-on label. The HN-31 provides a 50 ohm non-reactive load with an SWR or 1.5:1 from 1.5 to 300 MHz. It handles up to 1000 watts and can be filled with oil to help cool the resistor. With transformer oil the Cantenna will handle 1000 watts for 10 minutes. With mineral oil the 1KW rating drops to less than a minute. CAUTION: Some transformer oils contain PCBs—a suspected carcinogen. If you're not sure what's in your Cantenna, handle it with care. Heath did not supply oil. The original HN-31 has a 3:1 SWR spike just above 225 MHz and a 2:1 SWR above 400 MHz.. The "A" version moved this spike up to about 350 MHz and lowered the SWR above 400 MHz to less than 1.5:1. No shack should be without this piece of history. It's hard to go to a flea market and not see at least one Cantenna.

Weight/Size: 3 lbs ; Size: See text
Related Products: none

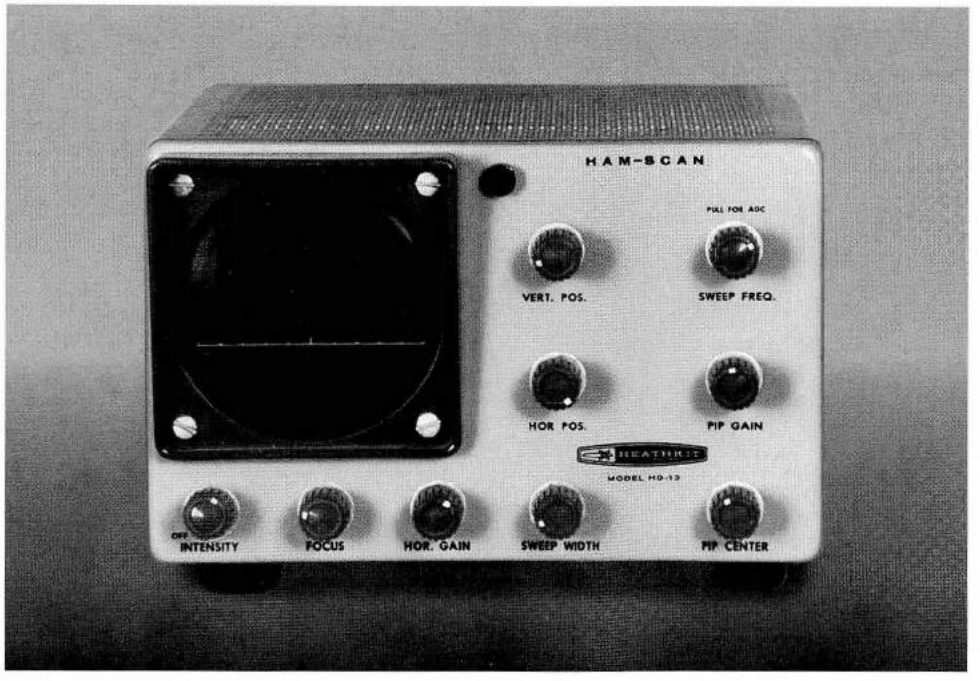


Station Monitor Scope

Manufactured: 62-66
Price: $59.95

Comments: The HO-10 monitor scope was brilliant idea. In one small box it combines everything needed to do all kinds of tests, adjustments, and measurements of your transmitter. It will display wave-envelope patterns of AM, SSB, or CW signals; trapezoidal patterns of linear amplifier operation or AM signals; and RTTY cross patterns. With the right connection to your receiver, it will also display patterns of received signals. The HO-10 uses 5 tubes (excluding the CRT) and connects to the RF line with a pair of SO-239s in a simple loop-through configuration. A built-in tone generator provides single-tone or two-tone audio tests (1000/1700 Hz) at mic level—15 mv (peak). Front panel controls include intensity, focus, vertical and horizontal position and gain, sweep frequency (approx 10-200 Hz), tone generator, and function selector. To prevent burning of the CRT, a clamp circuit pulls the beam off the face of the tube when input signals are not present. Rear panel connections include loop-through SO-239s, loop-through phono jacks for exciter input, vertical and horizontal phono inputs for received signal and RTTY input, and a phono jack output for the tone generator. (The 6J11 compactron tone generator is unrelated to the the rest of the circuit, and if it's bad, it will not affect the general operation of the scope.) The HO-10 requires a minimum of 5 watts of drive and will handle as much as 1000 watts. A rear panel attenuator control is used for adjusting the vertical deflection size based on your input power—0 to 24 dB in 6 dB steps. Vertical response is plus or minus 3 dB from 10 to 500 kHz with sensitivity of 500 mv per inch and an input resistance of 50,000 ohms. The horizontal section has a response of plus or minus 3 dB from 10 to 30 kHz with sensitivity of 800 mv per inch and an input resistance of 1 meg ohm. With respect to monitoring received signals, the HO-10 is designed for use with receivers having an IF frequency of 500 kHz or less, and connects through a 5-15 pf capacitor to the grid (preferably) or plate circuit of last IF stage of the receiver. It should be noted that any information gleaned about received signals monitored in this way is suspect at best since there are too many variables that can affect the quality of the incoming signal. Clearly, the monitoring of transmitted RF is the best use of the HO-10. The HO-10 has a 50-75 ohms coaxial input and a frequency coverage of 160-6 meters. The biggest problem with HO-10s seems to be the power transformer. It is a special design and if it goes out, your best option may be to find another HO-10 (or HO-13) for parts. Often, HO-10s can be found without the power transformer or with a home brew outboard power supply. The HO-10 is designed for 120 VAC, 50/60 Hz operation. The HO-10 is almost indistinguishable from the matching HO-13. The cabinet is finished in a two-tone green, designed to match the TX-1, et al, and is fitted with a dark green bezel. The green reticule over the standard 3RP1 CRT is an 8 x 8 grid. In 1966 the HO-10 was put into a cabinet that matched the new SB series and renamed the SB-610. There are only a few electrical differences between the two units. HO-10s used to show up at flea markets all the time, but in recent years have become much more elusive.

Weight/Size: 11 lbs; 7.5″ wide x 5.25″ high x 10.5″ deep
Related Products: HO-13, SB-610, SB-614



Panadapter

Manufactured: 64-66
Price: $79.00

Comments: The HO-13 is a very clever and useful device. It gives you a "picture" of band activity up to 100 kHz wide. Signals are displayed as pips on the screen, and their positions left or right of the center of the screen can be interpreted as their frequency in kilohertz higher or lower than where your receiver is tuned. As you tune the receiver, the pips move slowly across the screen. The signal you hear is always in the center of the screen. The value of such a gizmo depends to a certain extent on your fondness for gadgets. The advantages, however, are clear. You can identify open frequencies in a band without having to tune around. You also can get an idea of general band conditions, spot activity on a "deserted" band, and identify transmission modes and signal strengths of signals not tuned in. The HO-13 uses point-to-point wiring and is built around seven tubes (excluding the CRT) and four solid state diodes (in the low voltage section). Connection to the receiver is through a small value capacitor to the plate of the first IF stage. IMPORTANT: The HO-13 must be wired for a particular receiver IF frequency. The unit originally was supplied with all the parts needed to make it work with the following IFs: 455, 1600, 1650, 1681, 2075, 2215, 2445, 3000, 3055, and 3395 kHz (the SB and HW series IF). Before you buy an HO-13 be sure to find out what IF it has been wired for. To rewire for a new IF will require the right parts and the manual. While the manual may be easy to find, the right parts will not. Of course if you just need the unit for spare parts it doesn't matter what it has been wired for. Sensitivity is about 50 uV for one inch of vertical deflection. Frequency scan width is approximately 30 to 100 kHz and is continuously variable. Resolution is approximately 2 kHz. Using the HO-13 takes some practice, but once you become comfortable with it, it is (in the author's opinion) a very useful accessory. In 1966 the HO-13 was put into an SB style cabinet and renamed the SB-620. There are no significant electrical differences between the HO-10 and the SB-620. The biggest problem with HO-13s seems to be the power transformer. It is a special design, and if it goes, your best option may be to find another HO-13 (or HO-10) for parts. The HO-13 is designed for 120 VAC, 50/60 Hz operation. The HO-13 is almost indistinguishable from the matching HO-10. Early HO-13s were supplied with standard 3RP1 green CRTs. Late model units were fitted with high persistence yellow (P8) phosphor tubes, making them visible across the flea market. The reticule over the tube is a single line with ten divisions. The HO-13 is housed in a two-tone green cabinet with dark green bezel and matches the HO-10, TX-1, et al. Quite rare—especially in good working condition.

Weight/Size: 12 lbs; 7.5″ wide x 5.25″ high x 10.5″ deep
Related Products: HO-10, SB-620, HW-5404

FROM THE HEATH CATALOG

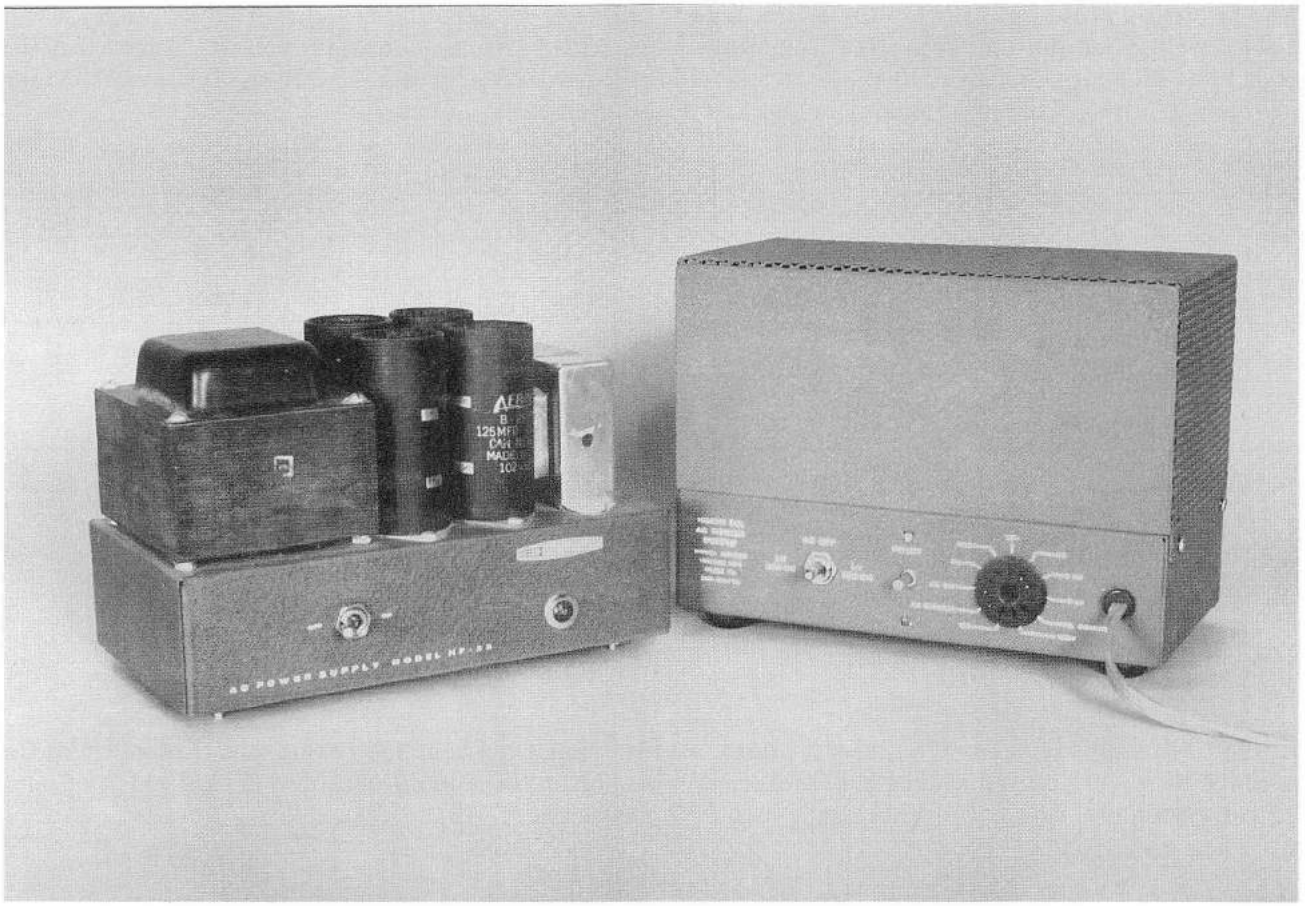
Station Monitor Scope

(with optional panadapter)

Manufactured: 85-88
Price: $249.95 (less panadapter module)

Comments: This was Heath's last ham related scope. Except for the CRT, the 5404 is a fully solid state device, and combines the features of the SB-610 and SB-620 (see listings), both of which had been discontinued more than 10 years earlier. Heath also added a little more in the way of general purpose scope features. The HO-5404 displays standard AM, CW, SSB, RTTY, and trapezoidal patterns, as well as audio signals to 40 kHz with good sync capability. RF frequency coverage is from 3.5 to 54 MHz. Sensitivity is 1/4 inch vertical deflection from 10 watts input to 3/4 inch deflection from 100 watts input. Vertical and horizontal amplifier sensitivity is 60 mV per 1/4 inch deflection. The *optional* panadapter module sold for $99.95 (though many catalog "specials" threw it in at no extra charge) and provides a visual representation of the band from plus and minus 20 kHz or plus and minus 100 kHz. These views are a bit more limiting that those of the SB-620, which was continuously variable. Most users will find the plus and minus 100 kHz view (200 kHz total) too wide to be of any use, but most would find plus and minus 20 kHz (40 kHz total view) to be almost ideal on a crowded band like 20 meters. Panadapter use requires connection to the first IF stage of your receiver and is for use with receivers that have IF frequencies of 3395 kHz (the SB and HW series IF) or 8830 kHz (the HW-5400 IF). The unit is enclosed in a brown cabinet to match the HW-5400, et al, and is designed for 120 VAC, 50/60 Hz operation. Be sure to ask if the unit you're looking at has the panadapter module. Although it worked well enough, most people thought the price tag on the HO-5404 was a little high, and Heath probably never sold very many. As a result, the HO-5404 is quite rare.

Weight/Size: 15 lbs; size not available
Related Products: HO-10, HO-13, SB-610, SB-620



Power Supplies

(AC for fixed-station use)

Manufactured/Price:

HP-23	**63-68**	**$39.95**
HP-23A	**68-73**	**$59.50**
HP-23B	**73-77**	**$59.95**
HP-23C	**77-79**	**$62.95**

Comments: These power supplies were designed specifically for the SB and HW series of radios, but can be used with a variety of other commercial and home brew equipment. The units provide all high, low, bias, and filament voltages needed. Voltage doubler circuits are used in both the high and low voltage sections. The four versions of the HP-23 differ only in small ways—their basic specifications are all the same. **High voltage** is 820 VDC no load and 700 VDC at 250 ma. Capacitor input filter ripple is less than 1 percent at 250 ma. High voltage duty cycle is 100 percent at 150 ma and 50 percent at 300 ma. **Low voltage** is 350 VDC no load, 300 VDC at 150 ma (high tap) and 275 VDC no load, 250 VDC at 100 ma (low tap). Low voltage section uses a capacitor input filter with 6 HY choke. Ripple is less than .05 percent at 150 ma. Low voltage duty cycle is 100 percent at 175 ma. **Fixed bias** voltage is -130 VDC no load, -100 VDC at 20 ma. Ripple is .5 percent at 20 ma. Fixed bias duty cycle is 100 percent at 20 ma. **Adjustable bias voltage is -40 to -80 VDC at 1 ma maximum. Filament** voltages are 6.3 VAC at 11 amps and 12.6 VAC at 5.5 amps. All units are fitted with an 11 pin "octal style" socket power connector. NOTE: You may encounter some units improperly assembled with plugs and sockets switched around. The connector on the power supply should always be a *socket*. The "rig end" of the cable connecting the power supply to the rig may be an 11 pin or an 8 pin *socket* depending on the model of the radio the power supply was used with.

(See chart next page)

The following table lists power supply pin outs for all four models and resistance charts to help you field check the supply for integrity. Resistances are with respect to chassis ground. Note: All filter caps have bleeders. It is *probably* safe to assume they are discharged. Also note that the transformer primary winding cannot be resistance checked without shorting pins 9 and 10.

Pin #	HP-23 & 23A	Field Check	HP-23B & 23C	Field Check
1	fixed bias	22k or higher	fixed bias	22k or higher
2	fil common	infinity	fil common	infinity
3	low voltage	75k or higher	low voltage	75k or higher
4	high voltage	75k or higher	high voltage	75k or higher
5	NC	infinity	NC	infinity
6	12 V filament	infinity	12 V filament	infinity
7	ground	0 ohms	ground	0 ohms
8	6 V filament	infinity	NC	infinity
9	AC switch	infinity	AC switch	infinity
10	AC Switch	infinity	AC switch	infinity
11	adj bias	10k-20k	NC	infinity

HP-23 has on/off toggle switch and pilot light (styles vary). Choice of 250 or 300 volt (low voltage) B+ is made by wiring option during assembly. Provides both fixed and adjustable bias, as well as 6 and 12 volt filaments. Fused 120 VAC plug. No 240 VAC operation.

HP-23A has on/off switch with selection of 250 or 300 volt B+. No pilot light. Provides both fixed and adjustable bias, as well as 6 and 12 volt filaments. Circuit breaker replaces fused plug. 120 and 240 VAC wiring options.

HP-23B has on/off switch with selection of 250 or 300 volt B+. No pilot light. Provides only fixed bias and only 12 volt filament. No adjustable bias or 6 volt filament. Circuit breaker operation. 120 and 240 VAC wiring options.

HP-23C has no on/off switch, or switch selection of B+. Choice of 250 or 300 volt (low voltage) B+ is made by wiring option during assembly. No pilot light. Circuit breaker operation. 120 and 240 VAC wiring options.

These power supplies are very well designed and perform nicely. The HP-23A is probably the most versatile of the series. They are still rather plentiful at flea markets and often can be had at bargain prices. CAUTION: Don't confuse these with the HP-24. The HP-24 looks the same but is designed for use only with the HA-14 "Kompact Kilowatt." The HP-23 series is SB green in color.

Weight/Size: 19 lbs; 9″ wide x 6.75″ high x 4.75″ deep
Related Products: HP-13, HP-14, HP-24

5 Band AM/CW/SSB Receiver

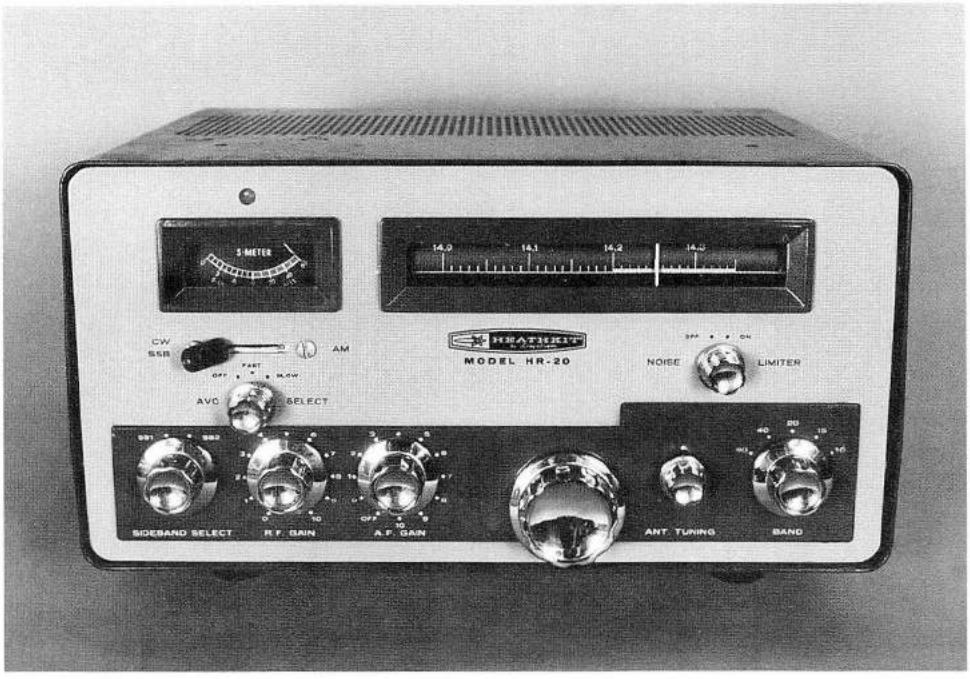
Manufactured/Price:

HR-10	**61-67**	**$82.95**
HR-10B	**67-75**	**$75.00**

Comments: Designed by Heath to match the DX-60 series of transmitters, the HR-10 and HR-10B (there was no A version) are 5-band, 80-10 meter receivers that will tune SSB, CW, and AM signals. In spite of their low cost and slide-rule dials, they work surprisingly well. The HR-10 and 10B are built around 7 tubes (unlike the DX-60 series, the power supplies are not solid state...curious) and employ a genuine crystal lattice filter in the first IF (1681 kHz). This filter provides a selectivity of 3 kHz at 6 dB down. Sensitivity is advertised as 1 uV. Image rejection is 40 dB or better. The coil/bandswitch unit is pre-assembled and tuning is fairly smooth with tuning dial ratio of about 12:1. The units take at least 30 minutes to stop drifting, although drift is not a serious problem. Also, the units are not prone to drift due to mechanical vibration. However, there is no voltage regulation in the power supply, and this can cause some sudden drift with changes in the 120 VAC power lines. Front panel controls include power on/off, AF gain, RF gain, BFO tune, band switch, main tuning, calibrator on/off, antenna trimmer, receiver/standby, BFO on/off, AVC on/off, and ANL on/off. There is also a headphone jack on the front panel. Rear panel connections include phono jacks for the antenna (50-75 ohms) and a speaker (8 ohms). There is no built-in speaker. The rear panel also contains a "meter zero" control for calibrating the "S" meter and an octal accessory socket. This socket provides only receiver muting and is for use in conjunction with the DX-60 series transmitters. If the mating plug is missing, pins 1 and 6 of this socket must be shorted together for normal operation. An *optional* crystal calibrator (HRA-10-1) plugs into an octal socket near the right rear corner of the chassis. Its presence can be determined with visual inspection by looking through the rear of the cabinet. Two-tone green paint matches the DX-60 series. There are no differences between the HR-10 and the 10B. Only the paint was changed. The smooth paint of the HR-10 was changed to a wrinkle finish on the 10B. This was done so the 10B would match the DX-60B's paint job. The HR-10 and 10B are designed for 120/240 VAC, 50/60 Hz operation. These receivers are fairly common.

Weight/Size: 20 lbs;13.75″ wide x 6.5″ high x 11.5″ deep

Related Products: DX-60 series, HG-10(B), HRA-10-1



5 Band SSB/CW Receiver

Manufactured: 62-64
Price: $134.95

Comments: The HR-20 and HX-20 are matching rigs designed primarily for mobile use and represent a general refinement of the MR-1 "Comanche" and the MT-1 "Cheyenne," which they replaced. The HR-20 receiver is an 8 tube design covering 80-10 meters. No PC boards are used—all wiring is point to point. It uses a hermetically sealed crystal filter and has a 3000 kHz first IF. Sensitivity was advertised as better than 1 uV on all bands. Selectivity is 3 kHz at 6 dB down, 10 kHz at 60 dB down. It can be used as a mobile or fixed-station radio with the appropriate power supply. IMPORANT: The HR-20 can be used only in vehicles with negative ground. There is no internal power supply. The rig must be used with either the HP-10 or HP-13 series (for mobile use) or the MP-1, HP-20, or HP-23 series (for 120 VAC use). The HR-20 is stabilized with extensive temperature compensation, plate voltage regulation (OA2), and regulation of the filament voltage of the RF amp and mixer/oscillator with a transistor/zener diode combination. A product detector is used for SSB, CW, and AM signals. The BFO is crystal controlled and provides for USB and LSB tuning. Features include lighted dial and meter windows, a built-in series ANL, front panel selection of fast and slow AVC action, and outputs for an 8 ohm speaker and 500 ohm headphones. There is no built-in speaker. Front panel controls include USB/LSB selector, RF gain, AF gain/power on/off, noise limiter, AVC selector, main tuning, band switch, antenna trimmer, and SSB/CW/ AM selector. Rear panel connections include an SO-239 for a 50 ohm antenna and connectors for operating and control voltages, antenna relay, speaker, and headphones. Power requirements: 275-300 VDC at 120 ma and 6 volts at 4 amps or 12 volts at 2.5 amps AC or DC. The dial mechanism has a 30:1 tuning ratio and incorporates a rotating drum. The drum is fragile and may crack easily. The condition of this drum (and the integrity of the band switching mechanism) should be checked by rotating the band switch through all positions. The band switching mechanism is a complicated scheme of springs, gears, and pulleys; beware. Note that the matching HX-20 does not use a rotating drum. The HR-20 is fitted with polished metal knobs and has a light green front panel with dark green cabinet. These are still around, but are becoming rare.

Weight/Size: 19 lbs; 12.25″ wide x 6.25″ high x 9.25″ deep
Related Products: HX-20, MR-1, MT-1, MP-1, HP-20, HP-23 series, HP-10, HP-13 series, AK-7

5 Band SSB/CW Receiver

Manufactured: 76-82
Price: $239.95

Comments: Released in Fall 1976, the HR-1680 (and latter the HX-1681) was designed as a state-of-the-art replacement for the aging technology of the venerable HR-10B and DX-60B pair. The HR-1680 is a fully solid state rig with an analog readout and a built-in power supply. It is a superhet double-conversion type receiver covering 500 kHz segments on 80-15 meters and the 28-29 MHz portion of the 10-meter band. There are no provisions for WARC band coverage. Features include a double-tuned RF stage on each band, diode band switching, a built-in 100 kHz crystal calibrator, AGC controlled IF and RF stages, a four-pole crystal filter, and a two-stage active audio filter. The HR-1680 can be aligned without instruments. Sensitivity is better than .5 uV for all bands. Selectivity is 2.1 kHz minimum at 6 dB down, 7 kHz maximum at 60 dB down. Audio response is 2100 Hz minimum at 6 dB down, 7 kHz maximum at 60 dB down (wide setting), and 250 Hz minimum at 6 dB down, 2.5 kHz maximum at 60 dB down (narrow setting). Center frequency is about 750 Hz. Image rejection is 50 dB or better. IF rejection is 60 dB or better. First IF is 8.395-8.895 MHz. Second IF is 3.396 MHz. Front panel controls include main tuning, AF and RF gain, band switch, pre-selector, mode switch, and function switch. Note that the mode switch automatically selects fast or slow AGC. The front panel also includes a headphone jack for low impedance phones. Rear panel connections include phono jacks for speaker, sidetone, mute, and a 50 ohm antenna. There also is a spare phono jack and a two-pin connector for 12 volts DC. The receiver is built on several plug-in PC boards and uses a wiring harness. A problem you may encounter is related to the card edge connectors Heath used. The surfaces of these connectors may become oxidized over time. If you experience any erratic operation, try cleaning up these connectors. The HR-1680 may be aligned without instruments. Power requirements: 120 VAC 50/60 Hz or 11.5 to 15 VDC at 750 ma. Light green front panel with red plastic dial window (illuminated) and dark green cabinet—same paint scheme as HW-100/101/104. All things considered, this is a pretty nice receiver. Not too rare.

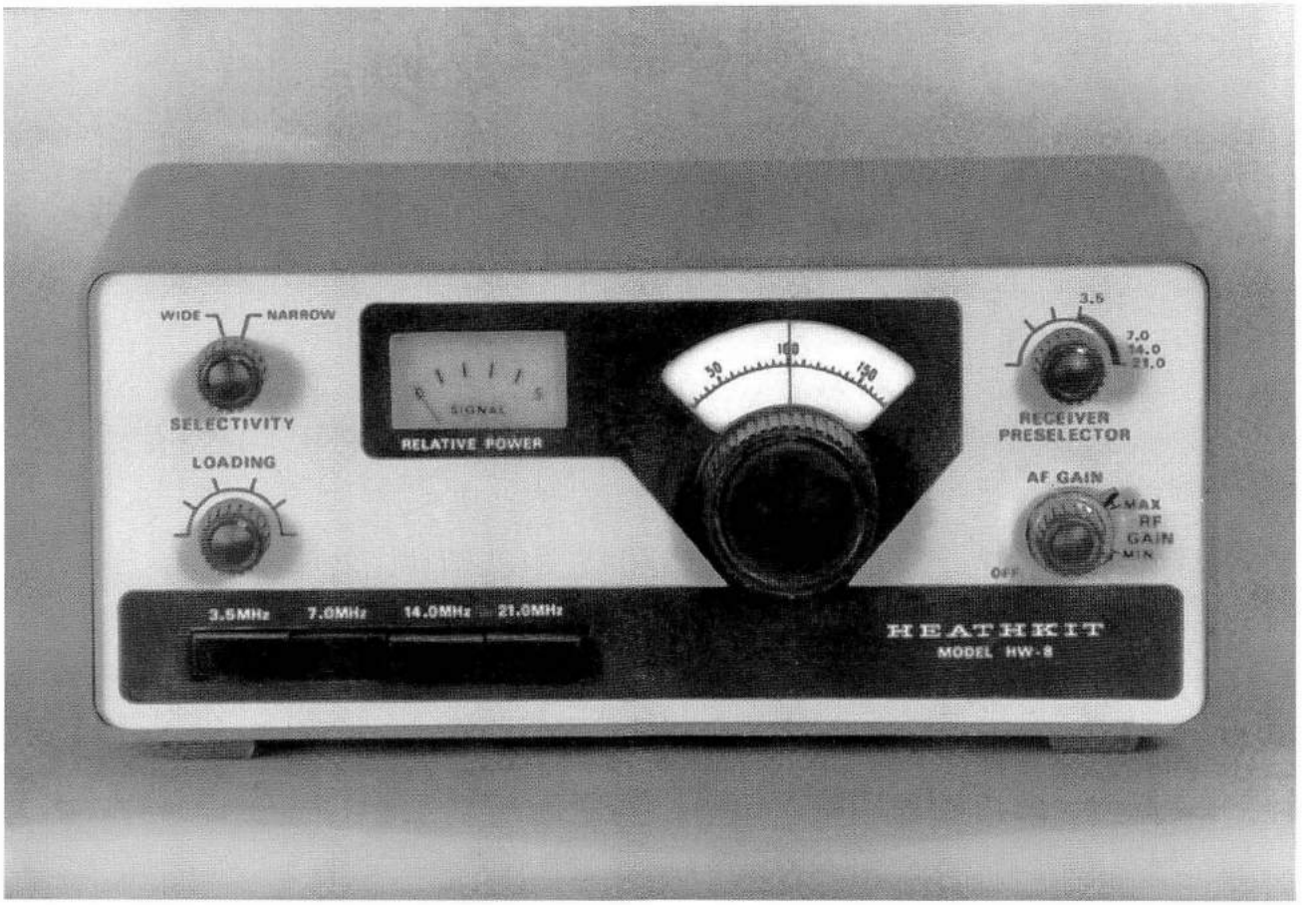
Weight/Size: 14 lbs; 12.75″ wide x 6.75″ high x 12″ deep
Related Products: HX-1681, HS-1661

3 Band QRP CW Transceiver

Manufactured: 72-75
Price: $79.95

Comments: The HW-7 was the first of three very successful QRP transceivers. The HW-7 covers the CW portions of the 40, 20, and 15-meter band and features VFO or crystal-controlled operation and push button selection of band. It is rated as having an RF input power of 3 watts on 40, 2.5 watts on 20, and 2 watts on 15 meters. The receiver is a direct conversion type using a dual-gate MOSFET product detector as a front end, with a single tuned circuit. Receiver selectivity is determined by an m-derived low-pass audio filter in the audio line between the product detector and the AF amp. Selectivity is about 2 kHz with broad skirts. Sensitivity is better than 1 uV. The HW-7 is not a QSK machine. The receiver is muted during transmit periods with an adjustable delay T/R relay. Front panel controls include PA tuning, receiver preselector, main tuning (6:1 tuning drive ratio), AF gain, and push buttons for band and VFO/crystal selection. There are rear panel connections for 12 VDC, standard quarter-inch jacks for a key and headphones (there is no built-in speaker), and a phono jack for a 50 (not 75) ohm antenna. The meter reads relative power only. The HW-7 is not without its problems. The receiver is very microphonic, and early units suffered from more than a little cross-modulation (a problem Heath later fixed). In addition, when used with an AC power supply and an end fed wire (even with a transmatch) a 60 Hz hum may be noticed in the receiver. This is not a problem when running on batteries. Some chirping and clicking are common especially on 15 and 20-meters. One minor complaint—the sidetone is very loud, causing the operator to have to lower the audio gain during transmit and raise it during receive. Also, since direct conversion receivers do not provide single-signal reception, care must be taken to adjust the receiver correctly so that the transmitter signal may be heard by the station being worked. The station being worked must be tuned in on the *high frequency* side of its zero beat frequency. This is necessary because of the way the HW-7's transmitter offset has been designed. A number of modifications have been published for HW-7—see appendix for listings. Power requirements: 12-16 VDC at 35 ma on receiver and 450 ma on transmit. Two-tone green color matches other HW series gear. In spite of any shortcomings it may have had, the HW-7 was very popular and sold well. It is still in demand by QRP enthusiasts and sells quickly at flea markets. Medium rare.

Weight/Size: 7 lbs; 9.25″ wide x 4.25″ high x 8.5″ deep
Related Products: HW-8, HW-9, HM-9, HFT-9(A), HWA-7-1



4 Band QRP CW Transceiver

Manufactured: 76-83
Price: $139.95

Comments: The HW-8 was far and away the most popular of the three versions of Heath's QRP rigs and is still highly prized by those serious about QRP. More than just an improved version of the HW-7, the HW-8 is a major overhaul with many added features. While a direct-conversion receiver is still used, Heath has added a JFET RF amp, a doubly balanced IC product detector, and an RC-active CW audio filter with two selectable bandwidths (wide—750 Hz and narrow—375 Hz). The receiver problems of the HW-7 (hum, microphonics, and cross-modulation) have been fixed. In addition, Heath has added an RF gain control, adjustable sidetone volume, an S-meter, 80 meter coverage, and wider frequency coverage—3.5-3.75; 7-7.25; 14-14.25; and 21-21.25 MHz. Note that no provision is made for crystal control. Sensitivity has also been improved to better than .2 uV. The minor transmitter chirp and click problems have been fixed as well. Extensive use is made of diode switching in the low-level RF and DC sections. This helps maintain tuned-circuit Q, improves stability, and reduces spurious responses. Power output is about 2 watts on all bands. A new crystal heterodyne circuit allows easier tuning with a single dial scale for all bands (6:1 tuning drive ratio). Like the HW-7, the HW-8 is not a QSK machine and has an adjustable delay T/R relay. Power requirements: 12-16 VDC at 90 ma on receiver and 450 ma transmit. Same two-tone green as HW-7 and other HW gear. Several books of modifications to the HW-8 have been published. One of the best is WB8VGE's *Hot Water Handbook*—It is now out of print, but you may still be able to find a copy if you scrounge hard enough. Also see the appendix for listings. HW-8s still can be found with regularity at flea markets but sell very quickly.

Weight/Size: 7 lbs; 9.25″ wide x 4.25″ high x 8.5″ deep
Related Products: HW-7, HW-9, HM-9, HFT-9(A)

FROM THE HEATH CATALOG

5 Band QRP CW Transceiver

Manufactured: 84-91
Price: $249.95 (less "Band Pack")

Comments: Although it offered a number of improvements and additional features, the HW-9 was never quite as popular as the HW-8 and was the last of the line. Still, it is a great little rig and is a complete redesign of its predecessors. In addition to covering 250 kHz segments of the 80, 40, 20, and 15 meter bands, the HW-9 also adds the 10 meter band, and is expandable (with the OPTIONAL "Band Pack") to include the 30, 17, and 12 meter WARC bands. Specific WARC frequency coverage is 24.89-24.99 MHz, 18.068-18.168 MHz, and 10.1-10.15 MHz. The HW-9 is a broadband design using a double-balanced mixer and a 4-pole crystal filter—there is no RF amp in the front end. The receiver is a single conversion type and features plus or minus 1 kHz RIT, automatic AGC, and active audio processing. Transmitter output power is rated at 4 watts on all bands (but is often found to be as high as 7 watts) except 10 meters, which is 3 watts. In addition, RF output is continuously variable. Receiver sensitivity is .2 uV. Selectivity is 1 kHz (wide setting) at 6 dB down and 250 Hz (narrow setting) at 6 dB down. Any problems with the HW-9 you may hear about will probably have to do with the VFO drive mechanics. There were reports of slippage and backlash and a general feeling that the whole dial assembly was too complicated and too small to work on. The HW-9 features full QSK break-in keying but is fairly sluggish above 20 WPM because the receiver takes about 30 ms to turn on after transmit. Keying is a little on the heavy side—above 35 or 40 WPM, the code elements begin to run together. A keyer with a weighting control may help out at these speeds. Requires a VTVM or VOM, a frequency counter, and a dummy load for alignment. Power requirements: 11-16 VDC (current rating not available). The HW-9 was released just after Heath abandoned the famous green color scheme and takes the two-tone brown and gray of the new order. Don't confuse it with the HW-99 (see listing). HW-9s were sold right to the end and are not too rare.

Weight/Size: 7 lbs; 9.25″ wide x 4.25″ high x 8.5″ deep
Related Products: HW-7, HW-8, HM-9, HFT-9(A)

6 Meter AM/CW Transceiver

"Shawnee"

Manufactured: 61-65
Price: $199.95

Comments: The HW-10 and its twin, the HW-20, were designed and sold mostly as mobile rigs but have a built-in three-way vibrator power supply allowing them to be run from 120 VAC, 6 VDC, or 12 VDC. Maybe that's what makes them so heavy. The HW-10 is built around 14 tubes and covers from 49.8 to 54.0 MHz using separately tunable VFOs for transmit and receive (it is not a true transceiver) . It will run both AM and CW and features illuminated slide-rule dials and a rather clever exciter stage design that tracks along with the VFO, thus permitting single-knob tuning. Other features include temperature stabilization of the VFO, selection of four crystal frequencies, CAP and MARS operation, a spotting switch, a tunable BFO, and a built-in low pass filter with a 54 MHz cut off (152 MHz for HW-20). The HW-10 was supplied with AC and DC cables and a PTT hand mike. Transmitter power output is about 8 watts CW and 10 watts AM from a 6360 final amp. Receiver sensitivity is .5 uV. Selectivity is 15 kHz at 6 dB down. The front panel contains an illuminated S/relative power meter and controls for AM/CW, AVC on/off, AF and RF gain, BFO on/off/pitch, ANL on/off, squelch, final tune, spot on/off, receiver and transmitter tune, and VFO/crystal selector. There are rear panel controls for modulation level, public address select, and a modulation monitor on/off switch. Rear panel connections include jacks for key and headphones, a grounding post, a phono jack for a public address speaker, a 15-pin rectangular Cinch-type plug for power input, and an SO-239 RF connector. Crystals are accessible through a rear panel cover plate. The HW-10 uses crystals in the 8.333 to 9.0 MHz range. The HW-20 uses crystals in the 8.0 to 8.222 MHz range. When Heath designed this rig, it pulled no punches and built it to last. The bottom cover plate, for example, is held on with no fewer than 36 screws. Restoring one of these will challenge even the most hardened among us. Heath packed a lot of point-to-point wiring and parts into a small space, and the tuning mechanisms are a frightening collection of gears, pulleys, and cords. The HW-10 is painted in the two-tone green color scheme. Early units had satin finish metal knobs, while later ones used polished metal TX-1 style knobs. Power requirements: 6 VDC at 14.5 amps transmit and 8.5 amps receive, or 12 VDC at 7.5 amps transmit and 4.5 amps receive, or 120 VAC at 1 amp transmit and .5 amps receive. Many users took advantage of the roomy interior of HW-10 and 20 to install a speaker. Very rare in good condition.

Weight/Size: 34 lbs; 12″ wide x 6″ high x 10″ deep
Related Products: HW-20

80 Meter SSB Transceiver

"Single-Bander"

Manufactured: 63-66
Price: $119.95

Comments: Heath released three "Single-Bander" transceivers (80, 40, and 20 meter models) in the summer of 1963. They became know popularly as "monobanders" and were instantly successful. These three units are identical in every way except for frequency coverage. The HW-12 covers 3.8 to 4.0 MHz—lower sideband only. The following is a general discussion of all three versions. The Single-Banders are 14 tube SSB-only rigs covering the phone portions of their respective bands. The 80 and 40 meter versions operate only LSB while the 20 meter version operates only USB. Their power input is about 200 watts PEP from a pair of 6GE5s. All units are a superheterodyne design using crystal filter SSB generation. The units are built on a single large PC board and feature ALC, built-in PTT and VOX, fixed (slow) AVC action, and an illuminated S-meter and dial. There is a socket for the *optional* HRA-10-1 crystal calibrator (the same one used in the HR-10). Its presence can be determined with visual inspection by looking through the cabinet top. Look for it in the left rear corner of the rig. Receiver sensitivity is 1 uV and selectivity is rated as 2.7 kHz at 6 dB down. Front panel controls include main tuning, final tune, function (ON-OFF-PTT-VOX-TUNE), RF gain, AF gain (pull for calibrator), VOX gain, and meter. Rear panel controls include mike gain, tune level, and final bias adjust. Rear panel connections include Hi-Z mike connector, phono jacks for 8 ohm speaker (there is no built-in speaker), 50 ohm antenna, external relay, separate receiver antenna input, and an octal plug for power input (for use with the HP-13 and HP-23 series power supplies). Many units will be found with SO-239s added to replace the phono jack antenna connector. The external relay jack provides a contact closure for use with amplifiers and for TR relays for amplifiers without internal switching. CAUTION: One side of the external relay jack is connected to chassis ground and therefore should NOT be connected to AC lines. If you intend to use AC lines, do so through an isolation transformer. Also, if you are using low voltage DC switching, be sure to get the polarity right. The grounded DC lead must be connected to the outside (chassis side) of the jack. Power requirements: 800 VDC at 250 ma, 250 VDC at 100 ma, -125 VDC at 5 ma, and 12 volts AC or DC at 3.75 amps. CAUTION: Run only at 250 VDC B+. The Single-Banders are enclosed in a cabinet painted in two-tone gloss finish green and use light gray DX-60 style plastic knobs. All three units were revamped in 1966 and re-released with an "A" on the model number (see listing under HW-12A). Single-Banders are not rare although it is difficult to find them in really good, unmodified condition. Many appear to have been well used. Beware all manner of strange modifications by well-meaning users. Among the Single-Banders, 80 meter units are seen more often than 40s or 20s. NOTE: The HS-24 matching mobile speaker makes a fine companion for the Single-Banders but is quite rare in good condition.

Weight/Size: 15 lbs; 12″ wide x 6.25″ high x 9.25″ deep
Related Products: HW-12A, HW-22, HW-22A, HW-32, HW-32A, HS-24

UNIT SHOWN IS HW-22A.

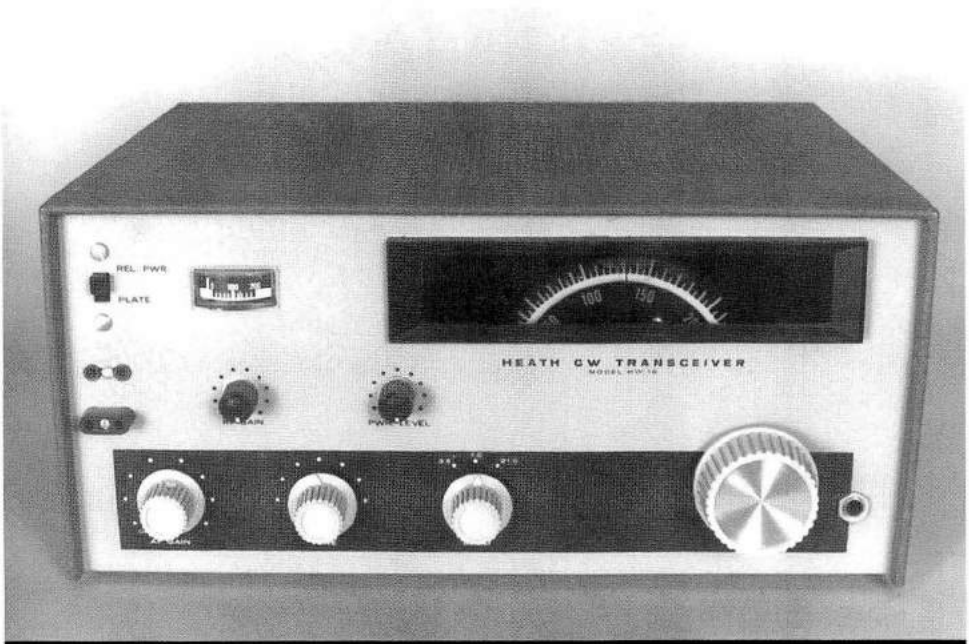
80 Meter SSB Transceiver

"Single-Bander"

Manufactured: 66-74
Price: $99.95

Comments: In 1966 Heath re-thought the Single-Banders and made a number of very nice changes, though the basic specifications of the A series of Single-Banders are identical to the originals. The reader is referred to the listing under HW-12 for full details and specifications. The following is a discussion of the differences found in the A series radios. Most of the changes were made to facilitate greater convenience and ease of use. Most notable among these changes are the microphone connector and mic gain control, which have been moved from the rear apron to the front panel along with the bias adjust control. Conversely, the VOX sensitivity control has been moved from the front panel to the rear apron, to which a VOX delay control has been added. The tune level control remains on the rear apron. Another significant change in the A series was the additon of a switch allowing the units to run USB and LSB. More subtle changes include an addition of a position on the function switch for on/off control of the crystal calibrator and the replacement of the octal power plug with an 11-pin "octal style" plug. The A series also was restyled with a new paint job. While the two-tone green color remains the same, dark green now surrounds the tuning window and main tuning knob, and the smooth finish of the originals has been replaced with the wrinkle finish that had become Heath's new standard paint. New knobs are used as well. They are the same knobs used by the SB line—dark green with polished chrome skirts. In 1966 at least of couple of companies came out with three band modification kits for the Single-Bander series of radio. One of these companies was Dynalabs, whose ad for the "upgrade" kit can be seen in the January 1966 issue of *QST* magazine. CAUTION: Run only at 250 VDC B+. Among the Single-Bander rigs, the A versions are generally more plentiful than the originals, and among the A versions, 80 meter units are seen more often than 40s or 20s. Beware all kinds of strange modifications by well meaning users. NOTE: The HS-24 matching mobile speaker makes a fine companion for the Single-Banders, but is quite rare in good condition.

Weight/Size: 15 lbs;12″ wide x 6.25″ high x 9 .25″ deep
Related Products: HW-12, HW-22, HW-22A, HW-32, HW-32A, HS-24



CONNECTOR AT BOTTOM RIGHT IS MODIFICATION.

3 Band CW Transceiver

Manufactured: 67-76
Price: $99.50

Comments: The HW-16, a complete Novice station in one box, was a very successful product for Heath. The unit uses a total of nine tubes, covers the lower 250 kHz of the 80, 40, and 15 meter bands, and has an input power of 50 to 90 watts (adjustable). Strictly speaking the HW-16 is not a true transceiver. It is a separate transmitter and receiver sharing a common (solid state) power supply. The word "transceiver" also is commonly interpreted to mean that the unit transmits and receives on the same frequency, and this is not necessarily the case with the HW-16. The transmitter section is a 3-tube crystal-controlled design using a modified Pierce oscillator, grid block keying, and a 6GE5 final amp. No attempt is made to shape the keyed wave form. As a result, the keying is a little "hard" but generally it is free of clicks, although some minor chirping may be noted on 15 meters. The output circuit is a pi-network type designed for 50-75 ohm loads. The VFO-tunable receiver is a double conversion type with a crystal-controlled first oscillator. A two-crystal half-lattice filter provides selectivity of 500 Hz. Sensitivity is 1 uV. Other features of the HW-16 include single-knob transmitter tuning, illuminated dial, a built-in sidetone oscillator, two crystal sockets for different pin diameter and spacing, and a built-in fully electronic antenna switching system providing true break-in keying—a nice touch. There are also provisions for control of the transmitter with the HG-10(B) VFO. An edgewise front panel meter reads relative power and plate current. The meter has a mark indicating maximum permissible plate current for Novice operation. Front panel controls include AF gain and power switch, final tune, band switch, RF gain, power level, meter function switch, and receiver tune. Rear panel connections include phono jacks for an 8 ohm speaker (there is no built-in speaker), VFO, and 50 ohm antenna and quarter-inch jacks for key and headphones, a ground post, and an octal socket for powering the HG-10(B) VFO. Many units will be found with an SO-239 added to replace the phono style antenna connector. The HW-16 wears the familiar two-tone green wrinkle paint and uses light gray DX-60 style knobs, as well as two small dark green knobs. The main tuning knob is light gray with a metal inset face. The HW-16 uses 80 meter crystals on 80 and 40 and 40 meter crystals on 40 and 15. The HG-10(B) VFO makes a fine companion. Add an HD-10 or HD-1410 keyer and you have a complete classic station. All things considered, the HW-16 is a great rig. Heath sold thousands of them and many are still on the air. HW-16s are not particularly rare and show up often a flea markets. The rig is designed for 120 VAC, 50/60 Hz operation. Beware modifications.

Weight/Size: 20 lbs;13.75″ wide x 6.5″ high x 11.5″ deep
Related Products: HG-10, HG-10B

2 Meter AM Transceiver

Manufactured/Price

HW-17	**68-69**	**$129.95**
HW-17A	**69-70**	**$129.95**

Comments: With the famous HW-30 2-meter AM "Lunch Box," Heath had had a signal on 2-meters since 1960, but in 1968, the HW-17 was Heath's first serious foray into the soon-to-be-booming world of VHF. It wouldn't be fair to say that the HW-17 was fraught with problems—but it was not entirely successful. The HW-17 is not a true transceiver since it has completely separate circuits for its crystal-controlled tube-type transmitter and VFO-tunable transistorized receiver. These two sections share a common solid state power supply. The 3-tube transmitter provides about 10 watts of AM output between 143.2 and 148.2 MHz with an 8156 final amp. It can operate on one of four switch-selected crystal frequencies or can be controlled by an external VFO (like the HG-10 or 10B). In addition to the ham band, the HW-17's frequency coverage permits operation on CAP, MARS, and Coast Guard Auxiliary channels. The receiver is a dual-conversion superhet design using a pre-assembled and pre-tuned tuner with an N-channel junction FET. Sensitivity is rated at 1 uV, with a selectivity of 27 kHz at 6 dB down. Other features of the HW-17 include PC board construction, a built-in 120 VAC power supply, electronic antenna switching, noise limiter, lighted dial, battery saver function, spotting switch, and a built-in speaker. Front panel controls include final load, final tune, driver tune, crystal/VFO selector, on/off/volume, squelch/ANL, function switch, and main tuning. The front panel also sports a meter that reads S-units and relative power. The microphone is hardwired to the transceiver and there is a rear panel meter zero control. Rear panel connections include phono jacks for a VFO and a 50-75 ohm antenna, an octal power socket for a VFO, octal power plug for power input, and a quarter inch headphone jack. The HW-17 was offered with an *optional* DC power supply (HWA-17-1) and an optional FM adapter (HWA-17-2)—a tube-type unit that mounted outboard on the rear panel. The HW-17 had a number of problems that Heath attempted to rectify with the release of the HW-17A. These problems included low audio on the transmitter, a spot signal that was far too strong, very poor AGC, a useless noise blanker, microphonics, poor receiver sensitivity, and an FM adapter that didn't work very well. HW-17 owners were offered two separate modification kits to help solve their problems. Although they tried diligently, Heath's engineers never completely solved all the troubles of the HW-17A. The kit never sold very well and was discontinued after three years on the market. The 17 and 17A can be aligned without instruments, are housed in a tone-tone green cabinet, use dark green knobs, and are designed for 120 VAC, 50/60 Hz operation. 12 VDC operation requires the HWA-17-1 mobile power supply. Very rare—working or otherwise.

Weight/Size: 13 lbs; 14.25″ wide x 6.25″ high x 8.5″ deep

Related Products: HW-17-1, HW-17-2

Special Purpose SSB Transceiver

CAP/MARS/160 Meter

Manufactured/Price

HW-18-1	**68-72**	**CAP**	**$119.95**
HW-18-2	**68-69**	**MARS**	**$109.95**
HW-18-3	**68-69**	**160-meters**	**$109.05**

Comments: The HW-18 series of transceivers were a great idea for which there apparently was no market. They are all based directly on the "Single-Bander" radios released two years earlier. Released in March 1968, the MARS and 160-meter rigs lasted just over a year, while the CAP unit managed to hang on for about four years. All three versions are identical except for frequency coverage. The CAP and MARS units are virtually identical rigs covering 4450 to 4650 kHz, while the 160-meter radio covers 1800 to 2000 kHz. The CAP and MARS rigs were so similar that Heath packaged the CAP version with the MARS assembly manual—along with a small booklet of changes needed to turn it into the CAP assembly manual. The HW-18 series are a 12-tube design built on a single large PC board. They run about 200 watts SSB input employing crystal filter sideband generation or about 40 watts in the "carrier" (AM) mode. The CAP and MARS units were sold as USB rigs but could be run in USB or LSB (but not both) depending on what heterodyne oscillator crystal you used—3396.500 kHz for USB or 3393.500 kHz for LSB. The 160-meter unit came from the box as an LSB rig but presumably could be switched to USB with the right crystal. All three can operate on one of two switch selectable crystal frequencies—transmit and receive frequencies are locked together. Receiver sensitivity is either .5 or 1 uV depending on which ad you read. Selectivity is 2.1 kHz at 6 dB down. CAP and MARS units use crystal frequencies between 7840 and 8000 kHz. The 160-unit uses crystals between 5200 and 5400 kHz. The crystal frequency formula for all versions (assuming LSB operation) is as follows—operating frequency = crystal frequency - 3393.500 kHz. While Heath made no provision for it, VFO operation is

possible by connecting the VFO output directly to one of the crystal sockets (observe polarity) via a short length of RG-58U. VFO output should be between 1 and 2 volts RMS. Features of the HW-18 series include fixed tuned operation, solid-state T/R switching, illuminated S-meter, and built-in speaker. Note that there is no built-in power supply, and that these rigs are intended primarily for SSB operation. AM operation is not recommended for more than 30 seconds at a time. Front panel controls include on/off/volume, clarifier (adjusts receiver frequency plus or minus 100 Hz), reception ("local"" or "distant"), mode (SSB or "carrier"), meter function, and channel selector. There are front panel screw driver adjustments for S-meter zero and bias setting. A rear panel control adjusts mic gain. Rear panel connections include a phono connector for a 50 ohm antenna, an 11 pin octal-style plug for power input (for use with the HP-13 or HP-23 series power supplies), and a ground post. The microphone is hard-wired to the unit through the middle of the front panel. Requires only a VTVM and a dummy load for alignment. Power requirements: 800 VDC at 250 ma, 250 VDC at 100 ma, -130 VDC at 5 ma, and 12 volts AC or DC at 3.75 amps. CAUTION: Run only at 250 VDC B+. Two-tone green wrinkle finish matches other HW series radios. The front panel of all three versions is labeled only "HW-18," so the easiest way to tell them apart is to look at the serial plate—usually found on the rear apron—which will include the dash 1, 2, or 3. The clever person should be able to put one of these on 75 meters without too much trouble. To the best of my knowledge such a modification has never been described in any of the popular magazines. Since not many were ever sold, all three are quite rare, but the 160-meter version is the rarest of all.

Weight/Size: 16 lbs; 12.25″ wide x 6.25″ high x 10″ deep
Related Products: HP-13, HP-23

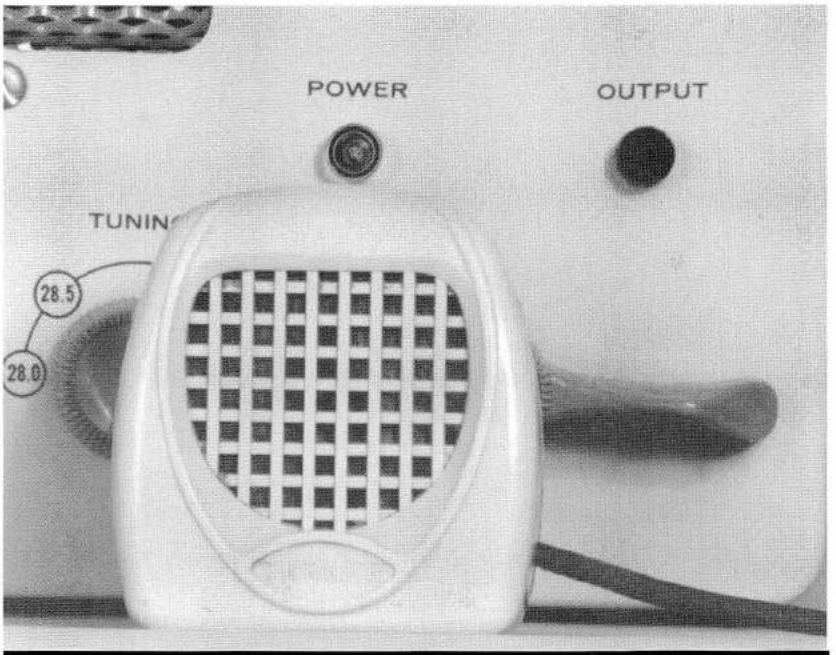
FROM THE HEATH CATALOG

10 Meter AM Transceiver

"The Tener"
"Benton Harbor Lunch Box"

Manufactured: 60-62
Price: $39.95

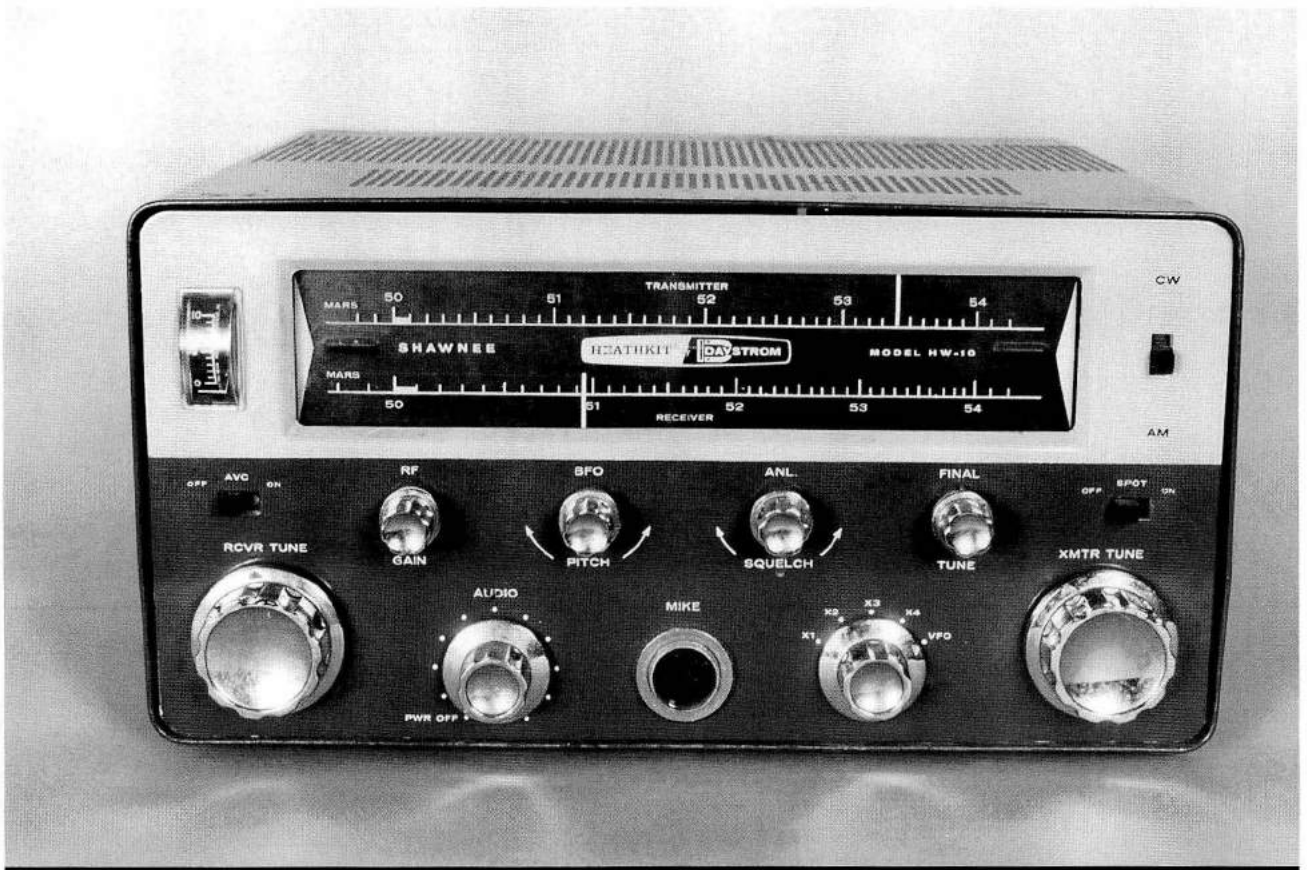
Comments: The famous "Lunch Box" series of transceivers were so called because in size and shape they bore a striking resemblance—right down to the handle—to the metal boxes full of sandwiches and coffee carried to work by millions. The series includes the HW-19, HW-29(A), and HW-30, but began in 1959 with the CB-1 CB radio. The CB-1 was not only Heath's first Lunch Box, it was also its first CB radio. Based on the success of the CB-1, Heath's marketing folks concluded that 10-meter and six-meter versions would be equally popular. They were not entirely correct. The popularity of the CB-1 was based on the popularity of the Citizens Band itself—not the Lunch Box concept. As interest in CBs grew, Heath responded with a wide variety of CB products, but the 10-meter Lunch Box languished and was pulled from production in 1962. Interestingly enough, the CB-1 was discontinued that same year—replaced by a number of other products that better reflected the direction CB was taking. The six-meter Lunch Box, however, did much better. So much better, in fact, that Heath decided to launch a two-meter version. Hams viewed these little gems as simple low-cost ways to explore VHF—which in those days was the final frontier. By the late '60s, six and especially two-meters were defining a clear technologic direction for themselves and the Lunch Boxes became increasingly anachronistic. Both the six-meter and 2-meter versions were discontinued in 1971, by which time tens of thousands of each had been sold. What follows is a general discussion of the entire Lunch Box series. The simplicity of these radios is reflected in their specifications. All versions in the series are five-tube units using a superregenerative receiver "preceded by an RF amplifier stage" and a five-watt input, plate modulated AM transmitter "automatically limited to less than 100 percent." The



THE LUNCH BOX MICROPHONE.

receiver is tunable while the transmitter is crystal controlled on a single frequency. Receiver sensitivity is "usable with signals as low as 1 uV at the antenna terminals." Boasting of the receiver's superb sensitivity, the receiver circuit description section in the manual notes that "3 uV will produce near full quieting." The specifications make no mention at all of selectivity. The Lunch Boxes feature a built-in solid state power supply, an amplifier metering jack, and a "press-to-talk" lever switch on the front panel. This switch also has a transmit "hold" position—apparently designed for the long-winded operator. Other front panel controls include on/off/volume and receiver tuning. Also on the front panel are a mic connector and two neon lamps—a power-on lamp (clear) and a transmit lamp (red). There is also a white and gold plastic Heathkit emblem on the front panel. Missing from these little rigs is any kind of squelch control—you have to listen to them roar between transmissions. On the rear apron is a regeneration control, a phono jack for a 50-75 ohm antenna, a fuse holder, a ground post, a quarter-inch jack for RF amp metering, and an octal plug for power input. Some units may have a small hole on the right side of the cabinet through which the final amplifier's tank circuit tuning capacitor may be adjusted. The crystal socket is located inside the cabinet, and all versions (except the original HW-29) use rocks in the 8-to-9 MHz range. The HW-19 covers from 28 to 29.7 MHz. See listings under HW-29(A) and HW-30 for their specific frequencies and details. Some units have a holder on the right side of the cabinet. This holder has a plastic face plate behind which one could slip the station license. A common (and benign) modification was to fit the rigs with an SO-239. Another mod to watch out for is a change in the mic connector that would permit true PTT operation. This mod is fairly common and most unfortunate since it destroys the original flavor of the Lunch Box. The physical design of the units is unique to the Lunch Box series. The paint style is a wrinkle finish brown cabinet and smooth finish light brown (advertised as "mocha") front panel. The knobs are unique as well. They are the same brown color as the cabinet and have gold-colored, inset faces. All versions came with a small desk/hand ceramic element microphone (made by Turner) and are not complete without it. Two power cables were originally supplied—one for 120 VAC operation and one for use with a 6- or 12-VDC optional external vibrator power supply. The units can not be directly powered from 6 or 12 VDC. Lunch Boxes used to be very common at swap meets, and it used to be that you couldn't give them away, but in recent years they have become quite rare. Among Lunch Boxes, six-meter (HW-29A) and 2-meter (HW-30) units are seen most often. However, because of their short life span, six-meter (HW-29), 10-meter (HW-19), and CB (CB-1) units are exceptionally rare. In addition to those described above, many Lunch Boxes have been subjected to a variety of other unfortunate modifications. Beware.

Weight/Size: 8 lbs; 9.75″ wide x 8″ high x 6″ deep
Related Products: CB-1, HW-29, HW-29A, HW-30



UNIT SHOWN IS HW-10.

2 Meter AM/CW Transceiver

"Pawnee"

Manufactured: 61-65
Price: $199.95

Comments: The HW-20 is identical in every way to the HW-10 except for frequency coverage. The frequency coverage of the HW-20 is 143.8 to 148.2 MHz. For additional details and specifications see listing under HW-10.

Weight/Size: 34 lbs; 12″ wide x 6″ high x 10″ deep
Related Products: HW-10

UNIT SHOWN IS HW-12.

20 Meter SSB Transceiver

"Single-Bander"

Manufactured: 66-74
Price: $119.95

Comments: The HW-22 is identical in every way to the HW-12 except for frequency coverage. Frequency coverage for the HW-22 is 7.2 to 7.3 MHz. It operates only in LSB. For additional details and specifications see listing under HW-12.

Weight/Size: 15 lbs; 12″ wide x 6.25″ high x 9.25″ deep
Related Products: HW-12, HW-12A, HW-22A, HW-32, HW-32A, HS-24

20 Meter SSB Transceiver

"Single-Bander"

Manufactured: 66-74
Price: $99.95

Comments: The HW-22A is identical in every way to the HW-12A except for frequency coverage. Frequency coverage for the HW-22A is 7.2 to 7.3 MHz. For additional details, specifications, and differences between the A series Single-Banders and the originals see listing under HW-12 and HW-12A.

Weight/Size: 15 lbs; 12″ wide x 6.25″ high x 9.25″ deep
Related Products: HW-12, HW-12A, HW-22, HW-32, HW-32A, HS-24

6 Meter AM Transceiver

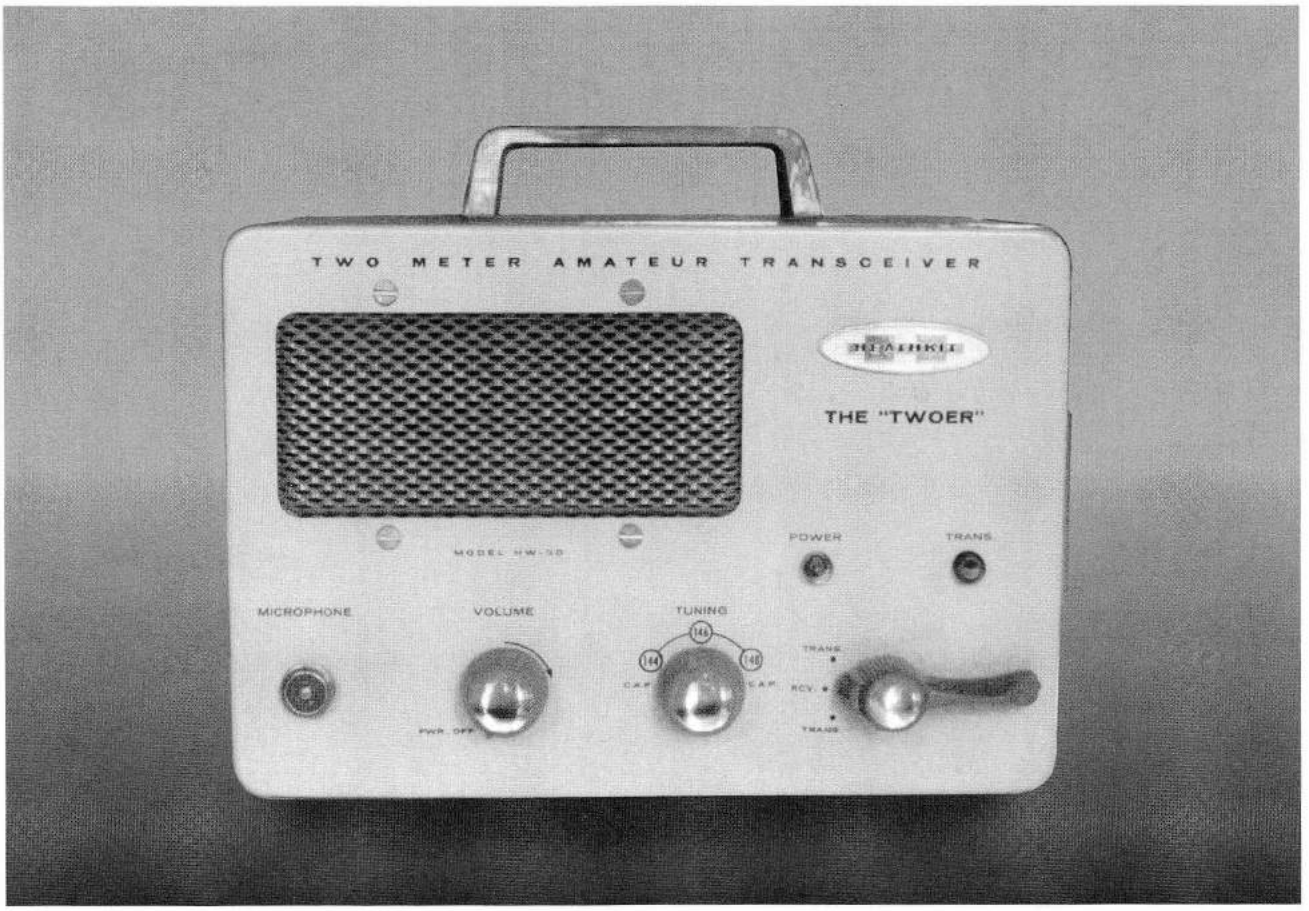
"Sixer"
"Benton Harbor Lunch Box"

Manufactured/Price:

HW-29	**60-60**	**$39.95**
HW-29A	**61-71**	**$44.95**

Comments: Almost immediately upon the release of the HW-29 Sixer in 1960, it was discovered that the unit had a couple of problems. The rig's regenerative receiver was radiating a respectable signal and getting into TV sets at a considerable distance. Additionally, the Sixer had been designed to use a 10 MHz fundamental crystal cut so that it would also oscillate at the fifth overtone (50 MHz). This scheme proved problematic for crystal activity and stability. Heath quickly redesigned the rig to solve the receiver problem and changed the transmitter oscillator section to include a multiplier stage to allow for the use of 8 MHz rocks. The new improved version was released as the HW-29A, and a modification kit was offered to owners of the original. It is likely that only a few hundred of the original units ever got out the door and as a result, finding one would be the ham radio equivalent of being dealt four of a kind. The frequency coverage of the HW-29 and HW-29A is 50 to 54 MHz. The transmitter (on the A version) uses crystals between 8.333 and 9.000 MHz. Transmit frequency = crystal frequency x 6. For additional details and specifications see listing under HW-19.

Weight/Size: 8 lbs; 9.75″ wide x 8″ high x 6″ deep
Related Products: CB-1, HW-19, HW-30



2 Meter AM Transceiver

"Twoer"
"Benton Harbor Lunch Box"

Manufactured: 60-71
Price: $44.95

Comments: The HW-30 is identical to the HW-19 except for frequency coverage. The frequency coverage of the HW-30 is 143 to 149 MHz. The transmitter uses crystals between 8.0 and 8.22 MHz. Transmit frequency = crystal frequency x 18. For additional details and specifications see listing under HW-19.

Weight/Size: 8 lbs; 9.75″ wide x 8″ high x 6″ deep
Related Products: CB-1, HW-19, HW-29, HW-29A

UNIT SHOWN IS HW-12.

40 Meter SSB Transceiver

"Single-Bander"

Manufactured: 66-74
Price: $119.95

Comments: The HW-32 is identical in every way to the HW-12 except for frequency coverage. Frequency coverage for the HW-32 is 14.2 to 14.35 MHz. It operates only in USB. For additional details and specifications see listing under HW-12.

Weight/Size: 15 lbs; 12″ wide x 6.25″ high x 9.25″ deep
Related Products: HW-12, HW-12A, HW-22, HW-22A, HW-32A, HS-24

UNIT SHOWN IS HW-22A.

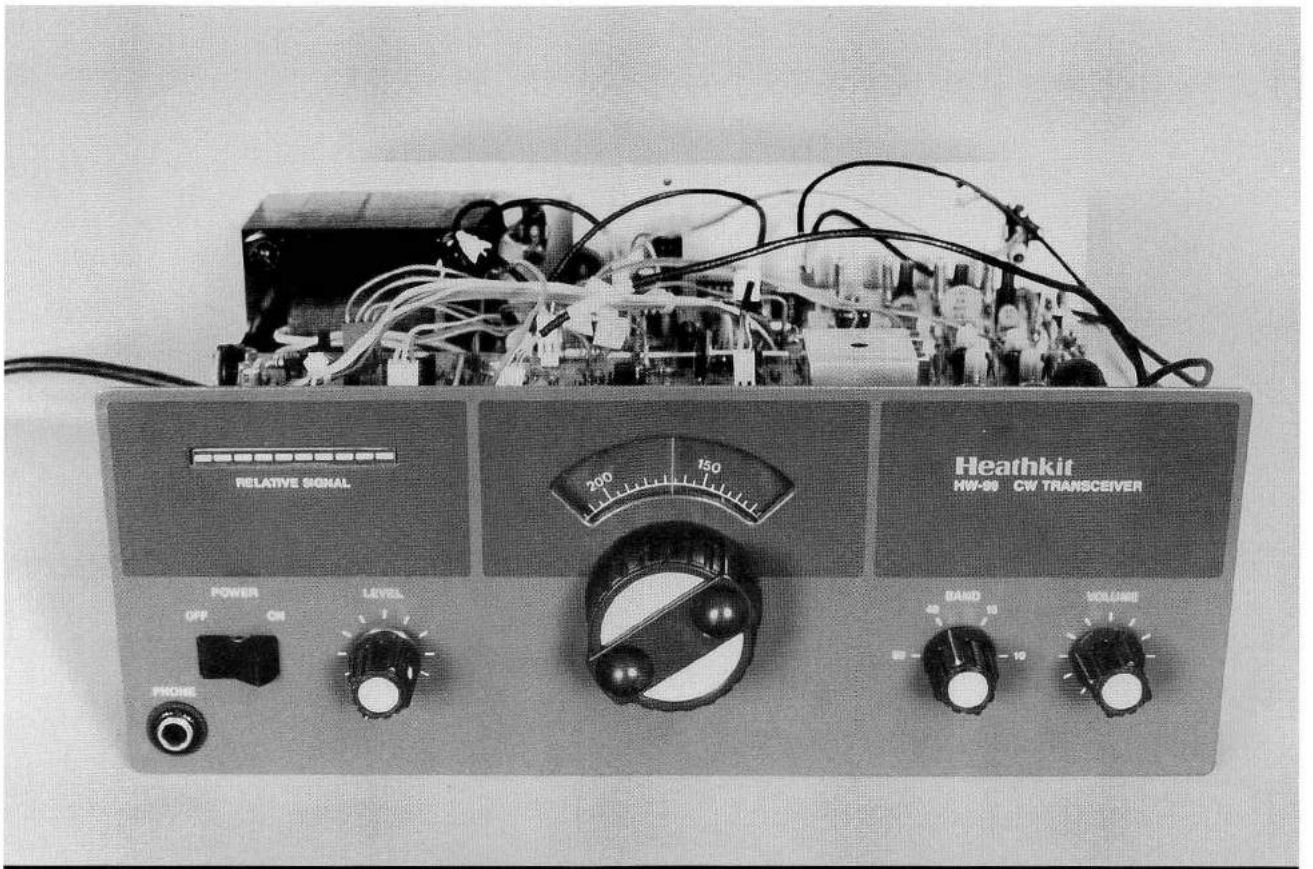
40 Meter SSB Transceiver

"Single-Bander"

Manufactured: 66-74
Price: $99.95

Comments: The HW-32A is identical in every way to the HW-12A except for frequency coverage. Frequency coverage for the HW-32A is 14.2 to 14.35 MHz. For additional details, specifications, and differences between the A series Single-Banders and the originals see listing under HW-12 and HW-12A.

Weight/Size: 15 lbs; 12″ wide x 6.25″ high x 9.25″ deep
Related Products: HW-12, HW-12A, HW-22, HW-22A, HW-32, HS-24



UNIT SHOWN WITHOUT COVER.

4 Band CW Transceiver

Manufactured: 85-87
Price: $299.95

Comments: The HW-99 is essentially an HW-9 with more power. The HW-99 is a fully solid state rig using a single conversion receiver with a broadband front end, a 4-pole crystal filter, and no RF amp. It has an AGC circuit and and active audio filter with a bandwidth of about 450 Hz at 6 dB down, receiver sensitivity of better than 1 uV, and frequency coverage from 3.5 to 3.75 MHz and the lower 250 kHz of 40, 15, and 10 meters. There are no provisions for WARC operation. The transmitter develops about 50 watts into a 50 ohm load and the PA transistors are protected against high SWR. The transmitter ALC will deliver at least 90 percent of rated output with an SWR as high as 2:1. Features include a built-in AC power supply, a front panel bar graph LED display for S-units and relative power, continuously variable RF output, and full QSK break-in operation up to 30 WPM. There is no built-in speaker. Front panel controls include a power on/off rocker switch, RF level, and band, volume, and main tuning. There is also a headphone jack on the front panel. Rear panel connections include an SO-239 for a 50-75 ohm antenna, a ground post, and phono jacks for a speaker (4 to 8 ohms) and a key. The HW-99 only lasted about a year and a half. It was viewed as expensive, featureless, and drifty. Heath's own specs do little to persuade one that this is a stable radio—"typically less than 1 kHz per hour after 30 minutes warmup. Typically less than 150 Hz per 30 minutes after 90 minutes warmup." At least one article (in *QST*) described a mod to fix the drift problem (see appendix). There are no DC power input connections that would let the HW-99 be used in a portable situation. The two-tone brown matches HW-9 and the "little brown box" series. The short production life of the HW-99 makes it a very rare item.

Weight/Size: 14 lbs; 11.5″ wide x 4.5″ high x 10.75″ deep
Related Products: SP-99

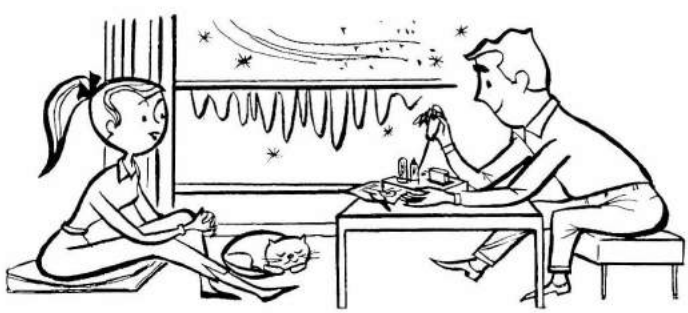
5 Band SSB/CW Transceiver

Manufactured: 68-70
Price: $250

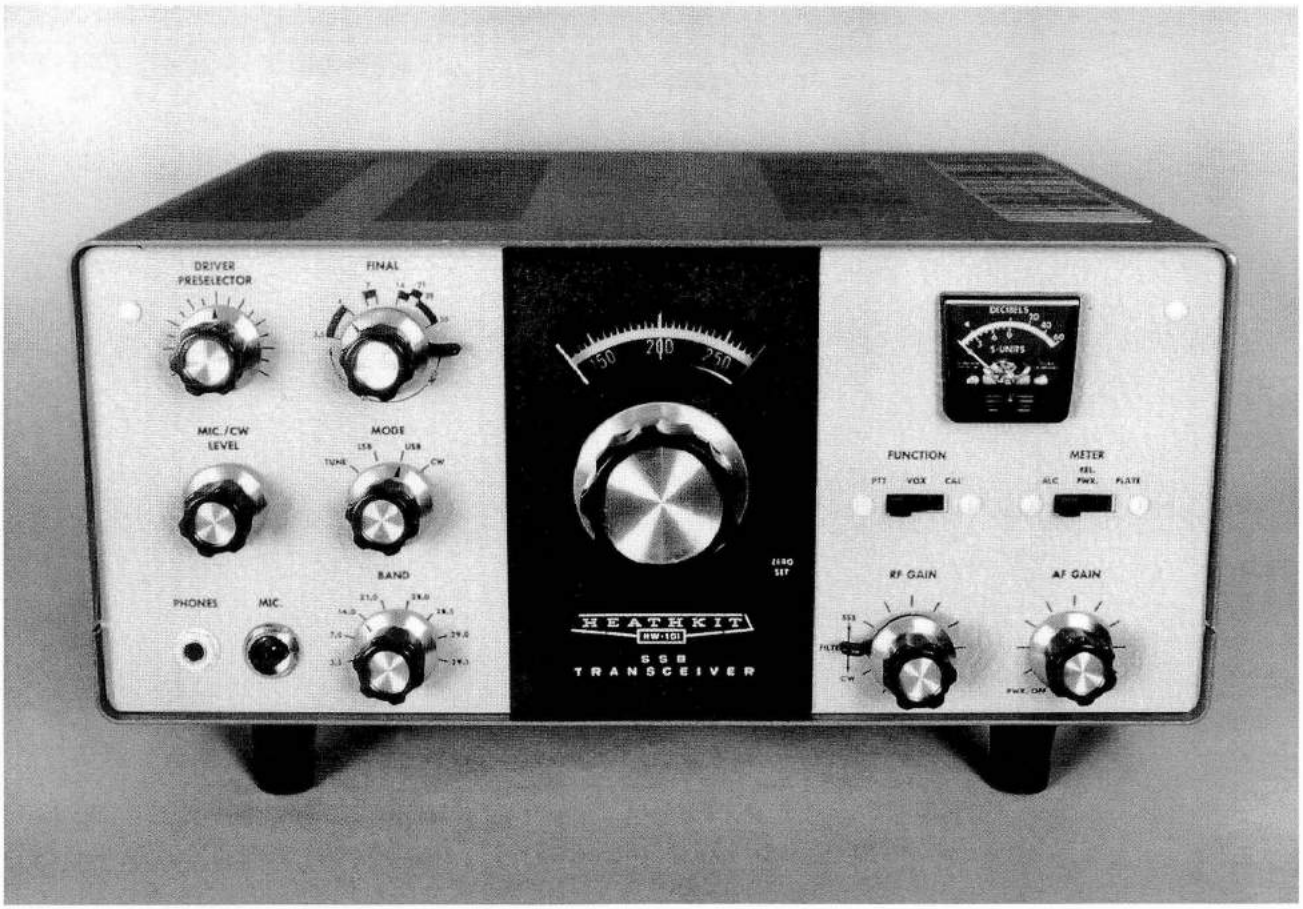
Comments: Shortly after its release in March 1968, Heath began advertising the HW-100 as "the world's fastest selling transceiver." Because all those records have been destroyed, we will never know exactly how fast it sold, but it is certain Heath's claim was no exaggeration. The HW-100 was the right product at the right time for the right price, and was offered as the low-cost alternative to the SB-101 (see listing). With the exception of the VFO, the two rigs are virtually identical. The SB series uses Heath's expensive patented tube-type Linear Master Oscillator or LMO as it was called. The HW-100 uses a much simpler and more traditional (but solid state) VFO design. The transceiver is built around 19 tubes (including a pair of 6146Bs), five main PC boards, and four small bandswitch PC boards. The metal chassis, PC boards, most parts, and parts placement of the HW-100 are identical to those in the SB-101. Even the layout of the front panel is similar. The specifications of the HW-100 are almost identical to the SB-101, too. Receiver sensitivity is .5 uV. Crystal filter selectivity is 2.1 kHz at 6 dB down and 7 kHz at 60 dB down. There are provisions for only only one filter—SSB. A CW filter was never offered as an option. The HW-100 uses the "standard" Heath IF frequency of 3395 kHz. IF and image rejection is better than 50 dB. Frequency coverage is 500 kHz segments of 80, 40, 20, 15, and the full 10-meter band right up to 30 MHz. The transmitter delivers 180 PEP SSB input and 170 watts CW input. Carrier and unwanted sideband suppression is 45 dB down. Frequency stability is less than 100 Hz per hour after 30 minutes warmup. Less than 100 Hz variation with 10 percent change in line voltage. Features include PTT and VOX operation, switch-selectable sidebands, semi-break-in CW (grid block keying) with built-in sidetone, and a built-in 100 kHz crystal calibrator. The biggest complaint heard about the HW-100 was the tuning dial mechanism. Heath had a patented tuning drive system it called Harmonic Drive. It provided a 28:1 turns ratio to cover 500 kHz. Some ops claimed

it was full of wobble and backlash. Popular ham magazines published mods to replace the dial with a better one. In the author's opinion these complaints were overblown. Front panel controls include band and mode selectors, load, final tune, driver preselector, mic/CW level, and slide switches for meter function and PTT/VOX/CAL. Rear panel connections include a quarter inch key jack, phono jacks for ALC input, 8 ohm speaker, and a 50-75 ohm antenna. There is also a spare phono jack. In addition there is an 11-pin "octal style" power input plug and a ground post. Advertising copy refers to a separate rear panel jack for "RF output" (in addition to an antenna jack), but examples of rig with this jack have not been found, although there is an unused hole in the rear panel that might have been used for this purpose. There are access holes in the lower right side of the cabinet for screw driver adjustment of controls for meter zero, bias, and VOX. The HW-100 has no internal speaker or power supply and is designed for use with the HP-23 or HP-13 series of power supplies. Power requirements are 700-850 VDC at 250 ma, 300 VDC and 150 ma, -115 VDC at 10 ma, and 12 volts AC or DC at 4.75 amps. The two-tone green styling also incorporates SB series knobs. See listing for SB-100 regarding information about modification of the driver preselector control. All things considered, the HW-100 is a fine rig and many are still on the air. Though they are still fairly common, the HW-100 is much rarer that the HW-101 (see listing).

Weight/Size: 22 lbs; 15″ wide x 6.25″ high x 13.5″ deep
Related Products: HW-101, HW-104, SB-600, SB accessories



FROM THE HEATH CATALOG



5 Band SSB/CW Transceiver

Manufactured: 70-83
Price: $399.95

Comments: Released for Christmas in 1970, the HW-101 was a refinement of the HW-100 and proved to be even more successful. When the last ad for the 101 appeared in the Winter '83 catalog, Heath noted that more than 30,000 units had been sold. It is likely that the final number was closer to 40,000. This is a truly staggering number of radios, and it is doubtful that that figure will ever be equaled by any other manufacturer for any kind of transceiver. There are three primary improvements in the HW-101. First, the receiver sensitivity has been improved and is now better than .35 uV (as opposed to 1 uV in the HW-100). Secondly, the Harmonic Drive tuning mechanism no one seemed to like was replaced with a more conventional ball bearing drive with a 34:1 tuning ratio (as opposed to the 28:1 in the '100). Lastly, Heath added front panel switch selection of filters for SSB and CW (the HW-100 has only an SSB filter), though the 400 Hz CW filter was optional. The enclosure must be removed to check for the presence of the CW filter. See listing for SB-101 for details on checking for the CW filter. One other small improvement Heath made was to fix the problem with the driver preselector—though it was never a big issue. To better distinguish itself from its predecessor, Heath restyled the 101's front panel. All other specifications and operating characteristics of the HW-101 are the same as the HW-100. See listing under HW-100 for additional details. The HW-101 was the last tube-type rig Heath ever made and is the most popular radio it ever sold. It is a true classic, and thousands are still on the air. Look for the two-tone green cabinet and SB series knobs. The HW-101 is not rare, but beware strange modifications.

Weight/Size: 22 lbs; 15″ wide x 6.25″ high x 13.5″ deep
Related Products: HW-100, HW-104, SB-600, SB accessories

5 Band SSB/CW Transceiver

Manufactured: 75-77
Price: $569.95

Comments: Released for Christmas in 1975, the HW-104 (there was no HW-102 or HW-103) was the "low cost" alternative to the the SB-104, which had been released a year earlier. As with the HW-101 and SB-101, the HW-104 is almost identical to the SB-104. The basic design and electronics are the same. Both are fully solid state units—including the final amplifier. The main difference was the frequency display. The SB-104 uses an expensive and complicated digital display. The HW-104 uses a much simpler analog dial. The HW-104 is built with 15 PC boards, 11 of which are plug-in circuit cards. There is no "mother board." The cards plug into sockets on the chassis and are connected by two wiring harnesses. Because the HW-104 shares its design with the SB-104, it also shares many of the same problems suffered by the SB-104. The reader is referred to the listing for the SB-104 for a discussion of these problems. The basic specifications of the two units are also very similar. Frequency coverage is 80 through 10 meters (through 29.0 MHz). Coverage to 29.7 MHz is provided with an optional accessory (a set of coils and crystals mounted on a space provided on the front end of a PC board). 15 MHz WWV reception is also provided but there are no provisions for WARC coverage. The receiver is a broadband design with a 4-pole crystal filter, sensitivity of better than 1 uV, and selectivity of 2.1 kHz at 6 db down. An optional CW filter provides selectivity of 400 Hz at 6 dB down. The top cover must be removed to check for the presence of the CW filter and extended 10-meter coverage. Drift is less than 100 Hz per hour after 30 minutes warmup. Transmitter output power for both SSB and CW is 100 watts (PEP SSB) in high power mode and 1 watt in low power mode. The main feature of the HW-104 is, of course, the broadband design, which facilitates instant band changing and eliminates the need to "tune up," and although a "tune" mode is provided, it is intended primarily for the adjustment of antenna tuners. Behind the red plastic window is the illuminated VFO dial, a meter reading S-units, relative power,

ALC and 13.8 VDC, and an illuminated window for display of your callsign. (The clever person will figure out some way to change or eliminate the callsign). Front panel controls include push button selection of meter function, power off/on, VOX, 25 kHz calibrator, and optional noise blanker. Push buttons also select operating mode and power level. Other front panel controls include AF and RF gain (pull for 100 kHz calibrator), main tuning, AGC speed, band, mic/CW level, VOX gain, and VOX delay. Rear panel controls include sidetone level, anti-VOX, and a switch to select separate or common antenna connections. Rear panel connections include phono jacks for the following: phone patch in and out, aux audio, key, 4-8 ohm speaker (there is no internal speaker), VFO in and out, ALC, driver output, IF output, receiver antenna, common antenna, and two spares. For normal operation there must be a jumper cable between the VFO "in" and "out" jacks. There are also two 11-pin "octal style" connectors—a plug for 12 VDC power input and an accessory jack for use with the SB-644 external VFO. For normal operation there must be a jumper wire between pins 2 and 5 of the accessory socket . Antenna switching is via a mechanical relay. CW operation is semi-break-in. NOTE: The card edge connectors used in the HW-104 almost certainly will develop oxidation over time leading to erratic operation. These connectors should be thoroughly cleaned. The HW-104 is designed for use with an external 12 VDC power supply. Power requirements: 13.8 VDC nominal at 2.5 amps low power, 20 amps high power. WARNING: DC input voltage must NOT EXCEED 16 volts or damage will result. REVERSE POLARITY will also result in damage as the HW-104 is not polarity protected. The HW-104 was the last of the classically styled "Hot Water" high frequency rigs and may have been one of the least successful primarily due to its price and problems. The two-tone green cabinet matches other HW series units. Clean HW-104s in good condition are very rare.

Weight/Size: 31 lbs; 14.5″ wide x 5.75″ high x 14″ deep
Related Products: HW-100, HW-101, HS-1661

FROM THE HEATH CATALOG

2 Meter FM Transceiver

Manufactured: 73-77
Price: $189.95

Comments: In the spring of 1973 Heath took serious aim at the 2-meter FM crowd and hit the mark with the release of the HW-202 and a group of accessories including a power supply (HWA-202-1), a wattmeter (HM-2021), and an amplifier (HA-202). Heath had learned some valuable lessons on VHF and FM with its HW-17, and did everything right with the 202. The HW-202 is a simple, straightforward, crystal-controlled transceiver. It was advertised as a 36 channel radio because it had 6 transmit and 6 receive frequencies that were independently selectable. Of course in 1973 not many people understood how 2-meters worked and didn't realize that you probably never would want to transmit, for example, on 146.28 and receive on 146.94. What you really have here is 6 channel radio. The 202 is built on 4 glass-epoxy PC boards and uses a dual conversion receiver with dual-gate MOSFETS in the front end and a 4-pole monolithic 10.7 MHz crystal filter. The receiver sensitivity is better than .5 uV with a nominal bandwidth of 22 kHz. The transmitter section provides 10 to 15 watts output and will do so indefinitely without failure into an infinite SWR. Deviation is adjustable from 0 to 7.5 kHz. The HW-202 will cover any 1 MHz segment of the band between 143.9 and 148.3 MHz. Features include an illuminated meter reading S-units and relative power, a built-in speaker, an optional tone-burst encoder (HW-202-2), and push button selection of transmit and receive frequencies. Existence of the tone-burst encoder can be determined by the presence of a row of 4 push buttons above the "transmit" frequency push buttons. Front panel controls include on/off/ volume, squelch, and push buttons for frequency, and (optional) tone burst selection. There is also a front panel mic connector. Rear panel connections include phono jacks for a 50 ohm antenna and an external speaker. A rear panel switch selects between the internal speaker and an external speaker. There is no power "connector"—power input wires come out an opening in the rear panel. The 202 can be run directly from a DC source. AC operation requires an external DC power supply. Power requirements: 12.6 to 16 VDC at 2.2 amps (while transmitting), 200 ma (while receiving). The HW-202 is polarity protected. The transmitter uses 6 MHz crystals. The crystal formula is transmit frequency / 24 = crystal frequency. The receiver uses 45 MHz crystal and the formula is (receive frequency - 10.7) / 3 = crystal frequency. The HW-202 was supplied with crystals for 146.94 simplex. The 202 can be aligned without instruments—but don't try it without the book. The two-tone green cabinet has chrome finish around the front panel. Heath sold tens of thousands of these. Many are still on the air. Great for packet. 202s turn up frequently at swap meets but often sell quickly if they are in good condition.

Weight/Size: 11 lbs; 8.25˝ wide x 2.75˝ high x 10˝ deep
Related Products: HWA-202-1, HA-202, HM-2021, HW-2026, HW-2036, VF-7401

2 Meter Hand-Held Transceiver

Manufactured: 75-77
Price: $179.95

Comments: This was Heath's first HT and it was a real handful (see dimensions below). The HW-2021 is a 1 watt, 5 channel, crystal-controlled unit. Assembly of the HW-2021 is tricky, demanding a small soldering iron and a steady hand as parts on the board are tightly packed. The same crystal is used for both transmit and receive, and an offset switch lets you use any of the frequencies as a simplex or shifts the transmit frequency 600 kHz below the receive frequency. It is important to note that the offset is accomplished by a crystal and can be plus or minus 600 kHz—but *not both*, since there is room for only one offset crystal. The 2021 came standard with the crystal for a transmit of -600 kHz. Other non-standard offsets are possible with the right crystal installed. The receiver sensitivity is .5 uV. Features include a dual-gate MOSFET front end, a pulse-type battery saver circuit, and an LED, which indicated battery charge status, battery saver status, and a squelch open condition. When crystaling the unit, always calculate for the receive frequency. Crystal formulas: crystal frequency = (receive frequency - 10.7) / 9. The transmit offset crystal formula (for transmit below receive): crystal frequency = 10.7 MHz - offset frequency in kHz. For transmit above receive: crystal frequency = 10.7 MHz + offset frequency in kHz. The HT is powered by 10 AA NiCad batteries (solder lug type) producing about 12 volts. Recharge time with the supplied drop-in charger is about 16 hours. Replacement batteries shouldn't be much trouble to find or install. Controls include on/off/volume, squelch, channel, and offset. The unit is equipped with a rubber duck and also has a jack for an external antenna. This jack can cause problems with poor connections due to the lack of "spring" in its contacts. The HW-2021 was offered with an optional 12 digit touch tone pad and is built into a black plastic case with a liner of metal foil-covered paper. The HW-2021 suffered from a variety of miscellaneous problems resulting mostly from difficulty in assembly rather than any intrinsic design faults. It was "not recommended for beginners because of its compactness." The 2021 was replaced by the VF-2031 (see listing) in 1978. Rare.

Weight/Size: 2 lbs; 3.25″ wide x 9.75″ high x 2″ deep
Related Products: HA-201, VF-2031, HW-6502

FROM THE HEATH CATALOG

2 Meter FM Transceiver

Manufactured: 75-76
Price: $299.95

Comments: The HW-2026 was Heath's disastrous attempt at frequency synthesis and its first ever product recall. It was on the market only briefly, from Christmas '75 through the winter of '76, and did not appear in the Spring 1976 catalog. It was designed to cover any 2 MHz segment of the band between 144.0 and 147.995 in 5 kHz steps by dialing the frequency from lever switches on the front panel. Specifications are similar to the HW-202 (see listing). The transmitter puts out about 10 watts, with spurious output supposed to be at -40 db within 2 MHz of the carrier, but the major problems with the 2026 are related to spurious emissions. It had a large number of spurs at levels high enough to bring up repeaters all over town. Heath's engineers discovered that a quick fix was not in the cards and pulled the 2026 from the market. Owners were offered their money back or credit toward another kit. Some owners who didn't have any trouble (as far as they knew) kept the rigs, and those are all that remain today. For this reason HW-2026s are exceptionally rare. The 2026 is cosmetically similar to the HW-2036(A) (see listing). The only major difference is in the toggle switches below the frequency lever switches. In the HW-2036(A) these were replaced by rotary switches. The HW-2026 features a built-in tone burst encoder (1800-2500 Hz, .6 kHz deviation, selectable during construction) or continuous tone encoder (70-200 Hz, .7 kHz deviation, selectable during construction). The transmitter has an offset selection of 0 or -600 kHz and one auxiliary. Transmitter deviation is adjustable from 0 to 7.5 kHz. The receiver sensitivity is .5 uV and a bandwidth of 15 kHz at 6 dB. There are two front panel LEDs. One lights when the squelch opens, indicating "channel busy," and the other lights when the synthesizer is locked on frequency. In normal operation this second LED should light whenever you key the mic, unless you are outside the range the unit has been tuned for or unless you are outside the band. Receiver birdies are rated at less that 1 uV equivalent except at 146.87, 146.90, 147.46, 147.53, and 147.80. Birdies at these frequencies are greater than 1 uV equivalent. The microphone is hard-wired, but watch for mic connector modifications. Power requirements: 12.6 to 16 VDC at 700 ma squelched and 2.5 amps transmitting. The two-tone green cabinet with chrome trim matches the HW-202. The HW-2026 may be one of Heath's rarest radios.

Weight/Size: 12 lbs; 8.25″ wide x 2.75″ high x 10″ deep
Related Products: HW-202, HW-2036, VF-7401, HWA-202-1, HA-202, HM-2021

2 Meter FM Transceiver

Manufactured/Price

HW-2036	**76-76**	**$269.95**
HW-2036A	**77-79**	**$269.95**

Comments: Smarting badly from the failure of the HW-2026, Heath took great pains to ensure that its replacement would perform without a hitch. After a long, difficult summer and endless testing, Heath unveiled the new rig in its 1976 Christmas catalog—complete with charts displaying its spectral purity. Cosmetically the new rig was almost identical to the 2026, but Heath gave it a new number so no one would mistake it. They designated it the HW-2036. There were some substantial differences. The HW-2036 uses a 10 MHz time base; the 2026 uses a 1 MHz time base. The 2026 has both a tone burst and a continuous tone encoder. The 2036 has only a continuous tone encoder, but gave a choice of three switch selectable frequencies between 70 and 200 Hz. Perhaps most significant is that the 2036 offers both plus and minus 600 kHz transmitter offset, as well as simplex operation plus and auxiliary offset. The HW-2036's basic specifications are about the same as the 2026. The receiver features dual-conversion, an 8-pole crystal IF filter, IC limiting, Quad detection, and a double tuned front end with a MOSFET RF amp. The receiver has a sensitivity rating of better than .5 uV and a bandwidth of 6 dB down at 15 kHz. All birdies are less than 1 uV equivalent. The transmitter puts out about 10 watts with harmonic and spurious emissions down 70 dB within 20 MHz of the carrier. Deviation is adjustable from 0 to 7.5 kHz. Front panel controls include on/off/volume, squelch, frequency selectors, mode, tone, 0 or 5 kHz, and a meter reading S-units and relative power. As with the 2026, there are two LEDs that light up on the front panel. One indicates "channel busy" and the other indicates synthesizer lock. In normal operation this light should come on whenever you key the mic, unless you dial in a frequency that is out of the band. The microphone is hard-wired—but watch for mods adding a mic connector. Rear panel connections include a phono jack for a 50 ohm antenna (many have been user replaced with SO-239s) and a phono jack for an external speaker. A rear panel switch selects between the internal speaker and an external speaker. There is no power "connector"—power input wires come out an opening in the rear panel. The HW-2036 covers any 2 MHz segment of the band between 143.5 and 148.5. NOTE: Both transmitter and receiver must be aligned with the same 2 MHz portion of the band. The only difference in the A version is in frequency coverage. The HW-2036A offers a full 4 MHz coverage—the entire 2-meter band. The HW-2036(A) is offered with the optional Micoder microphone, which features a built-in touch tone pad. The 2036(A) can be powered directly from a 12 VDC source and is polarity protected. AC operation requires an external 12 VDC power supply. Power requirements: 12.6 to 16 VDC at 700 ma squelched and 2.5 amps transmitting. The two-tone green cabinet with chrome trim matches the HW-202 and the HW-2026. In 1980 the HW-2036A was replaced with the VF-7401, but there was a small gap in production. The HW-2036A was not listed in the Christmas '79 catalog—and neither was its successor. The HW-2036(A) was very successful. They show up at flea markets regularly, but sell fairly quickly.

Weight/Size: 12 lbs; 8.25″ wide x 2.75″ high x 10″ deep
Related Products: HW-202, HW-2026, VF-7401, HWA-202-1, HA-202, HM-2021

8 Band SSB/CW Transceiver

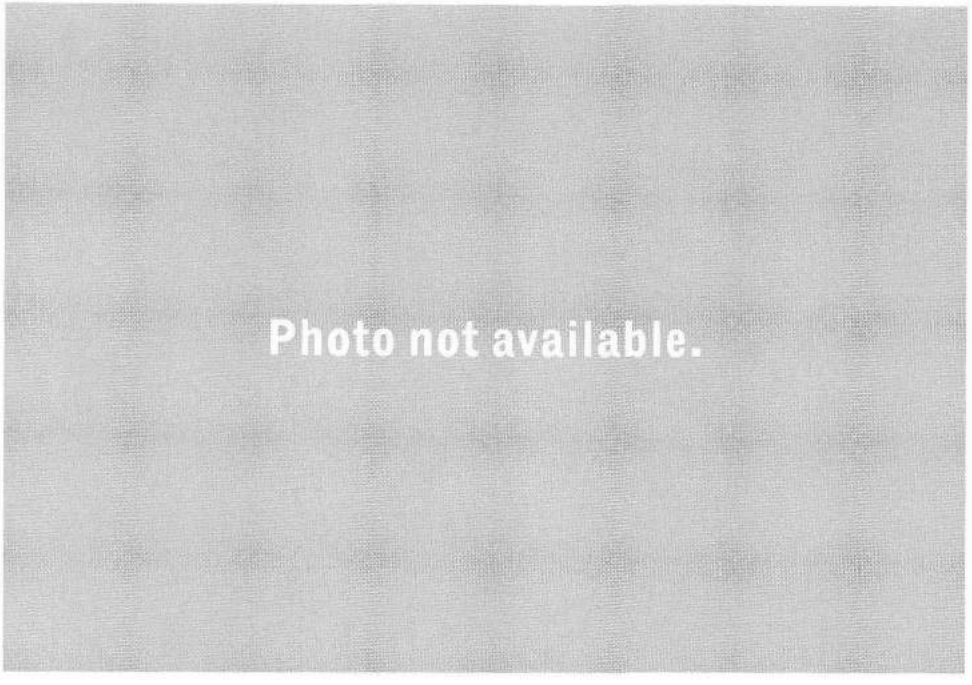
Manufactured: 83-84
Price: $499.95

Comments: The HW-5400 was the last big HF transceiver Heath made and it was not a big success. Plagued by foreign competition as well as excessive engineering and design costs, and troubled by persistent assembly and alignment problems, the HW-5400 wasn't long for the world. It was sold for just one year. Not that it wasn't a good enough rig, it's just that the production costs were so high Heath ended up having to sell it for about what you would pay for a ready-made transceiver with more features and fewer headaches. Add to this the 100 hours needed to put it together, and most of the advantages Heath originally had to offer were gone. Most hams opted out. The fully solid-state HW-5400 covers 80-10 meters including the WARC bands. It is built on 14 circuit boards, and so demanding was its assembly that toward the end of its production, large portions of the 5400 were being shipped pre-assembled. In some respects, Heath had finally exceeded the average kit builder's ability to assemble a kit successfully. Of course it didn't help that Heath was changing the design on an almost daily basis. Changes were so frequent that Heath abandoned its traditional soft bound assembly manual in favor of one in a three-ring binder. Still, once you (or the factory) got it working, it worked quite well. Features include broadband design, two-speed tuning, automatic sideband selection (with manual override), full CW QSK, and optional keypad frequency entry. The green vacuum fluorescent display indicates frequency, T/R status, split operation, and mode. Front panel controls include main tuning, mode, mic gain, CW gain, AF gain, RF gain, RIT, IF shift, and band, as well as push buttons for receive/tune, PTT/VOX, AGC fast/slow, and memory management. VOX controls and sidetone level adjustment are located behind the Heath nameplate. The meter reads S-units and ALC/relative power. Rear panel connections include an SO-239 for a 50 ohm antenna, and phono jacks for ALC and relay output for use with a linear amplifier. In addition there is an accessory socket for connection to the option-

al HWA-5400-1 power supply/speaker. This very inconvenient connector provides audio to a speaker, serves as a power input for memory back-up, and has "an essential sensor line for proper operation and remote on/off switching at the radio." There is also a connector for DC power input. A rear panel switch disables the linear relay for more quiet operation when not using an amplifier. The HW-5400 uses an optical encoder type tuning scheme. In addition, the main tuning knob is fitted with a metal insert in one of its two finger indents. Touching this indent causes the receiver to tune in 1 kHz steps instead of the normal 50 Hz steps—very clever. Heath patented the idea. Receiver sensitivity is better than .35 uV. Selectivity with standard filter is 2 kHz at 6 dB down. With optional SSB filter selectivity is 1.8 kHz at 6 dB down. CW active audio filter is 250 Hz at 6 dB down centered at 700 Hz. Overall stability is less than 50 ppm drift from turn-on. Numerous weak "birdies" and other miscellaneous strange noises are down far enough that they should not get in your way. Transmitter output power is 100 watts PEP and CW minimum except on 10 meters, which is 80 watts minimum. Power output is continuously variable. The PA transistors are thermally protected against high SWR and will deliver 90 percent of the rated power with an SWR of less than 2:1. Early units had real problems with the CW wave shape and length. Not only was the rise time abrupt, but the transmitter took a full 26 milliseconds to shut off upon key up. This made CW speeds at or above 20 WPM impossible. Heath would supply a fix for this problem to anyone who asked and incorporated a permanent fix into later units. Whether or not the unit you're looking at has this problem is impossible to say with only visual inspection. Missing is a way to shut off the AGC. In the end, Heath realized the HW-5400 was too complicated and too expensive given fierce competition from other ready-made rigs. They pulled it from production and cut their loses saying, in effect, "enough is enough." Heath lost a lot of money on this 5400 and vowed never to do it again. The 5400 requires a frequency counter and a VOM or VTVM with an RF probe for alignment. Power requirements: 13.8 VDC nominal at 20 amps (transmit). Requires an external power supply. Two-tone brown cabinet. Rare.

Weight/Size: 24 lbs; 11.5″ wide x 5″ high x 14″ deep
Related Products: HWA-5400-1

FROM THE HEATH CATALOG



2 Meter Hand-Held Transceiver

Manufactured: 85-86
Price: $199.95

Comments: The HW-6502 is a fully assembled HT and was Heath's last 2-meter product. Buckling under the weight of economic reality, foreign competition, and a changing consumer market, Heath pulled out of the two-meter competition in 1986 and never came back—at least not with its own radios. The HW-6502 includes a built-in CTCSS encoder with all available frequencies. Features include an S/battery meter, selectable 5 watt, 1.5 watt, and 300 mW power output levels, and thumbwheel frequency selection with +5 kHz and ±600 kHz offset switches. Frequency range is 144.0 to 147.995 MHz. Sensitivity is .25 uV. OPTIONAL speaker/mic available. Heath also offered the HW-6502 with an OPTIONAL "Mobile Console." Designed for mobile installation, this fully assembled console had a opening into which the HT could be inserted. Cables from the console provided power and antenna connections. The console, in turn, was available with an OPTIONAL 25 watt amplifier. The HW-6502 and its companion Mobile Console were sold for just over a year; this was Heath's last attempt at selling its own HTs. The HTs that followed—the HWS-2(4)(XL) series—were made for Heath by Standard and are not listed in this book. The 6502 and console are very rare.

Weight/Size: 1 lb; size not available
Related Products: HW-2021, VF-2031

5 Band SSB/AM/CW Transmitter

"Marauder"

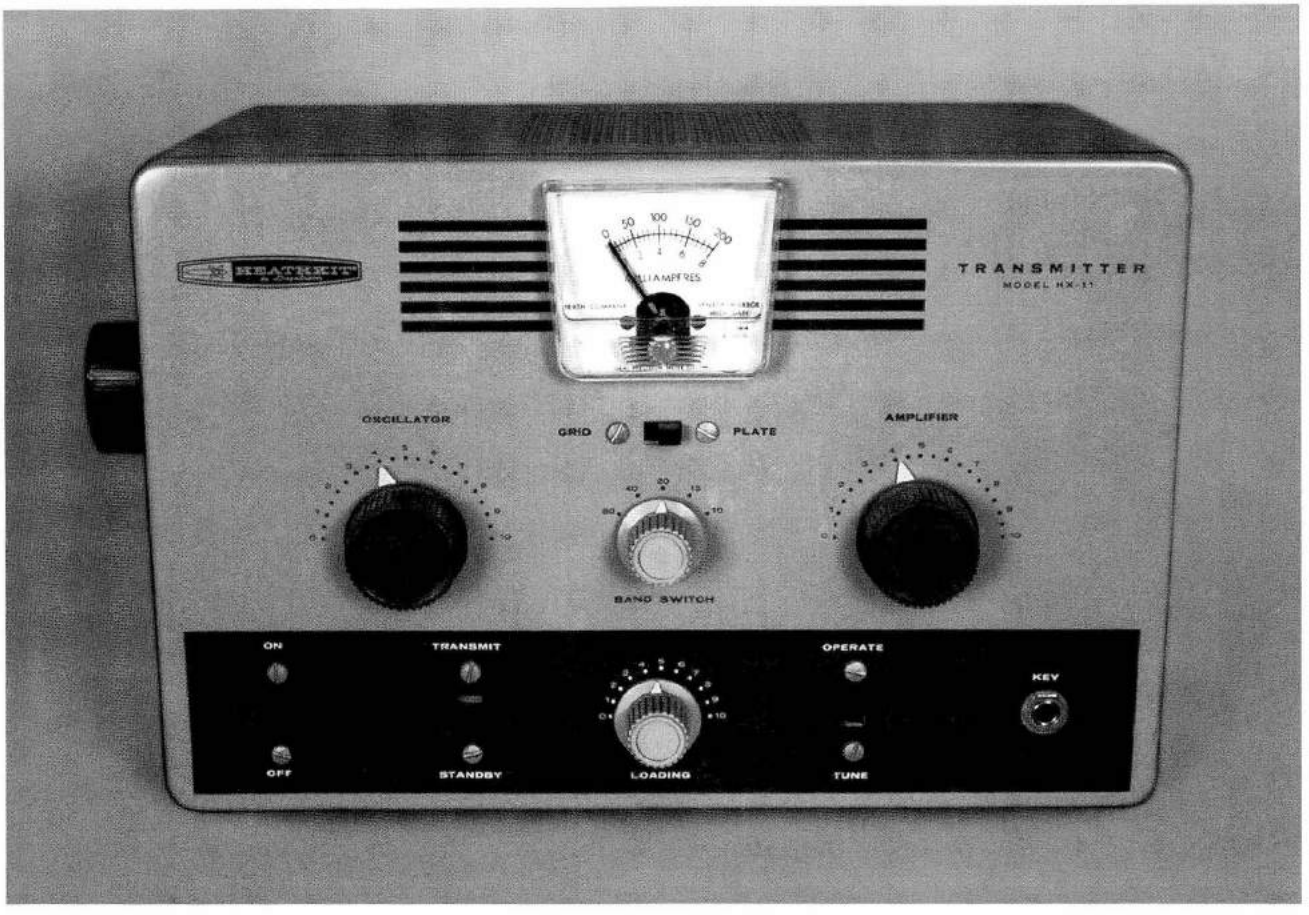
Manufactured: 62-65
Price: $334.95

Comments: The HX-10 was Heath's first self-contained sideband transmitter and was not a replacement for the TX-1 "Apache"—the two rigs were sold side by side for about three years. The HX-10 uses 21 tubes and 9 diodes and covers 80 through 10 meters. It runs 180 watts input on CW and FSK, 180 watts PEP on SSB (upper or lower), and about 75 watts input on AM using a pair of 6146s in the PA cage. Features include filter-type SSB operation, a multi-section, hermetically sealed band-pass filter, a dual conversion crystal-controlled heterodyne oscillator, ALC, and a fan-cooled final amp. In addition the operator can choose manual, PTT, or VOX control (VOX was built in). The HX-10 also features VOX controlled break-in CW operation and a built-in sidetone for monitoring CW transmission. To improve stability, VFO plate and screen voltages are regulated and the filaments in the VFO are left lighted, even when the main power is off. The main tuning mechanism is a worm gear type assembly featuring spring-loaded gears to minimize backlash. The dial is flywheel weighted and has a 165:1 turning ratio yielding about 10 kHz per revolution. Like all tuning linkages of this kind, repair may be complicated. There is a provision for one crystal-controlled frequency. Crystals used are in the 4900 to 5500 kHz range and any given crystal will produce 7 frequencies—one for each band. To find the crystal frequency, subtract desired operating frequency from the heterodyne mixing frequency for the correct band: 80 meters (subtract 9.0 MHz), 40 meters (subtract 12.4 MHz), 20 meters (subtract 19.4 MHz), 15 meters (subtract 26.4 MHz), 10A (subtract 33.4 MHz), 10B (subtract 34.0 MHz), 10C (subtract 34.6 MHz). Crystal frequencies can be tweaked with the trimmer (C129) on the VFO enclosure. All power supplies are built-in, and the bias supply is solid-state. There is a plastic cover window protecting the illuminated slide-rule dial, but it is sometimes

found to be missing in units picked up at flea markets. Care must be taken not to damage the dial markings or the pointer. Every control needed for normal operation is available on the front panel. These controls include the mode switch, audio gain, driver tune, band selector, main tuning (note that the main tuning knob has a 0-100 scale on it), frequency control (VFO or XTAL), drive level, spot level, meter function, final load, final tune, and controls for VOX operation. The front panel also has a mic connector and a key jack. There is a control on the rear apron of the HX-10 for adjustment of the scope monitor level. Rear panel connectors include an SO-239 for a 50-75 ohm antenna, a phono jack for spotting signal output, a phono jack for phone patch input, a quarter inch jack for FSK keyboard input, a 120 VAC power receptacle (switched), a ground post, and an octal accessory socket. This socket provides connections for receiver muting, external amplifier cutoff bias, connections to receiver audio, and power for a 120 VAC external relay. There is also a phono jack for monitoring the RF with an oscilloscope. For use with 120 VAC 50/60 Hz only. Two-tone green finish with polished chrome knobs. This was the last rig Heath made in the "big/heavy" style. Clean HX-10s in good condition are medium rare.

Weight/Size: 92 lbs; 19″ wide x 11.5″ high x 16″ deep
Related Products: TX-1, RX-1, HA-10

FROM THE HEATH CATALOG



5 Band CW Transmitter

Manufactured: 61-63
Price: $43.50

Comments: The HX-11 was released in November 1961 and was sold for only about a year and a half. As a result of its short production life, the HX-11 qualifies as one of the rarest and least known of Heath's early transmitters—rarer than the much-sought-after AT-1. The HX-11 is an exact copy of the transmitter it replaced—it is a DX-20 in new clothes. The tube line-up is the same, the power output is the same (50 watts), the front panel layout is the same, the crystal access hatch on the cabinet is the same; it is even in the same size cabinet. There were only a few significant changes: The meter style is more "modern," a low pass filter has been added, switched power for an external antenna relay has been added, Heath no longer advertised 11 meter operation (even though the HX-11 will do it), and the paint color has been changed. The HX-11 is painted in two-tone "Heath green"—the colors that by this time had become one of Heath's trademarks. Heath made these changes to bring the DX-20 into line with its new design style. Just as the DX-20 was sold against the DX-35, the HX-11 was sold against the new DX-60, which had been released about the same time as the HX-11. Heath used this same "two tier" product scheme over the years through most of its amateur product line. For addition details and specifications, see listing under DX-20. Clean HX-11s in good condition are very rare.

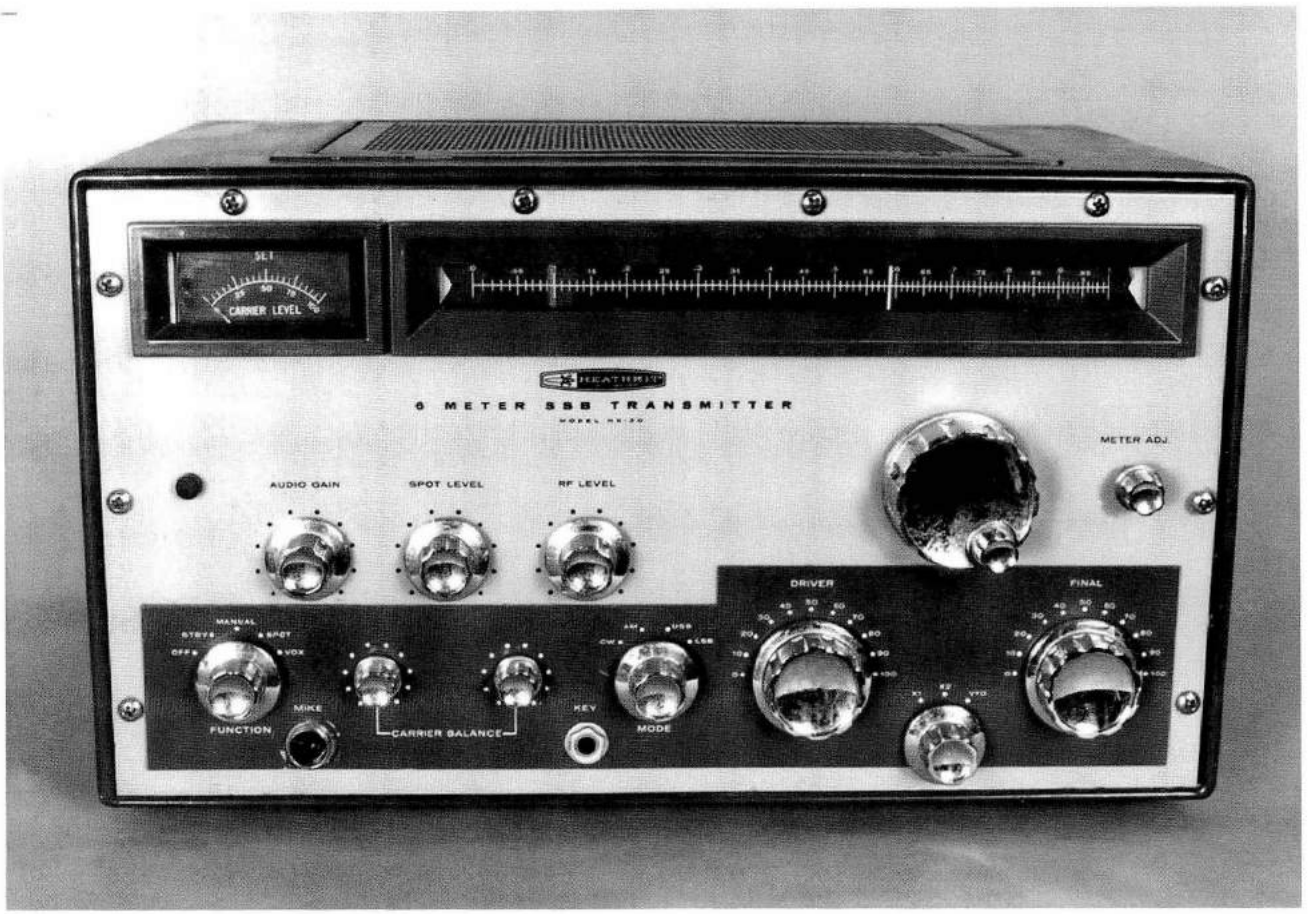
Weight/Size: 13 lbs; 13″ wide x 8.5″ high x 7″ deep
Related Products: DX-20

5 Band SSB/CW Transmitter

Manufactured: 62-64
Price: $134.95

Comments: The HX-20 and HR-20 are matching rigs designed primarily for mobile use and represent a general refinement of the MT-1 "Cheyenne" and the MR-1 "Comanche" (see listings), which they replaced. The biggest change is the addition of SSB and VOX and the elimination of AM. The HX-20 transmitter is a 13 tube design (including a 6146 PA) covering the entire 80-15 meters bands and three 500 kHz segments of the 10 meter band. No PC boards are used—all wiring is point-to-point. The HX-20 will operate USB, LSB, or CW (no AM), with an input power of 90 watts PEP, and must be used with one of the following power supplies: the HP-10 or HP-13 series (for mobile use) or the MP-1, HP, 20, or HP-23 series (for 120 VAC use). Features include crystal filtering and balanced modulator circuits, a temperature compensated VFO, a hermetically sealed bandpass filter, dual conversion heterodyne operation, crystal-controlled oscillators, and ALC. Heath went out of its way to assure the wary shopper of excellent "long term suppression stability" of unwanted carrier and sidebands and touted only 100 Hz drift after warm-up. Advertised carrier suppression is 50 dB below peak output and sideband suppression is 55 dB below peak output. The HX-20 uses grid block keying and a high impedance microphone (not included). Power requirements: 6 volts at 4 amps or 12 volts at 2.4 amps AC or DC, -125 VDC at 20 ma, 300 VDC at 100 ma, and 600 VDC at 130 ma. Front panel controls include operate/spot/standby, mode, final tune, driver tune, band, VFO tune, meter adjust, audio gain, and driver gain. Tune-up is done using the HX-20's relative power indication. Rear panel connections include a receiver accessory socket, power input socket, receiver antenna, RF output, key jack, and antenna relay, while the microphone connects on the right side of the chassis. The rear panel also features the fuse, a sideband balance control, and controls for VOX sensitivity and anti-trip. The final amp operates in class AB1 and is designed to work into a 50 ohm load. Unlike the matching HR-20, the HX-20 does not use a rotating dial drum. The tuning mechanism has a 30:1 tuning ratio and is quite a collection of springs and gears—take care when working on it. The unit is housed in a two-tone green cabinet. Rare.

Weight/Size: 22 lbs; 12.25″ wide x 6.25″ high x 9.25″ deep
Related Products: HR-20, MR-1, MT-1, MP-1, HP-20, HP-23 series, HP-10, HP-13 series, AK-7



6 Meter SSB/AM/CW Transmitter

Manufactured: 62-65
Price: $189.95

Comments: Looking much like a smaller version of the TX-1, the HX-30 was Heath's first VHF sideband transmitter and was very well received by VHF enthusiasts. The HX-30 is built on 4 PC boards, employs 14 tubes including a 6360 final, and uses crystal-controlled carrier and heterodyne oscillators together with an audio phase-shift scheme to generate the output. The HX-30 will cover *any one* 1 MHz portion of the six-meter band. The basic frequency generation method works in the following way. A carrier is produced at 11.5 MHz and is mixed with the heterodyne oscillator frequency of 30.5 MHz to produce a 42 MHz signal. This 42 MHz signal is mixed with the VFO output from 8 to 9 MHz to produce an output from 50 to 51 MHz. Since there is no "band switch," changing the heterodyne oscillator crystal is required to move to a different portion of the band. Changing the heterodyne oscillator crystal to 31.5 MHz (for example) would produce an output between 51 and 52 MHz. While somewhat inconvenient, this system—together with a very well made and temperature compensated VFO—provides excellent stability. The rig comes with a heterodyne crystal to provide output from 50 to 51 MHz but is capable of coverage to 54 MHz. NOTE: Changing the heterodyne crystal requires major realignment of the transmitter. Running SSB, the transmitter will provide 8 to 10 watts PEP output. On AM or CW the output is only 3 to 4 watts. Carrier suppression is better than 50 dB, and unwanted sideband suppression is better than 40 dB. Features include a built-in power supply, VOX or PTT control, switch selection of USB, LSB, AM, or CW (grid block keying), a built-in VFO, provision for two crystal frequencies (7.9 to 9 MHz crystals), and selectable temperature compensation. The illuminated slide-rule dial drive uses Heath's famous (infamous) gear-and-pulley tuning assembly—the repair of which is a sobering experience. Front panel controls include audio gain, spot

level, RF level, function, carrier balance, mode, driver tune, final tune, frequency control, meter adjust, and main tuning, while the output loading and coupling controls are inconveniently placed inside the cabinet. Also on the front panel are the mic and key jacks and a red panel light that indicates "on air" status. Controls for the adjustment of VOX and bias are located on the rear apron along with an SO-239 for a 50-75 ohm antenna, a ground post, and an 11 pin "octal style" accessory socket. Pins on this socket include four sets of contacts that open or close with transmit, a switched 117 VAC output for use with an antenna relay, and a chassis ground. Alignment of the HX-30 required a VTVM, a dummy load, a scope, a sine wave audio generator, and a frequency meter. All things considered, the HX-30 was a very well-designed transmitter and produces a clean, stable signal with great audio and solid CW. The unit is enclosed in a copper-clad steel cabinet and wears Heath's "official" colors—two-tone green. The knobs are polished aluminum, as opposed to the brushed aluminum knobs used on the VHF-1. Also note that the main tuning knob is a "spinner knob." The HX-30 is designed for 120 VAC, 50/60 Hz operation. Rare in good condition.

Weight/Size: 46 lbs; 16.5″ wide x 10″ high x 10″ deep
Related Products: VHF-1, HA-20

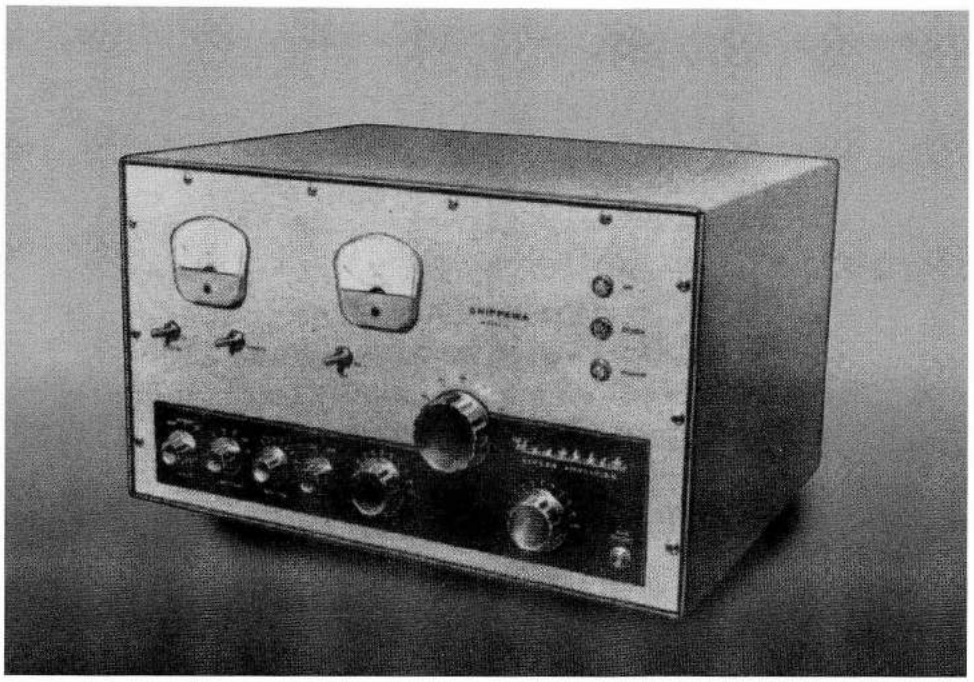
FROM THE HEATH CATALOG

5 Band CW Transmitter

Manufactured: 79-82
Price: $239.95

Comments: The HX-1681 and its companion receiver, the HR-1680, are the solid state replacements for the aging tube-type DX-60B and HR-10B novice pair. In the fall of 1976, in the ad featuring the new HR-1680, the HX-1681 (called the HX-1675 in the ad) was advertised as "coming soon." It turned out that "coming soon" was almost two years. It wasn't until the summer of 1979 that the transmitter was released—probably due to design problems and the distraction of Heath's problem-plagued HW-2026. The HX-1681 is a CW only transmitter covering 500 kHz segments of the 80-15 meter bands and the 28.0 to 28.5 MHz segment of the 10 meter band. There are no provisions for WARC band coverage. To call the HX-1681 a solid state rig isn't quite accurate—it uses a 12BY7 driver and a pair of 6146s in the final amp. Power output is rated at 100 watts minimum on 80-15 and 75 watts minimum on 10. Features include full break-in CW (QSK), a built-in VFO, solid state TR switching, and an adjustable sidetone level. As in the matching receiver, the transmitter is built around several plug-in PC boards. The card edge connectors on these boards are subject to a little oxidation over time and may need periodic cleaning. Front panel controls include sidetone level, CW level, band switch, tuning, meter function switch, and mode switch. Rear panel connections include phone jacks for a 50 ohm antenna, receiver muting, and amplifier keying. A "linear" mode is provided for use with an external amp. In this mode, the receiver is muted continuously during transmit with a selectable amount of delay time being chosen by the operator. The original units had a lot of trouble with key clicks. Eventually, Heath offered a free modification to owners and incorporated the fix into new units. An excellent modification to solve the key click problem is described in the March 1981 issue of *QST* magazine. NOTE: The HX-1681 requires an external power supply such as the HP-23 series. The HX-1861 was a good rig but was not as successful as its companion receiver and was pulled from production a year earlier than the HR-1680. It would have been much more popular had it been fully solid state with an internal power supply. Power requirements: 700-850 VDC at 250 ma (1 percent ripple), 250 VDC at 50 ma (.05 percent ripple), -115 VDC at 10 ma (.5 percent ripple), and 12.6 volts AC or DC at 2.5 amps. Light green front panel with red plastic dial window (illuminated) and a dark green cabinet. Medium rare.

Weight/Size: 16 lbs; 12.75″ wide x 6.75″ high x 12″ deep
Related Products: HR-1680, HS-1661



FROM THE HEATH CATALOG

5 Band HF Linear Amplifier

"Chippewa"

Manufactured: 60-60
Price: $399.96 (amplifier)
$169.95 (power supply)

Comments: This magnificently over-designed amplifier was Heath's first attempt at a linear. Although it was a good enough design and worked well, it was very short lived. Almost as soon as it was released (to favorable reviews), Heath realized that it probably had been a mistake. It was too much of everything. Too big, too heavy, and—most importantly—much too expensive to compete effectively. Almost before the ink on the assembly manual was dry Heath started work to design a more compact and less expensive replacement—the HA-10 (see listing). The KL-1 itself was sold for less than a year, although its companion power supply (the KS-1) was released in June 1959—about six months prior to the KL-1. The KL-1 was designed to match the TX-1 transmitter (see listing) and is the same size and color scheme of the TX-1. The unit covers 80-10 (but not 11) meters and can run class AB1 for SSB or AM (or CW) or class C for CW only. In AB1, the amp can be run with tuned or untuned input circuits depending on how much drive is available. In the tuned configuration drive power may be as low as 10 watts peak. With untuned input at least 60 watts of drive is required. Class C operation requires at least 40 watts of drive. Class AB1 output power is about 900 watts PEP on SSB, about 300 watts on AM, and about 750 watts (class C) CW. The KL-1 uses a pair of 4-400s and 7 other tubes. Features include forced air cooling, quarter inch silver-plated copper tubing in the final tank coil, full metering, and a heavy-duty plate parasitic choke assembly. Front panel controls include main power, meter function, grid bandswitch (selects tuned or untuned input), grid tuning, mode switch, bias, and final loading. There are two front panel meters. One reads plate current; the other may be switched between grid current, screen current, and plate voltage. WARNING: The entire 3000 volts plate supply appears at the meter. Use extreme caution when working in this area. Adjust the meter with an insulated screwdriver only. The KL-1 derives its basic power from the KS-1 power supply. But in spite of its obvious bulk, the KS-1 generates only the 3000 VDC high voltage. Filament voltage for the 4-400s as well as bias voltage are derived onboard the KL-1. All voltage regulation is done onboard the KL-1 as well. In addition to high voltage, the KL-1 also must have a source of 115 VAC for its filament and bias supplies. This 115 VAC comes from the KS-1 via a set of interconnecting cables along with the high voltage. There is also a six-wire control cable between the two units. The KS-1 has wiring options for 115 or 230 VAC input, uses old-style household fuses, has a 60 second time-delay tube to ensure that the 866 rectifiers don't see any high voltage until they have warmed up, and was not supplied with a top enclosure. The KL-1 is exceptionally rare in any condition.

Weight/Size: (KL-1) 70 lbs; 19.5″ wide x 11.5″ high x 16″ deep
Weight/Size: (KS-1) 105 lbs;17.75″ wide x 12″ high x 13″ deep
Related Products: TX-1, RX-1, HX-10, HA-10

5 Band AM/CW/SSB Receiver

"Comanche"

Manufactured: 59-62
Price: $119.95

Comments: The MR-1 and MT-1 are matching rigs designed primarily for mobile operation, although fixed-station use is possible. The MR-1 receiver is an 8 tube, single-conversion superheterodyne design covering 80-10 meters and will receive AM, CW, and SSB signals. No PC boards are used—all wiring is point to point. It uses a crystal lattice filter and has a 3000 kHz IF. Sensitivity was advertised as better than 1 uV on all bands. Selectivity is 3 kHz at 6 dB down, 10 kHz at 60 dB down. It can be used as a mobile or fixed-station radio with the appropriate power supply and is designed for use with either the HP-10 or HP-13 series (for mobile use) or the MP-1, HP-20, or HP-23 series (for 120 VAC use). Features include a noise limiter, AVC, voltage regulation, and an illuminated S-meter, but no built-in speaker. Additional features include a built-in series ANL, front panel selection of fast and slow AVC action, and outputs for an 8 ohm speaker and 500 ohm headphones. Two different detectors are used—a conventional diode type for AM and a product detector for CW and SSB. The MR-1 uses the same gear and pulley tuning mechanism and the same rotating dial drum as are used in the MT-1 (see comments under MT-1) and are as difficult to fix. Check the dial drum for cracks before you buy. Front panel controls include mode selector, RF gain, AF gain/power on/off, noise limiter on/off, AVC on/off selector, main tuning, band switch, BFO tune, and antenna trimmer. Rear panel connections include an SO-239 for a 50 ohm antenna, a phono jack for an 8 ohm speaker (there are no provisions for headphones), and a 6 pin power connector. If desired, power for the MR-1 can be taken from a loop-through mating connector on the MT-1. Power requirements: 6 volts at 4.7 amps or 12 volts at 2.35 amps AC or DC, -125 VDC at 20 ma, 300 VDC at 100 ma, and 500-600 VDC at 150 ma. In 1962 the MR-1 was redesigned to better accommodate SSB operation. The new rig was designated the HR-20 (no Indian name used), but is almost identical in outward appearance. Take care not to confuse them. The reader is referred to the listing for the MT-1 for additional information. The MR-1's paint color is Heath's standard two-tone green. Good clean units are rare.

Weight/Size: 19 lbs; 12.25″ wide x 6.25″ high x 9.25″ deep
Related Products: HX-20, HR-20, MT-1, MP-1, HP-20, HP-23 series, HP-10, HP-13 series, AK-7

5 Band HF Transmitter

"Cheyenne"

Manufactured: 59-62
Price: $99.95

Comments: The MT-1 and MR-1 were Heath's first mobile rigs. They are a matched set designed primarily for mobile use, though fixed-station operation is possible. *QST* reviewers were very impressed with the pair. They noted that in spite of their many features the Cheyenne and Comanche combination required "a mere cubic foot" of space. The MT-1 transmitter is a 7-tube design (including a 6146 PA) covering the entire 80-10 meters bands. No PC boards are used—all wiring is point-to-point. The MT-1 will operate AM or CW (no SSB) with an input power of 90 watts and must be used with one of the following power supplies: the HP-10 or HP-13 series (for mobile use) or the MP-1, HP, 20, or HP-23 series (for 120 VAC use). Features include a built-in VFO with an illuminated slide-rule dial, a controlled carrier modulator, four RF stages, PTT (no VOX) operation, and a spotting function. There are no provisions for crystal control. The front panel meter reads PA grid or plate current. Front panel controls include main tuning, band selector, final tune, final load, drive, audio level, mode selector, spotting, and meter function. Rear panel connections include two 6-pin connectors, which provide connection to the power supply and loop-through power to the receiver. There are also two SO-239s. One is RF out for a 50-75 ohm antenna, and the other connects to the receiver. In addition there is a quarter-inch key jack. The microphone connector is on the right side of the chassis. The main tuning mechanism involves a veritable constellation of gears and pulleys. There are also three sets of right angle gears in the tuning, loading, and bandswitch circuits. As noted elsewhere in this book, repair of these mechanisms presents a sobering challenge. Some Heath advertising said the tuning ratio was 30:1. That is incorrect. The MT-1 (and MR-1) tuning mechanism is smooth but rather coarse—about a 14:1 ratio. That works out to about 35 kHz per turn. Dial markings are printing on a translucent plastic drum that rotates to display band frequencies as the bandswitch is turned. This drum can crack if the unit is subjected to rough handling. Check it carefully before you buy. It would be very difficult (but not impossible) to make a new one if a salvaged drum could not be found. Power requirements: 6 volts at 4.7 amps or 12 volts at 2.35 amps AC or DC, -125 VDC at 20 ma, 300 VDC at 100 ma, and 500-600 VDC at 150 ma. In 1962 the MT-1 was completely redesigned to include SSB operation. The new rig was designated the HX-20 (no Indian name used), but is almost identical to the MT-1 in outward appearance. Take care not to confuse them. The MT-1 is dressed in Heath's standard two-tone green colors. Good clean units are medium rare.

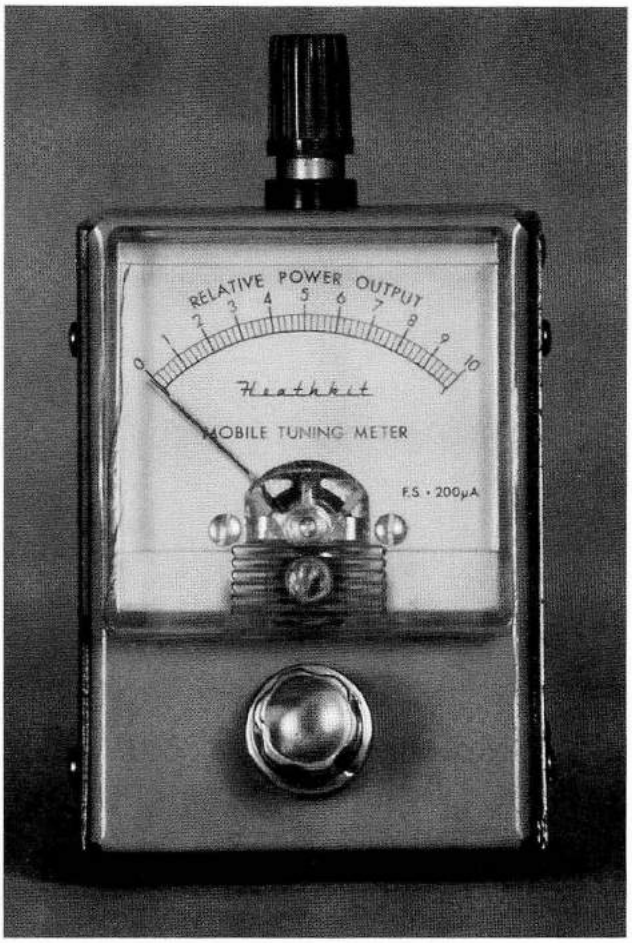
Weight/Size: 23 lbs; 12.25″ wide x 6.25″ high x 9.25″ deep
Related Products: HX-20, HR-20, MR-1, MP-1, HP-20, HP-23 series, HP-10, HP-13 series, AK-7

Field Strength Meter

Manufactured: 58-59
Price: $12.95

Comments: The PM-1 is a simple, self-powered field strength meter, and its design is oddly out of place in Heath's product line. By the time it was released in 1958 Heath was firmly committed to a design that included baked enamel two-tone green paint and metal cabinets. Here then is a small black Bakelite box with a shiny chrome front panel. Heath had used small Bakelite boxes before—but not in its amateur product line. It is not clear why Heath chose this design, but it was used for just under two years before being replacing by the PM-2, which conformed to the basic amateur products design philosophy. It is also the only Heath product to use the oval nameplate sticker seen on the front panel. The panel meter is a Simpson unit and reads relative power on a 0-10 scale with the Heathkit name. Very rare.

Weight/Size: 1 lb; 6.25″ wide x 3.75″ high x 2″ deep
Related Products: PM-2, HD-1426

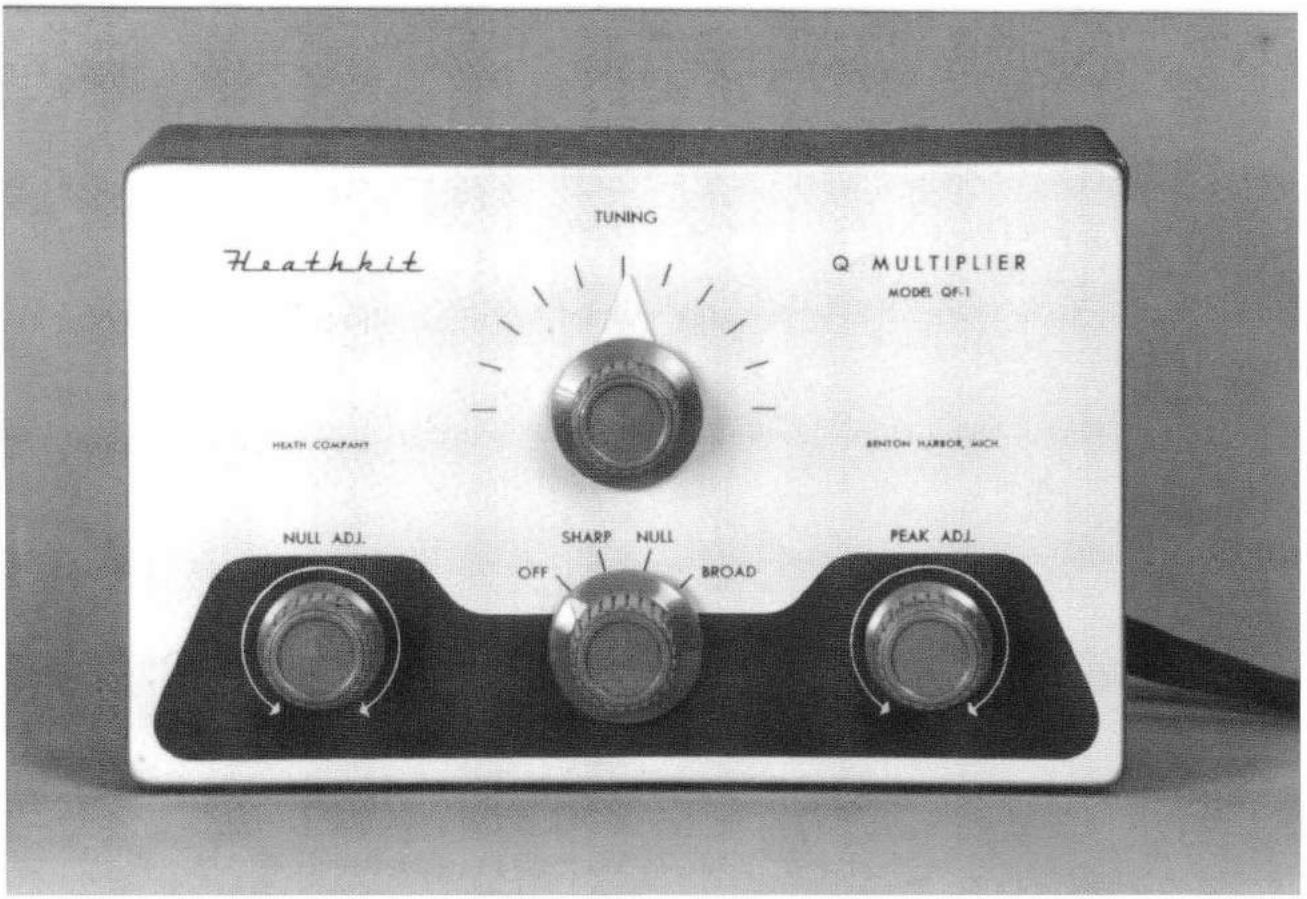


Field Strength Meter

Manufactured: 60-75
Price: $17.95

Comments: The PM-2 is a simple, self-powered field strength meter. It features a magnetic base to hold it down and has a working range from 100 kHz to 250 MHz with .3 volts (not microvolts) RMS sensitivity. It was sold for 15 years and originally cost $12.95. Toward the end of its production life, it seemed increasingly anachronistic. For example, it was odd to see it being sold side-by-side with the SB-104. Its two-tone green design and sloping cabinet match the HD-20 crystal calibrator. Early units used metal knobs while later ones used a small gray plastic knob of the style used on the AC-1 (see listing.) Collect both and have a nice pair. Rare.

Weight/Size: 1 lb; 2.5″ wide x 4.25″ high x 2.75″ deep
Related Products: PM-1, HD-20, HD-1426



Q Multiplier

Manufactured: 56-60
Price: $9.95

Comments: The QF-1 was Heath's first Q-multiplier and was designed for use with the "AR" series receivers, though it will work with any receiver having an IF between 450 and 460 kHz. Designed around a single 12AX7, the QF-1 has no internal power supply and takes its power from the receiver to which it is connected (or some other external power source). Note that the QF-1 will not work with AC/DC type (transformerless) radios. The unit uses special high-Q shielded coils to achieve an effective Q of about 4000. Front panel controls include peak, null, mode, and tuning. The tuning control has a 14:1 turns ratio for easy adjustment. The QF-1 uses the same dark gray knobs used on the DX-20, 35, and 40. Note that there are no skirts on the NULL or PEAK knobs. There are two cables coming out the back panel of the QF-1. One is for connection to the receiver IF and the other has an octal plug for power input. This plug is compatible with octal sockets on the back of the AR series receivers, but it would be worth the time to check the wiring to be sure before you plug it in—just in case someone has done a modification. The QF-1 was on the market for about four years, worked very well, and was very successful. Power requirements: 150-250 VDC at 2 ma and 6.3 volts AC or DC at 300 ma. In 1961 Heath updated the QF-1 and fitted it with an internal power supply. The new unit was designated as the HD-11 (see listing). Still later the HD-11 was updated and became the GD-125 (see listing). Through all of these updates, the basic circuit never changed. The QF-1 uses the silver and gray colors of the DX-100, et al. The QF-1 is still fairly common at flea markets, though clean units in good condition are seen a bit less often.

Weight/Size: 3 lbs; 7.25″ wide x 4.75″ high x 4.25″ deep
Related Products: HD-11, GD-125, AM-2, HD-19, etc.

7 Band SSB/AM/CW Receiver

"Mohawk"

Manufactured: 58-64
Price: $274.95

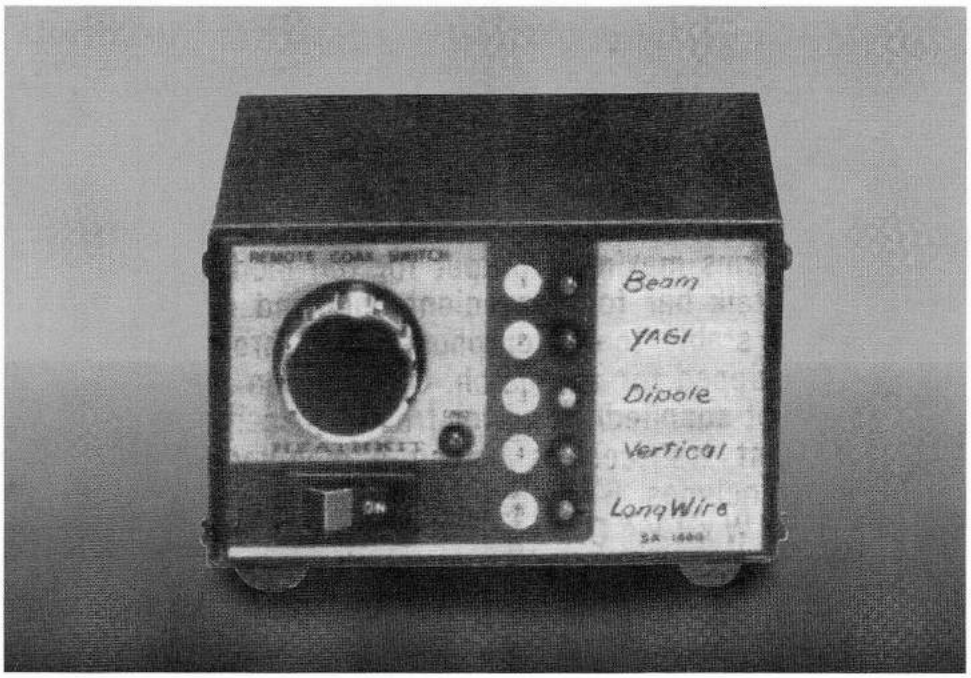
Comments: The RX-1 was Heath's first "ham band only" receiver and was one of the very first kit-form communications receivers on the market. The RX-1 is designed as a companion to the TX-1 (Apache) transmitter (see listing), and at first glance the two units are almost indistinguishable from each other. These two rigs were the first Heathkits to wear the famous green colors—a color scheme that would last nearly all of Heath's amateur radio life. The RX-1 is typical of equipment designed in the 1950s: it is built on a heavy gauge steel chassis and has a heavy aluminum front panel and a heavy steel enclosure. The operative word here is "heavy." It weighs 52 pounds on the bench. The unit is designed around 15 tubes and will receive upper and lower sideband as well as AM and CW. It covers from 160 through 10 meters (including 11 meters) and has a separate band position and dial markings for 6 and 2 meter coverage (with optional converters). Features include a built-in power supply, 5 switchable selectivity settings, a tunable notch filter, a built-in illuminated S-meter, and a 100 kHz crystal calibrator. The receiver is a double conversion superheterodyne type with a first IF of 1682 kHz and a second IF of 50 kHz. The front end section, which includes the bandswitching, RF, HF oscillator, and mixer stages, was preassembled, tested, and aligned at the factory. This "sub chassis" is simply attached to the main chassis with a few screws and connected by a few plug-in cables. The pre-assembled front-end greatly simplified construction and tune-up. In fact, the tune-up can be done with nothing more than the RX-1's S-meter and crystal calibrator. Other wiring is simplified by a wiring harness. Sensitivity is better than 1 uV. Selectivity can be adjusted in five steps—5, 3, 2, 1, and .5 kHz. The notch filter has a depth of 50 dB. Stability was never specified by Heath, but has been found experientially to be as good or better than most rigs of the genre. The front panel pro-

vides controls for RF, IF and AF gain (with power switch), notch tuning, notch depth, ANL, AVC, BFO, and the bandswitch. Additionally there are controls for main tuning, calibrator set, calibrator on/off, antenna trimmer, receive/standby, mode, and selectivity. There is also a standard quarter-inch headphone jack on the front panel. The rear panel has an SO-239 connector for a 50-75 ohm antenna and screw terminals for 50-75 ohm or 150-300 ohm antenna. There are also screw terminals for 8 ohm and 500 ohm audio output. CAUTION: Do not operate the receiver without a speaker or headphones connected. An octal accessory socket provide access to B+, 6.3 VAC, AVC, and receiver muting. In addition there is a rear panel switched 120 VAC receptacle and a 1.5 amp cartridge fuse. The dial mechanism is another of Heath's gear and pulley assemblies and uses a rotating drum with markings for each band. This drum is illuminated and rotates as the bandswitch is turned. The drum is plastic and can crack with rough handling. Be sure to check it before you buy. The RX-1 is designed for 120 VAC, 50/60 Hz operation. The unit has a two-tone green front panel with darker green copper clad cabinet. Early RX-1s were shipped with satin finish aluminum knobs, while later versions used polished knobs. Heath sold the RX-1 for about seven years, and although thousands were sold, few remain. In 1963 the RX-1 was replaced by the sleek SB-300—patterned after the Collins S line. Heath continued to sell the RX-1 until supplies ran out early in 1964. Clean RX-1s in good working order are medium rare.

Weight/Size: 66 lbs; 19.5″ wide x 11.75″ high x 16″ deep

Related Products: TX-1, HX-10, KL-1, HA-10, AK-5

FROM THE HEATH CATALOG



FROM THE HEATH CATALOG

Remote Antenna Switch

Manufactured: 79-84
Price: $84.95

Comments: This was the first of two remote antenna switches made by Heath—and probably the better of the two units. The SA-1480 will remotely switch up to five antennae from a control box in your shack. The actual switch box—typically tower mounted—is connected to the control box via a length of 8 conductor cable. A rotary switch selects which antenna will be placed on-line, and five LEDs show which antenna has been selected. The 8 conductor cable may sound like a disadvantage compared to Heath's later version, the HD-1481 (see listing), which sent switching signals through the coax line, but the separate switching cable made the unit immune from damage by high SWR, EMP, and so on. As a result the SA-1480 is more coveted than the HD-1481. The SA-1480 can be used with signals to 150 MHz and with 50-70 ohm lines. Insertion loss is less than 2 dB at 100 MHz. The switch is rated for "full power" operation. Features include a special shielded, weatherproof switch housing and silver plated switch contacts. In 1984 the SA-1480 was replaced by the HD-1481, but the two units were sold side by side for a short time. This is a well made unit and it is still in high demand. As a result they doesn't last long at flea markets. Medium rare as most are still in use.

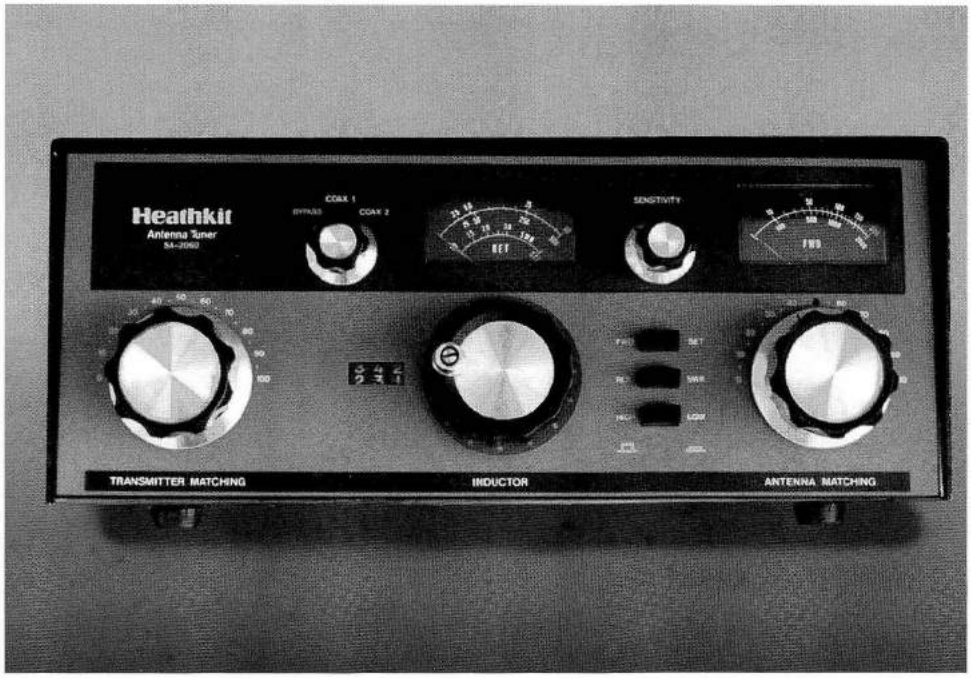
Weight/Size: 8 lbs; 5.25″ wide x 3.5″ high x 5.25″ deep
Related Products: HD-1481

Antenna Tuner

Manufactured: 79-83
Price: $149.95

Comments: The SA-2040 was the second in a series of antenna tuners but was the first in a very long time. The AC-1 was actually Heath's first antenna tuner—made from 1953 to 1956 and deigned for use with the AT-1. See listings for AT-1 and AC-1. Heath didn't make another tuner until the SA-2040 in 1979. It is not clear why such an obvious product was overlooked for so many years. At any rate, the SA-2040 is a well designed tuner and was very popular. Like most tuners, there isn't much inside—a couple of large air variables, a roller inductor, and a balun. Features include continuous tuning from 3.5 to 30 MHz, silver-plated straps and roller contacts, large ceramic feed-throughs, balanced and unbalanced output, and wide range output impedance. Other features include a continuously variable roller inductor with a mechanical turns counter, a 4:1 balun, and an erasable front panel on which you can write notes for quick adjustment of the tuner on various bands. The SA-2040 is ideal for WARC operation, is rated for 2000 watts PEP and 1000 watts CW input, and has an input impedance of 50 ohms. Rear panel connections include SO-239s for RF in and out and ceramic standoffs for connection to balanced lines or a random wire. NOTE: When adjusting the inductor take care that you do not adjust it too far and run the roller off the end of the coil—there is no "stop" to prevent this. This is not fatal but is very inconvenient. The SA-2040 is built on a copper plated steel chassis with a light green front panel and the black cabinet. These are popular and many are still in use. Medium rare.

Weight/Size: 15 lbs; 14.75″ wide x 5.75″ high x 14″ deep
Related Products: SA-2060(A), SA-2500



Antenna Tuner

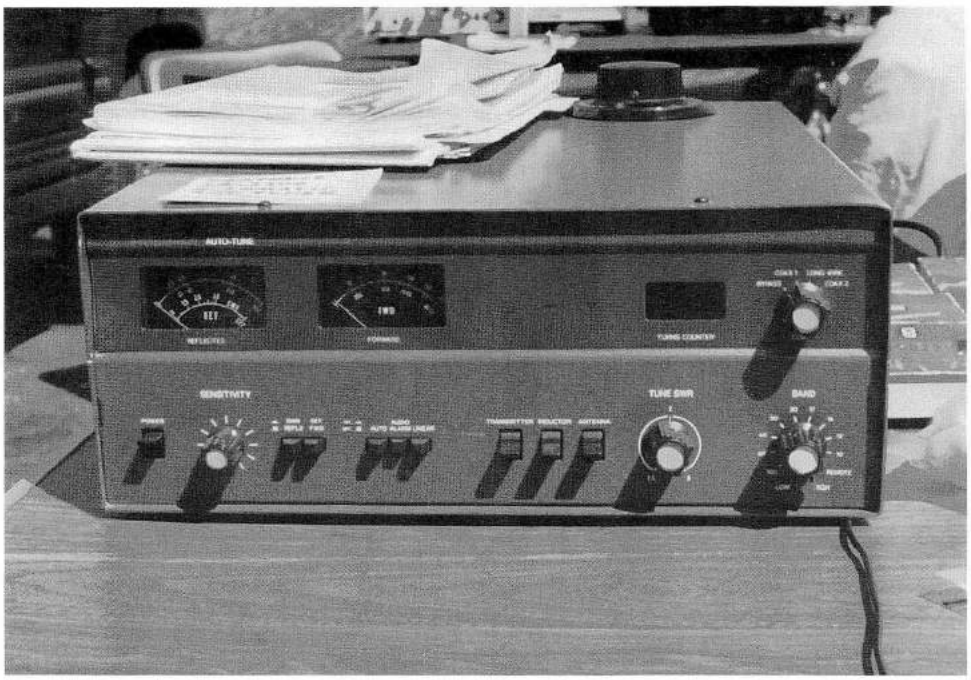
Manufactured/Price

SA-2060	**81-83**	**259.95**
SA-2060A	**83-91**	**279.95**

Comments: The SA-2060 and SA-2060A are the same basic tuners as the SA-2040 (there was no SA-2050), to which a number of additional features have been added. (Refer to listing for SA-2040 for basic specifications.) The most obvious of these additional features is the dual wattmeter and SWR bridge. The wattmeter reads 0-200 and 0-2000 watts forward and 0-50 and 0-500 watts reflected with 5 percent accuracy. The wattmeter/SWR sensor is factory assembled and calibrated. Other added features include an extension of the tuning range—the SA-2060 will cover down to 1.8 MHz. Front panel controls include transmitter match, inductor, antenna matching, SWR sensitivity, and a switch to select one of two coaxial lines or a bypass (to a dummy load or resonant antenna, for example). Three front panel push buttons control the operation of the wattmeter. Rear panel connections include an SO-239 input connector and three SO-239 outputs (coax 1, 2, and bypass). There are also three standoffs for use with a balanced line or random wire (not both). The major difference between the SA-2060 and the 2060A is the way the antennas are selected. When you use the SA-2060 with a random wire or balanced line you *must* have an open output at one of the two coaxial line connectors. Otherwise you will have two antennas connected at once. This precaution is not necessary with the 2060A. The styling was also changed in the A version. The black cabinet and light green front panel was changed to a two-tone brown to match the SS-9000 transceiver. SS-9000 style knobs also replace the familiar SB style knobs of the 2060. However, Heath also added a position to the front panel antenna selector switch to enable the selection of a longwire or balanced line as well as the coaxial lines. There are no additional connectors on the rear panel. NOTE: When adjusting the inductor take care that you do not adjust it too far and run the roller off the end of the coil—there is no "stop" to prevent this. This is not fatal but is very inconvenient. These tuners are well designed and do a nice job. They are still in demand and sell quickly at flea markets. As a result of their demand SA-2060s (and especially 2060As) are scarce.

Weight/Size: 15 lbs; 14.75″ wide x 5.75″ high x 14″ deep

Related Products: SA-2040, SA-2500

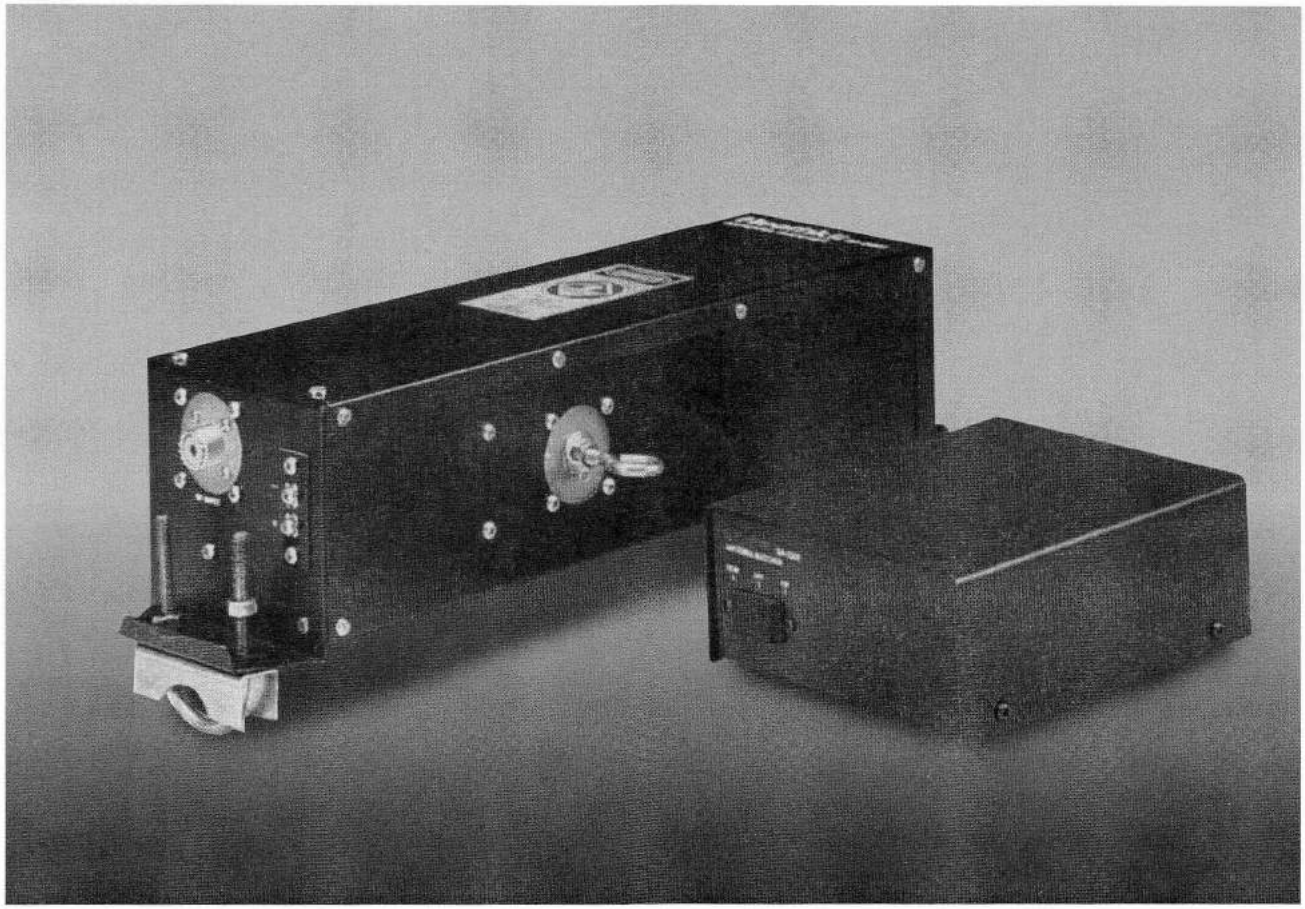


Automatic Antenna Tuner

Manufactured: 84-87
Price: $599.95

Comments: The SA-2500 contains the same basic tuner design found in the SA-2040 and SA-2060(A) (see listings). But in the 2500, the capacitors and the inductor are motor driven and are controlled by an electronics package (on two PC boards) that senses minimum SWR. The specifications of the SA-2500 are the same as the SA-2060(A)—it tunes from 1.8 to 30 MHz and has a dual wattmeter and SWR bridge that reads from 0 to 200 or 0 to 2000 forward and 0-50 or 0-500 reflected; however, in the 2500 the wattmeter is auto-ranging. The mechanical turns counter of the 2060 has been replaced with an electronic digital readout in the 2500, and status lights have been added to indicated what elements of the tuner are being adjusted. There is also an audio warning that indicates when the tuned SWR exceeds a user preset level. The 4:1 balun found as standard equipment in the SA-2040 and 2060(A) units is offered in the 2500 as an *option*. The presence of the balun can be determined by checking the back panel for the number of standoff insulator connections. If three standoffs are seen, the balun is installed. If only one is seen, no balun is present. The balun is really a must for the serious operator and is required for use with balanced lines. A front panel switch selects between three antennas and a bypass position (for use with a dummy load or resonant antenna). Manual operation of the tuner is possible with three spring-return lever switches—one for each element in the tuner. NOTE: When adjusting the inductor take care that you do not adjust it too far and run the roller off the end of the coil—there is no "stop" to prevent this. This is not fatal but is very inconvenient. As the roller on the inductor takes about a 90 seconds to make the trip from one end to the other, 18 preset positions (2 for each of 9 bands) are provided to speed the tuning process. These preset positions are user selectable and can be reconfigured at any time. Additionally, you can assign more than two presets to one band if desired. Front panel controls include power on/off, SWR sensitivity adjust, SWR forward/reverse, auto/manual tune, SWR alarm on/off, linear amp on-line/off-line, and manual tuning controls. There are also controls for band, band high/low preset select, and antenna select. Rear panel connections include an SO-239 input connector and three SO-239 outputs (coax 1, 2, and bypass). Standoff feed-throughs are used with a random wire and balenced lines (if the balun is installed). Other rear panel connectors include 12 VDC power, antenna relay (to disable your linear when tuning), and remote bandswitching (if your transmitter can support it). Automatic tuning time is about 15 seconds. The auto-tuning system requires a minimum of 35 watts input for proper SWR set. The SA-2500 is two-tone brown in color (to match the SS-9000). Power requirements: 120 VAC, 50/60 Hz, or 12 VDC at 1 amp. The SA-2500 works very well, but sales were held down because the $600 price tag was fairly steep for many operators. As a result you rarely see these at flea markets.

Weight/Size: 26 lbs; 14.5″ wide x 6.75″ high x 20″ deep
Related Products: SA-2040, SA-2060(A)



FROM THE HEATH CATALOG

Antenna Matcher

Manufactured: 86-88
Price: $149.95

Comments: It is important to note that the SA-2550 is not a "tuner." It is a "matcher" designed specifically for use with single or multi-band half-wave dipoles, inverted-Vs, and quarter-wave vertical antennas. It is not for use with 50 ohm beams, random wires, or balanced feed line antennas. The SA-2550 allows you to effectively double the bandwidth of your dipole so you can work the phone or CW end of the band from a single antenna while maintaining a low SWR. The unit will operate with antennas from 1.8 to 30 MHz and is rated for full legal power. To use the SA-2550 to its fullest requires you to lengthen your existing half-wave dipoles, inverted-V, or quarter-wave vertical by 5 to 15 percent, depending on the frequency. The control unit contains a simple switching circuit, and the remote unit contains a motor-driven high voltage variable capacitor. The SA-2550 is designed for power cube operation (15 VDC at 1 amp). The remote unit takes the place of the center insulator in your dipole or inverted-V, or can feed the base of your quarter-wave vertical. The remote unit can be controlled either through the coax cable or from a two-wire cable connection. The SA-2550 has no built-in SWR indicator and proper operation requires an external dual wattmeter or SWR bridge. The 2550's brown color matches the "Little Brown Box" series. Very rare.

Weight/Size: 2 lbs; 5.5″ wide x 2.5″ high x 4″ deep (control unit)
Weight/Size: 8 lbs; 8″ wide x 16.5″ high x 4″ deep (remote unit)
Related Products: none

Electronic Keyer

"uMatic"

Manufactured/Price:

SA-5010	**81-85**	**$99.95**
SA-5010A	**85-91**	**$?**

Comments: Although the SA-5010(A) replaced Heath's older (and very popular) HD-1410 keyer and was (and still is) very popular in its own right, the two keyers sold side by side for about 3 years. In a nutshell, the SA-5010(A) is a microprocessor controlled keyer with just about every feature you might imagine. One rather unusual feature is the paddle assembly. Unlike other paddles of other keyers, the paddles of the SA-5010(A) do not move. Instead they use touch-sensitive electronics to operate the keyer circuits. For many ops this will require some getting used to. The speed is user selectable from 1 to 99 WPM, and the keyer is iambic in operation. The uMatic (pronounced "micromatic") keyer can store up to 240 characters in up to 10 CMOS memories. Since the memories are "soft-sectored" the operator can store as many or as few characters in each memory as desired without wasting space. In addition to sendable characters, the memories can also hold "command strings." These may be used, for example, to insert a pause into which the op can manually send an RST, to tell the keyer to change speed, or to link two or more memories together, to name only a few applications. In addition, each memory message can automatically be sent up to 9 times. The keyer is also capable of inserting serial numbers that are automatically incremented. A clever operator could program the SA-5010(A) in such a way that an entire simple QSO could be made simply by pushing buttons. The SA-5010(A) also can send code practice sessions. The user can specify letters only, letters and numbers, or letters, numbers, and punctuation. Groups in these sessions are of random length. Over 6,000 practice sequences are available, so you don't have to worry about memorizing them, but they are repeatable to allow for checking your copy. The practice sessions operate the keyer output so they could be transmitted if desired. When not connected to a power source the keyer memories are retained by three "watch" type batteries (Eveready A76 or equivalent). Typical battery life is one year. There is no battery drain unless the keyer is removed from its power source. Virtually all operating parameters can be changed from the 22-key pad. When turned off the SA-5010(A) remembers the last configuration used. A diagnostic program is run each time the power is turned on. If the diagnostic fails, all the LEDs light and the sidetone sounds continuously. The paddles, which can be reversed (from the keypad) for left-hand operation, are detachable and can be stored in a drawer on the underside of the unit. Although basic operation of the uMatic is intuitive and simple instructions are printed on

the underside, the manual will be essential to an understanding of the more complex operations. Sidetone volume and pitch as well as separate right-and left-paddle sensitivity can be changed from access holes on the underside. The rear panel contains two keying jacks. One is for positive keying (250 volts at 100 ma), and the other is for negative keying (-200 volts at 40 ma). These jacks are protected and will key the transmitter continuously if the wrong one is used. NOTE: Use coaxial cable between the keyer and the transmitter. There is also a miniature phone jack for headphones, a 4-pin connector for an external paddle, and a power jack. The SA-5010(A) has a built-in full wave bridge rectifier allowing it to run from either an AC or DC source. Power requirements: 11-16 VDC at 200 ma (polarity not critical) or 8.5 VAC at 1 amp. The membrane keypad is attached to the keyer with self-stick backing and, over time, can begin to peel off, especially on the paddle end where the ribbon connector cable is attached. This condition is fixable with the careful application of a variety of adhesives. Because the uMatic uses CMOS chips it is subject to damage by static electricity—static sparks from your fingers touching the paddles, for example. Since the microprocessor (a 3870) is custom-made for the unit, a replacement could be very difficult to find. Early versions were plagued by static damage problems. The A version is more immune but both should be treated carefully with respect to static. It is not uncommon to find these keyers with factory repair labels on the bottom. The SA-5010 had a number of minor glitches including being bothered by stray RF from the transmitter. This could cause the unit to send random dots or dashes. Most of these problems were cleaned up in the 5010A. Units are occasionally seen with home brew paddles. The paddles are removable and can be stored in a draw that pulls out of the back. The SA-5010 has a beige case. The A version is gray. Medium rare.

Weight/Size: 3 lbs; 4.25″ wide x 1.75″ high x 6″ deep
Related Products: HD-10, HD-1410, HD-8999

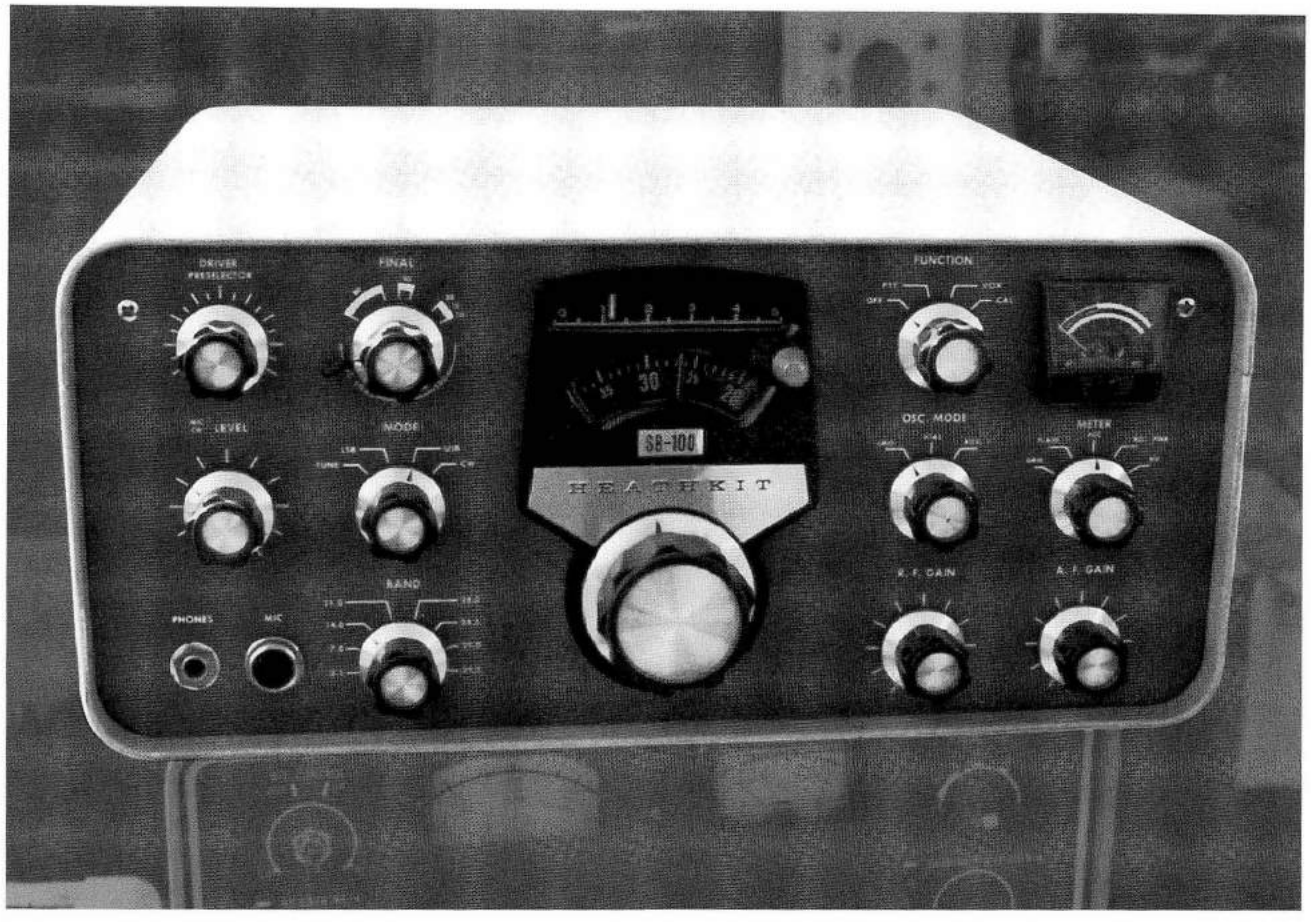
FROM THE HEATH CATALOG

Sideband Adaptor

Manufactured: 59-64
Price: $89.95

Comments: The earliest references to the SB-10 can be found in some DX-100 manuals, where the unit is referred to as the DX-10. The unit was originally deigned to be used with the DX-100 but because of significant delays in engineering the DX-10, it was renamed and restyled to match the TX-1 when work on that transmitter began. As a result the DX-10 never materialized. The SB-10 is a phasing type SSB generator designed to work with the TX-1, but with a simple modification of the transmitter, the SB-10 can be used with the DX-100 and 100B and almost any other similar transmitter. The SB-10 uses nine tubes and is placed in the transmitter's RF path between the driver and the final amplifier. It requires about three watts of drive, delivers about 10 watts of output, and will provide USB, LSB, or DSB—all with or without carrier. It covers 80-10 meters and is broadband in design so that once tuned for a given band it need not be re-adjusted after normal excursions in frequency within that band. The RF phase shifting is accomplished by a set of precision capacitors in an RC network. A separate set is used for each band. The audio phase shift network is a preassembled and wired, sealed plug-in unit made by B & W. Features include a front panel meter indicating relative power output and is used both in tuning and carrier suppression. There is also a built-in VOX circuit. Front panel controls include carrier null controls, bandswitch, mode selector, balanced modulator tuning, RF output tuning, audio gain, and VOX/standby/manual selector. There is also a front panel connector for a high impedance mic. Controls on the rear panel labeled "transmitter sensitivity" and "receiver sensitivity" are for VOX sensitivity and anti-trip. The rear panel also has SO-239 connectors for RF input and output, an octal socket for power input, and screw terminals providing connection for receiver audio, speaker, key, and antenna relay. Since the SB-10 has no internal power supply all voltages must be derived from the transmitter to which it is connected or some other external source. When used with the TX-1 all necessary power may be taken from the transmitter's accessory socket. Power requirements: 350 VDC at 140 ma and 6.3 VAC at 3.5 amps. The SB-10's two-tone green paint scheme matches the TX-1, et al. Early units were supplied with satin finish metal knobs while later versions used polished knobs. The SB-10 was sold for about five years and works pretty well. SB-10s are becoming quite rare—especially in good, unmodified condition.

Weight/Size: 12 lbs; 6.75″ wide x 10″ high x 13″ deep
Related Products: TX-1, DX-100(B)



FROM THE COLLECTION OF PAUL MARCH.

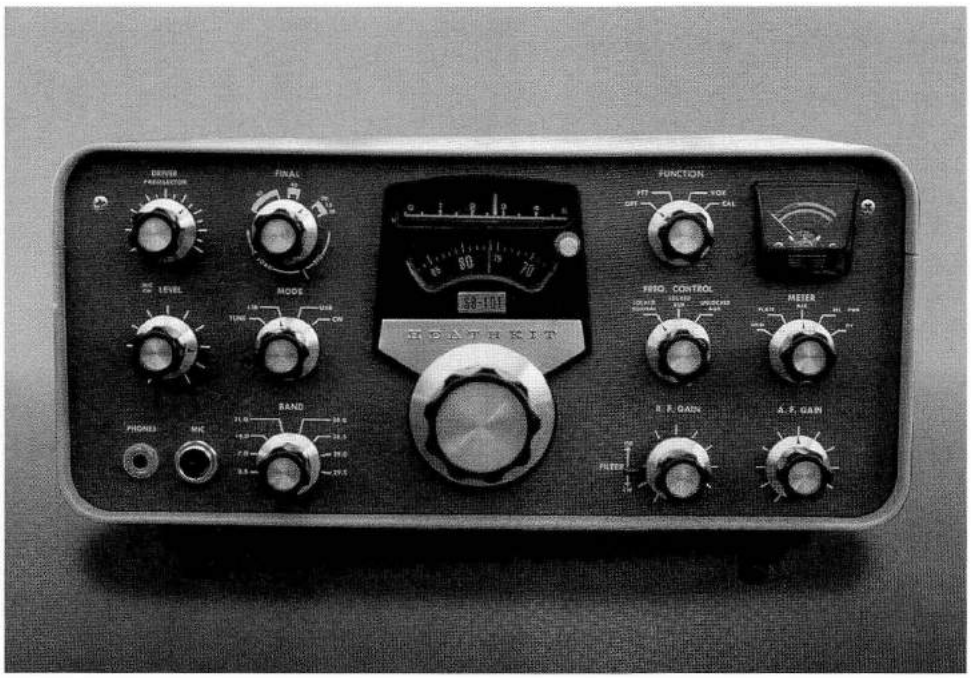
5 Band SSB/CW Transceiver

Manufactured: 65-67
Price: $360

Comments: Introduced for Christmas in 1965, the SB-100 was the first of three enormously popular transceivers that included the SB-101 and SB-102. Patterned after the Collins KWM-2, the SB series of transceivers were among the most popular ever made by any manufacturer. They sold so fast Heath could hardly keep up with demand. Indeed, for a while in the late 60s it seemed as though every other person you worked was running a "Sugar Baker" series rig. The following is both a specific discussion of the SB-100 and a general discussion of the SB-101 and 102—there are many similarities. For a specific discussion of the differences in the 101 and 102, see listings for those products. The SB-100 uses 20 tubes including a pair of 6146s in the final amp and is built on nine PC boards including five main boards and four smaller "switchboards" used in the bandswitching assembly. The SB-100 covers 500 kHz portions of the 80-10 meter bands. The 10 meter band is covered in four 500 kHz segments. The 100 operates USB, LSB, or CW, with no provision for AM. Transmitter input power is 180 PEP and 170 CW. RF output power is around 100 watts (a bit less on 10 meters). The receiver is a dual conversion superheterodyne type with an IF of 3395 kHz. Both transmitter and receiver use a 6 pole crystal lattice filter. Selectivity is 2.1 kHz at 6 dB down. There is no provision for a CW filter (although there is in the 101 and 102). Receiver sensitivity is rated at 1 uV (better in the 101 and 102). Drift is less than 100 Hz per hour after a 20-minute warm-up. The SB-100 uses a type of VFO Heath called the "LMO" or Linear Master Oscillator. The LMO is pre-assembled and aligned and housed in a sealed box, and came with a stern warning not to open it. The LMOs were made for Heath by several subcontractors including TRW and were both complicated and expensive to produce. But they were linear from one end of the band to the other and were cheaper to make and use than the Permeability Tuned Oscillators used by Collins. The LMO is accurate to 400 Hz after cal-

ibration from the nearest 100 kHz point. The dial drive mechanism is relatively simple, has a good feel and good resetability, and is reasonably free from backlash. Basic features include PTT and VOX operation, LMO or crystal controlled transmit or transceiver (one crystal position), built-in TR switching, and a built-in 100 kHz crystal calibrator. See listing for SB-640 for crystal frequency formula for crystal controlled operation. Front panel controls include main tuning, driver tuning and preselector, final tuning, final loading, mic and CW level, mode, band, function, frequency control (XTAL or LMO), meter function, RF gain, AF gain, and a dial calibration knob. The illuminated panel meter will read ALC/S-units, relative power, high voltage, grid current, and plate current. Internal controls include VOX sensitivity, delay and anti-trip, carrier null (control and capacitor), meter zero, CW sidetone level, relative power meter adjust, PA bias, headphone gain, and neutralizing. Rear panel connections include quarter-inch key jack and phono connectors for an eight ohm speaker, 600 ohm output, phone patch input, ALC input, RF output, and receiver antenna input. There is also an 11 pin "octal style" plug for power input and an antenna selector switch to select separate or common antennae for transmit and receive. Many of these rigs have been modified and fitted with an SO-239 to replace the phono RF output connector. Other acceptable modifications include the installation of phono jacks needed to operate the SB-650 frequency display and addition (or use) of spare jacks to support the SB-610 and/or SB-620. The SB-100, SB-101, and HW-100, as well as SB-102s with the last four digits of the serial number lower than 5446, have a minor problem with the driver preselector peaking in a slightly different spot for transmit and receive. To make them peak in the same place Heath offered a simple mod (much simpler than the one described in *QST*). The presence of this mod can be determined by checking for a three lug terminal strip soldered to one of the shields between two of the small PC boards in the bandswitch assembly. It should be noted that this preselector problem is *very* minor and most ops don't bother fixing it. Units with other modifications should be avoided except for parts. NOTE: Because of mechanical changes in the SB-102's solid state LMO, it is not possible to retrofit an SB-100 or 101 with an LMO from a 102. The 100 series of transceivers has no built-in power supply and is designed for use with the HP-13 and HP-23 series power supplies. Power requirements: 700-800 VDC at 250 ma, 300 VDC at 1509 ma, -110 VDC at 10 ma, and 12 volts AC or DC at 4.76 amps. The SB series of products all use a two-tone green wrinkle paint scheme. The paint color and texture varied from batch to batch and from year to year, so finding two SB units of the exact same paint shade and texture may not be easy. By the time the SB-102 was released in 1970, Heath had developed a full line of accessories for the SB line, and no SB series station is complete without all of them. These include the SB-2XX series of amplifiers and the SB-6XX series of accessories and are listed elsewhere in this book—see related products below. Together with the SB transceivers they created a high performance station without equal in the hobby. Once common, SB-100s are now quite rare—especially in good condition.

Weight/Size: 23 lbs; 15″ wide x 6.75″ high x 14″ deep
Related Products: SB-101, SB-102, SB-200(201), SB-220(221), SB-300(301), SB-303, SB-310, SB-313, SB-400(401), SB-600, SB-610, SB-620, SB-630, SB-640, SB-500, SB-650



5 Band SSB/CW Transceiver

Manufactured: 67-70
Price: $380

Comments: In 1967 Heath upgraded the popular SB-100 transceiver and renamed it the SB-101. There were two significant improvements in the SB-101. The first was the addition of a 400 Hz CW filter OPTION. If this filter was installed the operator could select either the SSB or CW filter from a switch on the front panel. Heath advertised that the SB-101 was "the first transceiver on the market with front panel selection of SSB or CW filters." The filter selector switch is a small lever switch located concentrically under the RF gain control. The presence of the CW filter can most easily be determined by removing the SB-101 from its enclosure. The SSB and CW filters are mounted on a metal bracket located on the underside of the chassis at the front of transceiver. Both filters are small black rectangular boxes about 2.5 inches wide and are installed side by side. If two boxes are seen, the CW filter is installed. The CW filter is usually clearly marked as being a 400 Hz unit. The other improvement was a change in the frequency control switch permitting the use of an external LMO (VFO). This gave the operator independent control of the transmit and receive frequencies. Although the switch position is provided for, actual use of the remote LMO (the SB-640) required a modification of the transceiver. Among other things it requires the removal of a rectangular knock-out on the rear of the enclosure (above the ground post), the installation of a connector and its mounting bracket on the chassis just behind the knock-out, and some wiring changes. Inspection to determine the presence of the connector is the easiest way to see if the rig has been modified for use with the SB-640. NOTE: The modification for the SB-102 is slightly different—see listing for SB-102 for details. Also see the listing for SB-640 for additional details. A minor change to the SB-101 was the addition of two "spare" phono jacks on the rear panel. These jacks can be used for connection of the SB-610 or SB-620. After the release of the SB-102 owners of the SB-101 were offered an upgrade kit (for a small charge). This upgrade kit addressed only one of the improvements found in the SB-102—receiver sensitivity. The kit amounted to a new RF amplifier tube (6HS6 replaces a 6AU6) and a couple of new parts. Checking for the presence of this mod is a bit tricky. All of the changes made are made to the component side of the RF driver circuit board. This board sits directly in front of the final amplifier cage. Look between tubes V10 and V11 (these are the tubes on the right-hand side of the board) for the addition of a resistor and a small disk capacitor that have been tack soldered between other existing parts. Also look for the space left by a disk capacitor clipped out near V10. These changes indicate that the mod has been done. Note that 6HS6 tubes are *very* rare today and may have been replaced by a 6AU6. The 101 is painted with the classic SB two-tone green paint. For additional information see listing for SB-100. Also see related products listed under SB-100. SB-101s are much more common than SB-100s and turn up at flea markets with some regularity.

Weight/Size: 23 lbs; 15″ wide x 6.75″ high x 14″ deep
Related Products: see related products listed under SB-100

5 Band SSB/CW Transceiver

Manufactured: 70-75
Price: $380

Comments: The SB-102 was the most successful of the SB series of transceivers and was the last of Heath's classic vacuum tube rigs. The introduction of the SB-102 in 1970 marked the peak of Heath's success, and when it was pulled from production six years later, it marked the closing of an era which began in 1963—the solid-state SB-104 could never match the grandeur of the elegant and venerable 102. The SB-102 has all of the features found in the 101 and adds three major improvements. The first was the replacement of the tube-type LMO with a solid state unit, which dramatically improved the stability of the rig. This meant that the 102 has only 19 tubes. The second improvement is to the receiver's sensitivity. The SB-100 and 101 have a sensitivity of about 1 uV. The SB-102 is better than .35 uV. This is due primarily to the use of a 6HS6 in the RF amplifier instead of a 6AU6. Note that 6HS6 tubes are very rare today; in any given SB-102 this tube may have been replaced with a 6AU6, which will degrade the 102's sensitivity. But unless you can locate a 6HS6 you'll have to make do. The third improvement was the addition of an accessory jack for use with the SB-500 transverter. This jack is installed, wired, and ready for use. Like the 101, the 102 must be modified for use with the SB-640 remote LMO. The modification is the same as on the 101, but it will mean placing a second accessory jack below the existing jack used by the SB-500. Look for the knock-out panel on the rear of the enclosure (just above the ground post). If it has been removed, check for two jacks just inside the opening. If two are present, the mod for the 640 has been done. The top jack is for the SB-500 and the bottom one is for the SB-640. SB-102s with serial numbers whose last four digits are lower than 5446 have a minor problem with the driver preselector. See listing for SB-100 for details. The SB-102 was one of Heath's finest products. It is dressed in classic two-tone green. SB-102s are still fairly common at flea markets.

Weight/Size: 23 lbs; 15″ wide x 6.75″ high x 14″ deep
Related Products: see related products under SB-100

5 Band SSB/CW Transceiver

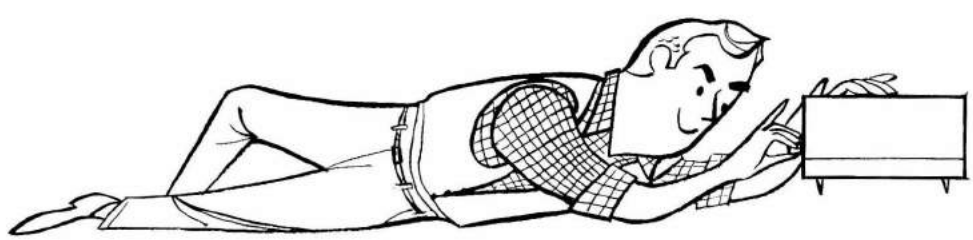
Manufactured/Price:
SB-104 74-77 $699.95
SB-104A 77-82 $699.95

Comments: The SB-103 was to be a solid-state version of the SB-102—solid-state except for the final amplifier, which would have used a pair of 6146s. A prototype of the 103 was built, but never made it out of the lab when it was decided that solid-state finals would be a better idea. The result was the SB-104—Heath's first solid-state HF rig and its first real disaster. The SB-104 uses both digital and broadband techniques—two concepts that were relatively new and unfamiliar to Heath. What Heath ended up with was a radio fraught with problems. The receiver was full of birdies; the transmitter was dirty; the final transistors would not take a high SWR, not even briefly; the CW waveform was much too abrupt; TR switching wasn't clean; the digital display had the jitters; and the list goes on and on. After four years of re-engineering and many modifications, most (but not all) of these problems were solved with the release of the SB-104A. A modification kit was offered to owners of the 104 to upgrade their units to the 104A. Most of the changes made in the modification kit are board-level parts changes and are not easily detected with casual inspection. The upgrade kit included a new front panel trim strip that was screened with "SB-104A" and a new blue and white stick-on serial plate with the new model number. These make it difficult to tell a modified 104 from a genuine 104A—the preferred unit. If the unit you are looking at has two blue-and-white serial plates, it is an upgraded unit. In later versions of the 104A, Heath began to ship the transceiver with some of the more critical PC boards pre-assembled and aligned. The 104 and 104A use more than 275 solid-state devices including 31 ICs and was the first radio Heath made that used a built-in digital frequency display. The SB-104 covers 80-10 meters (no WARC bands) plus 15 MHz WWV and runs about 100 watts PEP and CW output. The 104(A) will run USB, LSB, and CW and is built on 15 PC boards. Eleven of these plug in and can

be extended for ease of servicing and adjustment while the transceiver is operating. Features include a broadband no-tune design, built-in CW sidetone, push-button selection of most functions including meter function, VOX, mode, and power on/off. There is also a QRP mode that yields about one watt of output power. No crystal calibrator is required. Receiver sensitivity is less than 1 uV. Selectivity is 2.1 kHz at 6 dB down. There is an optional 400 Hz CW filter, and an optional noise blanker. Drift is less than 100 Hz per hour after a 30-minute warm-up. TR switching is done with a mechanical relay, so true QSK is not possible. Front panel controls include the aforementioned push buttons, AF and RF gain, AGC fast/slow/off, VOX gain and delay, bandswitch, mic/CW level, and main tuning. The main tuning knob is a "spinner" type and slues at the rate of 30 kHz per revolution. In addition to the digital display (seven segment neon type), the front panel also sports a meter that reads both S-units and relative power and the call letters of the station. (The clever person should be able to figure out a way to replace the call letters with his or her own.) Rear panel controls include VOX anti-trip, sidetone level, and a switch for selection of separate or common antennas. Rear panel connections include a standard quarter-inch key jack and phono type jacks for phone patch in and out, linear amp ALC input, a four ohm speaker, receiver audio input, VFO input and output, IF output, driver output, and two spares. There is also a ground post , an 11-pin "octal style" power plug, and an accessory socket (which includes relay output). The SB-104 comes with both an assembly and an operations manual—try to get them both. Also try hard to get the card extender boards that came with the radio. They are a virtual necessity for working on the rig. Any SB-104(A) series transceiver should be regarded as having one or more problems solvable only by the most skilled technicians, and claims of their being in good working order should be regarded with a degree of skepticism. The SB-104(A) was an expensive endeavor for Heath and one from which it never saw a profit. The 104(A) is designed for use with the HP-1144 power supply. Power requirements: 12 VDC at 20 amps maximum transmit, 2 amps receive. The SB-104(A) used the classic SB two-tone green wrinkle finish and SB series knobs. Not too rare. Caveat emptor!

Weight/Size: 31 lbs; 14.5″ wide x 5.75″ high x 14″ deep

Related Products: SB-230, SB-604, SB-614, SB-634, SB-644(A), HP-1144



FROM THE HEATH CATALOG

6 Meter SSB/CW Transceiver

Manufactured/Price:

SB-110	**65-69**	**$299**
SB-110A	**69-71**	**$299**

Comments: Looking very much a like a mirror image of the SB-100 series of transceivers, the SB-110 was actually on the market about six months before the SB-100. The SB-110(A) uses the same (tube type) LMO as the SB-100 (see SB-100 listing for a discussion of the LMO), and its specification are also similar. The SB-110(A) is built on five PC boards (six if you count the tiny ANL board) and uses 17 tubes including a pair of 6146s and a pair of 6DS4 Nuvitors. A single transistor is used as well—in the audio amp. The SB-110(A) will tune four 500 kHz band segments between 49.5 to 54 MHz and comes standard with crystals for coverage from 50 to 52 MHz—and front panel control legends to match. The receiver section is a triple conversion superhet using Heath standard IF frequencies. Second IF is 3395 kHz. Sensitivity is rated as .1 uV for a 15 db signal plus noise-to-noise ratio. Selectivity is 2.1 kHz at 6 db down. There are provisions for only one filter. Less than 100 Hz drift after a 20 minute warm up. RF power output is rated at 100 watts PEP, and 90 watts CW. Features include switch selection of USB, LSB, and CW, as well as PTT and VOX operation. In addition the SB-110(A) features ANL, AGC, a built-in sidetone, and a built-in 100 kHz crystal calibrator. Note that calibration of the calibrator is critical since a 5 hz error at 100 kHz will translate to a 2.5 kHz error at 50 MHz. Crystal controlled operation is provided for MARS or net operation. The SB-110(A) can transmit on the crystal frequency while the LMO tunes the receiver, or can be made to transceive on the crystal frequency. The SB-110(A) also has cross-mode capability — transmit CW and receive USB. The CW is VOX operated and uses grid block keying. Front panel controls include main tuning, zero set, meter function, AF gain (pull for ANL), RF gain, preselelector, band, final tune, driver, mode, function, oscillator mode, and MIC/CW level. The mic and headphone jacks are on either side of the main tuning control. Internal chassis mounted con-

trols include VOX controls, headphone level, S-meter zero adjust, relative power meter adjust, sidetone level, driver neutralizer, carrier null, carrier balance, bias adjust, and ALC meter adjust. A rear panel control selects between separate or common antenna inputs. In addition to an 11 pin "octal style" power plug, rear panel connections include phone jacks for 50 ohm RF output, receiver input, 8 ohm speaker, phone patch, ALC, and a spare. The key jack is a standard quarter-inch connector. There is no built-in speaker or power supply. Differences in the 110A include improvements in bypassing and filtering, and an improved (but still tube-type) LMO. The modifications were made to eliminate a signal being radiated by the heterdyne oscillator—present even in the receive mode. This signal was getting into TV channel 6. Very few original SB-110s got out the door before the FCC came calling on Heath and it is unlikely that you will find one. IMPORTANT: It is difficult to tell the difference between the 110 and the 110A as most changes are at the PC board level and are not easily detected with casual inpection. The front panel of both the SB-110 and 110A are labeled simply as SB-110. To determine if the unit in question is a 110A you must either check the blue-and-white serial plate usually located on the top of the LMO, or sometimes on the rear panel, or check the assembly manual cover. Also note that when the SB-500 is not connected to the 110(A) a mating plug must be installed on the rear panel connector for the 110(A) to function properly. The SB-110(A) is designed for use with the HP-23 and HP-13 series power supplies. CAUTION: Be sure to use the +250 volt tap (or switch position) on the HP-23 and HP-13 series power supplies. Using the 300 volt setting will cause erratic operation in the SB-110(A). Heath (and the QST reviewer) noted that this was a challenging kit recommended for those with previous kit building experience. The SB-110 and 110A are styled to match the rest of the SB series and are medium rare.

Weight/Size: 23 lbs; 15″ wide x 6.75″ high x 14″ deep
Related Products: SB accessories

FROM THE HEATH CATALOG

HF Linear Amplifier

Manufactured/Price:

SB-200	**64-78**	**$200.00**
SB-201	**78-83**	**$449.94**

Comments: The SB-200 was arguably the most popular linear amplifier ever sold—kit or assembled. In the SB-200(201)'s 20-year production life Heath may well have sold more of them than all other manufacturers' amps combined. So successful were the SB-200 and 201 that they outlasted all of the other SB products—even the SB-104A. The success of the 200(201) was due in part to its watts-per-dollar ratio. But it also succeeded because it was simply a great amplifier. It was well-engineered, compact, lightweight, and well-behaved. It could withstand a certain amount of abuse—and it kicked out the power. The SB-200(201) is rated at 1200 watts input PEP and 1000 watts CW using a pair of instant-on, fan-cooled, 572B (T160L) tubes running in parallel. It operates in grounded grid class B and requires 100 watts (nominal) of drive. The 200 has an input impedance of 50 ohms. The amp features a built-in, solid-state power supply with a circuit breaker (mounted inside the cabinet under the top cover), full metering, ALC output, a built-in SWR bridge, and pre-tuned cathode input circuitry. The only difference between the SB-200 and the SB-201 is frequency coverage. The 200 covers 80-10 meters. The 201 covers only 80-15 meters. This change was dictated by a change in the laws governing the manufacture of linear amplifiers. Front panel controls include a rocker-type on/off switch; tune, load, and bandswitch; relative power sensitivity; and meter function. The illuminated meter will read grid, plate, relative power, SWR, and high voltage. Rear panel connections include a ground post, phono jacks for RF input, antenna relay, ALC, and an SO-239 RF output connector for a 50 ohm antenna. The SB-200 and 201 can be wired for either 120 VAC (16 amp max) or 240 VAC (8 amp max) operation. 240 VAC is recommended. The SB-200 and 201 are styled to match the other SB-series gear and wear the classic two-tone green wrinkle finish paint. The SB-200 remains as good a value today as when it was last sold in 1983. The SB-200 is in greater demand by virtue of its 10 meter coverage. SB-200s and 201s are not rare, but watch for modifications.

Weight/Size: 41 lbs; 15″ wide x 6.75″ high x 14″ deep
Related Products: SB-220, SB-221,
see related products listed for SB-100

HF Linear Amplifier

Manufactured/Price:

SB-220	**70-78**	**$369.95**
SB-221	**78-83**	**$599.95**

Comments: The SB-220 is probably the second most popular amplifier on the planet, right behind the SB-200 and 201. Larger and heavier than the SB-200, the 220 is pretty much the same amplifier. The SB-220(221) is rated at 2000 watts input PEP and 1000 watts CW using a pair of fan-cooled, instant-on, 3-500Z tubes running in parallel, and operated close to ground potential in class B. The 220(221) can be driven with as little as 65 watts, but to realize a full 1000 watts of output power requires at least 100 watts of drive. A double shielded RF deck keeps the TVI potential to an minimum. The amp features a built-in, solid-state power supply with a circuit breaker (on the rear panel), safety interlocks, full metering, ALC output, pre-tuned broadband Pi-input, and Zener diode regulated bias to reduce plate idle current and help reduce operating temperature. The input impedance is about 50 ohms. There is no built-in SWR bridge, as in the SB-200. The only difference between the SB-220 and the SB-221 is frequency coverage. The 220 covers 80-10 meters. The 221 covers only 80-15 meters. This change was dictated by a change in the laws governing the manufacture of linear amplifiers. Front panel controls include rocker type switches for main power and mode (SSB/CW); tune, load, and bandswitch controls; relative power sensitivity; and meter function. There are two illuminated meters. One reads plate current and the other can be switched between grid current, relative power, and high voltage. Rear panel connections include a ground post, phono jacks for antenna relay, ALC, and SO-239s for both RF input and output. The SB-220(221) is designed for use with 50 ohm loads. The 220 is not quite as reliable as the 200(201) as far as the power supply is concerned—and low high-voltage due to blown diodes in the stack are common. A simple test: when run from 240 VAC in the SSB mode, the SB-220 high-voltage should push the meter right up to the end of the scale and perhaps right to the peg. A reading much less than full scale may indicate one or more bad diodes. Also, the Zener diode regulating the bias is easy to blow up with any significant arcing in and around the coils and caps. Plate idle current should be around 75 ma. A higher reading may indicate a bad Zener. The 220 was prone to a little arcing, and Heath eventually came out with a modification kit to fix the problem. This mod is hard to spot but is most obvious in the loading capacitor. The original loading cap has narrow spacing between the plates, while the new cap has a much wider spacing. The power supply and capacitor problems have been fixed in the 221. The SB-220 and 221 can be wired for either 120 VAC (20 amp max) or 240 VAC (10 amp max) operation. 240 VAC is highly recommended. The SB-220 and 221 are styled to match the other SB-series gear and wear the classic two-tone green wrinkle finish paint. The SB-220 remains as good a value today as when it was last sold in 1983. The SB-220 is in greater demand by virtue of its 10 meter coverage. SB-220s and 221s are not rare, but watch for modifications.

Weight/Size: 50 lbs; 15″ wide x 6.75″ high x 14″ deep
Related Products: SB-200, SB-201,
see related products listed for SB-100

HF Linear Amplifier

Manufactured: 74-78
Price: $469.95

Comments: The SB-230 was one of a family of new products released in the Christmas 1974 catalog and is designed to match the SB-104(A) transceiver. (See related products listed below.) The SB-230 is rated at 1200 watts input PEP and 1000 watts CW, which translates to about 600 watts output or about 400 watts for RTTY or SSTV. It uses a single (and very expensive) Eimac 8873 tube, which is convection cooled and operated in grounded grid class B. Convection cooling means the SB-230 requires no fan, and that means very quiet operation. The amp features a built-in solid-state power supply with a circuit breaker (built into the power switch), safety interlocks, full metering, and ALC output. The final tube cathode is fused to protect it from excessive drive. In addition the amplifier is thermally protected and will shut down if the final tube gets too hot. A time delay tube provides a 60- to 90-second start-up delay to give the 8873 time to warm up. During this delay the amp cannot be operated, except in the bypass mode. There is no built-in SWR bridge as in the SB-200. The SB-230 covers 80-10 meters. Front panel controls include a rocker-type power switch; tune, load, and bandswitch controls; relative power sensitivity; and a combination meter and function control. The illuminated meter reads plate current, grid current, relative power, and high voltage. There are front panel indicators for high temperature, delay mode, and the "exciter only" mode. In the "exciter only" mode is essentially a "standby" mode in which the amplifier remains on but is bypassed. This mode is provided since the amp is not an "instant on" type like the SB-200 and 220. Rear panel connections include a ground post, phono jacks for antenna relay, ALC and RF input, and an SO-239 for RF output. The SB-230 is designed for use with 50 ohm loads. The 8873 cathode fuse is also found on the rear panel. It is a 3AG .75 amp fuse. The SB-230 can be wired for either 120 VAC (14 amp max) or 240 VAC (7 amp max) operation. 240 VAC is recommended. **DANGER: The SB-230 contains a block of Beryllium Oxide. Dust and fumes from this material are**

DEADLY POISON! The Beryllium Oxide block is used as part of the heat sink for the 8873 and is located in a rear panel cut-out between the 8873 and the large finned heat sink on the rear panel. DO NOT drill, chip, crush, saw, or file the Beryllium block. It should be handled only with protective gloves and eye wear. Also note that the gooey heat sink compound is dangerous. Wash your hands immediately after contact with the Beryllium block or the heat sink compound. The Beryllium and the heat sink compound should be handled with the utmost care and treated like the hazardous materials they really are. Another minor hazard (but one to watch out for) is the temperature of the large heat sink on the rear panel. In normal operation the temperature of the heat sink may rise to as high as 750 F—as hot as the tip of a soldering iron. Keep the amplifier clear of combustible materials and be sure to provide adequate ventilation. The SB-230 is a good basic amplifier and will perform well providing it is not pushed too hard. It is well protected from a variety of adverse conditions and is easy to operate. The SB-230 fell victim to the popularity of Heath's older SB-201 and 221 amplifiers, which continued to sell well. Poor sales caused Heath to pull the 230 off the market in 1978—several years before the rest of the SB-104 family. No doubt the toxicity of the heat sink (and its potential liability) played a part in the decision to discontinue the 230 as well. It is interesting to note that Heath continued to sell both the SB-201 and SB-221 until 1983—long after the 230 was gone. Finished in classic two-tone SB green. SB-230s are medium rare.

Weight/Size: 50 lbs;15″ wide x 6.75″ high x 14″ deep
Related Products: see related products under SB-104(A)

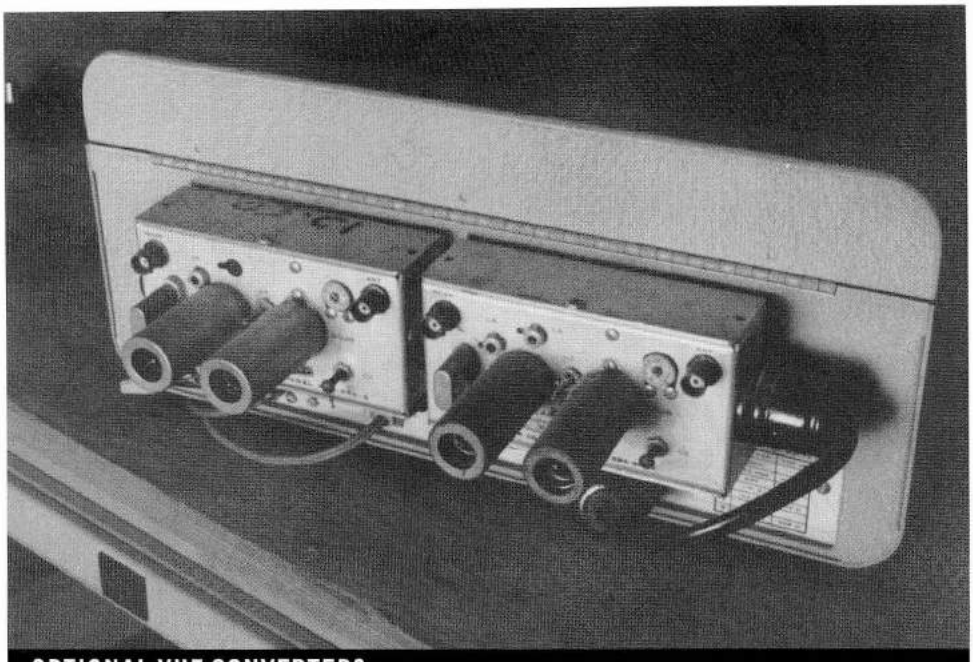
FROM THE HEATH CATALOG

FROM THE COLLECTION OF MIKE SEWELL.

5 Band SSB/CW Receiver

Manufactured: 63-66
Price: $264.95

Comments: Although the SB-10 was the first Heath product to wear the SB label, the SB-300 was really the first product in the classic Heath SB series. The 300's companion transmitter—the SB-400—would not appear for another 6 months. The SB-300 is designed around 10 tubes, and while two PC boards are used there is still a great deal of point-to-point wiring—much of it with a wiring harness. The SB-300 is a dual conversion superheterodyne unit with a 3395 kHz IF and covers 500 kHz portions the 80-10 meter ham bands. The 10 meter band is divided into four separate pieces. The 300 uses a crystal controlled front end with tunable inputs. The BFO is crystal controlled as well. At the heart of the 300 is a pre-assembled and aligned VFO Heath called an LMO or Linear Master Oscillator. The LMO was a remarkable piece of engineering. It had an output from 5 to 5.5 MHz on all bands, was linear from one end of the band to the other, provided 1 kHz dial markings with resetablility to about 200 Hz, and was accurate to within 400 Hz of the nearest 100 kHz marker. Heath used the LMO in all but the last of the SB series rigs. The 300's sensitivity is rated at better than 1 uV for 15 db signal plus noise-to-noise ratio. Selectivity is 2.1 kHz at 6 db down for SSB operation. The SSB crystal filter was supplied with the 300, but Heath also offered an optional 3.5 kc AM filter, and an optional 400 Hz CW filter. The presence of these filters may be determined easily by opening the top cover. The filters are small, black, rectangular modules about 2.5 inches wide mounted in a row between the LMO and the S-meter and are (from front to back) CW, SSB, and AM. A total of three filters may be installed. Without the proper filters installed, the SB-300 will not operate with the mode switch in the AM or CW position; however, reception of these signals is still possible in the SSB mode. Stability is better than 100 Hz after warm-up. Features of the SB-300 include a built-in solid state power supply, a built-in 100 kHz crystal calibrator, a lighted S-meter and

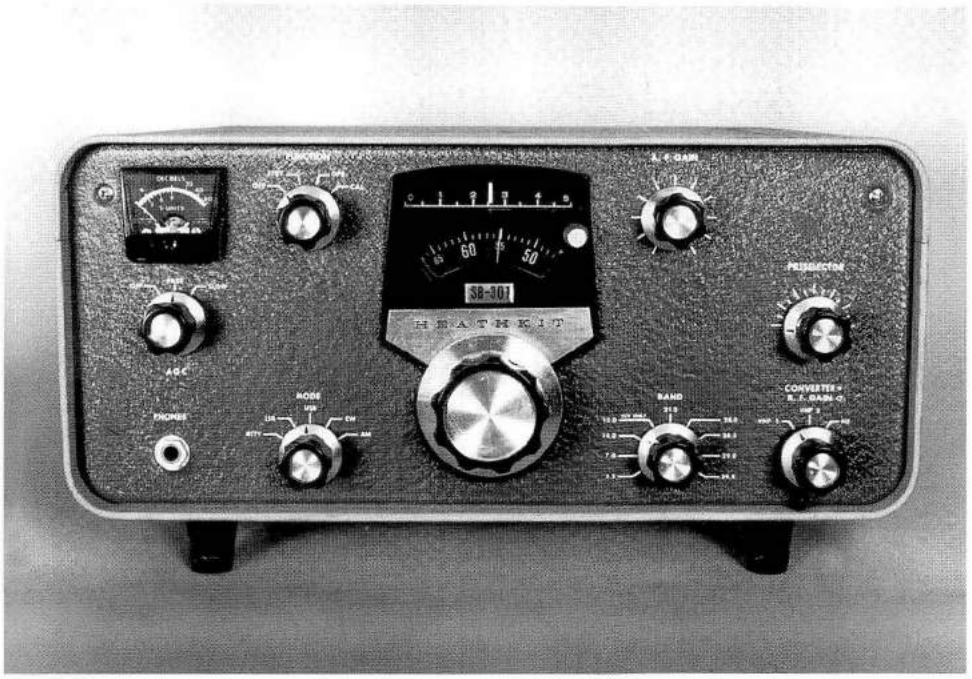


OPTIONAL VHF CONVERTERS.

FROM THE COLLECTION OF MIKE SEWELL.

tuning dial, and smooth backlash free vernier tuning that provides nearly 5 feet of bandspread. There is no built-in speaker and there are no provisions for crystal controlled operation. The SB-300 can be configured to work separately from the SB-400 or to transceive with it. In the transceive mode, the SB-300 determines the operating frequency. Switching from separate operation to transceive requires that you swap a couple of cables inside the SB-400. This clumsy chore was streamlined in the SB-401. NOTE: Do not attempt to transceive using the SB-400 with the SB-300's mode switch in either the AM or CAL positions as the units will not function properly. The SB-300 has provisions for two plug-in converters—the SBA-300-3 for 6 meters, and the SBA-300-4 for 2 meters. These converters are selected from a switch on the top side of the chassis at the right rear corner of the rig. Without the converters this same switch could be used to select one of three different antenna inputs. The presence of the converters is easy to check for. The converters are built into small metal boxes that attach externally to the 300's rear panel. They each have two tubes on board. Front panel controls include main tuning, function, mode, AGC (fast/slow/off), band, AF and RF gain, and preselector. There is also a front panel headphone jack. Rear panel connections include a two prong plug for a "cheater" type power cord, an octal accessory power socket for the VHF converters, and phono jacks for HF antenna, VHF #1 antenna, VHF #2 antenna, mute, anti-VOX, 8 ohm speaker out, heterodyne oscillator out, LMO out, and BFO, as well as two spare phono jacks. NOTE: Heath specifies that the LMO, BFO, and HFO interconnects must be 24 inch lengths of RG-62. (It takes no fewer than seven coaxial cables to connect the SB-300 to the SB-400.) Simple alignment requires only a VTVM. The SB-300 is finished in the classic SB two-tone green wrinkle paint. In 1967 the SB-300 was replaced by the SB-301 (see listing). SB-300s are increasingly rare at swap meets.

Weight/Size: 23 lbs; 15″ wide x 6.75″ high x 14″ deep
Related Products: see related products listed under SB-100



5 Band SSB/CW Receiver

Manufactured: 66-70
Price: $260.00

Comments: While the basic specifications of the SB-301 are the same as for the SB-300 (see listing for details), the 301 represents a substantial refinement. Improvements found in the 301 include the addition of an RTTY position on the mode switch. When activated, a carrier at 3392.11 kHz is produced that causes detected signals at 2125 Hz and 2975 Hz (850 Hz shift) to fall within the SSB filter's bandpass. 170 Hz RTTY can be tuned via the 400 Hz CW filter (if installed). Another handy improvement is the addition of a 15 to 15.5 MHz range on the bandswitch, permitting the reception of WWV. An ANL circuit has been added to the 301 as well. It is activated by pulling out the audio gain control knob. The ANL operates within the IF stage rather than the audio stage and uses a full wave shunt across the second IF amplifier. It is self-biased and self-adjusts to the level of the incoming signal. Activation of the optional VHF converters has been simplified on the 301 by the addition of front panel control. (On the 300 it was necessary to reach inside the unit to switch the converters.) This control switches between the HF antenna input and the two converters and is mounted concentrically on the RF gain control. The character of the optional CW and AM filters has been changed a little. The AM filter has been widened from 3.5 kHz to 3.75 kHz. The CW filter used to be 2.5 at the -60 db point; it has been narrowed to 2 kHz. A few controls on the front panel have been re-labeled to reflect these various changes. The rear panel is essentially the same although two more "spare" jacks have been added. SB-301s are still fairly common and are often found alongside their SB-401 mates. In 1970 the SB-301 was replaced by the solid state SB-303 (see listing). Finished in classic SB two-tone green wrinkle. SB-301s are not rare.

Weight/Size: 23 lbs; 15″ wide x 6.75″ high x 14″ deep
Related Products: see related products listed under SB-100

UNIT SHOWN IS SB-313.

5 Band SSB/CW Receiver

Manufactured: 70-76
Price: $345

Comments: The SB-303 was the first fully solid-state member of the SB series and was extremely popular. Using 27 silicon transistors, one IC, a handful of diodes, and the same LMO and dial assembly found in the SB-102, the SB-303 is built on nine plug-in PC boards. Its basic features and specifications are very much like the SB-301. It also looks very much like the 301, but is 2.75 inches narrower. The conversion scheme and IF frequencies are identical to the 300 and 301, and like the 301, the 303 covers 500 kHz portions of the 80 through 10 meter hams bands, as well as 15 to 15.5 MHz for WWV reception. The 10 meter band is covered in four segments. The use of dual gate MOSFETs in the RF amplifier, mixer, and IF amplifier results in a significant improvement in sensitivity over the SB-300 and 301. The 303 is rated at better than .25 uV for 10 db signal plus noise-to-noise ratio. The solid state LMO has improved stability as well—less than 10 Hz per hour drift after a 20 minute warm-up. The SB-303 also features an improved crystal calibrator. In addition to 100 kHz markers, the new calibrator also provides switch selection of 25 kHz markers. And in addition to the standard RF gain control, Heath has added an RF attenuator control with a 40 db range. As with the 301, the 303 can be used to transceive with the SB-400 and 401 and has provisions for two VHF converters. The 303 comes standard with a 2.1 kHz SSB filter and has provisions for two optional filters—a 3.75 kHz AM filter and a 400 Hz CW filter. These are the same filters used in the SB-300 and 301. The unit will not function in the AM or CW mode unless the appropriate filters have been installed, although reception of AM and CW is still possible in the SSB mode. The 303 does not have a cabinet with the hinged top to permit easy access to the inside—presumably because you would not be changing bad tubes. Therefore the only way to check for the presence of the filters is to either remove the unit from its case (by removing the rubber feet) or to try to look through the cabinet perforations. In any

case, the filters are located just behind the power transformer, which is located just behind the S-meter. There is room for three filters and they are (from left to right as view from the front) SSB, CW, and AM. The CW and AM filters may or may not be labeled as such. As mentioned earlier, the PC board may be unplugged for service. But to unplug some of them requires that the bandswitch control shaft be removed first. PC board extender cards were originally supplied with the SB-303 but are rarely found with the unit at flea markets. Front panel controls include function, converter (for selection of HF antenna or VHF converters), band, RF attenuator, main tuning, zero set, AGC (fast, slow, off), mode, AF gain/power on-off, and RF gain (pull to disable speaker). There is no ANL. Internal controls include IF/Audio-bias adjust, meter zero, meter full scale, BFO power supply adjust, 100 kHz adjust, RTTY wide/narrow shift, and CW shift. Rear panel connections include a quarter-inch headphone jack and phono jacks for HF input, VHF #1 input, VHF #2 input, mute, anti-VOX, 8 ohm speaker (there is no built-in speaker), HFO out, BFO out, LMO out, and CW shift. There are also four spare jacks as well as an "octal style" accessory socket providing power for the optional VHF converters and input for a RTTY keyboard. The 303's built-in power supply can be wired for 120 or 240 VAC 50/60 Hz operation and is protected with a rear panel circuit breaker. The 303 is a nice receiver—even by today's standards. SB-303s are still fairly common and are often found alongside their SB-401 mates. Painted in classic SB two-tone green wrinkle.

Weight/Size: 17 lbs; 12.25˝ wide x 6.75˝ high x 14˝ deep

Related Products: see related products listed under SB-100

FROM THE HEATH CATALOG

International Broadcast Band Receiver

Manufactured: 67-72
Price: $267.95

Comments: The SB-310 was released for Christmas in 1967 and is an SWL version of the SB-300. It took very little re-engineering to convert the SB-300 to an SWL unit, enabling Heath to tap into a new market for almost nothing. The 310's basic 10 tube design (incorrectly stated as 11 in the '67 Christmas catalog) and specifications are the same as the SB-300, and physically the SB-310 is, at first glance, indistinguishable from the SB-300. About the only things that differentiate these two rigs are the name plates and the markings on the bandswitchs. For a discussion of the 310's specifications and design please refer to the listing for the SB-300. The 310 is not a general coverage receiver. It is designed to cover the 16, 19, 25, 31, 41, and 49 meter international broadcast bands; the 80, 40, and 20 meter ham bands; and the 11 meter Citizens Band. Specific frequency coverage is as follows: 3.5 to 4.0; 5.7 to 6.2; 7.0 to 7.5; 9.5 to 10.0; 11.5 to 12.0; 14.0 to 14.5; 15 to 15.5; 17.5 to 18.0; and 26.9 to 27.4 MHz. An optional kit converted the 11 meter Citizens Band to 13 and 15 meter shortwave coverage. The conversion is easy to spot since it included a new dial legend plate on the band switch. The 310 will tune USB, LSB, AM, and CW but came standard with only a 5 kHz AM filter. A 400 Hz CW and a 2.1 kHz SSB filter were optional, and the 310 will not function in these modes unless the appropriate filters are installed. The filters are the same ones used in the SB-300 and 301. The filters are small rectangular modules located between the LMO and the S-meter and are (from front to back) CW, SSB, and AM. All front panel controls are identical to the SB-300. Rear panel connections include phono jacks for 50 ohm antenna input, mute, 500 ohm audio output, 8 ohm speaker, hi-fi output, and a spare. The SB-310 is finished in the classic SB two-tone green wrinkle paint. In 1973 the SB-310 was replaced by the solid state SB-313 (see listing). The SB-310 enjoyed moderate success but never achieved the popularity of Heath's low-cost, general coverage "GR" series receivers. It's a pity Heath never made a full general coverage SB series receiver—it would have been a best seller. SB-310s have always been scarce and because of their similarity to the SB-300 and 301, 310s are easily overlooked at swaps.

Weight/Size: 17 lbs; 15″ wide x 6.75″ high x 14″ deep
Related Products: see related products listed under SB-100

International Broadcast Band Receiver

Manufactured: 72-75
Price: $339.95

Comments: The SB-313 is the solid state replacement for the SB-310 SWL receiver. Just as the SB-310 is a direct copy of the SB-300, so too the SB-313 is a direct copy of the SB-303. It is curious therefore that Heath waited a full two years after the introduction of the 303 to introduce the 313. For a discussion of the 313's basic design and specifications the reader is referred to the listing for the SB-303, as the two units are essentially identical except for frequency coverage. The 313's frequency coverage is the same as the SB-310's except that the 26.9 to 27.4 MHz band of the 310 has been replaced with the 21.3 to 21.8 MHz band. Like the 310, the 313 is not a general coverage receiver. The SB-313's coverage includes 3.5 to 4.0; 5.7 to 6.2; 7.0 to 7.5; 9.5 to 10.0; 11.5 to 12.0; 14.0 to 14.5; 15 to 15.5; 17.5 to 18.0; and 21.3 to 21.8 MHz. These frequencies translate to the 15, 16, 19, 25, 31, 41, and 49 meter international broadcast bands and the 80, 40, and 20 meter ham bands. There are some obvious differences between the 313 and the 303. For example, the 313 has no provisions for external VHF converters and has a much simpler rear panel. There are only four phono jacks on the rear panel—antenna input, 8 ohm speaker output, mute, and a spare. Among the items missing from the rear panel are all the oscillator outputs needed for use with the SB-650 digital frequency display. The 313 is a very good receiver but its price tag may have been a little steep for all but the most hard-core of SWLers. The unit was popular enough to keep it on the market until '75, but it never sold very well. SB-313s have always been scarce and because of their similarity to the SB-303, 313s are easily overlooked at swaps.

Weight/Size: 17 lbs; 12.25″ wide x 6.75″ high x 14″ deep
Related Products: see related products listed under SB-100

UNIT SHOWN IS SB-401.

5 Band SSB/CW Transmitter

Manufactured: 64-67
Price: $325.00

Comments: The SB-400 transmitter was released about six months after the SB-300 receiver; it was designed as a matching unit and represents the second product in the SB series. The SB-400 is designed around 13 tubes (including a pair of 6146s in the final), and although two PC boards were used, there is still great deal of point-to-point wiring. The 400 will run USB, LSB, and CW, with no provision for AM; employs a 2.1 kHz crystal filter; and covers 500 kHz portions of the 80 through 10 meter ham bands. Ten meters is covered in four segments. Power input is about 180 watts PEP SSB and about 170 watts CW. Power output is about 100 watts from 80 through 15 meters and about 80 watts on 10. The finals are fully neutralized and are run in class AB1. Frequency stability is typical of the era—the transmitter drifts less than 100 Hz per hour after a 20-minute warm up. Features include PTT or VOX operation, break-in CW, a built-in TR relay (mechanical), Heath's standard LMO, a spotting function, and a built-in solid state power supply. For a more complete discussion of the LMO, please refer to the listing for the SB-300. It is interesting to note that while the operator can always choose to key the transmitter by pushing the PTT button on the mic, the VOX circuit is always active. There is no way to shut off the VOX short of turning the VOX sensitivity control (inside the cabinet) all the way down. It should also be noted that while Heath refers to the 400 as having "break-in" CW, it isn't QSK. In fairness, the relay operates with great speed, and most ops won't have any problem with it. The CW works by keying the VOX with a built-in sidetone. The sidetone is also fed to the SB-300's audio line where it is used to monitor sending. The SB-400 can be configured to work separately from the SB-300 or to transceive with it. In the transceive mode, the SB-300 determines the operating frequency. Switching from separate operation to transceive requires that you swap a couple of cables inside the SB-400. That is how you disable the 400's LMO. This clumsy chore was streamlined in the SB-401. The SB-400 is supplied with all needed heterodyne oscillator crystals so it can be used with any other make or model of receiver. The front panel is a mirror image of the SB-300. The panel meter is on the right, and the placement of the controls are likewise reversed. Front panel controls include driver tune, loading, function, main tuning, zero set, drive/ALC level, meter function, and mode. Internal controls include neutralizing, relative power adjust, bias adjust, sideband amplitude balance, carrier null, ALC adjust, sidetone output level, and VOX controls. Rear panel connections include a quarter inch key jack, phono jacks for receiver audio input, 8 ohm speaker output, anti-VOX, receiver mute, and receiver antenna output. There is also an SO-239 RF connector for a 50-75 ohm antenna, a ground post, and a 120 VAC standard two-blade receptacle used to power an external antenna relay. Alignment requires a dummy load, a VTVM with an RF probe, and a CW key. SB-400s sold very well but are comparatively rare. They are often found at swap meets alongside their companion SB-300. Because the 400 and 401 are identical they often are overlooked. Standard SB two-tone green wrinkle finish.

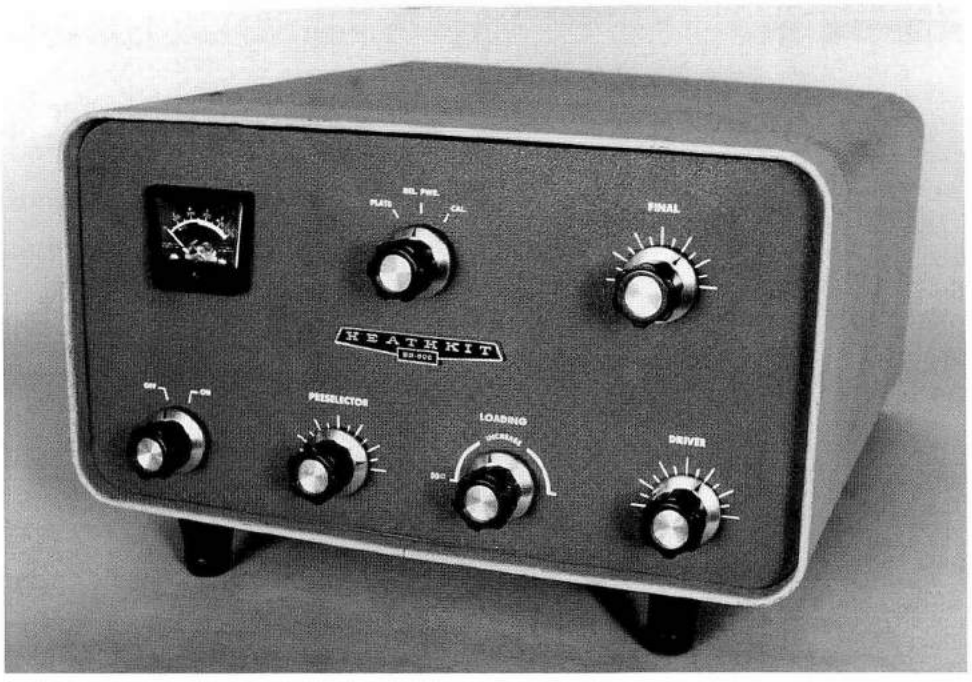
Weight/Size: 36 lbs; 15″ wide x 6.75″ high x 14″ deep
Related Products: see related products listed under SB-100

5 Band SSB/CW Transmitter

Manufactured: 66-75
Price: $285.00

Comments: The SB-401 represents a general refinement of the SB-400. Please see the listing for the SB-400 for a discussion of the basic design and specifications. Although the 401 and 400 are essentially identical, Heath made a few significant improvements in the 401. Most notable among these improvements is a front panel switch to change from separate operation to transceive operation. In the 400 it was necessary to open the hood and swap a couple of cables. Now, on the 401, one need only flip a switch—a major improvement to overall operating convenience. Other changes include the swapping of a 6BZ6 for the 6AU6 in the LMO and the addition of a sidetone level control, which is mounted on the chassis. The 120 VAC two-blade, external-antenna relay power receptacle of the 400 has been replaced by a nine-pin molded nylon connector on the 401. Lastly, figuring that most purchasers would be using the 401 with its companion 301 receiver, Heath made the heterodyne oscillator crystals optional. What this means is that if the 401 you're thinking about buying doesn't have the crystals, it can't be used as a transmitter except with the 301. Determining if the crystals are present is easy. Open the top of the cabinet and look in the left front corner of the chassis directly below the final tuning control shaft. There will be either a row of eight crystals or eight crystal sockets. If the crystals are installed, all is well. If not, you have two choices—find some crystals, or find an SB-300 or 301 to use with it. The 301/401 combination was wildly popular and Heath sold zillions of them. 401s are still fairly common at swap meets—often found in the 301/401 combination. Don't confuse the 401 and the 400. Like all other SB products, the SB-401 is finished with the standard SB two-tone green wrinkle paint.

Weight/Size: 36 lbs; 15″ wide x 6.75″ high x 14″ deep
Related Products: see related products listed under SB-100



2 Meter Transverter

Manufactured: 69-71
Price: $195.00

Comments: The SB-500 is designed to permit two-meter SSB or CW operation using Heath SB or HW series HF transceivers. The SB-500 is designed around 10 tubes including a pair of 6DS4 Nuvistors and a pair of 6146 final amplifiers. Only two small PC boards are used; the bulk of the wiring is point to point. The SB-500 can be wired to work via the 10-meter band or via the six-meter band—the choice is made during assembly. The receiver section sensitivity is .2 uV for 10 dB signal plus noise-to-noise ratio. The transmitter section will deliver about 140 watts PEP SSB and about 50 watts CW to a 50 ohm antenna with an SWR of less than 2:1. Note that the transmitter duty cycle is 50 percent. The frequency range of the 500 is 144 to 148 MHz into 50-54 MHz or 28-32 MHz. Determining which frequency option was chosen for the unit you are looking at is fairly easy. Check the PC board in the left front corner of the unit. On the end of the PC board farthest from the front panel there is space for two metal can-type coils. If the cans are present, the unit has been wired for operation with the SB-110 and 110A six-meter transceiver. If the cans are not in place, the unit has been wired for operation on a 10-meter band with the SB-101 or 102, the HW-100 or 101, or the SB-301/401 combination. Operation with the SB-102 or HW-101 is pretty much a matter of plugging the units together. Use with the SB-101, HW-100, or SB-301/401 requires some modification of those units. Use with the SB-100 or SB-300/400 combination is possible but will require modification of the transceiver, and the SB-500 manual does not cover this procedure. Use with other makes of radios is also possible for the more technically inclined operator. Alignment requires your HF station, a dummy load, and a VTVM. CAUTION: While the SB-500 is connected to your HF station, a full 800 volts is applied to the 500's final tubes **even when the SB-500 is off.** An illuminated front panel meter reads plate current or relative power. Front panel controls include meter function/calibrate switch, final tuning, on/off function, preselector, final loading, and driver tuning. Internal controls include relative power adjust and bias adjust. Rear panel connections include phono jacks for RF output, ALC, linear relay, drive, low frequency receiver output, and low frequency RF input. There is also an octal power plug to pick up some voltages and signals not provided by the 500's built-in supply. The SB-500 is built into the same size cabinet as the SB-303 and 313 and is finished in the standard SB two-tone green wrinkle paint. The SB-500 is medium rare and is often found alongside the radio for which it was wired. Having the manual would be very handy.

Weight/Size: 14 lbs; 12.25″ wide x 6.75″ high x 13″ deep
Related Products: see related products listed under SB-100

Station Speaker

Manufactured: 66-75
Price: $17.95

Comments: The SB-600 station speaker was introduced in 1966 as the first of a line of matching accessories for the SB (and HW) series rigs. The SB-600 contains only a six-by-nine-inch, 8 ohm speaker. The rest of the cabinet is empty but is designed to hold the HP-23 series of power supplies for use with the SB-100 series of transceivers. There are holes in the bottom of the cabinet permitting the power supply to be secured with screws. The SB-600 is finished in Heath's standard two-tone green wrinkle paint. No doubt Heath sold billions of SB-600s. SB-600s are very common.

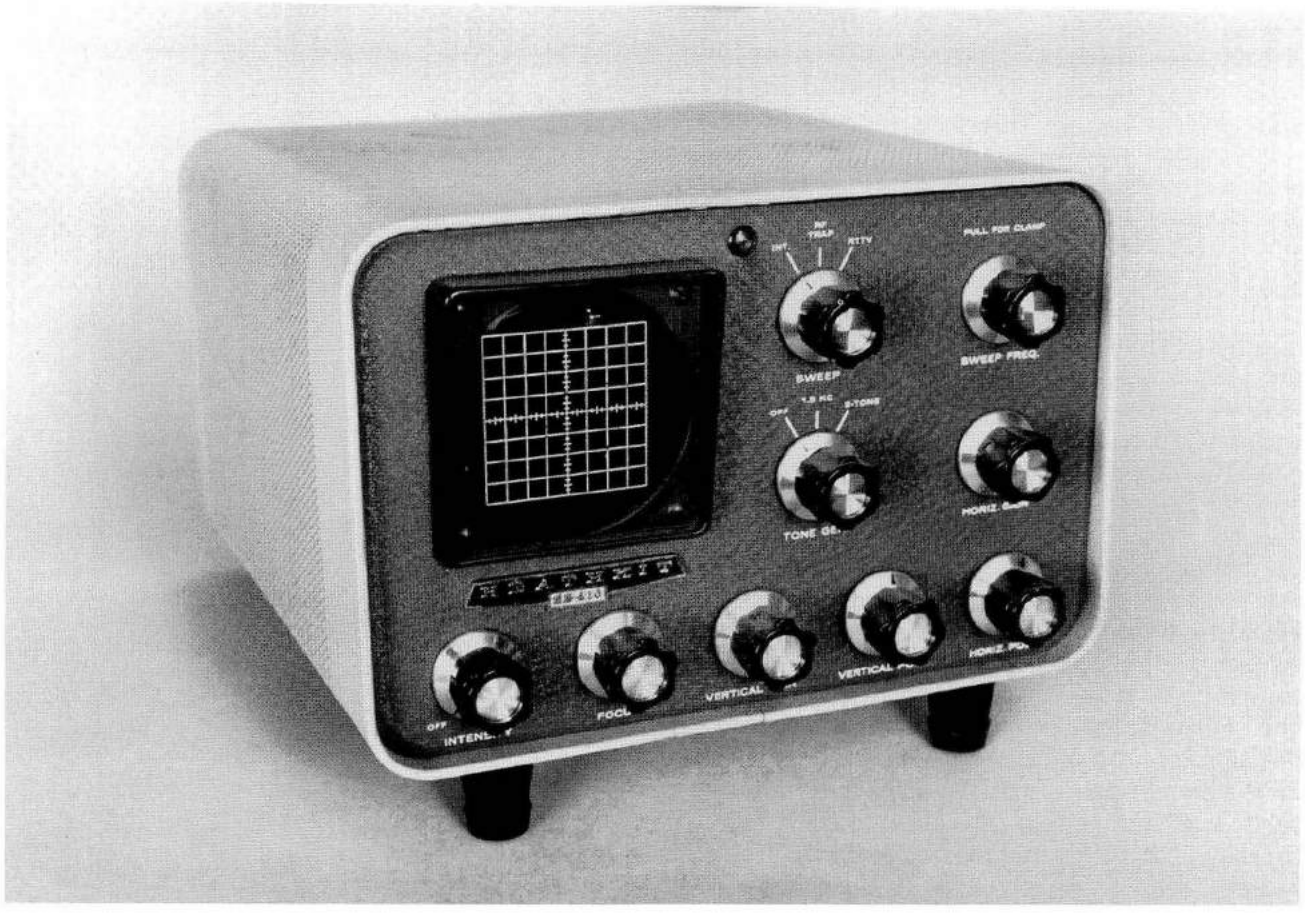
Weight/Size: 5 lbs; 10″ wide x 6.75″ high x 11″ deep
Related Products: see related products listed under SB-100

Station Speaker

Manufactured: 74-82
Price: $33.95

Comments: The SB-604 contains only a five-by-seven-inch 3.2 ohm speaker. There are no indicators or displays of any kind behind the red plastic window. The rest of the cabinet is empty but is designed to hold the HP-1144 power supplies for use with the SB-104(A) transceiver. There are holes in the bottom of the cabinet permitting the power supply to be secured with screws. The 604 is finished in Heath's standard two-tone green wrinkle paint. Curiously, SB-604s are not all that common.

Weight/Size: 10 lbs; 10.25″ wide x 7.25″ high x 15.25″ deep
Related Products: see related products listed under SB-104



Station Monitor Scope

Manufactured: 66-75
Price: $69.95

Comments: The SB-610 may well have been the most popular of the SB accessories—perhaps even more popular than the SB-600 station speaker. The 610 is essentially an HO-10 (see listing) put into a new cabinet—but there were a few differences worth noting. The 610 uses only three tubes (excluding the CRT), and the power supply is solid state. As in the HO-10, no PC boards are used—all wiring is point to point. But unlike the HO-10, Heath provided vertical amplifier wiring options to accommodate any receiver IF from 455 kHz to 6 MHz in addition to an option for 1 to 150 kHz operation for RTTY use—or for use as a simple oscilloscope. Since the correct parts may be very hard to find, these options are not easy to change after the fact, and there is no *simple* field check to determine which option has been chosen. However, conversion to the scope/RTTY option is easy since it requires only the removal of parts. To determine the chosen option, start by removing the 610 from its cabinet. While viewing the 610 from the top side of the chassis, locate the vacuum tube closest to the front panel and directly below the pilot light. Just behind this tube is a metal-can type coil. Check the part number of this coil. If the part number is 40-748, the unit has been wired for the high frequency IFs option for IFs between 3000 and 6000 kHz. If not, skip to "Low frequency IF" below. Complete absence (or disconnection) of the coil means the unit has been wired for 1 to 150 kHz RTTY operation. To find the exact high frequency IF that has been chosen, turn the unit over and view the underside of the chassis with the front panel toward you. Using the vacuum tube you located as a reference, locate a coil just in front and to the left of this tube socket. Check the value of the mica capacitor wired across this coil: 470 pf means an IF of 3000 or 3055 kHz; 330 pf means an IF of 3395 (the Heath SB/HW IF); 100 pf means an IF of 5000-6000 kHz. **Low frequency IF:** If the part number of the metal can is 40-746, the IF of the unit is 455 kHz. If the part number is 40-747 check the value of the capacitor wired

across the bottom of the IF: 200 pf means an IF of 1000 kHz; 100 pf means an IF of 1600 to 1680 kHz; 56 pf means an IF of 2075, 2215, or 2475 kHz. In the end all this may be a moot point since critical analysis of incoming signals displayed on the 610 isn't really possible in the first place—there are just too many variable that can effect the waveforms shown. The SB-610's greatest strength, however, is in the moniotring of transmitted energy. The 610 will work on any frequency from 160 to 6 meters. And there is a low power option for use with QRP and CB rigs. (Normally the 610 requires a minimum of 15 watts of drive.) The low power wiring option is easy to spot. On the underside of the chassis look for a tunable type coil wired in and "floating" between the SO-239 jacks and the attenuator switch on the rear panel. The frequencies of the two-tone generator have been changed to 1500 and 1950 Hz. You can choose a single tone output (1500 Hz) or the two-tone signal. Because they are subjected to high voltages, resistors in the intensity, focus, horizontal, and vertical position circuits will degrade over time, usually drifting up in value. The result will be an inability to effectively control one or more of these functions. This is a common ailment in SB-620s but one that is easy to cure. The tubes are also subjected to voltages that will cause them to fade faster that one might expect. Rear panel connections include a pair of loop-through SO-239s for RF input and output, a pair of loop-through phono jacks (exciter input for linearity checks), a phono jack for tone output, and phono jacks for vertical and horizontal input (for RTTY of scope use). Ultimately, the SB-610 is most useful in monitoring transmitted RF or for RTTY. The 610 is finished in Heath's standard two-tone green wrinkle paint and matches the rest of the SB line. Heath sold tens of thousands of SB-610s. They are not rare, and they turn up frequently at swap meets.

Weight/Size: 10 lbs; 10″ wide x 6.75″ high x 11″ deep
Related Products: HO-10, HO-5404; SB-614; see related products listed under SB-100

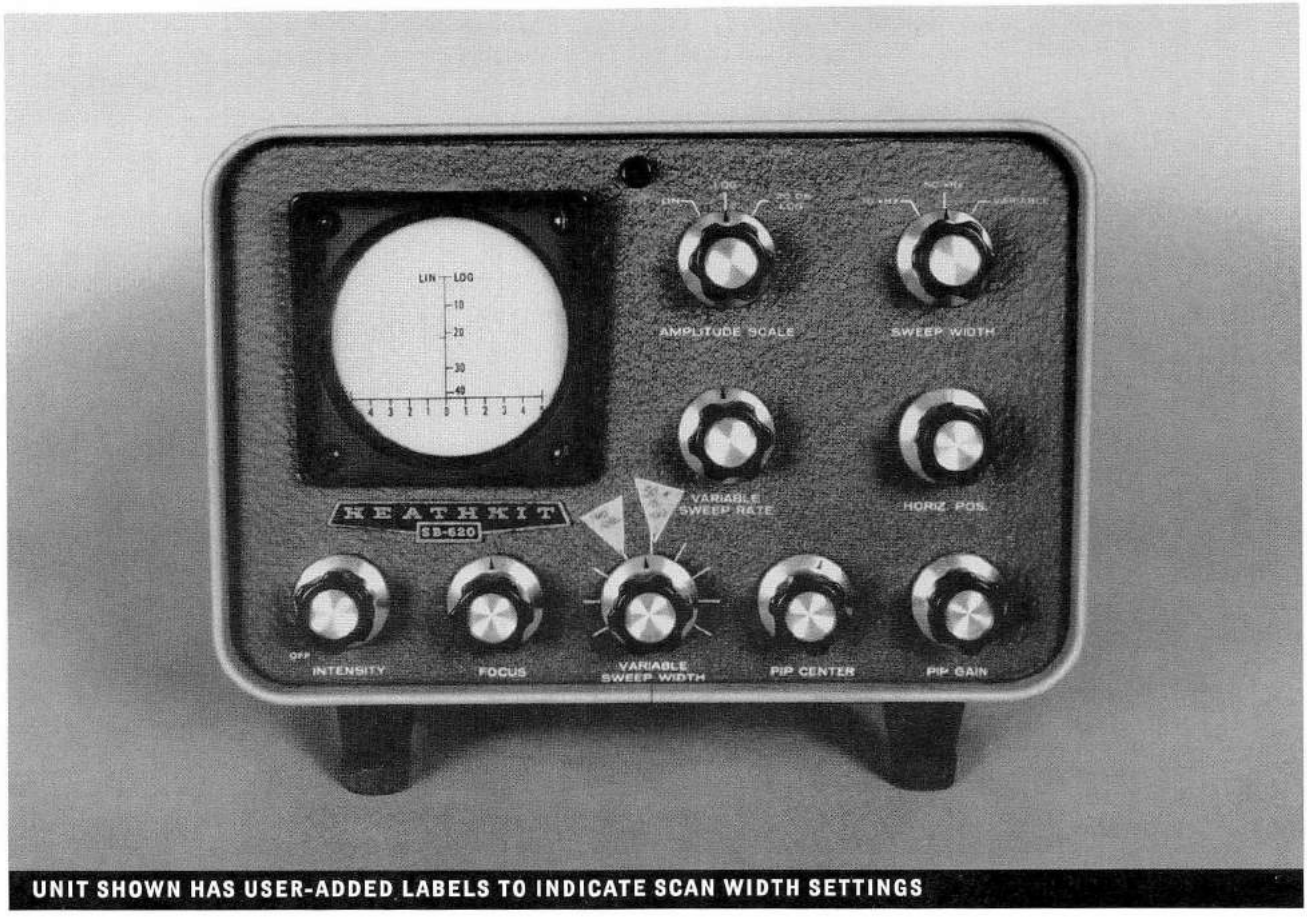
FROM THE HEATH CATALOG

Station Monitor Scope

Manufactured: 74-82
Price: $199.95

Comments: The SB-614 is the solid state (except for the CRT) replacement for the HO-10 and SB-610 (see listings), provides their same basic features, serves the same basic purpose—to monitor transmitted RF energy—and is styled to match the SB-104 transceiver. The SB-614 is built on two PC boards and uses 26 transistors and a handful of diodes. No ICs are used. The major difference in the 614 is that Heath has given up the notion of being able to monitor incoming signals. The HO-10 and SB-610 could be tapped into the receiver IF to provide a look at the other fellow's signal. This idea is intrinsically flawed, however, as there are too many things that can effect the waveforms you see displayed—including QRM, atmospheric noise, AGC and any problems or shortcomings your receiver might have. In the 614 Heath still suggests this can be done, but the connection used to do it is to the station speaker. Thus the display seen on the scope may be interesting to look at but is useless for any practical purpose. The 614 can, however, be useful for RTTY work and as a simple oscilloscope. As an oscilloscope the 614's vertical frequency response is from 10 Hz to about 50 kHz, with reasonable sync capability. To monitor transmitted RF energy the 614 requires a minimum of 10 watts of drive. Since there is no low power option as in the 610, the 614 cannot be used with CB or QRP equipment. In addition the 614 is advertised as covering only 80 to six-meters—no 160 meter coverage as with the HO-10 and SB-610. Also missing from the 614 is the two-tone test generator. IMPORTANT: When changing transmitter power levels care must be taken to keep the vertical height of the display within the bounds of the graticule (the marking on the screen). Failure to do so may result in the overheating and/or destruction of a resistor (R201) and a coil (L201). To complicate matters the potential for damage to these components exists even when the 614 is turned off. It would be prudent, therefore, to keep the vertical gain control in its full counter-clockwise position unless the 614 is on and the trace can be seen. One more caution: Use of the 614 on six-meters may present a high SWR (as high as 6:1) to your transmitter. Front panel controls include power on/off/intensity, mode, focus, vertical position and gain, horizontal position and gain, and sweep speed (and vernier adjust). Indicator lights behind the red window indicate SSB, TRAP, or CROSS (RTTY) mode. Internal controls include vertical and horizontal balance. Rear panel controls include astigmatism and a two-position attenuator. Rear panel connections include a pair of loop-through SO-239s for RF input and output, a pair of loop-through phono jacks (exciter input for linearity checks), and phono jacks for vertical and horizontal input (for RTTY of scope use). The missing features combined with the price tag and problems with the SB-104 (for which the 614 was designed) held sales down, and the 614 never achieved the popularity of its predecessors. Still, Heath sold the 614 for nine years, and the units still show up at swap meets. The 614 is finished in the standard two-tone green wrinkle paint.

Weight/Size: 10 lbs; 10.25″ wide x 7.25″ high x 15.25″ deep
Related Products: HO-10, SB-610; see related products listed under SB-104



UNIT SHOWN HAS USER-ADDED LABELS TO INDICATE SCAN WIDTH SETTINGS

Panadapter

"Scanalyzer"

Manufactured: 66-76
Price: $119.95

Comments: Easy to spot at a distance because of its bright yellow CRT, the SB-620 is an updated and refined version of the HO-13 (see listing) and has always been one of the author's favorite Heathkits. Like the HO-13, the SB-620 is designed to provide a visual presentation of the band you are tuned to. The 620 will present a portion of the band as wide as 500 kHz to as narrow as 10 kHz, depending to some extent on the IF frequency for which it has been wired. The presentation is centered on the frequency your receiver is tuned to and allows you to "see" up and down the band. Signals appear along a calibrated line as "pips" on a high persistence CRT. The SB-620 is particularly useful in spotting band openings and for finding clear spots in a crowded band. With some practice the user can determine not only the frequency of signals elsewhere on the band but their strength and emission type as well. The 620 also can be used as a spectrum analyzer, but this use will not be described here. The 620 is built around six tubes (excluding the CRT), and has a built-in solid state power supply. All wiring is point to point—no PC boards are used. The key thing to know when considering the purchase of a 620 is the IF frequency for which it has been wired. Unless the right parts can be found, changing the IF may be possible only by the most technically inclined. The kit was originally supplied with all the parts needed for all the optional wiring schemes. Be sure to ask if the unused parts are still around. NOTE: If you are going to change the IF you will need the manual. Heath designed the SB-620 for use with more than a dozen common receiver IFs and there is no *simple* field check to determine the IF of the unit at which you are looking, so unless the seller knows for sure (and it may be unwise to trust his/her memory) you'll have to take it out of the cabinet and do some digging. You will need to determine the part number for coil L3. Remove the 620 from its cabinet and position it so you can examine the underside of the chassis and so the front panel is

facing to your right. With the unit so positioned, the area to examine is in the lower right corner of the unit. In this corner locate two tube sockets. To locate coil L3 look to the 2 o'clock position from the upper tube socket. Use the following chart to determine the IF.

L3 Part #	IF Frequency
40-774	455 kHz
40-775	1000 kHz
40-808	1600-2245 kHz*
40-776	3000 or 3055 kHz*
40-807	5200 or 6000 kHz*
40-776	3395 kHz (Heath SB and HW series)

* To make a precise determination will require the manual. Also note that to re-establish the Heath 3395 kHz IF it will be necessary to change another coil (L2) from part number 40-590 to part number 52-101. For all IF changes the values of a few resistors and capacitors will need to be changed as well.

Because they are subjected to high voltages, resistors in the intensity, focus, horizontal, and vertical position circuits will degrade over time, usually drifting up in value. The result will be an inability to effectively control one or more of these functions. This is a common ailment in SB-620s but one that is easy to cure. The tubes are also subjected to voltages that will cause them to fade faster that one might expect. And, by the way, there is no functional reason that the 3RP7 CRT can't be replaced with a standard persistence 3RP1 (as found in the SB-610 and 614). The 620 uses a pair of not-so-easy-to-find NE-83 neon lamps. Note that an NE-2 or other neon bulb will not suffice as a replacement. One is used in the sweep generator and the other is used as a voltage regulator that doubles as the pilot light. The alignment procedure is not too complicated but does require a high-quality RF generator and an accurate audio generator. Connection to the receiver is done via the plate of the mixer just preceding the first IF amplifier and will require you to tweak up your receiver a bit to compensate for the additional load. The manual contains exact hookup instructions for many common radios including Collins, Drake, Eico, Hallicrafters, National, RME, and Swan. Heath discontinued the 620 in 1976 and it wasn't until 1988 that another panadapter was released—the HO-5404 monitor scope (the panadapter module was optional). The SB-620 is finished in Heath's two-tone green wrinkle paint and matches the rest of the SB line. It is designed for 120/240 VAC, 50/60 Hz operation. The SB-620 actually works very well and enjoyed moderate success. 620s used to be very common at flea markets but have become much more scarce in recent years.

Weight/Size: 10 lbs; 10″ wide x 6.75″ high x 11″ deep
Related Products: HO-13, HO-5404, see related products listed under SB-100

Station Console

Manufactured: 66-74
Price: $101.95

Comments: The SB-630 was a very popular accessory containing a 24-hour (mechanical) digital clock, an SWR meter, a hybrid phone patch, and 10-minute timer, and made an attractive addition to any station. It's hard to believe a gizmo like this would have tubes in it, but it does—two of them—an OA2 voltage regular and a 6EW8 relay control, both used in the 10-minute timer circuit. The timer circuit consists of an RC network that charges very slowly and fires a neon lamp. The lamp in turn shoots a pulse to the grid of the 6EW8, which then conducts and closes a relay. Depending on the setting of the timer function switch, the relay will activate a lamp and/or a buzzer. Calibrating the timer to operate at 10-minute intervals is accomplished by the trial-and-error adjustment to two potentiometers—a coarse adjust and a fine adjust. A front panel reset button restarts the timing sequence each time it is pushed. The duration of the light and buzzer is about one second. The phone patch section is based on the HD-19, et al (see listing for details). The SWR meter is based on the HM-15 (see listing for details). The clock is a standard Numechron movement and there is no convenient way to set it. You have to reach in through the open back of the cabinet and do the best you can. After a few years of operation these units often start making a lot of noise but will generally continue to work for many more years—it just depends on how long you want to put up with it. The industrious person should be able to find a new (or at least quiet) motor as a replacement, and entire clock movements can sometimes be found at swap fests. SB-630s are sometimes found with electronic digital clocks installed—a most unfortunate modification—often with equally unfortunate front panel holes added with which to set them. The best advice to keep the clock silent is to only run it when you have guests in the shack. The phone patch and SWR meter will continue to work without the unit being plugged in. Front panel controls include SWR sensitivity and forward/reverse, time reset, timer function, mode (SWR or phone patch), and phone patch receiver and transmit gain. The front panel meter is not illuminated and reads SWR or phone patch audio level. There is also a pilot light that indicates when the timer is on. Rear panel controls include phone patch null adjust, a monitor/null switch, and timer adjustment controls. Rear panel connections include SO-239s for RF connection to the SWR meter, phono jacks for Hi-Z or 600 ohm phone patch output to the transmitter, loop-through receiver audio, and screw terminals for connection to the phone line (polarity is not important). The SB-630 sold very well and still can be found with some regularity. Standard two-tone green wrinkle.

Weight/Size: 10 lbs; 10″ wide x 6.75″ high x 11″ deep
Related Products: see related products listed under SB-100

Station Console

Manufactured: 74-83
Price: $199.95

Comments: The SB-634 is a solid state SB-630 (see listing). It provides the same basic features, serves the same basic purpose, and is designed to match the SB-104 transceiver. The SB-634 is built on three PC boards and is really just a collection of existing Heath products put into a single box. The 634 contains a six-digit, 24-hour clock based on the GC-1005 (see listing), a phone patch based on the old (but reliable) technology of the HD-19 (see listing), a 10-minute digital ID timer, and a power/SWR meter based on the HM-2140 (see listing). The power meter is a feature not found in the SB-630, which had only an SWR meter. Overall the 634 is a very useful accessory and represents a substantial improvement over the SB-630. The 634 has a built-in power supply, but the only features that use it are the clock and the 10-minute time. The rest of the functions are self powered and can run with the 634 unplugged. The 10-minute identifier time appears alongside the main time readout and is displayed in smaller numbers. The counter starts at 0:00, counts to 9:59, and resets to zero. Then—depending in the setting of the timer function switch—a light will light, or light will light *and* an alarm will sound for about one second. The timer can be reset at any point in the cycle by means of a front panel button and can be disabled if desired. When first activated, the timer will indicate a random time and may display some non-numeric characters until reset. The power/SWR meter has a range of 1.8 to 30 MHz and will read to 2000 watts in two scales or 0-200 and 0-2000 watts. With a simple front panel adjustment, power readings of 1-20 watts may also be made. SWR sensitivity is less than 10 watts. CAUTION: A load *must* be connected to the output connector on the power/SWR meter. Insertion loss is negligible. Front panel controls include a row of push buttons for control of the power/SWR meter and controls for timer function, phone patch transmit and receive gain, and SWR sensitivity. Rear panel controls include phone patch null adjust, a monitor/null switch, and three switches to set the clock. Rear panel connections include SO-239s for RF connection to the SWR meter, phono jacks for Hi-Z or 600 ohm phone patch output to the transmitter and loop-through receiver audio, and screw terminals for connection to the phone line (polarity is not important). Standard SB two-tone green wrinkle paint. The SB-634 is fairly common.

Weight/Size: 10 lbs; 10.25″ wide x 7.25″ high x 15.25″ deep
Related Products: SB-604, SB-614, SB-630, SB-644(A)

Remote VFO

Manufactured: 67-70
Price: $99

Comments: Heath referred to the VFO used in the SB series as a Linear Master Oscillator (LMO). The SB-640 was made for only a short time and has become the rarest and most elusive of the SB series product line. It proved to be less popular that Heath had anticipated and was discontinued after only four years of production. Discontinuing the 640 may have been a mistake since the SB-102 (released in 1970) proved to be even more popular that its predecessors and would no doubt have boosted sales of the 640. The SB-640 is designed to permit split frequency operation with the SB-101 and 102 transceivers. With the combination of the 101 or 102 and the 640, five modes of operation are possible; (1) transceiving from the 101 or 102; (2) transceiving on the 640; (3) transceiving on the 640 crystals; (4) transmitting on the 640 LMO and receiving on the 101 or 102 LMO; and (5) transmitting on the 640 crystals and receiving on the 101 or 102 LMO. The SB-640 is largely an empty cabinet. Inside is a standard tube type LMO—the same one found in the SB-100 and 101 (see listing for the SB-100 for a discussion of the LMO). The 640 has two tubes inside, one of which is on the LMO itself. All wiring is point to point, and there is no internal power supply. All power is derived from the transceiver. Note that because of subtle mechanical differences between them, it is not possible to replace the 640's tube type LMO with the solid state version found in the SB-102. Also note that the SB-640 is not designed for use with the SB-100—or more precisely, the SB-100 is not designed for use with the SB-640. This is because SB-100 does not have any of the required switching circuits, though a modification would be possible by the more technically inclined operator. A simple modification is required even on the SB-101 and 102, but the 640's manual covers this in detail. The modification involves the installation of a nine-pin connector on the rear panel of the transceiver through which the 640 is connected. IMPORTANT: You will need the manual to do the installation. Front panel controls include main tuning, zero set, LMO/XTAL, and XTAL 1/XTAL 2. When connected to the 101 or 102, the 640's dial light comes on when the transceiver is switched on, but a red light on the 640 lights only when the 640 has been selected. The only rear panel controls are two trimmer caps—one for each crystal. The only rear panel connection is a nine-pin plug for connection to the transceiver. Standard SB two-tone green wrinkle paint. SB-640s are very rare.

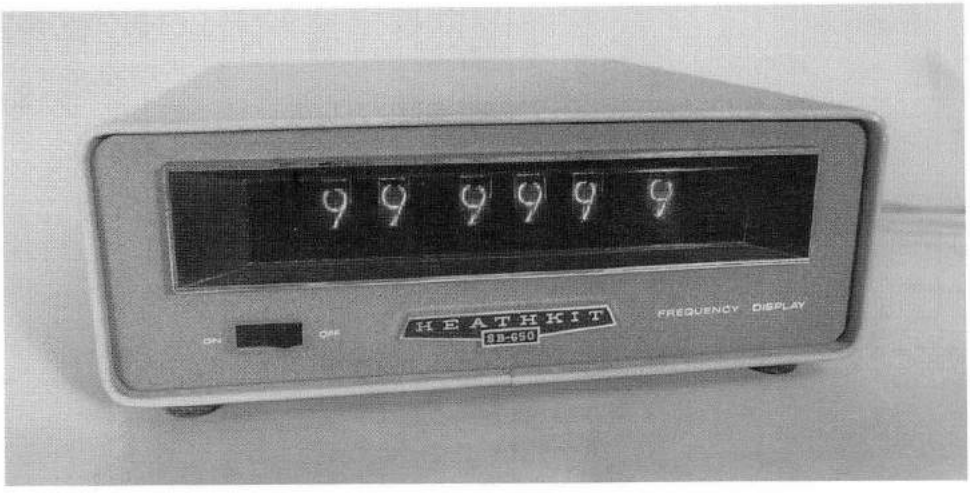
Weight/Size: 5 lbs; 10″ wide x 6.75″ high x 11″ deep
Related Products: SB-600, SB-610, SB-620, SB-630, SB-650

Remote VFO

Manufactured/Price:
SB-644 74-79 $134.95
SB-644A 79-84 $134.95

Comments: Just as the SB-640 permitted split frequency operation with the SB-101 and 102, so too the SB-644(A) permits split frequency operation with the SB-104(A). And like the 640, the 644(A) provides the same kinds of operating modes. You may transceive from either the 104 or the 644. Unlike the 640, the 644(A) allows you to control either the transmit or receive frequency from the 644 with the 104 controlling the other. The 644(A) also permits operation on one of two crystal frequencies. The 644(A) uses an illuminated slide rule dial as a general frequency indicator, but whenever it has been selected the 644(A)'s exact frequency is displayed on the 104's readout. When operating split frequency, the 104's display will change when you transmit. Other than the main tuning knob the only other controls are two rows of front panel push buttons allow you to select the mode of operation. Status lights behind the red window indicate in what mode the 644(A) is operating. There is no internal power supply. All needed voltages are derived from the SB-104(A). Rear panel connection include two phono jacks labeled "in" and "out." These match up with jacks on the 104(A). In 1979 the SB-104 was given a major overhaul to fix a variety of problems—among these were some minor problems with the VFO. The 104A's new VFO was incorporated into the 644 and the unit was renamed the 644A. The unit is finished in the standard two-two green wrinkle. The SB-644 and 644A are medium rare.

Weight/Size: 10 lbs; 10.25″ wide x 7.25″ high x 15.25″ deep
Related Products: see related products listed under SB-104



Digital Frequency Display

Manufactured: 72-75
Price: $199.95

Comments: The SB-650 was another very popular accessory for the SB and HW series of receivers and transceivers and caused quite a stir when first released. It was, however, released fairly late in the life of the SB-102 and was made only until the release of the digital readout SB-104 in 1975. The resulting short production life of the 650 has made it a very rare and highly sought-after piece. The SB-650 is a fully solid state device (well, OK, the readout tubes aren't solid state) and is built on one large double-sided PC board. It uses 36 ICs, six transistors, and a handful of diodes. The display uses six Nixie neon discharge tubes and provides a readout to 100 Hz. The SB-650 does not read the operating frequency directly but instead derives the frequency from three signals picked off of the receiver or transceiver. These signals are the BFO, the LMO, and the HFO, and getting them out of the SB or HW transceivers and receivers requires a modification to the units including the drilling of up to three rear panel holes for the installation of up to three phono jacks and some attendant internal wiring. Note that when used in combination with the SB-400 or 401 transmitter, the transmitter requires the addition of a small choke. The 650's manual is very clear about the procedure for all of the SB and HW family. IMPORTANT: You will need the manual to do the installation. Since the 640 depends on three signals, the unit will not read properly under certain conditions. For example, when used with the SB-300, 301, or 303, the 640 will not read correctly if the receiver is placed in the AM or RTTY mode since the BFO signal is not present in those modes. When operating CW, the 640 will read the receive frequency but will indicate the 1 kHz BFO offset upon key down. Attempting to use the 650 with other makes of equipment is not recommended. The only front panel control is an on/off rocker switch. There are four internal controls. Three of these are pots used to set the levels of the BFO, LMO, and HFO signals. The fourth is a trimmer cap used to calibrate the unit. Calibration is very simple. Just tune the receiver to CHU (7.3350 MHz) or WWV (at 15.0000 MHz) and adjust the trimmer for the correct reading. The only rear panel connections are three phono sockets—one for each signal. Interconnecting cables should be made from RG58A/U or equivalent and should be no longer than 18 inches. While a readout to 100 Hz is supposed to be possible, most units suffer a little from jitter in the right-most digit, but this is not a major problem. Maximum stability requires at least a 10-minute warm-up. If the unit you bought doesn't work right, the first course of action should be to re-seat the ICs. With time, the pin/socket junctions may oxidize, causing erratic operation, and re-seating the chips is a simple fix. The SB-650 manual is full of trouble-shooting tips and has dozens of voltage and wave form charts to assist you. Most of the ICs are common TTL devices and should be relatively simple to find should any need to be replaced. The Nixie display tubes are National NL-1220 or Burroughs B-5859A miniatures with wire bases—not the plug-in type. These tubes will be a bit hard to find but often can be scrounged from various pieces of "boat anchor" test equipment (and old desk calculators) found at swap meets. CAUTION: The SB-650 requires plenty of ventilation and should not be placed directly on top of heat-producing equipment. The unit is finished in the standard SB two-tone green wrinkle. The SB-650 is fairly rare.

Weight/Size: 5 lbs; 10″ wide x 6″ high x 10.25″ deep
Related Products: see related products listed under SB-100

HF Linear Amplifier

Manufactured: 87-92
Price: $739.95

Comments: In spite of its SB name, the SB-1000 is not a true Heath product. It is an Ameritron amplifier repackaged in kit form by Heath—and no one was ever really fooled. Still, the SB-1000 was reasonably attractive from both a buyer's and a seller's perspective since it could be sold for less than many commercial amps on the market. Thus Heath was able to revive, albeit briefly, the dynamic that gave it its start. The SB-1000 runs about 1000 watts PEP SSB output and about 850 watts CW. It uses a single 3-500Z in class AB2 grounded grid service. It will dissipate about 500 watts in continuous duty for about 30 minutes and requires about 85 watts of drive for full power output. Maximum permissible drive is 100 watts. The power supply uses a 22 pound hypersil steel E-I core transformer and runs about 3000 volts no load and 2700 volts full load at about .45 amps. Unlike the SB-200 series of amps, the SB-1000 is not "instant on" and requires a 10 second warm-up. Out of the box and as assembled, the frequency coverage is from 160 to 15 meters—including WARC bands. However, the SB-1000 will cover 10 meters as well. All the parts for 10 meter operation are included and are put in place during assembly—including an unlabeled position on the bandswitch. To enable 10 meter operation requires only the snipping of a black wire that exits the input-network enclosure and is attached to the ground lug secured to the plate tuning capacitor reduction-drive mounting screw. (See page 38 of the SB-1000 illustration book.) When operating on 10 meters be sure to turn the bandswitch past the 15 meter setting. The WARC bands are not labeled on the front panel bandswitch. To operate the SB-1000 on a WARC band, set the bandswitch to the nearest band position. For example, to operate on 12 meters, set the bandswitch to 10 meters. For 17 meter operation, set the bandswitch to 15 meters. Note that there are no input network coils specifically for WARC bands and that the output network is not tapped for these bands. As a result, operation on WARC bands will result in about 80 percent of rated power. The SB-1000

features a variable ALC providing a negative-going ALC voltage from 0-20 volts. True QSK operation is possible with the optional QSK board. The QSK board mounts almost directly above the power transfomer. Unless you can remove the unit from its cabinet, the best way to check for the presence of the QSK board is to look for a rear panel screw that had to be added to mount the board. This screw is located just above and to the right of the SO-239 RF output connector. There are two large illuminated panel meters. One is dedicated to grid current and the other will monitor plate current, plate voltage, ALC, and power output. Front panel controls include plate tune, load, band, meter function, main power, and operate/standby. The only rear panel control is the ALC output adjustment. Rear panel connections include SO-239 RF input and output connectors and phono jacks for TR relay, ALC out, and -12 volts (also for TR relay). There is also a ground post. Although the SB-1000 can be wired for either 120 or 240 VAC operation, only a 120 VAC line cord and plug were supplied. If you want to change to 240 VAC operation (preferred) you'll have to find the correct plug, do a bit of re-wiring, and install the correct fuses. The SB-1000 was the last amp Heath ever sold, but because it is not a genuine Heath product, it is not, in the author's opinion, much of a collector's piece. It is, however, a reliable, well-designed product and should be considered by anyone in the market for a good amplifier. Toward the end, Heath blew out its remaining stock of SB-1000s with substantial discounts. Finished in two-tone gray with red dial pointers. Medium rare.

Weight/Size: 48 lbs; 14.5″ wide x 8.25″ high x 14″ deep

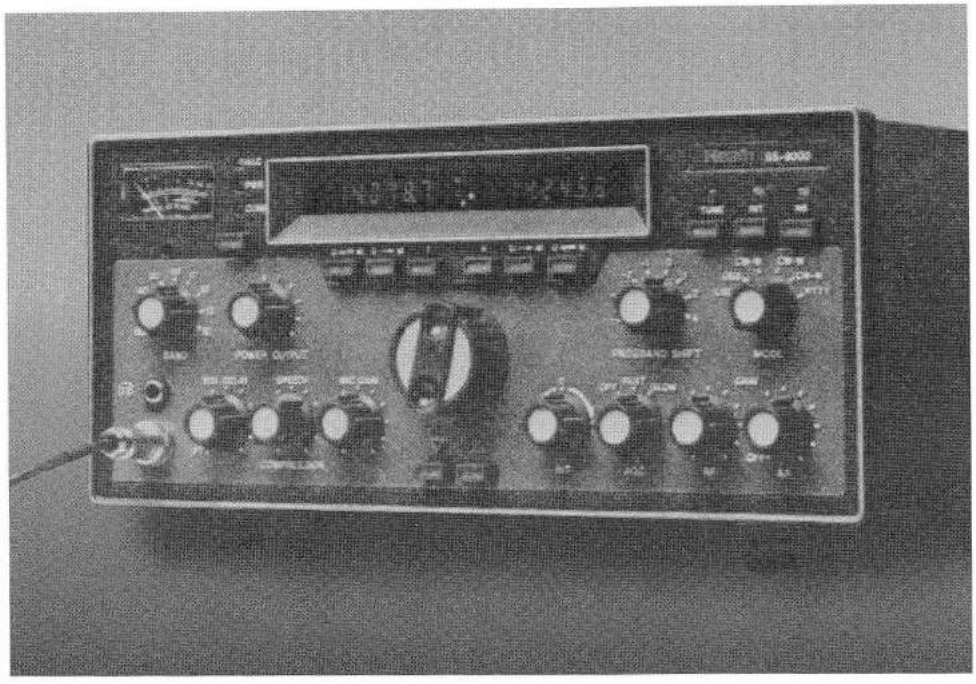
Related Products: SB-200, SB-201, SB-220, SB-221, SB-230, HL-2200

FROM THE HEATH CATALOG

SSB/CW Transceiver

Manufactured: 88-91
Price: $799.95

Comments: The SB-1400 is not a Heath product and was never offered in kit form. It was made for Heath by Yaesu and was patterned after Yaesu's FT-747GX. Because it was neither a Heath product nor a kit, it will not be discussed further.



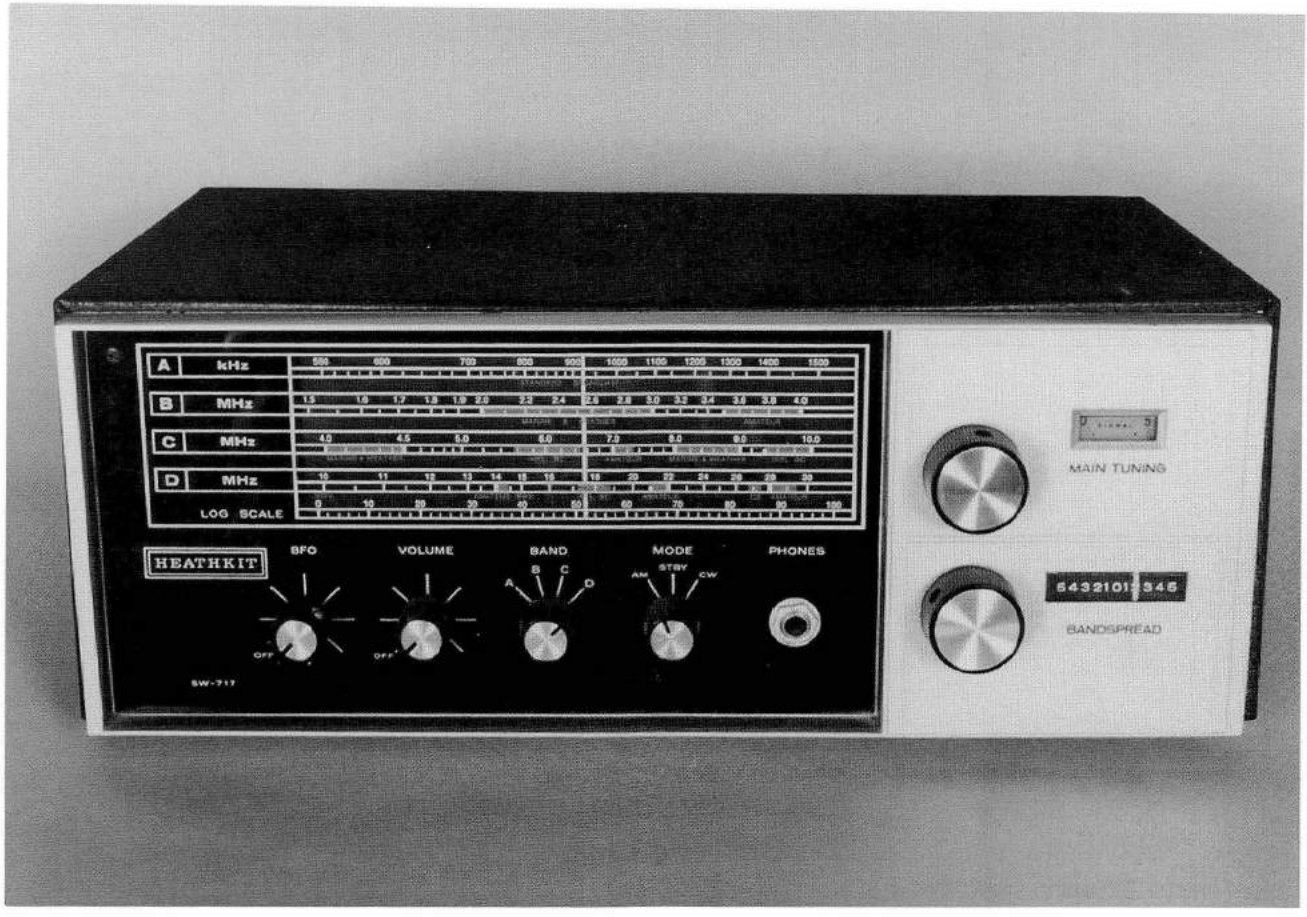
9 Band SSB/CW Transceiver

Manufactured: 82-84
Price: $2795

Comments: The SS-9000, a fully assembled product, actually began life as the SS-8000, a kit-form product. Development of the SS-8000 began in the mid 70s but in 1980, on the verge of shipping, it was clear that the rig was way too complicated for the average ham to assemble and align. Heath decided to redesign the SS-8000 for sale as a fully assembled and tested product, a process that took another three years. The SS-9000 finally shipped in 1982. The computer-controllable rig performed well and was loaded with just about every bell and whistle imaginable at the time. It was advertised as "a transceiver so feature-conscious, it has no options." The micro-processor controlled 9000 features coverage from 160 to 10-meters including the WARC bands and WWV at 15 MHz. The rig runs about 100 watts SSB PEP, about 100 watts CW and RTTY, and tunes in 100 Hz steps (5 kHz per dial revolution). Operation includes split transmit/receive or transceive from two VFOs, each with its own display. Stability is about 3 ppm from a cold start. Other features include full SWR protection, 27 frequency memories (3 per band), a built-in terminal interface (DTE) for full control from a terminal or computer, remote control via modem, push-button frequency slewing (16 selectable rates), compatibility with the SA-1480 Remote Coax Switch, PTT/VOX, RIT, adjustable speech processing, bandpass shift, a noise blanker, Fast/Slow/Off ACG, 400 and 200 Hz CW filters, and a four-function meter. Rear panel connectors and controls include an SO-239 RF antenna connector, linear ALC in, linear ALC adjust, low power enable, five spares, DC power in, CW key jack, external transmit audio in, speaker, external receiver audio, T/R in, T/R out, mute, mute inverted, external relay (for a linear), and an RS-232 port. The SS-9000 requires 11 to 16 VDC (13.8 nominal) with a maximum current of 25 amps at 100 watts CW output. Receive current is about 2 amps. The PS-9000 power supply was listed separately but was almost always offered with the transceiver in a package deal. The power supply features a speaker and a digital clock with two readouts (for GMT and local, for example). The SS-8000/9000 project cost Heath in excess of $3,000,000 and in the end the rig was way too expensive. Although the rig worked well, its high price tag combined with savage competition drove it off the market in less than two years. Heath cut its losses and blew out its remaining stock at huge discounts. Only about 2000 were ever sold. The SS-9000 and its "low end" companion, the HW-5400, were the last big rigs Heath ever made. Get the book—you'll need it.

Weight/Size: 35 lbs; 14″ wide x 6″ high x 13.75″ deep
Related Products: none

FROM THE HEATH CATALOG



General Coverage Receiver

Manufactured: 71-82
Price: $139.95

Comments: The SW-717 is essentially a solid state version of the GR-64 (see listing), which it replaced in 1971. The 717 was the last of the slide-rule dial SWL receivers, but it was not the first fully solid state SWL receiver Heath made. That title belongs to the GC-1(A) (see listing)—built in 1960—and it makes you wonder why, having built a very good solid state receiver way back then, Heath would have clung to the tube-tube type receivers of the GR family as long as it did. The SW-717 uses nine transistors and is built on a single PC board. It covers from 550 kHz to 30 MHz in four bands and features an illuminated dial, electrical bandspread, BFO control, a signal strength meter, ANL (the switch is on the rear panel), built-in speaker, a headphone jack, and a built-in ferrite rod antenna for broadcast band reception. In addition, there is a rear panel screw terminal connection for an external antenna and ground. The 717 will receive AM, CW, and SSB signals but does not have a selector for separate USB and LSB as is found on the GR-54. Because it is a solid state design the 717, is considerably more stable than its predecessor. It is not, however, considerably more sensitive or selective. Heath does not specify the sensitivity of the unit. Suffice it to say that the sensitivity is typical of the genre. The 717 can be aligned without instruments and is designed for 120/240VAC, 50/60 Hz operation. It is housed in a gray cabinet and has white and green band markings. Good condition SW-717s are becoming hard to find.

Weight/Size: 10 lbs; 14.5″ wide x 5.25″ high x 8″ deep
Related Products: AR-1, AR-2, AR-3, GC-1(A), GR-64, GR-78, GR-81, GR-91, SW-7800

General Coverage Receiver

Manufactured: 84-90
Price: $349.95

Comments: There was a two-year gap between the end of the SW-717 and the introduction of the SW-7800. The 7800 is built on three main PC boards plus a small board for the display. The unit's design includes a broadband, up-converting, double-conversion mixer, and covers from 150 kHz to 30 MHz in 30 overlapping bands. Features include fast and slow AGC, a "local/DX" switch, a telescoping whip antenna, and a front panel output (miniature phone jack) for tape recorder. This output is unaffected by the volume control. Other features include a five-digit digital display that resolves to 1 kHz, switch selection of USB/CW, LSB, or wide or narrow AM. There are also a built-in speaker, a standard quarter inch headphone jack (monophonic), an SO-239 antenna connector for a 50 ohm antenna, a screw terminal for a hi-Z antenna (normally connected to the on-board whip antenna), and a muting output for use with a transmitter. Selectivity is 2.5 kHz for SSB, CW, and AM narrow, and 5.5 kHz for AM wide. The manual does not refer to the stability of the SW-7800. Since the radio is fully synthesized and uses PLL circuits, one could conclude that the stability should be reasonable, though the unit owned by the author does not seem to support that conclusion. Only a VTVM is required for alignment. The unit will run from 120 VAC or from 11-15 VDC (750 ma). The SW-7800 enjoyed only moderate success. It was seen as expensive and featureless compared to other ready-made shortwave receivers on the market and was eventually pulled as part of Heath's decision to exit the kit market altogether. Not too rare.

Weight/Size: 7 lbs; 11.5″ wide x 5″ high x 11″ deep
Related Products: AR-1, AR-2, AR-3, GC-1(A), GR-64, GR-78, GR-81, GR-91, SW-717

5 Band AM/CW Transmitter

"Apache"

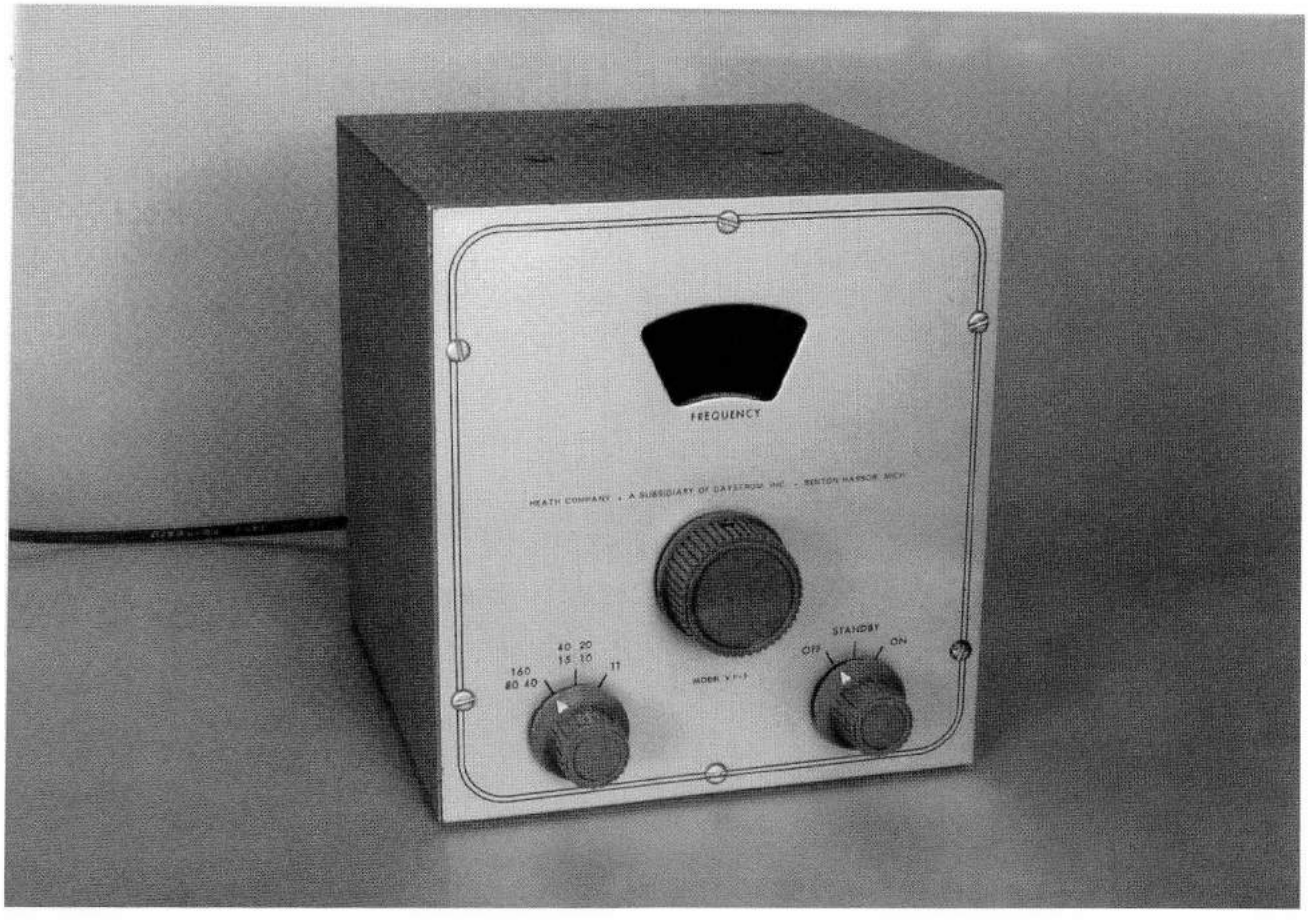
Manufactured: 58-64
Price: $252.50

Comments: The TX-1 and its companion, the RX-1 (see listing), were released as a pair in 1958 and were the first Heath amateur products to wear the now famous two-tone green paint. With a shipping weight of 107 pounds, the TX-1 was typical of transmitters of the day. "Big and heavy" was interpreted by most hams as "good and stable." More than just a DX-100 in a new box, the TX-1 was a substantial improvement over the 100 and was marketed as a step up. The TX-1 is designed around 19 tubes including a pair of 6146 finals. Some of the biggest improvements were in the VFO, a Clapp oscillator (a series tuned Colpitts) in which the 6AU6 filament was left on all the time. The tube was mounted outside the VFO housing, and liberal use was made of temperature compensation components including heavily doped ceramic slug-tuned coil forms. The Apache covers from 80-10 meters, and 11 meters with crystal operation. The TX-1 will not operate 160 meters, which is curious since the matching receiver (the RX-1) will. The TX-1 has a rated input power of 150 watts AM and 180 watts CW, and its Pi-Network output circuit will match from 50-72 ohms. The unit features a built-in power supply (with a solid state bias supply), adjustable low-level speech clipping, "time sequence" keying for "chirpless break-in" CW, heavy shielding, provisions for one crystal frequency, and fan cooled finals. There is also a front panel selector switch to route the signal to a rear panel connector for use with the SB-10 SSB adapter unit (see listing). An illuminated panel meter reads drive plate current, final grid current, final plate current, final plate voltage, and modulator plate current. There are a full range of front panel controls. These include the band switch, VFO main tuning, final amp tuning, driver tuning, frequency control (VFO or crystal), mode, plate high voltage on/off, audio gain, main power, tune/operate, meter function, antenna loading, final amp drive level, and a

spotting switch. The main modulation level control is adjusted with a screwdriver by reaching in through the key jack. In addition to the various controls, there is also a high voltage indicator light. On the rear panel is an octal accessory socket that provides an external duplication of the plate switch and 120 VAC for use with an antenna relay and/or receiver muting. Also available on this socket is 350 VDC at 85 ma and 6.3 VAC at 3.5 amps. These voltages are primarily for use with the SB-10 SSB adapter. A pair of screw terminal contacts near the center of the rear panel provide a general purpose contact closure. There are two closely spaced SO-239 connectors on the rear panel. These are for use with the SB-10 SSB adapter. As viewed from the rear, the left connector provides RF to the SB-10. The right connector provides input to the final amp. Since the RX-1 receiver had been designed and prototyped before the TX-1, and since the two units had to match, some tricky engineering was needed to fit the TX-1 into the the RX-1's box. Among other things, this required some complicated mechanical linkages that ended up working pretty well—even if they did look a little strange. The nick name "scratchy Apache" (not really heard much until recent years) refers to the TX-1's audio quality and is probably undeserved. The TX-1's audio response is about 300-3000 Hz and is really very clean. Any "scratchiness" heard may be the result of component failure or drift due to age or operator error. As in the RX-1, the plastic dial drum is fragile and can crack with rough handling. Be sure to check it before you buy. For 120 VAC 50/60 Hz operation. Two-tone green finish with darker green cabinet. Early units were shipped with satin finish metal knobs while later versions used polished knobs. The RX-1/TX-1 pair were the last big/heavy radios Heath made and were replaced by the SB series—a low cost (relatively speaking) series of products designed to appeal to those who wanted, but could not afford, Collins equipment. The TX-1/RX-1 pair were very successful and Heath sold thousands of them. In spite of this, relatively few remain in good condition. Clean TX-1s in good working order are becoming quite rare.

Weight/Size: 107 lbs; 19.5" wide x 11.5" high x 16" deep
Related Products: RX-1, SB-10, KL-1, HA-10

FROM THE HEATH CATALOG.

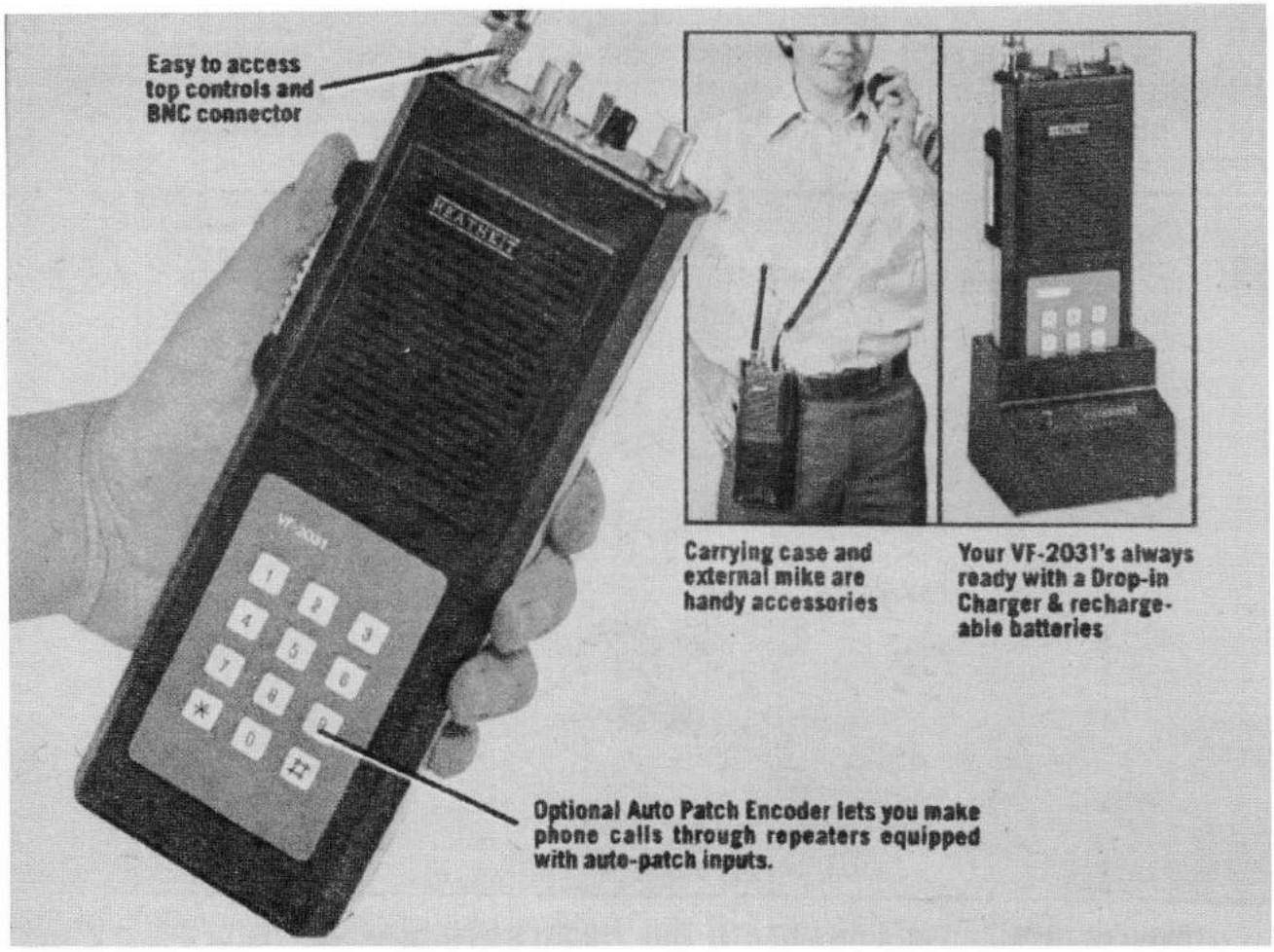


External VFO

Manufactured: 52-61
Price: $19.50

Comments: The VF-1 was Heath's first external VFO and was released in 1952 as a companion unit for the AT-1. The unit outlasted the AT-1 and later was sold for use with the DX-20, 35, and 40, although it could be used with the DX-60 series and others. The VF-1 is the same VFO design used later in the DX-100. It covers 160-10 meters (including 11 meters) with three basic output frequency ranges and provides about 10 volts of RF drive. It uses two tubes: an 0A2 and a 6AU6. The oscillator is an electron-coupled Clapp type (a series tuned Colpitts). Features include an illuminated dial, copper plated chassis, aluminum case, "profuse shielding," ceramic coil forms, switch wafers, and tuning capacitor insulation. The tuning vernier reduction drive provides about two feet of bandspread. There is no built-in power supply. The VF-1 is designed to take its power from the transmitter and requires 250 VDC at 15-20 ma and 6.3 VAC at .45 amps. Although the VF-1 employed some basic temperature compensation techniques, many users minimized drift by building a power supply that would keep the VF-1 powered up all the time. Front panel controls include main tuning, band switch, and off-standby-on. There are two cables on the rear panel: power in and RF out. The VF-1 is painted in a two tone gray to match the AT-1. The knobs are gray and are the same style used on the DX-20, et al. The VF-1 shows up with surprising regularity, though often in poor condition.

Weight/Size: 7 lbs; 6.5″ wide x 7″ high x 7″ deep
Related Products: AT-1, DX series transmitters



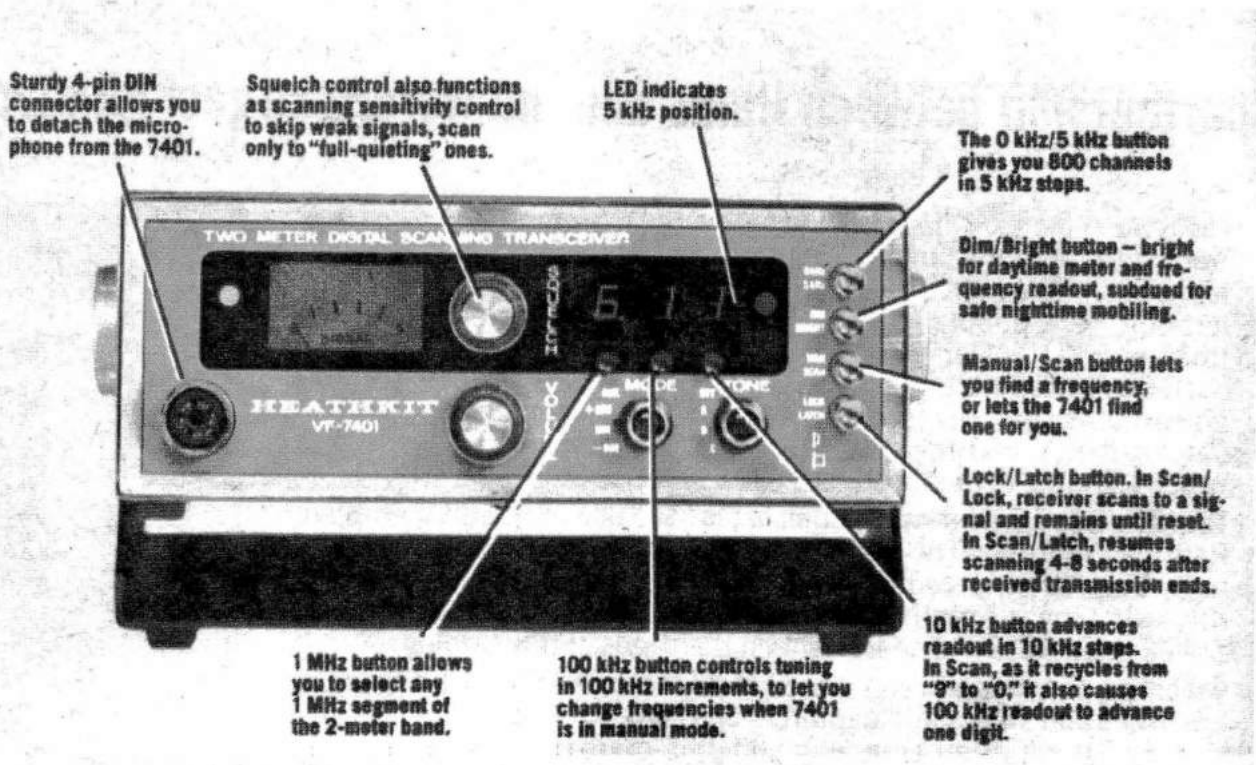
FROM THE HEATH CATALOG.

2 Meter Hand-Held Transceiver

Manufactured: 79-83
Price: $199.95

Comments: The VF-2031 replaced Heath's original HT (the HW-2021) in 1978. The new unit features several significant improvements. First, it has twice the output power—2 watts. Second, it provides switch selection of simplex, plus 600, or minus 600 kHz operation. Third, it provides three additional channels for a total of 8. The VF-2031's total frequency coverage is from 143.5 to 148.5 MHz, but in practice the 8 crystal frequencies all must fall within a single 2 MHz section of the total range. As with its predecessor, Heath cautioned that the VF-2031 was not for beginning kit builders. The 2031 uses a 10.7 MHz IF and has a rated sensitivity is .5 uV or less for 20 db quieting. Crystal formula: Receive crystal frequency = (operating frequency - 10.7) / 9. Top mounted controls include volume, squelch, channel selector, and a three position simplex/offset switch. Another switch controls the optional sub-audible continuous tone encoder. There is also a connector for an optional speaker/mic. Other optional equipment includes a touch tone pad and a leather case. The VF-2031 apparently did not incorporate the battery saver circuit employed in the 2021. Still, the 10 AA NiCads (solder lead type) will provide about 10 hours of "normal" operation. The 2031 is built into a black plastic case with a liner of metal foil covered paper and was supplied with a drop-in charger. The 2031 sold fairly well but suffered from a variety of problems mostly related to difficulty in assembly. Tiny parts in tiny spaces were more than many ops could take on. The VF-2031 requires only a VTVM for alignment. Rare.

Weight/Size: 2 lbs; 3.25″ wide x 9″ high x 2″ deep
Related Products: HA-201, VF-2021, HW-6502



FROM THE HEATH CATALOG.

2 Meter FM Transceiver

Manufactured: 80-83
Price: $369.95

Comments: The VF-7401 was Heath's last kit-type two-meter transceiver. It was a very nice rig with lots of power and features, but it had cost the company a bundle to develop, and by this time Heath was coming under heavy pressure from competition. Sales were never as high as Heath had hoped for, and it is likely that Heath lost money on the 7401. It was the last of the line that began with the HW-202 (see listing). The VF-7401 is a scanning rig but that label is a little misleading. The 7401 has no "memory channels" as we have come to understand them today. It scanned standard channel spacings. Heath advertised that it has "800 channel capacity." Again this is somewhat misleading. What Heath meant was that while scanning in 5 kHz steps, it would scan the 800 standard channel allocations between 144 and 148 MHz. There are two basic scanning modes. In one mode the rig will scan until it comes upon a signal, at which point it will stop until told to continue. In the other mode it will stop and then resume scanning at the end of the transmission. In both cases the unit will only scan 1 MHz portions of the band. Three front panel push buttons allow you to enter any frequency you want, and the unit can be wired to "power up" on a pre-programmed frequency of your choice. This frequency is chosen during assembly and can be rewired later. There is also a front panel switch to select an offset of + or - 600 kHz, + 1 MHz, or simplex. The 7401 will scan a full 4 MHz portion of the band between 143.5 and 148.5 MHz—the entire band—with a rated power output of 15 watts. Power output is continuously variable. The 7401 is built on six PC boards and borrows heavily from its predecessor, the HW-2036. The receiver features a double tuned front end with an RF amp, dual-conversion, an 8-pole crystal IF filter, IC limiting, and Quad detection. Receiver sensitivity is better than .5 uV. Bandwidth is 6 dB down at 15 kHz. All birdies are less than 1 uV equivalent. Heath advertised that the synthesizer had been substantially improved and no longer required a front panel indicator to tell you it's locked on frequency. Heath did, however, put a PLL lock indicator light inside—just in case. The transmitter is protected from high SWR and has a 100 percent duty cycle. Deviation is adjustable from 0-7 kHz. Mobile users may wish to note that the

operating temperature range is from +15 to +125 F. Depending on where you live, these limits could easily be exceeded in your car. The 7401 features a CTCSS (PL) tone encoder. The user can choose from three tones via a front panel switch. Tone frequencies are selected during assembly. Front panel controls include volume, squelch, offset, tone, scan mode, scan/manual, display brightness, a 5 kHz select, and three tuning buttons—1 MHz, 100 kHz, and 10 kHz. The front panel also features a red LED indicating 5 kHz selection, a green LED indicating a unsquelched or "channel busy" condition, and a three digit LED frequency display. Unlike the HW-2036, the mic on the VF-7401 is detachable. The mic connector is a standard 4-pin DIN connector. Rear panel includes power amp tuning, power level controls, a 12 VDC power connector, an external speaker jack, and an SO-239 antenna connector. The 7401 requires 12.6 to 16 VDC (13.8 nominal) and is polarity protected. Receive current consumption is 550 ma (squelched), 750 ma maximum. On transmit the current consumption is 4 amps maximum. Heath packaged the 7401 in a black cabinet with a light blue front panel, and this was the only Heath radio product to use this color scheme besides the rig's matching power supply. The VF-7401 is among the rarest of Heath products and is seldom seen at swap meets.

Weight/Size: 12 lbs; 8.25″ wide x 2.75″ high x 10″ deep

Related Products: HW-202, HW-2026, HW-2036(A), HWA-202-1, HA-202, HM-2102

FROM THE HEATH CATALOG.

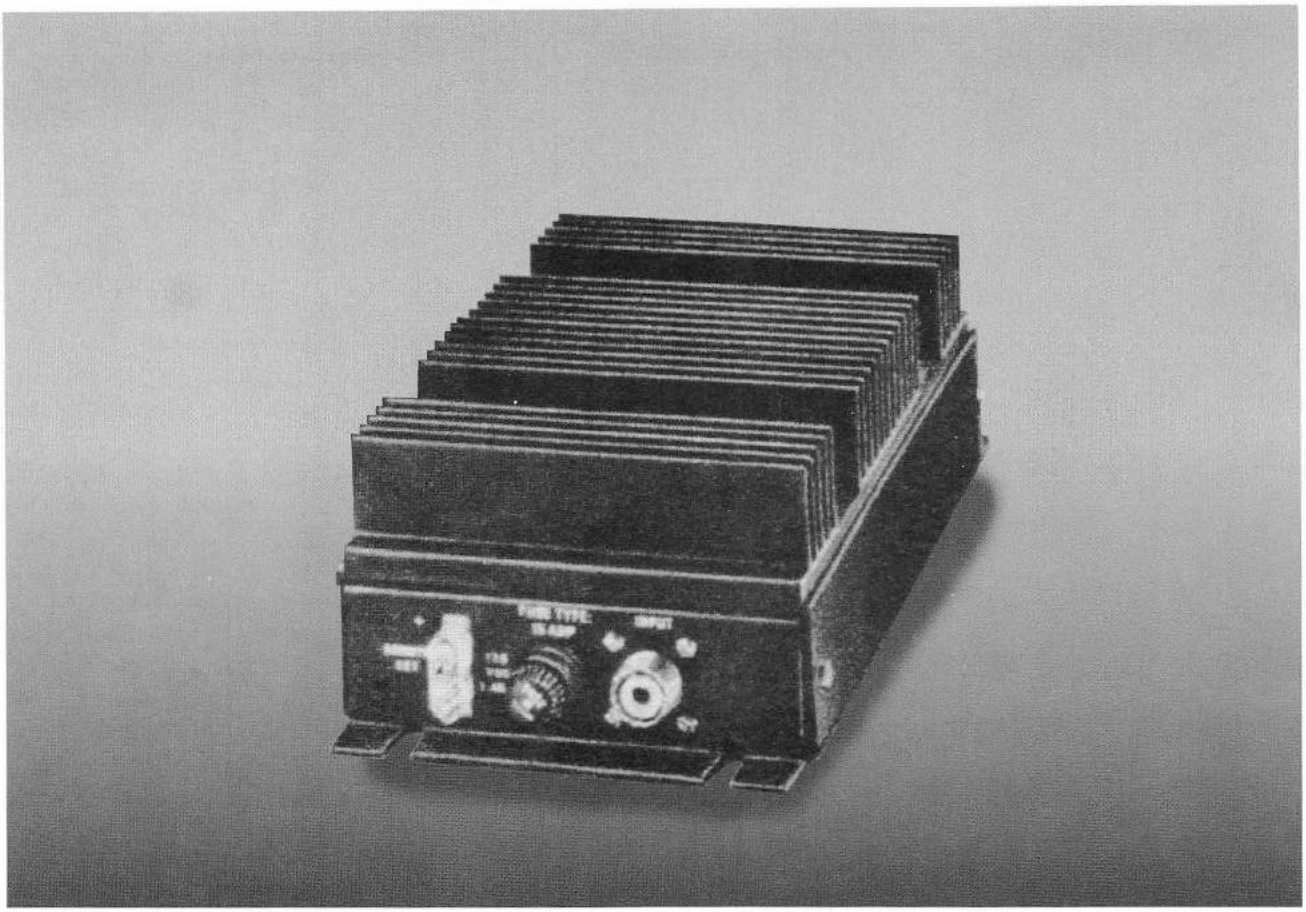
6 and 2 Meter AM/CW Transmitter

"Seneca"

Manufactured: 58-62
Price: $159.95

Comments: Released about the same time as the TX-1, and looking very much like a miniature version of it, the Seneca was Heath's first serious piece of VHF gear. The Seneca covers from 50-54 MHz and from 144-148.3 MHz and will operate AM or CW. The rig is built around 11 tubes including a pair of 6146 finals and has a rated power input on six-meters of 140 CW and 120 AM. On two-meters the input power rating is 110 watts CW and 95 watts AM. Features include carrier controlled AM operation and frequency control from the built-in VFO or one of four crystal. Although Heath advertised that the rig included "two power supplies" only one transformer is used, and it supplies both high and low voltage. The VFO used is the same one used in the TX-1—a 6AU6 running as a Clapp oscillator (a series tuned Colpitts). The output is from 8.000 to 8.222 MHz on two-meters and 8.333 to 9.000 on six-meters. On six-meters the crystal frequency times 6 equals the operating frequency, and ontwo-meters the multiplier is 18. Obviously, on two-meters any drift in the VFO is going to show up in a hurry. A *QST* reviewer noted that when using the Seneca for two-meter CW, "you'd better use a crystal if you want other CW men to think highly of you." The VFO dial drive mechanism and the bandswitch linkages are frightening but actually work quite well—though trying to repair them may lead to an as yet unnumbered Excedrin headache. Neutralization of the 6146s is accomplished with a pair of wires running along the outside each of the tube. During initial tune-up these wires are bent and moved to a position that yields the lowest reading on a grip dip meter. The scheme works quite well. Front panel controls include frequency control, meter function, buffer tune, final tank coupling, multiplier (tunes multiplier plate circuit to 2 times input frequency for six-meters, 3 times for two-meters), loading, drive tune, final tune, function (off, CW, standby, AM), bandswitch, main tuning, and "spot." The illuminated front panel meter reads multiplier grid current, driver grid current, final grid current, final plate current, and final plate voltage. Rear panel connections include a mic connector, S0-239 antenna connector, a standard quarter inch key jack, and a ground post. There is also a rear panel octal accessory socket. This socket provides a remote means of keying the transmitter, a 120 VAC output for an antenna relay, and contacts for receiver muting (wired normally closed). The Seneca is painted with the same two-tone green as the TX-1 and is housed in a one-piece copper-clad steel enclosure. The knobs are satin finish aluminum as opposed to the polished aluminum knobs used later on the HX-30. The VHF-1 is designed for 120 VAC, 50/60 Hz operation. In spite of the fact that Heath kept it on the market for almost five years, interest in the VHF-1 was never very high and comparatively few were sold. Senecas are quite rare in good condition.

Weight/Size: 59 lbs; 16.5″ wide x 10″ high x 10″ deep
Related Products: HX-30, HA-20



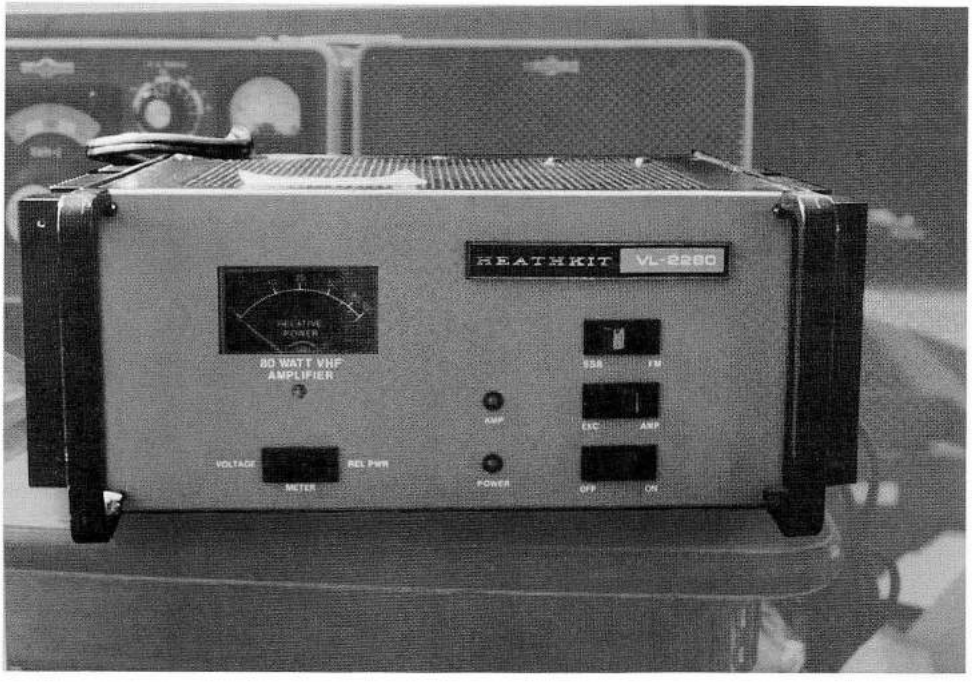
FROM THE HEATH CATALOG.

2 Meter Mobile Linear Amplifier

Manufactured: 81-83
Price: $139.95

Comments: This is the mobile version of the VL-2280 75-watt, all-mode linear amplifier (see listing). The two units are essentially identical in terms of the amplifier electronics. The difference is that the 1180 has no built-in power supply and no metering circuits. With these two items removed, the weight and physical size of the amp shrink considerably. The 1180 requires 12 VDC (nominal) at 11 amps. With a suitably hefty power supply the 1180 can be used for base station as well as mobile operation. Unlike the base station version, which features switch selection of an SSB TR relay drop-out delay, a relay drop-out delay (or lack thereof) in the 1180 must be chosen during assembly by means of a jumper wire. This isn't a big problem if you operate only one mode, but if you switch between FM and SSB, you have to put up with either some relay chatter on SSB or a one-second TR drop-out delay on FM. The technically inclined op could install an external switch to make selection of the delay possible. In spite of the fact that the amp worked very well, got great reviews, and had respectable sales, Heath sold the unit for only three years. For a detailed discussion of the amplifier, please refer to the listing for the VL-2280. The VL-1180 was a bargain in 1981 and is even more of a bargain today. The units are very rare and seldom show up at swap meets.

Weight/Size: 5 lbs; 4.75″ wide x 2.5″ high x 10.5″ deep
Related Products: VL-2280, HA-202(A), HA-201(A)



2 Meter All-Mode Linear Amplifier

Manufactured: 81-83
Price: $279.95

Comments: This big box o' watts was a truly great product: a 75 watt 2-meter all-mode base station linear amplifier for under $300. It got rave reviews and worked extremely well. Heath discontinued the unit s as part of a long-term decision to phase out its amateur product line. Heath also sold a mobile version of this amplifier—the VL-1180 (see listing). The VL-2280 covers 144-148 MHz and requires from 1 to 10 watts of drive. It will operate FM, SSB, and CW providing a nominal 75 watts out with 10 watts in—and will do so from one end of the band to the other without retuning. One watt of drive will yield nearly 20 watts of output. The 2280 has a well regulated power supply and is built on three PC boards. The RF board uses a single MRF247 power transistor and incorporates "strip-line" construction as well as air-wound inductors. Large heat sinks allow the amp to run with a 50 percent duty cycle—10 minutes on, 10 minutes off. These same heat sinks eliminate the need for SWR protection circuits. The unit will withstand a 30:1 SWR at full power. CAUTION: Do not exceed drive or duty cycle specifications. The illuminated front panel meter reads drive power, power output, and DC voltage. Front panel controls include main power, mode, standby, and meter function. The mode switch selects between SSB and FM and simply adds a TR relay drop-out delay to prevent relay chatter in the SSB mode. Two front panel LEDs (green) indicate "power on" and "amplifier on" status. Rear panel connections include two SO-239 RF connectors, a connector for supplying 12 VDC at up to 4 amps to an external device (an exciter for example), and an accessory socket for remote keying of the amp. There are also two standard cartridge fuse holders on the rear panel. One of these is for the 120 VAC input and the other for the 12 VDC supply. The amp may be keyed remotely or by RF sensing and has a built-in TR relay. RF is bypassed around the amp when it is off or in the standby mode. Insertion loss is about .6 db. The 2280 requires either 120 VAC at 4 amps or 240 VAC at 2 amps and also can run from an external 12 VDC source. 12 volt current consumption is 11 amps. Tune-up requires only an exciter and a wattmeter. The VL-2280 was a very popular amp and sold well. Today they are virtually impossible to find and are almost never seen at flea markets. Most units probably are still in service.

Weight/Size: 30 lbs; 13.5″ wide x 5.5″ high x 12.75″ deep
Related Products: VL-1180, HA-202(A), HA-201(A)

MIC CONNECTOR IS NON-ORIGINAL.

Electronic Voice Control

(VOX)

Manufactured: 58-60
Price: $23.95

Comments: The VX-1 is one of a series of small accessories Heath made to go along with the TX-1, RX-1, et al. It is built into the same box as the AM-2, the CA-1, and others. Although we now take VOX for granted, in its day the VX-1 was regarded as something of a luxury. Connection and operation of the unit is simple. The station mic connects to the VX-1 via a front panel connector. A terminal strip on the rear panel provides connections to the receiver, speaker, transmitter mic input, and a 120 volt TR relay. Front panel controls include power on/off, receive and transmit sensitivity, and delay. The VX-1 is painted in a silver and gray style to match the DX-100, AM-2, and others. The top and sides of the cabinet are perforated to provide ventilation. The VX-1 is one of the rarest Heath products ever made and finding one will require a special effort.

Weight/Size: 3 lbs; 7.25″ wide x 4.75″ high x 4.25″ deep
Related Products: AM-1, CA-1, QF-1

Heath Master Product Index
by Model

MODEL #	TYPE	NOTES / SPECIFICATIONS	FIRST YEAR MADE	FIRST CATALOG APPEARANCE*	LAST SOLD FOR	LAST YEAR MADE
AC-1	Antenna Coupler		53	WI	14.50	56
AK-5	Speaker	For RX-1	58		9.95	60
AK-6	Misc	Mobile Mounting kit for MT-1 and MR-1	59		4.95	63
AK-7	Speaker	Mobile for MR-1 and HR-20	59	1	5.95	63
AM-1	Impedance Meter		52	FA	19.50	60
AM-2	SWR Meter	HF	57	FA	15.95	62
APACHE	Transmitter	See TX-1				
AR-1	Receiver	SWL 550kHz-20MHz	49		23.50	51
AR-2	Receiver	SWL 535kHz-35MHz	52	FA	25.50	55
AR-3	Receiver	SWL 550kHz-30MHz	56	1	27.95	61
AT-1	Transmitter	80/40/20/15/11/10 CW	52	FA	29.50	56
B-1	Balun Coil	80-10 meter 200w	57	FA	8.95	63
CA-1	CONELRAD Alarm		57	FA	13.95	60
CANTENNA		See HN-31				
CB-1	Transceiver	"CB" "Lunch Box"	59	6	42.95	62
CHEYENNE	Transmitter	See MT-1				
CHIPPEWA	Amplifier	See KL-1				
CO-1	Code Practice Oscillator		59	6	7.95	67
COMANCHE	Receiver	See MR-1				
CROSSFIRE	RTTY Tuning Indicator	See HD-3006				
DX-20	Transmitter	80-10 meter 50w CW	57	1	35.95	60
DX-35	Transmitter	80-10 meter 75w AM/CW	56	1	56.95	57
DX-40	Transmitter	80-10 meter 75w AM/CW	58		64.95	60
DX-60	Transmitter	80-10 meter 75w AM/CW	61	5	82.95	64
DX-60A	Transmitter	80-10 meter 75w AM/CW	65	1	79.95	67
DX-60B	Transmitter	80-10 meter 75w AM/CW	67	6	79.95	76
DX-100	Transmitter	80-10 meter 100 Watt AM/CW	55	SP	189.50	57
DX-100B	Transmitter	HF 80-10 AM CW	58		189.95	60
EK-2	Receiver	SWL educational super regen	61	5	19.95	67
GC-1	Receiver	Solid-state SWL 550kHz-32MHz "Mohican"	60	6	99.50	62
GC-1A	Receiver	Solid-state SWL 550kHz-32MHz "Mohican"	62	6	89.50	68
GC-1000	Clock	"Most Accurate Clock"	83	XM	249.95	92
GC-1005	Clock	6 digit 7 segment neon	73	SU		77
GC-1107	Clock	4 digit fluorescent	77		29.50	84
GC-1094	Clock	Same as GC-1005				
GC-1108	Clock	Replaces GC-1107	84		24.95	91
GCW-1001	Clock	"Most Accurate Clock II" - assembled	92	1	349.95	92
GCW-1001-1	Clock	Slave clock for use with GCW-1001	92	1	149.95	92
GD-1	Grid Dip Meter		52		19.50	52
GD-1A	Grid Dip Meter		53	SP	19.50	53
GD-1B	Grid Dip Meter		53	SP	19.50	60
GD-125	Q Multiplier	"Low boy" styling	66	3	14.95	71
GH-12	Microphone	PTT mobile	66	3	6.95	66
GH-12A	Microphone	PTT mobile - new color/dark green	69	FW	6.95	79
GP-11	Power Supply	12 VDC for Lunch Box mobile	63	3	16.88	69

*First catalog appearance by season (WI=winter, SP= spring, SU= summer, FW=fall/winter, XM=Christmas) or month (1=January, 2= February, etc.).

MODEL #	TYPE	NOTES / SPECIFICATIONS	FIRST YEAR MADE	FIRST CATALOG APPEARANCE*	LAST SOLD FOR	LAST YEAR MADE
GR-54	Receiver	SWL 550kHz-30MHz deluxe	65	6	84.95	71
GR-64	Receiver	SWL 550kHz-30MHz	64	XM	39.95	71
GR-78	Receiver	Solid-state SWL 190kHz - 30MHz portable	69	FW	141.95	76
GR-81	Receiver	SWL 140kHz-18MHz super regen	61	11	24.95	72
GR-88	Receiver	VHF 152-174MHz FM tunable	69		54.95	77
GR-91	Receiver	SWL superhet 550kHz-30MHz	61	11	39.95	64
GR-98	Receiver	VHF Aircraft band tunable	69		54.95	76
GR-110	Scanner	8 ch VHF highband - digital readout	73	SU	129.95	76
GR-740	Scanner	40 ch prog - A Bearcat kit w/Heath name	84	SP	249.95	84
GR-1131	Scanner	8 ch VHF highband 8	76	XM	89.95	78
GR-1132	Scanner	8 ch LO/HI/UHF 8	76	XM	269.95	79
GR-1133	Scanner	8 ch aircraft band	77	XM	Never Released	
GW-30	Transceiver	10 meter or CB Walkie-Talkie - can be either	60	6	32.95	62
HA-10	Amplifier	HF KW amp Replaces KL-1 - has internal power supply	61	5	229.95	65
HA-14	Amplifier	KW Kompact linear 80-10 meter	65	5	99.95	68
HA-20	Amplifier	6 meter 70 watts PEP	62	10	99.95	64
HA-201	Amplifier	VHF (143-149MHz 10w)	74	XM	29.95	77
HA-201A	Amplifier	VHF (improved HA-201)	78	FA	39.95	83
HA-202	Amplifier	VHF (143-149MHz 40w)	73	SP	64.95	77
HA-202A	Amplifier	VHF (improved HA-202)	78	FA	79.95	84
HA-2513	Antenna	Discone - 25-1300MHz	87	SP	79.95	87
HD-10	Keyer		65	XM	39.95	74
HD-11	Q Multiplier	Improved QF-1	61	11	14.95	64
HD-15	Phone Patch	"low boy" styling	66	1	24.95	83
HD-16	Code Practice Oscillator	Replaces CO-1	67	3	8.95	74
HD-19	Phone Patch	Phone Patch	60	1	34.95	65
HD-20	Crystal Calibrator	100 kHz stand alone general purpose	60	6	14.95	75
HD-1234	Coaxial Switch		73	XM	11.95	91
HD-1250	Grid Dip meter	Replaces GD-1B	75	1	69.95	91
HD-1410	Keyer	Replaces HD-10	75	SU	59.95	84
HD-1416	Code Practice Oscillator	Replaces HD-16	75	1	12.95	84
HD-1416A	Code Practice Oscillator	Replaces HD-1416	85		24.95	90
HD-1416H	Code Practice Oscillator	Replaces HD-1416A	88	WI	19.95	91
HD-1418	Audio Filter	Active audio filter	83	XM	129.95	91
HD-1420	Converter	VLF to HF	86		49.95	91
HD-1422	Antenna Noise Bridge		85		49.95	89
HD-1422A	Antenna Noise Bridge		89	SP	49.95	91
HD-1424	Antenna	Active Antenna	85		49.95	89
HD-1424A	Antenna	Active Antenna Replaces HD-1424	89	SP	59.95	91
HD-1426	Field Strength Meter	Replaces PM-2	77	SP	12.95	80
HD-1481	Antenna Switch	4 position - Replaces SA-1480	84	FA	89.95	91
HD-1515	Phone Patch	Phone Patch	85		49.95	87
HD-1530	Touch-Tone Decoder	Touch-Tone Decoder	85		79.95	90
HD-1780	Antenna Rotor	"IntelliRotor"	90	XM	279.95	92
HD-1982	Microphone	"Micoder" touch-tone mike	77	SP	54.95	77
HD-1984	Microphone	"Micoder" Replaces HD-1982	78	SP	39.95	83
HD-1986	Microphone Pre-amp	"Microlizer"	84	FA	39.95	87
HD-3006	RTTY Tuning Indicator	"Crossfire"	84	FA	59.95	86
HD-3030	RTTY Terminal Unit		84	SP	249.95	87
HD-4040	TNC		85		199.95	87
HD-8999	Keyer	CW Keyboard ("UltraPro")	83	XM	249.95	88
HDP-21	Microphone	Base type for SB/HW series	62	10	29.40	66
HDP-121	Microphone	Base type for SB/HW - Replaces HDP-21	76	SP	44.95	77
HDP-121A	Microphone	Base type for SB/HW - Replaces HDP-121	78	SP	44.95	81
HDP-242	Microphone	Base type SB/HW Replaces HDP-121A	82	SP	49.95	82
HDP-444	Microphone	Base type new design for SB/HW	87	SP	59.95	90
HDP-1228	Speaker	portable for use	77	FA	9.95	79
HDP-1340	Microphone	PTT mobile	80	XM	15.95	81
HFT-9	Antenna Tuner	1.8-30MHz 50w with 4:1 balun	83	XM	54.95	91
HFT-9A	Antenna Tuner	Replaces HFT-9	87	SP	49.95	90
HG-10	VFO	80-2 meter matches DX-60	61	11	34.95	66
HG-10B	VFO	80-2 meter matches DX-60	67	6	37.95	76

MODEL #	TYPE	NOTES / SPECIFICATIONS	FIRST YEAR MADE	FIRST CATALOG APPEARANCE*	LAST SOLD FOR	LAST YEAR MADE
HK-21	TNC	"pocket packet"	88	SP	219.95	91
HK-232	TNC	multi-mode	87	FA	279.95	91
HK-232A	TNC	multi-mode	88	XM	279.95	90
HL-2200	Amplifier	HF (2kw linear matches SS-9000 Replaces SB-221)	83	SP	849.95	84
HM-9	Wattmeter	50w HF OR 6 meter OR 2 meter—choose one	83	XM	49.95	91
HM-10	Tunnel-Dipper		61	11	34.95	62
HM-10A	Tunnel-Dipper		62	10	34.95	70
HM-11	SWR Meter	HF	62		15.95	65
HM-15	SWR Meter	1.8-54MHz - "low boy" styling	66	1	14.95	70
HM-102	Wattmeter	3.5-30 MHz 2000w w/SWR bridge	70	XM	34.95	81
HM-2102	Wattmeter	50-160 MHz 250w	73	SP	34.95	81
HM-2103	Dummy Load / Wattmeter	1.8-30 MHz 1000w air cooled	73		69.95	75
HM-2140	Wattmeter	1.8-30 MHz 2000w dual reading	79	SP	74.95	83
HM-2140A	Wattmeter	HM-2140 with new paint	84	SP	99.95	91
HM-2141	Wattmeter	50-175 MHz 300w dual reading	79	XM	79.95	83
HN-31	Dummy load	0-450 MHz 2000w "Cantenna"	61	1	9.95	83
HN-31A	Dummy Load	Re-designed HN-31	83	SP	24.95	91
HO-10	Scope	Station monitor for TX-1 etc	62	7	59.95	66
HO-13	Panadapter	Panadapter for RX-1 etc	64	7	79.00	66
HO-5404	Scope	Station Monitor - see HOA-5404-1	85		249.95	88
HOA-5404-1	Panadapter Module	Panadapter Module for HO-5404	85		99.95	86
HP-10	Power Supply	Mobile supply for various	60	6	44.95	63
HP-13	Power Supply	Mobile for SB series	63	7	59.95	70
HP-13A	Power Supply	Mobile for SB series	70	SP	78.95	73
HP-13B	Power Supply	Mobile for SB series	73	XM	78.95	79
HP-14	Power Supply	Mobile for HA-14	65	5	89.95	68
HP-20	Power Supply	Replaces UT-1	61	5	29.95	63
HP-23	Power Supply	120 VAC for SB series	63	5	39.95	68
HP-23A	Power Supply	120 VAC for SB series	68	5	59.50	73
HP-23B	Power Supply	120 VAC for SB series	73	XM	59.95	77
HP-23C	Power Supply	120 VAC for SB series	78	SP	62.95	79
HP-24	Power Supply	120 VAC for HA-14	65	5	49.95	68
HP-1144	Power Supply	For SB-104 & HW-104	74	XM	99.95	78
HP-1175	Power Supply	For HW-2036A & HA-202A	78	SU	64.95	79
HR-10	Receiver	80-10 meter / matches DX-60	61	11	82.95	67
HR-10B	Receiver	80-10 meter / matches DX-60	67	6	75.00	75
HR-20	Receiver	SSB AM CW mobile replaces MR-1	62	3	134.95	64
HR-1680	Receiver	80-10 meter / replaces HR-10B	76	FA	239.95	82
HRA-101	Crystal Calibrator	100kHz for HR-10	67		8.95	73
HS-24	Speaker	Mobile for HW series incl. Singlebanders	64	7	7.00	78
HS-1661	Speaker	For HW-104	75	XM	22.95	82
HW-7	Transceiver	40/20/15 meters CW QRP	72	FA	79.95	75
HW-8	Transceiver	80/40/20/15 meters QRP - improved HW-7	76	SP	139.95	83
HW-9	Transceiver	80/40/20/15 meters QPR - improved HW-8	84	SP	249.95	91
HW-10	Transceiver	6 meter mobile "Shawnee"	61	5	199.95	65
HW-12	Transceiver	80 meter 200w PEP SSB "Singlebander"	63	5	119.95	66
HW-12A	Transceiver	80 meter 200w PEP SSB Replaces HW-12	66	10	99.95	74
HW-16	Transceiver	80/40/15 meters CW	67	6	99.50	76
HW-17	Transceiver	2 meter AM	68	5	129.95	69
HW-17A	Transceiver	2 meter AM	69	FW	129.95	70
HW-18-1	Transceiver	4450-4650kHz 200w SSB Civil Air Patrol	68	3	119.95	72
HW-18-2	Transceiver	MARS SSB	68	3	109.95	69
HW-18-3	Transceiver	160 meter SSB	68	3	109.95	69
HW-19	Transceiver	10 meter 5w AM "Tener" - "Lunch Box"	60	1	39.95	62
HW-20	Transceiver	2 meter mobile "Pawnee"	61	5	199.95	65
HW-22	Transceiver	40 meter 200w PEP SSB "Singlebander"	63	7	119.95	66
HW-22A	Transceiver	40 meter 200w PEP SSB Replaces HW-22	66	10	104.95	74
HW-29	Transceiver	6 meter 5w AM "Sixer" - "Lunch Box"	60	1	39.95	60
HW-29A	Transceiver	6 meter 5w AM "Sixer" - "Lunch Box"	61	5	44.95	71
HW-30	Transceiver	2 meter 5w AM "Twoer" - "Lunch Box"	60	6	44.95	71
HW-32	Transceiver	20 meter 200w PEP SSB "Singlebander"	63	7	119.95	66
HW-32A	Transceiver	20 meter 200w PEP SSB Replaces HW-32	66	10	104.95	74

MODEL #	TYPE	NOTES / SPECIFICATIONS	FIRST YEAR MADE	FIRST CATALOG APPEARANCE*	LAST SOLD FOR	LAST YEAR MADE
HW-99	Transceiver	50 watt HF CW	85		299.95	87
HW-100	Transceiver	80-10 meter 180w PEP SSB/CW HF	68	3	250.00	70
HW-101	Transceiver	80-10 meter 180w PEP SSB/CW HF	70	XM	399.95	83
HW-104	Transceiver	Solid-state 80-10 meter 100w PEP SSB/CW H)	75	XM	569.95	77
HW-202	Transceiver	2 meter 6 ch 10 w FM base/mobile	73	SP	189.95	77
HW-2021	Transceiver	2 meter HT 1 watt	75	XM	179.95	77
HW-2026	Transceiver	2 meter 10w synth base/mobile	75	XM	299.95	76
HW-2036	Transceiver	improved HW-2026	76	XM	269.95	77
HW-2036A	Transceiver	improved HW-2036	78	SP	297.95	79
HW-5400	Transceiver	HF syth w/WARC replaces SB-104	83	WI	699.95	84
HW-6502	Transceiver	2 meter HT w/thumb wheels - assembled	85		199.95	86
HWA-9	Band Pack	WARC crsytal pack for HW-9	84	SP	39.95	91
HWA-17-1	Power Supply	Mobile for HW-17	68	5	29.95	69
HWA-17-2	FM Adapter	For use with HW-17	69	FW	21.50	69
HWA-202-1	Power Supply	For HW-202	73		34.95	77
HWA-202-2	Tone Burst Encoder	For HW-202	73		29.95	77
HWA-2036-3	Power Supply	120 VAC for HW-2036A	78	SP	39.95	79
HWA-5400-1	Power Supply	120 VAC for HW-5400 w/speaker & clock	83	WI	199.95	84
HWA-5400-3	Frequency Entry Keypad	Frequency Entry Keypad for HW-5400	83	WI	59.95	84
HWA-6502-1	Amplifier	Amplifier (25 watt 2 meter - assembled)	85		49.95	86
HWA-6502-2	Misc	Mobile Console for HW-6502 HT	85		89.95	86
HX-10	Transmitter	80-10 meter SSB/AM/CW	62	1	334.95	65
HX-11	Transmitter	80-10 meter 50 watt novice	61	11	43.50	63
HX-20	Transmitter	SSB 80-10 mobile replaces Cheyenne	62	3	199.95	64
HX-30	Transmitter	6 meter SSB AM CW 10 watt PEP	62	10	189.95	65
HX-1681	Transmitter	HF/QSK matches HR-1680	79	SU	239.95	82
ID-1390	Thermometer	Digital thermometer - 7 segment neon readout	73	XM	64.95	77
ID-1390A	Thermometer	Digital thermometer - 7 segment neon readout	77	XM	64.95	81
ID-1390B	Thermometer	Digital thermometer - 7 segment neon readout	82	SP	79.95	92
IIM-4180	FM Deviation Meter		79	WI	169.95	87
IM-4190	Wattmeter	Bi-directional	78	SP	114.95	81
KL-1	Amplifier	HF KW - requires KS-1 power supply	59	6	399.95	60
KS-1	Power Supply	for KL-1	59	6	169.95	60
LUNCH BOX	Transceiver	See HW-19, HW-29, HW-30, CB-1				
MARAUDER	Transmitter	See HX-10				
MICROLIZER	Microphone Pre-amp	See HD-1986				
MOHAWK	Receiver	See RX-1				
MOHICAN	Receiver	See GC-1 and GC-1A				
MP-1	Power Supply	Mobile for MT-1/MR-1	60	1	44.95	60
MP-10	Inverter	12 VDC to 115 VAC inverter	60	6	29.95	68
MR-1	Receiver	"Comanche" mobile 80-10 AM/CW/SSB	59	1	119.95	62
MR-1134	Scanner	8 ch VHF marine band 156-163 MHz	76	XM	99.95	77
MT-1	Transmitter	"Cheyenne" mobile 80-10 meter 90w AM	59	1	99.95	62
PAWNEE	Transceiver	See HW-20				
PM-1	Field Strength Meter		58		12.95	59
PM-2	Field Strength Meter		59	1	12.95	75
PS-23	Power Supply	same as HP-23C			69.96	83
PS-1144	Power Supply	120 VAC for SB-104A	78	SP	99.95	82
PS-1175	Power Supply	120 VAC for 2 meter gear			74.95	83
PS-9000	Power Supply	120 VAC for SS-9000	82	XM	295.00	83
PSA-9	Power Supply	120 VAC for HW-9	84	SP	39.95	91
QF-1	Q Multiplier		56	1	9.95	60
RM-1	Antenna	HF mobile	60	3	36.95	60
RX-1	Receiver	160-10 meter "Mohawk"	58		274.95	64
SA-1480	Antenna Switch	5 position remote	79	FA	84.95	84
SA-2040	Antenna Tuner	80-10 meter 2kw	79	XM	149.95	83
SA-2060	Antenna Tuner	160-10 meter deluxe w/watt & SWR meter	81	SU	259.95	83
SA-2060A	Antenna Tuner	160-10 meter 1kw replaces SA-2060	83	SP	279.95	91
SA-2500	Antenna Tuner	160-10 meter 1kw automatic	84	FA	599.95	87
SA-2550	Antenna Matcher	160-10 meter 1500 PEP	85		149.95	88
SA-5010	Keyer	"uMatic"	81	FA	99.95	??
SA-5010A	Keyer	Replaces SA-5010	85		99.95	91
SB-10	Sideband Adapter	For use with TX-1 etc	59		89.95	64

MODEL #	TYPE	NOTES / SPECIFICATIONS	FIRST YEAR MADE	FIRST CATALOG APPEARANCE*	LAST SOLD FOR	LAST YEAR MADE
SB-100	Transceiver	80-10 meter 180 PEP SSB/CW	65	XM	360.00	67
SB-101	Transceiver	80-10 meter 180 PEP SSB/CW	67	3	360.00	70
SB-102	Transceiver	80-10 meter 180 PEP SSB/CW	70	SP	380.00	75
SB-104	Transceiver	80-10 meter 100w SSB/CW solid-state	74	XM	699.95	77
SB-104A	Transceiver	Replaces SB-104	77	SU	699.95	82
SB-110	Transceiver	6 meter	65	6	320.00	69
SB-110A	Transceiver	6 meter replaces SB-110	69		299.00	71
SB-200	Amplifier	HF linear 1200 PEP	64	7	389.95	78
SB-201	Amplifier	Replaces SB-200 - no 10 meter	78	XM	449.94	83
SB-220	Amplifier	HF linear 2kw PEP	70	SP	369.95	78
SB-221	Amplifier	Replaces SB-220 - no 10 meter	78	XM	599.95	83
SB-230	Amplifier	HF linear 1200 PEP	74	XM	469.95	78
SB-300	Receiver	80-10 meter SSB/CW optional AM	63	10	264.95	66
SB-301	Receiver	80-10 meter SSB/CW optional AM	66	10	260.00	70
SB-303	Receiver	80-10 meter solid state SSB/CW	70	XM	345.00	76
SB-310	Receiver	SWL 49/41/31/25/19/16m + 80/40/20/11m	67	XM	249.00	72
SB-313	Receiver	SWL solid state ver of SB-310	72	XM	339.95	75
SB-400	Transmitter	80-10 meter 180 PEP SSB/CW	64	7	325.00	66
SB-401	Transmitter	80-10 meter 180 PEP SSB/CW	66	10	285.00	75
SB-500	Transverter	For 2 meters for use with SB-series	69	FW	195.00	71
SB-600	Speaker	Matches SB-100 et al	66	3	17.95	75
SB-604	Speaker	Matches SB-104	74	XM	33.95	82
SB-610	Scope	Station monitor matches SB-100 et al	66	7	99.95	75
SB-614	Scope	Station monitor matches SB-104 et al	74	XM	199.95	82
SB-620	Panadapter	"Scanalyzer" panadapter matches SB-100 et al	66	10	159.95	76
SB-630	Station Console	Matches SB-100 et al	66	10	74.95	74
SB-634	Station Console	Matches SB-104 et al	74	XM	199.95	83
SB-640	VFO	Remote for SB-101/102	67	6	99.00	70
SB-644	VFO	Remote for SB-104	74	XM	134.95	78
SB-644A	VFO	Replaces SB-644	79	WI	134.95	83
SB-650	Freq Display	For SB-100 et al	72	SP	199.95	75
SB-1000	Amplifier	HF linear 1000 PEP	87	FA	739.95	92
SB-1400	Transceiver	Not a Heath product or kit	88		799.95	91
SBA-100-1	Misc	Mobile Mounting braket for SB series	68		14.95	73
SBA-401-1	Misc	Crystal Pack for SB-401	67		29.95	
SCANALYZER	Panadapter	See SB-620				
SENECA	Transmitter	See VHF-1				
SHAWNEE	Transceiver	See HW-10				
SIXER	Transceiver	See HW-29 and HW-29A				
SP-99	Speaker	Matches HW-99 / HW-9			29.95	91
SS-9000	Transceiver	WARC 100w SSB/CW assembled	82	XM	2795.00	84
SW-717	Receiver	Solid-state SWL 550kHz-30MHz	71	XM	139.95	82
SW-7800	Receiver	Solid-state SWL 550kHz-30MHz digital readout	84	FA	349.95	90
TENER	Transceiver	See HW-19				
TWOER	Transceiver	See HW-30				
TX-1	Transmitter	80-10 meter 150w AM/CW "Apache"	58	6	229.50	64
ULTRAPRO	Keyer	See HD-8999				
UT-1	Power Supply	120 VAC for MT-1/MR-1	60	1	28.95	60
VF-1	VFO	VFO (80-10 meter for use with DX series)	52	FA	19.50	61
VF-2031	Transceiver	2 meter HT 2 watt 8 ch	79	XM	199.95	83
VF-7401	Transceiver	2 meter scanning replaces HW-2036A	80	SP	369.95	83
VFA-7401-1	Power Supply	120 VAC for VF-7401	80	XM	44.95	82
VHF-1	Transmitter	6 & 2 meter "Seneca"	58		159.95	62
VL-1180	Amplifier	2 meter 75 watt mobile	81	SU	139.95	83

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MODEL #	TYPE	NOTES / SPECIFICATIONS	FIRST YEAR MADE	FIRST CATALOG APPEARANCE*	LAST SOLD FOR	LAST YEAR MADE
CHIPPEWA	Amplifier	See KL-1				
HA-10	Amplifier	HF KW amp replaces KL-1 - has internal power supply	61	5	229.95	65
HA-14	Amplifier	KW Kompact linear 80-10 meter	65	5	99.95	68
HA-20	Amplifier	6 meter 70 watts PEP	62	10	99.95	64
HA-201	Amplifier	VHF (143-149MHz 10w)	74	XM	29.95	77
HA-201A	Amplifier	VHF (improved HA-201)	78	FA	39.95	83
HA-202	Amplifier	VHF (143-149MHz 40w)	73	SP	64.95	77
HA-202A	Amplifier	VHF (improved HA-202)	78	FA	79.95	84
HL-2200	Amplifier	HF (2kw linear matches SS-9000 replaces SB-221)	83	SP	849.95	84
HWA-6502-1	Amplifier	Amplifier (25 watt 2 meter - assembled)	85		49.95	86
KL-1	Amplifier	HF KW - requires KS-1 power supply	59	6	399.95	60
SB-200	Amplifier	HF linear 1200 PEP	64	7	389.95	78
SB-201	Amplifier	Replaces SB-200 - no 10 meter	78	XM	449.94	83
SB-220	Amplifier	HF linear 2kw PEP	70	SP	369.95	78
SB-221	Amplifier	Replaces SB-220 - no 10 meter	78	XM	599.95	83
SB-230	Amplifier	HF linear 1200 PEP	74	XM	469.95	78
SB-1000	Amplifier	HF linear 1000 PEP	87	FA	739.95	92
VL-1180	Amplifier	2 meter 75 watt mobile	81	SU	139.95	83
VL-2280	Amplifier	2 meter 75 watt base station	81	SU	279.95	84
HA-2513	Antenna	Discone - 25-1300MHz	87	SP	79.95	87
HD-1424	Antenna	Active Antenna	85		49.95	89
HD-1424A	Antenna	Active Antenna replaces HD-1424)	89	SP	59.95	91
RM-1	Antenna	HF mobile	60	3	36.95	60
AC-1	Antenna Coupler		53	WI	14.50	56
SA-2550	Antenna Matcher	160-10 meter 1500 PEP	85		149.95	88
HD-1422	Antenna Noise Bridge		85		49.95	89
HD-1422A	Antenna Noise Bridge		89	SP	49.95	91
HD-1780	Antenna Rotor	"IntelliRotor"	90	XM	279.95	92
HD-1481	Antenna Switch	4 position - replaces SA-1480	84	FA	89.95	91
SA-1480	Antenna Switch	5 position remote	79	FA	84.95	84
HFT-9	Antenna Tuner	1.8-30MHz 50w with 4:1 balun	83	XM	54.95	91
HFT-9A	Antenna Tuner	Replaces HFT-9	87	SP	49.95	90
SA-2040	Antenna Tuner	80-10 meter 2kw	79	XM	149.95	83
SA-2060	Antenna Tuner	160-10 meter deluxe w/watt & SWR meter	81	SU	259.95	83
SA-2060A	Antenna Tuner	160-10 meter 1kw replaces SA-2060	83	SP	279.95	91
SA-2500	Antenna Tuner	160-10 meter 1kw automatic	84	FA	599.95	87
HD-1418	Audio Filter	Active audio filter	83	XM	129.95	91
B-1	Balun Coil	80-10 meter 200w	57	FA	8.95	63
HWA-9	Band Pack	WARC crsytal pack for HW-9	84	SP	39.95	91
GC-1000	Clock	"Most Accurate Clock"	83	XM	249.95	92
GC-1005	Clock	6 digit 7 segment neon)	73	SU		77
GC-1094	Clock	Same as GC-1005				
GC-1108	Clock	Replaces GC-1107	84		24.95	91
GCW-1001	Clock	"Most Accurate Clock II" - assembled"	92	1	349.95	92

*First Catalog Appearance by season (WI=winter, SP= spring, SU= summer, FW=fall/winter, XM=Christmas) or month (1=January, 2= February, etc.).

MODEL #	TYPE	NOTES / SPECIFICATIONS	FIRST YEAR MADE	FIRST CATALOG APPEARANCE*	LAST SOLD FOR	LAST YEAR MADE
GCW-1001-1	Clock	Slave clock for use with GCW-1001	92	1	149.95	92
HD-1234	Coaxial Switch		73	XM	11.95	91
CO-1	Code Practice Oscillator		59	6	7.95	67
HD16	Code Practice Oscillator	Replaces CO-1	67	3	8.95	74
HD-1416	Code Practice Oscillator	Replaces HD-16	75	1	12.95	84
HD-1416A	Code Practice Oscillator	Replaces HD-1416	85		24.95	90
HD-1416H	Code Practice Oscillator	Replaces HD-1416A	88	WI	19.95	91
CA-1	CONELRAD Alarm		57	FA	13.95	60
HD-1420	Converter	VLF to HF	86		49.95	91
XC-2	Converter	2 meter for MR-1	60	1	36.95	60
XC-6	Converter	6 meter for MR-1	59	3	26.95	60
HD-20	Crystal Calibrator	100 kHz stand alone general purpose	60	6	14.95	75
HRA-101	Crystal Calibrator	100kHz for HR-10	67		8.95	73
HN-31	Dummy load	0-450 MHz 2000w "Cantenna"	61	1	9.95	83
HN-31A	Dummy Load	Re-designed HN-31	83	SP	24.95	91
HM-2103	Dummy Load / Wattmeter	1.8-30 MHz 1000w air cooled	73		69.95	75
HD-1426	Field Strength Meter	Replaces PM-2	77	SP	12.95	80
PM-1	Field Strength Meter		58		12.95	59
PM-2	Field Strength Meter		59	1	12.95	75
HWA-17-2	FM Adapter	For use with HW-17	69	FW	21.50	69
IM-4180	FM Deviation Meter		79	WI	169.95	87
SB-650	Freq Display	For SB-100 et al	72	SP	199.95	75
HWA-5400-3	Frequency Entry Keypad	For use with HW-5400	83	WI	59.95	84
GD-1A	Grid Dip Meter		53	SP	19.50	53
GD-1B	Grid Dip Meter		53	SP	19.50	60
HD-1250	Grid Dip meter	Replaces GD-1B	75	1	69.95	91
AM-1	Impedance Meter		52	FA	19.5	60
MP-10	Inverter	12 VDC to 115 VAC inverter	60	6	29.95	68
HD-10	Keyer		65	XM	39.95	74
HD-1410	Keyer	Replaces HD-10	75	SU	59.95	84
HD-8999	Keyer	CW Keyboard ("UltraPro")	83	XM	249.95	88
SA-5010	Keyer	"uMatic"	81	FA	99.95	??
SA-5010A	Keyer	Replaces SA-5010)	85		99.95	91
ULTRAPRO	Keyer	See HD-8999				
GH-12A	Microphone	PTT mobile - new color/dark green	69	FW	6.95	79
HD-1982	Microphone	"Micoder" touch-tone mike	77	SP	54.95	77
HD-1984	Microphone	"Micoder" replaces HD-1982	78	SP	39.95	83
HDP-21	Microphone	Base type for SB/HW series	62	10	29.40	66
HDP-121	Microphone	Base type for SB/HW - replaces HDP-21	76	SP	44.95	77
HDP-121A	Microphone	Base type for SB/HW - replaces HDP-121	78	SP	44.95	81
HDP-242	Microphone	Base type SB/HW replaces HDP-121A	82	SP	49.95	82
HDP-444	Microphone	Base type new design for SB/HW	87	SP	59.95	90
HDP-1340	Microphone	PTT mobile	80	XM	15.95	81
GH-12	Microphone	PTT mobile	66	3	6.95	66
HD-1986	Microphone Pre-amp	"Microlizer"	84	FA	39.95	87
MICROLIZER	Microphone Pre-amp	See HD-1986				
AK-6	Misc	Mobile Mounting kit for MT-1 and MR-1	59		4.95	63
HWA-9	Misc	WARC crystal pack for HW-9	84	SP	39.95	91
HWA-5400-3	Misc	Frequency Entry Keypad for HW-5400	83	WI	59.95	84
HWA-6502-2	Misc	Mobile Console for HW-6502 HT	85		89.95	86
HWA-6502-2	Misc	Mobile Console for HW-6502 HT	85		89.95	86
SBA-100-1	Misc	Mobile Mounting braket for SB series	68		14.95	73
SBA-401-1	Misc	Crystal Pack for SB-401	67		29.95	
HO-13	Panadapter	Panadapter for RX-1 etc	64	7	79.00	66
SB-620	Panadapter	"Scanalyzer" panadapter matches SB-100 et al	66	10	159.95	76
SCANALYZER	Panadapter	See SB-620				
HOA-5404-1	Panadapter Module	Panadapter Module for HO-5404	85		99.95	86
HD-15	Phone Patch	"low boy" styling	66	1	24.95	83
HD-19	Phone Patch	Phone Patch	60	1	34.95	65
HD-1515	Phone Patch	Phone Patch	85		49.95	87
GP-11	Power Supply	12 VDC for Lunch Box mobile	63	3	16.88	69
HP-10	Power Supply	Mobile supply for various	60	6	44.95	63

MODEL #	TYPE	NOTES / SPECIFICATIONS	FIRST YEAR MADE	FIRST CATALOG APPEARANCE*	LAST SOLD FOR	LAST YEAR MADE
HP-13	Power Supply	Mobile for SB series	63	7	59.95	70
HP-13A	Power Supply	Mobile for SB series	70	SP	78.95	73
HP-13B	Power Supply	Mobile for SB series	73	XM	78.95	79
HP-14	Power Supply	Mobile for HA-14	65	5	89.95	68
HP-20	Power Supply	Replaces UT-1	61	5	29.95	63
HP-23	Power Supply	120 VAC for SB series	63	5	39.95	68
HP-23A	Power Supply	120 VAC for SB series	68	5	59.50	73
HP-23B	Power Supply	120 VAC for SB series	73	XM	59.95	77
HP-23C	Power Supply	120 VAC for SB series	78	SP	62.95	79
HP-24	Power Supply	120 VAC for HA-14	65	5	49.95	68
HP-1144	Power Supply	For SB-104 & HW-104	74	XM	99.95	78
HP-1175	Power Supply	For HW-2036A & HA-202A	78	SU	64.95	79
HWA-17-1	Power Supply	Mobile for HW-17	68	5	29.95	69
HWA-202-1	Power Supply	For HW-202	73		34.95	77
HWA-2036-3	Power Supply	120 VAC for HW-2036A	78	SP	39.95	79
HWA-5400-1	Power Supply	120 VAC for HW-5400 w/speaker & clock	83	WI	199.95	84
KS-1	Power Supply	for KL-1	59	6	169.95	60
MP-1	Power Supply	Mobile for MT-1/MR-1	60	1	44.95	60
MP-10	Power Supply	12 VDC to 115 VAC inverter	60	6	29.95	68
PS-23	Power Supply	same as HP-23C			69.96	83
PS-1144	Power Supply	120 VAC for SB-104A	78	SP	99.95	82
PS-1175	Power Supply	120 VAC for 2 meter gear)			74.95	83
PS-9000	Power Supply	120 VAC for SS-9000	82	XM	295.00	83
PSA-9	Power Supply	120 VAC for HW-9	84	SP	39.95	91
UT-1	Power Supply	120 VAC for MT-1/MR-1	60	1	28.95	60
VFA-7401-1	Power Supply	120 VAC for VF-7401)	80	XM	44.95	82
GD-125	Q Multiplier	"Low boy" styling)	66	3	14.95	71
HD-11	Q Multiplier	Improved QF-1	61	11	14.95	64
QF-1	Q Multiplier		56	1	9.95	60
AR-1	Receiver	SWL 550kHz-20MHz	49		23.50	51
AR-2	Receiver	SWL 535kHz-35MHz	52	FA	25.50	55
AR-3	Receiver	SWL 550kHz-30MHz	56	1	27.95	61
COMANCHE	Receiver	See MR-1				
EK-2	Receiver	SWL educational super regen	61	5	19.95	67
GC-1	Receiver	Solid-state SWL 550kHz-32MHz "Mohican"	60		99.50	62
GC-1A	Receiver	Solid-state SWL 550kHz-32MHz "Mohican"	63	6	89.50	68
GR-54	Receiver	SWL 550kHz-30MHz deluxe	65	6	84.95	71
GR-64	Receiver	SWL 550kHz-30MHz	64	XM	39.95	71
GR-78	Receiver	Solid-state SWL 190kHz - 30MHz portable	69	FW	141.95	76
GR-81	Receiver	SWL 140kHz-18MHz super regen	61	11	24.95	72
GR-88	Receiver	VHF 152-174MHz FM tunable	69		54.95	77
GR-91	Receiver	SWL superhet 550kHz-30MHz	61	11	39.95	64
GR-98	Receiver	VHF Aircraft band tunable	69		54.95	76
HR-10	Receiver	80-10 meter / matches DX-60	61	11	82.95	67
HR-10B	Receiver	80-10 meter / matches DX-60	67	6	75.00	75
HR-20	Receiver	SSB AM CW mobile replaces MR-1	62	3	134.95	64
HR-1680	Receiver	80-10 meter / replaces HR-10B	76	FA	239.95	82
MOHAWK	Receiver	See RX-1				
MOHICAN	Receiver	See GC-1 and GC-1A				
MR-1	Receiver	"Comanche" mobile 80-10 AM/CW/SSB	59	1	119.95	62
RX-1	Receiver	160-10 meter ""Mohawk"	58		274.95	64
SB-300	Receiver	80-10 meter SSB/CW optional AM	63	10	264.95	66
SB-301	Receiver	80-10 meter SSB/CW optional AM	66	10	260.00	70
SB-303	Receiver	80-10 meter solid state SSB/CW	70	XM	345.00	76
SB-310	Receiver	SWL 49/41/31/25/19/16m + 80/40/20/11m	67	XM	249.00	72
SB-313	Receiver	SWL solid state ver of SB-310	72	XM	339.95	75
SW-717	Receiver	Solid-state SWL 550kHz-30MHz	71	XM	139.95	82
SW-7800	Receiver	Solid-state SWL 550kHz-30MHz digital readout	84	FA	349.95	90
HD-3030	RTTY Terminal Unit		84	SP	249.95	87
CROSSFIRE	RTTY Tuning Indicator	See HD-3006				
HD-3006	RTTY Tuning Indicator	"Crossfire"	84	FA	59.95	86
GR-110	Scanner	8 ch VHF highband - digital readout)	73	SU	129.95	76

MODEL #	TYPE	NOTES / SPECIFICATIONS	FIRST YEAR MADE	FIRST CATALOG APPEARANCE*	LAST SOLD FOR	LAST YEAR MADE
GR-740	Scanner	40 ch prog - A Bearcat kit w/Heath name	84	SP	249.95	84
GR-1131	Scanner	8 ch VHF highband 8	76	XM	89.95	78
GR-1132	Scanner	8 ch LO/HI/UHF 8	76	XM	269.95	79
GR-1133	Scanner	8 ch aircraft band	77	XM	Never Released	
MR-1134	Scanner	8 ch VHF marine band 156-163 MHz	76	XM	99.95	77
HO-10	Scope	Station monitor for TX-1 etc	62	7	59.95	66
HO-13	Scope	Panadapter for RX-1 etc	64	7	79.00	66
HO-5404	Scope	Station Monitor - see HOA-5404-1	85		249.95	88
SB-610	Scope	Station monitor matches SB-100 et al	66	7	99.95	75
SB-614	Scope	Station monitor matches SB-104 et al	74	XM	199.95	82
SB-620	Scope	"Scanalyzer" panadapter matches SB-100 et al	66	10	159.95	76
SB-10	Sideband Adapter	For use with TX-1 etc	59		89.95	64
AK-5	Speaker	For RX-1	58		9.95	60
AK-7	Speaker	Mobile for MR-1 and HR-20	59	1	5.95	63
HDP-1228	Speaker	portable for use	77	FA	9.95	79
HS-24	Speaker	Mobile for HW series incl. Singlebanders	64	7	7.00	78
HS-1661	Speaker	For HW-104	75	XM	22.95	82
SB-600	Speaker	Matches SB-100 et al	66	3	17.95	75
SB-604	Speaker	Matches SB-104	74	XM	33.95	82
SP-99	Speaker	Matches HW-99 / HW-9			29.95	91
SB-630	Station Console	Matches SB-100 et al	66	10	74.95	74
SB-634	Station Console	Matches SB-104 et al	74	XM	199.95	83
AM-2	SWR Meter	HF	57	FA	15.95	62
HM-11	SWR Meter	HF	62		15.95	65
HM-15	SWR Meter	1.8-54MHz - "low boy" styling	66	1	14.95	70
ID-1390	Thermometer	digital thermometer - 7 segment neon readout	73	XM	64.95	77
ID-1390A	Thermometer	digital thermometer - 7 segment neon readout	77	XM	64.95	81
ID-1390B	Thermometer	digital thermometer - 7 segment neon readout	82	SP	79.95	92
HD-4040	TNC		85		199.95	87
HK-21	TNC	"pocket packet"	88	SP	219.95	91
HK-232	TNC	multi-mode	87	FA	279.95	91
HK-232A	TNC	multi-mode	88	XM	279.95	90
HWA-202-2	Tone Burst Encoder	For HW-202	73		29.95	77
HD-1530	Touch-Tone Decoder	Touch-Tone Decoder	85		79.95	90
CB-1	Transceiver	CB "Lunch Box"	59	6	42.95	62
GW-30	Transceiver	10 meter or CB Walkie-Talkie - can be either	60	6	32.95	62
HW-7	Transceiver	40/20/15 meters CW QRP	72	FA	79.95	75
HW-8	Transceiver	80/40/20/15 meters QRP - improved HW-7	76	SP	139.95	83
HW-9	Transceiver	80/40/20/15 meters QPR - improved HW-8	84	SP	249.95	91
HW-10	Transceiver	6 meter mobile "Shawnee"	61	5	199.95	65
HW-12	Transceiver	80 meter 200w PEP SSB "Singlebander"	63	5	119.95	66
HW-12A	Transceiver	80 meter 200w PEP SSB replaces HW-12	66	10	99.95	74
HW-16	Transceiver	80/40/15 meters CW	67	6	99.50	76
HW-17	Transceiver	2 meter AM	68	5	129.95	69
HW-17A	Transceiver	2 meter AM	69	FW	129.95	70
HW-18-1	Transceiver	4450-4650kHz 200w SSB Civil Air Patrol	68	3	119.95	72
HW-18-2	Transceiver	MARS SSB	68	3	109.95	69
HW-18-3	Transceiver	160 meter SSB	68	3	109.95	69
HW-19	Transceiver	10 meter 5w AM "Tener" - "Lunch Box"	60	1	39.95	62
HW-20	Transceiver	2 meter mobile "Pawnee"	61	5	199.95	65
HW-22	Transceiver	40 meter 200w PEP SSB "Singlebander"	63	7	119.95	66
HW-22A	Transceiver	40 meter 200w PEP SSB replaces HW-22	66	10	104.95	74
HW-29	Transceiver	6 meter 5w AM "Sixer" - "Lunch Box"	60	1	39.95	60
HW-29A	Transceiver	6 meter 5w AM "Sixer" - "Lunch Box"	61	5	44.95	71
HW-30	Transceiver	2 meter 5w AM "Twoer" - "Lunch Box"	60	6	44.95	71
HW-32	Transceiver	20 meter 200w PEP SSB "Singlebander"	63	7	119.95	66
HW-32A	Transceiver	20 meter 200w PEP SSB replaces HW-32	66	10	104.95	74
HW-99	Transceiver	50 watt HF CW	85		299.95	87
HW-100	Transceiver	80-10 meter 180w PEP SSB/CW HF	68	3	250.00	70
HW-101	Transceiver	80-10 meter 180w PEP SSB/CW HF	70	XM	399.95	83
HW-104	Transceiver	Solid-state 80-10 meter 100w PEP SSB/CW HF)	75	XM	569.95	77
HW-202	Transceiver	2 meter 6 ch 10 w FM base/mobile	73	SP	189.95	77
HW-2021	Transceiver	2 meter HT 1 watt	75	XM	179.95	77
HW-2026	Transceiver	2 meter 10w synth base/mobile	75	XM	299.95	76

MODEL #	TYPE	NOTES / SPECIFICATIONS	FIRST YEAR MADE	FIRST CATALOG APPEARANCE*	LAST SOLD FOR	LAST YEAR MADE
HW-2036	Transceiver	improved HW-2026	76	XM	269.95	77
HW-2036A	Transceiver	improved HW-2036	78	SP	297.95	79
HW-5400	Transceiver	HF syth w/WARC replaces SB-104	83	WI	699.95	84
HW-6502	Transceiver	2 meter HT w/thumb wheels - assembled	85		199.95	86
LUNCH BOX	Transceiver	See HW-19, HW-29, HW-30, CB-1				
PAWNEE	Transceiver	See HW-20				
SB-100	Transceiver	80-10 meter 180 PEP SSB/CW	65	XM	360.00	67
SB-101	Transceiver	80-10 meter 180 PEP SSB/CW	67	3	360.00	70
SB-102	Transceiver	80-10 meter 180 PEP SSB/CW	70	SP	380.00	75
SB-104	Transceiver	80-10 meter 100w SSB/CW solid-state	74	XM	699.95	77
SB-104A	Transceiver	Replaces SB-104	77	SU	699.95	82
SB-110	Transceiver	6 meter	65	6	320.00	69
SB-110A	Transceiver	6 meter	69		299.00	71
SHAWNEE	Transceiver	See HW-10				
SIXER	Transceiver	See HW-29 and HW-29A				
SS-9000	Transceiver	WARC 100w SSB/CW assembled	82	XM	2795.00	84
TENER	Transceiver	See HW-19				
TWOER	Transceiver	See HW-30				
VF-2031	Transceiver	2 meter HT 2 watt 8 ch	79	XM	199.95	83
VF-7401	Transceiver	2 meter scanning replaces HW-2036A	80	SP	369.95	83
APACHE	Transmitter	See TX-1				
AT-1	Transmitter	80/40/20/15/11/10 CW	52	FA	29.50	56
CHEYENNE	Transmitter	See MT-1				
DX-20	Transmitter	80-10 meter 50w CW	57	1	35.95	60
DX-35	Transmitter	80-10 meter 75w AM/CW	56	1	56.95	57
DX-40	Transmitter	80-10 meter 75w AM/CW	58		64.95	60
DX-60A	Transmitter	80-10 meter 75w AM/CW	65	1	79.95	67
DX-60B	Transmitter	80-10 meter 75w AM/CW	67	6	79.95	76
DX-60	Transmitter	80-10 meter 75w AM/CW	61	5	82.95	64
DX-100	Transmitter	80-10 meter 100 Watt AM/CW	55	SP	189.50	57
DX-100B	Transmitter	HF 80-10 AM CW	58		189.95	60
HX-10	Transmitter	80-10 meter SSB/AM/CW	62	1	334.95	65
HX-11	Transmitter	80-10 meter 50 watt novice	61	11	43.50	63
HX-20	Transmitter	SSB 80-10 mobile replaces Cheyenne	62	3	199.95	64
HX-30	Transmitter	6 meter SSB AM CW 10 watt PEP	62	10	189.95	65
HX-1681	Transmitter	HF/QSK matches HR-1680	79	SU	239.95	82
MARAUDER	Transmitter	See HX-10				
MT-1	Transmitter	"Cheyenne" mobile 80-10 meter 90w AM	59	1	99.95	62
SB-400	Transmitter	80-10 meter 180 PEP SSB/CW	64	7	325.00	66
SB-401	Transmitter	80-10 meter 180 PEP SSB/CW	66	10	285.00	75
SENECA	Transmitter	See VHF-1				
TX-1	Transmitter	80-10 meter 150w AM/CW "Apache"	58	6	229.50	64
VHF-1	Transmitter	6 & 2 meter "Seneca"	58		159.95	62
SB-500	Transverter	For 2 meters for use with SB-series	69	FW	195.00	71
HM-10	Tunnel-Dipper		61	11	34.95	62
HM-10A	Tunnel-Dipper		62	10	34.95	70
HG-10	VFO	80-2 meter matches DX-60	61	11	34.95	66
HG-10B	VFO	80-2 meter matches DX-60	67	6	37.95	76
SB-640	VFO	Remote for SB-101/102	67	6	99.00	70
SB-644	VFO	Remote for SB-104	74	XM	134.95	78
SB-644A	VFO	replaces SB-644	79	WI	134.95	83
VF-1	VFO	VFO (80-10 meter for use with DX series)	52	FA	19.50	61
VX-1	VOX		58		23.95	60
HM-9	Wattmeter	50w HF OR 6 meter OR 2 meter—choose one	83	XM	49.95	91
HM-102	Wattmeter	3.5-30 MHz 2000w w/SWR bridge	70	XM	34.95	81
HM-2102	Wattmeter	50-160 MHz 250w	73	SP	34.95	81
HM-2140	Wattmeter	1.8-30 MHz 2000w dual reading	79	SP	74.95	83

Product References

This list contains references to Heath products as found in two popular hobby magazines; *QST* and *CQ*. These references include everything from product reviews and articles about modifications, to new product announcements and brief mentions. Every reasonable effort has been made to ensure the accuracy of these listings, but some errors and omissions have no doubt crept into the process. This list is by no means exhaustive, as it references only two of many possible sources. The reader is invited to send additions and corrections to the author, whose address can be found in the front of this book.

DATE	PUB.	PAGE	MODEL	SUBJECT
Oct-59	CQ	52	AK-6	Incidental info
Oct-59	CQ	52	AK-7	Incidental info
Mar-59	QST	54	AM-2	Use as a modulation monitor
Jan-66	QST	20	AM-2	Modification
Jan-60	CQ	47	AR-1	Stabilizing
Apr-60	CQ	11	AR-1	Stabilizing (Correction)
Jun-61	CQ	41	AR-3	Improvements
Jul-61	CQ	20	AR-3	Correction
May-62	CQ	76	AR-3	Bandspread improvement
Jun-56	QST	70	AT-1	Use on 160 meters
Nov-56	QST	36	AT-1	Modulator for
May-57	QST	22	AT-1	Use on 6 meters
Dec-57	QST	65	AT-1	Modification - very brief - no detail
Jun-59	QST	62	AT-1	Use VF-1 to drive on 15 meters
Aug-60	CQ	78	CB-1	Adding squelch
Aug-69	CQ	53	CB-1	Convert to 6 meters
Oct-69	CQ	73	CB-1	Use on 10 meters
Jul-59	CQ	83	CO-1	Review
Jan-60	CQ	80	CO-1	Use as keying monitor
Jan-86	QST	49	DX-20	Use on 30 meters with VF-1
Arp-57	CQ	96	DX-20	
Sep-56	QST	28	DX-35	Review
Jun-58	QST	71	DX-35	Improvements
Jan-59	CQ	48	DX-35	Improvements
Dec-60	CQ	52	DX-40	Plate modulation for
Apr-61	CQ	78	DX-40	AF distortion
Jul-61	CQ	77	DX-40	AF gain
Jul-61	CQ	76	DX-40	TVI precautions
Aug-61	CQ	96	DX-40	Final modification
Jan-62	CQ	74	DX-40	Use on 6 meters
Feb-62	CQ	83	DX-40	Plate modulation for
Jun-62	CQ	32	DX-40	Use on 6 meters
Jun-62	CQ	32	DX-40	Use on 6 meters
Dec-62	CQ	65	DX-40	Modification
Jan-63	CQ	74	DX-40	Modulation problems
Feb-65	CQ	87	DX-40	Use on 6 meters
Mar-65	CQ	67	DX-40	Intermittent operation (brief)
Sep-66	CQ	90	DX-40	Output drops off after 1 min key down
Dec-66	CQ	78	DX-40	Blows fuses
Feb-71	CQ	64	DX-40	Spurious signals
Oct-72	CQ	12	DX-40	RFI on standby
Jan-68	CQ	117	DX-60A	PTT with HQ-170A
Oct-70	CQ	77	DX-60B	PTT for
Oct-71	CQ	79	DX-60B	Use with SB-640
Apr-72	CQ	10	DX-60B	Use wth Allied A-2516 Receiver
Sep-87	QST	43	DX-60B	Bandswitch replacement
Sep-88	QST	48	DX-60B	More switch replacement info
Jul-61	QST	42	DX-60	Review
Apr-61	CQ	80	DX-60	New product announcement
Jul-62	CQ	80	DX-60	Modulation problems
Sep-62	CQ	68	DX-60	Erratic keying
Oct-62	CQ	65	DX-60	Audio hum
Oct-62	CQ	65	DX-60	Distortion
Oct-62	CQ	65	DX-60	Drive/tune peaking on 80
Oct-62	CQ	65	DX-60	Fuse blowing problems
Oct-62	CQ	65	DX-60	Only loads on 40
Jan-63	CQ	74	DX-60	Use with SB-10
Feb-63	CQ	82	DX-60	Hints
Jul-63	CQ	57	DX-60	PTT for
Dec-64	CQ	101	DX-60	Plate modulation tip
Sep-65	CQ	51	DX-60	Key clicks fix
Sep-66	CQ	88	DX-60	Burned out meter
Sep-66	CQ	90	DX-60	Use with tuner (very brief)
Jan-69	CQ	85	DX-60	Straight-through VFO operation
Mar-85	CQ	90	DX-60	Use on 30 meters
Mar-61	CQ	36	DX-100B	Review

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Dec-55	QST	49	DX-100	Review
Jun-56	QST	76	DX-100	Notes
Aug-56	QST	34	DX-100	Improved keying
Aug-59	QST	53	DX-100	SB-10 modification for
Feb-57	QST	59	DX-100	More keying hints
Feb-58	QST	69	DX-100	Keying
Apr-59	QST	35	DX-100	Diode time-sequence keying
Jun-59	QST	62	DX-100	Correcting grid current
Nov-59	QST	55	DX-100	Audio circuit change
Feb-60	QST	50	DX-100	Improved keying and drive
Aug-62	QST	56	DX-100	High modulator stand-by current
Sep-62	QST	34	DX-100	Modification
Feb-59	CQ	44	DX-100	SSB for
Apr-59	CQ	46	DX-100	Improved keying
Jul-64	QST	80	DX-100	Fixing HV rectifier arcing
Aug-60	CQ	54	DX-100	Adding VOX
Oct-60	CQ	26	DX-100	Adding VOX (correction)
Jan-61	CQ	71	DX-100	Tips
Jan-61	CQ	71	DX-100	Tips
Feb-61	CQ	68	DX-100	Modification references
Aug-61	CQ	96	DX-100	Final modification
Aug-62	CQ	95	DX-100	FSK for - reference only
Jul-63	CQ	58	DX-100	RF output indicator
Nov-64	CQ	113	DX-100	Fuse blowing problems
Mar-65	CQ	67	DX-100	Rectifier replacement (brief)
May-69	CQ	83	DX-100	Use with Johnson 6N2
May-70	CQ	80	DX-100	TVI problems
Jun-72	CQ	12	DX-100	Improved stability for RTTY
Aug-77	QST	49	DX-100	Keying modification
Sep-77	QST	51	DX-100	Keying modification
Dec-60	QST	32	GC-1A	Review
Jul-62	QST	53	GC-1A	Improved noise limiter
May-62	CQ	44	GC-1A	Review
Aug-69	CQ	79	GC-1A	Use with wide band pre-amp
Mar-60	CQ	61	GC-1	New product announcement
Jan-61	CQ	72	GC-1	Converter for 2 meters
Jan-86	QST	46	GC-1000	Review
Dec-73	QST	43	GC-1005	Review
Jan-82	QST	49	GC-1107	Setting the seconds
Jul-56	QST	152	GD-1B	Use as a 144 MHz transmitter
Dec-57	QST	71	GD-1B	Use as a CONELRAD monitor
Sep-77	CQ	27	GH-17A	Review
Oct-70	QST	48	GR-78	Review
Aug-73	QST	58	GR-110	Review
Mar-72	CQ	57	GR-371MX	Review
Jan-85	QST	36	GR-740	Review
Dec-82	QST	46	GU-1820	Review
Nov-62	CQ	72	GW-21	Use on 10 meters
Nov-60	QST	46	GW-30	Review
Feb-61	QST	48	GW-30	Notes (by Heath's Al Robertson!)
Dec-61	CQ	75	GW-30	Very brief
Jun-61	QST	44	HA-10	Review
Dec-61	QST	62	HA-10	Improved bias circuit
Feb-62	QST	38	HA-10	Modification
Oct-61	CQ	100	HA-10	Better bias filter
Nov-61	CQ	99	HA-10	Recifier noise
Feb-62	CQ	84	HA-10	Bias improvement
Jul-62	CQ	80	HA-10	Use with TX-1/SB-10/phone patch
Sep-62	CQ	67	HA-10	Impulse interference fix
Feb-66	CQ	76	HA-10	Use on 6 meters
Nov-65	QST	89	HA-14	Review (Incorrectly called HW-14 in review)
Feb-66	CQ	52	HA-14	Review
Jul-67	CQ	68	HA-14	Improvements
Jul-78	QST	32	HA-201	COR
Nov-78	QST	32	HA-201	COR
Jul-75	CQ	51	HA-201	Review
Aug-73	QST	52	HA-202	Review
Jul-75	CQ	51	HA-202	Review
Jan-67	QST	45	HD-10	Review
Jan-67	QST	45	HD-10	Review
Feb-68	QST	56	HD-10	Improved performance
Sep-68	QST	51	HD-10	Use with external paddle
Jun-69	QST	50	HD-10	Protecting from RF
Aug-69	QST	34	HD-10	Modification
Aug-72	QST	52	HD-10	Speaker change
Feb-74	QST	41	HD-10	Modification
Jan-71	CQ	18	HD-10	QSK mod for SB-series
Jul-78	QST	34	HD-10	Positive key line
Aug-78	QST	31	HD-10	Squeeze paddle
Apr-83	QST	38	HD-10	Use with solid state rigs
Jun-66	CQ	84	HD-19	General information
Jan-76	QST	38	HD-1250	Review
Oct-78	QST	37	HD-1250	Carrying case
May-79	QST	48	HD-1250	Improved response
Dec-75	CQ	46	HD-1250	Review
Feb-81	QST	37	HD-1250	Add-on for greater versatility
Jul-81	CQ	16	HD-1250	
Mar-78	QST	38	HD-1410	Review
Nov-79	QST	57	HD-1410	Ideas for
Oct-80	QST	25	HD-1410	External paddles for
Dec-80	QST	52	HD-1410	Thoughts on
Sep-77	CQ	58	HD-1416	Review
Mar-84	QST	42	HD-1418	Review
Nov-86	QST	40	HD-1420	Review
Nov-86	QST	40	HD-1422	Review
Nov-76	QST	37	HD-1982	Review
Feb-85	QST	38	HD-3030	Review
Nov-84	CQ	60	HD-3030	Review
Nov-85	QST	54	HD-4040	Review
Apr-84	QST	46	HD-8999	Review
Jul-84	QST	41	HF-T9	Review
Jun-70	CQ	57	HG-10B	Review
Jun-70	CQ	76	HG-10B	Use on MARS 3.2 MHz
Oct-63	QST	54	HG-10	Review
Jan-68	CQ	103	HG-10	Use with Globe Scout 680
Jul-76	QST	42	HG-10	VFO output
Nov-88	CQ	48	HK-232	
Jan-88	QST	43	HK-232	Review
Sep-63	QST	61	HM-10A	Review
Feb-63	CQ	36	HM-10A	Review
Nov-66	QST	44	HM-15	Review
Dec-71	QST	44	HM-102	Review
Nov-71	CQ	45	HM-102	Review
Dec-76	QST	30	HM-102	Modification
Feb-77	QST	43	HM-102	Added switch
May-78	QST	38	HM-102	Extra meters for

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Sep-73	QST	46	HM-2103	Review
Feb-91	QST	35	HM-2140A	Comparisons
Feb-80	QST	40	HM-2140	Review
Sep-80	QST	41	HM-2141	Review
May-84	QST	42	HN-31A	Review
Mar-66	QST	79	HN-31	Use as an RF Wattmeter
Aug-70	QST	53	HN-31	Oil for
Dec-63	QST	58	HO-10	Review
Jun-64	CQ	37	HO-10	Review
Nov-64	QST	54	HO-13	Review
Sep-65	CQ	57	HO-13	Review
Jan-87	QST	30	HO-5404	Review
Mar-64	QST	61	HP-13	Review
Dec-69	QST	51	HP-13	Modification
Oct-81	CQ	70	HP-13	Cooling
Mar-73	QST	57	HP-23A	117/230 volt switch for
Feb-66	QST	72	HP-23	Review
May-66	QST	75	HP-23	Use with HW-12 and SB-100
May-74	QST	49	HP-23	Improved grounding
Oct-77	QST	46	HP-23	Low low-voltage fix
Sep-69	CQ	53	HP-24	Modification for use with screen-grid tubes
May-70	CQ	81	HR-10B	Won't work on 10/15/20 meters
Jul-63	QST	48	HR-10	Review
Mar-63	QST	58	HR-20	Review
Jun-66	QST	74	HR-20	Dial pointer
Jan-77	QST	35	HR-1680	Review
Oct-76	CQ	43	HR-1680	Review
Nov-82	QST	22	HR-1680	Modification
Apr-80	CQ	89	HR-1680	New product announcement
Oct-88	QST	39	HR-1680	Use as a CW monitor
Jan-77	QST	35	HS-1661	Review
Jan-73	QST	48	HW-7	Review
Dec-73	QST	23	HW-7	New front end for
Jan-74	QST	35	HW-7	Modification
Jul-75	QST	38	HW-7	RIT for
Dec-75	QST	45	HW-7	A small amp for
Jul-76	QST	42	HW-7	Hum reduction
Nov-76	QST	41	HW-7	Sidetone level control
Apr-73	CQ	60	HW-7	Review
Dec-75	QST	45	HW-8	A small amp for
Apr-76	QST	31	HW-8	Review
Jul-77	QST	22	HW-8	Full break-in and RIT
Nov-77	QST	20	HW-8	Full break-in and RIT
Jan-78	QST	40	HW-8	RIT for
Mar-78	QST	36	HW-8	Notes
Oct-78	QST	20	HW-8	25 kHz calibrator
Dec-78	QST	38	HW-8	RIT for
Apr-79	QST	47	HW-8	"Boots" for
Jun-79	QST	18	HW-8	"Boots" for
Nov-79	QST	57	HW-8	S-meter for
Jan-81	QST	45	HW-8	Ideas for
May-81	QST	46	HW-8	Use with "Accu-keyer"
May-77	CQ	32	HW-8	Review
Aug-77	CQ	48	HW-8	Contest Machine Part 1
Oct-77	CQ	62	HW-8	Contest Machine Part 2
May-84	QST	44	HW-8	Use on 30 meters
Jan-81	CQ	48	HW-8	Modification
May-81	CQ	52	HW-8	Adds speaker/amplifier
May-82	CQ	98	HW-8	RIT board
Jun-82	CQ	46	HW-8	Bandswitch lights
Oct-82	CQ	50	HW-8	Modification
Jul-85	QST	37	HW-9	Review
Apr-88	QST	26	HW-9	Improvements
Oct-88	QST	43	HW-9	Tips
Dec-88	QST	32	HW-9	Tips
Mar-90	QST	43	HW-9	AGC threshold controler
Sep-62	QST	62	HW-10	Increasing spotting signal
Oct-62	CQ	98	HW-10	Alignment problems
Mar-65	CQ	67	HW-10	Squelch trouble (brief)
Feb-66	CQ	76	HW-10	RF output indicator
Jan-67	CQ	86	HW-12A	New product announcement
Jan-64	QST	48	HW-12	Review
May-66	QST	75	HW-12	Use with HP-23
Dec-66	QST	49	HW-12	Fixing a rattle
Dec-66	QST	49	HW-12	Low voltage equalization
Jun-68	QST	36	HW-12	Dial modification
Sep-68	QST	51	HW-12	Carrier null adjustment
May-69	QST	53	HW-12	New gain control
Jan-66	CQ	70	HW-12	Adding bands (reference only)
Mar-66	CQ	48	HW-12	Power supply for
Feb-67	CQ	36	HW-12	CW modification
Jul-71	CQ	18	HW-12	CW coverage with
Sep-77	QST	45	HW-12	Use as QRP
Jan-68	QST	53	HW-16	Review
Dec-67	CQ	18	HW-16	Review
Aug-72	QST	51	HW-16	Use on 20 meters
Nov-68	CQ	117	HW-16	Use on 20 meters
Feb-69	CQ	84	HW-16	Use with SB-200
Nov-74	QST	20	HW-16	Adapting VFOs for
Oct-71	CQ	96	HW-16	Use on 20 meters (brief)
Nov-75	QST	35	HW-16	Use on 20 meters
Dec-71	CQ	72	HW-16	Use on 20 meters (more)
May-77	QST	48	HW-16	Sidetone level adjust
May-78	QST	29	HW-16	Improvements
Aug-79	QST	50	HW-16	Help for
Feb-76	CQ	43	HW-16	Calibration control for
May-76	CQ	35	HW-16	Use on 20 meters
Apr-69	QST	49	HW-17A	Review
Jul-69	QST	49	HW-17A	Review
Apr-70	QST	38	HW-17A	Relay switching for incr. sens. and output
Feb-72	CQ	14	HW-17A	Modification for FM
Feb-72	CQ	14	HW-17	Modification for FM
Dec-68	CQ	25	HW-181	Review
Dec-68	CQ	25	HW-182	Review
Dec-68	CQ	25	HW-183	Review
Nov-60	CQ	153	HW-19	Review
Aug-65	QST	71	HW-19	Final tuning tip
Jan-62	QST	50	HW-20	Review
Aug-64	QST	64	HW-20	Notes
Oct-62	CQ	98	HW-20	Alignment problems
Nov-62	CQ	37	HW-20	Review
Jan-67	CQ	86	HW-22A	New product announcement
Jun-81	QST	37	HW-22A	Extended coverage
Jan-79	CQ	65	HW-22A	Extended coverage
Jan-64	QST	48	HW-22	Review
Jun-68	QST	36	HW-22	Dial modification
Jan-66	CQ	70	HW-22	Adding bands (reference only)
Mar-66	CQ	48	HW-22	Power supply for

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Feb-67	CQ	36	HW-22	CW modification
Oct-74	QST	39	HW-22	Extended coverage
Jul-71	CQ	18	HW-22	CW coverage with
Oct-60	QST	50	HW-29	Modification
Apr-63	QST	48	HW-29	Motor tuning to "scan" the band
Nov-60	CQ	153	HW-29	Review
Aug-65	QST	71	HW-29	Final tuning tip
Jan-67	QST	50	HW-29	Add a final tuning knob
Apr-63	CQ	67	HW-29	DSB for
Sep-63	CQ	34	HW-29	Modification
May-68	QST	28	HW-29	Some useful modifications
Apr-63	QST	48	HW-30	Motor tuning to "scan" the band
Mar-61	CQ	52	HW-30	Review
Aug-65	QST	71	HW-30	Final tuning tip
Aug-61	CQ	99	HW-30	Hum fix
Oct-63	CQ	34	HW-30	Modification
May-68	QST	28	HW-30	Some useful modifications
Feb-69	QST	41	HW-30	More changes
Mar-65	CQ	35	HW-30	Improvements
Jan-67	CQ	86	HW-32A	New product announcement
Dec-70	CQ	76	HW-32A	Use in the CW band
Jan-64	QST	48	HW-32	Review
May-66	QST	74	HW-32	Alignment
Jun-68	QST	36	HW-32	Dial modification
Dec-65	CQ	75	HW-32	Modification to final
Dec-65	CQ	75	HW-32	Q Multiplier for
Jan-66	CQ	70	HW-32	Adding bands (reference only)
Mar-66	CQ	48	HW-32	Power supply for
Feb-67	CQ	36	HW-32	CW modification
Jul-71	CQ	18	HW-32	CW coverage with
Jul-89	QST	41	HW-99	Curing thermal drift
Jan-69	QST	51	HW-100	Review
Nov-71	QST	20	HW-100	Improved selectivity
Aug-68	CQ	45	HW-100	Review
Oct-68	CQ	108	HW-100	Review correction refer to 8/68
Mar-69	CQ	47	HW-100	Dial modification
Jul-69	CQ	86	HW-100	Incremental tuning for
Jan-74	QST	44	HW-100	Deactivated XOV for CW operation
Feb-70	CQ	89	HW-100	Better connection to SB-620
Feb-70	CQ	88	HW-100	Drift and mic gain problems
May-70	CQ	32	HW-100	Split frequency operation
Jun-70	CQ	33	HW-100	Variable AF bandwidth
Jun-71	CQ	87	HW-100	Use with Ameco model PCL RF pre-amp
Aug-72	CQ	16	HW-100	Increasing capabilities of
Mar-73	CQ	12	HW-100	Hum fix
Apr-79	QST	44	HW-100	Holding the relay
Mar-84	CQ	22	HW-100	Modification
Jan-72	QST	59	HW-101	Review
Sep-72	QST	53	HW-101	Tone oscillator repair
Oct-74	QST	38	HW-101	RIT for
Mar-75	QST	19	HW-101	Offset tuning and keying mods
Aug-75	QST	49	HW-101	Modification
Apr-72	CQ	12	HW-101	Sidetone gain control
Aug-72	CQ	16	HW-101	Increasing capabilities of
Jan-77	QST	44	HW-101	VOX relay response in CW operation
Jan-73	CQ	90	HW-101	Sidetone gain control
Feb-77	QST	43	HW-101	Better looking dial
Aug-77	QST	49	HW-101	WWV mod
Sep-77	QST	51	HW-101	WWV mod
Mar-78	QST	41	HW-101	CW modification
Apr-79	QST	44	HW-101	Holding the relay
Aug-79	QST	50	HW-101	Eliminating TVI
Mar-76	CQ	43	HW-101	Improvements
Feb-81	QST	47	HW-101	Modification for zero-beating
Feb-83	QST	54	HW-101	Troubleshooting chart
Mar-83	QST	42	HW-101	Oscillation problem
Feb-83	CQ	31	HW-101	Modification for 30 meters
Mar-88	QST	41	HW-101	Drive dial slippage fix
Mar-84	CQ	22	HW-101	Modification
Nov-90	QST	38	HW-101	Use with W6OWP keying interface
Dec-76	QST	37	HW-104	Review
Jan-80	QST	54	HW-104	Modification PC board etching pattern
Jan-80	QST	16	HW-104	RIT for
Mar-80	QST	49	HW-104	RIT for
Jul-74	QST	40	HW-202	Review
Aug-75	QST	49	HW-202	Protecting transistors
Sep-75	QST	45	HW-202	Antenna plug cautionary note
Jan-76	QST	43	HW-202	Tone pad connections
Oct-76	QST	40	HW-202	Remote control
Jun-74	CQ	25	HW-202	Review
Jul-75	CQ	24	HW-202	Modification
Jan-78	QST	39	HW-1982	Micoder
Apr-78	QST	27	HW-1982	"Mycoder" better design
Apr-79	QST	44	HW-1982	Better battery
Jan-77	QST	36	HW-2021	Review
Jun-76	CQ	22	HW-2021	Review
Oct-77	QST	46	HW-2036	Modification
Aug-79	QST	51	HW-2036	Channel switch visibility
Mar-78	CQ	51	HW-2036	Review
Oct-84	QST	34	HW-5400	Review
Dec-87	CQ	18	HW-5400	Review
Sep-88	QST	43	HW-5400	Frequency slewing speedup
Sep-88	QST	42	HW-5400	Improved RIT and split-freq
Jul-90	QST	37	HW-5400	Battery backup for
Mar-87	CQ	46	HW-6502	Review
Sep-76	QST	39	HW-series	VFO slippgae and backlash
Mar-76	CQ	26	HW-series	A receiver pre-amp for
Mar-87	CQ	46	HW-A6502-2	Review
Sep-88	QST	48	HW-S24	New product announcement
Oct-62	QST	55	HX-10	Review
Sep-62	CQ	68	HX-10	Normal grid current
May-63	CQ	71	HX-10	FSK for
May-63	CQ	94	HX-10	Key click filter
May-80	QST	41	HX-10	Spurious radiation from misaligned traps
Mar-63	QST	59	HX-20	Review
Mar-66	QST	44	HX-20	Modification
Apr-66	QST	44	HX-20	Improved CW operation
Jun-66	QST	74	HX-20	Dial pointer
Dec-63	CQ	60	HX-20	Nulling carrier
May-65	CQ	75	HX-20	Use of 6146B (brief)
Oct-68	CQ	48	HX-20	Improved carrier supression
May-63	QST	51	HX-30	Review
Mar-81	QST	48	HX-1681	Review

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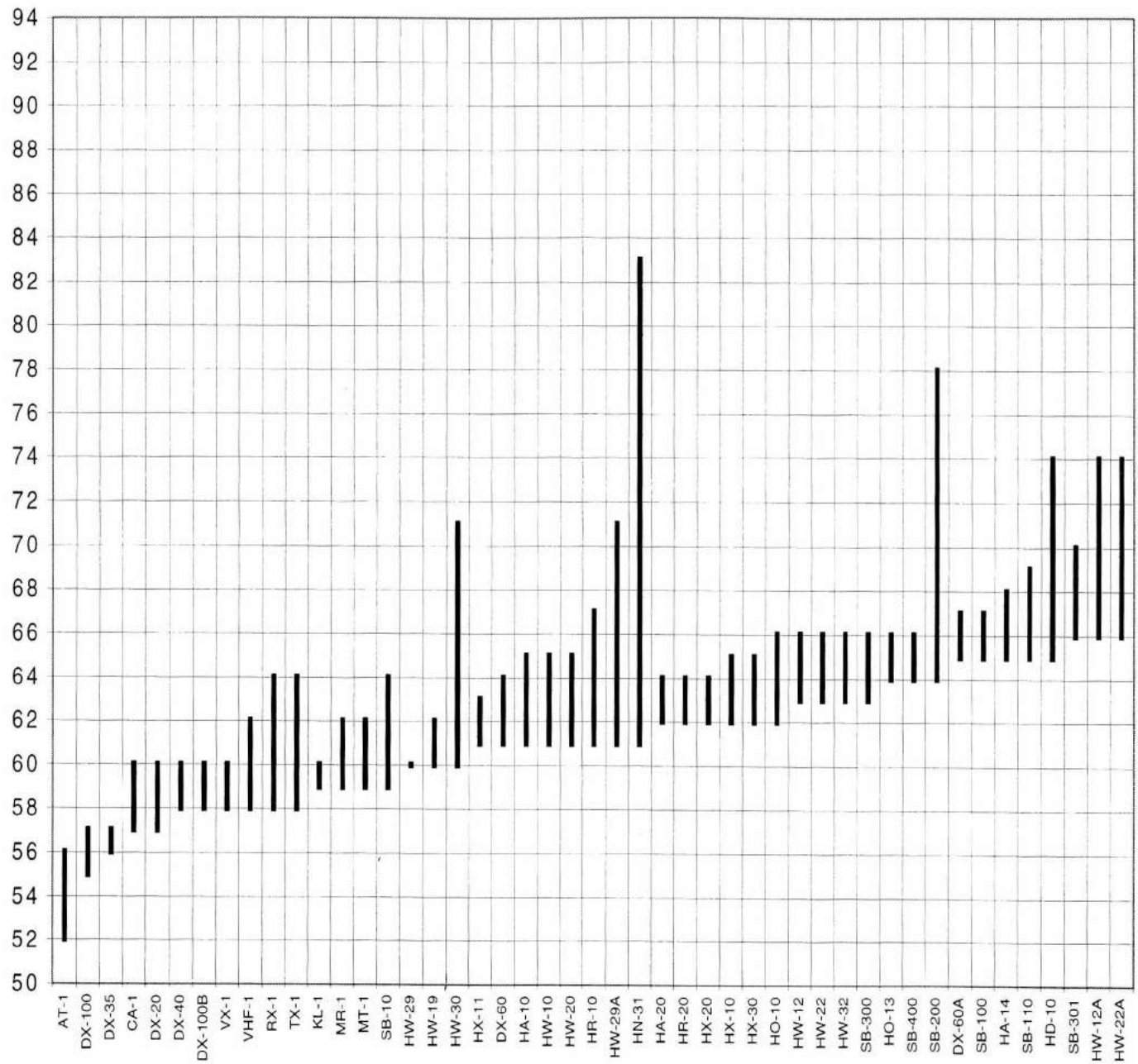
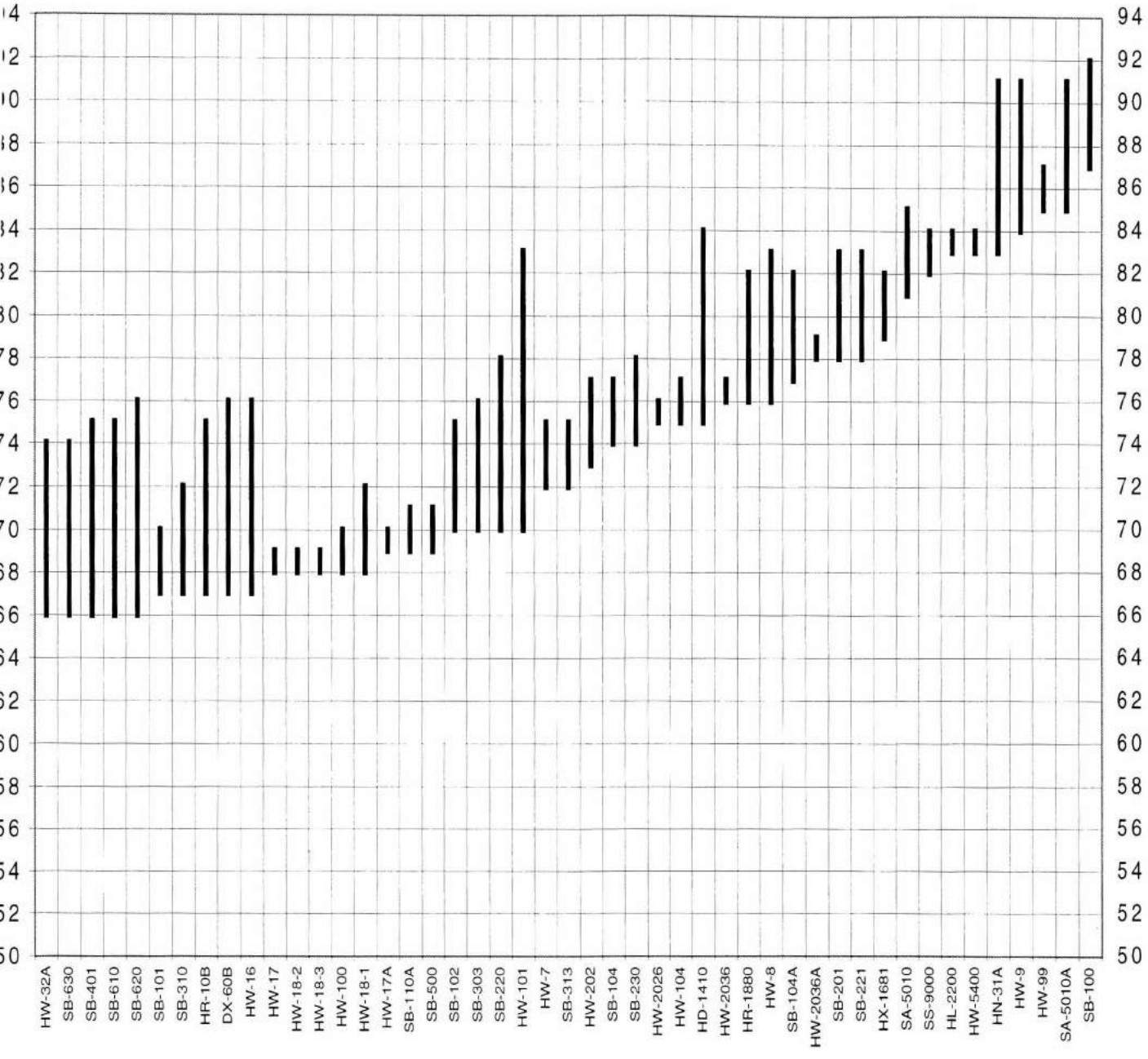
Apr-80	CQ	89	HX-1681	New product announcement
Dec-85	QST	50	HX-1681	Alignment
Jul-60	QST	42	KL-1	Review
Jul-60	QST	42	KS-1	Review
Dec-55	QST	29	LG-1	Modification for antenna measurements
Dec-55	QST	29	LS-1	Modification for antenna measurements
Apr-60	QST	41	MP-1	Review
Oct-59	CQ	52	MP-1	Review
Apr-60	QST	41	MR-1	Review
Oct-59	CQ	52	MR-1	Review
Jan-61	CQ	67	MR-1	Power supply for
Oct-61	CQ	83	MR-1	Tips
Jun-64	CQ	55	MR-1	Upgrading
Mar-65	CQ	67	MR-1	Intermittent BFO (brief)
Apr-67	CQ	86	MR-1	Drift problems
Apr-60	QST	41	MT-1	Review
Oct-60	QST	51	MT-1	Modification
Oct-59	CQ	52	MT-1	Incidental info
Mar-60	CQ	58	MT-1	Review
Aug-60	CQ	79	MT-1	Crystal control
Apr-61	CQ	112	MT-1	Reduce heating
Mar-66	CQ	65	MT-1	Use on 6 meters
Dec-66	CQ	79	MT-1	Modulation problems
Nov-68	CQ	115	MT-1	Crystal control
Feb-76	CQ	29	MT-1	Use on 160 meters
Apr-56	QST	39	QF-1	Review
May-58	QST	77	QF-1	Variable bandwidth for
Jan-64	QST	62	QF-1	Extending range
Jan-60	CQ	61	RF-1	New product announcement
Dec-58	QST	41	RX-1	Review
Dec-60	CQ	53	RX-1	10 kHz markers for
Dec-64	CQ	101	RX-1	Fuse blowing problems
Apr-69	QST	38	RX-1	Amplified AGC for
Jul-80	QST	43	SA-1480	Review
Jul-80	QST	43	SA-1480	Review
Jan-83	QST	46	SA-1480	Increased control voltage for
Mar-83	QST	41	SA-1480	Lubrication for sticky relays
Oct-80	CQ	69	SA-1480	Review
Nov-80	QST	49	SA-2040	Review
Jul-80	CQ	52	SA-2040	Review
Jul-82	QST	40	SA-2060	Review
Mar-85	QST	39	SA-2500	Review
Jun-85	CQ	18	SA-2500	Review
Aug-88	QST	43	SA-2550	Review
May-82	QST	41	SA-5010	Review
Jun-84	QST	41	SA-5010	Shorting fix
Sep-89	QST	37	SA-5010	Avoiding static damage
Aug-80	QST	45	SA-7010	Review
Aug-56	QST	53	SB-10	Modification for DX-100
Jul-59	QST	61	SB-10	Extra VOX sesitivity for
Aug-59	QST	45	SB-10	Review
Aug-60	QST	48	SB-10	Audio filter for
Aug-60	QST	48	SB-10	Use with Johnson Viking Valliant
Aug-62	QST	12	SB-10	Make it a complete transmitter
Feb-60	CQ	48	SB-10	Audio peak limiting
Feb-60	CQ	30	SB-10	Use with Johnson Viking II
Mar-61	CQ	67	SB-10	Use with Johnson Viking Ranger
Aug-61	CQ	96	SB-10	Filter modification
Oct-61	CQ	83	SB-10	Distortion
Jun-62	CQ	35	SB-10	Use on 6 meters
Jul-62	CQ	80	SB-10	Use with TX-1/HA-10/phone patch
Jan-63	CQ	74	SB-10	Use with DX-60
Nov-63	CQ	97	SB-10	Use on 6 meters
May-64	CQ	41	SB-10	Use with Johnson Ranger
Oct-64	CQ	80	SB-10	Trouble spots
Nov-64	CQ	114	SB-10	Drive problems with TX-1
Mar-65	CQ	65	SB-10	Lots of general information
Jul-69	CQ	86	SB-10	Use on 4467.5 kHz CAP freq
May-70	CQ	22	SB-10	Upgrading
Apr-73	CQ	16	SB-10	Problems (brief)
May-66	QST	75	SB-100	Use with HP-23
Sep-66	QST	45	SB-100	Review
Dec-66	QST	49	SB-100	Low voltage equalization
May-67	QST	49	SB-100	Incremental tuning for
Nov-67	QST	40	SB-100	Modification
May-68	QST	53	SB-100	Improvements
Sep-64	CQ	40	SB-100	Review
Dec-64	CQ	54	SB-100	Review
Apr-69	QST	47	SB-100	WWV mod
Oct-70	QST	42	SB-100	External VFO for
Nov-69	CQ	90	SB-100	Hum fix
Jun-71	QST	40	SB-100	Fixing audio hum
Aug-68	CQ	73	SB-100	Upgrading
Nov-73	CQ	10	SB-100	Improved AVC
Jun-80	QST	48	SB-1011	For the 75S-3
Jun-68	QST	38	SB-101	CW sidetone pitch mod
Oct-68	QST	44	SB-101	FMing fix
Oct-68	QST	45	SB-101	Use with SB-640 and not lose XTAL control
Nov-68	QST	50	SB-101	Improvements
Mar-69	QST	46	SB-101	Receiver only tuning modification
Feb-70	CQ	89	SB-101	Better connection to SB-620
Jan-75	QST	44	SB-101	Use as a separate reciever
Feb-75	QST	46	SB-101	OSCAR reception
Apr-71	CQ	72	SB-101	MARS operation with
Apr-71	CQ	72	SB-101	Use with 6146B
Aug-72	CQ	16	SB-101	Increasing capabilities of
Feb-77	QST	43	SB-101	Faster relay response
Feb-77	QST	44	SB-101	Perking up
Sep-77	QST	44	SB-101	Hints for owners
Dec-80	QST	53	SB-101	Low sensitivity and RF drive fix
Feb-71	QST	48	SB-102	Review
Aug-71	QST	43	SB-102	Fixing VOX and ALC problems
Aug-72	CQ	16	SB-102	Increasing capabilities of
Sep-72	CQ	48	SB-102	External VFO for
Feb-77	QST	44	SB-102	Eliminating AC buzz
Apr-73	CQ	51	SB-102	Hum reduction
Apr-73	CQ	50	SB-102	Receiver only tuning modification
Jun-77	QST	47	SB-102	Birdies
Jul-73	CQ	35	SB-102	Improved CW break-in
Aug-79	QST	28	SB-104A	Improvements
Sep-79	QST	23	SB-104A	Improvements

DATE	PUB.	PAGE	MODEL	SUBJECT
May-80	QST	41	SB-104A	Improvements
Mar-80	CQ	20	SB-104A	Review
Oct-75	QST	43	SB-104	Review
Dec-77	QST	45	SB-104	Relay hangs up
Aug-75	CQ	28	SB-104	Review
Jan-80	QST	54	SB-104	Modification PC board etching pattern
Jan-80	QST	16	SB-104	RIT for
Mar-80	QST	49	SB-104	RIT for
Dec-80	QST	53	SB-104	Improvements
Mar-82	QST	20	SB-104	Refinements
May-82	QST	43	SB-104	Refinements
Feb-66	QST	72	SB-110	Review
Feb-66	QST	72	SB-110	Review
May-66	CQ	59	SB-110	Review
Nov-66	CQ	10	SB-110	Modification for AM
Aug-67	CQ	75	SB-110	AM operation
May-65	QST	89	SB-200	Review
Aug-67	QST	40	SB-200	Tips
Jan-69	QST	44	SB-200	Use on 6 meters
Feb-69	CQ	84	SB-200	Use with HW-16
Jun-69	CQ	62	SB-200	Review
Dec-69	CQ	76	SB-200	Grid current problems
Dec-70	CQ	75	SB-200	Adjustable ALC threshold
Dec-70	CQ	75	SB-200	Use with 32S-3
Nov-73	CQ	10	SB-200	Intermittent output
Mar-81	QST	52	SB-200	Instant break-in for
Dec-86	QST	45	SB-200	Balanced grid circuit for
Nov-87	QST	32	SB-200	Use on 160 meters
Jun-84	CQ	51	SB-200	160 meter mod
Sep-88	QST	45	SB-200	"No holes" STBY switch mod
Dec-88	QST	44	SB-200	Panel labeling idea
May-89	QST	48	SB-200	Use with solid state XCVRs
Jan-91	QST	37	SB-200	Use with solid state XCVRs
May-87	CQ	48	SB-200	Power supply modifications
Feb-83	CQ	36	SB-201	Review
Jun-84	CQ	51	SB-201	160 meter mod
Aug-70	QST	45	SB-220	Review
Mar-70	CQ	29	SB-220	Review
Dec-74	QST	47	SB-220	Use on 6 meters
Jul-72	CQ	12	SB-220	Use with Swan 500
Nov-78	QST	40	SB-220	Modification
Nov-79	QST	56	SB-220	Upgrading
Jan-80	QST	25	SB-220	Solid-state QSK for
Feb-80	QST	44	SB-220	Comments on modification
Feb-69	CQ	46	SB-220	Adding 160 meters
Aug-86	QST	38	SB-220	Balanced grid circuit for
Aug-86	QST	37	SB-220	Tips
Jan-88	QST	45	SB-220	Use with solid state XCVRs
Sep-88	QST	45	SB-220	"No holes" STBY switch mod
Feb-89	QST	42	SB-220	Improvements
Feb-91	QST	38	SB-220	Panel light problems with 160 meter mods
May-87	CQ	48	SB-220	Power supply modifications
Mar-80	QST	43	SB-221	Review
Feb-83	CQ	36	SB-221	Review
Feb-76	QST	42	SB-230	Review
Jan-80	QST	51	SB-230	Tuning aid and protective circuits
Apr-77	CQ	33	SB-230	
Jul-64	QST	82	SB-300	Review
Dec-66	QST	21	SB-300	Modification
Dec-64	CQ	101	SB-300	AGC trouble
Jan-69	QST	16	SB-300	Notes
Sep-65	CQ	84	SB-300	60 Hz hum
Apr-66	CQ	79	SB-300	Improvements (very brief)
Dec-66	CQ	79	SB-300	Increase BFO output (brief)
Apr-68	CQ	61	SB-300	Front panel converter switch
Jul-68	CQ	112	SB-300	MARS reception on
Jan-69	CQ	96	SB-300	Operation outside the ham bands
Jun-69	CQ	79	SB-300	Improved AM
Nov-75	QST	37	SB-300	Improved stability
Mar-67	QST	43	SB-301	Review
Jan-69	QST	16	SB-301	Notes
Jan-70	QST	28	SB-301	Instant frequency change
Sep-70	QST	50	SB-301	Dual frequency operation
Jan-69	CQ	96	SB-301	Operation outside the ham bands
Jun-69	CQ	79	SB-301	Improved AM
Aug-69	CQ	95	SB-301	Noise blanker info (brief)
Mar-71	CQ	108	SB-301	Apparent sensitivity
Jul-79	QST	49	SB-301	Sidetone for
Jul-71	QST	48	SB-303	Review
Jul-72	QST	21	SB-303	Improved CW reception
May-73	QST	39	SB-303	Improved CW reception
Apr-71	CQ	43	SB-303	Review
Oct-71	CQ	79	SB-303	Internal noise fix
May-79	QST	45	SB-303	Sidetone and AGC mods
Jul-79	QST	49	SB-303	Sidetone for
Sep-79	QST	45	SB-303	Noise blanker for
Jan-65	QST		SB-400	Review
Jan-65	QST	54	SB-400	Review
Dec-66	QST	21	SB-400	Modification
Nov-68	QST	51	SB-400	Improved spotting
Dec-64	CQ	54	SB-400	
Oct-65	CQ	74	SB-400	No LSB (brief)
Jan-69	CQ	96	SB-400	Operation outside the ham bands
Mar-67	QST	42	SB-401	Review
Jan-69	QST	16	SB-401	Notes
Jan-70	QST	28	SB-401	Instant frequency change
Sep-70	QST	50	SB-401	Dual frequency operation
Sep-70	QST	53	SB-401	Foot switch operation
Dec-71	QST	40	SB-401	VOX adjustment
Jan-69	CQ	96	SB-401	Operation outside the ham bands
May-79	QST	45	SB-401	Sidetone and AGC mods
Jul-79	QST	49	SB-401	Sidetone for
Jun-81	QST	35	SB-401	High plate current fix
Sep-70	QST	43	SB-500	Review
Sep-69	CQ	59	SB-500	Review
Sep-66	QST	49	SB-600	Review
Jul-72	QST	49	SB-610	Review
Dec-72	QST	46	SB-610	Reducing baseline ripple
Oct-69	CQ	74	SB-610	Use with SX-101A
Jun-76	QST	37	SB-614	Review
Aug-76	CQ	40	SB-614	Review
Jan-82	QST	36	SB-614	Extend the versitility
Apr-68	QST	50	SB-620	Review
Feb-68	CQ	26	SB-620	Review
Jan-73	QST	52	SB-620	Use with other receivers
Oct-69	CQ	72	SB-620	Info on sensitivity fix
Feb-70	CQ	89	SB-620	Better connection to SB-101/HW-100

DATE	PUB.	PAGE	MODEL	SUBJECT
Jun-70	CQ	88	SB-620	Use as an RF monitor
Dec-76	QST	42	SB-630	Digital clock modification
Oct-68	QST	45	SB-640	Use with SB-101 and not lose XTAL control
Oct-71	CQ	79	SB-640	Use with DX-60B
Aug-79	QST	28	SB-644A	Improvements
Sep-79	QST	23	SB-644A	Improvements
May-80	QST	41	SB-644A	Improvements
Aug-72	QST	56	SB-650	Review
Oct-72	CQ	58	SB-650	Review
Mar-77	QST	24	SB-650	Use with FT-101
Sep-78	QST	37	SB-650	Use with AX-190
Feb-88	QST	33	SB-1000	Review
Jul-88	QST	47	SB-1000	Comments on
Oct-89	QST	34	SB-1400	Review
Jul-65	CQ	25	SB-series	Ad provides a look inside SB tube-type LMO
Jan-71	CQ	18	SB-series	QSK mod for SB-series
Jan-71	CQ	16	SB-series	QSK Mods
Sep-76	QST	39	SB-series	VFO slippgae and backlash
Jul-73	CQ	35	SB-series	Improved CW Break-In for
Jun-78	QST	44	SB-series	Better s/n and gain
Oct-78	QST	14	SB-series	Better s/n and gain
Feb-80	QST	44	SB-series	Dial zero modification
Mar-76	CQ	26	SB-series	A receiver pre-amp for
Aug-77	QST	33	SB-A1041	Modification
Aug-77	QST	33	SB-A1041	Use with HW-101
Aug-67	QST	52	SB-A100-2	Xtal filter mod kit
Apr-79	QST	47	SB-A101-1	More on adapting
Dec-79	QST	57	SB-A101-1	Adapting Heath noise blanker for 75S series
Feb-84	QST	41	SS-9000	Review
Feb-84	CQ	18	SS-9000	Review
Apr-85	QST	45	SW-7800	Review
May-85	QST	47	SW-7800	More info on
Mar-59	QST	44	TX-1	Review
Jun-59	QST	62	TX-1	Correcting grid current
Dec-59	QST	52	TX-1	Spotting switch modification
Mar-60	QST	48	TX-1	Adjustments made easy
Nov-60	QST	54	TX-1	Modification
Aug-59	CQ	55	TX-1	Review
Mar-61	CQ	66	TX-1	Final grid current problems
Mar-61	CQ	66	TX-1	Tips
Jul-61	CQ	76	TX-1	TVI precautions
May-62	CQ	76	TX-1	Chirp fix
Jun-62	CQ	35	TX-1	Capacitor problems
Jul-62	CQ	80	TX-1	Use with HA-10/SB-10/phone patch
Dec-62	CQ	66	TX-1	Improvements
Oct-64	CQ	79	TX-1	VFO drift
Nov-64	CQ	114	TX-1	Drive problems with SB-10
Aug-66	CQ	90	TX-1	Conversion (very brief)
Jan-68	CQ	78	TX-1	Use on 1815 kHz (brief)
Oct-69	CQ	73	TX-1	Use on 6 meters
Jul-70	CQ	84	TX-1	Chirp problems
Jun-72	CQ	12	TX-1	Excessive drift fix (brief)
Jun-59	QST	62	VF-1	Driving the AT-1 on 15 meters
Nov-59	QST	55	VF-1	Use on 14 MHz MARS freqs
Feb-60	CQ	59	VF-1	Use on 6 & 2
Mar-64	QST	64	VF-1	Modification to stablizing
Dec-72	QST	18	VF-1	New life for
Jan-86	QST	49	VF-1	Use on 30 meters with DX-20
Oct-79	QST	47	VF-2031	Review
Nov-81	QST	43	VF-7401	Review
Jul-83	CQ	40	VF-7401	Programmable power-up freq mod
Jan-61	QST	48	VH-F1	Review
Sep-60	CQ	41	VH-F1	Review
Jul-61	CQ	76	VH-F1	TVI precautions
Mar-65	CQ	67	VH-F1	Drive trouble (brief)
Jul-73	CQ	14	VH-F1	Chirp fix (brief)
May-82	QST	38	VL-1180	Review
Jun-82	QST	48	VL-2280	Review
Feb-59	QST	48	VX-1	Modification for CW break-in
Nov-60	QST	55	VX-1	Adding squelch
Sep-60	QST	47	XC-2	Review
Oct-59	QST	41	XC-6	
Feb-79	CQ	52		All About Kits Part 2 (not Heath specific)
Feb-62	CQ	36		Story on kit transmitters part 1
Mar-62	CQ	39		Story on kit transmitters part 2
Apr-67	CQ	85		Heath vs Collins (brief)
Jun-78	QST	39		Review
Jan-79	CQ	27		All About Kits Part 1 (not Heath specific)
Mar-79	CQ	74		All About Kits Part 3 (not Heath specific)
Apr-79	CQ	50		All About Kits Part 4 (not Heath specific)
Jul-79	CQ	55		Review
Jan-84	QST	19		Kit building tips (not Heath specific)

Product Timelines

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SB-101
SB-310
HR-10B
DX-60B
HW-16
HW-17
HW-18-2
HW-18-3
HW-100
HW-18-1
HW-17A
SB-110A
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SB-303
SB-220
HW-101
HW-7
SB-313
HW-202
SB-104
SB-230
HW-2026
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HD-1410
HW-2036
HR-1880
HW-8
SB-104A
HW-2036A
SB-201
SB-221
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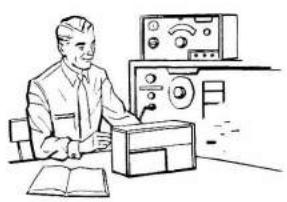
SB-100



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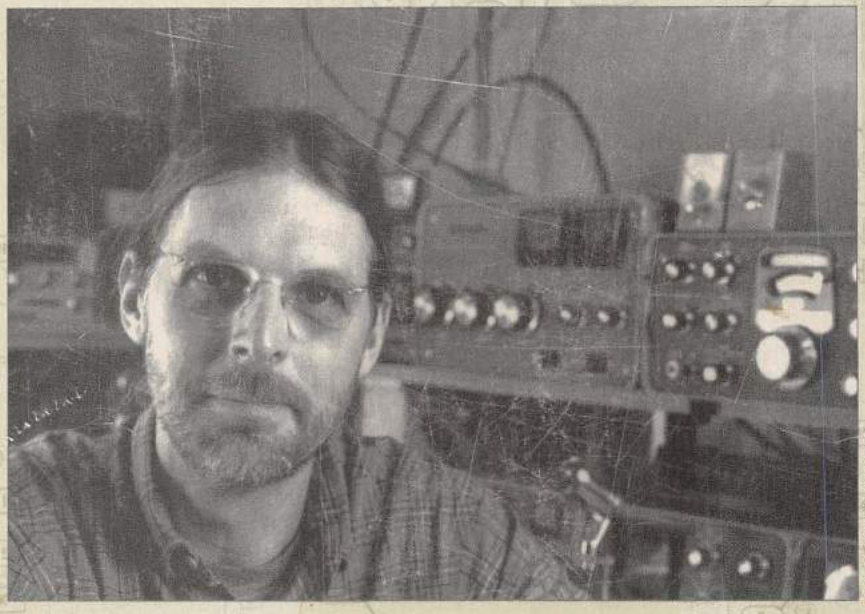

PHOTO BY JIM YUNKER.

About the author

Chuck Penson has been licensed since 1966 and holds an Advanced class ticket. His interest in the Heath company began in 1958 when his father bought an AR-3 receiver. Penson has been collecting Heath products (primarily amateur equipment) since 1983 and maintains a "pure Heathkit" environment in his shack. He has almost no interest in DXing but can often be heard rag-chewing on the 20-meter phone band or the 40-meter CW band. Chuck has worked in commercial broadcasting but for the last 15 years has worked for the Science Museum of Minnesota where he is director of the Computer Education Center. His other interests include astronomy, hiking, and solar energy.