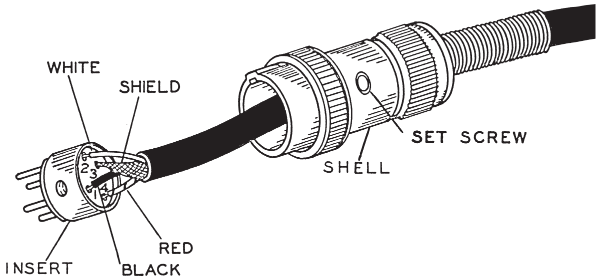


GH-12 microphone connections. Pins 1 and 3 are ground, 4 is PTT, pin 2 is audio.

References:
Review. *QST*. Apr 1960, p. 43.
Review. *CQ*. Mar 1960, p. 58.
Crystal control. *CQ*. Aug 1960, p. 79.
Modification. *QST*. Oct 1960, p. 50.
Reduce heating. *CQ*. Apr 1961, p. 112.
Use on 6 meters. *CQ*. Mar 1966, p. 65.
Modulation problems. *CQ*. Dec 1966, p. 79.
Crystal control. *CQ*. Nov 1968, p. 115.
Use on 160 meters. *CQ*. Feb 1976, p. 29.

Power input: 90 watts AM and CW
Power output: 30 watts nominal at 100% modulation
Output impedance: 50 to 72Ω
Frequency coverage (MHz): 3.5 to 4.0, 7.0 to 7.3, 14.0 to 14.35, 21.0 to 21.5 , 28.0 to 29.7
Power requirements:
6 volts at 4.7 amps or 12 volts at 2.35 amps AC or DC
300 VDC at 100 mA
500-600 VDC at 150 mA
Size: 6 high x 12 wide x 10 deep; **Weight:** 18 lbs
Tubes: (1) 0A2, (1) 6AU6, (1) 6CL6, (1) 6DE7, (1) 12AX7, (1) 5763, (1) 6146

SB-400

HF SSB CW Transmitter
1964-1966
$325.00

The SB-400 transmitter was released about six months after the SB-300 receiver; it was designed as a companion unit and represents the second product in the SB series.

The SB-400 was first seen in October 1963 issues of *QST*, *CQ* and *73* magazine. An ad for the SB-300 receiver in those publications included small teaser images of the SB-100, SB-200 and SB-400 with the text "Watch for these new Heathkit releases." The SB-400 did not actually appear for sale in the catalog for another seven months.

The SB-400 is designed around 12 tubes including three compactrons and a pair of 6146 finals, and although two PC boards were used, there is still a great deal of point-to-point wiring.

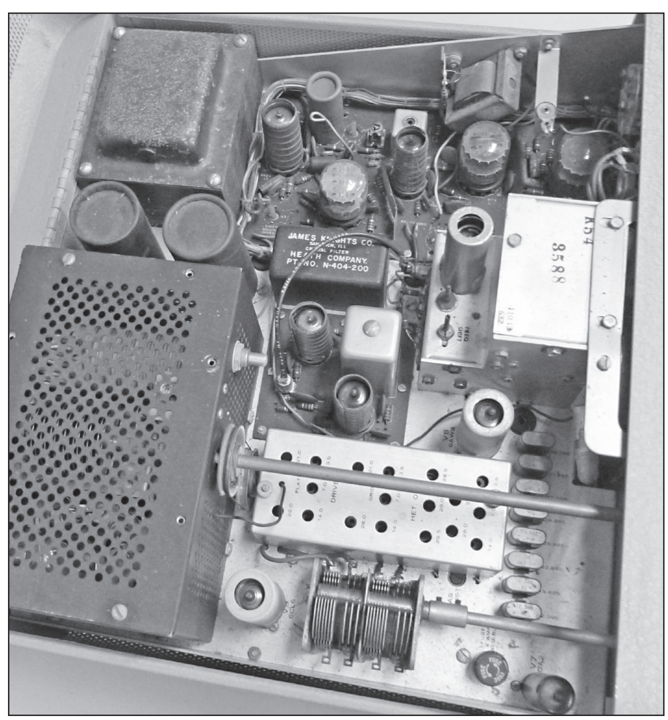
The 400 will run USB, LSB, and CW, but has no provision for AM. It employs a 2.1 kHz crystal filter and covers 500 kHz portions of the 80 through 10 meter amateur bands. 10 meters is covered in four 500 kHz segments.

DC power input is about 180 watts PEP SSB and about 170 watts CW. RF 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.

JERRY O'REILLY COLLECTION

Features include PTT or VOX operation, break-in CW, a built-in mechanical T/R relay, Heath's standard LMO, a spotting function, and a built-in solid-state power supply. For additional discussion of the LMO, refer to SB-100.

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. CW keying 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.



JERRY O'REILLY COLLECTION

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 changing a couple of cables inside the SB-400. This clumsy chore was streamlined in the SB-401. Refer to Figures 1A and 1B for cable connections required to transceive with the SB-300.

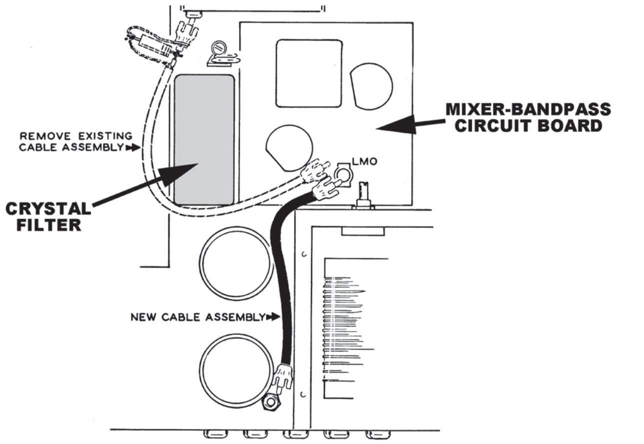


Figure 1A

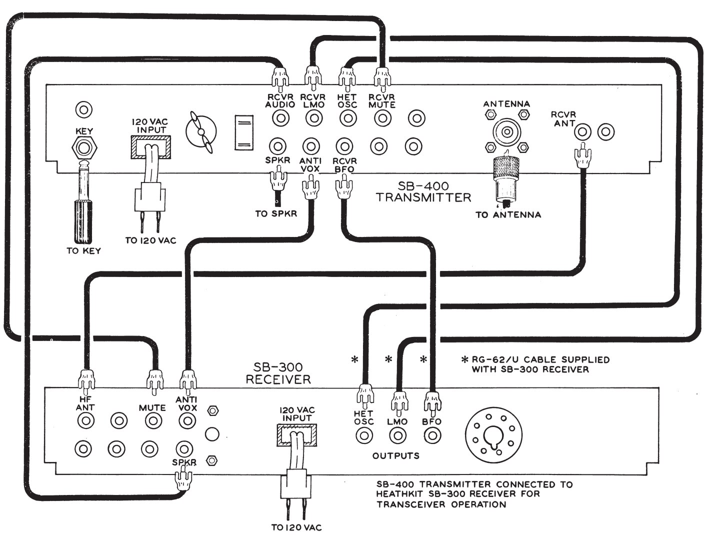


Figure 1B. Transceive configuration.

The SB-400 is supplied with all required heterodyne oscillator crystals so it can be used with any other make or model of receiver. Be sure to check that the crystals are installed.

The front panel is essentially a mirror image of the SB–300. The panel meter is on the right, and the placement of the controls is likewise reversed. Front panel controls include driver tune, loading, function, main tuning, zero set, mic/CW level, meter function, and mode. Internal controls include neutralizing, relative power adjust, bias adjust, sideband amplitude balance, carrier null, ALC adjust, sidetone output, and VOX controls. Refer to Figure 2 for the location of internal controls.

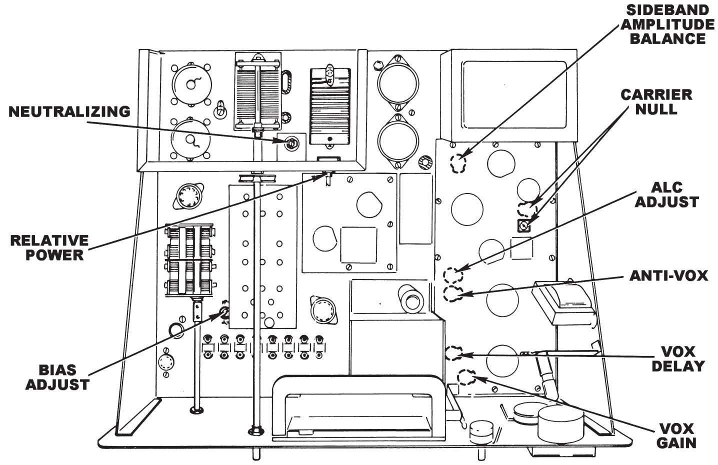
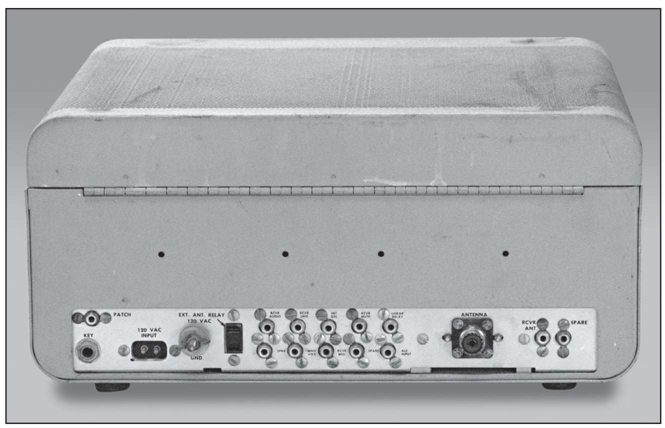


Figure 2

Rear panel connections include a quarter inch key jack, RCA jacks for receiver audio input, 8Ω speaker output, anti-VOX, receiver mute, and receiver antenna output. There is also an SO-239 connector for a 50-75Ω antenna, a ground post, and a 120 VAC standard two-blade receptacle used to power an external antenna relay.



Note: because of the different size and mounting hole configurations, SB-400 and 401 crystal filters are mutually incompatible. Refer to page 3-35 for details.

Alignment requires a dummy load, a VTVM with an RF probe, and a CW key.

References:

Review. *73 Amateur Radio*. Sep 1964, p. 64.
Review. *CQ.* Dec 1964, p. 54.
Review. *QST.* Jan 1965, p. 54.
Full break-in without keying VOX. *QST*. Jul 1965, p. 80.
No LSB (brief). *CQ.* Oct 1965, p. 74.
Adding a switch for working split. *73 Amateur Radio.* Nov 1966, p. 74.
Improved switching from transmit to transceive. *QST.* Dec 1966, p. 21.
Improved spotting. *QST.* Nov 1968, p. 51.
Operation outside the ham bands. *CQ.* Jan 1969, p. 96.
VOX adjustment. *QST.* Dec 1971, p. 40.
Increase friction in worn zero set. *QST*. Jan 1973, p. 52.

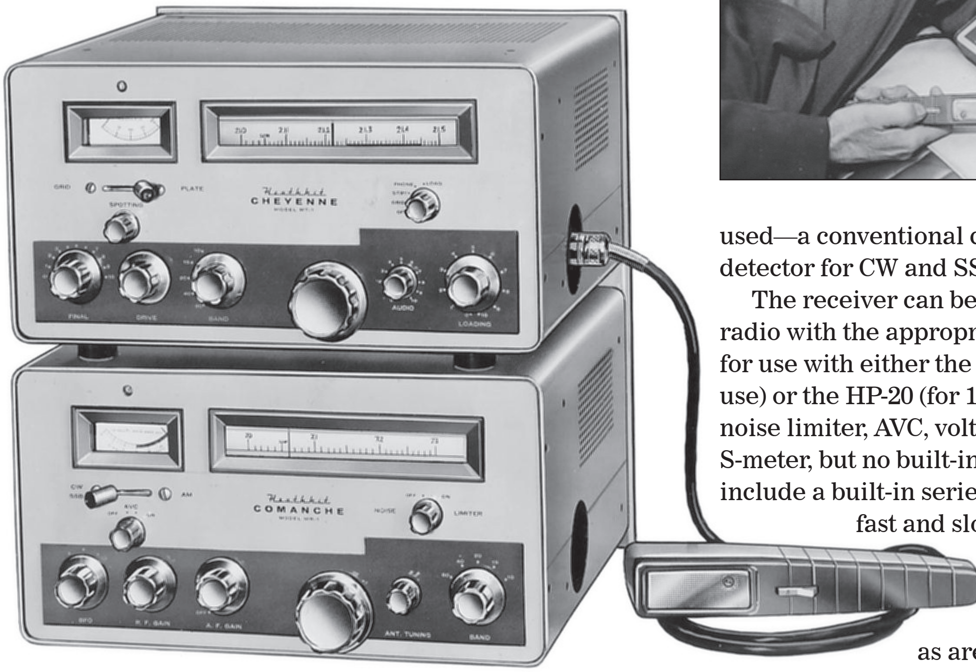
MR-1

HF Mobile Receiver

“Comanche”

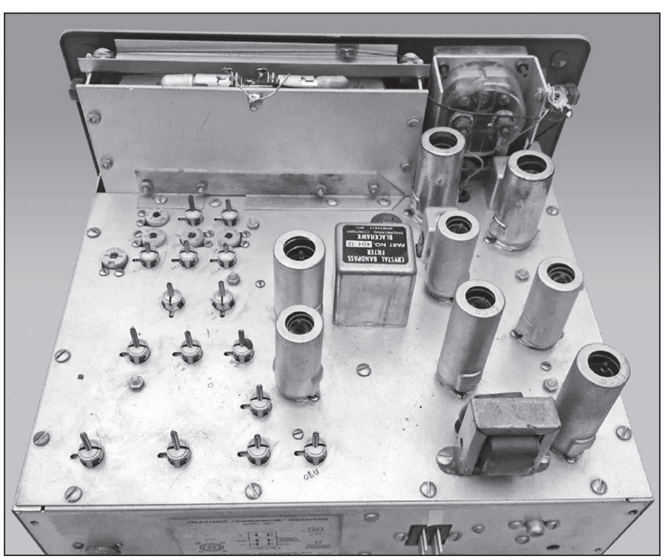
1959-1961

$119.95



The MR-1 and MT-1 are matching rigs designed primarily for mobile operation, although fixed-station use is possible. A *QST* review marveled that the space occupied by both units was “a mere cubic foot.”

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 μV on all bands. Selectivity is 3 kHz at 6 dB down, 10 kHz at 60 dB down. Two different detectors are used—a conventional diode type for AM and a product detector for CW and SSB.



The receiver can be used as a mobile or fixed-station radio with the appropriate power supply and is designed for use with either the MP-1 or the HP-10 (for mobile use) or the HP-20 (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, and front panel selection of fast and slow AVC action.

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 is 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 50Ω antenna, an RCA jack for an 8Ω 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.

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. Refer to the MT-1 for additional discussion and information.

The MR-1’s paint color is Heath’s standard two-tone green. The AK-6 mobile mounting bracket (page 12-01) is almost always missing.

WIRING OPTIONS

The MR-1 can be wired for 6- or 12-volt filament operation. Refer to Figure 1. For 6-volt operation jumpers should be installed between lugs 1 and 2, and between lugs 3 and 4, of terminal strip Q. For 12-volt operation, a jumper should be installed between lugs 1 and 4 of terminal strip Q. Terminal strip Q is located on the underside of the chassis directly beneath the audio transformer and adjacent to the 6AQ5 tube.

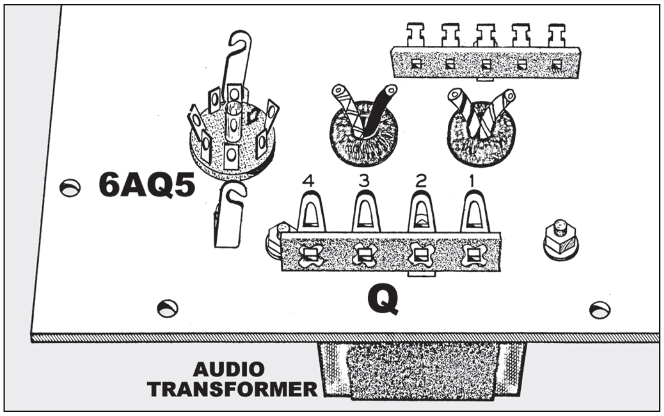


Figure 1

POWER CONNECTIONS

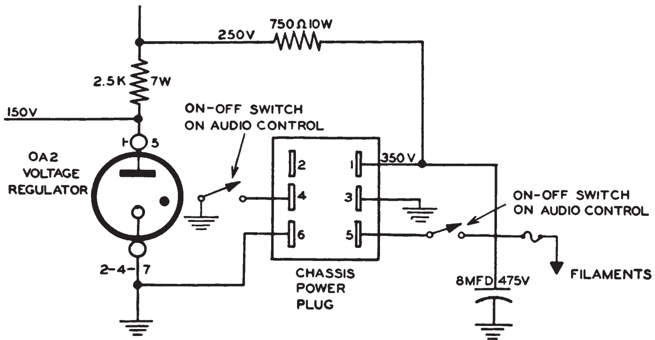


Figure 2. Detail of power connector and related circuit.

References:

Review. *CQ*. Oct 1959, p. 52.

Review. *QST*. Apr 1960, p. 41.

Power supply for. *CQ*. Jan 1961, p. 67.

Tips. *CQ*. Oct 1961, p. 83.

Upgrading. *CQ*. Jun 1964, p. 55.

Intermittent BFO (brief). *CQ*. Mar 1965, p. 67.

Drift problems. *CQ*. Apr 1967, p. 86.

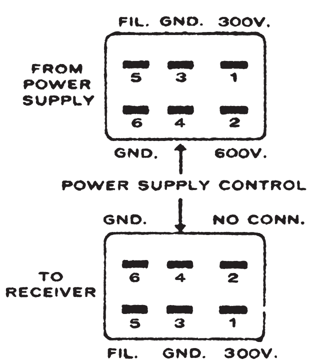


Figure 3. Rear panel power connections

Frequency coverage (MHz):
3.5 to 4.0, 7.0 to 7.3, 14.0 to 14.35, 21.0 to 21.5, 28.0 to 29.7

IF frequency: 3000 kHz

IF crystal filter:
center frequency: 3000 kHz
bandwidth at 6 dB down: 3 kHz
bandwidth at 60 dB down: 10 kHz maximum

Sensitivity: better than 1.0 μV on all bands

Signal to noise ratio: more than 10 dB at 1.0 μV input

Power requirements:
6 volts at 3.3 amps or 12 volts at 1.65 amps AC or DC
250 VDC at 125 mA

Size: 6 high x 12 wide x 10 deep; **Weight:** about 15 lbs

Tubes: (1) 0A2, (1) 6AQ5, (1) 6BE6, (2) 6BZ6, (2) 6EA8, (1) 6T8

RX-1

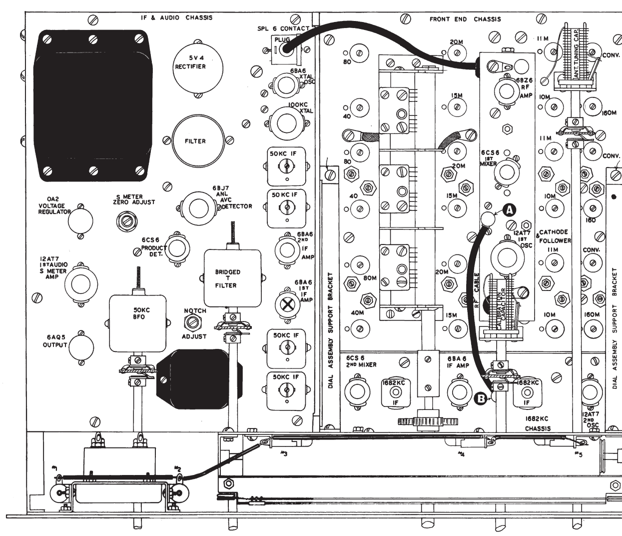
HF Receiver

"Mohawk"

1958-1963

$274.95

The RX-1 was Heath's first dedicated ham band receiver. The receiver is designed as a companion to the TX-1 "Apache" transmitter, 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 became a de facto trademark, and one the company would continue to use for more than 20 years.

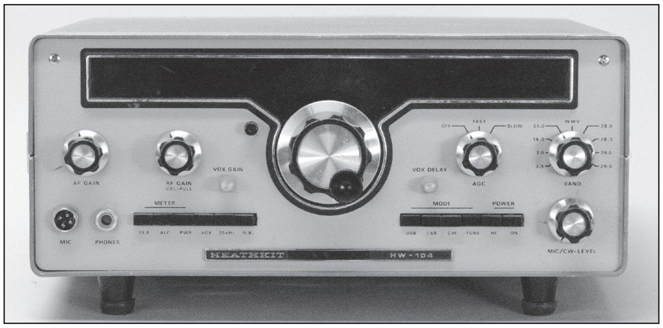


The RX-1 is typical of equipment designed in the 1950s: it is built on a heavy gauge steel chassis and has a heavy aluminum front panel and a heavy steel enclosure. The operative word here is "heavy." The RX-1 weighs 52 pounds on the bench. The unit is designed around 15 tubes and will receive upper and lower sideband as well as AM and CW. It covers from 160 through 10 meters (including 11 meters). There is a separate band position marked "CONV" (22 to 26 MHz) and dial markings for 6 and 2 meter for use with the optional XC-6 and XC-2

HW-104(A)

HF Transceiver

HW-104	1975-1977	$539.95
HW-104A	1977-1977	$489.95



STEVE GLADSTEIN COLLECTION

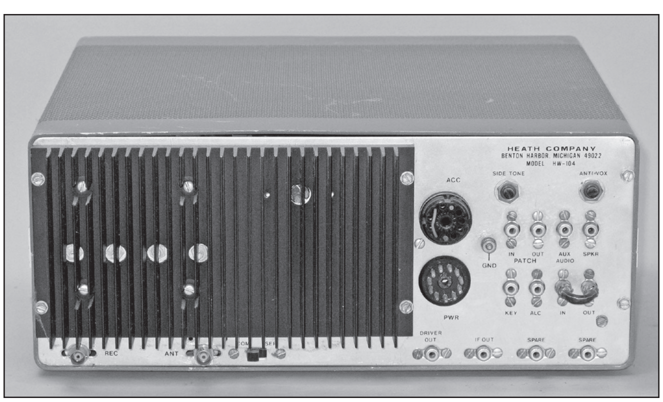
Released for Christmas in 1975, the HW-104 (there was no HW-102 or HW-103) was the lower cost alternative to the SB-104, which had been released a year earlier.

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 is the frequency display. The SB-104 uses an expensive and complicated digital display and attendant high voltage converter. Elimination of the converter had the added benefit of eliminating the birdies found flying all over in the SB-104. The HW-104 uses a much simpler analog dial. And because the HW-104 was released about a year after the SB-104, many of the problems suffered by the SB-104 had been worked out by the time the HW-104 was released.

Front panel controls include pushbutton selection of meter function, power off/on, VOX, 25 kHz calibrator, and optional noise blanker. Pushbuttons also select operating mode and power level. Other front panel controls include AF gain, RF gain (pull for calibrator), main tuning, AGC speed, band, mic/CW level, VOX gain, and VOX delay.

T/R switching is accomplished with a mechanical relay, so true QSK is not possible.

The HW-104 is built with 15 printed circuit boards, 11 of which are plug-in circuit cards. There is no "motherboard." The cards plug into sockets on the chassis which are connected by two wiring harnesses on the underside. As a cost-saving measure, Heath used

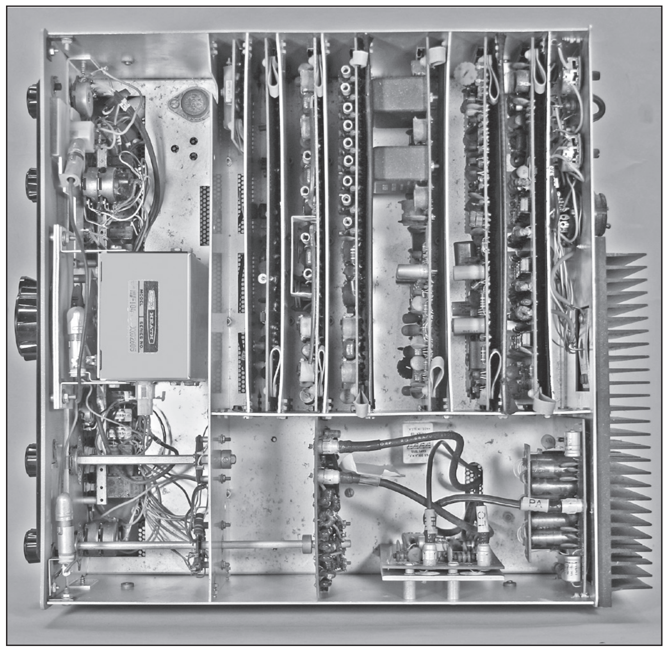


STEVE GLADSTEIN COLLECTION

less expensive phenolic material for the circuit boards instead the more expensive epoxy boards used in the SB-104. Since the circuit boards are interchangeable, it may be possible to find an HW-104 with one or more epoxy boards. The two types are readily identifiable by their color. The phenolic boards are reddish brown, while the epoxy boards are green.

The basic specifications of the two units are also very similar. Frequency coverage is 80 through 10 meters (up to 29.0 MHz). Coverage to 29.7 MHz was provided with an optional accessory (a set of two coils and two crystals mounted on a space provided on the front end of a PC board). Refer to Figure 1 for the location of the optional band components.

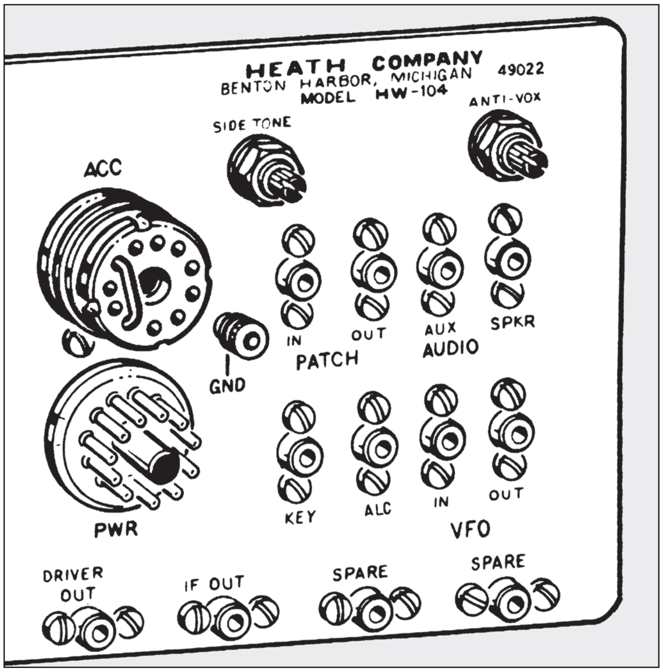
WWV reception on 15 MHz is also provided. The HW-104 pre-dates the WARC bands.


STEVE GLADSTEIN COLLECTION

Rear panel controls include sidetone level, anti-VOX, and a switch to select separate or common antenna connections.

Rear panel connections include RCA jacks for the following: phone patch in and out, aux audio, key, 4-8Ω speaker (there is no internal speaker), VFO in and out, ALC, driver output, IF output, receiver antenna, common antenna, and two spares. Note: For normal operation there must be a jumper cable between the VFO "in" and "out" jacks. There are also two 11-pin 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.

The receiver is a broadBand design using the same crystal filter as the HW-100/101 and others. 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. Refer to Figure 1.



Rear panel connectors.

An optional noise blanker was available (SBA-104-1). It is a small, plug-in circuit board. If present, it is located on the left side of the transceiver, just behind the front panel, adjacent to the VFO. Refer to Figure 2 for the location of the noise blanker. Note: The noise blanker front panel pushbutton is present whether or not the noise blanker itself is installed.

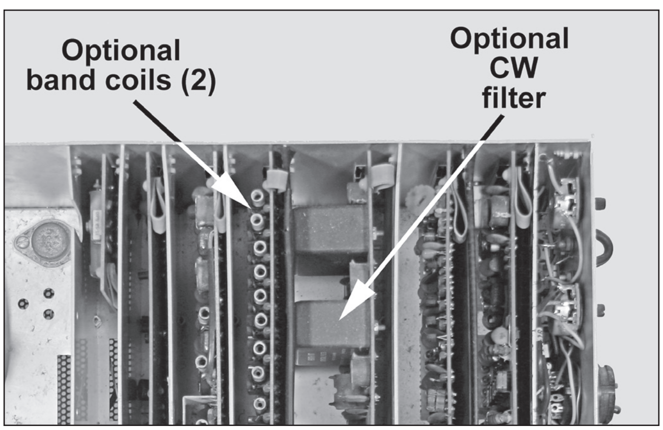


Figure 1. Location of optional band coils and CW filter.

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

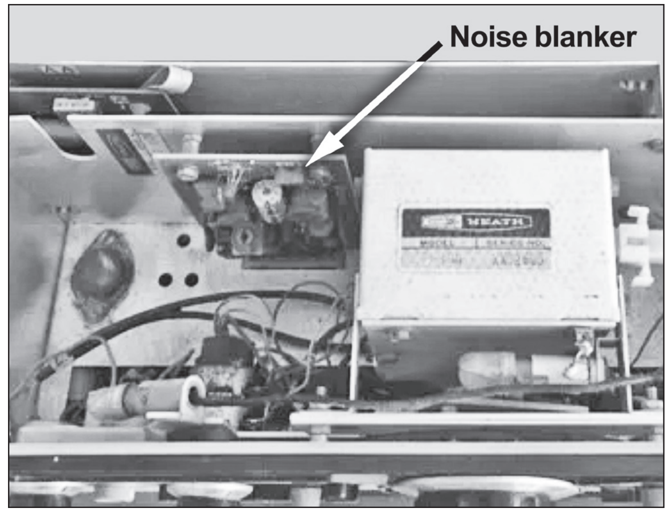


Figure 2. Location of optional noise blanker.

of your callsign. (The clever person will figure out some way to change or eliminate the callsign).

The HW-104A was introduced in the Christmas 1977 catalog and discontinued almost immediately. It is not clear if any were actually sold, as the unit did not appear in any subsequent catalogs. As of this writing, a Google search for "Heathkit HW-104A" returned zero hits. The difference between the 104 and 104A was a redesigned and pre-assembled front-end board (board G) that significantly improved receiver sensitivity from 1.0 μV to 0.5 μV. Bear in mind that the sensitivity of the HW-101 was 0.3 μV.

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.

Warning: DC input voltage must NOT EXCEED 16 volts or damage will result.

Warning: reverse polarity will also result in damage as the HW-104 is not polarity protected.

For power supply connections refer to HP-1144(A), page 7-09.

The two-tone green cabinet matches other HW series units.

References:

Review. *QST*. Dec 1976, p. 37.
Modification of PC board etching pattern. *QST*. Jan 1980, p. 54.
RIT for. *73 Amateur Radio*. Apr 1979, p. 128.
RIT for. *QST*. Jan 1980, p. 16.
RIT for. *QST*. Mar 1980, p. 49.

TRANSMITTER SECTION

RF power output (50Ω nonreactive load):
high power: SSB, 100 PEP ±1 dB; CW, 100 watts ±1 dB
low power: SSB, 1 watt PEP minimum; CW, 1-watt minimum

Output impedance: 50Ω, less than 2:1 SWR

Carrier suppression: 55 dB down from 100 watt single-tone output at 1000 Hz

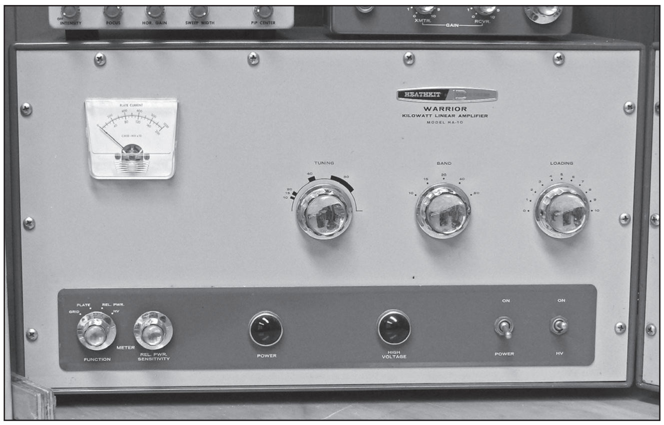
Unwanted sideband suppression: 55 dB down from 100 watt single-tone output at 1000 Hz

4

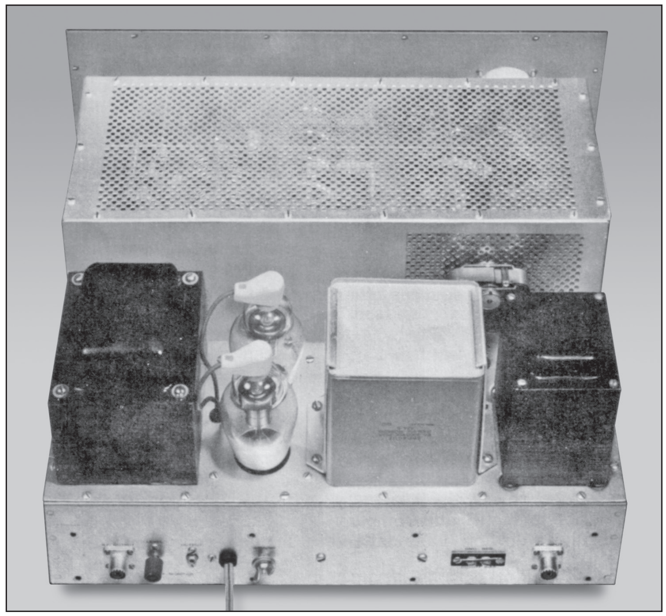
HF AMPLIFIERS

HA-10

HF Linear Amplifier
"Warrior"
1961-1965
$229.95



JERRY O'REILLY COLLECTION



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 factory assembled. It was designed to complement the TX-1 or HX-10, and to replace the too big, too heavy, and much too expensive KL-1 "Chippewa," 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. Together, they develop around 1000 watts PEP/CW and about 400 watts AM—a respectable signal by any definition—requiring only 50-75 watts of drive. The HA-10 covers 80 through 10 (including 11) meters and operates AM, SSB, and CW. There is no built-in antenna relay.

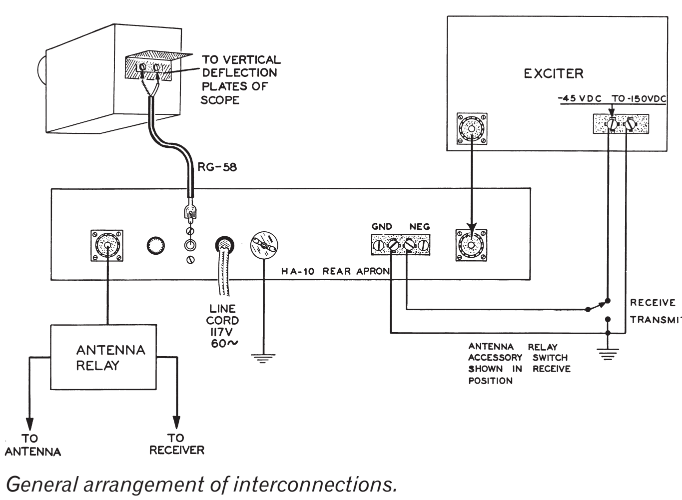
The amplifier is built on a 16-gauge steel chassis with an 1/8-inch thick aluminum front panel. It is enclosed in a one-piece welded copper-clad TX-1 style cabinet painted in the now familiar two-tone green colors.

The HA-10's broadband input circuit requires no tuning and will match about 70Ω.

The output circuit is a variable pi network with an impedance of 50 to 75Ω to an SO-239 RF connector. There is also a monitor scope output with a level control. The front panel meter reads grid and plate current, relative power, and high voltage. A bias supply ripple problem was solved in the first few weeks of production.

Beware the fused power plug.

Warning: Lethal voltages present while operating.



General arrangement of interconnections.

References:
Review. *QST.* Jun 1961, p. 44.
Review. *73 Amateur Radio.* May 1962, p. 68.
Review. *73 Amateur Radio.* Dec 1962, p. 60.
Improved bias circuit. *QST.* Dec 1961, p. 62.
Improved bias circuit (more). *QST.* Feb 1962, p. 33.
Improved bias circuit. *CQ*. Feb 1962, p. 84.
Rectifier noise. *CQ*. Nov 1961, p. 99.
Use with TX-1/SB-10/phone patch. *CQ*. Jul 1962, p. 80.
Impulse interference fix. *CQ.* Sep 62, p. 67.
Increasing plate voltage. *73 Amateur Radio.* Feb 1964, p. 12.
Use on 6 meters. *CQ.* Feb 1966, p. 76.
Improved performance. *Ham Radio*. Oct 1971, p. 68.

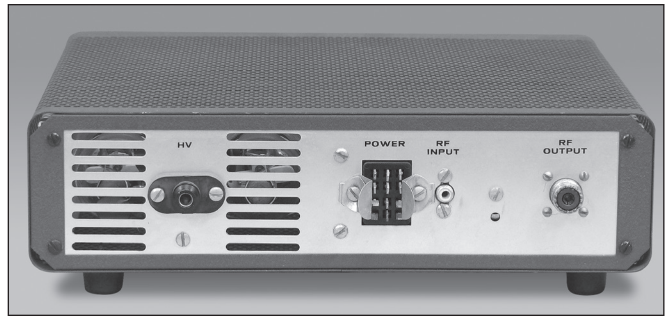
Drive power: 50 to 75 watts (depending on frequency)
Maximum input power:
SSB: 1000 watts PEP
CW: 1000 watts
AM: 400 watts (500 watts using controlled carrier modulation)
RTTY: 650 watts (load to only 430 mA plate current)
Output impedance: 50–75Ω
Input impedance: about 70Ω (broadband, no tuning required)
Power supply: filament, bias, 1500 VDC plate, and blower power
Power requirements: 120 VAC, 50/60 Hz, 1250 watts maximum
Size: 19.5 wide x 11.5 high x 16 deep; **Weight:** 90 lbs
Tubes: (4) 811A, (2) 866A.

HA-14

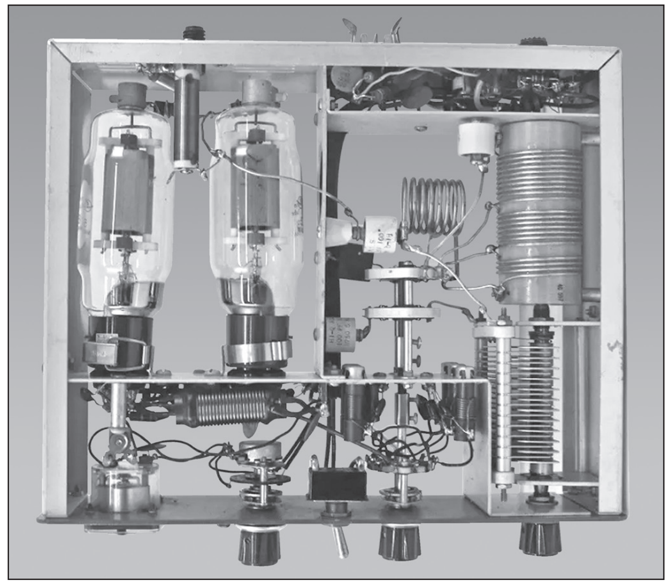
HF Linear Amplifier
"KW Kompact"
1965-1968
$99.95

JERRY O'REILLY COLLECTION

The HA-14 is essentially an SB-200 without an internal power supply. It was released about a year after the SB-200 and is designed primarily for mobile use (specifically with the Single-Bander series), though it also was promoted for use in a fixed station. Heath made two power supplies to match the HA-14 — the HP-14 mobile power supply and the HP-24 AC supply. The HA-14 can be used with virtually all of Heath's transmitters and transceivers, but seems to have been designed with the Single-Banders (HW-12(A), 22(A) and 32(A)) in mind, as the width and depth of the amplifier is a perfect match.



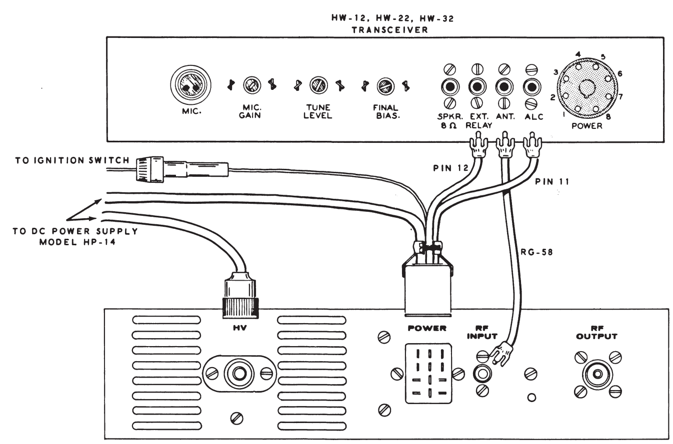
JERRY O'REILLY COLLECTION


JERRY O'REILLY COLLECTION

Like the SB-200, the KW Kompact uses a pair of 572B (T-160L) tubes and covers 80 through 10 meters. It uses a pre-tuned broadband input and provides 1000 watts input PEP with 100 watts of drive.

There are two important operating considerations: 1) The HA-14 has no load control in the pi network output circuit. Instead it uses a fixed capacitor. This limits its ability to work with antennas that are a bit off tune. 2) There is no fan. The amp is convection cooled. This means you can't run it as hard as the SB-200. For example, the SB-200's SSB duty cycle is 100%, but the HA-14's SSB duty cycle is only 50%. For CW operation Heath said "the duty cycle must not exceed the normal telegraphy duty cycle of 33% maximum."

CONNECTION WITH SINGLE-BANDERS



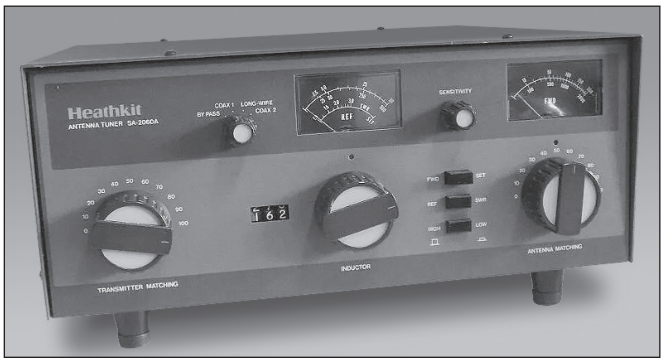
SA-2060(A)

Antenna Tuner

SA-2060 1981-1983 $254.95
SA-2060A 1983-1991 $279.95

STEVE GLADSTEIN COLLECTION

SA-2060



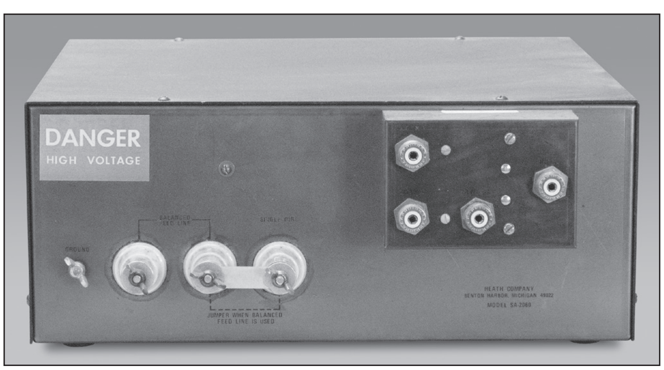
DON PETERSON COLLECTION

SA-2060A

The SA-2060 and SA-2060A essentially combine the SA-2040 with the HM-2140 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.

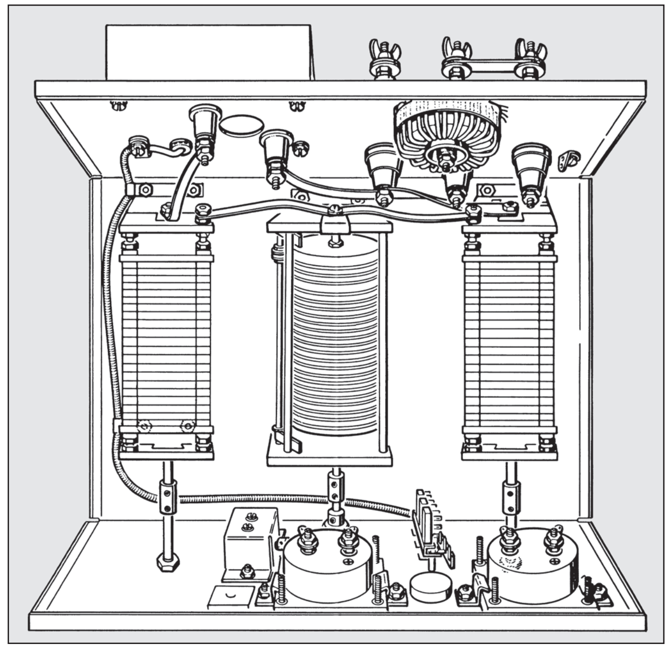
Also, frequency coverage has been extended to include 160 meters.

These tuners are built on a copper plated chassis. 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.

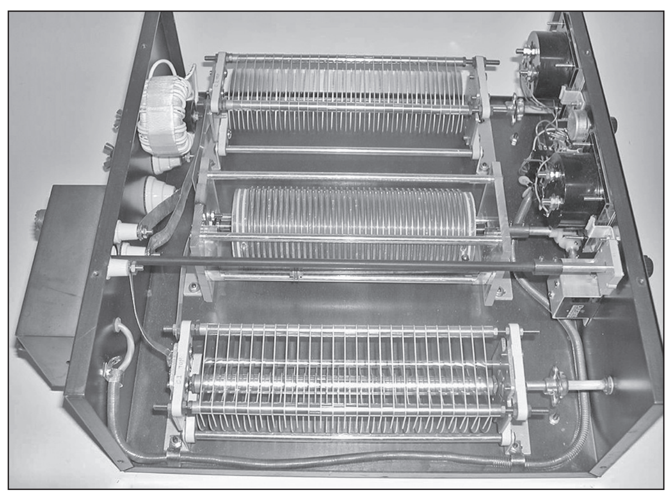


STEVE GLADSTEIN COLLECTION

Figure 1. Detail of front panel showing added position on antenna selector switch of SA-2060A (right).



General arrangement of interior parts.



DON PETERSON COLLECTION

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—Heath added a position to the front panel antenna selector switch to enable the selection of a long wire or balanced line as well as the coaxial lines. Refer to Figure 1. There are no additional connectors on the rear panel.

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 replaced the familiar SB style knobs of the 2060.

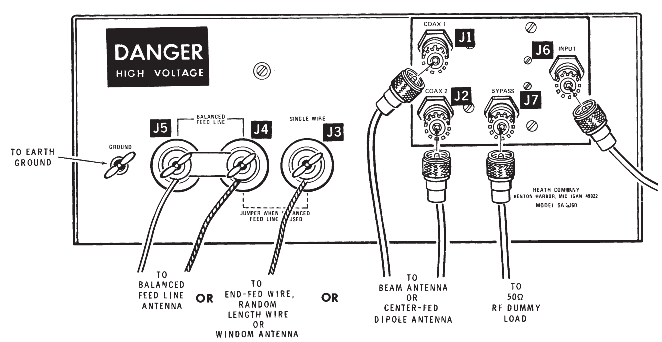
Rear panel connections include an SO-239 input connector and three SO-239 outputs (coax 1, 2, and bypass). There are also three standoffs for use with a balanced line or random wire (but not both simultaneously).

Refer to the Preset Chart shown in Figure 2 for values used to preset the tuner. These settings will help in establishing final working values.

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.

Caution: The box on the rear panel containing the SO-239 connectors houses the power and SWR sensor circuits. This assembly was preassembled and adjusted. Adjustment of the sensors is not advised without the proper documentation.

These tuners are built on a copper plated chassis. They are rugged and well-designed.



PRESET CHART

FREQUENCY (IN MHZ)	TRANSMITTER MATCHING	INDUCTOR	ANTENNA MATCHING
3.500	100	202	66
3.750	100	183	66
4.000	100	164	66
7.000	95	73	60
7.150	95	72	60
7.300	95	70	60
14.000	95	30	50
14.100	95	30	46
14.350	92	29	45
21.000	80	19	35
21.200	75	19	35
21.450	70	19	35
28.000	77	13	30
29.000	73	12	30
29.700	71	12	30

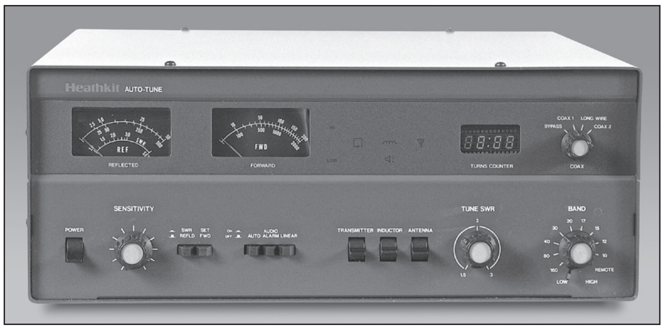
Figure 2. Tuner preset values.

References:
Review. *QST*. Jul 1982, p. 40.

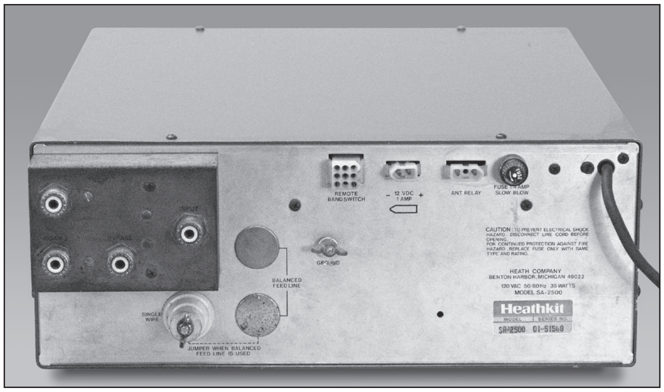
Frequency range: 1.8 to 30 MHz
Input power capability:
SSB: 2000 watts PEP
CW: 1000 watts
Input impedance: 50Ω
Output impedance: wide range
Meter functions: forward and reflected, average power, and SWR
Meter ranges:
forward: 0-200 and 0-2000 watts
reflected: 0-50 and 0-500 watts
SWR: 1:1 to 3:1
Wattmeter accuracy:
forward: 200/2000 watts: ±5% (average)
reflected: 500 watts: ±5% (average)
reflected: 50 watts: ±7.5% (average)
Insertion SWR: 1.1:1
Size: 14.5 wide x 14 deep x 5.75 high; **Weight:** 15.5 lbs

SA-2500

Antenna Tuner
1984-1987
$599.95



STEVE GLADSTEIN COLLECTION



STEVE GLADSTEIN COLLECTION

Note optional balun not installed.

The SA-2500 was designed with the SS-9000 in mind, but can be used with any transmitter. Motor-driven tuning elements are controlled by an electronics package (on two PC boards) that senses minimum SWR. The unit will tune from 1.8 to 30 MHz and has an auto-ranging

Tuners

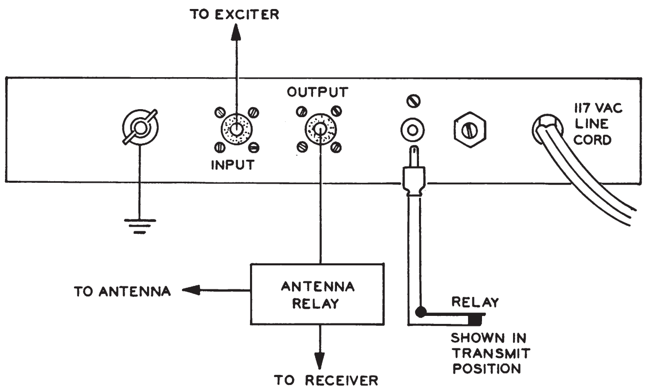


Figure 1. General arrangement of interconnections.

miniature version of the HA-10 (page 4-01).

The amplifier uses a pair of 6146 tubes 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 built-in power supply is solid-state, but uses an OA2 regulator.

The amplifier features forced-air cooling, extensive shielding, a multi-function meter, a 50Ω tuned grid input, a link-coupled output, and stub neutralized finals. The output circuit matches 50-75Ω antennas.

Front panel controls include coupling, loading, tune, power on/off, meter function, 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. The rear panel includes SO-239 connectors for RF input and output and a ground post.

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.

References:
Review. *Electric Radio.* Dec 2016.

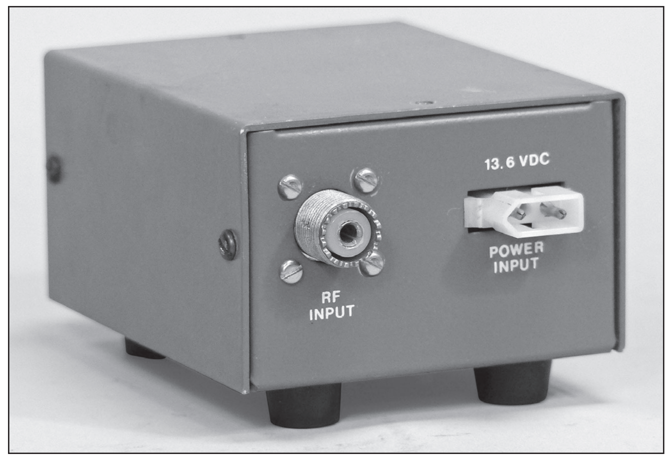
Drive power: 2.5 to 10 watts PEP
Maximum power input:
SSB: 125 watts PEP
AM: 75 watts
Power output: 70 watts PEP
Output impedance: 50 to 75Ω
Output coupling: link
Input impedance: about 50Ω
Input coupling: link (tuned grid)
Frequency coverage: 49.8 to 54 MHz
Power supply:
filament: 6.3 volts at 4 amps
spare: 6.3 volts at 4 amps
bias: –150 VDC
plate: 600 VDC
Power requirements: 120 VAC, 50/60 Hz, 95 watts standby, 200 watts at full output
Size: 10.25 high x 16.5 wide x 10 deep; **Weight:** 33 lbs
Tubes: (1) 0A2, (2) 6146A

HA-201(A)

Two Meter Amplifier

HA-201 1974-1977 $25.95
HA-201A 1978-1983 $34.95

JERRY O'REILLY COLLECTION



JERRY O'REILLY COLLECTION

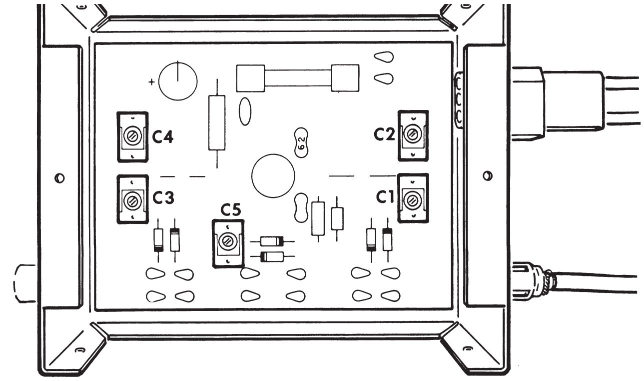
Released on the heels of the popular HA-202, this tiny amp was designed specifically to boost the signal from a handy-talkie. It provides about 8 watts of output with 1 to 3 watts of drive. The HA-201(A) is fully solid-state, no mechanical relays are used in switching. The amplifier will withstand infinite VSWR without failure but is not indestructible.

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 jacks with SO-239 connectors. Both versions, however, work very well and are easy to fix. The HA-201(A) is painted one-color green.

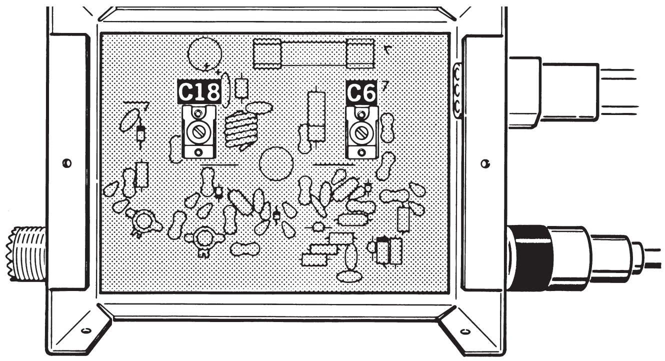
Caution: Do not exceed 3 watts of drive or you may damage the final (2N6081 or CTC B12-12).

Note: 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.

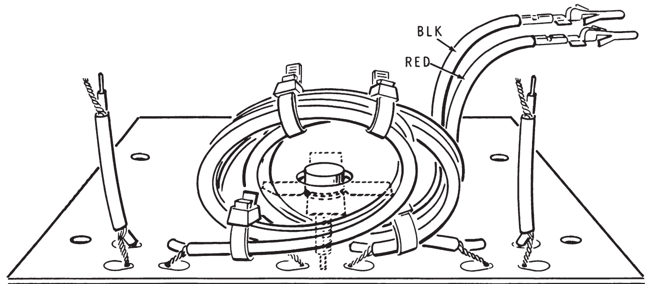
Note: there is no RF bypass around the HA-201(A) when its power is off. If the amp is in the RF line, it must be powered up or no RF will get through.



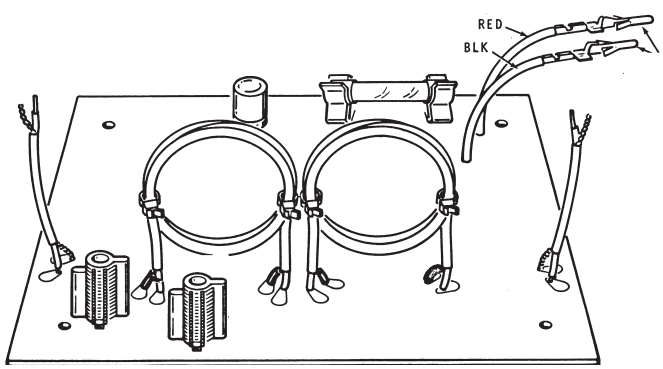
HA-201 component side of circuit board.



HA-201A component side of circuit board.



HA-201 component side of circuit board.



HA-201A component side of circuit board.

References:

Review. *CQ.* Jul 1975, p. 51.
Carrier operated relay. *QST.* Jul 1978, p. 32.
Carrier operated relay (more on). *QST.* Nov 1978, p. 32.

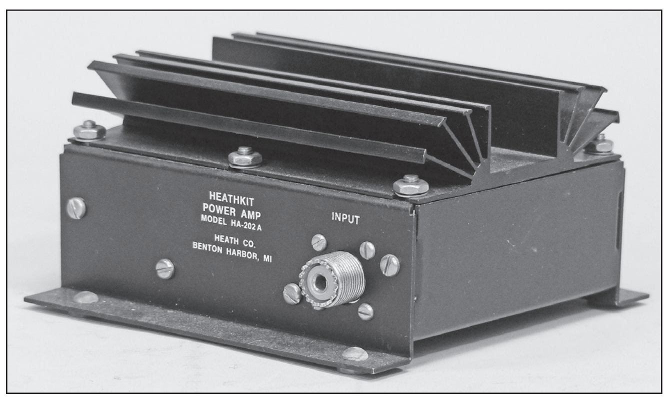
HA-201 SPECIFICATIONS:
Frequency range: 143 to 149 MHz
Power output:
1 watt drive: 8 watts
1.5 watts drive: 10 watts
Power input: 1 to 3 watts
Input/output impedance: 50Ω
Maximum load VSWR (non-catastrophic): infinite
Conducted spurious and harmonics: not specified
Operating temperature range: not specified

HA-201A SPECIFICATIONS:
All as above plus:
Maximum stable VSWR: 4:1 referenced to 50Ω
Conducted spurious and harmonics: –60 dB
Operating temperature range: –22 to +140° F
Power requirements: 12 to 16 VDC, 2.2 amps maximum
Size: 5.25 long x 3.5 wide x 2.75 high; **Weight:** 1 lb

HA-202(A)

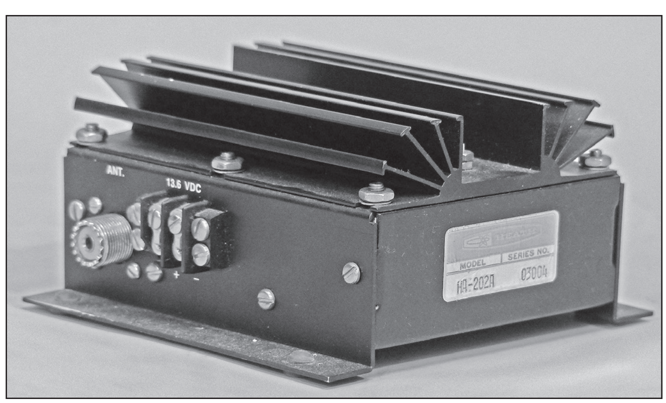
Two Meter Amplifier

HA-202 1973-1977 $69.95
HA-202A 1978-1984 $59.95



JERRY O'REILLY COLLECTION

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. A pair of 2N5591 transistors in push-pull will withstand up to 3:1 SWR and depend upon a big heat sink to keep them cool instead of "exotic sensing circuitry." Tuned input/output is 50Ω nominal.



JERRY O'REILLY COLLECTION

VHF Equipment

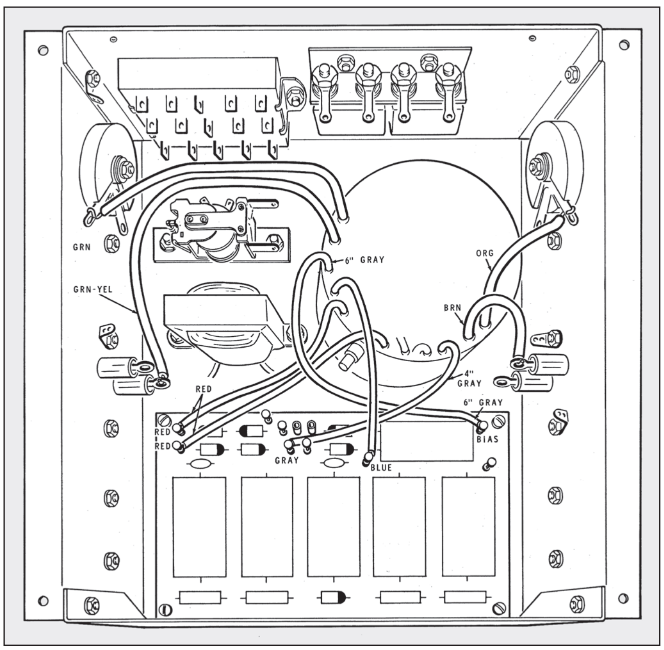
HP-13(A)(B)

Mobile Power Supply

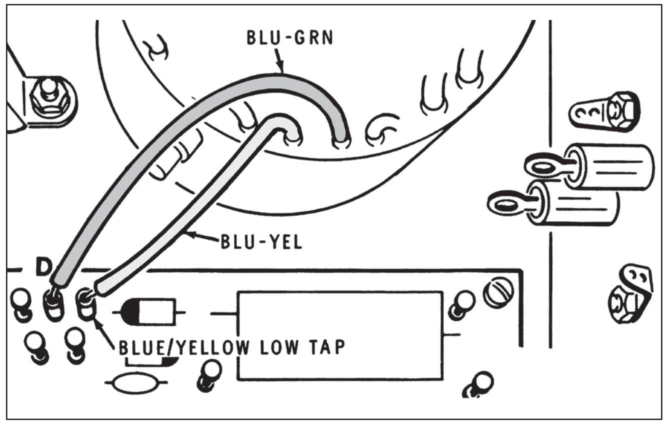
HP-13 1963-1968 $59.95
HP-13A 1969-1972 $69.95
HP-13B 1972-1979 $69.95

JERRY O'REILLY COLLECTION

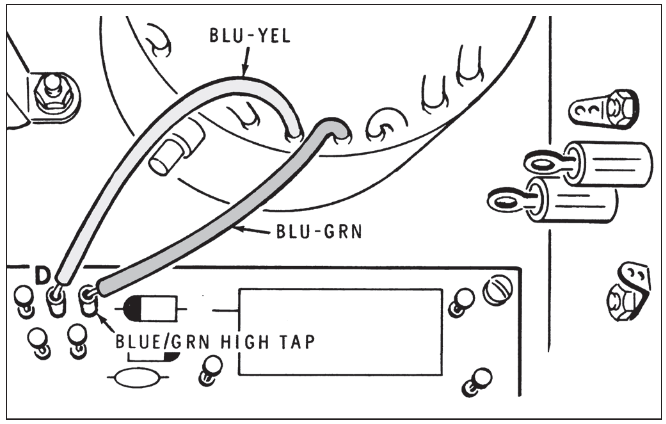
HP-13



HP-13B. General arrangement of internal parts.



Pictorial A. Detail of 250 volt low tap.



Pictorial B. Detail of 300 volt high tap.

The HP-13 evolved from the HP-10 and was released in 1963 principally as a companion for the HW-12, 22, and 32 "Single-Bander" transceivers introduced that same year, and with the soon-to-be-released SB series as well.

The basic specifications of these units are nearly identical to the HP-23 series. Outwardly, the HP-13 series are identical, except that the 13B has no bias adjust control. These are fully solid-state switching power supplies with a switching frequency of about 1500 Hz. They are all built around a single circuit board and a proprietary potted toroid type transformer.

The choice of low voltage (250 or 300 VDC) is made during construction. To determine what voltage any given unit has been set for, check the BLU-GRN and BLU-YEL wires from the potted transformer.

Refer to Pictorial A. For 250 volt operation, the BLU-YEL wire will be connected to the BLU-YEL LOW TAP solder terminal on the circuit board, and the BLU-GRN wire to point D.

Refer to Pictorial B. For 300 volt operation the BLU-GRN wire will be connected to the BLU-GRN HIGH TAP terminal, and the BLU-YEL wire to point D.

The units will also switch DC filament voltages to the rig, and feature circuit breakers with both automatic reset and load delay. No simple field check is possible to determine the status of the transformer.

Changes between the original and the A/B versions include better output transistors. Changes between the A and B version include removing the variable bias voltage, changing the bias on the transistors, and adding some asymmetry to improve starting. All three versions use the same potted transformer (p/n 54-144).

Caution: While the HP-13 "A" and "B" models will tolerate input voltages up to 16 VDC, the original version has an absolute maximum input rating of 14.5 volts.

Power Supplies

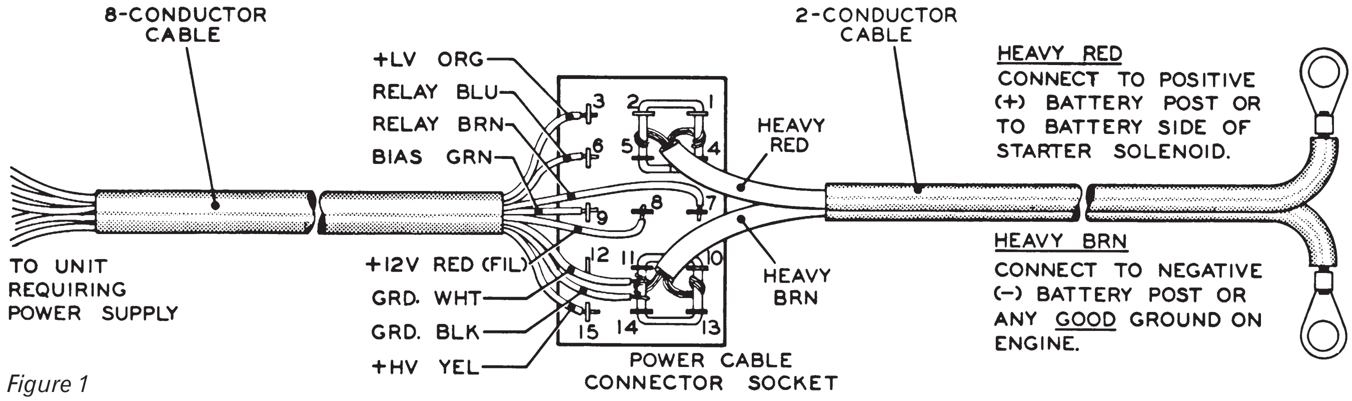


Figure 1

POWER CONNECTIONS

Refer to Figures 1 and 2 for power connections.

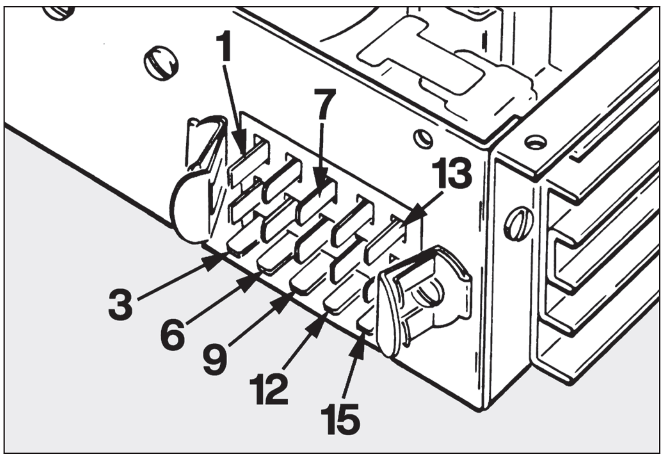


Figure 2

Pins 1, 2, 4, and 5: +12 VDC input
Pins 10, 11, 13 and 14: ground
Pin 3: +LV (250/300 VDC)
Pins 6 and 7: relay coil
Pin 8: filaments
Pin 9: bias
Pin 12: not used
Pin 15: +800 VDC

Multiple pins are used for the primary 12 volt supply for added current carrying capacity. For bench tests, after connecting DC supply, 12 volts must also be applied to pins 6 and 7 (polarity is not critical) to energize the relay, which turns on the HP-13.

References:

Review. *QST*. Mar 1964, p. 61.
Nuisance circuit breaker tripping. *QST*. Dec 1969, p. 51.
General repair tips. *Ham Radio*. Jun 1970, p. 56.
Cooling. *CQ*. Oct 1981, p. 70.

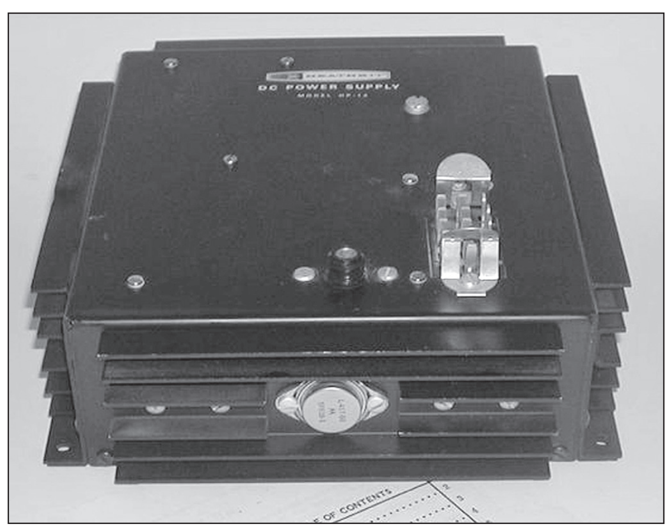
Specifications apply to all models, with differences as noted.

Input voltage:
HP-13: 12 to 14.5 VDC (do not exceed 14.5 volts)
HP-13A and B: 12 to 16 volts (do not exceed 16 volts)
Input current: 15 amps at full load
Operating temperature limits: –10 to +122° F
High voltage:
output: 800 volts, no load; 750 volts at 250 mA
effective output capacitance: 10 μF
ripple: less than 1% at 250 mA
duty cycle: continuous to 150 mA; 50% up to 300 mA
Low voltage high tap: 310 volts, no load; 300 volts at 150 mA
ripple: less than 0.05% at 150 mA
duty cycle: continuous up to 175 mA
Low voltage low tap: 265 volts, no load; 250 volts at 150 mA
ripple: less than 0.05% at 150 mA
duty cycle: continuous up to 175 mA
Bias:
HP-13/HP-13A: from –40 at 1 mA to –130 at 20 mA, adjustable
HP-13B: –130 VDC with 20 mA load
Switching frequency: approximately 1500 Hz
Size: 7.75 wide x 7.75 long x 2.5 deep; **Weight:** 5.25 lbs
Solid-state: (7) 1N2071; (1) 3A1 (rated 100 volts, 3 amp); (2) DTG110B (rated 90 volts, 25 amps)

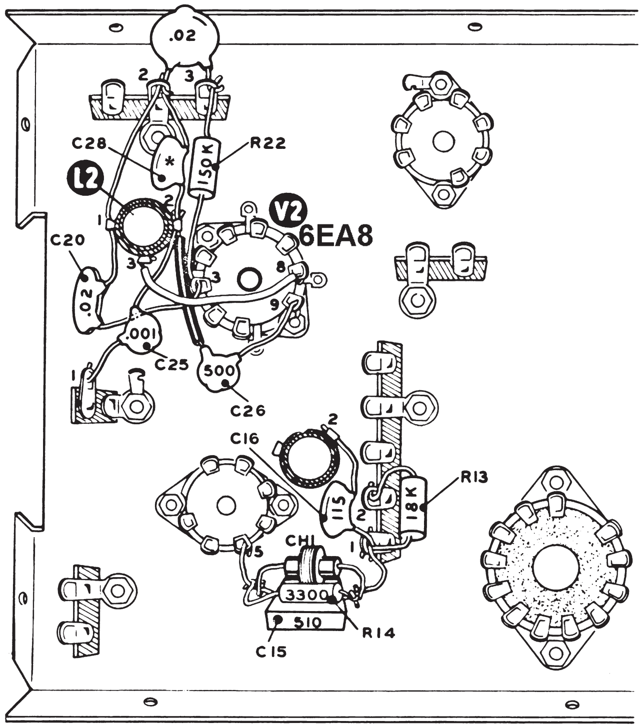
HP-14

Mobile Power Supply for HA-14 "KW Kompact"

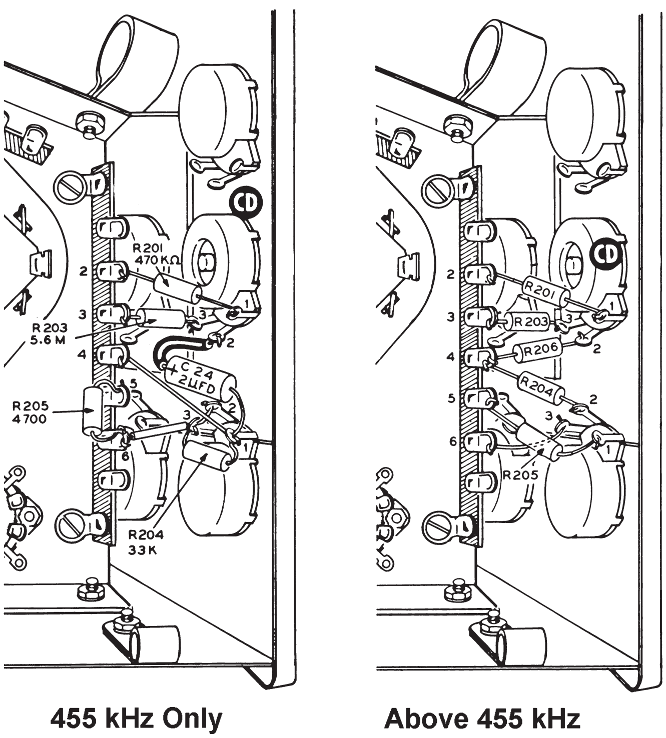
1965-1968
$89.95



DON PETERSON COLLECTION



Pictorial 1



Pictorial 2

References:
Review. *QST*. Nov 1964, p. 54.
Review. *73 Amateur Radio*. Sep 1965, p. 70.
Review. *CQ*. Sep 1965, p. 57.

Input frequencies (receiver IF), one of the following: 455, 1600, 1650, 1681, 2075, 2215, 2445, 3000, 3055 and 3395 kHz

Frequency response: ±0.5 dB at ±50 kHz from receiver IF
IF: 350 kHz
Sensitivity: 50 µV signal provides about 1 inch of vertical deflection with gain set at maximum
Sweep frequency: 10 to 50 Hz, variable
Sweep width: from less than 30 kHz to 100 kHz ±20%, continuously variable (from about 15 kHz to 100 kHz for 455 kHz)
Resolution: 2 kHz (frequency difference between two 1-inch pips whose adjacent 3 dB points are coincident); measured at 30 kHz width at lowest sweep speed
Power requirements: 120 VAC, 50/60 Hz, 40 watts
Size: 5.25 high x 7.5 wide x 11 deep; **Weight:** 8.5 lbs
Tubes: (1) 6AT6, (1) 6EW6, (1) 6C10, (2) 6EW6, (1) 6EA8, (1) 1V2, (1) 3RP1 CRT

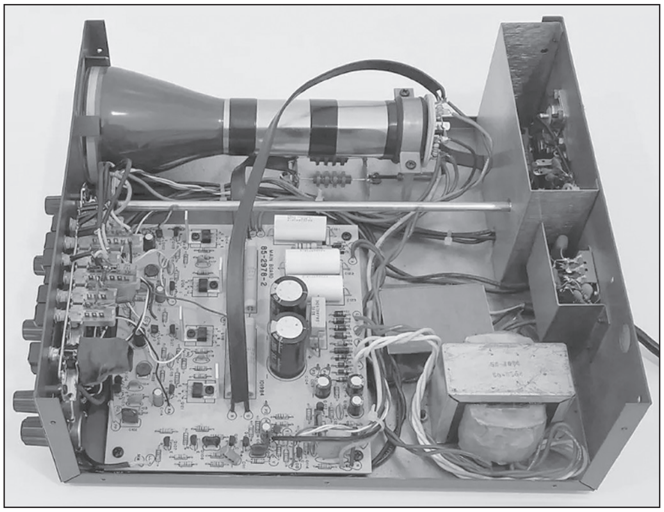
HO-5404

Station Monitor Scope
1985-1988
$249.95 (less panadaptor module)

PHOTO BY JOE VERAS. COLLECTION OF HERMAN CONE III

The HO-5404 was Heath's last ham-related scope. Except for the CRT, the 5404 is a fully solid-state device. The unit combines the features of the SB-610 and SB-620, 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 1.8 to 54 MHz.

The optional panadaptor module (HOA-5404-1) sold for $99.95, though many catalog specials threw it in at no extra charge. The panadaptor provides a visual representation of the band from ± 20 kHz or ±100 kHz. These views are a bit more limiting than those of the SB-620, which was continuously variable. Most users will find the ±100 kHz view (200 kHz total) too wide to be of any use, but most would find ± 20 kHz (40 kHz total view) to be almost ideal on a crowded band like 20 meters. Unlike the HO-13 and SB-620, which could be wired for a variety of popular transceivers and receivers, the optional panadaptor function of the HO-5404 is



Panadaptor module not installed.

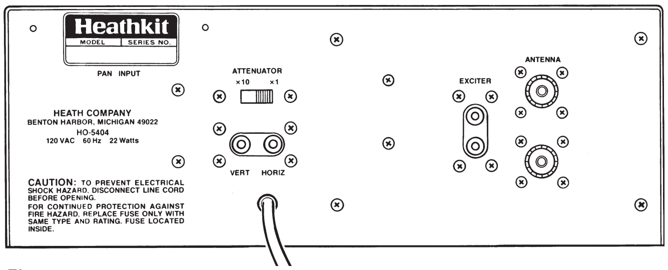


Figure 1

designed exclusively for use with Heath transceivers.

To check for the presence of the panadaptor module, look at the upper left corner of the HO-5404 rear panel. An RCA jack labeled “PAN INPUT” indicates the module is installed. Without the panadaptor module, the hole for this connector may be covered by the blue and white Heathkit label. Refer to Figure 1. If there is any doubt, remove the cover and check for the presence of the circuit board. Refer to Figure 2 for the location of the board.

Panadaptor 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) or 8830 kHz (the SS-9000 and HW-5400). To check which IF the unit has been wired for, it is necessary to remove the cover and look at the part number for transformer T301. Refer to Figure 2 for the location of T301.

For the 3395 kHz IF, T301 is part number 52-197 or 21167. For the 8830 kHz IF, the part number is 52-198 or 18379. Changing the IF requires not only the correct transformer, but also an adjacent crystal and handful of capacitors and resistors.

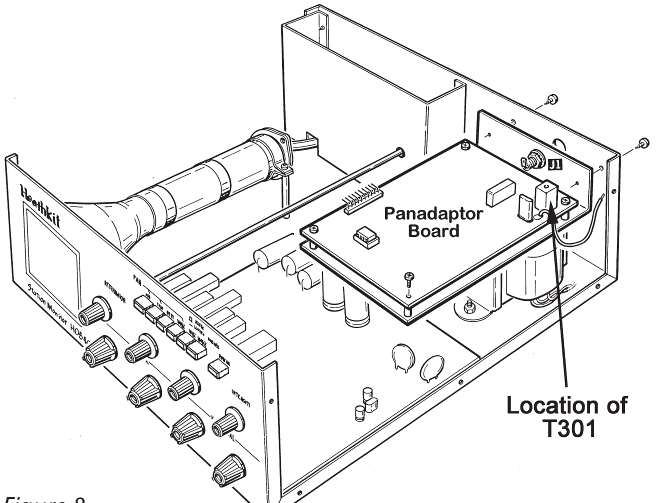


Figure 2

OPERATION OF PANADAPTOR

To turn on the panadaptor function, simultaneously press SSB and RTTY push buttons. The 1 kHz push button is used to choose the ± 20 kHz or ±100 kHz scans. An on-screen receive-frequency marker can be turned on and off with the MARKER pushbutton. Refer to Figure 3.

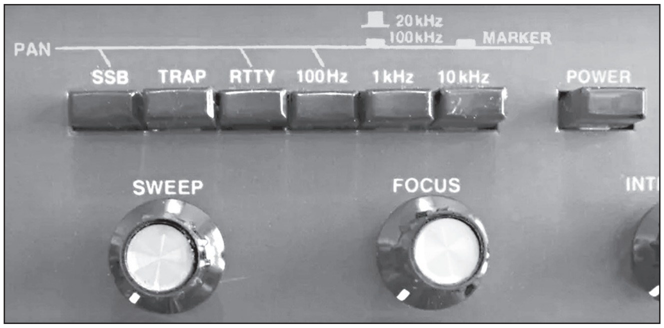


Figure 3. Detail of front panel function push buttons.

Warning: Lethal voltages present when operating.

Caution: Cathode ray tubes (CRTs) may implode if broken. Handle with great care.

References:

Review (scope). *73 Amateur Radio*, Sept 1986, p. 24.
Review (panadaptor). *73 Amateur Radio*, Oct 1986, p. 20.
Review. *QST*, Jan 1987, p. 30.

RF SAMPLING SECTION

Frequency coverage: 1.8 to 54 MHz (50-75Ω coaxial input)
Sensitivity:
0.25 inch vertical deflection at 10 watts, 1.8 to 54 MHz
0.75 inch vertical deflection at 100 watts, 1.8 to 54 MHz
0.25 inch vertical deflection at 100 watts, 1.8 MHz
Power limits:
exciter input (50-75 Ω): 10 to 300 watts
antenna input (50-75 Ω): 10 to 1000 watts
Insertion loss: negligible

VERTICAL AMPLIFIER

Input impedance: 1MΩ shunted by 125 pF
Sensitivity: 60 mV per 0.25 inches vertical deflection
Attenuator: X1, 1.0 volt RMS maximum; X10, 10 volts RMS maximum
Frequency response: 10 Hz to 40 kHz typical

HORIZONTAL AMPLIFER

Input impedance: 1MΩ shunted by 160 pF

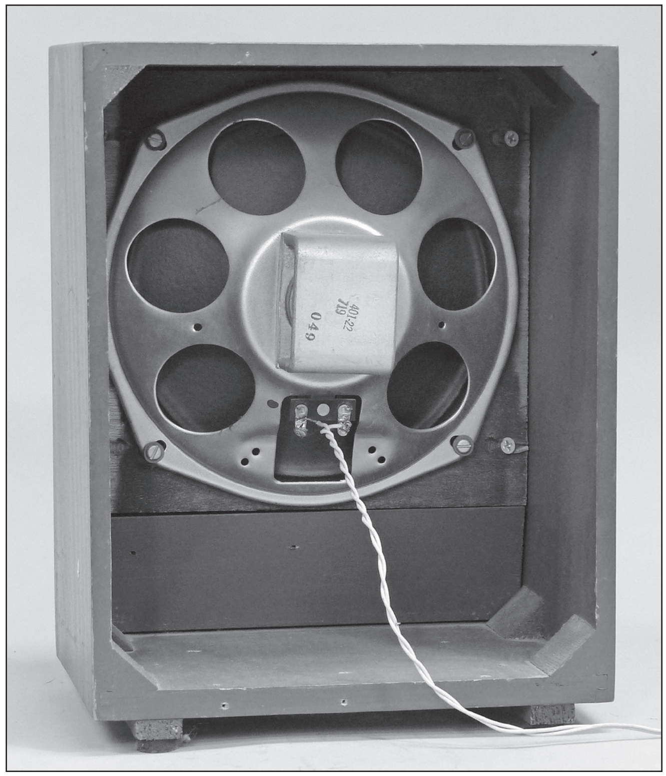
9

SPEAKERS

AK-5

Speaker
1958-1962
$9.95

JERRY O'REILLY COLLECTION



JERRY O'REILLY COLLECTION

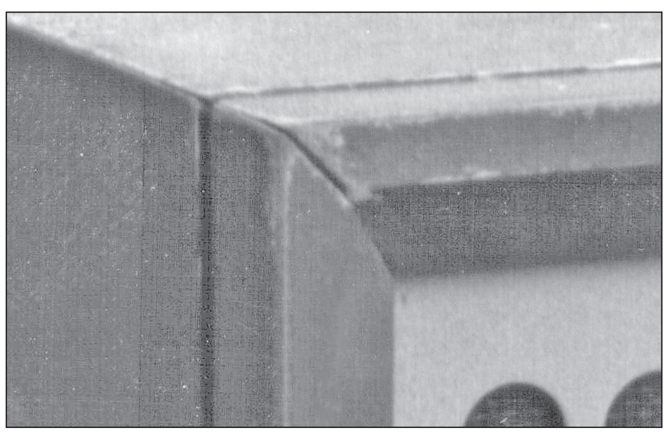


Figure 1. Note groove, which runs along the top and sides of the cabinet. Found only on the the first production run of the AK-5.

The AK-5 was designed for, and released with, the RX-1 in 1958. But while the RX-1 was last advertised in 1964, the AK-5 disappeared after 1962. The speaker may have been sold a while longer—available if you asked for it perhaps, until the stock ran out, but there is no way to know for sure.

The AK-5 is built in a nicely crafted 3/8 inch plywood box with a perforated metal grill and two-tone green styling to match the RX-1.

Uses an 8-inch 8Ω speaker with a 4.7 oz. magnet. The front panel is adorned with a "3D" silver plastic molded "Heathkit" script-type logo, the same as used on the RX-1, et al. The logo is an important design detail and the speaker should not be considered complete without it.

The first production run of the AK-5, perhaps only 100 or so kits, included a groove around the top and sides

HM-9(A)

QRP Wattmeter

HM-9 1983-198?
HM-9-A 198?-1991 (see text)
$49.95

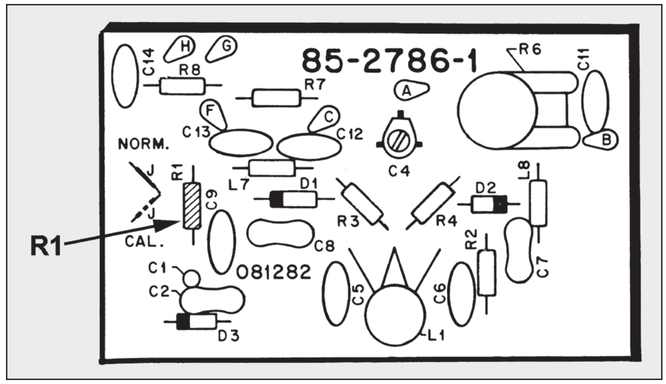
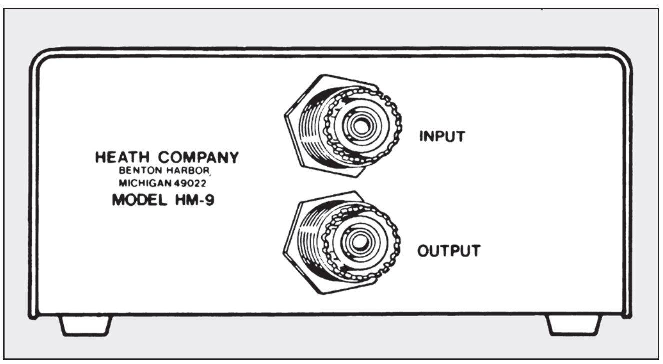


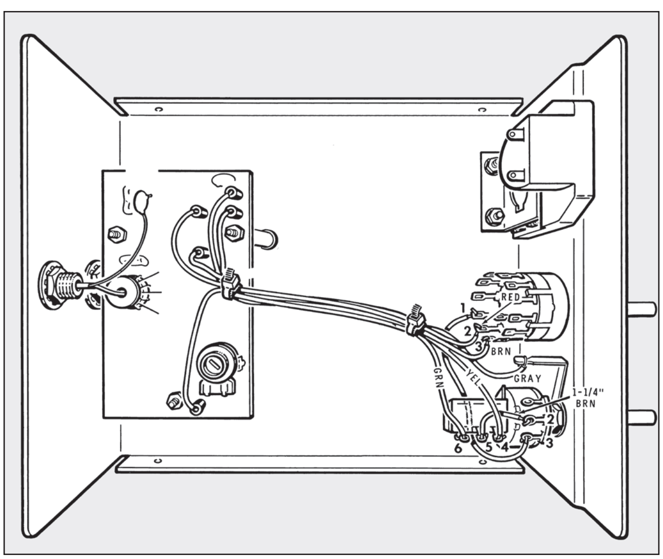
Figure 1

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 frequency range is determined by a variety of resistors and capacitors, and by a toroidal inductor, on the circuit board. Probably the easiest way to check the frequency range is to determine the value of resistor R1 on the circuit board. R1 has a unique value for each band. Refer to Figure 1 for the location of R1.

At some point, Heath revised the values of R1, presumably for better or more stable performance. As a result, units from the original production run will have one set of values, and units from the revised production run will have a different set of values. Note that the value for the 144 to 148 MHz band did not change. The exact date of the revision is unknown.





General arrangement of interior parts.

Original Production Run

Frequency Band	Value of R1
1.8 to 30 MHz	6340Ω 1% (blu-org-yel-brn)
50 to 54 MHz	4990Ω 1%(yel-wht-wht-brn)
144 to 148 MHz	5490Ω 1% (grn-yel-wht-brn)

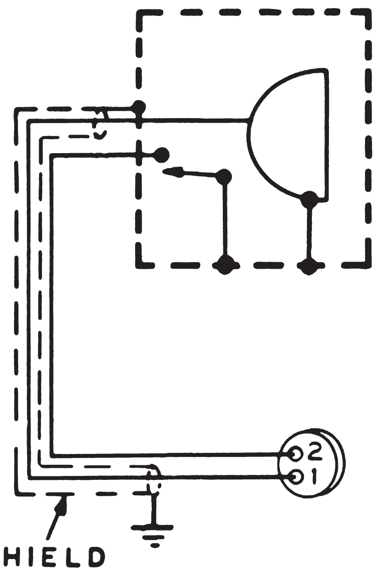
Revised Production Run

Frequency Band	Value of R1
1.8 to 30 MHz	6650Ω 1% (blu-blu-grn-brn)
50 to 54 MHz	5230Ω 1% (grn-red-org-brn)
144 to 148 MHz	5490Ω 1% (grn-yel-wht-brn)

The unit can be rewired for other bands by changing the value of several common resistors and capacitors, and a not-so-common toroidal inductor (L1). A full discussion of the changes is beyond the scope of this book. Consult the manual for details.

An "A" version of the HM-9 is known to exist. As of this writing, only a few have been found. The date of introduction is unknown because the unit was never shown in the catalog. It is likely that the only difference between the HM-9 and the HM-9-A is the color of the cabinet—the HM-9 is brown and the "A" version is gray. This would be consistent with other contemporaneous "A" units including the HD-1420A, 1422A and 1424A, for example.

HDP-21 (left) and HDP-21A



stand that looks the same as the 428, but with a gray anodized base and handle. EV literature describing such a stand has not been located as of this writing. It is not clear if the HDP-21(A) was sold with the anodized stand or if these were a result of mix-and-match parts assembled by the end user. While no Heath catalog photos reflect anything but shiny parts, the use of anodized parts may have been introduced near the end of production as an attempt to keep the units looking nicer longer, as sweaty hands would eventually tarnish the bases and handles of the shiny versions.

Element: dynamic
Frequency response: 70-10000 Hz
Impedance: Hi-Z
Output level: –57dB
Case: chrome-plated die-cast zinc
Size: 10.5 tall x 5 wide x 5 deep; **Weight:** about 2 lbs

HDP-121(A)

Microphone

HDP-121	1976-1977	$39.95
HDP-121A	1977-1981	$39.95

JOHN POLONCHAK COLLECTION

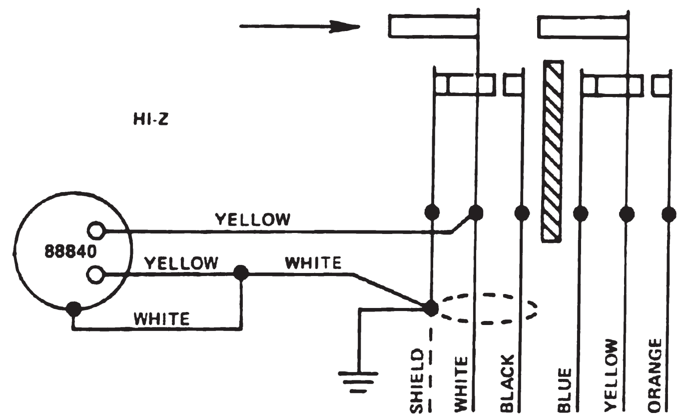
STEVE GLADSTEIN COLLECTION

HDP-121 (left) and HDP-121A

HDP-121 (Electro Voice model 619KK)
HDP-121A (Electro Voice model 621H)

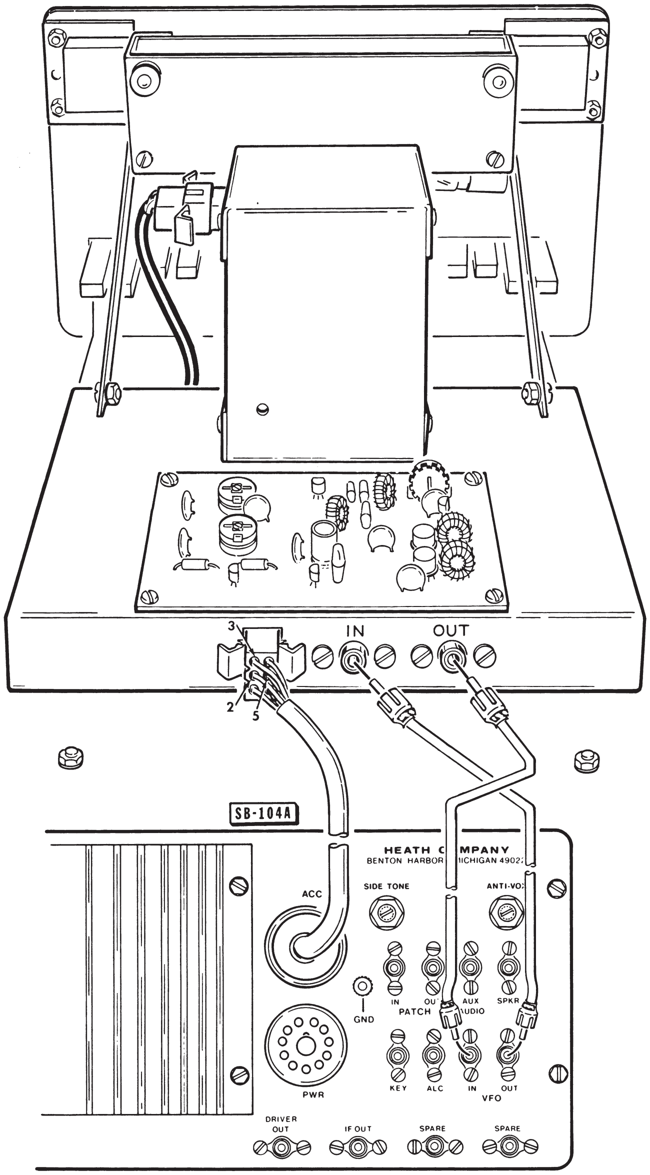
Introduced a couple of years after the SB-104. These mics can be assembled so that the PTT switch is on the stem (as in left photo), or the base (right). The PTT switch on the HDP-121 is black. A less expensive red switch is used on the 121A. Both models are available in high or low impedance, but are not switchable between the two. Heath used the high impedance type.

EV product literature does not list a model 619KK, only a 619 (with a note to specify high or low impedance when ordering). The 619KK listed on the Heath specification sheet that accompanied the mic may be an OEM designation specifically for Heath.



USE SHIELD AND WHITE WIRE FOR SHORTED OUTPUT IN OFF POSITION. USE SHIELD AND BLACK WIRE FOR OPEN OUTPUT IN OFF POSITION.

Microphones



644A. Problems with the original VFO included FMing and bleed-through between the remote VFO and the VFO onboard the 104. This caused a variety of tweets and heterodynes.

CRYSTAL OPERATION

The frequency scheme, including the output frequency of the VFO and heterodyne oscillator frequencies, used in the SB-104 is the same as used in the SB-100 series. Refer to SB-100 for crystal frequency calculations (page 3-34).

Crystal Characteristics

Frequency range: 5 to 5.5 MHz
Mode: fundamental
Tolerance: 0.005%
Type: HC-25U
Load capacity: 42 pF
Series resistance: 40Ω maximum
Reference series resistance: 13Ω
Drive level at reference series resistance: 5.2 mW at 20 mA

References:

Improving the SB-104/SB-644 combo. *QST*. Aug 1979, p. 28.
Improving the SB-104/SB-644 combo (more on). *QST*. Sep 1979, p. 23.
Improving the SB-104/SB-644 combo (more on). *QST*. Mar 1980, p. 49.
Improving the SB-104/SB-644 combo (more on). *QST*. May 1980, p. 41.

Size: 7.25 high x 10.25 wide x 15.25 deep; **Weight:** 6.5 lbs

SB-650

Digital Frequency Display
1972-1975
$179.95

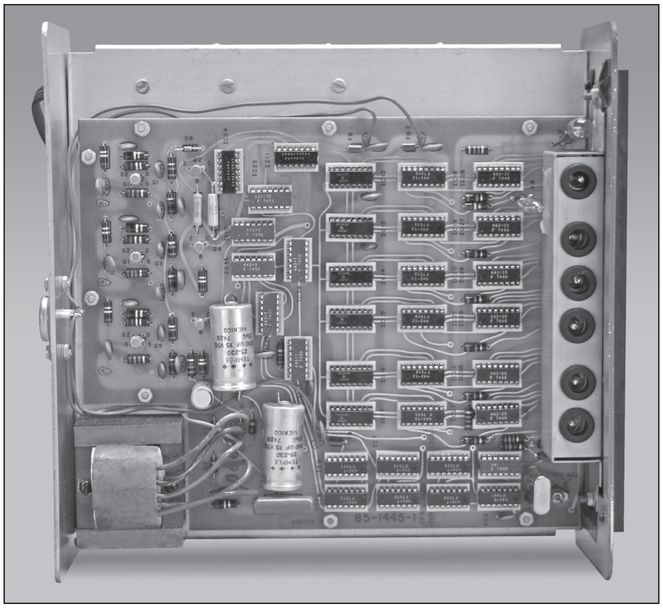
The SB-650 was another very popular accessory for the SB and HW series of receivers and transceivers and caused quite a stir when first released. It was, however, released about midway through the life of the SB-102 and was made only until the release of the digital readout SB-104 in 1975. The resulting short production life and retro Nixie tubes of the 650 have made it one of the more sought after pieces in the SB series.

Except for the readout tubes, the SB-650 is a fully solid-state device 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 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 up from the receiver or transceiver. These signals are the beat frequency oscillator (BFO), the linear master oscillator (LMO), and the heterodyne frequency oscillator (HFO). Getting these signals out of the SB or HW transceivers and receivers requires a modification to the units which includes the drilling of up to three rear panel holes for the installation of up to three RCA 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 SB-650 depends on three signals, the unit


STEVE GLADSTEIN COLLECTION

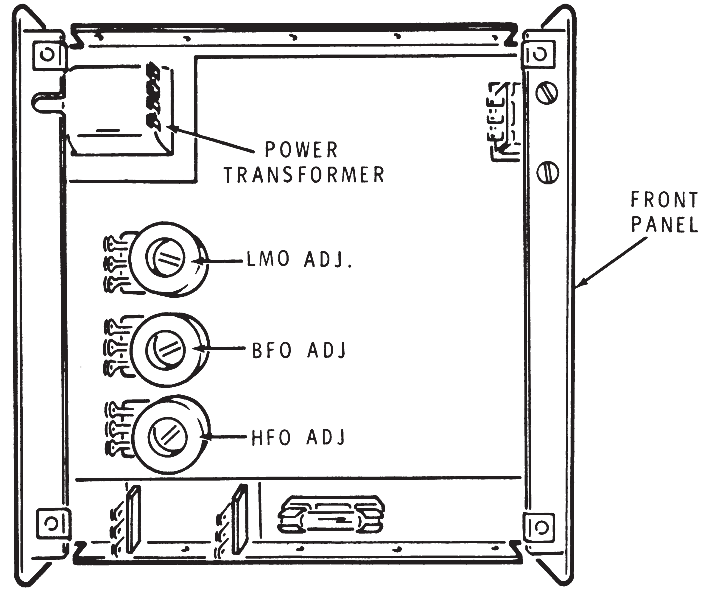


Figure 1. Location of level adjustments (on underside of chassis, left)

will not read properly under certain conditions. For example, when used with the SB-300, 301, or 303, it 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 650 will read the receive frequency but will indicate the 1 kHz BFO offset upon key down.

Heath did not recommend using the SB-650 with other brands of receivers, but it is often possible to do so with a few modifications. Use with the Drake 4-line, Yaesu FT transceivers and Collins S-line is fairly straightforward. See *QST* magazine, January 1973, p. 52 for details. Also see *Ham Radio* magazine, June 1973, p. 40.

The only front panel control is an on/off rocker switch. There are four internal controls. Refer to Figure 1. Three of these are potentiometers 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. Tune the receiver to a known freqeuncy and adjust the trimmer for the correct reading.

The only rear panel connections are three RCA 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 technically possible, many units have enough jitter in the right-most digit to render it meaningless. 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 often a simple fix. Readjusting the input level controls will also help.Refer to Figure 1 for the location of these controls.

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 easy 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.

Caution: The SB-650 requires plenty of ventilation and should not be placed directly on top of heat-producing equipment.

CONNECTION TO SB and HW SERIES TRANSCEIVERS

BFO Connection (SB and HW Series)

Refer to Figure 2. Connection to the modulator circuit board is made with a length of RG-174 coaxial cable, through a 220 pF capacitor, as shown. This cable is routed to a rear panel RCA jack labeled "BFO."

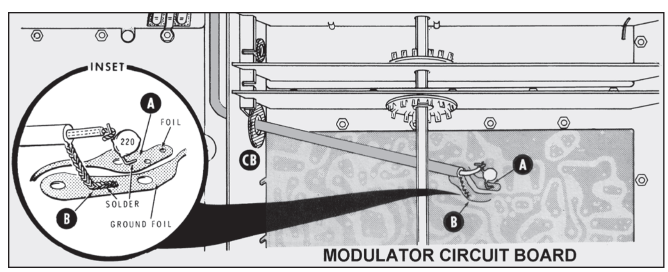


Figure 2. BFO Connection (SB and HW Series)

Caution: The GW-12 is not fuse protected in 120 VAC operation.

IF frequency: 455 kHz
Sensitivity: 1.0 µV for 10 dB S/N ratio
Selectivity: 7.5 kHz at 6 dB down from peak response time
AVC: a 60 dB change in input signal (10 µV to 10,000 µV) will cause a 17 dB change in audio level output
Input power: 5 watts maximum to final amplifier
Frequency control: 3rd overtone crystals
Stability: operating frequency will be within 0.005% of nominal crystal frequency over a temperature range of –20 to +130º F
Modulation: AM plate modulation limited to less than 100%
Output impedance: 50-70Ω
Power requirements: 120 VAC, 50 watts; 12 VDC
Optional GWA-12-1 Power Supply
12 VDC, 4 amps; 6 VDC, 8 amps
Vibrator: Mallory type 1610 or equivalent
Size: 6 high x 8.5 wide x 8 deep; **Weight:** 7 lbs
Tubes: (1) 6X4, (1) 6EA8, (1) 6BJ6, (1) 6BJ7, (1) 6AN8, (1) 6AQ5, (1) 6AU8
Sams Photofact: CB-5, 245

GW-14(A)

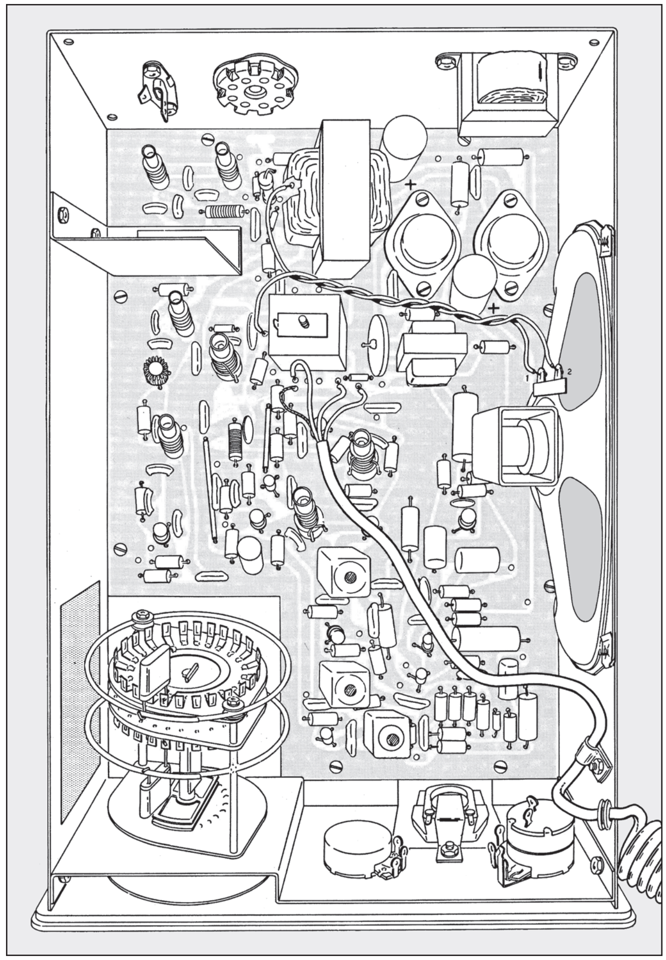
23 Channel CB Transceiver

GW-14	1965-1967	$89.95
GW-14A	1967-1974	$89.95

Shown with optional GWA-14-1 AC power supply.

The GW-14(A) was the last CB product designed by Heath, and the only one of its CB radios capable of operating on all 23 channels. The unit uses 14 transistors and 6 diodes, and features printed circuit construction and mechanical relay T/R switching. Output power is nominally 3 watts.

Front panel controls include on-off-volume, squelch and an illuminated channel selector. There is also an illuminated meter that reads received signal strength, relative power output and modulation. The hard-wired push-to-talk microphone was supplied by Turner.



General arrangement of chassis.

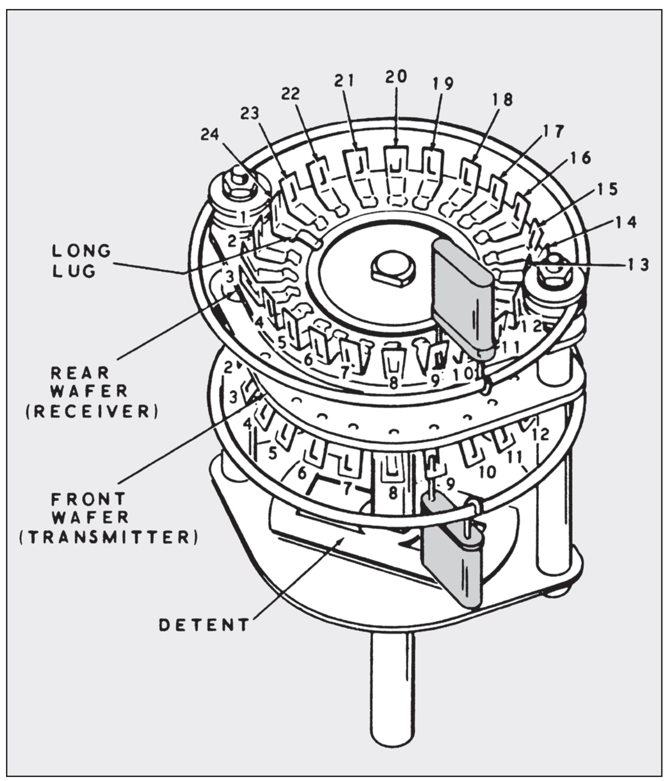


Figure 1. Detail of channel selector switch, with crystals installed for channel nine.

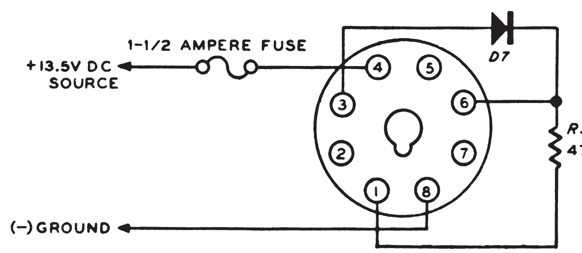
It is important to understand that while the GW-14(A) was 23 channel capable, that does not necessarily mean all 23 channels are actually installed. Channel crystals were sold separately, for about $2.00 each. The accessory GWA-14-2 "Crystal Pack" was exactly that—a small package containing all 46 crystals, priced at $85.00. There is no way to know how many channels are installed without taking off the cover and looking.

In addition, the GW-14(A) was designed to operate directly from a DC power source, so using it with 120 VAC requires the optional GWA-14-1 AC (or other) power supply—$15.00. Refer to GWA-14-1, page n-nn for more information.

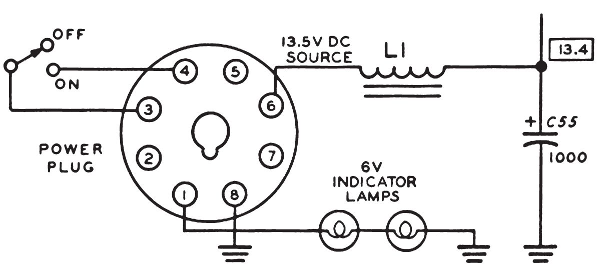
So the true cost of a Heathkit 23 channel CB radio was close to $200.00.

The cabinet is gray; the front panel is chrome.

POWER CONNECTIONS



DC POWER CABLE



DC POWER SOCKET ON RADIO

D7 is a 3 amp silicon diode for reverse polarity protection. R50 provides a voltage drop for the two 6-volt indicator lamps.

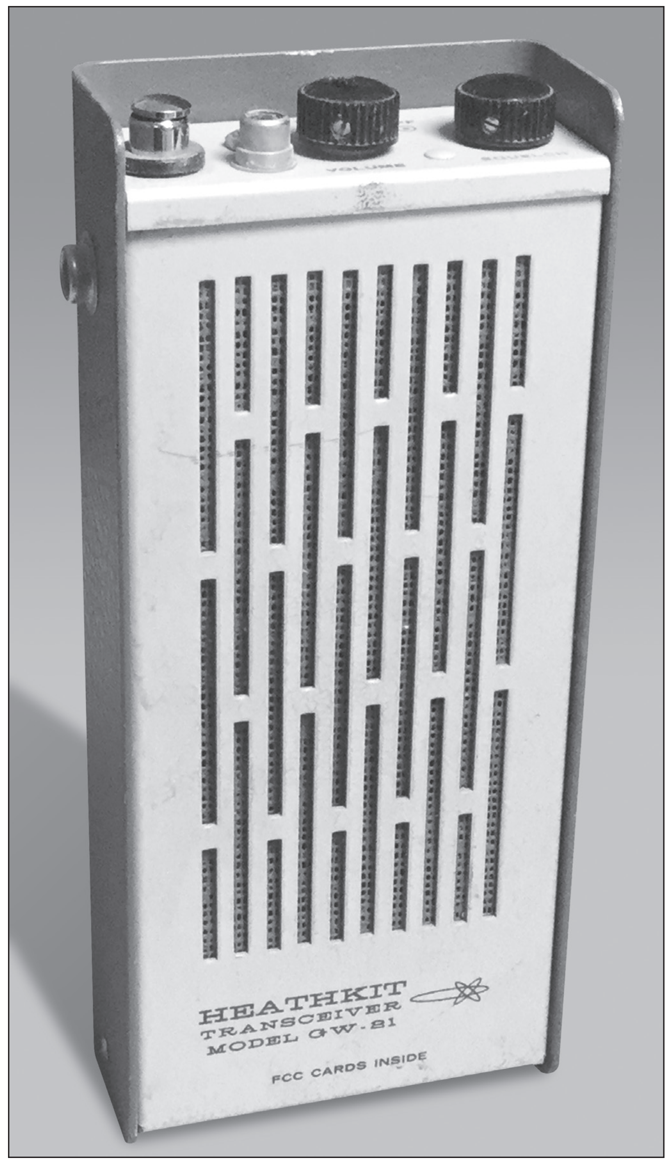
Channels: up to 23
Frequency range: 26.965 to 27.255 MHz
IF: 455 kHz
Noise limiter: self-adjusting clipper type
Sensitivity: 0.5 µV for 10 dB S/N
Selectivity: attenuation of an adjacent channel is at least 30 dB
Adjacent channel rejection: 30 dB
Meter: 150 µA full scale
Audio power output: 3 watts
Modulation: high level AM limited to less than 100%
RF output circuit: twin Pi matching network
Output impedance: 50Ω
RF input power to RF output transistor: 5 watts nominal
RF power output: 3 watts nominal
Crystals: 3rd overtone
Stability: within 0.005% from –20 to +130° F
Power requirements: 12 to 13.5 VDC, 750 mA transmit, 120 mA receive (60 mA with indicator lights disabled)
Size: 3 high x 7 wide x 11 deep; **Weight:** 5.25 lbs.
Transistors: (3) A1384, (2) 2N408, (1) 2N2654, (1) 2N2712, (1) 2N1274, (2) 40050, (1) 2N1524, (1) PT3141A/KT1001A, (1) PT3141B/KT1001B, (1) PT3141C/KT1001C
Sams Photofact:

GW-14	CB-11, 218
GW-14A	CB-29, 109

GW-21(A)

One Channel CB Walkie-Talkie

GW-21	1961-1964	$44.95
GW-21A	1964-1969	$39.95



The GW-21 uses nine transistors and a super–heterodyne circuit, crystal controlled on one channel.

Controls include on-off/volume, squelch and push-to-talk. Also includes jacks for an earphone and an external antenna. The crystals and all transistors mount in sockets.

GC-1092(A)(D)

Digital Clock

1974-1978

$82.95

Building on the success of the GC-1005, Heath introduced the GC-1092 late in 1974, and its futuristic style has "70s" written all over it. I have come to refer to the GC-1092 as the 'Jetsons' clock. It was a popular accessory in the shack, but never sold as well as the GC-1005/1094. The style worked for some people and not for others.

Heath made two versions of the clock. The A version displays only the time, while the D version displays both time and date. Another important distinction between the two is that the A version has an alarm function. The D version does not.

The D version can be set to alternate the time and date, or can be made to display the date on command, by tapping the Heathkit nameplate on top. There is only one small flaw: the clock thinks every month has 31 days. This shortcoming was not mentioned in advertising or the assembly manual. So when February 31st comes around...

Features include switch selection of 12 or 24 hour display, an automatic brightness control (which can be disabled), touch control of alarm and snooze functions (A version only), and perhaps most significantly, battery backup. During power outages, the clock will keep time but the display will not light.

The TOUCH CONTROL switch on the underside of the A version permits the top touch plate to function in one of two ways. When set to ALARM RESET, touching the touch plate will cancel the alarm until the next day. When set to SNOOZE, touching the plate will cancel the alarm for seven minutes. The snooze function can be used repeatedly for up to an hour. When in SNOOZE mode, the alarm may be cancelled for the day by momentarily moving the rear panel ALARM switch to OFF.

The battery backup system uses three AA cells. Refer to Figures 9 and 10. These can be NiCads, alkaline or zinc-carbon, but you must decide between expendable or rechargeable batteries during the assembly process, as wiring changes are required. Caution: Be sure you know which option was chosen before installing new batteries.

BATTERY TYPE WIRING OPTION

To determine which type of batteries have been chosen, refer to Figure 1 and check for a wire connected either to point N or point C. The wire is probably gray in the A version and probably orange in the D version. If the wire is connected to point N, the clock is wired for NiCad rechargeable batteries. If the wire is connected to point C, the clock is wired for carbon or alkaline batteries.

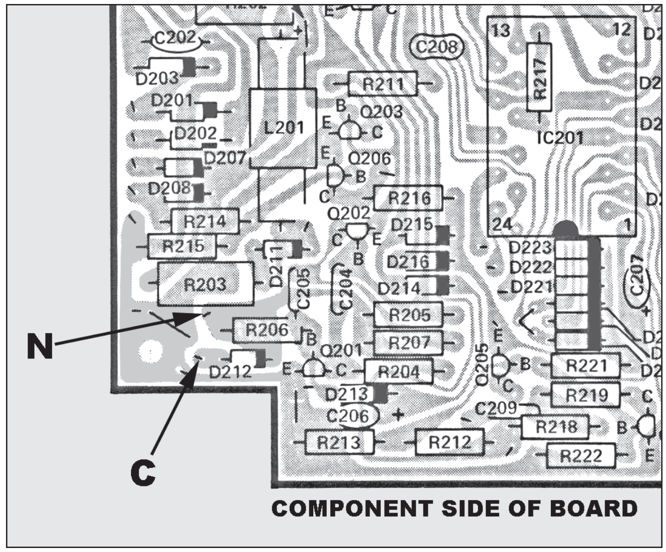


Figure 1. Battery type wiring options.

NiCads will keep the clock ticking for about six hours, while alkaline batteries will last about ten hours. The clock will function without backup batteries installed. Without backup batteries, the clock will display 88 88 88 when power is restored.

The GC-1092(A)(D) sits on a pivoting pedestal which can be removed, depending on your preference, but if you want the "full effect," the pedestal is a must have.

Note: Both versions are designed for 120 volt 60 Hz operation only. A separate version, the GC-1092AE, was designed for 120/240 volt 50/60 Hz operation, but was sold only in Europe. The U.S. assembly manual covers both the A and AE versions.

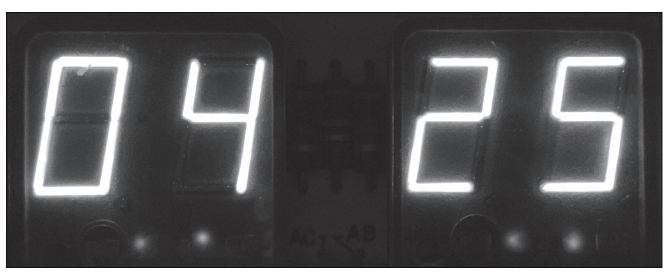


Figure 2. Beckman SP-352 using both keep-alive electrodes.

Aside from having to fix the date for five months of the year, the clock is a sweet little gizmo.

The neon displays are the same (Beckman SP-352) as used in the GC-1094. In this implementation, both keep-alive electrodes are used.

STORING THE CLOCK

If the clock will be put into storage or otherwise unplugged for an extended period, the TIME HOLD switch should be placed in the CAL/BAT OFF position. This will disconnect the backup batteries and prevent them from becoming fully discharged.

SETTING THE CLOCK (A VERSION)

To set the time and date refer to Figures 3 and 4. Start the process of setting the clock by configuring the switches as shown in row 1 of Figure 4. The graphics in Figure 4 correspond to the switches on the underside of the clock shown in Figure 3. Note that the chart in Figure 4 is also affixed to the clock itself.

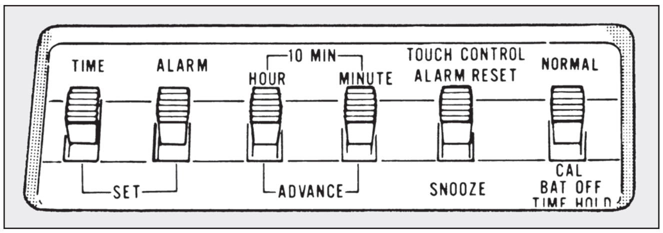


Figure 3. Bottom panel switches (A version).

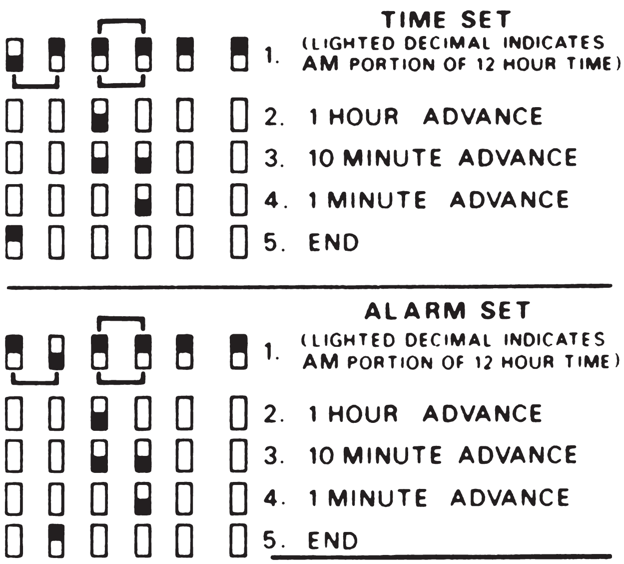


Figure 4. Time and date setting chart (A version).

SETTING THE CLOCK (D VERSION)

To set the time and date refer to Figures 5 and 6. Start the process of setting the clock by configuring the switches as shown in row 1 of Figure 6. The graphics in Figure 6 correspond to the switches on the underside of the clock shown in Figure 5. Note that the chart in Figure 6 is also affixed to the clock itself.

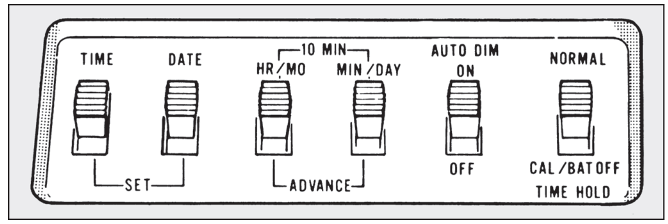


Figure 5. Bottom panel switches (D version).

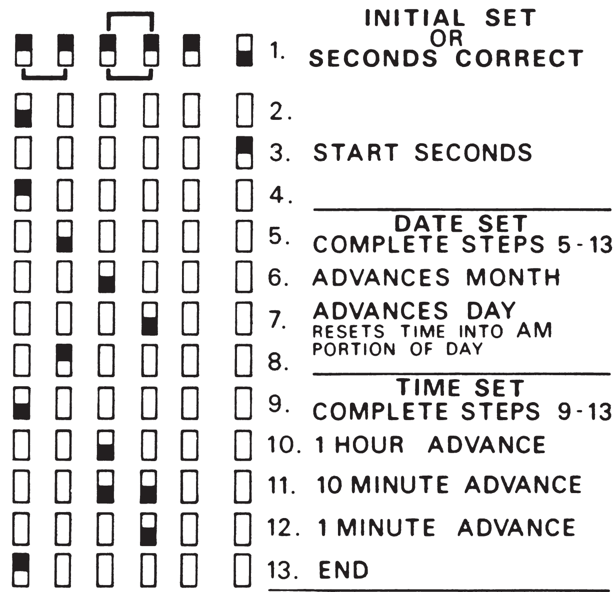


Figure 6. Time and date setting chart (D version).

CALIBRATION OF BACKUP TIMER

A 555 integrated circuit oscillator is used to provide 60Hz to the clock chip when running on backup battery power. The frequency of the oscillator must be calibrated to ensure reasonable accuracy. Calibration is accomplished by adjusting a potentiometer (R103) which is accessible through a small hole on the underside of the clock, located between the setting chart and the front panel. Use a small plastic screwdriver to adjust R103.

The following steps are used to set the oscillator to 60 HZ.

( ) Place the AUTO DIM switch in the ON position.

( ) Place the TIME HOLD switch in the CAL/BAT OFF position.

The clock display should cycle from bright to dim.

( ) Rotate R103 until the brightness of the display is constant. The level of brightness does not matter, as long as it is constant.

( ) Return to the TIME HOLD switch to the ON position.

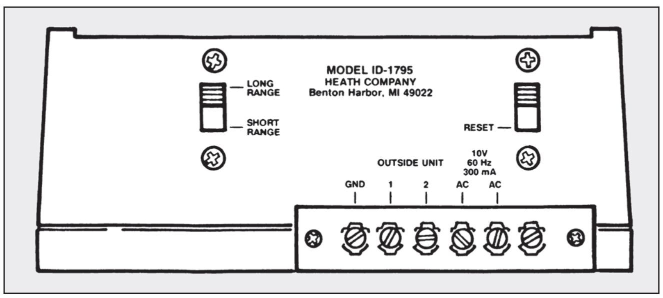
ALARM VOLUME REDUCTION (A VERSION ONLY)

The volume of the alarm is not adjustable, but if you find it to be too loud, the volume may be reduced by removing capacitor C210 on the main circuit board. Refer to Figure 7. The capacitor may be unsoldered, or clipped out with a small side cutters.

Weight:
display unit: 3.5 lbs
rain unit: 5 lbs

ID-1795

Digital Rain Gauge
1986-1990
$99.95



The ID-1795 was another huge success in Heath's line of weather instruments. The unit will measure rainfall in inches or centimeters, depending on the position of two jumper wires, which are easily changed. Refer to Figure 1. Note that changing from one unit of measure to the other will require recalibration of the collector bucket. A front panel LED indicates which units of measure are being displayed. LEDs are also used in the seven segment displays.

Both short-term and long-term measurements can be made. The short-term display will record up to 9.99 inches. The long-term total will indicate up to 99.9 inches. Both of these readings can be reset independently, permitting the long-term measurements to accumulate as long as desired.

A standard 9-volt battery is used to ensure continued measurements during a power outage and to retain the memory, but the display will not light during battery operation. An alkaline battery should keep the unit working for nearly a week.

Unlike most of Heath's other weather instruments, the ID-1795 is powered by a 10 volt AC power cube.

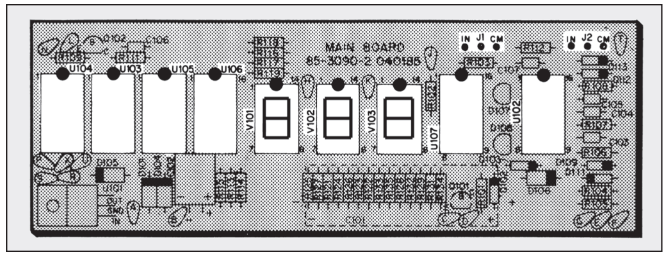


Figure 1. Location of jumpers (at upper right) required for inches or centimeters display.

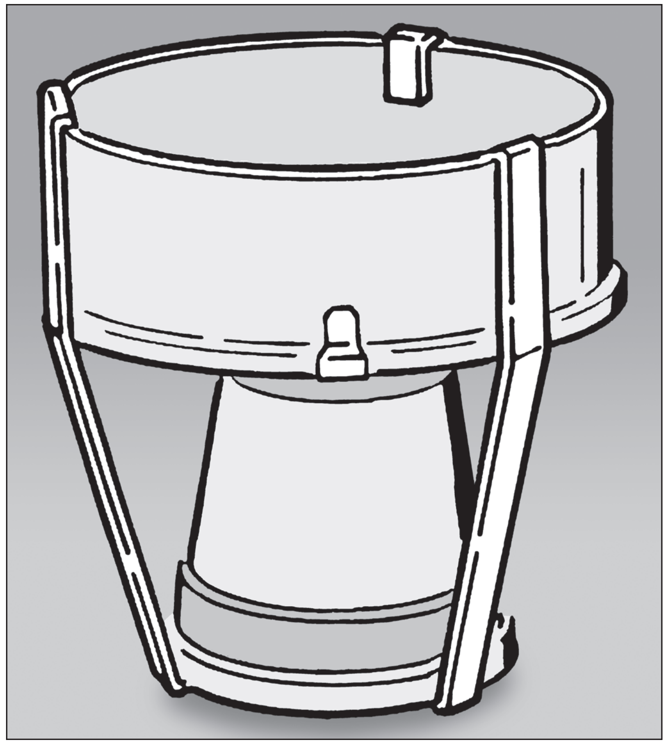


Figure 2. Collector bucket.

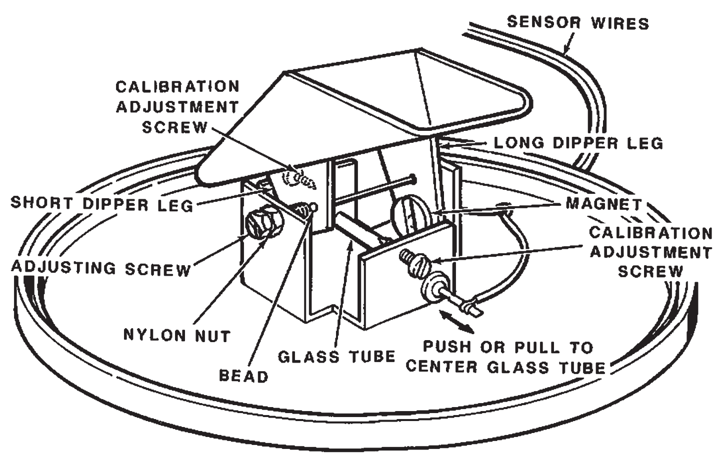


Figure 3. Detail of collection bucket tipping mechanism.

The collection bucket is the same one used with the ID-5001. It is a tipping bucket system using a magnetic reed switch. Each tip of the bucket provides a contact closure that is detected by the display unit. Each tip equals 0.01 inches of rain.

The collection bucket is considerably simpler than the