



## ARRL Periodicals Archive – Search Results

### A membership benefit of ARRL and the ARRL Technical Information Service

**ARRL Members:** You may print a copy for personal use. Any other use of the information requires permission (see Copyright/Reprint Notice below).

**Need a higher quality reprint or scan?** Some of the scans contained within the periodical archive were produced with older imaging technology. If you require a higher quality reprint or scan, please contact the ARRL Technical Information Service for assistance. Photocopies are \$3 for ARRL members, \$5 for nonmembers. For members, TIS can send the photocopies immediately and include an invoice. Nonmembers must prepay. Details are available at [www.arrl.org/tis](http://www.arrl.org/tis) or email [photocopy@arrl.org](mailto:photocopy@arrl.org).

**QST on CD-ROM:** Annual CD-ROMs are available for recent publication years. For details and ordering information, visit [www.arrl.org/qst](http://www.arrl.org/qst).

**Non-Members:** Get access to the ARRL Periodicals Archive when you join ARRL today at [www.arrl.org/join](http://www.arrl.org/join). For a complete list of membership benefits, visit [www.arrl.org/benefits](http://www.arrl.org/benefits).

### Copyright/Reprint Notice

In general, all ARRL content is copyrighted. ARRL articles, pages, or documents--printed and online--are not in the public domain. Therefore, they may not be freely distributed or copied. Additionally, no part of this document may be copied, sold to third parties, or otherwise commercially exploited without the explicit prior written consent of ARRL. You cannot post this document to a Web site or otherwise distribute it to others through any electronic medium.

For permission to quote or reprint material from ARRL, send a request including the issue date, a description of the material requested, and a description of where you intend to use the reprinted material to the ARRL Editorial & Production Department: [permission@arrl.org](mailto:permission@arrl.org).

**QST Issue:** May 1965

**Title:** Heathkit SB-200 Linear Amplifier, The

**Author:** W1JMY

[Click Here to Report a Problem with this File](#)



## 2010 ARRL Periodicals on CD-ROM

ARRL's popular journals are available on a compact, fully-searchable CD-ROM. Every word and photo published throughout 2010 is included!

- **QST** The official membership journal of ARRL
- **NCJ** National Contest Journal
- **QEX** Forum for Communications Experimenters

**SEARCH** the full text of every article by entering titles, call signs, names—almost any word. **SEE** every word, photo (including color images), drawing and table in technical and general-interest features, columns and product reviews, plus all advertisements. **PRINT** what you see, or copy it into other applications.

**System Requirements:** Microsoft Windows™ and Macintosh systems, using the industry standard Adobe® Acrobat® Reader® software. The Acrobat Reader is a free download at [www.adobe.com](http://www.adobe.com).

### 2010 ARRL Periodicals on CD-ROM

ARRL Order No. 2001

**Only \$24.95\***

\*plus shipping and handling

Additional sets available:

2009 Ed., ARRL Order No. 1486, \$24.95  
 2008 Ed., ARRL Order No. 9406, \$24.95  
 2007 Ed., ARRL Order No. 1204, \$19.95  
 2006 Ed., ARRL Order No. 9841, \$19.95  
 2005 Ed., ARRL Order No. 9574, \$19.95  
 2004 Ed., ARRL Order No. 9396, \$19.95  
 2003 Ed., ARRL Order No. 9124, \$19.95  
 2002 Ed., ARRL Order No. 8802, \$19.95  
 2001 Ed., ARRL Order No. 8632, \$19.95

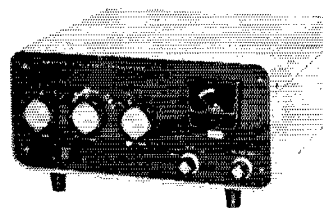


**ARRL** The national association for AMATEUR RADIO™

SHOP DIRECT or call for a dealer near you.  
 ONLINE [WWW.ARRL.ORG/SHOP](http://WWW.ARRL.ORG/SHOP)  
 ORDER TOLL-FREE 888/277-5289 (US)

## • Recent Equipment —

### The Heathkit SB-200 Linear Amplifier

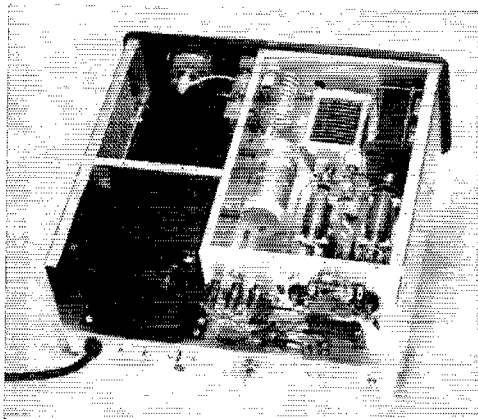


FOR the amateur willing to spend a few hours using a soldering iron and other simple hand tools, assembly and wiring of the Heathkit SB-200 linear amplifier is an enjoyable and rewarding experience. The end result of his efforts is a "pair of shoes" capable of 1 kilowatt d.c. input on c.w. and 1200 watts p.e.p. on s.s.b. The "shoebox" measures a mere 14 $\frac{1}{4}$  by 6 $\frac{5}{8}$  by 13 $\frac{3}{8}$  inches, contains its own built-in power supply, a "Monimatch" type bridge for relative r.f. output/s.w.r. checks, and bandswitching for coverage of the amateur bands from 80 through 10 meters.

Latest unit to be released in the new Heathkit SB-series, the SB-200 is designed to match in size and appearance the SB-300 receiver<sup>1</sup> and SB-400 transmitter<sup>2</sup>, and to work with them in an integrated equipment arrangement. However, it will work nicely with any exciter capable of supplying the necessary 100 watts of driving power. Our own on-the-air testing, in fact, was conducted with another brand of exciter in the 200-watt input class used as a driver.

<sup>1</sup> "Recent Equipment," QST, July, 1964.

<sup>2</sup> "Recent Equipment," QST, January, 1965.



The SB-200 with top shield plate and cabinet removed. The large compartment at right contains the triode amplifiers, cooling fan, output pi-network components and associated band-switch sections. The broad-band input networks and switch section appear at the rear center; to their right are the grid circuit r.f. choke, bypass capacitors and resistors, a.l.c. diode rectifier circuit and mounted below is the bifilar filament choke. The compartment at upper left houses the power supply h.v. filter, meter and primary circuit breakers. On the rear apron, left to right, are the a.c. line cord, connectors for a.l.c. output, antenna relay control, r.f. output, ground post and exciter input.

The circuit arrangement of the SB-200 is simple and straightforward. The "shoes" are a pair of graphite-anode zero-bias triodes, either United Electronics UE572Bs or Cetron T-160-Ls; both types have identical characteristics and are interchangeable. The kit we put together was supplied with T-160-Ls.

The triodes are parallel-connected in a more or less conventional grounded-grid class-B configuration. Drive is applied to the cathodes via pre-tuned broad-band input networks, one for each band. All input networks are of the pi variety, except on 3.5 Mc. where an L arrangement is employed, and are selected by the amplifier bandswitch assembly. Input impedance is approximately 52 ohms. The tube cathodes are isolated by a bifilar choke in the filament leads.

The amplifier output circuit contains a hand-switched pi network and is adjustable for loads between 50 and 75 ohms. Two tapped inductors are used, one covering the 80-, 40- and 20-meter bands, the second for 15 and 10 meters. For 80-meter operation, padding capacitors are switched across the main tuning and output capacitors to satisfy resonance and loading requirements. The amplifier tubes and pi-output circuit components are enclosed in a tightly shielded compartment and are fan-cooled.

Metering in the SB-200 is accomplished with a basic 0-200 microampere movement, selector switch, and suitable shunt and multiplier resistors. The meter scale is calibrated to read 0-1000 ma. plate current, 1500-3000 plate volts and 0-100 ma. grid current. In addition, relative r.f. power output is indicated on an arbitrary 0-1000 scale. For s.w.r. checks the meter is marked to cover the range from 1:1 to 3:1.

The total weight of the amplifier is only 35 pounds. The major portion of this weight is contributed by the power transformer and associated components. High voltage d.c. for the triode plates is developed by a full-wave voltage-doubling circuit utilizing sixteen silicon diodes. Six 125- $\mu$ f., 450-volt, electrolytic capacitors connected in series provide an effective filtering capacitance of about 21  $\mu$ f.; resistors connected across each capacitor serve the dual function of voltage equalizers and bleeder. All filter components are mounted on a printed circuit board which, for sheer simplicity and speed, is a delight to assemble.

In addition to the high-voltage winding, the power transformer has two secondaries, one for the triode filaments and another which, with a

silicon diode and filter, supplies antenna relay control voltage and standby cut-off bias for the amplifier tubes. A dual primary allows operation from either 120 or 240 volts a.c.; selection is made by appropriate connection of jumper wires on a screw terminal strip. Overload protection is afforded by two 8-ampere circuit breakers, easily accessible under the hinged lid of the SB-200 cabinet.

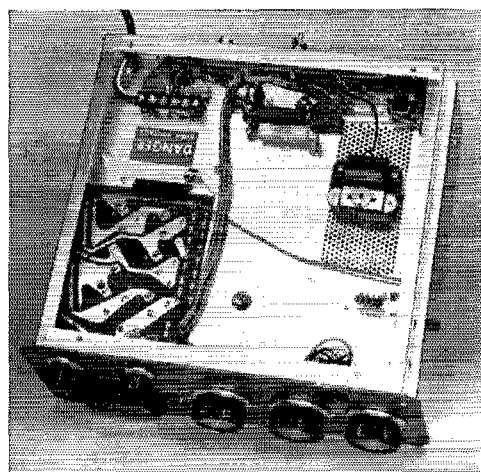
Controls are neatly arranged on the attractive Heath-green panel. The large knobs are, from left to right, output loading, plate tuning and band-switch. Smaller knobs below the meter select meter range and relative r.f. power sensitivity. A rocker-type switch at left turns the power supply on or off and simultaneously selects high-power or "barefoot" operation.

Connectors at the rear of the cabinet provide for exciter input, r.f. output, antenna relay control and a.l.c. output from the amplifier to an SB-400 or other exciter equipped with a.l.c. input. A husky terminal post provides the means for connecting the amplifier to an earth ground, an absolute necessity for safe use of any such high-power equipment.

Operation of the SB-200 is quick, easy and uncomplicated. With the rocker switch off the exciter is connected through the s.w.r. bridge to the antenna for "barefoot" operation. Throwing the switch to ON causes the instant-heating triode filaments to be energized and readies the solid-state power supply for immediate use. The bias voltage is applied through the coil of an internal d.p.d.t. change-over relay to the amplifier grids to cause plate current cutoff. The exciter remains connected through to the antenna until the relay control circuit is grounded via an external cable connected to extra contacts on the exciter VOX relay, an external exciter/receiver antenna change-over relay or a standby switch. This grounding action causes current to flow through the coil of the amplifier d.p.d.t. relay, the contacts of which in turn switch the exciter input to the UE572/T-160-L cathodes and the amplifier output through the s.w.r. bridge to the r.f. output connector; simultaneously, the cut-off bias is removed and the grids are left with -2 volts operating bias which limits resting plate current to approximately 90 ma. Tune-up takes but a few seconds after practice and is done with the aid of the relative r.f. output meter. When loaded to a kilowatt on c.w. the plate current reads 500 ma. and the plate voltage 2000.

A novel and useful feature of the SB-200 is the inclusion of a "Monimatch" type bridge. S.w.r. and relative output checks can be made using the exciter alone or with the amplifier operating at full output.

Assembling and wiring the SB-200 is a relatively simple task. We followed Heath's instructions to the letter and experienced no difficulty. The entire project required about 17 hours. We know of some amateurs who completed the job in 12 to 15 hours. However, because of the high voltage and power involved in kilowatt amplifier circuitry, special pains were taken with soldering



In this bottom view, the 120/240 volt a.c. terminal strip appears at upper left. The coaxial s.w.r. bridge cavity is attached to the inside rear apron and the antenna relay is visible in the upper right corner. The fan motor is mounted in perforated area at right. In the lower left corner is the power-supply filter printed-circuit board.

and placement of wiring. The extra effort apparently paid off when the amplifier was tested. No troubles were encountered and we were off in a cloud of S9 reports on c.w. and plus-db reports on s.s.b. after dummy-load tests that indicated the T-160-Ls were delivering about 600 watts output. One breakdown occurred in the SB-200 after about ten days of operation. The ceramic wafer used to switch in padding across the main tuning capacitor on 80 meters let go in a spectacular pyrotechnic display. Heath provided a replacement that has given no trouble since installation and has informed us that they are making modifications in the band switch.

The SB-200 is a compact, stylish piece of equipment that fits in well with most station layouts. During assembly we had some fears that a kilowatt amplifier in such a small package would be quite hot (thermally). The fears were groundless. With its fan-cooled graphite-anode triodes and wrap-around cabinet generously perforated on top, bottom and sides, it turned out to be as cool as the proverbial cucumber considering its full-gallon input. Electrically, it is cool, too; tuning is smooth, and there were no signs of instability noted.

—W1JAY

#### Heathkit SB-200 Linear Amplifier

Height: 6 $\frac{5}{8}$  inches

Width: 14 $\frac{1}{8}$  inches

Depth: 13 $\frac{3}{8}$  inches

Weight: 35 pounds

Power Requirements: 120 volts 60 cycles  
or 240 volts 60 cycles

Price Class: \$200

Manufacturer: Heath Company, Benton  
Harbor, Michigan 49023