

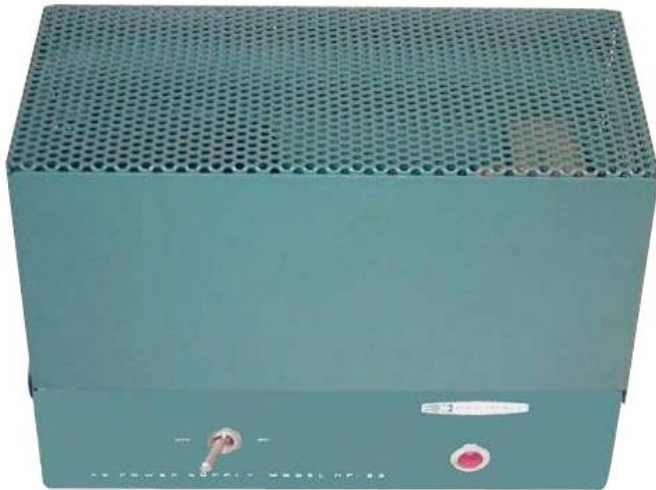
**Heathkit of the Month #26:
by Bob Eckweiler, AF6C**



**Heathkit HP-23A/B/C/E
AC Power Supply Family.**

Introduction:

Many of the Heathkit HF and six-meter transceivers and twin radios were designed to run either mobile or in a fixed location. Since these are tube radios they require high voltage power, and Heath decided to make the power supply for these radios separate from the radio. The savings in size and weight benefits its use in mobile service. Two types of power supplies were manufactured to support the Heath radio line. The first type runs off household standard AC power for home stations, and the second runs off the car electric system, or other 13.8 volt DC auxiliary power system.



This month we'll look at the AC power supplies that Heath manufactured for home use of its various transceivers and twins. The early AC power supplies run only on 120 VAC but later they were updated with dual primary windings on the power transformer so they can be used on either 120 or 240 VAC. Prior to this Heath made a separate 240 VAC 50 Hz supply for use in Europe.

The UT-1 Power Supply:

Manufactured for only one year - 1960, this power supply was introduced to power the Heathkit Cheyenne MT-1 90 watt mobile AM transmitter and Comanche MR-1 mobile receiver. It provides 300 volts for the receiver and transmitter stages and 600 volts for the final. By a simple change in wiring either 6.3 VAC at 8 amps or 12.6 VAC at 4 amps filament power can be chosen. No negative bias voltage is provided. The 600 volt output can supply up to 200 ma and the 300 volt output can supply up to 100 ma provided the total continuous power drawn from those two outputs is 120 watts or less. The high voltage supply utilizes a voltage doubler circuit with the half voltage tap providing the low voltage output. Power output is provided by a six blade Jones plug. The AC line is well filtered with a pi filter in each lead. The only controls on the unit are a power switch and a pilot light. The UT-1 was replaced by the HP-20 in 1961.

The HP-20 Power Supply:

Heath manufactured the HP-20 from 1961 through 1963. Circuit-wise it is very similar to the UT-1 with the addition of -130V 30 ma bias power. This is provided by an additional winding on the power transformer. The filament, LV and HV power specifications are the same as the UT-1. The only other change is the Jones plug on the UT-1 is now an octal tube socket type connector. This was most likely done for cost savings. The bias power requirement was driven by the release of the HX-20 mobile SSB Transmitter and the HR-20 mobile SSB receiver. The HP-20 could be used in place of the UT-1.

The HP-23 Power Supply:

In 1963 Heathkit introduced three single-band 200 watt PEP SSB transceivers. The HW-12, HW-22 and HW-32 'Singlebanders' covering 80M, 40M and 20M respectively. With the added power required by these rigs, a new AC power supply was needed. Heath's answer was the HP-23. This power supply has the same 9" x 4-3/4" footprint as the HP-20 but is 3/4"

taller. It supplies a high voltage of 820 volts at no load dropping to 700 volts at 250 ma. Up to 150 ma may be drawn continuously or up to 300 ma at a 50% duty cycle. The low voltage section supplies either 350 volts or 275 volts at no load dropping to 300 volts or 250 volts at 150 ma (with a 100 ma load concurrently on the HV section). A choke is used in the supply to minimize AC ripple. Maximum continuous current from the LV supply is 175 ma. The two voltage ranges are selected by an internal wiring change. The fixed bias supplies -130 volts no load dropping to -100V at up to 20 ma. is capable of continuously supplying up to 30 ma. An adjustable bias of -80 to -40 volts at 1 ma is also available. The voltage is set by a screwdriver adjustable pot on the rear apron of the power supply. Filament voltage is 12VAC at 5.5A with a center-tap to allow up to 11 A at 6.3V. Controls on the front panel are a power switch and a neon pilot light. On the rear is the power cord with a fused wall plug, adjustable bias potentiometer and an eleven-pin tube socket connector for power output. This power connector includes two wires to allow the use of a remote ON-OFF switch on the transceiver itself which, if used, is in series with the power switch on the front of the power supply. The HP23 remained in production until 1968 when it was upgraded to the HP-23A.

The HP-23E Power Supply:

Heath manufactured an European version of the HP-23 with the model number HP-23E that was designed for 240VAC 50 Hz AC power.

The HP-23A Power Supply:

By 1968 Heathkit had more transceivers in production that could use the HP-23 power supply. This included the SB-100 and HW-100. In 1968 Heath refined the HP-23 power supply by adding dual primaries to the power transformer so the unit could run off of either 120 or 240 VAC, obsoleting the HP-23E. At the same time the fuses were removed from the AC plug and a circuit breaker was added to the chassis. Small modifications were done to the low volt-

age section; the bleeder resistor was increased from 50K to 100K and the power switch was replaced with a three position switch that allows selection of either of the two low voltages without the necessity to rewire the unit. The pilot light was also removed. The HP23A stayed in production until 1973 when it received some new changes and was renamed the HP-23B.

The HP-23B Power Supply:

The HP-23B is more takeaway than addition. Gone are the adjustable bias supply and the center tap lead of the filament transformer; now only 12.6 VAC filament voltage (at 5.5A) is available. The addition is a three wire grounding AC plug and cord that replaces the two-wire AC cord on the earlier units. The HP-23B remained in production from 1973 to 1978 when the new HP-23C was introduced.

Radio	Introduced	Last Sold	Power Supplies
MT-1 / MR-1	1959	1962	UT-1, HP-20
HX-1 / HR-1	1962	1964	HP-20, HP-23 - 23A
HW-12/22/32	1963	1966	HP-23 - 23C, PS-23
SB-100	1965	1967	HP-23 - 23C, PS-23
HW-12A/ 22A/32A	1966	1974	HP-23 - 23C, PS-23
SB-101	1967	1970	HP-23 - 23C, PS-23
HW-100	1968	1971	HP-23 - 23C, PS-23
SB-102	1970	1975	HP-23 - 23C, PS-23
HW-101	1970	1975	HP-23 - 23C, PS-23
SB-110	1965	1969	HP-23 - 23C, PS-23
SB-110A	1969	1971	HP-23 - 23C, PS-23
Table 1: Radio Power - Supply Matrix			

The HP-23C Power Supply:

The HP-23C continued the takeaway changes. It no longer had the three position power switch. Instead the power is only controlled by the remote switch on the transceiver. The selection of the two levels of low voltage is again selected by a wiring change. In 1979 the HP-23 was replaced by the PS-23C.

The PS-23(C) Power Supply:

Sometime in early 1980 Heathkit renamed the HP23C to the PS-23. Other than the name

Model	Low Voltage	LV Filter & Circuit	High Voltage	HV Filter & Circuit	Max DC Watts	Filament	Bias	AC Power
UT-1	300 VDC @ 100 ma	C - R - C	600 VDC @ 200 ma	Doubler C - R - C	120 W. Total	6.3V @ 8A or 12.6V @ 4A	None	120 VAC 60 Hz
HP-20	300 VDC @ 100 ma	C - R - C	600 VDC @ 200 ma	Doubler C - R - C	120 W. Total	6.3V @ 8A or 12.6V @ 4A	-130 VDC @ 20 ma.	120 VAC 60 Hz
HP-23	300 VDC @ 100 ma	Doubler C - L - C	700 VDC @ 250 ma	Doubler - C	130 W. 100% 235 W. 50% duty cycle	6.3V @ 11A or 12.6V @ 5.5A	-100 VDC @ 20 ma. -40/-80 adj. @ 1 ma	120 VAC 50/60 Hz
HP-23E (Europe)	300 VDC @ 100 ma	Doubler C - L - C	700 VDC @ 250 ma	Doubler - C	130 W. 100% 235 W. 50% duty cycle	6.3V @ 11A or 12.6V @ 5.5A	-100 VDC @ 20 ma. -40/-80 adj. @ 1 ma	240 VAC 50/60 Hz
HP-23A	300 VDC @ 100 ma	Doubler C - L - C	700 VDC @ 250 ma	Doubler - C	130 W. 100% 235 W. 50% duty cycle	6.3V @ 11A or 12.6V @ 5.5A	-100 VDC @ 20 ma. -40/-80 adj. @ 1 ma	120/240 VAC 50/60 Hz
HP-23B	300 VDC @ 100 ma	Doubler C - L - C	700 VDC @ 250 ma	Doubler - C	130 W. 100% 235 W. 50% duty cycle	12.6V @ 5.5A	-100 VDC @ 20 ma.	120/240 VAC 50/60 Hz
HP-23C	300 VDC @ 100 ma	Doubler C - L - C	700 VDC @ 250 ma	Doubler - C	130 W. 100% 235 W. 50% duty cycle	12.6V @ 5.5A	-100 VDC @ 20 ma.	120/240 VAC 50/60 Hz
PS-23	300 VDC @ 100 ma	Doubler C - L - C	700 VDC @ 250 ma	Doubler - C	130 W. 100% 235 W. 50% duty cycle	12.6V @ 5.5A	-100 VDC @ 20 ma.	120/240 VAC 50/60 Hz
Table 2 - Heathkit Amateur Power Supplies (1960 - 1983)								

change, the kit appears to be identical electrically and physically. Sometimes this power supply is given the nomenclature of PS-23C. The PS-23 was discontinued in 1983 as demand for power supplies for vacuum tube radios diminished, and as Heath itself was then offering solid-state transceivers and had discontinued their line of vacuum tube ham transceivers.

Table 1 gives the power supplies that are usable with the various Heath radios. Table 2 gives the specifications for the various power supplies. Generally the newer power supply will work with the older radios, with the exception the two twins.

For home use the HP-23 series provides all the needed voltages and is compact enough to fit inside the SB-600 communications speaker, making its visible footprint negligible. Heath designed the HP-23 to be flexible enough to work with non-Heath radios too. The Heathkit HP-23 power supply could also be used to power some Collins and Drake equipment.

Miscellaneous:

Many HP-23 - HP-23C power supplies were sold over the span of twenty years. Many are **Copyright 2011, R. Eckweiler & OCARC, Inc.**

still in use today some 27 to 47 years later. The power supplies proved to be quite rugged, but time has taken its toll on the electrolytic capacitors in many units. New exact replacement capacitors are not available, but capacitors of the same values are available in a different mounting style. They are also much smaller than the originals. Numerous kits are available on today's market for rebuilding the HP-23 to put it in a like new condition. A Google search should give you numerous sources. If you can't find them feel free to drop me an email.

73, from AF6C



Remember if you come across any old Heathkit Manuals or Catalogs that you do not need, please pass them along to me.

Thanks - AF6C

This article originally appeared in the February 2011 issue of RF, the newsletter of the Orange County Amateur Radio Club - W6ZE.

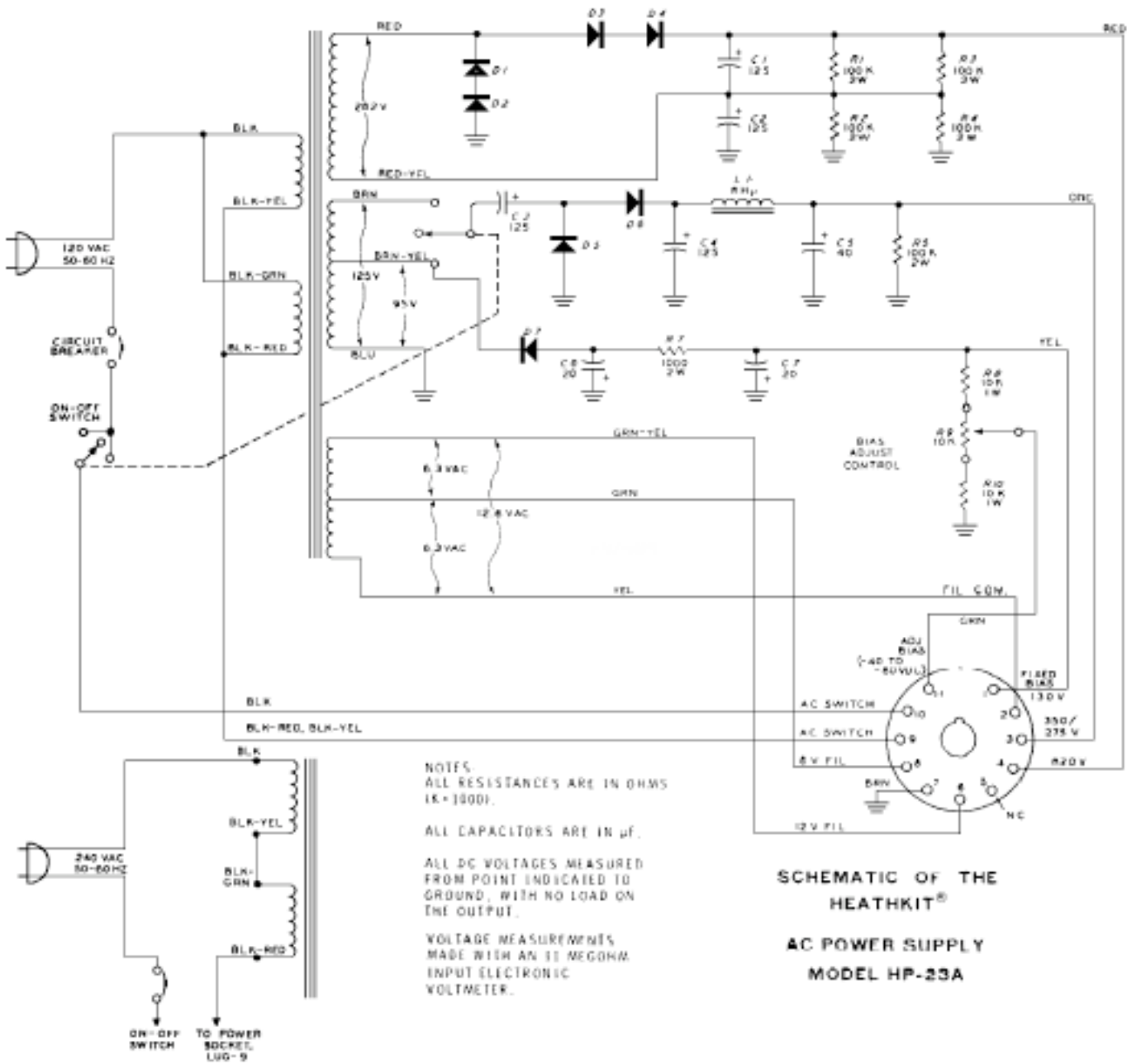


Figure 2 - Schematic of the Heathkit HP-23A Power Supply