



▶ A TINY VINTAGE GARAGE AMP

Could John Stewart post the schematic for his 3W AU6/6AQ5 garage amp ("An Affordable SE Triode Amp," GA 4/00)?

*Jim Petersen
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John Stewart responds:

I built this little amplifier back in 1968. Since then it has been used in quite a wide variety of locations. For the past few years it has been in my workshop. Program sources are an Eico HFT-90 FM receiver and a matching Eico HFT-94 AM receiver.

I managed to build the entire amp, tone controls, and preamp into a Hammond 8 × 12 × 3 chassis. Most of the major components are on a 3 × 12 sub-chassis inside. That includes the power supply, power amp, preamp, and tone circuits. I assembled the sub-chassis on the bench. The controls, input, and output connections are mounted on the front and rear panels of the chassis. These were all wired together at the final assembly stage.

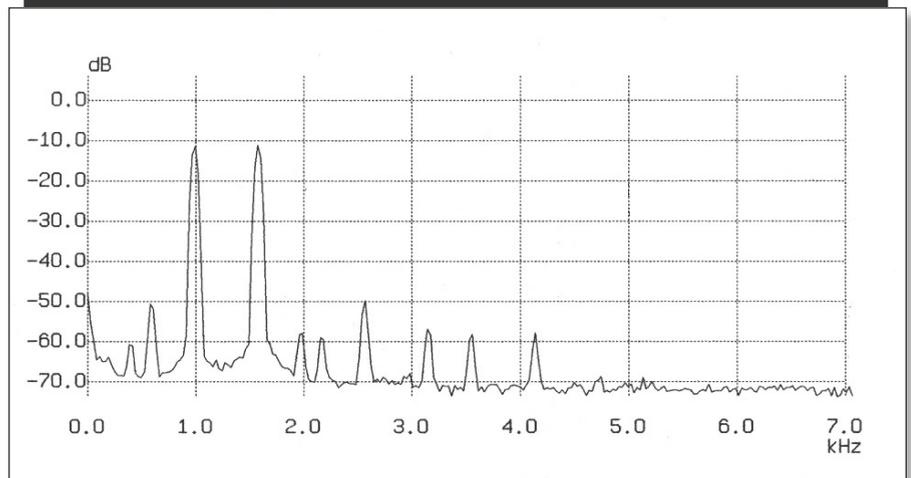
Because there is some heat to be dissipated, I used a set of four 1" diameter ventilation hole plugs mounted on the ends of the chassis. There are several 1/2" holes in the bottom plate to allow cooling air in.

The amplifier is by no means optimized and if I were to build another today I would make a few changes. The most important of

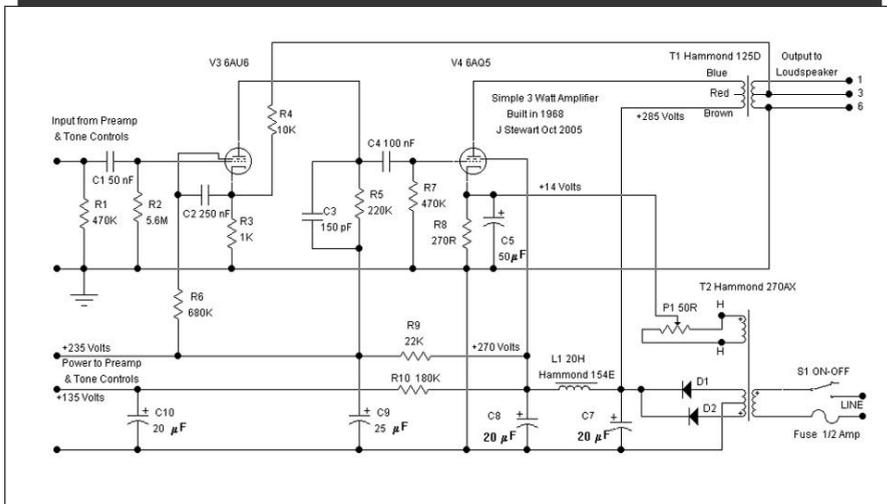
TABLE 1 PERFORMANCE SUMMARY

CONDITION		1	2	3	WATTS OUT
<i>WITHOUT FEEDBACK</i>					
HARMONIC	2nd	2.2	2.8	2.2	%
	3rd	1.2	1.7	1.2	
	4th	0.2	0.3	0.2	
DAMPING FACTOR	at 1 kHz	about 1/7th			
	at 65HZ	about 1/8th			
<i>WITH 16.9dB FEEDBACK</i>					
HARMONIC	2nd	0.8	0.9	0.7	%
	3rd	0.4	0.7	0.9	
	4th	~	~	0.4	
DAMPING FACTOR	at 1kHz	6.7			
	at 65HZ	not measured			

Intermodulation distortion at 2 watts output.



3W amp power section.



these changes would be to use one of the new Hammond output transformers (OPT) specifically designed for single-ended (SE) applications. At the time I had the Hammond 125D in my junk box, so it was easy

to incorporate into this amp. But one of the new SE OPTs would yield quite an improvement in the low frequency performance.

There are four inputs, three of which can be used with receivers or other high

level sources such as a CD player (I do). Full output is possible with only 70mV on those jacks, so any source with a nominal 1V output works well. The low-level input is corrected for something like the GE variable reluctance phono cartridges that were common at the time. Since I had a crystal mike I added the ability to use that as well. A miniature SPST switch on the front panel allows change of the preamp input loading. Another front panel miniature SPST switch is in the heater circuit of the 12AX7 V1. This can be shut off, thus extending the tube's life while not in use.

Most of the preamp and tone control circuitry is a direct lift from some of the circuits used by Eico. You may recognize the tone circuit as the Baxandall. The only connection the circuit has to the chassis is at the phono connector. There are two switched AC outlets on the rear panel to supply my tuners.

As shown there is 17dB NFB around the power amp. The resulting damping fac-

Parts List

C1, C17	50nF
C2, C13, C19	250nF
C3	150pF
C4, C23	100nF
C5	50µF, 25V
C6	not assigned
C7, C8	20µF, 350V
C9	25µF, 350V
C10	20µF, 350V
C11	100nF
C12	30µF, 25V
C14	10µF, 10V
C15	20nF
C16	1nF
C18	6.8nF
C20, C21	5nF
C22	100pF
C24	2.5nF
C25	820pF
C26	47pF
D1, D2	1N4007 or equivalent
L1	Hammond 154E, 20H, 20mA Choke
P1	50 R, Hum Balance
P2	500k, Volume
P3	500k, Treble with integral On-Off switch S1
P4	500k, Bass
R1, R7, R27	470k

R2	5.6 M
R3	1k
R4, R13	10k
R5	220k
R6	680k
R8	270 R
R9	22k
R10	180k
R11	6.8 M
R12, R25, R26,	
R30, R32, R33	100k
R14	2.2k
R15, R17	225k
R16, R19, R20,	
R21	1 M
R18	4.7k
R22	270k
R23	33k
R24	1.2k
R28	450k
R29	3.3k
R31	2.2 M
S1	On-Off Mounted on rear of Treble Control P3
S2	SPST Switch, set Mike or Phono Loading
S3	2 Pole, 6 Position Switch, Input Selector
S4	SPST Switch, Heater On-Off for V1 (not shown on schematic)
T1	Hammond 125D OPT
T2	Hammond 270AX
V1, V2	12AX7

V3	6AU6
V4	6AQ5

Hardware

- Hammond 1441-24, 8 × 12 × 3 Steel Chassis, Grey Baked Enamel Finish
- Hammond 1431-22, 8 × 12 Steel Bottom, Grey Baked Enamel Finish
- Screw Type Terminal Strip for loudspeaker connection, Cinch-Jones 17-4
- 4 Rubber Feet
- 2 of 9 pin sockets for 12AX7s
- 2 of 7 pin sockets for 6AU6 & 6AQ5
- Pilot Light #47 and Holder
- Fuse Post & ½A Fuse
- 4 RCA Double Phono Receptacles AES p/n S-H310
- 4 1" diameter ventilation hole plugs, Cinch 41V or GC 11-392-C
- 4 Knobs
- 2 Amphenol 61-MIP-61F AC Receptacles

tor is 6.7 at 1kHz. Power output is a little more than 3W maximum, enough for many applications. The power supply is very simple. The Hammond 270AX is meant to be used with a 6X4 rectifier, but I used some silicon rectifiers in order to somewhat limit the heat developed inside the chassis. I connected the heater supply (HH) to the 6AQ5 cathode so that it is lifted 14V above ground. That helps to minimize hum from the preamp.

All of the Total Harmonic Distortion (THD) and Intermodulation Distortion (IMD) measurements were taken with one of the Pico Technologies Virtual Instruments.

And the amp sounds very good for the application I had in mind. *ax*

3W amp preamp section.

