Solar Electronic Enterprises Public Address Booster Amplifier

This circuit is designed to take the output from the P.A. or external speaker jack on your CB set and boost it from its present 2 to 4 Watts to 50W RMS. This circuit is being presented as information only, for educational purposes, as it is illegal to use in some localities. If you intend to construct this unit, it would be wise to check with your local authorities before starting. We cannot be responsible for any consequences resulting from its use.

If two units are built, they could be used to boost the output of a car stereo to 50W RMS per channel. If the Hammond transformers specified are used, 50Hz to 50kHz response can be realized.

Two schematics are given. The first uses PNP types, while the second used NPN types. This will allow you to use your junk box to save money. If 50W is too much power, the circuit can be changed to 15W RMS by replacing T2 with the substitute listed.

Parts common to both versions

T1-8ohms to 125 or 250 ohms CT transformer such as a Hammond 147L or 146G respectively. (the 250ohm will give more sensitivity, but the 125ohm will give lower distortion) Typical U.S. equivalents are the Thordarson TR67(125ohm) and TR265(250ohm)

T2-for 15W 18ohms CT to voice coil impedance, such as a Hammond 147S. There is no direct U.S. made substitute, but the Allied 6T25HF, Essex TA-12, Stancor TA-12, and Thordarson TR-300 are close enough and give 12W output.

T2-for 50W output-5ohms CT to voice coil impedance, such as a Hammond 147UB. The closest U.S. made transformer is the Thordarson TR-199, which would give 40W RMS.

R1-1000 ohm $\frac{1}{2}$W resistor.

R2-25 ohm trimpot, or a 100 ohm $\frac{1}{4}$W trimpot in parallel with a 39 ohm $\frac{1}{2}$W resistor.

F1- 4A for 15W- 8A for 50W- Fast blow type.

Parts for NPN version

Q1,Q2- Any NPN transistor with these minimum specs: BVceo 30V, 600mA, 3W, such as a 2N3053, a 2N2219 or similiar.

Q3,Q4- Any NPN transistor with these minimum specs: BVceo 30V, 10A, 75W, such as a 2N3055, 2N3771, or MJE3055, or equivalent.

1N4001 or equivalent.

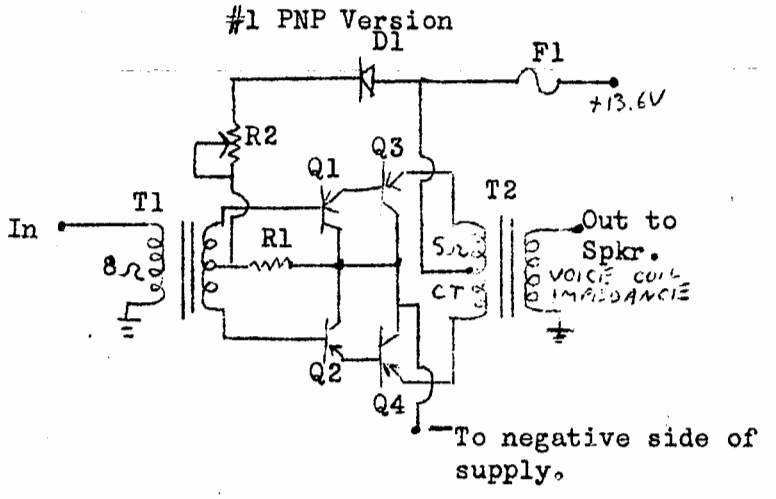
Parts for PNP version

Q1,Q2- Any PNP transistor with these minimum specs: BVceo 30V, 600mA, 3w, such as a 2N2904, 2N2905, or similiar.

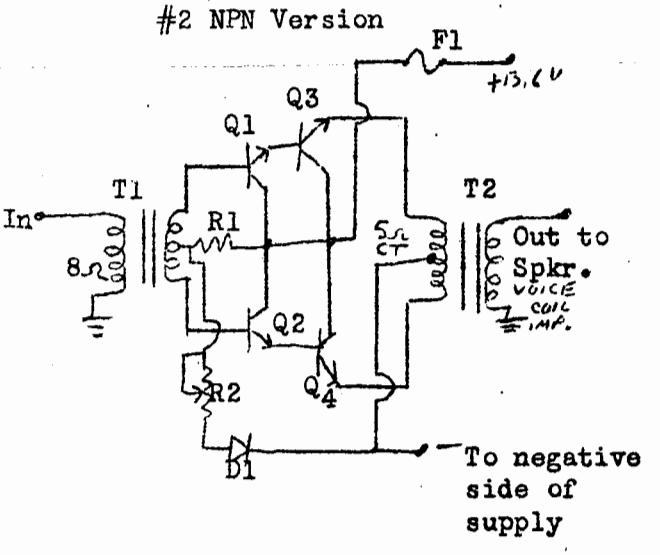
Q3,Q4- Any PNP transistor with these minimum specs: BVceo 30V, 10A, 75W, such as a 2N277, 2N2078, 2N2082, 2N1553, 2N1557, MJ2955, MJE2955 or similiar.

D1- Any 10PIV or more, 20mA or more diode. Germanium, if germanium outputs are used(1N34), and silicon, if silicon outputs are being used.(1N4001)

#1 PNP Version



#2 NPN Version



Mechanically, a case, jacks, and a heatsink are required, If you build the 15W version, the case is adequate for a heatsink if made of metal. If you build the 50W version, you need a heatsink with a rating no higher than 2'C/W for the two output transistors. Such a heatsink would be a Wakefield 403 or 641, with both Q3 and Q4 on the one heatsink. D1 is for thermal compensation, and should be mounted in close proximity with the heatsink(Mechanically attached, but electrically isolated). No mechanical layouts are given, as this is up to individual taste and preferences. The circuit is non critical, and layout unimportant as long as no shorts are produced. Note that the collectors of Q3 and Q4 in the NPN version are isolated from ground, while in the PNP version are connected to ground in a negative ground vehicle, making the PNP version easier to build. In a positive ground vehicle(Some models of Datsun, White Freightliner, and some British cars) the reverse is true.

After construction has been completed, a current meter is needed to set R2. Remove F1 from its holder, connect the meter across the fuse holder terminals, and set it to read in the hundreds of milliamps. Set R2 to minimum resistance and switch the unit on. If the unit has been wired properly, the current drain will be only a few mA. Now increase the resistance of R2, until you read 60mA in the 15W or 120mA in the 50W version. This is the idling current of the unit, and is done with no signal input. If due to leaky transistors, the temperature of the unit with no signal input rises above body temperature, after 10 minutes, reduce the bias so the idle current is reduced by 20%. This 20% reduction is manditory if the air temperature in your area ever exceeds 38'C (100'F). This does affect distortion, and the lower the current setting, the higher the distortion.If you could find an appropriate pot for R2, just try various values of fixed resistors, until you find the correct one.

To connect the unit in a negative ground car, connect the + 13.6 volt lead to the same point the power for your CB set or stereo is taken from; the negative lead going to the vehicle chassis. In a positive ground vehicle, reverse the + and - terminals. The two wires of the primary side of T1 go to where the speaker would have connected if you were not using the Booster amplifier. The output terminals obviously go to your speakers. With multitap output transformers, connect the appropriate terminals to whatever impedance your speaker load happens to be.

For speakers, a single Radio Shack PA-8 can handle the 15W version, but the 50W version needs a 50W RMS speaker. Two Radio Shack PA-12 hooked in parallel and connected to the 4 ohm tap on the output transformer will work fine.

These instructions have been written on the premise that you have built electronic equipment before, because you bought the electronics magazine these instructions were advertised in. If you have never built anything before, find someone who has, for help. This is a simple circuit and will work properly first time if wired correctly. When using the unit, your CB set or stereo volume may overdrive it, but this can be cured by turning down the volume on your set. When overdriven, the sound will be distorted due to clipping. However, we cannot answer individual enquiries about this or any other circuit, or any modifications thereof. However, many of these units have been built and have operated properly. The unit in my car has operated well, from -40'C(-40'F) in Edmonton, to + 38'C(100'F) in Spokane, Wa. We hope you will get many years faithful service from yours.

Hammond transformers are available from Electrosonic Industrial Sales, 1100 Gordon Baker Road, Willowdale, Ontario, Canada M2H 3B3. They, however will refuse all COD orders. As of June 1975, the 146G was $4.25(1.4oz.), the 147S was $12.65(3lb.-1.35Kg.) and the 147UB was $15.80(5lb.-2.3Kg.). Add postage for all items. All other parts are available at your local distributor, or most Radio Shack stores.

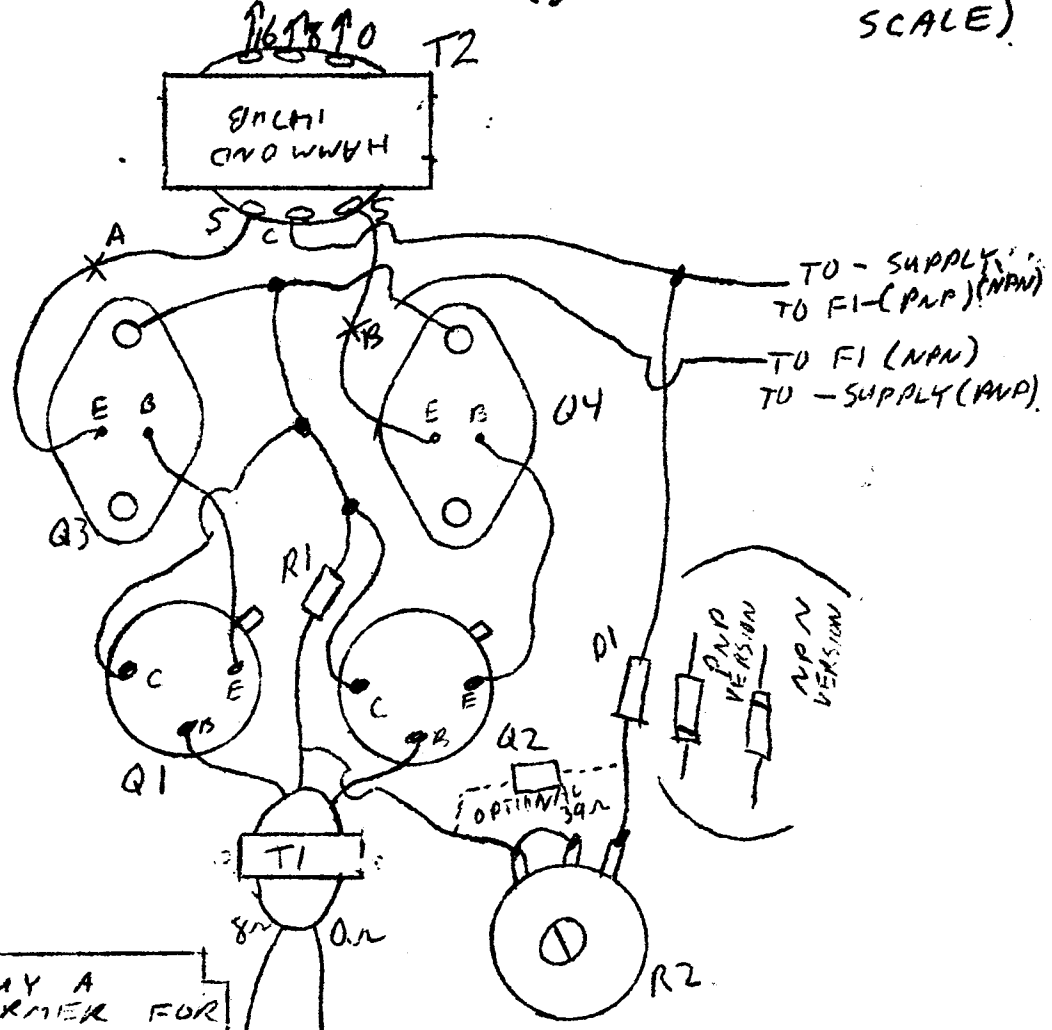
If ignition noise occurs, a 10mH 6Amp choke in series with the power lead will usually help. Also, a short across the speaker terminals may blow the transistors. A .33 ohm 5Watt resistor in series with the emitters of Q3 and Q4 will reduce the possibility of damage, but will cut output power by 10%.

Have fun with it and enjoy yourself.

Solar Electronic Enterprises-P.O.Box 778-Edmonton,Alberta, Canada-T5J 2L4.

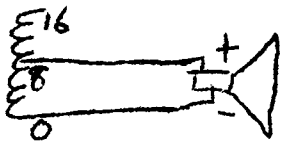
BOOSTER AMP PICTORIAL WIRING DIAGRAM

(DIAGRAM NOT TO SCALE)

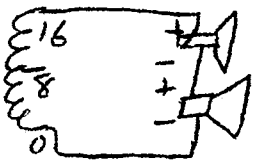


T2 SPKR OPTIONS

1 8Ω SPKR



2 8Ω SPKR



OR

(NOT AVAILABLE ON 1417AB)

IF YOU CANNOT BUY A SUITABLE TRANSFORMER FOR T2 - SEE SEPTEMBER, 1970 POPULAR ELECTRONICS FOR INSTRUCTIONS ON HOW TO WIND YOUR OWN. BACK ISSUES OF POPULAR ELECTRONICS ARE KEPT AT MOST PUBLIC LIBRARIES

ALL TRANSISTORS - BOTTOM VIEW SHOWN.

TO INSERT OPTIONAL 133Ω SW RESTORS BREAK WIRES A AND B AT PLACE MARKED AND INSERT THE RESISTORS THERE

D. Fraser Jan 9/75