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 or email 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.

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

Copyright/Reprint Notice

QST Issue: Oct 2007
Title: Build Your Own 600 W HF Amplifier
Author: Colin Darby, M0OTT

Click Here to Report a Problem with this File

TECHNICAL CORRESPONDENCE

BUILD YOUR OWN 600 W HF AMPLIFIER

◊ Dear ARRL,

I read with interest the construction article "Homebrew Solid-State 600 W HF Amplifier" by KØGKD, published in the June 2006 issue of *QST*.

Having recently constructed the same Motorola design from a set of components from the US based company Communication Concepts, I do have a number of extra construction hints (in no particular order) that may aid future builders.

1) The generic diagram shown in the *QST* article from the EB104 Engineering Bulletin differs slightly from the actual circuit used when constructed on the printed circuit board (PCB) supplied. Also the EB104 Bias Configuration, as redrawn by Communication Concepts, is slightly in error.

2) The value of R15-R18 has been changed to 2.7 Ω (as supplied by Communication Concepts). The power ratings of R19 and R20 may have to be increased for heavy key down applications.

3) Due to the very close spacing between the PCB and the copper heat spreader, ensure that all solder joints are cropped to within 2 mm on the lower side of the circuit board.

4) C17 and C18 are the four physically thickest 0.1 µF chip capacitors, and sit on the top surface of the PCB. Only thin chip capacitors are fitted to the underside.

[The *QST* article lists C17 and C18 each as two 0.01 µF capacitors in parallel for a total capacitance of 0.02 µF. The original App Note, EB104, lists them as two 0.1 µF capacitors in parallel for a total capacitance of 0.2 µF. Both places list them as 100 V ceramic, ATC 200/823 or equivalent, which is the correct designation. — *Ed.*]

5) M3 bolts and nuts can be used to mount the PCB to the copper spreader. M3 nuts used as spacers provide the correct clearance between the two surfaces.

6) Use a socket for U1, the MC1723C IC, to allow easy replacement.

7) The four ferrite beads used to create L1 and L2 are electrically conductive and must be mounted so that they do not touch the ground plane. Otherwise you will have a fire on your hands!

8) The phasing on T2 is critical; the red and orange leads need to be on opposite sides at the top and bottom of the transformer. If you have any doubt, phone Marlis at Communication Concepts for advice before proceeding with the construction.

9) Trim pots R1 to R4 need to be fitted slightly up in the air to ensure clearance for other components.

10) When all components are fitted to the PCB, double test that there are no shorts on the 50 V rail. You may have to remove a very small section of the PCB copper in close proximity to the MRF150 FETs and other areas to avoid this problem.

11) Only use silver loaded heat sink compound to ensure maximum heat transfer. Use two large diameter (4¾ in / 120 mm) 1400 RPM fans to provide adequate cooling and low noise.

12) The current bias stability of the MRF150 FETs is greatly improved if the output of the voltage regulator (U1) is reduced from 7 V to 5 or 5.5 V (via R5) and the thermistor (R25) is mounted in close thermal contact with one of the MRF150 transistors. I clamped the lead of one end of the thermistor close to its body under an extra nut on one of the securing bolts of the output transistors.

13) The Motorola data sheet suggests 0.25 A per device as a suitable bias current.

14) The bias voltage for the amplifier may be derived from the 50 V supply, and any relays and control circuitry can be powered by the existing 13.8 V power supply used by your transceiver.

15) For those in Europe, a suitable toroidal mains transformer (40 V + 40 V at 12.5 A each winding 1000 VA) can be sourced at a very reasonable price from Clairtronic Ltd in the UK. Contact them at **sales@clairtronic.co.uk** or by phone at +44 (0) 1234 330775. Use 63 V capacitors in the power supply, as the supply will be approximately 57 V without a load.

16) Provide a suitable 20 to 25 A fuse in the +50 V lead, and fit a rectifier diode (of adequate surge rating) with its cathode connected to the amplifier side of the fuse and its anode to ground, to protect the amplifier from reversed power supply leads.

17) When testing for the first time, ensure that pots R1 to R4 have their sliders at ground potential, and that a low current, fast blow fuse (2 A) is substituted for the normal one. If the fuse blows at turn on, test for shorts. If it blows when setting up the bias current, however, you may have the phasing of T2 incorrect. That will turn the amplifier into a high powered oscillator!

18) Do not forget that because of the high power gain you will require only around 6 W or so to drive the amplifier to 600 W output.

19) Extra circuitry for ALC control and other features may be required, depending on usage. A 50 Ω input attenuator (5 to 7 dB) feeding the amplifier is desirable, and can be protected from gross overload by a suitable fuse. A peak reading power meter needs to be incorporated either internally or externally to the amplifier.

20) If the RF unit and power supply are constructed as separate units (my preference), the power supply will sit very neatly under the bench alongside the transceiver supply. The solid state amplifier, with output filters, is small and light enough to stand on the back of the average transceiver, if required.

21) Communication Concepts also supply suitable LP output filters at reasonable cost, and which are simple to construct. These appear to be perfectly satisfactory at least up to the 400 W legal limit imposed in the UK.

Have fun! — *Colin Darby, MØOTT, Brookfield, Forest Green, Surrey RH5 5SG, UK*; **ColinDarby@FatRose.fsnet.co.uk**

◊ The subject article inspired me to build the EB104 kit. I was always skeptical of the push-pull parallel FETs, but knowing Ameritron was using the design "put me over the edge." The hints received from Colin Darby, MØOTT, via Communication Concepts were helpful. I have a few more to add, which might be useful to others building this amplifier.

In Figure 1, the main points of interest are the location of the thermistor and the two

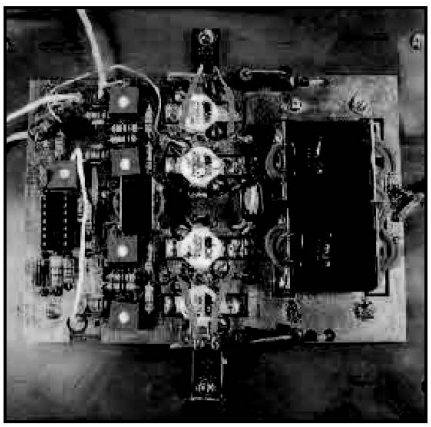

Figure 1 — This photo shows a top view of the completed amplifier board mounted on the copper spreader, which is in turn attached to the aluminum heat sink.

Larry D. Wolfgang, WR1B ♦ Senior Assistant Technical Editor ♦ tc@arrl.org