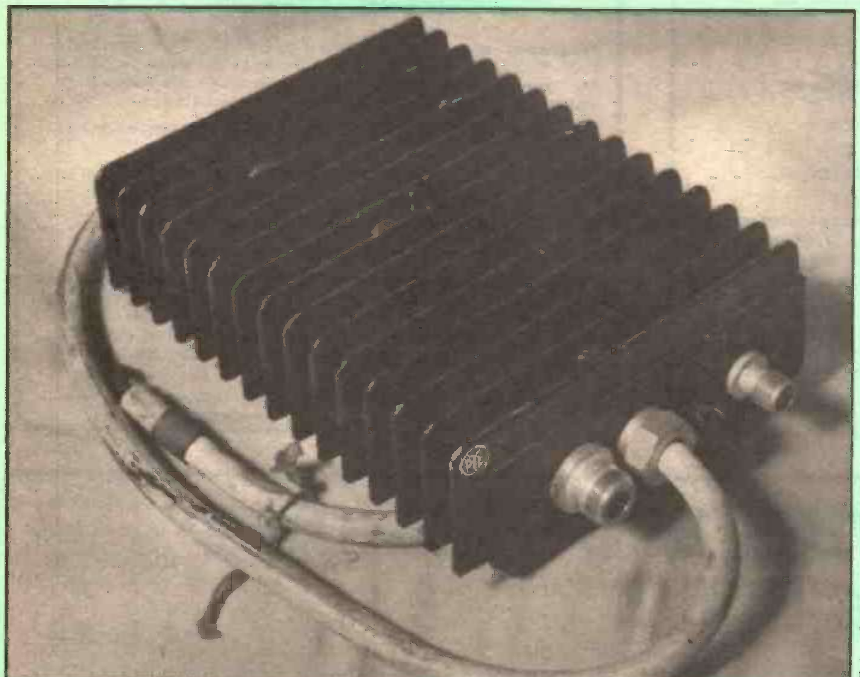
Pye A200 two metre CONVERSION



Eric Graham, G0CTM

The Pye A200 PMR RF Amplifier

Some Pye A200 RF amps are designed for bands other than Six and Two, but Chris Muriel, G3ZDM, shows us how to get these versions to go where they weren't intended with a few simple mods.

After reading Chris Lorek's article on modifying the Pye A200 RF amplifier for six metre use *(HRT, Sept '86)*, I decided to investigate the possibility of converting some of the other A200 variants for two metre use. To recap briefly, the metal plate fitted to the side of the case identifies the frequency range over which the unit is designed to operate — each range being represented by a two character code. As Chris mentioned in his article the codes are as follows:

EO=68-88MHz, M1=105-108MHz, BO=132-156MHz and AO=148-174MHz.

Obviously if you can get hold of the BO or AO versions then, apart from some retuning in the case of the AO, no further modifications should be necessary for two metre use. However, the chances are that these versions may be fetching higher prices now and they may also be more difficult to obtain as supplies dry up, so an alternative approach to getting a cheap two metre amplifier was tried out.

Universal circuit boards

The great advantage of the A200 series amplifiers is that they are all built on the same PCB, only component values are changed to accommodate the different ranges — so in theory at least any version can be converted to any other version if you know the correct component values. For the purposes of this article I will confine my comments to conversion of the M1 unit for amateur use on Two, ie. converting from 105-108MHz to 144-146MHz, which constitutes something in the region of a 38% frequency shift.

I managed to acquire the official Pye parts list which is common to all versions. This details the component differences and therefore the required component changes can be easily deduced — fortunately the coils used do not need changing.

The modifications

Undo the four cross-head screws securing the lid, taking care not to lose the screws and the rubber gasket. The heavy duty three core cable may look as if it is intended for mains use, but it's not. Brown and blue are 14.8 volts positive and negative respectively and green/yellow is a power switching lead — not normally required. Since 10 amps can be drawn on FM, any extensions to the power input leads must be of similar current-carrying capacity to avoid large voltage drops and an overheated power input cable; and of course you should ensure that you have a 13.8 volt power source capable of more than 10 amps. The first job is to remove the PCB by undoing nine small crosshead screws which secure the internal board, plus three larger ones which secure the main heatsink to the chassis. Take care not to lose the insulating nylon washers for these and beware the gooey white heatsink compound.

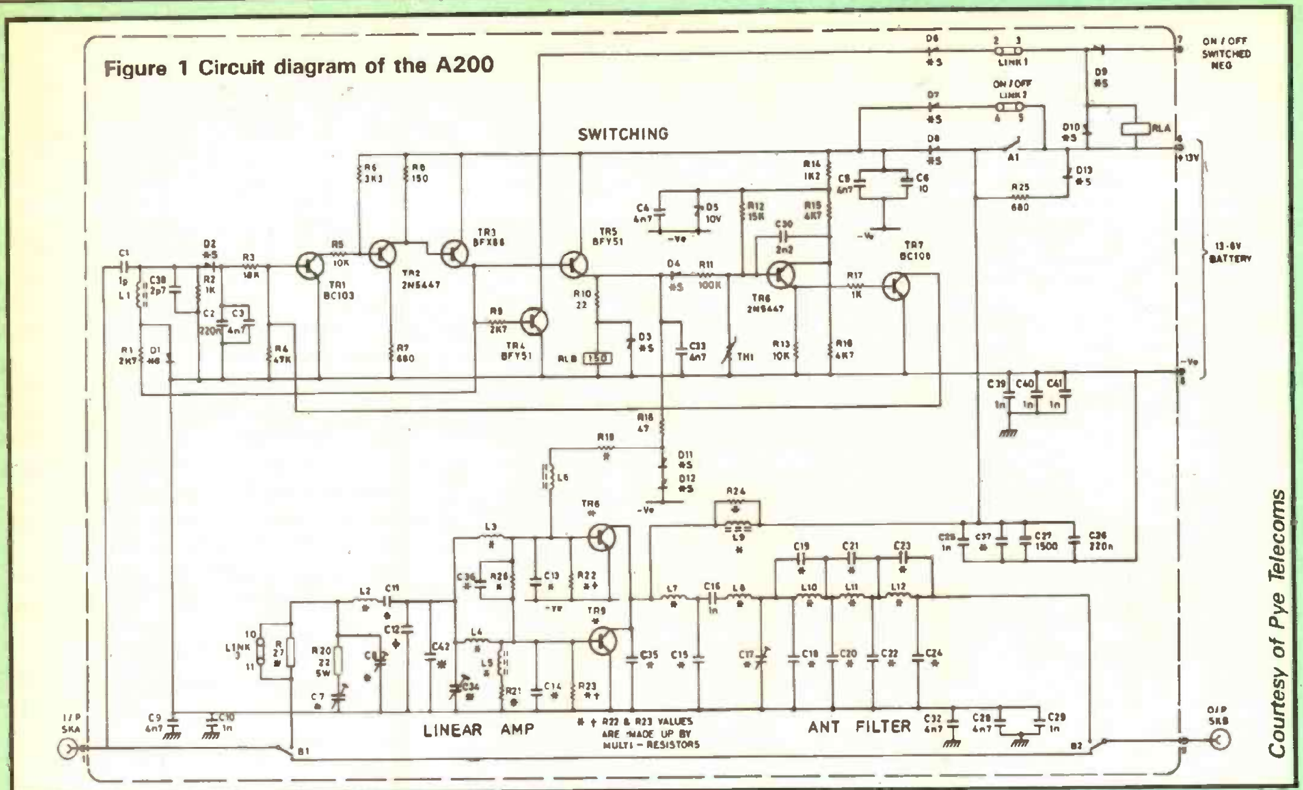


Figure 1 Circuit diagram of the A200

To remove the board completely the RF input and output leads must be unsoldered. At this stage the normal t.n.c. output socket can be replaced with a BNC bulkhead socket which will fit in the same hole — possibly needing a slight fettle with a round file. There are also three small 1nF capacitors on tags below the nylon washers which must be unsoldered before the board can be hinged out.

The mods themselves consist mainly of capacitor changes and either silver mica or ceramic plate types of close tolerance should be used. Proceed as follows:

1) Remove R23 and R22; these consist of three resistors each in the M1, yielding six components for the junk box.
2) Remove C12, C13 & C14 around the PA section. Substitute C12 (300pF) for C13 (originally 500pF in the M1 version), replace C12 with 200pF and C14 with 300pF; I used 200pF and 330pF chip capacitors here as good high Q capacitors are needed. Otherwise use the Semco mica-wrapped capacitors from Cirkit mentioned in Chris Lorek's six metre article or several capacitors in parallel to obtain the required capacitance with the shortest leads possible. With some A200's more output is achieved with C14 at around 220pF (150pF + 68pF in parallel). Chip capacitors are available from the RSGB Microwave Components Service.
3) C18, C19, C20, C21, C22, C23 and C24 must all be replaced as shown in the table. Use silver-mica or ceramic plate capacitors of the exact value needed.
4) You *may* find that the amplifier will tune onto two metres by adjustment of trimmers C7, C8 and C17. It is preferable, however to press on with the following changes; and of course it is essential if your unit won't tune at this stage.
5) Widen the thin strip of copper on the PCB joining L7 and L9 to about ¼-inch. I used adhesive copper tape here although the copper braid from television coaxial cable would do.
6) Replace C7 trimmer with a 2-22pF trimmer; a Mullard film dielectric (green) type fits easily here.
7) C8 and C17 may need replacement with lower values. As these are ceramic/mica compression types, I managed by trimming the brass plates with wire-cutters to obtain a lower capacitance. Otherwise substitute 10-80pF types for the original 30-140pF components.

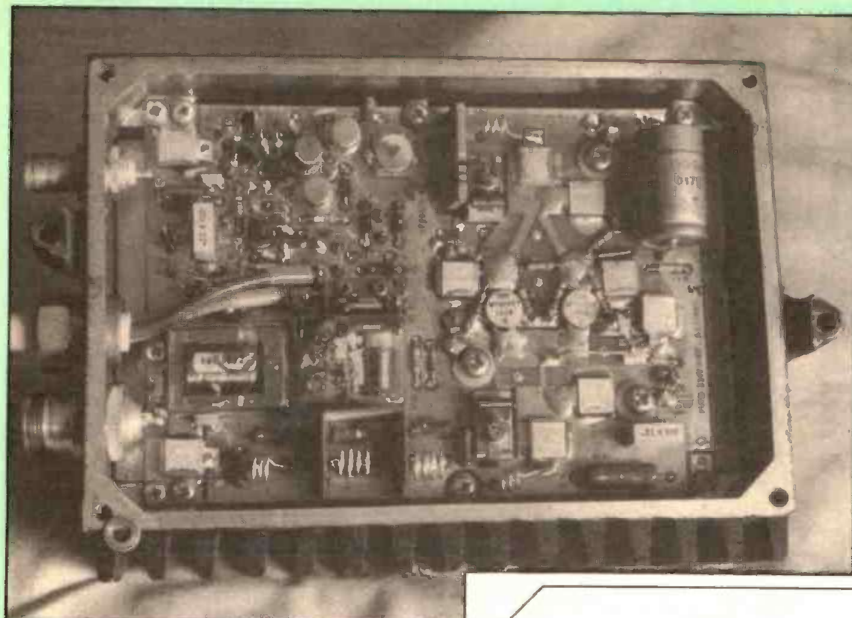
Switching modifications

The RF switching is designed to drop out immediately RF power is removed. For SSB use the hang-time needs to be increased from zero to about a second or so, depending on individual preferences. I used 2uF to give a one second delay, soldered between C2/C3 junction and the ground plane. Use an electrolytic, 10 volt working, negative to ground plane.

To increase RF sensitivity (remember I'm only driving this with an FT290) I decided to shunt C1, the input capacitor to the RF sensing circuitry, with a 4.7pF capacitor. A 1pF is used in the original so this

Table of capacitor changes

Capacitor	New value required
C18	12pF
C19	3.9pF
C20	22pF
C21	3.9pF
C22	22pF
C23	3.9pF
C24	12pF



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Internal view of the A200

takes the input reactance from about 1100 to 200 ohms.

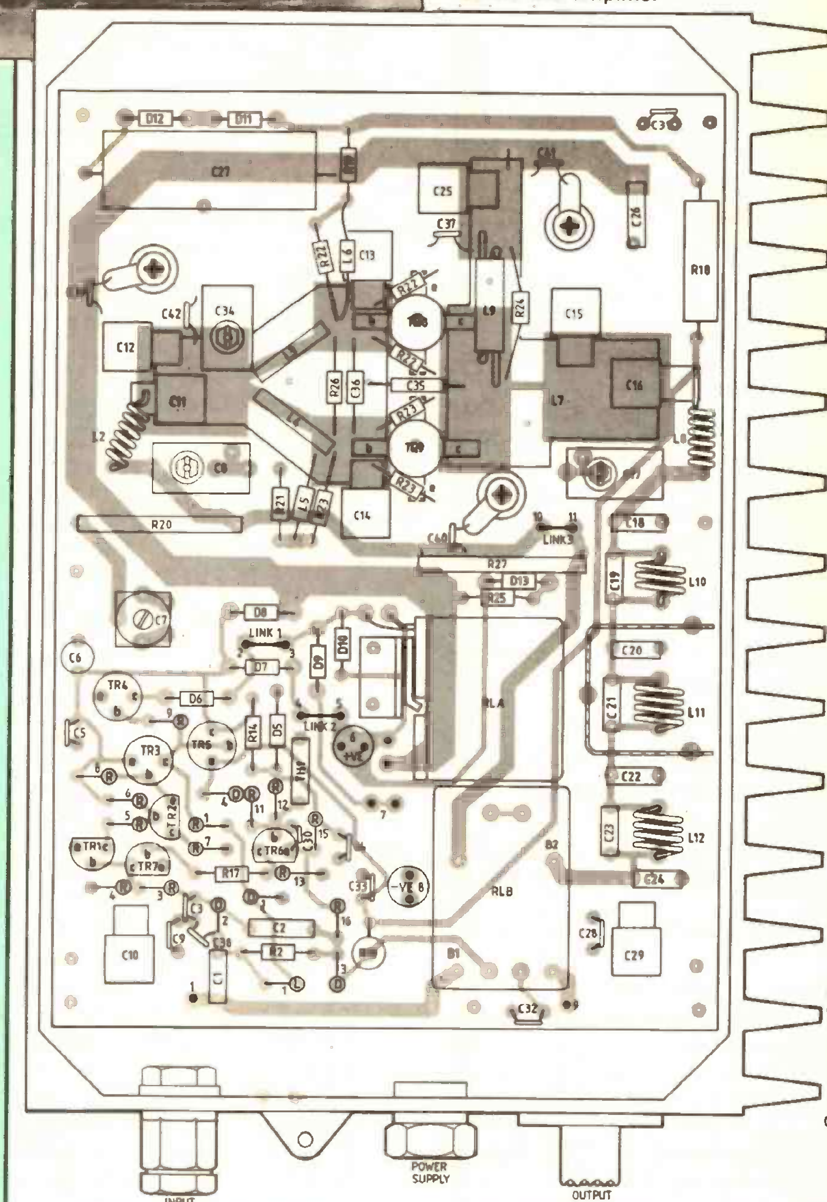
Tuning up

Replace the board and re-connect the input and output wires. Set C7 near mininum capacitance and apply 2 or 3 watts of FM (or CW with the key down) — preferably with the A200 connected to a dummy load via a power indicator. An SWR meter will suffice to show relative output level. Tune C8 and C17 for maximum output power. Then, if you have 5 to 10 watts of input power available from your rig, perform the following adjustment on C7 — set C7 to maximum, transmit 5 to 10 watts and adjust C7 so that the output power of the A200 reduces by 10%. You may now need to slightly re-tweak C8 for the best input match so the use of a second SWR meter (one in the input path, one on the output) is recommended here. This adjustment should prevent overdriving or clipping on the A200.

A further useful test is to use a hairdryer to test the thermal cutout. The sensor, TH1 (thermistor), is a black device with a white spot about 8mm long situated about 8mm to one side of the point where the brown + 13.8 volt power input lead connects to terminals on the board. Go to transmit and heat TH1, at about 80 to 100°C relay RLB should switch off, resulting in relay RLA dropping out and putting the A200 back to receive mode. After the temperature drops by about 5°C the A200 should switch back to normal transmit mode. Finally it is also a good idea to apply more heatsink compound just before replacing the PCB to ensure good heatsink contact.

The obvious use for one of these amps is, of course, in the car but do observe all the boring (but essential) rules such as wiring direct to the battery via a suitable fuse — wiring loom fires can be quite spectacular but rather pricey! Given the usual precautions the A200 should provide many years of cheap and reliable service.

Figure 2 Component placement inside the amplifier



Courtesy of Pye Telecoms