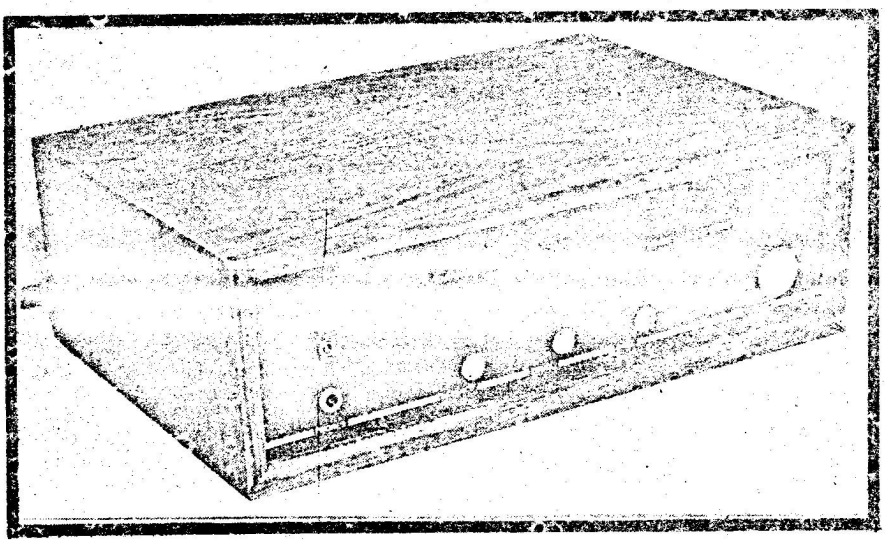
# INTERNATIONAL 422 STEREO AMPLIFIER



PROJECT 422

**This exciting new amplifier produces a full 50W (rms) per channel!**

SINCE publication of our 100 watt guitar amplifier, in February 1973, several thousand have been built and a surprisingly large quantity of these have been for home stereo use. People have used two of these together with a separate preamplifier for stereo, and would you believe it, we know of a few people using four in a quadraphonic system!

This is not as way out as it sounds for many present-day speakers sacrifice efficiency to gain quality. Many high quality speakers need at least 50 watts ('rms') to drive them satisfactorily.

There is an obvious *need* for a high powered amplifier, and in response to many pleas, we have designed an inexpensive amplifier that will deliver a genuine 50 watts rms per channel, both channels driven, into 8 ohms.

Since most modern speakers are 8 ohms impedance, we have not designed the amplifier for 4 ohm operation. Such an amplifier would require a much larger transformer and would be considerably more expensive, so we have decided to

## MEASURED PERFORMANCE OF PROTOTYPE UNIT

**POWER OUTPUT**
Both channels driven 8Ω + 8Ω loads — 50W rms

**FREQUENCY RESPONSE**
20Hz-20kHz — ±0.5dB

**CHANNEL SEPARATION**
At rated output and 1kHz — 45dB

**HUM AND NOISE**
With respect to rated output
Tape, Tuner and Aux. inputs — −78dB
Disc input (re 10mV) — −67dB

**INPUT SENSITIVITIES (for rated output)**
Tape, Tuner and Aux. inputs — 210mV into 47k
Disc at 1kHz — 2.1mV into 47k
Main amplifier — 500mV into 10k

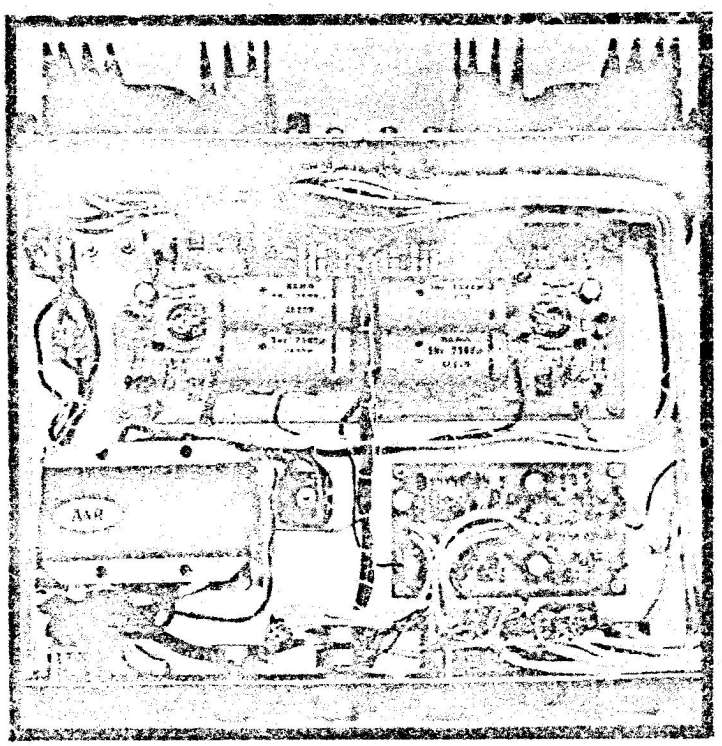
**TOTAL HARMONIC DISTORTION**

| | 100Hz | 1kHz | 6.3kHz |
|---|---|---|---|
| 1W output | 0.14% | 0.11% | 0.12% |
| 5W output | 0.17% | 0.13% | 0.15% |
| 10W output | 0.16% | 0.11% | 0.13% |
| 50W output | 0.27% | 0.38% | 0.60% |

**TONE CONTROLS**
Base — ±13dB at 50Hz
Treble — ±13dB at 10kHz

**DAMPING FACTOR** — >70

*Internal view of the completed amplifier.*



satisfy the many, rather than the few.

As well as being designed to provide high power at low cost, the amplifier has been kept simple from the constructional point of view. It uses the preamplifier from our ETI420 four-channel amplifier with only a few minor changes. Tape-in, tape-out and main amp in/preamp-out facilities have been provided. Tape monitoring may be achieved by pressing, simultaneously, the tape button as well as that for the desired input.

A new main amplifier board is used. This carries the components for both main amplifiers (apart from those mounted on the heatsinks) and the power supply components. All components are mounted on a simple pan-type chassis which slides into the same wooden case as was used for the four channel amplifier.

## CONSTRUCTION

The construction has been kept as simple as possible so that a person with only average electronics experience should have no problems in building the amplifier.

The printed circuit boards carry the majority of the components apart from hardware items such as switches, potentiometers and the transformer etc.

The boards should be assembled with reference to their component overlays making sure that all components are in the correct position and that they are orientated correctly.

It is preferable that pins be used to connect all external wiring to the main amplifier board, as this will considerably facilitate wiring up the board at a later stage.

The components should be assembled onto the heatsinks with the aid of Fig. 7 and Fig. 8. Note that a mica washer should be used on both sides of the heatsink for each of the 2N3055's so that the BD139-140 transistors may also be insulated from the heatsink.

The PN3643 transistor, Q13, should be glued into the heatsink in the position shown in Fig. 7 and the wires which connect to the flying leads of the transistors should also be secured to the heatsink with glue. The new quick-dry epoxies are ideal for this application.

The chassis hardware should be assembled in the following order:—

1. Fit all the phono sockets (tape in, tape out etc), the two-pin DIN sockets for the speaker outlets and the power outlet socket.

2. Fit the rear panel escutcheon using the fuse holders, the main-preamplifier connect toggle switch, the earth terminal and the 3-core flex and grommet, to secure it to the rear panel.

3. The heatsinks can now be fitted by passing the wiring through the rear panel holes (which should be fitted with grommets) and securing them using 12 mm long ¼" screws. The screws will screw directly into the

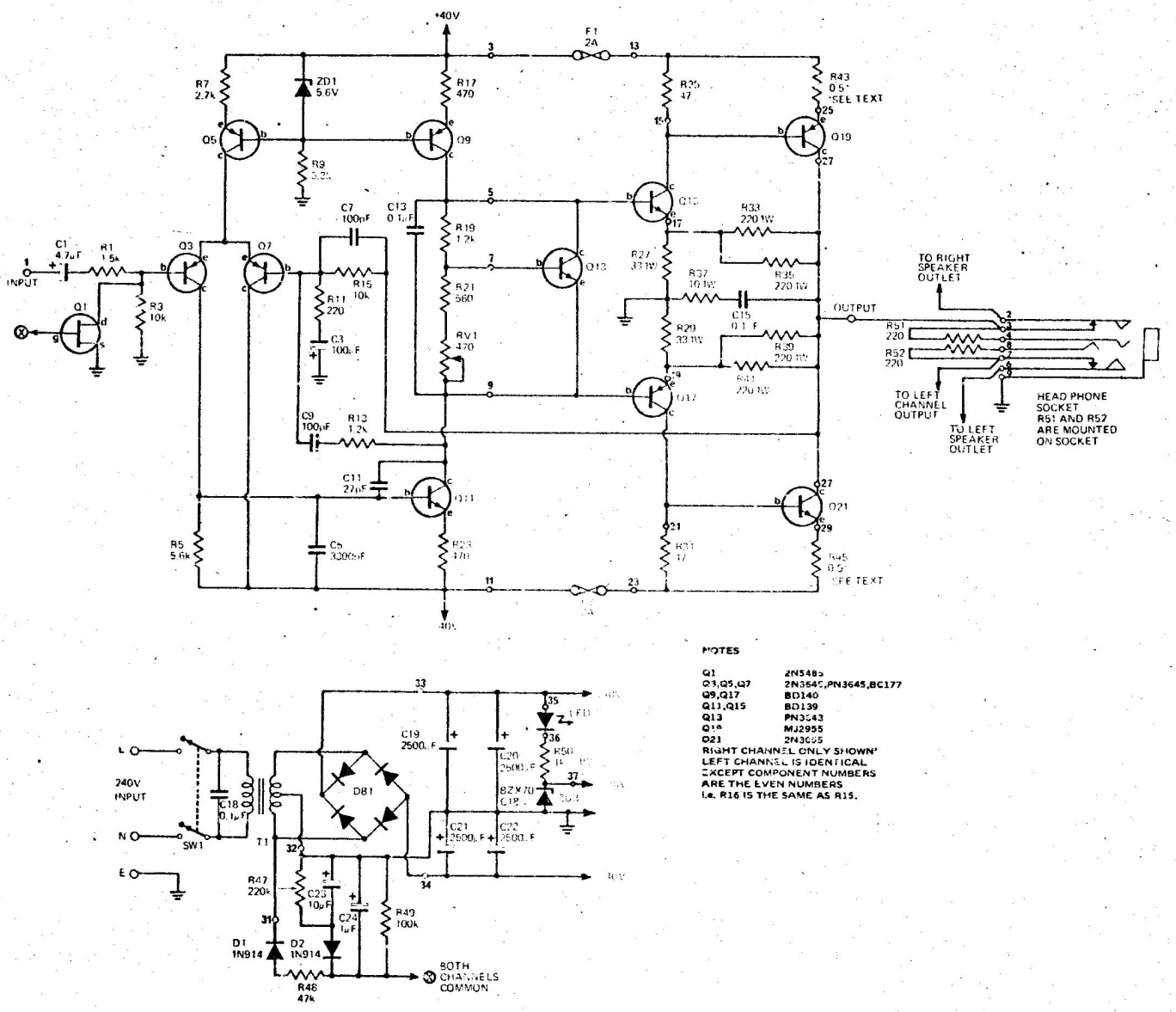



*Fig. 4. Circuit diagram of the main amplifier (one channel only) and the power supply.*

heatsink-fin spacing which is designed for such a mounting technique.

4. Fit a cable clamp to the 3-core power flex and terminate the cable into a two way terminal block and a separate earth screw.

5. The power switch and the selector switch should now be mounted using 12.7 mm spacers.

6. The front panel can now be mounted. It is secured by the potentiometers, LED and the phone socket.

7. Mount the preamplifier board after connecting coax. or hookup wire where applicable. The board should be supported on 6 mm spacers.

8. Mount the power amplifier board, also on 6 mm spacers, the power transformer and the bridge rectifier.

9. The interconnection wiring should now be carried out with the aid of the schematic wiring diagrams. Note that the earth lugs of the phono sockets for right channel PRE-OUT and MAIN-IN should be linked, and so should those for the left channel. There is no link between left and right and all other sockets have independent earths.

10. All exposed 240 volt wiring should be taped up to provide safety against personal contact. The capacitor C18 should be mounted on the power outlet socket and similarly taped up.

## SETTING UP

The only setting up required is the adjustment of bias current in the output stage. For this a milliammeter having a 100 mA range is required.

Rotate trim potentiometer wipers such that they are closest to the front. This adjusts bias current to its lowest value.

Remove both fuses from the right hand channel and the top fuse of the left hand channel. Connect the milliammeter across the left channel fuseholder from which the fuse has been removed.

If a variac is available wind the ac line supply up slowly whilst monitoring the bias current. If a variac is not available the amplifier will have to be switched on, if there is any gross fault the remaining fuse will blow but no other damage should result.

The bias current should be adjusted to about 25 mA. If it is adjustable, but too high, increase the value of R21 to 820 ohms. If it is adjustable but too low, decrease the value of R21 to 330 ohms.

If it is not adjustable *at all* check for errors in the layout or wiring. In a normal amplifier the range of bias

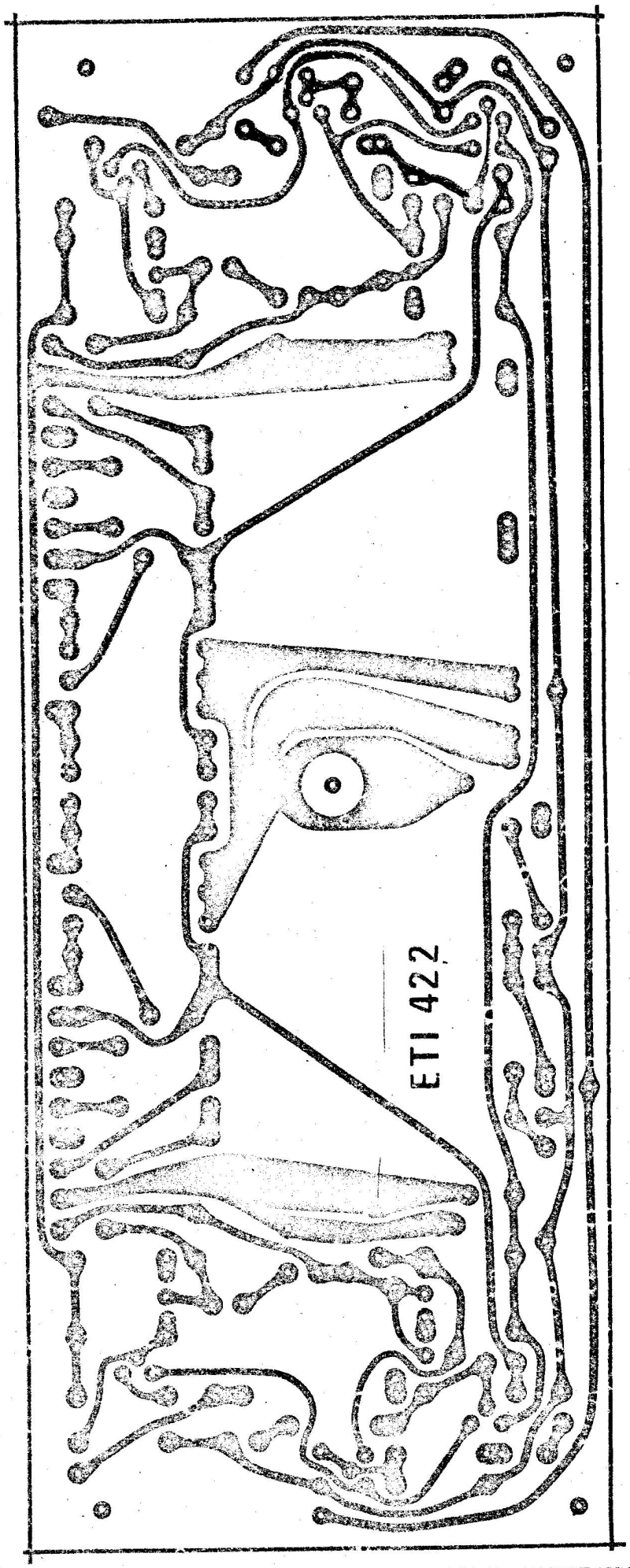



*Fig. 5. Printed circuit board pattern for the main amplifier and power supply (full size).*