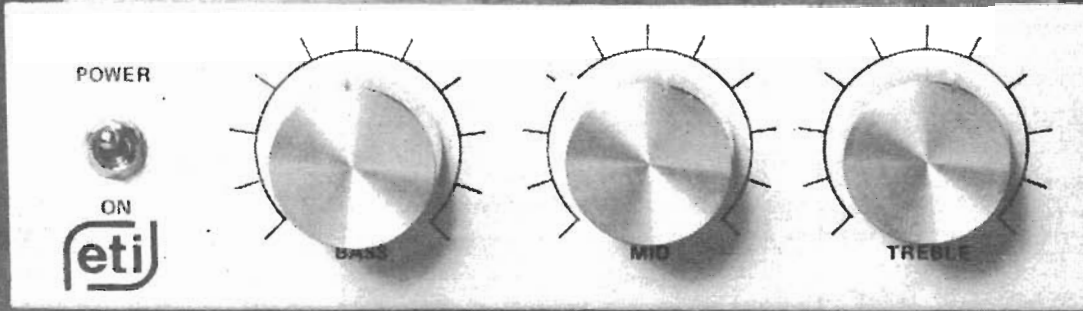


3 CHANNEL TONE CONTROL



WHEN LISTENING to your favourite L.P., if your hi-fi system were perfect, if your listening room did not colour the speaker's output and if your idea of balance coincided with that of the recording engineers — there would be no need for a tone control.

The perfect world alluded to in our first paragraph does not, unfortunately, exist as anyone over 21 (inches or months) will readily testify to. This

HOW IT WORKS

The input signal is fed via SK1 to the first active stage built around IC1. This is configured as a non-inverting amplifier whose gain is set by the ratio of R3 and R1. In this case the gain is set at unity. This initial stage is required to isolate the following stage from any loading effects.

The O/P from IC1 is fed via three frequency shaping networks to IC2. The three networks built around RV1, RV2, RV3 are also included in the feedback path of IC2, another inverting op-amp stage.

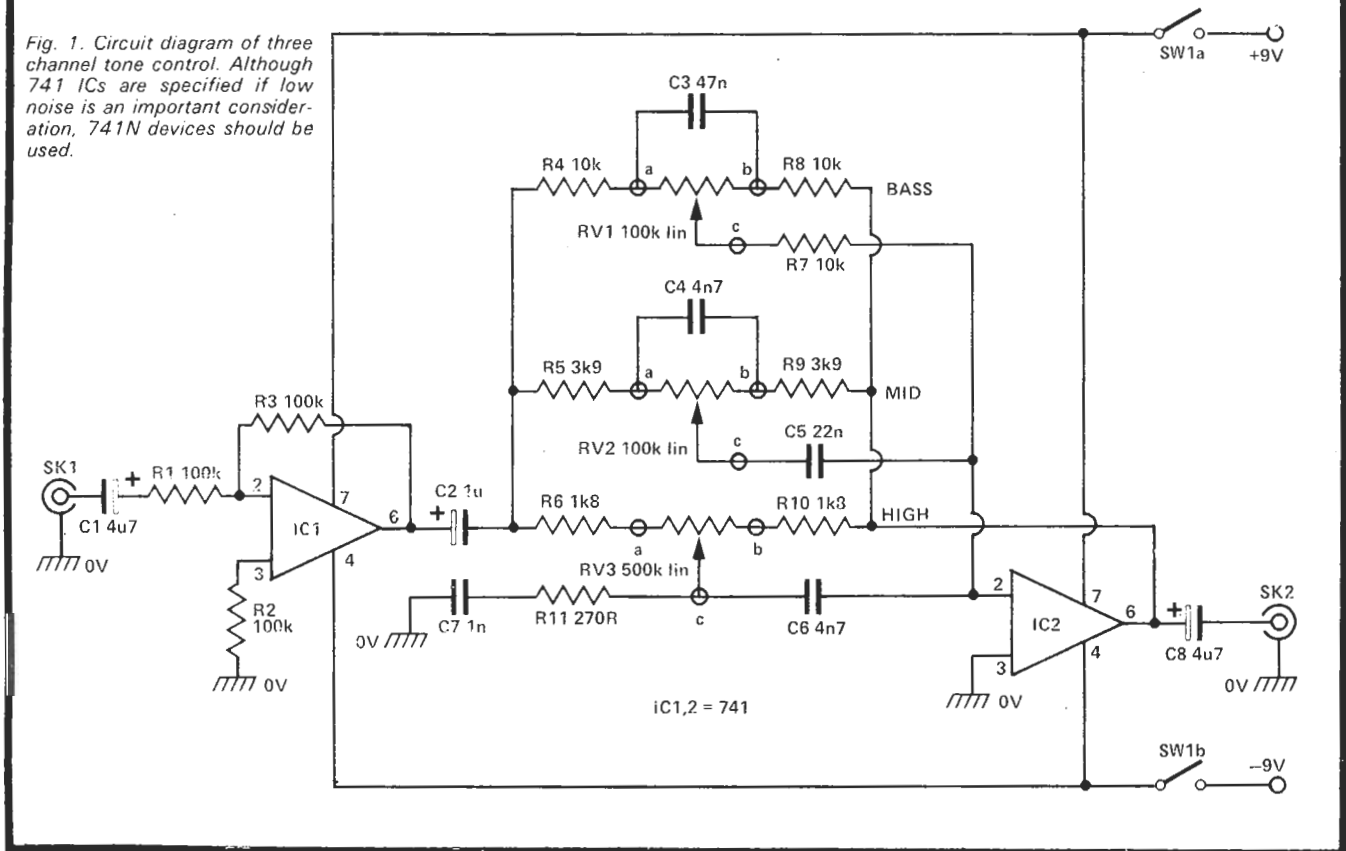
The components associated with the three variable resistors are chosen to give the required frequency control.

means that in most cases some form of tone control is a desirable, if not essential, item in any amplifier.

Tone of Voice

A tone control will alter the relative levels of the different frequencies present in any signal passed through it. In most designs the audio spectrum of frequencies falls into two bands, bass and treble, and will either boost

Fig. 1. Circuit diagram of three channel tone control. Although 741 ICs are specified if low noise is an important consideration, 741N devices should be used.



or cut these with respect to the mid-frequencies. A graphic equaliser, which is after all just a tone control with lots of channels, splits the audio frequencies into ten or more bands and allows each of these to be boosted or cut.

These two examples represent the extremes of tone control designs, the two channel unit not providing enough control while the equaliser represents expensive overkill in a lot of cases.

Voice of Tone

Between these two extremes comes our three channel control. Bass and treble functions are as most tone controls while the mid, or presence, control provides a means of controlling the mid-frequencies.

These frequencies, which are not affected by the controls of two channel units, have a large effect on the 'colour' of the sound. This is because the fundamental frequencies of many instruments, and indeed the human voice, lie in the range of frequencies covered by this mid control.

Assembly Point

Mount the components on the PCB

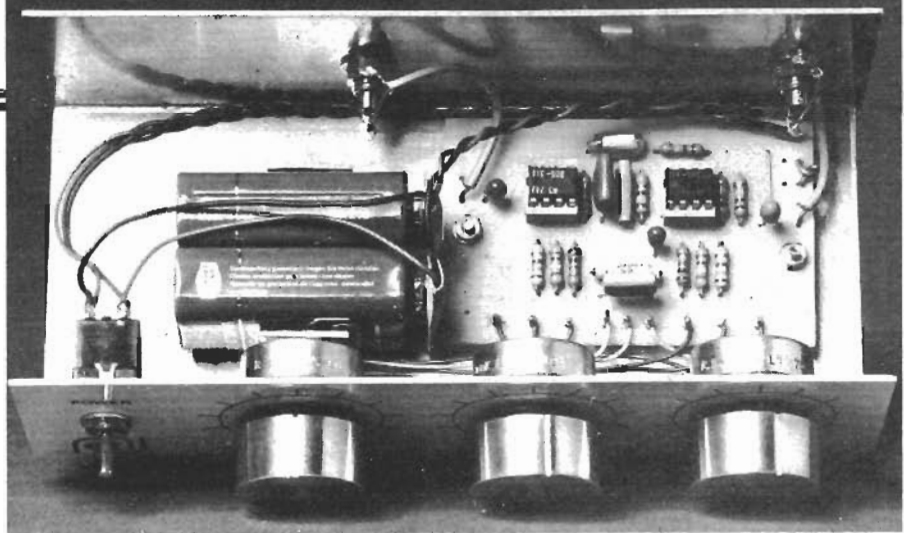


Fig. 2. The prototype was built as a mono version and mounted on an aluminium chassis. If built as part of an amplifier the battery power supply could be replaced with a well smoothed 9-0-9 mains PS.

as per the overlay diagram, paying particular attention of the ICs and electrolytic capacitors which must be correctly orientated.

Mounting of the PCB is largely a matter of personal taste. Our prototype was mounted on a chassis but it may easily be incorporated in an existing piece of equipment.

The power supply in the prototype was provided by two 9V batteries but any well smoothed 9-0-9V supply could be used.

We built our unit as a mono control

and if stereo operation is required two boards will have to be used with either separate, or perhaps, ganged pots.

Toning Up

If the unit is built as our prototype, and not incorporated in an amplifier, it should be connected between the existing preamplifier and the power amplifier.

After that it's a question of switching on and twiddling the knobs until the 'sounds' suit your particular tastes.

BUY LINES

The components used in this project should be available from most component shops and are certainly available from any of the large mail order suppliers.

The integrated circuits specified are standard 741 types. However, should a lower noise version be required 741N types could be used.

RESISTORS all 1/4 5%

| | |
|--------|------|
| R1,2,3 | 100k |
| R4,8 | 10k |
| R5,9 | 3k9 |
| R6,10 | 1k8 |
| R11 | 270R |

CAPACITORS

| | |
|------|---------------------------|
| C1,8 | 4u7 25V electrolytic |
| C2 | 1u 16V electrolytic |
| C3 | 47n polyester |
| C4,6 | 4n7 polyester |
| C5 | 22n polyester |
| C7 | 1n ceramic or polystyrene |

SEMICONDUCTORS

| | |
|-------|-------------|
| IC1,2 | 741 or 741N |
|-------|-------------|

POTENTIOMETERS

| | |
|-------|-----------------|
| RV1,2 | 100k lin rotary |
| RV3 | 500k lin rotary |

SWITCH

| | |
|-----|-----------------------|
| SW1 | DPST miniature toggle |
|-----|-----------------------|

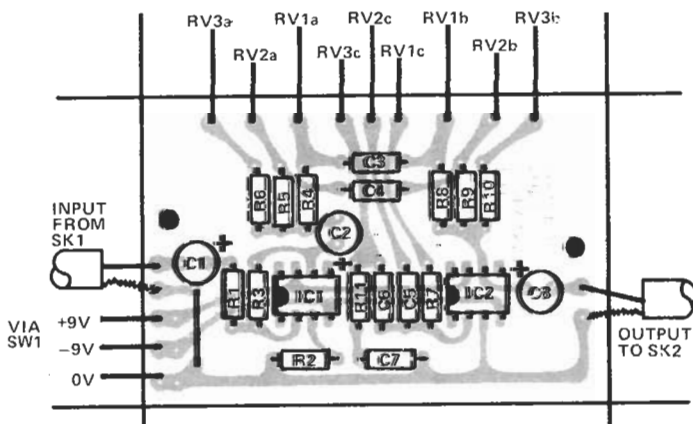
SOCKETS

| | |
|-------|---|
| SK1,2 | Panel mounting phono sockets or DIN sockets |
|-------|---|

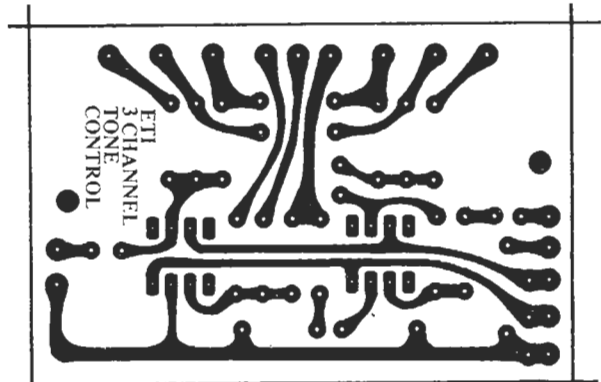
MISCELLANEOUS

2 X PP3 Batteries, clips, knobs, PCB as pattern, nuts bolts etc., screened wire, connecting wire, chassis to suit application.

PARTS LIST



Component overlay for the three-channel tone control unit. Note if stereo version is required the boards may readily be mounted vertically above one another.



PCB foil pattern is shown full size (73mm x 48mm).