EQUIPMENT REVIEWS

Radford SC24 pre-amplifier/control unit. Price: £80. Manufactured by Radford Audio Ltd., Bristol BS3 2HZ.

Students of modern audio will know that the valve-operated amplifiers designed and marketed by Arthur Radford were at the very peak of the quality tree. They will also know that the pre-amplifier first and review the power amplifier separately below.

Now, after more than a month of tests and just plain listening to the Radford SC24 pre-amplifier and SPA50 power amplifier, I can affirm that these are worthy successors of the earlier designs and indeed represent a new standard in amplifier excellence. Apart from the phenomenal performance in pure specification terms, the new system incorporates so many thoughtful features and facilities that I will take the unusual step of concentrating on the pre-amplifier first and review the power amplifier separately below.

The SCA24 pre-amplifier/control unit will obviously appeal to professional users and some people may feel that its exterior styling makes too few concessions to the needs of domestic harmony. The wrap-round metal case is painted a beige colour (or is it mushroom?), with rubber feet, and measures all of 16⅜ by 4½ inches by 8¾ inches deep. There is a black stove enamelled frame to the aluminium front panel and the latter is screen printed in black with all-black controls. In fact, with so many controls to accommodate—there are 12 push-buttons and 6 vertical in-line slide potentiometers—the printed lettering is rather small but easily legible from an operating distance.

The 12 push-keys have a truly professional feel and divide the fascia horizontally, aided by the two-tone panel colouring in eggshell enamel. From left to right, the buttons are for 4 alternative inputs, tape monitor, mono L, mono R (both being depressed if it is desired to reproduce a stereo signal monophonically), treble filters at 4, 7 and 10 kHz, 'quiet' (giving instant reduction by 15 phons, including frequency/amplitude compensation), output off, mains on/off.

The left hand pair of slider controls together perform the function of a normal stereo balance control, being effectively volume controls in the left and right channels respectively. I found this arrangement vastly superior to the usual single rotary knob. With the rear panel pre-set controls properly adjusted (as I shall describe in a moment) the two 'balance' sliders will normally remain at their top (maximum) setting. However, any desired degree of unbalance can be introduced (including silencing one channel completely) with very clear visual indication of the situation. Sensitive control of the mixture between two mono signals, connected to the left and right channels, would also be possible in a public address or discothèque application.

The next three slider controls are for bass, middle and treble. The bass and treble are the usual centre-zero, lift and cut variety though with only some ±8 dB traverse. The middle control gives 6 dB lift at 1.5 kHz and can be used to increase the 'presence' or forwardness of some programme material. Finally there is the overall volume control, a front panel dual socket for stereo headphones (run from an independent amplifier circuit) and a tiny white 'power on' indicator lamp.

Thoughtful design

The rear panel reveals just as many signs of thoughtful design as the fascia just described. First there is a panel of 6 pairs of phono sockets for stereo disc, tuner, auxiliary 1 and 2 and tape inputs, tape output. The disc input is of 2 mV sensitivity with the standard RIAA frequency characteristic to suit magnetic pickup cartridges. Auxiliary 1 has the same sensitivity but, by changing over a link connection, can either be RIAA corrected for a second pickup or 'flat' response with high gain for a microphone etc. Tuner, auxiliary 2 and tape input all have 80 mV sensitivity at 100K ohms impedance. The tape output is rated at 250 mV from a low source resistance and both the tape input and output phono sockets are duplicated on a 5-pin DIN socket, though the tape output level is here 30 mV.

The main output from the SC24 is also via phono sockets and is of such low source impedance that very long connecting leads to the

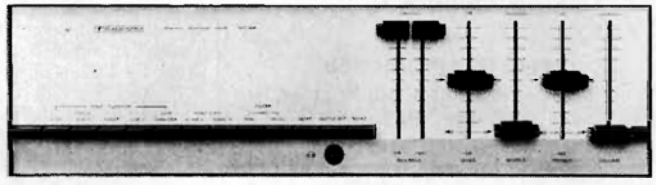

Fig. 1. Front panel view of Radford SC24 pre-amplifier

SPECIFICATION AND TEST RESULTS
RADFORD SC24 PRE-AMPLIFIER

	Maker's Specification	Test result
1. Type	Stereo control unit	—
2. Input sensitivity (mV) Disc (two) Tuner etc. (two)	2 80	2.1 90
3. Output To power amplifier (V) tape recorder (mV)	0–3.9 30 and 250	met 35 and 280
4. Output source impedance (Ohms)	150	—
5. Frequency response (Hz)	—	See Fig. 1
6. Harmonic distortion (at 1 V output)	less than 0.01%	0.01%
7. Signal-to-noise ratio (dB) Disc (ref. 5 mV) Auxiliaries (ref. 80 mV)	70 80	72 84
8. Crosstalk (dB)	—	50
9. Treble control (at 15 kHz)	± 8 dB	See Fig. 1
10. Middle Control (at 1.5 kHz)	+ 6 dB	See Fig. 1
11. Bass control (at 40 Hz)	± 8 dB	See Fig. 1
12. Filter frequencies (kHz) (12 dB per octave)	4, 7 and 10	See Fig. 2
13. Mains input (V)	110, 120, 130, 220, 230, 240	—
14. Dimensions (in.)	16¾ x 8¾ x 4½	—
15. Weight (lb)	17	—

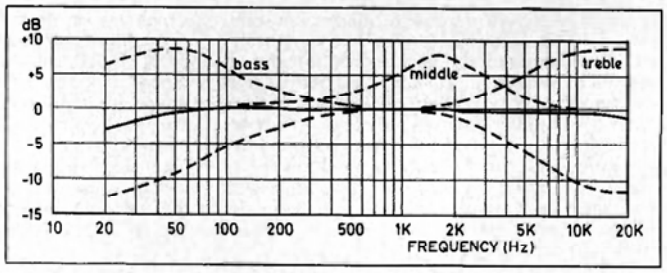

Fig. 1. Radford SC24 frequency response and range of bass, middle and treble controls

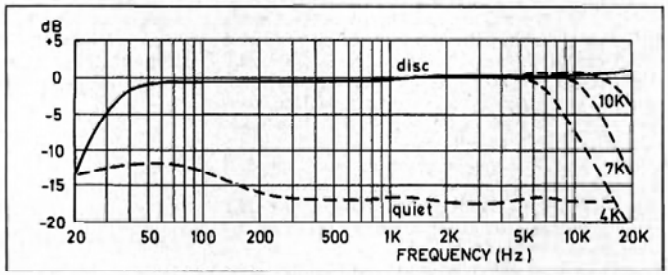

Fig. 2. Disc input RIAA response and effect of filters and 'quiet' control

power amplifier may be used. For example, it is claimed that 160 ft. of conventional screened cable could be used with the Radford SPA50 amplifier for a loss of only 3 dB at 20 kHz. Though the combination of SC24 with SPA50 is obviously part of the designer's plan, the SC24 will in fact operate happily with any power amplifier. Pre-set gain controls, having a thumb-wheel action along a linear track, are fitted in the output circuit and allow the SC24 to match any input sensitivity up to a maximum of 3.9 volts.

The rear panel carries similar pairs of pre-set gain controls for the disc, auxiliary 1 and tape inputs and I consider this a most valuable feature. It allows the overall gain of the pre-amplifier to be set to suit individual pickups and tape units, with the main volume control at around its centre setting for most convenient operation. It also allows one to balance the left and right hand sensitivities of pickups and loudspeakers, which can easily vary a decibel or more either way, with the front panel balance controls both at their maximum setting.

Finally, the rear panel has a special earth terminal, two pairs of 2-pin mains supply outlets for ancillary equipment—one pair switched by the SC24 on/off switch and the other pair not—fuses and an 8-foot captive mains lead. Steps have been taken to ensure reliability and ease of servicing. Thus, 60 volt transistors (50 of them) have been used throughout to provide high overload capability on transients and 1% tolerance components where accuracy is important as in the RIAA equalisation networks. Hard electro-gold plate contacts are used on the plug-in circuit boards and a mother board acts as a receptable base for the active circuit modules to eliminate the variable behaviour introduced by free wiring.

Performance tests

The Radford SC24 was used in conjunction with the SPA50 stereo power amplifier and top quality ancillary equipment. Reproduction of gramophone records, tapes and radio programmes was exemplary. The frequency and dynamic ranges seemed very extended, with bass and treble firm, clear and well balanced, background hiss and hum virtually non-existent and distortion totally absent. One rather unusual feature is that the amplifier takes some 30 seconds to warm up, during which period the sound is very distorted. (I have since been told that this does not apply to units now reaching the shops.)

I felt that a good word to describe the unit's performance was 'revealing'. There were indeed musical revelations on much of the programme material due to the clarity of the reproduction. At the same time as subtle differences in the musical timbre and texture were being revealed, of course, the Radford unit was able to expose any shortcomings in the quality or balance on individual broadcasts or recordings. But this is an inevitable feature of the best reproducers and I personally welcome it. Being able to enjoy the full richness of the audio treasures of, say, the Elgar quintet played by John Ogdon and the Allegri Quartet (on ASD2501) or some of the BBC's live relays from London auditoria amply compensates for the odd sub-standard offering.

As it is, the SC24 is well designed to compensate for errors of balance, tape hiss, radio aberrations and the like. The bass and treble controls are not very wide ranging, but are easy to adjust sensitively. The middle boost control is essentially a means of enlivening dim or backward sounding material and I had very little use for it, but the treble cut filters at 4, 7 and 10 kHz seemed to be effective on whistles or edginess without in any way affecting the remainder of the spectrum. The 'quiet' button too is ideal for background listening or, perhaps, answering the telephone while listening for a particular radio announcement.

Measurements were made on the SC24 as a unit in its own right, reserving the SPA50 for separate tests. On the assumption that the production quality control measurements are made with the Radford test oscillator and distortion measuring set, I chose these excellent instruments for my own tests.

Fig. 1 shows the frequency response at the tuner input and could almost have been drawn with a ruler except for a tiny roll-off at the extreme bass. In fact, I continued measuring beyond the 20 kHz upper limit of the graph and the response was still within 1 dB up to 40 kHz. The effect of the bass, middle and treble controls is also shown in Fig. 1 and is exactly in line with the specification. Fig. 2 illustrates the deviation from the standard RIAA characteristic I measured on the disc input. This graph too is quite remarkably flat but can you notice an important difference from the tuner input graph of Fig. 1? Yes, the low frequency response has been made to dip fairly sharply from about 40 Hz downwards. This, as you will realise, is the ideal curve for eliminating turntable motor rumble. The designers have thoughtfully built this into the disc input circuit only and set its turnover frequency so low as to interfere in no important degree with the wanted signal. As Fig. 2 also shows, the treble filters affect only the extreme top frequencies while the 'quiet' control dims the volume slightly less in the bass than elsewhere to compensate for the ear's reduced sensitivity at low frequencies for quiet sound levels.

The remaining items in the maker's specification, which are to a very high standard, were checked through and were substantially met or bettered in each case. Input sensitivity for the full 3.9 V output was respectively 2.1 and 105 mV at the low and high level inputs. Total harmonic distortion for 1 V output was 0.01% and did not exceed this at lower levels. Signal-to-noise ratio was 84 dB on the high level inputs and 72 dB on disc, while it was possible to increase the signal level into the disc channel to almost 200mV before running into serious distortion—an important feature considering the high level peaks recorded on some modern gramophone records.

I can best sum up these findings by saying that the Radford SC24 control unit/pre-amplifier meets its own stringent specification and therefore, considering also the flexible and well-planned control facilities, can be regarded as one of the leading units now available.

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