TECHNICAL REPORT

By G. HOWARD-SORRELL

Acoustical Q.U.A.D. Amplifier

Type - - -	*Main Amplifier Chassis* ($9\frac{1}{2} \times 6\frac{3}{4} \times 6\frac{1}{2}$). *Pre-Amplifier and Filter Unit. Panel Mounting with Cover* ($10\frac{1}{2} \times 3\frac{1}{2} \times 3\frac{1}{2}$).
Valves Used -	*Pre-Amp. ECC*35. *Main Amp.* 2 × *EF*37. 2 × *KT*66. 5u4*G*.
Mains Input -	200/250*v. A.C.*
Frequency Response	*Within* 0.5 *db.*, 20-20,000 *c/s.* (*Tone controls out*).
Power Output -	12 *watts.*
Distortion - -	0.2% *Total at* 1,000 *c/s.*
Input - -	*At Input A*, 10 *mv.* (0.01*v*). *At Input B*, 50 *mv.* (0.05*v*.).
Hum Level -	70 *dbs.* (*controls out*).
Damping Factor -	15 *app.*

Price—£33.

Acoustical Manufacturing Co., Ltd., Huntingdon, England.

Those enthusiasts who have doubted the advisability of buying high fidelity equipment, because of opinions expressed, that it is not suitable for ordinary day to day listening, may now feel encouraged to re-equip with the Q.U.A.D. amplifier which, to a large extent, enables one to "have one's cake and eat it." In other words the comprehensive tone and filter circuits allow of modification to narrow range response for poor sound sources or when the equipment is used to provide "background" music only.

The main amplifier chassis bears a strong family resemblance to the QA.12 and incorporates all the original features, of which the most noteworthy is the splitting of the output loads between anodes and cathodes of the KT66 output tetrodes, this gives several advantages including reduced output impedance and improved liniarity. The two EF37 driver valves are connected in a paraphase circuit with self-balancing cathode and screen networks. Two output tappings are provided on the multi-sectional output transformer for use with speakers of either 15 or 7 ohms impedance, which will deal satisfactorily with the majority of high grade speakers.

It is, of course, the pre-amplifier which contains the novel features which make this amplifier so interesting. Mounted on a grey crystalline finished die-cast panel, the unit is enclosed by a pressed metal cover which also serves to clamp the panel firmly to a motor board or other mounting surface. Five cast control knobs are semi-sunk into the panel, a large volume control with graduated scale, two balance controls which give bass and treble rise and fall, a four-position switch which has the following positions : (1) Balance controls out of circuit ; (2) Balance controls only in circuit ; (3) Balance controls and filter in 8kc. cutoff ; (4) As (3) but 6kc. cutoff. The final control varies the slope of the filter circuits from 10 db. per octave to 100 db. per octave.

Starting with the two input sockets: A, is a straight uncompensated inlet for pick-ups which do not require bass compensation, or can be used for radio inputs ; B, has the appropriate compensation at 6db/octave for constant velocity pick-ups. Both these inlets feed direct to the grid of the first stage (one section of the double triode, ECC35) which is coupled to the second stage via the volume control. Negative voltage feedback is applied between the stages, from anode to grid of V2.

Between the anode of V2 and the four feet long screened cable, linking pre-amplifier and main chassis, are tone control and filter networks with their associated switches.

It is perhaps not inappropriate to mention here that mechanically and electrically this unit is first-class and the workmanship and finish is amongst the best the writer has examined for some long time. Although of equal standard the main amplifier lacks 'eye-appeal,' but I understand a cover is available for those who do not house it in a cabinet.

Turning to performance, the makers have gone to considerable trouble to produce the most comprehensive booklet, which contains full working instructions and suggestions for getting the optimum results. Also included are drilling templates, full circuit diagrams with all values and full test data for maintenance engineers.

In carrying out our listening tests we had the advantage of using the "Corner Ribbon" speaker which has a wide enough frequency response to cause embarrassment with most sound sources, showing up only too plainly the distortion on most recordings, and the whistles, etc. common to radio.

As may have been noticed above, the tone controls are referred to by the makers as balance controls and are intended to be pre-set to suit room acoustics, speaker and pick-up characteristics, etc., rather than to deal with various types of programme input.

The bass and treble controls both give approximately 15 dbs. rise and fall at the ends of their respective ranges, the bass control varies in both slope and turnover point, so it is possible to use small degrees of bass boost without introducing middle range lift. The intended method of use is as follows: Taking a variety of programme material, the two controls are adjusted to give the best balance as proved by switching the controls in and out and thereafter are left set unless the listening conditions alter. During this portion of the set up, no notice is taken of high frequency distortions, surface noise or whistles, as these are dealt with by the filter arrangements, and not by the treble control as with more normal controls.

During our tests we tried as wide a variety of records as possible: early electric recordings, a few acoustic discs, American jazz pressings, and, of course, the latest wide range productions. Although with the Corner horn only a few selected discs could be used without some degree of filtering, we were able to play all the records picked with some degree of pleasure by cutting out the top end distortions with aid of the filters. With radio inputs the filters eliminate heterodyne whistles fairly simply and also deal effectively with 'monkey chatter' without cutting off too much of the signal, as would happen with normal top cut controls.

Apart from the filter advantages, the amplifier's performance is in keeping with the technical figures obtained during our tests, and when the tone controls are correctly adjusted gives the most satisfactory reproduction from good records or the better radio programmes, whilst with lower grade sound sources the use of filters allows of at least tolerable reproduction.

As will be noticed above, the B input is arranged for the correct bass boost needed for 78 r.p.m. discs, and when L.P. reproduction is required, a small switched correction unit is available, which is fed into the A input providing a simple method of switching from a 78 r.p.m. pick-up to a L.P. pick-up. Various correction units are available for use with any combination of two pick-ups and the correct model will be supplied if the pick-ups are quoted. The price of the units complete with screened lead and plug is 45s. each.

Taken all round it is difficult to find points of criticism with the Q.U.A.D. Amplifier, and it must be considered as one of the most interesting amplifiers we have tested to date, offering as it does almost complete quality control for all normal programme sources, at a price which must be counted as modest.

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From Messrs. M. Watts & Co., 8 Baker Street, Weybridge, we have received a list of components suitable for "The Gramophone Amplifier," which covers all the items needed for the construction. The prices quoted seem reasonable.

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E.M.I. Intermodulation Test Record

Although of little interest to the average amateur who lacks the necessary test equipment to use it, this disc is of considerable value to the professional engineer concerned with the manufacture and testing of pick-ups, amplifiers, etc.

Briefly it consists of recordings of two simultaneous pure tones of widely different frequencies and amplitudes. If distortion is present in the reproducing equipment combination tones are produced, their amplitude being a measure of the distortion.

For those interested the details are as follows:

SIDE 2. 78 r.p.m. Standard Groove Shape. 72 Grooves/inch.

The outer groove consists of a 60 c/s tone at a level of + 8·6 db. c., with 2,000 c/s tone at a level of 10·3 db. c. superimposed additively. When the 2,000 c/s tone is reduced in the pick-up bass equaliser by the correct amount relative to 60 c/s. (i.e.—13·7 db.) its effective level is —1·4 db. c. or 12 db. below the 60 c/s tone.

SIDE 1.

Is similar but the two tones are 400 c/s at + 22·5 db. c. with approx. 4,000 c/s at + 10·5 db. c. superimposed additively. The level difference is 12·5 db. and an exact integral frequency ratio is avoided to aid visual observation on a C.R.O.

Again the succeeding bands are reduced by 2 db. steps.

NOTE.—The term db.c. refers to the level in decibels above a zero of 1 cm/sec. R.M.S. lateral velocity as measured by the Buchmann-Meyer method.