

for Audio Perfection



The famous British

QUAD

AMPLIFIER

Precision Built to Exacting Standards



- Remote Corrective Control of Program Signal
- Room Acoustics Compensation
- Filter Slope Control of Program Variation
- 4 Push Button Controls Select 8 Equalizing Combinations

- 2 Separate Push Button Controlled Inputs
- Comes Complete, Ready For Immediate Use
- Response: 20 to 20,000 cps within 0.3 db
15 to 30,000 cps within 2 db
- Pre-amplifier provides for all types of pick-ups

**ATTRACTIVELY STYLED CONTROL UNIT INCORPORATING MANY TECHNICAL INNOVATIONS
SEPARATELY AVAILABLE.**

Distributed By:

Exclusive U. S. Agents
BEAM INSTRUMENTS CORP.

The QUAD Low Distortion Wide Range Amplifier

For the high fidelity enthusiast the QUAD amplifier with push button control and choice of eight pre-set equalizing circuits is a must! This amplifier has been designed to achieve the ultimate in authenticity of reproduction. By new control techniques embodied in the amplifier, the *quality* of the program signal is made a factor in determining the setting of the treble and bass controls, so that they fulfill their true function of *correction* rather than compromise.

Based on the original design of the Acoustical Manufacturing Company, Limited, of England, this latest QUAD amplifier system has potted transformers, five input circuits, a quality control unit consisting of a die-cast aluminum panel housing all the controls, and a heavy steel chassis with all steel parts bondcrized, rust proofed and painted.

The QUAD sound reproducing system is divided into two parts, the *main amplifier* and the *quality control unit*. The latter is coupled to the main chassis with a four foot cable for convenient installation. On the die-cast aluminum panel are five control knobs and six push buttons. The five control knobs have the following functions: master volume control and on-off switch; treble and bass controls (these are used to compensate for *room acoustics* and once set, rarely require further change); control switch to provide a choice of filters according to program conditions; filter slope control to compensate for individual program variations. Two push buttons provide a choice of radio inputs. By combining the remaining four buttons, eight equalizing circuits can be selected. Three phonograph inputs accept signals from low output velocity pick-ups, high output velocity pick-ups and crystal pick-ups.

THE MAIN AMPLIFIER

The main amplifier is mounted on a separate chassis and can also be supplied with a case to make it into a separate portable unit.

Circuit Description

The heart of the circuit is the output stage and transformer. The output transformer is wound in thirteen sections which are very tightly coupled and connected so that portions of the load are applied to cathode, screen, and anode circuits. In this circuit the KT66 tubes appear as triodes but have less than half the non-linearity of the conventional push-pull triode circuit. Increased efficiency, and decreased unbalance in tubes depreciated, are other valuable design features.

A self-balancing push-pull signal is developed in the EF37 push-pull stage which is RC coupled to the output stage. Because of the very low intermodulation, more than 12 db feedback is not required; although as much as 30 db could be applied if desired. However, in all feedback circuits, frequencies well beyond the operating range are not attenuated by feedback and may appear at a level greatly in excess of their original value at the input. Thus the QUAD is superior to other amplifiers using large amounts of feedback. These overtone frequencies are significant in normal musical reproduction, but their presence is undesirable at high levels.

Complete freedom from intermodulation and modulation distortion on very low beats produced by choral singing, strong unison playing, etc., is eliminated by the special QUAD feedback circuits.

Technical Data

Under input conditions of the maximum source impedance of 20,000 ohms, a minimum input of five millivolts produces an output of 10 watts into a resistive load. Under these conditions the following dynamic specifications apply:

Within 0.3 db., 20 to 20,000 cps.

Within 2 db., 15 to 30,000 cps.

In the range 20 to 20,000 cps. the volume control setting does not affect response more than 1 db. The filter frequencies of 6 and 8 kc., respectively, are accurate within plus or minus 500 cps., and slope is 10 db to 100 db per octave. A signal of 50 mv. into the 50,000 ohm input produces 12 watts output with 6 db per octave additional rise below 300 cps, plus or minus 2 db, with 15 db maximum rise.

Distortion

Total distortion max. 0.25% <-52db.)

Total higher order distortion max. 0.05% <-(36 db.)

Total harmonic max. 0.2% (-54 db.)

Second harmonic max. 0.1% (-60 db.)

The Quality Control Unit

(Incorporating Pro-amplifier)

AVAILABLE SEPARATELY OR WITH
COMPLETE AMPLIFIER SYSTEM.

The low pass filter slope can be continually varied from 10 db per octave to 100 db per octave. Since distortion in any program normally increases with frequency this development makes it possible to obtain optimum reproduction conditions from any program. This slope control covers all requirements due to tracing distortion from disc, tape or film. The ancillary control circuits are ideal for whistle suppression, discontinuity and the other severe distortions often encountered.

Since the QUAD amplifier bass and treble controls do not have to contend with harmonic and similar program distortions, they have been designed to fulfill their ideal purpose of compensating for room characteristics. Small amounts of boost at very low frequencies do not result in increased low and middle frequency output. The treble control comes into operation at 700 cps., but once in operation the slope does not increase with the frequency. Switch positions on the filter control enable the filters to be cut in and out. and compared with the bass and treble compensation without upsetting the settings of the latter controls. Two stages of amplification with fixed negative feedback are incorporated in the control unit, and the volume control is in the feedback circuit of the second stage.

The quality control unit is simply fitted to cabinet panels of any thickness from 1/8" to 1/2". The cut-out required is a 10" by 3" rectangle with 1/4" radius corners.

Operating Information

The QUAD amplifier operates on 110 volts alternating current and consumes 80 watts.

An additional power supply of 300 volts at 25 milliamps, and 6.3 volts at 2 amps-center tapped, is available from the amplifier chassis.

Output impedances of 7 ohms and 15 ohms are available. Tubes used are the easily obtainable EC35, EF37, KT66 and 5U4G. These, together with all component parts are stocked in the U.S.A.

Net weights: main amplifier, 14 lbs.; quality control unit, 5 lbs.

The QUAD high fidelity sound reproduction system includes the main amplifier, quality control unit and coupling cable, and comes complete and ready for immediate use.



QUAD

**FOR THE CLOSEST
APPROACH TO THE
ORIGINAL SOUND**



EQUIPMENT

This leaflet describes in general terms the Quad range of units, designed to provide the highest standards of reproduction of recorded or broadcast music attainable with modern techniques. You are invited to write for booklets describing each unit in greater detail.

QUAD 22

Pre-amplifier control unit providing full facilities for both mono and stereo operation.

QUAD II

Power amplifier, 15 watts output.

QUAD AM II

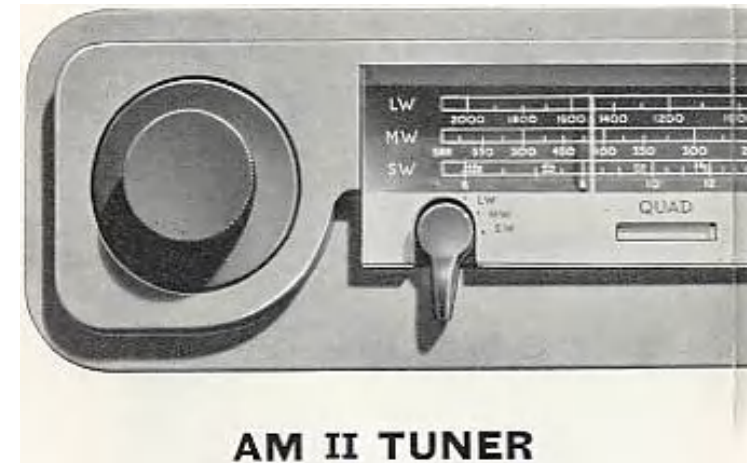
Radio tuner for long, medium and short wavebands.

QUAD FM

Radio tuner for VHF FM reception.

QUAD LOUDSPEAKER

Full range electrostatic loudspeaker.



AM II TUNER

TUNING RANGE: AM n/Europan
Long wave: 2070-800 metres
Medium wave: 588-185 metres
Short wave: 5-8-18-5 me,'s
AM n/Oversoas
Medium wave: 510-1620 kc/s
Short wave: 1: 2-2-6-6 mc/s
Short wave: 2: 5-8-18-5 mc/s

OUTPUT LEVEL 100mV (Nominal for 30% modulation)

OUTPUT RESISTANCE: 15.000 ohms

FILTER REJECTION AM II/European: 9 kc/s
FREQUENCY: AM II/Overseas: 10 kc/s

POWER REQUIREMENT: HT 35 mA at 330V
REQUIREMENT: LT 1-2 A at 6-3V

POWER AND SIGNAL
CABLE LENGTHS: M' (1m.)

VALVE COMPLEMENT: EF 89, ECH 81, EBF 89, EM 34

QUAD TUNERS

Quad tuners are designed primarily for use with Quad amplifiers and are similar in size, appearance, and method of mounting to the Quad 22 control unit.

They draw their power supplies from the outlets on the control unit and are controlled by the Quad 22 pushbuttons. The L.T. supply, however, is not switched and the tuners are therefore always ready for use whenever the amplifier is on. Connecting leads are fitted ready to plug into the control unit

Both tuners are designed to provide the highest quality of reproduction inherent in their respective programme transmissions and must, of course, be chosen to suit the broadcasts to be received. Local reception conditions will usually determine the most suitable type of aerial and the local dealer specialising in this field will be in the best position to advise on this point.

The AM n Tuner is made in two models covering different wavebands to suit requirements in different parts of the world and both AM and FM tuners are suitable for use under all climatic conditions.

The tuning scale is of Perspex machine engraved and silk screened, filled white and red and finished gold on a matt brown background. Accurate and positive tuning Indicators are fitted to both models.

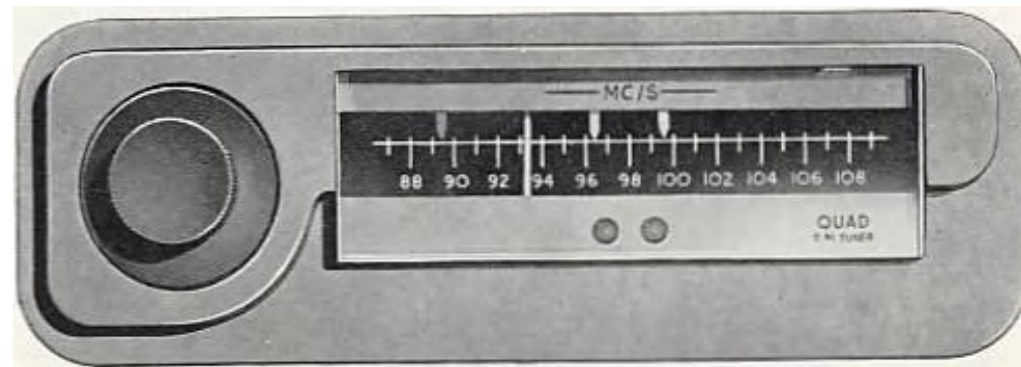
Dimensions: 10i"x3j' <6*. Weight: 6 lb. (2.7 Kg.).

QUAD TUNER. Hi-Fi News, October. 1960; Gramophone, October. 1960; R*:: i a* unC Recorder, November. WO. qua I) KM TUNER. Wireless World, September. 1935; Record Review. February. 1960; Gramophone. September. 1960



FM TUNER

TUNING RANGE	17-5-108 M/B
SENSITIVITY	3:1V for 20 dB quieting.
OUTPUT	160 mV at 100.000 ohm. impedance (to be terminated by 100.000 ohm. across amplifier input).
CONSUMPTION	6-3v MUJ 338v 27 mA.
VALVES	68H6: 12AT7, ECC81; 6BJ5; 6BHS: 6AU5: 6AL5EBS1; 12AX7 ECC83: neons Hrvac CCH: lamp 6 Sv 0 3A.





22 CONTROL UNIT

The Quad 22 control unit provides full facilities for either mono or stereo operation. Used with one power amplifier the Quad 22 provides full mono facilities; used with two power amplifiers it provides for both mono and stereo; both channels may also be used for mono when required, by pressing the "2 MON" pushbuttons.

Three easily distinguished types of control are used for the three main functions of selecting programme, adjusting volume and modifying signal as to tone, range, etc. The Control unit is compact, easily mounted (or may be used free standing if preferred) and combines simplicity and rigidity with a "clean" finish.

The six pushbuttons perform 19 different functions, all clearly marked. Two provide for selection of stereo or mono, or two channel mono, and also switch the second amplifier on or off as required. The other four select the programme source in either stereo or mono from radio, microphone, disc (with 6 different equalisation characteristics) or tape.

Sockets are provided for permanent connection of all radio tuners, pickups, tape recorders, etc., used with the unit

Plug-in adaptor units enable any pickup to be matched accurately and a chart is provided showing the pushbutton combination required to provide correct equalisation for different makes of record, old and new. Tape recordings (mono or stereo) may be made without affecting normal listening to the programme being recorded, and replayed either via the tape recorder pre-amplifier or direct from the head with compensation for any characteristic. A comprehensive booklet supplied with the unit gives full instructions for installation and operation as well as parts lists, photographs for component identification, circuit diagrams, mounting templates, etc.

Further comments:—
 Granop. cr. ' Apr: MM; id. -r_l IUccrdinr. April IM>: HI K! Sr>>>. April USD: Hlch Fwrllyi. o totor IV>>: D). !!*n.
 Ucceai&er W60.



SPECIFICATION

FREQUENCY RESPONSE

Bass and treble controls: ~ 1.5dB of curves shown.
 Filter frequencies: 5 Kc/s, 7 Kc/s, 10 Kc/s.
 Filter slope: See curves.

CANCEL POSITION

Radio and Tape inputs: 20-20,000 c/s
 Microphone: 20-20,000 c/s 2dB

Gramophone: Maintained
 over 20-20,000 c/s within -1cB
 of the following characteristics:



3180;AS	318-iS	75;-tS
3180^S	318V.S	100;*S
3180p.S	450 iS	50;iS
	45C^S	25uS

INPUT SENSITIVITY

Radio and Tape: 70mVrms. Load impedance 100,000 ohms. Microphone: 1.5mVrms. Load impedance 100,000 ohms. Pickup: Depending upon adaptor unit. Basic sensitivity prior to compensation 400,«Vrms.

DISTORTION

(1.4 Vrms output): All controls level: Any input: 0.02 Least favourable arrangement of controls: less than 0.1 ...

NOISE

Total hum and noise: Better than -70dB. Noise: -80dB or where applicable, the equivalent noise of the pickup load impedance at the input.

OUTPUT

Control unit to power amplifier: 1.4 Vrms. Tape outputs: Peak signal appro*. 0.25 Vrms. Maximum loading: 500,000 ohms and 200 pF.

INTERCHANNEL

Cross talk: Better than 40dB 20-20,000 c/s. Gain stability: With any volume setting and tone controls level: Less than 1dB between channels. With any volume setting and tone controls varied: Less than 2dB between channels. Balance control: Provides up to 9dB unbalance either way.

POWER SUPPLY

The unit takes its power from the power amplifier as follows: 330 V 4mA plus current taken by tuner units; 6.3 V 1.1 A plus current taken by tuner units.

Maximum power available from tuner sockets: 330 V 35 mA each tuner. Rad 1 (Yellow) and

Rad 2: 6.3 V 3 A total. Rad 1 (Blue): 6.3 V 3 A. The heater supply is C.T. to chassis.

VALVES

2 EF86 (Z.729 or 6267). 2x ECC83 (12AX7).

DIMENSIONS

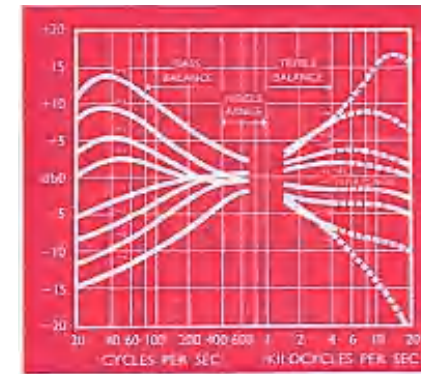
10'x3'x6'.

WEIGHT

6f lbs. (3.1 Kg.).

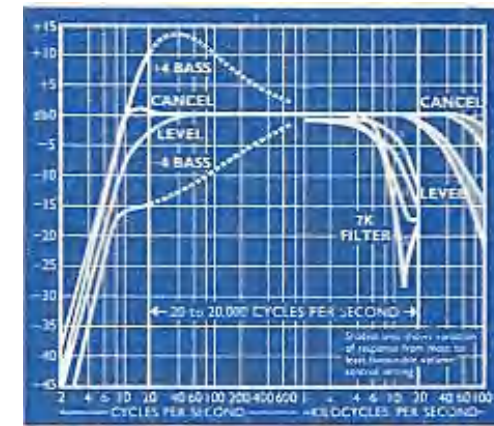
MECHANICAL

Front panel: Die cast, stove finished siiver fawn. Knobs: Matt brown. Chassis: Steel, Cadmium plated. Cover: Steel, stoved steel grey. The complete unit is suitable for use in all climatic conditions.



These Curves show the slopes of response provided by the bass and treble controls and the manner in which the filter may be adjusted to provide the widest possible frequency range consistent with minimum distortion in each programme.

The filter curves show the performance in the 7K position. In the 10K or 5K position these curves are displaced one half octave up or down respectively. The cancel position provides a useful reference standard for comparison purposes.



QUAD

II POWER AMPLIFIER

The QUAD II power amplifier contains no controls and may therefore be mounted inside the cabinet, leaving only the control unit panel (and that of the radio tuner if fitted) visible on the outside. Stability, and hence performance, are entirely independent of signal or load conditions and the amplifier is therefore suitable for use with any loud-speaker arrangement.

The performance specification is fully maintained with random replacements from normal valve stocks without the need for matching or alignment of any kind, and the output stage uses the now traditional QUAD cathode coupled arrangement combining low distortion with an efficiency which is reflected in the compact size of the equipment.

WEIGHT: 18i lbs. (8.3 Kg.). DIMENSIONS: 13'x4** 6f.

MECHANICAL: All windings are impregnated and housed in compound filled casings. All metalwork fully rust-proof processed and stoved steel grey. Metalwork, rust-proofing, finishing, transformer winding, tropicalisation. assembly and tests are all carried out under the constant supervision of our approved inspection section. The amplifier is suitable for use under all climatic conditions.

POWER OUPUT 15 watts throughout the range 20-20,0!» c/s

INPUT Sensitivity: 1-4 Vrms for 15 watts output

FREQUENCY Within 0*2 dB 20-20,000 c/s

RESPONSE Within 0*5 dB 10-50,000 c/s

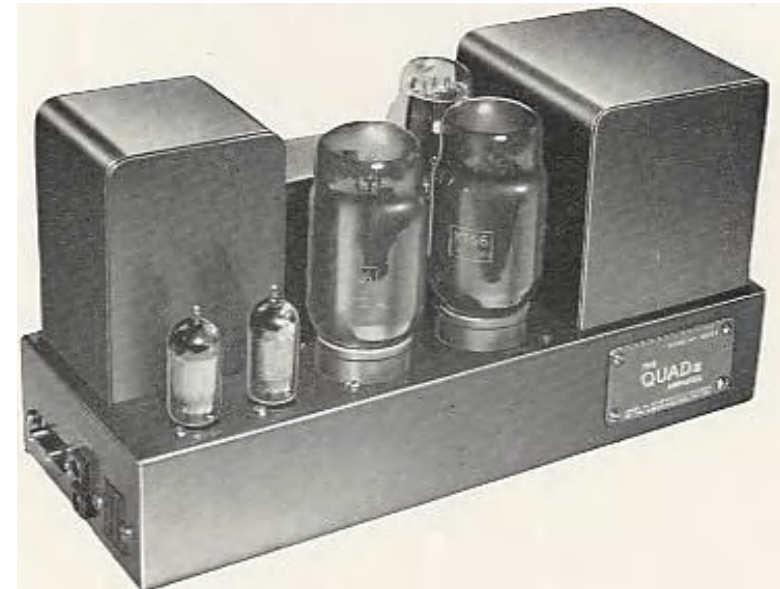
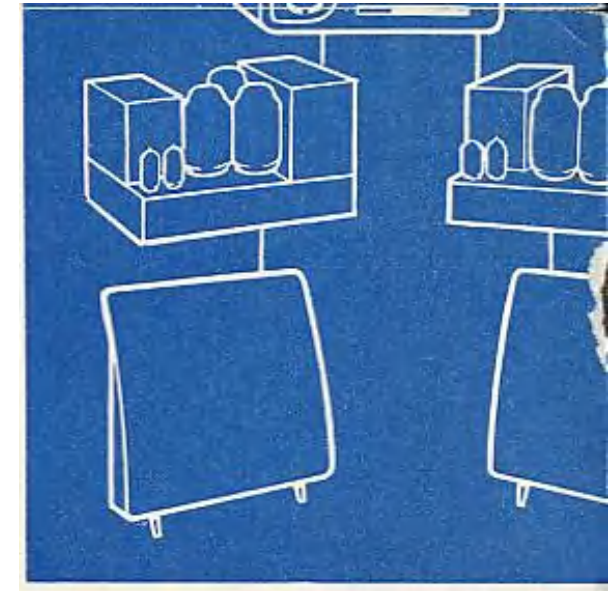
DISTORTION Total third and higher order: less than 0 1' .

(measured at at 7C0 c s. Higher order alone: less than 0 03*/
12 watts output) at 700 c s

BACKGROUND 80 dB referred to 16 watts

OUTPUT IMPEDANCE Effective output resistance: 1 for 15 output

POWER SUPPLIES Input: 200-250vAC single phase (or 95-125vAC)
40-80 c s 90 watts consumption (excluding control
unit, tuners, etc.)
Valves: 2 x EF.8S (2.729 or 6267). 2 x KT.&S (5883 or
6L6G matched). 1 x GZ.32 (54KU or 5V4G'





QUAD

ELECTROSTATIC LOUDSPEAKER



The Quad Electrostatic Loudspeaker is the world's first wide-range electrostatic loudspeaker.

Utilising closely coupled moving elements some two hundred times lighter than diaphragms of moving coil loudspeakers, the air is enabled to follow the electrical impulses with far greater precision than was previously possible.

The loudspeaker is extremely analytical and much of the recent improvement in gramophone records can be directly attributed to its use for studio monitoring and quality control. It is designed for use in rooms of up to 5,000 cubic feet.

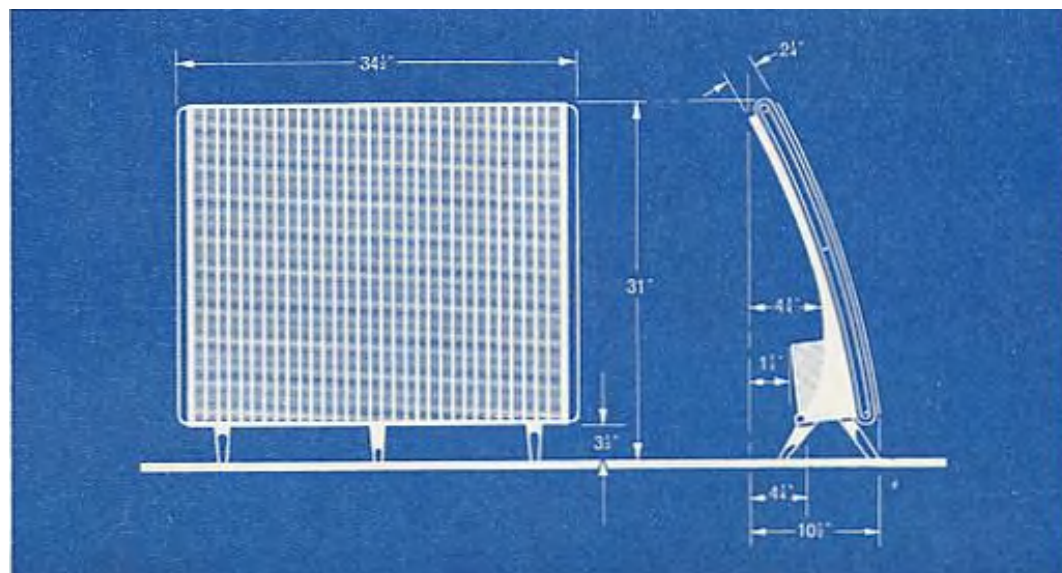
For the listener "it represents, by a wide margin, the closest approach to truly natural reproduction of sound in the home that we have yet heard". (American High Fidelity magazine H.H. Lab. report November 1960.)

The speaker is completely enclosed within expanded metal grilles with polished wood end frames and feet, and is suitable for use under normal domestic living conditions throughout the world.

It is essential that this loudspeaker is used only with a Quad amplifier or with amplifiers meeting specific requirements laid down in our detailed booklet.

For official records: "The Quad Electrostatic Loudspeaker" - Record News, April, 1956; Hi-Fi, June, 1956; Radio and Television, November, 1956; Hi-Fi News, November, 1956; Saturday Review, November, 1956; Revue de la Sonnerie, January, 1957; Record Review, July, 1957; High Fidelity, July, 1957; The Musician, October, 1957; Evolution of the Loudspeaker, December, 1957; Hi-Fi Fidelity, November, 1957; The Musician, December, 1957.

MAXIMUM OUTPUT	6 on axis in free space 93 dB referred to 0.0002 dynes, cm ² in frequency range 20 c/s-10Kc/s 100 dB referred to 0.0002 dynes, cm ² in range 70 c/s-7 Kc/s
BANDWIDTH	45 c/s-18 Kc/s. Rate of attenuation asymptotic to 18 dB/8ve
DISPERSION	Approximately 70 Horizontal. 15 Vertical
IMPEOANCE	30-15 ohm in range 40 c/s-8 Kc/s falling above 8 Kc/s
AC VOLTAGE RANGE	100-123. 200-250 volts 50-60 c/s
FRONT GRILLE	Expanded aluminium, anodised bronze
WEIGHT	Net <0 lbs. (18 Kg.)



— QUAD FOR THE CLOSEST APPROACH TO THE ORIGINAL SOUND —

THE ACOUSTICAL MANUFACTURING COMPANY LTD
HUNTINGDON, HUNTS
Telephone: Huntingdon 2561 2

INSTRUCTION BOOK

**THE QUAD
ELECTROSTATIC
LOUDSPEAKER**





THE ACOUSTICAL MANUFACTURING CO., LTD.
HUNTINGDON HUNTS. ENGLAND
TELEPHONE: 2561/2 TELEGRAMS: ACOUSTICAL, HUNTINGDON

QUAD ELECTROSTATIC LOUDSPEAKER

This is fundamentally different from other loudspeakers and it is essential that these instructions be followed if proper performance is to be obtained.

Attention is drawn to the heavy type on page 10. This point in particular must receive attention before any attempt is made to use the loudspeaker.

ASSEMBLY

The Loudspeaker pack contains

The Loudspeaker

3 1/8"

12 screws

2 signal plugs

1 mains plug

1 Instruction booklet

The legs are removed to avoid damage in transit, etc., and should be re-assembled before the loudspeaker is put into use. The three legs are not interchangeable. The one with the different off-set angle is the rear leg and when in position it should point towards the rear. The remaining two legs are slightly off-set right and left respectively. They should be mounted so that they

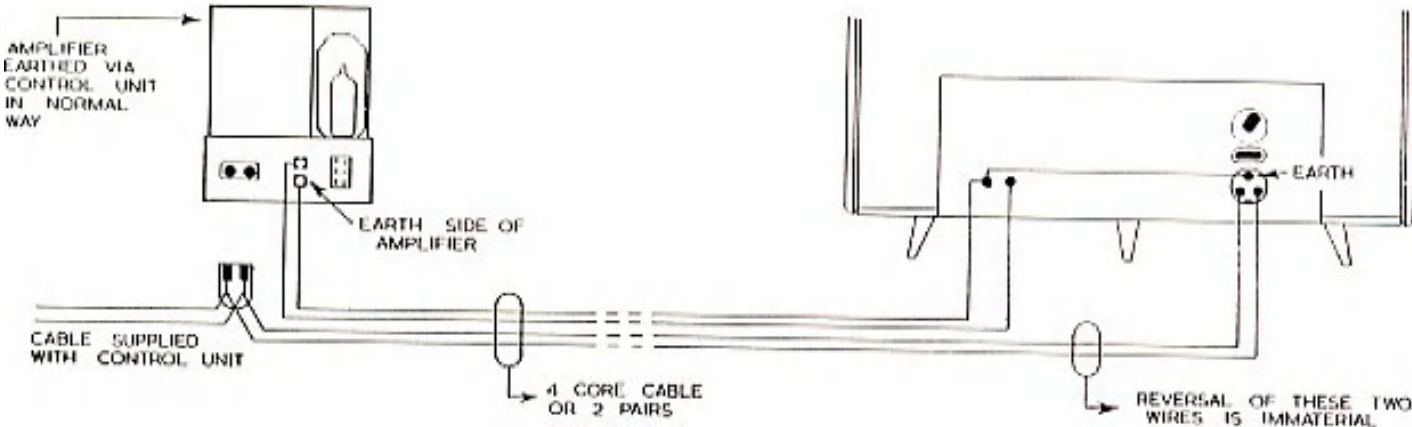
point forward and slightly outward. Screws are provided for fixing and the operation does not involve dismantling any part of the loudspeaker. As the expanded metal front grille marks rather easily, it is recommended that care be exercised when laying the speaker down on its face.

CONNECTING

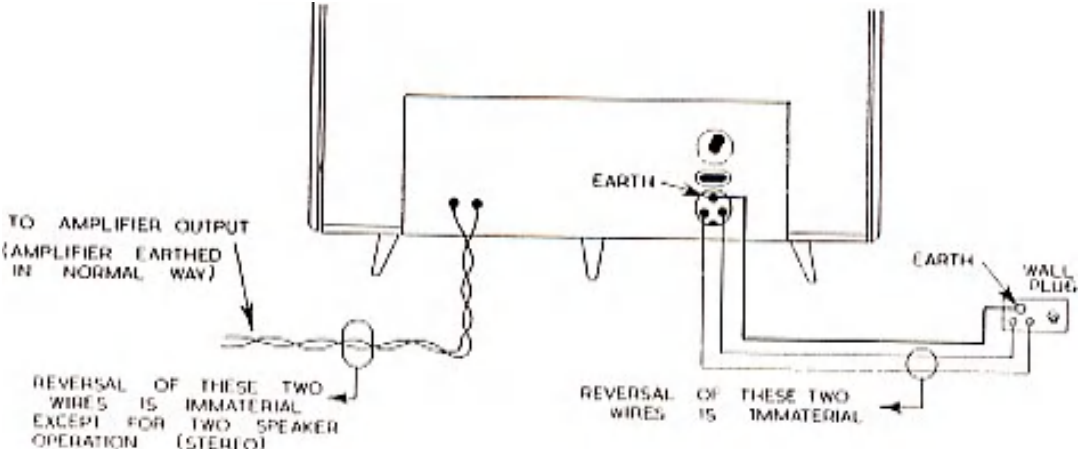
It is a good plan to connect temporary long leads to the speaker so that it may be moved round the listening room to find the optimum position for listening (see page 5).

Having set the voltage adjustment tapping to the appropriate voltage the AO mains and earth leads can be connected to the three pin socket provided. The

RECOMMENDED CONNECTIONS FOR AUTOMATIC SWITCHING FROM AMPLIFIER



ALTERNATIVE CONNECTIONS



three connections are marked inside the cable end connector L, N and E, corresponding to live, neutral and earth respectively. It will probably be found most convenient to connect a pair of wires to L and N and to connect their other end to the two pin cable-end mains socket leading into the power amplifier. In this way the loudspeaker power supply will be switched on and off by the amplifier volume control switch.

The F. connection should be taken to any convenient earth point. As the amplifier should already be earthed, it may be convenient to connect the E terminal to the " earthy side¹¹ of the signal input to the loudspeaker (since this is already earthed in the amplifier).

As with any mains operated apparatus, the services of a competent electrician should be sought if there is any doubt.

The signal output from the amplifier is connected to the sockets provided on the back of the loudspeaker. The phasing (which way round) is immaterial except for instances where more than one loudspeaker is used in the same room — stereophonic reproduction for example.

File signal and the mains supply may be carried on a multiple four or five core cable and in most cases this will be the most convenient method

File thickness of the wire carrying the signal can be of the calibre of ordinary lighting (lex for lengths up to III) or IfO ft. For longer runs correspondingly thicker cable should be used.

SWITCHING ON

The indicator lamp above the mains plug should glow upon switching on, and the loudspeaker will be reasonably well charged within about half a minute. It can thus be used immediately although the frequency response and maximum power may not be strictly correct in the first minute.

ROOM POSITION

With any type of loudspeaker the room will affect the performance quite considerably. This effect will be less with the QUAD Electrostatic than with most other types of speaker but care taken initially in finding the most suitable position in the room is always worthwhile.

As a general guide, radiation of the sound waves from both front and rear of the speaker should be restricted as little as possible, while corners and positions close to and parallel with walls should be avoided. A corner position is often necessary for other types of

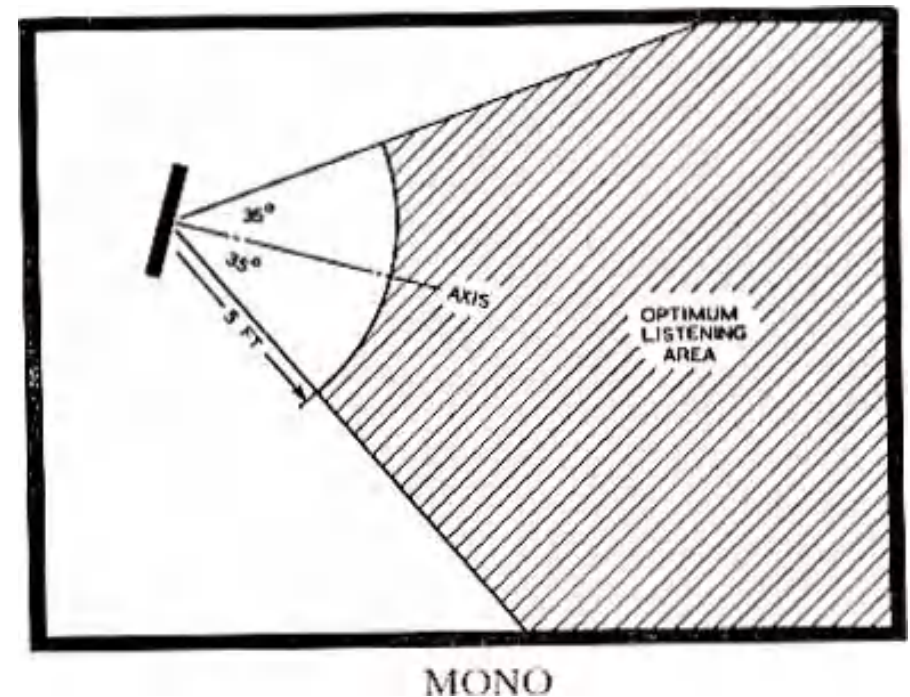
loudspeakers because it accentuates the low frequencies. In such a position for the QUAD will not reduce the bass seriously and cause ~ deterioration at middle frequencies due to standing waves.

If the loudspeaker has to be close to a wall, however, it should be stood at an angle so that reflections from the wall are not returned trapped. For example one end of the speaker could almost touch the wall provided the other end were say two feet away from it.

The best position may now be found experimentally and should be that, which gives the best perspective,

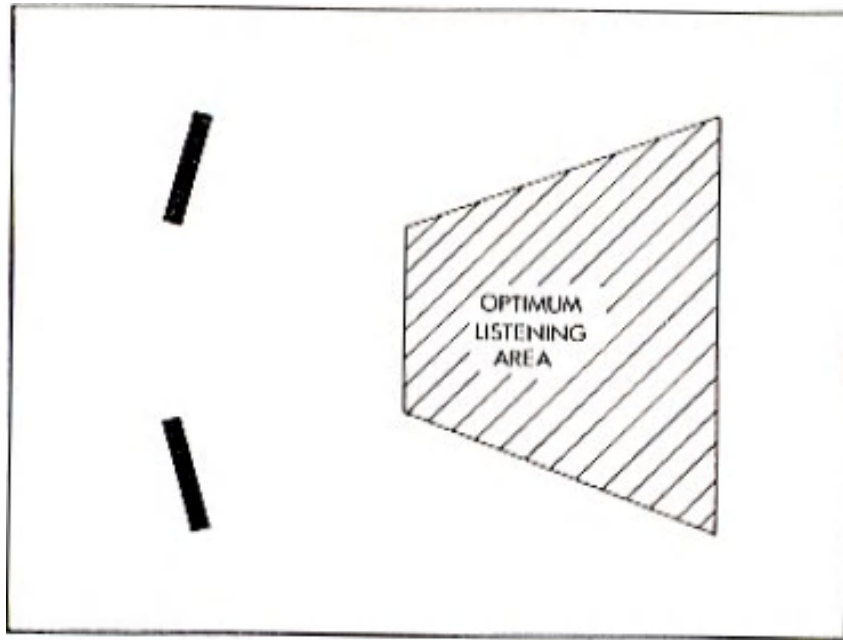
The objective on a concert programme is that the loudspeaker should appear as an open window beyond which lies the Concert Hall. The "closeness" of the orchestra is dependent upon the acoustics and microphone placing at the transmitting end. With modern studio practice the window should appear to open into a position about halfway down an idealised Concert Hall (front row dress circle). Of course, in these tests for optimum perspective, the volume level must be adjusted with care so that the intensity is commensurate with the perspective as broadcast or recorded (see page ?) •

It is practically impossible to predict which positions in a room are likely to lie best and two symmetrical positions in an apparently symmetrical room do not necessarily give similar results. Possible positions should



take into account that for mono the listeners should lie seated within 11" of the loudspeaker axis and not nearer

in 5 feet as illustrated. The ideal stereo arrangement is also shown, and the time spent in trying the loudspeaker(s) in all possible positions is usually very well worth while.



STICK CO

THE LOUDSPEAKER AND THE CONTROL UNIT

At first thought it would appear that the purpose of a volume control is solely to enable the listener to have his music loud or soft according to his whim. Whilst it, of course, fills this requirement, it has a further purpose that of adjusting the intensity of sound so that it is correctly related to the perspective as recorded or broadcast.

If a voice is picked up close to a microphone in a very absorbent studio, then on reproduction that voice will take up a position at the centre of, and in the plane of the loudspeaker. For natural sound, therefore, the loudspeaker should radiate similar power to that of the original voice. If on the other hand the voice is picked up some way from the microphone in a more live studio, then the voice on reproduction will take up a position through the loudspeaker and a considerable distance behind it. It is clear that the power required for the loudspeaker for natural sound is now very much less than in the first case. The *position* or *perspective* of the reproduced sound is fixed at the studio end and there is little (that can be done at the listening end to alter it, It

follows dull the volume setting for natural sound is to a large extent fixed at the studio end.

Studio monitoring is usually carried out at a reasonable level and the whole aim is to produce listening as from a favourable seat in the Concert Hall. Adjusting the volume control to a level to give this correct acoustic perspective will produce the most natural reproduction. The level is usually such that it is quite possible to speak to a person sitting next to the listener without raising the voice or turning down the sound level as indeed this is possible in the Concert Hall.

Raising the level to "bring the orchestra into the room" or turning it down to a low background will both distort the perspective, although this may have to be tolerated on certain occasions. It should be pointed out that no amount of tone control or loudness control can affect the perspective, although these effects can be used to produce a new sound which although quite unlike the original is sometimes found acceptable.

Popular music is often recorded or transmitted with close microphone technique and would therefore tend to require reproduction at higher levels. It is in fact generally monitored at a higher level. There are a

number of other factors which have a strong bearing on optimum listening levels but it is outside the scope of this handbook to deal with these adequately. It will be realised that the volume control setting should receive careful attention and it can be emphasised that much listening is spoilt due to insufficient care on this point.

Radio on V.H.F.

With the QUAD Electrostatic Loudspeaker used with B.B.C. broadcasts, it is recommended that no tone controls or filters be used, and they may be conveniently switched out of circuit by using the CANCEL position on the Control Unit. The greatest care is taken during transmission and only rarely can this quality be improved at the listening end.

It can be argued that some broadcasts are inferior in quality and that these can be improved by judicious use of tone control. Whilst this is true, such broadcasts are usually confined to those where the subject matter and not the quality is important.

Gramophone Records

The reproduction of gramophone records is a matter of compromise if the best performance is to be obtained.

There are many makes of records and almost without exception a programme is fed through various variable tone controls during the making of the record in order to obtain the effect which the manufacturer considers desirable. It is therefore understandable that there will be considerable variation in tonal balance among the recordings offered to the public. (This variation in balance is not to be confused with the recording characteristic, which is fully corrected in QUAD control units when the Disc pushbutton is pressed).

Musical balance should be adjusted if required by means of the treble and bass controls, referring to OANOET. to ensure that any adjustments are truly an improvement. Few modern recordings will require more than plus or minus 2 on bass or treble controls and the best recordings should require no adjustment at all.

Virtually all recordings, even the latest and best, will require some degree of filtering for the best possible quality. This is no reflection on the recordings themselves but is an inherent feature of the disc system of reproduction.

The higher the frequency the less easily can the stylus trace the groove, hence tracing distortions (and noise) increase. As the frequency increases, therefore, the ratio of musical content to unwanted sound reduces. Minimum distortion is obtained when the filter slope corresponds to the slope of the distortion rise. This will vary with the type of musical content and the recording level.

With the best recording the filter should be set to I OK and with the slope initially at level, the slope control should be rotated until the reproduction is clean yet without sacrificing any other aspect of quality. The optimum will usually be found somewhere between 10 K, and 15 K. With many good modern recordings the same procedure should be applied with the filter set to 7 K.

Older recordings and 78 r.p.m. recordings will usually require the filter at 5 K with more severe settings of the filter slope.

The filter controls are very carefully designed and their correct use is important in obtaining a satisfactory musical sound.

STEREO REPRODUCTION

Tim loudspeaker is symmetrically designed so that all frequencies have the same line or point source. This arrangement is the ideal one for stereo reproduction.

Proper stereo should produce a complete picture of the orchestra and concert hall acoustics *evenly* spaced over the area between the loudspeakers. Failure to achieve this objective can be due to unsatisfactory recording technique or unfortunate room reflections. The loudspeakers should be moved to find the best positions. In difficult rooms optimum result may sometimes be obtained by directing the speakers inwards.

MAINTENANCE

The QUAD loudspeaker requires no routine maintenance. Should a fault occur, the dealer supplying the loudspeaker or other competent engineer should be consulted.

The pilot lamp at the rear indicates that the AC mains is reaching the loudspeaker.

AMPLIFIER REQUIREMENTS

THIS LOUDSPEAKER IS DESIGNED FOR OPERATION WITH STANDARD QUAD II OR QUAD 303 POWER AMPLIFIERS. AND IT IS ESSENTIAL FOR BOTH PROPER PERFORMANCE AND RELIABILITY THAT IT IS USED ONLY WITH THESE AMPLIFIERS OR ONE KNOWN TO BE SUITABLE.

Other amplifiers if they are properly regulated (not more than 31! peak volts with any load) are unlikely to cause damage to the loudspeaker, although they may not necessarily provide the correct performance because of the very strict stability requirements,

To many uses the amplifier manufacturer will indicate the suitability of its product but we regret that we cannot accept responsibility for damage caused by the use of unsuitable amplifiers.

SPECIFICATION

	<i ft. on axis in free space 93 <11l referred to *0002 dynes/cm ² in frequency range 50 c/l.-10 Kc/s.
MAXIMUM OUTPUT	HM) dH referred to -0002 dynes/cm ² in range 70 c/s.-7 Kc/s. Total integrated radiation equivalent to 95 plums in enclosures up to 5,000 cubic feet with average reverberation.
BANDWIDTH	■13 c/s.-10 Kc/s. Rate of attenuation outside band • asymptotic to 1B dB/Bve.
DISPERSION	Approximately 70° Horizontal 15° Vertical.
IMPEDANCE	30-15 ohm in range 40 c/s.-H Kc/s . falling above 0 Kc/s.
AC POWER CONSUMPTION	Negligible.
AC VOL.TACF. KANC.F	100-120, 200-250 volts 50-60 c/s.

Guarantee

This instrument is guaranteed against any defect in material or workmanship for a period of twelve calendar months from the date of purchase.

Within this period we undertake to supply replacements free of charge for any parts which may prove on examination to be defective provided that such defectiveness is not the result of misuse (including use with unsuitable ancillary equipment), accident or negligence, and further that the instrument was purchased at the proper retail price prevailing in the country of purchase.

Any set requiring service under this guarantee should be taken to the supplier through whom it was purchased, or, in case of difficulty, it should be carefully packed and consigned, carriage paid to the main distributor for the country of purchase quoting the date and place of purchase. It must not be sent to any other agent or distributor except by special arrangement.

This guarantee is valid only when these conditions are complied with and does not cover labour or carriage costs involved in any repair under the guarantee.

Loud and Proud

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