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## **The A60 Amplifier**



## **Owner's Handbook**

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# Introduction

The A60 integrated stereo amplifier has been designed to provide high quality sound reproduction and to blend unobtrusively with domestic surroundings.

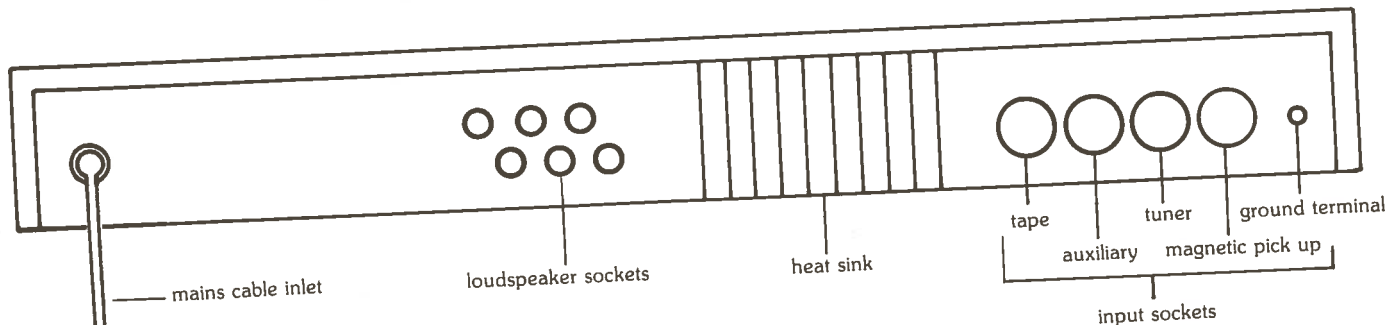
The amplifier has four switchable inputs accepting signals from a turntable (fitted with a magnetic cartridge), a tuner and both cassette and reel-to-reel tape recorders. It provides outputs for a pair of loudspeakers and for headphones, and low level signals suitable for recording on to cassette and open-reel tape. Although designed for simplicity of operation the A60 has comprehensive tone control facilities which enable good results to be obtained with a wide variety of programme material.

Please study this manual carefully to ensure that you get the best results from your amplifier. Remember your dealer is there to help you - he has been specially selected for the high quality of his after-sales service. If you have any unresolvable problems do not hesitate to contact us directly.



# Installing and using your A60

## Back panel connections



### Mains supply

The amplifier is normally set up for use with a nominal 240 volt 50/60 Hz supply. It can be modified for a nominal 120 volt supply by your dealer or by the manufacturer.

The mains lead should be terminated with a three pin (earthed) plug fitted with a five amp fuse. A 630mA anti-surge mains fuse (1A in 120 volt models) is fitted internally. It is recommended that the supply to the A60 be disconnected when the amplifier is not in use.

**UNDER NO CIRCUMSTANCES SHOULD THE AMPLIFIER COVER BE REMOVED  
UNLESS THE SUPPLY IS DISCONNECTED AT THE WALL SOCKET**

Do not put excessive strain on the mains cable fixing either at the amplifier or at the plug.

### Loudspeakers

The outputs are suitable for driving loudspeakers of 8 ohms nominal impedance or higher. "4-8 ohm" loudspeakers, when marked as such, may also be used. "4 ohm" loudspeakers may be used if care is taken not to operate at very high levels.

The loudspeaker terminals will accept either wires or 4mm plugs. The upper set of three terminals is for the left hand speaker, and the lower set for the right hand speaker. One side of your speaker (normally the - side) should be connected to the black terminal; the other (the + side) may be connected either to the red (direct) or to the white (switched) terminal. When the "direct" output is used loudspeakers and headphones may be used together; when the "switched" output is used, insertion of a jack plug into the headphones socket will automatically mute the loudspeakers.

The A60 is unconditionally stable and suitable for use with all types of loudspeaker leads, including the "high definition" types.

## **Heat sink**

The heat produced by the amplifier is dissipated into the air by the heat sink, which will, along with the surrounding panel, become warm while the amplifier is on. The whole back panel may become quite hot if the amplifier is run near full power. **This is perfectly normal.** However, if it becomes too hot to touch, switch off the amplifier at once and consult your dealer.

## **Magnetic pick-up input ( mag p.u. )**

The output lead from your turntable should be plugged into the magnetic pick-up socket. This input is designed for use specifically with magnetic cartridges. If a ceramic or crystal cartridge is used some loss in sound quality will occur, though neither amplifier nor cartridge will be damaged. To prevent hum pick-up in this very sensitive input, the cable must be screened and kept well away from mains wiring. If the turntable has a separate earthing lead connected, this should be attached firmly to the amplifier's ground terminal.

The magnetic input loading may be user-modified to suit different magnetic or high output moving coil cartridges (see page 9).

With low output moving coil cartridges a separate pre-amplifier must be used. The A&R (Cambridge) HA10 Moving Coil Pre-amplifier is recommended and can be powered directly from the mag p.u. socket (see pages 7 and 9).

## **Tuner input**

The tuner input is suitable for use with almost any AM or FM tuner or radio.

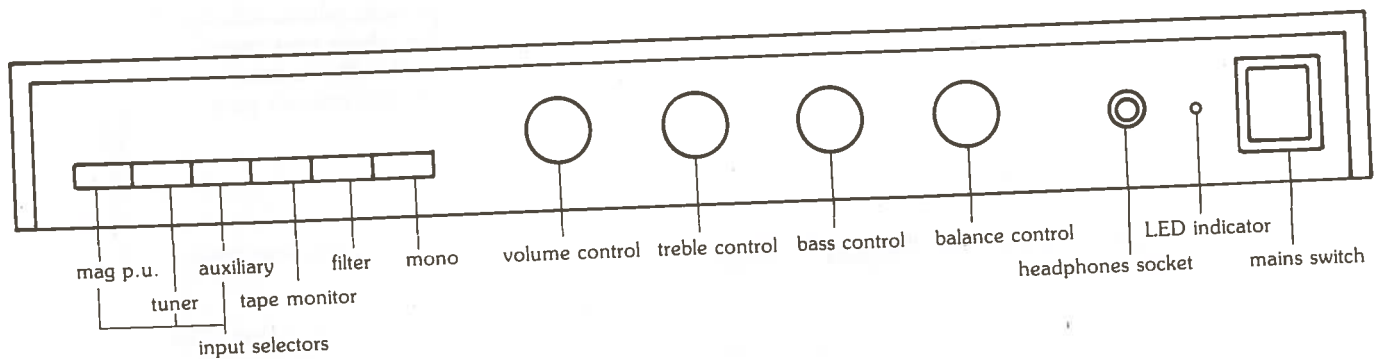
## **Auxiliary input/output**

The auxiliary input will accept any other signal, but is particularly suitable for use with a cassette tape recorder. This socket also provides an output for recording onto cassette (see page 6).

## **Tape input/output**

The tape input is designed to suit most reel-to-reel tape recorders and provides both input and output, with A/B monitoring facilities (see page 6).

## Front panel controls



### Mains power

The amplifier is turned on by the mains power switch (see illustration). It is good practice to turn the amplifier off when it is not in use.

### LED indicator light

This light indicates that the d.c. power supply in the amplifier is operating. It will continue to glow for a short time after the amplifier has been switched off as the d.c. voltage decays.

### Input selection

The "mag p.u.", "tuner" and "aux" switches are used to select the programme routed to the loudspeakers. By pushing any one of these buttons, you will cancel the previous setting. **Do not** attempt to push more than one button at the same time.

### Tape monitoring facility

The tape monitor switch is generally left in the "off" position (switch out), so that the programme selected by the input switches is routed to the loudspeakers. When the tape button is pushed, the recorded signal from the tape recorder is routed to the loudspeakers. Further details of the tape monitoring facility may be found on page 6.

### High frequency filter

When the filter switch is pushed in treble signals above approximately 7.5kHz are progressively reduced. This is extremely useful for removing unwanted hiss from noisy tapes or poor radio reception. Under such conditions, use of this filter is generally better than simply turning down the treble control.

## **Mono switch**

The amplifier is in its normal mode when the mono switch is out. In this position, the left and right input signals are amplified independently to appear at the corresponding loudspeaker outputs. When the mono button is pushed in, the left and right signals are mixed together and the combined signal is routed to both loudspeakers. The signals sent from the amplifier to external tape recorders, via the "tape" and "aux" sockets, are also blended into mono when the switch is in.

## **Volume control**

The volume control adjusts the listening level on both loudspeakers and headphones.

## **Treble control**

The treble control progressively cuts treble signals when turned anti-clockwise and boosts them when turned clockwise. A "flat" frequency response is obtained when the control is set accurately to the 12 o'clock position. It is unusual to have to use this control at its extremes, i.e. outside the 9 o'clock or the 3 o'clock positions.

## **Bass control**

The bass control progressively cuts bass signals when turned anti-clockwise and boosts them when turned clockwise. Again, the flattest response is obtained at the 12 o'clock position. The bass control in the A60 amplifier has been designed to operate at frequencies about an octave lower than normally encountered in other amplifiers. Because of this, a significant amount of boost or cut may be employed to compensate for loudspeaker deficiencies without affecting the lower middle frequencies.

## **Balance control**

The balance control is used to move the stereo sound image to the left or right. It can be used to compensate for imbalances in room acoustics or input signals.

## **Headphones socket**

The headphones socket accepts any headphones fitted with a standard 1/4 inch stereo jack plug. The headphones may mute the loudspeakers, or not, as required (see page 2).

## Tape recording

Tape recorders, whether reel-to-reel or cassette, may be connected to either the "aux" or the "tape" sockets.

### Tape recording using the "aux" socket

The "aux" socket is designed specifically for use with cassette machines or two-head reel-to-reel tape recorders, i.e. those without A/B monitoring (replay-while-recording) facilities. To record, the tape button is left "out" and the signal to be recorded is selected by pushing either the "mag p.u." or the "tuner" button. The selected signal will be sent both to the recorder (at 100k ohm impedance) and to the loudspeakers, and is DIN compatible.

**Do not push the "aux" button while the recorder is switched into record mode as this may cause a feedback whistle.**

It is not possible to record from the "tape" input. If it is desired to record from a reel-to-reel tape recorder onto cassette, then the reel-to-reel tape recorder should be plugged into the "tuner" socket and the "tuner" button pushed.

To record in mono, on either a mono or a stereo recorder, push in the mono button before starting to record.

N.B. None of the amplifier controls (apart from the input selector switches) affect the signal being recorded.

To replay via the "aux" socket, switch the recorder to play mode and push the "aux" button. The signal from the tape will then be sent to the loudspeakers.

### Tape recording using the "tape" socket

The tape socket is designed for use particularly with three-head reel-to-reel or cassette machines. It is intended to be connected to the line inputs/outputs of these machines, which are usually available via phono sockets.

To record, the programme source is selected by the "mag p.u.", the "tuner" or the "aux" button. This programme will automatically be sent to the recorder (at 5k ohm impedance). The signal to be sent to the loudspeakers can then be selected by using the "tape" button: with this button out, the selected programme source is sent directly to the loudspeakers; with the button in, the recorded signal from the tape will be sent to the loudspeaker (replay-while-recording). Hence, instant comparison is possible between the original and the recorded signals. The replay level is adjustable in the A60 by two screwdriver-adjustable controls accessible from the underside of the amplifier.

To record in mono, on either a mono or stereo recorder, push the mono button before starting to record. Again, the signal being recorded is not affected by the amplifier controls (apart from the input selectors).

To replay via the "tape" socket simply push the "tape" button and switch the recorder into play mode.

N.B. A licence may be required for recording from disc, radio or pre-recorded cassette.



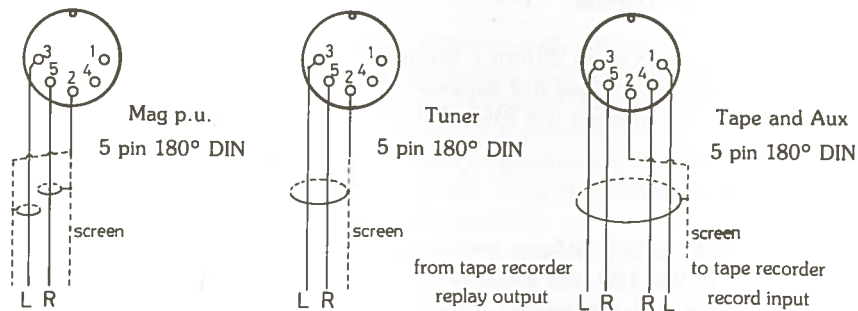
# Technical details.

## Spares kit

You are provided with a spares kit containing the following:-

- o 2 red and 2 black 4mm plugs for loudspeakers.
- o two 5 pin DIN plugs for input sockets
- o two spare speaker fuses (1.6 Amp fast blow)
- o one spare mains fuse (630 mAmp anti-surge for 240 volt models. 1 Amp anti-surge for 120 volt models)
- o one Allen key (1/16" A/F) which fits the screws in the control knobs.

## Connector wiring — views from rear of plug as wired



### Mag p.u.

If your turntable is fitted with a 5 pin 180° DIN plug, this should already be wired as illustrated. If fitted with PHONO plugs, then it is advised that a *two PHONO sockets to 5 pin 180° DIN plug* (Pins 3 and 5) adaptor lead be used. If any other connector is fitted, then it should be cut off and a 5 pin 180° DIN plug wired on as shown.

Should you be using your A60 with the HA10 Moving Coil Pre-amplifier, powered directly from the amplifier, then the HA10's lead is already suitably wired. Please refer to the HA10 instruction sheet for details.

### Tuner

A standard *5 pin 180° DIN plug to 5 pin 180° DIN plug* lead should be used for connection to a tuner with a DIN socket output, or a *5 pin 180° DIN plug* (Pins 3 and 5) to *two PHONO plugs* lead for a tuner with a PHONO socket output.

### Aux and tape

For connection to the low level DIN socket of a tape recorder a *5-pin 180° DIN plug to 5-pin 180° DIN plug* lead should be used in conjunction with the amplifier's aux. socket. For connection to high level line inputs and outputs of a tape recorder use the amplifier's tape socket. The lead required here is usually *5-pin 180° DIN to 4 PHONO plugs*.

### Loudspeakers

4mm (banana) plugs or wires should be used, with connectors on the other ends of the leads to suit your loudspeakers. It is important that the phasing of the loudspeakers is correct: that is, the black or - terminal of each loudspeaker should be connected to the corresponding black socket of the A60 and the red or + speaker terminal to the red (for direct output) or white (for switched output) socket. The upper sockets are for the left hand speaker and the lower for the right. Do not make any connection between left and right loudspeaker leads.

# Fuses

## Loudspeaker fuses

These are 1.6 Amp (or less) fast blow 20mm x 5mm diameter fuses. They may blow if the amplifier is:

- run continuously at high level into the correct loudspeaker load
- run at high level into a loudspeaker of too low an impedance ("4 ohms" or less)
- run into a short circuit

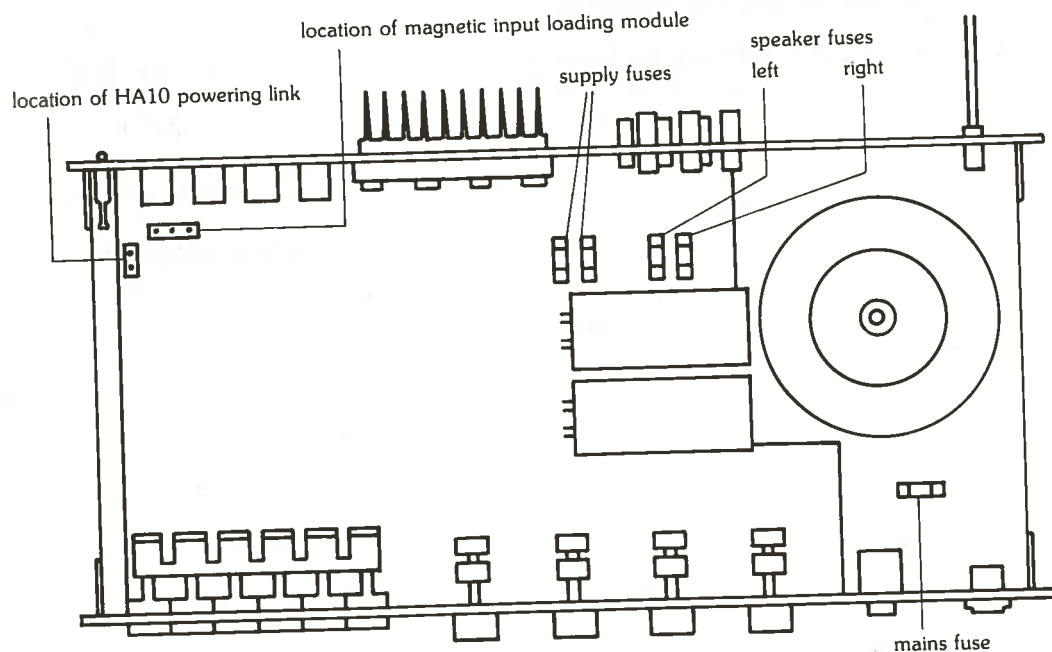
They are user-replaceable and two spares are provided. However, if they blow consistently without any of the above conditions obtaining please consult your dealer. **DO NOT** replace with a fuse of greater value than 1.6 Amps (or with a "slow blow" or "anti-surge" fuse) since this will endanger the amplifier and invalidate your guarantee.

## Power supply fuses

These are 3.15 Amp fast blow 20mm x 5mm diameter fuses. They are **NOT USER-REPLACEABLE** and spares are not supplied. If these fuses blow, there is probably a fault in the amplifier — do not change the fuses but consult your dealer.

## Mains fuse

This is a 630 mA or 500 mA anti-surge (slow blow) 20mm x 5mm diameter fuse in the 240 volt models. In the 120 volt models the fuse value is 1 Amp. This fuse is designed to protect against faults in the amplifier, transformer and mains switch. It is not normally user-replaceable. However, should it blow during a continuous period of very high level music, or on amplifier switch-on, it may be replaced once only **WITH A FUSE OF THE CORRECT TYPE** (one spare is provided). If a second fuse blows within a short period then there is a fault, and the amplifier should be returned to your dealer.



Internal view of amplifier indicating fuse positions

## Inspecting and changing fuses

In order to inspect or change the fuses, you will need to remove the wooden cover from the amplifier.

**BEFORE REMOVING THE COVER, ALWAYS SWITCH OFF THE AMPLIFIER AND DISCONNECT FROM THE MAINS SUPPLY**

Note that the mains fuse remains live whenever the amplifier is plugged into the mains, even when the amplifier power switch is in the off position. To remove the cover, turn the amplifier upside down on a soft cloth and, using a No. 1 "Poizdriv" screwdriver, remove the four screws from near the corners of the metal base plate. Holding the cover carefully in place, turn the amplifier the right way up and then ease off the cover. The positions of the fuses in the amplifier are shown in the diagram. *When replacing the cover, ensure that the four screws are firmly tightened.*

## Magnetic input loading module

Normally, the impedance of the magnetic input, together with the capacitance of the cables of the average pick up arm, will result in the cartridge seeing an impedance of 47k ohm in parallel with approximately 220 pF. This is perfectly adequate for most cartridges. However, for the best results certain cartridges require a lower input resistance and/or a higher input capacitance. Plug-in modules for modifying the input impedance of the A60 are obtainable from your dealer, who will be able to advise you when such modification is desirable. The location for the module is indicated in the diagram opposite.

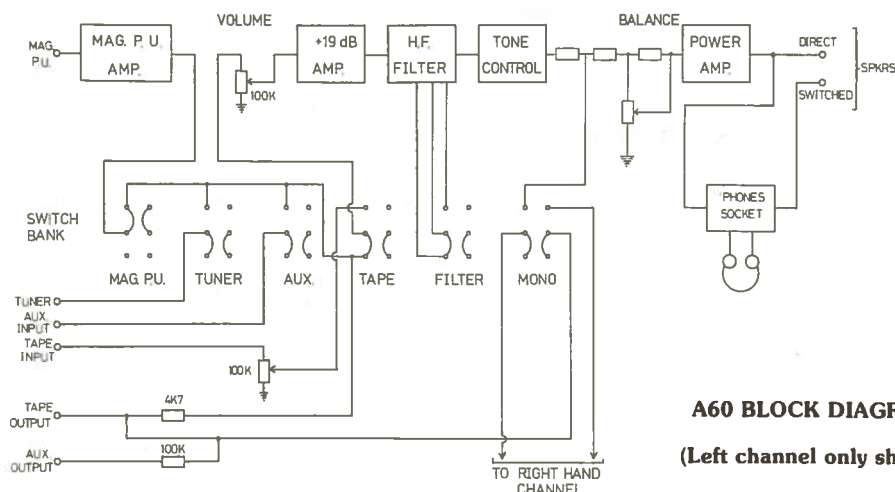
## Powering for the HA10

In order to power the A&R (Cambridge) HA10 Moving Coil Pre-amplifier directly from the A60, the link provided with the HA10 must be plugged into the A60 board. Please refer to the HA10 instruction sheet for details.

## System block diagram

The block diagram shows system design and signal routing details (for one channel only). It is worth noting that:—

- o the tuner, aux and tape inputs are all at 100 mV levels and feed via the selector switch directly into the volume control
- o the tape input is, in addition, fed via its own 100 k ohm tape presets (accessible from the underside of the amplifier)
- o the mag p.u. signal is amplified to 100 mV to feed via the selector switch directly into the volume control
- o the mono switch has two functions: it monos separately the feed to the power amplifier and the feed to the tape and aux outputs



**A60 BLOCK DIAGRAM**  
(Left channel only shown)

# Specification

## Input facilities

These are selected by the first four push buttons on the front panel and are in order.

### Magnetic pick-up

Sensitivity 2mV for 35 Watts output into 8ohms at 1kHz.  
Hum and noise less than - 68dB unweighted or CCIR/ARM weighted.  
Overload margin better than 36dB at all frequencies 20Hz - 20kHz  
Frequency response equalized within  $\pm 0.5$ dB of RIAA characteristics, 40Hz -20kHz, typically -3dB at 20Hz.  
Input impedance 47k ohms in parallel with approximately 30pF.  
Loading modules available to produce any load resistance less than 47k ohms and/or load capacitance greater than 30pF.

### Tuner & auxiliary inputs

Sensitivity 100mV into 100k ohms for 35 Watts output into 8 ohms at 1kHz.  
Hum and noise better than -80dB unweighted, or CCIR/ARM weighted.  
Overload margin - infinite.

### Tape input

Maximum sensitivity and other details: as above  
Sensitivity is variable via preset controls.  
Input impedance varies between 47k ohms at maximum sensitivity rising to 100k ohms at minimum sensitivity.

### Tone controls

Treble:	Up to 12dB boost and cut at 15kHz (ref. 1kHz)
Bass:	Up to 12dB boost and cut at 50Hz (ref. 1kHz)
High Filter:	Turnover frequency 7.5 kHz nominal. Ultimate slope 12dB/octave (Bessel characteristic).

## Outputs

### Tape output

Output level is the same as TUNER and AUX inputs and approximately 50 the MAG P.U. input level - nominally 100mV.  
Output impedance 5k ohms (plus any contribution from TUNER or AUX sources).  
Tape monitor switch allows A/B comparison between the recorded sound and the original.

### Auxiliary output

Output level as TAPE OUTPUT. Output impedance 100k ohms (plus any contribution from TUNER or AUX sources).

### Headphones

Connection via a front panel stereo jack socket. When using the headphones socket, the loudspeaker outputs may be muted or not, as desired. This output is suitable for phones of 8 - 2k ohms impedance.

### Loudspeakers

Connection via screw terminals which will accept bare wires or 4mm (banana) plugs. Suitable for 8 - 16 ohms loudspeakers.

### HA10 power supply

Power for the HA10 Moving Coil Cartridge Amplifier (15 volts d.c., up to 15 mA) is available on pin 4 of the magnetic input socket (when internally linked).

# Performance

## Output power & distortion (at 240 volts AC mains)

Guaranteed power bandwidth is 20Hz - 20kHz at 0.2% distortion (with both channels driven into 8 ohm loads at 35 Watts continuous sine wave power).

1kHz output at 0.2% distortion into 8 ohms is typically:

40 Watts (both channels driven)

47 Watts (one channel driven)

1kHz t.h.d. at any level to 35 Watts is less than 0.08% (typically less than 0.05% at 35 Watts)

## Frequency response

MAG P.U. Input - see Input Facilities.

Other inputs 20Hz - 20kHz  $\pm$  0.5 -1dB ref. 1kHz

Output falls continuously beyond these limits.

## Cross talk (stereo)

Less than - 50dB, 10Hz - 1kHz, reducing to typically - 45dB at 10kHz. The crosstalk products are pure and substantially free from distortion.

## Damping factor

Greater than 45, 10Hz - 1kHz, referred to 8 ohms.

Above 1kHz the damping factor reduces a little (typically 35 at 10kHz)

because of a small choke included to maintain absolute h.f. stability. This has negligible audible effect in practice.

## Protection

Delayed V-I limiting on output stages which resets automatically and protects against short and medium term overloads.

Long term overloads will blow internally replaceable quick blow fuses.

## Power supply

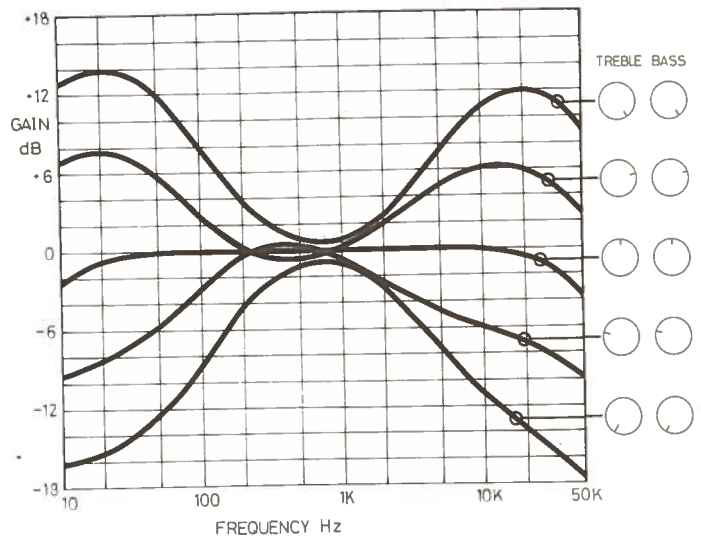
Normally 240 V a.c. 48 - 60Hz, 120VA maximum. The operating voltage may be dealer adjusted to 120volts if required. The amplifier may be operated from supplies in the range of 190 - 255volts a.c. (95 - 128 volts a.c. if dealer adjusted) with corresponding variations in maximum output power. Voltages outside this range should not be applied.

## Dimensions

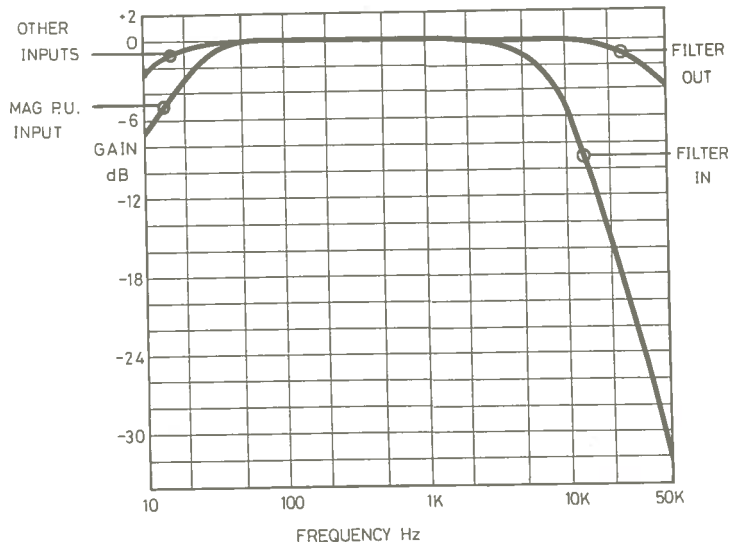
Width:	450mm
Depth:	255mm
Height:	60mm
Weight:	5kg

# Typical Performance Graphs

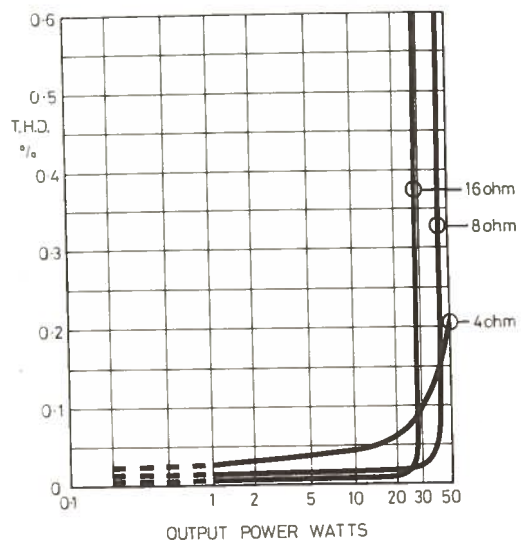
**Tone Control Responses (via Aux. Inputs)**



**Rumble and High Filter Responses**



**T.H.D. vs Power Output (1 kHz)**



# Guarantee for U.K. sales.

The A60 Amplifier has been fully tested and a full record of this test made before despatch from the factory. Both the workmanship and the performance of this amplifier are (except as set out below) guaranteed against defects for a period of one year from the date of purchase provided that it was originally purchased from an authorised U.K. dealer under a consumer sale agreement. (The words "consumer sale" shall be construed in accordance with Section 15 of the Supply of Goods (Implied Terms) Act 1973).

The Manufacturers can accept no responsibility for defects arising from accident, misuse, wear and tear, neglect or through unauthorised adjustment and or repair: neither can they accept responsibility for damage or loss occurring during transit to or from the person claiming under this guarantee.

This guarantee covers both labour and parts and is transferable to subsequent purchasers.

## Claims under this guarantee

In normal circumstances, this amplifier should be packed in the original packing and returned to the dealer from whom it was purchased. It is not possible to return the amplifier by hand, then it should be sent carriage prepaid by a reputable carrier.

Should the original packing not be available, replacement packing can be purchased from the Manufacturers. The amplifier should not be sent by post.

If you have any difficulty complying with these requirements, please contact the Manufacturers at the following address:—

Amplification and Recording (Cambridge) Limited,  
Denny End Industrial Centre,  
Waterbeach,  
Cambridge CB5 9PB

Tel: (0223) 861550

In either case you should state clearly your name and address, the date and place of purchase, together with a brief description of the fault experienced.

## Enquiries

The Manufacturers are happy to answer any queries you may have regarding the use of this amplifier on the condition that this enquiry is by letter and a stamped addressed envelope is provided. You should state clearly the serial number of the amplifier, the dealer from whom it was purchased and the date of purchase.

**THIS GUARANTEE IN NO WAY VARIES OR REMOVES A PURCHASER'S STATUTORY RIGHTS**



**Sound Reliability.**

**Amplification and Recording (Cambridge) Ltd.  
Denny End Industrial Centre,  
Waterbeach,  
Cambridge CB5 9PB  
Tel: (0223) 861550**