INSTRUCTION MANUAL

AP1 **AP3**

AC1

LECSON SYSTEMS LIMITED
BURREL ROAD, [redacted], CAMBRIDGESHIRE,
ENGLAND PE17 4LE. TELEPHONE : 0480 64124.
TELEX : 32562. A/B & CABLES : LECSON.

INTRODUCTION

Please take time to read this instruction manual. It will help you to get the best out of your Lecson equipment.

Lecson equipment is manufactured to the highest quality standards and designed to give you exceptional listening pleasure.

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IMPORTANT NOTE FOR UNITED KINGDOM CUSTOMERS

BEFORE SWITCHING ON:

All Lecson Power Amplifiers made for the United Kingdom market are now fitted with a 3-core double insulated mains cable. This cable should be wired as follows:-

Brown ..... to Live Line

Blue ..... to Neutral Line

Green/Yellow ..... to Earth (Ground)

When used with the Lecson AC1 Control Unit the two units should be wired separately to the mains supply. They should only be linked by the specified AC1 Audio Lead.

Providing both units are wired to the same mains supply (e.g. common earth point) no earth loop problems should be experienced.

Under no circumstances should the AP1/AP3 be opened unless the supply is disconnected.

An American style 2 pin plug is packed separately for use where local regulations allow. This plug should not be used in the United Kingdom.

IN USE:

It is recommended that the AC1 "Mute" switch be operated BEFORE switching the system ON or OFF. This procedure will minimise the occurrence of "clicks" and "plops" through the loudspeakers. This is because, although the AP1/AP3 have delayed switch-on relays, once they are on and working there is no attenuation of switching transients originating from the control units.

Where another make of pre-amplifier is used with an AP1/AP3 the pre-amplifier should be switched on BEFORE the AP1/AP3 and the AP1/AP3 switched off BEFORE the pre-amplifier. This procedure is not necessary with export models where the power amplifier is powered from the switched mains outlet of the AC1.

The blanking plate over the mains outlets must only be removed when the equipment is supplied for export.

It is recommended that the mains supply to the AP1/AP3 be disconnected whenever the amplifier is not in use.

REMEMBER: If you are in any doubt contact your local dealer.

1. INSTALLATION

Disposition. The Lecson range is intended to be used free standing, although control unit AC1 can be wall mounted.

Generally it is not advisable to connect a turntable to an amplifier such as AC1 with a lead longer than 2 metres, and if possible the lead provided with the turntable or arm should be used. If the installation contemplated requires a connection much longer than this (as for example wall mounting of AC1 may), then expert advice should be sought.

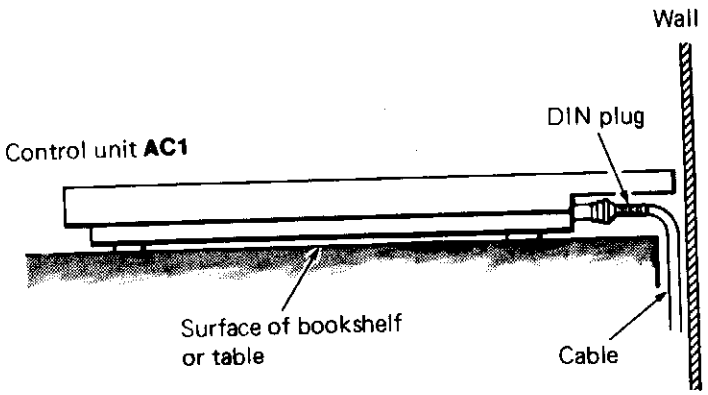


Figure 1.

Long leads to the amplifier will not upset it's performance, but they may adversely load the pick-up cartridge, giving high frequency loss or ringing.

These considerations will decide the permissible separation of the record playing equipment and AC1. It is not so important that the other signal sources, tuner, tape etc., be so close to AC1 and the procedure for long leads is outlined in section 7.

The AC1 will most likely be mounted on a table, bookshelf or wall. All connections are recessed at the rear so that interconnecting cables can be hidden (see Figure 1). Ventilation is not an important consideration as the unit consumes only 3 watts, and no perceptible temperature rise occurs in operation. Mounting AC1 with the Lecson tuner, FM1, is covered in the handbook for the tuner.

The AC1 and the AP1/AP1X/AP3 amplifiers can be operated correctly up to 10 metres apart using approved connecting and extension leads.

The amplifiers are also intended to be free standing, and ventilation approximating to that of free standing conditions should always be provided. For normal use on musical programme the cylindrical case - which is the heat sink of the amplifier - will only rise a few degrees above room temperature.

Although the units will operate over a wide temperature range, it is not recommended that they be placed near radiators or in direct sunlight.

Do not place the control unit unnecessarily close to equipment with mains transformers,or hum may be induced.

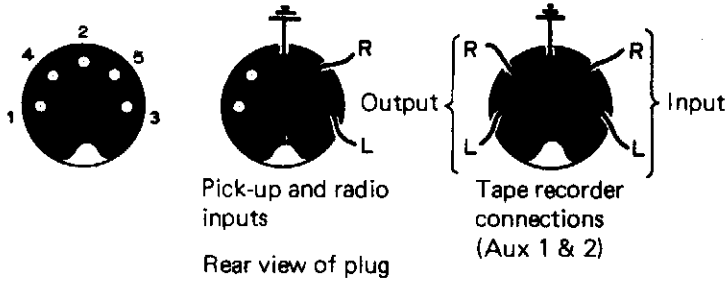
2. WIRING UP THE SYSTEM

AC1

Inputs are provided for two magnetic pick-ups, a tuner and two other auxiliary sources which may be tape recorders. AUX 1 and 2 also provide outputs to a tape recorder, and AUX 2 can be used for tape monitoring.

It may be advisable to attenuate signals to or from AC1 to obtain lowest distortion, highest overload and most convenient volume control range.

All connections to AC1 use DIN plugs, and the inputs sockets have DIN standard connections. (See Fig. 2).



Pick-up and radio inputs

Rear view of plug

Tape recorder connections (Aux 1 & 2)

Figure 2.

Figure 3. shows how the DIN plugs should be wired for optimum performance. It can be seen that two techniques exist for earthing equipment with and without separate earth leads.

The circuits of AC1 can be destroyed by making incorrect connections. Plugs should be carefully checked for incorrect wiring, shorting etc. If in doubt consult your dealer.

Do not push in or pull out DIN plugs while AC1 is switched on.

Two main outlets are provided which accept the standard American plug. Both outlets are switched by AC1 and protected by the fuse on the rear left of AC1. (EXPORT UNITS ONLY).

Please refer to next page for Figure 3.

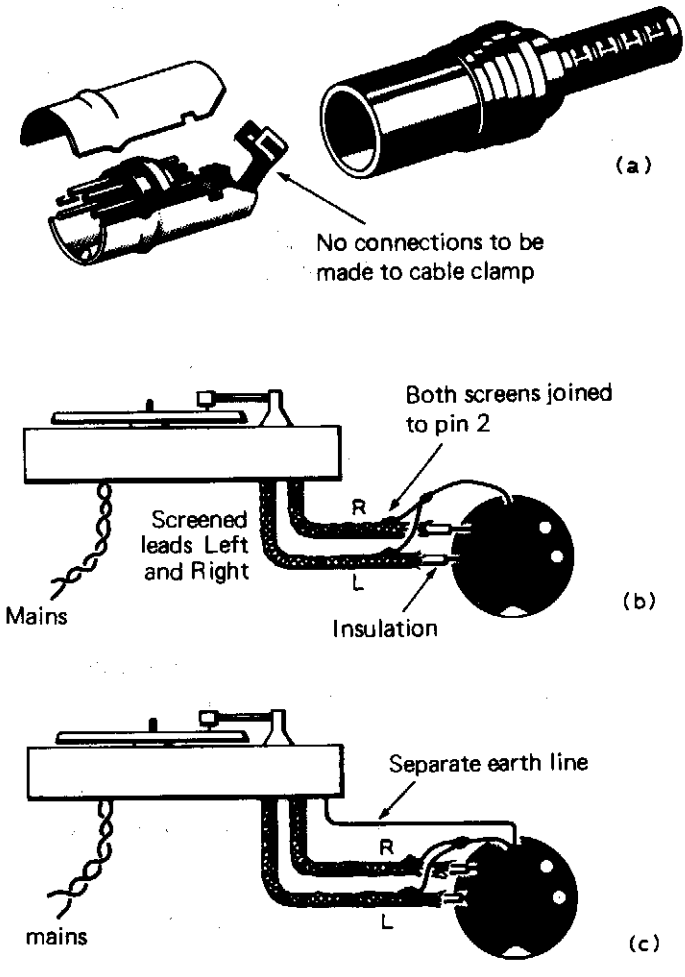


Figure 3. **The AC1 has an earth (ground) terminal of brass on the underside adjacent to the power cable. This terminal can be used to give earth continuity with ancilliary equipment, (e.g. record decks).**

Typical Installation (Export configuration on Mains Supply)

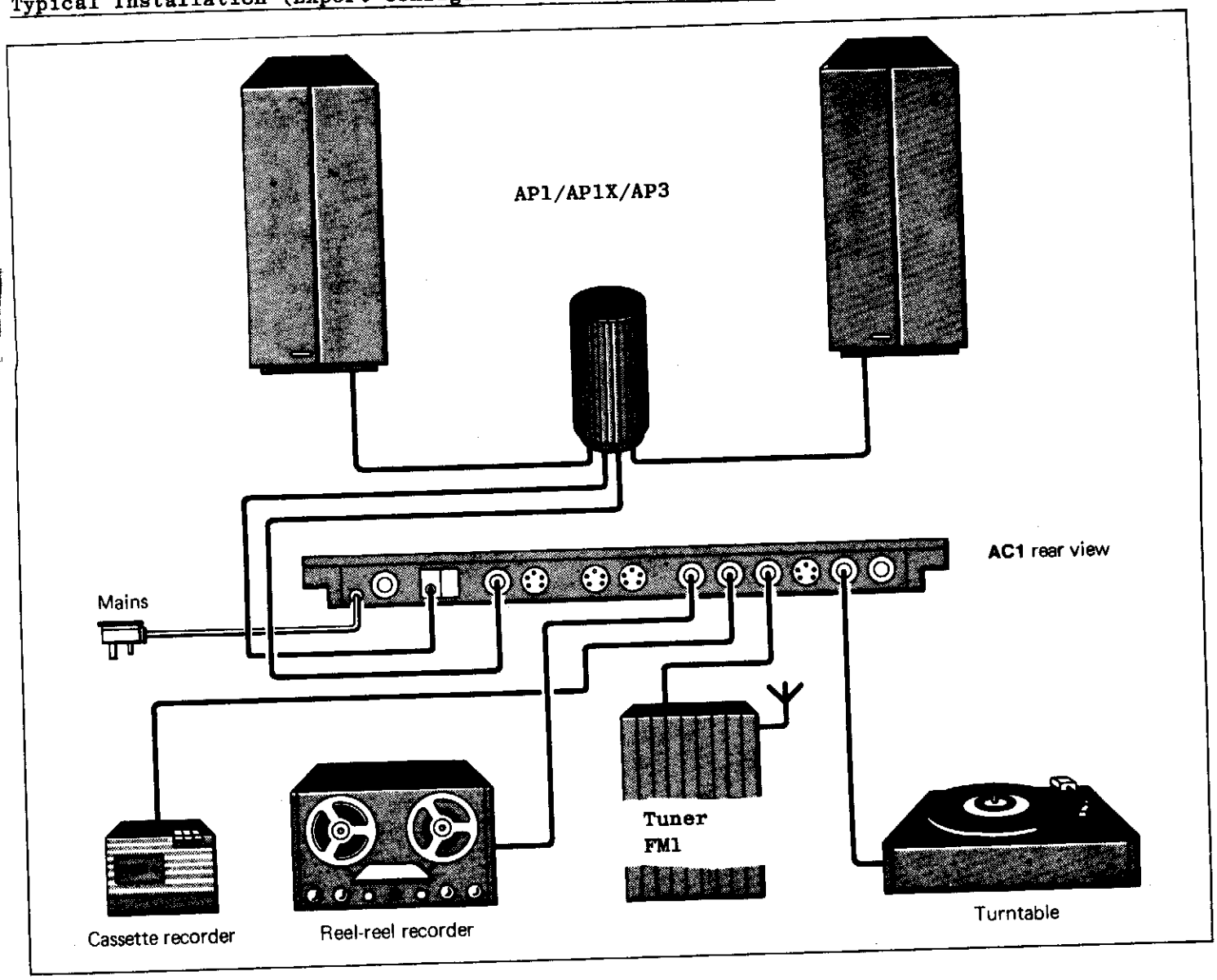


Figure 4: shows a typical stereo installation. Signal leads are connected to AC1 using the DIN plugs as described above. Standard leads (Part numbers AA 100 to AA 102, according to length) are used to connect the power amplifier to the control unit. A further connection between the units is made with the two-core mains lead, with reversible flat pinned plug, provided with the power amplifier, which is plugged into one of the outlets at the rear of the control unit.

Mains supply to the system is made through the three-core mains lead provided with AC1. It should be connected as shown in Figure 5.

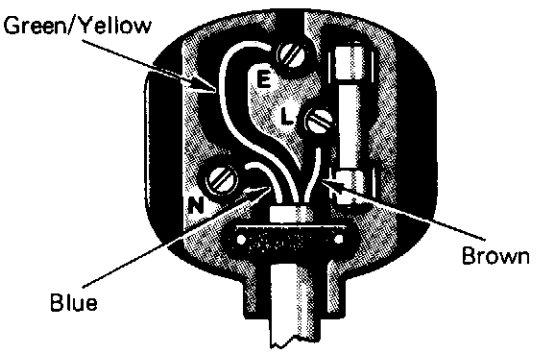
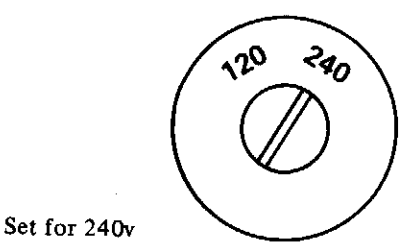


Figure 5.

Amplifiers normally leave the factory set for either 120 volt or 240 volt (50/60 Hz) and this should be checked before use. The mains voltage selector switch is located on the base plate adjacent to the mains cable entry point. (AC1). It is adjusted with a screwdriver blade to either of the settings shown below. This should only be done with the MAINS SUPPLY DISCONNECTED.



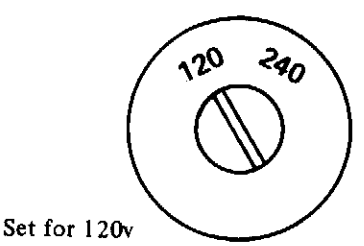


Figure 6.

In the case of the AP1/AP1X/AP3 the voltage selector switch is located as shown in Figure 7.

The final requirement is the loudspeaker wiring. Two-core cable should be used and wherever possible the recommendations of the loudspeaker manufacturer should be adhered to with regard to the thickness of wire. Often, lighting flex will do, but the total resistance of the wire used should be less than 5% of the loudspeaker impedance. Observe the phasing of the loudspeakers, as this is important in stereo

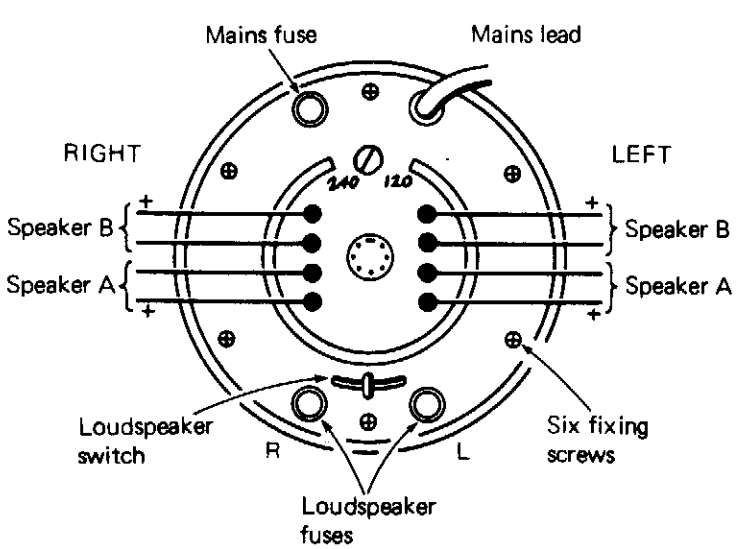


Figure 7.

Connections to the amplifier are made as in Figure 7. Two pairs of loudspeakers may be used, and a switch on the base of the amplifier (Fig. 7) allows either pair - a or b - to be selected, or both together (ab). Fuses are fitted in the loudspeaker and headphone outlets and these are also marked in Figure 7.

AP1 : 2.5 AMP QUICK BLOW

AP1X/AP3: 3.15 AMP QUICK BLOW

Where loudspeakers of a modest power rating are used these fuses can be reduced in value to protect the loudspeakers to some extent. These Power Amplifiers are perfectly stable when connected to a passive load and can be used quite safely with Electrostatic loudspeakers.

3. CONTROL FUNCTIONS

The drawing in Figure 8 shows the top face of AC1. The controls are shown in their normal position for playing records, and the functions are described below:-

A. Input selection determines which of the five possible inputs is connected to the system. The input which is selected here always appears at the tape outputs of sockets AUX 1 and 2 and this output is not in any way affected or changed by the setting of any other control.

PU1 and 2 are used for playing records with a magnetic cartridge.

RAD: Input at 125mV level intended for a tuner or similar source.

AUX 1: An input which also provides an output for a stereo tape recorder; in many systems this would be the ideal socket for a cassette tape machine.

AUX 2: As AUX 1, except that this input may be used for off-tape monitoring.

The input selection switch is not functional in the remote mode (B).

B. Tape Monitor allows an instantaneous comparison of 'before' and 'after' on a tape recorder fitted with 3 leads. In the off position the signal on the selected input (A) is fed to the loudspeakers. This is the 'before' signal that is fed to the tape recorder. Pushing the switch to 'on' switches the signals so that the loudspeakers can reproduce the signal coming off the tape recorder on AUX 2.

It is important for useful monitoring that the levels of the signals off and on be the same and the ways in which this can be achieved are shown in section 4.

The third position of this switch - remote - allows the input selection of AC1 to be achieved remotely (see section 5).

C. Volume. This control sets the loudness of the final sound, it is good practice to reduce the volume to 0 before switching to another input on A and before switching the power off (K).

The law and track-matching of this control are such that accurate two-channel loudness variation is given over a wide dynamic range.

Note that the high input overload capacity of the amplifier can mean that it will accept high signals and the useful range of movement of the volume control is restricted to the lower end of its scale without any distortion being apparent. This situation can be avoided by adjusting the signal level (See section 6).

Figure 8.

D. Treble and E. Bass. The effect of the tone controls is to adjust the balance between treble (high) and bass (low) notes. Normally these controls will be 'flat' i.e. set to 0, particularly if the ancillary equipment is of high quality.

The tone controls are most useful in obtaining the best results from a loudspeaker/room combination, where in some cases a setting of these controls other than 0 will produce the most pleasing sound. If however, it is found necessary to use a setting greater than ± 2 on either control then a fault in the ancillary equipment should be suspected.

Experience has shown that tone controls are of little use in compensating for deficiencies in programme material; for this, the filters (see H, I) are more satisfactory.

If there is any doubt the controls should be set to 0, or having found a pleasing position they should be left unchanged.

F. Balance. This allows the relative levels of the two channels to be adjusted, which may be necessary because of programme deficiencies or room effects. It is unusual in operation in that movement away from 0 holds one channel at a fixed level while the other is attenuated.

G. Mode usually set to stereo, movement to mono commons the two channels in the unit and allows a signal appearing on one input (left or right) to be fed to both channels of the power amplifier; or it may be used to sum both channels. This can be useful when phasing loudspeakers (see section 4).

The two positions 4 ch 1 and 4 ch 2 are not functional unless a Lecson 4 Channel adaptor is fitted at the rear of the unit. Instructions on the use of these are provided with the adaptor.

H. High Filter. This control operates the high frequency filter, which affects only the extreme high frequencies of the signal. For most signal sources distortion rises rapidly at high frequencies, and it will be found that some programme material is improved by switching in the 12 kHz (f1) or 8 kHz (f2) filter positions. Filter f3 is fairly severe, and normally should be used only for old recordings.

Many amplifiers have poor filters, but the Lecson filtering system is carefully designed to give a pleasing effect. With the switch out the amplifier response is curtailed above 30 kHz.

If in doubt about this control, set it to out for good modern recordings and f1 for other materials.

I. Low Filter. Normally in the out position, moving this switch to f1 curtails the extreme low frequencies. This is useful where rumble is arising anywhere in the chain - record, turntable, tape-transport etc.

In the cancel position the filter and tone controls are set for a 'flat' response. Thus the effect of any tone setting other than 0 or a filter frequency can be evaluated by switching between out and cancel on this control. Avoid using the amplifiers normally in the cancel positon as this extends the bandwidth unnecessarily beyond audibility.

J. Phones. Sliding this control up to on reveals the standard jack socket into which the headphone plug is inserted. (See the notes on headphone use). Moving the controls to mute allows the headphones to operate with the loudspeakers switched off (N.B. This applies only to systems using Lecson Power Amplifiers).

K. Power. This switches the mains supply to the amplifiers. Position on is indicated by a Red light.

4. OPERATION

When the Lecson amplifiers have been connected into a system a check should be made that they have been adjusted to suit the mains supply (120V or 240V).

Set the input control to the desired source (e.g. PU1 for disc) and the other controls as shown below:

Tape	Off
Volume	0
Treble	0
Bass	0
Balance	0
Mode	Stereo
High filter	Out
Low filter	Out
Phones	Off
Power	Off

Now push the power switch to on, a red light should shine and the system can be tested by playing a record and advancing the volume control.

When you are satisfied that all is working correctly, experiment with small movements of the tone controls and the filters.

If there are any problems, e.g. the unit fails to work or works incorrectly, switch off immediately and check all connections, control positions and fuses carefully. Should this not help, then consult your dealer.

Loudspeaker Phasing

A poorly defined stereo image will result if the loudspeakers are connected in antiphase.

If there is any doubt about this, switch the control unit to Mono. The image should be sharply defined in the centre between the loudspeakers. Reversing the leads to one speaker will show a difference. If changing the phase does not improve the stereo image, check that the loudspeakers are placed as they should be.

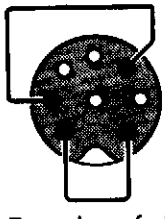
Headphone listening

Signal for headphones is taken from the power amplifier, and this is brought to the control unit in the accessory connecting lead (AA 100 - AA 102).

Phones with impedances between 3 and 600 can be used.

In certain circumstances phones of 600 impedance can be driven to moderate levels by AC1 on its own. In this case a special plug must be made up as shown in Fig. 9 to be inserted in the output socket on the rear of the AC1.

Headphone connections are standard stereo jack as shown in Fig. 10.



Rear view of plug

Figure 9.

Figure 10.

5. SPECIAL FACILITIES AND ADJUSTMENT

Adjustment of output level of AC1

It is possible to change the output level of AC1 from 500mV to 1.2V. This is made possible so that AC1 may be used to drive power amplifiers of other makes.

This modification can be undertaken only by Lecson Systems Limited or their appointed Service Agents.

Raising the output level to 1.2V reduces the effect of the tone controls to half the variation available normally.

Four channel operation

The AC1 control unit is provided with internal connections which make the 'mode' switch positions 4ch 1 and 4ch 2 indistinguishable from stereo. When used with a Lecson 4-channel adaptor the wire links must be removed. Operation in the mono or stereo modes will be as before.

Important. Once the wire links have been removed, the amplifier will not operate at all unless either the 4-channel adaptor is fitted according to the instructions supplied with it, or unless a shorting plug wired as in Fig. 11 is fitted to the four channel B socket at the rear.

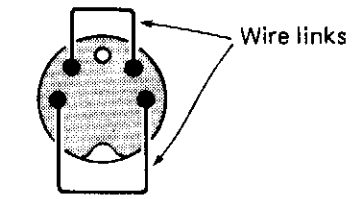


Figure 11.

MODIFICATIONS: Two modifications can be retro-fitted to existing equipment.

i) Delayed switch-on circuit for the AP1

ii) Tape output level signal booster for the AC1.

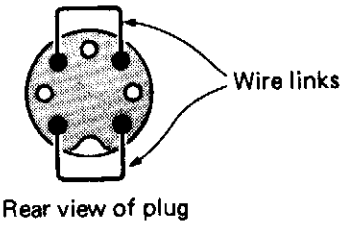
Remote control

Two remote-control sockets are provided at the rear of AC1. The first on the extreme right is used for remote input selection; the second (next to the output socket) can be used with the Lecson remote control unit to allow remote adjustment of volume level.

Figure 12.

It is necessary to remove two wire links to allow correct operation of the remote controller.

Important: Once the wire links have been removed the amplifier will not operate at all unless either the remote controller is plugged in, or a shorting plug wired as Fig. 12 is fitted to the left remote socket on the rear of the AC1.



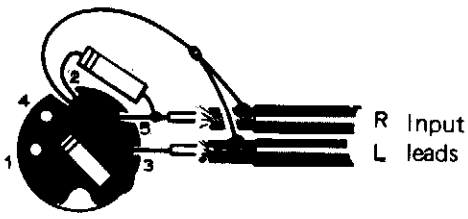
It is recommended that all internal modifications be undertaken only by Lecson or their appointed Service Agents otherwise the warranty may be invalidated.

6. FURTHER CONNECTION DETAILS

Long Input Leads

Figure 13.

Where it is desirable to operate the AC1 at a distance of more than 4 metres from signal sources other than a magnetic pick-up it may be advisable to fit a shunt resistor to the plug to avoid undue high frequency loss (as shown in Fig. 13). The value of this resistor should be 10K for 5 metres of cable and proportionally less for greater lengths, e.g. 5k for 10 metres, etc. However, at no time should this resistor have a value lower than the output impedance of the signal source - tuner, tape recorder, etc. Carbon film or metal oxide resistors of 1/8w or less can be used.



Rear view of plug

Procedure for Long Input Leads.

If any signal attenuation is also required the instruction in the next section will be helpful.

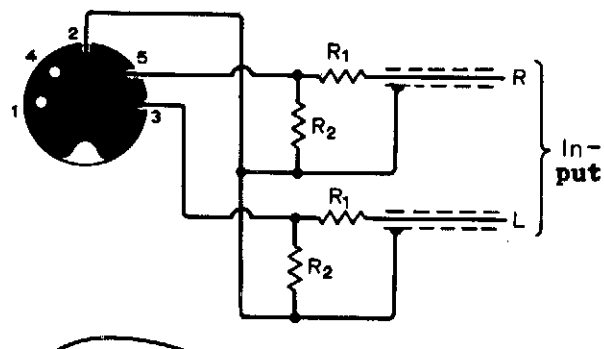
Level adjustment

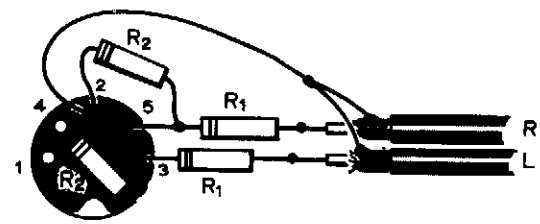
The rated sensitivity for the radio and auxiliary inputs is 120mV and it is good practice to adjust these signals at source if possible to this level. The control unit has a high overload capacity and no obvious distortion will be noted if high levels are fed in, particularly to the magnetic input.

Figures 14. and 15.

To reduce the levels of signal fed into the unit attenuating networks can be used as shown in Figures 14 and 15. Again carbon film or metal oxide resistors of 1/8W or less can be used.

For tape monitoring the levels should be equalised using the output level control on the tape recorder, or if this is not possible, by using an attenuator as above.





Rear view of plug

Procedure for attenuating input signal

Connection of AC1 to AP1/AP1X/AP3

Standard leads are available from Lecson for this purpose, but for those who wish to make non-standard lengths, details are given in Fig. 16. Remember, incorrect connections can cause serious damage to the circuits.

Use of Lecson Power Amplifiers with electrostatic loudspeakers

The power amplifiers are perfectly stable when connected to any load and can be used quite safely with any electrostatic loudspeakers.

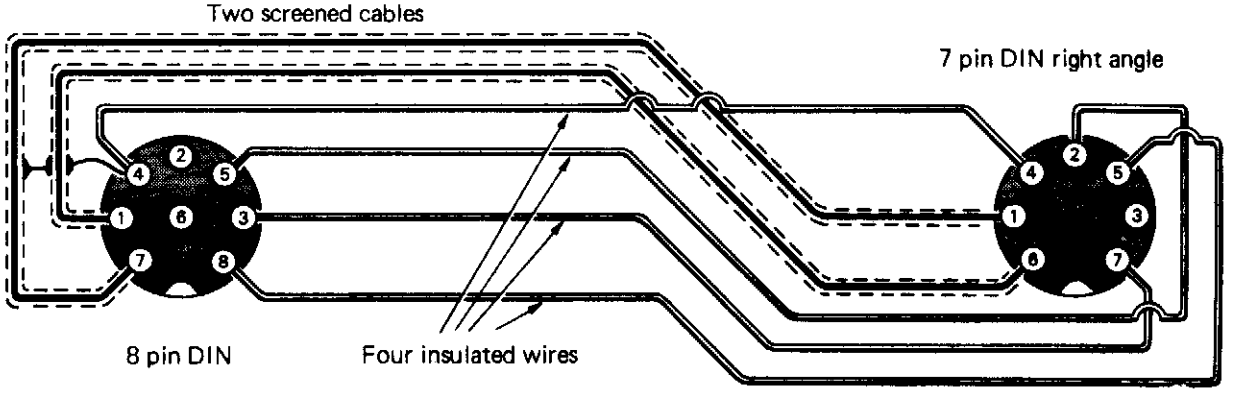
However, it is good practice with any amplifier to place a resistance of 1Ω 2W in series with such a loudspeaker if this is not already fitted by the manufacturer, as for example Quad. The purpose of this resistor is firstly to limit in a controlled way the peak currents that may flow at any time, and also to allow the amplifier more precisely to follow transient information in the signal.

Attenuation

		2:1 6dB	3:1 10dB	5:1 14dB	10:1 20dB	30:1 30dB	100:1 40dB	2:1 6dB	5:1 10dB	10:1 20dB	30:1 30dB
100Ω	R1	1K	2K2	2K2	2K2	2K7	10K	1K	2K2	2K2	10K
	R2	1K	1K	560Ω	220Ω	100Ω	100Ω	1K	1K	220Ω	100Ω
1KΩ	R1	5K6	10K	10K	10K	10K	10K	3K3	6K8	8K2	8K2
	R2	5K6	5K6	2K7	1K	330Ω	100Ω	3K3	1K8	820Ω	270 Ω
10KΩ	R1	22K	33K	33K	33K	33K	33K	2K2	5K8	8K2	19K
	R2	22K	15K	8K2	3K3	1K	330Ω	8K2	6K8	2K2	680 Ω
50KΩ	R1	47K	47K	47K	100K	100K	100K				
	R2	100K	68K	15K	10K	3K3	1K				
100Ω	R1		2K2	100K	100K	100K	100K				
	R2		82K	82K	22K	6K8	2K2				

Short Leads — Leads 5M

Figure 16.



7. SPECIFICATIONS

All specifications are for 120/240V input 50Hz after two minutes.

AC1

Inputs

Input	Sensitivity for 0.5V o/p	Input Impedance	Overload capacity	S/N (short circuit)
PU1 PU2	2.5mV for 1 cm/sec at 1kHz	47kΩ	50dB	70dB CCIR
RAD AUX 1 AUX 2	125mV	68kΩ*	25dB	80dB CCIR

*Input impedance of AUX 2 on tape monitor is 10kΩ.

At no time must the input voltage exceed 10V rms or ±14V peak with respect to ground, or damage will result.

Outputs

500mV rms to power amplifier (May be adjusted internally to 1.2V rms)
100mV rms to recorder (RAD, AUX1 and AUX2)
100mV rms to recorder (PU1 and 2 at 4 cm/sec, i.e. 10mV i/p)

Response

RIAA within 1dB (PU1 and 2)
flat ±0.5dB 30Hz - 20kHz (RAD, AUX1 and 2)
±3dB 10Hz - 32kHz (controls out)
±3dB 10Hz - 40kHz (cancel)

(2W max. to headphones from power amplifier)

Tone controls

±12dB at 100Hz
±8dB at 10kHz

Filters

High F Bessel characteristic
-3dB at 5, 8 and 13kHz ± 10%
ultimate slope 18dB/octave.
Low F Bessel characteristic
-3dB at 35Hz slope ultimately 12dB/octave.

Crosstalk

Typically better than 60dB
Record/replay better than 60dB
(Depends on input source impedances).

Total harmonic distortion (excluding noise)

At 1kHz at all times less than 0.5%. Typically less than 0.02%.
Controls flat at rated input and output less than 0.1%
30kHz - 20kHz and typically less than 0.05%.
No transient distortion effects. Index 0.1.

Hum

Better than -70dB CCIR

Four channel facility for matrix decoding or synthesising.

Remote control facility for remote input selection and volume adjustment.

Tape monitor available on AUX 2.

Power 100-130/200-260V 50/60Hz 3VA.

AP1/AP1X/AP3

Input:	500mV for 35 watts (AP1) 400mV for 70 watts (AP1X), 1kHz into 8 Ohms. 500mV for 100 watts (AP3).
Output:	Directly coupled to loudspeaker. Minimum outputs AP1 50w/ch, AP1X 75w/ch, AP3 100w/ch (8 Ohm Load). Typical outputs AP1 60w/ch, AP3 140w/ch.
Distortion:	THD into 8 Ohm load is less than 0.05% at rated power 20Hz to 10kHz. Typically 0.005% 1kHz.
Noise:	Better than 90dB below maximum output.
Protection:	All models have electrical and over-temperature protection. In addition, the AP1X and AP 3 have DC-offset loudspeaker protection. AP3 has temperature switched cooling fan. All models have delayed switch-on speaker relays.
Open Loop Response:	AP1 -3dB at 17kHz. AP1X and AP3 -3dB at 25kHz.
Dimensions:	AP1 280mm high x 145mm diameter. AP1X and AP 3 358mm high x 145mm diameter.
Transient Distortion:	Not measurable for applied signals up to 20kHz.
Input Impedance:	10k Ohm (nominal).
Output Impedance:	0.2 Ohm.
Mains Supply:	100-130V or 200-260V 50/60Hz.

8. SERVICING AND MAINTENANCE

Cleaning

Cleaning will normally be carried out with a dry duster or soft brush, or a damp chamois leather (and the unit disconnected from the mains).

Coloured strips may be cleaned by gently rubbing with a nearly dry chamois leather.

The AC1, AP1, AP1X and AP3 have acrylic tops which can be cleaned using a very soft cloth and a plastics cleaning fluid. It is advantageous to add an anti-static fluid.

In case of failure

Should the units go wrong, they should be returned to your dealer or to Lecson by prior arrangement.

Always retain the packing material so that safe transport can be assured.

The mains fuse ratings are as follows:-

AP1: 2.5 AMP A/S

AP1X/AP3: 2.5 AMP A/S

NEVER fit fuses of an incorrect rating or type.

Accessory leads are now available to permit the use of Lecson equipment with other manufacturers' equipment.

Lecson Systems Limited reserve the right to change design and specification without prior notice.