

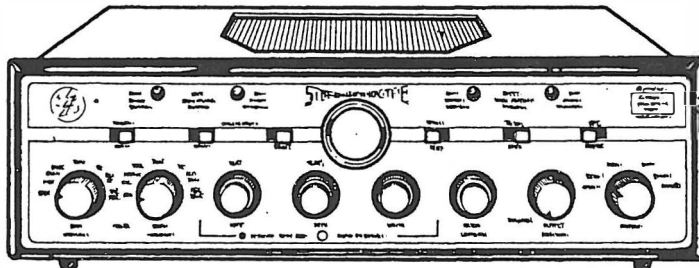


STEREOSCOPE

**PROFESSIONAL INTEGRATED
TWENTY-TWENTY AMPLIFIER**

MODEL No. 555

INSTRUCTION MANUAL



A PRODUCT OF ELECTRIC & MUSICAL INDUSTRIES LTD
HAYES · MIDDLESEX · ENGLAND

SCOPE[®] ELECTRONICS CORPORATION

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INTRODUCTION

The E.M.I. Stereoscope Model 555 is an integrated stereo amplifier designed to provide a complete audio installation for the home. The advanced features incorporated in the amplifier include rumble and scratch filters, loudness compensation, CRT indication, and many others. The range of inputs caters for all types of ancillary equipment, and the simplicity and flexibility of the various controls enables the user to obtain the best possible results from the installation under almost any conditions.

As with all precision instruments, however, a careful study of the operating instructions which follow will enable the superlative performance of this amplifier to be realised to the full, provided, of course, that the equipment used with it is of similar merit.

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SPECIFICATION

AC Supply: 117 volts 50 - 60 cycles
Consumption: 150VA
Power Rating: 20 peak watts per channel for rated distortion.
Distortion: 0.1% for 20 peak watts measured at 1kcs.
Frequency Response: 20 cycles - 20 kcs \pm 1db
Power Frequency Response: 40 cycles - 15 kcs at 20 peak watts 0.75% \pm 1db
Cross-talk: 30db down, 20 cycles - 20 kcs (50db down at 1 kc)
Damping Factor: 30
Inverse Feedback: 34db
Hum and Noise: Main amplifier 80db below full output
Radio inputs 60db below full output
Low level inputs corresponding to 2½ microvolts at the input grid.

Speaker Connections: Switched impedance matching, 32, 16, 8 or 4 ohms.

Inputs: 1. Tape head: 3mV for rated output. Impedance 47 K.ohms.
2. Mag.PU: 2mV for rated output. Impedance 47 K.ohms.
3. Crystal & Ceramic PU: 60mV for rated output. Impedance 33 K.ohms.
4. Microphone, 1: 2mV for rated output. Impedance 47 K.ohms.
5. Microphone, 2: 20mV for rated output. Impedance 470 K.ohms
6. Radio: 150mV for rated output. Impedance 100 K.ohms
7. Tape Replay: 150mV for rated output. Impedance 100 K.ohms

Stereo Tape Outputs: 150mV available from each channel for recording purposes, independent of level control settings.
Minimum load resistance 250,000 ohms.

Center Channel Output: Approx. 1V amplitude. Mixed signal from both stereo channels available at low impedance.

Tone Controls: Treble: \pm 15db with reference to "level" position \pm 2db
Bass : \pm 15db with reference to "level" position \pm 2db

Tubes: Six type ECC83
Four type EL84
Two type EF86
One type DH3-91 cathode ray tube

Dimensions: Height* 4"
Width: 14"
Depth: 13¾"

Fuses: AC: 3A
H.T: 350mA. Anti-surge

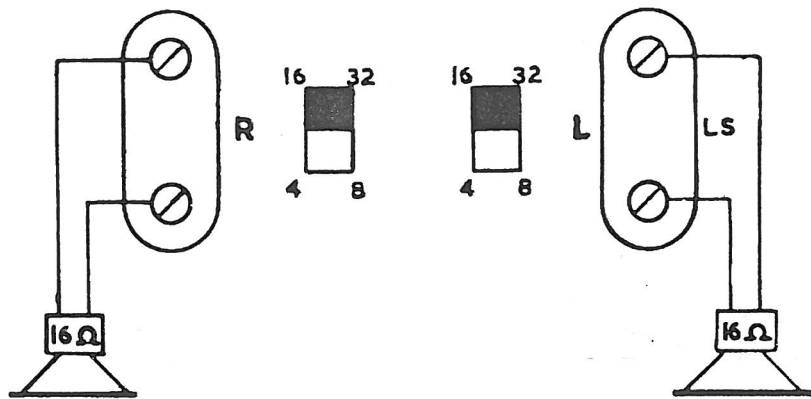


Fig.1 Normal connection of two loudspeakers.

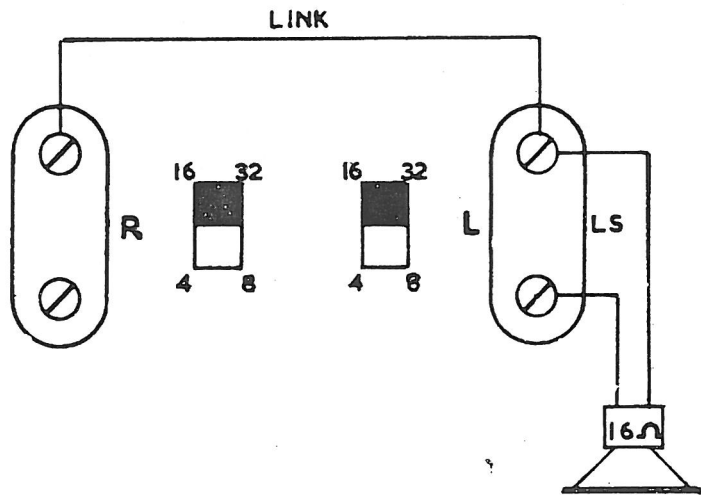


Fig.2 Single loudspeaker connected for mono operation.

INSTALLATION

AC. Connections.

The E.M.I. Stereoscope Model 555 is designed to work from an AC supply at a frequency of 50/60 cycles and at 117 volts, UNDER NO CIRCUMSTANCES MUST THE EQUIPMENT BE CONNECTED TO A DC SUPPLY.

Insert the AC plug into an appropriate power supply point and switch on and off the amplifier by means of the Monitor On/Off switch, checking that one or two of the red and green lamps (depending on the position of the Function switch) are illuminated when the amplifier is switched on.

Loudspeaker Connections.

At the rear of the amplifier there are terminals for connecting a loudspeaker to the output of each channel. For normal use the loudspeakers should be connected to the terminal panel in each case, as shown in Fig.1. The impedance matching switches adjacent to the terminal panels should be set to the range of impedance within which the loudspeaker lies.

For monophonic operation using one loudspeaker, the outputs of the two channels may be linked as depicted in Fig.2. It will then be found that normal output will only be obtained in one position of the Speaker Phase switch (slide type switch on right of front panel); in the other position there is a noticeable drop in volume and quality.

Arrangement of Loudspeakers for Stereo Reproduction.

Whenever possible the loudspeakers used should be identical units in similar enclosures. Compensation for differing sensitivities of speakers is available in the balance control of the amplifier, but differing frequency response characteristics can only be compensated to a limited degree with the individual Tone controls. The normal arrangement for stereo listening is shown in Fig.3. Although the best results are obtained in a comparatively limited space, in practice highly acceptable results are available over a much wider area.

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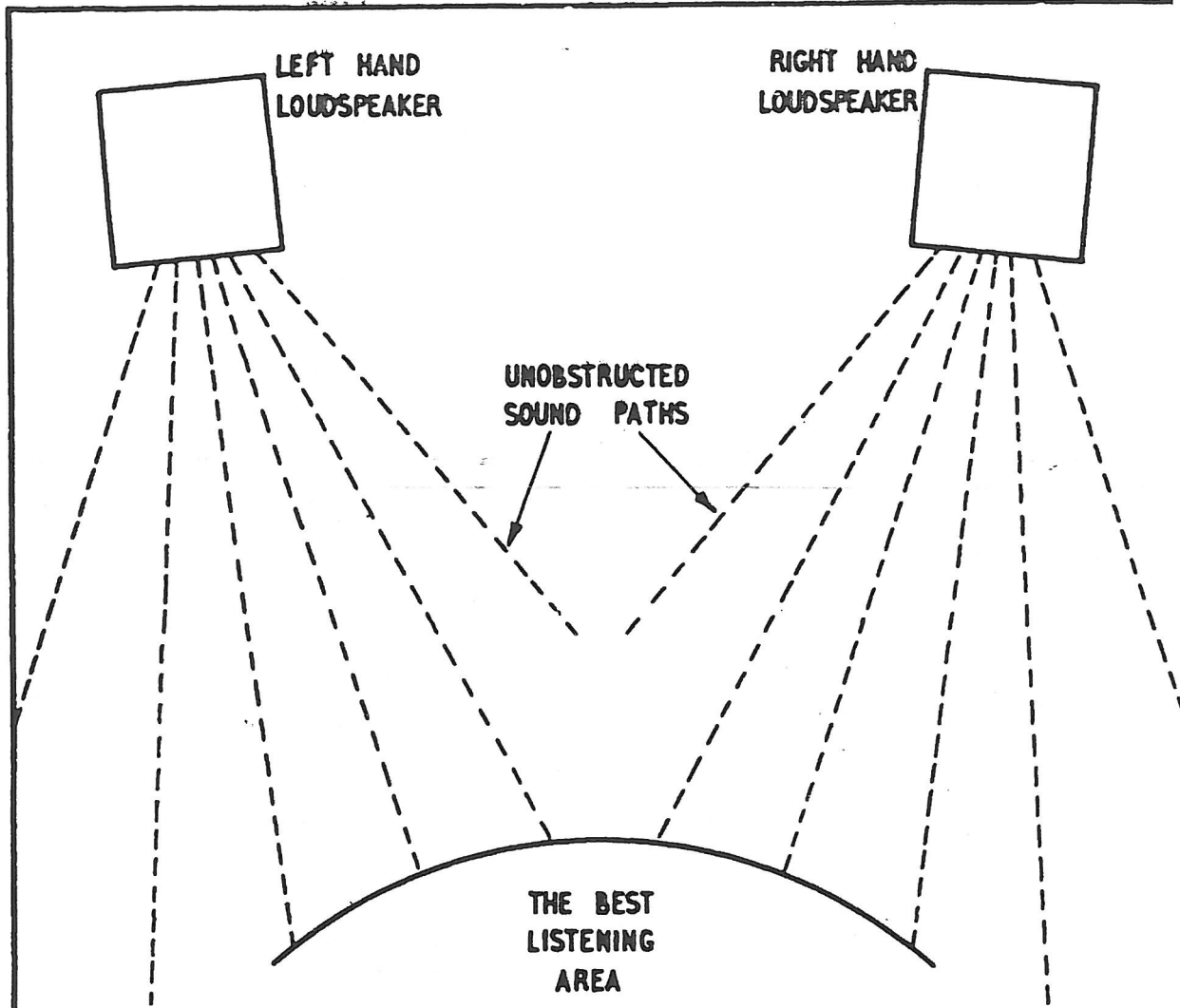


Fig.3 Ideal layout of loudspeakers for stereo reproduction.

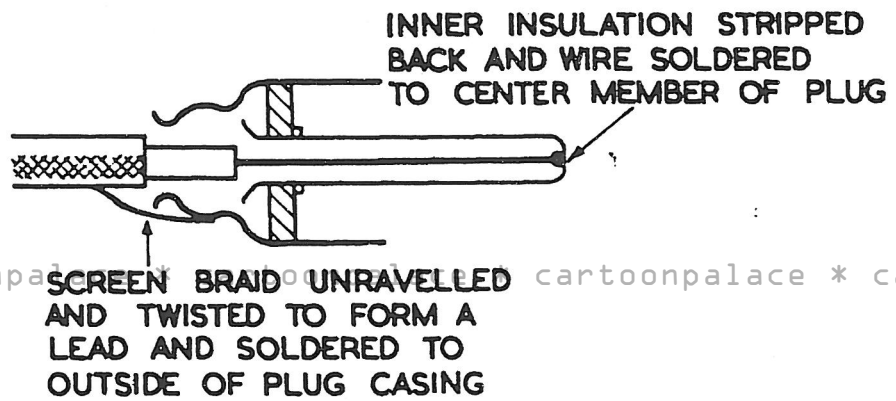


Fig.4 Method of connecting screened lead to input plug.

Loudspeaker Leads.

When making connections to loudspeakers, normal twin-flex may be used where comparatively short runs are involved. For long runs, heavier flex must be used so that its resistance is kept low compared with the impedance of the loudspeaker, and for the same reason it is desirable to use loudspeakers of at least 16 ohms impedance.

Input Connections (See Figs. 5 & 8).

Fourteen input sockets (seven stereo pairs) are provided at the rear of the amplifier. Ten of these inputs may be used simultaneously for any desired combination of monophonic or stereophonic applications. The inputs occur in stereophonic pairs horizontally, and are labelled 'L' and 'R' (left and right respectively). Connections to all inputs should be made with screened leads terminated in the standard input plugs supplied with the amplifier. Fig. 4 shows the method of connection. Inputs from stereo equipment will require two such leads.

For monophonic operation, connect the external equipment to the 'L' socket of the appropriate input pair. If independent amplification of two separate monophonic services is required, the two inputs should be connected one to each of the 'L' and 'R' sockets of the required input pair. Operation of the Function switch will then provide independent or mixed operation, as described under "Operation".

The following seven input pairs are provided:-

1. TAPE HEAD: A medium impedance input with a sensitivity (3mV) suitable for connecting the output direct from a high impedance replay head of a tape deck. A tape deck pre-amplifier should not be used with this arrangement.
2. MAG.FU: Magnetic Pick-up. A sensitive input (2mV) of medium impedance for connecting any of the modern light weight magnetic moving coil, or reluctance type pick-ups.
3. XTAL PU: Crystal Pick-up. High impedance input (sensitivity 60mV) for use with any crystal or ceramic pick-up cartridge.
4. MIC.1 : High Sensitivity Input for Microphone. Medium impedance input for any low output microphone requiring the maximum sensitivity (2mV) of the amplifier

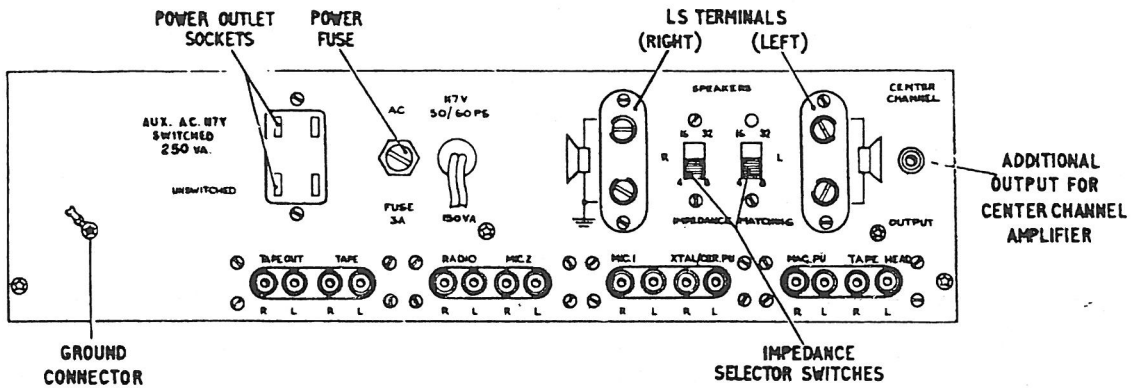


Fig.5 Rear view of E.M.I. Stereoscope Model 555

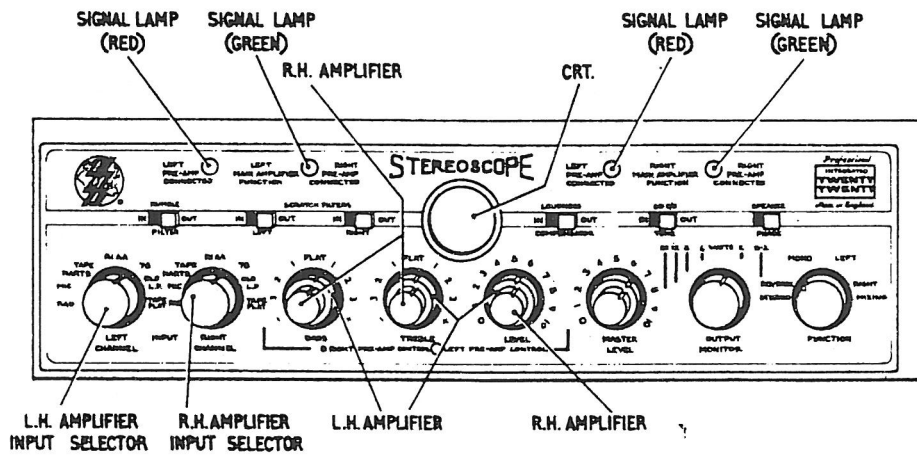


Fig.6 Front view of E.M.I. Stereoscope Model 555

5. MIC.2: Low Sensitivity Input for Microphone.
High impedance input (sensitivity 20mV)
for use with any crystal microphone.
6. RADIO: High impedance input (sensitivity 150mV)
for any AM or FM Tuner Unit.
7. TAPE/Tape Replay: A low sensitivity (150mV) input for
connecting to the output of a tape deck pre-
amplifier or tape recorder, or any other high
level sound source.

The only restriction in the use of these inputs is that only one pick-up or microphone pair should be connected simultaneously.

Output Connections (See Fig.5)

In addition to the normal loudspeaker output from each channel, there are the following facilities:

1. TAPE OUT A pair of outgoing sockets (one from each channel) supplying an audio recording voltage suitable for connecting to a tape recorder. The use of this outgoing voltage in no way affects the normal operation of the amplifier, which may thus be used as a monitor for the material to be recorded.
2. CENTER CHANNEL OUTPUT
In the 'Mixing' position of the Function switch the mixed material for recording is available at the Center Channel Output socket. In this way, commentaries, background music, etc., may be added and the recording made with full mix and fade facilities on both programmes.
3. AC OUTLET SOCKETS
A pair of convenient AC. outlets are provided at the rear of the amplifier, to which may be connected the AC. input of a record playing unit, FM tuner, etc. It will be observed that the top outlet is switched by the Output Monitor/On/Off switch and the bottom one is unswitched. It is recommended that the unswitched outlet be used for the record playing unit, since this obviates the possibility of the record playing unit being switched off during the operation and being left thus, with possible consequent damage to its driving mechanism. Total power consumption from these sockets should not exceed 250VA.

Mounting in a Cabinet.

When the E.M.I. Stereoscope is to be mounted into a cabinet, certain conditions must be observed. This amplifier is designed to be shelf mounted in a horizontal or near horizontal position. When so mounted a cut-out of generous dimensions must be made in the shelf to allow free access of air to the underside of the amplifier.

Removal of the four feet on the baseplate will provide four tapped fixing holes by which the amplifier may be secured to the shelf. The baseplates fitted to the 555 are of two types: Certain earlier models had a baseplate with eight cut-out holes for cooling. With this type it is necessary to remove the baseplate in order to permit removal of the feet. Access to the screw heads may be obtained by removing the small plastic cap on the base of each foot.

The other type of baseplate has two cut-outs only and here the feet may be taken off without removing the baseplate by pulling off the plastic caps to gain access to the screw heads, and then unscrewing the feet with a screwdriver. On the earlier Model 4BA fixing screws are required; 2BA on all subsequent models. Fig.7 gives the drilling dimensions for these four holes and the cut-out required in the cabinet panel to accommodate the amplifier. Care should be taken here to cut this opening to the correct size.

When fitted into a cabinet, it is important to ensure adequate ventilation by cutting apertures of generous dimensions in the back of the cabinet above and below the amplifier.

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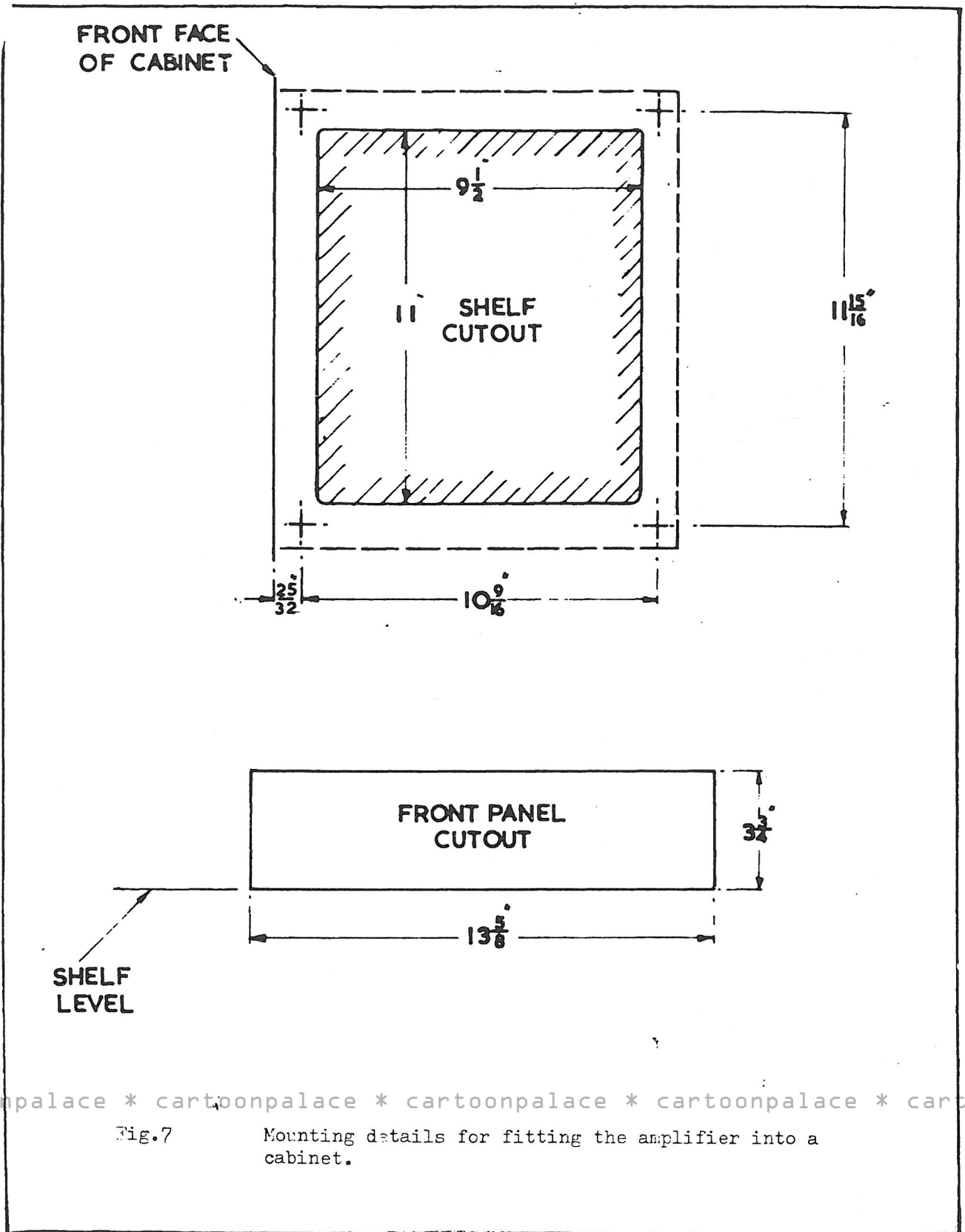


Fig.7 Mounting details for fitting the amplifier into a cabinet.

FUNCTION OF THE CONTROLS.
(Refer To Fig.6).

Introduction

The E.M.I. Stereoscope Model 555 consists basically of a twin amplifier system, each with its own Level, Bass and Treble controls, and for convenience of operation these three are manipulated by dual knobs set one behind the other. The front ones affect the right-hand amplifier channel and the rear ones the left-hand channel. In addition, each channel has an Input Selector switch which varies the input conditions of the amplifier to suit the particular service being fed into it, e.g., Microphone, Radio, L.P. 78 etc.,

Common to both of these amplifier channels is a Master Level control which, as its name implies, governs the overall output from both channels; also an Output Monitor control (combined with On/Off Switch), for adjusting the sensitivity of the CRT indication and for certain facilities to be described later, and a Function switch which selects the condition in which the twin channels will operate, e.g., stereo, mono, mixed etc.

These are the main controls. There are in addition a number of small switches to be described later which bring into operation various refinements, but they do not materially affect the basic system outlined above.

The Four Signal Lights.

A special feature of the Model 555 is the provision of four signal lights on the front panel - two reds and two greens. These lights indicate the direction in which the inputs to the amplifier channels are being routed, which in turn depends upon the setting of the Function switch. The red light on either side represents the left-hand input. The green the right-hand input.

If, for example, the Function switch is set to "Stereo" the red light will appear on the left-hand side of the control panel, (LH amplifier) and the green light on the right-hand side (RH amplifier). This indicates that the L. input is being fed to the LH amplifier and the R. input to the RH amplifier, which is, of course, correct for normal stereo. In the "Reverse" position, however, the red light appears on the right and the green on the left, thus indicating that the L. input is now going through the right amplifier, and the R. input through the left. These and the other combinations are shown in Fig.8, in which the sequence of the lamps is shown for every position of the Function switch.

The Function Switch

This switch selects the use to which the two amplifier channels are to be put, and operates in conjunction with the four light system described above. The six positions of the switch are as follows:

LAMPS ON L.H.
SIDE OF PANEL

FUNCTION SWITCH

LAMPS ON R.H.
SIDE OF PANEL

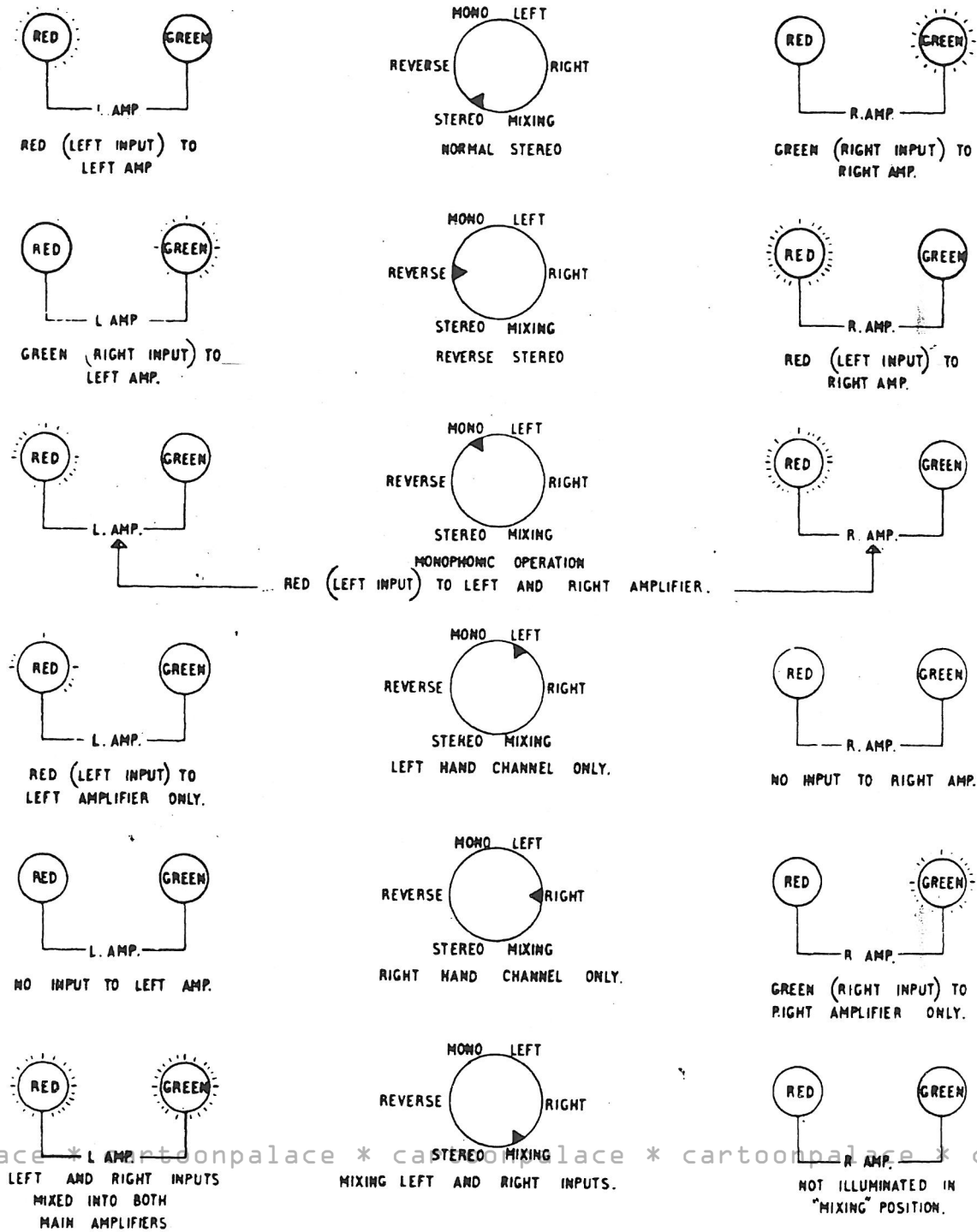


Fig.8

Sequence of signal lamps for all positions of The Function Switch.

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The Output Monitor.

This control (which is ganged with the On/Off switch) operates in conjunction with the CRT (by adjusting the sensitivity of the indication) and it enables the power output of the amplifier to be set to a desired mean level. A further use for this control is in the checking of the frequency response of a pick-up. Full instructions are given under "Operation".

The 60 C/S Tone.

Operation of this switch produces a low frequency tone which can be used for phasing a pair of loudspeakers for stereo operation (see "Operation")

Master Level Control

A ganged dual control which varies the level of both channels simultaneously.

Individual Level Controls.

The knob marked "Level" is split into two sections, one behind the other. The front knob controls the gain of the right-hand channel and the rear knob the left-hand channel. When playing stereo, the Master Level control should be set to approximately half way and the individual Level controls adjusted for correct balance, as described under "Adjustment of Balance".

Bass and Treble Controls.

Individually adjustable Bass and Treble controls with a wide range of adjustment are provided for each channel. Again, the front knob controls the 'R' channel and the rear knob the 'L'. With the knobs set to the "Flat" position the amplifiers assume a flat response characteristic.

Loudness Compensator Switch

Switching this to the 'In' position introduces a compensatory bass boost which becomes increasingly effective as the Master Level control is retarded. Operative on both channels.

Filter Switches.

In general these are used only when playing records. The Rumble filter operates upon both channels and is used to reduce the undesirable low frequency noise which an imperfect record playing motor may generate.

The Scratch filters may be switched in if it is necessary to reduce surface noise from records. An individual filter switch for each channel is provided. An additional use for the Scratch filters may occur when amplifying an AM radio which is producing heterodyne whistles. In many cases the Scratch filter will effectively reduce their nuisance value.

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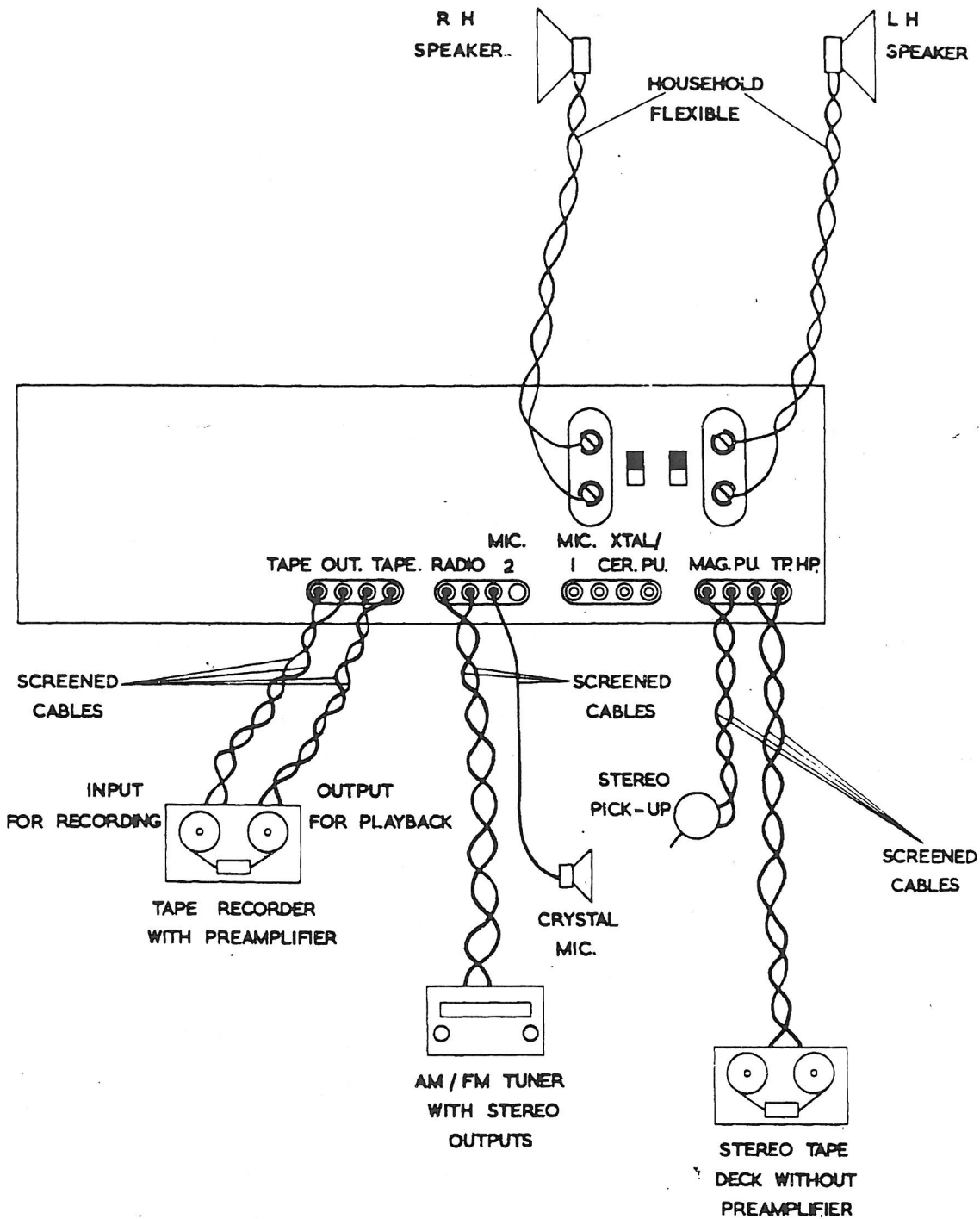


Fig. 9 * Typical connection of inputs to the E.M.I. Stereoscope Model 555. When connecting a pair of screened cables carrying a stereophonic input from radio, pick-up, tape head etc., it is advisable to twist the two leads together, as shown, to prevent the possibility of an increase in the hum level. This should only be done when using insulated covered screened cable.

OPERATION.

To Play Stereo Records.

Connect two identical loudspeakers, as described under "Installation", and connect one of the screened leads from the pick-up to the L. input sockets and the other to the R input sockets of the stereo pair appropriate to the type of pick-up being used.

Switch on the equipment by means of the Output Monitor/AC On/Off switch (one or more of the signal lights will then become illuminated) and allow a moment or two for the tubes to warm up, whereupon a trace or spot will appear on the CRT.

To begin, place the following five slide switches on the front panel to the "Out" (right-hand) position:

Rumble Filter
L Scratch Filter
R Scratch Filter
Loudness Compensator
60 c/s Tone.

Switch the Loudness Compensator or Filter switches into circuit later if the reproduction requires it. Set the Function switch to "Stereo" (or to "Reverse" if the pick-up or loudspeakers happen to be reversely connected).

The amplifier is now ready for use, but before playing stereo records it is advisable to adjust for loudspeaker phasing and balance, as described below.

Loudspeaker Phasing.

To ensure faithful stereo reproduction it is particularly important that the speakers used for the purpose are correctly phased with respect to each other. This is easily achieved with the E.M.I. Stereoscope Model 555:

Set the 60 c/s Tone switch to the 'In' position and the individual Level controls to half way. Advance the Master Level control until a loud low frequency note is heard from the loudspeakers. Adopt a position centrally between the two loudspeakers and operate, or have operated, the Speaker Phase switch. One of the two switch positions will yield a louder reproduction of the note. This is the correct in-phase condition of the loudspeakers.

Balance

For stereo reproduction it is essential that the outputs of the twin amplifier channels be the same. This is achieved in the E.M.I. Stereoscope Model 555 by a unique method of balancing using the CRT in

conjunction with an ordinary mono record.

With no signal input from the record player, set the Output Monitor/AC On/Off control to maximum, Master Level control to about half way, and the front and rear Level knobs to zero.

Using a stereo pick-up, commence playing a mono 33.1/3 or 45 r.p.m. record and advance the rear Level control until normal listening is reached. If necessary, re-adjust the Master Level in order to achieve this. The CRT will now bear a modulated trace extending from the center to the left.

Advance the front Level knob slowly from zero, whereupon the modulation will commence to shorten and eventually reduce to a vertical line. This is the correct point of electronic balance in the amplifier. If the knob is advanced further than this, the modulation will begin to extend to the right of the line.

The Output Monitor/AC On/Off control acts as a gain control for this operation and may be retarded or advanced to adjust the sensitivity of the CRT indication.

The Master Level control may be varied at will to control the level of reproduction without upsetting the balanced condition of the individual Level controls.

It must be pointed out that although the balance procedure detailed above will ensure a balanced output from the amplifiers, room acoustics and differing loudspeaker outputs may necessitate slight re-adjustment of the original setting when playing stereo records under normal listening conditions.

To Use with Stereo Tapes or Stereo Broadcasts.

To play stereo tape recordings each channel from the replay head of the tape deck should be connected via screened leads to the L and R sockets of the TAPE HEAD input. Alternatively, connection may be made to the output of a replay pre-amplifier, in which case the L and R sockets of the TAPE input should be used.

To use with the proposed new stereo broadcasts, connect the twin output from a stereo tuner unit via screened leads to the RADIO input pair.

Set the Input Selector switches to the type of input in use and all other controls as for playing stereo records.

To Play Monophonic Records.

Connect the pick-up screened lead to the L socket of the

XTAL PU or MAG.PU inputs, depending on the type of pick-up being used (see 'Input Connections')

If a single loudspeaker is to be used, connect it to the L loudspeaker terminals at the rear and link the top one to the R terminals, as shown in Fig.2 This is most important, for otherwise the R amplifier is unloaded and may suffer damage to the output stage. If two speakers are to be used, connect each to the terminal panels, as shown in Fig. 1.

Turn the rear Level knob to maximum (front Level control is inoperative). Set the Function switch to "MONO" and the LH Input Selector switch to the type of input being used i.e., "R.I.A.A." "78" or "OLD LP". The RH Input Selector switch is inoperative.

Start with the Rumble Filter, Scratch Filters, Loudness Compensator, and 60 c/s Tone switches in the "Out" position. Switch on the Output Monitor/AC On/Off switch and allow a moment or two for the equipment to warm up. Adjust the Master Level control for normal listening level. Switch the Speaker Phase switch to the position giving normal output if a single loudspeaker is in use, or to the in-phase condition (see "Loud-speaker Phasing") in the case of two loudspeakers.

The Treble and Bass controls may now be adjusted to suit individual taste. Only the rear knobs will have any effect, the front ones being inoperative under these conditions. If desired, the modulation may be observed on the CRT trace by advancing the Output Monitor/AC On/Off control.

To Play Monophonic Records with a Stereo Pick-up

Many record playing units contain a stereo cartridge and stylus suitable for playing both stereo and mono records. For this type, connection to the input of the amplifier may be made in either one of two ways:

- (a) Connect the left output of the pick-up to the L input socket of the PU stereo pair, and operate as for a mono pick-up.
- (b) Connect each pick-up output to their respective L & R sockets of the input pair. Set the Function switch to "MIXING".

The second method gives the most favourable results and should be used wherever possible.

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To Use with other Monophonic Inputs

Replaying Tapes: Connect the replay head of the tape deck via a screened lead to the L socket of the TAPE HEAD input pair. Alternatively connect the output of a replay pre-amplifier to the L socket of the TAPE input pair. Set the Input Selector (LH) to whichever of the above inputs is being used, and all other controls as for playing monophonic records.

Using with Microphone: Low output microphone (ribbon, condenser etc.,) normally use an input transformer, and this should be connected via screened lead to the L socket of the MIC. input pair. High output microphones (carbon, moving coil etc.) should be connected to the L socket of the MIC.2 input. Set the LH Input Selector switch to "MIC" and all other controls as for playing monophonic records. Do not rest the microphone on top of the amplifier, as this will cause extraneous noises to be reproduced, and may also produce unwanted feedback.

Using with Radio: Connect the output of an AM or FM tuner unit via a screened lead to the L socket of the RADIO input pair. Set the LH Input Selector to "RADIO" and all other controls as for playing monophonic records.

Using with Electric Guitars, Baby Alarms, Film Projectors etc: The most suitable input to use with these depends largely on the output and impedance of the particular attachment. In general, the output characteristics of the attachment should be checked against the input details given under "Specification", and connection made to the L socket of the input pair which approximates most closely to the conditions required. Switch the L input Selector to the chosen input and all other controls as for playing monophonic records.

To Use Two Monophonic Inputs Simultaneously

Owing to the fact that both amplifier channels in the E.M.I. Stereoscope 555 are functionally independent, it is possible to operate two services at the same time and, by means of the Function switch, to reverse them, switch or fade out one or the other, or mix them together. This is particularly useful when, for instance, a microphone input through one channel is to be accompanied by background music from the other or when two microphones separately placed on a stage are to be used simultaneously.

Each service should be connected to an L or R socket of the type of input required. There are two microphone input pairs (MIC.1 and MIC.2) and two pick-up input pairs (XTAL/CER.PU and MAG.PU) but only one microphone pair and one pick-up pair may be used at the same time.

Each loudspeaker should be connected, as shown in Fig.1, but in cases where a mixed output into a single loudspeaker is required, it should be wired as in Fig.2.

To obtain separate reproduction from two loudspeakers, set the Function switch to "STEREO" and the Input Selectors to the appropriate types of input. The rear and front Level controls may now be used to vary the level of each independently. Similarly, the Bass and Treble controls will have an independent effect upon the reproduction.

The Master Level control will continue to govern the maximum available sound from both channels.

To reverse the service from each speaker, switch the Function switch to "REVERSE". To switch off one service and leave the other, switch to "LEFT" or "RIGHT" as required. To mix the two services together, switch to "MIXING". In this position the combined output will be reproduced from the left speaker, the right becoming inoperative.

If only one speaker is being used, the Function switch may be set to "STEREO", "REVERSE" or "MIXING" to produce a mixed output, and to "LEFT" or "RIGHT" to select one service in exchange for the other. When one speaker is linked in this way, it is important to set the Speaker Phase switch in the position giving best quality reproduction.

If the output from both channels is taken from the Center Channel sockets to a tape recorder, the mixing and fading of two recording signals can be made, as described under "Output Connections".

To Measure the Audio Output.

A special feature of the E.M.I. Stereoscope Model 555 is that an indication of the actual output from the amplifier can readily be obtained for any setting of the controls. This is done by using a stereo or mono record and measuring the width of trace it produces on the CRT.

Such a facility is particularly useful when making accoustical assessments or comparing loudspeaker performance.

With no signal input, turn both Level controls to zero and the Master Level control to maximum. Set the Output Monitor AC/ On/Off knob to the level of output required. This is indicated on the front panel in watts (from the loudspeaker terminals). Set the Function switch to the appropriate input.

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Commence playing the record. Slowly advance one of the Level controls (belonging to whichever channel it is required to measure) until the peaks of the modulated trace on the CRT extend horizontally for, as near as can be judged, $\frac{3}{16}$ inch. To obtain a more accurate indication, draw a line (with a wax pencil) on the CRT face $\frac{3}{16}$ inch from the vertical trace prior to modulation. At this setting the amplifier channel is now producing the output at which the Output Monitor/AC/On/Off knob was set. When playing Stereo records, both channels may be measured simultaneously when the Level controls are adjusted for balance.

If two mono channels are being used, the other one can be set in the same way, but before doing so it is necessary to render the first inoperative, either by turning down the first Level control to zero or switching the Function switch to "LEFT" or "RIGHT".

An alternative way of using this facility is to read off on the Output Monitor/AC/On/Off scale the output being produced by any given setting of Level and Master Level controls. To do this, turn down one of the Level controls (or switch to "RH" or "LH"), commence playing a record, and slowly adjust the Output Monitor/AC/On/Off knob until the peaks of the CRT trace extend for $\frac{3}{16}$ inch. The figure now indicated on the calibration scale is the output power for the particular settings of the Level and Master Level controls. Repeat for the other channel, as described previously.

To Check The Frequency Response of a Pick-up

A further use for the calibration facility of the E.M.I. Stereoscope Model 555 is that of checking the frequency response of a pick-up:

Set the Bass and Treble controls to the "Flat" position and switch the Rumble and Scratch filters to "Out". Under these conditions the amplifier response is that indicated on the Input switch, and in the R.I.A.A. position a flat response would be produced from an LP test record. Commence playing a frequency test record and adjust the Level, Master Level and Output Monitor/AC/On/Off controls until a measurable trace is produced on the CRT.

By noting the width of the trace, which is proportional to the pick-up output, at the various test frequencies it is now possible to plot the frequency response of the pick-up.

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CIRCUIT DESCRIPTION

(refer to Schematic. Fig 10)

The Input Circuit

The seven input pairs are selected by Input Selectors SW5 for the L channel and SW6 for the R channel. The Inputs requiring maximum amplification (MIC, PU and TAPE HEAD) are fed via these switches to the control grids of the first pre-amplifier tubes, V10 and V11. Inputs requiring less amplification are fed to the second pre-amp. tube V.12, a double triode. The capacitors and resistors associated with SW 5 and SW6 provide automatic correction of the input impedances and characteristics as each input is switched into circuit.

The 60 C/S Tone Switch

In the grid circuit of V12 the 60 C/S Tone switch, SW12, introduces an AC voltage from the mains transformer when moved to the left-hand position. In the right hand position this same voltage produces the Y (vertical) deflection of the CRT trace. The AC voltage is amplified by the following stages in the normal way and serves as a test signal for phasing the loudspeakers.

Bass and Treble Controls

Each channel has separate Bass (RV 3 and RV5) and Treble (RV4 and RV6) controls in the grid circuit of V13. These are Baxandall feedback tone controls operating on the frequency selective potential divider principle, in conjunction with feedback from the anode of V13. Each control is variable over ± 15 db with reference to the "Flat" position.

Rumble Switch

The Rumble switch, SW7, controls the value of coupling capacitor linking the anode of V12 to the grid of V13. In the left-hand position of the switch, C40 and C42 are brought into the coupling circuit, thereby lowering the coupling capacity and reducing the response of the amplifier to very low (rumble) frequencies.

Scratch Switches

SW6 and SW9 switch into circuit a sharply tuned bridged-T filter in each channel, giving a roll-off of 40 db per octave above 7 kcs.

The Pre-amplifier Output Circuit

After pre-amplification by V10/V11 and the twin triodes V12 and V13, the signal from each channel converges via separate Scratch filter switches SW8 and SW9 and individual Level controls RV7 and RV10 to the ganged Master Level control RV8/9.

Loudness Compensator Switch

Master Level control, RV8/9 has fixed tapping points at the lower end of each track. These are connected to the Loudness Compensator switch, SW10. In the left-hand position of the switch R104/C55 and R105/C56 form a shunt path from the tapings, with the result that as the sliders of RV8/9 approach the lower end, the bass response is automatically compensated.

Function Switch

The sliders of Function switch wafers SW1 (c) and SW1 (d) receive the pre-amp signal from Master Level control RV8/9. The contacts of these two wafers are connected mainly to a further pair of wafers SW1 (e) and SW1 (f). This combination permits cross over of the inputs to the main amplifiers for the REVERSE position, and also the mixing or separation of the inputs for the other positions.

The Four Lights System

The four signal lamps LF1, LP2, LP3, LP4 have one common connection to filament winding "A" on TR2 and the remaining connections to the contacts of SW1 (a) and SW1 (b). The sliders of these wafers, which are connected to winding "b" on TR2, select the appropriate lamp or lamps according to the position of the Function switch.

Main Amplifier Circuit.

The pre-amplifier signal selected by the Function switch is passed to the control grids of the twin triode (one per channel) amplifying stage, V1. The cathodes of V1 receive inverse feedback across R8/R7 from the secondary windings of the output transformer TR1.

The top anode of V1 (carrying R3) feeds the grid of the left-hand section of V2, the phase splitter tube for one channel. The signal at the anode of this section is taken via C8 and R17 to the control grid of power amplifier tube V4 and, in addition, to the grid of the right-hand section of V2 via R18. The phase reversed signal which now appears at the anode of the right-hand section is fed to the control grid of V5, thus providing the anti-phase inputs required to operate V4 and V5 in push pull. Heavy inverse feedback is applied to the right-hand section of V2 by back coupling anode to grid through R19.

An identical arrangement is used for the other channel. The bottom anode of V1 feeds the left-hand section of V3. The signal at the anode of this section supplies the control grid of V6 and the grid of the right-hand section. The phase reversed signal now produced is fed to the other push-pull tube, V7 via C13, with feedback from R30.

The push-pull pairs for each channel, V4/5 and V6/7 are connected to tapped output transformers so as to provide ultra-linear operation.

Output Circuit

Each output transformer has two separate secondary windings and each pair is connected to one of the Impedance Matching switches SW 2 and SW3. With the switches in the high impedance (16-32 ohms) position, as shown, the two windings are connected in series with each other across the LS terminals. In the low impedance (4-8 ohms) position the windings are in parallel. The ends of the secondaries remote from earth supply feedback to V1 of their own and opposite channels.

The Speaker Phase switch, SW4, reverses the connections of one pair of LS output terminals to the output transformer secondary.

The Indicator Section

This is composed basically of the CRT (V9) and its associated signal amplifier V8.

A sample voltage is taken from the output transformers of each channel (top of R36 and R32) and fed to the ganged potentiometers RV1, RV2. These form the Output Monitor control, and their function is to vary the strength of sample signal being imposed upon the grids of the double triode, V8, which in turn governs the width of trace on the screen.

V8 amplifies the signals from each channel equally and feeds them via C20 and C22 to the X plates of the CRT. Also connected to the X plates are bias resistors R41 and R42 and metal rectifiers MR1 and MR2. The latter rectify the signal at the plates so that each channel causes the trace to be deflected in one direction only.

Vertical deflection of the trace is produced by an AC voltage from the 60 c/s Tone switch when in the "OUT" position. In the "IN" position the vertical deflection ceases, leaving a centre spot or a horizontal line, the extent and direction of which depends upon the settings of the controls.

The HT supply is derived from a bridge contact-cooled selenium rectifier with multi-stage smoothing circuit. The HT to the pre-amp section is stabilized by a neon (in conjunction with R112 and C64) to avoid switch-on surges.

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SERVICING.

Tube Replacement

It is advisable to check annually the performance of the output tubes in this amplifier. As the tubes are supplied in matched pairs it is important to keep the two pairs of tubes unmixed when having them checked. Similarly the tubes should be replaced only as a pair. Replacement of a single output tube will not cause damage, but is liable to put the amplifier performance outside the specification.

The output tubes may be inspected if there is a sudden increase in hum and noise level in the output, but before checking these tubes it is advisable to ensure that all screened connections are properly made and that the hum does not arise from an external source.

Fuse Replacement

Should the fuse blow repeatedly the amplifier must be serviced by an experienced technician. UNDER NO CIRCUMSTANCES SHOULD A FUSE OF DIFFERENT RATING BE USED.

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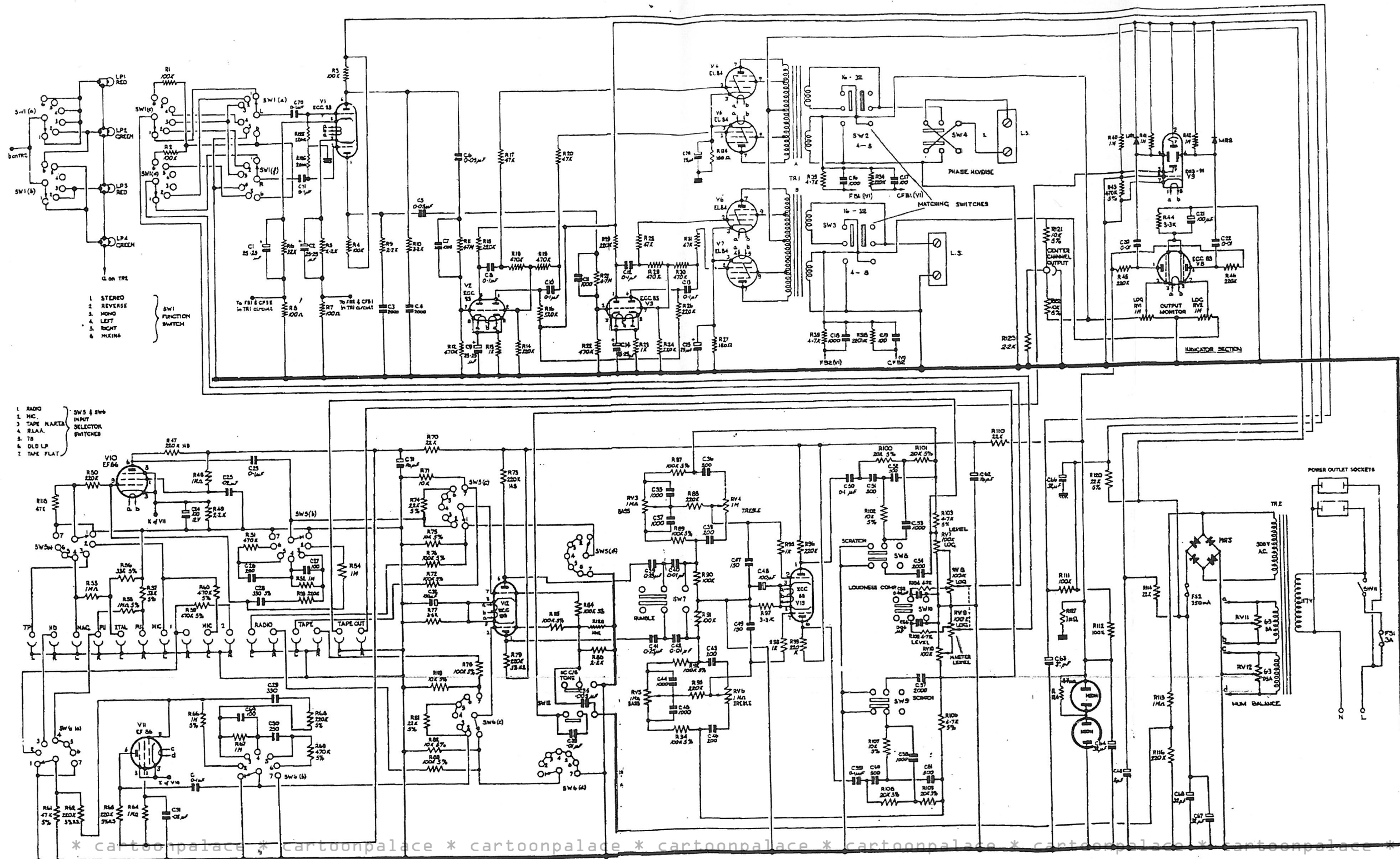


Fig.10 Schematic for E.M.I. Stereoscope Model 555.

All resistors are 20% \pm W unless otherwise stated. Capacitor values shown without a suffix, i.e. 100, 2,000, 150 etc., are in pfs and are 5% tolerance. Switches SW7, SW8, SW9, SW10, SW12, shown in 'IN' position.