



Projectionist's

OPERATORS INSTRUCTIONS.

R C A PHOTOPHONE LTD
ELECTRA HOUSE, LONDON, W.C.2.

OPERATING INSTRUCTIONS - LMI 9031

ROTARY STABILIZER SOUNDHEAD

The LMI 9031 soundhead is of the latest design, combining such features as: magnesium construction, RCA Rotary Stabilizer, built-in oil collection and drainage system, twin socket reversible printer lamp holder, adjustable projector mounting plate assembly, pre-focused projector lamp, and a drive gear assembly which can quickly be removed from the soundhead.

The motor, which is enclosed in a streamlined cover, is mounted on a bracket and can quickly be removed from the support without disturbing the soundhead mechanism.

OPERATING INSTRUCTIONS

RCA PHOTOPHONE

TYPE LMI-9031

All rotating shafts run in ball bearings. The centre shaft of the soundhead, to which the stabilizer is attached, and rotating apart, optical system. The Rotary Stabilizer is mounted on the main casting through facilities which allow for lateral movement thereby reducing the transmission of vibration to the optical system, so that any tendency to reproduce soundhead mechanical noise is eliminated.

A constant speed of the film and the scanning light beam is obtained by the use of the Rotary Stabilizer. The Rotary Stabilizer and the soundhead are mounted on a common shaft and set in motion by the rotation of the film on the outer surface of the drum. The Stabilizer consists of a cylindrical case of light metal alloy rigidly fixed to the shaft, and containing a heavy flywheel mounted on its end bearings so that it is free to rotate within the case. The small space between the flywheel and the case is filled with a high grade oil of a suitable viscosity so that the rotation of the case is transmitted via the viscous oil to the inner flywheel and the whole is hermetically sealed to prevent leakage. So little friction is required for the film to drive the stabilizer system that the film is never pulled back except at the start. Any tendency towards a change in the speed of the film is resisted by the inner flywheel and the viscous oil, which transfers of this resistance to the film. This feature in the film keeps constant to the scanning drum being positively maintained and insures the scanning point from any minute disturbances due to gears or sprockets, thus ensuring absolutely constant film speed.

Issued: December 1946.

R.C.A. Photophone Ltd.,
43 Berkeley Square,
LONDON, W.1.

OPERATING INSTRUCTIONS - LMI 9031

ROTARY STABILISER SOUNDHEAD.

The LMI 9031 soundhead is of the latest design, combining such features as streamline construction, RCA Rotary Stabiliser, built-in oil collection and drainage system, twin socket reversible exciter lamp holder, adjustable projector mounting plate assembly, prefocussed exciter lamps, and a drive gear assembly which can quickly be removed from the soundhead.

The motor, which is enclosed in a streamlined cover, is mounted on a bracket and can quickly be removed from its support without disturbing the soundhead mechanism. The motor switch is mounted independently on the motor bracket and protrudes through the streamlined cover on the operating side at a point convenient for operation. Speed variations are smoothed out by a heavy flywheel mounted on the motor shaft and a brake is provided so that the soundhead mechanism may be brought to a standstill quickly.

All rotating shafts run in ball bearings. The centre plate of the soundhead, to which is attached the exciter lamp mounting board, optical system, Rotary Stabiliser, and photocell, is fixed to the main casting through resilient cushions of oil resisting material thereby reducing the transmission of mechanical vibration to foregoing components, so that any tendency to reproduce soundhead mechanical noise is prevented.

Constant speed of the film past the scanning light beam is obtained by means of the Rotary Stabiliser. The Rotary Stabiliser and the sound take off drum are mounted on a common shaft and set in motion by the friction of the film on the outer surface of the drum. The Stabiliser consists of a cylindrical case of light metal alloy rigidly fixed to the shaft, and containing a heavy flywheel mounted on its own bearings so that it is free to rotate within the case. The small space between the flywheel and the case is filled with a high grade oil of a suitable viscosity so that the rotation of the case is transmitted via the viscous oil to the inner flywheel and the whole is hermetically sealed to prevent leakage. So little friction is required for the film to drive the stabiliser system that the film is never pulled taut except at the start. Any tendency towards a change in the speed of the film is resisted by the inner flywheel and the viscous oil ensures smooth transfer of this resistance to the film. This results in the film loops adjacent to the scanning drum being positively maintained and isolates the scanning point from any minute disturbances due to gears or sprockets, thus ensuring absolutely constant film speed.

RX 1028

RX.1028

THREADING SOUNDHEAD

a) Open the lateral guide and pressure roller by pulling outward on the latch knob and moving the assembly back toward the exciter lamp compartment. Open both pad roller assemblies by pulling them, against the snap action of their springs, away from the associated sprockets.

c) Allow a loop between the projector head lower sprocket and the soundhead constant speed sprocket such that when the pad rollers are down, and the lateral guide and pressure roller is latched in place, firm pressure against the film just above the drum will not quite bring the film into contact with the photocell lens holder. This loop should be carefully and accurately set as, if it is too large, the film will rub against the photocell lens holder and be scratched, and, if it is too small, there is a risk of lifting the lateral guide and pressure roller off the drum with resultant "sprocket tooth noise" or "wows".

e) Allow a four sprocket hole loop between the constant speed sprocket and the take-up sprocket so that any irregularities in the take-up reel are not transferred to the constant speed sprocket.

RX 1028

SOUND-HEAD ADJUSTMENTS.

Exciter Lamps

No adjustment of exciter lamps is necessary, as a pre-focussed type of lamp is used.

Focussing of Light Beam

Alterations to the focus of the optical system may only be carried out by the Service Representative, since correct adjustment can only be obtained by the use of special test gear.

Pad Rollers

To obtain proper clearance between a pad roller and its associated sprocket, proceed as follows:-

a) Thread two thicknesses of film in the soundhead and adjust each pad roller by means of the set screw in the arm, so that when closed, the pad rollers rest lightly against the film. In the case of the double pad roller, should one roller come into contact with the film before the other, the roller closest to the sprocket should be adjusted for the proper clearance.

b) Tighten the locking nut on each set screw.

Adjustment of Lateral Guide and Pressure Roller

The position of the lateral guide roller determines the alignment of the sound track with the light beam and is therefore critical. Correct adjustment necessitates special equipment and should only be carried out by the Service Representative.

Adjustment of the Feed Magazine Spindle

The tension on the film is maintained by a spring, and its adjusting nut, on the non-operating end of the feed magazine spindle and should be just sufficient to prevent the reel from feeding film faster than it is taken up by the upper feed sprocket.

The adjustment may be checked by loading and threading a full reel of film, running up to speed and switching off. No excessive accumulation of film should take place between the reel and the upper feed sprocket.

Should the film accumulate, increase the tension on the spring by tightening the adjusting nut until proper film tension is obtained.

Adjustment of the Take-up Mechanism.

Correct adjustment of the take-up reel, by means of the spring and its adjusting nut on the non-operating end of the take-up magazine spindle, should provide just sufficient tension to prevent the formation of a loose loop of film in the magazine.

The Adjustment should be checked when the take-up reel is nearly full, i.e. tension is at a minimum. If a loose loop forms increase the tension on the spring by tightening the adjusting nut.

Care must be taken that excessive tension is not present or applied during adjustment since undue wear or even damage to the film will result.

CARE OF SOUNDHEAD

Always keep the soundhead scrupulously clean and properly oiled as the continuous good performance of the soundhead will repay any effort spent in its care.

OILING: The oil gauge on the non-operating side of the soundhead should be checked each day before attempting to operate the machines to make sure that the oil level in the gear box is at the point shown by the mark on the glass whilst the soundhead is stationary (the oil level will drop when the soundhead is running). RCA Stock No. 25551 oil should be used.

The oil cup on the projector drive gear shaft should receive two drops of the same oil used in the gear box, at least once each day.

A small oil hole is provided at the end of each pad roller spindle, and there is also a small oil hole on each pad roller arm adjacent to the main fixing screw. These oiling points should be lubricated daily with one small drop of oil applied by means of a tooth pick or similar pointed article.

EXCITERLAMPS: The exciter lamps used are the pre-focussed type (Cat.28050) which require no further adjustment after insertion in the exciter lamp socket. To instal an exciter lamp, insert the lamp in the socket so that the pins on the socket enter the holes in the circular lamp base, then twist the lamp to lock it in position. A spare lamp should always be kept mounted in the extra socket of the exciter lampholder, so that it is only necessary to reverse the holder to place the spare exciter lamp in operation.

OPTICAL SYSTEM: The optical unit lenses, photocell lens, photocell and exciter lamps should be cleaned with lens cleaning tissue.

LATERAL GUIDE AND SOUND TAKE-OFF DRUM: The sound drum should be kept thoroughly clean as foreign matter on the drum, such as lint, dirt, or film emulsion may cause poor quality sound, such as noise "flutter" or "wows". Never use any metallic instrument such as a knife, screwdriver, etc., for cleaning purposes, as any scratches made on the drum may cause scratches on the film.

LIGHT SHIELD: This is located between the film and the photocell lens to prevent stray light from entering the photocell. There should always be a small clearance between the curved surface of the light shield and the sprocket hole portion of the film overhanging the drum. Care should be taken to avoid altering the location of the shield when cleaning the lenses or drum. Also the V notch in the shield must be kept free from particles of lint or dirt to allow full clearance for the light beam.

DRIVE MOTOR: The lubrication requirements of the soundhead drive motor will depend upon the type of motor fitted. Motors with grease-packed ball races should, under normal conditions only require greasing during routine inspection by the service engineer; other types should receive two drops of oil on each bearing once a week. It is recommended that each soundhead motor should be "warmed up" by running for ten minutes or so before using the equipment for show purposes.

IMPORTANT: After the end of the day's performance, the lateral guide and pressure roller assembly should be left in the "open" position.

OPERATING INSTRUCTIONS

RCA PHOTOPHONE

LG 230 - EQUIPMENT

Issued: January 1947

RCA Photophone Ltd.,
43 Berkeley Square,
London,
W.1.

RX1027

FOREWORD

It is a well recognised fact that the operation of any machine depends upon the knowledge and ability of the operator. Usually the manufacturer has no responsibility for, or control over, the selection of the operator and therefore cannot be responsible for the knowledge of that operator. On the other hand, the ability of the operator is directly dependent upon his knowledge of the machine, and it is the responsibility of the manufacturer to make available such information concerning his product as is necessary for its intelligent operation.

In presenting this booklet, RCA Photophone Ltd. aims to give in elementary terms a comprehensive description of its apparatus and an understanding of the operation of this apparatus. It is also our aim to give this information in such a fashion as to enable the projectionist intelligently to recognise, locate and remedy such minor defects as might occur during the operation of the equipment and to keep the equipment in the best operating condition.

Your Service Engineer, and our whole Service Organisation are available and anxious at anytime to give all possible assistance to you in your duties and we trust that you will not hesitate to avail yourself of our co-operation if any difficulties arise in the use of this apparatus.

OPERATING INSTRUCTIONS FOR LG230 EQUIPMENT

The RCA Photophone LG230 reproducing equipment represents the latest development in High Fidelity reproduction and is designed to meet the needs of the medium sized theatre.

In accordance with modern practice it is entirely A.C. operated and where D.C. voltages are required these are provided by suitable internal circuits. The design has been based on 50 cycle A.C. supply which is almost universal in this country. Where the supply is D.C. a rotary converter supplying 200/240 volts, 50 cycle A.C. power is necessary.

The LG230 equipment incorporates a number of advances in the design of High Fidelity reproducers the salient features of which may be summarised as follows:-

- a) The LMI-9031 Soundhead, an up-to-date model of high performance, reliability and appearance.
- b) The use of low-capacity cables to feed the audio-frequency signal between units, thus eliminating photocell transformers, increasing reliability, and permitting convenient location of the amplifier rack.
- c) A wide-range of frequency compensation is available to suit the individual requirements of the auditorium.
- d) Modern permanent magnet loudspeakers with improved performance, obviating the necessity to provide D.C. field energising power.
- e) An exciter lamp supply unit using a selenium rectifier of great reliability.
- f) The provision of a complete emergency amplifier system which gives a continuous indication of its availability by acting as a monitor amplifier under normal conditions.

GENERAL TECHNICAL DESCRIPTION

The main items of the equipment with the exception of the Soundheads, Fader Switches, Volume Control and Loudspeakers, are all mounted on the LMI-9324 Amplifier Rack. Reference should be made to the Block Diagram of the complete equipment at the end of these instructions.

LMI-9031 Soundhead

Full details of the soundhead will be found in the RCA Photophone publication "Operating Instructions for LMI-9031 Rotary Stabilizer Soundhead."

Two of these streamlined, totally enclosed, rotary stabilizer soundheads are used and the outputs of the RCA-868 photocells are

fed via low-capacity cables to the input network located in the LMI-9725 Volume Control Unit.

LMI - 9725-Volume Control Unit.

In addition to housing the volume control proper, the unit contains a balancing network for equalizing the soundhead outputs by adjustment of the photocell polarizing voltages. The volume control is a T-pad attenuator fitted with an extension rod and two control knobs enabling it to be used from either operating position. It is located electrically between the output of the LMI-9333 pre-amplifier and the input of the LMI-9358 power amplifier. These units are situated in the LMI-9324 Amplifier Rack.

LMI 9537-Exciter Lamp Supply Unit

This unit is located at the bottom of the main amplifier rack and provides a filtered D.C. power supply for the soundhead exciter lamps. It employs a selenium rectifier in place of the more usual valve type rectifiers and this feature renders it extremely reliable in operation.

A mains input fuse, consisting of a 3-amp glass cartridge fuse mounted in a bakelite holder, protects the circuit generally while individual fuses for the two large-capacity electrolytic condensers are clip-mounted on the panel.

The two exciter lamps are connected in series across the supply, but one of them is always shunted by the "pre-heat" resistor thus reducing the filament temperature so that no light is emitted. Reversal of either of the LMI-1708 Fader Switches changes this resistor from one lamp circuit to the other and the preheated lamp comes almost instantaneously to working brilliance.

LMI-9333 Pre-Amplifier and LMI-9358 Power Amplifier.

These two units have been designed to work as a complete amplifier channel with an overall frequency response characteristic of high quality which may be set up in accordance with the requirements of the auditorium.

A common power supply unit employing a pair of RCA 5U4G Radiotrons is located in the power amplifier and supplies all the necessary valve voltages. The polarizing voltage for the photocells is obtained from this source but is first passed to the pre-amplifier where it is stabilised by an RCA VR150/30 Voltage Regulator. A 3-amp glass cartridge type fuse is provided, and is readily accessible in a bakelite mounting on the front of the power amplifier chassis.

The LMI-9333 pre-amplifier consists of two RCA-1620 (6J7) Radiotrons in cascade and the input, interstage, and output couplings contain variable elements which enable the frequency response to be determined by the position of link strips on the front of the chassis. The output of the pre-amplifier is taken by screened cable to the volume control unit and then, attenuated to the desired level, returned to the input stage of the power amplifier.

In the power amplifier two RCA1620 (6J7) Radiotrons connected as triodes act ~~one~~ as an amplifier, the other as a conventional phase inverter and provide a push-pull input to the power stage. A tuned voice frequency filter for either 125 or 250 cycles may be inserted in the cathode circuit of the first 1620 when this is desirable. The output stage consists of four RCA 1622 (6L6) Radiotrons in a Class A parallel push-pull circuit terminated by a suitable transformer matching it to the LMI-9482 Crossover Unit. Negative feedback from a tapping on this transformer to the first RCA1620 Radiotron is used to ensure the absence of harmonic distortion.

A feature of the power amplifier is the valve checking facilities which enable the operator to see at a glance whether the conditions in each valve circuit are normal. The test switch places the meter across a portion of the cathode circuit of each valve in turn and so gives a reading which will vary if the cathode current varies. The test meter is marked in three sectors; a central green sector indicates normal conditions, while outer red sectors indicate inadequate or excessive currents. The first six positions of the test switch correspond to the valves V1 to V6 as marked on the power amplifier chassis, while the seventh position gives a check on the current supplied to the pre-amplifier.

LMI-9257 Monitor-Emergency Amplifier

The monitor emergency amplifier fulfils a double function and is a high gain amplifier capable of delivering a 15-watt power output when required. Under normal conditions a small fraction of the output of the power amplifier is fed to this unit where it is re-amplified and drives the monitor loudspeaker. By this means, in addition to monitoring, a continuous indication is given to the operator that the unit is available as an emergency amplifier should the need arise.

Two RCA-1620 Radiotrons resistance-capacity coupled in cascade form the initial voltage-amplifying stages and are followed by an RCA-6SN7-CT Radiotron. This latter is a double triode used as an amplifier and phase inverter to supply a suitable input to the two RCA-1622-Radiotrons in the push-pull output stage. Matching to the loudspeakers is effected by the output transformer which has separate tappings for the monitor loudspeaker and the crossover network.

The amplifier is self-contained as regards power supplies and utilizes a single RCA5U4G as rectifier. Polarizing voltage for the RCA868 Photocells in the soundheads is provided during emergency operation.

A 2-amp glass cartridge type fuse is provided and is mounted in a bakelite holder on the chassis between the RCA-1622 Radiotrons.

The LMI-9384 Emergency Switch Panel located immediately below the pre-amplifier provides switching facilities for emergency working. Throwing the emergency switch to "Emergency" disconnects the pre-amplifier and power amplifier units and substitutes the monitor amplifier in their place. The normal volume control is now inoperative and the monitor amplifier volume control is used to regulate the sound level in the auditorium, while a small volume control on the emergency switch panel is used for the monitor loudspeaker.

Loudspeakers

The loudspeakers are the latest development in the "two-way" type of loudspeaker system and are fed from the cross-over unit in the amplifier rack via matching transformers located inside the low frequency baffle.

The crossover network divides the output so that the low frequencies are fed to the L.F. speaker and the higher frequencies to the H.F. speaker.

The high frequency loudspeaker mechanism, an efficient permanent magnet type with a strong but very light plastic diaphragm, is coupled to a multi-cell exponential horn by a special throat and proper distribution of the higher frequencies throughout the auditorium is ensured by this means.

The low-frequency baffle is of the folded type with a large permanent magnet mechanism and is capable of handling large amounts of power with faithful reproduction of the very low frequencies.

Spares Cabinet

A complete set of consumable spare parts together with a spares cabinet is provided with the equipment. These include all items likely to be required urgently and it is in your interests to see that all spares are immediately replaced.

OPERATION

- a) It is recommended that the amplifier should be switched on and checked some time before the performance begins. This will permit all components of the equipment to reach a stable temperature and allow time to ascertain that the system is in proper operating condition.
- b) Before switching on ensure that both motor switches are in the "off" position and that the emergency switches, one on the emergency switch panel and one on the crossover network panel, are in the "Normal" position.
- c) Switch on the AC mains supply at the double pole switch fuse between the theatre ~~mains~~ and the distribution board.
- d) Switch on the amplifier at the main switch in the top righthand corner of the main amplifier rack, and, as soon as they have warmed up, check the power amplifier valves by means of the test meter and switch.
- e) Check that sound is available from each soundhead by interrupting the light beam between the optical system lens and the photocell with a pencil or similar object, with the fader switch in the appropriate position. Plug in and test any non-synchronous equipment which may be fitted.
- f) Clean and oil the soundheads, check that both motors start properly and allow them to run for approximately ten minutes before threading film for a performance.

g) By means of the fader switch "fade" the sound away from the soundhead to be used first and thread the film in the manner described in the Operating Instructions for the soundhead. Set the main and monitor volume control to the appropriate settings which give the desired sound level in the auditorium and the projection room.

h) When the performance is to commence start the motor of the first soundhead by means of the switch on the side of the streamlined motor cover, and when the motor has reached full running speed (in approximately two seconds) bring the soundhead into action by reversal of the fader switch.

i) If necessary, adjust the sound level in the auditorium and the projection room by the appropriate volume control.

j) Musical reproduction is usually more pleasing when delivered at a somewhat higher volume level than dialogue. Recordings of the type known as "Hi-Range" cater for this by an intentional reduction of about 6Db. on dialogue passages. Such prints require to be reproduced at a higher volume setting than normal prints so that the dialogue is at the usual level and musical passages will then be automatically raised without any action by the operator. With normal prints it may sometimes be desirable to introduce this effect manually in which case the changes should be made at such times as to be least noticeable and only on rehearsed cues.

k) Changeover is effected in the normal manner, the motor of the second projector being started when the motor cue appears, and either fader switch reversed on the appearance of the changeover cue.

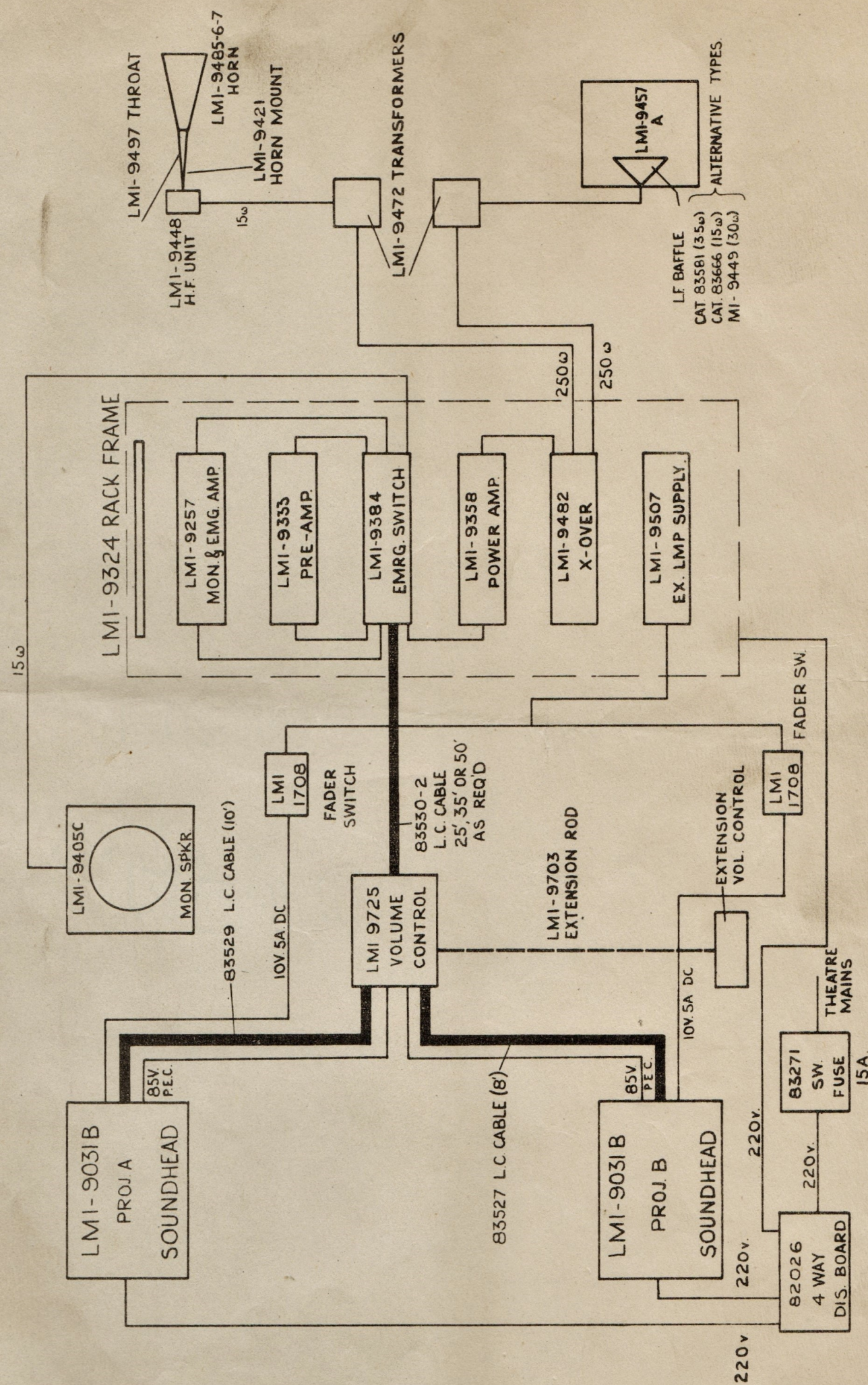
l) The equipment may be used in conjunction with non-synchronous turntables. The output of the non-synch is injected into the sound system by means of a plug and jack on the left-hand side of the volume control unit. This plug must always be removed before sound reproduction from film is commenced.

EMERGENCY OPERATION

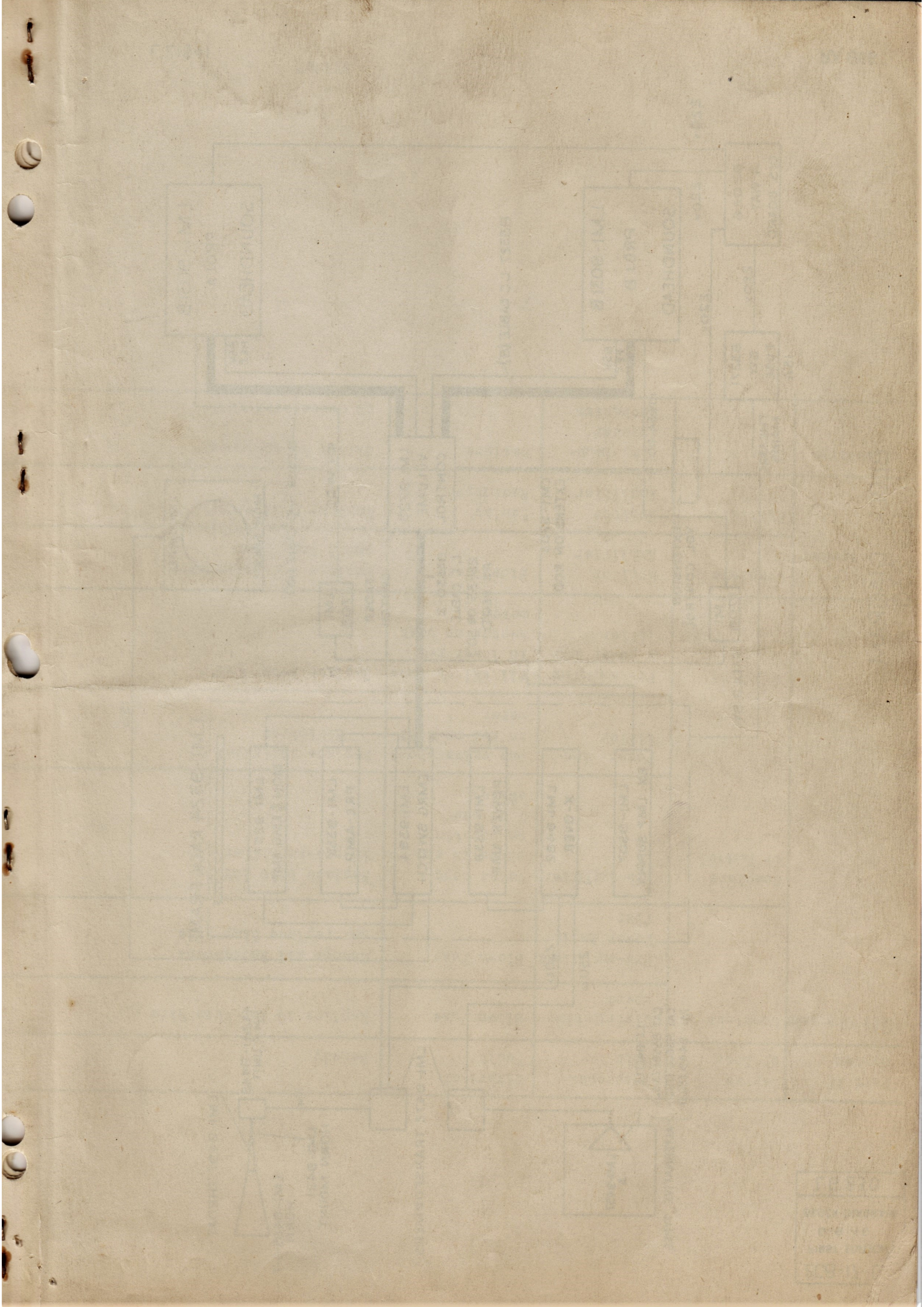
The complete or partial failure of any part of the main amplifier system is allowed for by the provision of the monitor - emergency amplifier. Switching to "Emergency" on the emergency switch panel is all that is necessary to bring the equipment back into action.

If the H.F. loudspeaker should fail for any reason then the switch on the cross-over network panel is thrown to "Emergency" and the full frequency range is then supplied to the low frequency unit.

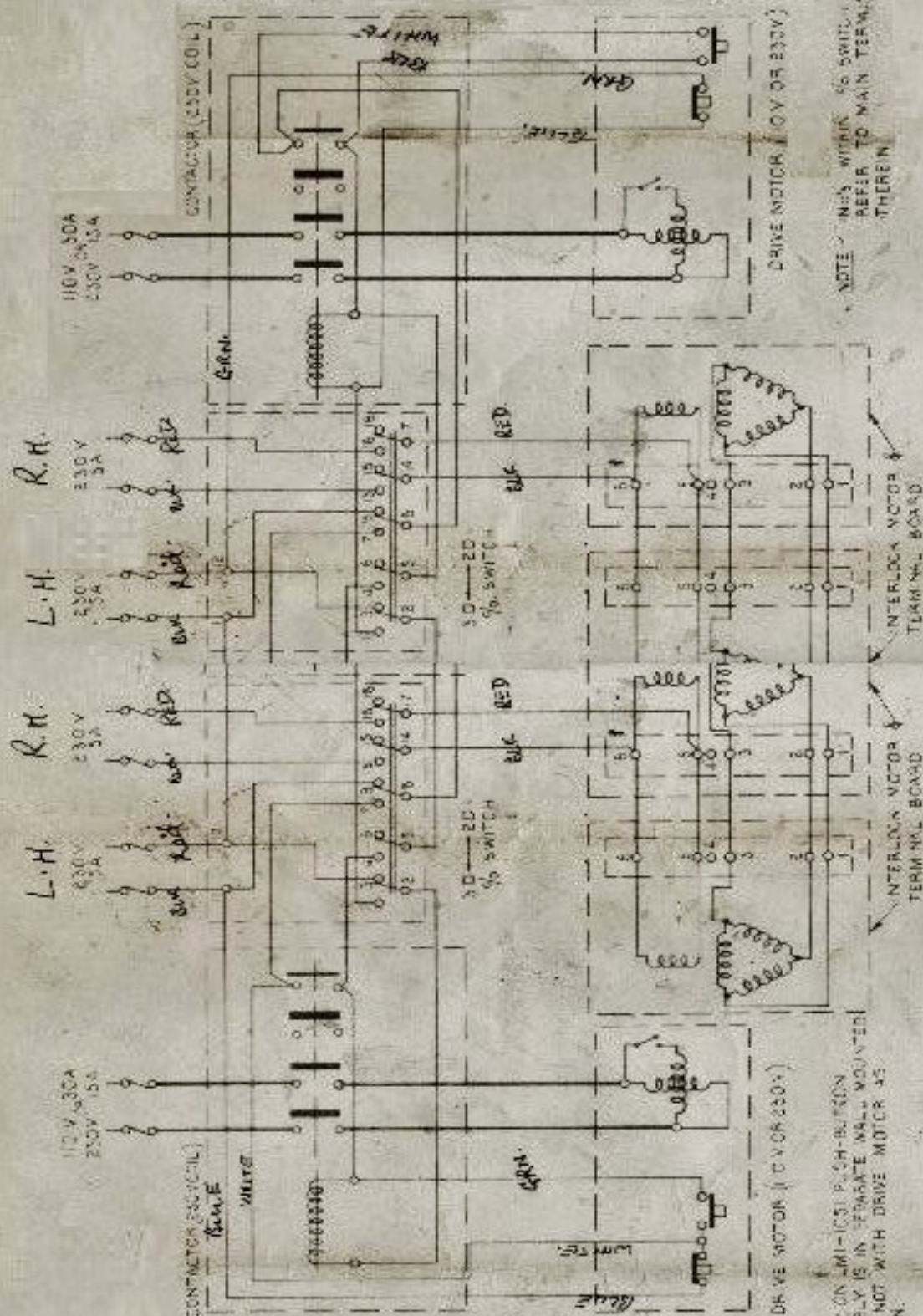
In either case the service representative should be notified immediately so that normal working can be resumed as early as possible.



BLOCK DIAGRAM
 LG 230







REVISIONS	DATE	BY	CHKD	APP	DATE
1	19-5-53	BTB	AC		

SCHEMATIC-MOTOR WIRING
FOR 2D/3D CONVERSION
LMI/MI-9031 & LMI/MI-1051
SOUNDHEADS

RCA PHOTOPHONE LTD.
LONDON

C 12478