Film-Tech

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Norelco®

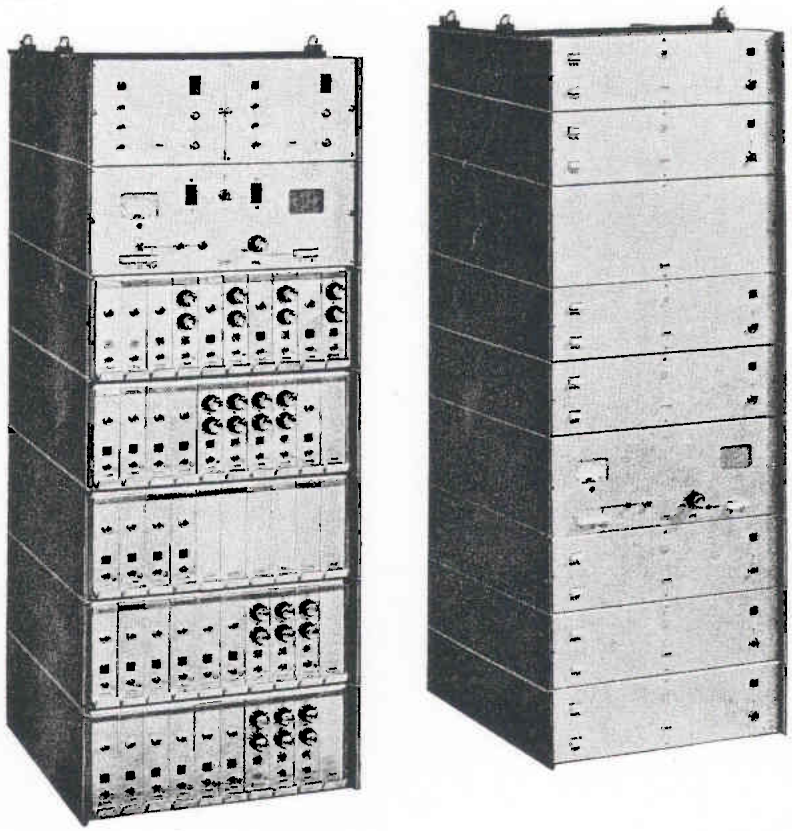
All Transistor Theatre Sound System Type "OMA 6"

QUEEN'S THEATRE - MANCHESTER.

INSTALLATION INSTRUCTIONS

Norelco® MOTION PICTURE EQUIPMENT DIVISION
NORTH AMERICAN PHILIPS COMPANY, INC.
100 EAST 42ND STREET, NEW YORK, N.Y. 10017
TEL. (212) OX 7-3600

All Transistor Theatre Sound System Type "OMA 6"



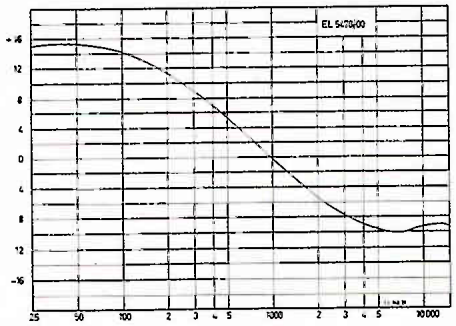
Equipment consists of:
- EL 5373 pre-amplifier cabinet,
- EL 5374 output amplifier cabinet,
- EL 5463 six-channel volume control with extension.

It is suitable for the reproduction of:
- Optical sound track on 35 mm film.
- Four magnetic sound tracks on 35 mm film.
- Six magnetic sound tracks on 70 mm film.
- Three possible non-sync. sound sources, e.i. record-players, microphones or tape recorders.

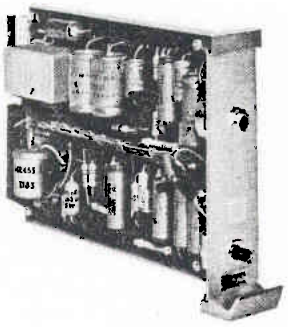
Principal features
- Perfect sound reproduction.
- Maximum reliability.
- Small dimensions.
- Easy operation.
- Minimum maintenance.
- Built-in testing facilities.
- Great versatility.
- Suitable for:
  - all conventional line voltages and frequencies,
  - remote control,
  - use under tropical conditions.
- Easily adaptable to projectors and loudspeakers other than Norelco.

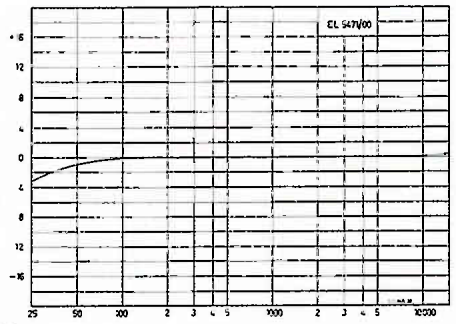
Norelco® MOTION PICTURE EQUIPMENT DIVISION

NORTH AMERICAN PHILIPS COMPANY, INC.

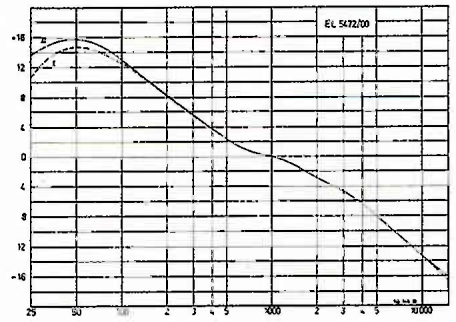


Magnetic pre-amplifier

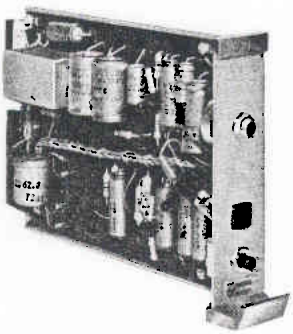


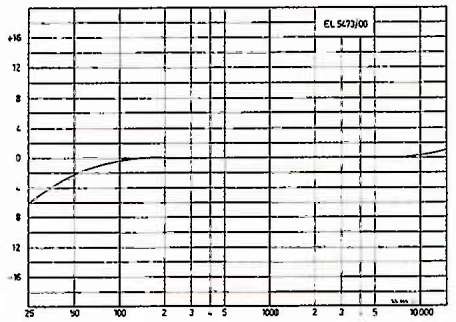


Optical pre-amplifier

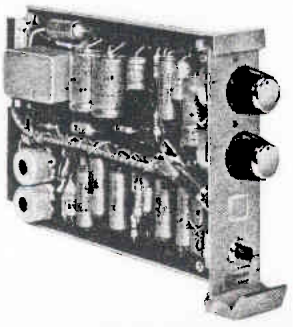


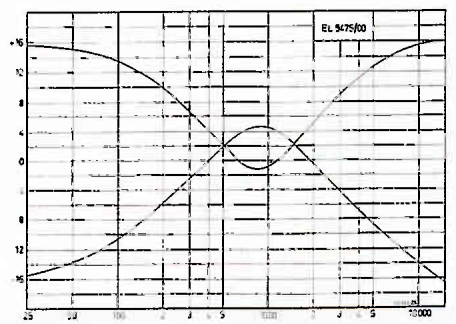
Record player pre-amplifier





Microphone pre-amplifier





Equalizing unit

Perfect sound reproduction

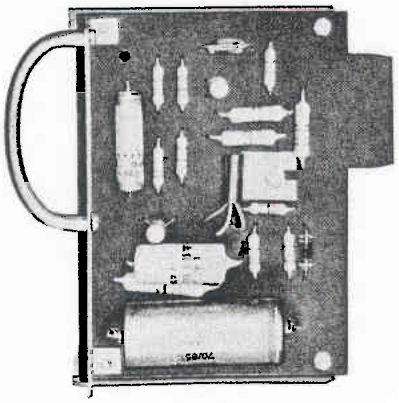
In this equipment each sound track and each non-sync. sound source has its own pre-amplifier with adjustable gain. The sound volume of all the signals can therefore be set accurately to the same level. Each film channel and each non-sync. sound channel has furthermore its own equalizing unit. Consequently the frequency responses of all the channels can be adjusted independently to provide the best possible adaptation to the prevailing acoustics of the auditorium and to the characteristics of the recorded sound.

In addition, the circuitry is such that optical sound tracks can, if desired, be reproduced via the output amplifiers and loudspeakers of channels 1 - 2 - 3. At the full output of 40 watts per channel the distortion is less than 1.5 %. The frequency response of the output amplifiers is flat from 40 to 12,000 c/s. The hum-and-noise level is very low.

The supply voltages for the photocell, the exciter lamp, the pre-amplifiers and the equalizing units are regulated, making the sound reproduction independent of line-voltage fluctuations.

Change-over between projectors and mode selection (i.e. optical, 4 or 6 track magnetic reproduction) takes place after the pre-amplifiers at a level of 80 mV, an impedance of 5000 ohms and without the use of relays in the sound circuit. In this equipment all the switching operations in the sound circuits are done by LDRs (light dependent resistors) which assures click-free operation.

An LDR unit consists of a cadmium sulphide cell and a 6 Volt lamp. When the cell is not illuminated its resistance is very high but drops to a low value when illuminated. Such cells are inserted in series with the outputs of all the pre-amplifier and equalizing units. A signal is allowed to pass by the switching on of all the LDR lamps of the units in its path. This is effected by means of flip-flops which are transistorized switching elements without moving parts.



Flip-flop

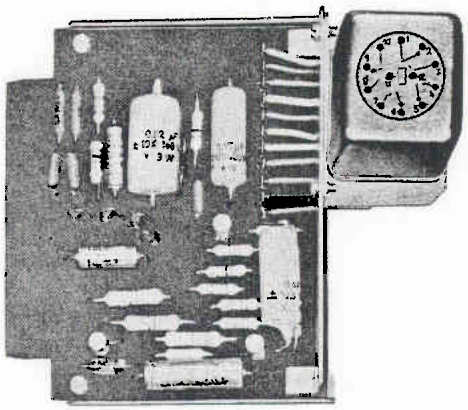
Maximum reliability

With this equipment utmost reliability — so important in theatres — is achieved by the use of:

- LDRs instead of relays,
- transistors instead of vacuum tubes,
- printed circuits instead of ordinary wiring,
- plug-in units (100 % spares optional).

The LDRs, unlike relays, contain no moving parts or switching contacts. The 6 Volt LDR lamp operates at a voltage of 5 Volts. Because of this conservative rating, the lamp has a very long life.

Only one relay per projector is used for change-over of the exciter lamp and dowser power supply. A complete installation contains therefore, at the most, three relays. These are housed in air-tight containers and have shown no measurable wear after life tests exceeding 250,000 operations. As illustrated below, the relays are of the plug-in type.



Relay unit

Transistors contain no components subject to deterioration, such as the filaments in vacuum tubes, hence their life expectancy is many times longer.

The use of printed wiring prevents short-circuits, such as may occur with ordinary wiring due to worn insulation. Soldered connections are also much more reliable.

Spare plug-in units are available for the pre-amplifiers, the output amplifiers, the equalizers, the power-supply, the relays and flip-flop units.

Small dimensions

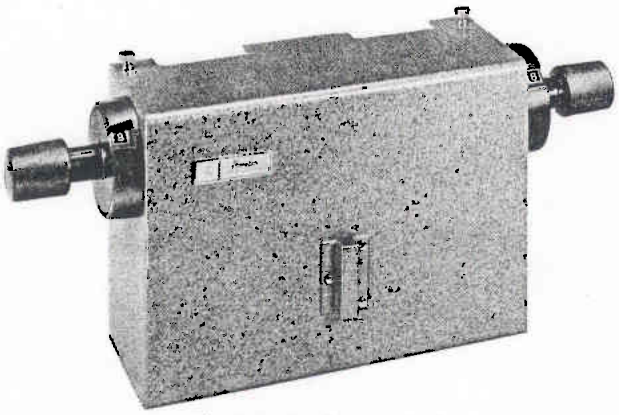
Because of the use of transistors and printed wiring, this equipment is much more compact than ordinary vacuum tube systems. Consequently it readily fits into rather small projection booths. The dimensions of the various versions are shown on the back page.

Very easy operation

A push-button is located near each sound source. By simple pressing it, a path is opened for the relevant sound signal while the paths of other signals are simultaneously blocked. The push-buttons near the projectors serve at the same time for opening the relevant dowser so that picture and sound are changed over simultaneously from one projector to the other.

A preselector switch near each projector makes it possible to choose the desired sound system — 35-mm optical or magnetic, or 70-mm magnetic — prior to change-over. With the Norelco 70/35 mm projectors, this switching can be arranged to operate automatically so that the projectionist need not switch manually.

The equipment is switched on by a master power switch on the pre-amplifier control panel and the volume is adjusted via the six-channel volume control.



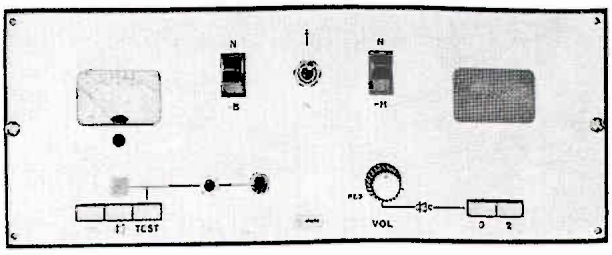
Six-channel volume control

Minimum maintenance

As this equipment contains only three relays (one being a spare) and no tubes, maintenance involves nothing more than keeping it clean.

Built-in testing facilities

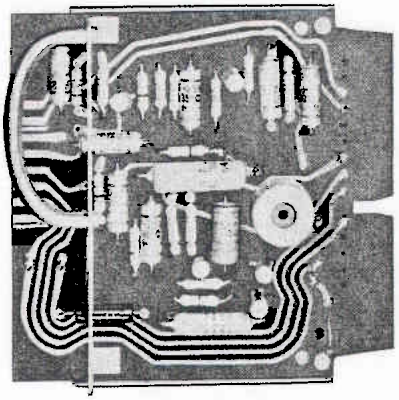
Normally the spare output amplifier is used as a monitor amplifier to which the monitor loudspeaker is connected. A monitor volume control is provided on the output amplifier control panel. On this panel there are also two push-buttons marked "2" and "0". The circuitry is arranged so that when button "2" is pressed, the mixed output of the six channels is reproduced by the monitor loudspeaker. When button "0" is pressed, any channel may be monitored separately by also pressing the "MON" button on the relevant output amplifier. In addition, the output can be read on the dB-scale of the meter on the control panel.



Control panel of pre-amplifier rack

Behind the control panels of both the pre-amplifier and the output amplifier cabinets there is an oscillator/measuring amplifier, also constructed as a plug-in unit. All the pre-amplifiers, equalizing units and output amplifiers are provided with a test button. When this button is pressed the oscillator supplies a 1,000-c/s signal to the input of the relevant unit and the output of the latter is connected to the built-in meter via the measuring amplifier. The normal reading on the meter will be 0 dB ± 1 dB.

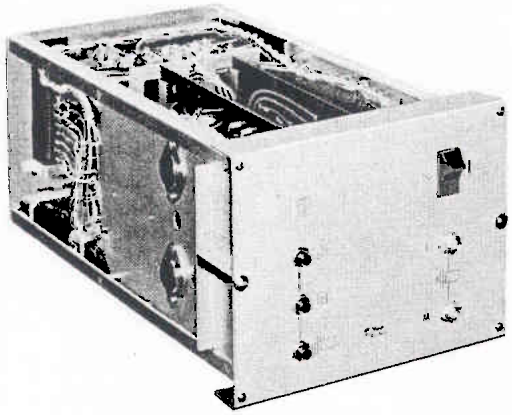
After the relevant test button on the power supply unit has been pressed, the photocell voltage, the exciter lamp current and the supply voltages for the pre-amplifiers may be read on the meter in the pre-amplifier control panel.



Oscillator/measuring amplifier

Great versatility

The pre-amplifier cabinet always contains three optical pre-amplifiers and three relay units, so that in a normal installation comprising two 70/35-mm projectors, there is always a spare pre-amplifier and relay unit available. A further advantage is that an additional 35-mm projector for optical sound can be connected without modification of the sound system. This projector can, for example, be used for showing a supporting program on 35-mm film before the main 70-mm feature. This makes it unnecessary to convert



Power-supply unit

the 70/35-mm projectors from 70 to 35-mm reproduction and vice versa.

On request the equipment can also be supplied for:

- three 70/35-mm projectors or
- two 70/35-mm projectors and one 35-mm projector for optical and four-track magnetic sound.

Line voltages and frequencies

The equipment is suitable for supply voltages of 110 - 125 - 220 - 250 V and with frequencies of 40 to 100 c/s.

Suitable for use under tropical conditions

The equipment is suitable for indoor use at an ambient temperature of up to 95° F and an air humidity of up to 100 %. For higher temperatures —up to 113° F—the output amplifier rack can be equipped with an additional ventilating unit.

Facilities for remote control

A great advantage of the flip-flops is that any desired number of remote controls can readily be connected to them, in parallel with the push-buttons of the relevant sound sources. The connecting cables need not be shielded; any two-wire cable may be used.

A remote volume control can be permanently installed and switched in or out by a built-in switch in the booth control.

Matching to projectors and loudspeakers other than Norelco

As a rule, matching is very simple since:

- the equipment is supplied with, either, a 5 V - 4 A or 6 V - 5 A or 9 V - 4 A exciter-lamp supply;
- the magnetic pre-amplifiers, which normally are suitable for Norelco magnetic clusters, can also be supplied with their inputs adapted to clusters with a higher inductance;
- the equipment can supply a dowser voltage of both 90 V d.c. and 6 V a.c.;
- the output impedance of the output amplifiers can be set for 250 - 125 - 62.5 - 31 - 15.5 - 2.5 Ω, corresponding to output voltages of 100 - 70 - 50 - 35 - 25 - 10 V, by shifting a plug. Other impedances are obtainable by changing the connections on the plug.

Survey of the various versions

TYPE	UNIT	PRE-AMPLIFIER CABINET, EL 5373/..												OUTPUT-AMPLIFIER CABINET, EL 5374/..	
		for two projectors						for three projectors						up to 95° F	up to 113° F
		/50	/51	/52	/53	/54	/55	/30	/31	/32	/33	/34	/35	/50	/60
EL 5470	magnetic pre-amplifier	20	20	20	20	20	20	30	30	30	30	30	30	—	—
EL 5471	optical pre-amplifier	3	3	3	3	3	3	3	3	3	3	3	3	—	—
EL 5472	record-player pre-amplifier	1	2	—	—	1	2	1	2	—	—	1	2	—	—
EL 5473	microphone pre-amplifier	1	—	2	3	2	1	1	—	2	3	2	1	—	—
EL 5474	12-kc/s unit	1	1	1	1	1	1	1	1	1	1	1	1	—	—
EL 5475	equalizing unit	13	13	13	14	14	14	13	13	13	14	14	14	—	—
EL 5476	oscillator/measuring amplifier	1	1	1	1	1	1	1	1	1	1	1	1	1	1
EL 5477	output amplifier	—	—	—	—	—	—	—	—	—	—	—	—	7	7
EL 5478	power-supply unit	2	2	2	2	2	2	2	2	2	2	2	2	—	—
EL 5486	ventilating unit	—	—	—	—	—	—	—	—	—	—	—	—	—	1

With all versions the six-channel volume control EL 5463/00 is supplied.

Technical data

	voltage	impedance
Inputs:		
photocell	6 mV	20,000 Ω
magnetic cluster	0.35 mV	for 5 mH cluster
microphone	1 mV	⩾ 2100 Ω from 100-20,000 c/s
record-player:		
crystal	300 mV	⩾ 50,000 Ω
high reluctance	30 mV	⩾ 40,000 Ω
Output of the output amplifiers:		
power	40 W	
voltages	100 - 70 - 50 - 35 - 25 - 10 V	
impedances	250 - 125 - 62.5 - 31 - 15.5 - 2.5 Ω	

Pre-amplifiers:	noise level		max. distortion at 1000 c/s
	average	max.	
optical	- 64 dB	- 60 dB	0.1 %
magnetic	- 57 dB	- 54 dB	0.2 %
microphone	- 65 dB	- 60 dB	1 %
record-player	- 70 dB	- 65 dB	1 %
Equalizing unit	- 76 dB	- 70 dB	0.25 %
Output amplifiers	- 77 dB	- 72 dB	1.25 %

Line voltages	110 - 125 - 220 - 250 V
Line frequencies	40 to 100 c/s

Dimensions and weights

Component	lb	height	width	depth
Pre-amplifier cabinet EL 5373/..				
/50 to /55	187½	38½"	15"	15¾"
/30 to /35	209½	44"		
Output amplifier cabinet				
EL 5374/50	203	34½"		
EL 5374/60	223	40"		
Volume control EL 5463/00	9	8¼"	15½"	4"

North American Philips Company, Inc. reserves the right to make changes in design, construction and specifications, details of which do not appear in this catalog issue. Supplemental data is available on changes which may have been necessary due to operational or design modifications and improvements.

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Available through Authorized NORELCO Theatre Supply Dealers

10-65

OMA-6 SOUND SYSTEM WITH DP75 PROJECTORS

See Fig. 1A and, in Directions for Installation, Fig. 5.

CONDUITS & WIRES:

Fig. 5 shows the wire runs, sizes and terminations.

Fig. 1A shows the required conduits for maximum separation of audio and control/signal wiring.

A desired alternative is to locate the amplifier racks on a side or the front wall. Two 2" square ducts, or a 2"x4" divided duct is then run from beneath the amplifier cabinets to a point beneath the farthest projector control cabinet. Short connecting conduits are installed between the cabinets and the ducts The lower duct is nipped to the upper duct at points below each amplifier cabinet and at the volume control.

Routed through the lower duct are:

2 - Solar cell cables
20 - Magnetic head cables
12 - Volume control cables

The 10 magnetic head cables with one solar cell cable are led to each projector through the bottom of the lower duct and a short length of flexible armored cable into one of the conduit holes provided in the front of the projector bases.

All other conductors carrying signal, control or exciter voltages, are routed through the upper duct.

The conduit hood on the volume control can be located at the top or the bottom of the control box.

Keep unshielded skinners as short as possible. Rigidly follow grounding system shown in Fig. 5.

Belden #8761 = 2 wire-#22 stranded - twisted - aluminum mylarshield with #22 ground wire - insulated jacket - .167" O.D.

Belden #8421 = Co-axial cable - #25 stranded - tinned copper spiral wrapped shield, vinyl jacket - .180" O.D.

#16 Conductors - Use stranded color coded - minimum of 11 colors required.

#14 Conductors - White - AC neutral
Black - AC
Green - Ground

#12 Conductors - Preferably 10 colors for stage speakers to assure proper connections and poling.

SWITCHING:

Each projector control cabinet contains 4 S.P.N.O. momentary contact illuminated switches. From left to right their functions are motor on, motor off, sound and picture changeover, and sound off/dowser closed. The changeover switch causes simultaneous changeover of sound and opening of the associated dowser.

Pressing the "I" changeover button of either projector or of a S.P.N.O. momentary contact switch which must be provided near each non-sync device, instantly connects the associated sound source to the amplifier and disconnects any previous signal input. This is done via noiseless electronic flip-flop circuits without any mechanical switching or relays.

Each sound "on" switch is connected to a specific pair of terminals:

105X - 106X for Projector X
105Y - 106Y for Projector Y
105Z - 106Z(for Projector Z)
105U - 106U Non-Sync
105V - 106V Non-Sync
105W - 106W Non-Sync

All sound "off" or muting switches are paralleled to terminals 105 - 106 (no suffix letter) in the pre-amplifier cabinet.

LOUDSPEAKER CONNECTIONS:

Each power amplifier output provides a plug over facility for six different impedances. The 25 volt position is used when the stage speaker network is rated between 12-16 ohms. For most efficient operation and flexibility of control of the output of each surround speaker, use of the 70 volt distribution system is recommended. This requires a small matching transformer for each surround speaker and plugging into the 70 volt tap on the surround power amplifier. If the matching transformers are located in the booth, control of the amount of power supplied to each speaker is more readily effected than is possible when the transformer is located on the speaker.

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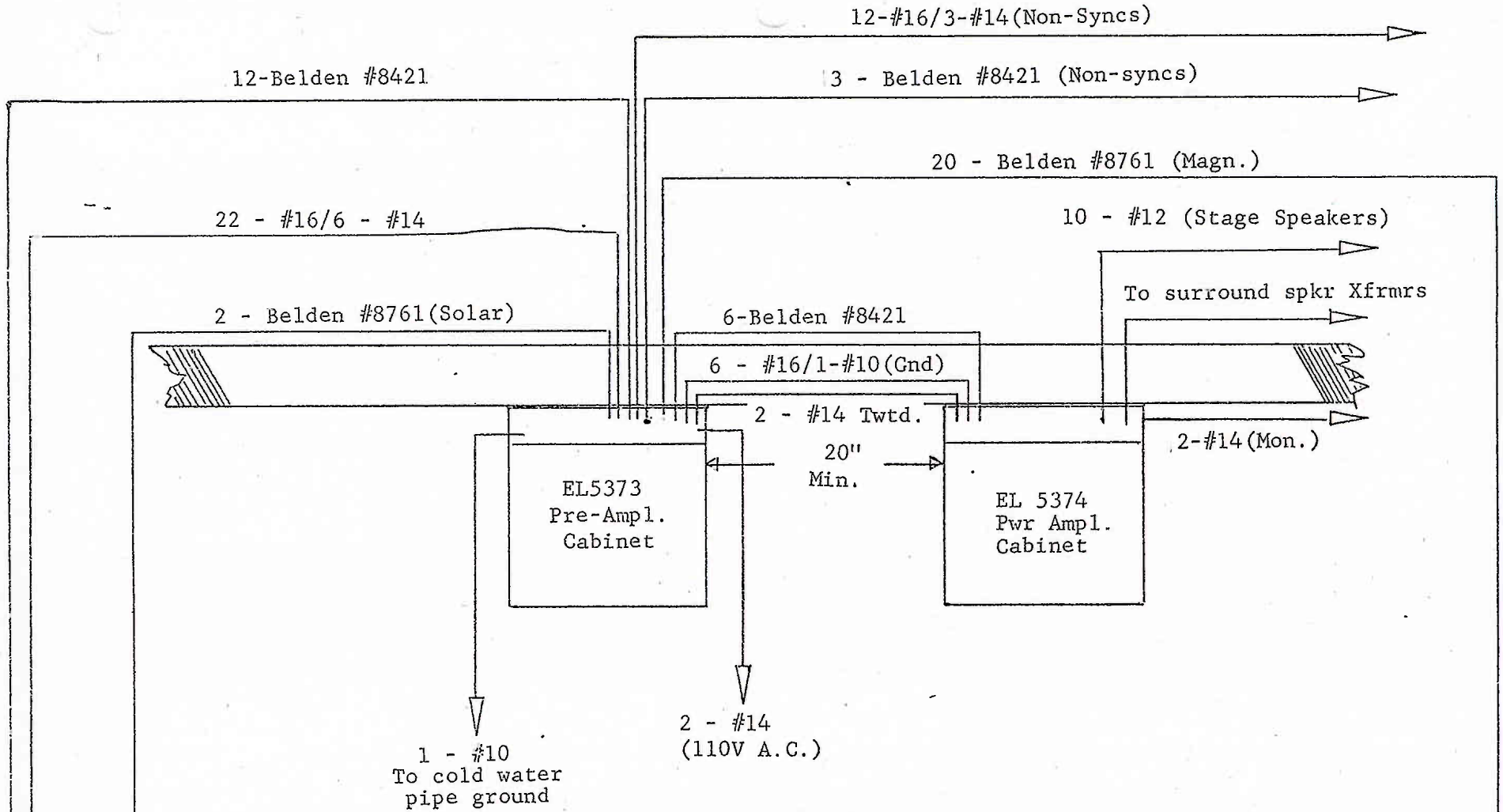

OMA-6 SOUND SYSTEM

OMA-6 SOUND SYSTEM
AND DP-75 PROJECTORS

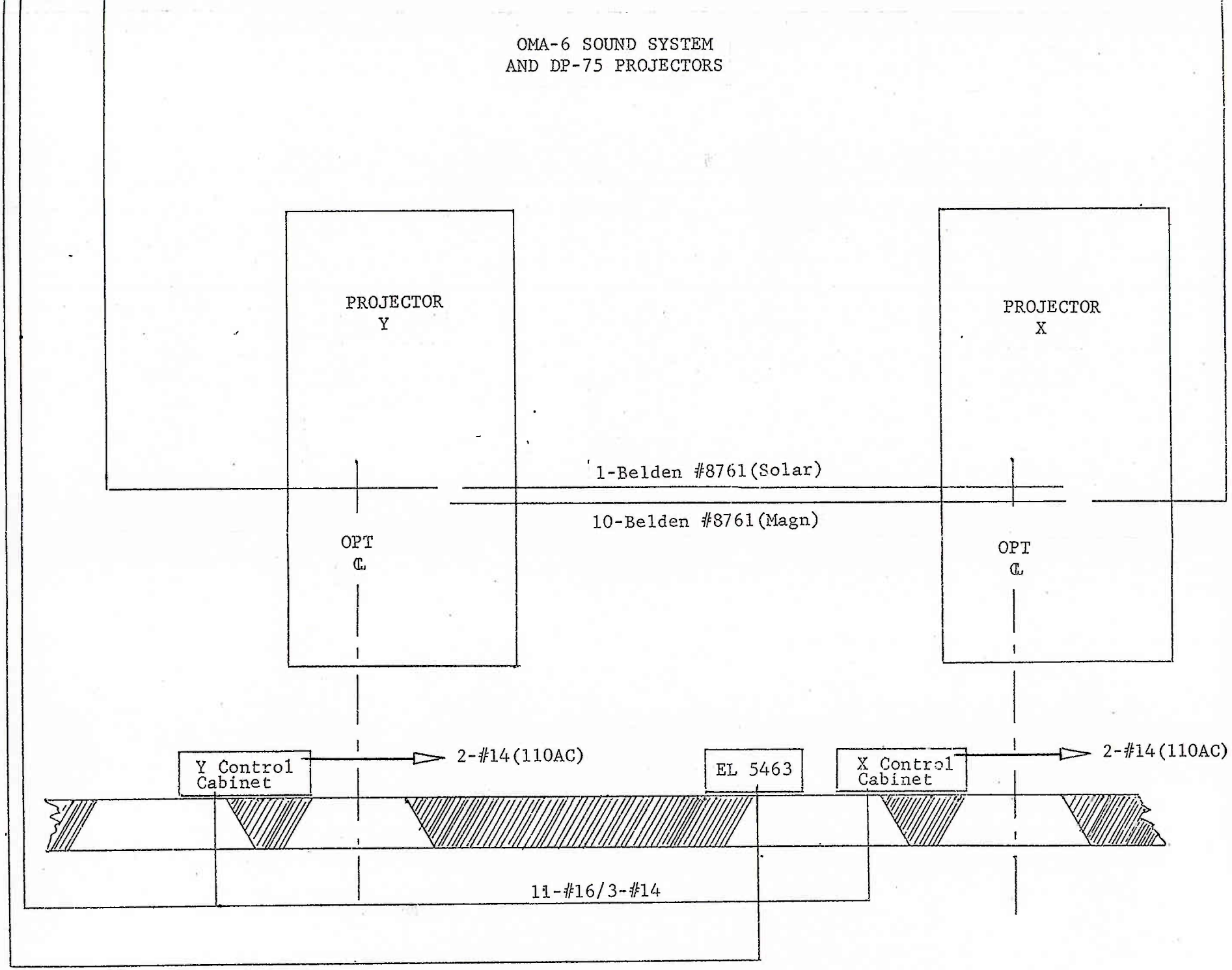

FIG. 1A

Norelco MOTION PICTURE EQUIPMENT DIVISION

O-3 AND OMA SOUND SYSTEMS

Installation Instructions

(1) If the plug-in cassettes are packed individually they should be left packed until the wiring is completed and the booth cleaned up.

(2) If the pre-amplifier cabinet is shipped with the cassettes installed they should be removed and carefully stored in a covered container until wiring is completed and booth cleaned up.

(3) The power amplifiers and power supplies should also be left unopened in their cartons until all installation work is done and the booth cleaned.

(4) The plastic covers, in which the cabinets are wrapped before crating, should be taped around the hinged portion of the racks to protect the magazines and printed circuit boards against construction and other debris. Before inserting the various plug-in units carefully brush out the magazines and blow out any accumulated dust.

(5) A green schedule card is packed with each system showing the proper arrangement of the plug-in units.

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"File after Fig 1A"
In Installation Manual

Norelco MOTION PICTURE EQUIPMENT DIVISION

MOUNTING ON THE WALL

The pre-amplifier and the output-amplifier cabinet racks are similar only the vertical spacing of the mounting holes differs.

All the racks have a width of 1' 3" and a depth of 1' 3-3/4". The heights vary as shown in the table.

Types of racks	Height	Center distance (H) between upper and lower bolts
EL 5373/50...55(Pre2M)	3' 2-1/2"	3' 1-3/8"
EL 5373/60...65(Pre3M)	3' 8"	3' 6-7/8"
EL 5374/50 Power	2' 10-1/2"	2' 9-1/4"
EL 5374/60 Power/Trop	3' 4"	3' 2-3/4"

Set in the wall for each rack the four 3/8" bolts supplied with the equipment, or equivalents, as indicated in Fig. 2.

Recommend mounting pre-amplifier cabinet in lefthand position. (See enclosed brochure.)

Note: The distance between the racks must be at least 1' 8".

Take any plug-in units out of both racks. (Plug-in units are usually shipped separately packed).

Lift rack and frame together and fasten the frame by means of the four bolts against the wall.

After wiring is completed insert all the plug-in units again as indicated in the drawing supplied with the equipment.

Type 160086 System-selector and C.O. Box "OPT/CS/70"

Fasten a box on the front wall of the projection booth below each projector observation porthole with three screws (see Fig. 3). A convenient method of connecting to the selector terminal strip is to temporarily mount the panel upside down, front facing box using two lower screw holes in box to support panel while wiring.

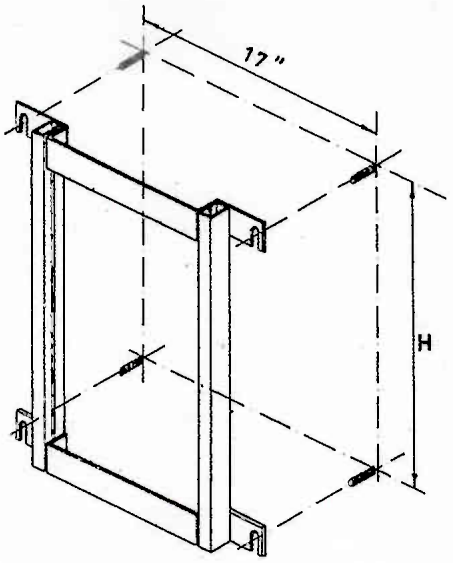
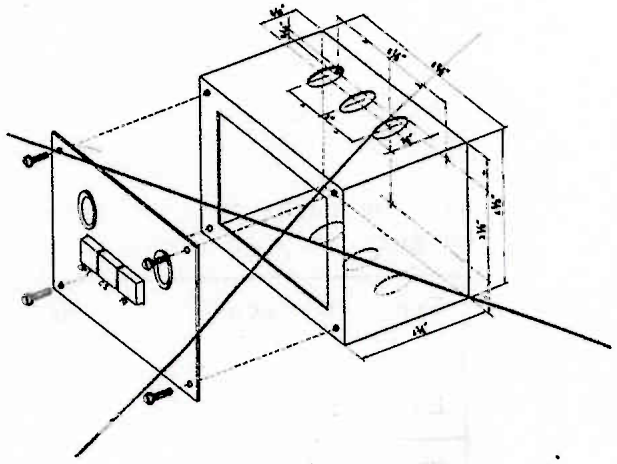


Fig. 2

Amplifier Cabinet-Wall Mounted
Section



~~Fig. 3~~

~~160086~~

Mounting of EL 5463 Volume Control (Fig. 4)

5S 852 74
Hood

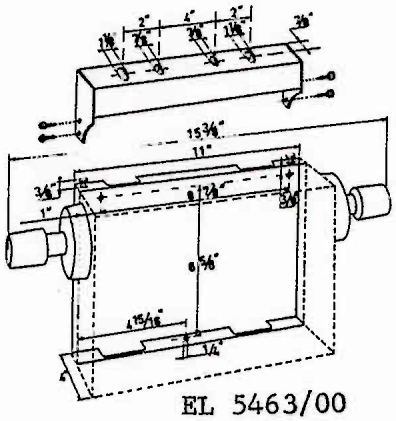


Fig. 4

EL 5463/00

In the chassis of this volume control there are three 1/4" holes. If the control has to be provided with an extension rod, mount this rod as indicated in Fig. 5. For aligning the rod, loosen screw "1" and shift disc "2" together with disc "3". For fixing bracket "4" to the wall two wedge bolts are supplied with the volume control.
The hood can be mounted either on the top or bottom of the volume control cabinet.

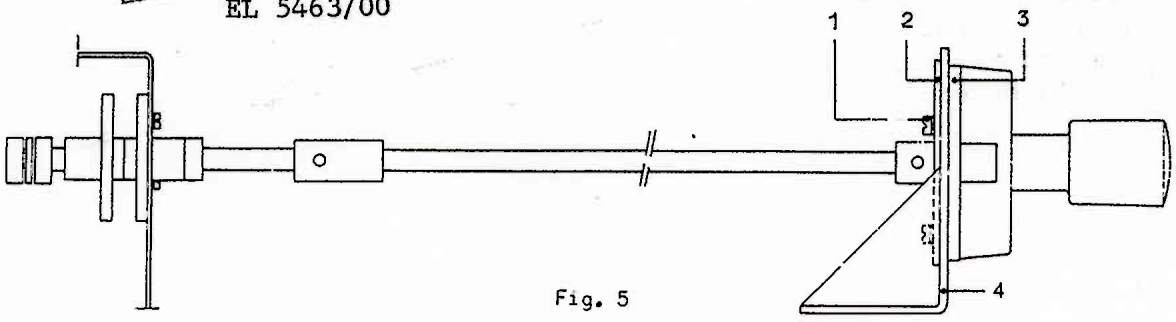
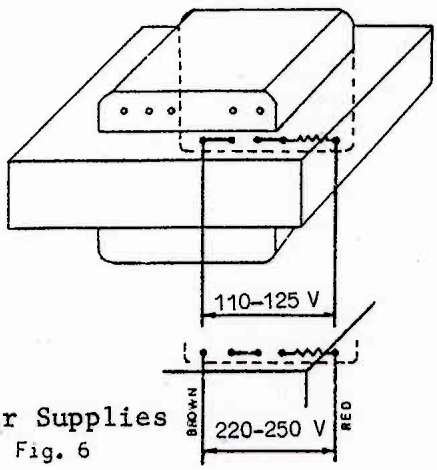


Fig. 5

EL 5464/00

Power supply connections.



Power Supplies
Fig. 6

Normally the equipment is supplied for connection to 110V but the connections should be checked.
For other line voltages, the connection of the transformer of the power-supply unit (Fig. 6) and of the supply transformers of all the output amplifiers (Figs. 7a and 7b) has to be changed as indicated.

Note: As no voltage stabilization is used in the output amplifiers, the transformers have separate tappings for 110 - 125 - 220 - 250V.

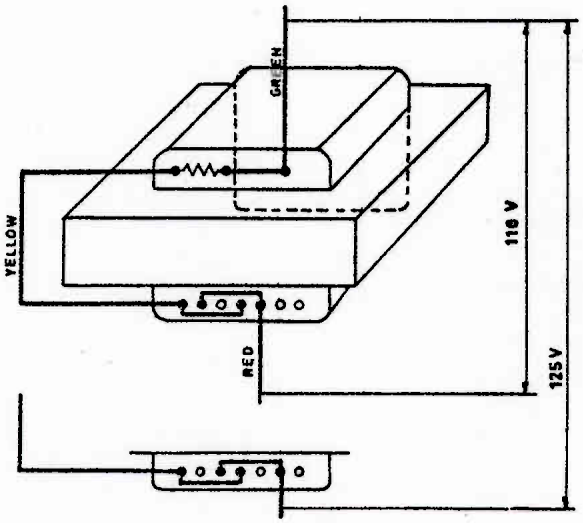


Fig. 7a

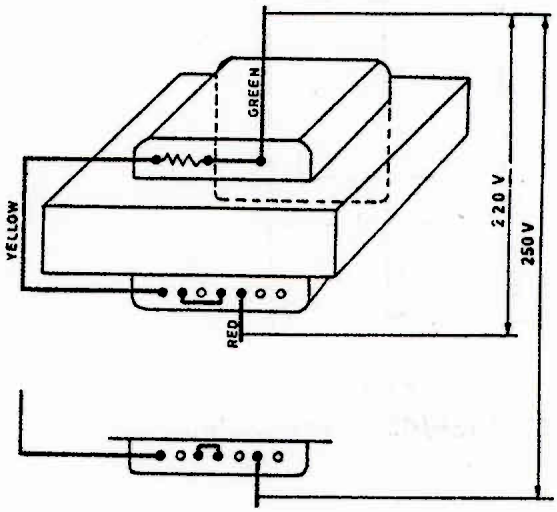


Fig. 7b

Power Amplifiers

Exciter-lamp supply

The power-supply unit is suitable for exciter lamps of 9V, 4A.
For matching to exciter lamps of 5V, 4A, remove the connections between emitter, base and collector of TS4 ~~(see Service Doc. pages 29 and 36)~~. See insert following

Fan(s)

Behind the control panel of the output-amplifier rack there is a fan; For the connection of its transformer see Fig. 8.

In the tropics-version of the output-amplifier rack (EL 5374/60) there is a ventilating unit EL-5486/00; for the connection of its transformer see Fig. 9.

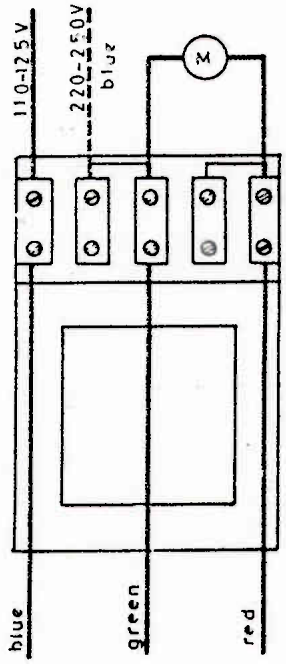


Fig. 8
EL 5488/00 Control Panel

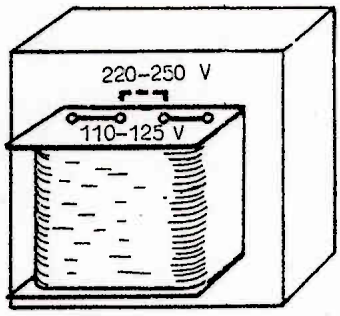


Fig. 9
EL 5486/00 Ventilating Unit

Record-player pre-amplifier - EL 5472/00

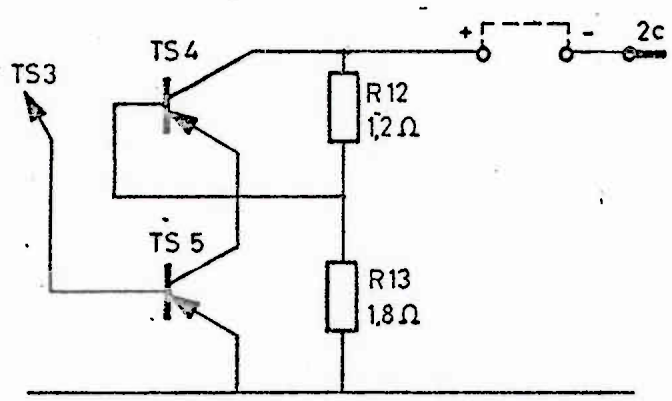
At the component-side of the printed circuit board there are two soldering points marked M and two marked X.
For high-reluctance pick-ups, points M have to be interconnected.
For crystal pick-ups, points X have to be interconnected.

If not indicated otherwise in the order, the equipment is supplied with points X interconnected.

EL 5478/00 POWER SUPPLY

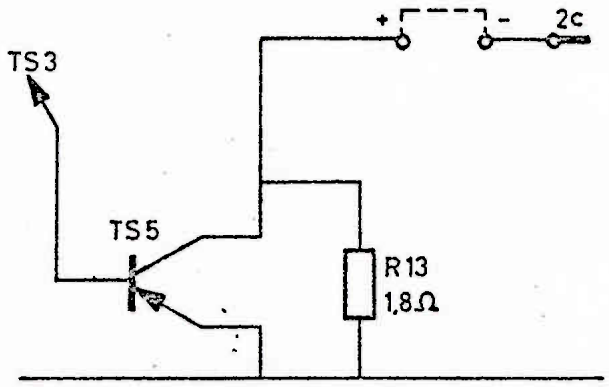
The schematic for this power supply depicts the circuitry when 5 Volt 4 Ampere exciter lamps are used (also see Figure A below).

Figure B below shows the modifications to the EL 5478 when 9 Volt 4 Ampere exciter lamps are to be used with the power supply.



NORMAL 5V 4A

FIG. A

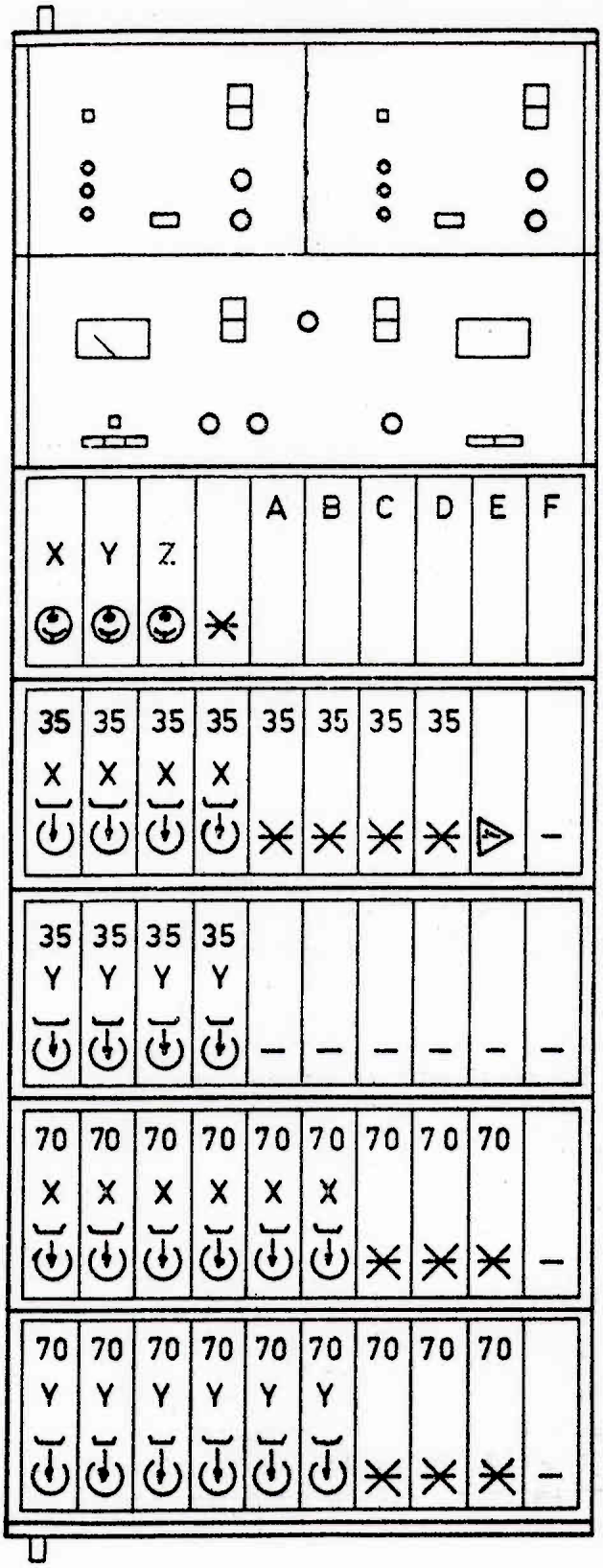


9V 4A

FIG. B

5S 845 93

North American Philips Company, Inc.
Motion Picture Equipment Division
100 East 42nd Street
New York, N.Y. 10017
6-21-65



X = projector X

Y = projector Y

Z = projector Z (only optical)

A...F = see table below

35 = for 35-mm films

70 = for 70-mm films

= magnetic pre-amplifiers type EL 5470/00

= optical pre-amplifiers type EL 5471/00

= record-player pre-amplifiers, type EL 5472/00

= microphone pre-amplifiers type EL 5473/00, also suitable for tape recorder or gong

= 12 kc switcher type EL 5474/00

= equalizing unit type EL 5475/00

— = blank panel

Fig. 10

	A	B	C	D	E	F
EL 5373/50					—	—
EL 5373/51					—	—
EL 5373/52	—	—				
EL 5373/53						
→ EL 5373/54						
EL 5373/55						

ELECTRICAL CONNECTIONS

Connect the cables as indicated in Fig. 1.

ATTENTION!

The pre-amplifier rack can be supplied in the versions /50.../55 with different units at the places A, C and E (Fig. 10).
The input terminals for the units are:
at A ..... 42U - 41U
at C ..... 42V - 41V
at E ..... 42W - 41W

To these terminals can be connected, depending on the version used:

EL 5373/20: 42U - 41U = record player
42V - 41V = microphone+) or gong or Mono recorder
42W - 41W = not used

EL 5373/21: 42U - 41U = record player) or Stereo record player
42V - 41V = record player)
42W - 41W = not used

EL 5373/22: 42U - 41U = not used
42V - 41V = microphone+) or gong or Mono recorder)or Stereo
42W - 41W = microphone+) or gong or Mono recorder) recorder

EL 5373/23: 42U - 41U = microphone+) or gong or Mono recorder)or Stereo
42V - 41V = microphone+) or gong or Mono recorder) recorder
42W - 41W = microphone+) or gong or Mono recorder

EL 5373/24: 42U - 41U = record player
42V - 41V = microphone+) or gong or Mono recorder)or Stereo
42W - 41W = microphone+) or gong or Mono recorder) recorder

EL 5373/25: 42U - 41U = record player) or Stereo record player
42V - 41V = record player)
42W - 41W = microphone+)

+) impedance: 500 Ohms

Near or on each sound source (projector, record player, microphone, etc.) a single-pole push-button, with momentary make-contact normally open, has to be connected for switching on the relevant input(s), thereby blocking at the same time all the other channels. For 70/35 projectors these switches are provided in the ~~160 086 Selector box (Fig. 3).~~ Connections are made as per Fig. ~~3~~ 5 to respective 105-106 terminals with letter suffixes.

It is recommended that "OFF" switches, also single pole momentary contact normally open, be located at each sound source. Such switches are connected in parallel across terminals 105-106 (without letter suffixes). For the projectors these switches are in the ~~160 086 Selector boxes.~~ The "ON" switch is marked "I" designating that the associated projector is in the circuit. The "OFF" switch is marked "0".

Install a 014-140 Terminal strip in each projector. In NORELCO AAII projector mounting holes and screws are provided inside the upper base just to the right of the minimum speed safety switch on the take-up drive bracket. Terminal strip assemblies are supplied as loose parts.

The 50-52 terminals in the 160 086 box are to be connected to 50-52 of the 014-140 terminal strip in the associated projector and then to the 50X-52X terminals in the pre-amplifier rack for projector X and to the 50Y-52Y for projector Y. These terminals provide a voltage for lighting a lamp behind the respective "I" buttons when one is pressed.

The output amplifiers contain no cross-over network. The advantage is that two wires can be used for the connection between each output amplifier and its loudspeaker assembly behind the screen. The cross-over network to be mounted on the L.F. loudspeaker baffle.

The power amplifier output plug can be moved to provide output voltages of 100-70-50-35-25-10 Volts, corresponding to impedances of 250-125-62.5-31-15.5-2.5 ohms. When 16 ohm networks are to be used the plug should be shifted, after removing two screws, to the 25 volt position.

If possible, all the shielded cables have to be passed through conduits or laid in cable ducts, separate from the power cables.

Normally, the equipment is supplied with a manual system-selector box "OPT/CS/70" (type 160086). The selection can also be effected automatically when the film is threaded into the relevant soundhead. For this purpose, the projectors have to be provided with the automatic system-selector switch EL 4215; for mounting see page 13.

CONNECTION OF A STEREO RECORD PLAYER OR A STEREO RECORDER (Tape)

Note: When connected a Stereo record player or a Stereo recorder see that the stereo sound is reproduced by the correct loudspeaker groups (either those for channels 5 and 6 or those for channels 1 and 3).

Connection of a Stereo record player
(only possible with the pre-amplifier racks EL 5373/51 and /55)

Connect one of the pick-up heads to terminals 42U - 41U.
and the other pick-up head to terminals 42V - 41V.

Remove the connection between the terminals
77U - D77M and 75U - D75M and 77V - B77M and 75V - B75M.

Furthermore,	for reproduction via channels 5 and 6	for reproduction via channels 1 and 3
connect the terminals	77U - E77	77U - A77M
	75U - E75	75U - A75M
	77V - F77	77V - C77M
	75V - F75	75V - C75M

Connection of a Stereo recorder (Tape)
(only possible with the pre-amplifier racks EL 5373/52, /53, /54)

With the racks EL 5373/52 and EL 5373/54, channels V and W (see page 5) have to be used (connection as for case c below).
With rack EL 5373/53 can be used optionally:

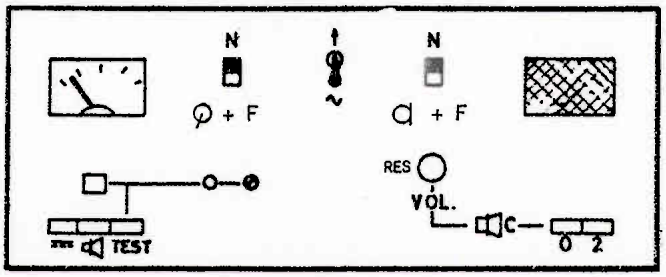
a) channels U + V	b) channels U + W	c) channels V + W
heads to	heads to	heads to
42U - 41U	42U - 41U	42V - 41V
42V - 41V	42W - 41W	42W - 41W

Proceed as follows:

	for reproduction via channels 5 and 6			for reproduction via channels 1 and 3		
	case a	case b	case c	case a	case b	case c
connect the terminals	77U-E77	77U-E77	77V-E77	77U-A77M	77U-A77M	77V-A77M
	75U-E75	75U-E75	75V-E75	75U-A75M	75U-A75M	75V-A75M
	77V-F77	77W-F77	77W-F77	77V-C77M	77W-C77M	77W-C77M
	75V-F75	75W-F75	75W-F75	75V-C75M	75W-C75M	75W-C75M
remove the connection between	77U-D77M	77U-D77M	77V-B77M	77U-D77M	77U-D77M	77V-B77M
	75U-D75M	75U-D75M	75V-B75M	75U-D75M	75U-D75M	75V-B75M
	77V-B77M	77W-B77M	77W-B77M	77V-B77M	77W-B77M	77W-B77M
	75V-B75M	75W-B75M	75W-B75M	75V-B75M	75W-B75M	75W-B75M

CONTROLS, etc.

CONTROL PANELS of the
PRE-AMPLIFIER and OUTPUT-AMPLIFIER RACKS



With the exception of the power switch and the switches N / ⌀ + F and N / ⊓ + F which are not on the control panel of the output-amplifier rack, the control panels of both racks are equipped with:

- a measuring instrument for checking the various voltages and currents.
- a push-button ⎓ for checking the d.c. voltages and currents, i.e., the supply voltage and the exciter-lamp current.
- a push-button 🔊*) for checking the output voltage of the output amplifiers.
- a push-button TEST (with pilot lamp) for testing the various amplifiers with the aid of the 1000 c/s signal supplied by the built-in oscillator/measuring amplifier.
- a push-button for checking the oscillator/measuring amplifier; when this

*) Inoperative on the pre-amplifier rack.

button is pressed, the meter should indicate 0 dB ± 1 dB.
a potentiometer with screwdriver adjustment for adjusting the oscillator/measuring amplifier.

. a switch N/ ℘ + F (normal / film picture + sound from record player).
. a switch N/ ◁ + F (normal / film picture + sound from microphone or tape recorder).
(On some models these two switches are marked N/-B and N/-H to provide the function of instantaneous bass or treble attenuation for optical reproduction).

. a power switch. ∿

. a push-button 0*) for monitoring any single channel by pressing the MON button on the power amplifier which is to be tested.
· a push-button 2*) for monitoring simultaneously all the channels without pressing a button on the output amplifiers; for this purpose
· a resistor of 120 ohms has been inserted between the terminal 18 of each output amplifier (with the exception of the monitor amplifier) and terminal 18B of the control panel.
· a volume control VOL*) for all the monitor loudspeakers.

a small monitor loudspeaker.

Note:
· Both racks are switched on and off simultaneously by means of the power supply switch on the pre-amplifier rack.

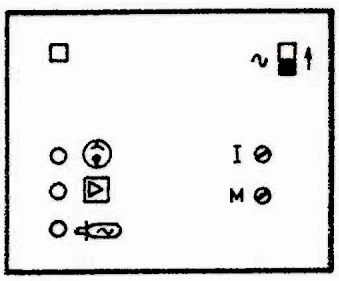
· Push-button ⎓ on the output-amplifier rack serves only for measuring the supply voltage for the oscillator/measuring amplifier mounted in this rack.

. Volume control VOL on the output-amplifier rack
.has to be turned clockwise (in direction ◁ C) for controlling the sound intensity of the monitor loudspeakers (via the monitor amplifier = spare output amplifier);
.has to be set to position RES when the monitor amplifier is used for replacement of one of the output amplifiers; the monitor amplifier (= defective output amplifier) is then inoperative and the sound in the projection booth is reproduced only by the built-in loudspeaker via the output amplifier of the channel in question.

*) Inoperative on the pre-amplifier rack.

UNITS of the PRE-AMPLIFIER RACK

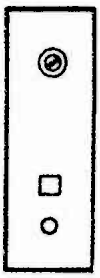
On the power-supply units (left-hand unit = spare)



. a push-button ⊙ for measuring the stabilized photocell voltage;
. a push-button ▷ for measuring the supply voltages for all the pre-amplifier and equalizing units;
. a push-button ⊂⊃ for measuring the exciter-lamp current;
. a yellow pilot lamp which lights up when the unit is switched on;
. a power supply switch; ∿
. a potentiometer I with screwdriver adjustment for adjusting the exciter-lamp current;

. a potentiometer M with screwdriver adjustment for calibrating the measuring circuit of the exciter-lamp current.

On the pre-amplifier units:



. a potentiometer with screwdriver adjustment for adjusting the output voltage;
. a pilot lamp which lights up when the unit is switched on;
. a push-button for testing the unit.

The colors of the pilot lamps are:
on the optical pre-amplifier units ..... white
on the magnetic pre-amplifier units ..... red
on the microphone pre-amplifier units ..... green
on the record-player pre-amplifier units .. purple

On the equalizing units:

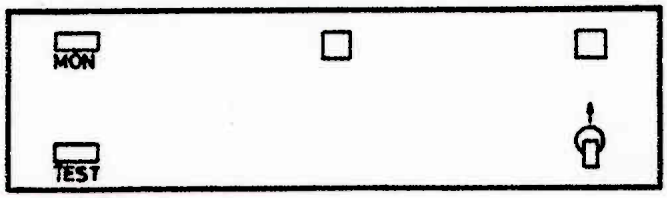
. a treble control H;
. a bass control B;
. a yellow pilot lamp which lights up when one of the pre-amplifier units connected to the equalizing unit is in operation;
. a push-button for testing the unit.

On the 12 Kc switcher:

. a potentiometer with screwdriver adjustment for adjusting the sensitivity;
. an orange pilot lamp which lights up when the unit is switched on;
. a push-button for testing the unit.

UNITS of the OUTPUT-AMPLIFIER RACK

On the output-amplifier units:



. a push-button MON for testing the output voltage of the unit;
. a push-button TEST for checking the operation of the unit and its gain with the aid of the 1000 c/s signal;
. a power switch with orange pilot lamp;

. a white pilot lamp, supplied by the output voltage of the respective output amplifier, the light intensity of this lamp being an indication of the output power.

OMA-6 SOUND SYSTEMS

PRE-OPERATIONAL NOTES

(1) Before turning on the system, loosen the two captive screws at the sides of the EL 5479 pre-amplifier Control Panel. Pull panel forward slightly and tilt down Check that the eight (8) vertical plug-in chassis are correctly pushed into their operating positions Re-fasten front panel

(2) When NORELCO 70/35 projectors with D-C operating picture changeovers (T52X or Y - 50X or Y = 90V) are used, the operation of the push-button "T" on the associated 160 086 Box changes over both sound and picture.

(3) When NORELCO AAII Type 66 projectors, equipped with A.C. operated picture changeovers are used, the #16 conductors between T52X - 50X and 51-52 in projector X, and between T52Y and 50Y, and 51-52 in projector Y, are not required. The A.C. picture changeover circuits are shown in Fig. 2 and 3 in the Norelco Installation Procedures (Dark Blue Cover).

(4) Fusing: Refer to page 3 - Fig. 6. Note that 2 ampere fuse (Cat. #974/2000) must be used at VL-1 of the EL 5478/00 power supplies when the transformer T-1 is connected for 110-125 volts. Referring to Fig. 7a 1.25 ampere slow blow fuses (Cat. #974/V1250) must be used in VL-1 of the EL 5477/00 power amplifiers when transformer T-4 is connected for 110 or 125 volts.

(5) NON-SYNC reproduction normally is through the surround speakers.

(6) MONITOR

(See page 3 of the "Directions for Use" light blue cover.)

When button "2" on the EL 5488/00 Control Panel (in the power-amplifier cabinet) is depressed all channels are monitored simultaneously.

To monitor any single channel press button "0" on the control panel and the "MON" button on the power amplifier which is to be tested.

(7) 12 KC SWITCHER for the 4th track on CinemaScope prints.

The EL 5474/00 switcher can be by-passed, if necessary, by operating the slide switch (SK-1) in the rear left corner of the horizontal printed circuit board, EL 5485/02, which is associated with the EL 5483/00 magazine into which the EL 5474/00 switcher is plugged. With the slide switch moved to the left ("N") the circuit is normal. Moving the switch to the right by-passes the 12 KC switcher and reproduction from the 4th track is independent of the 12 KC signal.

(8) OPTICAL REPRODUCTION

Normally the single optical track is reproduced through the left center, center and right center speakers. If reproduction through the center channel only is desired lamp LA-1 in the rear left corner of the EL 5485/02, horizontal printed circuit board, should be removed. This lamp will be found just to the left of switch SK-1 mentioned above.

(9) The 160 086 System Selector Box can serve 2 purposes (a) projector changeover (b) mode selection.

Pre Ampli. Cab't T.S.	Connections 014 - 140 T S In Proj. Base	#1 Projector* 160 086 S.S Box	Function
22X*	22	22	Common
23X	23	23	Selects Optical
24X	24	24	" 35mm Magn.
25X	25	25	" 70mm "
105X	105	105(X)*	Sound on
106X	106	106(X)	
50X	50	50	On Lamp Lit
52X	52	52	
	51 Not Used	51 Not Used	
105	105	105	Sound Off
106	106	106	

* For #2 projector use "Y" terminals

Mode selection can be made via an EL 4215/00 Automatic Selector installed in each projector. See Pages 13-14 of Installation Instructions. In this case terminals 22-23-24-25 in the 160 086 box are not used. Instead these leads from each EL 4215 are connected to the corresponding terminals on the 014-140 Terminal Strip in the associated projector base.

These circuits carry only signal energy, no sound, but the wires should be color coded and not run in same conduit with sound wires.

CHECKING and ADJUSTMENT

NEVER CHECK THE EQUIPMENT WHEN AN AUDIENCE IS IN THE THEATRE

CHECK THE PRE-AMPLIFIERS ONLY WHEN THEY ARE NOT IN OPERATION
(i.e. make sure that the pilot lamps are not lit).

OUTPUT VOLTAGES and CURRENTS

Press button ⎓ on the control panel of the pre-amplifier rack, then press consecutively on the right-hand supply unit:

button ⓟ = photocell voltage;

button ▣ = supply voltage for the pre-amplifier units, the equalizing units and the oscillator/measuring amplifier;

button ⊂⊃ = exciter-lamp current; switch on the relevant exciter lamp by means of the "change-over" button on the projector.

In all these cases the meter should indicate 0 dB ± 1 dB.
Release the button after checking.

For calibrating the exciter-lamp current, proceed as follows:

. Remove the short-circuiting plug at the rear of the supply unit and connect an ammeter (impedance max. 0.2 Ω) to the now available sockets.

. Adjust the exciter-lamp current with potentiometer I so that the ammeter indicates 4 Amperes for a ~~9V~~ 5V, 4A lamp.

. Press button ⊂⊃ and adjust potentiometer M so that the built-in meter indicates approx. 0 dB.

. Insert the short-circuiting plug again.

OSCILLATOR/MEASURING AMPLIFIER

Press button TEST on the control panel of the pre-amplifier rack, then press the button next to the potentiometer with screwdriver adjustment; the meter must indicate approx. 0 dB; if not, turn the potentiometer until the indication is correct.

GAIN AND OPERATION OF THE VARIOUS AMPLIFIERS

Press button TEST on the control panel of the pre-amplifier rack; then press consecutively the push-buttons of the pre-amplifier and equalizing units; the meter must always indicate approx. 0 dB.

Press button TEST on the control panel of the output-amplifier rack; then press consecutively the push-buttons TEST on all the output amplifier units; the meter of the output-amplifier rack must always indicate approx. 0 dB.

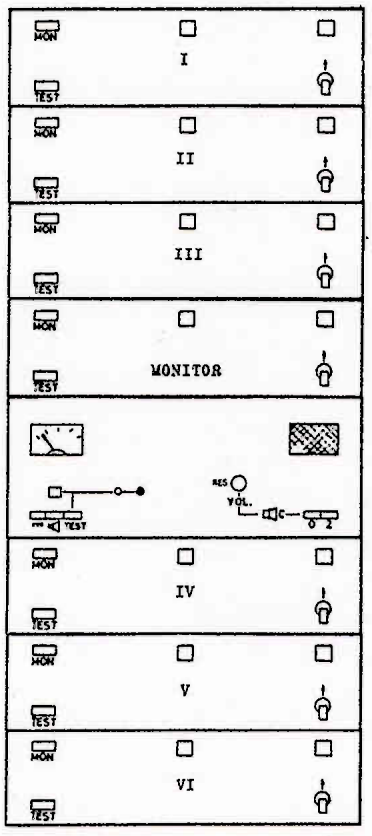
ADJUSTMENT OF THE SOUND

Switch on all power supply switches.
Turn the knob on the remote volume-control box to position 11.
Thread a 50% modulated (6 dB below 100%) frequency testfilm into projector X. 1000 Hz. optical and magnetic test loops are recommended.

Further proceed as follows:

For 35mm films with optical sound:

- Turn the potentiometer of the first optical pre-amplifier from the left, fully anti-clockwise.
- Set the tone controls B and H of the equalizing unit next to the three optical pre-amplifiers to their center position*).
- Press the buttons and 2 on the control panel of the output-amplifier rack.
- Start projector X and press the change-over button.
- Turn the potentiometer on the optical pre-amplifier so that at 1000 c/s the meter of the output-amplifier rack indicates 0 dB.



For 35mm films with four-track magnetic sound:

- Turn the potentiometers of the four magnetic pre-amplifiers "35 X" (Fig.10) fully anti-clockwise.
- Set the tone controls B and H of the relevant equalizing units to their center position *).
- Press the buttons and 0 on the control panel of the output-amplifier rack.
- Start projector X and press its change-over button.
- Press at the test frequency of 1000 c/s consecutively the buttons MON on the output amplifiers I...IV and turn the potentiometer of the relevant pre-amplifier so that each time the meter of the output-amplifier rack indicates 0 dB.

Repeat the above with the other projector (pre-amplifiers "35 Y").

For 70mm films (with six-channel magnetic sound):

- Turn the potentiometers of the six magnetic pre-amplifiers "70 X" (Fig.10) fully anti-clockwise.
- Set the tone controls B and H of the relevant equalizing units to their center position *).
- Press the buttons and 0 on the control panel of the output-amplifier rack.
- Start projector X and press its change-over button.
- Press at the test frequency of 1000 c/s consecutively the buttons MON on the output amplifiers I...VI and turn the potentiometer of the relevant pre-amplifier so that each time the meter of the output-amplifier rack indicates 0 dB.

Repeat the above with the other projector (pre-amplifiers "70 Y").

*) Later on, these controls have to be set as required by the acoustics of the auditorium and the quality of the sound recorded on the film.

The DP75 projector is equipped with an automatic mode selector switch. When connected to an OMA-6 Sound System the correct input circuitry is automatically set up depending on which type of film is threaded in the projector.

OPERATION

When the runner plate for 70mm films is in the projector, terminal 22 is connected to terminal 25 via SK1. Switch SK2 is then inactive.

When the runner plate for 35mm films is in the projector, terminal 22 is connected to contact 22A of SK2 via contact 22A of SK1.
When the film has magnetic sound tracks, the pivoted lever with roller is pulled upwards when the film is threaded into the magnetic soundhead, by which contact 22A of SK2 is connected to terminal 24.
When the film has an optical sound track, contact 22A of SK2 is connected to terminal 23.

Summary:

with 70mm films	terminal 22 connected to 25
with 35mm films with magnetic sound . . .	terminal 22 connected to 24
with 35mm films with optical sound . . .	terminal 22 connected to 23

For the amplifier equipment this signifies that by pressing the changeover button on the associated projector control cabinet

when 22-25 are connected:	the magnetic pre-amplifiers and their equalizing units for 70mm films are switched on automatically;
when 22-24 are connected:	only the magnetic pre-amplifiers and their equalizing units for 35mm films with magnetic sound are switched on automatically;
when 22-23 are connected:	only the optical pre-amplifier and its equalizing unit for 35mm films with optical sound are switched on automatically.

OMA-6 SOUND SYSTEM

NON-SYNC REPRODUCTION

(1) From the EL 5485/00 Horizontal Printed Panel for the Optical Magazine four (4) shielded cables connect at a terminal strip, on the wall frame, that bear the following designations:

77S/75S (for optical output)
77U/75U (for the left non-sync amplifier output)
77V/75V (for the center " " ")
77W/75W (for the right " " ")

(2) When the termination of these cables is to B77M/B75M, on the terminal strip to which a cable form from the EL 5485/02 Horizontal Printed Panel in the second preamplifier magazine is connected, the four sound sources listed in (1) above are all reproduced through the stage horns.

(3) When these conditions exist and it is desirable to reproduce one or more non-sync (phono-mike-tape) through the surround speakers, the associated cable(s) should be disconnected from B77M/B75M (stage circuit) and reconnected to D77M/D75M (surround circuit) on the terminal strip mentioned in (2) above.

(4) 77S/75S (optical) must always remain connected to B77M/B75M regardless of non-sync changes.

Norelco MOTION PICTURE EQUIPMENT DIVISION

VOLTAGE GAIN / POWER GAIN AT 1000 C/S INPUT

ALL-TRANSISTORIZED AMPLIFIERS

As Used in OMA-6, - OMA-4 & O-3 Systems

Amplifier	Input	Output	Voltage Gain	Power Gain
EL 5470 Magnetic Pre-Amplifier	2 mV : 660 Ohm 6×10^{-9} W - 52 dBm	80 mV : 1200 Ohm 5×10^{-6} W - 23 dBm	32 dB	29 dB
EL 5471 Optical Pre-Amplifier	5 mV : 1900 Ohm 13×10^{-9} W - 49 dBm	80 mV : 1200 Ohm 5×10^{-6} W - 23 dBm	24 dB	26 dB
EL 5472 Phono Pre-Amplifier	a) adapted to a crystal element 285 mV : 52000 Ohm 14×10^{-7} W - 28 dBm	80 mV : 1300 Ohm 49×10^{-7} W - 23 dBm (23.2)	- 11 dB	5 dB
	b) adapted to a magnetic dynamic element 30 mV : 49000 Ohm 17×10^{-9} W - 47.5 dBm	80 mV : 1250 Ohm 5×10^{-6} W - 23 dBm	8.5 dB	24.5 dB
EL 5473 Microphone Pre-Amplifier	0.8 mV : 8000 Ohm 8×10^{-11} W - 71 dBm	80 mV : 1250 Ohm 5×10^{-6} W - 23 dBm	40 dB	49 dB
EL 5474 12 KC Switching Unit	39 mV : 4000 Ohm 4×10^{-8} W - 34 dBm	80 mV : 1300 Ohm 5×10^{-6} W - 23 dBm	6 dB	11 dB
EL 5475 Equalizing Unit	70 mV : 4400 Ohm 11×10^{-7} W - 29.5 dBm	200 mV : 1300 Ohm 3×10^{-5} W - 15 dBm	11 dB	14.5 dB
EL 5477 Power Amplifier	21 mV : 600 Ohm 7×10^{-7} W - 31.5 dBm	100 V : 250 Ohm 40 W + 46 dBm	86.5 dB	77.5 dB

3-10-66
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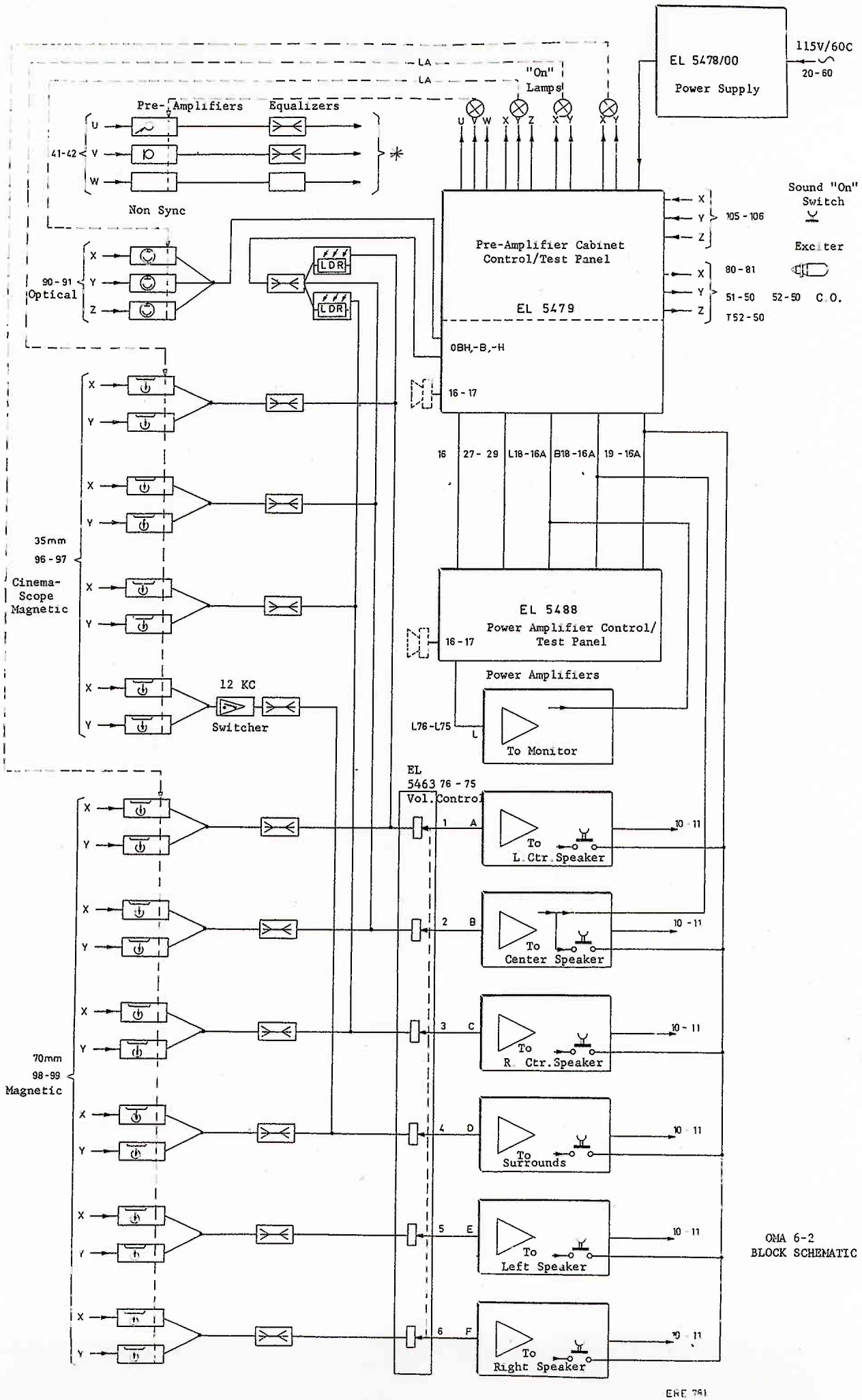
EL 5478/00
Power Supply
115V/60C
20-60
LA
LA
"On"
Lamps
Pre-Amplifiers
Equalizers
41-42
U
V
W
Non Sync
Sound "On"
Switch
Exciter
Pre-Amplifier Cabinet
Control/Test Panel
EL 5479
105-106
80-81
51-50
52-50
C.O.
T52-50
90-91
Optical
LDR
LDR
0BH,-B,-H
16-17
16
27-29
L18-16A
B18-16A
19-16A
35mm
96-97
Cinema-
Scope
Magnetic
EL 5488
Power Amplifier Control/
Test Panel
16-17
Power Amplifiers
12 KC
Switcher
L76-L75
To Monitor
EL
5463 76-75
Vol. Control
1 A
2 B
3 C
4 D
5 E
6 F
To
L. Ctr. Speaker
To
Center Speaker
To
R. Ctr. Speaker
To
Surrounds
To
Left Speaker
To
Right Speaker
10-11
70mm
98-99
Magnetic
EL 5373/2. + EL 5374/
OMA 6-2
BLOCK SCHEMATIC
ERE 241

Ch.	Spkr.	Term's
1	LC	A
2	C	B
3	RC	C
4	SURROUND	D
5	L	E
6	R	F

Source

X	Proj. 1	6-4-1
Y	Proj 2	6-4-1
Z	Proj 3 optical only	
U	Nonsync pos "A"	
V	Nonsync pos "C"	
W	Nonsync pos "E"	

EL 4215 AUTOMATIC MODE SELECTOR

Circuitry

Switch SK1 is mounted behind the light gate.
When the 70mm gate is in use circuit 22-25 is closed.
When the 35mm gate is in use circuit 22-22A is closed.
Switch SK2 is mounted to the left of the magnetic head.
When film is properly threaded through the magnetic head circuit 22A-24 is closed.
When the film is threaded through the optical sound head and not through the magnetic head then the circuit 22A-23 is closed.
The closing of the various circuits results in the application of +10V to the associated pre-amplifiers L.D.R. circuits.

Operation

When a 35mm film is threaded for optical reproduction the EL 4215 A.M.S. is set up so that the circuit 22-22A-23 is completed.

When the sound "ON" button for projector X is depressed the flip-flop for projector X switches ON relay ReX establishing the circuit:

+ of power supply — ReX — 22X — 22-22A-23 in projector — 23X in amplifier cabinet — lamp for LDR in optical pre-amplifier X — via a diode to the lamp in equalizer for its LDR — to negative power supply.

When a 35mm film is threaded for magnetic reproduction the EL 4215 A.M.S. is set up so that circuit 22-22A-24 is completed.

When the sound on button projector Y is depressed relay ReX (or ReZ) if closed is opened switching OFF the LDR lamps in the X (or Z) circuit. Simultaneously relay ReY is switched ON establishing the circuit:

+ of power supply — ReY — 22Y — 22-22A-24 in projector — 24Y in amplifier cabinet — the LDR lamps in the four C.S. magnetic pre-amplifiers Y — via diodes to the LDR lamps in the four "C.S. Magnetic" equalizers — to negative power supply.

When 70mm film is threaded through the magnetic sound head in a projector the circuit through the EL 4215 changes from that when 35mm film is used. When the associated projector ON button is depressed the circuit is as follows:

+ of power supply relay ReX (Y or Z) — 22X (Y or Z) — 22-25 in projector — 25X (Y or Z) in amplifier cabinet — the LDR lamps in X (Y or Z) 6 70mm magnetic pre-amplifiers X (Y or Z) — via diode to the LDR lamps in the 6 70mm equalizers — to negative power supply.

There are no mechanical switches or relays in the sound circuits.

Pre-selection from machine to machine, regardless of mode, is entirely normal.

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