

PRESTIGE 160

60 cycles

INSTALLATION OF THE PHONOGRAPH PRESTIGE 160

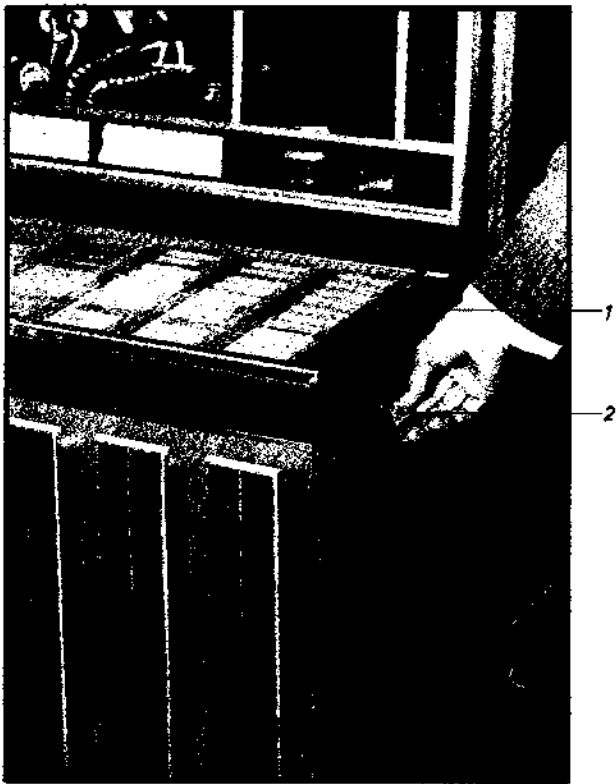


Fig. a



Fig. b

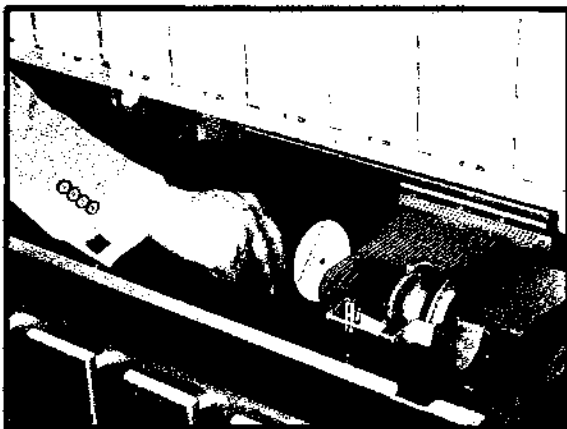


Fig. c

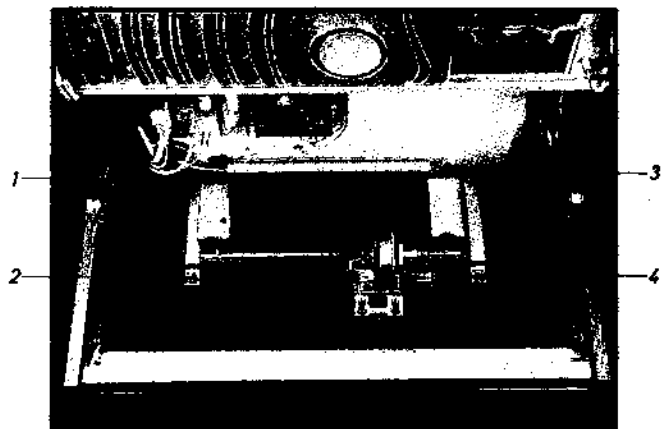


Fig. d

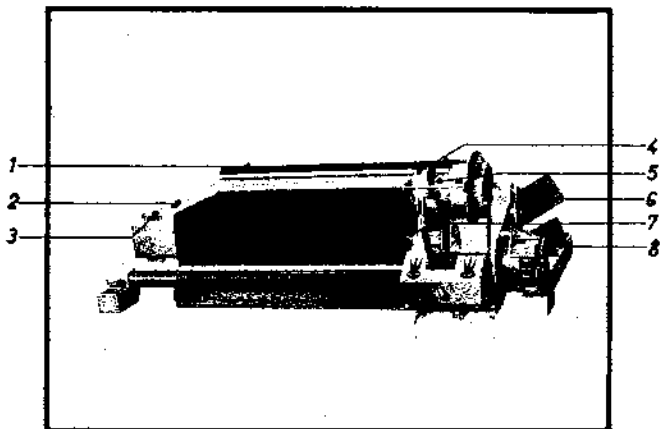


Fig. e

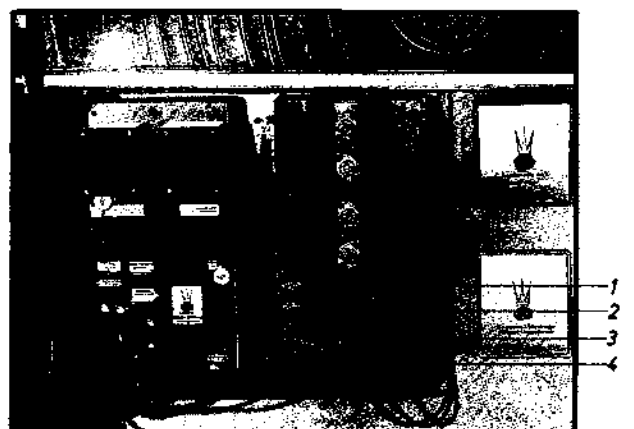


Fig. f

See instructions next page →

PLEASE READ INSTRUCTIONS BEFORE INSTALLATION

GENERAL

- 1 If external damage due to transport is noticed, this should at once be recorded on the delivery note and endorsed by the person making the delivery (Forwarding Agent, Railways, etc.). The manufacturer is not liable for damage caused during transit.
- 2 Devices for the safety and protection during transit must be removed before switching the phonograph on. They must, however, be refitted in the event of further transit.
- 3 All standard models of the phonographs are for a line voltage of 117 V/60 cycles.
- 4 The box is supplied with a 3-core line cable. Green-yellow must be connected to earth, corresponding to international wire code.
- 5 The proper functioning of the phonograph necessitates it to be horizontally and vertically levelled.

INSTALLATION OF THE PHONOGRAPH

1. Unscrew cabinet keys (end figures ... 76) and cash box keys from the back.
2. Open left hand cabinet lock by turning the cabinet key to the left and right hand cabinet lock by turning the cabinet key to the right (figure a/item 2). While doing so, press lightly on the program frame. Lift up program frame (figure b/item 2).
3. Remove clip from rack on carriage base.
4. To loosen carriage, remove screws painted red (figure e/items 6 and 8) on the right hand side of the carriage base.
5. To loosen record clamp arm, remove rubber ring (figure e/item 5) and rubber wedge (figure e/item 7).
6. To free pick-up arm, remove rubber band, but leave the stylus cover on (figure e/item 4) in order to protect the diamonds.
7. To loosen carriage base, unscrew four nuts (figure d) up to the catch.
8. Pull line cable through the cutout hole in the back of the cabinet. Cover cutout hole with protection plate.
9. **ATTENTION:** Check line voltage before connecting! After plugging line plug into the wall socket, switch on line switch on the back of the cabinet. (Fluorescent lamps should now light up.)
10. By depressing the scan button (figure e/item 2) let the carriage move from its rest position on the right to the left and remove card board strip out of groove.
11. Seize handle at the bottom of the title strip holder section (figure b/item 1) and lift up title strip holders.
12. Open cash box, title strips will be found in the cash bag. After lettering the title strips, insert same in the desired succession into the title holders A—V. After adjustment arrange in proper order the "ALBUM" title strips.
13. Insert records into record magazine (figure c) in the order of the title strips, the upper lettering of the magazine marking to the left. Move carriage by pressing scan button (figure e/item 2) from space into which records have to be fitted.
14. Remove stylus covers from cartridge. (Save the covers for later use.)
15. Slightly press program holder frame (figure a/item 1) downwards and lock cabinet. (Left hand lock by turning to the right and right hand lock by turning to the left.)
16. Refit cash box cover and lock cash box.
17. **IN CASE OF TRANSIT:** move carriage to the extreme right and insert safety screws. All other safety and protection devices have to be mounted contrary to above described sequence.

CONTROL AND SERVICE SWITCHES:

- Credit Button:** Free play button, each pulse gives one credit. Located on inside of the right hand side of the cabinet — the upper button on coin acceptor assembly.
- Credit Cancel Button:** All credits can be cancelled. Located on inside of the right hand side of the cabinet — the lower button on the coin acceptor assembly.
- Record Reject:** By holding the button down for 1.5 seconds, any record can be rejected before end of play. Locations: one is located on the back left hand corner of the cabinet and one is on the control box.
- Scan Button:** permits travel of the carriage to any desired place. Located at the left hand side of carriage base.

TAKING INTO OPERATION:

After inserting coin for single play, the single indicator lights up. After inserting coin for ALBUM play, the ALBUM indicator lights up. If both indicator lights are lit Album or Single Plays may be selected. When only Single indicator light is lit, only Single Play can be selected. After selection has been made, selection light will go out. Bent coins or slugs will — either immediately or after pressing the coin reject button — drop into the coin return cup.

The corresponding letter and number buttons are to be pressed. It is immaterial, which button will be pressed first. After the selection has been made, the buttons will be released. The selected and now playing record is being indicated by lighted figure- and letter-fields on the green panel.

The control box is fitted with a volume control and one reject button. The volume of both channels can be adjusted together.

In case of low volume the bass will automatically be reproduced louder (physiological volume control).

The control box is mounted at the back of the cabinet. It can easily be taken out and used as a remote control. (Cover hole with protection plate.)

A 3 core shielded or unshielded cable can be used. Therefore connection is possible at any location where remote control cable is on hand.

The remote control cable has to be connected to the corresponding terminals between amplifier and volume control box.

The box is equipped with a new type popularity meter (figure e/item 1) that indicates — easily detectable — the playing frequency of each record. The popularity meter can — by one simple movement of the lever — be reset to "0".

The total play meter is located on the left hand side of the carriage base (figure e/item 3).

Used or damaged diamonds can — together with their holders — easily be removed from the cartridge without any tools and be replaced by new ones.

CREDIT UNIT:

In order to alter credits, the corresponding wheel together with the needed slot have to be placed on the drive pin. For ex.:

- 1 play — slot nr. 1
- 3 plays — slot nr. 3
- 6 plays — slot nr. 6

Thus, any variation from 1 — 12 plays is possible.

1. Remove credit unit cover
2. Clap out base plate of credit unit
3. To take off top plate, loosen screw and remove circlip from main wheel pin. Take off plastic spacer and washer.
4. Remove tension spring
5. Take off top wheel
6. Refit wheel in such a way that the drive pin is led into the needed slot of the wheel
7. If second or third wheel has to be altered, follow same procedure as above. (Be careful to replace washers when assembling.)
8. Refit all other parts contrary to above indicated sequence.
9. Check with coins.
10. Change price instructions at the selector key panel. Credits and price instructions have to coincide.

DISCOTHEQUE / ALBUM:

An ALBUM-selection can be made, when sufficient credits have been accumulated. (See price instruction.) If, for ex., an ALBUM-selection is set for 3 credits, a minimum of 3 credits must be accumulated.

1. Positions 1 and 2 in the credit unit are connected with one contact finger and positions 3 and 4 with another contact finger.
2. Cam N4 of the switch mechanism (left hand side — carriage base) is set in such a way that 3 subtractions are realized in the credit unit at each ALBUM-selection.
3. Push open cover of the selector switches, contact finger at the selector switches must be changed from 1 to 2 for ALBUM-selection.

CONNECTION OF LOUDSPEAKERS:

The impedance of installed loudspeaker combinations is 8 Ω per channel. If additional loudspeakers are to be used, attention must be paid to the impedance matching.

In case of mismatching the electronic fuses in the amplifier will cut out.

The total impedance of the connected loudspeakers should not be less than 3 Ω per channel.

See inclosed "EXTENSION SPEAKER CONNECTIONS".

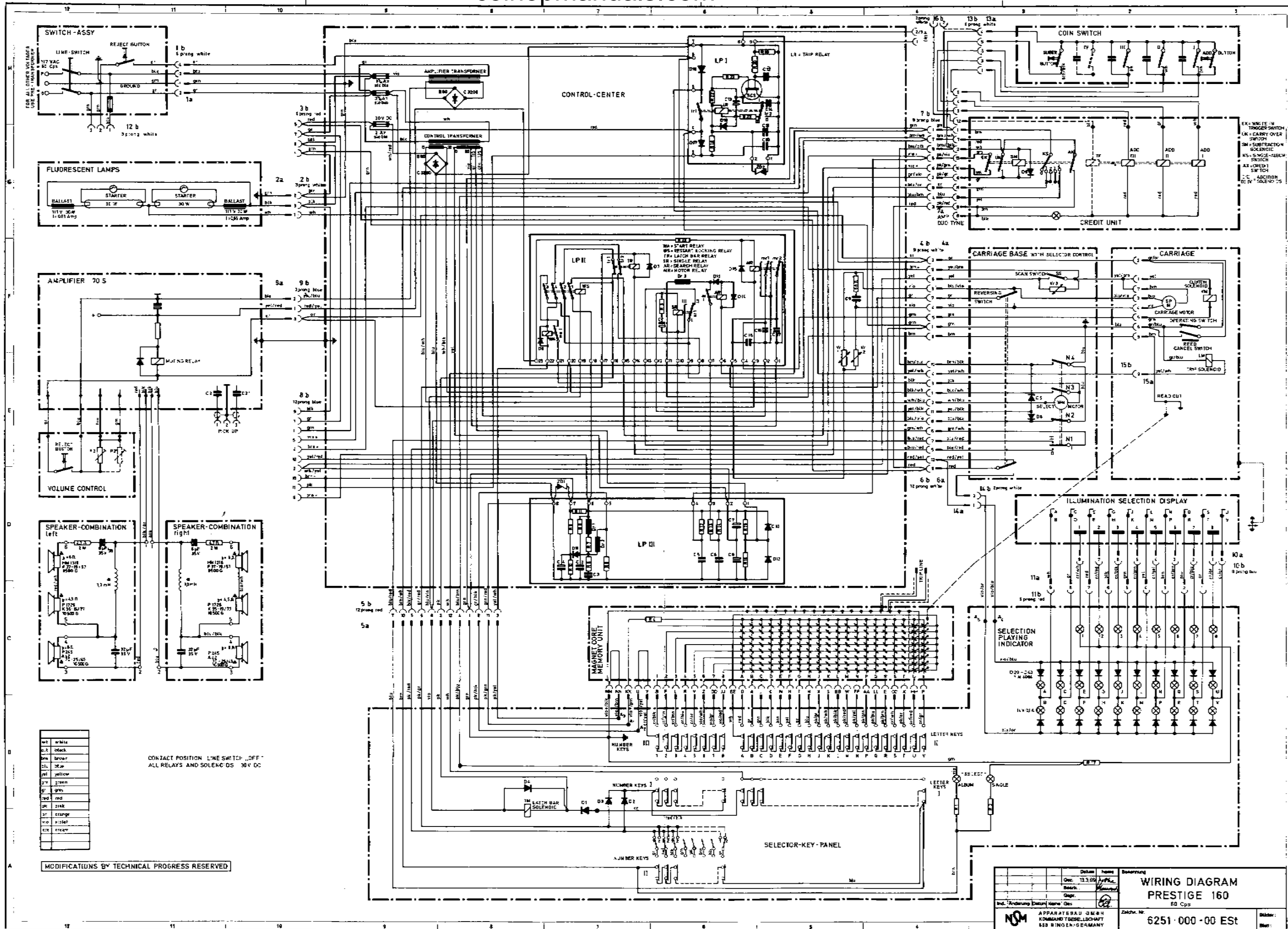
Max. music power = 60 Watts per channel.

MATCHING THE SOUND TO THE ROOM ACOUSTICS:

After lifting up selector key panel, the sound controls can be reached.

- Treble-control switch (figure f/item 4)
- Bass-control switch (figure f/item 3)
- Record quality compensator (figure f/item 2)
- Channel level adjusting (figure f/item 1)

Upon leaving the factory both channels are adjusted to the same level. If necessary, the level may be limited to the desired maximum at the place of installation.

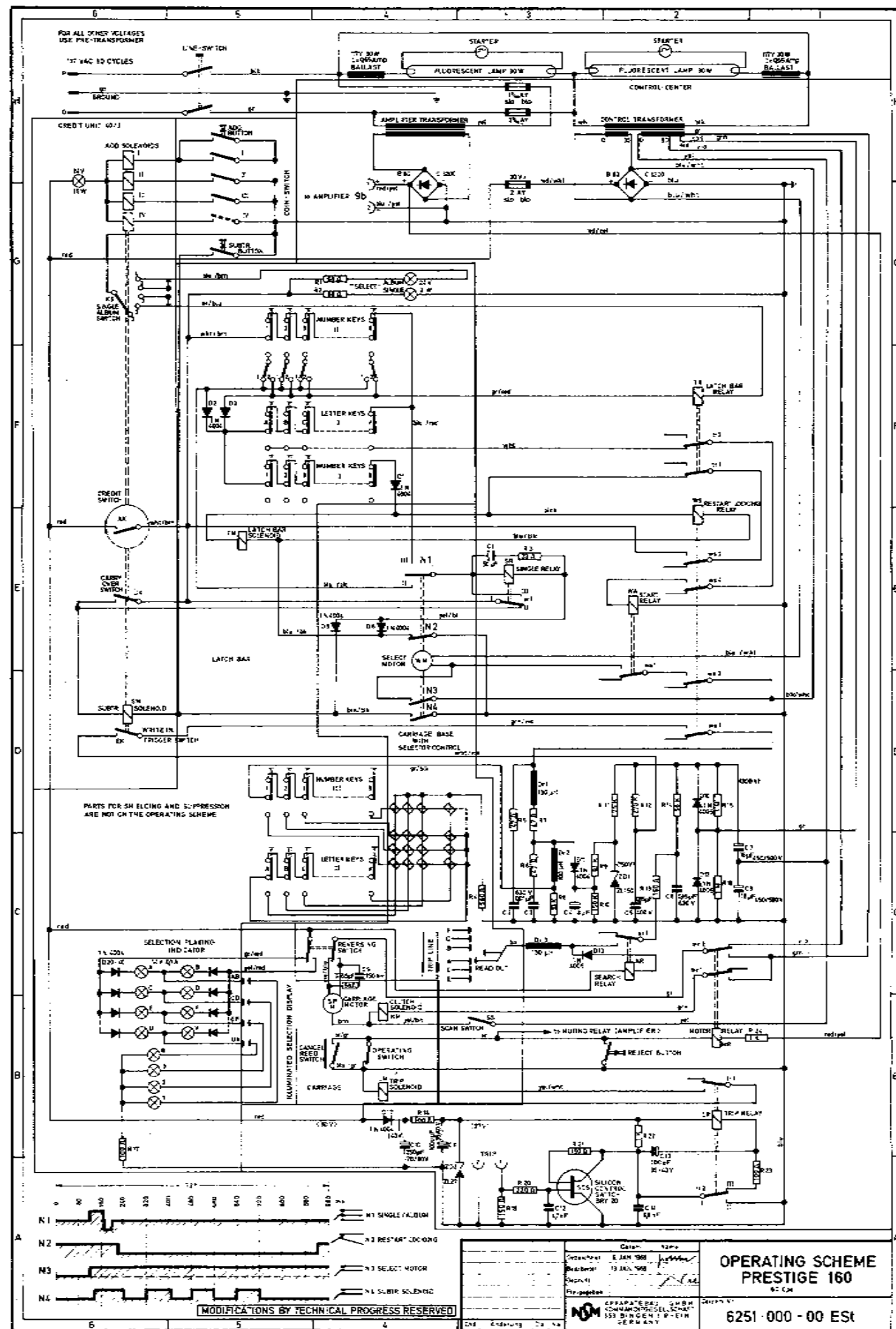


- wh white
- blk black
- brn brown
- blk blue
- grn green
- yel yellow
- blk red
- blk pink
- blk orange
- blk violet
- blk cream

CONTACT POSITION: LINE SWITCH 'OFF'
ALL RELAYS AND SOLENOIDS 30V DC

MODIFICATIONS BY TECHNICAL PROGRESS RESERVED

<p>WIRING DIAGRAM PRESTIGE 160 80 Cps</p>		<p>DATE: 11.3.69 BY: [Signature] CHK: [Signature]</p>
<p>APPARATEBAU GMBH KONIGSWALDSTRASSE 10 653 BINGEN/GERMANY</p>	<p>Zak. Nr. 6251 000 00 Est</p>	<p>Disk: [] Blat: []</p>



ATTENTION:

Sections of the wiring diagram with the corresponding circuits marked through heavy lines, have been added to the following descriptions. This makes it easier to follow the current run and helps to understand the functionings.

We recommend to have the left side of this page unfolded when studying the following sheets, because then the explained operations may be followed on the whole operating scheme.

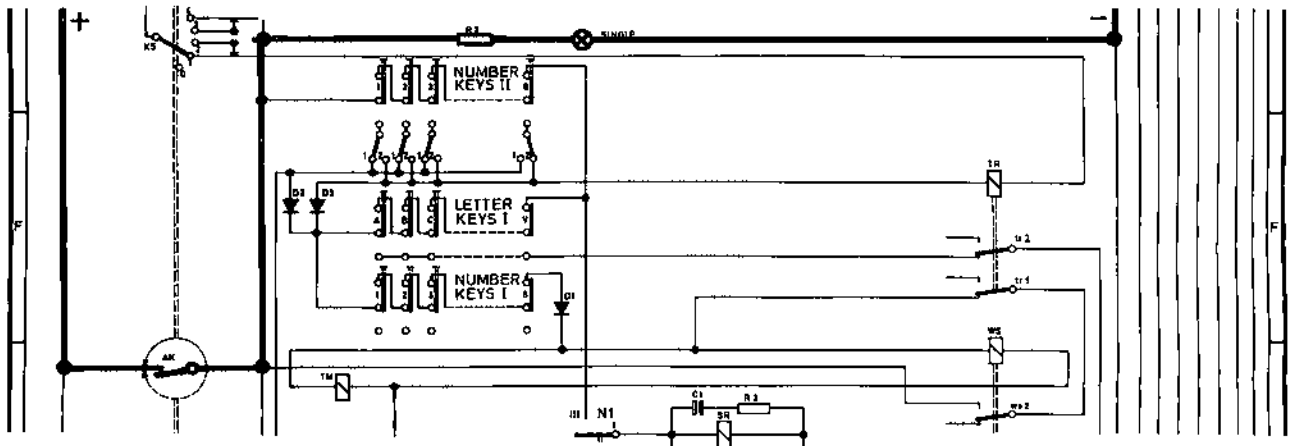
**OPERATING SCHEME
PRESTIGE 160**
6251-000-00 EST

CIRCUIT DESCRIPTION OF PRESTIGE 160

After connecting the cord to the 117 VAC line and switching the machine ON, it is ready to operate. The 3 2/10 amp. slo-blo fuse protects the circuit of the fluorescent lights, and the primary of the control transformer. The primary of the amplifier transformer is protected by the 1 2/10 amp. slo-blo fuse. All other circuits feed from the secondary of the transformer, and are thus insulated from the line voltage.

1. CREDIT

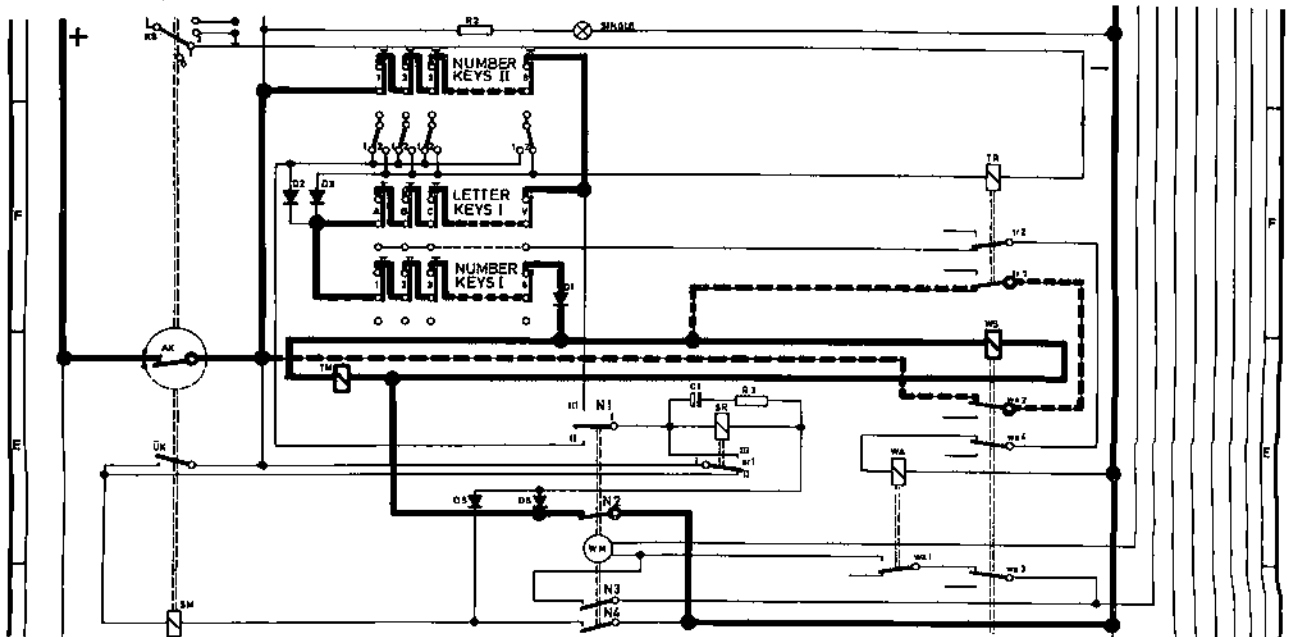
When a coin is deposited through the coin slot, it passes through the acceptor, closing the corresponding coin switch. This energizes the related add solenoid, a credit is made and the credit switch AK in the credit unit is now closed. Depending on the number of credits, the single-album switch KS will move to one of its contacts. Over contact AK the "Single Selection" lamp will be lit.



Circuit:

plus - AK - R2 - lamp, SINGLE - minus.

Simultaneously the circuit to the latch bar solenoid (TM) and the restart locking relay (WS) is closed.



Circuit:

plus - AK - number keys II (1 through 8) letter keys I (V through A) - number keys I (1 through 8) - D1 - TM and WS - N2 - minus.

With the latch bar solenoid energized, the buttons will be able to lock in. The contacts on the restart locking relay, ws1 through ws4, are now switched over. Contact ws2 locks the circuit to TM and WS.

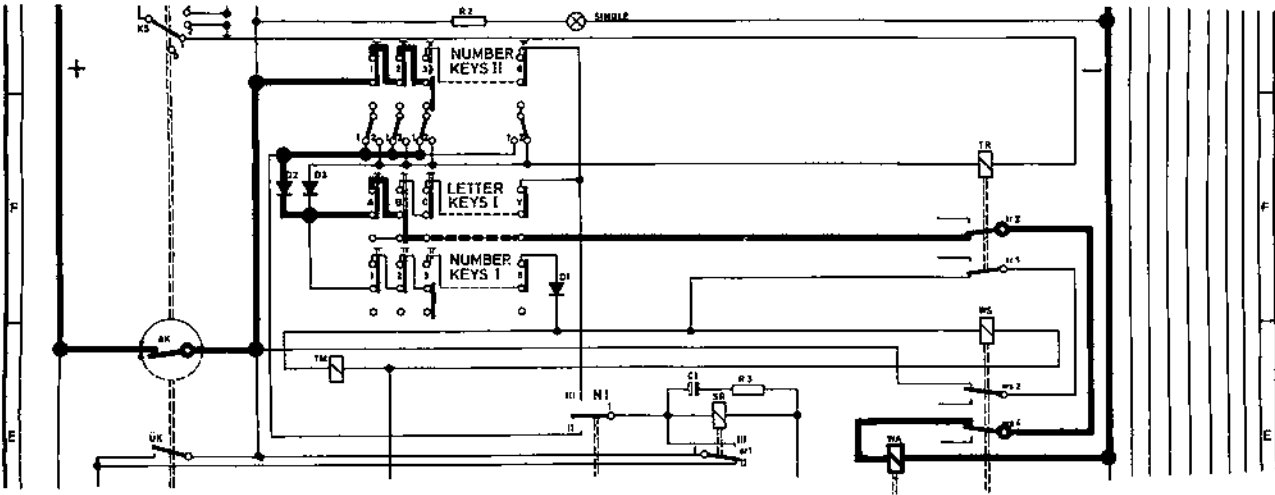
Circuit:

plus - AK - ws2 - tr1 - TM and WS - N2 - minus.

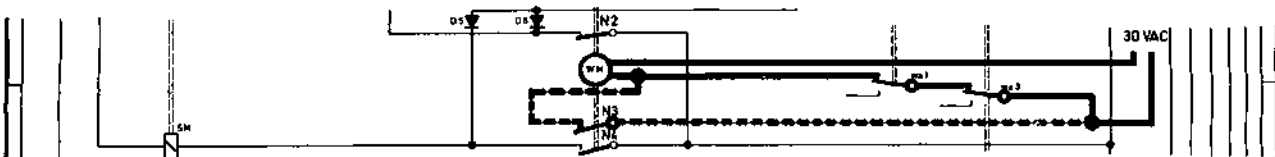
The price for album play can be changed (see credit unit). On the diagram, the album circuit is set for 3 credits per album. With less than 3 credits registered, the single-album switch KS is in the 1 or 2 position, thus connecting one side of the latch bar relay to minus.

2.1 SINGLE SELECTION CYCLE

When a number (single) and letter button are pressed, the circuit to the start relay (WA) is closed and the selection cycle starts.



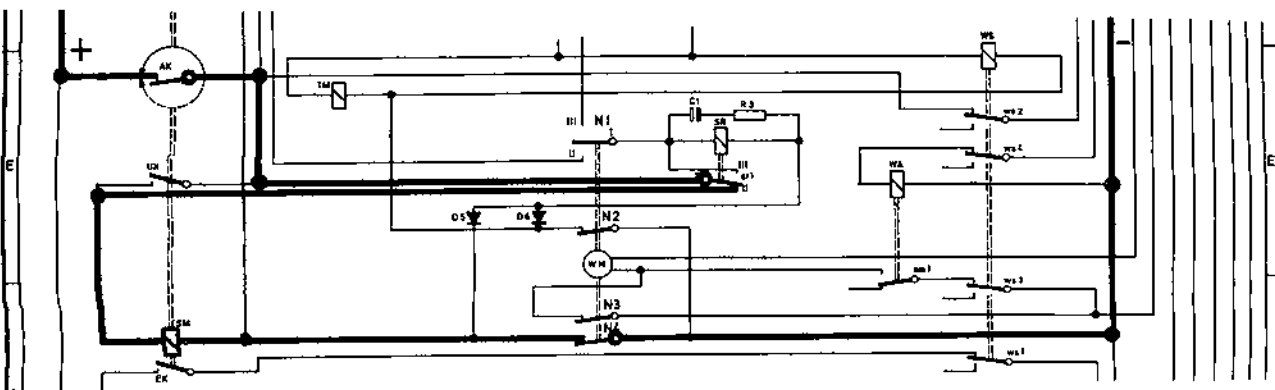
Circuit (B3 selected):
 plus - AK - number keys II,3 - contact plate pos. 1 - D2 - letter keys I,B - tr2 - ws4 - WA - minus.
 Energizing the start relay, closes contact wa1 hereby connecting the selection motor to the 30 VAC.



Circuit:
 30 VAC - selection motor - wa1 - ws3 - 30 VAC.
 The selection motor turns the contact cam, and contact N3 will close first.

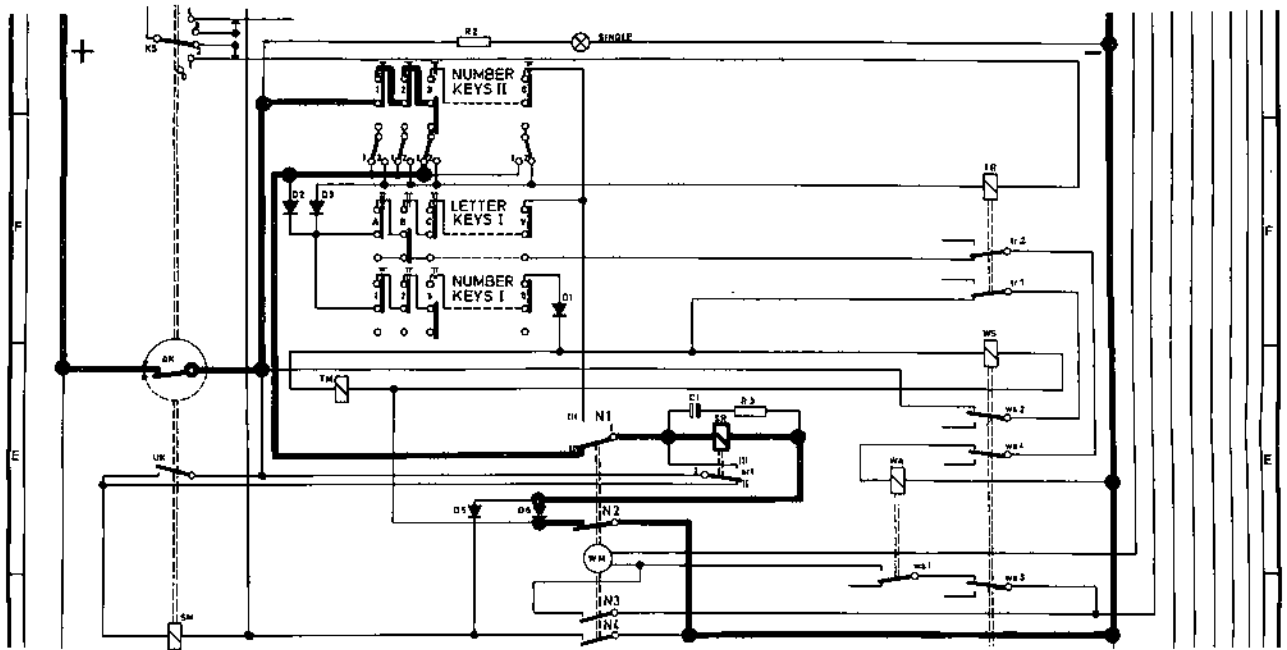
Circuit:
 30 VAC - selection motor - N3 - 30 VAC.

When contact N4 closes, the subtract solenoid (SM) is energized.



Circuit:
 plus - AK - sr1 - SM - N4 - minus.

The movement of the subtract solenoid causes the carry over switch SÜ and the write-in trigger switch EK to close. When the write-in trigger switch is closed, the actual preselection is concluded, but this action will be described in paragraph 3. Now contact N1, II-1 closes, completing the circuit to the single relay SR.



Circuit:

plus - AK - number keys II, 3 - contact plate pos.1 - N1, II-I - SR - D6 - N2 - minus.

Single relay contact sr1, I-II, opens the circuit to the subtract solenoid, thus cancelling all the other subtract pulses from contact N4, by single selection. Contact sr1, I-III, is now the holding contact for the single relay. The single relay stays energized after N2 has opened. It gets the minus over N4 and D5. Time constant network R3 and C1 over the single relay, keeps the relay closed while N4 is open between pulses. The movement of the subtract solenoid moves the credit wheel back one credit.

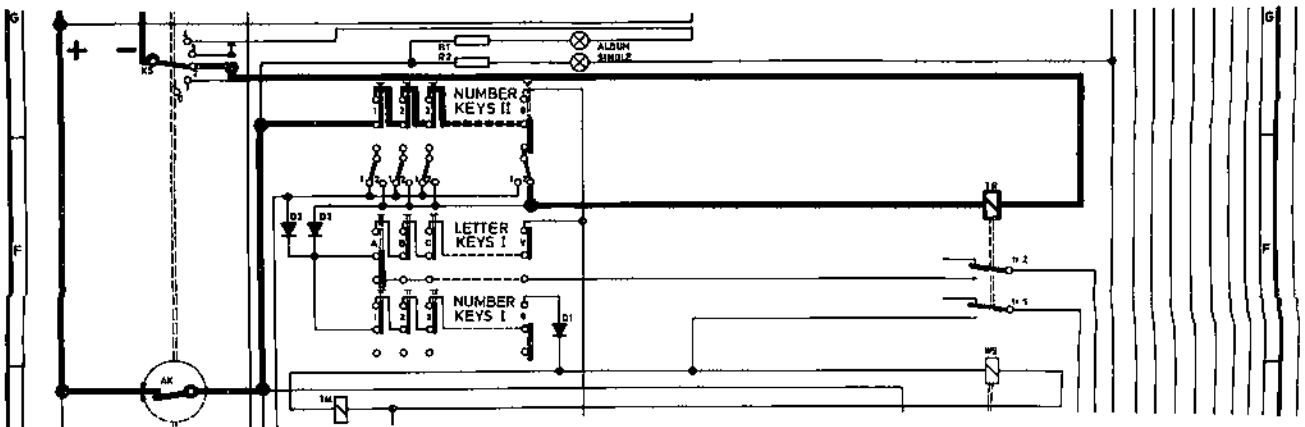
The selection motor closes the scan switch, which completes the circuit to the carriage motor and the clutch solenoid (see scanning). Just before completing the one subtraction pulse, N2 opens the circuit to the latch bar solenoid and the restart locking relay. The buttons will now jump back to the rest position.

At the end of the selection cycle, contact N2 closed again. If anymore credit is available, the restart locking relay and the latch bar solenoid will energize again through N2 and the rest contacts of the buttons. If a button should stay down, the restart locking relay cannot pull in because contact ws4 is open. This prevents making any undesired selections.

The selection motor will stop running as soon as contact N3 opens.

2.2 ALBUM SELECTION CYCLE

The jumper blade of number key 8 on the contact plate is in position 2. If an album number key is pressed, and there is not enough credit available the latch bar relay (TR) will energize.

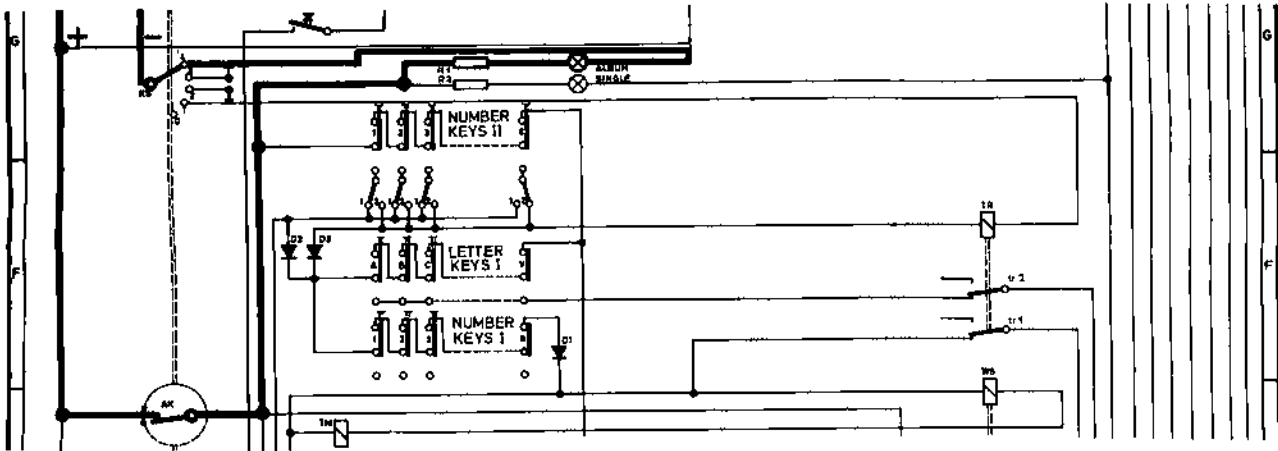


Circuit:

plus - AK - number keys II, 8 - contact plate pos. 2 - TR - single-album switch KS - minus.

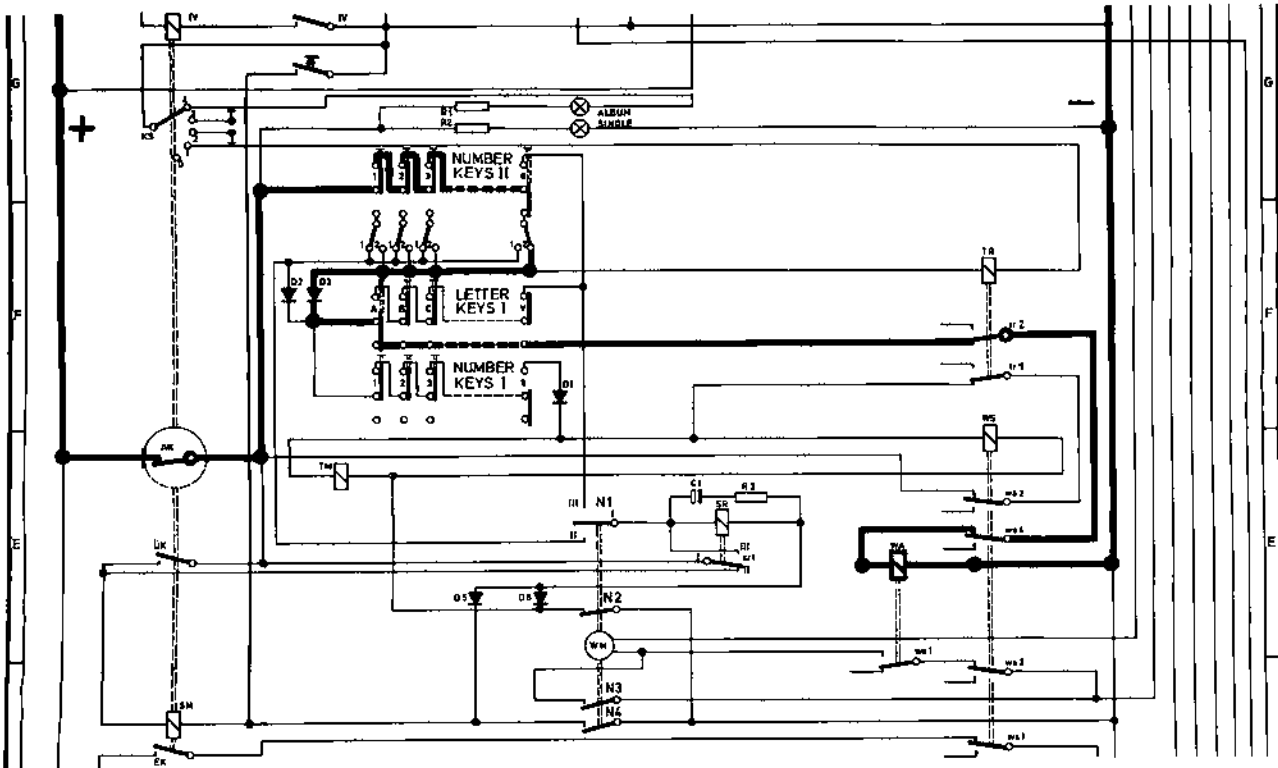
When the latch bar relay energizes, and contact tr1 opens the circuit to the restart locking relay on the latch bar solenoid, the buttons cannot latch, contact tr2 opens the circuit to the start relay, and no selection is made.

If 3 or more credits are available, single-album switch KS is in position 3 or 4, thus the negative line to the latch bar relay is open and the "ALBUM selection" lamp is lit.



Circuit:
plus - lamp, ALBUM - R1 - single-album switch KS - minus.

If a number (ALBUM) and letter button is pressed now, the circuit to the start relay is closed and the selection cycle starts.



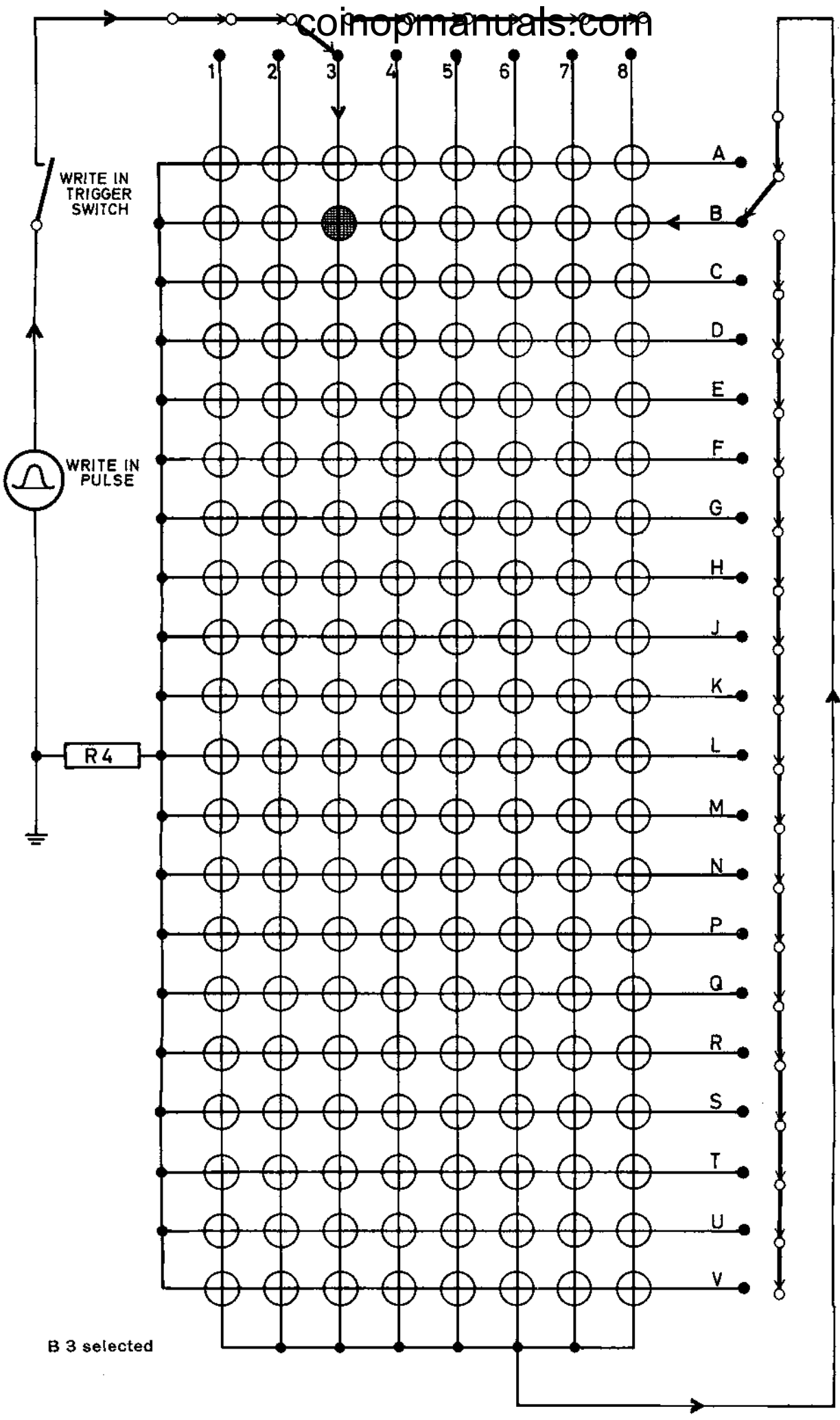
Circuit:
(A8 selected) plus - AK - number keys II, 8 - contact plate pos. 2 - D3 - letter keys I, A - tr2 - ws4 - WA - minus.

The cycle is the same as for single selection, except the following. The single relay will not be energized by album selection, therefore all the subtract pulses from contact N4 will be registered. Because contact N2 opens after the first subtract pulse, the restart locking relay is deenergized, opens contact ws1, thus only the first write-in pulse from the write-in trigger switch will be used.

3. THE ELECTRONIC SELECTION SYSTEM

The Prestige 160 uses the more advanced electronic system using toroidal shaped magnetic cores of magnesium ferrite, called toroids. There are 160 toroids, one for each selection arranged in two rows of 80. The system uses a minimum amount of current, while the only moving parts, the read-out plungers, only touch the contacts.

The 160 toroids are ring shaped with a diameter of 4 mm. Because they are made of ferrite, they have very definite properties.



SCHEMATIC
MEMORY UNIT

Each magnet has a northpole and a southpole.



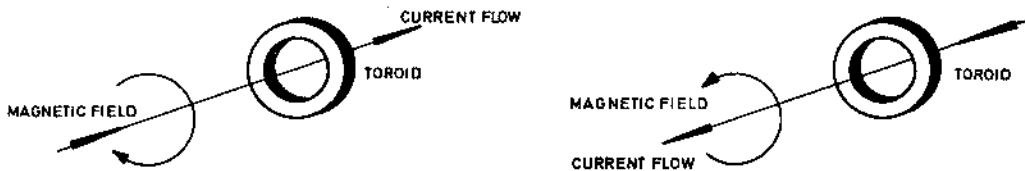
Magnetic lines run between the poles. With ring magnets, the lines form a closed circuit.

There are two conditions, the lines run clockwise, or they run counter clockwise.

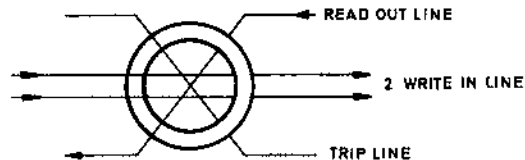


To change a toroid from one condition into the other a magnetic field of well defined amplitude, shape, and polarity is necessary.

When electric current flows through a wire, a magnetic field builds up around the wire. The direction of the magnetic lines depend on the direction of the current in the wire.



4 wires run through each toroid, 2 for write-in, 1 for read-out, 1 for trip.

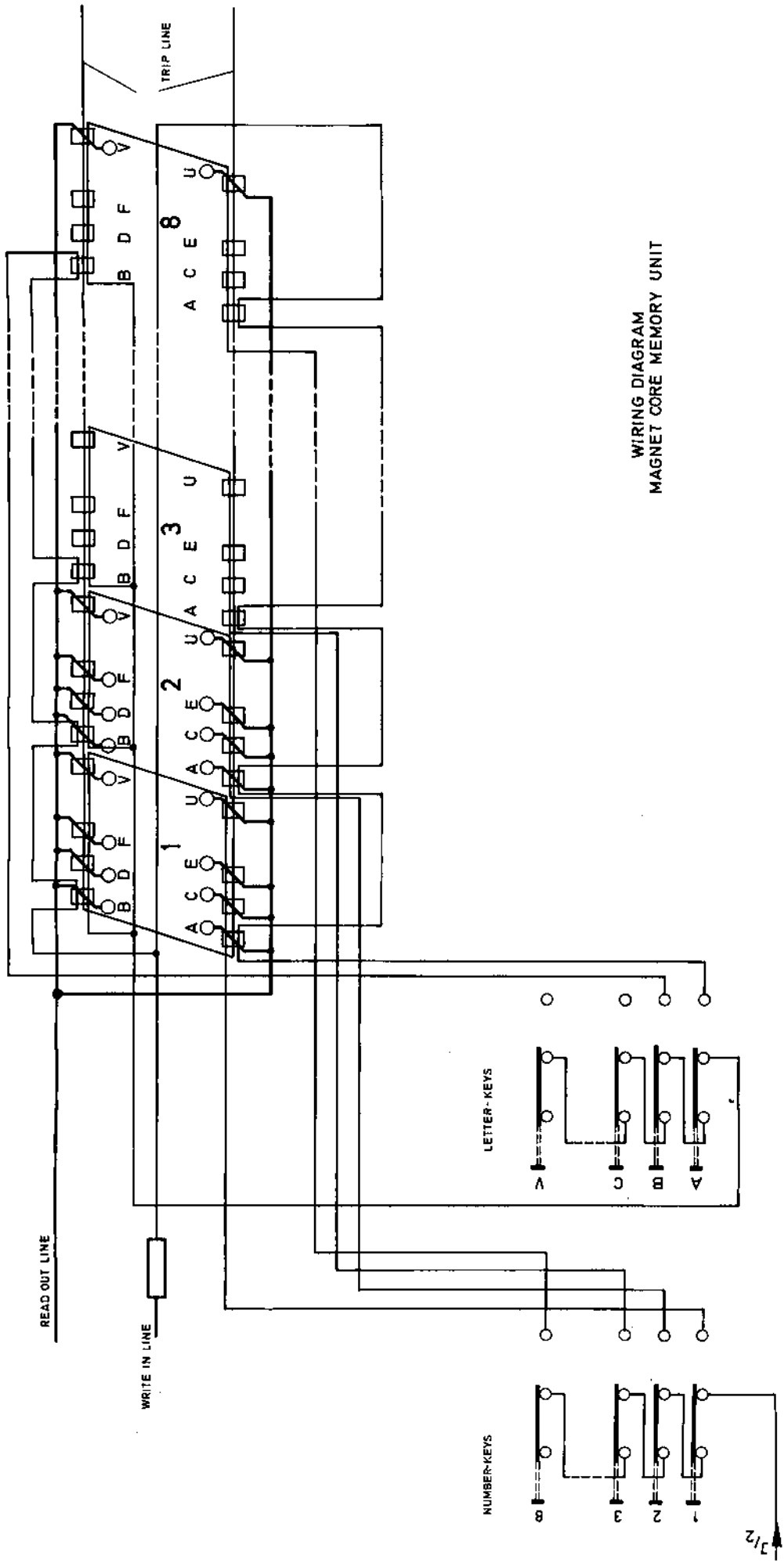


The electric pulses through these wires are of such amplitude and direction that the selected toroid will change its condition. We call the selected state the YES condition, the not selected state NO condition.

3.1 WRITE-IN (PRESELECTION)

From each number key a write-in line runs through that number group, then to the letter keys. From there a second write-in line runs through that letter group, over resistor R4 to negative. (See schematic).

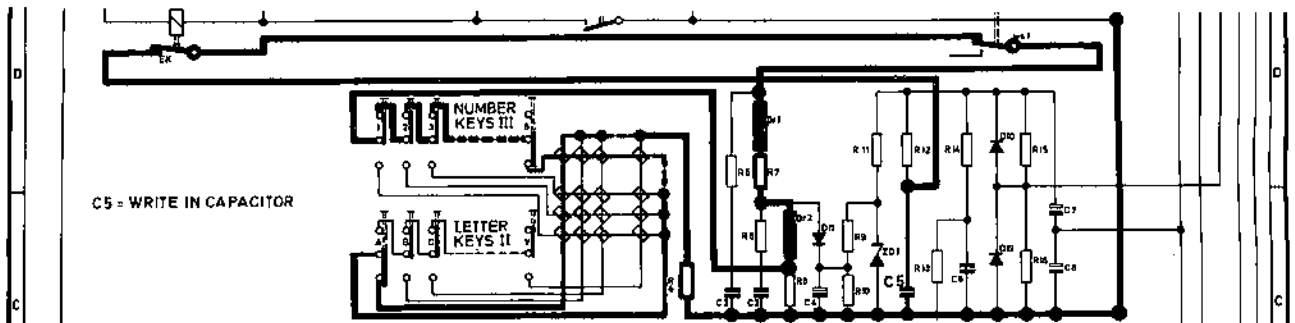
When a selection is made, in this case B3, the pulse travels through the write-in trigger switch, the line going through all the number 3 toroids, to the letter keys, through all the B toroids, and over R4 back to minus. Thus, all the number 3 and letter B toroids receive a current of half the necessary amplitude, but only the toroid where the two lines cross, in this case B3, will receive the pulse with the needed amplitude to turn from the NO to the YES condition.



WIRING DIAGRAM
MAGNET CORE MEMORY UNIT

The 110 VAC coming from the secondary of the control transformer is converted to 300 VDC by the rectifier-doubler circuit of D10, C7, C8, D12, R15 and R16.

Over R12, the write-in capacitor C5 is charged to 300 VDC. R11 is a series resistor for Zener diode ZD1. Over voltage divider R9 and R10, a reference pulse is placed over C4, which through D11, will control the amplitude of the write-in pulse. When the write-in trigger switch is closed, capacitor C5 is discharged over contact ws1 through the network R5, C2, Dr1, R7, R6, C3, which will give the pulse the desired shape, over Dr2, number and letter keys, the selected toroid, and through R4 back to ground.



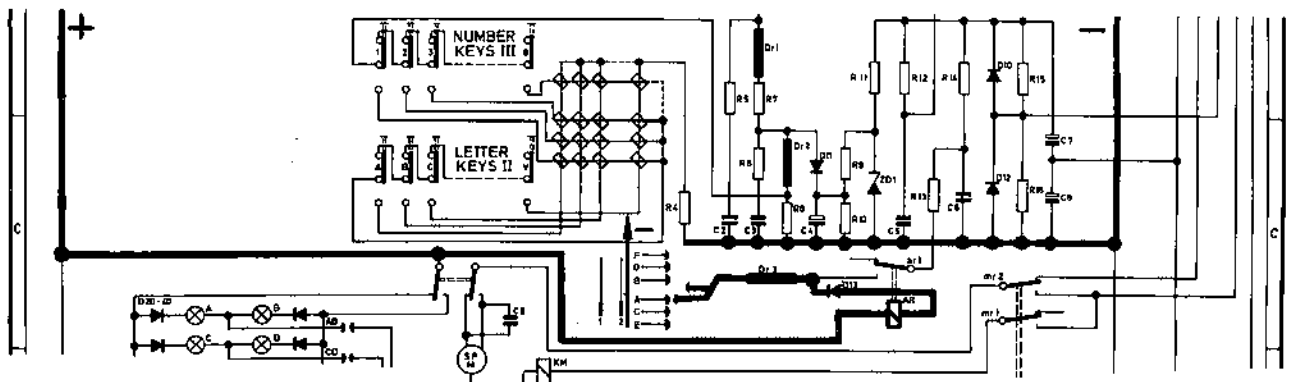
Circuit (A8 selected):

C5 - write-in trigger switch - ws1 - pulse shape circuit - Dr2 - number keys III,8 - toroids number 8 - letter keys II,A - toroids letter A - R4 - C5 minus.

Flipping over of toroid A8 completes the write-in cycle of selection A8.

3.2 READ-OUT

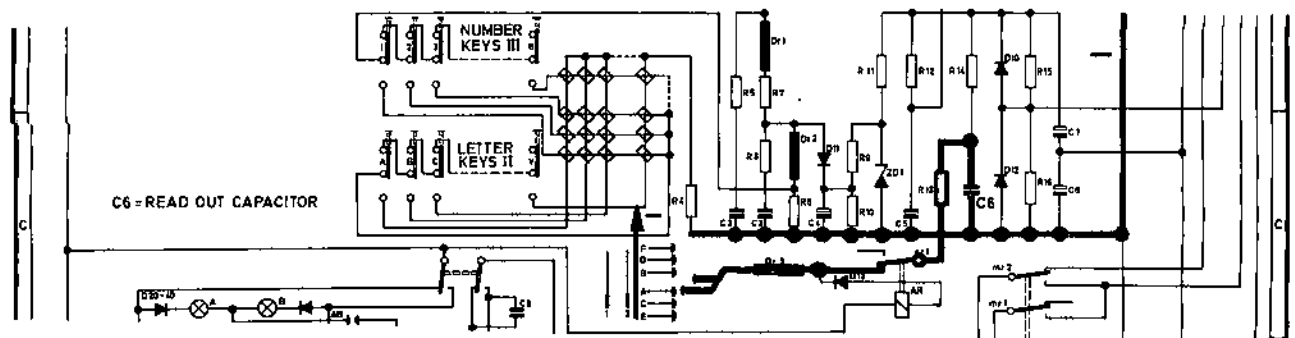
As we saw before, the turning of the selection motor, closes the scan switch, thus energizing the clutch solenoid, and starting the carriage motor. The read-out contacts will touch each contact on the memory unit in sequence. From each contact a read-out line runs through the related toroid to minus. Each time the read-out contact touches a toroid contact the circuit to the search relay (AR) is closed.



Circuit:

plus - AR - D13 - Dr3 - read-out contact - toroid contact - toroid - minus.

The search relay is energized. The current drawn by the relay through the toroids is not strong enough to flip a toroid over. This happens over the closing contact ar1. Now read-out capacitor C6, charged to 300 VDC, can discharge over R14 through the read-out line. Amplitude and rise time of this pulse are controlled by R13 and Dr3.



Circuit:

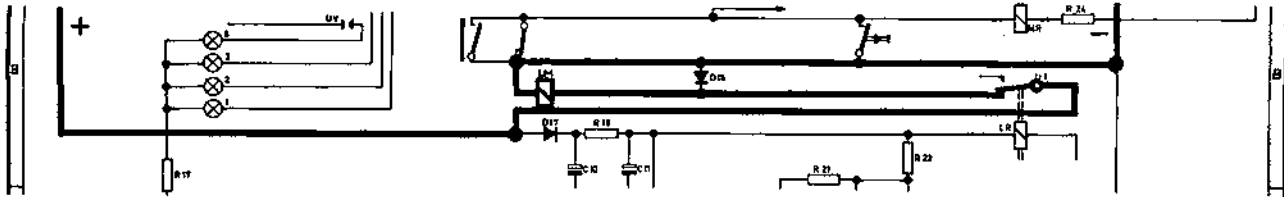
C6 - R13 - ar1 - Dr3 - read-out contact - toroid contact - toroid - C6 minus.

This happens with each of the 160 toroids.

If we encounter a toroid in the YES condition, this will flip over. Because of the changing magnetic field, a pulse will be induced in the trip line. Because the amplitude and duration (1 μ sec.) of this pulse are very small, we feed it to a pulse amplifier.

3.3 TRIP

The trip pulse is of positive polarity. These pulses are integrated by the input network R19, R20, and C12, and coupled to the cathode gate of the Silicone Control Switch (SCS). The supply voltage for SCS comes from the 30 VDC, and is filtered and stabilized by the network C10, R18, C11 and ZD1. The capacitor C14, prevents premature conducting of SCS by any transient pulses in the circuit. The input of the pulse amplifier is so designed that only pulses with the right amplitude and duration will trip the circuit. We can thus disregard the pulses induced during the write-in cycle, since these are of negative polarity. Capacitor C13 is discharged over R23 and contact lr2, I-III. The positive trip pulse will cause SCS to conduct, and trip relay (LR) will be energized. This will cause contact lr2, I-III, to switch. The relay will be held in by the charge current of C13. When C13 is completely charged the trip relay will deenergize. However, while the relay was energized, the anode gate of SCS was connected to ground by contact lr2, I- II, causing the SCS to go back into cut-off. Contact lr1 will have closed the circuit of the trip solenoid. (LM)



Circuit:
plus - lr1 - LM - minus.

The trip solenoid uncouples the scan gear, the carriage stops, and the transfer cycle starts.

4. TRANSFER

The selected record is transferred by the transfer arm. The record clamp arm will sense the diameter of the centerhole, and determine the desired speed, 45 RPM or 33 1/3 RPM. The pick-up arm lands in the first groove. The operating switch opens, causing the motor relay (MR) and the muting relay (SR) to deenergize.

Motor relay contact mr1: opens the circuit to the clutch solenoid.
contact mr2: switches the carriage motor from 125 VAC to 80 VAC.

Muting relay contact sr1: switches the amplifier ON.

5. PLAY

The needle will track the record.

6. END OF RECORD

When the needle reaches the cut-off groove the cancel reed switch will close, causing the motor relay and the muting relay to energize.

Motor relay contact mr1: closes the circuit to the clutch solenoid.
contact mr2: switches the motor back from 80 VAC to 125 VAC.

Muting relay contact sr1: mutes the amplifier.

7. TRANSFER AND SCANNING:

After returning the record to the record magazine, the carriage unlocks itself from the gear rack, and the drive gear goes back from the transfer to the scan position. At each end of the record magazine is a lever which controls the reversing switch, hereby changing the direction of travel of the carriage. The carriage will scan twice and will come to its rest position if no more selections are made.

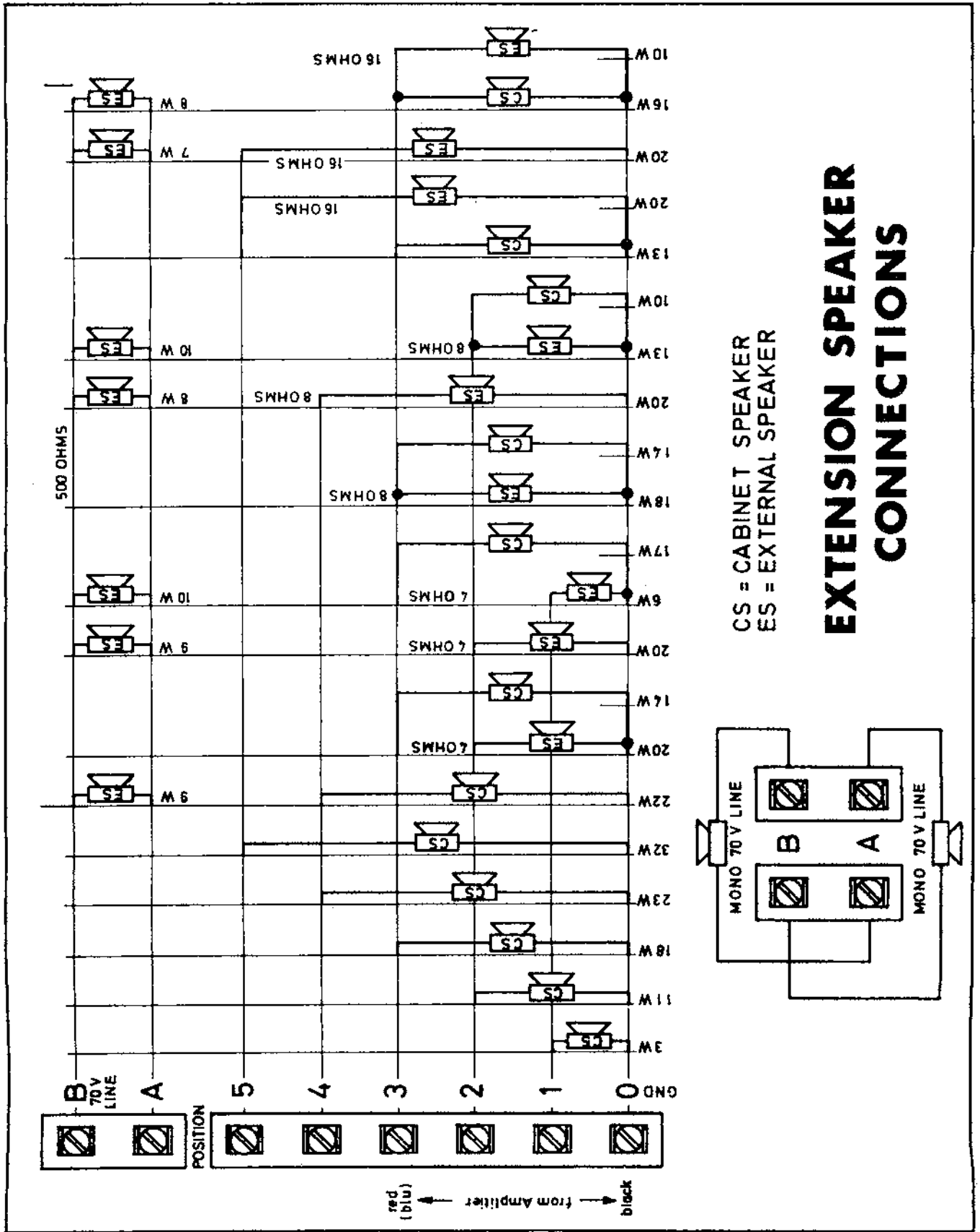
8. CONTROL AND SERVICE SWITCHES

Credit button: Free play button, each pulse gives one credit.

Credit cancel button: Each pulse will subtract one credit.

Record reject: By holding the reject button down for 1.5 seconds any record can be rejected before end of play.

Scan button: Allows travel and stop of carriage in any desired place.

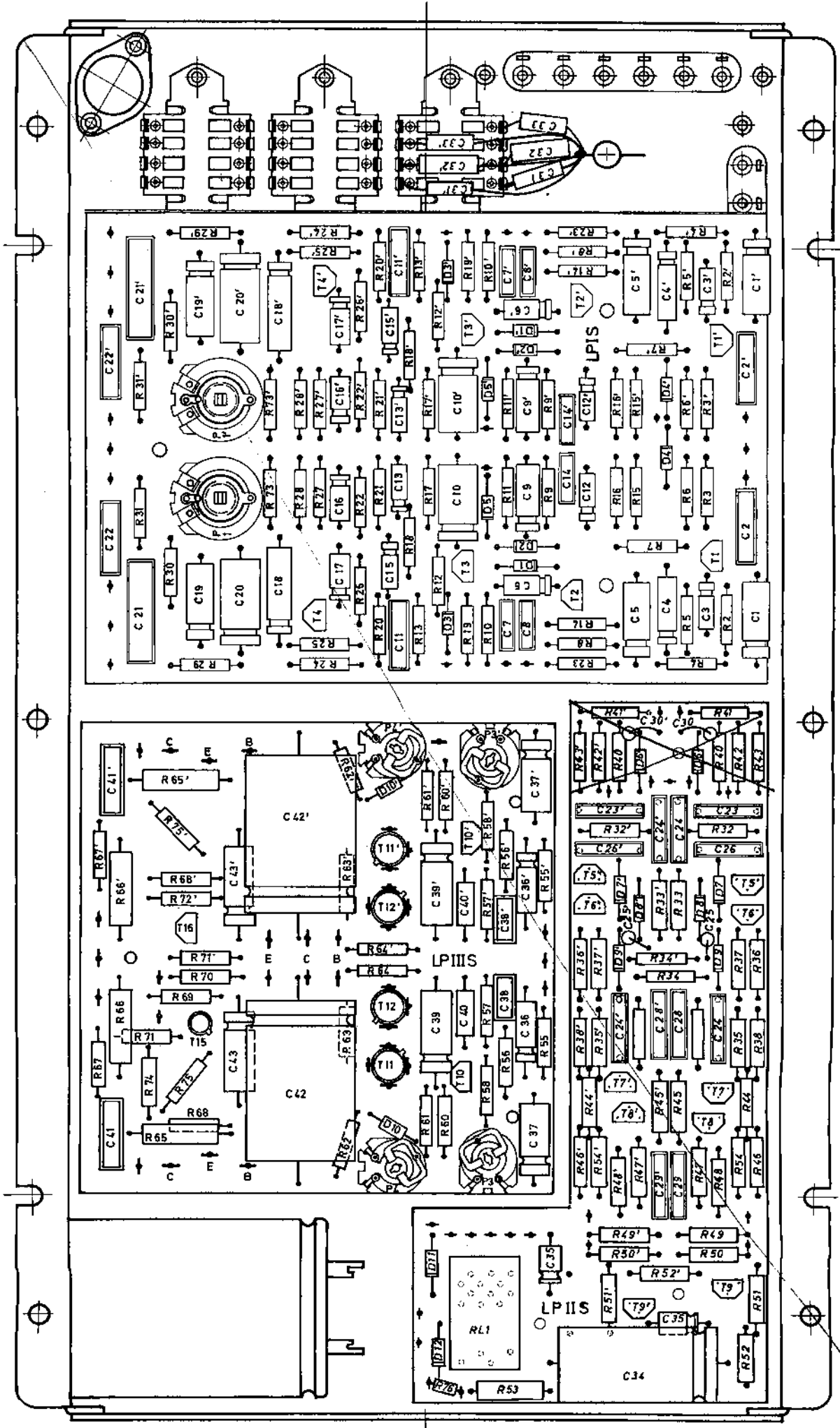


TRANSISTOR-AMPLIFIER 70 S

R 2/R 2'	Carbon resistor	2 Megohm	1/3 W. 5 %
R 3/R 3'	Carbon resistor	8 200 Ohm	1/3 W. 5 %
R 4/R 4'	Carbon resistor	3 300 Ohm	1/3 W. 5 %
R 5/R 5'	Carbon resistor	1 Megohm	1/3 W. 5 %
R 6/R 6'	Carbon resistor	120 000 Ohm	1/3 W. 5 %
R 7/R 7'	Carbon resistor	27 000 Ohm	1/3 W. 5 %
R 8/R 8'	Carbon resistor	1 000 Ohm	1/3 W. 5 %
R 9/R 9'	Carbon resistor	8 200 Ohm	1/3 W. 5 %
R10/R10'	Carbon resistor	82 000 Ohm	1/3 W. 5 %
R11/R11'	Carbon resistor	390 000 Ohm	1/3 W. 5 %
R12/R12'	Carbon resistor	10 000 Ohm	1/3 W. 5 %
R13/R13'	Carbon resistor	8 200 Ohm	1/3 W. 5 %
R14/R14'	Carbon resistor	22 000 Ohm	1/3 W. 5 %
R15/R15'	Carbon resistor	2 700 Ohm	1/3 W. 5 %
R16/R16'	Carbon resistor	560 Ohm	1/3 W. 5 %
R17/R17'	Carbon resistor	4 700 Ohm	1/3 W. 5 %
R18/R18'	Carbon resistor	120 Ohm	1/3 W. 5 %
R19/R19'	Carbon resistor	27 000 Ohm	1/3 W. 5 %
R20/R20'	Carbon resistor	820 000 Ohm	1/3 W. 5 %
R21/R21'	Carbon resistor	120 000 Ohm	1/3 W. 5 %
R22/R22'	Carbon resistor	82 000 Ohm	1/3 W. 5 %
R23/R23'	Carbon resistor	10 000 Ohm	1/3 W. 5 %
R24/R24'	Carbon resistor	10 000 Ohm	1/3 W. 5 %
R25/R25'	Carbon resistor	10 000 Ohm	1/3 W. 5 %
R26/R26'	Carbon resistor	100 000 Ohm	1/3 W. 5 %
R27/R27'	Carbon resistor	120 000 Ohm	1/3 W. 5 %
R28/R28'	Carbon resistor	3 900 Ohm	1/3 W. 5 %
R29/R29'	Carbon resistor	8 200 Ohm	1/3 W. 5 %
R30/R30'	Carbon resistor	2 200 Ohm	1/3 W. 5 %
R31/R31'	Carbon resistor	22 000 Ohm	1/3 W. 5 %
R32/R32'	Carbon resistor	150 000 Ohm	1/3 W. 2 %
R33/R33'	Carbon resistor	150 000 Ohm	1/3 W. 2 %
R34/R34'	Carbon resistor	10 000 Ohm	1/3 W. 2 %
R35/R35'	Carbon resistor	1 Megohm	1/3 W. 2 %
R36/R36'	Carbon resistor	5 600 Ohm	1/3 W. 2 %
R37/R37'	Carbon resistor	68 Ohm	1/3 W. 2 %
R38/R38'	Carbon resistor	1 Megohm	1/3 W. 2 %
R39/R39'	Carbon resistor	220 000 Ohm	1/3 W. 2 %
R40/R40'	Carbon resistor	10 000 Ohm	1/3 W. 2 %
R41/R41'	Carbon resistor	15 Ohm	1/3 W. 2 %
R42/R42'	Carbon resistor	4 700 Ohm	1/3 W. 2 %
R43/R43'	Carbon resistor	4 700 Ohm	1/3 W. 2 %
R44/R44'	Carbon resistor	3 900 Ohm	1/3 W. 2 %
R45/R45'	Carbon resistor	1 Megohm	1/3 W. 2 %
R46/R46'	Carbon resistor	5 600 Ohm	1/3 W. 2 %
R47/R47'	Carbon resistor	68 Ohm	1/3 W. 2 %
R48/R48'	Carbon resistor	220 000 Ohm	1/3 W. 2 %
R49/R49'	Carbon resistor	150 000 Ohm	1/3 W. 2 %
R50/R50'	Carbon resistor	220 000 Ohm	1/3 W. 2 %
R51/R51'	Carbon resistor	5 600 Ohm	1/3 W. 2 %
R52/R52'	Carbon resistor	4 700 Ohm	1/3 W. 2 %
R53	Carbon resistor	1 500 Ohm	1/3 W. 5 %
R54/R54'	Carbon resistor	1 Megohm	1/3 W. 2 %
R55/R55'	Carbon resistor	1 000 Ohm	1/3 W. 2 %
R56/R56'	Carbon resistor	1 000 Ohm	1/3 W. 2 %
R57/R57'	Carbon resistor	1 200 Ohm	1/3 W. 2 %
R58/R58'	Carbon resistor	12 000 Ohm	1/3 W. 2 %
R60/R60'	Carbon resistor	1 000 Ohm	1/3 W. 2 %
R61/R61'	Carbon resistor	1 800 Ohm	1/3 W. 2 %
R62/R62'	Carbon resistor	560 Ohm	1/3 W. 2 %
R63/R63'	Carbon resistor	330 Ohm	1/3 W. 2 %
R64/R64'	Carbon resistor	330 Ohm	1/3 W. 2 %
R65/R65'	Wire resistor	1/2 Ohm	2 W. 5 %
R66/R66'	Wire resistor	1/2 Ohm	2 W. 5 %
R67/R67'	Carbon resistor	22 Ohm	1/3 W. 2 %
R68/R68'	Carbon resistor	8 200 Ohm	1/3 W. 2 %
R69	Carbon resistor	5 600 Ohm	1/3 W. 2 %
R70	Carbon resistor	220 Ohm	1/3 W. 2 %
R71/R71'	Carbon resistor	4 700 Ohm	1/3 W. 2 %
R72	Carbon resistor	4 700 Ohm	1/3 W. 2 %
R73/R73'	Carbon resistor	120 Ohm	1/3 W. 2 %
R74	Carbon resistor	1 500 Ohm	1/3 W. 2 %
R75/R75'	Carbon resistor	1 200 Ohm	1/3 W. 2 %
R76	Carbon resistor	1 000 Ohm	1/2 W. 2 %

P 1/P 1'	Trimmer resistor	250 Ohm	1/3 W. lin.
P 3/P 3'	Adjusting resistor	500 000 Ohm, lin.	
P 4/P 4'	Adjusting resistor	2 500 Ohm, lin.	
C 1/C 1'	Lytic	50 Mfd/ 15 V	
C 2/C 2'	Mylar	0.1 Mfd/250 V	
C 3/C 3'	Lytic	1 Mfd/ 35 V	
C 4/C 4'	Lytic	50 Mfd/ 15 V	
C 5/C 5'	Lytic	50 Mfd/ 25 V	
C 6/C 6'	Lytic	10 Mfd/ 10 V	
C 7/C 7'	Mylar	0.033 Mfd/250 V	
C 8/C 8'	Mylar	0.015 Mfd/400 V	
C 9/C 9'	Lytic	100 Mfd/ 3 V	
C10/C10'	Lytic	250 Mfd/ 6 V	
C11/C11'	Mylar	0.22 Mfd/250 V	
C12/C12'	Lytic	25 Mfd/ 10 V	
C13/C13'	Lytic	25 Mfd/ 10 V	
C14/C14'	Mylar	0.01 Mfd/400 V	
C15/C15'	Lytic	5 Mfd/ 35 V	
C16/C16'	Lytic	10 Mfd/ 25 V	
C17/C17'	Lytic	10 Mfd/ 25 V	
C18/C18'	Lytic	50 Mfd/ 25 V	
C19/C19'	Lytic	10 Mfd/ 25 V	
C20/C20'	Lytic	100 Mfd/ 35 V	
C21/C21'	Mylar	0.68 Mfd/250 V	
C22/C22'	Mylar	0.22 Mfd/250 V	
C23/C23'	Mylar	0.1 Mfd/250 V	
C24/C24'	Mylar	0.1 Mfd/250 V	
C25/C25'	Lytic	5 Mfd/ 35 V	
C26/C26'	Mylar	0.1 Mfd/250 V	
C27/C27'	Mylar	0.1 Mfd/250 V	
C28/C28'	Mylar	0.1 Mfd/250 V	
C29/C29'	Mylar	0.1 Mfd/250 V	
C30/C30'	Lytic	250 Mfd/ 6 V	
C31/C31'	Mylar	0.01 Mfd/250 V	
C32/C32'	Mylar	0.033 Mfd/250 V	
C33/C33'	Mylar	0.1 Mfd/250 V	
C34	Lytic	1000 Mfd/ 35 V	
C35/C35'	Lytic	5 Mfd/ 35 V	
C36/C36'	Lytic	25 Mfd/ 10 V	
C37/C37'	Lytic	25 Mfd/ 35 V	
C38/C38'	Mylar	0.01 Mfd/400 V	
C39/C39'	Lytic	50 Mfd/ 35 V	
C40/C40'	Mylar	0.001 Mfd/160 V	
C41/C41'	Mylar	0.22 Mfd/250 V	
C42/C42'	Lytic	2500 Mfd/35/40 V	
C43/C43'	Lytic	250 Mfd/ 6 V	
D 1/D 1'	Silicon diode	1 N 4004	
D 2/D 2'	Silicon diode	1 N 4004	
D 3/D 3'	Silicon diode	1 N 4004	
D 4/D 4'	Silicon diode	1 N 4004	
D 5/D 5'	Silicon diode	1 N 4004	
D 6/D 6'	Silicon diode	1 N 4148	
D 7/D 7'	Silicon diode	1 N 4148	
D 8/D 8'	Silicon diode	1 N 4148	
D 9/D 9'	Silicon diode	1 N 4148	
D10/D10'	Zener diode	BZY 85 C 4 V 7	
D11	Silicon diode	1 N 4004	
D12	Silicon diode	1 N 4004	
T 1/T 1'	Transistor	BC 149 B	
T 2/T 2'	Transistor	BC 149 B	
T 3/T 3'	Transistor	BC 147 B	
T 4/T 4'	Transistor	BC 147 B	
T 5/T 5'	Transistor	BC 147 B	
T 6/T 6'	Transistor	BC 147 B	
T 7/T 7'	Transistor	BC 147 B	
T 8/T 8'	Transistor	BC 147 B	
T 9/T 9'	Transistor	BC 147 B	
T10/T10'	Transistor	BC 147 B	
T11/T11'	Transistor	40361 RCA	
T12/T12'	Transistor	40362 RCA	
T15	Transistor	BC 117 VI/BC 157 A	
T16	Transistor	BC 147 B	
RL 1	Mute relay	V 23154 — NO 721 — B 110	

TRANSISTOR AMPLIFIER 70 S



TRANSISTOR AMPLIFIER 70 S

The 70 S is a fully transistorized amplifier, free from iron cores and unaffected by supply voltage variations. Output is 60 W. music power per channel.

Distortion is less than 1% at 20 W. sine output in frequency range of 20 cs to 20 Kcs.

The 2 channels are completely separate and the amplifier has 30 transistors and 22 silicone diodes, and is divided in 3 major sections.

1. PLATE I S

Pre-amplifier with AVC and treble control.

2. PLATE II S

Volume control and bass control network, and muting relay.

3. PLATE III S

Phase splitter and output stage with electronic fuse.

1. PRE-AMPLIFIER (PLATE I S)

The audio signal from the cartridge is amplified by high input impedance transistor T1 and passed to the base of transistor T2. In order to obtain a constant output volume on records with varying recording levels, the next stage acts as AVC amplifier. After being amplified by T2, the audio signal is tapped before C16, and is coupled to the base of T3. The output of T3 in conjunction with D1, D2 and D3 forms a variable internal resistance: If the strength of the incoming signal changes, the AC-impedance of the network will also change and control the signal at the base of T2. Therefore, high signals will be amplified less and low signals will be amplified more. To reduce the background noise of old and worn records, a record noise compensating switch, with 3 positions, has been fitted into the circuit. To reduce the noise of the needle setting down on the record and entering the first groove, the AVC will allow the volume to reach its preset level with an 8 to 10 second delay. The output of each channel can be adjusted over 10 db. with the level controls.

2. VOLUME CONTROL (PLATE II S WITH MUTING RELAY)

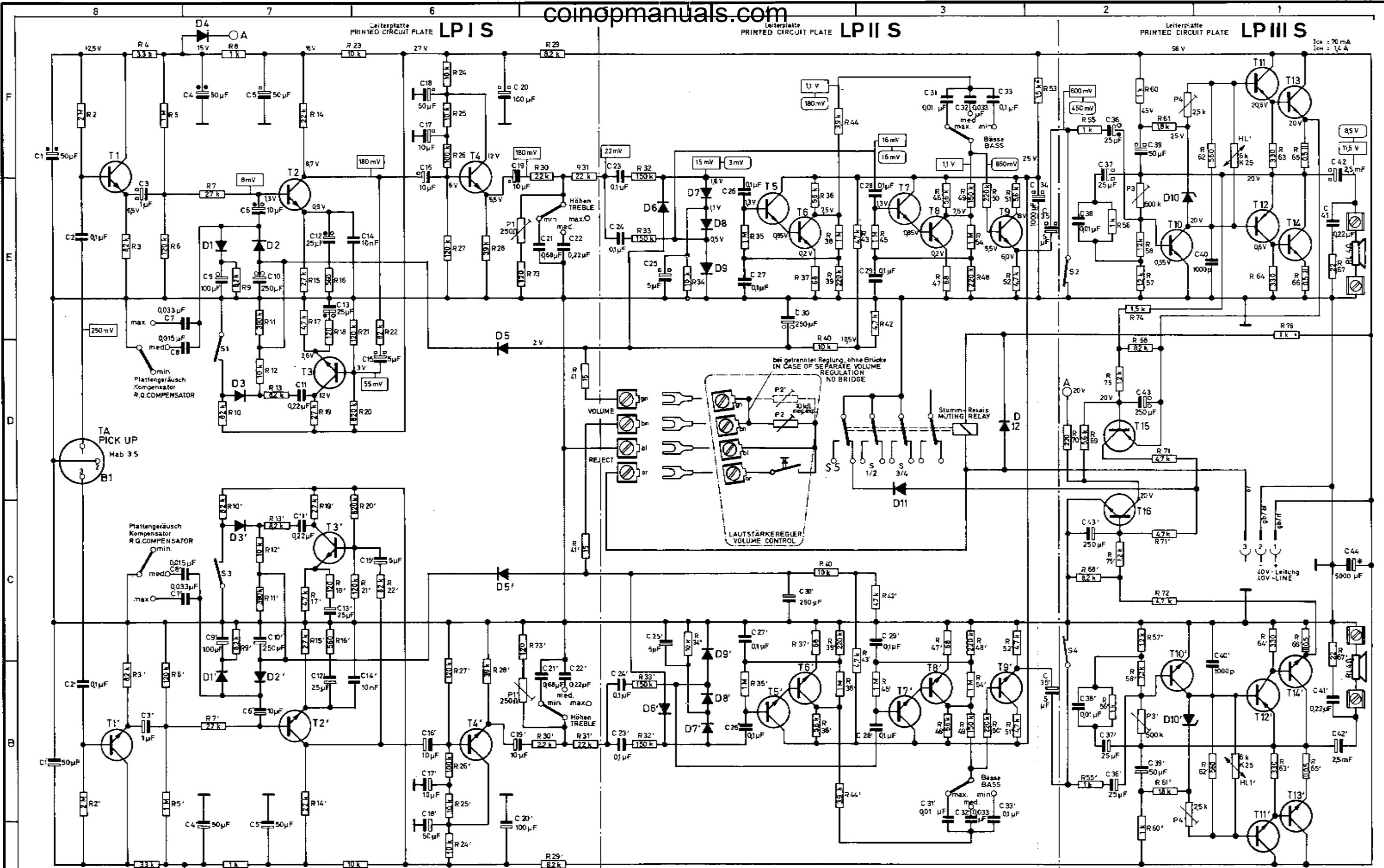
The signal coming from emitter-follower T4 goes over level control P1 to the volume control circuit. Diodes D6, D7, D8 and D9, and transistors T5, T6, T7 and T8 make up the two wire volume control and bass boost circuit. With full volume, the volume control has zero resistance. No current will flow through the diodes, thus they have a very high resistance, several M ohms. Therefore, the signal going to T5 and T7 is of the same amplitude. T6 and T8 are the drivers for T9. The combination of T5 and T6 drives the bottom end of the bass boost circuit, that means no filtering takes and the frequency response is flat. As the volume is turned down, current will flow through the diodes, and their resistance decreases. Due to the shunting effect of resistor R34 and capacitor C25, diodes D6 and D7 start reducing the signal before D8 and D9. This means smaller input to T5 and thus smaller output from T6. Since the signal over the bass boost is now different, the higher frequencies will be cut, thus giving the desired bass boost. As the volume control is turned down more, more current will flow through the diodes, D8 and D9 will to start conduct. This in turn will reduce the input to T7 and thus the output of T8, hereby reducing the total volume.

The bass boost will continue throughout the entire volume range, because D6 and D7 will always conduct more current than D8 and D9. Diode is to turn off the AVC, thus achieving complete turn off of the amplifier with minimum volume. T9 is an emitter-follower to match the low impedance of the next stage. With volume control, the volume of both channels can be adjusted together. There are two 3 positions switches to adjust treble and bass.

3. PHASE SPLITTER AND OUTPUT STAGE (PLATE III S)

The signal from T9 goes over amplifier T10 to the complementary pair phase splitters T11 and T12, these drive the transformerless push-pull output pair T13 and T14. The thermistor HL1 in base of T11 and T12 gives the circuit good thermal stability. Fine control P3 keeps both drivers symmetrical, and P4 adjusts the rest current (nosignal) of the output stage.

The overload protection is determined by the emitter current of the output stage. The voltage over R65, created by the emitter current flowing through it, is coupled to T15 over an integrating network with a time constant of 1 sec. When T15 starts conducting, the base of T16 becomes positive, thus placing point A in plate 1 at ground potential. This point is the voltage supply of the input stage. The audio signal is hereby completely cut-off. When the record rejects, the muting relay is energized. One of the muting contacts will bring the collector of T15 and the base of T16 back to negative, driving these transistors in cut-off, this on condition that the overload is removed from the circuit. In the muted state, the base of T10 is to ground over contacts S2 and S4, and the ground line to diode D3 is open over contacts S1 and S3.



□ NF Pegel bei 1kHz, $P_2 = 51\Omega$ gemessen mit Röhren-Voltmeter
 AC SIGNAL VOLTAGES AT 1000 CPS; $P_2 = 51\Omega$ WERE MEASURED WITH VTVM
 ○ NF Pegel bei 40 Hz, $P_2 = 620\Omega$ gemessen mit Röhren-Voltmeter
 AC SIGNAL VOLTAGES AT 40 CPS; $P_2 = 620\Omega$ WERE MEASURED WITH VTVM
 □ Gleichspannung ohne Signal gemessen mit 100 k Ω /V gegen Masse
 DC VOLTAGES WITHOUT SIGNAL WERE MEASURED WITH VOLTMEETER 100 KOHMS/V TO GROUND

- Sym. Regler
 P3 = SYMMETRICAL REGULATOR
 Ruhestrom-Einstellung
 P4 = CLOSED CIRCUIT ADJUSTMENT
- T1 = BC 149 B
 T2 = BC 147 B
 T3-T7 = BC 147 B
 T11 = RCA 40361
 T12 = RCA 40352
 T13 = RCA 2 N 3055
 T4 = BC 177 V

- D1-D5, D8, D12 = 1 N 4004
 D6-D9 = 1 N 4148
 D10 = 82Y 85 C4 V7
- 10 Ω 3 V
 10 Ω 6 V
 10 Ω 10 V
 10 Ω 15 V
 25 V
 35 V
 70 V
 1/3 W
 1/2 W
 2 W
 MKH, Styrolflex

Änderungen im Sinne des technischen Fortschrittes vorbehalten!
 MODIFICATIONS BY TECHNICAL PROGRESS RESERVED!

Datum	Name	Schaltbild WIRING DIAGRAM Transistor-Verstärker TRANSISTORIZED AMPLIFIER 70 S	Zeichn.Nr. 385-000-00 Est	Blätter: Blatt:
Gez.	5.2.69			
Bearb.				
Gepr.				

Apparatebau G.m.b.H.-KG
 653 BINGEN
 Germany

SPECIFICATIONS

Electrical Dates:

Line Voltage	117 V. AC 60 cycles
Working Voltage	30 V. DC
Power: standby	100 W.
transfer and scan	135 W.
play	150 W.

Control Center:

1 Transformer for working voltage	117 V. AC prim. 80/110/125 V. AC sec. I 30 V. AC sec. II
1 Transformer for amplifier	117 V. AC prim. 40 V. AC sec.

Fuses:

1 Line Voltage 117 V. AC	3 ² / ₁₀ Amp. slo blo
1 Amplifier	1 ² / ₁₀ Amp. slo blo
1 Working Voltage	2 Amp. slo blo
1 Accessories connection (AMP)	as needed
1 Electronic fuse	in the amplifier

Lighting:

1 Fluorescent lamp	F 30 T 8 30 W./33
1 Starter	FS — 4
1 Ballast	117 V./30 W./0.65 Amp.
2 Credit lights	24 V./ 3 W.
1 Safety lamp in Credit unit	24 V./15 W.
28 Indicator lamps (miniature GE 19)	12 V./0.1 Amp.

Credit Unit:

Credits	adjustable from 1 to 12 credits. (See note inside the lid)
Accumulation possible	up to 40 credits

Selection Circuit:

20 Letter buttons A — V	2 sets of switches, each 10 × 2 contacts
8 Number buttons 1 — 8	1 set of switches with 8 × 3 contacts
1 Latch bar solenoid	30 V. DC 100 % ED
1 Selection motor	30 V. AC
4 C a m switches N 1 — N 4	radio-shielded
1 Magnetic core memory unit	160 cores
ALBUM-selection	Adjustment see note in credit unit lid

Playing Mechanism:

1 Carriage base with pre-selector unit and record magazine for 80 records alternatively 45 rpm or 33 ¹ / ₂ rpm, 7 inch diameter, mono or stereo, vertically located.	
1 Popularity meter	80 counting strips
1 Total play meter	4 digits
1 Carriage with play motor (synchronous)	80/125 V. AC 15/33 W. 1500 rpm, left and right hand turns.
1 Clutch solenoid	125 V. AC 100 % ED
1 Trip solenoid	30 V. DC 5 % ED
1 Cartridge	ceramic DB 200 stereo/mono
2 Needles	diamond D 102 stereo/mono

Amplifier:

Stereo amplifier	with electronic fuse
Volume compensator	automatic (AVC)
Output stage	2 × 2 N 30 55 in push-pull
Output capacity per channel	60 W. music
Impedance	4 Ohms output
Muting relay	40 V. DC
1 (Remote-) volume control	volume control for both channels and one reject button
2 Woofers 10 inches	7 Ohms 10 W.
2 Medium (speakers) 7 inches × 10 inches	5 Ohms 5 W.
2 Tweeters 5 inches × 7 inches	6 Ohms 3 W.
1 Stereo network	1.5 mHy / 32 μF / 8 μF

Locks and Keys:

2 Cabinet locks Zeiss Ikon	SL 82 h/SL 82 g
2 Cabinet keys Zeiss Ikon	Nr. 167 676 (K 5)
1 Cash box lock Zeiss Ikon	SL 860
2 Cash box keys Zeiss Ikon	different numbers.

MEASUREMENTS AND WEIGHTS:

	height	mm (max.)		kg (max.)	
		width	depth	weight	
Box (without the following parts)	1335	1000	630	126.0	
Carriage base	235	695	286	13.5	
Carriage	260	200	345	4.0	
Amplifier	356	206	90	3.0	
Control Center	356	206	122	6.0	
Box total	1490	1090	720	net	152.5
Box packing					28.5
				gross	181.0

	height	Inches (max.)		pounds (max.)	
		width	depth	weight	
Box (without the following parts)	52 $\frac{3}{4}$	39 $\frac{1}{2}$	24 $\frac{3}{4}$	277 $\frac{1}{4}$	
Carriage base	9 $\frac{1}{4}$	27 $\frac{1}{2}$	11 $\frac{1}{4}$	29 $\frac{3}{4}$	
Carriage	10 $\frac{1}{4}$	8	13 $\frac{3}{4}$	8 $\frac{3}{4}$	
Amplifier	14 $\frac{1}{4}$	8 $\frac{1}{4}$	3 $\frac{1}{2}$	6 $\frac{1}{2}$	
Control Center	14 $\frac{1}{4}$	8 $\frac{1}{4}$	5	13 $\frac{1}{4}$	
Box total				net	335 $\frac{1}{2}$
Box packing	58$\frac{3}{4}$	43	28$\frac{1}{2}$		62$\frac{1}{4}$
				gross	398$\frac{1}{4}$



NSM APPARATEBAU KG
653 BINGEN/RHEIN · GERMANY

The Manufacturer reserves the right to make technical improvements and modifications.