SERVICE MANUAL

PRESTIGE 160 B II
CONSUL 120 A II

60 Cycles (Hz)
VERY IMPORTANT!

SINCE THE ONLY TECHNICAL DIFFERENCE BETWEEN PRESTIGE AND CONSUL IS A SMALLER SELECTION SYSTEM, THIS MANUAL IS USED FOR BOTH PHONOGRAPHICS. A SPECIAL SECTION CAN BE FOUND AT THE END, COVERING THE SPECIFICS OF THE CONSUL 120 A II.
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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.

The box is supplied with a 3-core line cable. Green-yellow must be connected to earth, corresponding to international wire code.

The proper functioning of the phonograph necessitates it to be horizontally and vertically levelled.

INSTALLATION OF THE PHONOGRAPH

1. Unscrew cabinet keys 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 1-2). While doing so, press lightly on the program frame. Lift up program frame (figure 2-2).

3. To loosen carriage, remove screws painted red (figure 5-6 and 8) on the right hand side of the carriage base. Turn the security lever on the left hand side of carriage clockwise.

4. To loosen record clamp arm, remove rubber ring (figure 5-5) and rubber wedge (figure 5-7).

5. To free pick-up arm, remove rubber band, but leave the stylus cover on (figure 5-4) in order to protect the diamonds.

6. To loosen carriage base, unscrew four nuts (figure 4). The nuts should clear the Carriage Base by at least 1/8 inch.

7. Pull line cable through the cutout hole in the back of the cabinet. Cover cutout hole with protection plate.

8. 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.)

9. By depressing the scan button (figure 5-2) let the carriage move from its rest position on the right to the left and remove card board strip out of groove.

10. Seize handle at the bottom of the title strip holder section (figure 2-1) and lift up title strip holders.

11. 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.

12. Insert records into record magazine (figure 3) in the order of the title strips, the upper lettering of the magazine marking to the left. Move carriage by pushing it by Hand to any desired position.

13. Remove stylus covers from cartridge. (Save the covers for later use.)

14. Slightly press program holder frame (figure 1-1) downwards and lock cabinet. (Left hand lock by turning to the right and right hand lock by turning to the left.)

15. Retie cash box cover and lock cash box.

16. IMPORTANT WHEN TAKING OUT CARRIAGE. Also on this model, the carriage can be taken out for servicing. In case the carriage has to be taken out, make sure that the security lever on the left hand side is completely turned to the back. Lift locking levers (2), located on both sides of carriage, with both hands. When inserting carriage, follow reverse procedure.

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 volume control box.

Scan Button: permits travel of the carriage. Located at the left hand side of cage 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 record playing is being indicated by lighted figure- and letter-fields on the green panel.

The control box R 2 is fitted with a volume control for both channels and one reject button.

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 4 pole 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 machine is equipped with a new type popularity meter (figure 5 - 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 cartridge base (figure 5 - 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
5 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 cinclip 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. Slice open cover of the selector switches and switch the contact fingers in the left (green) row.

Position 1 - Single
Position 2 - Album

Selector keys 5 through 8 can be changed.

CHANGING THE CARRIAGE TO ALBUMS:

To change the speed for album play, switch the contact fingers in the right (red) row.

Position 1 - 45 RPM
Position 2 - 33 1/2 RPM

Selector keys 5 through 8 can be changed.

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 included "EXTENSION SPEAKER CONNECTIONS". Max. music power = 35 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 4 - 5).
Base-control switch (figure 4 - 4).
Record quality compensator (figure 4 - 3).
Channel level adjusting (figure 4 - 2).

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.
**FIGURE 6: INSIDE VIEW**

1. Wooden Box  
2. Tweeters  
3. Control Center  
4. Amplifier  
5. Credit unit  
6. Output Junction Box  
7. Coin Mechanism  
8. Volume Control  
9. Popularity Meter  
10. Carriage Base  
11. Carriage  
12. Control Box  
13. Memory unit  
14. Woofers  
15. Carriage Rod  
16. Hole for Carriage Rod  
17. Locking Bolts  
18. Scan button
To remove the cross bar (fig. 7-1) unlock both latches (fig. 7-2) by pulling up. Then pull the cross bar forward and up.

**FIGURE 7 CROSS BAR**
1. Cross Bar
2. Latch

To remove the single credit light (fig. 8-1) or the album credit light (fig. 8-2), press both sides of lampholder in, and pull out. The bulb (fig. 8-3) can now be removed.

To change the pricing plastic (fig. 8-4), slip the plastic out from the top and insert the other, making sure it is centered in front of the window.

**FIGURE 8 Credit Lights**
1. Single light
2. Album light
3. Bulb
4. Pricing Plastic

The coin mechanism swings out on the hinges (fig. 9-2), after lifting the latch (fig. 9-1). It can be removed by lifting it off the hinges, and unplugging the cable.

**FIGURE 9 COIN MECHANISM**
1. Latch
2. Hinges
3. Add-button
4. Subtract-button
The control center and amplifier can be taken out of the cabinet, by disconnecting all the cables, then letting the unit swing down 1/4 of the way, and lifting the unit of the brackets (fig.10).

**FIGURE 10. E-Z SNAP OUT UNITS**
1. Amplifier  
2. Bracket  
3. Credit unit

To remove the credit unit from the machine, loosen the screw holding the plastic cover. Disconnect the plug (fig.11-3) loosen the 2 screws (fig.11-1) holding the unit. Let the unit swing down. Unscrew the pivot (fig.11-2). First pull the right side out, and slip the pin (fig.11-4) out of the hole.

**FIGURE 11. CREDIT UNIT**
1. Screws  
2. Pivot  
3. Plug  
4. Pin

To take the carriage off the carriage base, swing the handle lock (fig.12-2) backwards. Lift up on both handle bars (fig.12-1) lift mechanism slightly to clear the rollers (fig.12-3) off the gear rack. Pass the carriage forward from underneath the carriage base. After inserting the carriage rod (fig.6-16) into the hole (fig.6-16) place the pin on the bottom of the carriage in the rod. Should it be necessary to remove the carriage completely, unplug the pick-up plug (fig.12-4) and the control plug (fig.12-5) and unlock the cable from the clamp. The control center and the amplifier can be lowered in horizontal position by turning the locking bolts (fig.6-17) a quarter turn. The clearance of the carriage is still enough to play any selection, while both units are down.

**FIGURE 12. CARRIAGE**
1. Handle Bars  
2. Handle lock  
3. Rollers  
4. Pick-up plug  
5. Control plug
The contact finger plate (single-album) (fig. 13-1) can be reached by sliding back the metal cover. The lights in the playing indicator (fig. 13-2) are Type No. 19 GE 120. 1A bulbs. To take out the indicator, remove the 2 screws (fig. 13-3) and slide the indicator from underneath the contact finger plate.

FIGURE 13 CONTACT FINGERS
PLAYING INDICATOR
1. Contact finger plate
2. Playing Indicator
3. Screws
4. Green section (credit change)
5. Red section (speed change)

To remove the keyboard (fig. 14) remove the 3 screws (fig. 14-1). The keyboard is now free. Take the cover of the wire channel (fig. 14-2) and remove wires. The keyboard can now be placed on the glass lid. If it is necessary to remove the keyboard completely, take cover of large wire channel, and remove wires and plugs.

FIGURE 14 KEYBOARD
1. Screws
2. Wire channel

To remove the display panel (fig. 15-1) remove the 4 screws (fig. 15-2) and the aluminium trim (fig. 15-3). The panel can now be removed.

FIGURE 15 DISPLAY PANEL
1. Panel
2. Screws
3. Trim
To bring display lid up (fig. 16-1) the program frame will have to be removed. Unlock both locks, lift frame up halfway and lift the frame out. Unlock both latches (fig. 16-1) and bring lid up.

**FIGURE 16  DISPLAY LID**

1. Lid
2. Latch

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**PRESTIGE 160 B II**

**MEASUREMENTS AND WEIGHTS:**

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PRESTIGE 160 B II

SPECIFICATIONS

Electrical Data:

Line Voltage
117 V. AC 60 cycles
30 V. DC
100 W.
135 W.
150 W.

Control Center:

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

Fuses:

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

Lighting:

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

Credit Unit:

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

Selection Circuit:

20 Letter buttons A — V
8 Number buttons 1 — 8
1 Latch bar solenoid
1 Selection motor
1 Positioning Motor
4 Cam switches N 1 — N 4
1 Pin assembly
ALBUM-selection
2 sets of switches, each 10 x 2 contacts
1 set of switches with 8 x 3 contacts
30 V. DC 100 % ED
30 V. AC
30 V. AC
radio-shielded
160 pins 16 selection coils
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 1/3 rpm, 7 inch diameter, mono or stereo, vertically located.
1 Popularity meter
1 Total play meter
1 Carriage
with play motor (synchronous)
1 Clutch solenoid
1 Trio solenoid
1 Speed changing solenoid
1 Cartridge
2 Needles
80 counting strips
4 digits
80/125 V. AC 16/33 W. 1500 rpm, left and right hand turns.
55 V. DC 100 % ED
30 V. DC 5 % ED
55 V. DC 100 % ED
ceramic DB 200 stereo/mono
diamond D 102 stereo/mono

Amplifier:

Stereo amplifier
Volume control
Output stage
Output capacity per channel
Impedance
Muting relay
1 (Remote-) volume control
2 Woofers 10 inches
2 Tweeters DNS 6/13/100 pressure chamber system
1 Stereo network
with electronic fuse
automatic (AVC)
2 x 2 N 30 55 in push-pull
35 W. music per channel (65 W. sine wave)
4 Ohms output
40 V. DC
volume control for each channel separately and
one reject button
8 Ohms 30 W.
4 Ohms 6 W.

Locks and Keys:

2 Cabinet locks
2 Cabinet keys
1 Cash box lock
2 Cash box keys
SL 82 h/SL 82 g
Nv. 187 679 (x 5)
SL 86 p
different numbers.
SEQUENCE OF OPERATION

1. Motor relay, muting relay, speed changing solenoid and clutch solenoid are energized in stand-by position
2. Coin switch energizes add solenoid, credit switch (AK) closed.
3. Credit switch (AK) supplies 30 VDC to control circuits.
4. Selection light is lit.
5. Latch bar solenoid and restart locking relay are energized.
6. Start relay is energized when buttons are pressed.
7. Position motor starts.
8. Position relay is energized, stops motor at selected letter.
10. N3 holding contact for selection motor.
11. N4 pulses subtract solenoid
12. Carry over switch (UK) completes subtract pulse.
13. Write-in trigger switch completes write-in
15. Single relay allows only one subtract pulse.
17. N2 opens latch bar solenoid and restart locking relay.
18. N2 reenergizes latch bar solenoid and restart locking relay.
20. Trip solenoid stops carriage.
22. Clutch solenoid deenergized.
23. record plays.
24. Reed switch activated.
25. Motor relay and muting relay energized.
27. Scanswitch opens.
28. Carriage stops on right side of carriage base.
SEQUENCE OF OPERATING P 160 B II AND C 120 II

117 V.A.C. 60 C/S LINE SWITCH

LIGHTS CONTROL TRANSFORMER AMPLIFIER TRANSFORMER

1 2/10 FUSE

3 2/10 FUSE

FIGURE 17

Closing the line switch connects the 117 V.A.C. line to the fluorescent lights, the control transformer and the amplifier transformer.
The muting relay and motor relay are energized as soon as the line switch is turned on, over the normally closed operating switch. With the record transfer arm in the down position, the speed changing switch is closed, completing the circuit to the speed changing solenoid. The clutch solenoid is energized over the now closed contact 1 of the motor relay.

Thus with the line switch on and the machine in stand-by, the following are energized: motor relay, muting relay, speed changing solenoid and clutch solenoid.
Closing one of the coin switches will energize the corresponding add solenoid. When credit is established, the AK credit switch will be closed, connecting all the control circuits to the 30 V.D.C.
Closing the AK credit switch will light the single credit light. Also the album credit light depending on the position of the KS single-album switch. The restart locking relay and the latch bar solenoid are energized over the rest contacts of the buttons and contact N2.
After the restart locking relay is energized, its own contact 2 will lock the circuit over contact 1 of the latch bar relay even if the buttons are pressed.
When we press a letter (B), and a number (5) button, the circuit to the start relay is closed over contact plate 1 (green section) and D2 for single selections, and over contact plate 2 and D3 for album selections. The letter keys from A to K go through D61, the letter keys from L to V go through D62.
Closing of start relay contact 1, starts the position motor.
The position motor moves the wiper contact over the position contacts. When position contact B is reached, the circuit to the position relay is completed.
Once the position relay is energized, it is locked in over its own contact 2.
Contact 4 of the position relay will switch the position motor from A.C. to D.C. over the rectifier-voltage divider R4 - R5 - D11 - C2. Since the position motor is an A.C. motor, the D.C. current created by the discharge of C2 through the motor will stop the motor immediately.
Switching contact 3 of the position relay will complete the circuit to the selection motor.
Starting the selection motor will close contact N3, which will carry the motor through the full cycle.
When contact N4 closes, the subtract solenoid is energized, closing the write-in trigger switch.
During the first subtraction pulse, the single relay is energized when contact N1,(1-II) closes.
Energizing the single relay will open the circuit to the subtract solenoid, but by that time, the carry-over switch has been closed, and the subtraction pulse will not be interrupted. The credit wheel is moved back one credit.
When the single relay is energized, contact 1, (-1I) on the single relay is now closed, locking the positive line of the single relay. Opening N4, will break the negative line to the single relay, but the relay is held in by the discharge current of C1 over the relay coil, long enough until N4 will close again.

As long as the single relay is energized, the subtraction solenoid circuit is open, thus only the first pulse of N4 will reach the solenoid and only one subtraction is made.

When contact N2 opens, the latch bar solenoid and the restart locking relay will deenergize, releasing the buttons. They will pull in again if more credit is available.
The mechanical motion of the selection motor closes the scan switch, hereby completing the 125 VAC circuit to the carriage motor.
If not enough credit is available for album selection, the negative line to the latch bar relay is completed over the KS single-album switch. If a number key programmed for albums (8) is pressed, the latch bar relay will be energized opening its contacts 1 and 2. Contact 1 will release the buttons by opening the circuit to the latch bar solenoid and the restart lacking relay. (see page 18) Contact 2 will open the circuit to the start relay. (see page 19). No selection is made.
If enough credit is available, the start relay is energized over contact plate position 2. The single relay will not be energized over contact plate position 2, single relay contact 1 (I-III) will stay closed, and the subtract solenoid will receive all the pulses from contact N4.
The pulse from the write-in trigger switch is shaped over R6 - R7 - C5 and sent to the base of transistor T1. This transistor will start conducting and the resulting current will energize a selection solenoid. (In our case with selection B5 it will be solenoid 51). Since the solenoid is lined up with selection pin B5, this pin will be pushed out far enough to be sensed by the search contacts.
If a search contact touches a selection pin, the silicon controlled switch will be triggered. This will energize the trip relay. After contact 2, (I-III) is opened, the loading current of C13 will keep the trip relay energized long enough to energize the trip solenoid.
Trip relay contact 1 closes the circuit to the trip solenoid, hereby stopping the carriage and starting the transfer cycle. When the record is in play position, the operating switch will open, deenergizing the muting and motor relays. (see page 15). Motor relay contact 1 opens the circuit to the clutch solenoid, and contact 2 switches the carriage motor from 125 VAC to 80 VAC. At the end of the record, the cancel reed switch will energize the motor relay again. The record is placed back in the record rack, and the carriage will start scanning again.
The speed changing solenoid is energized with the transfer arm down. As the transfer arm brings the record up, the speed changing switch will open. If the carriage is in a number section set for albums, the speed changing solenoid will stay energized over the number contacts. (In our case all 8 selections).

With the solenoid energized, the turntable will turn at 33 1/3 RPM. If the carriage stops in a number section set for singles, the solenoid will deenergize and the turntable will turn at 45 RPM.
On the memory unit are 8 silver plated bars, one for each number. Under each bar are 10 contacts, one for each record space. (AB, CD...UV) The reversing switch determines which light will be connected to the positive line, together with the number light.
DETAILED CIRCUIT
DESCRIPTION OF PRESTIGE 160 B II

NOTICE:

SINCE THE BASIC OPERATION IS THE SAME FOR 160 OR 120 SELECTIONS,
THIS DESCRIPTION CAN ALSO BE USED FOR THE CONSUL 120 A II.
ATTENTION:

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

We recommend to keep 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.
CIRCUIT DESCRIPTION OF PRESTIGE 160 B II

After connecting the cord to the 117 VAC line and switching the machine on, it is ready to operate.

The 1 2/10 Amp.slo-blo fuse (fig. 41-1) protects the primary of the amplifier transformer (fig. 41-4). The 3 2/10 Amp.slo-blo fuse (fig. 41-2) protects the primary of the control transformer (fig. 41-5) and the fluorescent lights.

All other circuits feed from the secondary of the transformer, and are thus insulated from the line voltage, whereby the 2 Amp.slo-blo fuse (fig. 41-3) protects the 30 VDC control voltage.

FIGURE 41 CONTROL CENTER

1. 1 2/10 Amp.slo-blo
2. 3 2/10 Amp.slo-blo
3. 2 Amp.slo-blo
4. Amplifier Transformer
5. Control Transformer

1. CREDIT

When a coin is deposited through the coin slot, it passes through the acceptor (fig. 42-1), closing the corresponding coin switch (fig. 42-2, 3 or 4). This energizes the related add solenoid (fig. 42-1, 2 or 3), a credit is made and the credit switch AK (fig. 43-7) in the credit unit is now closed. Depending on the number of credits, the single-album switch KS (fig. 43-8) will move to one of its contacts. Over contacts AK the "single-selection" lamp (fig. 44-1) will be lit.

FIGURE 42 COIN MECHANISM AND SWITCHES

1. Coin acceptor
2. Nickel and dime coin switch
3. Quarter coin switch
4. Half Dollar coin switch
5. Add-button
6. Subtraction-button

FIGURE 43 CREDIT UNIT (INSIDE)

1. Nickel-dime add solenoid
2. Quarter add solenoid
3. Half Dollar add solenoid
4. Nickel-dime credit wheel
5. Quarter credit wheel
6. Half Dollar credit wheel
7. Credit switch (AK)
8. Single Album switch (KS)
9. Contact Jumpers
10. Fuse light

Important:
All prestige 160 B II machines have a dollar credit unit. (Additional add solenoid and credit wheel). Is interchangeable with standard credit unit if no dollars are used.
FIGURE 44 SELECTION LIGHTS

1. Single selection
2. Album selection

Circuit:
Plus - AK - R 2 - lamp, Single - minus.

FIGURE 45 LATCH BAR SOLENOID (TM)
Simultaneously the circuit to the latch bar solenoid TM (Fig. 45) and the restart locking relay WS (Fig. 46-2) is closed.

Circuit:
Plus - AK - TP 5-6 number keys II (1 through B) - letter keys I (V through A) - number keys I (1 through B) - D1 - latch bar solenoid TM and restart locking relais WS - N2 - minus.

With the latch bar solenoid TM energized, the button will be able to lock in. The contacts on the restart locking relay, ws 1 through ws 4, are now switched over. Contact ws 2 locks the circuit to latch bar solenoid TM and restart locking relais WS.

Circuit:
Plus - AK - TP 5-6 - ws 2 - tr 1 - latch bar solenoid TM and restart locking relais WS - N2 - minus.
2. 1 SINGLE SELECTION CYCLE

When a number (single) and letter button are pressed, the circuit to the start relay WA (Fig. 46-1) is closed and the selection cycle starts.

Circuit: (B 5 selected)
Plus - AK - TP 5-6 - number keys 11, 5 - contact plate, position 1 - D 2 - letter keys 1, B - D 61 - r 2 - ws 4 - start relay WA - minus.

Energizing the start relay, closes contact wa 1, hereby connecting the positioning motor STM (Fig. 47-3) to the 30 VAC.

Circuit:
30 VAC - ws 3 - wa 1 - s 3 - 3, I-III - st 4, III-I - positioning motor STM - 30 VAC.

The positioning motor moves the 16 selection solenoids (Fig. 50-1) behind the selection pins (Fig. 49-1) back and forth and at the same time moves the wiper contacts (Fig. 48-4) over the printed circuit plate (Fig. 48-1).
Each number group has two selection solenoids. One for the letters A to K. The second one for the letters L to V.
One side of the solenoids are connected together, the other side goes to the corresponding letter key. When the wiper - contacts touch the selected position contact (Fig. 48-2) the position relay (Fig. 51-1) is energized.
**FIGURE 47** POSITION MOTOR

1. Bolts
2. Pin assembly
3. Position motor
4. Printed circuit board

**FIGURE 48** CIRCUIT BOARD

1. Printed circuit board
2. Position contacts
3. Position motor
4. Contact wiper
5. Crank arm coupling

**FIGURE 49** PIN ASSY

1. Pins
2. Crank guide
3. Pin pushers
4. Crank arm

**FIGURE 50** COIL BANK

1. Selection coils
2. Plungers
3. Cover
Circuit:
Plus - AK - TP 5-6 - number keys II,5 - contact plate, position 1 - D 2 - D 63 letter keys II,B - position contact B - wiper contact - position relay ST - N 2 - minus.

The position relay ST is locked in over

Circuit:
Plus - AK - ws 2 - tr 1 - D 63 - TP 1 - st 2,II-1 - position relay ST - N 2 - minus.
Position relay contacts 3 and 4 switch the positioning motor STM from AC to DC. This DC is used to brake the motor (brakecurrent), and is caused by discharging capacitor C2.

Circuit:
C2 is charged over the voltage divider R4 - R5 with the 30 VAC, rectified by D11.
st3, 1-II closes the circuit to the selection motor WM (Fig. 52-2).

FIGURE 52  SCAN CONTROL BOX
1. Scan switch
2. Selection motor
3. Contact cam
4. Cam switches
5. Pioymeter

Circuit:
30 VAC - ws 3 - wa 1 - st 3, I-II - selection motor WM - 30 VAC.
The selection motor (Fig. 52-2) turns the contact cam (Fig. 52-3) and contact N3 (Fig. 52-4) will close first.

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

When contact N4 (Fig. 52-4) closes, the subtract solenoid (SM) (Fig. 53-1) is energized.

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**FIGURE 52 CREDIT UNIT (OUTSIDE)**

1. Subtract solenoid
2. Carry over switch UK
3. Write-in trigger switch EK

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Circuit:

Plus - AK - or 1, 1-III - subtract solenoid SM - N4 - minus.
The movement of the subtract solenoid (Fig. 53-1) causes the carry over switch (Fig. 53-2) (UK) and the write-in trigger switch (Fig. 53-3) (EK) to close. When the write-in trigger switch is closed, the actual pre selection is concluded, but this action will be described in paragraph 3. Now contact N 1, III-1 closes, completing the circuit to the single relay SR (Fig. 46-4).

Circuit:

**Plus - AK - TP 5-6 - number keys 11,5 - contact plate, position 1 - N 1,III-1 - single relay SR - D 5 - N 4 - minus.**

Single relay contact s 1, I-III opens the circuit to the subtract solenoid, thus cancelling all the other subtract pulses from contact N 4, by single selection. Contact s 1, I-II is now the holding contact for the single relay. The single relay stays energized after N 2 has opened. It gets minus over N 4 and D 5. Time constant network R 3 and C 1 over the single relay keeps the single relay closed while N 4 is open between pulses. The movement of the subtract solenoid moves the credit wheel (Fig. 43-4) back one credit. The selection motor advances the play motor (Fig. 52-3) and closes the scan switch (Fig. 52-1), which completes the circuit to the carriage motor (see scanning). Just before completing the one subtract pulse, N 2 opens the circuit to the latch bar solenoid, the restart locking relay and the position relay. The buttons will now reset back to the rest position. At the end of the selection cycle, contact N 2 closed again. If anymore credit is available, the restart locking relay and the latch bar solenoid will energize again through N 2 and the rest contacts of the buttons. The position relay is in stand-by for the next selection. If a button should stay down, the restart locking relay cannot pull in, because contact js 4 is open. This prevents making any undesired selections. The selection motor will stop running as soon as contact N 3 opens.

2.2 ALBUM SELECTION CYCLE

The jumper blade of number key 8 on the contact plate (Fig. 13-4) is in position 2. If an album number key is pressed and there is NOT ENOUGH CREDIT AVAILABLE the latch bar relay TR (Fig. 46-3) will energize.

Circuit:

**Plus - AK - TP 5-6 - number keys 11,8 - contact plate, position 2 - latch bar relay TR - single-album switch KS - minus.**
When the latch bar relay energizes and contact tr1 opens the circuit to the restart locking relay and the latch bar solenoid, the buttons cannot latch. Contact tr2 opens the circuit to the start relay and no selection is made.

If three or more credits are available, single-album switch KS (Fig. 43-8) 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 - AK - R1 - album-lamp - 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-TP S-6 - number keys 11, 8 - contact plate, position 2 - D3 - letter keys I, A - D 61 - tr 2 - ws 4 - start relay 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 N-4 will be registered. Because contact N-2 opens after the first subtract pulse, the restart locking relay is deenergized which opens contact ws 1. Thus, only the first pulse from write-in trigger switch will be used.
The selection pulse from trigger switch EK is shaped over network R 6 – C 5 – R 7 and limited to 20 ms, then send to the base of transistor T 1 (Fig. 51-2). The transistor will drive the selected selection solenoid (Fig. 50-1).

Circuit: (B 5 selected)


Selection solenoid S 1 will energize and push selection pin (Fig. 49-1) (B 5) in the selected position. The pin will stick out far enough (1 mm) to be detected.

FIGURE 54 MEMORY UNIT
1. Selected pin
2. A, C, E, ... selection pins
3. B, D, F, ... selection pins
4. Letter contacts
5. Number contacts and speed selection
4. READ-OUT
The turning of the selection motor closes the scan switch (Fig.52-1). This starts the carriages (Fig.57-1) and the carriage will scan. The search contacts (Fig.55-1,2) glide over the selection pins (Fig.54-2,3). Not selected pins will be recessed and no contact will be made. Selected pins (Fig.54-1) will stick out far enough to be touched by the search contacts. Resistor R 35 is now grounded over the search contacts, thus the anode gate of the silicon controlled switch, SCS, (Fig.55-1) will receive a negative pulse. The spring tension of the search contacts will push the selection pins back to the neutral position.

FIGURE 55 READ-OUT BLOCK
1. B, D, F, . . . search contact
2. A, C, E, . . . search contact
3. Selection playing and speed changing contacts

FIGURE 56 TRIP PLATE LPI
1. Silicon controlled switch (SCS)
2. ZD2, ZL 27 Zener diode
3. Trip relay LR
5. TRIP

The trip pulse is of negative polarity. These pulses are integrated by the input network and coupled to the anode gate of the silicone controlled switch SCS. The supply voltage for SCS comes from the 30 VDC and is filtered and stabilized by the network C10, R18, C11 and ZD2 (Fig. 56-2). 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 trigger the circuit. Capacitor C13 is discharged over R23 and contact Ir2, I-III. The negative trip pulse will cause SCS to conduct and trip relay LR (Fig. 56-3) will be energized. This will cause Ir 2, I-III to open, but the relay will be held in by the charge current of C 13. When C 13 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 Ir 2, I-II, causing the SCS to go back into cut-off. Contact Ir 1 will have closed the circuit of the trip solenoid LM (Fig. 58-1).

Circuit:
Plus - D17, Ir 1 - trip solenoid LM - minus.

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

FIGURE 57 CARRIAGE (FRONT)
1. Carriage motor
2. Clutch solenoid
3. Butterfly clutch
4. Spring loaded lever
5. Worm gear
6. Gear for alternating clutch
7. Tappet gear slip clutch (SCAN GEAR)
8. Bottom gear slip clutch

FIGURE 58 CARRIAGE (BOTTOM)
1. Trip solenoid
2. Trip lever
3. Clutch arm
4. Gear segment
5. Record transfer arm
6. Leaking lever
7. Popularity meter lever
8. Leaking pawl
6. SCAN

The carriage starts from the rest position, right hand side of the carriage base. The clutch solenoid (Fig.57-2) is normally energized, causing the spring loaded lever (Fig.57-4) to engage with the butterfly clutch (Fig.57-3) which is attached to the motor shaft. The moment the scan switch closes, the carriage motor will turn.

This causes the worm gear (Fig.57-5) to turn the gear for the alternating clutch (Fig.57-6, 59-1). This gear will turn the drive pin (Fig.59-5) which is in the scan position (Fig.60-1), resting on the bottom of the notch of the cam gear (Fig.59-6). The cam gear will turn the bottom gear of the slip-clutch (Fig.57-8). This gear is friction-coupled to the scan gear (Fig.61-1) which travels in the gear-rack.

**FIGURE 59  ALTERNATING CLUTCH**

1. Gear for alternating clutch
2. Worm gear
3. Worm gear cam
4. Drive pin
5. Cam gear
6. Drive pin shaft

Since the two gears of the slip clutch are friction coupled through a spring, the carriage can be stopped while travelling. The pressure needed for this, is between 750 and 1200 grams (900 grams is ideal). When carriage reaches the end of the carriage base, it moves the reversing arm (Fig.62-1) causing the reversing switch (Fig.62-2) to activate, hereby reversing the direction of travel.

Travelling from right to left, the carriage will play A, C, E, ... selections, travelling from left to right B, D, F, ... selections. As seen before, when the trip solenoid (Fig.58-1) is energized, the carriage will stop.

**FIGURE 60  DRIVE PIN POSITION**

1. Scan position
2. Transfer-play position
3. Lever actuator
**FIGURE 61** CARRIAGE (REAR)

1. Scan gear
2. Locking pawl
3. Record transfer arm
4. Locking arm
5. Pick-up shifting lever
6. Cradle actuator

**FIGURE 62** REVERSING SWITCH

1. Reversing arm
2. Reversing switch

**FIGURE 63**

1. Speed changing solenoid
2. 33 1/3 RPM idler wheel
3. 45 RPM idler wheel
4. Turntable
5. 2 speed drive rod

**FIGURE 64**

1. Speed changing switch
2. Transfer arm
The speed changing solenoid (Fig. 63-1) is normally energized over the speed changing switch (Fig. 64-1). Parallel over this switch is another circuit, over contact plate position 2, red section (Fig. 13-5) to the playing indicator number contacts (Fig. 54-5). The record transfer arm (Fig. 64-2) opens the speed changing switch, the speed changing solenoid will de-energize and the turntable (Fig. 63-6) will be driven by the 45 RPM idler wheel (Fig. 63-3). However if the switch opens while the carriage is in the album section, the speed changing contact (Fig. 54-5) will touch the number contact (Fig. 54-5). Hereby overriding the speed changing switch, and the turntable will be driven by the 33 1/3 RPM idler wheel (Fig. 63-2).

FIGURE 65 33 1/3 RPM
1. 2 speed drive rod
2. Speed control lever
3. Speed control ring

FIGURE 66 45 RPM
1. 2 speed drive rod
2. Speed control lever
3. Speed control ring
In the 33 1/3 RPM position, the upper control shaft (Fig. 65-5) is in the second drive rod (Fig. 63-5) in all the way. The speed control ring (Fig. 65-3) is now over the speed control lever (Fig. 65-2). This lever will now rest on the rod in the play position (Fig. 65), and push the large idler wheel (Fig. 63-2) against the turntable.

In the 45 RPM position, the speed control lever will rest on the speed control ring and the small idler wheel (Fig. 63-3) will drive the turntable. (Fig. 66)

8. TRANSFER

When the trip lever (Fig. 58-2) is activated, the clutch arm (Fig. 58-3) is moved up, and the locking pawl (Fig. 58-8, 61-2) locks itself in one of the teeth of the gear rack. The upward movement of the clutch arm causes the drive pin (Fig. 59-3) to go up, into the transfer position (Fig. 60-2), and engages the worm gear cam (Fig. 59-4). The cam gear (Fig. 59-6) stops, and the worm gear (Fig. 59-3) turns.

If the carriage stops while traveling from right to left, the movement of the worm gear (Fig. 59-3) is so that the cradle actuator (Fig. 61-6) is moved to the left by the lever actuator (Fig. 60-3), also moving the pick-up shifting lever (Fig. 61-5), thereby positioning the pick-up cradle (Fig. 60) on the left side of the carriage. The locking arm (Fig. 61-4) will keep the cradle actuator in this position. The worm gear also starts the camshaft (Fig. 67) turning.

**FIGURE 67 CAM SHAFT**
1. Clamp arm cam
2. Gear segment cam (large roller)
3. Gear segment cam (small roller)
4. Locking lever cam
5. Trip lever reset cam
6. Cam shaft gear
7. Operating switch cam
8. Speed drive cam

**FIGURE 66 CRADLE**
1. Cam shaft gear
2. Cradle shaft
3. Torsion arm
4. Reed switch
5. Magnet holder
6. Operating switch
7. Cradle
8. Pick-up guide
9. Pick-up pivot
10. Pick-up roller
11. Reset control lever
12. 2 speed drive rod

**FIGURE 69**
1. Clamp arm disc
2. Clamp arm roller
3. Clutch solenoid
4. Carriage motor
1. The clamp arm disc (Fig.69-1) is moved away from the turntable by the clamp arm roller (Fig.69-2) riding on the clamp arm cam (Fig.67-1).

2. The locking lever (Fig.58-6) is moved out by the cam (Fig.67-4) and locks the locking pawl (Fig.61-2) so it will keep the carriage locked after the trip lever (Fig.58-2) is reset.

3. The small roller on the gear segment (Fig.58-4) moves the record transfer arm (Fig.61-3) up, riding on its cam (Fig.67-3).

4. When the record transfer arm is at its maximum upward position, the clamp disc begins to move in, towards the turntable. The popularity meter lever (Fig.58-7) is pushed upwards.

5. The gear segment cam (Fig.67-3) now pushes the pick-up guide (Fig.68-8) up, thereby moving the tonearm (Fig.68-3) towards the record.

6. The record transfer arm is now moved slightly away from the record by the large roller on the gear segment (Fig.58-4) riding on the gear segment cam (Fig.67-2). This is to prevent the record from rubbing against the transfer arm. The record transfer arm also spreads the record separators for the same reason.

7. Trip lever reset cam (Fig.67-5) places the trip lever (Fig.58-2) back in front of the trip solenoid.

8. The speed control lever (Fig.65-2) will move inward riding on the speed drive cam (Fig.66-8) and come to rest on either the speed control ring (Fig.65-3) or the speed drive rod (Fig.65-1) depending on the speed changing solenoid.

9. The upward movement of the pick-up guide (Fig.68-8) allows the tonearm to land on the record. The pick-up pivot (Fig.68-9) is filled with silicon grease, to slow down the landing of the needle.

10. The high part of the operating switch cam (Fig.67-7) will open the operating switch (Fig.68-6) causing the motor relay MR (Fig.46-5) and the muting relay in the amplifier to deenergize.

   Motor relay contact pr 1: Opens the circuit to the clutch solenoid (Fig.69-3)
   contact pr 2: Switches the carriage motor from 125 VAC to 80 VAC.

   Muting relay contact sr 1: Switches the amplifier on.

11. The spring loaded lever (Fig.57-4) is now disengaged from the butterfly clutch (Fig.57-3). The carriage now only drives the turntable.

9. PLAY
The needle will track the record

10. END OF RECORD
When the needle reaches the cut-off groove, the magnet (Fig.68-5) will close the cancel read switch (Fig.68-4), causing the motor relay and muting relay to energize.

   Motor relay contact pr 1: Closes the circuit to the clutch solenoid
   contact pr 2: Switches the carriage motor back from 80 VAC to 125 VAC.

   Muting relay contact sr 1: Mutes the amplifier.

11. TRANSFER AND SCANNING
With the clutch solenoid energized, the spring loaded lever (Fig.57-4) is again engaged with the butterfly clutch (Fig.57-3). The camshaft (Fig.67) will start turning

1. The operating switch cam (Fig.67-7) closes the operating switch (Fig.68-6). The switch takes over from the read switch, keeping the motor and muting relays energized.

2. The gear segment cam (Fig.67-3) will allow the pick-up guide (Fig.68-8) to move the tonearm away from the record.

3. The pick-up guide (Fig.68-8) will also move the reset control lever (Fig.68-11), down, moving the tonearm out.

4. The clamp arm cam (Fig.67-1) will move the record clamp away from the turntable, thereby releasing the record.

5. The record transfer arm (Fig.61-3) is brought down by the gear segment cam (Fig.67-3), replacing the record in the record magazine.

6. The speed changing solenoid is energized.

7. When the record is back in the magazine, the clamp arm is moved back slightly towards the turntable.
8. The locking lever (Fig. 58-6) drops into the notch of the locking lever cam (Fig. 67-4) and releases the locking pawl (Fig. 61-2).

9. With the locking pawl, the clutch arm (Fig. 58-3) is released, this brings the drive pin (Fig. 59-5) down, into the scan position (Fig. 60-1).

10. The drive pin is now in one of the notches of the cam gear (Fig. 59-6). The worm gear (Fig. 59-3) will stop, and the cam gear will turn the clutch gears (Fig. 61-1).

The carriage will start scanning. If no more selections are made, the carriage will scan twice and stop in its rest position. If a B, D selection was made, the carriage will trip while travelling from left to right. The movement of the worm gear (Fig. 59-3) will shift the cradle actuator (Fig. 61-6) to the right with the lever actuator (Fig. 60-3).

The rest of the action is the same as before, only the right side of the record will be played.

SWITCHES AND RELAYS (SEE OPERATING SCHEME)

Credit switch AK (E-6) (Fig. 43-7): Is closed when credit is made. Supplies 30 VDC to all circuits related to the selection system.

Restart locking relay ws (E, F-2) (Fig. 46-2): Is in parallel with the latch bar solenoid TM (E-5) (Fig. 45). Is energized when the credit switch AK (E-6) (Fig. 43-7) is closed, and is released during part of the selection cycle over contact N2 (E-4) (Fig. 52-4).

ws 1 (D-2) N.O.: Connects the write-in voltage to one side of the write-in trigger switch EK (D-6) (Fig. 53-3), thereby preparing the write-in circuit for the trigger switch EK (D-6) (Fig. 53-3).

ws 2 (E-2) N.O.: Locks the restart locking relay ws (E, F-2) (Fig. 46-2) and the latch bar solenoid TM (E-5) (Fig. 45) while the buttons are down.

ws 3 (D-2) N.O.: Prepares the circuit of the selection motor WM (E-4) (Fig. 52-2) and the position motor STM (D-4) (Fig. 47-3) by feeding the 30 VAC to contact WA 1 (D-2) of the start relay WA (E-2) (Fig. 46-1).

ws 4 (E-2) N.O.: In the circuit of the start relay WA (E-2) (Fig. 46-1) which will now energize when a letter and number button are pressed.

Start Relay WA (E-2): is energized when a letter and number button are pressed. Is deenergized when the release of the restart locking relay WS (E, F-2) (Fig. 46-2) opens contact WS 4 (E-2).

ws 1 (D-2) N.O.: Completes the circuit to the position motor STM (D-4) (Fig. 47-3), and the selection motor WM (E-4) (Fig. 46-2) hereby starting the selection cycle.

Position motor contact wipe (C3) (Fig. 48-4):

energizes the position relay (D3) (Fig. 51-1) when the contact wipe (Fig. 48-4) reaches the selected position contact (Fig. 48-2).

Position relay ST (D3) (Fig. 51-1):

energized when the position motor contact wipe (C3) (Fig. 48-4) reaches the selected position contact (Fig. 48-2).

ST 1 not used.

ST 2 (D3) N.O.: Locks the position relay in, once it is energized.

ST 3 (D3) SPDT:

Switches the 30 vac from the position motor (D4) (Fig. 47-3) to the selection motor (E4) (Fig. 52-2) when the position relay energizes.

ST 4 (D3) SPDT:

Switches the position motor (D4) (Fig. 47-3) from 30 vac to the DC brake voltage, when the position relay energizes.

Speed changing switch (B4) (Fig. 64-1) N.C.:

energizes the speed changing solenoid (B4) (Fig. 63-1) when the record transfer arm is in the downward position.

Selection motor com switch (Fig. 52-4): (See timing on bottom of operating scheme).

N 1 (E-4) N.O.: Is one middle blade with an N.O. contact on each side. One contact closes when on the high part of the cam, the other closes when on the low part.

The top contact will close first, but this is only a safety circuit. If for any reason the buttons should not lock in, the single relay SR (E-3) (Fig. 46-4) will be energized, preventing the suction of any credit.

The bottom contact will close after N 3 and N 4. This will energize the single relay SR (E-3) (Fig. 46-4) when a single selection is made.
N.2 (E-4) N.O.: Just before the end of the first vibration pulse, N.2 opens the circuit to the latch bar solenoid TM (E-5) (Fig.45) and the restart locking relay WS (E,F-2) (Fig.46-2) thereby releasing the buttons.

N.3 (D-4) N.O.: Is the first contact to close, it is parallel over contact wa 1 (D-2) and wa 3 (D-2), thus serving as the carry-over contact for the selection motor WM (E-4) (Fig.46-2).

N.4 (D-4) N.O.: Pulses the subtract solenoid SM (D-6) (Fig.53-1).

Carry over switch ÜK (E-6) (Fig.53-2) N.O.: In the circuit of the subtract solenoid SM (D-6) (Fig.53-1) to assure complete travel of the subtract solenoid plunger. Activated by the subtract solenoid SM (D-6) (Fig.53-1).

Write-in trigger switch EK (D-6) (Fig.53-3) N.O.: Triggers transistor T1 with the write-in pulse. Is activated by the subtract solenoid SM (D-6) (Fig.53-1).

Single relay SR (E-3) (Fig.46-4): Is energized only when a single selection is made, over contact N.1 (E-4) (Fig.55-6). Its own contact SR 1 locks the relay in. The relay will not release, while contact N.4 (D-4) (Fig.52-4) is pulsing and time constant C1 and R3, over the relay, keeps it energized between pulses. After the last pulse of N.4, the relay will release.

SR 1 (E-3) S.P.D.T.: Opens the circuit to the subtract solenoid SM (D-6) (Fig.53-1) after the first subtract pulse, and locks its own relay.

Latch bar relay TR (F-2) (Fig.46-3): Is energized when an album is selected and not enough credit is available.

TR 1 (F-2) N.C.: Opens the circuit of the latch bar solenoid TM (E-5) (Fig.45) and the restart locking relay WS (E,F-2) (Fig.46-2) thus the buttons will not lock.

TR 2 (F-2) N.C.: Opens the circuit of the start relay WA (E-2) (Fig.46-1) so the selection cycle can not start.

Scan switch SS (A-4) (Fig.52-1) N.O.: Completes the circuit to the carriage motor SPM (B-4) (Fig.69-4). Is a two step switch, mechanically activated by the selection motor WM (E-4) (Fig.52-2) or the scan button (Fig.6-18).

Reversing switch (C-4) (Fig.62-2) DPDT: Reverses the direction of the carriage motor SPM (B-4) (Fig.69-4) and switches the playing indicator lights.

Operating switch (B-3) (Fig.68-6) N.C.: Keeps the motor relay MR (B-2) (Fig.46-5), and the muting relay in the amplifer, energized during scan and transfer.

Motor relay MR (B-2) (Fig.46-5): Is normally energized, only released in the play position.

MR 1 (C-2) N.O.: Is in the circuit of the clutch solenoid KM (C-3) (Fig.69-3).

MR 2 (C-2) SPDT: Switches the carriage motor SPM (B-4) (Fig.69-4) from 80 VAC in the play position, to 125 VAC in the transfer and scan position.

Concel read switch (b-3) (Fig.69-6) N.O.: Energizes the motor relay MR (B-2) (Fig.46-5), thus activating the clutch solenoid KM (C-3) (Fig.69-3).

Trip relay LR (B-2) (Fig.56-3): Is energized through the loading current of C 13 when the SCS (B-2) (Fig.56-1) fires. Will release as soon as C 13 is fully charged.

LR 1 (B-2) N.O.: Energizes the trip solenoid UM (B-3) (Fig.58-1).

LR 2 (A-2) S.P.D.T.: Keeps C 13 discharged over R 23 in the normal position. Places the anode gate of the SCS (B-2) (Fig.56-1) to ground, cutting off the switch when the trip relay LR (B-2) (Fig.56-3) is energized.

Trip solenoid UM (B-3) (Fig.58-1): Activates the trip lever (Fig.58-2). Energized through contact LR 1 (B-2)

Muting relay (in amplifier): Energized together with the motor relay MR (B-2).

S 1-2 SPDT: With the relay energized contact S 1 is open, and places a bias voltage on the AVC circuit, so that when the needle enters the first groove, it will take several seconds for the sound to reach full volume. Contact S 2 is closed connecting the input of the output stage to ground, thereby muting the amplifier. With the relay deenergized, contact S 1 is closed, connecting S 2 to ground, thereby activating the AVC. Contact S 2 is open, thus the signal from T 9 can now be amplified.

S 3 - 4 SPDT: Has the same function as S 1 - 2, but for the other channel.

S 5 N.O.: Will reset the electronic fuse as soon as the relay is energized.
ADJUSTMENTS

The clamp disc has two adjustments. The vertical and horizontal positions of the centering pin (Fig. 70-1) in relation to the hole (Fig. 70-2). If we imagine a vertical line through the middle of the hole, the pin should enter the hole on that line. This adjustment depends on the position of the two plastic nuts (Fig. 70-3) in relation to each other. Horizontally, the centering pin should touch the bottom slope of the centering hole. This adjustment depends on both plastic nuts in relation to the clamp disc.

FIGURE 70: CLAMP DISC
1. Centering pin
2. Centering hole
3. Adjusting nut

The needle should enter the first groove, when landing on the record. Turning in the record entering adjusting screw (Fig. 71-1) advances the needle inward toward the center of the record. Cancelling of the record is done by the magnet (Fig. 68-5) closing the reed switch (Fig. 68-6) at the end of the record. After loosening the record cancel adjustment screw (Fig. 71-2), the magnet holder can be moved.

FIGURE 71: TONE ARM
1. Record entering Adj.
2. Record cancel Adj.
3. Needle pressure Adj.

Moving it in, results in a sooner closing of the reed switch, moving it out will close the reed switch later.

The needle pressure should be 7 grams. Bringing the lugs (Fig. 71-3) down will apply more pressure, bringing them up less pressure. In the left side play position, the right spring is adjusted; in the right side play position, the left spring is adjusted.

CLUTCH

By pressing on the adjusting screw (Fig. 72-1), the clutch armature can be seated against the core inside the clutch solenoid. The spring loaded lever (Fig. 72-2) should engage with the butterfly clutch (Fig. 72-3) for at least 1/16".

The armature is slotted, so a screwdriver can be used to hold it steady while the adjusting screw is turned in or out as needed.

FIGURE 72: CLUTCH
1. Adjusting screw
2. Spring loaded lever
3. Butterfly clutch
The pin assembly is adjusted at the factory and secured in place by 4 bolts (Fig. 47-1) to the carriage base. It is very unlikely that the unit will have to be removed. The contacts can be cleaned by simply taking the carriage out. If the need ever occurs, the following procedure should be followed.

Remove the complete carriage base from the machine, by removing all the plugs and the 4 nuts used to bolt down the base. Lift the carriage base out of the cabinet and place it horizontally on a table. Push the carriage by hand to the right side of the base, and manually trip the trip lever, while the record transfer arm is lined up with the A8-B8 record space. This will lock the carriage in the A8 selected position. Now note the gap between the A selection search contact (Fig. 73-1) and the face of the pin assembly. Manually switch the reversing lever. The gap between the B selection search contact and the face of the pin assembly should be the same as with the A contact, approximately 1/16". If the two spaces are not the same, the pin assembly should be moved as needed.

Important: If the bolts holding the pin assembly are loosened too much, excessive play between the pin assembly and the contact block will make proper adjustment impossible.
Place the carriage on the carriage rod. Press the scan button, this will start the carriage motor (Fig. 74-5). The direction of rotation can be changed by the reversing arm on the control box (Fig. 62-1). The drive belt (Fig. 74-1) should always travel in the center of the idler wheel (Fig. 74-2). While the belt is traveling downward, loosen the front screw (Fig. 74-3) and move the motor up or down until the belt stays in the center of the idler wheel. Reverse the direction of the motor. The belt will travel upward.

Loosen the rear screw (Fig. 74-4) and move the motor until the belt again stays in the center of the idler wheel. Now go back to the first adjustment, and keep repeating this procedure until the belt stays in the center in both directions. This adjustment might be necessary when replacing the rubber grommets in the front and the rear of the carriage motor. Spare grommets are delivered with each machine.

**Operating Switch**

With the carriage in the play position, the operating switch (Fig. 75-1) should be open with a gap of 1/64". This adjustment can be done by turning the adjusting screw (Fig. 75-2) in or out as needed.

**Figure 75 Operating Switch**

1. Operating switch
2. Adjusting screw

**Credit Unit**

**Figure 76 Credit Unit**

1. top plate
2. holding screw
3. circlip
4. half dollar credit wheel
5. quarter credit wheel
6. nickel-dime credit wheel
7. contact jumpers
8. washer
9. spacer
10. screws
11. tension spring
12. drive pin

The half dollar credit wheel (Fig. 76-4) and the quarter credit wheel (Fig. 75-5) have several slots, numbered to indicate the amount of credits. The mounted half dollar wheel gives 4-6-8 credits; the spare wheel, on the outside of the credit unit gives 5-7-9 credits.

The factory setting of the credit unit is: 2 plays 1 quarter
5 plays 5-7-9 credits
Credit change procedure:
1. Remove credit unit cover.
2. Drop credit unit by loosening two top screws (Fig. 76-10).
3. To take off top plate (Fig. 76-1), loosen screw (Fig. 76-2) and remove circlips (Fig. 76-3) from main wheel shaft.
4. Remove plastic spacer (Fig. 76-9) and washer (Fig. 76-8).

**Important:** If the credit unit has 4 credit wheels, the top wheel will be for use with the dollar bill validator.

4. Remove tension spring (Fig. 76-11).
5. Take off top wheel (Fig. 76-4).
6. Refit wheel in such a way that the drive pin (Fig. 76-12) 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 and spacers 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.
To change album price, the number of subtract pulses from cam switch N4 (Fig. 77-2) will have to be changed. At the left hand side of the contact cam is a spring loaded disc (Fig. 77-1) that after lifting it away from the contact cam can be turned clockwise or counterclockwise.

**FIGURE 77 SCAN CONTROL BOX**

1. Spring loaded disc.
2. N4 cam switch

There are 3 positions:

1. Two credits are needed per album selection, contact N4 should pulse twice. The teeth on the disc and on the contact cam are lined up to form 2 wide teeth. Contact jumpers 2-3-4 (Fig. 76-7) in the credit unit are connected. The album light is lit with 2 credits.

2. Three credits are needed per album selection, contact N4 should pulse three times. The middle teeth are lined up to form 1 wide and 2 narrow teeth. Contact jumpers 1-2 and 3-4 are connected. The album light is lit with 3 credits.

3. Four credits are needed per album selection, contact N4 should pulse four times. None of the teeth are lined up to form 4 narrow teeth. Contact jumpers 1-2-3 are connected, the album light is lit with 4 credits.

Each number series can be selected for single or album play, by placing the contact fingers on the contact plate (Fig. 48) in the 1 position for single play or the 2 position for album play.

**AMPLIFIER 70 S bb**

After lifting up the selector key panel, the sound controls can be reached. Treble control (Fig. 78-2) bass control (Fig. 78-3) record quality compensator (Fig. 78-1) channel level adjustment (Fig. 78-6). 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.

**FIGURE 78 AMPLIFIER**

1. Record quality compensator
2. Treble control switch
3. Bass control switch
4. Output to junction box
5. Volume control connections
6. Level controls
7. Output transistors
EXTENSION SPEAKER CONNECTIONS

without output transformer

CABINET - SPEAKERS
left

right

Box without extension speakers

Cabinet speaker-switch in position:

8 ohm or
8 ohm

CABINET - SPEAKERS
left

right

Clamp additional speakers between
8 - 16 Ohm parallel to box speakers

Cabinet speaker-switch in position:

8 ohm

ADDITIONAL SPEAKERS
8 - 16 Ohm

CABINET - SPEAKERS
left

right

Clamp additional speakers between
2 - 8 Ohm in series with box speakers

Cabinet speaker-switch in position:

4 ohm

ADDITIONAL SPEAKERS
2 - 8 Ohm

CABINET - SPEAKERS
parallel (mono)

Additional speakers in other room (mono).
With volume-control R2, Part-Nr. 41 527,
separate control for both rooms possible.

Cabinet speaker-switch in position:

8 ohm

ADDITIONAL SPEAKER (mono)
in other Room

The cabinet speaker-switch is mounted on the left inside the cabinet. (PRESTIGE 160 B II only)
CS = CABINET SPEAKER
ES = EXTERNAL SPEAKER
CABINET SPEAKER • SWITCH IN 8 OHMS • POSITION
EXTENSION SPEAKER CONNECTIONS
In most cases, the existing cable from a former installation can be used; if not, the 3 wire cable used for wall box installation is ideal for this purpose.

The amplifier is fitted with a 4 prong connection strip (Fig. 78-5). With a dual volume control each channel can be adjusted separately. The machine is delivered with a single control, both channels are controlled simultaneously, thus only 3 wires are needed, and a jumper is placed between the green and brown connections. The same color code is used in the control box. To connect additional speakers see the paragraph on this subject.

Any repairs or adjustments should be done by qualified technicians, or dubious damage to the amplifier may result.

**CONNECTION OF ADDITIONAL SPEAKERS**

With the tube type amplifiers, the impedance matching of speakers to the output was very important. However, mismatching resulted in possible distortion, loss of power, premature exhausting of the output tubes, but in most cases the amplifier would keep on functioning. With the solid state amplifiers, using direct coupled output stages, complete destruction of the output stage will result.

The 70 S amplifier is protected against overload by an electronic fuse, this protection however is not definite. In case of mismatch, the output is not completely shorted, thus is possible that the electronic fuse will not function, so damage to the output stage will result after a certain length of time.

If certain rules are observed, the 70 S amplifier will produce Hi-Fidelity stereo sound for an indefinite period of time.

**NEVER, UNDER ANY CONDITION CONNECT ADDITIONAL SPEAKERS DIRECTLY TO THE AMPLIFIER OUTPUT TERMINALS, ALWAYS USE THE OUTPUT JUNCTION BOX.**

Use the 70.7 C.V. line whenever possible. In case of mismatching, the C.V. transformer will insulate the amplifier from the overload. Greater flexibility is possible with the use of multi-tap C.V. transformers.

The primary winding of the transformers is marked in either ohms or watts. Conversion is easily done by these two formulas:

\[ Z = \frac{E^2}{P} \]

\[ E = \sqrt{2 \times 70.7 \times P} \]

\[ Z = \frac{E^2}{P} = \frac{70.7 \times 70.7}{P} = \frac{5,000}{P} = \text{impedance in ohms} \]

\[ P = \frac{E^2}{Z} = \frac{70.7 \times 70.7}{Z} = \frac{5,000}{Z} = \text{power in watts} \]

See extension speaker connections chart.
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 ranges from 20 cs to 20 Kcs.
The two channels are completely separate and the amplifier has 30 transistors and 22 silicon diodes, and is divided in three 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.

TECHNICAL DESCRIPTION AND ADJUSTMENTS FOR 70 S BB AMPLIFIER

Since we use a ceramic cartridge, the input of the amplifier should be high impedance, therefore T 1 is used in a common collector or emitter-follower configuration. The amplification factor of this stage is less than 1, and is only used for impedance matching. T 2 will amplify the output of T 1. Since this is a common emitter circuit, there will be gain. The output of T 2 is sent to T 3 and T 4. Stage T 3 is a voltage amplifier. The output of T 3 is rectified by D 3, and this positive voltage, developed over voltage divider R 11, R 12, is sent to D 1 and D 2. The higher this voltage, the more current will flow through D 1 and D 2, thus the smaller the resistance, to ground from C 6. The RC network R 9-C 9 will delay the attack time, resulting in a smooth performance of the AVC. T 4 is an emitter-follower to match the impedance of T 2 to the volume control circuit. Again no amplification in this stage. The output of LP 1 is at this point controlled by the level control P 1.
The signal reaches T 5 over C 22-R 32-C 26, and T 7 over C 24-R 33-C 28. The input to these transistors is shunted by diodes D 6-D 7 and D 8-D 9. With P 2 at zero resistance, the anode of D 6 is at ground potential and no current is flowing through the diodes. The internal resistance of the diodes is very high when they are not conducting, thus the full signal will reach T 5 and T 7, so with P 2 minimum, the volume is maximum. As P 2 is turned up, the potential at the anode of D 6 will increase, and current will flow through the diodes. As the current increases, the internal resistance decreases and more of the audio signal will be diverted to ground. Due to the shunting effect of resistor R 34 and capacitor C 25, diodes D 6 and D 7 start reducing the signal before D 8 and D 9. The circuits T 5-T 6 and T 7-T 8 are identical distortion amplifiers.

With full volume, both amplifiers receive the same input, therefore the outputs of T 6 and T 8 will also be the same, and there is no potential difference across the capacitor network C 31-C 32-C 33. As the volume is turned down, D 6 and D 7 start conducting first, hereby reducing the input to T 5, thus a smaller output from T 6. The bottom of the bass boost circuit is now at a higher potential and the higher frequencies will be filtered over the bass control. Cutting the high frequencies will give us the bass boost needed to compensate for bass losses at low volume. As the volume is turned down more, a greater amount of current will flow through the diodes and D 8-D 9 will start conducting, hereby reducing the input to T 7 and thus the total volume. The bass boost will continue throughout the entire volume range because D 6-D 7 will always conduct more current than D 8-D 9. Diode D 5 turns off the amplifier at minimum volume, by activating the AVC. T 9 is an emitter-follower to match the impedance of the next stage.

The complete power amplifier and the electronic fuse are mounted on the LP III S board. The amplifier is a quasi-complementary type. (see schematic on page 75). T 11 and T 13 form the conventional differential circuit, T 12 and T 14 are the complementary amplifier pair. The output load of T 10 is formed by R 62-P 4-R 61-R 60. Thermal stability is achieved by thermistor H L 1 in parallel with R 62. The value of R 62 is so low that it can be disregarded in the following audio analysis of the amplifier. This resistor together with P 4 and D 10 sets the bias for T 11 and T 12. The quiescent current, or rest current, of the circuit is a direct function of this bias voltage, as we will see in the adjustment procedure for P 4.

Therefore it is very important that this circuit is very stable, hence the use of Zener diode D 10 and thermistor H L 1. This bias also minimizes crossover distortion.

Under quiescent conditions, the voltage at X is 1/2 Vcc and the collector of T 10 is adjusted to this same potential by P 3. When the collector of T 10 is positive with respect to X, due to an input signal, T 11 and T 13 conduct, and output power is developed across the output load. When an input signal occurs, the collector of T 10 negative with respect to X, T 12 and T 14 will conduct. The two outputs combine across the output load to retrace the input signal. The DC collector currents through T 13 and T 14 are determined by their respective base currents, which are in turn, functions of the collector and base currents of T 11 and T 12, respectively. The base current through T 12 never drops below the quiescent value, regardless of the input signal. Without a special circuit, this would not be the case with the quiescent base current of T 11. This transistor would cut off during the peaks of the positive swing of the input signal. Capacitor C 39 is used to prevent T 11 from cutting off at any time. This is called "bootstrapping." This effect is through feedback from this capacitor and is offset by about the same magnitude of negative feedback via P 3 for DC and C 37-R 56 for AC. If C 39 were not in the circuit, T 11 would not conduct on the signal peaks. With C 39 in the circuit, the voltage across the capacitor remains constant at Vcc. As the lower end of C 39 is at point X and the upper end is at the junction of R 60 and R 61, the capacitor maintains the junction at Vcc volts above the voltage at X. This voltage is higher than Vcc during positive signal peaks. As Vcc is across the sum of R 61 and the base-emitter junction of T 11, it will keep this transistor conducting at all times, even when point X or the emitter is at Vcc.
Under quiescent conditions, the voltage at X is 1/2 Vcc. Since the collector of T10 is at the same potential, this is essentially the voltage across R60 - R61 - P4 - R62. It is also the voltage across C39 - R60. The voltage across R60 - R61 - P4 will change with the output signal of T10. However, the voltage across the capacitor, Vc, will remain constant until discharged. The charged capacitor is essential to maintain the voltage at the junction of R60 and Vcc with respect to X. While being discharged, the voltage across C39 will maintain a current through R61 - P4 and the base-emitter junction of T11. This current keeps T11 and T13 in the conducting state. The action can be clarified with a typical example. Assume that the current through the base of T11 must be 20 ma, if transistor T11 and T13 are to be operated properly. When the signal is at a positive peak, the base and emitter of T11 are at +Vcc, and the transistors will not conduct. For proper circuit operation, T11 must conduct at all times. This can only be done keeping the voltage across R61 stable. This voltage is approximately the same as Vc across C39. Since C39 maintains the charge, it does not permit the voltage across R61 to change. By selecting the proper values for the time constant R61 - P4 - C39, this will be true even at the lowest frequency to be amplified.

The power output transistors T13 and T14 operate in a single-ended class B push-pull arrangement. They have a small forward bias to minimize crossover distortion and it also operates the output transistors in a more favorable beta range. This bias is set by the voltage drop across R63 - R64 that shunts the input to T13 and T14. A small fuse resistor, R65 - R66, is used in the emitter of each output transistor for protective fusing, and also to provide local feedback. This local feedback increases the bias stability of the circuit and also improves the declining frequency response of T13 and T14 at the upper end of the audio spectrum.

Because of the lower transistor efficiency above 10 kHz, care should be used when checking the amplifier for maximum continuous sine wave output at these frequencies. If continuous power is applied for more than a short duration, sufficient heating may result to raise the transistor current enough to burn the fuse resistors. Since there is not sufficient sustained high frequency power in regular record material, to raise the current to this level, actual performance of the amplifier does not suffer since the power level in music declines as the frequency increases beyond about 1 to 2 kHz.

The speaker system is shunted by C41 - R67 to filter out any frequencies beyond the audio spectrum that may increase the load impedance. 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 second. When T15 starts conducting, the base of T16 becomes positive, thus placing point A in LP 15 S at ground potential. This point is the voltage supply of the pre-amplifier 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 base of T16 back to negative, driving these transistors in cut-off, this an condition that the overload is removed from the circuit.

**POWER AMPLIFIER LP III S**

![Power Amplifier Circuit Diagram](image-url)
ADJUSTMENT PROCEDURE: (see drawing on page 15)

If after repairs, readjustment of the amplifier should be necessary, the following step by step procedure should be executed very carefully.

The following test instruments are necessary:

1. AC-DC voltmeter; input resistance at least 10 KΩ/volt, preferably VTVM.
2. Ammeter, range 100 mA.
3. Sinewave generator.
4. Oscilloscope.
5. Dummy loads, 4 Ω, at least 80 watts each.
6. Male plug to fit the input of the amplifier. Wire the output of the sinewave generator to both channels (pins 1 and 3).

A control center with a line cord soldered to the amplifier and control fuses makes an ideal power supply.

The amplifier must be cold, unplugged for several hours.

1. Connect the volume control, and the 4 Ω dummy loads (both channels).

Set the following controls:

- Volume control—min.
- Record quality compensator—min.
- Bass and treble—max.

2. Turn P4 and P4’ to exactly halfway.

3. Connect the mA meter. The positive lead to the positive lug of C44. Use the range 0-100 mA.

4. Disconnect both power supply jumpers on LP III S.

   Now comes the most critical part of the procedure. There is only 5 sec. to make the next adjustment, since the current will start rising rapidly. Performing the adjustment will be simplified if the negative lead of the mA-Meter ends in an attenuator clip.

   Plug the amplifier into the control center.

5. With the negative lead of the meter, tap the collector terminal several times to avoid the surge current from damaging the meter. Clamp the lead to the terminal, and adjust P4 until the current reads between 40 and 45 mA. Notice that the current will start rising almost immediately. If this should happen before the adjustment is completed, disconnect the negative lead from the collector terminal and let the circuit cool off for several minutes. Repeat this procedure for the other channel with P4’.

   To increase the current, P4 is turned counter clockwise, and P4’ clockwise.

6. Unplug the amplifier and disconnect the meter. Resolder both jumpers.

7. Connect the voltmeter and the oscilloscope to the right channel output terminals (blue wire). Set the voltmeter on the AC scale, 0-15 V.

8. Connect the sinewave generator to the amplifier. The input should be 1000 c/s at 250 mV., going to both channels. If the generator does not have an output meter, this can be measured with the AC voltmeter first.

9. Turn both level controls to minimum, P1 clockwise and P1’ counter clockwise. Plug in the amplifier and turn the volume control to maximum. Increase P1 until clipping occurs. Notice the clipping is not the same for the positive as for the negative part of the sinewave.

10. Adjust P3 so that when P1 is turned up, both peaks, positive and negative, of the sinewave will start clipping at the same time. With P3 adjusted, P1 should be set for an output of 11 V.

11. Connect the scope and the voltmeter to the left channel output terminals (red wire), and repeat the procedure for the left channel with P1’ and P3’. After adjusting P1’, measure the output of the right channel again, since this may have been affected by adjusting the left channel. Both channels should have the same output of 11 V.

12. All controls should now be sealed with a drop of sealing paint, or nailpolish.
ACCESSORIES

Electro-mechanical totalizer

It is simple to install on the right side of the carriage base assembly. Mounting instructions will be included. The totalizer registers the total amount of coins which have been inserted.

Part-number 41 654

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Microphone assy

Dynamic microphone MB 270 RS with switch and 15 m (50 ft.) cable-length. Microphone assy with relays, mix-control and terminal board for volume control. The assy may be easily connected by following the instructions. The microphone may be used during sound production or also in stand-by position.

Part-number 41 676

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Remote Selection-Stepper

Adaptable to all world known remote control boxes (wall box). Detailed installation instructions are included in unit.

Part-number 41 925
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.

The box is supplied with a 3-core line cable. Green-yellow must be connected to earth, corresponding to international wire code.

The proper functioning of the phonograph necessitates it to be horizontally and vertically levelled.

INSTALLATION OF THE PHONOGRAPH

1. Remove cabinet keys located at the front door.

2. Lift the top lid of the cabinet.

3. Unlock and open right front door. Unlatch top and bottom of left front door by depressing spring loaded latch. Unlatch lid containing program holder (figure 1-1).

4. To loosen carriage, remove screws painted red (figure 2-6 and 8) on the right hand side of the carriage base. Turn the security lever on the left hand side of carriage clockwise.

5. To loosen record clamp arm, remove rubber ring (figure 2-5) and rubber wedge (figure 2-7).

6. To free pick-up arm, remove rubber band, but leave the stylus cover on (figure 2-4) in order to protect the diamonds.

7. To loosen carriage base, unscrew four nuts (figure 1-4). The nuts should clear the Carriage Base by at least 
3/8 inch.

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 2-2) 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 suction (figure 4-1) 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 3) in the order of the title strips, the upper lettering of the magazine marking to the left. Move carriage by pushing it by hand to any desired position.

14. Remove stylus covers from cartridge. (Save the covers for later use.)

15. Slightly press program holder frame downwards and lock cabinet.

16. Lock cash box and remove key (figure 1-2).

17. Close front doors and lock cabinet.

18. IMPORTANT WHEN TAKING OUT CARRIAGE. Also on this model, the carriage can be taken out for servicing. In case the carriage has to be taken out, make sure that the security lever on the left hand side is completely turned to the back. Lift locking levers (2), located on both sides of carriage, with both hands. When inserting carriage, follow reverse procedure.

19. 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 volume control box.

Scan Button: permits travel of the carriage. 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 Play 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 record playing is being indicated by lighted figure- and letter-fields.

The control box R 2 is fitted with a volume control for both channels and one reject button.

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 4 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 machine is equipped with a new type popularity meter (figure 2-1) 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 2-3).

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.:

<table>
<thead>
<tr>
<th>Credits</th>
<th>Slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 play</td>
<td>1</td>
</tr>
<tr>
<td>3 plays</td>
<td>3</td>
</tr>
<tr>
<td>6 plays</td>
<td>6</td>
</tr>
</tbody>
</table>

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

1. Remove credit unit cover
2. Clasp out base plate of credit unit
3. To take off top plate, loosen screw and remove clip from line 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 N 1 of the switch mechanism (left hand side — carriage base) is set in such a way that 2 subtractions are realized in the credit unit at each ALBUM-selection.
3. Slide open cover of the selector switches and switch the contact fingers in the left (green) row.
   Position 1 - Single
   Position 2 - Album

Selector keys 4 through 6 can be changed.

To change the speed for Album play, switch the contact fingers in the right (red) row.
   Position 1 - 45 RPM
   Position 2 - 33 1/3 RPM

Selector keys 4 through 6 can be changed.

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 enclosed “EXTENSION SPEAKER CONNECTIONS”.

If desired output-transformer is available Part No. 41513
Max. music power = 35 Watts per channel.

MATCHING THE SOUND TO THE ROOM ACOUSTICS:

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

Treble-control switch Record quality compensator
Bass-control switch Channel level adjusting

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.
CONSUL 120 A II

SPECIFICATIONS

Electrical Data:
Line Voltage
117 V. AC 60 cycles
Working Voltage
30 V. AC
Power: standby
85 W.
transfer and scan play
120 W.
140 W.

Control Center:
1 Transformer
for working voltage
1 Transformer
for amplifier
117 V. AC prim. 80/110/125 V. AC sec. I
117 V. AC prim. 40 V. AC sec.

Fuses:
1 Line Voltage 117 V. AC
1 Amplifier
1 Working Voltage
1 Accessories connection (AMP)
1 Electronic fuse
3 1/4, Amp. slo blo
1 1/4, Amp. slo blo
2 Amp. slo blo
as needed
in the amplifier

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

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

Selection Circuit:
20 Letter buttons A — V
6 Number buttons 1 — 6
1 Latch bar solenoid
1 Selection meter
1 Positioning Motor
4 Cam switches N 1 — N 4
1 Pin assembly
ALBUM-selection
2 sets of switches, each 10 × 2 contacts
1 set of switches with 6 × 3 contacts
30 V. DC 100 % ED
30 V. AC
30 V. AC
radio-shielded
120 pins 12 selection solenoids
Adjustment see note in credit unit lid

Playing Mechanism:
1 Carriage base
with pre-selector unit and record magazine for 60 records alternatively
45 rpm or 33 1/3 rpm, 7 inch diameter, mono or stereo, vertically located.
1 Popularity meter
1 Total play meter
1 Carriage
with play motor (synchronous)
1 Clutch solenoid
1 Trip solenoid
1 Speed changing solenoid
1 Cartridge
2 Needles
50 counting strips
4 digits
80/110 V. AC 15/31 W. 1500 rpm, left and right hand turns.
100 V. AC 100 % ED
30 V. DC 5 % ED
56 V. DC 100 % ED
ceramic DB 200 stereo/mono
diamond D 102 stereo/mono

Amplifier:
Stereo amplifier 70 S bb
Volume compensator
Output stage
Output capacity per channel
Impedance
Mutating relay
1 (Remote) volume control
2 Woofers 10 inches
2 Tweeters DFS 6/13/100 pressure chamber system
1 Stereo network
with electronic fuse
automatic (AVC)
2 × 2 N 30 65 in push-pull
35 W. music (60 W. sine wave)
4 Ohms output
40 V. DC
volume control for both channels and one reject button
8 Ohms 30 W.
4 Ohms 6 W.
1.5 mH / 32 µF

Locks and Keys:
1 Cabinet locks
2 Cabinet keys
1 Cash box lock
2 Cash box keys
SL 82 d
Nr. 107 676 (K9)
SL 85 p
different numbers.
# CONSUL 120 A II

## MEASUREMENTS AND WEIGHTS:

<table>
<thead>
<tr>
<th></th>
<th>height (mm)</th>
<th>width (mm)</th>
<th>depth (mm)</th>
<th>weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box total</td>
<td>850</td>
<td>1070</td>
<td>550</td>
<td>112,0</td>
</tr>
<tr>
<td>Carriage base</td>
<td>235</td>
<td>583</td>
<td>286</td>
<td>12,0</td>
</tr>
<tr>
<td>Carriage</td>
<td>260</td>
<td>200</td>
<td>345</td>
<td>4,0</td>
</tr>
<tr>
<td>Amplifier 70 S bb</td>
<td>356</td>
<td>206</td>
<td>90</td>
<td>3,0</td>
</tr>
<tr>
<td>Control Center</td>
<td>356</td>
<td>206</td>
<td>122</td>
<td>6,0</td>
</tr>
<tr>
<td>Box packing</td>
<td>950</td>
<td>1140</td>
<td>620</td>
<td>19,0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>inches (max.)</th>
<th>pounds (max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box total</td>
<td>33 3/4</td>
<td>246 1/2</td>
</tr>
<tr>
<td>Carriage base</td>
<td>9 3/4</td>
<td>20 1/2</td>
</tr>
<tr>
<td>Carriage</td>
<td>10 3/4</td>
<td>8 1/2</td>
</tr>
<tr>
<td>Amplifier 70 S bb</td>
<td>14 3/4</td>
<td>6 1/2</td>
</tr>
<tr>
<td>Control Center</td>
<td>14 3/4</td>
<td>13 1/4</td>
</tr>
<tr>
<td>Box packing</td>
<td>37 3/8</td>
<td>41 1/4</td>
</tr>
</tbody>
</table>
ATTENTION:

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

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.
<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>No lights, no power</td>
<td>Check wall outlet, ON-OFF switch, 3 2/10 amp fuse.</td>
</tr>
<tr>
<td>2.</td>
<td>Coins hang up in rejector or return</td>
<td>Check for dirt or slugs in coin rejector.</td>
</tr>
<tr>
<td>3.</td>
<td>Coins fall into cash bag but no credit</td>
<td>Check coin switches, 24 V light in credit unit, 2 amp fuse AK credit switch.</td>
</tr>
<tr>
<td>4.</td>
<td>Buttons do not latch, latch bar solenoid not energized</td>
<td>Check AK credit switch, rest contacts in key switch assembly. Open latch bar solenoid, plunger in latch bar solenoid.</td>
</tr>
<tr>
<td>5.</td>
<td>Buttons stay down, no selection is made</td>
<td>Check start relay, contacts in key switch assembly.</td>
</tr>
<tr>
<td>6.</td>
<td>Selection cycle completed, carriage scans but no selection is made and no credit is subtracted.</td>
<td>Check single relay contact, subtract solenoid.</td>
</tr>
<tr>
<td>7.</td>
<td>Selection is made, motor does not turn</td>
<td>Check scan switch.</td>
</tr>
<tr>
<td>8.</td>
<td>Motor turns but does not scan</td>
<td>Check clutch solenoid, butterfly clutch, slip clutch.</td>
</tr>
<tr>
<td>9.</td>
<td>Motor turns clutch solenoid not energized</td>
<td>Check operating switch, amplifier plug, 1 2/10 fuse.</td>
</tr>
<tr>
<td>10.</td>
<td>Credits subtracted but no selection is made</td>
<td>Check write-in trigger switch, carry over switch, read-out contacts.</td>
</tr>
<tr>
<td>11.</td>
<td>Too many credits subtracted when single selection is made</td>
<td>Check single relay, cam switch N1, check contact plate.</td>
</tr>
<tr>
<td>12.</td>
<td>Not enough credits subtracted when album selection is made</td>
<td>Check contact plate.</td>
</tr>
<tr>
<td>13.</td>
<td>Carriage picks up record and puts it back without playing</td>
<td>Check armature in clutch solenoid, magnetic read switch.</td>
</tr>
<tr>
<td>14.</td>
<td>Record does not cut off at the end</td>
<td>Check magnetic reed switch, magnet.</td>
</tr>
<tr>
<td>15.</td>
<td>Record plays at wrong speed</td>
<td>Check idler wheels, belt, turntable, speed changing mechanism.</td>
</tr>
<tr>
<td>16.</td>
<td>No sound</td>
<td>Check amplifier, needles, pick-up.</td>
</tr>
<tr>
<td>17.</td>
<td>Sound at start of record and then disappears</td>
<td>Check outside speaker lines for mismatch or short.</td>
</tr>
<tr>
<td>18.</td>
<td>Sound distorted or low</td>
<td>Check for mismatch of speakers, pick-up, needles</td>
</tr>
</tbody>
</table>