▲ MITSUBISHI
AUDIO SYSTEMS

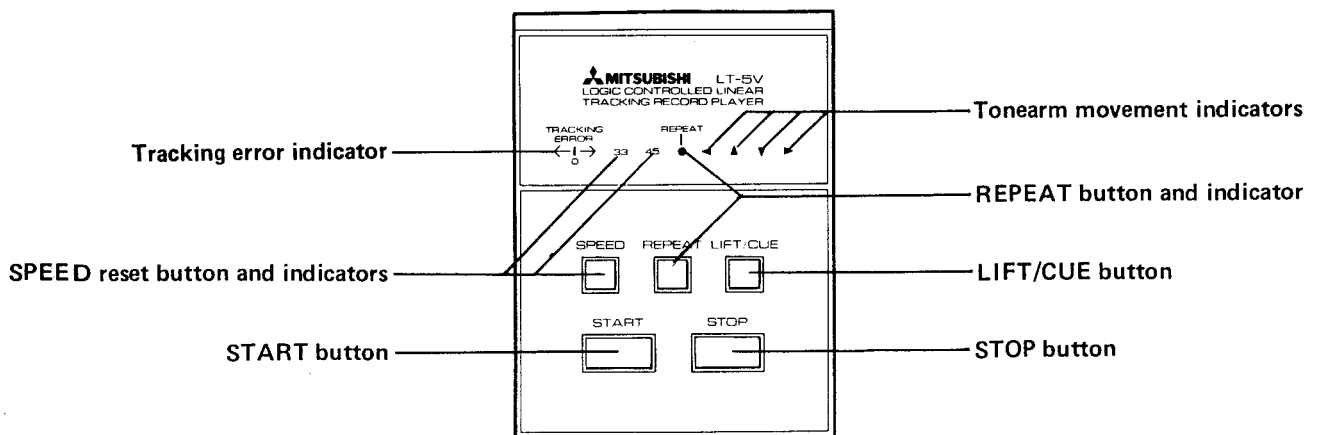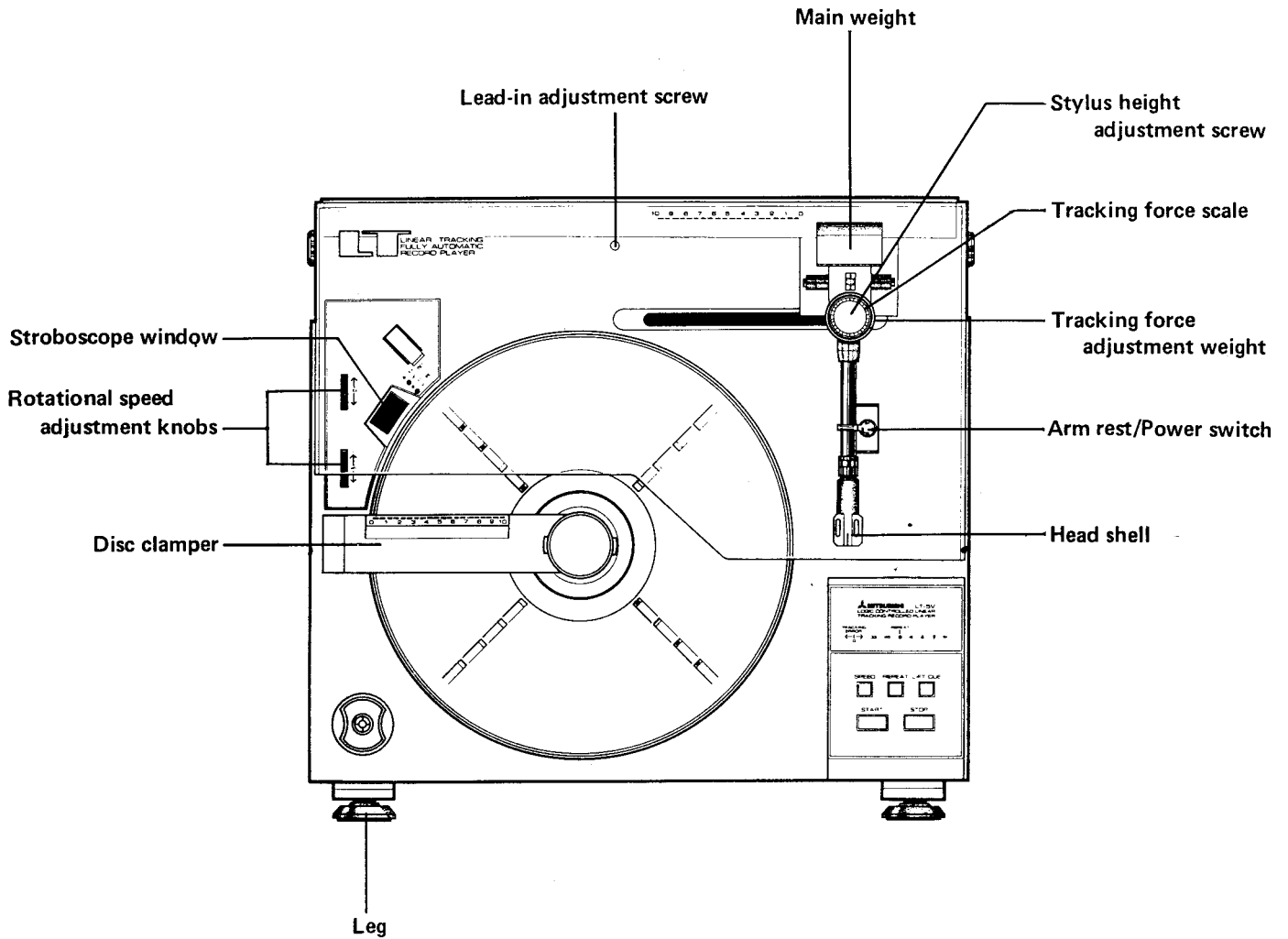## SERVICE MANUAL

LINEAR TRACKING TURNTABLE
MODEL LT-5V

CONTENTS

▲ MITSUBISHI ELECTRIC CORPORATION

NAMES OF PARTS

Main weight

Lead-in adjustment screw

Stylus height adjustment screw

LINEAR TRACKING
FULLY AUTOMATIC
RECORD PLAYER

Tracking force scale

Stroboscope window

Tracking force adjustment weight

Rotational speed adjustment knobs

Arm rest/Power switch

Disc clamper

Head shell

Leg

Tracking error indicator

Tonearm movement indicators

REPEAT button and indicator

SPEED reset button and indicators

LIFT/CUE button

START button

STOP button

MITSUBISHI   LT-5V
LOGIC CONTROLLED LINEAR
TRACKING RECORD PLAYER

SPECIFICATIONS

1. PHONO MOTOR SECTION

Drive system		Belt drive
Motor		PLL DC servo motor
Platter	Size	30.4 cm (12")
	Weight	1.3 kg (2.9 lb)
	Material	Aluminum diecast
Platter speed		33-1/3, 45 r.p.m.
	Selection	Automatic
	Adjustment	±3.0 %
Wow and Flutter		±0.045 % (Wrms)
Signal to noise ratio		65 dB (IEC-B)
		76 dB (DIN-B)

2. TONEARM SECTION

Type	Straight universal type, static balanced
Overall length	22.3 cm (8-3/4")
Effective length	18.0 cm (7-1/12")
Overhang	14 mm (9/16")
Tracking error	±0.1°
Head shell	GFRP (6.2 g)

3. CARTRIDGE SECTION

|	
Model	AT-12E (Audio Technica)
Type	Dual moving magnet
Stylus	0.4 x 0.7 mil elliptical diamond
Recommended traking force	1.5 g
Output level	
(1kHz, 5 cm/sec)	3.5 mV
Frequency responce	15 ~ 26.000 Hz
Channel separation (1 kHz)	23 dB

4. GENERAL

Power consumption	14 W
Dimensions (W x H x D)	466 x 430 x 200 mm
	(18-3/8 x 16-15/16 x 7-7/8")
Weight	12.5 kg (27.5 lb)

Design and specifications are subject to change without notice for improvement.

GENERAL ADJUSTMENTS

1. **Tracking Force Adjustment**
(1) Attach the cartridge (mounted on head shell) to the tonearm.
(2) Adjust the tonearm for zero balance by rotating the tracking force adjustment weight. Zero balance is achieved when the tonearm stays just clear of the armrest and remains suspended vertically.
(3) Rotate the tracking force scale so that the 0 mark points upwards. While turning the dial, hold the tracking force adjustment weight so as not to disturb its position.
(4) Rotate the tracking force adjustment weight until the indication on the scale matches the tracking force recommended for the cartridge in use. By turning the weight counter-clockwise, it is pushed out and the tracking force increases.

Tracking force adjustment weight
Tracking force scale
Tracking force adjustment weight
Arm rest/Power switch
Zero balance is achieved when tonearm floats just clear of armrest.
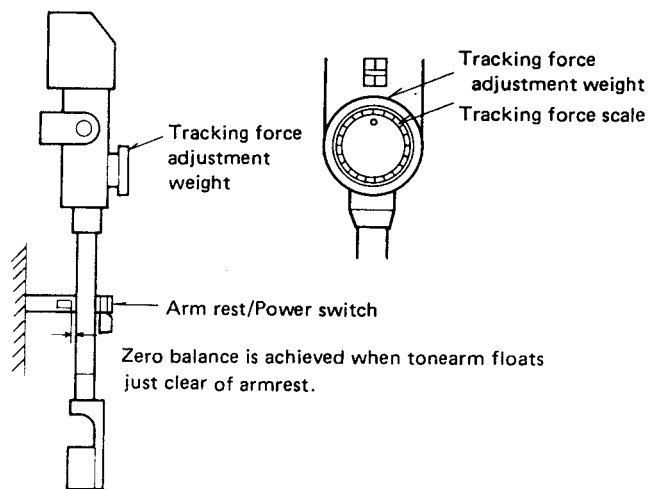
2. **Stylus Height Adjustment**
(1) Remove the main weight by pulling it upwards.
(2) Remove the tracking force adjustment weight by turning it counter-clockwise.
(3) Turn the power ON and move the tonearm to the UP position with the LIFT/CUE button.
(4) Hold the overhang gauge vertically to the turntable base and adjust the stylus height. The adjustment screw is located in the opening for the tracking force adjustment weight. Turning it clockwise increases the stylus height.


Base
Overhang gauge
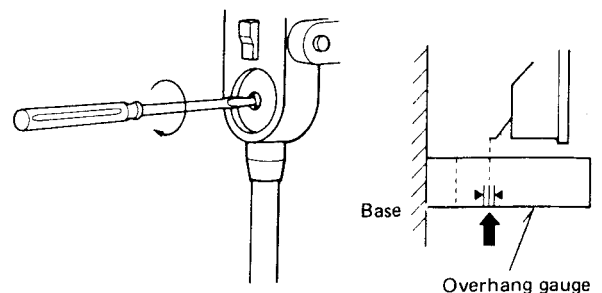
3. Adjustment of Lead-in Position

In case the stylus does not correctly descend in the lead-in groove of a record, perform the following adjustment.

(1) Make sure that the turntable is positioned horizontally. Place a 30cm record on the platter and check to which side the stylus is off position.

(2) Adjust the lead-in position gradually by turning the lead-in adjustment screw.

(3) After having performed the adjustment for a 30cm record, repeat the same adjustment with a 17cm record.

Note: If the stylus sets down outside of the turntable, or the lead-in position is set too far inward, the automatic end-of-play shut-off may become inoperative.

Lead-in adjustment screw

Screwdriver
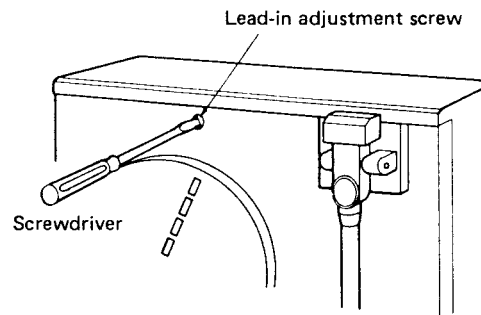
CIRCUIT DESCRIPTION

1. Start Switch ON

When the start switch S106 becomes ON, L is fed into pin 9 (START) of IC102, and because pin 21 (↑) goes L, Q120 turns OFF, Q121 becomes ON, and Q122 turns OFF. Because pin 22 (↓) is H, Q117 becomes ON, Q118 OFF, and Q119 ON. This starts the vertical motion motor and the tonearm is lifted up. Also, as Q120 goes OFF, H is fed to the base of Q204, causing Q203 to turn ON and LA207 (↑) to illuminate. (Signal flow shown by blue ➡ on schematic diagram.)

2. Tonearm Elevation Stop

As the CAM/UP switch S102 is switched to NO (Normally open), L is applied to pin 4 (UP) of IC102, the vertical motion motor stops and the elevation of the tonearm ceases.

3. Horizontal Tonearm Movement (Inwards)

As pin 23 (←) of IC102 becomes L, Q109 turns OFF, Q111 ON, and Q112 OFF. Because 22 (→) is H, Q113 becomes ON, Q115 OFF, and Q116 ON, causing the horizontal motion motor to operate and move the tonearm inwards. Also, as Q109 turns OFF, Q201 turns ON and LA204 (←) illuminates. (Signal flow shown by blue ▷ on schematic diagram.)

4. Record Size Detection (30cm Record)

When a 30cm record is placed on the turntable, the size detector Q101 receives no light and turns OFF. Thus Q103 goes OFF, and H is fed to pin 12 and pin 13 of IC101, causing L to be outputed from pin 11. L is placed on pin 15 (SIZE) of IC102, (Shown by blue ▶ on schematic diagram.) Because Q105 turns ON, the position light source LA101 goes on and the position light receiving photo diode D101 receives light. Thus H is imposed on the base of Q107 and it turns ON.

5. Tonearm Lowering

As pin 1 (S-LEAD-IN) of IC102 changes from H→L, pin 21 (↓) changes from H→L, and Q117 turns OFF, Q118 ON and Q119 OFF. At that time, because pin 20 (↑) is H, Q120 is ON, Q121 OFF and Q122 ON. This causes the horizontal movement of the tonearm to stop and the tonearm to start lowering. Also, because Q117 is OFF, Q203 turns ON and LA206 (↓) illuminates. (Shown by red ➡ on schematic diagram.)

6. Tonearm Lowering Stop

First the CAM/UP switch S102 switches from NO to NC (Normally closed) and pin 4 (UP) of IC102 becomes H, then the CAM/DOWN switch S103 switches from NC to NO and the vertical motion motor stops. The tonearm now rests on the record.

7. Operation of Tracking Servo Circuit

When S102 and S103 are switched as described in Step 6, pins 1 and 2 of IC102 become H, causing pin 3 to become L, and H is outputed at pin 4. Thus Q137 turns ON, causing the relay RL102 to switch to tracking servo. However, as the stylus of the cartridge follows the record groove, the tonearm is tilted inwards. This tilt causes the light interruption board to shut off the light from LA104, reducing the voltage from D107 and causing pin 2 of IC 103 to become L and pin 1 to become H. Thus pin 7 of IC103 becomes H, Q129 and Q130 go OFF, Q131 turns ON, and Q132 OFF. On the other hand, the light from LA105 is increased and the voltage from D108 increases accordingly, imposing H on pin 2 of IC104 and causing pin 1 to become L. Then, because pin 7 of IC104 goes L, Q133 and Q134 turn ON, Q135 turns OFF, and Q136 ON. When Q132 turned OFF, H was inputed into pin 3 of IC201, causing pin 1 to become H, Q205 to turn ON and LA201 (←) to illuminate. In this

way, the voltage difference between D107 and D108 is amplified, operating the horizontal motion motor and moving the tonearm inwards. When the tonearm becomes exactly vertical again, the voltages from D107 and D108 are equal and the motor stops. When the tonearm is again tilted by the movement of the stylus, the above process is repeated, and so forth until the tonearm has reached the end groove of the record. (Shown by blue ⇨ on schematic diagram.)

8. End Detection (Tonearm Lift)

When the tonearm moves to the end groove of a record, D103 receives the END light and produces a voltage, causing Q108 to turn ON and L to be fed to pin 2 (END) of IC102. First, pin 20 (↑) of IC102 becomes H, causing Q120 to turn OFF, Q121 to turn ON, and Q122 to turn OFF. Because pin 21 (↓) of IC 102 is H at this time, it causes Q117 to turn ON, Q118 to turn OFF, and Q119 to turn ON. Thereby, the vertical motion motor starts to operate and the tonearm is lifted up. (Indicator lamps are the same as in Step 1. Signal flow shown by red ▷ on schematic diagram.)

9. Tracking Servo Circuit Release

When the tonearm moves upwards and the CAM/DOWN switch S103 switches to NC, pin 2 of IC101 goes L, and because pin 1 is H, pin 3 becomes H and pin 4 becomes L.

Thus Q137 turns OFF and the solenoid RL 102 switches from tracking servo to normal.

10. Tonearm Elevation Stop

Same as in Step 2.

11. Horizontal Tonearm Movement (Outwards)

When the toneam reaches the upper limit pin 22 (→) of IC102 goes L, causing Q113 to go OFF, and Q116 to go OFF. At this time, because pin 23 (←) is H, Q109 becomes ON, Q111 OFF, and Q112 ON. Also, because Q202 is ON when Q113 is OFF, LA205 (→) illuminates. Accordingly, the horizontal motion motor operates and the tonearm is moved outwards. (Signal flow shown by red ▶ on schematic diagram.)

12. Tonearm Movement Stop

When the tonearm moves horizontally and reaches the armrest position, the REST switch S101 switches from NC to NO, and L is fed into pin 3 of IC102. As the horizontal motion motor stops, the vertical motion motor starts operating, the CAM/UP switch S102 changes from NO to NC, and the tonearm is lowered. When it reaches the lower limit, the CAM/DOWN switch S103 switches to NO, and the tonearm stops on the arm rest. (Indicator lamps are the same as in Step 5. Signal flow shown by red ▷ on schematic diagram.)

INFORMATION ON LOGIC I.C. (IC102)

1. Circuit Construction
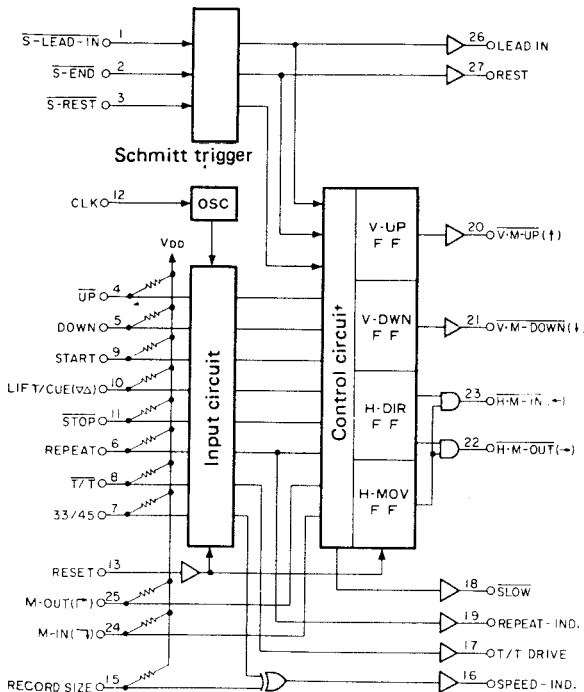
2. Pin and Function

1 (S-LEAD-IN): L when tonearm is on a record, otherwise H.

2 (S-END): Becomes L when tonearm is moving inwards on a record and reaches the end groove, otherwise H.

3 (S-REST): L when at armrest, otherwise H.

4 (UP): L when tonearm is being lifted or moving horizontally, otherwise H.

5 (DOWN): L when tonearm is at armrest or on a record, otherwise H.

6 (REPEAT): Ordinarily H. When L is fed into this pin, the tonearm continues the repeat operation. To release, feed in L once more or make 11 (STOP) L.

7 (33/45): Used when selecting platter speed manually. Making this pin L causes speed to change from 33-1/3 rpm to 45 rpm or vice versa.

9 (START), 10 (LIFT/CUE), 11 (STOP): When START becomes L, the tonearm moves inwards; when STOP becomes L, the tonearm moves outwards. When LIFT/CUE becomes L, the tonearm is lifted or lowered. Note that, while the tonearm is being lifted, making this pin L produces no change, but if L is fed in during the lowering process, it changes back to upwards.

12 (CLK): By connecting an external resistor/condensor combination to the input, a reference clock pulse is generated internally.

13 (RESET): A resistor/condensor combination is connected to the input. Immediately after switching on the power, the RESET input becomes L, blocking automatic movement of the tonearm.

14 (Vss): Connects to ground.

15 (RECORD SIZE): L indicates 30cm LP, H indicates 17cm EP.

16 (SPEED-IND): L indicates 33-1/3 rpm, H indicates 45 rpm. Can be changed freely by making 7 (33/45) L.

17 (T/T-DRIVE): When 9 (START) becomes L, this pin becomes H and the platter rotates. When record play is finished and the returns to arm rest position, this pin becomes L and platter rotation stops.

18 (SLOW): To move the tonearm horizontally while on a record, this output becomes L and the horizontal motion speed is low. At H level, the motion speed is high.

19 (REPEAT-IND): When 6 (REPEAT) is L in the repeat mode, this pin becomes L.

20 (V.M-UP), 21 (V.M-DOWN), 22 (H.M-OUT), 23 (H.M-IN): When the tonearm is at rest position or on a record and thus 5 (DOWN) is L, at first 20 (V.M-UP) becomes L and the tonearm moves up, causing 5 (DOWN) to become H. At that time 4 (UP) is L, and when the tonearm stops at the upper limit, the horizontal motion starts. When the tonearm moes inwards, 23 (H.M-IN) is L, when it moves outwards, 22 (H.M-OUT) is L. When the tonearm has moved to the pre-set horizontal position and is being lowered, 21 (V.M-DOWN) becomes L. Thus, of these 4 signals during tonearm movement, there is always one which becomes L, but never two or more simultaneously.

27 (REST): Same as output of 3 (S-REST).

28 (Vpp): Supply voltage INPUT.
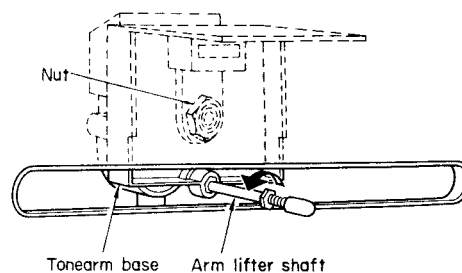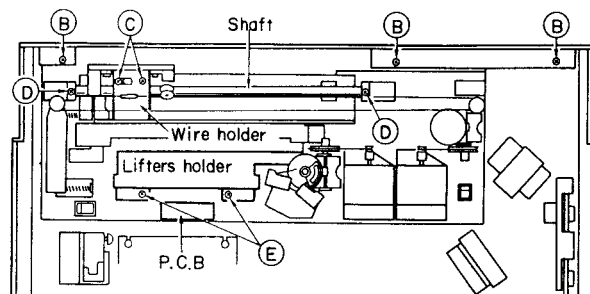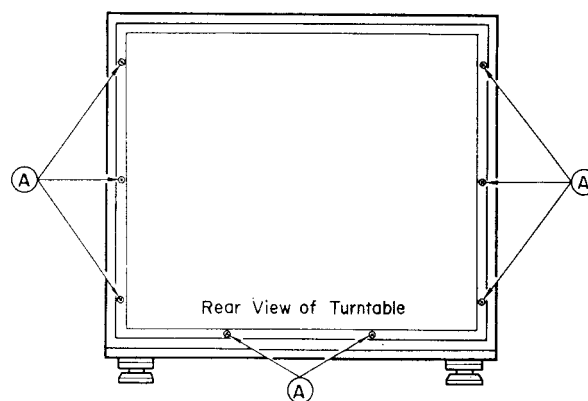
DISASSEMBLY INSTRUCTIONS

Removal of Rear Cover
(1) Remove the eight screws Ⓐ as shown in the figure.
(2) The rear cover can now be removed.

Removal of Turntable Platter
(1) Remove the rear cover as described above.
(2) Insert the supplied rod or a small hex wrench through the hole in the platter spindle. Using the rod as a lever turn the spindle in a clockwise direction. Remove the spindle.
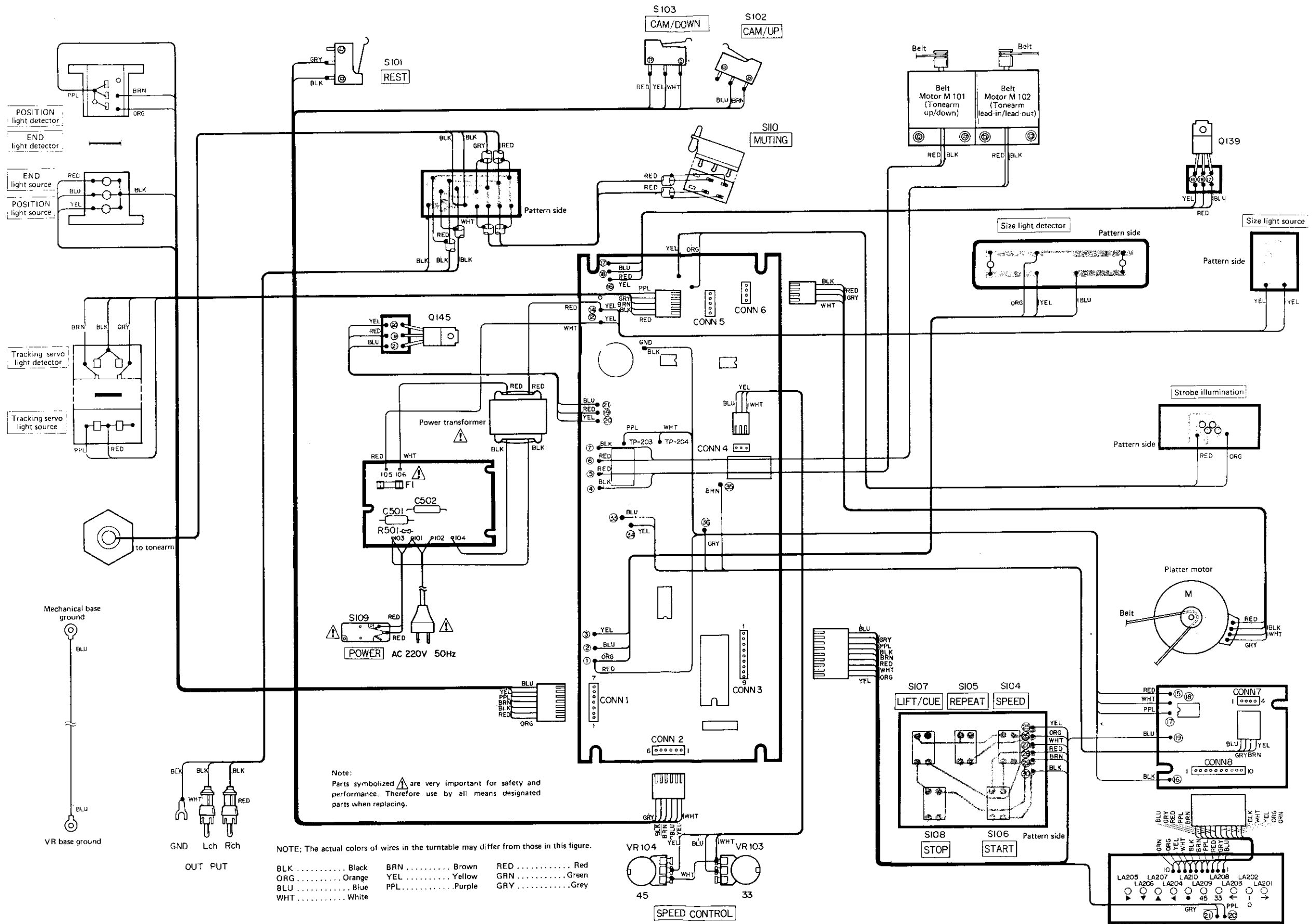(3) While holding the platter rotate the flyweel to loosen the platter. The platter can now be pulled off.

Removal of Tonearm
(1) Unscrew the three screws Ⓑ for the ornamental metal provided on the upper side and remove the metal. When removing the metal trim use care so as not to damage.
(2) Remove the two fixing screws Ⓒ for the wire holder.
(3) Losen the two fixing screws Ⓓ for the shaft and remove the shaft.
(4) Remove the two screws Ⓔ for the lifter's holder.
(5) Turn the arm lifter shaft attached to the tonearm base with a pair of pliers and remove the shaft.
(6) Now, the tonearm, together with the tonearm base, can be lifted upward and removed.
(7) Disconnect the output lead wires from the printed circuit board.
(8) Remove the nut securing the tonearm.
(9) In this condition, the tonearm can now be serviced.

Rear View of Turntable

Shaft
Wire holder
Lifters holder
P.C.B

Nut
Tonearm base   Arm lifter shaft

WIRING DIAGRAM

Note:
Parts symbolized ⚠ are very important for safety and performance. Therefore use by all means designated parts when replacing.

NOTE; The actual colors of wires in the turntable may differ from those in this figure.

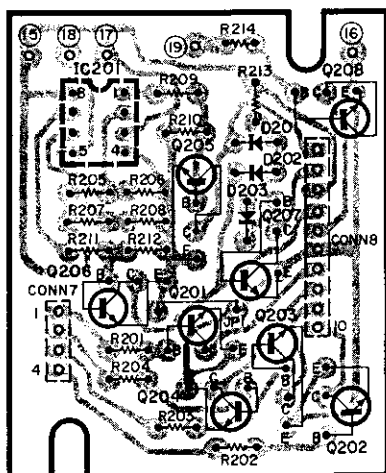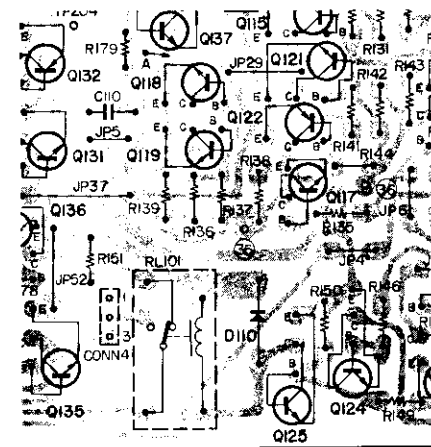|		
BLK .... Black	BRN .... Brown	RED .... Red
ORG .... Orange	YEL .... Yellow	GRN .... Green
BLU .... Blue	PPL .... Purple	GRY .... Grey
WHT .... White		

PRINTED CIRCUIT BOARDS
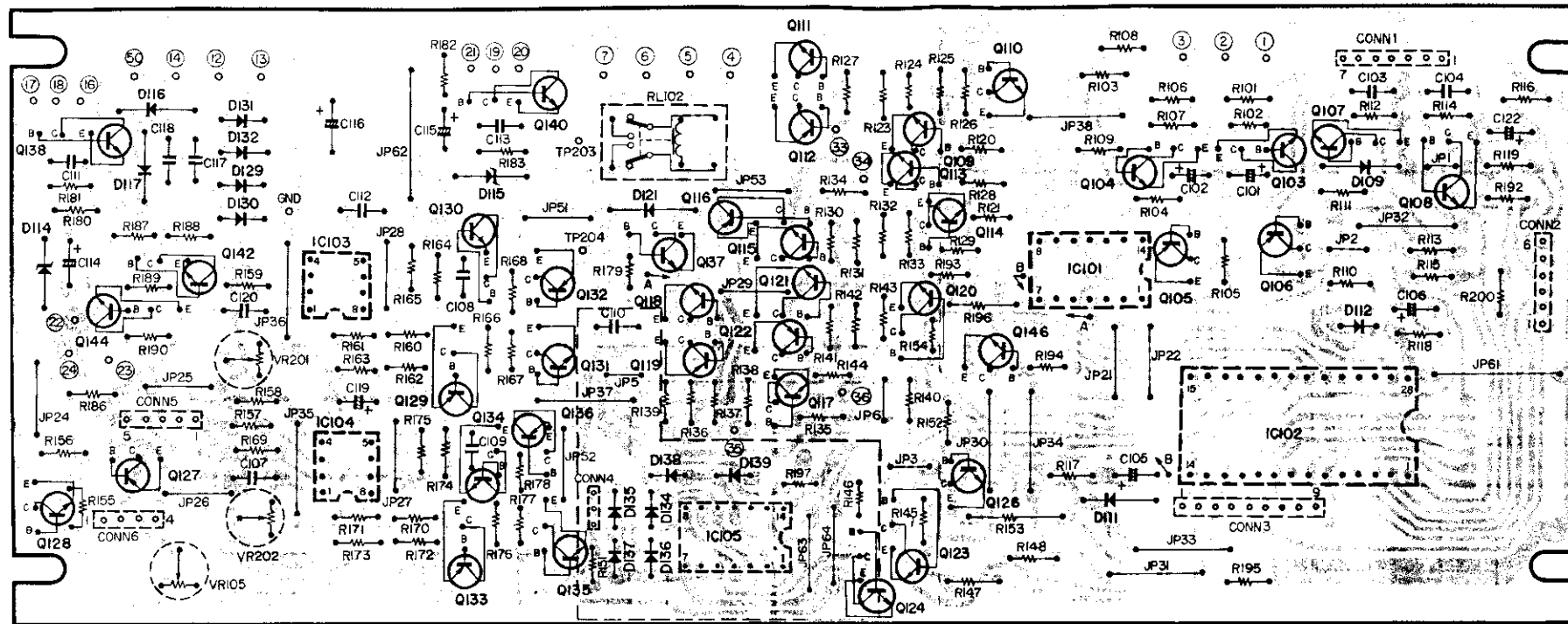
MAIN P.C. BOARD
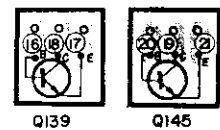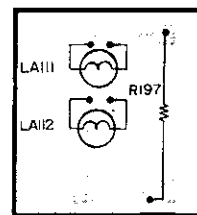
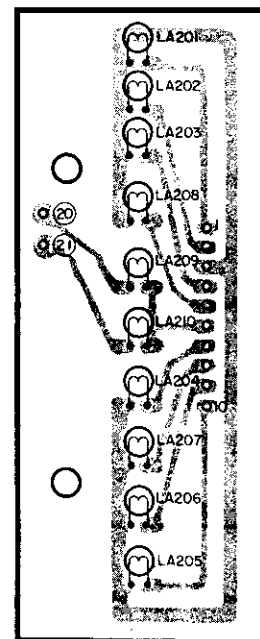CAUTION
for WEST GERMAN;
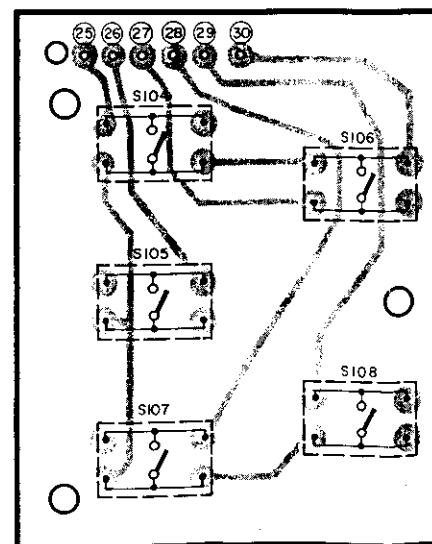
For the [____] marked section, a relay circuit
is used for sets with Serial Nos. up to 100,
while an IC circuit is used for sets upward
from 101.

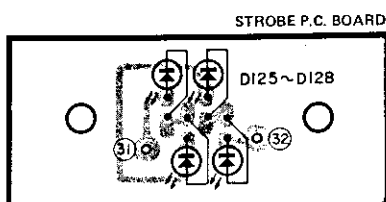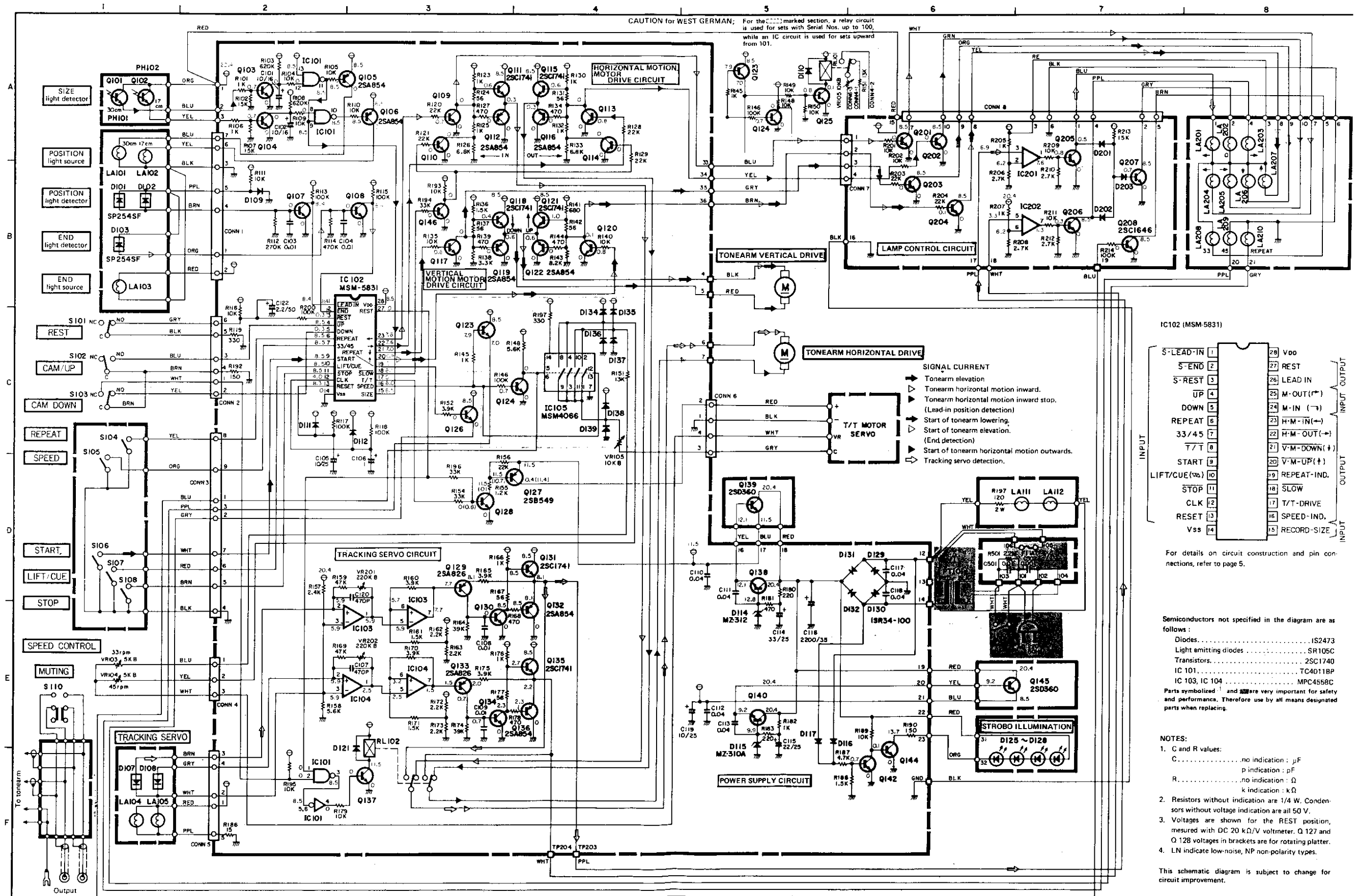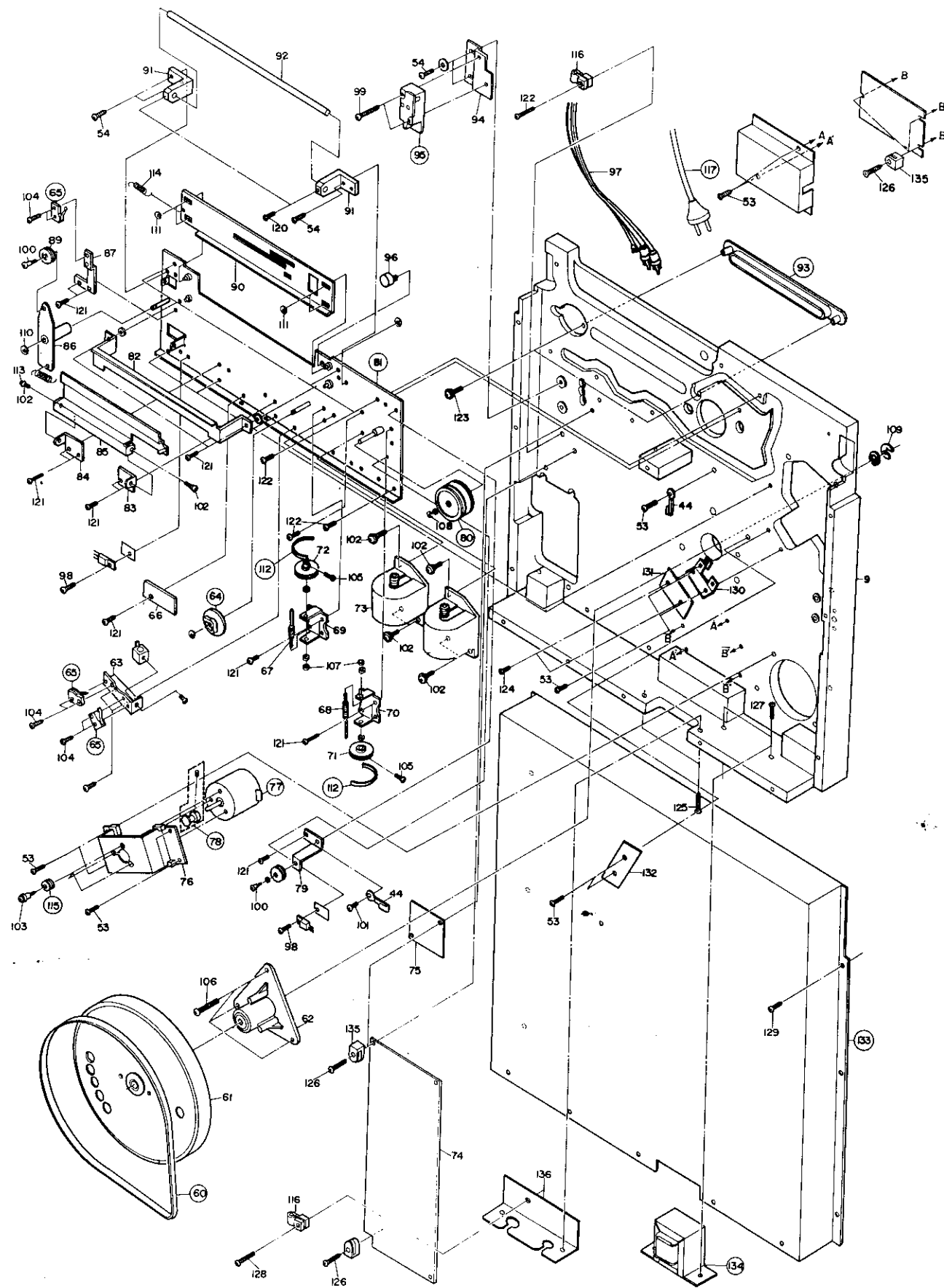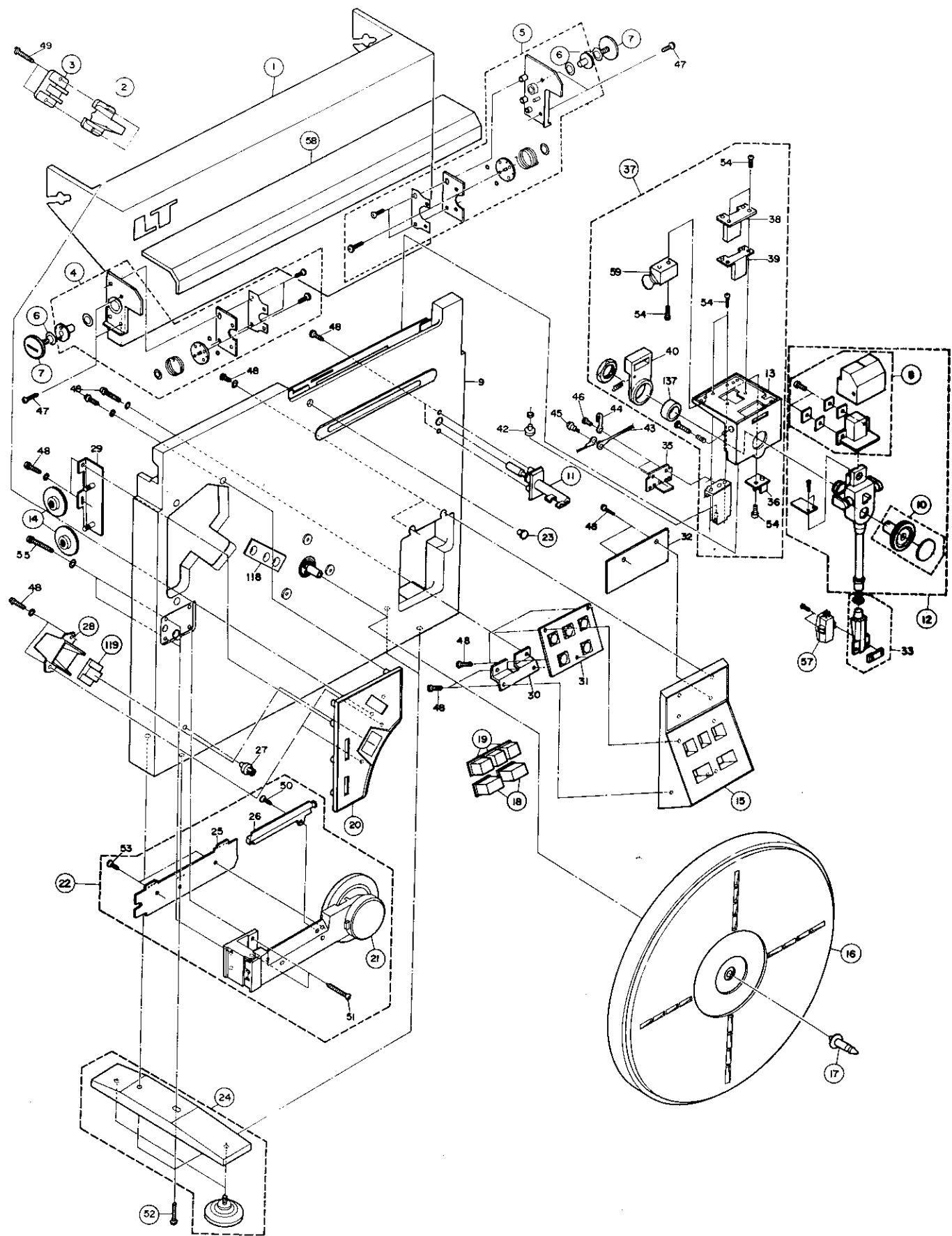LAMP CONTROL P.C. BOARD

STROBE P.C. BOARD

LAMP P.C. BOARD

SWITCH P.C. BOARD

SCHEMATIC DIAGRAM

LT-5V   LT-5V

EXPRODED VIEWS

PARTS LIST

NOTE: ⚠ and �▓ marked components on Parts list have special characteristics to keep safety performance of this unit. When replacing any of these parts, be sure to use only specified parts.

Symbol No.	Part No.	Description
1	M07445690	**Dust cover**
2	M07137605	**Reflector**
3		Holder
4	M07445772	**Hinge-assy (L)**
5	M07445773	**Hinge-assy (R)**
6	M07445747	**Spacer**
7	M07445777	**Screw-metal**
8		Weight-main
9		Base
10		Weight
11	M07445618	**Arm rest-assy**
12	U487B023G02	Tonearm
13	U580C047G03	Base-assy
14	U704D320H02	Knob (Speed control)
15	U703D147G02	Ornament-assy
16	U524D046G02	Platter-assy
17	M07445602	**Shaft (For platter)**
18	U704C076H01	Knob (Start, Stop)
19	U704C067H04	Knob (Speed, Repeat, Lift)
20	U703B035H04	Ornament
21	M07478720	**Holder-assy**
22	U541B003G04	Holder-assy
23	M07445786	**Cap**
24	M07478695	**Leg-assy**
25		Holder
26		Holder
27	U685D189H11	Pin
28	U561C053H01	Case (For strobo)
29		Holder
30		Holder
31		PCB-assy
32		PCB-assy
33	M07478734	**Head shell-assy**
34		Holder
35		Holder
36		Slider
37	U580C047G03	Base-assy (For tonearm)
38		Slider
39		Holder
40		Holder
41		Spacer
42		Pulley
43	M07478686	**Wire**
44		Clamper
45		Screw-metal M3
46		Screw-Bind M3 x 5
47		Tapping-screw 3.1 x 13
48		Tapping-screw 1-3 x 10
49		P-tapping-screw 2-3 x 16
50		Tapping-screw 1-3 x 8
51		Screw-bind M3 x 20
52		Screw-metal M4 x 14
53		Tapping-screw 1-3 x 12
54		Screw-bind M3 x 8
55		Screw-metal 2-3 x 20
56		Screw-metal M3 x 20
57	M07296760	**Cartridge AT-12E**
58	U713B064H05	Ornament
59		Slider
60	M04162629	**Belt (For flywheel)**

Symbol No.	Part No.	Description
61	U524D049G01	Fly-wheel-assy
62		Bearing
63		Holder
64	M07478645	**Gear**
65	M07297450	**Sw-micro**
66		PCB-assy
67		Gear
68		Gear
69		Holder
70		Holder
71		Pulley
72		Pulley
73	M07478638	**Motor (For vertical)**
74		PCB-assy
75		PCB-assy
76		Holder
77	M04162638	**Motor (For platter)**
78	M07445621	**Pulley-assy**
79		Holder
80	M07445645	**Gear**
81		Base
82		Holder
83		Holder
84		Holder
85		Holder
86		Holder
87		Holder
88	M07297639	**Motor (Horizontal)**
89		Pulley
90		Slit plate
91		Holder
92		Shaft
93	U703C088H02	Ornament
94		Holder
95	M07179660	**Sw-micro (Power)** ⚠
96		Pin
97	M07478680	**Lead (Output)**
98		Screw pc M3 x 6
99		Screw-bind M3 x 14
100		Screw M2.6 x 8
101		Screw-bind M3 x 10
102		Screw M3 x 8
103		Screw M2.6 x 8
104		Screw M2 x 10
105		Screw M2 x 6
106		Screw M4 x 20
107		E-ring 1.5
108		E-ring 2.0
109		E-ring 8.0
110		E-ring 4
111		E-ring 2.5
112	M04162628	**Belt**
113		Spring
114		Spring
115		Cushion-gum
116		Clamper
117	M07459440	**Power cord** ⚠
118	U621D050H01	Shade
119	U564D026H02	Cover (For strobo)
120		Screw-bind M3 x 4

Symbol No.	Part No.	Description
121		Screw-bind M3 x 6
122		Tapping-screw 1-3 x 16
123		Tapping-screw 2-3 x 8
124		Screw-metal 3 x 5
125		Screw metal M3 x 20
126		Screw bind-p 3 x 20
127		Screw-metal 4 x 20
128		Screw-bind M3 x 6
129		
130		Holder
131		PCB-assy
132		PCB-assy
133	U564D067G01	Cabinet-back
134	M07479549	Trans-power △※
135		Holder
136		Holder
		Packing
201	U800B093H03	Packing box
202	U831C036H15	Packing bag
203	U813A060H05	Cushion-mold
204	U813A060H04	Cushion-mold
205	U803D585H01	Cushion
	M07445603	Adaptor

Symbol No.	Part No.	Description
		Diodes
D101	M07297320	SP254FS
D102	M07297320	SP254FS
D103	M08297320	SP254FS
D107	M07297320	SP254FS
D108	M07297320	SP254FS
D109	M07060320	1S2473
D110	M07060320	1S2473
D111	M07060320	1S2473
D112	M07060320	1S2473
D114	M07394320	MZ312
D115	M07171322	MZ310
D116	M07060320	1S2473
D117	M07060320	1S2473
D121	M07060320	1S2473
D125	M07297321	SR105C
D126	M07297321	SR105C
D127	M07297321	SR105C
D128	M07297321	SR105C
D129	M07391320	1SR34-100
D130	M07391320	1SR34-100
D131	M07391320	1SR34-100
D132	M07391320	1SR34-100
D134	M07060320	1S2473
D135	M07060320	1S2473
D136	M07060320	1S2473
D137	M07060320	1S2473
D138	M07060320	1S2473
D139	M07060320	1S2473
D201	M07060320	1S2473
D202	M07060320	1S2473
D203	M07060320	1S2473
		ICs
IC101	M07297343	TC-4011BP
IC102	M07437343	MSM-5831RS
IC103	M07370343	μPC-4558C
IC104	M07370343	μPC-4558C
IC105	M07445343	MSM-4066
IC201	M07370343	μPC-4558C
IC202	M07370343	μPC-4558C
		Transistors
Q101	M07137303	PH101
Q102	M07137303	PH101
Q103	M05104313	2SC1740
Q104	M05104313	2SC1740
Q105	M07137308	2SA854
Q106	M07137308	2SA854
Q107	M05104313	2SC1740
Q108	M05104313	2SC1740
Q109	M05104313	2SC1740
Q110	M05104313	2SC1740
Q111	M07137307	2SC1741
Q112	M07137308	2SA854
Q113	M05104313	2SC1740
Q114	M05104313	2SC1740
Q115	M07137307	2SC1741
Q116	M07137308	2SA854
Q117	M05104313	2SC1740
Q118	M07137307	2SC1741

Symbol No.	Part No.	Description
Q119	M07137308	2SA854
Q120	M05104313	2SC1740
Q121	M07137307	2SC1741
Q122	M07137308	2SA854
Q123	M05104313	2SC1740
Q124	M05104313	2SC1740
Q125	M05104313	2SC1740
Q126	M05104313	2SC1740
Q127	M07230307	2SB549
Q128	M05104313	2SC1740
Q129	M07137306	2SA826
Q130	M05104313	2SC1740
Q131	M07137307	2SC1741
Q132	M07137308	2SA854
Q133	M07137306	2SA826
Q134	M05104313	2SC1740
Q135	M07137307	2SC1741
Q136	M07137308	2SA854
Q137	M05104313	2SC1740
Q138	M05104313	2SC1740
Q139	M05079311	2SD360
Q140	M05104313	2SC1740
Q142	M05104313	2SC1740
Q144	M05104313	2SC1740
Q145	M05079311	2SD360
Q201	M05104313	2SC1740
Q202	M05104313	2SC1740
Q203	M05104313	2SC1740
Q204	M05104313	2SC1740
Q205	M05104313	2SC1740
Q206	M05104313	2SC1740
Q207	M05104313	2SC1740
Q208	M05104313	2SC1646
Electrical parts		
LA101	M07374251	Lamp (Position light source)
LA102	M07374251	Lamp (Position light source)
LA103	M07374251	Lamp (End light source)
LA104	M07374251	Lamp (Tracking servo light source)
LA105	M07374251	Lamp (Tracking servo light source)
LA111	M07297250	Lamp (Refractor light source)
LA112	M07297250	Lamp (Refractor light source)
LA201	M07374251	Lamp (Tracking indicator)
LA202	M07374251	Lamp (Tracking indicator)
LA203	M07374251	Lamp (Tracking indicator)
LA204	M07374251	Lamp (Lead-in indicator)
LA205	M07374251	Lamp (Lead-out indicator)
LA206	M07374251	Lamp (Tonearm down indicator)
LA207	M07374251	Lamp (Tonearm up indicator)
LA208	M07374251	Lamp (33 speed indicator)
LA209	M07374251	Lamp (45 speed indicator)
LA210	M07374251	Lamp (Repeat indicator)
PT101	M07479549	Power transformer ⚠
RL101	M07374460	Relay
RL102	M07215465	Relay (Tracking servo select)
F1	M07352490	Fuse-1A-SEMKO ⚠

Symbol No.	Part No.	Description
S101	M07297450	Micro switch (Rest)
S102	M07297450	Micro switch (Cam/Up)
S103	M07297450	Micro switch (Cam/Down)
S104	M07445660	Push switch (Repeat)
S105	M07445660	Push switch (Speed)
S106	M07445660	Push switch (Start)
S107	M07445660	Push switch (Lift/Cue)
S108	M07445660	Push switch (Stop)
S109	M07459660	Micro switch (Power) ⚠
S110	M07445661	Slide switch (Muting)
VR103	M07445435	Variable resistor (5KΩ-B, Speed fine adj.)
VR104	M07445435	Variable resistor (5KΩ-B, Speed fine adj.)

PACKING CHART

TIE

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