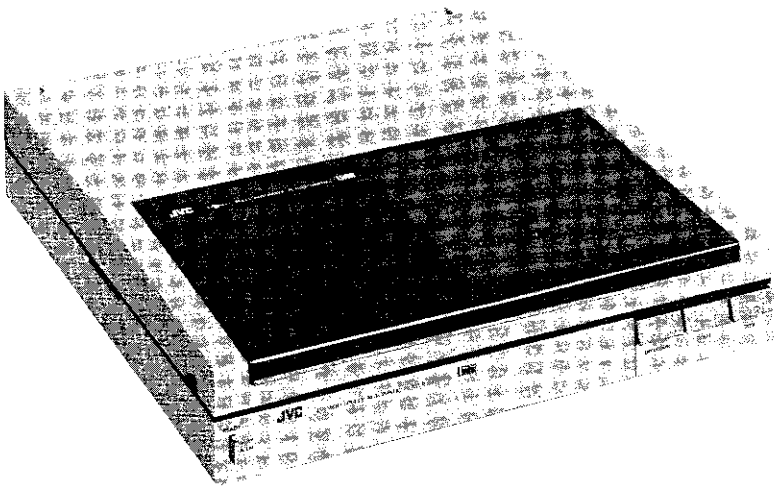
JVC

SERVICE MANUAL

MODEL L-E600

LINEAR TRACKING
FULLY AUTOMATIC
TURNTABLE



No. 2586
Nov. 1981

Contents

1. Specifications

Motor Section

Motor	: DC type, FG servomotor
Drive system	: Belt drive
Speeds	: 33-1/3 rpm, 45 rpm
Wow and flutter	: 0.08 % (DIN), 0.06 % (WRMS)
Signal-to-noise ratio	: More than 60 dB (DIN-B)

Tonearm Section

Type	: Linear tracking statically balanced low mass arm
Effective length	: 102 mm
Tracking error	: 0.3°

Cartridge Section

Model	: MD-1038L (USA, Canada only) MD-1041 (others)
Type	: Low mass type, dual magnet (USA, Canada only), induced magnet (others)
Frequency response	: 20 Hz – 20,000 Hz
Output	: 2.4 mV (1,000 Hz)
Channel separation	: 20 dB (1,000 Hz) (Test record TRS-1)
Load resistance	: 47 kΩ
Stylus tip	: 0.6 mil diamond
Stylus	: DT-38 (USA, Canada only), DT-41 (others)
Optimum tracking force	: 2.0 g (USA, Canada only), 2.5 g (others)

General

Power source	: See below.
Power consumption	: See below.
Dimensions	: 8.7 cm (H) x 34 (or 34.4) cm (W) x 35 cm (D) (Since the dimensions are only the design figures, additional space will be required when installing the unit in a rack, etc.)
Weight	: 4.5 kg (10.0 lbs) (without corrugated cardboard case)

Accessory
EP adaptor 1

Design and specifications subject to change without notice.

Power specifications

Countries	Line Voltage & Frequency	Power Consumption
U.S.A., CANADA	AC 120 V∿, 60 Hz	12 watts
EUROPEAN CONTINENT	AC 220 V∿, 50 Hz	12 watts
U.K., AUSTRALIA	AC 240 V∿, 50 Hz	12 watts
U.S. MILITARY MARKET	AC 110 ~ 120/220 ~ 240 V∿ Selectable, 50/60 Hz	12 watts
OTHER AREAS	AC 110 ~ 120/220 ~ 240 V∿ Selectable, 50/60 Hz	12 watts

2. Names of Controls and Their Functions

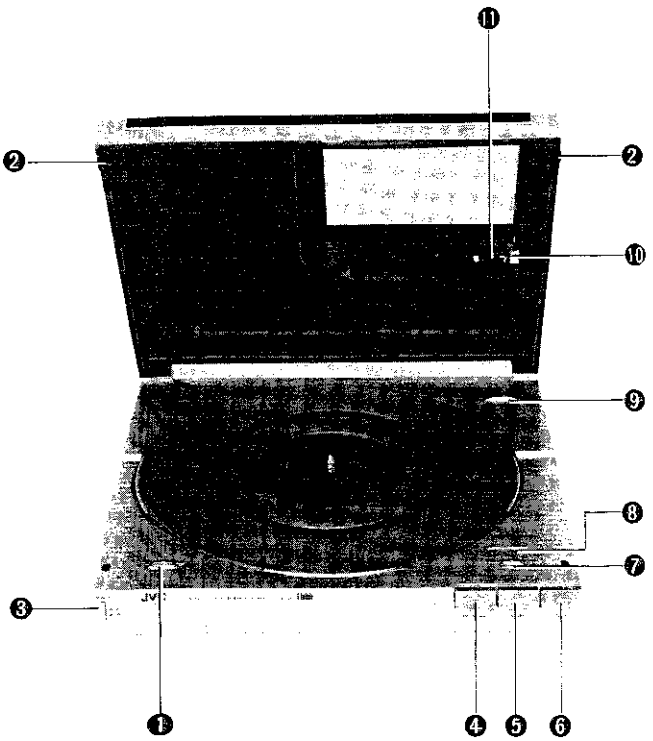


Fig. 1

1. **SPEED SELECT button**
   Select the turntable speed as required.
2. **Lock buttons**
   Press these buttons to open the cover.
   Note:
   If the cover is opened during playback of a record, playback will stop and the tonearm will automatically return to the rest position.
3. **READY switch**
   ON (▬): Press to IN position to turn on the power. The AUTO indicator will light.
   OFF (▭): Press again to set to OUT position to switch the power off.
   Note:
   - When the cover is opened, playback will not start even if the READY button is set to ON.
   - Even when the READY switch is off, this turntable consumes a small amount of electricity. This is to return the tonearm to the rest position when the READY switch is set to OFF or the cover is opened during playback. If you are not going to use the turntable for a long time, disconnect the power cord from the wall socket.
4. **UP/DOWN button**
   If this button is pressed during playback, the tonearm is raised and the MANUAL indicator will light to show that manual playback is being employed.
   When manual playback is used, press this button to lower the tonearm after moving the tonearm using the "◄" (START) and "►" (STOP) buttons.
   At the same time that the tonearm is lowered, the AUTO indicator lights to show that automatic playback is being employed. If this button is pressed when the tonearm is raised, the tonearm will be lowered; if it is pressed when the tonearm is lowered, the tonearm will be raised. It can be used to raise the tonearm to pause during the manual or automatic playback of a record.
5. **START button (◄)**
   Press this button to start automatic playback. For manual playback, hold this button pressed. When holding this button pressed, the tonearm will start to move and the indicator will change from AUTO to MANUAL; release this button at the desired position. The tonearm will stop at that position; now press the UP/DOWN button to start playback.
   If this button is pressed during playback, the tonearm will move to the left automatically (←) and return to the rest position; if the UP/DOWN button is pressed while the tonearm is moving, playback will start at that position. This allows it to be used for the playback of any tune (music scanning).
6. **STOP button (►)**
   If this button is pressed during playback, the tonearm will move to the right (→) automatically and when it reaches the rest position, the tonearm indicator will go out and the turntable will stop.
   If the UP/DOWN button is pressed while the tonearm is moving, playback will start again at that position, so this can be used for music scanning. When the tonearm stops in the up position (manual playback) the tonearm will move to the right (→) while this button is pressed.
7. **SIZE SELECT button**
   Used for automatic selection of the position where the tonearm will descend and where playback will end according to the record.
8. **MANUAL, AUTO indicator**
   Indicates manual playback when the MANUAL indicator lights, and automatic playback when the AUTO indicator lights.
9. **EP adaptor**
   Place the adaptor on the center spindle when playing an EP with a large center hole.
10. **Tonearm indicator**
    This indicator lights when the START button is pressed and during the playback showing the position of the stylus.
11. **Clamp**
    Move this clamp to the right (↷) to release the tonearm lock. If the tonearm is locked, playback is impossible. If the clamp is moved to the left (↶), the tonearm will be locked in the up position. Used in this position when transporting the turntable.

3. Service Precautions

3-(1) For safety

1. When replacing the parts marked with ⚠ , be sure to use the designated parts to ensure safety.
2. A solderless connector is used in connection between the power cord and the primary lead wires of the power transformer.
   When replacing the power transformer, when the connector must be replaced unavoidably, be sure to confirm that the solderless connection is properly made.
3. When replacing the power cord, confirm that the new power cord is not disconnected even when pulled in every direction.

3-(2) In disassembly

1. When repairing or checking the tonearm for desirable action, remove the mechanism cover.
   In this case, refer to "Troubleshooting" on pages 16-20.
2. When replacing or removing the tonearm, the motor or any other mechanism component, be sure to check and adjust the lead-in position, the tracking error sensitivity, etc.
3. Do not apply a lubricant to the engaging section of the drive and worm gears.
4. Do not apply a lubricant to the arm rail on which the tonearm moves. In addition, since a lubricant (Shin'etsu silicone G-331) is used in the pickup damper, be careful not to attach it to the arm rail when replacing.
5. When remounting the mechanism cover, check each wire for connection and at the same time pay special attention to the wire arrangement to protect the tonearm from abnormal action. In addition, set the length of each arm signal wire up to the clamping (taping) position of the sensor board at 100 ± 5 mm.
6. When remounting the surface cover upon completion of servicing, confirm that the cover lock mechanism is positively working with the cover closed.

3-(3) Operation check after servicing

1. When only turning ON the POWER switch with the surface cover closed, the platter and tonearm should both not move.
2. Even when pressing the STOP (S104) or UP/DOWN (S105) switch from the situation of item 1, the mechanism should not operate.
3. With the SIZE select switch (S102) set to "30", when pressing the START switch (S103) from the situation of item 1, the tonearm should move inwards, the LED (D601) at the cartridge's tip light and the turntable rotate. In addition, the tonearm should pause for about 2 sec before being led in.
4. While pressing the START switch with the SIZE select switch set to "17" from the situation of item 3, when the tonearm passes through the "17" lead-in position, the green LED (D108) should go out and the red LED (D109) light.
   When stopping pressing the START switch, the tonearm should stop action.
5. When pressing the UP/DOWN switch from the situation of item 4, the tonearm should lower down, the red LED go out and green LED light.
6. Upon play under the situation of item 5, the tonearm should follow the groove normally.
7. When opening the surface cover or turning OFF the POWER switch from the situation of item 6, the tonearm should return to its rest and the turntable stop rotation.

4. Main Parts Location

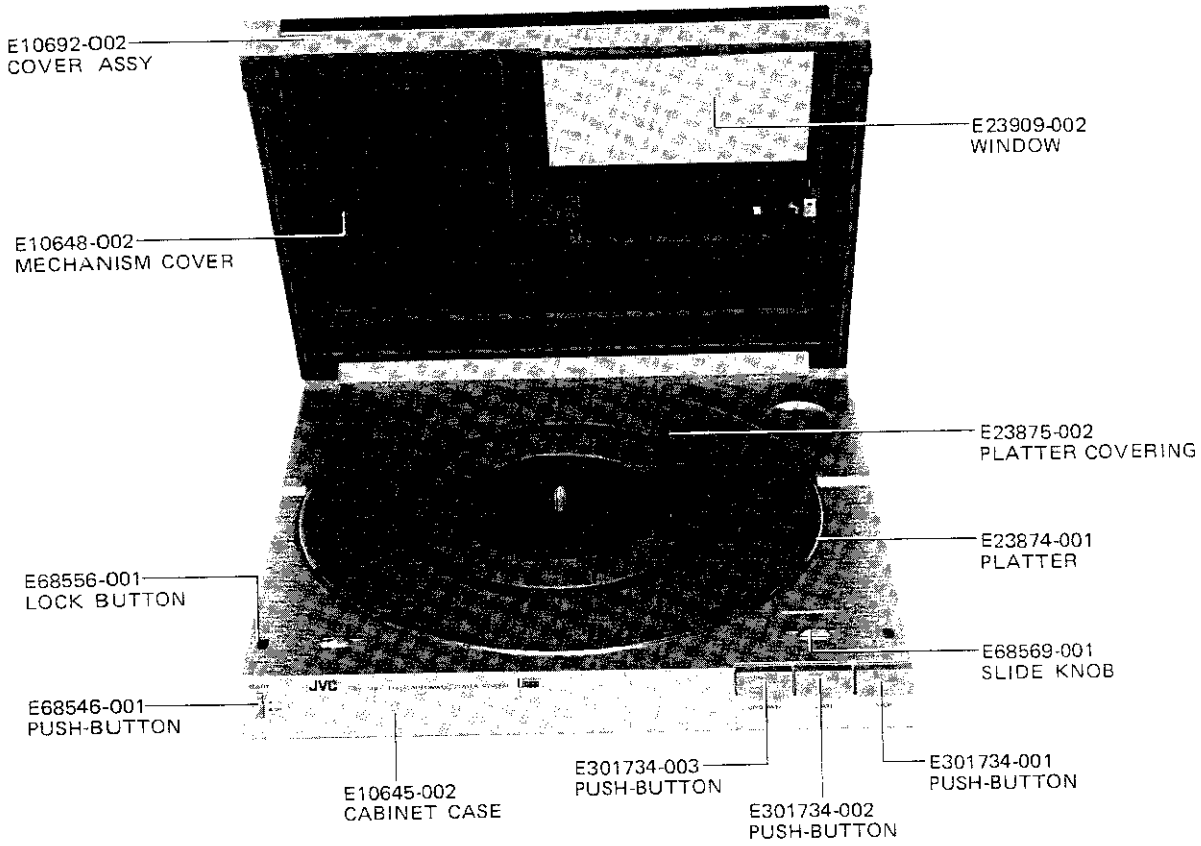


Fig. 2

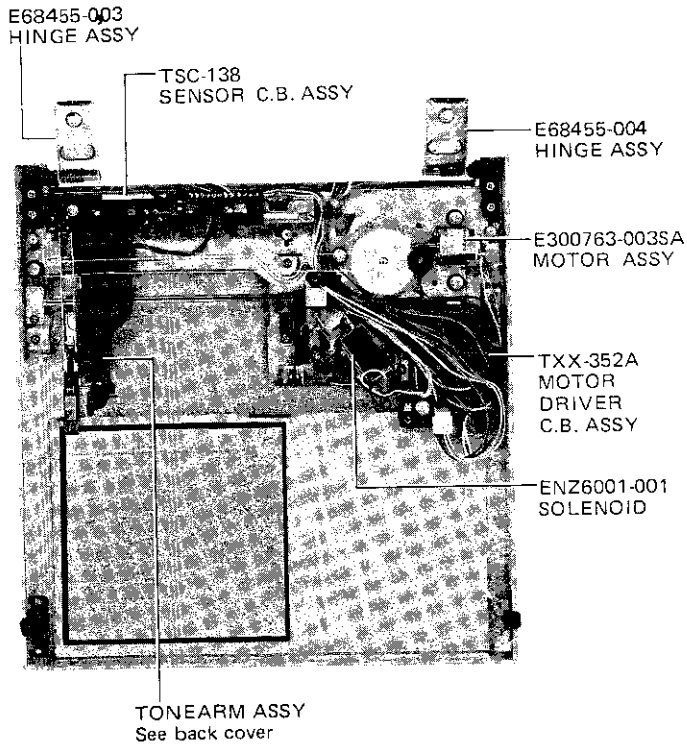


Fig. 3

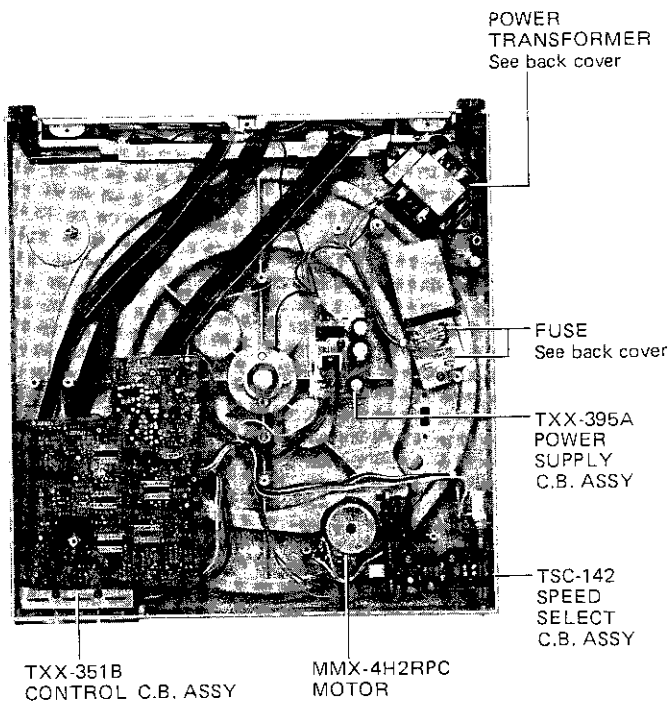


Fig. 4

5. Removal Procedures

5-(1) Removal of surface cover (Fig. 5)

1. Remove the rear cover.
2. Remove the respective securing screws ① - ④ of the right and left hinges.
   Note:
   Since these hinges use a strong spring, unscrew each group of screws depressing the hinge.
3. Remove the connection wires from sockets ⑤-⑧.
4. Remove the surface cover with screwdriver as pushing it out backwards (to the rear side).
   Note:
   After remounting the surface cover, confirm that the cover lock mechanism is positively working with the cover closed.

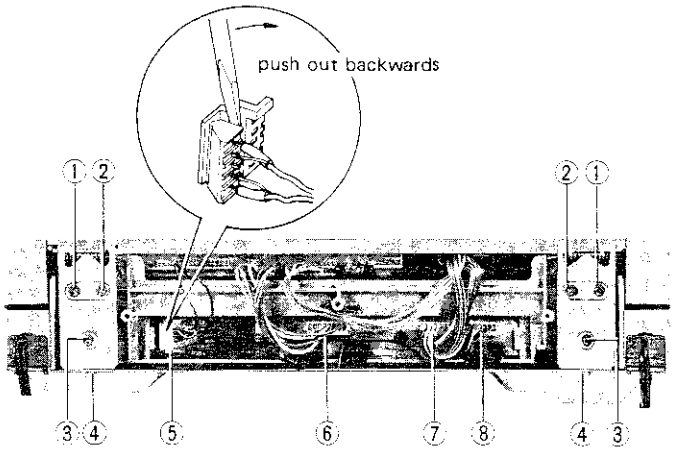


Fig. 5

5-(2) Removal of mechanism cover (Fig. 6)

1. Move the tonearm to its start position.
2. Remove the securing black screws ① - ⑨ of the mechanism cover.

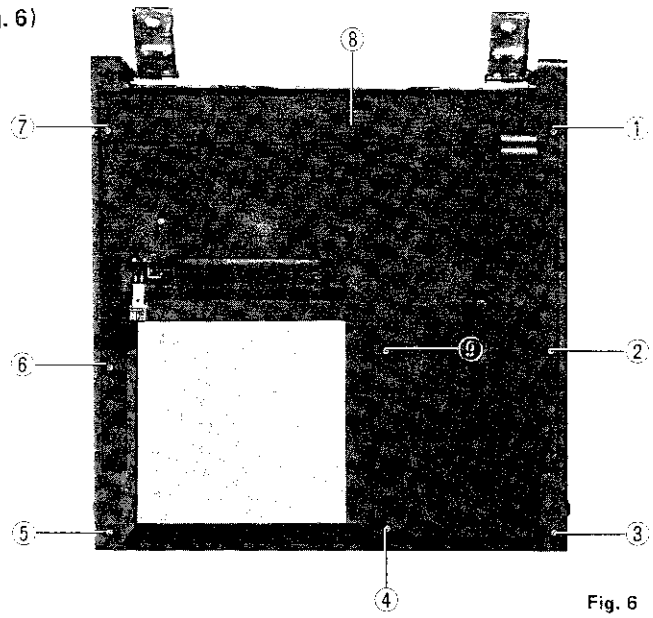


Fig. 6

5-(3) Removal of mechanism base ass'y (Fig. 7)

1. Remove the securing screws ① - ④ of the right and left hinges.
2. Remove securing screws ⑤ - ⑦, then take out the mechanism cover.

5-(4) Removal of tonearm ass'y (Fig. 7)

1. Remove carrier rope ⑧ from roller ⑨.
2. Remove shaft bracket ⑩, then take the tonearm off the shaft (arm rail).
   Note:
   When remounting tonearm ass'y, confirm that the shutter and guide pins are at right angles with the side of the tonearm.

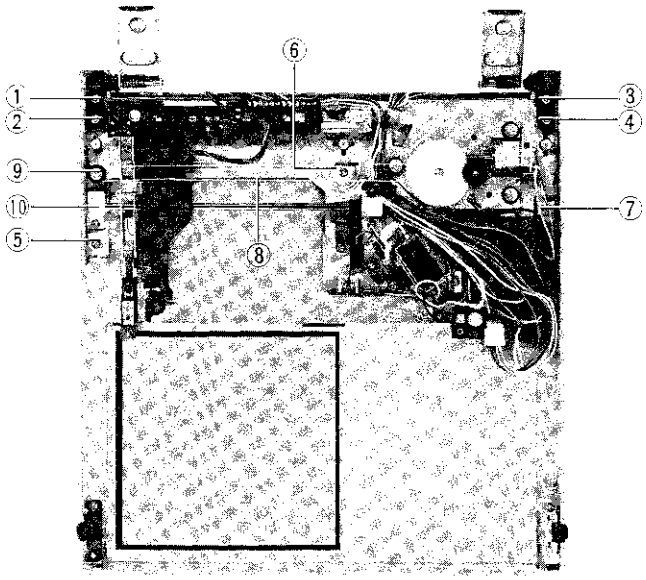


Fig. 7

5-(5) Replacement of cartridge (Fig. 8)

1. Remove the stylus.
2. Remove lead wires ①.
3. Remove the securing screw ② of the headshell.
4. Remove screw ③, then replace the cartridge.

Note:
While paying attention to the lead wires for disconnection after replacement, securely tighten screw ② to secure the headshell.

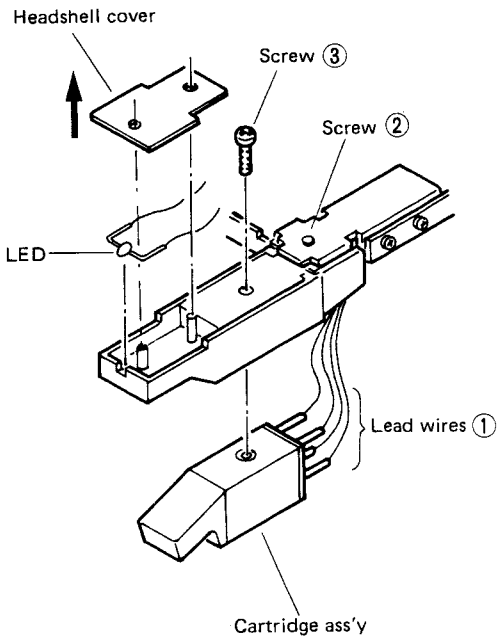


Fig. 8

5-(6) Replacement of PLAY indicator (LED) (Fig. 8)

1. Remove the headshell cover by pushing it up in the direction of an arrow, then replace the indicator.

Notes:
1. Do not apply stress to the base of the LED.
2. Use a soldering iron of less than 20 W.
3. Soldering time must be less than 2 sec.
4. Secure the headshell cover with the screw lock.

5-(7) Stringing of sensor wire (Fig. 9)

1. When replacing the carrier base, positively string the sensor wire as shown.

Note:
Since this sensor wire acts as the output of +B, unplug the power cord when replacing.

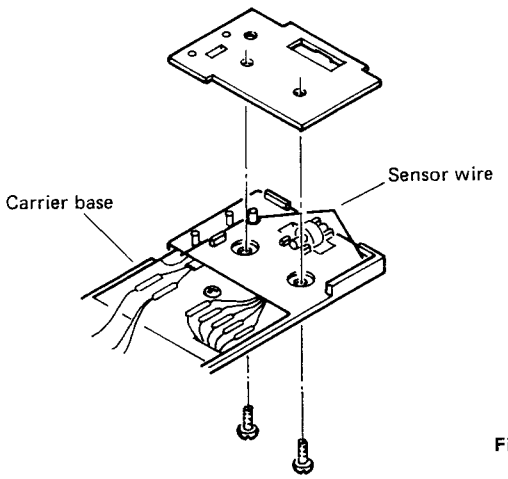


Fig. 9

5-(8) Replacement of spindle shaft (Fig. 10)

1. Remove securing screws ①, then take it out.

Note:
Screw ② is used to secure the plate. When removing this plate mistakenly, confirm that the lubricant (Anderole 732) does not leak.

Part Number	Description
EBS0008-001	Anderole 732

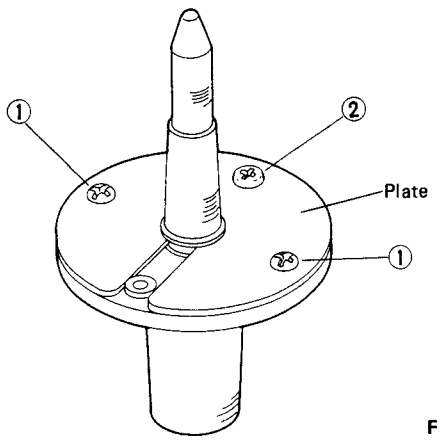


Fig. 10

6. Alignment Procedures

6-(1) Motor RPM adjustment (Fig. 11)

Remove the turntable covering, then adjust it by a VR shown. Turning clockwise permits increased RPM, while turning counterclockwise permits decreased RPM.

45rpm : VR401

33rpm : VR402

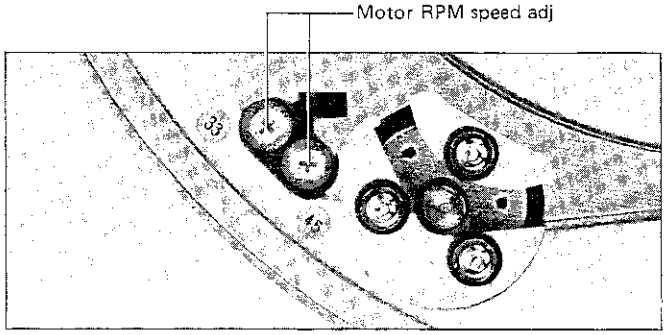


Fig. 11

6-(2) Lead-in adjustment (Fig. 12)

Adjust it with a VR shown. Turning clockwise causes the position to shift outwards, while turning counterclockwise causes it to shift inwards.

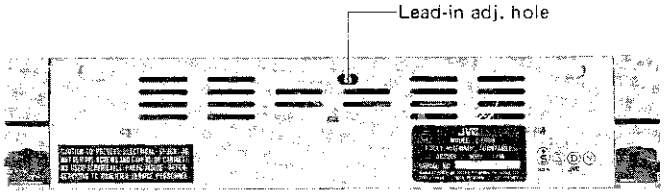


Fig. 12

6-(3) Tonearm following sensitivity adjustment (Fig. 13)

With the tonearm at the UP position, adjust it with VR201 shown. The output voltage should be 3.5 ± 0.2 V between (1) and (2) of test point (P203). (Adjust the output to this voltage at a lapse of more than 3 minutes after power ON.)

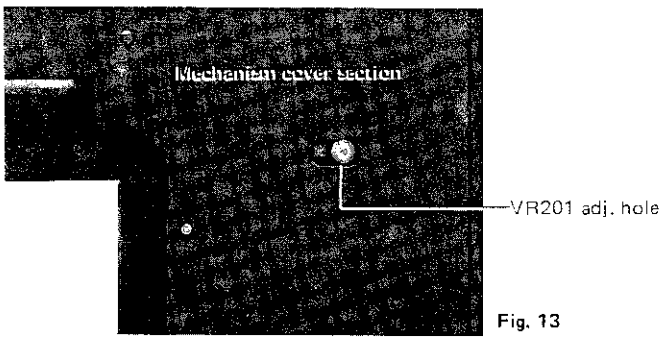


Fig. 13

7. Carrier Rope Stringing Procedure

When setting the tonearm ass'y to the right end, string the carrier rope so that the spring is located above screw Ⓐ shown in Fig. 14.
Length of rope: 529 mm (between knots)

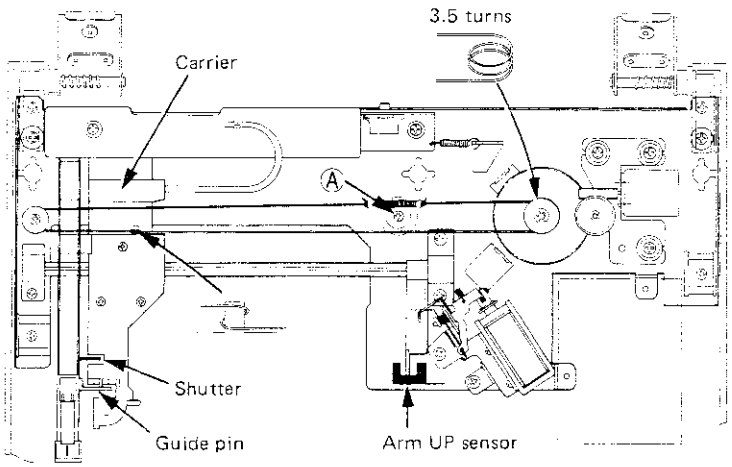


Fig. 14

8. Connection Diagram

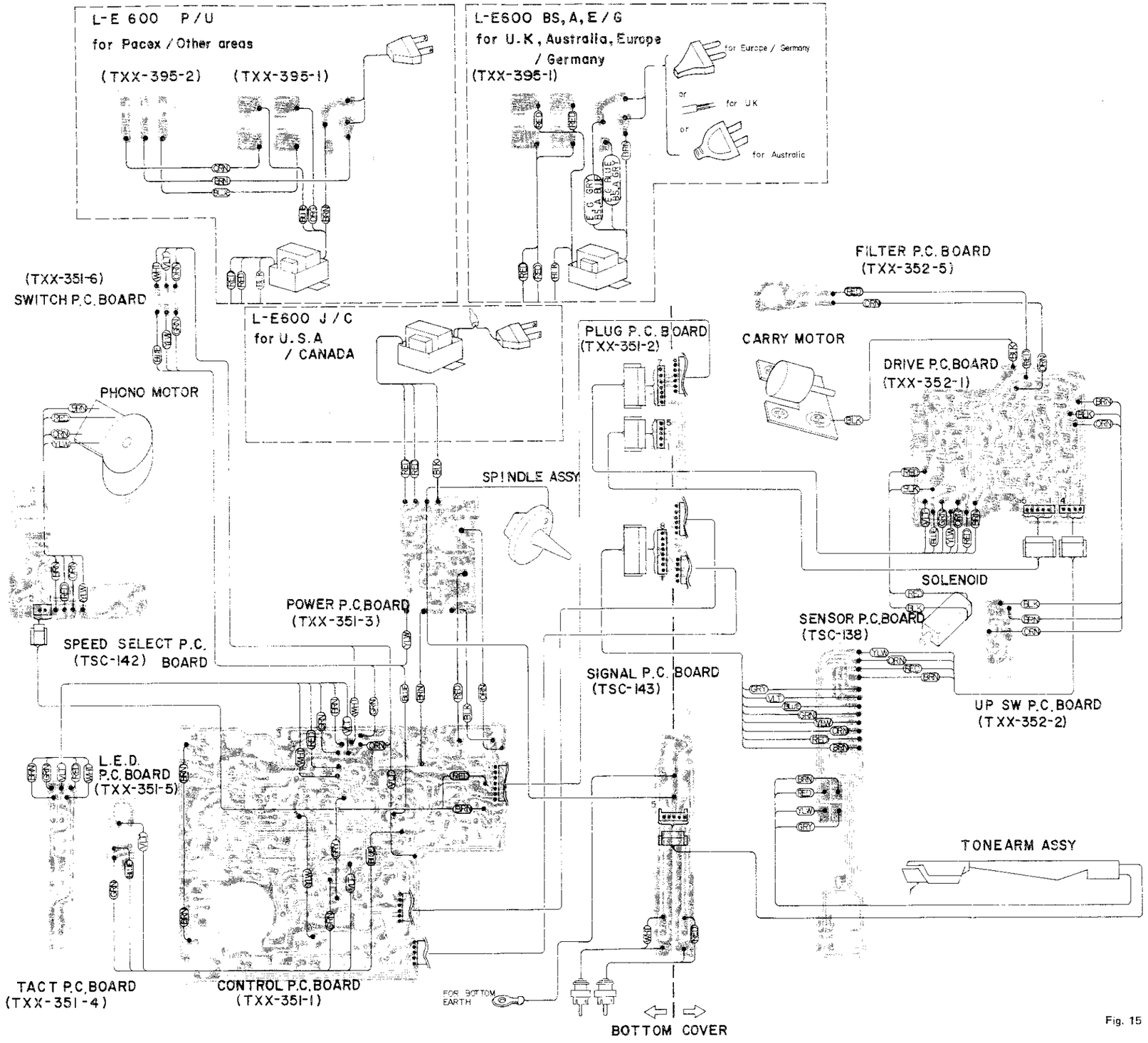


Fig. 15

9. Exploded Views and Parts List

9-(1) Mechanism ass'y

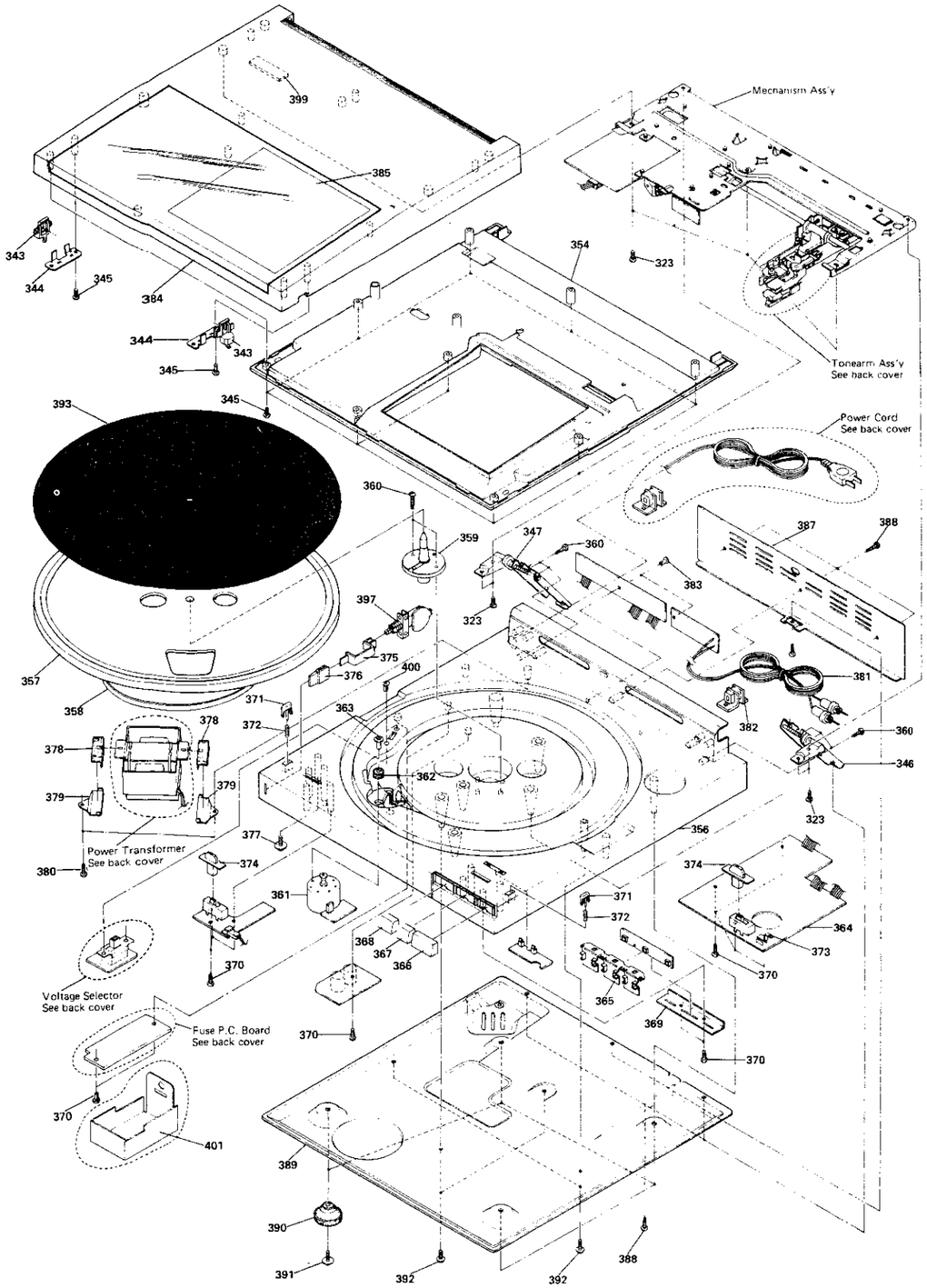


Fig. 16

9-(2) Mechanism base ass'y

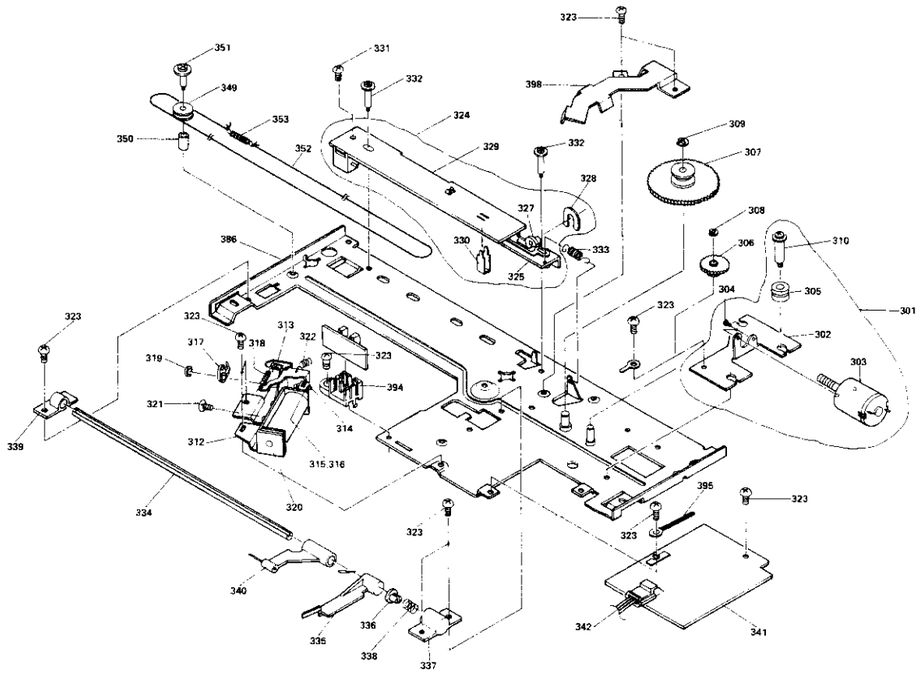


Fig. 17

9-(3) Tonearm ass'y

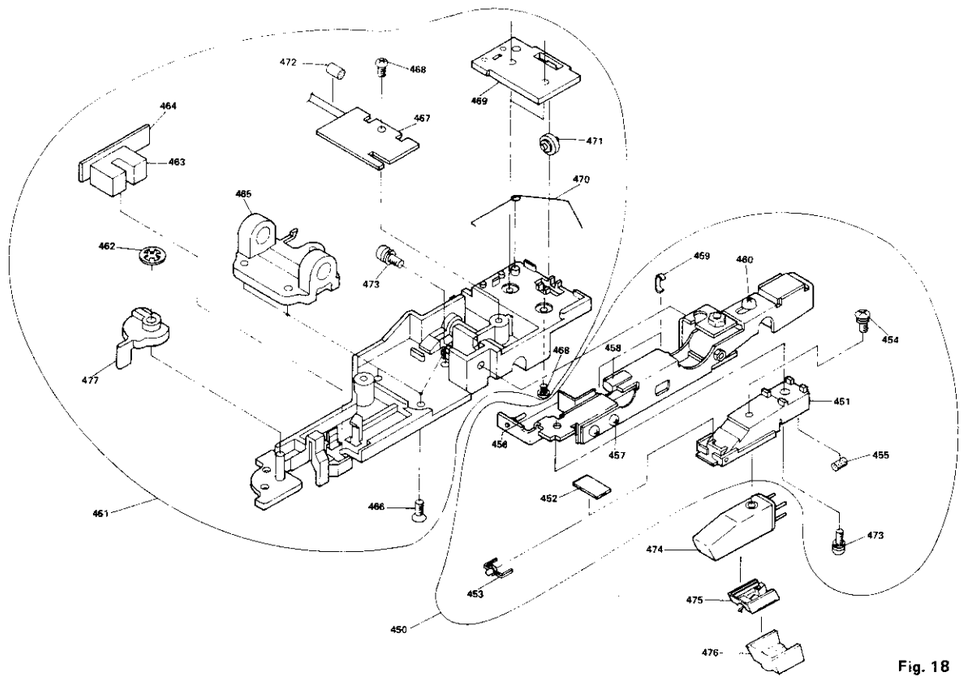


Fig. 18

9-(4) Parts list

Item No.	Part Number	Description	Q'ty	Remarks
301	E68961-001	Motor Bkt Unit	1	
302	E68960-001	Motor Bracket	1	
303	E300763-003SA	Motor Assy	1	With Worm
304	SPSP2003Z	Screw	2	
305	E68465-001	Bushing	3	
306	E68463-001	F, Gear	1	
307	E68464-001	Gear	1	
308	REE2000	E Ring	1	
309	REE3000	E Ring	1	
310	E66042-003	Special Screw	3	
311	E68953-001	Lifter Assy	1	
312	E68952-001	Lifter Bkt Assy	1	
313	E68663-001	Lifter	1	
314	E68605-002	Stud	1	
315	REE2000	E Ring	1	
316	Q03093-814	Washer	2	
317	E69280-001	Lift Arm	1	
318	E301777-009	Tension Spring	1	
319	E60912-003	Speed Nut	1	
320	ENZ6001-001	Solenoid	1	
321	SSSP2604Z	Screw	2	
322	E301777-005	Tension Spring	1	Lift Assy
323	E65119-001	Special Screw	9	
324	E301923-001	Sensor Unit	1	
325	E301686-001	Sensor Base Assy	1	
326	E301687-001	Sensor Base	1	
327	E60435-002	Adjustor	1	
328	52514	Spring Washer	1	
329	TSC-138	Sensor C, B Assy	1	
330	E68576-001	Touch Plate	1	
331	SBSB3008Z	Screw	1	
332	E68469-001	Special Screw	2	
333	E301777-006	Tension Spring	1	
334	E68466-001	Shaft	1	Arm Rail
335	E68664-001	Link	1	
336	E68666-002	Brake Pad	1	
337	E68665-001	Bearing	1	
338	E66722-010	Spring	1	
339	E68468-001	Bracket	1	
340	E68575-001	Shifter	1	
341	TXX-352A	Motor D, C, B, Assy	1	
342	EWS01Z-017	Socket Wire Assy	1	
343	E68556-001	Lock Button	2	
344	E68578-002	Spring Plate	2	
345	SBSF3010M	Screw	2	
346	E68455-003	Hinge Assy (R)	1	
347	E68455-004	Hinge Assy (L)	1	
348	—	—		
349	E45020-001	Roller	1	
350	E68467-001	Tube Spacer	1	
351	E68469-001	Special Screw	1	
352	E32757-019	Dial Rope	1	
353	E301777-003	Tension Spring	1	
354	E10648-002	Mecha Cover	1	
355	—	—		
356	E10645-002	Cabinet Case	1	
357	E23874-001	Platter	1	
358	Y30273-001	Belt	1	
359	E68445-002	Spindle Assy	1	
360	SBSF3012Z	Screw	8	
361	MMX-4H2RPC	Motor	1	
362	E43372-001	Rubber Bushing	3	Motor
363	E66042-004	Special Screw	3	
364	TXX-351B	Control C, B Assy	1	
365	E301733-001	Button Hinge	1	
366	E301734-001	Push Button	1	Stop
367	E301734-002	Push Button	1	Start
368	E301734-003	Push Button	1	Up/Down
369	E68550-001	Bracket	1	
370	SBSF3010Z	Screw	2	

Item No.	Part Number	Description	Q'ty	Remarks
371	E68570-001	Cap	2	
372	E66722-006	Spring	2	
373	E68956-002	Spring Lever	1	
374	E68569-001	Slide Knob	2	
375	E68568-001	Push Shaft	1	
376	E68546-001	Push Button	1	Power SW.
377	E65923-001	Screw	1	
378	E68566-001	Trans. Cushion	2	
379	E68565-001	Lock Bracket	2	
380	GBSF3010Z	Screw	2	
381	E03697-006	Signal Cord	1	
382	A37897	Cord Clamp	1	
383	E48729-003	Prastic Rivet	2	
384	E10692-002	Cover Assy	1	
385	E23909-002	Window	1	
386	E24047-002	Base Assy	1	
387	E301735-002	Rear Cover	1	
388	SBSF3010N	Screw	3	
389	E10646-002	Bottom Cover	1	
390	E301318-00A	Foot Assy	2	For Frant
	E301318-008	Foot Assy	2	For Rear
391	E65923-002	Screw	4	
392	GBSF3010Z	Screw	4	Bottom
393	E23875-002	Platter Covering	1	
394	E68755-002	Sensor Holder	1	
395	E47203-003	Wire Clamp	1	
396	E50670-005	Wire Clamp	1	
397	QSP2210-401	Push Switch	1	
398	E69275-001	Clamp Bracket	1	
399	E3400-338	Spacer	1	
400	SSSP3010Z	Screw	2	
401	See back cover	Barrier	1	
450	See back cover	Arm Assy	1	
451	See back cover	Headshell	1	
452	See back cover	Headshell Cover	1	
453	SR506D	Diode	1	D601 (8-2485-1)
454	LPSP2604Z	Screw	1	
455	EC0132-1	Clamp Rubber	1	
456	EC82489-1	Shutter	1	
457	SPSP2003Z	Screw	4	
458	EC82490-1	Shifter Cap	1	
459	EC82497-1	Lead Clamp	2	
460	SBSB2604Z	Screw	1	
461	EC82482-1	Carry Base Assy	1	
462	RDS3000M	C.S. Ring	1	
463	ON1128	Photo Interrupter	1	D602, Q601 Pair
464	EC82501-1	Circuit Board (A)	1	
465	EC82502-1	Carry Arm	1	
466	SSSB3006Z	T, Screw	3	
467	EC82503-1	Circuit Board (B)	1	
468	SBSB2606Z	T, Screw	3	
469	EC82504-1	Sensor Holder	1	
470	EC82505-1	Sensor Wire	1	
471	EC82506-1	Carry Roller	1	
472	EC0132-5	Clamp Rubber	1	
473	LPSP3006Z	Screw	1	
474	See back cover	Cartridge	1	
475	See back cover	Stylus	1	
476	See back cover	Stylus Cover	1	
477	EC82499-1	Lock Lever	1	

Note:
Bkt = Bracket
C.B. Ass'y = Circuit Board Ass'y
Trans. = Transformer.

10. Printed Circuit Board Assemblies and Parts Lists

10-(1) TXX-351B logic control P.C. board ass'y

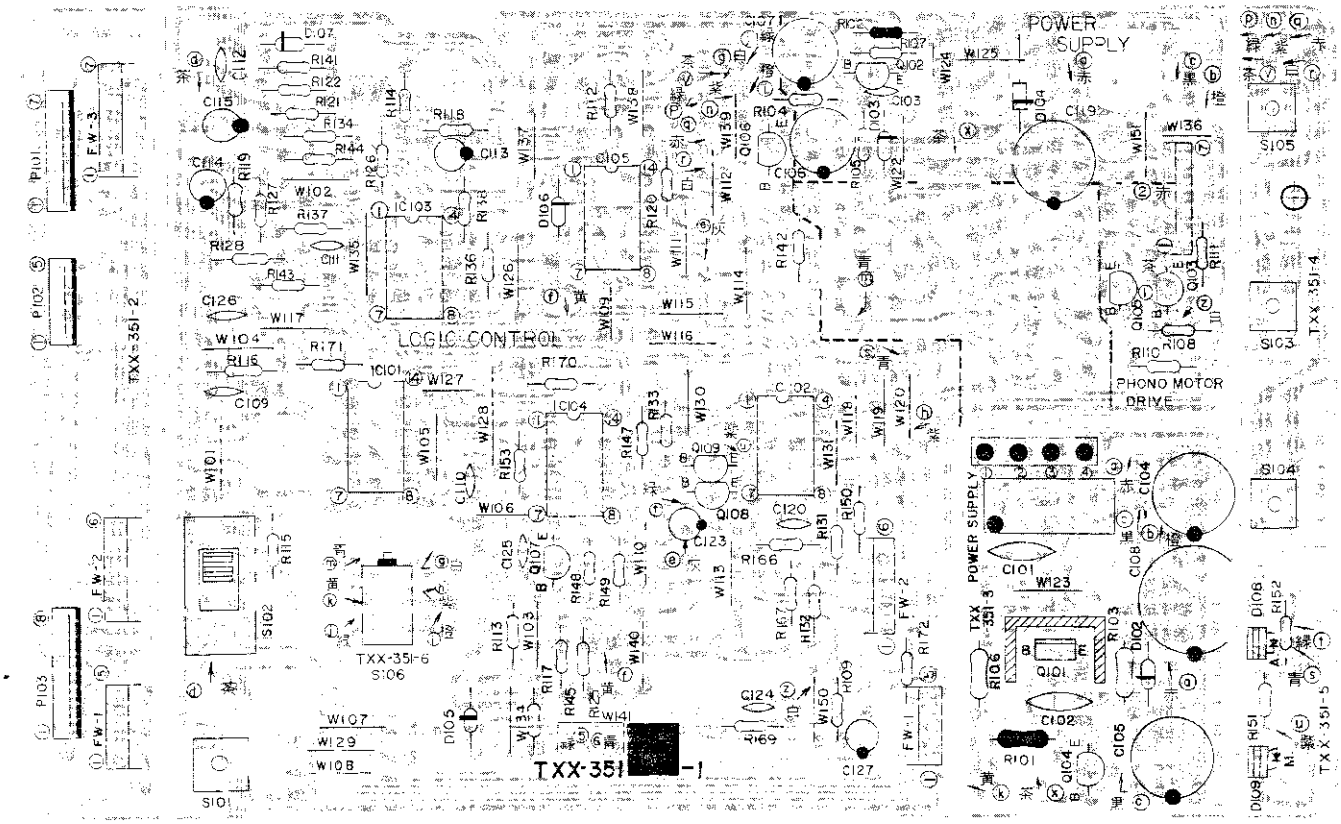


Fig. 19

Each Individual P.C. Board Location

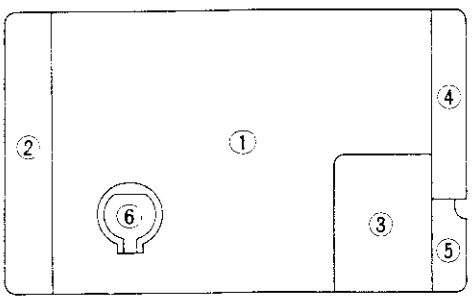


Fig. 20

① TXX-351-1: Control P.C. board ass'y
② TXX-351-2: Plug P.C. board ass'y
③ TXX-351-3: Power supply P.C. board ass'y
④ TXX-351-4: Tact P.C. board ass'y
⑤ TXX-351-5: LED P.C. board ass'y
⑥ TXX-351-6: Switch P.C. board ass'y

Note:
The symbols (赤, 黒, 白 . . .) on P.C. board surface are factory process only.

Transistors

Item No.	Part Number	Rating		Description	
		Pc	fT		Maker
Q101	2SD313V(E)	30 W	8 MHz	Silicon	Sanyo
Q103	2SD467(C)	0.5 W	280 MHz	"	Hitachi
Q104	2SC458(C)	0.2 W	230 MHz	"	"
Q106	2SC458(C)	0.2 W	230 MHz	"	"
Q107	2SC458(C)	0.2 W	230 MHz	"	"
Q108	2SC458(C)	0.2 W	230 MHz	"	"
Q109	2SC458(C)	0.2 W	230 MHz	"	"

Integrated Circuits

Item No.	Part Number	Rating	Description	
				Maker
IC101	TC4013BP		I.C.	Toshiba
IC102	TC4013BP		"	"
IC103	TC4071BP		"	"
IC104	TC4073BP		"	"
IC105	TC4075BP		"	"

Diodes

Item No.	Part Number	Rating	Description	
				Maker
D101	S1RBA20F1		Silicon	Shindengen
D102	RD13EB3		(Zener)	NEC
D103	RD82EB3		(Zener)	NEC
D104	ERB12-02RKL1		Silicon	Fujidenki
D105	1S2076-31	0.25 W	"	Hitachi
D106	1S2076-31	"	"	"
D107	1S2076-31	"	"	"
D108	TLG205		L.E.D	Toshiba
D109	TLR205		"	"

Capacitors

Item No.	Part number	Rating		Description
C101	QCF21HP-223	0.022 μF	50 V	Ceramic
C102	QCF21HP-223	"	"	"
C103	QCF21HP-223	"	"	"
C104	QET51CR-108	1000 μF	16 V	Electrolytic
C105	QET51ER-477	470 μF	25 V	"
C106	QET51ER-227	220 μF	"	"
C107	QET51CR-227	"	16 V	"
C108	QET51CR-228	2200 μF	"	"
C109	QCF21HP-223	0.022 μF	50 V	Ceramic
C110	QCF21HP-223	"	"	"
C111	QCF21HP-223	"	"	"
C112	QCF21HP-223	"	"	"
C113	QET51HR-475	4.7 μF	50 V	Electrolytic
C114	QET51HR-475	"	"	"
C115	QET51AR-107	100 μF	10 V	"
C119	QET51CR-477	470 μF	16 V	"
C120	QCF21HP-103	0.01 μF	50 V	Ceramic
C123	QET51HR-105	1 μF	"	Electrolytic
C124	QCF21HP-223	0.022 μF	"	Ceramic
C125	QCF21HP-102	0.001 μF	"	"
C126	QCF21HP-102	"	"	"
C127	QET51HR-225	2.2 μF	"	Electrolytic

Resistors

Item No.	Part Number	Rating		Description
R101	QRD149J-101S	100 Ω	1/4 W	Carbon ⚠
R102	QRZ0052-220	22 Ω	"	Fusible "
R103	QRD141J-153S	15 kΩ	"	Carbon
R104	QRD141J-562S		"	
R105	QRD141J-103S	10 kΩ	"	"
R106	QRD141J-102S	1 kΩ	"	"
R107	QRD141J-102S	"	"	"
R108	QRD141J-102S	"	"	"
R109	QRD141J-103S	10 kΩ	"	"
R110	QRD141J-184S	180 kΩ	"	"
R111	QRD141J-103S	10 kΩ	"	"
R112	QRD141J-471S	470 Ω	"	"
R113	QRD141J-471S	"	"	"
R114	QRD141J-471S	"	"	"
R115	QRD141J-471S	"	"	"
R116	QRD141J-103S	10 kΩ	"	"
R117	QRD141J-103S	"	"	"
R118	QRD141J-103S	"	"	"
R119	QRD141J-103S	"	"	"
R120	QRD141J-103S	"	"	"
R121	QRD141J-224S	220 kΩ	1/4 W	Carbon
R122	QRD141J-224S	"	"	"
R125	QRD141J-103S	10 kΩ	"	"
R126	QRD141J-223S	22 kΩ	"	"
R127	QRD141J-223S	"	"	"
R128	QRD141J-223S	"	"	"
R131	QRD141J-223S	"	"	"
R132	QRD141J-562S	5.6 kΩ	"	"
R133	QRD141J-223S	22 kΩ	"	"
R134	QRD141J-223S	"	"	"
R136	QRD141J-105S	1 MΩ	"	"
R137	QRD141J-105S	"	"	"
R138	QRD141J-105S	"	"	"
R141	QRD141J-103S	10 kΩ	"	"
R142	QRD141J-223S	22 kΩ	"	"
R143	QRD141J-562S	5.6 kΩ	"	"
R144	QRD141J-562S	"	"	"
R145	QRD141J-102S	1 kΩ	"	"
R147	QRD141J-153S	15 kΩ	"	"
R148	QRD141J-101S	100 Ω	"	"
R149	QRD141J-101S	"	"	"
R150	QRD141J-101S	"	"	"
R151	QRD141J-561S	560 Ω	"	"
R152	QRD141J-331S	330 Ω	"	"
R153	QRD141J-223S	22 kΩ	"	"
R166	QRD141J-562S	5.6 kΩ	"	"
R167	QRD141J-103S	10 kΩ	"	"
R169	QRD141J-103S	"	"	"
R170	QRD141J-104S	100 kΩ	"	"
R171	QRD141J-104S	100 kΩ	"	"
R172	QRD141J-101S	100 Ω	"	"

Others

Item No.	Part Number	Rating	Description
S101	ESP0001-006		Push Switch
S102	QSS2201-006		Slide Switch
S103	ESP0001-006		Push Switch
S104	ESP0001-006		"
S105	ESP0001-006		"
S106	QSP0219-051		"
	QMV5005-005		5p Plug Ass'y
	QMV5005-007		7p "
	QMV5005-008		8p Plug Ass'y
	EWS012-057		Socket wire Ass'y
	EWS013-101		"
	EWR35A-30NN		Flat Wire
	EWR36A-30NN		"
	EWR37A-30NN		"
	Y40597-003		Wrapping Terminal
	SBSB3008Z		Screw
	E23919-101		Circuit Board

10-(2) TXX-352 motor drive P.C. board ass'y

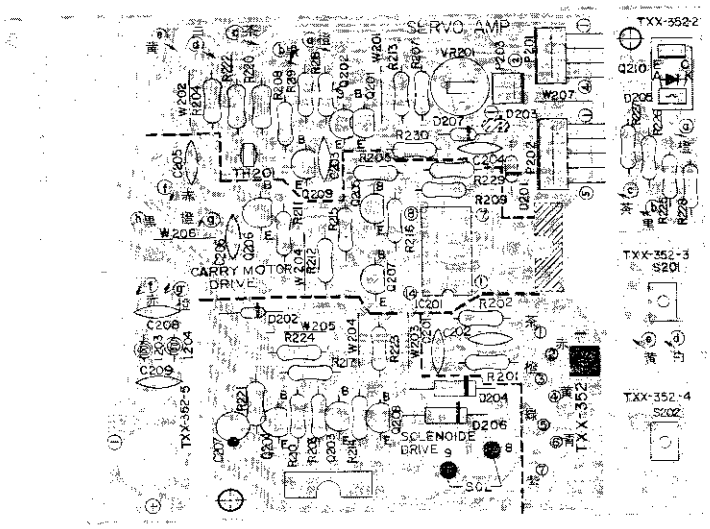
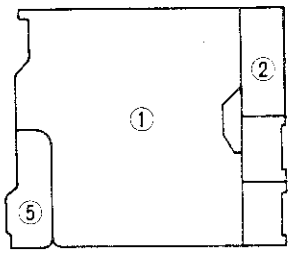


Fig. 21

Each Individual P.C. Board Location



① TXX-352-1: Drive P.C. board ass'y
② TXX-352-2: Up switch P.C. board ass'y
⑤ TXX-352-5: Filter P.C. board ass'y

Fig. 22

Note:
The symbols (赤 , 黒 , 白 .....) on P.C. board surface are factory process only.

Transistors

Item No.	Part Number	Rating		Description	
		Pc	fT		Maker
Q201	2SC458(C)	0.2 W	230 MHz	Silicon	Hitachi
Q202	2SC458(C)	0.2 W	230 MHz	"	"
Q203	2SC458(C)	0.2 W	230 MHz	"	"
Q204	2SC458(C)	0.2 W	230 MHz	"	"
Q205	2SC458(C)	0.2 W	230 MHz	"	"
Q206	2SB562(C)	0.9 W	350 MHz	"	"
Q207	2SB562(C)	0.9 W	350 MHz	"	"
Q208	2SB562(C)	0.9 W	350 MHz	"	"
Q209	2SA1029(C)	0.2 W	200 MHz	"	"
Q210	PH103			Photo Transistor	NEC

Integrated Circuits

Item No.	Part Number	Rating	Description	
				Maker
IC201	UPA53C		I.C.	NEC

Diodes

Item No.	Part Number	Rating		Description	
		Pc	fT		Maker
D201	1S2076-31	0.25 W		Silicon	Hitachi
D202	1S2076-31	"		"	"
D204	ERB12-02RKL1	"		"	Fujudenki
D205	SR110			L.E.D.	NEC
D206	ERB12-02RKL1	0.25 W		"	Fujidenki
D207	1S2076-31	"		"	Hitachi

Coils

Item No.	Part Number	Rating	Description
L203	EQL1001-200		Inductor
L204	EQL1001-200		"

Capacitors

Item No.	Part Number	Rating		Description
C201	QCF31HP-223	0.022 μF	50 V	Ceramic
C202	QCF31HP-223	"	"	"
C203	QCS31HJ-561	560 pF	"	"
C204	QCS31HJ-101	100 pF	"	"
C205	QCF31HP-223	0.022 μF	"	"
C206	QCF31HP-223	"	"	"
C207	QET51ER-106	10 μF	25 V	
C209	QCF31HP-223	0.022 μF	50 V	"

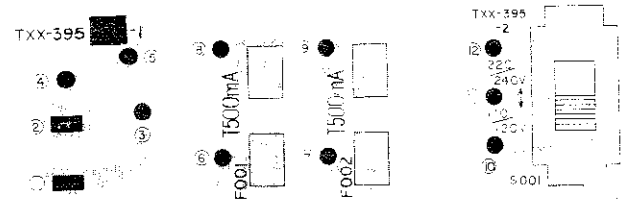
Resistors

Item No.	Part Number	Rating		Description
R201	QRD141J-103S	10 kΩ	1/4 W	Carbon
R202	QRD141J-103S	"	"	"
R203	QRD141J-103S	"	"	"
R204	QRD141J-103S	"	"	"
R205	QRD141J-103S	"	"	"
R207	QRD141J-223S	22 kΩ	"	"
R208	QRD141J-223S	"	"	"
R209	QRD141J-223S	"	"	"
R210	QRD141J-222S	2.2 kΩ	"	"
R211	QRD141J-222S	"	"	"
R212	QRD141J-222S	"	"	"
R213	QRD141J-102S	1 kΩ	"	"
R214	QRD141J-102S	"	"	"
R215	QRD141J-102S	"	"	"
R216	QRD141J-102S	"	"	"
R217	QRD141J-473S	47 kΩ	"	"
R218	QRD141J-562S	5.6 kΩ	"	"
R219	QRD141J-562S	"	"	"
R220	QRD141J-122S	1.2 kΩ	"	"
R221	QRD141J-221S	220 Ω	"	"
R222	QRD141J-821S	820 Ω	"	"
R223	QRD141J-561S	560 Ω	"	"
R224	QRD141J-561S	"	"	"
R225	QRD141J-331S	330 Ω	"	"
R226	QRD141J-103S	10 kΩ	"	"
R227	QRD141J-682S	6.8 kΩ	"	"
R229	QRD141J-393S	39 kΩ	"	"
R230	QRD141J-562S	5.6 kΩ	"	"
VR201	QVZ3501-103			V. Resistor

Others

Item No.	Part Number	Rating	Description
TH201	SDT1000		Thermistor
P201	QMV5004-004		4p Plug Ass'y
P202	QMV5004-005		5p "
P203	QMV5005-002		2p "
	EWT011-027		Terminal Wire Ass'y
J101	EWS017-034		Socket Wire Ass'y
	E68755-002		Sensor Holder
	E65396-001		Earth Plate
	E43727-003		Tab
	E23920-004		Circuit Board

10-(3) TXX-395A power SA P.C. board ass'y



Item No.	Part Number	Rating	Description
	EMG7331-001		Fuse Clip
	QSS2228-103		Slide Switch
	E65508-002		Tab
	E43727-002		Tab
	E302177-001		Circuit Board

Fig. 23

Each Individual P.C. Board Location

① TXX-395-1: Fuse P.C. board ass'y
② TXX-395-2: Voltage selector P.C. board ass'y

Fig. 24

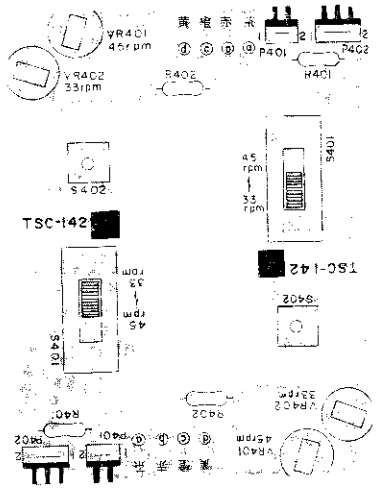
10-(4) TSC-138 sensor P.C. board ass'y

Fig. 25

Item No.	Part Number	Rating	Description
	QSP2210-401		Push Switch
	EWS018-029		Socket Wire
	EWS014-055		Socket Wire
	E301752-004		Circuit Board

Note:
The symbols (赤, 黒, 白 .....) on P.C. board surface are factory process only.

10-(5) TSC-142 speed selector P.C. board ass'y



Item No.	Part Number	Rating		Description
S401	QSS2201-005			Slide Switch
VR401	QVP4A0B-103			Volume Resistor
VR402	QVP4A0B-103			〃
P401	QMV5004-002			2P Plug Assy
R401	QRD148J-303S	30 kΩ	1/4 W	Carbon Resistor
R402	QRD148J-153S	15 kΩ	〃	〃
	E302067-001			Circuit Board

Note:
The symbols (赤, 黒, 白 .....) on P.C. board surface are factory process only.

Fig. 26

10-(6) TSC-143A signal P.C. board ass'y

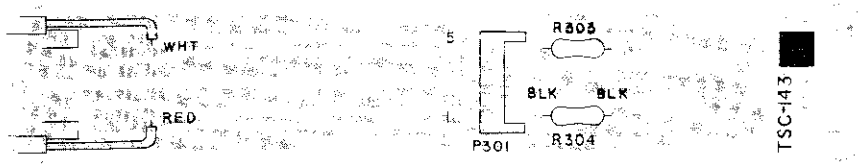


Fig. 27

Item No.	Part Number	Rating		Description
R303	QRD148J-221S	220 Ω	1/4 W	Carbon Resistor
R304	QRD148J-221S	220 Ω	〃	〃
	E03808-005A			Connector
	EWT011-037			Terminal Wire Ass'y
	E03697-006			Signal Cord
	E302178-001			Circuit Board

11. Block Diagram

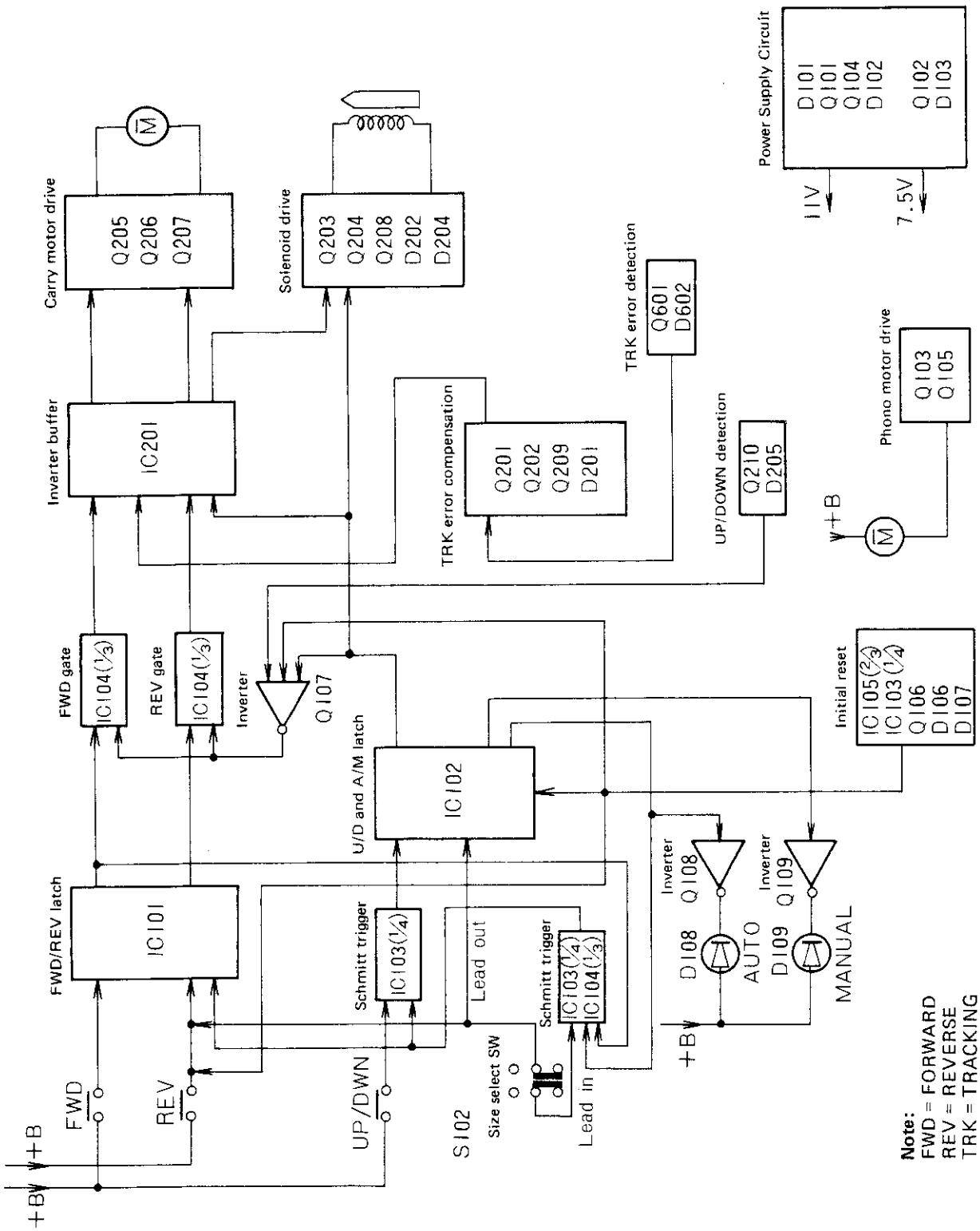
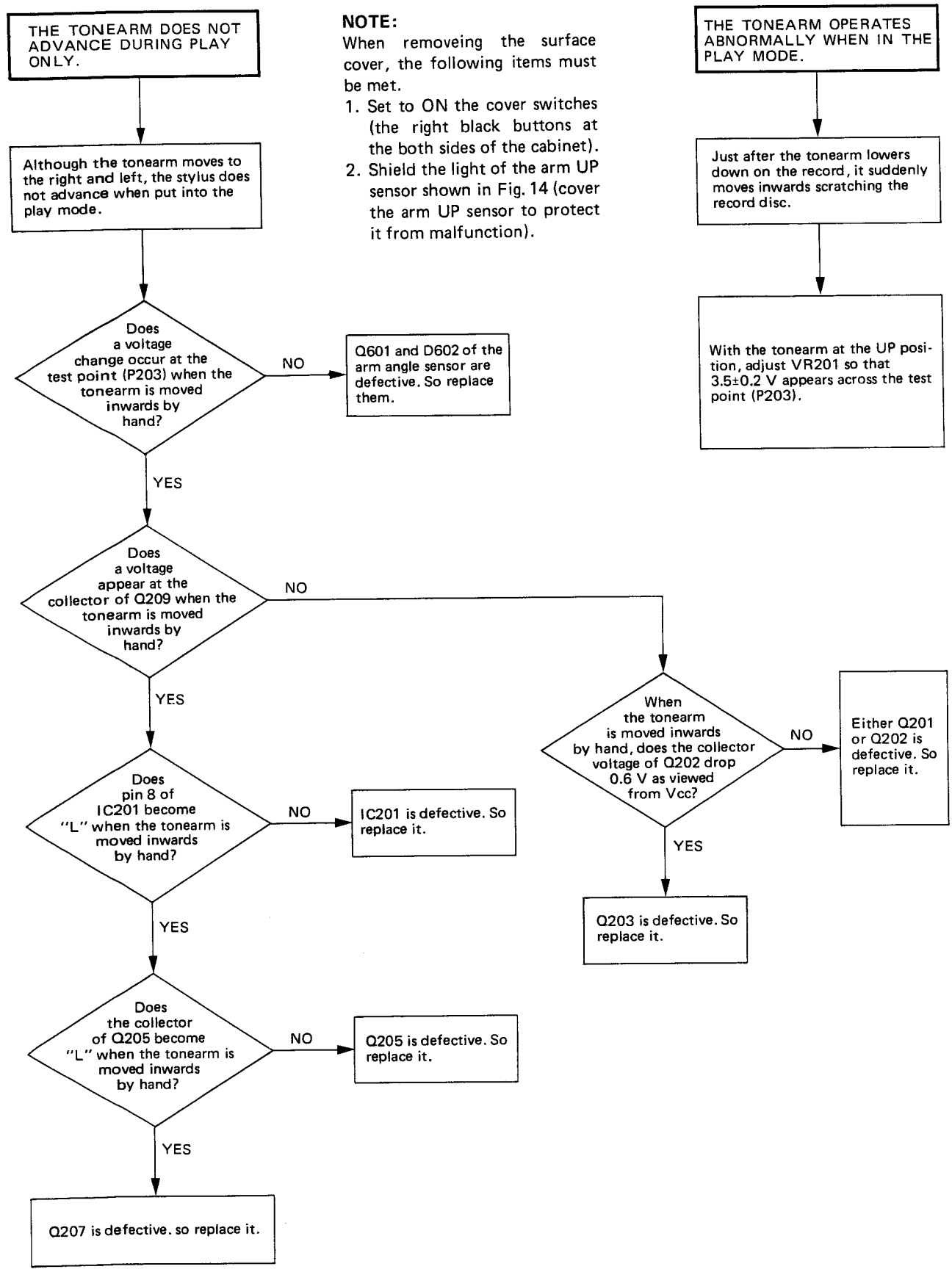


Fig. 28

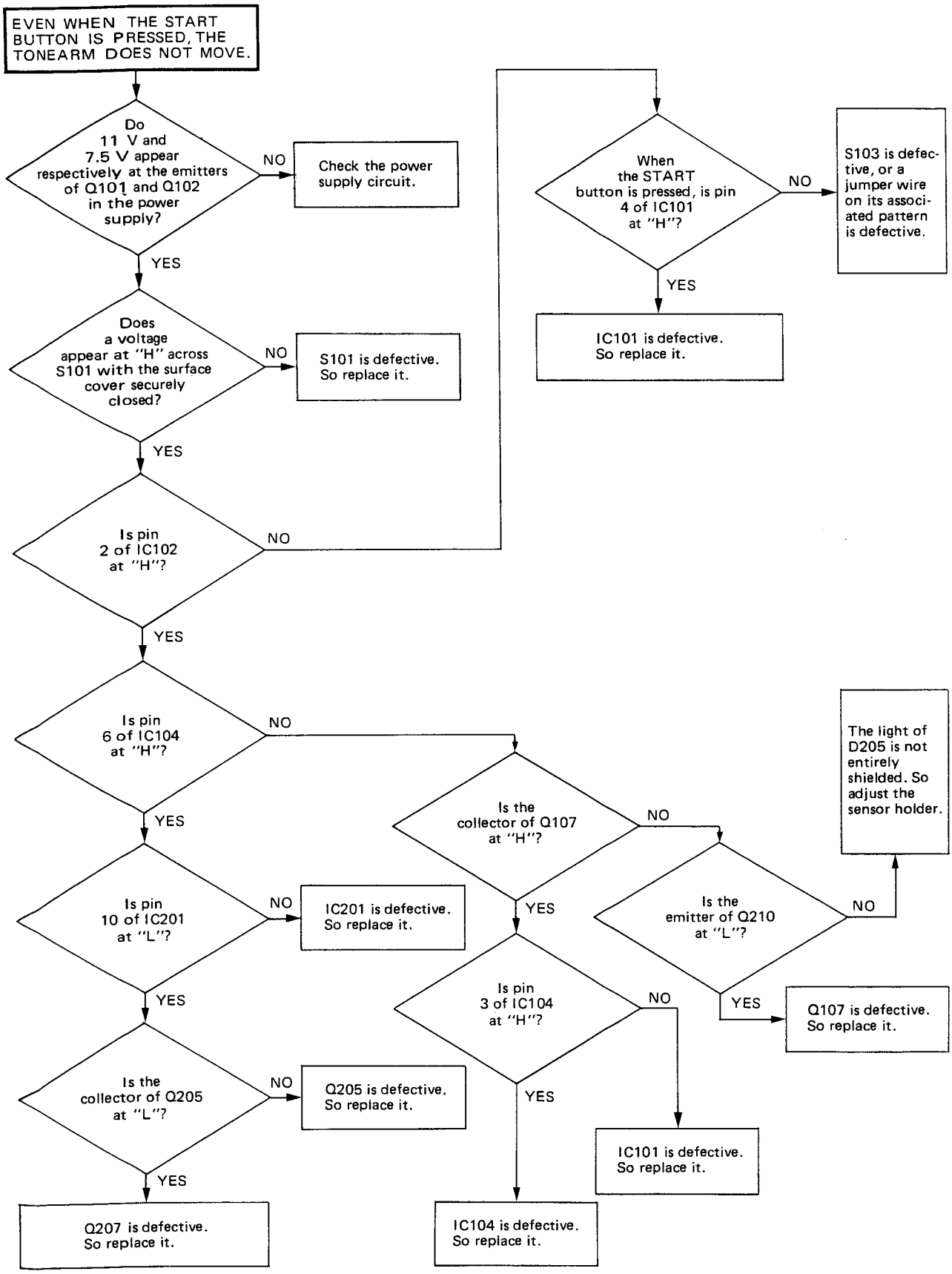
12. Troubleshooting

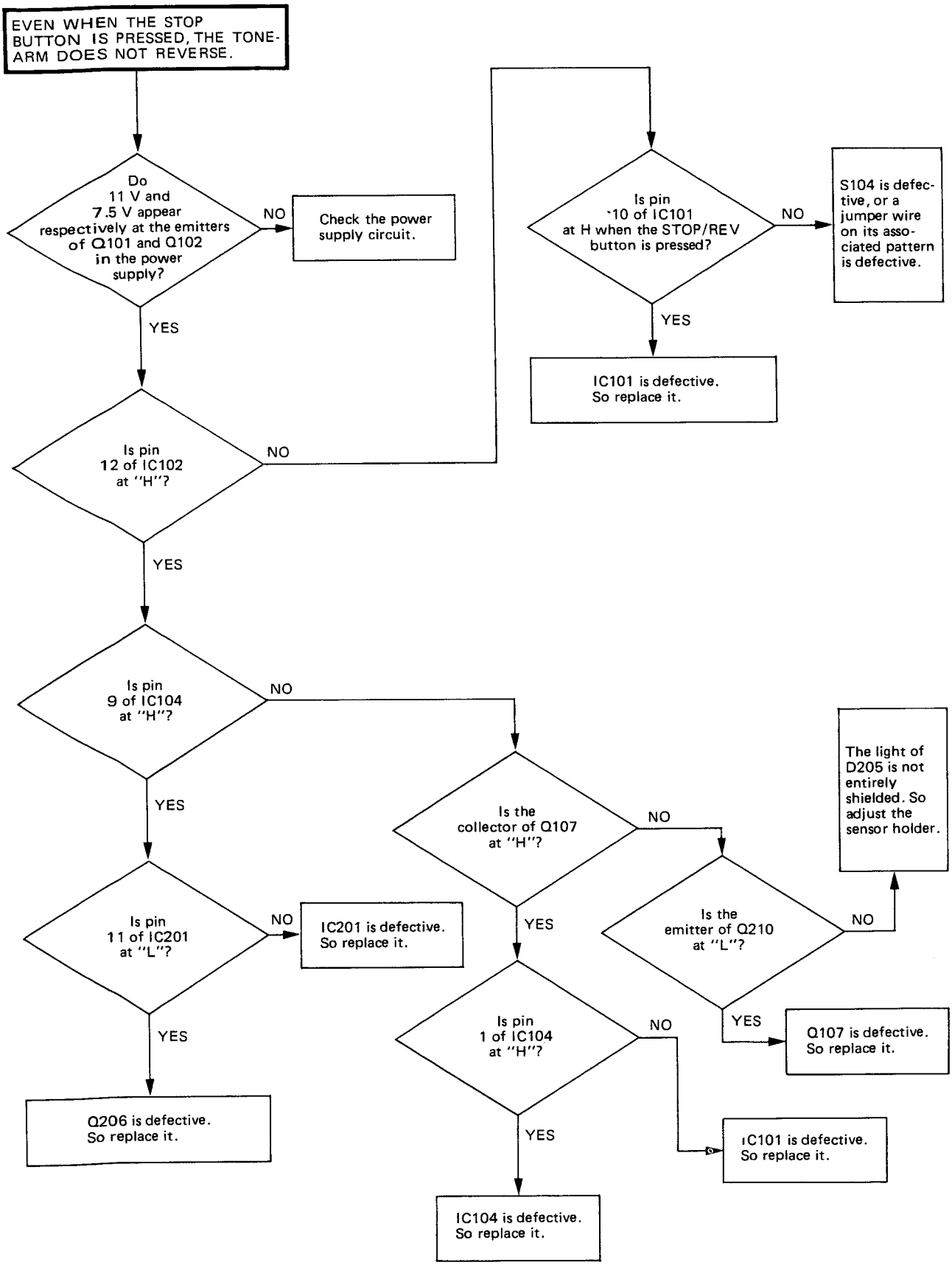
12-(1) When tonearm action is abnormal

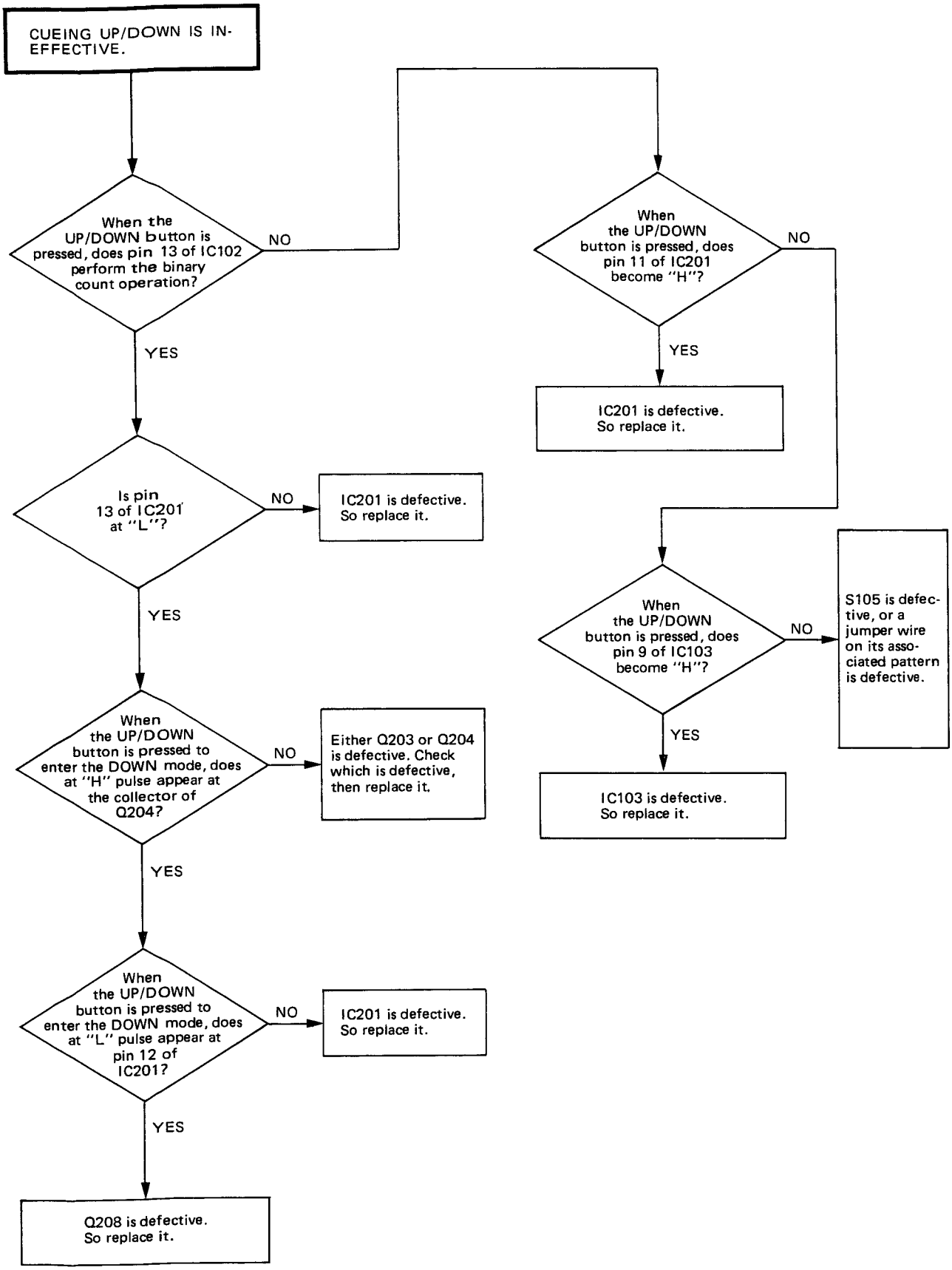


NOTE:
When removeing the surface cover, the following items must be met.

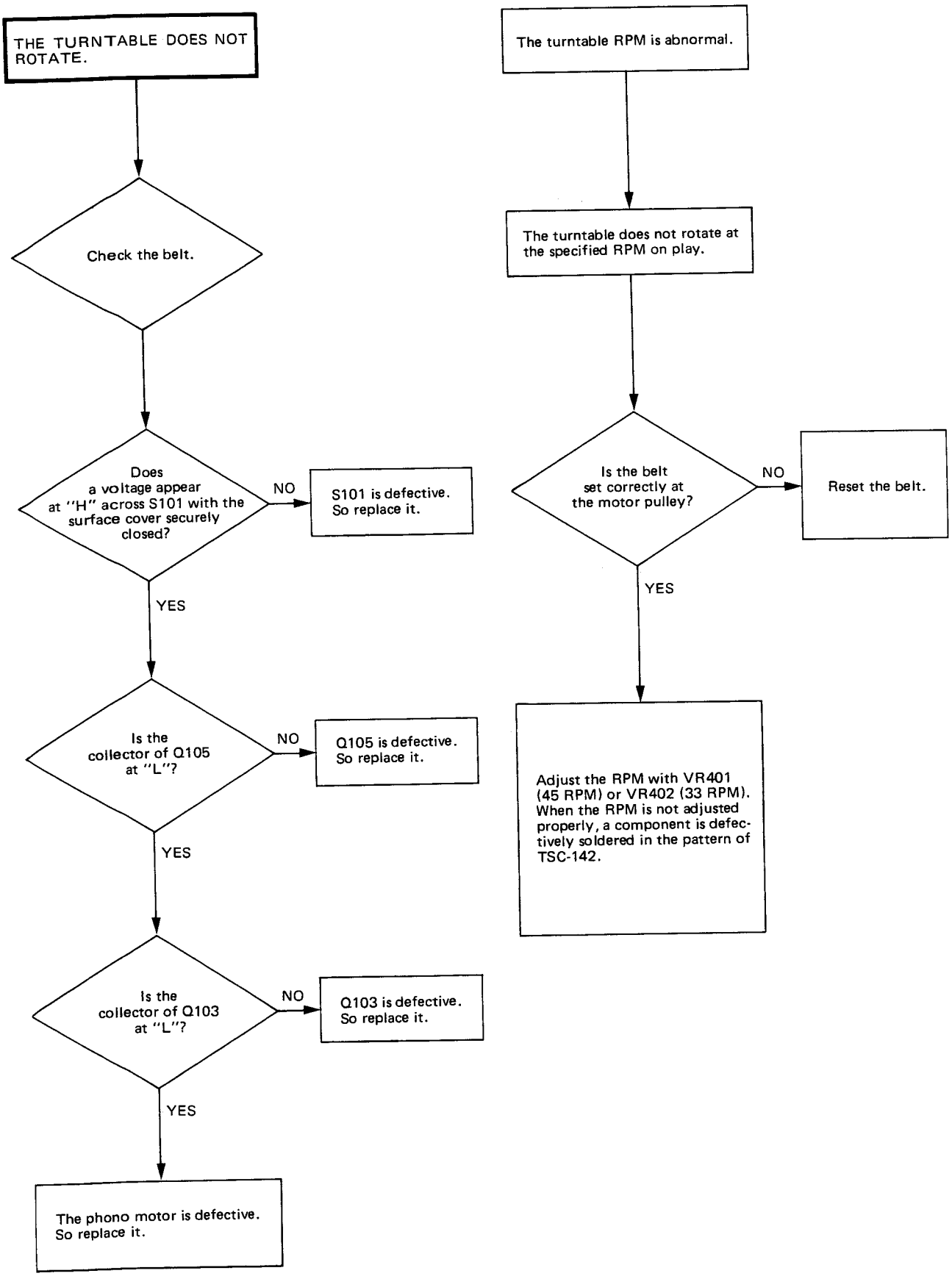
1. Set to ON the cover switches (the right black buttons at the both sides of the cabinet).
2. Shield the light of the arm UP sensor shown in Fig. 14 (cover the arm UP sensor to protect it from malfunction).


EVEN WHEN THE START BUTTON IS PRESSED, THE TONEARM DOES NOT MOVE.
Do 11 V and 7.5 V appear respectively at the emitters of Q101 and Q102 in the power supply?
NO
Check the power supply circuit.
YES
Does a voltage appear at "H" across S101 with the surface cover securely closed?
NO
S101 is defective. So replace it.
YES
Is pin 2 of IC102 at "H"?
NO
When the START button is pressed, is pin 4 of IC101 at "H"?
NO
S103 is defective, or a jumper wire on its associated pattern is defective.
YES
IC101 is defective. So replace it.
YES
Is pin 6 of IC104 at "H"?
NO
Is the collector of Q107 at "H"?
NO
The light of D205 is not entirely shielded. So adjust the sensor holder.
YES
Is pin 10 of IC201 at "L"?
NO
IC201 is defective. So replace it.
YES
Is the collector of Q205 at "L"?
NO
Q205 is defective. So replace it.
YES
Q207 is defective. So replace it.
YES
Is pin 3 of IC104 at "H"?
NO
IC101 is defective. So replace it.
YES
IC104 is defective. So replace it.
Is the emitter of Q210 at "L"?
NO
YES
Q107 is defective. So replace it.


EVEN WHEN THE STOP BUTTON IS PRESSED, THE TONE-ARM DOES NOT REVERSE.
Do 11 V and 7.5 V appear respectively at the emitters of Q101 and Q102 in the power supply?
NO
Check the power supply circuit.
YES
Is pin 12 of IC102 at "H"?
NO
YES
Is pin 9 of IC104 at "H"?
NO
YES
Is pin 11 of IC201 at "L"?
NO
IC201 is defective. So replace it.
YES
Q206 is defective. So replace it.
Is pin 10 of IC101 at H when the STOP/REV button is pressed?
NO
S104 is defective, or a jumper wire on its associated pattern is defective.
YES
IC101 is defective. So replace it.
Is the collector of Q107 at "H"?
NO
The light of D205 is not entirely shielded. So adjust the sensor holder.
YES
Is the emitter of Q210 at "L"?
NO
YES
Q107 is defective. So replace it.
Is pin 1 of IC104 at "H"?
NO
YES
IC101 is defective. So replace it.
IC104 is defective. So replace it.


CUEING UP/DOWN IS IN-EFFECTIVE.
When the UP/DOWN button is pressed, does pin 13 of IC102 perform the binary count operation?
NO
YES
When the UP/DOWN button is pressed, does pin 11 of IC201 become "H"?
NO
YES
IC201 is defective. So replace it.
Is pin 13 of IC201 at "L"?
NO
IC201 is defective. So replace it.
YES
When the UP/DOWN button is pressed, does pin 9 of IC103 become "H"?
NO
S105 is defective, or a jumper wire on its associated pattern is defective.
YES
IC103 is defective. So replace it.
When the UP/DOWN button is pressed to enter the DOWN mode, does at "H" pulse appear at the collector of Q204?
NO
Either Q203 or Q204 is defective. Check which is defective, then replace it.
YES
When the UP/DOWN button is pressed to enter the DOWN mode, does at "L" pulse appear at pin 12 of IC201?
NO
IC201 is defective. So replace it.
YES
Q208 is defective. So replace it.

12-(2) When turntable operation is abnormal



13. Power Cord Connections in Different Areas

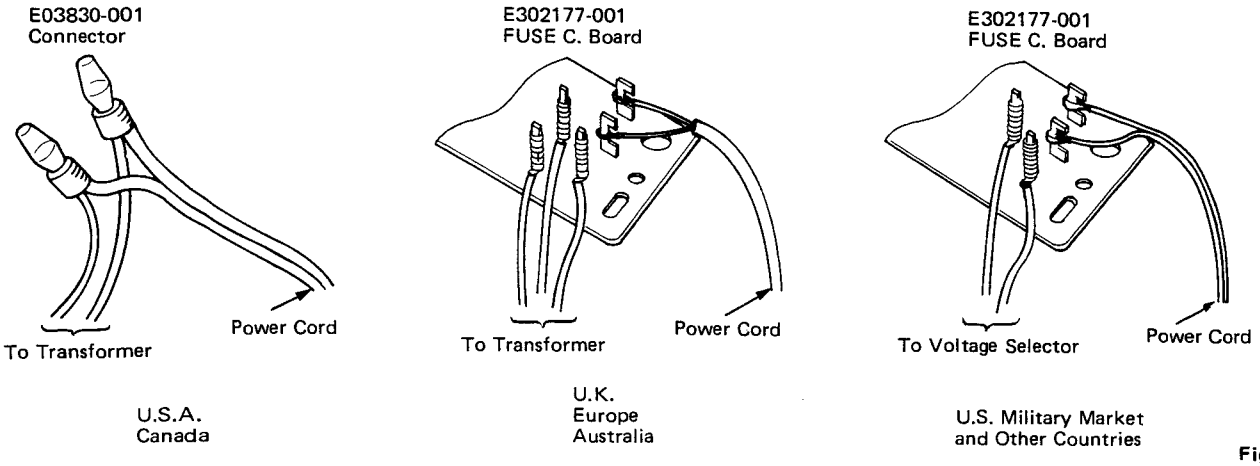


Fig. 29

13-(1) How to handle the solderless connector

In this turntable, a solderless connector is used to connect the power cord with the primary lead wire of the power transformer.
When it is unavoidable to replace this connector for replacement of the power transformer, or the like, positively perform the replacement in accordance with the following procedure to avoid dangers.

- **Connector part number**
  E03830-001
- **Tools**
  Tool for installing solderless connectors.
  Do not use those (small cutting pliers, etc.) other than regular tools.
  Example: VACO No. 1963 (Courtesy Vaco Products Co.)

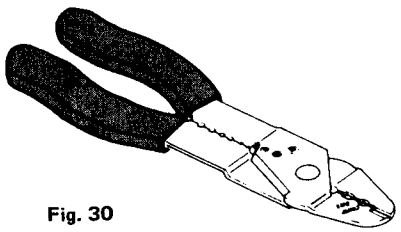


Fig. 30

- **Replacement**

1. Cut both the power cord and the primary lead wire at near the edge of the connector to be replaced.
   Note: Do not re-use the used connector.

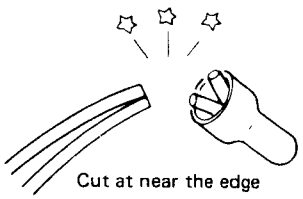


Fig. 31

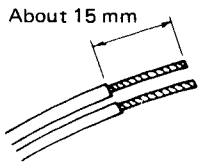


Fig. 32

2. Peel off the coverings so that the respective conductor tops appear by about 15 mm as shown in the Fig. 32.
   Note: In the case of stranded wires, test each wire.
3. Adjust the tips of the power cord and the primary lead wire with each other, then securely insert them into the connector as shown in the Fig. 33.

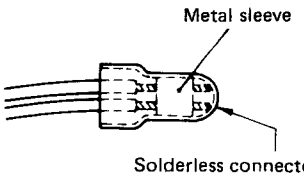


Fig. 33

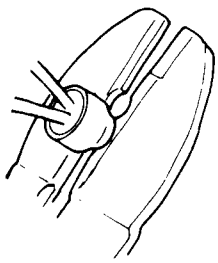


Fig. 34

4. Secure the nearly equal central part of the metal sleeve with the second concave of the tool for solderless securing as shown in the Fig. 34.
   Note: Perform a complete securing.
5. After solderless securing, check the following as shown in the Fig. 35.
   Note: Protect connector with isolation tape or vinyl tube for safety. Furthermore, clamp it for out of touch with metal part.

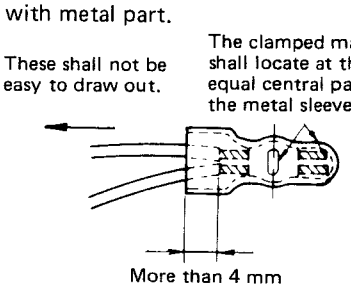


Fig. 35

Chapter 6. Circuit Diagram and P.C.Board Connection Diagram

6-1 Schematic diagram

L-E600 is configured as shown in **Figs 17** and **18.** For the voltage value and adjustment of each section, refer to the Service Manual No. 2586 for linear tracking full-auto turntable L-E600.
It should be here noted that the symbol Nos in **Fig. 17** are different from those in the service note for practical description.

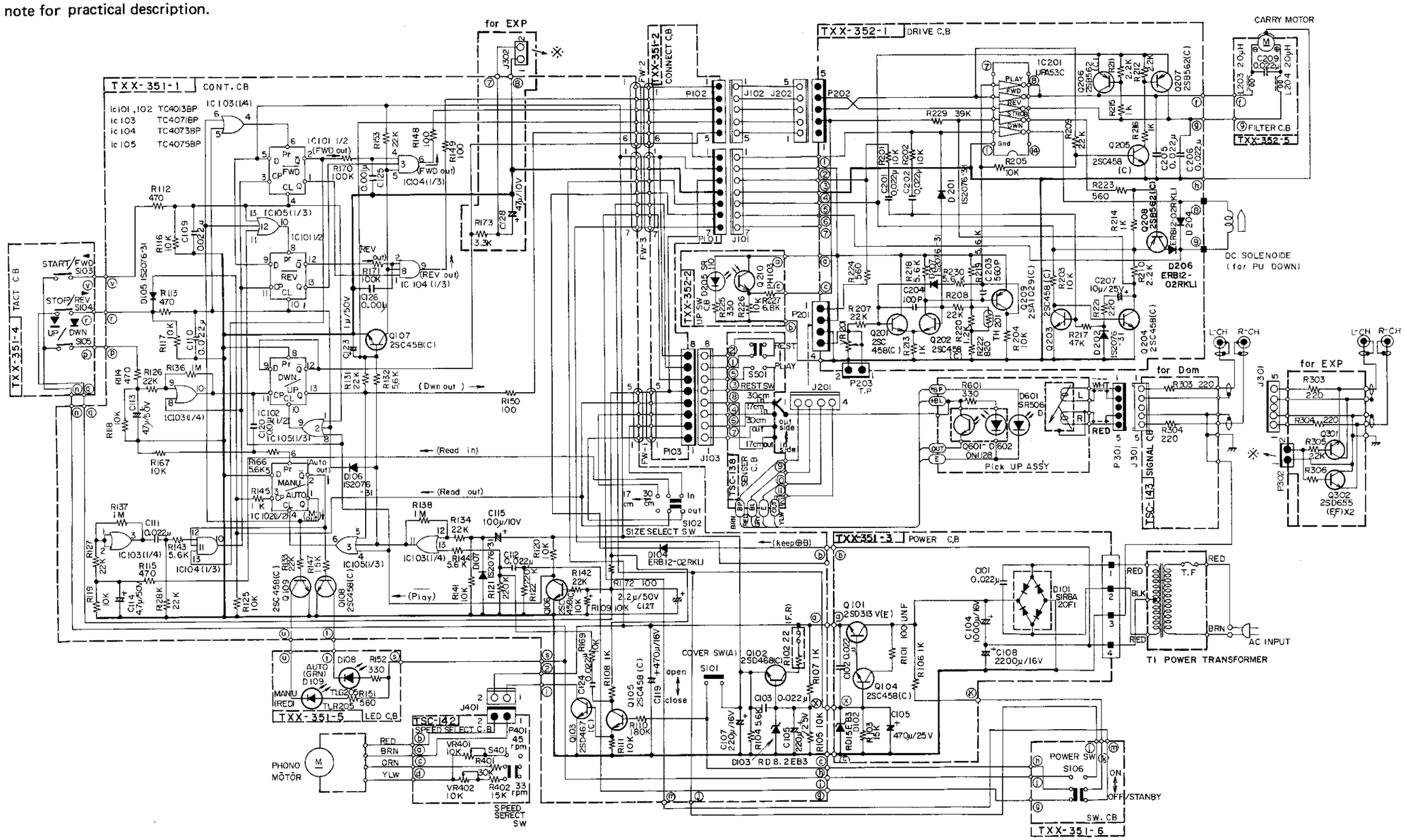


Fig. 17

6-2 P.C. board connection diagram

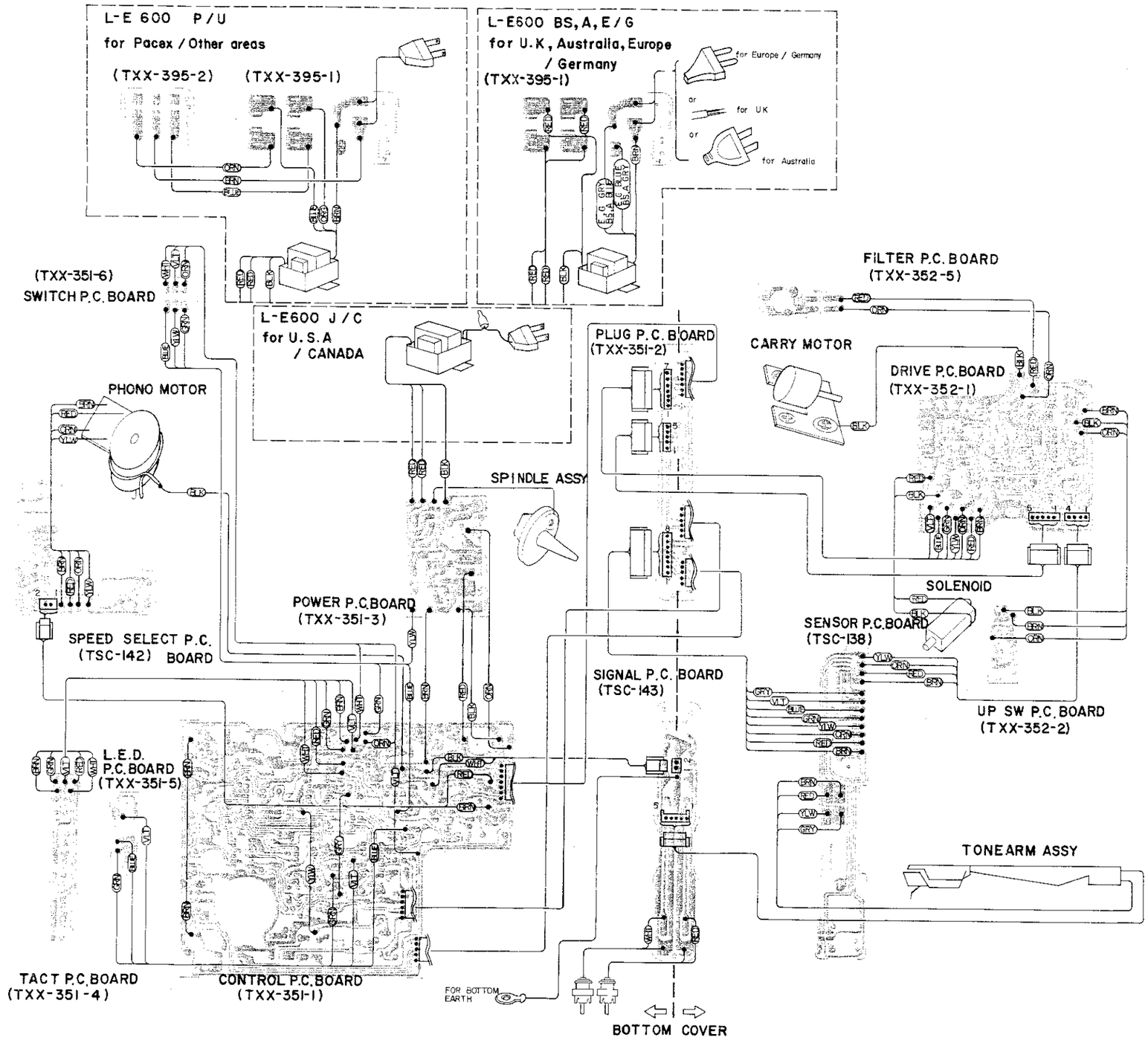


Fig. 18

15. Packing Materials and Part Numbers

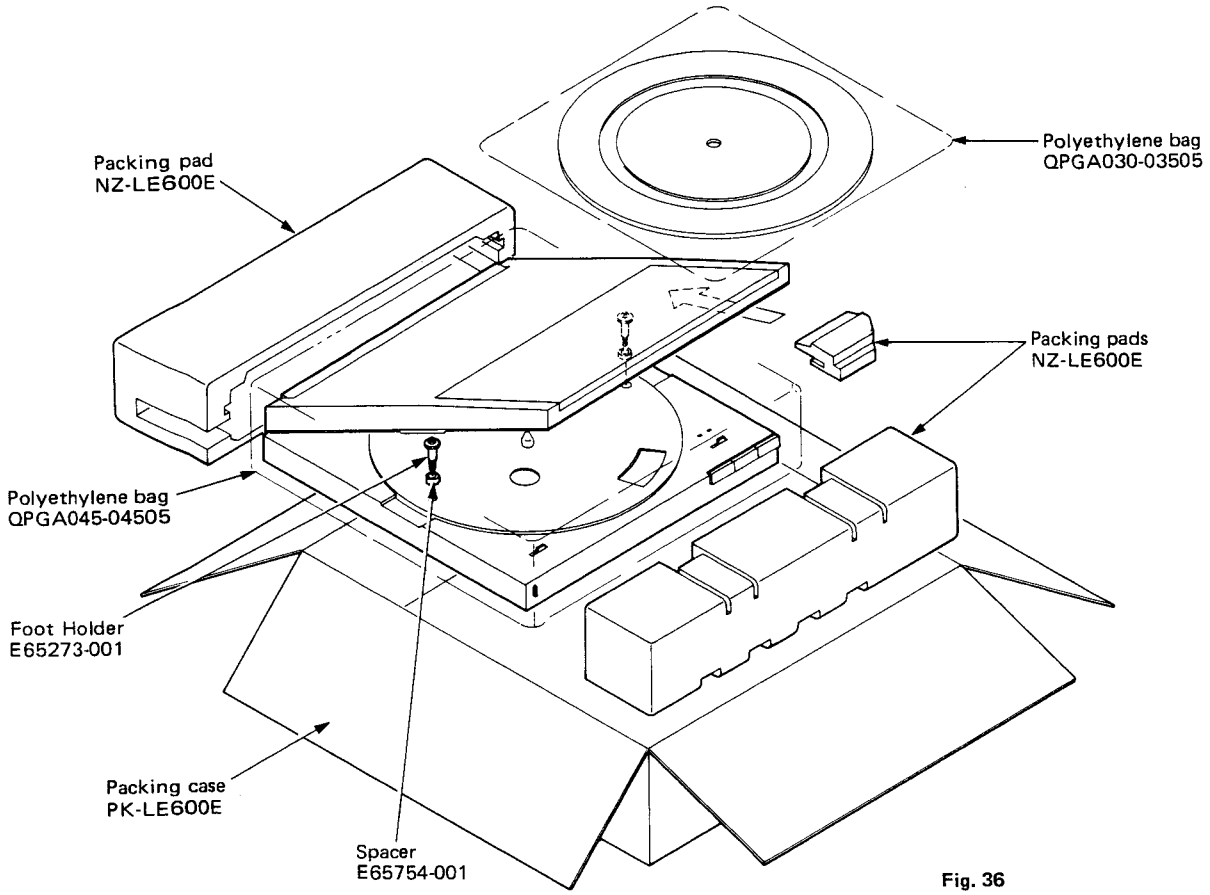


Fig. 36

16. Accessories List

Item No.	Description	U.S.A. & (Canada)	U.S. Military Market & (Other Countries)	Europe & (Germany)	Australia	U.K.
1	Instruction Book	E30580-988A (E30580-988A)	E30580-988A (E30580-988A)	E30580-988A (E30580-988A)	E30580-988A	E30580-988A
2	EP Adaptor	E66329-002 (E66329-002)	E66329-002 (E66329-002)	E66329-002 (E66329-002)	E66329-002	E66329-002
3	Warranty Card	BT20047 (BT20025E)	BT20047 (–)	– (–)	BT20029C	BT20013C
4	Safety Instruction	BT20044B (–)	BT20044B (–)	– (–)	–	–
5	Service Information Card	BT20046A (–)	BT20046A (–)	– (–)	–	–
6	Siemens Plug		– (E04056)	– (–)	–	–
7	Caution Sheet		E300488-005~008 (E300488-005~008)	– (–)	–	–

17. Parts List with Specified Numbers for Designated Areas

Page	Item No.	Description	U.S.A. & Canada	U.S. Military Market & Other Countries	Europe & Germany	Australia	U.K.
9	9-(3)	Tonearm Ass'y	E301765-002	E301765-003	E301765-003	E301765-003	E301765-003
		Power Cord ⚠	QMP1200-200	QMP7600-250	QMP3900-200	QMP2560-244	QMP9017-008BS
		Cord Clamp ⚠	QHS3876-162	A37897	A37897	A37897	A37897
		C.S. Plate	E68029-002	–	–	–	–
4	4	Power Transformer ⚠	ETP1010-06JA	ETP1010-06LA	ETP1010-06EA	ETP1010-06EA	ETP1010-06EABS
4	4	Fuse ⚠	–	QMF51A2-0R2L (0.2A)	QMF51A2-0R5L (0.5A)	QMF51A2-0R5L (0.5A)	QMF51A2-0R5L (0.5A)
14	10-(3)	Fuse P.C. Board Ass'y	–	TXX-395A	TXX-395A	TXX-395A	TXX-395A
14	10-(3)	Voltage Selector	–	QSS2228-103	–	–	–
		Rating Label	E35064-029	E35339-084	E35339-087	E35339-085	•E35339-086BS
10	401	Barrier	–	–	E302176-001	E302176-001	E302176-001
10	450	Arm Ass'y	EC82559-1	EC82481-3	EC82481-3	EC82481-3	EC82481-3
"	451	Headshell	EC82555-1	EC82483-1	EC82483-1	EC82483-1	EC82483-1
"	452	Headshell Cover	EC82556-1	EC82484-1	EC82484-1	EC82484-1	EC82484-1
"	474	Cartridge	MD-1038L	MD-1041Z	MD-1041Z	MD-1041Z	MD-1041Z
"	475	Stylus	DT-38	DT-41	DT-41	DT-41	DT-41
"	476	Stylus Cover	E301614-001	EC62233-1	EC62233-1	EC62233-1	EC62233-1

⚠ Safety Parts

JVC

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Vol.6

TECHNICAL MANUAL

L-E600
LINEAR TRACKING TONEARM

JVC

Contents

Chapter 1. Features

1-1 T.L.T. system employed

In the TLT (Top side Linear Tracking) system, since the linear tracking tonearm and the sweep drive mechanism are located at the upper side of the turntable, the horizontal space is expanded that much. **(Fig. 1)**

1-2 Ease in mounting and demounting

Since the tonearm is incorporated in the cover of the upper side owing to the TLT system, it is unnecessary to pay attention to the pickup as in a conventional turntable when mounting or demounting the record.

1-3 Logic control by three buttons

As the tonearm is logic controlled by the three operation buttons (▼ ◄ ►) in the front section, auto play is possible by simply pressing the button.

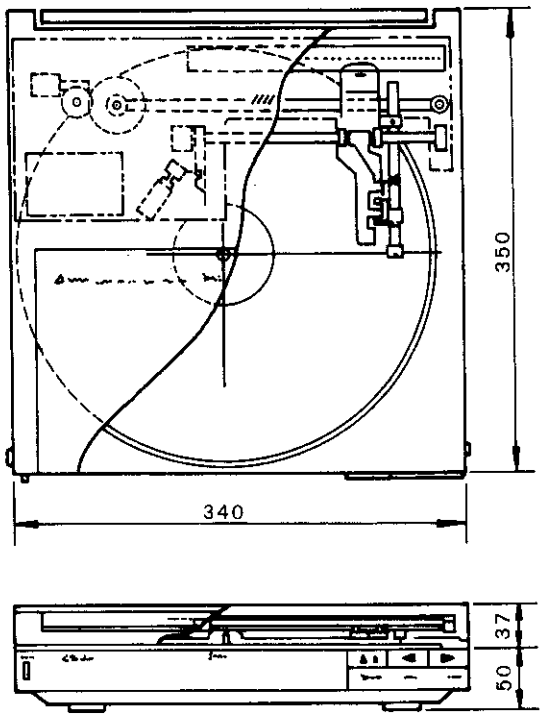


Fig. 1

1-4 Operation can be monitored at a glance

1) PLAY monitor:
When the START button is pressed, as the PLAY indicator LED (red) at the cartridge's tip lights, it is easier to check the position of the tonearm.

2) AUTO/MANUAL monitor:
The auto and manual modes can be freely switched to each other by operating operation buttons. According to the selected mode, a red or green LED lights to indicate the mode.

1-5 No-contact horizontal tracking error detection with photo-sensor

The horizontal tracking error is detected so that the tonearm follows the groove on play to move parallel. Concretely, very small deviation angle of the tonearm is detected by the photo-senser. Thereby, the arm carrier is slided by the high-speed servo control, thus permiting linear tracking.

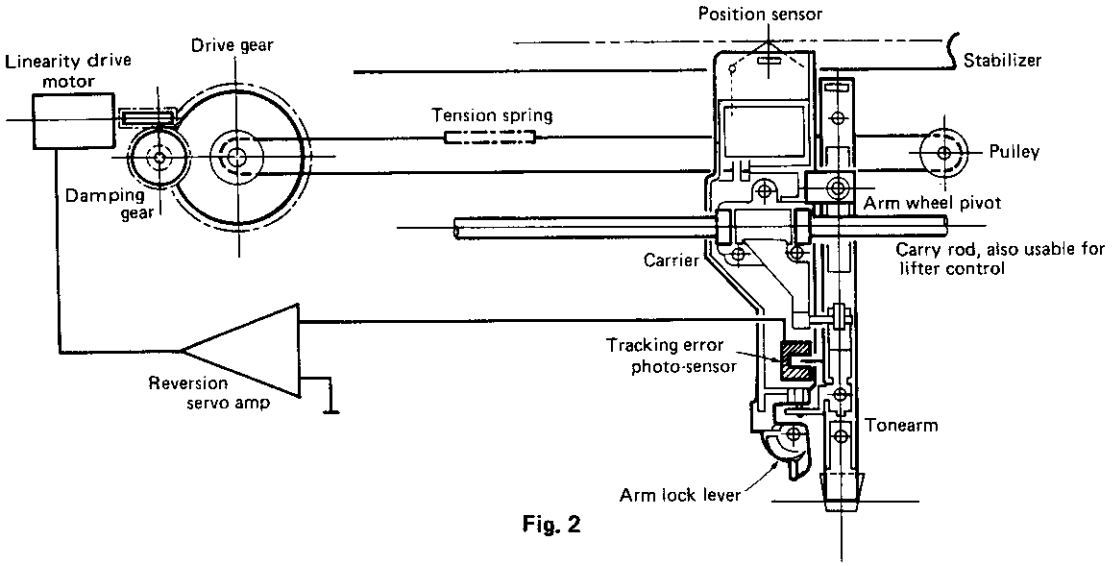


Fig. 2

1-6 Auto safety reject mechanism employed

During play, when opening the cover or turning off the POWER switch, the tonearm is automatically rejected to its rest position in either case. The turntable is designed to stop rotation especially when the cover is opened.

1-7 Auto lift-up mechanism employed

During play, even when the power cord is mistakenly unpluged or a power failure occurs, the tonearm is necessarily lifted up. Thus, the stylus and record are protected from damage. This is also true of when the timer play is at OFF.

1-8 IM cartridge and low-mass aluminum tonearm employed

Utilizing the excellent response at high frequencies. As the mass of the cantilever is lowered, the response at high frequencies is extended and the distortion rate is decreased. Thus, the sound can be reproduced more clearly and straightly.

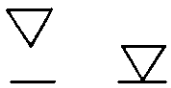
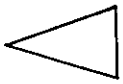
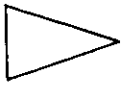
Concerning the tonearm, its horizontal tracking effective length is shortened to 102 mm. In addition, its regidity is heightened and its mass is lowered by employment of aluminum frame.

1-9 FG servo motor and alminum diecasting platter

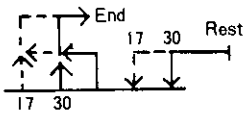
Through employment of newly developed thin type FG servo (frequency speed control) motor and aluminum diecasting platter, the rotating accuracy is high despite of the belt drive.

Chapter 2. Operation Modes

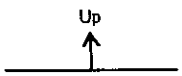
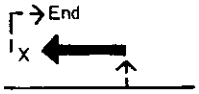
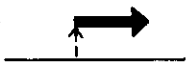
NOTE : The turntable speed (33/45 RPM) and record size (30/17 cm) selectors are manual switches.

		
UP/DOWN	START/FWD	STOP/REW

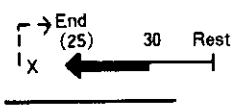
2-1 Auto play

		
When pressed during play, arm is lowered down or lifted up according to its situation. When pressed during auto FWD or REV, arm is lowered down. (With 17 cm record, be careful not to lower down outside of disc.)	When pressed to start, arm is led in and led out after play according to record size. When pressed during play, arm is lifted up and forwarded. In the latter case, when arm is not lowered down, it is led out at lead-out position.	When pressed during play, arm is led out at its existing position.

2-2 Manual play (A)

		
When pressed during play, arm is lifted up at its existing position to enter manual mode. When pressed again, arm is lowered down and play is performed in auto mode.	While being pressed while arm is being lifted up, arm is forwarded. During pressing, arm is not led out.	While being pressed while arm is being lifted up, arm is reversed. During pressing, arm returns to its rest to enter auto mode.

2-3 Manual play (B)

		
	When pressed until arm passes through predetermined lead-in position, turntable enters manual mode.	

2-4 Cancel of manual mode

When the tonearm is lifted up, the turntable enters manual mode. When it is lowered down, the manual mode is canceled.

NOTE: Special cases of canceling the manual mode.

1) Turning the power OFF once:
   When canceling the manual mode without the tonearm lowered down.
2) Opening the cover once:
   Not recommended

2-5 Precautions on operation

1) Do not start the turntable without a record mounted.
2) Correctly set the SIZE select switch.
3) Release the arm lock lever. (Pull it to your side, referring to **Fig. 2.**)

2-6 Operation check (Summary)

Check the following operational items in or after servicing.

1) When only turning ON the POWER switch with the cover closed, the turntable and tonearm should both not move.
2) Even when pressing the STOP (S104) or UP/DOWN (S105) switch from the situation of item 1), the mechanism should not operate.
3) With the SIZE select switch (S102) set to "30", when pressing the START switch (S103) from the situation of item 1), the tonearm should move inwards, the LED (D601) at the cartridge's tip light and the turntable rotate. In addition, the tonearm should pause for about 2 sec before being led in.
4) While pressing the START switch with the SIZE select switch set to "17" from the situation of item 3), when the tonearm passes through the "17" lead-in position, the green LED (D108) should go out and the red LED (D109) light. When stopping pressing the START switch, the tonearm should stop action.
5) When pressing the UP/DOWN switch from the situation of item 4), the tonearm should lower down, the red LED go out and green LED light.
6) Upon play under the situation of item 5), the tonearm should follow the groove normally.
7) When opening the cover or turning OFF the POWER switch from the situation of item 6), the tonearm should return to its rest and the turntable stop rotation.

NOTE: On method of test with cover opened
As the cover switch (S101) is connected to the cover lock mechanism at the right in front of the motor board, push in the lock section (oval black mold piece) about 4~5 mm (not more than 5 mm). In this way, it is possible to perform the trial test of items 1) to 7).

Chapter 3. Mechanism

3-1 Tonearm mechanism

The tonearm is lifted up or lowered down by operating the solenoid plunger by the arm UP/DOWN signal of the control circuit. When the solenoid is activated, the rod is rotated by the angle conversion arm in a certain direction, thus the tonearm is lowered down through the elevation arm. Differently, when the solenoid is released from activation, the tonearm is lifted up.

3-2 Tonearm movement control

Secondly, the rotating direction of the carry motor is controlled by the FWD/REV signal. Thus, the tonearm is forwarded or reversed along the rod together with the carrier on which the tonearm is mounted. In this case, only when the arm UP/DOWN sensor detects that the tonearm is being lifted up, the tonearm is forwarded or reversed by an operation button.

Thirdly, the position of the tonearm is detected by the brush mounted at the rear part of the carrier and the position sensor with the electrodes mounted at the lead-in and lead-out positions. Thus, the tonearm is led in or out as predetermined.

Lastly, the arm deviation angle is detected by the tracking error sensor and the control circuit functions to forward the tonearm sequentially little by little by the carry motor. Thus, the tonearm follows the groove correctly on play.

Fig. 4 shows the block diagram of the control circuit. Each circuit block performs as follows:

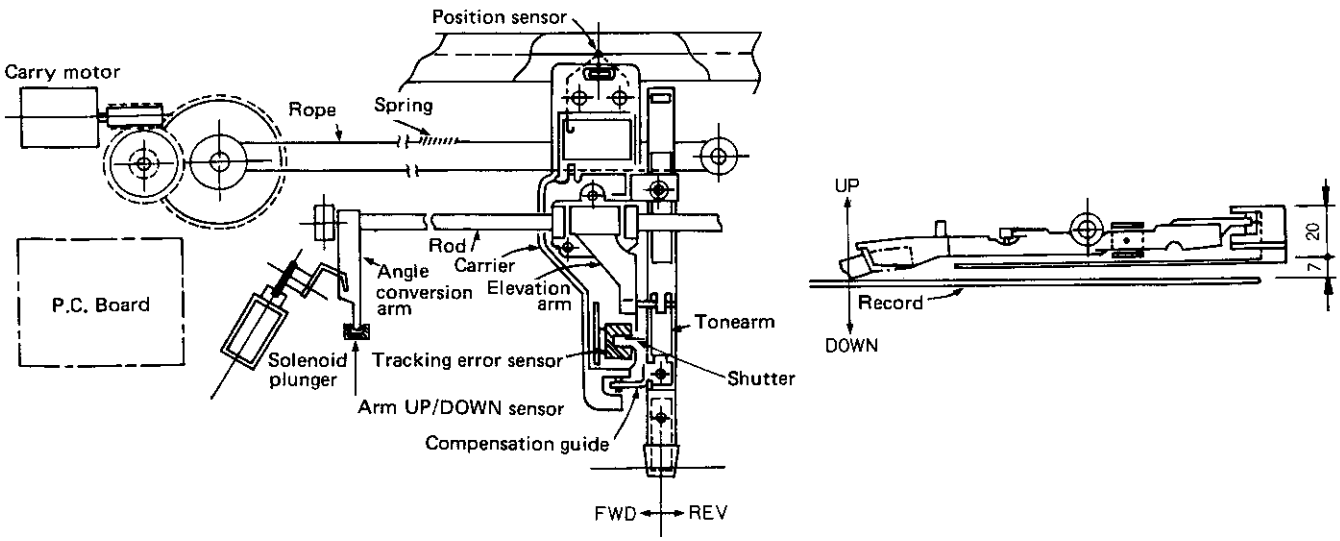


Fig. 3

Chapter 4. Block Diagram and Introduction to Circuits

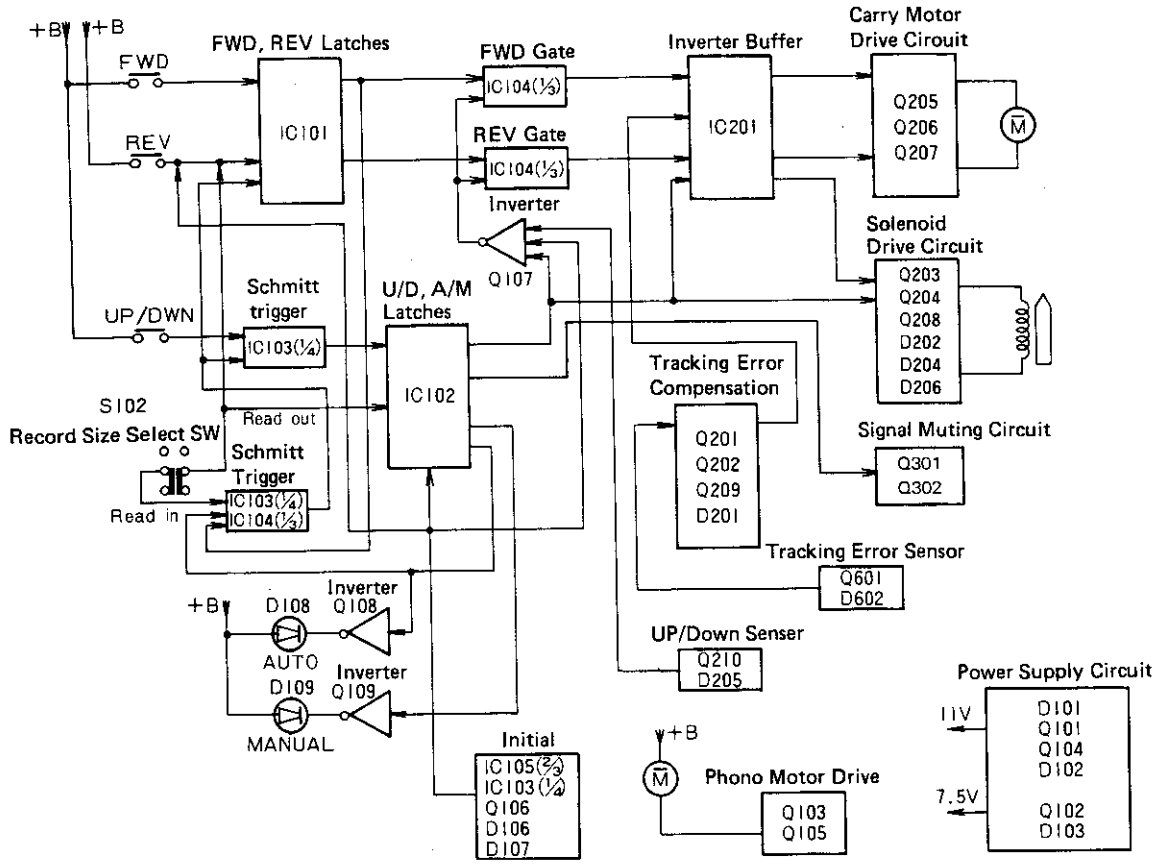


Fig. 4

4-1 Carry motor drive circuit

This circuit controls the rotating direction of the carry motor by signal, thus permitting the FWD and REV operation of the tonearm.

4-2 Solenoid drive circuit

This circuit functions to lift up and lower down the tonearm by signal. When the solenoid is activated, the tonearm is lowered down to enter the play mode.

4-3 Inverter buffer

This circuit inverts signals FWD OUT, REV OUT, PLAY, DOWN OUT, and similar others to actuate the drives in the output side of the control circuit.

4-4 Tracking error sensor and compensator

The sensor detects the tracking error of the tonearm and the compensator generates signal PLAY OUT to compensate this error. Thus, the tonearm is forwarded by signal PLAY sequentially little by little so that it is controlled to trace the groove correctly.

4-5 FWD and REV latches

These latches keep the operation states of the START/FWD and STOP/REV switches. These latches are controlled so that signal FWD or REV is emitted for lead-in or lead-out operation by the signal from another block when in the auto mode.

4-6 Up/Down and auto manual latches

The UP/DOWN latch, when the UP/DOWN button is pressed, holds the UP or DOWN mode of the tonearm to emit an output. The AUTO/MANUAL latch holds the auto or manual mode according to the operation mode to emit an output. These latches are controlled so that the lead-in or lead-out operation is performed by the signal from another block.

4-7 Size selector switch and lead-in/lead-out

The output of the position sensor is correctly used according to the selected size to control each block so that the tonearm is led in and out properly.

The lead-in gate indicates the lead-in operation to each block, when signal LEAD IN is detected during forwarding the tonearm in the auto mode.

4-8 Tonearm up/down sensor

This circuit detects the UP or DOWN action of the tonearm.

4-9 FWD and REV gates, and Q107

The FWD and REV gates emit the FWD and REV signals as FWD OUT and REV OUT, respectively. When signal DOWN OUT is emitted or when the initial reset is performed or until the tonearm is completely lifted up, FWD OUT and REV OUT are not emitted by Q107.

4-10 Initial reset and play circuit

When the power is turned ON or OFF, or when the cover is opened, this circuit indicates the lead-out operation unless the tonearm is at its rest position and inhibits other than the start operation if it is at the rest position.

4-11 Signal Muting Circuit

The signal muting circuit, Q301/Q302 operation is performed by the $\overline{\text{DOWN OUT}}$ signal of the UP/DOWN latch.

When the tonearm is lowered down (lifted up), the signal muting circuit, Q301/Q302 is turned off (turned on).

Chapter 5. Circuit Description

5-1 Power supply circuit and switches

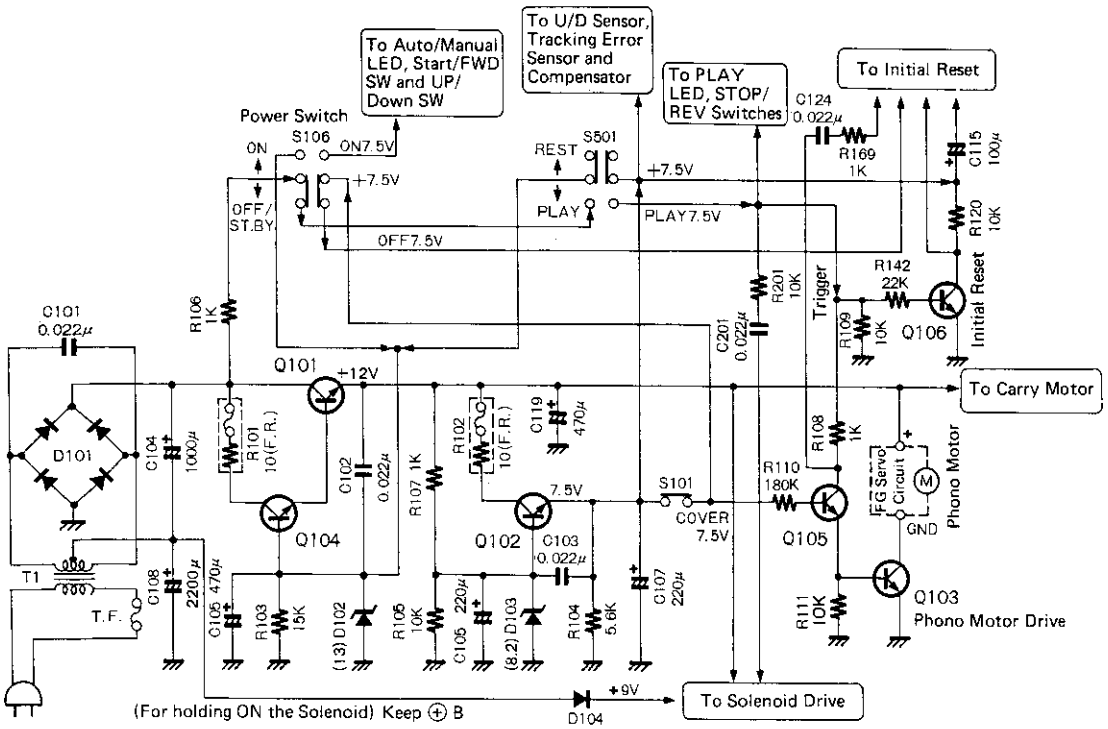


Fig. 5

This circuit supplies +12 V or +7.5 V to each section according to the operation state of each switch as shown in **Fig. 6.**

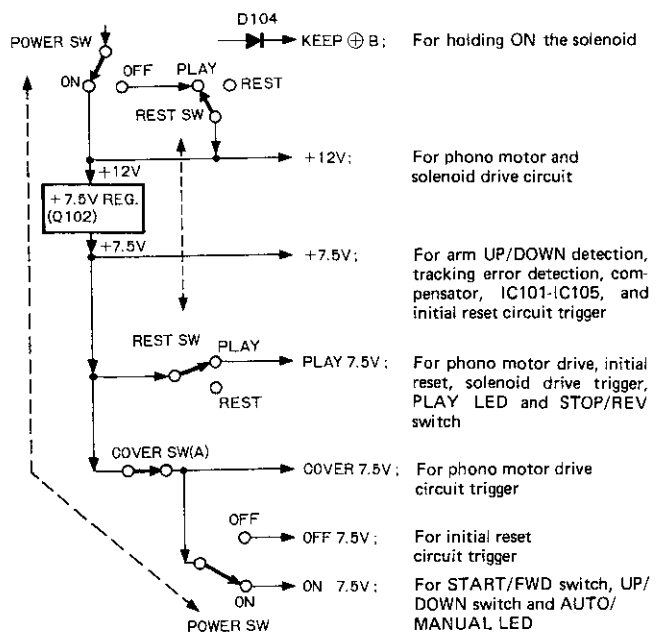


Fig. 6 Connection Diagram (in the play mode)

In **Fig. 6,** normally, KEEP ⊕ B the power source for holding ON the solenoid when the tonearm is lowered down. Power source +7.5 V is explained as +7.5 V or PLAY 7.5 V according to the respective operation states of each switch.
In addition, **Fig. 5** shows the practical wiring diagram of the power circuit and switches.

5-2 Carry motor drive circuit

★ Flow of current in FWD operation:
+12 V→Q207→motor
→IC201 pin ⑩→GND
★ Flow of current in REV operation:
+12 V→Q206→motor
→IC201 pin ⑪→GND
★ Flow of Tracking error compensation current in play operation:
+12 V→Q207→motor
→IC201→GND

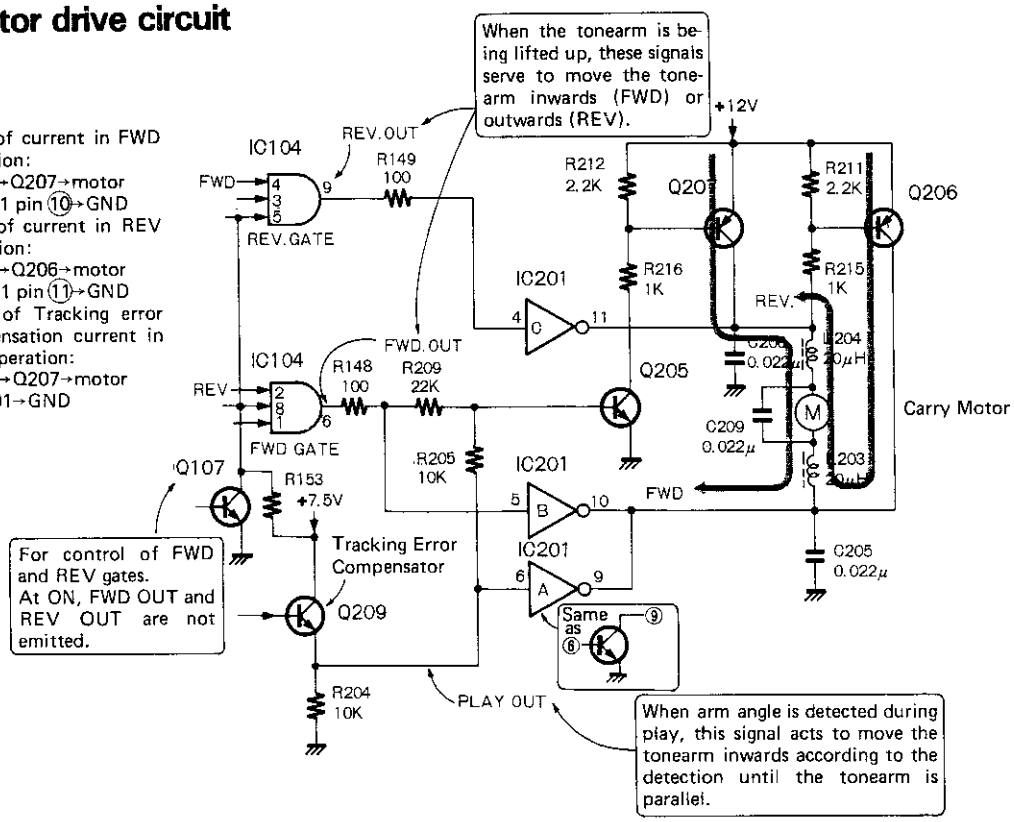


Fig. 7

This circuit is as shown in **Fig. 7.**
The carry motor acts to move the tonearm by signal REV OUT, FWD OUT or PLAY OUT. In each of the FWD, REV and play operations, the respective states of each section are as follows:
IC201MPA53C is a Darlington transistor array IC. Each input is entered from the base terminal and each output is emitted from the collector terminal. For the flow of the operating current in each mode, refer to **Fig. 7.**
Q107 is used for gate control. At ON, FWD OUT and REV OUT are not emitted.

MODE	REV	FWD	PLAY	UP
REV OUT (IC104 ⑨)	H	L	L	L
FWD OUT (IC104 ⑥)	L	H	L	L
PLAY OUT (Q209E)	L	L	H	L
IC201 ⑪	L	H	H	H
IC201 ⑩	H	L	H	H
IC201 ⑨	H	L	H	H
Q206	ON	OFF	OFF	OFF
Q205	OFF	ON	ON	OFF
Q207	OFF	ON	ON	OFF
CARRY MOTOR	REV ROTATION	FWD ROTATION	FWD ROTATION	STOP

5-3 Solenoid drive circuit

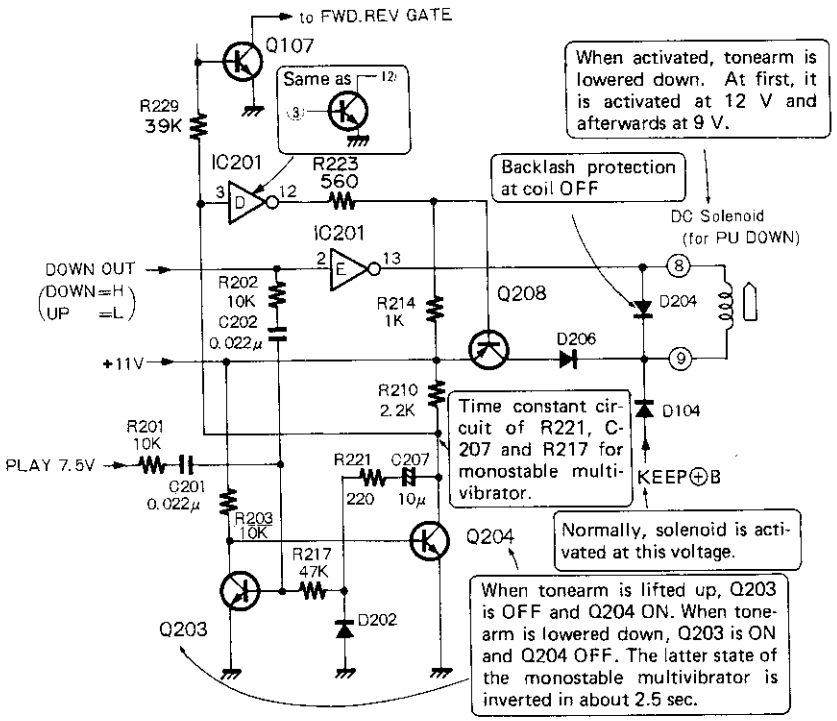


Fig. 8 Solenoid Drive Circuit

This circuit is as shown in **Fig. 8.**

This circuit is controlled by the arm UP/DOWN signal to activate the solenoid by which the tonearm is lifted up or lowered down. Q203 and Q204 from a monostable multivibrator. Normally (when the tonearm is lifted up), Q203 turns OFF and Q204 ON. Thus, pin 12 of IC201 becomes "H" to turn Q208 OFF. When the tonearm is lifted up, since signal DOWN OUT is "L", pin 13 of IC201 is "H" (the transistor of pin 13 is OFF). Thus, the solenoid is not activated and the tonearm is at the UP position.

Next, when the tonearm is lowered down, since signal DOWN OUT becomes "H", pin 13 of IC201 is "L". Thus, when Q203 is turned ON and Q204 OFF at the leading edge of signal DOWN OUT through R202 and C202, since the collector of Q204 is "H", pin 12 of IC201 becomes "L". +12 V thereby serves to activate the solenoid through the route of Q208→D206→solenoid→IC-201 pin 13. This activation continues for about 2.5 sec by the time constant circuit of C207, R221 and R217. Subsequently, since the monostable multivibrator of Q203 and Q204 returns to the stable state in which Q203 is OFF and Q204 ON, the collector of Q204 is "L" and pin 12 of IC201 is "H". Thus, Q208 turns OFF and the solenoid is held ON by KEEP ⊕ B voltage.

Finally, when the tonearm is released from its rest by pressing the START switch, the trigger of R201 and C201 functions to actuate the monostable multivibrator of Q203 and Q204 by PLAY 7.5 V with the REST switch at PLAY. Thereby, this trigger acts to temporarily stop the action of the tonearm (at the outermost position of the 30 cm LP record).

Since the distance between the rest and "30 cm" lead-in positions is short, when the START switch is pressed for an excessively long time, the mode changes from auto to manual (play (B)) when the tonearm passes through the lead-in position. To avoid this problem, the above temporary stoppage is performed, thus assuring the lead-in operation of the tonearm.

During the period of the stoppage, since signal DOWN OUT resultant from detecting the lead-in position is not emitted, the solenoid is not activated. Accordingly, the tonearm is not lowered down.

5-4 Tracking error sensor and compensator

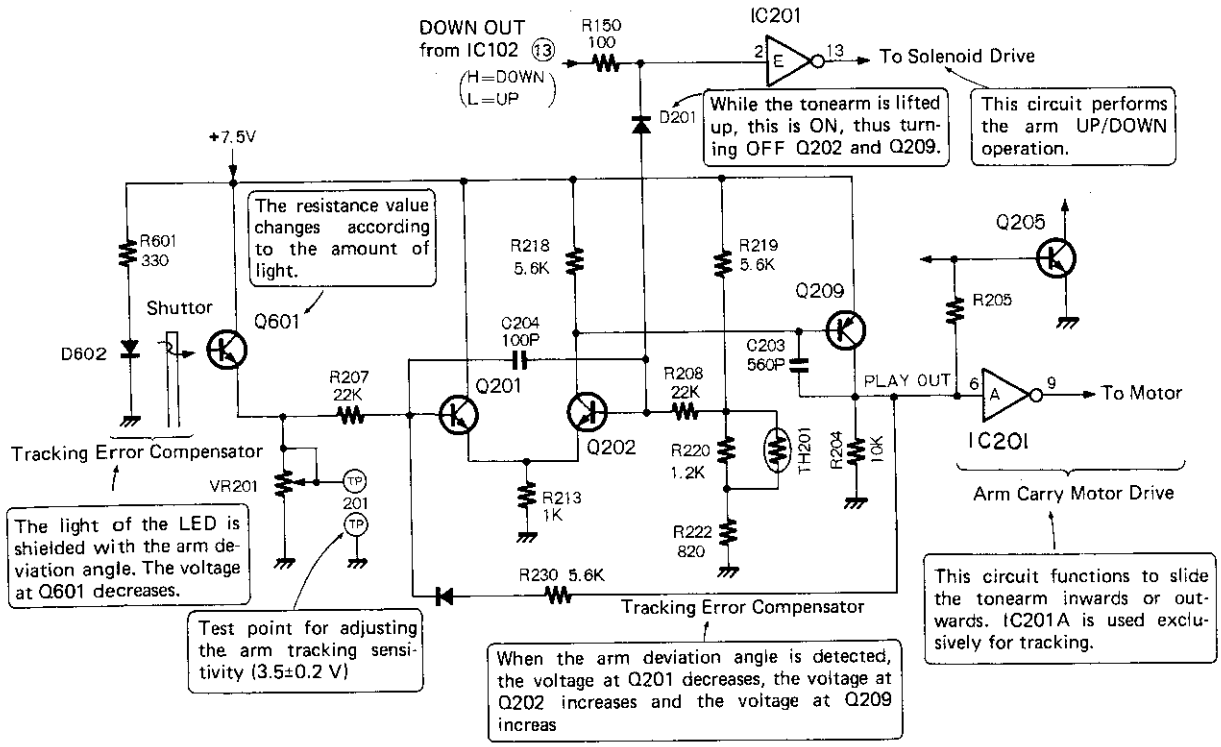


Fig. 9

This circuit of the sensor and compensator is as shown in **Fig. 9.**

This circuit provides the linear tracking action during play. It detects the arm deviation angle to slide the tonearm according to the detection.

The horizontal tracking error of the tonearm is detected by the tracking error sensor (consisting of an LED and a phototransistor) mounted on the carrier and the shutter placed at the tonearm. As shown in **Fig. 10.** This detection makes use of the fact that the emitter voltage of Q601 (phototransistor) varies when the shutter shields the light of LED D602. The shutter controls the passing amount of the light according to the amount of the tracking error. Thus, the emitter voltage of Q601 decreases, the voltage at Q201 decreases, the voltage at Q202 increases, the voltage at Q209 increases and the voltage at Q205 increases. When pin 9 of IC201 thereby becomes "H", the carry motor performs the FWD rotation to slide the tonearm (analog control).

When the tonearm is lifted up (signal DOWN OUT at "L"), D201 is used to prevent the tonearm from sliding at Q202 OFF and Q209 OFF even when tracking error occurs. The base voltage of Q202 is the bias voltage which determines the operating point of the tracking error compensator which includes a differential circuit of Q201 and Q202. This circuit is subject to temperature compensation by TH201. VR201 is used for adjusting the tonearm tracking sensitivity and its level determines the deviation angle at which the tracking error is compensated.

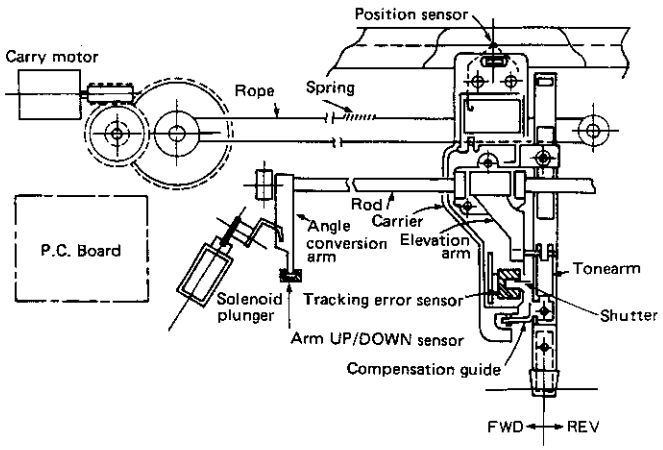


Fig. 10

5-5 Lead-In and lead-out sensor and circuit

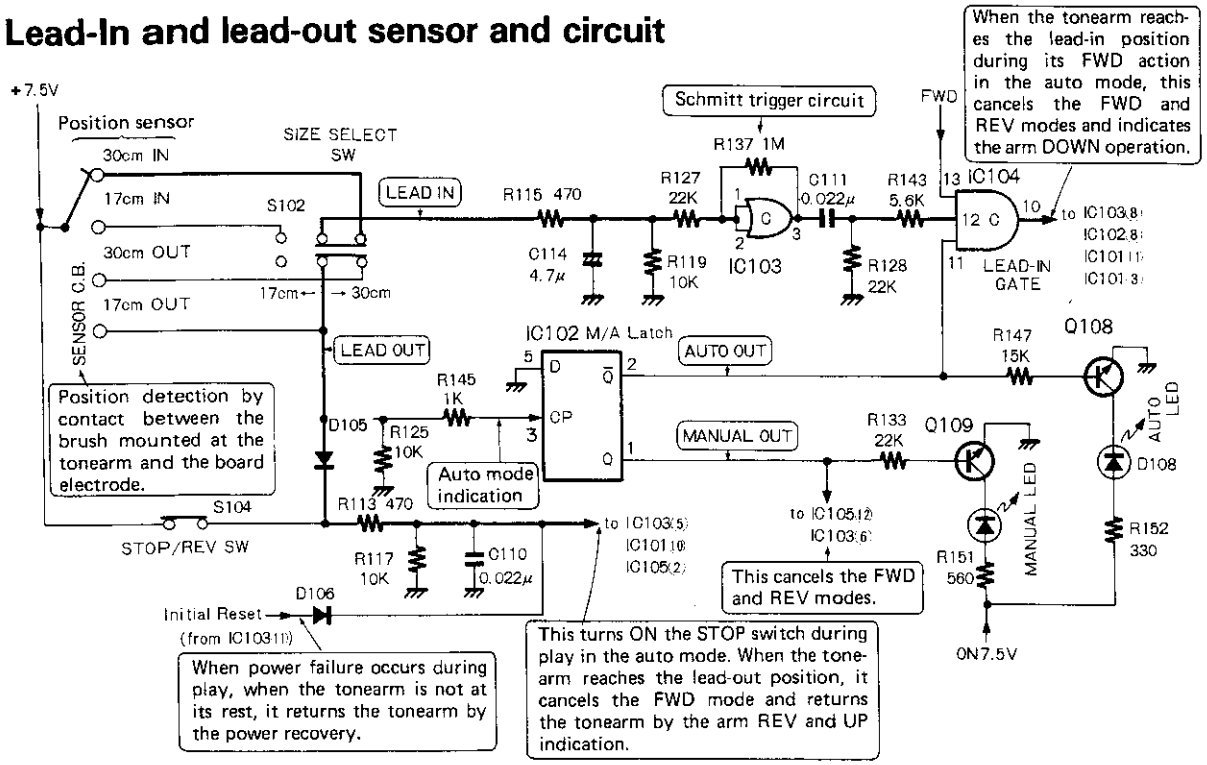


Fig. 11

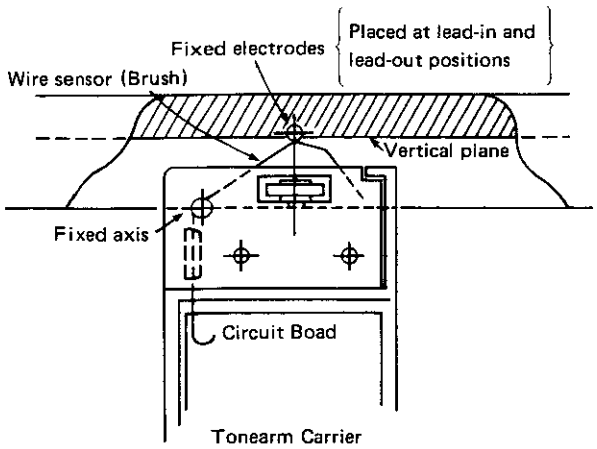


Fig. 12

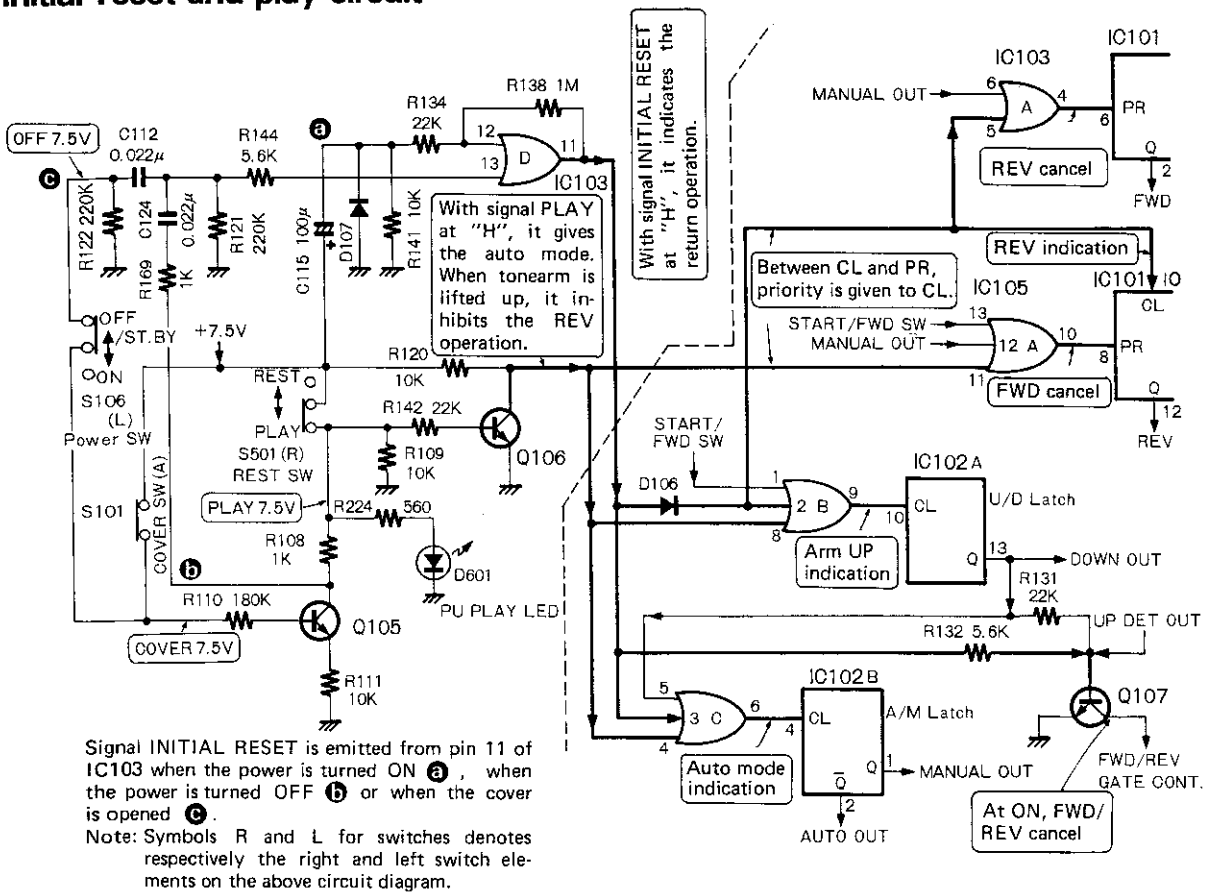
The position sensor shown in **Fig. 12** detects the predetermined positions in combination with the wire sensor (brush) located at the rear part of the carrier and the electrodes fixed at the lead-in and lead-out positions (for 30 cm and 17 cm records) as shown in **Fig. 11.**

At power ON, the tonearm enters the auto mode. When the START switch is pressed, the tonearm moves in the FWD mode. Thereupon, when the SIZE select switch is set to "30", the position sensor turns ON with "30 cm IN" and enters as signal LEAD-IN the "H" pulse into pin 12 of lead-in gate IC104 which is timed by Schmitt trigger IC103C. At this time, since signal FWD is "H" (FWD mode) and signal AUTO OUT is also "H" (auto mode), signal LEAD-IN GATE OUT (pin 10 of IC104) becomes "H", thus the FWD and REV modes are canceled (the stoppage of the tonearm motion) and indicates the arm DOWN operation so that the play starts at the "30 cm" lead-in position.

Next, signal LEAD-OUT at "H" from the position sensor becomes the lead-out (return) indication signal through D105 and R117 which in turn indicates the arm UP and REV operation to the respective circuits. At this time, the MANUAL/AUTO (M/A) latch is set to the auto mode by signal LEAD-OUT.

In addition, when the stop operation is indicated by the STOP/REV switch or power failure occurs with the tonearm not placed at its rest (the play mode), the lead-out operation is also performed by the initial reset indication for power recovery.

5-6 Initial reset and play circuit



Signal INITIAL RESET is emitted from pin 11 of IC103 when the power is turned ON ⓐ, when the power is turned OFF ⓑ or when the cover is opened ⓒ.

Note: Symbols R and L for switches denotes respectively the right and left switch elements on the above circuit diagram.

Fig. 13

This circuit is as shown at the right side of the broken lines in **Fig. 13.** This circuit performs the initial reset at power ON/OFF. It emits two outputs; signal INITIAL RESET from pin 11 of IC-103 and signal PLAY from the collector of Q106. At power ON, when +7.5 V makes pin 12 of IC-103 into "H" and also pin 11 of IC103 (signal INITIAL RESET) into "H" by the time constant of C115 and R141, the circuit gives the auto mode, the arm UP and REV indications, and cancels the FWD mode, thus permitting the lead-out operation. At this time, when the tonearm is at its rest, Q106 turns OFF and the circuit inhibits the REV operation by the auto mode and arm UP indications with signal PLAY at "H".

At power OFF during play, since the POWER switch is turned OFF to enter the standby mode, the lead-out operation is performed with signal INITIAL RESET at "H" through +7.5 V→C112→R144→pin 13 of IC103.

When the cover is opened during play, since the cover switch is turned OFF and Q105 OFF, PLAY 7.5 V makes pin 11 of IC103 into "H" by an "H" pulse through R108→R169→C124, thus permitting the lead-out operation.

When the initial reset operation is performed at power ON, Q107 is turned ON with signal INITIAL RESET at "H", via R132 at the start of the lead-out operation esp. by the time constant of C115 and R141. Thereby, signal REV OUT is not emitted from the REV gate during this time only.

5-7 Mode latch circuit and up/down sensor

First, we describe the operation of the D-type flip-flop of IC101 and IC102 for latch.
Each IC is CMOS TC4013BP which is composed of the D-type flip-flop with two independent circuits as shown in **Fig. 14.** The level of the input applied to the data (D) input is transmitted to the Q and $\overline{Q}$ outputs at the rise time of the clock pulse (CP).
When the clear (CL) input is made "H", the Q output becomes "L" irrespective of any other input. When the preset (PR) input is made "H" with the clear input at "L", the Q output becomes "H" independent of the clock pulse and data inputs.
When the clear and preset inputs are "H", the clear input is given priority, thus the Q output becomes "L" and the $\overline{Q}$ output "H".
The mode latch circuit is as shown in **Fig. 15,** which operates as described in the timing chart of **Fig. 16.**

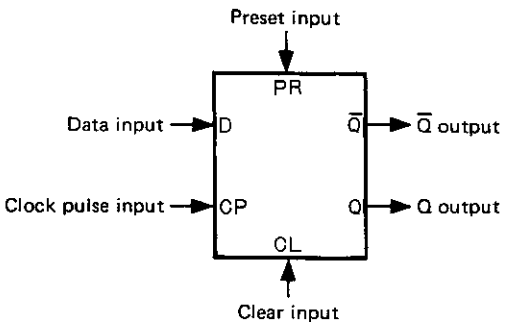


Fig. 14

Mode Latch Circuit

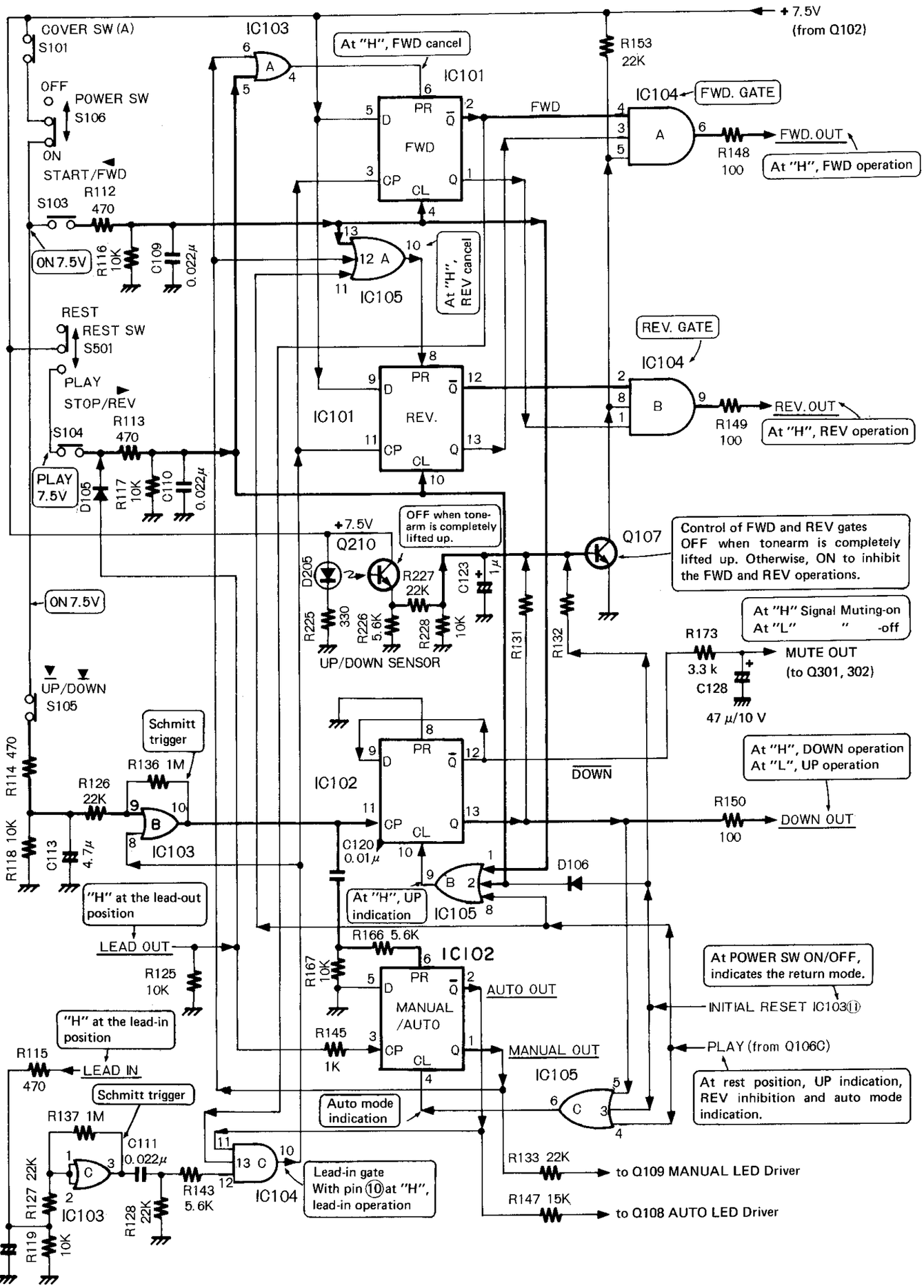


Fig. 15 Mode latch Circuit

Timing Chart

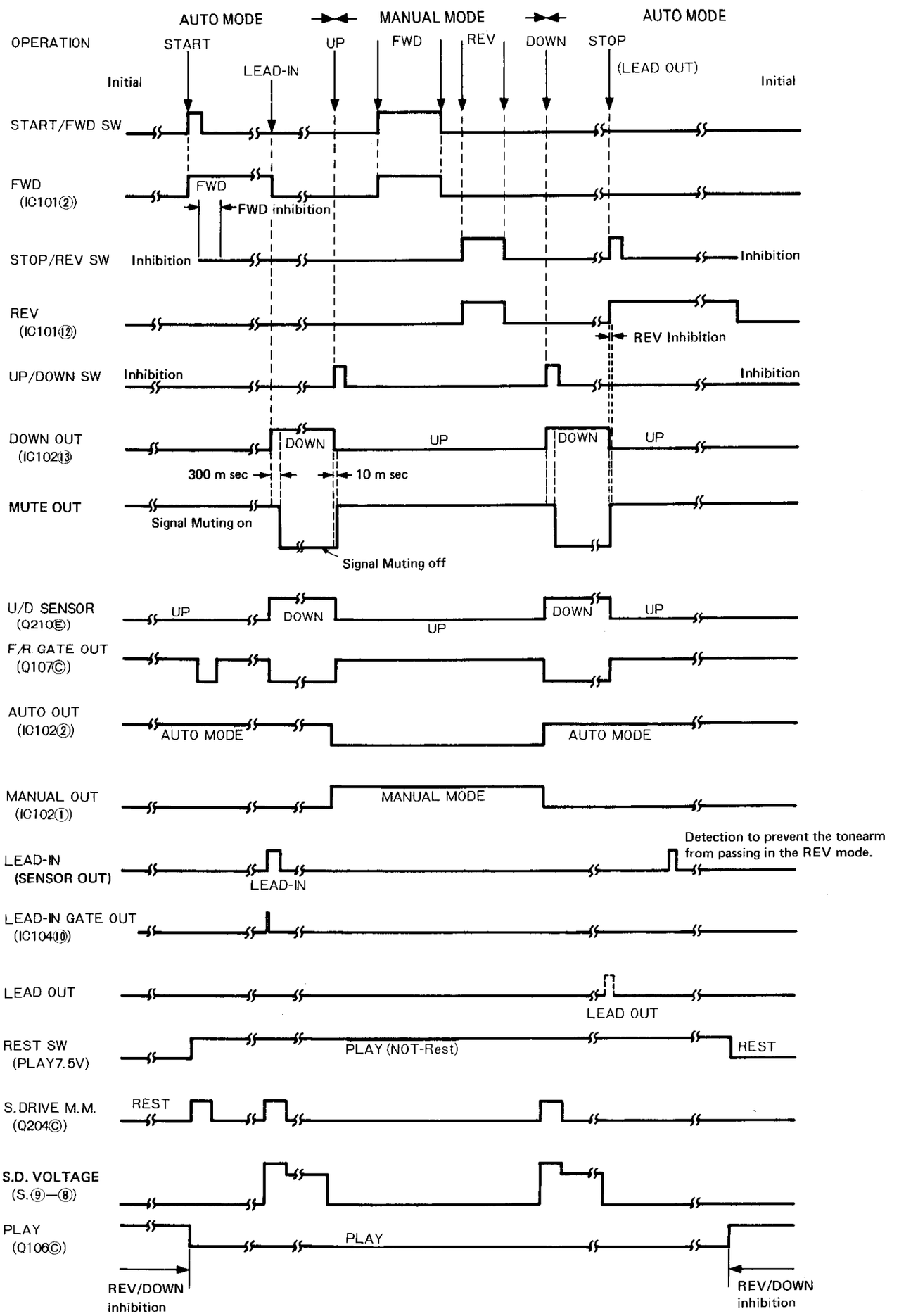


Fig. 16 Timing Chart

5-7-1 Start operation

1) At first, by signals INITIAL RESET and PLAY, the tonearm is lifted up to the rest position and the turntable is in the auto mode. At this time, since PLAY 7.5 V is not supplied to the STOP/REV switch, the operation of this switch is inhibited. Even when the UP/DOWN switch is pressed, the UP/DOWN latch is cleared with signal PLAY at "H", thus the DOWN operation is inhibited with the UP mode kept as it is. This is called the "initial mode."

2) When the START/FWD switch is pressed and soon released, the start operation begins because of the auto mode. First, the FWD latch is cleared with signal START SW OUT at "H", thus making signal FWD into "H". The REV latch is preset by pin 10 of IC105 (OR-A), thus making signal REV into "L".
Subsequently, signal FWD OUT at "H" is emitted from pin 6 of FWD gate IC104 (AND-A). Thereby, the tonearm is forwarded.

3) When the tonearm is moved and released from the REST switch, the state of the solenoid drive monostable multivibrator is inverted at the rise time of PLAY 7.5 V by R201 and C201. Then, when Q107 (the control of the FWD and REV gates) is turned ON with the collector of Q204 at "H", the tonearm is stopped temporarily with signal FWD OUT at "L" (see 5-3. Solenoid Drive Circuit on page 11), after which the tonearm continues forwarding again.
In addition, PLAY 7.5 V turns Q106 ON to enter the play mode with signal PLAY at "L". The operation of the START/FWD and UP/DOWN switches is thereby released from inhibition. Therefore, especially with a 17 cm record, be careful in operating the UP/DOWN switch until the tonearm is led in.
(This is because the tonearm is lowered down outside of the record.)

4) When the lead-in position is detected subsequent to FWD action, signal LEAD-IN becomes "H", thus an "H" pulse is entered into pin 12 of IC-104 (AND-C) with pin 3 of IC103 (OR-C) at "H". At this time, since any other input is "H" because of the auto and FWD modes, signal LEAD-IN GATE OUT of pin 10 of IC104 (AND-C) becomes "H". The leading edge of this signal becomes the clock pulse to the FWD and REV latches.
Since the data (D) inputs of the FWD and REV latches are "H", the tonearm is stopped with signals FWD and REV at "L". In addition, signal LEAD-IN GATE OUT becomes the clock pulse of the UP/DOWN latch through IC103 (OR-B). Therefore, the Q output (pin 13), signal DOWN OUT, of IC102 becomes "H" with the $\overline{Q}$ output (pin 12) and data input (pin 9) of IC102 both at "H" in the UP mode.
The tonearm is thus lowered down.
Since the MANUAL/AUTO latch is cleared with signal DOWN OUT at "H", the turntable enters the auto mode.

5-7-2 UP operation

1) When the UP/DOWN switch is pressed during play, signal UP SW OUT at "H" becomes the clock pulse of the UP/DOWN latch through IC-103 (OR-B). At this time, since signal DOWN OUT becomes "L" at the rise time of signal UP SW OUT with the $\overline{Q}$ output (pin 12) and data input (pin 9) of IC102 both at "L", the tonearm is lifted up.

2) Since the "H" output of pin 10 of IC103 (OR-B) presets (PR) the MANUAL/AUTO latch through C120 and R166, signals AUTO OUT (pin 2) and MANUAL OUT (pin 1) of IC102 becomes "L" and "H", respectively.
Thus, the turntable enters the manual mode.

3) Signal MANUAL OUT at "H" presets the FWD latch through IC103 (OR-A) to make signal FWD into "L".
Subsequently, signal MANUAL OUT presets the REV latch through IC105 (OR-A) to make signal REV into "L". Thereby, the FWD and REV operations are canceled.

5-7-3 FWD, REV and MANUAL operations

1) Any of these operations can be performed in the UP mode by the UP/DOWN switch. At first, when the FWD switch is pressed, the FWD latch is cleared and signal FWD becomes "H". Then the REV latch is preset and signal REV becomes "L".
   At this time, since the tonearm is lifted up, it is forwarded with signal FWD OUT at "H" while the FWD switch is pressed. When the FWD switch is released, the FWD operation is canceled with signal MANUAL OUT at "H". In addition, while the REV switch is pressed, the tonearm is reversed.
2) When the lead-out position is detected during the FWD action, since the leading edge of signal LEAD OUT at "H" becomes the clock pulse of the MANUAL/AUTO latch, the turntable enters the auto mode with the data input (pin 5) of IC102 at "L".
   Signal LEAD OUT at "H" becomes the stop indication signal through D105. However, while the FWD switch is pressed, the FWD latch is cleared by signal FWD SW OUT and the REV latch by signal LEAD OUT. Subsequently, signals FWD and REV become "H". Since the inputs to the FWD and REV gates however become "L" at the respective $\overline{Q}$ outputs of these latches, signals FWD OUT and REV OUT become "L". Thus, the tonearm stops at the lead-out position. When the FWD switch is released, the stop operation (described later) is performed. In addition, when the tonearm reaches the rest position in the REV operation, signal PLAY of the collector of Q106 becomes "H". The turntable thus enters the initial mode.
3) When the START/FWD and STOP/REV switches are both pressed without the tonearm at its rest, since the FWD, REV and UP/DOWN latches are all cleared, the tonearm is inhibited from moving in the UP mode.

5-7-4 DOWN operation

In this operation, when the UP/DOWN switch is pressed while the tonearm is slided or manually lifted up, the tonearm is lowered down. First, the leading edge of signal UP/DOWN SW OUT at "H" becomes the clock pulse of the UP/DOWN latch through IC103 (OR-B). Thus, signal DOWN OUT becomes "H" with the $\overline{Q}$ output (pin 12) and data input (pin 9) of IC102 both at "H" when the tonearm is lifted up, thereby permiting the DOWN operation. At the same time, Q107 turns ON to inhibit the FWD and REV operations.
At this time, the MANUAL/AUTO latch is preset to enter the auto mode. In addition, the DOWN operation is performed irrespective of the manual or auto mode when required. Therefore, be careful not to lower down the tonearm outside of the record in the start (auto FWD) or stop (auto REV) operation. If so, play is made again.

5-7-5 Stop (lead-out/auto REV) operation

1) During play, when the STOP/REV switch is pressed or when the lead-out position is detected, the FWD latch is preset by signal STOP SW OUT at "H" or signal LEAD-OUT at "H" through D105. Thus, signal FWD becomes "L" and the REV latch is cleared.
   At this time, signal REV becomes "H" to clear the UP/DOWN latch to make signal DOWN OUT into "L".
2) Q107 (the control of the FWD and REV gates) is turned OFF when the tonearm is lifted up. Signal REV OUT at "H" is emitted from pin 9 of REV gate IC104 (AND-B), thus starting the REV operation.
3) During the REV action, even when the lead-in position is detected, the tonearm passes the lead-in position as it is, because lead-in gate IC104 (AND-C) remains "L". Subsequently, when the tonearm reaches its rest, signal PLAY at the collector of Q106 becomes "H". Thus, the REV operation is canceled to enter the initial mode.
4) During the REV action, when the DOWN switch is pressed, the tonearm stops and lowers down. (Refer to 5-7-4)

5-7-6 Manual (B) operation

When continuing pressing the START switch in the start operation, even when the lead-in position is detected, the FWD latch is cleared with signal START/FWD SW OUT at "H". At the same time, the UP/DOWN latch in the FWD mode is also cleared through IC105 (OR-B). Thus, the turntable enters the manual mode.

5-7-7 Auto FWD operation

Since the turntable is in the auto mode during play, when the START/FWD switch is pressed and released, the tonearm is forwarded in the start operation with itself lifted up. When the DOWN switch is pressed as required, the turntable enters the play mode again (see item 5-7-4).
Therefore, unless the DOWN operation is indicated, the tonearm automatically moves inwards as it is. When the lead-out position is detected, the stop (lead-out) operation is performed.
In addition, when the START/FWD switch is pressed at the lead-out position, the tonearm stops there.
When it is released, the tonearm returns to its rest.

Memo

Memo

Chapter 6. Circuit Diagram and P.C.Board Connection Diagram

6-1 Schematic diagram

L-E600 is configured as shown in **Figs 17** and **18.** For the voltage value and adjustment of each section, refer to the Service Manual No. 2586 for linear tracking full-auto turntable L-E600.
It should be here noted that the symbol Nos in **Fig. 17** are different from those in the service note for practical description.

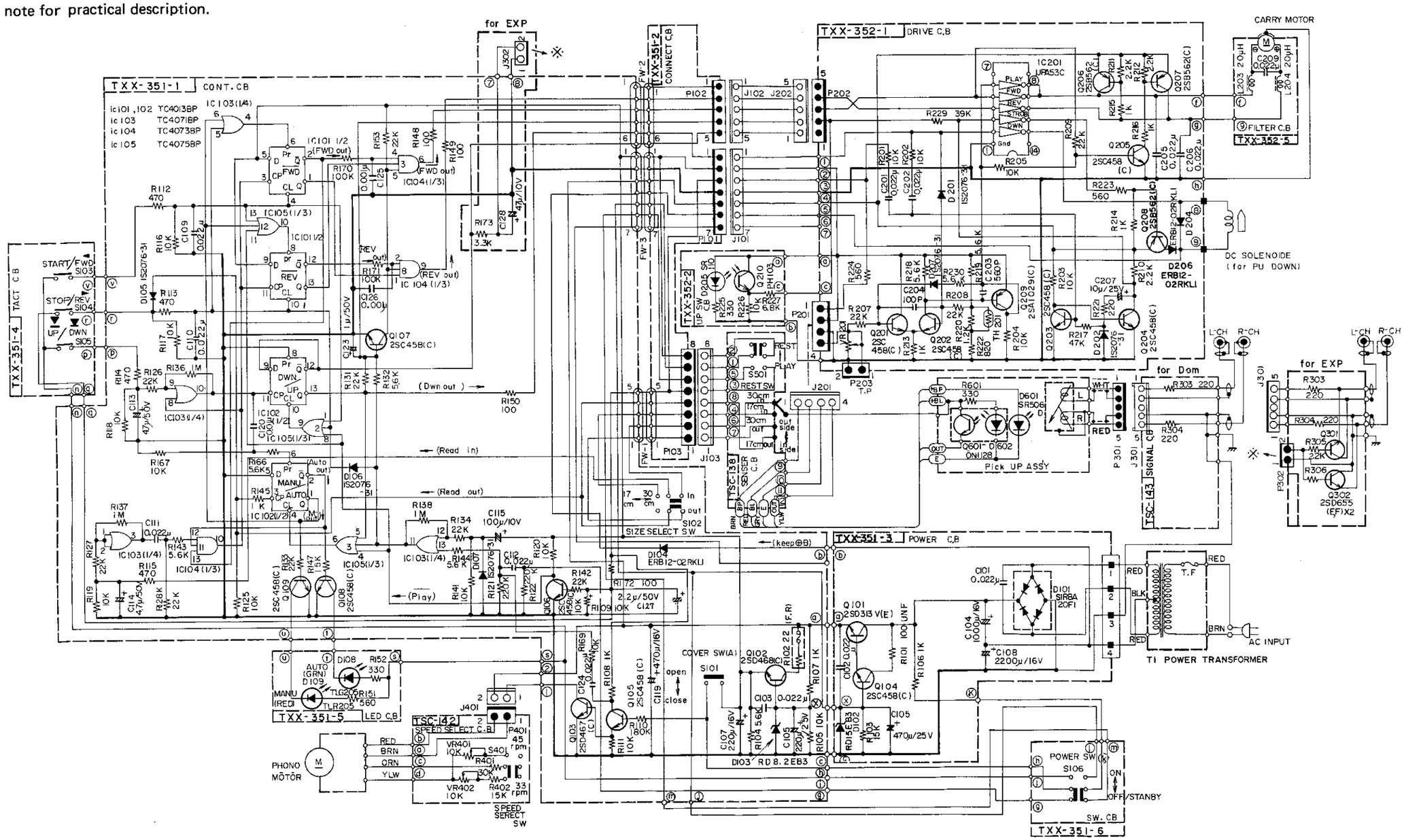


Fig. 17

6-2 P.C. board connection diagram

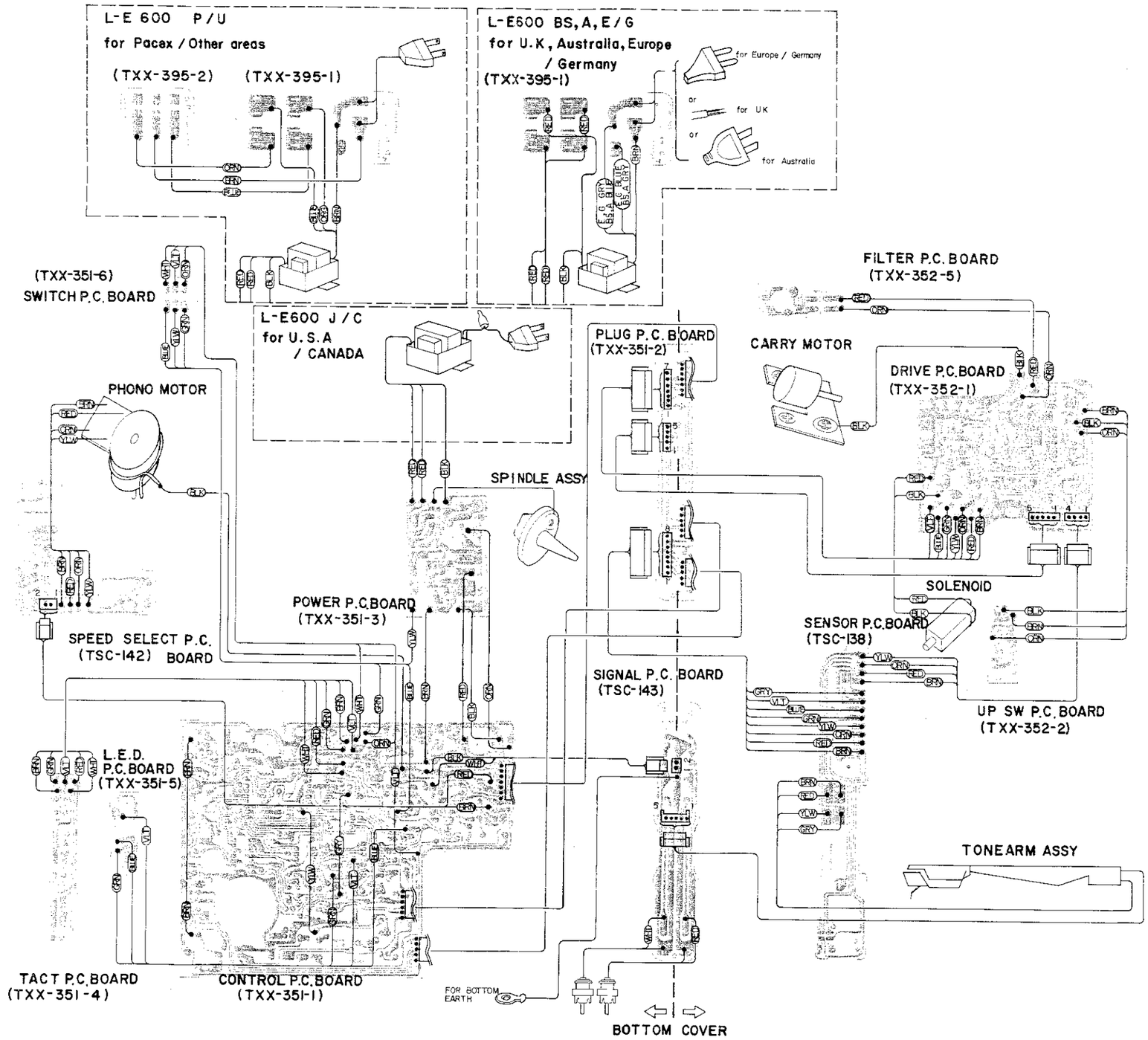


Fig. 18

Appendix

Specifications

Motor Section

Motor	: DC type, FG servomotor
Drive system	: Belt drive
Speeds	: 33-1/3 rpm, 45 rpm
Wow and flutter	: 0.08 % (DIN), 0.06 % (WRMS)
Signal-to-noise ratio	: More than 60 dB (DIN-B)

Tonearm Section

Type	: Linear tracking statically balanced low mass arm
Effective length	: 102 mm
Tracking error	: 0.3°

Cartridge Section

Model	: MD-1038L (USA, Canada only) MD-1041 (others)
Type	: Low mass type, dual magnet (USA, Canada only), induced magnet (others)
Frequency response	: 20 Hz – 20,000 Hz
Output	: 2.4 mV (1,000 Hz)
Channel separation	: 20 dB (1,000 Hz) (Test record TRS-1)
Load resistance	: 47 kΩ
Stylus tip	: 0.6 mil diamond
Stylus	: DT-38 (USA, Canada only), DT-41 (others)
Optimum tracking force	: 2.0 g (USA, Canada only), 2.5 g (others)

General

Power consumption	: 12 watts
Dimensions	: 8.7 cm (H) x 34 (or 34.4) cm (W) x 35 cm (D) (Since the dimensions are only the design figures, additional space will be required when installing the unit in a rack, etc.)
Weight	: 4.5 kg (10.0 lbs) (without corrugated cardboard case)

Accessory

EP adaptor 1

Design and specifications subject to change without notice.