JVC

SERVICE MANUAL

MODEL TT-81

QUARTZ-LOCKED TURNTABLE

No. 2390
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CONTENTS

		Page
1. Specifications		2
2. Features		3
3. New Technical Information		
	3-(1) Block Diagram	4
	3-(2) Crystal Oscillator and Frequency Deviders	5
	3-(3) Neon Lamp Circuit	5
	3-(4) Frequency Generator, Output Amp. Waveform and Phase Comparison	6
	3-(5) Drive Circuit	7
	3-(6) Reverse Turn Detection	7
	3-(7) Start/Stop Circuit	8
	3-(8) Cut-off of Hall Element Drive Circuit	8
	3-(9) Quick Stop Circuit	8
4. Dismounting		9
5. Adjustment Procedures		
	5-(1) Power Supply Voltage	10
	5-(2) Lock Adjustment	10
	5-(3) Quick Stop Adjustment	11
	5-(4) Wow and Flutter Adjustment	11
	5-(5) Speed Adjustment	11
6. Connections Wiring		12
7. Lubrication		12
8. Waveforms		13
9. Troubleshootings		
	9-(1) Turntable does not rotate	14
	9-(2) Turntable rotates at high speed and fails to stop	15
	9-(3) Speeds increase when rotated in the reverse direction	16
	9-(4) Neon Lamp does not light	16
	9-(5) Neon Lamp remains lit	16
	9-(6) Turntable rotates at an incorrect rpm	17
	9-(7) Speed Select button does not function	18
	9-(8) Quick Stop does not function	18
10. Exploded View and Parts List		19
11. TAS-19C Servo Control and Power Supply P.C. Board Ass'y		21
12. Packing Material Parts List		26
13. Accessories List		27
14. Parts List with Specified Number for Designated Areas		27
15. Schematic Diagram		28
16. Diagram of TAS-19C Printed Circuit Board Ass'y		29

1. Specifications

Motor	: DC servomotor
Drive system	: Direct drive
Speeds	: 33-1/3 and 45 rpm
Speed detection	: Integrated frequency generator
Servo system	: Quartz-locked positive and negative servo control
Pitch control	: ±6Hz (reference: 440Hz)
Starting time	: Within 1 sec
Wow and flutter	: 0.025% (WRMS) 0.05% (DIN)
Rumble	: 63dB (IEC-B), 73dB (DIN-B)
Starting torque	: 1.3kg.cm
Speed deviation	: Within 0.002%
Load characteristics	: 0% (with a 40g total tracking force)
Drift (hour)	: 0.0004%/H
Power characteristics	: 0% (±10V)
Temperature characteristics	: 0.00003%/°C
Platter	: 31cm diecast aluminium
Quick stop time	: Within 1 sec
Power supply	: Refer to Table below
Power consumption	: Refer to Table below
Dimensions	: 15cm(H) x 35.8cm(W) x 35.8cm(D)
Weight	: 8kg (net)

TABLE

Countries	Line Voltage & Frequency	Power consumption
		TT-81
U.S.A., CANADA	AC 120V, 60Hz	13 watts
EUROPE CONTINENT	AC 220V, 50Hz	13 watts
U.K., AUSTRALIA	AC 240V, 50Hz	13 watts
U.S. MILITARY MARKET	AC 100, 120V/220, 240V Selectable, 50/60Hz	10 watts
OTHER AREAS	AC 110, 120V/220, 240V Selectable, 50/60Hz	13 watts

2. Features

- **Quartz-locked turntable**

  The oscillating frequency of an oscillator circuit using crystal quartz is accurate and stable, as suggested by the fact that quartz is used in clocks and watches. The quartz-locked turntable utilizes this accurate oscillating frequency to control the speed of the turntable. In both aecuracy and stability, quartz-locked speed control is far superior to the conventional servo systems.

- **Positive and negative servo control**

  Factors which disturb the servomotor such as wear of the rotating parts, increased load or voltage drop, usually act to slow down the turntable speed. To cope with this, the conventional servomotor increases the drive current to the drive circuit to accelerate the motor. However, to correct excess acceleration due to increased voltage or servo overshooting, it only switches off the drive current. This results in poor response because of the inertia of the rotating parts. The new positive and negative servo control is capable of correcting the speed in both directions. This also makes it possible to bring the speed instantly to a steady state when it is switched from 45 rpm to 33-1/3 rpm.

- **Quick stop**

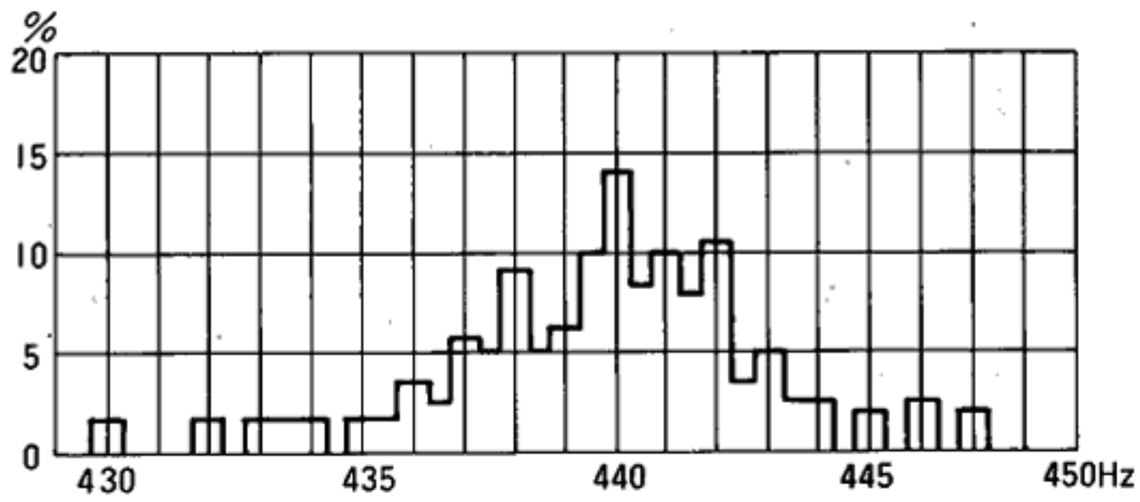
  With most turntables, it takes some time before the turntable stops completely after the stop button has been pressed, owing to inertia in the rotating parts. This makes changing records rather inconvenient. To solve this problem, the TT-81 is equipped with a quick stop device. When the stop button is pressed, an electronic brake produces a reverse-current in the drive circuit and instantly stops the rotation with reverse motor torque.

- **Integrated frequency generator**

  A frequency generator for speed detection is an integral part of the motor. To detect the speed, a disc rotor has 180 grooves cut in its circumference and a doughnut-shaped magnet is attached to this disc rotor. Therefore, 180 magnetic fluxes are formed around this magnetic component, under which a stator coil for detection is printed on a doughnut-shaped circuit board. When the motor is rotating, 180 pulses per revolution are available from this circuit board.

- **1Hz pitch control**

  The pitch, "A′" is standardized at 440Hz according to international standards, and is the standard for all western musical instruments. In other words, the tuning of all instruments of the orchestra is based on this pitch. But in reality, the basic tuning pitch of each orchestra differs due to the instrumentation and individual characteristics of each orchestra, as well as the personality of the conductor. The diagram shows such differences by orchestra. Most of the pitches range within ±6Hz of 440Hz. To reproduce these subtly different pitches, a quality turntable with highly accurate rotation is required. Another important requirement is the possibility of minute speed adjustment. If the speed of a turntable could be adjusted to the individual pitch used by an orchestra while at the same time remaining controlled by a quartz-locked servo system, the benefits of flexibility and precision would be significant from a musicological viewpoint. For this reason the TT-81 is equipped with built-in speed-control facilities which can adjust the pitch in 1Hz steps within a range of ±6Hz of 440Hz. The difference of pitches between master tape recorders and disc record cutting machines has been intentionally ignored before but now the speed of a record can be adjusted to match the original pitch of the orchestra, even if the master was recorded differently from the original performance. For example, a performance of the NHK Symphony Orchestra on one record can be adjusted to match the pitch of the same performance on a record by the London Symphony Orchestra, for the enjoyment of a critical comparison.
  The "A′" key of a piano in your home is usually tuned to 440Hz. When you practice the piano while playing back a record, you can adjust the pitch of the record, to be in perfect tune with your piano.



Concert tuning pitches

Relationship between pitch control and turntable speed

Pitch / Speed	+6Hz	+5	+4	+3	+2	+1	0	−1	−2	−3	−4	−5	−6Hz
33-1/3	33.79	33.71	33.64	33.56	33.48	33.41	33.33	33.25	33.18	33.10	33.03	32.96	32.88
45	45.62	45.51	45.41	45.30	45.20	45.10	45.00	44.89	44.79	44.69	44.59	44.49	44.39

3. New Technical Information

3-(1) Block Diagram

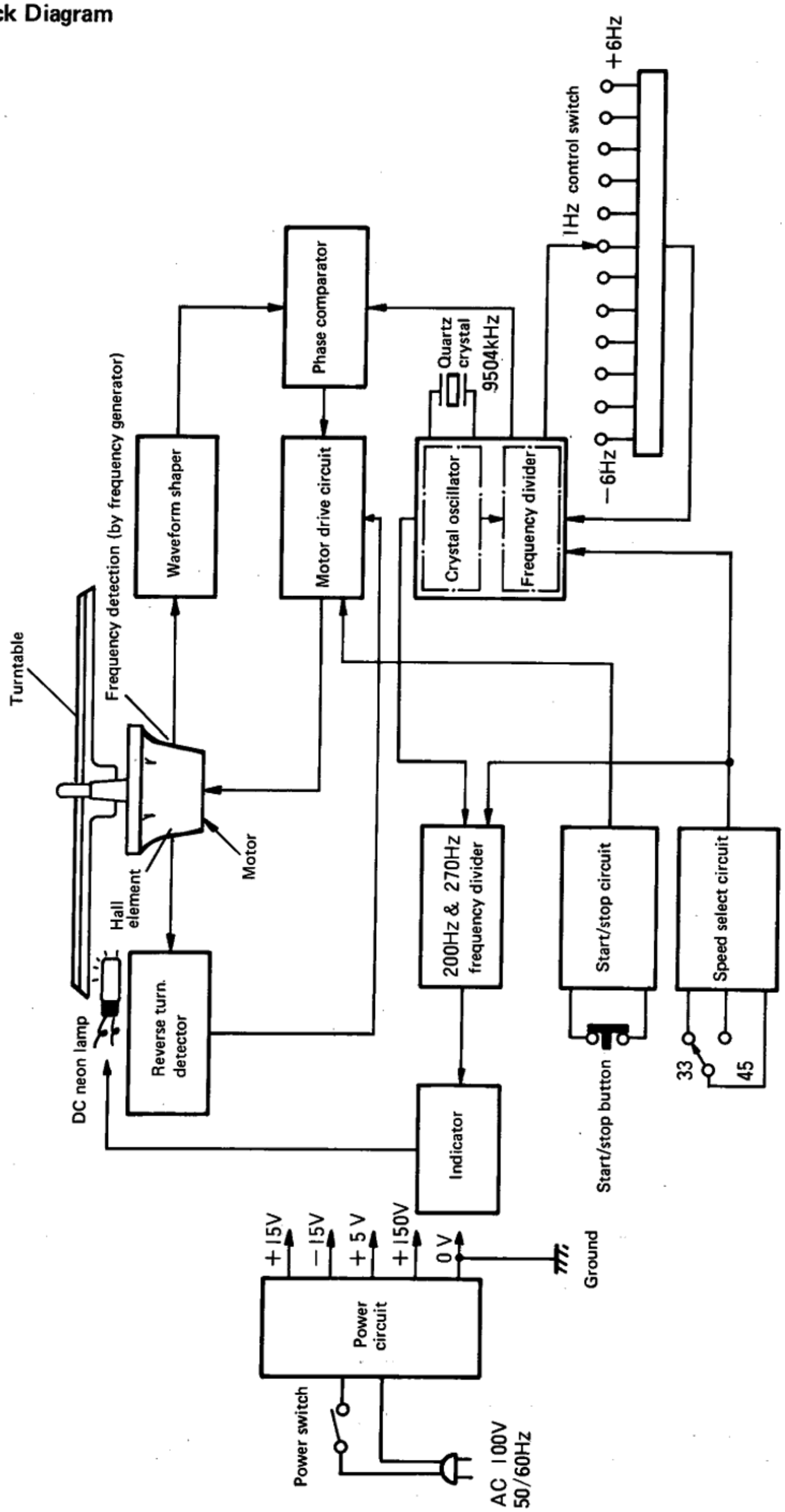


Fig. 1

3-(2) Crystal Oscillator and Frequency Deviders

1. The SC3042 C.MOS LSI performs basic frequency oscillation, frequency division and phase comparison. A block diagram of the LSI is shown in Fig. 2.

2. The crystal oscillator frequency of 9504kHz, is divided by the built-in frequency dividers to provide the 100Hz (33-1/3 rpm) or 135Hz (45 rpm) output required for quartz-locked speed control.
   A 9504kHz frequency is also employed to drive the neon lamp circuit.

3. Speed adjustment is performed by varying the ratio of division of the frequency divider (B) in the range of 1/434 to 1/446 to 1/446 with the speed adjust terminal connected to the ground wire through a select switch. The adjustment range is ±6Hz from the 440Hz reference. (The speed deviation corresponding to 1/440Hz is approximately 0.226%.)

4. Speed selection is performed by connecting the speed select terminal to either Vcc or Vss, which provides the 100Hz or 135Hz output in negative pulses.

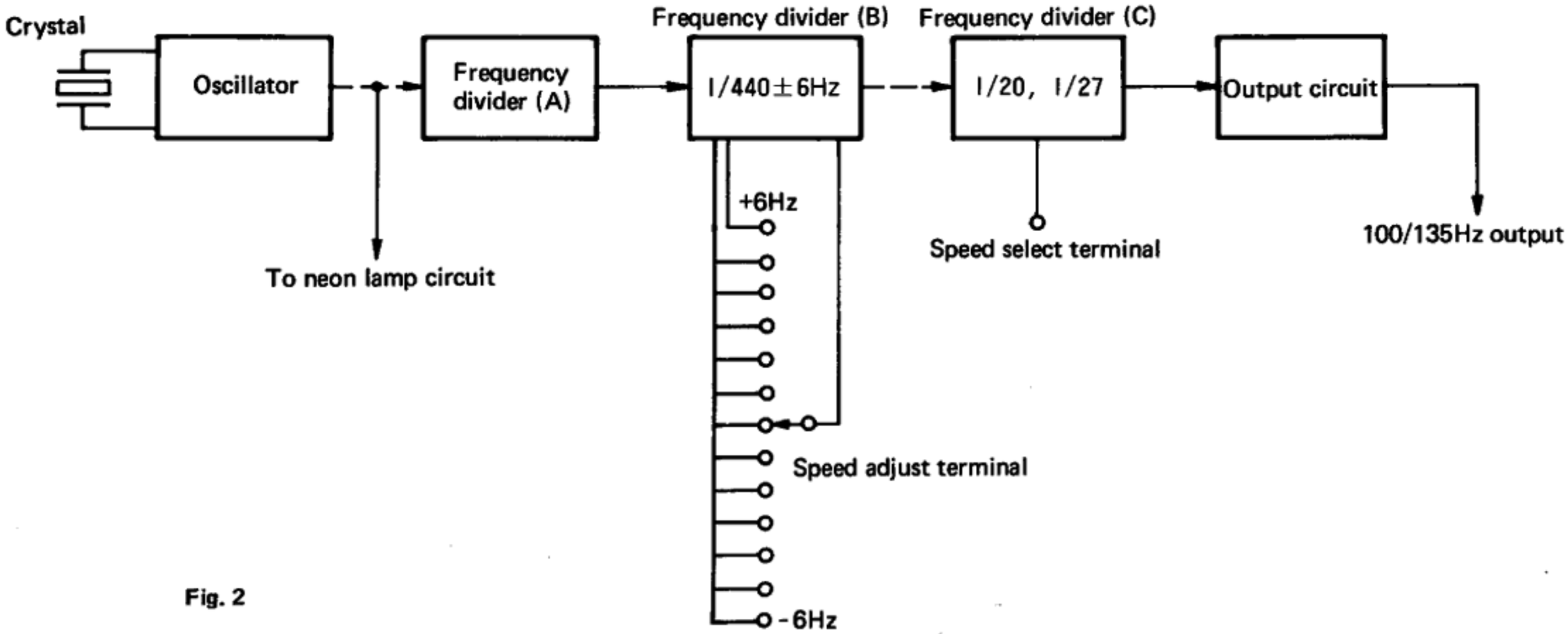
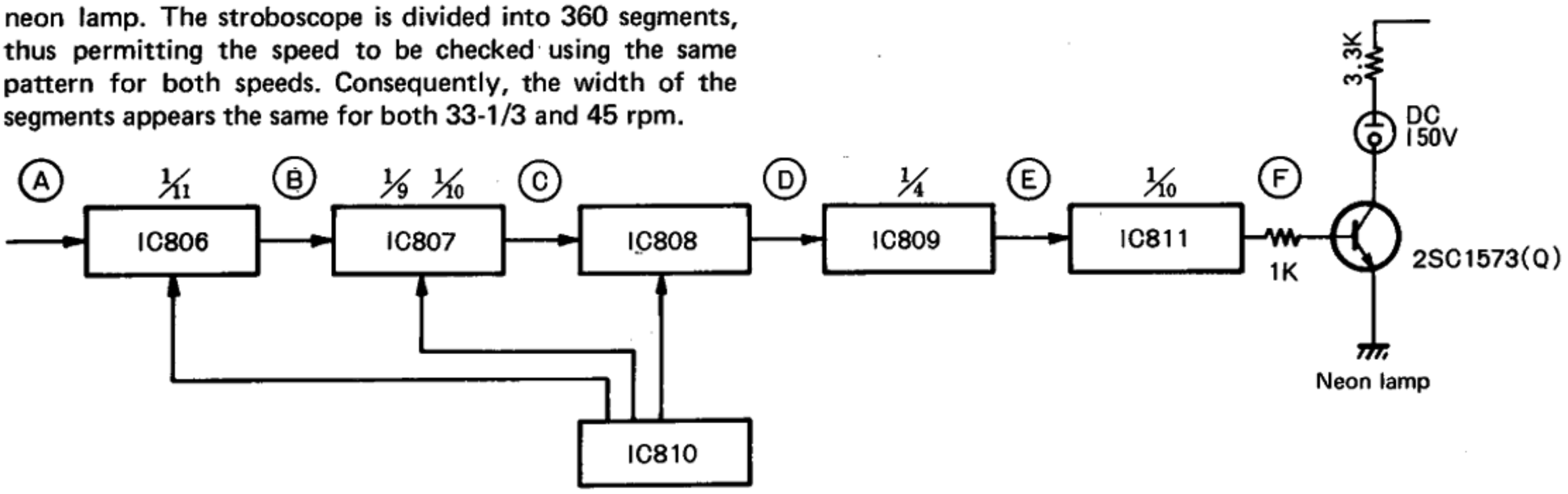


Fig. 2

3-(3) Neon Lamp Circuit

The 9504kHz oscillating frequency from the crystal oscillator is divided by a TTL IC to provide a 200Hz (for 33-1/3 rpm) or 270Hz (for 45 rpm) frequency to drive the neon lamp. The stroboscope is divided into 360 segments, thus permitting the speed to be checked using the same pattern for both speeds. Consequently, the width of the segments appears the same for both 33-1/3 and 45 rpm.

As shown in Fig. 3, the input frequency at A is divided at different division ratios for both speeds to provide different lighting pulses.



	A	B	C	D	E	F
33-1/3 rpm	9504kHz	864kHz	96kHz	8kHz	2kHz	200Hz
45 rpm	9504kHz	864kHz	86.4kHz	10.8kHz	2.7kHz	270Hz

Fig. 3 Neon lamp circuit block diagram

The output pulses from IC811 drive X842 (2SC1573) at a duty cycle of 1 : 4 as shown in Fig. 4 to cause intermittent lighting of the neon lamp. The neon lamp employed in this unit, unlike the AC type used for other models such as JL-B31, 41, 44 and 51, consists of a small positive electrode and a large negative electrode which glows.

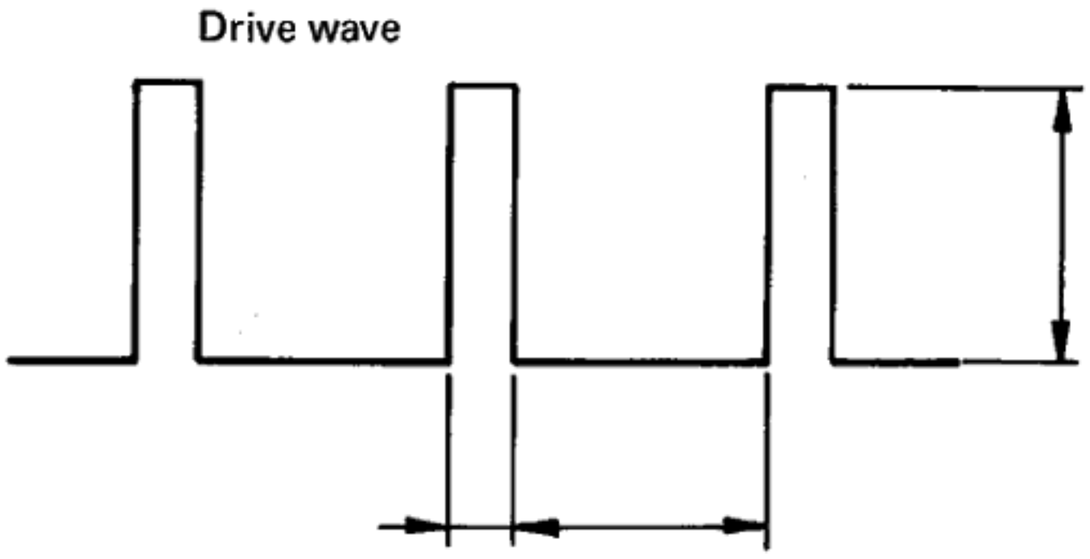


Fig. 4

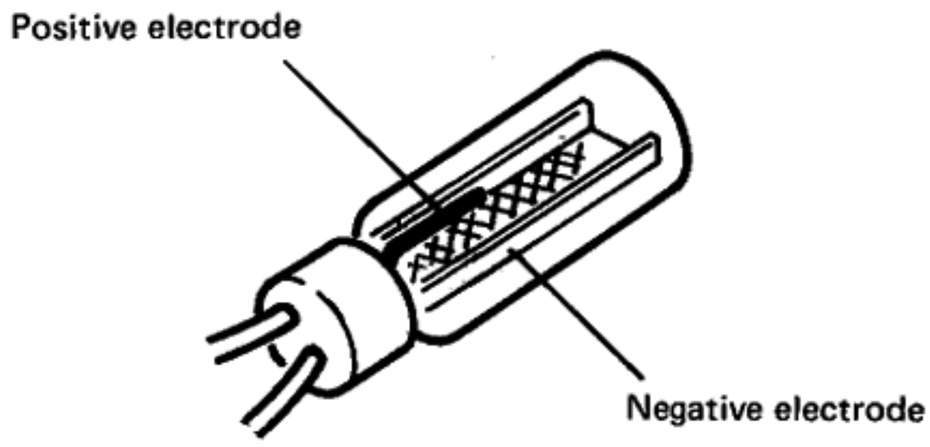


Fig. 5

3-(4) Frequency Generator, Output Amp. Waveform and Phase Comparison

1. Frequency generator output amplification and wave shaping

The 0.5mV – 1.0mV FG output (sine wave) is amplified and shaped into a square wave. First, operation amplifier NJM4558D performs AC amplification with positive feedback, and DC amplification with hysteresis to produce a square wave, which is then shaped into a +15V square wave with perfect attack.

2. Phase comparison

The phase comparator compares the 100Hz (for 33-1/3 rpm) FG output and the 100Hz LSI output. The circuit operation is as follows. The square wave from the collector of X801 is differentiated by C804 and R810, then short circuits X805 utilizing the rise section of each pulse. C805, inserted between the collector of X805 and ground, causes the collector to be grounded with every pulse input. This results in the saw tooth wave shown in Fig. 7 being obtained. The collector of X802 is supplied positive pulses using the differentiated pulses of the falling sections of the square wave from the collector of X801. X806 is short circuited by each of these pulse inputs and transmits the X805 collector voltage to C806.

The voltage across C806 is obtained from the source follower circuit using X807 (FET). The relationship to speed of the source voltage at X807 is as shown in Fig. 6.

This shows that it is not the output voltage resulting from phase comparison, but a voltage proportional to the speed. On the other hand, the standard pulses from the crystal to X814 switches X810 to produce a saw tooth wave with C811 in line with the collector of X810. This saw tooth wave is sampled by X809 with the falling pulse of the FG output and obtained as the phase comparison output at the source of X808 (FET).

Fig. 7 shows the output characteristics. The voltages proportional to speed and phase are mixed at R817 and R829, with the resultant composite voltage being series-amplified by IC802, X812 and X813 to drive the Hall elements. In the stop mode, X811 is negatively biased to prevent the output from IC802 from entering X812 and X813.

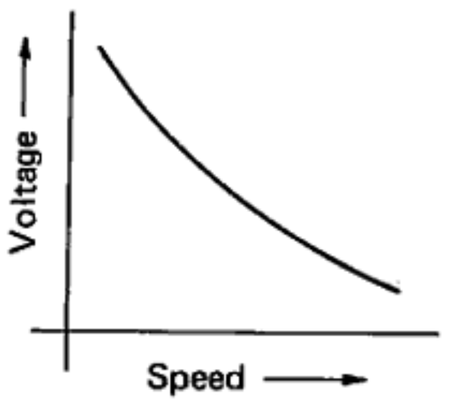


Fig. 6

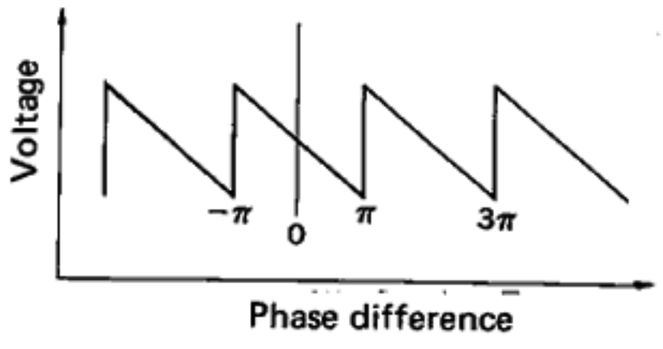


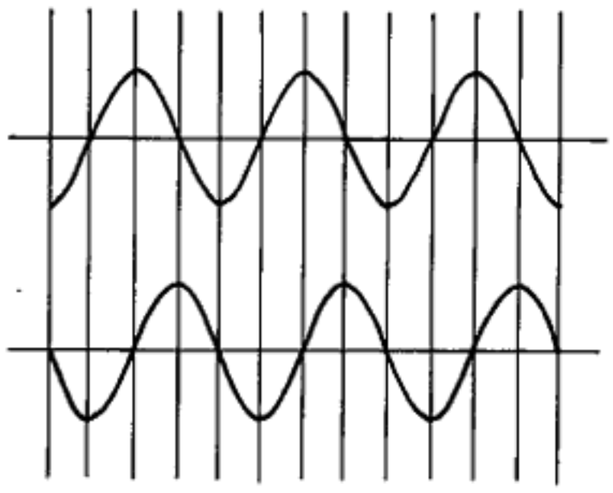
Fig. 7

3-(5) Drive Circuit

The output of the Hall elements, driven by X812 and X813 according to the speed and phase, is DC amplified by IC803 and power amplified by the complementary circuit consisting of X815, 816, 817 and 818 to drive the motor stator coil. For waveforms and voltages, refer to the schematic diagram on page

3-(6) Reverse Turn Detection

The rotor position is detected by the two Hall elements beneath the rotor, while edge-trigger flip-flop IC805 uses "L" level for clockwise rotation and "H" level for counter-clockwise rotation. When the turntable rotates in the reverse direction, the "H" level signal short circuits X830, which causes pin (6) of IC802 to take "L" level, thus switching the Hall elements to the forward drive mode. At the instant the turntable begins to rotate in the forward direction, the output of IC805 reaches "L" level, thus opening X830 and completing reverse turn detection.



The phases of the Hall elements differ by 90° from each other in generating electromotive force.

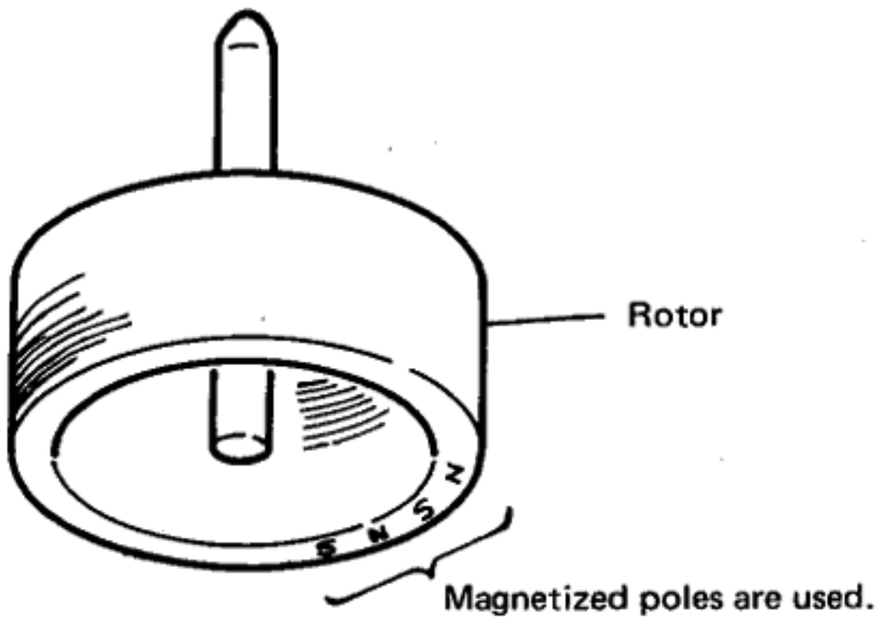


Fig. 8

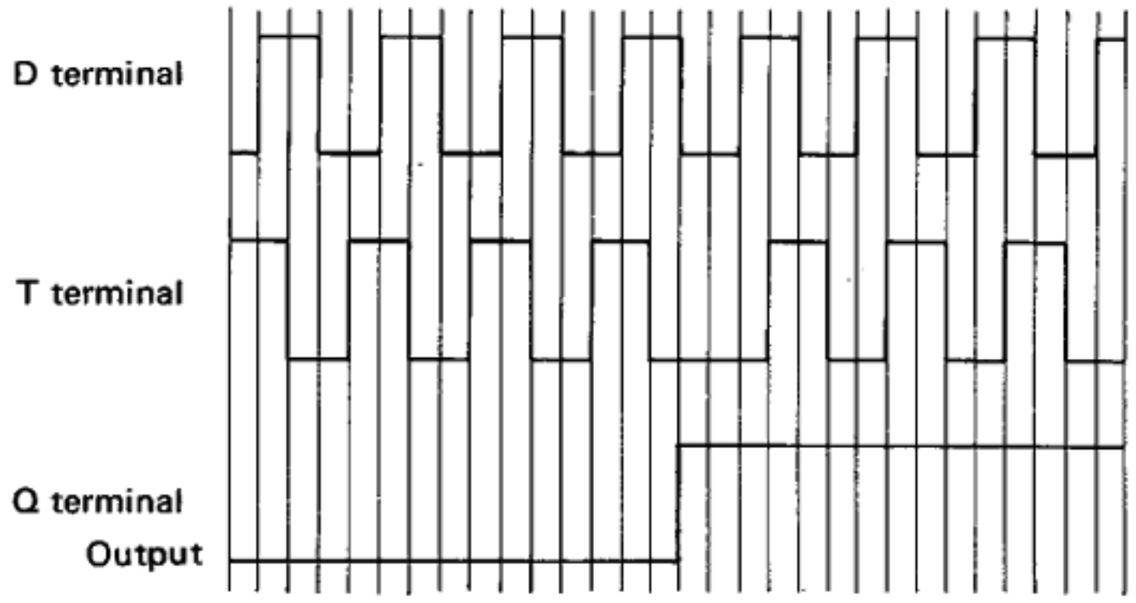


Fig. 9

3-(7) Start/Stop Circuit

Each time the micro switch is turned off, flip-flop IC805 is inverted by the input pulse, thus permitting start and stop to be performed by pressing the switch button repeatedly. When a positive voltage is applied to the T (trigger) terminal of IC805, the output is reversed (from "1" to "0" or from "0" to "1") and a command signal is supplied to the related parts. Refer to Fig. 10.

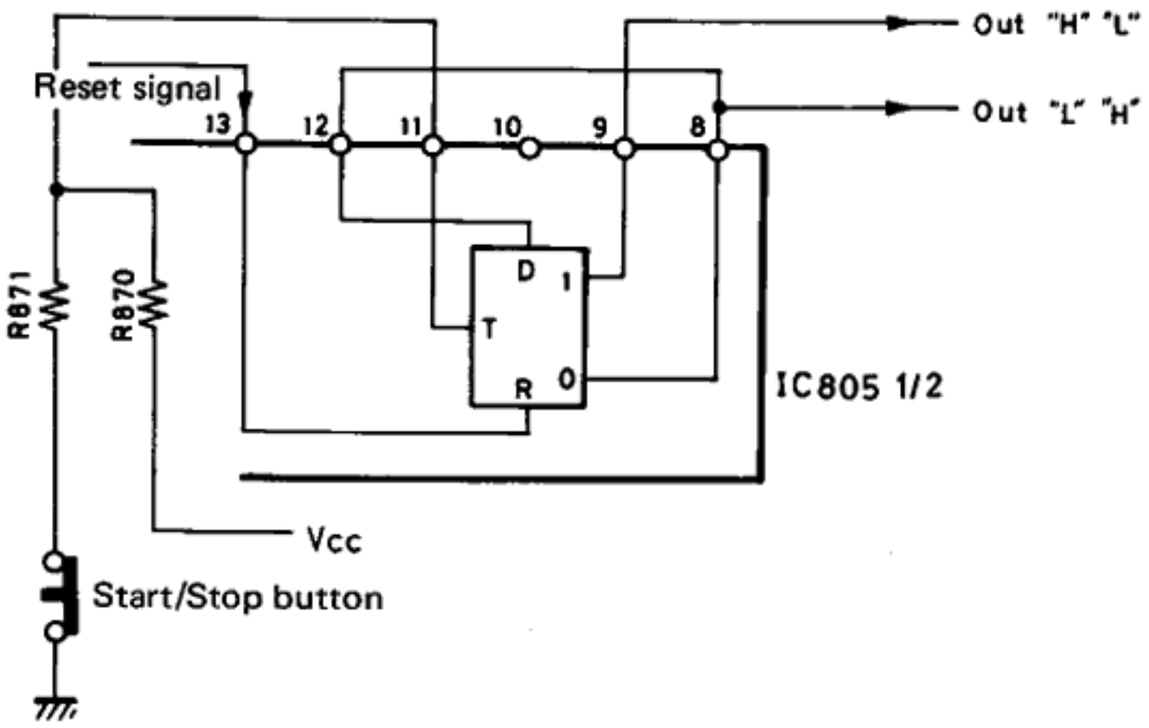
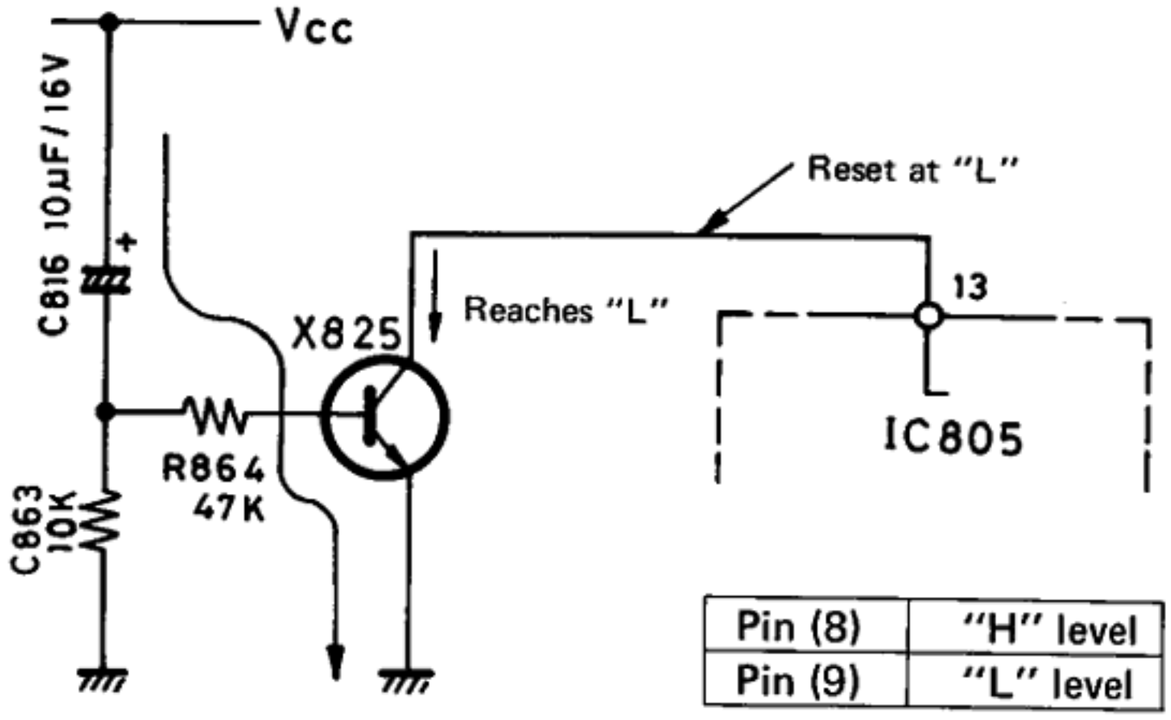


Fig. 10

When power is turned on, X825 is short circuited and pin (13) is reset. This causes pin (8) of IC805 to take "H" level and pin (9) "L" level. Refer to Fig. 11.



Pin (8)	"H" level
Pin (9)	"L" level

Fig. 11

3-(8) Cut-off Hall Element Drive Circuit

When the turntable is stationary, the Hall element drive circuit (for rotor position detection) is cut-off by X811 FET to prevent current from flowing to the stator coil. Pin (9) of IC805 takes "L" level and X820 does not conduct through diodes and resistors. Therefore, X821 is in the nonconductive state while the collector potential is negative, and X811 completely cut-off. The Hall elements are not driven due to the zero potential at the base of X812 and X813. During rotation, pin (9) of IC805 is "H" level and X811 is short circuited.

3-(9) Quick Stop Circuit

To quickly stop the turntable, the motor current is momentarily reversed to produce a reverse torque, then after a specific interval, the current is cut off.
When the start/stop button is pressed during rotation, pin (9) of IC805 changes from "H" level to "L" level, thus causing X837 to change from a short circuit to open state. C815 starts to charge through R891 and gradually raises the voltage at (A). The reference voltage is provided at (B) with depression of the start/stop button. IC802 output maintains "H" level until the voltage at (A) exceeds the reference voltage, short circuits X820, X821 (through D807) and X811 for a specific interval.
On the other hand, when the base of X824 becomes "H" level, X823 is short circuited, thus causing pin (6) of IC802 to take "H" level. As a result, the pin (7) output becomes negative and produces a reverse torque. The reference voltage at (B) differs with the speed. Refer to Fig. 12.

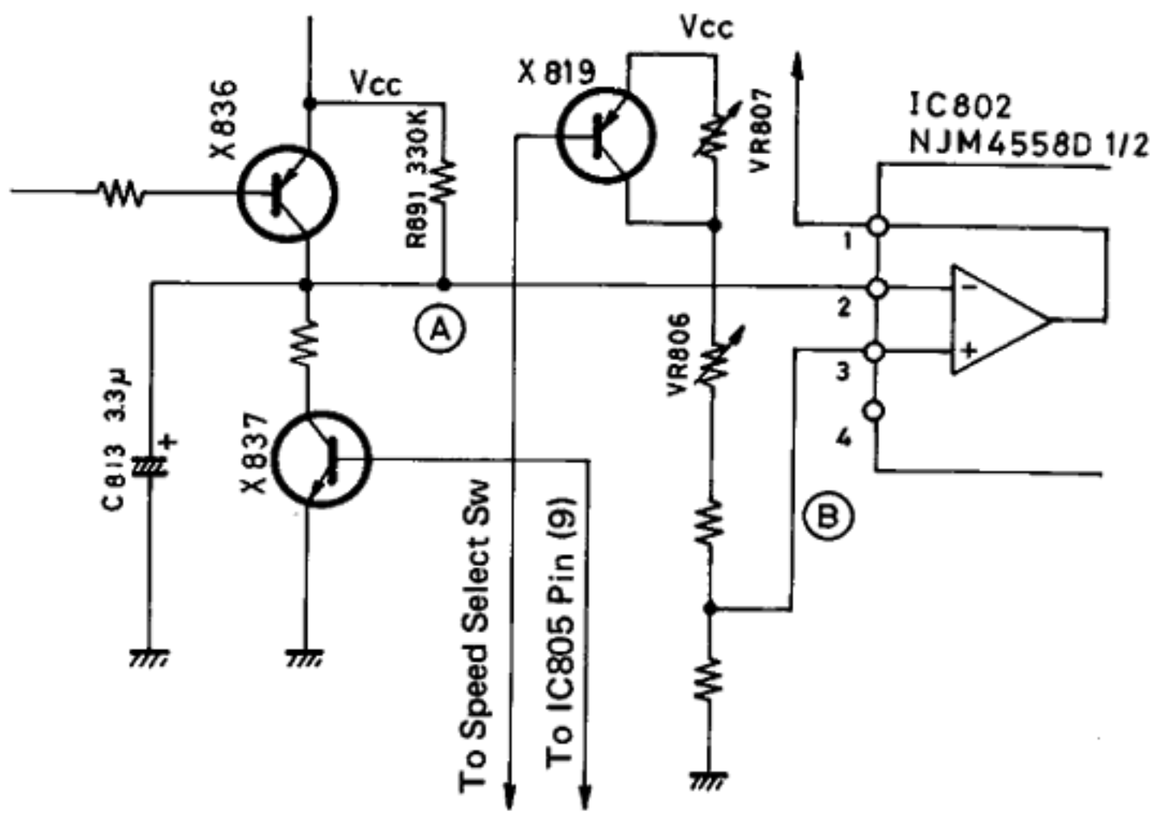


Fig. 12

4. Dismounting

1. Remove screws (1) through (3), then remove the control panel.
2. Remove screws (4) through (8), then remove the cover plate.

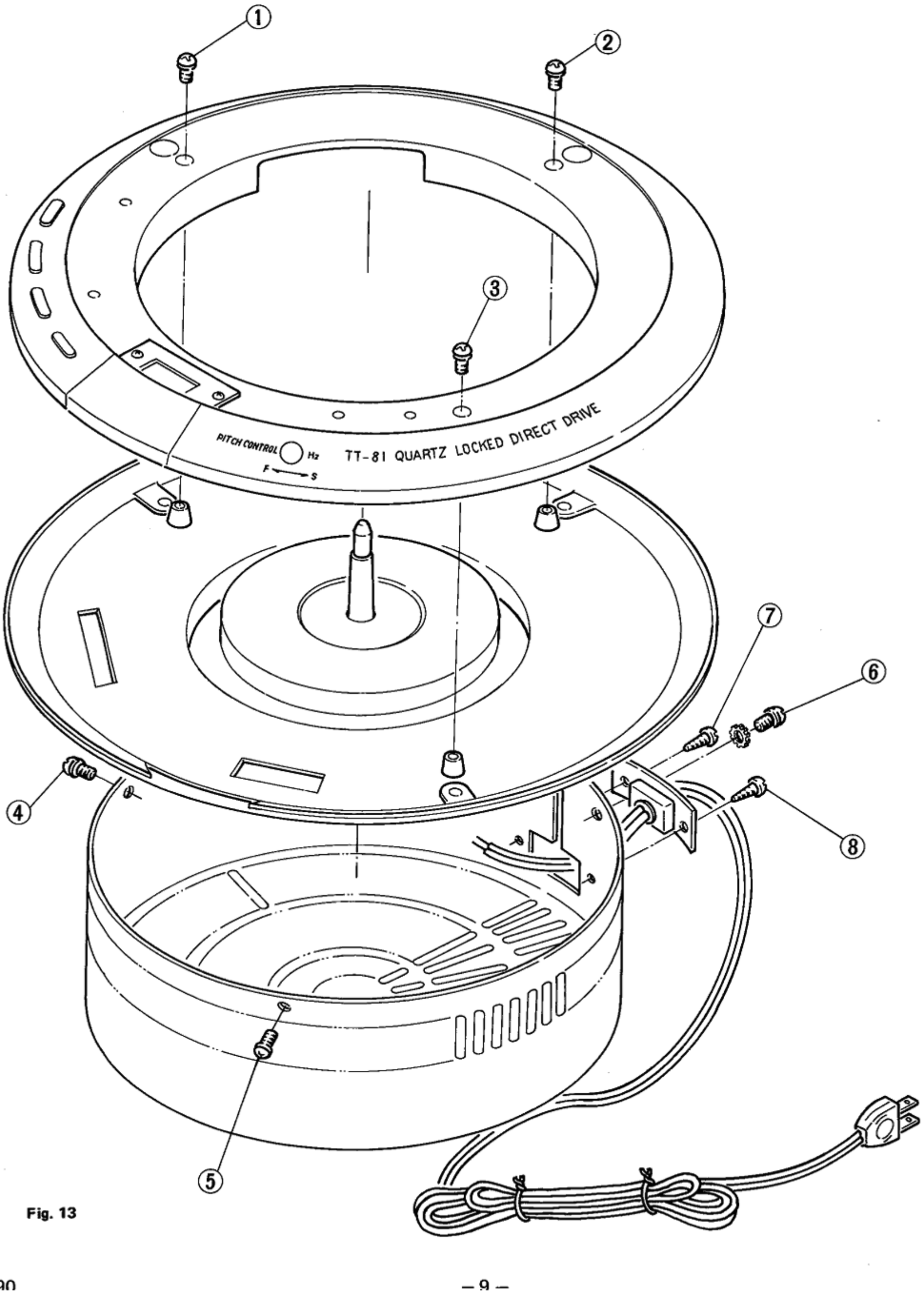


Fig. 13

5. Adjustment Procedures

Power ON and OFF

Do not turn power on before all connections are completed. Do not make any connection while the power is on.

Handling of C. MOS

IC812 is a highly sensitive C. MOS. Therefore, care must be exercised to prevent contact with other elements and leakage current. (All pins should be maintained at the same potential.)

5-(1) Power Supply Voltage

1. −15V adjustment and +15V confirmation

Turn VR808 fully clockwise, apply the rated 120V AC voltage to the primary side and measure the DC voltage of the +15V line connected to the emitter of X843.
For −15V adjustment, measure the voltage between X848 emitter test point TP (1) and ground test point TP (2), then turn VR808 gently in the counterclockwise direction until the voltage measured is the same as that of the +15V line.

2. +5V confirmation

Make sure that the voltage of the line connected to the emitter of X849 is between 4.4V and 5.4V.

5-(2) Lock Adjustment

1. Connect a dual-function oscilloscope to TP (4), TP (5) and TP (2), then adjust VR801 (for 33-1/3 rpm) or VR802 (for 45 rpm) until the following waveforms are obtained.

The rise points of TP (5) waveform and the starting points of TP (4) triangular wave ("a" and "b") should coincide.

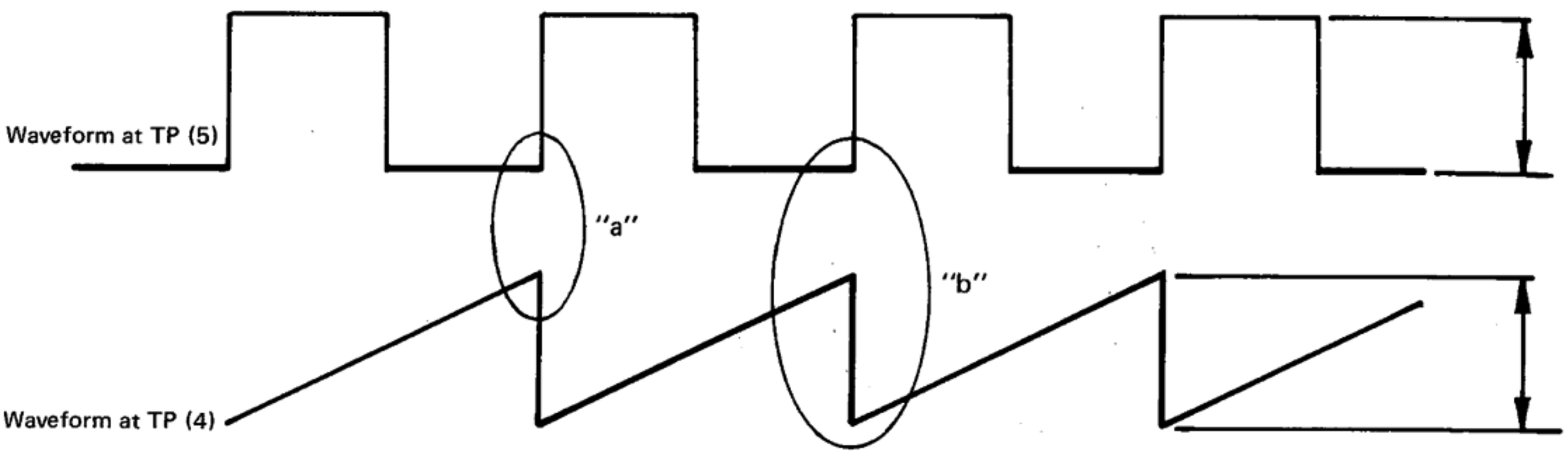


Fig. 14

2. Connect two 2.2M ohm-resistors to TP (4) and TP (5). Next, connect a single-function oscilloscope between the junction point and ground, then adjust to obtain the following waveform.

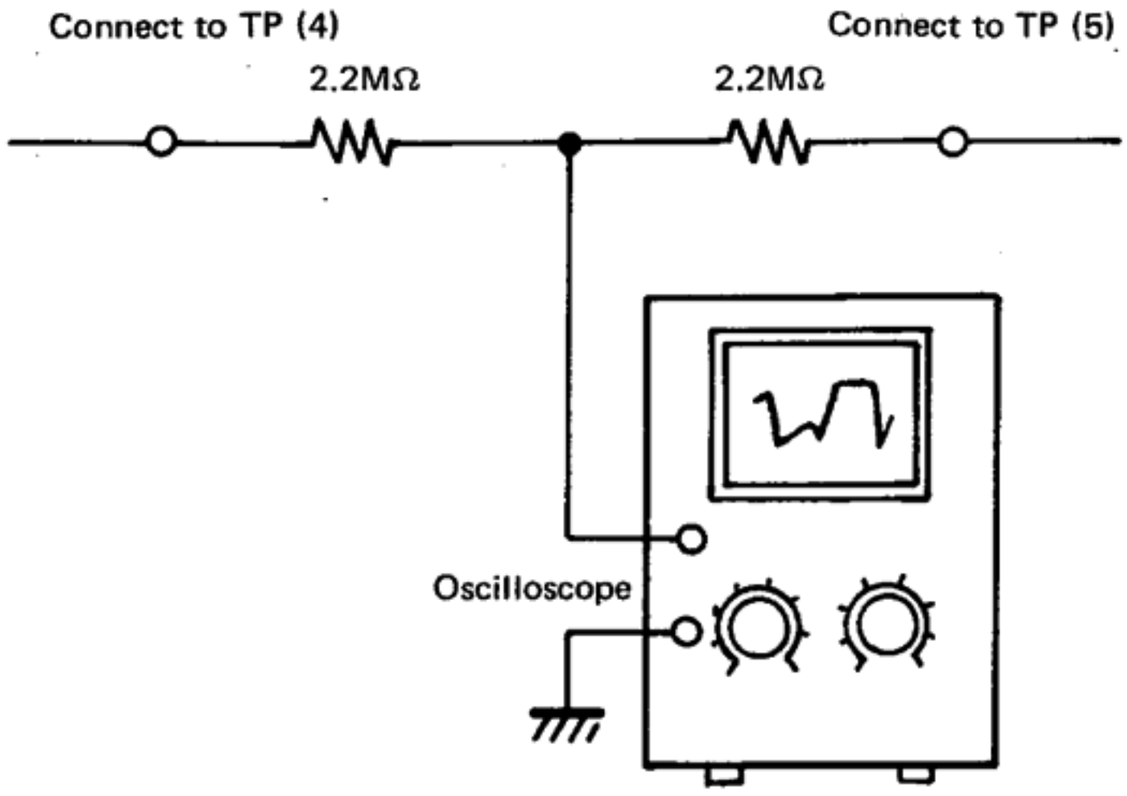


Fig. 15

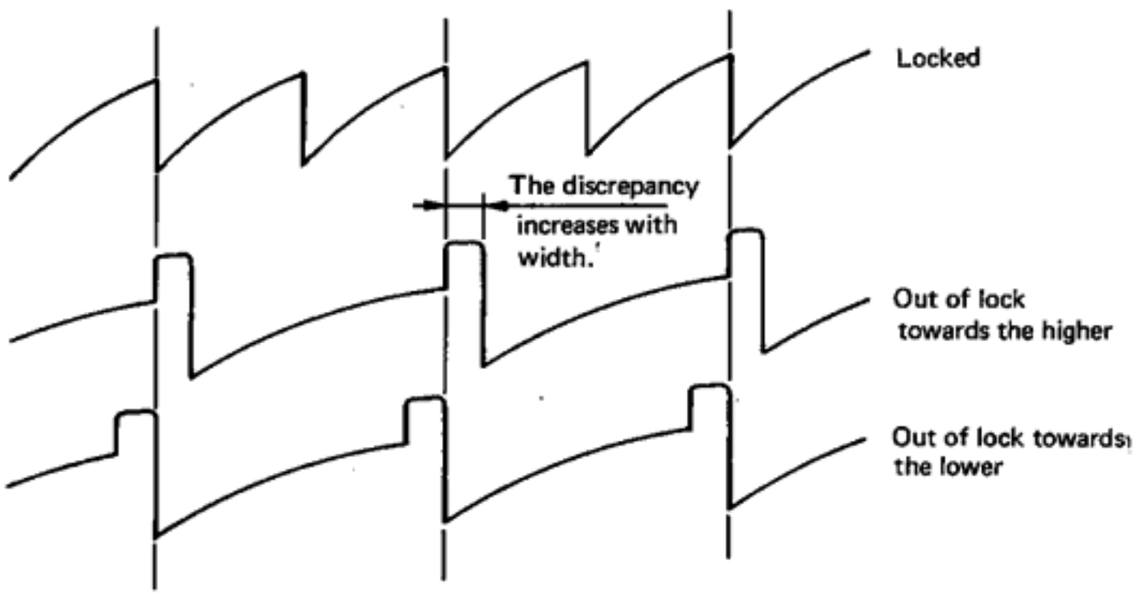


Fig. 16

5-(3) Quick Stop Adjustment

For quick stop adjustment, employ the JL-B31 platter mat to obtain a standard moment of inertia.

1. Adjust VR806 until the turntable stops correctly, without reversing, when the start/stop button is pressed at 45 rpm.
2. Adjust VR807 in the same way as above for 33-1/3 rpm.
3. Replace the platter mat with that of the TT-81 and confirm that the quick stop functions after a slight forward rotation for both 33-1/3 and 45 rpm.

5-(4) Wow and Flutter Adjustment

Measurement should be performed at 33-1/3 rpm. The residual drive voltage ripples at TP (3) and ground TP (2) should be minimized at both 3.3Hz and 6.6Hz. 2mV should be retained when the phono motor is assembled.
Adjust VR803 and 804 (10k-ohms) for 3.3Hz adjustment.
Adjust VR805 (47k-ohms) for 6.6Hz adjustment.
These adjustments should be performed repeatedly.

5-(5) Speed Adjustment

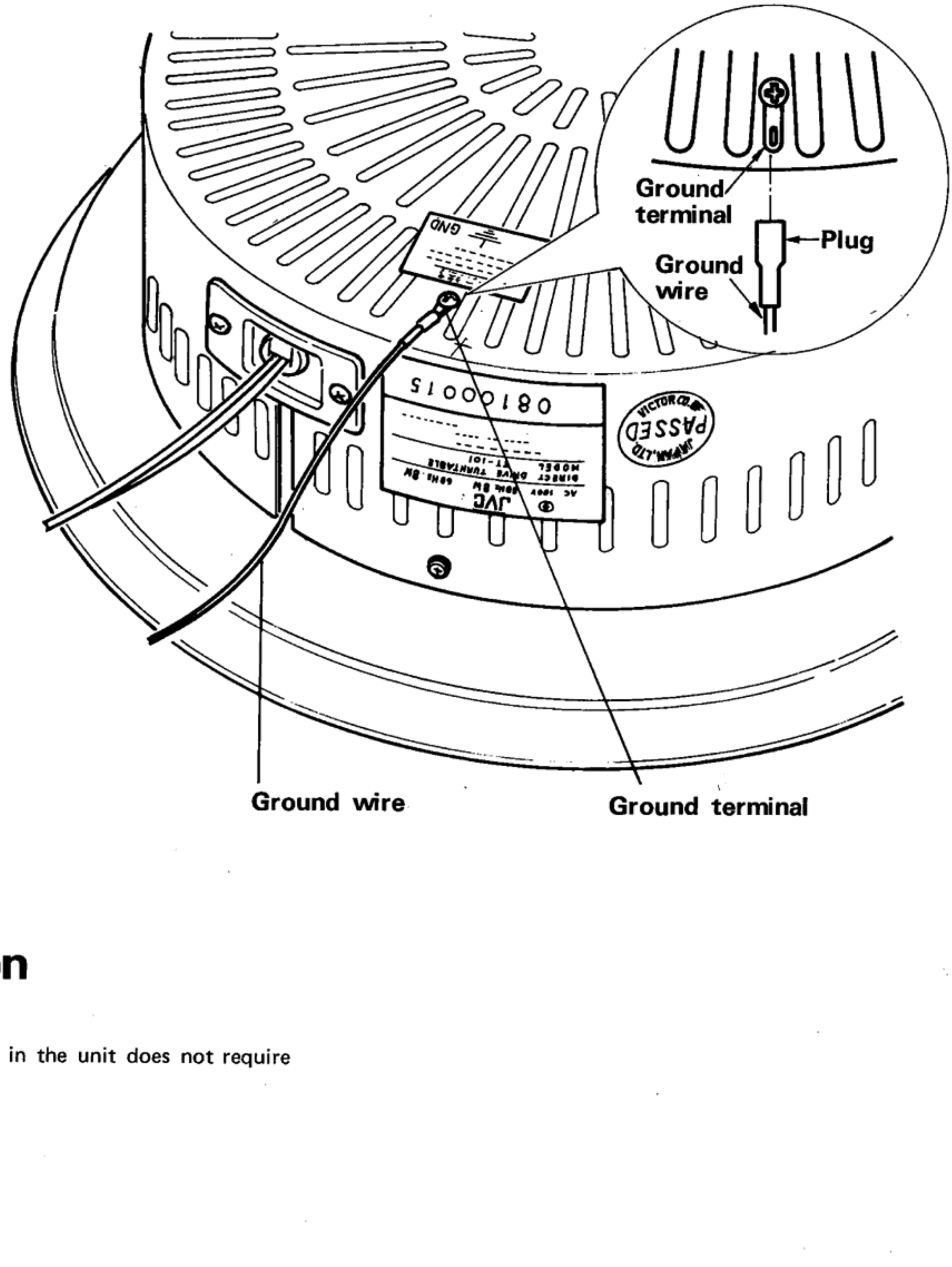
- **Why is speed adjustment necessary?**
  The turntable, due to the quartz-locked servo system, is not subject to variations in speed, but always rotates at exactly 33.33 or 45.00 rpm. However, the unit is designed to permit 1Hz pitch control for the following reason.
  At present, the frequency of reference "A'" is determined at 440Hz by an international standard. This is the reference key to which orchestral tuning is performed. However, in actual practice, tuning differs, depending on the character of the orchestra and conductor, with reference "A'" within the range of ±6Hz. On the other hand, ordinary pianos are tuned based on a reference "A'" of 440Hz. Therefore, if you wish to play a piano with an orchestra performance from a record, pitch control is required. The pitch control facility permits a new kind of listening pleasure by playing a record of a particular orchestra with the pitch of another orchestra.

6. Connections

Ground connection

Connect the ground terminal of the unit to the ground terminal of the amplifier.

- Connect the ground wire (provided) to the ground terminal of the unit.
- Connect the other end of the ground wire to the amplifier.



7. Lubrication

The direct drive motor used in the unit does not require lubrication.

8. Waveforms

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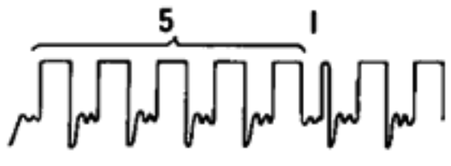

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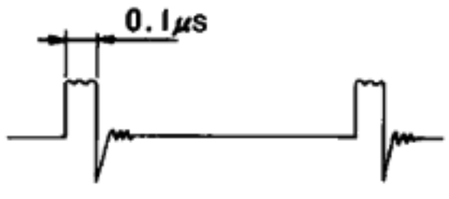

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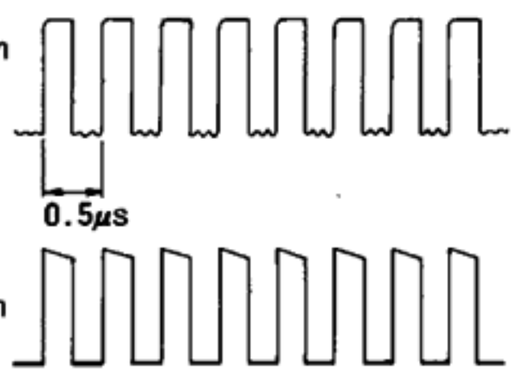

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0 level at 45 rpm

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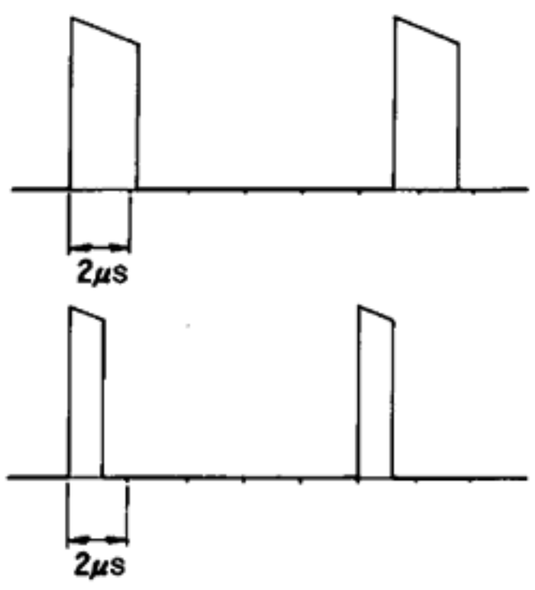

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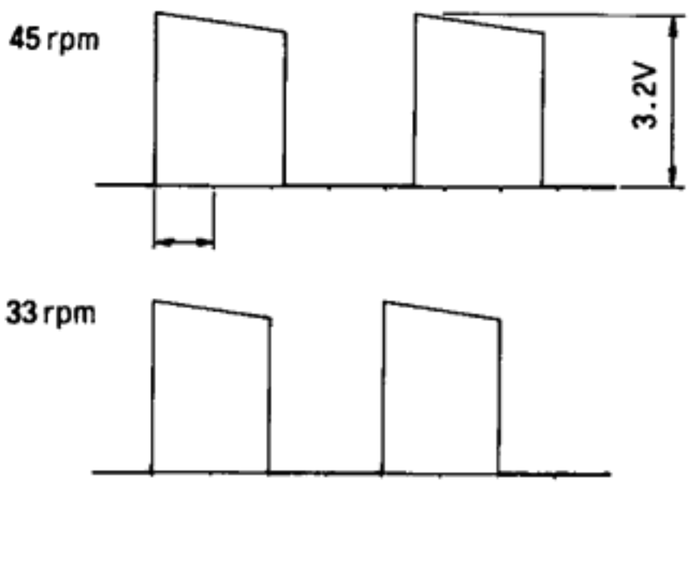

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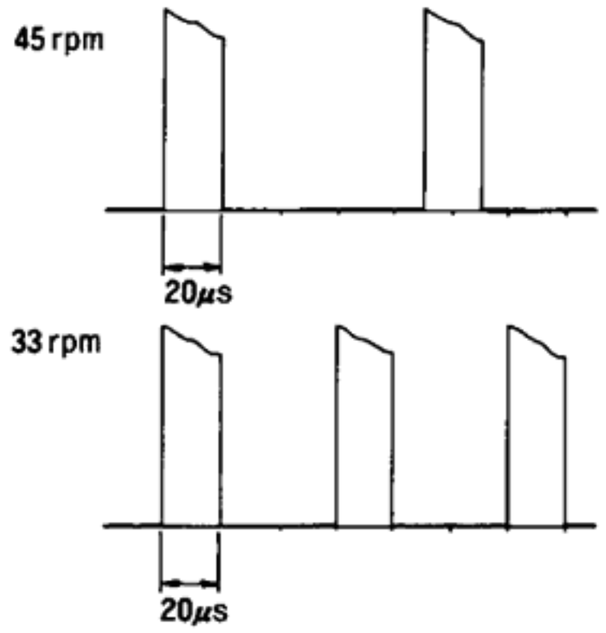
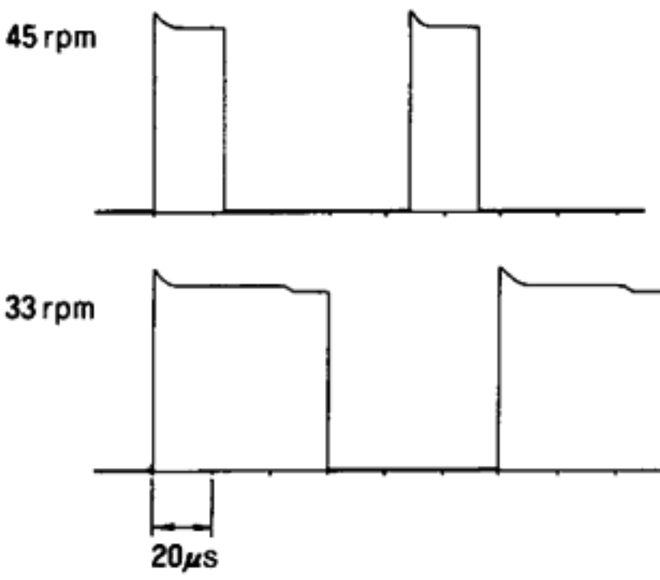
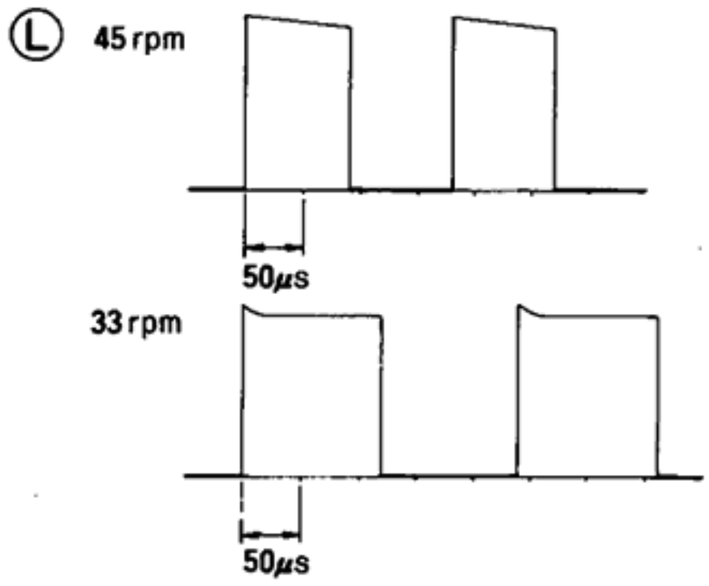


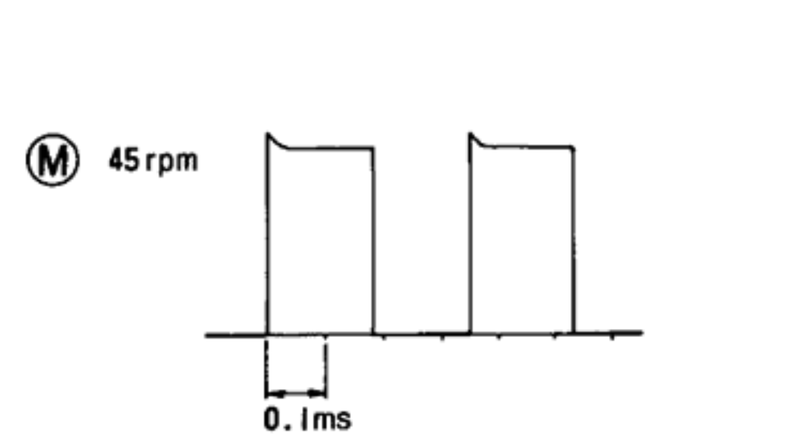
Ⓚ



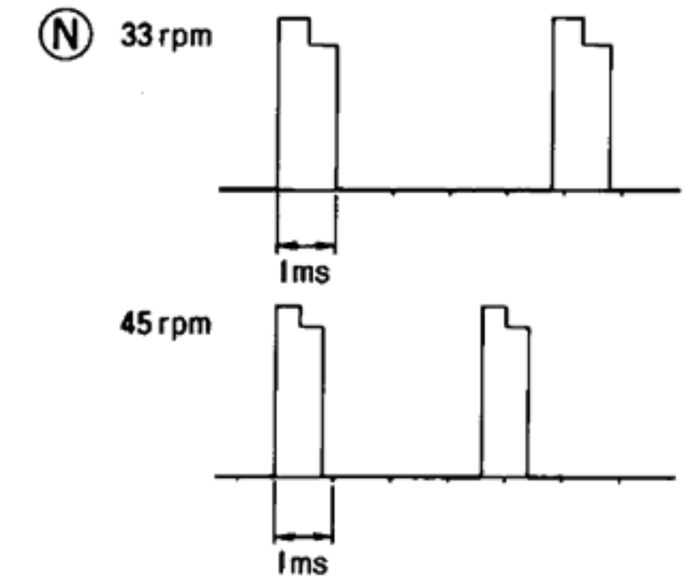
Ⓛ



Ⓜ



Ⓝ

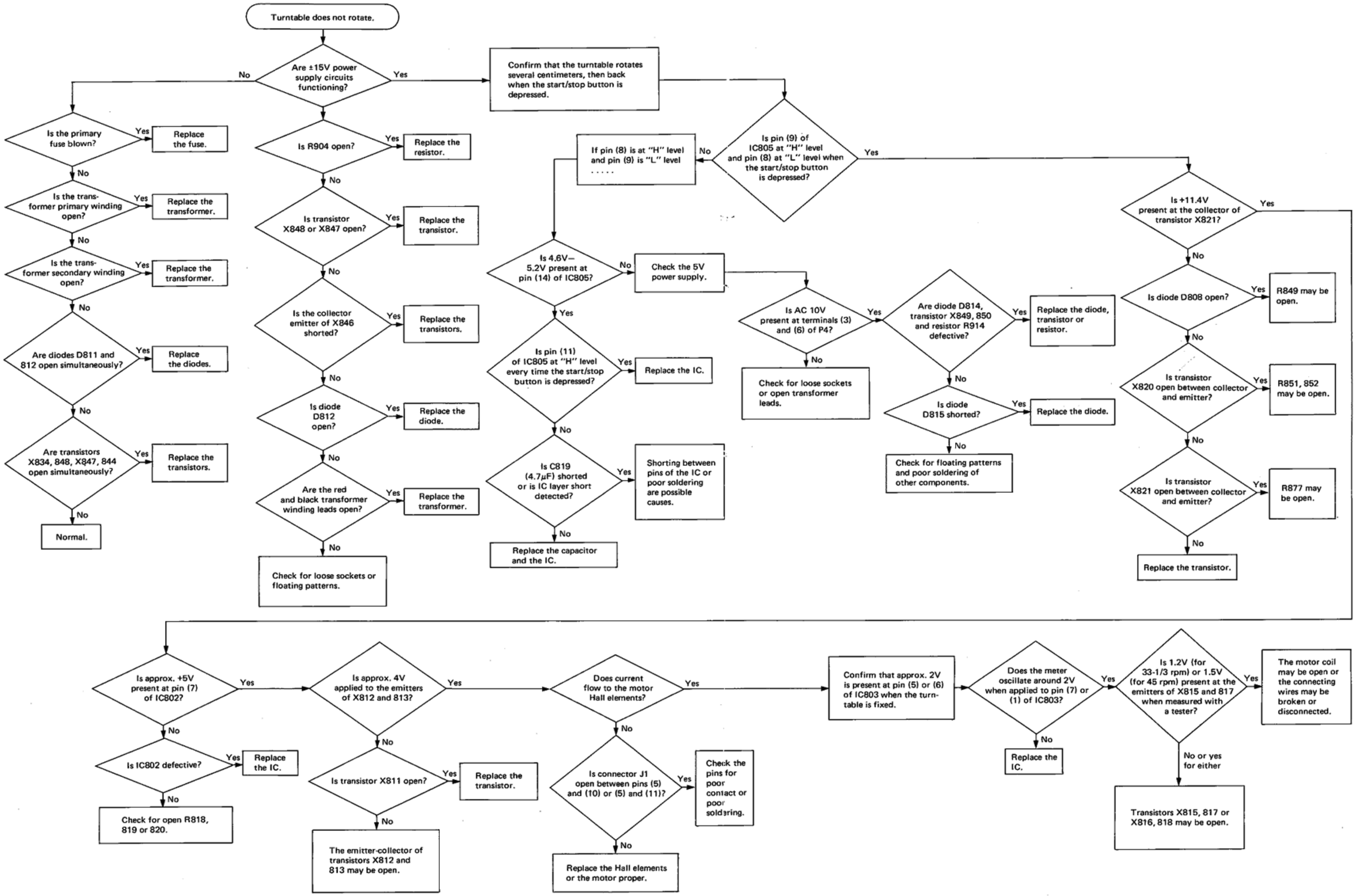


Waveforms Ⓐ to Ⓝ

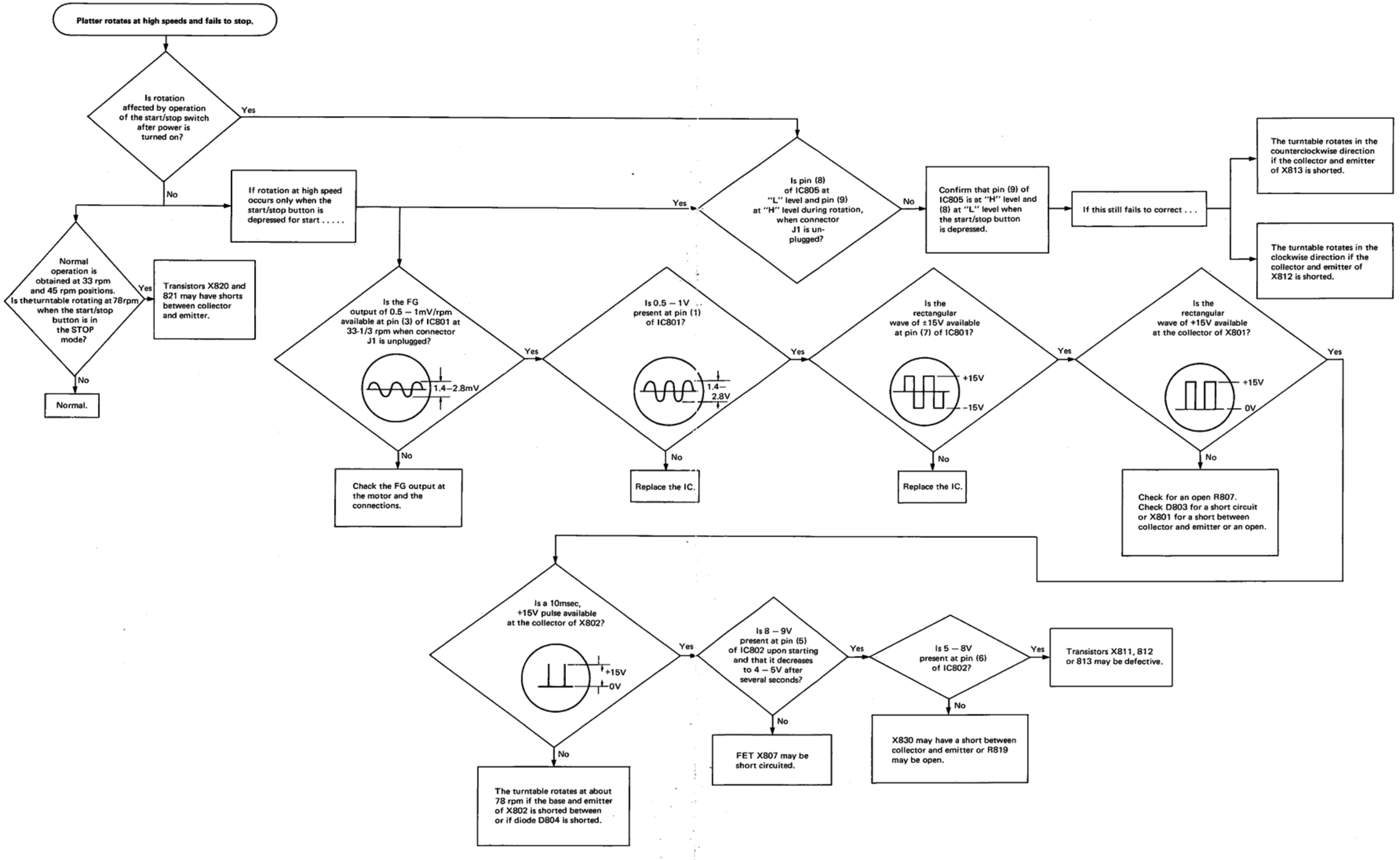
These waveforms are used for Troubleshooting 9-(4) "Neon lamp does not light" on page 16 and appear on IC806 through IC811 indicated in Schematic Diagram on page 28.

9. Troubleshooting

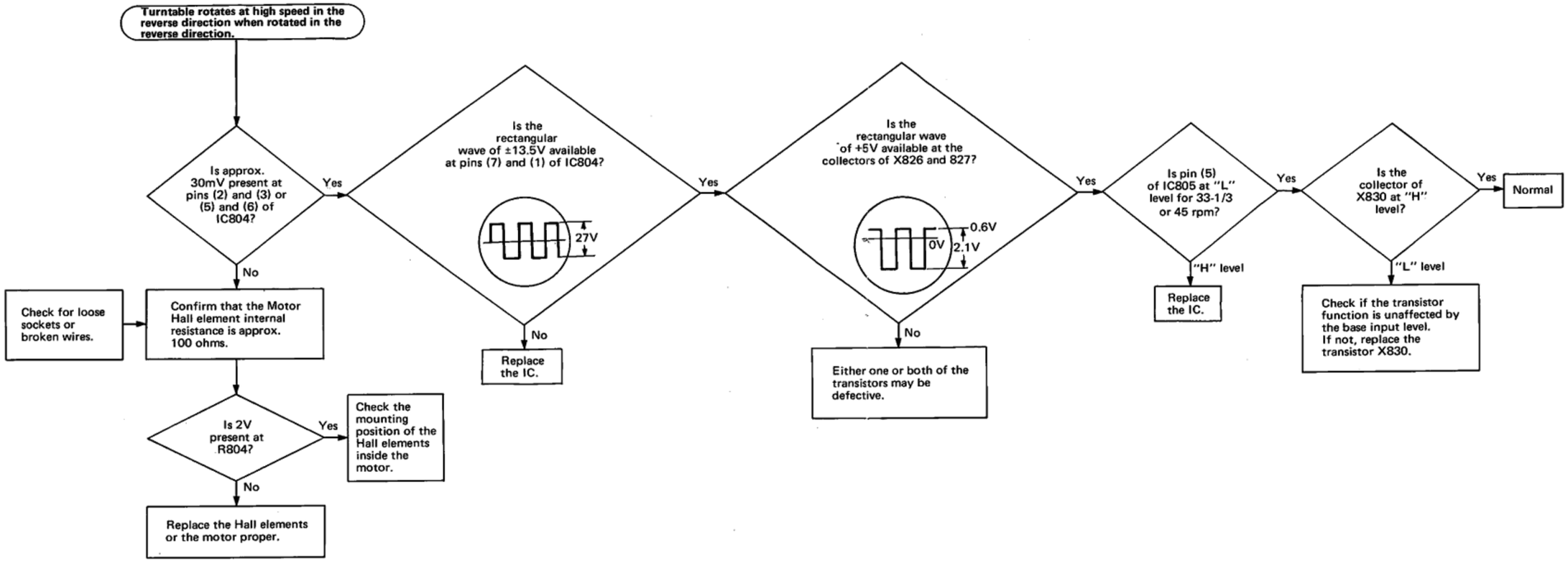
9-(1) Turntable does not rotate



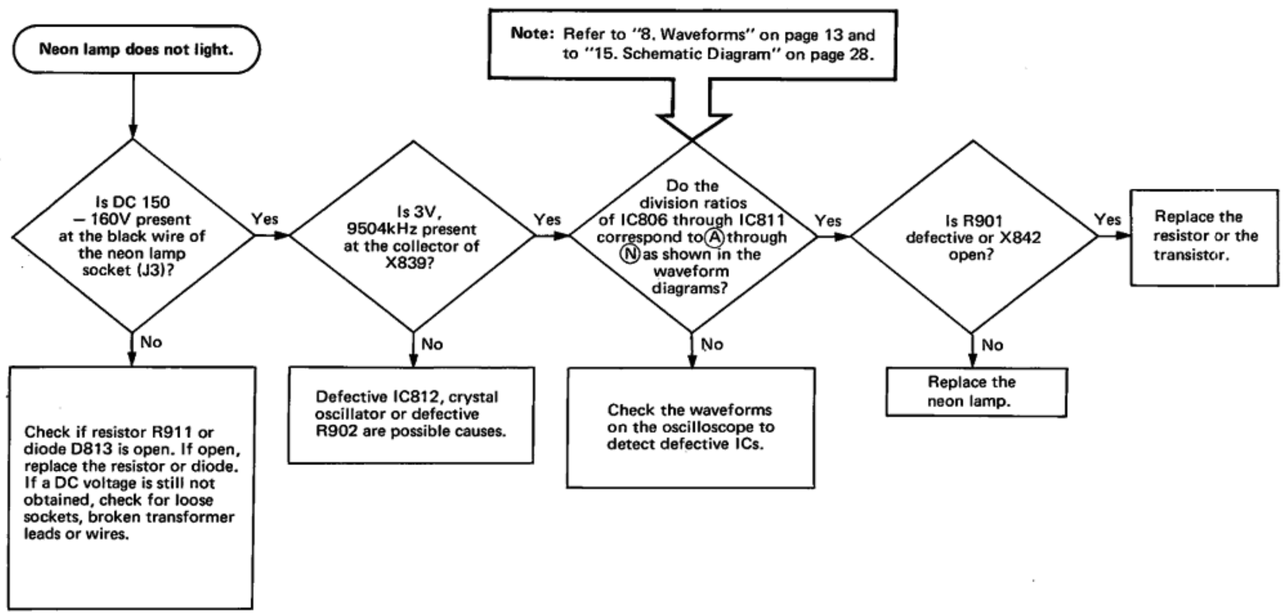
9-(2) Turntable rotates at high speed and fails to stop



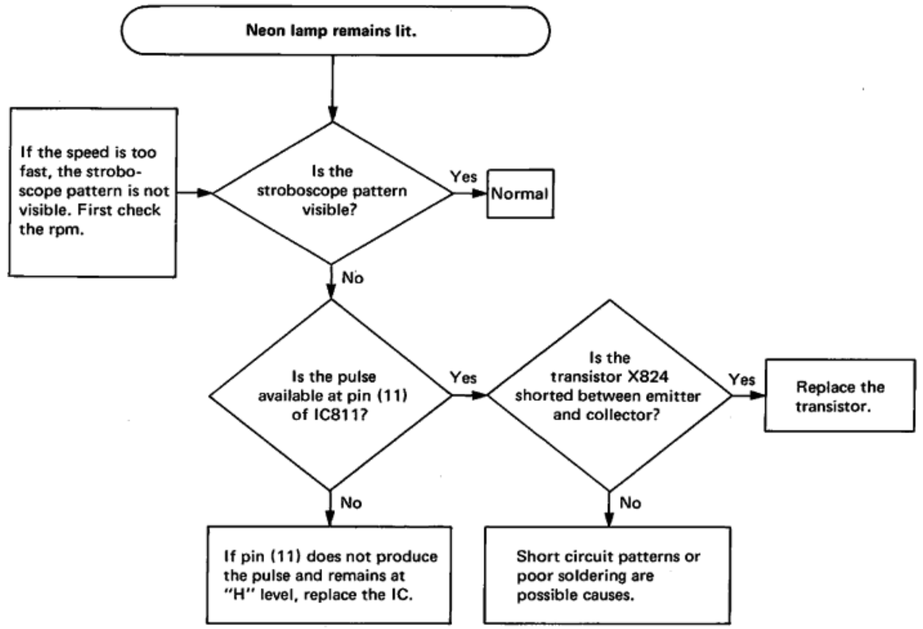
9-(3) Speeds increase when rotated in the reverse direction



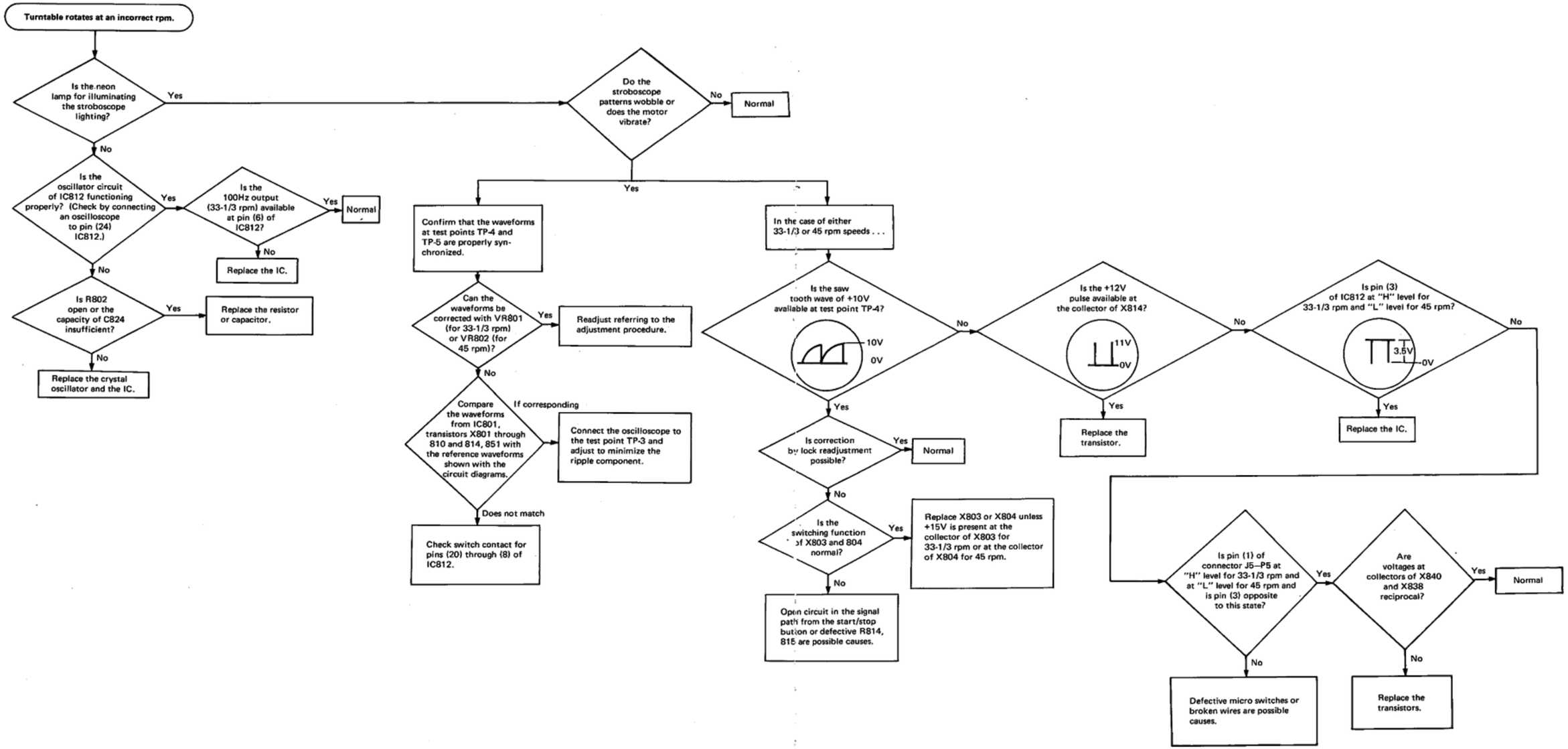
9-(4) Neon Lamp does not light



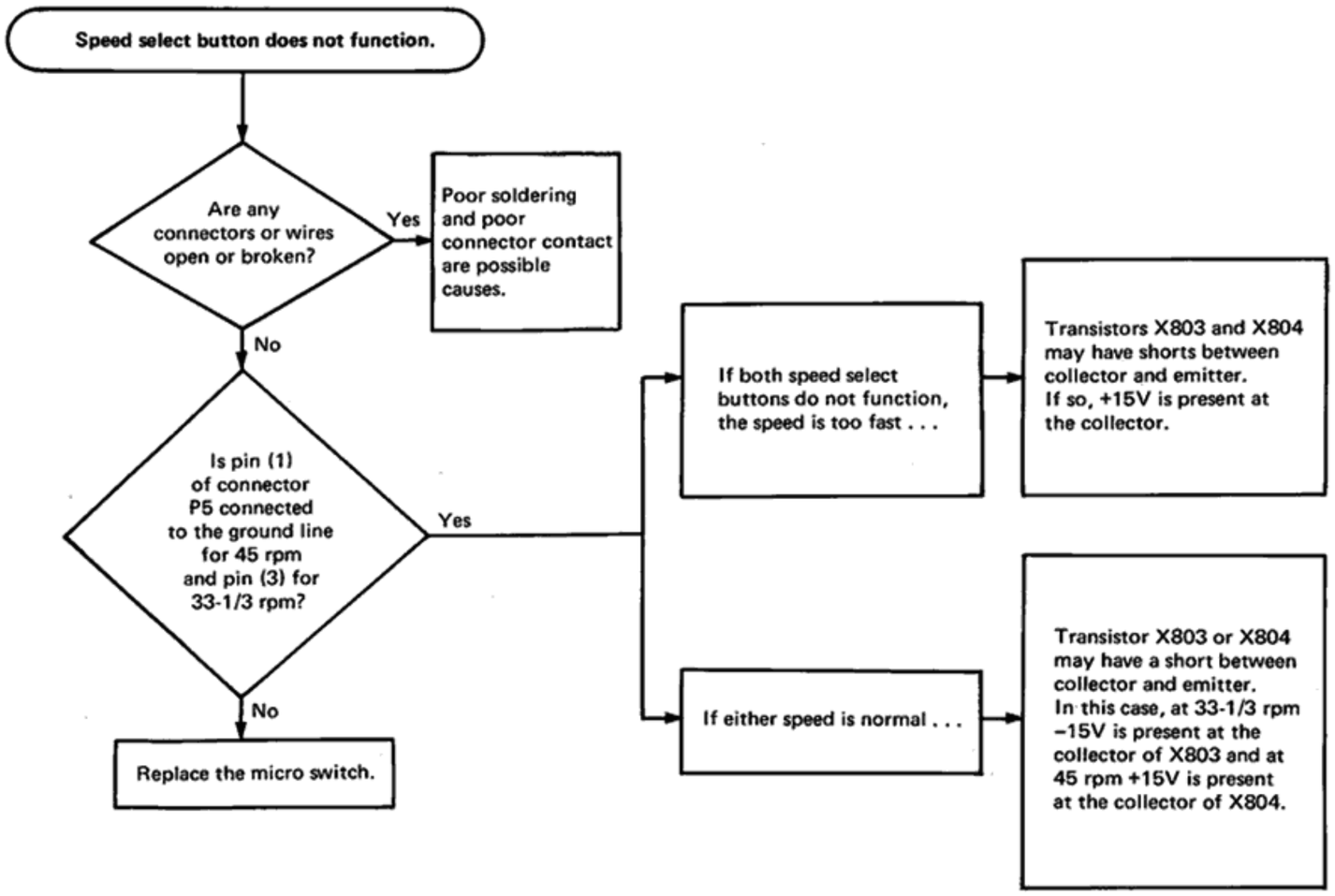
9-(5) Neon Lamp remains lit



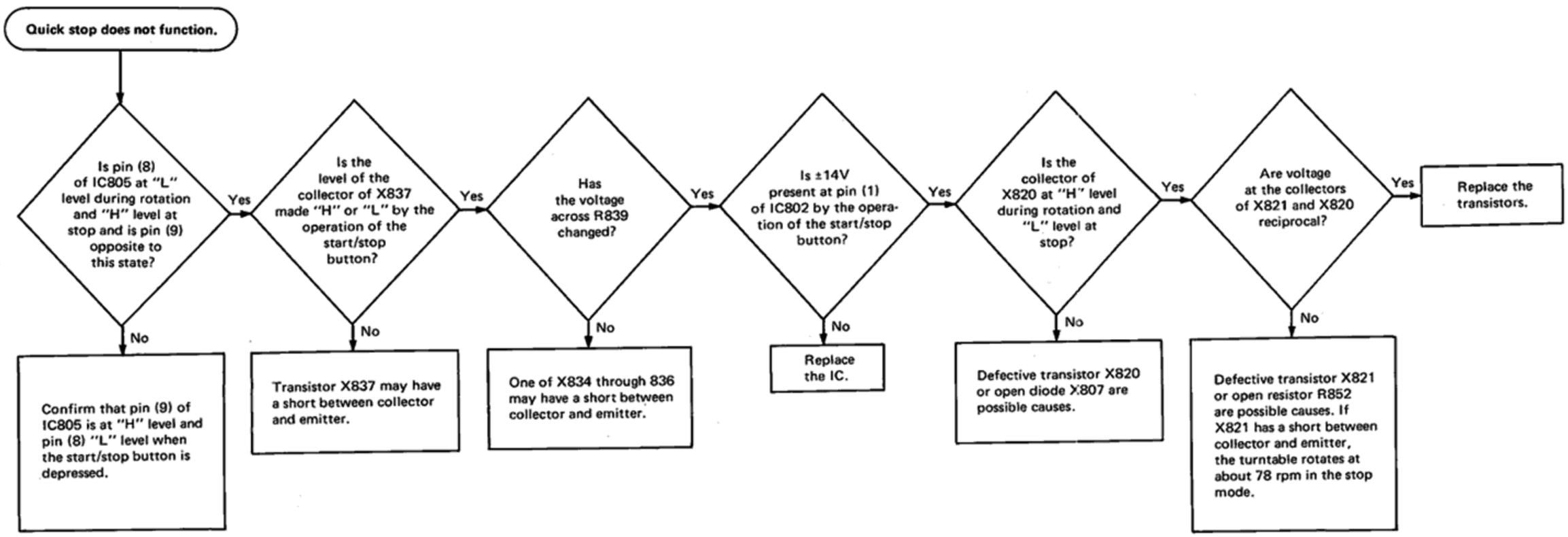
9-(6) Turntable rotates at an incorrect rpm



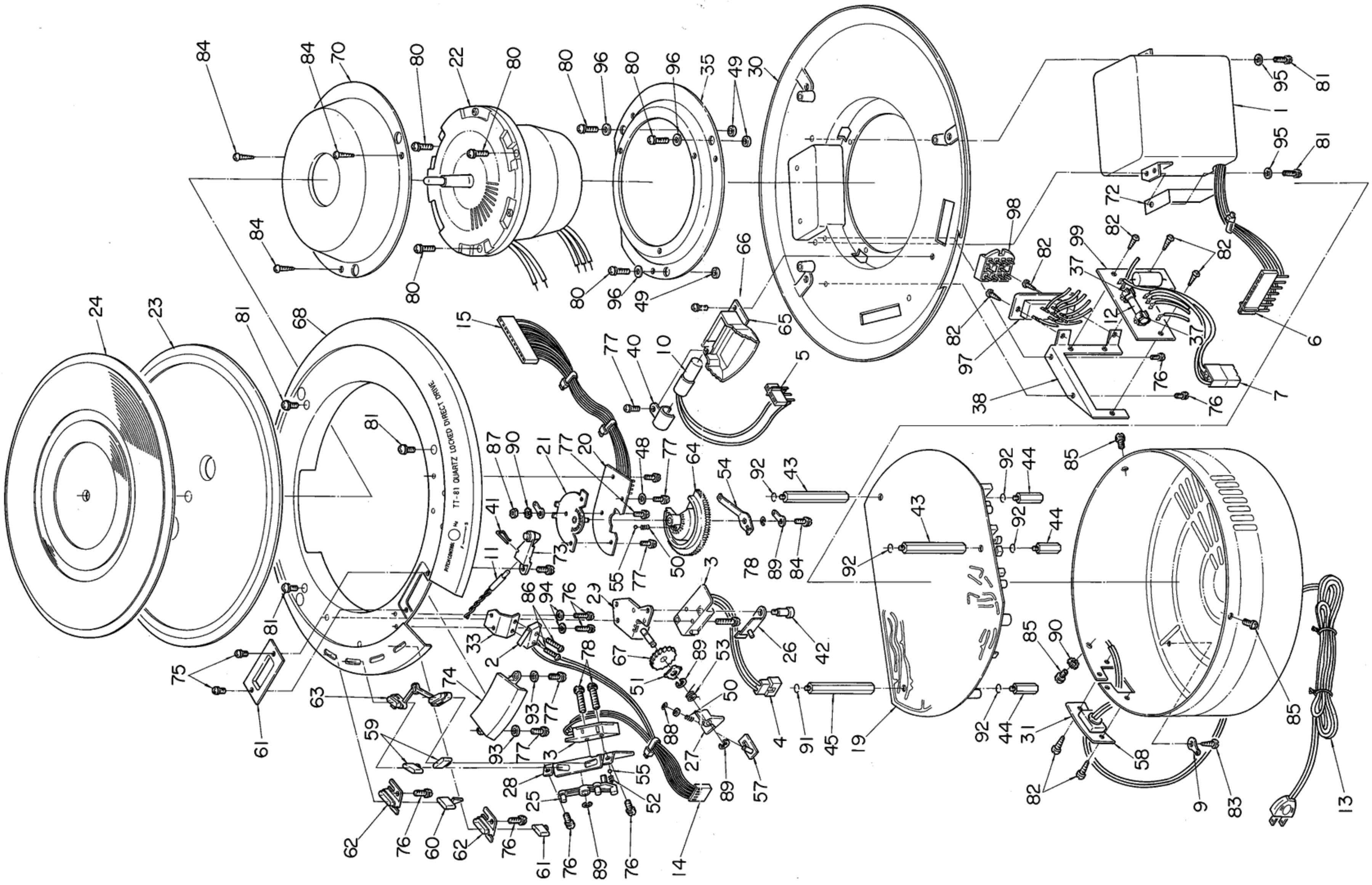
9-(7) Speed Select button does not function



9-(8) Quick Stop does not function



10. Exploded View and Parts List



Parts List

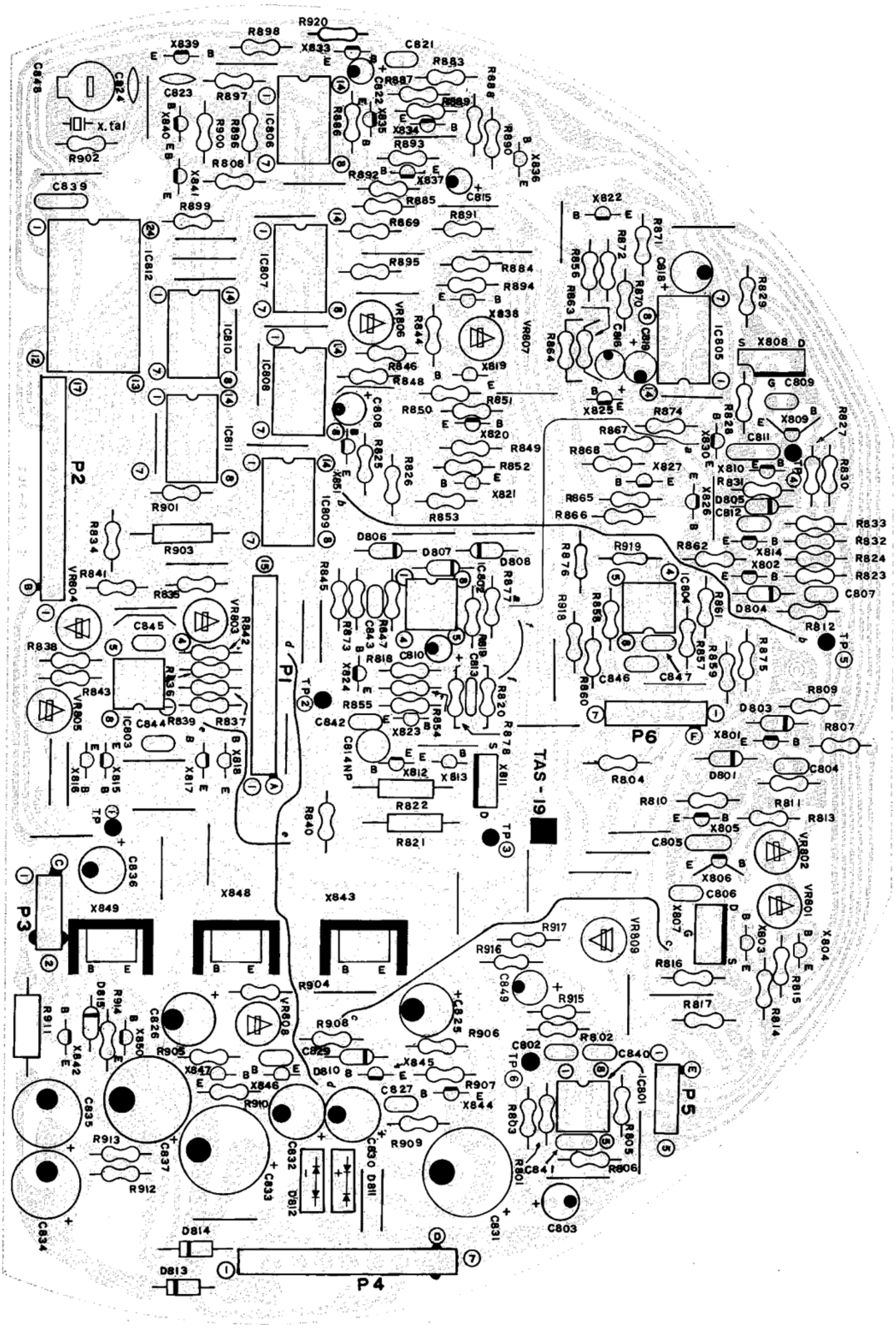
Drawing

No.	Parts No.	Description
1	E03617-010	Power transformer
2	QSM1S01-014	Micro switch
3	See page 27	"
4	E03682-001	AC plug
5	E03565-3BO	3p socket
6	E03565-7BO	7p socket
7	E03683-001	AC socket ass'y
9	052868-3	Lug
10	QLN7001-002	Neon lamp
11	QLP3105-001	Lamp
12	See page 27	Fuse
13	See page 27	Power cord
14	E03681-0505	Socket wire ass'y
15	E03681-1701	"
19	TAS-19C	Circuit board ass'y
20	TDS-2A	"
21	E60797-001	Circuit board base ass'y
22	M922A	Direct drive motor
23	E21899-001	Turn table
24	E21890-001	Turn table sheet
25	E60227-001	Select lever
26	E60241-001	Switch lever
27	E60248-001	Lever
28	E60225-001	Base
29	E60239-001	Base ass'y
30	E10069-001	Motor board
31	E34197-001	Bracket
33	E60767-001	Switch bracket
35	E34195-001	Motor holder
37	See page 27	Fuse holder
38	E61564-001	Bracket
40	E60952-001	Lamp holder
41	E60798-001	Clamper
42	E60244-001	Lever shaft
43	E60278-002	Stud (A)
44	E60280-002	Stud (C)
45	E60393-001	Stud (D)
46	E49934-001	Spacer
48	Q03093-517	Spacer
49	E60961-001	Bushing
50	E49842-001	Spring
51	E60246-001	"
52	E60252-001	"
53	E60253-001	"
54	E60774-001	"
55	G41505-3	Steel ball
56	E60234-001	Strovo millar
57	E60249-001	Key ass'y
58	QHS3876-162	Cord stopper
59	E60237-001	Push knob

Drawing

No.	Parts No.	Description
60	E60254-00	Switch knob
61	E60276-001	Push knob
62	E60728-001	Knob base
63	E60765-001	"
64	E60778-001	Control knob
65	E34193-002	Strobo box
66	E60629-002	Strobo box ass'y
67	E60245-001	Cam
68	E10068-003	Control panel
69	E21896-002	Cover
70	E34196-001	Motor cover
71	E60691-001	Switch cover
73	E60779-001	Indicator
74	E60238-001	Window
75	LPSP3005NS	Screw
76	LPSP3006ZS	"
77	LPSP3008ZS	"
78	LPSP3014ZS	"
79	LPSP4008ZS	"
80	LPSP4016ZS	"
81	LPSP4012ZS	"
82	SBSB3008M	"
83	SBSB3008N	"
84	SBSB3006M	"
85	SDSP3006NS	"
86	SPSP2008N	"
87	NNZ3000ZS	Nut
88	REE2000X	E-ring
89	REE3000X	"
90	WBS3000N	Washer
91	WLS3000N	"
92	WLS4000N	"
93	WNS3000N	"
94	WNS3000Z	"
95	WNS4000Z	"
96	Q03091-206	"
97	E03676-001	Plug
98	E03676-002	"
99	See page 27	P.C. board ass'y

11. TAS-19C Servo Control and Power Supply P.C.Board Ass'y



Transistors

Item No.	Part Number	Rating		Description	Maker
		Pc	fT		
X801, X802	2SC711 (E, F, G)	200mW	150MHz	Silicon	Mitsubishi
X803, X804	2SA628 (E, F)	"	"	"	"
X805, X806	2SC711 (E, F, G)	"	"	"	"
X807, X808	2SK40-2	100mW		FET	Hitachi
X809, X810	2SC711 (E, F, G)	200mW	150MHz	Silicon	Mitsubishi
X811	2SK40-2	100mW		FET	Hitachi
X812	2SD438 (E)	750mW	100MHz	Silicon	Sanyo
X813	2SB560 (E)	750mW	100MHz	"	"
X814	2SC711 (E, F, G)	200mW	150MHz	"	Mitsubishi
X815	2SD438 (E)	750mW	100MHz	"	Sanyo
X816	2SB560 (E)	"	"	"	"
X817	2SD438 (E)	"	"	"	"
X818	2SB560 (E)	"	"	"	"
X819	2SA628 (E, F)	200mW	150MHz	"	Mitsubishi
X820	2SC711 (E, F, G)	"	"	"	"
X821	2SA628 (E, F)	"	"	"	"
X822	2SC711 (E, F, G)	"	"	"	"
X823	2SA628 (E, F)	"	"	"	"
X824–X827	2SC711 (E, F, G)	"	"	"	"
X830	2SC711 (E, F, G)	"	"	"	"
X833–X835	2SC711 (E, F, G)	"	"	"	"
X836	2SA628 (E, F)	"	"	"	"
X837	2SC711 (E, F, G)	"	"	"	"
X839–X841	2SA628 (E, F)	"	"	"	"
X842	2SC1573 (Q)	600mW	80MHz	"	Matsushita
X843	2SC1061 (B, C)	25W	6MHz	"	Hitachi
X844	2SD438 (E)	750mW	100MHz	"	Sanyo
X845	2SC711 (E, F, G)	200mW	150MHz	"	Mitsubishi
X846	2SA628 (E, F)	"	"	"	"
X847	2SB560 (E)	750mW	100MHz	"	Sanyo
X848	2SA671 (B, C)	25W	8MHz	"	Hitachi
X849	2SC1061 (B, C)	"	6MHz	"	"
X850–X851	2SC711 (E, F, G)	200mW	100MHz	"	

Integrated Circuits

Item No.	Part Number	Rating	Description	Maker
IC801–IC804	NJM4558D		IC	Shinnihon Musen
IC805	M53274P		"	Mitsubishi
IC806	M53293P	155mW	"	"
IC807	M53290P	"	"	"
IC808	M53292P	"	"	"
IC809	M53273P	80mW	"	"
IC810	M53208P		"	"
IC811	M53290P	155mW	"	"
IC812	SC3042		"	Nihon Precision Circuit

Diodes

Item No.	Part Number	Rating	Description	Maker
D801—D808	1S2473		Silicon	Toyo Dengu
D810	RD6A(N)D		Zener	NEC
D811	ESAB02-02C		Silicon	Fuji Denki
D812	ESAB02-02N		〃	〃
D813, D814	SIB01-02		〃	〃
D815	RD6A(N)D		Zener	NEC

Capacitors

Item No.	Part Number	Rating		Description
C802	QFM41HK-682	6800pF	50V	Mylar
C803	QEW41CA-106	10μF	16V	Electrolytic
C804	QFM41HK-222	2200pF	50V	Mylar
C805	QFM41HK-154	0.15μF	〃	〃
C806	QFM41HK-103	0.01μF	〃	〃
C807	QFM41HK-222	2200pF	〃	〃
C808	QEW41CA-106	10μF	16V	Electrolytic
C809	QFM41HK-103	0.01μF	50V	〃
C810	QEB41HM-224	0.22μF	〃	L.L.C. electrolytic
C811	QFM41HK-104	0.1μF	〃	Mylar
C812	QFM41HK-222	2200pF	〃	〃
C813	QFM41HK-122	1200pF	〃	〃
C814	QEZ0046-105	1μF		Electrolytic
C815	QEB41EM-335	33μF	25V	L.L.C. electrolytic
C816	QEW41CA-106	10μF	16V	Electrolytic
C818	QEW41EA-476	47μF	25V	〃
C819	QEW41EA-475	4.7μF	〃	〃
C821	QFM41HK-272	2700pF	50V	Mylar
C822	QEW41EA-106	10μF	25V	Electrolytic
C823	QCS11HJ-120			Ceramic
C824	QCT05UJ-330			〃
C825, C826	QEW41EA-107	100μF	25V	Electrolytic
C827	QFM41HK-103	0.01μF	50V	Mylar
C829	QFM41HK-103	〃	〃	〃
C830	QEW41EA-107	100μF	25V	Electrolytic
C831	QEW41VA-108	1000μF	35V	〃
C832	QEW41EA-107	100μF	25V	〃
C833	QEW41VA-108	1000μF	35V	〃
C834, C835	QEW42AA-476	47μF		〃
C836	QEW41CA-107	100μF	16V	〃
C837	QEW41CA-108	1000μF	〃	〃
C839	QFM41HK-104	0.1μF	50V	Mylar
C840—C847	QFM41HK-103	0.01μF	〃	〃
C848	QAT3001-006			Trimmer
C849	QEW41CA-106	10μF	16V	Electrolytic

Resistors

Item No.	Part Number	Rating		Description
VR801, VR802	QVZ3501-473			S. valiable
VR803, VR804	QVZ3501-103			Variable
VR806, VR807	QVZ3501-103			〃
VR808	QVP4A0B-222			〃
VR809	QVZ3501-103			〃
R017	QRD141J-223	22kΩ	1/4W	Carbon
R801	QRD141J-102	1kΩ	〃	〃
R802	QRD141J-474	470kΩ	〃	〃
R803	QRD141J-471	〃	〃	〃
R804	QRD121J-101	100Ω	1/2W	〃
R805	QRD141J-102	1kΩ	1/4W	〃
R806	QRD141J-104	100kΩ	〃	〃
R807	QRD141J-123	12kΩ	〃	〃
R808	QRD141J-473	47kΩ	〃	〃
R810	QRD141J-272	2.7kΩ	〃	〃
R811	QRD141J-683	68kΩ	〃	〃
R812	QRD141J-104	100kΩ	〃	〃
R813—R815	QRD141J-473	47kΩ	〃	〃
R816	QRD141J-103	10kΩ	〃	〃
R817	QRD141J-183	18kΩ	〃	〃
R818—R820	QRD141J-683	68kΩ	〃	〃
R821, R822	QRG027J-121	120Ω		Uninflammable O.M.
R823	QRD141J-104	100kΩ	1/4W	Carbon
R824—R826	QRD141J-103	10kΩ	〃	〃
R827	QRD141J-104	100kΩ	〃	〃
R828	QRD141J-103	10kΩ	〃	〃
R829	QRD141J-274	270kΩ	〃	〃
R830	QRD141J-104	100kΩ	〃	〃
R831	QRD141J-272	270kΩ	〃	〃
R832	QRD141J-472	4.7kΩ	〃	〃
R833	QRD141J-473	47kΩ	〃	〃
R834	QRD141J-683	68kΩ	〃	〃
R835—R838	QRD141J-102	1kΩ	〃	〃
R839, R840	QRD141J-683	68kΩ	〃	〃
R841, R842	QRD141J-225	2.2MΩ	〃	〃
R843, R844	QRD141J-473	47kΩ	〃	〃
R845	QRD141J-103	10kΩ	〃	〃
R846	QRD141J-472	4.7kΩ	〃	〃
R847	QRD141J-105	1MΩ	〃	〃
R848	QRD141J-682	6.8kΩ	〃	〃
R849, R850	QRD141J-103	10kΩ	〃	〃
R851	QRD141J-153	15kΩ	〃	〃
R852, R853	QRD141J-473	47kΩ	〃	〃
R854	QRD141J-153	15kΩ	〃	〃
R855, R856	QRD141J-473	47kΩ	〃	〃
R857—R860	QRD141J-102	1kΩ	〃	〃
R861	QRD141J-473	47kΩ	〃	〃
R862, R863	QRD141J-103	10kΩ	〃	〃
R864	QRD141J-473	47kΩ	〃	〃
R865	QRD141J-472	4.7kΩ	〃	〃
R866	QRD141J-473	47kΩ	〃	〃
R867	QRD141J-103	10kΩ	〃	〃
R868	QRD141J-472	4.7kΩ	〃	〃
R869	QRD141J-102	1kΩ	〃	〃
R870	QRD141J-472	4.7kΩ	〃	〃

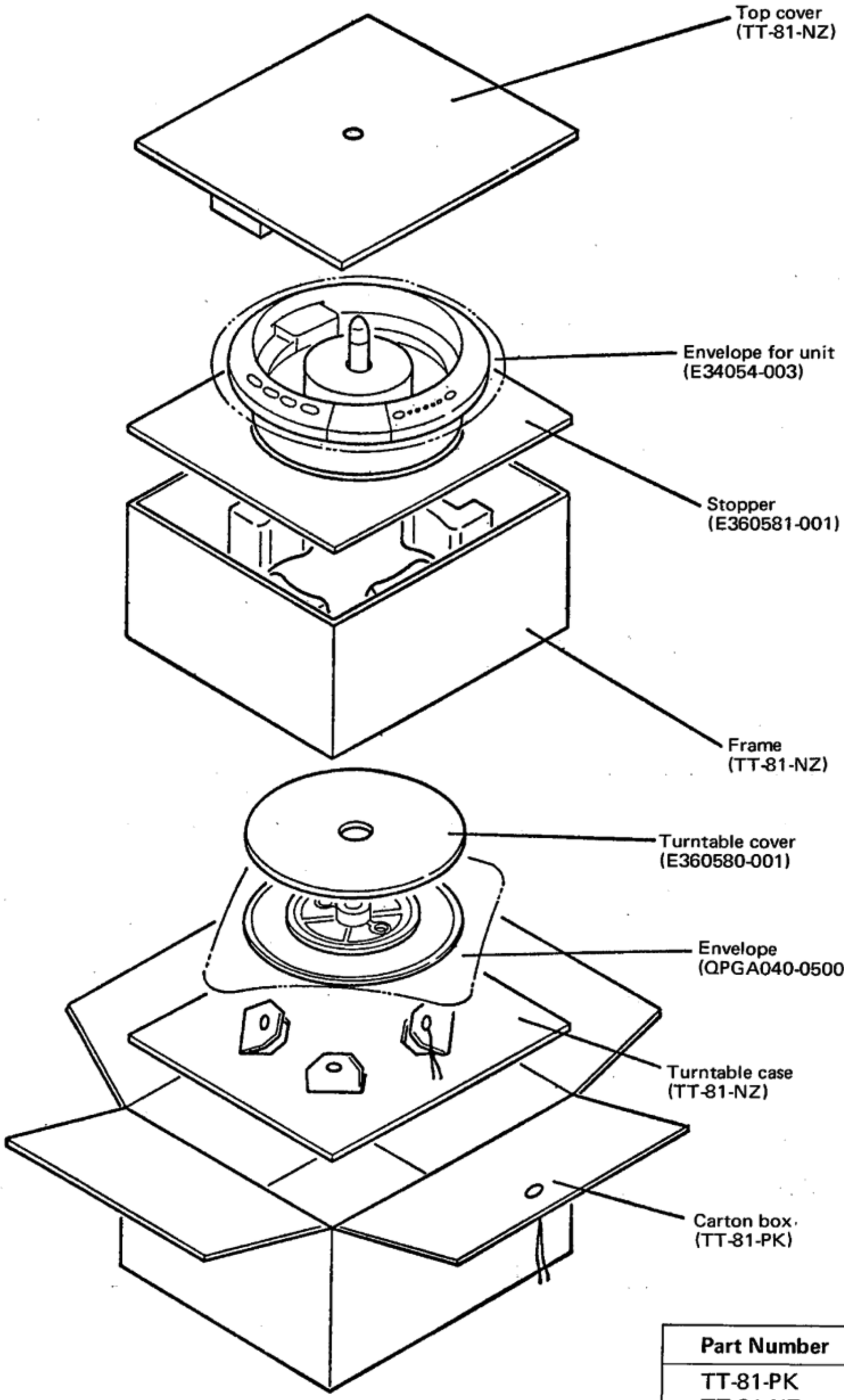
Resistors

Item No.	Part Number	Rating		Description
R871	QRD141J-271	270Ω	1/4W	Carbon
R872	QRD141J-102	1kΩ	"	"
R873	QRD141J-103	10kΩ	"	"
R874	QRD141J-473	47kΩ	"	"
R875—R877	QRD141J-105	1MΩ	"	"
R878	QRD141J-102	1kΩ	"	"
R883, R884	QRD141J-153	15kΩ	"	"
R885	QRD141J-103	10kΩ	"	"
R886	QRD141J-473	47kΩ	"	"
R887	QRD141J-103	10kΩ	"	"
R888—R890	QRD141J-473	47kΩ	"	"
R891	QRD141J-334	330kΩ	"	"
R892	QRD141J-103	10kΩ	"	"
R893	QRD141J-222	2.2kΩ	"	"
R894	QRD141J-473	47kΩ	"	"
R895	QRD141J-153	15kΩ	"	"
R896	QRD141J-472	4.7kΩ	"	"
R898	QRD141J-102	1kΩ	"	"
R899	QRD141J-472	4.7kΩ	"	"
R900	QRD141J-473	47kΩ	"	"
R901	QRD141J-102	1kΩ	"	"
R902	QRD141J-225	2.2MΩ	"	"
R903	QRG027J-101	100Ω		Uninflammable O.M.
R904, R905	QRD141J-332	3.3kΩ	1/4W	Carbon
R906	QRD141J-152	1.5kΩ	"	"
R907	QRD141J-102	1kΩ	"	"
R908	QRD141J-122	1.2kΩ	"	"
R909, R910	QRD141J-272	2.7kΩ	"	"
R911	QRG027J-332			Uninflammable O.M.
R912, R913	QRD141J-103	1kΩ	1/4W	Carbon
R914	QRD141J-821	820Ω	"	"
R915	QRD141J-105	1MΩ	"	"
R916	QRD141J-222	2.2kΩ	"	"

Others

Item No.	Part Number	Rating	Description
P1	E03686-015A		Plug
P2	E03686-017A		"
P3	E03628-3		3-pin plug
P4	E036628-7		7-pin plug
P5	E03686-005A		Plug
P6	E03686-007A		"

12. Packing Material Parts List



Part Number	Description
TT-81-PK	Carton Box
TT-81-NZ	Fillers
QPGA040-05005	Envelope for Platter
SPSP4012AS	Screw for Power Transformer
Q03091-114	Washer for Power Transformer
G6711-1	Caution Tag
E34054-003	Envelope for Unit
E360581-001	Stopper
E360580-001	Turntable Cover

13. Accessories List

Part Number	Description	Q'ty
See below	Instruction Book	1
E48820-001	EP Adaptor	1
E21892-001	Caution Sheet	1
E41202-002	Envelope for Instruction Book	1
E60259-002	Overhang Indicator	1
SPSP6075Z	Screw (Use for Base Board CL-P1)	3
MRSP4113Z	Screw (Use for Wooden Cabinet)	3
WNS6000Z	Washer	3
NTS6000Z	Nut	3
QPGA010-1503	Envelope for Screw, Washer & Nuts	1
See below	Warranty Card	1

14. Parts List with Specified Numbers for Disignated Areas

Item No.	Description	U.S.A. & Canada	Europe	U.K.	Australia	U.S. Military Market	Other Countries
3	Micro Switch	QSM1V01-001	QSM1V01-022	QSM1V01-022	QSM1V01-022	QSM1V01-001	QSM1V01-001
12	Fuse	QMF61U2-R50 (0.5AT)	QMF51A2-R20 (0.2AT)	QMF51A2-R20 (0.2AT)	QMF51A2-R20 (0.2AT)	QMF61U2-R50 (0.5AT)	QMF61U2-R50 (0.5AT)
13	Power Cord	QMP1200-244	QMP3910-244	QMP9017-007BS	QMP2500-200	QMP1200-244	QMP1200-244
37	Fuse Holder	E45524-001	E48965-002	E48965-002	E48965-002	E45524-001	E45524-001
99	P.C. Board Ass'y	TSC-77A	TSC-77C	TSC-77C	TSC-77C	TSC-77B	TSC-77B
	Inst. Book	E30580-570A (English) E30580-571A (French)	E30580-570A (English) E30580-572A (German)	E30580-570A (English)	E30580-570A (English)	E30580-570A (English)	E30580-570A (English)
	Warranty Card	BT20020C (U.S.A.) BT20025 (Canada)	Not enclosed	BT20013	BT20029	BT20014	BT20014

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