

SERVICE MANUAL

KD-5100



QUARTZ PLL DIRECT-DRIVE FULL-AUTOMATIC TURNTABLE

CONTENTS

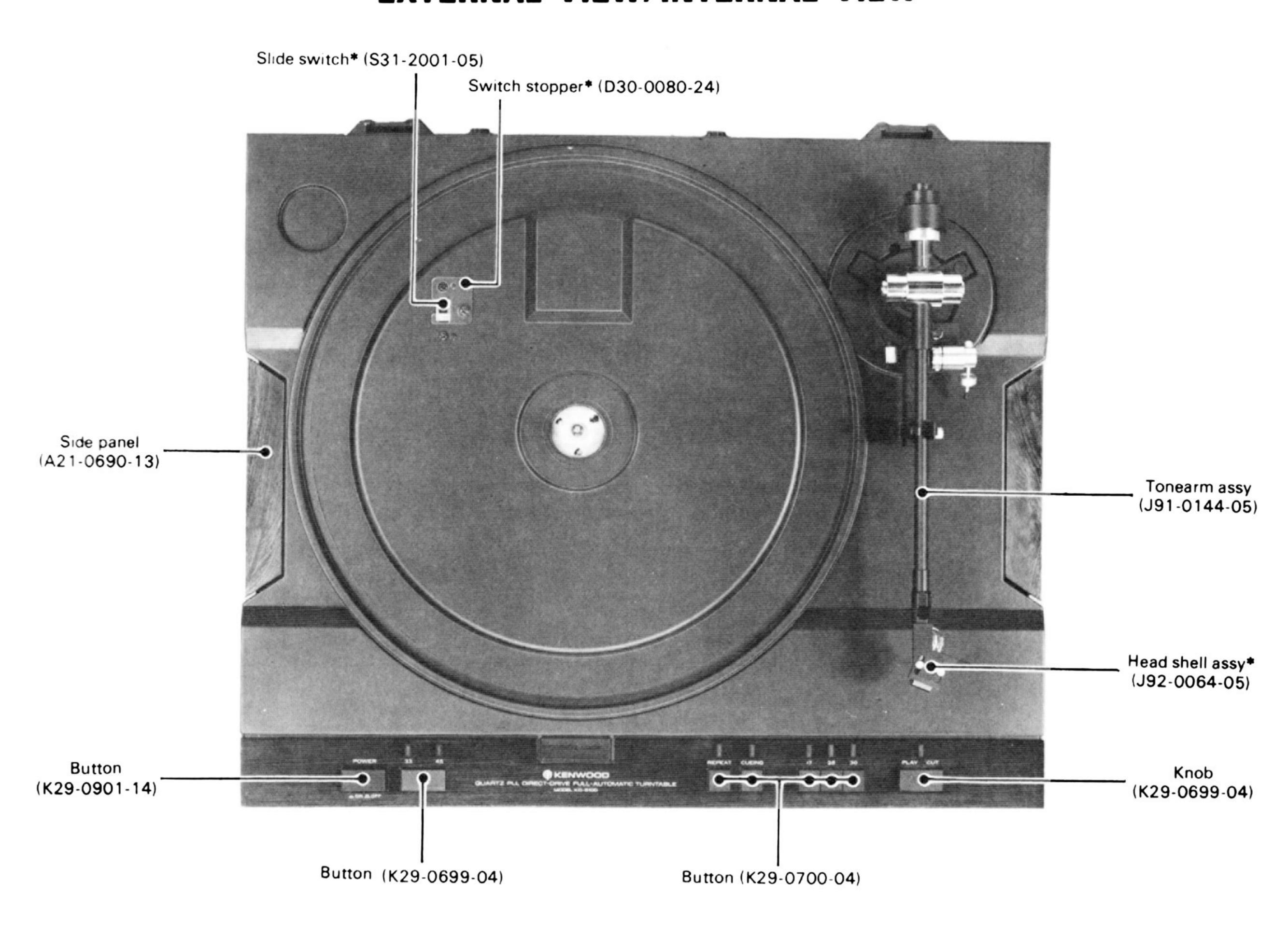
EXTERNAL VIEW	3
INTERNAL VIEW	3
INSTALLATION OF AUTOMATIC MECHANISM ASSY	4
ADJUSTMENT (AUTOMATIC MECHANISM)	5
EXPLODED VIEW	6
CIRCUIT DESCRIPTION	7
TROUBLESHOOTING	27
PC BOARD	32
SCHEMATIC DIAGRAM	35
PARTS LIST	36
PACKING	38

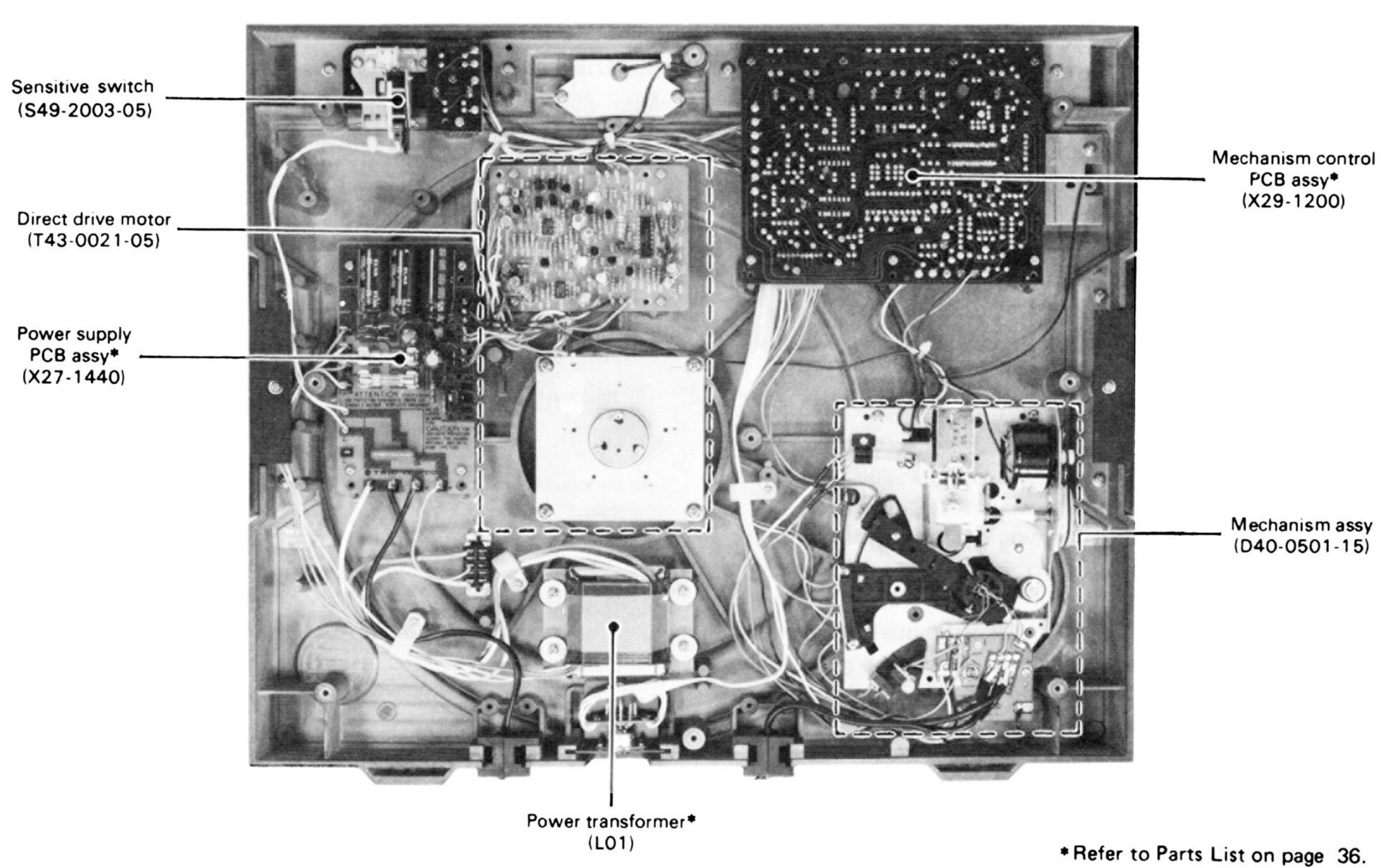
Note:

Component and circuitry are subject to modification to insure best operation under differing local conditions. This manual is based on, the U.S. (K) standard, and provides information on regional circuit modification through use of alternate schematic diagrams, and information on regional component variations through use of parts list.

Region	Code
U.S.A	K
Canada	P
PX (Far East)	U
Australia	. X
South Africa	
England	. Т
Europe and Scandinavia	
Other Areas	. M
Audio Club	. н

EXTERNAL VIEW/INTERNAL VIEW



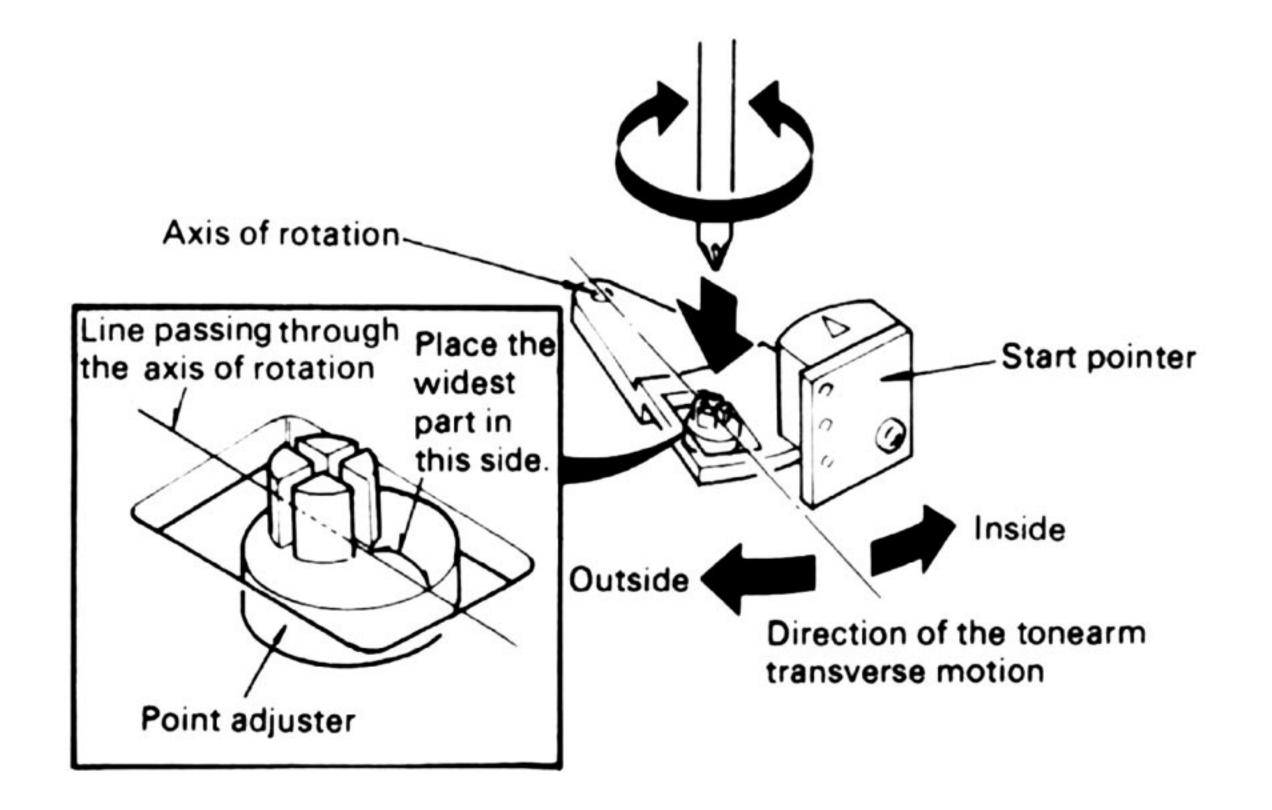


INSTALLATION OF AUTOMATIC MECHANISM ASS'Y

Start pointer (arm rest position detection) Search holder Search arm Pan head machine screw M3 × 16 Position holder Pan head machine screw Idler M3 × 10 (Viewed from the bottom)

1. Installation of Start Pointer and Return Holder

Adjust the start pointer and return holder positions so that the cross on each point adjuster coincides with the line passing through the axis of rotation. (Adjustment of the start pointer is shown below.)

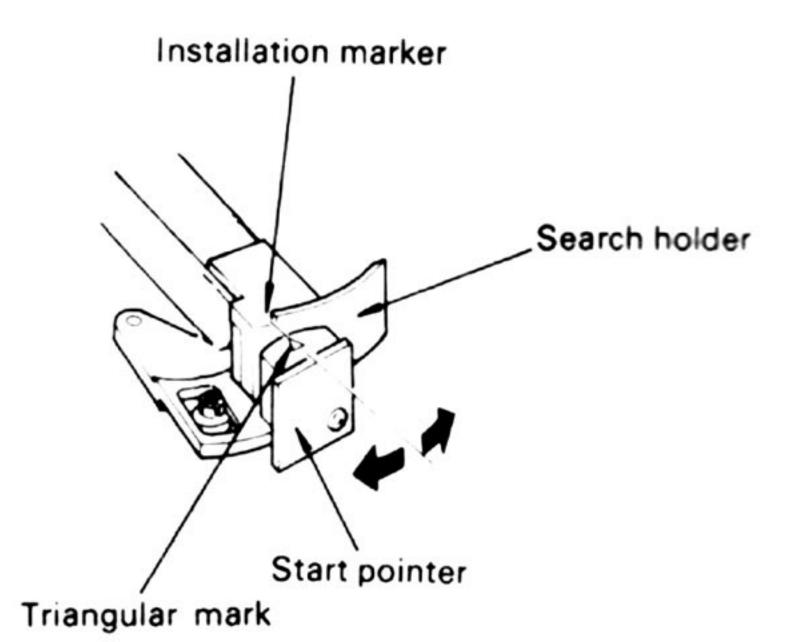


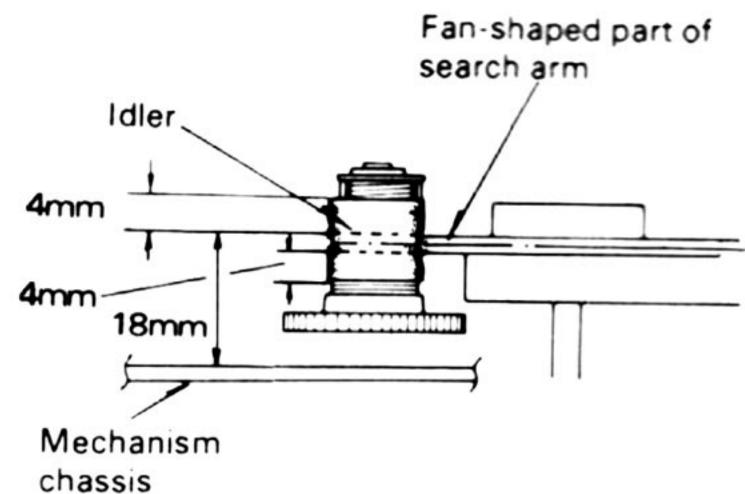
Notes:

- The start pointer position affects detection of the arm rest position and determination of the auto-in and auto-return and determination of the auto-in and auto-return positions. If it is placed in a wrong position, the automatic mechanism may mulfunction, for example, the turntable platter may not stop even if the tonearm returns to the arm rest position. Adjust the start pointer accurately.
- Adjustment of the return holder point adjuster is explained in the Paragraph "Adjustment of Auto-return Position".

2. Installation of Search Arm

- 1. Fix the tonearm on the arm rest.
- 2. Install the search arm so that its installation marker is aligned with the triangular mark of the start pointer and the relationship between the search arm and the idler becomes as shown below, then tighten the pan head machine screws, M3 x 16 and M3 x 10.

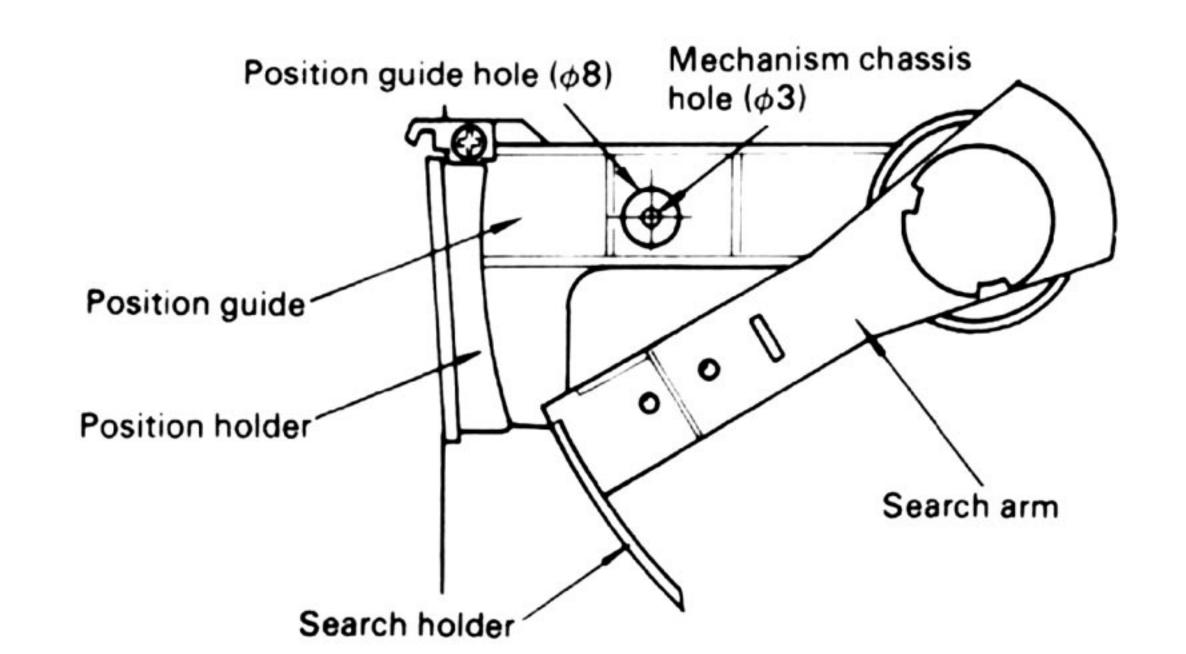




Cross section

3. Installation of Position Guide

Align the center of the hole of the position guide with the center of the hole of the mechanism chassis.



ADJUSTMENT (AUTOMATIC MECHANISM)

In adjustment of the automatic mechanism, Test Record 3 (P-3027) (parts No.: T99-0204-05) is used. Check the cartridge for the following before adjustment: 1) overhang, 2) whether the stylus is exactly aligned with the center line of the tone arm pipe. (2) is especially important.)

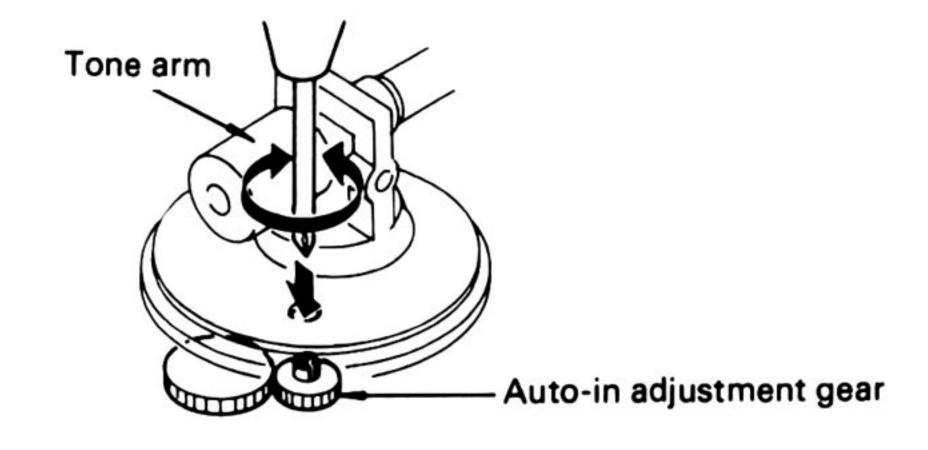
1. Specifications of Test Record

Play the test record at 45 rpm.

BAND (Side A)	Cont	Use					
	30 cm lead-ii	n test groove	A				
1	L-ch: voice (1-65)	R-ch: 1 kHz	Auto-in adjustment				
	25 cm lead-ii	25 cm lead-in test groove					
2	L-ch: voice (1-65)	R-ch: 1 kHz					
	17 cm lead-ii	ditto					
3	L-ch: voice (1-65)	R-ch: 1 kHz	GILLO.				
	30/17 cm lead-out test groove						
4	L-ch: voice (1-59)	R-ch: 315 kHz	Auto-return adjustment				

2. Adjustment of Auto-in Position

- Place the test record on the turntable platter, set the speed to 45 rpm and press the PLAY button.
- Adjust the auto-in adjustment gear so that the spoken count recorded in band 1 is between 23 and 29 when play starts.

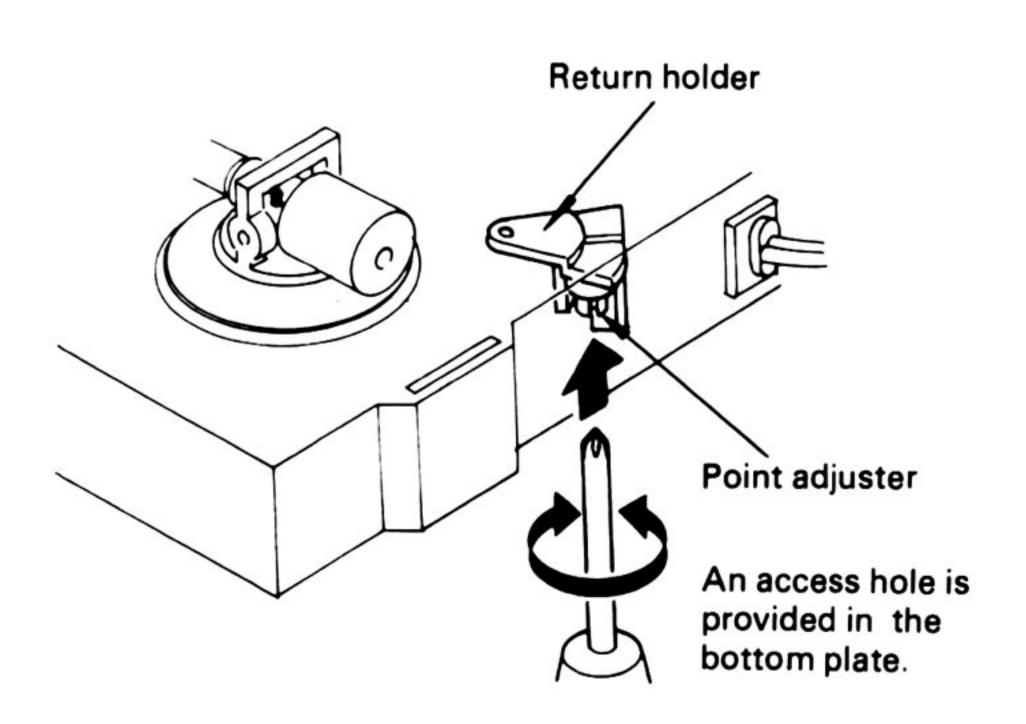


Note:

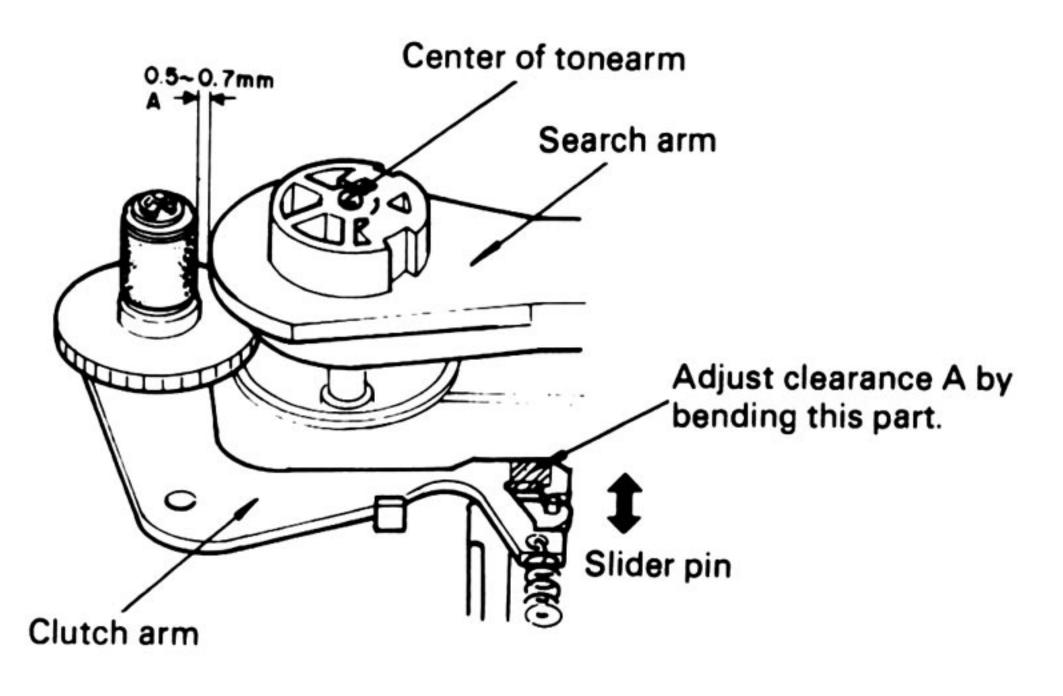
As the auto-in adjustment gear is turned clockwise, the tonearm moves towards the center, and vice versa.

3. Adjustment of Auto-return Position

- 1. Play band 4 of side A of the test record.
- 2. Adjust the point adjuster of the return holder so that the spoken count is 17 when the tonearm automatically returns.

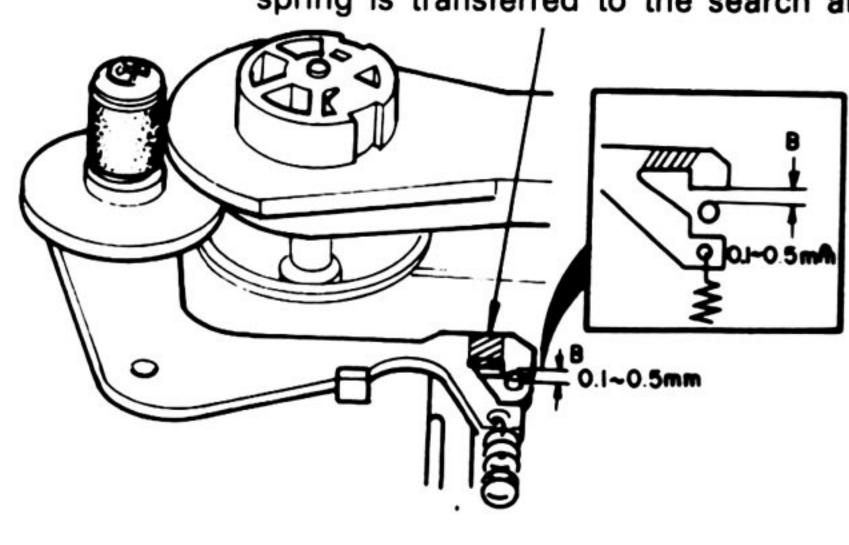


4. Clearance Adjustment of Idler and Clutch Arm



< Plunger: OFF > (Solenoid)

Adjust clearance B by bending this part. Bend as little as possible so the force of spring is transferred to the search arm.

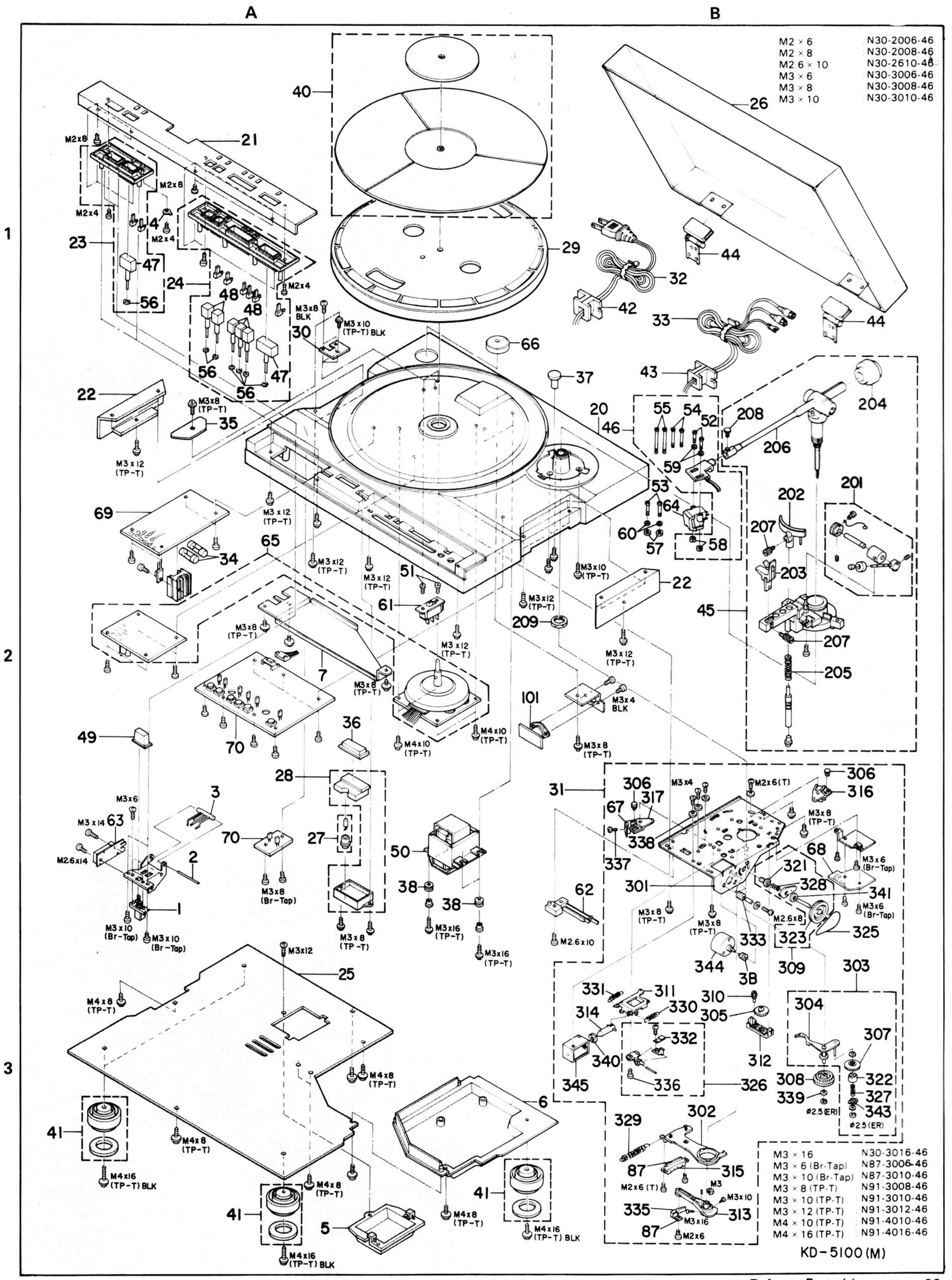


< Plunger: ON>
(Solenoid)

Note:

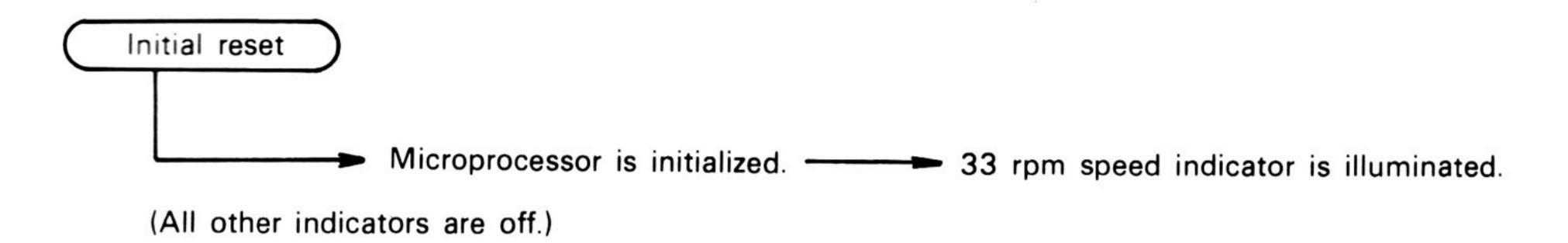
When the automatic mechanism is removed and then installed again in the turntable, the above clearances may vary. Install the automatic mechanism carefully.

EXPLODED VIEW



1. OPERATION PROCEDURES

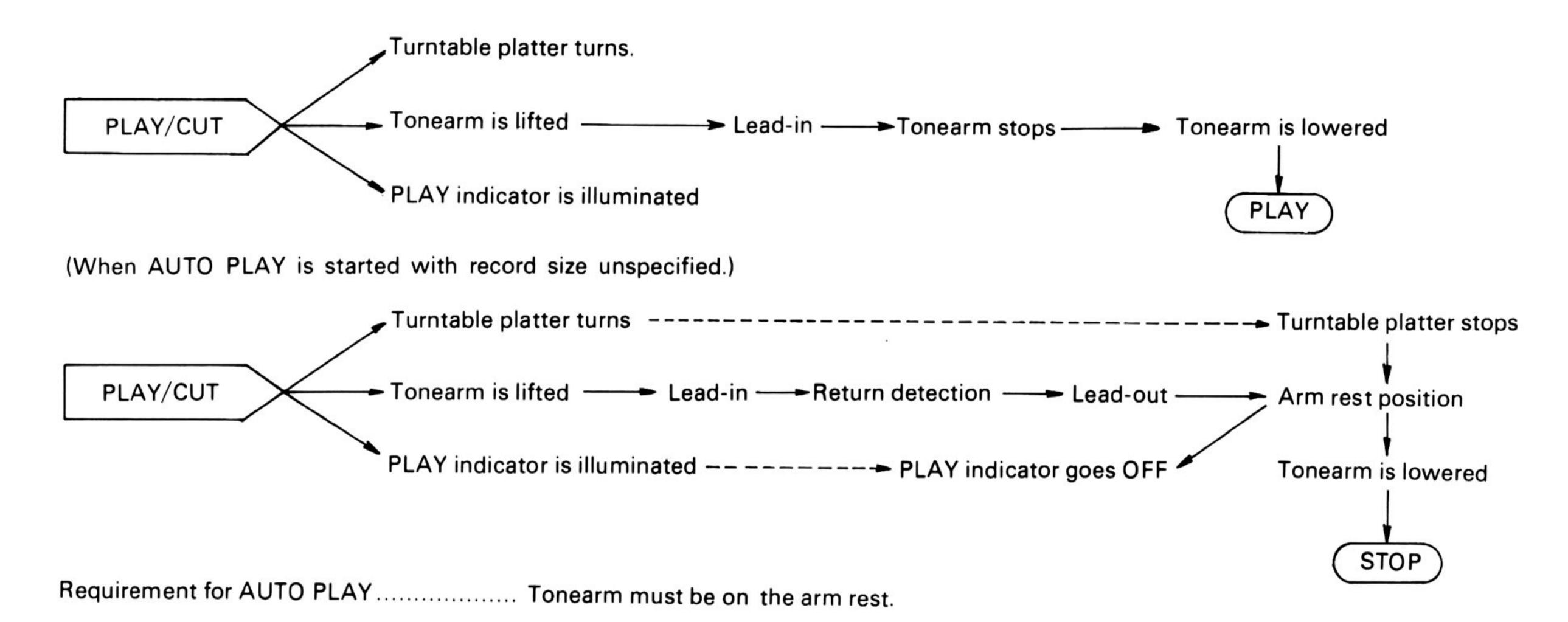
1-1 POWER SWITCH ON



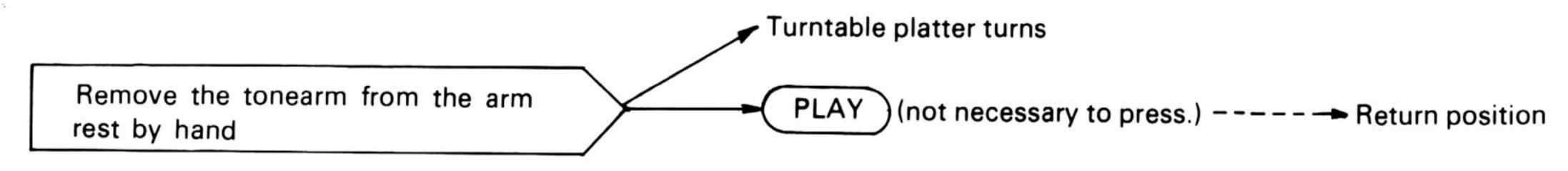
1-2 RECORD SIZE SELECTION

- Record size can be selected when the tonearm is on the arm rest, and before AUTO PLAY is started.
- Record size cannot be changed during AUTO PLAY.
- If two or more buttons are pressed simultaneously, the one which is released last has priority.

1-3 AUTO PLAY

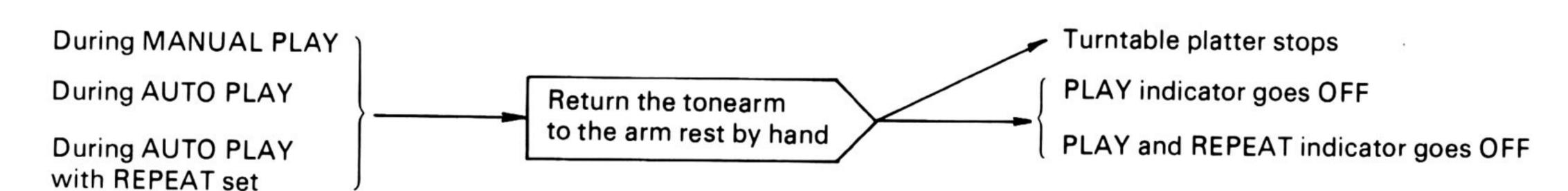


1-4 MANUAL OPERATION

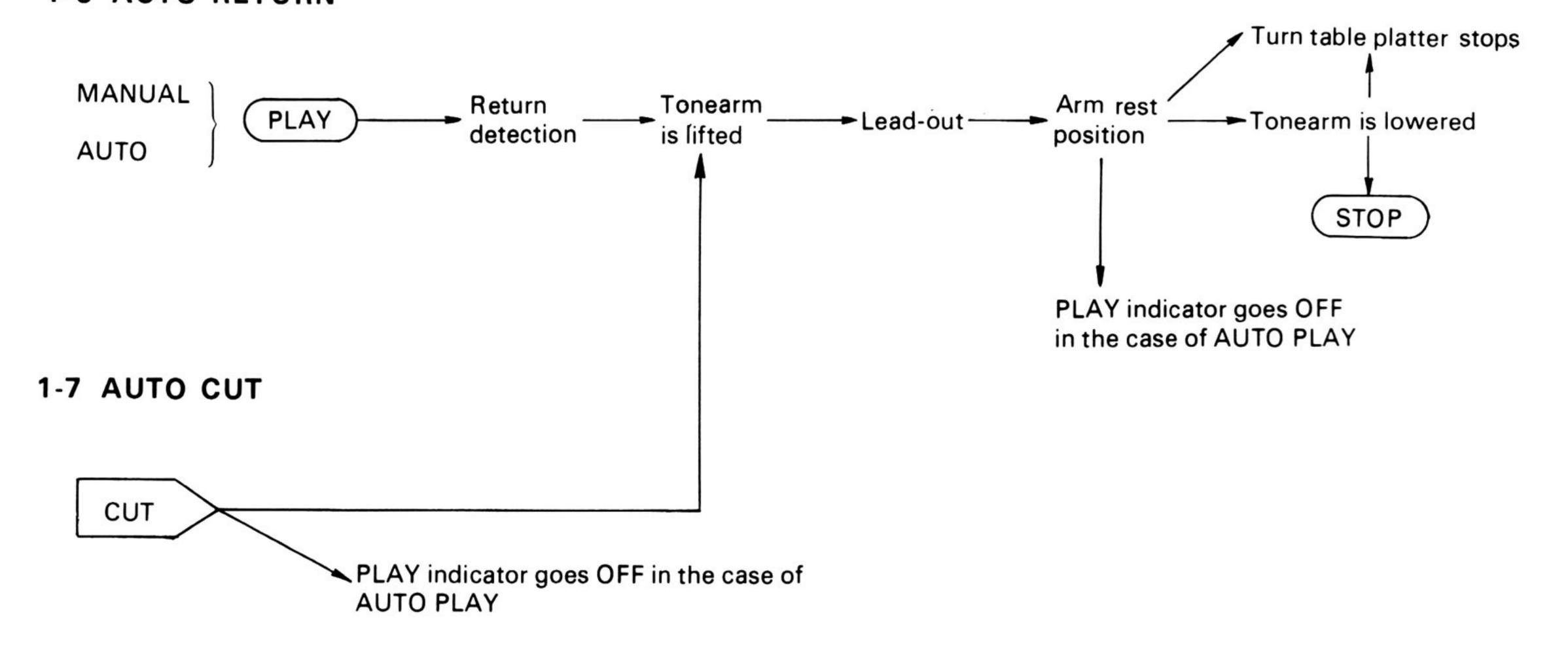


* If the proper record size is not selected previously, the tonearm will not automatically return when it reaches the return position.

1-5 MANUAL STOP

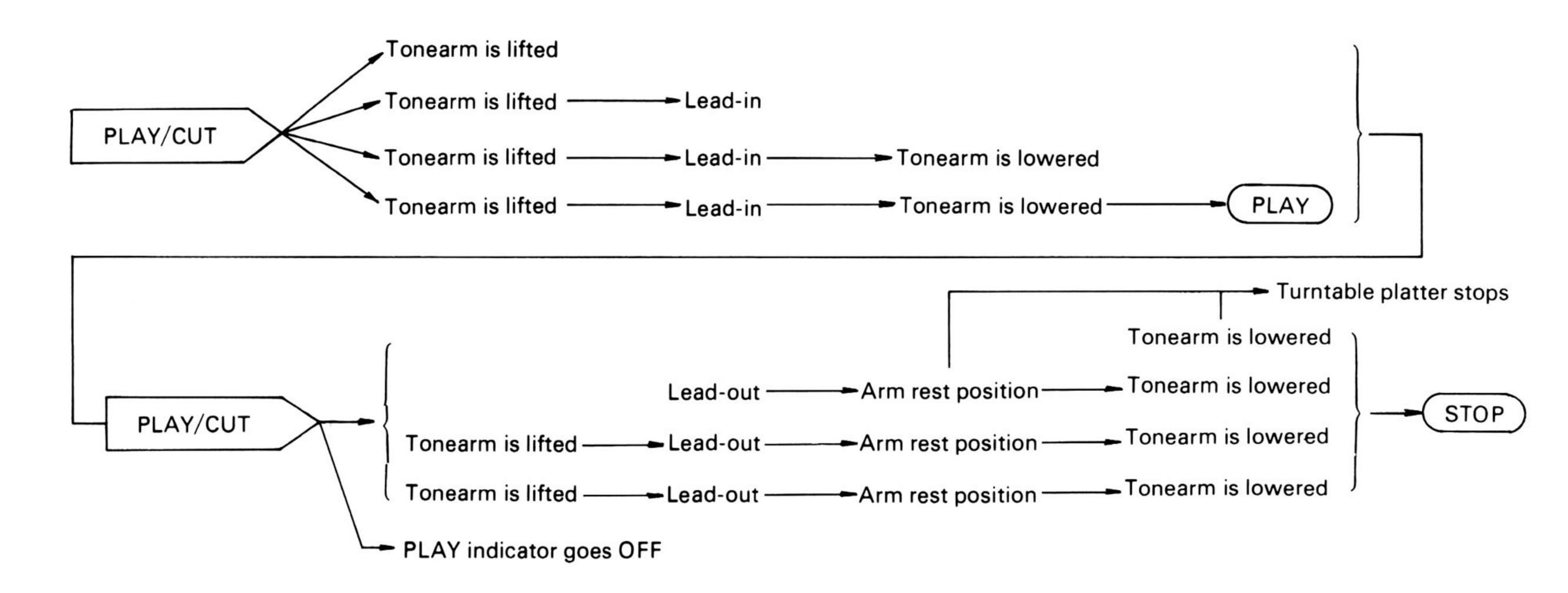


1-6 AUTO RETURN



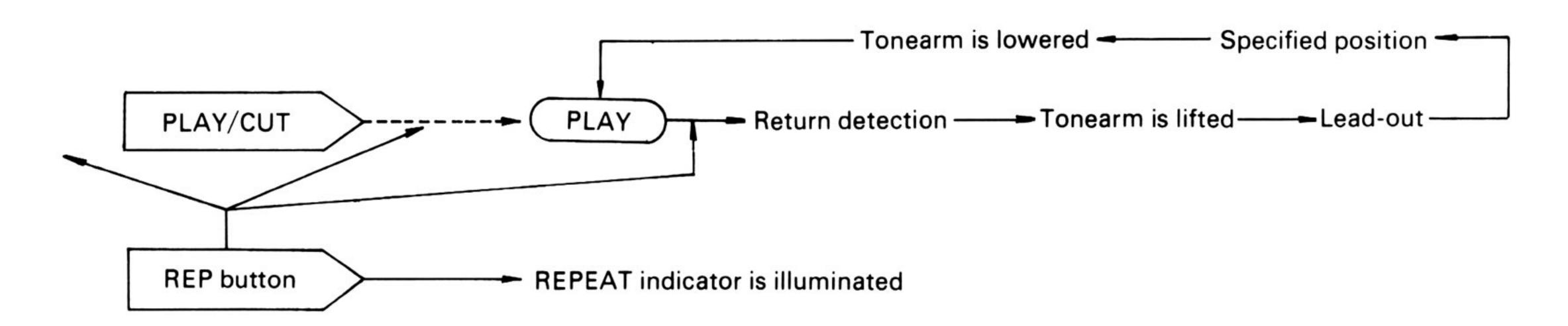
* AUTO CUT effective unless the tonearm is on the arm rest or after AUTO PLAY has been started.

1-8 AUTO CUT after AUTO PLAY has been started



1-9 REPEAT

1) Auto play



2) Manual play

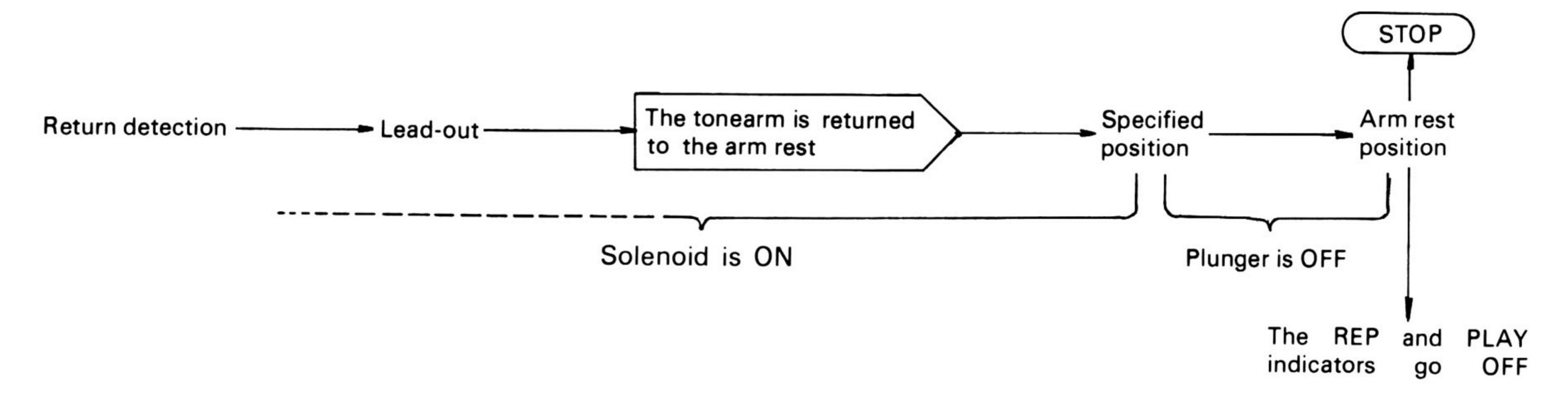
When the tonearm is removed from the arm rest by hand, the repeat condition, if it has been set previously, is reset and will not be effective even if the REP button is pressed.

3) When the repeat condition is reset, the REP indicator goes OFF.

The repeat condition is reset when one of the following occurs.

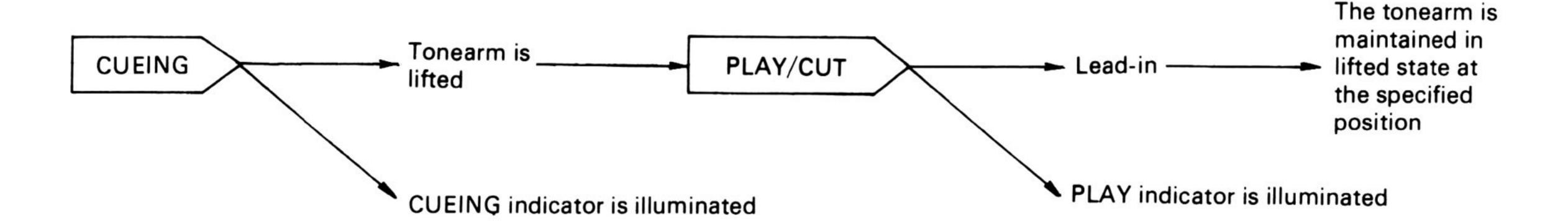
- The REP button is pressed and the repeat condition has already been set.
- The CUT button is pressed.
- The tonearm is returned to the arm rest by hand.
- * Operating the REP button while returning in REPEAT operation has no effect.

4) When the arm is returned to the arm rest by hand while returning in REPEAT mode.

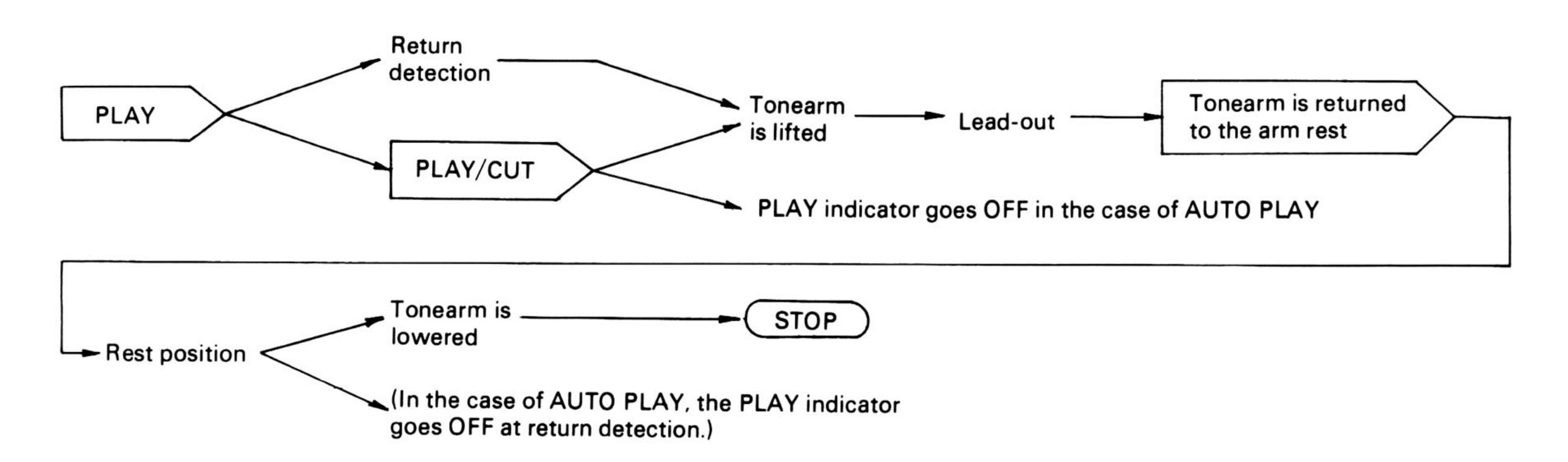


1-10 CUEING

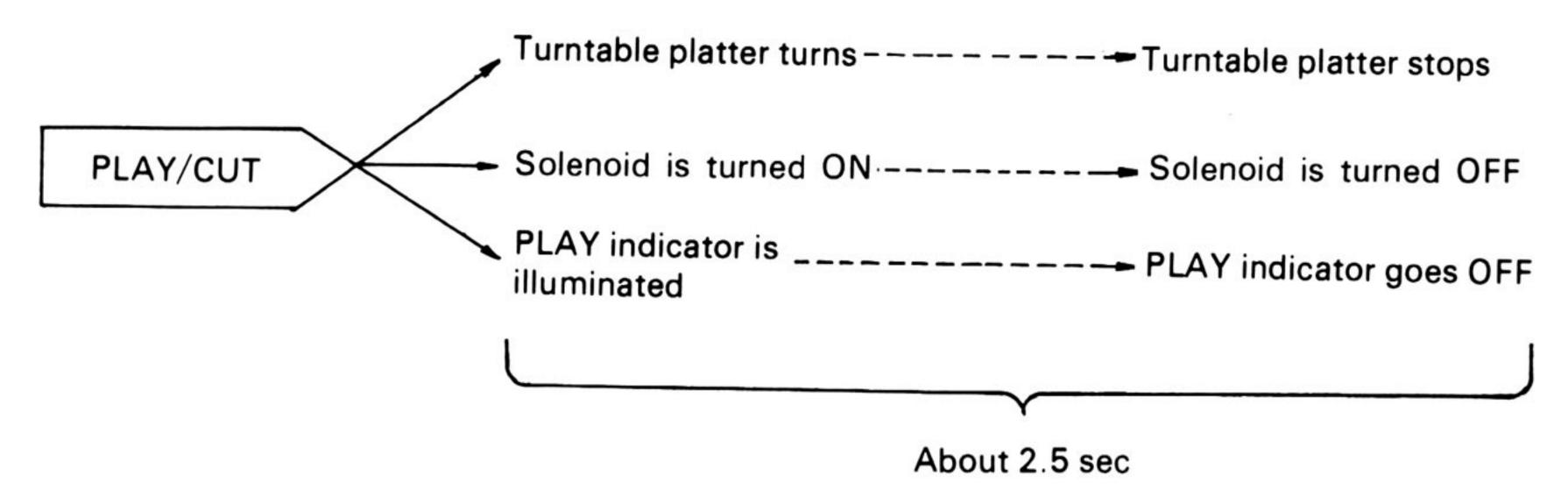
- When the CUEING button is pressed while the CUEING indicator is OFF, the indicator is illuminated and the arm lifter rises.
- When the CUEING button is pressed while the CUEING indicator is ON, the indicator goes OFF and the arm lifter lowers.
- If the PLAY/CUT button is pressed when the CUEING indicator is ON, the AUTO CUT operation starts and the CUEING indicator goes OFF.
- If the PLAY/CUT button is pressed after the CUEING operation has started and the tonearm is at the arm rest position, operation is as follows:



1-11 WHEN THE TONEARM IS RETURNED TO THE ARM REST BY HAND DURING AUTO RETURN OR AUTO CUT OPERATION



1-12 AUTO PLAY IS STARTED WITH TONEARM CLAMPED AT ARM REST



1-13 CHARACTERISTICS OF TURNTABLE OPERATION

- MANUAL operation has highest priority.
- The record size is not automatically selected at power-on.
 Therefore, even if an AUTO operation is started without selecting the record size, the tonearm will not be lowered.
- 3 Even if the tonearm is returned to the arm rest by CUT operation or by hand with the CUEING mode set, the CUEING mode will be reset, preventing errorneous operation.

2. REMOTE CONTROL

The KD-5100 can be remotely controlled using the system remote control RC-500.

2-1 RC-500 REMOTE CONTROL FUNCTIONS

- PLAY/CUT
- REPEAT
- 30 cm
- 25 cm Record size selection
- 17 cm
- Memory trace

3. MICROPROCESSOR

The KD-5100 mechanism control circuit uses a microprocessor (TI MP0222S). The MP0222S type name is registered, and its program developed by KENWOOD. Its hardware is the same as TMS1000.

The TMS 1000 is a 4-bit P. channel MOS microprocessor which uses the masterslice system; ROM, RAM and processing circuits are built on an LSI chip. The ROM and OPLA areas of the MPO222S are occupied by the KENWOOD developed program.

The TMS1000 is provided with 43 basic instructions as shown in Fig. 3.1. With these instructions, input and output data control, bit control, internal data transfer, operations, blanking, looping and subroutine processing are carried out. Each instruction word consists of 8 bits. The ROM consists of 1024×8 bits and its area is divided into 16 pages with each page containing 64 instructions.

The data memory RAM consists of 64 x 4 bits and one word consists of 4 bits. The RAM area is divided into 4 files, with each file selected by the 2-bit X-register and each word addressed by the 4-bit Y-register controlled by the ROM.

There are two output ports; O-port and R-port. The O-port outputs 8-bit data which is decoded from the 5-bit data stored in data latches by PLA (Program Logic Array). The R-port consists of 11 latches which can be individually set and reset by the program.

The input port has 4 data input terminals, K1, K2, K4 and K8 with which to load data into the accumulator.

Data flow is as shown in Fig. 3.2, and the specifications of TMS1000 are shown in Table 3.1.

Note:

While a subroutine is being executed, another subroutine cannot be called. A subroutine must be stored in one page; e.g., the number of steps must be 64 or less, as a subroutine cannot branch to another page.

MACHINE INSTRUCTION CODE

8,9

A,B

C,D

E,F

	MSB			LSB												
	Α			Z												
(0)	(4) (5) (6) (7)			7)												
AZ	0	1	2	3	4	5	6	7	8	9	Α	В	С	D	E	F
0	COMX ABAAC YNEA TAM TAMZA A10AAC A6AAC DAN TKA KNEZ							KNEZ	TDO	CLO	RSTR	SETR	IA	RETN		
1								LDP								
2	TAMIY	ТМА	TMY	TYA	TAY	AMAAC	MNEZ	SAMAN	IMAC	ALEM	DMAN	IYC	DYN	CPIAZ	ХМА	CLA
3		SBI	Τ			RB	BIT		TBIT1 LDX							
4	TCY															
5	YNEC															
6	TCMIY															
7								ALEC								

Fig. 3.1 TMS1000 Instructions Map

BR

CALL

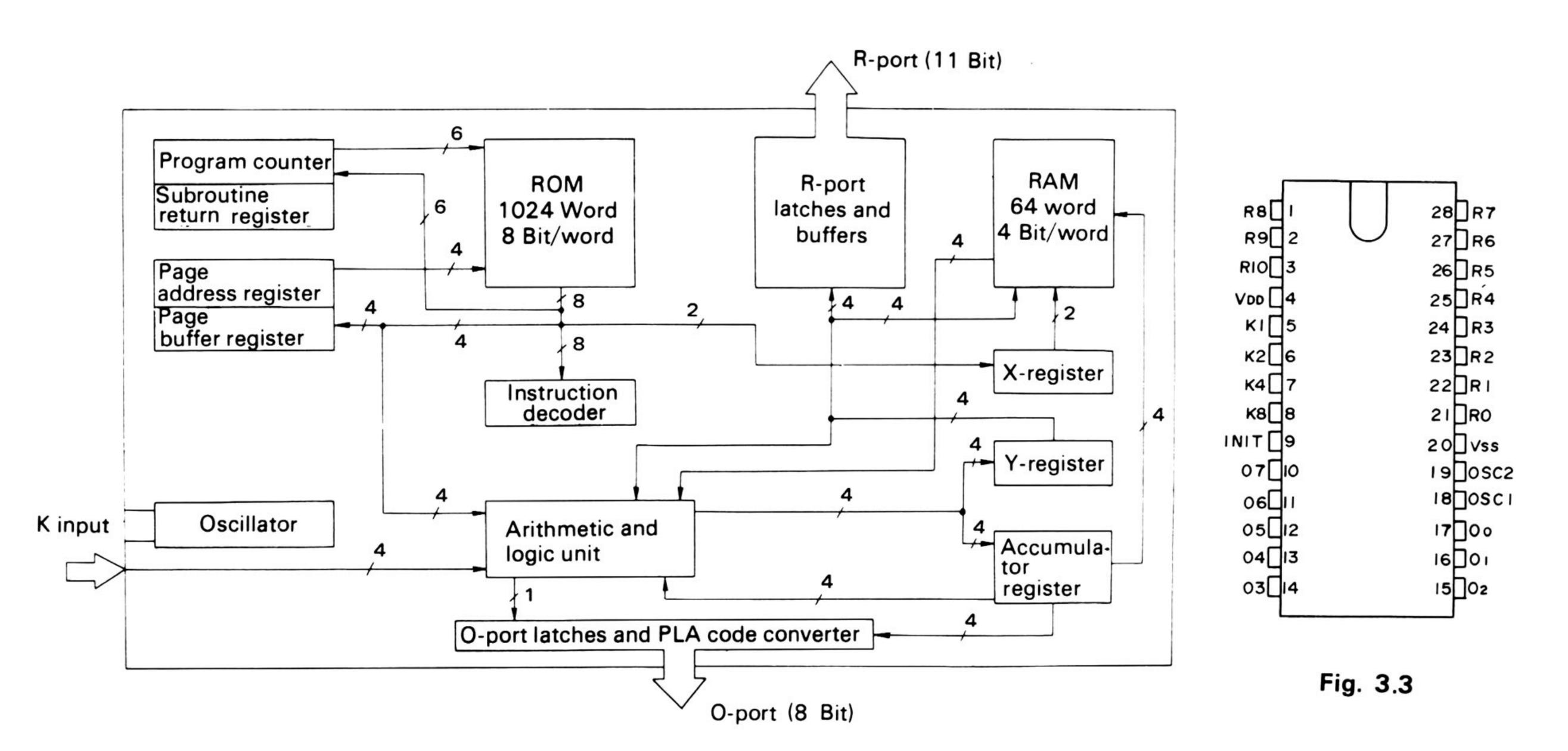


Fig. 3.2 TMS1000 Configuration

* Voltage to V DD.

Number of pins	28	Number of subroutine calls available	1 (Nesting not possible.)
Instruction ROM	1024 × 8 bits	Max. applicable voltage (O-, R- and K-ports)	20V*
Data RAM	64 × 4 bits	Supply voltage	14.1 ~ 17.5V*
Number of bits of R-port	11 ($R_0 \sim R_{10}$)	Power consumption	90 mW
Number of bits of O-port	Parallel 8 bits,	Operating temperature	0 ~ 70°C
Instruction time	About 20 μs	Storage temperature	−55 ~ 150°C
Interrupt	No		

Table 3.1 TMS 1000 Specifications

4. MECHANISM CONTROL CIRCUIT

The mechanism control circuit (X29-1200-00) of the KD-5100 uses microprocessor MP0222S allowing a more simple and reliable circuit design than circuits using the CMOS

IC gates used in our former turntable models. Signal flow is as shown in Fig. 4.1 and Fig. 4.2 and the schematic diagram is shown in Fig. 4.3.

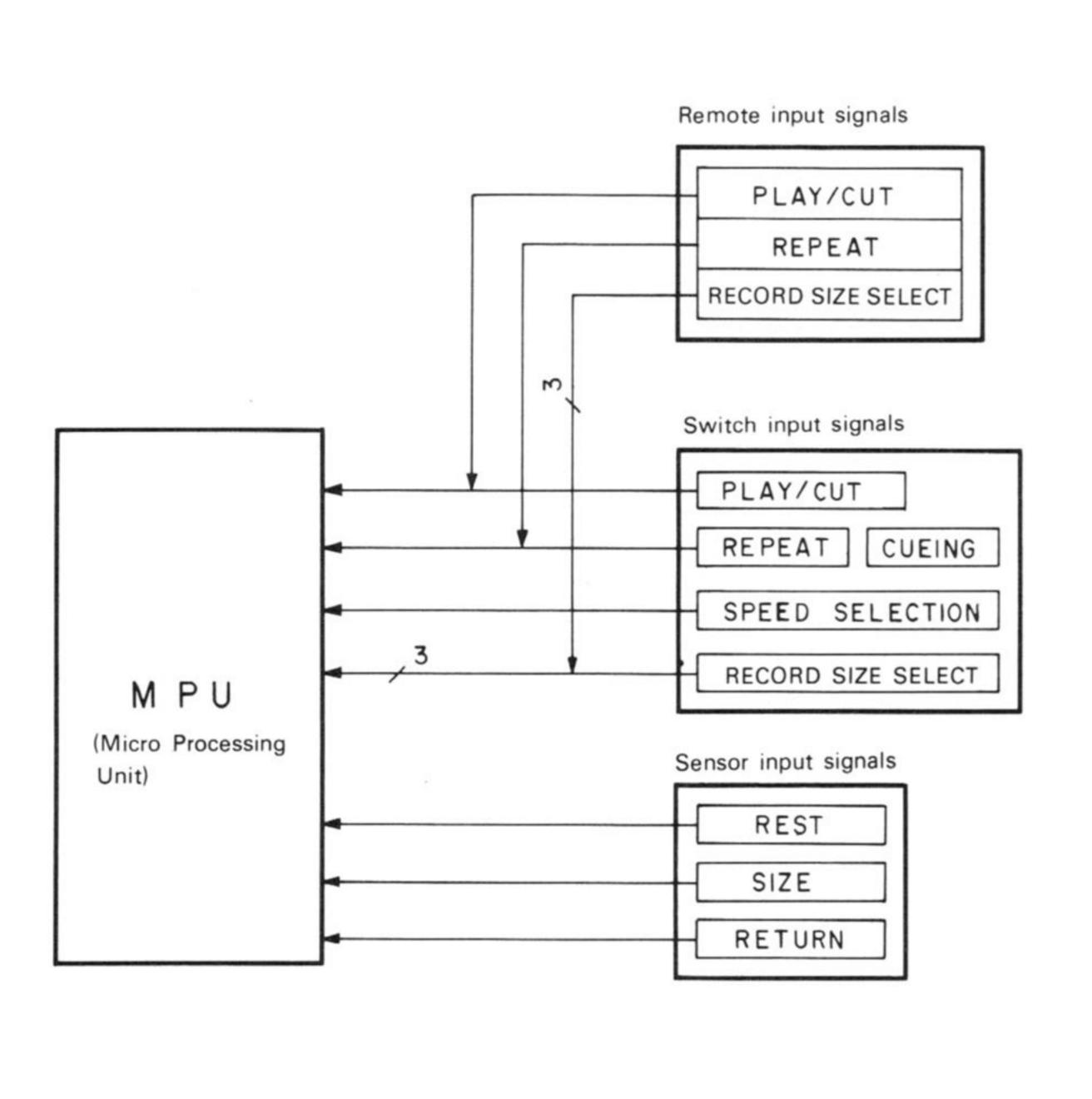


Fig. 4.1. Signal flow (I/O to MPU)

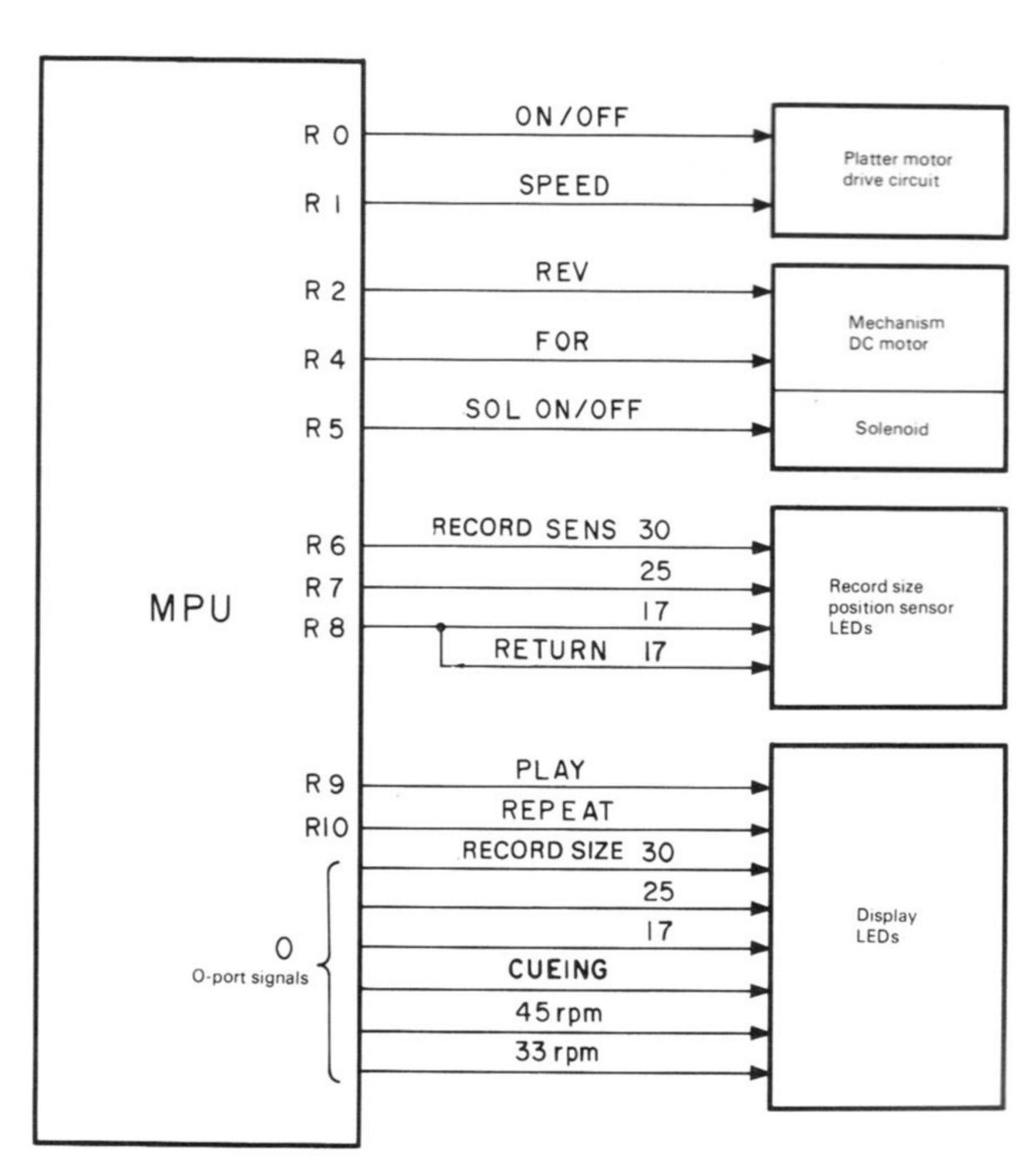


Fig. 4.2 Signal flow (MPU to I/O)

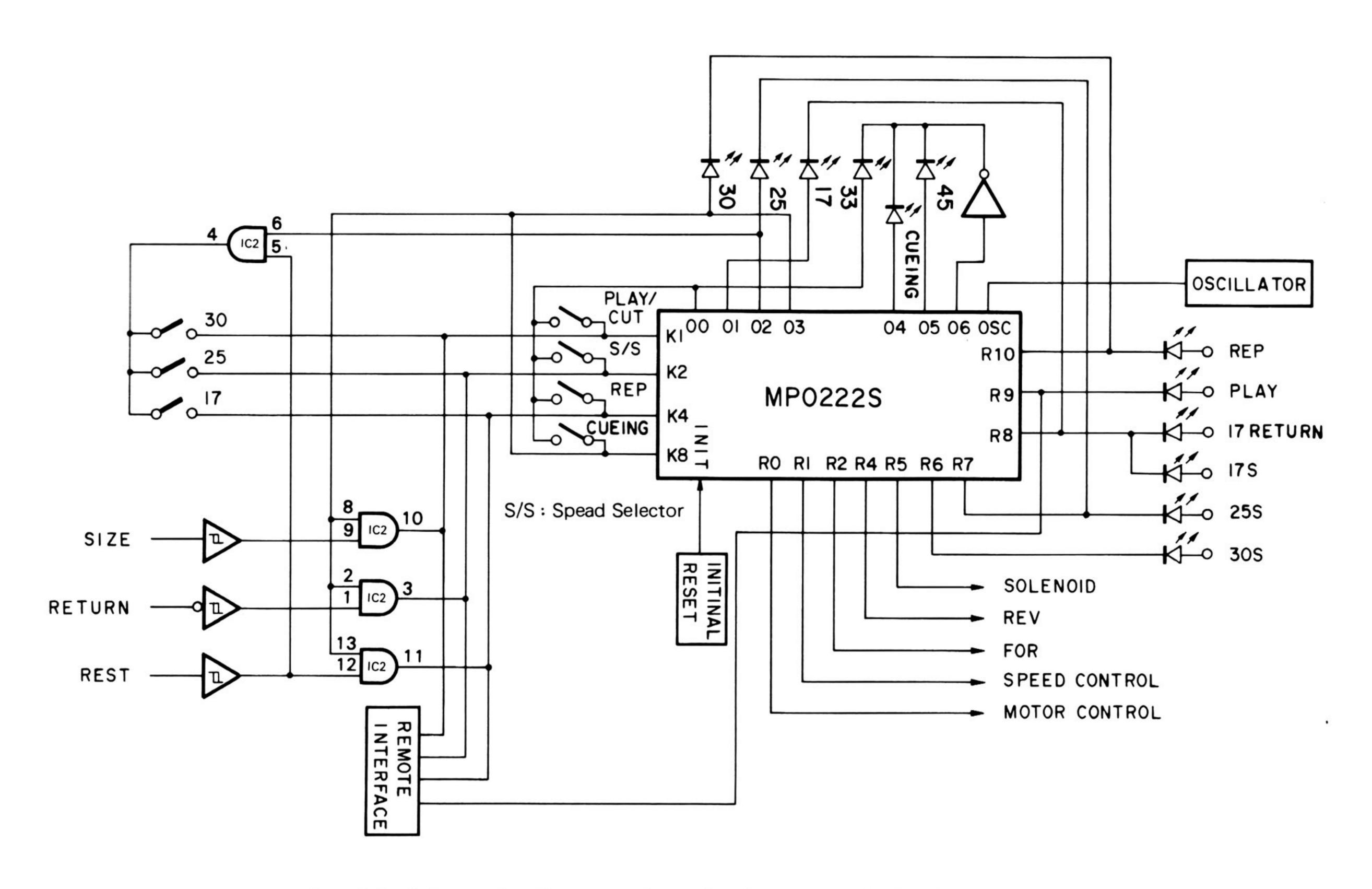
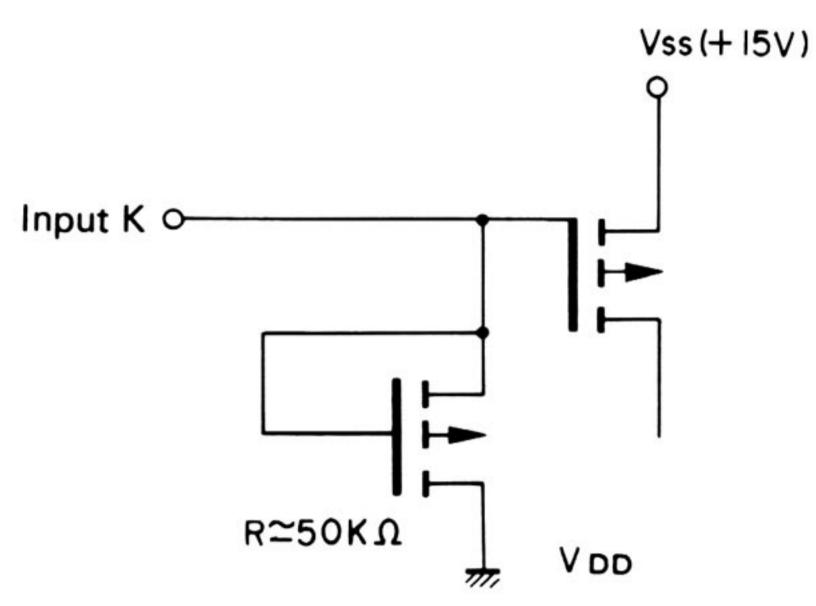


Fig. 4.3 Schematic diagram of mechanism control circuit

4.1 MICROPROCESSOR INPUT AND OUTPUT CIRCUITS

a) Input circuit



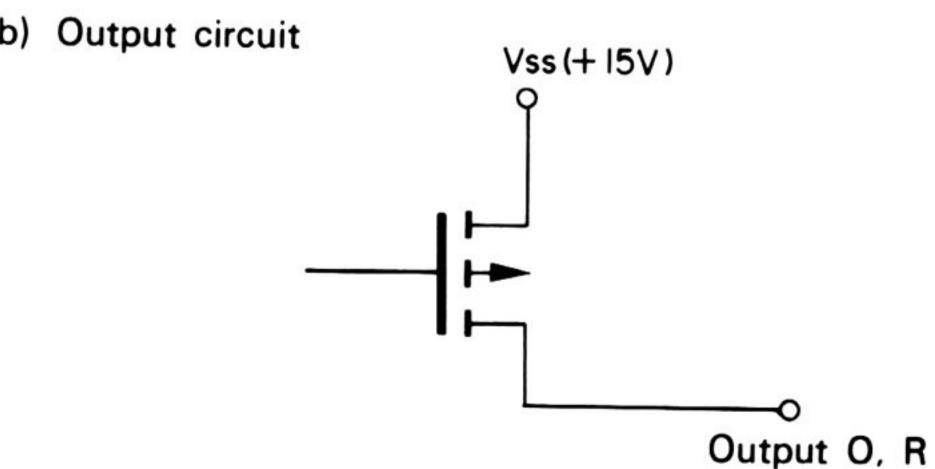


Fig. 4.4

As shown above, each input terminal is grounded through an active resistance and each output is of the open drain type.

4.2 INITIAL RESET

When the power is turned on, the program counter, page address register, R output latches, and O output latches are cleared, then the accumulator, X-register, Y-register, and status latch is cleared by the program.

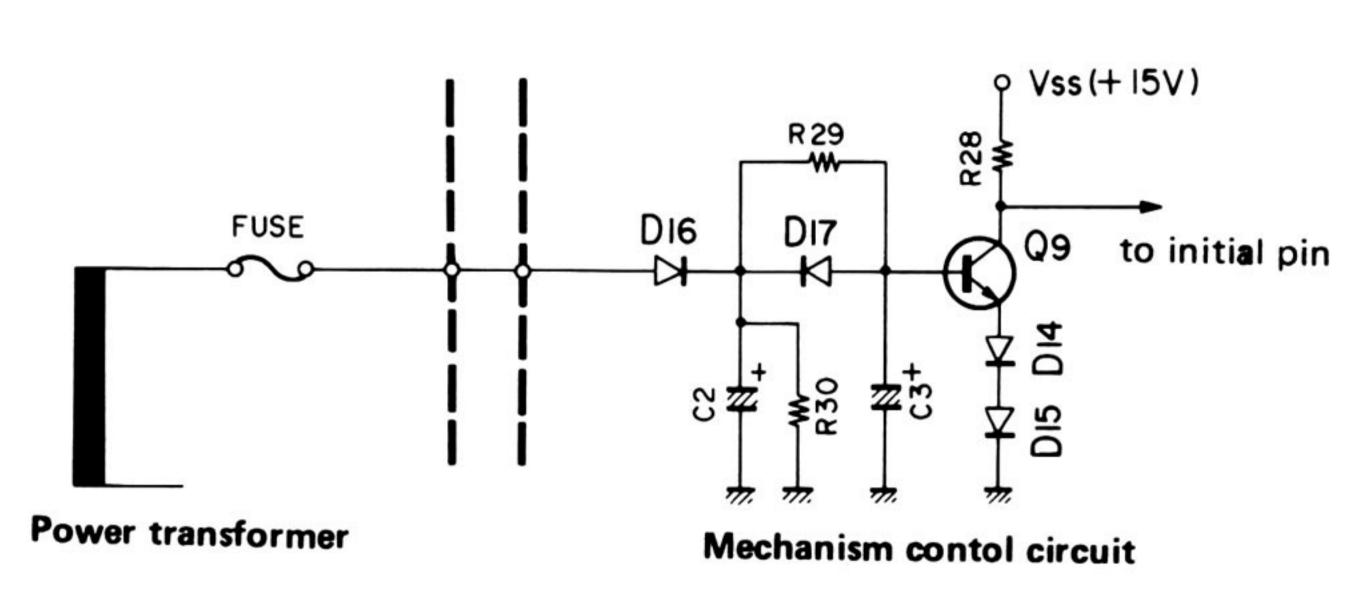


Fig. 4.5

Figure 4.5 shows the KD-5100 MPU initialization circuit. The initializing signal is taken from directly behind the power transformer so the smoothing capacitors will have no influence upon the initialization circuit. This system provides stable start-up because the power supply voltage rises and drops rapidly.

The pulse width of the initialization pulse must be longer than the time required for six instruction cycles. For example, when f = 300 kHz

One instruction cycle $= \frac{1 (\text{sec}) \times 6}{300 \times 10^3 (\text{Hz})}$ $= 20 (\mu \text{s}) \text{ then,}$

Pulse width must equal 20 (μ s) \times 6 = 120 (μ s)

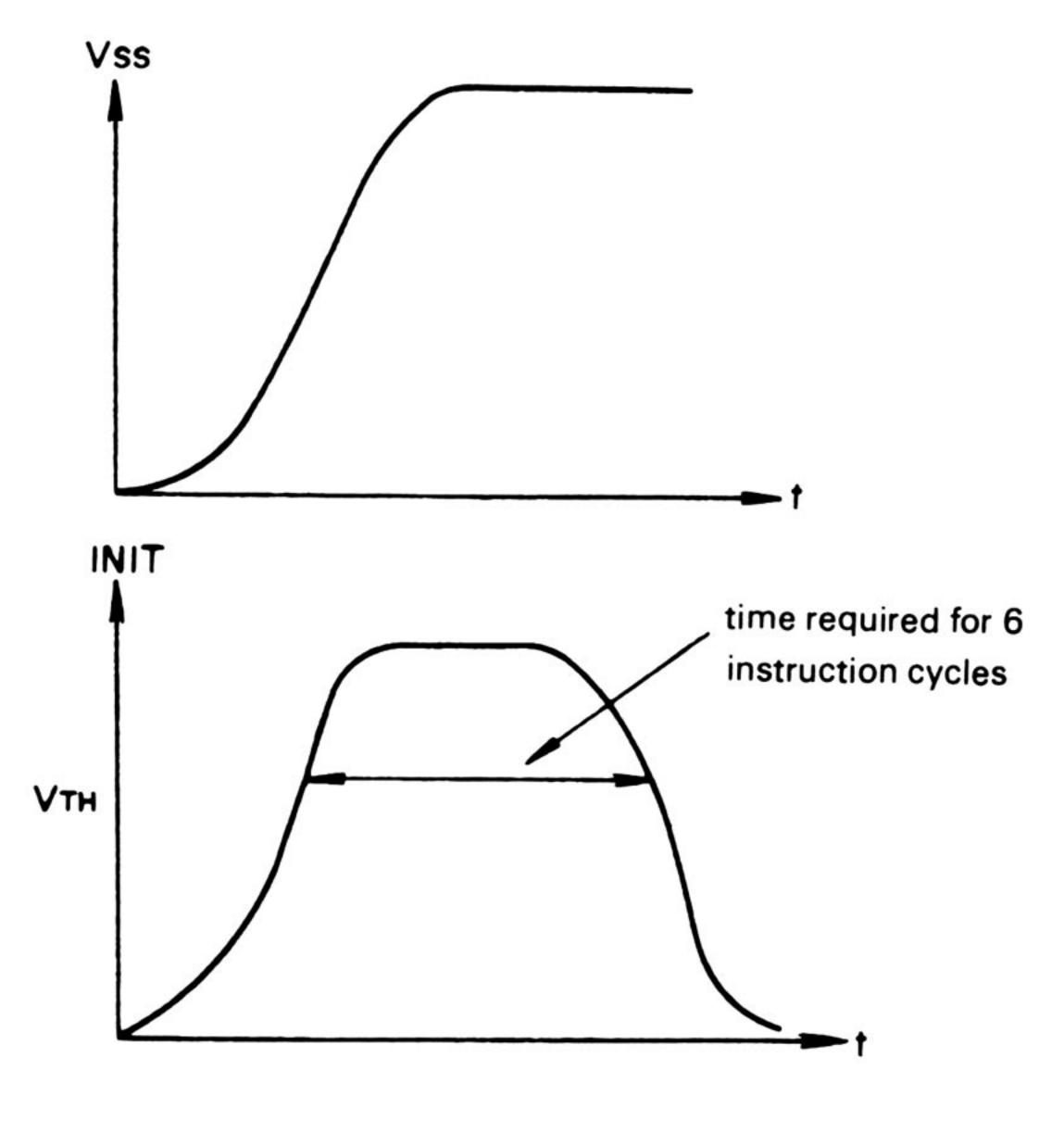
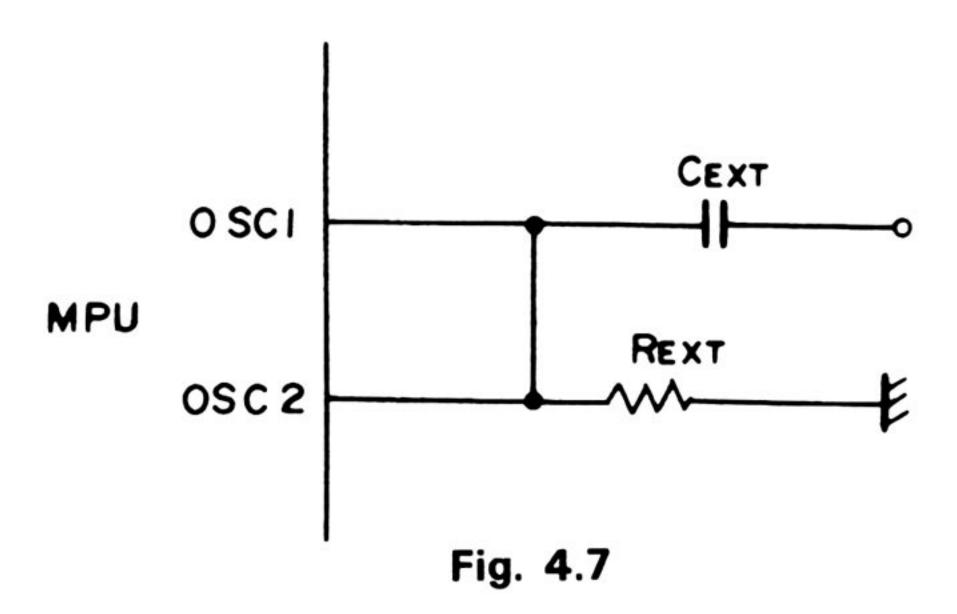


Fig. 4.6

4.3 OSCILLATOR

The external resistor and capacitor are connected as shown in Fig. 4.7.

The oscillator generates a saw-tooth wave as shown in Fig. 4.8. One instruction is executed within six cycles of this saw tooth wave.



The oscillating frequency differs somewhat in every production lot, but the individual frequency is stable and varies little with changes in ambient temperature or other environmental conditions.

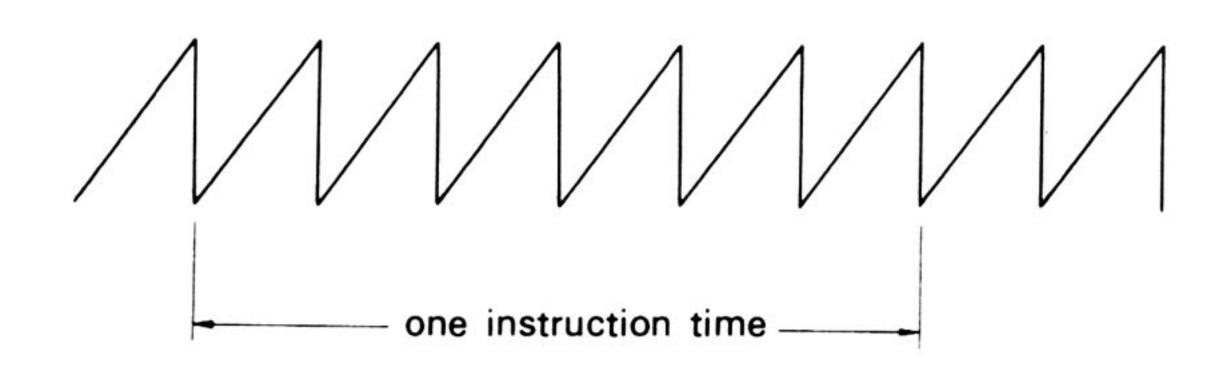


Fig. 4.8

4.4 OPLA (O-PORT PROGRAM LOGIC ARRAY)

OPLA determines the decoding rule from 5 bits to 8 bits. The O-port register outputs 5-bit data to OPLA where 5-bit data is decoded by AND and OR matrixes. Twenty 5-bit datas can be decoded with OPLA as shown in Table 4.1. These output signals are used to light display LEDs and scan input keys and switches.

In Table 4.1, SL indicates the status of the latch bit and ACC indicates data input from the accumulator register. These data are written in hexadecimal.

SL	ACC	Ο ₇	O ₆	O ₅	O ₄	O ₃	O ₂	O ₁	Oo	Indicators to be illuminated
1	0	1	1	0	0	0	0	1	1	33 17
1	1	1	1	0	1	0	0	1	1	33 17 CUEING
1	2	1	1	1	0	0	0	1	0	45 17
1	3	1	1	1	1	0	0	1	0	45 17 CUEING
1	4	1	1	0	0	1	0	0	1	33 30
1	5	1	1	0	1	1	0	0	1	33 30 CUEING
1	6	1	1	1	0	1	0	0	0	45 30
1	7	1	1	1	1	1	0	0	0	45 30 CUEING
1	8	1	1	0	0	0	1	0	1	33 25
1	9	1	1	0	1	0	1	0	1	33 25 CUEING
1	Α	1	1	1	0	0	1	0	0	45 25
1	В	1	1	1	1	0	1	0	0	45 25 CUEING
1	С	1	1	0	0	0	0	0	1	33
1	D	1	1	0	1	0	0	0	1	33 CUEING
1	E	1	1	1	0	0	0	0	0	45 .
1	F	1	1	1	1	0	0	0	0	45 CUEING
0	0	0	0	0	0	0	0	0	1	Scan signal O ₀
0	1	0	0	0	0	0	0	1	0	Scan signal O ₁
0	2	0	0	0	0	0	1	0	0	Scan signal O ₂
0	3	0	0	0	0	1	0	0	0	Scan signal O ₃

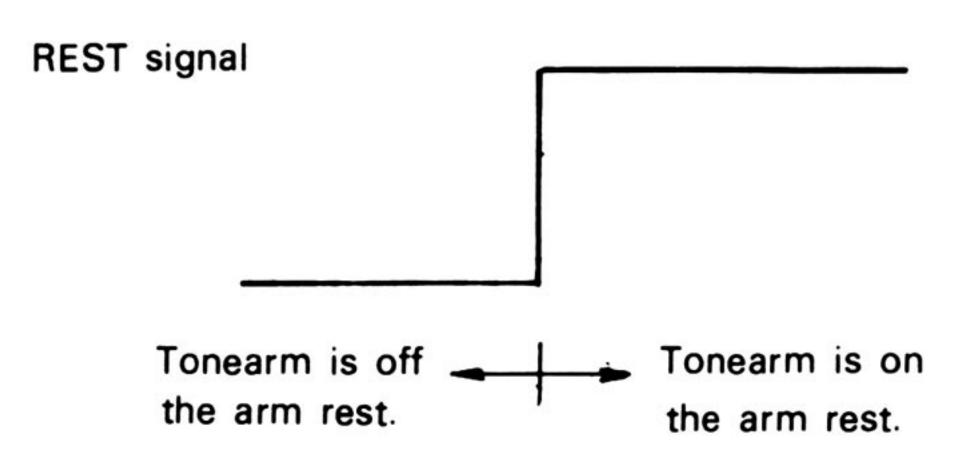
Table 4.1 OPLA definition

4.5 CIRCUIT X29-1200

The mechanism is controlled by two logic ICs and one MPU (Microprocessor unit). This control circuit uses a fewer number of ICs but is more stable and reliable than former models. One instruction time requires only 20 μ s, and signals from the sensors can be processed quickly to control the mechanism.

4.6 X29-1200 CIRCUIT OPERATION

 Input signals from sensors
 The SIZE and REST signals are effective when they are at Vss level ("H").



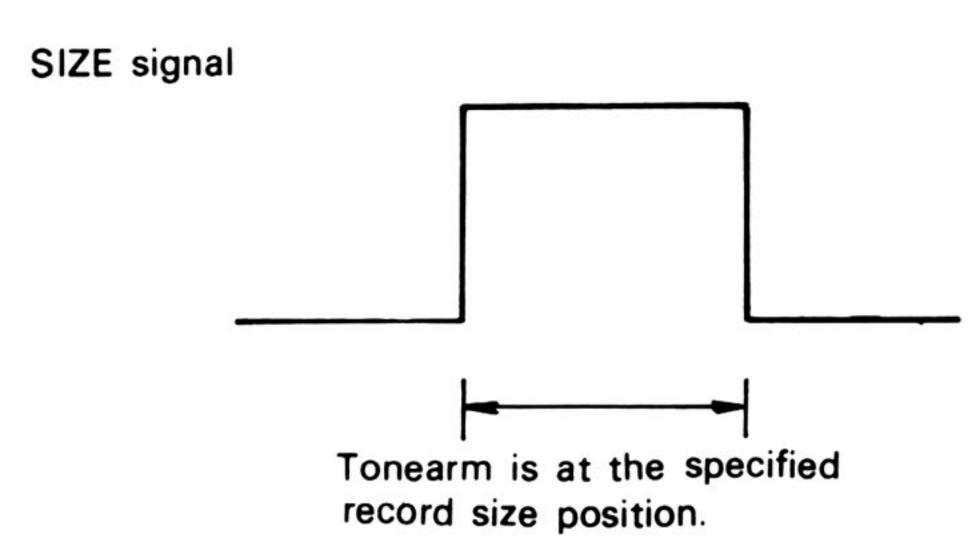


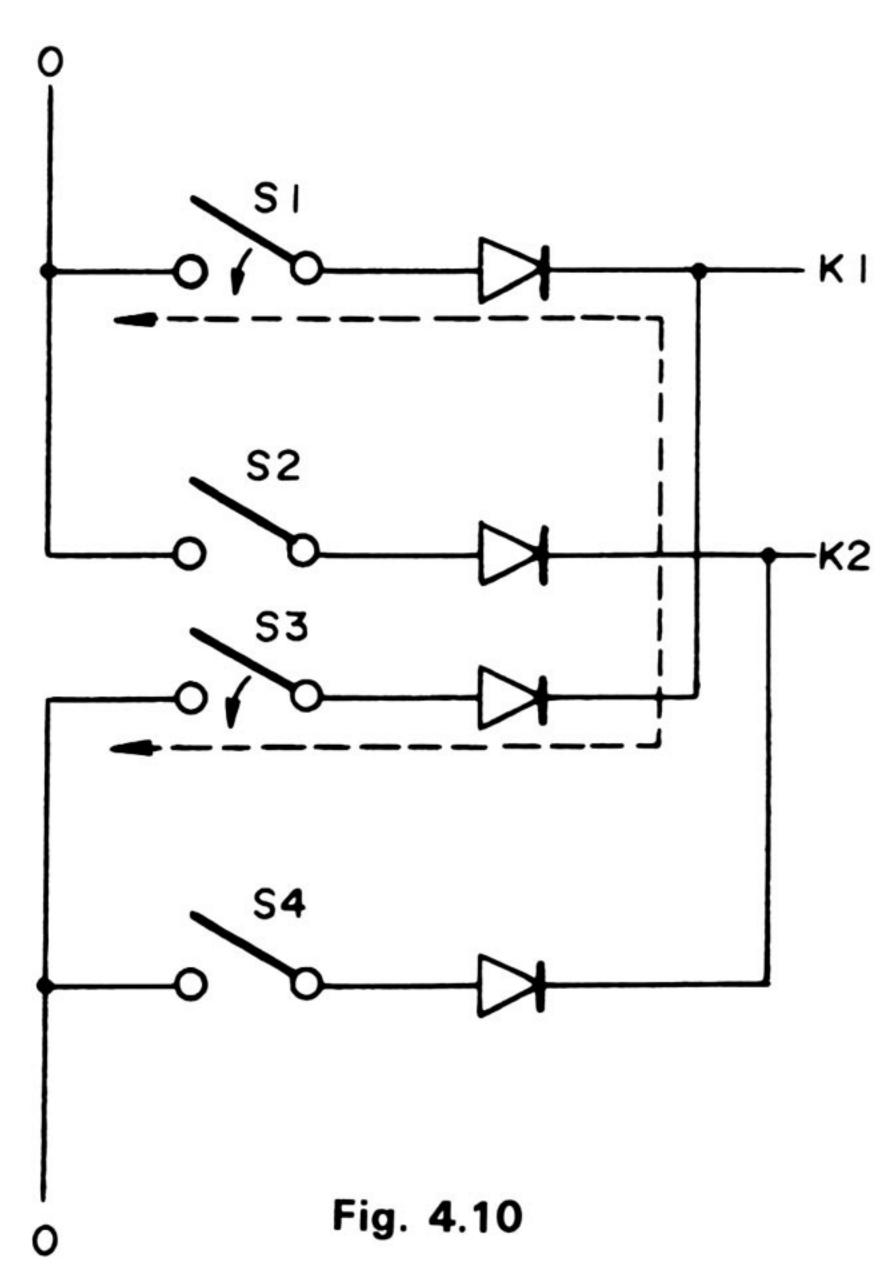
Fig. 4.9

The RETURN signal is effective when it is at VDD level.

Signals to MPU K-port

K-port signals are logical "1" when they are at "H" (Vss) level. The switch signals, sensor signals and remote signals are input synchronized with the scan signals. The scan signals are shown in Table 4.1.

Diodes connected to the K-port terminals prevent reverse current flowing when two or more switches are pressed simultaneously, and also prevent two or more indicators lighting simultaneously.



Signals to the platter motor control circuit
 The PLAY/STOP signal is output from the R₀-port and the SPEED signal from the R₁-port.

Signal	Port	Function	Logic level
Motor		STOP	L
	R₀	PLAY	Н
Speed control		33-1/3 rpm	L
	Rı	45 rpm	Н
		STOP	Н

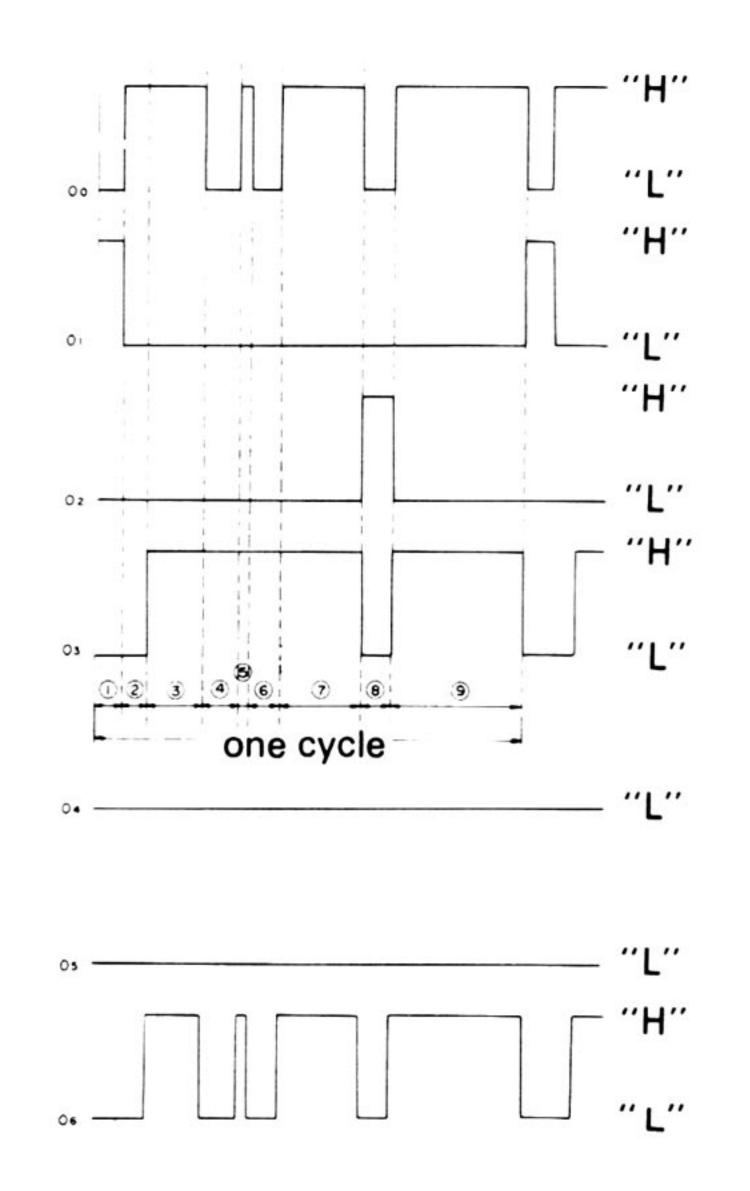
Table 4.2

When the power is turned ON, the R₀-port level is "L" and the R₁-port level "H".

- Signals from other terminals of the R-port The $R_2 \sim R_{10}$ ports output "H" level signals according to the required operation.
 - R₂ "H" when tonearm is at lead-in groove...
 - R4 "H" when tonearm is at lead-out groove.
 - R₅ "H" when tonearm is lifted.
 - R₆ "H" when 30 cm record size is selected.
 - R7 "H" when 25 cm record size is selected.
 - R₈ "H" when 17 cm record size is selected.
 - R₉ "H" during AUTO PLAY operation.
 - R₁₀ "H" during REPEAT operation.
- MPU O-port signals

Pulse signals are output from the O-ports as shown in Fig. 4.11. The waveforms shown in Fig. 4.11 are those when

the tonearm is on the arm rest and 33 rpm and 30 cm are selected. These synchronous pulse trains are generated at an interval of 5 ms.



- 1 Scan signal O₁ timing
- 2 Scan signal O₀ timing
- 3 33 rpm and 30 cm display signal timing
- 4 Scan signal O₃ timing
- 5 Same as 3
- 6 Scan signal O₃ timing
- 7 Same as 3
- 8 Scan signal O₂ timing
- 9 Same as 3

Fig. 4.11

Tonearm motor drive circuit

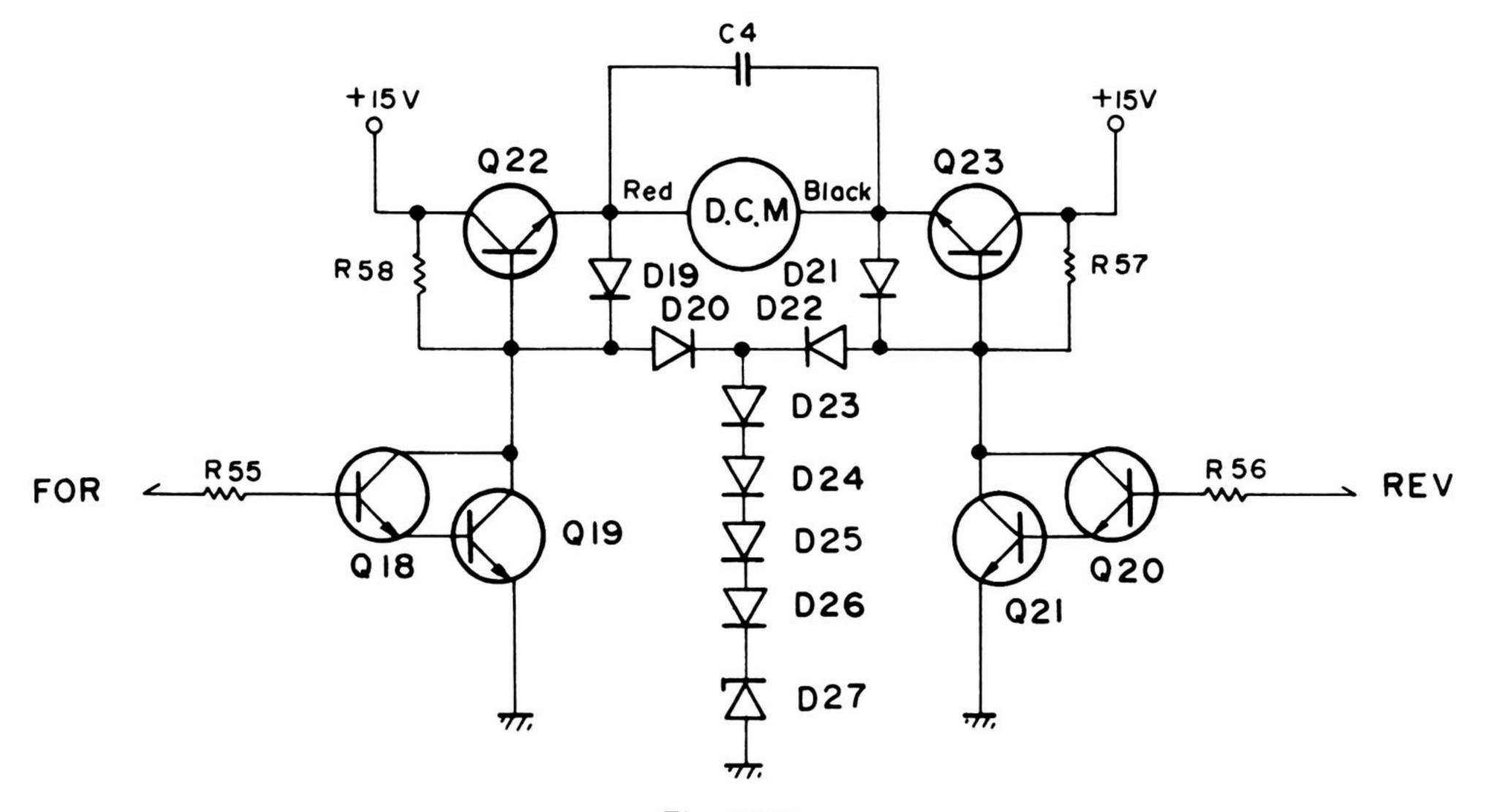


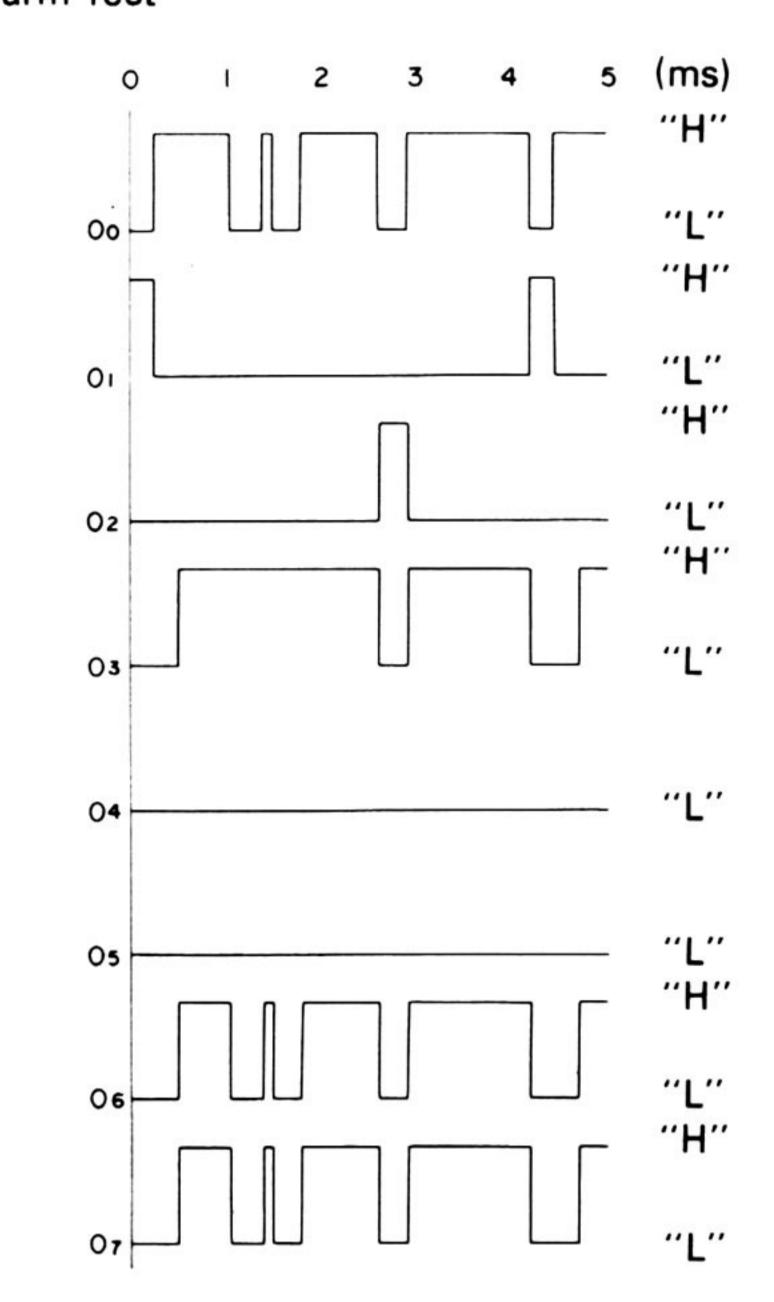
Fig. 4.12

This circuit is a highly accurate motor drive circuit with a built-in temperature compensation circuit similar to that used in the KD-850 and KD-4100. To move the tonearm to the lead-in position, Q18 and Q19 are turned ON, so

that the motor current flows from the black terminal to the red terminal: To return the tonearm from the lead-out position, Q20 and Q21 are turned on, so that the motor current flows from the red terminal to the black terminal.

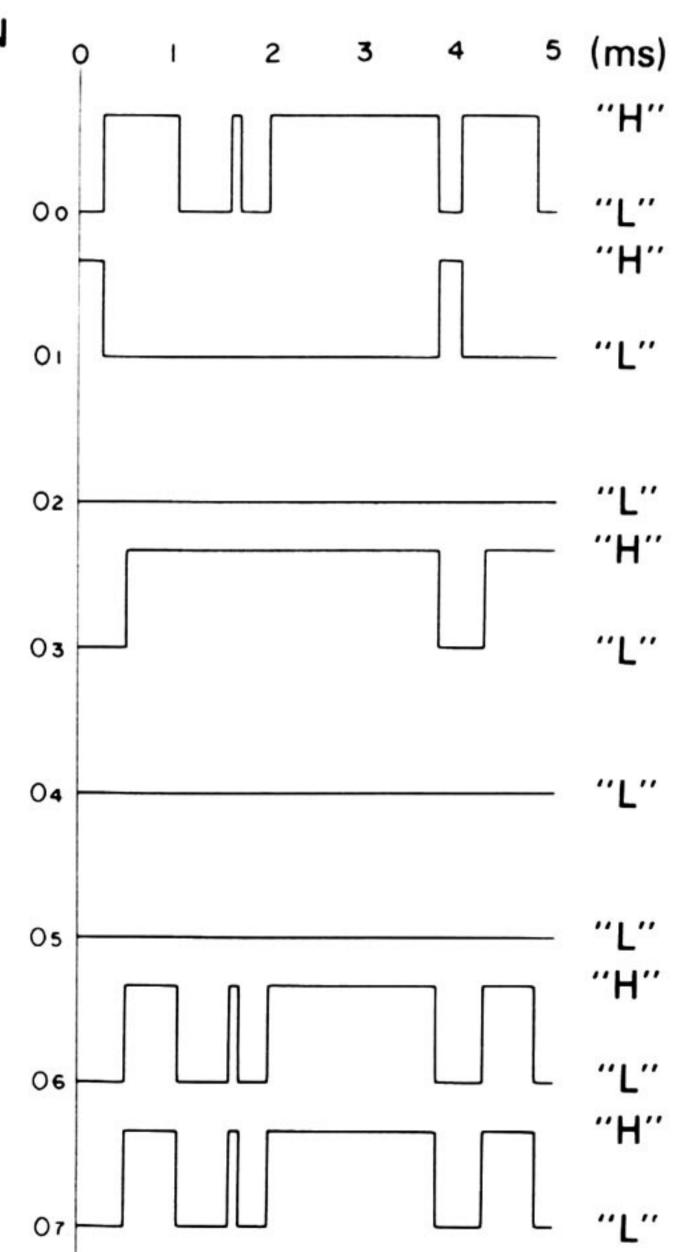
5. O-PORT SIGNAL WAVEFORMS

- Condition
 33 rpm
 17 cm
 REP ON
 - During AUTO RETURN
- 2. Condition33 rpm30 cmTone arm on the arm rest

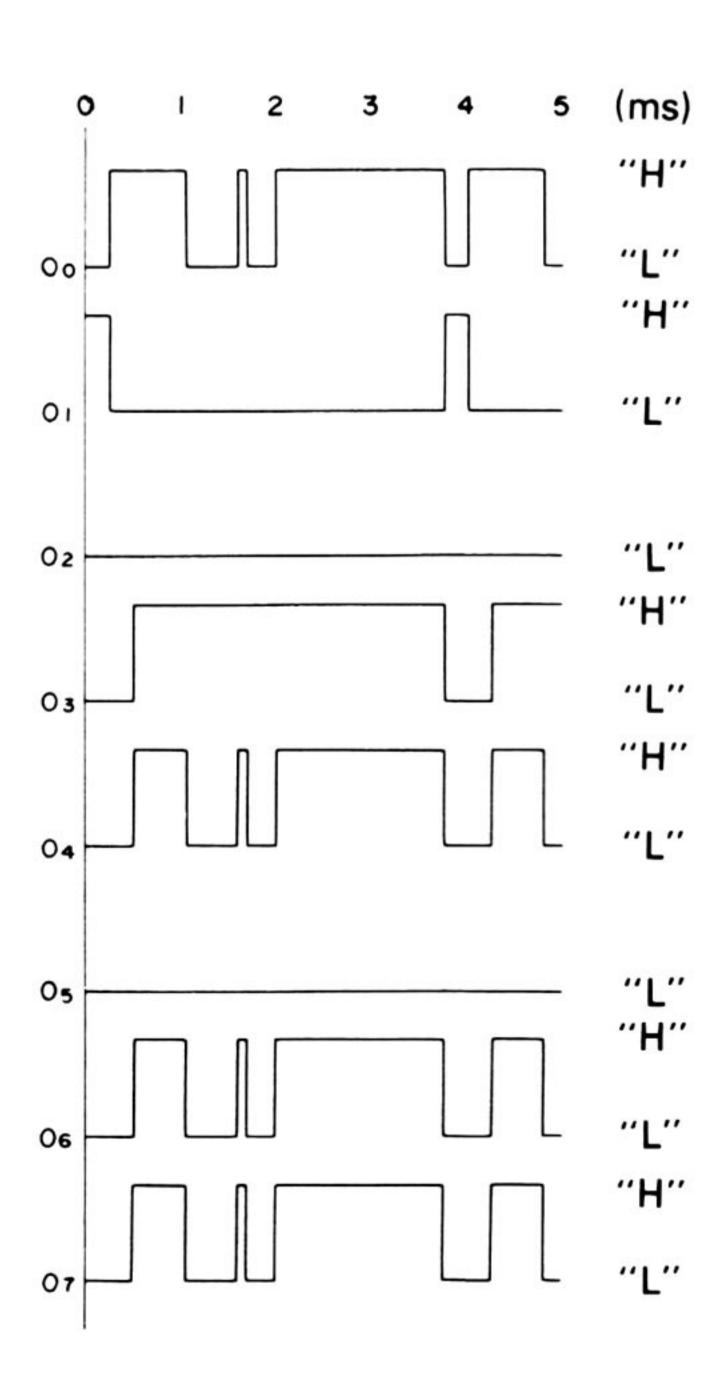


3. Condition 33 rpm 30 cm REP ON

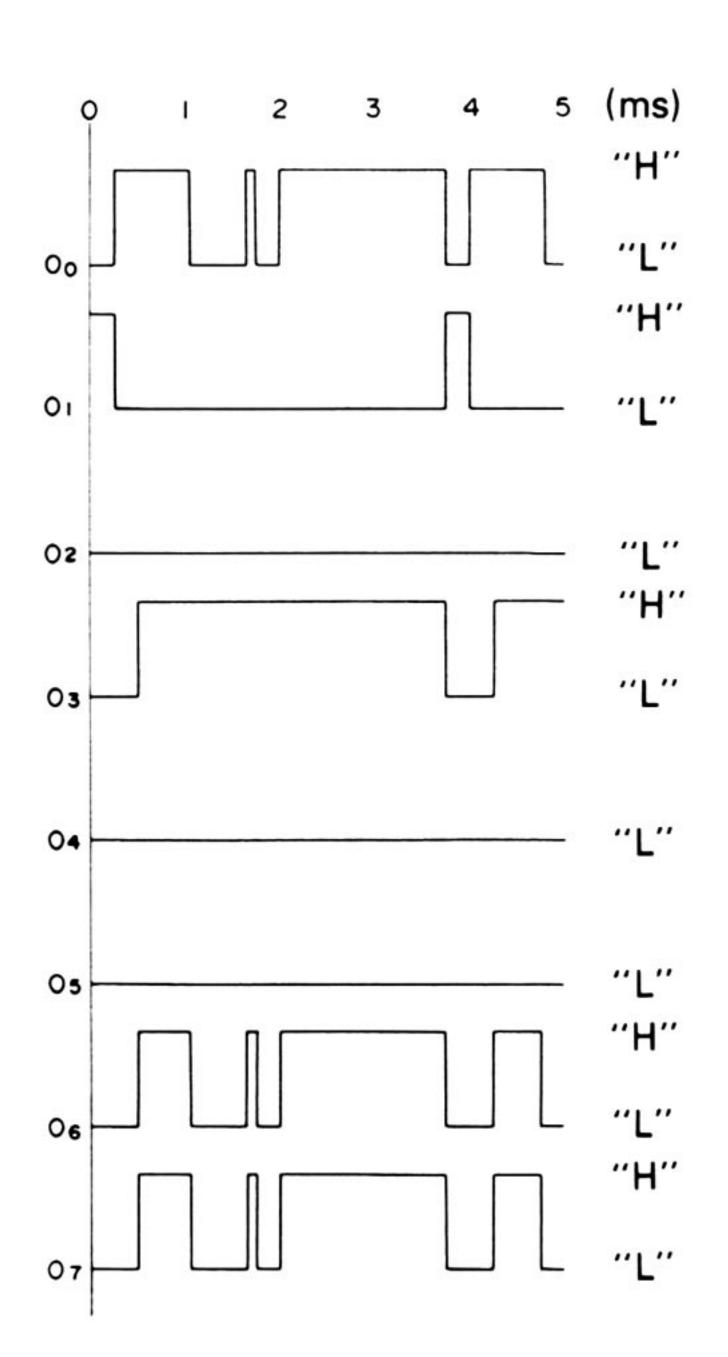
During AUTO RETURN



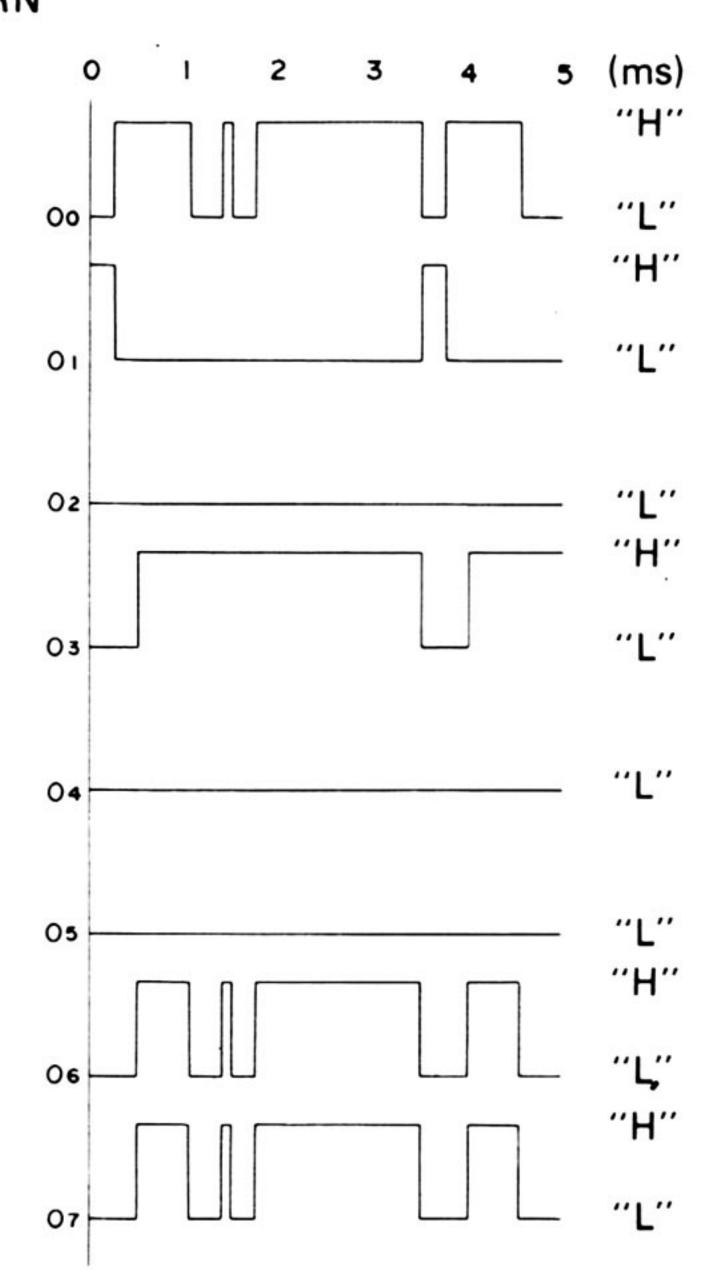
4. Condition
33 rpm
30 cm
REP ON
CUE ON
During tracing



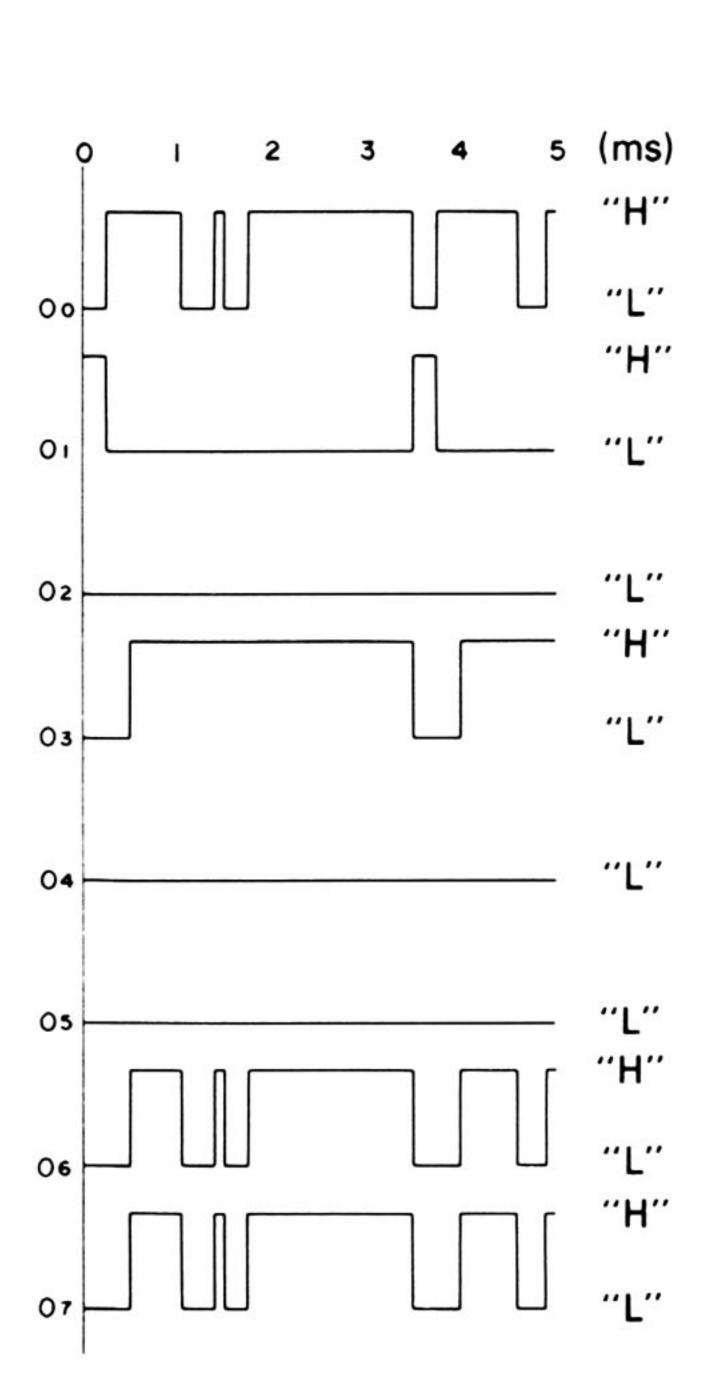
5. Condition
33 rpm
30 cm
REP ON
During tracing



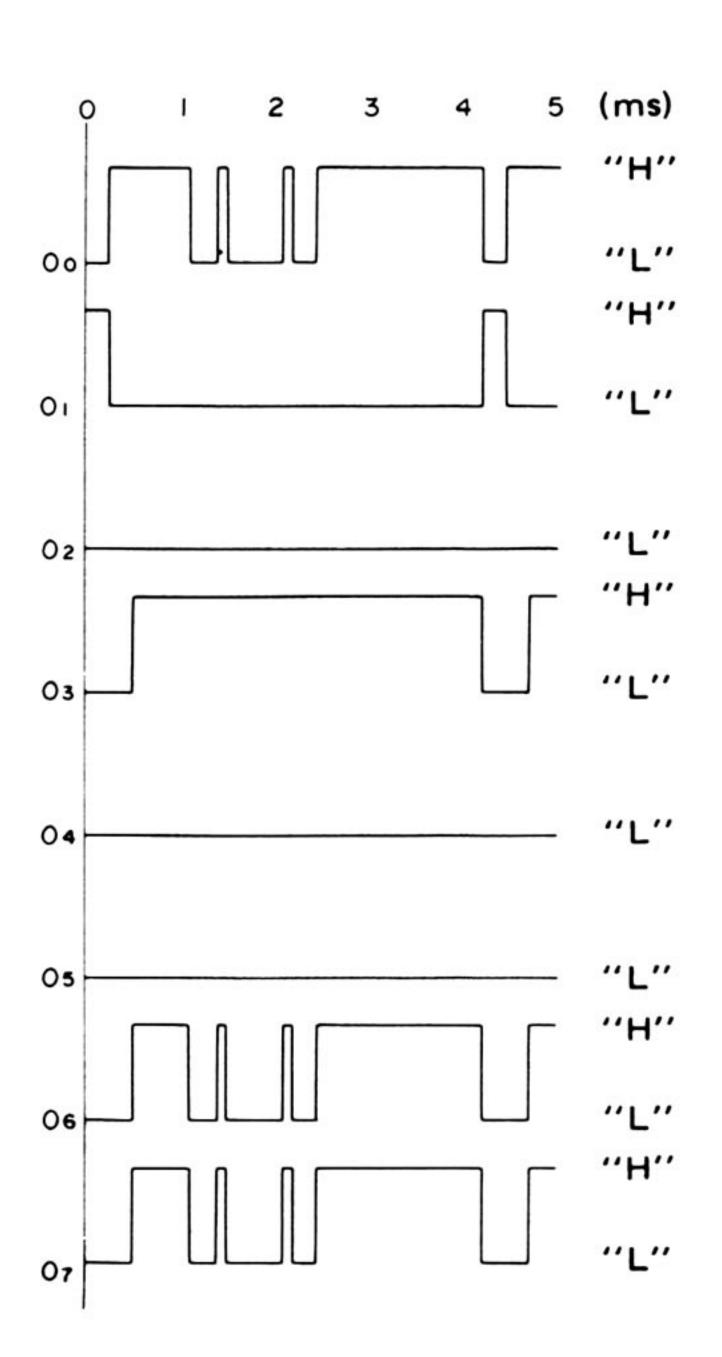
6. Condition
33 rpm
30 cm
During AUTO RETURN



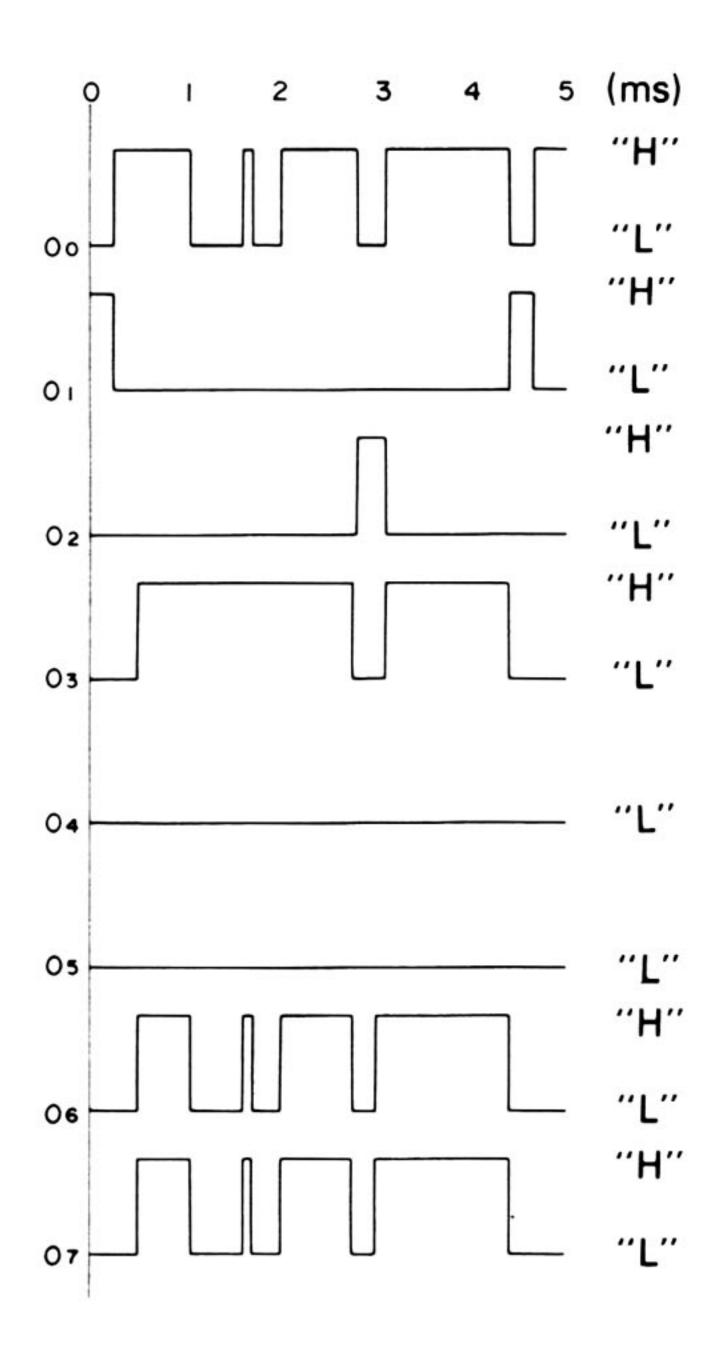
7. Condition 33 rpm 30 cm During tracing



8. Condition 33 rpm 30 cm REP ON Lead-in



- 9. Condition 33 rpm 30 cm Lead-in
- 00 | 2 | 3 | 4 | 5 (ms) | "H" | "L" | "H" | "L" | "H" | "L" | "H" | "L" | "H" | "H"
- 10. Condition
 33 rpm
 30 cm
 REP ON
 Tonearm on
 the arm rest



6. MOTOR CONTROL CIRCUIT

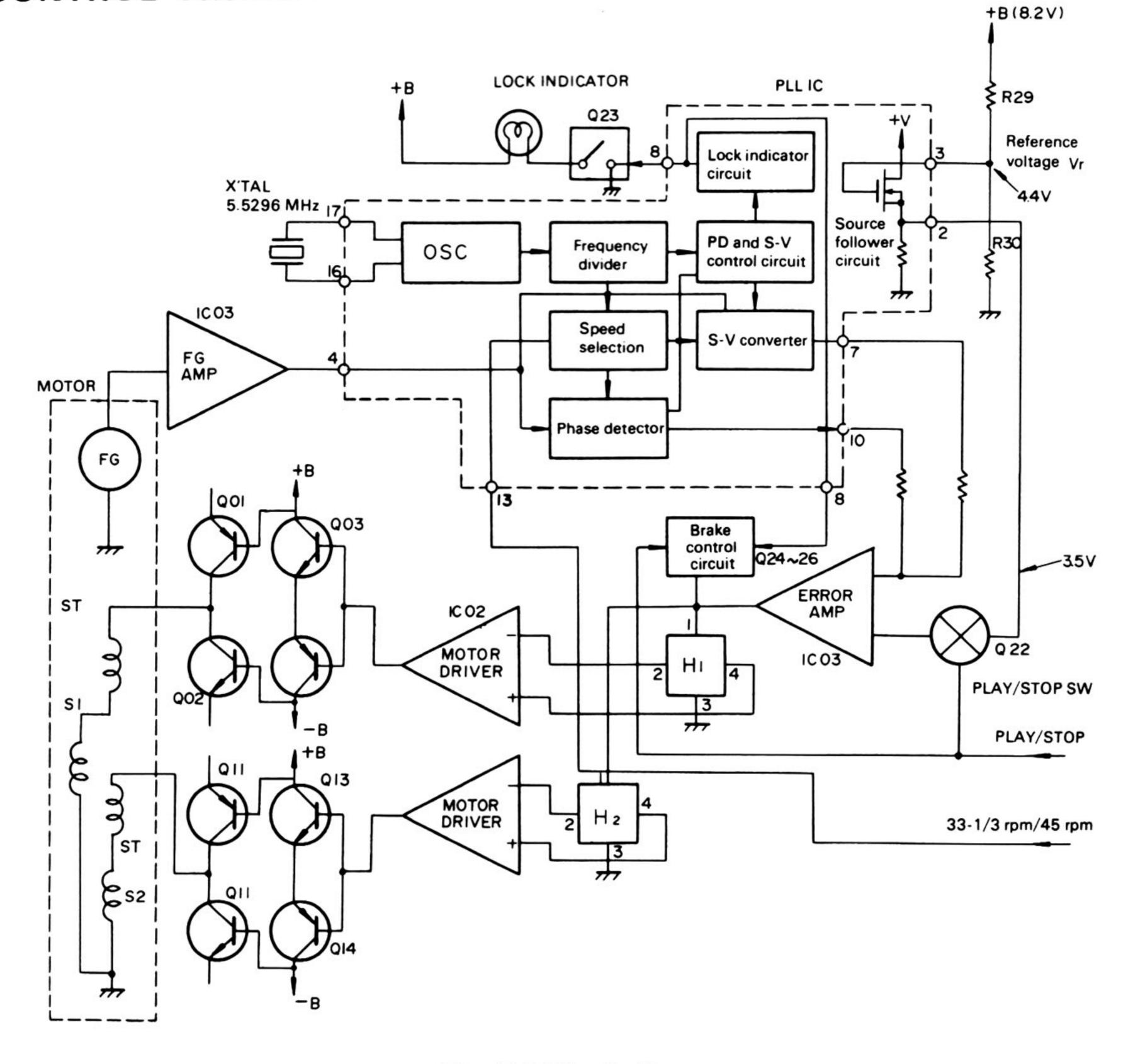
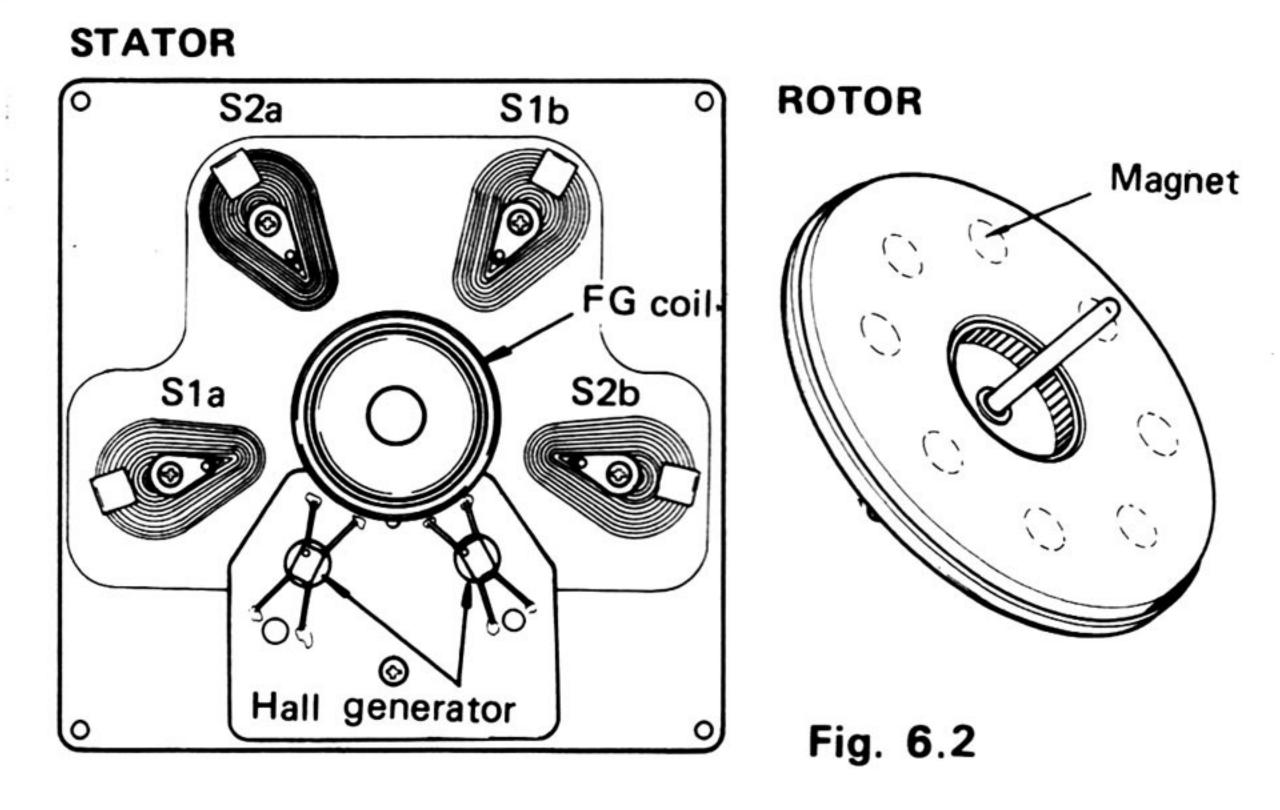


Fig. 6.1 Block diagram

6-1 MOTOR

The motor has a 8 pole permanent magnet rotor and a 2-phase, 4-coil stator as shown in Fig. 6.2. The rotor poles and stator coils are arranged as shown in Fig. 6.3. Two Hall generators are so arranged that the turntable platter rotates clockwise.



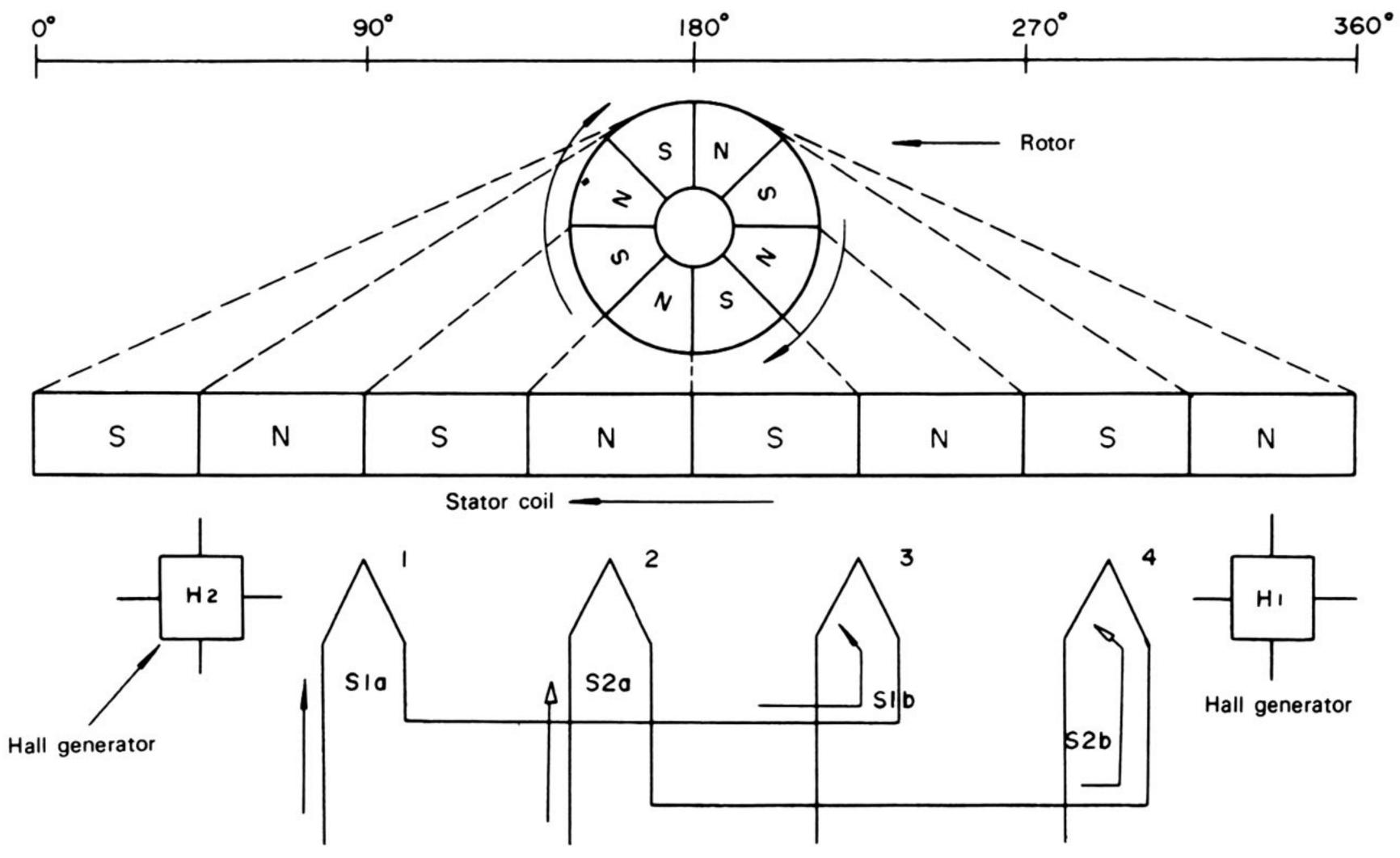


Fig. 6.3

Ammeter

through the coil to vary.

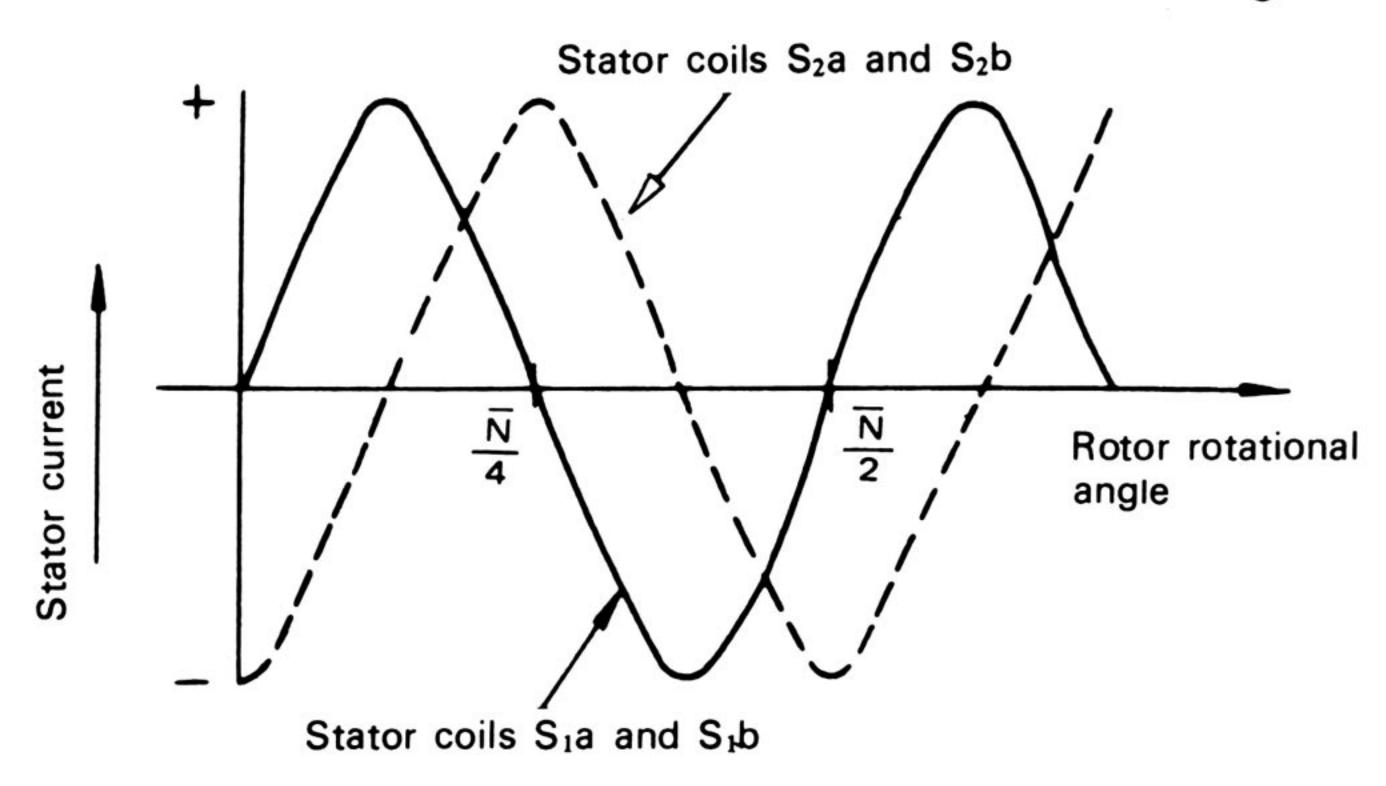


Fig. 6.4 Stator current

As the rotor, stator and Hall generators are arranged as shown in Fig. 6.3, Hall generator H_1 controls stator coils S_1 a and S_1 b and Hall generator H_2 controls stator coils S_2 a and S_2 b. Each stator produces current flow as shown in Fig. 2, causing the motor to rotate clockwise.

6-2 FREQUENCY GENERATOR (GF)

The frequency generator used in the KD-4100 is theoretically the same as that used in the KD-750 and KD-650. The principle of power generation, and a cross section of the frequency generator is shown in Fig. 1.

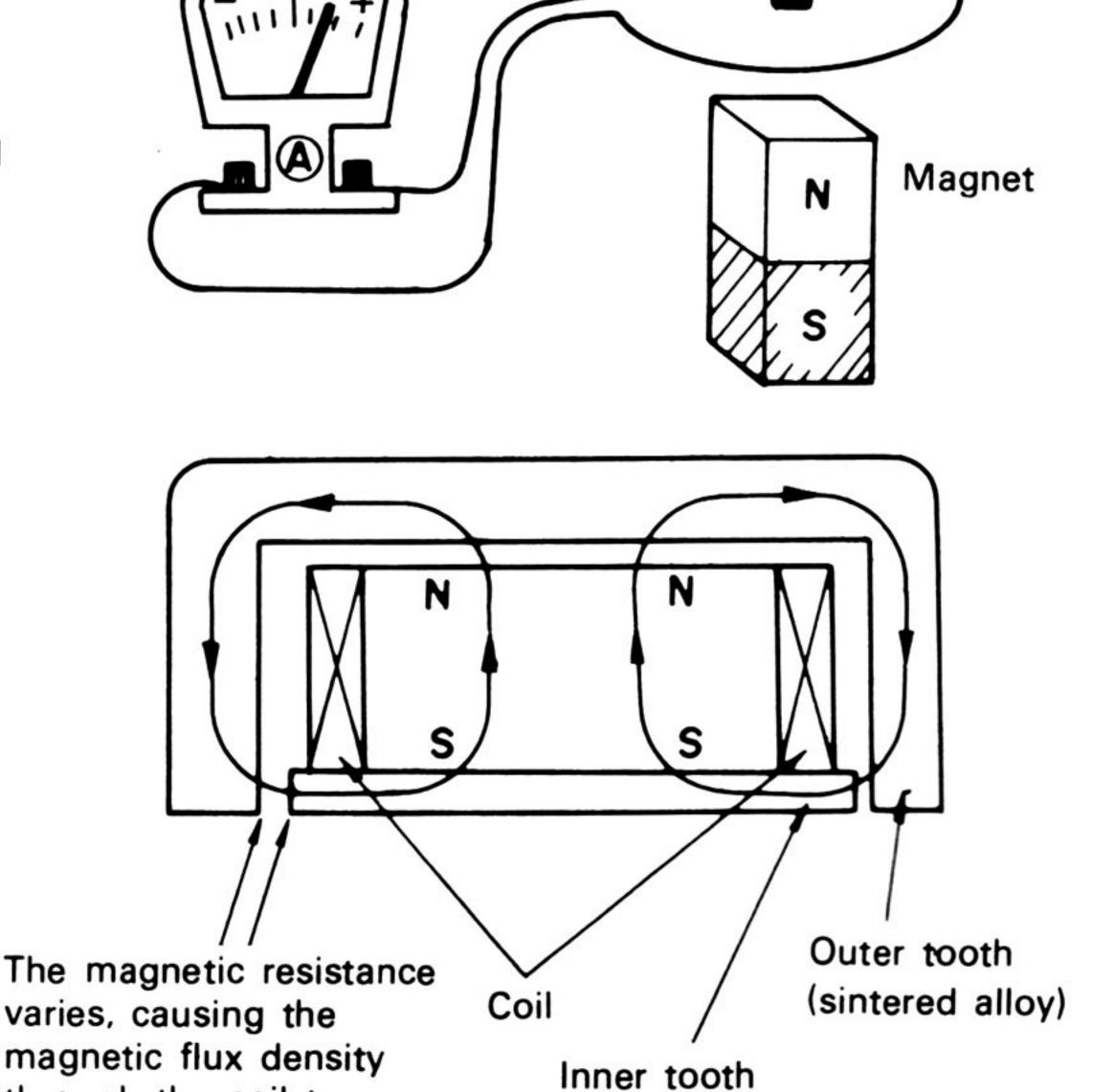


Fig. 6.5 Principle of power generation

Coil

Previous frequency generators used a rotor and stator with 180 perforated teeth, therefore some means was required to cancel the error caused by the perforating. However, this frequency generator employs an accurate sintered alloy rotor and stator with 90 teeth resulting in a very accurate output level.

The power generating coil is completely shielded magnetically so that the unit is hardly affected by external noise.

6-3 SAMPLE AND HOLD TYPE PHASE DETECTOR AND F/V CONVERTER

The KD-5100 uses a PLL LSI (MSM 5819RS) for motor control in addition to the L-07D.

This IC is an 18-pin resin dual in-line package (DIP) and includes a crystal control oscillator, frequency divider, sample and hold phase detector (S/H P.D), sample and hold frequency-voltage converter (S/H F/V), strobe control circuit and lock detector. The S/H P.D. generates less ripple than former phase detectors. Therefore, a filter with a large time constant is not necessary and optimum design of the system is possible. Further, it is not necessary to increase the frequency of the FG, so the accuracy of the FG output can be maintained at a high level. The S/H F/V has a higher conversion gain than the previous F/V converter. Therefore, the high gain amplifier, resulting in offset voltage drift normally present in a high gain amplifier is eliminated.

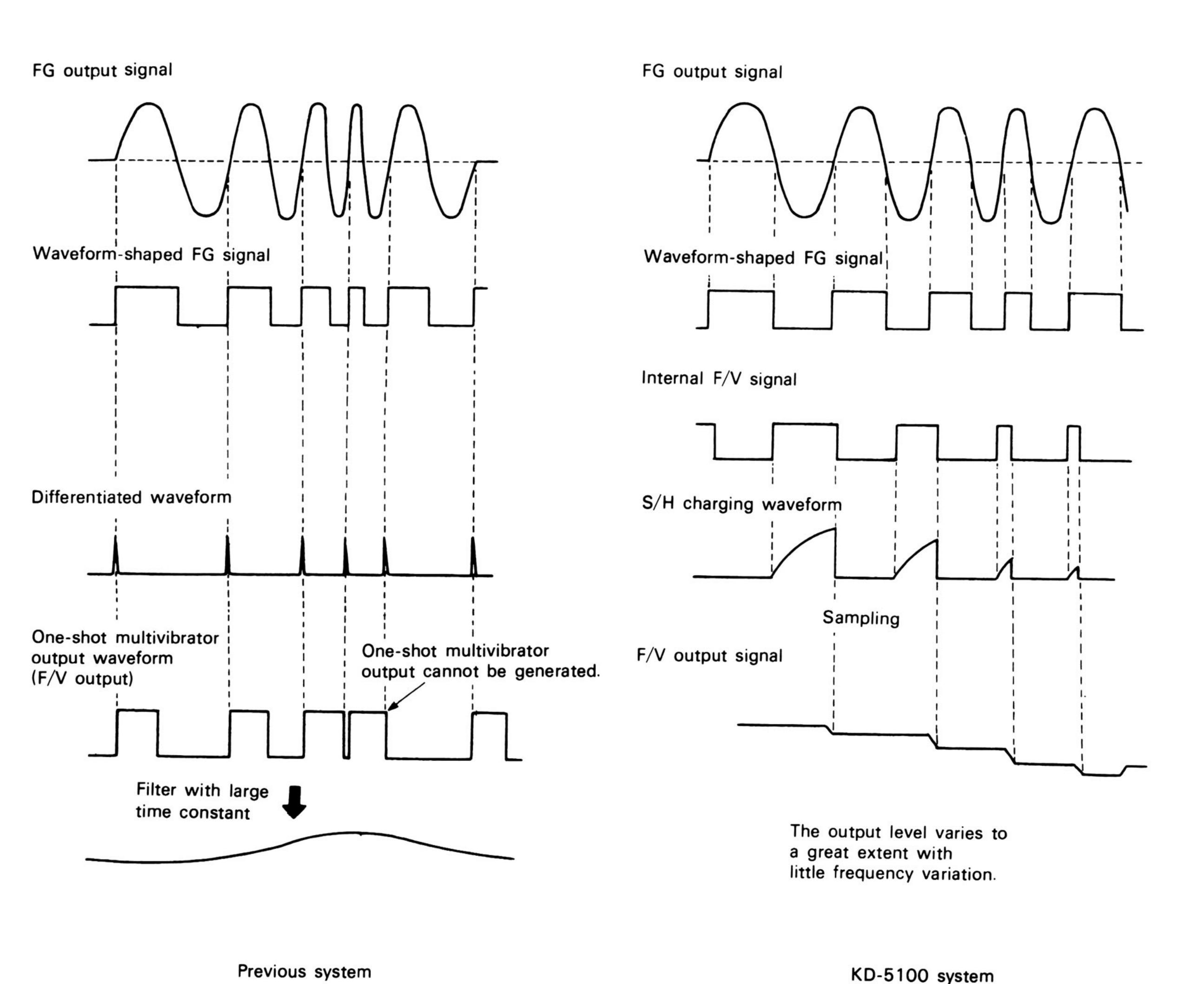


Fig. 6.6 Comparison of F/V conversion systems

6-4 MOTOR DRIVE

The motor drive uses an AC-DC coupling circuit connected

with a Hall generator as shown in Fig. 6.7.

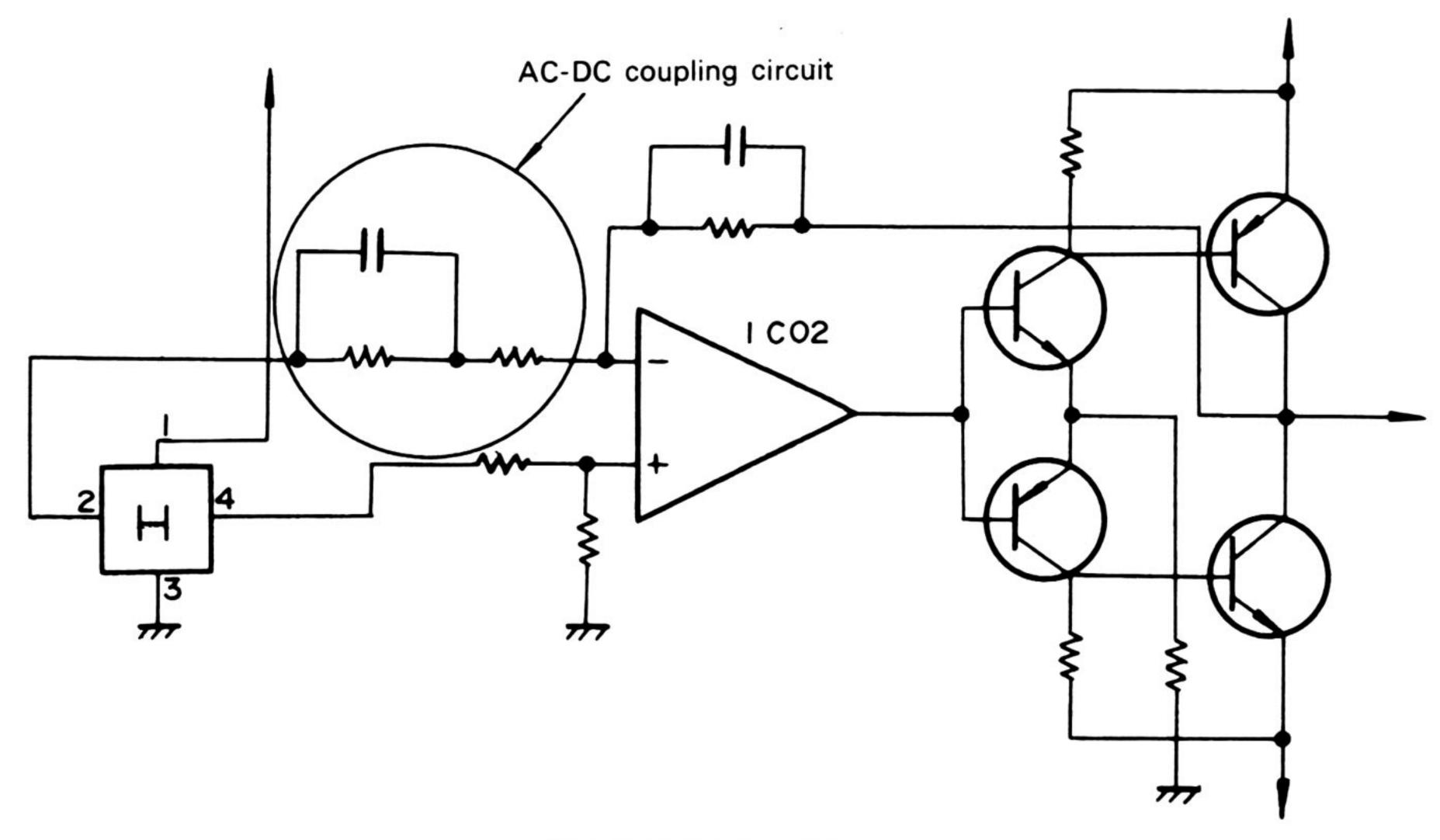
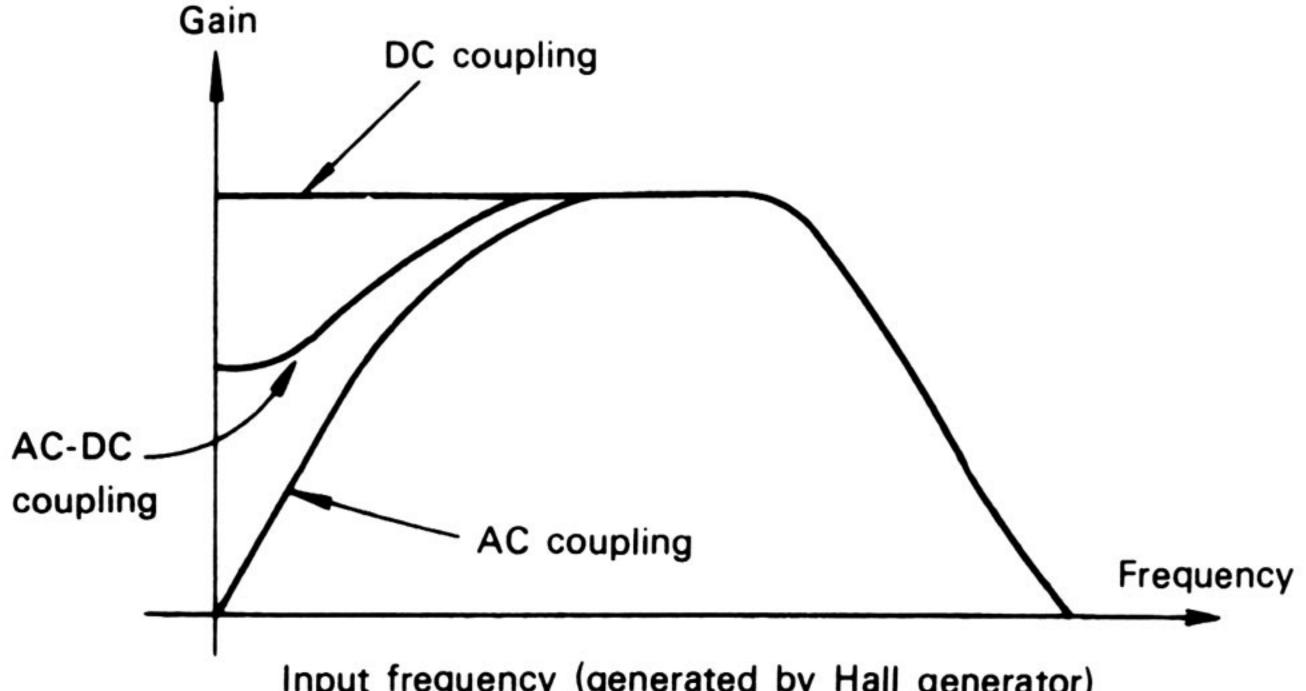


Fig. 6.7 Motor drive



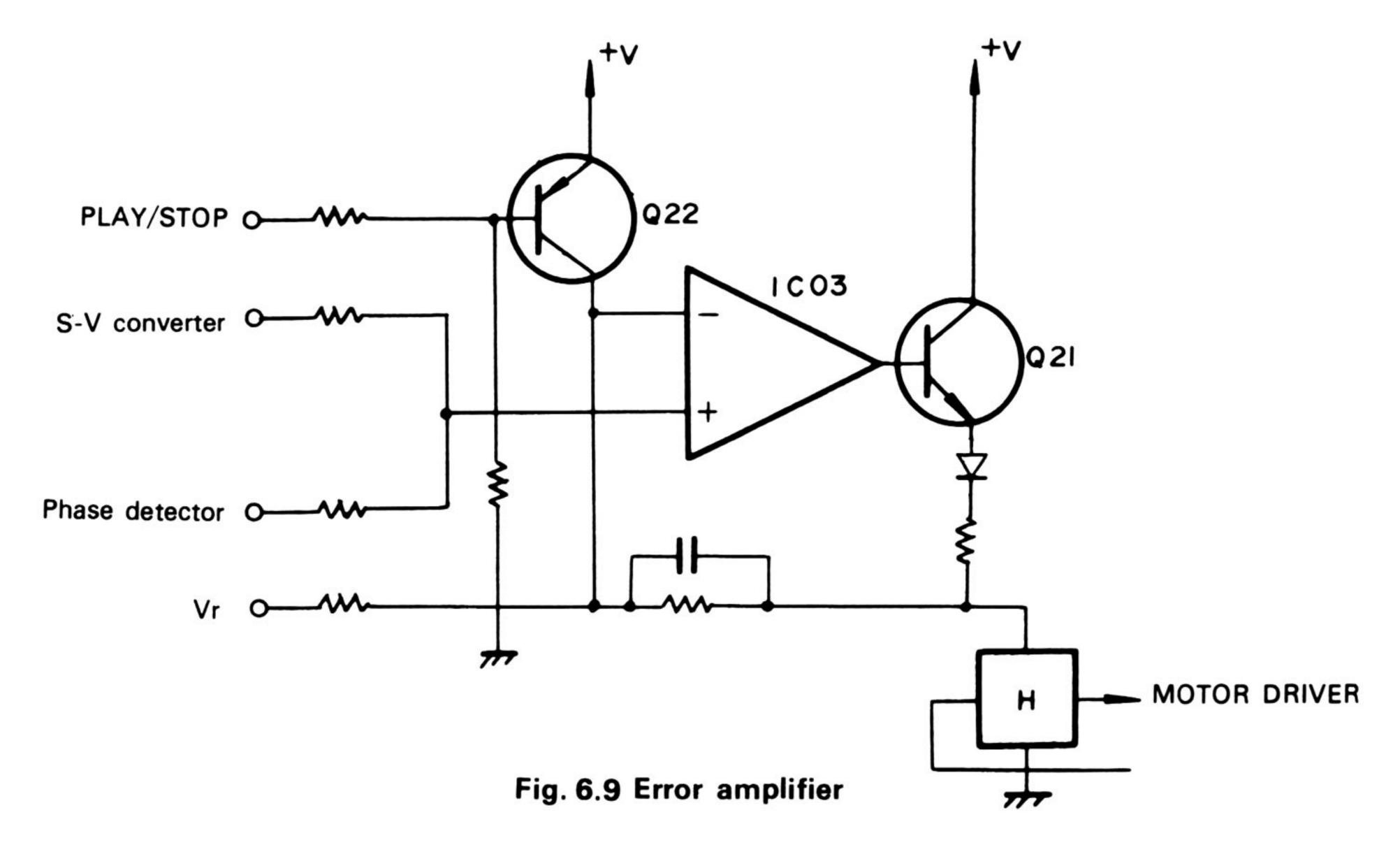
Input frequency (generated by Hall generator)

The AC-DC coupling circuit has advantages of both DC and AC coupling circuits, decreasing the influence from offset and improving wow and flutter.

6-5 ERROR AMPLIFIER

This circuit compares the sum of the S-V converter output signal (from PLL IC) and the phase detector output signal with the reference voltage Vr and outputs the difference between them.





In the PLAY mode, the PLAY/STOP terminal is "H", and Q22 is OFF. Therefore, ICO3 outputs the difference between the reference voltage Vr and the sum of the output from the S-V converter and phase detector.

In the STOP mode, the PLAY/STOP terminal is "L", and Q22 is ON. Therefore, +V is applied to the inverting input terminal of ICO3. As a result, Q21 is OFF and the motor is at STOP.

6-6 HALL GENERATOR OPERATION

The hall generator is an electromagnetic switching device employing the hall effect. As shown in the diagram below, terminals 1 through 4 are constructed on a suitable semiconductor wafer having a thickness of d. Input control current lc is applied to terminals 1 and 3, and as magnetic flux from an external field of a certain density B influences the surface of the wafer from a perpendicular direction, a voltage potential V_H is generated between output terminals 2 and 4. V_H is referred to as the hall output voltage and its value is calculated by the following equation:

$$V_H = \frac{R_H}{d} I_C \times B (R_H = hole coefficient)$$

Thus, the output voltage V_H is obtained proportionate to the product of the control current Ic and magnetic flux density B.

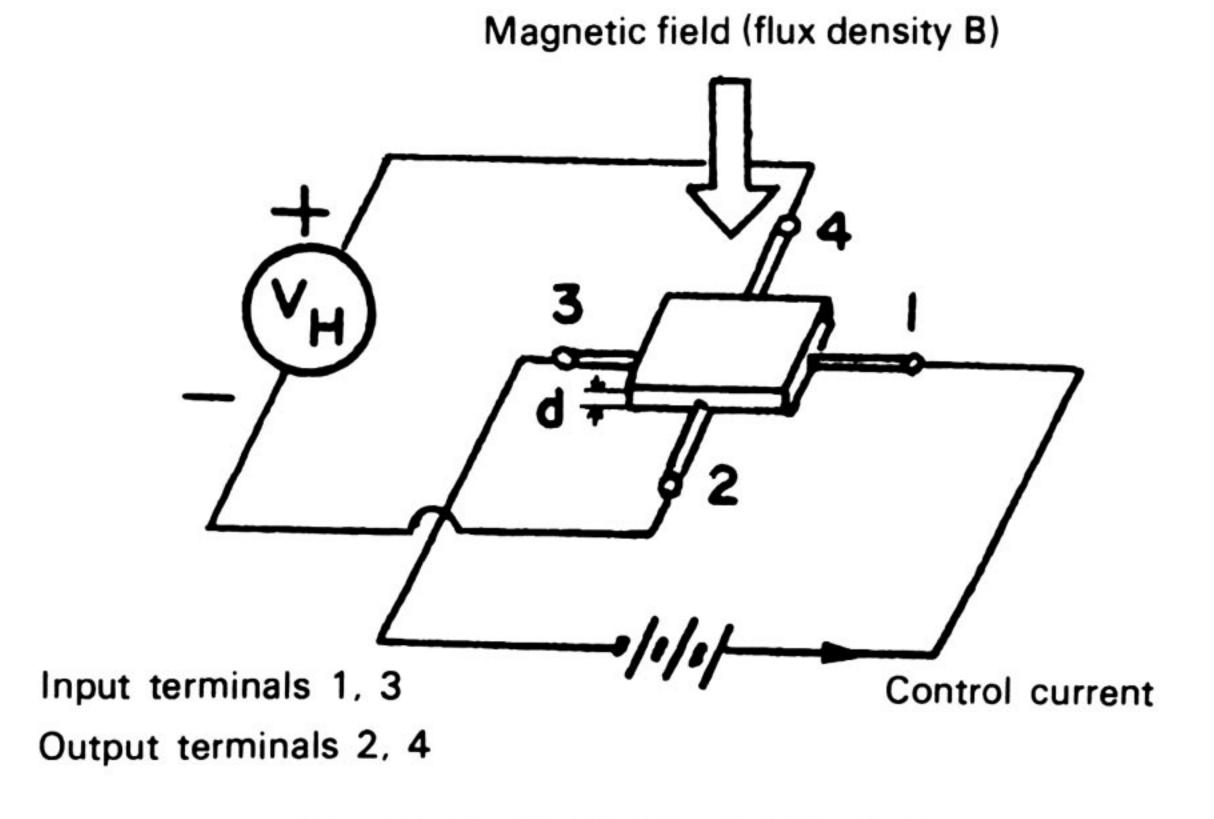


Fig. 6.10 Hall Effect Principle

6-7 BRAKE CIRCUIT

The brake circuit is a time constant type and operates to stop the motor. The circuit will not operate when the speed drops from 45 rpm to 33-1/3 rpm.

In the PLAY mode, point 2 is at "H" level, and at lock condition, point 1 is also at "H" level. At this time, C38 and C39 are charged (current flow is shown by \rightarrow) and Q24, Q25 and Q26 are OFF. When the STOP signal is applied to point 2, the level at point 2 drops to "L". As the lock condition is reset, the level at point 1 is also "L". Therefore, C38 is discharged (\leftarrow) and Q24 is turned ON. C39 is also discharged (\leftarrow) and Q25 is turned ON. When both Q24 and Q25 are ON, Q26 is ON. Thus, a negative voltage is generated by Hall generators H1 and H2 producing a counterclockwise torque. The time during which the brake is effective is given by (R43 + R44 + \triangle R') C38 because (R43 + R44 + \triangle R') C38 < (R46 + R47 + \triangle R'') C39.

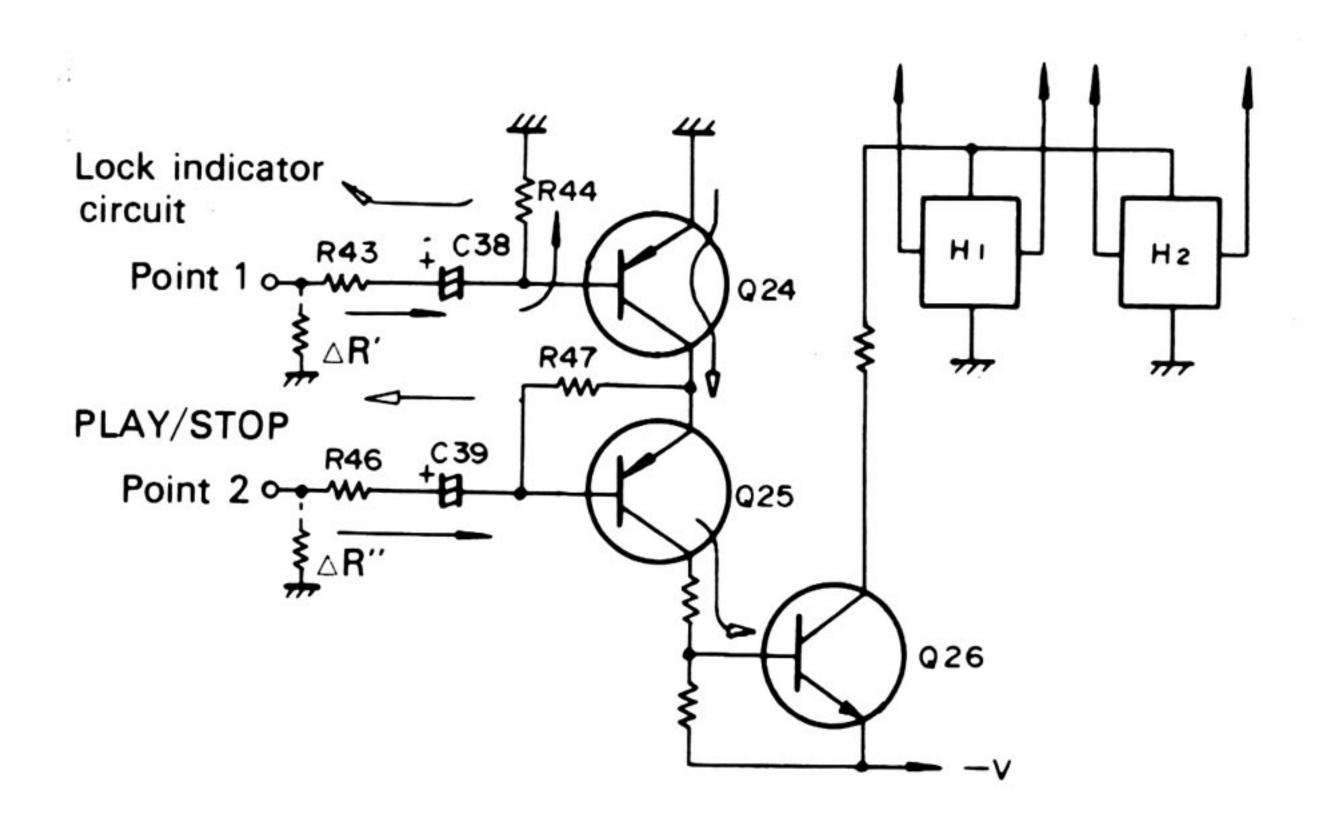


Fig. 6.11 Brake circuit

7. PLL MOTOR CONTROL IC MSM 5819

The configuration of MSM 5819 is shown in Fig. 7.1 MSM 5819 features the following:

- (1) Built-in high gain speed control circuit
- ② Sample-and-hold type speed control output and phase comparator output circuits
- 3 Built-in starter and lock range detector

7-1 SPEED CONTROL CIRCUIT

The PLL circuit used for motor control is different from that consisting of discrete electrical components as used in CB transcivers, tuners, etc. In general, the motor drive control PLL controls speed as well as phase. If only phase is controlled, hunting or other trouble may occur due to the large moment of inertia of the platter making phase delay control difficult. Therefore, the voltage in proportion to the speed is mainly used for turntable motor control. Where long term variation of motor speed not possible to compense with the speed control system is involved, the phase control system is used. With this system, superb transient response and accurate speeds are obtained.

In MSM 5819, the detector gain at the specified speed is set to a high level causing the F/V RC signal to rise rapidly immediately prior to the stable rotation range as shown in the Fig. 7.2 "Timing Diagram".

The F/V OUT signal is output as a DC signal directly from the sample-and-hold circuit creating a loop with good phase characteristics.

7-2 PHASE CONTROL CIRCUIT

The phase control circuit is designed so that it operates on a frequency half the frequency of the speed control circuit. It is shown in Fig. 7.2. Since the gain of the phase comparator is in proportion to the operating frequency, the gain is lowered to prevent hunting, and the gain matches that of the speed control circuit. The output stage uses the sample-and-hold circuit to obtain a DC output.

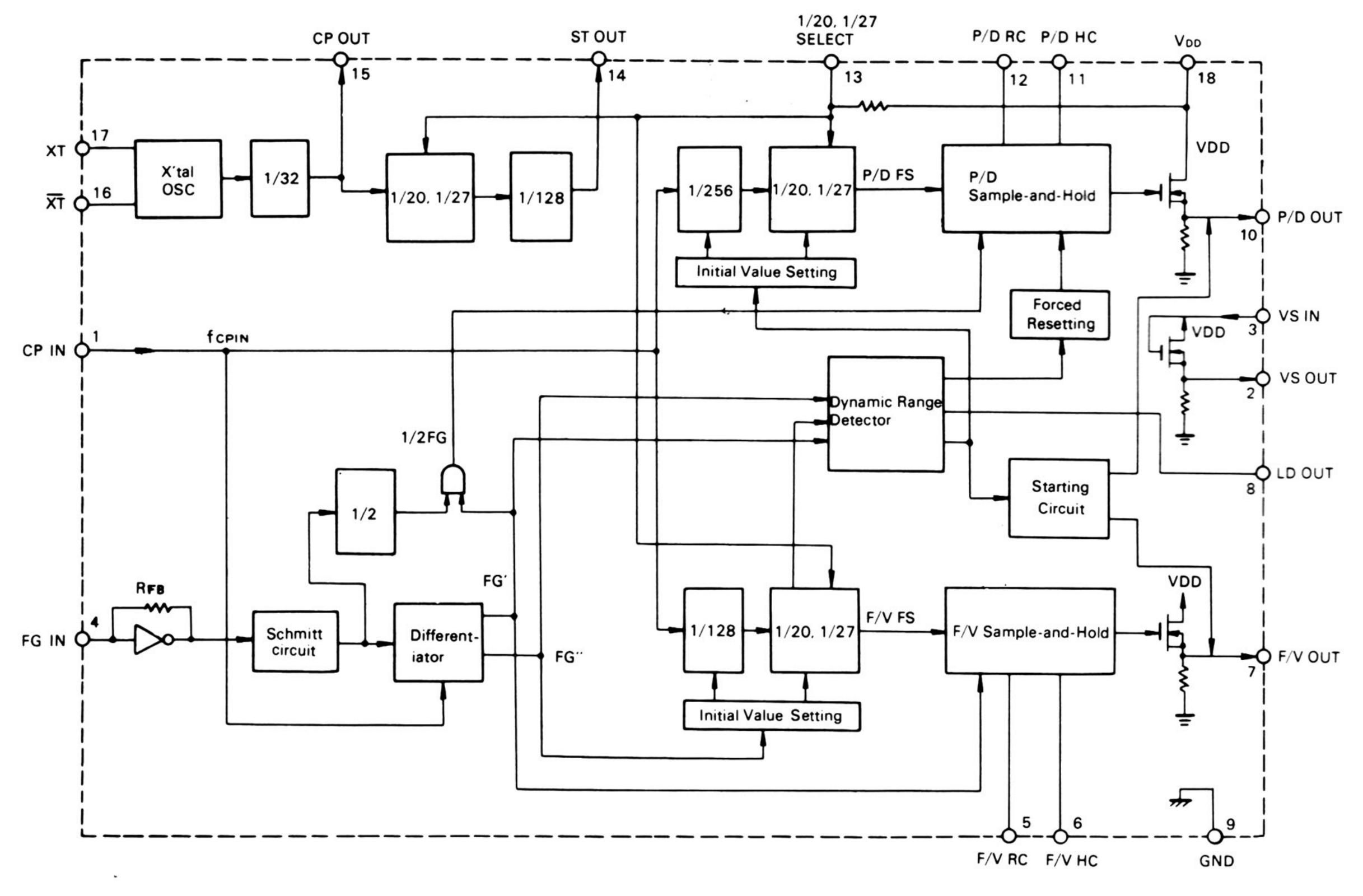


Fig. 7.1 MSM 5819 Block Diagram

(1) F/V stystem in locked state (Speed control)

(2) P/D system in locked state (Phase control)

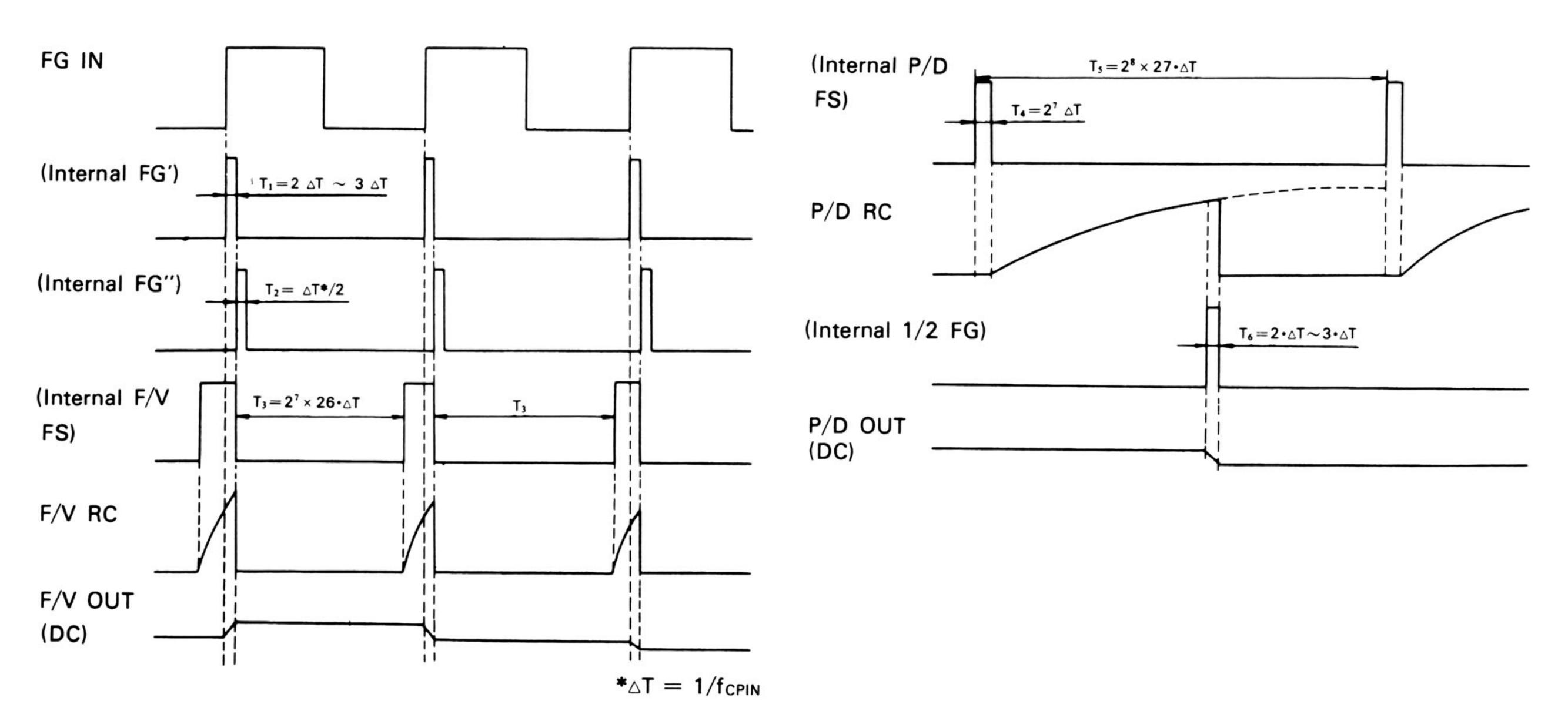


Fig. 7.2 Timing Diagram (see Fig. 7.1 for signal names)

7-3 FUNCTIONAL DESCRIPTION

(1) The output signals, F/V OUT, P/D OUT have three states

1) Locked state

Both F/V OUT and P/D OUT are normal and lock indicator signal (LD OUT) at "H" level (VDD).

Locking range

33-1/3 rpm ±3.7% of reference signal period T 45 rpm ±5% of reference signal period T

Note:

Reference signal period T = $\frac{1}{f_{CPIN} \times 1/128 \times (1/20 \text{ or } 1/27)}$

2 Underspeed state

Both F/V OUT and P/D OUT are at "H" level (VDD) and the lock indicator signal (LD OUT) is at "L" level (GND).

3 Overspeed state

Both F/V OUT and P/D OUT are at "L" level (GND) and the lock indicator signal (LD OUT) is at "L" level (GND). Relation between LD OUT and locking range is as follows:

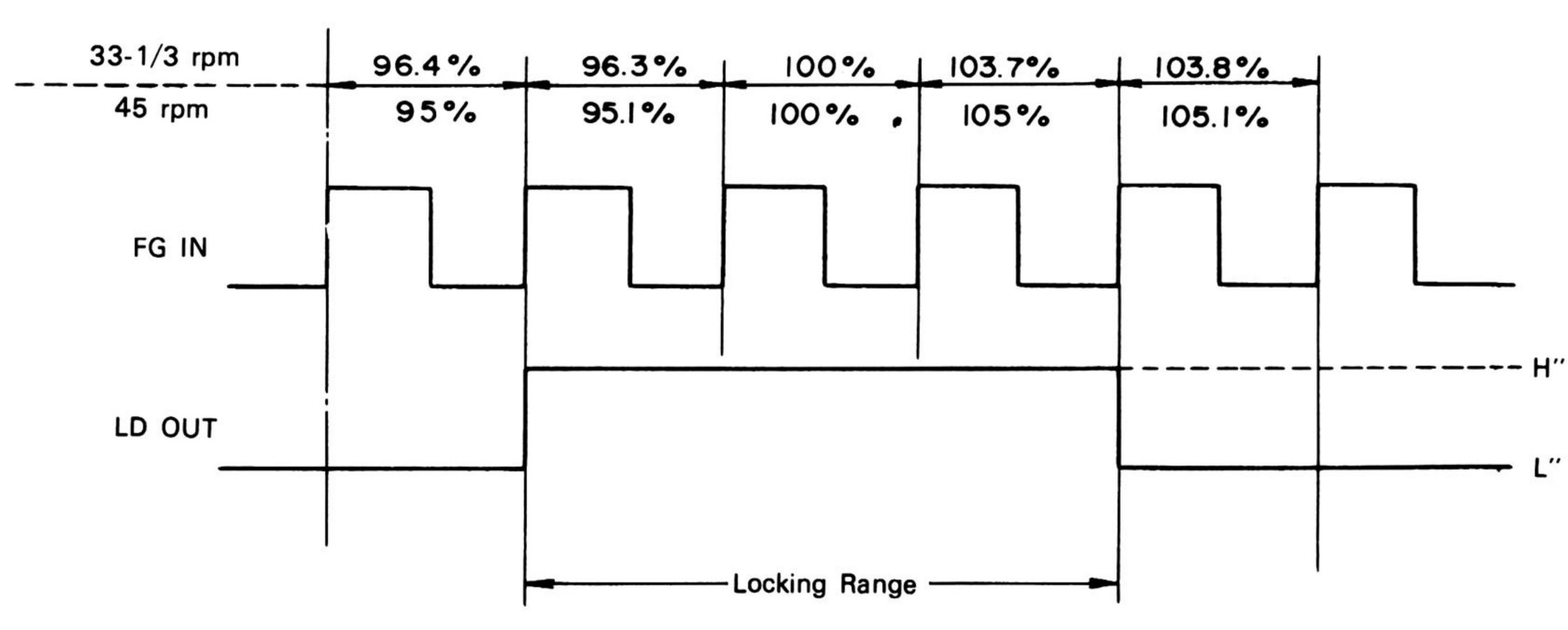


Fig. 7.3

Note:

For 45 rpm and 33-1/3 rpm, LD is "H" when the FG signal period is within 95.1% \sim 105% and 96.3% \sim 103.7% of the reference signal period T, respectively. For other cases, LD is "L".

(2) Quartz Controlled Oscillation

As shown in the following figure, a quartz resonator and trimmer capacitor is connected in parallel across XT and $\overline{\text{XT}}$ terminals.

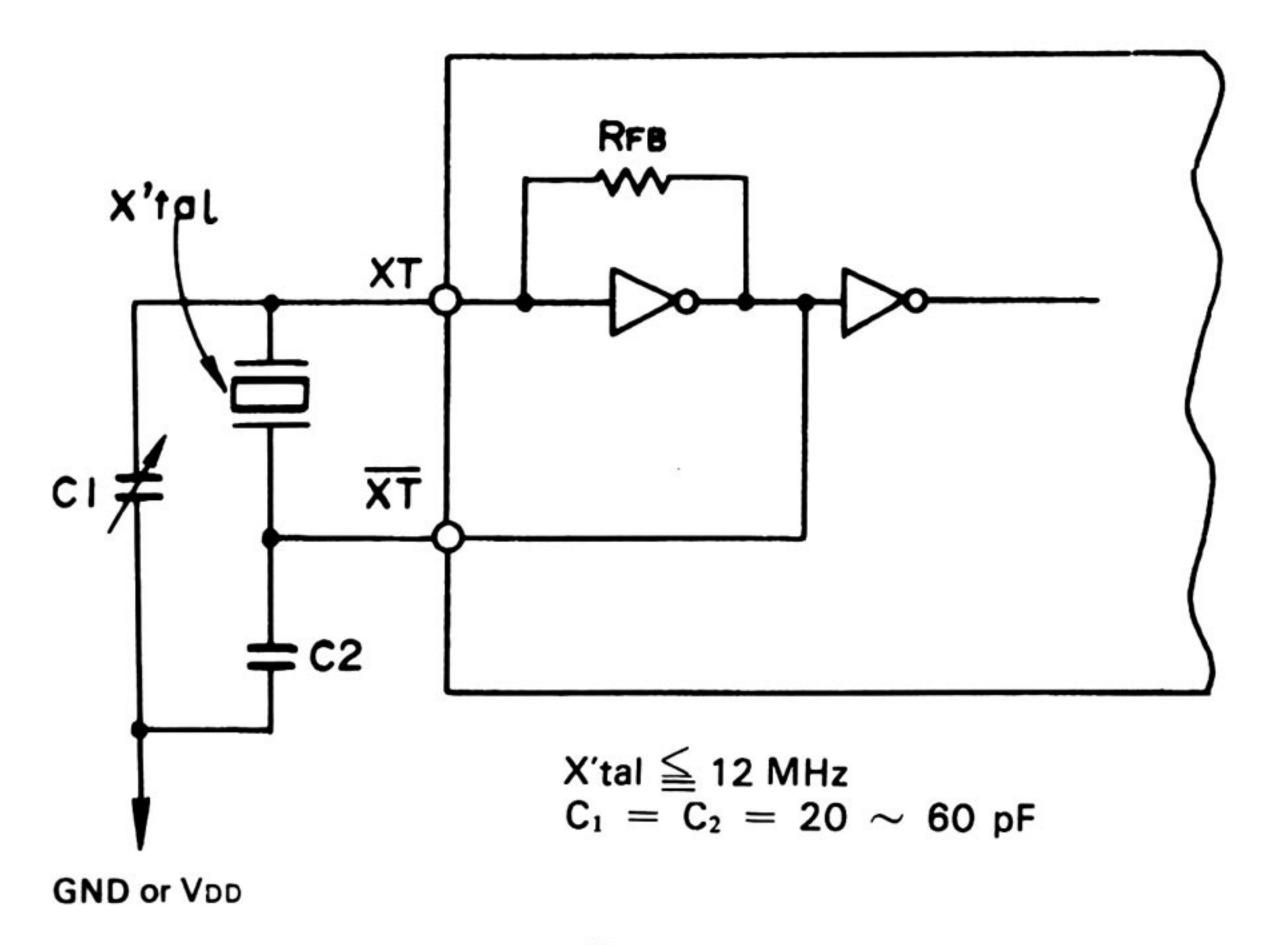


Fig. 7.4

(3) CP OUT and CP IN terminals

The CP OUT terminals outputs 1/32 of the reference signal frequency (quartz osillation frequency). At CP IN, the reference signal input terminal is usually connected to the CP OUT for operation.

(4) FG IN terminal

This sensing signal (comparison signal) input terminal is used by C coupling (about $1\mu F$).

(5) 1/20, 1/27 select terminal (incorporating a pull up resistor)

This reference signal speed switching terminal is used for changing motor speed.

(6) ST OUT terminal

This is the 1/16 duty strobe reference output terminal.

(7) VS IN and VS OUT terminals

The reference voltage setting terminals are of the source follower type. A voltage between $0 \sim V_{DD}-V_{TN}$ is provided at the VS OUT terminal depending on the voltage at the VS IN terminal. ($V_{TN} \doteq 2V$)

(8) F/V RC terminal

R1 and C1 determine the period of the saw tooth wave of the F/V output signal and, and they are connected to this terminal. R1 must be 10 k Ω or more and C1 must be 1 μ F or less.

The period of the saw tooth wave is given by $T1 = C1 \times R1$ (where $T1 = 1/20 \times T33$) T33 = FG signal period at 33-1/3 rpm

(9) F/V HC terminal

A holding capacitor connected to this terminal is used to obtain F/V output voltage. (HC \simeq 1/10C1 and HC > 1000 pF).

(10) P/D RC terminal

R2 and Cw determine the period of the saw tooth wave of F/V output signal, and they are connected to this terminal. R2 must be 10 k Ω or more and C2 must be 1 μ F or less. The period of the saw tooth wave is given by

 $T2 = C2 \times R2$ (where $T2 = 1/0.7 \times T33$) T33 = FG signal period at 33-1/3 rpm

(11) P/D HC terminal

A holding capacitor connected to this terminal is used to obtain P/D output voltage. (HC \simeq 1/10C2 and HC \geq 1000 pF)

(12) F/V OUT and P/D OUT terminals

The F/V HC and P/D HC source follower buffer output terminals provide about +2V of level-shifted output for each F/V and P/D HC level. The typical value of the source follower resistance is 40 k Ω .

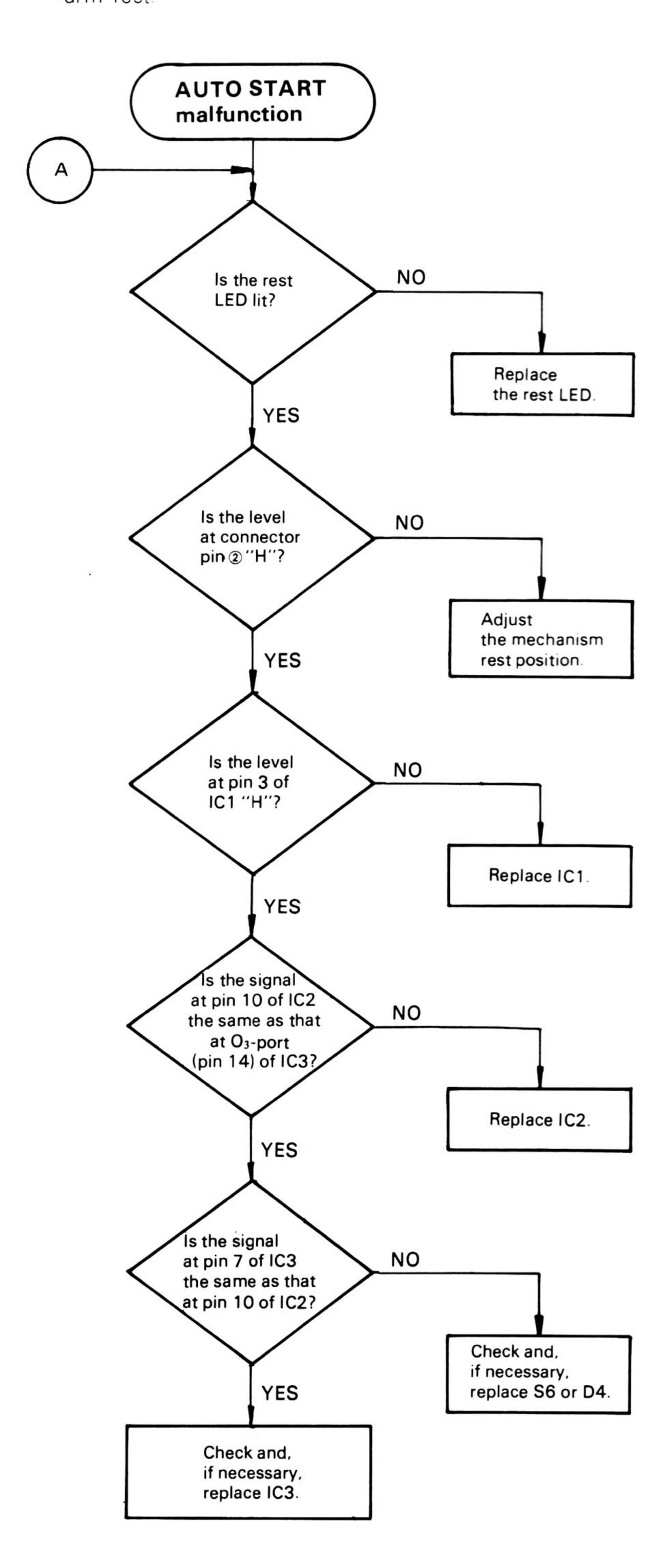
(13) LD OUT

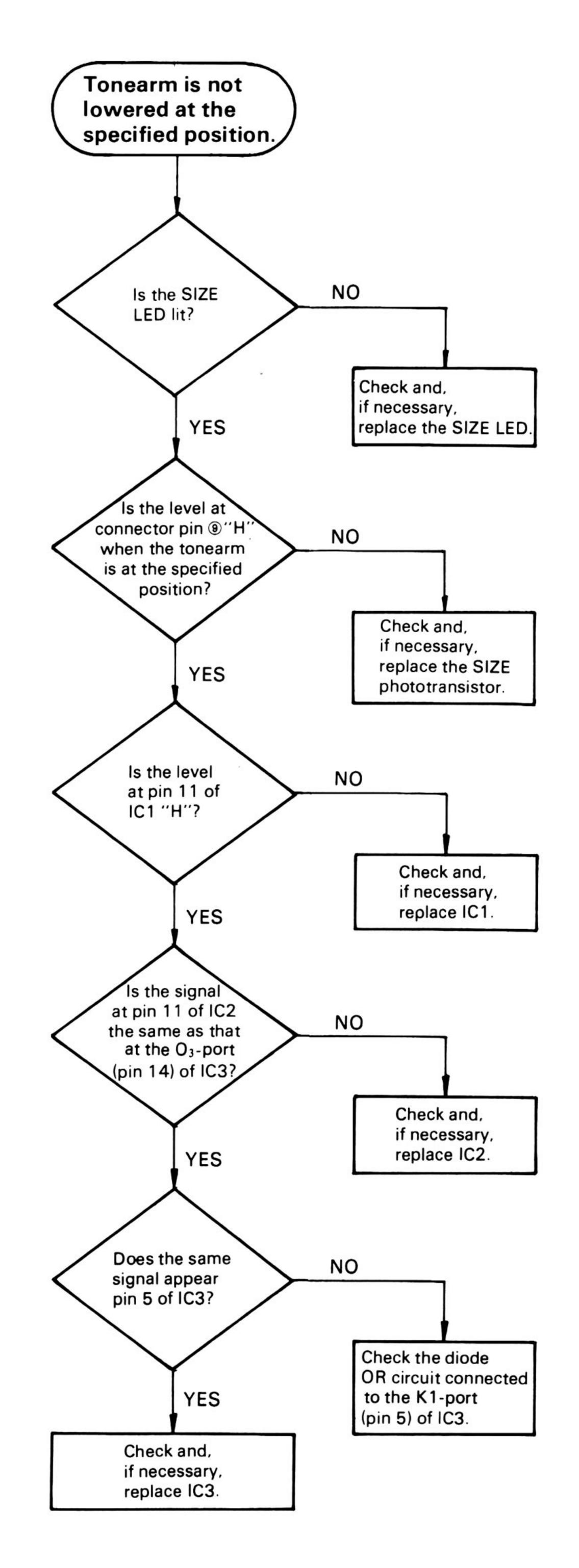
The lock sensing terminal is at "H" level (Voo) for near normal motor speeds (within lock range) and at "L" level for fast or slow motor speeds (outside lock range).

TROUBLESHOOTING (X29-1200-00)

a) AUTO START Malfunction

- Troubleshoot as follows with the tonearm set on the arm rest.
- b) Tonearm is not lowered at the specified position after lead-in.





TROUBLESHOOTING (X29-1200-00)

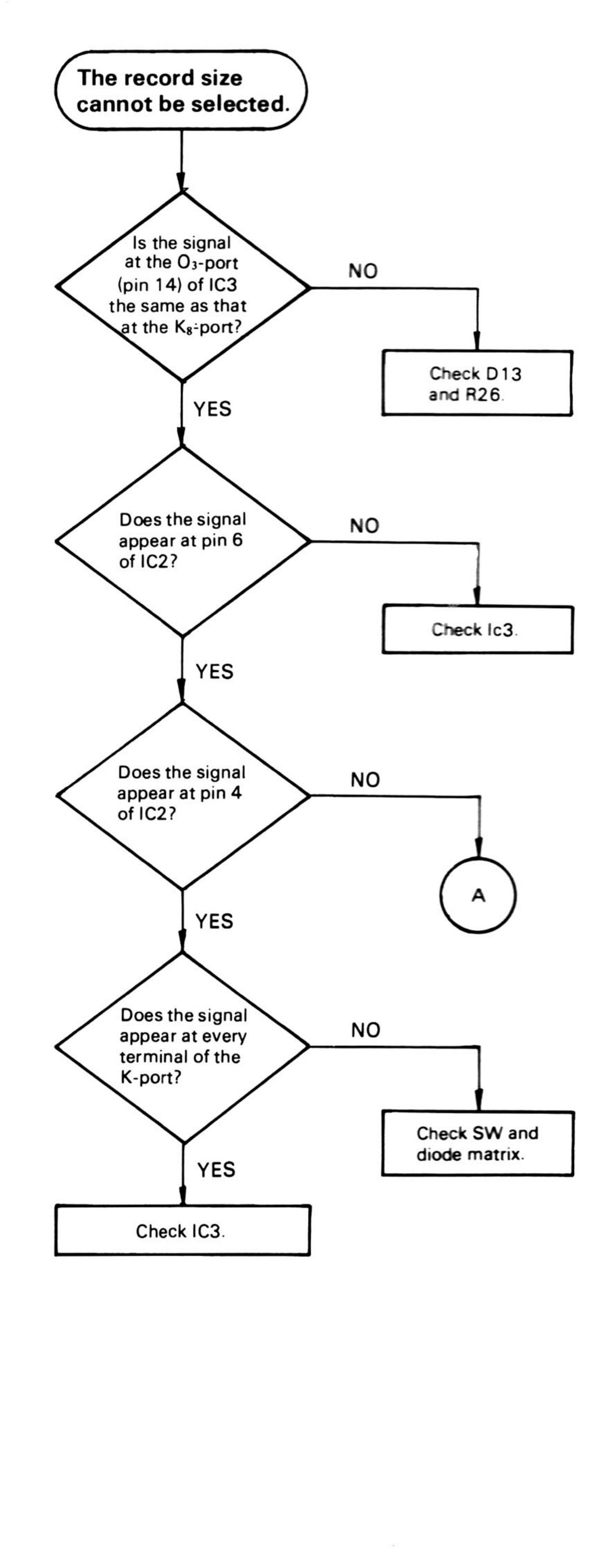
c) AUTO RETURN Malfunction

 Troubleshoot as follows with the tonearm at the return position.

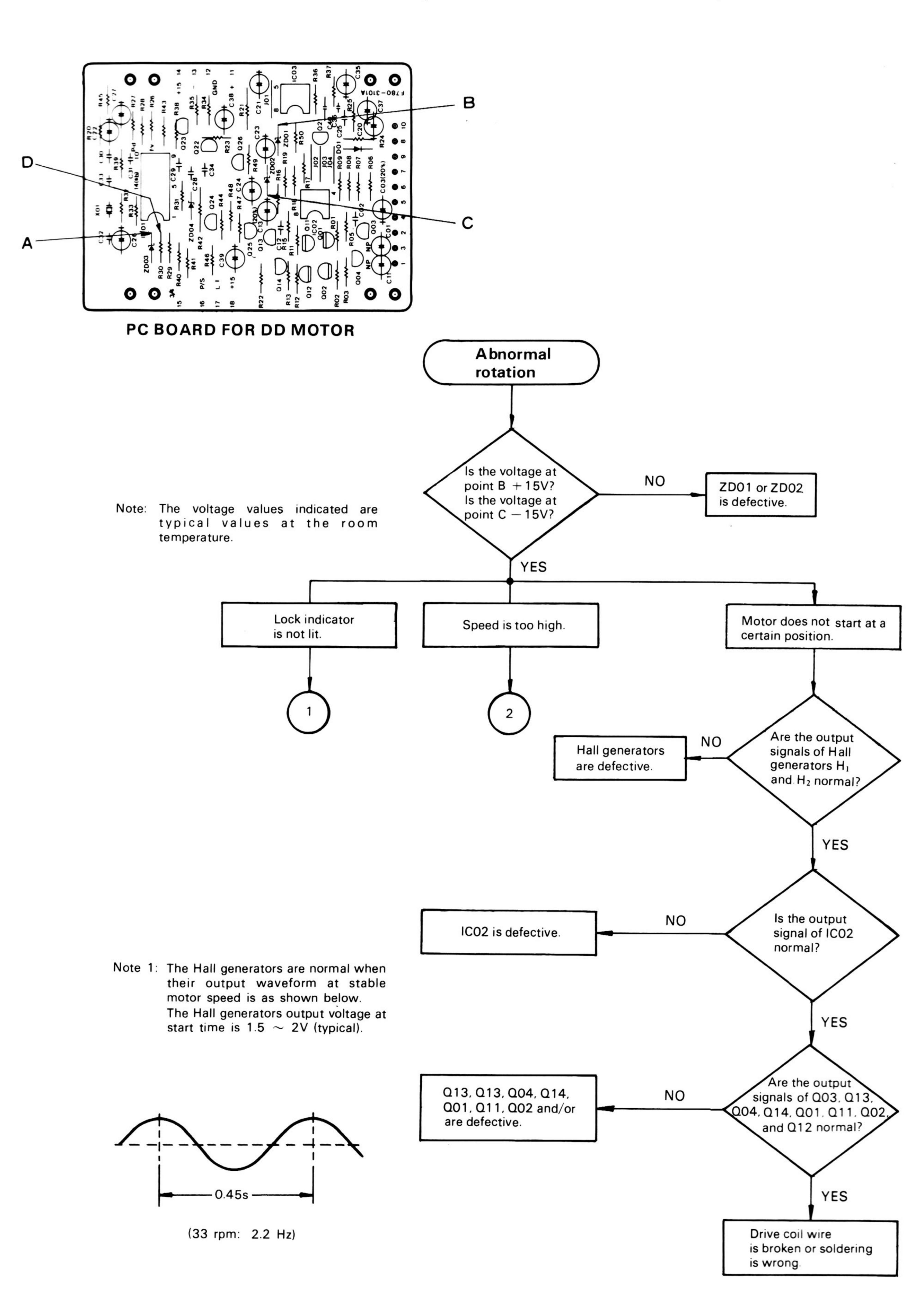
AUTO RETURN malfunction. Is the level NO at connector pin ® "L"? Adjust the return mechanism and check the phototransistor. YES Is the level NO at pin 10 of IC1 "L"? Check IC1 or Q6 YES Is the level NO at Q6 collector "H"? Check Q6. YES Does the pulse NO signal appear at pin 3 of IC2? YES Does the pulse NO signal appear at the O₃-port (pin 14) of IC3? Does the same NO pulse appear at Check IC3. the K₂-port (pin 6) of IC3? YES Check IC2. YES Check IC3. Check the diode matrix connected to the K₂-port (pin 6) of IC3.

d) Record (Disk) Size cannot be selected.

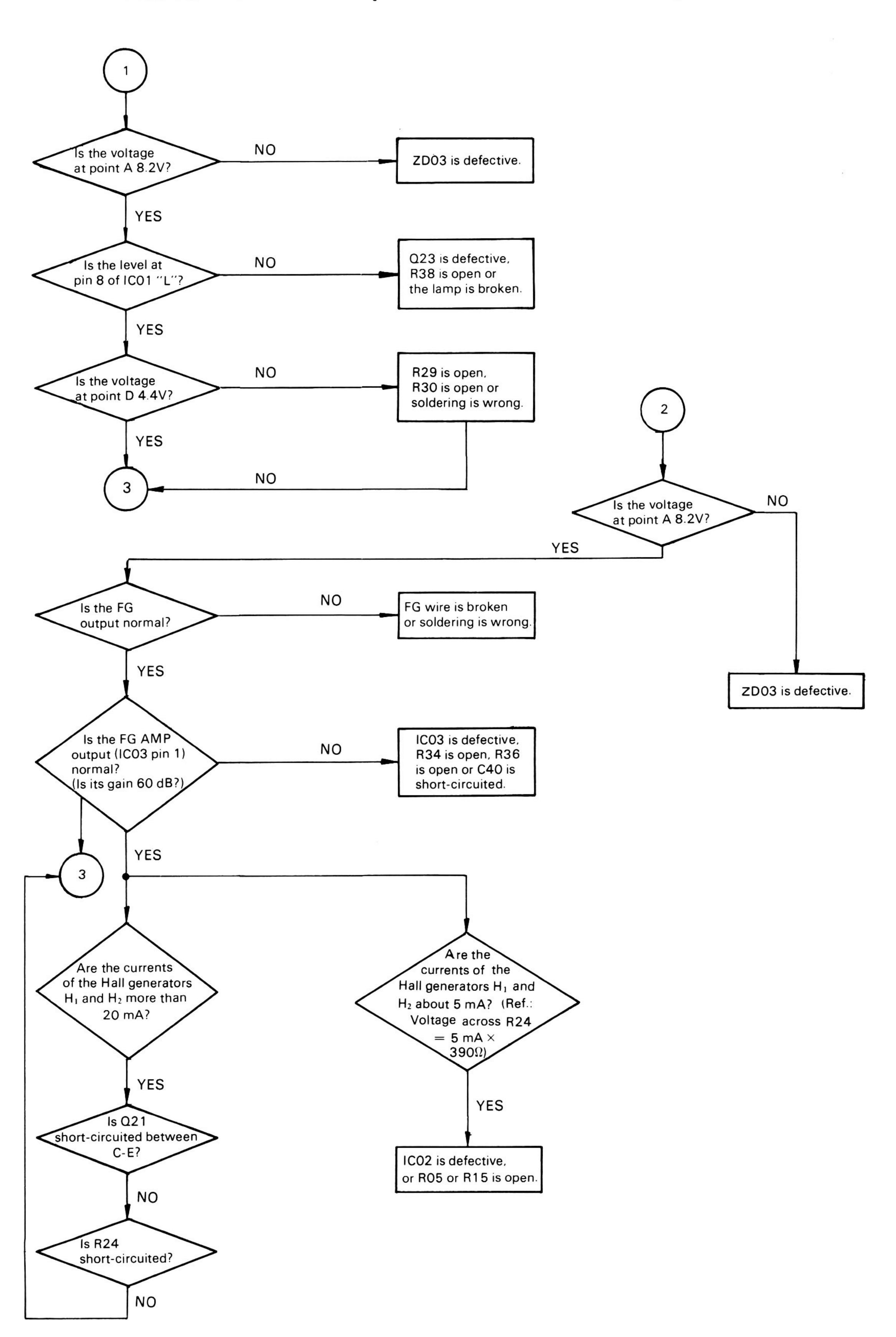
 Troubleshoot as follows with the tonearm on the arm reset.



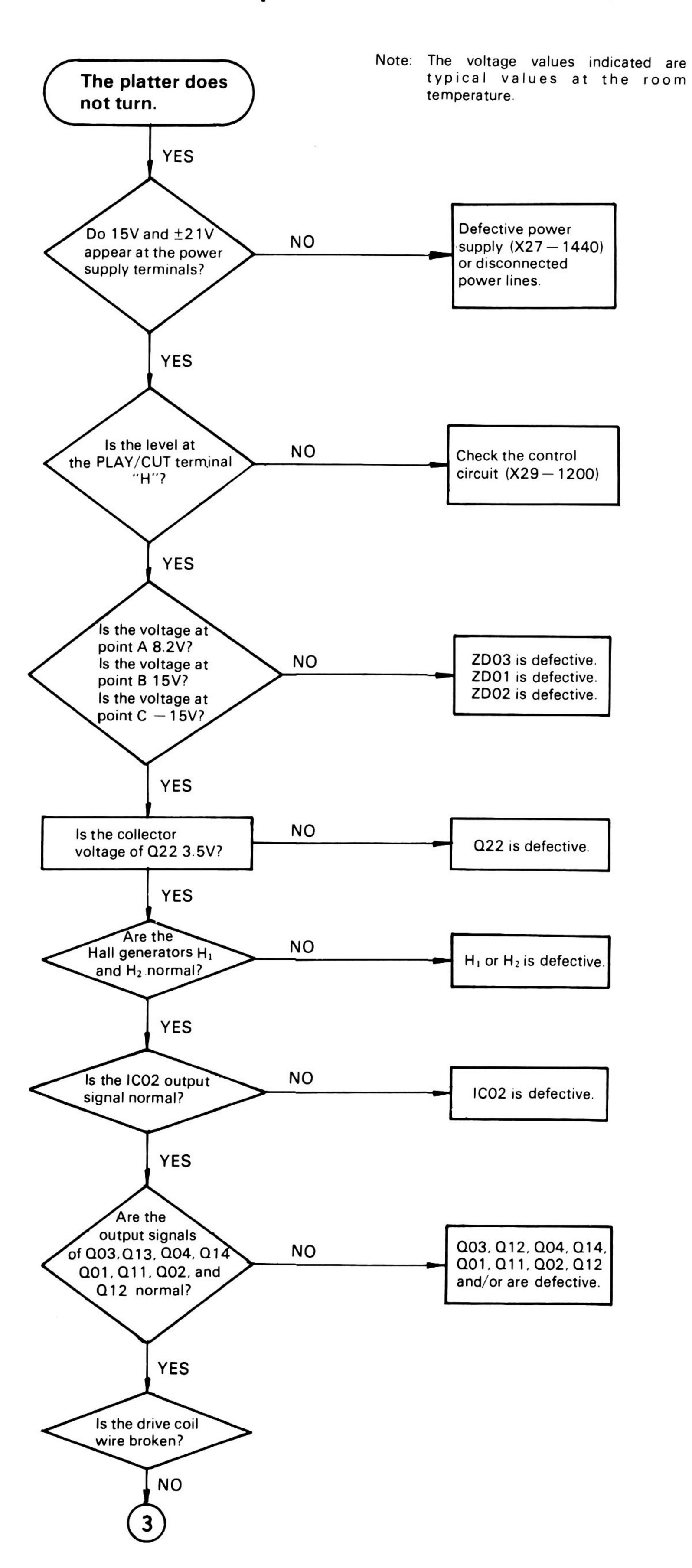
TROUBLESHOOTING (DD MOTOR:T43-0021-05)



I KUUBLESHOOTING (DD MOTOR:T43-0021-05)



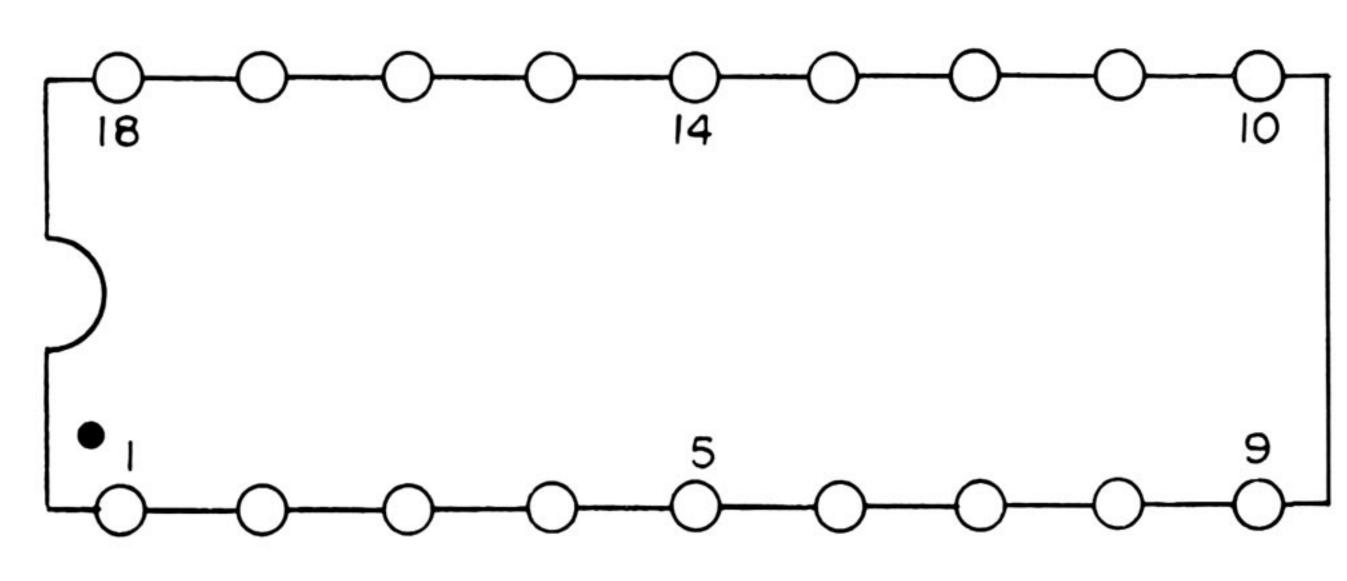
TROUBLESHOOTING (DD MOTOR:T43-0021-05)



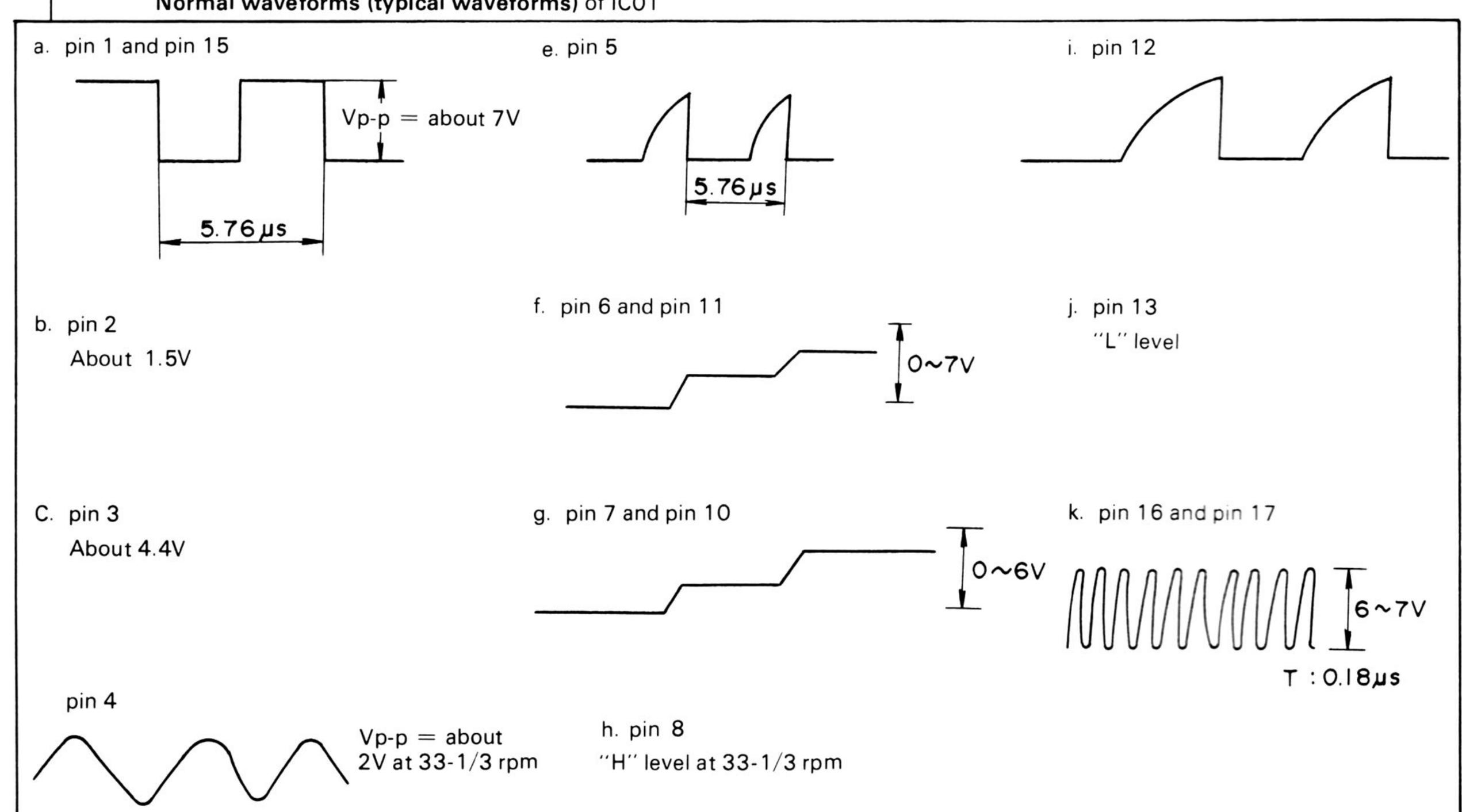
TROUBLESHOOTING (DD MOTOR:T43-0021-05)

Checking MSM5819

Set the motor to the STOP condition, then observe the following waveforms with the paltter turned by hand (at about 33 rpm).



Normal waveforms (typical waveforms) of ICO1



1. NOTES FOR REPLACEMENT OF HALL GENERATORS

This motor uses two Hall generators, H-300A. H-300A is ranked according to its sensitivity (or Hall voltage when driven by a constant voltage). These groups are identified by color. This motor uses the following three ranks of H-300A marked with yellow, pink and orange.

(Only pink rank H-300s are in stock for service parts.)
To keep stably the output voltage of the motor driver stage, pay attention to the following.

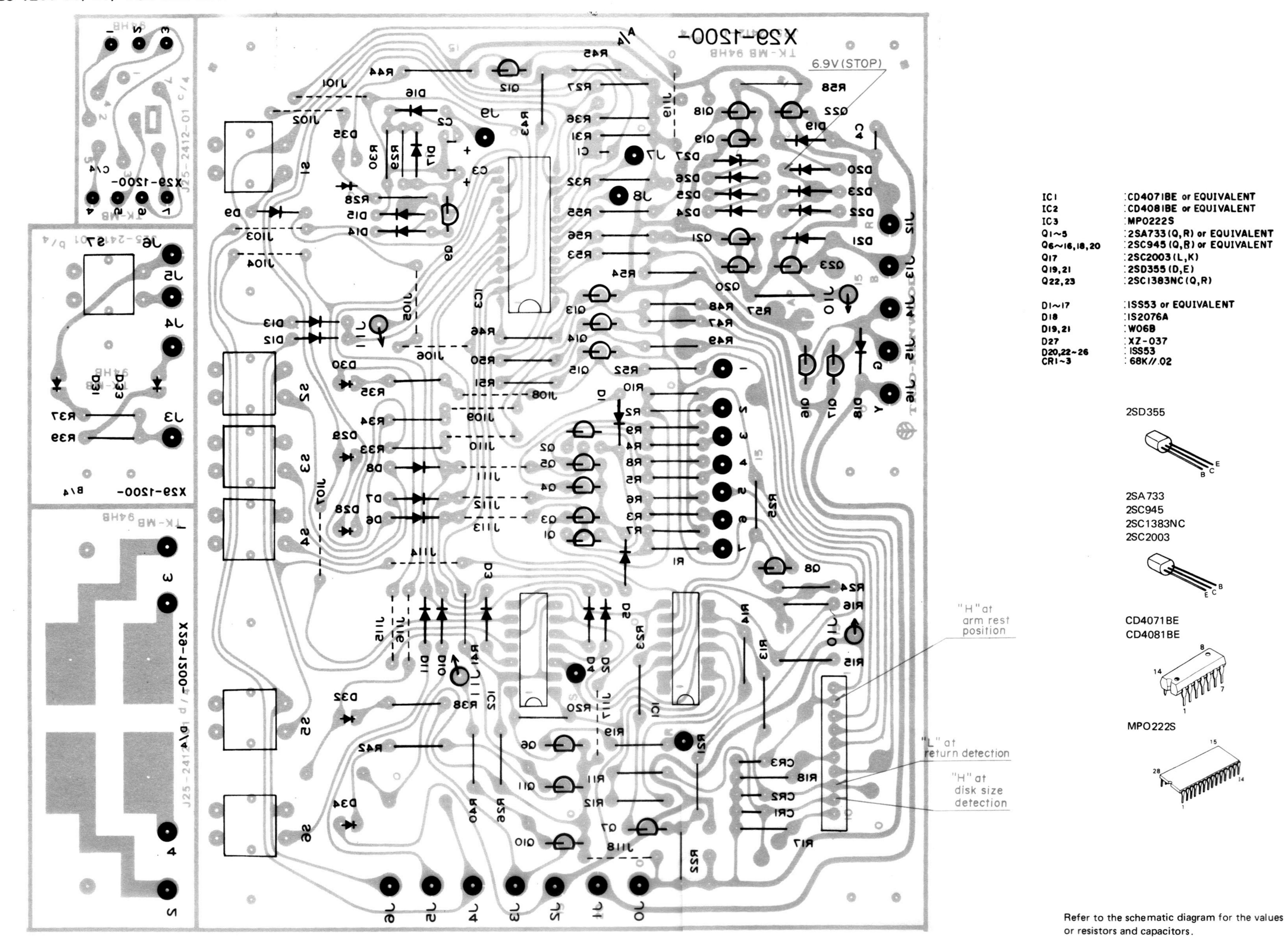
- (1) Two Hall generators must be the same rank, that is, must have the same color mark.
- (2) Change several resistors as follows according to the rank of the Hall generators used.

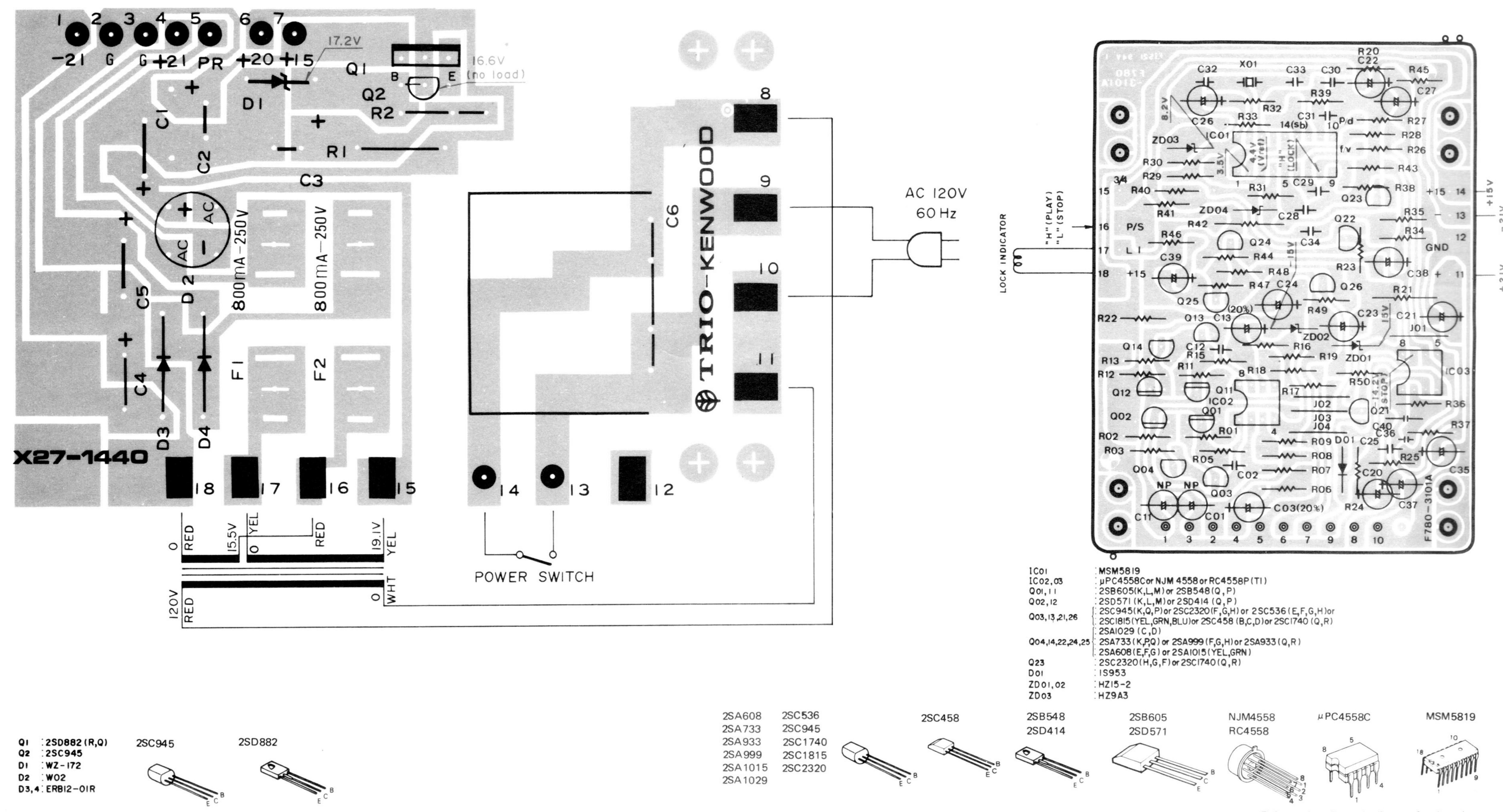
Color mark	R05 and R09	R15 and R19
Yellow	390 kΩ	360 kΩ
Pink Orange	330 kΩ	300 kΩ

2. NOTES FOR REPLACEMENT OF BRAKE CIRCUIT CAPACITORS C38 AND C39

These capacitors must be of M ($\pm 20\%$) type since this brake is the time constant type brake.

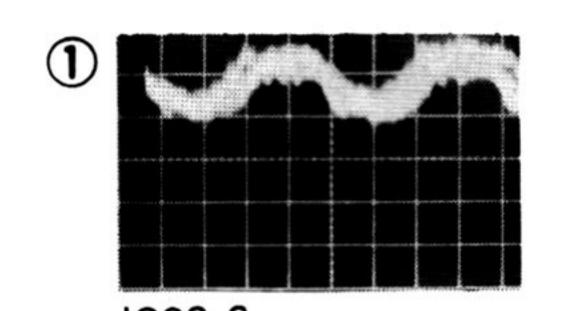
MECHANISM CONTROL (X29-1200-00, 01) Foil side view



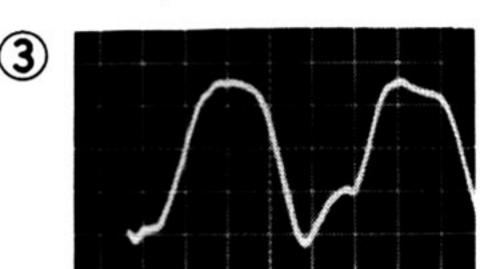


WAVEFORM AT CHECK POINTS

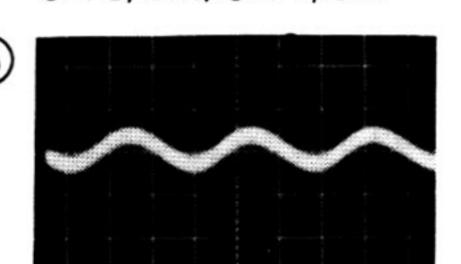




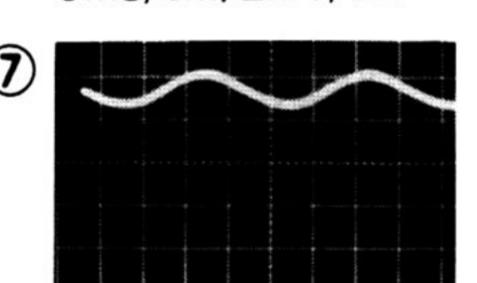
IC02-2 0.1S/cm,5mV/cm



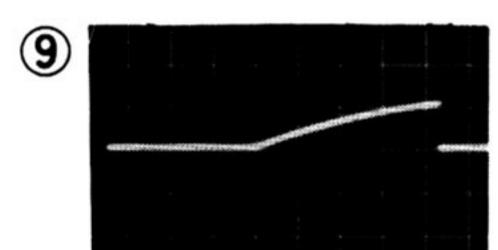
Q01-C 0.1S/cm, 0.1V/cm



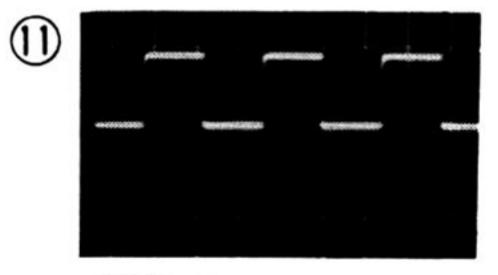
IC03-3 (45 rpm) 5mS/cm, 2mV/cm



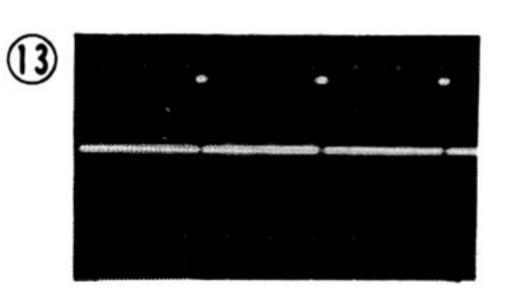
ICO1-4 (33 rpm) 5mS/cm, 0.2V/cm



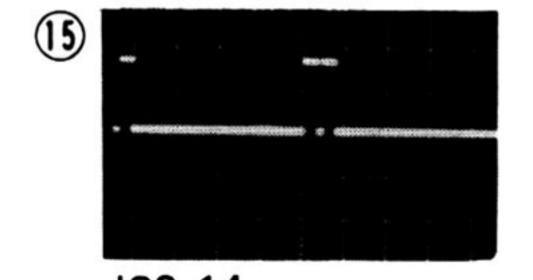
IC01-12 (33 rpm) 5mS/cm, 0.5V/cm



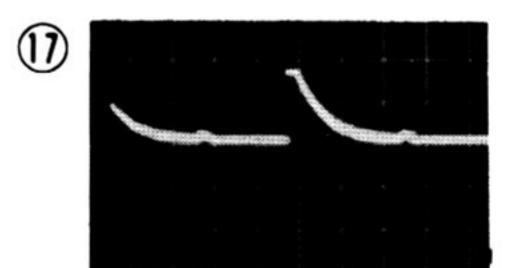
ICO1-12 μ S/cm, 0.5V/cm



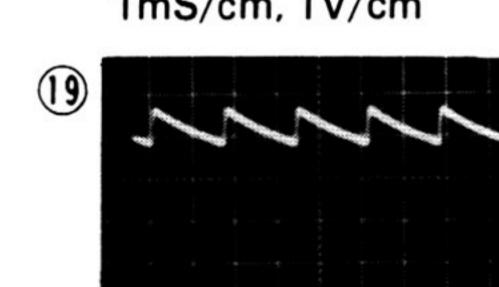
ICO1-14 (45 rpm) 5mS/cm, 0.5V/cm



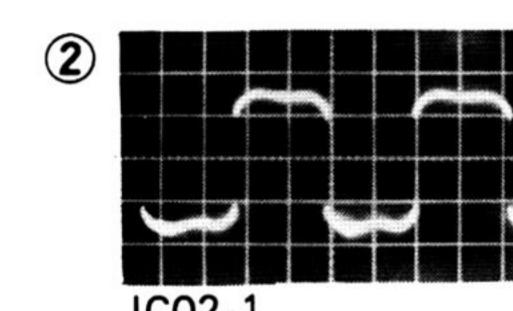
IC3-14 1mS/cm, 1V/cm



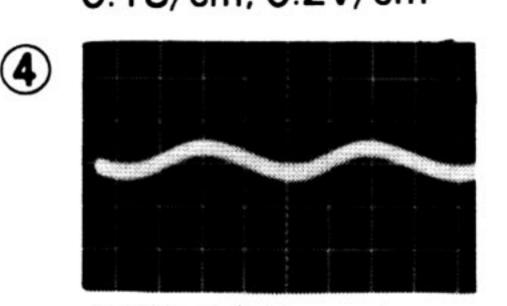
IC3-16 1mS/cm, 1V/cm



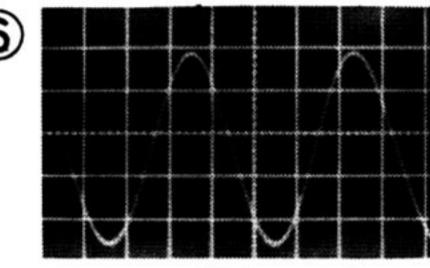
IC3-18 0.02mS/cm, 1V/cm



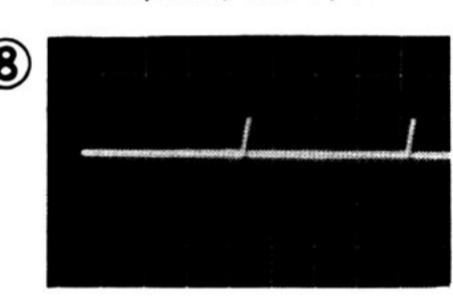
0.1S/cm, 0.2V/cm



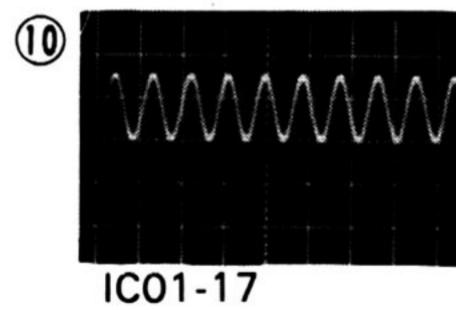
IC03-3 (33 rpm) 5mS/cm, 2mV/cm



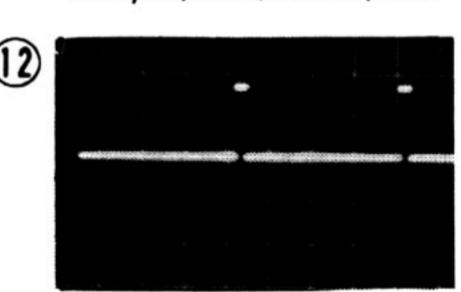
ICO3-1 (33 rpm) 5mS/cm, 0.5V/cm



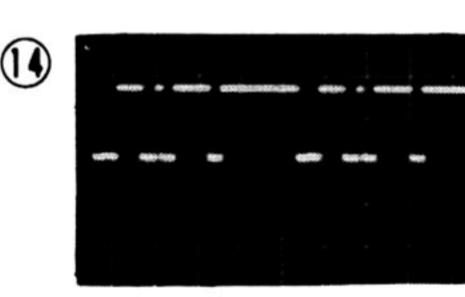
ICO1-5 (33 rpm) 5mS/cm, 0.5V/cm



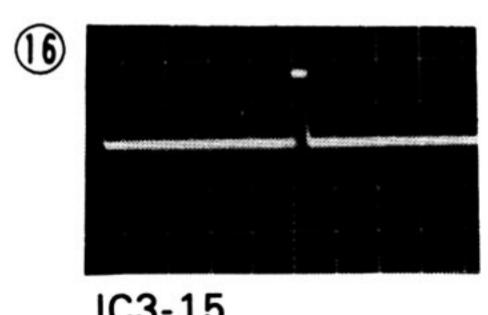
 0.2μ S/cm, 0.5V/cm



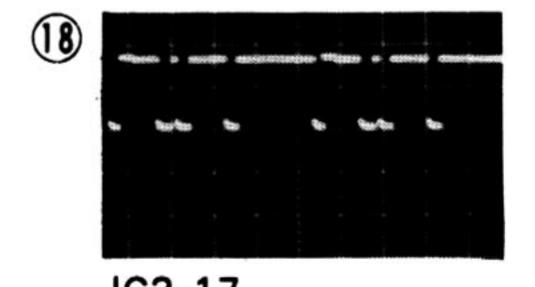
IC01-14 (33 rpm) 5mS/cm, 0.5V/cm



IC3-11 1m/cm, 1V/cm



IC3-15 1mS/cm, 1V/cm

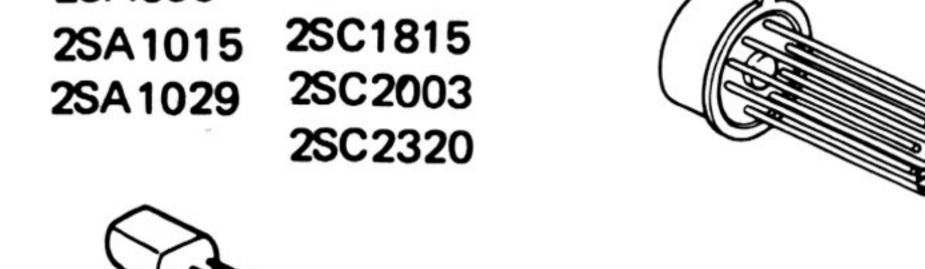


IC3-17 1mS/cm, 1V/cm



2SB605 2SD355 2SD571

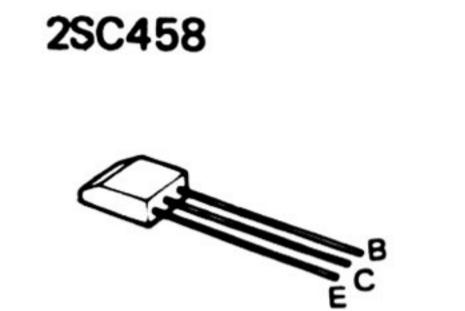
NJM4558 2SA 733 RC4558



CD4071BE

CD4081BE

μPC4558C

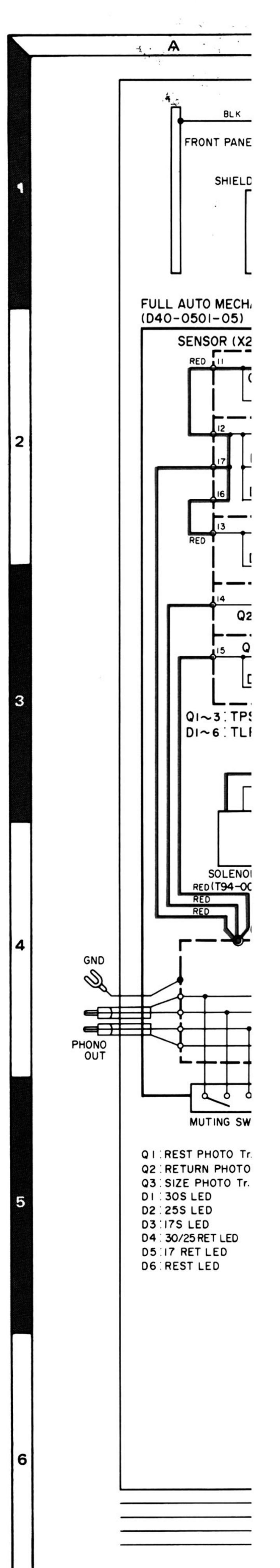


2SB548 2SD414

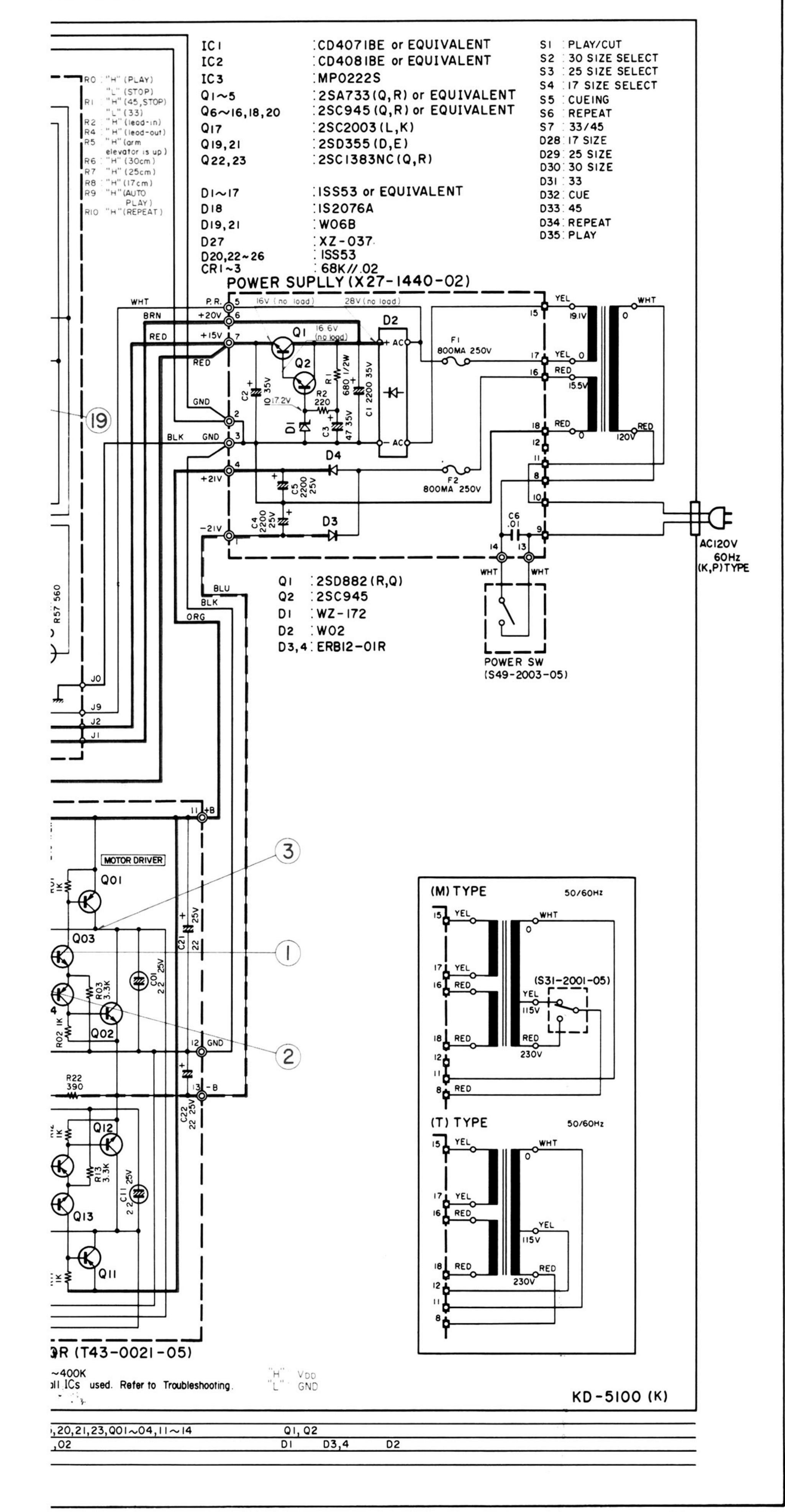


MSM5819

MPO222S



TURNTABLE





SPECIFICATIONS


MOTOR AND TURNTABLE	
Drive System	Direct-drive system
Motor	Quartz PLL coreless & slotless DC servo motor
	(for platter drive)
	2-pole, 3-slot DC micro-motor (for automatic functions)
Turntable Platter	.31.6cm (12-7/16") diameter,
	aluminum alloy die-cast
	Weight: 1.5kg (3.3 lbs.)
	Moment of inertia: 330 kg·cm²
Speeds	.2 speeds, 33-1/3 and 45 rpm.
Wow & Flutter	Less than 0.03% (WRMS)
	DIN weighted better than - 75 dB
TONEARM	
Type	Static-balance type straight tubular arm
Effective Arm Length	. 225 mm (8-7/8")
Overhang	
Tracking Error	. + 3°24′ ~ - 1°
Tracking Force Variable Range	. 0 to 3.grams
Usable Cartridge Weight	. 4 to 12 grams (with supplied headshell)
	nd U.K. models are not equipped with the V-39 MKIII .)
Furnished Cartridge	V-39 MKIII (Moving magnet type)
Frequency Response	
Output Voltage	
Load Impedance	
Stylus	
Optimum Tracking Force	
Replacement Stylus	N-39 MKⅢ
MISCELLANEOUS	
	. AC 120 V, 60 Hz: U.S.A. and Canada Models
Power Requirements	
	AC 240 V, 50 Hz: U.K. Model
	AC 120 V/220V (Switchable), 50/60 Hz:
	European and Military Models
	AC 120 V/240V (Switchable) 50/60 Hz: Other countries
Power Consumption	. 19 watts: U.S.A. and Canada Models
	20 watts: Other countries
Dimensions	
	H 142mm (5-9/16")
	D 407mm (16-1/32")
Weight	
Built-in Features	
	(Automatic lead-in/return/cut/repeat)
	Anti-skating device
	Oil-damped cueing device with LED indicator
	Illuminated quartz lock indicator
	Record size selector with LED indicators
	Speed selector switch with LED indicators
	Low capacitance phono cables
	45 rpm adaptor stand
	Stylus pressure direct readout counter
	Built-in vibration isolators
	Describe an adval lead

Kenwood follows a policy of continuous advancements in development. For this reason specifications may be changed without notice.

Kenwood poursuit une politique de progrès constants en ce qui concerne le développement. Pour cette raison, les spécifications sont sujettes à modifications sans préavis.

Kenwood strebt ständige Verbesserungen in der Entwicklung an. Daher bleiben Änderungen der technischen Daten jederzeit vorbehalten.

DC voltages are measured by a VOM of 20 $k\Omega/V$ input impedance.



INSTRUCTION FOR PARTS LIST

18 1A A01-0608-12 METALLIC CABINET 19 2A A2C-1979-11 FRONT PANEL ASSY 19 2A A2O-1979-11 FRONT PANEL ASSY 19 2A A2O-1979-11 FRONT PANEL ASSY XW R221 R43-1333-15 FL-PROOF RD330 J 2H R222 R43-1368-15 FL-PROOF RD680 J 2H VR1 ,2 R12-3301-05 TRIMMING POT, 20K(B) VR3 ,4 R19-4305-05 POTENTIOMETER (OUTPUT)	Ref. No.	Parts No.	Description 部品名/規格	Re- marks 音号
19 2A A2C-1979-11 FRONT PANEL ASSY XW R221 R43-1333-15 FL-PROOF RD330 J 2H R222 R43-1368-15 FL-PROOF RD680 J 2H VR1 ,2 R12-3301-05 TRIMMING POT, 20K(B)				
19 2A A2C-1979-11 FRONT PANEL ASSY 19 2A A2C-1979-11 FRONT PANEL ASSY 19 2A A2C-1979-11 FRONT PANEL ASSY 19 2A A2O-1979-11 FRONT PANEL ASSY 19 2A A2O-1979-11 FRONT PANEL ASSY XW R221 R43-1333-15 FL-PROOF RD330 J 2H R222 R43-1368-15 FL-PROOF RD680 J 2H VR1 ,2 R12-3301-05 TRIMMING POT, 20K(B)	_18 1A	A01-0608-12	METALLIC CABINET	
19 2A A2C-1979-11 FRONT PANEL ASSY 19 2A A2C-1979-11 FRONT PANEL ASSY 19 2A A2O-1979-11 FRONT PANEL ASSY XW R221 R43-1333-15 FL-PROOF RD330 J 2H R222 R43-1368-15 FL-PROOF RD680 J 2H VR1 ,2 R12-3301-05 TRIMMING POT, 20K(B)				• K-
19 2A A20-1979-11 FRONT PANEL ASSY XW R221 R43-1333-15 FL-PROOF RD330 J 2H ** R222 R43-1368-15 FL-PROOF RD680 J 2H ** VR1 , 2 R12-3301-05 TRIMMING POT, 20K(B)				
R221 R43-1333-15 FL-PROOF RD330 J 2H • R222 R43-1368-15 FL-PROOF RD680 J 2H • VR1 ,2 R12-3301-05 TRIMMING POT, 20K(B)	19" ZA	A2C-1979-11	FRONT PANEL ASSY	SU
R222 R43-1368-15 FL-PROOF R0680 J 2H • VR1 ,2 R12-3301-05 TRIMMING POT, 20K(B)	19 ZA	A20-1979-11	FRONT PANEL ASSY	Xw
R222 R43-1368-15 FL-PROOF R0680 J 2H • VR1 , 2 R12-3301-05 TRIMMING POT. 20K(B)	0221	043-1111-15	C1 - 0000 P0330 1 24	!
VR1 ,2 R12-3301-05 TRIMMING POT, 20K(B)		레이트 강경에 되었다는 그램, 이번 맛있었다면서 그런 그렇게 그		1
		:		•
443 /4		네를 가지되어 있어지까? 아버지가 얼마를 하셨다. 그렇게 그 전하였다구요요.		
VR5 ,6 R12-2302-05 TRIMMING POT. 5K(B)				•

- (1) Exploded view drawing No.
- 2 Position in exploded view.
- 3 Symbol of new parts.
- (4) Area to which parts are shipped. Example: A20-1390-13 is the part No. of FRONT PANEL ASS'Y for the "K" type products (for U.S.A.). When this column is blank, it means that the same type of parts (same parts No.) are used for the products shipped to all areas.
- (5) Reference No. in schematic diagram.
- (6) Abbreviation of "ceramic capacitor".
 - All capacitors and resistors are listed using abbreviations. Abbreviations.
- Abbreviations of capacitors (Parts No. with initial letter "C").

ELECTRO Electrolytic capacitor LL-ELEC Low leak electrolytic capacitor NP-ELEC Non-pole electrolytic capacitor

MICA Mica capacitor POLYSTY Polystyrene capacitor

MYLAR Mylar capacitor CERAMIC Ceramic capacitor TANTAL Tantalum capacitor MF...... Metallized film capacitor MP..... Metallized paper capacitor

OIL Oil capacitor

The unit "UF" is used in lieu of " μ F" Abbreviations of resistors (Parts No. with initial letters "R").

RC Carbon composition resistor RD Carbon film resistor

FL-PROOF RD Flame-proof carbon film resistor RW Wire wound power resistor

FL-PROOF RS Flame-proof metal oxide film resistor RN Metal film resistor

FUSE-RESIST Resistor with fuse function 1/8W 2B..... Rated wattage 2E Rated wattage 1/4W 2H Rated wattage 1/2W 3A Rated wattage 1W 2W **3D** Rated wattage 3F Rated wattage **3W 3G** Rated wattage 4W 3H Rated wattage 5W

All resistor values are indicated with the unit (Ω) omitted.

Abbreviations common to capacitors and resistors.

C ±0.25pF (Used for capacitors only) **D** ±0.5pF (Used for capacitors only)

K..... ±10% ±20%

 \mathbf{Z} +80%. – 20%(Used for capacitors only)

Resistors RD (carbon composition resistors) are not listed in the parts list. For values, refer to the schematic diagram.

(7) Codes in X27-1440

M: X27-1440-00 K: X27-1440-02 E: X27-1440-03 T: X27-1440-04

Re	ef. No.	Parts No.	Description	Re-				
*	照番号	部品番号	部品名/規格	marks 備考				
	KD-5100(UNIT)							
1 2 3 4 5	3 A 2 A 2 A 1 A 3 A	-	PUSH LOCK SHAFT SWITCH ARM TERMINAL TRANS COVER					
ر 7	3 b 2 A	-	MECHANISM COVER SHIELDING PLATE					
20 21 21 21 21	1 E 1 A 1 A 1 A	A02-0329-05 A21-0689-02 A21-0689-02 A21-0689-02	PLASTIC CABINET DRESSING PANEL DRESSING PANEL DRESSING PANEL DRESSING PANEL	* :				
21 22 23 24 25	1 A 1 E 1 A 1 A 1 A 1 A 3 A	A21-0692-02 A21-0690-13 A22-0616-13 A22-0617-13 A40-0546-12	DRESSING PAREL SIDE PAREL X2 SUB PAREL A ASSY SUB PAREL B ASSY BOTTOM PLATE	* T * *				
26	1 B	A53-0232-02	DUST COVER ASSY	*				
- - -		E46-0055-30 E46-0060-00 E46-0061-20 E46-0062-20 E46-0063-13	WARRANTY CARD WARRANTY CARD WARRANTY CARD WARRANTY CARD WARRANTY CARD	F K U H U				
		646-0064-20 650-2403-00 850-2403-00 850-2404-00 850-2404-00	WARRANTY CARD INSTRUCTION MANUAL INSTRUCTION MANUAL INSTRUCTION MANUAL INSTRUCTION MANUAL	X *E * X UE				
- - - 27	2 A	650-2404-00 650-2405-00 650-2431-00 659-0018-00 630-0736-05	INSTRUCTION MANUAL INSTRUCTION MANUAL INSTRUCTION MANUAL INSTRUCTION PRINT LAMP	H * T * M U *				
28	2 A	E38-0221-03	DISPLAY ASSY	*				
29 30 30 30 31	1 I: 1 A 1 A 1 B	D32-0080-24 D32-0080-24 D32-0080-24 D40-0501-15	TURNTABLE PLATTER SWITCH STOPPER SWITCH STOPPER MECHANISM ASSY	* I.U X E H *				
32 32 32 32 32	1 B 1 B 1 B 1 B	E30-0181-05 E30-0459-05 E30-0587-05 E30-1317-15	POWER CORD POWER CORD POWER CORD POWER CORD POWER CORD	K P E T N U H				
32 33 33 33	1 B 1 B 1 B 1 B	E30-1341-05 E30-1319-15 E30-1319-15 E30-1319-15	POWER CORD AUDIO CORD AUDIO CORD AUDIO CORD	X M F U X E H T				
33	1 B	E30-1320-25	AUDIO CORD	К				
34 34 34 35	2 A 2 A 2 A 1 A	F05-8012-05 F05-8015-05 F05-8015-05 F05-8019-05 F07-0610-04	FUSE 0.8A 250V FUSE 0.8A 250V FUSE 0.8A 250V FUSE 0.8A 250V HOLE COVER PLATE	ET NU XH KF				
36 37	2 A 2 B	F07-0672-04 F19-0504-04	INDICATOR COVER	*				

#### 3	Re	f. No.	Parts 140. Description	e-
1	*	照番号		
- H01-2427-04	40 40 40	1 A 1 A 1 A	G16-0340-03 TURNTABLE SHEET ASSY G16-0340-03 TURNTABLE SHEET ASSY TURNTABLE SHEET ASSY	N E
- H01-2430-04	40	1 A	G16-0341-03 TURNTABLE SHEET ASSY	ł K
- H12-0385-02 PACKING FIXTURE - H12-0386-13 H20-1102-04 COVER COVER - H20-1102-04 COVER - H20-1102-04 COVER - H20-1102-04 H25-0078-04 BAG - H25-0078-04 BAG - H25-0078-04 BAG - H25-0159-04 BAG - H25-0159-04 BAG - H39-0015-05 PACKING PARTS - H20-1102-04 PACKING PACKIN		•	H01-2430-04 CARTON BOX (E) H10-2273-12 POLYSTYRENE FIXTURE (L) H10-2274-12 POLYSTYRENE FIXTURE (R)	•
- H20-1102-04 H25-0029-04 H25-0029-04 H25-0078-04 H25-0078-08 H28 H28 H28 H28 H28 H28 H28 H28 H28 H2			H12-0385-02 PACKING FIXTURE H12-0386-13 PACKING FIXTURE H20-1102-04 COVER	
1	• • • •		H20-1102-04 COVER H25-0029-04 BAG H25-0078-04 BAG	. H
41 3A,3B	-		H39-0015-05 PACKING PARTS	
18	41	3A,38	J02-0339-05 INSULATOR X4 J02-0339-05 INSULATOR X4 J02-0339-05 INSULATOR X4	K L
46 16	42 43 44	1 B 1 B 1 B	J42-0312-05 BUSHING J42-0313-05 BUSHING J50-0318-05 HINGE X2	•
48				• K
SO	48	1 A	K29-0700-04 BUTTON X5	k
51 2A N09-C167-05 SCREW (M3x8)x2 E 52 1B N09-C817-08 SCREW (N2.6x10)x2 MU 52 1B N09-0817-08 SCREW (M2.6x10)x2 XE 52 1B N09-0817-08 SCREW (M2.6x10)x2 H 53 1B N09-0850-04 SCREW (M2.6x10)x2 H 53 2B N09-0850-04 SCREW (M2.6x10)x2 T 54 1B N09-0851-04 SCREW (M2.6x15)x2 KF 54 1B N09-0851-04 SCREW (M2.6x15)x2 T 55 1D N09-0852-04 SCREW (M2.6x20)x2 T 55 1B N09-0852-04 SCREW (M2.6x20)x2 T 56 1A N14-0108-05 NUT M2.6 NUT M2.6 NUT M2.6 57 2B N14-0108-05 NUT M2.6 NUT M2.6 NUT M2.6 58 2P N14-0412-04 NUT M2.6 X2	50 50 50	2 A 2 A 2 A	LO1-6344-05 POWER TRANSFORMER + LO1-6344-05 POWER TRANSFORMER L	: • 1. J. X.
52 18 N09-0817-08 SCREW (N2.6X10)X2 MU 52 18 N09-0817-08 SCREW (M2.6X10)X2 AE 52 18 N09-0817-08 SCREW (M2.6X10)X2 H 53 18 N09-0850-04 SCREW (M2.6X10)X2 H 54 18 N09-0850-04 SCREW (M2.6X10)X2 T 54 18 N09-0851-04 SCREW (M2.6X15)X2 T 55 10 N09-0852-04 SCREW (M2.6X15)X2 T 55 10 N09-0852-04 SCREW (M2.6X20)X2 T 56 1A N14-0074-05 SPEED NUT X6 57 2B N14-0108-05 NUT M2.6 NUT M2.6 57 2B N14-0108-05 NUT M2.6 NUT M2.6 58 2P N14-0412-04 NUT M2.6 X2	50	2 A	LO1-6344-05 POWER THANSFURMEN T	Γ
54 16 N09-0851-04 SCREW (M2.6x15)X2 KF 54 18 N09-0851-04 SCREW (M2.6x15)X2 T 55 18 N09-0852-04 SCREW (M2.6x20)X2 KF 55 18 N09-0852-04 SCREW (M2.6x20)X2 T 56 1A N14-0074-05 SPEED NUT X6 57 2B N14-0108-05 NUT M2.6 NU 57 2B N14-0108-05 NUT M2.6 M2 57 2B N14-0108-05 NUT M2.6 M2 58 2P N14-0412-04 NUT M2.6 X2	5 2 5 2 5 2	1 B 1 B 1 B	N09-0817-08 SCREW (N2.6x10)X2 N N09-0817-08 SCREW (N2.6x10)X2 N N09-0817-08 SCREW (M2.6x10)X2 N	1
57 28 N14-0108-05 NUT M2.6 N14-0108-05 NUT M2.6 N14-0108-05 NUT M2.6 N14-0412-04 NUT M2.6 X2	5 4 5 4 5 5	1 b 1 B 1 B	NO9-0851-04 SCREW (M2.6x15)XZ N NO9-0851-04 SCREW (M2.6x15)XZ N NO9-0852-04 SCREW (M2.6X2U)XZ N	ī
58 28 1:14-0412-04 NUT N2.6 X2	57 57 57	2 B 2 B	N14-0108-05 NUT M2.6 N14-0108-05 NUT M2.6 N14-0108-05 NUT M2.6	(E
	58	2 E	1:14-0412-04 NUT M2.6 X2	ſ

Ref. No.	Parts No.	Description	Re-
参照番号	部品番号	部品名/規格	marks 備考
59 18 59 16 60 28 60 26 61 28	1.19-0267-05 1.19-0267-05 1.19-0516-05 1.19-0516-05 1.19-0516-05	WASHER (2.6) X2 WASHER (2.6) WASHER (2.6) WASHER (2.6) WASHER (2.6)	ki T N.U A E h
2A' 61 2A 61 2A 61 3B	\$49-2003-05 \$31-2001-05 \$31-2001-05 \$31-2001-05 \$46-2308-03	SENSITVE SWITCH SLIDE SWITCH SLIDE SWITCH LEAF SWITCH	h U
64 2B 64 2C 64 2B 65 2A	T21-0067-05 T21-0067-05 T21-0067-05 T43-0021-05	MAGNETIC CARTRIDGE MAGNETIC CARTRIDGE MAGNETIC CARTRIDGE DIRECT DRIVE NOTCE	i U X E Fi
66 18 67 38 68 28 69 2A 69 2A	x25-1490-02 x25-1510-02 x27-1440-00 x27-1440-00 x27-1440-00	SENSOR PCL ASSY JUNCTION PCH ASSY POWER SUPPLY PCH ASSY POWER SUPPLY PCH ASSY POWER SUPPLY PCH ASSY	* * * * * * * * * * * * * * * * * * *
69 2A 69 2A 69 2A 69 2A 70 2A	x27-1440-02 x27-1440-02 x27-1440-03 x27-1440-04 x29-1200-00	POWER SUPPLY FCE ASSY POWER SUPPLY FCE ASSY POWER SUPPLY FCE ASSY MECHANISM CONT PLE ASSY	* K P * L * T * * *
7C 2A 7C 2A 7C 2A 7C 2A 7C 2A	x29-1200-00 x29-1200-00 x29-1200-01 x29-1200-01 x29-1200-01	MECHANISM CONT PCB ASSY	KP UX H ± L T
	SENSOR(X25-1		1
-	v11-3100-60 v30-0386-10	TLR121 X6 TPS605 X3	
		Y(X27-1440-00,02,03,04)	
C1 C2 C3 C4 .5 C6	C24-1710-69	ELECTRO 2200UF 35WV ELECTRO 47UF 35WV ELECTRO 2200UF 25WV CERAMIC 0.01UF AC250V	N *
C & C &	C91-0079-05 C91-0079-05	CERAMIC 0.01UF AC125V CERAMIC 0.01UF AC125V	K E
R 1	R43-1368-15	FL-PROOF RC680 J 2H	
D1 D2 D3 ,4 Q1	v11-4108-30 v11-7100-60	W02 WZ-172 ERB12-01R 2SD882(U.R) 2SC945(U.R)	*
N	MECHANISM C	ONT(X29-1200-00,01)	
C 1 C 2 C 3	c24-1747-59	CERAMIC 47PF J ELECTRO 4.7UF 35 NV ELECTRO 10UF 35 NV	
101 2B	E06-0801-05	DIN CONNECTOR SP	
CR1 -3 R57 ,58	R90-0403-05 R43-1356-15	FL-PROOF RD560 J 2H	
s1 -7	s40-1309-05		
D1 -17	v11-0271-05	1s2076	

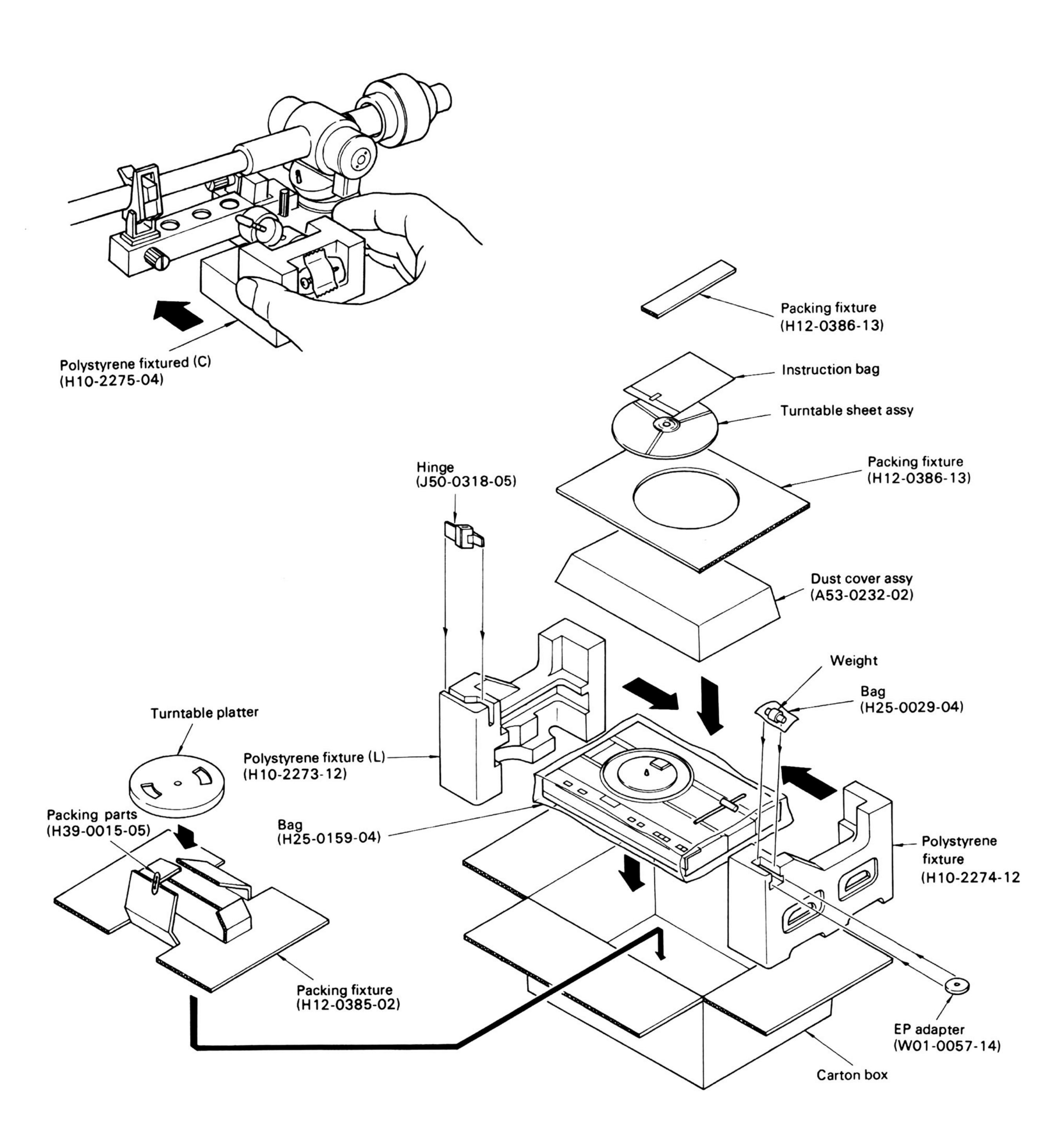
Ref	. No.		Part	s No).	Description	Re-
# !	照番号	部	品	番	号	部品名/規格	marks 備考
			0 40 770		2000		
01 018	-17		-12 -02			1ss53 1s2076A	
019		v11	-02	95-	05	WC68	
D20 D21			-12			1SS53 W06B	
022	-26	v 1 1	-12	0 C =	.80	18853	
027	-20		-41			xz-037	
D28	-35		-12 -03			SR603D UPD4071C	
IC1		V 3 0	, - 0 3	, -	10	CD4071BE	
I C 1						CD40716CN	
I C 1			-03			40718FC	
101) - 0 3) - 0 3	0.00		MC140718 40818FC	
105		v30	-03	67-	10	CC40818E	
102				_		CD4081BC1.	
105) - 03		35 - 137A	MC14081B UPD4681C	
103		V30	-04	80-	10	MP0222S	
01	- 5	V01	-07	55-	50	25A733A(R, _)	
Q1	-5 -14		-09			25A999(E,F)	
46	-16 -16		-09 -23			2SC945(Q.R) 2SC232C(E.F)	
917 Q18			-20			2sc2003(L,K) 2sc945(G,R)	
ASSER			1753407	100 T 1			
618 619			-23 -03			2sc2320(E.F) 2sc355(D.E)	
620		v03	-09	45-	40	25C945(Q.R)	
Q20 Q21			-23 -03			2SC2320(E.F) 2S0355(U.E)	
922	. 23	V 03	-13	83-	10	25C1383%C(G.K)	
412	, , ,	"	, - , 5		, 0		
201	2 &	012	2 - 0 2	31-	08	CANCELLER ASSY	*
202		039	-01	54-	80	ARM ELAVATOR ASST	*
203	20		-01 -01			WEIGHT	:
205	2 B	601	-10	27-	.0.8	SPRING	.
		10 -11 -11-11-11					
20.6	26	J91	-01	45-	80	TONEARM	*
207 208	50.0		-04			DRESS SCREW XZ	•
209						NUT (M12)	
	M	IECI	IAH	VIS	M A	SSY(D40-0501-15)	
301		-				MAIN CHASSIS	
302 303		-				CLUTCH ARM ASSY	
304	36	•				CLUTCH ARM	
305		•				CAM	
305 307	26,38 38	-				POINT ADJUSTER INTERMEDIATE GEAR	
308	38	-				WORM WHEEL	
309		-				GEAR ASSY	
	5.2 MS at						
311 312	3 B 3 E	-				SLIDER CAM HOLDER	
313 314	38	-				SEARCH ARM ASSY	
315		-				POSITION HOLDER	
316	2 B	_				RETURN HOLDER	
		_				START POINTER	
317	20	ı					'

Ref. No.	Parts No.	Description	Re-
#Ref. No.	部品番号	部品名/規格	marks
			18.75
321 3B 322 3B	D13-0205-08	WORM GEAR IDLER ASSY	
323 36 324 36	D15-0514-08	PULLEY	*
325 3B	016-0219-08	BELT	*
326 3B	040-0805-08	ELEVATION ARM ASSY	*
327 3B 328 3E	G01-0722-08 G01-0723-08	COIL SPRING	*
329 3E 330 3E	G01-0724-08 G01-0725-08	COIL SPRING	*
331 36	601-0726-08	COIL SPRING	
332 3B	G02-0319-08	PLAT SPRING	
333 3B	613-0458-04	CUSHION X3	*
335 3B	J19-2000-08	SEARCH HOLDER (C.3)	*
336 3R 337 36	N09-0869-08	SCREW (M3X6) SCREW X5	*
338 2B	N15-1030-46 N19-0540-08	FLAT WASHER X2 WASHER	
340 3B	N19-0561-08	WASHER	•
341 3E	N19-0566-08	WASHER	
343 3B	N29-0215-08	SPRING RETAINER	
344 3B 345 3B	T42-0116-05	D C MOTOR SOLENOID	*
		MOTOR(T43-0021-05)	
C C 3	C26-1722-57 C25-1247-69	NP-ELEC 2.2UF 25mV ELECTRO 47UF 10mV	
C11	- 'T' '열명생일' 및 - 현급기() 원자는 경영생명	NP-ELEC 2.2UF 25kV CERAMIC 0.047UF J	
C13	c25-1247-69	ELECTRO 47UF 10mV	
C20 C21 ,22	C25-1247-69 C24-1422-61	ELECTRO 47UF 16WV ELECTRO 22UF 25WV	
C23 ,24	C24-1447-69	ELECTRO 47UF 25WV	
C 2 6	c25-1247-69 c24-1710-47	ELECTRO 470F 10mV ELECTRO 0.10F 50mV	
C 2 8	C45-1710-35	MYLAR 0.01UF J	
C29	C45-1710-25 C45-1747-35	MYLAR 0.001UF J MYLAR 0.047UF J	
C31	C45-1747-25 C63-1722-05	MYLAR 0.0047UF J CERAMIC 22PF J	
c33	c63-1733-05	CERAMIC 33PF J	
C34	C90-0253-05	CERAMIC 0.022UF J	
C35	C45-1747-25	MYLAR 0.0047UF J	
C37	N. SAZZA SA SEL SA NEGOVERNO NEGO SONO	ELECTRO 10UF 25WV	
C38 ,39	C24-1447-59 C90-0270-05	CERAMIC 0.1UF K	
x C 1	L77-1101-05	X.TAL 5.52960MHZ	
R 6 8	R47-5468-05	RS 66 J 3A	
D C 1	v11-9974-05	18953	
H1 ,2	v30-0534-10 v30-0424-10	H-300A MSM5819RS	
1002,03	v30-0248-10	NJM4558	
1002,03	v30-0349-10	UPC4558C	
1002,03	v30-0426-10 v02-0605-10	RC4558P 2SB605(K,L,M)2SB548(G,P	
QC2 QC3	v04-0571-10 v03-0405-05	2SD571(K,L,M)2SD414(Q,F 2SC945(K,Q,F)2SC536	
003	v03-1740-10	2sc1740(Q,R)	

Ref. No.	Parts No.	Description 部品名/規格	Re-
- M - 7		14 14 7 / 7% TH	備考
Q03 Q04 Q04 Q04	v03-1815-16 v03-2320-20 v01-0733-60 v01-0999-10 v01-1015-06	2sc1815(Y,G,B) 2sc2320(F,G,H)2sc458 2sa733(K,P,Q)2sa933(Q,R 2sa999(F,G,H)2sa608(EFG 2sa1015(Y,G)	
Q11 Q12 Q13 Q13 G13	V02-0052-05 V04-0068-05 V03-0405-05 V03-1740-10 V03-1815-16	2SB605(K,L,M)2SB549(Q,P 2SD571(K,L,M)2SD415(Q,P 2SC945(K,Q,P)2SC536 2SC1740(Q,R) 2SC1815(Y,G,B)	
Q13 Q14 Q14 Q14 Q21	v03-2320-20 v01-0733-60 v01-0999-10 v01-1015-06 v03-0405-05	2SC232O(F,G,H)2SC458 2SA733(K,P,Q)2SA933(Q,R 2SA999(F,G,H)2SA608(EFG 2SA1015(Y,G) 2SC945(K,G,P)2SC536	
Q21 Q21 Q21 Q22 Q22	v03-1740-10 v03-1815-16 v03-2320-20 v01-0733-60 v01-0999-10	2SC1740(Q,R) 2SC1815(Y,G,B) 2SC2320(F,G,H)2SC458 2SA733(K,P,Q)2SA933(Q,R 2SA999(F,G,H)2SA608(EFG	
022 023 023 024,25	v01-1015-06 v03-1740-10 v03-2320-20 v01-0733-60 v01-0999-10	2SA1015(Y,G) 2SC1740(Q,R) 2SC2320(H,G,F) 2SA733(K,P,Q)2SA933(Q,R 2SA999(F,G,H)2SA608(EFG	
024 ,25 026 026 026	V01-1015-06 V03-0405-05 V03-1740-10 V03-1815-16 V03-2320-20	2SA1015(Y,G) 2SC945(K,Q,P)2SC536 2SC1740(Q,R) 2SC1815(Y,G,B) 2SC2320(F,G,H)2SC458	
Z00102 Z00102 Z003	v11-1200-30 v11-2101-80 v11-1200-90	RD15EB3 HZ15-2 RD8.2EB3.HZ9A3	

Ref. No.	Parts No.	Description.	Re-
**	部品番号	1300	marks 備考

PACKING



A product of TRIO-KENWOOD CORPORATION

6-17, 3-chome, Aobadai, Meguro-ku, Tokyo 153, Japan

KENWOOD ELECTRONICS, INC.

1315 E. Watsoncenter Rd. Carson, California 90745, U.S.A.
75 Seaview Drive, Secaucus, New Jersey 07094, U.S.A.
1098 North Tower Lane Bensenville, Illinois 60106, U.S.A.
TRIO-KENWOOD ELECTRONICS, N.V.
Leuvensesteenweg 504 B-1930 Zaventem, Belgium
TRIO-KENWOOD ELECTRONICS GmbH
Rudolf-Braas-Str. 20, 6056 Heusenstamm, West Germany
TRIO-KENWOOD FRANCE S.A.
5, Boulevard Ney, 75018 Paris, France
TRIO-KENWOOD SVENSKA AB
Kemistvagen 10A, S-183 21 Taby, Sweden
TRIO-KENWOOD (AUSTRALIA) PTY, LTD.
30 Whiting St., Artarmon, N.S.W. 2064, Australia

KENWOOD & LEE ELECTRONICS, LTD.

Room 501, Wang Kee Building, 5th Floor, 34-37, Connaught Road, Central, Hong Kong

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