

KENWOOD
HI/FI STEREO COMPONENTS

SERVICE MANUAL

KD-850

The KD-850 is a fully automatic turntable: all its mechanisms and controls are the same as the KD-650 except for the full automatic mechanism and control. Refer to the service manual and technical data of the KD-650. The automatic mechanism assembly (D40-0461-05) is the same as that of the KD-4100 except for the position guide. For troubleshooting of the automatic mechanism assembly, refer to the service manual of the KD-4100.



**FULL AUTOMATIC QUARTZ PLL DIRECT DRIVE
TURNTABLE**

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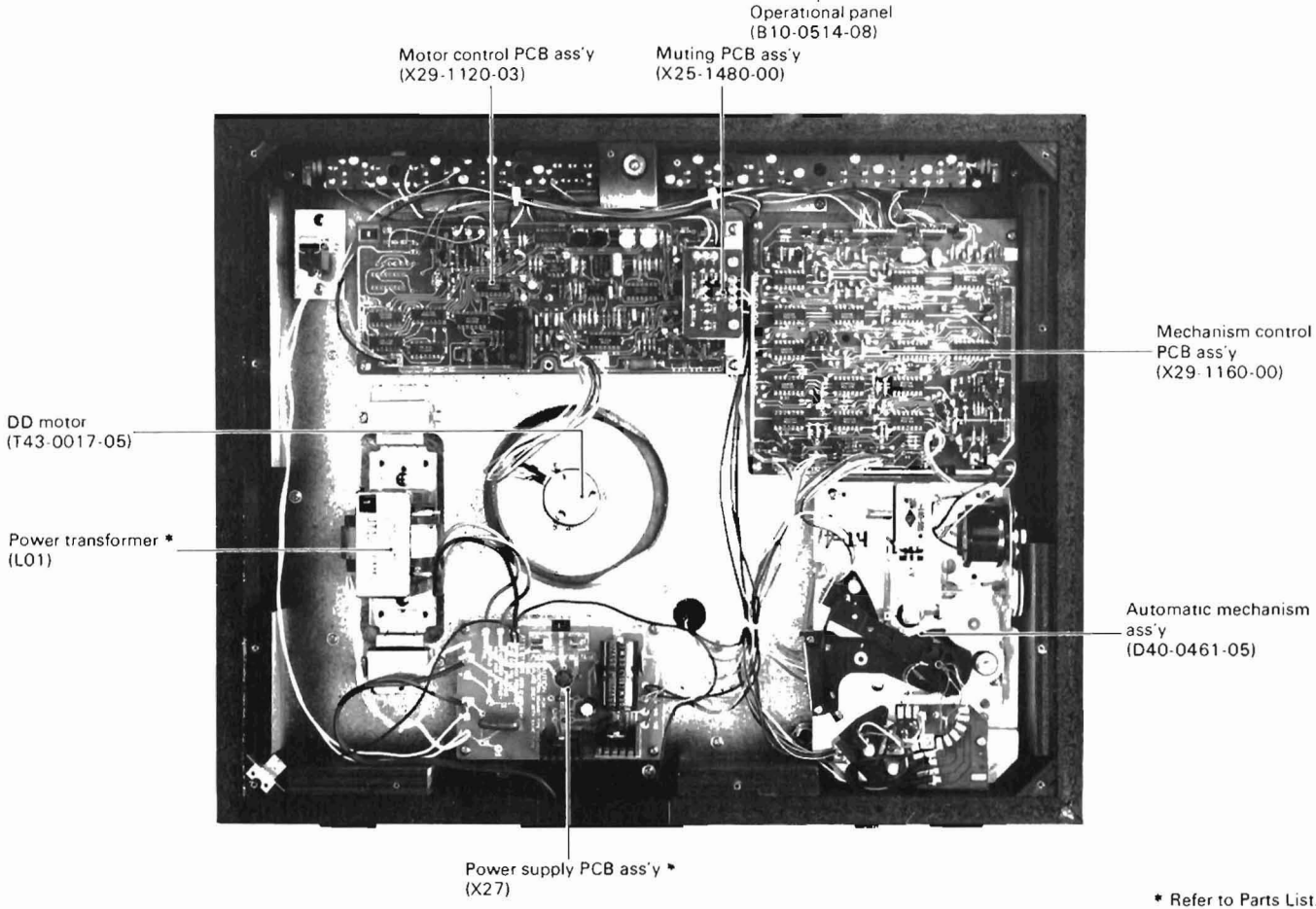
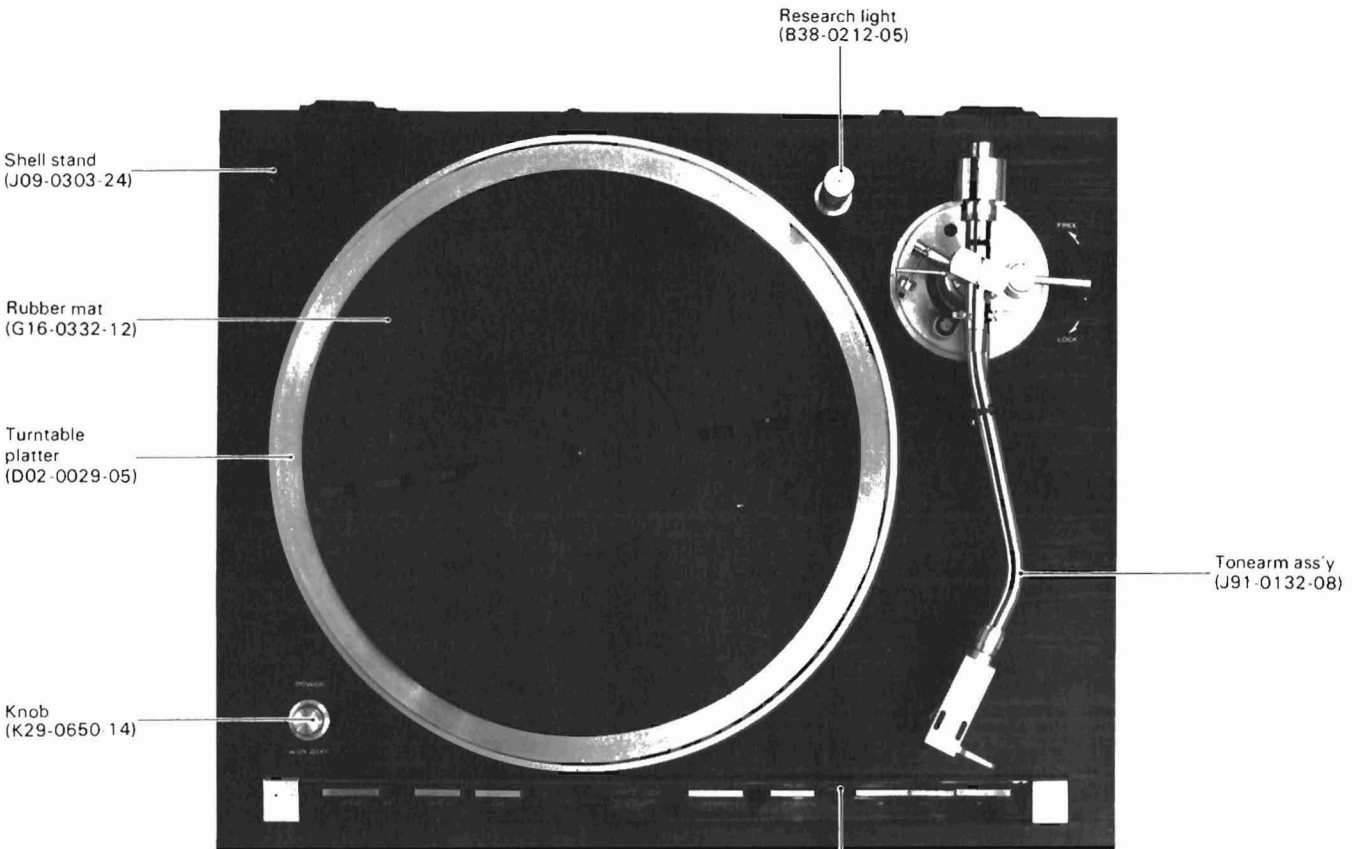
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Note:

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	U
Australia	X
Europe	W
England	T
South Africa	S
Other Areas	M
Audio Club	H

EXTERNAL VIEW / INTERNAL VIEW



* Refer to Parts List.

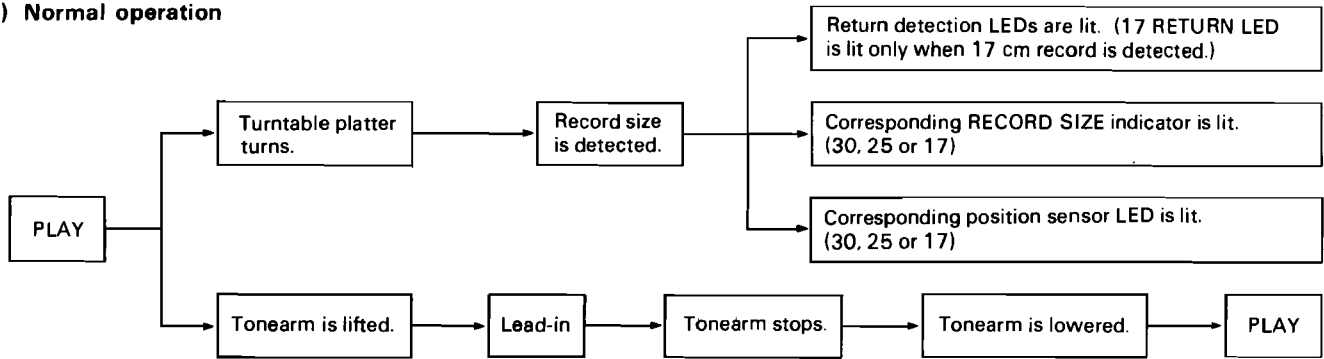
OPERATION PROCEDURES

1. POWER SWITCH ON

- Initial reset → 33 rpm speed indicator is lit.
- Power lamp is lit.
- Research light is lit.

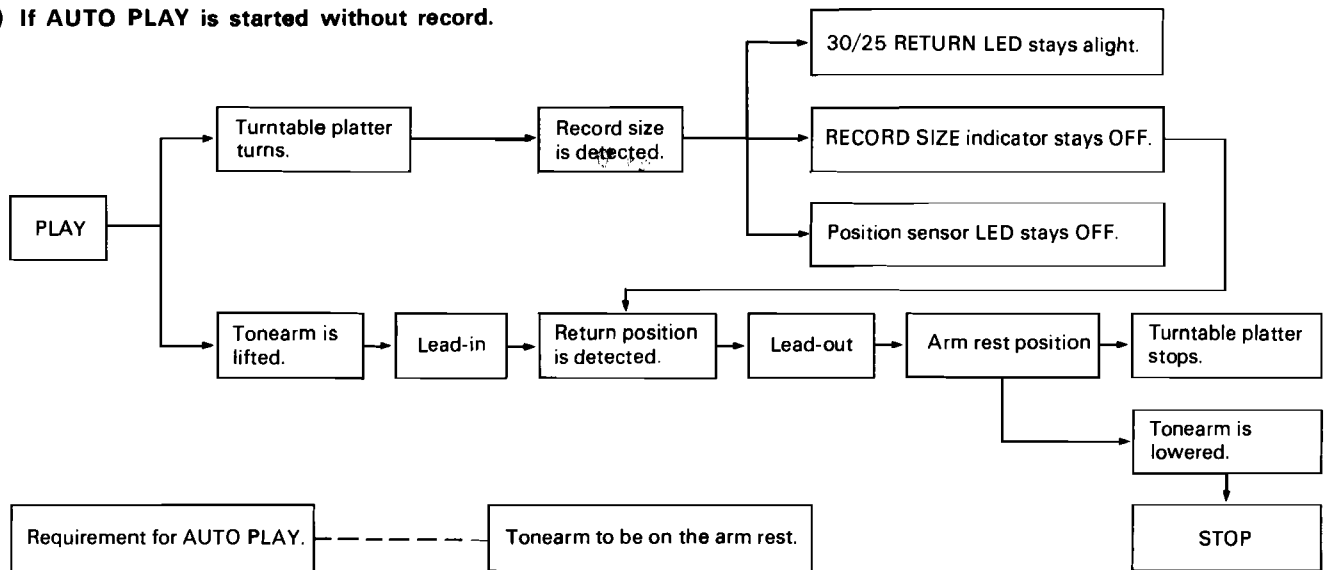
2. AUTO PLAY

A) Normal operation

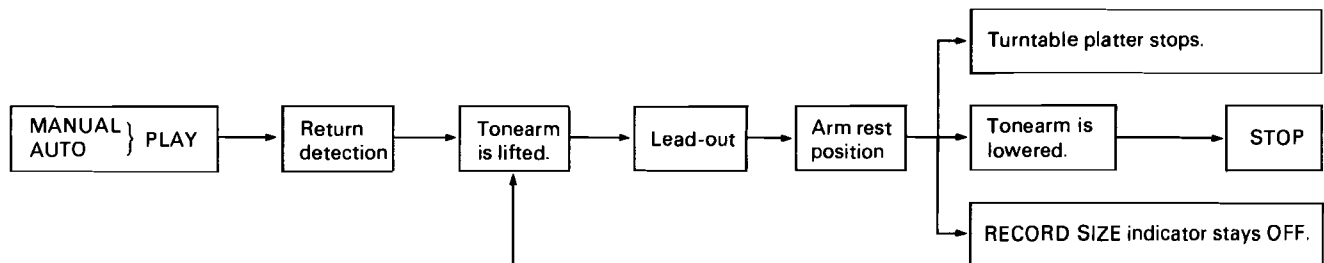


Note: 30/25 RETURN LED is always lit. 17 RETURN LED is lit only when the AUTO SIZE SELECTOR selects 17

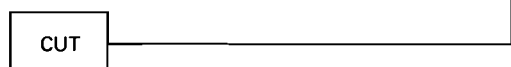
B) If AUTO PLAY is started without record.



3. AUTO RETURN



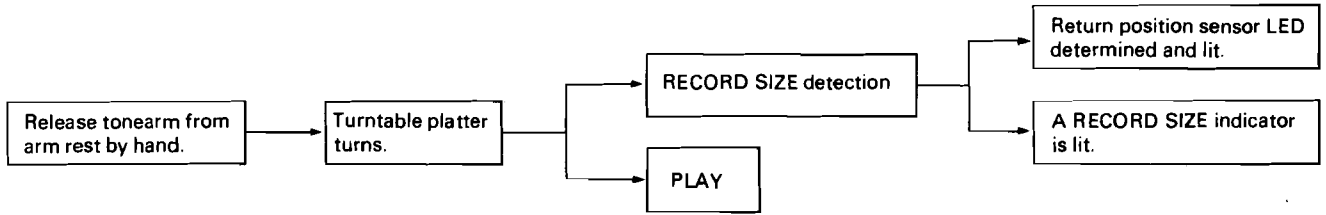
4. AUTO CUT



OPERATION PROCEDURES

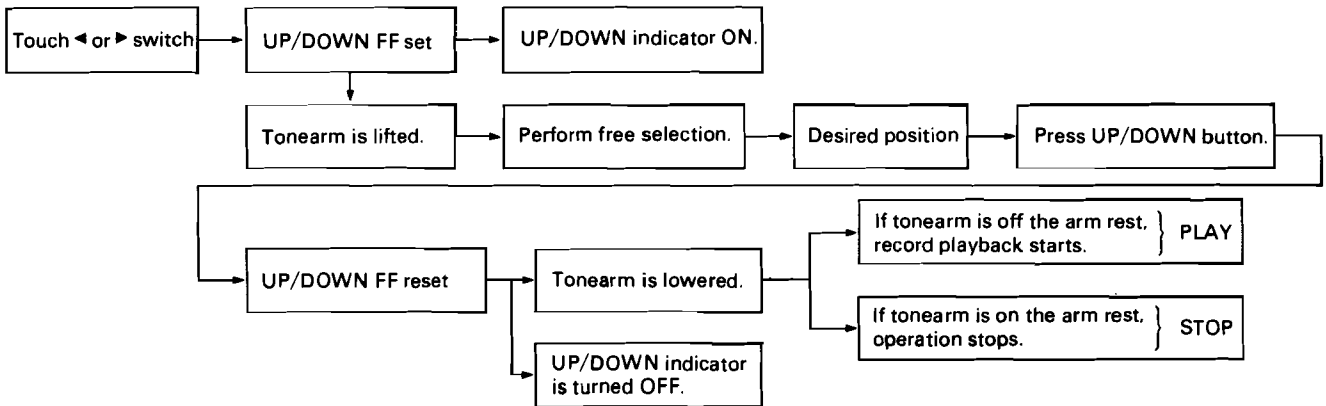
5. MANUAL OPERATION

A) Quick MANUAL



B) Free selection

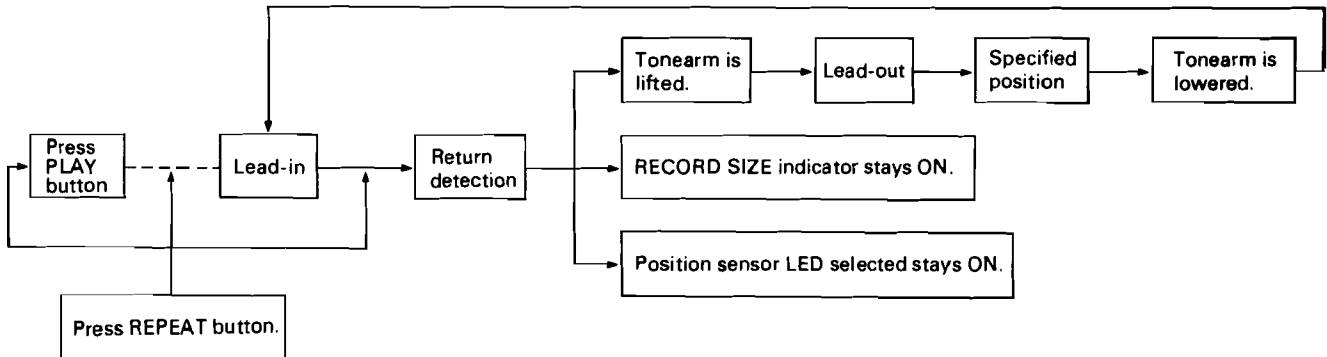
- ◀ FOR → SLOW FORWARD } FAST FORWARD (Both pressed)
- FAST
- ▶ REV → SLOW REVERSE } FAST REVERSE (Both pressed)



- Notes:**
- When the tonearm is on the arm rest, the tonearm drive motor won't be turned ON even if the ▶ switch is turned ON.
 - The tonearm will be returned to the arm rest when RETURN is detected during free selection operation.

6. REPEAT

A) AUTO PLAY

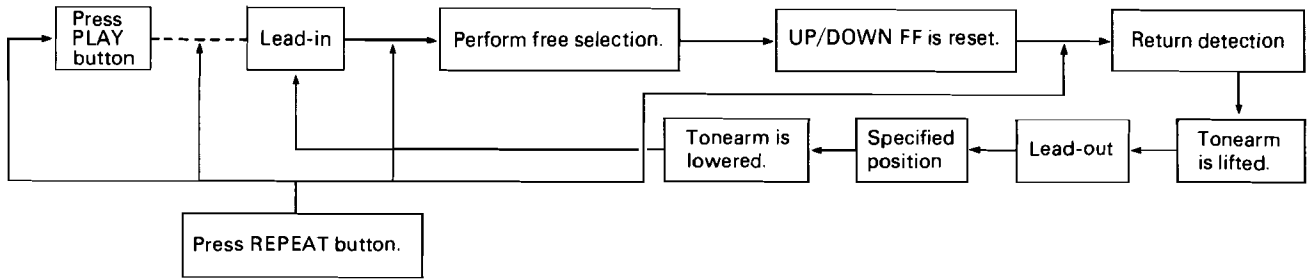


B) MANUAL PLAY

When the tonearm is detached from the arm rest by quick manual or free selection operation, the repeat condition, if it has been set previously, is reset at that point and will not be set.

OPERATION PROCEDURES

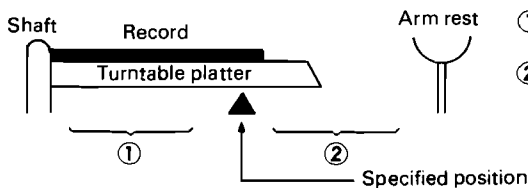
C) When free selection is performed during AUTO PLAY



D) REPEAT condition is reset when one of the following occurs.

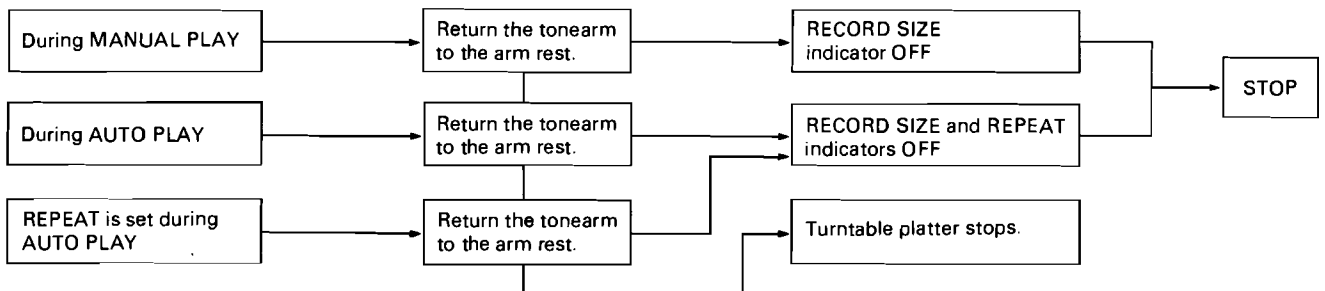
- REP button is pressed when REPEAT has already been set.
- CUT button is pressed.
- Quick stop operation is performed.

Note: Operation differs according to the tonearm's position as shown below.

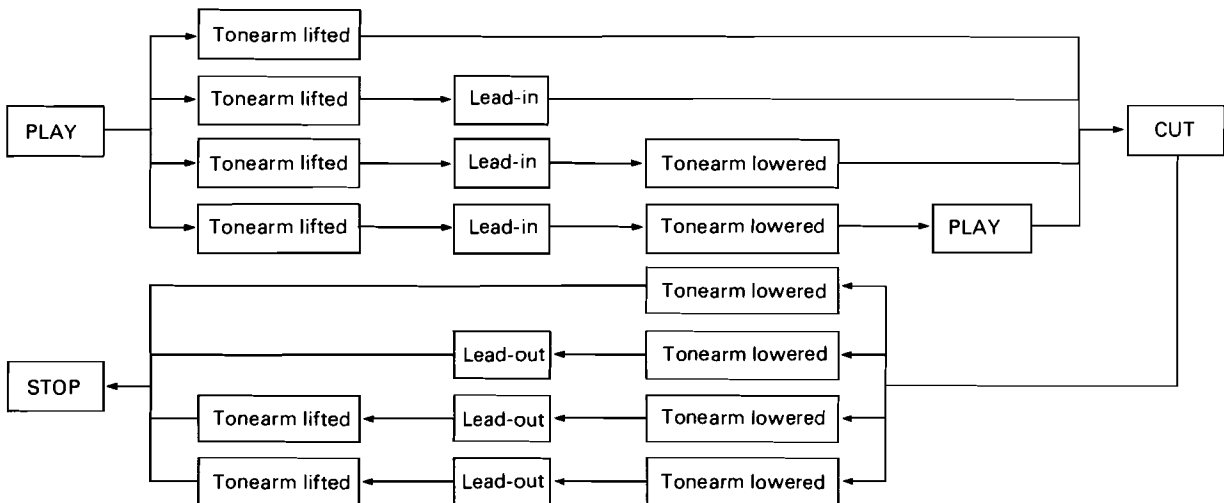


- ① REPEAT is set when the tonearm is located within ① → REPEAT operates. REPEAT is reset when the tonearm is located within ① → REPEAT is reset.
- ② REPEAT is set when the tonearm is located within ② → REPEAT does not operate and will be reset when the tonearm returns to the arm rest.

7. Quick STOP



8. CUT after AUTO PLAY



RECORD SIZE indicator is turned OFF when the tonearm returns to the arm rest.

OPERATION PROCEDURES

9. UP/DOWN operation

A) Independent UP/DOWN operation + initial reset (DOWN):

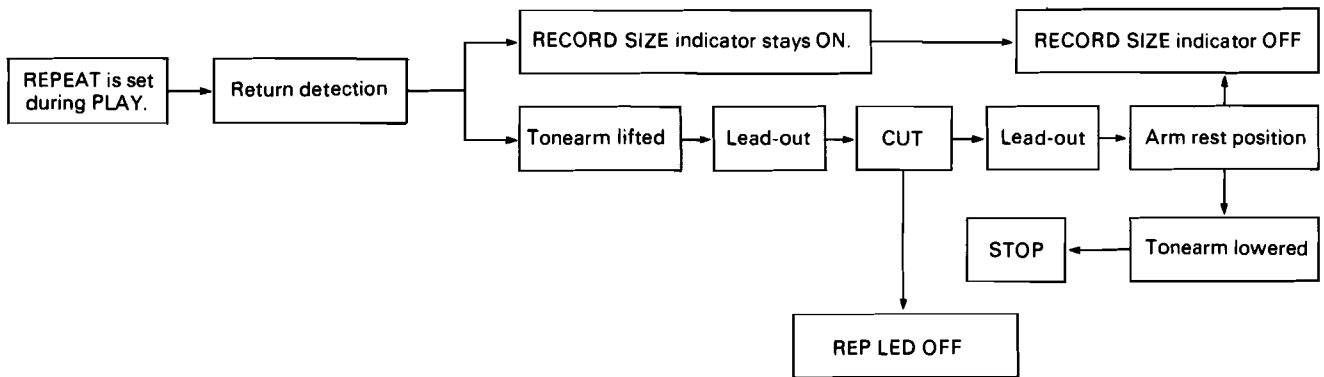
UP/DOWN indicator is lit when the tonearm is lifted up.

B) Free selection:

During free selection, turning ► or ◀ ON acts for UP operation and the indicator is lit. DOWN operation is performed by pressing the UP/DOWN button.

10. Operation during returning in REPEAT mode

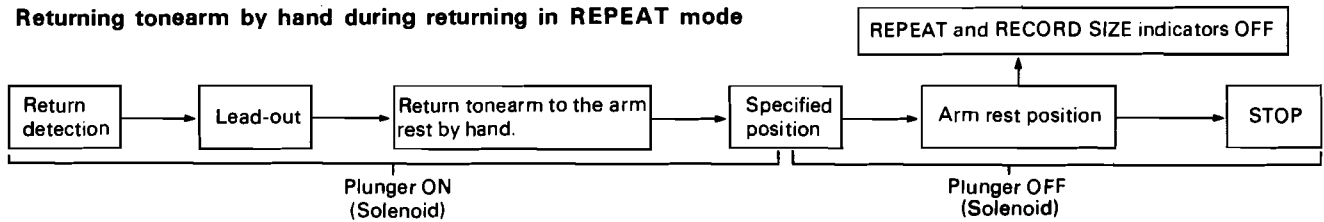
A) CUT operation during lead-out in REPEAT mode



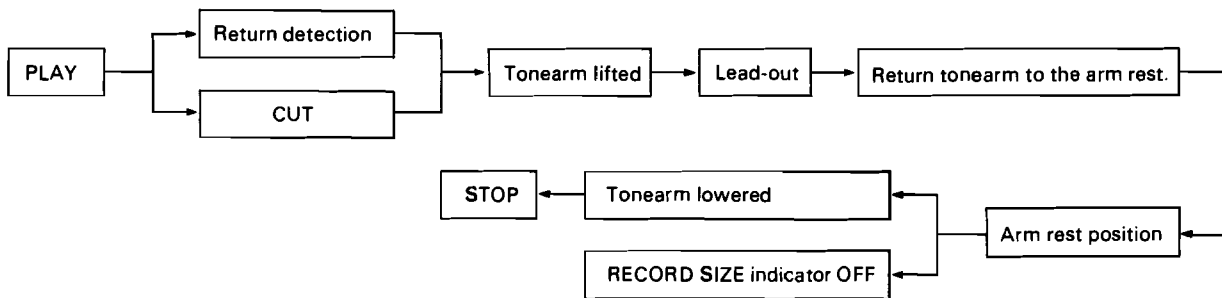
B) REPEAT set/reset operation during returning in REPEAT mode

Refer to the note in Paragraph 6.

C) Returning tonearm by hand during returning in REPEAT mode



11. Returning tonearm by hand during AUTO-RETURN or AUTO-CUT



12. AUTO PLAY during returning in REPEAT mode

Unavailable.

13. Operation when tonearm comes to return position or arm rest position after being started by free selection.

A) When the tonearm comes to the return position

- The tonearm drive motor is turned OFF
- If the free selection switch is turned OFF, the tonearm will return to the arm rest after lead-out.

B) When the tonearm comes to the arm rest position

- The tonearm drive motor is turned OFF even if the ► switch is turned ON. However, it is turned ON if the ◀ switch is turned ON.

FULL AUTOMATIC MECHANISM CONTROL OF KD-850 (X29-1160-00)

I. Initialization after power is turned ON

1. Power reset circuit

The power lamps L and R and the research light are turned ON after power is turned ON. All mechanism control (X29-1160-00) circuits are initialized by the power reset circuit. The power reset circuit is shown in Fig. 1 and waveforms at points in the circuit are shown in Fig. 2.

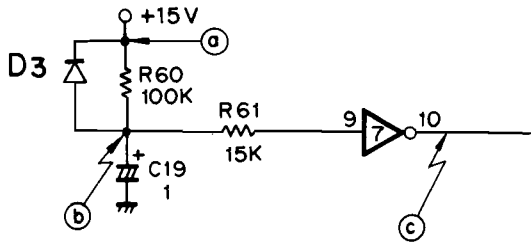
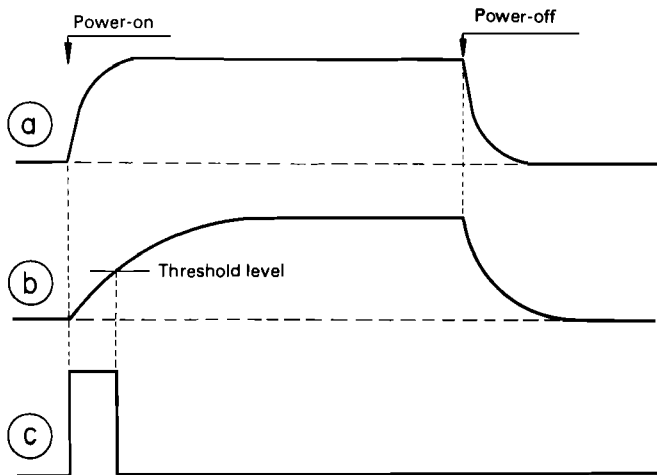


Fig. 1 Power reset circuit



This signal is used to initialize all circuits after power is turned ON.

Fig. 2 Waveforms

2. D•FF (Delayed Flip-flop)

Two delayed flip-flops are provided in each IC12 and IC15 of these. Operation of a D•FF is explained in the following.

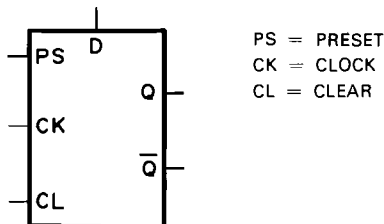


Fig. 3 D•FF

Timing diagram of a D•FF is shown in Fig. 4.

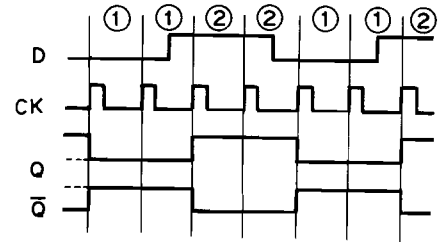


Fig. 4 Timing Diagram of D•FF

When a clock pulse is applied to CK (clock) while D is "H", Q becomes "H" and \bar{Q} becomes "L". When a clock pulse is applied to CK while D is "L", Q becomes "L" and \bar{Q} becomes "H". In other words, the condition of D is output delayed by the time of one clock pulse. The D•FFs used are equipped with PS (preset) and CL (clear) inputs. When PS is set to "H", Q is set to "H" and \bar{Q} is set to "L" regardless of the D input. When CL is set to "H", Q is set to "L" and \bar{Q} to "H" regardless of the D input. CL must be set to "L" to read the CK input. A D•FF can be used as a T•FF by connecting D to \bar{Q} .

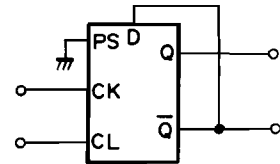


Fig. 5

FULL AUTOMATIC MECHANISM CONTROL OF KD-850 (X29-1160-00)

II. Arm rest position, size and return detection circuits (X25-1490-01)

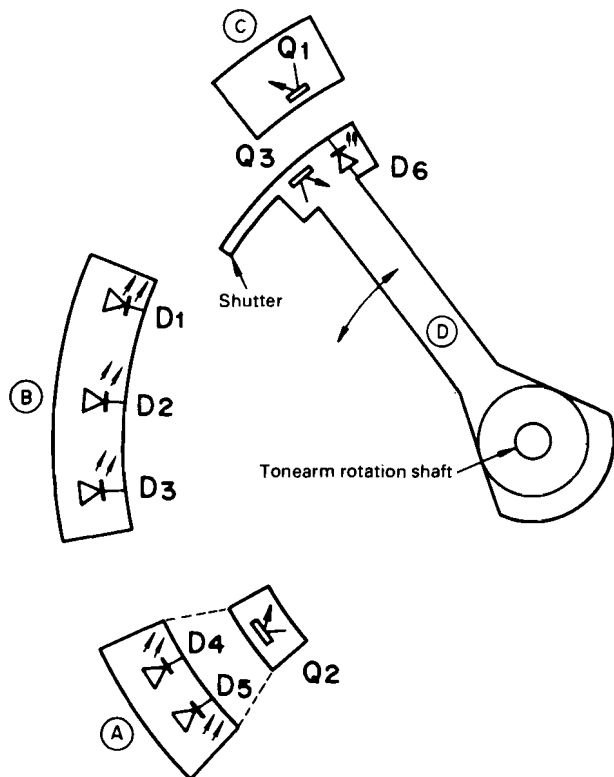


Fig. 1 Detection mechanism (viewed from the bottom)

- Q1 Photo. Tr to detect if the tonearm is at the arm rest.
- Q2: Tonearm return detection Photo. Tr
- Q3: Record size detection Photo. Tr
- D1: 30 cm size LED
- D2: 25 cm size LED
- D3: 17 cm size LED
- D4: 25/30 cm return LED
- D5: 17 cm return LED
- D6: Rest LED
- (A) LED housing for returning point detection
- (B) LED housing for record size detection
- (C) Photo Tr housing to detect if the tonearm is at the arm rest.
- (D) Search arm

1. Appearance of LEDs and phototransistors

Color: white

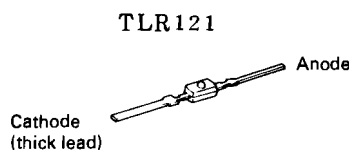


Fig. 2 LED

Color: Black and white

TPS 605

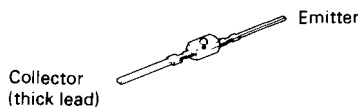


Fig. 3 Phototransistor

If the lens surface is flawed or stained, apparent emitting efficiency may decrease and directivity may vary. As a result, lead-in, arm rest position or lead-out detection timing may differ or they may not be detected at all.

2. Arm rest-position detection (Refer to Schematic Diagram 3.)

LED D6 in the search arm is always lit. When the tonearm is on the arm rest, the phototransistor Q1 (© of Fig. 1) detects light emitted by D6, so its emitter is at "H" level. The Q1 output signal is used to carry out the automatic playing (explained later) and to stop the tonearm drive motor and turn the plunger OFF when the tonearm returns to the arm rest after play has been completed. (Refer to "Tonearm operation".)

3. Record size detection (1) (Refer to Schematic Diagrams 1 and 4.)

Phototransistors Q1 ~ Q3 on the PC board X25-1520-00 detect the research light through a prism, which is installed in the turntable platter, when the turntable platter is rotating without a record disk. Light is detected only when the prism passes through the research light, therefore these phototransistors alternate their ON and OFF states. The emitter waveform is shown in Schematic Diagram 4.

① Operation at the time the tonearm is on the arm rest (refer to Schematic Diagram 1)

IC1-3 is "H" and the inverter output IC7-2 is "L" as shown in Paragraph 2 above. Then, "L" level is applied to IC6-12. As one of the AND inputs is "L", IC6-11 is "L" and Q4 is OFF. As the reset input (R) of RS•FF (IC3) is "H" (because the DD motor is not rotating), Q is "L". Both Q5 and Q6 are OFF because they are driven by the AND gate output. Therefore, record size detection is not performed.

② Operation when PLAY switch is turned ON with a 30 cm record on the turntable platter

When a 30 cm record is on the turntable platter, the phototransistors can not detect the research light, thus Q1 through Q3 are all OFF. Therefore, the set input (S) is "L". The reset input (R) is "H" since the DD motor is OFF. As a result, all RS•FFs shown in Schematic Diagram 4 are in the reset condition, that is, Q is "L" and \bar{Q} is "H".

When the PLAY switch is turned ON, the DD motor starts stable rotation, then the reset inputs are turned to "L". However, no "H" signal is applied to the set inputs, so RS•FFs are kept in the reset condition.

FULL AUTOMATIC MECHANISM CONTROL OF KD-850 (X29-1160-00)

IC6-13 is "H", and IC6-12 is "H" unless the tonearm is on the arm rest, so IC6-11 is "H" and Q4 is ON. Thus, the record size indicating LED "30D" is lit. At this time, since IC13-3 is "H", Q7 is ON and the 30 cm size LED D1 (in ⑧ of Fig. 1) is lit.

Its light is detected by phototransistor Q3 in the search arm.

③ Operation when PLAY switch is turned ON with a 25 cm record on the turntable platter

The middle and inside phototransistors cannot detect the research light, thus Q2 and Q3 are OFF. The set inputs of the lower two flip-flops shown in Schematic Diagram 4 are "L". In these flip-flops, Q is "L" and \bar{Q} is "H" after the PLAY switch has been turned ON. Therefore, IC6-10 is "L" and Q6 is OFF.

The signal shown in the diagram appears at the emitter of Q1. When this signal is applied to the set input of the flip-flop at the top, Q becomes "H" and \bar{Q} becomes "L" and this condition is maintained. As a result, IC6-3 becomes "H" and Q5 is turned ON, then D2 and 25D are lit. Since IC6-11 is "L", Q4 is OFF.

④ Operation when PLAY switch is turned ON with a 17 cm record on the turntable platter

Only the inside phototransistor cannot detect the light and Q3 is OFF. Therefore, the set input of the flip-flop at the bottom is "L". In this flip-flop, Q is "L" and \bar{Q} is "H" when the PLAY switch is ON. In the upper two flip-flops, Q is "H" and \bar{Q} is "L". As a result, among the AND gates, only IC6-10 is "H". Therefore, Q4 and Q5 are OFF and Q6 is ON. D3 and 17D are lit.

The lead-out position for 17 cm records is different from that for 30 cm and 25 cm records, so another return detection LED is provided. This is D5 which is lit in this case.

4. Record size detection (2) (Refer to Schematic Diagram 3.)

Light emitted from the light detection LEDs is detected by the phototransistor Q3 built into the search arm to control the motion of the tonearm. When Q3 detects light, its emitter becomes "H" (The tonearm at this time is in the lead-in position.). The OR gate output IC4-4 becomes "H". This output is differentiated with C10 and R35 so that a positive pulse is obtained. This positive pulse is applied to IC14-1 to stop the tonearm drive motor and turn the plunger OFF (Refer to IV "Tonearm motion".)

5. Return detection (Refer to Schematic Diagram 3.)

Return detection is performed by LED D4 (for 25/30 cm records), LED D5 (for 17 cm records) and phototransistor Q2. D4 is always lit and D5 is lit only when a 17 cm record is being played. (Refer to "Record size detection (1), Paragraph 4".)

① 25/30 cm record

When the search arm reaches the return detection position, Q2 is shielded from the light of D4 and so IC1-4 becomes "L". Then, IC7-4 becomes "H". As a result, a positive pulse is generated by C9 and R34. This pulse is applied to IC4-2 to invert the plunger flip-flop (refer to Schematic Diagram 6) and is also applied to IC15-4 to reset the D•FF. (Refer to "Motor ON delay circuit, Paragraph C" and "Rotational direction determination circuit, Paragraph C".) When the REPEAT switch is OFF, IC9-13 is "H". As IC9-12 is set to "H" by the return detection signal, IC9-11 becomes "H". This signal resets the PLAY•FF, thus IC10-10 is "H" and IC14-6 is "L" (Refer to "Auto Play"). Therefore, IC13-1 becomes "L" and Q7 is turned OFF, so that LED goes off. (IC13-2 is also "L".)

② 17 cm record

D5 is used instead of D4. Other operations are the same as in Paragraph ① above.

III. Speed selection circuit

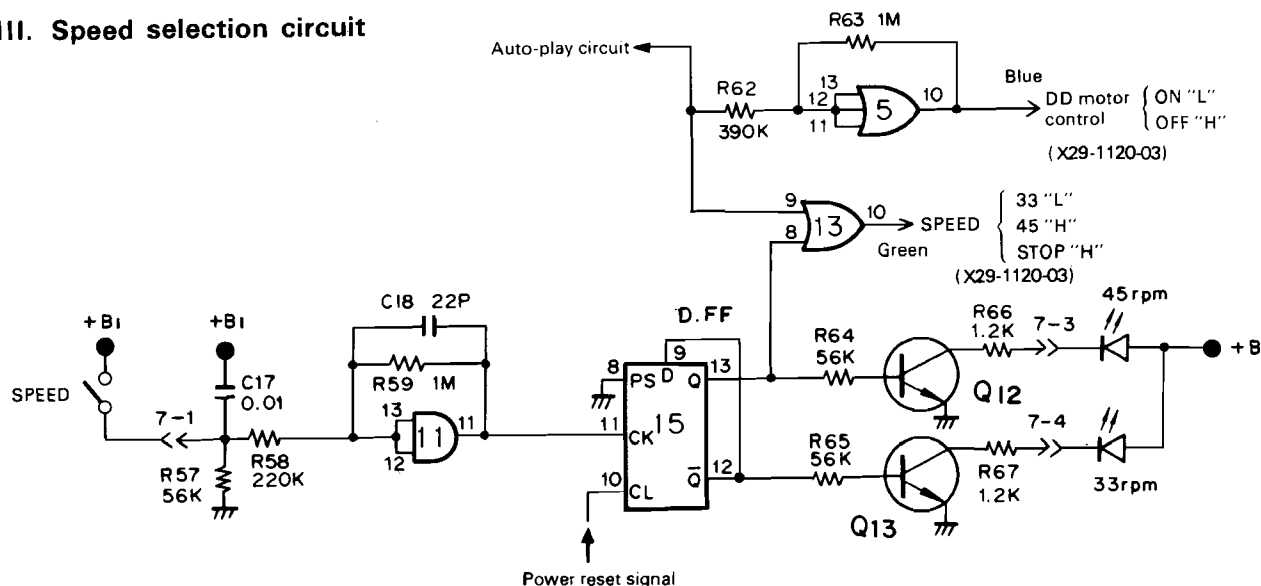


Fig. 1 Speed selection circuit

FULL AUTOMATIC MECHANISM CONTROL OF KD-850 (X29-1160-00)

The power reset signal is applied to CL of the D•FF immediately after power is turned ON, and Q becomes "L" and \bar{Q} becomes "H". Q13 is turned ON and the 33 rpm indicator LED is lit. Q is connected to the DD motor speed selecting OR gates, IC13-8 ~ 10, so IC13-8 is "L". As explained in "Automatic play", first IC8-11 (IC13-9) is "H". When the PLAY switch is pressed in this condition, IC13-10 becomes "L". This output signal is sent to the motor control circuit (X29-1120-03) to set the motor speed to 33 rpm. At the same time, the Schmitt trigger output IC5-10 becomes

"L" and the DD motor starts. CL of the D•FF becomes "L" soon so that D•FF is able to read the CK input. When D is "H" (\bar{Q} is "H", i.e. 33 rpm condition is set) and a clock is input to CK, Q becomes "H" and \bar{Q} becomes "L" (Refer to "D•FF".) As a result, Q13 is turned OFF while Q12 is turned ON so that the 45 rpm LED is lit. At this time, D drops to "L" and D•FF (T•FF) will be inverted by the next clock pulse. Further, since IC13-8 becomes "H", IC13-10 becomes "H" to set the motor speed to 45 rpm.

IV. Tonearm Motion

1. Tonearm drive motor drive circuit

The tonearm is moved by means of the tonearm drive motor and gears. The motor drive circuit is shown in Fig. 1

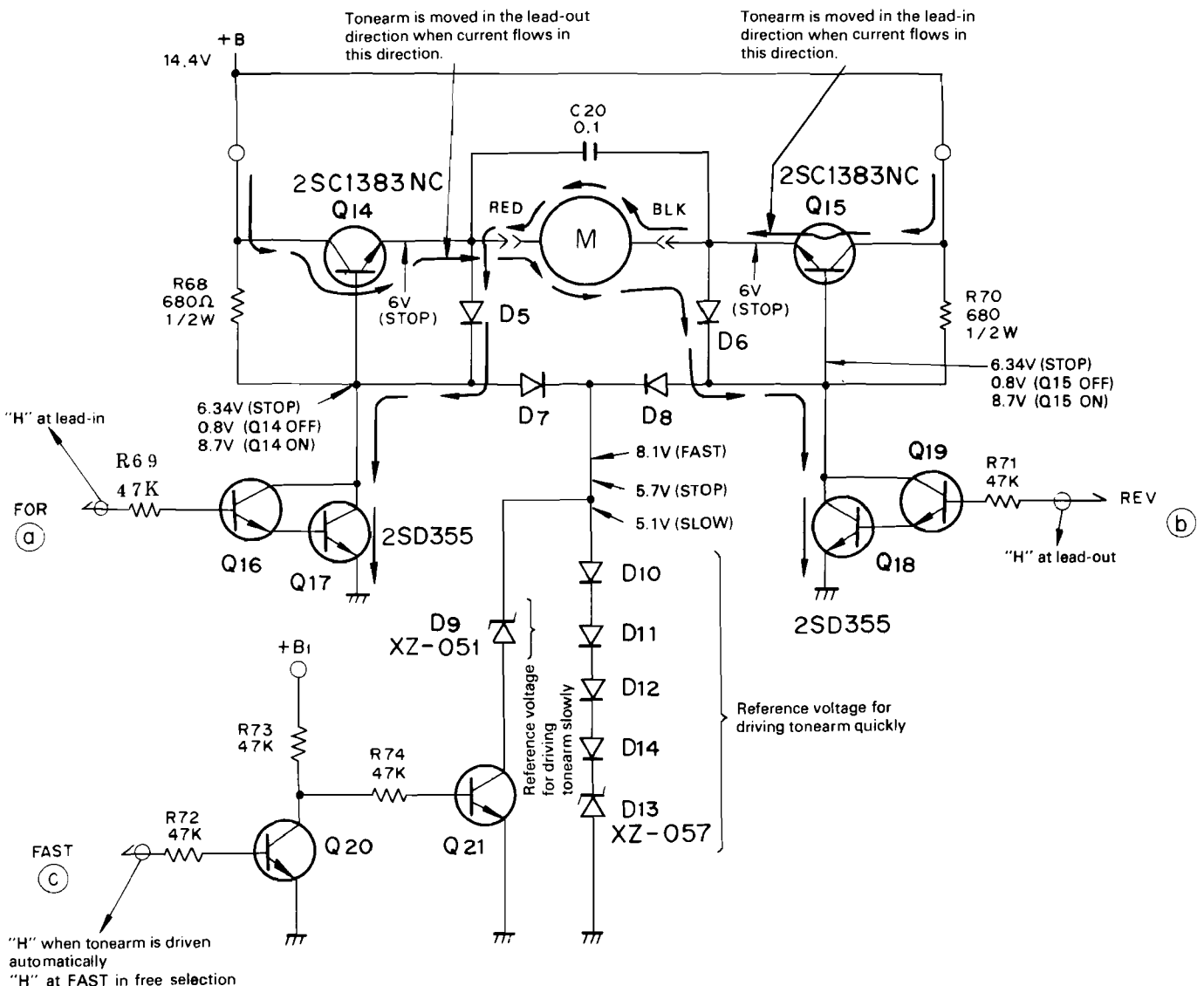


Fig. 1 Tonearm drive motor drive circuit

FULL AUTOMATIC MECHANISM CONTROL OF KD-850 (X29-1160-00)

This motor drive circuit switches two constant current circuits (one consisting of Q14 and a Zener diode and the other consisting of Q15 and a Zener diode) so that the motor is supplied with current in either direction and can rotate in either direction. D10 through D14 compensate the temperature characteristics of the input with their negative temperature characteristics. D7 and D8 form an OR circuit.

The signals shown in Table 1 are given from the rotational direction determination circuit to the inputs (a), (b) and (c).

STOP	(a): L (b): L	
Lead-in	(a): H (b): L	
Lead-out	(a): L (b): H	
During Tonearm movement in auto-play FAST motion or in free selection		(c): H
▶ or ◀ in free selection		(c): L

Table 1

a STOP

Since both (a) and (b) are "L", Q16 through Q19 are OFF. Q14 and Q15 operate in the active region and the potential with respect to GND at both terminals of the motor becomes the same. Thus, the motor does not rotate. At this time, the circuit impedance viewed from the motor is low and so the motor, if it has been rotating, stops rapidly.

b Lead-in

Since (a) is "H" and (b) is "L", Q16 and Q17 are ON and Q18 and Q19 are OFF. Q14 is OFF and Q15 operates in the active region. Therefore, the motor drive current flows through Q15 (emitter) → motor → D5 → Q17 (emitter).

c Lead-out

Since (a) is "L" and (b) is "H", Q16 and Q17 are OFF and Q18 and Q19 are ON. Q15 is OFF and Q14 operates in the active region. Therefore, the motor drive current flows through Q14 (emitter) → motor → D6 → Q18 (emitter).

d Switching tonearm drive speed

When the tonearm is driven in automatic play operation or FAST is selected in free selection, Q20 is ON and Q21 is OFF. Therefore, the Zener voltage of the constant current circuit becomes about 8.7V (= voltage across D13 (XZ-057 · 5.7V) + voltage across D8, D10 through D12, D14 (0.6V × 5 = 3V)). When ▶ or ◀ is selected in free selection, Q21 is ON. Therefore, the voltage across D9 (XZ-051 · 5.1V) becomes effective. In the latter case, the voltage supplied to the motor is low, so the motor rotates more slowly.

2. Tonearm drive motor control circuit

① Initialization of PLUNGER (Solenoid) Flip-flop (Refer to Schematic Diagram 1.)

The power reset signal is applied to IC14-2 immediately after power is turned ON and IC14-9 becomes "L". As IC4-1 and -2 are "L", IC4-3 is "L". Both IC10-5 and -6 become "L", so that IC10-4, i.e. IC14-8, becomes "H". Therefore, after the

power reset signal has disappeared, Pin 4 of the PLUNGER•FF is kept at "H" and Pin 9 at "L". IC4-1 is also kept at "L".

Initialization of the PLUNGER•FF is now complete.

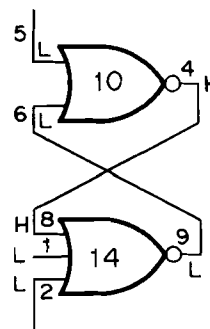


Fig. 2 Initialization of PLUNGER•FF

② Motor ON delay circuit (Refer to Circuit Diagram 6.)

This circuit turns the drive motor ON after the tonearm has been fully lifted up by the plunger. The circuit consists of a one-shot multivibrator. It is initialized as shown in Schematic Diagram 6. This circuit operates when a) PLAY switch is turned ON, b) at the time of return detection or c) when the CUT switch is turned ON. (Refer to "Free selection".)

Note:

PLUNGER•FF means the flip-flop controlling the up/down of the tonearm.

a) PLAY switch is turned ON

A positive pulse is applied to IC4-1 when the PLAY switch is turned ON, and the PLUNGER•FF inverts its state.

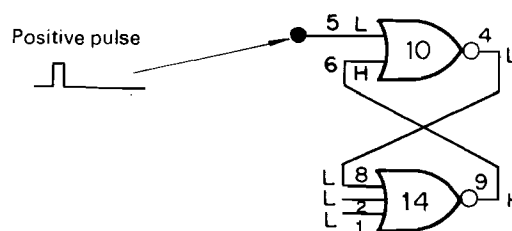


Fig. 3 State of FF after PLAY switch ON

Since IC14-9 becomes "H", IC14-10 drops to "L" so that a negative pulse is applied to IC10-13. IC10-11 becomes "H" for an instant, but it returns to "L" after C13 is fully charged. This period during which IC10-11 is "H" is the delay time. See the following timing diagram.

FULL AUTOMATIC MECHANISM CONTROL OF KD-850 (X29-1160-00)

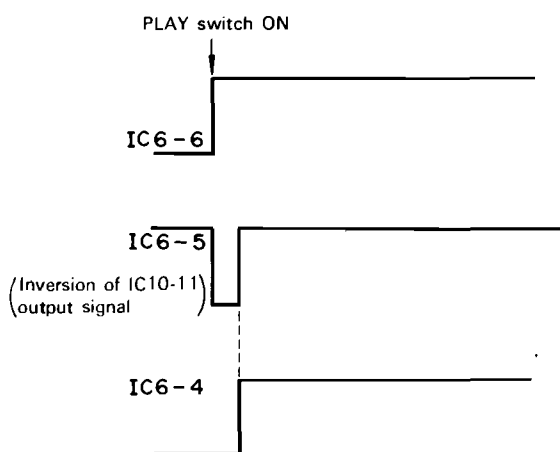


Fig. 4 Timing diagram

When IC6-4 is "H", the drive motor rotates and the tonearm is moved. When the tonearm reaches the lead-in position, the plunger FF is inverted by the size detection signal. Therefore, IC10-4 is "H" and IC14-9 is "L". At this time, the AND gate output, IC6-4, immediately drops to "L" and the drive motor is turned OFF

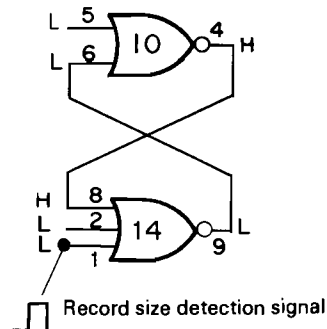


Fig. 5 State of FF after lead-in

b) Return detection

When the tonearm reaches the return detection position, the PLUNGER•FF is again inverted with the return detection signal. IC10-4 becomes "L" and IC14-9 becomes "H". Operation after this is the same as in Paragraph a) above.

c) CUT switch is turned ON

Operation is the same as in Paragraph b).

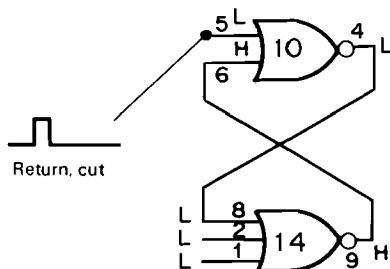


Fig. 6 State of FF after return detection or CUT

③ Rotational direction determination circuit (Refer to Schematic Diagram 6.)

This circuit determines the motion of the drive motor, that is whether it is rotating clockwise or counterclockwise or if it stopped. The signals from this circuit are sent to the tonearm drive motor drive circuit.

a) Drive motor rotation signal (Forward)

A positive trigger signal is applied to IC15-1 ~ 6, PS of the D•FF, when the PLAY switch is turned ON, so that Q becomes "H" and \bar{Q} becomes "L". IC9-8 becomes "H". IC9-10 becomes "H" when the motor ON delay signal is applied to IC9-9. Then, IC1-10 becomes "H" and the motor rotates so that the tonearm moves forward.

b) Drive motor stop signal after lead-in

IC6-4 becomes "L" and IC9-9 becomes "L", then IC1-10 becomes "L". Therefore, the motor stops. IC9-4 is also "L"

c) Drive motor rotation signal (Reverse)

When the return detection signal is applied to CL of the D•FF, Q becomes "L" and \bar{Q} becomes "H". This signal also inverts the PLUNGER•FF, so IC9-1 is set to "H" through the motor ON delay circuit. IC9-3 becomes "H" and IC9-5 also "H". As IC9-6 is "H" unless the tonearm is on the arm rest, IC9-4 is "H". This "H" signal turns the motor so that the tonearm moves in reverse.

d) Motor stop signal generated after the tonearm returns to the arm rest.

When the tonearm reaches the position over the arm rest, IC9-6 becomes "L" and the motor stops.

④ Free selection (Refer to Schematic Diagram 5.)

a) Operation when ◀ switch is turned ON

When ◀ switch is turned ON, a positive pulse is applied to PS of the T•FF, IC12-8, via IC13-11, so Q (IC12-13) is set to "H". This "H" signal is applied to IC5-5 to lift the tonearm. This signal is also applied to the motor ON delay circuit so that IC7-15 is set to "L" for an instant and then set to "H". Since IC8-6 is kept at "H" while the switch is kept pressed, IC8-4 is "H". Therefore, the drive motor rotation signal (forward) is sent to the tonearm drive motor drive circuit.

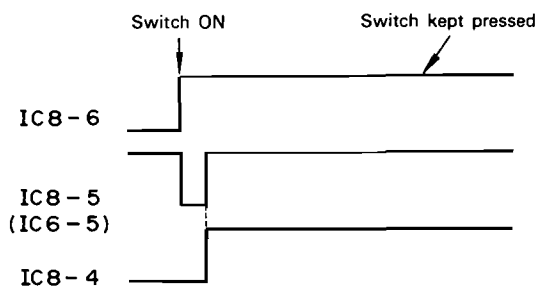


Fig. 7 Timing diagram

FULL AUTOMATIC MECHANISM CONTROL OF KD-850 (X29-1160-00)

- b) **Operation when ► switch is turned ON**
 Operation is similar to that explained in Paragraph a) above. The difference is as follows: IC8-3 becomes "H" instead of IC8-4, so the drive motor rotation signal (reverse) is sent to the motor drive circuit via an AND gate (IC9-4, 5, 6).
- ⑤ **Tonearm fast drive signal (Refer to Schematic Diagram 1.)**
- a) **AUTO PLAY**
 Both IC13-12 and -13 are "L", so IC8-9 is "H". When the PLAY switch is turned ON, IC8-8 becomes "H". Therefore, IC8-10 becomes "H" and IC13-4 becomes "H".
- b) **When ◀ or ► switch is turned ON**
 Either IC13-12 or IC13-13 is "H", so IC8-10 becomes "L" and IC13-4 becomes "L".
- c) **When FAST switch is turned ON**
 Since IC13-5 is turned to "H", IC13-4 becomes "H".

3. Up and down motion of tonearm (Refer to Schematic Diagram 1.)

① AUTO PLAY

When the PLAY switch is turned ON, Pin 9 of the PLUNGER flip-flop is set to "H" to turn Q10 and Q11 ON via an OR gate (IC5-3 ~ 6). Therefore, the plunger is turned ON to lift the tonearm.

At the lead-in position, the PLUNGER flip-flop is inverted, so that the tonearm is lowered. However, since IC5-4 is delayed for the time determined by C12 and R46 in dropping to "L", the tonearm is delayed for a moment before it is lowered.

At the lead-out position, the PLUNGER flip-flop is inverted again. Therefore, the tonearm is lifted. When the tonearm returns to the arm rest, the PLUNGER flip-flop is inverted and the tonearm is lowered. The operation controlled by the return detection signal when the CUT switch is ON is the same as that of when the PLAY switch is ON.

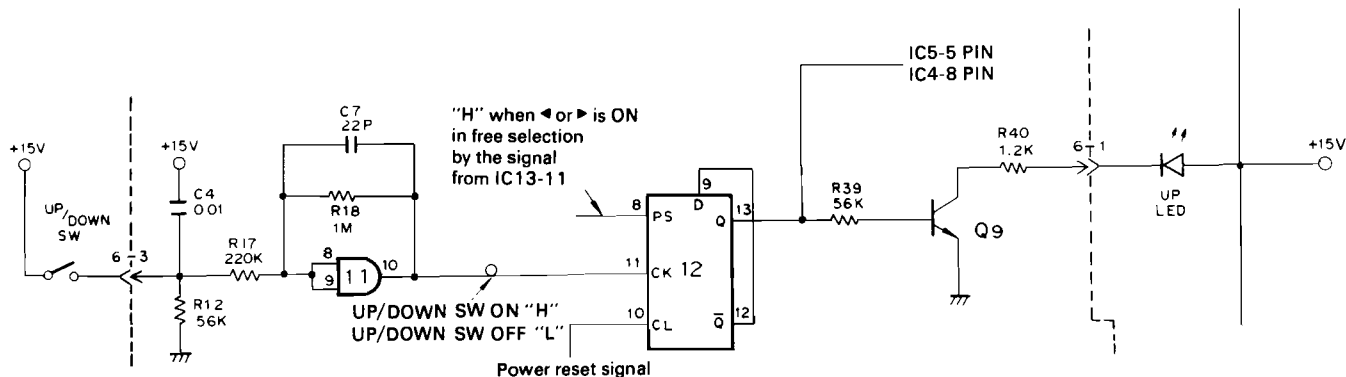


Fig. 8 Tonearm up/down control circuit

- ② **When UP/DOWN switch is turned ON**
 T•FF (IC12-8 ~ 13) has been initialized by the power reset signal. Therefore, Q is "L" and \bar{Q} is "H", and IC5-5 is "L".
 When the UP/DOWN switch is pressed once, a positive pulse is applied to CK of the T•FF through the Schmitt trigger (IC11-3 ~ 10) which is provided to prevent erroneous operation. Therefore, IC5-5 is turned to "H" and the tonearm is lifted. This condition is maintained till power is turned OFF.
 When the UP/DOWN switch is pressed again, T•FF is inverted and the tonearm is lowered.
 While the tonearm is kept in the lifted position, Q9 is ON and so UP LED is lit.
- ③ **When ◀ or ► switch is turned ON**
 When either switch is pressed once, a pulse is applied to PS of T•FF, i.e. IC12-8, so that Q becomes "H" and \bar{Q} becomes "L". Operation after this is the same as in Paragraph 2) above.

V. AUTO PLAY operation (Refer to Schematic Diagram 3)

Process of automatic play of a 30 cm record is explained here. The tonearm must be on the arm rest before turning the PLAY switch ON. At this time, IC8-13 is "H".

1. Initialization of PLAY•FF

Pin 8 of IC2 (NOR gate) is connected to +B through R4, that is, its level is "H". IC2-9 is "L" as will be explained later. Therefore, IC11-6 (IC2-10) is "L", and IC11-4 is "L". Thus, the set input of PLAY•FF, IC10-8, is "L". The power reset signal is applied to IC14-4 via IC5-1 immediately after power is turned ON. Therefore, IC14-4 becomes "H" for an instant, and IC14-6 becomes "L". This "L" level is applied to the upper NOR gate (IC10-8 ~ 10) and IC10-10 becomes "H". Since this "H" level is applied to IC14-5, IC14-6 is kept at "L" after the power reset signal has disappeared. Thus, PLAY•FF is initialized. Since IC8-12 is "H", IC8-11 is "H". Therefore, IC5-10 is "H" and the DD motor does not rotate. IC2-9 is set to "L" through the inverter (IC7-6, 7).

FULL AUTOMATIC MECHANISM CONTROL OF KD-850 (X29-1160-00)

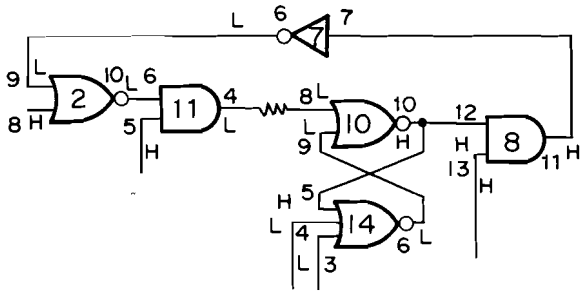


Fig. 1 Initialization of PLAY•FF

2. When PLAY switch is turned ON

IC2-8 becomes "L". Since IC2-9 is "L", IC2-10 becomes "H". Since IC11-5 is "H", IC11-4 becomes "H" and IC10-8 becomes "H". Thus, PLAY•FF is inverted. Since IC10-10 becomes "L", IC8-11 becomes "L" and the turntable platter motor ON/OFF signal becomes "L". Thus, the motor rotates. Since IC13-10 also becomes "L", the motor speed is set to 33 rpm. (Refer to "Speed selection circuit".) The "H" level signal from IC14-6 is sent to the tonearm drive circuit, and the tonearm starts moving. (Refer to "Tonearm motion".) Further, Q7 is turned ON so that the LEDs relating to a 30 cm record are able to light.

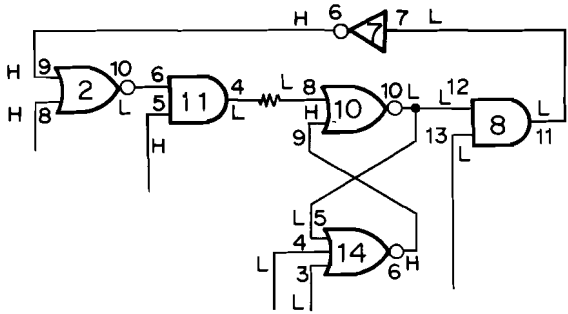


Fig. 2

3. Lead-in

When the tonearm reaches the lead-in position, IC4-4 is set to "H" by the record size detection signal. A positive pulse is applied to the PLUNGER•FF (IC14-1) by means of C10 and R35. As explained in "Tonearm motion", the tonearm stops transverse motion and is lowered to the record surface.

4. Lead-out

When the tonearm reaches the lead-out position, IC7-4 is set to "H" by the return detection signal. A positive pulse is applied to IC4-2 and IC15-4 by means of C9 and R34. Then, the tonearm is lifted and moved toward the arm rest.

5. Return to arm rest

When the tonearm reaches the position over the arm rest, IC1-3 is set to "H" by the arm rest-position detection signal. This "H" level signal is sent to the tonearm drive circuit via IC7-2, 3 so that the drive motor stops. It is also sent to the

LED drive circuit to turn LEDs OFF. A positive pulse is generated with C5 and R20 and it is applied to PLAY•FF to invert its state. Thus, IC10-10 (IC8-12) becomes "H". Since IC8-13 has become "H", IC8-11 becomes "H" so that the DD motor is stopped. Further, IC4-4 becomes "H" and a positive pulse is given to IC14-1 by means of C10 and R35, then the PLUNGER•FF is inverted and the tonearm is lowered.

VI. AUTO CUT operation

Operations when the CUT switch is turned ON during the playing of a record is explained here. Refer to the diagram showing the stable state of the PLAY•FF after the PLAY switch is turned ON. When the CUT switch is turned ON in this condition, IC2-13 is set to "L", so IC2-11 becomes "H" (IC2-12 is "L" because the tonearm is not on the arm rest.) This "H" level signal inverts the PLAY•FF, then IC10-10 becomes "H" and IC8-12 becomes "H". The pulse generated by C8 and R32 is applied to IC4-2 and IC15-4 so that the tonearm is lifted and moved toward the arm rest.

Operations after the tonearm returns to the arm rest are the same as explained in "AUTO PLAY". The only exception is that the PLAY•FF will not be inverted when the arm rest position is detected, because it has already been inverted.

VII. AUTO REPEAT

IC12 in the auto-repeat circuit is reset by the power reset signal (which is applied to Pin 4). Therefore, Q is "L" and \bar{Q} is "H". When the REPEAT switch is turned ON, a positive pulse is applied to CK of IC12, so IC12 is inverted. Since Q becomes "H", Q8 is turned ON and the REPEAT indicator is lit. At the same time, IC13-2 becomes "H" and Q7 remains conducting. While the tonearm is moving to the arm rest after return detection, the search arm detects the size of the record. As a result, the tonearm stops and drops at the lead-in position and play is restarted.

The auto-repeat condition is reset at the time when power is turned ON, the CUT switch is turned ON or the tonearm is returned to the arm rest by hand.

VIII. C-MOS Schmitt trigger

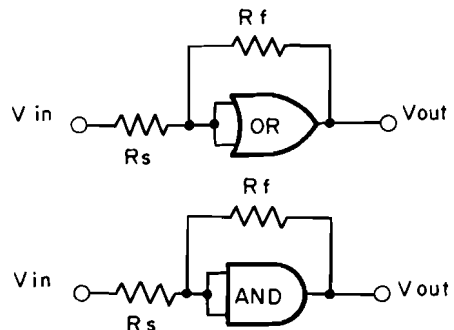


Fig. 1

FULL AUTOMATIC MECHANISM CONTROL OF KD-850 (X29-1160-00)

A Schmitt trigger can be formed by setting up a circuit using a C-MOS AND gate or OR gate as shown in Fig. 1. This circuit utilizes the threshold level (V_{TH}) of the C-MOS circuit. In a C-MOS, the level UTL (Upper threshold level) at which the output changes from "L" to "H" and the level LTL (lower threshold level) at which the output changes from "H" to "L" have characteristics similar to hysteresis curves.

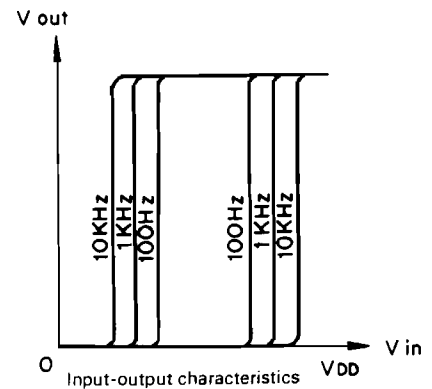
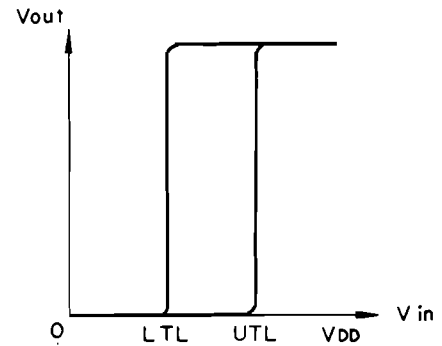
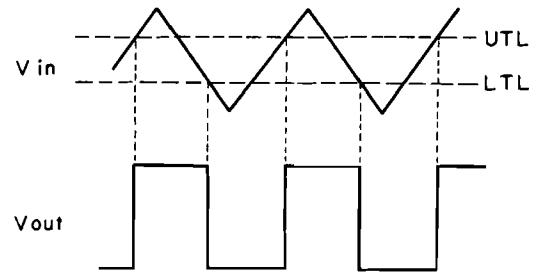
UTL and LTL are given as follows:

$$\begin{cases} UTL = \frac{R_s + R_f}{R_f} \cdot V_{TH} \\ LTL = \frac{R_s + R_f}{R_s} \cdot (V_{TH} - \frac{R_s}{R_s + R_f} \cdot V_{DD}) \end{cases}$$

Then, noise margin V_{NI} is given as

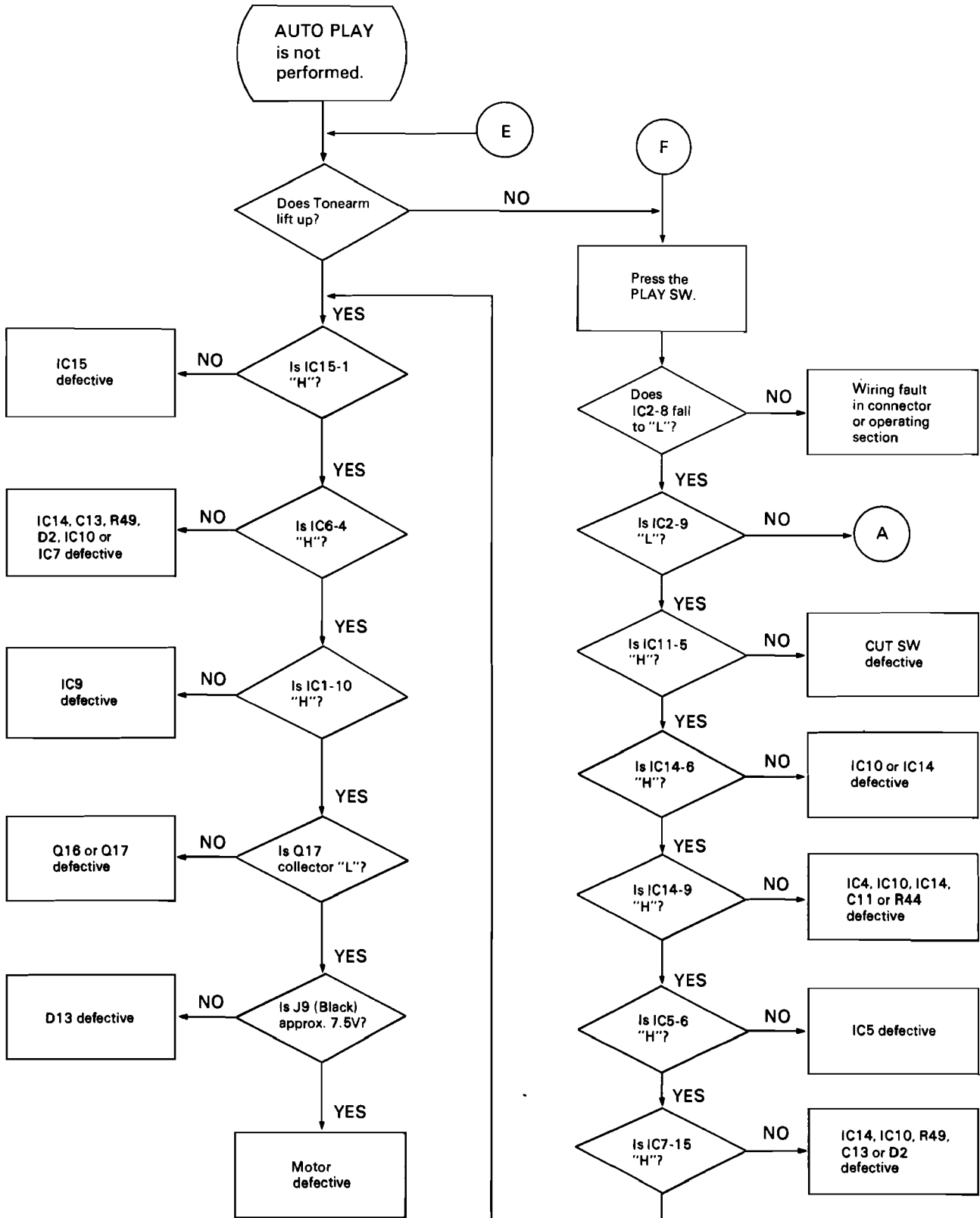
$$V_{NI} = UTL - LTL = \frac{R_s}{R_f} \cdot V_{DD}$$

By connecting a small capacitor in series with R_f , frequency dependent hysteresis characteristics can be obtained.

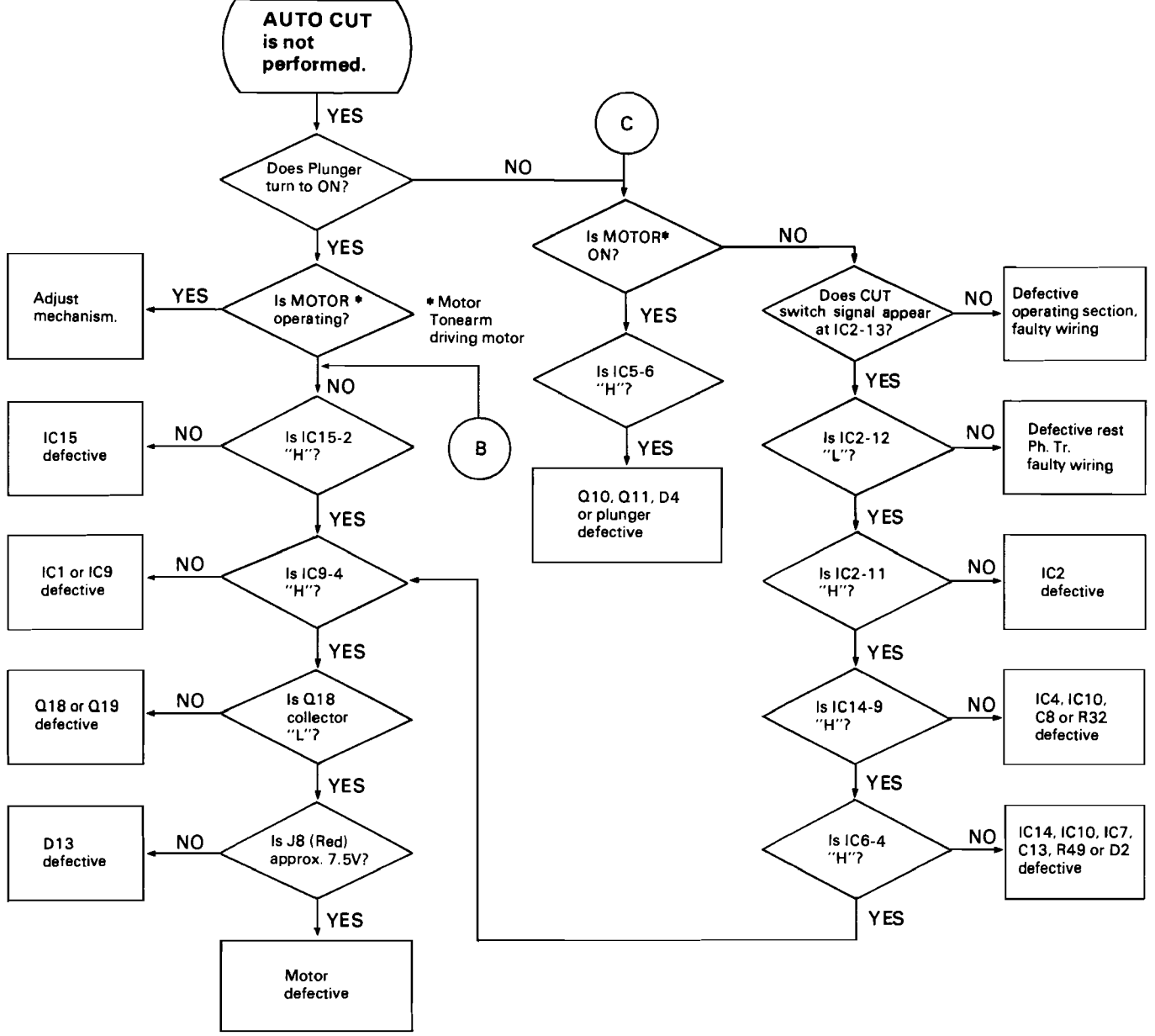
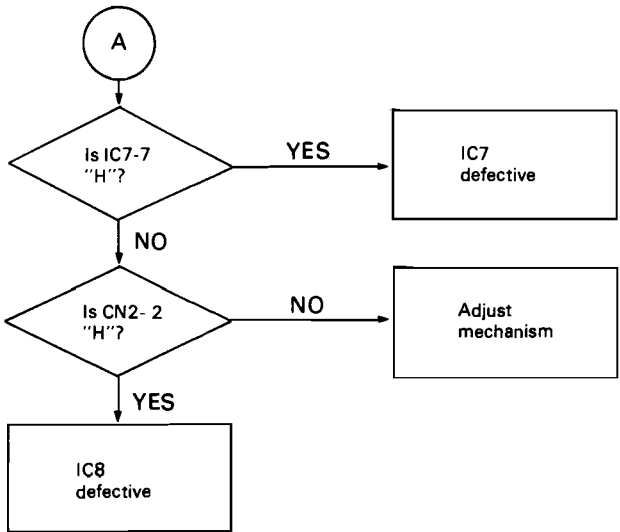


TROUBLESHOOTING

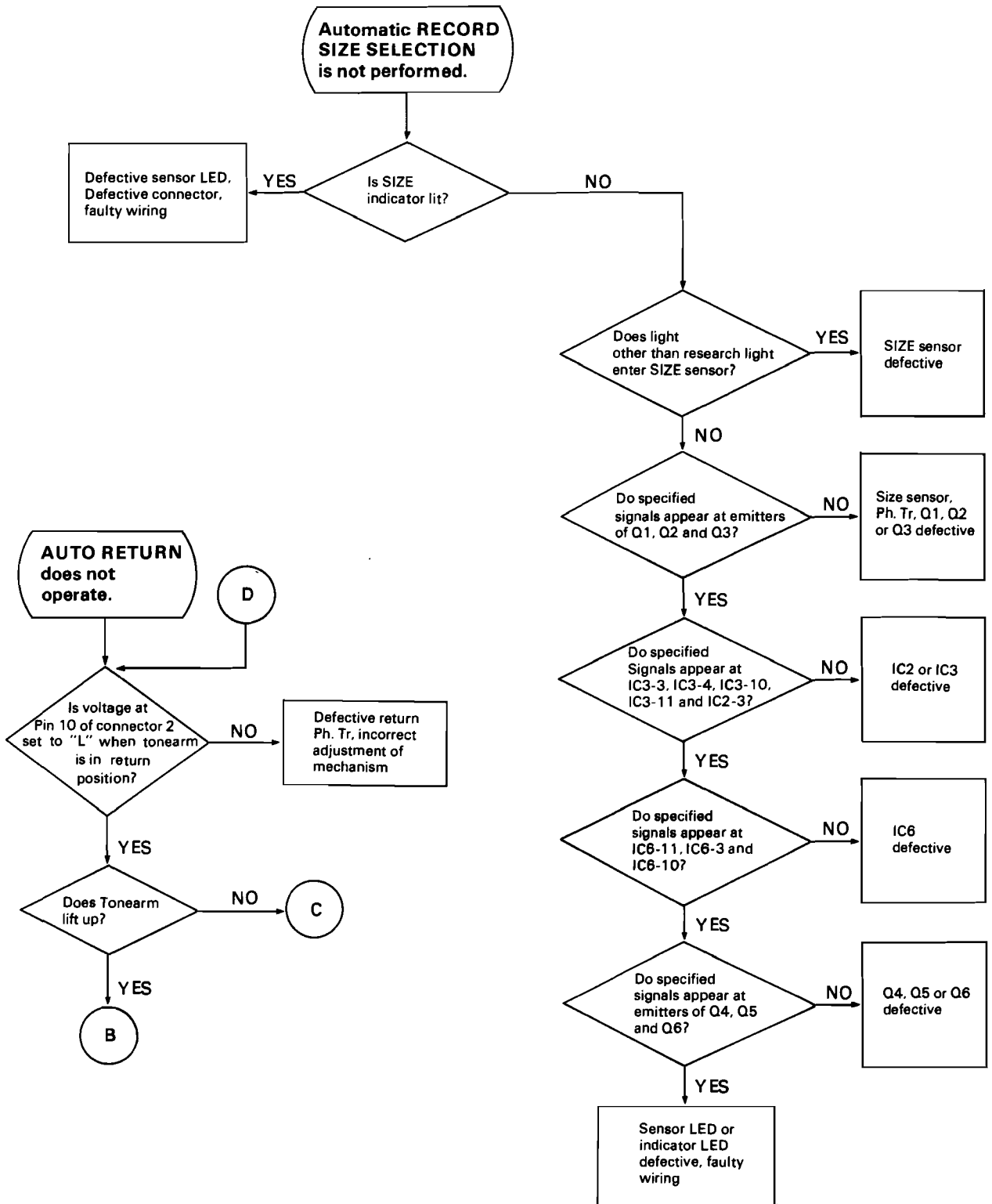
X29-1160-00: Mechanism control PCB



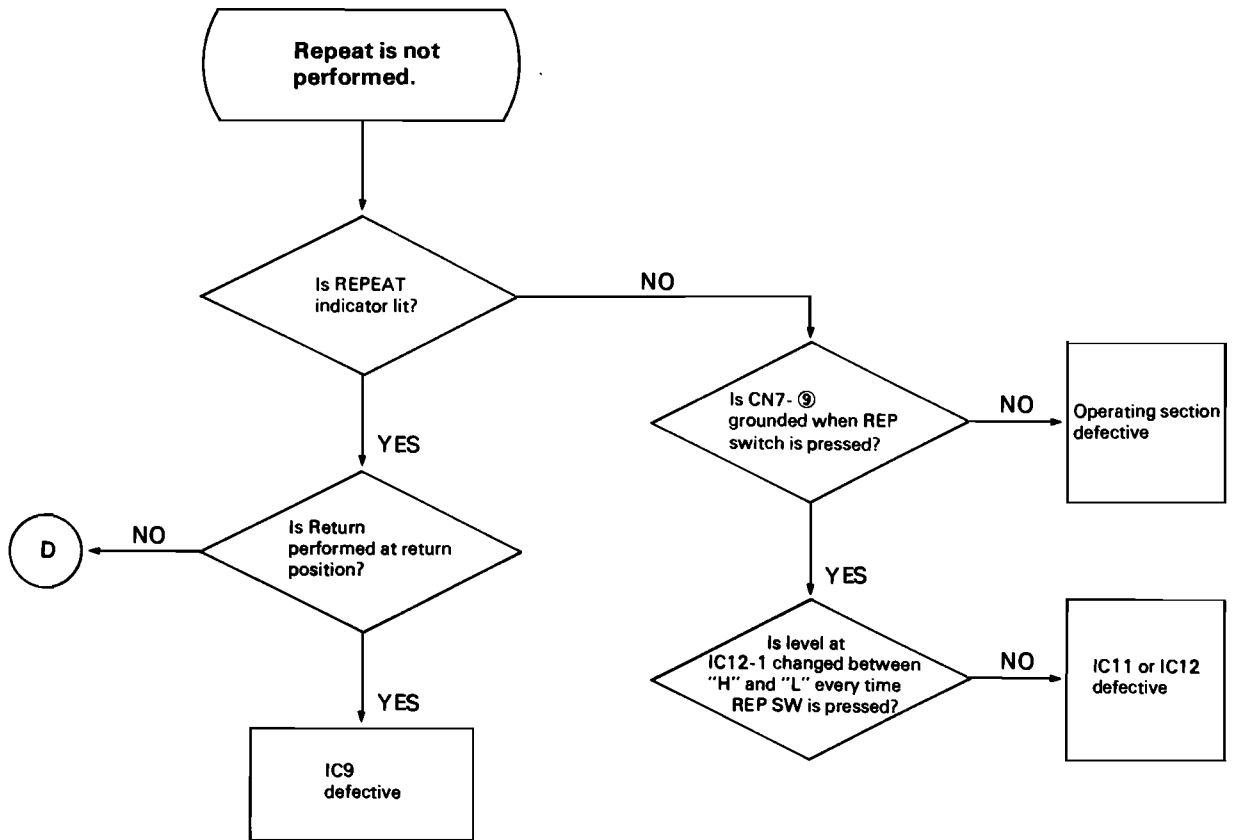
TROUBLESHOOTING



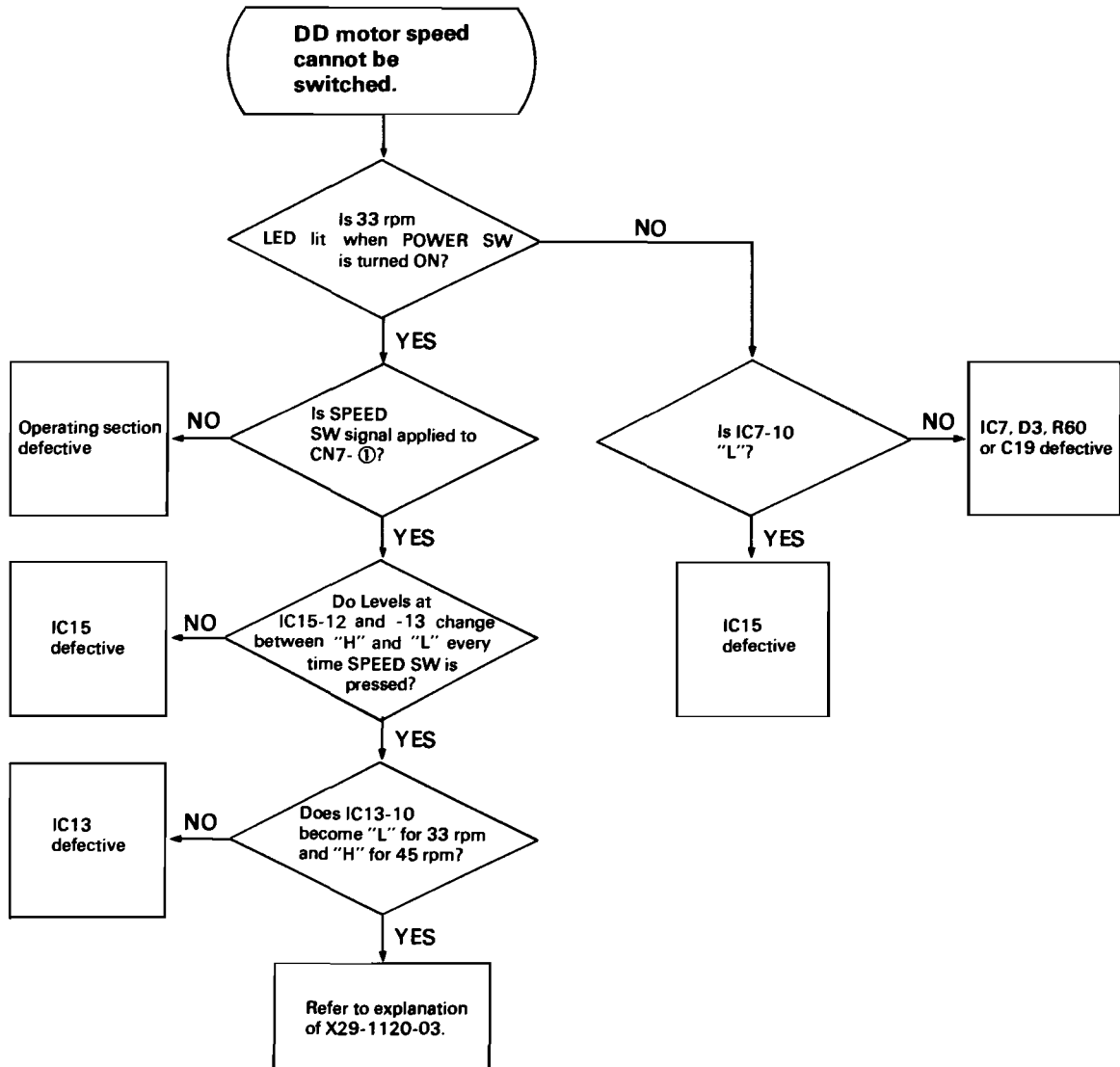
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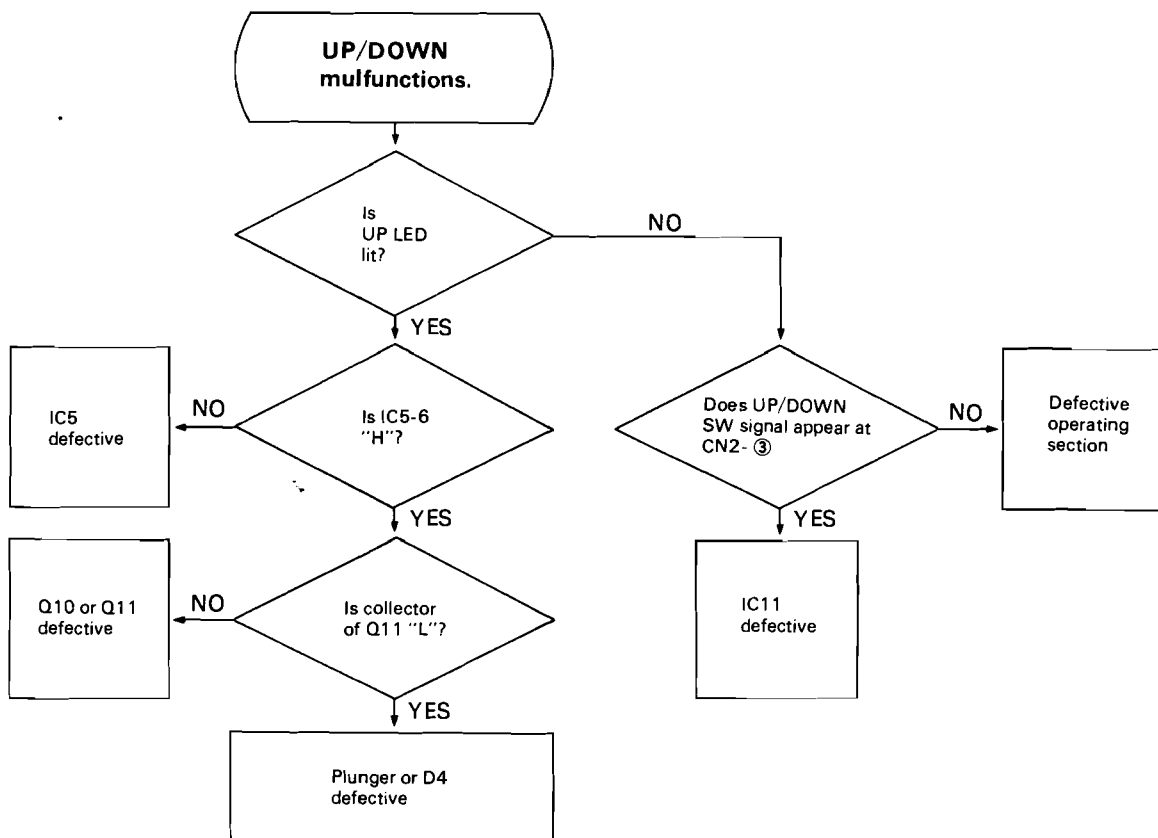
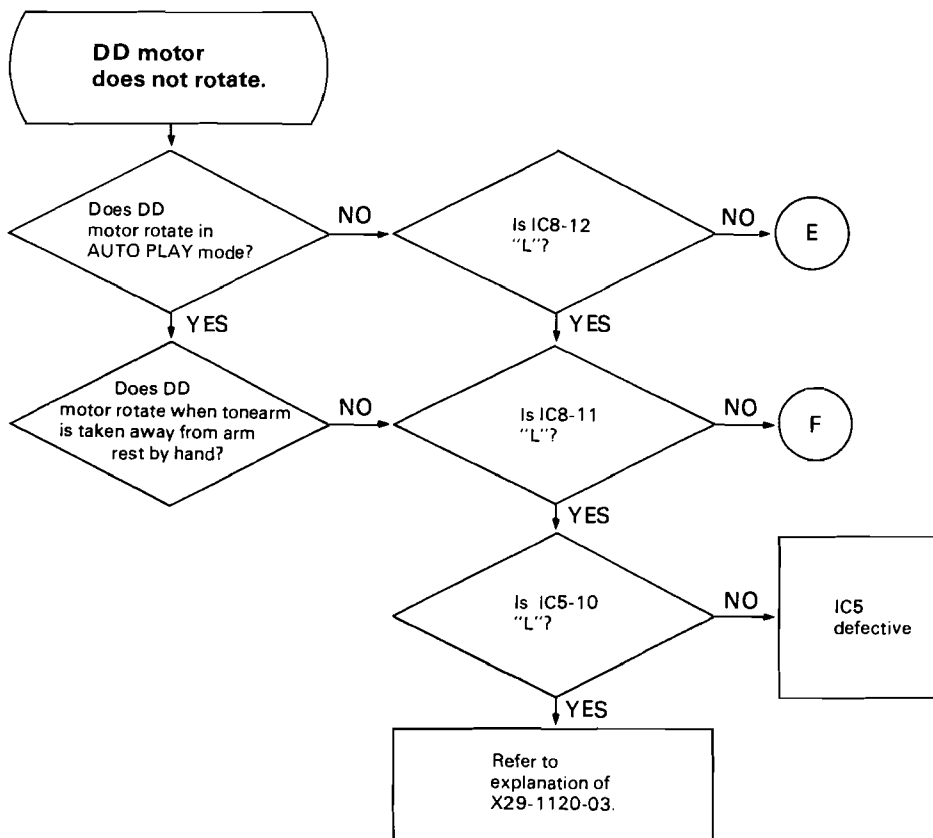
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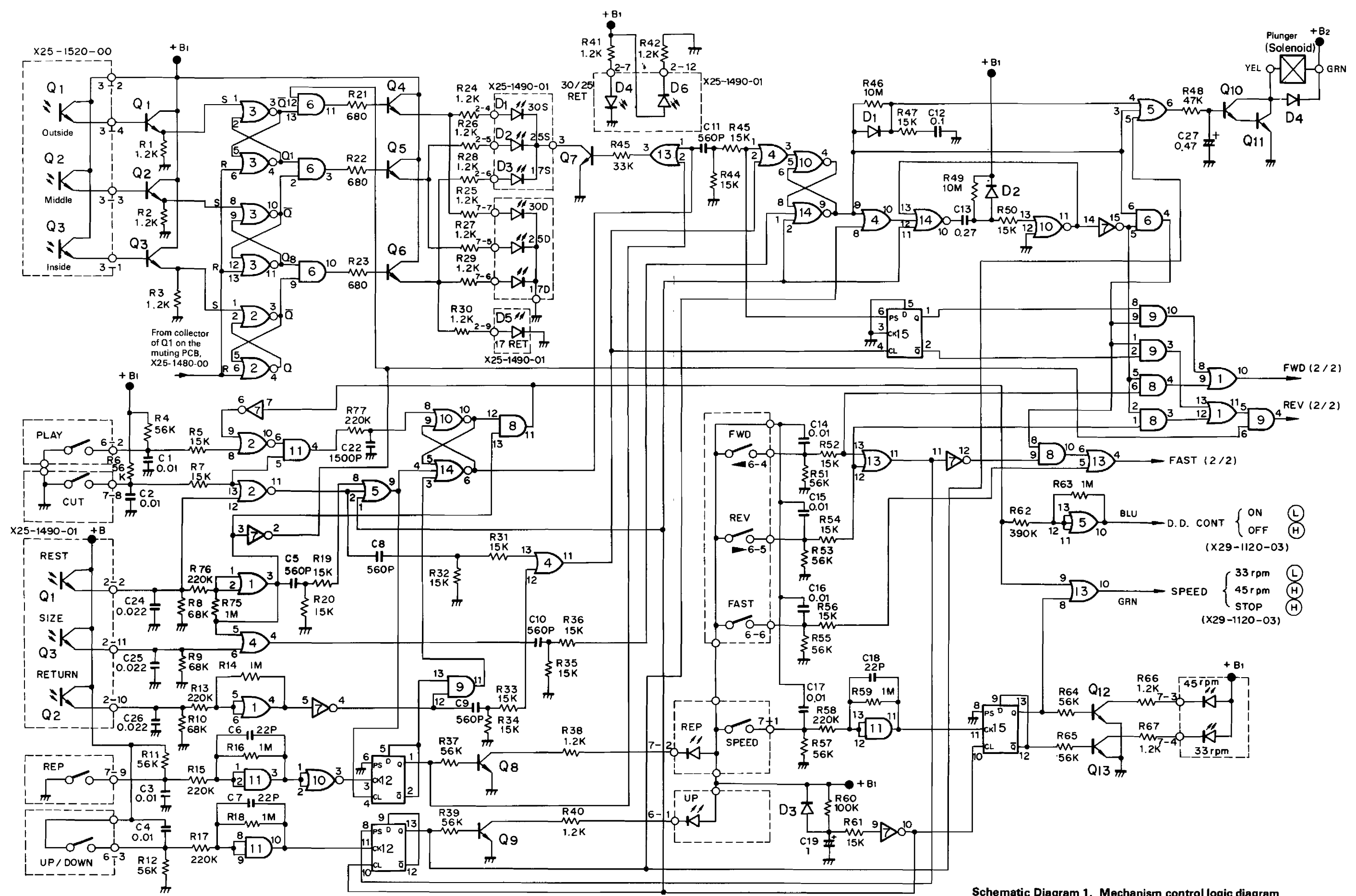


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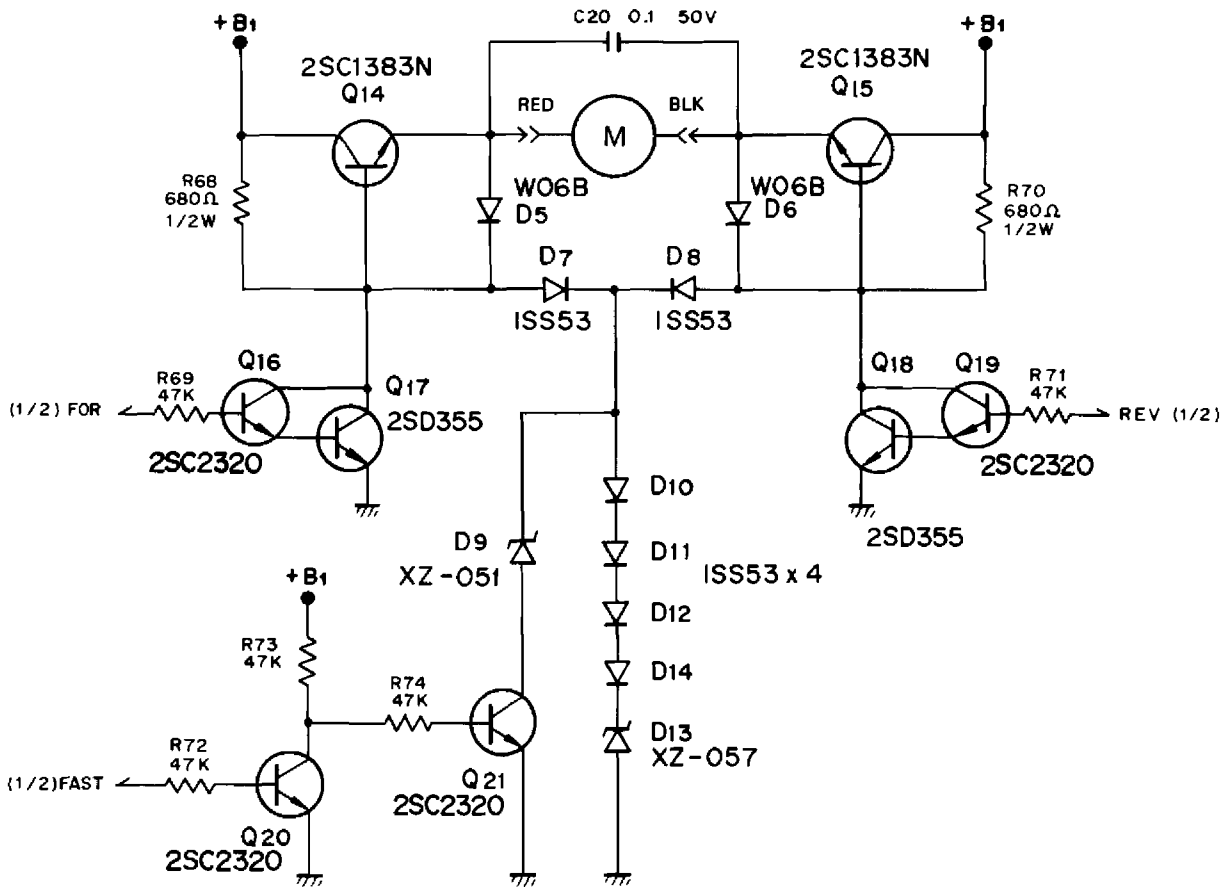


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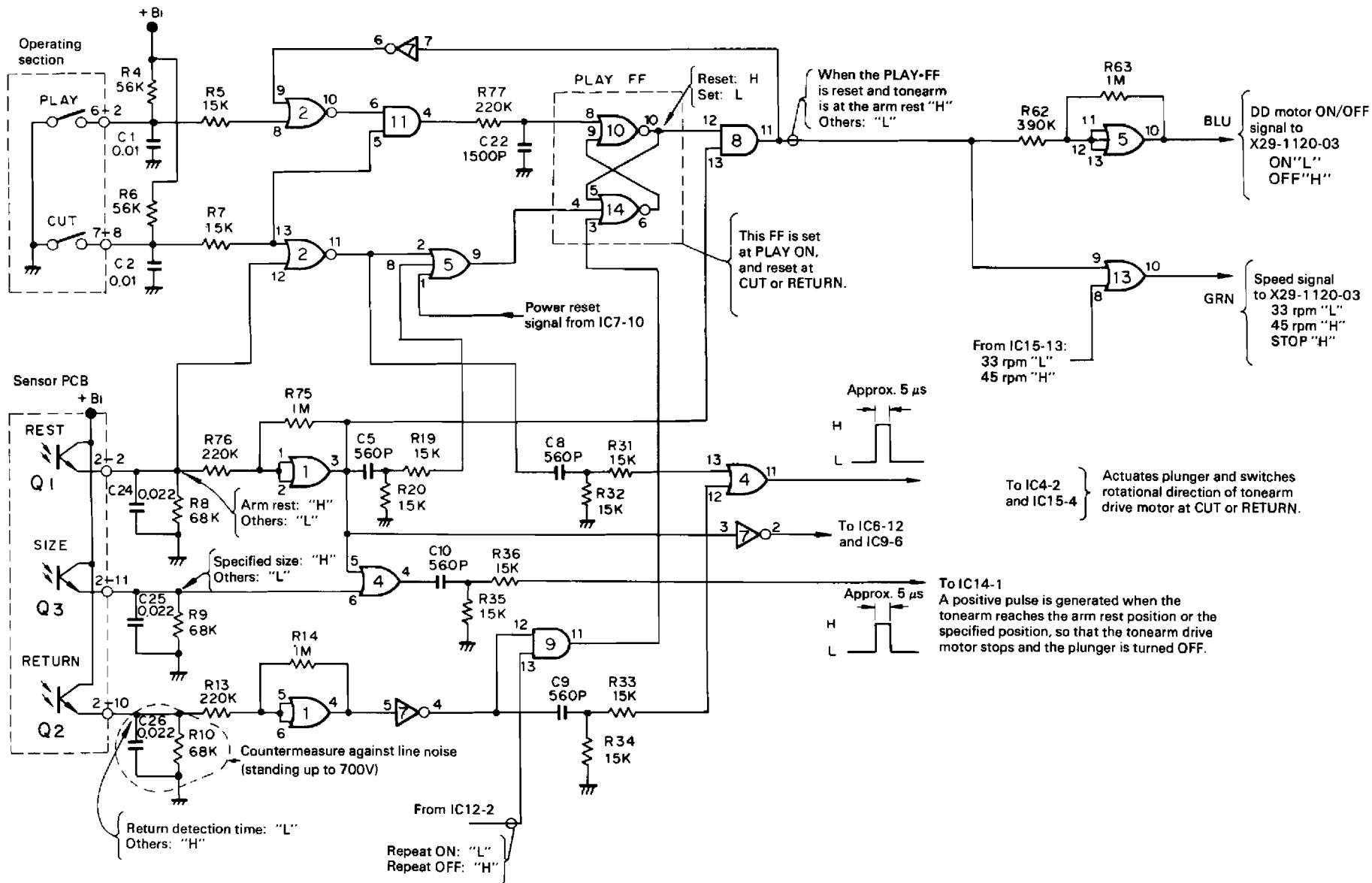


Schematic Diagram 1. Mechanism control logic diagram

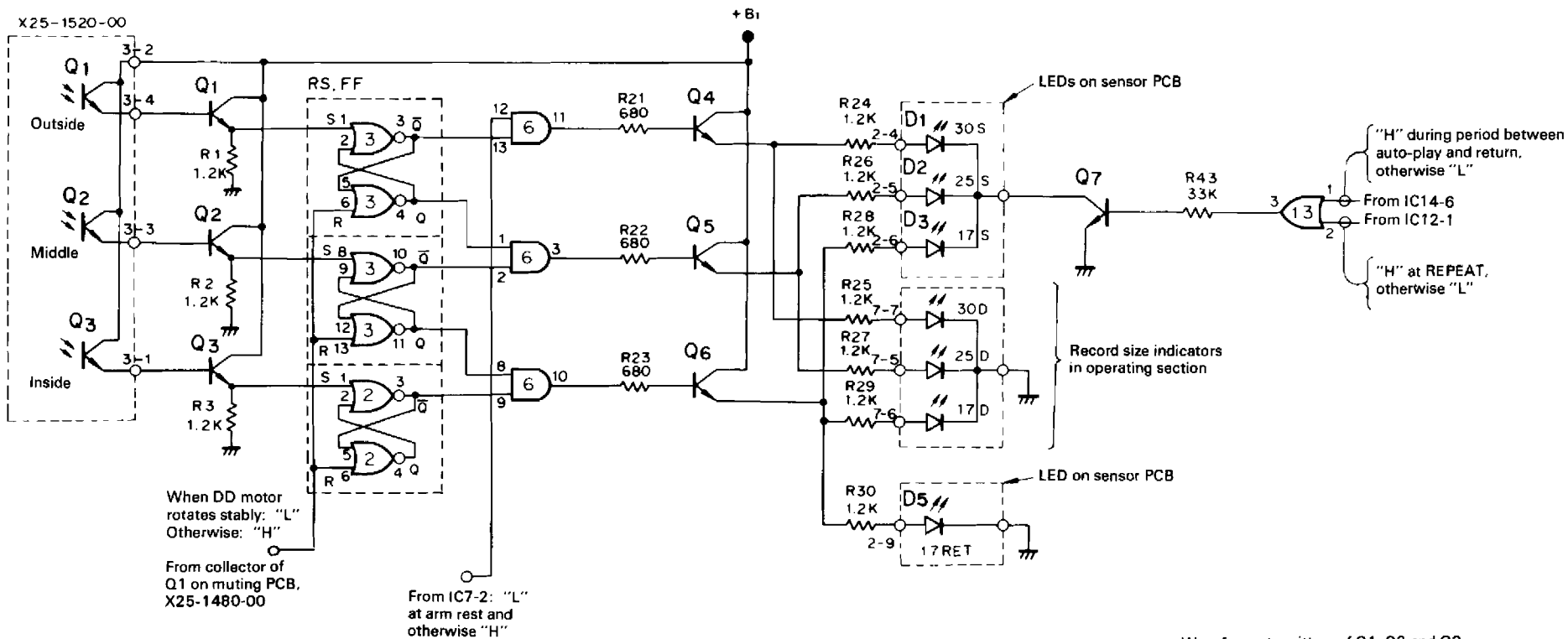


Schematic Diagram 2 Mechanism control circuit

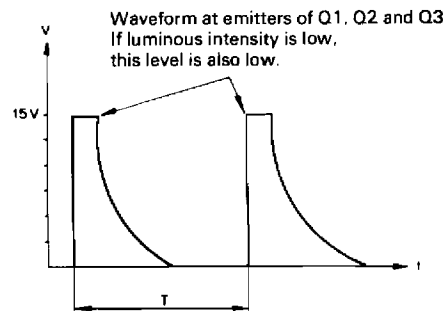
Schematic Diagram 3. Detection circuit and PLAY/CUT circuit



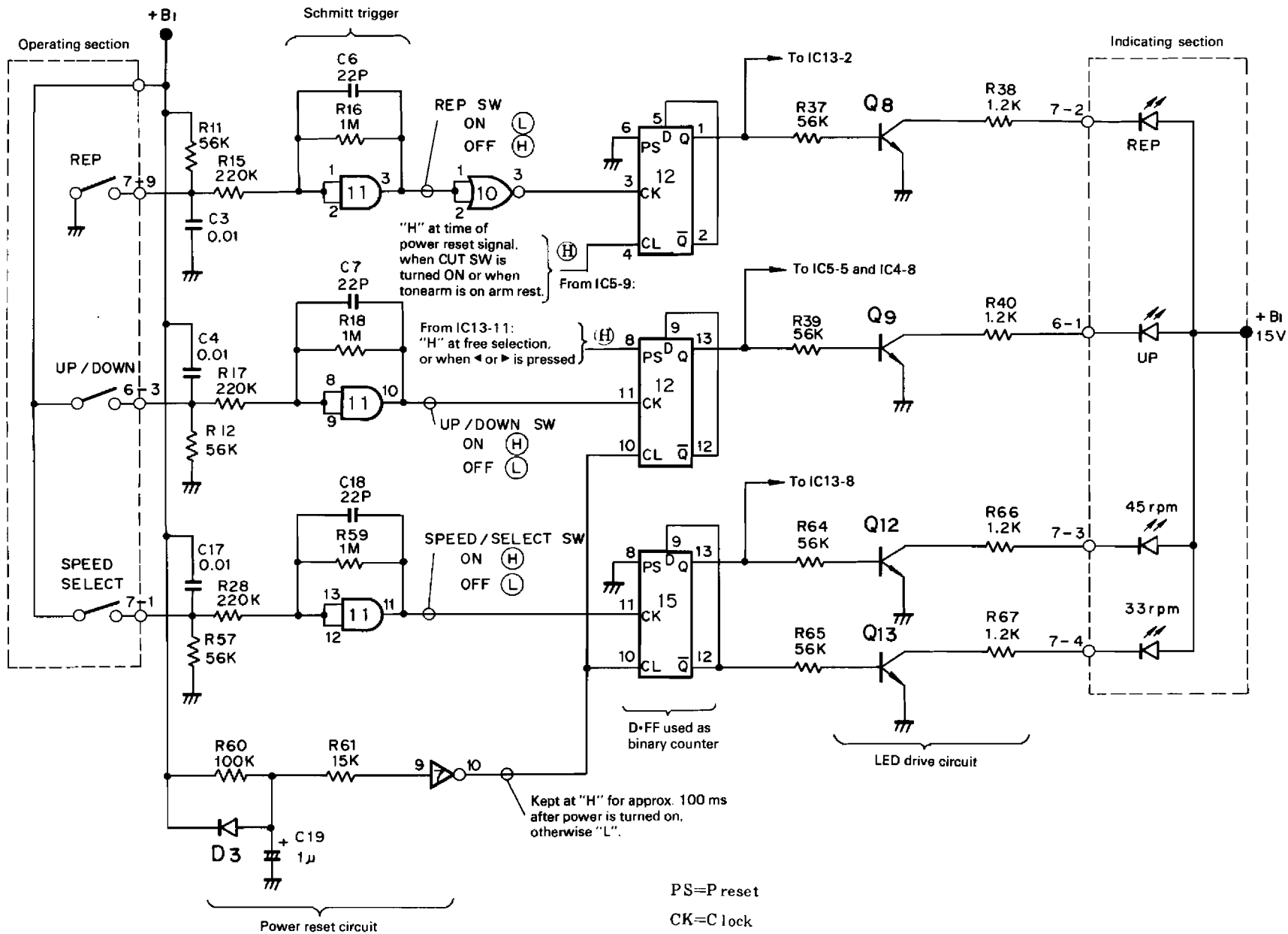
Schematic Diagram 4 Record size detection circuit



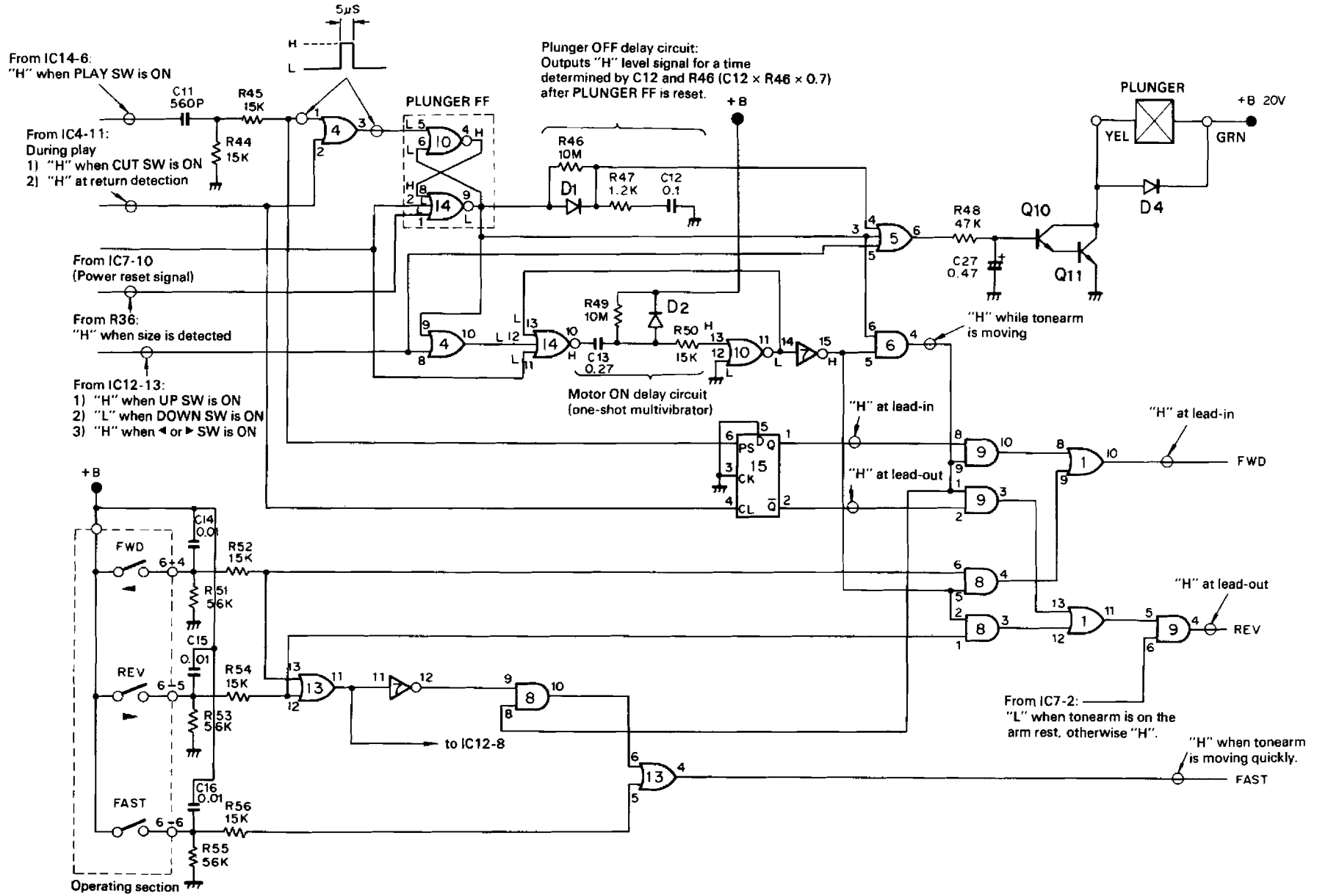
Record size	IC3 3 pin	IC3 4 pin	IC3 10 pin	IC3 11 pin	IC2 3 pin	IC6 11 pin	IC6 3 pin	IC6 10 pin
30 cm	H	L	H	L	H	H	L	L
25 cm	L	H	H	L	H	L	H	L
17 cm	L	H	L	H	H	L	L	H
None	L	H	L	H	L	L	L	L



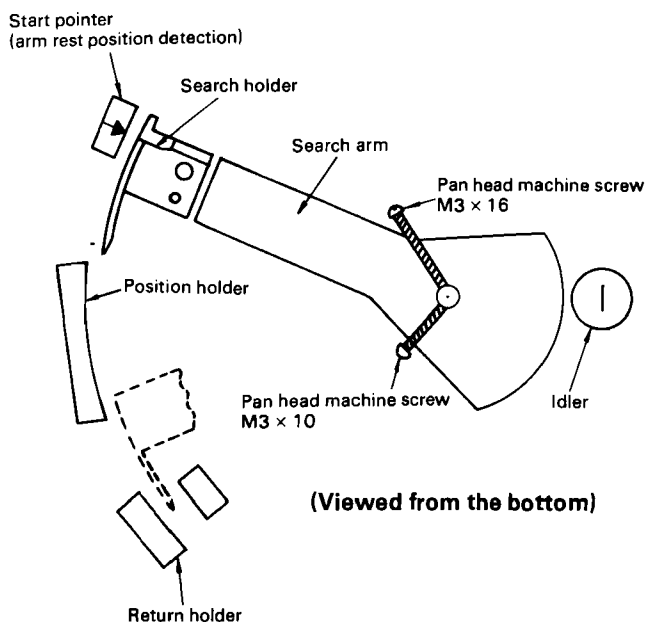
Schematic Diagram 5



Schematic Diagram 6 Drive motor control circuit and tonearm up/down circuit

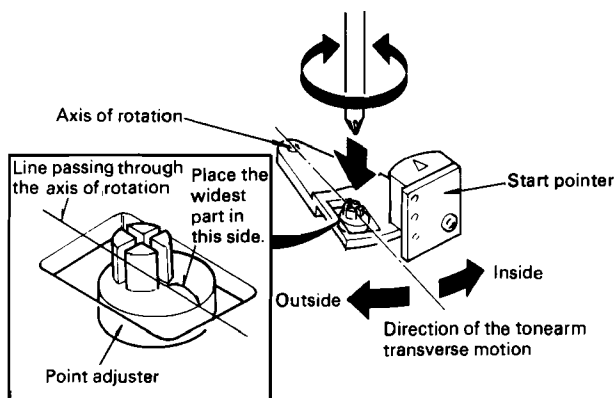


INSTALLATION OF AUTOMATIC MECHANISM ASS'Y



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.)

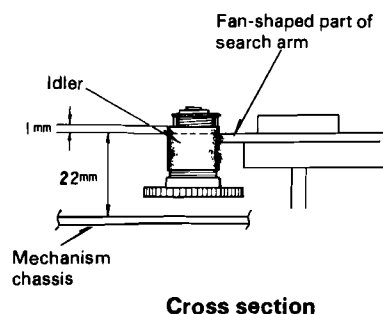
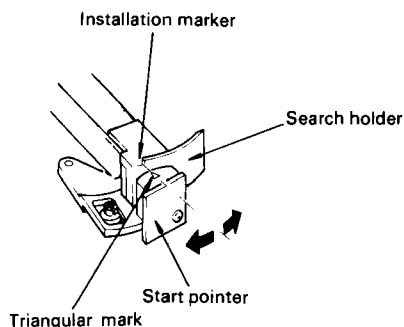


Notes:

- The start pointer position affects detection of the arm rest position and determination of the auto-in and auto-return positions. If it is placed in a wrong position, the automatic mechanism may malfunction, 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".

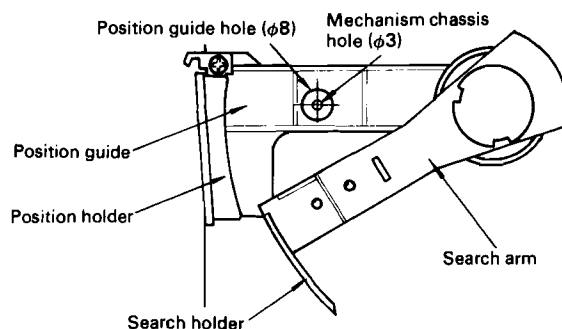
2. Installation of Search Arm

- 1 Adjust the tonearm height adjuster so that the tonearm is as low as possible.
- 2 Fix the tonearm on the arm rest.
- 3 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.



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.) The arm lifter pin must have been adjusted.

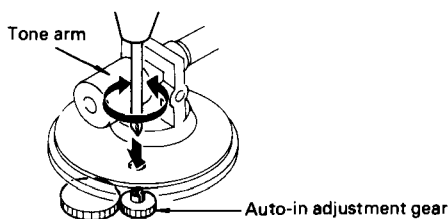
1. Specifications of Test Record

Play the test record at 45 rpm.

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

2. Adjustment of Auto-in Position

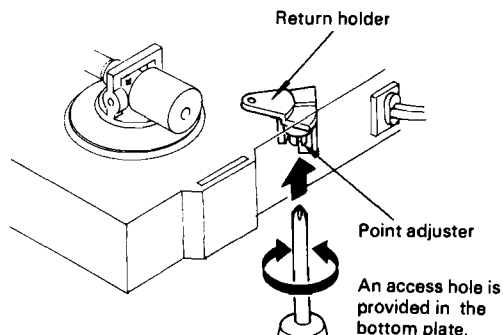
- Place the test record on the turntable platter, set the speed to 45 rpm and press the PLAY button.
- Adjust the auto-in adjustment gear so that the spoken count recorded in band 1 is between 20 and 27 when play starts.



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

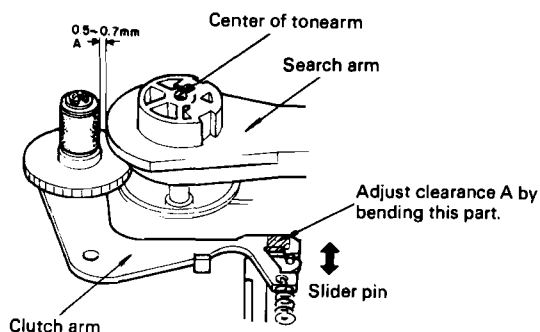
3. Adjustment of Auto-return Position

- Play band 4 of side A of the test record.
- Adjust the point adjuster of the return holder so that the spoken count is 13 when the tonearm automatically returns.



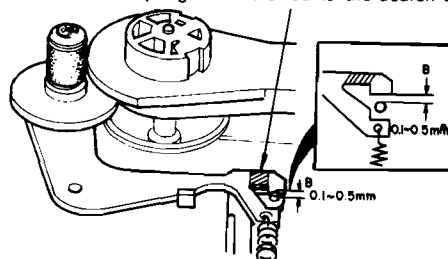
Adjustment of auto-return position

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.

ADJUSTMENT (X29-1120-03)

Adjustment (X29-1120-03)

Adjusting method is the same as that of KD-650.

Before adjustment:

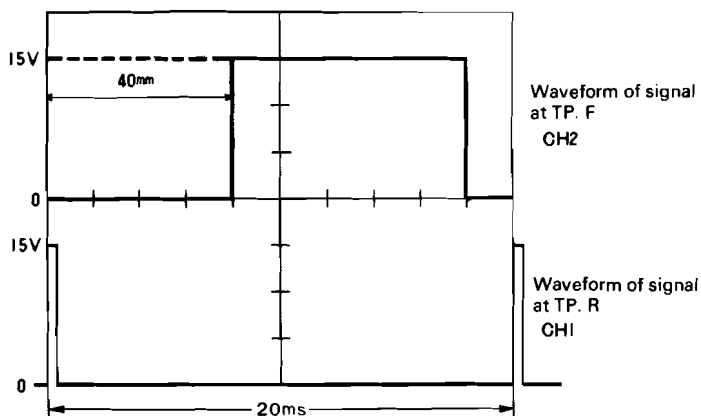
- An oscilloscope and a DC voltmeter are necessary. (A 2 CH oscilloscope will facilitate adjustment.)
- Place the turntable horizontally.
- Install the turntable platter and rubber sheet.
- First, carry out adjustment for 33 rpm and then for 45 rpm.
- Set the PC trimming potentiometers VR1 and VR2 (white) on the P.C. board to the center.
- After adjustment of phase difference, carry out adjustment of the lock indicator

Adjustment:

In the KD-850, both the phase difference (PLL) and the lock indicator lighting range, (including brake OFF timing), require adjustment.

1. Adjustment of phase difference (PLL) (Using a single channel oscilloscope)

1. Apply the reference signal (the output of the X'tal oscillator: TP. R) to the oscilloscope and fully expand the waveform on the screen. (Fig. 1)
2. Set the oscilloscope to the external synchronization mode, and apply the reference signal (TP. R) to the external sync terminal. (Now, the oscilloscope is triggered with the reference signal.) Then, apply the FG signal (rotation signal of the motor: TP. F) to the input of the oscilloscope. (Fig. 2)
3. Adjust VR3 (45 rpm) or VR4 (33 rpm) so that the waveform of the FG signal on the screen stops and the waveform shown below (waveform of signal at TP. F) is observed. (Fig. 3)



Note:
This time scale is for 33 rpm.

Waveforms observed on 2 CH oscilloscope

2. Adjustment of lock indicator lighting range and brake OFF timing

1. Connect the DC voltmeter (input imp.: 1 mΩ or more) to TP. V
2. Turn the power ON and set the speed to 45 rpm. After the speed has become stable, adjust VR1 so that the voltmeter reading is 265 mV
3. Perform the same adjustment for VR2 with the speed set to 33 rpm.

ADJUSTMENT (X29-1120-03)

Fig. 1

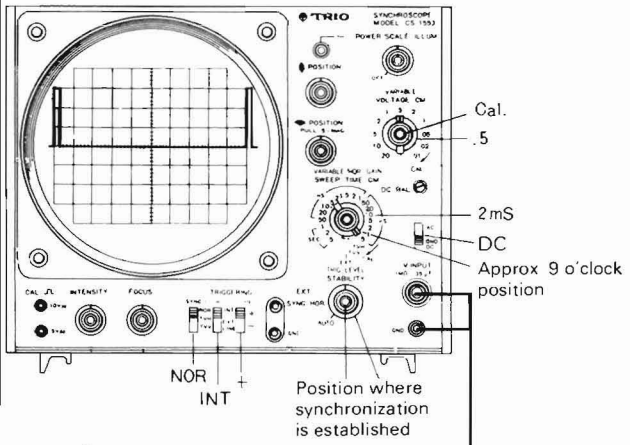
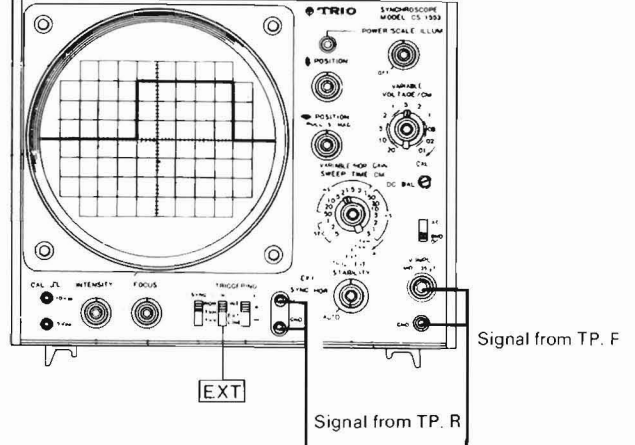


Fig. 2



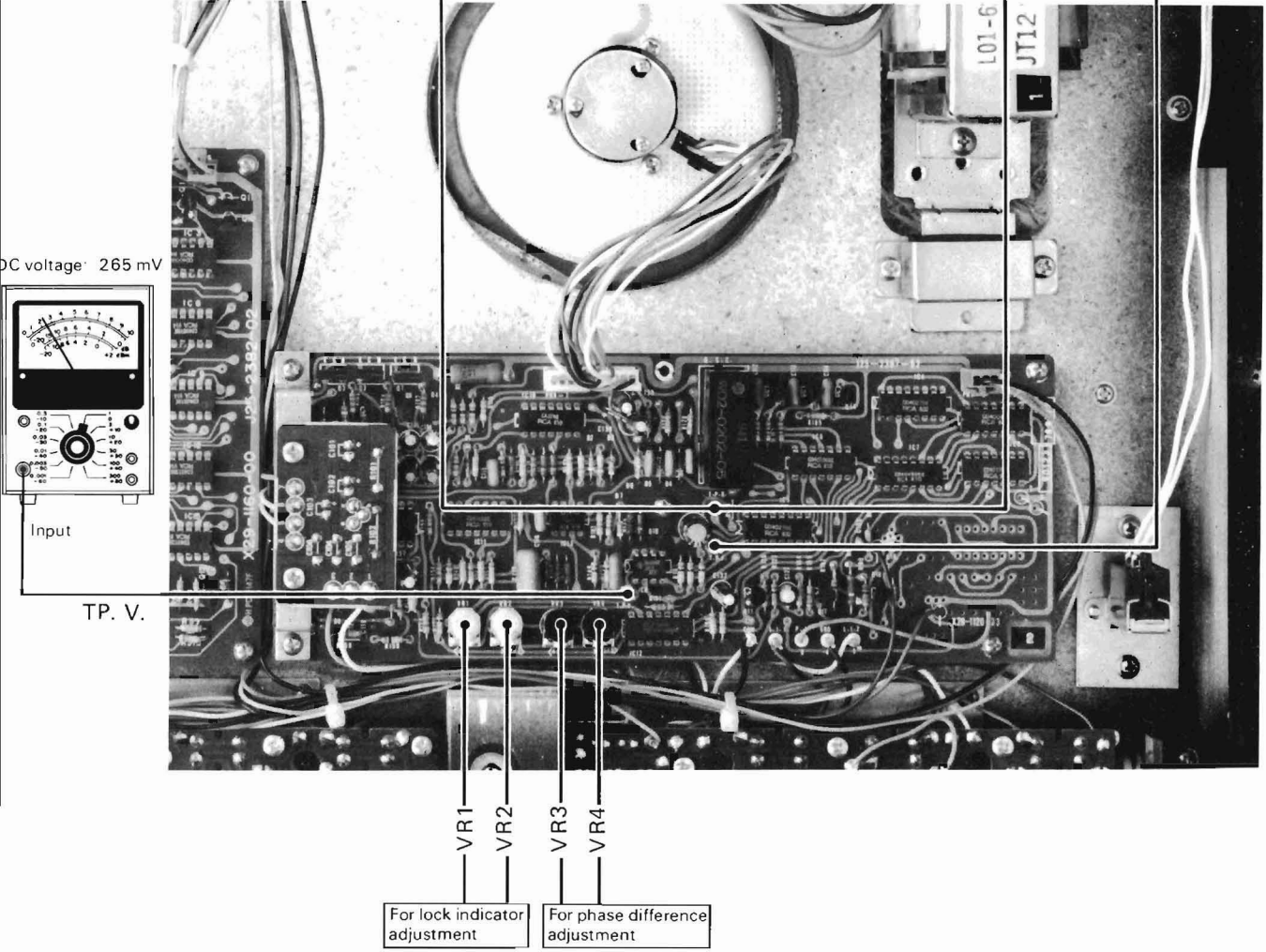
- ① Set the sweep time to 2 mS
 - ② Adjust the trigger level so that synchronization is established.
- Note:**
Use a 10:1 probe (input impedance, 10 MΩ or more) for adjustment. If such a probe is not used, connect the oscilloscope via a resistor of 10 kΩ or more to the test point.
- ③ Set the sweep time to 1 μs for 45 rpm and expand the waveform to the same scale as that at 33 rpm.

When a 2 CH oscilloscope is used, apply the signal from TP. F to CH1 and the signal from TP. R to CH2, then adjust the phase difference (Refer to waveforms shown on the previous page.)

Use a 10.1 probe

Signal from TP. R

Signal from TP. F

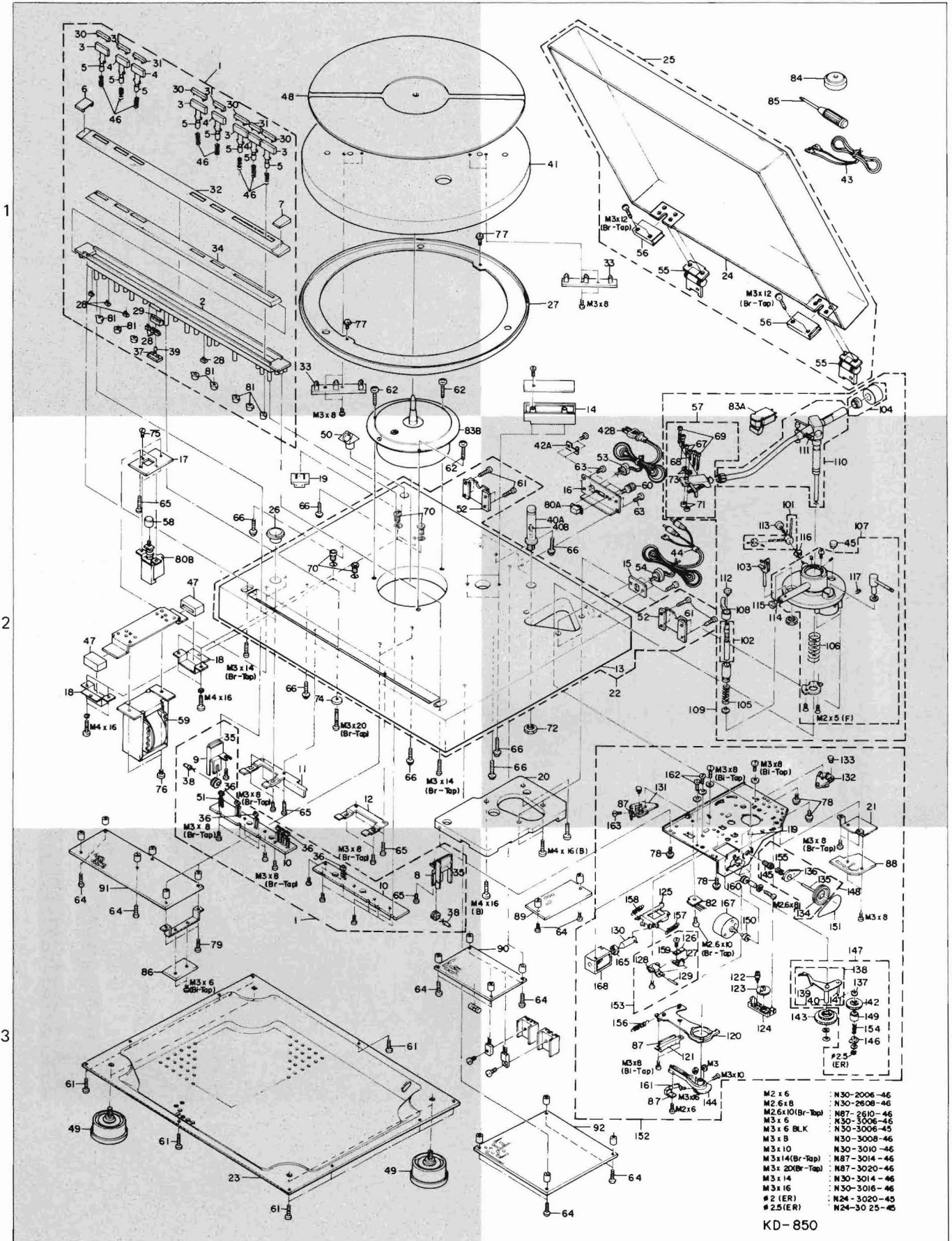


EXPLODED VIEW

See Parts List on page 36.

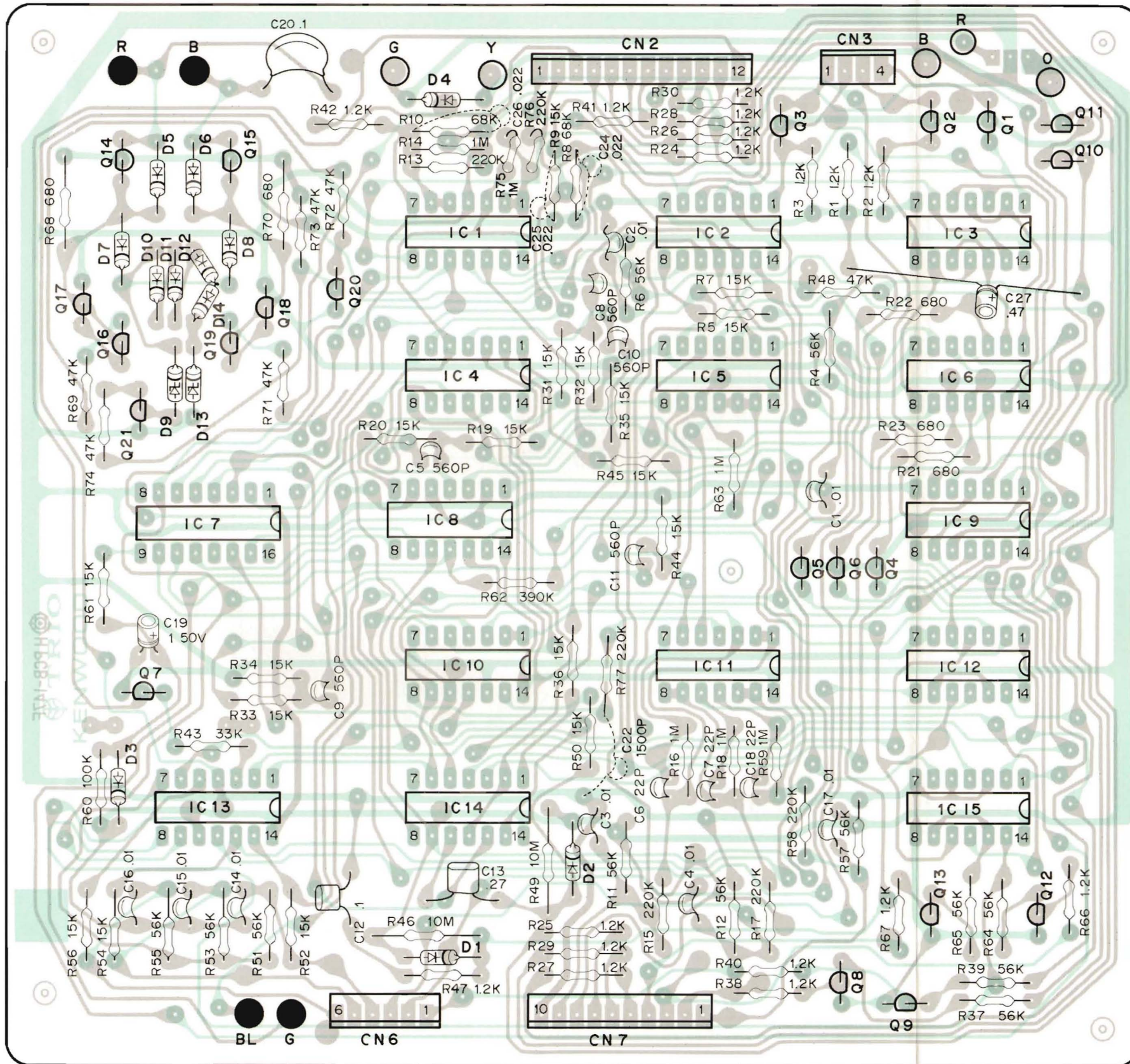
A

B

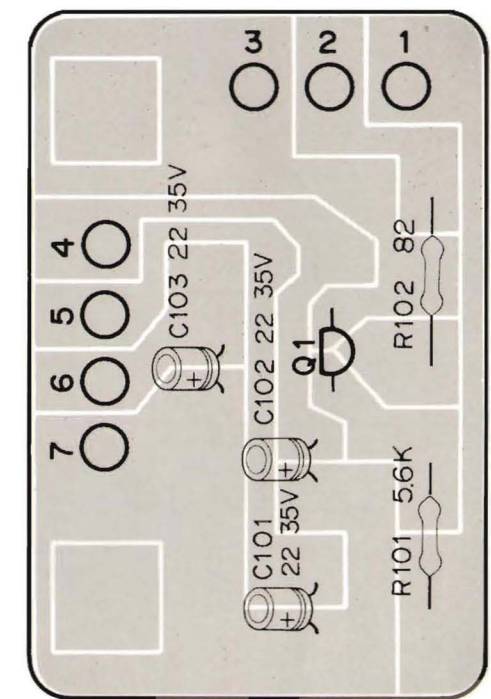


PC BOARD

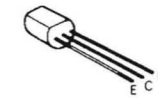
MECHANISM CONTROL (X29-1160-00) Component side view



MUTING (X25-1480-00) Component side view



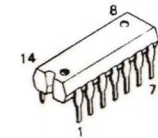
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2SC2003
2SC1383



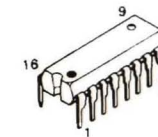
2SD355



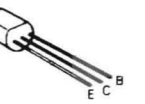
4001 CD4001 MC14001
4013 CD4013
4025 CD4025 MC14025
4071 CD4071 MC14071
CD4075
4081 CD4081 MC14081



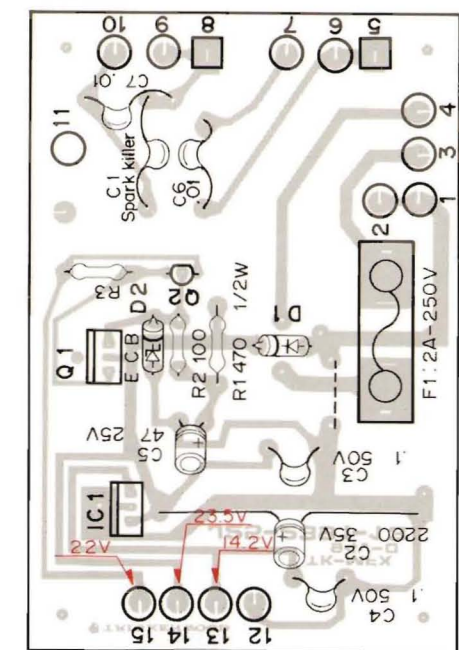
4049
CD4049
MC14049



2SC945



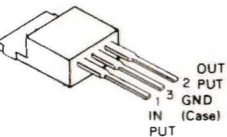
POWER SUPPLY (X27-1380-01) Component side view



2SD882



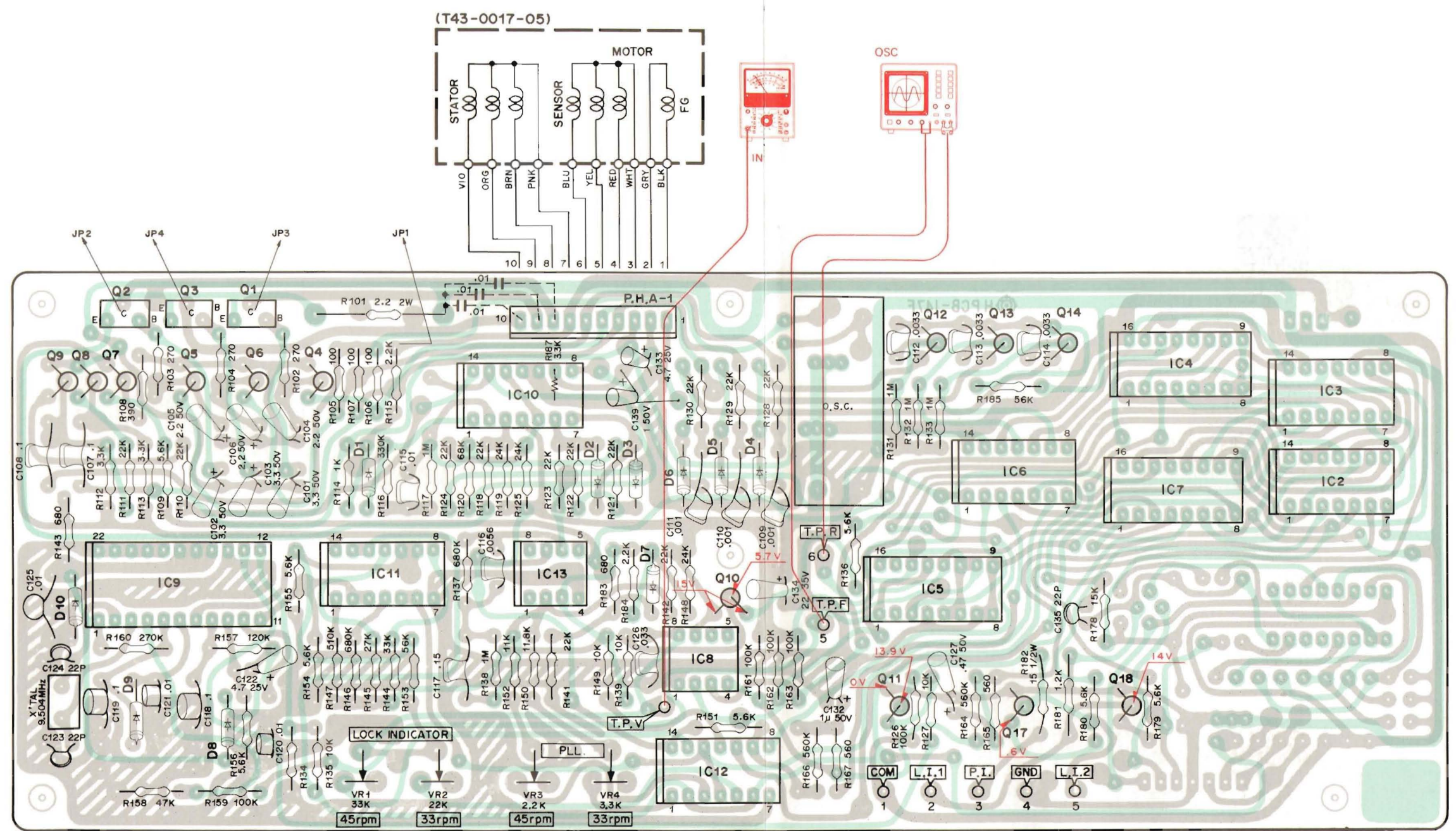
μPC14315



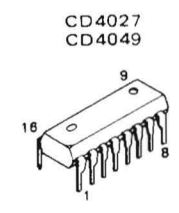
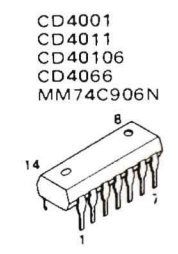
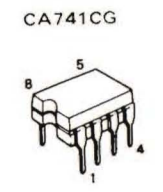
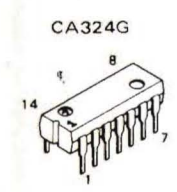
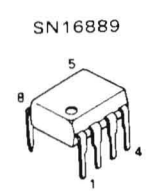
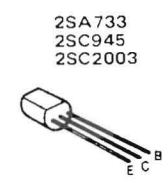
C1 is provided for other than X27-1380-03.
C6 is provided for X27-1380-05 only.
C7 is provided for X27-1380-03 only.
R3 is 2.2Ω for X27-1380-01 and jumper wire for other than X27-1380-01
Q2 is provided for X27-1380-01 only

PC BOARD

MOTOR CONTROL (X29-1120-03) Component side view



See DC voltages table left side the schematic diagram.



DC voltages of X29-1120-03 (Reference value)

Unit: V

Pin No.	IC 2		IC 3		IC 4		IC 5		IC 6		IC 7	
	STOP	33 rpm	STOP	33 rpm	STOP	33 rpm	STOP	33 rpm	STOP	33 rpm	STOP	33 rpm
1	L	H	H	H	L	L	L	L	7.0	7.0	0	6.1
2	L	H	H	H	L	L	L	L	7.0	7.0	14.2	7.5
3	H	L	L	L	8.4	9.0	H	L	7.5	7.4	13.5	13.5
4	H	H	H	H	0.2	0.2	H	H	L	L	0	0
5	H	L	L	L	L	L	H	H	H	H	14.1	0
6	L	13.3	13.3	L	H	H	H	H	H	H	0	14.0
7	0	→	0	→	0	→	0	→	0	→	0	H
8	H	H	H	H	5.8	5.1	0	→	0	→	L	*
9	L	H	H	H	L	0	→	→	12.9	*	H	L
10	H	L	L	L	8.2	8.7	L	*	14.2	*	*	L
11	H	H	H	L	L	L	H	*	14.2	→	1.6	*
12	L	L	L	H	H	0	→	→	L	0.1	0.1	14.2
13	L	L	L	L	L	L	L	*	7.0	7.0	1.5	*
14	14.2	→	14.2	→	L	H	H	5.6	5.1	14.2	→	L
15	→	→	→	→	H	L	L	L	8.6	9.0	→	H
16	→	→	→	→	14.2	→	14.2	→	→	→	L	L

Pin No.	IC 8		IC 10		IC 11		IC 12		IC 13		
	STOP	33 rpm	STOP	33 rpm	STOP	33 rpm	STOP	33 rpm	STOP	33 rpm	
1	0	→	0	→	0.8	4.0	0	0.8	4.9	0	0
2	0	0	9.2	6.9	6.9	0	1.4	0.8	H	L	14.0
3	0	14.2	14.2	6.9	6.9	6.9	0	1.4	0.8	L	5.2
4	0	14.2	14.2	→	5.4	1.4	4.6	L	H	L	0
5	0.3	0.2	0.2	6.8	6.8	6.8	0	14.2	0	0.6	L
6	0.2	0.2	0.2	6.8	6.8	6.8	0	14.2	0	H	L
7	14.2	→	6.1	6.2	6.2	0	→	→	14.2	→	14.2
8	0.6	0.2	0.2	6.0	6.0	5.7	1.8	4.9	L	H	H
9	0	0	0	0	0	3.8	1.8	1.3	L	H	H
10	0	→	→	3.8	1.8	1.3	H	H	H	→	→
11	0	→	→	3.8	5.2	1.3	5.7	5.2	4.9	→	→
12	→	→	→	6.8	6.8	6.8	14.2	0	14.0	L	H
13	→	→	→	13.5	7.3	7.3	14.2	0	14.0	L	0.2
14	→	→	→	0	0	0	14.2	→	→	→	→

L: 0V
H: 14.2V

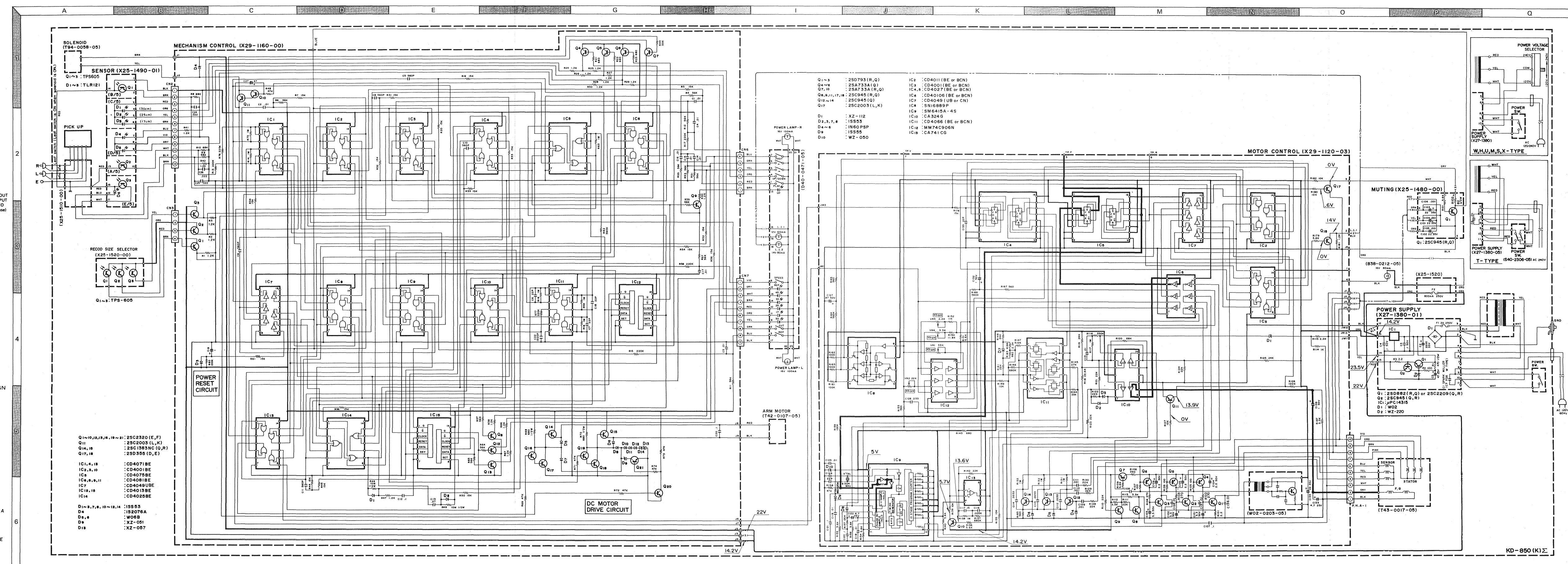
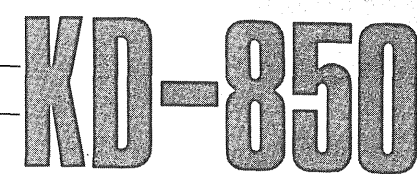
→: Impossible to measure

IC 9	1	2	3	4	5	6	7	8	9	10	11
STOP	5	1.6	1.2	4.4	4.8	4.3	3.8	2.0	1.4	0	1.7
33rpm	1.6	1.2	2.2	1.4	2.6	1.8	2.7	1.9	2.2	1.3	
45rpm	1.6	1.2	2.3	1.0	2.0	1.3	2.0	1.4	1.6	0.8	
IC 9	12	13	14	15	16	17	18	19	20	21	22
STOP	4.7	0	0	5	5	5	0	0	0	0	0
33rpm	0	0	0	→	→	→	→	→	→	→	→
45rpm	4.7	0	0	→	→	→	→	→	→	→	→

4001	CD4001	MC14001
4013	CD4013	MC14013
4025	CD4025	MC14025
4071	CD4071	MC14071
4081	CD4081	MC14081



FULL AUTOMATIC QUARTZ PLL DIRECT DRIVE TURNTABLE



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

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

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

SPECIFICATIONS

- MOTOR & TURNTABLE**
- Drive System: Quartz PLL direct drive system
 - Motor: 20 pole, 30 slot brushless DC servo motor (Starting torque 1.5kg-cm)
 - Turtable Platter: 33cm (13inch) diameter, aluminum alloy die-cast (Weight: 2.8kg (6.17lbs))
 - Wav & Filter: Moment of inertia: 550g-cm²
 - Speeds: 2 speeds: 33.1/3 and 45 rpm
 - Signal to Noise Ratio: More than 82dB
 - Rumble: DIN weighted better than -83dB
 - Load Fluctuation: 0% (within 120g of tracking force)
 - Transient Load Fluctuation: Less than 0.0003% (at 33.1/3 rpm, 400Hz, 20g-cm load)
 - Starting Time: Within 1.8sec
 - Platter Speed Deviation: Less than 0.002%
 - Time Diff: Less than 0.0002%
 - Temperature Drift: Less than 0.00002%/C

- TONERARM**
- Type: Static balanced type, S-shaped pipe arm, EIA plug-in connector
 - Effective Tonerarm Length: 245mm (9.5/8inch)
 - Overhang: 15mm (0.6inch)
 - Tracking Error: ±1.8 to ±1.0 degree
 - Stylus Pressure Variable Range: 0 to 3grams (0.1g step)
 - Usable Cartridge Weight: 2.0 to 12.0grams
 - Adjustable height Range: Within a 3mm (1/8inch)
 - Arm Base: Wedge-shaped chuck type

- CARTRIDGE**
- (Only military's model is equipped with the DM-11 cartridge.)
 - Furnished Cartridge: DM-11 (DM type)
 - Stylus: N-11 with 0.5 mil diamond
 - Frequency Response: 20Hz to 20,000Hz
 - Output Voltage: 3.5mV (1,000Hz, 5cm/sec.)
 - Optimum Tracking Force: 2.0 ± 0.3grams
 - load Impedance: 50kohms
 - Channel Separation: Better than 27dB (1,000Hz)
 - Replacement Stylus: N-11

- ADDITIONAL FEATURES:**
- Full electronic controlled fully-automatic tonearm system (Automatic lead-in/return/cue/repeat)
 - Automatic disc size selector
 - Free-selection tonearm operation system (Forward/reverse)
 - Oil damped cueing device
 - Illuminated quartz-look indicator
 - LED speed indicators
 - Electronic-controlled brake
 - Stylus height adjuster
 - Wedge-shaped chuck type arm base
 - Anti-skating device
 - Low capacitance phono cables
 - Stylus pressure direct readout counter
 - Adjustable height insulators
 - Acrylic dust cover (weight: 1.2kg)
 - Head-shell stand

- MISCELLANEOUS**
- Power Requirement: AC 120V, 60Hz; U.S.A. and Canada models; AC 240V, 50Hz; European and U.K. model
 - AC 120V/220V (switchable), 50Hz/60Hz; European and Military models
 - AC 120V/240V (switchable), 50Hz/60Hz; Other countries.
 - Power Consumption: 35.5 watts
 - Dimensions: W 439mm (19-5/16"); H 176mm (6-15/16"); D 404mm (15-7/8")
 - Weight: 14.5kg (32.0lbs)

- SUPPLIED ACCESSORIES:**
- 45rpm adaptor
 - Overhang gauge
 - Screw driver
 - Ground wire

- CABINET**
- Material: Particle board laminated with simulated wood grain veneer and an Anti-Resonance Compression Base (ARC/B) are combined in the construction of the Cabinet.

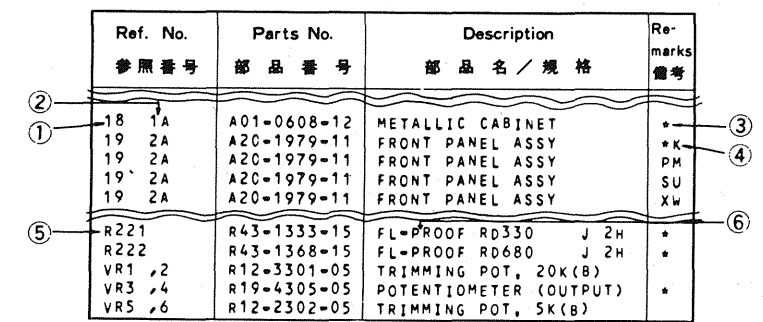
DC voltages are measured when the DD motor is OFF.

PARTS LIST

PARTS LIST

PARTS LIST

PARTS LIST



- ① Exploded view drawing No.
② Position in exploded view.
③ Symbol of new parts.
④ Area to which parts are shipped.
⑤ Reference No. in schematic diagram.
⑥ Abbreviation of "Flame proof metal oxide film resistor".

- 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
OIL Oil capacitor

- 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
2B Rated wattage 1/8W
2E Rated wattage 1/4W
2H Rated wattage 1/2W
3A Rated wattage 1W
3D Rated wattage 2W
3F Rated wattage 3W
3G Rated wattage 4W
3H Rated wattage 5W

- Abbreviations common to capacitors and resistors
C ±0.25pF (Used for capacitors only)
D ±0.5pF (Used for capacitors only)
F ±1%
G ±2%
J ±5%
K ±10%
M ±20%
Z +80% -20% (Used for capacitors only)
P +100% -0% (Used for capacitors only)

Codes in X27-1380
K: X27-1380-01
P: X27-1380-02
W: X27-1380-03
M: X27-1380-04
T: X27-1380-05

Table with columns: Ref. No., Parts No., Description, Remarks. Includes sub-section 'UNIT (KD-850)' with various components like operation panel, mounting hardware, and turntable case.

Table with columns: Ref. No., Parts No., Description, Remarks. Lists various electrical and mechanical parts such as switches, fuses, and capacitors.

Table with columns: Ref. No., Parts No., Description, Remarks. Lists parts including vibration isolators, shells, hinges, and various bushings.

Table with columns: Ref. No., Parts No., Description, Remarks. Lists parts for muting, sensor, junction, fuse, power supply, and motor control.

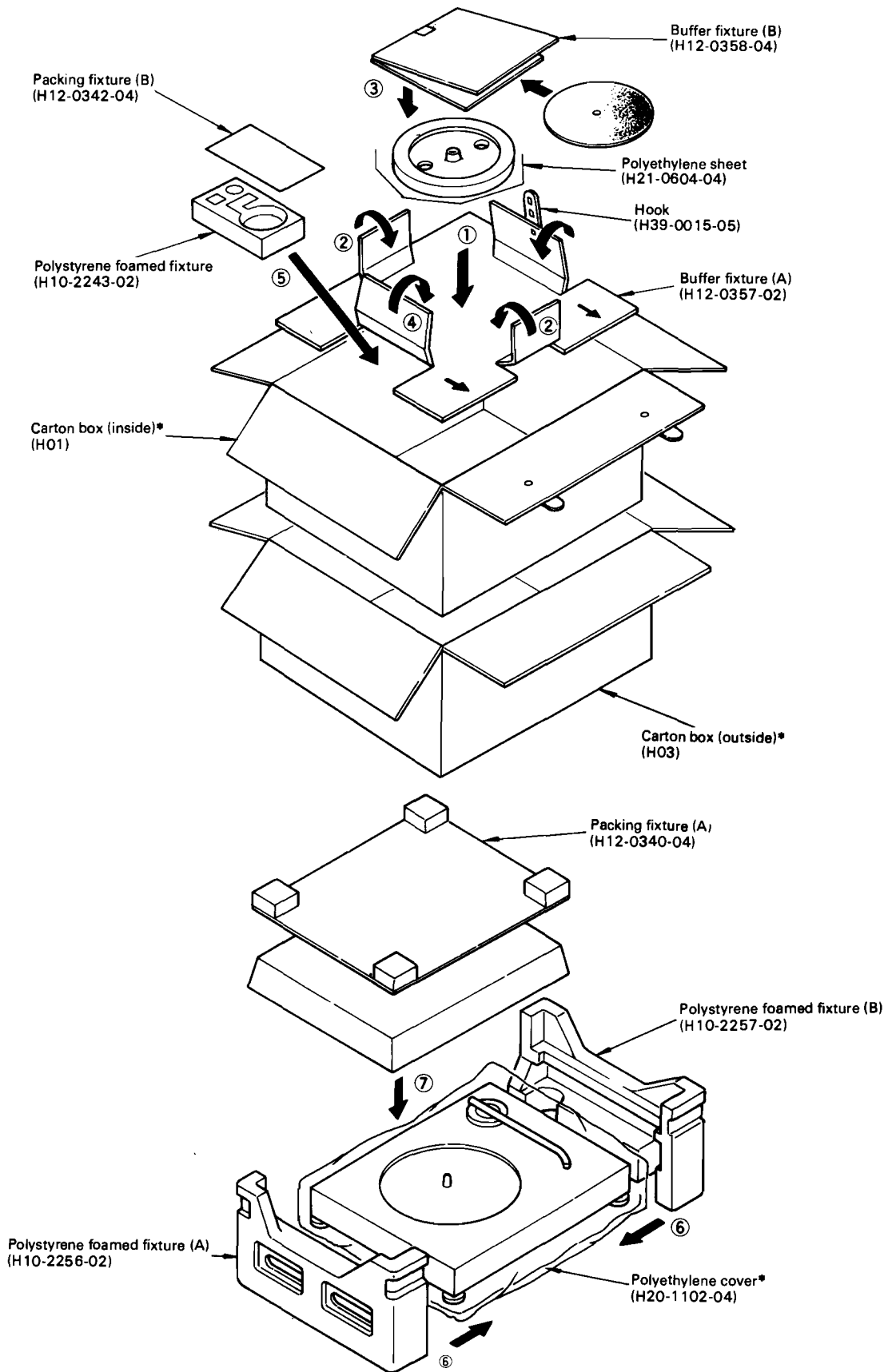
Table with columns: Ref. No., Parts No., Description, Remarks. Lists various electronic components like resistors, capacitors, and diodes.

Table with columns: Ref. No., Parts No., Description, Remarks. Lists parts for oscillation block, mechanical control, and various electronic components.

Table with columns: Ref. No., Parts No., Description, Remarks. Lists various electronic components like capacitors, resistors, and diodes.

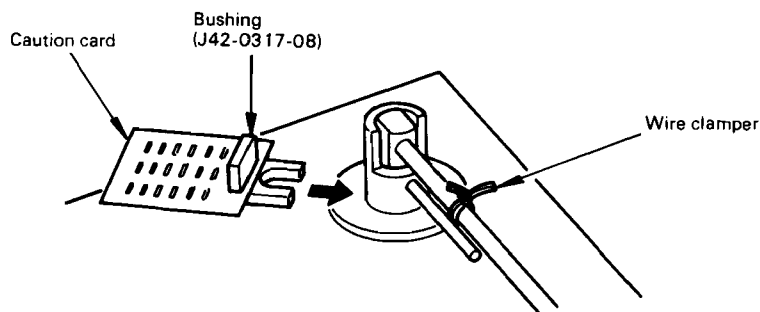
Table with columns: Ref. No., Parts No., Description, Remarks. Lists various electronic components like capacitors, resistors, and diodes.

PACKING



* Refer to Parts List

PACKING



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