SHARP OPTONICA

SERVICE MANUAL

RP-9100H
RP-9100HB

MICROPROCESSOR CONTROLLED STEREO TURNTABLE

MODEL

RP-9100H (Silver panel)
RP-9100HB (Brown panel)

with REMOTE CONTROL UNIT

MODEL AD-700

(PHOTO : RP-9100H)

AD-700

APMS
Auto Programmable Music Selector

In the interests of user-safety the set should be restored to its original condition and only parts identical to those specified be used.

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SHARP CORPORATION OSAKA, JAPAN

SPECIFICATIONS

General

Type:	Micro-processor Controlled Stereo Turntable OPTONICA RP-9100H/HB
Power Source:	A.C. 110/220/240 V, 50/60 Hz
Power Rating:	20 Watts.
Semiconductors:	40 ICs 40 Transistors 22 Diodes 2 Hall Elements 2 Quartz Crystal Oscillator
Overall Dimensions:	
Front length;	440 mm. (17-3/8")
Side length;	480 mm. (19")
Height;	135 mm. (5-5/16")
Weight:	11 kg (24.3 lbs.)

Turntable

Motor:	Core-less DC Servo Mono-torque
Stabilization:	160-pole Frequency Generator, P.L.L. with Quartz Crystal Oscillator, sample hold phase detector
Drive System:	Direct
Speeds:	33-1/3 rpm. and 45 rpm.
Control Range:	±4%
Wow and Flutter:	±0.045% (DIN 45 507)
Rumble:	Less than 68 dB (DIN-B)
Platter:	31 cm. (12-1/4") diameter diecast aluminium, machined and balanced.

Tonearm

Type:	Statically balanced, tubular, with APMS Sensor.
Effective Length:	227 mm. (9")
Overhang:	15 mm. (7/16")
Off-set Angle:	23°
Cartridge Weight:	4 g. to 10 g.

Remote control unit

Type:	AD-700
Power:	Battery. 6 x 1.5 V. UM/SUM-3 (HP-7)

Specifications are subject to change without prior notice.

FEATURES

Inclusive Front Panel Controls
The RP-9100H/HB unit is designed with all controls mounted on the front panel in a logical arrangement. Also the control panel is protected during play and storage with a rigid translucent cover.

Automatic Programmable Music Selector (APMS)
The RP-9100H/HB micro-processor facilitates the selection of a program of musical items from one record. This is possible on all standard records having gapped bands. Up to 15 separate items can be selected and played in any arrangement. The program composed can be automatically repeated — continuously or for fixed repetitions.

Mono-torque Direct Drive Motor
The newly developed OPTONICA mono-torque direct drive motor maintains a constant rotational torque on the platter. The drive system incorporates a 160 pole frequency generator and P.L.L. quartz crystal oscillator circuit which virtually eliminates minute platter fluctuations during play.

Tonearm Drive Motor
The tonearm drive motor corrects centrifugal forces during record play and improves tracking control. The motor also operates the control mechanisms so that all control buttons only require very light pressure.

Statically Balanced Tonearm
The tonearm is a highly sensitive, statically balanced universal type.

Precision Engineered Diecast Platter
Weighing as much as 1.4 kg (3.1 lbs.), this diecast platter greatly improves its wow & flutter.

Remote Control Unit
The AD-700 infrared remote control unit duplicates all of the RP-9100H/HB unit's controls except the power switch and APMS sensor sensitivity control. Remote control is effective 10-meters from main unit.

Mode/Number Display
The Display indicates operational modes — tonearm life, and automatic lead-in. The Display also indicates all micro-processor inputs — program item selections, remaining items to be played, and a program item review after play.

DISASSEMBLY

Prior to removing the chassis, be sure to draw the AC power supply plug from a wall outlet. Then, proceed with the removal work in the following order after disconnecting all of the connection cords at the rear of the unit.
Turn the unit over, remove the ten (10) screws and two (2) nuts retaining the bottom cover, then the bottom cover can be detached.

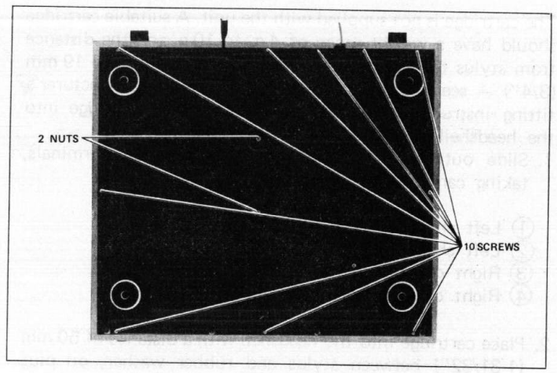


Figure 3–1

AC SUPPLY VOLTAGE SELECTION

The RP-9100H/HB unit operates on a 110 V, 220 V, or 240 V. AC supply of either 50 Hz or 60 Hz. The unit needs to be adjusted to the local supply voltage level. The Voltage Selector is on the turntable chassis under the platter.
1. Check the AC supply plug — do not connect to outlet.
2. Turn the Voltage Selector with a screwdriver until the correct voltage reading appears in the window adjacent to adjusting screw.

Figure 3–2

Note:
The DC motor — for driving the turntable — can be operated on an AC mains supply of 50 Hz or 60 Hz.

Note for users in UK
IMPORTANT
The wires in the mains lead of this apparatus are coloured in accordance with the following code:
BLUE: "NEUTRAL"
BROWN: "LIVE"

CONNECTING PLUG TO MAINS LEAD:
As the coloures of the wires in the mains lead of this apparatus may not correspond to the coloured markings identifying the terminals in your plug, proceed as follows:
* The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.
* The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

This apparatus must be protected by a 3 A fuse in the mains plug or distribution board.
This equipment leaves the factory adjusted for use on a 240-volt (50 Hz) mains supply.

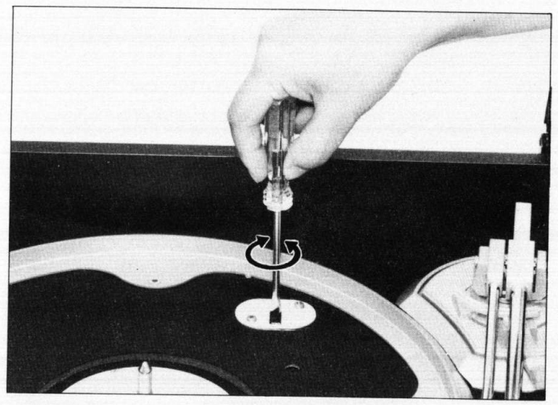


Figure 3–3

CARTRIDGE FITTING

The cartridge is not supplied with the unit. A suitable cartridge should have a weight range of 4 g, to 10 g, and the distance from stylus tip to top of cartridge should not exceed 19 mm (3/4") – see figure 4–2. Read the cartridge manufacturer's fitting instructions carefully before installing cartridge into the headshell of the R P-9100H/HB unit.

1. Slide output lead connectors onto cartridge terminals, taking care to observe correct polarity.

   ① Left channel Earth (Blue)
   ② Left channel (White)
   ③ Right channel (Red)
   ④ Right channel Earth (Green)

2. Place cartridge into the headshell with a distance of 50 mm (1-31/32") between stylus and rubber washer, on plug end of headshell – see figure 4–2. This is a critical adjustment for the APMS functioning.

   ⑤ Rubber grommet

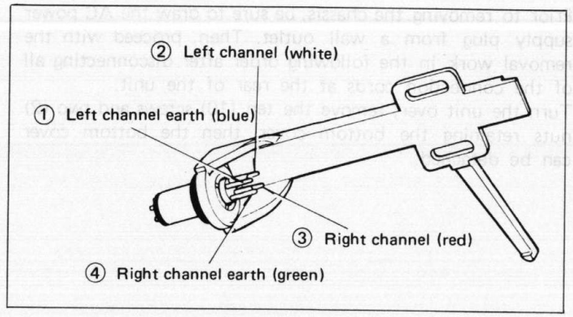


Figure 4–1

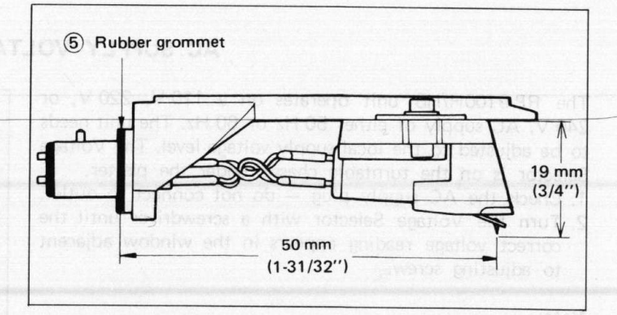


Figure 4–2

TONEARM LIFTER-FREEING

The tonearm lifter may require freeing on the new unit and also after a period of disuse.
Operate the lifter by hand – sliding it up and down – several times until movement is smooth.

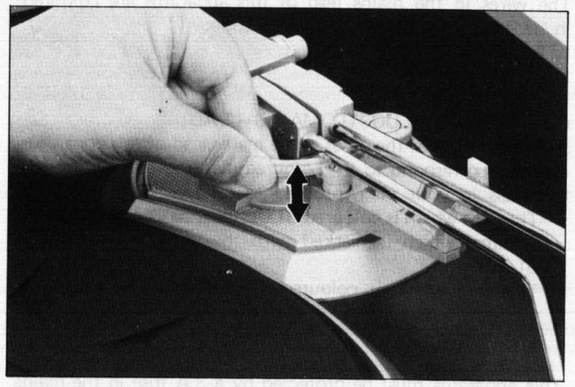


Figure 4–3

TONEARM TRACKING AND ANTI-SKATING-ADJUSTMENT

1. Turn anti-skating control to "0".
2. Swing tonearm over platter and maintain support with finger.
3. Rotate tracking force control until tonearm is balanced – when it remains in horizontal position without support.
4. Replace tonearm on its rest.
5. Re-align tracking force control dial (with graduations) to zero reading.
6. Rotate tracking force control to correct value (as recommended by cartridge manufacturer). Numerals on control dial indicate grams pressure.
7. Adjust anti-skating control to same value as tracking force.

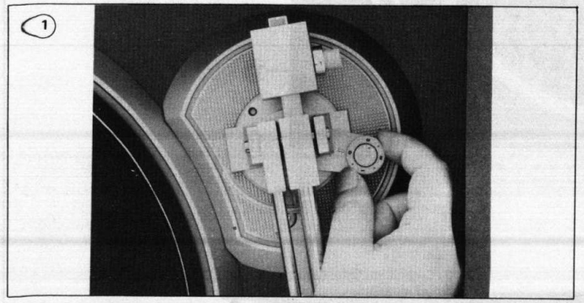


Figure 5–1

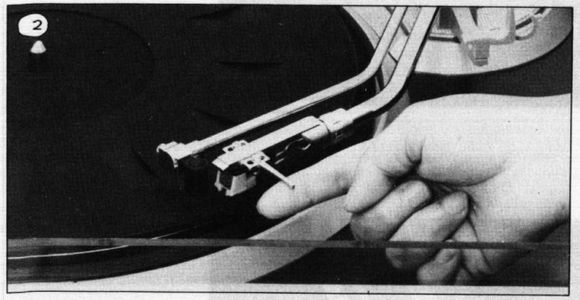


Figure 5–2

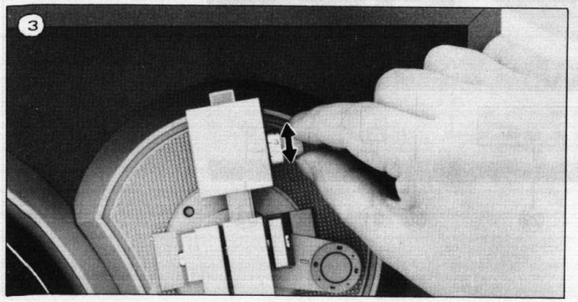


Figure 5–3

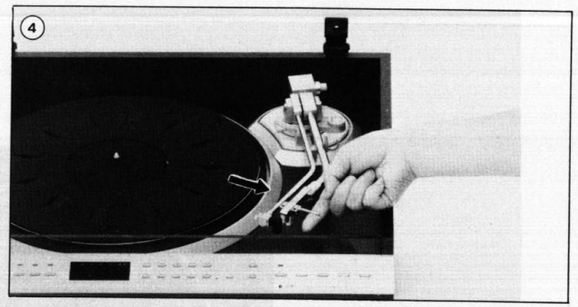


Figure 5–4

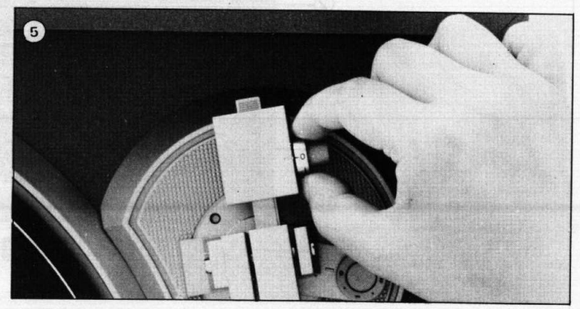


Figure 5–5

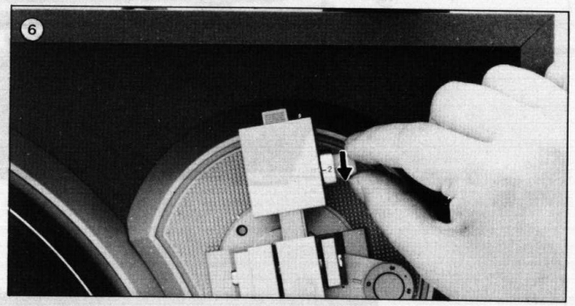


Figure 5–6

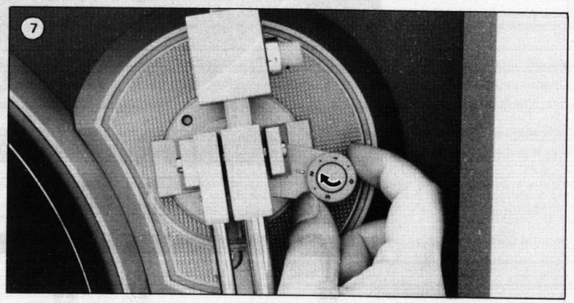


Figure 5–7

PARTS LAYOUT AND FRONT CONTROLS

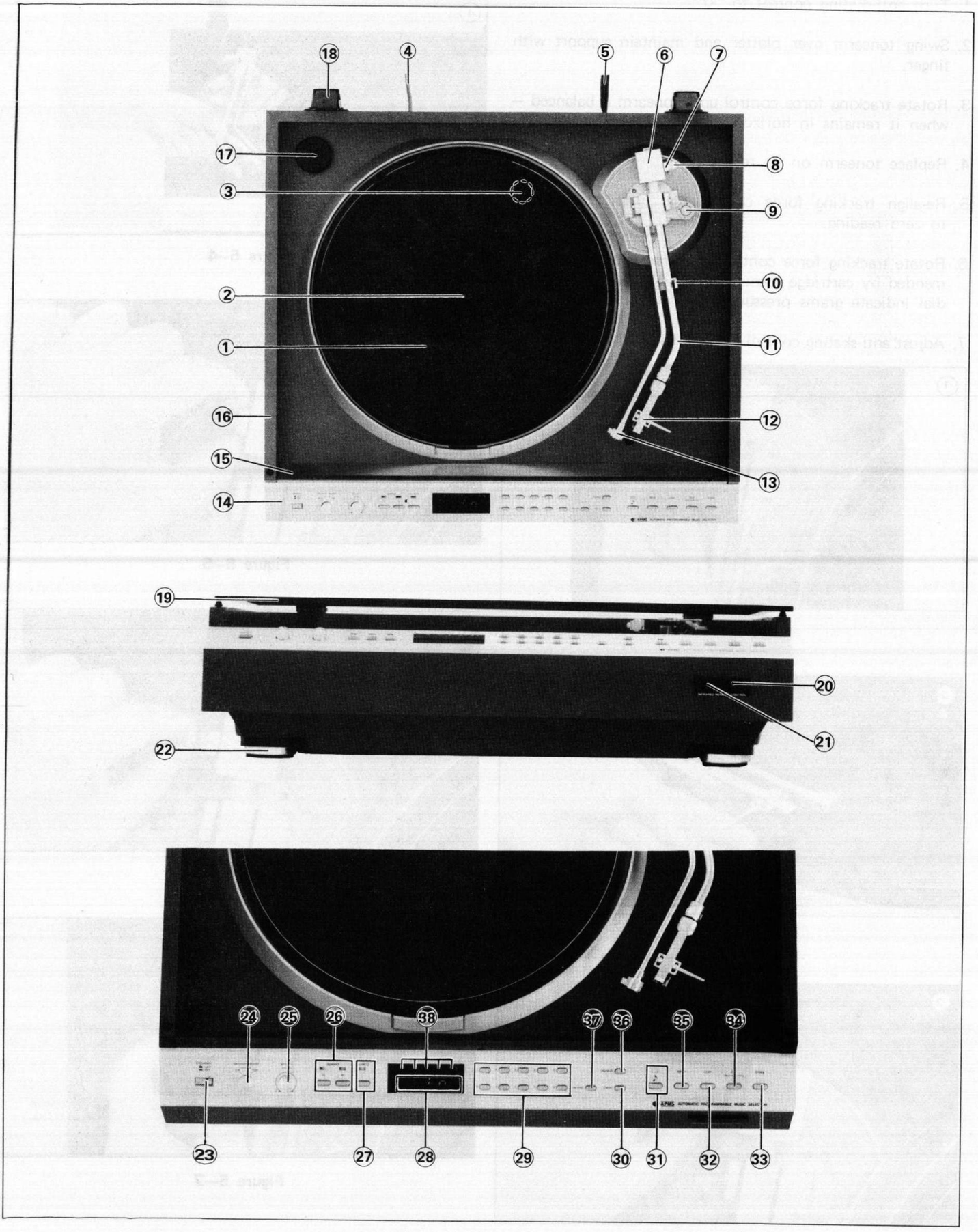


Figure 6

① Turntable Platter Mat (Rubber) (91Z871160)
② Center Spindle
③ Socket, AC Supply Voltage Selector (QSOCE0558AFZZ)
④ AC Supply Cord
⑤ Output Cord and Earth Cord (QCNW-0627AFZZ)
⑥ Counterbalance Weight
⑦ Tracking Force Guage
⑧ Tracking Force Adjuster
⑨ Anti-Skating Control
⑩ Tonearm Rest
⑪ Tonearm (91Z851919)
⑫ Headshell
⑬ APMS (Music Band) Sensor
⑭ Front Panel (RP-9100H HPNLC3415AFSA, RP-9100HB HPNLC3415AFSB)
⑮ Front Cover, Acryl Plate (GCOVA1183AFSA)
⑯ Cabinet (91Z847415)
⑰ EP Adaptor (PEPAP0050AFSA)
⑱ Hinge (91Z872331)
⑲ Dust Cover (91Z851908)
⑳ Remote Control Receptor (91Z898616)
㉑ Remote Control Indicator, LED (VHPGL-5PG5/1F)
㉒ Front Insulated Legs (91Z898646)
㉓ Power ON/OFF Switch Button (RP-9100H JKNBM0297AFSA, RP-9100HB JKNBM0297AFSB)
㉔ Sensor Level Control Knob (RP-9100H JKNBN0441AFSA, RP-9100HB JKNBN0441AFSB)
㉕ Pitch Control (Fine Speed Adjustment) Knob (RP-9100H JKNBN0442AFSA, RP-9100HB JKNBN0442AFSB)
㉖ Speed Selector Button (RP-9100H JKNBZ0178AFSA, RP-9100HB JKNBZ0178AFSB) and Indicators (33-1/3 rpm VHPGL-9NG12-1, 45 rpm RH-PX1008AFZZ)
㉗ Quartz Crystal P.L.L. Circuit ON/OFF Switch Button (RP-9100H JKNBZ0178AFSA, RP-9100HB JKNBZ0178AFSB) and Indicator (RH-PX1008AFZZ)
㉘ Operation Mode/Program Item-Number Display, LED (VHPGL9P03D/-1)
㉙ APMS Item Number Input Buttons (RP-9100H JKNBZ0164AFSA, RP-9100HB JKNBZ0164AFSB)
㉚ Clear Button (RP-9100H JKNBZ0164AFSA, RP-9100HB JKNBZ0164AFSB)
㉛ Input Tone (♪) ON/OFF Switch Button (RP-9100H JKNBZ 0178AFSA, RP-9100HB JKNBZ0178AFSB) and Indicator (VHPGL-9NG12-1)
㉜ Cue/Pause Button (RP-9100H JKNBZ0178AFSA, RP-9100HB JKNBZ0178AFSB)
㉝ Play Start Button(RP-9100H JKNBZ0178AFSA, RP-9100HB JKNBZ0178AFSB)
㉞ Cut/Clear Memory Button (RP-9100H JKNBZ0178AFSA, RP-9100HB JKNBZ0178AFSB)
㉟ Skip Button (RP-9100H JKNBZ0178AFSA, RP-9100HB JKNBZ 0178AFSB)
㊱ Repeat Play Button (RP-9100H JKNBZ0164AFSA, RP-9100HB JKNBZ0164AFSB)
㊲ Channel Selection Button (RP-9100H JKNBZ0164AFSA, RP-9100HB JKNBZ0164AFSB)
㊳ Pitch Indication Display, LED (RH-PX1008AFZZ)

REMOTE CONTROL UNIT (MODEL AD-700)

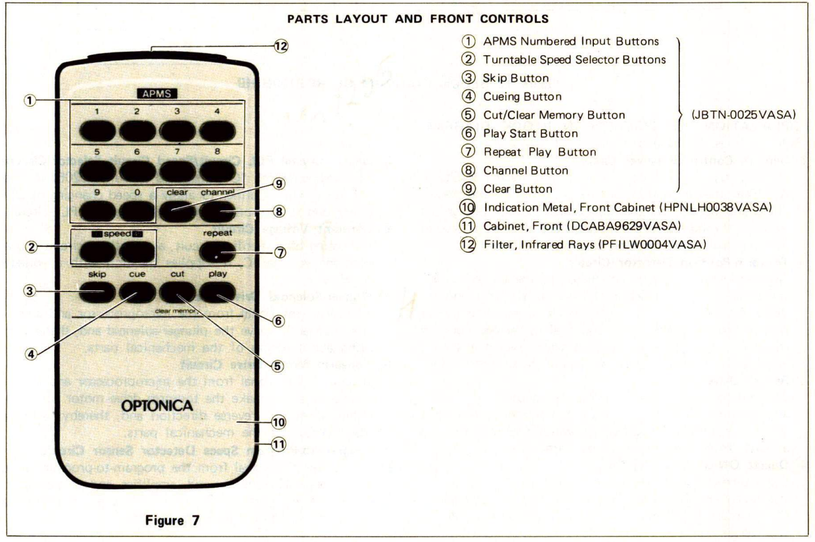


Figure 7

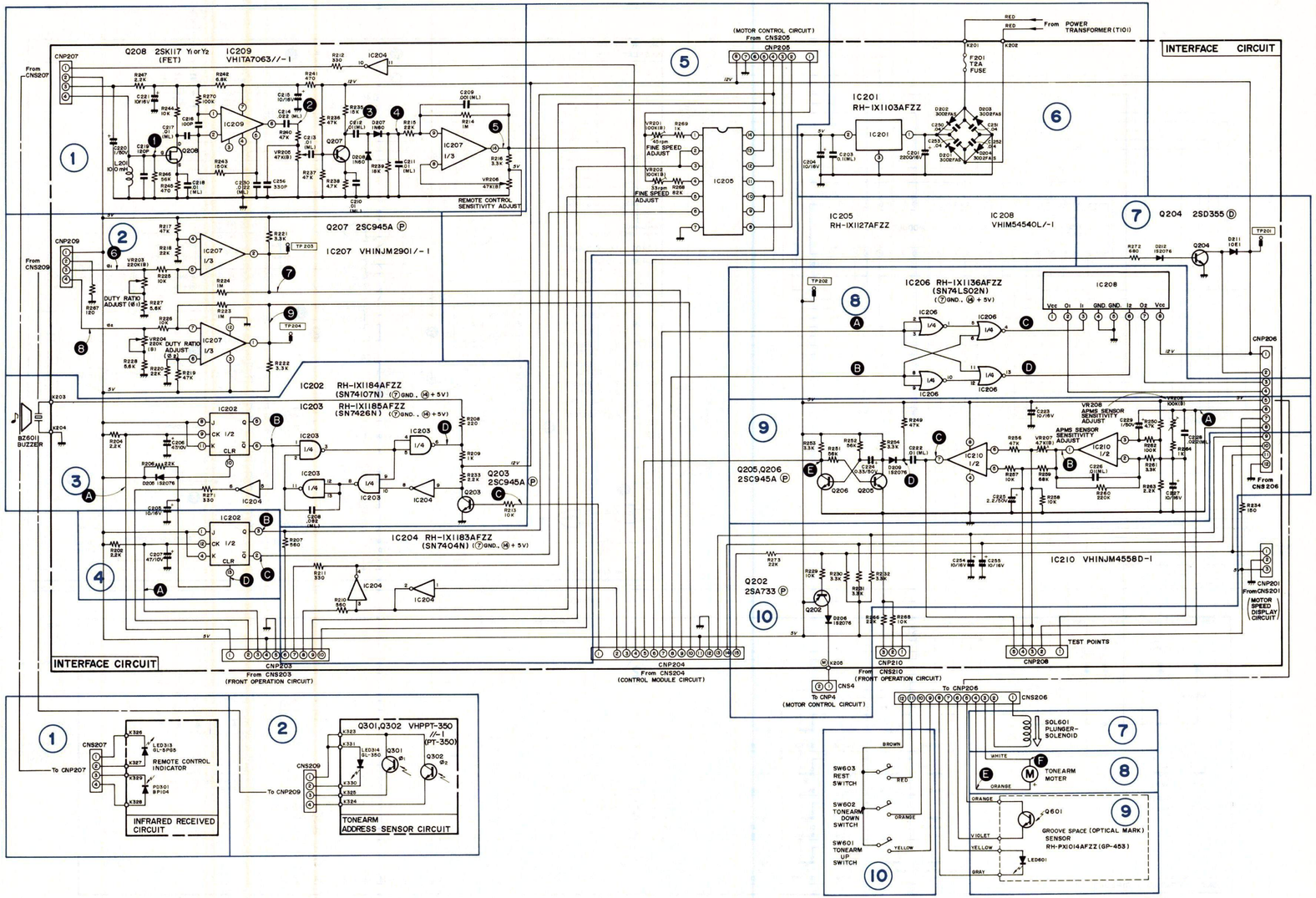


Figure 8 INTERFACE CIRCUIT

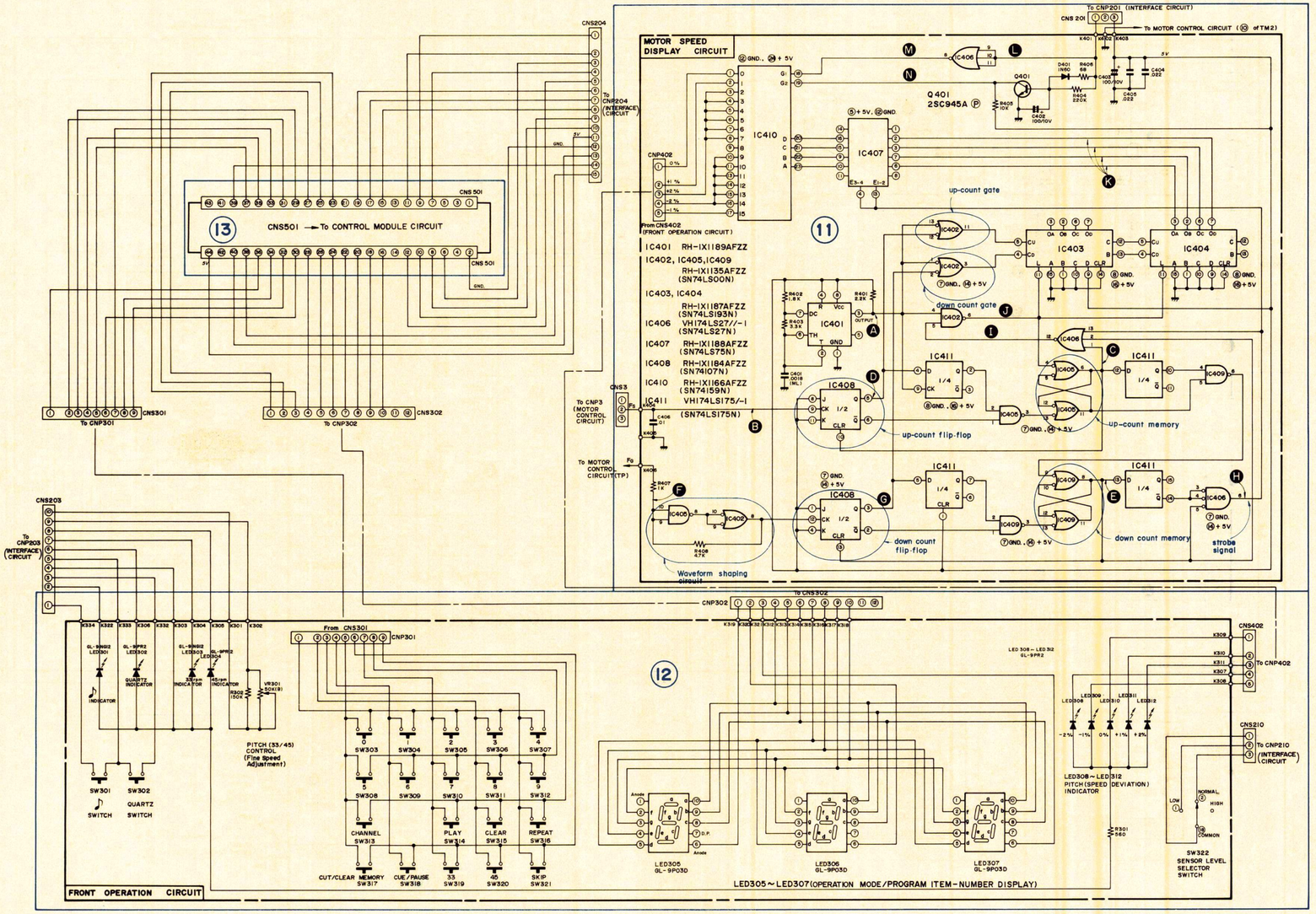


Figure 10 FRONT OPERATION CIRCUIT/MOTOR SPEED DISPLAY CIRCUIT

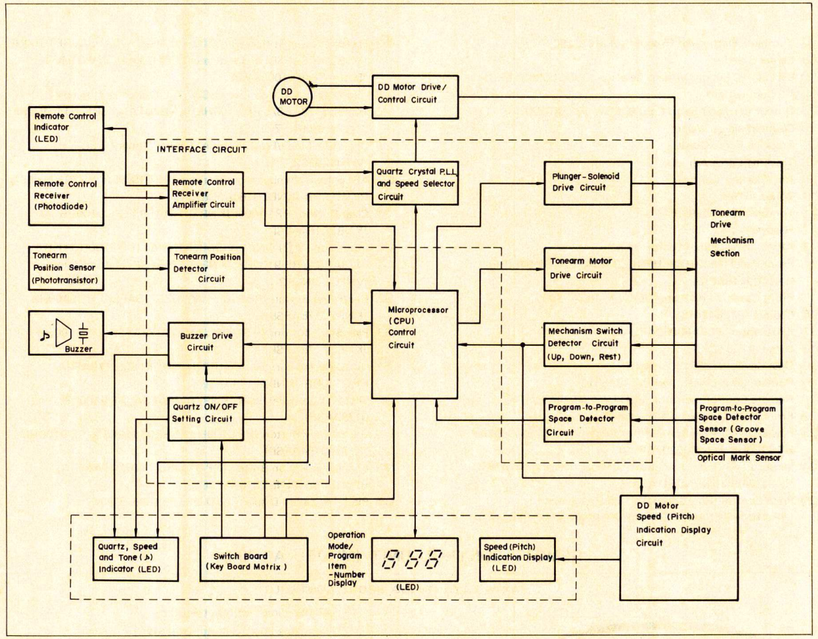


Figure 12 BLOCK DIAGRAM OF RP-9100H/HB

EXPLANATION OF CIRCUITS IN BLOCK DIAGRAM

(Refer to Figs. 8, 10 and 12)

① **Remote Control Receiver Circuit**
Emitted by the remote control transmitter (MODEL AD-700), the infrared-ray signal is sensed by the photo-diode and applied to the transistors and ICs (integrated circuits) through which it is amplified as well as shaped in waveform, then reaching the microprocessor.

② **Tonearm-Position Detector Circuit**
One slit plate is directly connected to the tonearm shaft and it moves as the tonearm changes position, but another slit is designed not to move at all. The infrared-ray sensor is intended to detect the positional difference between the two slit plates to produce a signal, which is shaped in waveform by the IC, then applied to the microprocessor.

③ **Buzzer Drive Circuit**
The buzzer drive circuit consists of an oscillator circuit and a control circuit, through which a buzzer sounds when the key (button) is pushed or when the unit receives a signal from the remote control transmitter.

④ **Quartz ON-OFF Setting Circuit**
Every time the quartz crystal switch key (button) is pushed, the quartz ON-OFF setting circuit causes the quartz crystal PLL circuit to change from "on" to "off" state or vice versa.

⑤ **Quartz Crystal PLL Circuit/Speed Circuit Selector Circuit**
The analog switch IC (Integrated Circuit, IC205) in this selector circuit is either to allow a speed changing of DD motor and to turn on or off the quartz crystal PLL circuit.

⑥ **Constant Voltage Circuit**
Consisting of a rectifier circuit, a smoothing circuit and a constant voltage IC, it supplies the unit with a voltage of +5 V.

⑦ **Plunger-Solenoid Drive Circuit**
It receives the signal from the microprocessor and amplifies it so as to drive the plunger-solenoid and, thereby to bring about action of the mechanical parts.

⑧ **Tonearm Motor Drive Circuit**
It receives the signal from the microprocessor and amplifies it so as to make the tonearm drive motor rotate in either normal or reverse direction and, thereby to bring about action of the mechanical parts.

⑨ **Program-to-Program Space Detector Sensor Circuit**
It receives the signal from the program-to-program space sensor (APMS sensor), and amplifies and shapes it in waveform; program-to-program space pulse is thus created to be delivered to the microprocessor.

⑩ Mechanism Switch Detector Circuit
It detects in which mode the tonearm drive mechanism is situated, and its output signal is fed to the microprocessor, and to the DD motor start/stop circuit and the blanking circuit (acting on the speed indicator LED) as well.

⑪ Speed Indicator Circuit
It detects FG signal coming from the DD motor control circuit and compares it with the reference signal (from the DD motor control circuit), as a result of which the pulse length is decided from period to period to light up the LED (composed of 5 dots).

⑫ Control Board Circuit
It is composed of a control keyboard matrix and an indicator LED circuit.

⑬ Microprocessor (Control Circuit)
Consisting of 8-bit CPU, PIO, ROM and RAM, it serves all the controls including auto-play operation and APMS operation. Also it comprises an indicator 3-digit LED drive circuit.

WHAT'S APMS

1. Principle of APMS Operation

APMS (Automatic Programmable Music Selector) equipped in this model is a breakthrough never found in ordinary audio apparatus, which permits the unit to select and play the desired programs in the desired order fully automatically for yourself; it is, then, no wonder to call it a full-automatic record player system.

A special arm, connected to the program-to-program detector sensor, is employed and it moves as the pickup arm moves so as to detect program-to-program spaces of a record with the very accuracy.

The program-to-program space detector sensor is the combination of an infrared emitting diode and a photo-transistor, which is called an optical mark sensor in another way, and which produces an output just when it travels over the program-to-program spaces of a record in playback. How far the tonearm has moved is detected in such a way that: as the tonearm moves, so does the slit plate which is coupled with the former, the distance thus caused is detected by the infrared emitting diode and phototransistors which transform it to be an electrical signal. The APMS allows you to memorize the order of playing recorded programs and the number of times of repeating them, in the microprocessor by merely pushing the operation buttons (keys) on the front panel [during the memorization, each time the operation button (key) is pushed, the operation mode/program item-number display tells you which key has been just pushed].

When the play button (key) is pushed, the tonearm begins scanning to reach the recorded grooves of a record, then the microprocessor makes comparison between the program-to-program space signal and the tonearm-position detection signal to find out both the start and end points of every program and write the information of them into the memory.

When the scanning of the tonearm reaches its end, the microprocessor gets now prepared to supply the tonearm drive mechanism with the signal, one that permits the unit to do playing according to the programs thus memorized; at the same time to supply the operation mode/program item-number display circuit with the signal, one that allows the unit to indicate what program is being played.

2. APMS Block Diagram

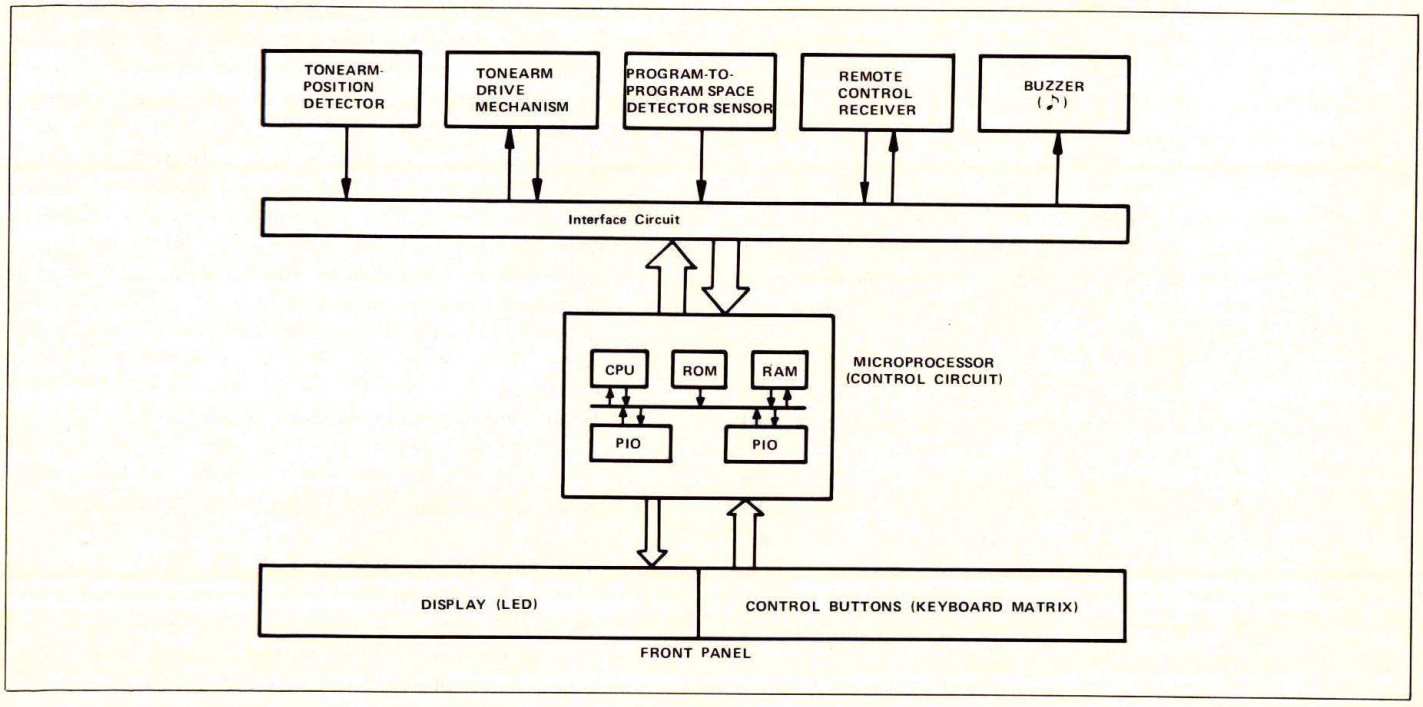


Figure 13 APMS BLOCK DIAGRAM

3. Detecting Capacity of APMS

Sensor-detection of the APMS relies on a leading groove of non-recorded part of a record, and it may come to be wrong with some record; say, the tonearm may either descend onto a program prior to the designated one or go over the designated program to the next one. This is, however, a malfunction.

If this happens, set the sensor level control to "low" or "high" position; otherwise keep it at "normal" position.

In the following instances, a normal APMS operation may not be attained even if the sensor level control is set at either "low" or "high" position. In this case, let the unit play in "manual" operation mode.

3–1. The APMS (program-to-program space detector) sensor is designed to operate making use of infrared rays, and it can detect a program-to-program space of a record which is 0.4 mm wide or more.
If a record comprises such spaces as less than the limited width (0.4 mm), the APMS may not function.

APMS (program-to-program space detector) sensor

{ Light emitting element: Infrared emitting diode
  Light receiving element: Phototransistor }

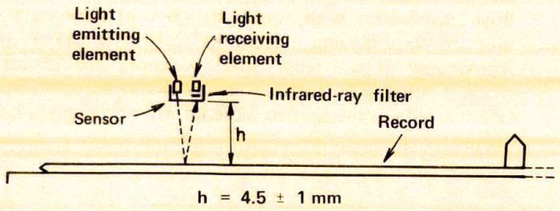


Figure 14

3–2. If a record is colored in other than black (like red, white, etc.), or it is a transparent one, the APMS may not function normally. This is also true with a record which is much eccentric or warped.

3–3. Reflection and irregular reflection of the infrared rays of the APMS (program-to-program space detector) sensor give rise to detection of whether a part of a record is recorded or not recorded.
This is why if a record is the one subjected to a rather inferior cutting skil, even its recorded part may be considered as a non-recorded part by the APMS.

3–4. Application of a great amount of light (from a spotlight, for instance) to the surface of a record may not permit the APMS to function normally.

4. Record Size Detection

The microprocessor, using the output of the program-to-program space detector sensor, is also capable of a detection of the record size (30 cm, 25 cm or 17 cm) and of whether or not a record is being placed on the unit as well.

If there is not a record, the APMS has the tonearm, if moved, automatically return to its rest.

Note:

- In playing a record out of the specified size (17 cm, 25 cm or 30 cm) in "automatic" operation mode, the APMS may cause the tonearm to go out of the periphery of a record, and, thereby to damage the stylus tip. In this case, let the unit play in "manual" operation mode.
- If the most inner groove (with signal recorded) of a record is at less than 55 mm (2-3/16 inches) from the center hole, the tonearm may not return automatically to its rest even after a playing is finished. In this case, press the "cut" button.

CIRCUITRY BEHAVIORS

(Refer to Figures 8 and 10)

1–1. Remote Control Receiver Circuit (Refer to Fig. 8)
Emitted by the remote control transmitter (MODEL AD-700), the infrared-ray signal enters the photodiode (PD301) of the remote control receiver, and it is here converted into an electric signal. This new signal is then applied to the parallel resonance circuit formed by coil (L201) and capacitor (C219) where noises other than the 40 kHz signal are removed, then it is amplified while passing through the high-input-impedance FET (Field Effect Transistor Q208), and AF amplifier IC (Integrated Circuit IC209), and into the transistor (Q207). The amplified signal goes out of the collector of transistor (Q207) and is applied to the diodes (D207 and D208) to be detected for its demodulation. The demodulated signal then undergoes a shaping in waveform by the comparator of the IC (Integrated Circuit IC207), finally entering the microprocessor unit.
The microprocessor unit will decode the signals incoming in serial order in this way, so that it will issue every information to command all the motions of the player.
The semi-variable resistor (VR206) aims at adjustment of a threshold level of the comparator IC (IC207).
The signals caused by pushing the keys on the keyboard have preference to those produced by the remote control unit.

*Waveforms of Outputs of the Remote Control Receiver Circuit (They are the ones obtained when the remote control transmitter is brought mostly near the player, say, its receiver unit).

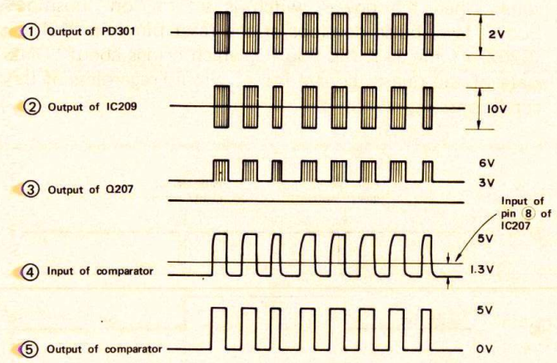


Figure 15–1

1–2. Remote Control Reception Indicator Circuit
(Refer to Figure 8)
On reception of the infrared-ray signal from the remote control transmitter, a signal develops at pin ⑦ of the microprocessor (pin ④ of CNP204), and it keeps "High" level for approx. 160 miliseconds; during which, it passes through the inverter of IC (IC204, pins ⑩ and ⑪) to make the LED (Light Emitting Diode LED313) light up.

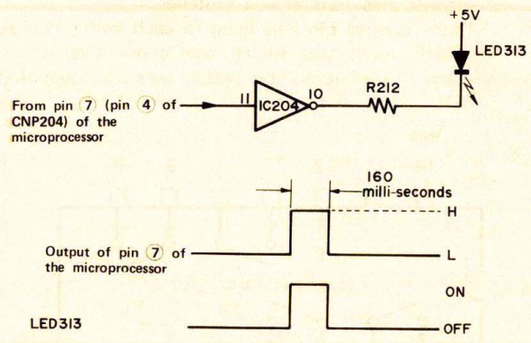


Figure 15–2

2–1. Tonearm-Position Detector Unit (Refer to Figure 8)
In order for the APMS (Automatic Programmable Music Selector) to function, a design must be needed which allows the microprocessor to know all the times where the tonearm is being positioned.
This is enabled by use of two slit plates, one never movable and one movable since it is directly interlocked with the motion of the tonearm shaft; by the aid of this facility, how far the tonearm changes position is detected by the infrared emitting diode (LED314) and phototransistors (Q301 and Q302), and it is further converted into electric signals by them. The new signals (ϕ1 and ϕ2) are then applied to the comparator of the IC (IC207) to undergo a shaping in waveform, then they are fed to the microprocessor unit.
Again, it is necessary to detect both inward and outward motions of the tonearm, and to meet this, there are two pairs of slits holes on the fixed (not movable) slit plate so arranged that they have a 90° phase difference in terms of the electrical output; the microprocessor receives and counts up the two different signals (ϕ1 and ϕ2) with a 90° phase difference in them, the ones that have been caused in this way.

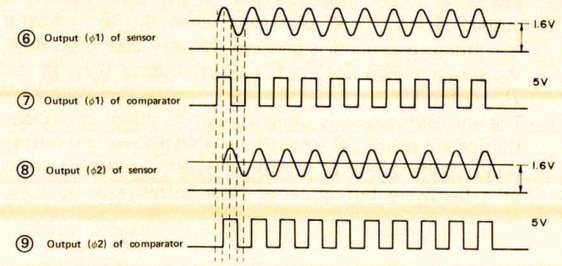


Figure 15–3

2–2. Configuration of the Tonearm-Position Detector Sensor

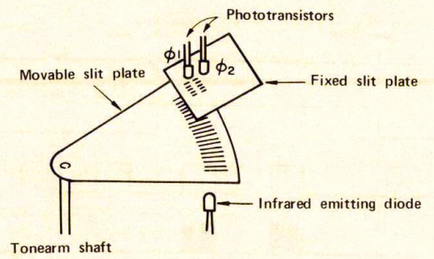


Figure 15–4

2–3. Output Signals

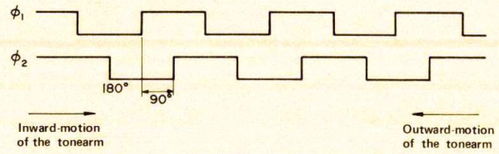


Figure 15–5

3. Piezoelectric Buzzer Circuit (Refer to Figure 8)

- The buzzer drive circuit consists of an oscillator circuit and a control circuit, through which a buzzer sounds when the key (button) is pushed or when the unit receives a signal from the remote control transmitter.
- The IC (IC203) oscillates to produce square waves driving the piezoelectric buzzer (BZ601).
- The oscillation is in a stop as far as the pin ① or pin ⑩ of IC (IC203) is at "Low" level.
  Pin ⑩ gets conductive with the signal incoming from the microprocessor (CNP204, pin ①) through both the transistor (Q203) and the inverter of IC (IC204, pins ⑧ and ⑨); pin ① gets conductive with the signal caused by the flip-flop IC (IC202).
- Every time the ♪ (input tone ON/OFF switch) button (key) is pushed, the output pin ⑥ of the flip-flop IC (IC202) changes potential accordingly, like "High" → "Low" → "High" → "Low" → "High", and so on.

- The ♪ indicator (LED) lights up following a push of the ♪(input tone ON/OFF switch) button (key), and while it is lit, if the other button (key) is pushed, a "beep" sound comes to tell this pushing has just been effected. Push the ♪ button (key) once more to make the sound disappear; at the time, the ♪ indicator goes off and the sound no longer gives off even if any other button is pushed. [Note, here, that even when the ♪ indicator is lighting, no sound is given in the very case of pushing the power switch button, the quartz button (key) or the ♪ button.]
- The microprocessor is designed not to affect the operation of either the ♪ (input tone ON/OFF switch) button (key) or the quartz button (key) at all, not only in terms of a hardware but in terms of a software as well.

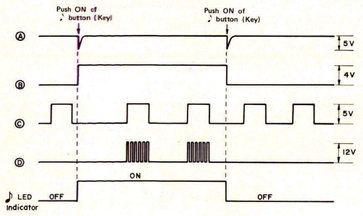


Figure 16–1

4. ON/OFF Setting Circuit of Quartz Crystal P.L.L. Circuit (Refer to Figure 8)

Each time the quartz crystal P.L.L. circuit ON/OFF switch button (key) is pushed, the outputs of the J–K flip-flop IC (IC202, pins ② and ③) change from state to state accordingly. To put it another way referring to Figure 8, when the Ⓑ (pin ③ of IC202) is at "Low" level while the Ⓒ (pin ② of IC202), at "High" level, the quartz crystal P.L.L. circuit is set at "ON" state; if the case is reversed, the quartz crystal P.L.L. circuit is set at "OFF" state. When the power switch is set to "on" position, "Low" level pulse develops at the reset pin (pin ⑬ of IC202) of the J–K flip-flop IC, which brings about "ON" state of the quartz crystal P.L.L. circuit regardless of the conditions.

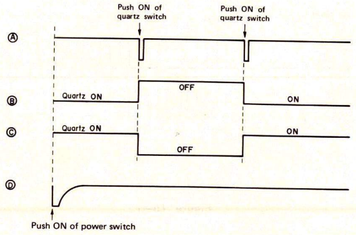


Figure 16–2

5. Quartz Crystal P.L.L. Circuit/Speed Circuit Selector Circuit

5–1. The analog switch IC (Integrated Circuit, IC205) in this selector circuit is either to allow a speed changing of DD motor and to turn on or off the quartz crystal P.L.L. circuit.

5–2. Action of Analog Switch IC (Integrated Circuit IC205)

The IC (IC205) is a C-MOS analog switch (Quad Bilateral Switch), only a single package of which incorporates four analog switches.

If the control pin belonging to each switch is made "High" level, that switch gets conductive; if it is made "Low" level, the switch gets nonconductive.

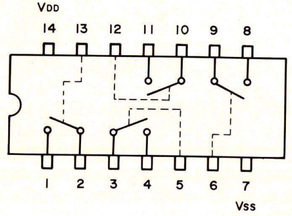
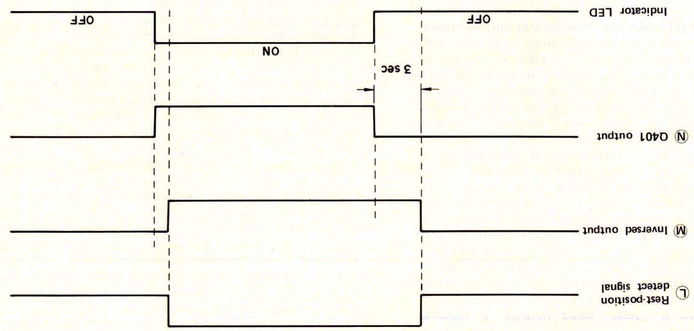


Figure 16–3

Figure 19



SPEED INDICATION LED PUT-OFF CIRCUIT

Counter Outputs & LED Indication

– : OFF

Counter outputs				LED			
D	C	B	A	–2%	–1%	0%	+1%	+2%
0	0	0	0	–	–	ON	–	–
0	0	0	1	–	–	–	ON	–
0	0	1	0	–	–	–	–	ON
0	0	1	1	–	–	–	–	ON
0	1	0	0	–	–	–	–	ON
0	1	0	1	–	–	–	–	ON
0	1	1	0	–	–	–	–	ON
0	1	1	1	–	–	–	–	ON
1	0	0	0	–	–	–	–	–
1	0	0	1	ON	–	–	–	–
1	0	1	0	ON	–	–	–	–
1	0	1	1	ON	–	–	–	–
1	1	0	0	ON	–	–	–	–
1	1	0	1	ON	–	–	–	–
1	1	1	0	ON	–	–	–	–
1	1	1	1	–	–	–	–	–

11–2. LED Put-Off Circuit (Refer to Figure 8)

- The pitch indication display (LED) is so designed as to be put off for a certain while right after the DD motor has been started; otherwise, the display (LED) would flicker casually at the time.
  Only when the potentials at pins ⑱ and ⑲ of the 4-to-16 decoder IC (IC410) are both at "Low" level, does there appear an output of that decoder (which means the pitch indication display will be lighting).
- To put it another way, when the tonearm leaves its rest, the potential at Ⓝ of Figure 10 changes from "High" to "Low" level following a time constant assured by the capacitor C402 and resistor R404, and this changing offers an interval of time during which the pitch indication display (LED) is forced to go off.
- Contrariwise, when the tonearm comes back to its rest, the potential at Ⓜ of Figure 10, in turn, gains "High" level; there, no time constant is given but the pitch indication display (LED) so far lit extinguishes.

11–3. Clock Signal Generator Circuit (Refer to Figure 8)
Consisting of IC401 (timer) and a time constant circuit (resistors R402 and R403, and capacitor C401), it produces square wave signal (at pin ③ of IC401), oscillating at the frequency of 71 kHz.

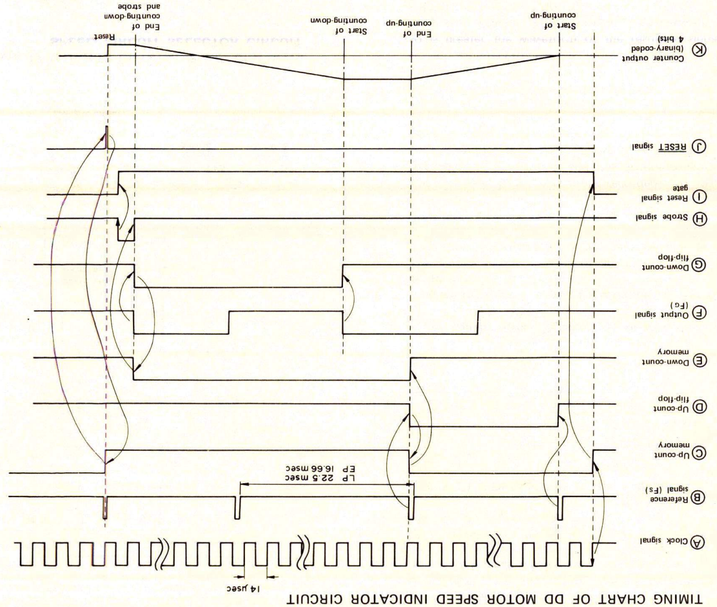
11–4. Waveform Shaping Circuit (Refer to Figure 8)
It is a Schmidt trigger circuit that comprises IC402 (pins ⑧, ⑨, ⑩), IC405 (pins ⑧, ⑨, ⑩) and resistors (R407 and R408), and shapes in waveform the output signal (Fo) coming from the motor control circuit.

12. Control Board Circuit (Refer to Figure 10)
It is composed of a control keyboard matrix and an indication LED circuit.

13–1. Microprocessor (Control Circuit)
It is an 8-bit microprocessor that serves as many roles as shown below.

(1) Determines whether the tonearm-driving motor has to rotate in normal or reverse direction, and as well to cut down its speed.
(2) Drives the plunger-solenoid into conduction (on/off), thereby to give rise to an action of the tonearm.
(3) Automatically fixes a certain speed (r.p.m.) of the DD motor to rotate.
(4) Initiates the function indicator LED (the operation mode/program item-number display LED).
(5) Detects an input by the key (button).
(6) Controls the output of the ♪ buzzer following a push of the key (button) or upon reception of the signal from the remote control unit.
(7) Decodes the signal from the remote control unit.
(8) Decodes the tonearm-position detect signal.
(9) Decodes the APMS (program-to-program space) signal.
(10) Judges in which state the tonearm driving mechanism is situated.
(11) Initiates the remote control receiver's indicator LED.

Figure 20



TIMING CHART OF DD MOTOR SPEED INDICATOR CIRCUIT

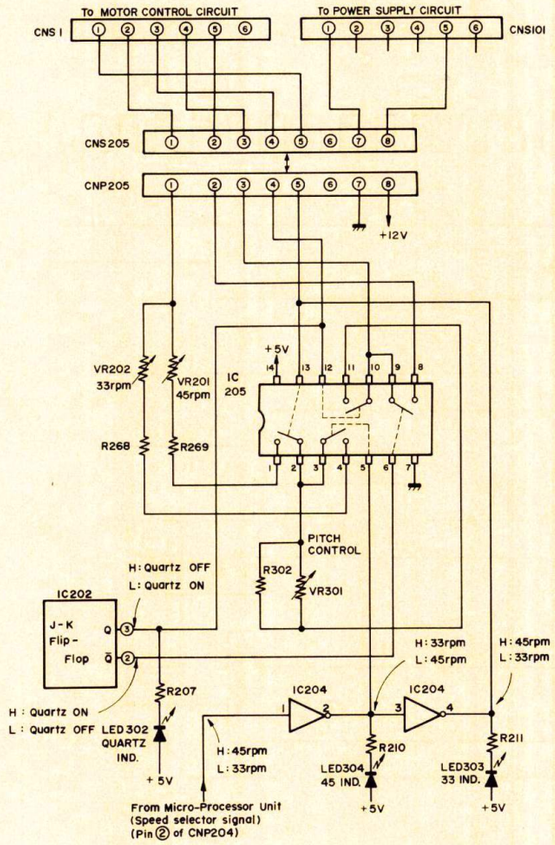


Figure 17 QUARTZ CRYSTAL P.L.L. CIRCUIT/ SPEED CIRCUIT SELECTOR CIRCUIT

6. Constant Voltage Circuit (Refer to Figure 8)
AC power leaving the secondary of the power transformer (T101) passes through the terminals K201 and K202 of the interface circuit and into the diodes (D201, D202, D203 and D204) where it is rectified into DC voltage, then smoothed by the electrolytic capacitor (C201) and applied to the voltage regulator IC (IC201) making it quite steady, the one having DC +5 V.

7. Plunger-Solenoid Drive Circuit (Refer to Figure 8)
Going out of the microprocessor (pin ⑥ of CNP204), the signal is applied to the transistor (Q204) where it is amplified in current enough to put the mechanism drive plunger-solenoid into action.

Input	Plunger-Solenoid
"Low" level	OFF
"High" level	ON

8. Tonearm Motor Drive Circuit (Refer to Figure 8)
The signal coming from the microprocessor (pins ⑦ and ⑧ of CNP204) is amplified by the IC (Integrated Circuit IC208) to the extent enough to rotate the tonearm drive motor in either normal or reverse direction (and, thereby to put the mechanical parts into action).
TTL IC (IC206) is intended to protect the tonearm motor drive IC (IC208) against an excess of current possibly caused when the inputs Ⓐ (pin ⑦ of CNP204) and Ⓑ (pin ⑧ of CNP204) come to "High" level at a time – Refer to Figure 8 and the Table below.

Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ	Motor
L	L	L	L	L	L	Stop
H	L	H	L	H	L	Normal rotation
L	H	L	H	L	H	Reverse rotation
H	H	L	L	L	L	Stop

9. Program-to-Program Space Detector Sensor Circuit (Refer to "WHAT'S APMS".)

9–1. Program-to-Program Space Detector Sensor (APMS Sensor) (Refer to Figure 8)
The APMS sensor consists of an infrared emitting diode and a phototransistor and it is usually called an optical mark sensor.
Projecting infrared rays on the surface of a record in rotation, it detects a difference of the rays' reflection degree from part (non-recorded) to part (recorded) of the record, and this difference is told to the APMS, as a result of which a program-to-program space on the record is detected as en electric signal.
When the APMS sensor travels over the non-recorded part, the voltage at the emitter of its phototransistor comes to as Fig. 18–1– Ⓐ shows: as the area of the non-record part is more and more wide, so is greater the waveform of the resultant signal.

9–2. Program-to-Program Space Detector Signal Amplifier Circuit (Refer to Figure 8)
The signal (Ⓐ) leaving the program-to-program space detector sensor is, as it is very feeble, amplified by the operational amplifier IC (IC210, pins ①, ② and ③); the waveform of output signal is as shown in Fig. 18–1–Ⓑ.

9–3. Waveform Shaping Circuit (Refer to Figure 8)
It refers to the operational amplifier IC (IC210, pins ⑤, ⑥ and ⑦) and serves to transform the signal which has come from the program-to-program space detector sensor amplifier circuit, into a square wave signal; the output waveform is as shown in Fig. 18–1–Ⓒ.

9–4. Program-to-Program Space Detection Pulse Generator Circuit (Refer to Figure 8)
It is a circuit in which the square wave signal from the waveform shaping circuit is once more differentiated to come to gain a specified width as shown in Fig. 18–1–Ⓔ. The new signal is then applied as a program-to-program space detection pulse to the microprocessor unit.

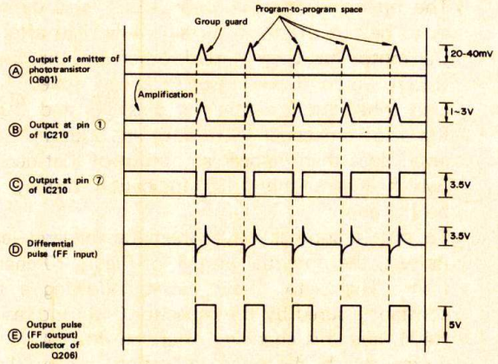


Figure 18–1

10. Mechanism Switch Detector Circuit (Refer to Figure 8)
A circuit whose microswitch detects in which state the tonearm drive mechanism is situated, and tells the microprocessor its information.
Simultaneously, the information signal is, passing through the transistor (Q202) and diode (D206), transferred to the start/stop circuit on the DD motor control unit, and to the blanking circuit of DD motor speed indicator LED.

11–1. DD Motor Speed Indicator Circuit (Refer to Figure 8)
There are two signals, a reference signal (Fs) from the DD motor control circuit and an output signal (FG) (from the DD motor control circuit) caused by the DD motor speed indicator circuit itself, and these two signals are compared in period to produce another signal, one that is to make 5-dot LED (Light Emitting Diode) light up.

(1) With an appearance of $\overline{\text{RESET}}$ signal at Ⓙ of Figure 10, the up-count memory IC (IC405) is "set" so that the up-count flip-flop IC (IC408) gets ready to be conductive, then it is "set" by the aid of the reference signal (Fs).

(2) The clock signal is, by way of the up-count gate IC (IC402, pins ⑪, ⑫ and ⑬), applied to pin ⑤ of the up/down counter IC (IC403) bringing about the counting of it.
Since both the "carry" output (at pin ⑫) and "borrow" output (at pin ⑬) of the up/down counter IC (IC403) are coupled to the same type of up/down counter, say, the IC (IC404), these two ICs further make up an 8-bit binary up/down counter when they operate in combination.

(3) The next coming reference signal (Fs) causes the up-count flip-flop IC (I408) to be "reset", so the two up/down counter ICs (IC403 and IC404) stop counting-up. At the same time, the signal which is differentiated, in sync terms, by the IC411 (pins ②, ④, ⑨) and IC405 (pins ①, ②, ③) causes the up-count memory IC (IC405) to be "reset" too.

(4) The output, as a result of the up-count memory IC (IC405) being "reset", is also differentiated, in sync terms, by the IC411 (pins ⑩, ⑫) and IC409 (pins ④, ⑤, ⑥), which lets the down-count memory IC (IC409) be "set".

(5) With the down-count memory IC (IC409) "set", the down-count flip-flop IC (IC408) has to be conductive, then it is "set" the moment the pulse output signal (FG) breaks down.

(6) "Setting" of the down-count flip-flop IC (IC408) permits the clock signal to enter pin ④ of the up/down-counter IC (IC403) by way of the down-count gate IC (IC402, pins ①, ②, ③) and, thereby, to make the up/down counter ICs (IC403 and IC404) start counting-down.

(7) The pulse output signal (FG), which next comes, breaks down so that the down-count flip-flop IC (IC408) is "reset"; and the up/down counter ICs (IC403 and IC404), therefore, stop counting-down. At once, the "reset" signal from the down-count flip-flop IC (IC408) is sinc-differentiated by the IC411 (pins ⑤, ⑦) and IC409 (pins ①, ②, ③) to give rise to "resetting" of the down-count memory IC (IC409). The output of the up/down counter ICs (IC403 and IC404) which is caused then is referred to as that depending upon the equation of Nu–Nd: the Nu means the number of times of counting-up per period of reference signal (Fs) while the Nd, that of counting-down per period of the output pulse signal (FG). Then too, the relationship among the counter ICs output, a period of Fs and a period of FG comes to be:
Period of the reference signal (Fs) > Period of the output signal (FG): Nu–Nd > 0
Period of the reference signal (Fs) = Period of the output signal (FG): Nu–Nd = 0
Period of the reference signal (Fs) < Period of the output signal (FG): Nu–Nd < 0

(8) The output, as a result of the down-count memory IC (IC409) being "reset", is sync-differentiated by the IC411 (pins ⑬, ⑭) and IC406 (pins ③, ④, ⑤, ⑥) to assume a strobe signal, and this new signal is applied to the 4-bit latch IC (IC407) to bring about a latching of the number of times of counting. The output of the 4-bit latch IC (IC407) enters the 4-to-16 decode IC (IC410) to make the LED light up, with its 4-to-16 decoded signal.

(9) As the strobe signal vanishes from where it was at Ⓗ of Figure 10, the potential at Ⓘ of Figure 10 comes to have "High" level; with an appearance of the next clock pulse, the "reset" signal is caused at Ⓙ, to make the up/down counter ICs (IC403 and IC404) "reset" and as well the up-count memory IC (IC405) "set": in this way, an operation of the counting finishes and the next counting again starts just from the beginning (the procedure at the step ①) and also in the same way.

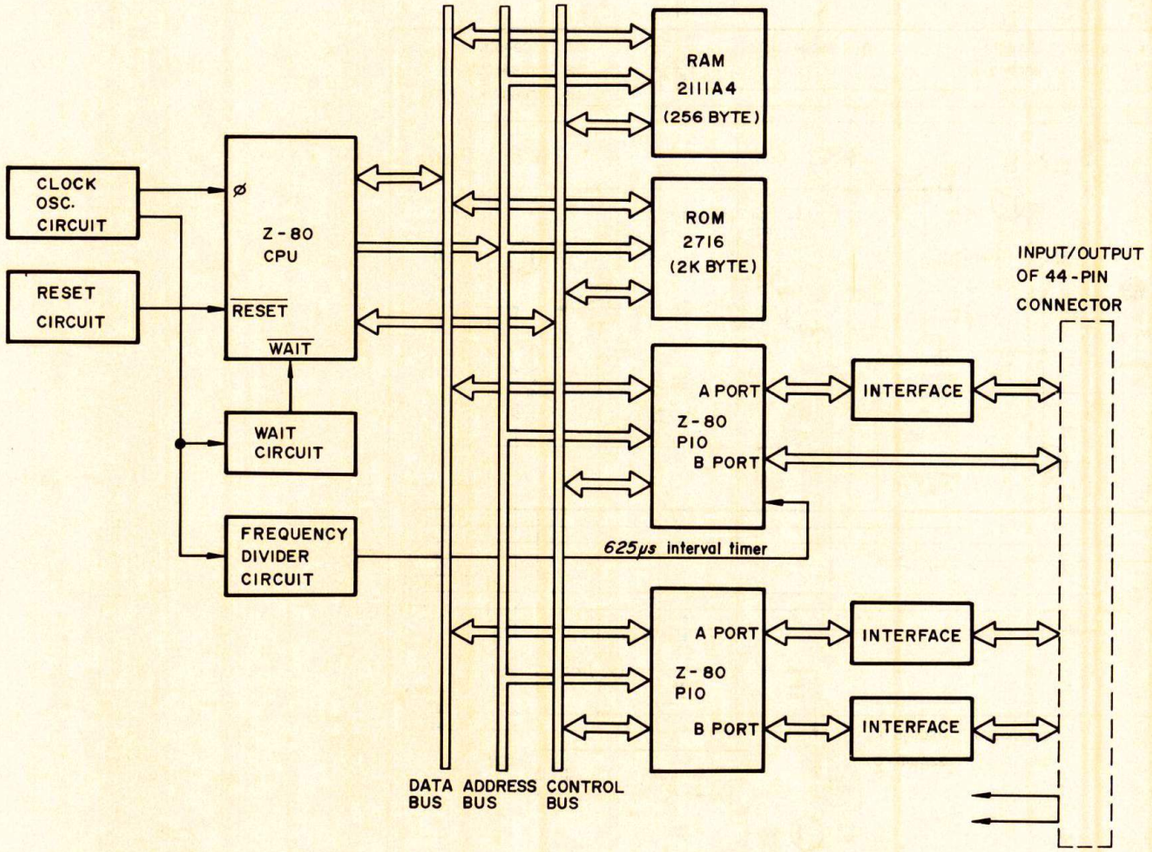


Figure 21 BLOCK DIAGRAM OF CONTROL CIRCUIT (MICROPROCESSOR)

13–2. Explanation of the Hardwares

(1) CPU (Central Processing Unit)
An N-channel MOS microprocessor with 8-bit parallel processing. (Z-80)

(2) PIO (Parallel Input/Output Controller)
A versatile-use programmable I/O unit with pairs of 8-bit input/output ports in connection with the microprocessor.

(3) RAM (Random Access Memory)
It is a memory that is capable of both writing in and reading the information out of it and having the memory capacity of 256 byte, it stores the information about program contents, program-to-program spaces, etc.

(4) ROM (Read Only Memory)
It is a read-out exclusive memory and, having the memory capacity of 2 K byte, stores all the control programs.

(5) A block diagram of the microprocessor is shown in Figure 21.
The control program consists of 2 K byte and it has been stored in the 2716 EP ROM (Erasable and Programmable Read Only Memory).

Different data (constant value, counter value, etc.) necessary for execution of the control program are to be written in and/or read out of the 2111A4 static RAM. There are two units of Z-80 PIO and the ports of each PIO treat instructions or data in the bit configuration of them; say, the PIOs handle control signals (ϕ1 signal, ϕ2 signal, remote control signal etc.) which are input and output from the interface circuit of the record player; and in this connection, the interval timer is to give the intervals timer signal of 625 μs each to the PIOs in operation. What's more, the PIOs are able to see what state the key switches (buttons) are situated in and hence to pass the result to the LEDs to light up.
Clock frequency to control the entire of the microprocessor system is 2.4576 MHz and operation of the CPU and PIO, therefore, depends upon this frequency.
The frequency divider circuit is to divide the above 2.4576 MHz into 1.6 kHz (at the intervals of 625 μs) making it a time clock.
The wait circuit is to suspend $\overline{M1}$ cycle for 1T clock with every $\overline{M1}$ operation.

The reset circuit is intended to make the CPU be in exact response to the turning-on of the power switch and to let it execute the instruction just from the address 0000H.

- The signals caused by pushing the keys on the keyboard have preference to those produced by the remote control unit.
- The microprocessor is designed not to affect the operation of either the ♪ (input tone ON/OFF switch) button (key) or the quartz button (key) at all, not only in terms of a hardware but in terms of a software as well.

Ⓐ Oscillator Circuit
The crystal-oscillated frequency is 4.9152 MHz and it is halved, by the IC509 (7493), into 2.4576 MHz to drive the CPU and PIO through the IC511 (pins ⑧ and ⑨, 7404); pin ϕ of the CPU (IC501) as well as pin ϕ of the PIO (IC502 and IC503) are given 2.4576 MHz therefore.

Ⓑ Frequency Divider Circuit
The crystal-oscillated frequency (4.9152 MHz) is reduced to 1/16 first by the IC509 (7493) and next by the IC510 (7493), and further so does to 1/12 by the IC512 (7492); thus the output of this frequency divider circuit comes to have 1.6 kHz, which refers to 625 μs in terms of one period of the operation.

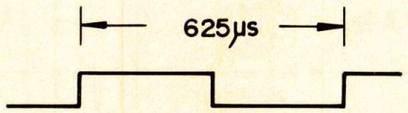


Figure 22

PIO Operation Mode
The PIO is made effective when set at "bit control" mode.

PIO	Port	I/O select	Mask	Bit	Function
IC502	A-port	1	0	A_7	Remote control input
		0	1	A_6	Segment g (LED)
		0	1	A_5	Segment f (LED)
		0	1	A_4	Segment e (LED)
		0	1	A_3	Segment d (LED)
		0	1	A_2	Segment c (LED)
		0	1	A_1	Segment b (LED)
		0	1	A_0	Segment a (LED)
	B-port	1	1	B_7	Rest detection (rest-L)
		1	1	B_6	Up detection (on-H)
		1	1	B_5	Down detection (on-H)
		0	1	B_4	Buzzer output (on-H)
		1	0	B_3	625 μs timer
		0	1	B_2	Remote control indicator
		1	1	B_1	ϕ2 signal
		1	1	B_0	ϕ1 signal

PIO	Port	I/O select	Mask	Bit	Function
IC503	A-port	0	0	A_7	Serial output
		0	1	A_6	Switch common select 2
		0	1	A_5	Switch common select 1
		0	1	A_4	Switch common select 0
		1	1	A_3	Switch return 3
		1	1	A_2	Switch return 2
		1	1	A_1	Switch return 1
		1	1	A_0	Switch return 0
	B-port	1	0	B_7	Program-to-program space pulse (normal-L)
		0	1	B_6	Reverse rotation (Motor)
		0	1	B_5	Normal rotation (Motor)
		0	1	B_4	Plunger-solenoid (on-H)
		0	1	B_3	r.p.m. changeover $\left(\frac{33\text{-L}}{45\text{-H}}\right)$
		0	1	B_2	LED digit selection
		0	1	B_1	LED digit selection
		0	1	B_0	LED digit selection

Note:
1. For the column of the I/O select, "1" refers to an input and "0", to an output.
2. For the column of the mask, "1" refers to the mask and "0", to the non-mask (to allow a monitoring).

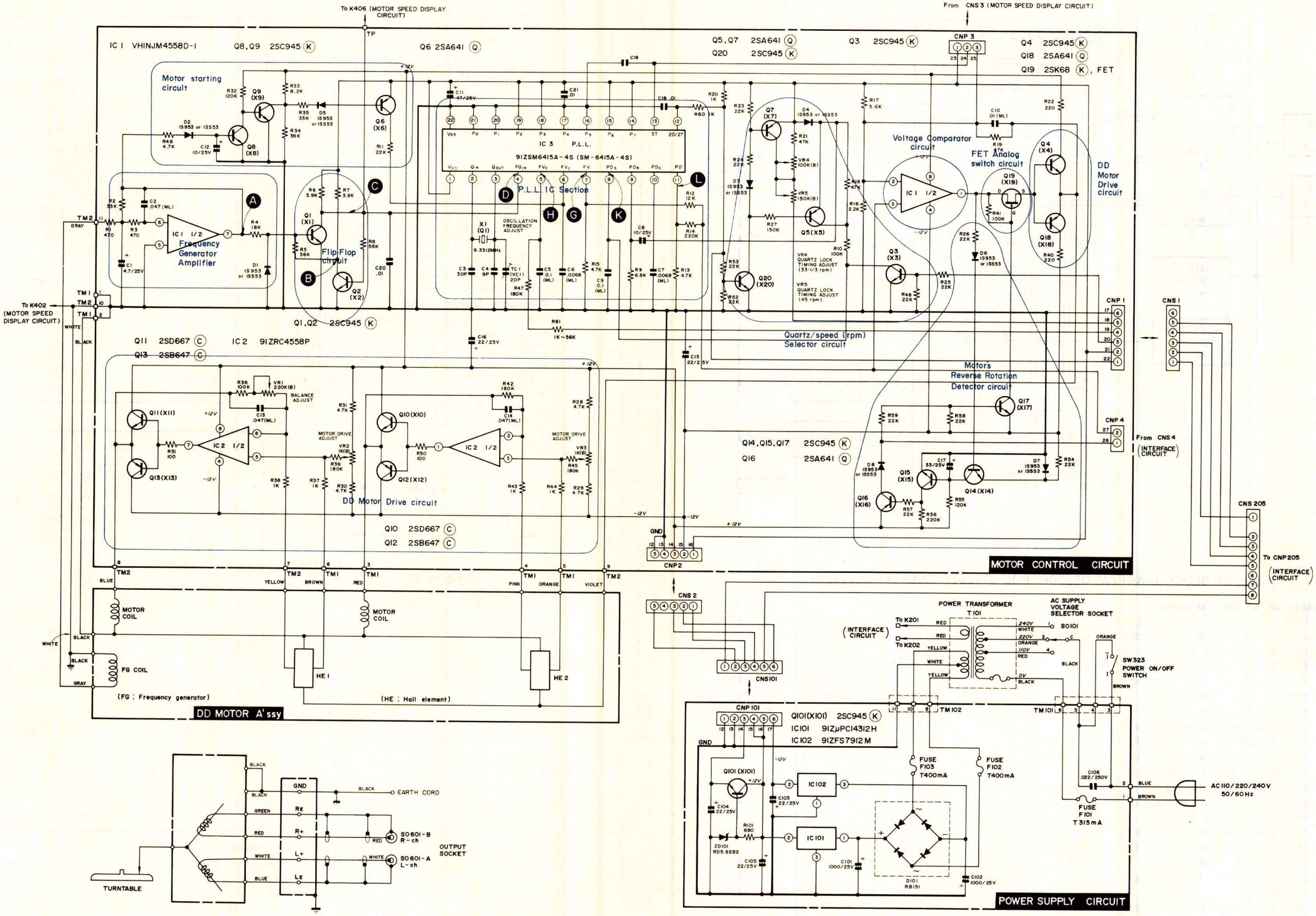


Figure 23 DD MOTOR CONTROL CIRCUIT AND POWER SUPPLY CIRCUIT

DIRECT DRIVE MOTOR CONTROL CIRCUIT

(Refer to Figure 23)

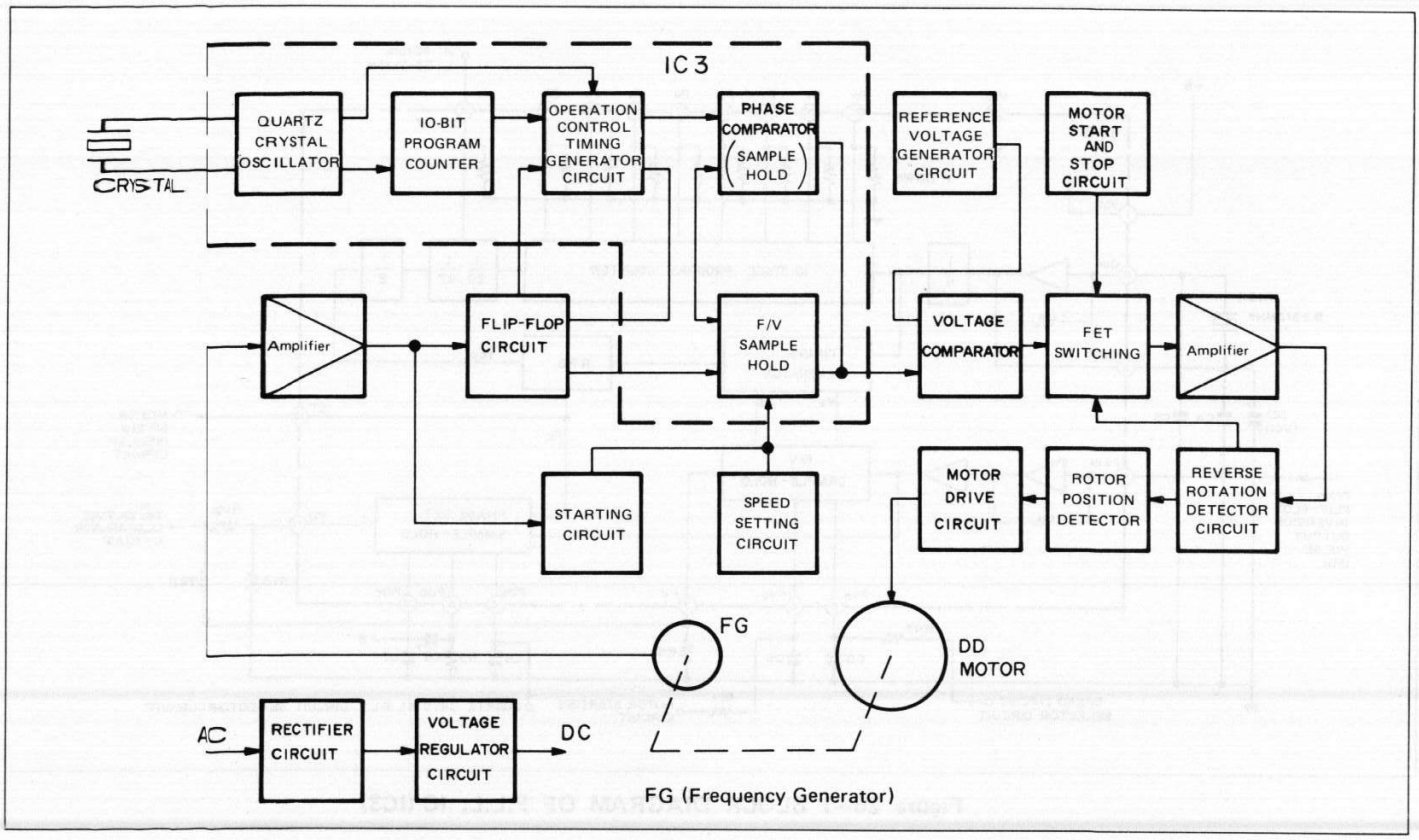


Figure 25–1 BLOCK DIAGRAM OF DD MOTOR CONTROL CIRCUIT

* **Actions of Control Circuit** (Refer to Figs. 23 and 25–1)
The control circuit for detecting the motor speed of this unit consists of two circuits: one is the FG (frequency generator) servo circuit which detects frequency by means of output of the generator which rotates coaxially with the motor, and the other is the sync circuit (P.L.L.) that controls the phase with the quartz crystal oscillator as a reference.

1. Frequency Generator, Amplifier and Flip-flop Circuit
(Refer to Figs. 23 and 25–2)
The frequency generator comprises a 160-pole magnet, a multigap head having 80-pair-pole teeth and coils. The frequency generator produces the 44.44 Hz sine-wave signal when playing the LP (33-1/3 rpm) record, and the 60 Hz sine-wave signal in the case of the EP (45 rpm) record; the signal is amplified by the operational amplifier IC1 (1/2) and the 24 V peak-to-peak waveform (Fig. 25–2–Ⓐ) is obtained; then the waveform (Fig. 25–2–Ⓐ) is sent to the flip-flop circuit so that the rectangular waveform (Figs. 25–2–Ⓑ and –Ⓒ) of 50% duty cycle is obtained.

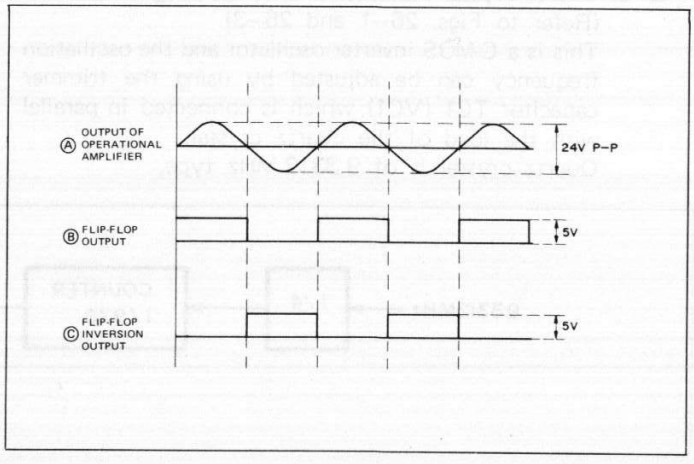


Figure 25–2

2. P.L.L. IC Section (CMOS LSI)

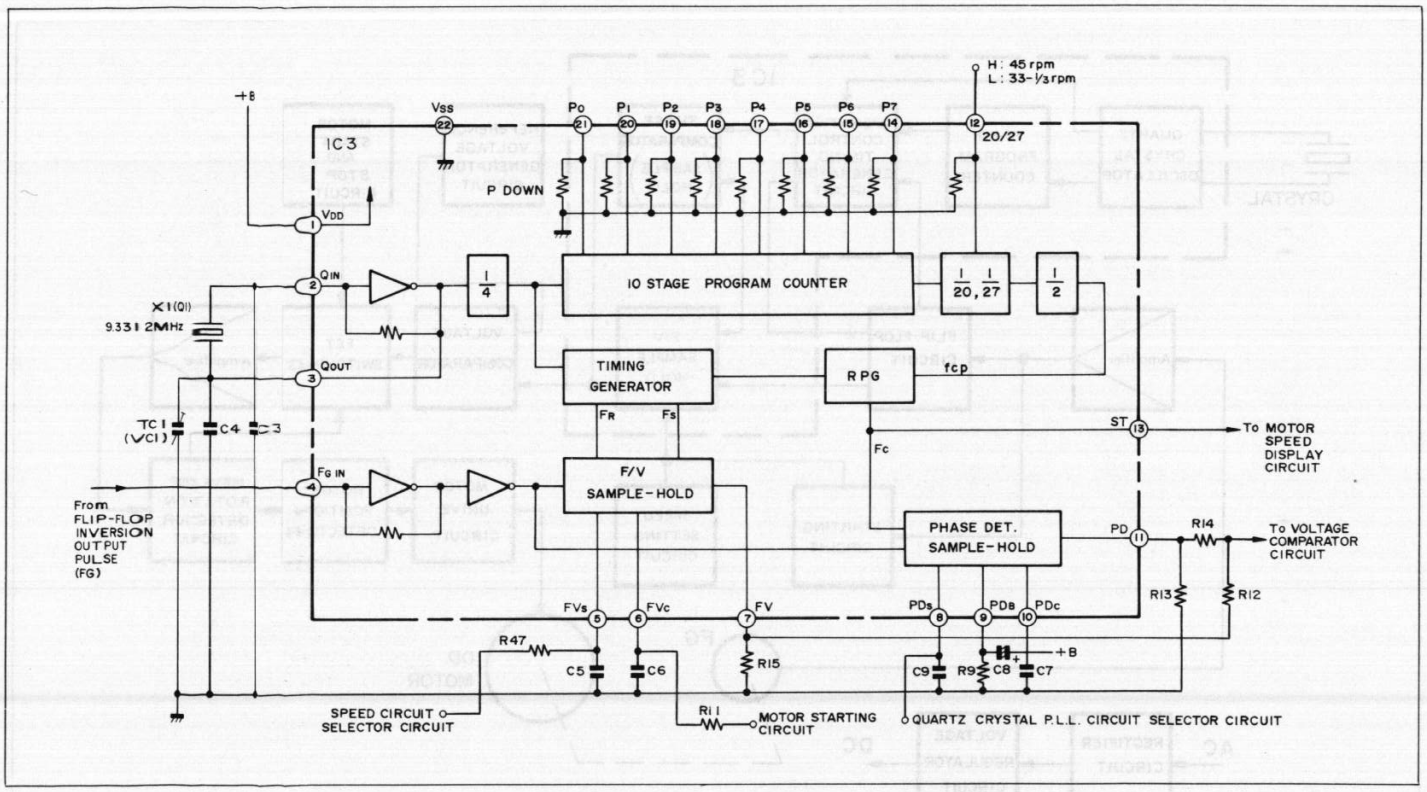


Figure 26–1 BLOCK DIAGRAM OF P.L.L. IC (IC3)

2–1. Operation control timing generator circuit, F/V sample and hold circuit (Refer to Figs. 23 and 26–1)
The timing generator circuit is actuated by a pulse gained by dividing the quartz crystal oscillator's frequency to quarters. When rise part of the FG (Frequency generator) flip-flop inversion output signal enters the F/V (frequency-to-voltage conversion) smaple hold circuit, it is held by a sample pulse (Fs) coming from the timing generator circuit to obtain an output voltage (FV) (at pin ⑦ of IC3). By a reset pulse (F_R) of the timing generator circuit, thereafter, the electric charge of the capacitor C5 discharges to gain saw tooth wave (FVs) (at pin ⑤ of IC3).

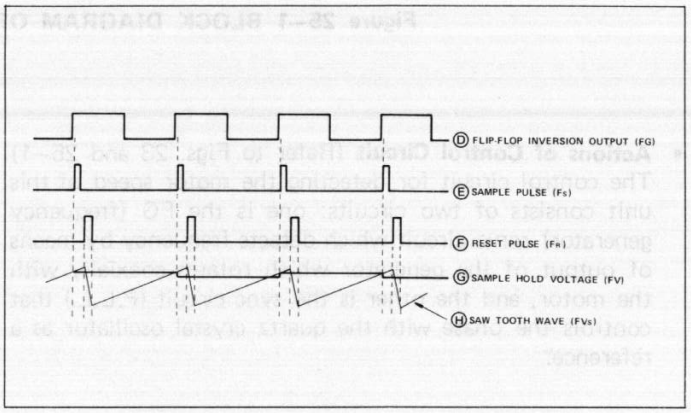


Figure 26–2 SIGNAL FLOW CHART

2–2. Quartz crystal oscillator and 10-bit program counter (Refer to Figs. 26–1 and 26–3)
This is a C-MOS inverter oscillator and the oscillation frequency can be adjusted by using the trimmer capacitor TC1 (VC1) which is connected in parallel with the load of the quartz crystal.
Quartz crystal is of 9.3312 MHz type.

The 10-bit program counter is a frequency divider of the quartz crystal oscillator, and so programmed as to divide the frequency to 972nds (1/972) regardless of playing LP or EP record.

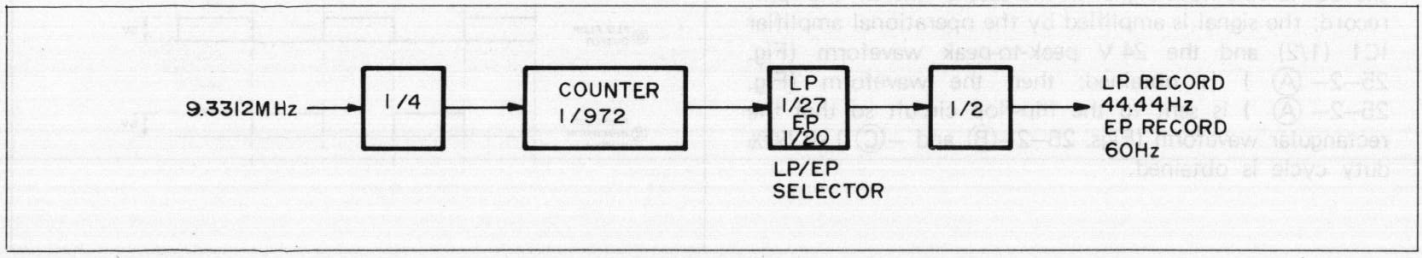


Figure 26–3 FREQUENCY DIVIDER

2–3. Phase detector circuit (P/D sample hold)
(Refer to Figs. 23 and 27)
By the strobo signal output pulse, this circuit generates the saw tooth wave (at pin ⑧ of IC3). Besides, the circuit is appended with a bootstrap circuit so that the resultant saw tooth wave will have an excellent linearity.
This saw tooth wave is sample-held by means of the flip-flop inversion output of FG (frequency generator) to obtain the output voltage (PD) at pin ⑪ of IC3.
The phase detector circuit is designed to be kept off by a switch when the quartz lock is off.

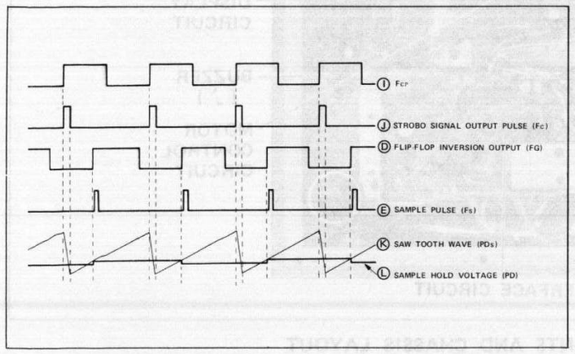


Figure 27 PHASE DETECTOR SIGNAL CHART

2–4. Strobo signal output circuit
(Refer to Figs. 23 and 26–1)
It is by means of the voltage ("High" level: 45 rpm, "Low" level: 33-1/3 rpm) applied to pin ⑫ (an input terminal of the speed selector switch) of IC3 that the output signal of the 10-bit program is divided into 27ths (1/27) for playing LP record, or into 20ths (1/20) for playing EP record; the divided output is further divided into halves to be applied to the RPG (reset pulse generator); then a timing pulse is taken out of it for strobo signal. This timing pulse also serves as a reference signal of the P/D sample hold circuit.

3. Voltage Comparator Circuit (Refer to Figure 23)
This is a circuit which resistance-divides the output voltage coming from the constant voltage circuit to take it as a constant voltage (reference voltage), and applies it to Pin ② of IC1 (1/2).
It also applies the sum of two outputs, that is the output of the phase comparator and that of the F/V sample hold circuit, to pin ③ of IC1 (1/2) where they are compared by the operational amplifier (voltage comparator); whose output appears at pin ① of IC1 (1/2).

4. Motor's Reverse Rotation Detector Circuit and FET Analog Switch Circuit (Refer to Figure 23)
If the output from the voltage comparator circuit becomes below 0 V (in the case of the reverse rotation), the transistor Q14 gets turned off to make the transistors Q15 and Q16 both turned on. When the transistor Q16 is turned on its collector voltage becomes 12 V to turn on the transistor Q17. When the transistor Q17 is turned on, the voltage between the source and gate of the FET Q19 decreases below the pinch-off voltage and the resistance between the drain and source of it rises so much that the signal no longer flows into Hall element. Since such voltage between the source and gate is above the pinch-off voltage till the electrolytic capacitor (C19) located at the base of transistor Q15 has been charged, the motor is braked not to rotate in the reverse direction.
The FET analog switch receives the motor start/stop signal from the interface circuit (pin ① of CNP4) and, thereby, causes the FET Q19 to be conductive or not conductive. It also receives the signal from the reverse rotation detector circuit to make the FET Q19 conductive or not conductive too (in the case of the motor in reverse rotation).

5. DD Motor Drive Circuit (Refer to Figure 23)
This circuit detects a position of the rotor magnet by means of the Hall element (HE) and determines an order of the currents to feed to the two-phase drive coil.
Besides, the voltage applied to the Hall element is controlled by the servo phase control circuit; the output voltage from the Hall element is varied according to variation of the rotation phase; then that output voltage is amplified by the operational amplifier IC2 to feed the current into the drive coil.

6. Motor Starting Circuit (Refer to Figure 23)
This circuit consists of transistors Q6, Q8 and Q9.
There is no output from the FG (frequency generator) when the motor is not in motion, so there is no rectified output voltage given rise to by the diode D2 and electrolytic capacitor C12. Therefore, the transistor Q8 gets turned off, and the transistors Q9 and Q6 turned on, so that the capacitor C6 (pin ⑥ of IC3) of the F/V converter of C-MOS LSI (IC3) is charged to attain a voltage of +5 V. When the voltage of the capacitor C6 attain +5 V, pin ⑦ of the F/V converter of C-MOS LSI (IC3) is brought into a maximum output state; hence, the current which runs through the motor-winding coil builds up to maximum to drive (start) the motor.
Since the frequency generator produces its output when the motor is driven, the transistor Q8 is turned on, and the transistors Q9 and Q6 are turned off so that the F/V converter circuit of C-MOS LSI (IC 3) switches over to its usual acting state.

7. Quartz/Speed (rpm) Selector Circuit (Refer to Fig. 23)

(1) When quartz is off:
When the potential at pin ③ (No. 20) of CNP1 is raised to "High" level, the transistor Q3 gets turned on and the capacitor C9 (pin ⑧ of IC3) of the phase comparator of C-MOS LSI (IC3) discharges, so that the output of the phase comparator at pin ⑪ of C-MOS LSI (IC3) ceases. The motor is, then, controlled only by the output of the F/V converter circuit. In addition, the time constant of the F/V converter circuit is determined by the capacitor C5 and such resistors as:
- R47 + R61 + VR301 // R302 + R268 + VR202 (at the time of 33-1/3 rpm) or
- R47 + R61 + VR301 // R302 + R269 + VR201 (at the time of 45 rpm).

(2) When quartz is on:
When the potential at pin ③ (No. 20) of CNP1 becomes "Low" level, the transistor Q3 gets turned off, and the phase comparator of C-MOS LSI (IC3) is put in motion to come into the phase control state.
- At the time of 45 rpm, the potential of pin ① (No. 22) of CNP1 becomes "High" level, and that of pin ⑫ of C-MOS LSI (IC3) also becomes "High" level to change the frequency divider circuit from one state to another. And the transistors Q20, Q7 and Q5 are all turned on. The time constant of the F/V converter circuit is determined by the capacitor C5 and resistors R47, R61 and VR5. The resistor R18 (time constant) of the phase comparator circuit is short-circuited by the transistor Q5.
- At the time of 33-1/3 rpm, the transistors Q20, Q7 and Q5 are all turned off; and the time constant of the F/V converter circuit is determined by the capacitor C5 and resistors R47, R61, VR5 and VR4.

Rectifier circuit and constant voltage circuit (Refer to Figure 23)
AC power at the secondary of the power transformer (T101) is rectified and smoothed into DC voltage by the diode (D101) and electrolytic capacitors C101 and C102. And it is made constant by the voltage regulator integrated circuits (IC101: +12 V, IC102: −12 V) to obtain ±12 V DC voltage which is fed to each circuit concerned. The +12 V DC output at the voltage regulator IC (IC101) is again made constant by the transistor (Q101) and Zener diode (ZD101) to obtain +5 V DC voltage which is fed to each circuit concerned.

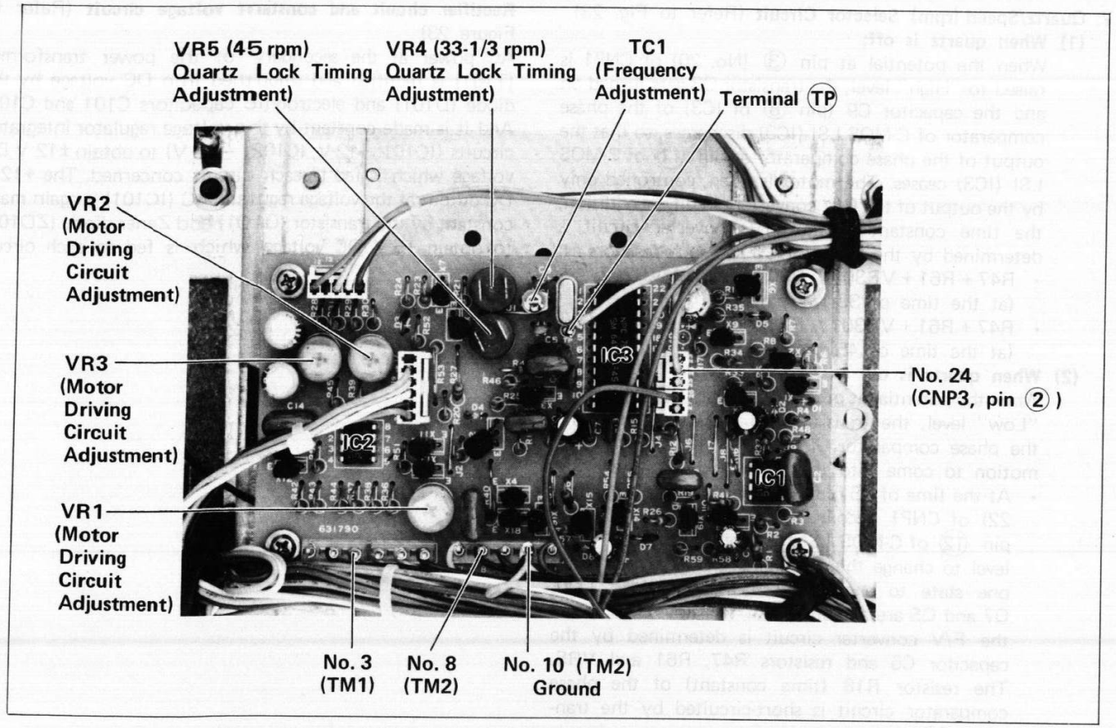


Figure 29–1 ALIGNMENT POINTS OF DD MOTOR CONTROL CIRCUIT

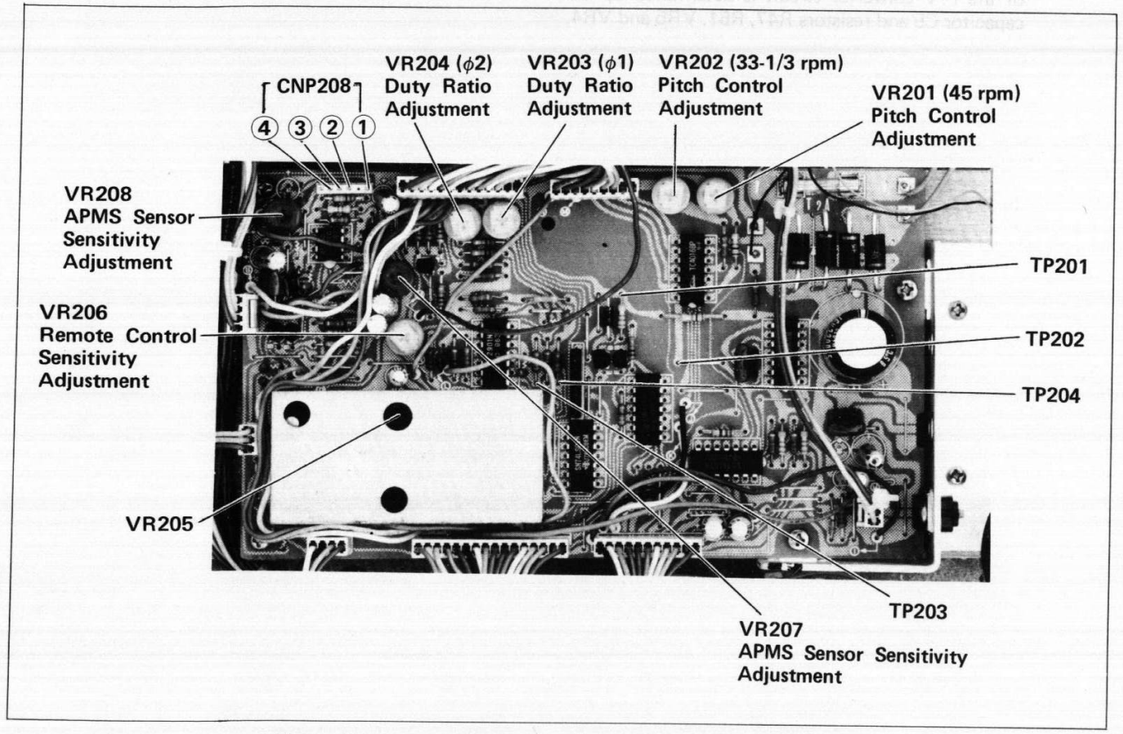


Figure 29–2 ALIGNMENT POINTS OF INTERFACE CIRCUIT

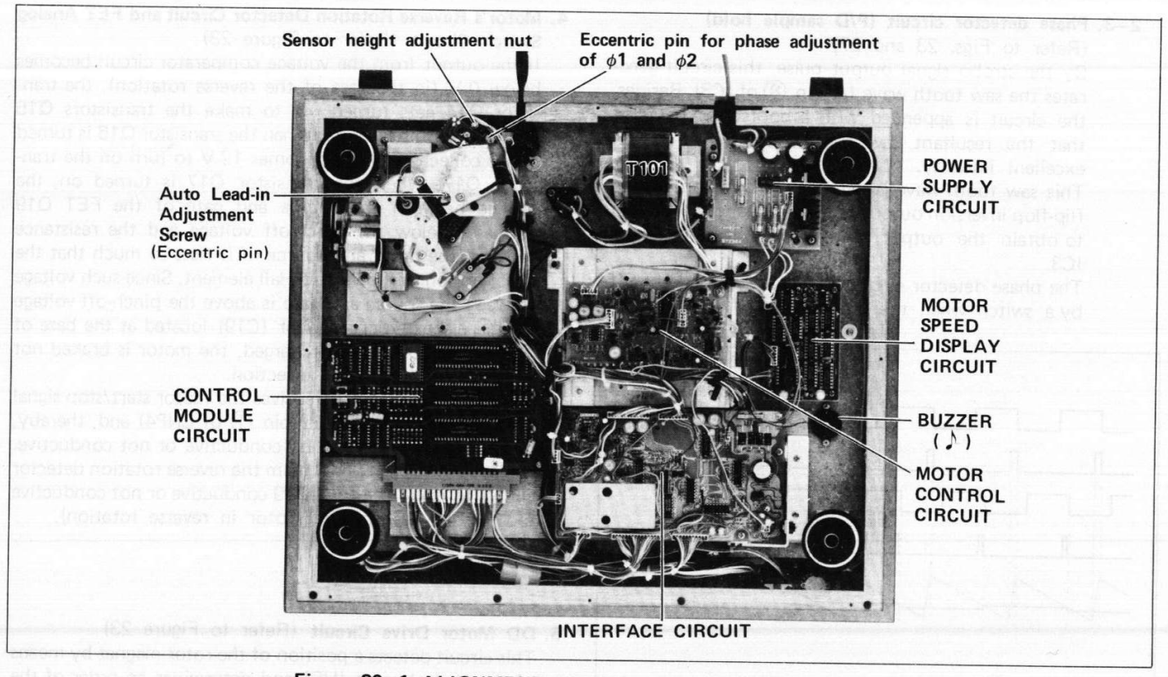


Figure 30–1 ALIGNMENT POINTS AND CHASSIS LAYOUT

ADJUSTMENT

1. Voltage Check

Before adjusting each part of the circuit, check voltages at the below-mentioned test points.

(1) TP201 . . . . . 12 ± 1 V
(2) TP202 . . . . . 5 ± 0.25 V

Refer to Figure 29–2.

2. Stylus Height Adjustment (Lead-in Height)

(1) Put the power supply cord of the unit into a wall outlet; set the power switch in "on" position; then press the cueing button to send the tonearm up.
(2) Manually hold the headshell grip; bring it over the record; then put the tonearm onto the tonearm lifter.
(3) Turn the adjustment screw of the tonearm lifter using a screwdriver having a form as shown in the figure in order to adjust the stylus height.
- In order to lower the stylus, turn a screwdriver clockwise.
- In order to raise it, turn a screwdriver counter-clockwise.

3. Automatic lead-in adjustment

Play the test record (SSR-4001), and turn the adjusting screw (eccentric pin) so that the lead-in count becomes 20 ± 5.

Then, make sure the counting conforms to the range below.

30 cm record:	20 ± 5 counts
25 cm record:	21 ± 5 counts
17 cm record:	22 ± 5 counts

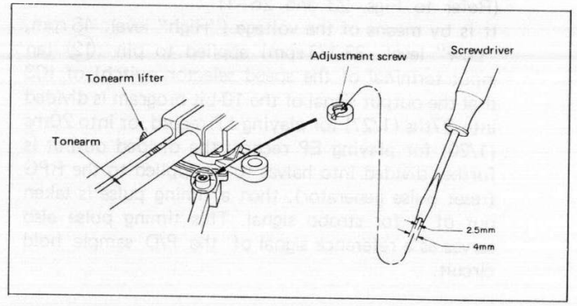


Figure 30–2

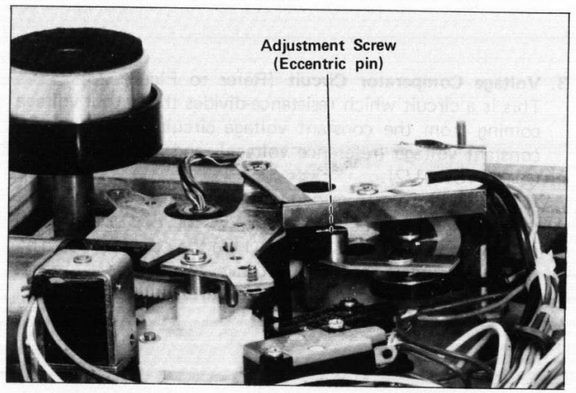


Figure 30–3

4. How to Adjust A lighting Position of Stylus When APMS Functioning

(1) When the stylus alights behind a program-to-program space:
Turn the adjustment screw shown in Fig. 31–1 counterclockwise so that the stylus alights upon the center of the program-to-program space.

(2) When the stylus alights ahead of a program-to-program space:
Turn the adjustment screw shown in Fig. 31–1 clockwise so that the stylus alights upon the center of the program-to-program space.

- The range of movement (adjustment) of the APMS (program-to-program space) sensor is 1.5 mm ahead from the center and 1.5 mm behind from the center, making 3 mm altogether.

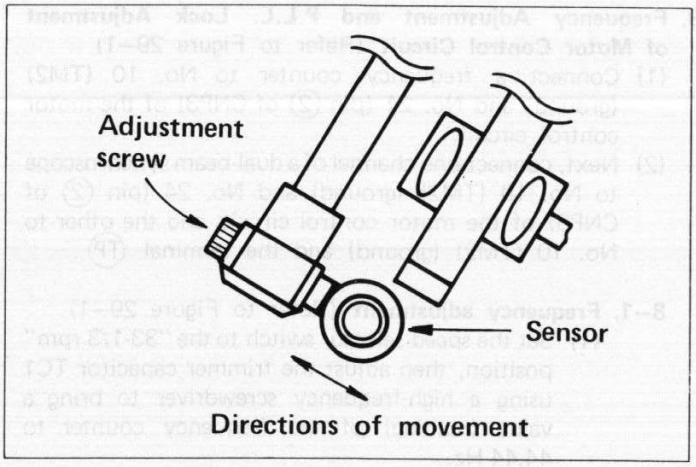


Figure 31–1

5. Adjustment of Height of Tonearm-Position Detector Sensor

Adjust it by the sensor height adjustment nut so as to have a space between the movable slit plate and fixed slit plate be within a range from 1 to 2 mm as illustrated by the figure below.

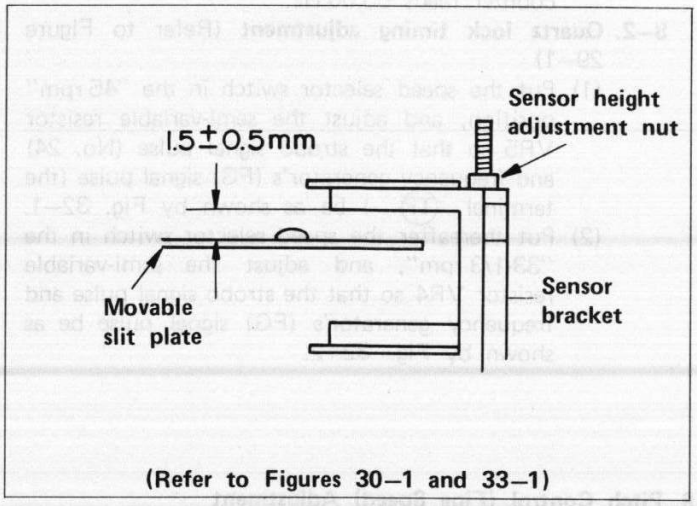


Figure 31–2

6. Checking of The APMS Sensor Height

Check the hight and horizontal of the APMS sensor against the record surface on the turntable.

1. Set the power switch to "on", press the cueing button, move the headshell over the record, and set the power switch to "off".
2. Make sure the height of sensor bottom from the record surface to be with-in 4.5 ± 1 mm, and at the same time to be parallel with record surface.
3. If, not correct, loosen the two screws fixing the sensor arm pipe at it's root, and modify the hight and horizontal of the sensor by rotating the sensor arm pipe.
   Never forget the screws fixing.

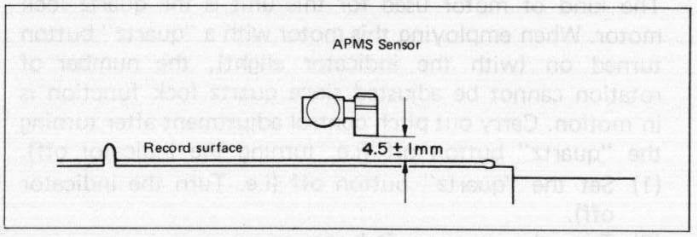


Figure 31–3

7. Adjustment of Motor Driving Circuit (Refer to Figure 29–1)

(1) Connect one channel of a dual-beam synchroscope to No. 10 (TM2) (ground) and No. 8 (TM2) of the motor control circuit, and the other to No. 10 (ground) and No. 3 (TM1) of the motor control circuit.

(2) Adjust (Change a resistance values of) the semi-variable resistors VR2 and VR3 so that two waveformes concerned become symmetrical as shown in Fig. 31–4.

(3) Next, adjust (change a resistance value of) the semi-variable resistor VR1 so that both the waveforms concerned have the same peak value.

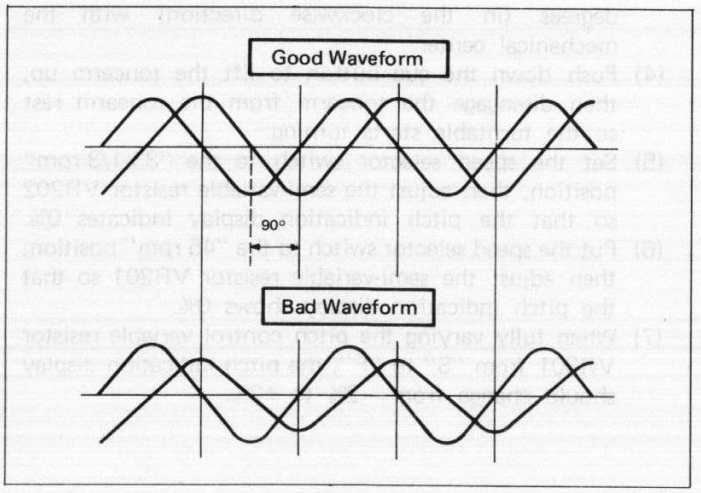


Figure 31–4

8. Frequency Adjustment and P.L.L. Lock Adjustment of Motor Control Circuit (Refer to Figure 29–1)

(1) Connect a Frequency counter to No. 10 (TM2) (ground) and No. 24 (pin ② of CNP3) of the motor control circuit.

(2) Next, connect one channel of a dual-beam synchroscope to No. 10 (TM2) (ground) and No. 24 (pin ② of CNP3) of the motor control circuit, and the other to No. 10 (TM2) (ground) and the terminal (TP).

8–1. Frequency adjustment (Refer to Figure 29–1)

(1) Set the speed selector switch to the "33-1/3 rpm" position, then adjust the trimmer capacitor TC1 using a high-frequency screwdriver to bring a value (reading) of the frequency counter to 44.44 Hz.

(2) Put the speed selector switch thereafter in the "45 rpm", and check here that the frequency counter reads 60.00 Hz.

8–2. Quartz lock timing adjustment (Refer to Figure 29–1)

(1) Put the speed selector switch in the "45 rpm" position, and adjust the semi-variable resistor VR5 so that the strobo signal pulse (No. 24) and frequency generator's (FG) signal pulse (the terminal (TP)) be as shown by Fig. 32–1.

(2) Put thereafter the speed selector switch in the "33-1/3 rpm", and adjust the semi-variable resistor VR4 so that the strobo signal pulse and frequency generator's (FG) signal pulse be as shown by Fig. 32–2.

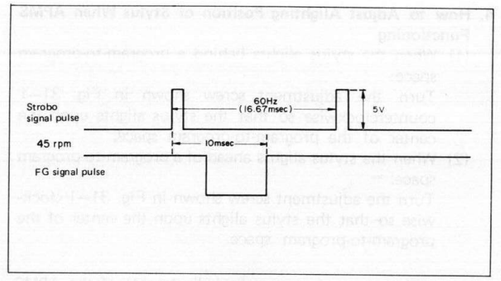


Figure 32–1

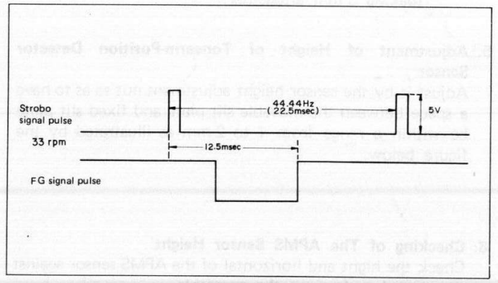


Figure 32–2

9. Pitch Control (Fine Speed) Adjustment (Refer to Figure 29–2)

Note:

The kind of motor used for this unit is the quartz lock motor. When employing this motor with a "quartz" button turned on (with the indicator alight), the number of rotation cannot be adjusted since quartz lock function is in motion. Carry out pitch control adjustment after turning the "quartz" button off (i.e. turning the indicator off).

(1) Set the "quartz" button off (i.e. Turn the indicator off).

(2) Turn the power switch on.

(3) As shown in Fig. 32–4, set the pitch control variable resistor VR301 at a position making an angle of 30 degrees (in the clockwise direction) with the mechanical center.

(4) Push down the cue button to lift the tonearm up, then disengage the tonearm from the tonearm rest so the turntable starts turning.

(5) Set the speed selector switch to the "33-1/3 rpm" position, then adjust the semi-variable resistor VR202 so that the pitch indication display indicates 0%.

(6) Put the speed selector switch to the "45 rpm" position, then adjust the semi-variable resistor VR201 so that the pitch indication display shows 0%.

(7) When fully varying the pitch control variable resistor VR301 from "S" to "F", the pitch indication display should change from –2% to +2%.

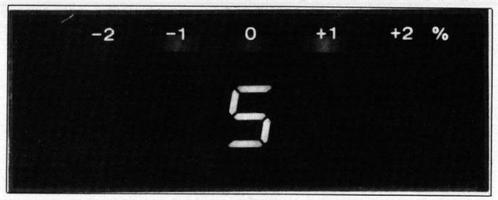


Figure 32–3 PITCH INDICATION DISPLAY

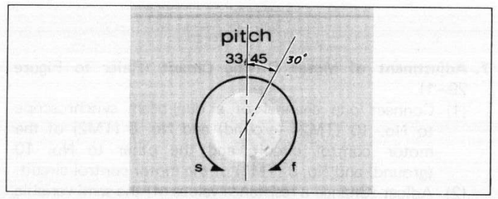


Figure 32–4 PITCH CONTROL

10. Adjustment of Tonearm-Position Detector Sensor (Adjustment of Duty Ratio and Phase of Comparator Output)

10–1. Duty ratio adjustment (Refer to Figure 29–2)

(Adjusting points and adjusting connection diagram are as shown in Figs. 29–2 and 33–3.)

Adjust the semi-variable resistors (ϕ 1 VR203 and ϕ 2 V204) so that when the tonearm is moved at uniform speed the duty ratio of ϕ 1 and ϕ 2 signals (A/B) be 50 ± 10%.

10–2. Phase adjustment of ϕ1 signal and ϕ2 signal

(1) Adjust the eccentric pin so that when the tonearm is moved at uniform speed in the inward direction the ϕ2 signal be 90 ± 30 degrees behind the ϕ1 signal.

(2) Next, check that when the tonearm is moved at uniform speed in the outward direction the ϕ1 signal be 90 ± 30 degrees behind the ϕ2 signal.

(3) In addition, when moving the tonearm in the inward direction, the ϕ2 signal should rise at the center of the first pulse of the ϕ1 signal, as mentioned above, with regard to an output at the slit starting point.

(4) If the waveform of output signal are as shown in Figs. 33–4 and 33–5, adjust the eccentric pin again.

[Since the phase difference between outputs (ϕ1 signal and ϕ2 signal) of two phototransistors is to be adjusted within an angle of 90 ± 30 degrees, an angle of the fixed slit plate with the movable slit plate is made adjustable by means of the eccentric pin.]

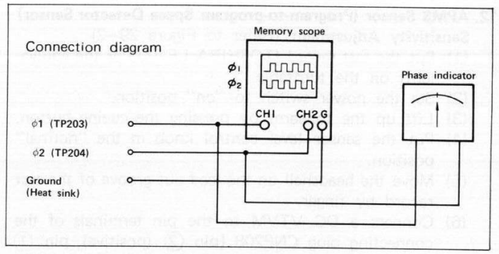


Figure 33–2

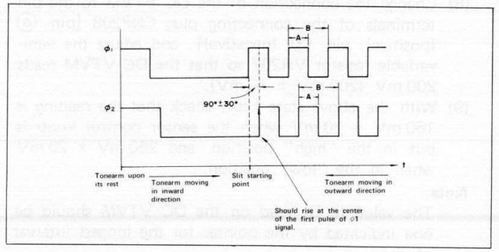


Figure 33–3

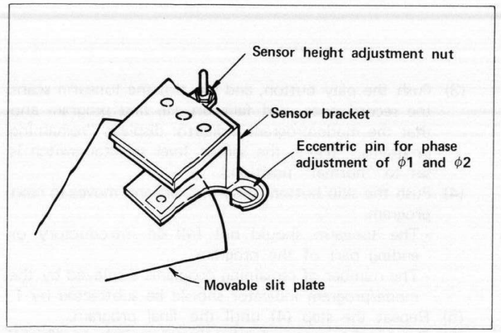


Figure 33–1

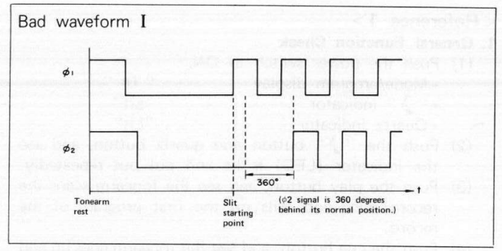


Figure 33–4

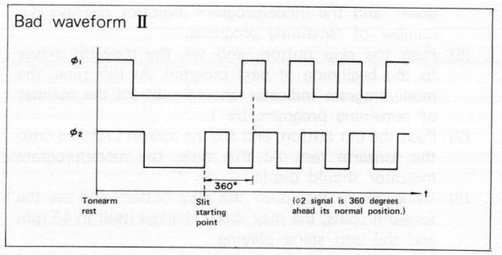


Figure 33–5

11. Remote Control Sensitivity Adjustment (Refer to Figure 29–2)

(1) Fully rotate the semi-variable resistor VR205 clockwise. (The VR205 will be disused from the second lot.)

(2) Adjust the semi-variable resistor VR206 so a voltage at pin ⑧ of IC207 be 1.3 ± 0.05 V. At this time, check the signal can be received when the remote control transmitter is set 10 m above the optical axis of the photoconductive cell (receiver) of the unit.

(3) Next, fine-adjust the semi-variable resistor VR206 so that the remote control transmitter can be put in action if it comes into contact with the photoconductive cell.

(4) Check Items (2) and (3) above are satisfied.

Note:

A supply voltage of the remote control transmitter should be 9 V.

1. APMS Sensor (Program-to-program Space Detector Sensor) Sensitivity Adjustment (Refer to Figure 29–2)

(1) Put the test record (TOSHIBA LF1003 or the equivalent) on the turntable.
(2) Set the power switch to "on" position.
(3) Lift up the tonearm by pressing the cueing button.
(4) Put the sensor level control knob in the "normal" position.
(5) Move the headshell on the lead out groove of the test record by finger.
(6) Connect a DC VTVM to the pin terminals of the connecting plug CNP208 [pin ② (positive), pin ① (negative)], and adjust the semi-variable resistor VR-208 so that the VTVM reads 30 mV (30 ± 2 mV).
(7) Next, set the tonearm on the tonearm rest.
(8) Change the connection of the DC VTVM to the pin terminals of the connecting plug CNP208 [pin ④ (positive), pin ③ (negative)], and adjust the semi-variable resistor VR207 so that the DC VTVM reads 200 mV (200 mV ± 10 mV).
(9) With the above state kept, check that the reading is 160 mV ± 20 mV when the sensor control knob is put in the "high" position, and 260 mV ± 20 mV when in the "low" position.

Note:
The value to be read on the DC VTVM should be one indicated by the pointer for the longest interval of time.

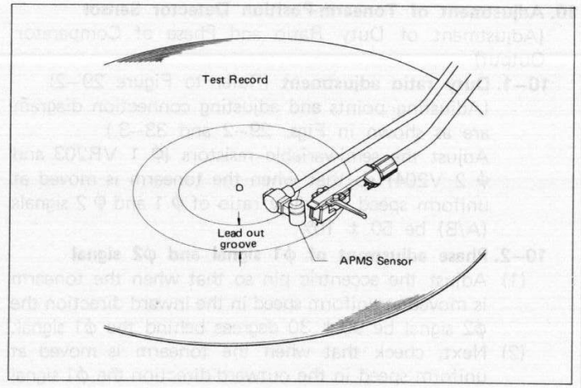


Figure 34–1

<Reference 1>

1. General Function Check

(1) Push the power switch to ON.
- Mode/program display "in"
- "♪" indicator "Lit"
- Quartz indicator "Lit"

(2) Push the "♪" button and quartz button, and see the indicator (LED) is lit and put out repeatedly.
(3) Push the play button, and see the tonearm scans the record once and falls on the first program of the record.
(4) Push the cue button, and see the tonearm goes up and the mode/program indicator displays "number of remaining programs u."
(5) Push the cue button again, and see the tonearm goes down, and the mode/program indicator displays the number of remaining programs.
(6) Push the skip button, and see the tonearm moves to the beginning of next program. At this time, the mode/program indicator should subtract the number of remaining programs by 1.
(7) Push the cut button, and see the tonearm returns onto the tonearm rest. At this time, the mode/program indicator should display "in."
(8) Using EP record, push the play button, and see the tonearm scans, the play speed changes itself to 45 rpm and the unit starts playing.

2. APMS Checking

(1) Set the sensor level selector switch to "high" position and push the play button without placing record; see the tonearm scans once and returns to its rest.
(2) Put a test record onto the turntable. (containing 10 programs)
(3) Push the play button, and see that the tonearm scans the record once, and falls on the first program and that the mode/program indicator displays "remaining programs." (Here, the sensor level selector switch is set to "normal" position.)
(4) Push the skip button, then the tonearm moves to next program.
- The tonearm should not fall on introductory or ending part of the program.
- The number of remaining programs displayed by the mode/program indicator should be subtracted by 1.

(5) Repeat the step (4) until the final program.
(6) Return the sensor level selector switch to "high" position, and push the play button; see the tonearm scans the record once and sets down on the first program, while the mode/program indicator displays "remaining programs."
(7) The same motions as in the step (6) shall occur also with the sensor level selector switch being set to "low" position.
(8) Change the sensor level selector switch to "normal" position, and press [5], [CH], and [PLAY] buttons, then the unit shall start playing from the fifth program of the record.

[CH] = channel button

Note:
In the steps (3) and (6), the mode/program indicator may display "remaining programs" one program more than actual number. This is why an extra part (the lead-out part) of the record has been detected.

3. Display Checking

Push the "♪" button (with LED indicator lighting), and check while confirming the buzzer sound.

Button	Display of mode/program indicator
1 channel	in C
2 channel	2 C
3 channel	3 C
4 channel	4 C
5 channel	5 C
6 channel	6 C
7 channel	7 C
8 channel	8 C
9 channel	9 C
10 channel	10 C
cut	in
3 channel	3 C
1	in
2	12
0	20
channel	E r
1 2	in 2
clear	
1 2	in 2
channel	in 2 C
clear	
5	5
repeat	5 r P
cut/clear memory	in
1 6	in 6
channel	E r
cue	u
cue	in
repeat	E n
Lead-in by tonearm manual operation	P
Return onto armrest by tonearm manual operation	in

4. Memory Checking

Using test record (containing 15 programs):
(1) Enter buttons in this order: [1] [CH] [5] [CH] [1] [0] [CH] [1] [5] [CH] [5] [CH] [PLAY]
Make sure the playing proceeds in this sequence: 1st program → 5th program → 10th program → 15th program → 5th program → Return to the rest.
(2) Enter buttons in this order: [3] [CH] [5] [CH] [2] [REP] [PLAY]
Make sure the playing proceeds in this sequence: 3rd program → 5th program → 3rd program → 5th program → Return to the rest.

[CH] = channel button
[REP] = repeat button

5. Automatic Return Position Checking

When the tonearm is at the very point where it returns after scanning the record, the distance between the stylus and turntable's center spindle should be as follows:
LP: 55 ± 5 mm
EP: 50 ± 5 mm

6. Play Speed Manual Setting Checking

(1) With LP record:
Press [45] and [PLAY] buttons, and see the turntable rotates at 45 rpm.
(2) With EP record:
Press [33] and [PLAY] buttons, and see the turntable rotates at 33 rpm.

7. Speed Indicator LED Checking

(1) Quartz: ON
Both at 33 and 45 rpm, "0%" LED lights up.
(2) Quartz: OFF
When the pitch control (fine speed adjustment) is changed from "s" to "f" position, "–2%" LED thru "+2%" LED should light up sequentially, either at 33 rpm or at 45 rpm.
(3) Adjust the pitch control so that "0%" LED may light up in 33 rpm mode, when the quartz switch is at "off" position. When changed to 45 rpm, "0%" LED should also light up.

<Reference 2>

Fundamentals of RP-9100H/HB

Described below are the basic motions, functions and operations of this unit.

1. Power on/off switch

(1) When the power switch is turned on while the tonearm is seated in its rest, the mode/program indicator displays "in."
(2) When the power switch is turned on while the tonearm is not seated in its rest, the tonearm returns to its rest, and the mode/program indicator displays "in." If it is physically attempted to stop the tonearm, while it is in motion, the signal to move the tonearm still keeps going.

2. Setting of play speed

(1) Normally, the speed is 33 1/3 rpm.
(2) Automatic setting
After scanning of record by the tonearm:
ⓐ In the case of 25 cm and 30 cm records, the speed sets itself to 33-1/3 rpm.
ⓑ In the case of 17 cm record, the speed sets itself to 45 rpm.
ⓒ In the case of other records (such as 33-1/3 rpm 17 cm record), it is needed to set their play speed manually in advance.
ⓓ Records of other sizes than 17 cm, 25 cm, 30 cm shall not be applied to this unit.
(3) Resetting of play speed
When the tonearm returns to its rest after playing at 45 rpm, the play speed is automatically reset to 33-1/3 rpm.

(4) Manual setting
Once [33] or [45] button is operated, automatic setting is disabled. However, when the tonearm returns to the rest after complete performance or by depressing [CUT] button, or when the tonearm is manually returned to the rest, the memory is reset, and the mode returns to automatic setting. (For button entries, see Table 1.)

3. Channel designation
(1) For displays, see Table 1; for button entries, see Table 2. Channel designation is applicable to a record containing up to 15 programs on one side.
(2) 0-channel entry, or channel-16 entry and after causes "Er" display; this is an error and not accepted. For instance, after operation of [1], [6] and [CH] buttons, the display shows "Er."
(3) If [CH] button is operated twice consecutively, the second input is disregarded.
(4) Maximum 15 programs can be designated. If 16 or more programs are designated, an error mark "Er" appears on display, and such input is not accepted. This error message disappears when a correct input is made.
[CH] = channel button

4. Clear operation
(1) For button entries, see Table 1.
(2) When [clear] button is depressed, only the numerical input before operation of [CH] and [repeat] buttons is cleared.
(3) When [CUT] button is depressed, all the memories are cleared away.
[CH] = channel button

5. Repeat designation
(1) For button entries, see Table 1.
(2) Repeat operation may be designated from twice to 5 times. Specification of 6 or more times causes "Er" display. When specified as 1, the record is played only once. For instance, in the case of button entries [3], [CH], [5], [CH], [2], [REP], [PLAY], the playing goes as follows:
3rd program → 5th program → 3rd program → 5 program → end.
(3) If repeat is specified without numerical input or after input of 0, the playing is repeated endlessly. For instance, in the case of button entries [3], [CH], [5], [CH], [REP], [PLAY], or [3], [CH], [5], [CH], [0], [REP], [PLAY], the third program and fifth program are repeated endlessly until [CUT] button is pushed down.
(4) When only the number of repeats is designated without specifying the programs, all the programs on one side of a record are played by the number of times specified.
(5) If [REP] and [PLAY] buttons are pressed without specifying the programs and the number of repeats, all the programs on one side are played endlessly until [CUT] button is depressed. (This holds true also in the case of 0 repeat time designation.)
[CH] = channel button, [REP] = repeat button

6. Play operation
(1) For button entries, see Table 1.
(2) When [PLAY] button is depressed, the tonearm scans once, and the playing is started when a record has been placed on turntable.
(3) When [PLAY] button is depressed without specifying the programs, all the programs on one side are played.
(4) Repeat operation may be used.

7. Cue operation
(1) For button entries, see Table 1.
(2) [CUE] button is used to move the tonearm up and down.
(3) When [CUE] button is pushed during programming while the tonearm is seated on its rest, the memory is cleared, and "U" is displayed.
When [CUE] button is operated again, "in" is displayed if the tonearm is on the rest; "P" is displayed, if the tonearm is separated from the rest by manual operation and it falls onto the record.

8. Cut operation
(1) For button entries, see Table 1.
(2) Cut operation causes the tonearm to return automatically, and clears the memory at the same time, returning all operations to the initial states.
At this time, the mode display disappears.

9. Skip operation
(1) The tonearm skips to a next selected program.
(2) The display of the number of remaining programs is decreased (whether playing with or without memory).
(3) When playing without memory, the tonearm moves to the next program. However if the skip operation occurs at the final program, the tonearm returns to the rest.
When playing with memory, if no selected program is left any longer; the tonearm returns to the rest (when the display of the number of remaining programs is 1).

10. Consecutive channels
The tonearm is not lifted. Only the display of the number of remaining programs is decreased (whether playing with or without memory).

11. Buzzer sound
The buzzer sounds for the specified duration after input of buttons other than sound mode button and quartz button or corresponding remote control buttons.

12. Display of remaining programs [REP] = repeat button
(1) 2-program entry [PLAY]:
Display of remaining programs; 2
(2) No entry [PLAY]:
Display of remaining programs; Number of programs on one side * Note
(3) 5-program entry [5] [REP] [PLAY]:
Display of remaining programs; 25
(4) No entry [3] [REP] [PLAY]:
Display of remaining programs; 3 x (No. of programs on one side) * Note
(5) 2-program entry [1] [REP] [PLAY]:
Display of remaining programs; 2
(6) 4-program entry [0] [REP] [PLAY]:
Display of remaining programs; En
(7) 4-program entry [REP] [PLAY]:
Display of remaining programs; En
(8) No entry [REP] [PLAY]:
Display of remaining programs; En
(9) No entry [0] [REP] [PLAY]:
Display of remaining programs; En

Note:
Maximum number of programs on one side should be 15, so that 16th and subsequent programs are disregarded.

13. No record on turntable
(1) When [PLAY] button is depressed, the tonearm scans once, and returns to the rest, displaying "in" message.
(2) The same operation is carried out in the case of repeat operation.

14. Automatic return
(1) This function is effective only in the case of automatic operation, and does not work in the case of manual operation.

15. Manual operation
(1) For displays, see Table 2.
(2) Usable buttons are shown in Table 1.
(3) The automatic return function is not effective.
(4) When the tonearm is lifted above the rest manually, "P" is displayed.
And when it is returned to the rest manually, all the memories are cleared and "in" is displayed, thereby returning to the initial states.
(5) Where [CUE] button has been set to "up" position, if the tonearm is returned to the rest manually, it doesn't tend to keep itself above the rest but does fall onto the rest automatically, for such cue-up function is cancelled as the result of detection of the return motion by the internal switch. Then "in" is displayed.

16. Others
(1) When the tonearm is manually returned to the rest in the course of automatic playing, all memories are cleared as soon as the tonearm is seated on the rest, and "in" is displayed, so that all operations return to the initial states.
(2) When two buttons are pressed down simultaneously, the one depressed even a moment earlier is entered. If depressed completely simultaneously, either one determined by the program is entered.
(3) The tonearm does not return to the rest when it is running over the space between two programs. (The tonearm moves the shortest course while playing.)
(4) When lifting the tonearm by [CUE] button, take care not to move it horizontally beyond the limit. When the tonearm is set down by [CUE] button, the unit then resumes program-designated operation.

[Table 1]
Entry-allowable range of buttons
(This applies to either operation of the front panel's buttons or operation of remote control's buttons.)

State / Tonearm rest position	While Playing	When tonearm is lifted by cue button / Manual operation	While tonearm is moving (Auto)
Numeric keys, [0] to [9] — ○ (X after repeat)	X	X	X
Channel button, [CH] — ○ (NOTE) (X after repeat)	X	X	X
Play button, [PLAY] — ○	X	X	X
Clear button, [CE] — ○ (X after channel or repeat designation)	X	X	X
Repeat button, [REP] — ○ (NOTE)	X	X	X
Cut button, [CUT] — ○	○	○	X
Cue button, [CUE] — ○	○	○	X
Speed button, [33] — ○	○	○	X
Speed button, [45] — ○	○	○	X
Skip button, [SKIP] — X	○	X	X

○ : entry enabled
X : entry disabled (instruction is not accepted)

(NOTE)
In the case of consecutive inputs of [CH] or [REP] button, the second and subsequent inputs are disregarded.

[Table 2]

Operation	Display	Remarks
1. Power switch ON	1 n	
2. Numeric button input [3]	3	
3. Channel button input [CH]	3 C	
4. Numeric button input [1]	1	
5. Numeric button input [2]	1 2	
6. Numeric button input [0]	2 0	① In numeric button input last 2 digits are effective. ② Zero suppressing is applied to higher digit of effective numerals.
7. Channel button input [CH]	E r	Entry of channel 20 results in an error.
8. Numeric button input [1] , [2]	1 2	
9. Channel button input [CH]	1 2 C	
10. Clear button input [CE]	1 2 C	Clear is invalid.
11. Numeric button input [5]	5	
12. Repeat button input [REP]	5 r P	Repeat of 5 times is entered.
13. Play button input [PLAY]	① Tonearm moving ② Tonearm lowering: 1 0 ③ Tonearm lifted at the end of program ④ Tonearm moving, lowering: 9	① 3rd program and 12th program are repeated 5 times. ② Display of remaining program (2 × 5 = 10) ③ Display of remaining programs: 9
14. Cut button input [CUT] , or end of playing	① Tonearm lifted ② Lowering at rest position: 1 n	Returning operations to the initial states.
15. Numeric button input [8]	8	
16. Clear button input [CE]		Cleared.
17. Repeat button input [REP]	E n	Endless repeat.
18. During manual operation	P	
19. Cue operation		
(1) CUE UP while playing	1 2 U	12 programs remaining.
(2) CUE UP on the rest	U	
(3) CUE DOWN after CUE UP on the rest	1 n	CUE UP while programming will clear the program.
(4) CUE UP during endless repeat	E n U	

CAUTIONS ON HANDLING MOS LSI (IC)

MOS IC is to control the electric conductivity between the source and drain by using the voltage at the gate electrode through insulating oxide film (SiO_2). If overvoltage is applied to the gate electrode, the insulator at the gate electrode undergoes dielectric breakdown. Once such dielectric breakdown occurs, the junction between the gate and other terminals is shortcircuited and MOS IC is so damaged that its quality will not be recovered again.

And, MOS IC is highly sensitive to static charge because its gate oxide film is as thin as 1000 Å to 1500 Å. Input protective circuit is provided to protect MOS IC but this circuit can not always play its role according to the conditions of using MOS IC.
Therefore, pay due attention to the following when handling it.

▪ CAUTIONS ON TRANSPORTATION AND PRESERVATION

As for MOS IC, either the input or output terminal has remarkably high impedance in comparison with ordinary semiconductor IC. Therefore, MOS IC is liable to be affected by the induction of neary-by high-tension power source or A.C. power source and it may be given a larger voltage unexpectedly due to body discharged possibly causing dielectric breakdown of the gate. To eliminate this, during transportation and preservation of MOS IC all the terminals should be kept at the same potential in the following methods (to shortcircuit all the terminals).

① Wind thin wire around MOS IC.
② Fit metallic ring on it.
③ Pack it with aluminum foil.
④ Hold it by electric conductive jig.
⑤ Put it in a special case for LSI.

Note: Never put MOS IC in a mal-conductive container such as made of polystyrene.

▪ CAUTIONS ON SERVICING

① A soldering tool to be used should be the less-leak one (more than 100 Kohm of leak resistance—there may be a soldering tool of more than 1 Meg.ohm to be used for semiconductor). Otherwise, ground the soldering tool when using it.
② Ground the earth terminal of a measuring instrument.
③ Ground a bench.
④ Before insertion or removal of LSI to or from P.W.B., be sure to turn off the power switch.
⑤ When inserting LSI to P.W.B., ground the earth terminal of P.W.B.
⑥ Never touch the terminals of LSI by hand.
⑦ Be sure to ground the earth terminal of D.C. power source.
⑧ To prevent LSI from being broken due to human body discharge, it is necessary to ground the human body. But this requires the greatest care as otherwise the body encounters large current (absolutely avoid touching A.C. power source).
⑨ As MOS LSI is actuated with a small current, be sure to remove soldering flux and perform moisture-proof treatment after repairing. (Apply moisture-proof agent for electronic calculator.)

VHINJM4558D-1 (NJM4558D)

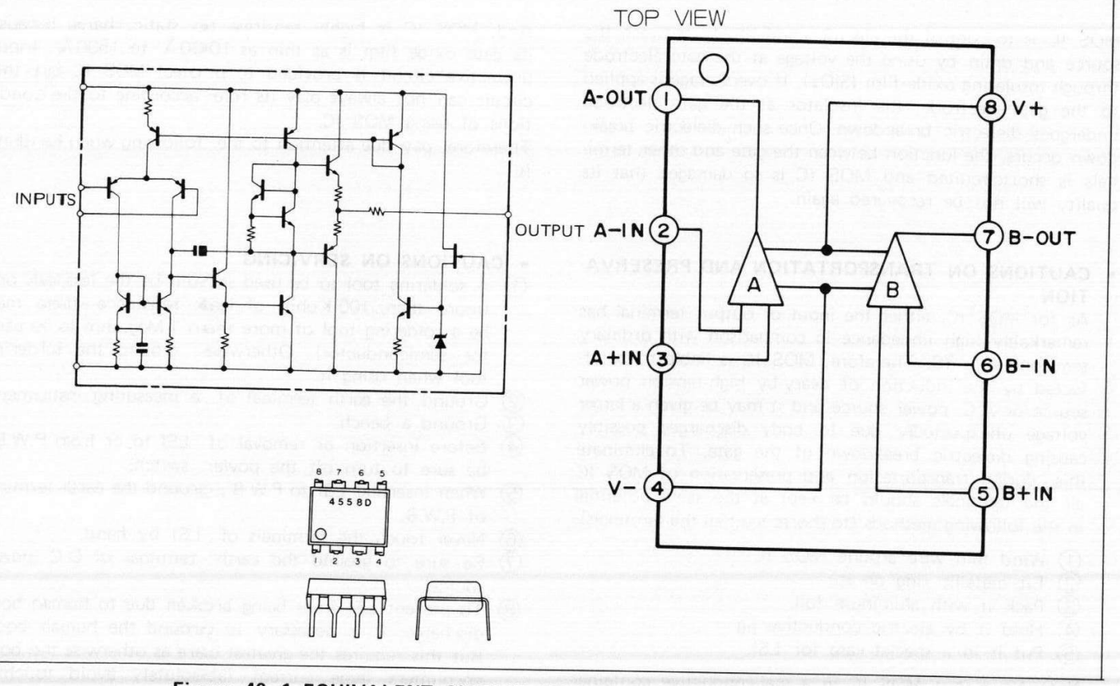


Figure 40–1 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC1, IC210)

91ZRC4558P (RC4558P)

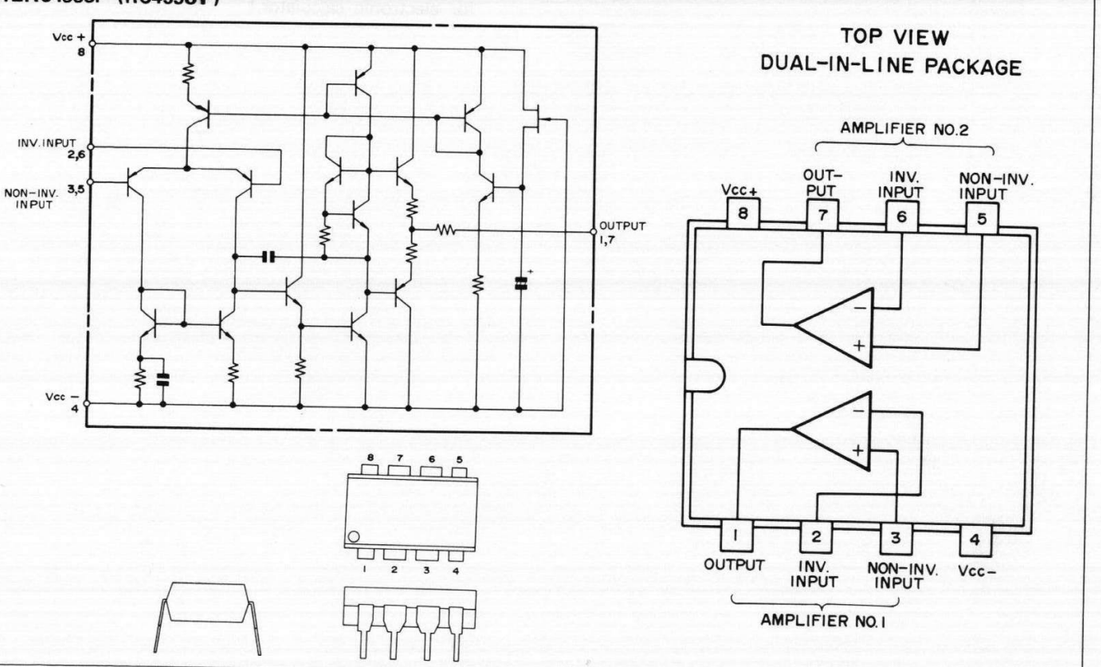


Figure 40–2 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC2)

91ZSM6415A-4S (SM-6415A-4S)

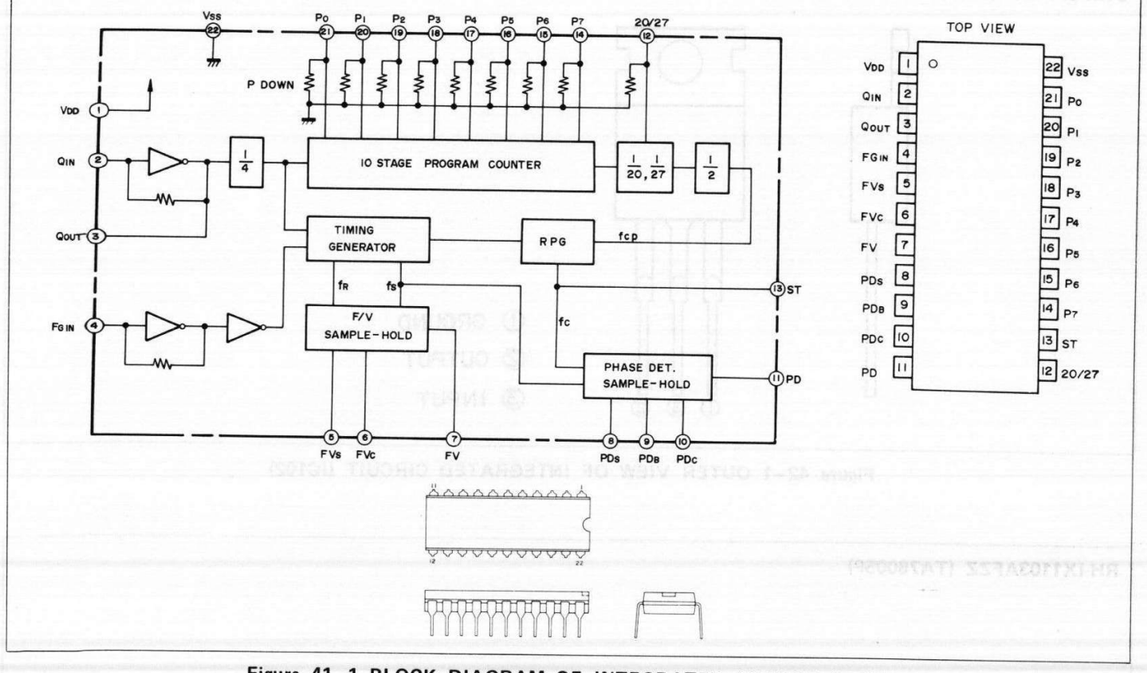


Figure 41–1 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC3)

91ZμPC14312H (μPC14312H)

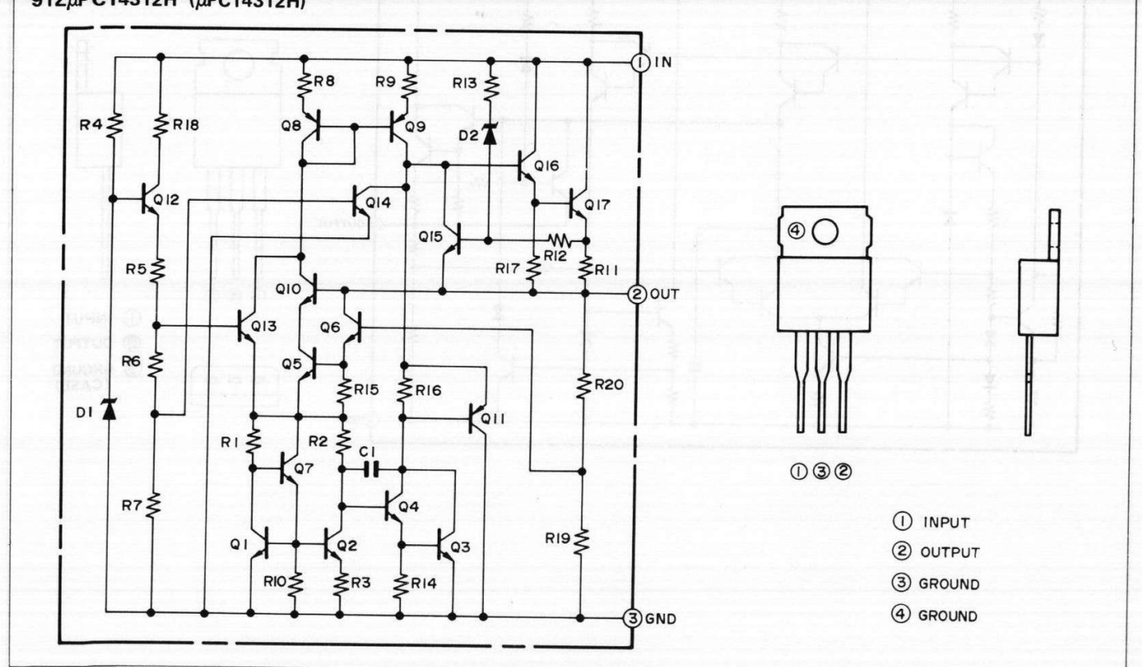


Figure 41–2 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC101)

91ZFS7912M (FS-7912M)

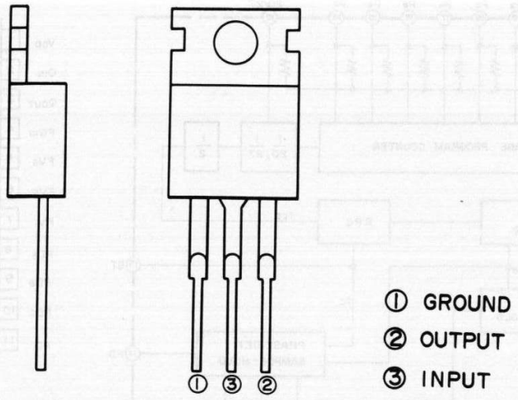


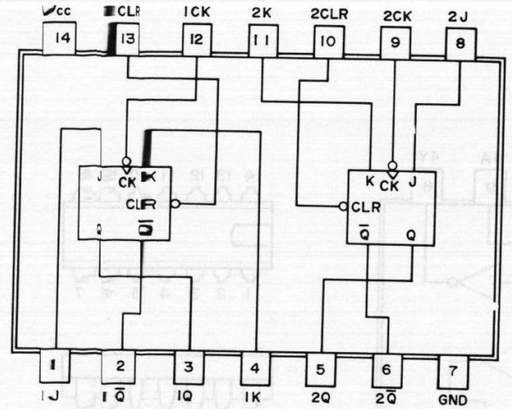
Figure 42–1 OUTER VIEW OF INTEGRATED CIRCUIT (IC102)

RH-IX1103AFZZ (TA78005P)

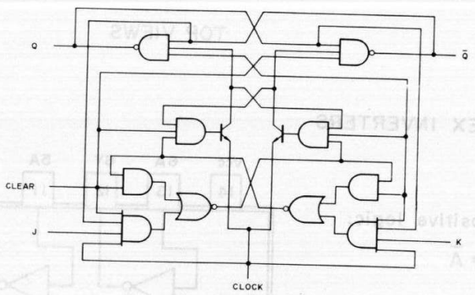
Figure 42–2 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC201)

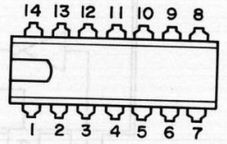
RH-IX1103AFZZ (SN74107N)

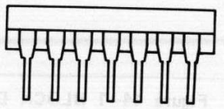
DUAL J-K FLIP-FLOPS WITH CLEAR



functional block diagrams (continued)







FUNCTION TABLE

INPUTS				OUTPUTS	
CLEAR	CLOCK	J	K	Q	Q̄
L	X	X	X	L	H
H	↓	L	L	Q_0	$\bar{Q}_0$
H	↓	H	L	H	L
H	↓	L	H	L	H
H	↓	H	H	TOGGLE	

H = high level (steady state)
L = low level (steady state)
X = irrelevant (any input, including transitions)
Q_0 = level of Q before the indicated steady-state input conditions were established
$\bar{Q}_0$ = complement of Q_0 or level of Q̄ before the indicated steady-state input conditions were established
⎍ = one high-level pulse
TOGGLE = each output changes to the complement of its previous level on each active transition indicated by ↓ or ↑.

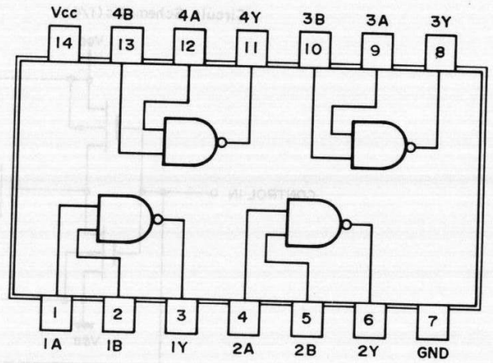
Figure 43–1 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC202 and IC408)

RH-IX1185AFZZ (SN7426N)

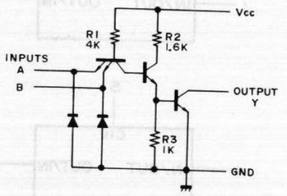
TOP VIEW

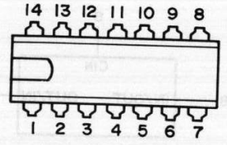
Quadruple 2-Input
High-voltage
Interface
Positive-NAND Gates

Positive logic:
$Y = \overline{AB}$



Schematic (each gate)





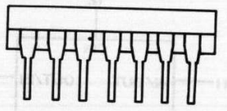


Figure 43–2 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC203)

RH-IX1138AFZZ (SN7404N)

TOP VIEWS

HEX INVERTERS

positive logic
Y = $\overline{A}$

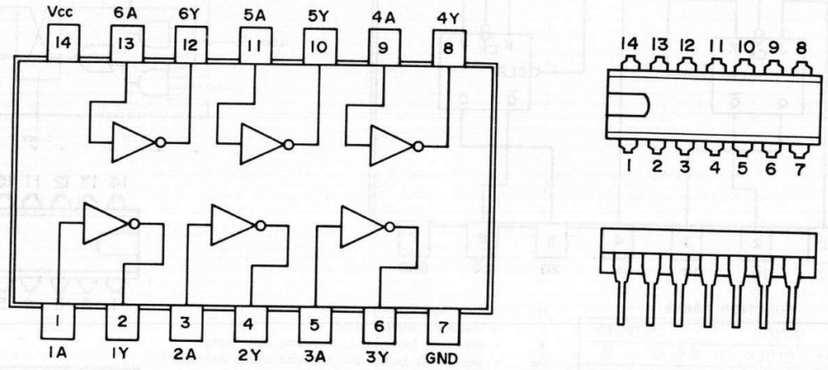
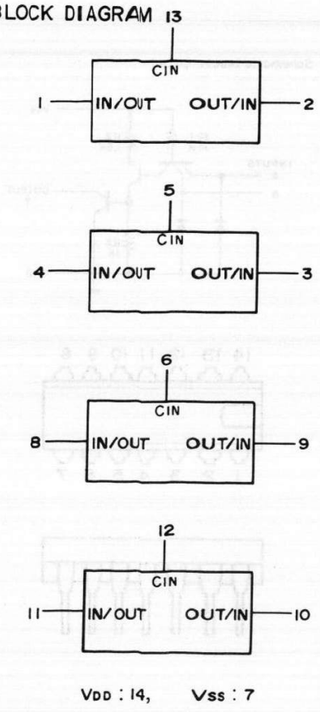


Figure 44–1 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC204 and IC511)

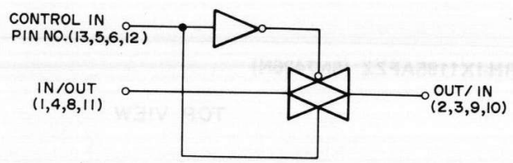
RH-IX1127AFZZ (TC4016BP)

BLOCK DIAGRAM

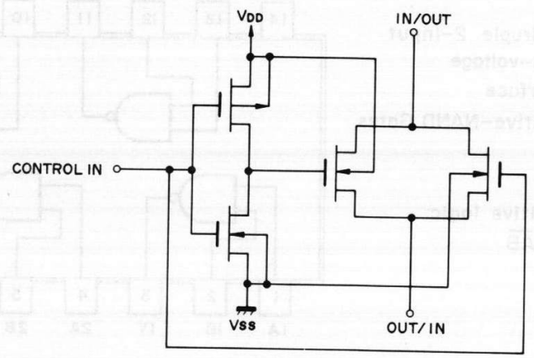


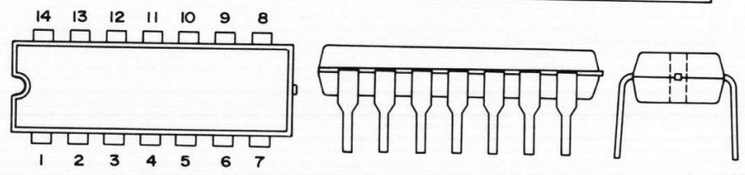
LOGIC DIAGRAM

Logic Symbol (1/4)



Circuit Schematic(1/4)





VDD : 14, Vss : 7

Figure 44–2 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC205)

RH-IX1136AFZZ (SN74LS02N)

Positive logic:
Y = $\overline{A+B}$

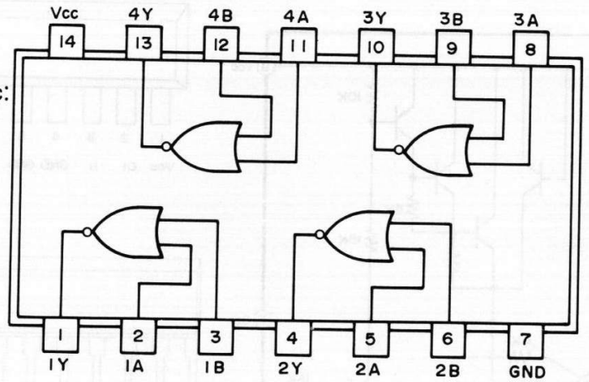
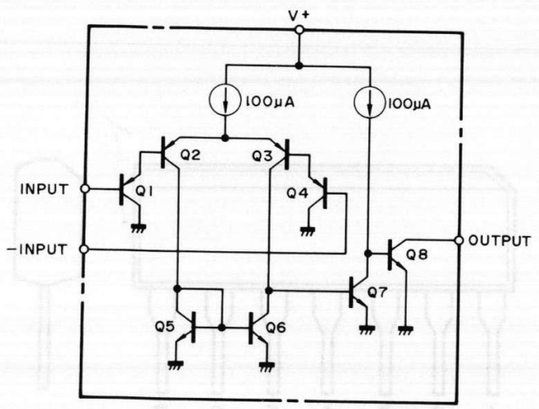


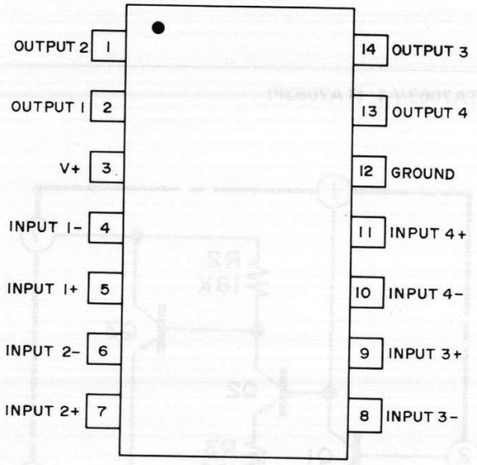
Figure 45–1 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC206)

VHINJM2901/-1 (NJM2901N)

SCHEMATIC DIAGRAM



CONNECTION INFORMATION(TOP VIEW)



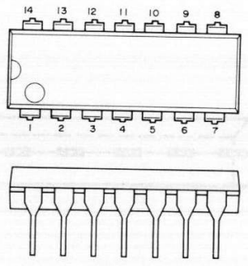


Figure 45–2 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC207)

VHIM54540L/-1 (M54540L)

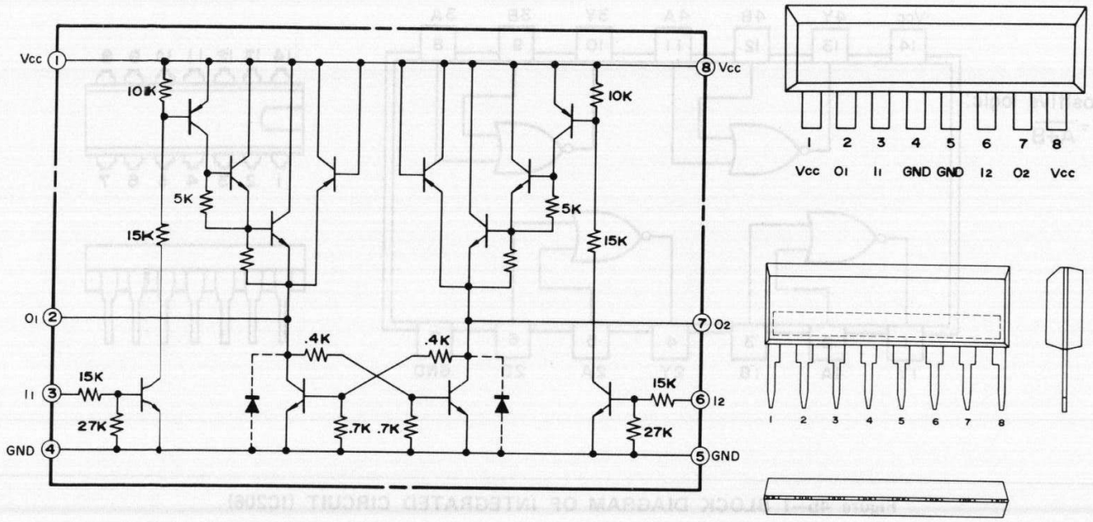


Figure 46–1 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC208)

VHITA7063//-1 (TA7063P)

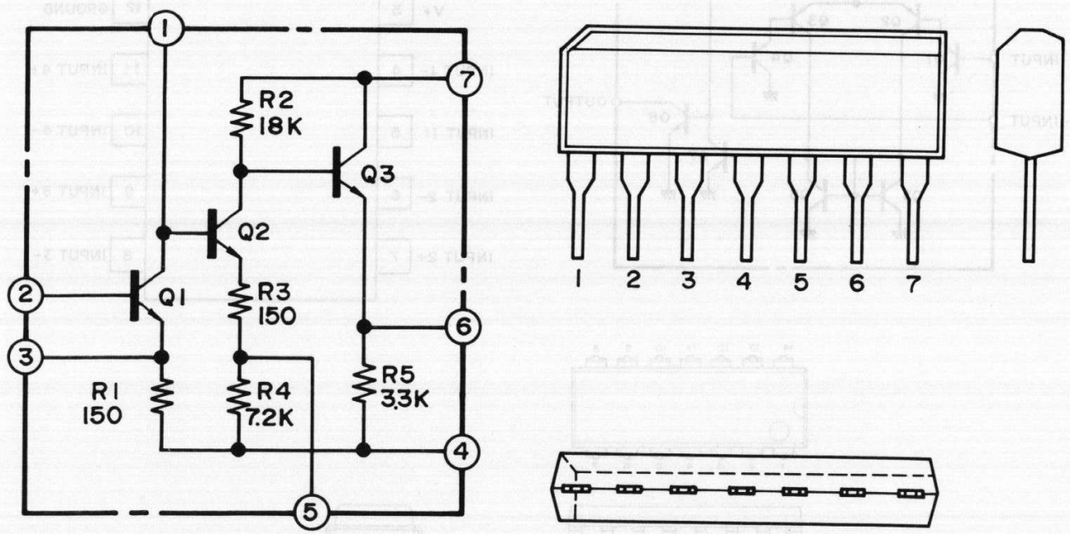


Figure 46–2 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC209)

RH-IX1189AFZZ (RC555NB)

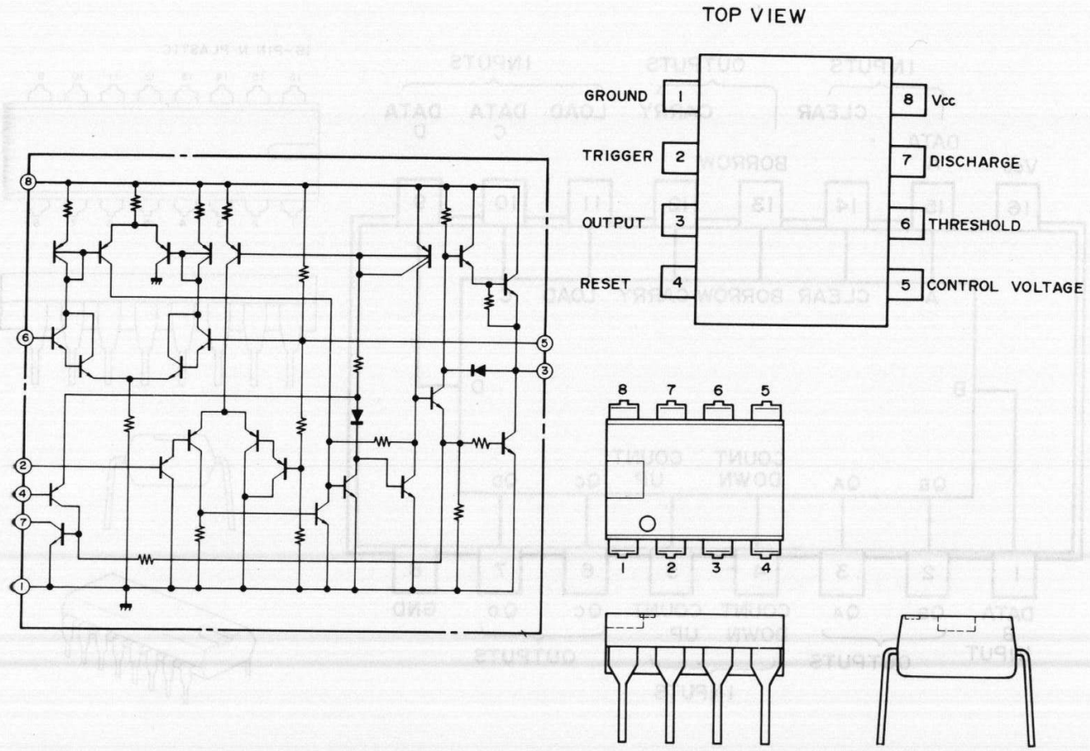


Figure 47–1 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC401)

RH-IX1135AFZZ (SN74LS00N)

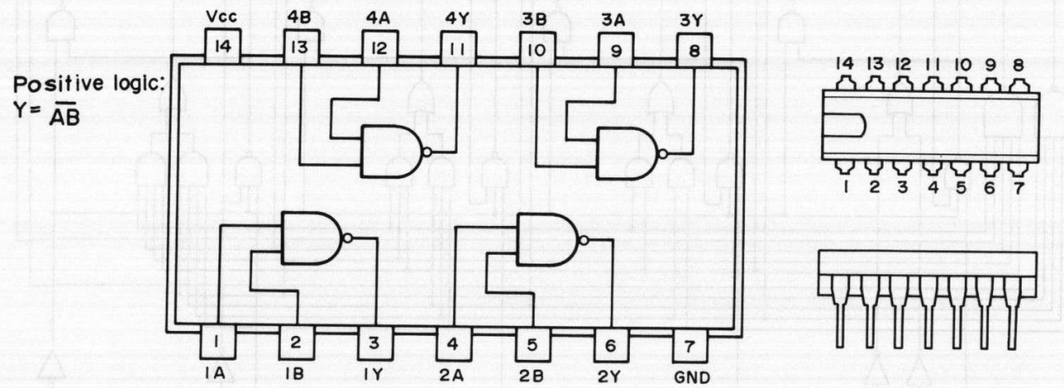
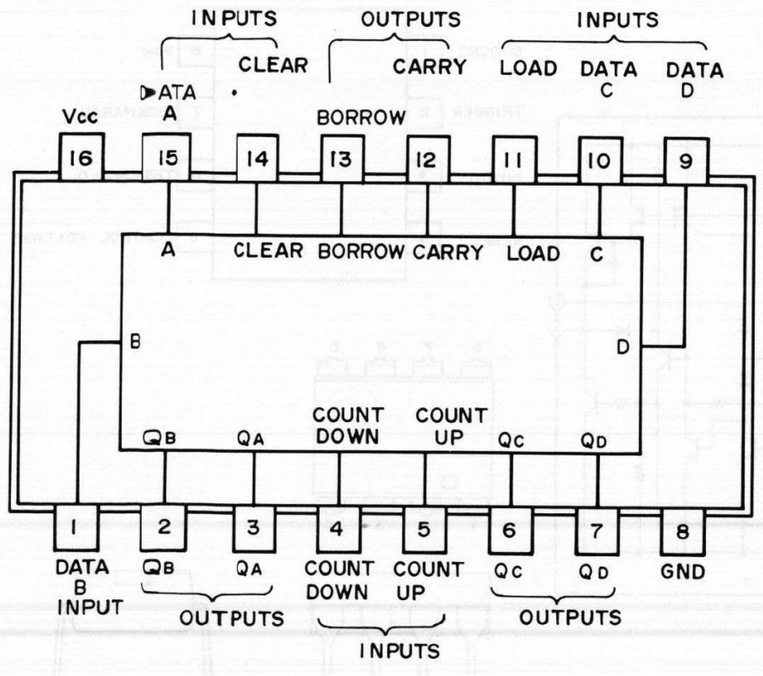
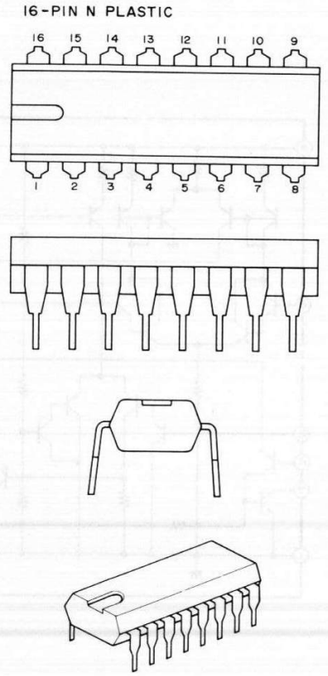


Figure 47–2 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC402, IC405 and IC409)

RH-IX1187AFZZ (SN74LS193N)





SYNCHRONOUS 4-BIT UP/ DOWN COUNTERS (DUAL CLOCK WITH CLEAR)

functional block diagram

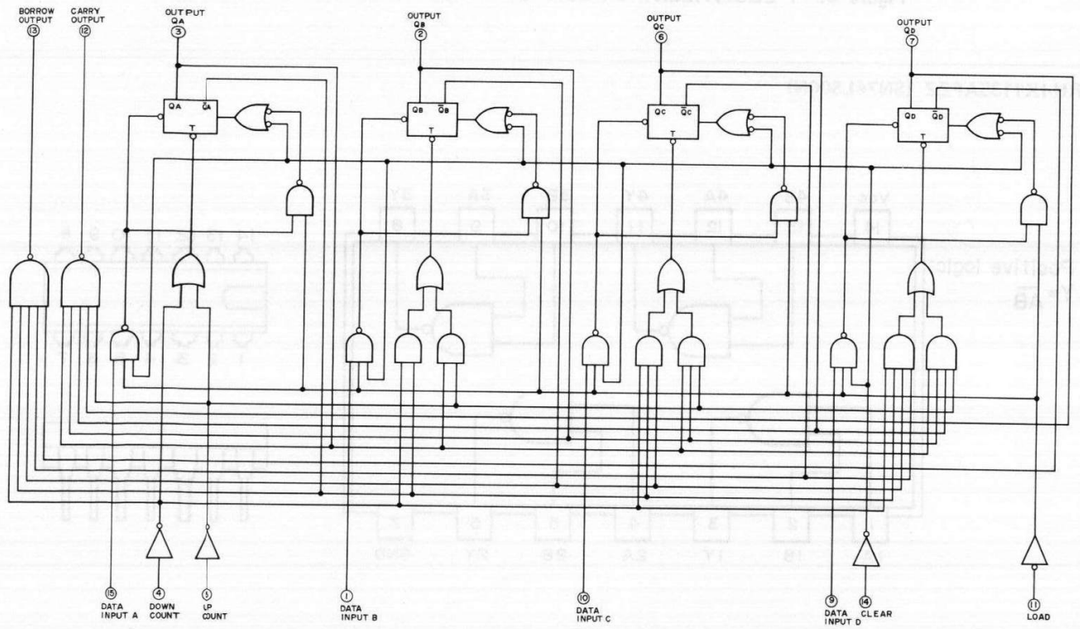
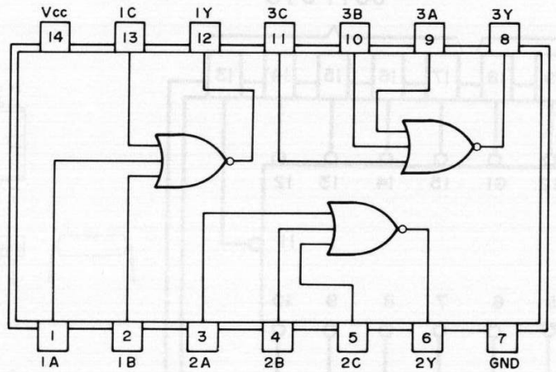
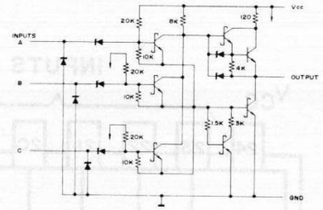


Figure 48 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC403 and IC404)

HI74LS27//-1 (SN74LS27N)

Positive logic:
$Y = \overline{A+B+C}$





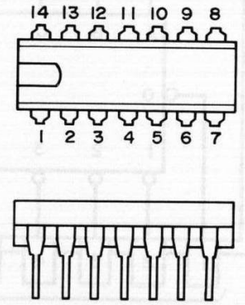
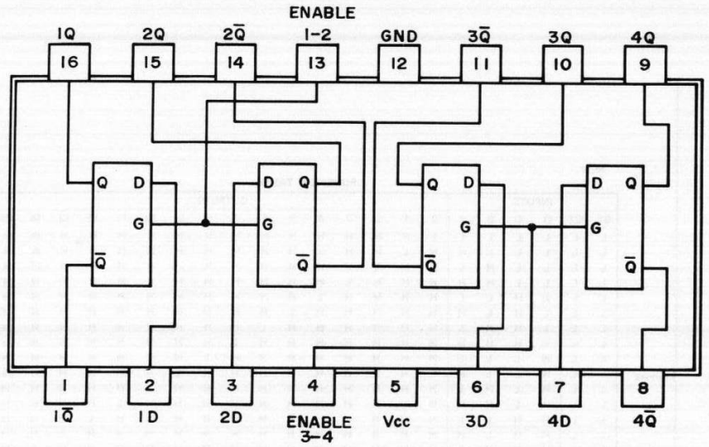


Figure 49–1 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC406)

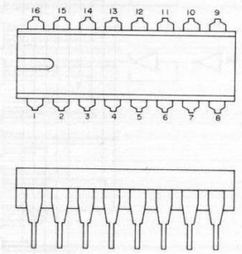
RH-IX1188AFZZ (SN74LS75N)



FUNCTION TABLE (EACH LATCH)

INPUTS		OUTPUTS	
D	G	Q	$\overline{Q}$
L	H	L	H
H	H	H	L
X	L	Q_0	$\overline{Q}_0$

H = high level, L = low level, X = irrelevant
Q_0 = the level of Q before the high-to-low transition of G



functional block diagrams (each latch)

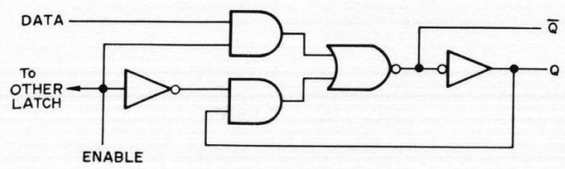
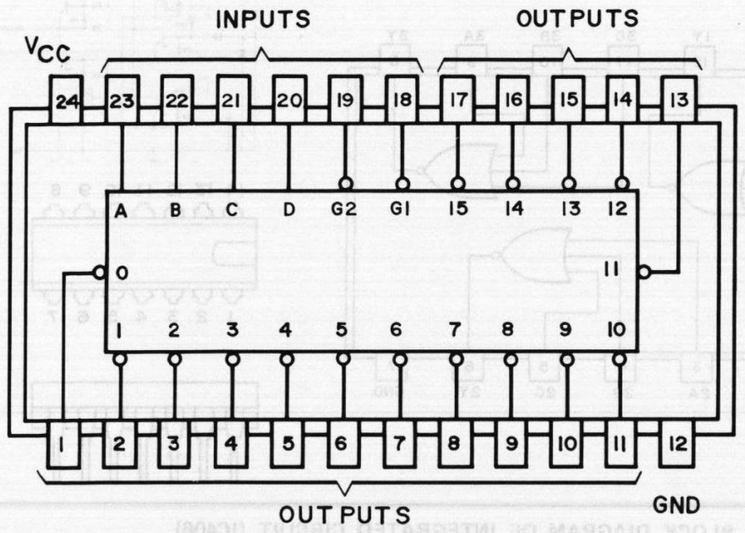
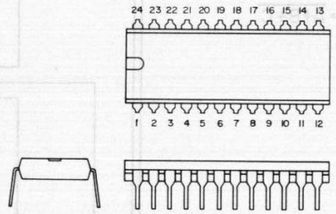
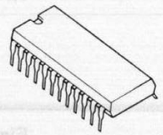


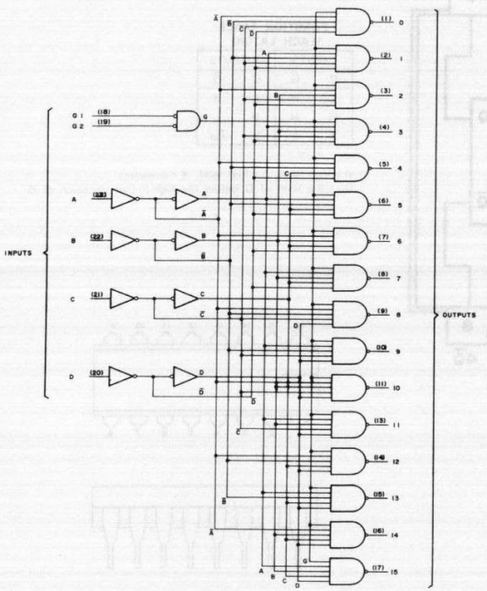
Figure 49–2 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC407)

RH-IX1166AFZZ (SN74159N)









logic

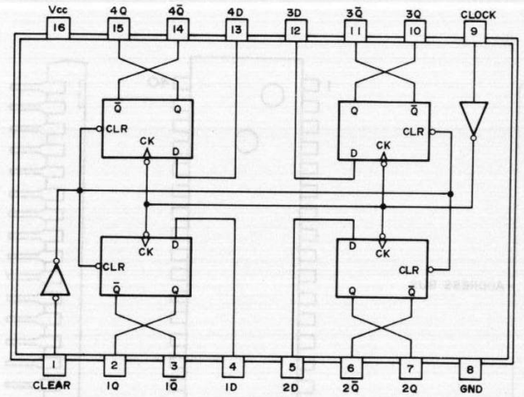
FUNCTION TABLE

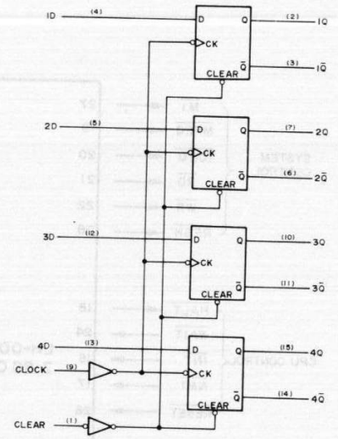
INPUTS						OUTPUTS														
G1	G2	D	C	B	A	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	L	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	L	H	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	L	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	H	L	L	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H
L	L	L	H	L	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H
L	L	L	H	H	L	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H
L	L	L	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H
L	L	H	L	L	L	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H
L	L	H	L	L	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H
L	L	H	L	H	L	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H
L	L	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H
L	L	H	H	L	L	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H
L	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H
L	L	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H
L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L
L	H	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
H	L	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
H	H	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H = high level, L = low level, X = irrelevant

Figure 50 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC410)

VHI74LS175/-1 (SN74LS175N)





FUNCTION TABLE
(EACH FLIP-FLOP)

INPUTS			OUTPUTS	
CLEAR	CLOCK	D	Q	Q̄
L	X	X	L	H
H	↑	H	H	L
H	↑	L	L	H
H	L	X	Q_0	$\bar{Q}_0$

H = high level (steady state)
L = Low level (steady state)
X = irrelevant
↑ = transition from low to high level
Q_0 = the level of Q before the indicated steady-state input conditions were established.
$\bar{Q}_0$ = complement of Q_0 or level of Q̄ before the indicated steady-state input conditions were established

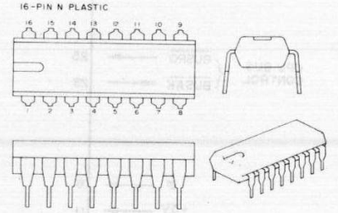
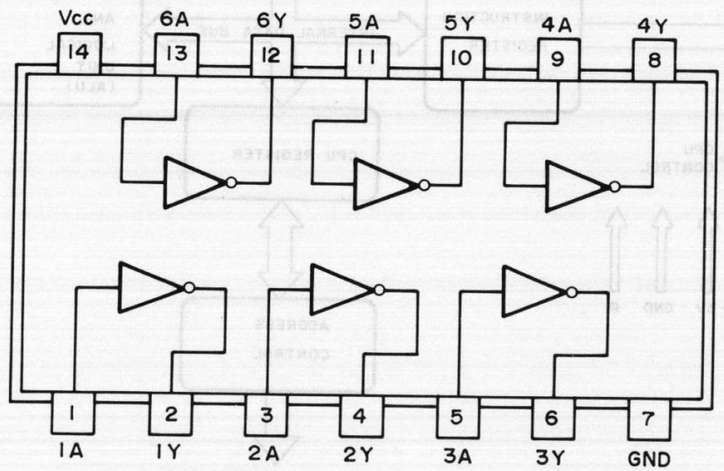


Figure 51–1 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC411)

VHI7405////-1 (SN7405N)

Positive logic:
$Y = \bar{A}$



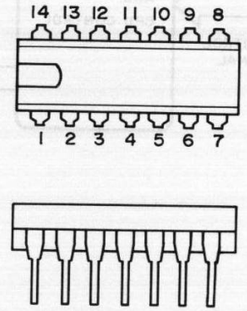
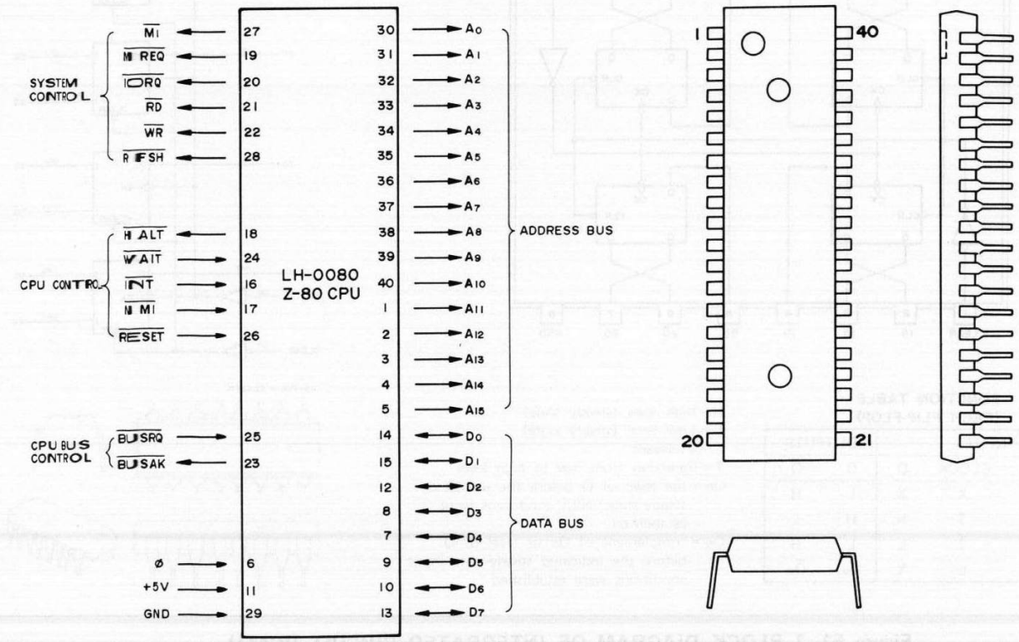


Figure 51–2 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC513)

94WLH0080 (LH-0080)



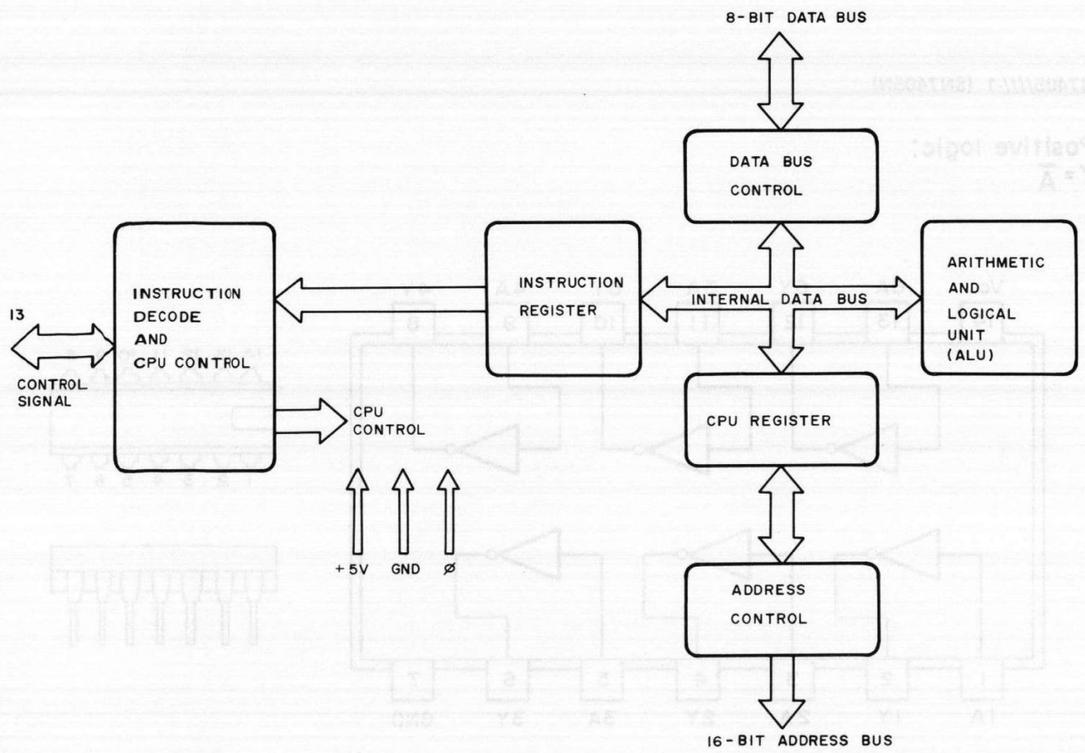
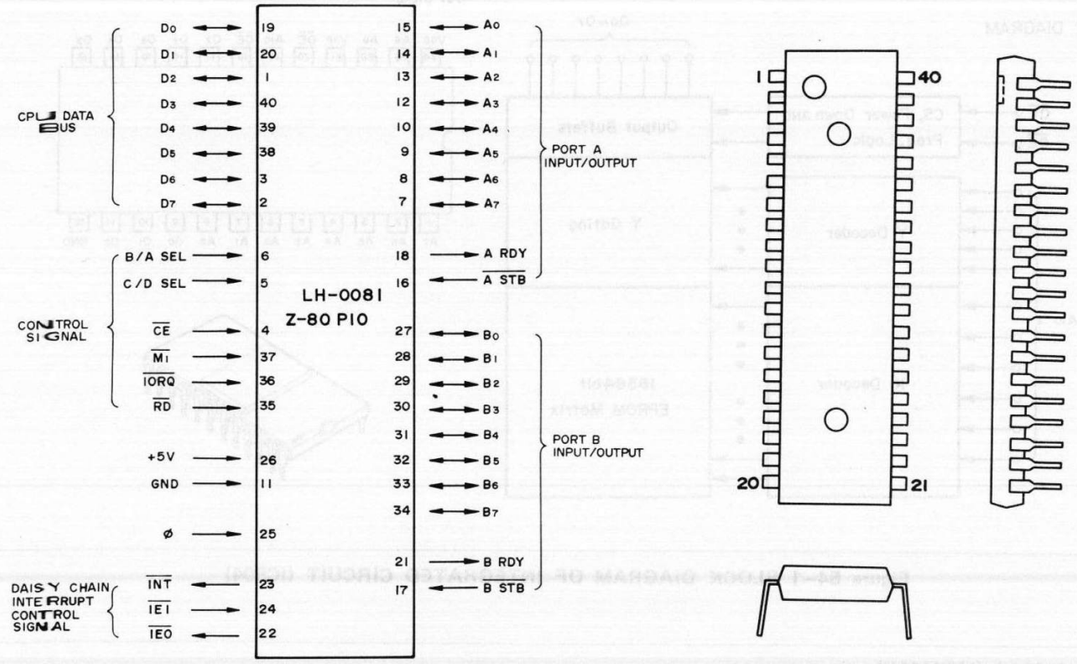


Figure 52 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC501)

94WL_H0081 (LH-0081)



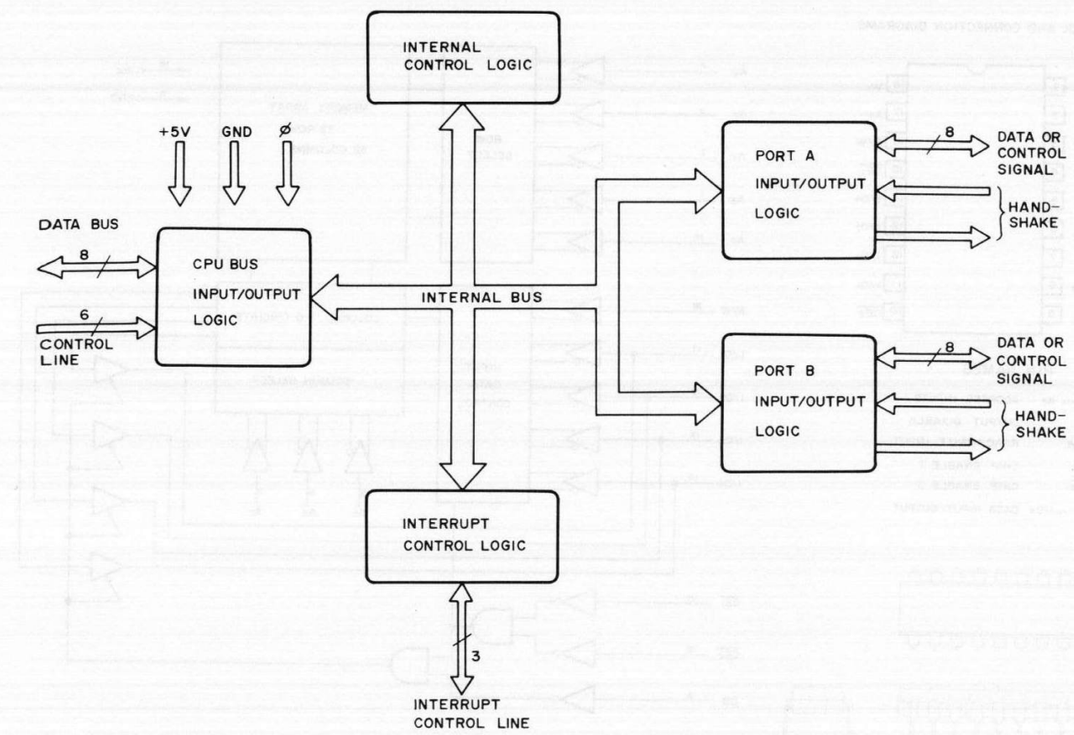


Figure 53 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC502 and IC503)

94WS-14P01 (HN462716)

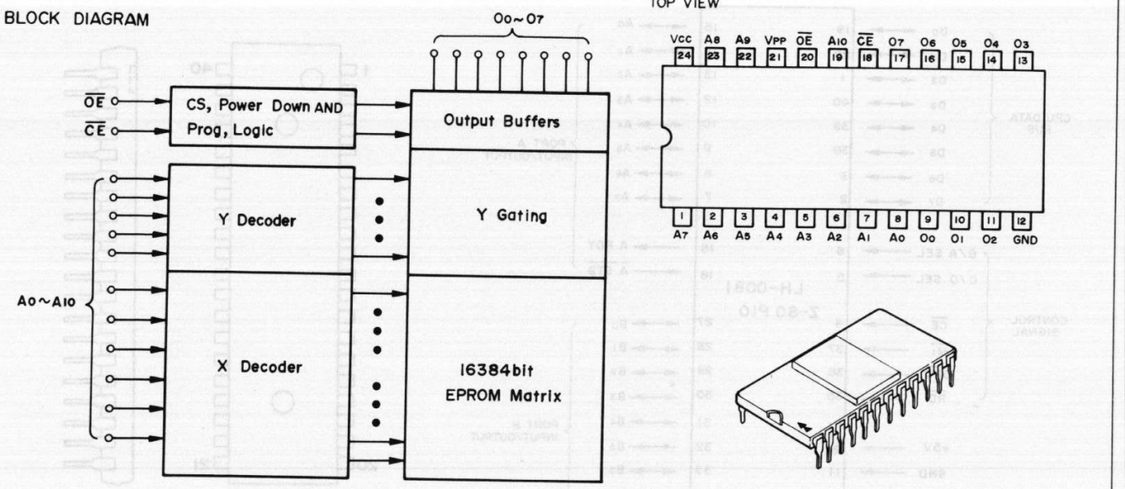


Figure 54–1 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC504)

94WLH2111A4 (MB8111N)

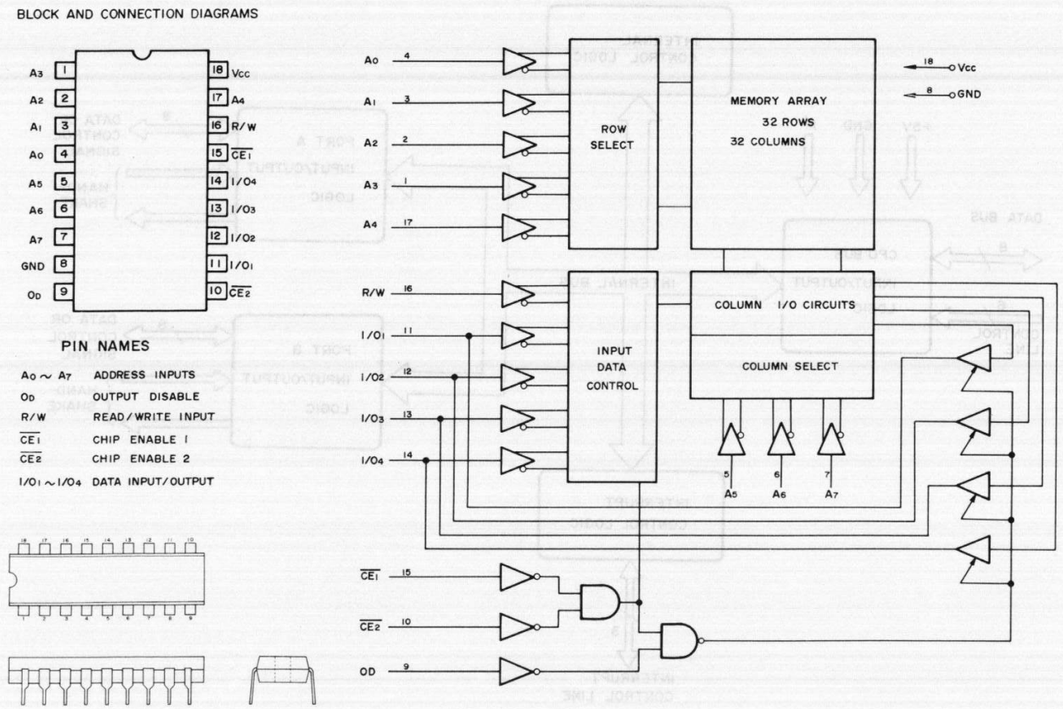


Figure 54–2 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC505 and IC508)

VHI74LS32//-1 (SN74LS32N)

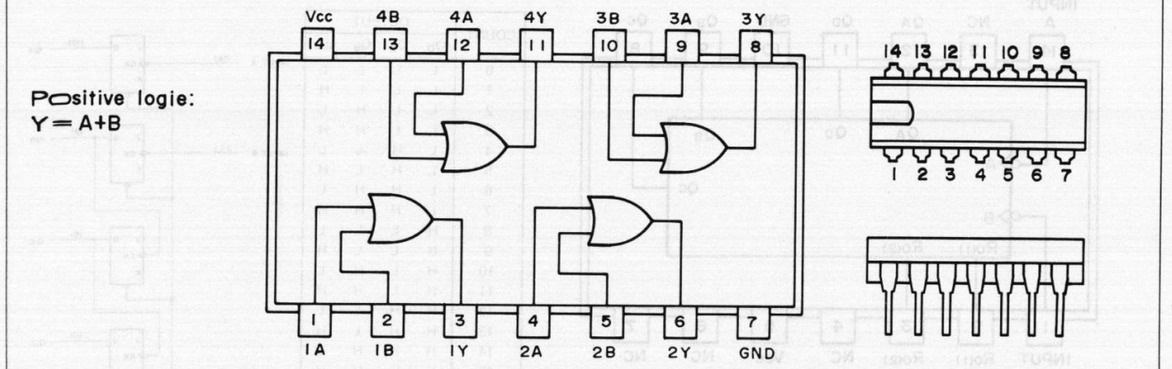
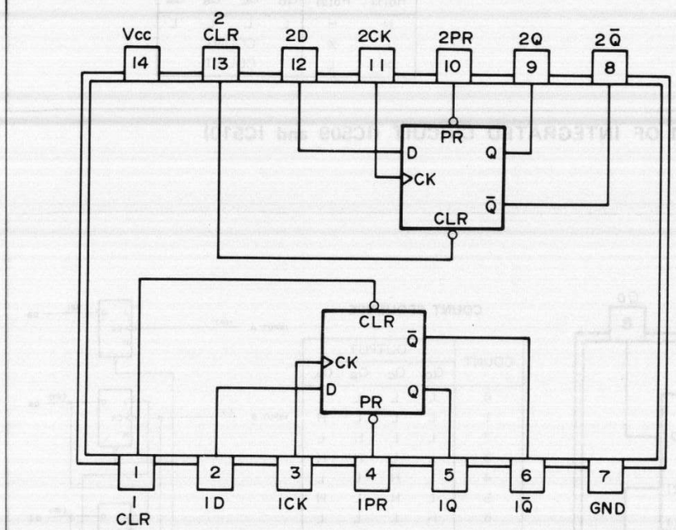
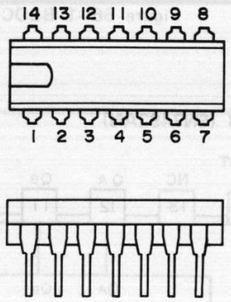


Figure 55–1 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC506)

VHI74LS74//-1 (SN74LS74AN)





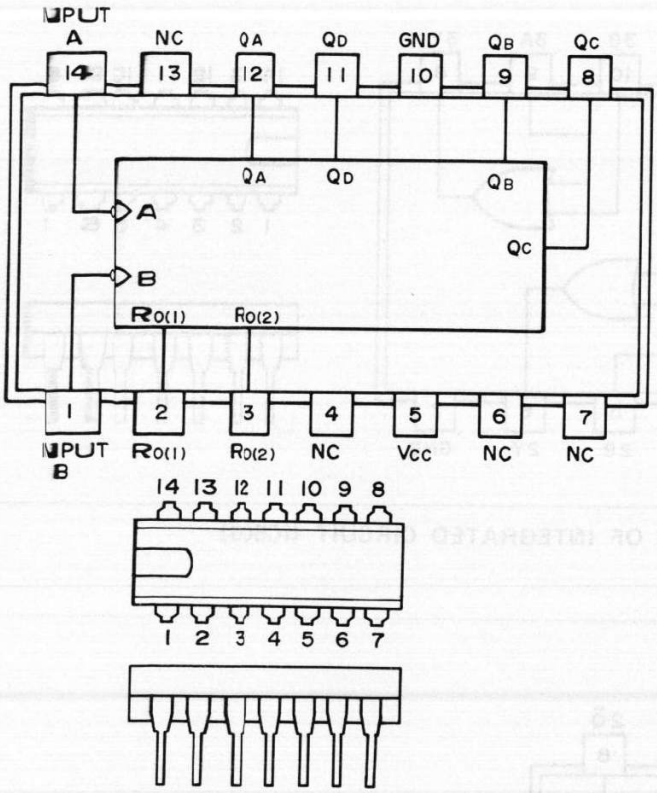
FUNCTION TABLE

INPUTS				OUTPUTS	
PRESET	CLEAR	CLOCK	D	Q	$\bar{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H*	H*
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q_o	$\bar{Q}_o$

H = high level, L = low level,
X = irrelevant,
↑ = transition from low to high level
Q_o = level of Q before the indicated steady-state input conditions were established
$\bar{Q}_o$ = complement of Q_o or level of $\bar{Q}$ before the indicated steady-state input conditions were established
* = This configuration is nonstable; that is, it will not persist when preset and clear inputs return to their inactive (high) level.

Figure 55–2 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC507)

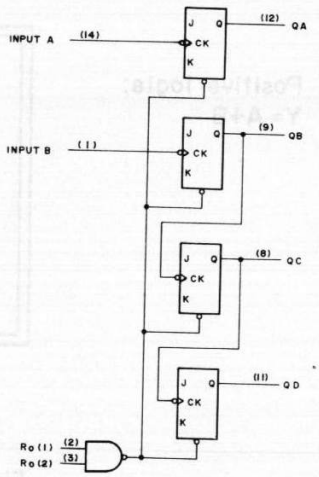
94VS-14P04 (SN7493AN)



COUNT SEQUENCE

COUNT	OUTPUT			
	Q_D	Q_C	Q_B	Q_A
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	L	H	L	H
6	L	H	H	L
7	L	H	H	H
8	H	L	L	L
9	H	L	L	H
10	H	L	H	L
11	H	L	H	H
12	H	H	L	L
13	H	H	L	H
14	H	H	H	L
15	H	H	H	H

1. Output Q_A is connected to input B.
2. H = high level, L = low level, X = irrelevant

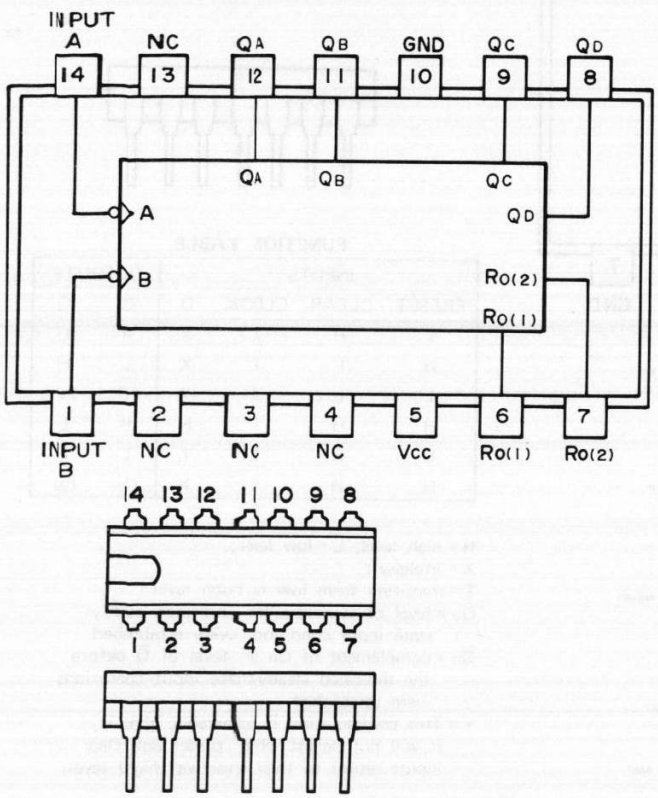


RESET/COUNT FUNCTION TABLE

RESET INPUTS		OUTPUT			
$R_{0(1)}$	$R_{0(2)}$	Q_D	Q_C	Q_B	Q_A
H	H	L	L	L	L
L	X	COUNT			
X	L	COUNT			

Figure 56–1 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC509 and IC510)

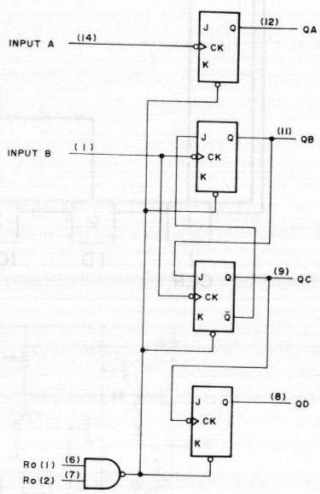
94VS-14P03 (SN7492AN)



COUNT SEQUENCE

COUNT	OUTPUT			
	Q_D	Q_C	Q_B	Q_A
0	L	L	L	L
1	L	L	L	H
2	L	L	H	L
3	L	L	H	H
4	L	H	L	L
5	L	H	L	H
6	H	L	L	L
7	H	L	L	H
8	H	L	H	L
9	H	L	H	H
10	H	H	L	L
11	H	H	L	H

1. Output Q_A is connected to input B.
2. H = high level, L = low level, X = irrelevant.

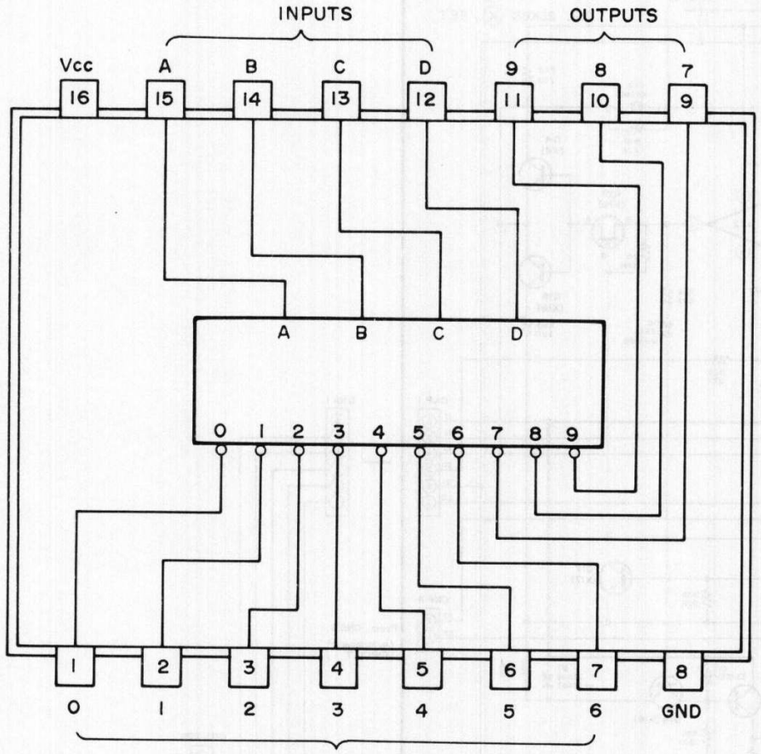


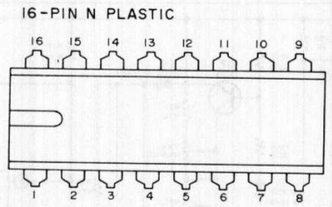
RESET/COUNT FUNCTION TABLE

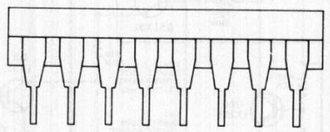
RESET INPUTS		OUTPUT			
$R_{0(1)}$	$R_{0(2)}$	Q_D	Q_C	Q_B	Q_A
H	H	L	L	L	L
L	X	COUNT			
X	L	COUNT			

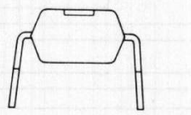
Figure 56–2 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC512)

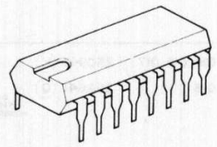
VHI7442////-1 (SN7442AN)
BCD-TO-DECIMAL DECODERS

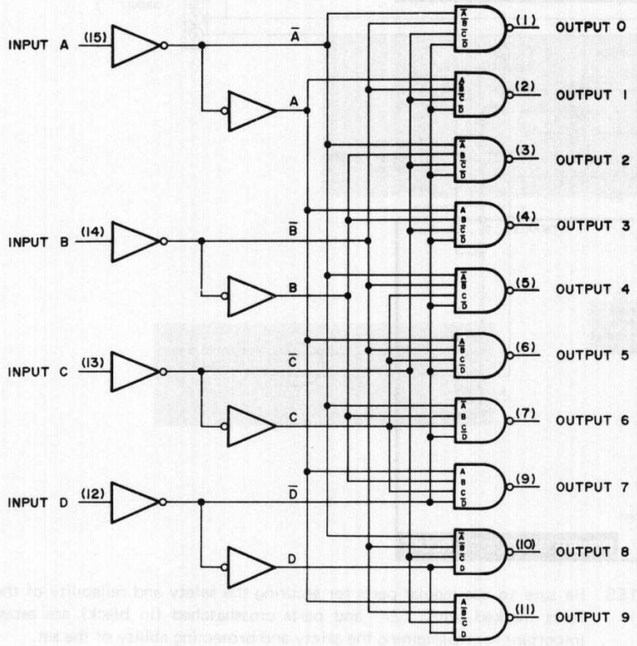












FUNCTION TABLE

NO.	BCD INPUT D	C	B	A	DECIMAL OUTPUT 0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
INVALID	H	L	H	L	H	H	H	H	H	H	H	H	H	H
	H	L	H	H	H	H	H	H	H	H	H	H	H	H
	H	H	L	L	H	H	H	H	H	H	H	H	H	H
	H	H	L	H	H	H	H	H	H	H	H	H	H	H
	H	H	H	L	H	H	H	H	H	H	H	H	H	H
	H	H	H	H	H	H	H	H	H	H	H	H	H	L

H = high level, L = low level

Figure 57 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC514)

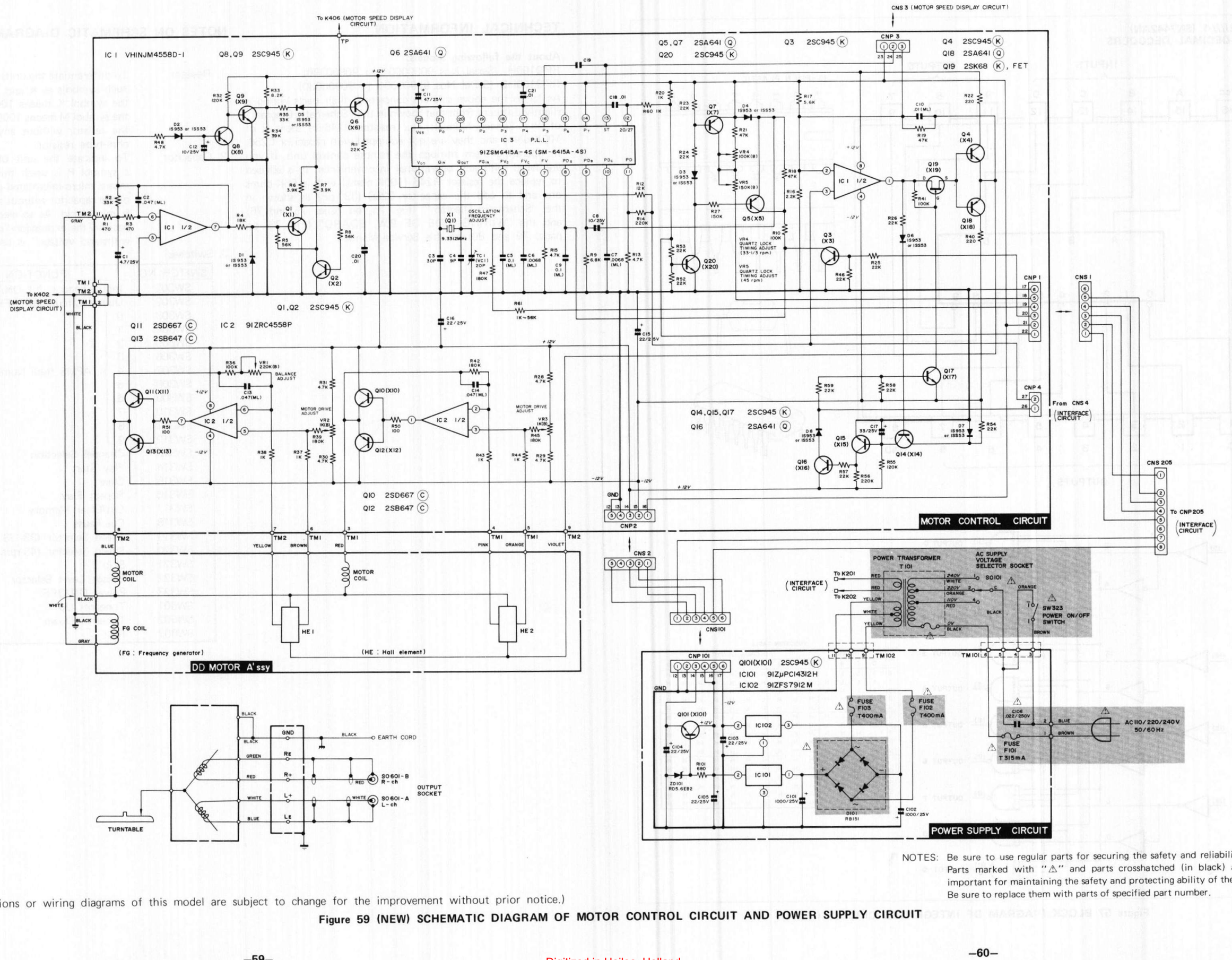
TECHNICAL INFORMATION

About the following models:
RP-9100H (Serial Nos. 90800001 to 90800390)
RP-9100HB (Serial Nos. 90900001 to 90900030)
As far as the above sets are concerned, their parts wiring is slightly different from that shown in the "Schematic Diagram" of this Service Manual; i.e., resistor R246 in them is of 100K ohms and they are not equipped with capacitor C256. In operating them through the remote control unit, if you are faced with any operational inconvenience, it is advised to replace the resistor R246 (100K ohms) with a 56K ohms one and to add the capacitor C256 (330 pF) as shown in the "Schematic Diagram" (Fig. 75, on pages 75 and 76) and the "WIRING SIDE OF P.W. BOARD" (Fig. 79, on pages 79 and 80) of this Service Manual.

NOTES ON SCHEMATIC DIAGRAM

1. Resistor: To differentiate the units of resistors, such symbols as K and M are used: the symbol K means 1000 ohm and the symbol M means 1000K ohm and the resistor without any symbol is ohm-type resistor.
2. Capacitor: To indicate the unit of capacitor, a symbol P is used; this symbol P means micro-microfarad and the unit of the capacitor without such symbol is microfarad. As to electrolytic capacitor, the expression "capacitance/withstand voltage" is used;
3. Switches

SWITCH NO.	FUNCTION
SW301	Input Tone (♪) ON/OFF
SW302	Quartz Circuit ON/OFF
SW303	0 }
SW304	1
SW305	2
SW306	3
SW307	4 } APMS Item Number Input
SW308	5
SW309	6
SW310	7
SW311	8
SW312	9 }
SW313	Channel Selection
SW314	Play Start
SW315	Clear
SW316	Repeat Play
SW317	Cut/Clear Memory
SW318	Cue/Pause
SW319	Speed Selector (33-1/3 rpm)
SW320	Speed Selector (45 rpm)
SW321	Skip
SW322	Sensor Level Selector
SW323	Power ON/OFF
SW601	Tonearm Up
SW602	Tonearm Down
SW603	Rest



NOTES: Be sure to use regular parts for securing the safety and reliability of the set. Parts marked with "⚠" and parts crosshatched (in black) are especially important for maintaining the safety and protecting ability of the set. Be sure to replace them with parts of specified part number.

(Specifications or wiring diagrams of this model are subject to change for the improvement without prior notice.)

Figure 59 (NEW) SCHEMATIC DIAGRAM OF MOTOR CONTROL CIRCUIT AND POWER SUPPLY CIRCUIT

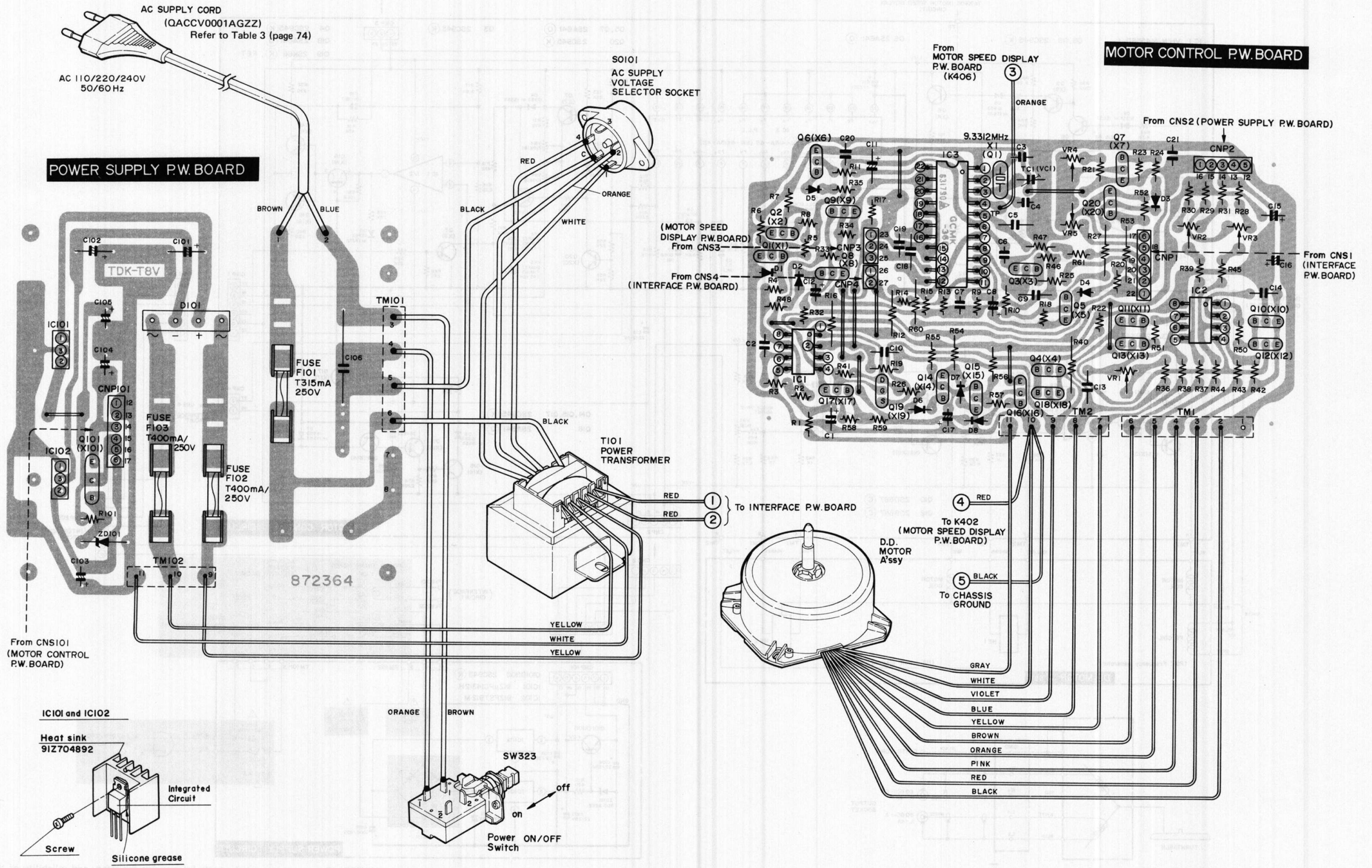
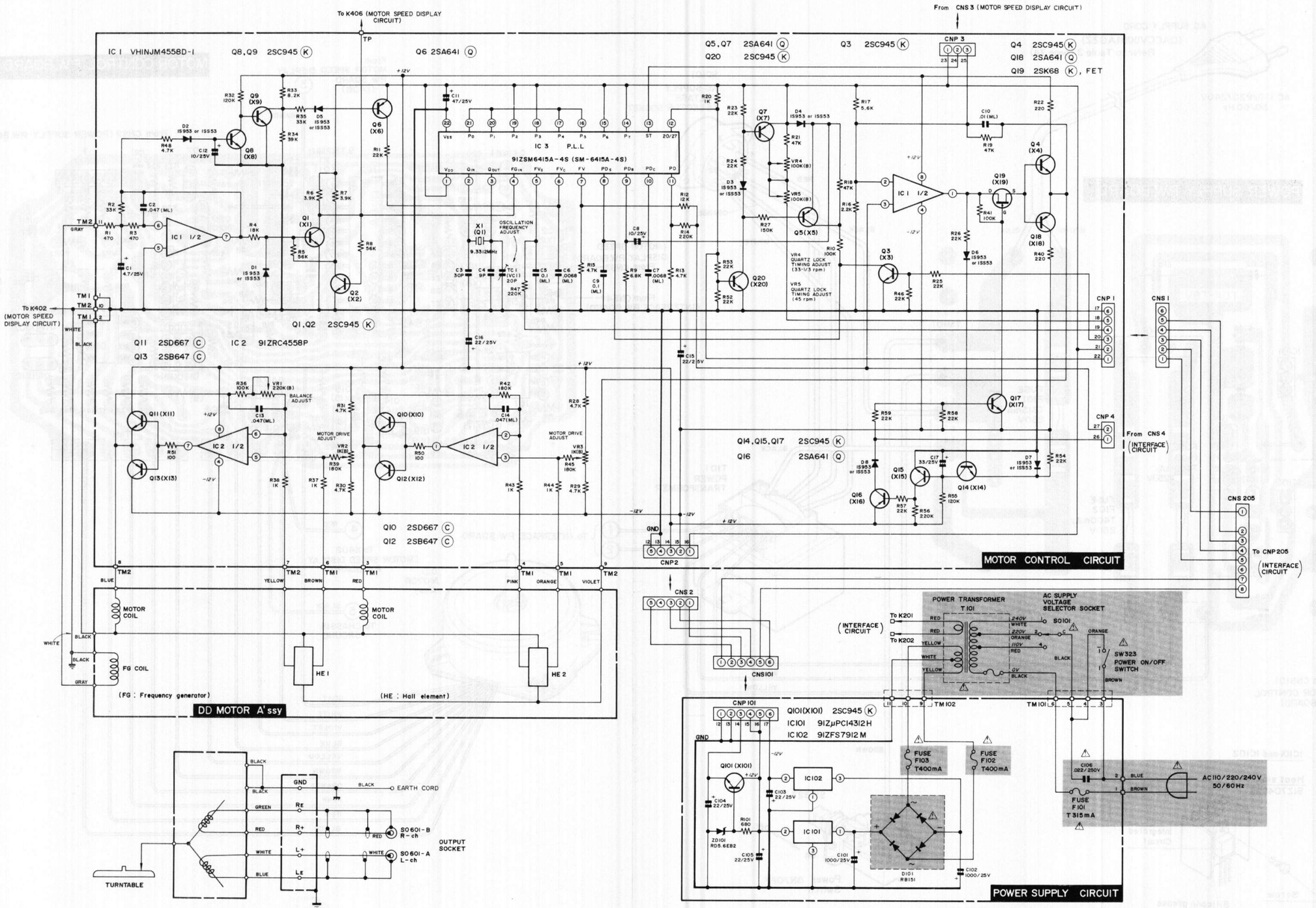


Figure 61 (NEW) WIRING SIDE OF MOTOR CONTROL P.W. BOARD AND POWER SUPPLY P.W. BOARD



(Specifications or wiring diagrams of this model are subject to change for the improvement without prior notice.)

Figure 63 (OLD) SCHEMATIC DIAGRAM OF MOTOR CONTROL CIRCUIT AND POWER SUPPLY CIRCUIT

NOTES: Be sure to use regular parts for securing the safety and reliability of the set. Parts marked with "⚠" and parts crosshatched (in black) are especially important for maintaining the safety and protecting ability of the set. Be sure to replace them with parts of specified part number.

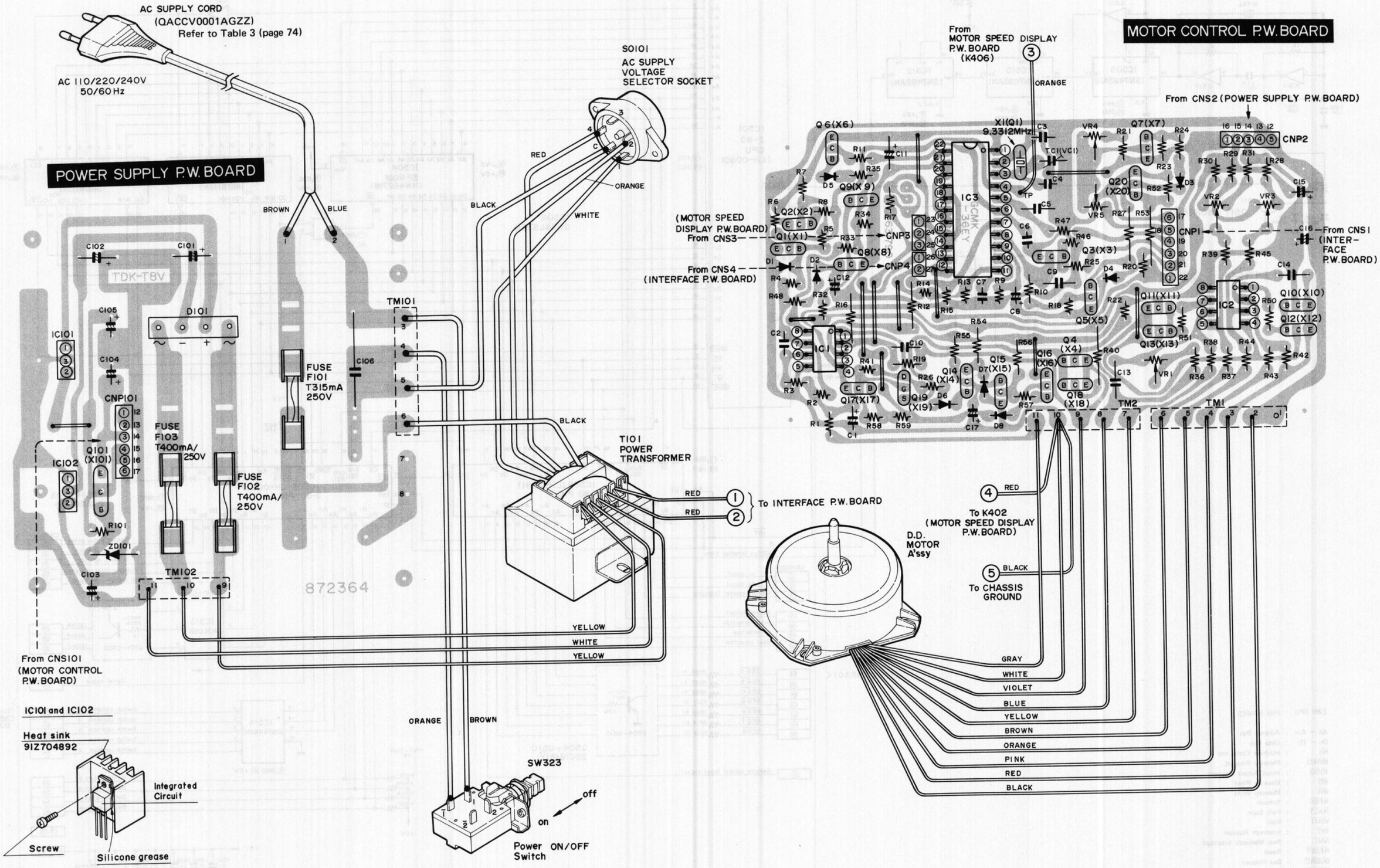
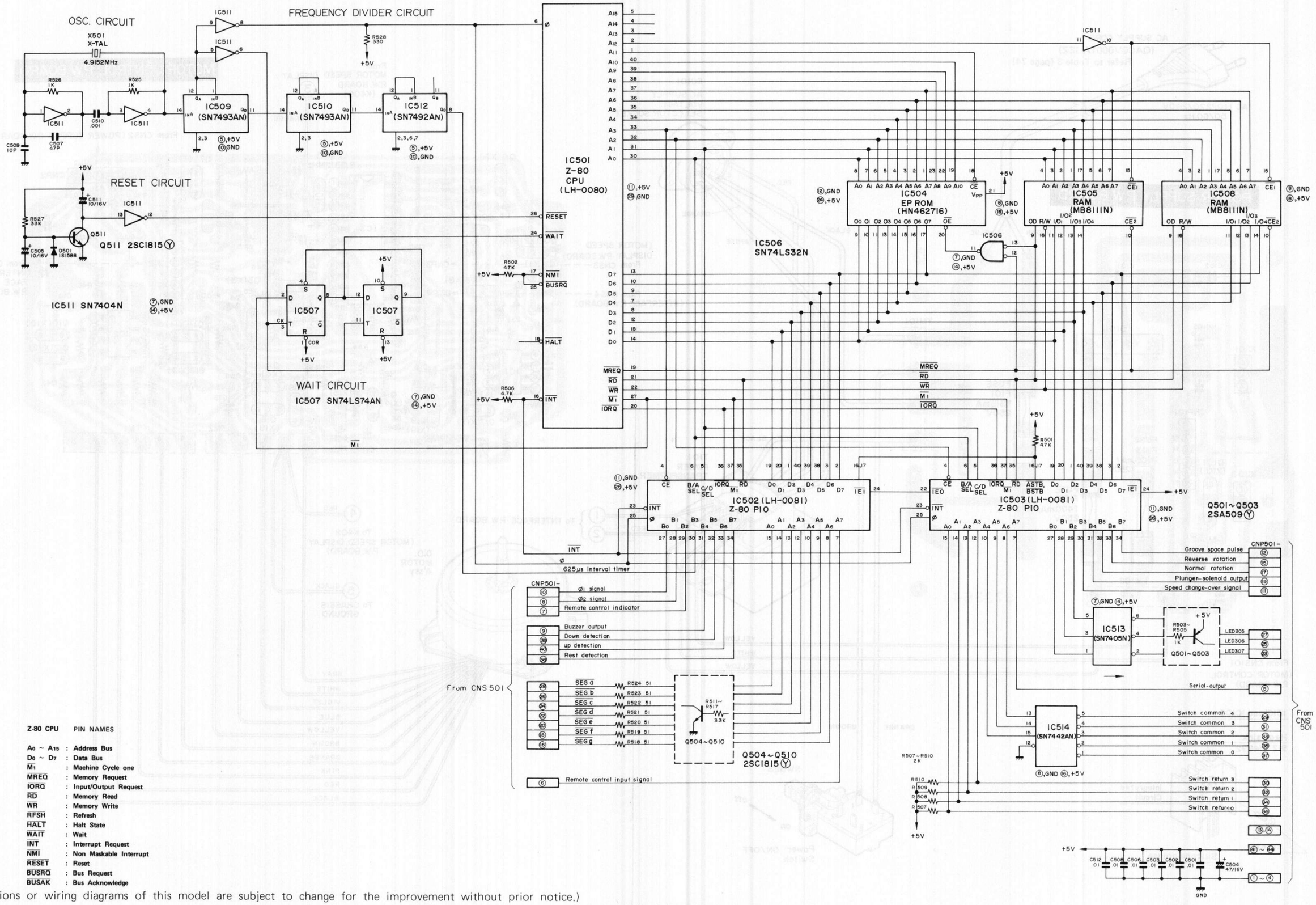


Figure 65 (OLD) WIRING SIDE OF MOTOR CONTROL P.W. BOARD AND POWER SUPPLY P.W. BOARD



Z-80 CPU	PIN NAMES
$A_0 \sim A_{15}$	: Address Bus
$D_0 \sim D_7$	: Data Bus
$\overline{M_1}$	: Machine Cycle one
$\overline{MREQ}$	: Memory Request
$\overline{IORQ}$	: Input/Output Request
$\overline{RD}$	: Memory Read
$\overline{WR}$	: Memory Write
$\overline{RFSH}$	: Refresh
$\overline{HALT}$	: Halt State
$\overline{WAIT}$	: Wait
$\overline{INT}$	: Interrupt Request
$\overline{NMI}$	: Non Maskable Interrupt
$\overline{RESET}$	: Reset
$\overline{BUSRQ}$	: Bus Request
$\overline{BUSAK}$	: Bus Acknowledge

(Specifications or wiring diagrams of this model are subject to change for the improvement without prior notice.)

Figure 67 SCHEMATIC DIAGRAM OF CONTROL MODULE CIRCUIT

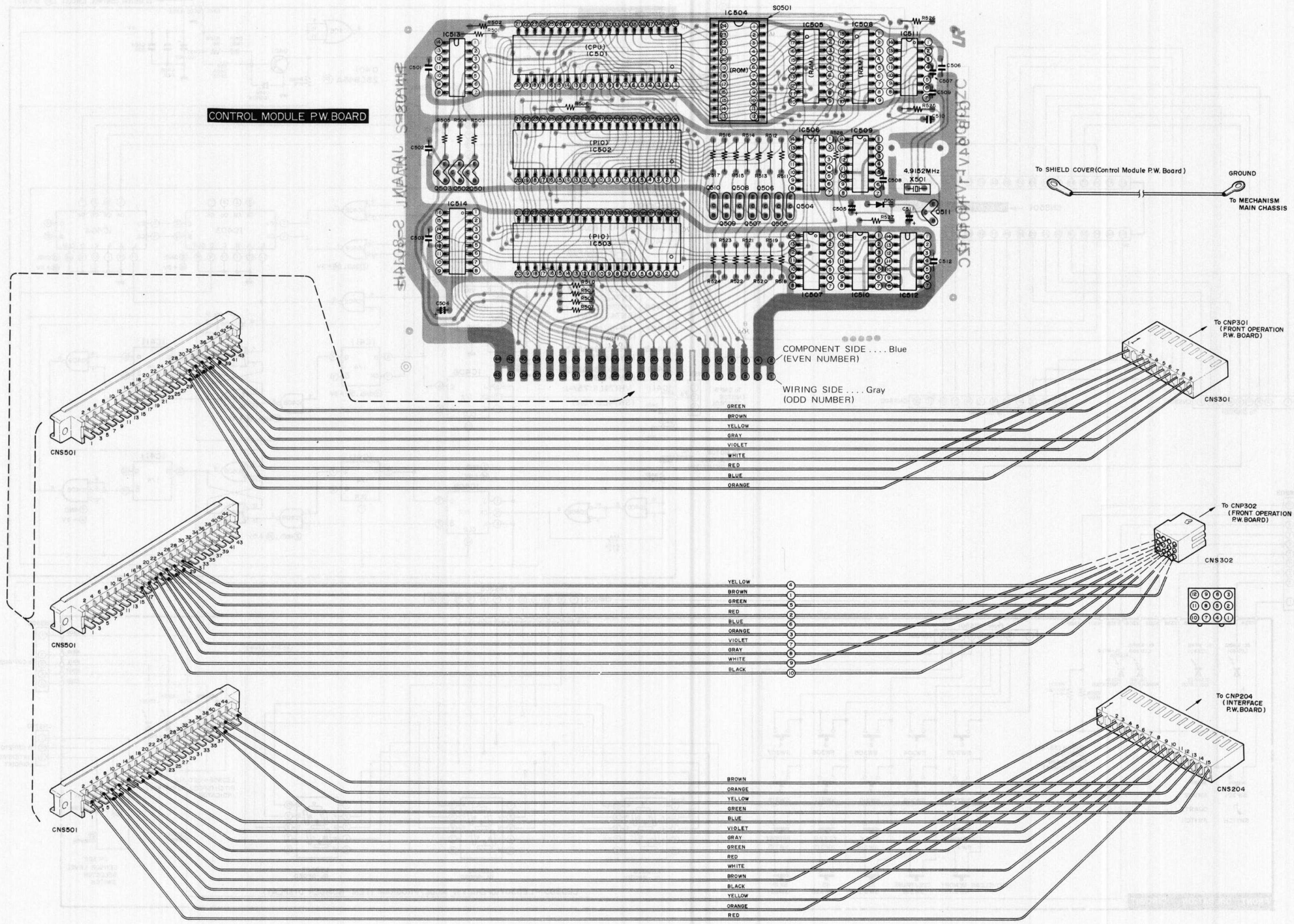
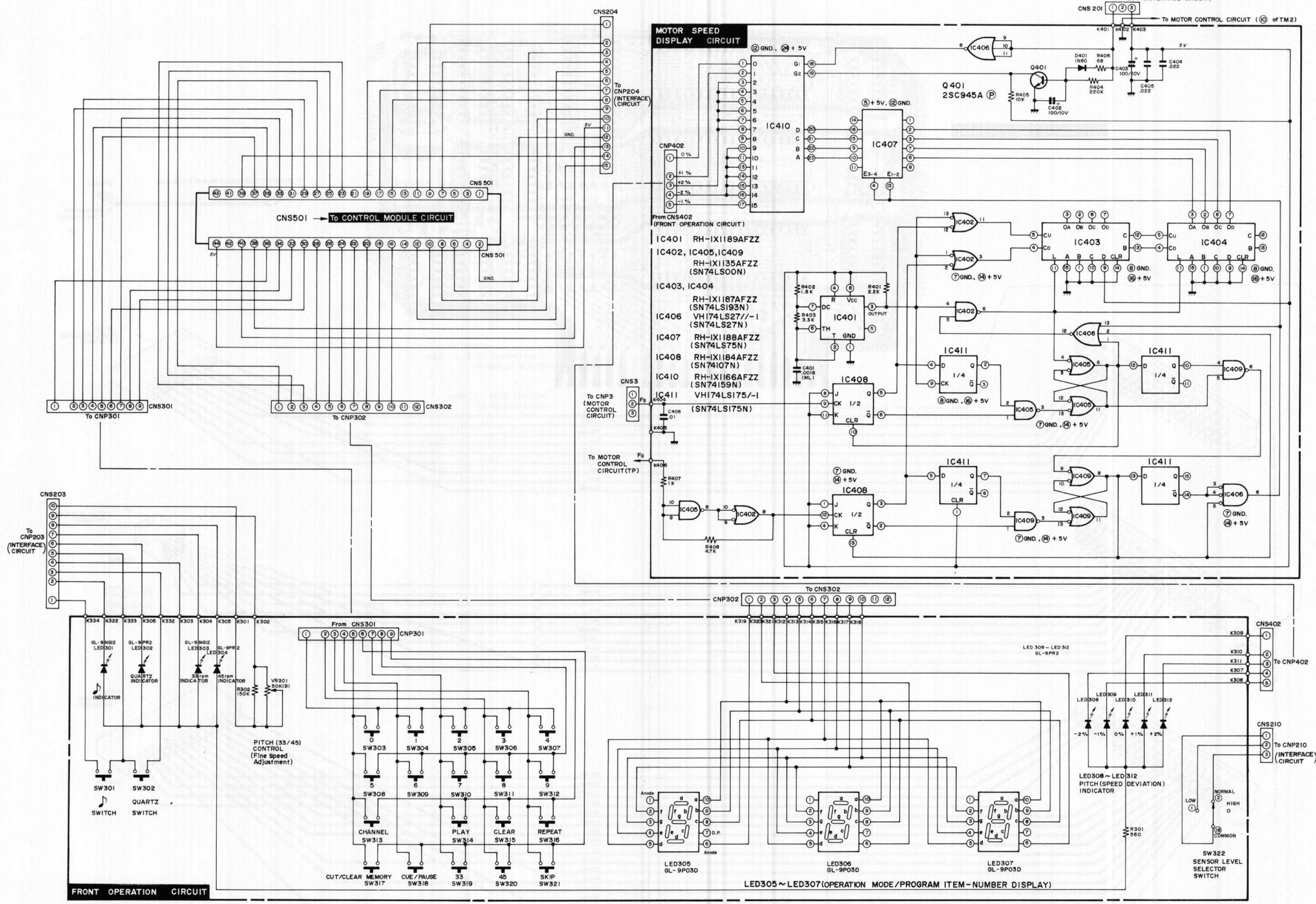


Figure 69 WIRING SIDE OF CONTROL MODULE P.W. BOARD



(Specifications or wiring diagrams of this model are subject to change for the improvement without prior notice.)

Figure 71 SCHEMATIC DIAGRAM OF FRONT OPERATION CIRCUIT AND MOTOR SPEED DISPLAY CIRCUIT

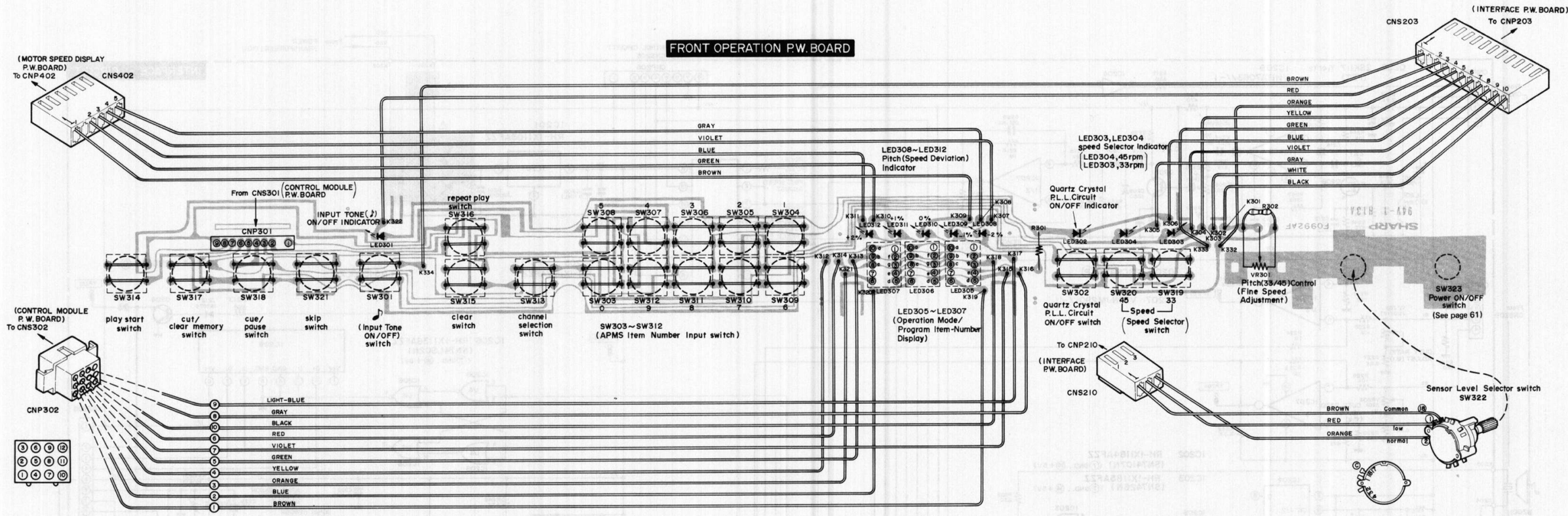
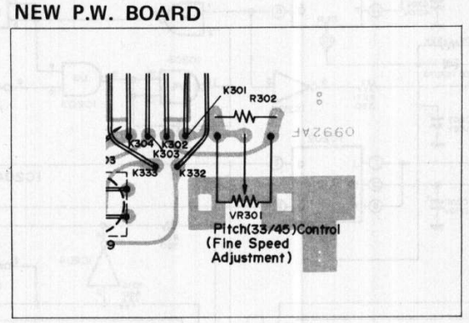
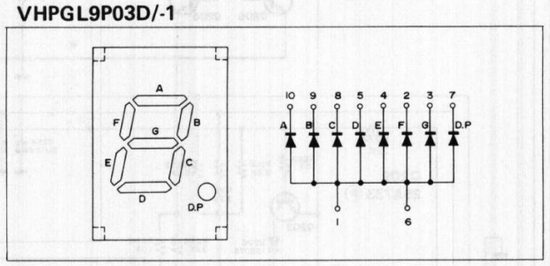


Figure 73–1 WIRING SIDE OF FRONT OPERATION P.W. BOARD

NEW P.W. BOARD



VHPGL9P03D/-1



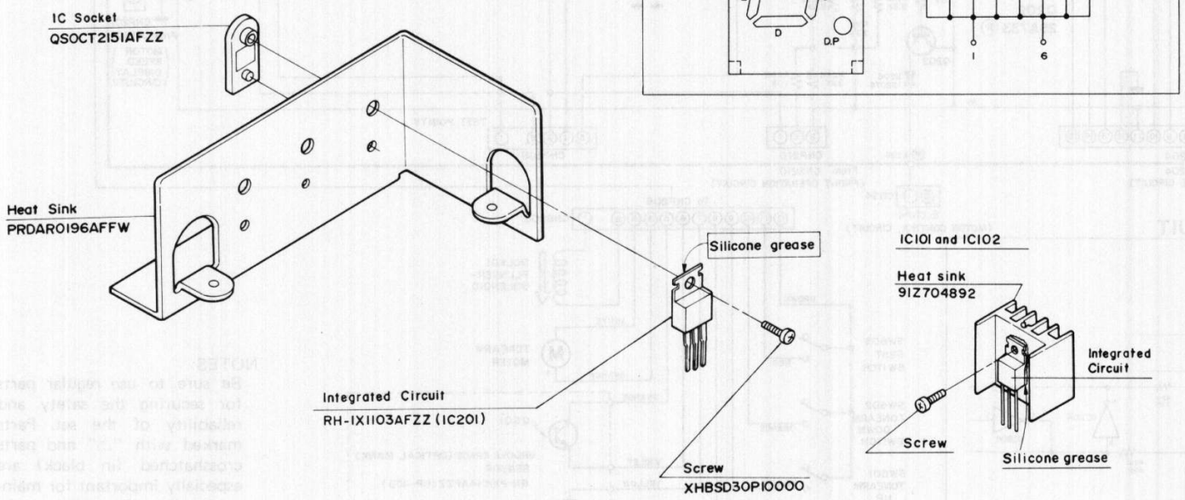


Figure 73–2 VOLTAGE REGULATOR IC REPLACEMENT

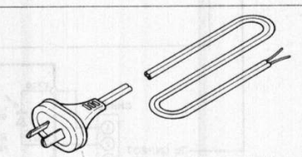
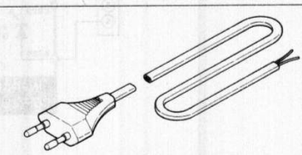
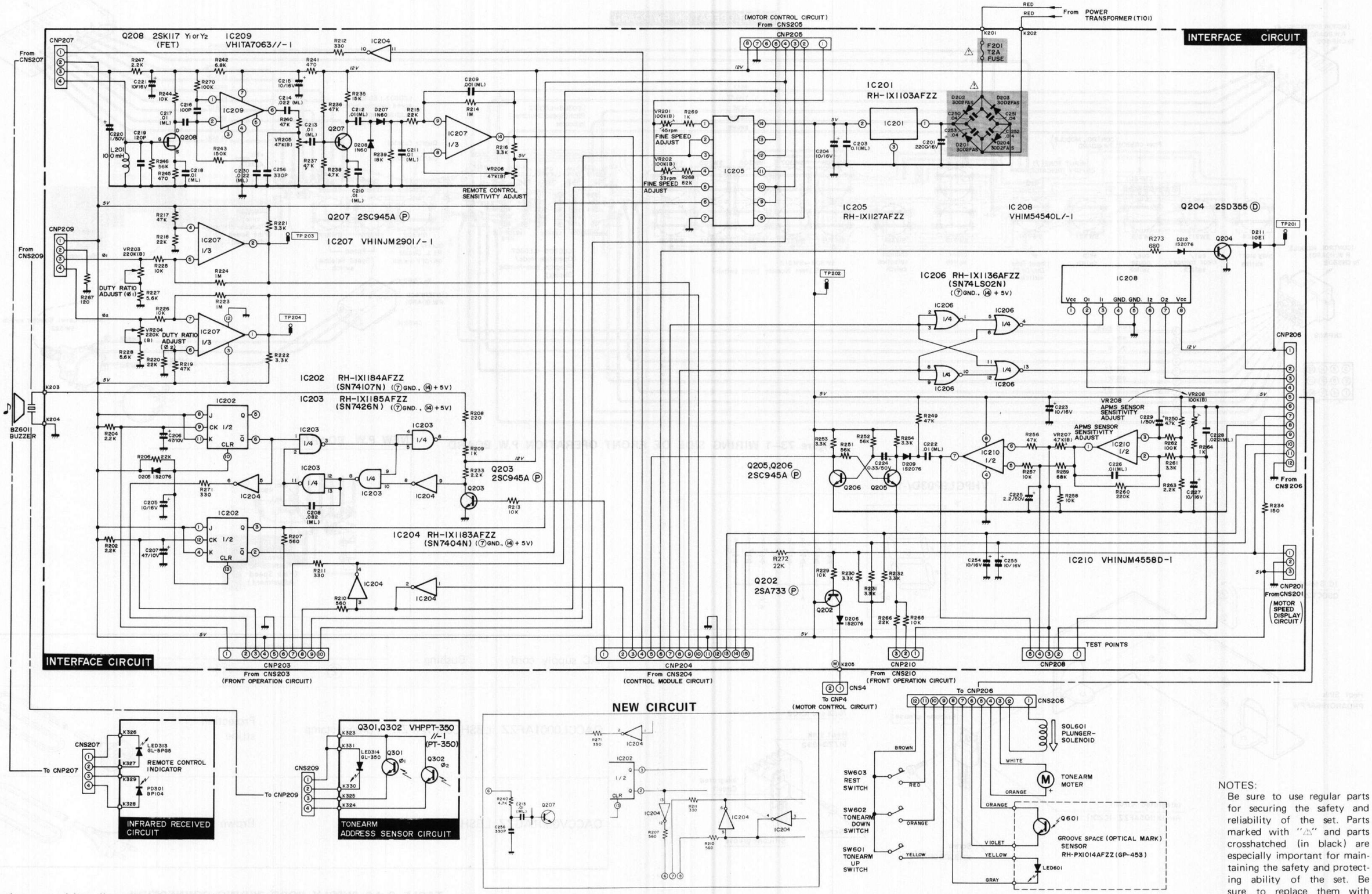
AC supply cord	Bushing	Connection		figure
		②	①	
QACCL0001AFZZ	LBSHC0007AFZZ	Brand stamp	Projection stripe	
QACCV0001AGZZ	LBSHC0004AGZZ	Blue	Brown	

TABLE 3 AC SUPPLY CORD WIRING CONNECTION



(Specifications or wiring diagrams of this model are subject to change for the improvement without prior notice.)

Figure 75 SCHEMATIC DIAGRAM OF INTERFACE CIRCUIT

NOTES:
Be sure to use regular parts for securing the safety and reliability of the set. Parts marked with "⚠" and parts crosshatched (in black) are especially important for maintaining the safety and protecting ability of the set. Be sure to replace them with parts of specified part number.

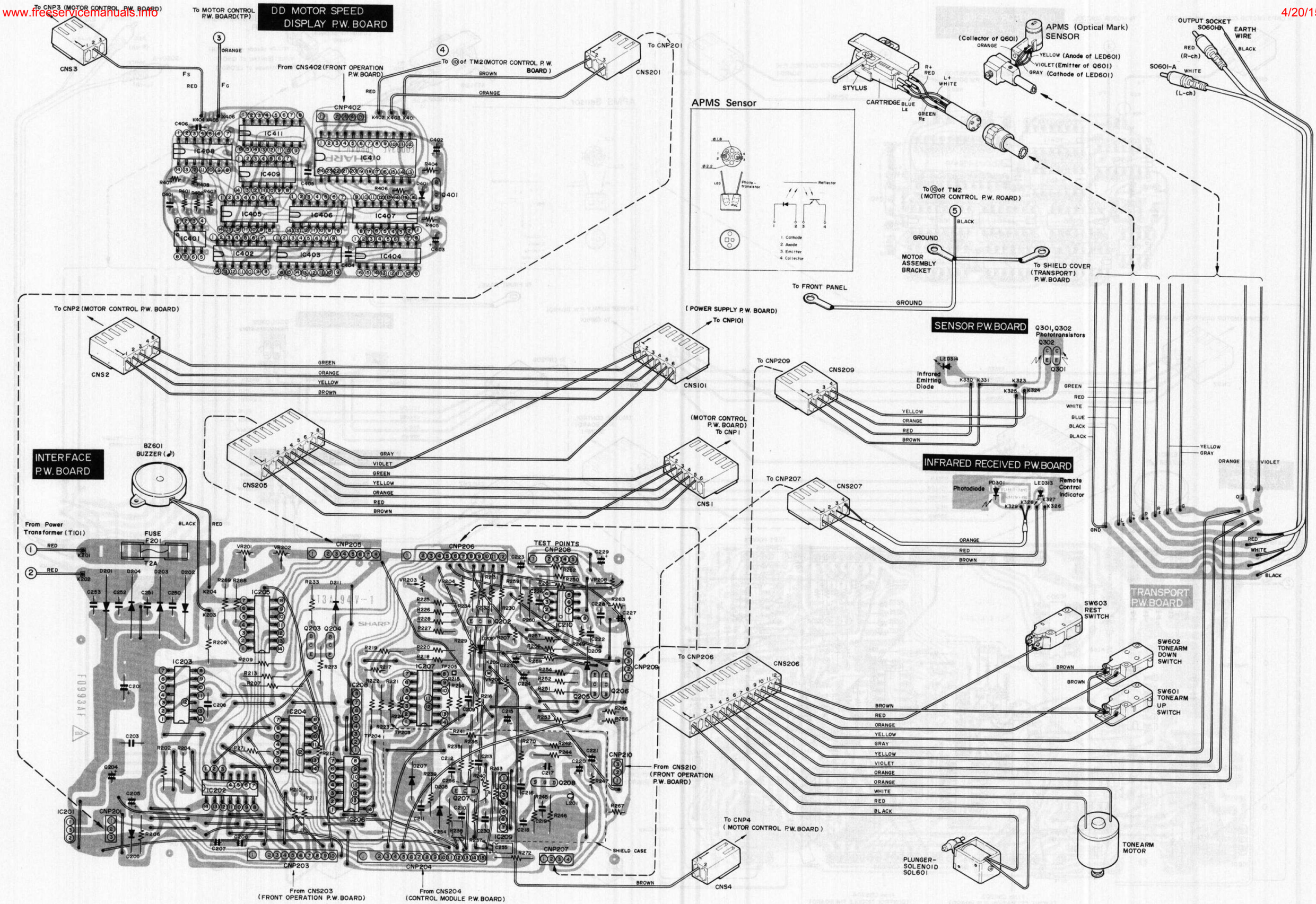


Figure 77 (NEW) WIRING SIDE OF DD MOTOR SPEED DISPLAY P.W. BOARD, INTERFACE P.W. BOARD AND TRANSPORT P.W. BOARD

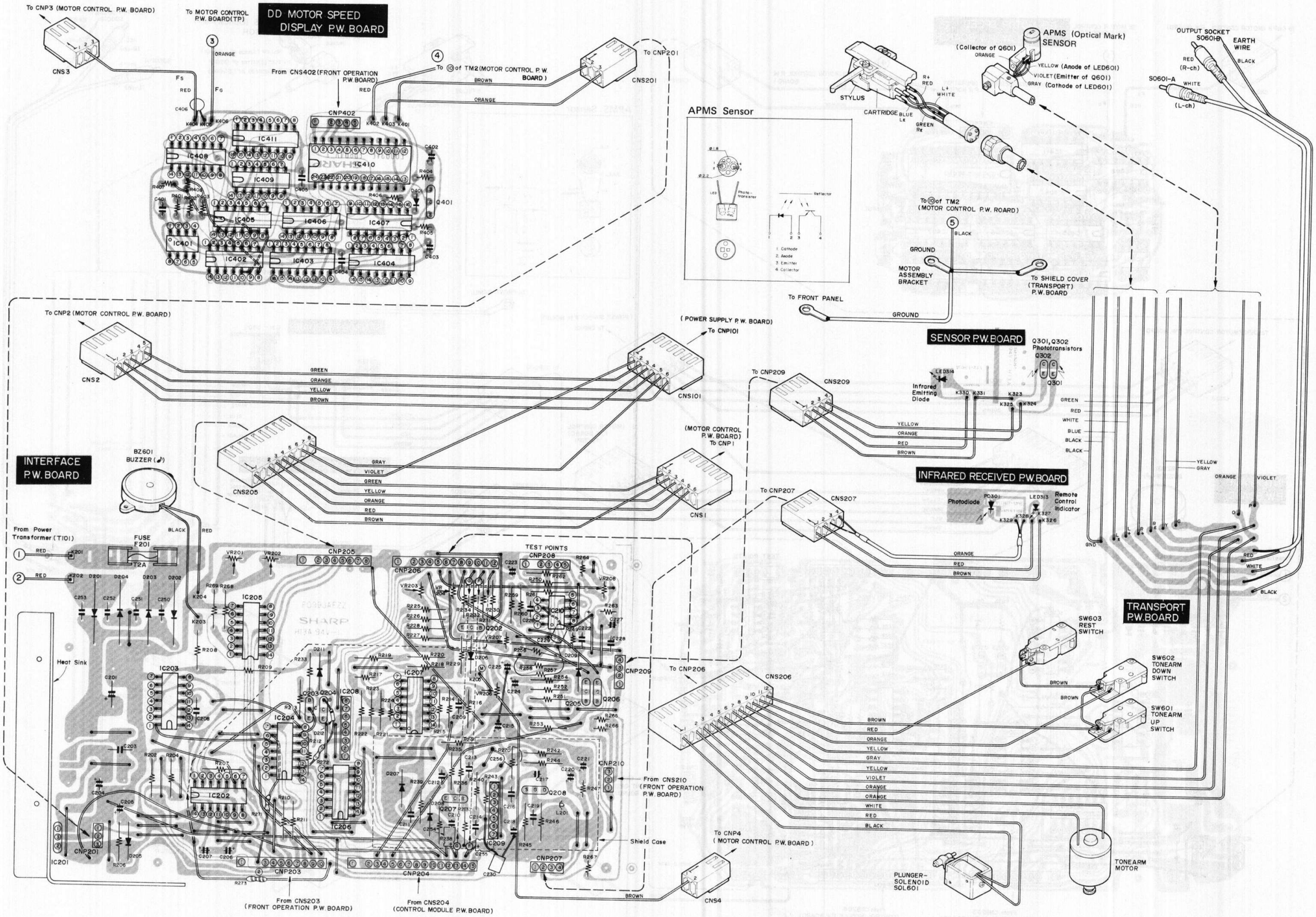


Figure 79 (OLD) WIRING SIDE OF DD MOTOR SPEED DISPLAY P.W. BOARD, INTERFACE P.W. BOARD AND TRANSPORT P.W. BOARD

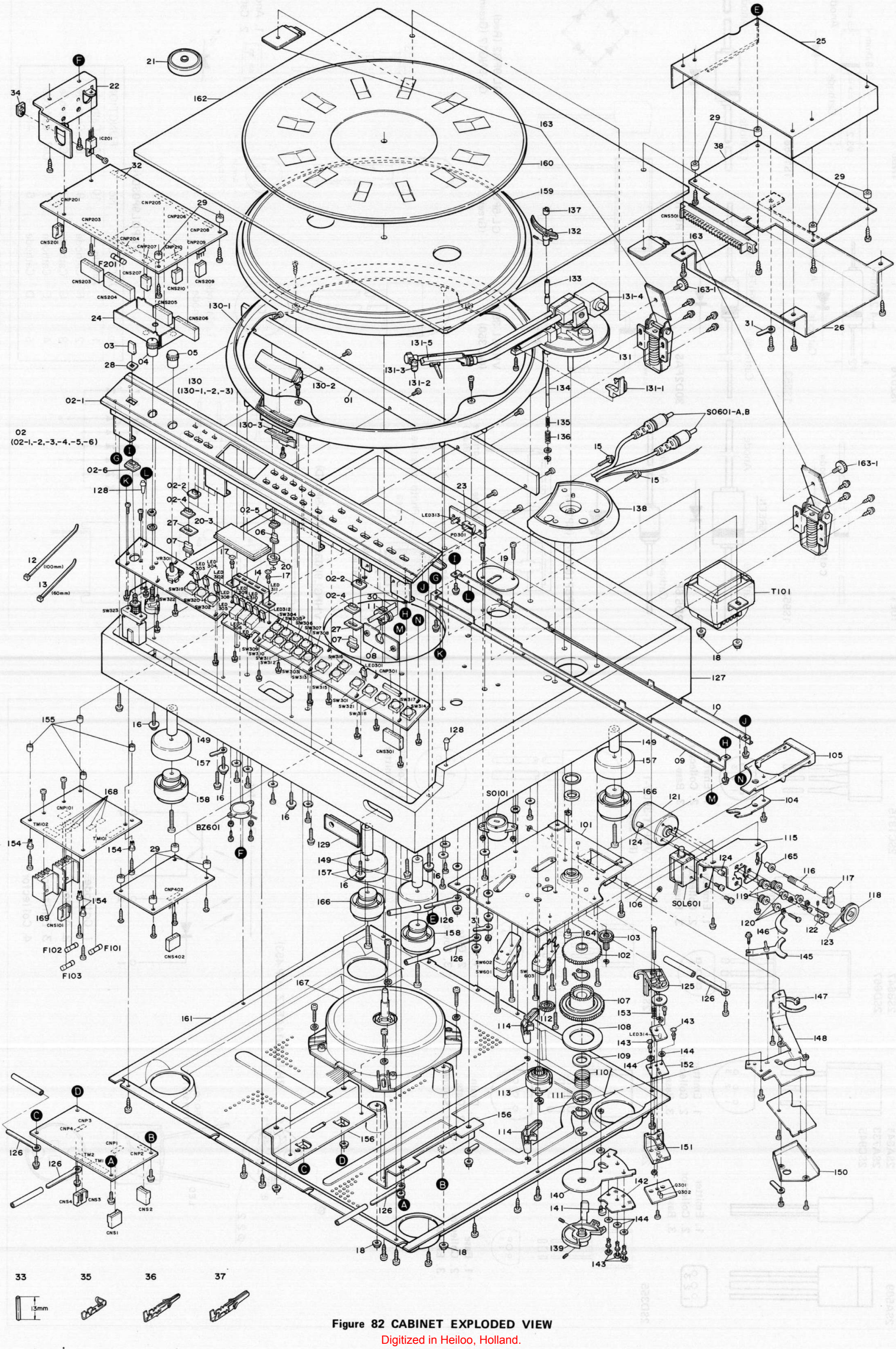
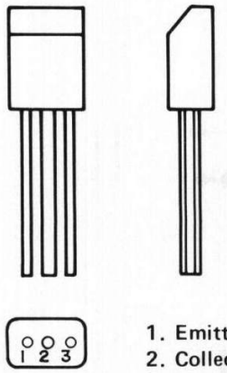


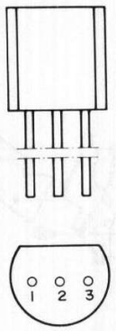
Figure 82 CABINET EXPLODED VIEW

2SA509



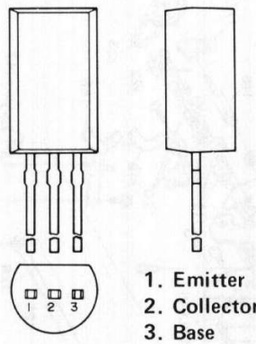
1. Emitter
2. Collector
3. Base

2SA641
2SA733
2SC945



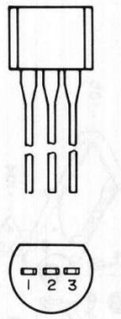
1. Emitter
2. Collector
3. Base

2SB647
2SD667



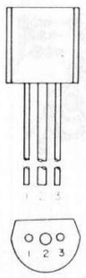
1. Emitter
2. Collector
3. Base

2SC1815



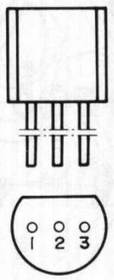
1. Emitter
2. Collector
3. Base

2SD355



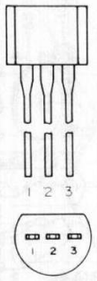
1. Base
2. Collector
3. Emitter

2SK68



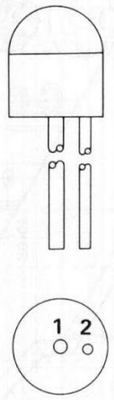
1. Drain
2. Gate
3. Source

2SK117

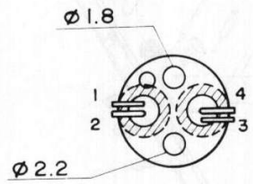


1. Drain
2. Gate
3. Source

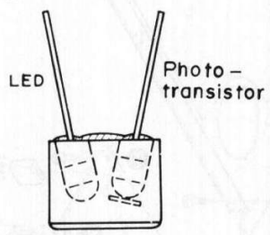
VHPPT-350//-1
(PT-350)

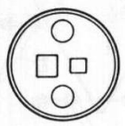


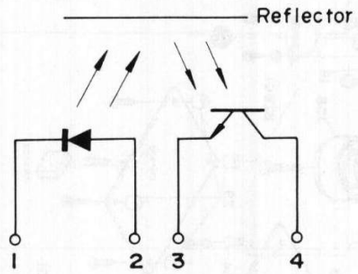
1. Collector
2. Emitter



RH-PX1014AFZZ (GP-453)



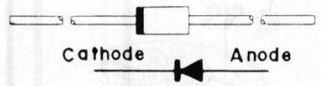




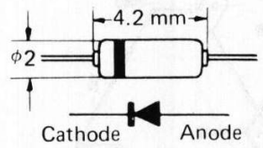
1. Cathode
2. Anode
3. Emitter
4. Collector

Figure 83 TRANSISTORS TYPE

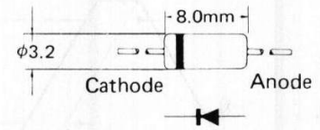
10E1



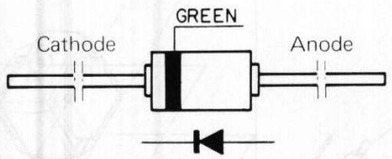
1S2076



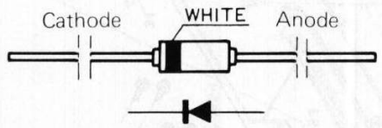
1N60



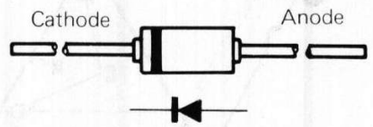
1S953



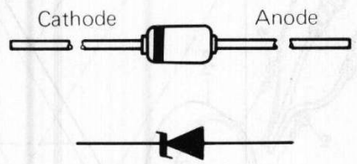
1SS53



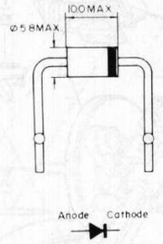
1S1588



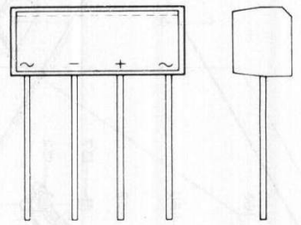
RD5.6E

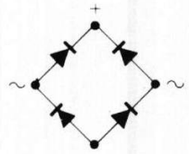


30D2FAS

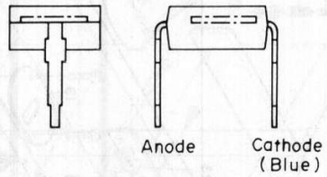


RB-151





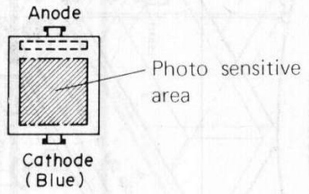
VHPBP104///-1 (BP104)



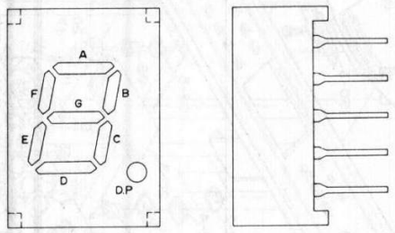
VHPGL-350//-1
(GL-350)

GL-5PG5
(Green)

GL-9PR2 (Red)
GL-9NG12 (Green)

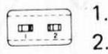


VHPGL9P03D/-1 (GL-9P03D)

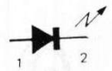


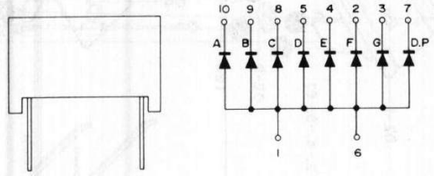
1. Cathode
2. Anode

1 Anode
2 Cathode



1. Anode
2. Cathode





VHPGL9P03D/-1

No.	FUNCTION	No.	FUNCTION
1	Anode	10	A Cathode
2	F Cathode	9	B Cathode
3	G Cathode	8	C Cathode
4	E Cathode	7	D P Cathode
5	D Cathode	6	Anode

Figure 84 DIODES AND LEDS TYPE

CIRCUIT DESCRIPTION

This remote control unit is of an infrared-ray emitting system, and the infrared rays, when transmitted, are modulated at 40 kHz to become carriers: then they are made 12-bit pulse codes to be delivered to the receiver. [PCM (Pulse Code Modulation) System]

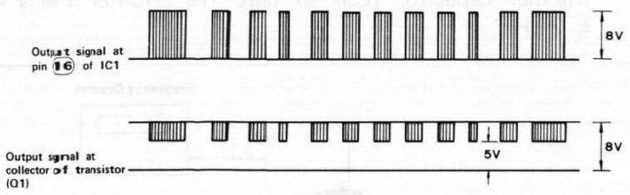


Figure 85–1

When one of the operation buttons (keys) of the remote control unit is pushed, the code of its own is caused at pin (16) of C-MOS LSI (IC1), and the resultant signal is current-amplified by the transistor (Q1) enough to drive the infrared emitting diodes (D1, D2 and D3); the frequency of the signal is decided by the capacitors (C1, C3 and C4) and resistor (R1); moreover, the frequency of transmitting carrier can be adjusted to 40 kHz by the trimmer capacitor (C3).

[The C-MOS LSI (IC1) is composed of an oscillator circuit, 11 keyboard inputs, a keyboard encoder circuit, a shift register and a control circuit. The oscillator circuit is provided with CR network as an externally given circuit and it operates only for the data transmitting. The keyboard inputs consist of two groups, one of the inputs A, B, C, D and E, and one of the inputs F, G, H, I, J and K, which are subjected to a matrix selection. If any one input regardless of the groups is selected, the keyboard encoder circuit gives birth to a 5-bit symbol, and this symbol is loaded, together with a sync symbol, a prefix symbol and an end symbol, in the shift register, thus forming a 12-bit message. The transmitting output is of a carrier (50%-duty-factor square wave) which is pulse-modulated at 40 kHz; that is, the pulses are produced repeatedly with every generation of a symbol frame of 3.2 milliseconds, and besides, since the shift register experiences a clock control (shift) every time one symbol frame is shifted to another, so that a 12-bit message is emitted at the intervals of 38.4 milliseconds.]

- Transmission Code

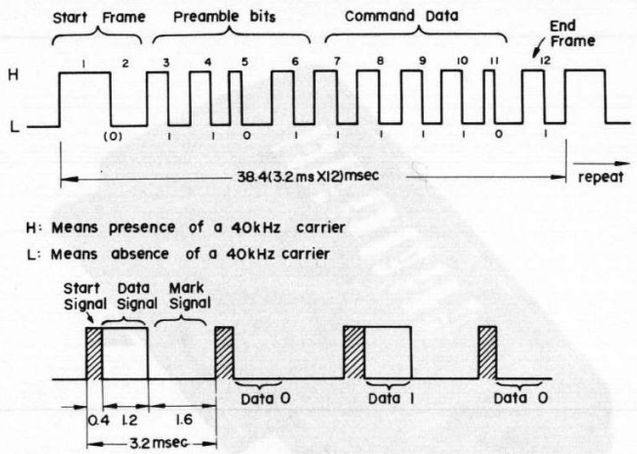


Figure 85–2

While the transmission code is as shown above, a variety of the command data as tabulated below will be available according to the keys to be pushed.

Command Data Table

Button function	Command data					Key code
	D_4	D_3	D_2	D_1	D_0	
4	1	1	1	1	0	AF
3	1	1	1	0	1	AG
2	1	1	1	0	0	AH
1	1	1	0	1	1	AI
0	1	1	0	1	0	AJ
9	1	1	0	0	1	AK
8	1	1	0	0	0	BF
7	1	0	1	1	1	BG
6	1	0	1	1	0	BH
5	1	0	1	0	1	BI
repeat	1	0	1	0	0	BJ
clear	1	0	0	1	1	BK
play	1	0	0	1	0	CF
channel	1	0	0	0	0	CH
skip	0	1	1	1	1	CI
speed 45	0	1	1	1	0	CJ
speed 33	0	1	1	0	1	CK
cue	0	1	1	0	0	DF
cut (clear memory)	0	1	0	1	1	DG

Disassembly

(1) Turn over the set, remove battery compartment cover, and take out 6 batteries from the compartment.
(2) Remove 2 screws which are securing the bottom cabinet, as shown in the drawing, then the bottom cabinet can be dismounted.

Figure 86–1

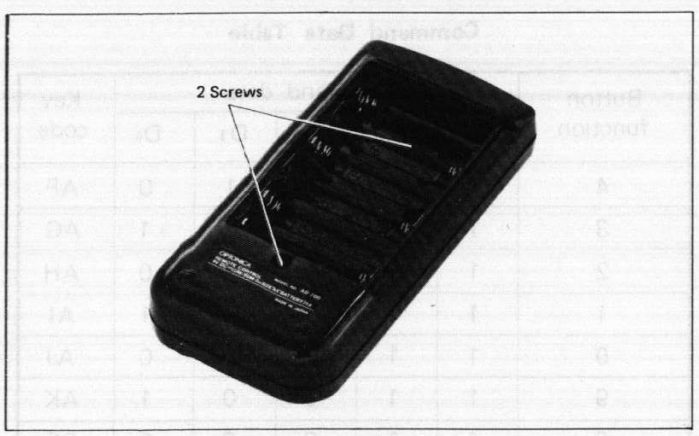


Figure 86–2

Adjustment of Remote Control Transmitter

(1) Removing the batteries from the remote control unit, apply DC voltage of 7.5 V, from a constant power source, to the leads of the battery holder (the red lead: +, the black lead: –).
(2) Push any two desired keys (buttons) at a time, then the output wave comes to have a continuously – oscillated form. Connect a frequency counter between the resistor (R3, 27 ohms) and the earth and adjust the trimmer capacitor (C3) so that the counter reads 40 ± 2 kHz.

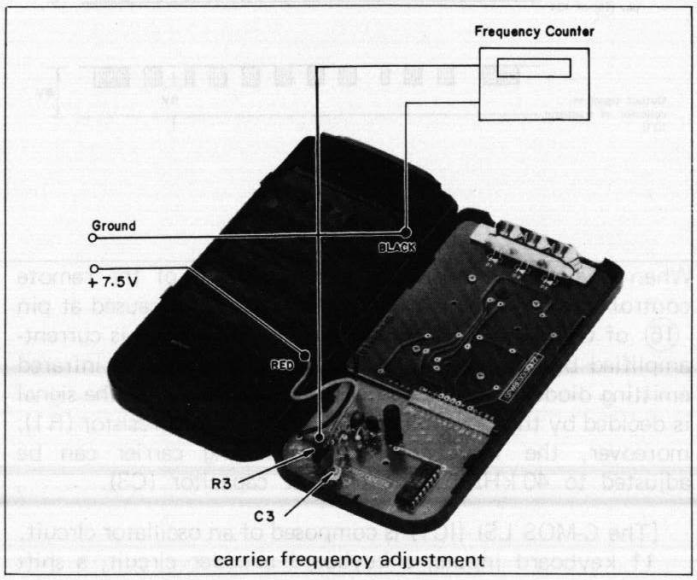
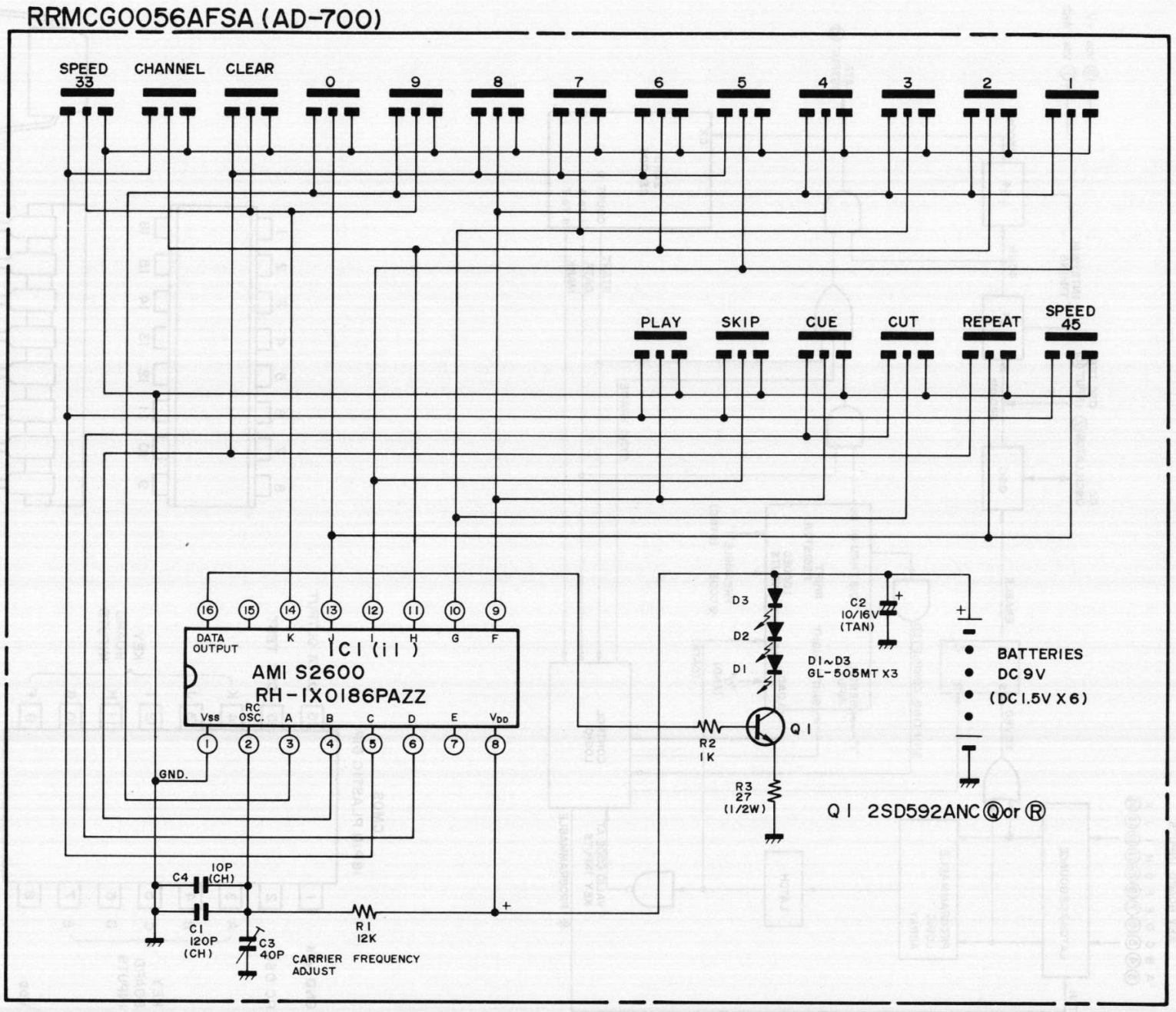


Figure 86–3



(Specifications or wiring diagrams of this model are subject to change for the improvement without prior notice.)

Figure 87 SCHEMATIC DIAGRAM OF REMOTE CONTROL UNIT

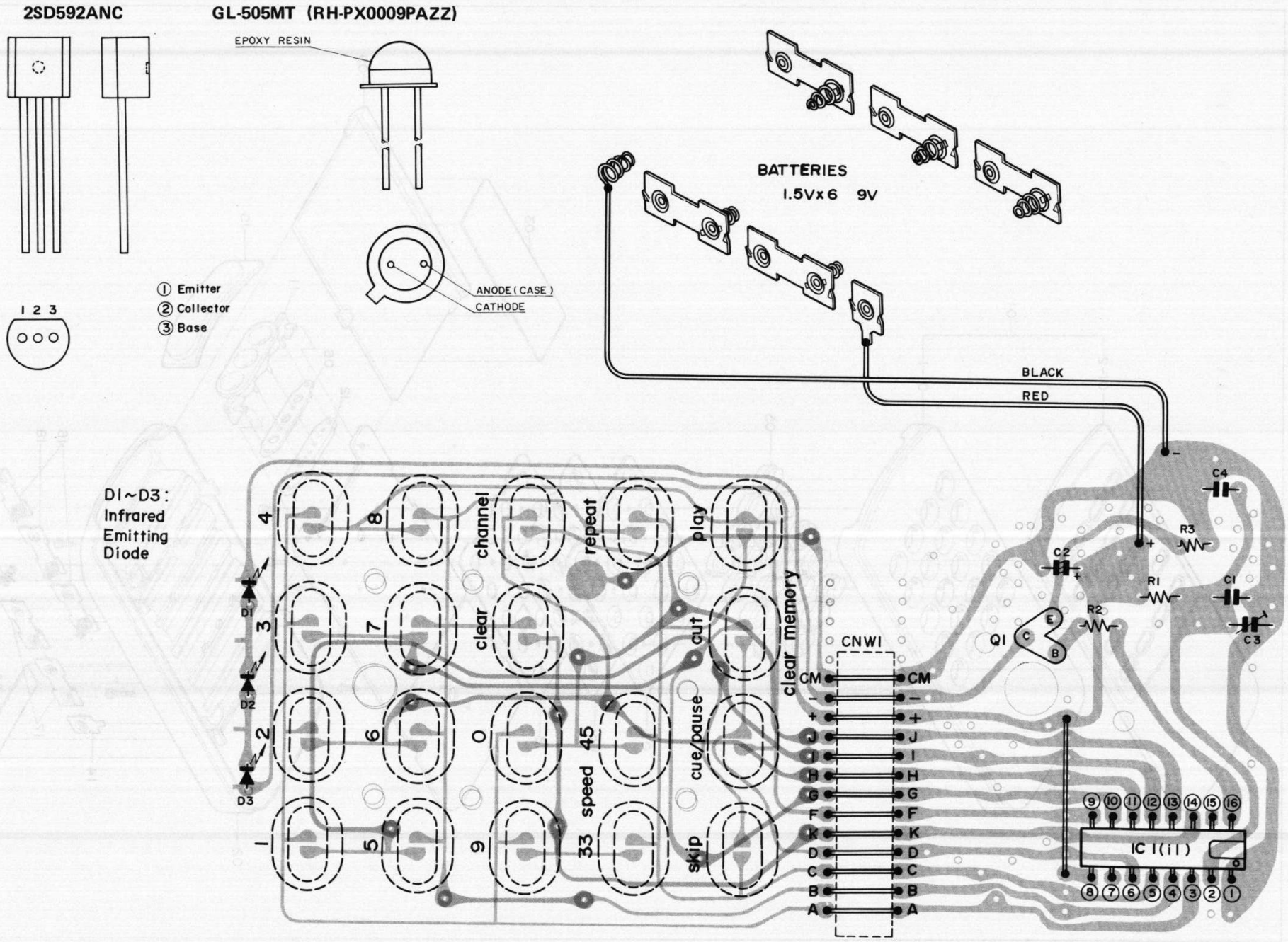


Figure 88 WIRING SIDE OF REMOTE CONTROL P.W. BOARD

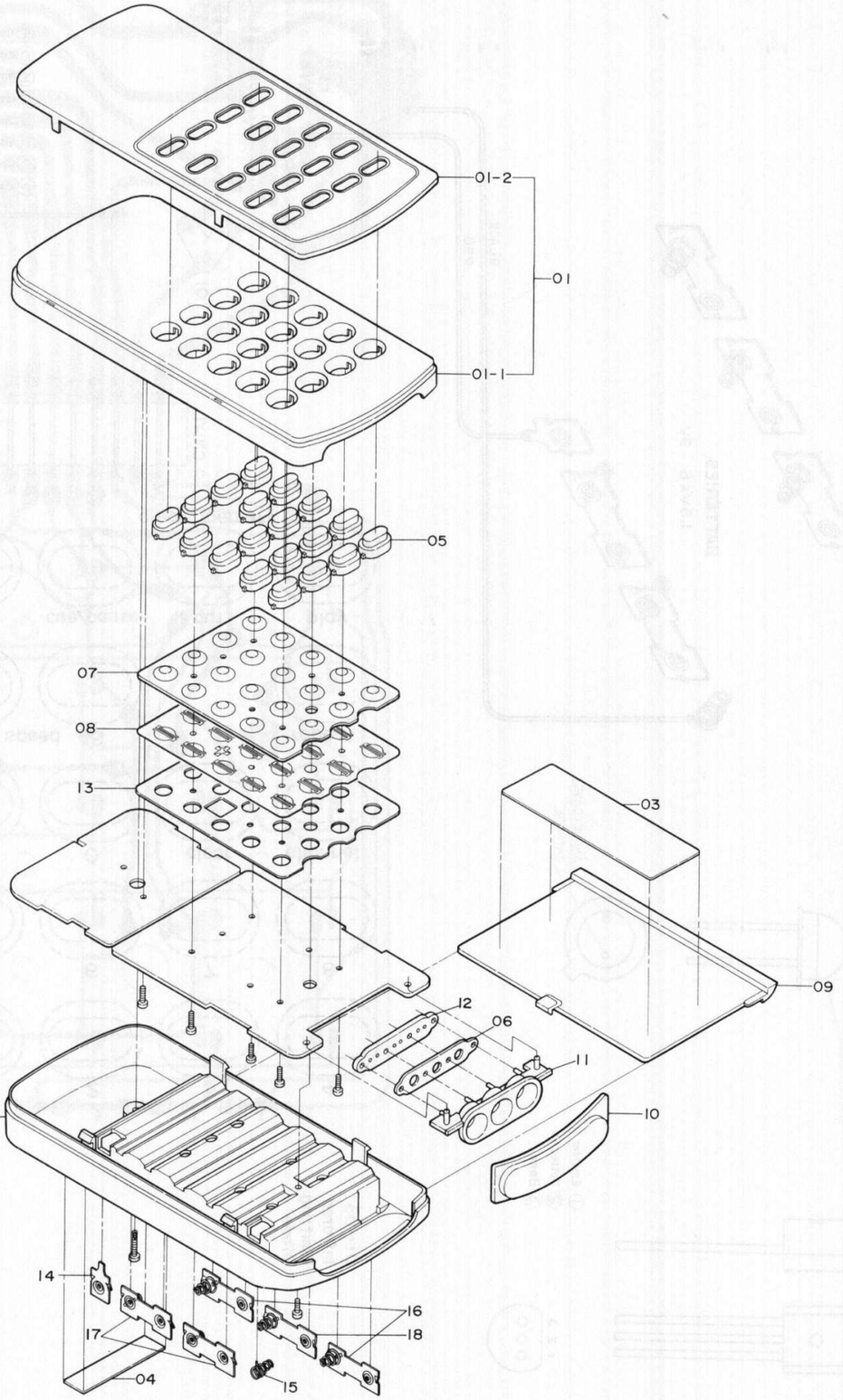
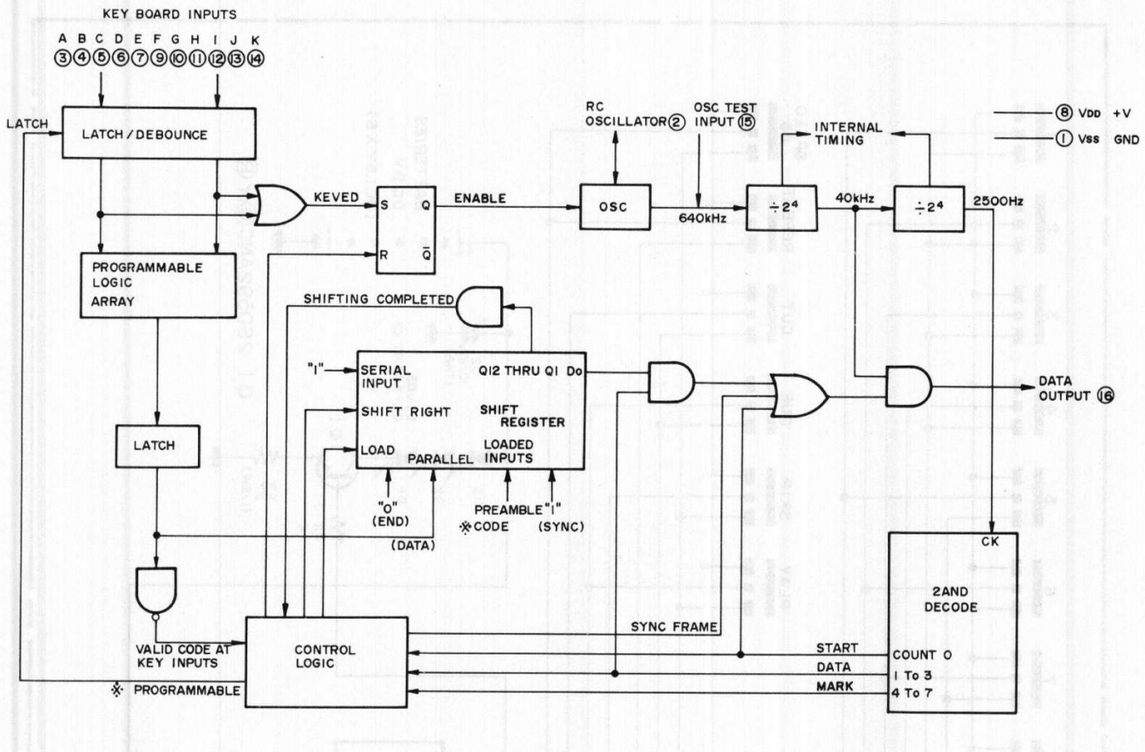


Figure 89 CABINET EXPLODED VIEW (REMOTE CONTROL UNIT)

RH-IX0186PAZZ (S2600)

BLOCK DIAGRAM (S 2600 Encoder)



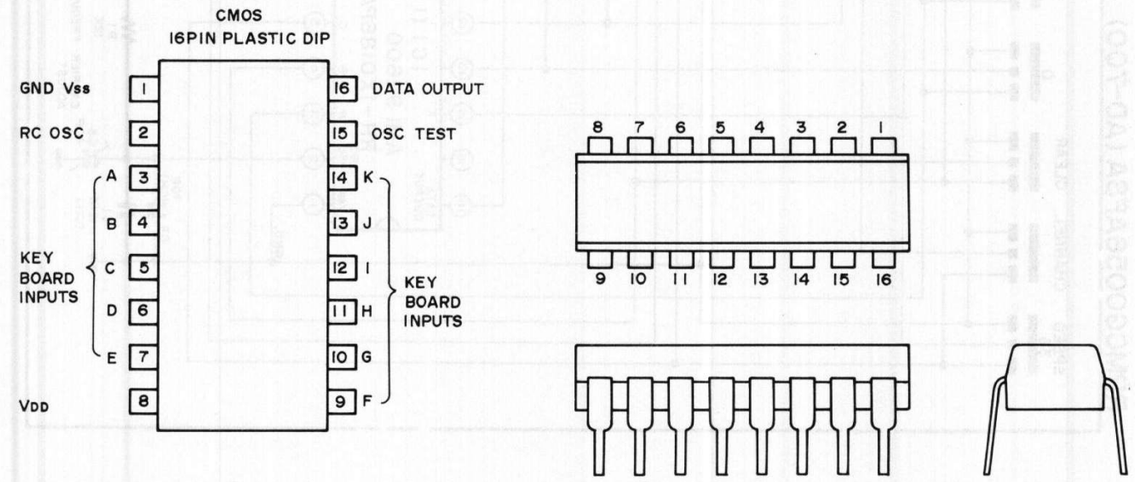


Figure 90 BLOCK DIAGRAM OF INTEGRATED CIRCUIT (IC1)

REPLACEMENT PARTS LIST

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION

NOTES: Be sure to use regular parts for securing the safety and reliability of the set. Parts marked with " ⚠ " and parts cross-hatched (in black) are especially important for maintaining the safety and protecting ability of the set. Be sure to replace them with parts of specified part number.

INTEGRATED CIRCUITS

REF. NO.	PART NO.	DESCRIPTION	CODE
IC1	VHINJM4558D-1	Dual Operational Amplifier (NJM4558D)	AH
IC2	91ZRC4558P	Dual Operational Amplifier (RC4558P)	
IC3	91ZSM6415A4S	P.L.L. (Phase-Locked-Loop) C-MOS LSI (SM-6415A-4S)	
IC101	91ZμPC14312H	DC 12V Fixed Voltage Regulator (μPC14312H)	
IC102	91ZFS7912M	DC −12V Fixed Voltage Regulator (FS-7912M)	
IC201	RH-IX1103AFZZ	DC 5V Fixed Voltage Regulator (TA78005P)	AK
IC202	RH-IX1184AFZZ	TTL, Dual J-K Flip-Flops with Clear (SN74107N)	AG
IC203	RH-IX1185AFZZ	TTL, Quadruple 2-Input High-Voltage Interface Positive-NAND Gates (SN7426N)	AF
IC204	RH-IX1183AFZZ	TTL, Hex Inverters (SN7404N)	AE
IC205	RH-IX1127AFZZ	Quad Bilateral Switch (TC4016BP)	AK
IC206	RH-IX1136AFZZ	TTL, Quadruple 2-Input Positive-NOR Gates (SN74LS02N)	AE
IC207	VHINJM2901/-1	Quadruple Comparator (NJM2901N)	AL
IC208	VHIM54540L/-1	Tonearm Motor Driver (M54540L)	AK
IC209	VHITA7063//-1	AF Amplifier, Remote Control Signal (TA7063P)	AG
IC210	VHINJM4558D-1	Dual Operational Amplifier (NJM4558D)	AH
IC401	RH-IX1189AFZZ	Timer (Clock) (RC555NB)	AH
IC402	RH-IX1135AFZZ	TTL, Quadruple 2-Input Positive-NAND Gates (SN74LS00N)	AE
C403	RH-IX1187AFZZ	TTL, Synchronous 4-Bit Up/Down Counters (Dual Clock with Clear) (SN74LS193N)	AP
IC404	RH-IX1187AFZZ	TTL, Synchronous 4-Bit Up/Down Counters (Dual Clock with Clear) (SN74LS193N)	AP
IC405	RH-IX1135AFZZ	TTL, Quadruple 2-Input Positive-NAND Gates (SN74LS00N)	AE
IC406	VHI74LS27//-1	TTL, Triple 3-Input Positive-NOR Gates (SN74LS27N)	AF
IC407	RH-IX1188AFZZ	TTL, 4-Bit Bistable Latches (SN74LS75N)	AH
IC408	RH-IX1184AFZZ	TTL, Dual J-K Flip-Flops with Clear (SN74107N)	AG
IC409	RH-IX1135AFZZ	TTL, Quadruple 2-Input Positive-NAND Gates (SN74LS00N)	AE
IC410	RH-IX1166AFZZ	TTL, 4-Line-to-16-Line Decoders/Demultiplexers with Open-Collector Outputs (SN74159N)	AR
IC411	VHI74LS175/-1	TTL, Quadruple D-type Flip-Flops with Clear (SN74LS175N)	AL
IC501	94WLH0080	Z-80 CPU (Central Processing Unit) (LH-0080)	
IC502	94WLH0081	Z-80 PIO (Parallel Input/Output Controller) (LH-0081)	
IC503	94WLH0081	Z-80 PIO (Parallel Input/Output Controller) (LH-0081)	
IC504	94WS-14P01	EPROM (Erasable and Programmable Read Only Memory), 2048 Byte (HN462716)	
IC505	94WLH2111A4	MOS RAM (Random Access Memory), 256 x 4 (MB8111N)	
IC506	VHI74LS32//-1	TTL, Quadruple 2-Input Positive-OR Gates (SN74LS32N)	
IC507	VHI74LS74//-1	TTL, Dual D-type Positive-Edge-Triggered Flip-Flops with Preset and Clear (SN74LS74AN)	
IC508	94WLH2111A4	MOS RAM (Random Access Memory), 256 x 4 (MB8111N)	
IC509	94WS-14P04	TTL, 4-Bit Binary Counters (SN7493AN)	
IC510	94WS-14P04	TTL, 4-Bit Binary Counters (SN7493AN)	
IC511	RH-IX1183AFZZ	TTL, Hex Inverters (SN7404N)	
IC512	94WS-14P03	TTL, Divide-by-Twelve Counters (SN7492AN)	
IC513	VHI7405////-1	TTL, Hex Inverters with Open-Collector Outputs (SN7405N)	
IC514	VHI7442////-1	TTL, BCD-to-Decimal Decoder (SN7442AN)	

TRANSISTORS

Q1 (X1)	91Z2SC945K	Flip-Flop, Frequency Generator, Motor Control Circuit (2SC945 Ⓚ)
Q2 (X2)	91Z2SC945K	Flip-Flop, Frequency Generator, Motor Control Circuit (2SC945 Ⓚ)
Q3 (X3)	91Z2SC945K	Switching (Quartz Crystal P.L.L.), Motor Control Circuit (2SC945 Ⓚ)
Q4 (X4)	91Z2SC945K	Driver, Hall Element, Motor Control Circuit (2SC945 Ⓚ)
Q5 (X5)	91Z2SA641Q	Switching (45 rpm/33 rpm), Motor Control Circuit (2SA641 Ⓠ)
Q6 (X6)	91Z2SA641Q	Starting, Motor Control Circuit (2SA641 Ⓠ)

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
Q7 (X7)	91Z2SA641Q	Switching (45 rpm/33 rpm), Motor Control Circuit (2SA641 Q)	
Q8 (X8)	91Z2SC945K	Starting, Motor Control Circuit (2SC945 K)	
Q9 (X9)	91Z2SC945K	Starting, Motor Control Circuit (2SC945 K)	
Q10 (X10)	91Z2SD667C	Motor Drive, Motor Control Circuit (2SD667 C)	
Q11 (X11)	91Z2SD667C	Motor Drive, Motor Control Circuit (2SD667 C)	
Q12 (X12)	91Z2SB647C	Motor Drive, Motor Control Circuit (2SB647 C)	
Q13 (X13)	91Z2SB647C	Motor Drive, Motor Control Circuit (2SB647 C)	
Q14 (X14)	91Z2SC945K	Reversing Detector, Motor Control Circuit (2SC945 K)	
Q15 (X15)	91Z2SC945K	Reversing Detector, Motor Control Circuit (2SC945 K)	
Q16 (X16)	91Z2SA641Q	Reversing Detector, Motor Control Circuit (2SA641 Q)	
Q17 (X17)	91Z2SC945K	Reversing Detector, Motor Control Circuit (2SC945 K)	
Q18 (X18)	91Z2SA641Q	Driver, Hall Element, Motor Control Circuit (2SA641 Q)	
Q19 (X19)	91Z2SK68K	FET, Analog Switching (Motor), Motor Control Circuit (2SK68 K)	
Q20 (X20)	91Z2SC945K	Switching (45 rpm/33 rpm), Motor Control Circuit (2SC945 K)	
Q101 (X101)	91Z2SC945K	Voltage Regulator, Power Supply Circuit (2SC945 K)	
Q202	VS2SA733-P/-1	Switching (Motor Start-Stop), Interface Circuit (2SA733 P)	AC
Q203	VS2SC945AP/-1	Buzzer Drive Circuit, Interface Circuit (2SC945A P)	AB
Q204	VS2SD355-D/-1	Solenoid Drive, Interface Circuit (2SD355 D)	AD
Q205	VS2SC945AP/-1	Pulse Oscillator Circuit (APMS Space Detector), Interface Circuit (2SC945A P)	AB
Q206	VS2SC945AP/-1	Pulse Oscillator Circuit (APMS Space Detector), Interface Circuit (2SC945A P)	AB
Q207	VS2SC945AP/-1	Remote Control Signal Amplifier, Interface Circuit (2SC945A P)	AB
Q208	VS2SK117-Y/1F	FET, High Input Impedance, Remote Control Signal Amplifier, Interface Circuit (2SK117-Y1 or Y2)	AE
Q301	VHPPT-350//-1	Phototransistor, Tonearm Position Sensor (PT-350)	AH
Q302	VHPPT-350//-1	Phototransistor, Tonearm Position Sensor (PT-350)	AH
Q401	VS2SC945AP/-1	Switching (Pitch Indication), Speed Display Circuit (2SC945A P)	AB
Q501	VS2SA509-Y/-1	Digit Drive (2SA509 Y)	
Q502	VS2SA509-Y/-1	Digit Drive (2SA509 Y)	
Q503	VS2SA509-Y/-1	Digit Drive (2SA509 Y)	
Q504	VS2SC1815Y/-1	Segment Drive (2SC1815 Y)	
Q505	VS2SC1815Y/-1	Segment Drive (2SC1815 Y)	
Q506	VS2SC1815Y/-1	Segment Drive (2SC1815 Y)	
Q507	VS2SC1815Y/-1	Segment Drive (2SC1815 Y)	
Q508	VS2SC1815Y/-1	Segment Drive (2SC1815 Y)	
Q509	VS2SC1815Y/-1	Segment Drive (2SC1815 Y)	
Q510	VS2SC1815Y/-1	Segment Drive (2SC1815 Y)	
Q511	VS2SC1815Y/-1	Reset Circuit (2SC1815 Y)	
Q601/ LED601	RH-PX1014AFZZ	APMS Sensor (Optical Mark Sensor), Groove Space Detector (GP-453)	AR

DIODES

REF. NO.	PART NO.	DESCRIPTION	CODE
D1	91Z1S953 or 91Z1SS53	Protector (1S953 or 1SS53)	
D2	91Z1S953 or 91Z1SS53	Level Shift, Starting Circuit (1S953 or 1SS53)	
D3	91Z1S953 or 91Z1SS53	Compensator (1S953 or 1SS53)	
D4	91Z1S953 or 91Z1SS53	Compensator (1S953 or 1SS53)	
D5	91Z1S953 or 91Z1SS53	Level Shift, Starting Circuit (1S953 or 1SS53)	
D6	91Z1S953 or 91Z1SS53	Detector, Reversing Circuit (1S953 or 1SS53)	
D7	91Z1S953 or 91Z1SS53	Level Shift, Reversing Detector (1S953 or 1SS53)	
D8	91Z1S953 or 91Z1SS53	Protector, Reversing Detector (1S953 or 1SS53)	
⚠D101	91ZRB151	Rectifier, Power (RB151)	
⚠D201	VHD30D2FAS/-1	Rectifier, Power (30D2FAS)	AE
⚠D202	VHD30D2FAS/-1	Rectifier, Power (30D2FAS)	AE
⚠D203	VHD30D2FAS/-1	Rectifier, Power (30D2FAS)	AE
⚠D204	VHD30D2FAS/-1	Rectifier, Power (30D2FAS)	AE
D205	VHD1S2076//-1	Discharger (1S2076)	AB
D206	VHD1S2076//-1	Switching, Motor Start-Stop Circuit (1S2076)	AB
D207	VHD1N60////-1	Detector, Remote Control Signal (1N60)	AB
D208	VHD1N60////-1	Detector, Remote Control Signal (1N60)	AB
D209	VHD1S2076//-1	Switching, APMS Space Detector Circuit (1S2076)	AB
D211	VHD10E1////-1	Protector (Surge Absorber), Plunger-Solenoid (10E1)	AC
D212	VHD1S2076//-1	Protector, Plunger-Solenoid Drive Circuit (1S2076)	AB
D401	VHD1N60////-1	Discharge, Speed Display Circuit (1N60)	AB
D501	VHD1S1588//-1	Discharge, Reset Circuit (1S1588)	
PD301	VHPBP104///-1	Photodiode, Remote Control Receptor (BP104)	AS
ZD101	91ZRD5.6EB2	Zener Diode, Voltage Regulator (RD5.6EB2)	

LED (Light Emitting Diode)

REF. NO.	PART NO.	DESCRIPTION	CODE
LED301	VHPGL-9NG12-1	Input Tone (♪) ON/OFF Indicator (GL-9NG12)	AD
LED302	RH-PX1008AFZZ	Quartz Crystal P.L.L. Circuit ON/OFF Indicator (GL-9PR2)	AD
LED303	VHPGL-9NG12-1	Speed Selector (33-1/3 rpm) Indicator (GL-9NG12)	AD
LED304	RH-PX1008AFZZ	Speed Selector (45 rpm) Indicator (GL-9PR2)	AD

REF. NO.	PART NO.	DESCRIPTION	CODE
LED305	VHPGL9P03D/-1	Numeric LED (7-Segment) Display, Common Anode (GL-9P03D)	AM
LED306	VHPGL9P03D/-1	Numeric LED (7-Segment) Display, Common Anode (GL-9P03D)	AM
LED307	VHPGL9P03D/-1	Numeric LED (7-Segment) Display, Common Anode (GL-9P03D)	AM
LED308	RH-PX1008AFZZ	Pitch (Speed Deviation) Indicator (GL-9PR2)	AD
LED309	RH-PX1008AFZZ		AD
LED310	RH-PX1008AFZZ		AD
LED311	RH-PX1008AFZZ		AD
LED312	RH-PX1008AFZZ		AD
LED313	VHPGL-5PG5/1F	Remote Control Indicator (GL-5PG5)	AD
LED314	VHPGL-350//-1	Infrared Emitting Diode, Tonearm Position Sensor (GL-350)	AH

COIL

REF. NO.	PART NO.	DESCRIPTION	CODE
L201	RCILZ0001SGZZ	100mH, Parallel Resonance, Remote Control Signal	AF

TRANSFORMER

REF. NO.	PART NO.	DESCRIPTION	CODE
⚠T101	RTRNP0651AFZZ	Power	AY

CRYSTALS

REF. NO.	PART NO.	DESCRIPTION	CODE
X1 (Q1)	91ZHC-18C	9.3312MHz	
X501	94WS-14P02	4.9152MHz (NC-18C)	

CONTROLS

REF. NO.	PART NO.	DESCRIPTION	CODE
VR1	RVR-M0145AFZZ	220K ohm (B), Balance Adjust, Motor Drive Circuit	
VR2	91ZSR19R1K	1K ohm (B), Motor Drive Adjust	
VR3	91ZSR19R1K	1K ohm (B), Motor Drive Adjust	
VR4	RVR-M0024AGZZ	100K ohm (B), Quartz Lock Timing Adjust (33-1/3 rpm)	AC
VR5	RVR-M0024AGZZ	100K ohm (B), Quartz Lock Timing Adjust (45 rpm)	AC
VR6	91ZCR19R150K	150K ohm (B), Quartz Lock Timing Adjust (45 rpm)	
VR201	RVR-M0024AGZZ	100K ohm (B), Fine Speed Adjust (Pitch Control), 45 rpm, White	AC
VR202	RVR-M0024AGZZ	100K ohm (B), Fine Speed Adjust (Pitch Control), 33-1/3 rpm, White	AC
VR203	RVR-M0145AFZZ	220K ohm (B), Duty Ratio Adjust (φ1) (Tonearm Position Sensor), White	AD
VR204	RVR-M0145AFZZ	220K ohm (B), Duty Ratio Adjust (φ2) (Tonearm Position Sensor), White	AD
VR205	RVR-M0183AFZZ	47K ohm (B), Remote Control Sensitivity Adjust, White	AD
VR206	RVR-M0183AFZZ	47K ohm (B), Remote Control Sensitivity Adjust, White	AD
VR207	RVR-M0065AGZZ	4.7K ohm (B), APMS Sensor Sensitivity Adjust, Blue	AE
VR208	RVR-M0084AGZZ	100K ohm (B), APMS Sensor Sensitivity Adjust, Blue	AE
VR301	RVR-B0209AFZZ	50K ohm (B), Pitch (33/45) Control (Fine Speed Adjustment)	AE
TC1 (VC1)	91Z60726	Trimmer Capacitor, 20PF, 50V Oscillation Frequency Adjust	

ELECTROLYTIC CAPACITORS

REF. NO.	PART NO.	DESCRIPTION	CODE
C1	VCEAAU1EW475Y	4.7MFD, 25V, +50 –10%	
C8	VCEAAU1EW106Y	10MFD, 25V, +50 –10%	
C11	VCEAAU1EW476Y	47MFD, 25V, +50 –10%	
C12	VCEAAU1EW106Y	10MFD, 25V, +50 –10%	
C15	VCEAAU1EW226Y	22MFD, 25V, +50 –10%	
C16	VCEAAU1EW226Y	22MFD, 25V, +50 –10%	
C17	VCEAAU1EW336Y	33MFD, 25V, +50 –10%	
C101	VCEASU1EW108Y	1000MFD, 25V, +50 –10%	
C102	VCEASU1EW108Y	1000MFD, 25V, +50 –10%	
C103	VCEAAU1EW226Y	22MFD, 25V, +50 –10%	
C104	VCEAAU1EW226Y	22MFD, 25V, +50 –10%	
C105	VCEAAU1EW226Y	22MFD, 25V, +50 –10%	
C201	VCEAAU1CW228Y	2200MFD, 16V, +50 –10%	AF
C204	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C205	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C206	VCEAAU1AW476Y	47MFD, 10V, +50 –10%	AB
C207	VCEAAU1AW476Y	47MFD, 10V, +50 –10%	AB
C215	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C220	VCEALU1HC105A	1MFD, 50V, +75 –10%, Orange	AB
C221	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C223	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C224	VCEALU1HW334M	.33MFD, 50V, ±20%, Yellow	AB
C225	VCEALU1HW225M	2.2MFD, 50V, ±20%, Yellow	AB
C227	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C229	VCEAAU1HW105Y	1MFD, 50V, +50 –10%	AB
C254	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C255	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C402	VCEAAU1AW107Y	100MFD, 10V, +50 –10%	AB
C403	VCEAAU1AW107Y	100MFD, 10V, +50 –10%	AB
C504	VCEAAU1CW476Y	47MFD, 16V, +50 –10%	
C505	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	
C511	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	

CAPACITORS

REF. NO.	PART NO.	DESCRIPTION	CODE
C2	VCQYKU1HM473K	.047MFD, 50V, ±10%, Mylar	
C3	VCCSPU1HL300K	30PF, 50V, ±10%, Ceramic	
C4	VCCSPU1HL9R0K	9PF, 50V, ±10%, Ceramic	
C5	VCQYKU1HM104J	.1MFD, 50V, ±5%, Mylar	
C6	VCQYKU1HM682K	.0068MFD, 50V, ±10%, Mylar	
C7	VCQYKU1HM682K	.0068MFD, 50V, ±10%, Mylar	
C9	VCQYKU1HM104J	.1MFD, 50V, ±5%, Mylar	
C10	VCQYKU1HM103K	.01MFD, 50V, ±10%, Mylar	AA
C13	VCQYKU1HM473K	.047MFD, 50V, ±10%, Mylar	
C14	VCQYKU1HM473K	.047MFD, 50V, ±10%, Mylar	
C18	VCKZPU1HB103K	.01MFD, 50V, ±10%, Ceramic	AA
C20	VCKZPU1HB103K	.01MFD, 50V, ±10%, Ceramic	AA
C21	VCKZPU1HB103K	.01MFD, 50V, ±10%, Ceramic	AA
⚠C106	91ZPME271Y	.022MFD, 250V, Metallized Paper	
C203	VCQYKU1HM104K	.1MFD, 50V, ±10%, Mylar	AB
C208	VCQYKU1HM823K	.082MFD, 50V, ±10%, Mylar	AB
C209	VCQYKU1HM102K	.001MFD, 50V, ±10%, Mylar	AA
C210	VCQYKU1HM103K	.01MFD, 50V, ±10%, Mylar	AA
C211	VCQYKU1HM103K	.01MFD, 50V, ±10%, Mylar	AA
C212	VCQYKU1HM103K	.01MFD, 50V, ±10%, Mylar	AA
C213	VCQYKU1HM103K	.01MFD, 50V, ±10%, Mylar	AA
C214	VCQYKU1HM223K	.022MFD, 50V, ±10%, Mylar	AB

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
R235	VRD-ST2EE153J	15K ohm	
R236	VRD-ST2EE473J	47K ohm	
R237	VRD-ST2EE473J	47K ohm	
R238	VRD-ST2EE472J	4.7K ohm	
R239	VRD-ST2EE183J	18K ohm	
R240	VRD-ST2EE472J	4.7K ohm	
R241	VRD-ST2EE471J	470 ohm	
R242	VRD-ST2EE682J	6.8K ohm	
R243	VRD-ST2EE154J	150K ohm	
R244	VRD-ST2EE103J	10K ohm	
R245	VRD-ST2EE471J	470 ohm	
R246	VRD-ST2EE563J	56K ohm	
R247	VRD-SU2EE222J	2.2K ohm	
R249	VRD-SU2EE473J	47K ohm	
R250	VRD-ST2EE472J	4.7K ohm	
R251	VRD-ST2EE563J	56K ohm	
R252	VRD-ST2EE563J	56K ohm	
R253	VRD-ST2EE332J	3.3K ohm	
R254	VRD-ST2EE332J	3.3K ohm	
R256	VRD-ST2EE473J	47K ohm	
R257	VRD-SU2EE103J	10K ohm	
R258	VRD-ST2EE103J	10K ohm	
R259	VRD-ST2EE683J	68K ohm	
R260	VRD-ST2EE224J	220K ohm	
R261	VRD-ST2EE332J	3.3K ohm	
R262	VRD-ST2EE104J	100K ohm	
R263	VRD-SU2EE222J	2.2K ohm	
R264	VRD-SU2EE102J	1K ohm	
R265	VRD-SU2EE103J	10K ohm	
R266	VRD-SU2EE223J	22K ohm	
R267	VRD-SU2EE121J	120 ohm	
R268	VRD-ST2EE823J	82K ohm	
R269	VRD-ST2EE102J	1K ohm	
R270	VRD-SU2EE104J	100K ohm	
R271	VRD-ST2EE331J	330 ohm	
R272	VRD-ST2EE223J	22K ohm	
R273	VRD-ST2EE681J	680 ohm	
R301	VRD-ST2EE561J	560 ohm	
R302	VRD-ST2EE154J	150K ohm	
R401	VRD-SU2EE222J	2.2K ohm	
R402	VRD-SU2EE182J	1.8K ohm	
R403	VRD-SU2EE332J	3.3K ohm	
R404	VRD-SU2EE224J	220K ohm	
R405	VRD-SU2EE103J	10K ohm	
R406	VRD-SU2EE680J	68 ohm	
R407	VRD-SU2EE102J	1K ohm	
R408	VRD-SU2EE472J	4.7K ohm	
R501	VRD-ST2EE472J	4.7K ohm	
R502	VRD-ST2EE472J	4.7K ohm	
R503	VRD-ST2EE102J	1K ohm	
R504	VRD-ST2EE102J	1K ohm	
R505	VRD-ST2EE102J	1K ohm	
R506	VRD-ST2EE472J	4.7K ohm	
R507	VRD-ST2EE202J	2K ohm	
R508	VRD-ST2EE202J	2K ohm	
R509	VRD-ST2EE202J	2K ohm	
R510	VRD-ST2EE202J	2K ohm	
R511	VRD-ST2EE332J	3.3K ohm	
R512	VRD-ST2EE332J	3.3K ohm	
R513	VRD-ST2EE332J	3.3K ohm	
R514	VRD-ST2EE332J	3.3K ohm	
R515	VRD-ST2EE332J	3.3K ohm	
R516	VRD-ST2EE332J	3.3K ohm	
R517	VRD-ST2EE332J	3.3K ohm	
R518	VRD-ST2EE510J	51 ohm	
R519	VRD-ST2EE510J	51 ohm	
R520	VRD-ST2EE510J	51 ohm	
R521	VRD-ST2EE510J	51 ohm	
R522	VRD-ST2EE510J	51 ohm	
R523	VRD-ST2EE510J	51 ohm	
R524	VRD-ST2EE510J	51 ohm	
R525	VRD-ST2EE102J	1K ohm	
R526	VRD-ST2EE102J	1K ohm	
R527	VRD-ST2EE333J	33K ohm	
R528	VRD-ST2EE331J	330 ohm	

MISCELLANEOUS

REF. NO.	PART NO.	DESCRIPTION	CODE
01	GCOVA1183AFSA	Front Cover, Acryl Plate	AS
02	HPNLC3415AFSA	Front Panel Assembly (RP-9100H)	BD
02-1	————	Front Panel	—
02-2	GCOVA1184AFSA	Cover, LED Indicator (91Z897735)	AC
02-3	GMADZ0059AFSA	Window, Operation Mode/ Program Item-Number Display	AK
02-4	PSPAS0103AFSA	Spacer, Button (JKNBZ0178AFSA) (91Z897736)	AA
02-5	PSPAS0084AFSA	Spacer, Button (JKNBZ0164AFSA)	AA
•02-6	PSPAS0080AFSA	Spacer, Power ON/OFF Switch Button	AB
02	HPNLC3415AFSB	Front Panel Assembly (RP-9100HB)	BD
02-1	————	Front Panel	—
02-2	GCOVA1184AFSA	Cover, LED Indicator (91Z897735)	AC
02-3	GMADZ0059AFSA	Window, Operation Mode/ Program Item-Number Display	AK
02-4	PSPAS0103AFSB	Spacer, Button (JKNBZ0178AFSB) (91Z897736-2)	AA
02-5	PSPAS0084AFSB	Spacer, Button (JKNBZ0164AFSB)	AA
•02-6	PSPAS0080AFSB	Spacer, Power ON/OFF Switch Button	AB
03	JKNBM0297AFSA	Button, Power ON/OFF Switch (RP-9100H)	AD
03	JKNBM0297AFSB	Button, Power ON/OFF Switch (RP-9100HB)	AD
04	JKNBN0441AFSA	Knob, Sensor Level Control (RP-9100H)	AG
04	JKNBN0441AFSB	Knob, Sensor Level Control (RP-9100HB)	AH
05	JKNBN0442AFSA	Knob, Pitch Control (Fine Speed Adjustment) (RP-9100H)	AG
05	JKNBN0442AFSB	Knob, Pitch Control (Fine Speed Adjustment) (RP-9100HB)	AG
06	JKNBZ0164AFSA	Button, APMS Item Number Input, Channel Selection, Clear and Repeat Play (RP-9100H)	AC
06	JKNBZ0164AFSB	Button, APMS Item Number Input, Channel Selection, Clear and Repeat Play (RP-9100HB)	AD

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
07	JKNBZ0178AFSA	Button, Speed Selector, Quartz Crystal Switch, Input Tone ON/OFF Switch, Skip, Cue/ Pause, Cut-out/Clear Memory and Play Start (RP-9100H) (91Z897683)	AE
07	JKNBZ0178AFSB	Button, Speed Selector, Quartz Crystal Switch, Input Tone ON/OFF Switch, Skip, Cue/ Pause, Cut-out/Clear Memory and Play Start (RP-9100HB) (91Z897683-2)	AE
08	LANGQ0733AFZZ	Bracket, AC Supply Cord (91Z893037)	AD
09	LANGR0497AFZZ	Bracket, Front Operation P.W. Board Retaining, Front	AD
10	LANGR0498AFZZ	Bracket, Front Operation P.W. Board Retaining, Rear	AD
11	LBSHC0004AGZZ	Bushing, AC Supply Cord	AB
11	LBSHC0007AFZZ	Bushing, AC Supply Cord	
12	LHLDW1068AFZZ	Wire Holder, 100mm	AA
13	LHLDW1075AFZZ	Wire Holder, 60mm	AA
14	LHLDZ9057AF00	LED Holder, Pitch Indicator (LED308 ~ LED312) (91Z898613)	AG
15	LX-BZ0278AF00	Screw with Flange, AC Supply Cord Retaining (3ϕ x 12mm)	AB
16	LX-JZ0005AFFF	Screw with Flange, Front Panel Retaining (14mm x 3ϕ)	
17	LX-LZ0051AF00	Push Rivet, Nylon, 3.5ϕ	
18	LX-NZ0122AFFD	Nut with Flange, Bottom Board Retaining, Power Transformer Retaining	AA
19	PCOVZ3050AFZZ	Cover, AC Supply Voltage Selector Socket (91Z898257)	AC
20	PCUSG0102AF00	Cushion (Rubber), Button (JKNBZ0164AFSA/SB)	AB
21	PEPAP0050AFSA	EP Adaptor (91Z890949)	AE
22	PRDAR0196AFFW	Heat Sink, IC201	AG
23	PREFL0073AFZZ	Reflection Plate, Remote Control Receptor (91Z898611)	
24	PSLDC3089AFZZ	Shield Cover, Interface P.W. Board	AC
25	PSLDC3096AFZZ	Shield Cover, Bottom, Control Module P.W. Board	AD
26	PSLDC3097AFZZ	Shield Cover, Upper, Control Module P.W. Board	AD
27	PSPAI0148AFZZ	Spacer, Button (JKNBZ0178AFSA/SB), Fiber	AA
28	PSPAI0153AFZZ	Spacer, Power ON/OFF Switch, Fiber	AB
29	PSPAJ0053AFZZ	Spacer, Printed Wiring Board Retaining (91ZE-832380-4)	AB
⚠30	QACCV0001AGZZ	AC Supply Cord with Plug, KEMA Safety Standard	AL
⚠30	QACCL0001AFZZ	AC Supply Cord with Plug, SAA Safety Standard	
31	QHWS-0001CEFN	Lug, Connecting Cord	
32	QFSHD1001AGZZ	Fuse Holder, F201	AA
33	QLUGP0111CEFW	Lug Terminal, Printed Wiring Board	AA
34	QSOCT2151AFZZ	Socket, Integrated Circuit (IC201)	AB
35	QTIPZ0002SGZZ	Tip, Connecting Socket	AA
36	QTIPZ0056AFZZ	Tip, Connecting Plug (CNP302)	AA
37	QTIPZ0065AFZZ	Tip, Connecting Socket (CNS302)	AA
38	RUNTK0001AFZZ	Control Module Unit (Micro-Processor Unit)	
101	91Z872035-1	Mechanism Main Chassis	
102	91Z897665	Clutch Gear, Tonearm	
103	91Z897669	Gear (Double Type)	
104	91Z898284	Plate Spring, Clutch Lever	
105	91Z897663	Clutch Lever (Plunger-Solenoid)	
106	91Z897814	Shaft, Clutch Lever	
107	91Z897666	Clutch Gear, Tonearm	
108	91Z898364	Friction Plate, Tonearm	
109	91Z897668	Washer, Stainless Steel	
110	91Z897876	Spring, Clutch Gear	
111	91Z897667	Holder, Clutch Gear Spring	
112	91Z897664	Gear, Tonearm Lifter Cam	
113	91Z871965	Cam, Tonearm Lifter	
114	91Z897671	Lever, Micro-Switch	
115	91Z871958	Bracket, Tonearm Motor	
116	91Z897894	Worm Shaft	
117	91Z897675	Bearing, Worm Shaft	
118	91Z897677	Pulley, Worm Shaft	
119	91ZE-288760	Cushion (Rubber), Tonearm Motor	
120	91Z700749	Sleeve, Tonearm Motor Retaining	
121	91Z705471	Tonearm Motor	
122	91Z897813	Pulley, Tonearm Motor	
123	91Z897692	Belt, Tonearm Motor	
124	91Z897682	Stopper (Rubber), Plunger-Solenoid	
125	91Z898471	Bracket, Fixed Slit (Tonearm Position Sensor)	
126	91Z890755	Wire Holder	
127	91Z847415	Cabinet	
128	91Z898641	Cushion (Rubber), Dust Cover	
129	91Z898616	Remote Control Receptor Screen	
130	91Z851918	Turntable Ring Assembly	
130-1	91Z847148	Turntable Ring	
130-2	91Z897854	Lamp Cover, Upper	
●130-3	91Z897855	Lamp Cover, Lower	
131	91Z851919	Tonearm Assembly (with APMS Sensor) without Cartridge	
131-1	91Z897733	Tonearm Rest	
131-2	PCOVZ1052AFZZ	Cover (Sensor Slit), APMS Sensor (Optical Mark Sensor) (91Z898563)	AD
131-3	RH-PX1014AFZZ	APMS Sensor (Optical Mark Sensor), Q601 and LED601 (91Z898070)	AR
131-4	91ZMWEIGHT9100	Main Weight with Counter Ring	
●131-5	91ZH-SHELL9100	Head Shell Assembly	
132	91Z897687	Plate, Tonearm Lifter	
133	91Z897706	Shaft, Tonearm Lifter	
134	91Z897737-2	Rod, Tonearm Lifter	
135	91Z897905	Spring (Small), Tonearm Lifter	
136	91ZE-287680	Spring (Large), Tonearm Lifter	
137	91Z896268	Adjustment Screw, Tonearm Lifter	
138	91Z872326	Base, Tonearm	
139	91Z897672	Drum, Tonearm	
140	91Z898468	Bracket (Metal Plate), Movable Slit	
141	91Z896598-3	Pin, Eccentric, Auto Lead-In Adjustment	
142	91Z872328	Movable Slit, Tonearm Address Sensor	
143	91Z898638	Push Rivet, Plastics	

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
144	91Z290851	Flat Washer (φ3.7 x φ6 x t0.5)	
145	91Z897907	Brake-Arm, Tonearm	
146	91Z897679	Friction Plate (Felt), Brake-Arm	
147	91Z894408	Wire Holder, Nylon	
148	91Z897680-1	Mechanism Sub-chassis	
149	91Z898604	Stay, Leg	
150	91Z897689-1	Shield Cover, Transport P.W. Board	
151	91Z898470	Holder, Tonearm Position Sensor	
152	91Z872329	Fixed Slit, Tonearm Position Sensor	
153	91Z898614	Spring, Tonearm Position Sensor Holder	
154	91Z897343	Bushing, Power Supply P.W. Board Retaining Spacer	
155	91Z897342	Spacer, Power Supply P.W. Board Retaining	
156	91Z897114-2	Bracket, DC Servo Motor	
157	91Z898106	Holder, Leg	
158	91Z898646	Front Insulation Leg	
159	91Z620058-2	Turntable	
160	91Z871160	Platter Mat (Rubber), Turntable	
161	91Z847389	Bottom Cover	
162	91Z851908	Dust Cover	
163	91Z872331	Hinge Assembly (with Securing Screw)	
163-1	91Z898610	Securing Screw, Dust Cover	
164	91Z896598-3	Eccentric Pin, Phase Adjust (φ1 Signal and φ2 Signal)	
165	91Z897768	Bearing, Worm Shaft (Oilless Metal)	
166	91Z898646-1	Rear Insulation Leg	
167	91Z631874	Core-less DC Servo Mono-torque Motor Assembly	
168	91Z893395	Fuse Holder, F101 ~ F103	
169	91Z704892	Heat Sink, IC101 and IC102	
CNP1	91Z896351-6	Connecting Plug, 6-Pin	
CNP2	91Z896351-5	Connecting Plug, 5-Pin	
CNP3	91Z896351-3	Connecting Plug, 3-Pin	
CNP4	91Z896351-2	Connecting Plug, 2-Pin	
CNP101	91Z896351-6	Connecting Plug, 6-Pin	
CNP201	QCNCM136CAFZZ	Connecting Plug, 3-Pin	AB
CNP203	QCNCM1001AGZZ	Connecting Plug, 10-Pin	AC
CNP204	QCNCM1501AGZZ	Connecting Plug, 15-Pin	AE
CNP205	QCNCM0806SGZZ	Connecting Plug, 8-Pin	AC
CNP206	QCNCM1201AGZZ	Connecting Plug, 12-Pin	AC
CNP207	QCNCM233DAFZZ	Connecting Plug, 4-Pin	AC
CNP208	QCNCM0503SGZZ	Connecting Plug, 5-Pin, Test Points	AC
CNP209	QCNCM233DAFZZ	Connecting Plug, 4-Pin	AC
CNP210	QCNCM136CAFZZ	Connecting Plug, 3-Pin	AB
CNP301	QCNCM372JAFZZ	Connecting Plug, 9-Pin	AE
CNP302	QCNCM374MAFZZ	Connecting Plug, 12-Pin, Housing Only	AD
CNP402	QCNCM0503SGZZ	Connecting Plug, 5-Pin	AC
CNS1	QCNCW103FAFZZ	Connecting Socket, 6-Pin	AB
CNS2	QCNCW155EAFZZ	Connecting Socket, 5-Pin	AB
CNS3	QCNCW107CAFZZ	Connecting Socket, 3-Pin (Housing only)	AB
CNS4	QCNCW085BAFZZ	Connecting Socket, 2-Pin	AA

REF. NO.	PART NO.	DESCRIPTION	CODE
CNS101	QCNCW103FAFZZ	Connecting Socket, 6-Pin	AB
CNS201	QCNCW107CAFZZ	Connecting Socket, 3-Pin	AB
CNS203	QCNCW1002AGZZ	Connecting Socket, 10-Pin (Housing only)	AB
CNS204	QCNCW1501AGZZ	Connecting Socket, 15-Pin	AC
CNS205	QCNCW0805SGZZ	Connecting Socket, 8-Pin	AB
CNS206	91Z898731	Connecting Socket (12-Pin) Assembly	
CNS207	QCNCW164DAFZZ	Connecting Socket, 4-Pin	AA
CNS209	QCNCW164DAFZZ	Connecting Socket, 4-Pin	AA
CNS210	QCNCW107CAFZZ	Connecting Socket, 3-Pin	AB
CNS301	QCNCW0902AGZZ	Connecting Socket, 9-Pin (Housing only)	AB
CNS302	QCNCW234MAFZZ	Connecting Socket, 12-Pin	AD
CNS402	QCNCW0502SGZZ	Connecting Socket, 5-Pin	AA
CNS501	QCNCW232ZAFZZ	Connecting Socket, 44-Pin	AT
SW301	QSW-Z0051AFZZ	Switch, Input Tone ON/OFF(♪)	AC
SW302	QSW-Z0051AFZZ	Switch, Quartz Crystal P.L.L. Circuit ON/OFF	AC
SW303	QSW-Z0051AFZZ	Switch, APMS Item Number Input (0)	AC
SW304	QSW-Z0051AFZZ	Switch, APMS Item Number Input (1)	AC
SW305	QSW-Z0051AFZZ	Switch, APMS Item Number Input (2)	AC
SW306	QSW-Z0051AFZZ	Switch, APMS Item Number Input (3)	AC
SW307	QSW-Z0051AFZZ	Switch, APMS Item Number Input (4)	AC
SW308	QSW-Z0051AFZZ	Switch, APMS Item Number Input (5)	AC
SW309	QSW-Z0051AFZZ	Switch, APMS Item Number Input (6)	AC
SW310	QSW-Z0051AFZZ	Switch, APMS Item Number Input (7)	AC
SW311	QSW-Z0051AFZZ	Switch, APMS Item Number Input (8)	AC
SW312	QSW-Z0051AFZZ	Switch, APMS Item Number Input (9)	AC
SW313	QSW-Z0051AFZZ	Switch, Channel Selection	AC
SW314	QSW-Z0051AFZZ	Switch, Play Start	AC
SW315	QSW-Z0051AFZZ	Switch, Clear	AC
SW316	QSW-Z0051AFZZ	Switch, Repeat Play	AC
SW317	QSW-Z0051AFZZ	Switch, Cut/Clear Memory	AC
SW318	QSW-Z0051AFZZ	Switch, Cue/Pause	AC
SW319	QSW-Z0051AFZZ	Switch, Speed Selector (33-1/3 rpm)	AC
SW320	QSW-Z0051AFZZ	Switch, Speed Selector (45 rpm)	AC
SW321	QSW-Z0051AFZZ	Switch, Skip	AC
SW322	QSW-R0170AFZZ	Switch, Sensor Level Selector	AH
⚠SW323	QSW-P9105AFZZ	Switch, Power ON/OFF	AK
SW601	91Z894614	Switch, Tonearm Up	
SW602	91Z894614	Switch, Tonearm Down	
SW603	91Z871418	Switch, Rest	

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
⚠F101	91Z893791-6	Fuse, T315mA/250V	
⚠F102	91Z893791-1	Fuse, T400mA/250V	
⚠F103	91Z893791-1	Fuse, T400mA/250V	
⚠F201	QFS-C202CAGNI	Fuse, T2A	AE
BZ601	RALMBO052AFZZ	Buzzer (♪)	AG
⚠SO101	QSOCE0558AFZZ	Socket, AC Supply Voltage Selector	AG
SO501	QSOCZ2188AFZZ	IC Socket, 24-Pin (IC504)	
SO601-A, B	QCNW-0627AFZZ	Outputs and Earth Cord	AP
SOL601	91Z897896-1	Plunger-solenoid, 12V	
TM1	91Z704841-4	Lug Terminal, 6-Pin	
TM2	91Z704841	Lug Terminal, 5-Pin	
TM101	91Z704907-2	Lug Terminal, 4-Pin	
TM102	91Z704907-1	Lug Terminal, 3-Pin	
	RRMCG0056AFSA	Infrared-Remote Control Unit (MODEL AD-700)	BQ
	91Z705295-4	Label, Fuse T400mA	
	SSAKA0007AGZZ	Polyethylene Bag, EP Adaptor	AA
	SSAKA0007SEZZ	Polyethylene Bag, Instruction Manual	AA
	91Z851914	Packing Case (RP-9100H)	
	91Z851914-1	Packing Case (RP-9100HB)	
	TCAUH0218AFZZ	Caution Label, Tonearm	
	TCAUZ0123AFZZ	Caution Label, Packing	
	TINSZ0182AFZZ	Instruction Manual, English/German/French/Spanish	AU
	TINSZ0183AFZZ	Instruction Manual, Swedish	
	TMAPC0638AFZZ	Schematic Diagram	
	TLABG0132AFZZ	Spec. Label, Model No. (RP-9100H)	
	TLABG0133AFZZ	Spec. Label, Model No. (RP-9100HB)	
	TLABZ0141AFZZ	Label, Setting Voltage (91Z895746)	
	TTAGH0103AFZZ	Tag, English/German/French/Spanish/Swedish	AD
	TTAGH0114AFZZ	Tag, AD-700	
	91Z847416	Packing Add., Assembly	
	91Z847416-1	Packing Add., Cushion, Right Side	
	91Z847416-2	Packing Add., Cushion, Left Side	
	91Z847416-3	Packing Add., Turntable	
•	91Z847416-4	Packing Add., Tonearm Cushion (40 x 15 x 20)mm	
	SPAKA0621AFZZ	Packing Add., Cushion, Remote Control Unit	

PWB ASSEMBLY

(Not Replacement Item)

DUNTX0020AF02	Interface Circuit	BN
DUNTZ0366AF01 (Combined Assembly)	Front Operation Circuit Infrared Received Circuit Tonearm Position Sensor Circuit	BN

REF. NO.	PART NO.	DESCRIPTION	CODE
	REMOTE CONTROL UNIT (RRMCG0056AFSA)		
IC1 (i1)	RH-IX0186PAZZ	C-MOS LSI, Remote Control (S2600)	
Q1	VS2SD592ANC1A	Transistor, AF Output Amplifier (2SD592ANC Ⓠ or Ⓡ)	
D1	RH-PX0009PAZZ	Infrared Emitting Diode, Remote Control (GL-505MT)	
D2	RH-PX0009PAZZ	Infrared Emitting Diode, Remote Control (GL-505MT)	
D3	RH-PX0009PAZZ	Infrared Emitting Diode, Remote Control (GL-505MT)	
C1	VCCCPR1H3121J	120PF (CH), 50V, ±5%, Ceramic Capacitor	
C2	VCSACU1CE106M	10MFD, 16V, ±20%, Tantalum Capacitor	
C3	RTO-H0003VAZZ	Trimmer Capacitor, 40PF, Carrier Frequency Adjust	
C4	VCCCPR1H3100J	10PF (CH), 50V, ±5%, Ceramic Capacitor	
R1	VRD-SS2EY123J	12K ohm, 1/4W, ±5%, Carbon Resistor	
R2	VRD-SS2EY102J	1K ohm, 1/4W, ±5%, Carbon Resistor	
R3	VRC-MT2HG270J	27 ohm, 1/2W, ±5%, Solid Type Resistor	
01	DCABA9629VASA	Cabinet, Front, with Indication Metal	
01-1	GCABA9409VASA	Cabinet, Front	
•01-2	HPNLH0038VASA	Indication Metal, Front Cabinet	
02	GCABB9409VASA	Cabinet, Bottom	
03	HINDP0012VASA	Caution Label, Battery	
04	HINDP0032VASA	Indication Plate, Model No.	
05	JBTN-0025VASA	Button	
06	LDAI-0005VAZZ	Holder, Infrared Emitting Diodes	
07	MSPRP0053VAZZ	Silicone Rubber Sheet, Switch	
08	MSPRP0054VAZZ	Plate Spring, Switch Terminal	
09	PCOVP0003VASA	Cover, Battery Compartment	
10	PFILW0004VASA	Filter, Transmitter, Infrared Rays	
11	PMIR-0004VAZZ	Reflector	
12	PSPAN0002VAZZ	Spacer, Infrared Emitting Diodes	
13	PZETE0002VAZZ	Insulation Sheet, Switch	
14	QTANZ1054CCZZ	Terminal, Battery, Plate (+)	
15	QTANZ1055CCZZ	Terminal, Battery, Spring (–)	
16	QTANZ1056CCZZ	Terminal, Battery	
17	QTANZ1057CCZZ	Terminal, Battery	
18	QTANZ0005VAZZ	Terminal, Battery	
CNW1	QCNW-0013PAZZ	Connecting Wires	
	SPAKA0008VAZZ	Packing Add., Spacer, Battery	
	SPAKA0009VAZZ	Packing Add., Spacer, Front Panel	
	SPAKT0023VAZZ	Packing Case, Remote Control Unit	
	SSAKH0003VAZZ	Polyethylene Bag, Remote Control Unit	
	UBATU0306PAZZ	Battery, SUM-3E x 6	

PARTS LIST

• INTERCHANGE ABILITY TABLE

REF NO.	PART NO.
INTEGRATED CIRCUITS	
IC1	91ZNJM4558D, 91ZμPC4558C, 91ZRC4558P
IC2	91ZNJM4558D, 91ZμPC4558C, 91ZRC4558P
IC101	91ZμPC14312H, 91ZFS7812, 91ZμA7812C (KC)
IC102	91ZFS7912M, 91ZFS7912, 91ZμA79M12C
TRANSISTORS	
Q1 (X1), Q2 (X2), Q3 (X3), Q4 (X4)	91Z2SC945 Ⓟ, Ⓠ or Ⓚ, 91Z2SC2308 Ⓑ or Ⓒ
Q5 (X5), Q6 (X6), Q7 (X7)	91Z2SA733 Ⓠ or Ⓟ, 91Z2SA641 Ⓠ or Ⓟ, 91Z2SA844 Ⓑ or Ⓒ
Q8 (X8), Q9 (X9)	91Z2SC945 Ⓟ, Ⓠ or Ⓚ, 91Z2SC2308 Ⓑ or Ⓒ
Q10 (X10), Q11 (X11)	91Z2SD667 Ⓑ or Ⓒ
Q12 (X12), Q13 (X13)	91Z2SB647 Ⓑ or Ⓒ
Q14 (X14), Q15 (X15)	91Z2SC945 Ⓟ, Ⓠ or Ⓚ, 91Z2SC2308 Ⓑ or Ⓒ
Q16 (X16)	91Z2SA733 Ⓠ or Ⓟ, 91Z2SA641 Ⓠ or Ⓟ, 91Z2SA844 Ⓑ or Ⓒ
Q17 (X17)	91Z2SC945 Ⓟ, Ⓠ or Ⓚ, 91Z2SC2308 Ⓑ or Ⓒ
Q18 (X18)	91Z2SA733 Ⓠ or Ⓟ, 91Z2SA641 Ⓠ or Ⓟ, 91Z2SA844 Ⓑ or Ⓒ
Q19 (X19)	91Z2SK68 Ⓚ or Ⓛ
Q20 (X20)	91Z2SC945 Ⓟ, Ⓠ or Ⓚ, 91Z2SC2308 Ⓑ or Ⓒ
Q101 (X101)	91Z2SC945 Ⓟ, Ⓠ or Ⓚ
Q501, Q502, Q503	VS2SA509-Y/-1, VS2SA950-Q/-1

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