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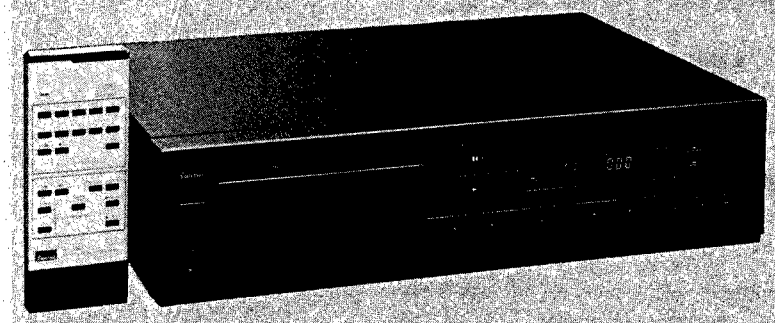
SERVICE MANUAL

COMPACT DISC PLAYER

SANSUI PC-V1000



CAUTION

1. Parts identified by the ⚠ symbol on the schematic diagram and the parts list are critical for safety. Use only replacement parts that have critical characteristics recommended by the manufacturer.
2. Make leakage-current or resistance measurements to determine that exposed parts are acceptably insulated from the supply circuit before returning the appliance to the customer.

Sansui

SANSUI ELECTRIC CO., LTD.

•SPECIFICATIONS

Type..... Compact disc digital audio system
Pickup..... Semiconductor laser
Channels..... 2-channels
Frequency response..... 5 ~ 20,000 Hz
Dynamic range..... More than 96 dB.
Harmonic distortion (1 kHz)
..... 0.003% or less
Wow and Flutter..... Below measurable limits
Output voltage..... 2V
Signal format
Sampling frequency .... 44.1 kHz
Quantization bit number
..... 16 bit linear
Transmission rate..... 4.3218 Mbit/sec
Compact disc
Playing time ..... About 60 minutes
Dimensions ..... Diameter 120 mm
Power requirements..... 120/220/240V 50/60 Hz
For U.S.A. and Canada
..... 120V (60 Hz)
Power consumption..... 50W
Dimensions
Compact disc player ... 430 mm (16-15/16″)W
111.5 mm (4-3/8″)H
297 mm (11-11/16″)D
Remote control..... 66 mm (2-5/8″)W
23 mm (15/16″)H
168 mm (6-5/8″)D
Weight
Compact disc player ... 7.2 kg (15.9 lbs) net
Remote control..... 160g (0.35 lbs) net

* **Design and specifications subject to changes without notice for improvements.**

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CAUTION

1. The symbols, UL, CSA, BS, UK, EU, AS and XX on the parts list and the schematic diagram mean followings respectively.

   UL..... Manufactured for U.S.A market.
   (Underwriters Laboratories approved model.)
   CSA..... Manufactured for Canadian market.
   SA..... Manufactured for South African market.
   BS, UK ..... Manufactured for United Kingdom market.
   EU ..... Manufactured for European market.
   AS..... Manufactured for Australian market.
   XX..... Standard Version.
   NON MARK ..... Common Parts.

2. Some printed circuit boards are not supplied as the assembled. To separate these in this service manual, the stock No's are not indicated at the ends of the board names. However, the individual parts on the circuit boards are provided by orders.

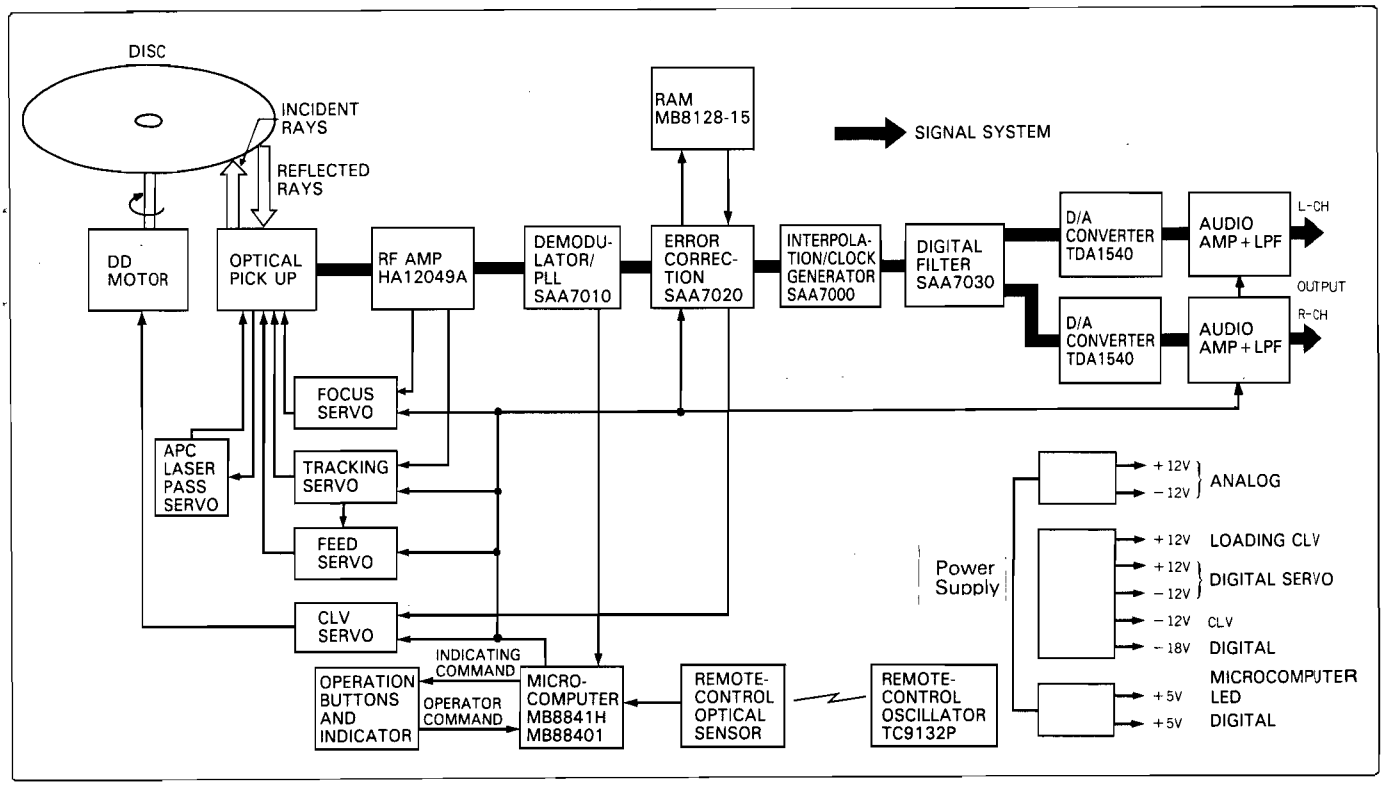
3. Since some of capacitors and resistors are omitted from parts lists in this service manual, refer to the Common Parts List for capacitors & resistors, which was issued on February 1983.

4. Abbreviations in this service manual are as follows.

•Abbreviations List

C.R.	: Carbon Resistor	E.B.	: Bi-Polar Electrolytic Capacitor
S.R.	: Solid Resistor	E.B.L.	: Low Leak Bi-Polar Electrolytic Capacitor
Ce.R.	: Cement Resistor	Ta.C.	: Tantalum Capacitor
M.R.	: Metal Film Resistor	F.C.	: Film Capacitor
F.R.	: Fusing Resistor	M.P.	: Metalized Paper Capacitor
N.I.R.	: Non-Inflammable Resistor	P.C.	: Polystyrene Capacitor
A.R.	: Array Resistor	G.C.	: Gimmic Capacitor
C.C.	: Ceramic Capacitor	A.C.	: Array Capacitor
C.T.	: Ceramic Capacitor, Temoerature Compensation	V.R.	: Variable Resistor
E.C.	: Electrolytic Capacitor	S.V.R.	: Semi Variable Resistor
E.L.	: Low Leak Electrolytic Capacitor	SW.	: Switch

1. BLOCK DIAGRAM



2. FUNCTIONS OF MAIN ICs

A. HA12049A (Input signal processing IC for CD)

* Four-divided photodiode output signal amplifier/adder
* AGC amplifier
* Signal waveform shaper with slice-level controller
* Three-beam tracking error detector
* Focus error detector
* Focus lock detector
* LASER power stabilizer

B. SAA7010 (Demodulator, PLL)

* EFM-modulated 14-bit PCM signals are returned to original 8-bit signals.
* PLL circuit produces 4.3-MHz CLOCK signals in synchronization with input signals.

C. MB88401, MB8841H (Microcomputers)

* Operation and indication controls
* Mechanism sensor control
* Signal processing in signal system

D. SAA7020 (Error correction)

* This IC corrects data sampling error as correctly as possible and feeds the correctly sampled data to the next stage SAA7000 together with timing signals.
* Non-corrected data are fed to the next error-recognized stage SAA7000.
* DD motor speed controlling signal is supplied.

E. MB8128-15 (RAM)

* Write and read of information necessary for error detection and error correction
* Revolution fluctuation absorption and data rearrangement

F. SAA7000 (Interpolation, clock generation)

* Harmful influence due to error information upon original signals is reduced. The error information results from misscorrection at the preceding stage SAA7020.

G. TDA1540 (D-A converter)

* 14-bit converter for converting PCM digital signals into analog signals.
* By the use of this D-A converter, it is possible to obtain a high S/N ratio and an excellent linearity as in 16-bits, in combination with the preceding stage digital filter.

H. SAA7030 (Digital filter)

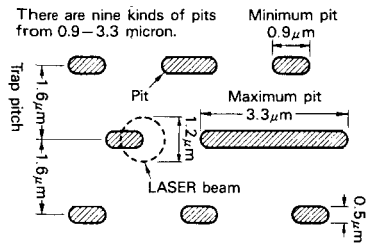
* After analog signals are reproduced through D-A converter, sampling frequency modulated signals (the fundamental harmonic is modulated by the sampling frequency) and higher harmonic are included in the fundamental harmonic.
  The higher-order harmonic cannot be eliminated by a low-pass filter through which 20 kHz or more frequency components are cut off. Therefore, a digital filter system has been adopted. A signal with a frequency of 44.1 kHz is frequency-converted into another signal with a frequency of 176.4 kHz (4 times). By this, no modulated wave is included within the fundamental harmonics of 176.4 kHz ±20 kHz and 20 kHz. Additionally, a low-pass filter through which 30 kHz or more frequency components are cut off is used for preventing higher-order harmonics from being generated within audible range of 20 kHz or less.

3. OPERATION PRINCIPLE OF COMPACT DISC PLAYER

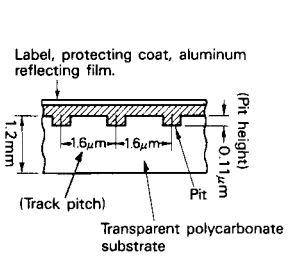
3-1. Comparison of Compact Disc Player and Conventional Disc Player

Compact Disc		Conventional Disc (30 cm disc)
Transparent resin disc with a signal surface of aluminum reflecting film	**Disc structure**	Black resin disc
12 cm	**Dia.**	30 cm
1.2 mm	**Thickness**	About 1.8 mm
About 15 gram	**Weight**	About 120 gram
LASER beam from inner to outer circumference	**Pickup travel direction**	Stylus from outer to inner circumferences
About 500 rpm near inner circumference, about 200 rpm near outer circumference (constant linear velocity: 1.2—1.4 m/sec.)	**Revolution speed**	33-1/3 rpm (Constant revolution speed)
Digital signals are recorded on presence or absence of a series of fine hollows (See fig a))	**Music signals recorded on disc**	Music vibrations are directly recorded on continuous zigzag lines of a V-shaped groove
1.6 micron	**Pitch (Width between two adjacent signals)**	About 60—200 micron (variable pitches according to vibration magnitude)
One surface	**Recording surface**	Both surfaces
Ordinally one hour (2ch stereo), 78 min. at maximum	**Recording time period**	Ordinally one hour (both surfaces) (2ch stereo)
LASER beam is allowed to be incident to the lower surface of a disc, transmitting through a transparent resin body, being reflected from a signal surface of reflecting film. The beam reflected by and transmitted from resin body is sensed in dependence upon fluctuations in magnitude of beam caused by presence or absence of a series of fine hollows.	**Reproductions of recorded signals**	A pickup stylus vibrates in a groove. Vibrations are sensed with a pickup cartridge as electrical music signals.
Fluctuations in magnitude of beam are sensed as digital signals. After being D-A converted (incorporated in a player), these signals are amplified to actuate a speaker.	**Processing of sensed signals**	Signals outputted from a cartridge are directly amplified to actuate a speaker.
Signals indicative of music numbers, music playing time intervals, etc. are included in recorded music signals in order to enable selection of music start, automatic music selecting program or indication of music playing time periods. Additionally, information signals indicative of music contents are recorded at the innermost circumference (lead-in portion), by which various interesting functions are synthetically enabled corresponding to the type of players.	**Music discrimination or other**	Musics recorded on a disc can be selected by eyesight on the basis of lead-over grooves between two modulated grooves. A stylus can be put onto any desired lead-over groove. Playing time periods are usually recorded on a disc label or record jacket.

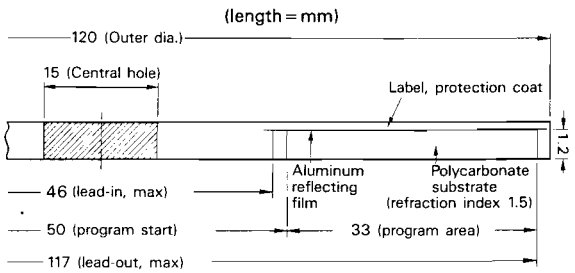
3-2. Disc Structure and LASER Beam Reflection



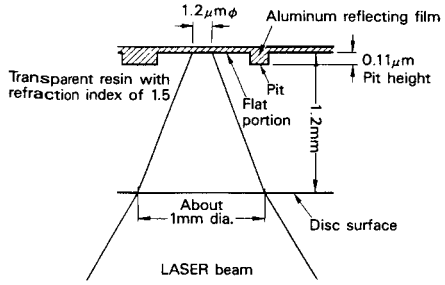
a) Pit dimensions



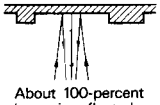
b) Enlarged disc cross-sectional view



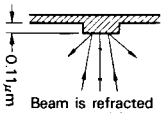
c) Form of disc



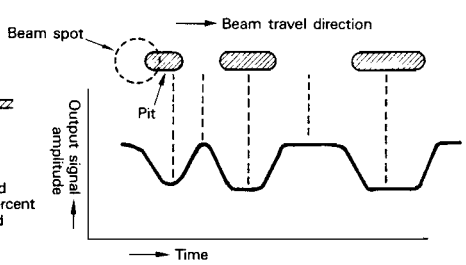
d) Cross-sectional view and LASER spot



e) Flat portion

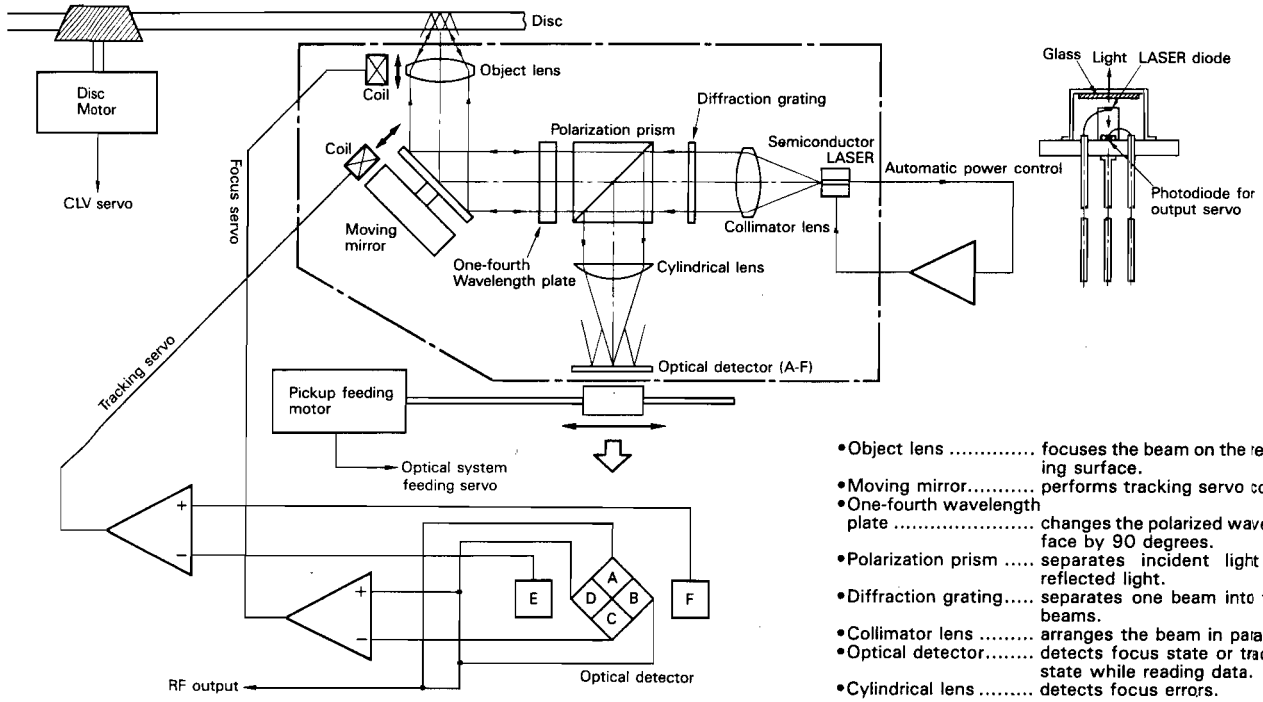


f) Pit portion



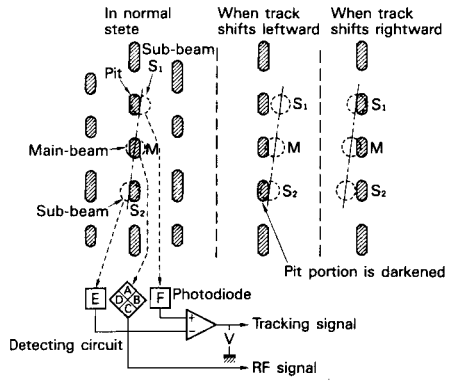
g) Pit and output signal

3-3. Optical System and Servo Mechanism

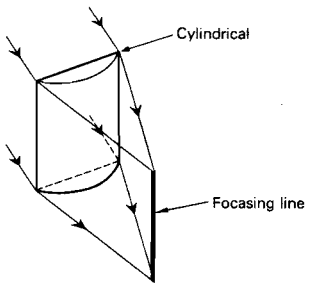


- Object lens ..... focuses the beam on the reflecting surface.
- Moving mirror..... performs tracking servo control
- One-fourth wavelength plate ..... changes the polarized wave surface by 90 degrees.
- Polarization prism ..... separates incident light and reflected light.
- Diffraction grating..... separates one beam into three beams.
- Collimator lens ..... arranges the beam in parallel.
- Optical detector..... detects focus state or tracking state while reading data.
- Cylindrical lens ..... detects focus errors.

3-4. Three-beam tracking detection method

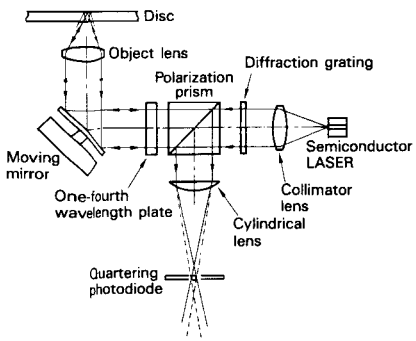


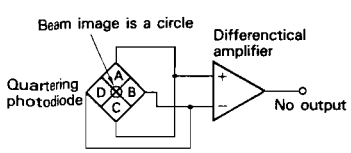
<Focusing line of cylindrical lens>



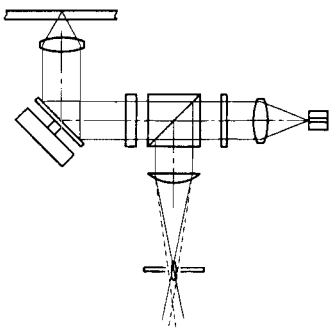
3-5. Focus detection on astigmatism method

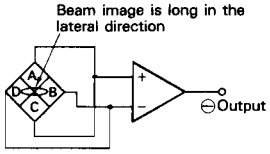
a) Normal position



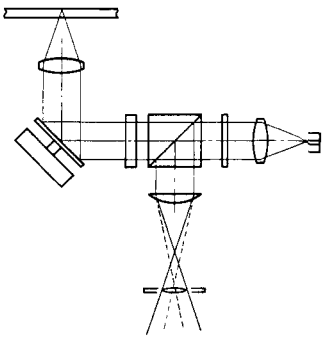


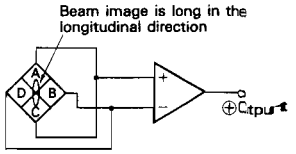
b) When disc is too close





c) When disc is too far





3-6. Principle of PCM

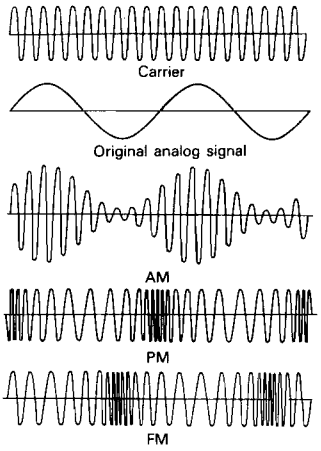
Pulse code Modulation system is adopted in the compact disk. The PCM system is superior in improvement of frequency band, S/N, non-linearlity, and time fluctuations.

Sampling ..... In PCM system, sampling values are read from time-series original signals at appropriate time intervals and coded by the combinations of two pulses (0 and 1). The sampling frequency is 44.1 kHz.

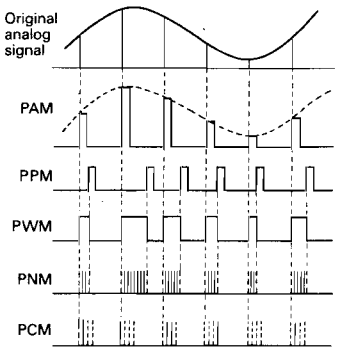
Quantization ..... When the original signals are sampled, finite values can be obtained. However, since these values cannot indicate the magnitude of amplitude, the sampled values are divided into finite amplitude segments. Quantization is to code these amplitude segments. (Quantization bits are sixteen)

PM..... Phase Modulation
PAM..... Pulse Amplitude Modulation
PPM..... Pulse Position Modulation
PWM ..... Pulse Width Modulation
PNM ..... Pulse Number Modulation

< Kinds of modula system >



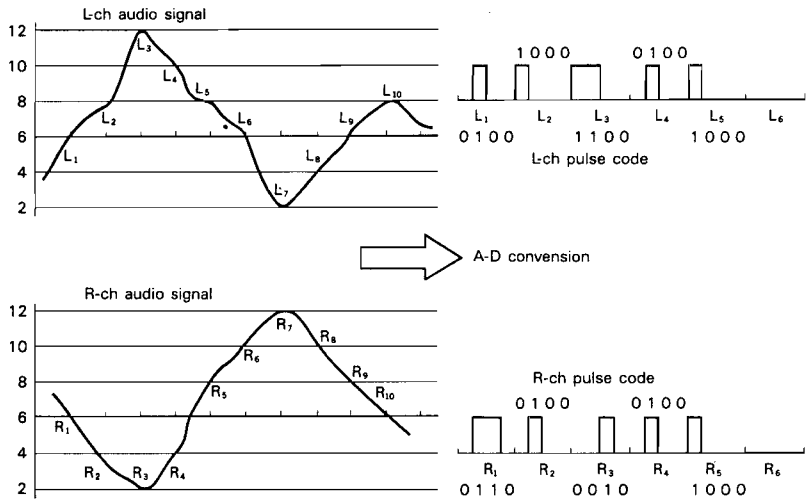
Continuous wave parameter modulation

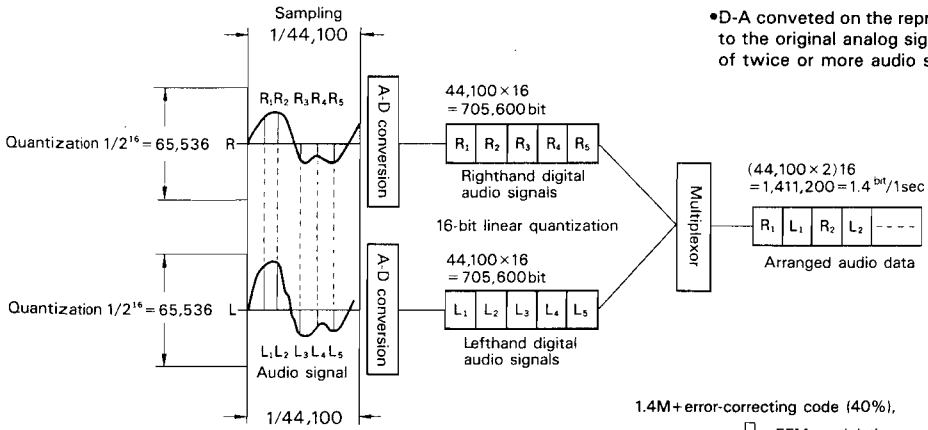


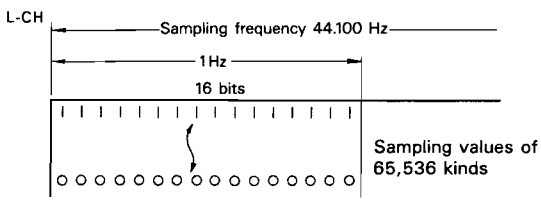
Pulse parameter modulation

< Principle of PCM >

Dicimal notation	Binary notation
15	1 1 1 1
14	1 1 1 0
13	1 1 0 1
12	1 1 0 0
11	1 0 1 1
10	1 0 1 0
9	1 0 0 1
8	1 0 0 0
7	0 1 1 1
6	0 1 1 0
5	0 1 0 1
4	0 1 0 0
3	0 0 1 1
2	0 0 1 0
1	0 0 0 1
0	0 0 0 0





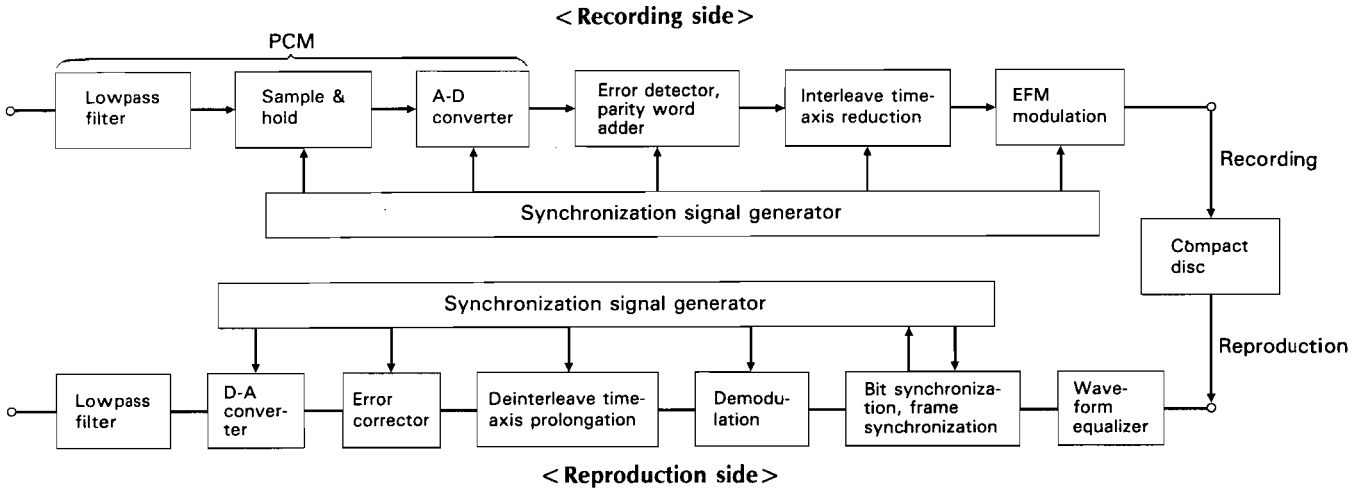


•D-A conveted on the reproduction side, sampled pulse signals are returned to the original analog signals completely. However, a sampling frequency of twice or more audio signals are necessary.

1.4M+error-correcting code (40%),
⇩ FEM modulation
4.32M bit/sec

•If quantization is implemented by use of 16 bits, it is possible to divide the amplitude of a signal into 65,536.
•If a signal is sampled at a sampling frequency of 44.1 kHz and further the sampled data is quantized by 16 bits, 1.4M bits can be obtained in stereo.
•If EFM (eight-to-fourteen modulation) is implemented by adding a control signal, synchro signal, parity word, etc. to 1.4 bits, the sum total is 4,3218M bits per sec.

3-7. CD Signal Processing Step



•Circuit Functions

<Recording side>

•Lowpass filter..... Frequencies of 20 kHz more are eliminated to perfectly demodulate PCMed original signals.

•Sample and hold..... Original signals are sampled and held until the sampled signals are A-D converted.

•A-D converter..... Original sampled signals (analog signals) are converted to pulse code signals (digital signals).

•Error detector, parity word adder and interleave ..... Compact disc for recording PCMed signals are not subject to dust or stains. However, in case information signals are deficient due to cracks, it is impossible to reproduce the information signals. To overcome these problem, error-correcting codes are added or information signals are rearranged on the so-called interleave method.

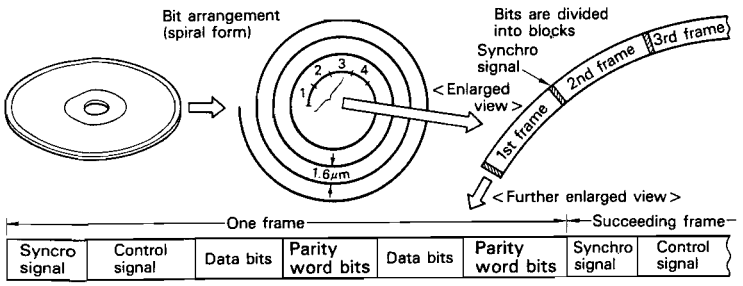
•EFM modulation ..... PCM method are of several systems in dependence upon how to select waveform corresponding to binary codes (1 or 0) of pulse data. The compact disc employs Eight-to-Fourteen Modulation system in which 8-bit pulses are converted into 14-bit pulses. This system is easy to correct error produced in reproducing information signals.

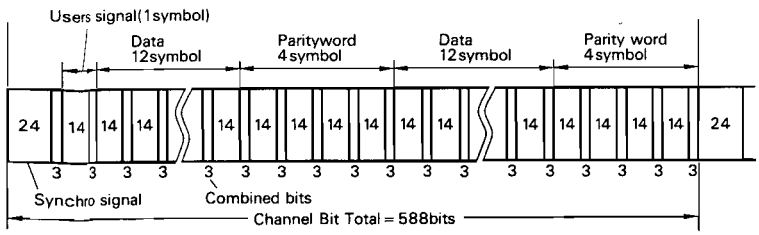
<Reproduction side>

•On this sound reproduction side, information signals recorded on a disc are reproduced through almost the reverse operation of the recording side.

•Lowpass filter..... Higher-frequency signals other than the original signals generated in PCM sampling are eliminated.

3-8. Recording Method on Disc





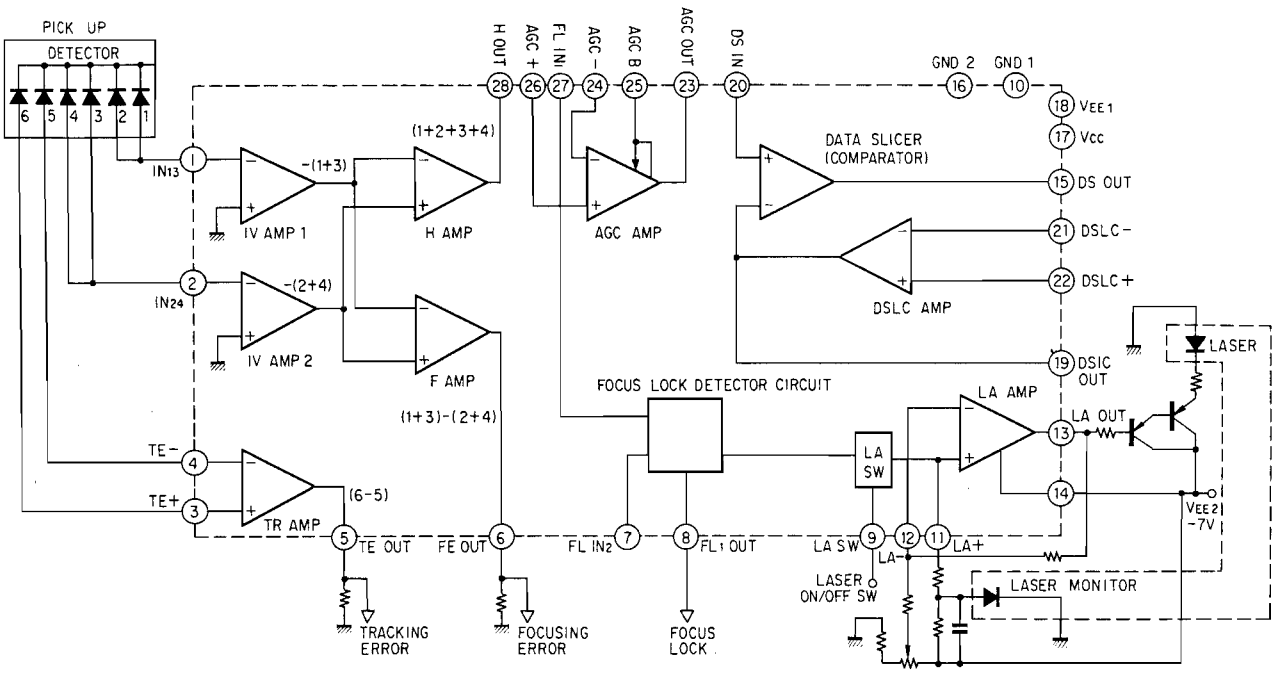
Contents of one frame

Synchro signal	24-ch bits
Control signal (user's signal)	1×14-ch bits
Data signal	12×2×14-ch bits
Parity word signal	4×2×14-ch bits
Combined bits	34×3-ch bits
Total:	588-ch bits

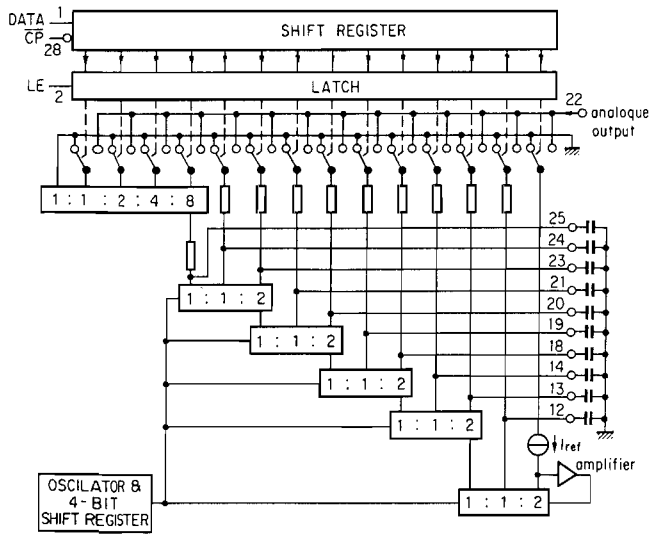
•Channel bits (ch bits) ..... Bits converted from 8 bits to 14 bits by EMF modulation are called channel bits to distinguish them from the original data bits.

4. INTERIOR BLOCK DIAGRAM & TERMINAL FUNCTION OF IC

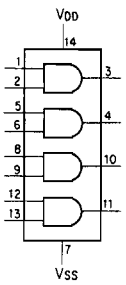
•HA12049 (Input Signal Process)



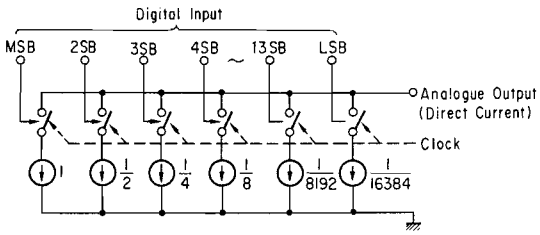
•TDA1540D (Digital-to-Analog Converter)



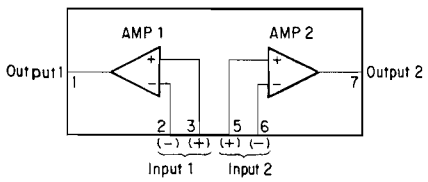
•TC4081BP (Quad And Gate)



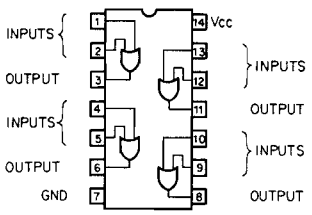
•TDA1540D



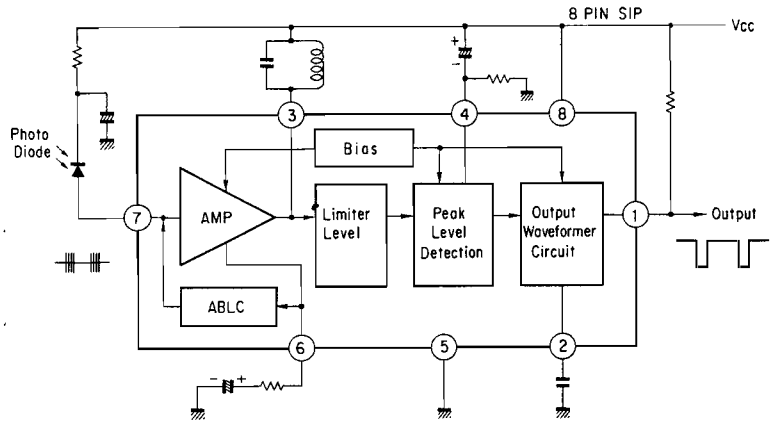
•M5218L (Dual Operation Amp)



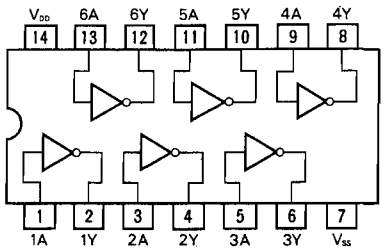
•M74LS32P (Quad OR Gate)



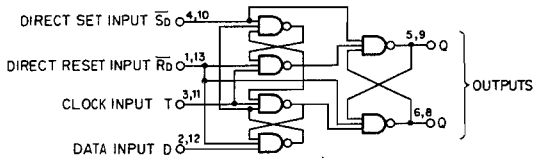
•μPC1373H (Pre Amp of Remote Control)



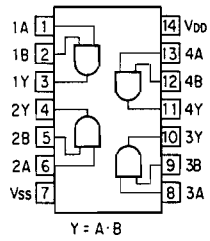
•TC40H004P (Hex Inverter)



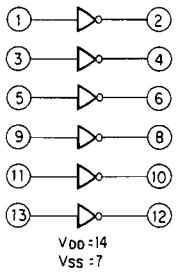
•M74LS74P (Each Flip-Flop)



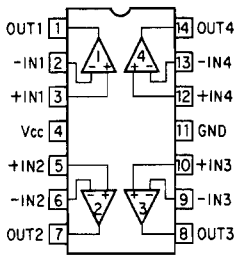
•MB84081B (Quad And Gate)



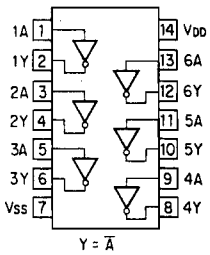
•TC4090BP (Inverter)



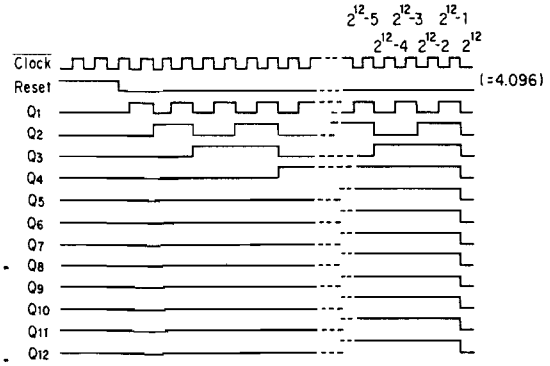
•MB3614 (Quad Operation Amp)

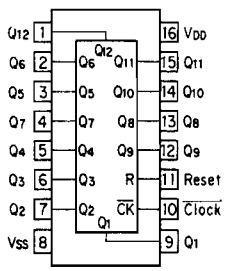


•MB840693 (Inverter)

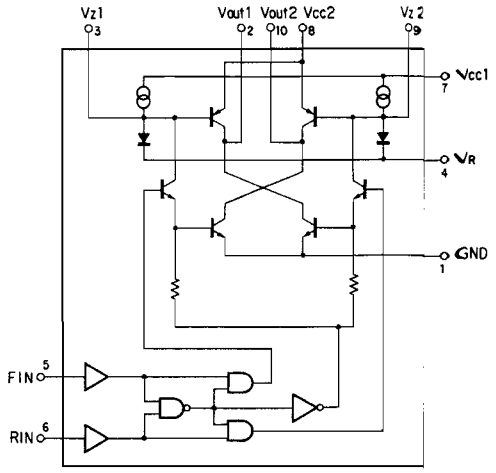


•MB84040B (12-bit Ripple-Carry Binary Counter)





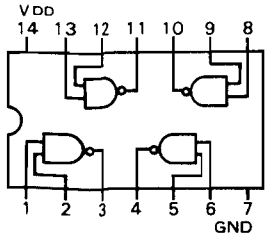
•BA6109 (Motor Driver)



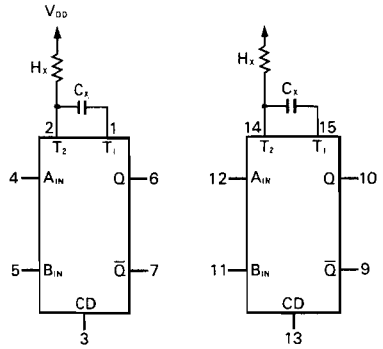
FIN	RIN	Vout 1	Vout 2
1	1	L	L
0	1	L	H
1	0	H	L
0	0	L	L

Input level
1 > 2.0V
0 < 0.7V

•TC4011RS (NAND1 ~ 4)/MSM4011 (NAND1 ~ 4)



•TC4538BP (Resettable Monostable Multiviblator)



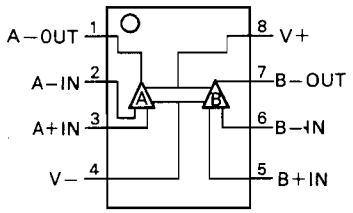
V_{DD} : 16, V_{SS} : 8

<TC4538P>

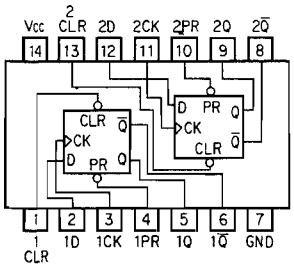
INPUT			OUTPUT		NOTE
A_{IN}	B_{IN}	CD	Q	$\overline{Q}$	
↓	H	H	⊓	⊔	OUTPUT ENABLE
↓	L	H	L	H	INHIBIT
H	↓	H	L	H	INHIBIT
L	↓	H	⊓	⊔	OUTPUT ENABLE
*	*	L	L	H	INHIBIT

* : Don't Care

•NJM4558D/NJM4559D (Operation Amp)



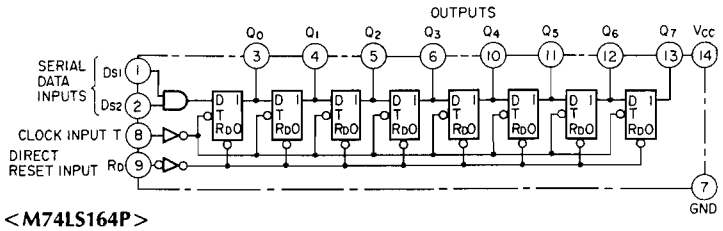
•MB74LS74 (Flip-Flop)



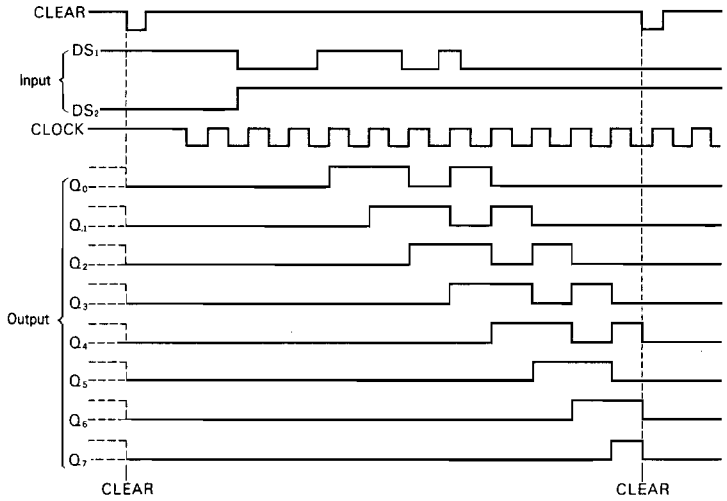
<MB74LS74>

INPUT				OUTPUT	
PRESET	CLEAR	CLOCK	D	Q	$\overline{Q}$
L	H	×	×	H	L
H	L	×	×	L	H
L	L	×	×	H*	H*
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	×	Q_0	Q_0

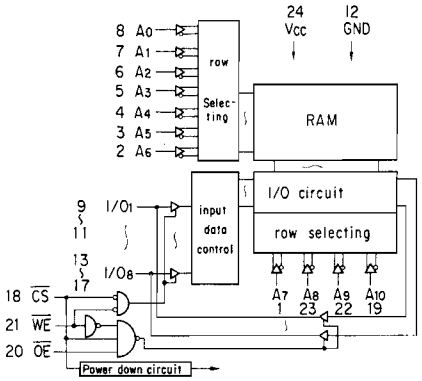
•M74LS164P (8 bit Serial-In Parallel-Out Shift Resister)



<M74LS164P>



•MSN2128-15RS/MB8128-15 (RAM)

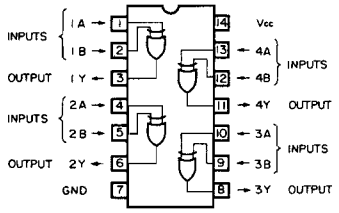


<MSN2128-15RS/MB8128-15>

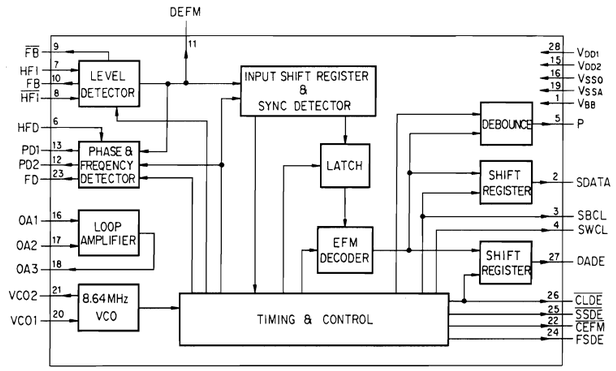
$\overline{CS}$	$\overline{WE}$	$\overline{OE}$	Operation Mode	Input/ Output	Comsumed Power
H	X	X	Non Selection	High Impedance	Stand-by
L	L	X	Write Mode	Input	Operation
L	H	L	Read Mode	Output	Operation
L	H	H	Output disable	High Impedance	Operation

H: high level L: low level X: Unrelated to "H" and "L"

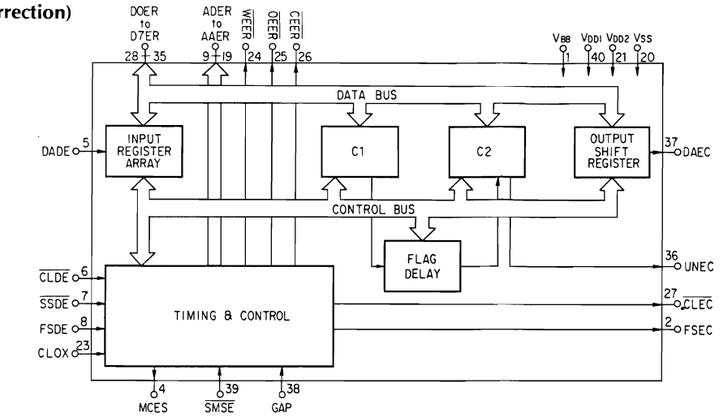
•M74LS86P (EXOR Gate)



•SAA7010 (Demodulator/PLL)



•SAA7020 (Error Correction)



Description of terminals <SAA-7010>

Pin No.	Symbol	Function and operation
1	VBB	—2.5V. Back Bias Supply.
2	SDATA	Push-pull output for subcoding data. An 8 bit burst of data (including a 1 bit subcoding frame sync) is output serially once per frame coincident with SBCL.
3	SBCL	Push-pull output for subcoding bit clock. An 8 bit burst clock at nominally 2.1609MHz which is used to sychronise the subcoding data.
4	SWCL	Push-pull output for subcoding word clock. A square wave signal at data frame rate (7.35kHz) used to synchronise the subcoding words and the pause (P) bit.
5	P	Push-pull output for the subcoding Pause bit. This signal is derived from the encoded subcoding word and is used to indicate a music pause. A debounce circuit is incorporated to eliminate erroneous data.
6	HFD	Input from external High Frequency Detector. When this signal is high the frequency detector output (FD) and phase detector are enabled.
7	HFI	Non-inverting input to the Level Detector. A differential signal of between 0.5V and 2.5V peak-peak is required between pins 7 and 8 drive the Level Detector correctly.
8	$\overline{\text{HFI}}$	Inverting inpu to the Level Detector.
9	$\overline{\text{FB}}$	Inverted feedback output from the Level Detector. These outputs ($\overline{\text{FB}}$ and FB) have a nominal impedance of 10kΩ and will default to 1/2 VDD1 when a drop-out is sensed.
10	FB	Non-inverted feedback output from the Level Detector (see $\overline{\text{FB}}$).
11	DEFM	Push-pull output for EFM data after it has passed through the level detector.
12	PD2	Phase Detector output signal. These outputs (PD1 and PD2) have a nominal impedance of 10kΩ and the differential dc content of the signals is a measure of the phase difference between the data and the internal 4.3218MHz clock.
13	PD1	Phase detector reference signal. (see PD2)

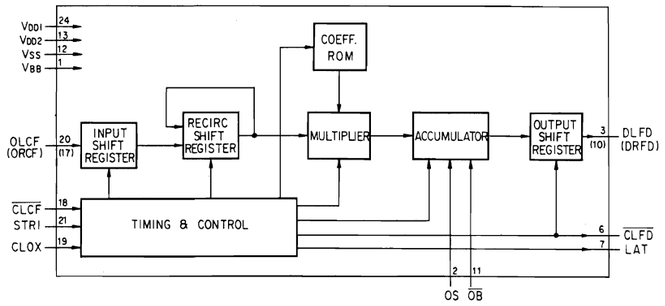
Pin No.	Symbol	Function and operation
14	VSSD	Digital Ground. Main ground terminal
15	VDD2	+12V supply.
16	OA1	Non-Inverting input to the Operational Amplifier.
17	OA2	Inverting input to the Operational Amplifier.
18	OA3	Source follower output of Operational Amplifier.
19	VSSA	Analogue Ground. Ground terminal for Operational Amplifier only. Connected internally to VSSD via a nominal 25Ω resistor.
20	VC01	Input to Voltage Controlled Oscillator amplifier. The amplifier is a simple inverter designed for up to 10MHz operation. The frequency control is achieved via an external 'Varicap' tuned circuit.
21	VC02	Output from Voltage Controlled Oscillator amplifier. The load for the inverting transistor may be turned off for test purposes by reducing VDD2 to 0V.
22	$\overline{\text{CEFM}}$	A push-pull output from the internal 4.3218MHz clock generator.
23	FD	Three state push-pull output from the Frequency Detector. This output has a nominal 1kΩ impedance when active but assumes a high impedance state once the system is in lock.
24	FSDE	Push-pull output for Frame Sync signal to ERCO. A positive going pulse occuring at the end of each data frame (nominal frequency 7.35kHz).
25	$\overline{\text{SSDE}}$	Push-pull output for Symbol Sync. signal to ERCO. A negative going pulse occuring during the last bit of each data symbol (nominal frequency 254kHz).
26	$\overline{\text{CLDE}}$	Push-pull output for Data bit clock to ERCO. An 8 bit burst clock at nominally 2.1609MHz which is used to synchronise the data to ERCO.
27	DADE	Push-pull output for Data to ERCO. Serial data consisting of 32×8 bit symbols per frame which is synchronised to $\overline{\text{CLDE}}$.
28	VDD1	+5V Supply.

Description of terminals <SAA-7020>

Pin No.	Symbol	Function and operation
1	VBB	Supply. This pin will be connected externally to a —2.5V supply for back bias.
2	FSEC	Output. Output data clock, data is valid on the falling edge.
3	C1 FLAG	Output. This pin is not connected for nomal operation, it is for testing purposes. Indicating Flags in the C1 Flag store and hence showing the positions of multiple errors.
4	MCES	Output. This is an open drain output providing a pulse-width modulated signal to control the rate of data entry. If the data rate has been correct for a period, MCES will have a 50% duty cycle. If MCES is mostly high data is entering too slowly and if MCES is mostly low data is entering to quickly.
5	DADE	Input. This pin takes in the data for processing from the DEMOD I.C. Data is clocked in by $\overline{\text{CLDE}}$ in 8 bit symbols, m.s.b. first.
6	$\overline{\text{CLDE}}$	Input. This is the clock for the data input. Data is accepted into DADE on the negative edge of $\overline{\text{CLDE}}$.
7	$\overline{\text{SSDE}}$	Input. This signal indicates the last bit of each 8 bit symbol. If it is low during the negative transisition of $\overline{\text{CLDE}}$ a symbol is counted and clocked in, therefore $\overline{\text{SSDE}}$ must remain low for only one negative transition in eight for correct operation.
8	FSDE	Input. A high on this pin during the negative transition of $\overline{\text{CLDE}}$ indicates the end of a frame of data. The minimum duration of FSDE is critical at high rates of data input, to ensure no FSDE pulses are missed causing erroneous speed indications of MCES.
9—19	AOER—AAER	Outputs. Eleven address outputs to 2K8 Ram. Provided data is being received by DADE, $\overline{\text{CLDE}}$ etc. then address AOER to AAER are completely exercised every four frames ena bling refresh to be automatic for pseudo-static rams.
20	VSS	Supply. Ground supply for ERCO.
21	VDD2	Nominal 12V supply.

Pin No.	Symbol	Function and operation
22	$\overline{\text{TEST}}$	Input. This pin should be connected directly to VDD1 or VDD2 for normal operation.
23	CLOX	Input. This is the basic Clock input for the ERCO I.C. A nominal frequency of 4.2336MHs is fed in from the CIM I.C.
24	$\overline{\text{WEER}}$	Output. Write enable bar for control of the memory, when low ERCO is writing to the RAM.
25	$\overline{\text{OEER}}$	Output enable bar for control of the memory output buffers, when low the memory outputs must be tri-stated.
26	$\overline{\text{CEER}}$	Output. Chip enable bar for use with pseudostatic memories.
27	$\overline{\text{CLEC}}$	Output data clock, data is valid on the falling edge.
28—35	DOER—D7ER	Inputs/Outputs. An 8 bit parallel data bus between ERCO and the RAM. The outputs are high impedance state when $\overline{\text{OEER}}$ is low.
36	UNEC	Output. Unreliable data flag, when high indicates that output data is unreliable. During active data output (i.e. when $\overline{\text{CLEC}}$ is operating) UNEC applies to each symbol of 8 bits of data output at that time. Before each data word of two symbols is output, UNEC applies to the whole data word that will follow in five frames time.
37	DAEC	Data output to CIM I.C. Data is output in 16 bit words separated by gaps. Each word is in two's complement format with msb first and is made up of 2×8 bit symbols. Between the data words the state of the GAP pin is output. Data is valid on the falling edge of $\overline{\text{CLEC}}$.
38	GAP	Input. The state of this pin is reflected in the state of the data output between words on DAEC. It is used to pass information with the data words. A high on GAP making the GAP level on DAEC high and vice versa.
39	$\overline{\text{SMSE}}$	Input. If $\overline{\text{SMSE}}$ is held low the UNEC output will be held high. This input is used to cause the CIM I.C. to mute the data.
40	VDD1	Nominal 5V supply.

•SAA7030 (Digital Filter)



Description of terminals <SAA-7030>

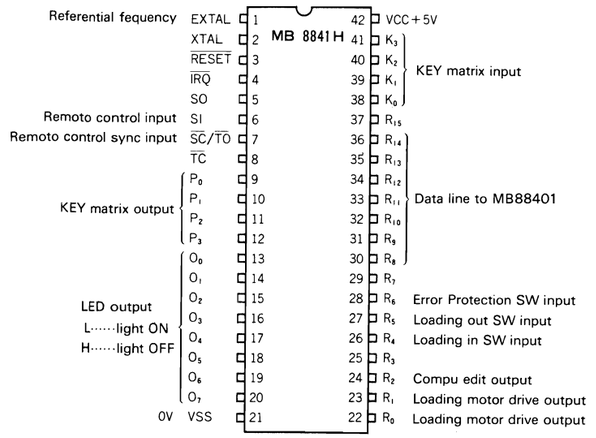
Pin No.	Symbol	Function and operation
1	VBB	−2.5V±0.5V supply.
2	OS	Offset select input. When connected to VDD1 the data output has a fixed DC offset of 3%. When connected to VSS the output has no offset.
3	DLFD	Left channel data output. The data is 14 bit serial, MSB first and is valid on the falling edge of output clock $\overline{CLFD}$.
6	$\overline{CLFD}$	Output data clock, nominal frequency 4.2336MHz (=CLOX). The falling edge of this signal defines output data valid.
7	LAT	Output 176.4MHz strobe. The rising edge of this pulse says that the output of a 14 bit data word has been completed.
10	DRFD	Right channel data output.
11	$\overline{OB}$	Offset Binary Not Input. When connected to VDD1 the output data is coded as 2's complement. When connected to VSS the output data is coded as Offset Binary.
12	VSS	Ground
13	VDD2	12V±10% supply
15	TINR	Test input (R). Right channel test chain input. In normal operation this pin should be connected to either VSS or VDD1.
16	TINL	Test input (L). Left channel test chain input.
17	DRCF	Right Channel Data Input. Data should be 16 bit serial, MSB first, offset binary coded. It should be valid on the falling edge of the data clock $\overline{CLCF}$.
18	$\overline{CLCF}$	Input Data Clock. The falling edge of this signal defines input data valid.
19	CLOX	Master Input Clock. runs continuously at a nominal frequency of 4.2336MHz.
20	DLCF	Left Channel Data Input. See DRCF.

Pin No.	Symbol	Function and operation
21	STR1	Input 44.1kHz strobe. The circuit's internal timing chain is synchronized by the rising edge of STR1 which must run synchronously with CLOX in accordance with the timings specified in the Electrical Characteristics. The rising edge should follow the completion of the input data stream.
22	$\overline{RT}$	Reset Test Not Input. When low resets the part of the acumulator not reset in normal operation to initialise the accumulator for testing. In normal operation should be connected to VDD1.
23	$\overline{TE}$	Test Enable Not Input. When low switches the internal circuitry into the sequertial scan test mode. In normal operation should be connected to VDD1.
24	VDD1	5V±10% supply.

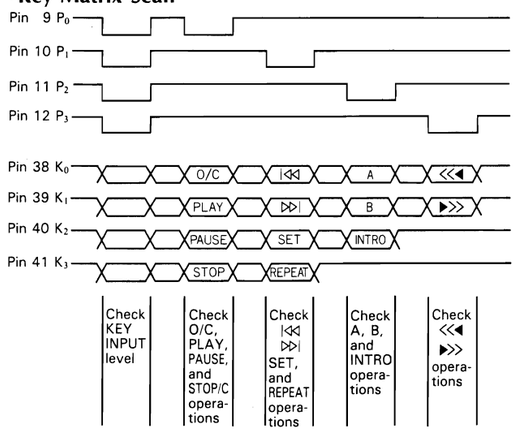
5. OPERATION OF MICRO COMPUTER MB8841 & MB88401

5-1. MB8841H

•Function of Terminal



•Key Matrix Scan



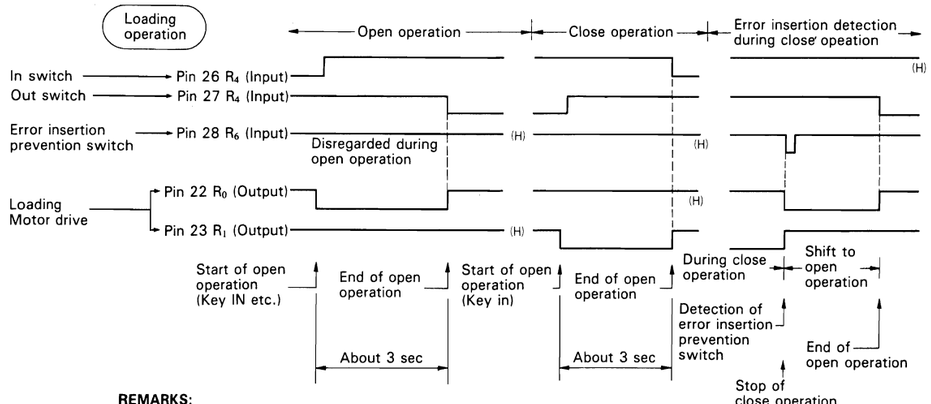
•LED output of SIC1 (8841H)

Pin	i/s	LED	Operation
13	O0	DISC SET	Warning: during OPEN/CLOSE operation ON: when disc is present Note) Quick warning in hardware error
14	O1	PLAY	ON: during PLAY operation inclusive of PAUSE and INTRO
15	O2	PROGRAM	Warning: when musics more than 15 are stored Informs that programmed musics are selectably stored in memory.

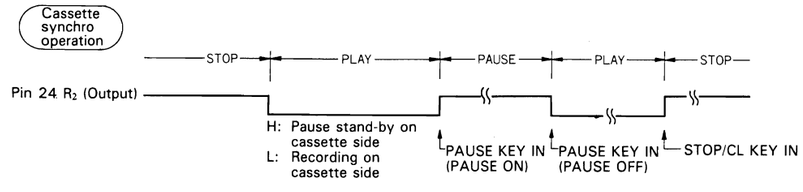
LED comes on when static display operates. L..... ON H..... OFF

Pin	i/s	LED	Operation
16	O3	PAUSE	ON: during PAUSE operation
17	O4	REPEAT	ON: during REPEAT operation
18	O5	INTRO	ON: during INTRO SKIP operation
19	O6	A, B	Warning: by A input, ON: by B input
20	O7	RECEIVED	ON 500msec: when remote control signal is received

•Operation timing of SIC1 (8841H) system



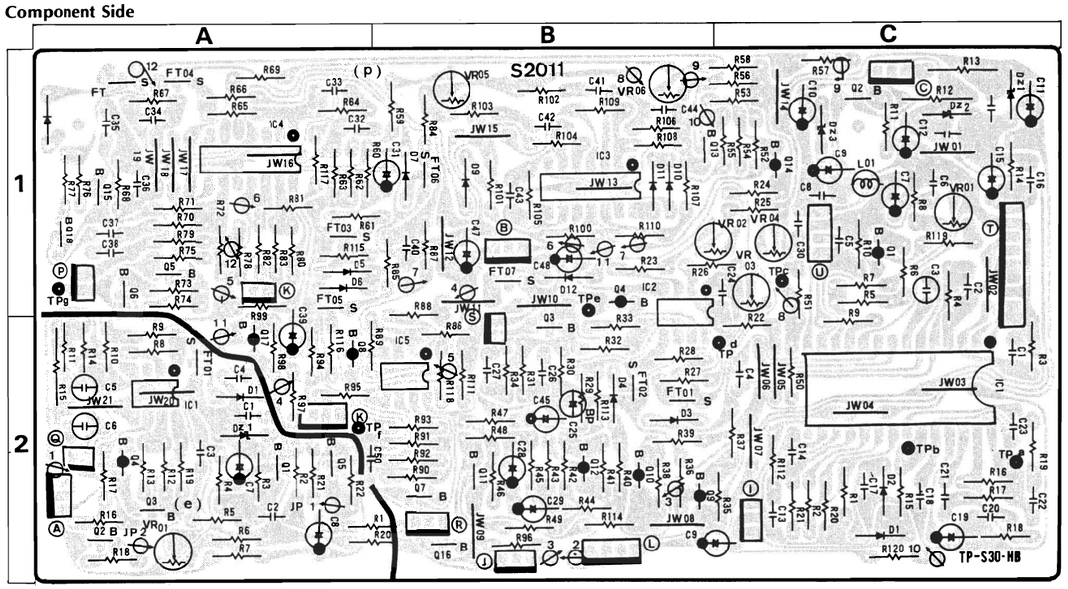
REMARKS:
During loading operation, DISC SET LED comes on at about 0.5 Hz for warning.
When no predetermind signal is inputted for 10 sec or more, the operation stops and DISC SET LED comes on at about 0.2 Hz for warning of hardware error.



7. PARTS LOCATION & PARTS LIST

7-1. S-2011 Mechanism Servo Control Circuit Board (Stock No. 13706101)

Component Side



Parts List

Parts No.	Stock No.	Description
•Transistor		
eQ1	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
eQ2	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
eQ3	46149401	2SD794
eQ4	46149301	2SB744
eQ5	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
•FET		
eFT1	46643500	2SK163-K1
	or 46643501	2SK163-K2
	or 46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
	or 46643506	2SK163-N1
•IC		
eIC1	03607700	NJM4558D
•Diode		
eD1	03117600	1S2473T77
•Zener Diode		
eDZ1	46111500	05Z 5.6-Y
eR15	46624000	56Ω 2W N.I.R
eC5	08451700	10 μF 50V E.B.
eC6	46368200	22 μF 25V E.B.
EVR1	46924600	47kΩ(B) S.V.R., Main Motor

Parts No.	Stock No.	Description
•Transistor		
pQ1	46359701	2SA952
pQ2	46359701	2SA952
pQ3	46149401	2SD794
pQ4	46149301	2SB744
pQ5	46149401	2SD794
pQ6	46149301	2SB744
pQ7	46149401	2SD794
pQ8	46149301	2SB744
pQ9	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
pQ10	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
pQ11	46367102	2SC2603
	or 46367301	2SC2458
	or 46361901	2SC2785
pQ12	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
pQ13	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
pQ14	46367001	2SA1115
	or 46362201	2SA1048
	or 46392001	2SA1175
pQ15	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
pQ16	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
pQ17	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
pQ18	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785

Parts List <S-2011>

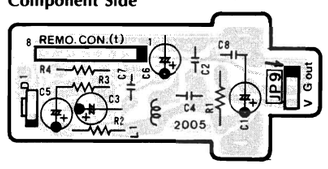
Parts No.	Stock No.	Description
•FET		
pFT1	46643800	2SJ103-Y
	or 46643801	2SJ103-GR
	or 46643802	2SJ103-BL
pFT2	46643800	2SJ103-Y
	or 46643801	2SJ103-GR
	or 46643802	2SJ103-BL
pFT3	46643500	2SK163-K1
	or 46643501	2SK163-K2
	or 46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
	or 46643506	2SK163-N1
pFT4	46643500	2SK163-K1
	or 46643501	2SK163-K2
	or 46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
	or 46643506	2SK163-N1
pFT5	46643500	2SK163-K1
	or 46643501	2SK163-K2
	or 46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
	or 46643506	2SK163-N1
pFT6	46643500	2SK163-K1
	or 46643501	2SK163-K2
	or 46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
	or 46643506	2SK163-N1
pFT7	46643800	2SJ103-Y
	or 46643801	2SJ103-GR
	or 46643802	2SJ103-BL
pFT8	46643500	2SK163-K1
	or 46643501	2SK163-K2
	or 46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
	or 46643506	2SK163-N1

Parts No.	Stock No.	Description
•IC		
pIC1	46707500	HA12049A
pIC2	03607700	NJM4558D
pIC3	07258300	MB3614M
pIC4	07258300	MB3614M
pIC5	03667700	NJM4558D
•Diode		
pD1	03117600	1S2473T77
pD2	03117600	1S2473T77
pD3	03117600	1S2473T77
pD4	03117600	1S2473T77
pD5	03117600	1S2473T77
pD6	03117600	1S2473T77
pD7	03117600	1S2473T77
pD9	03117600	1S2473T77
pD10	03117600	1S2473T77
pD11	03117600	1S2473T77
pD12	03117600	1S2473T77
pD13	03117600	1S2473T77
•Zener Diode		
pDZ1	46111500	05Z 5.6-Y
pDZ2	46111500	05Z 5.6-Y
pDZ3	46112700	05Z 8.2-Y
pC3	08451700	1 μF 50V E.B.
pC25	08451700	1μF 50V E.B.
pC31	08451700	1μF 50V E.B.
pC34	46281800	1000pF 50V F.C.
pC35	46286100	0.22μF 63V F.C.
pC40	46286100	0.22μF 63V F.C.
pC42	46281800	1000pF 50V F.C.
pC45	08451000	10μF 16V E.B.
pL1	46706800	Inductor
pVR1	46738600	4.7kΩ S.V.R., Laser Power
pVR2	46738700	10kΩ S.V.R., Focus offset
pVR3	46738700	10kΩ S.V.R., Focus Gain
pVR4	46738700	10kΩ S.V.R., Tracking offset
pVR5	46738700	10kΩ S.V.R., Tracking Gain
pVR6	46738700	10kΩ S.V.R., Tracking Millar

7-2. S-2005 Remote Control Circuit Baord

(Stock No. 13701501)

Component Side

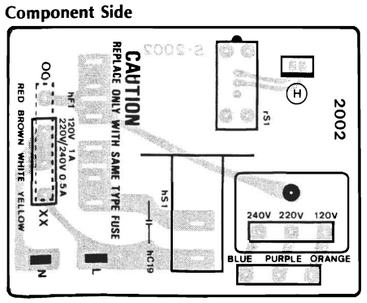


Parts List

Parts No.	Stock No.	Description
•IC		
tIC1	46707600	μPC1373H
tD1	46706900	PH302 Photo Diode
tL1	46090700	Inductor 3.9MH
⚠ tR1	00130900	100Ω 1/2W N.I.R.

7-3. S-2002 Power Fuse Circuit Board <XX, CS>

Component Side

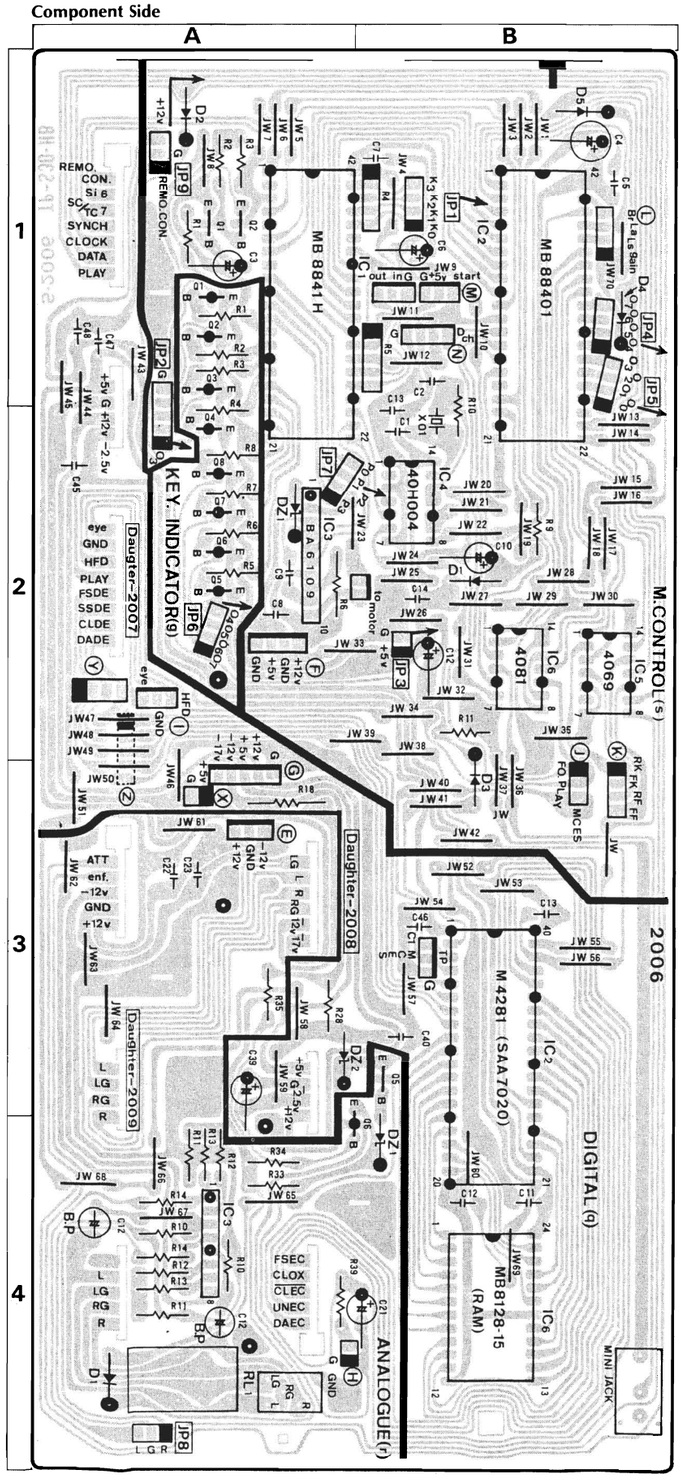


Parts List

Parts No.	Stock No.	Description
⚠ hC19	46425800	0.01 μF 400V C.C.
⚠ hSW1	46364300	Push SW., POWER
⚠ hF1	07188600	2A 250V AC Fuse
⚠	07188400	1A 250V AC Fuse

7-4. S-2006 Mother Circuit Board (Stock No. 13701601)

Component Side



Parts List

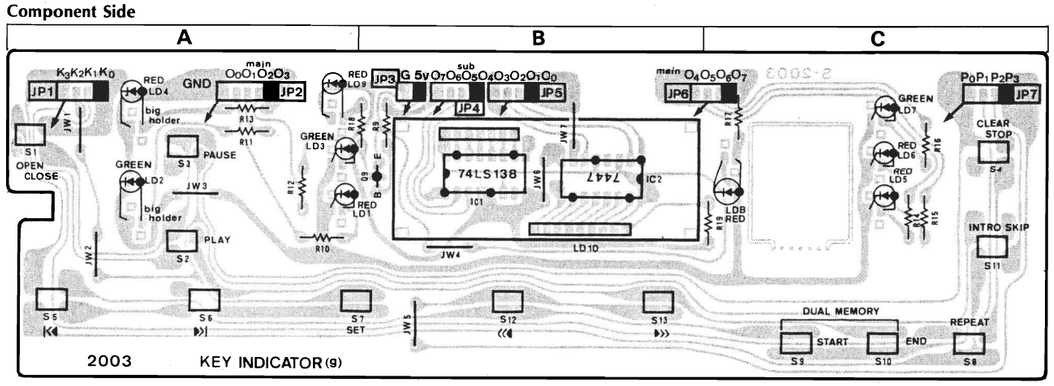
Parts No.	Stock No.	Description
•Transistor		
gQ1	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ2	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ3	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ4	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ5	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ6	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ7	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
gQ8	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
	46547200	Jack
•IC		
qIC2	46722400	SAA7020
qIC6	46707200	MSM2128-15RS
	or 46707300	MB8128-15
•Diode		
qD5	03111600	1S2473D
qD6	03117600	1S2473T77
•Zener Diode		
qDZ2	46109100	05Z 2.7-Y
•Transistor		
rQ5	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
rQ6	46367201	2SA1048
	or 46392001	2SA1175
•IC		
rIC3	46078900	M5218L
•Diode		
rD1	03117700	10E2
•Zener Diode		
rDZ1	46109100	05Z 2.7-Y
rC12	08451000	10μF 16V E.B.
rRL1	46706400	Relay
•Transistor		
sQ1	46367301	2SC2458
	or 46391901	2SC2785
sQ2	46367301	2SC2458
	or 46391901	2SC2785
•IC		
sIC1	46720700	MB8841H-1225M
sIC2	46720600	MB88401-254M
sIC3	07233100	BA6109
sIC4	46428900	TC40H004P
sIC5	07107600	TC4069UBP
	or 07207400	MB84069BM

Parts List <S-2006>

Parts No.	Stock No.	Description
sIC6	07245800	TC4081BP
	or 46164400	MB84081B
sX01	07225300	Quartz Element, LN-X-046
	or 07225301	Quartz Element, 4.0MHz
•Diode		
sD1	03117600	1S2473T77
sD2	03117600	1S2473T77
sD3	03117600	1S2473T77
sD4	03117600	1S2473T77
sD5	03117600	1S2473T77
sR4	46038500	10kΩ×4 1/8W A.R.
sR5	46038500	10kΩ×4 1/8W A.R.
⚠ sR6	00140300	2.2Ω 1W N.I.R.

7-5. S-2003 Function Switch Circuit Board (Stock No. 13701301)

Component Side



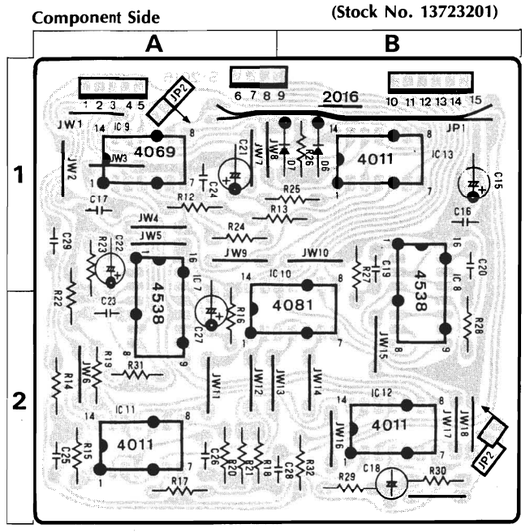
Parts List

Parts No.	Stock No.	Description
•Transistor		
gQ9	46367001	2SA1115
	or 46367201	2SA1048
	or 46392001	2SA1175
•IC		
gIC1	46720400	MB74LS138
	or 46721200	M74LS138P
gIC2	46720500	HD7447A
	or 46720900	M53247P
•LED		
gLD1	46095200	TLR123
gLD2	07250900	TLG-123A
gLD3	07250900	TLG-123A
gLD4	46095200	TLR123
gLD5	46095200	TLR123
gLD6	46095200	TLR123

Parts No.	Stock No.	Description
gLD7	07250900	TLG-123A
gLD8	46095200	TLR123
gLD9	46095200	TLR123
gLD10	46706100	7 Segment LED Ass'y
gSW1	46549500	Push SW., OPEN/CLOSE
gSW2	46549500	Push SW., PLAY
gSW3	46549500	Push SW., PAUSE
gSW4	46549500	Push SW., STOP
gSW5	46549500	Push SW., I◀◀
gSW6	46549500	Push SW., ▶▶I
gSW7	46549500	Push SW., SET
gSW8	46549500	Push SW., REPEAT
gSW9	46549500	Push SW., START
gSW10	46549500	Push SW., END
gSW11	46549500	Push SW., INTRO SKIP
gSW12	46549500	Push SW., ◀◀◀
gSW13	46549500	Push SW., ▶▶▶

7-6. S-2016 Mechanism Control Circuit Board

Component Side (Stock No. 13723201)

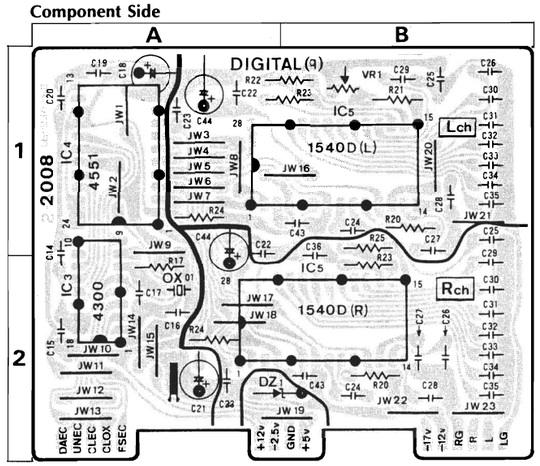


Parts List

Parts No.	Stock No.	Description
•IC		
sIC7	46160800	TC4538BP
	or 46122900	MSM4538RS
sIC8	46160800	TC4538BP
	or 46122900	MSM4538RS
sIC9	07107600	TC4069UBP
	or 07207400	MB84069BM
	or 03605700	MSM4069RS
sIC10	07245800	TC4081BP
	or 46164400	MB84081B
	or 07272700	MSM4081RS
sIC11	03604100	TC4011P
	or 07207200	MB84011BM
	or 03604000	MSM4011RS
sIC12	03604100	TC4011P
	or 07207200	MB84011BM
	or 03604000	MSM4011RS
sIC13	03604100	TC4011P
	or 07207200	MB84011BM
	or 03604000	MSM4011RS
•Diode		
sD6	03117600	1S2473T77
sD7	03117600	1S2473T77
sC18	08451700	1μF 50V E.B.
sC19	46283300	0.22μF 50V F.C.
sC20	46283300	0.22μF 50V F.C.

7-7. S-2008 D/A Converter (Stock No. 13705801)

Component Side

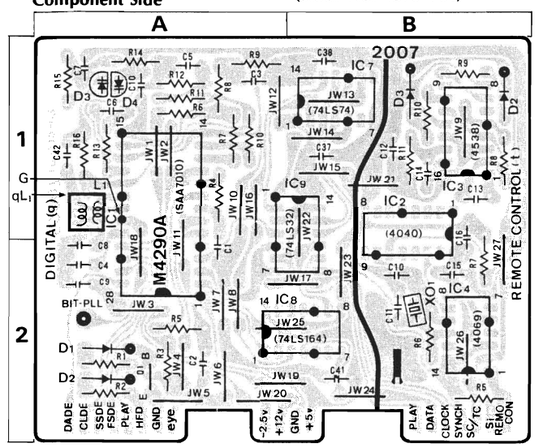


Parts List

Parts No.	Stock No.	Description
•IC		
qIC3	46721500	SAA7000
qIC4	46721600	SAA7030
qIC5	46707400	TDA1540D
qX01	46708300	Quartz Element, 4.2336MHz
•Zener Diode		
qDZ1	46111500	05Z 5.6-Y
qR21	00209700	560Ω 1/4W M.R.
qR22	00205700	270Ω 1/4W M.R.
qR23	00211600	82Ω 1/4W M.R.
qR25	00210200	620Ω 1/4W M.R.
qC27	46286100	0.22μF F.C.
qVR1	10335900	220Ω(B) S.V.R., Level Balance

7-8. S-2007 Modulation/PLL Circuit Board

Component Side (Stock No. 13701701)

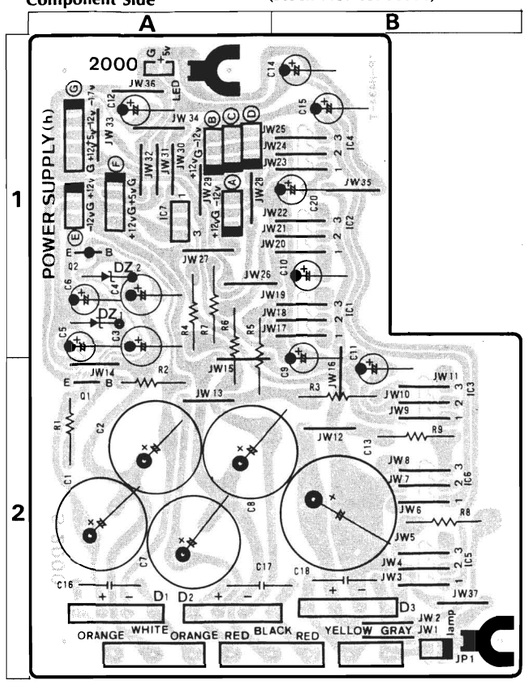


Parts List

Parts No.	Stock No.	Description
•Transistor		
qQ1	46367101	2SC2603
	or 46367301	2SC2458
	or 46391901	2SC2785
•IC		
qIC1	46721400	SAA7011
qIC7	46429600	MB74LS74AM
	or 46636800	M74LS74
qIC8	46430200	MB74LS164M
	or 46721300	M74LS164P
qIC9	46721000	MB74LS32
	or 46721100	M74LS32P
•Diode		
qD1	03117600	1S2473T77
qD2	03117600	1S2473T77
qD3	46708400	SVC321
qD4	46708400	SVC321
qL1	46706700	VCO Coil
•IC		
tIC2	46720100	TC4040BP
	or 46720200	MB84040B
tIC3	46160800	TC4538BP
tIC4	07107600	TC4069UBP
	or 07207400	MB84069BM
•Diode		
tD2	03117600	1S2473T77
tD3	03117600	1S2473T77
tXO1	07274000	CSB550A, Ceramic Filter

7-9. S-2000 Power Supply Circuit Board

Component Side (Stock No. 13701001)

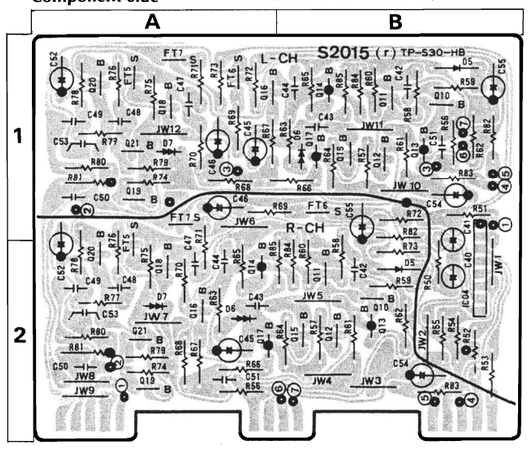


Parts List

Parts No.	Stock No.	Description
•Transistor		
hQ1	46359801	2SC2001
hQ2	46359701	2SA952
•IC		
hIC1	46144600	NJM78M12A
hIC2	46581200	NJM79M12A
hIC3	46144600	NJM78M12A
hIC4	46581200	NJM79M12A
hIC5	46720300	μPC7805H
hIC6	46720300	μPC7805H
hIC7	46581400	NJM79M18A
	or 46544600	NJM79L18A
•Diode		
⚠ hD1	07193300	UB-152LFF
⚠ hD2	03117000	RB-152
⚠ hD3	03117000	RB-152
hD4	46445500	10YD4.5-A
hD5	46445500	10YD4.5-A
•Zener Diode		
hDZ1	46114200	05Z13-Y
hDZ2	46114200	05Z13-Y
hC1	46628700	1000μF 50V E.C.
hC2	46628700	1000μF 50V E.C.
hC13	46271200	25V 3300 μF E.C
hC16	00411600	0.047 μF 400V P.C.
hC17	00411600	0.047 μF 400V P.C.
hC18	00411600	0.047 μF 400V P.C.
⚠ hR3	46240900	5.6Ω 1W N.I.R.
⚠ hR5	46290900	5.6Ω 1W N.I.R.
⚠ hR6	46240900	5.6Ω 1W N.I.R.
⚠ hR7	46240900	5.6Ω 1W N.I.R.
⚠ hR8	46240000	1Ω 1W N.I.R.
⚠ hR9	46240000	1Ω 1W N.I.R.

7-10. S-2015 Analog Filter Circuit Board

Component Side (Stock No. 13721701)

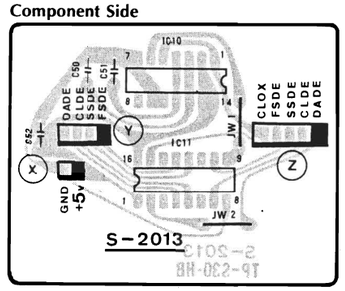


Parts List

Parts No.	Stock No.	Description
•Transistor		
rQ10	46926201	2SC2784
rQ11	46926201	2SC2784
rQ12	46926201	2SC2784
rQ13	46926101	2SA1174
rQ14	46926101	2SA1174
rQ15	46926201	2SC2784
rQ16	46926201	2SC2784
rQ17	46926101	2SA1174
rQ18	46926201	2SC2784
rQ19	46926201	2SC2784
rQ20	46926201	2SC2784
rQ21	46926201	2SC2784
•FET		
rFT5	46643502	2SK163
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
rFT6	46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
rFT7	46643502	2SK163-L1
	or 46643503	2SK163-L2
	or 46643504	2SK163-M1
	or 46643505	2SK163-M2
•IC		
rIC4	46078900	M5218L
•Diode		
rD5	03117600	1S2473T77
rD6	03104900	SV02Y
rD7	03104900	SV02Y
rC40	08451700	1μF 50V E.B.
rC41	08451700	1μF 50V E.B.
⚠ rR82	00135800	4.7Ω 1/2W N.I.R.
⚠ rR83	00135800	4.7Ω 1/2W N.I.R.

7-11. S-2013 Flip-Flop Circuit Board

Component Side

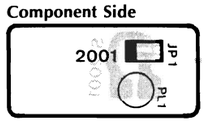


Parts List

Parts No.	Stock No.	Description
•IC		
qIC10	46863100	MB74LS86
	or 46545600	M74LS86P
qIC11	46863200	MB74LS175
	or 46863700	M74LS175P

7-12. S-2001 Pilot Lamp Circuit Baord

Component Side



Parts List

Parts No.	Stock No.	Description
	07913900	Lamp Holder T47
gPL1	46836100	Pilot Lamp 8V 0.2A

7-13. S-2004 Phones Jack Circuit Board

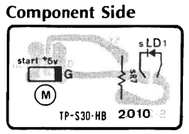
Component Side

Parts List

Parts No.	Stock No.	Description
	46706300	Jack

7-14. S-2010 Disc Detector LED Circuit Board

Component Side

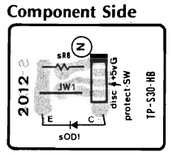


Parts List

Parts No.	Stock No.	Description
•LED		
sLD1	46095200	TLR123

7-15. S-2012 Disc Photo-Transistor Circuit Board

Component Side

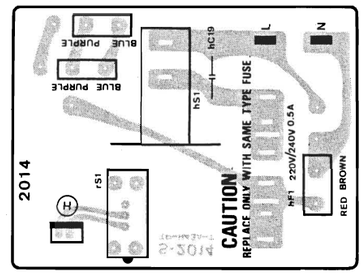


Parts List

Parts No.	Stock No.	Description
sOD1	46719500	PH102, Photo Transistor

7-16. S-2014 Power Supply Circuit Board <EU, BS>

Component Side



Parts List

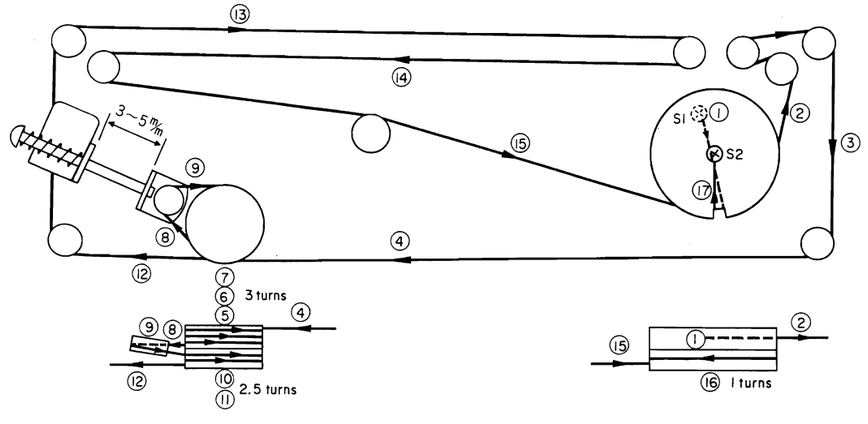
Parts No.	Stock No.	Description
dZ0235S	47139300	LB Fuse
⚠ hC19	46425800	10000pF 400V C.C.
⚠ hSW1	46364300	Push SW., POWER

8. How to Set String for driving Disc Table (See Fig. 8-1)

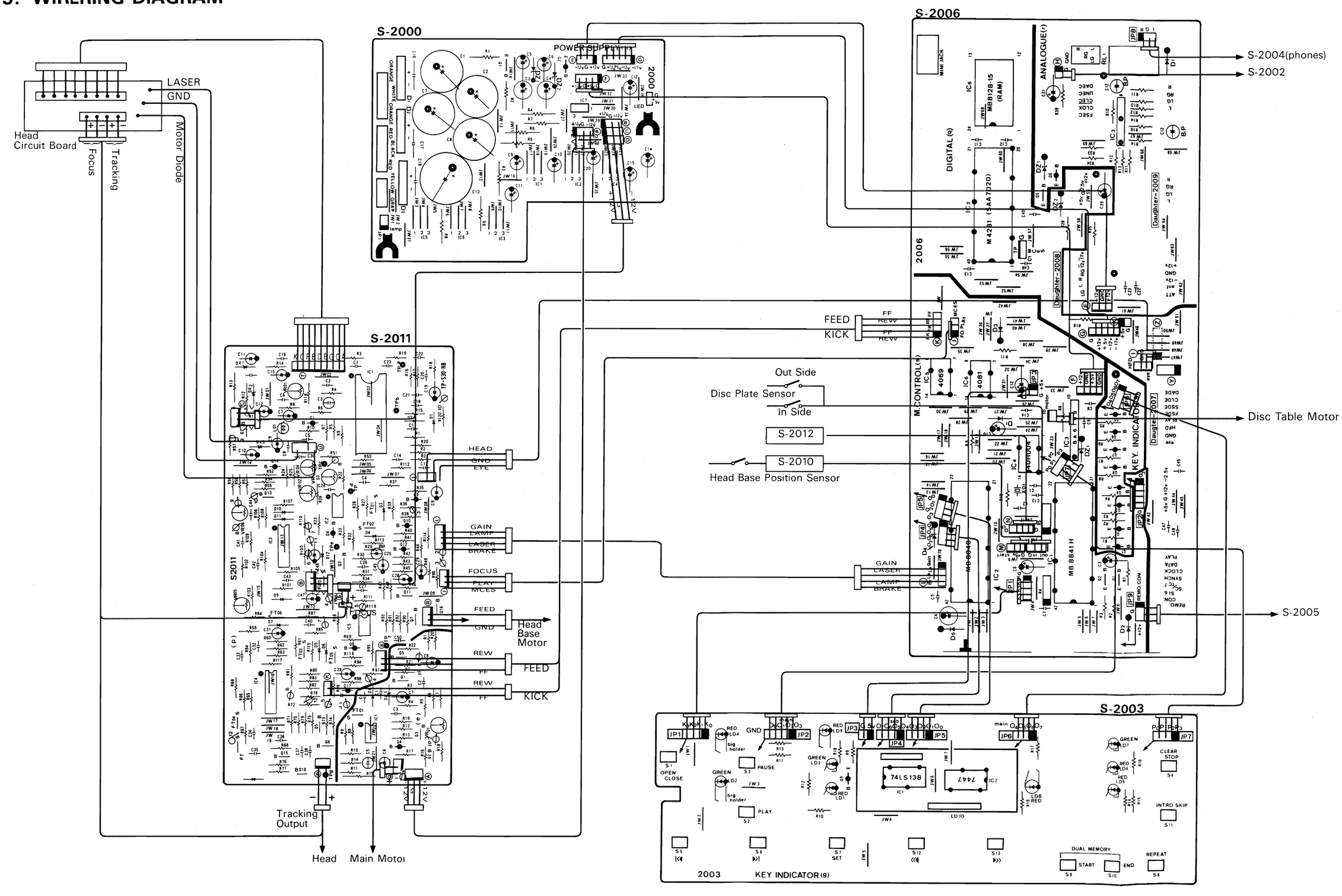
1) Remove mechanism assembly.
2) Turn on main switch and then pull disc table at its extreme end.
3) Turn off main switch and extract the power supply plug from socket outlet.
4) Connect string to ㊶ and set the string in accordance with the procedure from ① to ⑰ shown below.
   Fix the string at ㊷.
5) Turn on main switch and check that disk table operates normally repeating the opening and closing of disc table.

•Stock No. of driving string (1.6m)
Stock No. 13721800

Fig.8-1

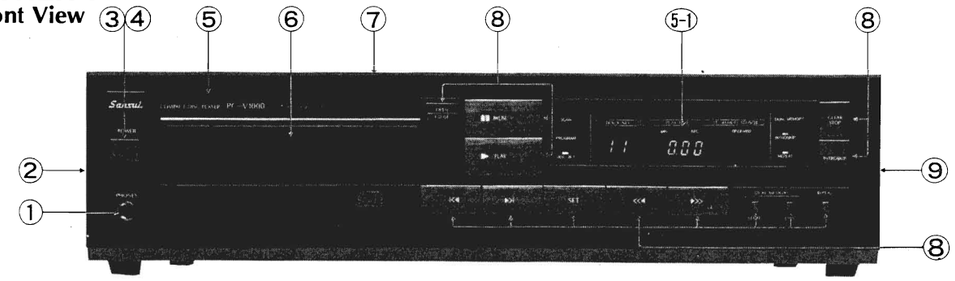


9. WIRERING DIAGRAM



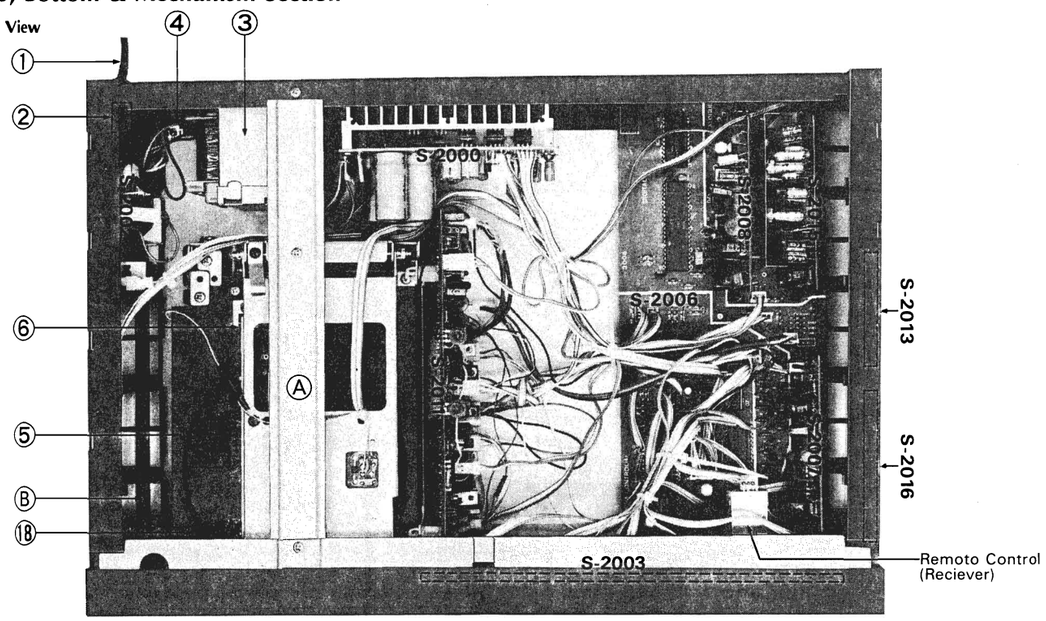
10. OTHER PARTS

10-1. Front View



10-2. Top, Bottom & Mechanism Section

Fig.1 Top View



Parts List <Front View>

Parts No.	Stock No.	Description
1	46706300	Phone Jack
2	13714710	Left Side Panel Ass'y
3	13703900	Knob, power SW.
4	13705300	Joint Shaft, power SW.
5	13707600	Front Panel Ass'y
5-1	13703600	Display Table
6	13708300	Dress Panel
7	13705000	Bonnet
8	46549500	Push SW., OPEN/CLOSE, PAUSE, PLAY, CLEAR/STOP, INTRO SKIP, REPEAT, DUAL MOEMORY, ▶▶▶ , ◀◀ , SET, ▶▷₁ , ▷◀
9	13714810	Right Side Panel Ass'y

Parts List <Top, Bottom & Mechanism Section>

Parts No.	Stock No.	Description
⚠ 1	38004700	Power Supply Cord <XX>
⚠	38004500	Power Supply Cord <EU>
⚠	38004300	Power Supply Cord <BS>
2	47157300	Cord Cover
⚠ 3	15013701	Power Transformer <XX>
⚠	15013705	Power Transformer <EU>
⚠ 4	46364900	AC Outlet <XX, CS>
5	13708100	Disc Table
6	13708700	Disc Table Roller (3)
7	47320900	Pulley, D28
8	13721200	Head, MLP-1A
9	46719600	Motor (F), for disc table
10	46722700	Motor (G), for head base
11	46719700	Main Motor, for disc
12	13720900	Micro Switch, head base position
13	13720900	Micro Switch, inside position of disc table
14	13719300	Micro Switch, out side position of disc table
15	13709900	Tension Ass'y
16	13721800	Disc Table Drive Cord (1.6m)
17	13714600	Belt, for disc base drive
18	18087200	Disc Sensor Switch Ass'y
19	13708500	Lift Cam
⚠ 20	07188600	2A 250V AC Fuse <XX, CS>
⚠	07188400	1A 250V AC Fuse <XX, CS>
⚠	07184400	500mA 250V AC Fuse <EU, BS>
⚠	07204700	Slide Switch <EU, BS>

Fig.2 Top View

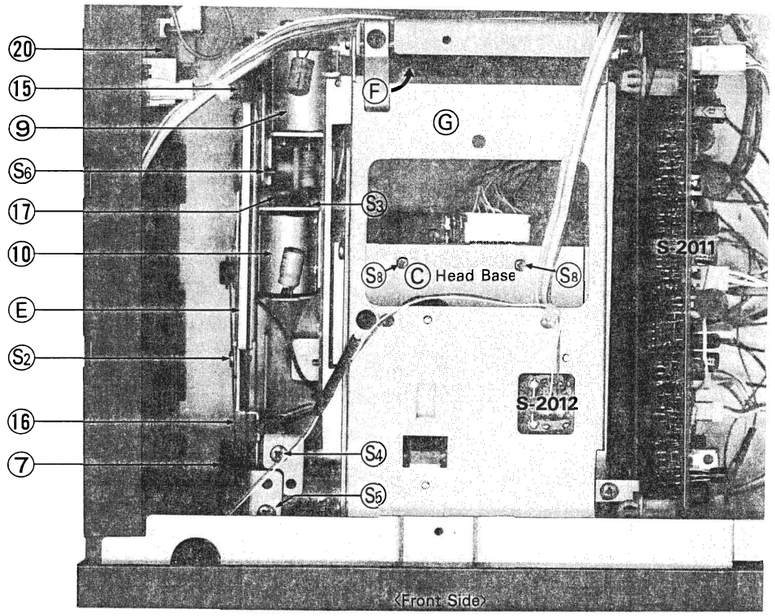


Fig.3 Bottom View

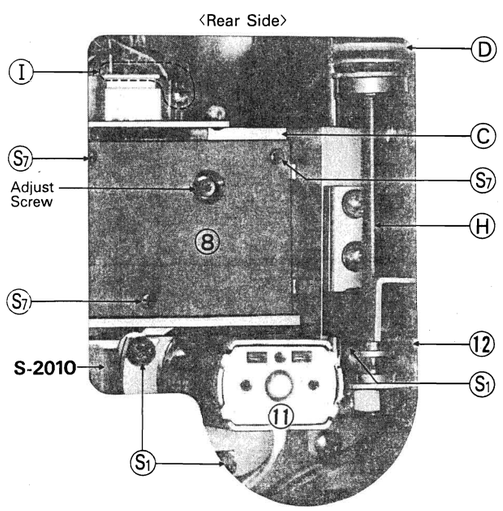


Fig. 4 Front View of Mechanism Assembly

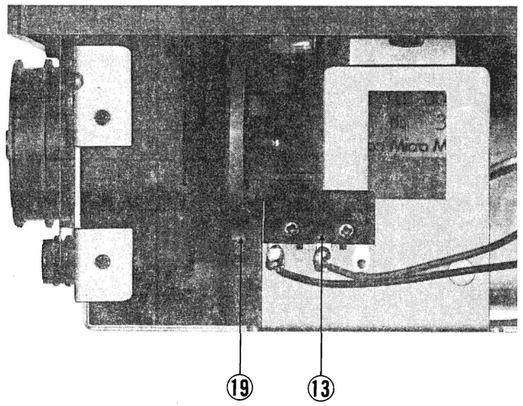
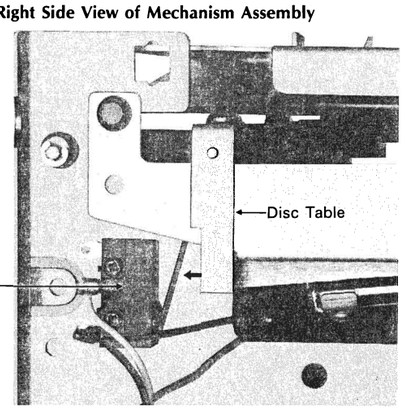


Fig. 5 Right Side View of Mechanism Assembly



11. HOW TO REPLACE MAIN PARTS

A. Bonnet
1) Remove two bonnet fixing screws from the back side.

B. Bottom plate
1) Remove three bottom plate fixing screw. (two on the back side and one on the bottom side).

C. Backside Panel
1) Remove bonnet and bottom plate.
2) Remove right and left side plates.
3) Remove reinforcement frame Ⓐ disposed between back plate and backside panel. (See Fig. 1 on page 21.)

D. Front panel assembly
1) Remove bonnet and bottom plate.
2) Remove right and left side plates.
3) Remove reinforcement frame Ⓐ disposed between back plate and backside panel.
4) Remove power switch connecting rod Ⓑ and power switch board S-2004 (See Fig. 1 on page 21.)
5) Remove mechanism servo control board S-2011.
6) Remove display board S-2003.
7) Remove front panel assembly.
8) Remove remote-control optical sensor section (See Fig. 1 on page 21.)

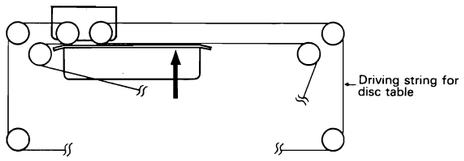
E. Mechanism assembly
1) Remove front panel aseembly.
2) Remove four back plate and mechanism assembly fixing screws.

F. Main motor (for rotaing disc) ⑪
1) Remove bottom plate.
2) Remove the connector leading to main motor from servo control board S-2011.
3) Remove board S-2011 from two board holders and then cut off the lead connected to main motor.
4) Shift head base Ⓒ toward the backside of the set.
   In this case, rotate pulley Ⓓ by the hand. After motor has been replaced, the head base will automatically be returned to the original position when power swtich is turned on. (See Fig. 3 on page 21.)
5) Remove three main motor fixing screws ⑤1. (See Fig. 3 on page 21.)
6) Shift motor toward the backside of the set and then pull it toward you.

Note: Make sure to perform Adjustment of Main Motor Revolution on page 24 after replacement.

G. Head base shifting motor ⑩
1) Remove bonnet and bottom plate.
2) Loosen reinforcement metal fixture fastening screw ⑤2 and then shift the fixture Ⓔ upward. (See Fig. 2 on page 21.)
3) Remove motor belt ⑰. (See Fig. 2 on page 21.)
4) Remove two motor leads.
5) Remove two motor fixing screw ⑤3. (See Fig. 2 on page 21.)

H. Disc table shifting motor ⑨
1) Remove mechanism assembly.
2) Move FH plate depressing spring Ⓕ in the direction of arrow and then lift FH plate Ⓖ upward. (See Fig. 2 on page 21.)
3) Remove two disc plate fixing screws ⑤4 and ⑤5 and then remove disc plate ⑤. (See Fig. 1, 2 on page 21.)
4) Lift head base Ⓒ. (See Fig. 1, 2 on page 21.)
5) Shift reinforcement plate Ⓔ and then remove head shifting motor. (See Fig. 2 on page 21.)
6) Remove string holder.
7) Remove motor leads.
8) Remove two motor fixing screws ⑤6 and then remove motor. (See Fig. 2 on page 21.)



Note: When installing the reinforcement, be sure to position it in parallel with string as Fig. 2.

I. Head (LASER pich μp) ⑧
1) Remove bonnet and bottom plate.
2) Pull out disc table.
3) Shift head base to the central position by rotating pulley Ⓓ of feed unit assembly Ⓗ by the hand. (See Fig. 3 on page 21.)
4) Remove three pick up fixing screws ⑤7 from the top surface of the set. (See Fig. 3 on page 21.)
5) Remove connector leading to head and three leads Ⓘ. (See Fig. 3 on page 21.)

Note: In removing these leads, use a soldering iron one terminal of which is grounded in order to prevent LASER diode from being damaged due to static electricity.

6) After having removed the leads, short red lead to black lead for prevention of damage due to static electricity.
7) In heads for service, the red lead is shorted to the back lead on head terminal connecting board. After the lead has been connected, remove this black lead.

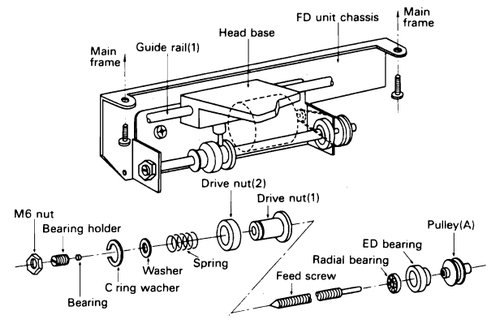
Note: When head is replaced with a new one, make sure to perform all the adjustments for mechanism control section.

Note: Perform step 6) when mechanism servo control circuit board S-2011 is replaced with a new one.

12. ADJUSTMENTS

A. Check whether or not the mechanism assembly is defective, before adjusting the set.

1. When disc plate will not move; that is, LOADING does not operate, check the following points:
   a) Fixing screws or pins for transmit are removed.
   b) String is set to pulley correctly.
   c) Main frame does not stay at the uppermost position.
   d) Loading motor is rotating.
   e) When main frame rises up, microswitch for detecting disc-table IN-position is depressed.
   f) When disk plate comes out, microswitch for detecting disc-table OUT-position is depressed.
   g) Protection switch is not kept closed.
   h) Protection switch is out of contact with panel edge. (An appropriate clearance is 0.3 to 0.8 mm between switch top surface and panel edge.)
   i) Disc is correctly chucked. (Pressure of center cap against disc is 200 to 250g, which is determined by the pressure of FH depression spring.)
   j) Disc is correctly fitted.
2. When feed (head base) will not move:



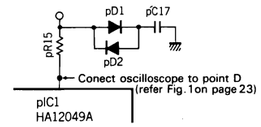
   a) There exists no dust or foreign substances around feed screw and drive nut (1).
   b) Rubber belt is set correctly.
   c) When head holder is located at the initial position, microswitch is depressed.

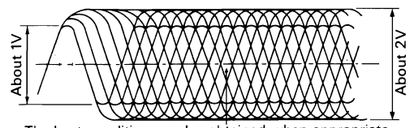
B. Make sure to perform Adjustment of Mechanism Servo described on page 23, when mechanism servo board S-2011 is replaced with a new one, when optical head is replaced with a new one, or when it seems that mechanism servo system is not adjusted correctly.

C. Perform Adjustment of Mechanism Assembly when the following troubles occur. However, it is unnecessary to adjust Servo Board by the use of adjusting connector lead assemblies described on page 23 in every case.

•Examples of Trouble
a) Sound is reproduced jumpingly or repeatedly during PLAY operation.
b) Focus is not correct, so that disc table comes out.
c) Music selection operation is not normal.
d) The number of musics and the time are not indicated correctly beacause lead-in detection is abnormal.
   Or, music begins to be played beginning from the middle.
e) Creak sound is produced while oscillating.
   In these cases, check and adjust the set as follows:

* Check the eye pattern of output signal waveform from servo system circuit. In case the eye pattern is not normal, this causes sound jamping, repeat or defective music selection. In case the eye pattern is not correct, finely adjust tracking gain variable resistor PVR05 and focus offset variable resistor PVR02. However, take care that an excessively high tracking gain causes oscillation.
(Refer to the drawing on page 23 with respect to to checked position and adjusted parts.)

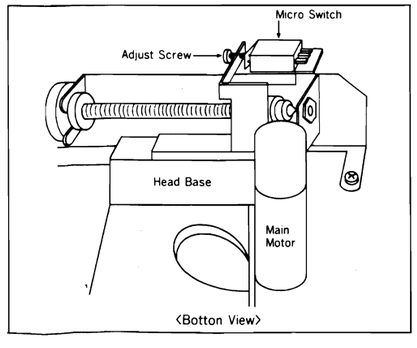




The best condition can be obtained when appropriate openings exist on both the upper and lower sides.

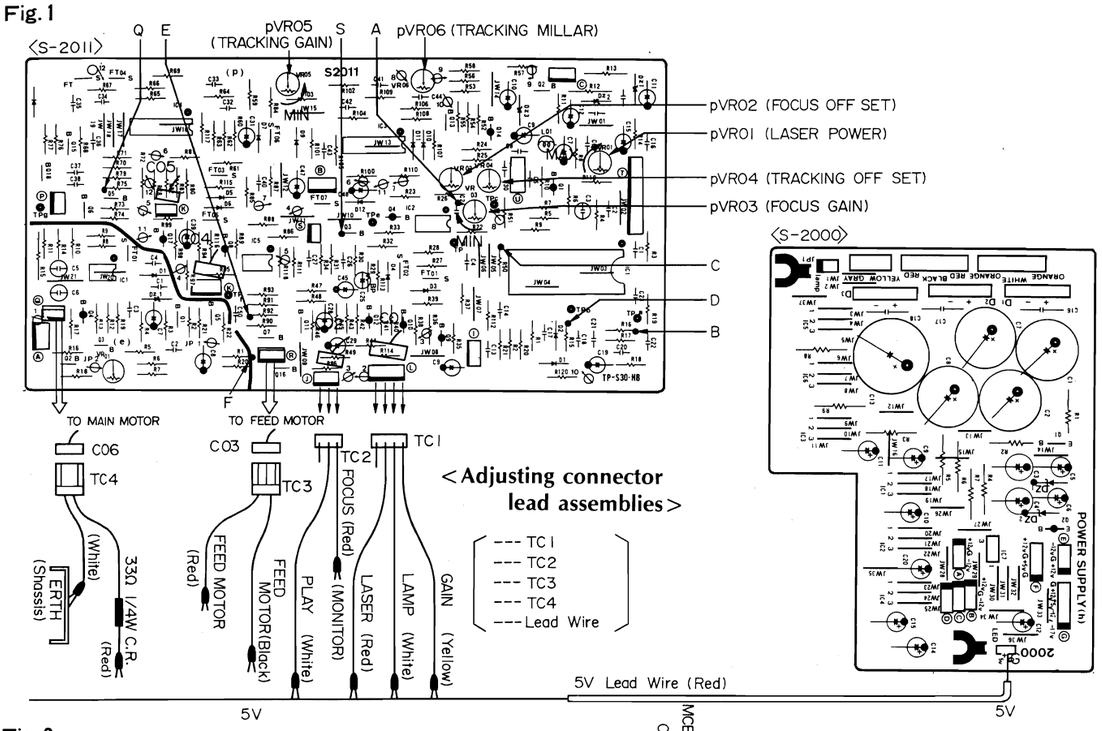
* In case sound jumping or repeat occurs, finely adjust bit PLL described under Procedure 3 on page 24, in addition to the above eye pattern adjustment.
* According to the trouble state, adjust servo board described on page 23. However, when the range to be adjusted is not great, perform step 10 in adjustment of mechanism section and succeeding procedure. In this case, it is unnecessary to disconnect connectors from board S-2011. Therefore, disregard the description of GAIN, LAMP, LASER, PLAY terminals explained under Adjusting Conditions.
* In case lead-in operation is abnormal, adjust it as follows:
Shift head base to the innermost position and then adjust adjusting screw so that microswitch is turned on.
After adjustment, check lead-in operation and that the number of musics and time can be displayed and further the first music can be played beginning from the start.

Note: Be sure to remove mechanism assembly before this adjustment. Further, make sure to perform this adjustment whenever microswitch for detecting head-base initial position has been replaced with a new one.

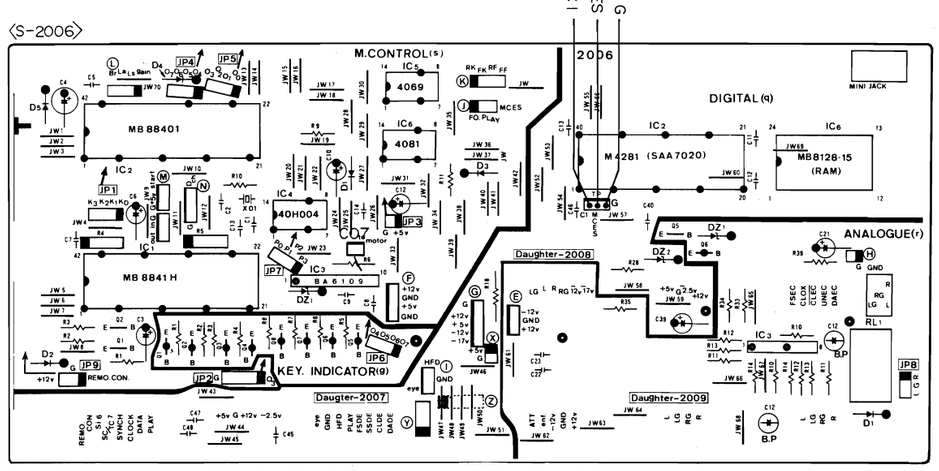


12-1. Adjustment of Head Servo Section

● Fig. 1



● Fig. 2



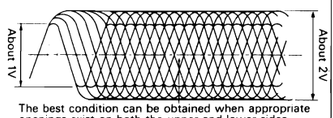
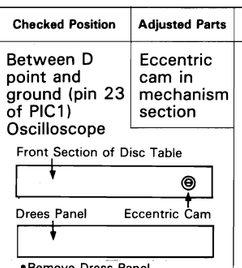
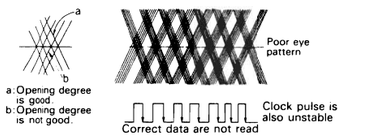
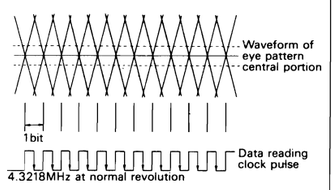
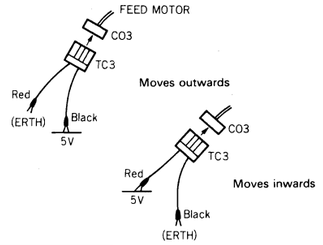
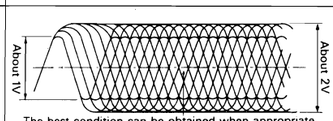
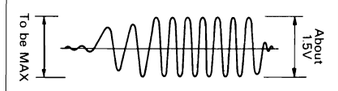
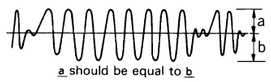
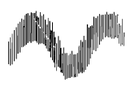
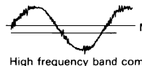
● Preliminary procedure by the use of adjusting connector lead assemblies

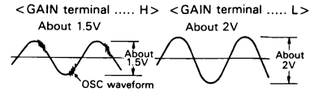
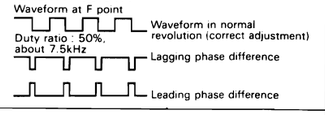
1. Push the OPEN/CLOSE button to move out the disc table, then pull up the dress panel to remove it. Turn off the POWER switch.
2. Set each variable resistor on board S-2011 as follows: (See Fig. 1)
   PVR01 ..... MAX, PVR03 ..... MIN, PVR05 ..... MIN,
   PVR02, PVR04, PVR06 ..... CENTER
3. Remove connectors C01 to C06 on board S-2011.
4. Connect a lead to 5V power supply pattern lead on board S-2000.
5. Connect adjusting connector assemblies TC1 and TC2 to two pin assemblies from which the connectors C01 and C02 have been removed on board S-2011.
6. Connect adjusting connector assemblies TC3 and TC4 to two pin assemblies from which the connectors C03 and C04 have been removed on board S-2011.
7. Connect GAIN (yellow), LAMP (white) and LASER (red) leads of the adjusting connector assembly TC1 and PLAY (white) lead of the connector assembly TC2 to a 5V lead (red) connected to board S-2000 by use of each clip attached to the end of each connector assembly lead.

Note: Do not connect FOCUS (red) lead of connector assembly CT2 and other two leads of connector assemblies TC3 and TC4. Connected positions of these leads will be instructed under ADJUSTMENT.

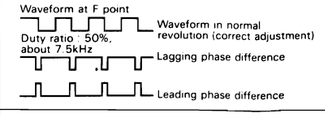
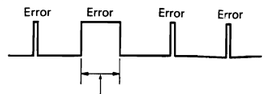
<Adjustment of Mechanism Servo Section>

	Adjustment procedure	Checked Position	Adjusted Parts	Adjustment Contents	Adjusting Conditions
1	Adjustment of tracking mirror preset value	Between Q point and ground (Emitter of PQ5) DC voltmeter	PVR6	DC 0V±0.3V	1. POWER ..... ON 2. Disc ..... none 3. GAIN, LASER LAMP, PLAY terminals ..... H (5V) 4. MAIN MOTOR ..... OFF
2	Adjustment of LASER power	Upper surface of head lens Power meter	PVR1	0.4mW Power meter Head / Object lens / Head base	1. POWER ..... ON 2. Disc ..... none 3. LASER terminal ..... from H(5V) to L(ground) 4. GAIN, LAMP, PLAY terminals ..... H(5V) 5. MAIN MOTOR ..... OFF
3	Adjustment of focus offset	Between A point and ground (output of PIC1) DC voltmeter	PRV2	DC 0V	1. POWER ..... ON 2. Disc ..... none 2. GAIN, LASER, LAMP, PLAY terminals ..... H(5V) 3. LASER terminals ..... L (chassis) 4. GAIN, LAMP, PLAY terminal ..... H(5V) 5. MAIN MOTOR ..... OFF
4	Operation check of object lens	Between S point and ground (Emitter of PQ3) DC voltmeter		○ Head object lens moves toward disc when LAMP terminal changes from H(5V) to L(chassis). ○ Potential is DC 0.7V at S point.	1. POWER ..... ON 2. Disc ..... none 3. LASER terminal ..... L(chassis) 4. GAIN, LAMP, PLAY terminals ..... H(5V) 5. MAIN MOTOR ..... OFF
5	Adjustment of focus gain (Focusing head object lens)	FOCUS terminal (adjusting lead assembly) Oscilloscope	PRV3	1. Set a disc to retract disc table. 2. Immediately after disc table is retracted, remove connector C07 on board S-2006. (Leave this connector remove for the succeeding adjustments.) 3. Rotate PVR3 a litle. 4. Change LAMP terminal from H(5V) to L(chassis). 5. Focus terminal of connector C02 is held at L(0V). 6. In case the terminal is not held at L(0V), rotate PVR3 and repeat the above procedures 4 and 5.	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... OFF 4. LASER terminal ..... L(chassis) 5. GAIN, LAMP, PLAY terminals ..... H(5V) Normal / Abnormal LASER terminal LAMP terminal 5V FOCUS terminal Good focus / poor focus
6	Adjustment of tracking mirror preset value	B point (pin 28 of PIC1) Oscilloscope	PVR6	About 1V / To be MAX	1. POWER ..... ON 2. Disc ..... set 3. MIAN MOTOR ..... ON (by applying 3.5V to motor as shown in Fig. 1) 4. GAIN, LAMP, PLAY terminals ..... H(5V) 5. LASER terminal ..... L(chassis)
7	Adjustment of diffraction grating (for detecting tracking error or 3-beam spot positioning)	Between C point and ground (an intersection of PR50 and PR51) Oscilloscope	Screw on head lower side (See Fig.3 on page 21)	To be MAX / About 15V ○ The waveform amplitude becomes maximum at two points (normal point and abnormal point) as shown in the righthand drawing. ○ Abnormality results from incorrect eye pattern. This cause can be found under Jitter adjustment under Procedure 10.	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... ON (by applying 3.5V to motor as shown in Fig. 1) 4. GAIN, LAMP, PLAY terminals ..... H(5V) 5. LASER terminal ..... L(chassis) Normal / Abnormal
8	Adjustment of tracking offset	Between C point and ground (an intersection of PR50 and PR51) Oscilloscope	PRV4	a b a should be equal to b	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... ON (by applying 3.5 to motor as shown in Fig. 1) 4. GAIN, LAMP, and PLAY terminals ..... H(5V) 5. LASER terminal ..... L(chassis)
9	Adjustment of tracking gain	Between Q point and ground (Emitter of PQ5) Oscilloscope	PVR5	○ Adjust the gain at a level beyond which oscillation begins. (Amplitude is about 0.7V) About 0.7V About 0.7V Initial oscillation Perfect oscillation (creak noise sound will be produced)	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... ON (by applying 3.5V to motor as shown in Fig. 1) 4. GAIN and LAMP terminals ..... H(5V) 5. LASER terminal ..... L(chassis) 6. PLAY terminal ..... L(chassis)

	Adjustment procedure	Checked Position	Adjusted Parts	Adjustment Contents	Adjusting Conditions
10	Adjustment of mechanism section (Jitter adjustment)	Between D point and ground (pin 23 of PIC1) Oscilloscope	Eccentric cam in mechanism section	o Adjust eye patern at the best condition.  The best condition can be obtained when appropriate openings exist on both the upper and lower sides.    **Note:** In case eye pattern will not be improved under this adjustment, return to Adjustment Procedure 7, because the two maximum waveform amplitudes are rever sely adjusted at the normal and abnormal points in adjusting diffracting grating.	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... ON (by applying 3.5V to motor as shown in Fig. 1) 4. GAIN and LAMP terminals ..... H(5V) 5. LASER terminal ..... L(chassis) 6. PLAY terminal ..... L(chassis) 7. Move head base (feed) to the center of the disc in accordance with the following method: o Apply 5V to the connector C03 on board S-2011 as shown in Fig. 1. (Connect the adjusting connector lead assembly TC3 as depicted below.) 
11	Adjustment of focus offset	Between D point and ground (pin 23 of PIC1) Oscilloscope	PVR2	o Adjust eye pattern at the best condition	The same as described under Procedure 10 above.
12	Fine adjustment of tracking mirror preset result	B point (pin 28 of PIC1) Oscilloscope. Between Q point and ground (Emitter of PQ5) DC voltmeter	PVR6	 The best condition can be obtained when appropriate openings exist on both the upper and lower sides. o Check that voltage lies within ±0.3V at Q point.	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... ON (by applying 3.5V to motor as shown in Fig. 1) 4. GAIN and LAMP terminals ..... H(5V) 5. LASER terminal ..... L(chassis) 6. PLAY terminal ..... H(5V) 7. Remember the current position of PVR5 and then set PVR5 to MIN. (Return to the current position after Procedure 14.)
13	Fine adjustment of diffraction grating	Between C point and ground (an intersection of PR50 and PR51) Oscilloscope	Screw on head lower side (See Fig.3 on page 21)		The same as described under Procedure 12 above.
14	Fine adjustment of tracking offset	Between C point and ground (an intersection of PR50 and PR51) Oscilloscope	PVR4	 a should be equal to b	The same as described under Procedure 12 above.
15	Check of eye pattern when head is move to the inner and outer circumfrences of a disk.	Between D point and ground (pin 23 of PIC1) Oscilloscope DC voltmeter		o Check that eye pattern is in the best condition when head base (feed) is moved to the inner and outer circumferences. Refer to Procedure 10 with respect to the method of moving head base.) o Check that voltage is L(0V) at Focus terminal while head base is being moved.	1. POWER ..... ON 2. Disc ..... set 3. MAIN MOTOR ..... ON (by applying 3.5V to motor as shown in Fig. 1) 4. GAIN and LAMP terminals ..... H(5V) 5. LASER and PLAY terminals ..... L(chassis) 6. Return PVR5 to the position remembered under Procedure 12.
16	Check of switching operation of tracking loop	Between Q point and ground (Emitter of PQ5) Oscilloscope		o Check that waveform is as shown below with GAIN terminal set to H(5V) or L(chassis). <GAIN terminal ..... H>  Tracking drive signal including high frequency band components Mirror preset value (The level · changes according to setting method) <GAIN terminal ..... L>  Mirror preset value High frequency band components are reduced and low frequency band waveform is obtained due to eccentricity.	The same as described under Procedure 15 above.

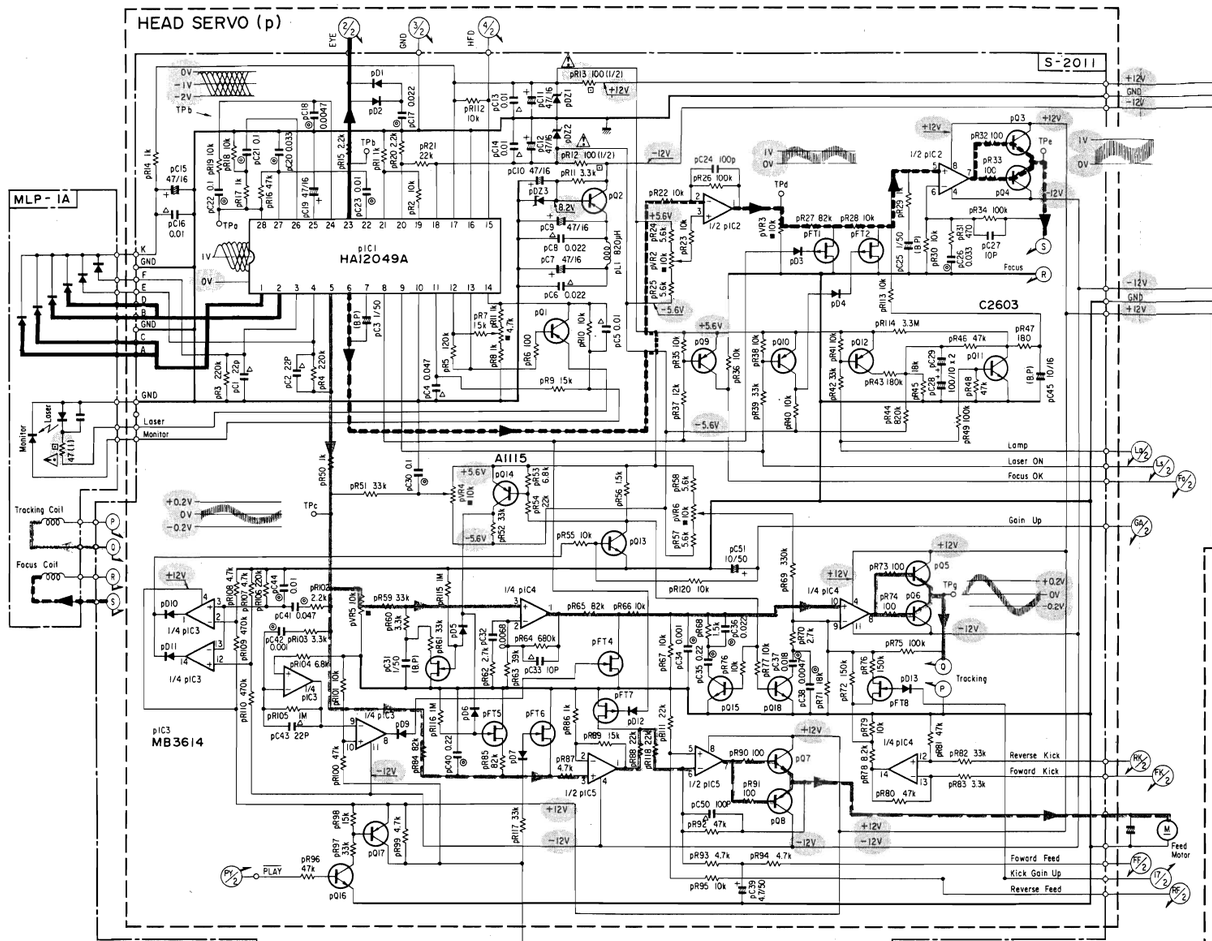
	Adjustment procedure	Checked Position	Adjusted Parts	Adjustment Contents	Adjusting Conditions
17	Check of feed output	Between E point and ground (Emitter of PQ7) Oscilloscope		o Check that waveform is as shown below with GAIN terminal set to H(5V) or L(chassis). <GAIN terminal ..... H> <GAIN terminal ..... L>  o If tracking gain is excessive, oscillation begins when GAIN terminal is set to H.	The same as described under Procedure 15 above.
18	Adjustment of main motor revolution.	Between F point and ground (an intersection of ER20 and ER1) Oscilloscope	EVR1	o Adjust duty ratio to 50 percent as shown below. 	1. Return connectors C01, C02, C03, C04 C05 and C06 on board S-2011 and C07 on board S-2006 to the original state before adjustment. 2. Operate the set in PLAY after MUSIC SELECT has been completed.
19	Check of performance 1. Check that no sound jump occurs by the use of a Philips TEST SAMPLE DISC (NR 4A 410-056-2). 2. Check that focus loop is not out of the normal condition.		PVR5 PVR3	Fifteen musics must be reproduced. If not reproduced, adjust tracking gain finely. Perform start operation after loading open. Repeat this operation two or three times. In this case, music must be reproduced smoothly. If not smoothly, adjust focus gain finely.	The same as described under Procedure 18 above.

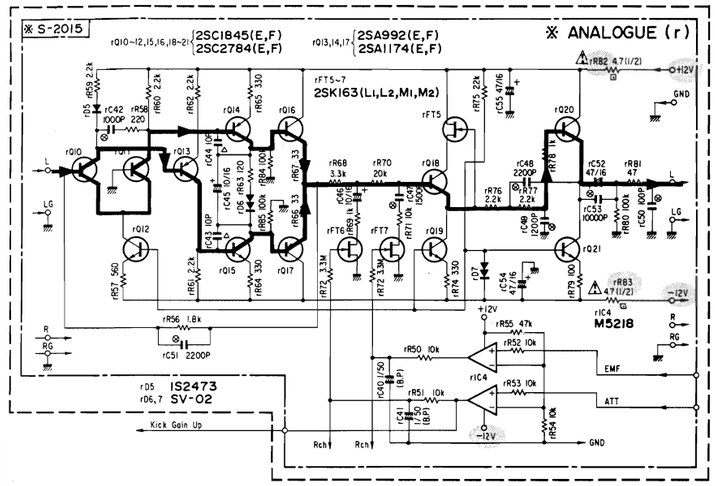
12-2. Adjustment of electric circuits other than Mechanism Servo Section

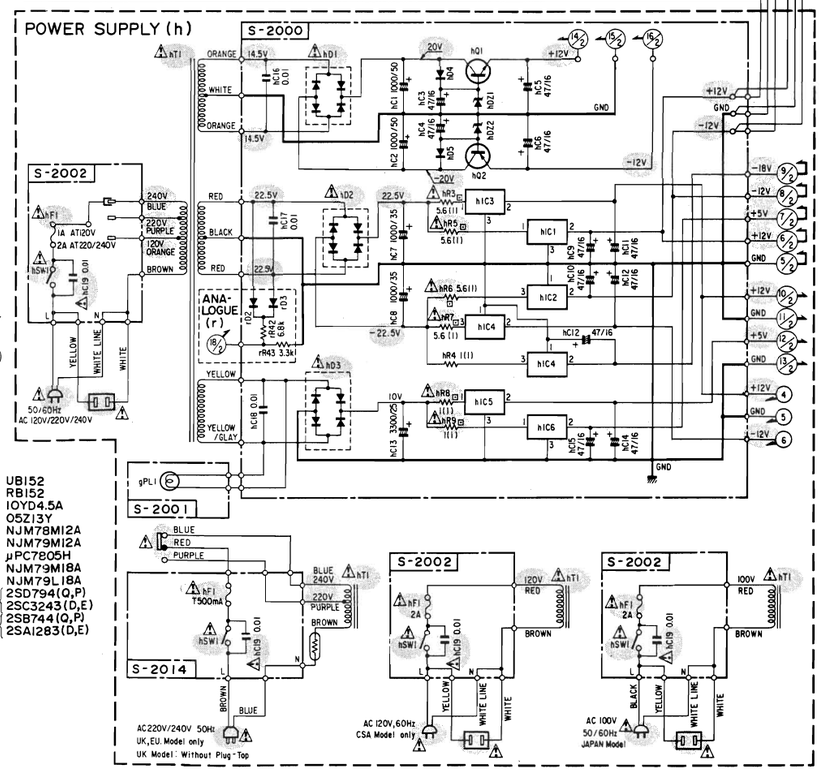
	Adjustment Procedure	Checked Position	Adjusted Parts	Adjustment Contents	Adjusting Conditions
1	Rough adjustment of bit PLL	Between G point and ground (Pin 22 of qIC1) Frequency counter See Parts Location F-2007 on Page 18	qL1 (S-2007) See Parts Location F-2007 on Page 18	4.3128MHz	1. Check that the connectors of board S-2011 are all connected correctly. 2. Disc ..... none 3. POWER ..... ON
2	Adjustment of main motor revolution	Between F point and ground (an intersection of eR20 and eR1) Oscilloscope	eVR1	Adjust duty ratio to 50 percent as shown below. 	1. POWER ..... ON 2. Operate the set in PLAY after MUSIC SELECT has been completed.
3	Fine adjustment of bit PLL	Between TPC1 and ground (S-2006) (See Fig. 1) Oscilloscope	qL1 See Parts Location F-2007 on Page 18	Adjust error within 2ms.  Adjust this portion within 2ms, where there is no signal cause of black spot. In case it is impossible to adjust it within 2ms, finely adjust pVR05 and pVR02 while watching eye pattern.	1. POWER ..... ON 2. Reproduce the fifteenth music on Philips TEST SAMPLE DISC (NR4A 410-056-2). 3. Set TIME/DIV to 1ms and TRIG MODE to NORMAL, VOLTS/DIV to AC, COUPLING to AC in oscilloscope.
4	Adjustment of level difference between L-CH and R-CH	OUTPUT terminal, Oscilloscope	qVR1 See Parts Location F-2008 on Page 18	Match the output level of L-CH to that of R-CH (about 2V). The variable range of pVR1 is within ±1dB Therefore, in case of no TEST DISC, set qVR1 at the center.	1. POWER ..... ON 2. Reproduce the first music on SONY TEST DISC (TYPE 3 YEDS7).

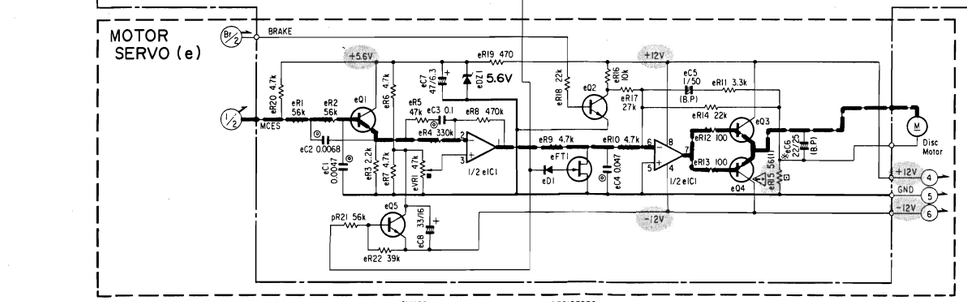
13. SCHEMATIC DIAGRAM 13-1. Servo Control Section

*Design and specifications subject to change without notice for improvement.
*La présention et les specifications sont susceptibles d'être modifiées sans préavis par suites d'améliorations éventuelles.
*Anderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.









SYMBOL OF FUNCTION
(e) MOTOR SERVO
(h) POWER SUPPLY
(p) HEAD SERVO
(r) ANALOGUE

SYMBOL
△ Ceramic
(M) Mylar
⊗ Polystyrene
Ta Tantalum Electrolytic
◒ Low-Leak Electrolytic
(B.P) Bi-Polar Electrolytic
⊡ Non-Inflammable Resistor

RESISTORS
Are in ohms, 1/4 Watts, ±5% Tolerance
Unless Otherwise Noted. k: kΩ, M: MΩ

CAPACITORS
Are in μF, Unless Otherwise Noted. P: pF

Measuring Instrument
Volt Meter
Oscilloscope

⚠ is Safety Part.
Use only replacement parts recommended by the manufacturer.

rD2,3 / pDI~13	IS2473
eDI	05Z5.6Y
eDZI / pDZ1,2	05Z8.2Y
pDZ3	05Z10Y
pFT1,2,7	2SJ103(GR,BL,Y)
eFT1	2SK163 (M1,M2,N1,K1,K2 L1,L2)
pFT3 6,8	
pIC1	HA12049A
eIC1 / pIC2,5	NJM4558D
pIC3,4	MB3614M
pQ1,2	2SA952(L,M)
eQ3	2SC3243(D,E)
pQ3,5,7	2SD794(Q,P)
eQ4	2SAI283(D,E)
pQ4,6,8	2SB744(Q,P)
	2SAII15(E,F)
pQ9,10,12 14,17	2SAI048(GR,Y) 2SAII75(E,F,H J,K,R)
pQ11,13,15 16,18	2SC2603(E,F) 2SC2458(BL,GR,Y)
eQ1,2	2SC2785(E,F,H J,K,R)

hD1	UB152
hD2,3	RB152
hD4,5	10YD4.5A
hDZ1,2	05Z13Y
hIC1,3	NJM78M12A
hIC2	NJM79M12A
hIC5,6	μPC7805H
hIC7	NJM79M18A
	NJM79L18A
hQ1	2SD794(Q,P) 2SC3243(D,E)
hQ2	2SB744(Q,P) 2SAI283(D,E)

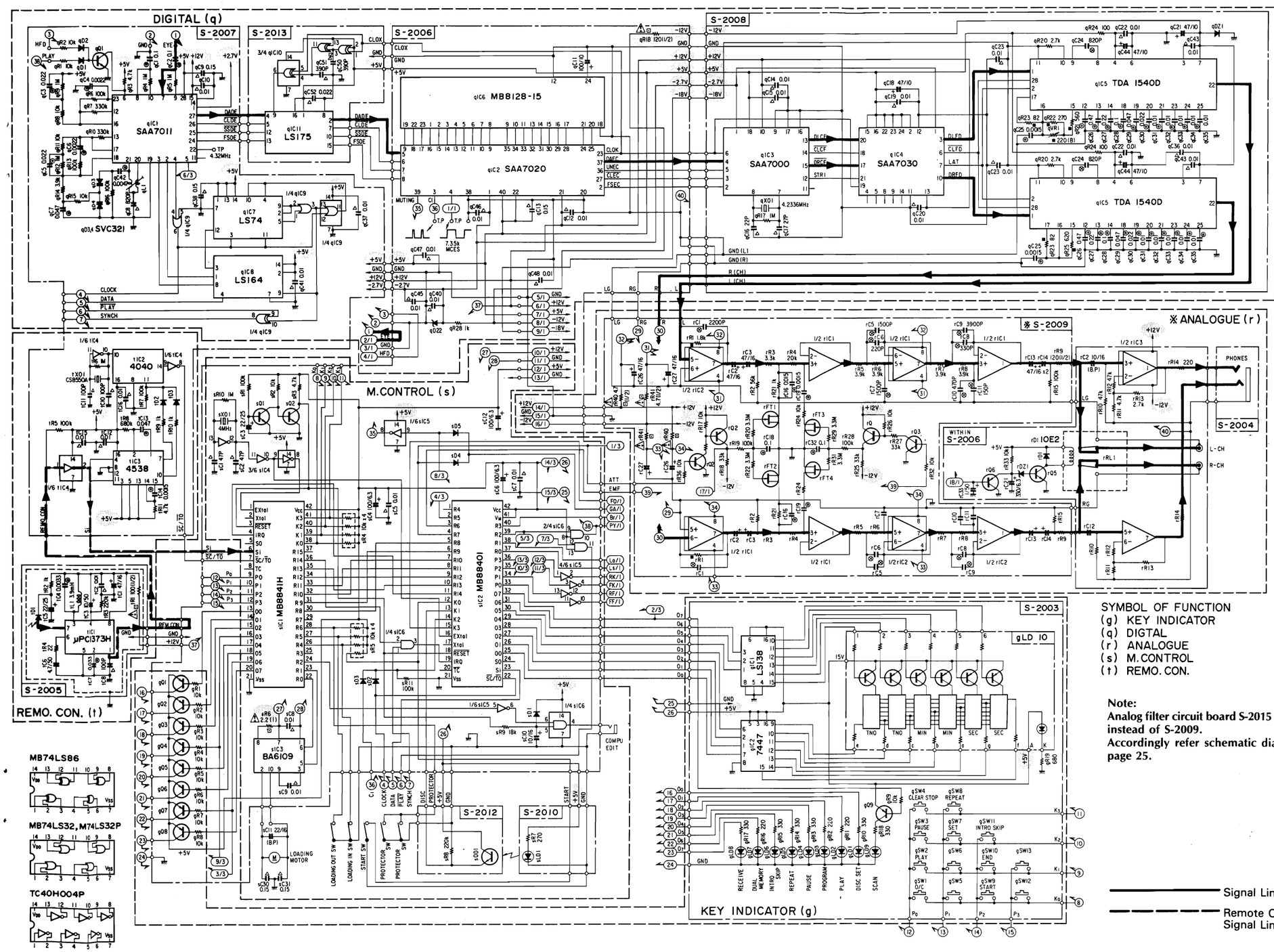
Servo Line
Main Motor
Focus
Signal Line
Tracking
Fead Motor

2SA952 2SC2001 2SB744 2SD794 2SA1048 2SA1115 2SC2458 2SC2603
μPC7805 2SK163 2SA1175 2SC2785
2SJ103 M5218L
MB84081BP μPC1373H
NJM79M12A NJM79M18A
TC4538BP
NJM78M12A BA6109P NJM79L18A
HA12049A MB84640BP
HD7447A MB88401-254
M74LS32 MB8841-1225M
M74LS74 MSM2128-15RS
M74LS86P MSM4011RS
M74LS138 NJM4558D
M74LS164 NJM4559D
M74LS175 SAA7000
M53247P SAA7011
MB74L32 SAA7020
MB74LS86 SAA7030
MB74LS138 TC40H004P
MB74LS164M TC4011
MB74LS175 TC4040BP
MB3614M TC4069VBP
MB8128-15 TC4081BP
MB84011BM TC91432P
MB84069BM TDA1540D
MB84069BP
Dot or Slit or Line
05Z2.7Y 1N60P μB-152LFF
05Z5.6Y 1S2473
05Z8.2Y 10E2
05Z10Y TLG-123A
05Z13Y TLR123

A	B	C	D	E	F	G	H

13-2. Amp. & Control Section

*Design and specifications subject to change without notice for improvement.
*La presention et les specifications sont susceptibles d'être modifiées sans préavis par suites d'améliorations éventuelles.
*Anderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.

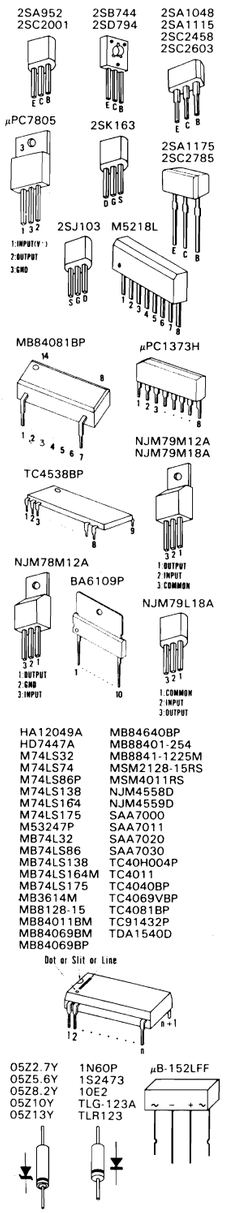


SYMBOL OF FUNCTION
(g) KEY INDICATOR
(q) DIGTAL
(r) ANALOGUE
(s) M.CONTROL
(t) REMO. CON.

Note:
Analog filter circuit board S-2015 is used for PCV-1000 instead of S-2009.
Accordingly refer schematic diagram of S-2015 on page 25.

Signal Line
Remote Control Signal Line

qD2,3 qD1,2 sD1-5 qD3,4 qDZ1 rDZ1 qDZ2	IS2473T77 SVC321 05Z5.6-Y 05Z2.7-Y
qIC1	SAA7011
qIC2	SAA7020
qIC3	SAA7000
qIC4	SAA7030
qIC5	TDA1540D
qIC6	MB8128-15 MSM2128-15RS
qIC7	M74LS74AM M74LS74
qIC8	M74LS164P M74LS164M
qIC9	M74LS32 M74LS32P
qIC10	MB74LS86
qIC11	MB74LS175
qQ1 rQ1,3	2SC2603(E,F) 2SC2458(BL,GR,Y) 2SC2785(E,F,H,J,K,R)
rD1	10E2
rFT1,2,3,4	2SK163(K1,K2,L1,L2,M1,M2,N1)
rQ2,4 qQ1-9	2SA1115(E,F) 2SA1048(GR,Y) 2SA1175(E,F,H,J,K,R)
rQ5	2SC2603(G) 2SC1815(BL) 2SC2458(BL) 2SC2785(K,F) 2SA1048(GR) 2SA1175(E,F)
rQ6	
rIC1,2	NJM5532D
rIC3	M5218L
qIC1	MB74LS138 M74LS138P
qIC2	HD7447A M53247P
sLD1 qLD1,4,5,6,8,9 qLD2,3,7 qLD10	TLRI23 TLG123A LH004
sIC1	MB8841H-1225M
sIC4	MB84069BM
sIC5	TC4069UBP
sQ1	2SC2458(BL,GR) 2SC2785(E,F,K)
rIC1	µPC1373H
sIC3	BA6109
sIC6	TC4081BP MB84081B
sQ2	2SC2458(BL,GR) 2SC2785(E,F,K)
sIC4	TC40H004P
sD01	PH102
tD1	PH302
rIC2	TC4040BP MB84040B
rIC3	TC4538BP
sIC2	MB8840I-254M



HA12049A	MB84640BP
HD7447A	MB88401-254
M74LS32	MB8841-1225M
M74LS74	MSM2128-15RS
M74LS86P	MSM4011RS
M74LS138	NJM4558D
M74LS164	NJM4559D
M74LS175	SAA7000
M53247P	SAA7011
MB74L32	SAA7020
MB74LS86	SAA7030
MB74LS138	TC40H004P
MB74LS164M	TC4011
MB74LS175	TC4040BP
MB3614M	TC4069VBP
MB8128-15	TC4081BP
MB84011BM	TC91432P
MB84069BM	TDA1540D
MB84069BP	

05Z2.7Y	1N60P	µB-152LFF
05Z5.6Y	1S2473	
05Z8.2Y	10E2	
05Z10Y	TLG-123A	
05Z13Y	TLR123	

1 2 3 4 5

A	B	C	D

13-3. Mechanism Control Section

*Design and specifications subject to change without notice for improvement.
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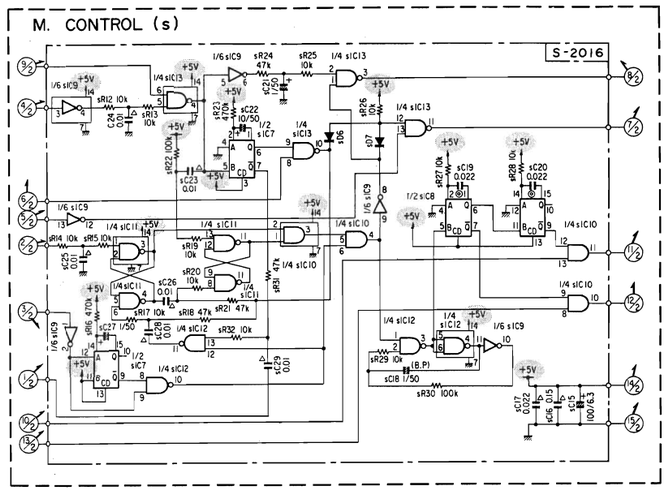
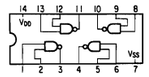
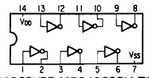
*Anderungen, die dem technischen Fortschritt dienen, bleiben vorbehalten.

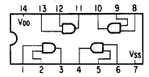




MSM4011RS,MB8401IBM,TC4011P



MSM4069UBP,MB84069BM,TC4069UBP



MSM4081RS,MB8408IB,TC4081BP

SYMBOL
△ Ceramic
(m) Mylar
Ta Tantalum Electrolytic
Low-Leak Electrolytic
(B.P) Bi-Polar Electrolytic
Non-Inflammable Resistor

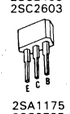
RESISTORS
Are in ohms, 1/4 Watts, ± 5% Tolerance
Unless Otherwise Noted. k: kΩ, M: MΩ

CAPACITORS
Are in μF, Unless Otherwise Noted. P: pF

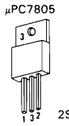
sIC7,8 { TC4538BP / MSM4538RS
sIC9 { TC4069UBP,MSM4069RS / MB84069BM
sIC10 { TC4081BP, MSM4081RS / MB8408IB
sIC11,12,13 { TC4011P, MSM4011RS / MB8401IBM

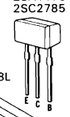
sD6,7 IS2473T77

2SA952 2SC2001 — 2SB744 2SD794 — 2SA1048 2SA1115 2SC2458 2SC2603

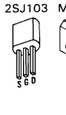


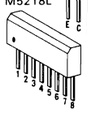
μPC7805 — 2SK163 — 2SA1175 2SC2785



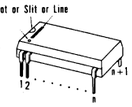


2SJ103 — M5218L

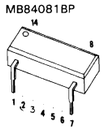




HA12049A, HD7447A, M74LS32, M74LS74, M74LS86P, M74LS138, M74LS164, M74LS175, M53247P, MB74L32, MB74LS86, MB74LS138, MB74LS164M, MB74LS175, MB3614M, MB8128-15, MB84011BM, MB84069BM, MB84069BP — MB84640BP, MB88401-254, MB8841-1225M, MSM2128-15RS, MSM4011RS, NJM4558D, NJM4559D, SAA7000, SAA7011, SAA7020, SAA7030, TC40H004P, TC4011, TC4040BP, TC4069VBP, TC4081BP, TC91432P, TDA1540D

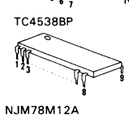


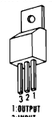
MB84081BP — μPC1373H



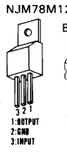
05Z2.7Y, 05Z5.6Y, 05Z8.2Y, 05Z10Y, 05Z13Y — 1N60P, 1S2473, 10E2, TLG-123A, TLR123 — μB-152LFF

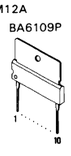
NJM79M12A NJM79M18A — TC4538BP

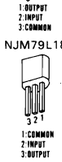




NJM78M12A — BA6109P — NJM79L18A

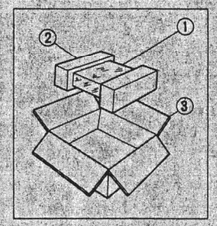






14. PACKING LIST

Parts No.	Stock No.	Description
1	91167620	Vinyl Bag
2	13707300	Styrofoam Packing
3	13707200	Carton Case



15. ACCESSORY LIST

Parts No.	Stock No.	Description
1	46722600	Pin Plug Cord
2	46607500	Operating Instruction
3	13716900	Transit Screw
4	13239400	Transit Spacer

Sansui

SANSUI ELECTRIC CO., LTD.: 14-1, Izumi 2-chome, Suginami-ku, Tokyo 168 Japan
SANSUI ELECTRONICS CORPORATION: PHONE: (03) 324-8891/TELEX: 232-2076 (International Division)
1250 Valley Brook Ave. Lyndhurst, N.J. 07071 U.S.A.
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SANSUI ELECTRONICS (U.K.) LTD.: Unit 10A, Lyon Industrial Estate, Rockware Avenue, Geenford, Middx UB6, OAA, England
SANSUI ELECTRONICS G.M.B.H.: Pau Ehrich Strasse 8, 6074 Rödermark 2, West Germany

(SM1-107) Printed in Japan (N35620) <Stock No. 36483800>