D102R

COMPUTER DIRECT-LINE™ COMPACT DISC PLAYER

SAE SERVICE MANUAL

SCIENTIFIC AUDIO ELECTRONICS INC

This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Caution: To prevent electric shock do not use this (polarized) plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

Attention: Pour prévenir les chocs électriques ne pas utiliser cette fiche polarisée avec un prolongateur, une prise de courant ou une autre sortie de courant, sauf si les lames peuvent étre insérées à fond sans en laisser aucune partie à découvert.

WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.

This Service Intruction is for D102R Series Ⅱ (D102R Ⅱ)

Contents

Specification

System	Logic controlled compact disc digital audio system
Power Voltages	120V, 220V ±10% (to be changed by main transformer and standby transformer connections)
Main Frequency	50, 60Hz
Power Consumption	max. 24W
Frequency Range	2~20KHz ±0.3dB
Output Voltage	max. 2Vrms
Dynamic Range	≧96dB
S/N Ratio	≧100dB @ 1KHz
Channel Seperation	≧100dB @ 1KHz
Channel Defference	≦1dB
Total Harmonic Distortion	
Fixed Output	0.001% @ 1KHz
Variable Output	0.005% @ 1KHz
Intermodulation Distortion	≦0.003%
Remote Control	Computer controlled remote commander for self-remote control
De-emphasis	0 or 15/50 μs(switched by the subcode on the disc)
Headphone Output Level	max 140mV @ 8 ohms
Commander	
Remote control function	Totally 12 buttons
Remote control technices	32 bit pules code pulse modulated infra-red beam
Distance of remote control	min. 10 meters
Operating Angle	30° max. from right front of the IR receiver
Type of dry battery	2X UM-3, Size AA or R6 1.5V
Dimensions (WxHxD)	19 x 3.5 x 13 inches
Weight	20 lbs (shipping weight)

NOTE: Design and Specifications Subject to change without notice for improvements.

Servicing Hints

For servicing hints of the CD mechanism and the servo + preamplifier PCB see Service Manual C.D.M.-2 Top HiFi

ESD

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD).
Careless handling during repair can drastically reduce life expectancy.
When repairing, make sure that you are connected via a wrist wrap with resistance to the same potential as the chassis of the set. Keep components and aids also at the same potential.

• SERVICE AIDS

Audio test disc (No. 3)	4822 397 30085
Disc without errors + disc with DO errors, black spots and fingerprints (No. 5+No. 5A)	4822 397 30096

• DISASSEMBLY OF TOP COVER

— Remove the 4 screws out of side walls of top cover.
— Take top cover from set.

• REPLACEMENT OF GLASS FUSE

— Remove top cover.
— The glass fuse is situated on the **FUSE PCB** in the left-hand rear corner of the set.

• SERVICING OF THE FRONT PANEL

Disassembly of front panel

— Remove top cover.
— Remove the 4 fixing screws at both sides of front panel.
— Remove the 3 fixing screws at under side of front panel.
— Ensure during mounting that the 3 bosses of the main chassis engage with the appropriate guiders of the front panel.

Disassembly of front PCB

— The front PCB can be taken out after removal of the 8 screws.

• SERVICING OF THE DECODER + POWER SUPPLY PCB

— Remove top cover.
— Remove the 3 screws on the decoder + power supply PCB.
— Remove the 2 screws at the upper side of the Heat Sink.
— Remove the screw in the back chassis for fixation of the RCA JACK.
— After the connectors have been disconnected the decoder + power supply PCB can be slid forwards and be taken out of the player.

• SERVICING OF THE SERVO + PREAMPLIFIER PCB

— Remove top cover.
— Remove the front panel.
— Remove screw S4 and mecha supporter 26 (see exploded view) at the rear of the tray mechanism.
— Now the tray mechanism/CDM/servo + pre-ampl. PCB assy can be taken out of the frame and can be placed vertically in the appropriate servicing supports in the main chassis.
— In this way measurements and adjustments can be performed on the servo + preampl. PCB.
— See Service Manual C.D.M. – 2 for measurements and adjustments on the servo + preampl. PCB.
— Ensure during mounting of the tray mechanism/CDM/servo + preampl. PCB assy that the cushion rubbers and springs item no. 28 and 27 are present (see exploded view).

• SERVICING OF THE TRAY MECHANISM/CDM/SERVO + PREAMPL. PCB ASSY

— Disassemble top cover.
— Disassemble front panel.
— Remove screw S4 and mecha supporter 26 (see exploded view) at the rear of the tray mechanism.
— Now the assy can be taken out of the set after the connectors have been disconnected.
— Remove disc tray LED guide PCB (see exploded view of tray mechanism).
— The CDM + servo + preampl. PCB is kept in place by a boss of the tray mechanism. If this boss, in the region of the foil connector is bent away the CDM + servo + preampl. PCB can be taken out of its support points of the tray mechanism.
— Ensure during mounting of the CDM/servo + preampl. PCB in the tray mechanism that the mechanism bracket item no. 24 (see exploded view of loading) is positioned properly.

• SERVICING OF THE TRAY MECHANISM

Disassembly of the tray mechanism

— Remove pressure plate J by disassembling coil spring at rear. Then plate J can be taken out of its hinge points.
— Remove belt D.
— Disassemble pulley B after retain ring on shaft has been removed.
— Remove slide lever N by elevating lug M and sliding bracket out of its shaft guiding.
— Remove gearwheel G by removing shaft k after ring L has been taken away.
— Now disc carrier O can be taken out of he plate by lifting it at the front and sliding it out of the guiding.
— Next cam wheel C, switch bracket E and gearwheel F can be removed successively.

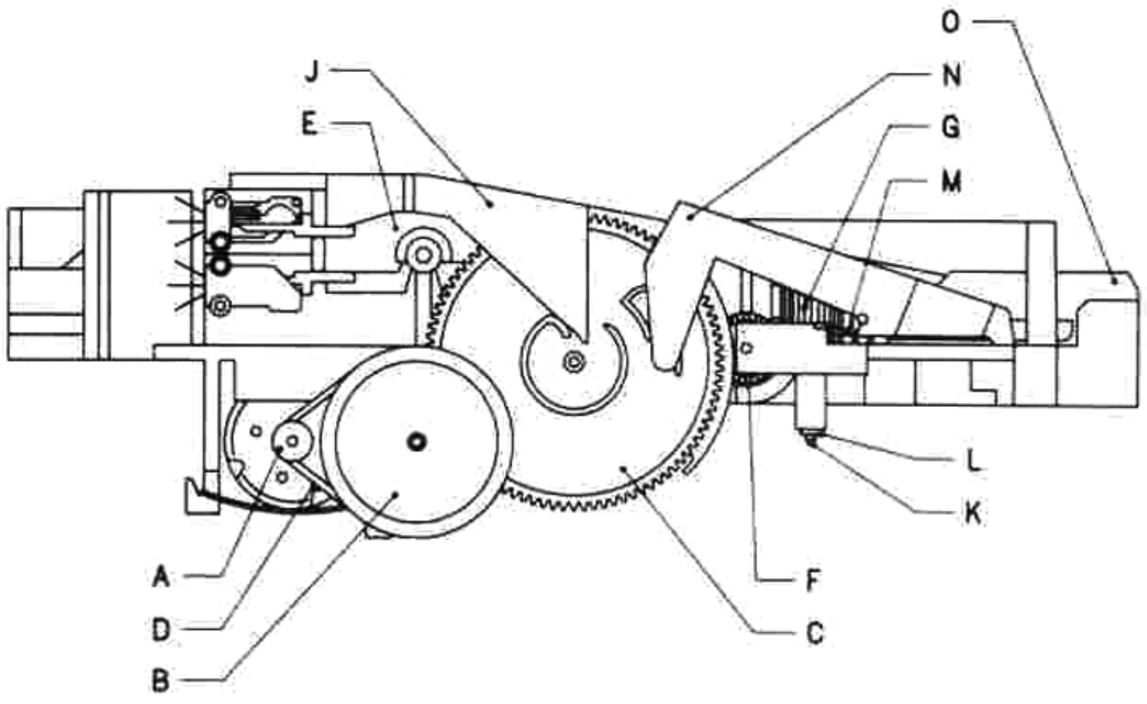


Fig. 1

— The tray motor with belt wheel A can be taken out by removing the spring.

Assembly of tray mechanism

— Place disc carrier O in guiding and slide it in place (= disc carrier in position "close").
— Mount gearwheel F.
— Apply switch bracket E. The left-hand boss of the bracket should be positioned between the 2 switches.
— Ensure that the aperture in gearwheel F is Vertical (see Fig. 1) and apply can wheel C in the way described in Fig. 2.

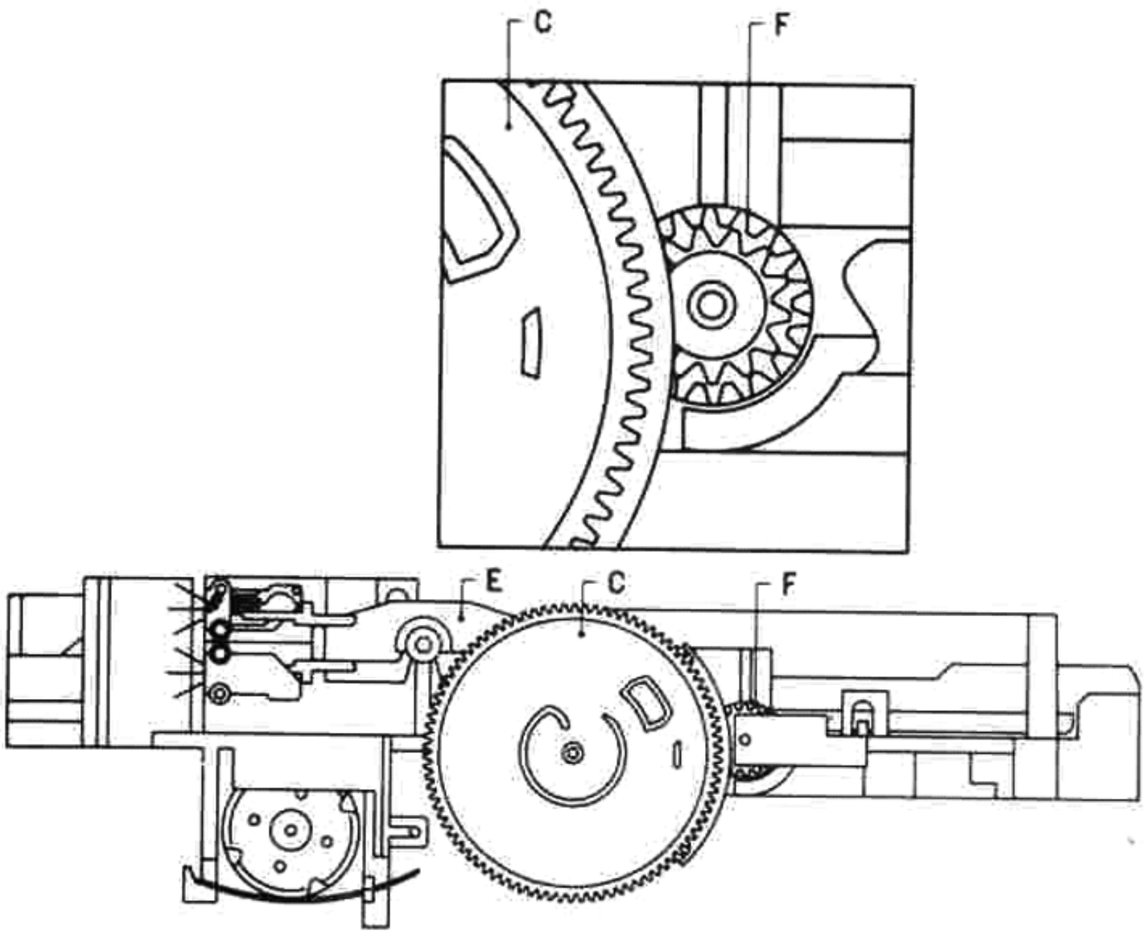


Fig. 2

— Turn cam wheel C counterclockwise till its final position and ensure that the boss of switch bracket E engages with the guiding at the rear of the cam wheel. Turn the cam wheel counterclockwise and clockwise and check if both switches are switched on alternately.
— Turn cam wheel C counterclockwise so that the upper switch is operated and mount pulley B in this position. Next apply the retain ring.
— Mount gearwheel G and apply shaft K and retain ring L. Ensure that gearwheel G is positioned before shaft and retain ring are mounted.

— Apply slide lever N. Ensure that the fork at the right of the lifting bracket encloses the guide rail of the tray.
— Mount the motor with pulley A and apply belt D.
— Next pressure plate J and the motor spring can be mounted.
— Check after mounting the working of the tray mechanism by turning pulley B counterclockwise and clockwise.

Electrical Measurements and Adjustments

For measurements and adjustments on the CD mechanism and the servo + preampl. PCB see the CDM-2 Service Manual.

Specification measurement

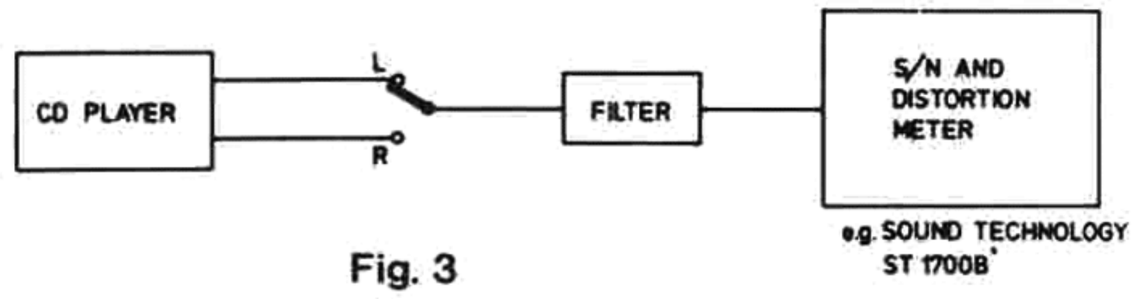


Fig. 3

To measure the specification use can be made of audio test disc No. 3
Use 7th order filter 4822 395 30204 (see Fig. 4) to measure:
— Total harmonic distortion (THD)
— Intermodulation distortion
— Signal-to-noise ratio (S/N)

Specification of 7th order filter

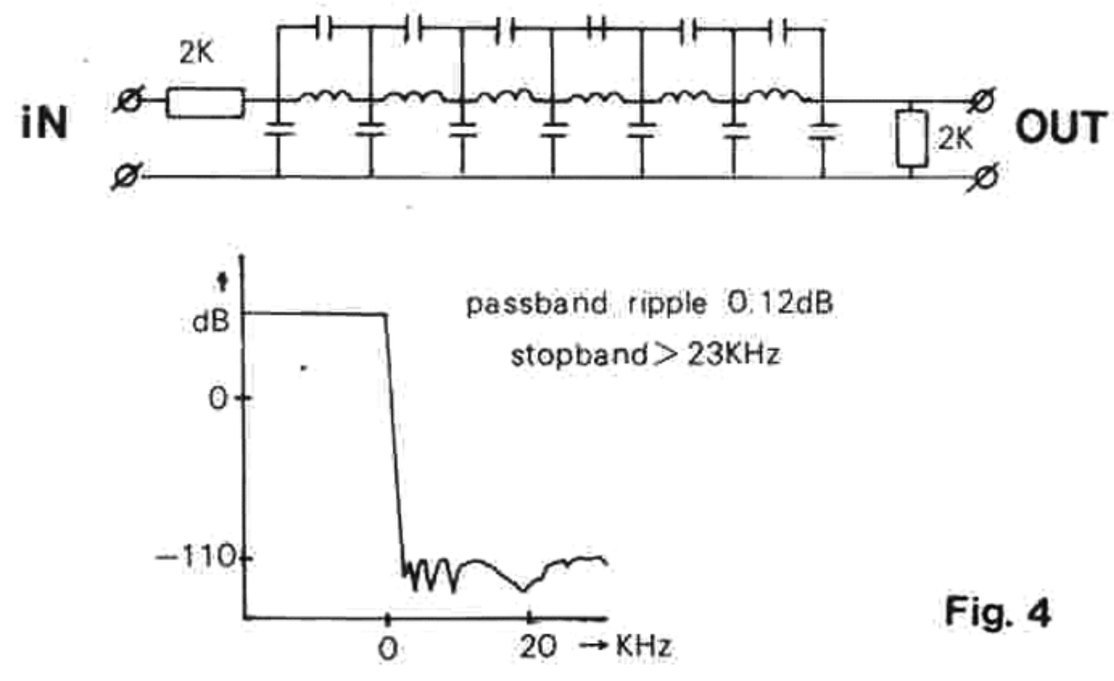
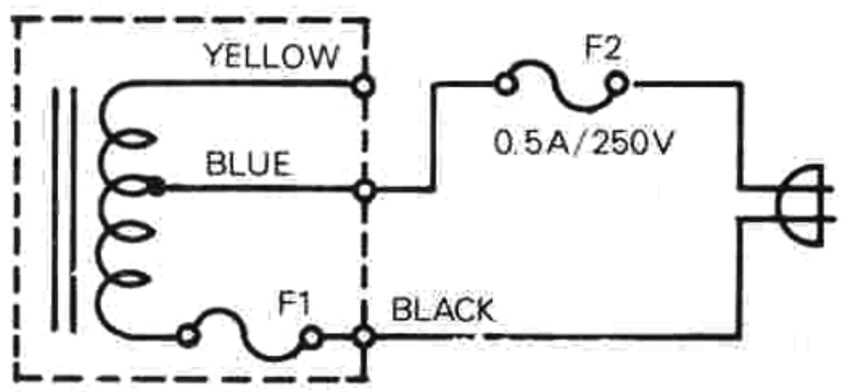
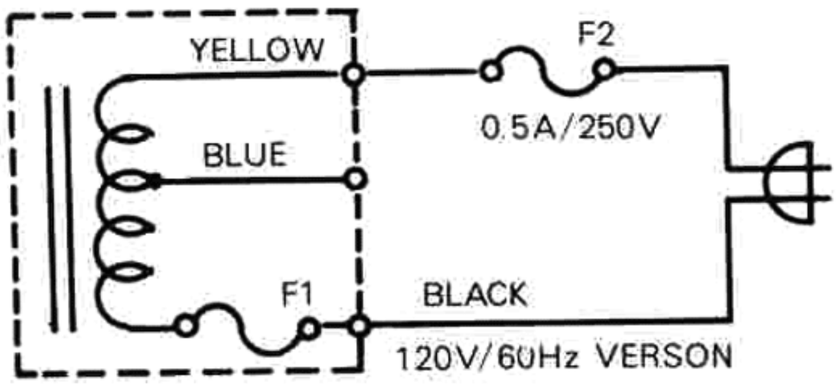


Fig. 4

Changing the transformer connections

a. Main transformer





- F1 : Thermo fuse (Melting Point 130°C)
  Built-IN Transformer

If the set should be connected to a power voltage that deviates from the voltage mentioned on the type plate, the transformer connections should be changed, as indicated in Fig.5.

b. Standby transformer
To change 120V version to 220V version, you should remove the glass fuse F502 and use the glass fuse F501(250V/125mA).

Attention
In case of the change of a power voltage, the glass fuse on the

- 120V ~ : main fuse..... 250V/500mA
  standby fuse..... 250V/250mA
- 220V ~ : main fuse..... 250V/T200mA
  standby fuse..... 250V/T125mA

• DETAILED MEASURING METHOD FOR THE DECODER CIRCUIT

HINTS

Test discs

It is important to treat the test discs with great care. The disorders on the discs (black spots, fingerprints, etc.) are exclusive and unambiguously positioned. Damage may cause additional drop-outs etc. rendering the intentional errors no longer exclusive. In that case it will no longer be possible to check e.g. the good working of the track detectors.

Measurements on op-amps

In the electronic circuits op-amps have been used frequently. Some of the applications are amplifiers, filters, inverters and buffers.

In those cases where in one way or the other feedback has been applied the voltage difference at the differential inputs converges to zero. This applies to both DC and AC signals. The cause can be traced to the properties of an ideal op-amp ($Z_i = \infty$, $G = \infty$, $Z_o = 0$). If one input of an op-amp is directly connected to ground it will be virtually impossible to measure at the inverting and the non-inverting inputs. In such cases only the output signal will be measurable.

That is why in most cases the AC voltage at the inputs will not be given. The DC voltages at the inputs are equal.

Stimulation with "0" and "1"

During troubleshooting sometimes certain points should be connect to ground or supply voltage. As a result certain circuits can be brought in a desired state thus shortening the diagnosis time. In a number of cases the related points are outputs of op-amps. These outputs are short-circuit resistant, i.e. they can be brought to "0" or ground without problem.

The output of an op-amp, however, should never be connected directly to the power supply voltage.

Measurements on microprocessors

Inputs and outputs of microprocessors should never be connected directly to the power supply voltage. The inputs and outputs should only be brought to "O" or ground if this is stated explicitly

Measurements with an oscilloscope

During measurements with an oscilloscope it is recommended to measure with a 1:10 test probe, since a 1:10 probe has a considerably smaller input capacitance than a 1:1 probe.

Selection of ground potential

It is very important to select a ground point that is as close as possible to the test point.

Conditions for injection

— Injection of levels or signals from an external source should never take place if the related circuit has no supply voltage.
— The injected levels or signals should never be greater than the suply voltage of the related circuit

Continuous burning of the laser

— Bridge capacitor 2305 on the servo + preampl. PCB.
— Connect $\overline{Si}$ (= pin 20 of IC6101 on the servo + preampl. PCB) to ground.
— Switch on the supply voltage.
— Now the laser will burn continuously.

Indication of test points

In the drawings of the diagrams the test points have been indicated by a number (e.g. ◇12◇) to which the measuring method refers. In the measuring method below, the symbol (◇) has been omitted for the test points indicated.

• GENERAL CHECKPOINTS

In the detailed measuring method below a number of general conditions, required for a properly functioning set, will not be mentioned. Before the detailed measuring method is started, these general points should frist be checked.

a. Ensure that disc and objective are clean (remove dust, fingerprints, etc.) and work with undamaged discs.
b. Check if all supply voltages are present and if they has the correct values.
c. Check the good working of the two microprocessors by means of their built-in best program and servicing program.

Method:

Self-test of the decoder μp

With the self-test the following parts of the μP are tested.

— RAM

— ROM
— TIMER
— serial I/O interface
— I/O gates
— Interrupt the I^2C and I^2D connections on connectorpins 43-1 and 43-2 of the decoder PCB
— Unsolder pins 1,7,26 and 27 of the decoder μP
— Render pin 2 of the servo μP "low" (ground) and switch on the supply voltage.
— The test starts if pin 2 is rendered "high" again (interrupt the connection to ground).
— If all tests are positive, pin 1 of the servo μP will go low within 1 sec.

Self-test of the control and display μP

With this self-tes the following parts of the μP are tested
— RAM
— ROM
— TIMER
— Serial I/O interface
— I/O gates
— Interrupt the I^2C and I^2D connections on connectors 204-4 and 204-2
— Render pin 2 of the control display μP "low" (ground) and switch on the supply voltage.
— The test starts if pin 2 is rendered "high" again (= interrupt the connection to ground).
— If all tests are positive, pin 1 of the control + display μP will go "low" again within 1 sec.

Initiation of the servicing program of the μP

— Servicing position "O"

Simultaneously depress the PREVIOUS. NEXT and TIME/TRACK buttons. Keep these three buttions depressed while the main voltage is switched on. (plug in.)
This is the STAND-BY mode, "O" appears on the display.

In this state it is possible to move the arm by means of the FORWARD and BACKWARD buttons with a minimum torque to the outside and the inside resp. This enables a check of the free motion of the arm across the disc.

— Servicing position "1"

From servicing position "O" the player can be brought in servicing position "1" by depressing the NEXT button.

In this state the laser emits light and the objective starts to focus. When the focal point has been reached, "1" appears on the display.

When no disc has been inserted the objective goes 16 x up and down. Then the player reassumes servicing position "O".

As in servicing position "O" the arm can be moved across the diameter of the disc by means of the FORWARD and BACKWARD buttons.

— Servicing position "2"

To be reached by depressing the NEXT button after servicing position "1" has been reached.

The turntable motor starts to run

On the display appears "2"

In preparation of the transition to servicing position "3" the arm is sent to the center of the disc.

— Servicing position "3"

To be reached by depressing the NEXT button after servicing position "2" has been reached.

The radial control is switched on. The subcode information is ignored. $\overline{\text{MUSB}}$ is high so that the music information **is released.**

On the display appears "3"

(Dependent on the length of the lead-in track music will be reproduced after approx 1 min.)
In this state it is possible to move the arm by means of the FORWARD and BACKWARD buttons to the outside and to the inside resp. Now the motion is controlled by the μP and the arm moves by steps of 64 tracks as long as the buttions is depressed.

If one of the servicing positions 1, 2 or 3 is disturbed (e.g. braking or removing the disc) the player reassumes servicing position "O"

The servicing program can be left by switching the power switch (POWER ON/OFF)off and on. (Hardware reset).

① DECODER μP

- **Self-test decoder μP**

  See self-test of the decoder μP sub.: "General check points".

- **Reset (pin 17)**

  When the supply voltage is switched on, a positive pulse should be present.

- **X-TAL out (pen 16; test point 31)**

  The frequency of this signal should be 6 MHz.

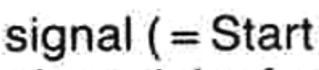
- **$\overline{\text{Si}}$ (pin 21; test point 21)**

  When the $\overline{\text{Si}}$ signal (= Start Initialization) is "low", the laser supply and the focusing control are switched on.

Position of player	POWER ON	Servicing pos. 1	PLAY
$\overline{\text{Si}}$ signal	"high"	"low"	"low"

- **RD (pin 7; test point 24)**

  The RD signal (= Ready) goes "high" when the focal point has been found.
  So there should be a disc on the turntable.

Position of player	Lead-in Area	Servicing pos. 1	PLAY
RD-signal		"high"	"high"

- **$\overline{\text{MSTP}}$ (pin 20; test point 78)**

  When, after RD "high", the $\overline{\text{MSTP}}$ is "high" for a

  control will be switched on.
  The turntable motor is controlled by the MC-signal (test point 81).
  To check MC, see: "Decoder A IC". To check the turntable motor control, see CDM-2 Service Manual: "Checking of the motor control".

- **B0 (pin 8 ; test point 36)**
  B1 (pin 9 ; test point 34)
  B2 (pin 10; test point 33)
  B3 (pin 11; test point 32)

With the B0 ÷ B3 signals
- The radial control is switched on.
- The level on the DAC output is controlled.

— In the SEARCH mode, there should be activity on all 4 test points.
— In the following postions the signals B0 ÷ B3 are stable:

signal	STOP	PLAY	Serice pos. 0, 1, 2	Service pos. 3
B0	"low"	"high"	"low"	"high"
B1	"high"	"high"	"high"	"high"
B2	"high"	"high"	"high"	"high"
B3	"low"	"low"	"low"	"low"

- **$\overline{\text{TL}}$ (pin 12; test point 16)**

— The $\overline{\text{TL}}$ signal (Track Loss) is used to tell the μP that track loss threatens. The μP then can give correction signals with B0 ÷ B3.
— In the "SEARCH" mode, or when the player is bumped against, there are pulses on test point 16.

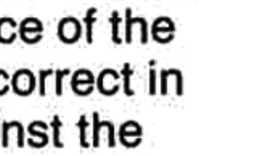
- **REdig (pin 13; test point 37)**

  The REdig signal (= Radial Error Digital = radial deviation) is used to determine the place of the arm relative to the track and to check/correct in case of track jumping or bumping against the player.

  In servicing position 3 or in the PLAY or PAUSE mode, a square wave should be present on test point 37.
  Because of frequency variations, this square wave is hard to trigger.

- **$\overline{\text{DODS}}$ (pin 22; test point 19)**

  The $\overline{\text{DODS}}$ signal (= Drop Out Detector Suppression) avoids that Drop-Out signals influence the arm control during track jumping.

Position of player	POWER ON	Servicing pox. 3	PLAY	SEARCH
$\overline{\text{DODS}}$ signal	"low"	"high"	"high"	

II DECODER-A IC

- **Check the MC signal (pin 17; test point 81)**

— In stand-by mode, the MC signal (Motor Control) corresponds to the figure below.

  Note:
  The repetition time of the MC signal is 11.3 μsec.

— Place a disc on the turntable.
— In position PLAY or SERVICE POSITION 3, the MC signal corresponds to the figure below.

  Note:
  During start-up the duty cycle is 98%, then the duty cycle of the signal becomes about 50%.

See also Service Manual CDM-2: "Check of the motor control".

POSITION: STAND BY

POSITION: PLAY (BEGINNING)

POSITION: PLAY (NORMAL)

- **Check the HF signal on test point 65 (eye pattern)**

— Insert a disc.
— The HF signal should be present and be stable in the PLAY mode and in:
  SERVICING POSITION 3 after the run-in track has been read.
— In SERVICING POSITION 2 and during reading of the lead-in track in HF signal is not stable.

Position of oscilloscope 0.5 μs/DIV.

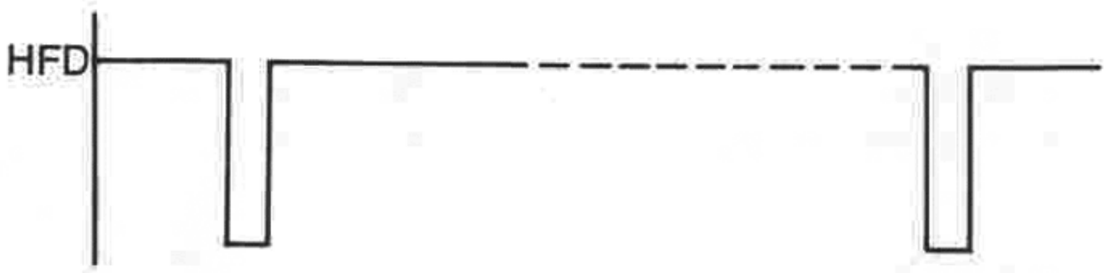
Amplitude ≈ 1.5Vpp

- **Check the HFD signal on test point 66**

— Insert a disc.
— In the PLAY mode and in SERVICING POSITION 3 the HFD signal is "high"; however, minor pulses may be present and in cause of disorders on the disc.

— In SERVICING POSITION 2 and during playback of track no. 15 of test disc 5A HFD pulses are visible.

Position of the oscilloscope 5 ms/DIV



- **Check if the $\overline{\text{MUTE}}$ signal (pin 11; test 67) is "high"**

  When Filter-B IC is applied, the $\overline{\text{MUTE}}$ input will not be used.

- **Check the CEFM signal (pin 27; test point 68)**

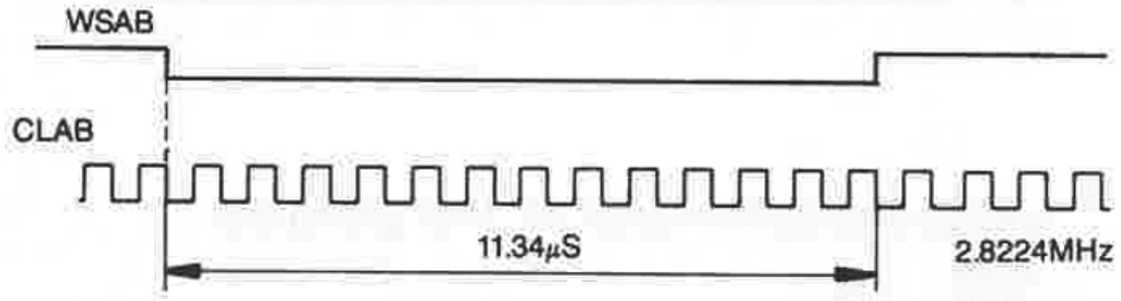
— Place a disc on the turntable.
— In stand-by mode (only the main switch is depressed), the frequency lies between 2.82 MHz and 5.64 MHz.
— In the position PLAY and SERVICE POSITIONS 2 and 3, the frequency is 4.32 MHz.

- **Check the Xin signal (pin 19; test point 69)**

— The Xin frequency is 11.2896 MHz.
— If this frequency deviates, check test point 70; Xout signal, on Filter-B IC.
This frequency should also be 11.2896 MHz.

- **Check the timing signals meant for Filter-B IC**

— Place a disc on the turntable.
— Select one of the following positions:
SERVICE PSOTION 2 or 3, or position PLAY.
— Trigger the oscilloscope with the WSAB signal (test point 71; pin 39).
— check signals:
WSAB at test point 71 (pin 39)
(Word Select from Decoder-A to Filter-B)
CLAB at test point 72 (pin 38)
(Clock from Decoder-A to Filter-B)
and their interrelation.
— There must be activity at test point 73 (pin 37), DAAB signal (DATA from Decoder-A to Filter-B).

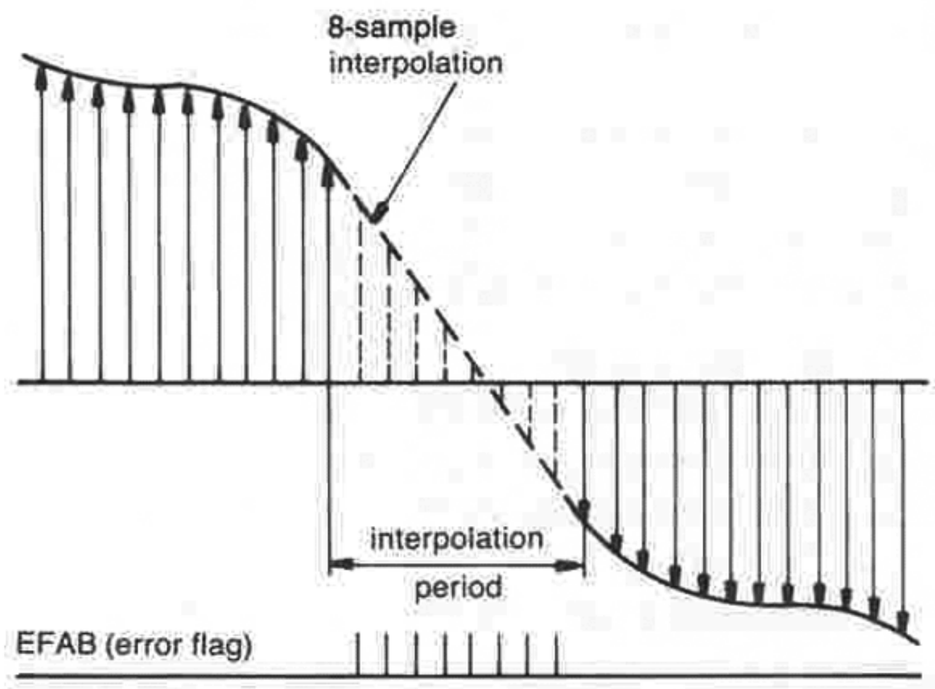


- **Check the EFAB signal (Error Flag from Decoder-A to Filter-B) at thest point 74 (pin 36)**

— Place test disc 5A on the turntable.

During playback, EFAB Pulses should be present at test point 74 for soft braking of the disc and during fast search (F.Forward, F.Reverse)

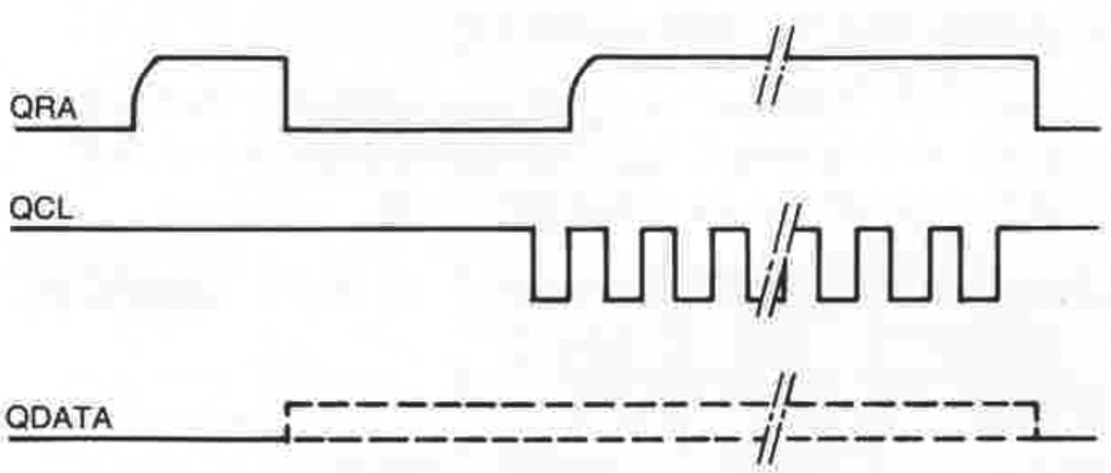
Note:
Filter-B IC is capable of interpolating linearly 8 successive EFAB pulses.



- **Check the Q-channel signals**

— When the "μP panel" is applied, above the decoder which houses IC MAB8441P/T042 the test points 75, 76 and 77 are not connected.
— Place a disc on the turntable.
— Select one of the following positions:
SERVICE POSITION 3 or position PLAY.
— Trigger on the QRA signal (Q-channel Request Acknowledge) test point 75; pin 30.
— Check signals QRA at test point 75 (pin 30)
QCL at test point 76 (pin 31)
(Q-channel-clock)
and their interrelation.
— There should then be activity at test point 77 (pin 29) QDA (Q-channel Data).

Note:
The QRA request is initiated by decoder μP (QRA "high"). Then Decoder-A answers this request (QRA goes "low"). With the next leading clock pulse (QCL) the QRA signal is rendered "high" again by the decoder μP. As soon as the decoder μP has taken in enough information via QDA, QRA will go low again. That is why the QRA times vary each time.



- **Check the SSM signal (test point 78; pin 33) = Start-Stop turntable motor**

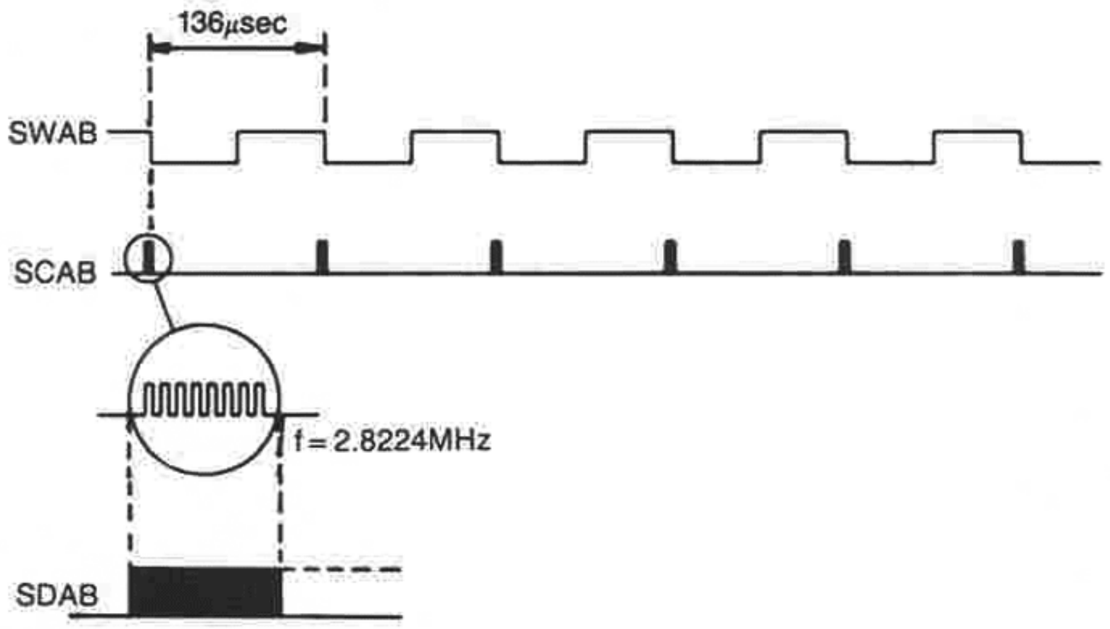
— Motor start pulse when test point 78 is "high" for ≥ 0.2 sec.
— Motor stop pulse when test point 78 is "low" for ≥0.2 sec.

Note:
After the motor start pulse, SWAB information (Subcoding World clock) will become visible at this point. The period time of that signal is 136 μsec.

- **Check the subcode clock signals**

— Place a disc on the turntable.
— Select one of the following positions:
SERVICE POSITION 3 or position PLAY.
— Trigger the oscilloscope with the SWAB signal at test point 78.
— Check the following signals:
SWAB at test point 78; pin 33
SCAB at test point 79; pin 35 (Subcode Clock from Decoder-A to Filter B)
SDAB at test point 80; pin 34 (Subcode Data from Decoder-A to Filter B)
and their interrlations.

Note:
While the burst of 10 clock pulses, appear on SCAB the Q-channel information is transferred on SDAB. Hereafter the P-bit indication follows.
The P-bit is "high" between two bursts of 10 clock pulses in case of pause indication and "low" in case of music indication.



- **Check the $\overline{CRI}$ signal (pin 28)**

The $\overline{CRI}$ signal is "low" in case of track jumping.
Player in position SEARCH.

- **Check the DEEM signal (test point 84; pin 32)**

— Place test disc 5 on the turntable.
— During playback of track no. 14 (recorded without PRE-EMPHASIS), the DEEM signal should be "low".
— During playback of track no. 15 (recorded with PRE-EMPHASIS), the DEEM signal should be "high".

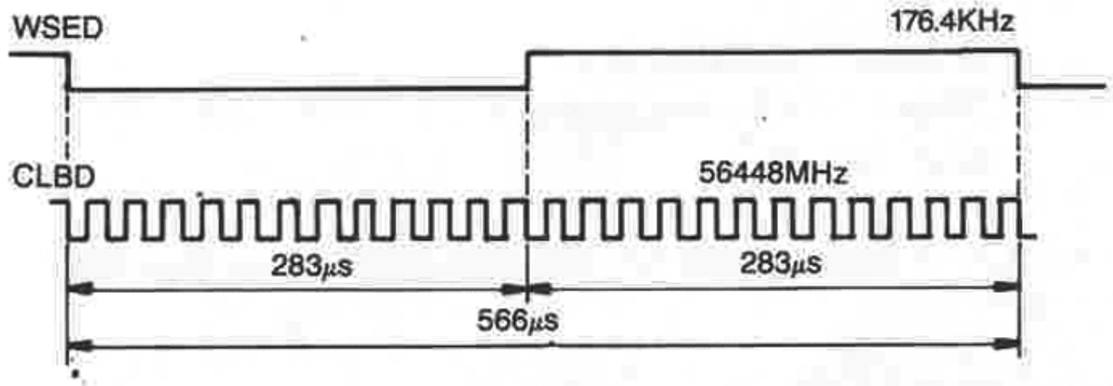
III FILTER-B IC

- **Check the signals between Decoder-A IC and Filter-B IC**

— See sub. "II Decoder-A IC":
* Check the X IN signal (test points 69 and 70)
* Check the timing signals meant for Filter B (WSAB, CLAB, DAAB signals; test points 71, 72 and 73).
* Check the EFAB signal (test point 74)
* Check the subcode clock signals (SWAB, SCAB, SDAB signals; test points 78, 79 and 80).

- **Check the timing signals between Filter-B IC and DAC IC**

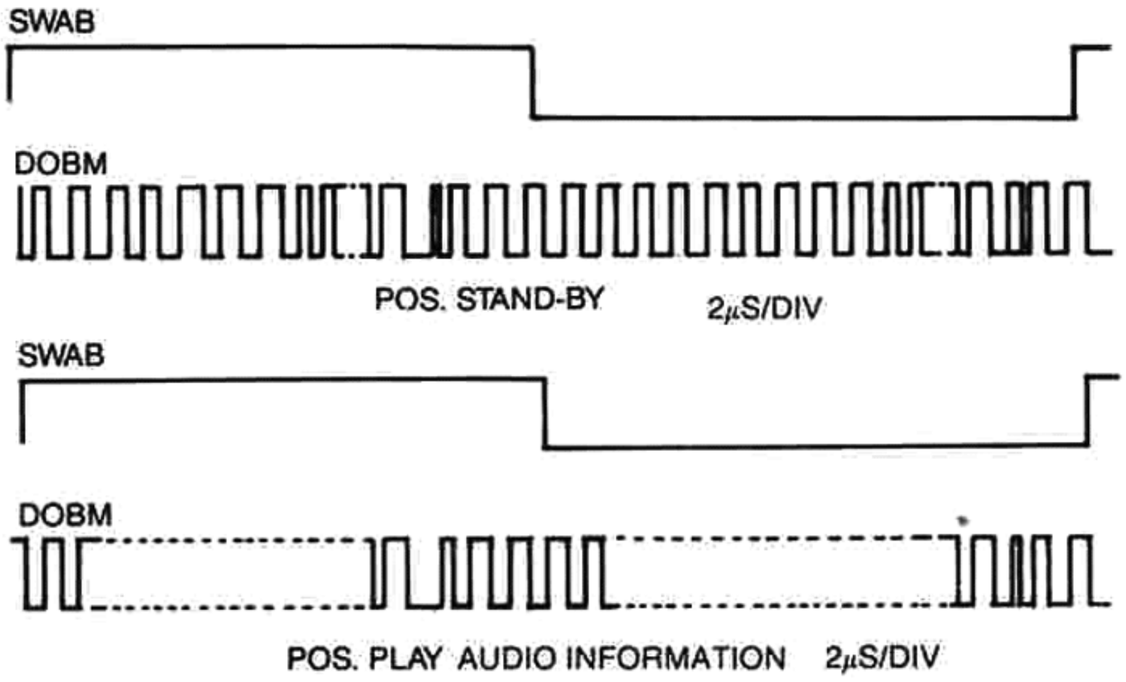
— Place a disc on the turntable.
— Select one of the following positions:
SERVICE POSITION 3 or position PLAY.
— Trigger the oscilloscope with the WSBD signal (Word Select from Filter B to DAC) test point 85 (pin 18).
Check the following signals:
WSBD at test point 85; pin 18
CLBD at test point 87; pin 16 (Clock signal from Filter B to DAC) and their interrelation.
If an Audio disc is used, there should be activity at test point 86 (pin 15) DABD signal (DATA from Filter B to DAC). If a disc with Digital Data (CD-ROM) is used, this point is continuously switched "low" by transistor 6315. In that case the word "data" appears on the display.



- **Check the DOBM signal (Digital Output)**

— Place a disc on the turntable.
— Select the stand-by mode (only main switch depressed).
— Trigger the oscilloscope with the SWAB signal (test point 78).

— Check the DOBM signal (test point 88; pin 14).
An empty audio signal has a fixed pattern.
See drawing, ''Stand-by''.
— Select the PLAY mode.
Check the DOBM signal. See drawing ''PLAY''.



- **In position SEARCH the $\overline{\text{ATSB}}$ signal is ''low'' test point 89; pin 24 (Attenuation Audio Signal)**

— When the ''μP panel'' is applied, (a sub-printed circuit board) that houses IC 251:
MAB8441P/T082, test point 89 is not connected.

- **Check the $\overline{\text{MUSB}}$ signal test point 90; pin 23 (Soft Mute)**

This signal is ''low'' in positions:
PAUSE
NEXT or PREVIOUS when jumping from one track to another.
Fast SEARCH when the Search button is kept depressed for some time.

IV DAC IC (Dual Digital Analog Converter)

- **Check the signals between Filter-B IC and DAC IC**

— See sub. ''III Filter-B IC'':
* Check the timing signals between Filter-B IC and DAC IC.

- **Check the output of the OP-AMP after the DAC IC**

— Place a disc on the turntable.
— In position PLAY or in SERVICE POSITION 3, the analog (music) signal should be present at the output of the OP-AMP, after the lead-in track has been read.

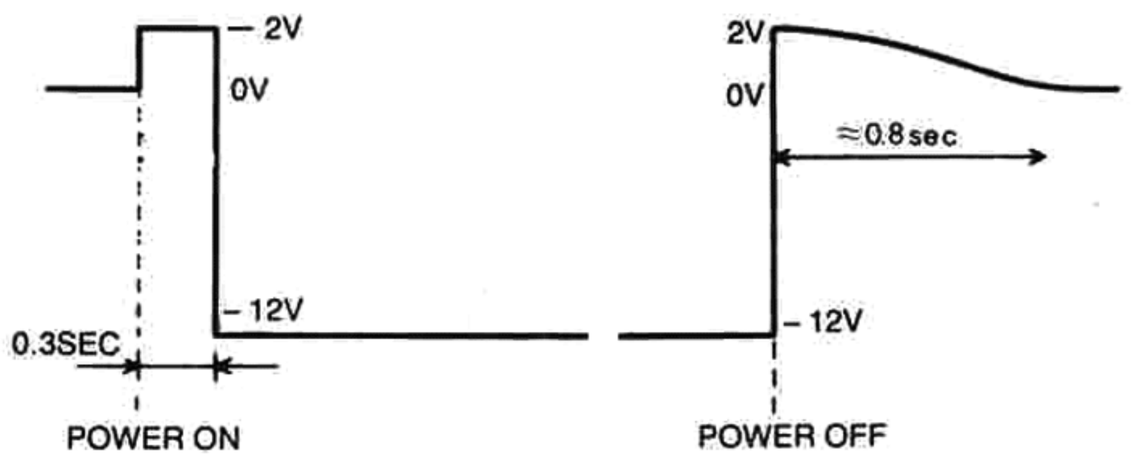
V DEEM CIRCUIT

- **Check DEEM circuit**

— Place test disc 5 on the turntable.
— During playback of track no. 14 (recorded without PRE-EMPHASIS).
the DEEM signal at test point 84 should be ''low''.
— During playback of track no. 15 (recorded with PRE-EMPHASIS), the DEEM signal at test point 84 should be ''high''
— During playback of track no. 14 the analogue signal should be present at the source of Q512 (test point 91) and Q510 (test point 92).
— During playback of track no. 15 the analog signal at the source of Q512 (test point 91) and Q510 (test point 92) should be 0 V.

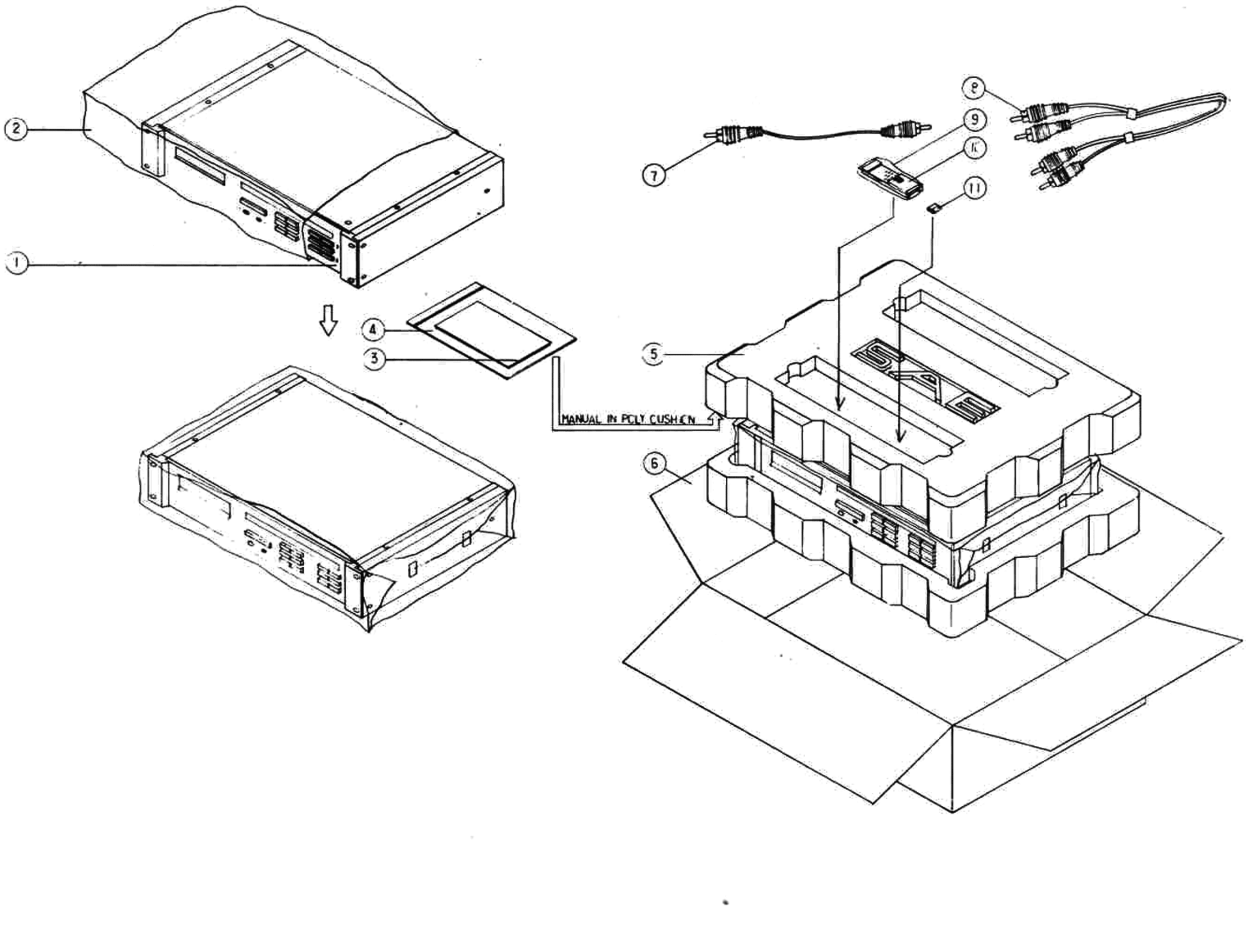
VI KILL CIRCUIT

— During switching on and off the main voltage the signal on the collector of Q507 (tp 93) should be as indicated in the figure below.



Packing

NO.	PARTS NO.	DESCRIPTION	Q'TY
1	0188700310	D102R SET	1
2	9705000610	POLY BAG	1
3	9007011652	MANUAL	1
4	9705001510	POLY BAG	1
5	9721000210	POLY CUSHION	1
6	049605047908	BOX CARTON	1
7	4328202410	RCA CORD	1
8	4328200510	RCA CORD	1
9	9705002010	POLY BAG	1
10	058670020113	COMMADDER NDER	1
11	5518000410	BATTERY	1



Parts List & Top View of P.C Boards

MAIN BOARD 4002512900

Ref No.	Parts No.	Description	Position
• IC			
IC601	2168613107	MA 7915UC	
IC602	2168611102	MC 7805C	
IC603	2168611103	MC 7815C	
IC604	2168600108	MC 7906C	
IC605	2168013125	MB 81416C-12	
IC606	2138000137	SAA 7210P	
IC607	2138000136	MAB 8441P T082	
IC608	2138000134	SAA 7220 P/A	
IC609	2138000135	TDA 1541	
IC510,IC611	2168000105	LM 833N	
IC6112	2138007124	TC 9176P	
IC613,IC614	2168600105	LM 833N	
• TRANSISTOR			
Q311	2208606104	KTC 1815Y	
Q320,Q323	2208606104	KTC 1815Y	
Q324	2208606104	KTC 1815Y	
Q330	2208606104	KTC 1815Y	
Q321	2208206105	KTA 1015Y	
Q325~Q327	2208206105	KTA 1015Y	
Q312~Q319	2008610102	2SD 1302	
Q331	2008610102	2SD 1302	
Q328,Q329	2018207114	2SK 117	
• DIODE			
D101~D108	2058106100	IN 4002	
D110~D112	2058106100	IN 4002	
D114~D125	2058106100	IN 4002	
D119,D120	2058106100	IN 4002	
D121~D123	2058106100	IN 4002	
D109~D113	2058306101	IN 4148	
D117	2058306101	IN 4148	
D124	2058306101	IN 4148	
D115	2058599101	ZENER RD 3.9 E82	
D116	2058599103	ZENER RD 5.1 EB2	
• COIL			
L401	2638710020	MATCHING TRANS COIL	
L402	2648601860	COIL FIXED 2.2μH	
L403	2648601860	COIL FIXED 2.2μH	
L404	2648060870	COIL FIXED 470μF1	
• CRYSTAL & RESONATOR			
	3938001040	CSA 6.00μMHz	
	3908101200	X-tal 11.2896μMHz	
• RESISTOR(Carbon Film ¼W)			
R501,R507	3069103270	10K ohm	4A
R502	3069104270	100K ohm	4A
R503,R506	3069101270	100 ohm	4A
R508,R511	3069101270	100 ohm	4A
R504,R509	3069122270	112K ohm	4A
R505,R550	3069471270	470 ohm	4A
R512,R522	3069103270	10K ohm	3A
R517	3069103270	10K ohm	3A
R513,R516	3069101270	100 ohm	3A
R518,R211	3069101270	100 ohm	3A
R514,R519	3069122270	1.2K ohm	3A
R515,R520	3069471270	470 ohm	3A
R523	3069563270	56K ohm	4D
R526	3069333270	33K ohm	2A
R527	3069272270	2.7K ohm	2A
R528	3069392270	3.9K ohm	2B
R529	3069565270	5.6Mohm	1B
R530	3069563270	56K ohm	2B
R531	3069472270	4.7K ohm	2B
R532	3069153270	150K ohm	1B
R533,R534	3069101270	100 ohm	3B
R535,R537	3069104270	100K ohm	4A
R539,R540	3069104270	100K ohm	4B,3B
R536,A538	3069224270	220K ohm	3A,3B
R541~R543	3069103270	10K ohm	4B
R544	3069392270	3.9K ohm	2B
R545	3069479270	4.7 ohm	2B
R548,R550	3069242240	2.4K ohm(2%)	4B,3B
R549,R551	3069101270	100 ohm	4B,3B
R552,R560	3069242240	2.4K ohm(2%)	4C,3C
R553,R559	3069101270	100 ohm	4C,3C

Ref No.	Parts No.	Description	Position
R554,R561	3069182240	1.8K ohm(2%)	4C,3C
R555,R537	3069475270	4.7Mohm	4C
R558,R562			4C,3C
R556,R563	3069102240	1K ohm(2%)	4C,3C
R564	3069472270	4.7K ohm	3C
R565,R567	3069223270	22K ohm	3C,2B
R566	3069154270	150K ohm	3C
R568	3069182270	1.8K ohm	2B
R569	3069761270	760 ohm	2B
R570	3069470270	47 ohm	1B
R571,R578	3069223270	22K ohm	1B,2C
R572	3069122270	1.2K ohm	1B
R573	3069222270	2.2K ohm	1C
R574,R575	3069223270	22K ohm	1C
R576,R580	3069229270	2.2 ohm	1D,2C
R577	3069105270	1Mohm	2C
R579	3069472270	4.7K ohm	2C
R581~R587	3069223270	22K ohm	2C
R524	3069223270	22K ohm	2C
R589,R590	3069223270	22K ohm	1D
R588	3069154270	150K ohm	2D
R591	3069333270	33K ohm	3D
R592	3069109270	1 ohm	3D
R593,R594	3069100260	10 ohm	4C
R595	3069479270	4.7 ohm	3D
R596	3069392270	3.9K ohm	4D
R597	3069561270	560 ohm	4D
R598	3069470270	47 ohm	4D
R599	3069621270	620 ohm	4D
• CAPACITOR			
C201~C208	3579473534	C.0.047μF 50V	1A
C209,C214	3579104534	C.0.1μF 50V	1B,2A
C210,C211	3579473534	C.0.047μF 50V	1B
C212,C215	3479247041	E.47μF 25V	1A,2A
C219,C222	3479247041	E.47μF 25V	
C213,C218	3409222171	E.220μF 50V	1A,1B
C216	3409210231	E.1000μF 16V	1A
C217	3409268231	E.6800μF 16V	1A
C220	3409210171	E.100μF 50V	2A
C221,C230	3579223530	C.0.022μF 50V	2B,2C
C223	3579473534	C.0.047μF 50V	1B
C224	3479233971	E.3.3μF 50V	1B
C225	3609224122	M 0.22μF 100V	1C
C226	3579470130	C.47PF 50V	3C
C227,C242	3479210971	E.1μF 50V	1C,3D
C228	3509182530	C.0.0018μF 50V	1C
C229	3579222971	E.2.2μF 50V	2C
C231,C235	3479247041	E.47μF 25V	2C,3C
C241	3479247041	E.47μF 25V	3D
C246,C248	3479247041	E.47μF 25V	4D
C232,C233	3529330210	C.33PF 50V(CH)	2C
C234	3579473534	C.0.047μF 50V	3B
C237,C238	3579470134	C.47PF 50V(CH)	1D
C240	3579223530	C.0.022μF 50V	2D
C245,C247	3579473534	C.0.047μF 50V	3D
C249~C262	3579104534	C.0.1μF 50V	4C,4D
C263	3579681230	C.680PF 50V	3C
C264	3579473534	C.0.047μF 50V	3C
C265	3479247041	E.47μF 25V	3C
C269,C270	3479247041	E.47μF 25V	3C,4C
C277,C278	3479247041	E.47μF 25V	3C,4C
C266,C274	3679472120	M.0.0047μF 100V	3C,4C
C267,C275	3679153120	M.0.015μF 100V	3C,4C
C268,C276	3679202120	M.0.002μF 100V	3C,4C
C271,C279	3679102120	M.0.001μF 100V	3B,4B
C272,C280	3679222120	M0.0022μF 100V	3B,4B
C273,C281	3409210121	E.100μF 10V	3B,4B
C282~C285	3579222971	E.2.2μF 50V	3B,4B
C286,C287	3579473534	C.0.047μF 50V	3B
C289,C290	3409210171	E.100μF 50V	3B
C291~C294	3979222971	E.2.2μF 50V	3A,4A
C295~C297	3679122120	M0.0012μF 100V	4B
C298,C299	3409210121	E.100μF 10V	4A

CONTROL & DISPLAY BOARD-A
4002513000

Ref No.	Parts No.	Descfiption	Position
• IC			
IC201	2138300138	MAB 8441P T042	B
IC202	2130309101	DWP 200	C
IC203	2108000100	74 LS04	C
IC204	2168000114	MC 4558C	C
• TRANSISTOR			
Q201,Q202	2208206105	KTA 1015Y	A
Q203~Q206	2208606104	KTC 1815Y	A,B
• DIODE			
D101,D102	2058513103	Zenner RD 5.1EB2	A
D203~D207	2058306101	IN 4148	B,C
• RESISTOR			
R201,R204	3069472270	CF. 4.7K ohm ¼W	A
R206,R210	3069472270	CF. 4.7K ohm ¼W	A
R214~R220	3069472270	CF. 4.7K ohm ¼W	B,C
R205,R207	3069330270	CF. 330 ohm ¼W	A
R209,R211	3069330270	CF. 330ohm ¼W	
R208	3069109270	CF. 1 ohm ¼W	A
R212	3069229270	CF. 2.2 ohm ¼W	A
R213	3069105270	CF. 1M ohm ¼W	B
R221	3069150270	CF. 150 ohm ¼W	C
R222	3069152270	CF. 1.5K ohm ¼W	C
R223,R230	3069222270	CF. 2.2K ohm ¼W	C
R224	3069103270	CF. 10K ohm ¼ W	C
R225,R227	3069102270	CF. 1K ohm ¼W	C
R228,R229	3069102270	CF. 1K ohm ¼ W	C
R226	3069473270	CF. 47K ohm ¼W	C
• CAPCITOR			
C201,C211	3579473534	C. 0.047μF 50V	A,C
C204~C207	3529330210	C. 33P(CH)50V	B
C212	3579103530	C. 0.01μF 50V	C
C202	3479210071	E. 10μF 50V	A
C203,C213	3479247031	E. 47μF 50V	A,C
C206	3479247871	E. 0.47μF 50V	B
C210	3479210121	E. 100μF 10V	C
• X-TAL			
	3908101150	6MHz	B
	3908101140	4MHz	

CONTROL & DISPLAY BOARD-B
4002513010

Ref No.	Parts No.	Description	Position
• IC			
IC205	2168000115	LTM 8563	A
RCVR201	2138000129	BX-1387	D
• TRANSISTOR			
Q207,Q208	2008610102	2SD 1302	D
• LED			
LD201~LD209	2308170101	SLP141B-RD	B,C,D
LD205	2308220132	SLT-3SUR3	C
LD207	2308170301	SLP241B-RD	D
• RESISTOR			
R231,R233	3069339270	CF. 3.3 ohm ¼W	A
R234			
R232	3069123270	CF. 12K ohm ¼W	A
R234,R241	3069330270	CF. 330 ohm ¼W	D
R235,R239	3069472270	CF. 4.7K ohm ¼W	D
R240	3069472270	CF. 4.7K ohm ¼W	D
R236,R237	3069103270	CF. 10K ohm ¼W	D
R238	3069220270	CF. 220 ohm ¼W	D
• CAPACITOR			
C214	3579103530	C. 0.01μF 50V	A

FUSE BOARD
4002513020

Ref No.	Parts No.	Description	Posistion
• IC			
IC501	2168611102	MC 7805C	
RLY501	5528001330	HR-CR 313 DC12	
• TRARSISTOR			
Q501	2008609101	MPS A05	
• DIODE			
D501~D506	2058106100	IN 4002	
• RESISTOR			
R501	3039220572	MO 22 ohm 2W	
R502	3039100572	MO 10 ohm 2W	
R503	3069392270	CF 3.9K ohm ¼W	
R504	3069102270	CF. 1K ohm ¼W	
• CAPACITOR			
C501	3409222231	E. 2200μF 16V	
C503	3479210131	E.100μF 16V	
C502,C504	3579473534	C. 0.047μF 50V	
C505	3549472407	C. 0.0047μF 400VAC	
• FUSE			
F501	5508211231	NB 0.25A 250(UL/CSA)	
F503	5508211631	NB 0.5A 250V(UL/CSA)	
• TRANSFORMER			
	2828046507	STANDBY XFMR	
	2828062207	MAIN XFMR	

H.P BOARD
4002513030

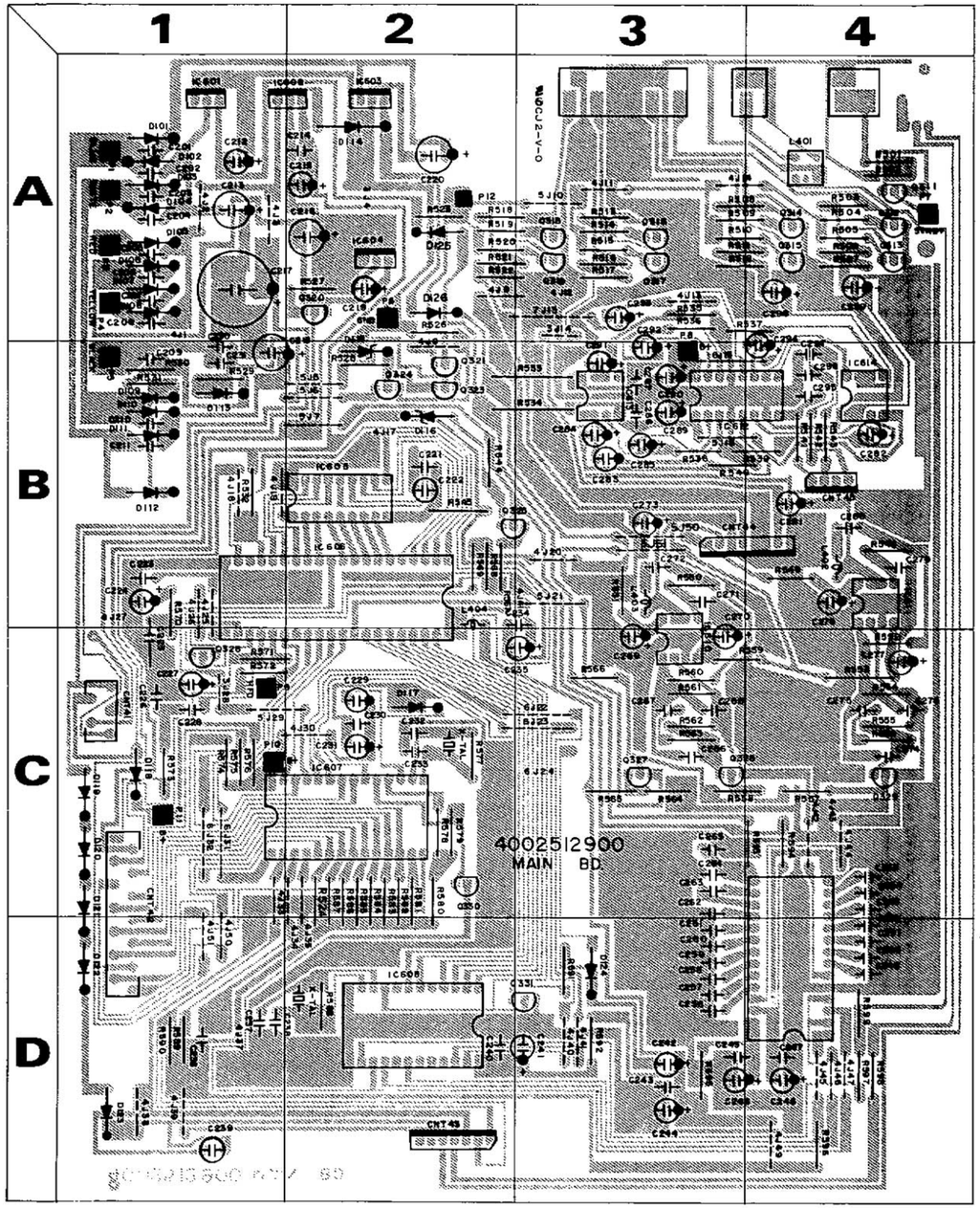
Ref No.	Parts No.	Description	Position
• IC			
IC601	2168020101	NJM 4560S	
• TRANSISTOR			
Q601,Q603	2008209101	MPS A55	
Q602,Q604	2008609101	MPS A05	
• DIODE			
D601~D604	2058306101	IN 4148	
• RESISTOR			
R601,R608	3069153270	CF. 15K ohm ¼W	
R602,R603	3069102270	CF. 1K ohm ¼W	
R606,R607	3069104270	CF. 100K ohm ¼W	
R609,R613	3069152270	CF. 1.5K ohm ¼W	
R617,R620	3069100270	CF. 10 ohm ¼W	
R610,R612	3069100270	CF. 10ohm ¼W	
R617,R618	3069100270	CF. 10ohm ¼W	
R623,R624	3069180270	CF. 10ohm ¼W	
R611,R622	3069180270	CF.18 ohm ¼W	
R614,R621	3069123270	CF. 12K ohm ¼W	
VR601		VR 50KB	
• CAPACITOR			
C601,C604	3479247031	E. 47μF 16V	
C607,C608	3479247031	E. 47μF 16V	
C603,C605	3479210071	E. 10μF 50V	
C602,C606	3579221130	C. 220PF 50V	
C698,C699			
C609,C610	3579200130	C. 20PF 50V	

COMMANDER BOARD 4005511300

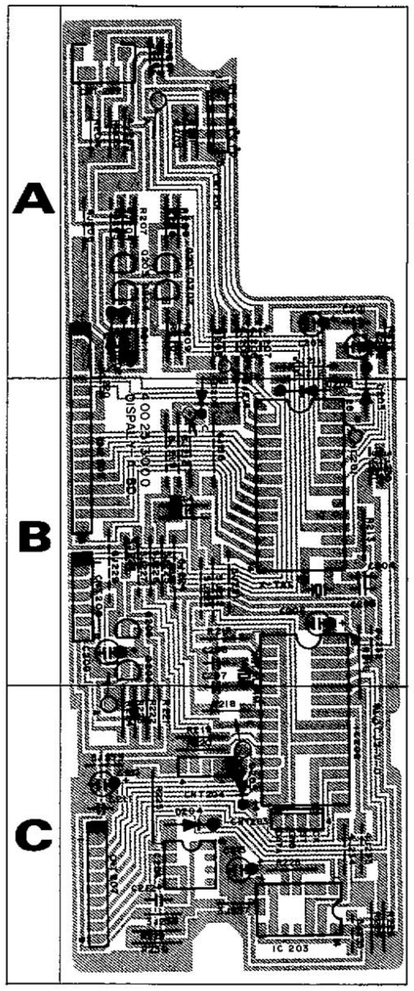
Ref No.	Parts No.	Description	Position
• IC			
IC901	5568100001	IC SAA 3006P	
• TRANSISTOR			
Q901	2208206105	KTA 1015Y	
Q902.Q903	2208606104	KTC 1815Y	
• DIODE			
D901.D902	2058306101	IN 4148	
D903	2408001100	I.R.EL-IL2	
D904	2308060105	LED KLR 226ERD	
• CAPACITOR			
CSB901	3908001250	R Ceramic Resonator CSB429P	
• RESISTOR			
R905.R906	3069109270	CF. 1 ohm ¼WJ	
R902.R907	3069101270	CF. 100 ohm ¼WJ	
R908			
R901	3069102270	CF. 1K ohm ¼WJ	
R904	3069472270	CF. 4.7K ohm ¼WJ	
R903.R909	3069562270	CF. 5.6K ohm ¼WJ	
• CAPACITOR			
C902	3529560210	Ceramic 56PF(CH) 50WV	
C901	3409210121	E. AF. RSA 100μF 10WV	

Top View of P.C Boards

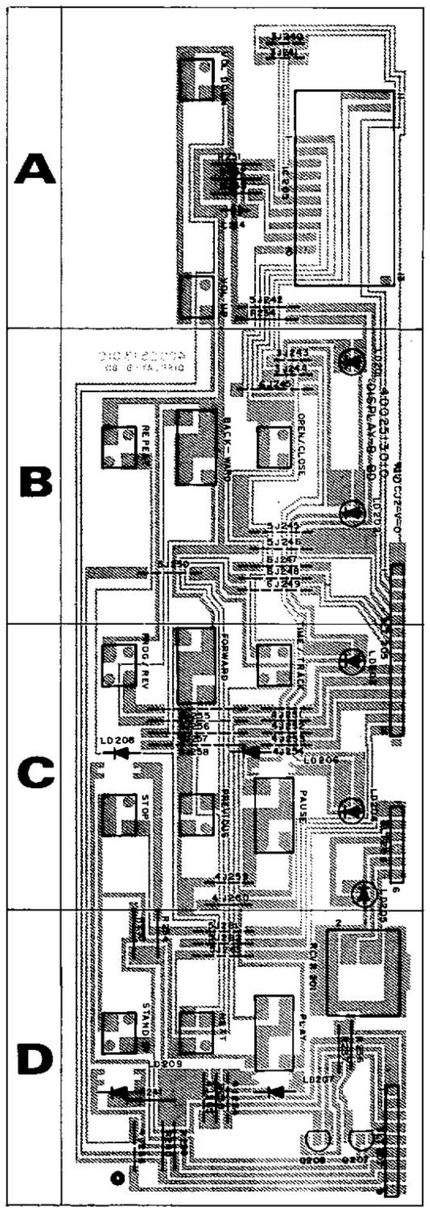
MAIN BOARD 4002512900



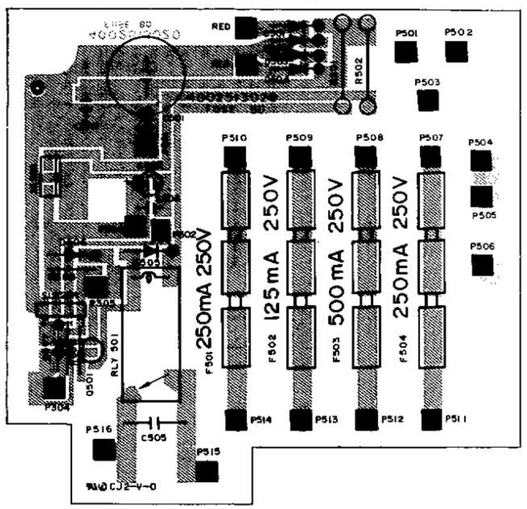
DISPLAY BOARD-A 4002513000



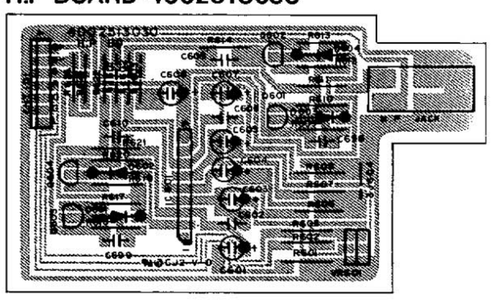
DISPLAY BOARD-B 4002513010



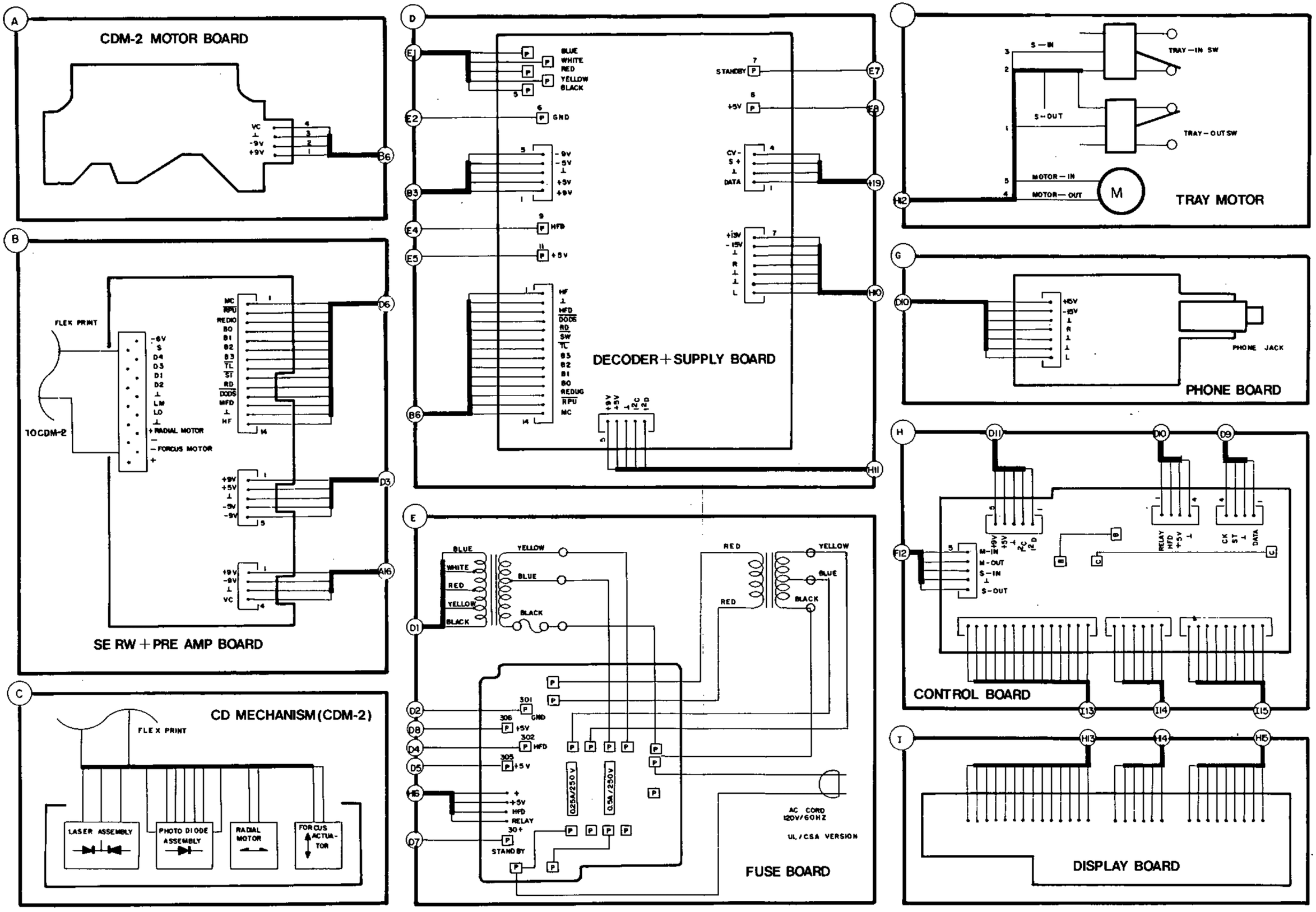
FUSE BOARD 4002513020



H.P BOARD 4002513030

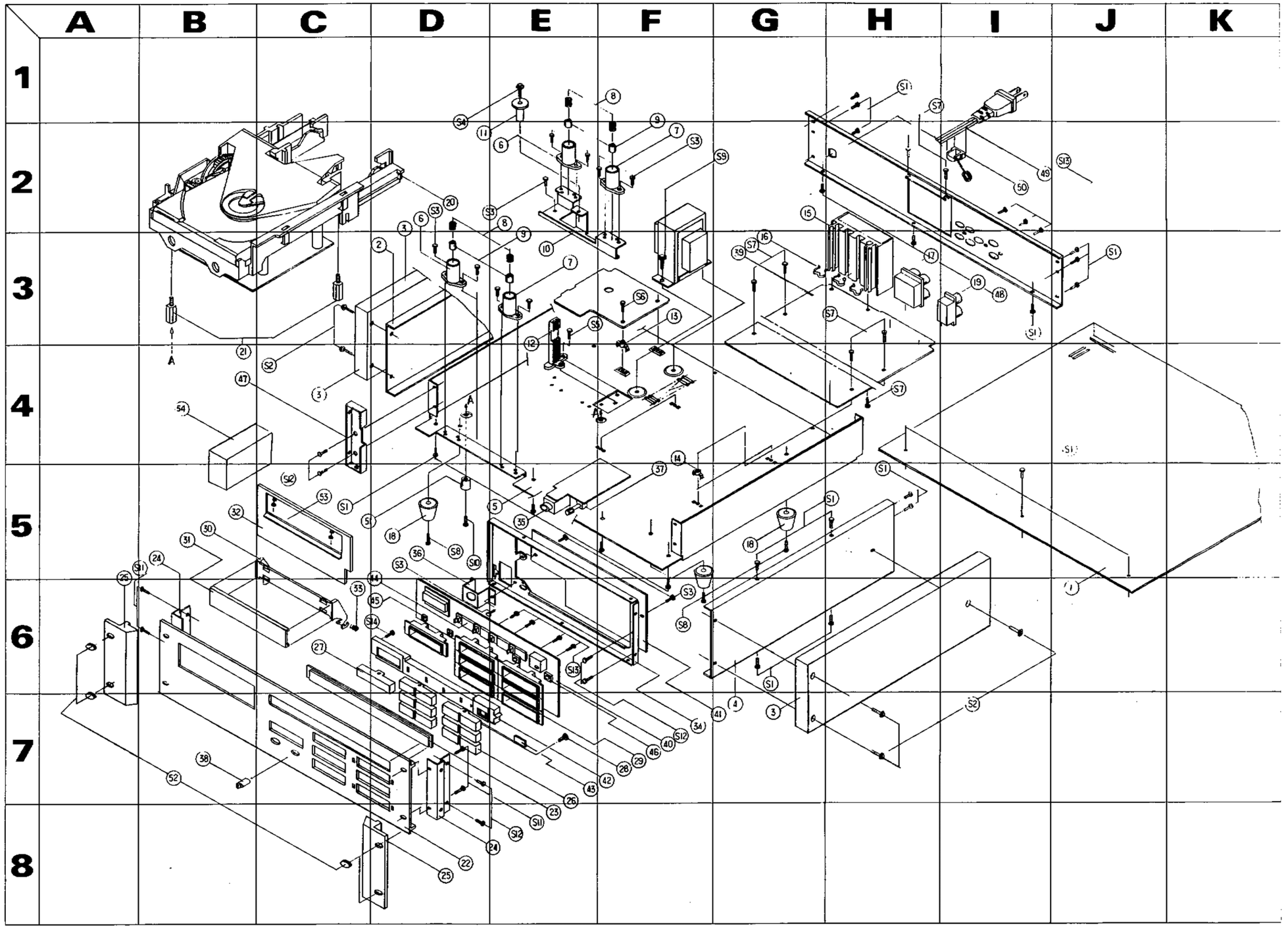


Point to Point Wiring Diagram



Parts List & Exploded View of Cabinet & Chassis

NO.	PARTS NO.	DESCRIPTION	Q'TY	POSITION
1	0461220089 13	COVER TOP	1	J5
2	0461230018 13	COVER SIDE L	1	D2
3	8683000510	WOODEN END CAP	2	G7,C4
4	0461230018 14	COVER SIDE R	1	G6
5	6122613410	CHASSIS MAIN	1	E5
6	6535004410	SUPPORTER L	2	D2,E2
7	6535004420	SUPPORTER R	2	E3,F2
8	6555004910	SPRING CUSHION	4	E2,F1
9	6715011210	CUSHION RUBBER	4	E2,F1
10	6503008910	BKT MECHANISM	1	E3
11	6535004210	SUPPORTER MECHA	1	E2
12	6045006010	INTERVAL GUIDE	1	E3
13	670500020	SPACER NYLON	2	F3
14	6705004210	SPACER NYLON	2	F4
15	7505101420	HEAT SINK	1	G2
16	6515009110	HOLDER IC	3	G2
17	4438100410	JACK RCA(4P)	1	H3
18	6335002210	FOOT	4	G5,D5
19	4438101510	JACK RCA(2P)	1	I3
20	57080074101	CDP MECHA ASS'Y	1	D2
21	6535004310	TRANSFIX MECHA	2	B3
22	048602014011	PANEL FRONT	1	D8
23	8555006330	WINDOW DISPLAY	1	E7
24	6503005911	BKT PANEL	2	E8
25	048663000111	BASE RECK MOUNT	2	D8
26	8543002810	BTN SEE SAW	6	E7
27	8543002820	BTN SEE SAW	1	C6
28	6045005100	BTN INSERT	4	E7 F7
29	8523005410	BASE BUTTOM	7	F7
30	8523008310	LID TRAY	1	B5
31	048625001211	PLATE LID TRAY	1	B5
32	6042000310	GUIDE LID TRAY	1	B5
33	6555004810	SPRING LID TRAY	1	C6
34	6123007610	CHASSIS FRONT	1	F7
35	4308000810	PHONE JACK	1	E5
36	6505072410	BKT PHONE JACK	1	D5
37	3228010910	ROUND VR(50K AX2)	1	F4
38	8545010210	KNOB CONTROL	1	B7
39	4002512900	PCB MAIN	1	G3
40	054002500452	PCB DISPLAY 1	1	F7
41	054002500453	PCB DISPLAY 2	1	G7
42	8523008210	COVER DISPLAY	1	F7
43	8555015210	WINDOWREMOCON	1	E7
44	8525006410	GUIDE LED	1	D5
45	4658001810	TACT SW(EVQ-QS30)	10	D6
46	4658002810	TACT SW(SKHDAB0002)	4	F7
47	6505072510	BKT FRONT CHASSIS	1	B4
48	046102018911	CHASSIS BACK	1	I3 I3
49	4308001410	CORD AC POWER	1	I2
50	6518000710	STOPPER CORD	1	I2
51	6045004910	GUIDE SCREW	2	C5
52	8585004010	CAP HANDLE HOLE	4	C7
53	6715011310	CUSHION LID TRAY	2	C5
54	6715014140	GUIDE RUBBER	1	B4
S1	8109535083	SCREW # 3 BT 3.5x8B	0	J4,G6,H4
S2	8159535203	SCREW # 3 BT 3.5x20B	2	I3,C5, J3 I8,C4
S3	8119430061	SCREW SAM 3x6Y	6	D2,E2,F2 D5,F6
S4	8159430201	SCREW WSAM3x20Y	4	D1
S5	8119430081	SCREW SAM2x8Y	1	E3
S6	8109230141	SCREW #2 BTC3x14Y	1	F3
S7	8109230101	SCREW #2 BTC3x10Y	2	H3,H4,H1
S8	8009140083	SCREW BM4x8B	2	F6,D5
S9	8159440083	SCREW WSAM4x8B	8	G2
S10	8009130101	SCREW BM3x10Y	4	D5
S11	8069140101	SCREW WPM 4x10Y	2	E8
S12	8109535081	SCREW #3 BT 3.5x8Y	2	F7,G5,E7 A5
S13	8119130083	SCREW #1 PT 3x8B	17	E6,J2
S14	8119130061	SCREW #1 PT 3x6Y	3	D6



Block Diagram