Compact disc player CD371/00R/05R/30R/35R

Service
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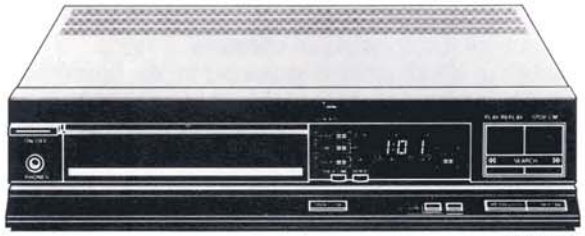

Service Manual

COMPACT disc DIGITAL AUDIO

CONTENTS

For repair of the CD mechanism refer to Service Manual CDM-2, version 0500.

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

CLASS 1 LASER PRODUCT

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COMPACT disc DIGITAL AUDIO

1. EXPLANATION ON THE LAYOUT OF THE DOCUMENTATION

The documentation consists of chapters.
The number of the chapter is indicated by the first digit of the page number.
The second digit of the page number is the sequence numbering.

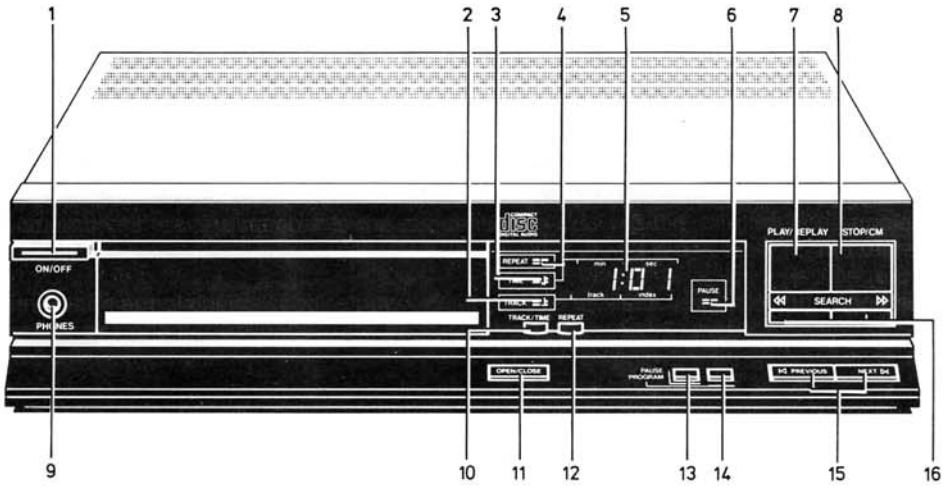
If modifications or supplements require new supplementary or replacement pages, the page number is extended with a third part:

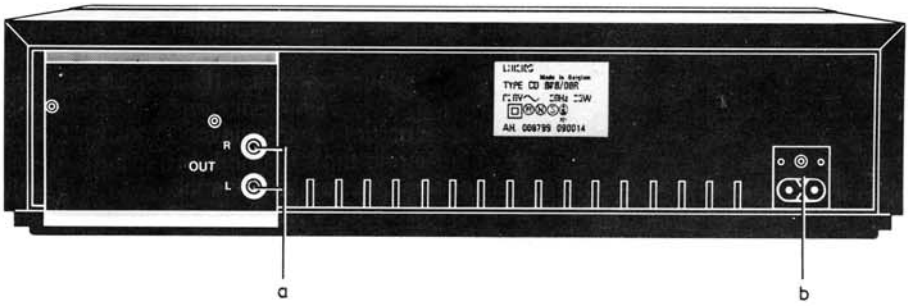
A digit behind the page number indicates that it concerns a supplementary page.
A replacement page is indicated by a letter behind the page number.

Example

3-6	is page 6 of chapter 3
3-6-1	is a supplementary page behind page 3-6
3-6-a	is the replacement page of page 3-6 (so page 3-6 can be removed from the documentation).

TABLE OF CONTENTS PER PAGE





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2. CONTROLS

1 "ON/OFF" key: for switching the player on and off.
2 Track Led: lights during display of track numbers.
3 Time Led: lights during display of playing time.
4 Repeat Led: lights when you press the "REPEAT" key.
5 Display: functions as on/off indicator; gives information about the number of tracks on the disc, the playing time, the progress of play and particular functions of the player, and signals any faults occurring during operation or programming.
6 Pause Led lights when you press the "PAUSE" key.
7 "PLAY/REPLAY" key: for starting play ("PLAY") and returning to the beginning of a track ("REPLAY").
8 "STOP/CM" key: for stopping play during playback ("STOP") and for erasing a programme (CM = Clear Memory).
9 "PHONES" socket: for the connection of a headphone for listening to discs without using an amplifier.
10 "TRACK/TIME" key: for switching from track number to playing time indication and vice-versa.
11 "OPEN/CLOSE" key: for opening and closing the disc tray.
12 "REPEAT" key: for repeating a disc or a programme.
13 "PAUSE" key: for holding play at the start of a track or passage and for interrupting play.
14 "PROGRAM" key: for storing the track numbers of a programme and producing the display of the programme stored.
15 "PREVIOUS/NEXT" keys: for indicating the track number you want to begin with, and selecting track numbers when compiling a programme (◁ from high to low and ▷ from low to high); also for returning to a previous track number or moving on to a later one during play.
16 "◁◁ SEARCH ▷▷" keys: for fast search to a particular passage (◁◁ backwards, ▷▷ forwards).

a. Out: for the signal output cable to the amplifier.
b. Connections for the mains lead.

TECHNICAL SPECIFICATION

- System : Compact Disc Digital Audio system
- Mainsvoltages : 110 V, 127 V, 220 V, 240 V ± 10% (to be changed by transformer connections)
- Mains frequencies : 50-60 Hz (no adaption required)
- Power consumption : 14 W
- Frequency range : 2 Hz + 20 kHz ± 0,05 dB
- Output voltage : max. 2 V_{rms}/⩾10 kOhms
- Output impedance : 200 Ohms
- S/N ratio : ⩾96 dB
- Chanell separation : ⩾93 dB
- Total harmonic distortion : ⩽0,003% (-90 dB)
- Intermodulation distortion : ⩽0,003% (-90 dB)
- De-emphasis : 0 or 15/50 µs (switched by the subcode on the disc)
- Dimensions wxhxd : 360 x 300 x 80 mm (tray closed) 360 x 425 x 80 mm (tray opened)
- Weight : approx. 2.9 kg
- Headphone
  - Output voltage : max. 5.6 Vrms
  - Output impedance : 150 Ω
  - Load impedance range : 8 Ω - 2 kΩ
  - Output power : 30 mW at 32 Ω

SERVICE AIDS

Audio test disc	4822 397 30085
Disc without errors + disc with DO errors, black spots and fingerprints	4822 397 30096
Torx screwdrivers	
Set (straight)	4822 395 50145
Set (square)	4822 395 50132
13th order filter	4822 395 30204
Service cable (4-pole)	4822 321 21284
Service cable (14-pole)	4822 322 40066
Service connector (14-pole)	4822 267 50676
Green LED CQYG II	5322 130 32182

3. SERVICING HINTS

ESD

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

The disc should always rest properly on the turntable.
To achieve this a disc hold-down has been mounted in the cover.
When the cover has to be taken from the set for repair, a separate hold down should be used.
Switch SK2 has to be interconnected.
The set can be used normally.

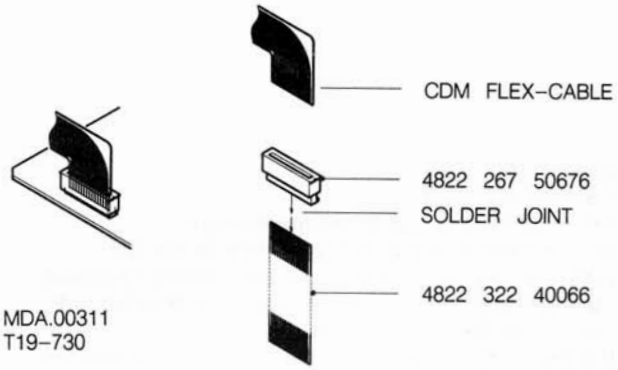
In the set chip components have been applied.
For disassembly and assembly of chip components see the figure below.
For measurements and adjustments it is possible to position the working mechanism outside the set.
To do this work the following service aids are available:

- Service cable (4-pole 4822 321 21284
- Service flat cable (14-pole) 4822 322 40066
- Service connector (14-pole) 4822 267 50676

These two items should be used to assemble an extension calbe between connector 11 and the flex cable of the CDM-2 unit.

Remark: The service cable should be assembled as follows (see drawing MDA 00311).

The 14-pole connector should be soldered as indicated in the drawing. Please remove the blue tape of the rear of the service flat cable-end which has to be connected to connector 11.



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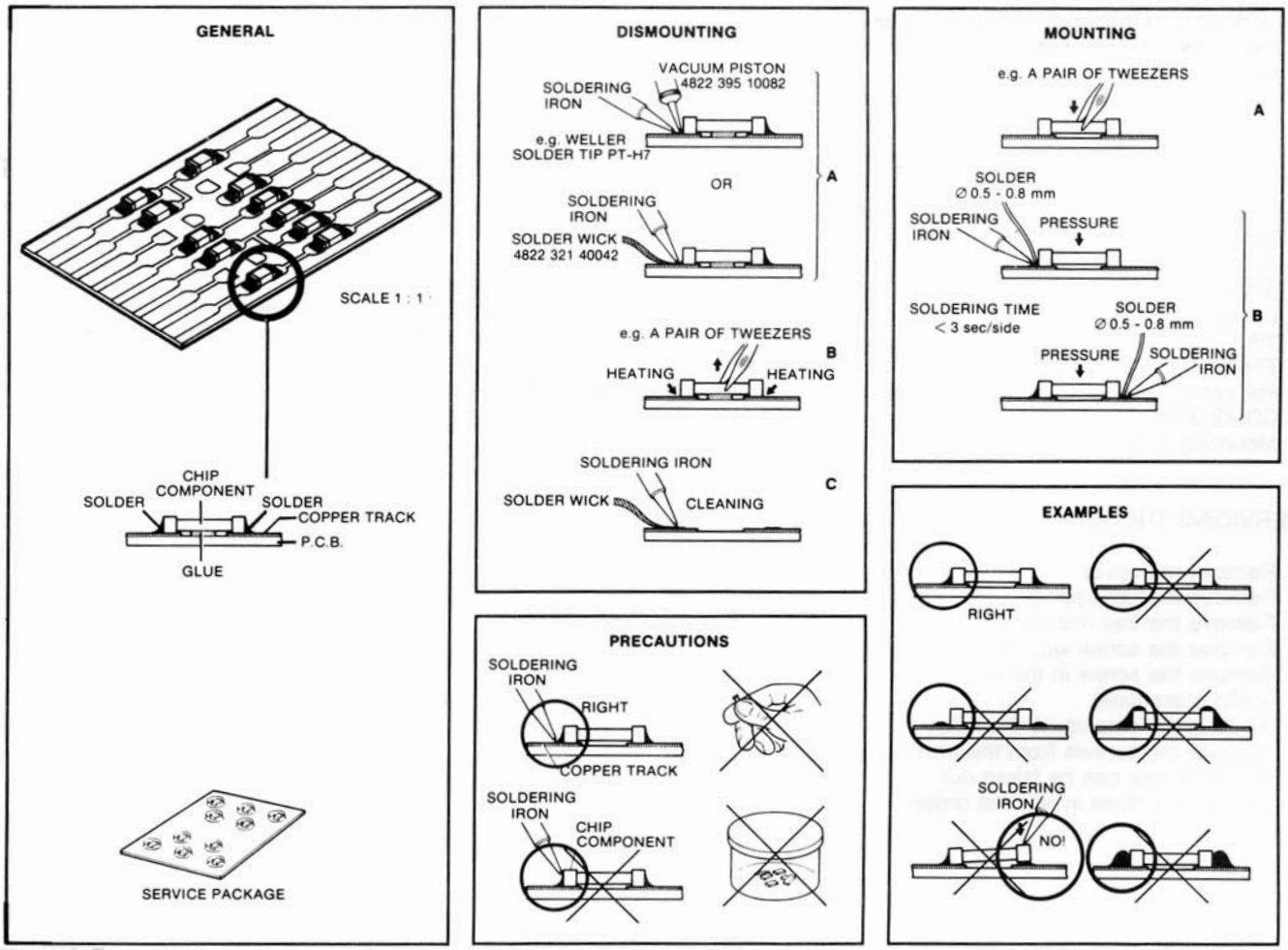

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Fig. 1

DISASSEMBLY OF TOP COVER

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

SERVICING OF THE FRONT PANEL

Disassembly of front panel

- Remove top cover.
- Remove the 3 fixing screws at upper side of front panel.
- Now the front panel can be taken off.
- Ensure during mounting that the 3 bosses of the set frame engage with the appropriate holes of the frontpanel.

Disassembly of control + display panel

- The control and display PCB can be detached by removing the 4 screws 3Mx16 at the bottom of the display panel.
- Then the control + display panel can be taken out of the front.
- When mounting, make sure that the 2 bosses on the PCB slip into the appropriate holes in the front.

SERVICING OF THE TRAY MECHANISM

- Demounting the tray mechanism.
- Remove the top cover.
- Remove the front.
- Remove the tray out of the mechanism.
- Remove the screw from the bottom of the set.
- Undo the 3 screws with which the loading has been mounted into the set. Two screws are situated in front and one in the centre at the rear.
- Lift the tray mechanism a little and undo the flexible PCB from the connector by lifting the upper part of the connector and taking the flexible PCB out. Short circuit the connections by means of a paperclip.
- Undo the 2 stocko connectors.
- Now take the tray mechanism out of the set.

DEMOUNTING THE CDM

- Remove the complete disk hold-down.
- Turn the loading upside down.
- Support the CDM.
- Loosen the 2 screws on the metal bracket with which the CDM is suspended.
- The CDM can now be removed.
- For servicing the CDM see Service Manual CDM2/0500.
- Mounting is done in reverse order.

SERVICING THE SERVO + DECODER PANEL

- Remove top cover.
- Remove the front panel.
- Remove the tray mechanism.
- Remove the screw with which the chassis part is fixed.
- Remove the screw in the rear with which the CINCH sockets are fixed.
- Remove the screws on the PCB.
- Remove the screws from the transformer.
- The PCB now can be taken out.
- Mounting is done in reverse order.

REPLACEMENT OF TRANSFORMER FUSE

- For replacing the transformer fuse the transformer must be desoldered from the main panel.

4. ELECTRICAL MEASUREMENTS AND ADJUSTMENTS

HINTS

Test disc

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 circuit 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 voltages at the inputs will not be given. The DC voltages at the inputs are equal.

Simulation with "0" and "1"

During troubleshooting sometimes certain points should be connected to ground or supply voltage. As a result certain circuit 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 problems.
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 "0" or ground if this is stated explicity.

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 supply voltage of the related circuit.

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 first 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 have the correct values.
c. Check the good working of the CD mechanism by means of the servicing programme.

Indication of test points

In the drawings of the diagrams and the panels 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 testpoints indicated.

Initialization of the service program of the µP

- **Servicing position "0"**

  Press the STOP/CM, NEXT and PAUSE keys. Keep these three keys depressed while switching on the mains voltage. This is the 1st standby position. The number of the internal ROM program of the µP (e.g. P101) appears on the display. The "TRACK" Led lights up as well. In this position the radial arm of the CDM can be driven inwards (with SEARCH≫) and outwards (with ≪SEARCH) with minimum torque. When one of these search keys is actuated, laser control and focus control become active as well. If a disc is put on the turntable, the working of the focus control can already be observed in this position. (If the arm moves outwards and inwards, you can hear the optical pick-up unit jump across the tracks).
  Attention: After one of these keys (SEARCH ≫, ≪SEARCH) is pressed, the laser remains controlled up to service position 3.
  Avoid, therefore, direct exposure to the laser beam in service positions 0, 1 and 2).

- **Servicing position "1"**

  From service position "0" the player can be brought into service position "1" by pressing the "NEXT" key. The indication "0001" appears on the display. In this position the focus start procedure is repeated over and over again. The laser control is active.
  However, this start procedure does not release the focus control. So we cannot ascertain that the focal point is found. This position is very suitable, however, for measurements of the focus circuit.
  In service positions 1 and 2 the arm with the rafoc unit can be moved inwards and outwards with the SEARCH≪ key and the ≫SEARCH key respectively. In this way the free movement of the arm under the disc can be checked.

  sturen. Daarmee kan de vrije beweging van de arm onder de plaat worden gekontroleerd.

- **Service position "2"**

  To be attained by pressing the "NEXT" key after service position "1" is reached. The indication "0002" appears on the display. Make sure that the rafoc unit is within the reach of the disc. If a disc is put on the turntable in this position, the working of the decoder (MC signal) and the turntable motor control can be checked (turntable motor is running at the right speed). Laser control, focus control and turntable motor control are active. This position is very suitable for measurements of the turntable motor control. If the HF signal is not well coded or if no disc is present, the turntable motor will start rotating at maximum speed.

- **Service position "3"**

  To be attained by pressing the "NEXT" key after service position "2" is reached. The indication "0003" appears briefly on the display. Then the normal standby display is shown. the set is now in the 2nd standby position. All keys have their original function again. In case of deviations an extensive error indication takes place via the display.
- If the µP observes a system error, a system error indication will appear on the display: Er 01 to Er 08.
- If the µP observes an operating error, an operating error indication will appear on the display for 1.5 sec.: Er 30 to Er 37 and Er 60 to Er 61.
  For an explanation of the error indications: See Error table.

  The service program can be abandoned by turning the mains switch (POWER ON/OFF) off and on again (Hardware reset).

ERROR TABLE

Er 01: RD pulse is missing. Check the start capacity Sc, the RD signal and the photodiode signal processor. (Starting error)
Er 02: $\overline{TL}$ pulse is missing during start-up. Check the $\overline{TL}$ signal, the HF-signal and the Photodiode signal processor. (Starting error)
Er 03: Lead-in track not found. Check the disc used. Check also that the radial arm rests against the inside. Check the RE-dig signal and the Radial error processor. (Starting error)
Er 04: Too many $\overline{TL}$ pulses during play. Check the quality of the disc used. Check the HFD signal. (Error during PLAY)
Er 05: $\overline{TL}$ pulse is low for more than 50 msec. Check the disc used. Check the HF-in signal and the photodiodes (Error during PLAY).
Er 06: No $\overline{TL}$ pulse received within 0.5 sec. during track jumping. Check the RE-lag circuit. (Error during SEARCH or NEXT/PREVIOUS)
Er 07: Subcode error. In case of track loss during play the information of the subcode is used to determine the place of the last information that was still well readable. In case of an interruption of HF or other signals, this will lead to Er 07. (Error during PLAY)
Er 08: TOC error (Table of Contents). Check the quality of the disc used. Check the initial speed of the turntable motor and the motor control. Check also that the radial arm rests against the inside. (Starting error)

Temporary errors

Er 30: NEXT when repeat is off.
Er 31: PREVIOUS when repeat is off.
Er 32: INDEX selected when no track selected.
Er 33: Selected index does not exist on this CD.
Er 34: Review error: no program.
Er 35: Program memory full.
Er 36: Programmed track is non existing on this CD.
Er 37: Selected track is non existing on this CD.
Er 60: Fast forward bound.
Er 61: Fast reverse bound.

Specification measurement

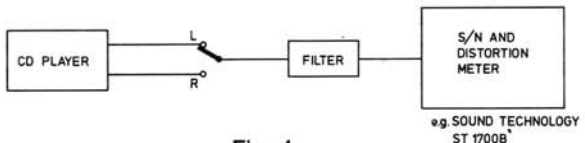


Fig. 4

To measure the specification use can be made of audio test disc 4822 397 30095.
Use 13th order filter 4822 395 30204 to measure (see Fig.4):
- Total harmonic distortion (THD)
- Intermodulation distortion
- Signal-to-noise ratio (S/N)

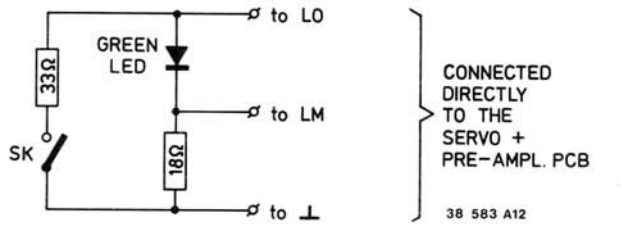
Continuous burning of the laser see:
Initiation of the servicing programme, service position "0".

***Note:* Danger**

Invisible laser radiation.
Avoid direct exposure to beam.

Check of the laser supply

The laser and, the laser supply in IC6525 plus the monitor diode form a feedback system.
A defect in the laser supply can result in the destruction of the laser.
If, in that case, the laser (= complete CDM2 unit) is replaced, the new laser will also become defective.
However, it is impossible to check and repair a feedback system if a link is missing. The laser supply can be checked with the circuit below. The green LED replaces the laser, the voltage across the 18 Ohm resistor is feed back as monitor voltage, the 33 Ohm resistor and the switch serve to draw more current from the laser supply.



LED GREEN e.g. CQY 94 IV 5322 130 32182

The above circuit is connected to the connector on the main panel via an extension cable instead of a flex print. The normal flex print is not suited for this purpose because of its high internal resistance.

Code no. extension cable 4822 322 40066

- Take the above flex print out of the connector on the main panel.
- Connect the circuit via the extension cable to the connector.
- Select the play mode by grounding $\overline{Si}$ (pin 20 of IC6525).
  Note: $\overline{Si}$ = 0, start initialisation low, is the play mode.
- Measure the voltage LO (Laser Out) at test point 9.

SK open: 1,8 V ≤ LO ≤ 2,3 V
170 Mv ≤ LM ≤ 220 mV
The green LED emits little light.

SK closed: 1,8 V ≤ LO ≤ 2,3 V
170 Mv ≤ LM ≤ 220 mV
The green LED emits little light.

- During the change over from SK closed to SK open, the LED will emit more light for a short moment.
- The control sees to it that the same amount of current flows through the LED when SK is open and when SK is closed.

At $\overline{Si}$ = 1, in the STAND-BY state, LO = 0 V ± 0,2 V.

Repair procedure

Since laser, monitor diode and photodiodes are very sensitive to static charges, care should be taken that during measurements and adjustments the aids and yourself have a potential that is equal to that of the CD mechanism.

Attention: When exchanging the CDM2 unit, the laser output potentiometer 3528 should be placed in mechanical mid-position to avoid damage to the laser.

Adjusting the laser current.

Coarse adjustment

- Place potentiometer 3528 approximately in mid-position.
- Put test disc 5 on the turntable.
- Bring the player in service position 3, position Play.
- The focusing motor can now start focusing and when it has found the focal point index "01" will appear on the display.
- If this does not happen, turn potentiometer 3528 clockwise or anti-clockwise a little and press the playbutton again.
  Here after the fine adjustment of the laser current has to be carried out.

Fine adjustment

- Play track 1 of the test disc 5.
- Adjust potentiometer for a voltage across 3508 test point 1 and 2 of 50 mV ± 5 mV.

Adjustment of the focus off-set

Coarse adjustment

Adjust the focussing motor to the eye for a horizontal position by means of potentiometer 3517.
- Here after the fine adjustment of the focus off-set has to be carried out.

Fine adjustment

- Bring the player in service position 2.
- Adjust potentiometer 3517 for a voltage across 2545 (test point 27) of 400 mV ± 40 mV.

Note: Notice that the CDM is in a horizontal position.

Changing the transformer connections

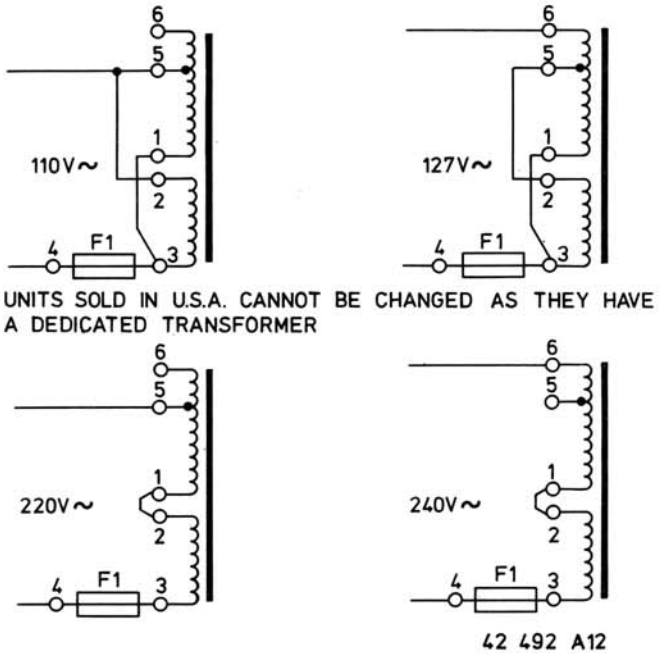


Fig. 6

If the set should be connected to a mains voltage that deviates from the voltage mentioned on the type plate, the transformer connections should be changed, as indicated in Fig. 6.

DETAILED MEASURING METHOD

I. µP IC6551

- **Servicing program**

  For initiation of the servicing program see: General checkpoint: Initiation of the service program.

- **Reset (pin 1, testpoint 14)**

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

- **X-tal out (pin 39; test point 13)**

  The frequency of this signal should be 6 MHz.

- **$\overline{\text{MSTP}}$ (pin 26; test point 78)**

  When, after RD "high", the $\overline{\text{MSTP}}$ is "high" for a short moment (> 0.2 sec.), the turntable motor control will be switched on.
  The turntable motor is controlled by the MC-signal (test point 12).
  To check MC, see: "Decoder A IC". To check the turntable motor control see CDM2 Service Manual "Checking of the motor control".

- **B0 (pin 11; test point 36)**
  B1 (pin 10; test point 34)
  B2 (pin 9 ; test point 33)
  B3 (pin 8 ; 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 positions the signals B0 + B3 are stable:

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

- **$\overline{\text{TL}}$ (pin 34; test point 16)**

- The $\overline{\text{TL}}$ signal (Track Lost) 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 7; 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/corect in case of track jumping or bumping against the player.

  In servicing position 3 position Play or in the PLAY 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 5; 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 PLAYER	POWER ON	SERVICE POSITION 3	PLAY	SEARCH, PAUSE
$\overline{\text{DODS}}$ SIGNAL	"LOW"	"HIGH"	"HIGH"	

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II. PHOTODIODE SIGNAL PROCESSOR IC6525

● **SC (pin 25, testpoint 20)**
SC (= Start Capacitor)

High Ohmic measurement

Position of player	SC (pin 25)
POWER ON	−4 V
PLAY	+5 V
Servicing pos. 1	+5 V

● **$\overline{Si}$ (pin 20; test point 21)**
LO (pin 17; test point 9, 9^A, 9^B)

- With the $\overline{Si}$ signal (= Start Initialization) the laser supply, among other things, is switched on.
When the $\overline{Si}$ signal is "low", the LO signal (= Laser Out) should be "high".
Via the LM signal (= Laser Monitor) the power supply for the laser diode is controlled.

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

● **LM (pin 16; test point 11) to check LM**
See general checkpoints 'check of the laser supply'
● **To check the laser supply,** see General checkpoints "Check of the Laser Supply".
● **To check the focus offset,** see General checkpoints "Adjustment of the Focus Offset".

*) To ensure that the player stays in servicing position 1, there should be a disc on the turntable.

● **FE pin (pin 5; test point 26)**

- The FE signal (= Focus Error) is used to drive the focusing unit.
When the $\overline{Si}$ signal goes to "high", the focal point will be searched for.

- When the player is brought into servicing position 1, the objective will keep repeating the focus start procedure.
At test point 26 the FE signal varies between +1,5 V and −1,3 V.

● **RD signal (pin 21; test point 24)**

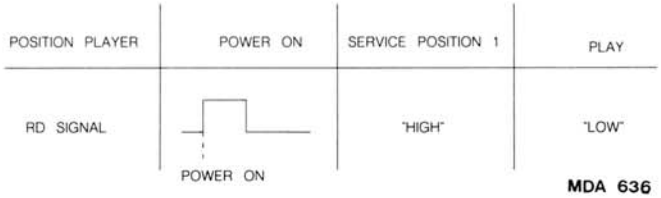
HIGH-OHMIC MEASUREMENT

The RD signal (= Ready) will go high when the starting procedure of IC6525 has been completed.

● **RD (pen 21; testpunt 24)**

Het RD-signaal wordt "hoog" wanneer de opstart procedure van IC6525 voltooid is.

(Hoogohmig meten)

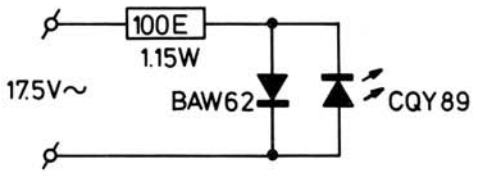


MDA 636

● **D1 (pin 9 ; test point 4)**
D2 (pin 10; test point 6)
D3 (pin 8 ; test point 7)
D4 (pin 7 ; test point 8)

- The signals D1÷D4 are the error signals from the photodetector circuits.
- When in servicing position 2 the disc is moved, the focusing unit should keep in track.
When the disc is moving, there should be a changing signal on test points 4, 6, 7 and 8.

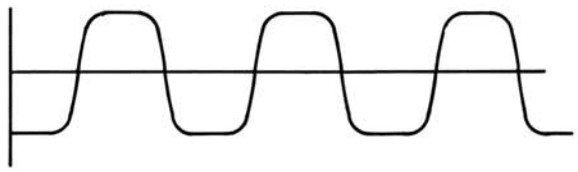
Check of the photodetector.
Connected the circuit below to an atternating voltage of 17,5 V.



39 368 A12

100 E-1.5 W - 4822 116 51098
BAW 62 - 4822 130 30613
CQY 89 - 4822 130 31332

Switch on the supply voltage and bring the player in the stand-by mode or in serciving position 0.
In this measurement, infrared diode CQY89 replaces the function of the laser diode.
When this diode is held above the objective unit, the infrared light falls on the 4 photodiodes.
When the 4 photodiodes are functioning, the following voltage form will be visible on test point 4, 6, 7 and 8.
(The amplitude depends on the distance between the IR diode and the objective).



38 314 A12

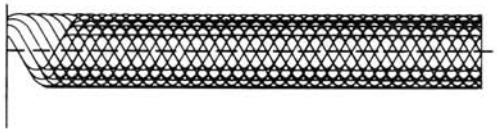
Position of the oscilloscope: 100 ms/div.

● **HF-in (pin 3, test point 3)**

- The HF-signal (= High Frequency in) is the information signal from the 4 photodiodes.

● **HF-out (pin 27; test point 17)**

- The HF-out signal (= High Frequency) is the amplified information signal for the decoder circuit.
During playback of test disc no. 5 (4822 897 30096), a so-called "eye pattern" should be present on test point 17 (see figure below).
- The HF signal should be present and stable in the PLAY mode.



Position of the oscilloscope: 0,5 µs/div.
Amplitude about 1,5 V_{pp}

- **DET (pin 26)**
  HFD (pin 19; test point 23)
  $\overline{TL}$ (pin 18; test point 16)

- The DET signal (= Detector) gives information on the level of the HF signal to the high-frequency. Level-Drop-out detector IC6525.
- When the level of the HF signal is too low, the HFD signal (= High Frequency Detector) will go "low".
- The $\overline{TL}$ signal (= Track Lost) will then go "low" in order to tell the µP that the tracking signals Re_1 and Re_2 are unreliable.

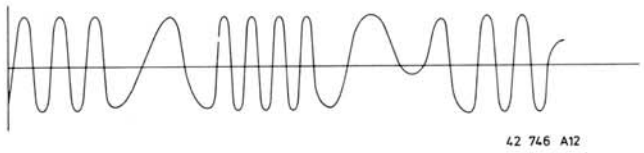
Method:
(Can only be used in a playing set).

- Put test disc 5A 84822 397 30096) on the turntable.
- Switch on the power-supply switch and press the PLAY key.
- Play track number 10 or 15 and check the HFD signal at test point 23.
  When drop-out pulses are present on the DET signal (pin 26), the HFD pulses should also be present at test point 23.
  (Position of oscilloscope: 2 ms/div.).

When the disc is slowly braked by hand, $\overline{TL}$ pulses will be visible at test point 16.

- **RE1 (pin 11; test point 18)**
  RE2 (pin 12; test point 22)

- Signals RE1 and RE2 (Radial Error) are the control signals for the arm during tracking.
- In servicing position 3, position Play the following signals should be visible at test point 18 and 22.



Position of the oscilloscope: 2 ms/div.
The frequency strongly depends on the eccentricity of the disc.

III. RADIAL ERROR PROCESSOR IC6529

- **Check the signals between the µP and the Radial Error and the signals between the photo diode signal processor and the Radial Error Processor.**

- **DAC (pin 10; test point 38)**

  With the DAC signal (= Digital B0÷B3 signal converted into the Analogue signal) the track jumping speed is controlled.
  This signal is derived from the signals B0 ÷ B3 coming from the µP.

- **RE-lag (pin 8; test point 41)**

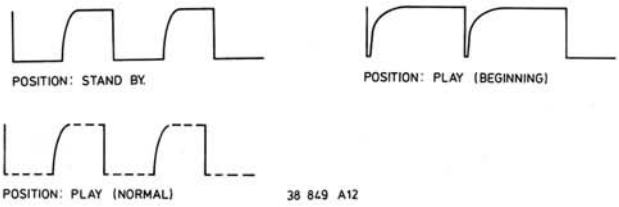
  Capacitor 2559 in the RE-lag circuit has a memory function.
  It memorizes the degree of inclination of the disc.
  When a jump is made to a certain track on the disc, the memory should be cleared.
  This is done by the µP ($\overline{RPU}$ signal) via transistors 6533, 6534.

  During track jumping (SEARCH), slow pulses should be visible at test point 43 (position of the oscilloscope 0,1 ms/div.)
  In that case pulses should also be visible on the collector of transistor 6533, 6534.

IV. DECODER-A IC

- **Check the MC signal (pin 17; test point 12)**

- In stand-by mode, the MC signal (Motor Control) corresponds to the figure below.
- Place a disc on the turntable.
- In position PLAY or SERVICE POSITION 3 position Play the MC signal corresponds to the figure below.



- **Check the HFD-signal on test point 66, pin 26**

- Insert a disc.
- In the PLAY mode and in SERVICING POSITION 3 position Play the HFD-signal is "high"; however, minor pulses may be present and in case of disorders on the disc.
- During playback of track no. 15 of test disc 5A HFD pulses are visible.

Position of the oscilloscope 5 ms/div.

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

- **VC (connector point 15-1; test point 46)**

- Place a disc on the turntable.
- The voltage at connector point 15-1 during playback will be:
  $V_C = 0 > V_C > -1.7$ V
  To check the turntable motor control, see C.D.M.-2 Service Manual: "Checking of the motor control".

- **Check the HFI signal test point 65 pin 25 (eye pattern)**

- Place a disc on the turntable.
- The HF signal is present and stable in the position Play. See figure below.

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

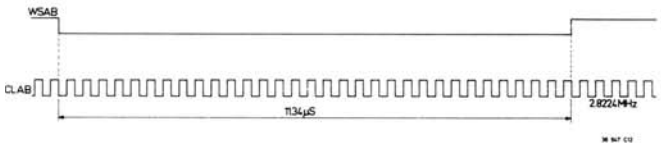
- Place a disc on the turntable.
- In stand-by mode (only the mains switch is depressed), the frequency lies between 2.82 MHz and 5.64 MHz.
- In the position PLAY the frequency is 4.32 MHz.

● **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**

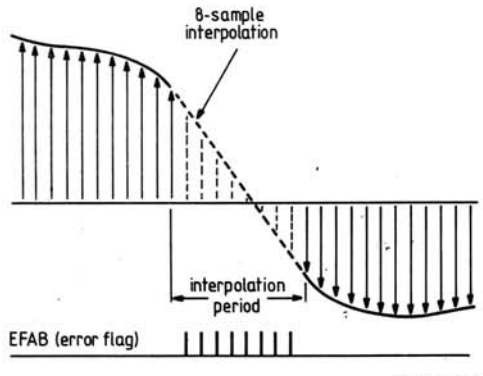
- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 position Play or position PLAY.
- Trigger the oscilloscope with the WSAB signal (test point 71; pin 39).
- Check signals:
  WSAB at test point 71 (pin 39)
  (Word Select from Decoder-A to Filter-B)
  CLAB at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



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

- Place test disc 5A on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 or position PLAY.
- During playback of track no. 17, a EFAB pulse should appear at test point 61 for a short moment.
  The EFAB pulses also appear when the disc is gently slowed down and during fast search (Fast Forward or Fast Reverse).

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



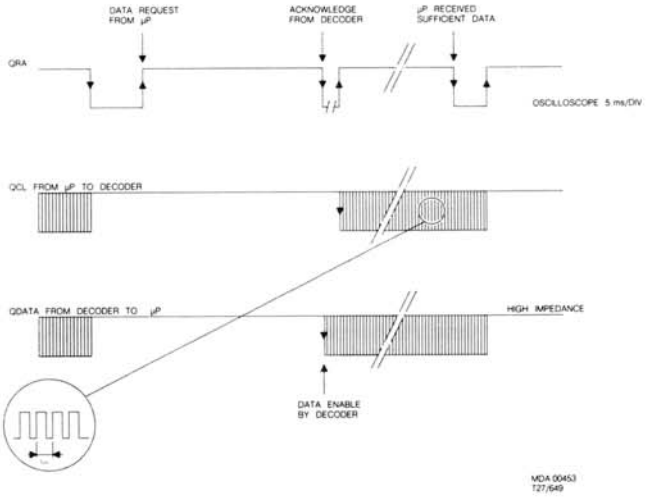
38 845 A12

● **Check the Q-channel signals**

- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 position Play or position PLAY.
- Trigger on the QRA signal (Q-channel Request Acknowledge) test point 75; pin30.
- Check signals: QRA at test point 75 (pin 30)
  QCL a 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 the 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 µP.
As soon as the µP has taken in enough information via QDA, QRA will go low again. That is why the QRA times vary each time.

Daarom zullen de QRA tijden telkens varieren.



● **Check the $\overline{\text{SSM}}$ 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.

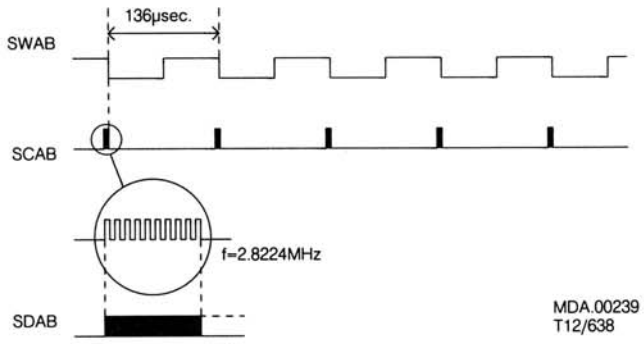
Note:
After the motor start pulse, SWAB information (Subcoding Word clock) will become visible at this point.
The period time of that signal is 136 µsec.

● **Check the subcode clock signals**

- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 position Play 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 interrelations.

  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 $\overline{\text{CRI}}$ signal (pin 28)**

  The $\overline{\text{CRI}}$ 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 without PRE-EMPHASIS), the DEEM signal should be "high".

V. FILTER-B IC

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

- See sub. "IV. Decoder-A IC":
  * Check the X-tal signal
  * 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**

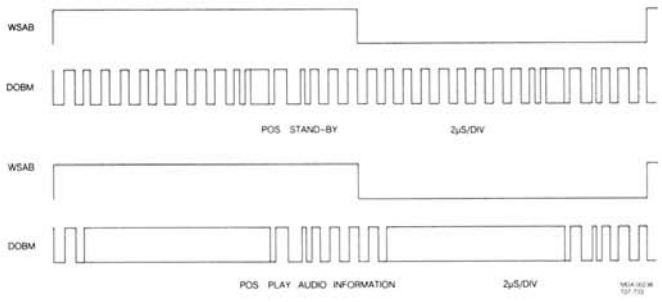
- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 position Play or position PLAY.
- Trigger the oscilloscope with the WSBD signal (Word Select from Filter B to DAC) test point 85 (pin 18).

- **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 6562.

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

- Place a disc on the turntable.
- Select the stand-by mode (only mains switch depresed).
- Trigger the oscilloscope with the WSAB signal (test point 71).
- Check the DOBM signal (test point 88; pin 14)
- An empthy 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 22) (Attenuation Audio Signal)**



- **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.

VI. DAC IC (Dual Digital Analog Converter)

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

- See sub. "V. 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 position Play, the analog (music) signal should be present at the output of the OP-AMP, after the lead-in track has been read.

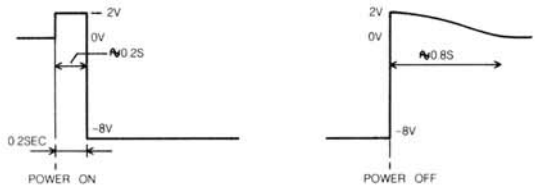
VII. DEEM CIRCUIT

● **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 6583 (test point 91) and 6582 (test point 92).
- During playback of track no. 15 the analog signal at the source of 6583 (test point 91) and 6582 (test point 92) should be 0 V.

VIII. KILL CIRCUIT

- During switching on and off the mains voltage the signal on the collector of 6580 (to be measured on a jumper, tp93) should be as indicated in the figure below.



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T07/733

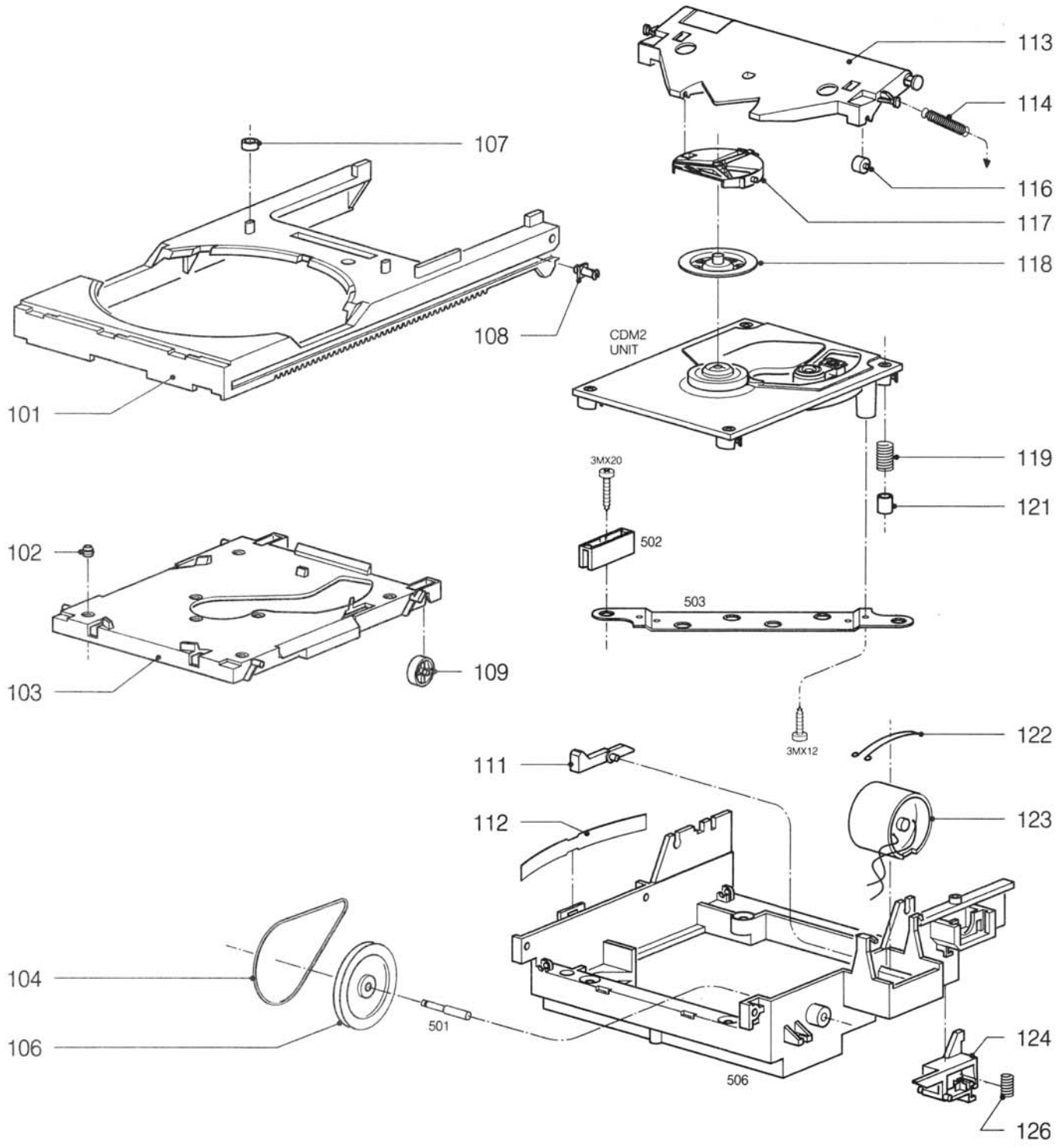
EXPLODED VIEW LOADING

Partslist loading

101	4822 466 92111
102	4822 325 60317
103	4822 444 50582
104	4822 358 10115
106	4822 522 32359
107	4822 532 51756
108	4822 402 61081
109	4822 528 90638
111	4822 402 61107
112	4822 492 63659
113	4822 444 60467
114	4822 492 32762
116	4822 528 90639
117	4822 532 11547
118	4822 462 50383
119	4822 492 51902
121	4822 466 61587
122	4822 492 63746
123	4822 361 20998
124	4822 402 50244
126	4822 492 51935

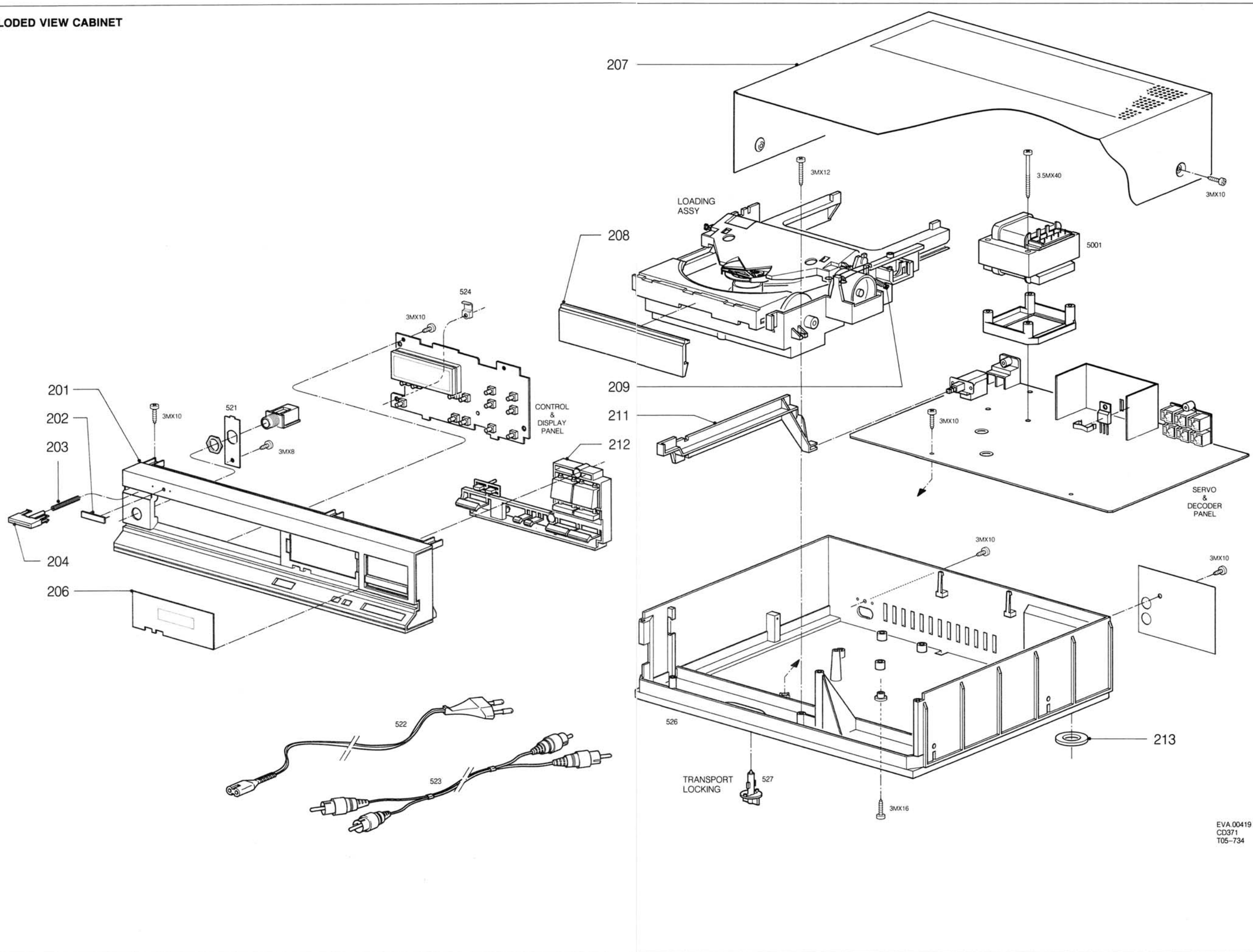
Partslist cabinet

201	4822 444 40208
202	4822 459 10771
203	4822 492 51944
204	4822 410 26055
206	4822 450 61109
207	4822 444 60507
208	4822 444 50589
209	4822 492 32762
211	4822 402 50245
212	4822 410 26056
213	4822 462 40409

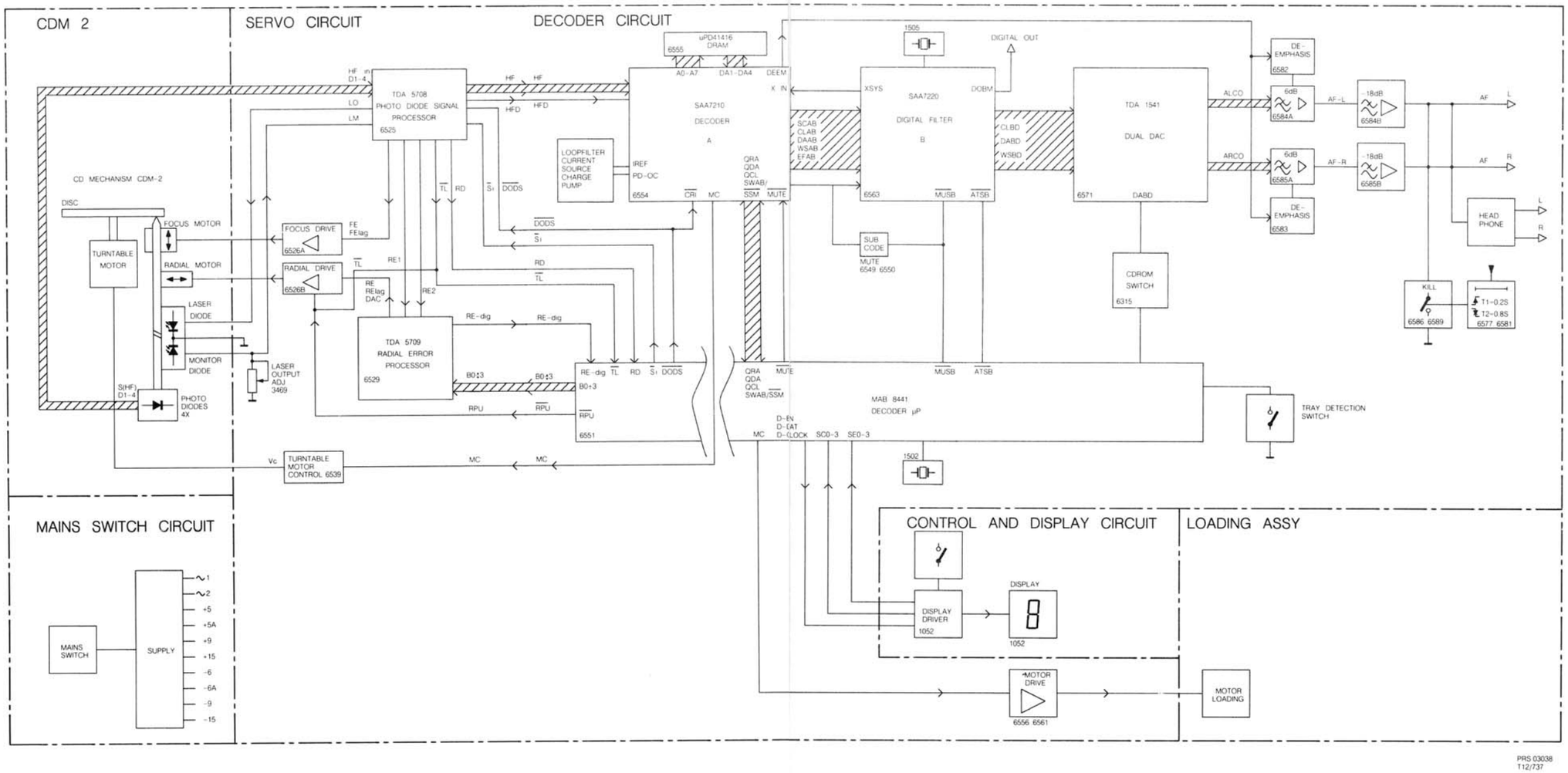


EVA.00365
T07/722

EXPLODED VIEW CABINET

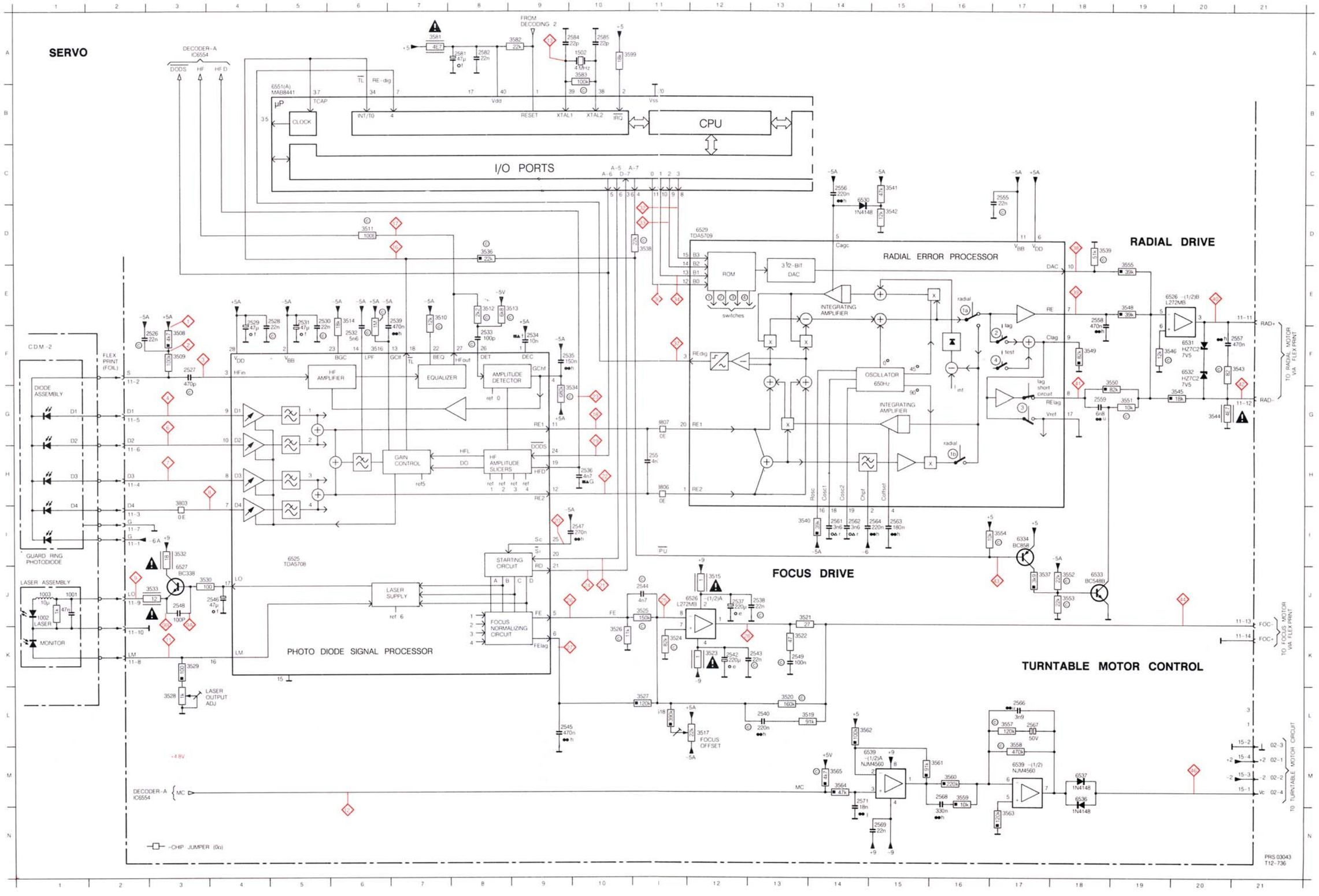


BLOCK DIAGRAM

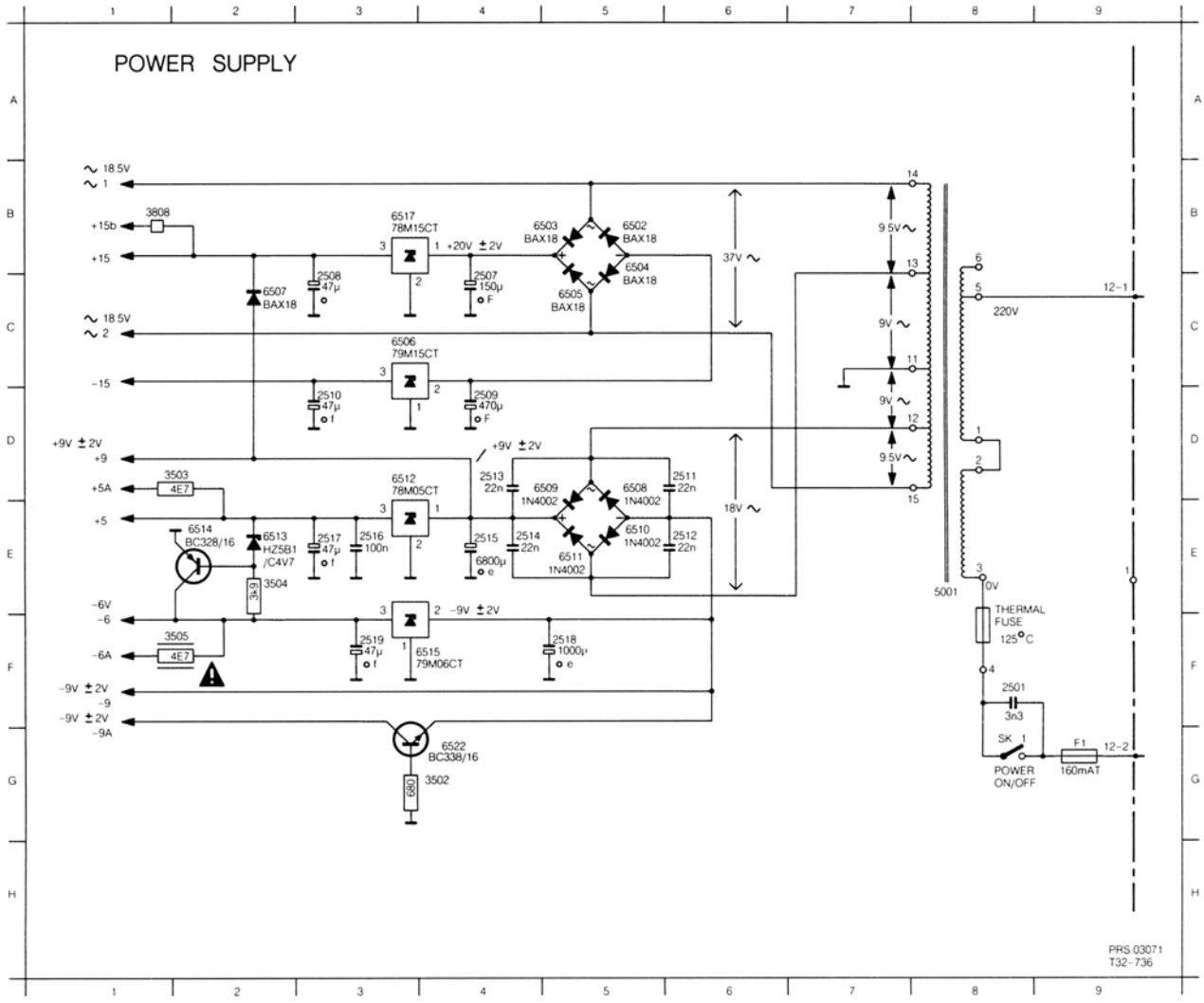


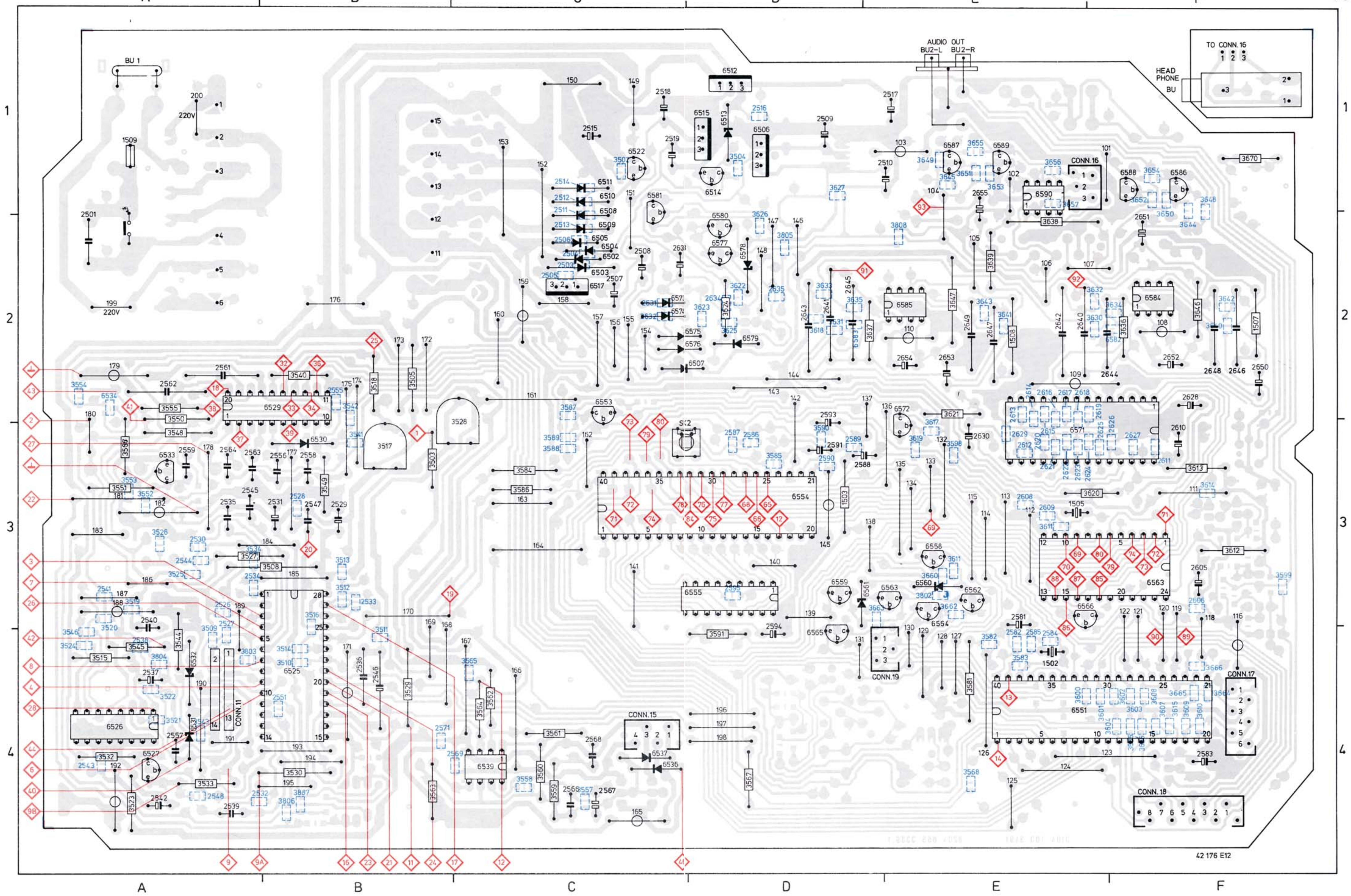
BLOCK DIAGRAM

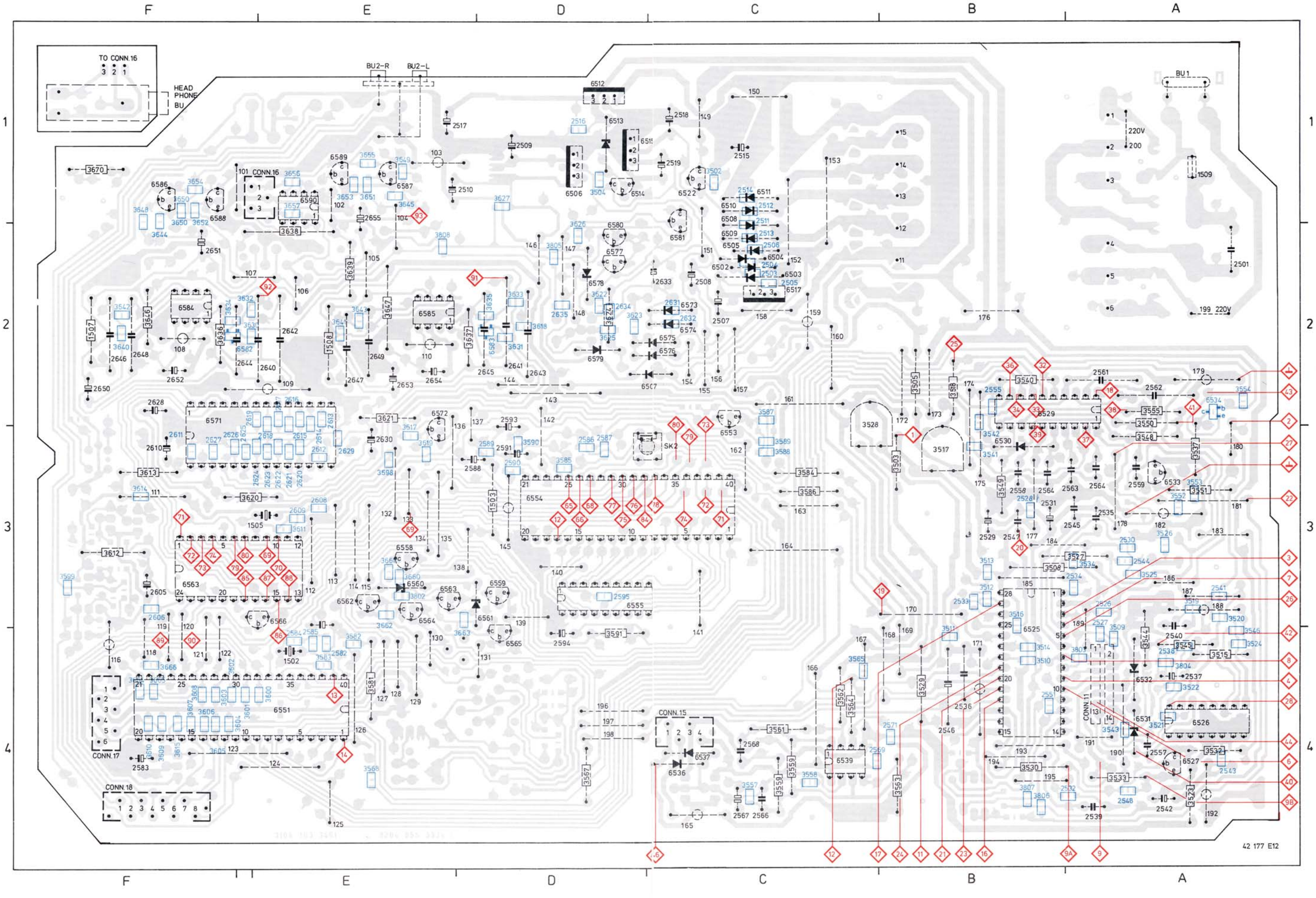
B0-B3	-	Control bits for radial circuit
DAC	-	Current output for track jumping (Digital to Analogue Converted)
$\overline{DODS}$	-	Drop out detector supression
D1+4	-	Photodiode currents
FE	-	Focus error signal
FE-lag	-	Focus error signal for LAG network
HF	-	HF output for DEMOD
HFD	-	HF detector output for DEMOD
HF-in	-	HF current input
LM	-	Laser monitor diode input
LO	-	laser amplifier current output
MC	-	Motor control signal
RE	-	Radial error signal (amplified RE_2-RE_1 currents)
RE1	-	Radial error signal 1 (summation of amplified currents D_3 and D_4
RE2	-	Radial error signal 2 (summation of amplified currents D_1 and D_2
RE dig	-	Radial error digital
$\overline{RE\ lag}$	-	Radial error signal for LAG network
$\overline{RPU}$	-	Radial puls after track jumping
$\overline{Si}$	-	On/off control for laser supply and focus circuit
$\overline{TL}$	-	Track loss signal
Vc	-	Control voltage for turntable motor
$\overline{ATSB}$	-	Attenuation of Audio level in Search position (Cueing)
CD ROM Switch	-	Digital Data information on disc signal
CEFM	-	Clock Eight-to-Fourteen Modulator
CLAB	-	Clock signal Decoder-A to Filter-B
$\overline{CLBD}$	-	Clock signal Filter-B to DAC
$\overline{CRI}$	-	Counter Reset Inhibit
DAAB	-	Data signal Decoder-A to Filter-B
$\overline{DABD}$	-	Clock signal Filter-B to DAC
$\overline{DEEM}$	-	Deemphasis
DOBM	-	Digital out signal
$\overline{EFAB}$	-	Error flag Decoder-A to Filter-B
$\overline{MSTP}$	-	Motor start-stop signal
$\overline{MUTE}$	-	Mute signal
$\overline{MUSB}$	-	Soft Mute signal
QCL	-	Q-channel Clock signal
QDA	-	Q-channel Data signal
QRA	-	Q-channel Request Acknowledge
SCAB	-	Subcode clock Decoder-A to Filter-B
SDAB	-	Subcode data Decoder-A to Filter-B
SWAB/$\overline{SSM}$	-	Subcode Word/Start-stop motor signal
WSAB	-	Word Select Decoder-A to Filter-B
WSBD	-	Word Select Filter-B to DAC
XIN	-	Oscillator signal in Decoder-A
XSYS	-	Oscillator signal out Filter-B
A0-A7	-	Adressbus A0-A7



2501	F 8	2509	D 4	2512	E 6	2515	E 4	2518	F 5	3503	D 2	3808	B 1	6503	B 5	6506	C 3	6509	D 5	6512	D 3	6515	F 4	F1	G 9
2507	C 4	2510	D 3	2513	D 4	2516	E 3	2519	F 3	3504	E 2	5001	E 8	6504	B 5	6507	C 2	6510	E 5	6513	E 2	6517	B 3	SK1	G 8
2508	C 3	2511	D 6	2514	E 4	2517	E 3	3502	G 4	3505	F 2	6502	B 5	6505	C 5	6508	D 5	6511	E 5	6514	E 2	6522	G 4		




AUDIO OUT
BU2-L BU2-R
TO CONN.16
HEAD PHONE
BU
BU 1
220V
CONN.16
CONN.15
CONN.11
CONN.17
CONN.18
CONN.19
SK2
6525
6526
6529
6539
6551
6554
6555
6563
6571
6584
6585
6590
42 176 E12


TO CONN.16
3 2 1
HEAD PHONE BU
BU2-R
BU2-L
BU1
220V
200
199 220V
1509
2501
101 CONN.16
CONN.17
CONN.18
CONN.15
SK2
42 177 E12

1	B03	7	A03	11	B04	17	B04	22	A03	32	B02	38	A02	43	A02	68	D03	73	C03
2	A03	8	A04	12	C04	18	A02	23	B04	33	B02	39	B03	44	A04	69	E03	74	F03
3	A03	9	A04	13	E04	19	B03	24	B04	34	B02	40	A04	46	C04	70	E03	75	D03
4	A04	9A	A04	14	E04	20	B03	26	A04	36	B02	41	A02	65	D03	71	C03	76	D03
6	A04	9B	A04	16	B04	21	B04	28	A04	37	A03	42	A04	66	D03	72	F03	77	D03
78	C03	86	E03	92	E02	SK2	C03	1508	E02	2506	C02	2511	C02	2516	D01	2527	A04	2532	A04
79	E03	87	E03	93	E01	1502	E04	2501	A02	2507	C02	2512	C01	2517	E01	2528	B03	2533	B03
80	C03	88	E03	BU1	A01	1503	D03	2503	C02	2508	C02	2513	C02	2518	C01	2529	B03	2534	A03
84	C03	89	F04	BU2	E01	1505	E03	2504	C02	2509	D01	2514	C01	2519	C01	2530	A03	2535	A03
85	E03	90	F04	SK1	A02	1507	F02	2505	C02	2510	E01	2515	C01	2526	A03	2531	B03	2536	B04
2537	A04	2543	A04	2548	A04	2558	B03	2566	C04	2581	E04	2586	D03	2591	D03	2606	F03	2612	E03
2538	A04	2544	A03	2551	B04	2559	A03	2567	C04	2582	E04	2587	D03	2593	D03	2608	E03	2613	E02
2540	A03	2545	A03	2555	B02	2561	A02	2568	C04	2583	F04	2588	D03	2594	D04	2609	E03	2614	E02
2541	A03	2546	B04	2556	B03	2563	A03	2569	C04	2584	E04	2589	D03	2595	D03	2610	F03	2615	E02
2542	A04	2547	B03	2557	A04	2564	A03	2571	B04	2585	E04	2590	D03	2605	F03	2611	E03	2616	E0
2617	E02	2623	E03	2628	F02	2633	C02	2642	E02	2647	E02	2652	F02	3503	B03	3510	B04	3515	A04
2619	E02	2624	E03	2629	E03	2634	D02	2643	D02	2648	F02	2653	E02	3504	D01	3511	B04	3516	B04
2620	E03	2625	E03	2630	E03	2635	D02	2644	E02	2649	E02	2654	E02	3505	B02	3512	B03	3517	B03
2621	E03	2626	E03	2631	C02	2640	E02	2645	D02	2650	F02	2655	E01	3508	B03	3513	B03	3518	B02
2622	E03	2627	F03	2632	C02	2641	D02	2646	F02	2651	F02	3502	C01	3509	A04	3514	B04	3519	A03
3520	A03	3525	A03	3530	B04	3539	A04	3544	A04	3550	A02	3556	C04	3562	C04	3568	E04	3585	D03
3521	A04	3526	A03	3532	A04	3540	B02	3545	A04	3552	A03	3557	C04	3563	B04	3581	E04	3586	C03
3522	A04	3527	A03	3533	A04	3541	B03	3546	A04	3553	A03	3559	C04	3564	C04	3582	E04	3587	C02
3523	A04	3528	C02	3534	A03	3542	B02	3548	A03	3554	A02	3560	C04	3565	C04	3583	E04	3588	C03
3524	A04	3529	B04	3537	A03	3543	A04	3549	B03	3555	A02	3561	C04	3567	D04	3584	C03	3589	C03
3590	D03	3601	E04	3606	F04	3611	E03	3617	E03	3622	D02	3627	D01	3636	F02	3641	E02	3646	F02
3591	D04	3602	F04	3607	F04	3612	F03	3618	D02	3623	D02	3630	E02	3637	D02	3642	F02	3647	E02
3598	E03	3603	F04	3608	F04	3613	F03	3619	E03	3624	D02	3631	D02	3638	E02	3643	E02	3648	F01
3599	F03	3604	F04	3609	F04	3614	F03	3620	E03	3625	D02	3633	D02	3639	E02	3644	F01	3649	E01
3600	E04	3605	F04	3610	F04	3615	F04	3621	E02	3626	D02	3634	E02	3640	F02	3645	E01	3650	F01
3651	E01	3656	E01	3664	F04	3803	A04	3808	E02	6506	D01	6511	C01	6517	C02	6529	B02	6534	A02
3652	F01	3657	E01	3665	F04	3804	A04	6502	C02	6507	C02	6512	D01	6522	C01	6530	B03	6536	C04
3653	E01	3660	E03	3666	F04	3805	D02	6503	C02	6508	C02	6513	D01	6525	B04	6531	A04	6537	C04
3654	F01	3662	E03	3670	F01	3806	B04	6504	C02	6509	C02	6514	D01	6526	A04	6532	A04	6539	C04
3655	E01	3663	D03	3802	E03	3807	B04	6505	C02	6510	C01	6515	D01	6527	A04	6533	A03	6551	F04
6553	C02	6560	E03	6566	E03	6575	C02	6580	D02	6586	F01								
6554	D03	6561	D03	6571	E02	6576	C02	6581	C02	6587	E01								
6555	D03	6562	E03	6572	E03	6577	D02	6583	D02	6588	F01								
6558	E03	6563	F03	6573	C02	6578	D02	6584	F02	6589	E01								
6559	D03	6565	D04	6574	C02	6579	D02	6585	E02	6590	E01								

DECODING 1

TO CONTROL

IR 17-6 17-1 17-2 +5

SC0 18-8 | SC1 18-7 | SC2 18-6 | SC3 18-5 | D-DAT 17-5 | D-CLOCK 17-4 | D-EN 17-3 | SE0 18-4 | SE1 18-3 | SE2 18-2 | IE3 8-1

3604 22k, 3605 22k, 3606 22k, 3607 22k, 3615 22k, 3609 22k, 3608 22k, 3600 22k, 3601 22k, 3602 22k, 3603 22k, 3598 22k

SK-2 TRAY DETECTION

6551 (B) MC68HC05

µP

I/O PORTS

1-4 | C-7 | C-6 | C-5 | C-4 | C-3

TRAY M-IN 19-2 | TRAY M-OUT 19-1 | 19-3

6564 BC546B, 6565 BC548B, 6563 BC328, 6562 BC328, 6560 HZ5C2, 6561 HZ5C2, 6559 BC338, 6558 BC338, 6562 BC338

CD ROM SWITCH

DODS | MSTP | CRI | SWAB/SSM | QDA | QCL | QRA

6554 SAA7210

DECODER-A

SERVO CIRCUIT | HF | HFD | HFI | FB | IREF | PDIOC | CEFM

DATA SLICER | DEMOD TIMING | EFM DECODER | SUBCODE PROCESSOR | Q CHANNEL PROCESSOR

FIFO CONTROL & RAM INTERFACE | X-TAL CLOCK

PHASE & FREQUENCY DETECTOR | V.C.O

CONTROL | ADDRESS | DATA & FLAG

C1 INTERLEAVER CORRECTOR | C2 INTERLEAVER CORRECTOR DESCRAMBLER | ADAPTIVE FLAG PROCESSOR

1 SAMPLE INTER-POLATOR & SAMPLE /HOLD & MUTE CIRCUIT

DEEM 32 → DEEM { DECODING2 CIRCUIT

MC 17 → MC SERVO CIRCUIT

SCAB 35 | SDAB 34 | WSAB 39 | CLAB 38 | DAAB 37 | EFAB 36

6563 SAA7220

FILTER-B

ATSB 22 | MUSB 23

CHANNEL DEMULTI-PLEXER | INPUT STAGE

8 SAMPLE INTERPOLATOR | 12 dB ATTENUATOR | SOFT MUTE CIRCUIT | 4 x UPSAMPLING DIGITAL FILTER

DIGITAL OUTPUT ENCODER | DOBM 14

CHANNEL MULTI-PLEXER CIRCUIT | OUTPUT STAGE

DABD 15 | CLBD 16 | WSBD 18 → DABD | CLBD | WSBD { DECODING2 CIRCUIT

X-TAL OSCILLATOR | X OUT 18 | X IN 19 | XSYS 9 | TO CIRCUIT

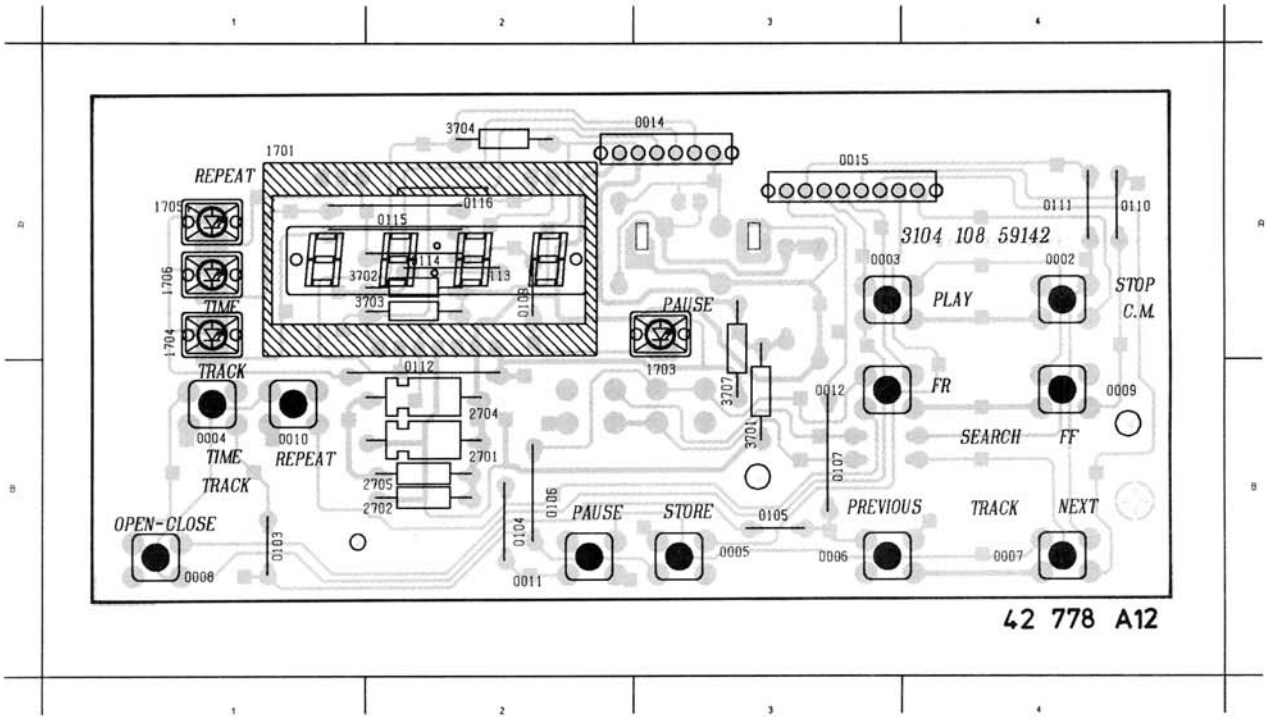
X-IN 11 | X-OUT 10 | Vss 12 | TEST 13 | Vdd 24

3606 100Ω, 1505 11.2896MHz, 2608 47p, 2609 47p, 2606 22n, 3612, 2605 47µ

DRAM 6555 UPD41416C-15

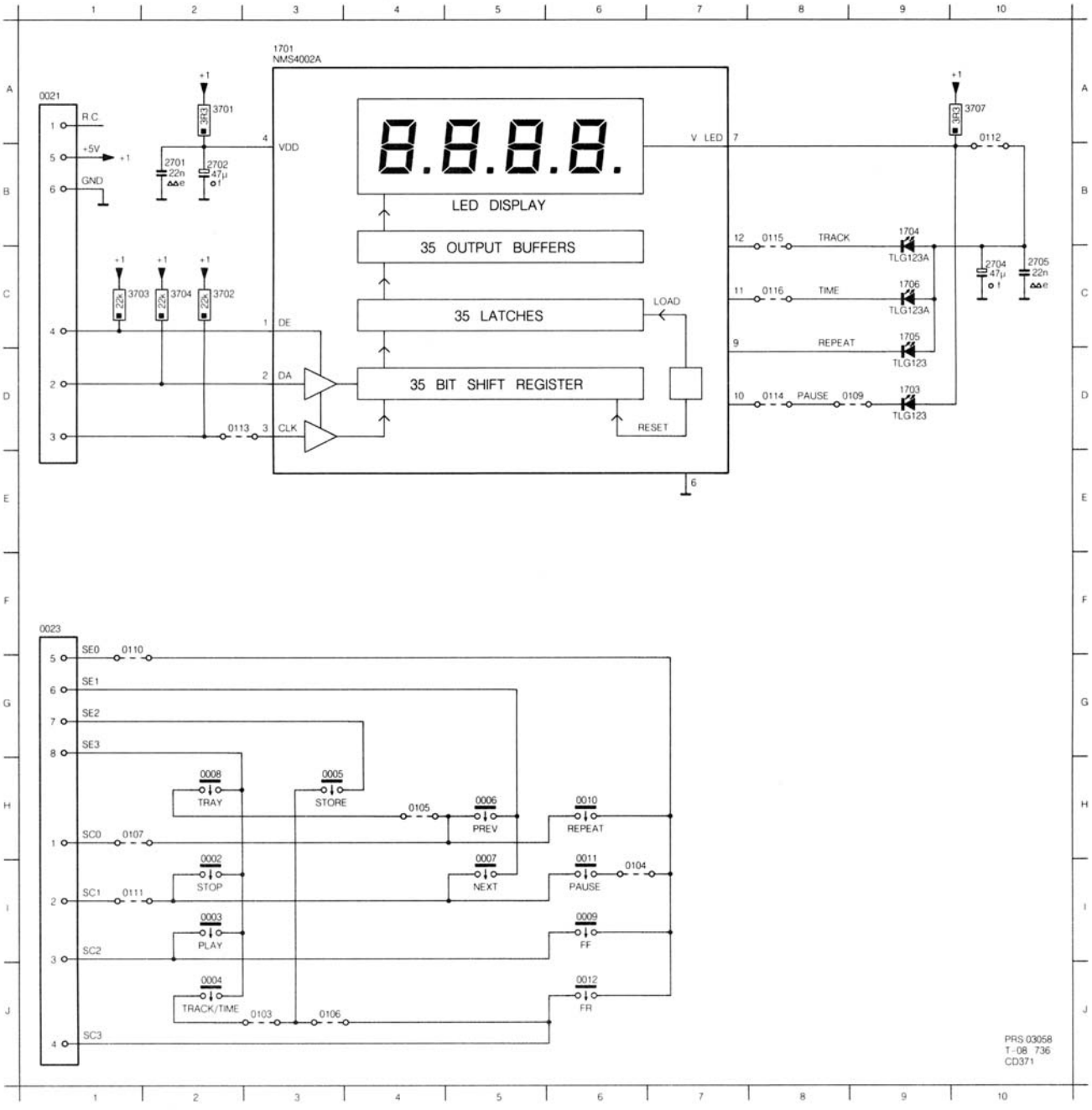
Vdd 40 | Vss 20 | Vbb 21 | 2588 47µ, 2589 22n, 2590 22n, 2595 22n, 2594 47µ, 3591 4E7

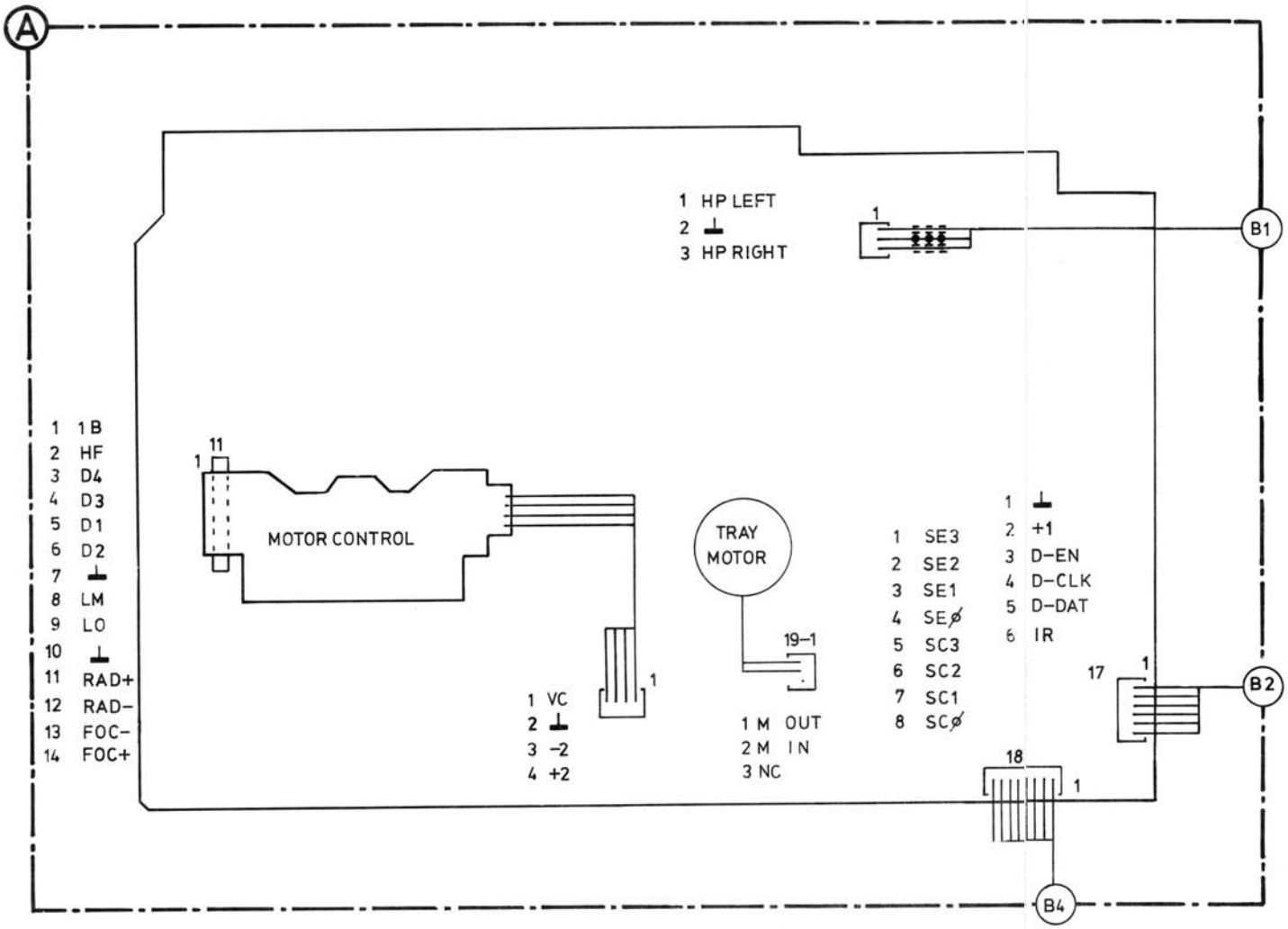
PRS 03041 T12-741

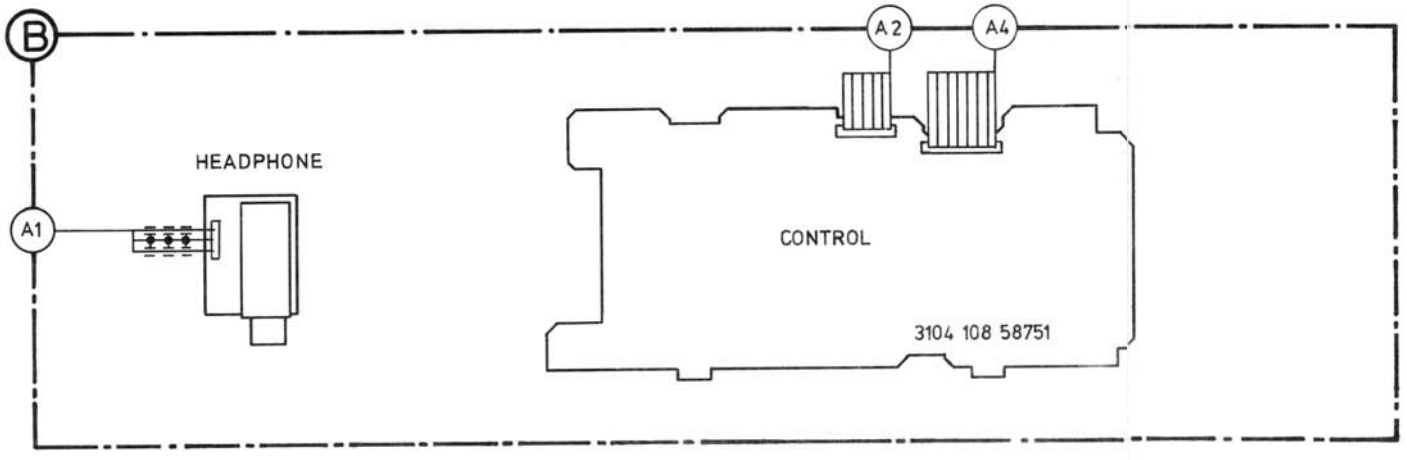

REPEAT
TIME
TRACK
TIME
TRACK
OPEN-CLOSE
REPEAT
PAUSE
PAUSE
STORE
PLAY
STOP
C.M.
FR
SEARCH
FF
PREVIOUS
TRACK
NEXT
3104 108 59142
42 778 A12

PRINCIPE DISPLAY

0002	H 2	0006	H 5	0010	H 6	0023	F 1	0106	J 3	0111	I 1	0115	B 8	1704	B 9	2702	B 2	3702	C 2
0003	I 2	0007	H 5	0011	H 6	0103	J 3	0107	H 1	0112	A10	0116	C 8	1705	C 9	2704	C10	3703	C 2
0004	J 2	0008	H 2	0012	J 6	0104	I 6	0109	D 9	0113	D 3	1701	A 3	1706	C 9	2705	C10	3704	C 2
0005	H 3	0009	I 6	0021	A 1	0105	H 4	0110	F 1	0114	D 8	1703	D 9	2701	B 2	3701	A 2	3707	A10



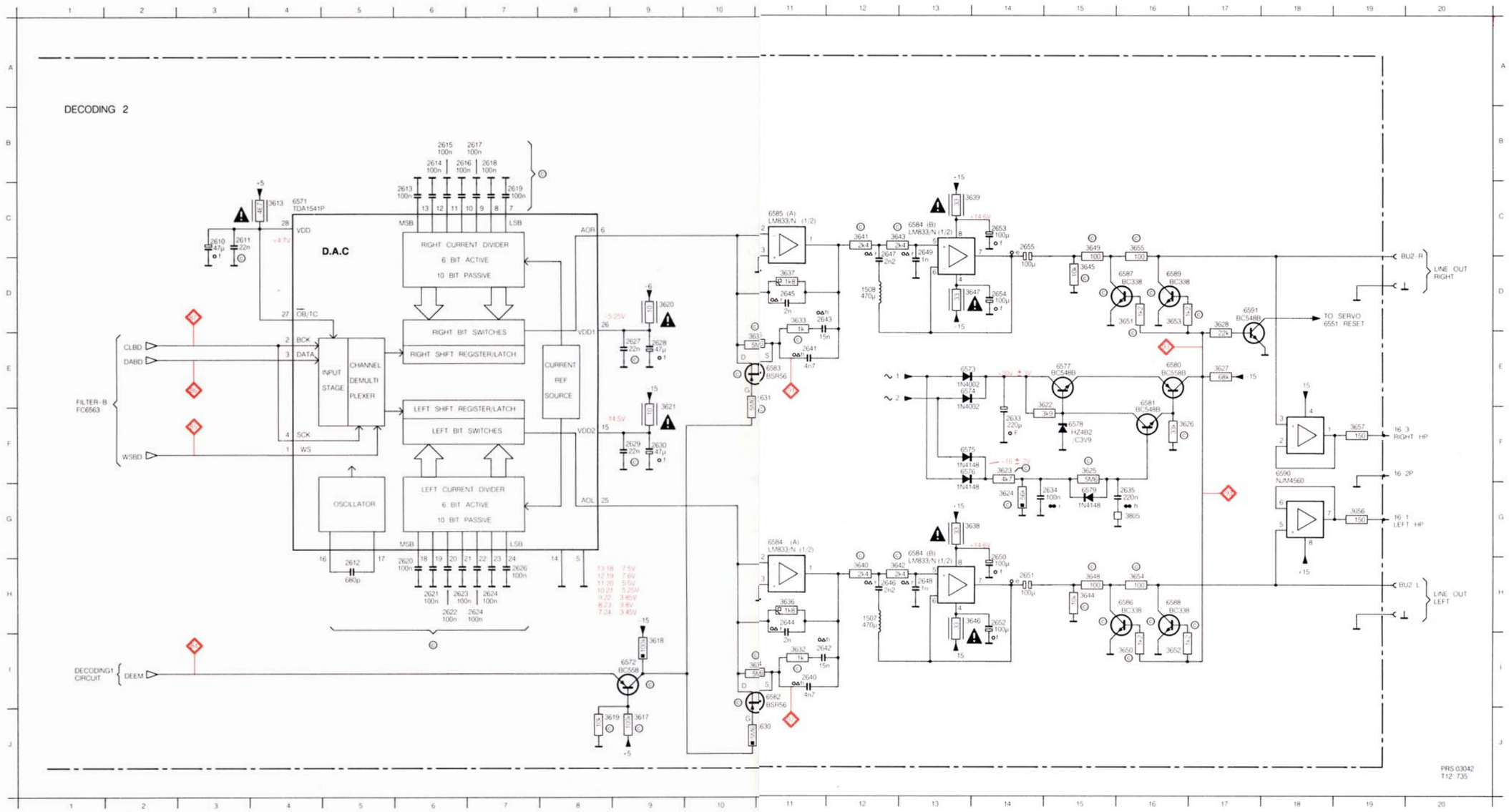




42 470 D12

CS 11 077

DECODING 2



SUPPLY + DECODER
For non active chip components see separate list

MC79M15CT	5322 209 86361
MC7906CT	4822 209 82056
TY40408 (+5 V)	4822 209 71579
MC78M15	4822 209 80808
TDA5708/C3	4822 209 83202
TDA5709	4822 209 83203
SAA7210P/04	4822 209 71001
µPD41416C-20	4822 209 50582
SAA7220	4822 209 11157
TDA1541/N5	4822 209 70295
LM833	4822 209 72031
NJM4560D	4822 209 83274
L272BH	4822 209 72026
MC68HC05C4	482 2209 72236
MM58348	4822 209 72122

BC328-16	4822 130 41023
BC328	4822 130 44104
BC338	4822 130 44121
BC548B	4822 130 40937
BC548C	4822 130 44196
BC558B	4822 130 44197
BC858B	5322 130 41983
BF450	4822 130 44237
BSR56	4822 130 42633

-Miscellaneous-

Display	4822 130 90474
Cinch socket	4822 267 40766
Tackt switch (for main panel)	4822 276 11276
Mains switch	4822 276 11309
Mains inlet	4822 265 20291
Transformer, mains	4822 146 30623

BAX18	4822 130 34121
1N4002	5322 130 30684
1N4148	4822 130 30621
HZ5B1/4V7	4822 130 32986
HZ5C2 5V1	4822 130 33293
HZ7C2/7V5	4822 130 32862
BZV85 C6V2	5322 130 32962
LED	5322 130 34957

CSA4.000MG	4822 157 51193
11289.6 kHz	4822 242 71644

Coil 470 µH	4822 157 51193

Bip 2M2 50 V	4822 124 22341
Bip 100M 16 V	4822 124 22339

1R	4822 111 30483
4R7	4822 111 30499
10R	4822 111 30508
12R	4822 111 30511
18R	4822 111 30515
33R	4822 111 30522
1K8	4822 116 53104

3517 22K	4822 100 20522
3528 1K	4822 100 10874

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1 pF	5%	4822 122 32479
1,5 pF	5%	4822 122 31792
1,8 pF	5%	4822 122 32087
2,2 pF	5%	4822 122 32425
3,3 pF	5%	4822 122 32079
3,9 pF	5%	4822 122 32081
4,7 pF	5%	4822 122 32082
5,6 pF	5%	4822 122 32506
6,8 pF	5%	4822 122 32507
8,2 pF	5%	4822 122 32083
10 pF	5%	4822 122 31971
12 pF	5%	4822 122 32139
15 pF	5%	4822 122 32504
18 pF	5%	4822 122 31769
22 pF	10%	4822 122 31837
27 pF	5%	4822 122 31966
33 pF	5%	4822 122 31756
39 pF	5%	4822 122 31972
47 pF	5%	4822 122 31772
56 pF	5%	4822 122 31774
68 pF	5%	4822 122 31961
82 pF	10%	4822 122 31839
100 pF	5%	4822 122 31765
120 pF	5%	4822 122 31766
150 pF	5%	4822 122 31767
180 pF	2%	4822 122 31794
220 pF	5%	4822 122 31965
270 pF	5%	4822 122 32142
330 pF	10%	4822 122 31642
390 pF	5%	4822 122 31771
470 pF	5%	4822 122 31727
560 pF	5%	4822 122 31773
680 pF	5%	4822 122 31775
820 pF	5%	4822 122 31974
1 nF	10%	5322 122 31647
1,2 nF	5%	4822 122 31807
1,5 nF	10%	4822 122 31781
1,8 nF	10%	4822 122 32153
2,2 nF	10%	4822 122 31644
2,7 nF	10%	4822 122 31783
3,3 nF	10%	4822 122 31969
3,9 nF	10%	4822 122 32566
4,7 nF	10%	4822 122 31784
5,6 nF	10%	4822 122 31916
6,8 nF	10%	4822 122 31976
10 nF	10%	4822 122 31728
12 nF	10%	5322 122 31648
15 nF	10%	4822 122 31782
18 nF	10%	4822 122 31759
22 nF	10%	4822 122 31797
27 nF	10%	4822 122 32541
33 nF	10%	4822 122 31981
47 nF	10%	4822 122 32542
56 nF	10%	4822 122 32183
100 nF	10%	4822 122 31947
180 nF	10%	4822 122 32915
220 nF	20%	4822 122 32715

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0 E	jumper	4822 111 90163
1 E	5%	4822 111 90184
1,1 E	5%	4822 111 90377
1,2 E	5%	4822 111 90378
1,3 E	5%	4822 111 90379
1,5 E	5%	4822 111 90381
1,6 E	5%	4822 111 90382
1,8 E	5%	4822 111 90383
2 E	5%	4822 111 90384
2,2 E	5%	5322 111 90104
2,4 E	5%	4822 111 90385
2,7 E	5%	4822 111 90386
3 E	5%	4822 111 90387
3,3 E	5%	4822 111 90388
3,6 E	5%	4822 111 90389
3,9 E	5%	4822 111 90391
4,3 E	5%	4822 111 90392

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4,7 E	5%	5322 111 90376
5,1 E	5%	4822 111 90393
5,6 E	5%	4822 111 90394
6,2 E	5%	4822 111 90395
6,8 E	5%	4822 111 90254
7,5 E	5%	4822 111 90396
8,2 E	5%	4822 111 90397
9,1 E	5%	4822 111 90398
10 E	2%	5322 111 90095
11 E	2%	4822 111 90338
12 E	2%	4822 111 90341
13 E	2%	4822 111 90343
15 E	2%	4822 111 90344
16 E	2%	4822 111 90347
18 E	2%	5322 111 90139
20 E	2%	4822 111 90352
22 E	2%	4822 111 90186
24 E	2%	4822 111 90355
27 E	2%	5322 111 90105
30 E	2%	4822 111 90356
33 E	2%	4822 111 90357
36 E	2%	4822 111 90359
39 E	2%	4822 111 90361
43 E	2%	5322 116 90125
47 E	2%	4822 111 90217
51 E	2%	4822 111 90365
56 E	2%	4822 111 90239
62 E	2%	4822 111 90367
68 E	2%	4822 111 90203
75 E	2%	4822 111 90371
82 E	2%	4822 111 90124
91 E	2%	4822 111 90375
100 E	2%	5322 111 90091
110 E	2%	4822 111 90335
120 E	2%	4822 111 90339
130 E	2%	4822 111 90164
150 E	2%	5322 111 90098
160 E	2%	4822 111 90345
180 E	2%	5322 111 90242
200 E	2%	4822 111 90348
220 E	2%	4822 111 90178
240 E	2%	4822 111 90353
270 E	2%	4822 111 90154
300 E	2%	4822 111 90156
330 E	2%	5322 111 90106
360 E	1%	4822 111 90288
360 E	2%	4822 111 90358
390 E	2%	5322 111 90138
430 E	2%	4822 111 90362
470 E	2%	5322 111 90109
510 E	2%	4822 111 90245
560 E	2%	5322 111 90113
620 E	2%	4822 111 90366
680 E	2%	4822 111 90162
750 E	2%	5322 111 90306
820 E	2%	4822 111 90171
910 E	2%	4822 111 90372
1 k	2%	5322 111 90092
1,1 k	2%	4822 111 90336
1,2 k	2%	5322 111 90096
1,3 k	2%	4822 111 90244
1,5 k	2%	4822 111 90151
1,6 k	2%	5322 111 90265
1,8 k	2%	5322 111 90101
2 k	2%	4822 111 90165
2,2 k	2%	4822 111 90248
2,4 k	2%	4822 111 90289
2,7 k	2%	4822 111 90569
3 k	2%	4822 111 90198
3,3 k	2%	4822 111 90157
3,6 k	2%	5322 111 90107
3,9 k	2%	4822 111 90571
4,3 k	2%	4822 111 90167
4,7 k	2%	5322 111 90111
5,1 k	2%	5322 111 90268
5,6 k	2%	4822 111 90572
6,2 k	2%	4822 111 90545

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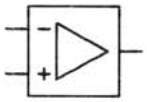
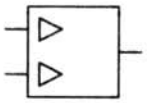
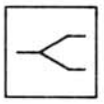
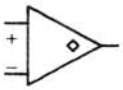
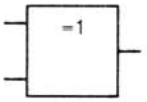
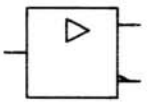
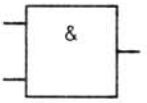
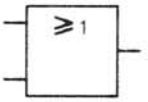
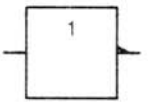
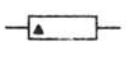
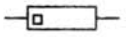
1T

6,8 k	2%	4822 111 90544
7,5 k	2%	4822 111 90276
8,2 k	2%	5322 111 90118
9,1 k	2%	4822 111 90373
10 k	2%	4822 111 90249
11 k	2%	4822 111 90337
12 k	2%	4822 111 90253
13 k	2%	4822 111 90509
15 k	2%	4822 111 90196
16 k	2%	4822 111 90346
18 k	2%	4822 111 90238
20 k	2%	4822 111 90349
22 k	2%	4822 111 90251
24 k	2%	4822 111 90512
27 k	2%	4822 111 90542
30 k	2%	4822 111 90216
33 k	2%	5322 111 90267
36 k	2%	4822 111 90514
39 k	2%	5322 111 90108
43 k	2%	4822 111 90363
47 k	2%	4822 111 90543
51 k	2%	5322 111 90274
56 k	2%	4822 111 90573
62 k	2%	5322 111 90275
68 k	2%	4822 111 90202
75 k	2%	4822 111 90574
82 k	2%	4822 111 90575
91 k	2%	5322 111 90277
100 k	2%	4822 111 90214
110 k	2%	5322 111 90269
120 k	2%	4822 111 90568
130 k	2%	4822 111 90511
150 k	2%	5322 111 90099
160 k	2%	5322 111 90264
180 k	2%	4822 111 90565
200 k	2%	4822 111 90351
220 k	2%	4822 111 90197
240 k	2%	4822 111 90215
270 k	2%	4822 111 90302
300 k	2%	5322 111 90266
330 k	2%	4822 111 90513
360 k	2%	4822 111 90515
390 k	2%	4822 111 90182
430 k	2%	4822 111 90168
470 k	2%	4822 111 90161
510 k	2%	4822 111 90364
560 k	2%	4822 111 90169
620 k	2%	4822 111 90213
680 k	2%	4822 111 90368
750 k	2%	4822 111 90369
820 k	2%	4822 111 90205
910 k	2%	4822 111 90374
1 M	2%	4822 111 90252
1,1 M	5%	4822 111 90408
1,2 M	5%	4822 111 90409
1,3 M	5%	4822 111 90411
1,5 M	5%	4822 111 90412
1,6 M	5%	4822 111 90413
1,8 M	5%	4822 111 90414
2 M	5%	4822 111 90415
2,2 M	5%	4822 111 90185
2,4 M	5%	4822 111 90416
2,7 M	5%	4822 111 90417
3 M	5%	4822 111 90418
3,3 M	5%	4822 111 90191
3,6 M	5%	4822 111 90419
3,9 M	5%	4822 111 90421
4,3 M	5%	4822 111 90422
4,7 M	5%	4822 111 90423
5,1 M	5%	4822 111 90424
5,6 M	5%	4822 111 90425
6,2 M	5%	4822 111 90426
6,8 M	5%	4822 111 90235
7,5 M	5%	4822 111 90427
8,2 M	5%	4822 111 90237
9,1 M	5%	4822 111 90428
10M	5%	5322 111 91141

SYMBOL	DESCRIPTION
	Operational amplifier
	Differential amplifier
	Splitter
	Operational amplifier with open output
	Exclusive OR gate
	True/complement amplifier with high input
	Flip Flop
	AND gate
	OR gate
	Inverter with high input



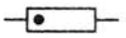
0.2W (CR 16) ≤ 220kΩ 5%; > 270kΩ 10%



0.33W (CR 25) ≤ 1MΩ 5%; > 1MΩ 10%

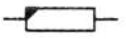
0.33W (SFR25) 5%

0.25W (VR 25) ≤ 10MΩ .5%; > 10MΩ 10%



0.5W (CR 37) ≤ 1MΩ 5%; > 1MΩ 10%

0.67W (CR 52) 5%



1.15W (CR 68) 5%

Ceramic plate

Polyester flat foil

Polyester mepolesco

Mylar (Polyester flat foil small sized)

Micropoco

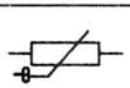
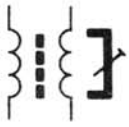
Tubular ceramic (body colour pink or yellow/green)

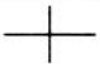
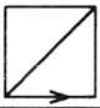
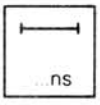
Miniature single elco

Subminiature tantalum

★ a=2,5V
b=4V
c=6,3V
d=10V
e=16V
f=25V
g=40V
h=63V
i=100V
j=125V
l=125V
m=150V
n=160V
q=200V
r=250V
s=300V
t=350V
u=400V
v=500V
w=630V
x=1000V
A=1.6V
B=6V
C=12V
D=15V
E=20V
F=35V
G=50V
H=75V
I=80V

MDA 00084
T32-735

SYMBOL	DESCRIPTION
	Capacitor, general
	Electrolytic capacitor (+ and − may be omitted)
	Bipolar electrolytic capacitor (+ may be omitted)
	Resistor, general
	N.T.C. resistor
	P.T.C. resistor
	Voltage divider with preset adjustment
	Chip jumper
	Pin contact
	Bus contact
	Coil, self-induction
	Transformer with electrically poor conducting core and adjustable pre-magnetization
	Diode
	Zener diode
	Stabistor
	Double variable capacity diode (in one envelope)
	Photo conductive diode
	L.E.D.

SYMBOL	DESCRIPTION
	Transistor (N.P.N.)
	Transistor (P.N.P.)
	Direct current (DC)
	Alternating current (AC)
	Earth (functional)
	Frame or chassis connection
	Direction in which AC voltages are passed on (optional present)
	Interrupted line
	Not-connected crossing lines
	Connected lines
	Cable tree with lead-outs
	Changer, general (arrow is optional)
	Voltage Controlled Oscillator
	Band-pass filter
	Phase changing network
	Delay element
	Amplifier, general

MDA.00083
T32-735

Service
Service
Service Information

1988-01-27

CD371

A88-105

Due to the introduction of CDM-4 (from AH01on) the following pages have been added to the service manuals.
Note A separate manual for the CDM-4 will not be published. Therefore these pages are added to the existing manual.

Change sheets:

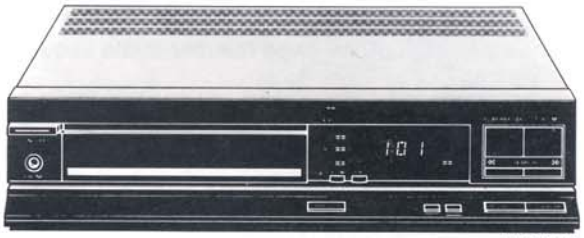
1-1-a
6-2-a

Supplementary sheets:

7-1	Changes
8-1	Laser adjustment for CDM-4
8-3	Technical Data
8-4	Servicing hints
8-5	Servicing hints
8-6	Measurements and adjustments
8-7	Measurements and asjustments
8-8	Exploded view
8-9	Motor circuit

Compact disc player CD371/00R/05R/30R/35R

Service
Service
Service



42 453 A12

For repair of the CDM mechanism with serialnumber AH00 see Service Manual CDM-2-0500.

For serialnumber AH01 and on, see chapter 8.

Service Manual

COMPACT disc DIGITAL AUDIO

CONTENTS

CLASS 1
LASER PRODUCT
3122 110 03420

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

Documentation Technique Service Dokumentation Documentazione di Servizio Huolte-Ohje Manual de Servicio Manual de Serviço

Subject to modification
GB 4822 725 21605
Printed in The Netherlands

PHILIPS

Published by Service Consumer Electronics
CS 13 879 GB

1. EXPLANATION ON THE LAYOUT OF THE DOCUMENTATION

The documentation consists of chapters.
The number of the chapter is indicated by the first digit of the page number.
The second digit of the page number is the sequence numbering.

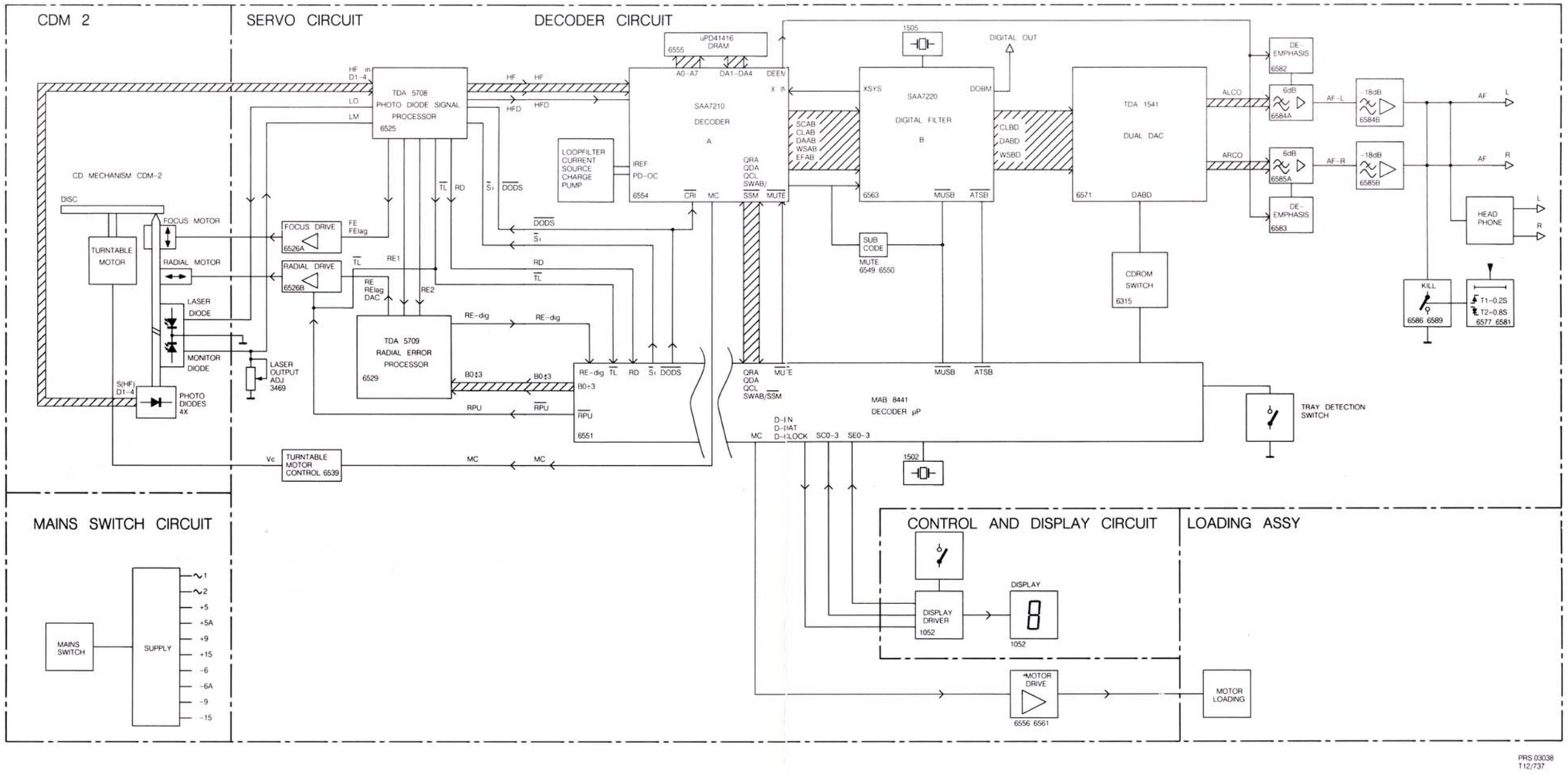
If modifications or supplements require new supplementary or replacement pages, the page number is extended with a third part:

A digit behind the page number indicates that it concerns a supplementary page.
A replacement page is indicated by a letter behind the page number.

Example

3-6	is page 6 of chapter 3
3-6-1	is a supplementary page behind page 3-6
3-6-a	is the replacement page of page 3-6 (so page 3-6 can be removed from the documentation).

TABLE OF CONTENTS PER PAGE



BLOCK DIAGRAM

B0-B3	-	Control bits for radial circuit
DAC	-	Current output for track jumping (Digital to Analogue Converted)
$\overline{\text{DODS}}$	-	Drop out detector supression
D1+4	-	Photodiode currents
FE	-	Focus error signal
FE-lag	-	Focus error signal for LAG network
HF	-	HF output for DEMOD
HFD	-	HF detector output for DEMOD
HF-in	-	HF current input
LM	-	Laser monitor diode input
LO	-	laser amplifier current output
MC	-	Motor control signal
RE	-	Radial error signal (amplified RE_2-RE_1 currents)
RE1	-	Radial error signal 1 (summation of amplified currents D_3 and D_4
RE2	-	Radial error signal 2 (summation of amplified currents D_1 and D_2
RE dig	-	Radial error digital
RE lag	-	Radial error signal for LAG network
$\overline{\text{RPU}}$	-	Radial puls after track jumping
$\overline{\text{Si}}$	-	On/off control for laser supply and focus circuit
$\overline{\text{TL}}$	-	Track loss signal
Vc	-	Control voltage for turntable motor

$\overline{\text{ATSB}}$	-	Attenuation of Audio level in Search position (Cueing)
CD ROM Switch	-	Digital Data information on disc signal
CEFM	-	Clock Eight-to-Fourteen Modulator
CLAB	-	Clock signal Decoder-A to Filter-B
$\overline{\text{CLBD}}$	-	Clock signal Filter-B to DAC
$\overline{\text{CRI}}$	-	Counter Reset Inhibit
DAAB	-	Data signal Decoder-A to Filter-B
$\overline{\text{DABD}}$	-	Clock signal Filter-B to DAC
$\overline{\text{DEEM}}$	-	Deemphasis
DOBM	-	Digital out signal
$\overline{\text{EFAB}}$	-	Error flag Decoder-A to Filter-B
$\overline{\text{MSTP}}$	-	Motor start-stop signal
$\overline{\text{MUTE}}$	-	Mute signal
	-	

$\overline{\text{MUSB}}$	-	Soft Mute signal
QCL	-	Q-channel Clock signal
QDA	-	Q-channel Data signal
QRA	-	Q-channel Request Acknowledge
SCAB	-	Subcode clock Decoder-A to Filter-B
SDAB	-	Subcode data Decoder-A to Filter-B
SWAB/$\overline{\text{SSM}}$	-	Subcode Word/Start-stop motor signal
WSAB	-	Word Select Decoder-A to Filter-B
WSBD	-	Word Select Filter-B to DAC
XIN	-	Oscillator signal in Decoder-A
XSYS	-	Oscillator signal out Filter-B
A0-A7	-	Adressbus A0-A7

SERVO

DECODER-A IC6554 — DODS, HF, HFD

FROM DECODING 2

6551(A) MC68HC05 µP — TCAP, Vdd, RESET, XTAL1, XTAL2, IRQ, Vss, TL, RE-dig, CLOCK, INT/T0, CPU, I/O PORTS

FOR ✱✱ SEE TABLE

	2540	2541	2557	3518	3519	3522	3528	3529	3543	3545	3550	3551
CDM2	220n	–	470n	390k	91k	39	1k	100	39	18k	82k	10k
CDM4	470n	2n7	1µ5 50V	680k	39k	22	4k7	220	15	15k	91k	8k2

RADIAL DRIVE

6529 TDA5709 — RADIAL ERROR PROCESSOR, ROM, 3 12-BIT DAC, INTEGRATING AMPLIFIER, switches, OSCILLATOR 650Hz, 0°, 45°, 90°, Cagc, VBB, VDD, DAC, RE, Clag, RElag, Vref, I lag, I test, I int, lag short circuit, radial

6526 -(1/2)B L272MB — 6531 HZ7C2 7V5, 6532 HZ7C2 7V5

TO RADIAL MOTOR VIA FLEX.PRINT — RAD+, RAD-

FOCUS DRIVE

6526 -(1/2)A L272MB — FOCUS NORMALIZING CIRCUIT, FE, FElag, RPU, Rsnc, Cosc1, Cosc2, Chpf, Coffset

TO FOCUS MOTOR VIA FLEX.PRINT — FOC-, FOC+

TURNTABLE MOTOR CONTROL

6539 -(1/2)A NJM4560, 6539 -(1/2) NJM4560 — 6537 1N4148, 6536 BAT85

TO TURNTABLE MOTOR CIRCUIT — 02-3, 02-1, 02-2, 02-4

C.D.M.-2 — DIODE ASSEMBLY (D1–D4), GUARD RING PHOTODIODE, LASER ASSEMBLY (1003, 1001, 1002 LASER, MONITOR), FLEX PRINT (FOIL)

6525 TDA5708 — HF AMPLIFIER, EQUALIZER, AMPLITUDE DETECTOR, GAIN CONTROL, HF AMPLITUDE SLICERS, STARTING CIRCUIT, LASER SUPPLY, PHOTO DIODE SIGNAL PROCESSOR, LASER OUTPUT ADJ, FOCUS OFFSET

DECODER-A IC6554 — MC

-CHIP JUMPER (0ω)

PRS 03822 T12-807

CS 13 881

CHANGES

Introductions with A88-105 from marking AH01

Description		Reason
Table of contents	1-1-a	Contents adapted
Block diagram	6-1-a	Block diagram adapted
Diagram of the servo	6-2-a	Table added because of the introduction of the CDM-4
Laser adjustment	8-1	Laser current adjustment for the CDM-4
Technical data	8-3	A separate manual for the CDM-4 will not be published.
Servicing Hints	8-4	Therefore these pages are added to the existing manual.
Servicing Hints	8-5	
Measurements and adjustments	8-6	
Measurements and adjustments	8-7	
Exploded view	8-8	
Motor circuit	8-9	

Laser adjustment for CDM4

- Measure the resistance of R3529 + R3528 with an ohmmeter and adjust potentiometer R3528 so that R3528 + R3529 have a combined value of 1 kΩ.
- Check the monitor diode connections. Measure at test point 11 and ground (⊥).
- Put test disc 5 on the turntable.
- Switch on the set and select the PLAY mode or a similar service position.
- Take a DC voltmeter and measure across R3532. The voltage across this resistor should stay smaller than 1260 mV.
- Check if HF is present. If not, stop the measurement immediately and analyse the fault.
- If HF is present, play track 1 of test disc 5 and adjust the sum HF across R3508 (test points 1 and 2) to 50 mV with a DC voltmeter.
  Check, during the adjustment, that the voltage across R3532 does not exceed 1260 mV.
- If the adjustment is not successful within the 1260 mV margin across R3104, check the angle setting.

2. TECHNICAL DATA

General

- Application: Compact Disc "Home Player"
- Single–stage radial and balanced actuator for track following
- Track following error detection method : Push–Pull
- Focus error detection method : Double Foucault
- Dimensions: 130 x 100 x 44 mm
- Weight : abt. 270 grams

Radial actuator

- Swing angle: 72°
- Diameter readout range: from 47.4 mm ± 0.6 mm to 117.5 mm ± 0.5 mm
- Squareness relative to turntable: 90° ± 0.4°
- Bearing friction: 0.75 mNm max.
- Total ohmic resistance of the coils: 20 Ω ± 2 Ω
- Maximum allowable voltage: 14V/DC continuous
- K factor: 0.019 Nm/A (± 20%)

Focus actuator

- Vertical amplitude: 1.9 mm ± 0.2 mm
- DC voltage across the focus motor in focus: between −0.8V and +0.7V.
- Sensitivity: 21 mm/A
- Ohmic resistance: 23.5 Ω ± 2.5Ω
- Maximum allowable voltage: 8V/DC continuous

Laser diode LTO 22MC

- Wave length: 780 nm ± 10 nm
- Light energy: 3 mW
- Voltage across the diode at 3mW: typical = 1.75 V, max. = 2.2 V

Turntable motor

- Hall motor

3. SERVICING HINTS

To prevent loose metal objects from getting in the CD mechanism, it will be necessary to see to a clean repair station.

The objective can be cleaned with a blow brush.

When effecting repairs to, or making measurements on the CD mechanism, be careful not to damage the flat springs of the focusing unit.

ESD

THE PHOTODIODES AND THE LASER ARE MORE SENSITIVE TO ELECTROSTATIC DISCHARGES THAN MOS ICS.
CARELESS HANDLING DURING SERVICING MAY REDUCE LIFE EXPECTANCY DRASTICALLY.
FOR THIS REASON CARE SHOULD BE TAKEN THAT DURING SERVICING THE POTENTIALS OF THE AIDS AND YOURSELF ARE EQUAL TO THAT OF THE SCREENING OF THE SET.

For measurements and adjustments it is possible to position the working mechanism outside the set.
For this purpose, an extension cable can be made from the following parts.

- Service flat cable (14-pole) 4822 322 40066
- Service connector (14-pole) 4822 290 60602

These two items should be used to assemble an extension cable between the connector and the flex cable of the CDM-4 unit.
The two connections to the motor should be lengthened with loose wires.

Remark: The service cable should be assembled as follows; (see Fig. 1)

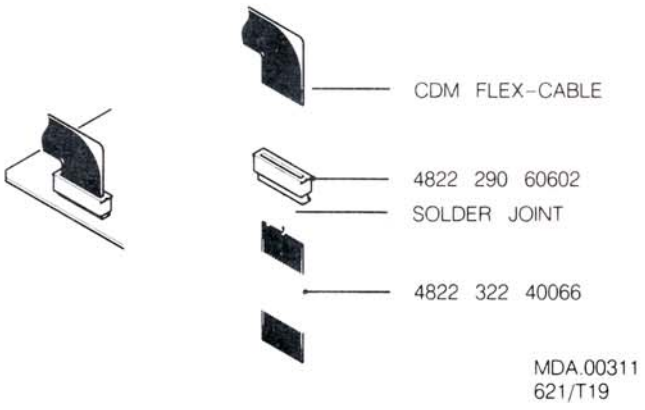


Fig. 1.

Service aids

Audio test disc	4822 397 30085
Disc without errors +	
Disc with DO errors,	
black spots and fingerprints	4822 397 30096
Disc hold-down	see page 3-2
Torx screwdrivers	
Set (straight)	4822 395 50145
Set (square)	4822 395 50132
Glass disc	4822 395 90204

Demounting the Rafoc unit

- Take the CD-mechanism out of the set.
- Remove the flexible PCB from the connector on the PCB by lifting the upper part of the connector and taking the flexible PCB out. (see Fig. 2)

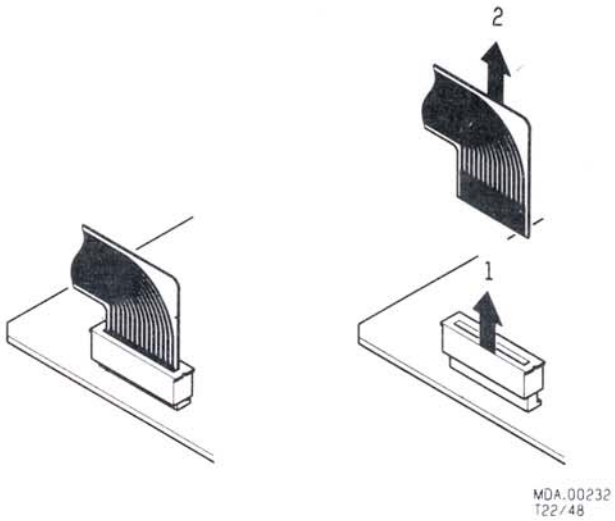


Fig. 2

- The RAFOC unit can be removed after the two fixing screws M3 × 25 have been loosened.
  Caution: when doing so, the two nuts M3 on the upper side of the CD mechanism come loose.
- Now the pivot plate, item no. 56, can be removed.
- After removing the clamping piece, item no. 51, the RAFOC unit/flexible PCB assembly can be taken out.
  Attention: when mounting the RAFOC unit, see to it that the flexible PCB reset well against the mounting plate at the height of the clamping piece (item no. 51).
  In some cases, after exchanging the RAFOC unit/flexible PCB assembly, it may be necassary to glue the flexible PCB with a fast-drying glue to prevent the RAFOC unit from rubbing against the flexible PCB. The glueing should be done very carefully.
- When the laser and/or the monitor diodes are defective, it will be necessary to replace the complete CDM unit.
- After mounting the RAFOC unit you should make sure that the arm runs clear over the entire disc diameter. This can be checked by means of a spring-pressure gauge which is held against the magnet of the focusing unit.
  The friction of the arm, measured over the entire meter reading, may not be greater than 25mN.
- A fast check of the clearance of the arm is possible in service position 0.
  For servicing positions see the service manual of the set.
- After mounting, the angle setting should be adjusted.

Replacing the flexible PCB item 54

- Demount the RAFOC unit.
- Desolder the connections A (see Fig. 3) of the flexible PCB.

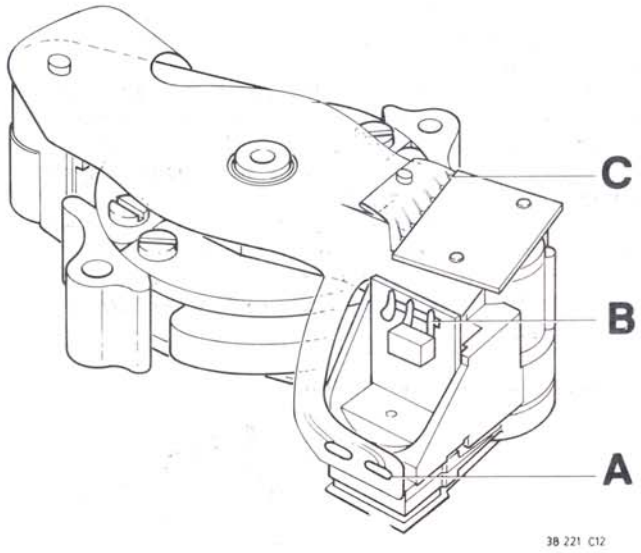


Fig. 3

- Before desoldering the connections C of the photodiode PCB, the positions of the connecting points of the photodiode PCB should be marked, so that afterwards the PCB can correctly be replaced.
- Now the 6 connections C of the photodiode PCB can be desoldered by heating the pins C one by one until the flexible PCB comes loose.
  This should be done very carefully.
- Desolder the 4 connections of the radial coils.

Mounting the flexible PCB (item 54).

- Solder the 4 connections of the radial coils.
- Apply the connections A and B (see Fig. 3).
- Before the 6 connections of the photodiode PCB can be soldered, they should be provided with an extra coating of tin.
- Place the flexible PCB under the photodiode PCB.
- In order to hold this position, the flexible PCB may be supported (for example by an expanded paper-clip between the arm and the underside of the flexible PCB).
- Then the 6 connections C can be heated so that they become soldered to the photodiode PCB.

Replacing electrical components

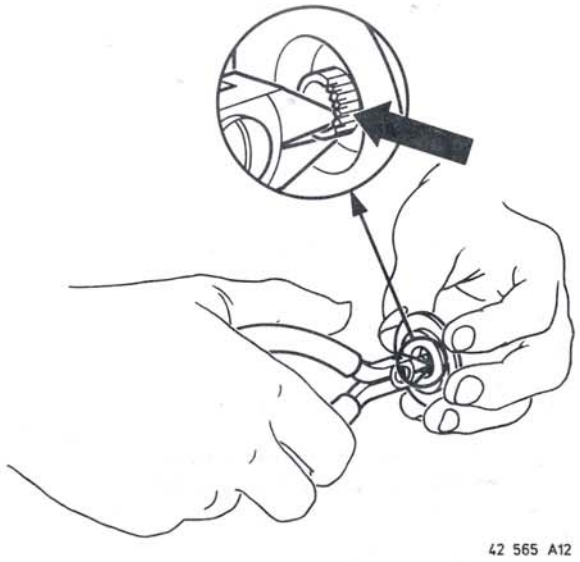
- If one of the following components is defective: photodiodes, laser diode, focus motor, radial actuator turntable motor, the entire CDM unit should be replaced.

A service disc-holddown

The disc should always bed down well on the turntable. If the mechanism has to be dismounted for repair, a service disc-holddown should be used.
The CD mechanism then can function normally as in the set.

Compose a service Disc hold-down in the following way

- Cut in the most inner ring of a disc hold-down (4822 462 56383) with small and sharp nippers. See fig. below.
- Enlarge the diameter of the innermost ring slightly with the hind part of a pencil of ballpoint, so that it jams onto the turntable with sufficient force.
- If the jamming force decreases after certaintime of use, the diameter has to be enlarged with a pencil or ballpoint again.



Replacing chip components

Leadless components have been applied in the set.
For the insertion and removal of leadless components see the figure on page 3-1.

4. MEASUREMENTS AND ADJUSTMENTS

Checking the angle setting

The angle setting can be checked with the glass-disc method which is explained below.

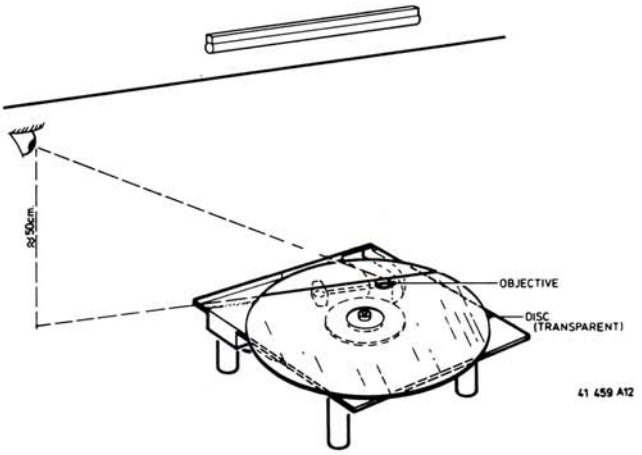


Fig. 4

Put glass disc 4822 395 90204 on the turntable.
Make sure that the glass disc beds down well on the turntable.
Place the CD mechanism under a light source, under which there is a straight line (e.g. under a fluorescent tube with grid).
Set the arm to mid-position of its radial track.
Turn the mechanism until the arm is parallel to the line under the light source (see figure below).
Look into the direction and in the extension of the line to the reflection there of on the glass disc and in the objective.
Locate the CDM in such a way that the line reflected by the glass disc runs across the centre of the objective.
The line reflected by the objective should fall just within the surface of the objective. If this is the case, the two lines are not more than 4 mm apart and squareness is correct.

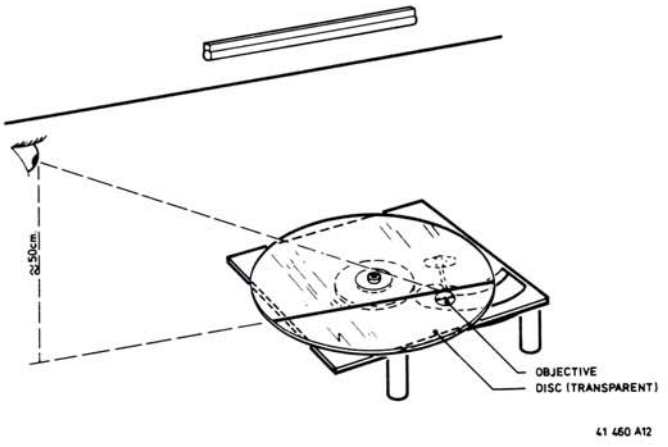


Fig. 5

Turn the CD mechanism through 90° relative to the previous position. The arm must be kept in mid-position (see figure above).
Repeat the previous check.

Adjusting the angle setting

For adjusting the angle settig one or both of the two locking knocks for the bearing plate on pos. 59 must be broken.
If a check on the angle setting shows that the angle falls outside the tolerance, the angle should NOT be adjusted for minimum deviation, but it should be adjusted within the tolerance.
The new setting should lie between the old setting and the optimum setting. After adjusting the setting, the friction of the arm must be checked. This is done by means of a spring pressure gauge which is held against the magnet of the focusing unit.
The friction of the arm, measured over the entire meter reading, should not be greater than 25 mN.
When the friction appears to be too high, the RAFOC unit must be replaced and the angle between disc and light path adjusted.

The lock is adjusted as follows:

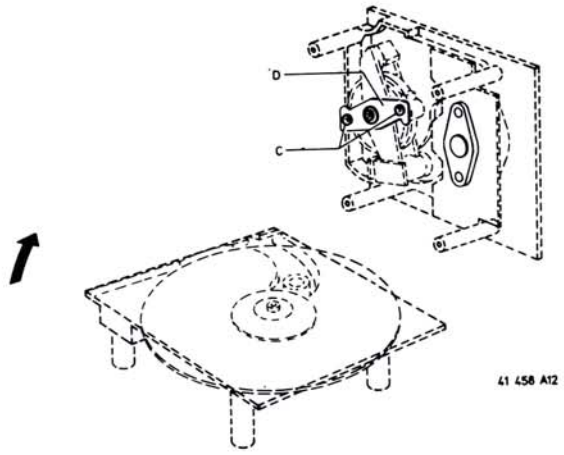


Fig. 6

Loosen screws C (see figure above) unitl bearing plate D can be displaced. Correct the angle setting by moving the bearing plate into the direction shown in figure below.
Tighten screws C, ensuring that the setting does not drift.
Then double check the setting in two directions.

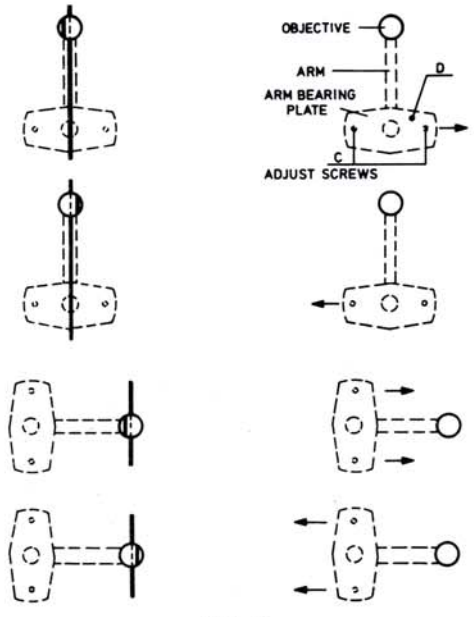


Fig. 7

Check of the motor control (Hall control) (see motor PCB)

Principle

With the oscilloscope the form of the voltage across resistor 3094 in the +2 lead and across resistor 3093 in the −2 lead is seen. This voltage is a consequence of the current and in this way current signals (pictures) are formed.
The current through the motor−coils A and B is sinusoidal. This current is switched on and controlled by the Hall ICs.
The Hall ICs are mounted at an angle of 90 degrees with respect to each other. Consequently the currents through A and B are shifted in phase 90 degrees.
In the following figures the origin of the current signal through the +2 and −2 leads is shown graphically.

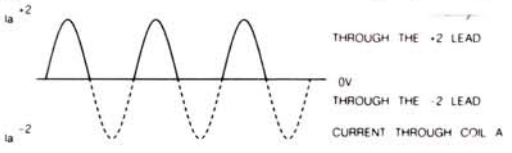


FIG.1

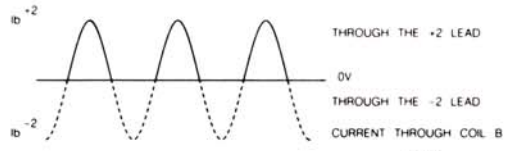


FIG.2

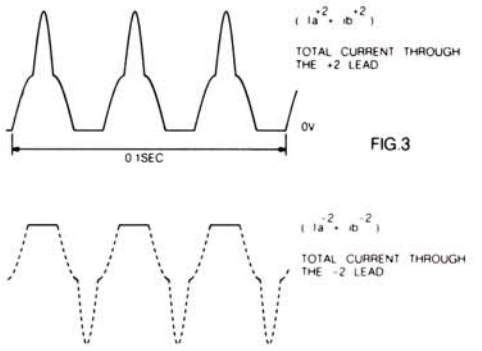
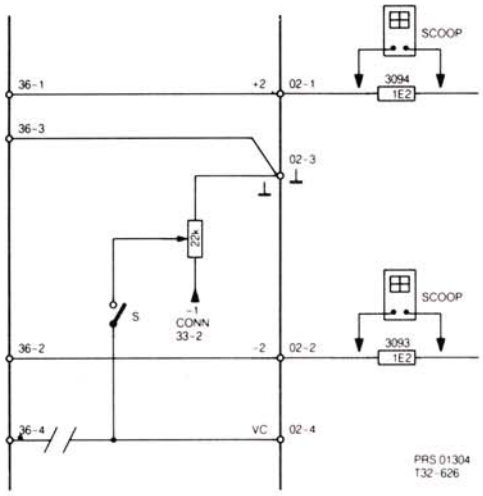


FIG.3

SERVO P.C.B MOTOR P.C.B



1. Interrupt the Vc connection by unsoldering the connector point 36−4 on the servo + preamplifier p.c.b.

2. Connect a trimming potentiometer of 22K Ohm to the motor print between 02−3( ) and connector 33−2(−1) on the servo board.

3. Connect the slider with 02−4(Vc) via switch S.

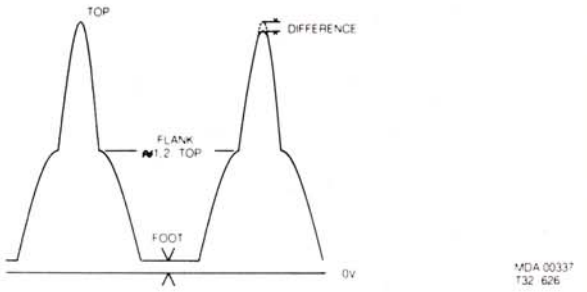
4. Measure with an oscilloscope first across 3094 and hereafter across 3093.
   Do not measure across both resistors at the sametime, since the currents are measured through the +2 lead and −2 lead.

5. Put the trimming potentiometer in the maximum position (the slider is then connected to connector 33−2(−1)).

6. With a disc on the turntable, put the set in service−loop 0. Switch S on and adjust the trimming potentiometer back in such a way that 3 complete pulses are visible during 0.1 sec. (fig. 3). The polarity of the oscilloscope must be chosen so that the tops of the pulses are in upward position.
   The rotor magnet of the motor has 3 polespairs. Therefore the behaviour of the motor during one revolution with a speed of 600 r.p.m. is visible.

7. Measure with a DC−voltmeter on 02−4(Vc).
   A. V_c = −1.7 +/− 0.5 V.
   B. Measure across 3094, value 1 = maximum 56.4 mV.
   C. Measure across 3093, value 2 = maximum 58.8 mV.
   D. Difference: **(value 1 - value 2)** maximum 6 mV. If the difference exceeds 6 mV, while value 1 and value 2 are below the maximum the motor is then wrong!

8. For a good functioning the signal has to meet the following values:

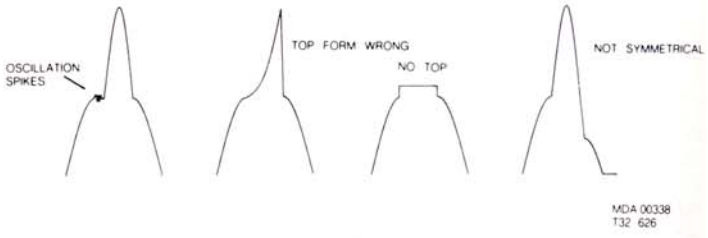


Top is not specified by value, see 7 (value 1 and value 2).

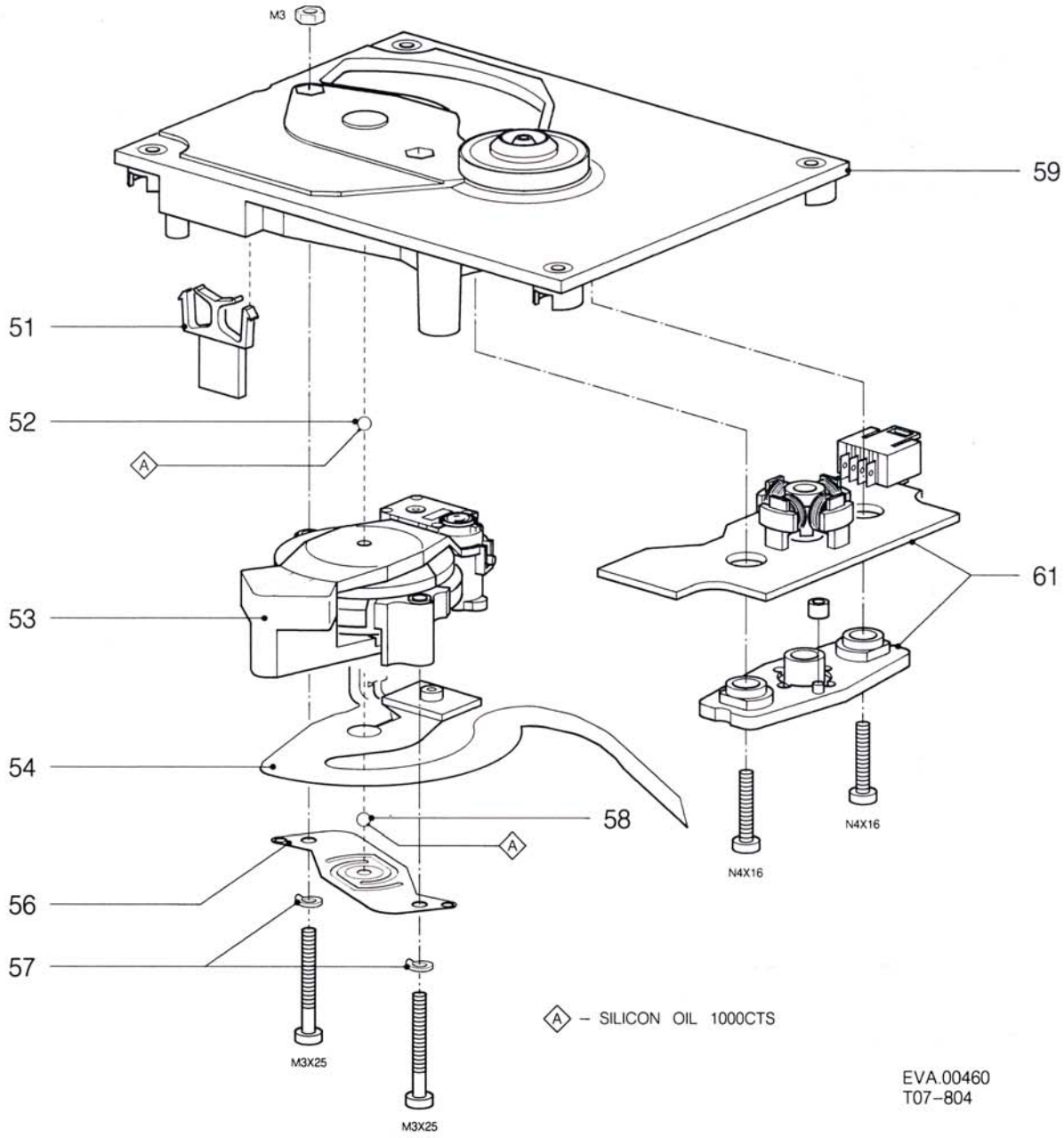
Top difference	<24 mV
Flank difference	<36 mV
Foot	is not specified

Remark:
Flank difference is at one asymmetrical pulse.
Foot is DC offset.

9. Examples of the wave form faults:



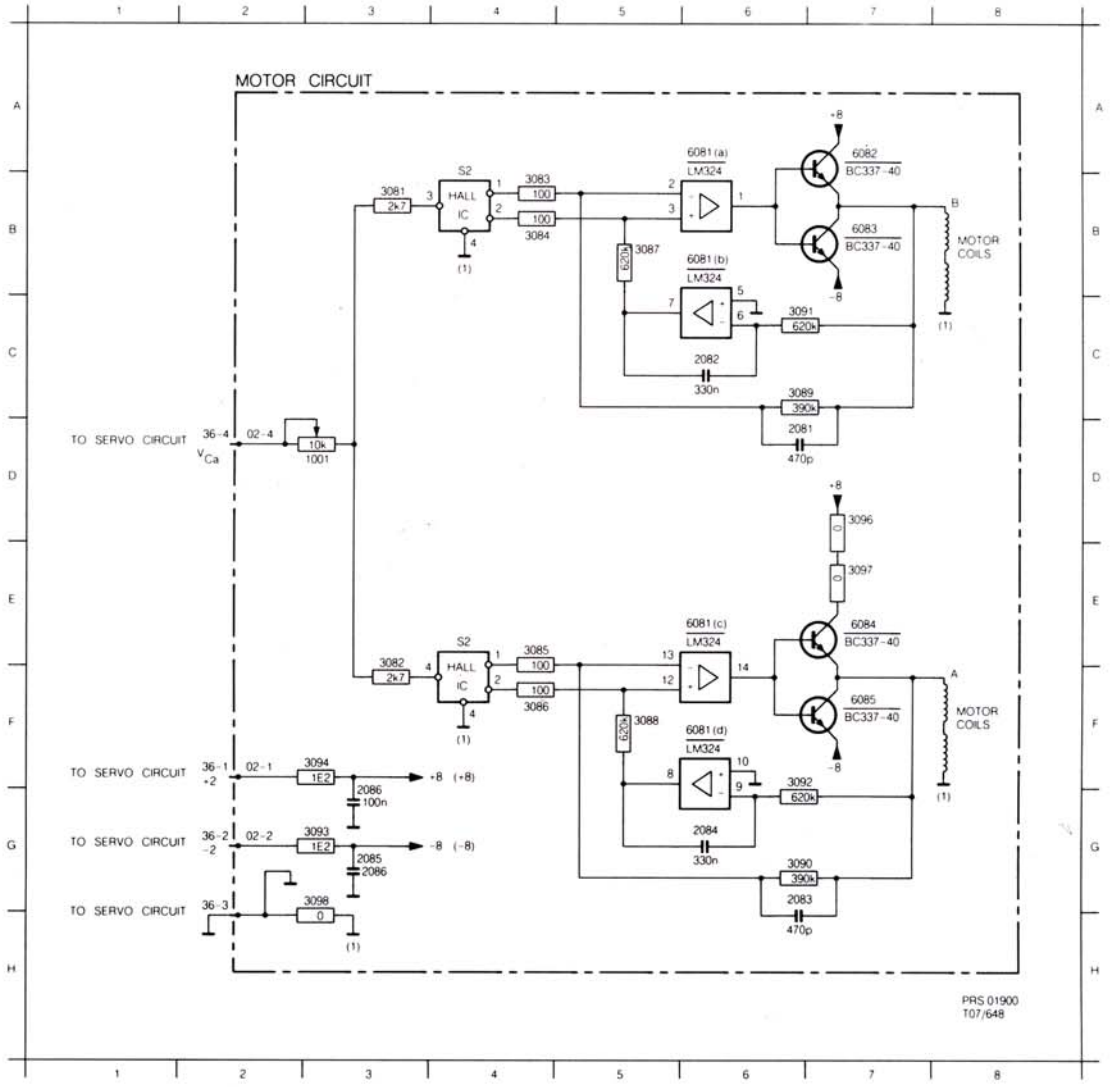
10. Adjust the voltage on 02−4(Vc) with the potentiometer back to −0,9 V. The motor must still turn. Although the top height is much lower now the wave form has to be symmetrical and rounded.



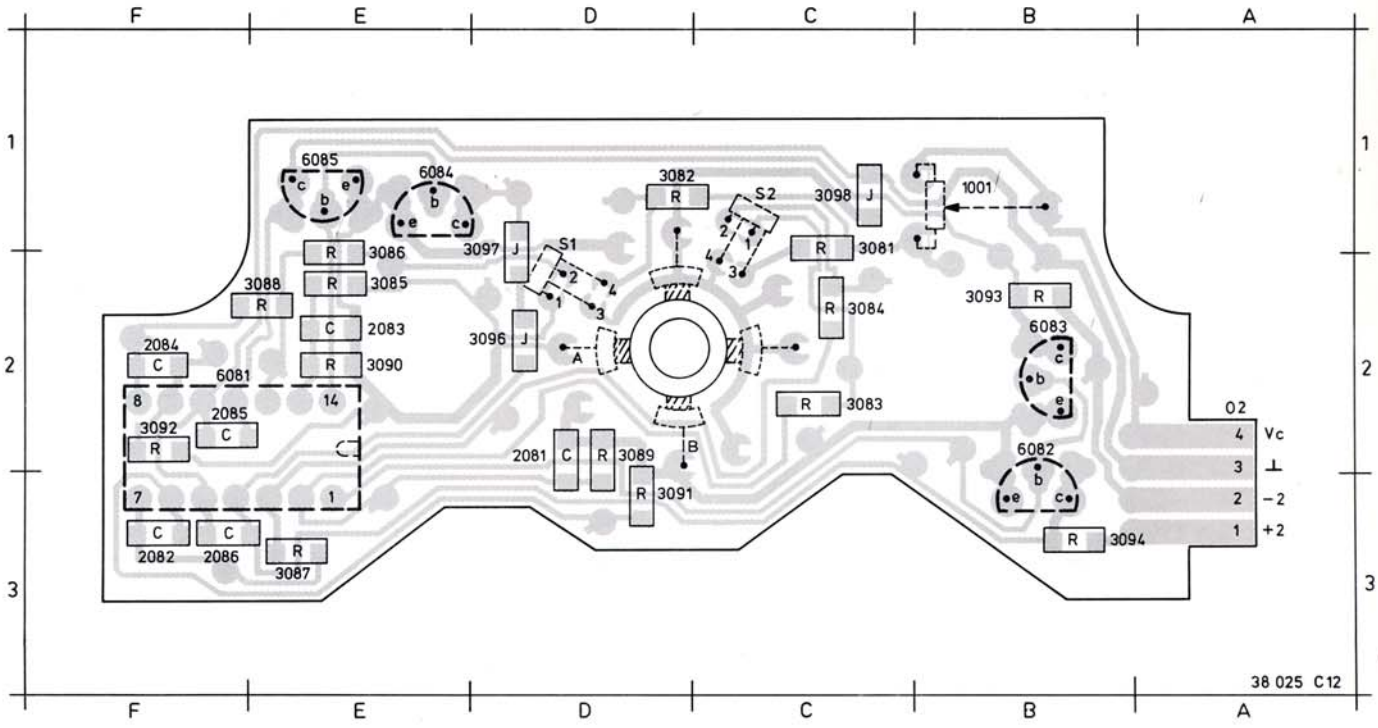
Mechanism parts

Complete unit	4822 691 20464 (pos. 51÷61)
51	4822 492 63761
52,58	4822 520 40177
54	4822 323 50124
56	4822 520 10555
57	4822 530 80188
A	4822 390 80145

MOTOR CIRCUIT



MOTOR PANEL



CS 13 890