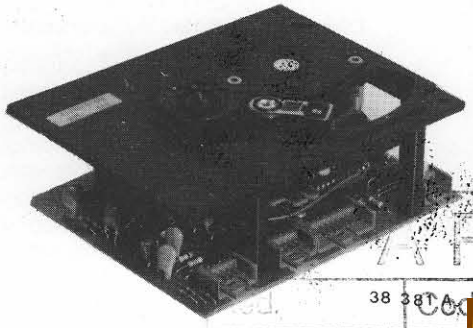
Compact disc mechanism C.D.M.-2

Service
Service
Service

Hi-Fi/Leuven/Top Hi-Fi/

0000/0001/0003/
0300/0301/
0303/0008/
0307



Service Manual

COMPACT disc DIGITAL AUDIO

Version (see sticker) on CDM)	Circuit diagram	PCB drawing	Block diagram	Test method	µP on PCB?	Turntable magnetic
Static versions						
CDM-2 Hi-Fi/ 0000	I	I	I	I	yes	no
CDM-2 Leuven/ 0003	I	I	I	I	yes	yes
CDM-2 Top Hi-Fi/ 0001	IIA	IIA	II	II	no	no
Dynamic versions						
CDM-2 0300	I	I	I	I	yes	no
CDM-2 0301	IIB	IIA	II	II	no	no
CDM-2 0303	I	I	I	I	yes	yes
CDM-2 0008	IIB	IIA	II	II	no	no
CDM-2 0307	–	–	–	–	–	yes

CLASS 1
LASER PRODUCT
3122 110 03420

Safety regulations require that the set by 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 20657
Printed in The Netherlands

Published by Service Consumer Electronics
CS 7 940 GB

CONTENTS

1. Table of contents and elucidation on the layout.
2. Servicing hints.
3. Measurements and adjustments.
4. Exploded view of CD mechanism and component parts lists.
5. Block diagram, circuit diagrams, PCB data and parts lists of electrical components.
6. Changes.
7. Additional information.

1. ELUCIDATION ON THE LAYOUT OF THE DOCUMENTATION

This 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 taken out of the documentation).

2. 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.

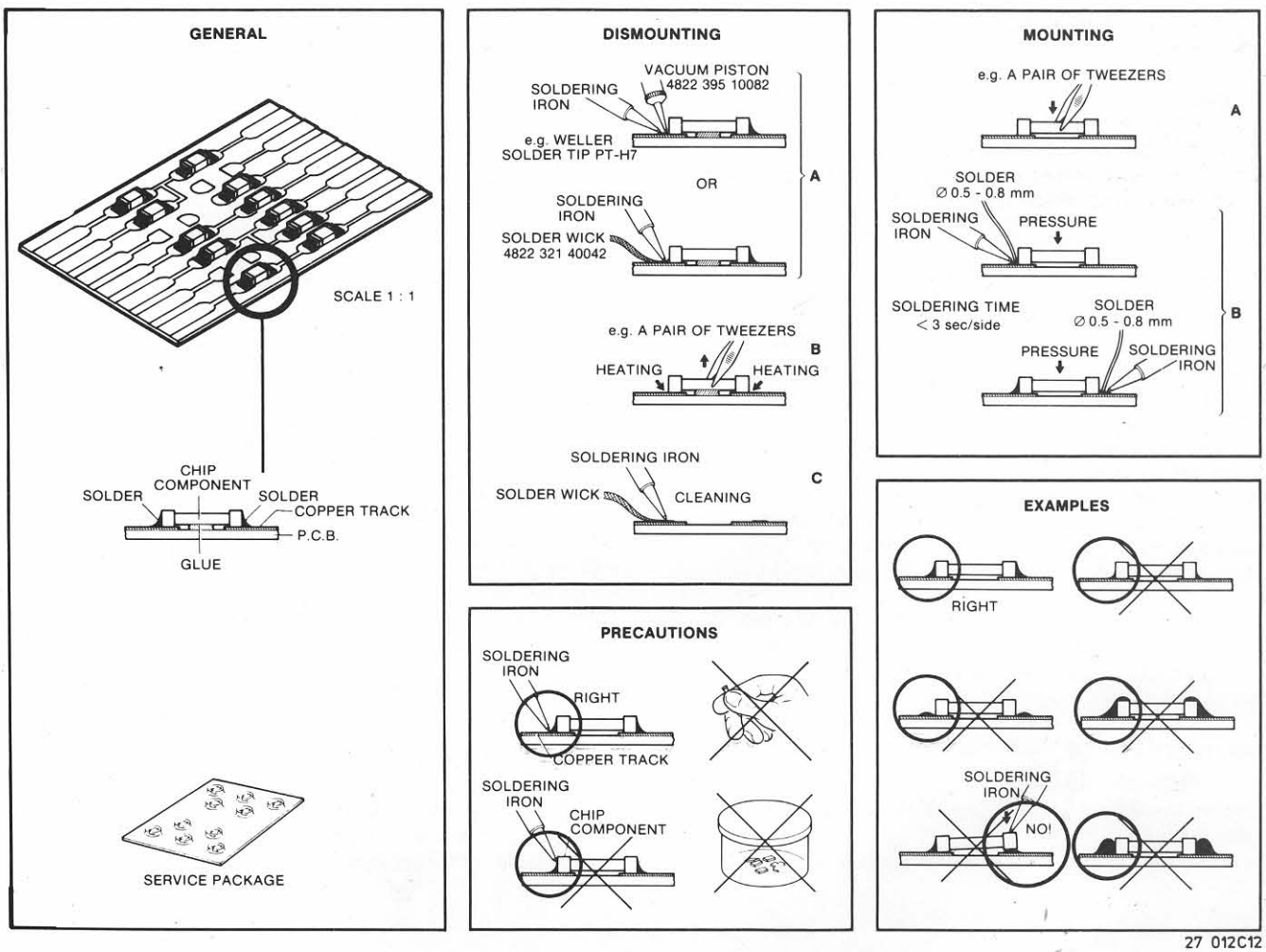
THE PHOTODIODES AND THE LASER ARE MORE SENSITIVE TO ELECTROSTATIC DISCHARGES THAN MOS ICS.
CARELESS HANDLING DURING SERVICING MAY REDUCE LIFE EXPECTANY DRASTICALLY.
FOR THIS REASON CARE SHOULD BE TAKEN THAT DURING SERVICING THE POTENTIALS OF THE AIDS AND YOURSELF ARE EQUAL TO THAT OF THE SCREENING OF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

Leadless components have been applied in the set.
For the insertion and removal of leadless components see the figure below.

The disc should always bed down well on the turntable.
If the tray mechanism has to be demounted for repair, one or several separate disc hold-downs should be used.
The CD mechanism then can function normally in the set.

For measurements and adjustments it is possible to position the working mechanism outside the set.
To do this, the following extension cables are supplied as service aids: cable between connector 34 on the servo + preamplifier PCB and connector 43 on the decoder PCB: 4822 321 21274 (9-pole).
Cable between connector 33 on the servo + preamplifier PCB and connector 42 on the decoder PCB: 4822 321 21273 (5-pole).
Cable between the Hall motor PCB and connector 36 on the servo + preamplifier PCB: 4822 321 21284.
This last cable allows us to demount the servo + preamplifier PCB and place it beside the CD mechanism on the work table.
In this way, measurements on a working set can easily be carried out.

SERVICE AIDS	
Audio test disc	4822 397 30085
Disc without errors + Disc without DO errors, black spots and fingerprints	4822 397 30096
Torx screwdrivers:	
-set (straight)	4822 395 50145
-set (square)	4822 395 50132
Disc hold-down	4822 532 60906
Service cable (9-pole)	4822 321 21274
Service cable (5-pole)	4822 321 21273
Serivce cable (4-pole)	4822 321 21284
IR LED CQY89A-II	4822 130 31332



27 012C12

Fig. 1.

Servicing the RAFOC unit (=Radial and Focusing unit, item no. 56. See exploded view CDM-2).

- Take the CD-mechanism and servo PCB assembly out of the set.
  (For the demounting instructions see the service manual of the set).
- Remove the flexible PCB from connector 31 on the servo PCB by lifting the upper part of the connector and taking the flexible PCB out.

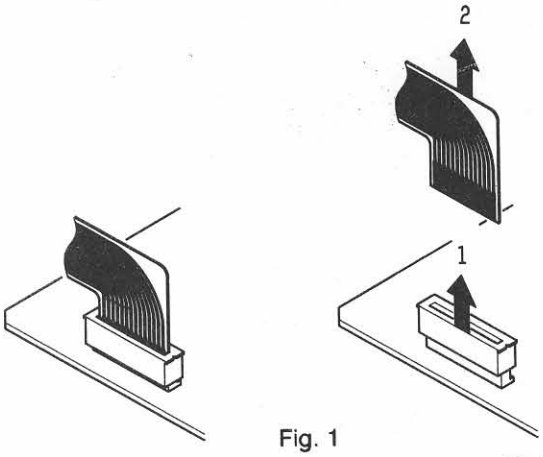


Fig. 1

MDA.00232
T22/48

- Undo the 4 screws on the conductor-side of the servo + pre-amplifier PCB.(Fig. 1)
  The servo + pre-amplifier PCB can now be removed.
- The RAFOC unit can be removed after the two fixing screws M3 x 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. 59, 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 gluing should be done very carefully.
- When the laser and/or the monitor diodes are defective, it will be necessary to replace the RAFOC unit, item no. 56.
- **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.
  The RAFOC unit can be moved across the diameter of the disc by operating the SEARCH FORW. and REV. keys. (see DETAILED MEASURING METHOD Servo-circuit).

Replacing the flexible PCB (item 57)

- Demount the RAFOC unit.
- Remove the 2 fixing rings (item 60) from the flexible PCB.
- Desolder the connections A (see Fig. 2) of the flexible PCB.

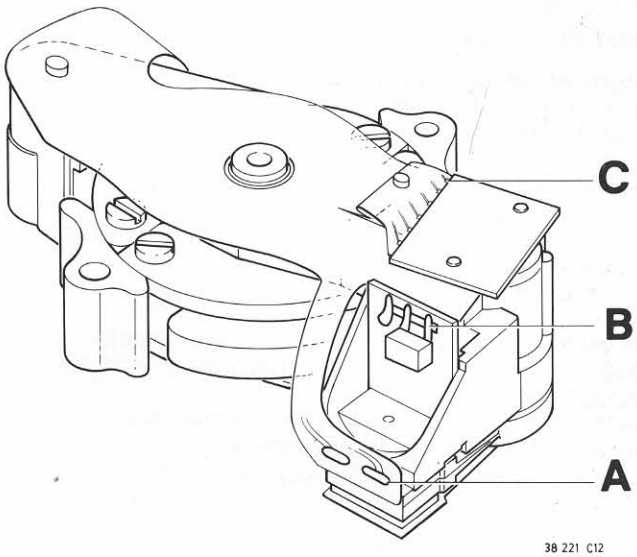


Fig. 2

- 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.
- Unsolder the 3 connections of the laser PCB.

Mounting the flexible PCB (item 57).

- Solder the 4 connections of the radial coils.
- Apply the connections A and B (see Fig. 2).
- 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.
- Replace the two fixing rings (item 60) of the flexible PCB.

Replacing the focusing unit (item 52).

- Desolder the 2 connections of the flexible PCB on the focusing unit.
- Remove screw 2Nx10.
- As a result the fixing piece (item 54) will come loose.
- The focusing unit can now be removed.
- When mounting the focusing unit, care should be taken that the focusing unit runs clear.
  The position of the focusing unit is fixed, adjustments are not possible.

Servicing the turntable motor (see exploded view).

The components indicated in the exploded view by item numbers 62, 63 and 64 are supplied as an assembly for servicing purposes because of the mechanical and electrial factory adjustments.
For inspection of the turntable motor assy see "check of the turntable motor", page 3-1.

3. MEASUREMENTS AND ADJUSTMENTS

Check of the laser supply

The laser and the laser supply in IC6101 plus the monitor diode form a feedback system. A defect in the laser supply may result in the destruction of the laser. If, in that case, the laser (= complete RAFOC unit item no. 56) 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. For this reason the laser supply can be checked with the circuit below. The green LED replaces the laser, the voltage across the 18-Ohm resistor is fed back as monitor voltage, the 33-Ohm resistor and the switch serve to draw more current from the laser supply.

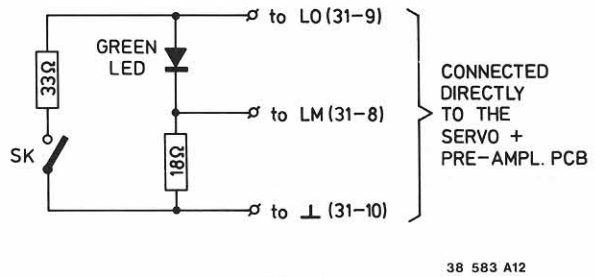


Fig. 3

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

The above circuit is connected to connector 31 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

- The above flex print out of connector 31 on the servo + pre- amplifier PCB.
- Connect the circuit via the extension cable to connector 31.
- Select the play mode by grounding Si (pin 20 of IC6101).
  Note: Si = 0, start initialization low, is the play mode.
- Measure the voltage LO (Laser Out) at test point 9.

  SK open: 1,8 V LO 2,3V
  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 STANDBY state, LO = 0V ± 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 RAFOC unit (item 56 on the CDM-2 exploded view drawing), the laser output potentiometer (3106) should be placed in mechanical mid-position to avoid damage to the laser.

Adjusting the laser current

Coarse adjustment

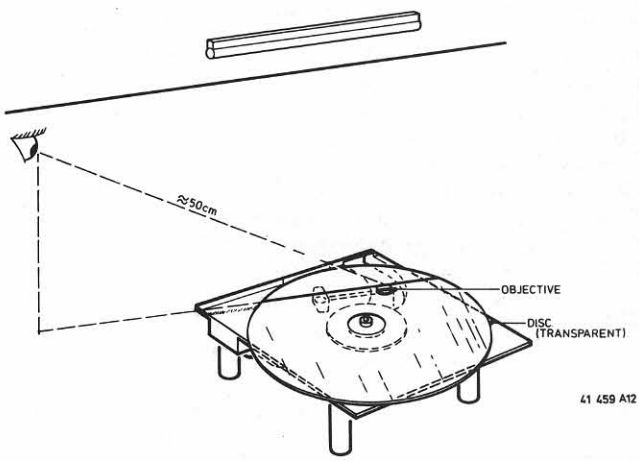
- Place potentiometer 3106 approximately in the centre.
- Place test disc 5, 4822 397 30096, on the turntable.
- Bring the player in Service position I.
- Now the focus motor will max. 16X search for the focal point. On the display a "1" will appear if the focal point has been found.
- If this does not happen, turn potentiometer 3106 a bit to the left or to the right until a "1" appears on the display.

Fine adjustment of the laser current

- Connect a DC voltmeter to test points 1 and 2 (= across resistor 3102).
- Play track 1 of test disc 4822 397 30096.
- Using potentiometer 3106, adjust the laser supply until the voltage across resistor 3102 is 50 mV ± 5 mV.

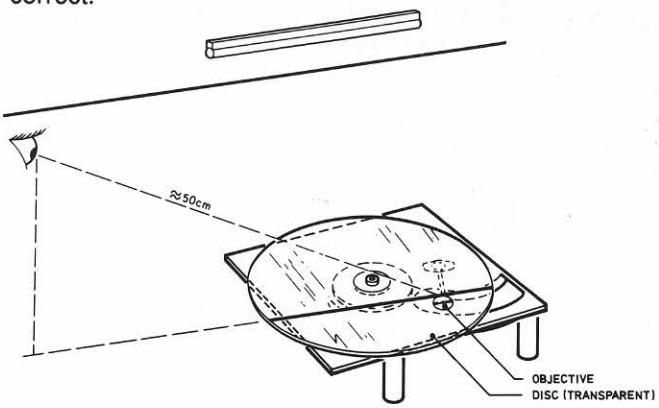
Checking the angle setting

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



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.
These lines should not be apart more than 4 mm.

Place the CD mechanism so that the reflected line runs across the centre of the objective.
When the line that is reflected by the glass disc stays within the surface of the objective, the angle setting is correct.



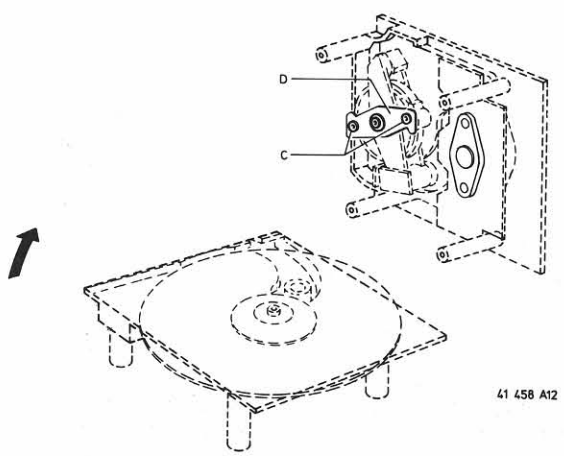
41 460 A12

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

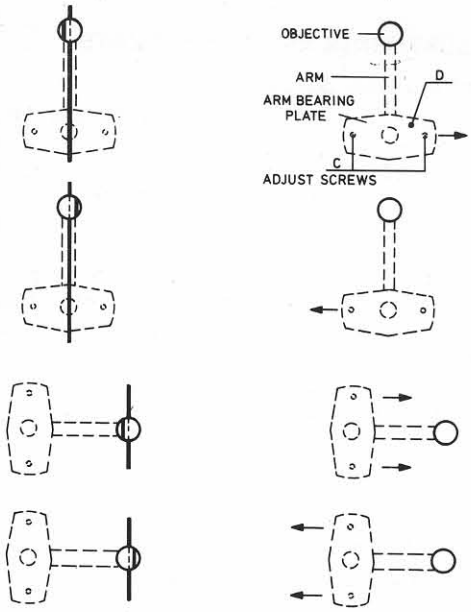
For adjusting the angle setting one or both of the two locking knocks for the bearing plate on pos. 62 must be broken.
If a check on the angle setting shows that the angle falls outside the tolerance, the angle should NOT be adjusted for minimum deviation, but it should be adjusted within the tolerance.
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:



41 458 A12

Loosen screws C (see figure above) until 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.



38 692 A12

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.

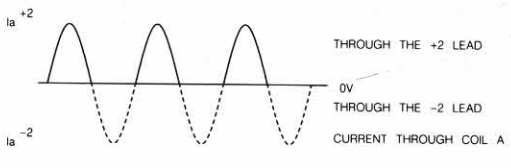


FIG.1

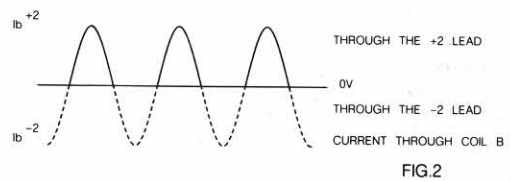


FIG.2

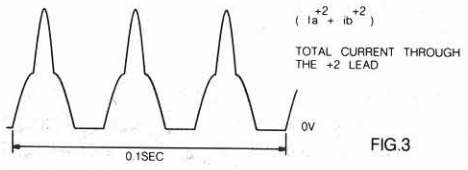


FIG.3

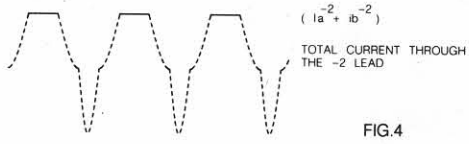
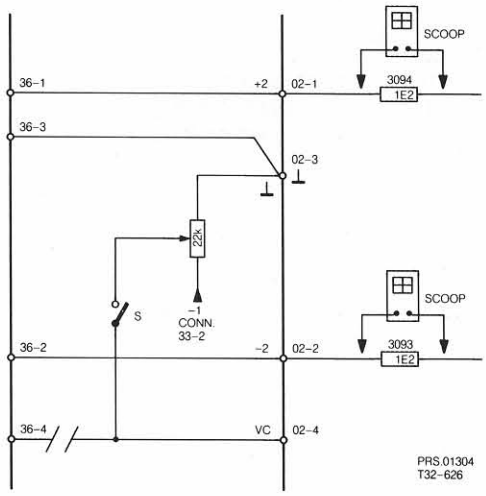


FIG.4

MDA 00336
T32−646

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.

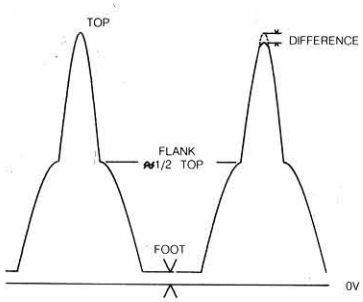
4. Measure with an oscilloscope first across 3094 and hereafter across 3093.
   Do not measure across both resistors at the sametime, since the currents are measured through the +2 lead and –2 lead.

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. For statically adjusted motors: Vc = –2.5 V +/–0.3V.
   B. For dynamically adjusted motors:
      V_c = –1.7 V +/– 0.5 V.
   C. Measure across 3094, Value 1 = maximum 56.4 mV.
   D. Measure across 3093, Value 2 = maximum 58.8 mV.
   E. 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:

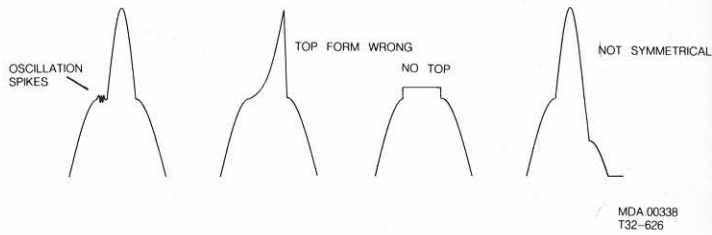


Top is not specified by value, see 7.(value 1 and value 2).

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 – 1.5 V. The motor must still turn. Although the top height is much lower now the wave form has to be symmetrical and rounded.

DETAILED MEASURING METHOD FOR THE SERVO + PRE-AMPLIFIER CIRCUIT I

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 connected 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 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 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 supply voltage of the related circuit.

Continuous burning of the laser

- Bridge capacitor 2305 on the decoding panel.
- Connect Si (= pin 20 of IC6101 on the servo + preampl. panel) to ground.
- Switch on the supply voltage.
- Now the laser will burn continuously.

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 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 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 two microprocessors by means of their built-in test programme and servicing programme.

Method:
Self-test of the decoder μP

Initiation of the service programme of the µP

- *Servicing position "0"*
  Simultaneously depress the PREVIOUS, NEXT and TIME/TRACK keys.
  Keep these three keys depressed while the mains voltage is switched on.

  This is the **stand-by** mode; on the display appears "0".

  In this state it is possible to move the arm by means of the SEARCH FORW. and SEARCH REV. keys with a minimum torque to the outside and to the inside, respectively.
  Thus the free motion of the arm across the disc can be checked.

- *Servicing position "1"*
  From servicing position "0" the player can be brought in servicing position "1" by depressing the NEXT key.

  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 moves 16× to and fro.
  Then the player assumes servicing position "0" again.

  As in servicing position "0", the arm can be moved across the diameter of the disc by means of the SEARCH FORW. and SEARCH REV. keys.

- *Servicing position "2"*
  This position can be reached by depressing the NEXT key 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 centre of the disc.

- *Servicing position "3"*
  This position can be reached by pressing the NEXT key after servicing position "2" has been reached.
  The **radial control** is **switched on.**
  The **sub-code information** is **ignored.**
  Mute is high so that the **music information** is **released.**

  On the display appears "3".
  (Depending on the lenght of the lead-in track, music will be played after about 1 minute).
  In this state it is possible to move the arm by means of the SEARCH FORW. and SEARCH REV. keys to the outside and inside, respectively.
  Now the motion is controlled by the µP and the arm moves by steps of 64 tracks as long as the key is depressed.

  If one of the servicing positions 1, 2 or 3 is disturbed (for example braking or removing the disc), the player assumes servicing position "0" again.

  The servicing programme can be left by switching the mains switch (POWER ON/OFF) on and off (HARDWARE reset).

I SERVO µP IC6105

•Self-test

With the self-test of the servo µP the following parts of the µP are tested:
- RAM
- ROM
- Timer
- Serial I/O interface
- I/O gates.

- Interrupt the I^2C connection and the I^2D on connector pins 35-2 and 35-4 the servo + pre-amplifier PCB.
- Desolder pins 1, 7, 26 and 27 of the servo µP.
- Render pin 2 of the µP "low" (=ground) and switch on the supply voltage.
- The test starts when pin 2 is rendered "high" again (=removing the connection with ground)
- If all tests are positive, pin 1 of the µP will go "low" within 1 second.

•Reset (pin 17)

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

•X-tal out (pin 16; test point 31)

The frequency of this signal should be 6 MHz.

•Q-sync. (pin 1)
Q-clock (pin 27)
Q-data (pin 26)

See "DETAILED MEASURING METHOD FOR THE DECODER CIRCUIT"
for measurements on the "DEMOD IC", section I of the service manual of the set type.

•$\overline{\text{DEEMPH}}$ (pin 24; test point 14)

See "DETAILED MEASURING METHOD FOR THE DECODER CIRCUIT" for measurements on the "$\overline{\text{DEEMPH}}$ circuit", section VI of the service manual of the set type.

•$\overline{\text{MUTE}}$ (pin 25; test point 13)

See "DETAILED MEASURING METHOD FOR THE DECODER CIRCUIT" for measurements on the "DEMOD-IC", section I of the service manual for the set type.

•$\overline{\text{Si}}$ (pin 22; 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)
HIGH-OHMIC MEASUREMENT

The RD signal (= READY) will go high when the starting procedure of IC6101 has been completed.

Position of player	POWER ON	Servicing pos. 1	PLAY
RD signal	"low"	"high"	"high"

•MCO (pin 21; test point 29)

When the MCO signal (=Motor Control On) goes "high", the turntable motor control will be switched on.

Position of player	POWER ON	Servicing pos. 2	PLAY
MCO signal	"low"	"high"	"high"

•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 and the level on the DAC output is controlled.
- In the SEARCH mode, there should be activity on all 4 test points.
- In servicing position 1 the arm can be moved at constant speed to the centre and to the outside of the disc (by means of both SEARCH keys).
  In that case the signals B0÷B3 are stable:

signal	B0	B1	B2	B3
arm to outside of disc	"high"	"low"	"high"	"low"
arm to centre of disc	"low"	"high"	"high"	"low"

• TL (pin 12; test point 16)

- With the $\overline{TL}$ signal (=Track Lost) the µP is told that the tracking signals are unreliable.
- In the "SEARCH" mode, or when the player is bumped against, there are pulses on test point 16.

• REdig (pin 13; test point 37)

With the REdig signal (=Radial Error digital = Radial Polarity) the motion of the arm is controlled /corrected in case of track jumping and bumping against the player.

In servicing position 3 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.

• $\overline{DODS}$ (pin 23; test point 19)

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

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

II PHOTODIODE SIGNAL PROCESSOR IC 6101

•$\overline{Si}$ (pin 20; test point 21)
LO (pin 17; test point 9)
LM (pin 16; test point 11)

- 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 signal	0 V	0,2V ± 0,05V	0,2V ± 0,05V

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

To check the laser supply, see "CHECK OF THE LASER SUPPLY", page 3-1.

•FE (pin 5; test point 26)

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

- When the player is brought into servicing position 1 without disc, the objective will search 16× for the focal point.
  At test point 26 the FE signal varies 16× between +3 V and -3 V.

- The FE signal ensures that the spot stays in focus. When an error signal is injected, the FE signal will correct.
  Bring the player in servicing position 2 (with disc on turntable):
  Inject successively a voltage of +5 V and -5 V (=+1B and -1B) via a 200 kΩ resistance to testpoint 25 and check the FE signal.

Sigal injected testpoint 25	+5 V	-5 V
FE signal	negative	positive

• RD signal (pin 21; test point 24)
HIGH-OHMIC MEASUREMENT

The RD signal (= READY) will go high when the starting procedure of IC6101 has been completed.

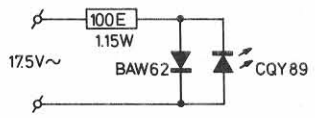
Position of player	POWER ON	Servicing pos. 1	PLAY
RD signal	"low"	"high"	"high"

•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 1 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 photodiodes

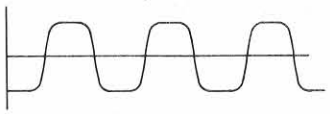
Connected the circuit below to an alternating voltage of 17,5 V.
(In CD150 and CD350 to transformer pins 33 and 34).



39 368 A12

100 E-1.15 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 servicing 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 on the servo + pre-amplifier PCB.
(the amplitude depends on the distance between the IR diode and the objective).



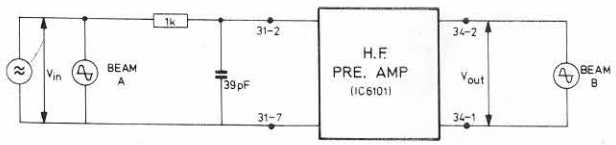
38 314 A12

Position of the oscilloscope: 100 ms/div.

•HF-in (pin 3, test point 3)
- The HF-in signal (=High Frequency in) is the information signal from the 4 photodiodes.

Check of the HF amplifier in IC6101

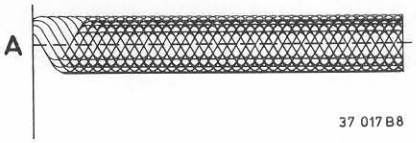
- Take the flexible PCB out of connector 31.
- Switch on the supply voltage.
- Inject a signal V-in of about 10 mV_{pp}, 50 kHz, via the RC network, beween connector pin 31-2 and connector pin 31-7 according to the diagram below.
- The output voltage between connector pins 34-2 and 34-1 should be about 1 Vpp.



38 312 A12

•HF-out (pin 27; measure at connector pin 34-2)

- 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 and in
  - servicing position 3 after the lead-in track has been read.
  - In servicing position 2 and during the reading of the lead-in track, the HF signal is present, but is not stable.



37 017 B8

Position of the oscilloscope: 0,5 µs/div.
Amplitude about 1,2 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 of IC6101.
- 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 servo µP that the tracking signals are unreliable.

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

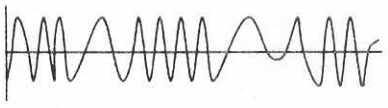
- Put test disc 5A (4822 397 30096) on the turntable.
- Switch on the power-supply switch and press the PLAY key.
- Play track number 10 or 15 and check the HFD signal at test point 23.
  When drop-out pulses are present on the DET signal (pin 26), the HFD pulses should also be present at test point 23.
  (Position of oscilloscope: 2 ms/div).

When the disc is slowly braked by hand, $\overline{TL}$ pulses will be visible at test point 18.

•RE 1 (pin 11; test point 18)
RE 2 (pin 12; test point 22)

- Signals RE1 and RE2 (Radial Error) are the control signals for the arm during tracking.

- In servicing position 2, the following signals should be visible at test point 18 and 22:



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

•SC (pin 25)
SC (=Start Capacitor)
HIGH-OHMIC MEASUREMENT

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

III RADIAL ERROR PROCESSOR

•Check the signals coming from the servo μP and from photodiode signal processor IC6101.

•RE-dig (pin 3; test point 37)

- With the RE dig signal (=Radial Error digital=Radial Polarity), the movement of the arm is controlled/corrected in case of track jumping and bumping against the player).

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

•DAC (pin 10; test point 38).
With the DAC signal (=Digital to Analogue Converter) the track jumping speed is controlled.
This signal is derived from the signals B0 ÷ B3 coming from the servo μP.

Position of player	Servicing position 1	
	SEARCH FORW.	SEARCH REV.
DAC signal	+0,5 V	-0,5 V

•RE (pin 7; test point 39)

- With the RE signal (=Radial Error) the light spot is kept on the track.
  When an error signal is injected, the RE signal will correct.
- Bring the player in servicing position 3.
- Inject successively a voltage of +5 V and -5 V (=+1B and -1B), via a 120 k Ω resistance, to pin 5 of IC6104B and check the RE signal.

Signal injected to testpoint 40	+5 V	-5 V
RE signal	Negative	Positive

•RE lag (pin 8; test point 41)

Capacitor 2156 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 servo μP (pin 6; test point 43) via transistor 6109.

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 6109.

•Turntable Motor Control
•MCO (test point 39).
With the MCO signal (=Motor Control On) the turntable motor control is switched on and off.

Position of player	POWER ON	Servicing pos. 2	PLAY
MCO signal	"low"	"high"	"high"

•MCES (test point 12)

With the MCES signal (=Motor Control information from ERCO-IC to Servo circuit) the speed of the turntable motor is controlled.

In position POWER ON, a signal as shown in the figure below should be present at test point 12.
The repetition time of the signal is 140 μs.

When there is a disc on the turntable and the player is either in servicing position 3 or in the PLAY mode, a signal as shown in the figure below should be present at test point 12.
The repetition time of the signal is 140 μs.

MDA.00135

When the MCES signal is correct and released by the MCO signal, the turntable motor should be running.
(see also "Check of the motor control; Hall Control", page 3-1).

DETAILED MEASURING METHOD FOR THE SERVO + PRE-AMPLIFIER CIRCUIT II

HINTS

Test discs

It is important that the test discs be treated with great care.
The disturbances on the discs (black spots, finger-prints, etc.) are exclusive and are unamibiguously positioned. Damages may cause extra drop-outs etc., thus putting an end to the exclusivity of the intentional error on the disc.
In that case it is not possible anymore to check for example the good functioning of the track detector.

Measurements on op-amps

In the electronic circuits, op-amps have frequently been used.
The applications include amplifiers, filters, invertors 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 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.

Stimulating with "0" and "1"

During faultfinding it is sometimes necessary to connect certain points to ground or to 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 relevant points are outputs of op-amps.
These outputs are short-circuit-resistant, that is, they can be brought to "0" or ground without problems.
The output of an op-amp, however, should never be connected directly to the supply voltage.

Measurements on microprocessors

Inputs and outputs of microprocessors should **never** be connected directly to the supply voltage.
The inputs and outputs should only be brought to "0" or ground if this is stated explicitly.

Measurements with an oscilloscope

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

Selection of the 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 relevant circuit has no supply voltage.
- The injected levels or signals should **never** be greater than the supply voltage of the relevant circuit.

Continuous burning of the laser

- Bridge capacitor 2305 on the decoder PCB.
- Connect $\overline{Si}$ (=pin 20 of IC6101 on the servo + pre-amplifier PCB) to ground.
- Switch on the power supply.
- The laser now burns continuously.

Indication of the test points

In the drawing of the diagrams and PCBs the test points are indicated by a number (e.g. ◇12◇) to which the measuring method refers.
In the following measuring method the symbol ◇ has been omitted for the test points indicated.

GENERAL CHECK POINTS

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 be checked:

a. Ensure that the disc and objective are clean (remove dust, fingerprints, etc.) and use undamaged discs.

b. Check that all supply voltages are present and that they have the correct values.

c. Check the good working of the microprocessor by means of the built-in test programme and servicing programme.

Method:

See sub. self-test of the decoder µP in the service manual of the set.

Initiating the service programme of the µP

For the initiation of the service programme of the µP, see the service manual of the set.

I PHOTODIODE SIGNAL PROCESSOR IC 6101

•$\overline{Si}$ (pin 20; test point 21)
LO (pin 17; test point 9)
LM (pin 16; test point 11)

- 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 signal	0 V	0,2V ± 0,05V	0,2V ± 0,05V

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

To check the laser supply, see "CHECK OF THE LASER SUPPLY", page 3-1.

•FE (pin 5; test point 26)

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

- When the player is brought into servicing position 1 without disc, the objective will search 16× for the focal point.
  At test point 26 the FE signal varies 16× between +3 V and -3 V.

- The FE signal ensures that the spot stays in focus. When an error signal is injected, the FE signal will correct.
  Bring the player in servicing position 2 (with disc on turntable).
  Inject successively a voltage of +5 V and -5 V (=+1B and -1B) via a 200 kΩ resistance to testpoint 25 and check the FE signal.

Sigal injected testpoint 25	+5 V	-5 V
FE signal	negative	positive

• RD signal (pin 21; test point 24)
HIGH-OHMIC MEASUREMENT

The RD signal (= READY) will go high when the starting procedure of IC6101 has been completed.

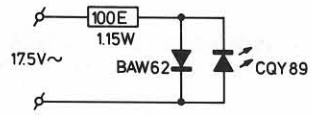
Position of player	POWER ON	Servicing pos. 1	PLAY
RD signal	"low"	"high"	"high"

•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 1 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 photodiodes

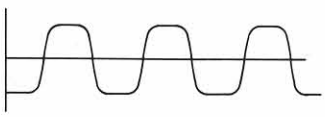
Connected the circuit below to an alternating voltage of 17,5 V.



39 368 A12

100 E-1.15 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 servicing 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 on the servo + pre-amplifier PCB.
(the amplitude depends on the distance between the IR diode and the objective).



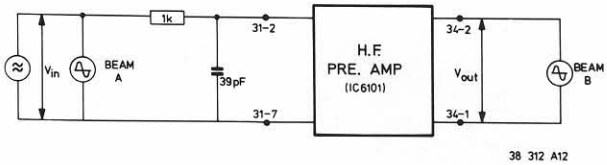
38 314 A12

Position of the oscilloscope: 100 ms/div.

•HF-in (pin 3, test point 3)
- The HF-in signal (=High Frequency in) is the information signal from the 4 photodiodes.

Check of the HF amplifier in IC6101

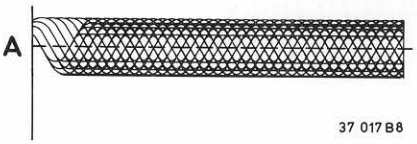
- Take the flexible PCB out of connector 31.
- Switch on the supply voltage.
- Inject a signal V-in of about 10 mV_{pp}, 50 kHz, via the RC network, beween connector pin 31-2 and connector pin 31-7 according to the diagram below.
- The ouput voltage between connector pins 34-14 and 34-13 should be about 1 V_{pp}



38 312 A12

- **HF-out (pin 27; measure at connector pin 34-14)**

- 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 and in
  - servicing position 3 after the lead-in track has been read.
  - In servicing position 2 and during the reading of the lead-in track, the HF signal is present, but is not stable.



Position of the oscilloscope: 0,5 µs/div.
Amplitude about 1,5 Vpp.

- **DET (pin 26)**
  HFD (pin 19; test point 23)
  $\overline{\text{TL}}$ (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 of IC6101.
- When the level of the HF signal is too low, the HFD signal (=High-Frequency Detector) will go "low".
- The $\overline{\text{TL}}$ signal (=Track Lost) will then go "low" in order to tell the servo µP that the tracking signals are unreliable.

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

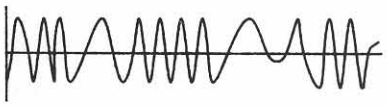
- Put test disc 5A (4822 397 30096) on the turntable.
- Switch on the power-supply switch and press the PLAY key.
- Play track number 10 or 15 and check the HFD signal at test point 23.
  When drop-out pulses are present on the DET signal (pin 26), the HFD pulses should also be present at test point 23.
  (Position of oscilloscope: 2 ms/div).

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

- **RE 1 (pin 11; test point 18)**
  RE 2 (pin 12; test point 22)

- Signals RE1 and RE2 (Radial Error) are the control signals for the arm during tracking.

- In servicing position 2, the following signals should be visible at test point 18 and 22:



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

- **$\overline{\text{DODS}}$ (pin 24: test point 19)**

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

Stand speler	POWER ON	Service pos. 3	PLAY	SEARCH
$\overline{\text{DODS}}$-signaal	"laag"	"hoog"	"hoog"	"laag"

- **SC (pin 25)**
  SC (=Start Capacitor)

HIGH-OHMIC MEASUREMENT

Pos. speler	SC (pen 25)
POWER ON	-4V
PLAY	+5V
Service pos. 1	+5V

- **FE lag (pin 6, test point 27)**

- In service position 1 and in the PLAY mode, a voltage of about 100 mV is present at this point.
  When the disc is moved by hand in service position 1, the signal will vary.

II RADIAL ERROR PROCESSOR

- **Check the signals that come from the decoder µP and from photodiode signal processor IC6101**

•RE-dig (pin 3; test point 37)

- With the RE dig signal (=Radial Error digital=Radial Polarity), the movement of the arm is controlled/corrected in case of track jumping and bumping against the player).

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

- In the positions PREVIOUS and NEXT the frequency of the square wave decreases.

•DAC (pin 10; test point 38).

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

•RE (pin 7; test point 39)

- With the RE signal (=Radial Error) the light spot is kept on the track. When an error signal is injected, the RE signal will correct.
- Bring the player in servicing position 3.
- Inject successively a voltage of +5 V and -5 V (=+1B and -1B), via a 120 k Ω resistance, to pin 5 of IC6104B and check the RE signal.

Signal injected test point 38.	+5 V	-5 V
RE signal	Negative	Positive

•RE lag (pin 8; test point 41)

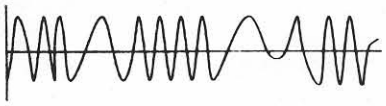
Capacitor 2156 in the RE-lag circuit has a memory function.
It memorizes the degree of inclination of the disc.
When a jump is made to a certain track on the disc, the memory should be cleared.
This takes place by the decoder µP ($\overline{\text{RPU}}$ signal) via transistor 6109.

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 6109.

•RE 1 (pin 11; test point 18)
RE 2 (pin 12; test point 22)

- Signals RE1 and RE2 (Radial Error) are the control signals for the arm during tracking.

- In servicing position 2, the following signals should be visible at test point 18 and 22:



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

- **B0 (pin 12; test point 36)**
  B1 (pin 13; test point 34)
  B2 (pin 14; test point 33)
  B3 (pin 15; test point 32)

With the B0 ÷ B3 signals
•The radial control is switched on and
•The level on the DAC output is controlled.
- In the SEARCH mode, there should be activity on all 4 test points.

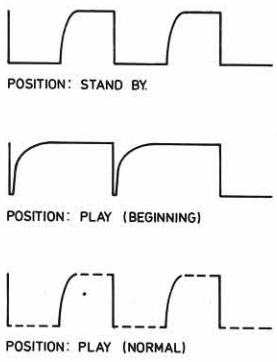
	STOP	PLAY	SERVICING POSITION 0,1,2	SERVICING POSITION 3
B0	"low"	"high"	"low"	"high"
B1	"high"	"high"	"high"	"high"
B2	"high"	"high"	"high"	"high"
B3	"low"	"low"	"low"	"low"

Adjusting the offset on RAD + (test point 40).

- Render B0, B1, B2 and B3 low by grounding them.
- Measure at test point 40 relative to ground.
- Adjust potentiometer 3165 for a voltage of 0V ± 0,1 V at test point 40.

- **C agc (pin 5, test point 35)**
  Adjusting the offset on C agc (test point 35)
- Connect pins 18 and 19 to ground.
- Measure with a high-ohmic voltmeter at test point 35 relative to the -1C supply voltage.
- Adjust potentiometer 3167 until the voltage at test point 35 is 4,5V ± 0,1V relative to the -1C supply voltage.

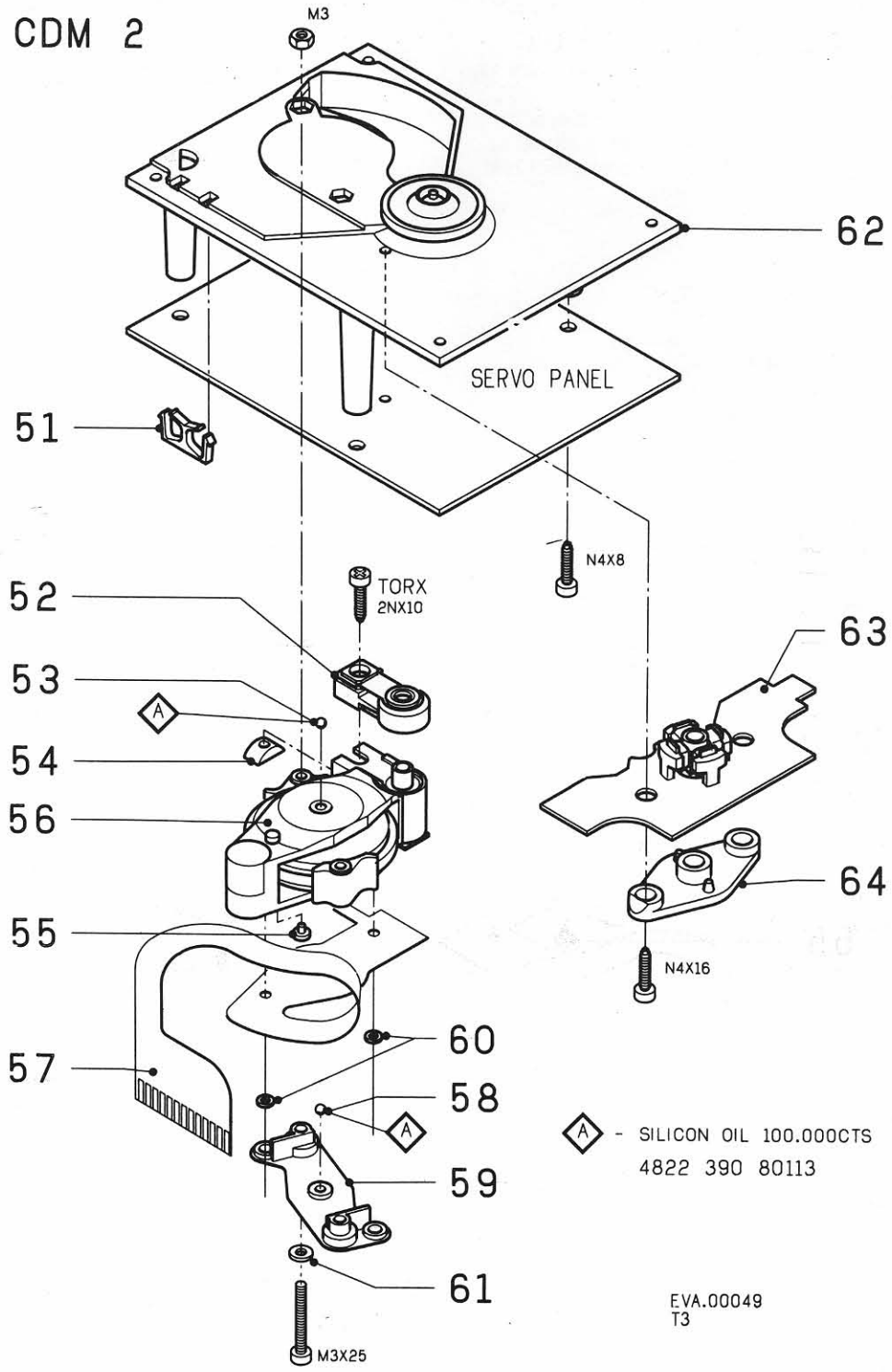
- **MC (test point 12)**
  The MC signal (= Motor Control) is used to control the speed of the turntable.
- In the standby position (= power on), a signal as shown in the figure below is present at test point 12. The frequency is 88,2 kHz.
- With a disc on the turntable and with the player in service position 3 or in the PLAY mode, a signal as shown in the figure below should be present at test point 12. The frequency is 44,7 kHz.



When the MC signal is correct and is released by the RD signal, the turntable motor must be rotating.
(See also "Check of the motor control Hall (control) page 3-1-a).

- **VC (connector point 36-1)**
  Fast check.
- Place a disc on the turntable. The voltage at connector point 36-1 will be about -2,5 V during playback of the first piece of music (inside of the disc) and about -1,5V during the last piece (outside of disc).
- For dynamically adjusted motors:
  $Vc = 0 > V_c > -1.7$ V

EXPLODED VIEW C.D. MECHANISM



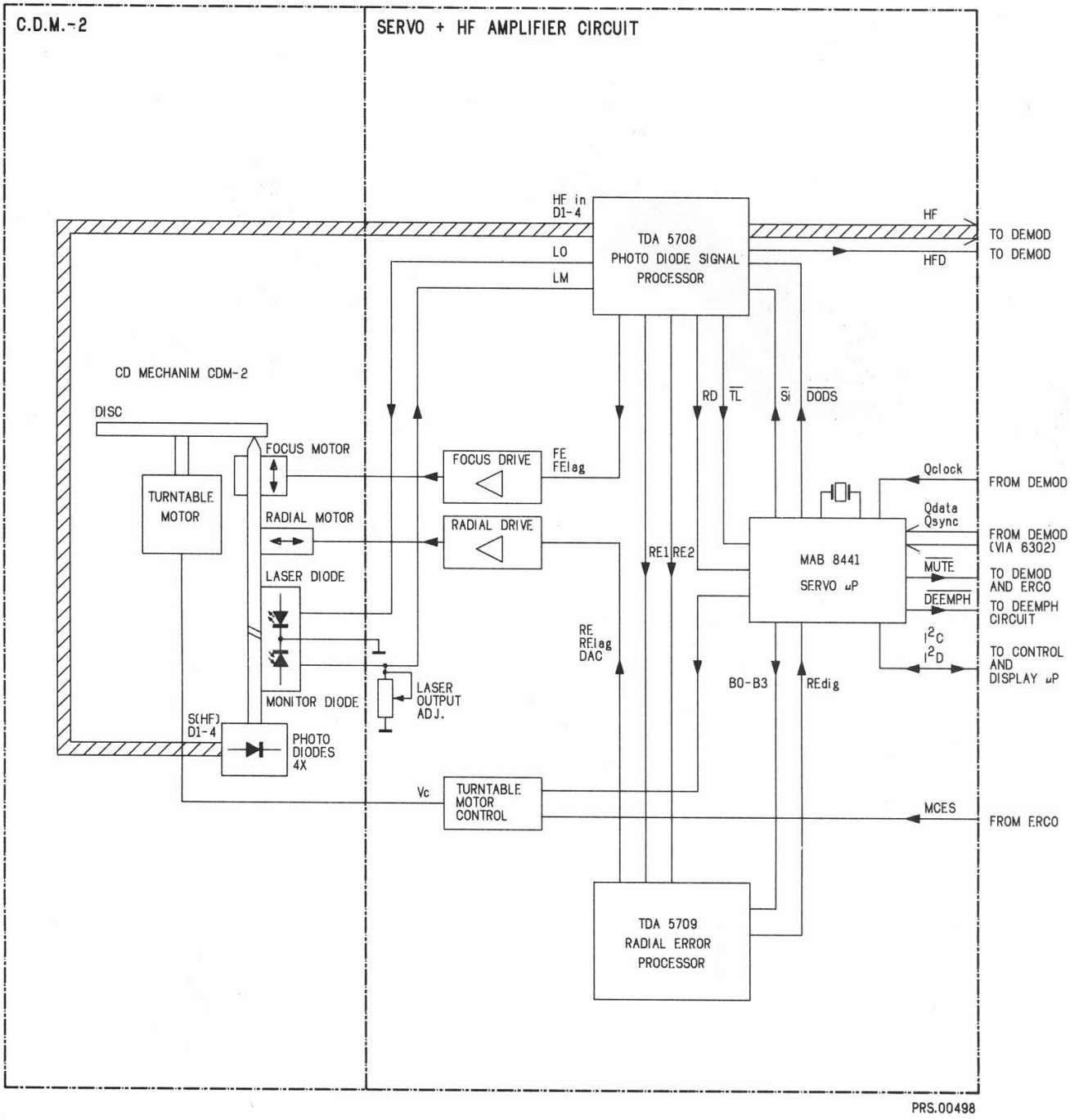
MECHANISM PARTS

51	4822 401 10895
53	4822 520 40177
54	4822 401 10896
55	4822 462 71374
57	4822 323 50107
58	4822 520 40177
59	4822 520 10555
60	4822 532 50268
61	4822 530 80188

52+56+62+63+64

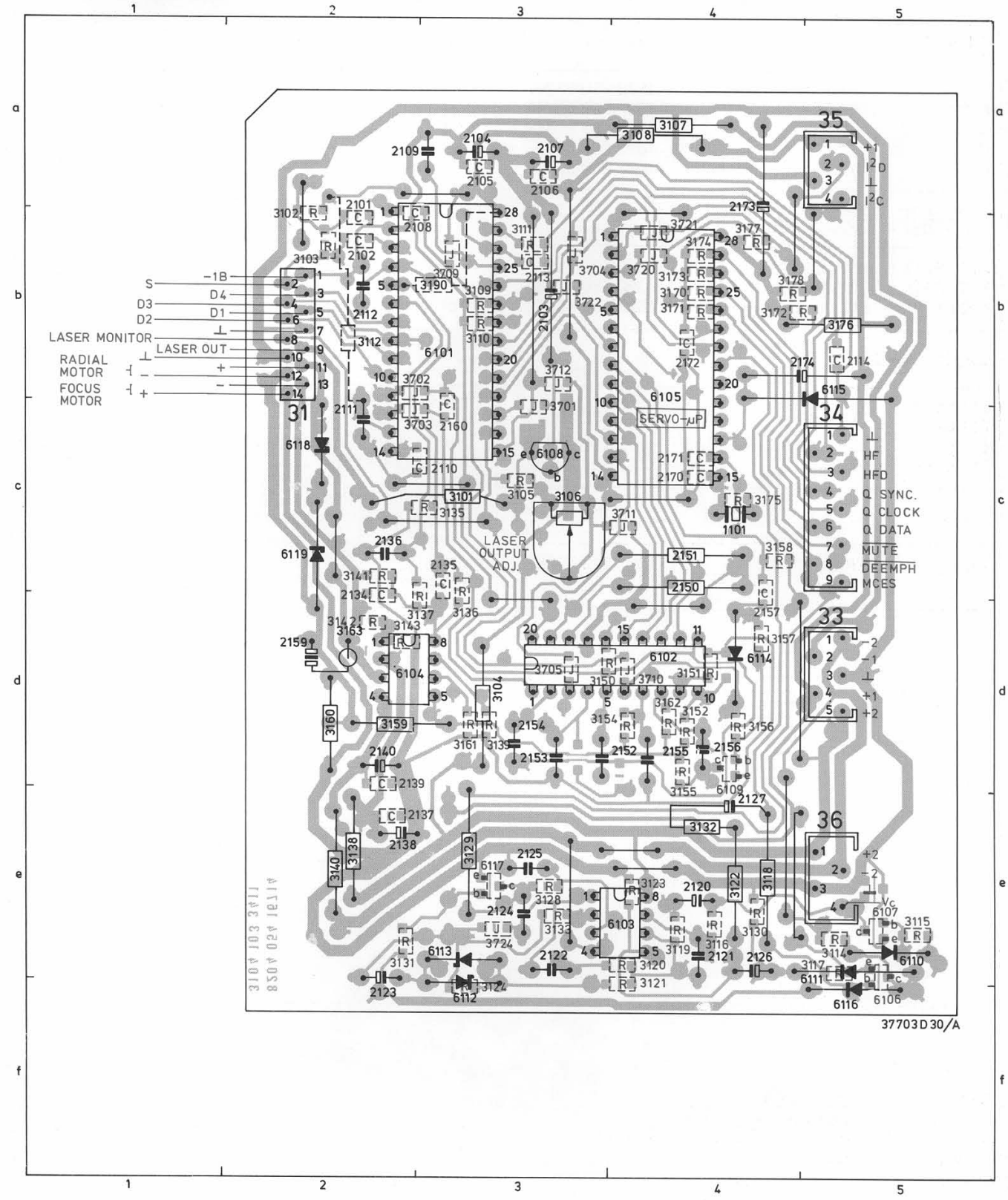
Version	Codenumber
Hi-Fi, 0000, 0300	4822 691 30188 (+ servo PCB)
Top Hi-Fi, 0001, 0301	4822 691 30191 (+ servo PCB)
Leuven, 0003, 0303, 0307	4822 691 20428
0008	4822 691 30193

BLOCK DIAGRAM I



B0-B3	-	Control bits for radial circuit
DAC	-	Current output for track jumping (Digital to Analogue Converted)
$\overline{\text{DEEMPH}}$	-	Deemphasis
$\overline{\text{DODS}}$	-	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
I^2C	-	Clock signal servo-control µP
I^2D	-	Data signal servo-control µP
LM	-	Laser monitor diode input
LO	-	Laser amplifier current output
$\overline{\text{MCES}}$	-	Motor control from ERCO to servo circuit
MUTE	-	Mute signal
Q CLOCK	-	Subcode clock input for servo µP
Q DATA	-	Subcode data input for servo µP
Q SYNC	-	Subcode synchronization input for servo µP
RE	-	Radial error signal (amplified RE1-RE2 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
RD	-	Ready signal, starting up procedure finished
$\overline{\text{Si}}$	-	On/off control for laser supply and focus circuit
$\overline{\text{TL}}$	-	Track lost signal
Vc	-	Control voltage for turntable motor

SERVO + PRE-AMPLIFIER PCB I



1101	C04	2105	A03	2110	C03	2120	E04	2125	E03	2136	C02	2150	C04	2155	D04	2170	C04	3101	C03
2101	A02	2106	A03	2111	C02	2121	E04	2126	E04	2137	E02	2151	C04	2156	D04	2171	C04	3102	A02
2102	B02	2107	A03	2112	B02	2122	E03	2127	E04	2138	E02	2152	D04	2157	D04	2172	B04	3103	B02
2103	B03	2108	B02	2113	B03	2123	F02	2134	C02	2139	D02	2153	D03	2159	D02	2173	A04	3104	D03
2104	A03	2109	A03	2114	B05	2124	E03	2135	C03	2140	D02	2154	D03	2160	C03	2174	B05	3105	C03
3106	C03	3111	B03	3117	E05	3122	E04	3127	E02	3132	E05	3139	D03	3150	D04	3156	D04	3161	D03
3107	A04	3112	B02	3118	E04	3123	E04	3128	E03	3135	C03	3140	E02	3151	D04	3157	D04	3162	D04
3108	A04	3114	E05	3119	E04	3124	F03	3129	E03	3136	D03	3141	C02	3152	D04	3158	C04	3170	B04
3109	B03	3115	E05	3120	E04	3125	E03	3130	E04	3137	D03	3142	D02	3154	D04	3159	D02	3171	B04
3110	B03	3116	E04	3121	F04	3126	E03	3131	E02	3138	E02	3143	D02	3155	D04	3160	D02	3172	B04
3173	B04	3178	B04	3705	D03	3720	B04	6102	D04	6107	E05	6112	E03	6117	E03				
3174	B04	3701	C03	3709	B03	3721	B04	6103	E04	6108	C03	6113	E03	6118	C02				
3175	C04	3702	B02	3710	D04	3722	B03	6104	D02	6109	D04	6114	D04	6119	C02				
3176	B05	3703	C03	3711	C04	3723	E03	6105	B04	6110	E05	6115	B05						
3177	B04	3704	B03	3712	B03	6101	B03	6106	F05	6111	E05	6116	F05						

ELECTRICAL PARTS I

6101	TDA5708	4822 209 83202
6102	TDA5709	4822 209 83203
6103	MC1458	4822 209 81349
6104	L272MB	4822 209 83197
6105	MAB8441P/T012	4822 209 50418

6106,6109	BC858B©	5322 130 41983
6107,6117	BC848B©	5322 130 41982
6108	BC338-16	4822 130 40892

6110,6111 6114÷6116	1N4148	4822 130 30621
6112,6113	BZV46-C2V0	4822 130 31248
6118,6119	HZ7C2	4822 130 32862

1101	6 MHz	4822 242 70392

IC

28P	IC socket	4822 255 40156
20P	IC socket	5322 255 44259
14P	Flex print connector	4822 290 60602

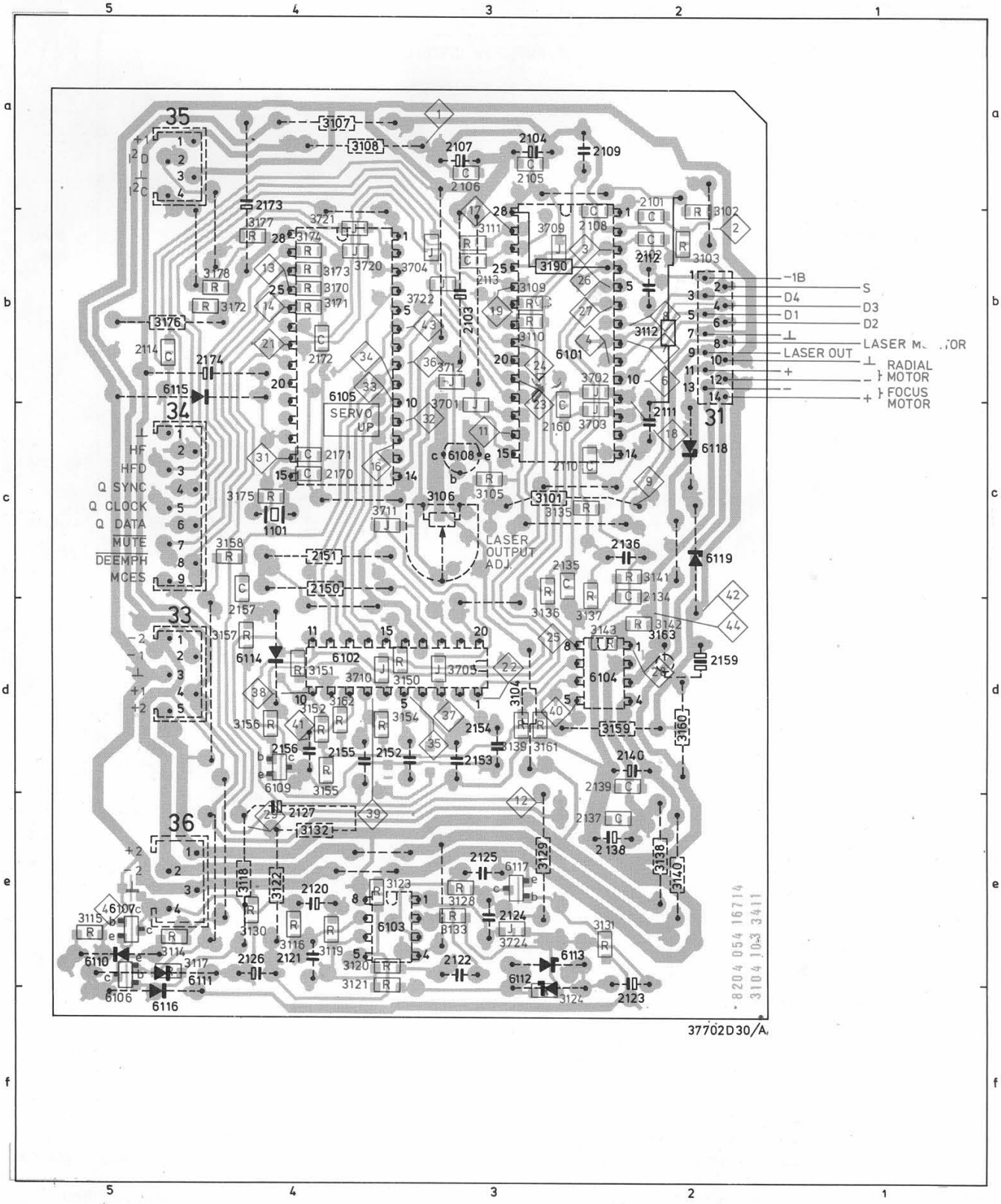
2120	6.8 µF- 16 V	4822 124 21538
2123	33 µF- 10 V	4822 124 20945
2126	6.8 µF- 25 V	4822 124 21538
2150,2151	2.2 nF-160 V-2%	4822 121 50841

For chip capacitors see list on page 5-6

3101	12 Ω-NFR25	4822 111 30511
3104	18 Ω-NFR25	4822 111 30515
3106	1 kΩ-Trimpot	4822 100 20151
3107,3108	10 Ω-NFR25	4822 111 30508
3125	2.7 kΩ-MRS25	4822 116 52918
3127	10 kΩ-MRS25	4822 116 53022
3138,3140	1 Ω-NFR25	4822 111 30483
3160	4.7 Ω-MRS25	4822 116 52858
3176	4.7 Ω-NFR25	4822 111 30499

For chip resistors see list on page 5-8

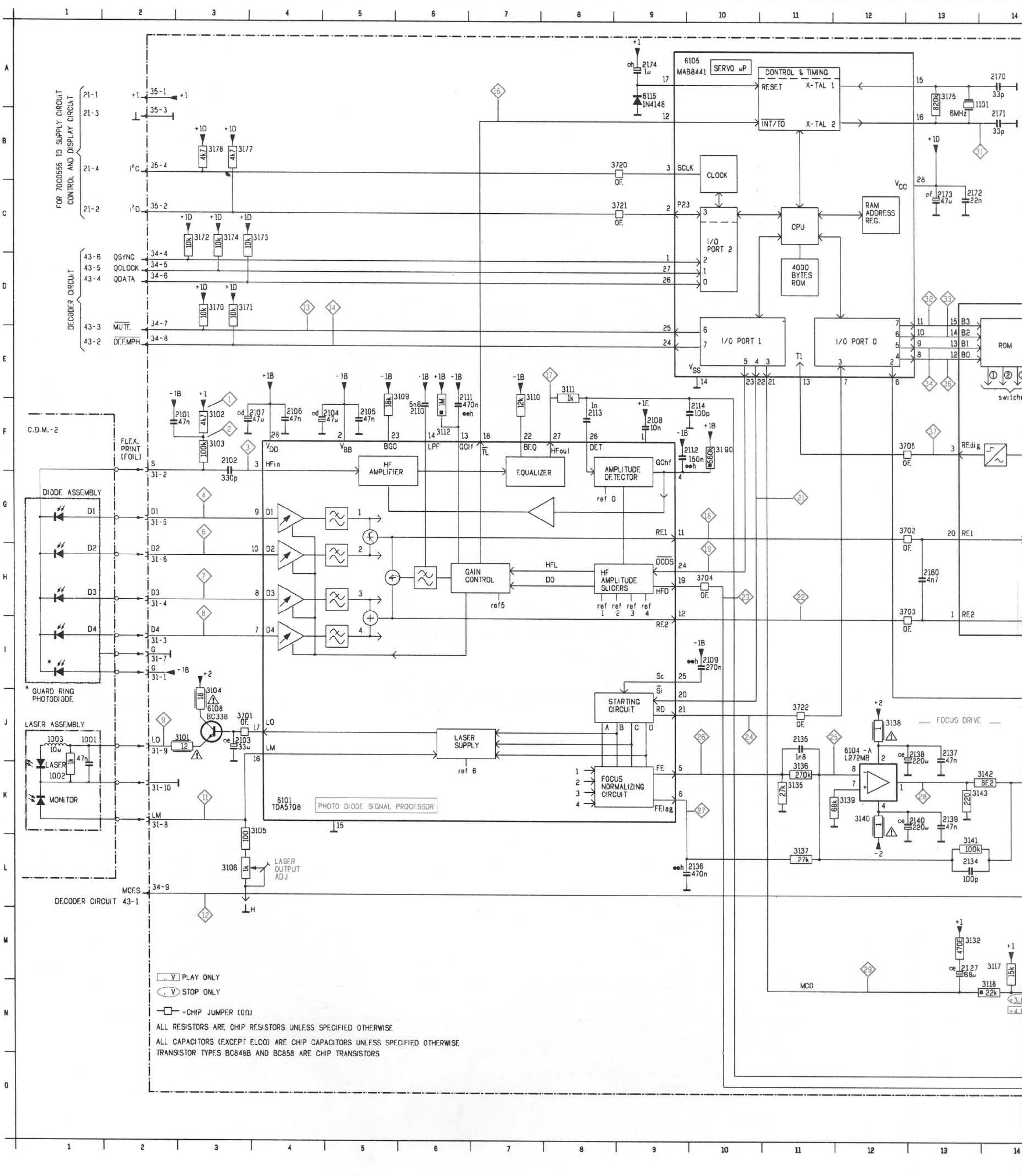
SERVO + PRE-AMPLIFIER PCB I



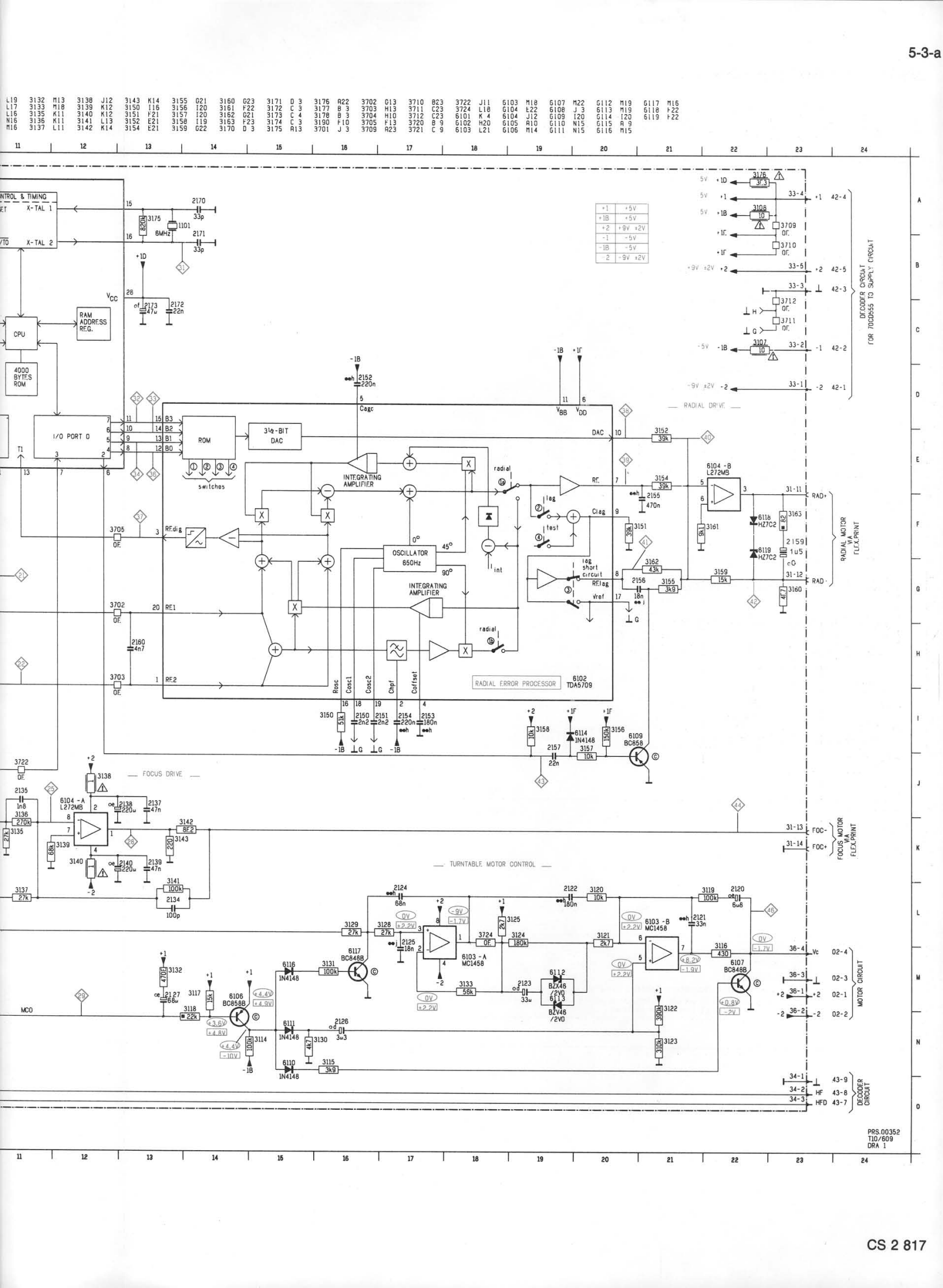
1101	C04	2105	A03	2110	C03	2120	E04	2125	E03	2136	C02	2150	C04	2155	D04	2170	C04	3101	C03
2101	A02	2106	A03	2111	C02	2121	E04	2126	E04	2137	E02	2151	C04	2156	D04	2171	C04	3102	A02
2102	B02	2107	A03	2112	B02	2122	E03	2127	E04	2138	E02	2152	D04	2157	D04	2172	B04	3103	B02
2103	B03	2108	B02	2113	B03	2123	F02	2134	C02	2139	D02	2153	D03	2159	D02	2173	A04	3104	D03
2104	A03	2109	A03	2114	B05	2124	E03	2135	C03	2140	D02	2154	D03	2160	C03	2174	B05	3105	C03
3106	C03	3111	B03	3117	E05	3122	E04	3127	E02	3132	E05	3139	D03	3150	D04	3156	D04	3161	D03
3107	A04	3112	B02	3118	E04	3123	E04	3128	E03	3135	C03	3140	E02	3151	D04	3157	D04	3162	D04
3108	A04	3114	E05	3119	E04	3124	F03	3129	E03	3136	D03	3141	C02	3152	D04	3158	C04	3170	B04
3109	B03	3115	E05	3120	E04	3125	E03	3130	E04	3137	D03	3142	D02	3154	D04	3159	D02	3171	B04
3110	B03	3116	E04	3121	F04	3126	E03	3131	E02	3138	E02	3143	D02	3155	D04	3160	D02	3172	B04
3173	B04	3178	B04	3705	D03	3720	B04	6102	D04	6107	E05	6112	E03	6117	E03				
3174	B04	3701	C03	3709	B03	3721	B04	6103	E04	6108	C03	6113	E03	6118	C02				
3175	C04	3702	B02	3710	D04	3722	B03	6104	D02	6109	D04	6114	D04	6119	C02				
3176	B05	3703	C03	3711	C04	3723	E03	6105	B04	6110	E05	6115	B05						
3177	B04	3704	B03	3712	B03	6101	B03	6106	F05	6111	E05	6116	F05						

SERVO + PRE-AMPLIFIER CIRCUIT I

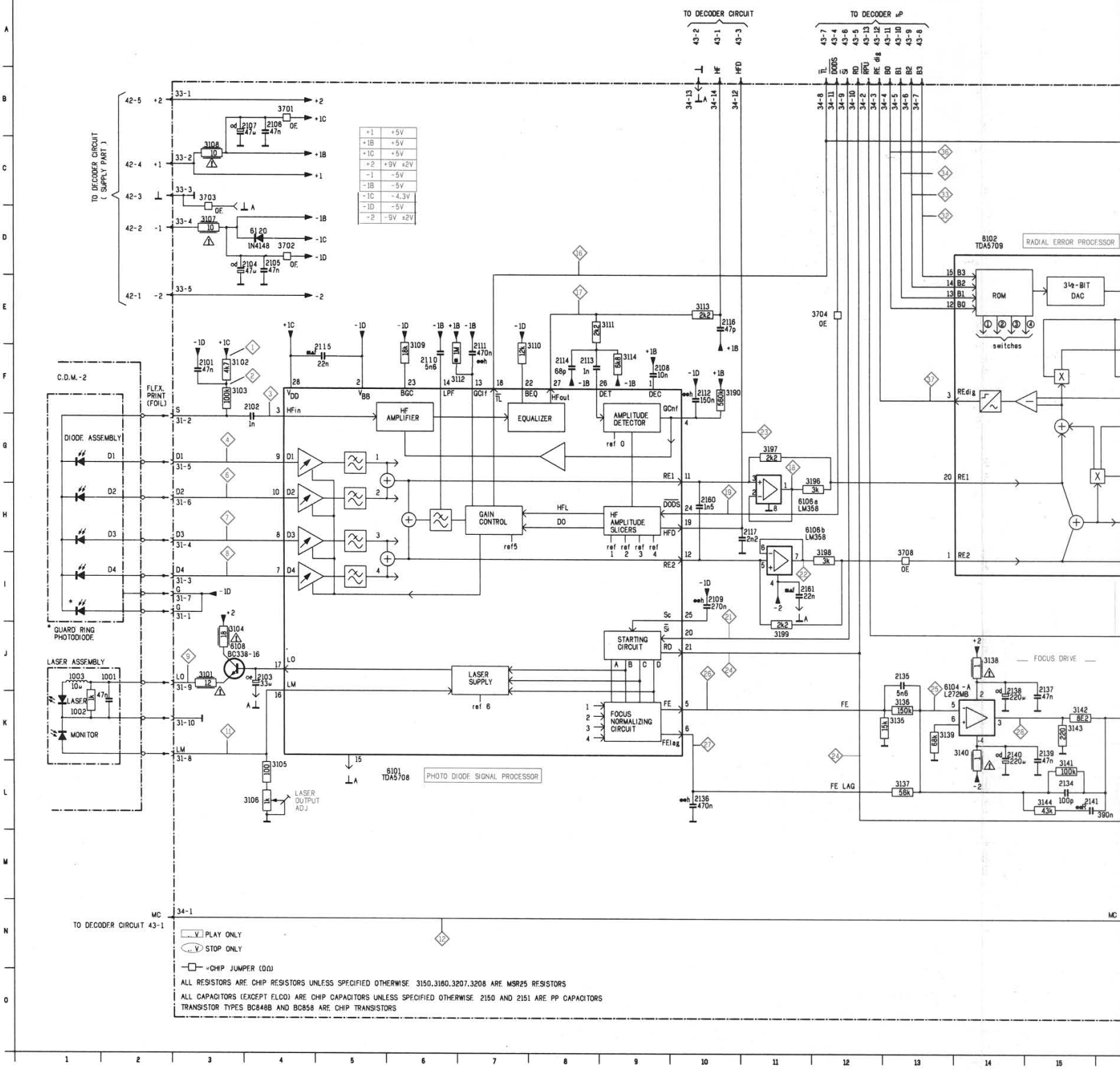
1001	J 1	2102	F 3	2107	F 4	2112	F10	2122	L19	2134	L13	2139	K13	2153	I17	2159	F23	2173	C13	3104	J 3	3109	E 6	3115	N16	3120	L20	3125	L19	3132	M13	3138	J12	3143	K14	3155	G21
1002	K 1	2103	J 3	2108	F 9	2113	F 8	2124	L17	2135	J11	2140	K13	2154	I17	2160	H13	2174	A 9	3105	K 4	3110	E 7	3116	L22	3121	L20	3128	L17	3133	M18	3139	K12	3150	I16	3156	I20
1003	J 1	2104	F 5	2109	I10	2114	F10	2125	L17	2136	L10	2150	I16	2155	F21	2170	A14	3101	J 3	3106	L 3	3111	E 8	3117	M14	3122	M21	3129	L16	3135	K11	3140	K12	3151	F21	3157	I20
1101	A14	2105	F 5	2110	F 6	2120	L22	2126	N16	2137	J13	2151	I17	2156	G21	2171	B14	3102	F 3	3107	C22	3112	F 6	3118	N14	3123	N21	3130	N16	3136	K11	3141	L13	3152	E21	3158	I19
2101	F 3	2106	F 4	2111	E 7	2121	L21	2127	M13	2138	J13	2152	D16	2157	I19	2172	C13	3103	F 3	3108	A22	3114	N15	3119	L22	3124	L19	3131	M16	3137	L11	3142	K14	3154	E21	3159	G22

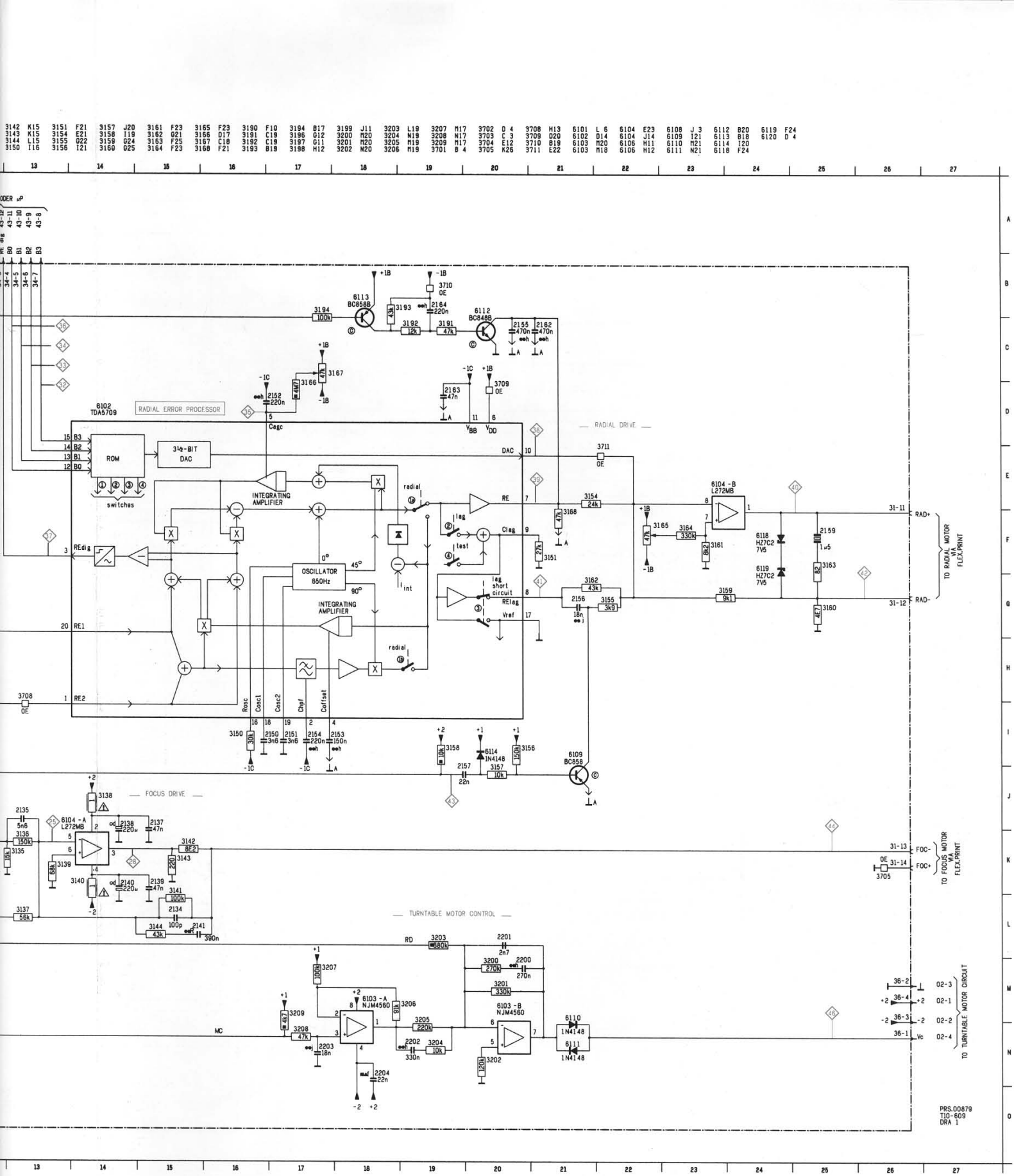


L19	3132	M13	3138	J12	3143	K14	3155	G21	3160	G23	3171	D 3	3176	A22	3702	G13	3710	B23	3722	J11	6103	M18	6107	M22	G112	M19	G117	M16
L17	3133	M18	3139	K12	3150	I16	3156	I20	3161	F22	3172	C 3	3177	B 3	3703	H13	3711	C23	3724	L18	6104	E22	6108	J 3	G113	M19	G118	F22
L16	3135	K11	3140	K12	3151	F21	3157	I20	3162	G21	3173	C 4	3178	B 3	3704	H10	3712	C23	6101	K 4	6104	J12	6109	I20	G114	I20	6119	F22
N16	3136	K11	3141	L13	3152	E21	3158	I19	3163	F23	3174	C 3	3190	F10	3705	F13	3720	B 9	6102	H20	6105	A10	6110	N15	G115	A 9		
M16	3137	L11	3142	K14	3154	E21	3159	G22	3170	D 3	3175	A13	3701	J 3	3709	A23	3721	C 9	6103	L21	6106	M14	6111	N15	G116	M15		

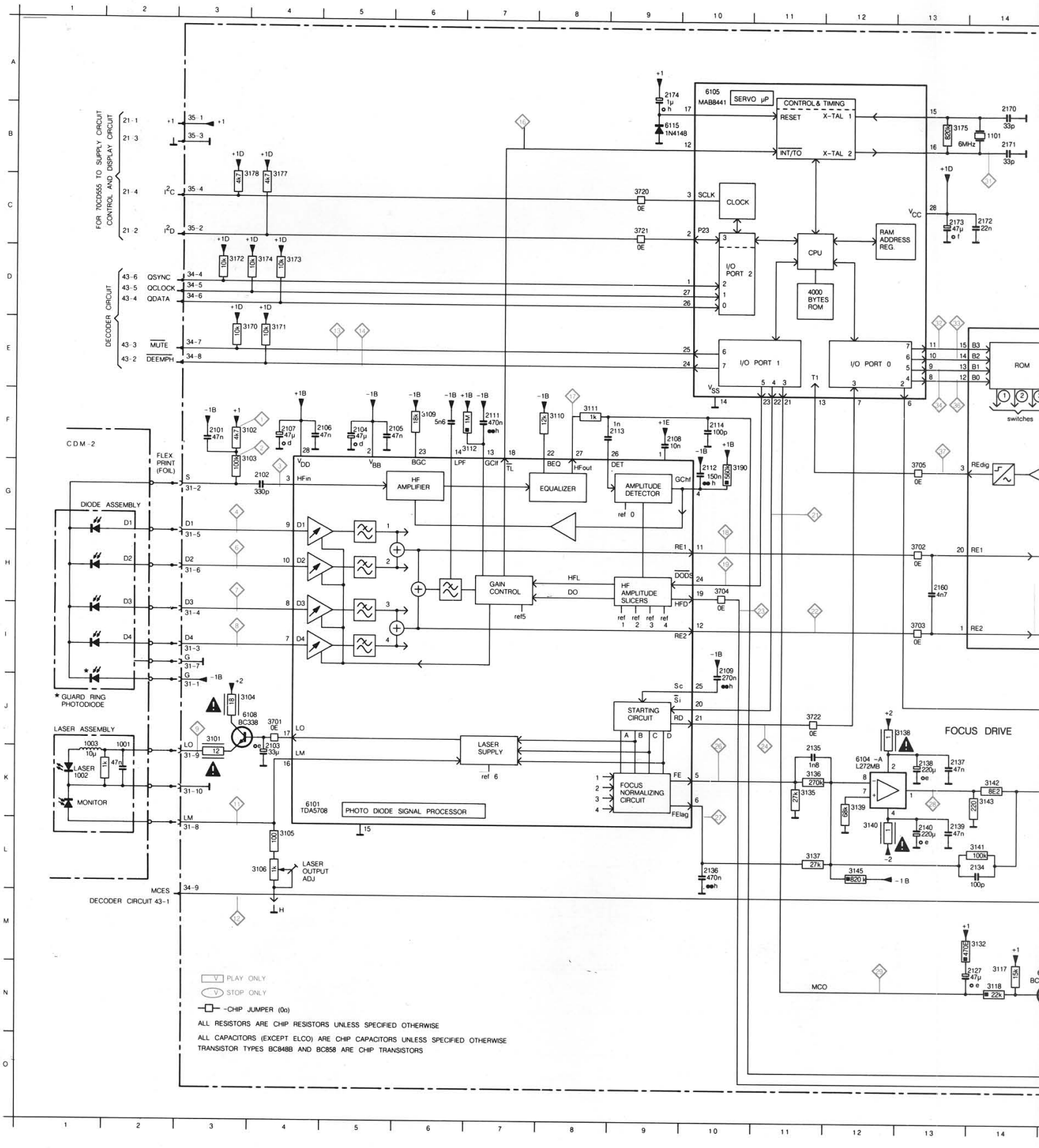


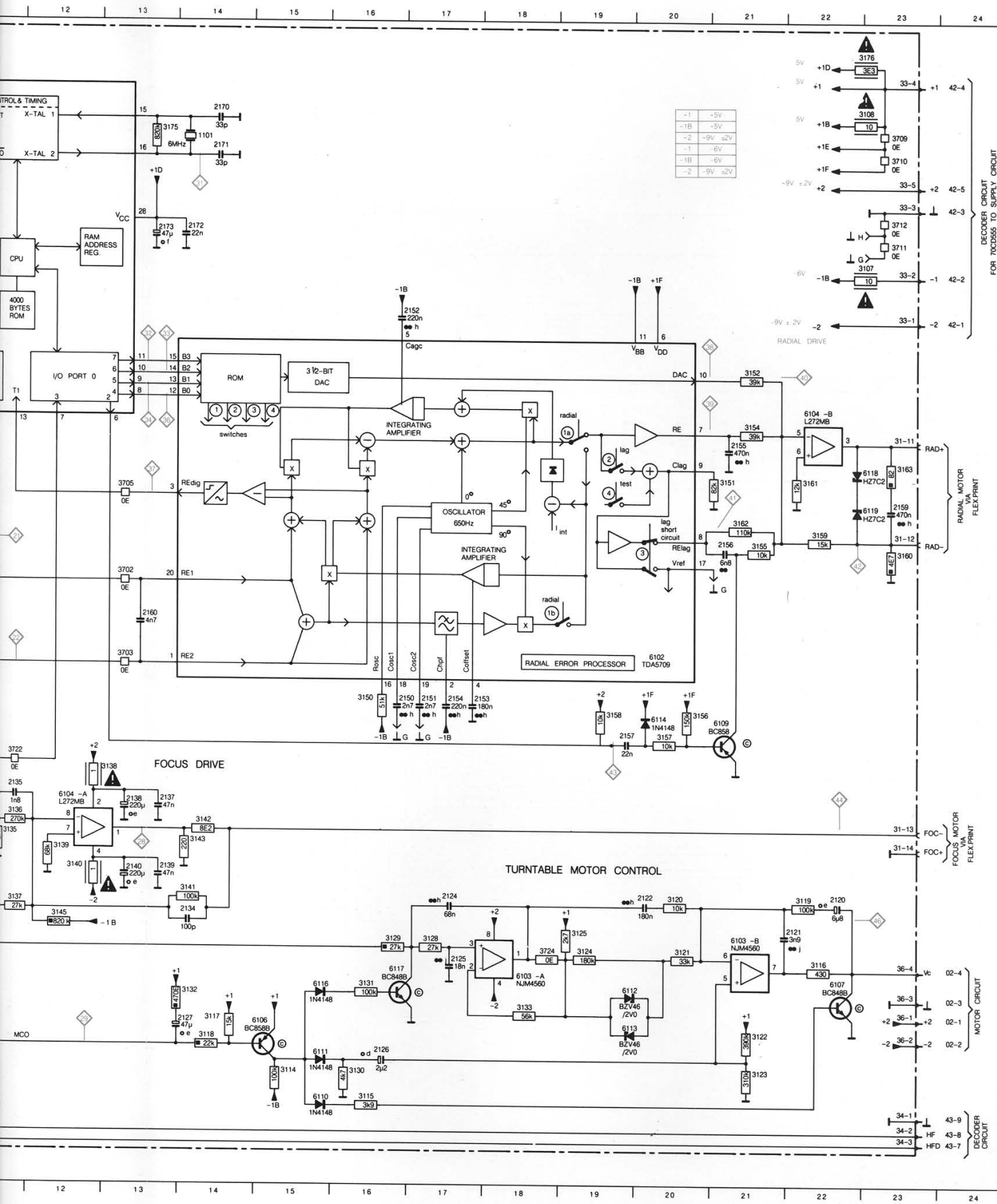
SERVO + PRE-AMPLIFIER CIRCUIT II




RADIAL ERROR PROCESSOR
6102 TDA5709
ROM
34-BIT DAC
switches
INTEGRATING AMPLIFIER
OSCILLATOR 650Hz
0°
45°
90°
INTEGRATING AMPLIFIER
radial
lag
test
lag short circuit
REIag
Vref
Clag
RE
DAC
Cagc
VBB
VDD
REdig
RE1
RE2
Rosc
Cosc1
Cosc2
Chpf
Cofiset
— RADIAL DRIVE —
6104 - B L272MB
6118 HZ7C2 7V5
6119 HZ7C2 7V5
RAD+
RAD-
TO RADIAL MOTOR VIA FLEX.PRINT
— FOCUS DRIVE —
6104 - A L272MB
FOC-
FOC+
TO FOCUS MOTOR VIA FLEX.PRINT
— TURNTABLE MOTOR CONTROL —
RD
MC
6103 - A NJM4560
6103 - B NJM4560
6110 1N4148
6111 1N4148
Vc
TO TURNTABLE MOTOR CIRCUIT
PRS.00879
T10-609
DRA 1

SERVO + PRE-AMPLIFIER CIRCUIT I FOR STATIC MOTORS

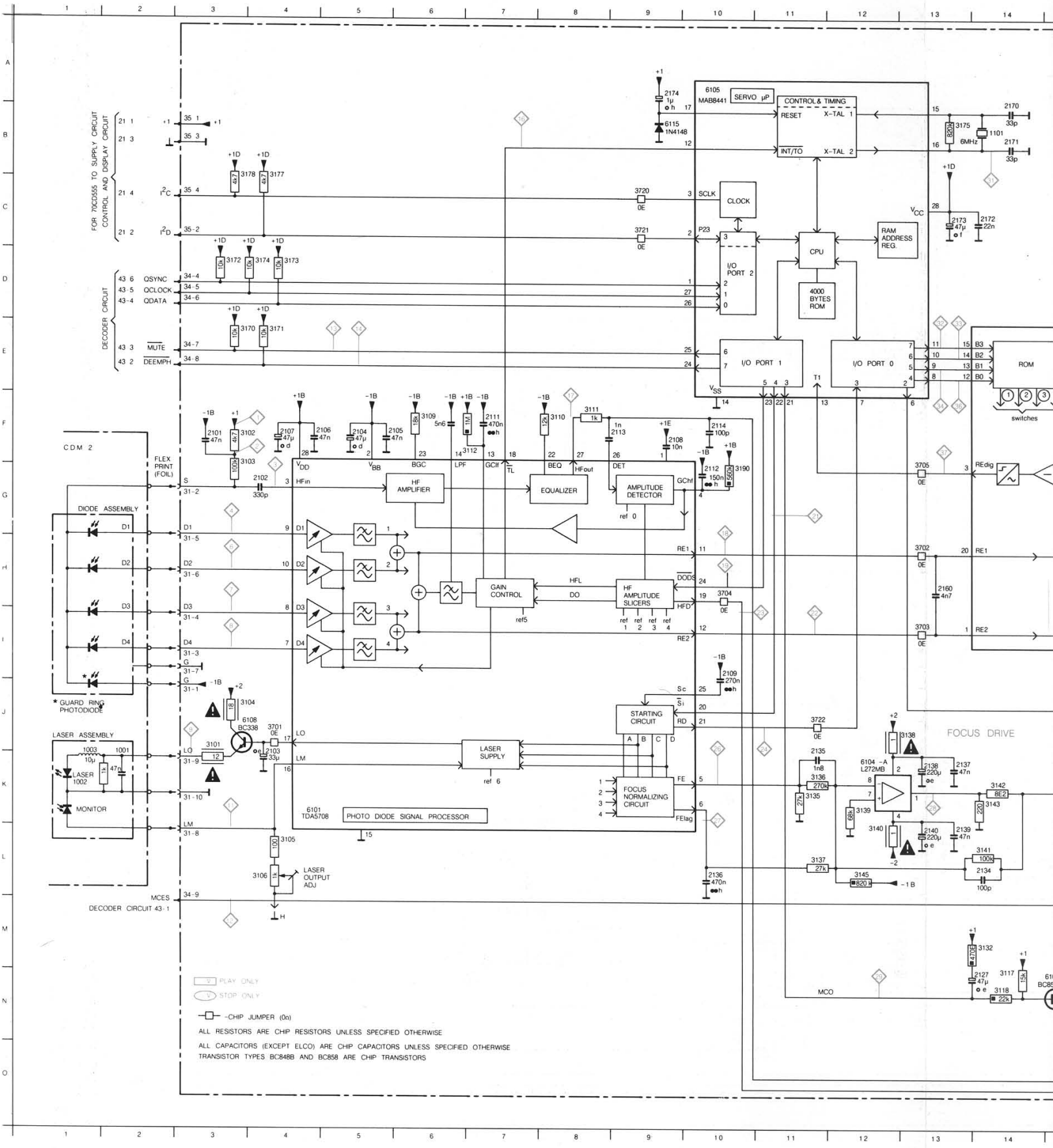


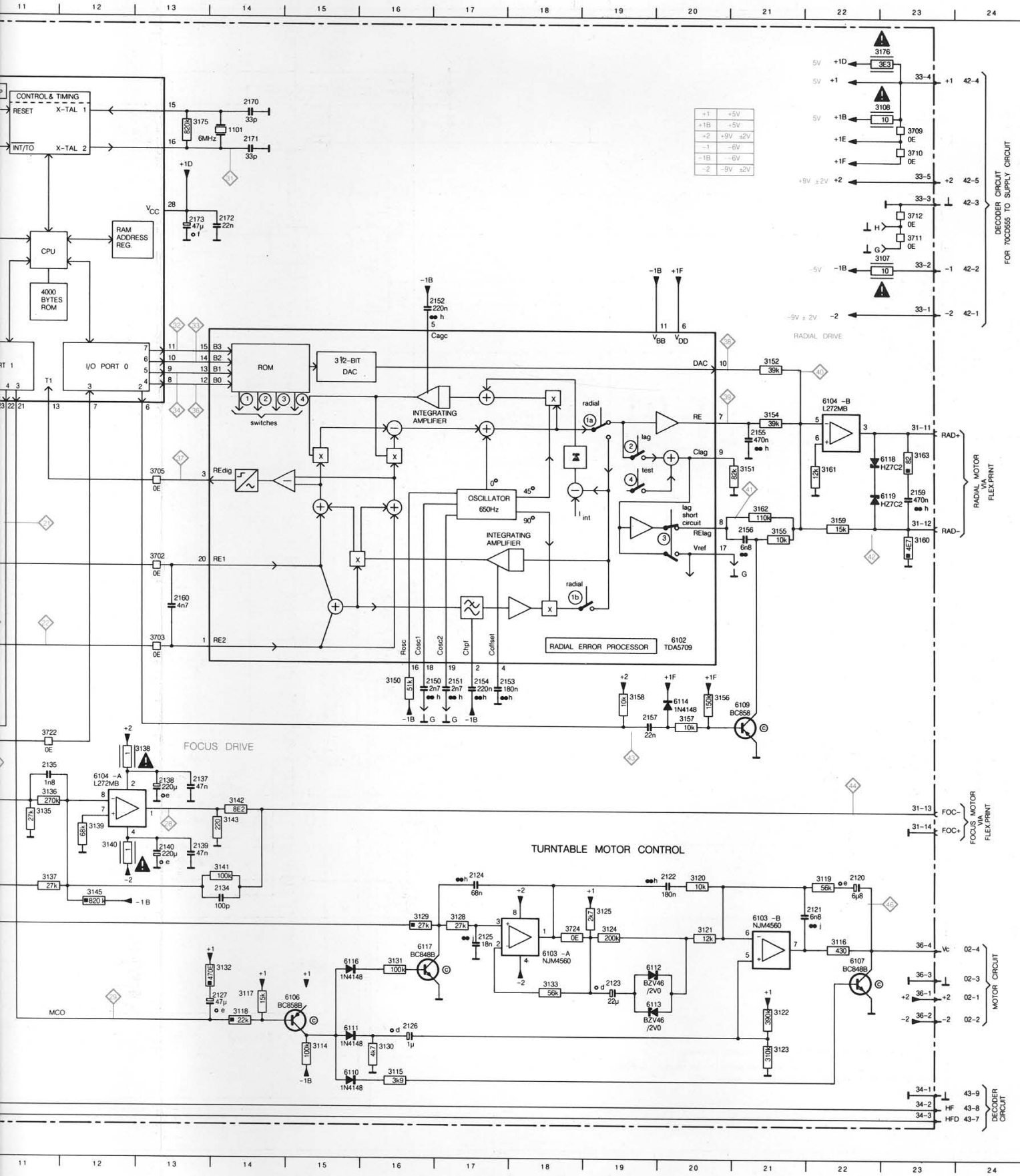


1001 J 2
1002 K 1
1003 J 1
1101 B14
2101 F 3
2102 G 4
2103 J 4
2104 F 5
2105 F 6
2106 F 5
2107 F 4
2108 F 9
2109 I 10
2111 F 7
2112 G10
2113 F 9
2114 F10
2120 L22
2121 L22
2122 L20
2124 L17
2125 M17
2126 N16
2127 N14
2134 L14
2135 J11
2136 L10
2137 K13
2138 K13
2139 L13
2140 L13
2150 I 17
2151 I 17
2152 D17
2153 I 18
2154 I 17
2155 F21
2156 G21
2157 J 19
2159 G23
2160 H13
2170 A14
2171 B14
2172 C14
2173 C13
2174 A 9
3101 J 3
3102 F 4
3103 F 4
3104 J 4
3105 L 4
3106 L 4
3107 D23
3108 A23
3109 F 6
3110 F 8
3111 F 8
3112 F 7
3114 N15
3115 O16
3116 M22
3117 M14
3118 N14
3119 L22
3120 L20
3121 M20
3122 N21
3123 N21
3124 M19
3125 L19
3128 L17
3129 L16
3130 N16
3131 M16
3132 M14
3133 M18
3135 K11
3136 K11
3137 L11
3138 J13
3139 K12
3140 L12
3141 L14
3142 K14
3143 K14
3145 L12
3150 I 16
3151 F21
3152 E21
3154 F21
3155 G21
3156 I 20
3157 J20
3158 I 19
3159 G22
3160 G23
3161 F22
3162 G21
3163 F23
3170 E 4
3171 E 4
3172 D 3
3173 D 4
3174 D 4
3175 B13
3176 A23
3177 B 4
3178 B 4
3190 G10
3701 J 4
3702 H13
3703 I 13
3704 H10
3705 F13
3709 B23
3710 B23
3711 C23
3712 C23
3720 C 9
3721 C 9
3722 J11
3724 M18
6101 K 4
6102 I 20
6103 L21
6103 M18
6104 E22
6104 K12
3105 A10
6106 N15
6107 M22
6108 J 4
6109 J21
6110 O15
6111 N15
6112 M19
6113 N19
6114 J20
6115 B 9
6116 M15
6117 M16
6118 F23
6119 G23

PRS.00352
T10/644

SERVO + PRE-AMPLIFIER CIRCUIT I FOR DYNAMIC MOTORS

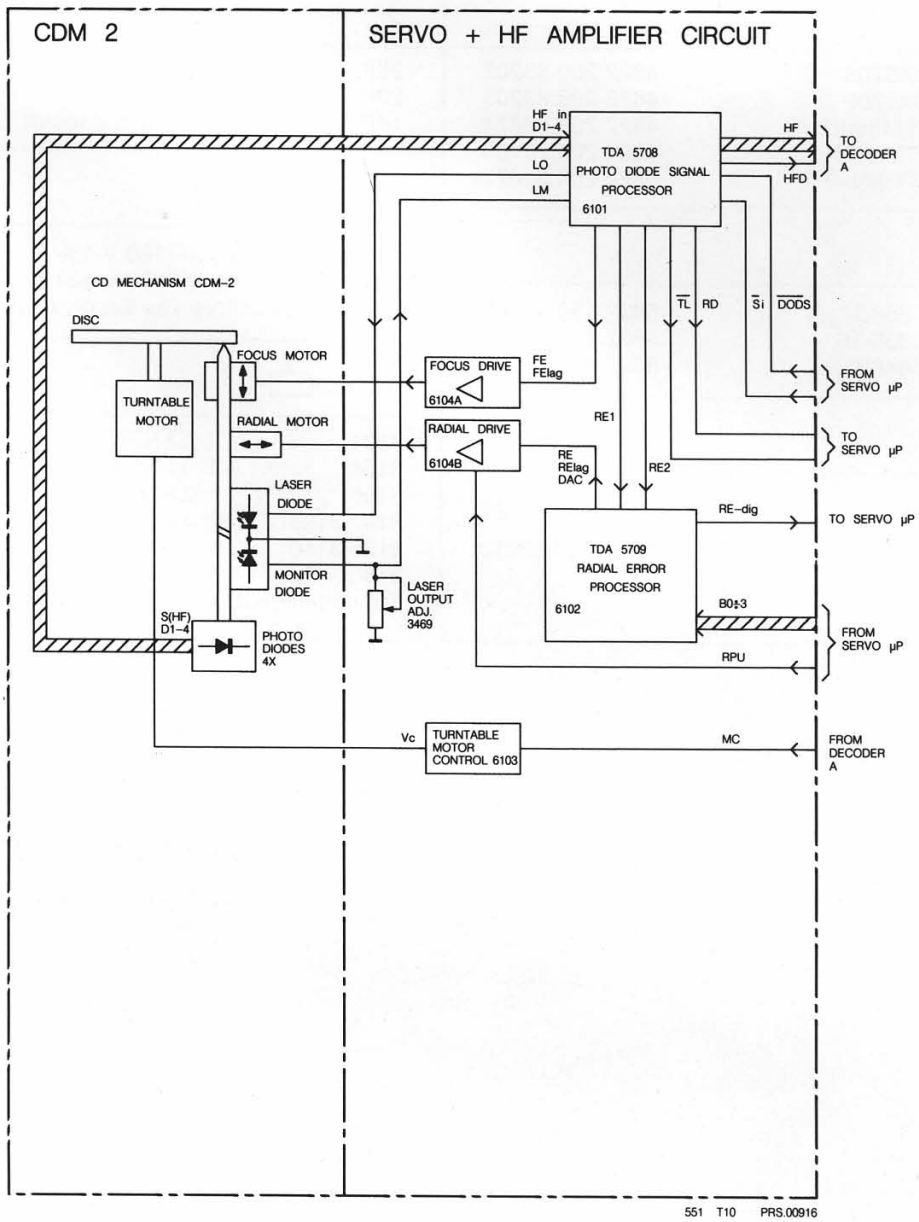




+1	+5V
+1B	+5V
+2	+9V ±2V
-1	-6V
-1B	-6V
-2	-9V ±2V

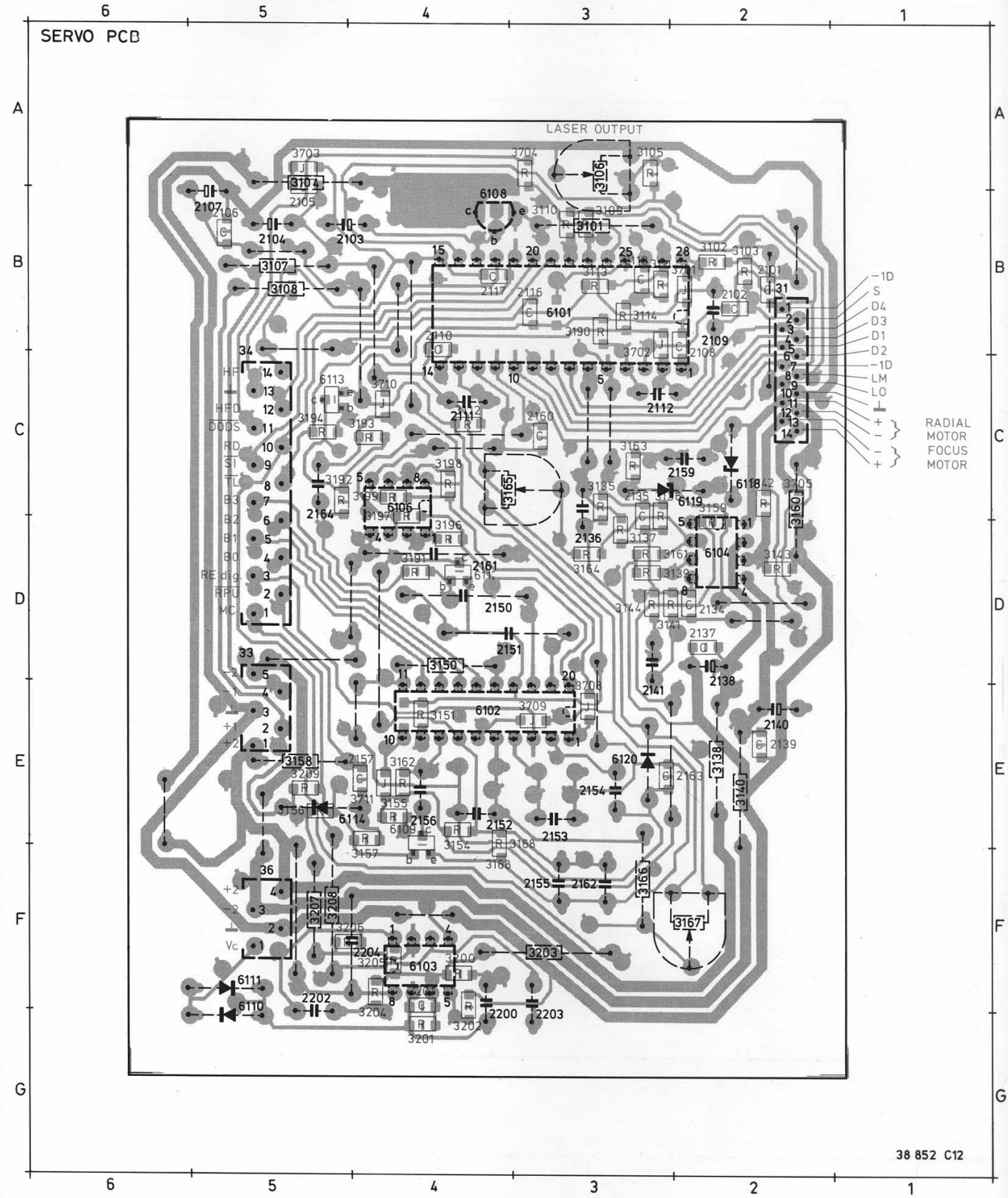
PRS.018
T32/644

BLOCK DIAGRAM II



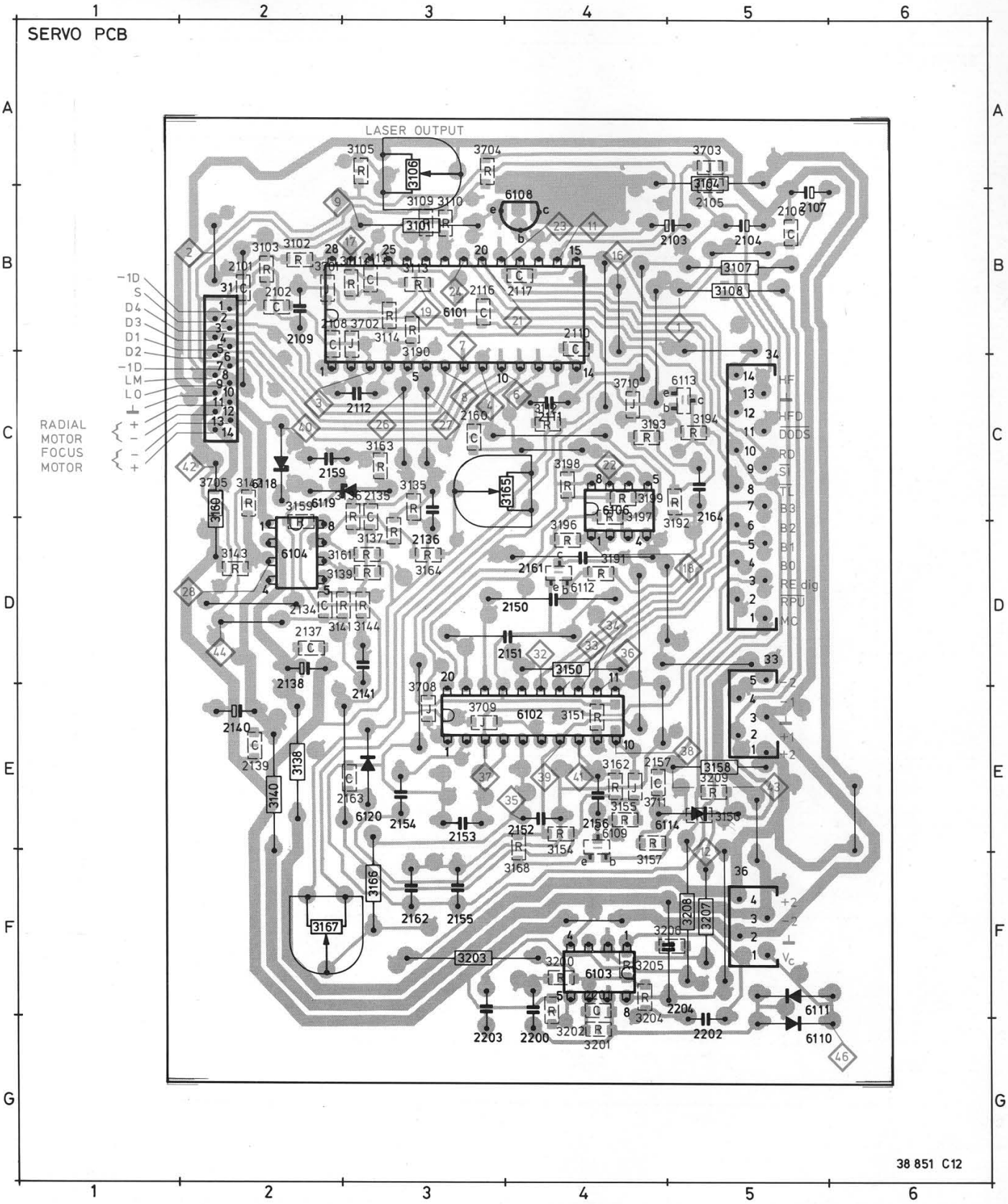
B0-B3	-	Control bits for radial circuit
DAC	-	Current output for track jumping (Digital to Analogue Converted)
$\overline{\text{DODS}}$	-	Drop out detector supression
D1÷4	-	Photodiode currents
FE	-	Focus error signal
FE lag	-	Focus error signal for LAG network
HF	-	HF output for DEMOD
HFD	-	HF detector 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
RD	-	Ready signal, starting up procedure finished
$\overline{\text{RPU}}$	-	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

SERVO + PRE-AMPLIFIER PCB II



2101	B02	2106	B05	2111	C04	2134	D02	2139	E02	2152	E04	2157	E04	2163	E03	2203	G03	3104	A05
2102	B02	2107	B05	2112	C03	2135	C03	2140	E02	2153	E03	2159	C02	2164	C05	2204	F05	3105	A03
2103	B05	2108	B02	2113	B03	2136	D03	2141	E03	2154	E03	2160	C03	2200	G04	3101	B03	3106	A03
2104	B05	2109	B02	2116	B03	2137	D02	2150	D04	2155	F03	2161	D04	2201	F04	3102	B02	3107	B05
2105	B05	2110	B04	2117	B04	2138	D02	2151	D04	2156	E04	2162	F03	2202	G05	3103	B02	3108	B05
3109	B03	3114	B03	3139	D03	3144	D03	3156	E05	3161	D03	3166	F03	3192	D05	3198	C04	3203	F03
3110	B03	3135	C03	3140	E02	3150	D04	3157	F04	3162	E04	3167	F02	3193	C04	3199	C04	3204	G04
3111	B03	3136	C03	3141	D02	3151	E04	3158	E05	3163	C03	3168	F04	3194	C05	3200	F04	3205	F04
3112	C04	3137	D03	3142	C02	3154	F04	3159	C02	3164	D03	3190	B03	3196	D04	3201	G04	3206	F04
3113	B03	3138	E02	3143	D02	3155	E04	3160	C02	3165	C04	3191	D04	3197	C04	3202	G04	3207	F05
3208	F05	3704	A03	3711	E04	6106	C04	6112	D04	6120	E03								
3209	E05	3705	C02	6101	B03	6108	B04	6113	C05										
3701	B02	3708	E03	6102	E04	6109	E04	6114	E05										
3702	B03	3709	E03	6103	F04	6110	G05	6118	C02										
3703	A05	3710	C04	6104	D02	6111	F05	6119	C03										

SERVO + PRE-AMPLIFIER PCB I



1101	C04	2105	A03	2110	C03	2120	E04	2125	E03	2135	C03	2140	D02	2154	D03	2160	C03	2174	B04
2101	B02	2106	A03	2111	C02	2121	E04	2126	E04	2136	C02	2150	C04	2155	D04	2170	C04	3101	C03
2102	B02	2107	A03	2112	B02	2122	E03	2127	E04	2137	E02	2151	C04	2156	D04	2171	C04	3102	B02
2103	B03	2108	B02	2113	B03	2123	E02	2129	E03	2138	E02	2152	D04	2157	D04	2172	B04	3103	B02
2104	A03	2109	A03	2114	B05	2124	E03	2134	C02	2139	D02	2153	D03	2159	D02	2173	A04	3104	D03
3105	C03	3110	B03	3116	E04	3121	E04	3130	E04	3136	D03	3141	C02	3152	D04	3158	C04	3163	D02
3106	C03	3111	B03	3117	E05	3122	E04	3131	E02	3137	D02	3142	D02	3154	D03	3159	D02	3170	B04
3107	A04	3112	B02	3118	E04	3123	E04	3132	E04	3138	E02	3143	D02	3155	D04	3160	D02	3171	B04
3108	A04	3114	E05	3119	E04	3124	E03	3133	E03	3139	D03	3150	D03	3156	D04	3161	D03	3172	B04
3109	B03	3115	E05	3120	E04	3128	E03	3135	C03	3140	E02	3151	D04	3157	D04	3162	D04	3173	B04
3174	B04	3190	B03	3705	D03	3720	B04	6102	D04	6107	E05	6112	E03	6117	E03				
3175	C04	3701	C03	3709	B03	3721	B04	6103	E04	6108	C03	6113	E03	6118	C02				
3176	B05	3702	B02	3710	D04	3722	B03	6104	D02	6109	D04	6114	D04	6119	C02				
3177	B04	3703	C02	3711	C04	3724	E03	6105	B04	6110	E05	6115	B05						
3178	B04	3704	B03	3712	B03	6101	B03	6106	E05	6111	E05	6116	E05						

ELECTRICAL P

6101 6102 6103 6104 6106
6109 6108 6112
6110,6111 6114,6120 6118,6119

ELECTRICAL PARTS II

6101	TDA5708	4822 209 83202
6102	TDA5709	4822 209 83203
6103	NJM4560D	4822 209 83274
6104	L272MBH	4822 209 70705
6106	LM358N	4822 209 81472

6109	BC858B	5322 130 41983
6108	BC338-16	4822 130 40892
6112	BC848B	5322 130 41982

6110,6111 6114,6120	1N4148	4822 130 30621
6118,6119	HZ7C2	4822 130 32862

IC

28P	IC socket	4822 255 40156
20P	IC socket	5322 255 44259
14P	Flex print connector	4822 290 60602

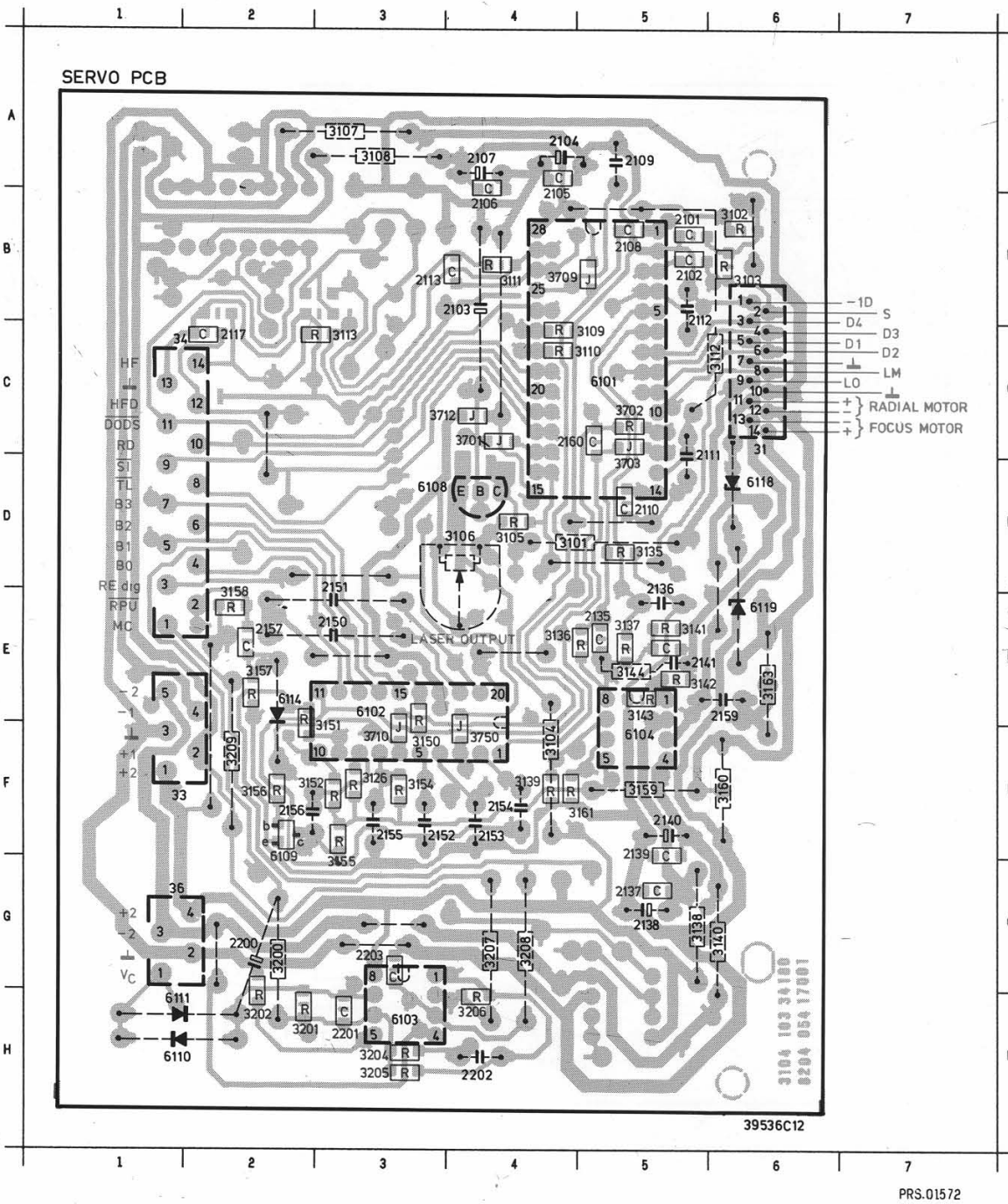
2150,2151	3.6 nF-160 V-1%	4822 121 51001
2159	1.5 µF- 50 V-131P	4822 124 21918

For chip capacitors see list on page 5-8-a

3101	12 Ω-NFR25	4822 111 30511
3104	18 Ω-NFR25	4822 111 30515
3106	1 kΩ-Trimpot	4822 100 20151
3107,3108	4.7 Ω-NFR25-5%	4822 111 30499
3138,3140	1 Ω-NFR25	4822 111 30483
3160	4.7 Ω-MRS25	4822 116 52858

For chip resistors see list on page 5-8-a

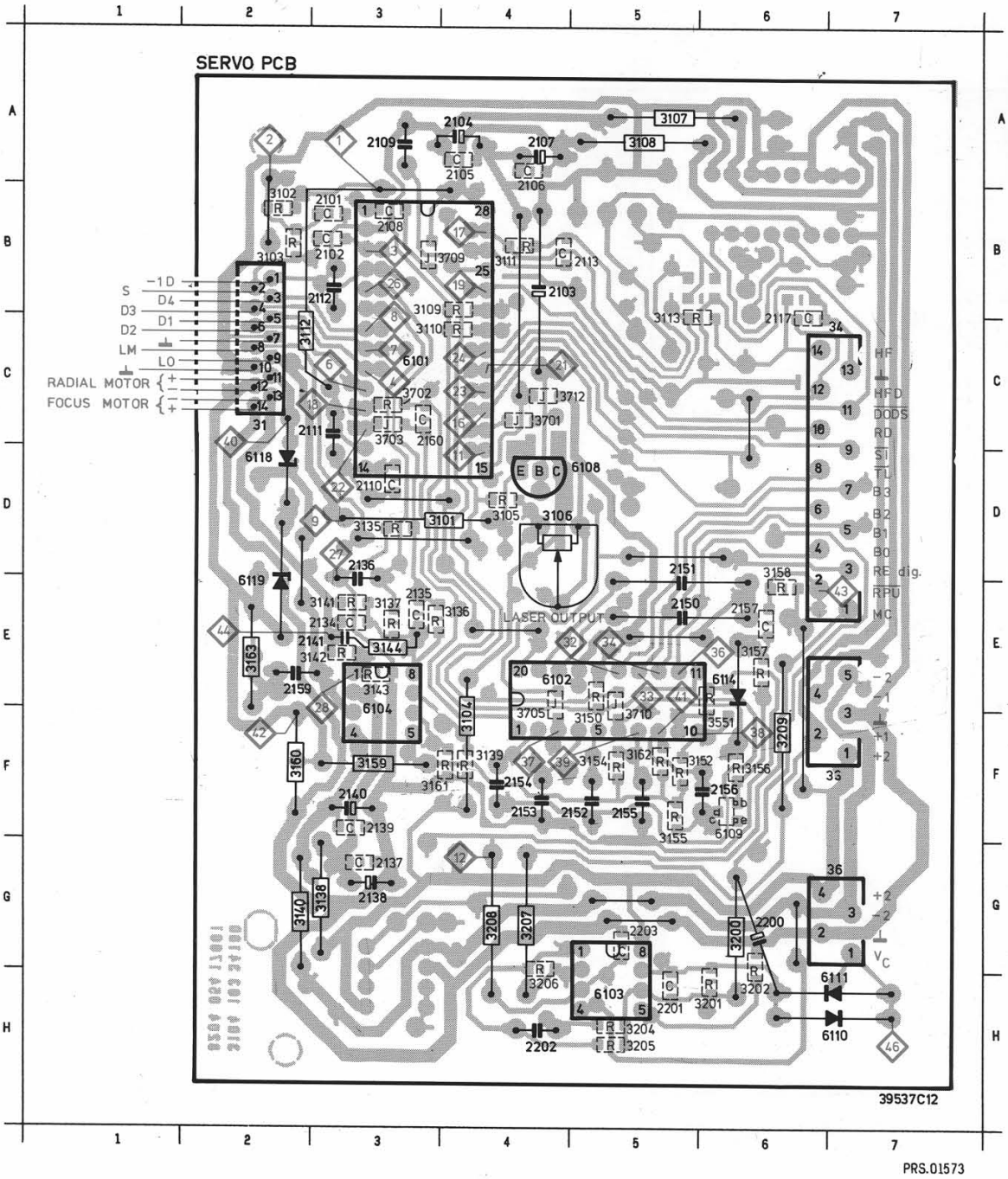
SERVO + PRE-AMPLIFIER PCB IIA



2101	B	5	3701	C	4	3126	F	3	3209	F	2
2102	B	5	3702	C	5	3135	D	5			
2103	B	4	3703	D	5	3136	E	4			
2104	A	4	3709	B	4	3137	E	5			
2105	B	4	3710	F	3	3138	G	5			
2106	B	4	3712	C	4	3139	F	4			
2107	A	4	3750	F	4	3140	G	6			
2108	B	5	6101	C	5	3141	E	5			
2109	A	5	6102	E	3	3142	E	6			
2110	D	5	6103	H	3	3143	E	5			
2111	C	6	6104	F	5	3144	E	5			
2112	B	6	6108	D	3	3150	F	3			
2113	B	3	6109	G	2	3151	E	3			
2117	C	2	6110	H	2	3152	F	3			
2135	E	5	6111	H	2	3154	F	3			
2136	D	5	6114	E	2	3155	G	3			
2137	G	5	6118	D	6	3156	F	2			
2138	G	5	6119	E	6	3157	E	2			
2139	F	5				3158	D	2			
2140	F	5				3159	F	5			
2141	E	6				3160	F	6			
2150	E	3				3161	F	5			
2151	D	3				3163	E	6			
2152	F	4				3200	G	2			
2153	F	4				3201	H	2			
2154	F	4				3202	H	2			
2155	F	3				3204	H	3			
2156	F	2				3205	H	3			
2157	E	2				3206	H	4			
2159	E	6				3207	G	4			
2160	C	5				3208	G	4			
2200	G	2									
2201	H	3									
2202	H	4									
2203	G	3									
3101	D	5									
3102	B	6									
3103	B	6									
3104	F	4									
3105	D	4									
3106	D	4									
3107	A	3									
3108	A	3									
3109	C	5									
3110	C	5									
3111	B	4									
3112	C	6									
3113	C	3									

5-6-b-2

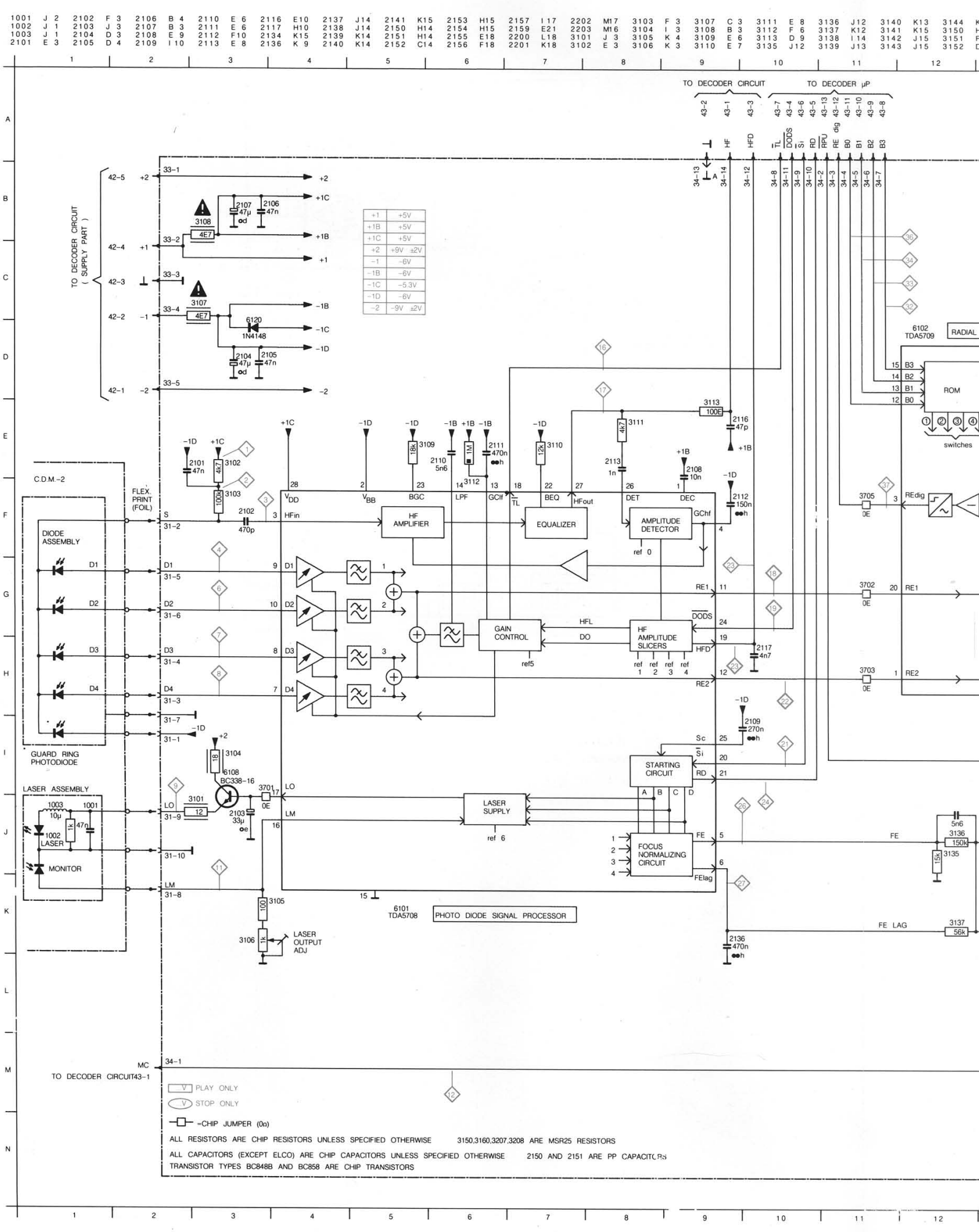
SERVO + PRE-AMPLIFIER PCB IIA

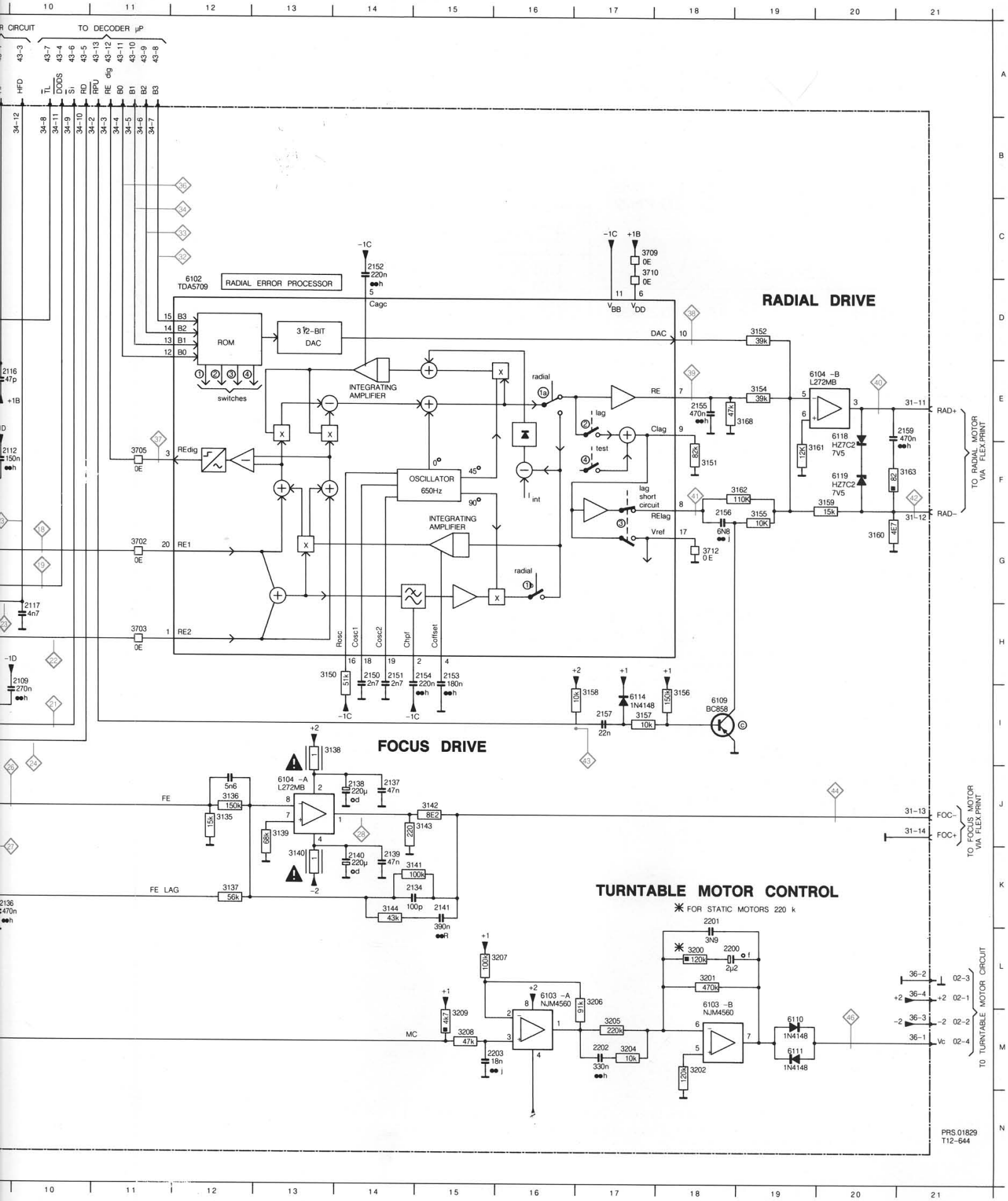


2101	B 3	3208	G 4		
2102	B 3	3209	F 6		
2103	B 4	3701	C 4		
2104	A 4	3702	C 3		
2105	A 4	3703	C 3		
2106	A 4	3705	E 4		
2107	A 4	3709	B 4		
2108	B 3	3710	E 5		
2109	A 3	3712	C 5		
2110	D 3	6101	C 3		
2111	C 3	6102	E 5		
2112	B 3	6103	H 5		
2113	B 5	6104	F 3		
2117	B 6	6108	D 5		
2134	E 3	6109	F 6		
2135	E 3	6110	H 7		
2136	D 3	6111	H 7		
2137	G 3	6114	E 6		
2138	G 3	6118	D 2		
2139	F 3	6119	E 2		
2140	F 3				
2141	E 3				
2150	E 5				
2151	D 5				
2152	F 5				
2153	F 4				
2154	F 4				
2155	F 5				
2156	F 6				
2157	E 6				
2159	E 2				
2160	C 4				
2200	G 6				
2201	H 5				
2202	H 4				
2203	G 5				
3101	D 4				
3102	B 2				
3103	B 2				
3104	F 4				
3105	D 4				
3106	D 4				
3107	A 5				
3108	A 5				
3109	B 3				
3110	C 3				
3111	B 4				
3112	C 2				
3113	B 5				
3135	D 3				
3136	E 4				
3137	E 3				
3138	G 3				
3139	F 4				
3140	G 2				
3141	E 3				
3142	E 3				
3143	E 3				
3144	E 3				
3150	F 5				
3151	E 5				
3152	F 6				
3154	F 5				
3155	F 5				
3156	F 6				
3157	E 6				
3158	D 6				
3159	F 3				
3160	F 3				
3161	F 4				
3162	F 5				
3163	E 2				
3200	G 5				
3201	H 6				
3202	H 6				
3204	H 5				
3205	H 5				
3206	H 4				
3207	G 4				

PRS.01573

SERVO + PRE-AMPLIFIER CIRCUIT IIB





ELECTRICAL PARTS IIB

6101	TDA5708	4822 209 83202
6102	TDA5709	4822 209 83203
6103	NJM4560D	4822 209 83274
6104	L272MBH	4822 209 70705
6109	BC858B	5322 130 41983
6108	BC338-16	4822 130 40892
6110,6111 6114,6120	1N4148	4822 130 30621
6118,6119	HZ7C2	4822 130 32862

IC

28P	IC socket	4822 255 40156
20P	IC socket	5322 255 44259
14P	Flex print connector	4822 290 60602

2150,2151	3.6 nF-160 V-1%	4822 121 51001
2159	1.5 µF- 50 V-131P	4822 124 21918

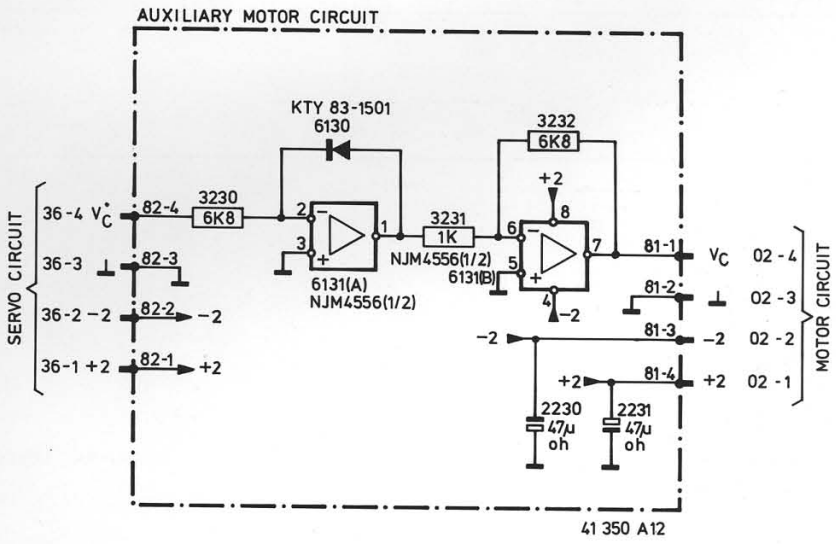
For chip capacitors see list on page 5-8-a

3101	12 Ω-NFR25	4822 111 30511
3104	18 Ω-NFR25	4822 111 30515
3106	1 kΩ-Trimpot	4822 100 20151
3107,3108	4.7 Ω-NFR25-5%	4822 111 30499
3138,3140	1 Ω-NFR25	4822 111 30483
3160	4.7 Ω-MRS25	4822 116 52858

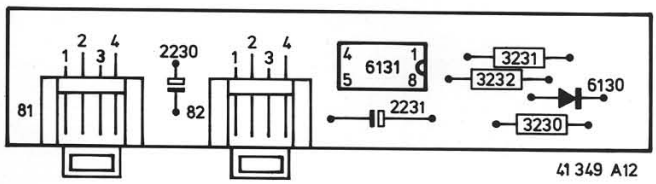
For chip resistors see list on page 5-8-a

4822 255 40156 5322 255 44259 4822 290 60602
4822 121 51001 4822 124 21918 -a
4822 111 30511 4822 111 30515 4822 100 20151 4822 111 30499 4822 111 30483 4822 116 52858

*

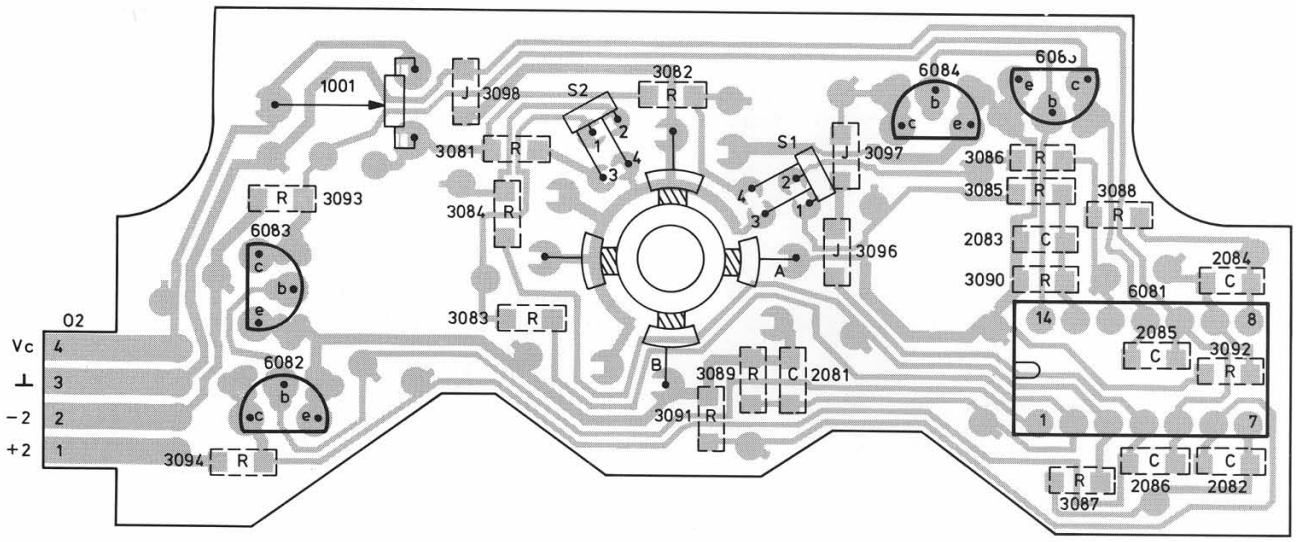


*

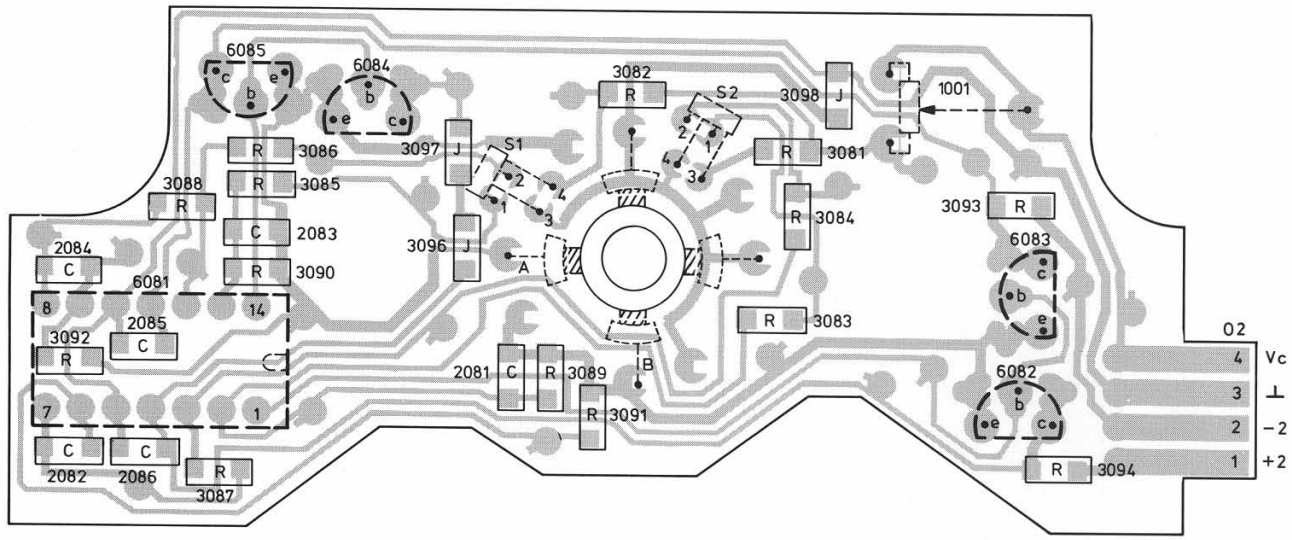


* Only for version 0303

MOTOR PCB



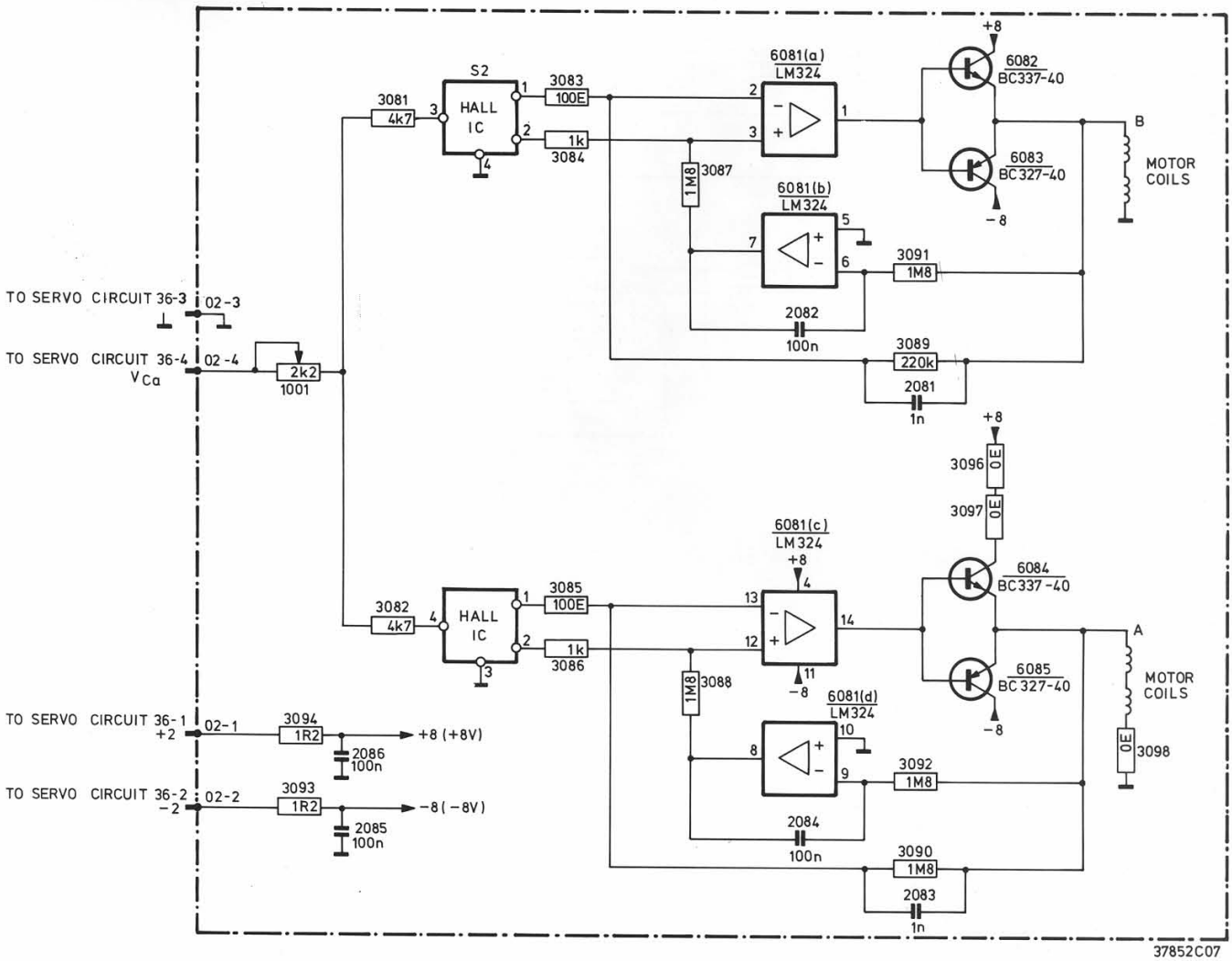
38 024 C12



38 025 C12

For codenumber of the motorassembly see the C.D. mechanism exploded view page 4-1

MOTOR CIRCUIT



Carbon film 0.2 W	70°C	5%	
Carbon film 0.33 W	70°C	5%	
Metal film 0.33 W	70°C	5%	
Carbon film 0.5 W	70°C	5%	
Carbon film 0.67 W	70°C	5%	
Carbon film 1.15 W	70°C	5%	

© Chip component

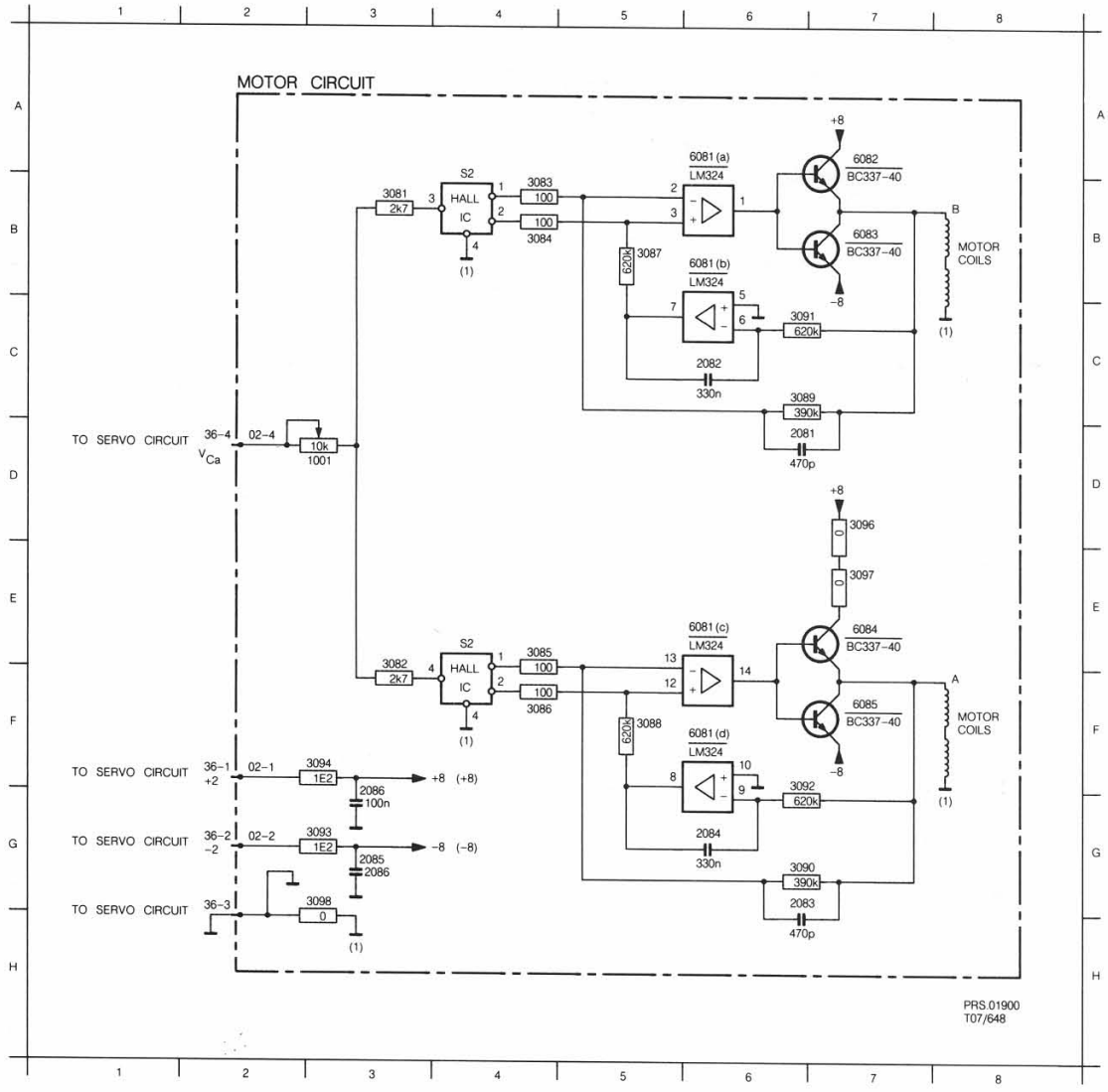
Ceramic plate Tuning ⩽ 120 pF NP.0	2%
Ceramic plate Others	—20/+80%
Polyester flat foil	10%
Metalized polyester flat film	10%
Polyester flat foil small size (Mylar)	10%
Polysterene film/foil	1%
Tubular ceramic	
Miniature single	
Subminiature tantalum	± 20%

*a	= 2,5 V
b	= 4 V
c	= 6,3 V
d	= 10 V
e	= 16 V
f	= 25 V
g	= 40 V
h	= 63 V
j	= 100 V
l	= 125 V
m	= 150 V
n	= 160 V
q	= 200 V
r	= 250 V
s	= 300 V
t	= 350 V
u	= 400 V
v	= 500 V
w	= 630 V
x	= 1000 V
A	= 1,6 V
B	= 6 V
C	= 12 V
D	= 15 V
E	= 20 V
F	= 35 V
G	= 50 V
H	= 75 V
I	= 80 V

27 037A/C

DYNAMIC MOTOR CIRCUIT

1001	D 3	2084	G 6	3082	E 3	3086	F 4	3090	G 6	3094	F 3	6081	A 6	6082	A 7
2081	D 6	2085	G 3	3083	B 4	3087	B 5	3091	C 6	3096	D 7	6081	B 6	6083	B 7
2082	C 6	2086	G 3	3084	B 4	3088	F 5	3092	F 6	3097	E' 7	6081	E 6	6084	E 7
2083	G 6	3081	B 3	3085	E 4	3089	C 6	3093	G 3	3098	G 3	6081	F 6	6085	F 7



For motor PCB see page 5-7

© Chips 50 V NP0 S1206

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

© Chips 0,125 W S1206 NP0

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

© Chips 0,125 W S1206

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

© Chips 0,125 W S1206

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

SURVEY OF SERVO PANEL CHANGES

Each time when a change is made, the print gets another yellow sticker with a different character.

Panels for the static version : 5725 (on label); this version is for CDM2 - Hi-Fi/0000, see circuit on page 5-3-a.

The basic panel is indicated with label A.

Label	Item	Changed into	Date
B	3119	12 KΩ	16-12-1985
C	2109	270 nF	22-01-1986
	2121	3.9 nF	
	2122	180 nF	
	2124	68 nF	
	2125	18 nF	
	3116	430 EΩ	
	3119	100 kΩ	
	3120	10 kΩ	
	3121	33 kΩ	
	3122	390 kΩ	
	3123	330 kΩ	
	3124	180 kΩ	
	3125	removed	
	3126	jumper 3724	
	3127	removed	
	3723	56 kΩ	

Reason:
The performance of the hallmotors is different as those, which are used with label A and B.

Remark:
Panels with label C do not have a delaytime for the MCO signal.

D	2126	3.3 uF/25 V	03-02-1986
	2127	68 uF/16 V	
	3132	470 E ohm	

Reason:
Start (MCO signal) delay of the hallmotor.

E	2126	2.2 uF/25 V	06-03-1986
	6104	L272MBH codenumber 4822 209 70705.	

Reason:
Time reduction of the start pulse of the hallmotor. L272MBH is a low offset selected version.

F	6103	NJM4560D	13-05-1986

Reason:
NJM4560D has a better performance.

H	2127	47 uF/10 V	07-06-1986

Reason:
Reduction of the start (MCO signal) delay.

I	2123	short-circuit wire	24-06-1986

Reason:
Increasing the total gain factor during and after starting up of the hallmotor.

J The radial output circuit has been changed according to the circuit on page 5-4-a-1.

Reason:
Reduction of the bandwidth of the radial control.

Panels for the static version : 5768 (on label); this version is for CDM 2 - Top Hi-Fi/0001, see circuit on page 5-6-a-3.

The basic panel has no label. It is possible that capacitor 2104 is mounted in a wrong way. On panels with a sticker D, 2104 is mounted in the right way.

Panels for the dynamic version : 5826 (on label); this version is for CDM 2 - 0300/0303, see circuit on page 5-4-2.

The basic panel has the label G.

Label	Item	Changed into	Date
K	The radial output circuit has been changed according to the circuit on page 5-4-2.		22-08-1986
	Reason: Reduction of the bandwidth of the radial control.		
J	2109	270 nF	07-10-1986
	2127	47 uF/10 V	

Reason:
Increasing the time for the startup procedure.

M	these were panels indicated with label G		
	2109	270 nF	09-10-1986
	2127	47 uF/10 V	
	Reason: See J, only for panels with the old radial circuit.		

Panels for the dynamic version : 5827 (on label); this version is for CDM 2 - 0301, see circuit on page 5-6-5.

The basic panel has the label B.

Label	Item	Changed into	Date
C	the radial output circuit has been changed according to the circuit on page 5-6-5. It is possible that pos. 2104 is mounted in the wrong way.		
D	2104	mounted in the right way.	

Service Information

1988-04-20

Conversion Tables CDM-2 to CDM-4

A88-226

Product Service Group CE Audio

Service
Service
Service

4822 725 42457

TABLE 1: What to do in case of repairing a cd-set, with a damaged CDM-2

CD-set		See column of TABEL 3													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
FCD162	=	X	X													
FCD365	=													X		
FCD365 B	=													X		
FCD560	=	X	X													
FCD562	=	X	X													
FCD563	=	X	X													
FCD565	=	X	X													
ST5136	=	X	X													
ST5156	=	X	X													
CD45 MARANTZ	=	X	X													
CD56 MARANTZ	=			X	X	X										
CD65 MARANTZ	=			X	X	X										
CD75 MARANTZ	=			X	X	X										
CD150	=	X	X													
CD151	=	X	X													
CD152	=	X	X													
CD160	=			X	X	X										
CD350	=	X	X													
CD350/75	=			X	X	X										
CD350/77	=			X	X	X										
CD351	=	X	X													
CD360	=			X	X	X										
CD450	=			X	X	X										
CD460	=			X	X	X										
CD463	=			X	X	X										
CD470	=			X	X	X										
CD555							X	X								
CD560	=			X	X	X										
CD650	=			X	X	X										
CD660	=														X	X
CD670	=														X	X
CD680	=											X				
CD1005	=	X	X													
CD1006	=			X	X	X										
CD1151	=	X	X													
CD4006	=			X	X	X										
CD8200	=			X	X	X										
CD8400	=														X	X
D8854	=								X	X						
D8874	=								X	X						
D8878	=										X					
D8884	=								X	X						
D8958	=								X	X						

TABLE 2: The next sets only with serialnumber AH00....
What to do in case of repairing a cd–set, with a damaged CDM-2

CD–set		See column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15 of TABLE 3
FCD465	=											X				
FCD760	=											X				
FCD762	=											X				
CD65DX MARANTZ	=											X				
CD75DX MARANTZ	=											X				
CD371	=											X				
CD372	=											X				
CD373	=											X				
CD471	=											X				
CD472	=											X				
CD473	=											X				
CD771	=											X				
CD782	=											X				
CD873 MARANTZ	=											X				
CD1371	=											X				
CD1471	=											X				

TABLE 3: ADAPTATIONS FOR DIFFERENT VERSIONS.

			Versions (see sticker on CDM)						
			1	2	3	4	5	6	7
			3104 102 0000x Hifi 0000x	3104 102 0300x 0300x	3104 102 0001x Top Hifi 0001x	3104 102 0301x 0301x with servo 5827	3104 102 0301x with servo 5886	3104 102 0003x Leuven 0003x	3104 102 0303 0303
Codenr.CDM–4		=							
4822 691 30212		=	X	X					
4822 691 30211		=			X	X	X		
4822 691 20464		=							
4822 691 30205		=							
4822 691 30206		=						X	X
4822 691 30207		=							
Codenr. servopanel		=							
4822 214 51702	1st.gen	=						X	X
4822 214 51721	2nd.gen	=							
The next items must be changed into a new value of : (see drawing of servo circuit in the manual of the set)									
Codenr.chip–R		=							
5322 111 90118	8,2kΩ	=							
5322 111 90108	39kΩ	=							
5322 111 90264	160kΩ	=							
Codenr.norm.–R		=							
5322 116 53612	33Ω	=							
4822 116 51255	15kΩ	=							
4822 116 52479	91kΩ	=							
Codenr.Caps.		=							
4822 121 41674	470nF	=							
4822 124 21918	1,5µFBip	=							
Remove		=							
Codenr.trimpotm.		=							
4822 101 10685	4,7kΩ	=							

5	6	7	8	9	10	11	12	13	14	15
3104 102 0301x with servo 5886	3104 102 0003x Leuven 0003x	3104 102 0303x 0303x	3104 102 0307x 0307x	3104 102 0307x 0307x	3104 102 0407x	3104 102 0500x 0500x	3104 102 0501x 0501x	3104 102 0503x 0503x	3104 102 0008x 0008x with servo 5827	3104 102 0008x 0008x with servo 5886
X										
						X	X		X	X
								X		
	X	X	X	X						
					X					
	X	X								
									X	X
						3551	3551	3551		
						3519	3519	3519		
						3520	3520	3520		
			R552	3552		3543	3543	3543		
						3545	3545	3545		
						3550	3550	3550		
						2540	2540	2540		
						2557	2557	2557		
						2541	2541	2541		
			R506	3506		3528	3528	3528		