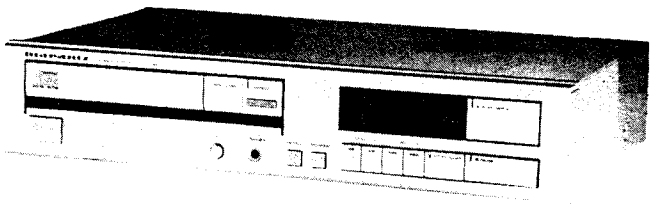
Compact disc player CD65

Service
Service
Service

AB/ABC/AC/AN/EB/FB/NB/NBC/NC/PG/TB/TBC



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For servicing hints of the CD mechanism see Service Manual C.D.M.-2 (version top HIFI). (At the Back of this manual)

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.

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TABLE OF CONTENTS PER PAGE

1. ELUCIDATION 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).

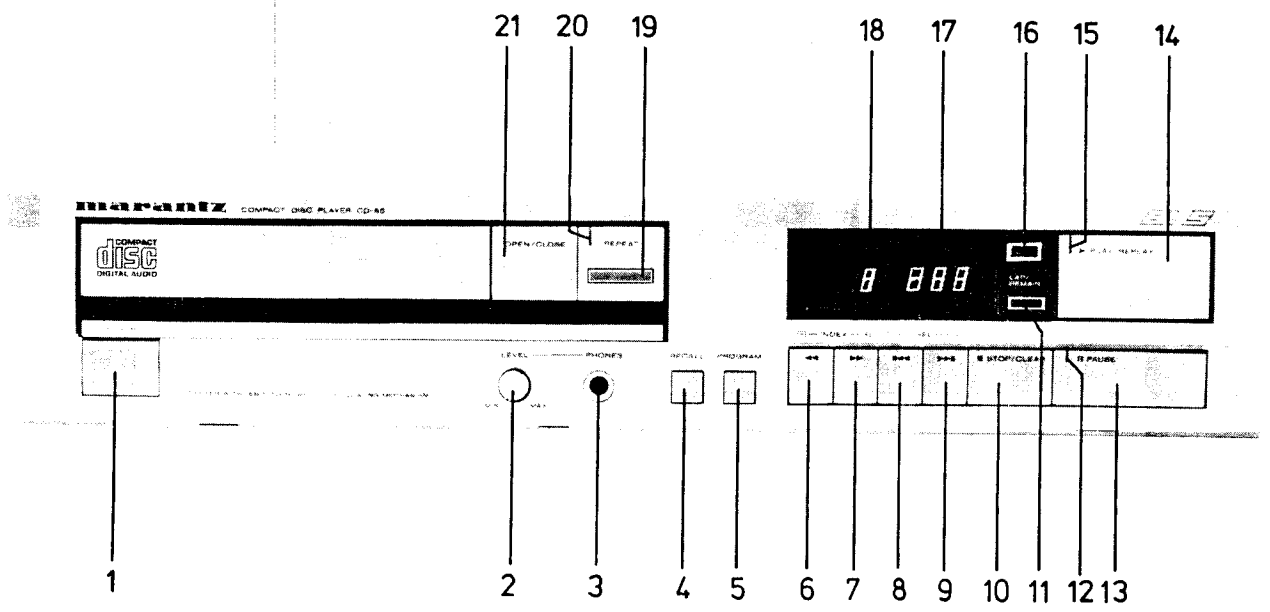

Fig. 1

2 CONTROLS

1 ON/OFF key: for switching the mains voltage supply on or off.

2 Level adjustment knob for the head phone volume.

3 Head phone socket.

4 "RECALL" key: In the programmode it is possible to review a program with this key.
the tracknumbers selected are successively displayed for one second on the time display section.

5 "PROGRAM" key: for storing the tracknumbers selected in the memory while running through the track numbers by means of the select keys.

6 "INDEX –" key: for fast search backwards to a particular passage (in the play mode or the programmode).

7 "INDEX +" key: for fast search forwards to a particular passage (in the play mode or the programmode).

8 "SELECT –" key: in the play mode one can select track numbers backwards.
In the programmode one can select tracknumbers backwards for storage in the program memory.

9 "SELECT +" key: in the play mode one can select track numbers forward.
In the programmode one can select tracknumbers forward for storage in the program memory.

10 "STOP/CLEAR" key: pressing this key will stop replay or play of a tracknumber in the play mode. The display will show the maximum number of tracks and the remaining time.
Pressing this key with the player in the program mode will stop replay or play of the tracknumbers selected within the program.
The display will show the total amount of tracknumbers selected and the maximum playtime of the program.
The program stored will be erased if the stop key is pressed for the second time.

11 "LAP/REMAIN" key: using this key the laptime or the remaining time will be displayed on the time display section.

12 "PAUSE" LED: lights up during the pause mode.

13 "PAUSE" key: this key may be used for interruption of replay or play of a tracknumber indicated on the tracknumber display in the play mode or programmode.
The pause mode can only be reset by pushing the play/replay key.

14 "PLAY/REPLAY" key: this key may be used for replay or play of the track number indicated on the tracknumber display in the play mode or program mode.

15 "PLAY/REPLAY" LED: lights up during play/replay mode.

16 "ERROR" LED: lights up during a wrong handling or control action.

17 "DISPLAY" section: this display part shows the laptime or the remaining time or the tracknumbers selected during recall or programming.

18 "DISPLAY" section: this display part shows the track number during the play mode and the program mode.

19 "REPEAT" key: for endless repetition of a program stored in the program mode or of all tracks recorded on the disc in the play mode.

20 "REPEAT" LED: lights up during the repeat mode.

21 "OPEN/CLOSE" key: for opening or closing the disc tray.

TECHNICAL SPECIFICATION

- System : Compact Disc Digital Audio system
- Mains voltages : 110 V, 127 V, 220 V, 240 V ± 10% (to be changed by transformer connections)
  : CD.../F 100 V (special transformer)
- Mains frequencies : 50-60 Hz (no adaption required)
- Power consumption : ⩽20 W
- Frequency range : 20 Hz ÷ 20 kHz ±0,1 dB
- Output voltage : max. 2 V_{rms}/⩾10 kΩ
- Output impedance : 200 Ω
- S/N ratio : ⩾96 dB
- Headphone
  Output voltage : 5,6 V_{rms}
  Output resistance : 150 Ω
  Load impedance range : 8 Ω – 2 kΩ
  Output power : 30 mW max into 32 Ω load.
- Channel separation : ⩾90 dB
- Channel difference : ⩽0,6 dB
- Total harmonic distortion : ⩽0,005% (at -86dB)
- Intermodulation distortion : ⩽0,005% (at -86dB)
- Remote control : M.R.C. remote bus
  Easy bus
  Synchro recording bus
- De-emphasis : 0 or 15/50 µs (switched by the subcode on the disc)
- Dimensions wxhxd : 420 x 85 x 280 mm (tray closed)
  420 x 85 x 410 mm (tray opened)
- Weight : approx 3 kg

3 SERVICING HINTS

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

– ESD

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

In the set chip components have been applied.
For disassembly and assembly of chip components see the figure below.

The disc should always rest properly on the turntable.
To achieve this a disc hold-down has been mounted in a bracket of the tray mechanism.
If the tray mechanism has to be disassembled for servicing, one or more than one seperate disc hold-downs should be used.
The set can function normally then.
Code number of the disc hold-down is 4822 532 60906

When the tray mechanism has been disassembled the player can be prepared for measurements via interconnection of connector pins 22-2 (⊥) and 22-3 (S in) on the control + display panel.

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
Disc hold-down	4822 582 60943
13th order filter	4822 395 30204
Service cable (5-pole)	4822 321 21273
Service cable (14-pole)	4822 321 21598

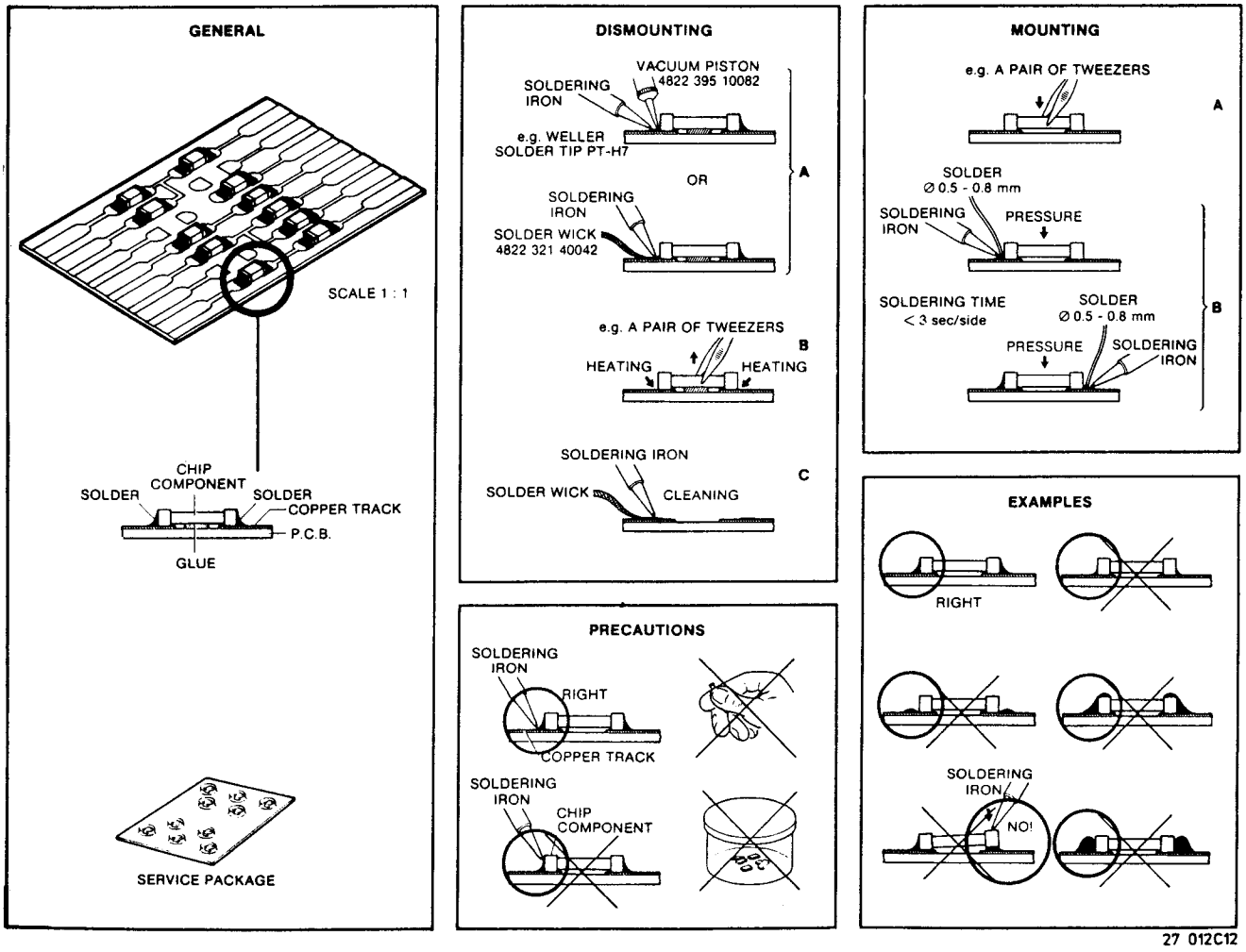

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Fig. 2

DISASSEMBLY OF TOP COVER

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

REPLACEMENT OF GLASS FUSE 1701

- Remove top cover.
- The glass fuse is situated on the mains switch panel in the left-hand rear corner of the set.

REPLACEMENT OF TRANSFORMER FUSE

- Remove top cover.
- Remove screening cap that has been placed over transformer.
- Now the transformer fuse is accessible.
- Reapply the screening cap after fuse exchange.

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 front panel.

Disassembly of control + display panel

- The control + display panel can be taken out after removal of the 5 screws.

SERVICING OF THE DECODER + POWER SUPPLY PANEL

- Remove top cover.
- Remove the 2 screws on the decoder + power supply panel and the buspanel.
- Remove the 2 screws at the upper side of the cooling bracket.
- Remove the screw in the backcover for fixation of the 2 CINCH sockets.
- After the connectors have been disconnected the decoder + power supply panel can be slid forwards and be taken out of the player.

SERVICING OF THE SERVO + PREAMPLIFIER PANEL (see Fig. 3)

- Remove top cover.
- Remove the front panel.
- Remove screw 4Nx10 and ring item no. 224 (see exploded view of cabinet) at the rear of the tray mechanism.
- Now the tray mechanism/CDM/servo + pre-ampl. panel assy can be taken out of the frame and can be placed vertically in the appropriate servicing supports in the frame (see Fig. 3).
- In this way measurements and adjustments can be performed on the servo + preampl. panel.
- See Service Manual C.D.M.-2 for measurements and adjustments on the servo + preampl. panel.
- Ensure during mounting of the tray mechanism/CDM/servo + preampl. panel assy that the suspension rubbers and springs item no. 236 and 237 are present (see exploded view of cabinet).

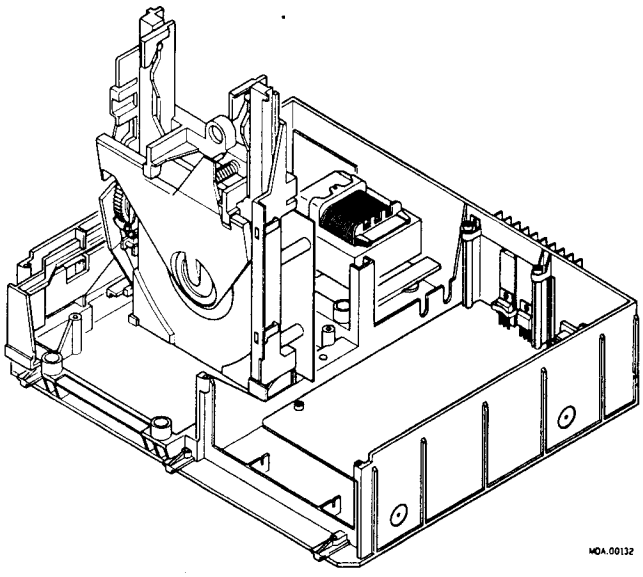


Fig. 3

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

- Disassemble top cover.
- Disassemble front panel.
- Remove screw 4Nx10 and ring item no. 224 (see exploded view cabinet) at the rear of the tray mechanism.
- Now the assy can be taken out of the set after the connectors have been disconnected.
- Remove screw N4x8 and bracket item no. 508 (see exploded view of tray mechanism).
- The CDM + servo + preampl. panel is kept in place by a boss of the tray mechanism. If this boss, in the region of the foil connector is bent away the CDM + servo + preampl. panel can be taken out of its support points of the tray mechanism.
- Ensure during mounting of the CDM/servo + preampl. panel in the tray mechanism that the mechanical brake item no. 123 (see exploded view of tray mechanism) is positioned properly.

SERVICING OF THE TRAY MECHANISM

Disassembly of the tray mechanism

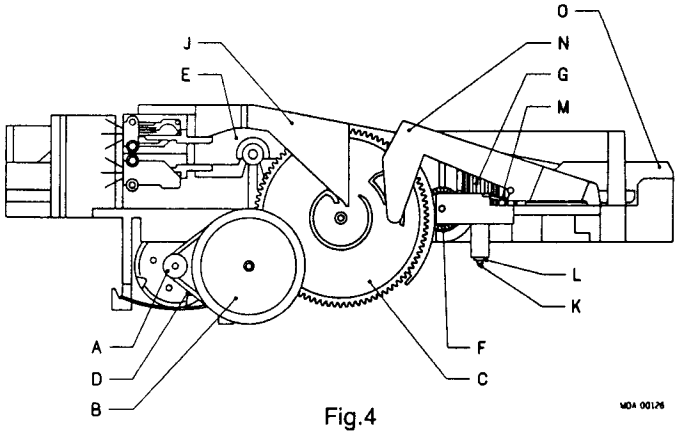


Fig.4

- Remove disc hold-down holder J by disassembling coil spring at rear. Then holder J can be taken out of its hinge points.
- Remove belt D.
- Disassemble pulley B after clamping ring on shaft has been removed.

- Remove lifting bracket N by elevating lug M and sliding bracket out of its shaft guiding.
- Remove gearwheel G by removing shaft K after ring L has been taken away.
- Now disc carrier O can be taken out of the holder by lifting it at the front and sliding it out of the guiding.
- Next cog wheel C, switch bracket E and gearwheel F can be removed successively.
- The tray motor with belt wheel A can be taken out by removing the spring.

Assembly of tray mechanism

- Place disc carrier O in guiding and slide it in place (= disc carrier in position "close").
- Mount gearwheel F.
- Apply switch bracket E. The left-hand boss of the bracket should be positioned between the 2 switches.
- Ensure that the aperture in gearwheel F is vertical (see Fig. 4) and apply cog wheel C in the way described in Fig. 5.

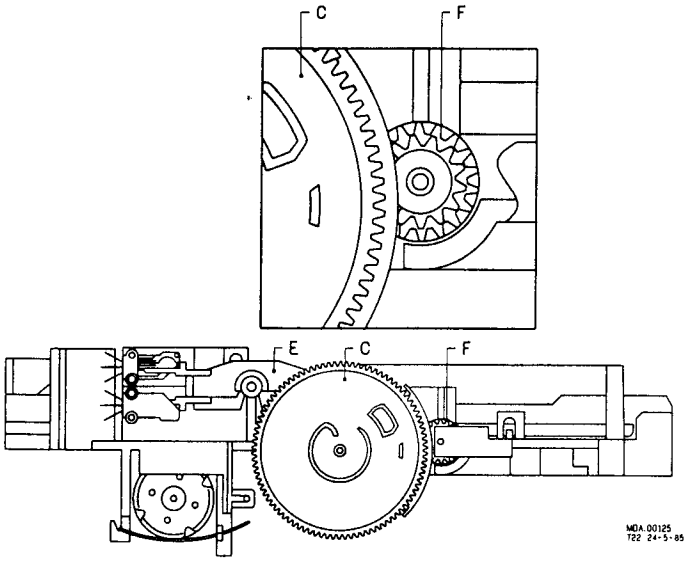


Fig. 5

- Turn cog wheel C counterclockwise till its final position and ensure that the boss of switch bracket E engages with the guiding at the rear of the cog wheel. Turn the cog wheel counterclockwise and clockwise and check if both switches are switched on alternately.
- Turn cog wheel C counterclockwise so that the upper switch is operated and mount pulley B in this position. Next apply the clamping ring.
- Mount gearwheel G and apply shaft K and clamping ring L.
  Ensure that gearwheel G is positioned before shaft and clamping ring are mounted.
- Apply lifting bracket N. Ensure that the fork at the right of the lifting bracket encloses the guide rail of the tray.
- Mount the motor with pully A and apply belt D.
- Next hold-down holder J and the compression spring can be mounted.
- Check after mounting the working of the tray mechanism by turning pulley B counterclockwise and clockwise.

4 ELECTRICAL MEASUREMENTS AND ADJUSTMENTS

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

Specification measurement

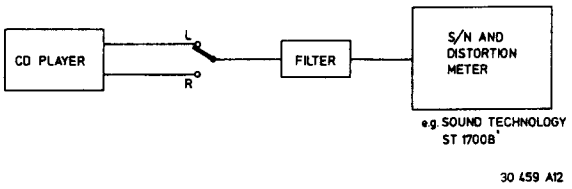


Fig. 6

To measure the specification use can be made of audio test disc 4822 397 30085.
Use 13th order filter 4822 395 30204 (see Fig. 5) to measure:
- Total harmonic distortion (THD)
- Intermodulation distortion
- Signal-to-noise ratio (S/N)

Changing the transformer connections

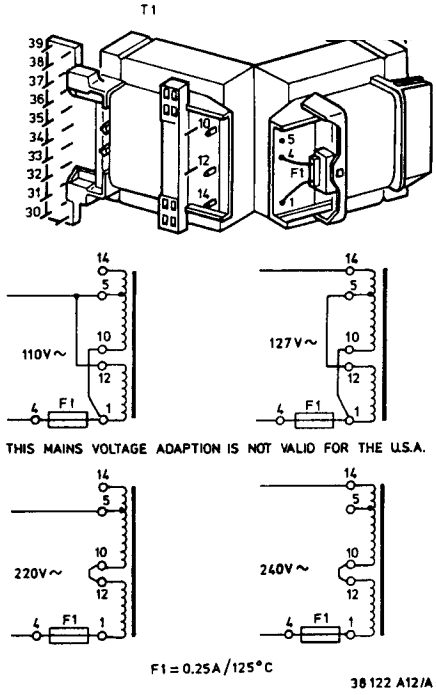


Fig. 7

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. 7.

Attention

In case of a change to 110V or 127V the glass fuse on the mains switch panel should be changed from 200 mA-T to 400 mA-T.

DETAILED MEASURING METHOD FOR THE DECODER CIRCUIT

HINTS

Test discs

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

Measurements on op-amps

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

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

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

Stimulation with "0" and "1"

During troubleshooting sometimes certain points should be 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 $\overline{Si}$ (= 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 servo µP IC6301

With the self-test the following parts of the µP are tested:
-RAM
-ROM
-TIMER
-serial I/O interface
-I/O gates

-Interrupt the I^2C connection on connector 46-1 on the decoder panel.
-Unsolder pins 1, 7, 26 and 27 of the decoder µP.
-Render pin 2 of the servo µP "low" (ground) and switch on the supply voltage.
-The test starts if pin 2 is rendered "high" again (interrupt the connection to ground).
-If all tests are positive, pin 1 of the decoder µP will go low within 1s.

Self-test of the control and display µP IC6056

With this self-test the following parts of the µP are tested:
-RAM
-ROM
-TIMER
-serial I/O interface
-I/O gates

-Interrupt the I^2C connection on connector pin 21-4 on the control + display panel.
-Render pin 2 of the control display µP "low" (ground) and switch on the supply voltage.
-The test starts if pin 2 is rendered "high" again (= interrupt the connection to ground).
-If all tests are positive, pin 1 of the control + display µP will go "low" again within 1s.

Initiation of the servicing programme of the µP

-Servicing position "0"

Simultaneously depress the LAP/REMAIN, SELECT - and SELECT + keys. Keep these three keys depressed while the mains voltage is switched on.

This is the STAND-BY mode, "0" appears on the display.

-Servicing position "1"

From servicing position "0" the player can be brought in servicing position "1" by depressing the SELECT + 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 goes 16 x up and down. Then the player reassumes servicing position "0".

-Servicing position "2"

To be reached by depressing the SELECT + 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"

To be reached by depressing the SELECT + key after servicing position "2" has been reached.

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

On the display appears "3".

(Dependent on the length of the lead-in track music will be reproduced after approx 1 min.)

In this state it is possible to move the arm by means of the INDEX + and INDEX – keys to the outside and to the inside resp. Now the motion is controlled by the µP and the arm moves by steps of 64 tracks as long as the key is depressed.

If one of the servicing positions 1, 2 or 3 is disturbed (e.g. braking or removing the disc) the player reassumes servicing position "0".

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

I DECODER µP IC6301

- **Self-test decoder µP**

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

- **Reset (pin 17)**

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

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

  The frequency of this signal should be 6 MHz.

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

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

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

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

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

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

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

When, after RD "high", the $\overline{MSTP}$ 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 81).
To check MC, see: "Decoder A IC". To check the turntable motor control, see CDM-2 Service Manual: "Checking of the motor control".

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

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

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

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

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

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

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

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

In servicing position 3 or in the PLAY 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 22; 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"

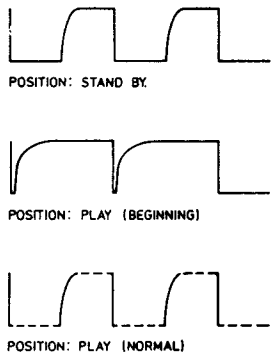
II DECODER-A IC

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

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

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

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



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

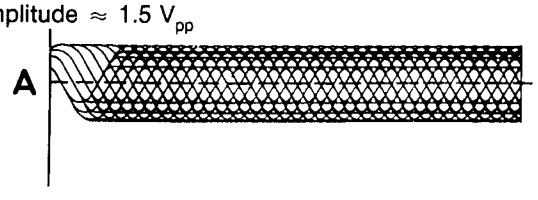
See also Service Manual CDM-2: "Check of the motor control".

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

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

Position of oscilloscope 0.5 µs/DIV.

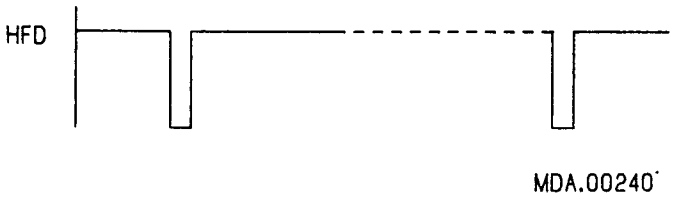
Amplitude ≈ 1.5 V_{pp}



- **Check the HFD signal on test point 97**

- Insert a disc.
- In the PLAY mode and in SERVICING POSITION 3 the HFD signal is "high"; however, minor pulses may be present and in cause of disorders on the disc.
- In SERVICING POSITION 2 and during playback of track no. 15 of test disc 5A HFD pulses are visible.

Position of the oscilloscope 5 ms/DIV



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

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

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

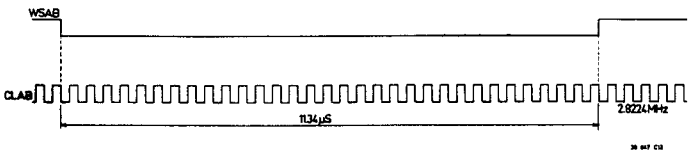
- Place a disc on the turntable.
- In stand-by mode (only the mains switch is depressed), the frequency lies between 2.82 MHz and 5.64 MHz.
- In the position PLAY and SERVICE POSITIONS 2 and 3, the frequency is 4.32 MHz.

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

- The Xin frequency is 11.2896 MHz ± 10%.
- If this frequency deviates, check test point 70; Xout signal, on Filter-B IC.
  This frequency should also be 11.2896 MHz ± 10%.

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

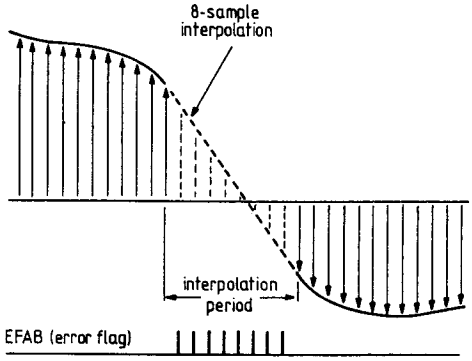
- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 2 or 3, or position PLAY.
- Trigger the oscilloscope with the WSAB signal (test point 71; pin 39).
- Check signals:
  WSAB at test point 71 (pin 39)
  (Word Select from Decoder-A to Filter-B)
  CLAB at test point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



- **Check the EFAB signal (Error Flag from Decoder-A to Filter-B) at 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 71 for a short moment.
  The EFAB pulses also appear when the disc is gently slowed down and during fast search (INDEX + or INDEX –).

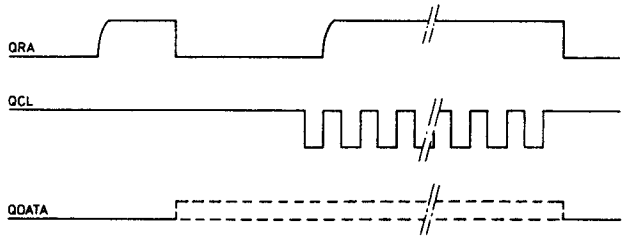
Note:
Filter-B IC is capable of interpolating linearly 8 successive EFAB pulses.



- **Check the Q-channel signals**

- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 or position PLAY.
- Trigger on the QRA signal (Q-channel Request Acknowledge) test point 75; pin 30.
- Check signals QRA at test point 75 (pin 30)
  QCL at test point 76 (pin 31).
  (Q-channel-clock)
  and their interrelation.
- There should then be activity at test point 77 (pin 29) QDA (Q-channel Data).

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



- **Check the $\overline{SSM}$ signal (test point 78; pin 33) = Start-Stop turntable motor**

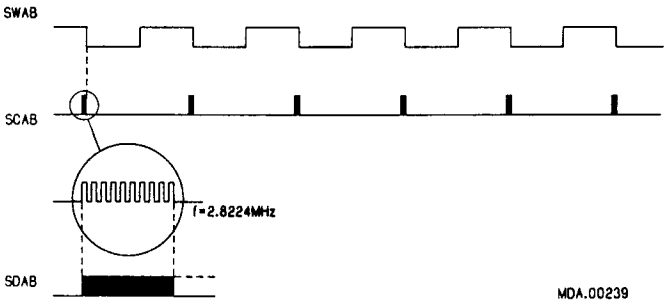
- Motor start pulse when test point 78 is "high" for ⩾ 0.2 sec.
- Motor stop pulse when test point 78 is "low" for ⩾ 0.2 sec.

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 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 $\overline{CRI}$ signal**

The CRI signal is "low" in case of track jumping.
Player in position SEARCH.

- **Check the $\overline{DEEM}$ signal (test point 84; pin 32)**

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

III FILTER-B IC

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

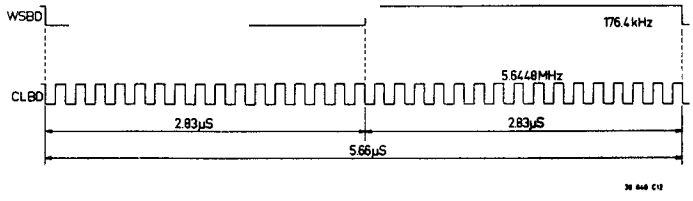
- See sub. "II Decoder-A IC":
  * Check the X IN signal (test points 69 and 70)
  * Check the timing signals meant for Filter B (WSAB, CLAB, DAAB signals; test points 71, 72 and 73).
  * Check the EFAB signal (test point 74)
  * Check the subcode clock signals (SWAB, SCAB, SDAB signals; test points 78,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

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

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

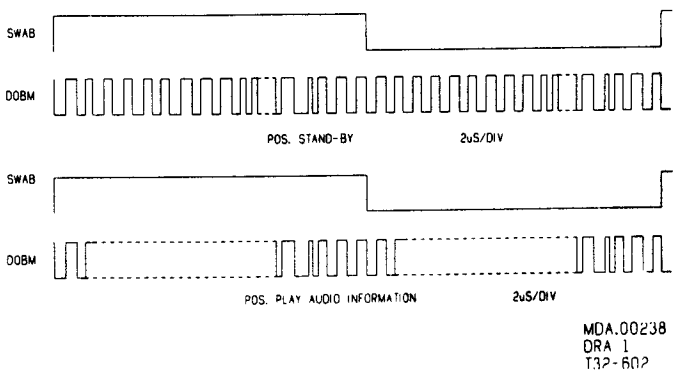
Check the following signals:
WSBD at test point 85; pin 18
CLBD at test point 87; pin 16 (Clock signal from Filter B to DAC) and their interrelation.

If an Audio disc is used, there should be activity at test point 86 (pin 15) DABD signal (DATA from Filter B to DAC).
If a disc with Digital Data (CD-ROM) is used, this point is continuously switched "low" by transistor 6315. In that case the word "data" appears on the display.



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

- Place a disc on the turntable.
- Select the stand-by mode (only mains switch depressed).
- Trigger the oscilloscope with the SWAB signal (test point 78).
- Check the DOBM signal (test point 88; pin 14).
  An empty audio signal has a fixed pattern.
  See drawing, "Stand-by".
- Select the PLAY mode.
  Check the DOBM signal. See drawing "PLAY".



- **In position SEARCH the $\overline{\text{ATSB}}$ signal is "low", test point 89; pin 22 (Attenuation Audio Signal)**

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

  This signal is "low" in positions:
  PAUSE
  SELECT + or SELECT – when jumping from one track to another.
  Fast SEARCH when the INDEX + or INDEX – button is kept depressed for some time.

IV DAC IC (Dual Digital Analog Converter)

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

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

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

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

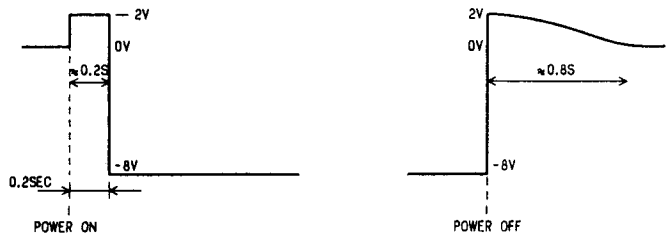
V $\overline{\text{DEEM}}$ CIRCUIT

- **Check $\overline{\text{DEEM}}$ circuit**

– Place test disc 5 on the turntable.
– During playback of track no. 14 (recorded without PRE-EMPHASIS) the $\overline{\text{DEEM}}$ signal at test point 84 should be "high".
– During playback of track no. 15 (recorded with PRE-EMPHASIS), the $\overline{\text{DEEM}}$ signal at test point 84 should be "low".
– During playback of track no. 14 the analogue signal should be present at the source of 6317 (test point 91) and 6318 (test point 92).
– During playback of track no. 15 the analog signal at the source of 6317 (test point 91) and 6318 (test point 92) should be 0 V.

VI KILL CIRCUIT

– During switching on and off the mains voltage the signal on the collector of 6325 (to be measured on a jumper, tp93) should be as indicated in the figure below.

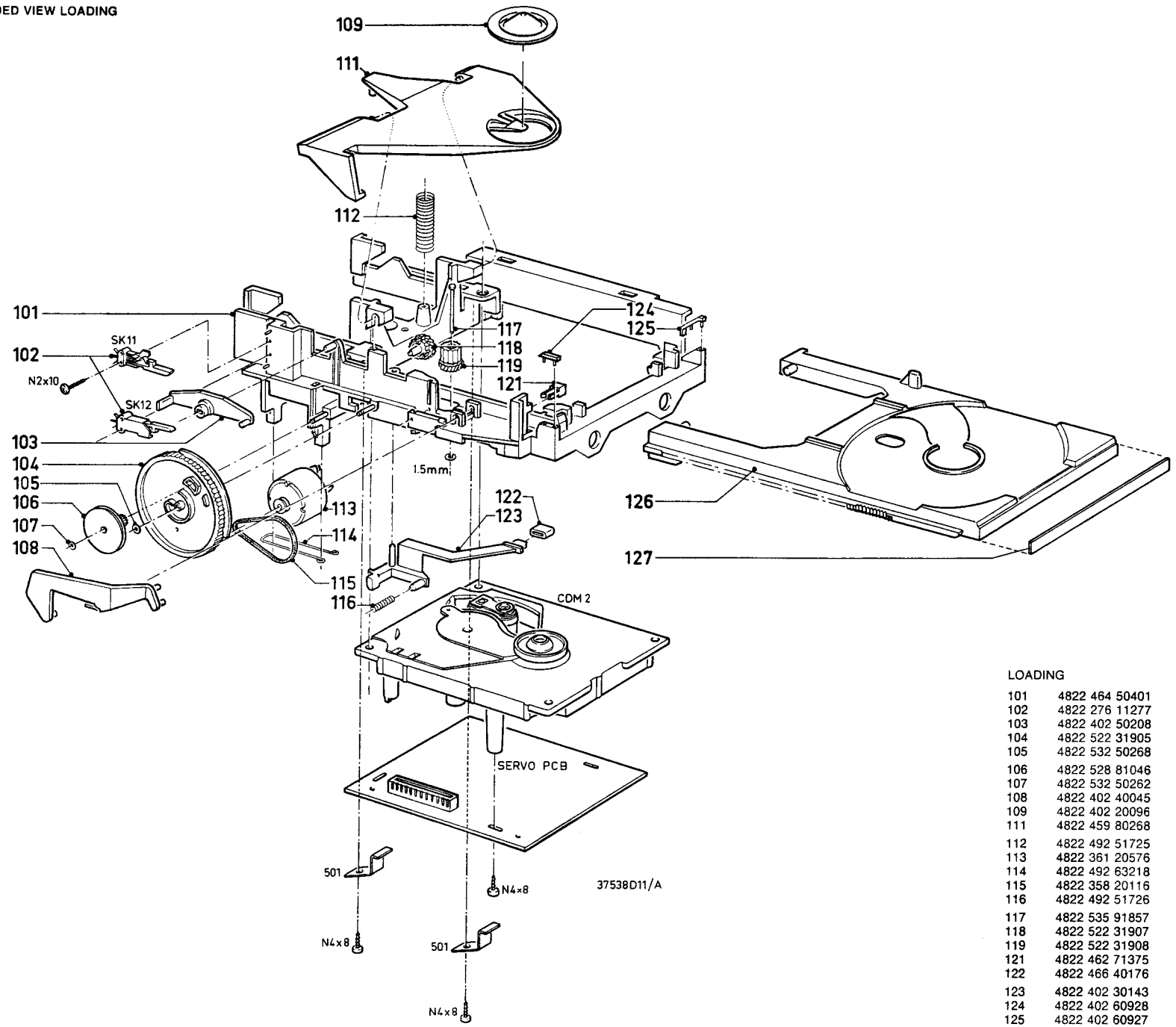


MDA.00134
T28

M A R A N T Z Service Bulletin		Date:23-11-90	Model: CD 65
		Page:1/1	NBR:MZ90-056
		Subject: Replacement CDM2	
Circulation: all	Application:		
xx for information customer complaint in case of service mandatory		Int.ref:	

When replacing CDM-2 by CDM-4 alo uP has to be changed.
Delete the uP sub-print with MAB8441/TO12 and insert MAB8441/TO82 (4822 209 11416) on the original place (pos.6301) on the decoder PCB. Desolder X-tal from sub-print and place it on the decoder print (pos.1301).

EXPLODED VIEW LOADING



LOADING

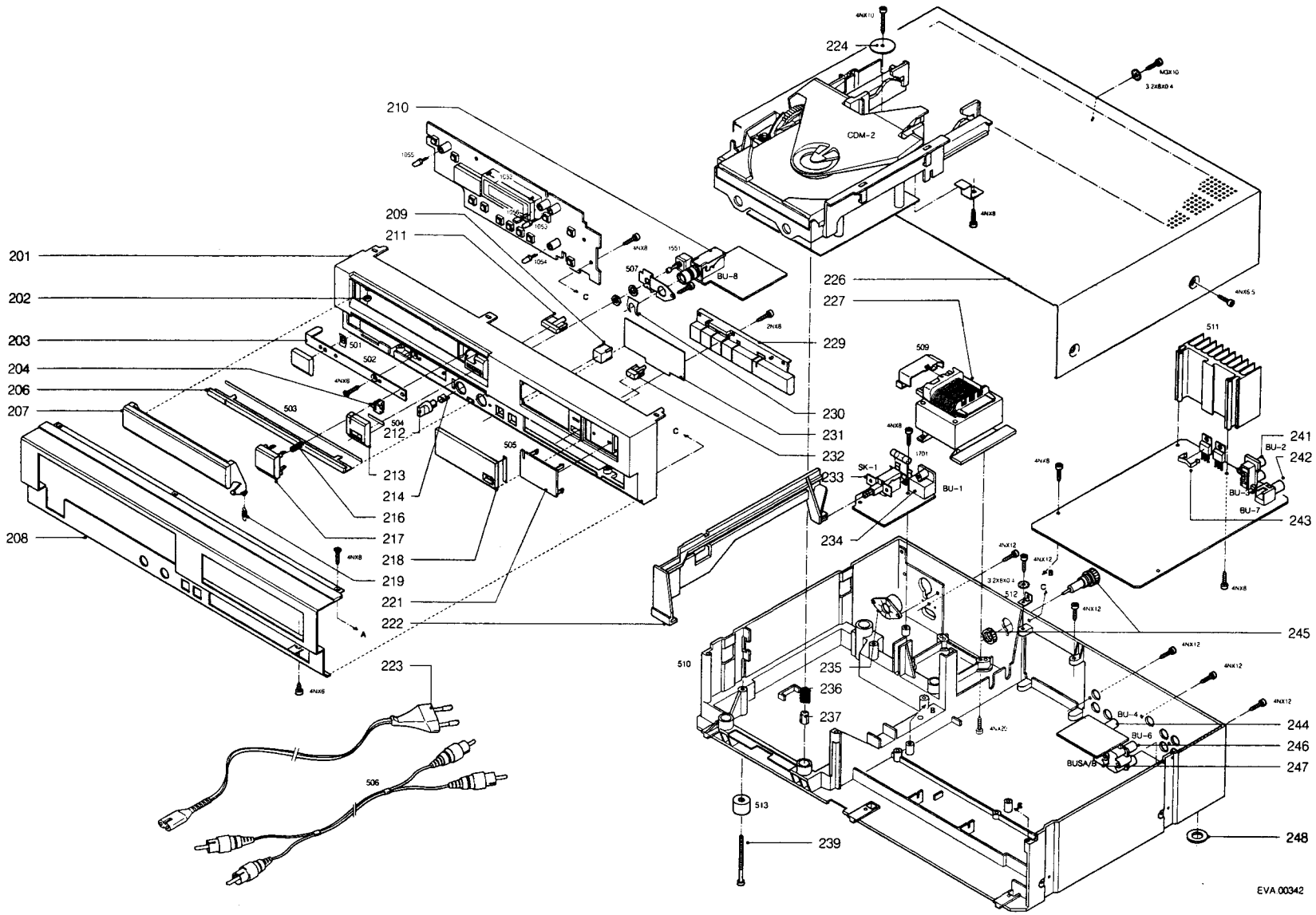
101	4822 464 50401
102	4822 276 11277
103	4822 402 50208
104	4822 522 31905
105	4822 532 50268
106	4822 528 81046
107	4822 532 50262
108	4822 402 40045
109	4822 402 20096
111	4822 459 80268
112	4822 492 51725
113	4822 361 20576
114	4822 492 63218
115	4822 358 20116
116	4822 492 51726
117	4822 535 91857
118	4822 522 31907
119	4822 522 31908
121	4822 462 71375
122	4822 466 40176
123	4822 402 30143
124	4822 402 60928
125	4822 402 60927
126	4822 443 50771

5-2-a

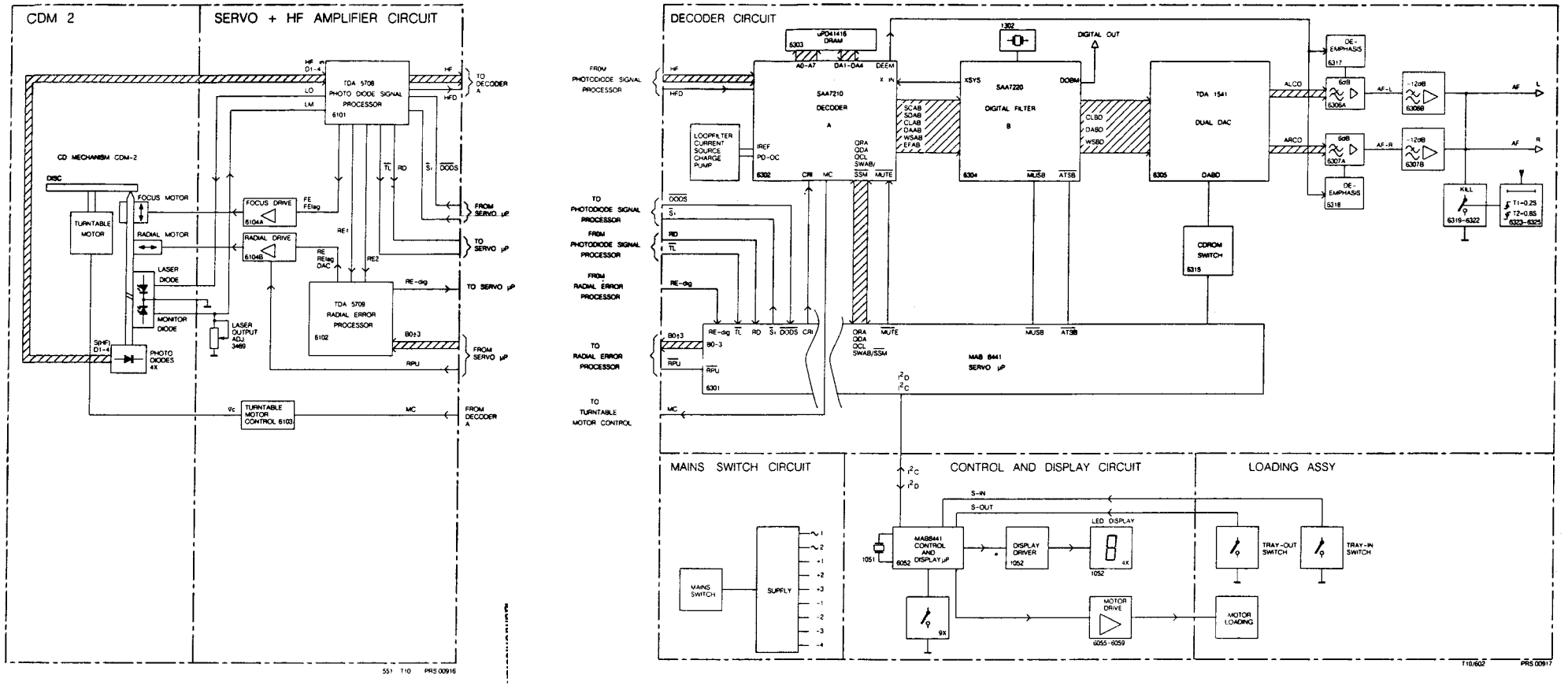
EXPLODED VIEW CABINET

CABINET PARTS

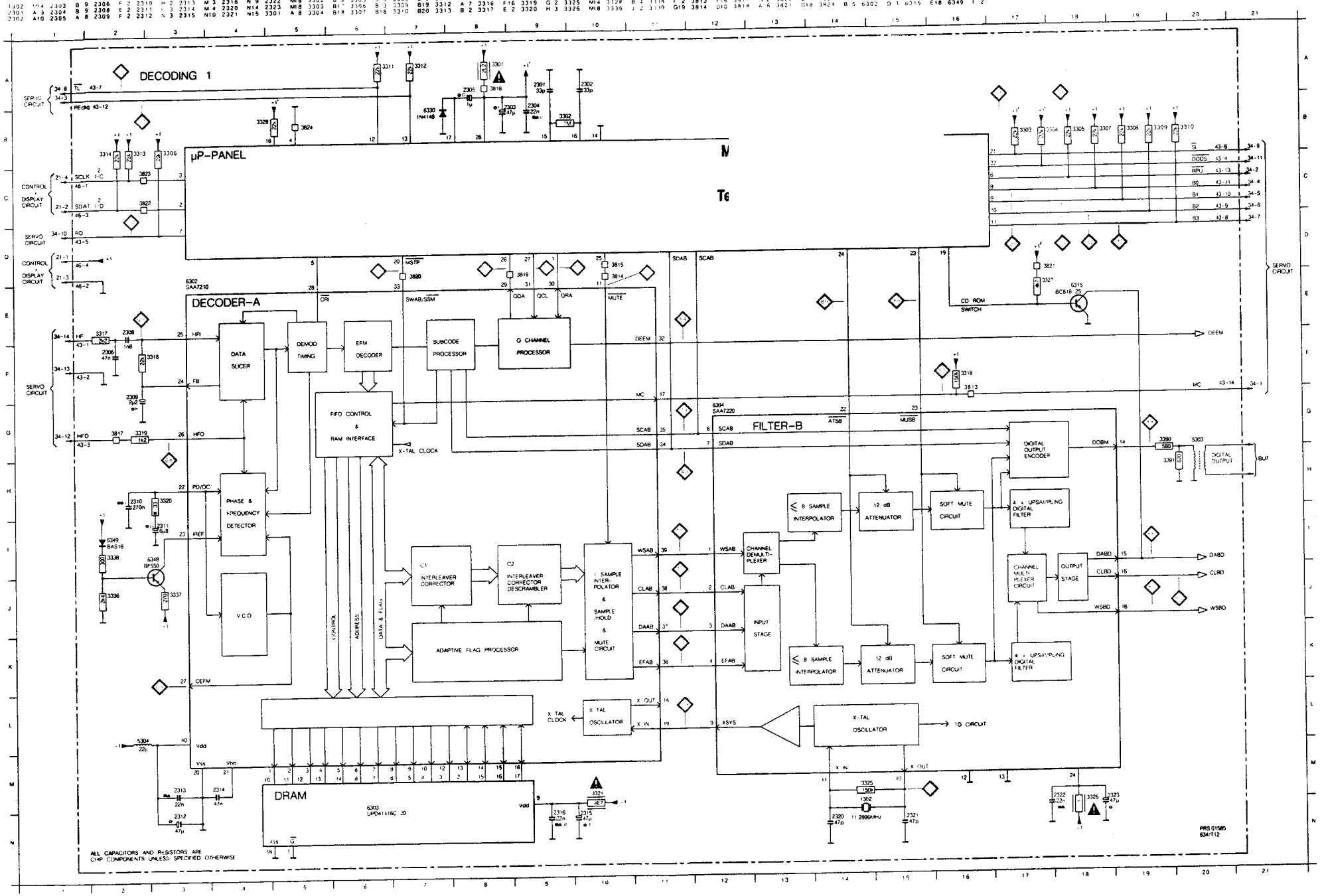
201	4822 701 10195	/A/N
201	4822 443 50773	/AB/FB/NB/TB/EB/PG
202	4822 466 61074	
203	4822 701 10196	/A/N
203	4822 410 24769	/AB/FB/NB/TB/EB/PG
204	4822 701 10206	
206	4822 701 10209	/A/N
206	4822 460 20608	/AB/FB/NB/TB/EB/PG
207	4822 701 10203	/A/N
207	4822 443 61737	/AB/FB/NB/TB/EB/PG
208	4822 701 10207	/A/N
208	4822 460 20607	/AB/FB/NB/TB/EB/PG
209	4822 701 10197	/A/N
209	4822 413 41301	/AB/FB/NB/TB/EB/PG
210	4822 267 30688	/A/N
210	4822 267 30721	/AB/FB/NB/TB/EB/PG
211	4822 701 10201	/A/N
211	4822 410 24772	/AB/FB/NB/TB/EB/PG
212	4822 701 10205	/A/N
212	4822 413 41299	/AB/FB/NB/TB/EB/PG
213	4822 701 10208	/A/N
213	4822 462 41106	/AB/FB/NB/TB/EB/PG
214	5322 492 64624	
216	4822 492 51723	
217	4822 701 10202	/A/N
217	4822 410 24771	/AB/FB/NB/TB/EB/PG
218	4822 701 10193	/A/N
218	4822 450 60677	/AB/FB/NB/TB/EB/PG
219	4822 492 32505	
221	4822 701 10204	/A/N
221	4822 410 24773	/AB/FB/NB/TB/EB/PG
222	4822 402 50207	
223	4822 321 10385	/A/AB/N/NB/TB/EB/PG
223	4822 701 10152	-/FB
224	4822 532 11218	
226	4822 701 10194	/A/N
226	4822 443 61735	/AB/FB/NB/TB/EB/PG
227	4822 145 40185	/A/AB/N/NB/TB/EB/PG
227	4822 145 40186	-/FB
228	4822 492 60063	
229	4822 701 10192	/A/N
229	4822 310 30698	/AB/FB/NB/TB/EB/PG
230	4822 505 10571	
231	4822 701 10199	
232	4822 701 10198	
233	4822 276 11309	
234	4822 265 20262	
235	5322 272 10215	/EB/PG
236	4822 492 51724	
237	4822 325 20138	
239	4822 502 12012	
241	4822 267 30631	
242	4822 267 30673	
243	4822 492 63076	
244	4822 267 30673	
245	4822 256 30231	/EB/PG
246	4822 267 30671	
247	4822 267 30672	
248	4822 462 40409	

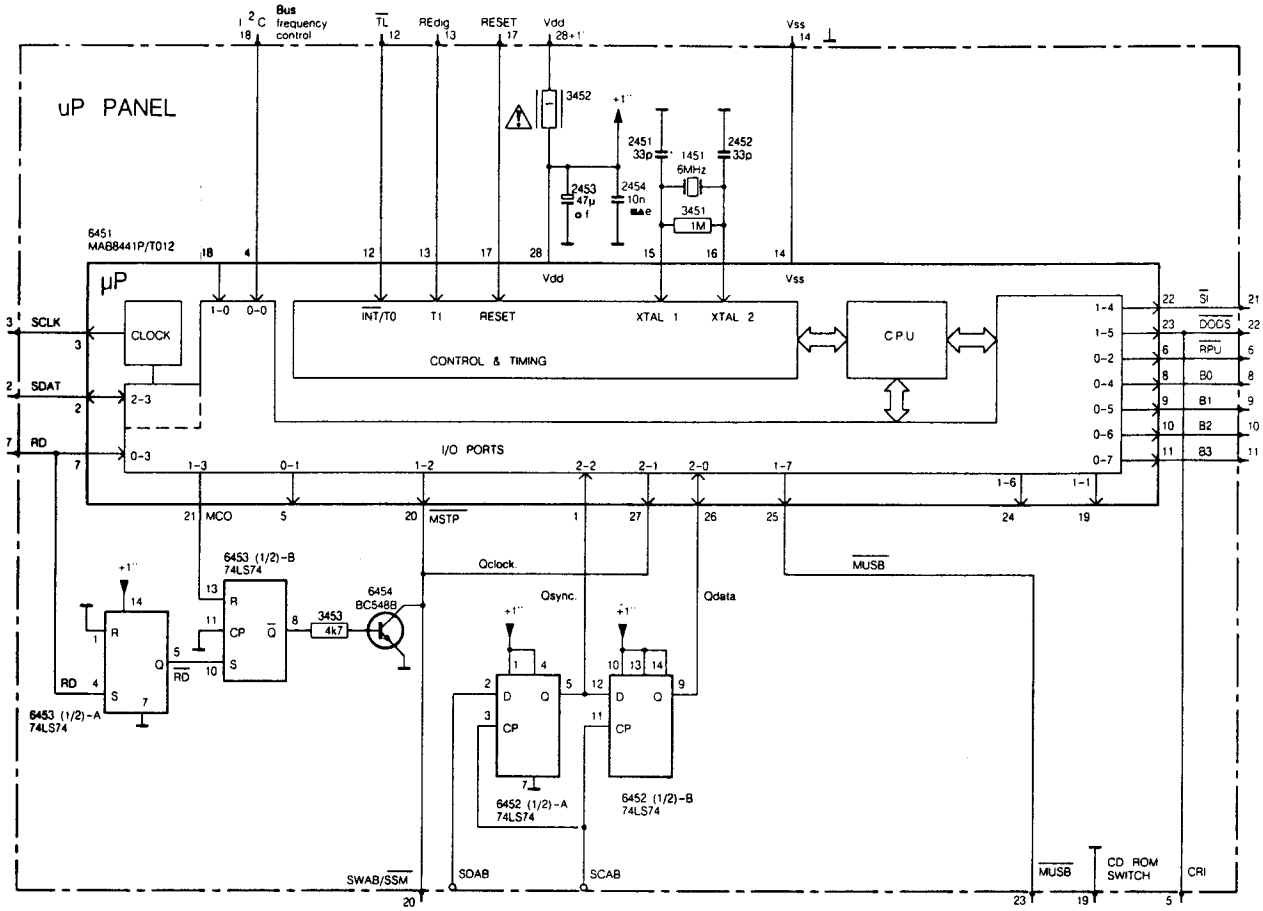


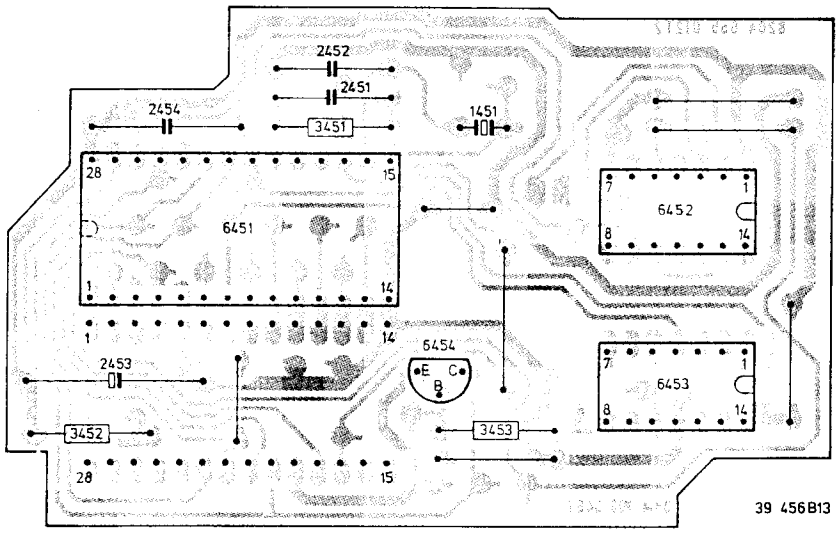
BLOCK DIAGRAM

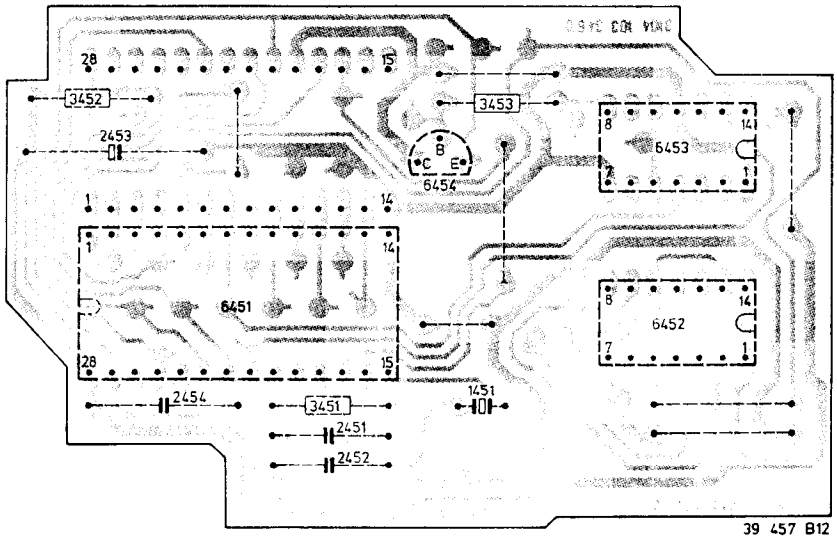


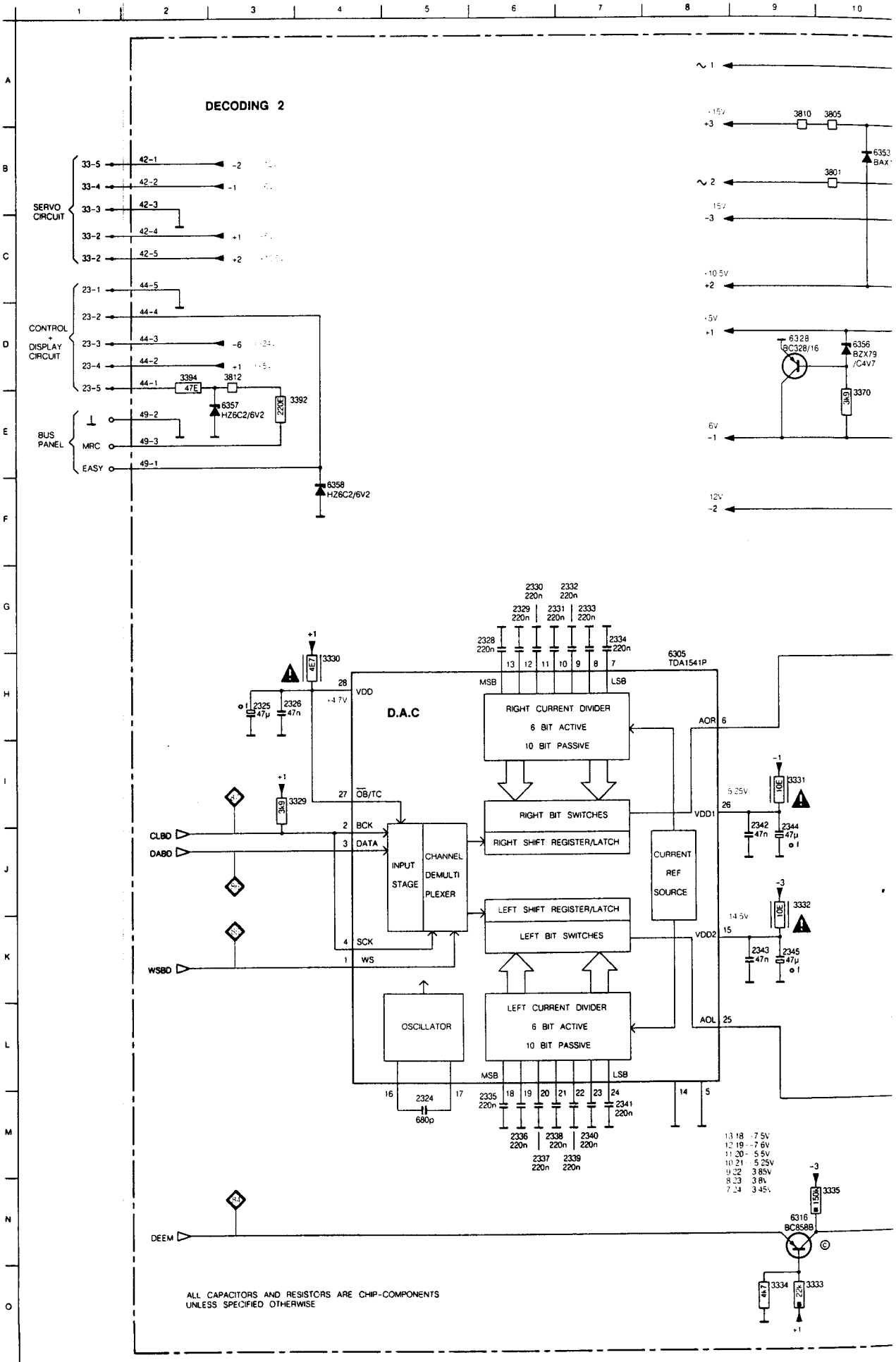
B0-B3	-	Control bits for radial circuit	RE1	-	Radial error signal 1 (summation of amplified currents D_3 and D_4	$\overline{ATSB}$	-	Attenuation of Audio level in Search position (Cueing)	$\overline{MUSB}$	-	Soft Mute signal
DAC	-	Current output for track jumping (Digital to Analogue Converted)	RE2	-	Radial error signal 2 (summation of amplified currents D_1 and D_2	CD ROM Switch	-	Digital Data information on disc signal	PD/OC	-	Phase detector - oscillator control
$\overline{DODS}$	-	Drop out detector supression	RE dig	-	Radial error digital	CEFM	-	Clock Eight-to-Fourteen Modulator	QCL	-	Q-channel Clock signal
D1+4	-	Photodiode currents	RE lag	-	Radial error signal for LAG network	CLAB	-	Clock signal Decoder-A to Filter-B	QDA	-	Q-channel Data signal
FE	-	Focus error signal	RD	-	Ready signal, starting up procedure finished	CLBD	-	Clock signal Filter-B to DAC	QRA	-	Q-channel Request Aknowledge
FE lag	-	Focus error signal for LAG network	$\overline{RPU}$	-	Radial puls after track jumping	$\overline{CRI}$	-	Counter Reset Inhibit	SCAB	-	Subcode clock Decoder-A to Filter-B
HF	-	HF output for DEMOD	$\overline{Si}$	-	On/off control for laser supply and focus circuit	DAAB	-	Data signal Decoder-A to Filter-B	SCLK-I²C	-	Serial Clock signal Decoder-Control µP (Inter IC Connection)
HFD	-	HF detector output for DEMOD	$\overline{TL}$	-	Track loss signal	DABD	-	Data signal Filter-B to DAC	SDAB	-	Subcode data Decoder-A to Filter-B
HF-in	-	HF current input	Vc	-	Control voltage for turntable motor	$\overline{DEEM}$	-	Deemphasis	SDAT-I²D	-	Serial Data Signal Decoder-Control µP (Inter IC Connection)
LM	-	Laser monitor diode input				DOBM	-	Digital out signal	SWAB/$\overline{SSM}$	-	Subcode Word/Start-stop motor signal
LO	-	Laser amplifier current output				EFAB	-	Error flag Decoder-A to Filter-B	WSAB	-	Word Select Decoder-A to Filter-B
MC	-	Motor control signal				IREF	-	Reference Current	WSBD	-	Word Select Filter-B to DAC
RE	-	Radial error signal (amplified RE_2-RE_1 currents)				$\overline{MSTP}$	-	Motor start-stop signal	XIN	-	Oscillator signal in Decoder-A
						$\overline{MUTE}$	-	Mute signal	XSYS	-	Oscillator signal out Filter-B

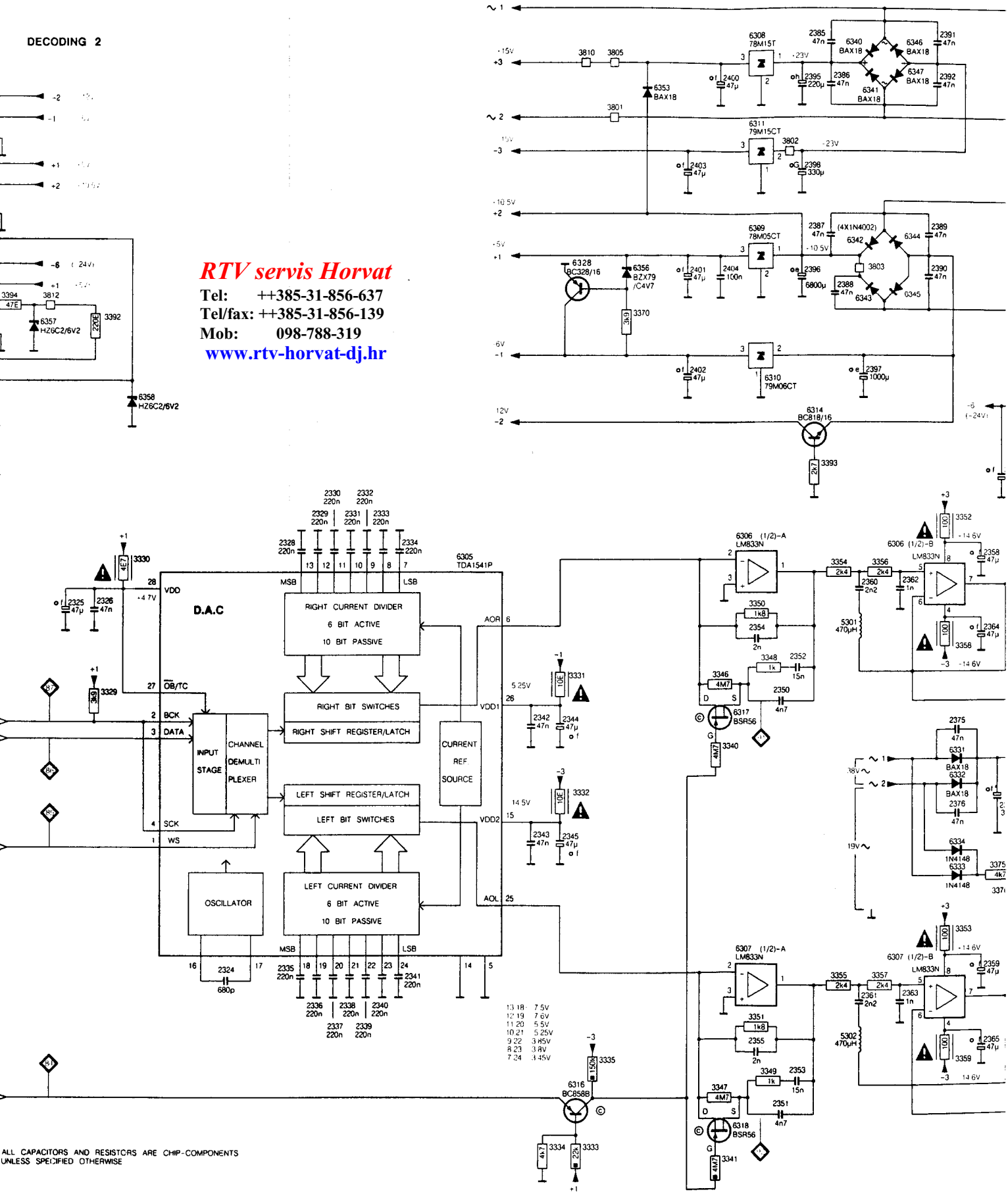

DECODING 1
µP-PANEL
DECODER-A
FILTER-B
DATA SLICER
DEMOD TIMING
EFM DECODER
SUBCODE PROCESSOR
Q CHANNEL PROCESSOR
FIFO CONTROL & RAM INTERFACE
PHASE & FREQUENCY DETECTOR
VCO
C1 INTERLEAVER CORRECTOR
C2 INTERLEAVER CORRECTOR DESCRAMBLER
ADAPTIVE FLAG PROCESSOR
1-SAMPLE INTERPOLATOR & SAMPLE HOLD & MUTE CIRCUIT
CHANNEL DEMULTIPLEXER
INPUT STAGE
8 SAMPLE INTERPOLATOR
12 dB ATTENUATOR
SOFT MUTE CIRCUIT
4 x UPSAMPLING DIGITAL FILTER
DIGITAL OUTPUT ENCODER
DIGITAL OUTPUT
CHANNEL MULTIPLEXER CIRCUIT
OUTPUT STAGE
X-TAL OSCILLATOR
DRAM
CD ROM SWITCH
ALL CAPACITORS AND RESISTORS ARE CHIP COMPONENTS UNLESS SPECIFIED OTHERWISE
PRS 01585 634712

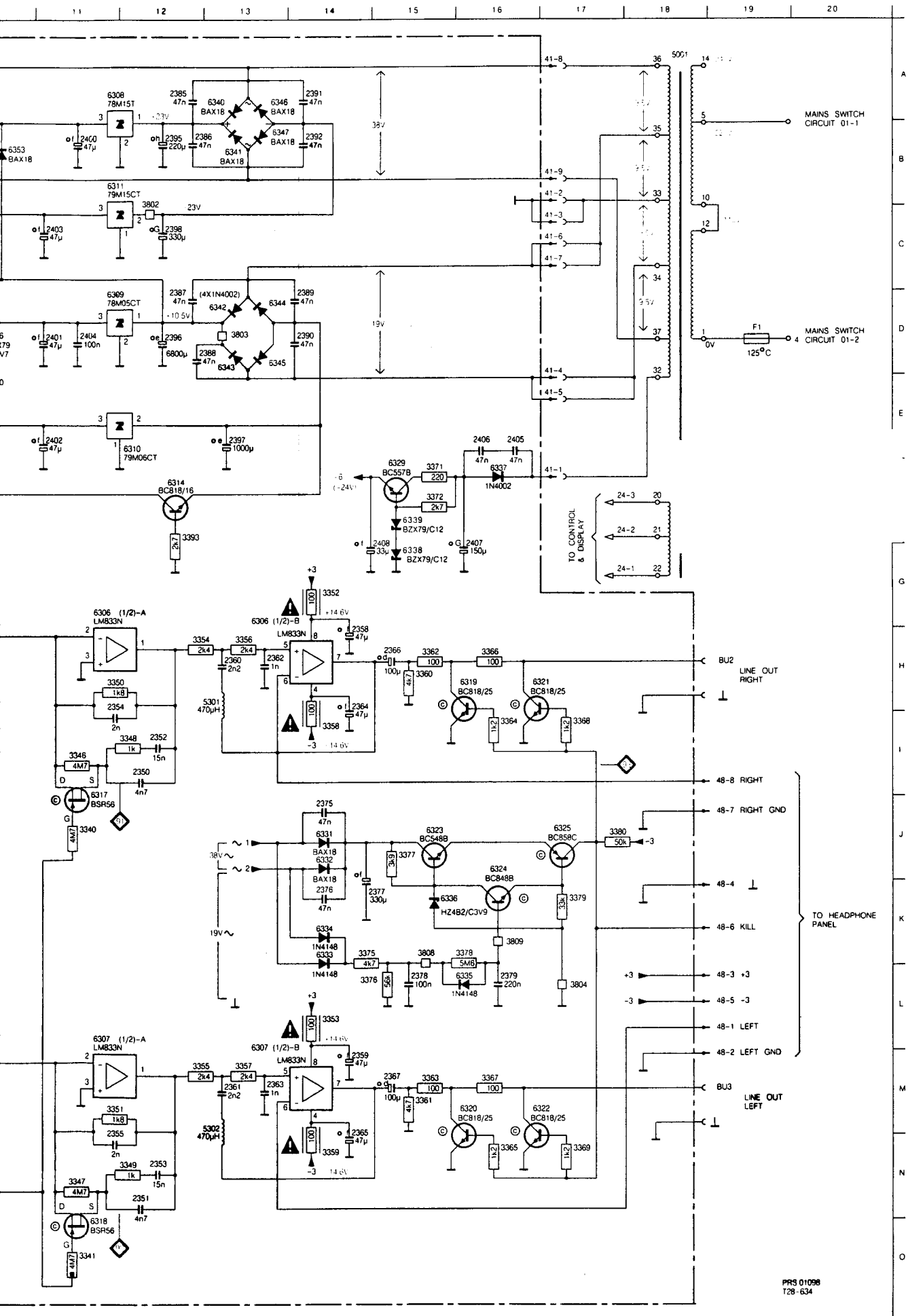

uP PANEL
I²C Bus frequency control
TL
REdig
RESET
Vdd
Vss
6451
MAB8441P/T012
µP
CLOCK
CONTROL & TIMING
CPU
I/O PORTS
SCLK
SDAT
RD
MCO
MSTP
Qclock
Qsync
Qdata
MUSB
6453 (1/2)-B
74LS74
6453 (1/2)-A
74LS74
6454
BC548B
6452 (1/2)-A
74LS74
6452 (1/2)-B
74LS74
SWAB/SSM
SDAB
SCAB
CD ROM SWITCH
CRI
PRS 01208
DRA CS1
T12/620


6451
6452
6453
6454
39 456B13

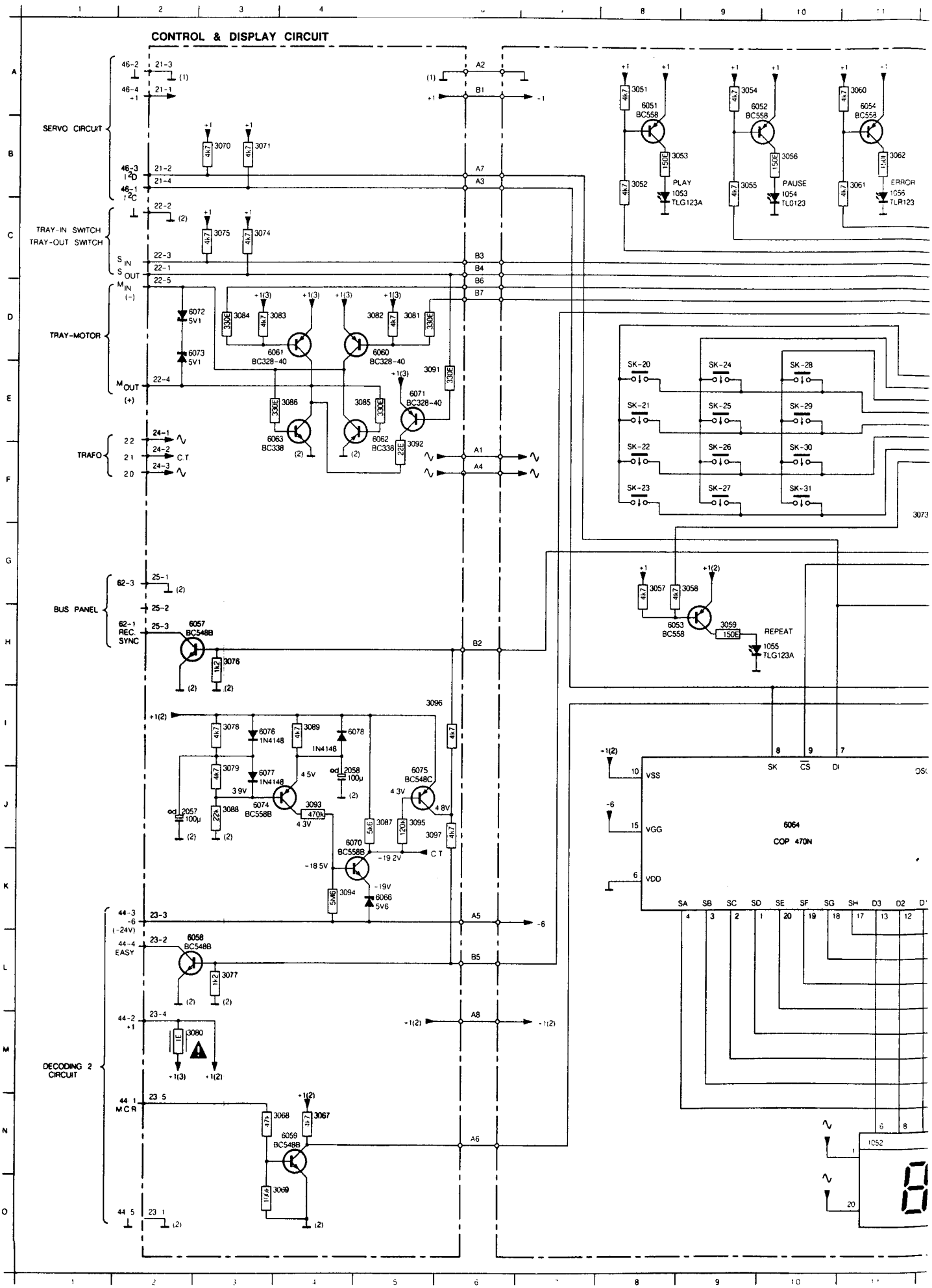

6451
6452
6453
6454
39 457 B12

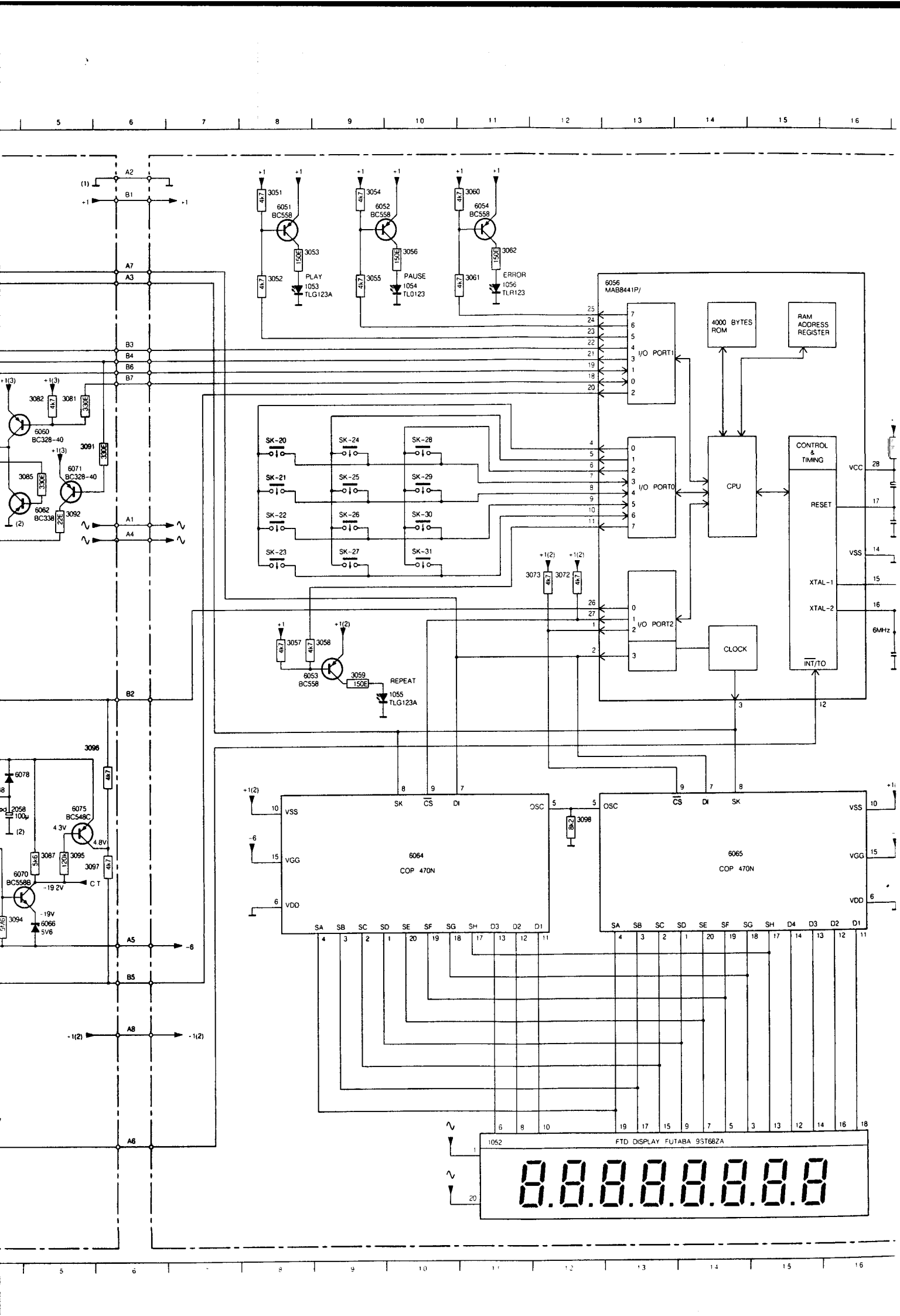

DECODING 2
SERVO CIRCUIT
CONTROL + DISPLAY CIRCUIT
BUS PANEL
MRC
EASY
6358 HZ6C2/6V2
6357 HZ6C2/6V2
6328 BC328/16
6356 BZX79 /C4V7
6353 BAX
D.A.C
6305 TDA1541P
RIGHT CURRENT DIVIDER
6 BIT ACTIVE
10 BIT PASSIVE
RIGHT BIT SWITCHES
RIGHT SHIFT REGISTER/LATCH
INPUT STAGE
CHANNEL DEMULTI PLEXER
CURRENT REF SOURCE
LEFT SHIFT REGISTER/LATCH
LEFT BIT SWITCHES
LEFT CURRENT DIVIDER
6 BIT ACTIVE
10 BIT PASSIVE
OSCILLATOR
CL80
DA80
WS80
DEEM
6316 BC858B
ALL CAPACITORS AND RESISTORS ARE CHIP-COMPONENTS
UNLESS SPECIFIED OTHERWISE

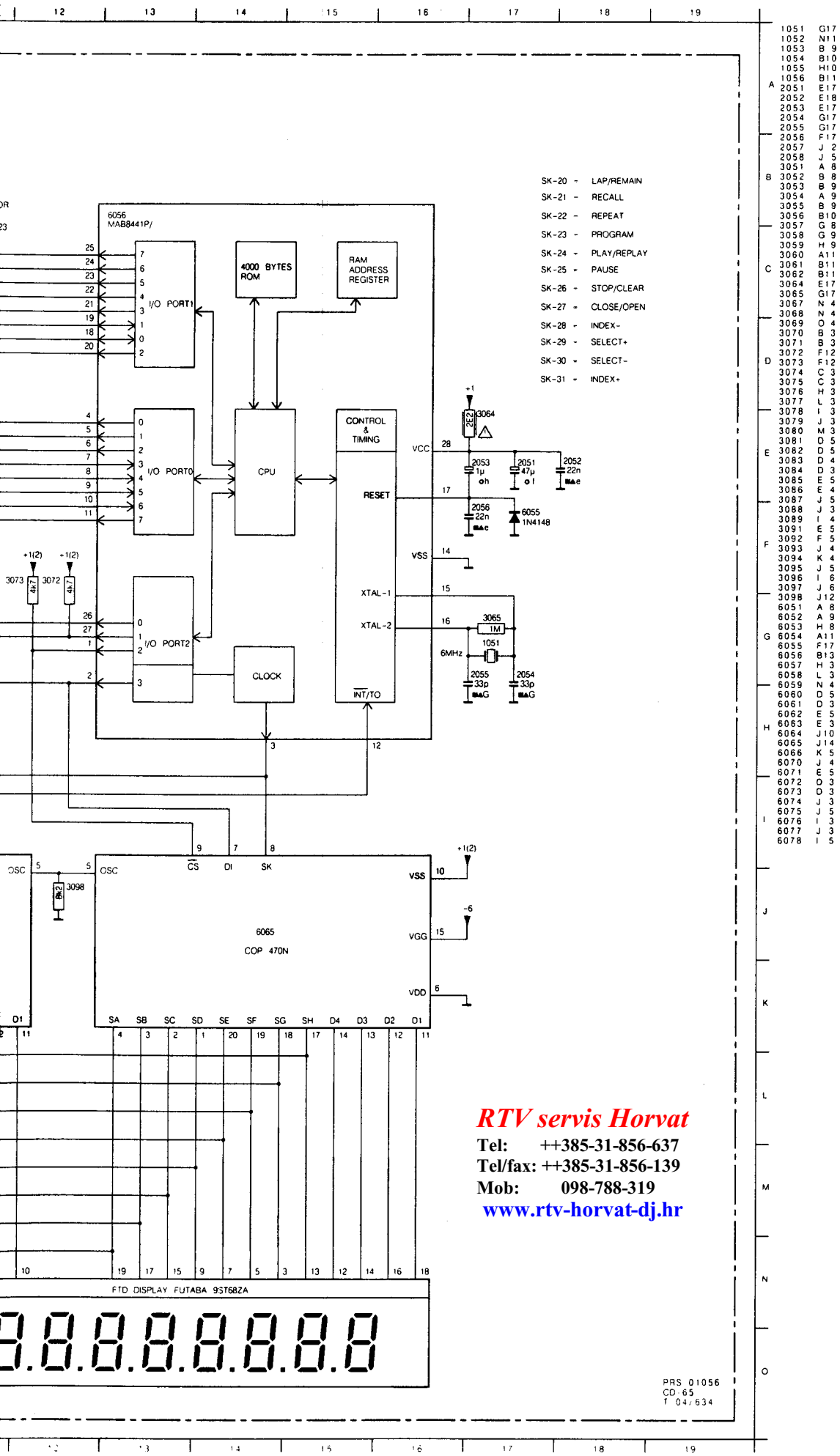



6308 78M15T
6309 78M05CT
6311 79M15CT
6310 79M06CT
6314 BC818/16
6329 BC557B
6337 1N4002
6339 BZX79/C12
6338 BZX79/C12
6340 BAX18
6341 BAX18
6342 (4X1N4002)
6343
6344
6345
6346 BAX18
6347 BAX18
3803
3802
38V
19V
23V
-10.5V
-24V
MAINS SWITCH CIRCUIT 01-1
MAINS SWITCH CIRCUIT 01-2
F1
125°C
TO CONTROL & DISPLAY
6306 (1/2)-A LM833N
6306 (1/2)-B LM833N
6307 (1/2)-A LM833N
6307 (1/2)-B LM833N
6317 BSR56
6318 BSR56
6319 BC818/25
6320 BC818/25
6321 BC818/25
6322 BC818/25
6323 BC548B
6324 BC848B
6325 BC858C
6331 BAX18
6332 BAX18
6333 1N4148
6334 1N4148
6335 1N4148
6336 HZ4B2/C3V9
5301 470µH
5302 470µH
BU2 LINE OUT RIGHT
BU3 LINE OUT LEFT
TO HEADPHONE PANEL
48-8 RIGHT
48-7 RIGHT GND
48-4
48-6 KILL
48-3 +3
48-5 -3
48-1 LEFT
48-2 LEFT GND
PRS 01098
T28-634

CONTROL + DISPLAY CIRCUIT




6056
MAB8441P/
4000 BYTES ROM
RAM ADDRESS REGISTER
I/O PORT1
I/O PORT0
I/O PORT2
CPU
CONTROL & TIMING
CLOCK
RESET
XTAL-1
XTAL-2
INT/TO
VCC
VSS
6MHz
SK-20
SK-21
SK-22
SK-23
SK-24
SK-25
SK-26
SK-27
SK-28
SK-29
SK-30
SK-31
6051 BC558
6052 BC558
6054 BC558
6053 BC558
6060 BC328-40
6071 BC328-40
6062 BC338
6070 BC558B
6075 BC548C
PLAY
PAUSE
ERROR
REPEAT
1053 TLG123A
1054 TL0123
1056 TLR123
1055 TLG123A
6064
COP 470N
6065
COP 470N
VSS
VGG
VDD
SK
CS
DI
OSC
SA SB SC SD SE SF SG SH D3 D2 D1
1052
FTD DISPLAY FUTABA 9ST68ZA
6066 5V6
4.3V
4.8V
-19 2V
-19V
CT

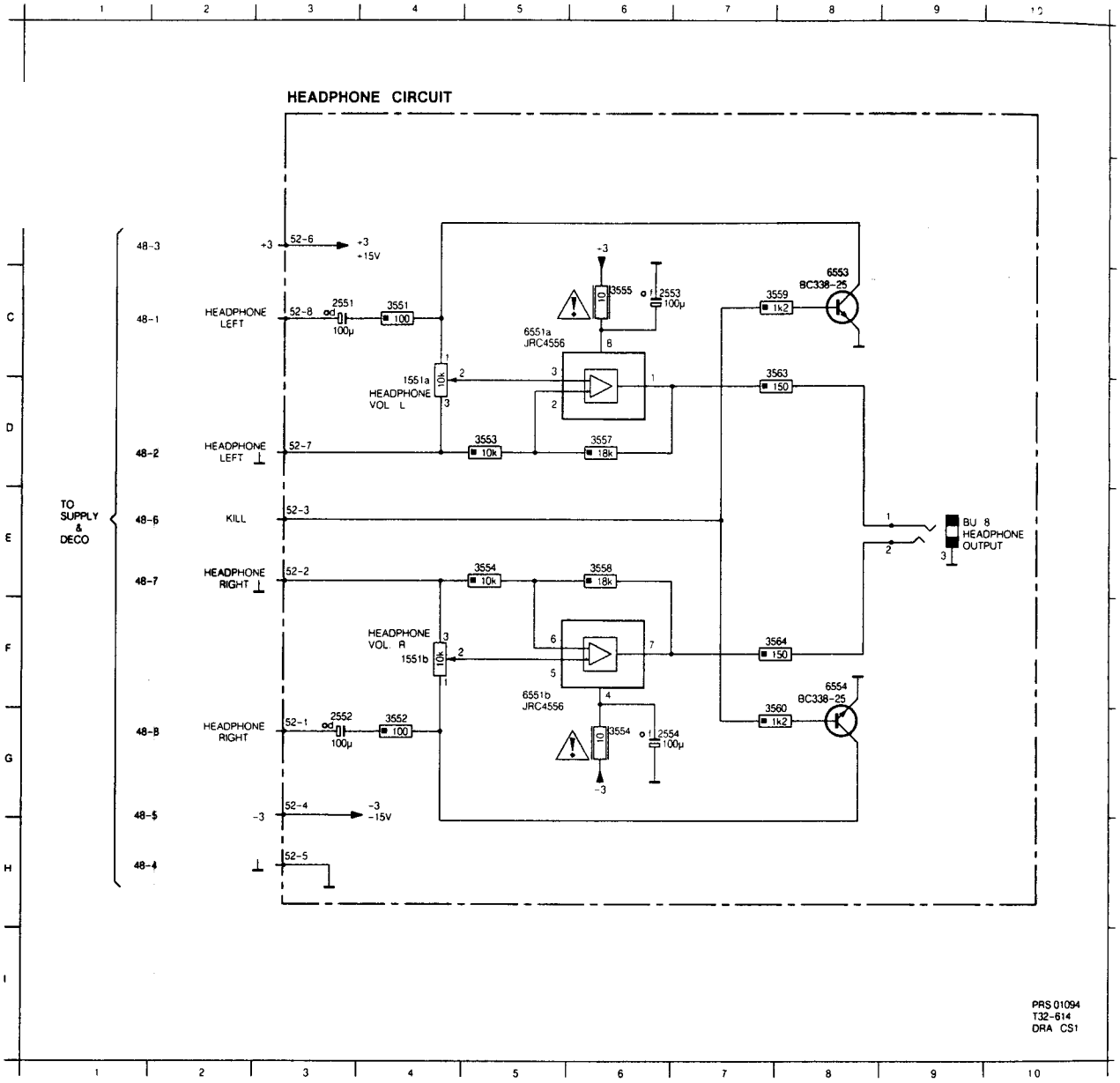


1051 G17
1052 N11
1053 B 9
1054 B10
1055 H10
1056 B11
2051 E17
2052 E18
2053 E17
2054 G17
2055 G17
2056 F17
2057 J 2
2058 J 5
3051 A 8
3052 B 8
3053 B 9
3054 A 9
3055 B 9
3056 B10
3057 G 8
3058 G 9
3059 H 9
3060 A11
3061 B11
3062 B11
3064 E17
3065 G17
3067 N 4
3068 N 4
3069 O 4
3070 B 3
3071 B 3
3072 F12
3073 F12
3074 C 3
3075 C 3
3076 H 3
3077 L 3
3078 I 3
3079 J 3
3080 M 3
3081 D 5
3082 D 5
3083 D 4
3084 D 3
3085 E 5
3086 E 4
3087 J 5
3088 J 3
3089 I 4
3091 E 5
3092 F 5
3093 J 4
3094 K 4
3095 J 5
3096 I 6
3097 J 6
3098 J12
6051 A 8
6052 A 9
6053 H 8
6054 A11
6055 F17
6056 B13
6057 H 3
6058 L 3
6059 N 4
6060 D 5
6061 D 3
6062 E 5
6063 E 3
6064 J10
6065 J14
6066 K 5
6070 J 4
6071 E 5
6072 D 3
6073 D 3
6074 J 3
6075 J 5
6076 I 3
6077 J 3
6078 I 5

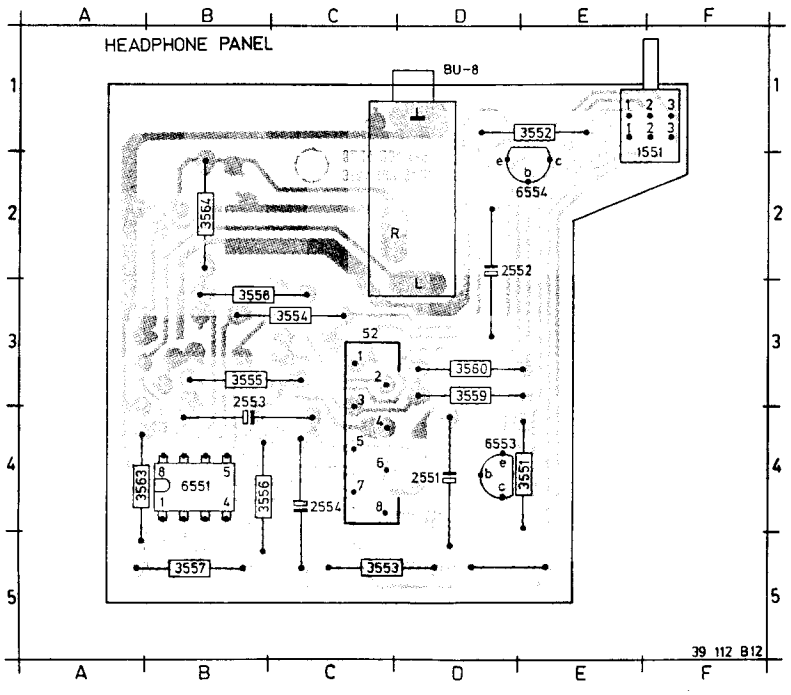
PRS 01056
CO 65
T 047634

HEADPHONE CIRCUIT

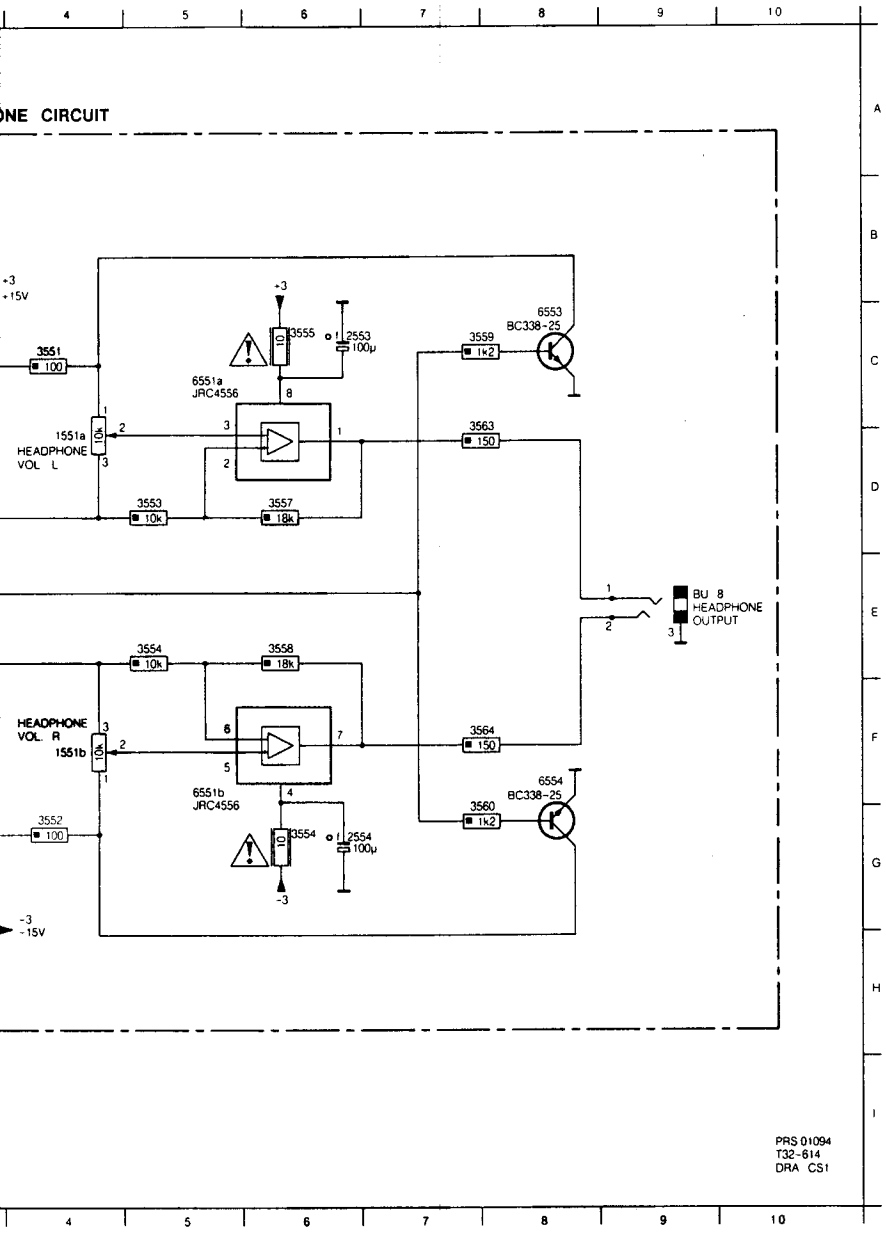
1551a D 4 2551 C 3 2553 C 7 3551 C 4 3553 D 5 3554 G 6 3557 D 6 3559 C 8 3563 C 8 6551a C 5 6553 C 8
1551b F 4 2552 G 3 2554 G 7 3552 G 4 3554 E 5 3555 C 6 3558 E 6 3560 F 8 3564 F 8 6551b F 5 6554 F 8

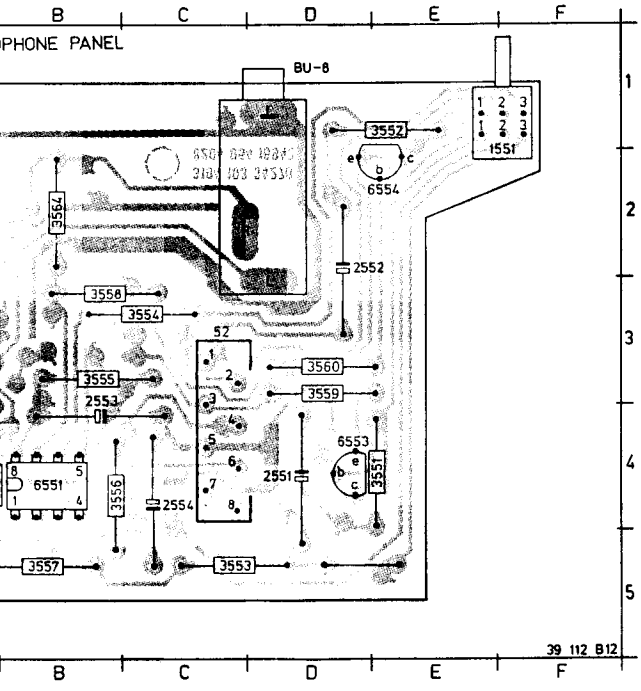


HEADPHONE PANEL



3553 D 5 3554 G 6 3557 D 6 3559 C 8 3563 C 8 6551a C 5 6553 C 8
3554 E 5 3555 C 6 3558 E 6 3560 F 8 3564 F 8 6551b F 5 6554 F 8





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
8,2 pF	5%	4822 122 32083
10 pF	5%	4822 122 31971
12 pF	5%	4822 122 32139
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
4,7 E	5%	5322 111 90376
5,1 E	5%	4822 111 90393

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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
8,2 pF	5%	4822 122 32083
10 pF	5%	4822 122 31971
12 pF	5%	4822 122 32139
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
4,7 E	5%	5322 111 90376
5,1 E	5%	4822 111 90393

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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
6,8 k	2%	4822 111 90544

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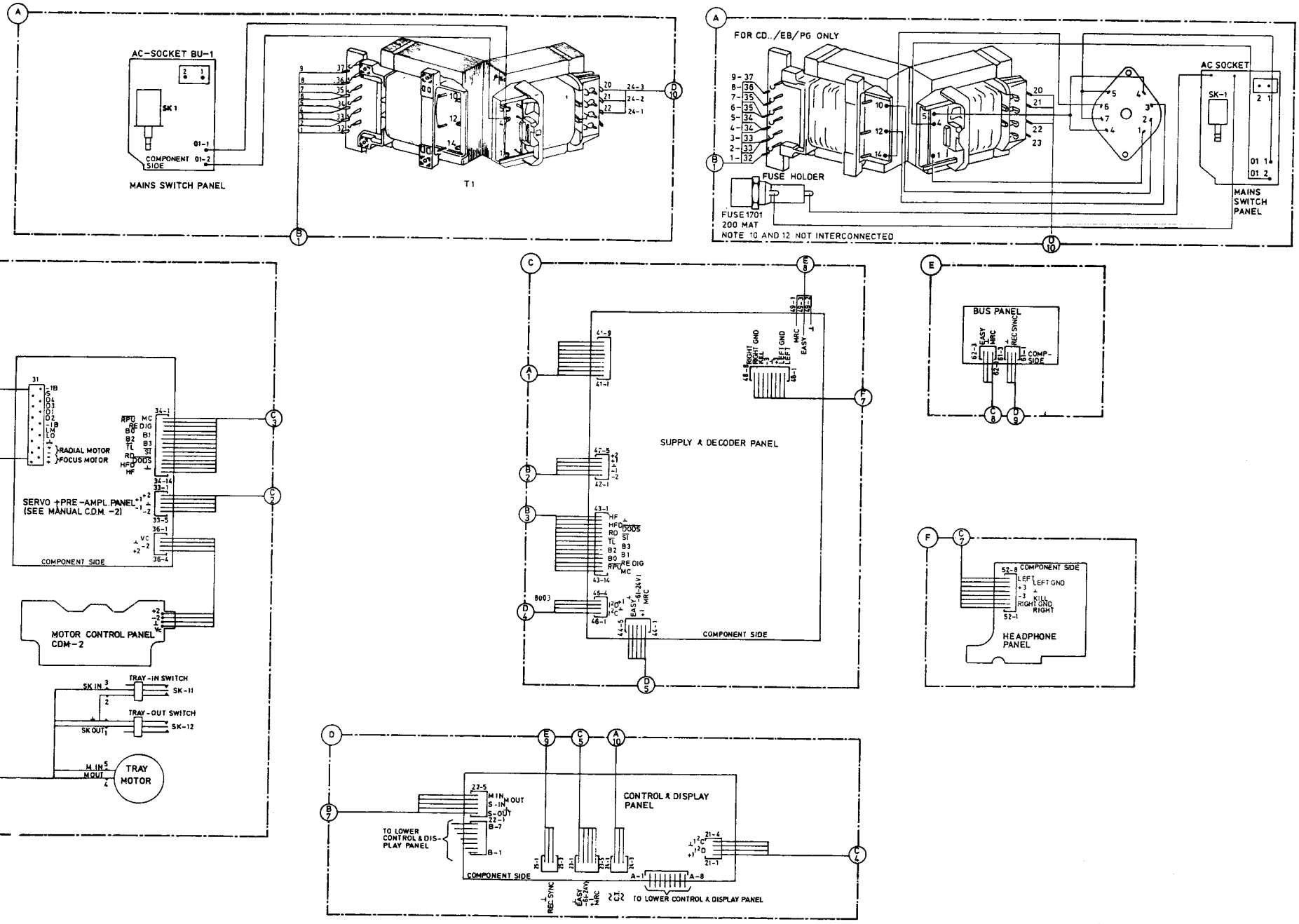
1R

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

WIRING DIAGRAM



42 001 D12

DRAM UPD41416C-15		4822 209 50682
FTD DRIVER COP470N		4822 209 11121
IC-A SAA7210		4822 209 11155
IC-B SAA7220		4822 209 11157
LM833 (NSC)		4822 209 83163
MAB8441P/T041		4822 209 11154
MAB8441P/T012		4822 209 50418
SN74LS74AN		4822 209 80782
MC78M15CT		4822 209 80808
MC7805CT		4822 209 80891
MC79M15CT		5322 209 86361
MC7906CT		4822 209 82056
NJM4556D		4822 209 82362
TDA1541/N5 DUAL DAC		4822 209 70295
BC338-25		4822 130 40958
BC328-16		4822 130 41023
BC328-40		4822 130 41715
BC548B		4822 130 40937
BC557B		4822 130 44568
BC818-25		4822 130 42696
BC848BR		4822 130 42549
BC858B		5322 130 41983
BSR56		4822 130 42633
BC338-16		4822 130 40892
BC558B		4822 130 44197
BAX18		4822 130 34121
HZ12A2 (12V0)		4822 130 32987
HZ12B3 (13V0)		4822 130 32699
HZ4B2 (3V9)		4822 130 32843
HZ5B1 (4V7)		4822 130 32986
MV57123 RED		4822 130 32301
HZ6C2 (6V2)		4822 130 32698
TLO123A orange		4822 130 32939
TLR123A green-led		5322 130 34959
1N4002		5322 130 30684
1N4148		4822 130 30621
1052, 1451	6 MHz	4822 242 70392
1302	11,2986 MHz	4822 242 71349
5301, 5302	Coil 470 UH	4822 157 51193
5303	HF-TRAFO dig. output	4822 148 80281

2350	4,7NF	2%	63 V	4822 121 50961
2352	14 NF	2%	63 V	4822 121 50432
2354	2 NF	2%	160 V	4822 121 50987
2360	2,2NF	2%	160 V	4822 121 50841
2362	1 NF	2%	250 V	4822 121 41531
2328	220 NF			4822 122 32715
2501	Cer. cap	3N3-400 V		4822 121 40327
1551	Potm. 10k log.			4822 100 30056
3064	Safety res.	2E2	5%	4822 111 30492
3080	Safety res.	1E	5%	4822 111 30483
3301	Safety res.	2E2	5%	4822 111 30492
3321	Safety res.	4E7	5%	4822 111 30499
3332	Safety res.	10E	5%	4822 111 30508
3352	Safety res.	47E	5%	4822 111 30526
3371	Safety res.	220E	5%	4822 111 30544
3555	Safety res.	10E	5%	4822 111 30508
3316	Safety res.	150K	5%	4822 111 60166
3356	Safety res.	3 k9	5%	4822 111 60156

BU1	Mains inlet		4822 265 20262
BU2, 3	Cinch socket	2P	4822 267 30631
BU4	Cinch socket	1P	4822 267 30673
BU5	Cinch socket	2P	4822 267 30672
BU6	Cinch socket	2P	4822 267 30671
BU7	Cinch socket	1P	4822 267 30673
BU8/A/N	Headphone socket		4822 267 30688
BU8/.. ..	Headphone socket		4822 267 30721

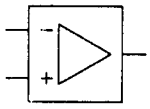
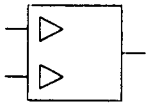
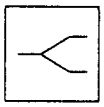
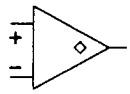
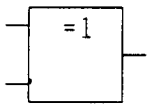
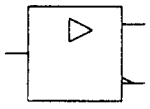
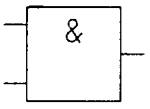
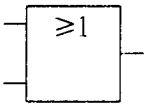
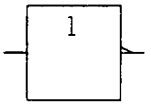
Misellaneous

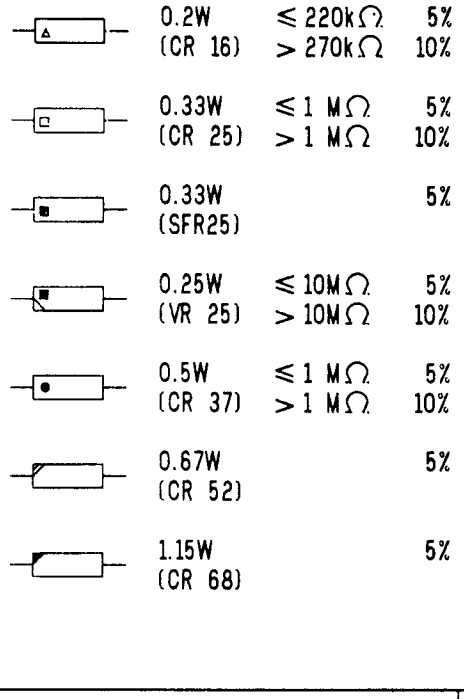
SK-1		4822 276 11309
SK-20 + SK-31		4822 276 11276
Fuse holder		4822 492 60063
1701/..	200MA-T	4822 253 30012
1701/FB	400MA-T	4822 253 50076
5001/..	Mains transformer	4822 145 40185
5001/FB	Mains transformer	4822 145 40186
Thermal fuse (5001)		4822 252 20007
1052	Display 9ST68ZA	4822 130 90285

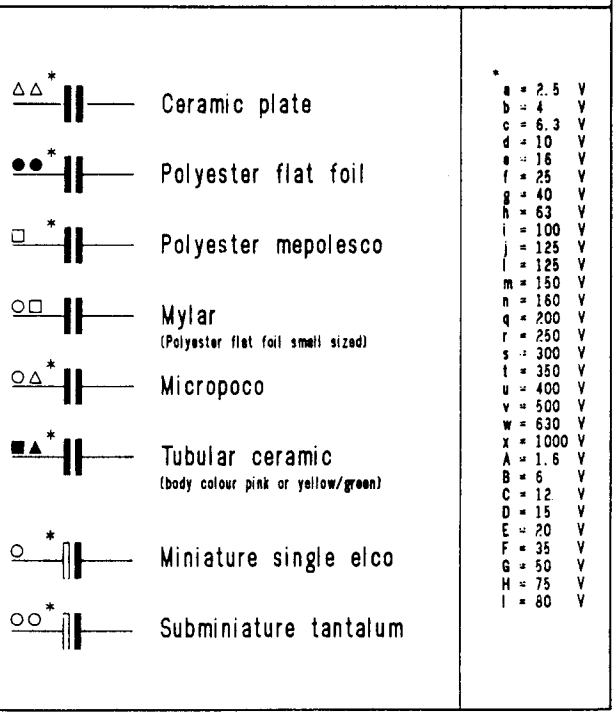
SYMBOL	DESCRIPTION
	Capacitor, general
	Electrolytic capacitor (+ and - may be omitted)
	Bipolar electrolytic capacitor (+ may be omitted)
	Resistor, general
-θ	N.T.C. resistor
+θ	P.T.C. resistor
	Voltage divider with preset adjustment
	Chip jumper
	Pin contact
	Bus contact
	Coil, self-induction
	Transformer 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)
G VCO	Voltage Controlled Oscillator
	Band-pass filter
	Phase changing network
.. ns	Delay element
	Amplifier, general

MDA.00083 T28

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





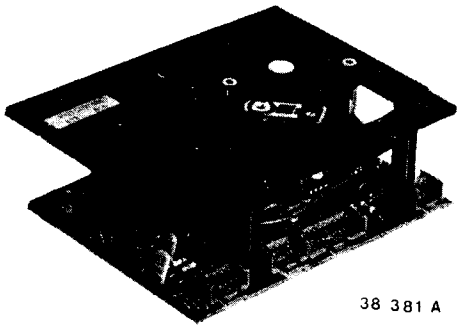
MDA.00084

Compact disc mechanism C.D.M.-2

Hi-Fi/Leuven/Top Hi-Fi/

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

Service
Service
Service



38 381 A

Service Manual

For Service Manuals **Contact**
MAURITRON TECHNICAL SERVICES
8 Cherry Tree Rd, Chinnor
Oxon OX9 4QY
Tel:- 01844-351694 Fax:- **01844-352554**
Email:- enquiries@mauritron.co.uk

COMPACT disc DIGITAL AUDIO

Version (see sticker) on CDM)						
Static versions	Circuit diagram	PCB drawing	Block diagram	Test method	µP on PCB?	Turntable magnetic
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

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 Serviçic

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.

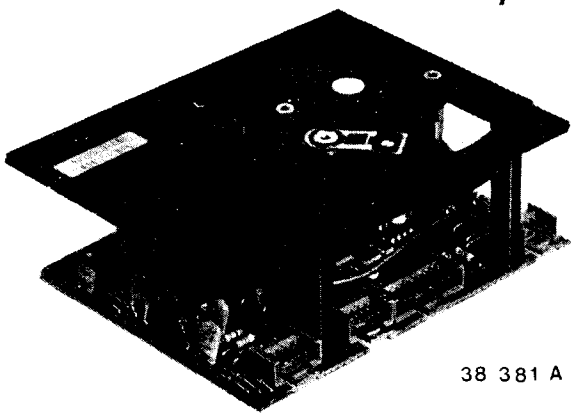
A replacement page is indicated by a letter behind the page number.

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).

Compact disc mechanism C.D.M.-2

Hi-Fi/Leuven/Top Hi-Fi

Service
Service
Service



38 381 A

Service Manual

COMPACT disc DIGITAL AUDIO

Version (see sticker on CDM)	Circuit diagram	PCB drawing	Block diagram	Test method	µP on PCB?	Turntable magnetic
CDM-2 HiFi	I	I	I	I	yes	no
CDM-2 Leuven	I	I	I	I	yes	yes
CDM-2 Top HiFi	II	II	II	II	no	no

CLASS 1
LASER PRODUCT
3122 110 03420

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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.

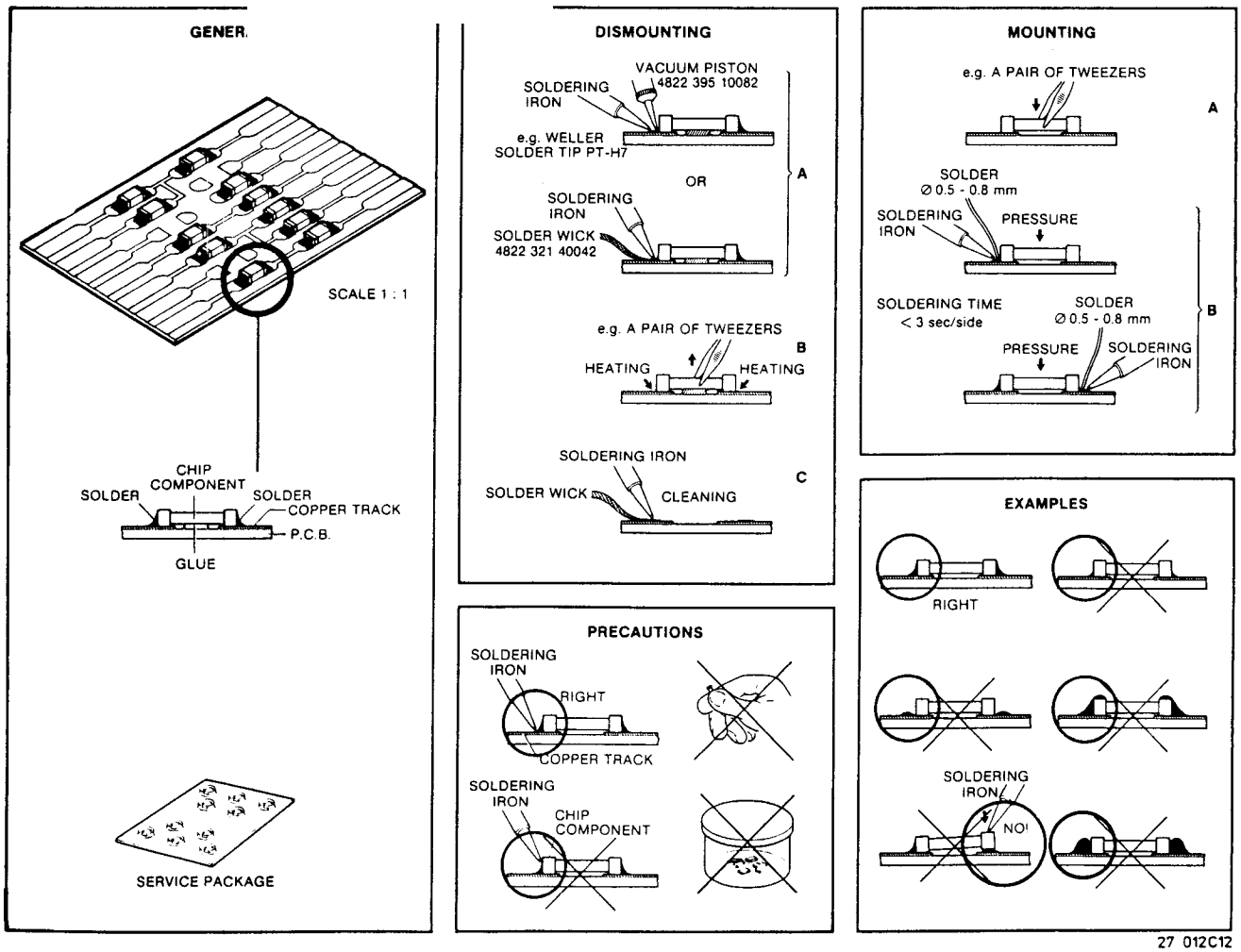
THE PHOTODIODES AND THE LASER ARE MORE SENSITIVE TO ELECTROSTATIC DISCHARGES THAN MOS ICS.
CARELESS HANDLING DURING SERVICING MAY REDUCE LIFE EXPECTANY DRASTICALLY.
FOR THIS REASON CARE SHOULD BE TAKEN THAT DURING SERVICING THE POTENTIALS OF THE AIDS AND YOURSELF ARE EQUAL TO THAT OF THE SCREENING OF 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 3008
Disc without errors + Disc without DO errors, black spots and fingerprints	4822 397 3009
Torx screwdrivers:	
-set (straight)	4822 395 5014
-set (square)	4822 395 5013
Disc hold-down	4822 532 6090
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.

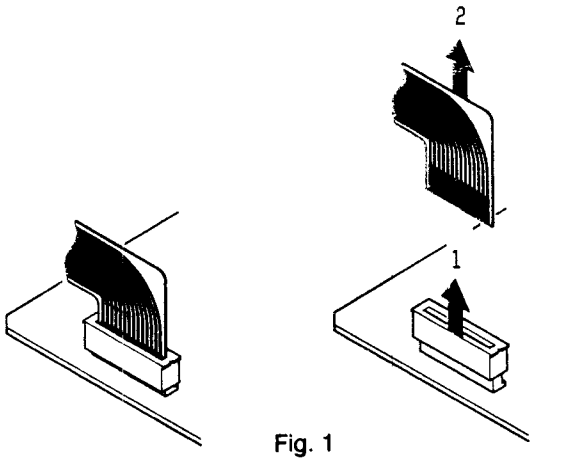


Fig. 1

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 × 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.

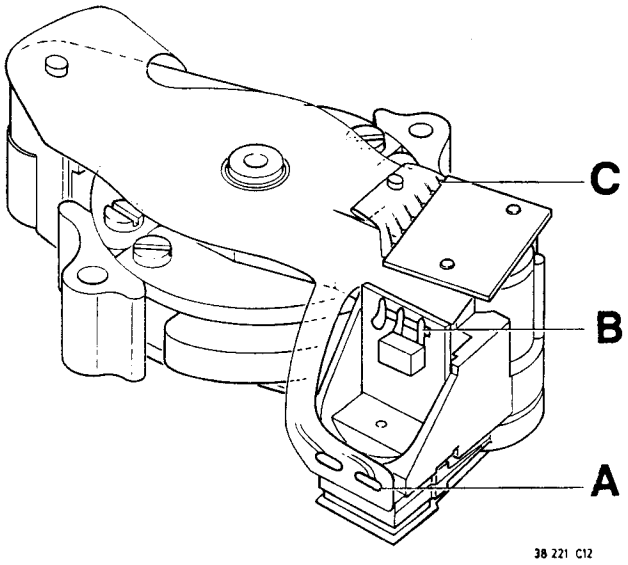


Fig. 2

- 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 2N×10.
- 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.

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.

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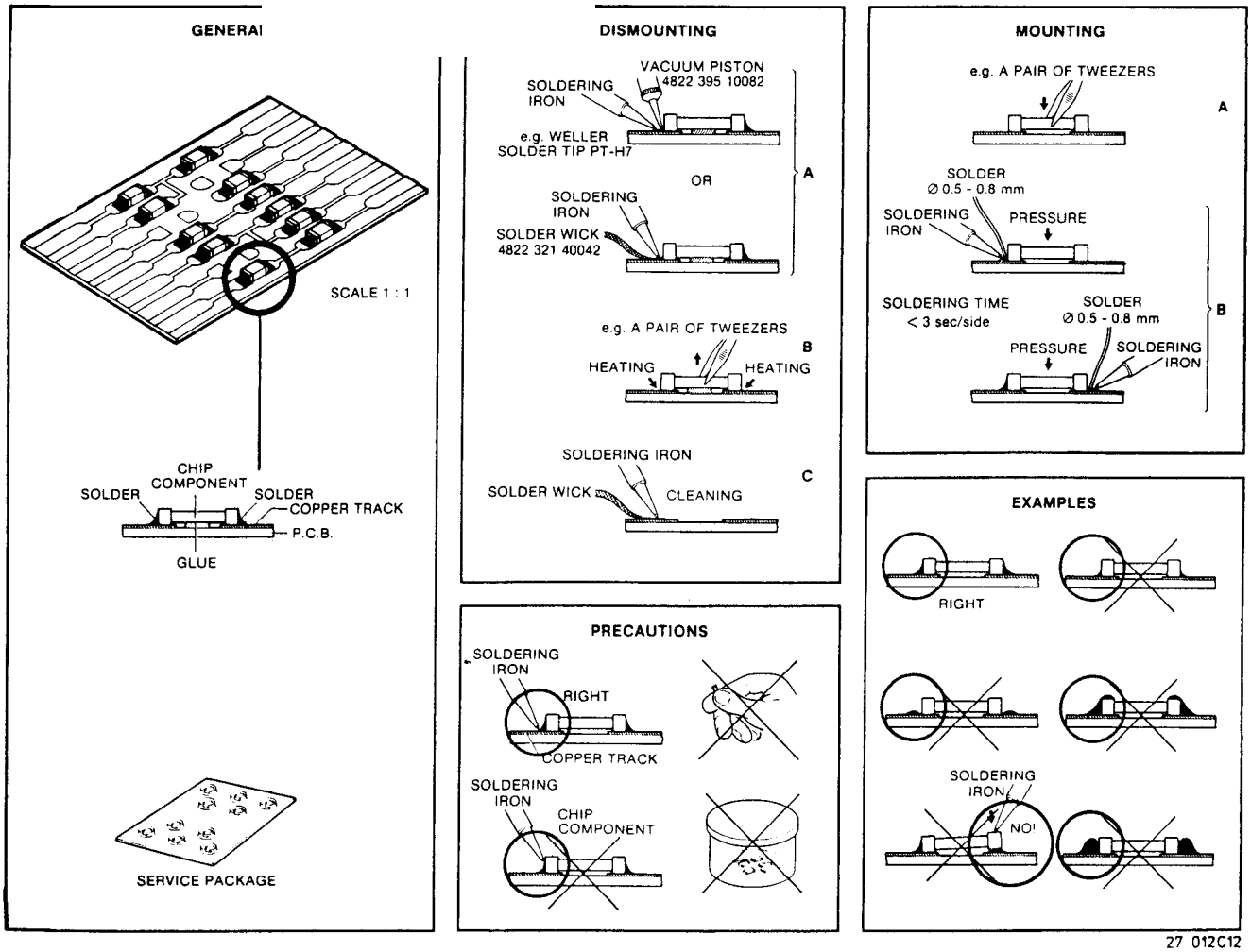
In this way, measurements on a working set can easily be carried out.

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.

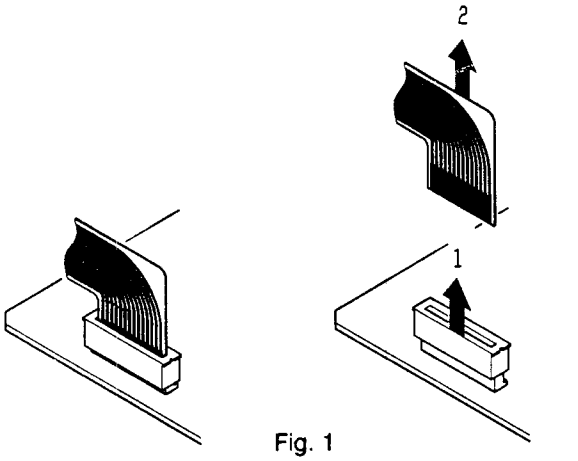


Fig. 1

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.
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  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.

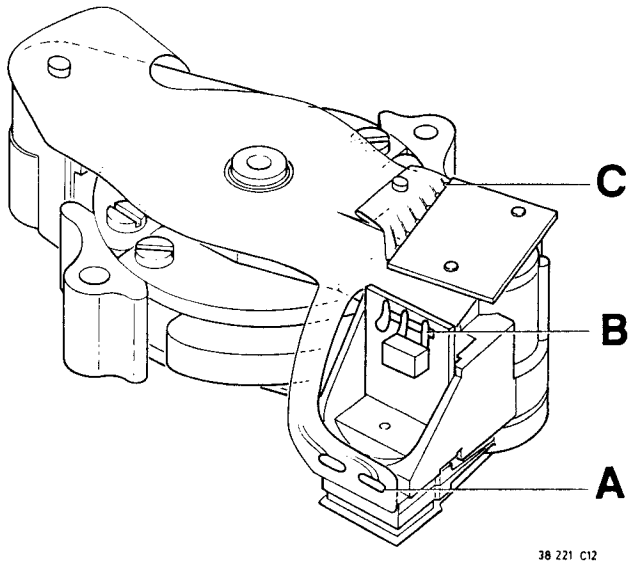

Fig. 2

- 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.
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- Desolder the 4 connections of the radial coils.
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Mounting the flexible PCB (item 57).

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- Apply the connections A and B (see Fig. 2).
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- 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).
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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.

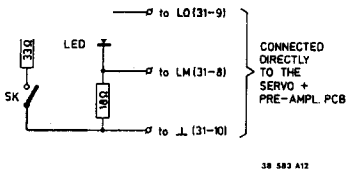

Fig. 3

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 ± à 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.

Test point on the servo + pre-amplifier PCB.

- Put test disc 4822 397 30096 (disc without defects = Test disc number 5) on the turntable.
- Put the player in service position 1.
- Connect a DC voltmeter to test points 1 and 2 (=across resistor 3102).
- Using potentionmeter 3106, adjust the laser supply until the voltage across resistor 3102 is about 40mV. (This voltage varies when the disc is rotated). This is a preliminary adjustment.

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 50mV ±5mV.

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

1. Interrupt the V_c connection by desoldering connector pin 36-5 on the servo + pre-amplifier PCB.
2. Connect channel A of a dual-beam oscilloscope to the emitter of transistors 6082, 6083 on the motor PCB and channel B to the emitter of transistors 6084, 6085. Position of the oscilloscope: 2V/div-10 ms/div.
3. Switch on the player.
4. Inject a **negative** voltage (Vin) to pin 4 of connector 02 of the motor PCB.
   This voltage **may only** be injected **after** the circuit is connected to the supply voltage.
   Start from 0V and lower this voltage fast to -5V.
   The motor should then be running.
   When the motor is running, the voltage can be reduced to -1,5V.
   The motor should keepon running
5. Now sinusoidal signals (V-out) should be present on the oscilloscope (see figure 4) which, after about 2 seconds, lie symmetrically round the 0-axis and have shifted 90° in phase relative to one another.
   The amplitudes of these 2 signals have a maximum permissible ratio of 1:2.
6. The amplitude is dependent on the injected voltage. The ratio V-in/V-out pp should lie between 1:2 and 1:3.
7. Now determine at what value for V-in the motor rotates 600 r.p.m.
   At 600 r.p.m. the frequency of V-out is 30 Hz.
   V-in should lie between -1,5V and -3,7V at this speed.

Conclusion

When all these conditions are fulfilled, it may be assumed that the motor and the PCB are all right.
If items 4, 5 and 6 are not correct, the fault is most likely to be found in the electronics.
If items 4, 5 and 6 are correct, and at item 7 a voltage of, for example, -4,5V is needed to obtain a motor speed of 600 r.p.m., it is very likely that there is a mechanical fault, for example a too high bearing friction.

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.
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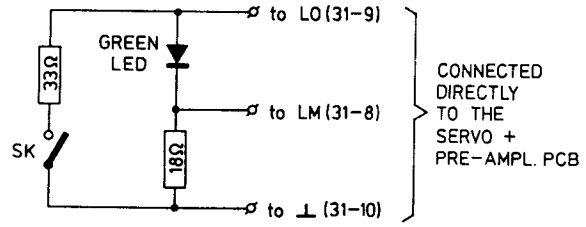

Fig. 3

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

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Code no. extension cable 4822 322 40066

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  Note: Si = 0, start initialization low, is the play mode.
- Measure the voltage LO (Laser Out) at test point 9.

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  The green LED emits little light.

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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

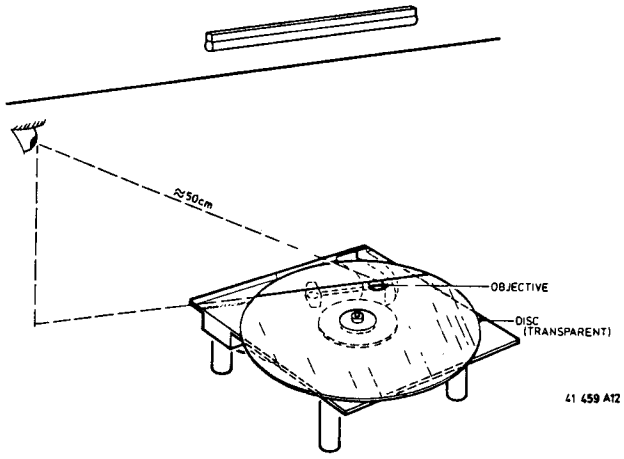
- Place potentiometer 3106 approximately in the centre.
- Place test disc 5, 4822 397 30096, on the turntable.
- Bring the player in Service position I.
- Now the focus motor will max. 16X search for the focal point. On the display a "1" will appear if the focal point has been found.
- If this does not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

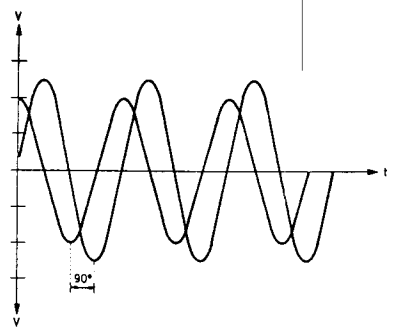


Fig.4

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

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 capacitor2174 on the servo + pre-amplifier 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.

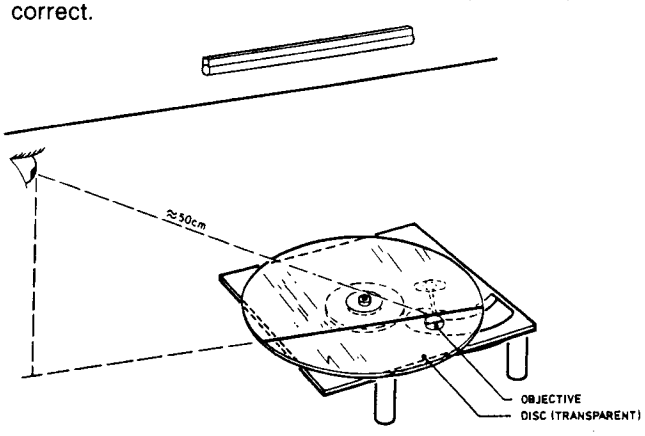
b. Check that all supply voltages are present and that they have the correct values.

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

Method:

See self-test of the servo µP.

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.



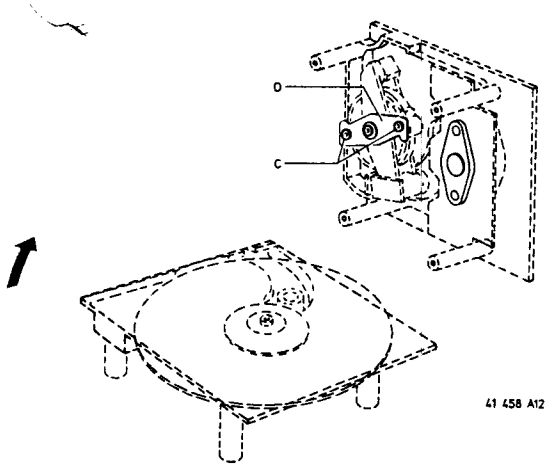
41 460 A12

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

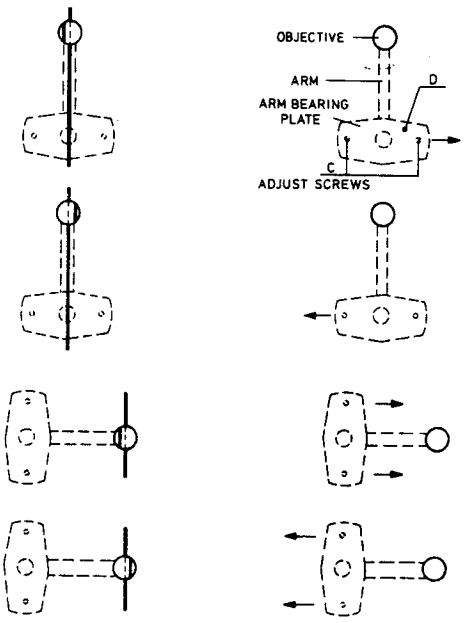
For adjusting the angle setting one or both of the two locking knocks for the bearing plate on pos. 62 must be broken.
If a check on the angle setting shows that the angle falls outside the tolerance, the angle should NOT be adjusted for minimum deviation, but it should be adjusted within the tolerance.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

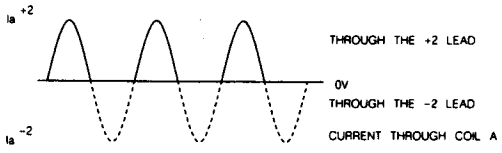


FIG.1

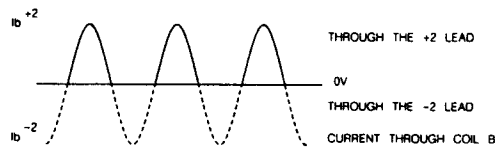


FIG.2

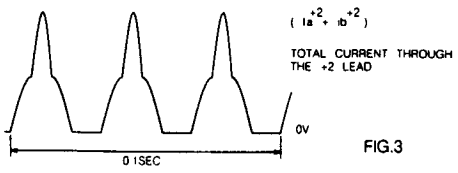


FIG.3

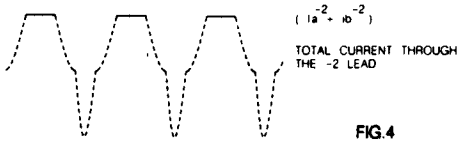
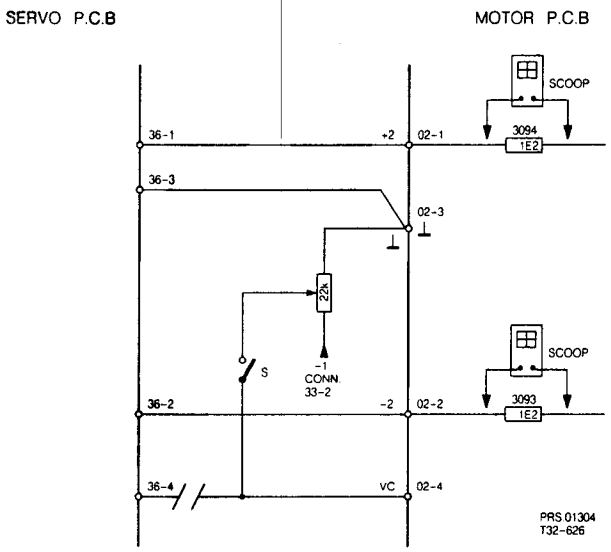


FIG.4

MDA 00336
T32-648



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.

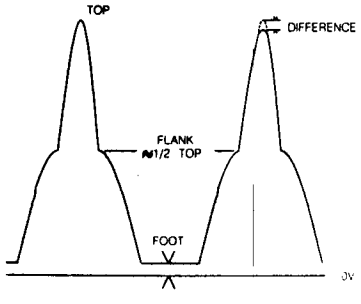
4. Measure with an oscilloscope first across 3094 and hereafter across 3093.
   Do not measure across both resistors at the sametime, since the currents are measured through the +2 lead and –2 lead.

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:

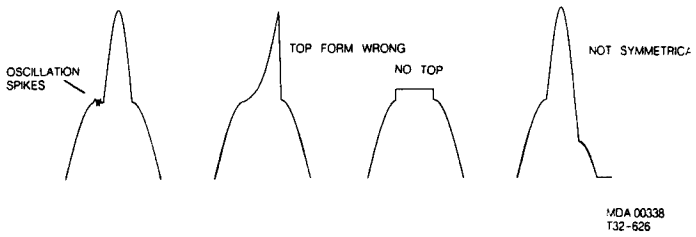


Top is not specified by value, see 7.(value 1 and value 2).

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.

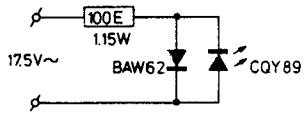
Position of player	POWER ON	Servicing pos. 1	PLAY
RD signal	"low"	"high"	"high"

•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

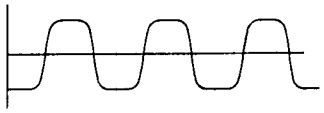
Connected the circuit below to an alternating voltage of 17,5 V.
(In CD150 and CD350 to transformer pins 33 and 34).



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).



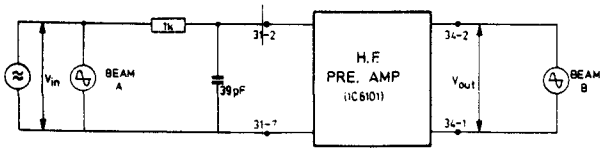
38 314 A12

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

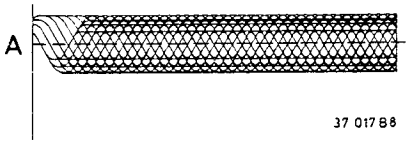
- Take the flexible PCB out of connector 31.
- Switch on the supply voltage.
- Inject a signal V-in of about 10 mV_{pp}, 50 kHz, via the RC network, beween connector pin 31-2 and connector pin 31-7 according to the diagram below.
- The output voltage between connector pins 34-2 and 34-1 should be about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

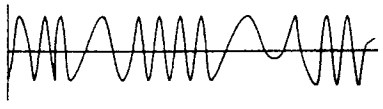
- Put test disc 5A (4822 397 30096) on the turntable.
- Switch on the power-supply switch and press the PLAY key.
- Play track number 10 or 15 and check the HFD signal at test point 23.
  When drop-out pulses are present on the DET signal (pin 26), the HFD pulses should also be present at test point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

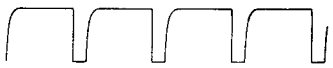
•Turntable Motor Control
•MCO (test point 39).
With the MCO signal (=Motor Control On) the turntable motor control is switched on and off.

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

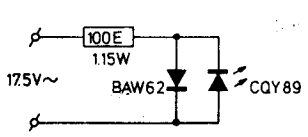
When the MCES signal is correct and released by the MCO signal, the turntable motor should be running.
(see also "Check of the motor control; Hall Control", page 3-1).

•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

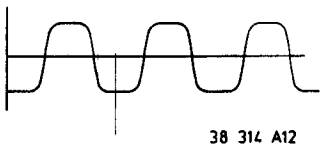
Connected the circuit below to an alternating voltage of 17,5 V.
(In CD150 and CD350 to transformer pins 33 and 34).



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).



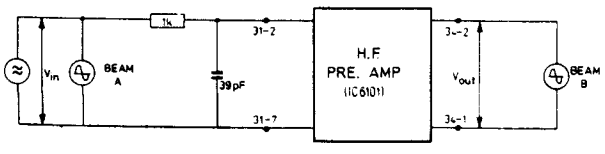
38 314 A12

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

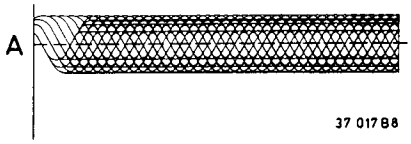
- Take the flexible PCB out of connector 31.
- Switch on the supply voltage.
- Inject a signal V-in of about 10 mV_{pp}, 50 kHz, via the RC network, beween connector pin 31-2 and connector pin 31-7 according to the diagram below.
- The output voltage between connector pins 34-2 and 34-1 should be about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

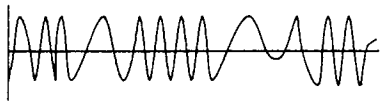
- Put test disc 5A (4822 397 30096) on the turntable.
- Switch on the power-supply switch and press the PLAY key.
- Play track number 10 or 15 and check the HFD signal at test point 23.
  When drop-out pulses are present on the DET signal (pin 26), the HFD pulses should also be present at test point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

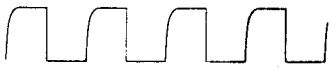
Position of player	POWER ON	Servicing pos. 2	PLAY
MCO signal	"low"	"high"	"high"

•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. ◇2◇) 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

•$\overline{Si}$ (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.

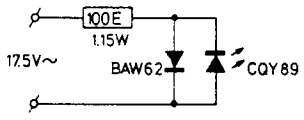
Position of player	POWER ON	Servicing pos. 1	PLAY
RD signal	"low"	"high"	"high"

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

ɡnals 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

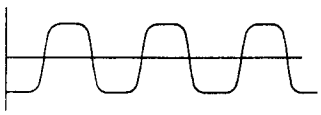
Connected the circuit below to an alternating voltage of 17,5 V.



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).



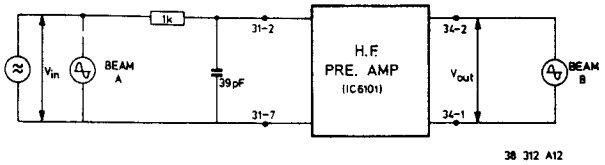
38 314 A12

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

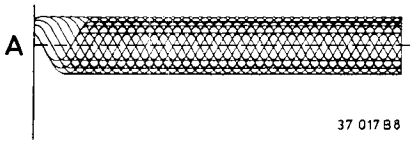
- Take the flexible PCB out of connector 31.
- Switch on the supply voltage.
- Inject a signal V-in of about 10 mV_{pp}, 50 kHz, via the RC network, beween connector pin 31-2 and connector pin 31-7 according to the diagram below.
- The ouput voltage between connector pins 34-14 and 34-13 should be about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

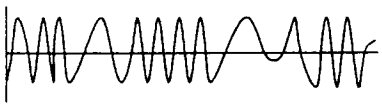
- Put test disc 5A (4822 397 30096) on the turntable.
- Switch on the power-supply switch and press the PLAY key.
- Play track number 10 or 15 and check the HFD signal at test point 23.
  When drop-out pulses are present on the DET signal (pin 26), the HFD pulses should also be present at test point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

When the disc is lowly braked by hand, $\overline{TL}$ 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.

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

The $\overline{DODS}$ 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
$\overline{DODS}$-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)

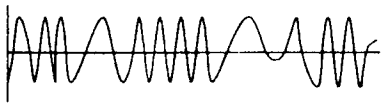
Capacitor 2156 in the RE-lag circuit has a memory function.
It memorizes the degree of inclination of the disc.
When a jump is made to a certain track on the disc, the memory should be cleared.
This takes place by the decoder µP ($\overline{RPU}$ signal) via transistor 6109.

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.

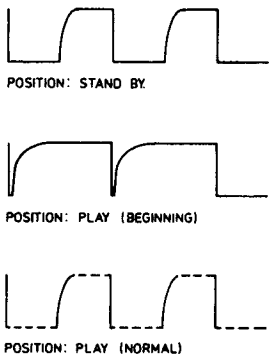
	STOP	PLAY	SERVICING POSITION 0,1,2	SERVICING POSITION 3
B0	"low"	"high"	"low"	"high"
B1	"high"	"high"	"high"	"high"
B2	"high"	"high"	"high"	"high"
B3	"low"	"low"	"low"	"low"

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.



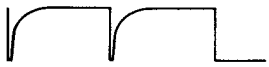
38 849 A12

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).

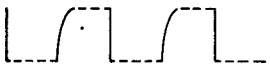
- **VC (connector point 36-1)**
  Fast check.
- Place a disc on the turntable. The voltage at connector point 36-1 will be about -2,5 V during playback of the first piece of music (inside of the disc) and about -1,5V during the last piece (outside of disc).

- **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.

POSITION: STAND BY.



POSITION: PLAY (BEGINNING)



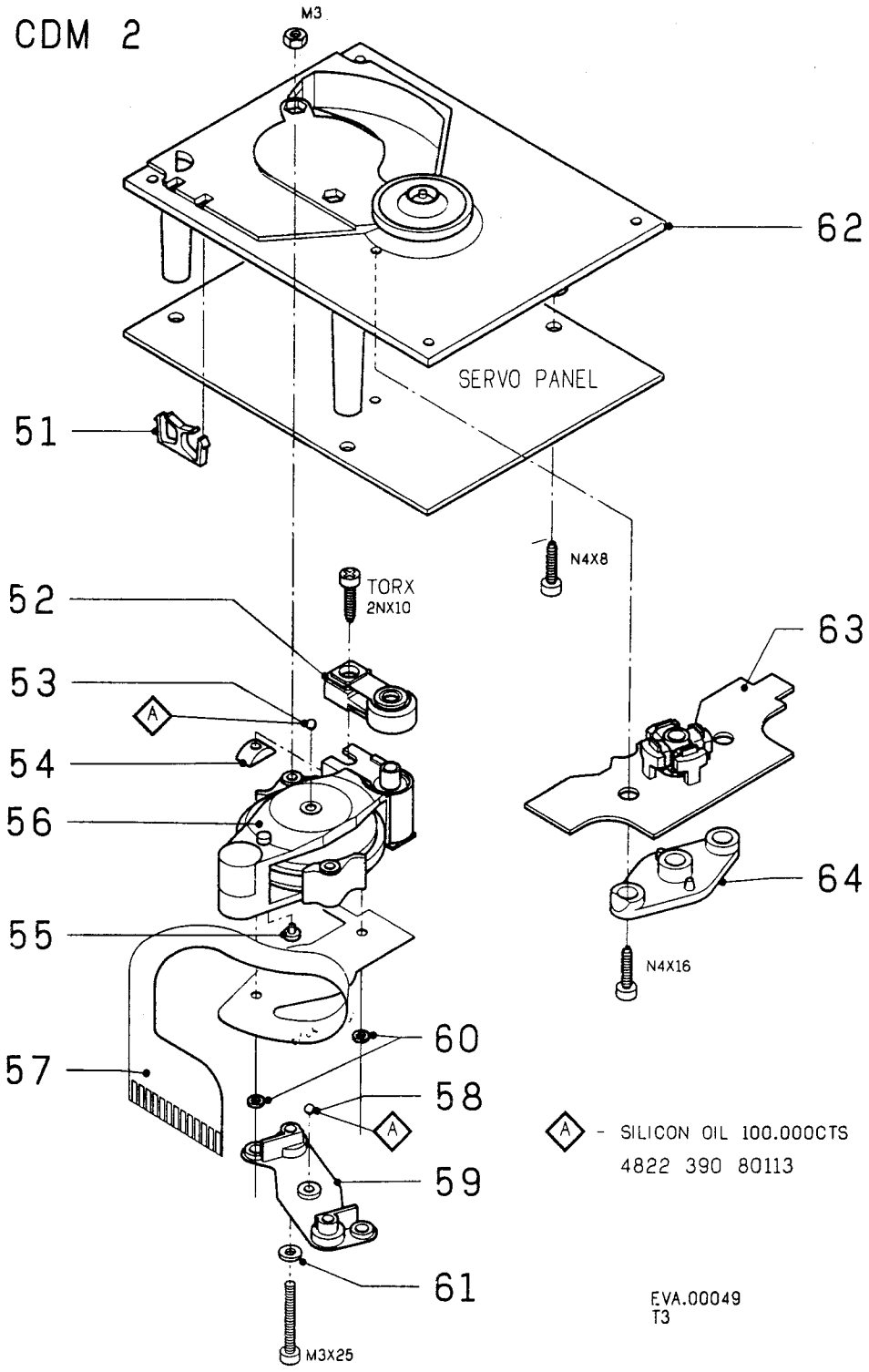
POSITION: PLAY (NORMAL)

38 849 A12

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

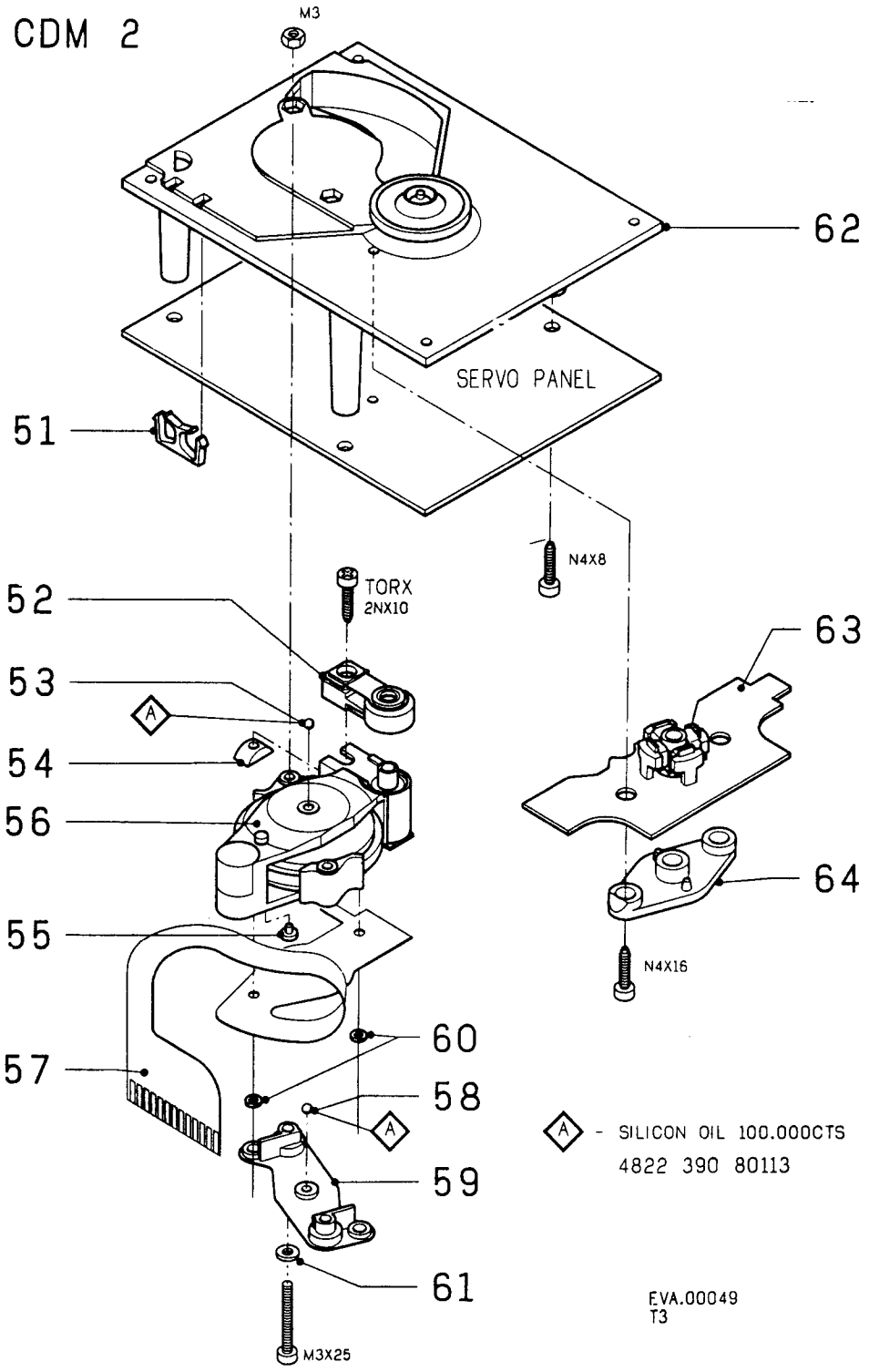
EXPLODED VIEW C.D. MECHANISM



MECHANISM PARTS

51	4822 401 10895	
52	4822 691 30133	
53	4822 520 40177	
54	4822 401 10896	
55	4822 462 71374	
56	4822 691 30134	
57	4822 323 50107	
58	4822 520 40177	
59	4822 520 10555	
60	4822 532 50268	
61	4822 530 80188	
62+64	4822 691 30135	for C.D.M.-2 Hi-Fi, Top-Hi-Fi
62+64	4822 691 30136	for C.D.M.-2 Leuven

EXPLODED VIEW C.D. MECHANISM



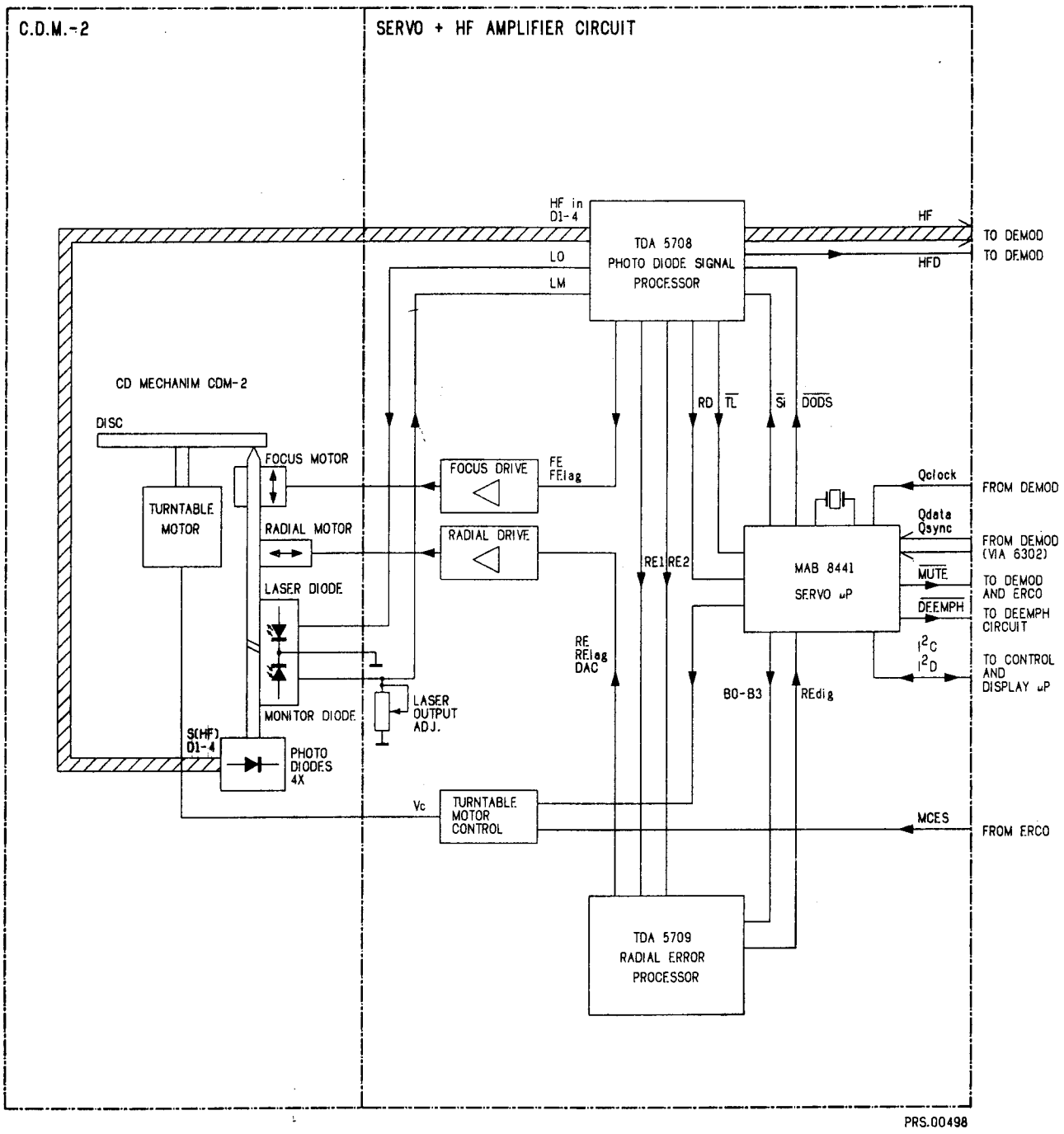
52+56+62+63+64

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

MECHANISM PARTS

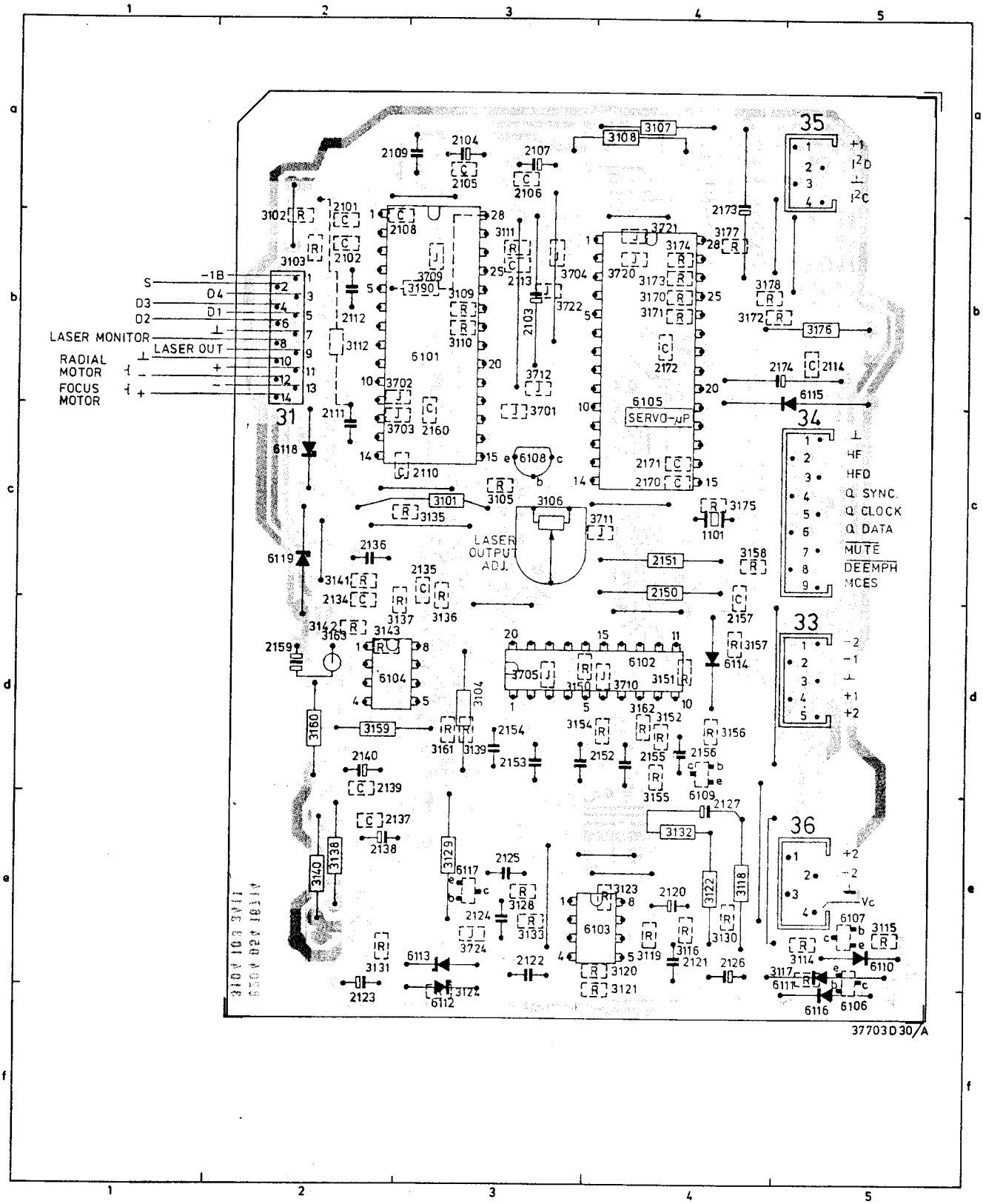
51	4822 401 10895
53	4822 520 40177
54	4822 401 10896
55	4822 462 71374
57	4822 323 50107
58	4822 520 40177
59	4822 520 10555
60	4822 532 50268
61	4822 530 80188

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
I²C	-	Clock signal servo-control µP
I²D	-	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	1N4148	4822 130 30621
6114÷6116		
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

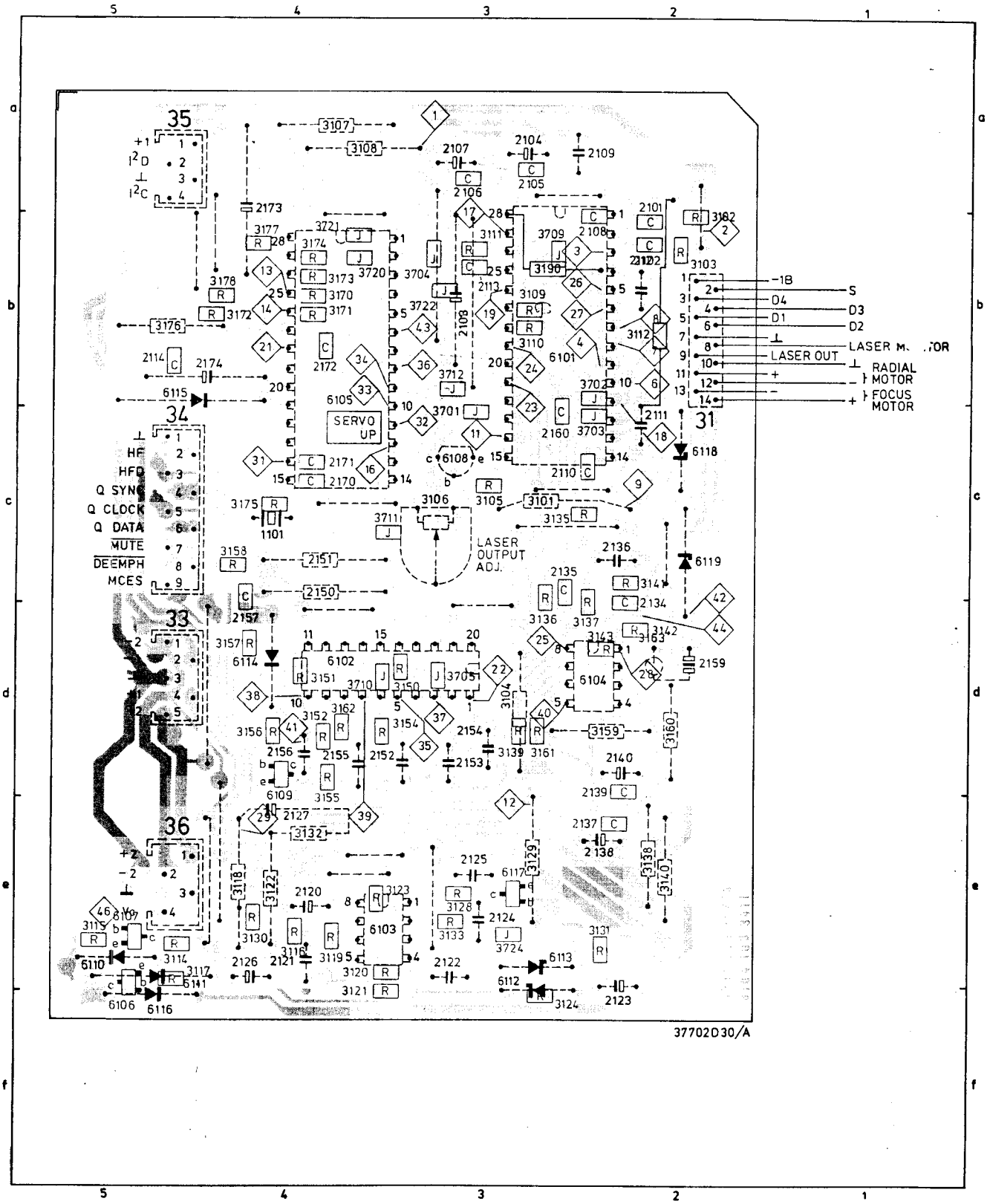
2120	6.8 µF- 16 V	4822 124 21538
2123	33 µF- 10 V	4822 124 20945
2126	6.8 µF- 25 V	4822 124 21538
2150,2151	2.2 nF-160 V-2%	4822 121 50841

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

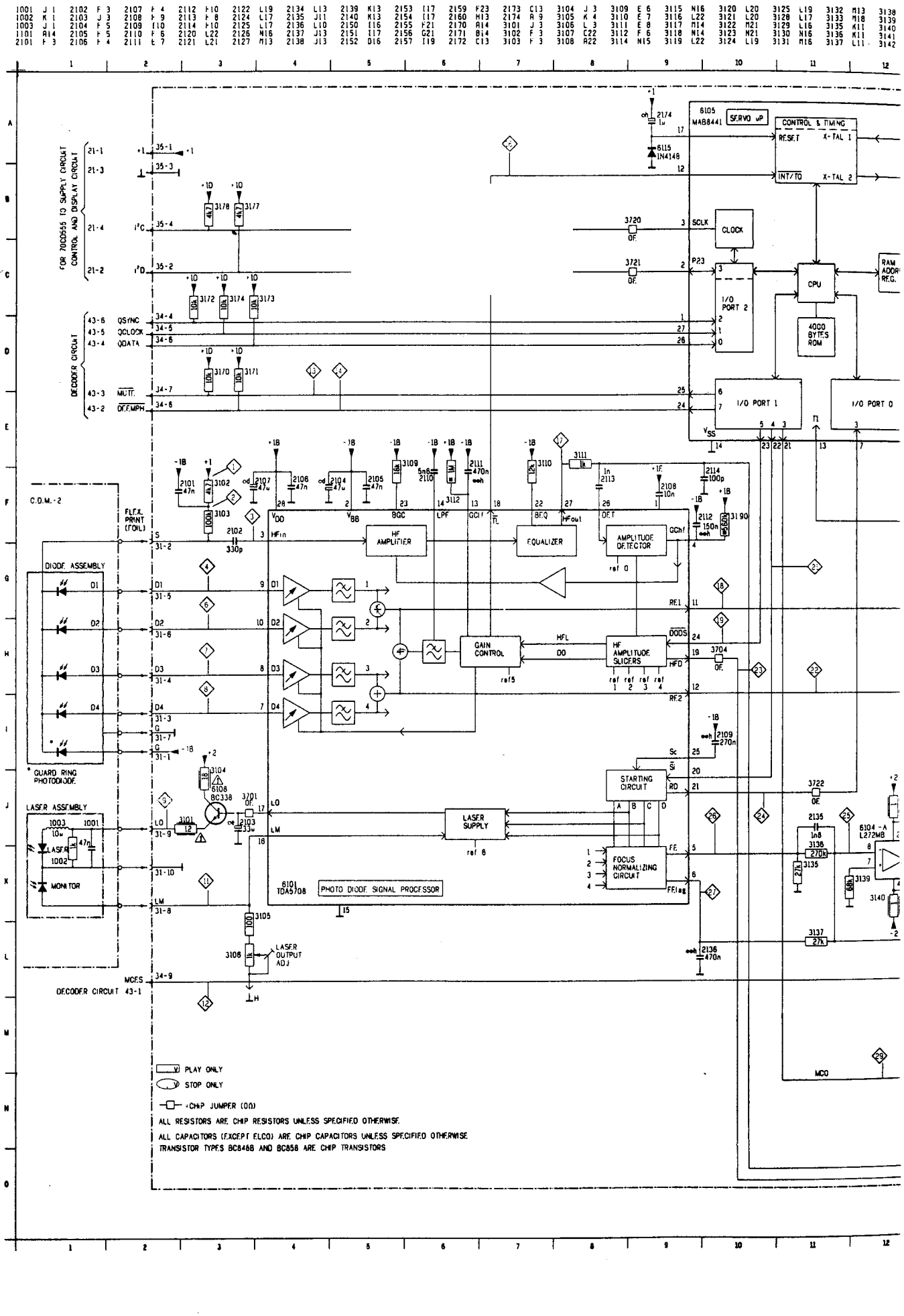
For chip resistors see list on page 5-8

SERVO + PRE-AMPLIFIER PCB I

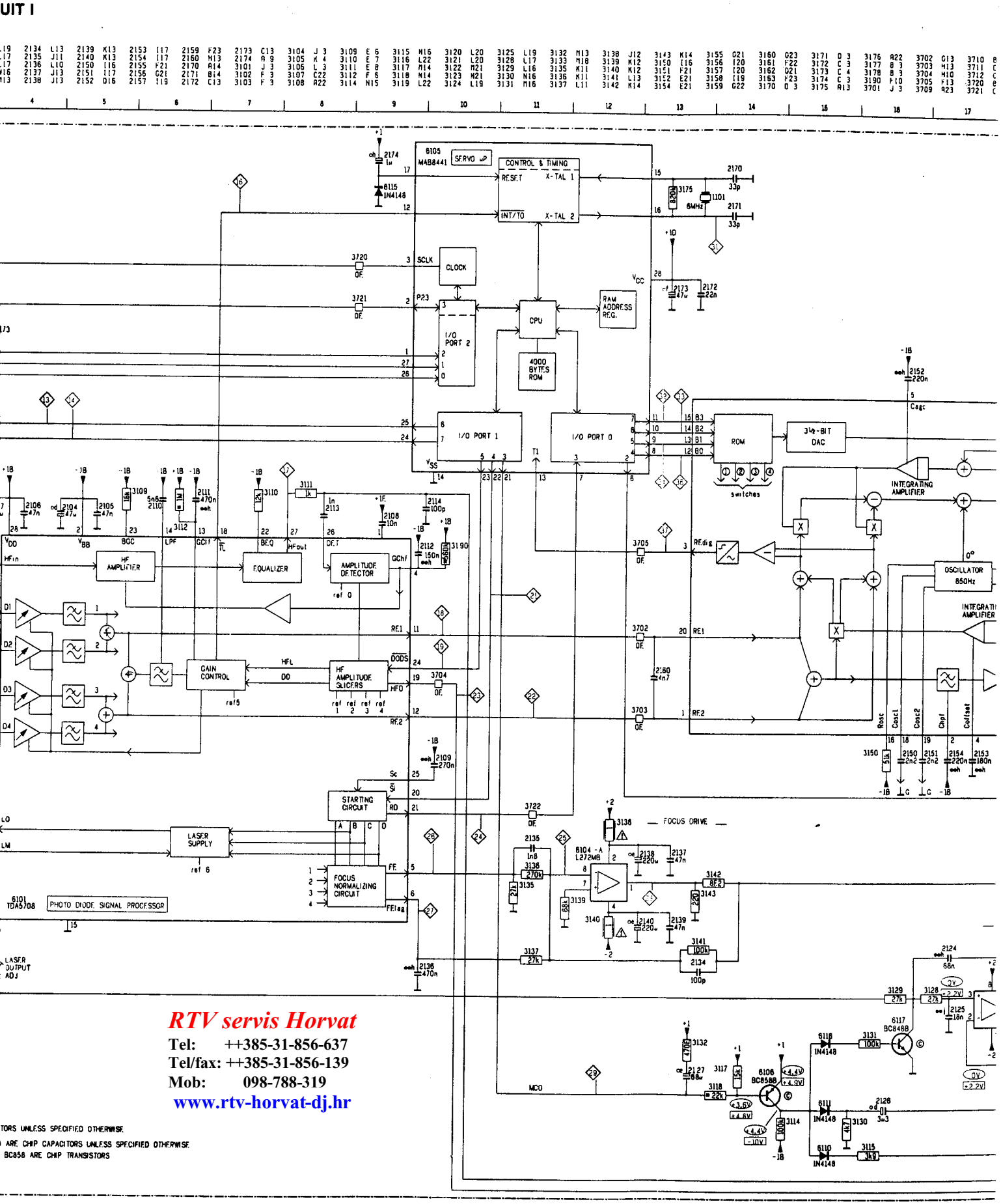


1101	C04	2105	A03	2110	C03	2120	E04	2125	E03	2136	C02	2150	C04	2155	D04	2170	C04	3101	C03
2101	A02	2106	A03	2111	C02	2121	E04	2126	E04	2137	E02	2151	C04	2156	D04	2171	C04	3102	A02
2102	B02	2107	A03	2112	B02	2122	E03	2127	E04	2138	E02	2152	D04	2157	D04	2172	B04	3103	B02
2103	B03	2108	B02	2113	B03	2123	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



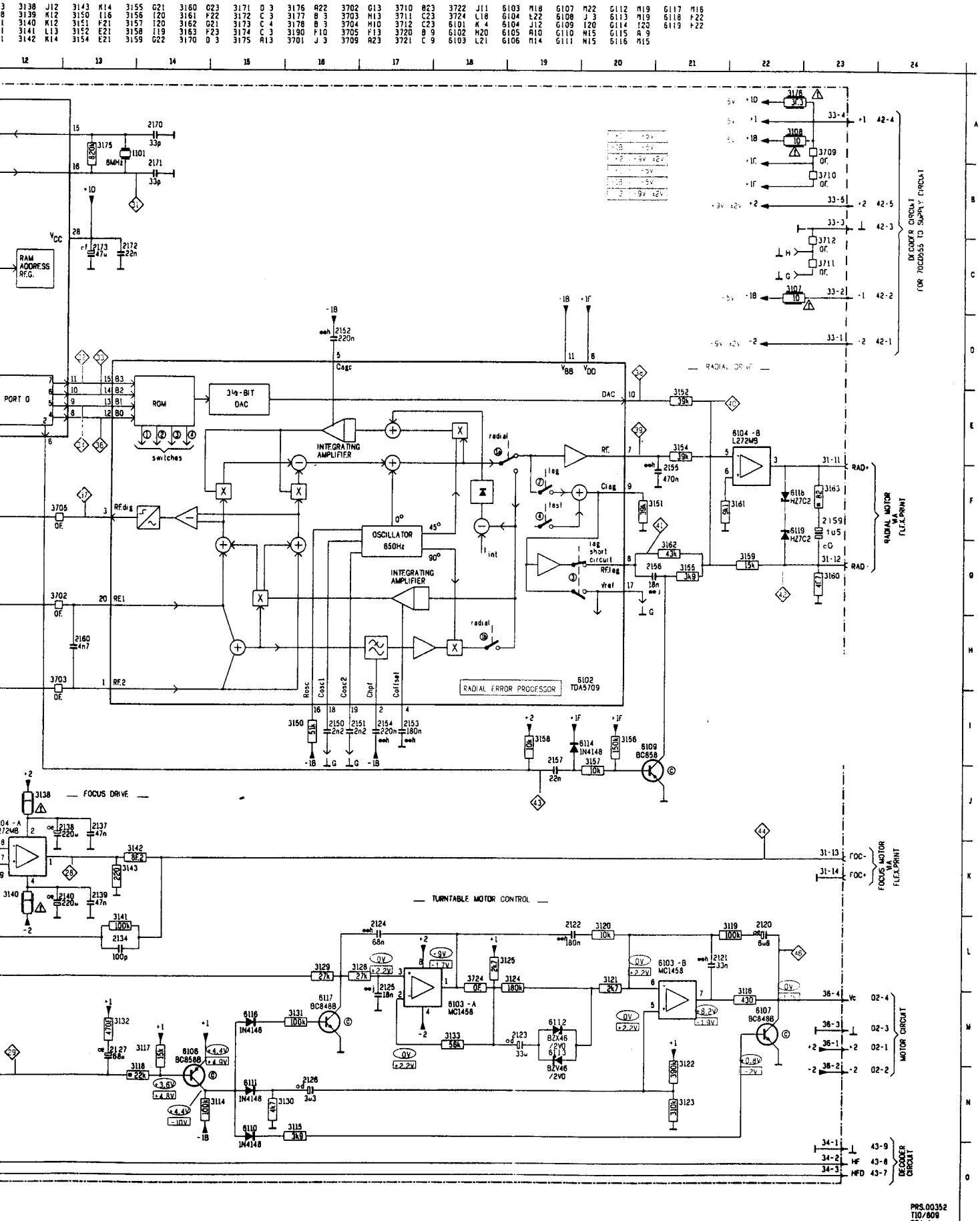
UIT I



TORS UNLESS SPECIFIED OTHERWISE.

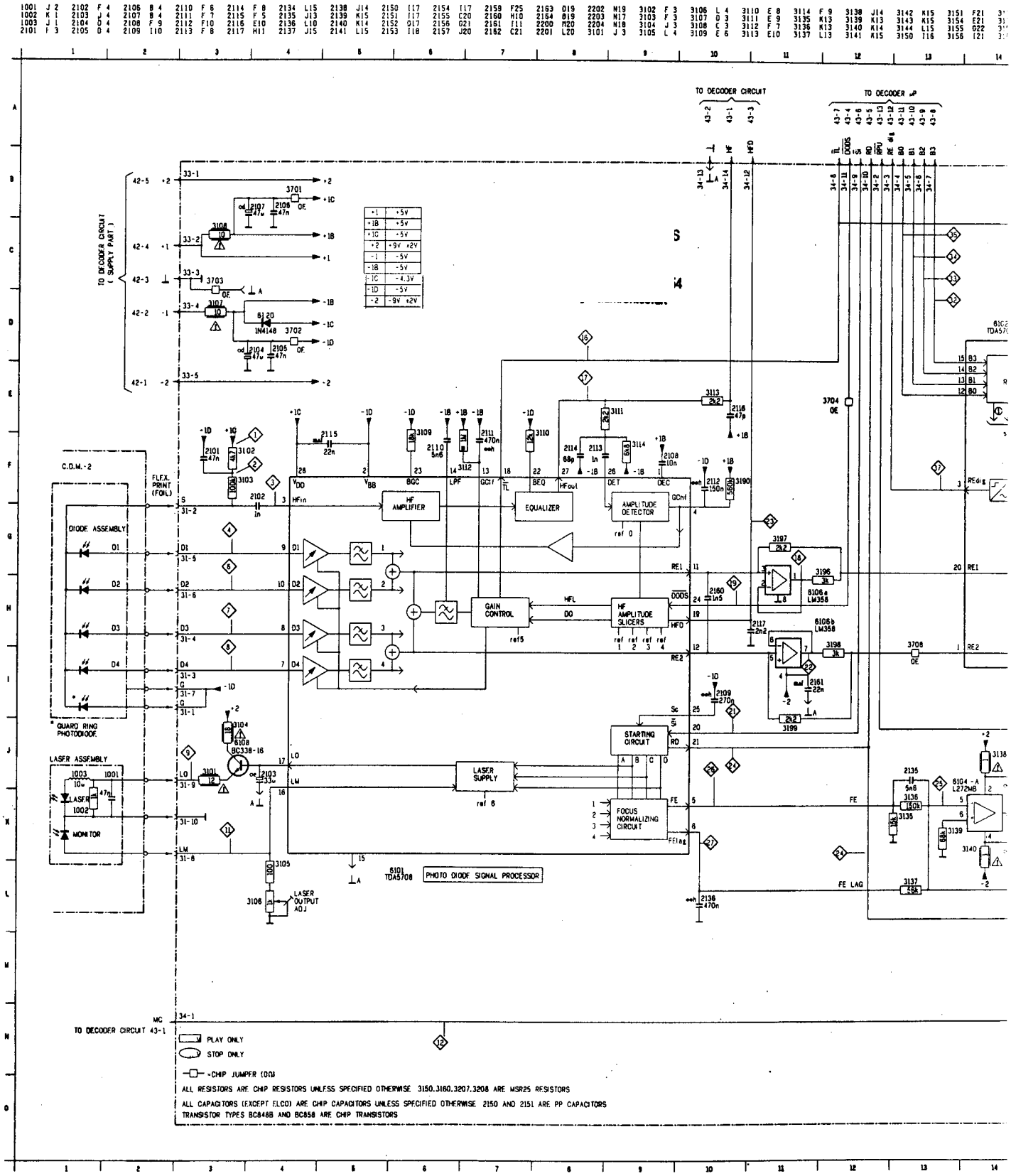
ARE CHIP CAPACITORS UNLESS SPECIFIED OTHERWISE.

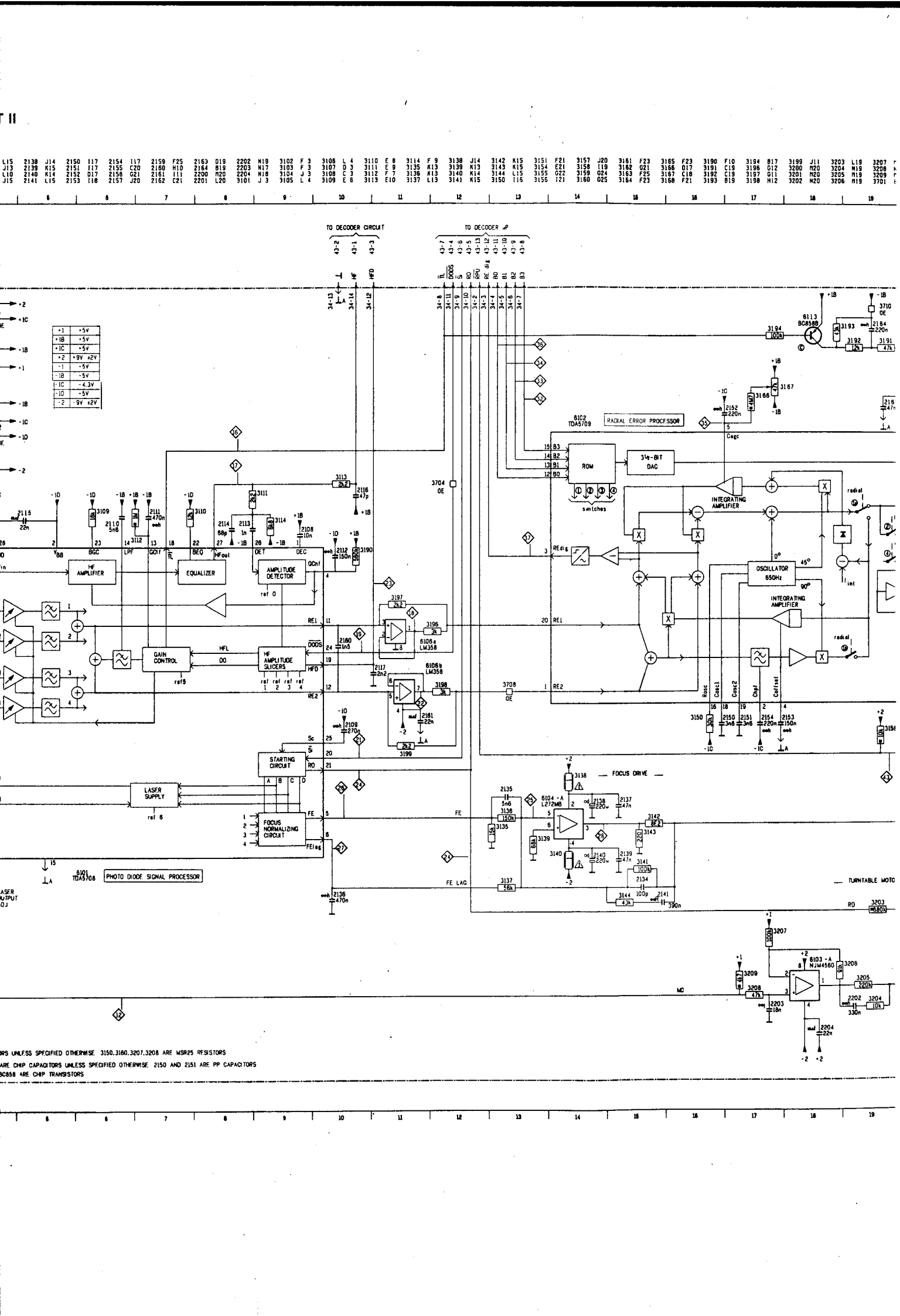
BC858 ARE CHIP TRANSISTORS



PRS.00352
TIO/609
DRA 1

SERVO + PRE-AMPLIFIER CIRCUIT II

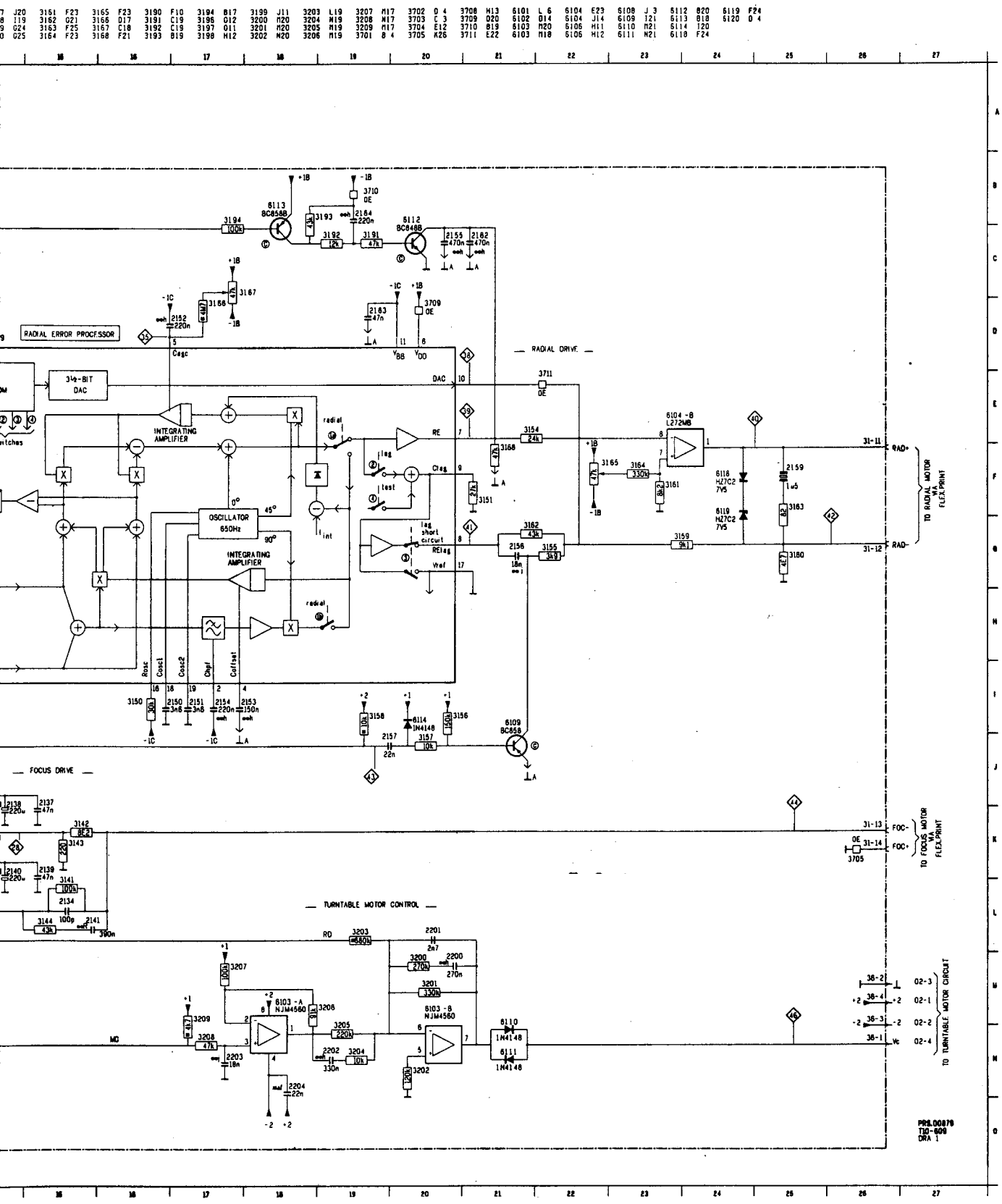




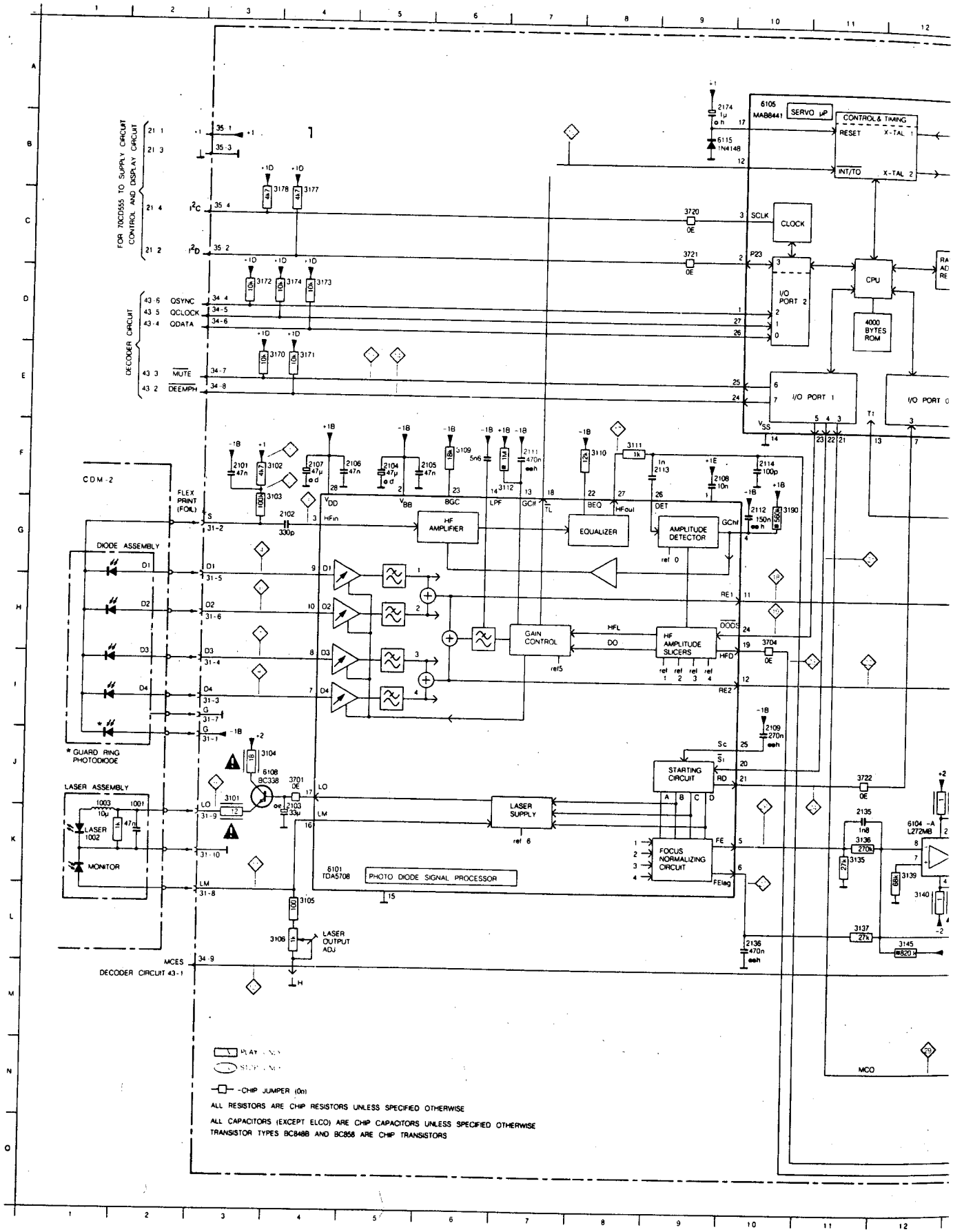
RS UNLESS SPECIFIED OTHERWISE 3150,3160,3207,3208 ARE MSR25 RESISTORS

ARE CHIP CAPACITORS UNLESS SPECIFIED OTHERWISE 2150 AND 2151 ARE PP CAPACITORS

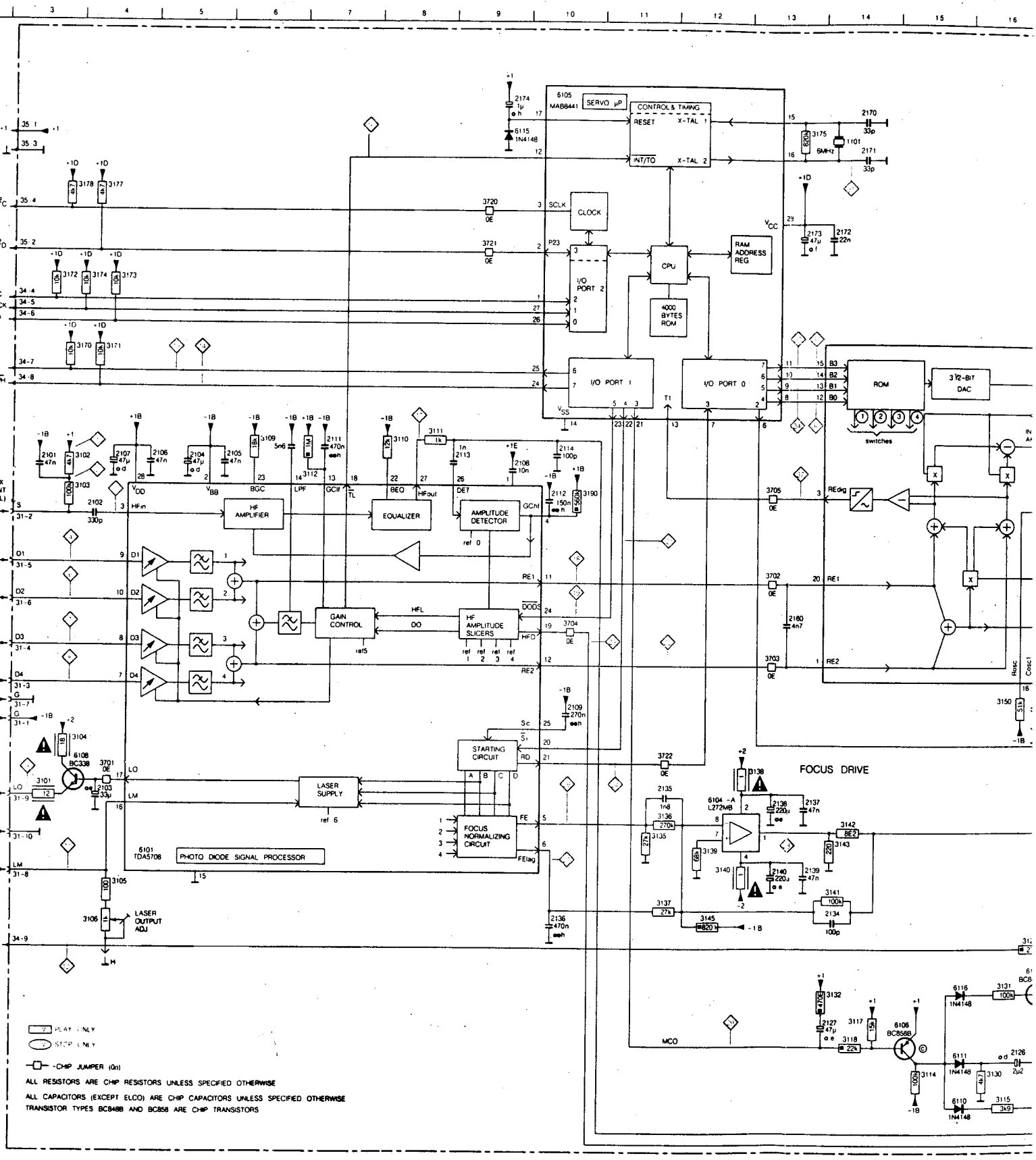
BC858 ARE CHIP TRANSISTORS

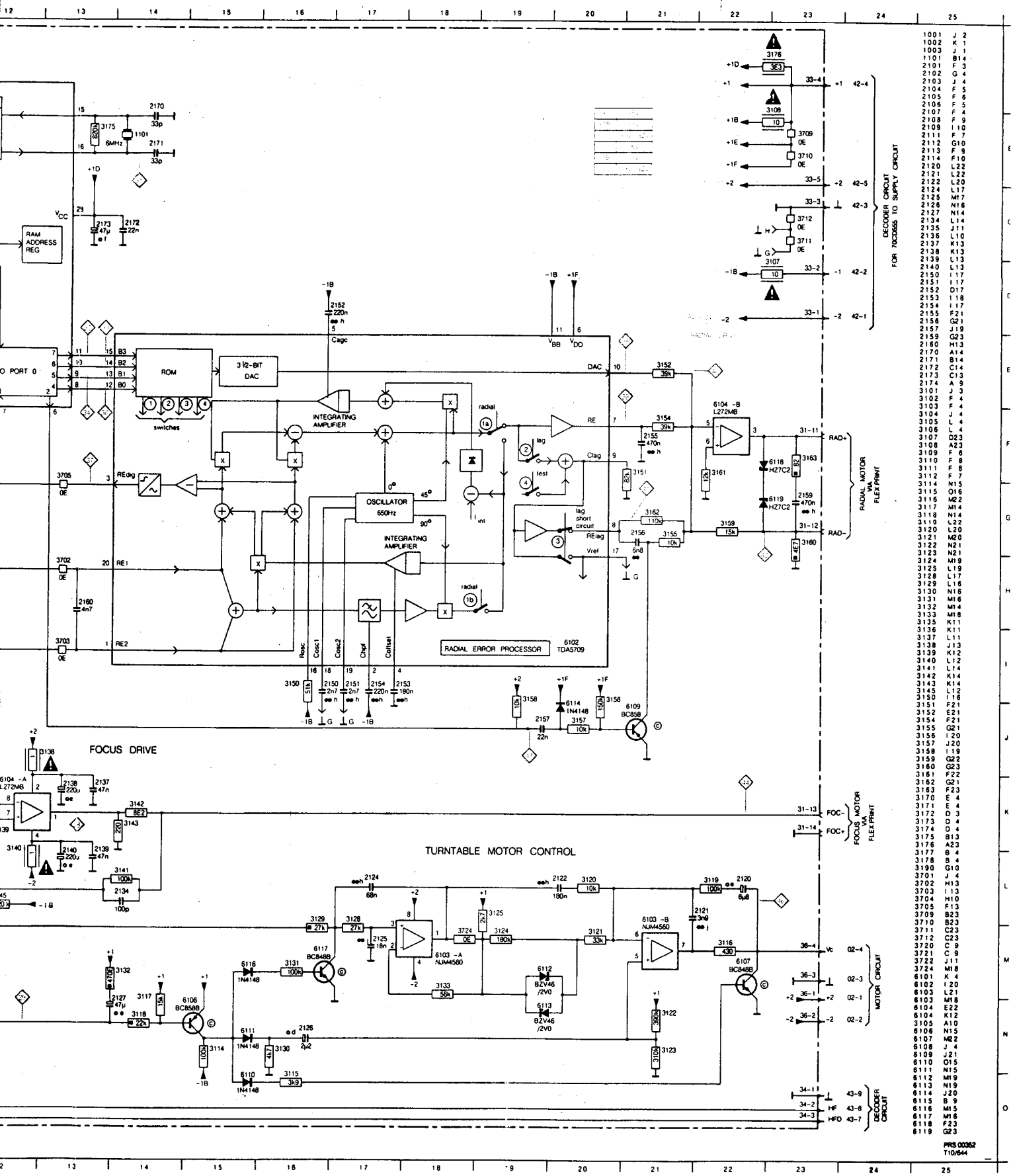


SERVO + PRE-AMPLIFIER CIRCUIT I FOR STATIC MOTORS

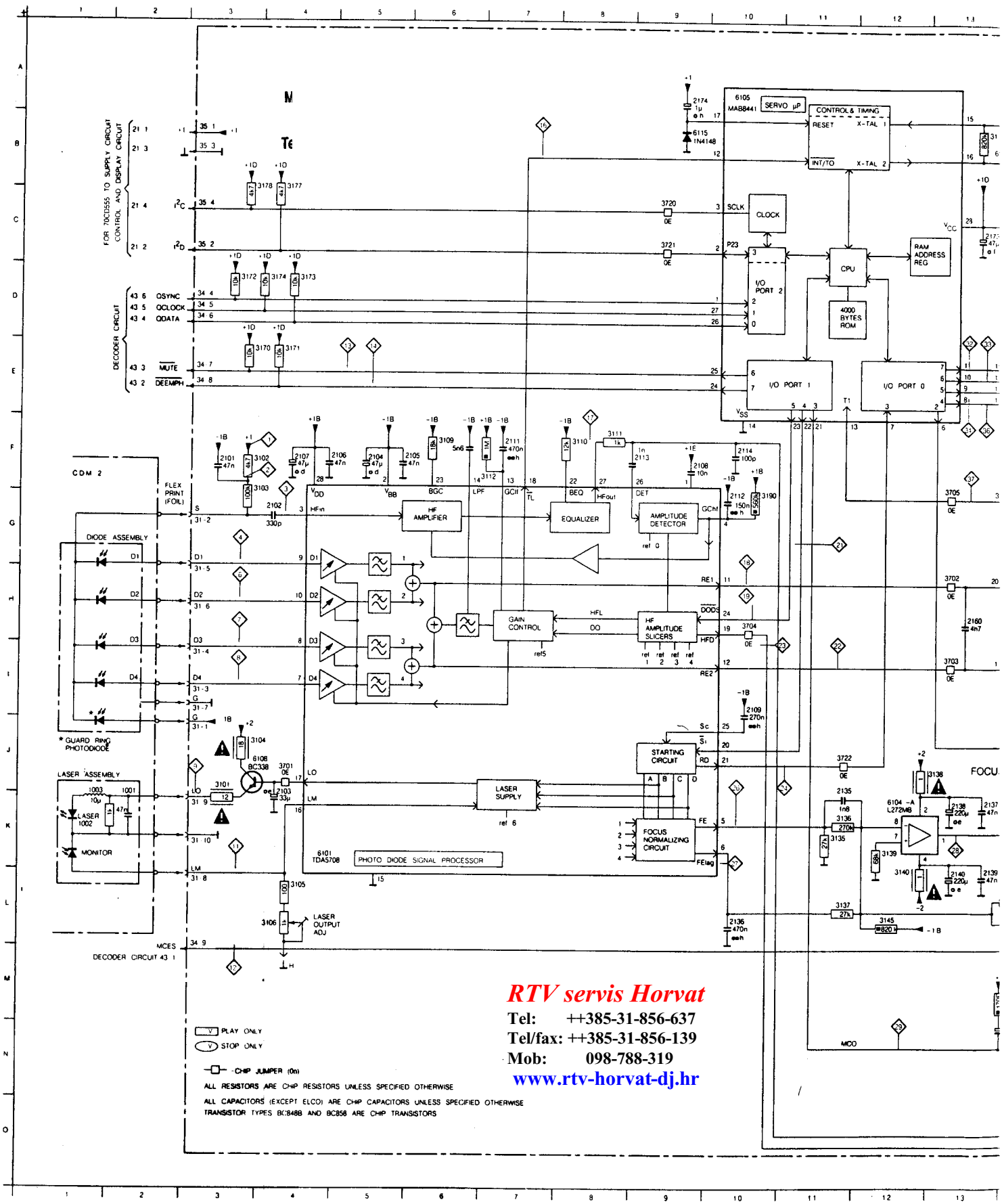


PLIFIER CIRCUIT I FOR STATIC MOTORS

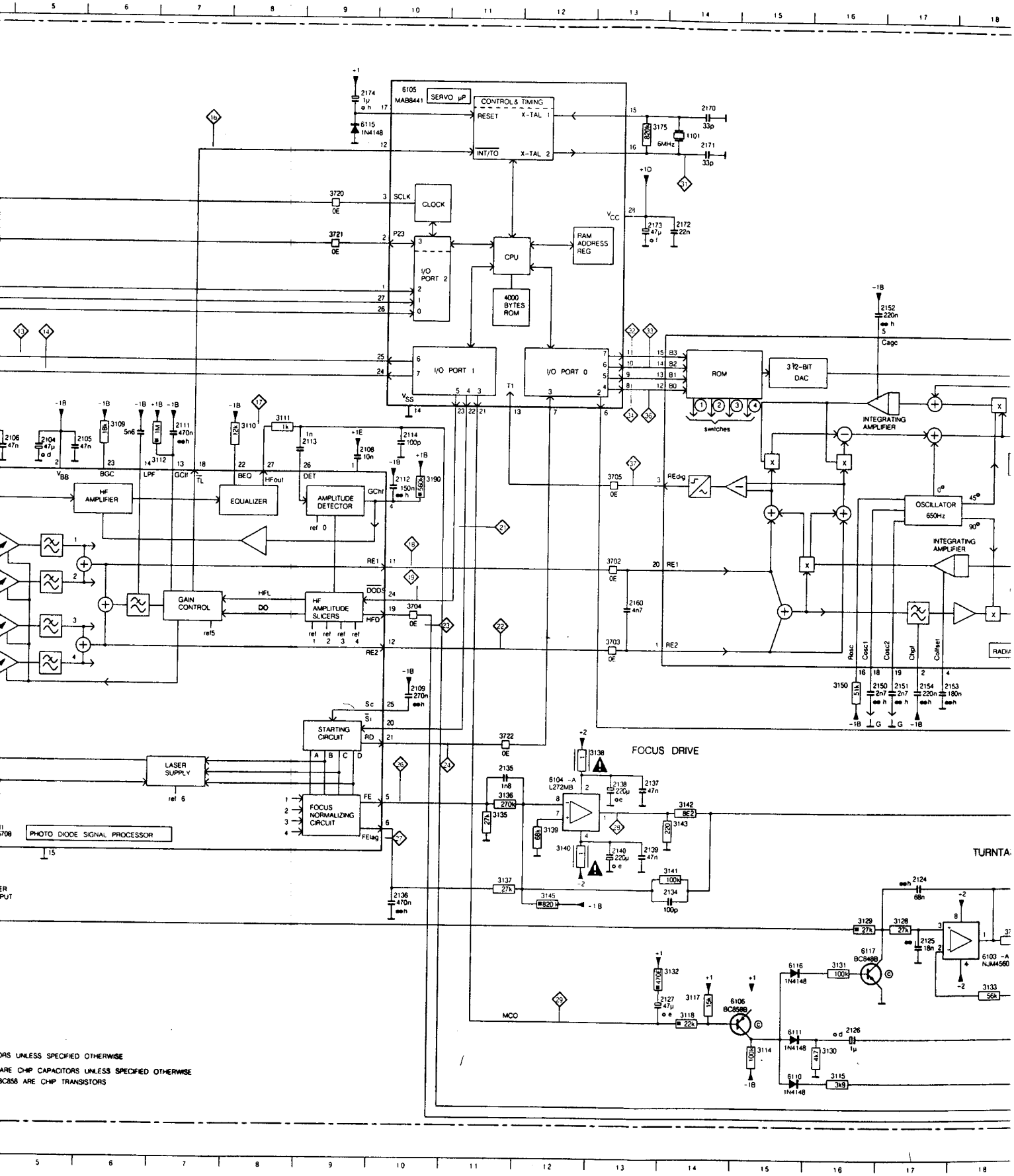


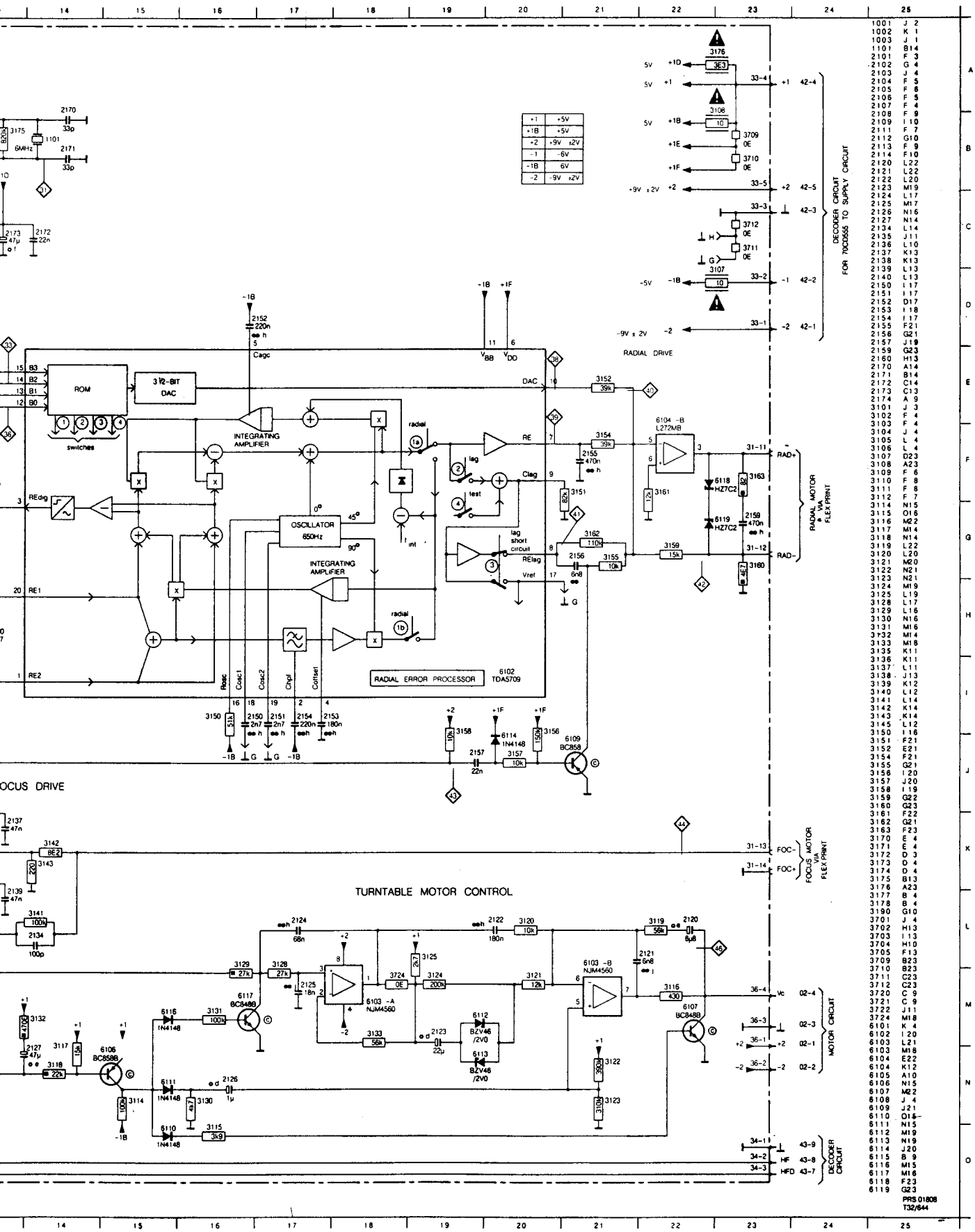

RAM ADDRESS REG
ROM
3½-BIT DAC
INTEGRATING AMPLIFIER
OSCILLATOR 650Hz
INTEGRATING AMPLIFIER
RADIAL ERROR PROCESSOR
6102 TDA5709
FOCUS DRIVE
TURNTABLE MOTOR CONTROL
DECODER CIRCUIT FOR 70CD555 TO SUPPLY CIRCUIT
RADIAL MOTOR VIA FLEX PRINT
FOCUS MOTOR VIA FLEX PRINT
MOTOR CIRCUIT
DECODER CIRCUIT

SERVO + PRE-AMPLIFIER CIRCUIT I FOR DYNAMIC MOTORS



FOR DYNAMIC MOTORS



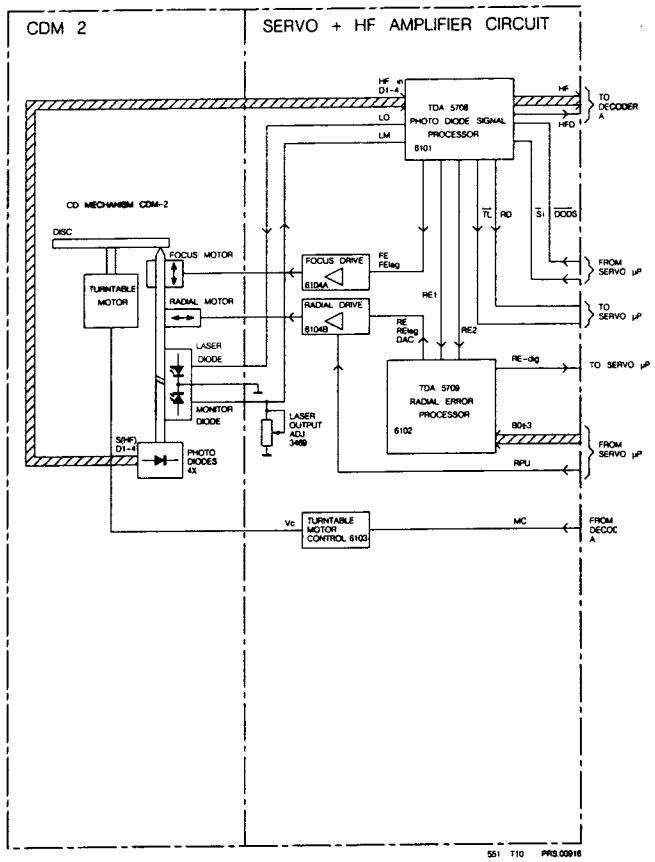


+1	+5V
+1B	+5V
+2	+9V ±2V
-1	-6V
-1B	6V
-2	-9V ±2V

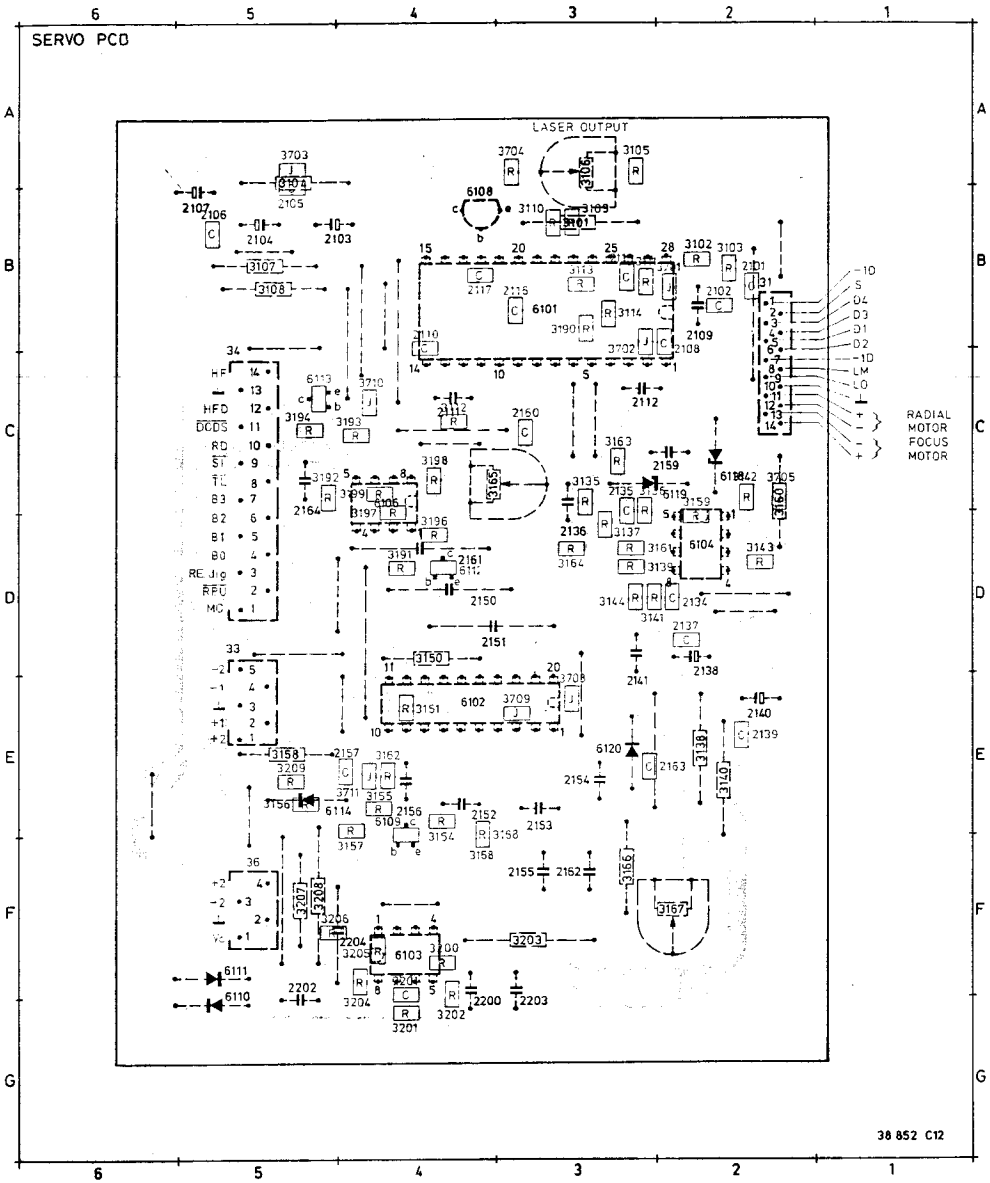
1001	J	2
1002	K	1
1003	J	1
1101	B	14
2101	F	3
2102	G	4
2103	J	4
2104	F	5
2105	F	6
2106	F	5
2107	F	4
2108	F	9
2109	I	10
2111	F	7
2112	G	10
2113	F	9
2114	F	10
2120	L	22
2121	L	22
2122	L	20
2123	M	19
2124	L	17
2125	M	17
2126	N	16
2127	N	14
2134	L	14
2135	J	11
2136	L	10
2137	K	13
2138	K	13
2139	L	13
2140	L	13
2150	I	17
2151	I	17
2152	D	17
2153	I	18
2154	I	17
2155	F	21
2156	G	21
2157	J	19
2159	G	23
2160	H	13
2170	A	14
2171	B	14
2172	C	14
2173	C	13
2174	A	9
3101	J	3
3102	F	4
3103	F	4
3104	J	4
3105	L	4
3106	L	4
3107	D	23
3108	A	23
3109	F	6
3110	F	8
3111	F	8
3112	F	7
3114	N	15
3115	O	16
3116	M	22
3117	M	14
3118	N	14
3119	L	22
3120	L	20
3121	M	20
3122	N	21
3123	N	21
3124	M	19
3125	L	19
3128	L	17
3129	L	16
3130	N	16
3131	M	16
3132	M	14
3133	M	18
3135	K	11
3136	K	11
3137	L	11
3138	J	13
3139	K	12
3140	L	12
3141	L	14
3142	K	14
3143	K	14
3145	L	12
3150	I	16
3151	F	21
3152	E	21
3154	F	21
3155	G	21
3156	I	20
3157	J	20
3158	I	19
3159	G	22
3160	G	23
3161	F	22
3162	G	21
3163	F	23
3170	E	4
3171	E	4
3172	D	3
3173	D	4
3174	D	4
3175	B	13
3176	A	23
3177	B	4
3178	B	4
3190	G	10
3701	J	4
3702	H	13
3703	I	13
3704	H	10
3705	F	13
3709	B	23
3710	B	23
3711	C	23
3712	C	23
3720	C	9
3721	C	9
3722	J	11
3724	M	18
6101	K	4
6102	I	20
6103	L	21
6103	M	18
6104	E	22
6104	K	12
6105	A	10
6106	N	15
6107	M	22
6108	J	4
6109	J	21
6110	O	18
6111	N	15
6112	M	19
6113	N	19
6114	J	20
6115	B	9
6116	M	15
6117	M	16
6118	F	23
6119	G	23

PRS.01808
T32/644

SERVO + PRE-AMPLIFIER PCB II

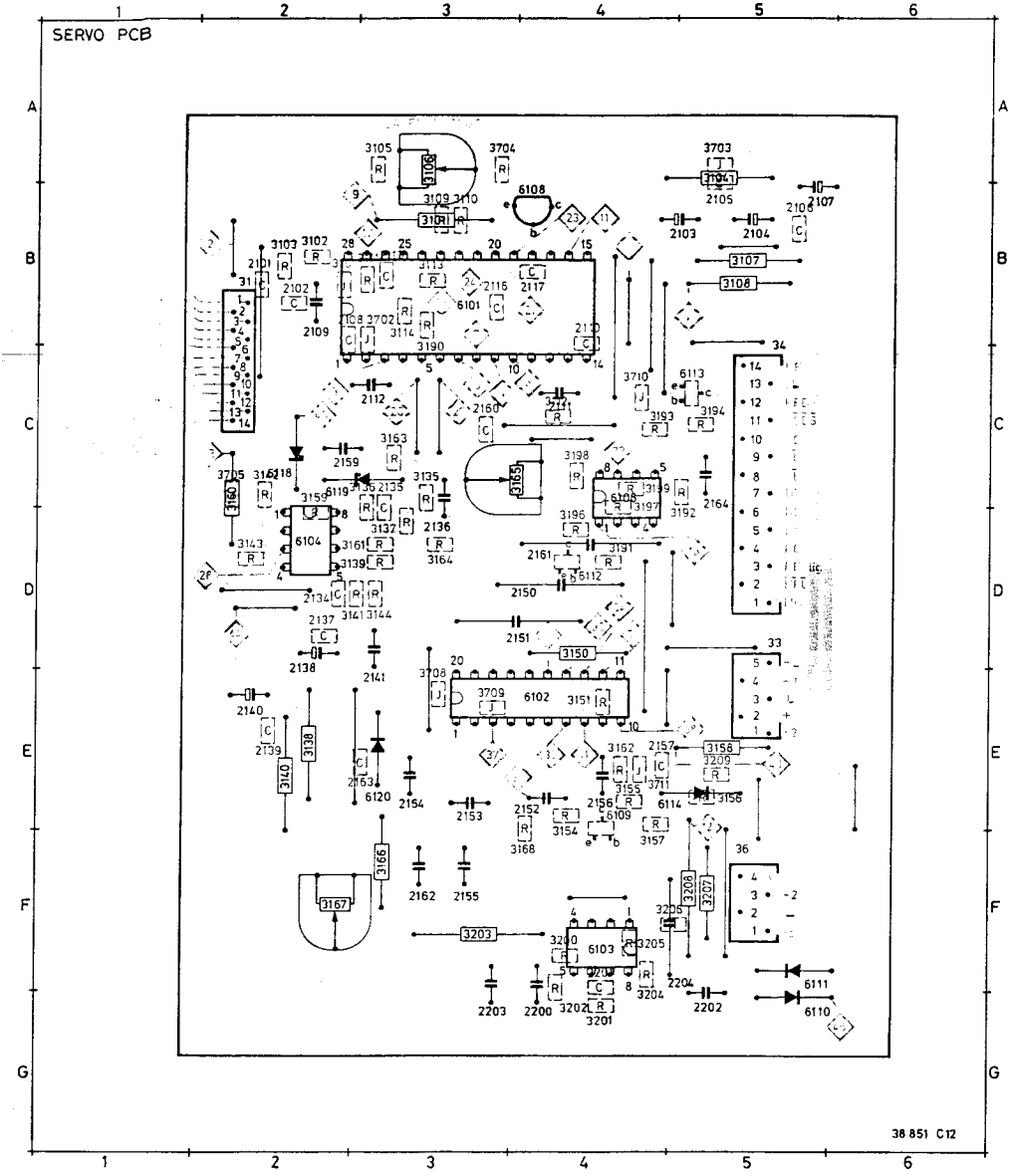


B0-B3	-	Control bits for radial circuit
DAC	-	Current output for track jumping (Digital to Analogue Converted)
$\overline{DODS}$	-	Drop out detector supression
D1÷4	-	Photodiode currents
FE	-	Focus error signal
FE lag	-	Focus error signal for LAG network
HF	-	HF output for DEMOD
HFD	-	HF detector output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



2101	B02	2106	B05	2111	C04	2134	D02	2139	E02	2152	E04	2157	E04	2163	B03	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	B03	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	B02	2151	C04	2156	D04	2171	C04	3102	B02
2103	B03	2108	B02	2113	B03	2123	E02	2129	E03	2138	B02	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 PARTS II

6101	TDA5708	4822 209 83202
6102	TDA5709	4822 209 83203
6103	NJM4560D	4822 209 83274
6104	L272M	4822 209 82374
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

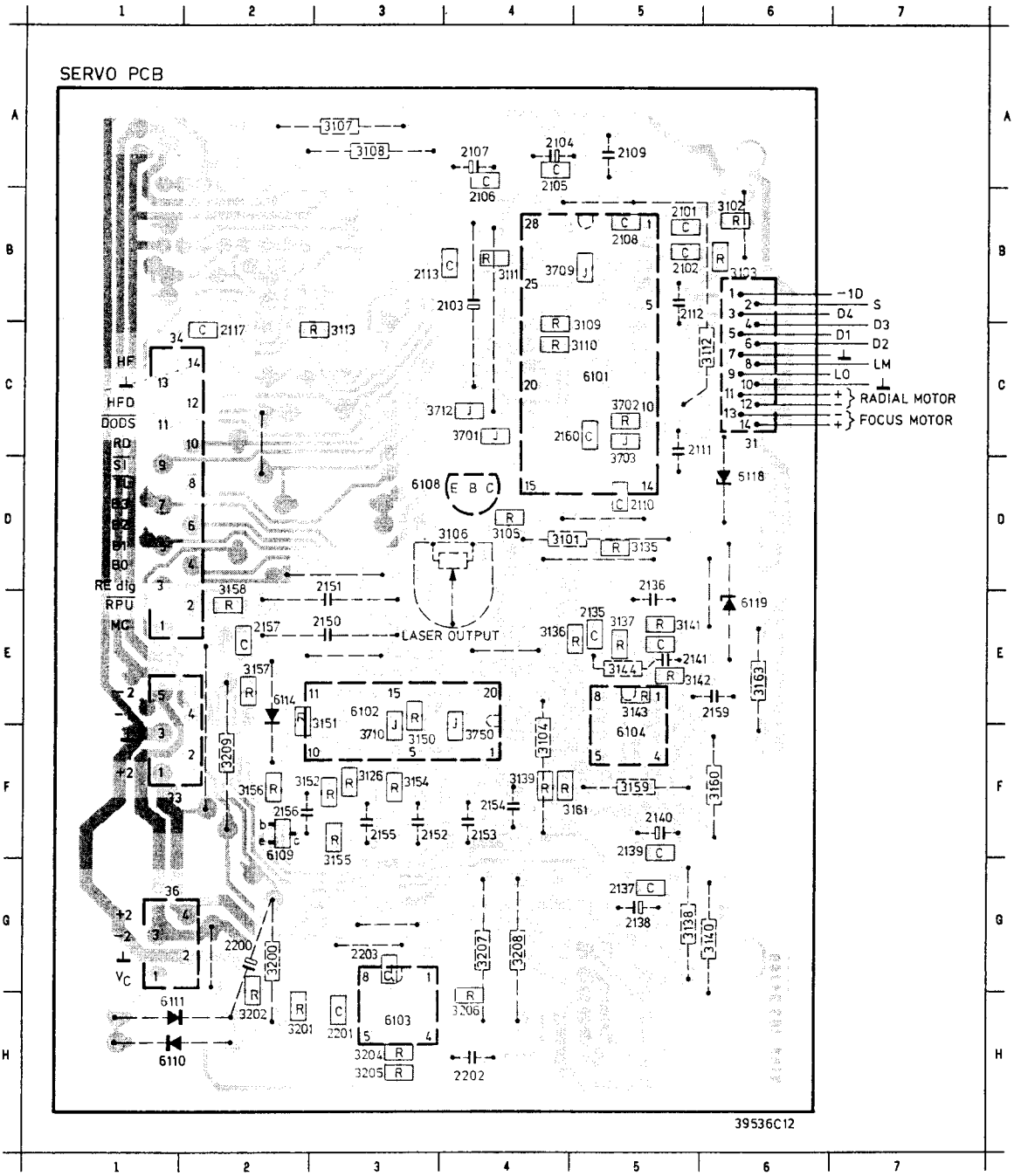
2150,2151	3.6 nF-160 V-1%	4822 121 51001
2159	1.5 µF- 50 V-131P	4822 124 21918

For chip capacitors see list on page 5-6

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

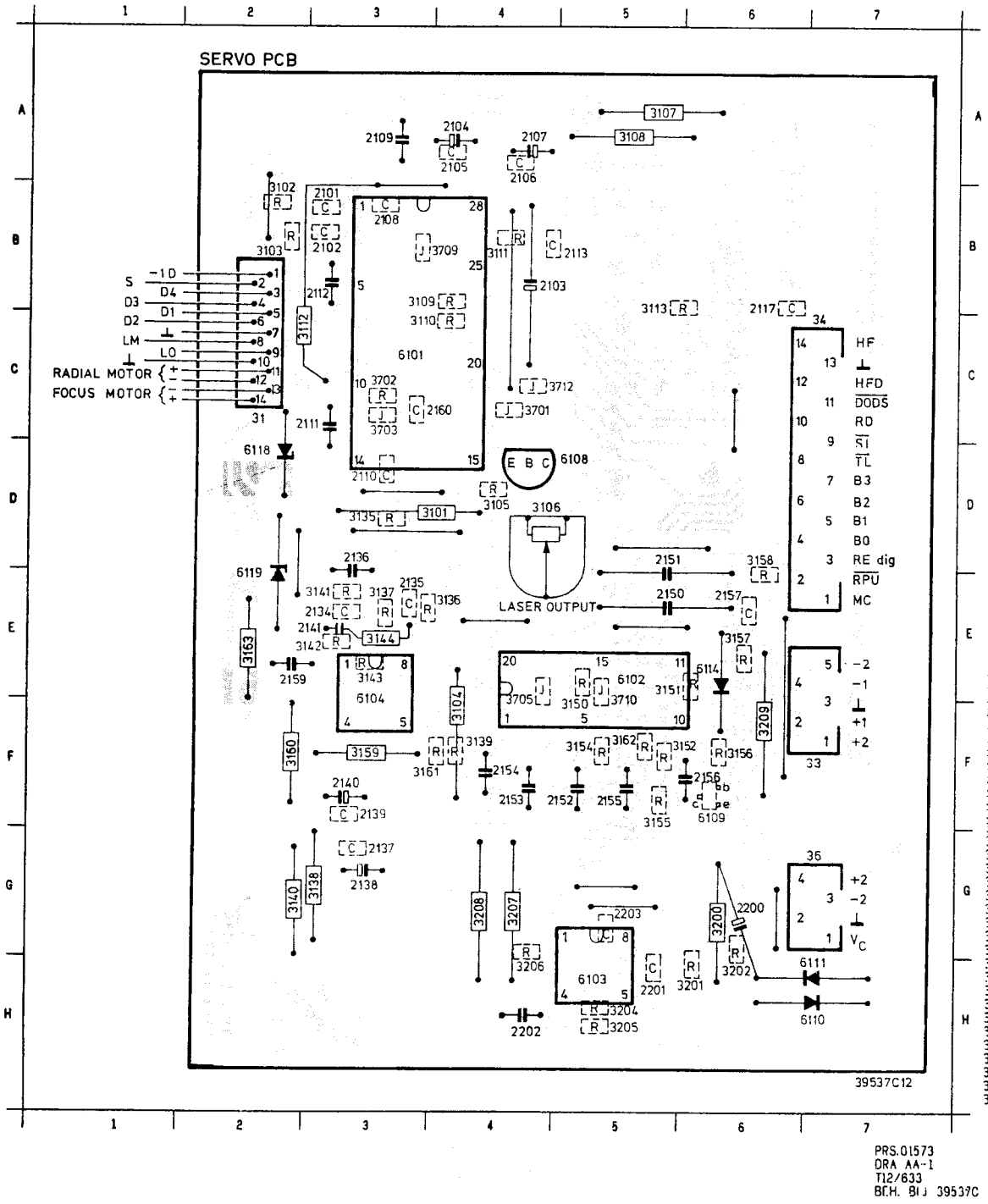
SERVO + PRE-AMPLIFIER PCB IIA



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

PRS.01572
DRA AA-1
T12/633
BFH. BIJ 39536C

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		
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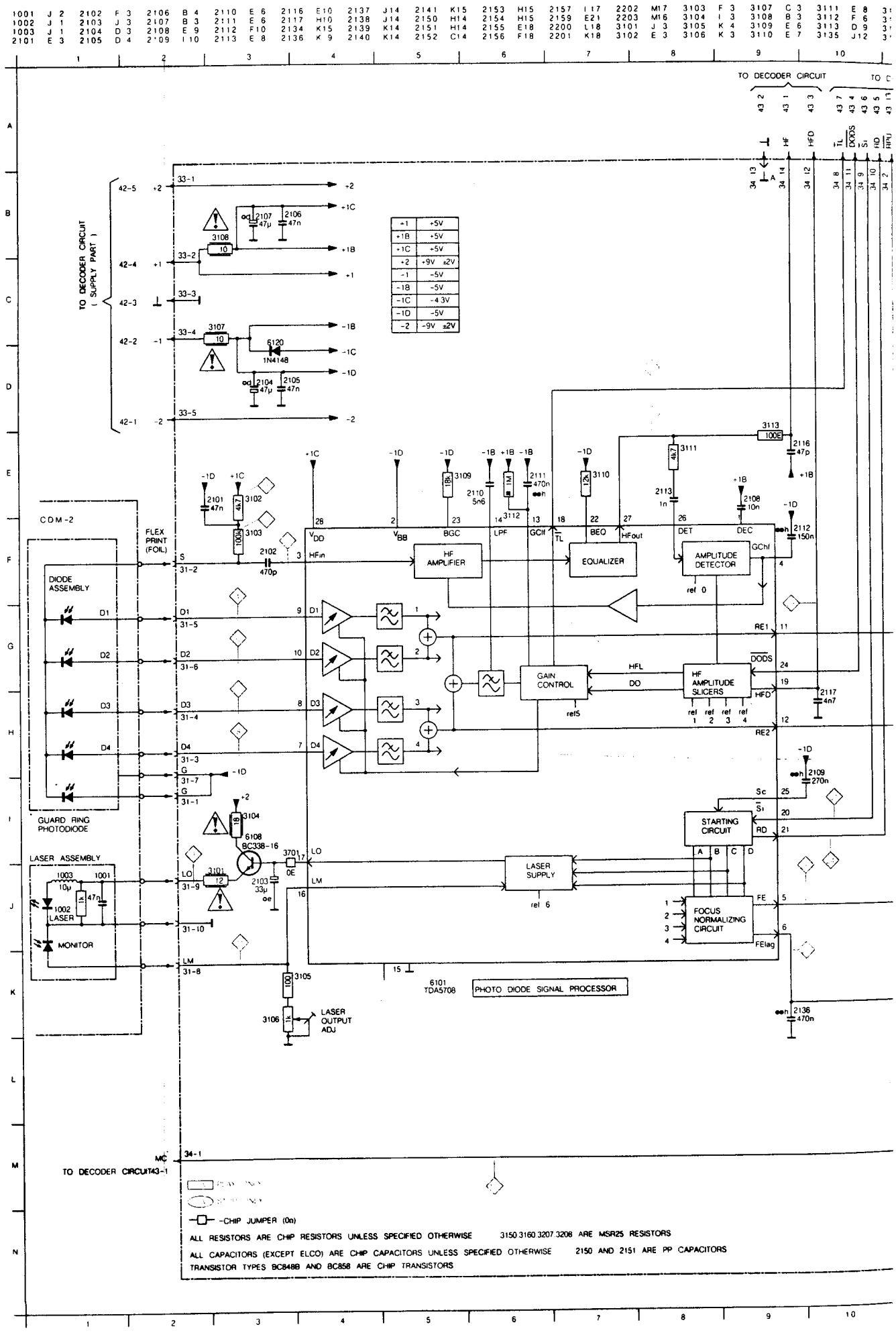
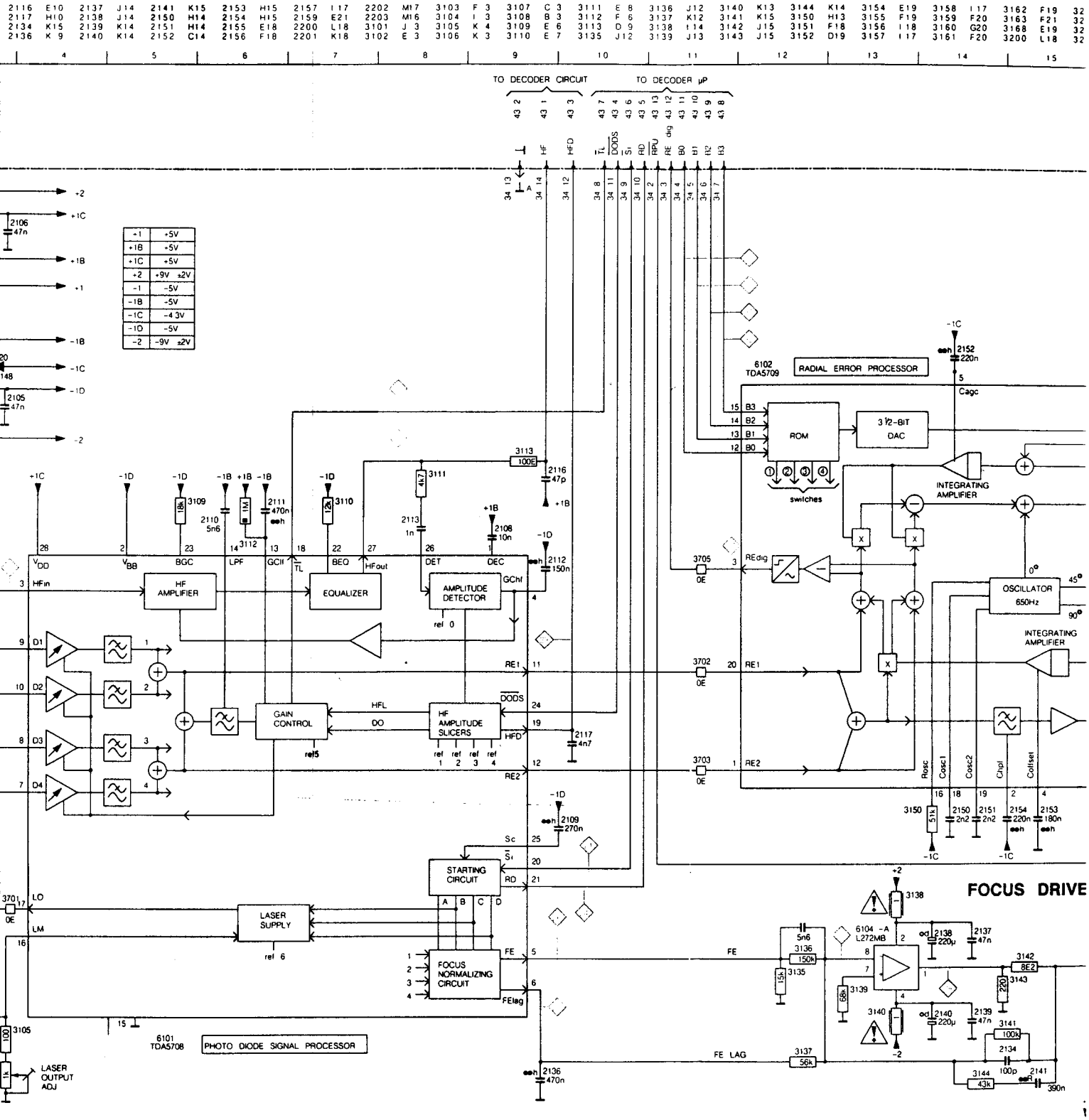
3206	H 4		
3207	G 4		

PRS.01573
DRA AA-1
T12/633
BCH. BIJ 39537C


TO DECODER CIRCUIT (SUPPLY PART)
+1 +5V
+1B +5V
+1C +5V
+2 +9V ±2V
-1 -5V
-1B -5V
-1C -4.3V
-1D -5V
-2 -9V ±2V
CDM-2
FLEX PRINT (FOIL)
DIODE ASSEMBLY
GUARD RING PHOTODIODE
LASER ASSEMBLY
LASER
MONITOR
HF AMPLIFIER
EQUALIZER
AMPLITUDE DETECTOR
GAIN CONTROL
HF AMPLITUDE SLICERS
STARTING CIRCUIT
LASER SUPPLY
FOCUS NORMALIZING CIRCUIT
LASER OUTPUT ADJ
6101 TDA5708
PHOTO DIODE SIGNAL PROCESSOR
TO DECODER CIRCUIT
-CHIP JUMPER (0Ω)
ALL RESISTORS ARE CHIP RESISTORS UNLESS SPECIFIED OTHERWISE 3150 3160 3207 3208 ARE MSR25 RESISTORS
ALL CAPACITORS (EXCEPT ELCO) ARE CHIP CAPACITORS UNLESS SPECIFIED OTHERWISE 2150 AND 2151 ARE PP CAPACITORS
TRANSISTOR TYPES BC848B AND BC858 ARE CHIP TRANSISTORS

SERVO + PRE-AMPLIFIER CIRCUIT IIA 5-6-a-3 5-6-a-3



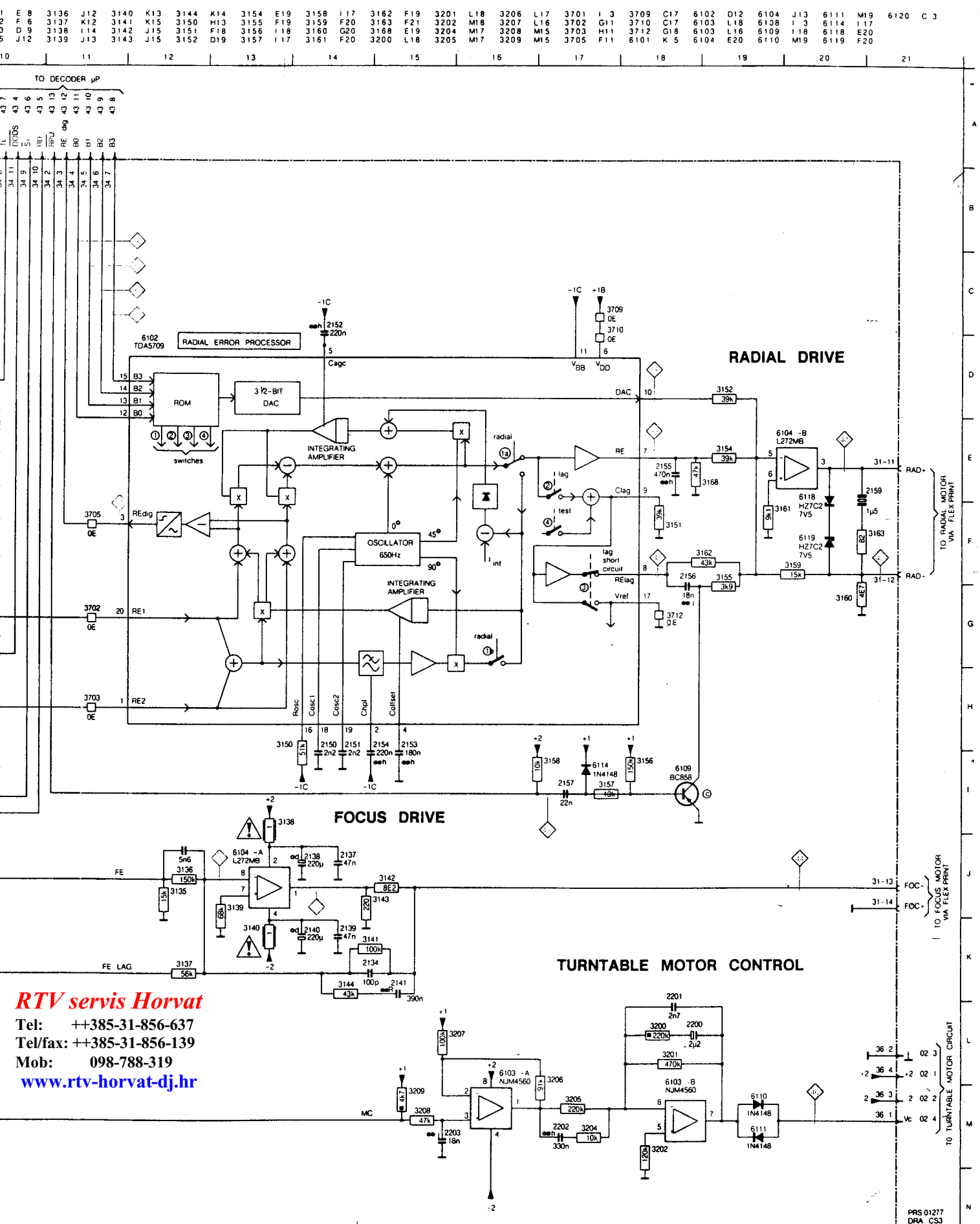
+1	+5V
+1B	+5V
+1C	+5V
+2	+9V ±2V
-1	-5V
-1B	-5V
-1C	-4.3V
-1D	-5V
-2	-9V ±2V

(On)

HIP RESISTORS UNLESS SPECIFIED OTHERWISE 3150.3160.3207.3208 ARE MSR25 RESISTORS

PT ELCO) ARE CHIP CAPACITORS UNLESS SPECIFIED OTHERWISE 2150 AND 2151 ARE PP CAPACITORS

48B AND BC858 ARE CHIP TRANSISTORS



ELECTRICAL PARTS IIA

6101	TDA5708	4822 209 83202
6102	TDA5709	4822 209 83203
6103	NJM4560D	4822 209 83274
6104	L272MB	4822 209 83197

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

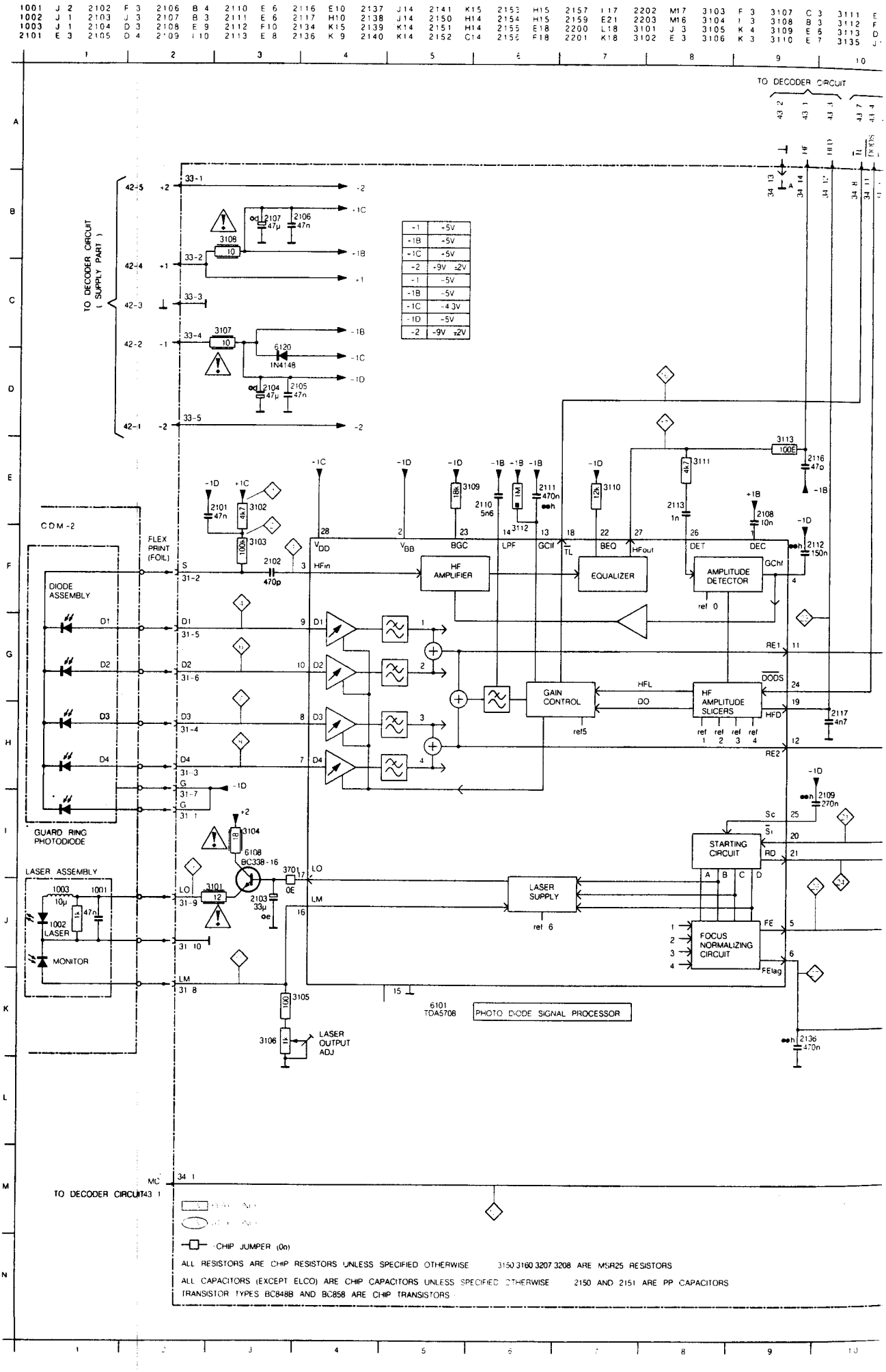
28P	IC socket	4822 255 40156
20P	IC socket	5322 255 44259
14P	Flex print connector	4822 290 60602

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

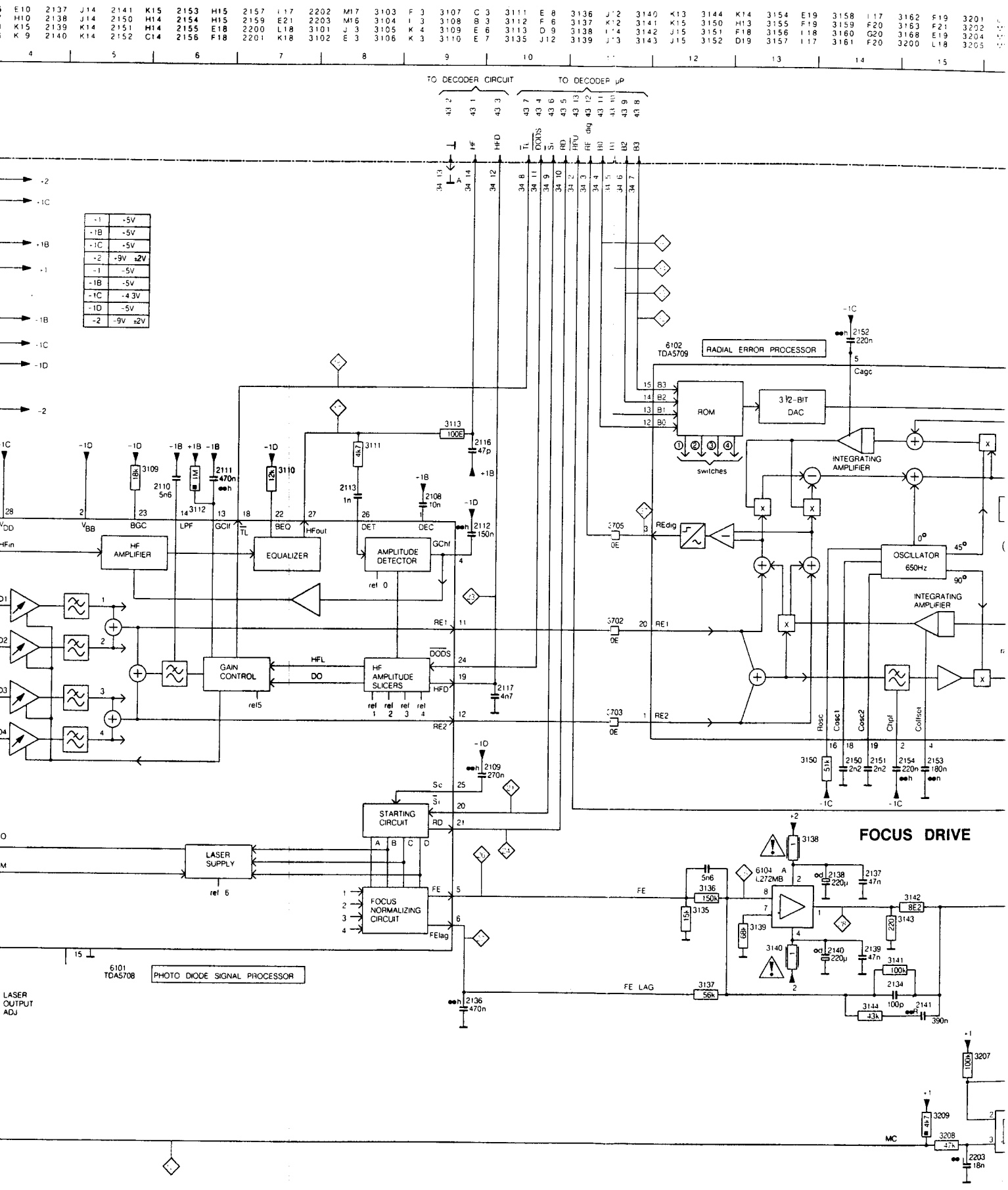
For chip capacitors see list on page 5-6

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

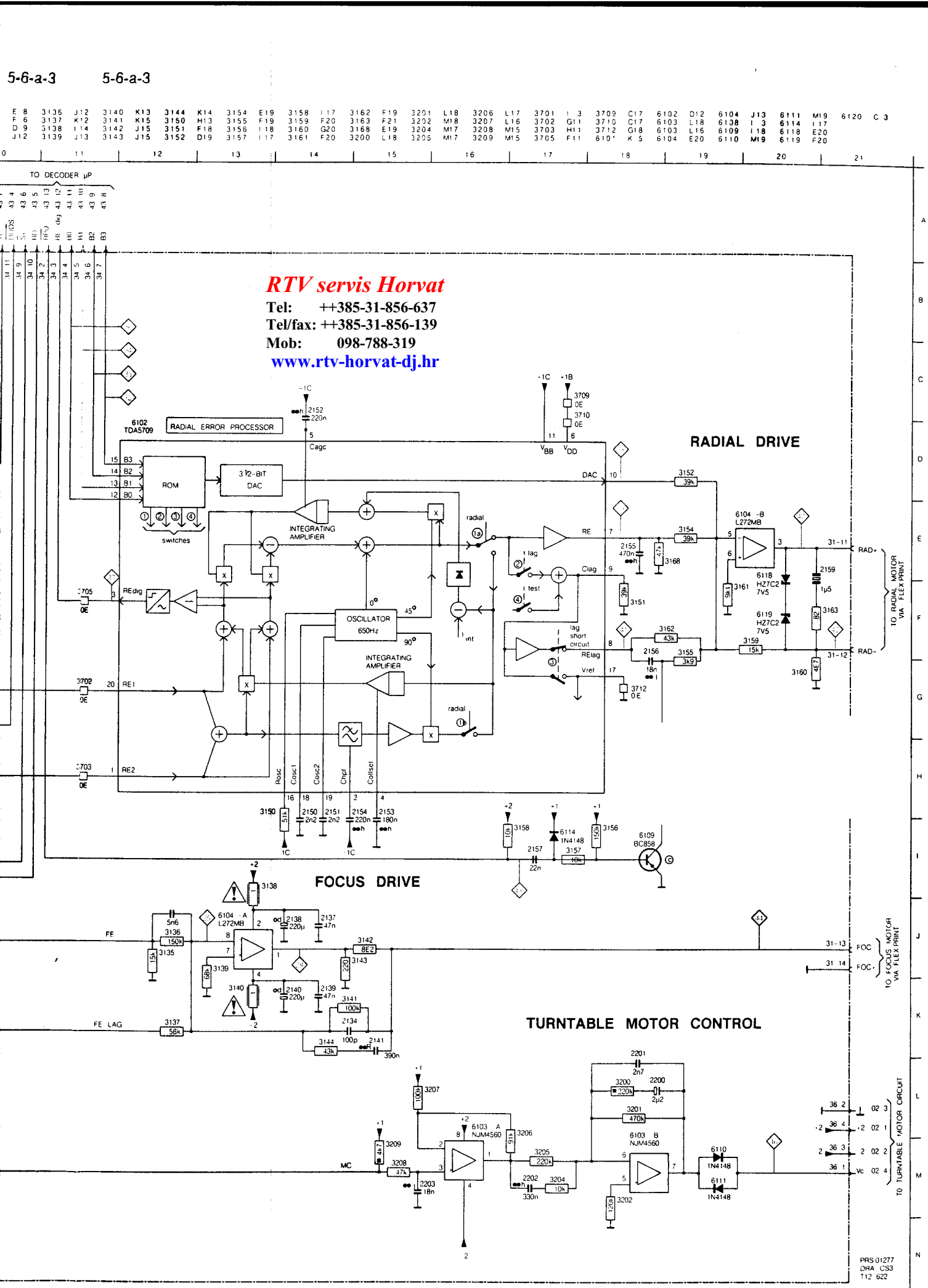

TO DECODER CIRCUIT
TO DECODER CIRCUIT (SUPPLY PART)
CDM-2
FLEX PRINT (FOIL)
DIODE ASSEMBLY
GUARD RING PHOTODIODE
LASER ASSEMBLY
1002 LASER
MONITOR
HF AMPLIFIER
EQUALIZER
AMPLITUDE DETECTOR
GAIN CONTROL
HF AMPLITUDE SLICERS
STARTING CIRCUIT
LASER SUPPLY
FOCUS NORMALIZING CIRCUIT
LASER OUTPUT ADJ
6101 TDA5708
PHOTO DIODE SIGNAL PROCESSOR
TO DECODER CIRCUIT
CHIP JUMPER (0Ω)
ALL RESISTORS ARE CHIP RESISTORS UNLESS SPECIFIED OTHERWISE 3150 3160 3207 3208 ARE MSR25 RESISTORS
ALL CAPACITORS (EXCEPT ELCO) ARE CHIP CAPACITORS UNLESS SPECIFIED OTHERWISE 2150 AND 2151 ARE PP CAPACITORS
TRANSISTOR TYPES BC848B AND BC858 ARE CHIP TRANSISTORS

SERVO + PRE-AMPLIFIER CIRCUIT IIA 5-6-a-3 5-6-a-3



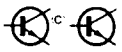
-1	-5V
-1B	+5V
-1C	+5V
+2	+9V ±2V
-1	-5V
-1B	-5V
-1C	-4.3V
-1D	-5V
-2	-9V ±2V

TORS UNLESS SPECIFIED OTHERWISE 3150 3160 3207 3208 ARE MSR25 RESISTORS
ARE CHIP CAPACITORS UNLESS SPECIFIED OTHERWISE 2150 AND 2151 ARE PP CAPACITORS
BC858 ARE CHIP TRANSISTORS

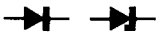


ELECTRICAL PARTS IIA

6101	TDA5708	4822 209 83202
6102	TDA5709	4822 209 83203
6103	NJM4560D	4822 209 83274
6104	L272MB	4822 209 83197



6109	BC858B	5322 130 41983
6108	BC338-16	4822 130 40892

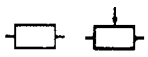


6110,6111 6114,6120	1N4148	4822 130 30621
6118,6119	HZ7C2	4822 130 32862

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

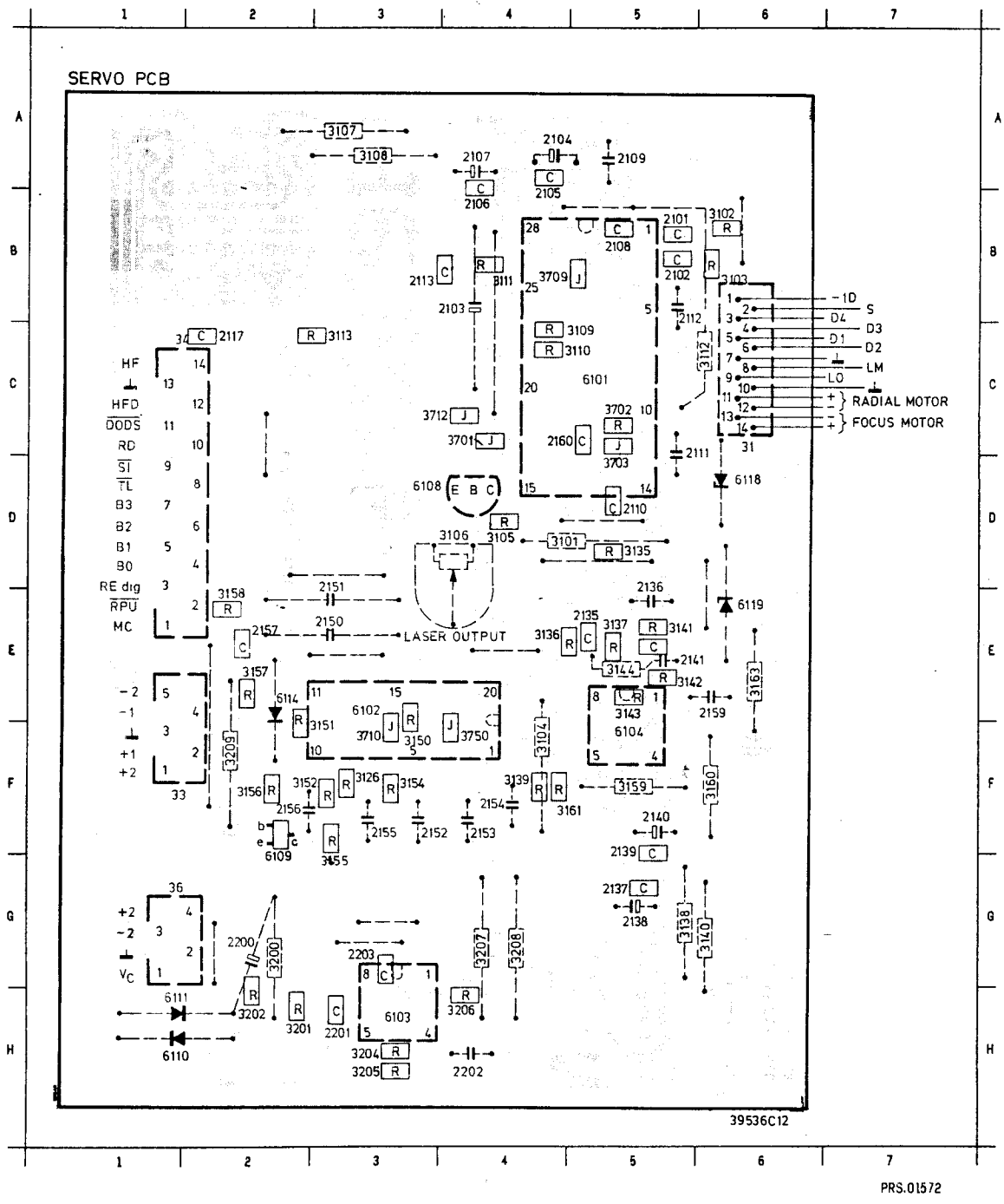
For chip capacitors see list on page 5-6



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

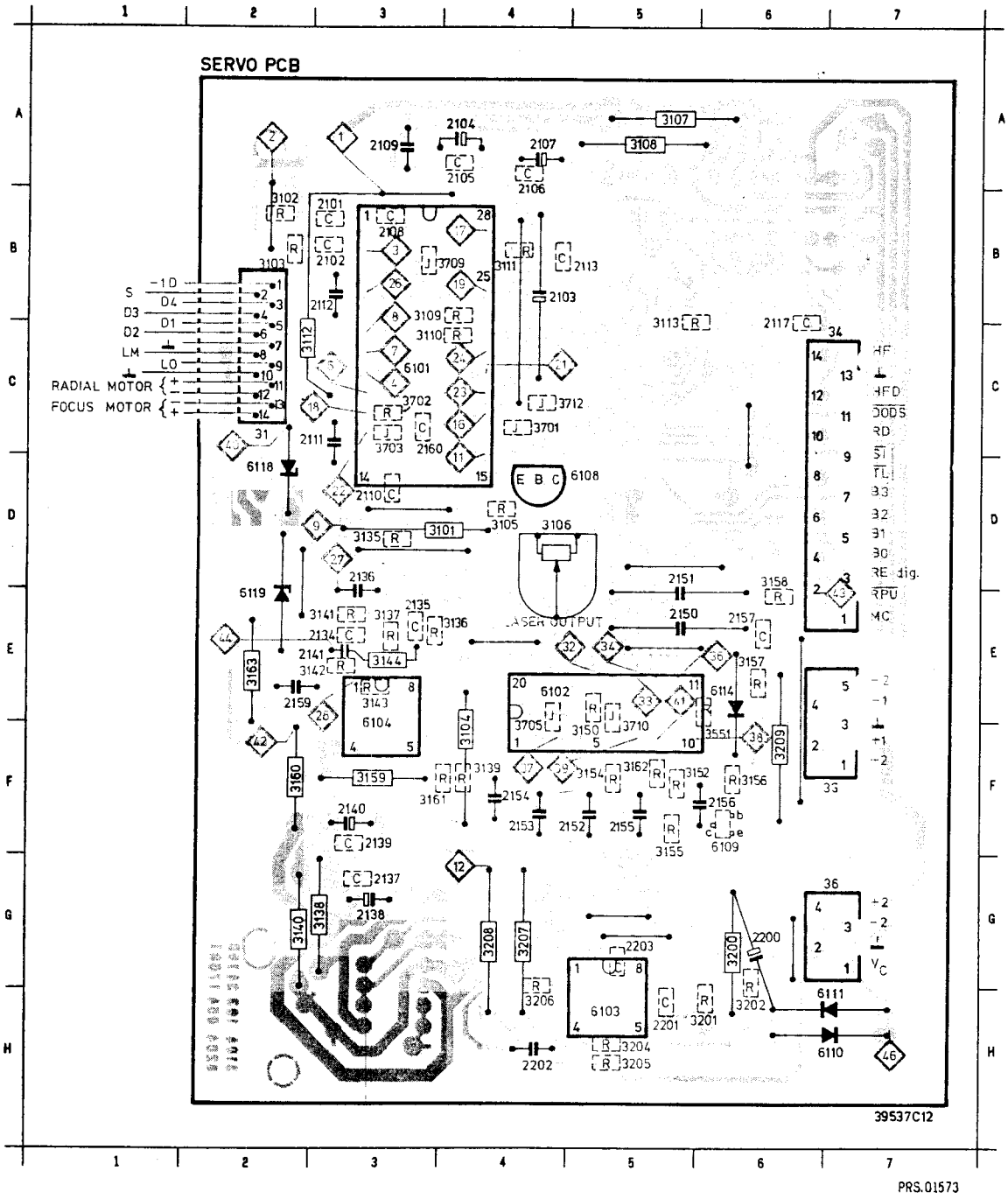
SERVO + PRE-AMPLIFIER PCB IIA



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

5-6-b-2

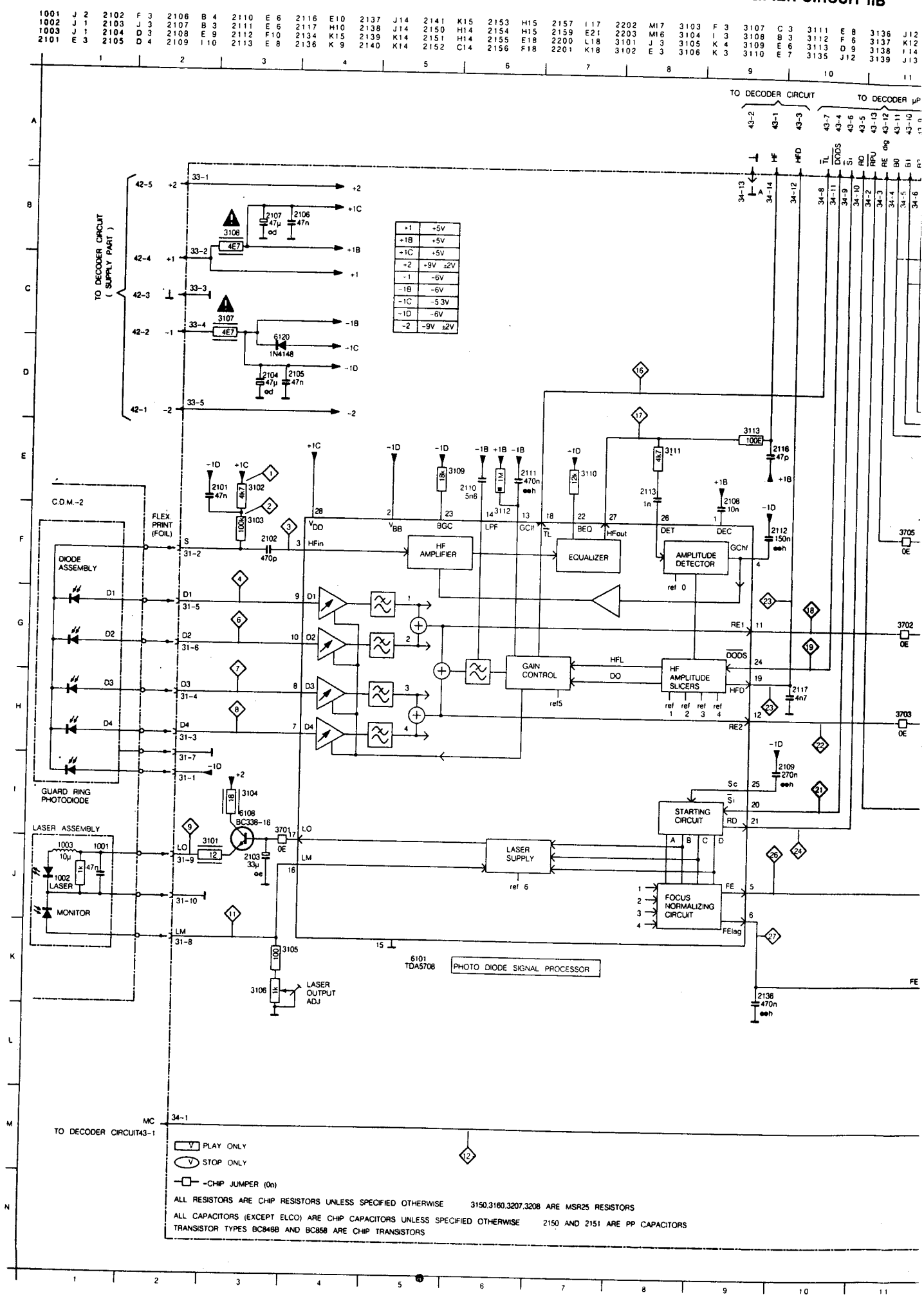
SERVO + PRE-AMPLIFIER PCB IIA



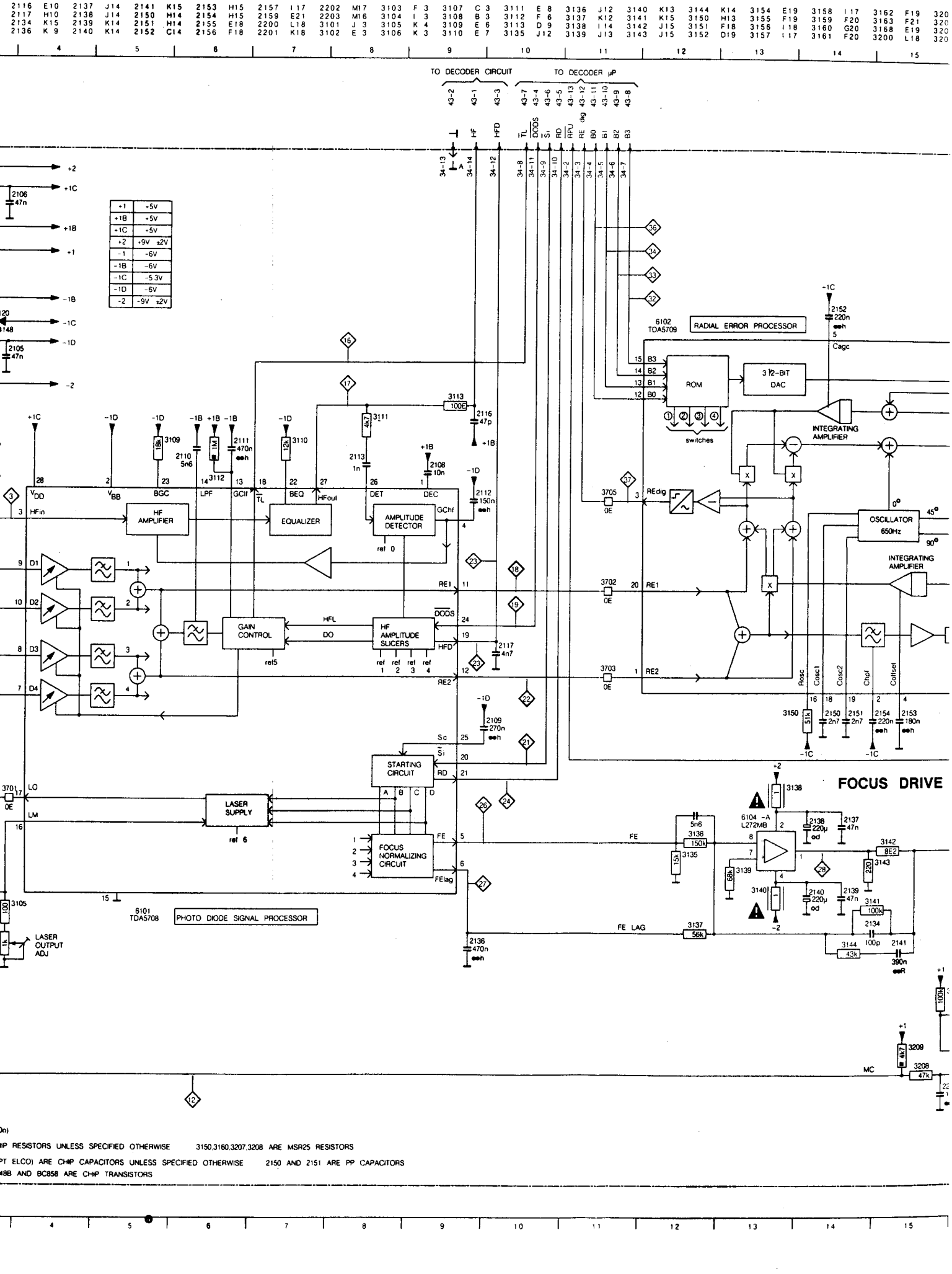
2101	B	3	3208	G	4
2102	B	3	3209	F	6
2103	B	4	3701	C	4
2104	A	4	3702	C	3
2105	A	4	3703	C	3
2106	A	4	3705	E	4
2107	A	4	3709	B	4
2108	B	3	3710	E	5
2109	A	3	3712	C	5
2110	D	3	6101	C	3
2111	C	3	6102	E	5
2112	B	3	6103	H	5
2113	B	5	6104	F	3
2117	B	6	6108	D	5
2134	E	3	6109	F	6
2135	E	3	6110	H	7
2136	D	3	6111	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



SERVO + PRE-AMPLIFIER CIRCUIT IIB

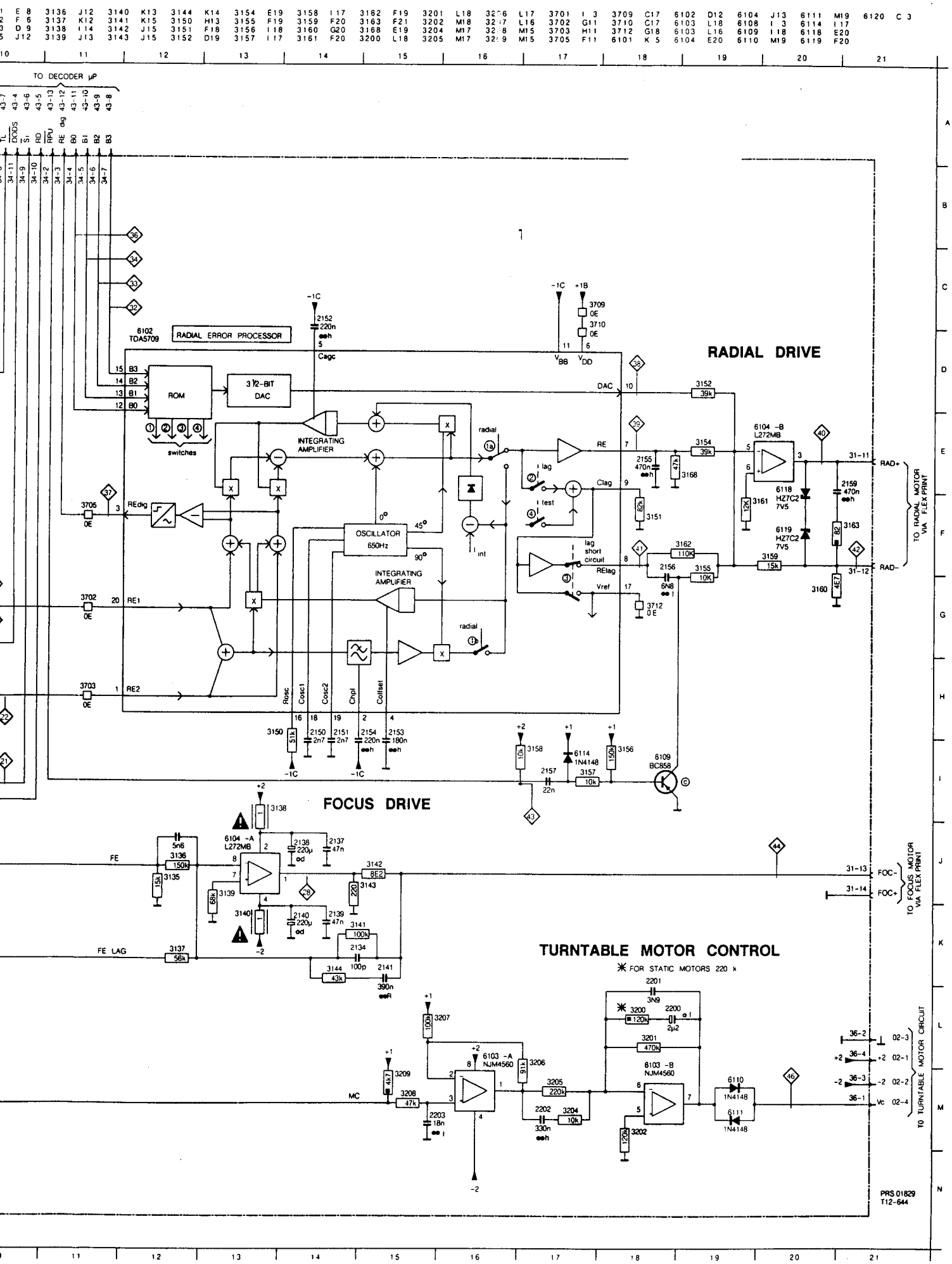


+1	+5V
+1B	+5V
+1C	+5V
+2	+9V ±2V
-1	-6V
-1B	-6V
-1C	-5.3V
-1D	-6V
-2	-9V ±2V

IP RESISTORS UNLESS SPECIFIED OTHERWISE 3150,3160,3207,3208 ARE MSR25 RESISTORS

PT ELCO) ARE CHIP CAPACITORS UNLESS SPECIFIED OTHERWISE 2150 AND 2151 ARE PP CAPACITORS

48B AND BC858 ARE CHIP TRANSISTORS


TO DECODER µP
RADIAL ERROR PROCESSOR
6102 TDA5709
ROM
3½-BIT DAC
INTEGRATING AMPLIFIER
switches
OSCILLATOR 650Hz
INTEGRATING AMPLIFIER
RADIAL DRIVE
FOCUS DRIVE
TURNTABLE MOTOR CONTROL
* FOR STATIC MOTORS 220 k
6104 -A L272MB
6104 -B L272MB
6103 -A NJM4560
6103 -B NJM4560
6109 BC858
6114 1N4148
6110 1N4148
6111 1N4148
6118 HZ7C2 7V5
6119 HZ7C2 7V5
RAD+
RAD-
FOC-
FOC+
TO RADIAL MOTOR VIA FLEX PRINT
TO FOCUS MOTOR VIA FLEX PRINT
TO TURNTABLE MOTOR CIRCUIT
PRS 01829
T12-644

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

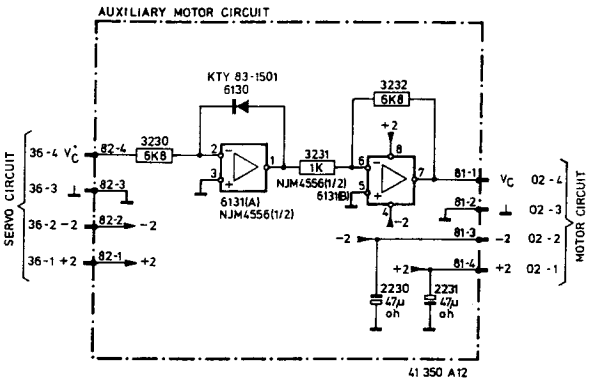
28P	IC socket	4822 255 40156
20P	IC socket	5322 255 44259
14P	Flex print connector	4822 290 60602

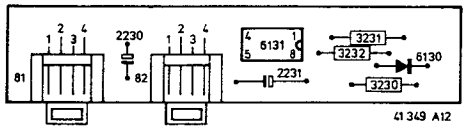
2150,2151	3.6 nF-160 V-1%	4822 121 51001
2159	1.5 µF- 50 V-131P	4822 124 21918

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

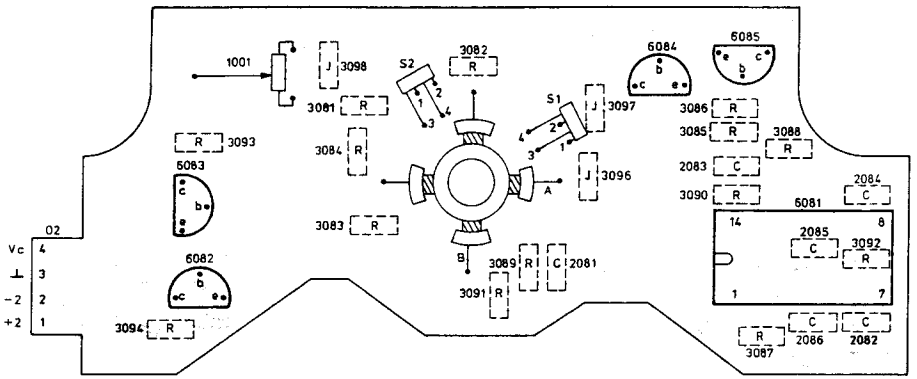
For chip resistors see list on page 5-8-a



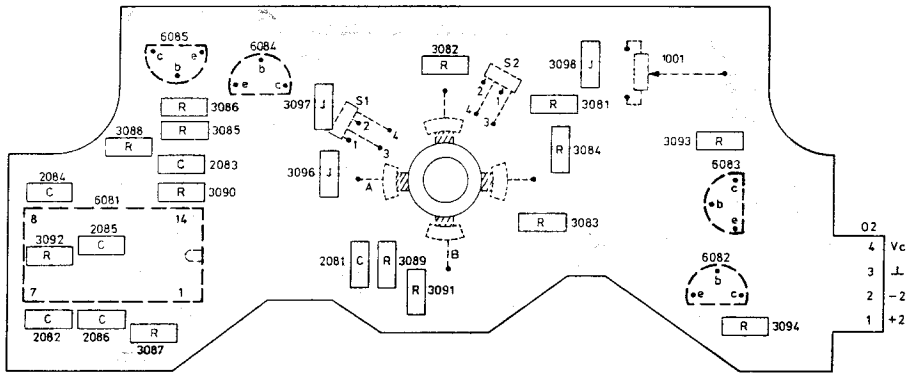


* Only for version 0303

MOTOR PCB



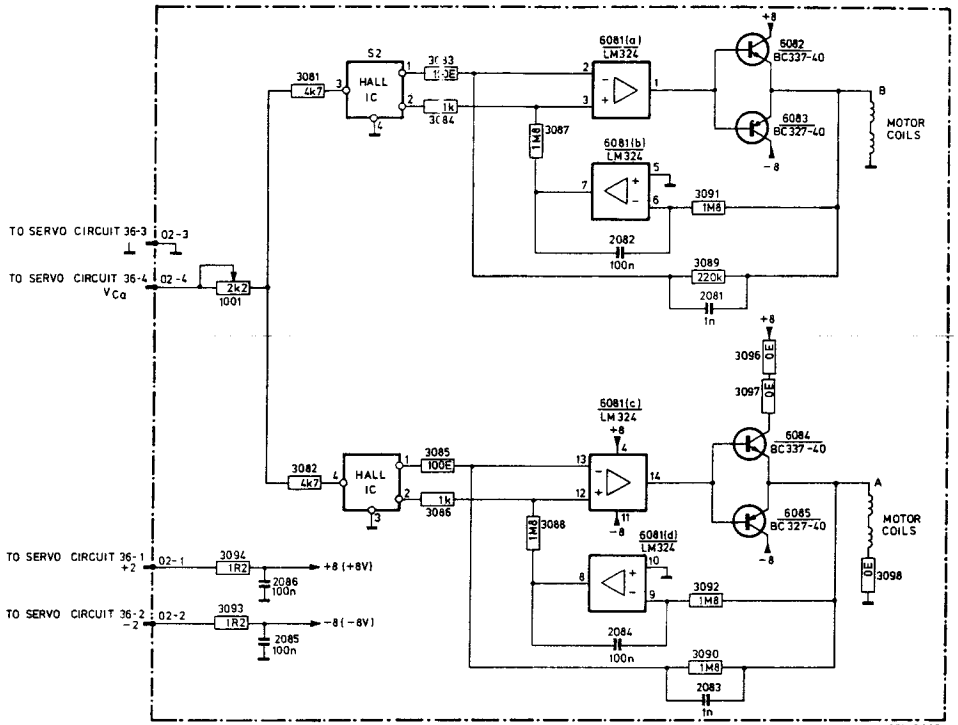
38 024 C12



38 025 C12

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

MOTOR CIRCUIT



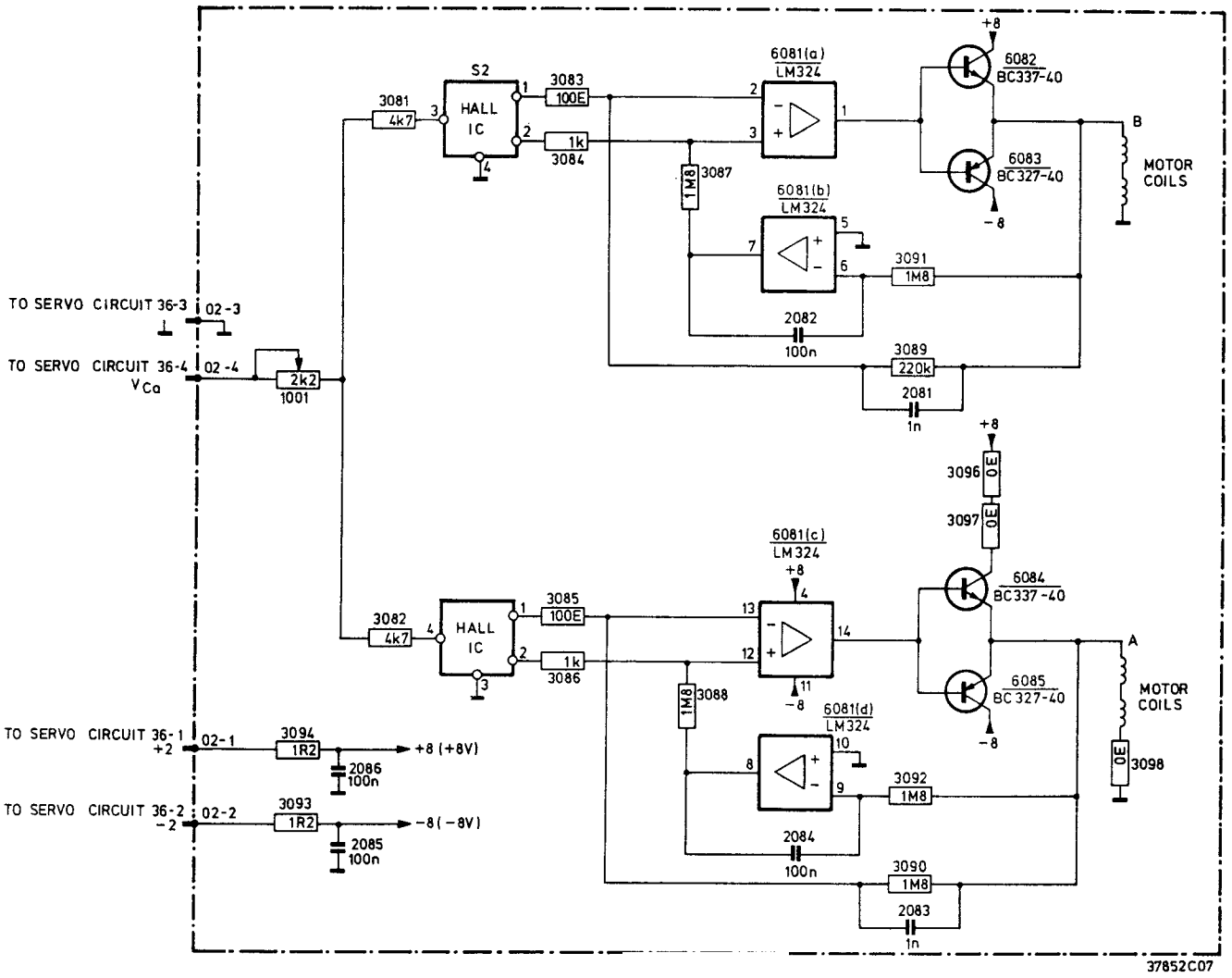
	Carbon film 0.2 W	70°C	5%	Ceramic plate Tuning ≤ 120 pF NP.0	2%
	Carbon film 0.33 W	70°C	5%	Others	−20/+80%
	Metal film 0.33 W	70°C	5%	Polyester flat foil	10%
	Carbon film 0.5 W	70°C	5%	Metalized polyester flat film	10%
	Carbon film 0.67 W	70°C	5%	Polyester flat foil small size (Mylar)	10%
	Carbon film 1.15 W	70°C	5%	Polysterene film/foil	1%
				Tubular ceramic	
				Miniature single	
				Subminiature tantalum	± 20%

© Chip component

*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

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

© Chips 50 V NP0 S1206

1 pF	5%	4822 122 32279
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
8,2 pF	5%	4822 122 32083
10 pF	5%	4822 122 31971
12 pF	5%	4822 122 32139
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 32267
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
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

© Chips 0,125 W S1206

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 90338
3,6 E	5%	4822 111 90389
3,9 E	5%	4822 111 90391
4,3 E	5%	4822 111 90392
4,7 E	5%	5322 111 90376
5,1 E	5%	4822 111 90393
5,6 E	5%	4822 111 90394

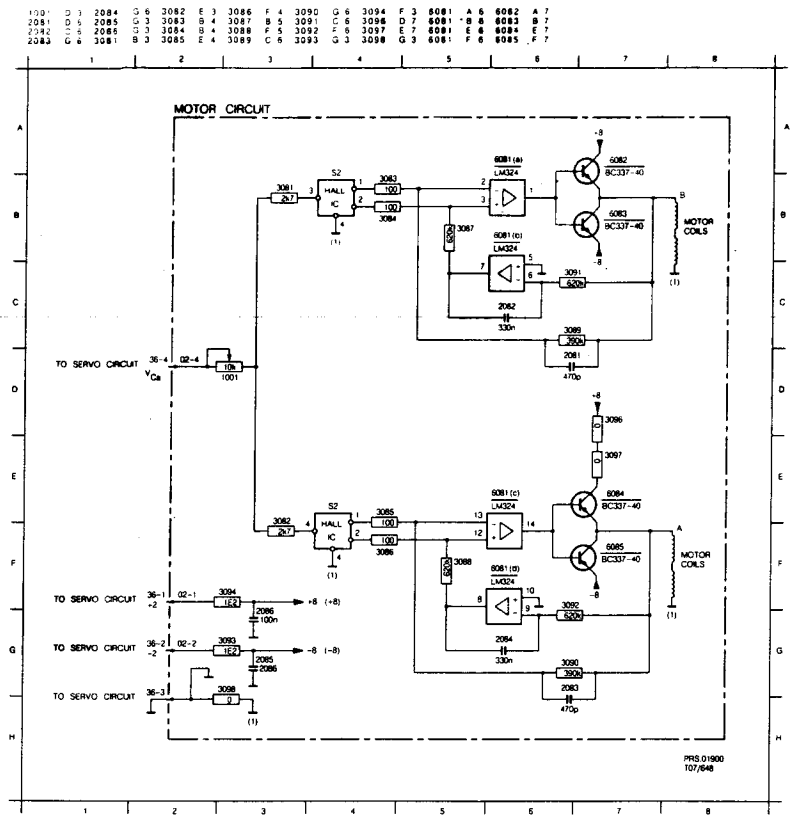
© Chips 0,125 W S1206

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 90375
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
6,8 k	2%	4822 111 90544

© Chips 0,125 W S1206

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

DYNAMIC MOTOR CIRCUIT



For motor PCB see page 5-7

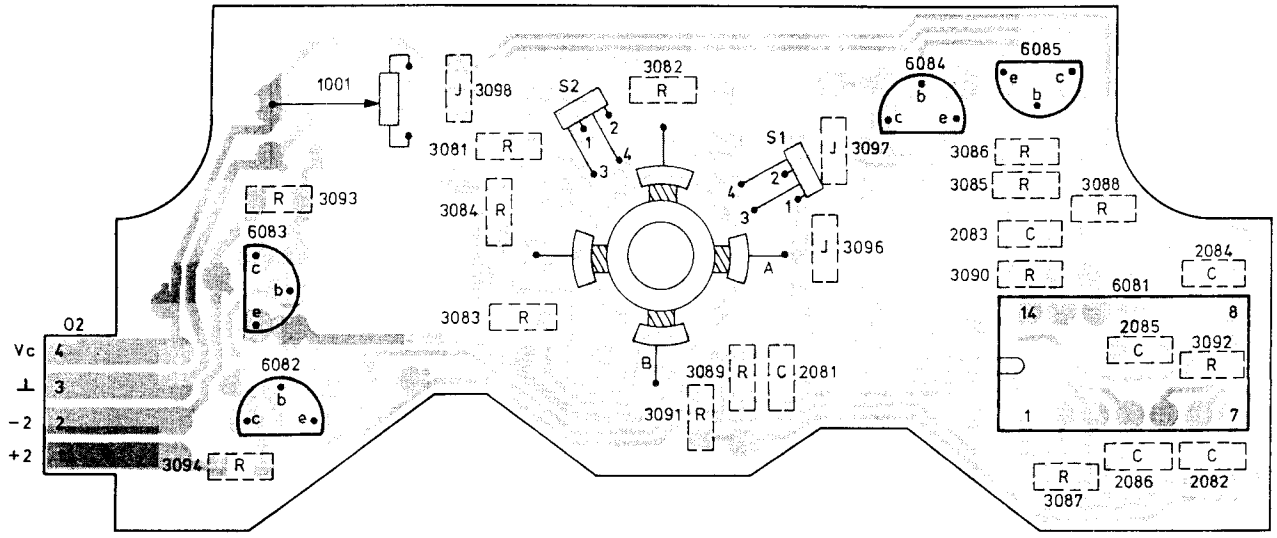
Chips 50 V NP0 S1206		
1 pF	5%	4822 122 32479
1,5 pF	5%	4822 122 31792
1,8 pF	5%	4822 122 32087
2,2 pF	5%	4822 122 32425
3,3 pF	5%	4822 122 32079
3,9 pF	5%	4822 122 32081
4,7 pF	5%	4822 122 32082
5,6 pF	5%	4822 122 32506
6,8 pF	5%	4822 122 32507
8,2 pF	5%	4822 122 32083
10 pF	5%	4822 122 31971
12 pF	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

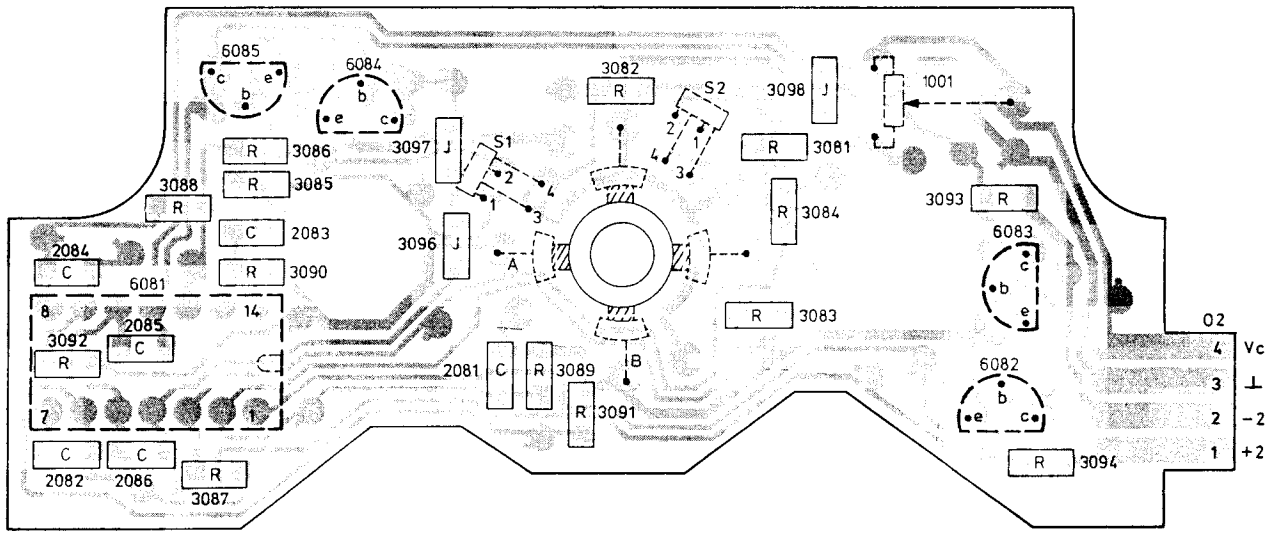
Chips 0,125 W S1206		
4,7 E	5%	5322 111 90376
5,1 E	5%	4822 111 90393
5,6 E	5%	4822 111 90394
6,2 E	5%	4822 111 90395
6,8 E	5%	4822 111 90254
7,5 E	5%	4822 111 90396
8,2 E	5%	4822 111 90397
9,1 E	5%	4822 111 90398
10 E	2%	5322 111 90095
11 E	2%	4822 111 90338
12 E	2%	4822 111 90341
13 E	2%	4822 111 90343
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			1S
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	

MOTOR PCB



38 024 C12



38 025 C12

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

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.	