

Compact disc player CD65

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

Service
Service
Service



40 035 A12

22 APR. 1988

For servicing hints of the CD mechanism
see Service Manual C.D.M.-2 (version top HI-FI).

Service Manual

COMPACT
disc
DIGITAL AUDIO

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- 5 Exploded views and parts lists of mechanical components
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- 7 Changes
- 8 Additional information

**CLASS 1
LASER PRODUCT**

3122 110 03420

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

Documentation Technique Service Dokumentation Documentazione di Servizio Huolto-Ohje Manual de Servicio Manual de Serviciu

Subject to modification

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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).

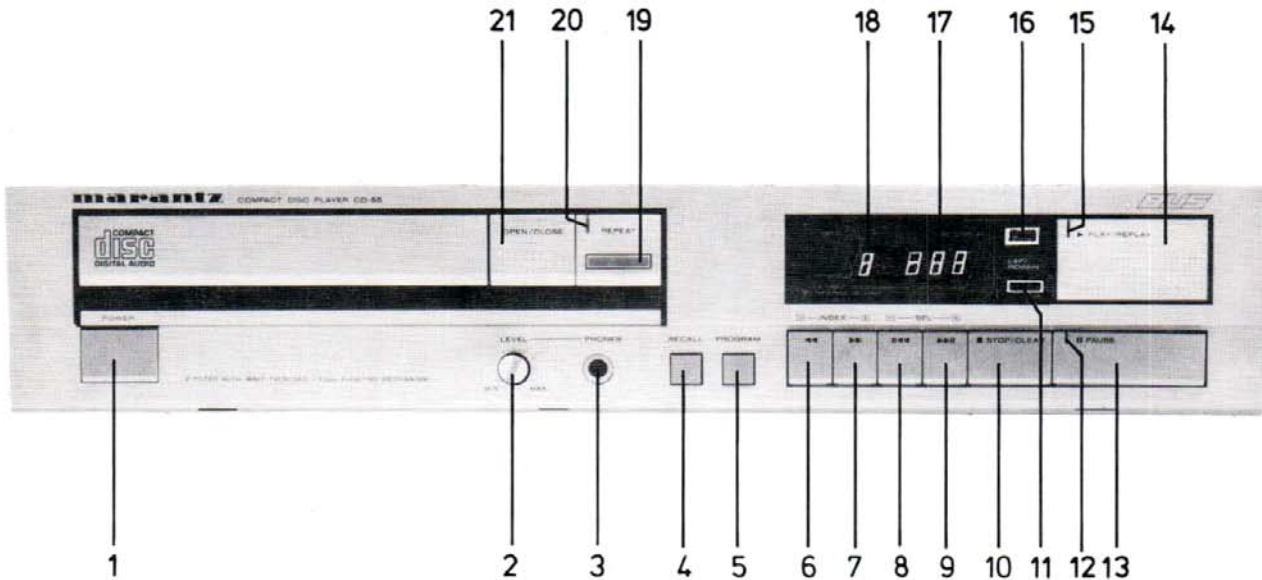


Fig. 1

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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 programme 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 programme).
- 7 "INDEX +" key: for fast search forwards to a particular passage (in the play mode or the programme).
- 8 "SELECT -" key: in the play mode one can select track numbers backwards. In the programme 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 programme 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 programme. 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 programme.
- 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 programme.
- 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 separate disc hold-downs should be used.

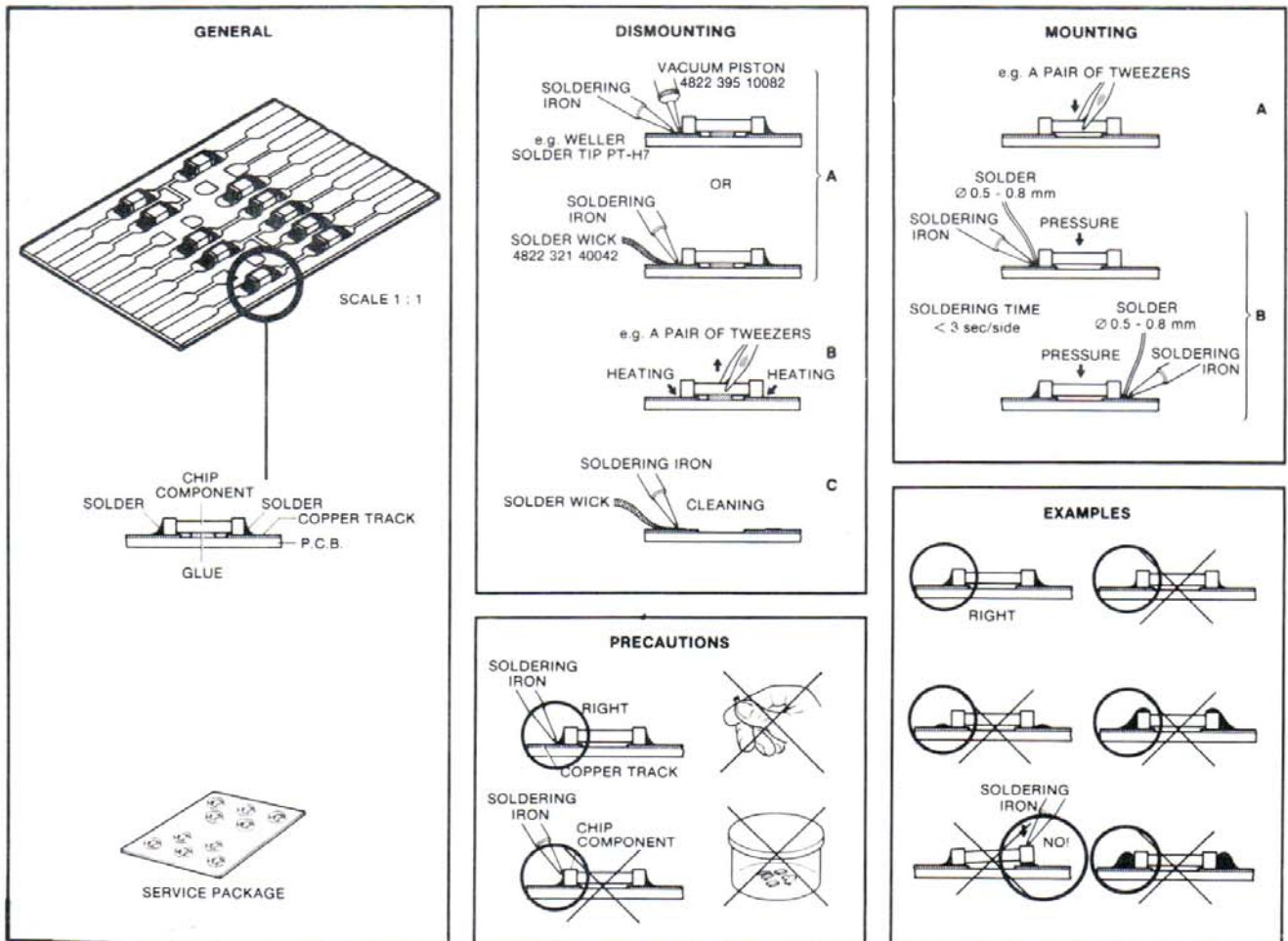
The set can function normally then.

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 finger-prints	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



27 012C12

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).

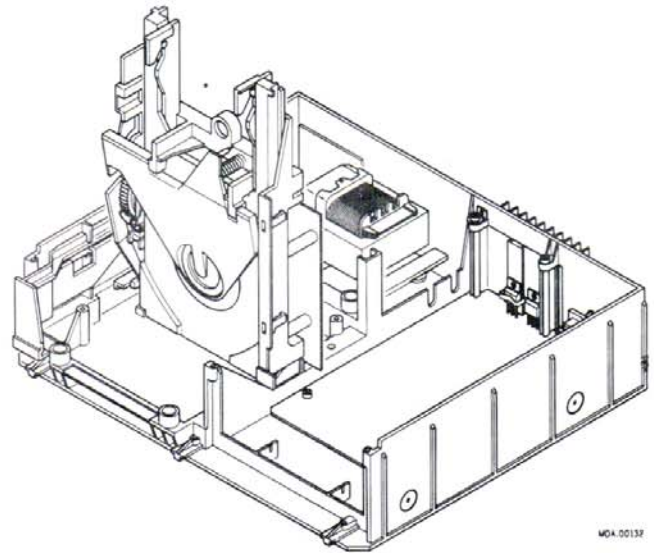


Fig. 3

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

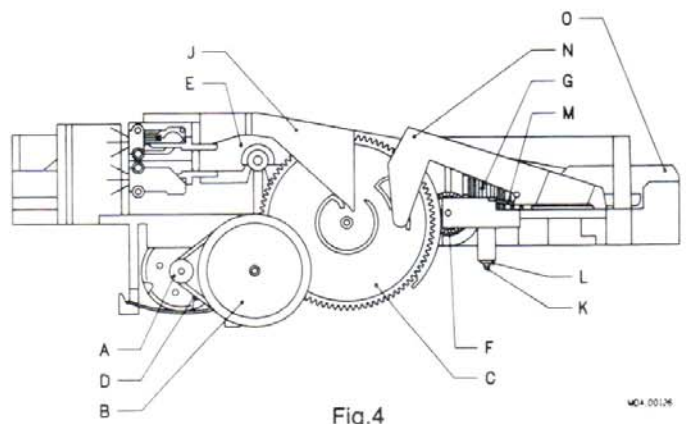


Fig.4

- 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.

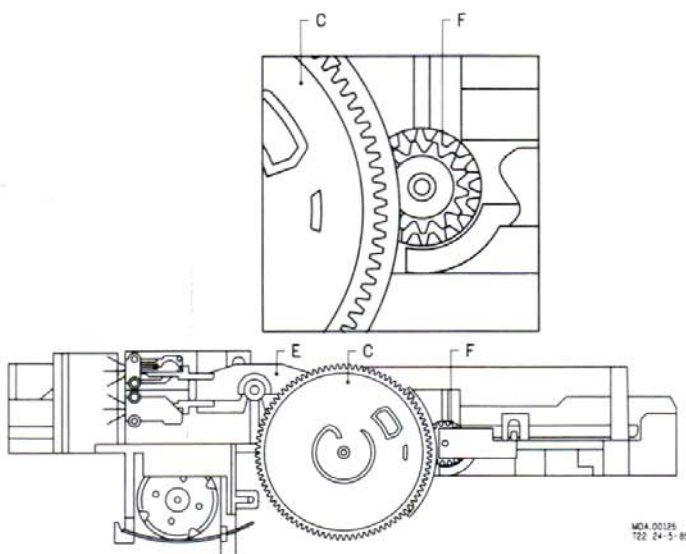


Fig. 5

- 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 pulley 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

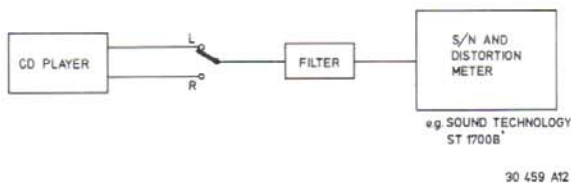


Fig. 6

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

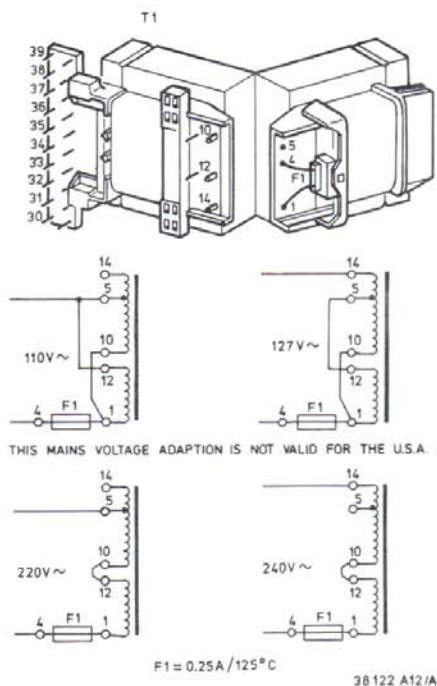


Fig. 7

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 + preamp. 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. ②) 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 μ P IC6301

With the self-test the following parts of the μ P are tested:

- RAM
 - ROM
 - TIMER
 - serial I/O interface
 - I/O gates
- Interrupt the I²C connection on connector 46-1 on the decoder panel.
 - Unsolder pins 1, 7, 26 and 27 of the decoder μ P.
 - Render pin 2 of the servo μ P "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 μ P will go low within 1s.

Self-test of the control and display μ P IC6056

With this self-test the following parts of the μ P are tested:

- RAM
 - ROM
 - TIMER
 - serial I/O interface
 - I/O gates
- Interrupt the I²C connection on connector pin 21-4 on the control + display panel.
 - Render pin 2 of the control display μ P "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 μ P will go "low" again within 1s.

Initiation of the servicing programme of the μ P

-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 μ P 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 μ P IC6301

● **Self-test decoder μ P**

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

● **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.

● **\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 μ P that track loss threatens. The μ P 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

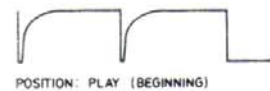
● **Check the MC signal (pin 17; test point 81)**

- 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 μ sec.

- 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 μ s/DIV.

Amplitude $\approx 1.5 V_{pp}$



● 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 MUTE signal (pin 11; test point 67) is "high"

When Filter-B IC is applied, the MUTE input will not be used.

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

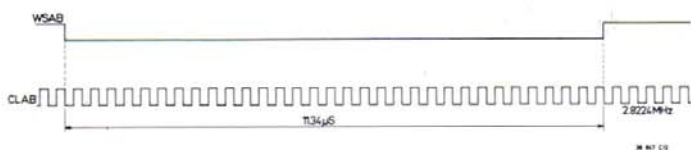
- Place a disc on the turntable.
- In stand-by mode (only the mains switch is depressed), the frequency lies between 2.82 MHz and 5.64 MHz.
- In the position PLAY and SERVICE POSITIONS 2 and 3, the frequency is 4.32 MHz.

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

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

● 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).

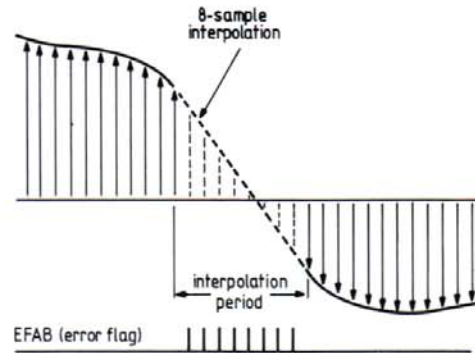


● Check the EFAB signal (Error Flag from Decoder-A to Filter-B) at test point 74 (pin 36)

- 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.



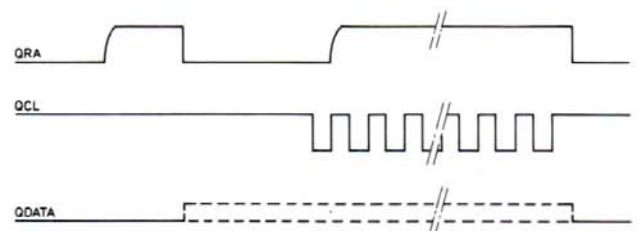
38 845 A12

● 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.



38 846 A12

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

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

Note:

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

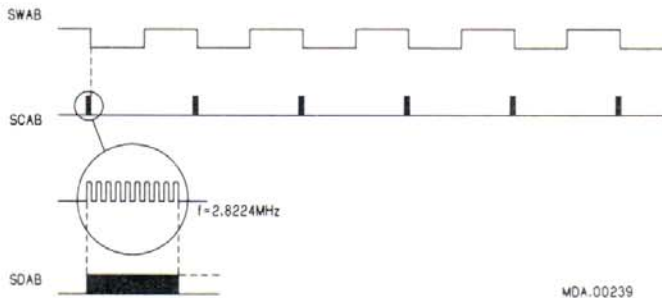
● **Check the subcode clock signals**

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

Note:

While the burst of 10 clock pulses, appear on SCAB the Q-channel information is transferred on SDAB. Hereafter the P-bit indication follows.

The P-bit is "high" between two bursts of 10 clock pulses in case of pause indication and "low" in case of music indication.



● **Check the $\overline{\text{CRI}}$ signal**

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

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

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

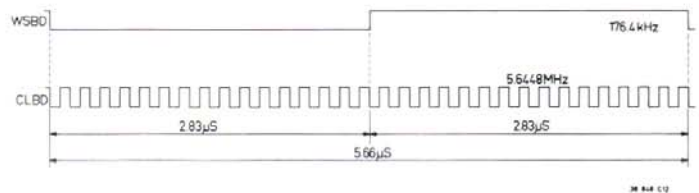
- Place a disc on the turntable.
- Select one of the following positions: SERVICE POSITION 3 or position PLAY.
- Trigger the oscilloscope with the WSBD signal (Word Select from Filter B to DAC) test point 85 (pin 18).

Check the following signals:

WSBD at test point 85; pin 18

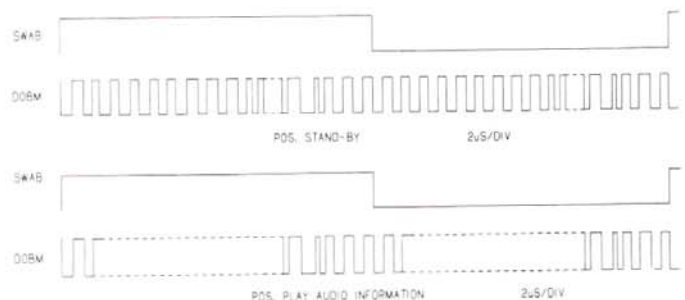
CLBD at test point 87; pin 16 (Clock signal from Filter B to DAC) and their interrelation.

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 DEEM CIRCUIT

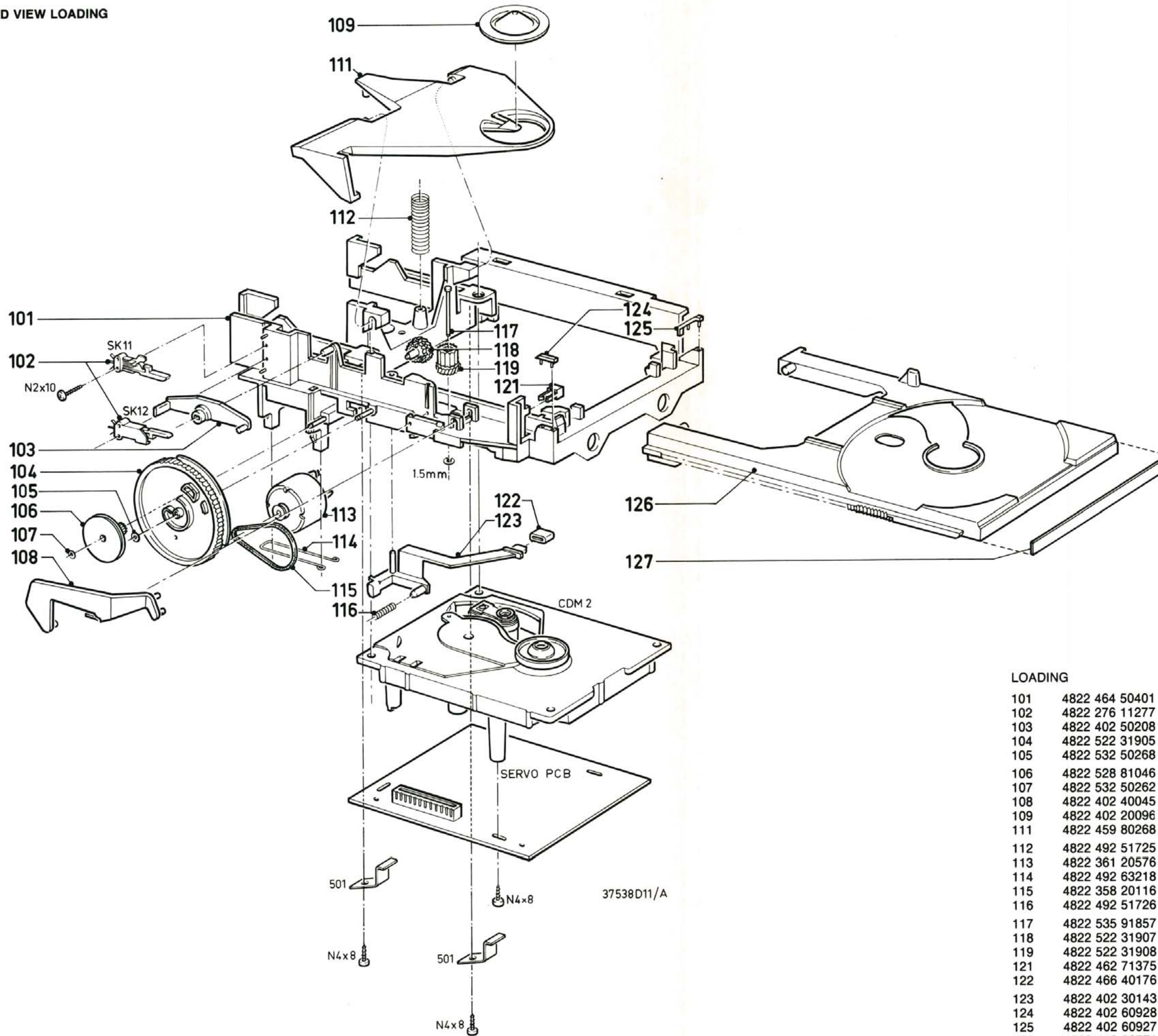
- Check $\overline{\text{DEEM}}$ circuit
 - Place test disc 5 on the turntable.
 - During playback of track no. 14 (recorded without **PRE-EMPHASIS**) the $\overline{\text{DEEM}}$ signal at test point 84 should be "high".
 - During playback of track no. 15 (recorded with **PRE-EMPHASIS**), the $\overline{\text{DEEM}}$ 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



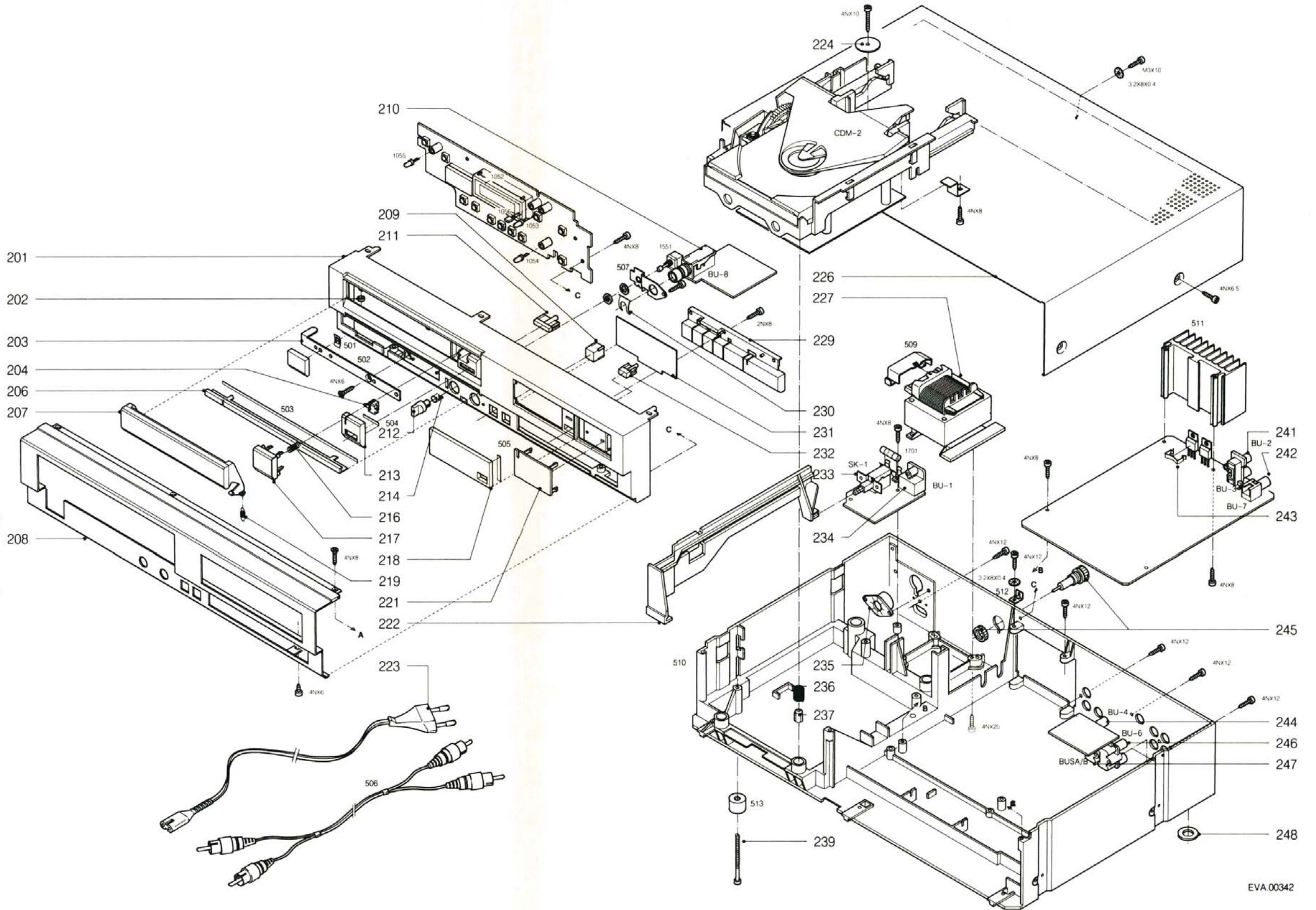
LOADING

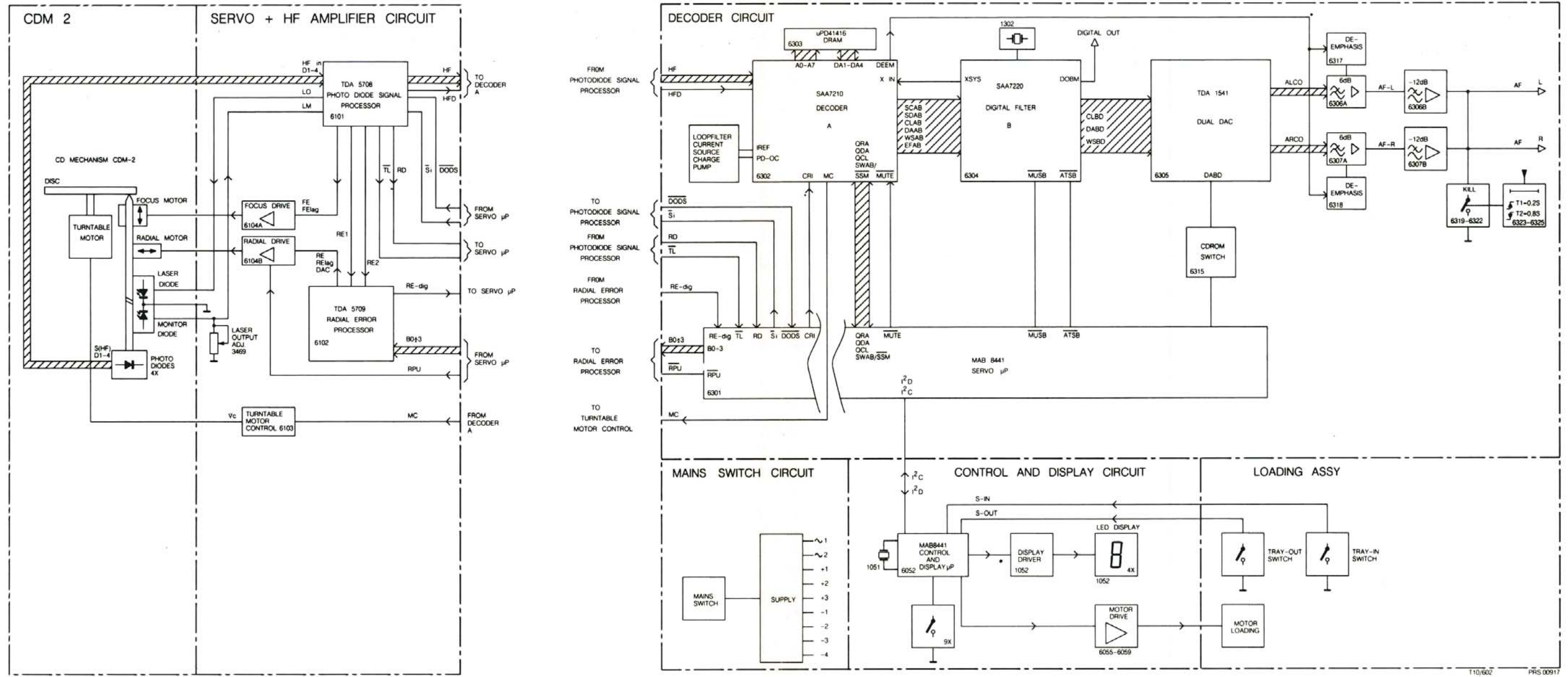
101	4822 464 50401
102	4822 276 11277
103	4822 402 50208
104	4822 522 31905
105	4822 532 50268
106	4822 528 81046
107	4822 532 50262
108	4822 402 40045
109	4822 402 20096
111	4822 459 80268
112	4822 492 51725
113	4822 361 20576
114	4822 492 63218
115	4822 358 20116
116	4822 492 51726
117	4822 535 91857
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

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





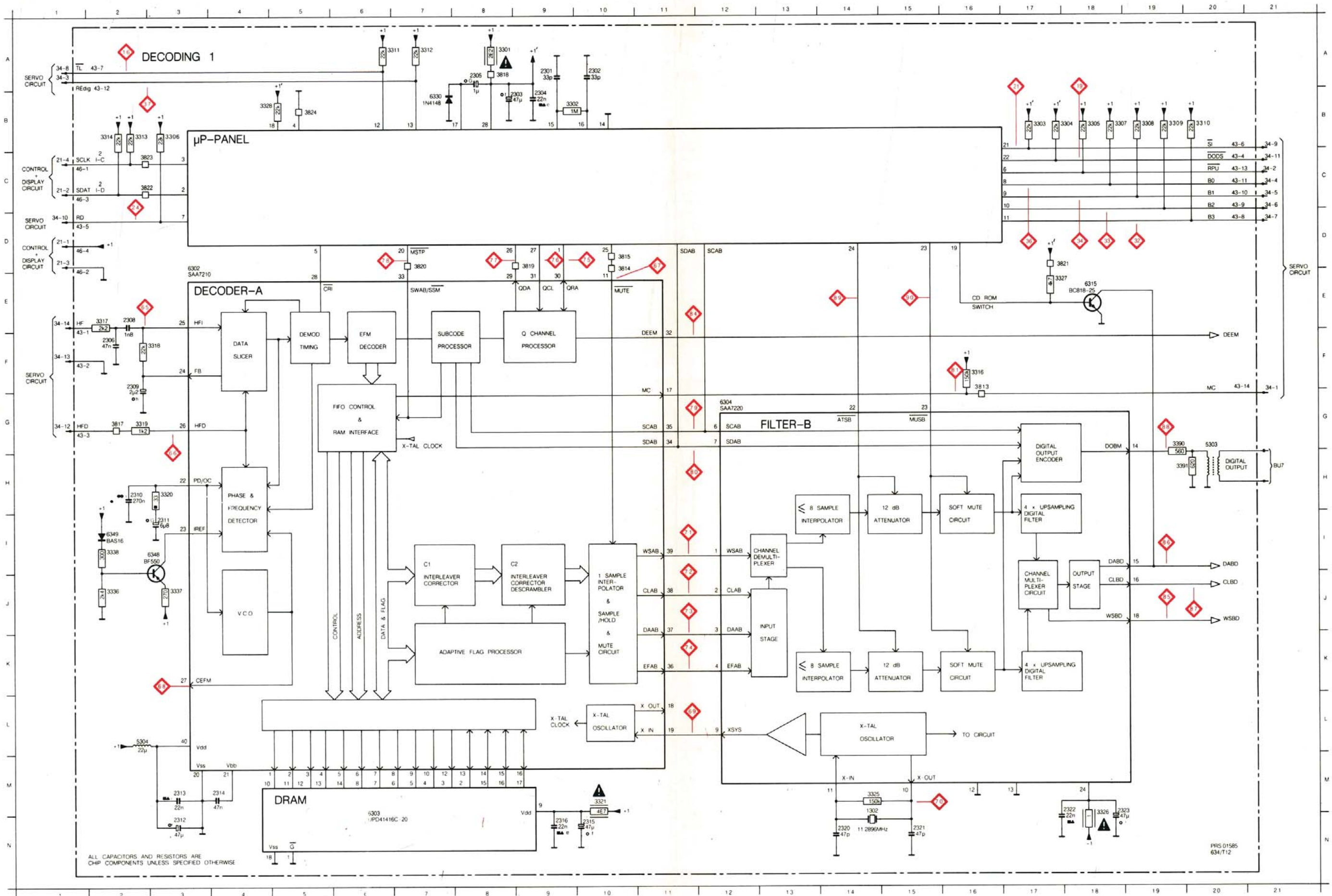
B0-B3 - Control bits for radial circuit
 DAC - Current output for track jumping (Digital to Analogue Converted)
 DODS - Drop out detector suppression
 D1+4 - Photodiode currents
 FE - Focus error signal
 FE lag - Focus error signal for LAG network
 HF - HF output for DEMOD
 HFD - HF detector output for 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 RE₂-RE₁ currents)

RE1 - Radial error signal 1 (summation of amplified currents D₃ and D₄)
 RE2 - Radial error signal 2 (summation of amplified currents D₁ and D₂)
 RE dig - Radial error digital
 RE lag - Radial error signal for LAG network
 RD - Ready signal, starting up procedure finished
 RPU - Radial puls after track jumping
 Si - On/off control for laser supply and focus circuit
 TL - Track loss signal
 Vc - Control voltage for turntable motor

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

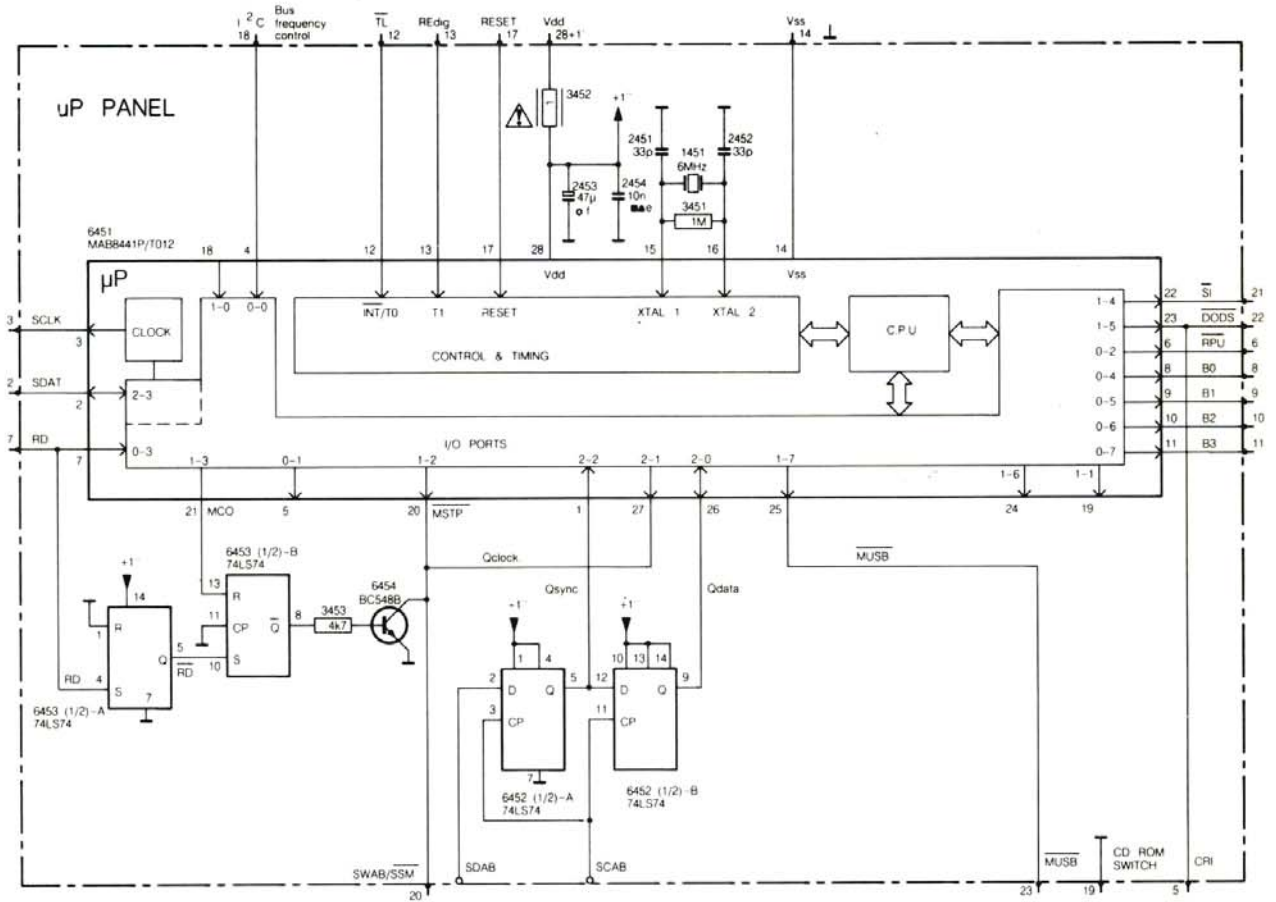
MUSB - Soft Mute signal
 PD/OC - Phase detector - oscillator control
 QCL - Q-channel Clock signal
 QDA - Q-channel Data signal
 QRA - Q-channel Request Acknowledge
 SCAB - Subcode clock Decoder-A to Filter-B
 SCLK-I²C - Serial Clock signal Decoder-Control μP (Inter IC Connection)
 SDAB - Subcode data Decoder-A to Filter-B
 SDAT-I²D - Serial Data Signal Decoder-Control μP (Inter IC Connection)
 SWAB/SSM - Subcode Word/Start-stop motor signal
 WSAB - Word Select Decoder-A to Filter-B
 WSBD - Word Select Filter-B to DAC
 XIN - Oscillator signal in Decoder-A
 XSYS - Oscillator signal out Filter-B

1302 M14 2303 B 9 2306 F 2 2310 H 2 2313 M 3 2316 N 9 2322 M18 3302 B 8 3305 B18 3308 B19 3311 A 7 3314 B 2 3318 F 3 3321 M10 3327 E18 3337 J 3 3391 H19 3815 D10 3819 D 9 3822 C 2 5303 G20 6303 M 6 6330 B 7
 2301 A 9 2304 B 9 2308 E 2 2311 I 3 2314 M 4 2320 N14 2323 M18 3303 B17 3306 B 3 3309 B19 3312 A 7 3316 F16 3319 G 2 3325 M14 3328 B 4 3338 I 2 3813 F16 3817 G 2 3820 D 7 3823 C 2 5304 L 2 6304 G12 6348 I 3
 2302 A10 2305 A 8 2309 F 2 2312 N 3 2315 N10 2321 N15 3301 A 8 3304 B18 3307 B18 3310 B20 3313 B 2 3317 E 2 3320 H 3 3326 M18 3336 J 2 3390 G19 3814 D10 3818 A 8 3821 D18 3824 B 5 6302 D 3 6315 E18 6349 I 2

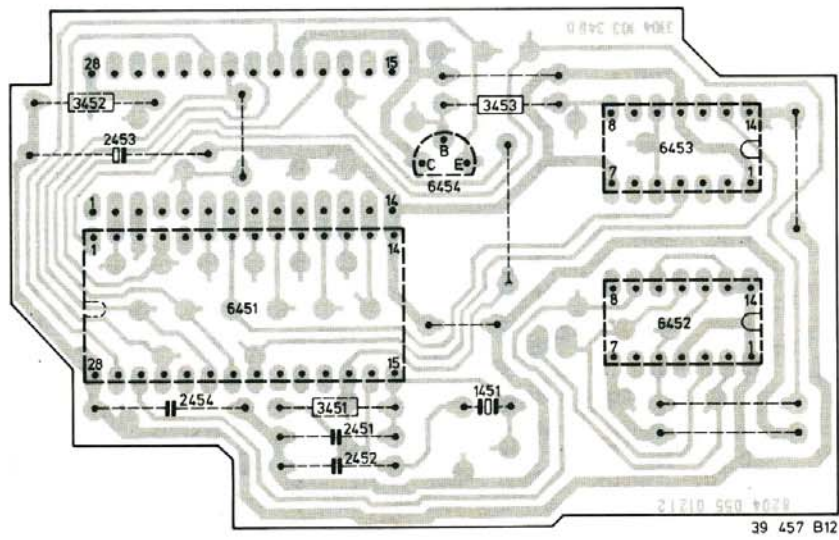
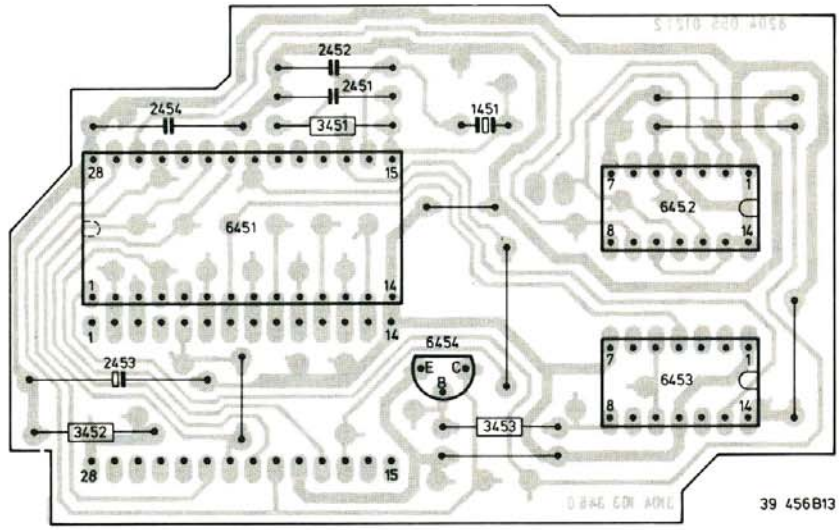


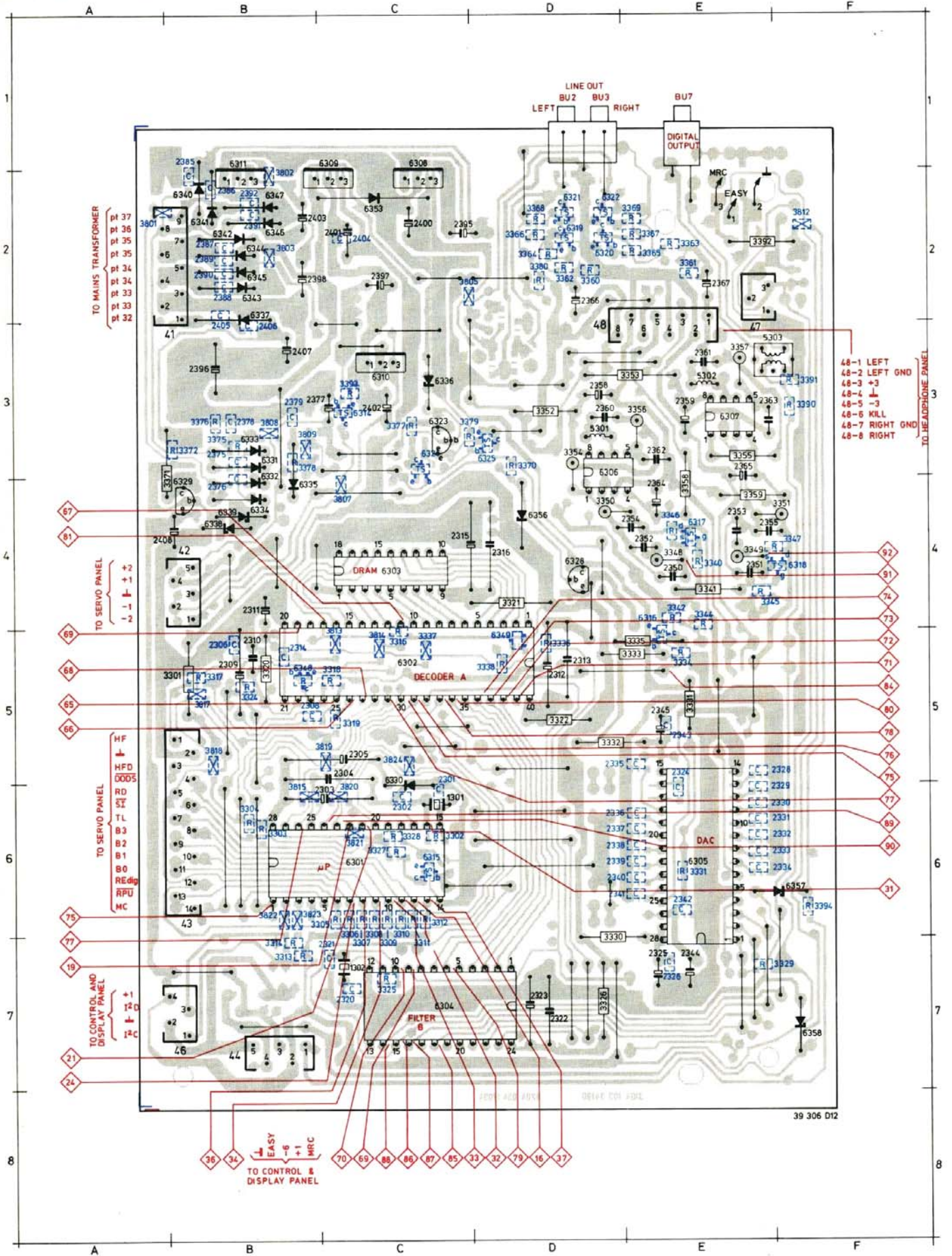
ALL CAPACITORS AND RESISTORS ARE CHIP COMPONENTS UNLESS SPECIFIED OTHERWISE

PRS 01585
634/T12



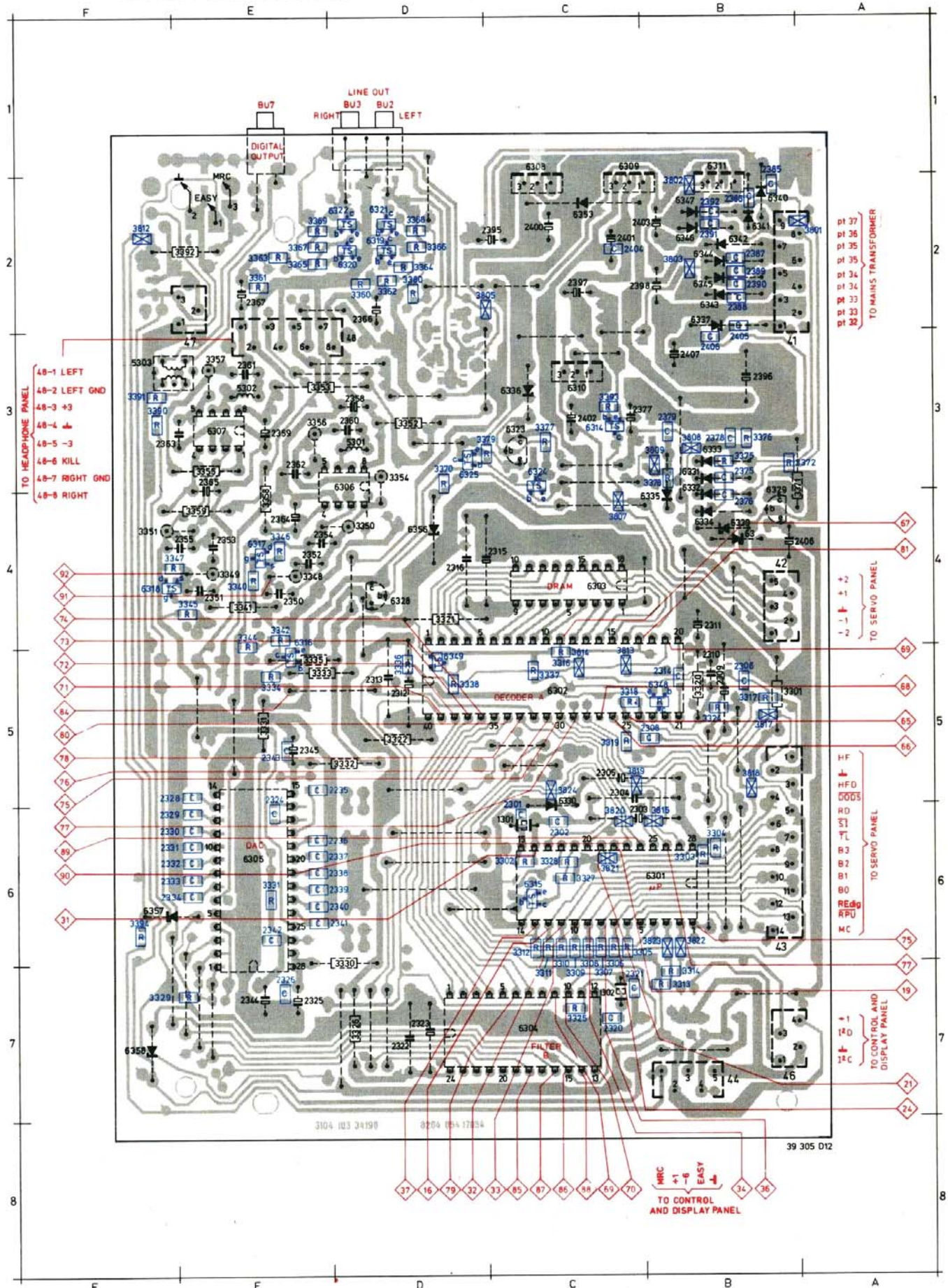
PRS 01208
DRA CS1
T12/620



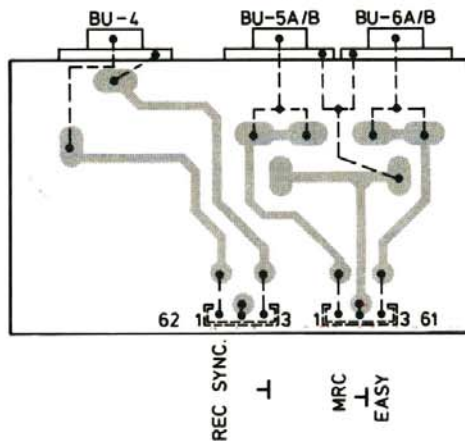


for coordinates see page 6-4

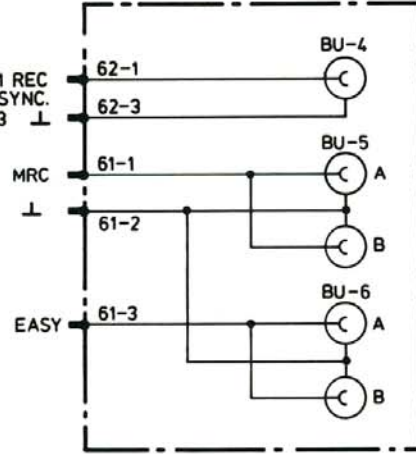
SUPPLY + DECODER PANEL



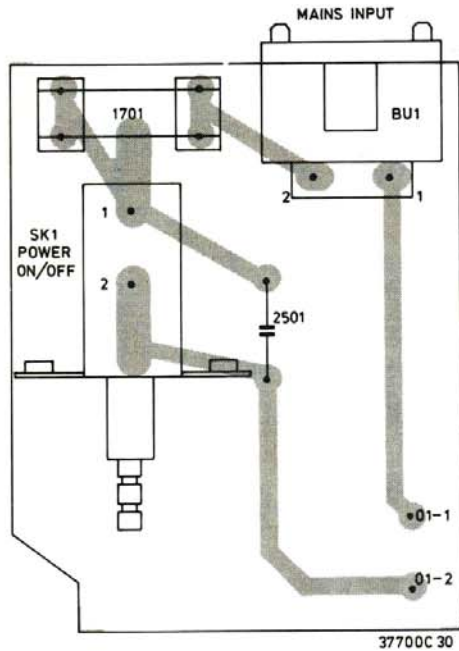
BUS PANEL



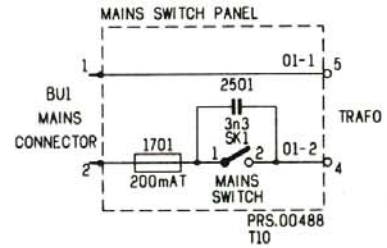
TO CONTROL & DISPLAY PCB.



38 762 A12

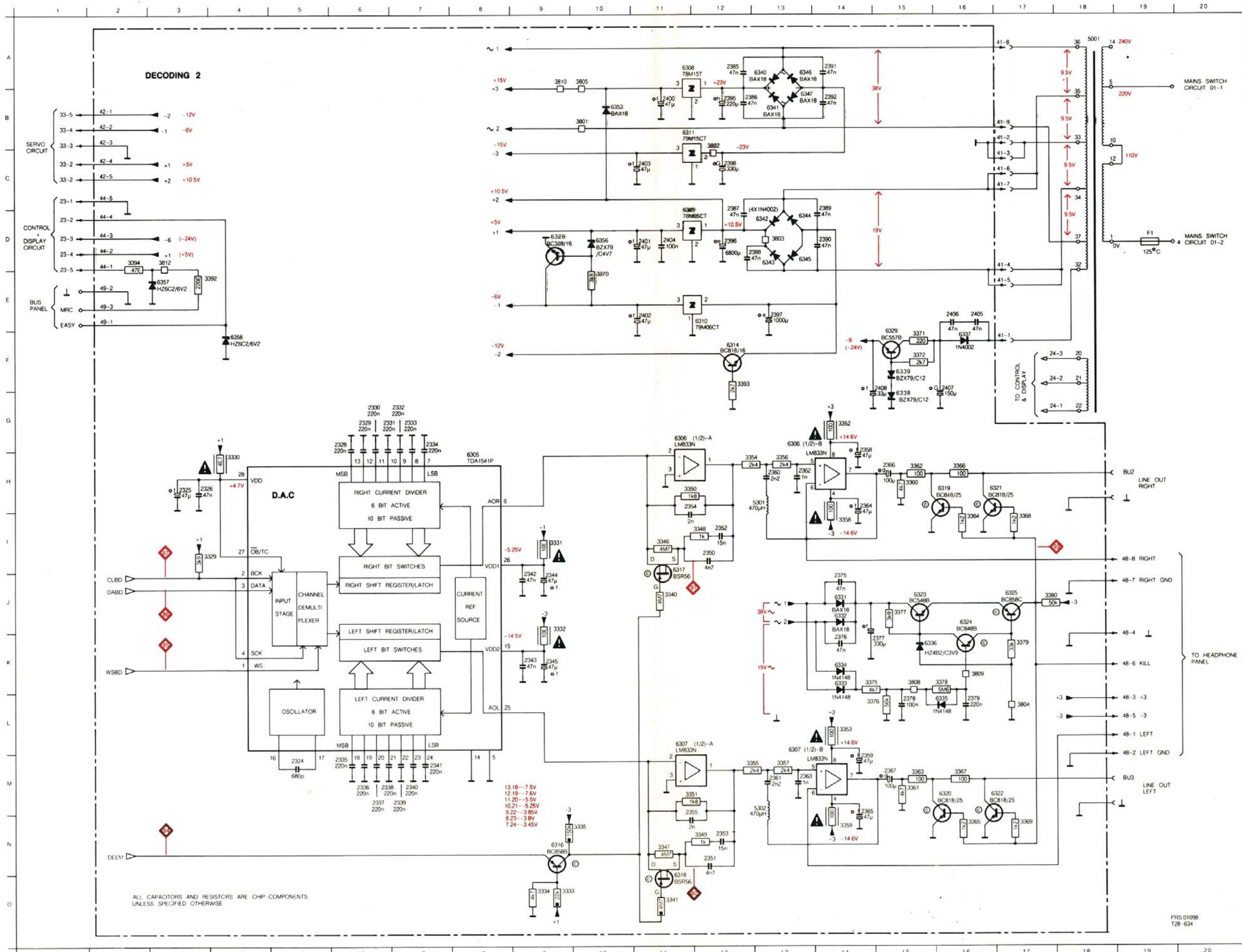


37700C 30



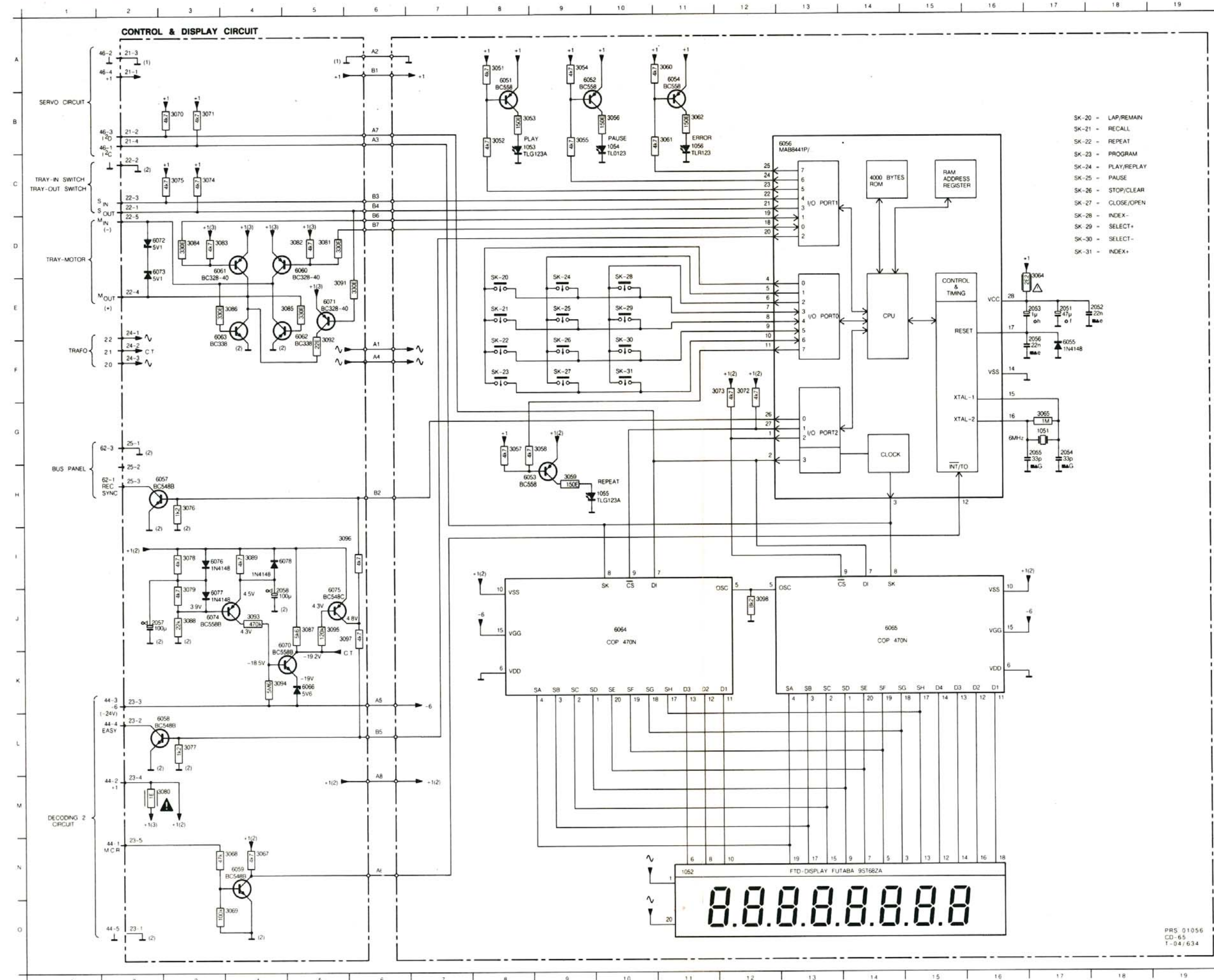
PRS.00488 T10

1301	C6	2304	C5	2310	B5	2315	D4	2323	D7	2329	E6	2334	E6	2339	E6	2344	E7	2353	E4
1302	C7	2305	C5	2311	B4	2316	D4	2324	F6	2330	E6	2335	E5	2340	E6	2345	E5	2354	E4
2301	C6	2306	B5	2312	D5	2320	C7	2325	E7	2331	E6	2336	E6	2341	E6	2350	E4	2355	E4
2302	C6	2308	B5	2317	D5	2321	C7	2326	E7	2332	E6	2337	E6	2342	E6	2351	E4	2356	E5
2303	B6	2309	B5	2314	B5	2322	D7	2328	E5	2333	E6	2338	E6	2343	E5	2352	E4	2358	D3
2359	E3	2364	E4	2376	B4	2387	B2	2392	B2	2400	C2	2405	B3	3302	C6	3307	C6	3312	C6
2360	D3	2365	E3	2377	C3	2388	B2	2395	C2	2401	C2	2406	B3	3303	B6	3308	C6	3313	B7
2361	E3	2366	D2	2378	B3	2389	B2	2396	B3	2402	C3	2407	B3	3304	B6	3309	C6	3314	B7
2362	E3	2367	E2	2385	B2	2390	B2	2397	C2	2403	B2	2408	B4	3305	C6	3310	C6	3316	C5
2363	E3	2375	B3	2386	B2	2391	B2	2398	B2	2404	C2	3301	B5	3306	C6	3311	C6	3317	B5
3318	C5	3324	B5	3329	E7	3334	E5	3340	E4	3349	E4	3354	D3	3359	E4	3364	D2	3369	E2
3319	C5	3325	C7	3330	D7	3335	E5	3341	E4	3350	D4	3355	E3	3360	D2	3365	E2	3370	D3
3320	B5	3326	D7	3331	E6	3336	D5	3346	E4	3351	F4	3356	E3	3361	E2	3366	D2	3371	B3
3321	D4	3327	C6	3332	D5	3337	C5	3347	F4	3352	D3	3357	E3	3362	D2	3367	E2	3372	B3
3322	D5	3328	C6	3333	E5	3338	D5	3348	E4	3353	E3	3358	E4	3363	E2	3368	D2	3375	B3
3376	B1	3381	B3	3394	F6	3807	C4	3814	C5	3820	C6	5301	D3	6302	C5	6307	E3	6314	C3
3377	C3	3390	F3	3801	A2	3808	B3	3815	B6	3821	C6	5302	E3	6303	C4	6308	C2	6315	C6
3378	B3	3391	F3	3802	B2	3811	E2	3817	B5	3822	B6	5303	E3	6304	C7	6309	C2	6316	E5
3379	D3	3392	E2	3803	B2	3812	F2	3818	B5	3823	B6	5304	D5	6305	E6	6310	C3	6317	E4
3380	D2	3393	C3	3805	C2	3813	C5	3819	C5	3824	C5	6301	C6	6306	D3	6311	B2	6318	F4
6319	D2	6324	C3	6330	C5	6335	B4	6340	B2	6345	B2	6353	C2	BU 3	D1				
6320	D2	6325	D3	6331	B3	6336	C3	6341	B2	6346	B2	6356	D4	BU 4	E1				
6321	D2	6326	C3	6332	B3	6337	B2	6342	B2	6347	B2	6357	F6	BU 5	E1				
6322	D2	6328	D4	6333	B3	6338	B4	6343	B2	6348	B5	6358	B7						
6323	C3	6329	B4	6334	B4	6339	B4	6344	B2	6349	D5	BU 2	D1						



2324	M 5	6332	J14
2325	H 3	6333	K14
2326	H 4	6334	K14
2328	G 6	6335	L16
2329	G 6	6336	K15
2330	G 6	6337	F16
2331	G 7	6338	G15
2332	G 7	6339	F15
2333	G 7	6340	A13
2334	G 7	6341	B13
2335	M 6	6342	D13
2336	M 6	6343	D13
2337	M 6	6344	D13
2338	M 6	6345	D13
2339	M 7	6346	A13
2340	M 7	6347	B13
2341	M 7	6353	B10
2342	J 9	6356	D10
2343	K 9	6357	E 3
2344	J 9	6358	F 4
2345	K 9		
2350	I 2		
2351	N12		
2352	I 12		
2353	N12		
2354	H11		
2355	M11		
2358	H14		
2359	M14		
2360	H13		
2361	M13		
2362	H13		
2363	M13		
2364	H14		
2365	M14		
2366	H15		
2367	M15		
2375	J14		
2376	K14		
2377	K15		
2378	L15		
2379	L16		
2385	A12		
2386	B13		
2387	D12		
2388	D13		
2389	D14		
2390	D14		
2391	A14		
2392	A13		
2395	B12		
2396	D12		
2397	E13		
2398	C12		
2400	B11		
2401	D11		
2402	E11		
2403	C11		
2404	D11		
2405	E16		
2406	E16		
2407	F16		
2408	F15		
3329	I 4		
3330	H 4		
3331	I 9		
3332	J 9		
3333	O 9		
3334	O 9		
3335	N10		
3340	J11		
3341	D11		
3346	I 11		
3347	N11		
3348	I 12		
3349	N12		
3350	H11		
3351	M11		
3352	G14		
3353	L14		
3354	H12		
3355	M12		
3356	H13		
3357	M13		
3358	I 14		
3359	N14		
3360	H15		
3361	M15		
3362	H15		
3363	M15		
3364	I 16		
3365	N16		
3366	H16		
3367	M16		
3368	I 17		
3369	N17		
3370	E10		
3371	F15		
3372	F15		
3375	K14		
3376	L15		
3377	J15		
3378	K16		
3379	K17		
3380	J17		
3392	E 4		
3393	F12		
3394	D 2		
3801	B10		
3802	B12		
3803	D13		
3804	L17		
3805	A10		
3808	K15		
3809	K16		
3810	A 9		
3812	D 3		
5001	A 8		
5001	A 8		
5001	H13		
5002	M13		
6005	H 8		
6006	G11		
6006	G13		
6007	L11		
6007	L13		
6008	A11		
6009	D11		
6010	E12		
6011	B11		
6014	F12		
6016	N 9		
6017	I 11		
6018	O11		
6019	H16		
6020	M16		
6021	H17		
6022	M17		
6023	J15		
6024	J16		
6025	J17		
6028	D 9		
6029	F15		
6031	J14		

CONTROL + DISPLAY CIRCUIT

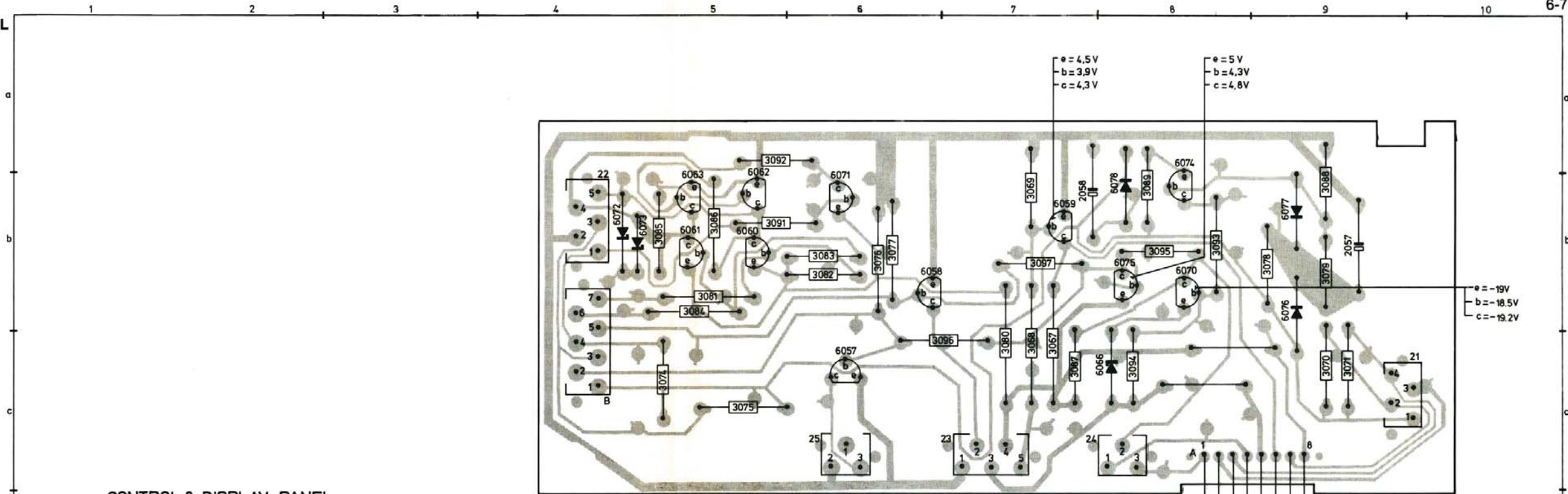


1051	G17
1052	N11
1053	B 9
1054	B10
1055	H10
1056	B11
2051	E17
2052	E18
2053	E17
2054	G17
2055	G17
2056	F17
2057	J 2
2058	J 5
3051	A 8
3052	B 8
3053	B 9
3054	A 9
3055	B 9
3056	B10
3057	G 8
3058	G 9
3059	H 9
3060	A11
3061	B11
3062	B11
3063	N 4
3064	E17
3065	G17
3067	N 4
3068	N 4
3069	O 4
3070	B 3
3071	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

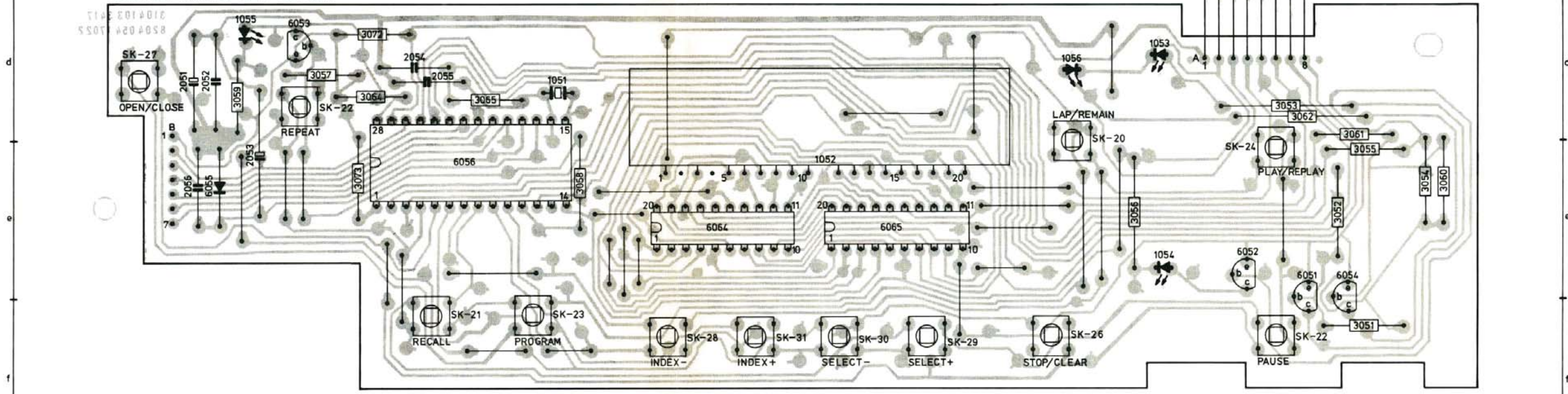
PRS 01056
CD-65
1-04/634

CONTROL + DISPLAY PANEL

6-7



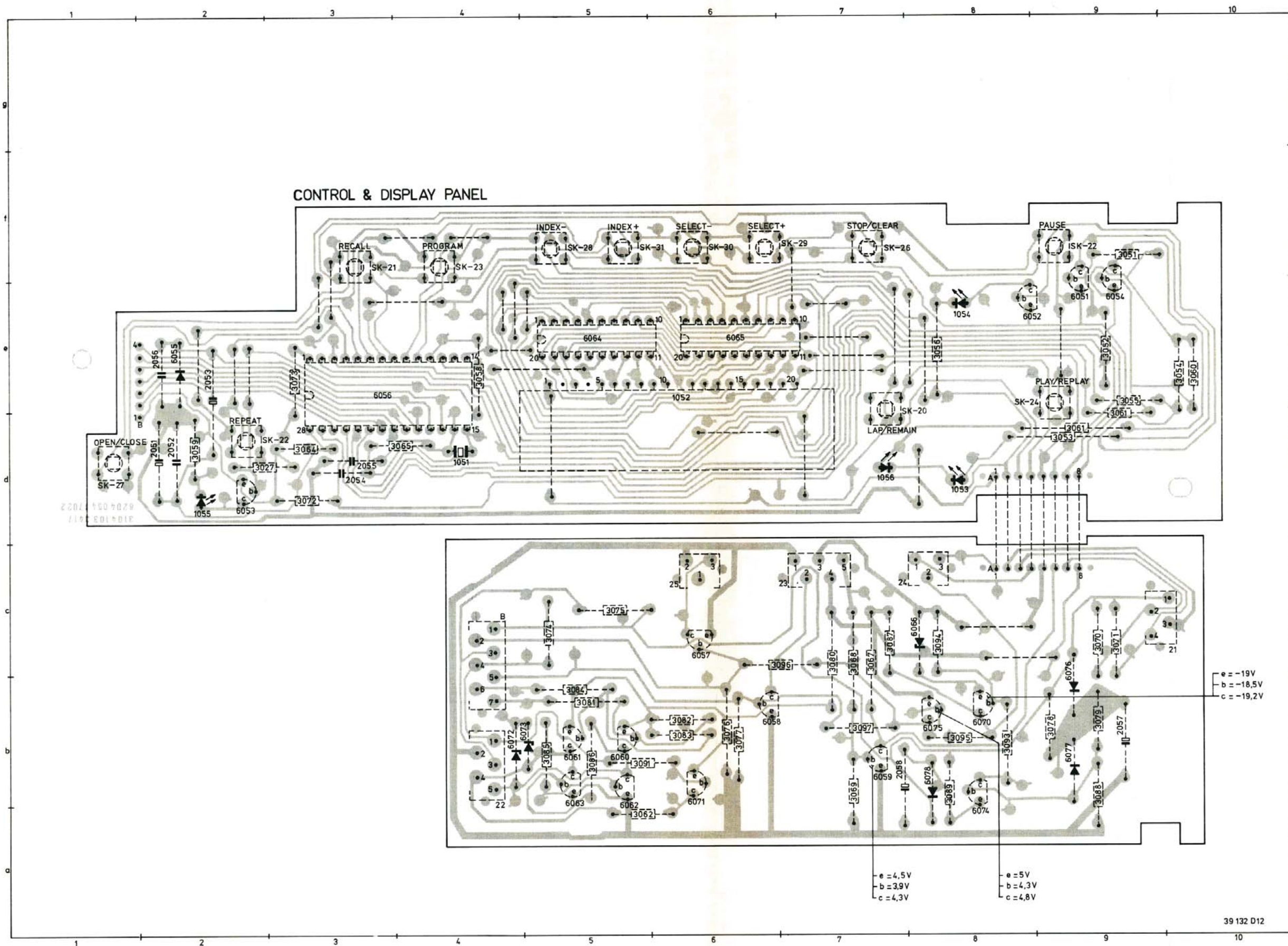
CONTROL & DISPLAY PANEL



39 131 D12

1051	D4	1056	D7	2055	D3	3051	F9	3056	E8	3062	A5	3069	B7	3074	C5	3079	B9	3084	B5
1052	E6	2051	D2	2056	E2	3052	E9	3058	E4	3064	D3	3070	C9	3075	C5	3080	C7	3085	B5
1053	D8	2052	D2	2057	B9	3053	D9	3059	D2	3065	D4	3071	C9	3076	B6	3081	B5	3086	B5
1054	E8	2053	E2	2058	B7	3054	E10	3060	E10	3067	C7	3072	D3	3077	B6	3082	B6	3087	C7
1055	D2	2054	D3	3027	D2	3055	E9	3061	D9	3068	C7	3073	E3	3078	B9	3083	B6	3088	B9
3089	B8	3096	C6	6054	E9	6059	B7	6065	E6	6073	B5	6078	B8	SK-24	E9	SK-30	F6		
3091	B5	3097	B7	6055	E2	6060	B5	6066	C8	6074	B8	SK-20	D7	SK-26	F7	SK-31	F5		
3093	B8	6051	E9	6056	E3	6061	B5	6070	B8	6075	B8	SK-21	F3	SK-27	D1				
3094	C8	6052	E8	6057	C6	6063	B5	6071	B6	6076	C9	SK-22	D2	SK-28	F5				
3095	B8	6053	D2	6058	B6	6064	E5	6072	B4	6077	B9	SK-23	F4	SK-29	F6				

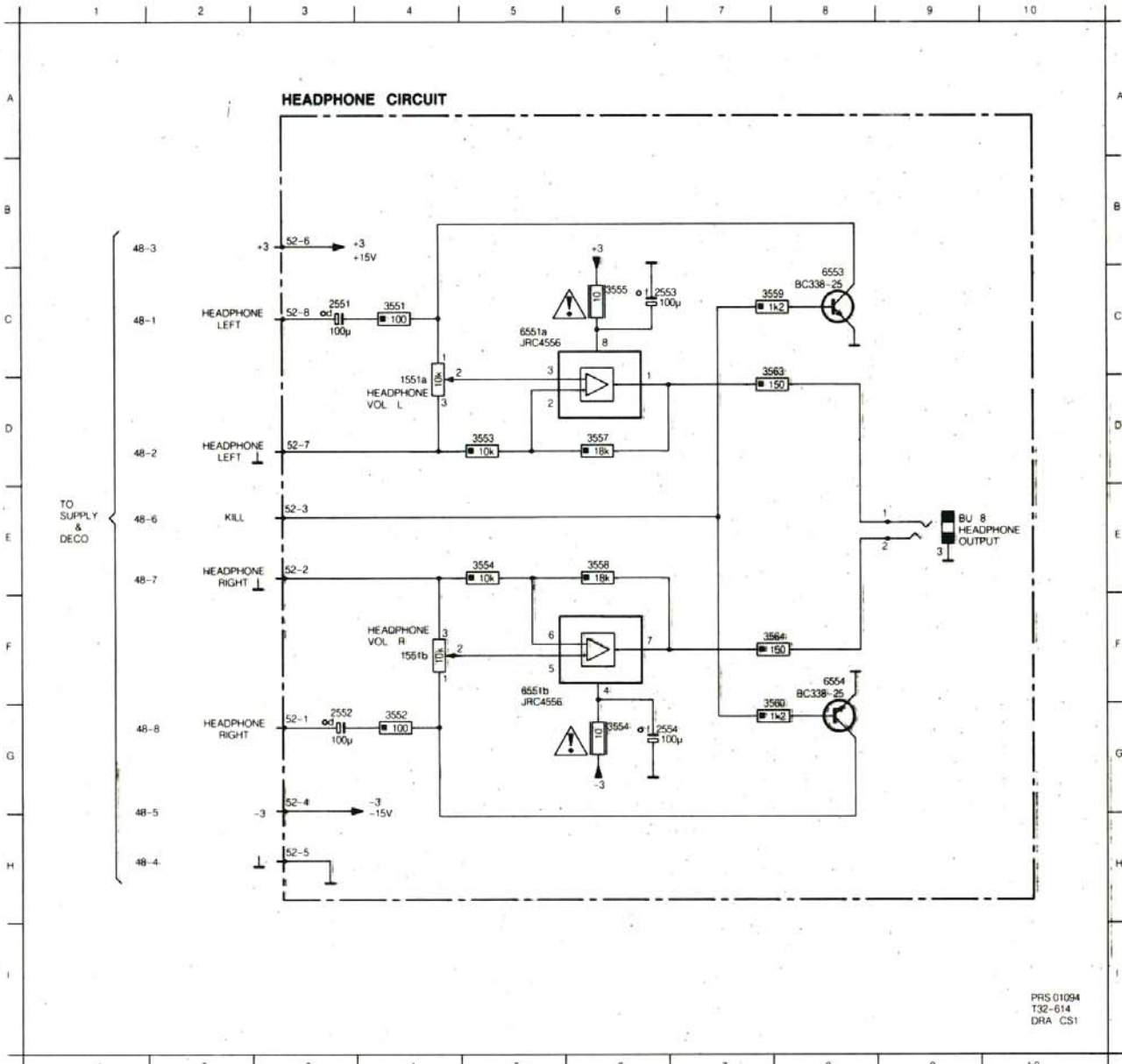
CONTROL + DISPLAY PANEL



1051 D4	1056 D7	2055 D3	3051 F9	3056 E8	3062 A5	3069 B7	3074 C5	3079 B9	3084 B5	3089 B8	3096 C6	6054 E9	6059 B7	6065 E6	6073 B5	6078 B8	SK-24 E9	SK-30 F6
1052 E6	2051 D2	2056 E2	3052 E9	3058 E4	3064 D3	3070 C9	3075 C5	3080 C7	3085 B5	3091 B5	3097 B7	6055 E2	6060 B5	6066 C8	6074 B8	SK-20 D7	SK-26 F7	SK-31 F5
1053 D8	2052 D2	2057 B9	3053 D9	3059 D2	3065 D4	3071 C9	3076 B6	3081 B5	3086 B5	3093 B8	6051 E9	6056 E3	6061 B5	6070 B8	6075 B8	SK-21 F3	SK-27 D1	
1054 E8	2053 E2	2058 B7	3054 E10	3060 E10	3067 C7	3072 D3	3077 B6	3082 B6	3087 C7	3094 C8	6052 E8	6057 C6	6063 B5	6071 B6	6076 C9	SK-22 D2	SK-28 F5	
1055 D2	2054 D3	3027 D2	3055 E9	3061 D9	3068 C7	3073 E3	3078 B9	3083 B6	3088 B9	3095 B8	6053 D2	6058 B6	6064 E5	6072 B4	6077 B9	SK-23 F4	SK-29 F6	

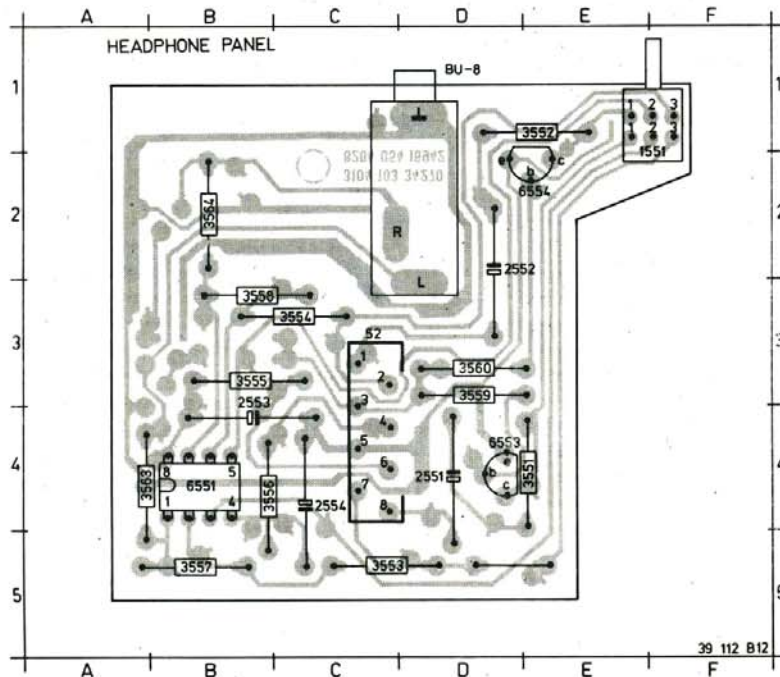
HEADPHONE CIRCUIT

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



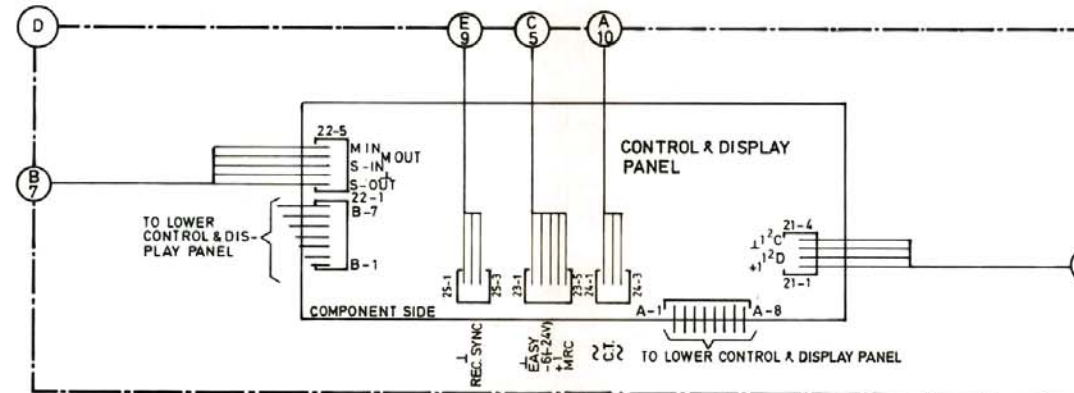
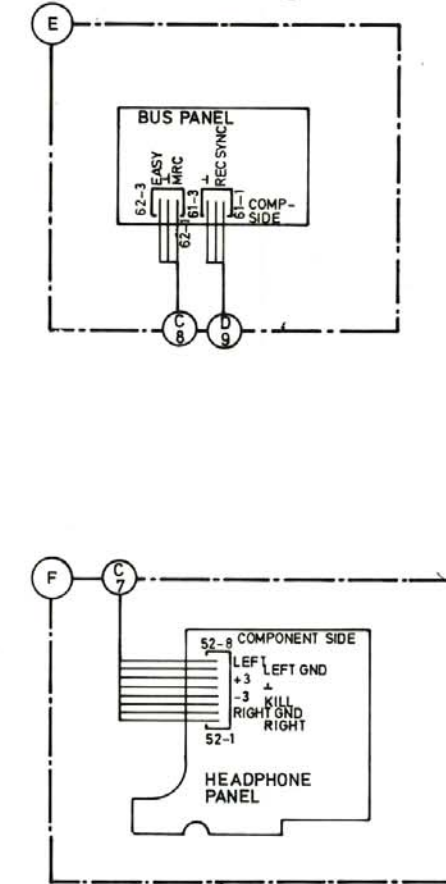
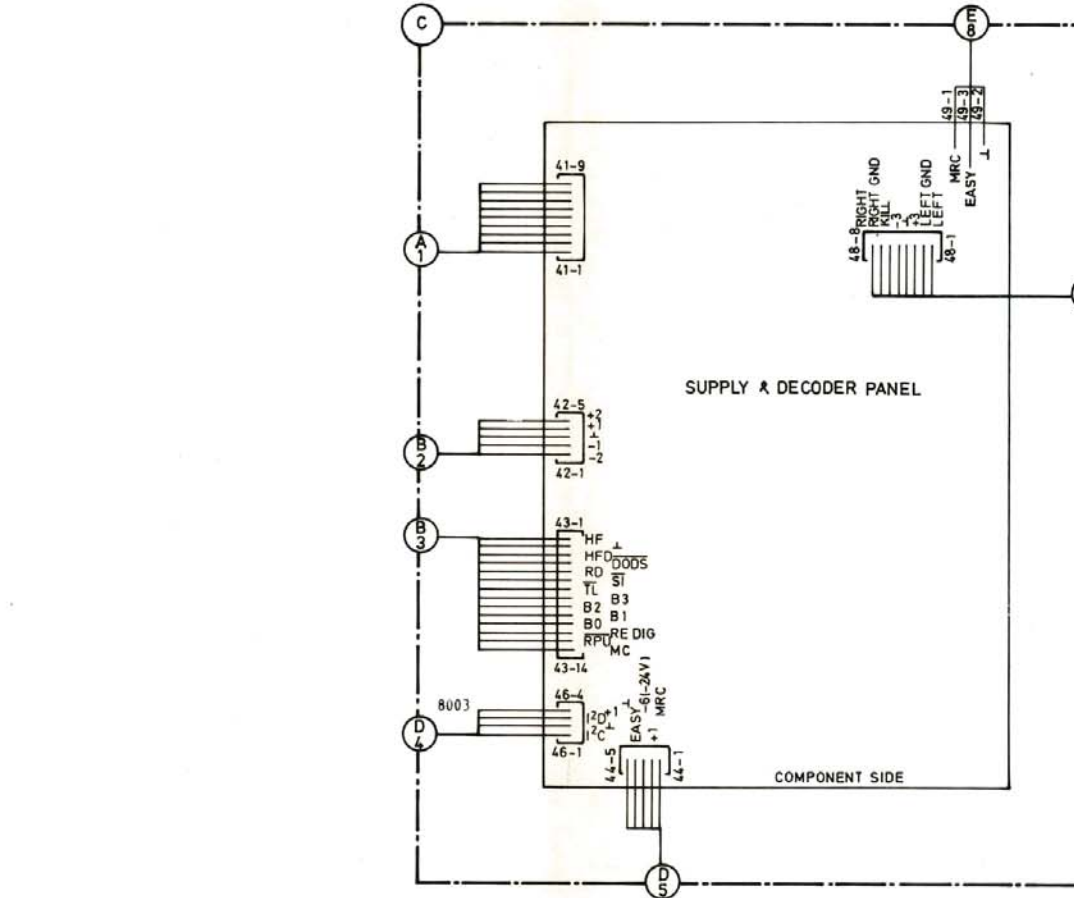
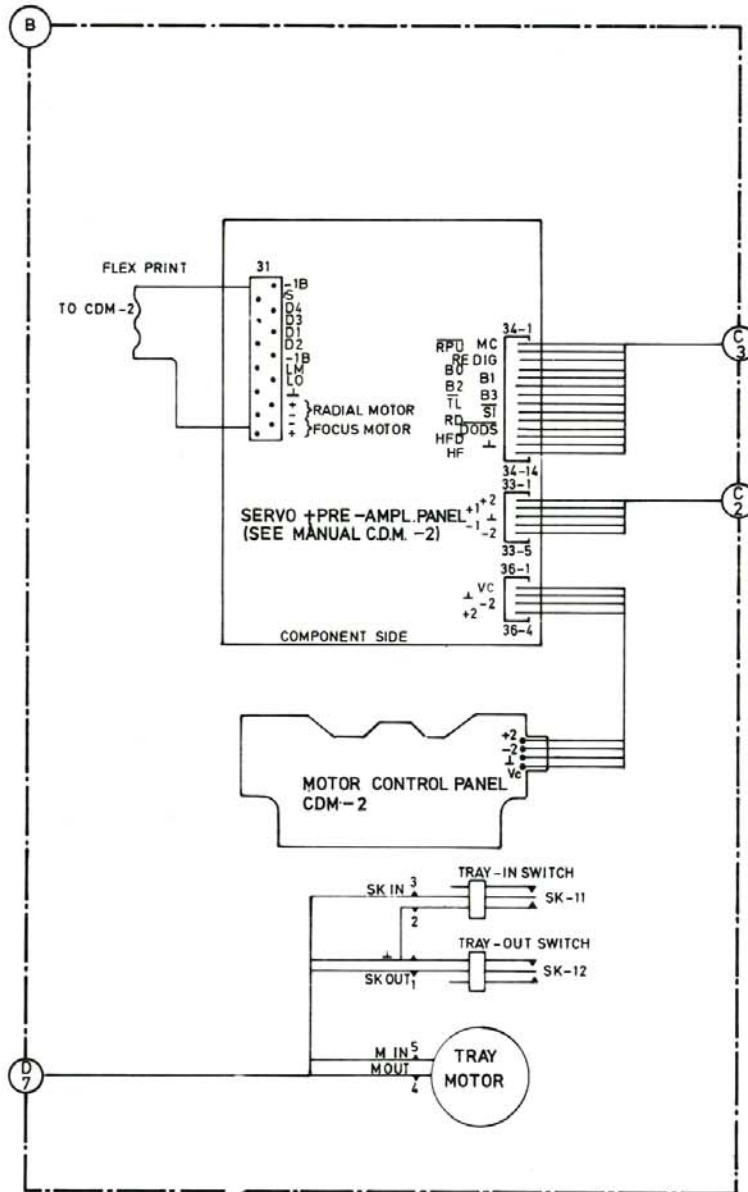
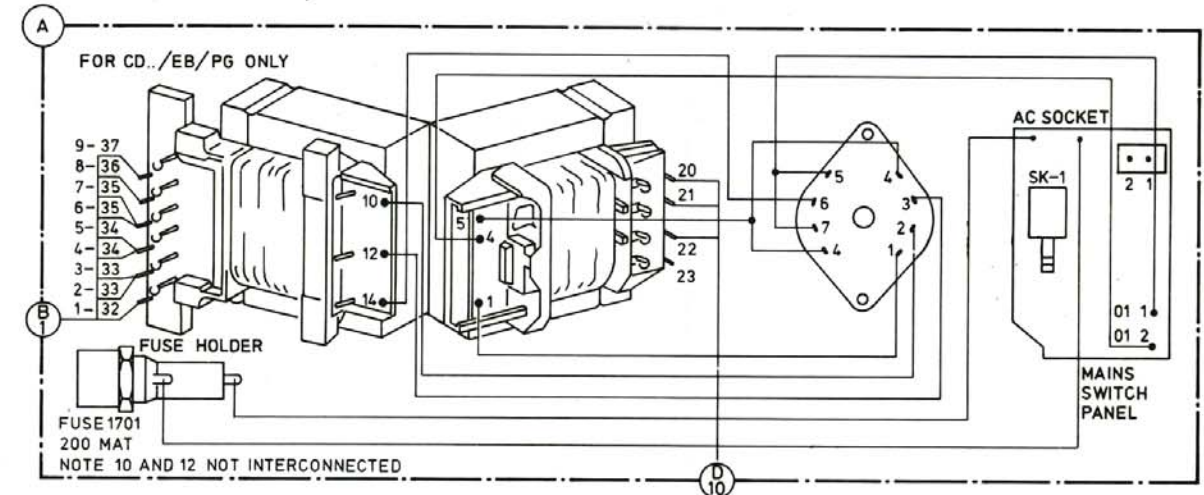
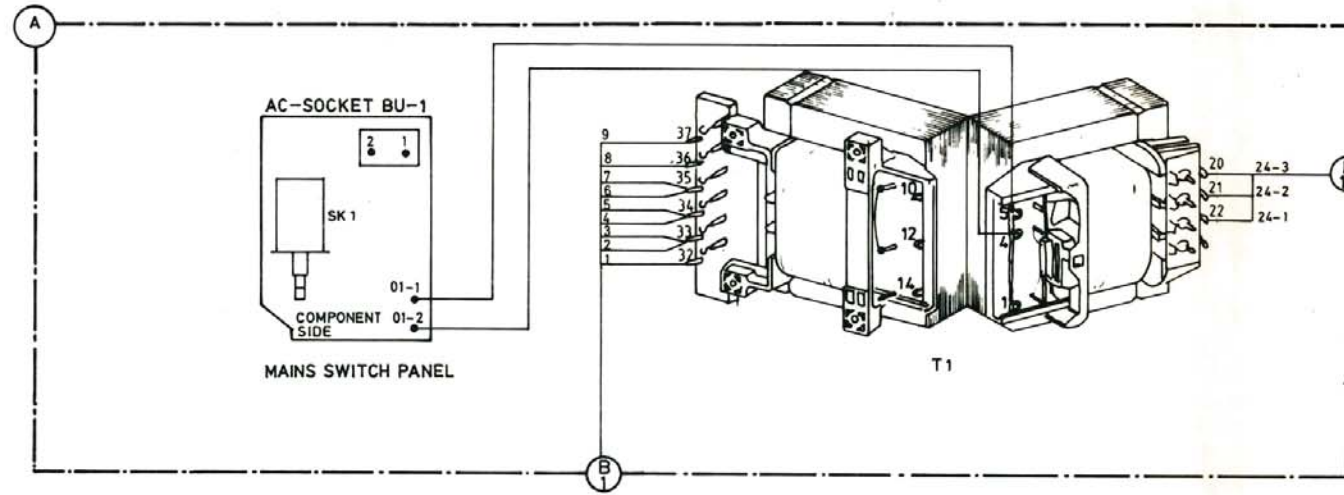
PRS 01094
 T32-614
 DRA CS1













HEADPHONE PANEL



39 112 B12

① — Chips 50 V NP0 S1206			② □ Chips 0,125 W S1206			③ □ Chips 0,125 W S1206			1R
1 pF	5%	4822 122 32479	5,6 E	5%	4822 111 90394	7,5 k	2%	4822 111 90276	
1,5 pF	5%	4822 122 31792	6,2 E	5%	4822 111 90395	8,2 k	2%	5322 111 90118	
1,8 pF	5%	4822 122 32087	6,8 E	5%	4822 111 90254	9,1 k	2%	4822 111 90373	
2,2 pF	5%	4822 122 32425	7,5 E	5%	4822 111 90396	10 k	2%	4822 111 90249	
3,3 pF	5%	4822 122 32079	8,2 E	5%	4822 111 90397	11 k	2%	4822 111 90337	
3,9 pF	5%	4822 122 32081	9,1 E	5%	4822 111 90398	12 k	2%	4822 111 90253	
4,7 pF	5%	4822 122 32082	10 E	2%	5322 111 90095	13 k	2%	4822 111 90509	
5,6 pF	5%	4822 122 32506	11 E	2%	4822 111 90338	15 k	2%	4822 111 90196	
8,2 pF	5%	4822 122 32083	12 E	2%	4822 111 90341	16 k	2%	4822 111 90346	
10 pF	5%	4822 122 31971	13 E	2%	4822 111 90343	18 k	2%	4822 111 90238	
12 pF	5%	4822 122 32139	15 E	2%	4822 111 90344	20 k	2%	4822 111 90349	
18 pF	5%	4822 122 31769	16 E	2%	4822 111 90347	22 k	2%	4822 111 90251	
22 pF	10%	4822 122 31837	18 E	2%	5322 111 90139	24 k	2%	4822 111 90512	
27 pF	5%	4822 122 31966	20 E	2%	4822 111 90352	27 k	2%	4822 111 90542	
33 pF	5%	4822 122 31756	22 E	2%	4822 111 90186	30 k	2%	4822 111 90216	
39 pF	5%	4822 122 31972	24 E	2%	4822 111 90355	33 k	2%	5322 111 90267	
47 pF	5%	4822 122 31772	27 E	2%	5322 111 90105	36 k	2%	4822 111 90514	
56 pF	5%	4822 122 31774	30 E	2%	4822 111 90356	39 k	2%	5322 111 90108	
68 pF	5%	4822 122 31961	33 E	2%	4822 111 90357	43 k	2%	4822 111 90363	
82 pF	10%	4822 122 31839	36 E	2%	4822 111 90359	47 k	2%	4822 111 90543	
100 pF	5%	4822 122 31765	39 E	2%	4822 111 90361	51 k	2%	5322 111 90274	
120 pF	5%	4822 122 31766	43 E	2%	5322 116 90125	56 k	2%	4822 111 90573	
150 pF	5%	4822 122 31767	47 E	2%	4822 111 90217	62 k	2%	5322 111 90275	
180 pF	2%	4822 122 31794	51 E	2%	4822 111 90365	68 k	2%	4822 111 90202	
220 pF	5%	4822 122 31965	56 E	2%	4822 111 90239	75 k	2%	4822 111 90574	
270 pF	5%	4822 122 32142	62 E	2%	4822 111 90367	82 k	2%	4822 111 90575	
330 pF	10%	4822 122 31642	68 E	2%	4822 111 90203	91 k	2%	5322 111 90277	
390 pF	5%	4822 122 31771	75 E	2%	4822 111 90371	100 k	2%	4822 111 90214	
470 pF	5%	4822 122 31727	82 E	2%	4822 111 90124	110 k	2%	5322 111 90269	
560 pF	5%	4822 122 31773	91 E	2%	4822 111 90375	120 k	2%	4822 111 90568	
680 pF	5%	4822 122 31775	100 E	2%	5322 111 90091	130 k	2%	4822 111 90511	
820 pF	5%	4822 122 31974	110 E	2%	4822 111 90335	150 k	2%	5322 111 90099	
1 nF	10%	5322 122 31647	120 E	2%	4822 111 90339	160 k	2%	5322 111 90264	
1,2 nF	5%	4822 122 31807	130 E	2%	4822 111 90164	180 k	2%	4822 111 90565	
1,5 nF	10%	4822 122 31781	150 E	2%	5322 111 90098	200 k	2%	4822 111 90351	
1,8 nF	10%	4822 122 32153	160 E	2%	4822 111 90345	220 k	2%	4822 111 90197	
2,2 nF	10%	4822 122 31644	180 E	2%	5322 111 90242	240 k	2%	4822 111 90215	
2,7 nF	10%	4822 122 31783	200 E	2%	4822 111 90348	270 k	2%	4822 111 90302	
3,3 nF	10%	4822 122 31969	220 E	2%	4822 111 90178	300 k	2%	5322 111 90266	
3,9 nF	10%	4822 122 32566	240 E	2%	4822 111 90353	330 k	2%	4822 111 90513	
4,7 nF	10%	4822 122 31784	270 E	2%	4822 111 90154	360 k	2%	4822 111 90515	
5,6 nF	10%	4822 122 31916	300 E	2%	4822 111 90156	390 k	2%	4822 111 90182	
6,8 nF	10%	4822 122 31976	330 E	2%	5322 111 90106	430 k	2%	4822 111 90168	
10 nF	10%	4822 122 31728	360 E	1%	4822 111 90288	470 k	2%	4822 111 90161	
12 nF	10%	5322 122 31648	360 E	2%	4822 111 90358	510 k	2%	4822 111 90364	
15 nF	10%	4822 122 31782	390 E	2%	5322 111 90138	560 k	2%	4822 111 90169	
18 nF	10%	4822 122 31759	430 E	2%	4822 111 90362	620 k	2%	4822 111 90213	
22 nF	10%	4822 122 31797	470 E	2%	5322 111 90109	680 k	2%	4822 111 90368	
27 nF	10%	4822 122 32541	510 E	2%	4822 111 90245	750 k	2%	4822 111 90369	
33 nF	10%	4822 122 31981	560 E	2%	5322 111 90113	820 k	2%	4822 111 90205	
47 nF	10%	4822 122 32542	620 E	2%	4822 111 90366	910 k	2%	4822 111 90374	
56 nF	10%	4822 122 32183	680 E	2%	4822 111 90162	1 M	2%	4822 111 90252	
100 nF	10%	4822 122 31947	750 E	2%	5322 111 90306	1,1 M	5%	4822 111 90408	
180 nF	10%	4822 122 32915	820 E	2%	4822 111 90171	1,2 M	5%	4822 111 90409	
			910 E	2%	4822 111 90372	1,3 M	5%	4822 111 90411	
			1 k	2%	5322 111 90092	1,5 M	5%	4822 111 90412	
④ □ Chips 0,125 W S1206 NP0			1,1 k	2%	4822 111 90336	1,6 M	5%	4822 111 90413	
0 E	jumper	4822 111 90163	1,2 k	2%	5322 111 90096	1,8 M	5%	4822 111 90414	
1 E	5%	4822 111 90184	1,3 k	2%	4822 111 90244	2 M	5%	4822 111 90415	
1,1 E	5%	4822 111 90377	1,5 k	2%	4822 111 90151	2,2 M	5%	4822 111 90185	
1,2 E	5%	4822 111 90378	1,6 k	2%	5322 111 90265	2,4 M	5%	4822 111 90416	
1,3 E	5%	4822 111 90379	1,8 k	2%	5322 111 90101	2,7 M	5%	4822 111 90417	
1,5 E	5%	4822 111 90381	2 k	2%	4822 111 90165	3 M	5%	4822 111 90418	
1,6 E	5%	4822 111 90382	2,2 k	2%	4822 111 90248	3,3 M	5%	4822 111 90191	
1,8 E	5%	4822 111 90383	2,4 k	2%	4822 111 90289	3,6 M	5%	4822 111 90419	
2 E	5%	4822 111 90384	2,7 k	2%	4822 111 90569	3,9 M	5%	4822 111 90421	
2,2 E	5%	5322 111 90104	3 k	2%	4822 111 90198	4,3 M	5%	4822 111 90422	
2,4 E	5%	4822 111 90385	3,3 k	2%	4822 111 90157	4,7 M	5%	4822 111 90423	
2,7 E	5%	4822 111 90386	3,6 k	2%	5322 111 90107	5,1 M	5%	4822 111 90424	
3 E	5%	4822 111 90387	3,9 k	2%	4822 111 90571	5,6 M	5%	4822 111 90425	
3,3 E	5%	4822 111 90388	4,3 k	2%	4822 111 90167	6,2 M	5%	4822 111 90426	
3,6 E	5%	4822 111 90389	4,7 k	2%	5322 111 90111	6,8 M	5%	4822 111 90235	
3,9 E	5%	4822 111 90391	5,1 k	2%	5322 111 90268	7,5 M	5%	4822 111 90427	
4,3 E	5%	4822 111 90392	5,6 k	2%	4822 111 90572	8,2 M	5%	4822 111 90237	
4,7 E	5%	5322 111 90376	6,2 k	2%	4822 111 90545	9,1 M	5%	4822 111 90428	
5,1 E	5%	4822 111 90393	6,8 k	2%	4822 111 90544	10M	5%	5322 111 91141	



						
DRAM UPD41416C-15	4822 209 50682		2350	4,7NF	2% 63 V	4822 121 50961
FTD DRIVER COP470N	4822 209 11121		2352	14 NF	2% 63 V	4822 121 50432
IC-A SAA7210	4822 209 11155		2354	2 NF	2% 160 V	4822 121 50987
IC-B SAA7220	4822 209 11157		2360	2,2NF	2% 160 V	4822 121 50841
LM833 (NSC)	4822 209 83163		2362	1 NF	2% 250 V	4822 121 41531
MAB8441P/T041	4822 209 11154		2328	220 NF		4822 122 32715
MAB8441P/T012	4822 209 50418		2501	Cer. cap	3N3-400 V	4822 121 40327
SN74LS74AN	4822 209 80782					
MC78M15CT	4822 209 80808					
MC7805CT	4822 209 80891					
MC79M15CT	5322 209 86361		1551	Potm. 10k log.		4822 100 30056
MC7906CT	4822 209 82056		3064	Safety res. 2E2	5%	4822 111 30492
NJM4556D	4822 209 82362		3080	Safety res. 1E	5%	4822 111 30483
TDA1541/N5 DUAL DAC	4822 209 70295		3301	Safety res. 2E2	5%	4822 111 30492
  			3321	Safety res. 4E7	5%	4822 111 30499
BC338-25	4822 130 40958		3332	Safety res. 10E	5%	4822 111 30508
BC328-16	4822 130 41023		3352	Safety res. 47E	5%	4822 111 30526
BC328-40	4822 130 41715		3371	Safety res. 220E	5%	4822 111 30544
BC548B	4822 130 40937		3555	Safety res. 10E	5%	4822 111 30508
BC557B	4822 130 44568		3316	Safety res. 150K	5%	4822 111 60166
BC818-25	4822 130 42696		3356	Safety res. 3 k9	5%	4822 111 60156
BC848BR	4822 130 42549					
BC858B	5322 130 41983		BU1	Mains inlet		4822 265 20262
BSR56	4822 130 42633		BU2, 3	Cinch socket	2P	4822 267 30631
BC338-16	4822 130 40892		BU4	Cinch socket	1P	4822 267 30673
BC558B	4822 130 44197		BU5	Cinch socket	2P	4822 267 30672
  			BU6	Cinch socket	2P	4822 267 30671
BAX18	4822 130 34121		BU7	Cinch socket	1P	4822 267 30673
HZ12A2 (12V0)	4822 130 32987		BU8/A/N	Headphone socket		4822 267 30688
HZ12B3 (13V0)	4822 130 32699		BU8/..	Headphone socket		4822 267 30721
HZ4B2 (3V9)	4822 130 32843		Misellaneous			
HZ5B1 (4V7)	4822 130 32986		SK-1			4822 276 11309
MV57123 RED	4822 130 32301		SK-20 + SK-31			4822 276 11276
HZ6C2 (6V2)	4822 130 32698		Fuse holder			4822 492 60063
TLO123A orange	4822 130 32939		1701/..	200MA-T		4822 253 30012
TLR123A green-led	5322 130 34959		1701/FB	400MA-T		4822 253 50076
1N4002	5322 130 30684		5001/..	Mains transformer		4822 145 40185
1N4148	4822 130 30621		5001/FB	Mains transformer		4822 145 40186
			Thermal fuse (5001)			4822 252 20007
1052, 1451	6 MHz	4822 242 70392	1052	Display 9ST68ZA		4822 130 90285
1302	11,2986 MHz	4822 242 71349				
						
5301, 5302	Coil 470 UH	4822 157 51193				
5303	HF-TRAFO dig. output	4822 148 80281				

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

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

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

	0.2W (CR 16)	$\leq 220k\Omega$ $> 270k\Omega$	5% 10%
	0.33W (CR 25)	$\leq 1 M\Omega$ $> 1 M\Omega$	5% 10%
	0.33W (SFR25)		5%
	0.25W (VR 25)	$\leq 10M\Omega$ $> 10M\Omega$	5% 10%
	0.5W (CR 37)	$\leq 1 M\Omega$ $> 1 M\Omega$	5% 10%
	0.67W (CR 52)		5%
	1.15W (CR 68)		5%

	Ceramic plate	* 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 i = 100 V j = 125 V l = 125 V m = 150 V n = 160 V o = 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
	Polyester flat foil	
	Polyester nepolesco	
	Mylar (Polyester flat foil small sized)	
	Micropoco	
	Tubular ceramic (body colour pink or yellow/green)	
	Miniature single elco	
	Subminiature tantalum	

MDA.00084