S E R V I C E D O C U M E N T A T I O N F O R
P H I L I P S C O M P A C T D I S C P L A Y E R
i n C D - J U K E B O X

I. SERVICE MODUL

II. COMPACT DISC PLAYER MECHANISM CDM 3

III. CD-CONTROL BOARD

important check that transistor 6314 (BC CS 4515) removed + is shorted correctly!
This is for early CD CONTROL Boxes with Tone on Board!

WURLITZER
Deutsche Wurlitzer GmbH

XI.89 Gr/Kö

MA 02

Servicemodul 53 880 401 00 CD-Box

for check procedure of CD-player.

The CD control board is operated from the SCC-unit, which sends control signals to play the selected chapter from the disc. With the service module the CD components can be checked separately.

It is to be connected at P6 and P14 on the CD control board, lid has to be removed before.

At first the disc must be in play position (operate 7 in service program) and the toggle switch SERVICE on chassis in position "off".

The following key operation from CD control unit has the same function as during normal selection controlled by the SCC-unit.

key	service display	function
	- -	Machine in stand-by position. disc on player, LED "tray out:' is on
press OPEN/CLOSE	- - (flashes)	Simulation: tray closed Disc starts briefly and stops.
	1 2 <----------	Subcode and number of titles, e.g. 12, is read, disc stops.
NEXT	1. -	Each key operation advances one title
"	2. -	
"	3. -	
"		
	etc.	
PROG	3. P	Title which was selected with the NEXT key, is stored
START	3.0 1	Program title is played. Number of playing title and time or track is indicated. At end of title player stops.

STOP	1 2	CD stops, number of titles is indicated.	
		Searching a previous or later track on the same disc return to "NEXT" and continue	If no titles on same disc are stored in SCC press "OPEN/CLOSE". Command is transferred during movement of gripper arm.

The other remaining buttons on CD-Servicemodul have following functions:

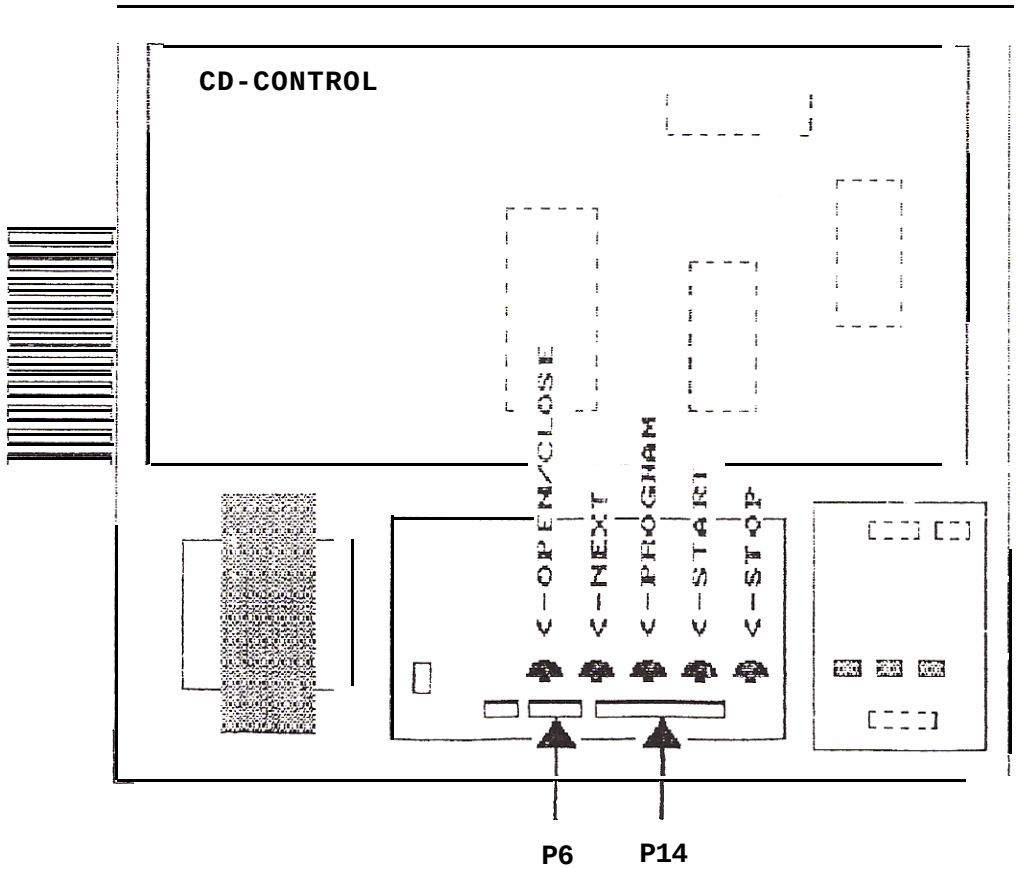
Preview: Returns to the previous track

FR : Fast reserve search

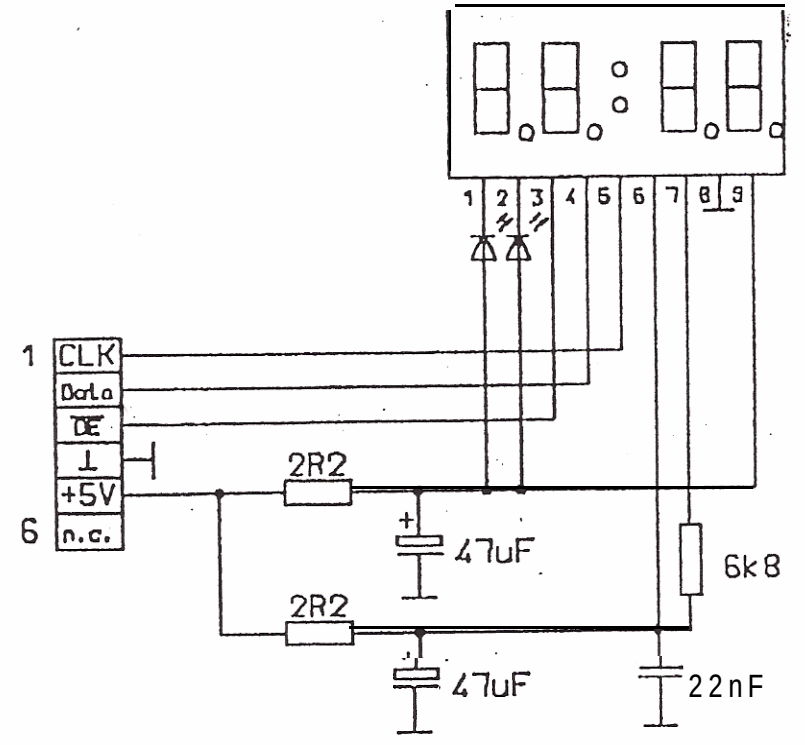
FF : Fast forward search

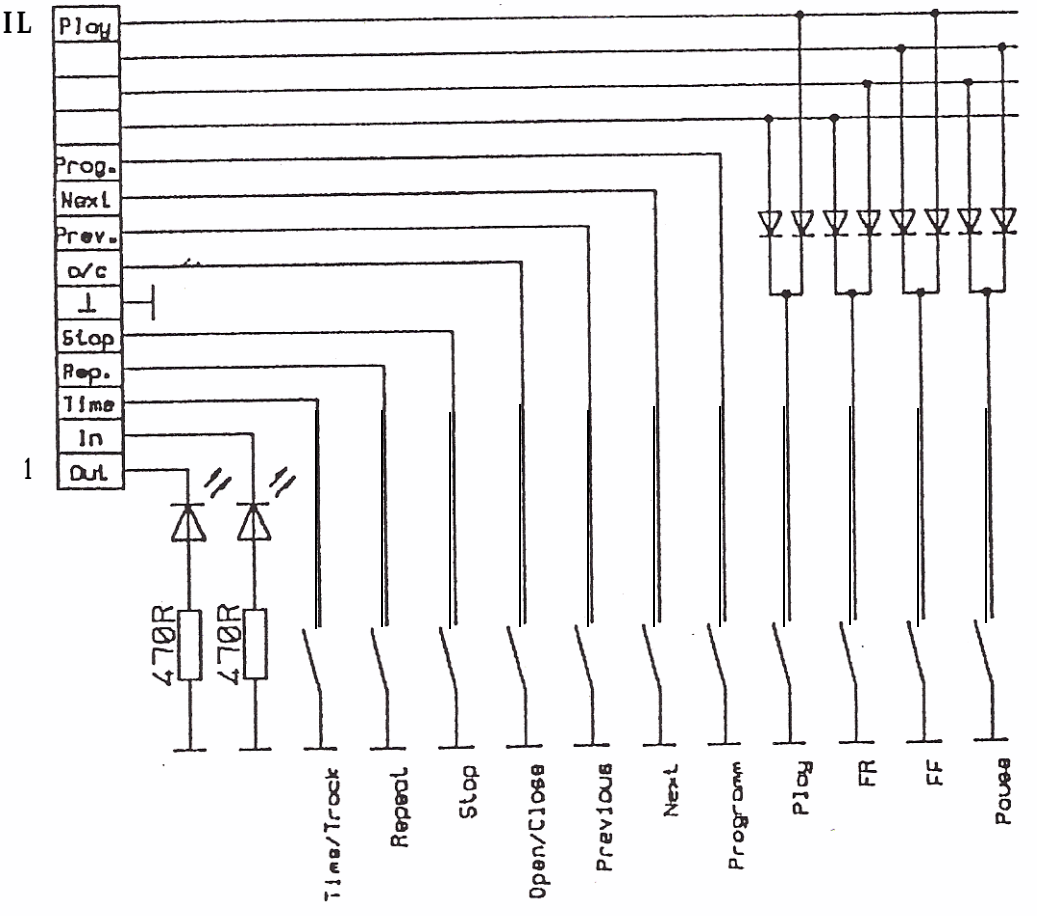
Repeat : for reoeatins a disc

Pause : interrupts play and continues at the same passage by pressing key again



Servicemodul C D - C o n t r o l





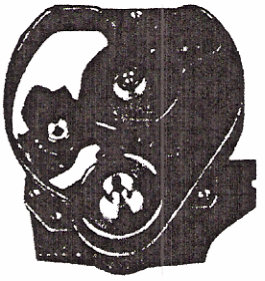
Bestellnummer/
Part n u m b e r: 5 3 880 401 00

07-88

Service
Service
Service

Compact disc player

MECHANISM



40 013 A12

Service Manual

COMPACT disc DIGITAL AUDIO

CLASS 1
LASER PRODUCT
3122 110 03420

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

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

Subject to modification
GB 4822 72521078
Printed in The Netherlands

Published by Service Consumer Electronics
CS 4 372 GB

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 lo damage the fiat 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 EXPECTANCY DRASTICALLY.
FOR THIS REASON CARE SHOULD BETAKENTHAT DURING SERVICiNG THE POTENTIALS OF THE AIDS ANDYOURSELFARE EQUALTOTHATOFTHE 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.

Do not loosen any screws other than those mentioned in the hints

- ESD

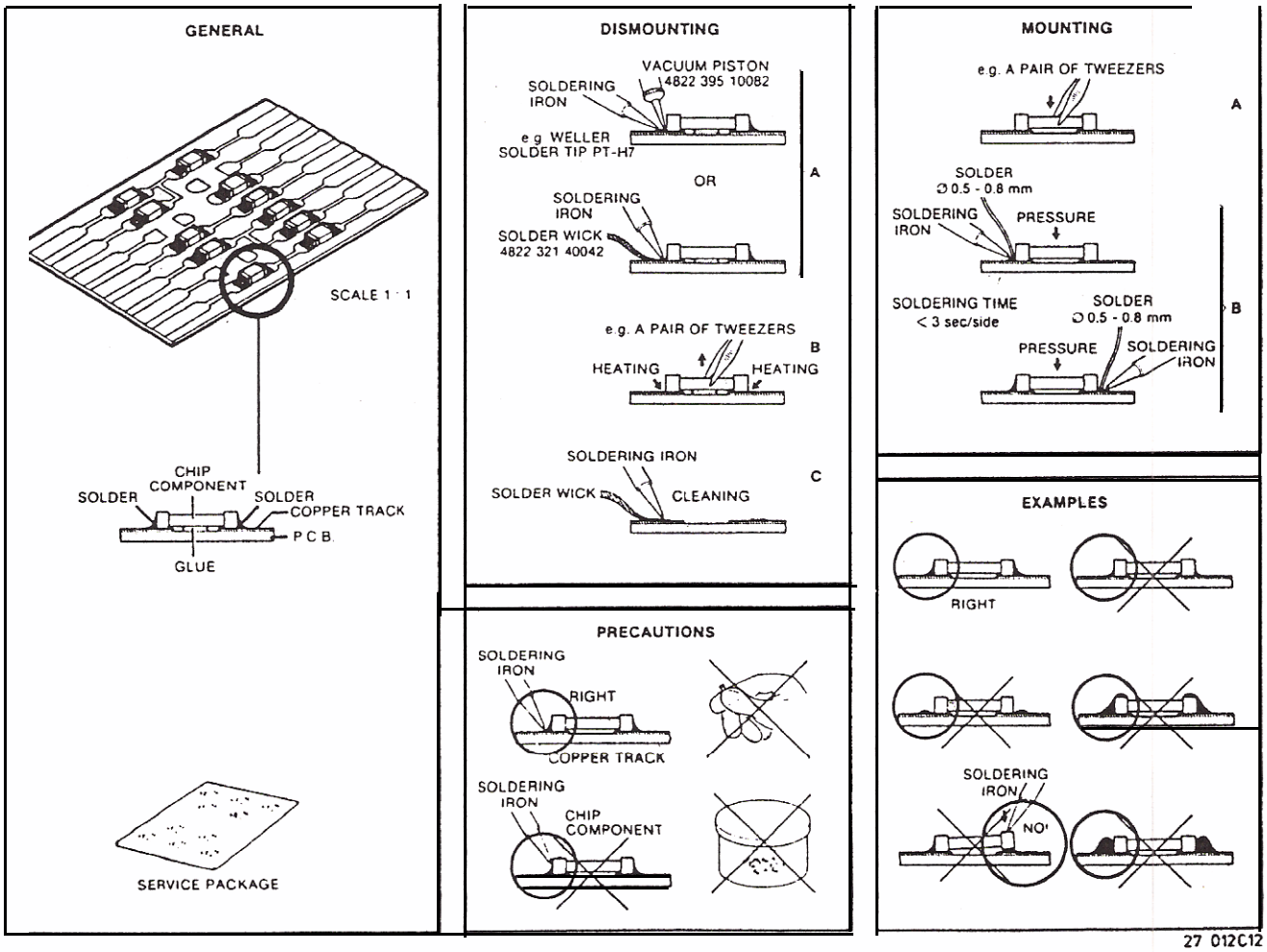
All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD).
Careless handling during repair can drastically reduce life expectancy.
When repairing, make sure that you are connected via a wrist wrap with resistance to the same potential as the chassis of the sat. Keep components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

Servicing the RAFOC unit

The RAFOC unit consists of item numbers 51, 53, 56 and 59.

- Loosen the foil PCB by pulling the clamp, item no. 52, out of the motor chassis.
- Undo the two nuts M2,5x6 and remove the bearing plate item no. 54. Item no. 57 and item no. 58 are clamped into the plate.
- Remove the defective RAFOC unit.
- Mount the new RAFOC unit in reverse order.
- Check that the arm runs clear and check the angle setting.
  For the angle setting see the next chapter.

In the player chip components have been applied. For insertion and removal of chip components see the figure below



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 unambiguously 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 defector.

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 "O" 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 "O" or ground without problems.
The output of an op-amp, however, should never be connected directly to the supply voltage.

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.

GENERAL CHECK POINTS

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.

Attention:

Do not disconnect the player from the CD-board under power!

In this case electrical parts of the CD-player may be damaged.

MEASUREMENTS AND ADJUSTMENTS

Height setting of the turntable

For this adlustment the set should be in the position of normal end use.

- Connect a DC voltmeter between the FOCUS+ and the FOCUS- of the focus motor (for the connections refer to the service manual of the set into which the CDM has been built).
- Play back track 1 of test disc 5 (code number 4822 397 30096). **disc** without defects.
- Adjust the turntable height with bearing screw item no. 66 until the voltage across the focusing motor is 0 V +/- 100 mV.
- Lock the screw with locking paint.

Checking **the angle setting**

For this adjustment use the glass disc with code number 4822 395 90204 and disc hold-down 4822 404 20725.

- Place the glass disc on the turntable with the disc hold-down.
- Place the CDM under a light source under which there is a straight line (e.g. fluorescent tube with grid).
- Put the arm in mid-position. Turn the set so that the arm is in parallel with the line under the light source (see Fig. 1).

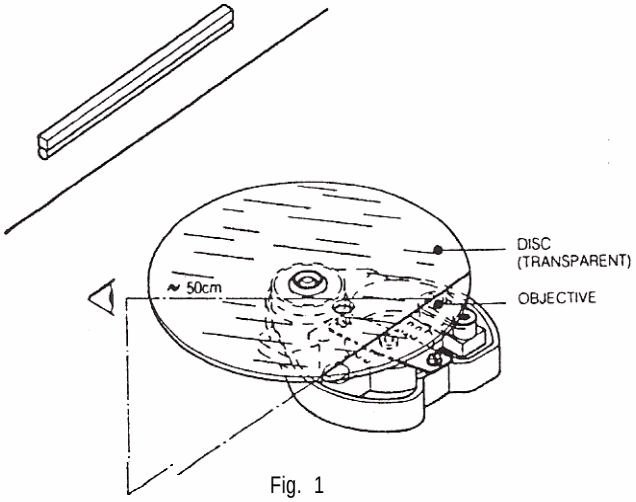


Fig. 1

- Look in the direction and in the prolongation of the line to its reflection on the glass disc and focus lens.
- The reflection in the objective should fall within the surface of the focus lens. (The two reflections are then =<4mm apart).
- Turn the CDM 90 degrees relative to the previous position (see Fig. 2).
- Repeat the measurement.

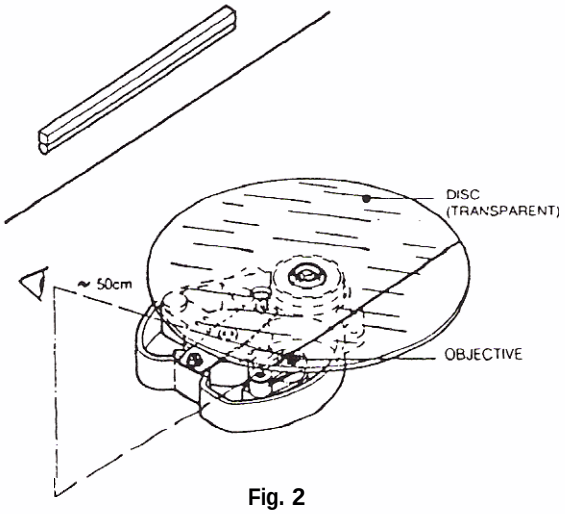


Fig. 2

Adjusting the angle setting

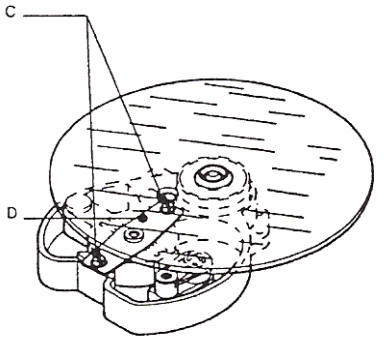
For the factory adjustment of the angle between disc and light path, a compromise was looked for between minimum angular deviation and minimum friction of the arm.

If. during measurement. it appears that the angle falls outside the specified tolerance, the angle must NOT be adjusted for minlmum deviation, but just within the tolerance. The new setting must be between the old setting and the optimum setting.

After the adjustment the friction of the arm must be checked.

This is done by means of a spring-pressure gauge which is applied at the counterweight. The friction of the arm, measured across the full deflection, may not exceed 25 mN.

If the friction is too high, the setting should be returned to the old value. Or replace the arm by a new one and check the angle again.



MDA.00357
T28/633

Fig. 3

- Undo the screws C (see Fig. 3) until bearing plate D can be displaced. For the inner screw a hole has been made in the glass disc.
- Correct the angle setting by pushing the bearing plate in the direction shown in Fig. 4.
- Tighten the screws C and take care that the settinq does not drift.
- Now double check the angle setting in two directions.
- After the angle setting the **height setting of the** turntable **must** be **checked.**

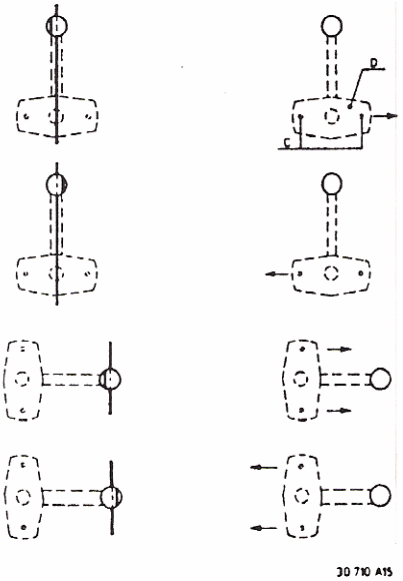


Fig. 4

Checking the motor control [Hall control)

- Disconnect the Vc connector (for the connection refer to the service manual of the apparatus into which the CDM has been built).
- Connect channel A of a dual beam oscilloscope to pin 3 of IC6083(a) and channel 8 to pin 1 of IC6083(b). Time base 10 ms/div. measure in respect to Vb+/2.

1 Switch the player on.
2 Inject a voltage of -0.9 V relative to Vb+/2 (!) +/- 0.1 V to pin 04 of the motor PCB.
The voltage may only be injected after the circuit has been connected to the supply voltage.
3 Now sinusoidal signals should be visible on the oscilloscope which, after about 2 sec.. lie symmetrically around the O-axis and which differ 90 degrees in phase relative to one another (see Fig. 5). The maximum ratio of these signals is 1:2

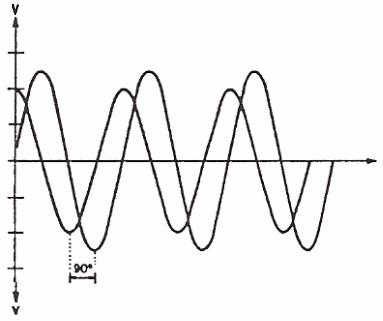
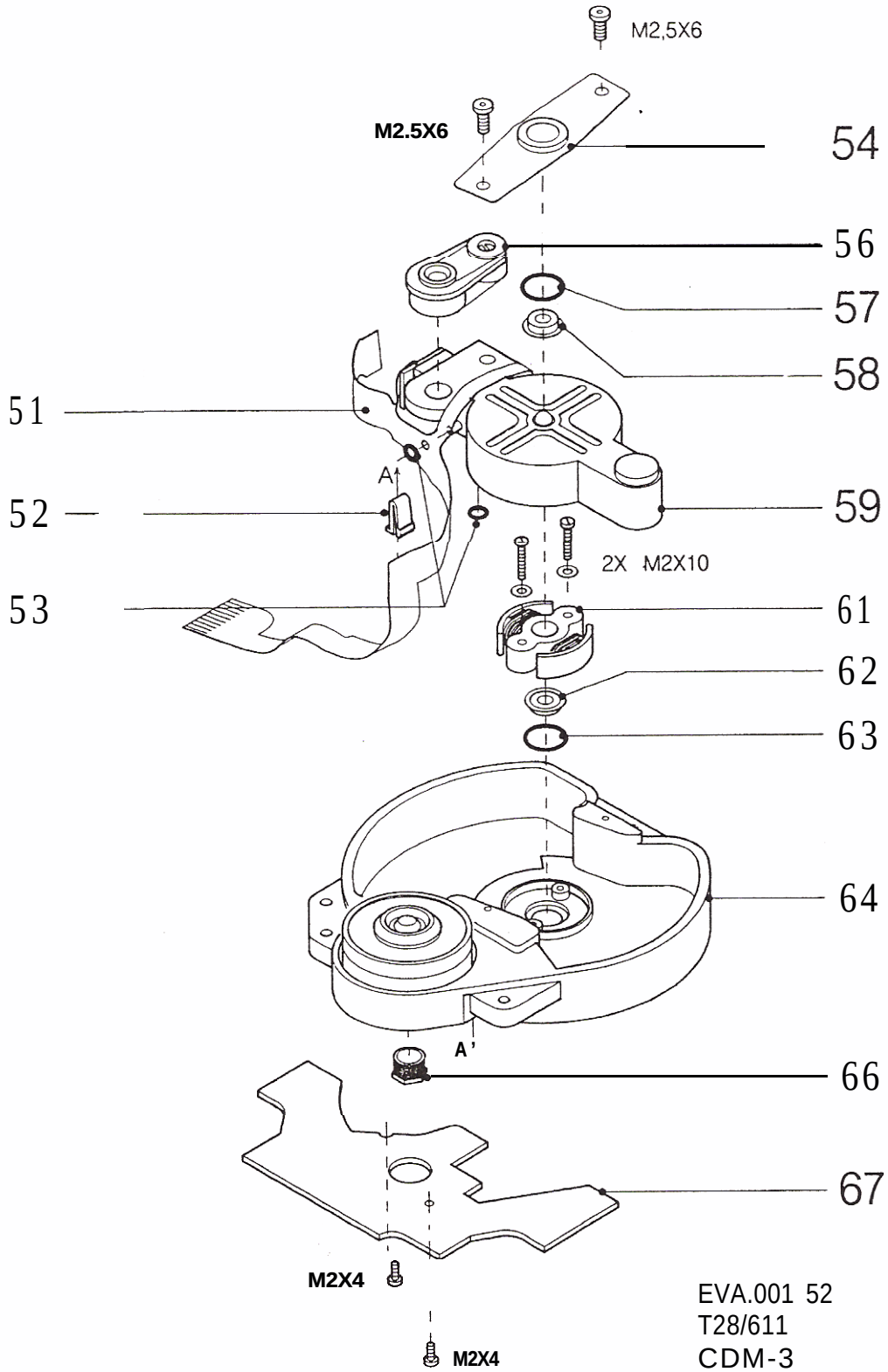


Fig. 5

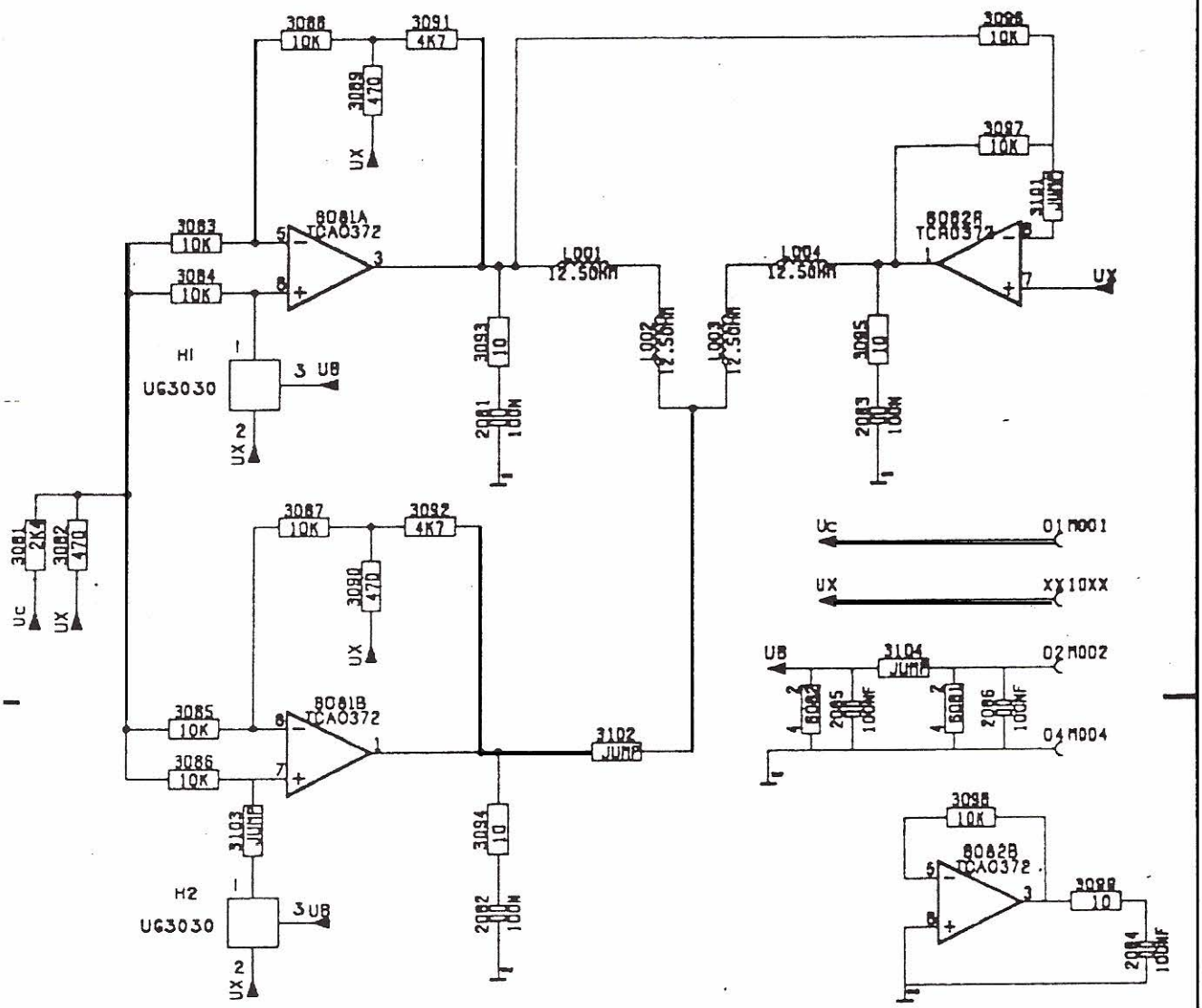
4 At Vc = -0.9 V +/- 0.1 V. the speed should be 600 rpm. The signals then have a frequency of about 30 Hz

- Switch the player off and connect channel A of the oscilloscope to pin 1 of IC6081(a) and channel B to pin 3 of IC6081(b).
- Repeat points 1 through 4.
- Now decrease Vc to -0.3 V.
- At this voltage the motor should still be running well. When all these conditions are met. it may be assumed that the motor and the PCB are all right.
If points 3 and 4 are not all right, or if the motor does not rotate well at -0.3 V. the entire motor (item numbers 61 through 67) should be replaced.

EXPLODED VIEW



POS.	Code number
51	482232350116
52	4822 401 10948
53	482253050876
54	4822520 10601
56,59	4822 691 30173
57	4822 530 50864
58	4822 520 20429
61-67	4822 361 20678
66	4822 502 12529

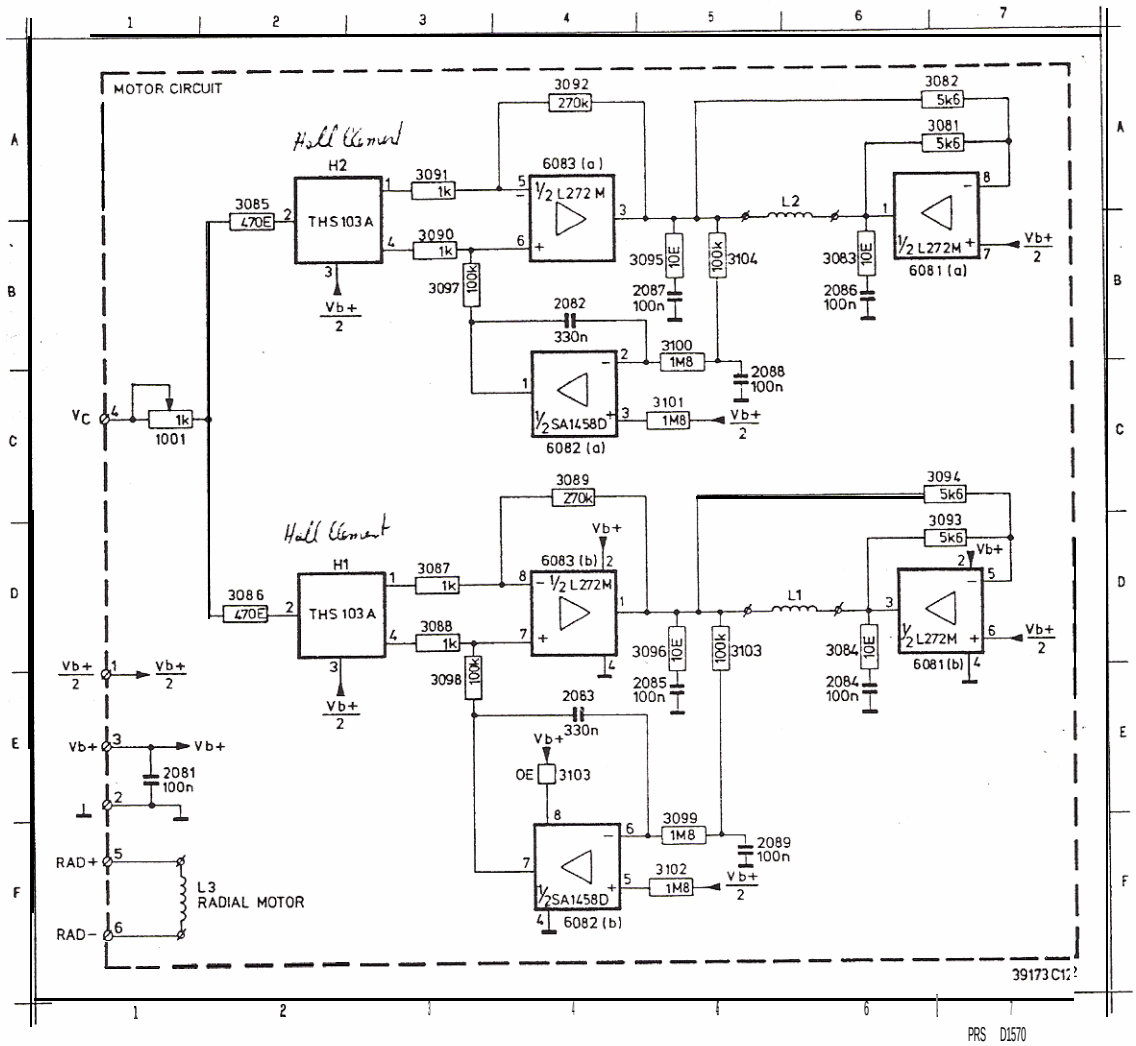


Version 2

CLASS NO.	P.C.B. CDM3	4322.010.0234			
NAME C.Kraaijeveld	SUPERS. VERV. 8222.011.03110	1	130 - 1	10	A4
W CHECK COMPTR.	DAT 11-01-88	PROPERTY OF EIGENDOM VAN N.V. PHILIPS' GLOEILAMPENFABRIEKEN EINDHOVEN-NEDERLAND			

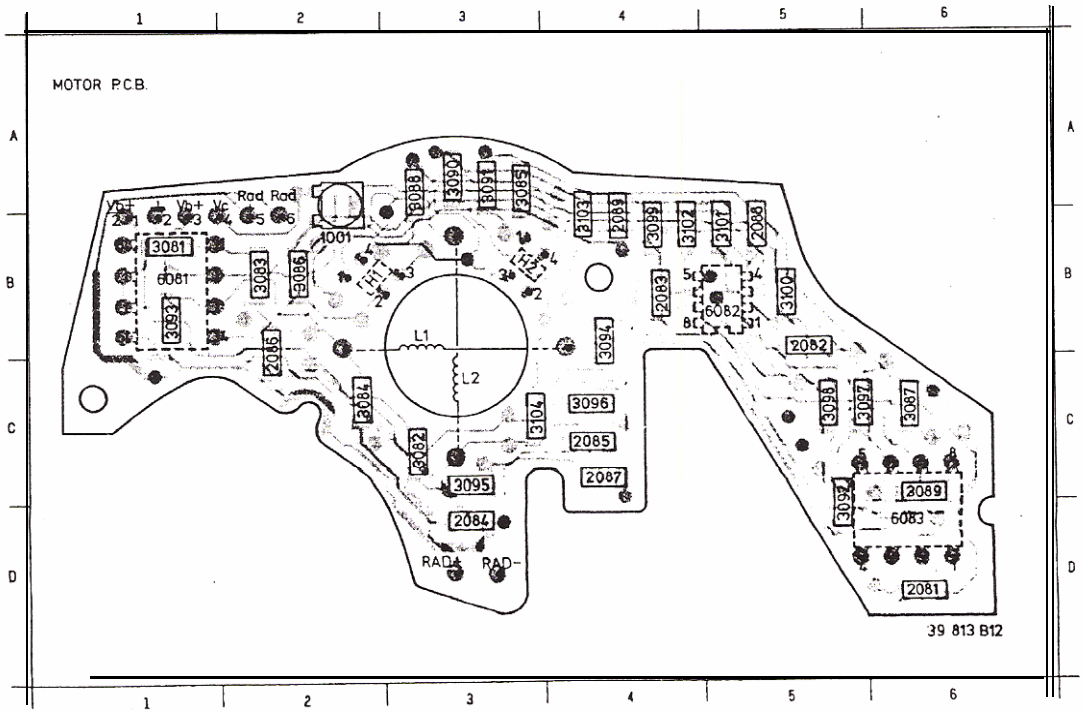
3?5

1001	C 1	2085	E 5	3081	A 7	3086	D 2	3091	A 3	3096	D 5	3101	C 5	6081	B 6	6083	D 4		
2081	E 1	2086	B 6	3082	A 7	3087	D 3	3092	A 4	3097	B 3	3102	F 5	6081	D 6				
2082	B 4	2087	B 5	3083	B 6	3088	D 3	3093	D 7	3098	E 3	3103	E 4	6082	C 4				
2083	E 4	2088	C 5	3084	D 6	3089	C 4	3094	C 7	3099	E 5	3103	D 5	6082	F 4				
2084	E 6	2089	F 5	3085	A 2	3090	B 3	3095	B 5	3100	B 5	3104	B 5	6083	A 4				



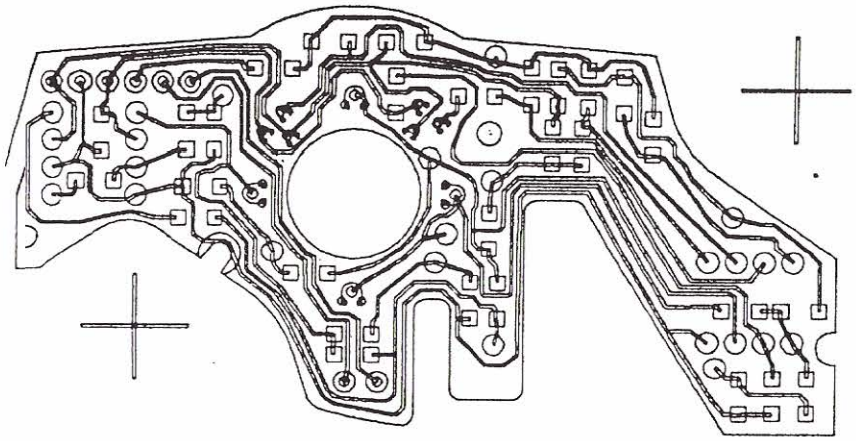
PRS D1570

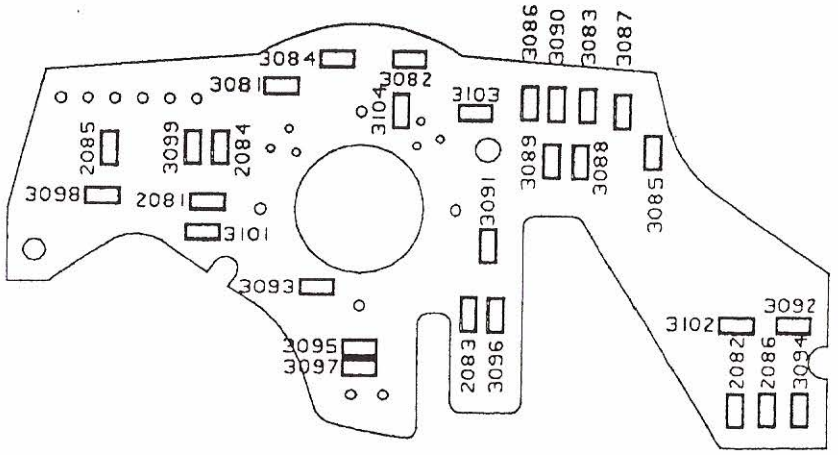
1001	B 2	2085	C 4	3014	C 4	3085	A 3	3090	A 3	3095	C 3	3100	B 5	6082	B 5				
2081	D 6	2086	B 2	3081	B 1	3086	B 2	3091	A 3	3096	C 4	3101	B 5	6083	D 6				
2082	B 5	2087	C 4	3082	C 3	3087	C 6	3092	D 5	3097	C 6	3102	B 5						
2083	B 4	2088	B 5	3083	B 2	3088	A 3	3093	B 1	3098	C 5	3103	B 4						
2084	D 3	2089	B 4	3084	C 2	3089	C 6	3094	B 4	3099	B 4	6081	B 1						

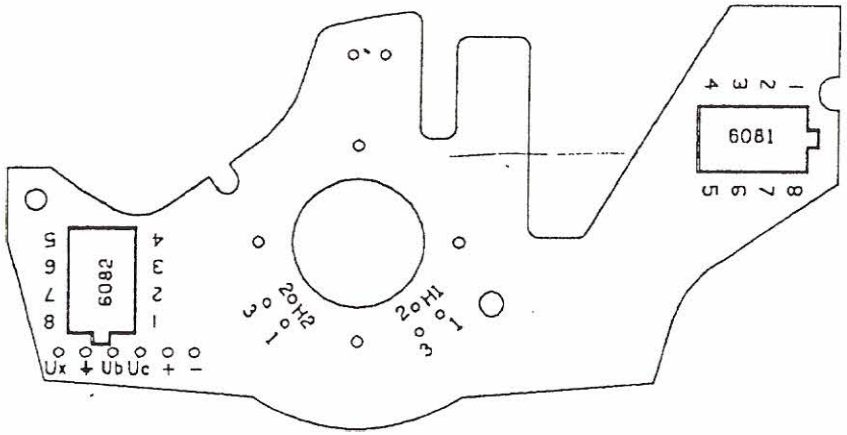


Version 1

PRS.01569







Version 2

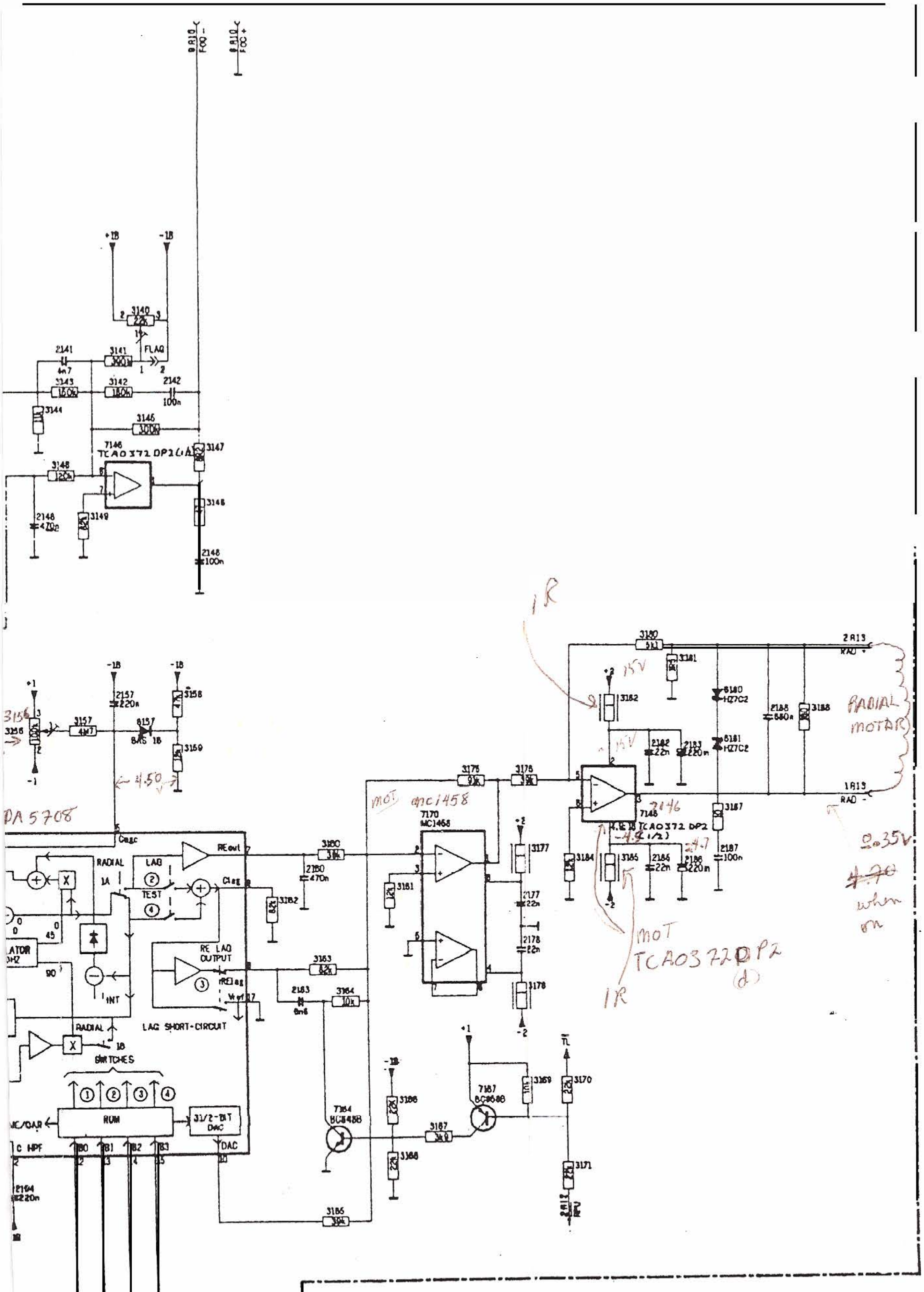
ORS							
UN-O 98 Ra in um	TOLERANCES UNLESS OTHERWISE STATED / TOLERANTIES TENZIJ ANDERS VERMELD		UN-O 643	ITEM POSNR	ASSEMBLY NO. / SAMENSTELLINGSNR.	QUANT. / AANTAL
	DIMENSIONS / MAAT	ANGLE / HOEK				
GENERAL ROUGHNESS / ALGEMENE RUWHEID	UNIT / EENHEID: mm	MATERIAL / MATERIAAL			PATTERN NO. / MODELNR.	
SCALE / SCHAAL	PROJ. / EUROP.	TREATMENT / BEHANDELING			DRAWING NO. / TEKENINGNR.	QUANT. / AANTAL

PANEL ASSY

SAM. PANEEL

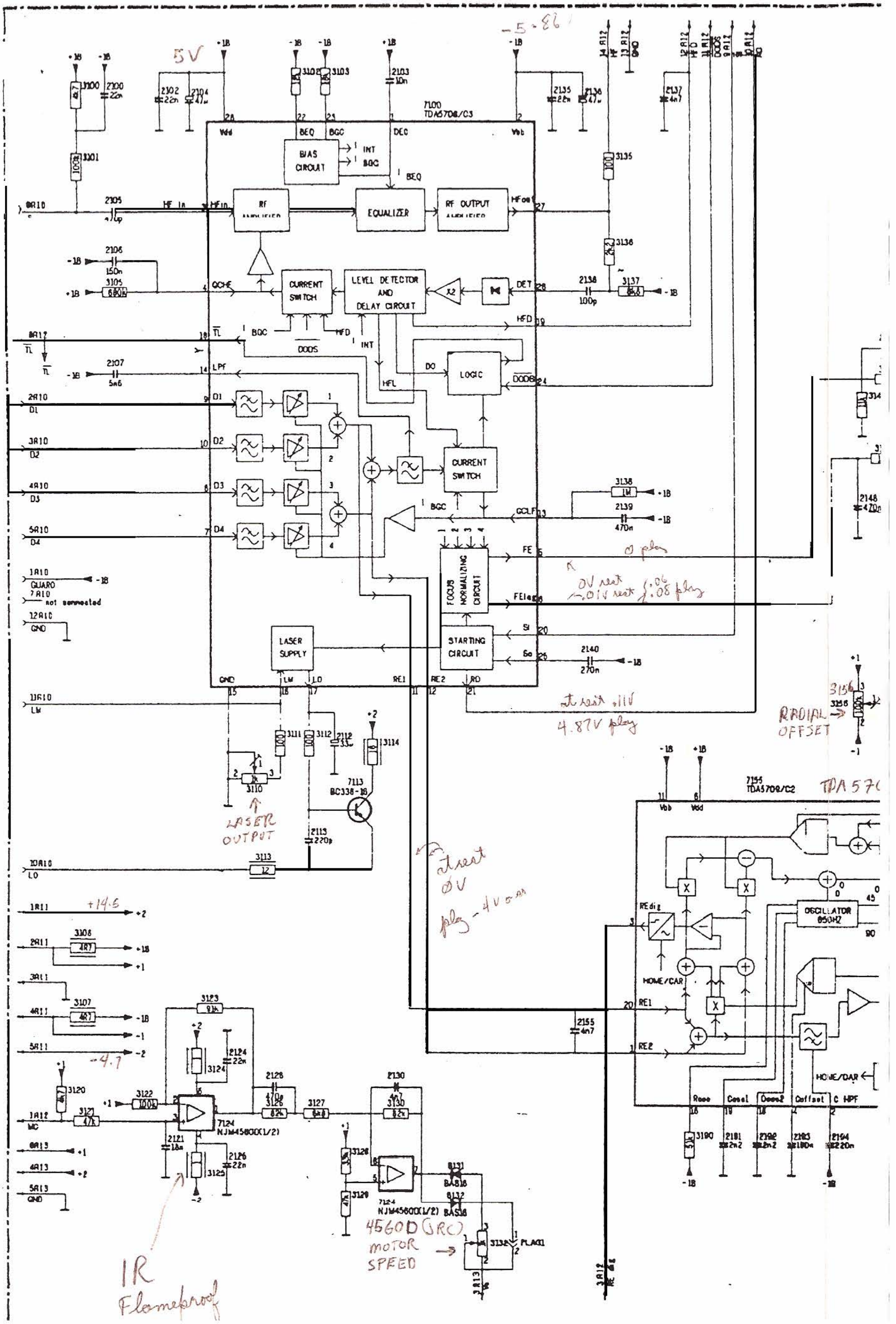
4322 010 0234

NAME / NAAM: C. KRAAIJEVELD	DRAWING VERS.: 1	132 - 1	10	A3



CLASS NO.	SERVO PANEL CDM-3 O.E.M.	3122 118 50730
88.04.06		
NAME MCGEE/PAUL J	SUPERS.	BD SH. 130 — 10
A CHECK	DAT. 83-01-04	N.V. Nederlandse Philips Bedrijven B.V.

38


7100
TDA5708/C3
BIAS CIRCUIT
RF AMPLIFIER
EQUALIZER
RF OUTPUT AMPLIFIER
CURRENT SWITCH
LEVEL DETECTOR AND DELAY CIRCUIT
LOGIC
FOCUS NORMALIZING CIRCUIT
STARTING CIRCUIT
LASER SUPPLY
Vdd
BEQ
BGC
DEC
Vbb
HFin
HFout
QCHE
DET
HFD
LPF
DODS
GCLF
FE
FElec
SI
So
GND
LM
LO
RE1
RE2
RD
D1
D2
D3
D4
GUARD
7A10 not connected
GND
7113
BC338-16
7124
NJM4560D(1/2)
BAS16
PLA01
7155
TDA5709/C2
OSCILLATOR 850HZ
HOME/CAR
REdig
5V
-5.86
0V rest
4.87V play
LASER OUTPUT
RADIAL OFFSET
+14.5
-4.7
4560D (JRC)
MOTOR SPEED
IR
Flameproof

1985-07-01

ELECTRICAL MEASUREMENTS AND ADJUSTMENTS

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

Specification measurement

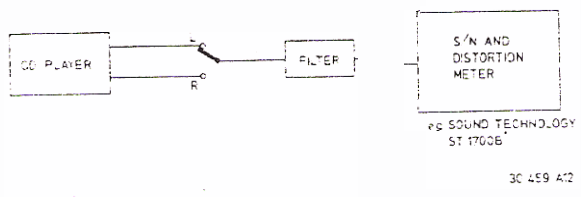


Fig. 6

To measure the specification use can be made of audio test disc 4822 397 30085.
Use 7th order filter 4822 395 30204 (see Fig. 5) to measure:
- Total harmonic distortion (THD)
- Intermodulation distortion
- Signal-to-noise ratio (S/N)

DETAILED MEASURING METHOD FOR THE DECODER CIRCUIT

HINTS

Test discs

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

Measurements on op-amps

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

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

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

Stimulation with "0" and "1"

During troubleshooting sometimes certain points should be connect to ground or supply voltage. As a result certain circuits can be brought in a desired state thus shortening the diagnosis time. In a number of cases the related points are outputs of op-amps. These outputs are short-circuit-resistant, i.e. they can be brought to "0" or ground without 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 aood workinq of the two microprocessors by means of their built-in test programme and servicing programme.

Method:

Self-test of the **decoder uP IC6301 MAB8441 P TO 82**

With the self-test the following parts of the uP are tested:

- RAM
- *ROM*
- TIMER
- serial I/O interface
- I/O gates

- Interrupt the I²C and I²D connections on connector pins 46-l and 46-3 of the decoder panel.
- Unsolder pins 1. 7,26 and 27 of the decoder uP
- Render pin 2 of the decoder uP "low" (ground) and switch on the supply voltage.
- The test starts if oin 2 is rendered "hiqh" again (interrupt the connection to ground).
- If all tests are positive pin 1 of the decoder uP will go low within 1s

Self-test of the control uP MAB 8441 P TO42

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

- RAM
- *ROM*
- TIMER
- serial I/O interface
- I/O gates

- Interrupt the I²C and I²D connections on connectors P5-4 and P5-5 on the CD Control Print
- Desolder the 6 connections 19 through 24 from the EEPROM panel.
- Render pin 2 of the control display uP "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 uP will go "low" again within Is.

Initiation of the service programme of the uP

- 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 aim by means of the SEARCH FORW. and SEARCH REV. keys with a minimum torque to the outside and to the inside. respectively.
Thus the fre 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 16x 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 bv 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.

- *Servicino 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 length of the lead-in track. music will be played afler 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 uP 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 DECODER uP

. Self-test decoder uP 6301

See self-test of the decoder uP 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.

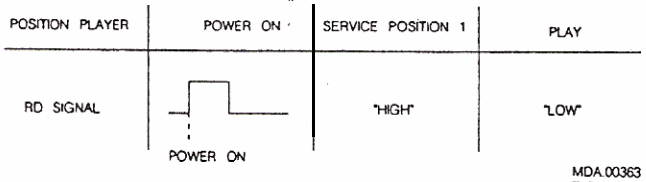
- Si (pin 21; test point 21)

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.



MDA.00363
T12 –638

- MSTP (pin 20; test point 78)

When. after RD “high’. the MSTP is “high” for a short moment (> 0.2 set), 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. sea CDM-2 Service Manual: "Checking of the motor control”.

- BO (pin 8 ; test point 36)
  B1 (pin 9 ; test point 34)
  82 (pin 10; test point 33)
  83 (pin 11; test point 32)

With the BO + 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 BO + B3 are stable:

signal	STOP	PLAY	Service pos. 0,1,2	Service pos. 3
B O	“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 uP that track loss threatens. The uP then can give correction signals with 60 + B3
- I” the “SEARCH” mode, or when the player is bumped against, there are pulses on test point 16.

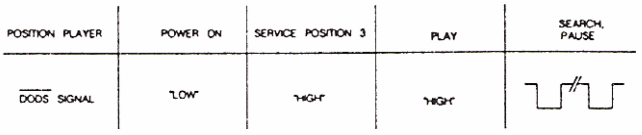
- REdig (pin 13: test point 37)

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

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

- DODS (pi” 22; test point 19)

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



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T12 –638

II DECODER-A IC

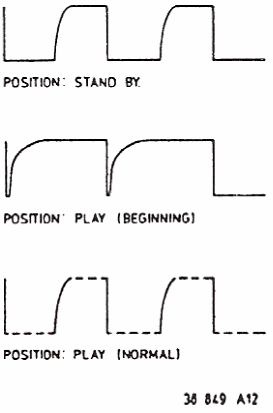
- Check the MC signal (pin 17; test point 81)
- In stand-by mode, the MC signal (Motor Control) corresponds to the figure below.

Note:
The repetition time of the MC signal is 11.3 usec

- 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%.

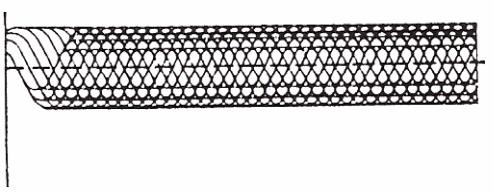
See also Service Manual CDM-2: “Check of the motor control".

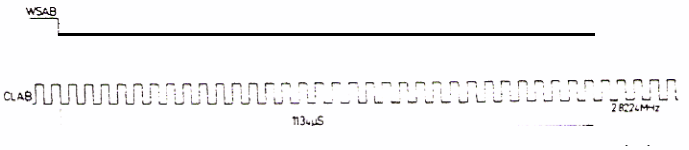


- Check the HF signal on test point 65 (eye pattern)pin 25
- Insert a disc.
- The HF signal should be present and be stable in the PLAY mode and in:
  SERVICING POSITION 3 after the run-i” track has been read.
- In SERVICING POSITION 2 and during reading of the lead-i” track the HF signal is not stable.

Position of oscilloscope 0.5 us/DIV

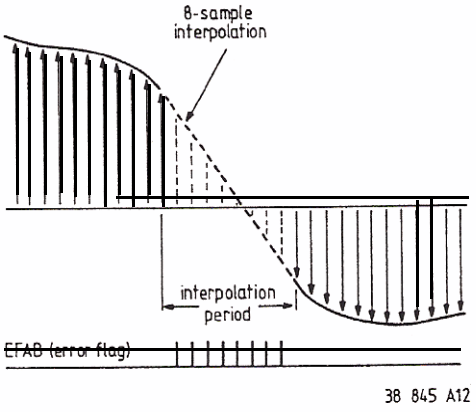
Amplitude = 1.5 Vpp





- Check the EFAB signal (Error Flag from Decoder-A to Filter-B) et test point 74 (pin 36)
- Place test disc 5A on the turntable.
- During playback, EFAB fulses should be present at test point 74 for soft braking of the disc and during fast search (F.Forward, F.Reverse).

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



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

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

MDA.00240

0 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.

0 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.

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

– The Xin frequency is 11.2896 MHz.
- If this frequency deviates, check test point 70; Xout signal. on Filter-B IC.
This frequency should also be 11.2696 MHz

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

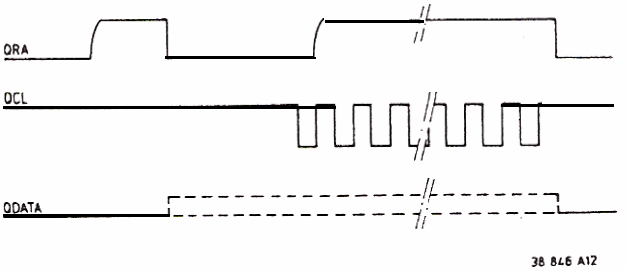
- Place a disc on the turntable.
- Select one of the following positions:
SERVICE POSITION 2 or 3, or position PLAY
- Trigger the oscilloscooe with the WSAB signal (test point 71: pin 39).
- Check sionals:
WSAB at test point 71 (pin 39)
(Word Select from Decoder-A to Filter-B)
CLAB et test point 72 (pin 36)
(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).

0 Check the C&channel signals

- When the uP panel" is applied, (a sub-printed circuit board) above the decoder which houses IC6451: MAB6441P/T012, the test points 75, 76 and 77 are not connected.
- Place a disc on the turntable.
- Select one of the following positions:
SERVICE POSITION 3 or position PLAY
- Trigger on the QRA signai (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).
IQ-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 uP (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 uP
As soon as the decoder uP has taken in enough information via QDA. QRA will go low again. That is why the QRA times vary each time.



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

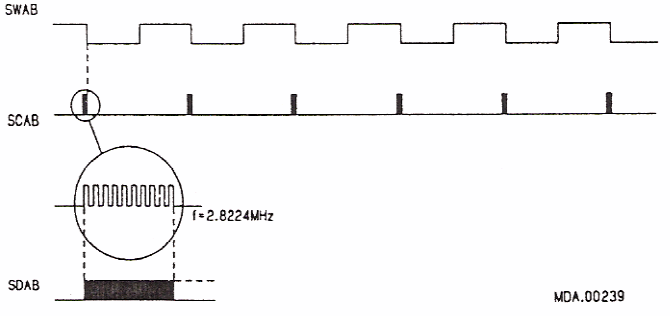
- Motor start pulse when test point 78 is “high” for ⩾ 0.2 sec.
- Motor stop pulse when test point 78 is “low” for ⩾ 0.2 sec.

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 usec.

0 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 CRI signal

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

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

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

III FILTER-B IC

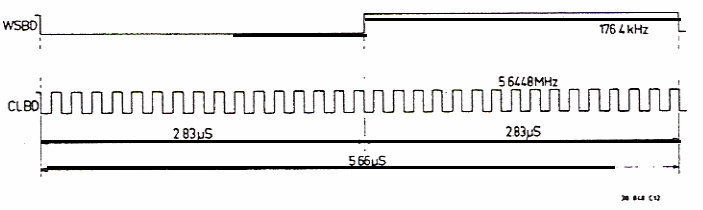
0 Check the signals between Decoder-A IC and Filter-8 IC

- See sub. “II Decoder-A IC"
  * Check the X IN signal (test points 69,pin 11 and 70,pin 10)
  +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) Decoder A
  * Check the subcode clock signals (SWAB, SCAB, SDAB signals: test points 78, 79 and 80).

- Check the timing signals between Filter-B IC end DAC IC

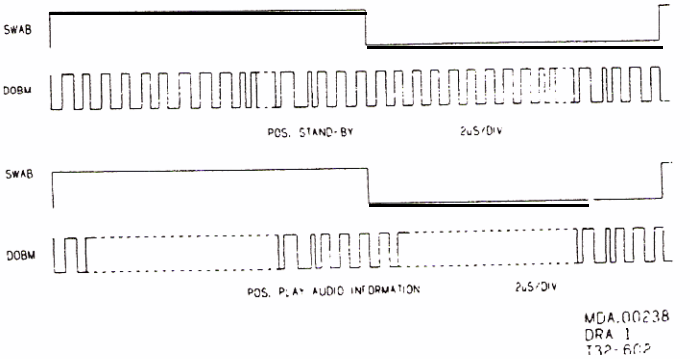
- Place a disc on the turntable.
- Select one of the following positions:
  SERVICE POSITION 3 or position PLAY.
- Trigger the oscilloscope with the WSBD signal (Word Select from Filter B to DAC) test point 85 (pin 18).

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)

– Whenthe "uP panel" is applied, (a sub-printed circuit board) that houses IC6451: MAB8441P/T012, test point 89 is not connected.

. Check the MUSB signal test point 90; pin 23 (Soft Mute)

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

IV DAC IC (Dual Digital Analog Converter)

0 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.

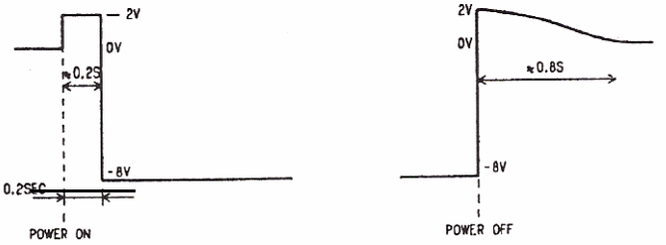
V DEEM CIRCUIT

0 Check DEEM circuit

– Place test disc 5 on the turntable.
– During playback of track no. 14 (recorded without PRE-EMPHASIS) the DEEM signal at test point 84 should be "low".
– During playback of track no. 15 (recorded with PRE-EMPHASIS), the DEEM signal at test point 84 should be "high".
– During playback of track no. 14 the analogue Signal should be present at the source of 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 6327 (to be measured on a jumper, tp93) should be as indicated in the figure below.



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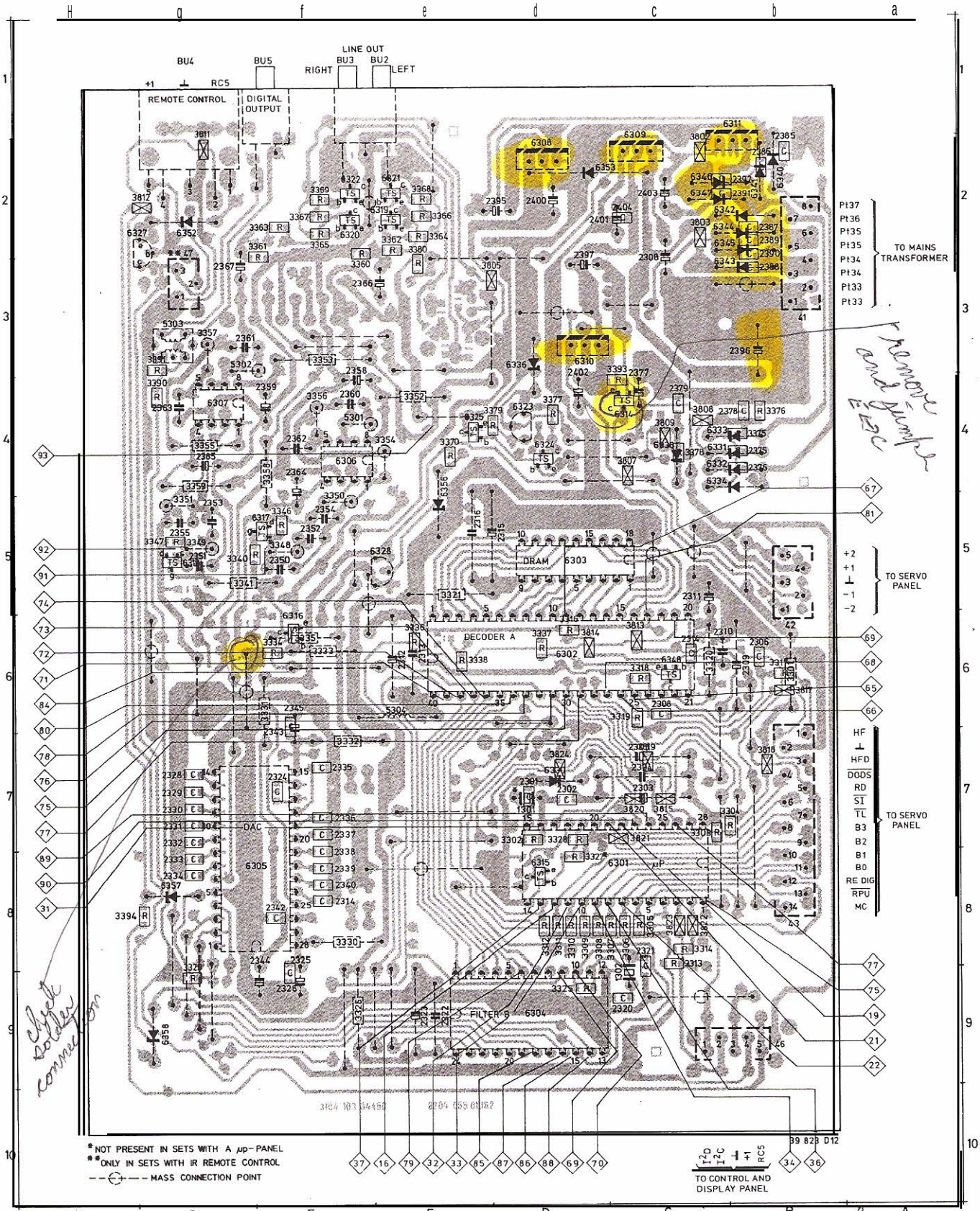
T28

6-4 SUPPLY + DECODER PANEL

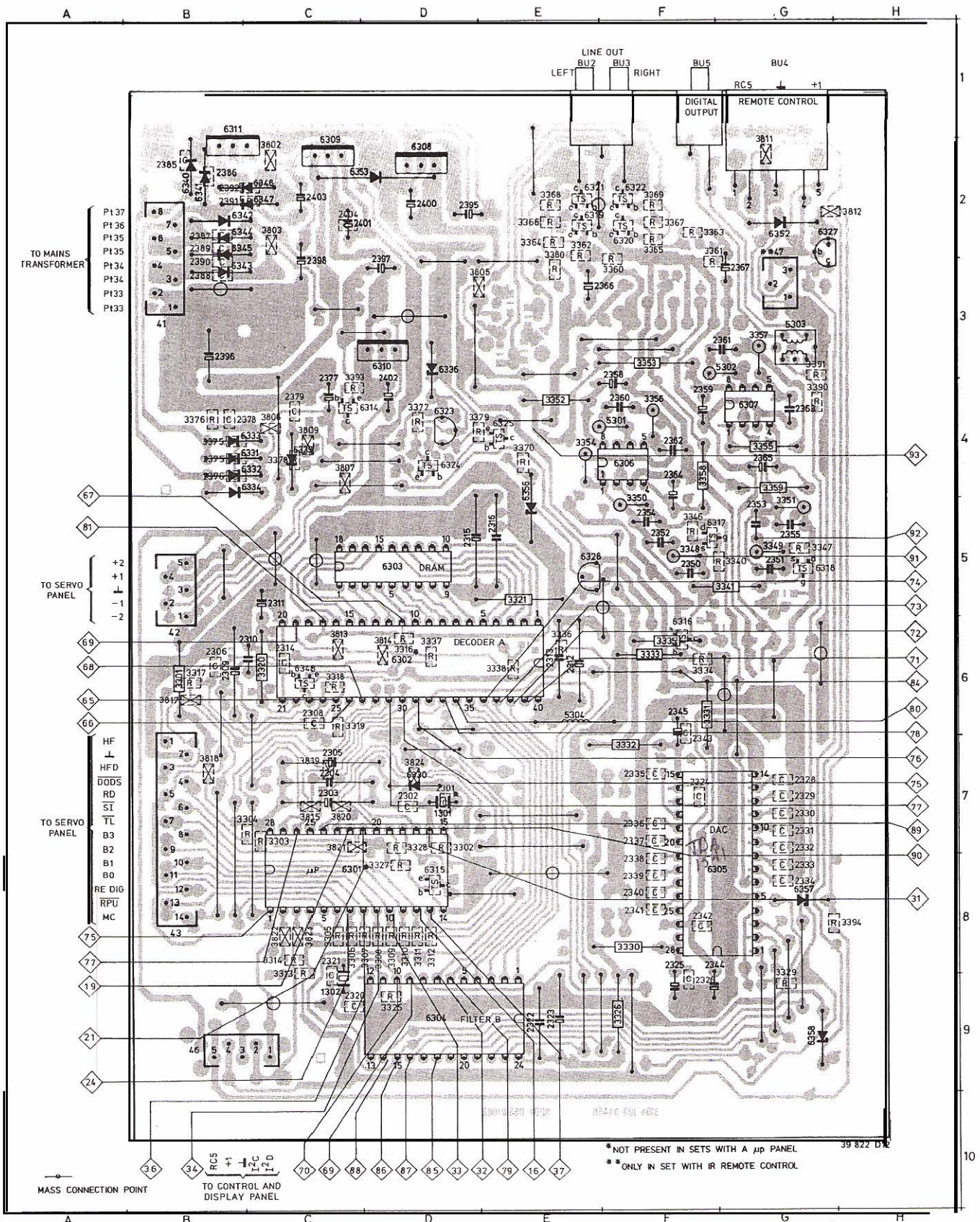


Remove and bump here

check solder connection

note: these are not plate through
check for cracks on solder at
IC's 6301, 6302, 3, 4, 5 ...

SUPPLY + DECODER PANEL



For coordinates see Page 6-4

Pac Samir has
TDA 1541 cheap
replace when noise appears
in audio/and sound fades away

Chips 50 V NPO S1 206

1 pF	5%	4822 122 32479
1.5 pF	5%	4822 12231792
1.8 pF	5%	4622 12232087
2.2 pF	5%	4622 122 32425
3.3 pF	5%	4622 12232079
3.9 pF	5%	4622 122 32081
4.7 pF	5%	4822 12232062
5,6 Pf	5%	4822 12232506
8,2 pF	5%	4622 12232083
10 pF	5%	4822 122 31971
12pF	5%	4622122 32139
18 pF	5%	482212231769
22 pF	10%	482212231837
27 pF	5%	482212231966
33 pF	5%	482212231756
39 pF	5%	482212231972
47 pF	5%	482212231772
56 pF	5%	4822 12231774
68 pF	5%	4822 122 31961
82 pF	10%	4822 12231839
100 pF	5%	482212231765
120 pF	5%	4622 12231766
150 pF	5%	482212231767
180 pF	2%	4822 12231794
220 pF	5%	4622 12231965
270 pF	5%	4822 122 32142
330 pF	10%	4822 12231642
390 pF	5%	4822 12231771
170 pF	5%	4822 12231727
560 pF	5%	4822 122 31773
680 pF	5%	4822 12231775
820 pF	5%	4822 12231974
1 nF	10%	5322 122 31647
1.2 nF	5%	4822 122 31807
1,5 nF	10%	4822 12231761
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%	4622 122 31976
10 nF	10%	4822 12231728
12 nF	10%	5322 122 31648
15nF	10%	4622 122 31782
18nF	10%	4622 122 31759
22 nF	10%	4822122 31797
27 nF	10%	4622122 32541
33 nF	10%	462212231981
47 nF	10%	482212232542
56 nF	10%	4822 12232183
100 nF	10%	482212231947
180 nF	10%	4622 122 32915

Chips 0,125 W S1206 NPO

0 E	jumper	4822 111 90163
1 E	5 %	4622 111 90184
1.1 E	5 %	4822111 90377
1,2 E	5 %	4622111 90378
1,3 E	5 %	4622 111 90379
1.5 E	5 %	4822 111 90381
1.6 E	5 %	4622 111 90382
2 E	5%	4622 111 90383
2,2 E	5%	illegible 90384
	5%	
2.4 E	5%	4822 111 90365
2.7 E		4822 111 90386
3 E	5 %	4822 111 90387
3.3 E	5%	4822 111 90368
3.6 E	5 %	4822 111 90359
3.9 E	5 %	4822 111 90391
4.3 E	5 %	4822 111 90392
4.7E	5 %	5322111 90376
5.1 E	5 %	4822 111 90393

Chips 0,125W S1206

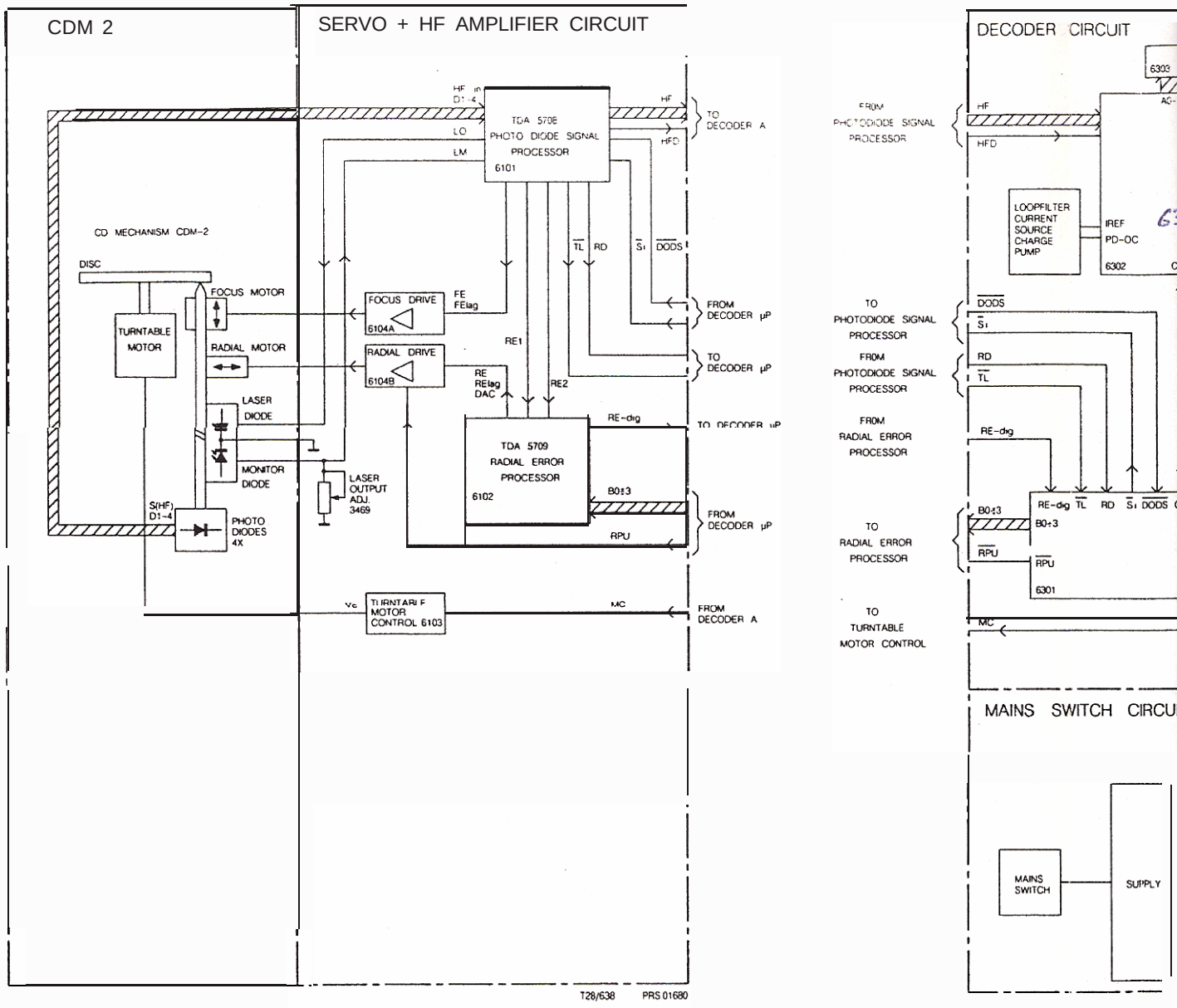
5,6 E	5%	4622 111 SO394
6.2 E	5%	4622 111 90395
6.8 E	5%	4822 111 SO254
7.5 E	5%	4822 111 90396
8.2 E	5%	4822 11 1190397
9.1 E	5%	4622 11 1190398
10 E	2%	5322 11 1190095
11 E	2%	4622 11 1190338
12 E	2%	4822 11 190341
13 E	2%	482211 1 so343
15 E	2%	482211 1 so344
16 E	2%	482211 1 so347
18 E	2%	532211 1190139
20 E	2%	4622 11 190352
22 E	2%	4822111 90186
24 E	2%	4822111 90355
27 E	2%	5322111 90105
30 E	2%	4822liI 90356
33 E	2%	4822 111 90357
36 E	2%	4822111 90359
39 E	2%	4822 111 90361
43 E	2%	532211690125
47 E	2%	4822111 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%	4822111 90371
62 E	2%	4822 111 90124
91 E	2%	4822 111 90375
100 E	2%	5322 Ill 90091
110 E	2%	4822 111 90335
120 E	2%	4822111 90339
130 E	2%	4822 111 90164
150 E	2%	5322111 90096
160 E	2%	4822 111 90345
180 E	2%	5322111 90242
200 E	2%	4822111 90348
220 E	2%	4822111 90178
240 E	2%	4822111 90353
270 E	2%	4822111 90154
300 E	2%	4822111 90156
330 E	2%	5322111 90106
360 E	1%	4822111 90288
360 E	2%	4622111 90358
390E	2%	5322 111 90138
430 E	2%	4822111 90362
470 E	2%	5322 111 90109
510 E	2%	4822 111 90245
560 E	2%	5322 111 90113
620 E	2%	4822111 90368
680 E	2%	4822111 90162
750 E	2%	5322111 90306
820 E	2%	4822111 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%	4622 111 90571
4.3 k	2%	4822111 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%	4622 111 90544

Chips 0,125 W S1206

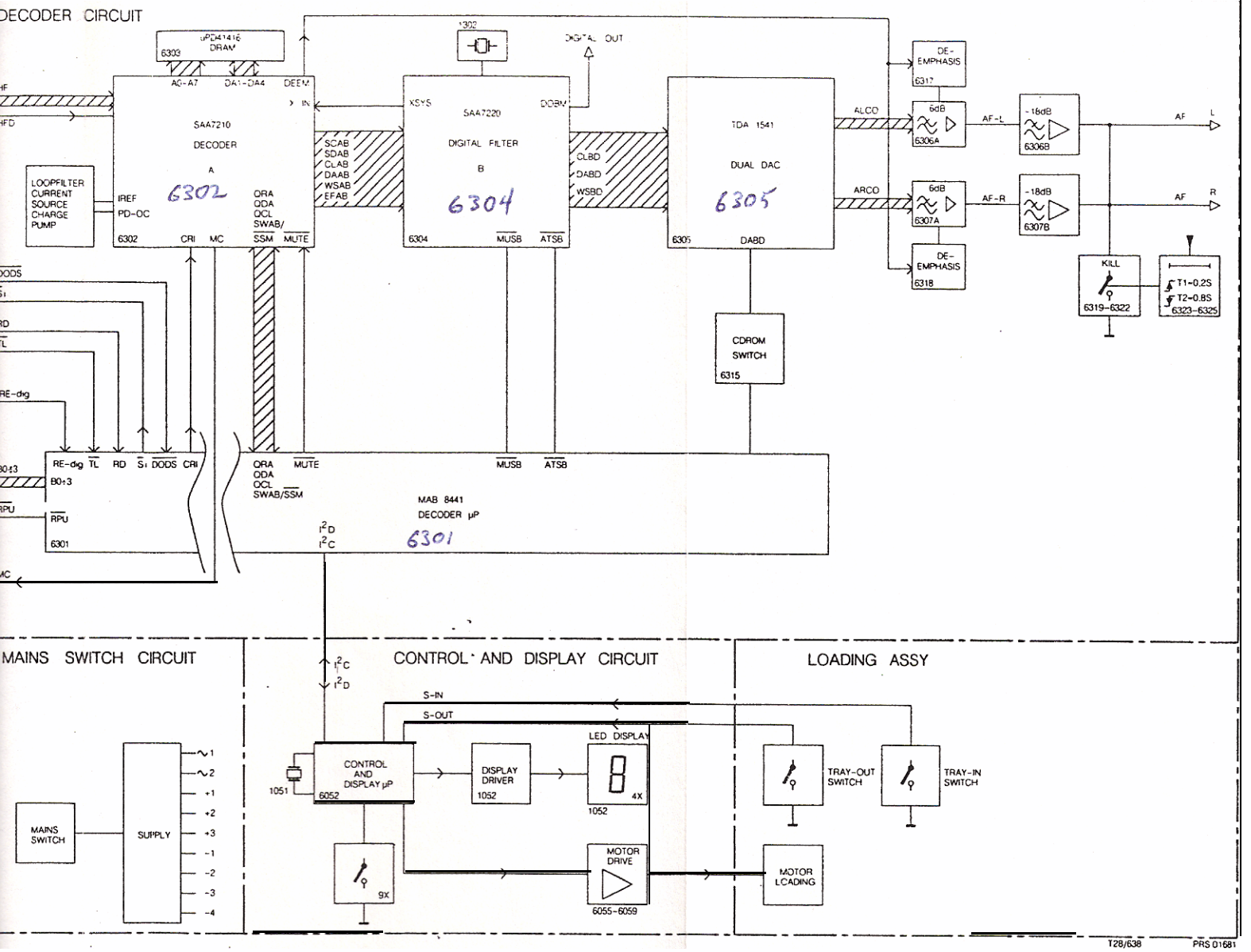
7.5 k	2%	4822 111 90276
8.2 k	2%	5322 Ill 90118
9,1 k	2%	4622 111 90373
10k	2%	4822 111 90249
11 k	2%	4822111 90337
12k	2%	4822 111 90253
13k	2%	4822111 90509
15k	2%	4822 111 90196
16k	2%	4822111 90346
18k	2%	4622 111 SO238
20k	2%	4822111 SO349
22 k	2%	4822111 90251
24k	2%	4822111 90512
27 k	2%	4822111 SO542
30k	2%	4822 111 90216
33k	2%	5322111 90267
36k	2%	4822111 90514
39 k	2%	5322111 90106
43k	2%	4822111 90363
47 k	2%	4822111 90543
51 k	2%	5322 Ill SO274
56k	2%	4822111 SO573
62 k	2%	5322 111 SO275
68 k	2%	4822111 90202
75 k	2%	4622 111 90574
82 k	2%	4822 111 90575
91 k	2%	5322111 SO277
100 k	2%	4822 111 90214
110 k	2%	5322 111 90269
120k	2%	4822 111 90568
130k	2%	4822 111 90511
150k	2%	5322 111 90099
160k	2%	5322 111 90264
180k	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
470k	2%	4822 111 90161
510 k	2%	4822 111 90364
560k	2%	4822 111 90169
620k	2%	4822 111 90213
680k	2%	4822 111 90368
750 k	2%	4822 111 90369
820k	2%	4822 111 90205
910 k	2%	4822 111 90374
1M	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%	4622 111 90417
3 M	5%	4822 111 90418
3.3 M	5%	48221119019:
3.6 M	5%	4622 11 90419
3.9 M	5%	4622 1111 90421
4.3 M	5%	4822 11 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%	4622 111 SO235
7.5 M	5%	4822 111 90427
8.2 M	5%	4822 111 90237
9.1 M	5%	4822 1111 90428
10M	5%	5322 11191141

COMPACT disc DIGITAL AUDIO

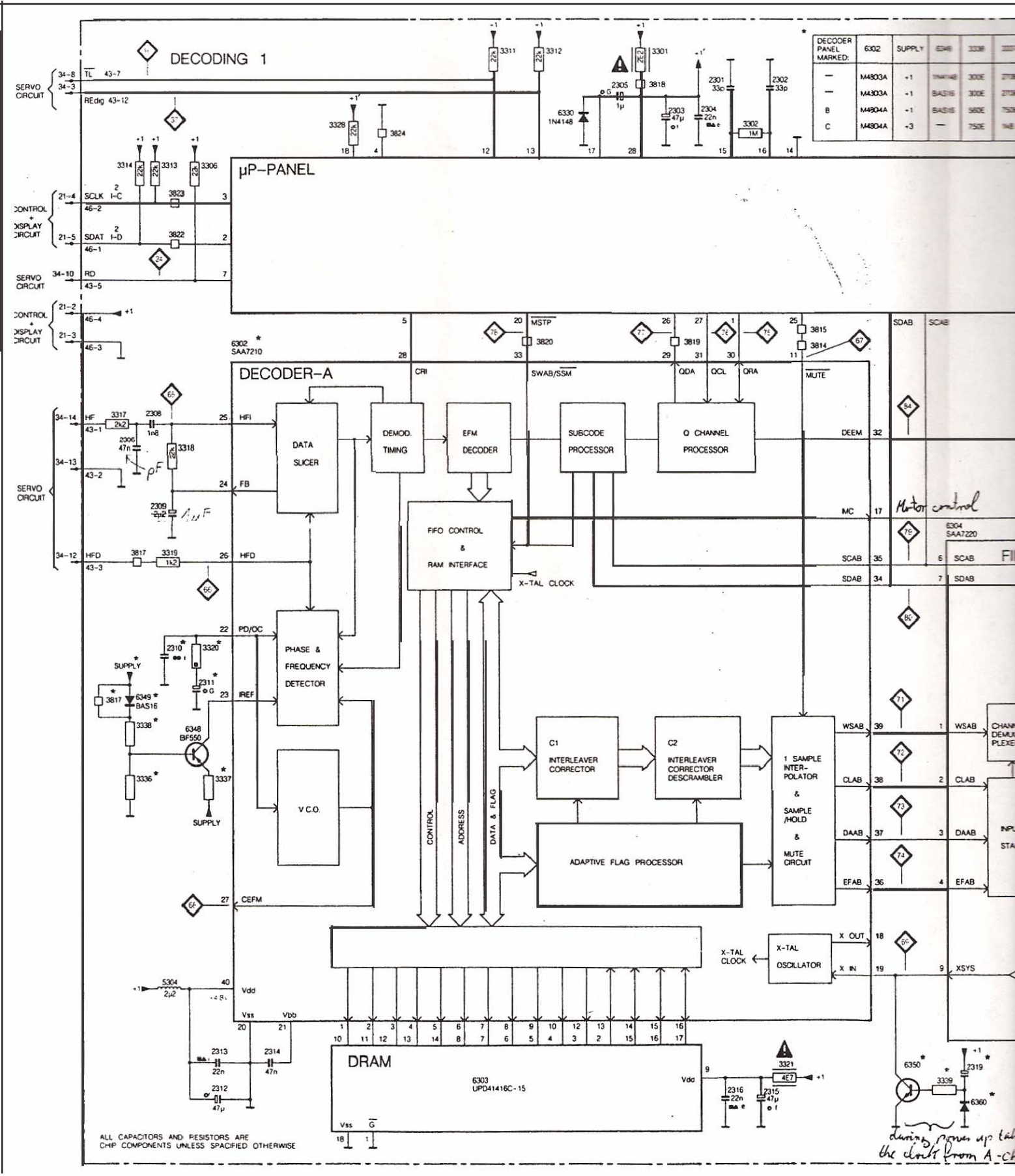
BLOCK DIAGRAM



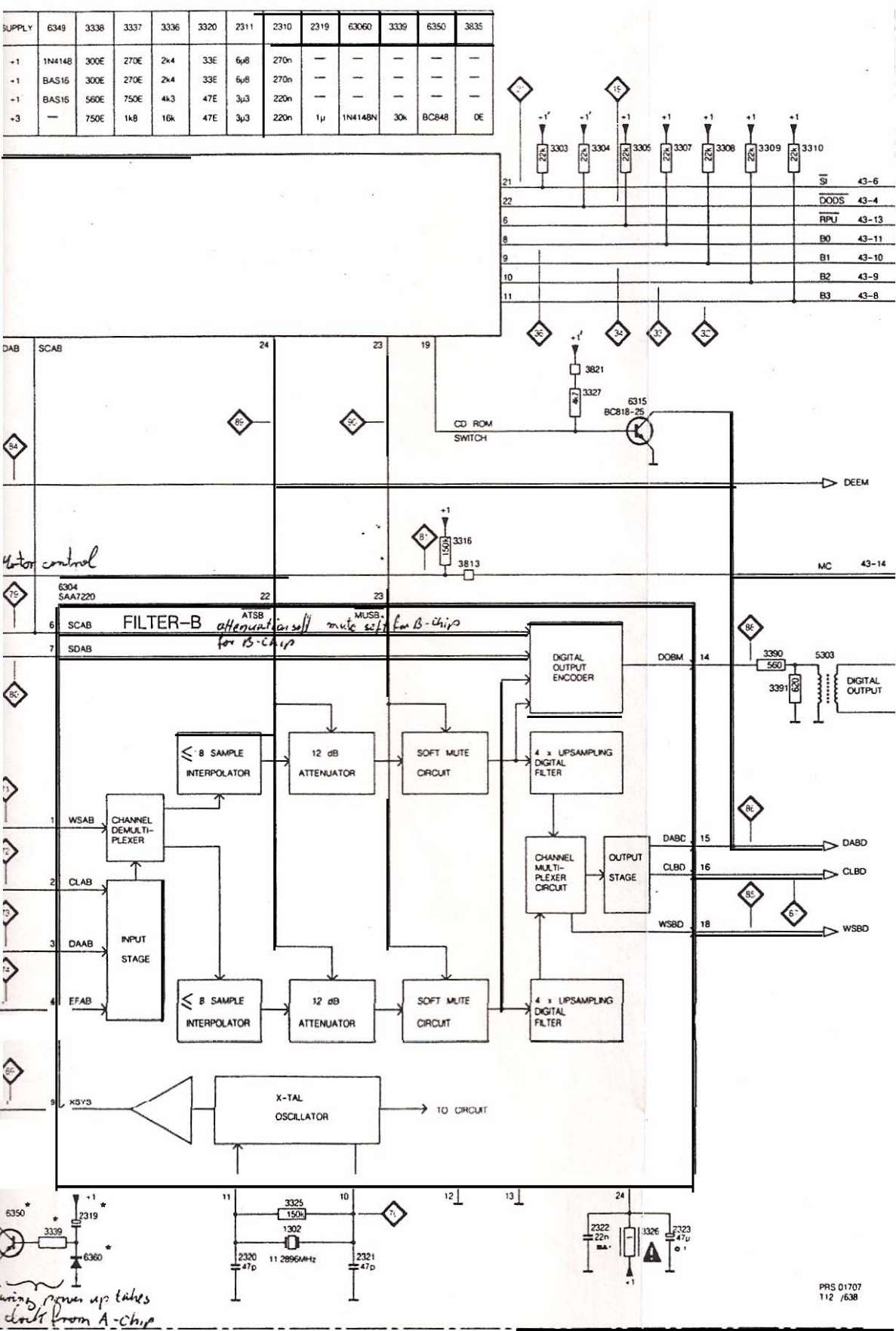
B0-B3	-	Control bits for radial circuit	REI		Radial error signal 1 (summation of amplified currents D_3 and D_4
DAC		Current output for track jumping (Digital to Analogue Converted)	RE2		Radial error signal 2 (summation of amplified currents D, and D_2
D O D S		Drop out detector supression	RE dig		Radial error digital
D1+4		Photodiode currents	RE lag		Radial error signal for LAG network
FE		Focus error signal	RD		Ready signal, starting up procedure finished
FE lag	-	Focus error signal for LAG network	RPU		Radial puls after track jumping
HF		HF output for DEMOD	Si		On/off control for laser supply and focus circuit
HFD		HF detector output for DEMOD	TL		Track loss signal
HF-in		HF current input	Vc		Control voltage for turntable motor
LM		Laser monitor diode input			
LO		Laser amplifier current output			
MC		Motor control signal			
RE		Radial error signal (amplified RE_2-RE, currents)			



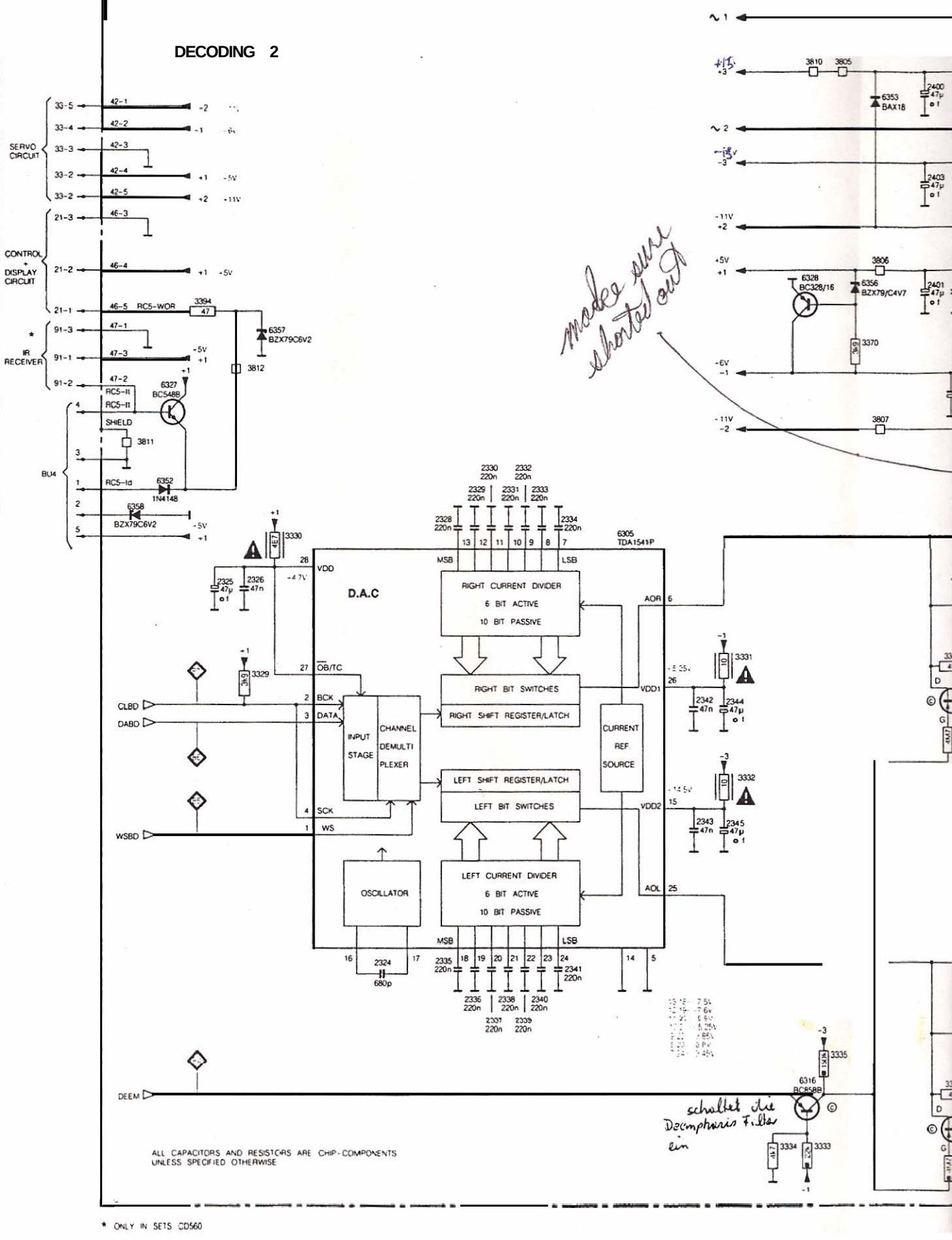
ATSB	-	Attenuation of Audio level in Search position (Cueing)
CD ROM Switch	-	Digital Data information on disc signal
CEFM	-	Clock Eight-to-Fourteen Modulator
CLAB	-	Clock signal Decoder-A to Filter-B
CLBD	-	Clock signal Filter-B to DAC
$\overline{CRI}$		Counter Reset Inhibit
DAAB	-	Data signal Decoder-A 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 Aknowledge
SCAB		Subcode clock Decoder-A to Filter-B
SCLK-I^2C	:	Serial Clock signal Decoder-Control uP (Inter IC Connection)
SDAB	-	Subcode data Decoder-A to Filter-B
SDAT-I^2D	-	Serial Data Signal Decoder-Control uP (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-9


DECODING 1
μP-PANEL
DECODER-A
DATA SLICER
DEMOD. TIMING
EFM DECODER
SUBCODE PROCESSOR
Q CHANNEL PROCESSOR
FIFO CONTROL & RAM INTERFACE
PHASE & FREQUENCY DETECTOR
V.C.O.
C1 INTERLEAVER CORRECTOR
C2 INTERLEAVER CORRECTOR DESCRAMBLER
1 SAMPLE INTERPOLATOR & SAMPLE /HOLD & MUTE CIRCUIT
ADAPTIVE FLAG PROCESSOR
X-TAL OSCILLATOR
DRAM
6303 UPD41416C-15
6302 SAA7210
6304 SAA7220
SERVO CIRCUIT
CONTROL + DISPLAY CIRCUIT
ALL CAPACITORS AND RESISTORS ARE CHIP COMPONENTS UNLESS SPACIFIED OTHERWISE

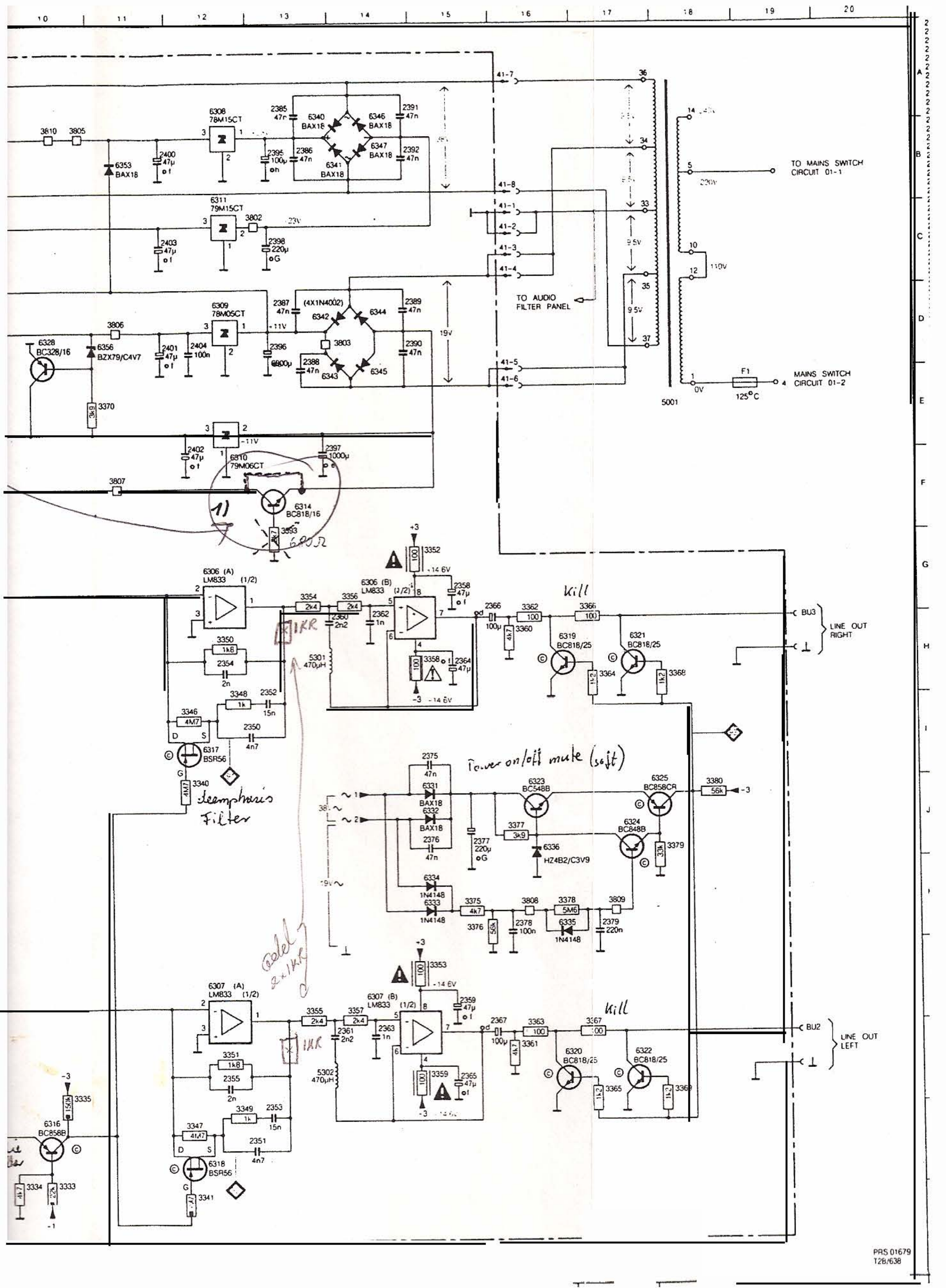
SUPPLY	6349	3338	3337	3336	3320	2311	2310	2319	63060	3339	6350	3835
+1	1N4148	300E	270E	2k4	33E	6µ8	270n	—	—	—	—	—
+1	BAS16	300E	270E	2k4	33E	6µ8	270n	—	—	—	—	—
+1	BAS16	560E	750E	4k3	47E	3µ3	220n	—	—	—	—	—
+3	—	750E	1k8	16k	47E	3µ3	220n	1µ	1N4148N	30k	BC848	0E



DECODING 2



* ONLY IN SETS CD560


10
11
12
13
14
15
16
17
18
19
20
A
B
C
D
E
F
G
H
I
J
3810
3805
6353
BAX18
2400
47µ
6308
78M15CT
2395
100µ
2385
47n
6340
BAX18
6346
BAX18
2391
47n
2386
47n
6347
BAX18
2392
47n
BAX18
6311
79M15CT
3802
2403
47µ
2398
220µ
41-7
41-8
41-1
41-2
41-3
41-4
41-5
41-6
36
34
33
35
37
14
5
10
12
1
110V
220V
9.5V
0V
TO MAINS SWITCH
CIRCUIT 01-1
MAINS SWITCH
CIRCUIT 01-2
F1
125°C
5001
TO AUDIO
FILTER PANEL
6309
78M05CT
2387
47n
(4X1N4002)
6342
6344
2389
47n
3803
2390
47n
2388
47n
6343
6345
2396
6800µ
19V
+11V
6328
BC328/16
6356
BZX79/C4V7
3806
2401
47µ
2404
100n
3370
3k9
2402
47µ
6310
79M06CT
2397
1000µ
-11V
3807
6314
BC818/16
3393
4k7
680Ω
1)
+3
3352
100
+14.6V
2358
47µ
6306 (A)
LM833
(1/2)
6306 (B)
LM833
(1/2)
3354
2k4
3356
2k4
2360
2n2
2362
1n
1KR
5301
470µH
3358
100
2364
47µ
-3
-14.6V
2366
100µ
3362
100
3360
4k7
Kill
3366
100
6319
BC818/25
6321
BC818/25
3364
1k2
3368
1k2
BU3
LINE OUT
RIGHT
3350
1k8
2354
2n
3348
1k
2352
15n
3346
4M7
2350
4n7
D
S
6317
BSR56
G
3340
4M7
deemphasis
Filter
Power on/off mute (soft)
2375
47n
6331
BAX18
6332
BAX18
2376
47n
38V
19V
2377
220µ
6323
BC548B
6325
BC858CR
3380
56k
3377
3k9
6336
HZ4B2/C3V9
6324
BC848B
3379
33k
6334
1N4148
6333
1N4148
3375
4k7
3376
56k
3808
2378
100n
3378
5M6
6335
1N4148
3809
2379
220n
Cabel
2x1KR
+3
3353
100
+14.6V
2359
47µ
6307 (A)
LM833
(1/2)
6307 (B)
LM833
(1/2)
3355
2k4
3357
2k4
2361
2n2
2363
1n
1KR
5302
470µH
3359
100
2365
47µ
-3
2367
100µ
3363
100
3361
4k7
Kill
3367
100
6320
BC818/25
6322
BC818/25
3365
1k2
3369
1k2
BU2
LINE OUT
LEFT
3351
1k8
2355
2n
3349
1k
2353
15n
3347
4M7
2351
4n7
6318
BSR56
3341
-3
3335
150k
6316
BC858B
3334
4k7
3333
22k
-1
PRS 01679
T2B/638