Compact Disc player CD100

00/05/30

Service
Service
Service

30 704 A15

Service Manual

COMPACT disc DIGITAL AUDIO

CONTENTS

1. Table of Contents per page
2. Explanation of the Layout of the Documentation
3. Technical Specification
4. Controls
5. Repair Hints
6. Measurements and Settings
7. Exploded Views and Parts Lists of Mechanical Components
8. Block Diagram, Principal Diagrams, Printed Circuit Board Data and Parts Lists of Electrical Components
9. Wiring Drawings
10. Trouble Shooting Methods
11. Changes
12. Additional Information

CLASS 1
LASER PRODUCT
3122 110 03420

Safety regulations require that the device be switched on during repairs. It is returned in its original condition and parts identical to those specified are used.

English Version

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1. TABLE OF CONTENTS PER PAGE

Chapter	Page	Contents	
2	2-1	Explanation of the layout of the Documentation	
3	3-1-a	Technical Specification	A83-109
4	4-1	Controls	
5	5-1-a	Repair Hints	A84-118
	5-2-c	Bill Of Materials - Tools	A84-118
	5-3	Removing the Frame	
		Replacing the Transformer Fuse	
		Servicing the Mains Input Filter	
		Servicing the Decoding Board	
		Servicing the Servo Board	
		Servicing the Switch and Display Board	
	5-4-b	Replacing the Lid	A84-118
		Service of the RAFOC unit	
6	6-1-a	Turntable Height Adjustment	A83-109
		Checking the Angle Setting	
	6-2-a	Adjusting the Angle Setting	A83-109
	6-3-b	Measurement Specification	A84-118
		Changing the Transformer Connections	
		Adjusting the Offset Control	
		Control of the A.G.C. and Offset circuits	
	6-4-b	Laser Power Control and Adjustment (NEG.VOLT.PH.)	A84-118
		Adjusting the Focus Bandwidth	
	6-5-a	Laser Power Control and Adjustment (POS.VOLT.SH.)	A84-118
7	7-1-a	Exploded view of the mechanism/parts list	A84-118
	7-2-a	Exploded view of the Cabinet	A84-118
		BOMs	
		Exploded View of the Frame	

Chapter	Page	Contents	
8	8-1	Block Diagram	
	8-2-b	Mains Filter Circuit Schematic Mains Filter PCB Drawing BOM	A84-118
	8-3	Power Supply Circuit Schematic Power Supply PCB Drawing BOM	
	8-3-1	Power Supply Circuit Schematic Power Supply PCB Drawing BOM	A83-109
		6V Power Supply Circuit Schematic 6V Power Supply PCB Drawing BOM	
	8-3-2-a	Power Supply Circuit Schematic BOM	A84-118
	8-4	Pre-amplifier Circuit Schematic	
	8-5	Pre-amplifier PCB Drawing BOM	
	8-5-1	Pre-amplifier Circuit Schematic	A83-109
	8-5-2	Pre-amplifier PCB Drawing (NEG.VOLT PH.) BOM	A83-109
	8-5-3	Pre-amplifier Circuit Schematic	A83-109
	8-5-4	Pre-amplifier PCB Drawing (POS.VOLT.SH.) BOM	A83-109
	8-5-5	Pre-amplifier Circuit Schematic	A84-118
	8-5-6	Pre-amplifier PCB Drawing (POS. VOLT. SH.) BOM	A84-118
	8-6	Control Circuit Schematic	
	8-7	Control PCB Drawing BOM	
	8-7-1	Control Circuit Schematic	A84-118
	8-7-2	Control PCB Drawing BOM	A84-118

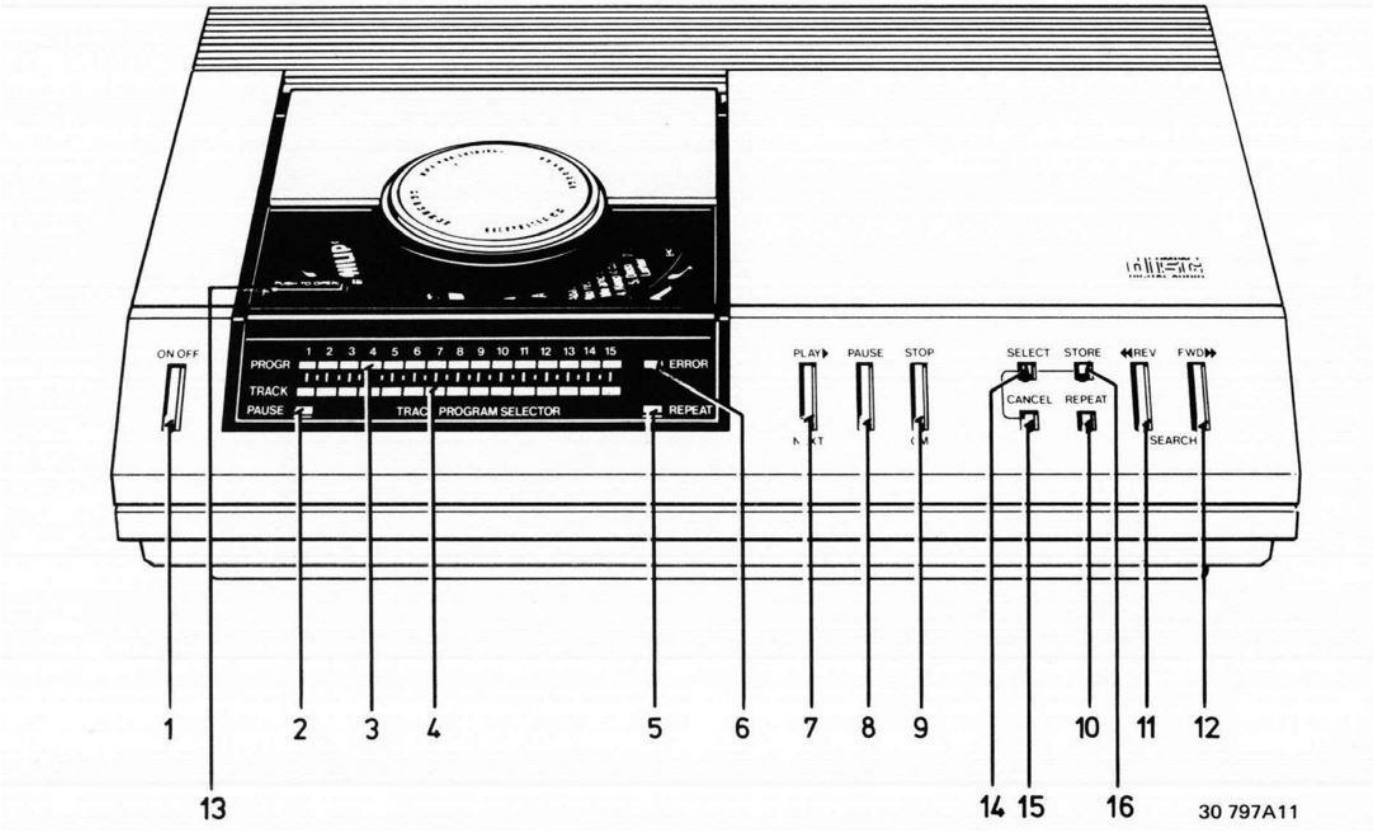
Chapter	Page	Contents	
8	8-8	Servo Circuit Schematic (part 1)	
	8-9-a	Servo PCB Drawing	A83-109
		BOM	
	8-10-a	Servo PCB Drawing	A83-109
		BOM	
	8-11	Servo Circuit Schematic (part 2)	
	8-11-1	Servo Circuit Schematic (part 1)	A84-118
	8-11-2	Servo PCB Drawing	A84-118
	8-11-3	Servo PCB Drawing	A84-118
		BOM	
	8-11-4	Servo Circuit Schematic (part 2)	A84-118
	8-12	Decoder Circuit Schematic (part 1)	
	8-13	Decoder PCB Drawing	
		BOM	
	8-14	Decoder PCB Drawing	
		BOM	
	8-15	Decoder Circuit Schematic (part 2)	
	8-15-1	Decoder Circuit Schematic (part 1)	A83-109
	8-15-2	Decoder PCB Drawing	A83-109
		BOM	
	8-15-3	Decoder PCB Drawing	A83-109
		BOM	
	8-15-4	Decoder Circuit Schematic (part 2)	A83-109
	8-15-5	Decoder Circuit Schematic (part 1)	A84-118
	8-15-6	Decoder PCB Drawing	A84-118
		BOM	
	8-15-7	Decoder PCB Drawing	A84-118
		BOM	
8	8-15-8	Decoder Circuit Schematic (part 2)	A84-118
	8-16	List of Standard Symbols	A83-109
9	9-1	Wiring Drawing	
	9-2	Wiring Drawing	A84-118
10	10-1-a	Fault Finding Method	A84-134
	10-2-a	Fault Finding Method	A84-134
	10-2-1	Fault Finding Method	A84-134
	10-2-2	Fault Finding Method	A84-134
	10-3-a	Fault Finding Method	A84-134
	10-4-a	Fault Finding Method	A84-134
	10-5-a	Fault Finding Method	A84-134
	10-6-a	Fault Finding Method	A84-134
	10-7-a	Fault Finding Method	A84-134
	10-8-a	Fault Finding Method	A84-134
	10-9-a	Fault Finding Method	A84-134
	10-10-a	Fault Finding Method	A84-134
	10-11-a	Fault Finding Method	A84-134
	10-12-a	Fault Finding Method	A84-134
	10-13-a	Fault Finding Method	A84-134
11	11-1-c	Amendments	A84-134
	11-2	Amendments	A84-118
	11-3	Amendments	A84-118
	11-4	Amendments	A84-118
	11-5	Amendments	A84-118
12	12-1-a	Additional Information	A84-118

3 TECHNICAL SPECIFICATION

• System	Compact Disc Digital Audio System	• Channel Separation	≥ 86dB
• Mains Voltages	110V, 127V, 220V, 240V ± 10% (by changing transformer connections)	• Channel Difference	< 0.3dB
• Mains Frequencies	50, 60Hz (no switching necessary)	• Total Harmonic Distortion	< 0.005% (0dB)
• Power consumption	≤ 35W	• Intermodulation Distortion	< 0.005% (0dB)
• Frequency Response	20Hz – 20kHz ± 0.3dB	• De-emphasis	50µS or 15µS (switched by the subcode on the CD)
• Output Voltage	max. $2V_{eff}$ / ≥ 100kΩ	• Dimensions (b x h x d)	320 x 72 x 255mm (lid closed) 320 x 179 x 255mm (lid open)
• Output Impedance	≤ 100Ω	• Weight	About 5kg
• Signal to Noise Ratio	≥ 90dB		

The above specifications apply to 20 Hz - 20 kHz

4. CONTROLS



1. 'ON/OFF' button: for turning the player on and off.
2. 'PAUSE' LED: lights up when you press the 'PAUSE' button.
3. 'PROGR' (amme) indicator: this indicates how many tracks a CD contains by means of lit LEDs; also aids in compiling a program.
4. 'TRACK' indicator: shows how the record is playing by means of a lit LED; is also used to designate the numbers you want to program.
5. REPEAT LED: Lights up when you press the REPEAT button.
6. ERROR LED: Flashes if you make an error in operation or programming.
7. 'PLAY/NEXT' button: for starting playback ('PLAY') and going to the next track during playback ('NEXT').
8. 'PAUSE' button: for short interruptions in playback; the sound cuts out but the CD keeps spinning.
9. 'STOP/CM' key: for intermittently stopping playback ('STOP') and erasing a program ('CM' = Clear Memory)
10. REPEAT button; for repeating a disc or a program.
11. 'REV FINE SEARCH' button: to find a specific passage back in a track.
12. 'FWD FINE SEARCH' button: to search for a specific passage further forward in a track.
13. 'PUSH TO OPEN': elevation on the lid that you have to press to open the record compartment.
14. 'SELECT' button: for finding a track with which you want to start playback and selecting tracks when compiling a programme.
15. 'CANCEL' button: for omitting numbers you do not want to hear in a programme.
16. 'STORE' button: for storing numbers when compiling a programme.

5. REPAIR HINTS

To prevent loose metal objects from getting into the CD mechanism, make sure that the repair area is clean.

Before commissioning or servicing the device, the two transport screws in the bottom can be removed. These must be refitted after servicing.

The lens can be cleaned with a blower brush.

The CD mechanism is fitted with self-lubricating bearings and must therefore NOT be lubricated.

Make sure that during repairs and measurements on the side, the unit is not resting on the turntable motor shaft.

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

The device consists of several MOS ICs. Because MOS ICs are generally very sensitive to overload and overvoltage, the greatest possible care must be taken during servicing. For further instructions, see the package insert in the packaging of the ICs.

The CD must always rest properly on the turntable. For this purpose, a plate pressure device is mounted in the lid. If a plate has to be used for repairs to a boxed-out frame, use a separate pusher. Code number of the pusher is 4822 532 60906.

Chip components are used in the device. For disassembling and assembling chip components, see figures below.

The servo-µp can be placed in the service position to check the switch and display board and also to test the servo systems separately. (See Troubleshooting Method.)

The ERCO-IC, (Error Correction IC) which is supplied by servicing, operates on a supply voltage of approx. 5V. When an ERCO-IC is replaced, check the supply voltage. If an extra PCB is mounted on the decoding PCB, remove this PCB and make the connections as indicated in the drawing of the decoding PCB.

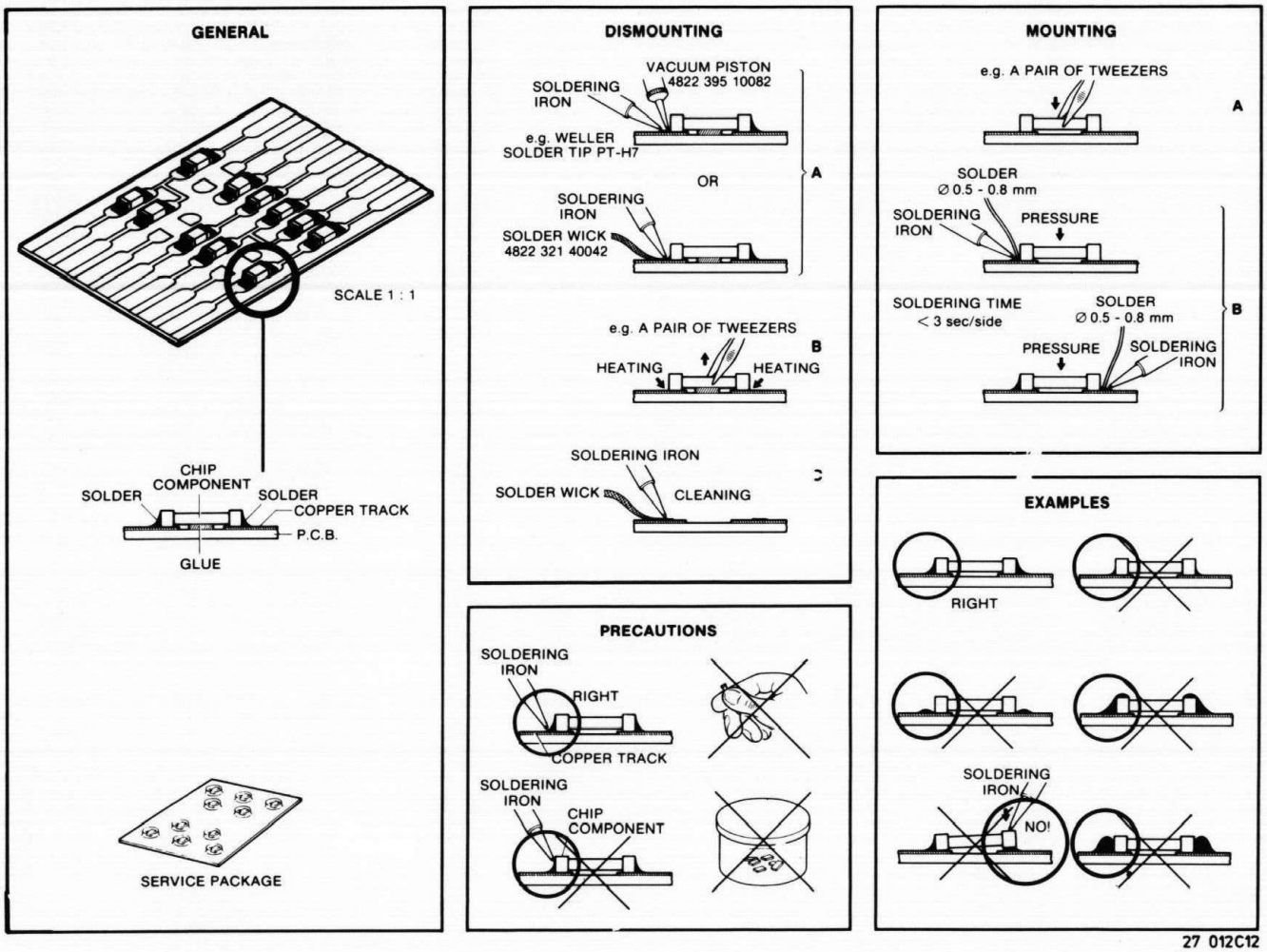
The ICs used in the decoding circuit may have a different type number than stated in the principal diagram.

DEMOD = SAA7010 = M429x
ERCO = SAA7020 = M428x
CIM = SAA7000 = M430x
FIL = SAA7030 = M455x

x is a digit from 0 - 9.

Service supports are provided for bottom settings that require the unit to be in the normal operating position. Code number 4822 395 30202.

These supports can be fixed in the 4 holes of the frame.



Service Tools

Support Services	4822 395 30202
Laser Simulator PCB	
NEG VOLT PH.	4822 395 30203
POS VOLT SH 2.	4822 395 30215
POS VOLT SH 3.	4822 395 30229
Light Sensitive Components	
Photodiode	4822 130 32108
L.D.R. (Light Dependent Resistor)	4822 116 10002
7th Order Filter	4822 395 30204
Angle Mirror	4822 395 90205
Test CDs	
Glass CD	4822 395 90204
Audio test CD	4822 397 30085
CD without defects	
CD with DO-errors	
CD with black spots and fingerprints	4822 397 30096
Test ICs	
Set 1	4822 395 30194
Separate test ICs	
For kit 1	
SAA7000	4822 395 30198
SAA7010	4822 395 30195
SAA7020	4822 395 30196
SAA7030	4822 395 30199
TDA1540	4822 395 30201
Pusher	4822 532 60906
Screwdriver TORX	
Straight	4822 395 50145
Curved	4822 395 50132

Removing the frame

- Remove the bottom plate after removing the 5 screws at the bottom.
- Turn the player over.
- The top cover can now be lifted and turned forward.
- To be able to take measurements of the device, the lid must be closed (the power supply for the laser diode is via the lid switch).
- When measuring at the bottom of the frame, make sure that the device is not resting on the turntable motor shaft.

NOTE: Before closing, the power switch must be in the "ON" position.

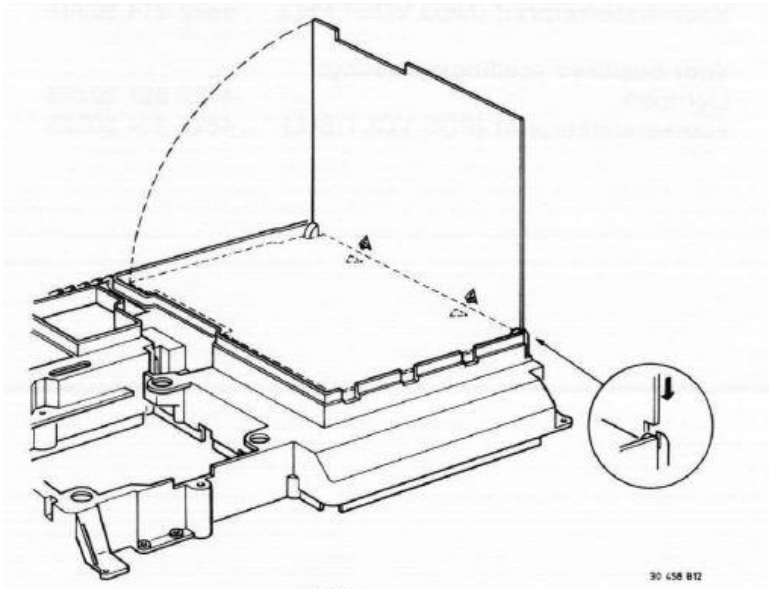
Replacing the transformer fuse

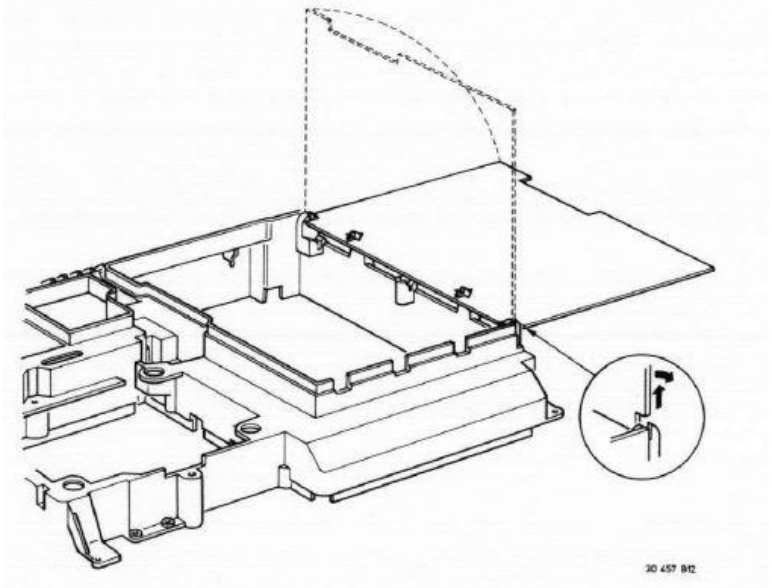
- Take the frame out of the cabinet.
- Remove the transformer shield at the top of the frame, after the two locking tabs have been bent away.

Servicing the secondary filter PCB

- Take the frame out of the cabinet.
- Remove the transformer shield at the top of the frame, after the two locking tabs have been bent away.
- Remove the 2 screws in the transformer shielding on the underside of the frame.
- The shield can be dismantled after the locking clip has been bent away from the PCB.

Servicing the decoding board and the servo board





- Take the frame out of the cabinet.
- Remove the 2 metal protective plates at the top of the frame.
- Remove the 2 screws from the decoder board.
- By placing the decoding board in one of the two service positions (see Fig.), measurements can be made on both the decoding board and the servo board.
- If the servo PCB has to be removed from the frame, remove the metal shielding plate at the bottom of the frame.
- The PCB can be removed after removing the 6 fixing screws: 4 screws are mounted in the PCB of the cooling block. These are accessible from the rear of the frame.

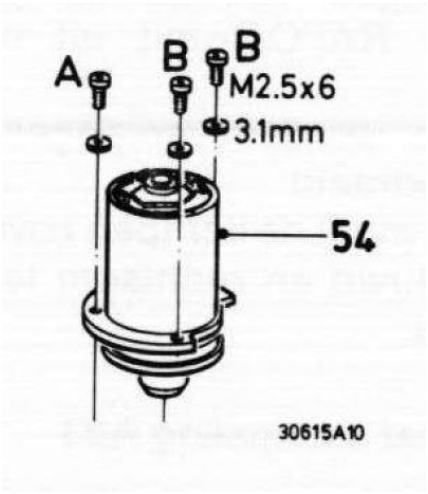
Servicing the switch and display board

- The PCB is mounted in the top cover.
  Remove the top cover, (see "removing the frame")
- The PCB is accessible from the track side.
- If the PCB needs to be detached, remove the 5 fixing screws.

Replacing a LED

- Remove the switch and display PCB from the top cover (see "service of the switch and display PCB")
- Remove the indication plate above the LEDs after removing the two fixing screws in the PCB.
- The LED holder consists of two parts which are attached to each other with 4 locking tabs.
  The upper part of the LED holder can be removed by bending away the 4 locking tabs.
- The LED can be removed upwards from the PCB.
- When mounting, pay attention to the correct connection (anode and cathode) and the height of the LED: To get the LED to the correct height, it must be pushed against the top of the LED holder before soldering.

Replacing the rotary table motor



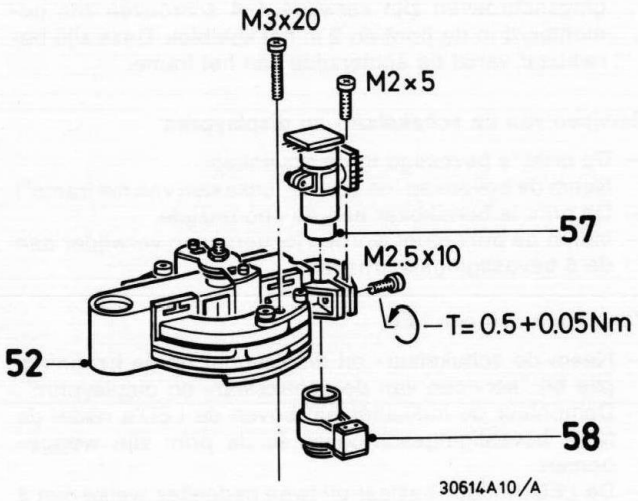
- Take the frame out of the cabinet.
- Remove the preamplifier board which is attached to the CD mechanism with four screws
- The turntable motor is attached to the chassis plate with 3 screws.
- When mounting, screw A must first be mounted (see Fig.).

ATTENTION: After assembly, the motor must be checked as follows:
a. CD/Plate-light angle
b. Height adjustment of the turntable

Replacing the Lid

- Remove the top cover (see "removing the frame").
- Remove the retainer from the valve switch and damper.
- Press the detent tab and slide the damper shaft until a hinge point is exposed.
- The tipping can be done with the axle from the top removed when in the open position.

Servicing the RAFOC (Radial Focus) unit



- Open the frame.
- Remove the two flex boards from the connectors on the preamplifier board.
- The unit can be removed after the two mounting fixing screws M3x20 have been removed (see Fig.).
- The unit consists of 5 service parts:
  2 flex boards, radial motor pos. 52, light pen pos. 57
  and focus unit pos. 58.
- If the focus unit needs to be replaced screw M2.5x10 must be loosened and screw M2x5 must be removed.
- It is not necessary to remove the RAFOC unit from the device in order to replace the light pen.
  The light pen can be replaced after loosening screw M2.5x10.
  When mounting the light pen, it must be pushed into the arm as far as possible and turned clockwise against the stop.

CD mechanism with identification A03

Servicing the RAFOC (Radial Focus) unit

- Open the frame.
- Remove the two flex boards from the connectors on the preamplifier board.
- The unit can be removed after removing the two fixing screws M3x20.
- The unit consists of 4 service parts:
  2 flex boards, the radial motor focus unit and the light pen.
- It is not necessary to remove the RAFOC unit from the device to replace the light pen.
  The light pen can be removed by turning it counterclockwise with a 12 mm wrench and then sliding it out of the holder.
  When mounting, the light pen must be pushed into the arm as far as possible and turned clockwise against the stop.

CAUTION: To prevent settings from being changed, DO NOT loosen ANY SCREWS other than those mentioned above.

**THE LASER MECHANISM IS MUCH MORE SENSITIVE TO STATIC CHARGE THAN A MOS IC.
CARELESS HANDLING DURING SERVICING CAN DRASTICALLY REDUCE THE LIFETIME OF THE LASER.
THEREFORE, MAKE SURE THAT DURING THE SERVICE, THE TOOLS AND YOURSELF HAVE THE SAME POTENTIAL AS THE MECHANISM.**

When one of the parts of the RAFOC unit is replaced, the angle adjustment must be checked.

Remark:
The laser mechanism can contain both a laser diode that operates at a positive supply voltage and a laser diode that operates at a negative voltage.

THEY MUST NOT BE INTERCHANGED

When a laser diode is used which operates on a positive supply voltage, the preamplifier board is provided with service printing with the designation POS.VOLT.SH.

When using a laser diode that operates on a negative supply voltage, the preamplifier board is provided with the service printing with the designation NEG.VOLT PH.

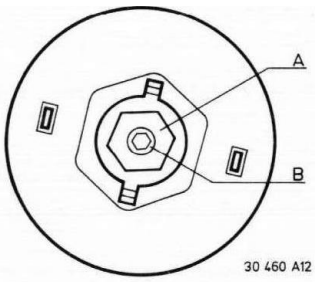
Both the light pen and the preamplifier board are supplied for service:

For negative supply voltage:	
Light pen	4822 691 30117
Preamplifier Board (NEG.VOLT.PH.)	4822 214 50307
For positive supply voltage:	
Light pen	4822 691 30123
Preamplifier Board (POS.VOLT.SH.)	4822 214 50325

6. MEASUREMENTS AND SETTINGS

MECHANICAL MEASUREMENTS AND SETTINGS

Height adjustment of the turntable (see Fig.)

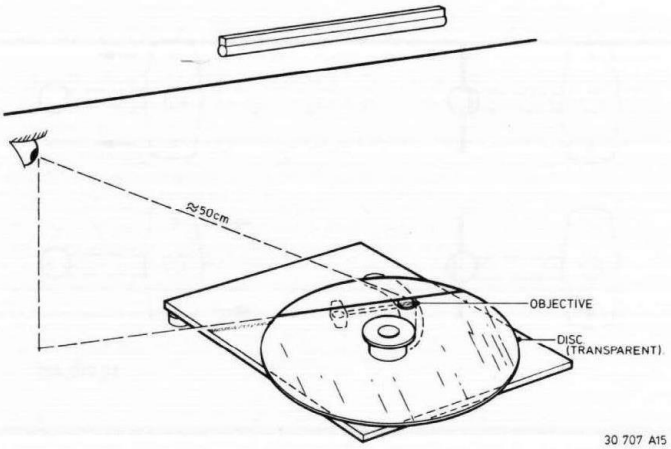


This setting requires the device to be in normal operating mode. Service supports 4822 395 30202 can be used for this

Play from CD 4822 397 30086 track 1 or (CD without defects).

Connect a DC voltmeter across resistor 3240 on the SERVO PCB. (FOCUS MOTOR).
Loosen lock nut A. Use bolt B to adjust the turntable height so that the voltage across 3240 is 0V ± 100mV. Retighten lock nut A. When tightening, make sure that the voltage setting does not change.

Checking the angle setting

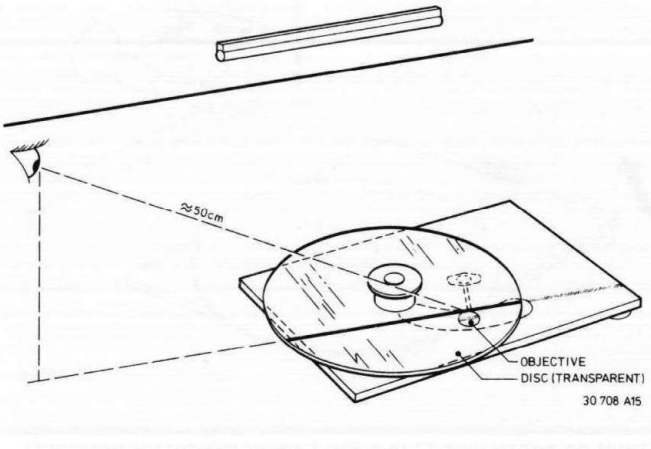


Open the frame.
Place the mirror 4822 395 90205 on the focus unit and the glass plate 4822 395 90204 (with pusher 4822 526 10241) on the turntable.
Place the device under a light source, under which there is a straight line (e.g. fluorescent with grille).

Place the RAFOC arm in the middle position. Turn the device so that the RAFOC arm is parallel to the line under the light source (see Fig.).

Look in the direction and in line with the line at its reflection on the glass plate and mirror.

These lines should be no more than 4mm apart: Position the device so that a line runs across the center of the mirror.
When the other line remains within the surface of the mirror, the distance s is 4mm.



Turn the CD mechanism 90° from the previous position. The RAFOC arm must remain in the middle position (see Fig.).

Repeat the previous measurement.

Adjusting the angle setting

When adjusting the angle of the plate-light path in the factory, a compromise was sought between minimal angular deviation and minimal friction of the arm.

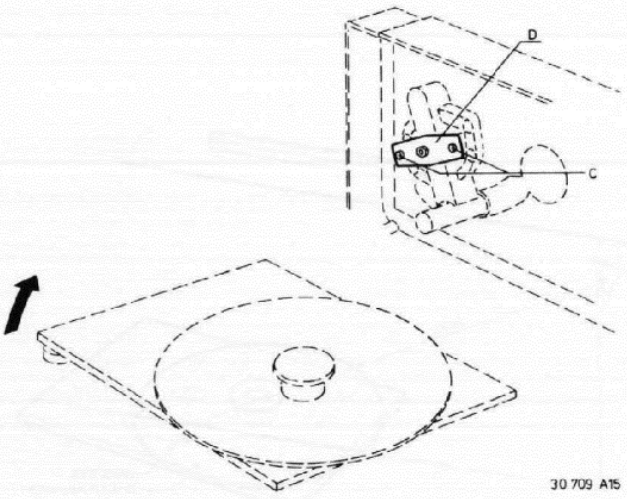
If the measurement shows that the angle falls outside the given tolerance, the angle must NOT be adjusted to a minimum deviation, but just within the tolerance. The new setting must be between the old setting and the optimal installation.

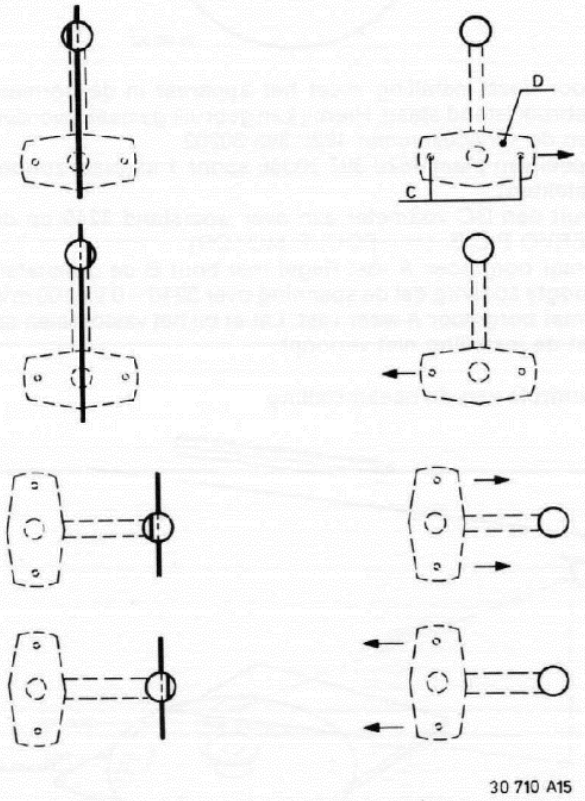
After adjustment, the friction of the arm must be checked. This is done with the aid of a spring pressure gauge which is applied to the counterweight. The friction of the arm, measured over the hole deflection, should not exceed 30 Nm.

If the friction appears to be too high, the setting must be returned to the old value. Then replace the lens unit with a new one and check the angle again.

If the angle does not fall within tolerance, the arm must be replaced. Adjusting the angle is done as follows:

Place the frame on the service supports 4822 395 30202.





Loosen the screws C (see Fig.) until bearing plate D can be moved.

Correct the angle setting by moving the bearing plate in the direction shown in the figure.

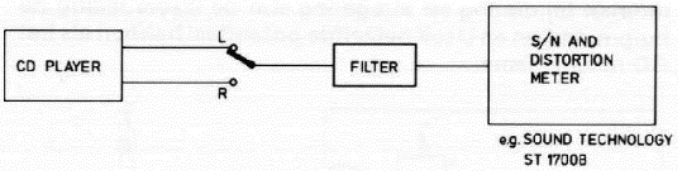
Tighten the screws C, making sure that the setting does not change.

Then check the angle setting again in two steps.

Note:

After adjusting the angle, the height adjustment of the turntable must be checked

ELECTRICAL MEASUREMENTS AND ADJUSTMENTS
Specification Measurement

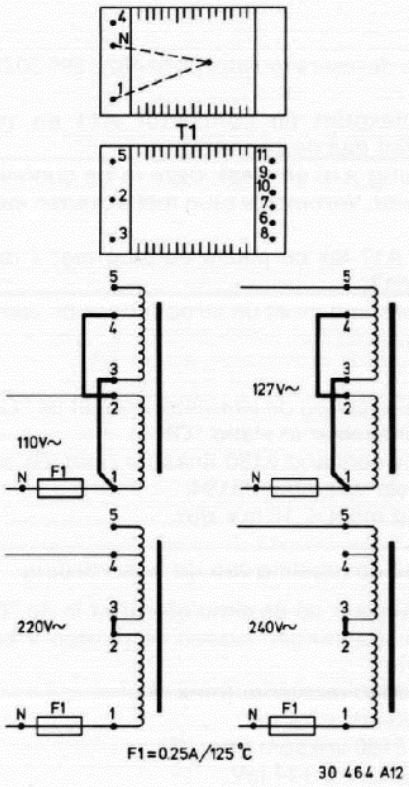


The audio test CD 4822 397 30085 can be used to measure to the specification.

Use to measure:
- Total Harmonic Distortion (THD).
- Intermodulation distortion.
- Signal-to-Noise Ratio (S/N)

A 7th order filter 4822 395 30204.

Changes to the transformer connections



If the appliance is to be connected to a mains voltage different from that stated on the rating plate, the transformer connections must be changed as shown in the figure.

Note

When changing to 110V or 127V, the glass fuse on the mains filter must be changed from 160mA to 315mA.

Adjusting the offset control

(see SERVO PCB)
Put the servo-µp into service mode by simultaneously pressing the power switch and the stop keys.

Connect a DC voltmeter between point 14 of IC6215 and ground. With resistor 3315 regulate the voltage to 0V.

Control of the AGC and the offset circuits

(see SERVO PCB)
Play from test disc 4822 39730096 track 1. (CD without defects).

The voltage between point 14 of 106212 and ground should be -4V ±2V.

The voltage between point 14 of IC6215 and ground must be 0V ± 5.5 V.

Adjusting the channel equality

(see DECODER PCB)
From the audio test CD, play the track or where the left and right channels are modulated at 0dB.

Measure the output voltage of the left and right channels.

Adjust the output voltage of the left channel with bias resistor 3586 so that the difference with the right channel is 0dB ± 0.2dB

A DECODER with identification A05 and subsequent, this setting is no longer valid.

Setting of the PLL circuit

(see DECODER PCB)
Put the device into the stop position.

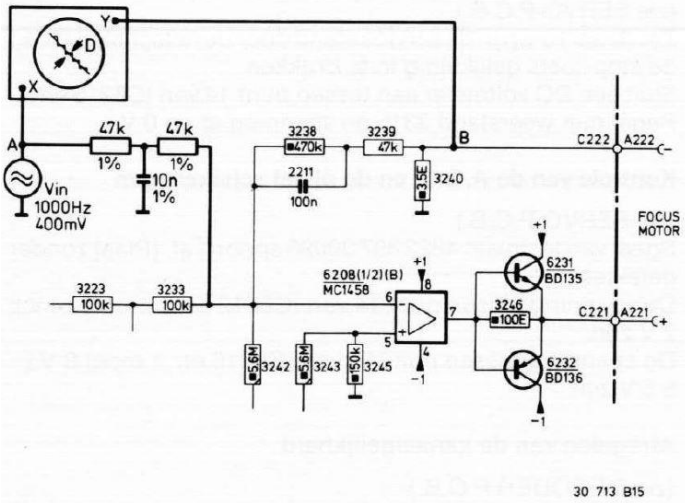
Connect a frequency counter between point 22 of IC6501 (DEMOD) and ground.

Adjust the frequency with the coil 5501 to 4.350MHz ± 5kHz.

Note: This installation must be done immediately after switching on the device.

With decoding boards marked A05 and subsequent, this setting is no longer valid.

Adjusting the focus bandwidth



Make a measurement setup according to the figure.

Play from test CD 4822 397 30096 track 1 (CD without defects).

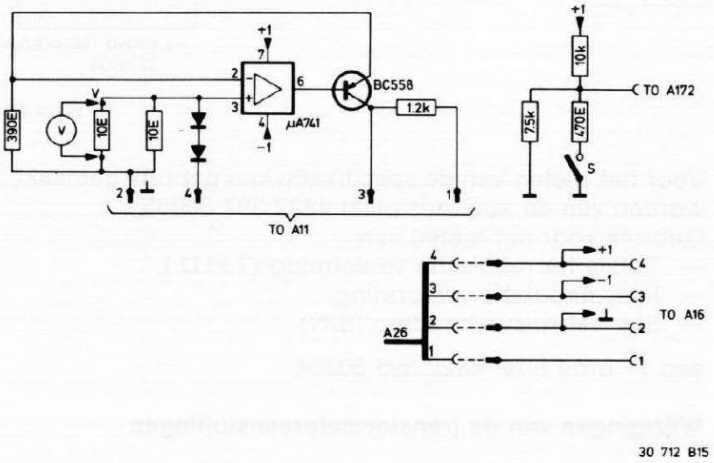
Adjust with resistor 3158 to PRE-AMPLIFIER. + LASER PCB the phase difference between the signals A and B decreases to 180°.

This corresponds to a minimum distance D on the Lissajous figure.

R=47kΩ -1% 5322 116 54671
C=10nF -1% 5322 121 54154

Laser power supply (NEG.VOLT.PH.)

Since the light pen is very sensitive to static charges, when measuring and adjusting the laser power, the tools and yourself must have the same potential as the CD mechanism.



Control

The laser simulator board 4822 395 30203 must be used for this.

Remove the flex board from connector A11 and connect the simulator board to the connector.

Remove plug A16 and insert it into the connector on the simulator board. Connect the 4-wire plug to connector A16.

Disconnect plug A17 and insert the 1-wire plug into connector A17.

In the quiescent state, the current through the laser diode should be ≤ 1mA.

Control:

Set the switch on the simulator board to the "OFF" position and the power switch to the "ON" position
Turn bias resistor 3180 counterclockwise (min. R) and measure voltage across resistor 3194.
The voltage measured should be ≤ 10 mV.

Checking the control of the laser power supply:

Set the switch on the simulator board to the "ON" position and measure the voltages between point V and ground on the simulator board.

Resistance 3180 clockwise (max. R):
Uv to ground = -120 mV ± 24mV.
Resistance 3180 counterclockwise (min. R):
Uv to ground = -720 mV ± 144mV.

Set resistor 3180 so that Uv to ground is ≈ -500 mV.
This is a preset. After the simulator PCB has been removed, the laser current must be set.

Adjust

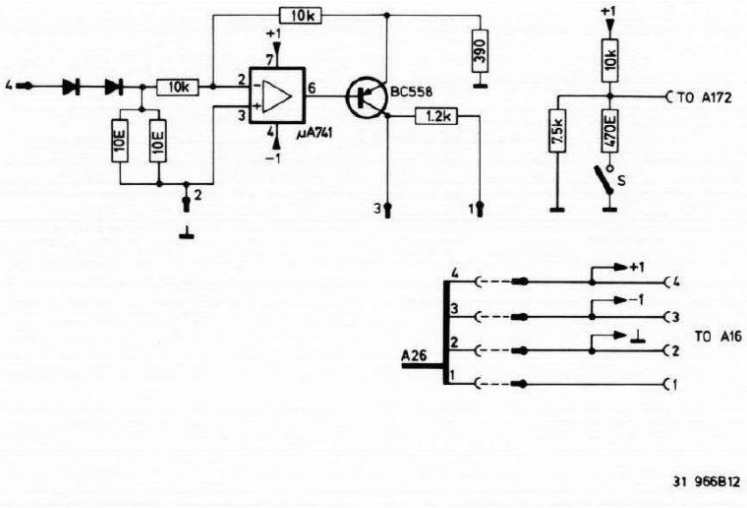
Play from test CD 4822 397 30096 track 1 (CD without defects).
Connect across resistor 3308 to SERVO PCB a DC voltmeter.

Use resistor 3180 to adjust the laser power supply so that the voltage across resistor 3308 is 500mV ± 50mV.

Note
A laser current that is too high (> 550 mV across resistor 3308) shortens the life of the laser diode.

Laser power supply (POS.VOLT.SH.)

Since the light pen is very sensitive to static charges, when measuring and adjusting the laser power, the tools and yourself must have the same potential as the CD mechanism.



Control

The laser simulator board POS.VOLT.SH.2 (4822 395 30215) must be used for this.

Remove the flex board from connector A11 and connect the simulator board to the connector.

Remove plug A16 and insert it into the connector on the simulator board. Connect the 4-wire plug to connector A16.

Disconnect plug A17 and insert the 1-wire plug into connector A17.

In the quiescent state, the current through the laser diode should be ≤ 1mA.

Control:

Set the switch on the simulator board to the "OFF" position and the power switch to the "ON" position.
Turn bias resistor 3180 counterclockwise (min. R) and measure voltage across resistor 3194.
The voltage measures to be ≤ 15 mV.

Checking the control of the laser power supply:

Set the switch on the simulator board to the "ON" position and measure the voltages between point +V and -V on the simulator board.

Resistance 3180 clockwise (max. R):
U+v to v = 60 mV ± 30mV.
Resistance 3180 counterclockwise (min. R):
U+v to v = 560 mV ± 50mV.

Set resistor 3180 in the centre/mid position.
This is a preset. After the simulator PCB has been removed, the laser current must be set.

Adjust

Play from test CD 4822 397 30096 track 1 (CD without defects).
Connect across resistor 3308 to SERVO PCB a DC voltmeter.

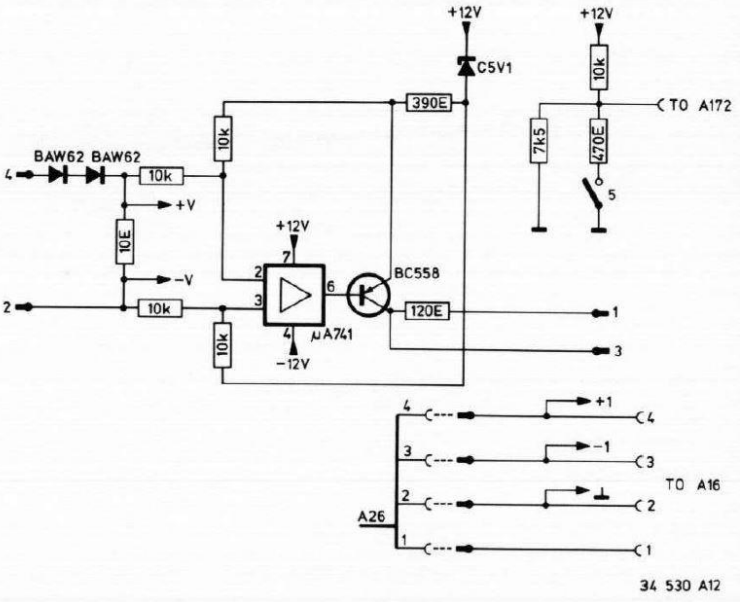
Use resistor 3180 to adjust the laser power supply so that the voltage across resistor 3308 is 500mV ± 50mV.

Note
A laser current that is too high (> 550 mV across resistor 3308) shortens the life of the laser diode.

PRE-AMP + LASER PCB marked with identification A06 and above

Laser power supply (POS.VOLT.SH.)

Since the light pen is very sensitive to static charges, when measuring and adjusting the laser power, the tools and yourself must have the same potential as the CD mechanism.



Control

The laser simulator board POS.VOLT.SH.3 (4822 395 30229) must be used for this.

Remove the flex board from connector A11 and connect the simulator board to the connector.

Remove plug A16 and insert it into the connector on the simulator board. Connect the 4-wire plug to connector A16.

Disconnect plug A17 and insert the 1-wire plug into connector A17.

Control of the resting state

Set the switch on the simulator board to the "OFF" position and the power switch to the "ON" position.
Turn bias resistor 3180 clockwise (max. R) and measure voltage on the simulator between points +V and -V.
The voltage measures to be ≤ 15 mV.

Checking the control of the laser power supply:

Set the switch on the simulator board to the "ON" position and measure the voltages between point +V and -V on the simulator board.

Resistance 3180 clockwise (max. R):
U+v to v = -225mV ± 45mV.
Resistance 3180 counterclockwise (min. R):
U+v to v = -750mV ± 150mV.

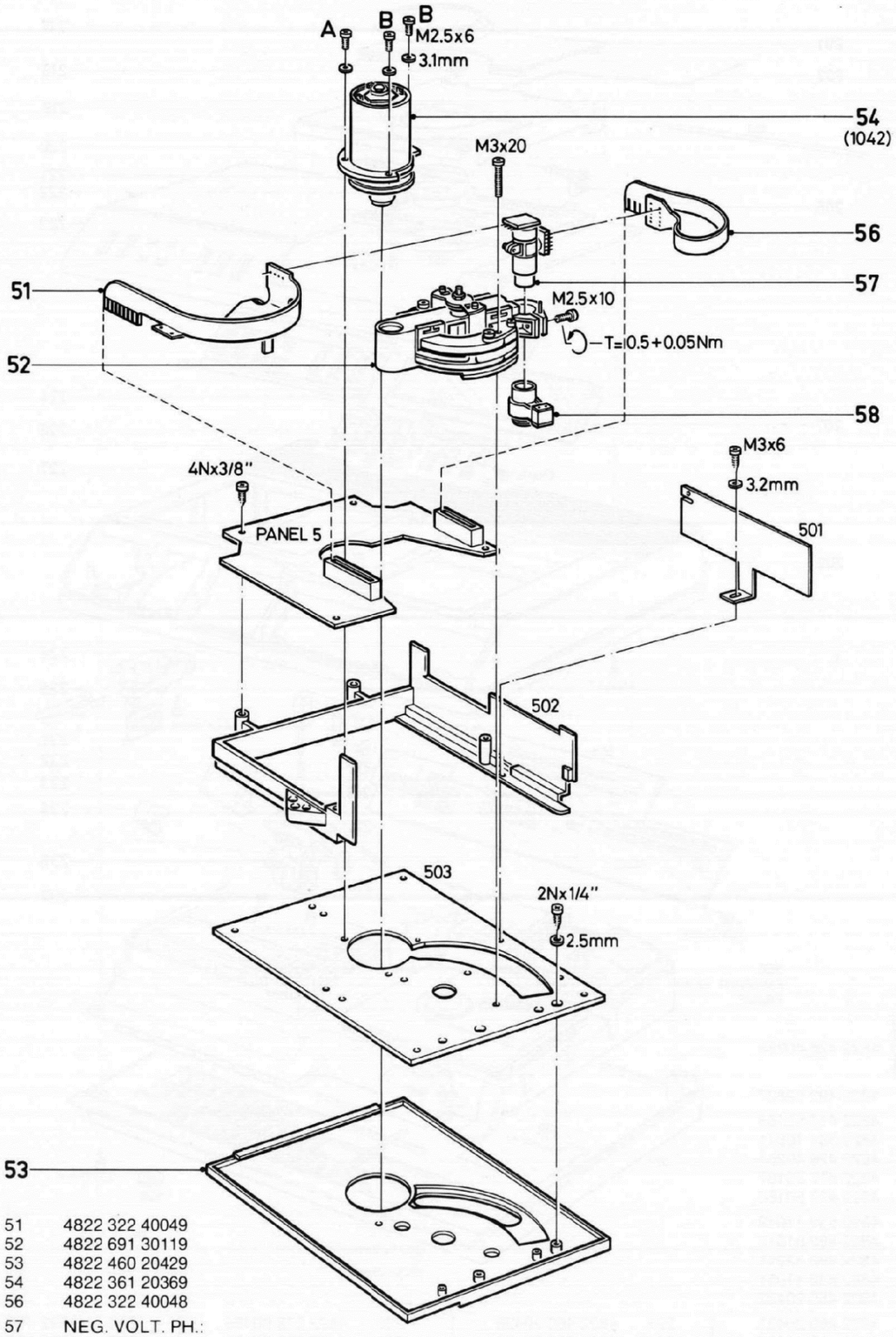
Set resistor 3180 in the middle position.
This is a preset. After the simulator PCB has been removed, the laser current must be set.

Adjust

Play from test CD 4822 397 30096 track 1 (CD without defects).
Connect across resistor 3308 to SERVO PCB a DC voltmeter.

Use resistor 3180 to adjust the laser power supply so that the voltage across resistor 3308 is 575mV ± 75mV.

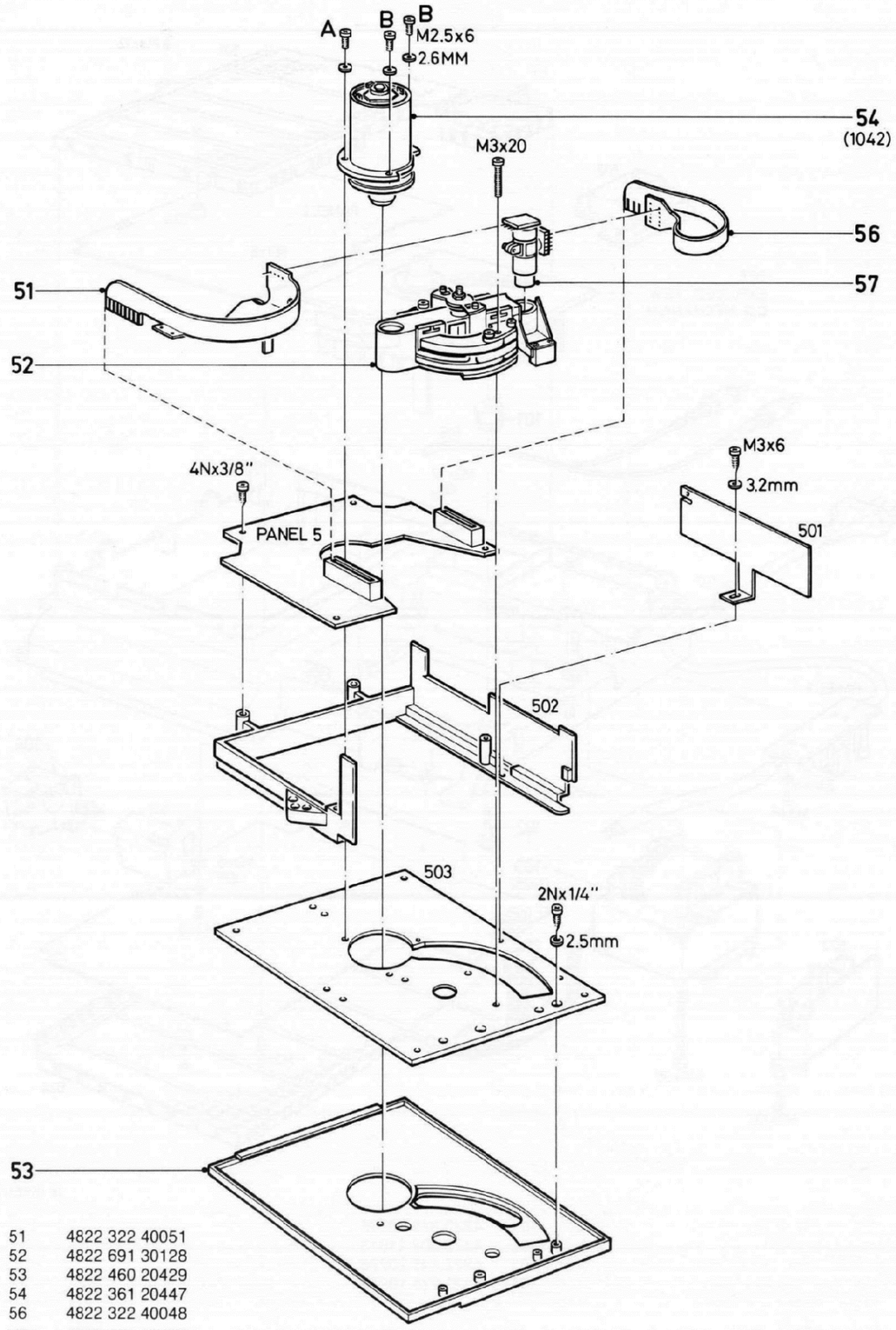
EXPLODED VIEW C.D MECHANISM.



51	4822 322 40049
52	4822 691 30119
53	4822 460 20429
54	4822 361 20369
56	4822 322 40048
57	NEG. VOLT. PH.: 4822 691 30117
57	POS. VOLT. SH.: 4822 691 30123
58	4822 691 30118

28 080 E12

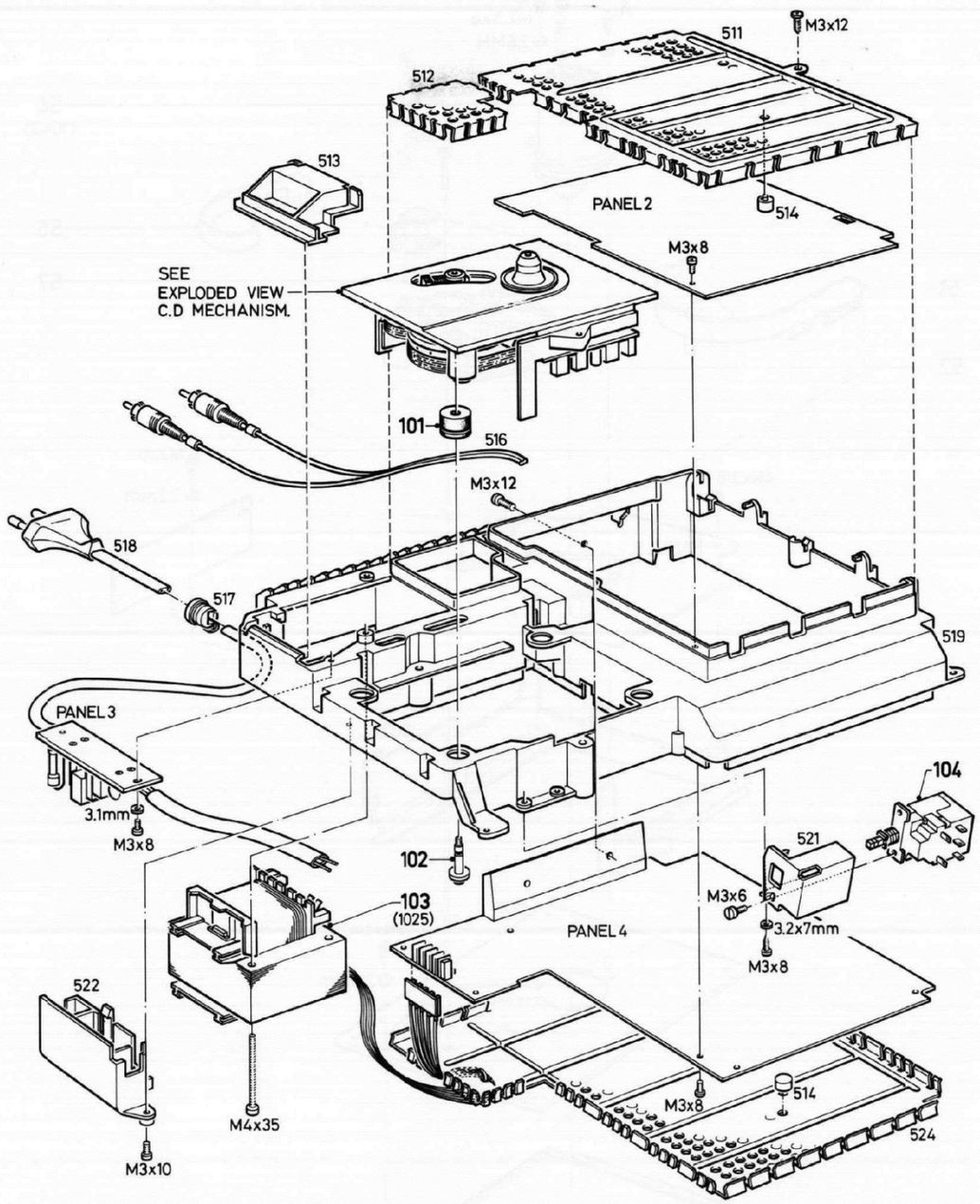
EXPLODED VIEW C.D MECHANISM.



51	4822 322 40051
52	4822 691 30128
53	4822 460 20429
54	4822 361 20447
56	4822 322 40048
57	4822 691 30123

28 080 E12/B

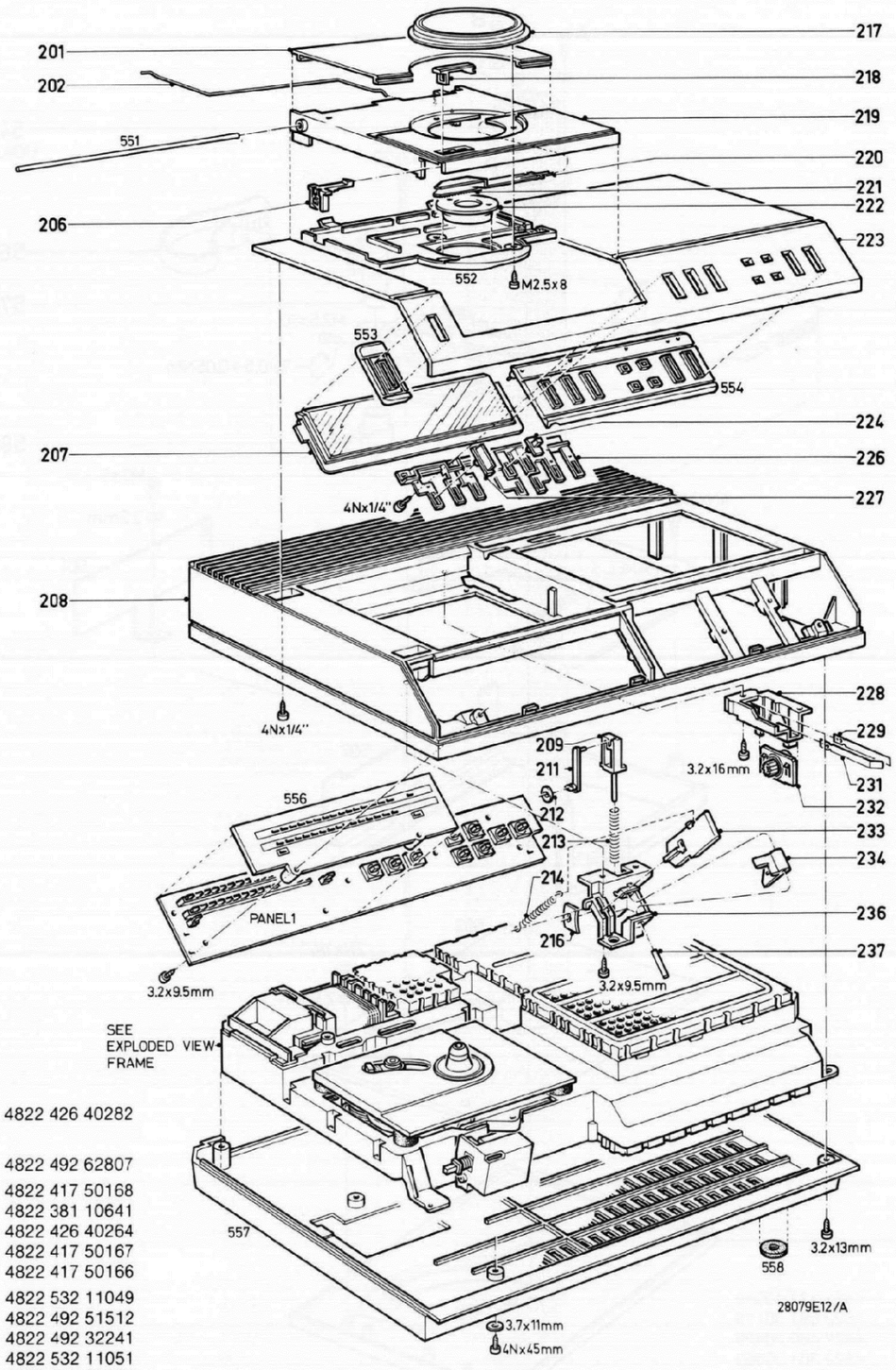
EXPLODED VIEW FRAME



28 078E12/A

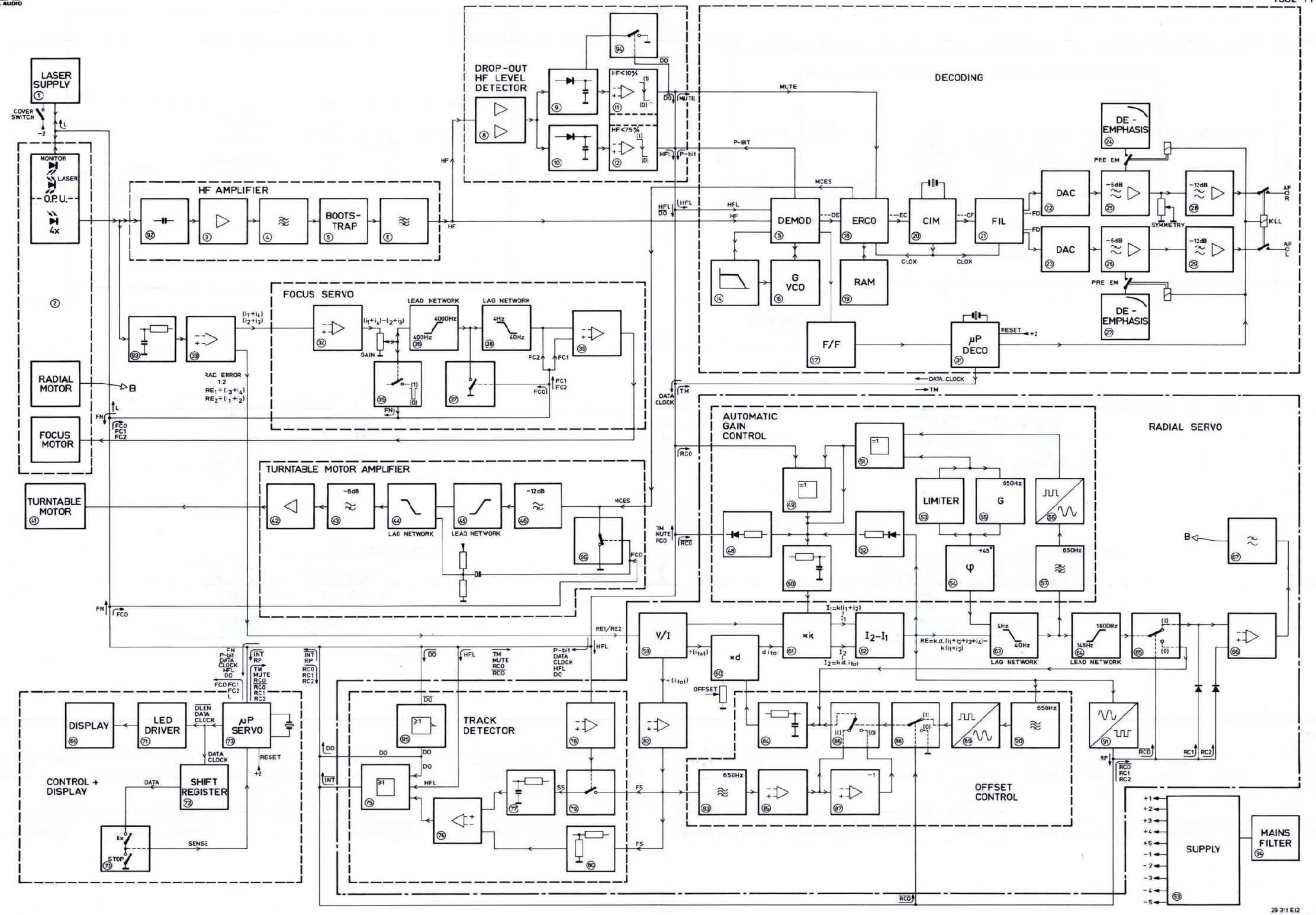
101	4822 325 80226						
102	4822 502 11613						
103	4822 145 20228						
104	4822 276 10973						

EXPLODED VIEW CABINET

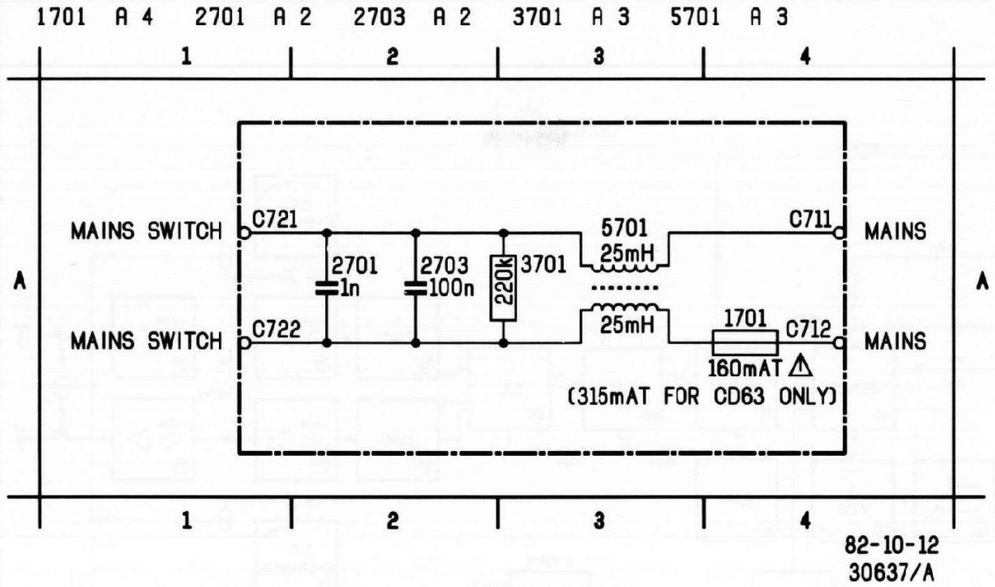


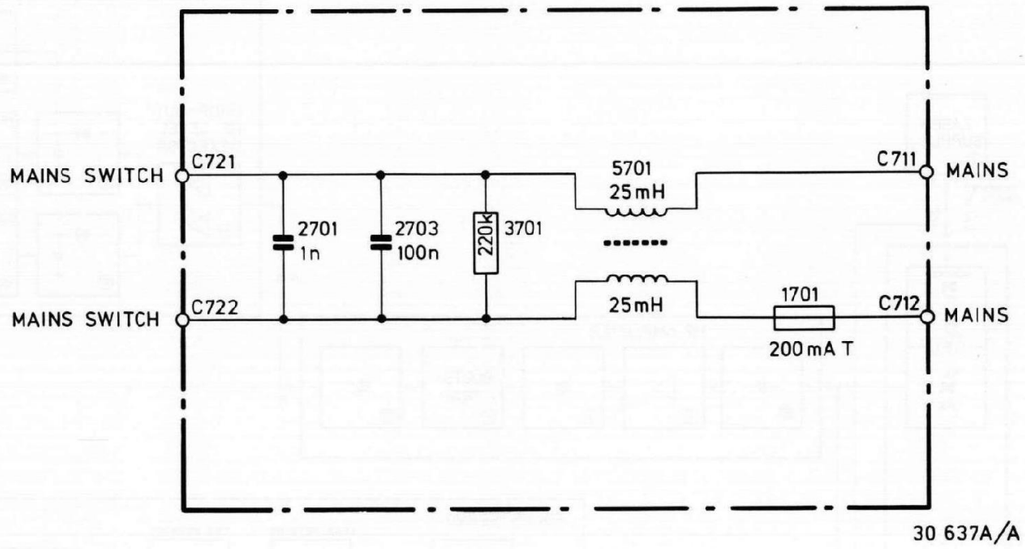
28079E12/A

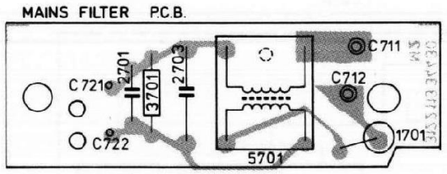
201 }							
202 }	4822 426 40282						
218 }							
219 }							
202	4822 492 62807						
206	4822 417 50168						
207	4822 381 10641						
208	4822 426 40264						
209	4822 417 50167						
211	4822 417 50166						
212	4822 532 11049						
213	4822 492 51512						
214	4822 492 32241						
216	4822 532 11051						
217	4822 460 20432						
218	4822 460 20431	223	4822 460 20428	229	4822 278 90489	236	4822 403 51868
219	4822 426 40263	224	4822 256 90473	231	4822 278 90491	237	4822 535 91561
220	4822 492 62808*	226	4822 256 90475	232	4822 535 70618		
221	4822 532 51429*	227	4822 256 90474	233	4822 410 22887	*In later sets deleted	
222	4822 532 60906	228	4822 466 81374	234	4822 403 51867		

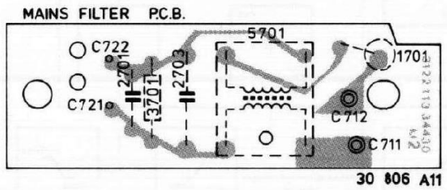


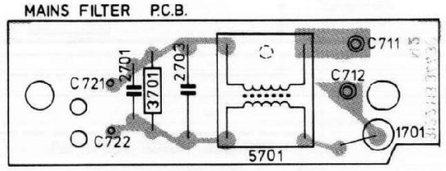
29 311 E12
CS 84 856

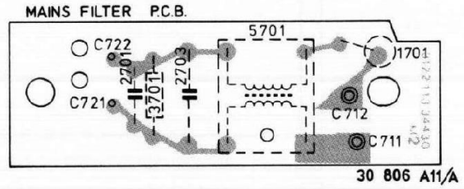












2701	1 nF - 1000 V	4822 122 40347	5701	2x 25 mH	4822 157 51576
2703	100 nF - 250 V~	5322 121 44302			
3701	220k - ¼ W VR25	5322 116 64114	1701	110/127 V - 315 mAT	4822 253 30014
			1701	220/240 V - 160 mAT	4822 253 30009

2701	1 nF - 1000 V	4822 122 40347	5701	2x 25 mH	4822 157 51576
2703	100 nF - 250 V~	5322 121 44302			
3701	220k - ¼ W VR25	5322 116 64114	1701	110/127 V - 315 mAT	4822 253 30014
			1701	220/240 V - 160 mAT	4822 253 30012

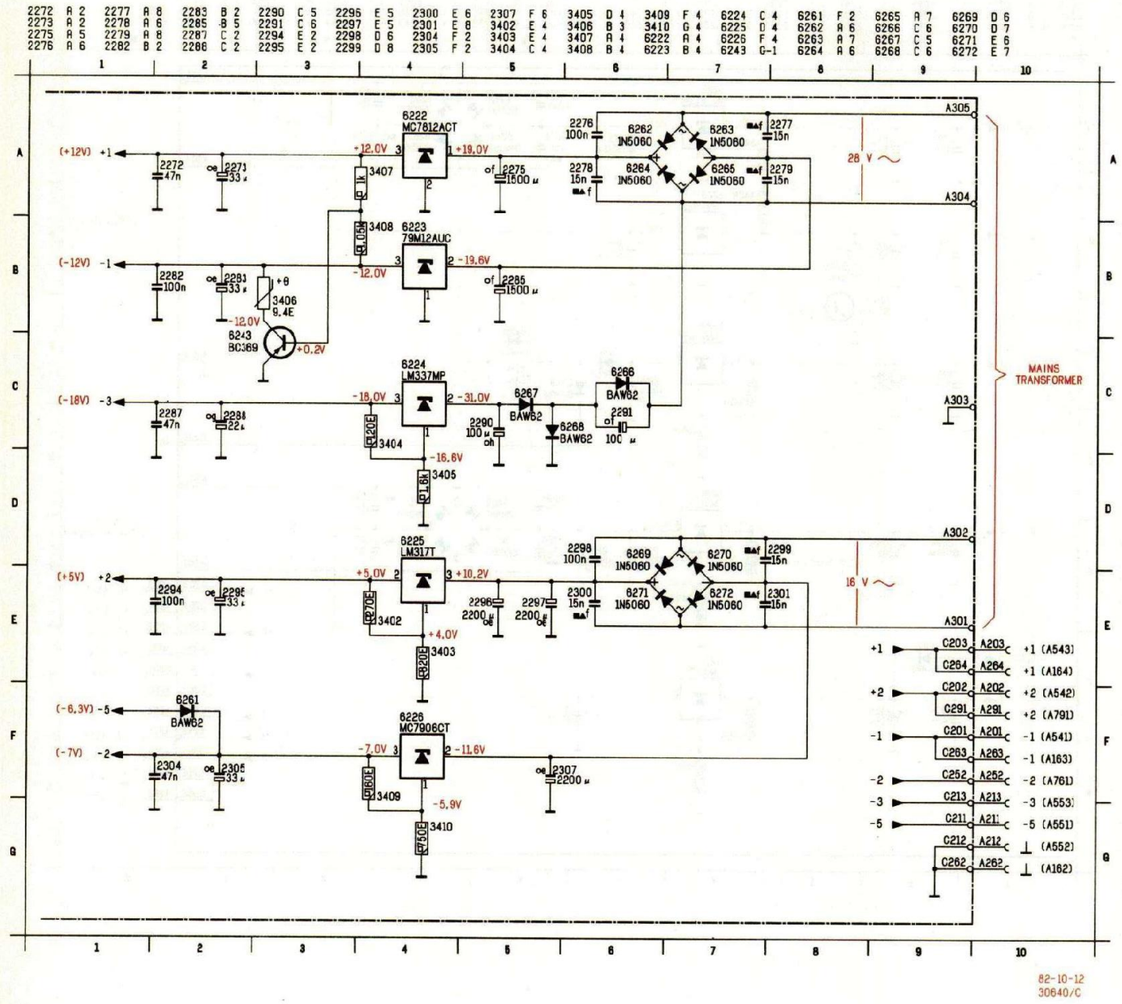
LM317T	4822 209 80591	
LM337MP	4822 209 81452	
LM337T	5322 209 81236	
MC78M12CT	5322 209 86176	
79M12AUC	5322 209 85769	
BC369	5322 130 44593	
1N5060	4822 130 31164	
BAW62	4822 130 30613	

3402	270E	- 1% MR25	4822 116 51281
3403	820E	- 1% MR25	5322 116 54541
3404	120E	- 1% MR25	5322 116 54426
3405	1k6	- 1% MR25	4822 116 51241
3406	9.4E PTC		4822 116 40031
3407	1k	- 1% MR25	4822 116 51235
3408	1k05	- 1% MR25	5322 116 55286
3409	160E	- 1% MR25	5322 116 50417
3410	750E	- 1% MR25	4822 116 51234

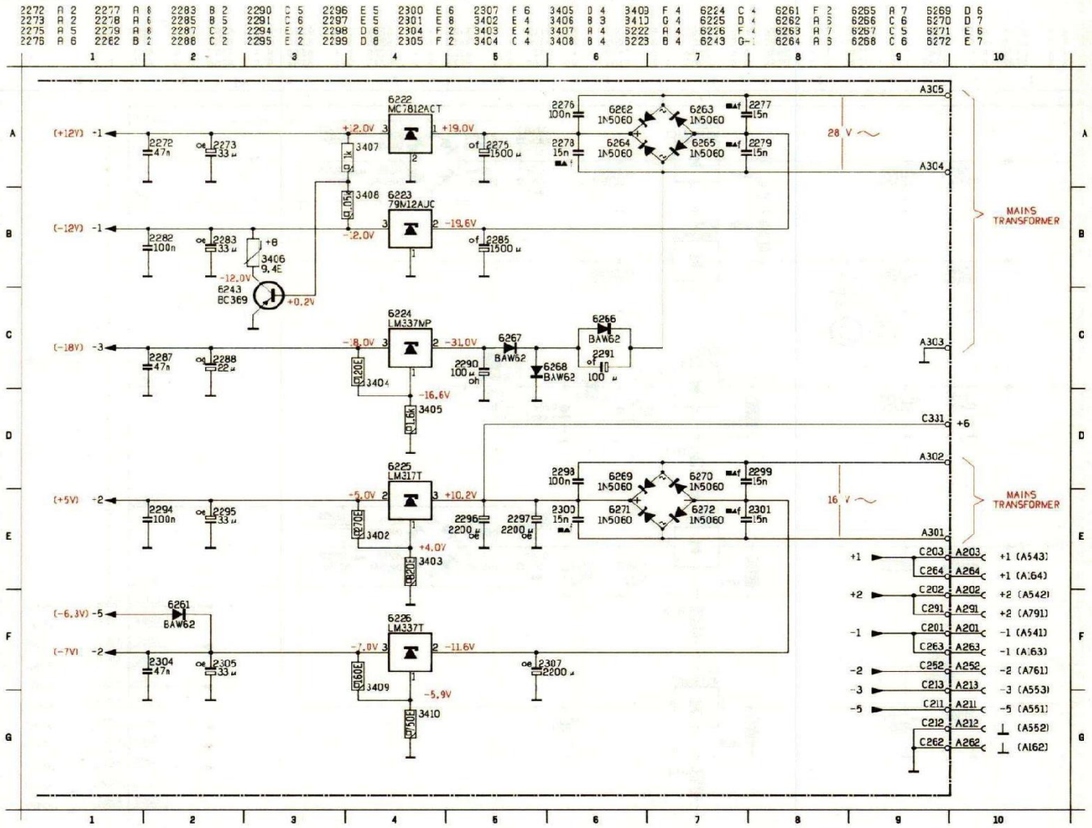
2272,2287, 2304	47n - 10%	4822 121 40525
2276,2282, 2294,2298	100n - 10%	4822 121 40334

Miscellaneous

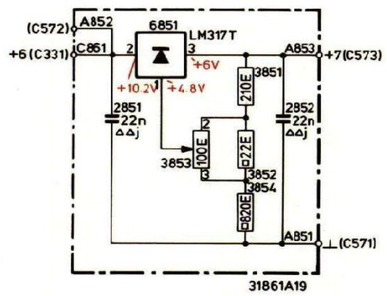
Mica washer for supply IC's	4822 255 40161
Insulating bush for supply IC's	4822 255 40174

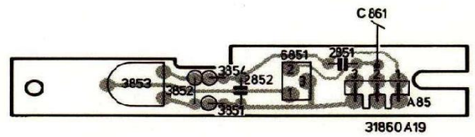


Adapted to A00 (see page 12-1)



83-03-01
30640 C/A





LM317T	4822 209 80591	
LM337T	5322 209 81236	
MC78M12ACT	5322 209 86176	
79M12AUC	5322 209 85913	
BC369	5322 130 44593	
1N5060	4822 130 31164	
BAW62	4822 130 30613	

3402	270E - 1% MR25		4822 116 51225
3403	820E - 1% MR25		5322 116 54541
3404	120E - 1% MR25		5322 116 54426
3405	1k6 - 1% MR25		4822 116 51241
3406	9.4E PTC		4822 116 40031
3407	1k - 1% MR25		4822 116 51235
3408	1k05 - 1% MR25		5322 116 55286
3409	160E - 1% MR25		5322 116 50417
3410	750E - 1% MR25		4822 116 51234

2272,2287 2304	47n - 10%	4822 121 40525
2276,2282, 2294,2298	100n - 10%	4822 121 40334

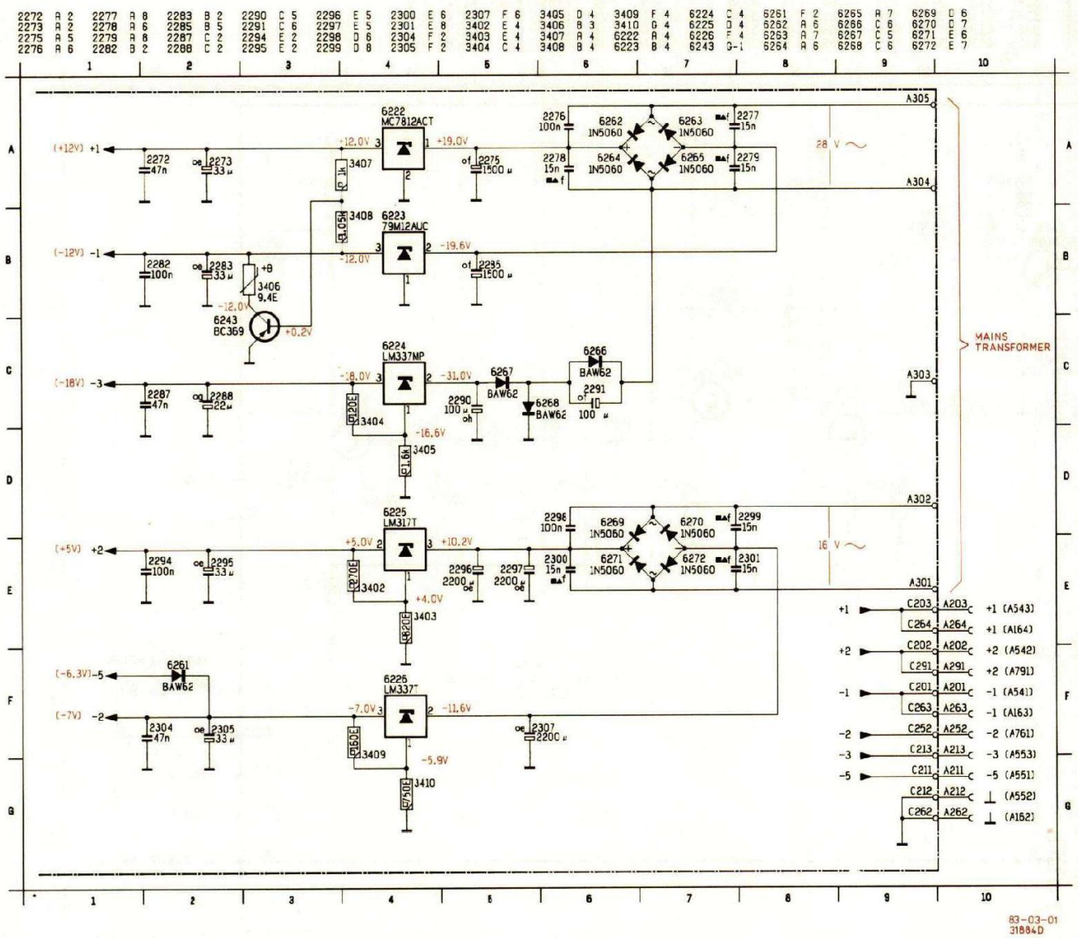
Miscellaneous

Mica washer for supply IC's	4822 255 40161
Insulating bush for supply IC's	4822 255 40174

LM317T	4822 209 80591	
3853 100E	5322 101 14011	

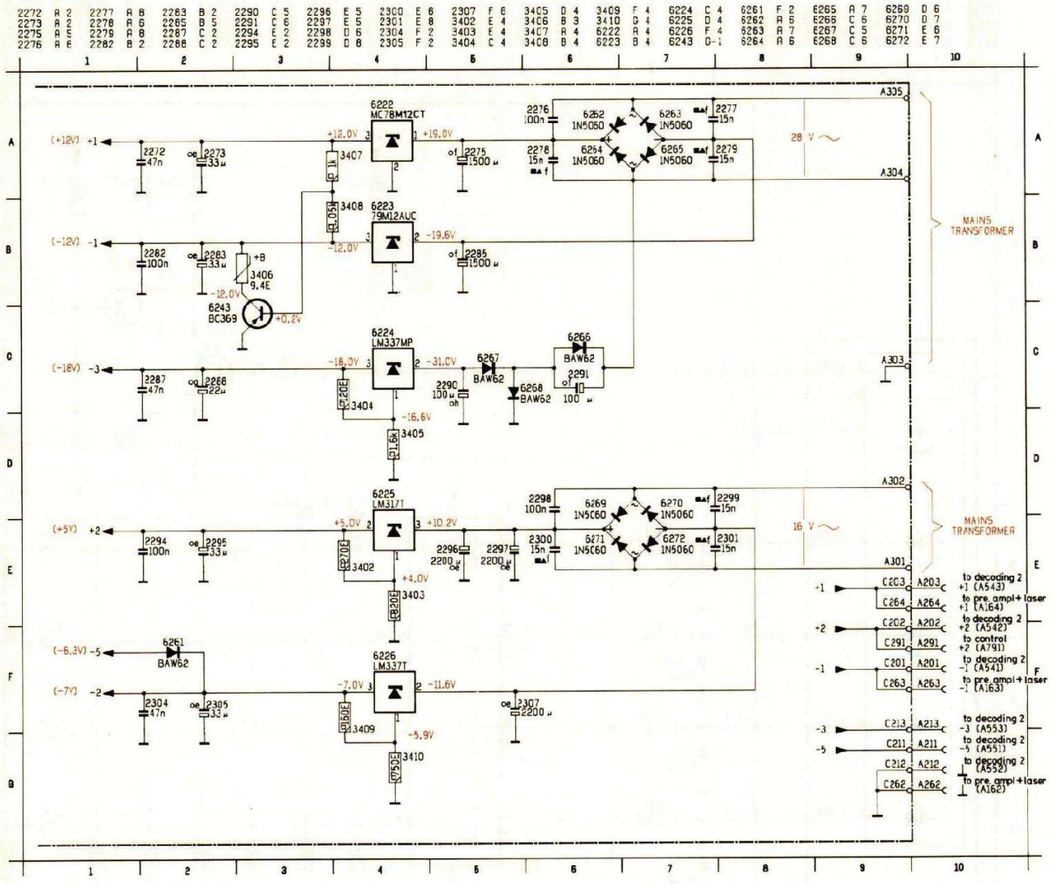
3851	210E - 1% MR25		5322 116 54036

Adapted to A01



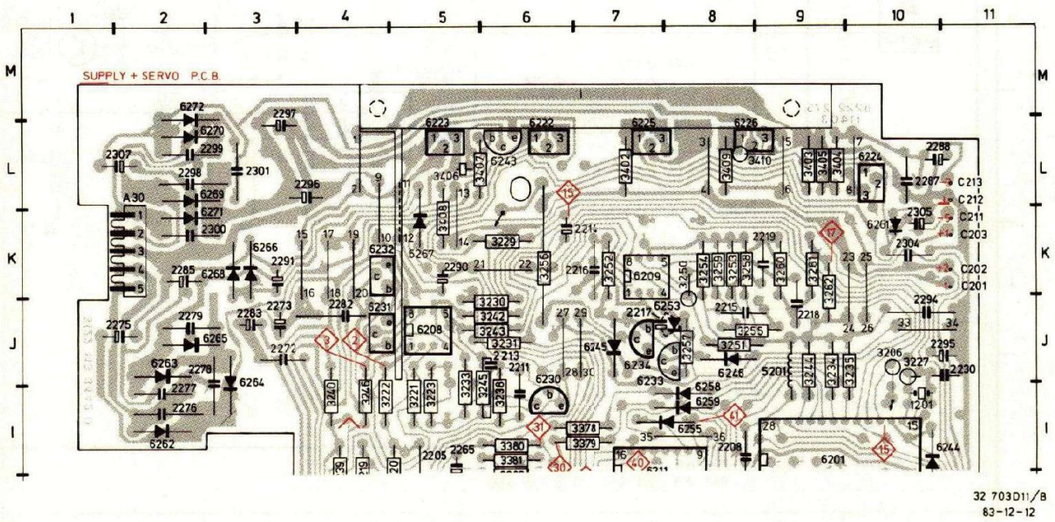
83-03-01
31884D

SUPPLY



30640 C/B

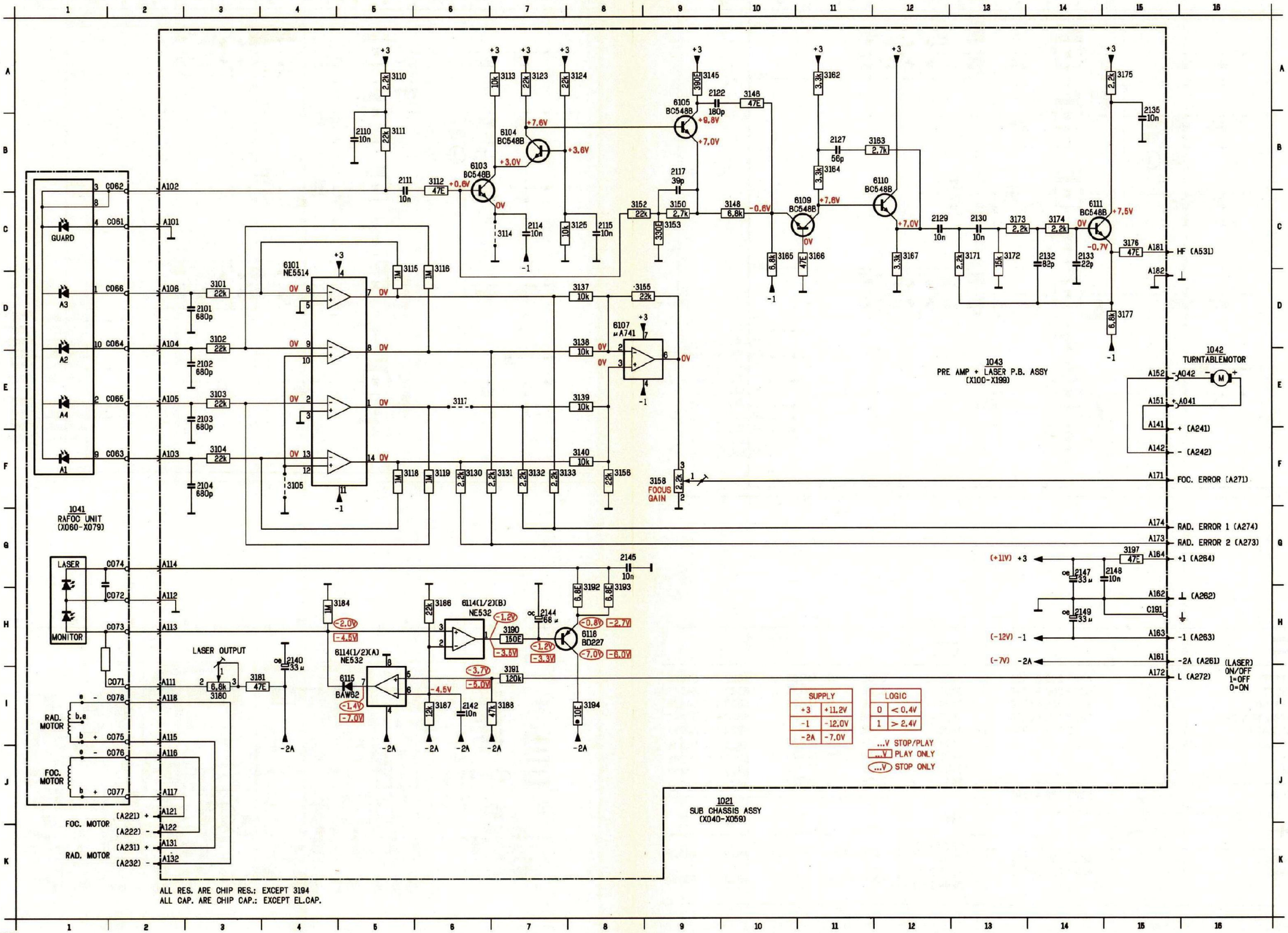
IC			
LM317T	4822 209 80591		
LM337T	5322 209 81236		
LM337MP	5322 209 81236		
MC78M12ACT	5322 209 86176		
79M12AUC	5322 209 85913		
Transistor			
BC369	5322 130 44593		
Diode			
1N5060	4822 130 31164		
BAW62	4822 130 30613		
Resistor			
3402	270E - 1% MR25		4822 116 51225
3403	820E - 1% MR25		5322 116 54541
3404	120E - 1% MR25		5322 116 54426
3405	1k6 - 1% MR25		4822 116 51241
3406	9.4E PTC		4822 116 40031
3407	1k - 1% MR25		4822 116 51235
3408	1k05 - 1% MR25		5322 116 55286
3409	160E - 1% MR25		5322 116 50417
3410	750E - 1% MR25		4822 116 51234
Capacitor			
2272,2287 / 2304	47n - 10%		4822 121 40525
2276,2282, 2294,2298	100n - 10%		4822 121 40334



32 703D11/B
83-12-12

CS 95 605

2101 D 3 2111 B 5 2127 B11 2135 A15 2147 G14 3103 E 3 3112 B 6 3117 E 6 3125 C 8 3137 D 8 3146 K 1 3155 D 9 3164 B11 3172 C13 3177 D15 3187 I 6 3193 H 8 6104 B 7 6111 C14
2102 E 3 2114 C 7 2129 C12 2140 H 4 2148 G15 3104 F 3 3113 A 7 3118 F 5 3130 F 6 3138 D 8 3148 K 1 3156 F 8 3165 C10 3173 C13 3180 I 3 3188 I 7 3194 I 8 6105 A 9 6114 H 6
2103 E 3 2115 C 8 2130 C13 2142 I 6 2149 H14 3105 F 4 3114 C 7 3119 F 6 3131 F 7 3139 E 8 3150 K 1 3158 F 9 3166 C11 3174 C14 3181 I 3 3190 H 7 3197 G15 6107 D 8 6114 H 5
2104 F 3 2117 B 9 2132 C14 2144 H 7 3101 D 3 3110 A 5 3115 C 5 3123 A 7 3132 F 7 3140 F 8 3152 K 1 3162 A11 3167 C12 3175 A15 3184 H 5 3191 I 7 6101 C 4 6109 C11 6115 I 5
2110 B 5 2122 A 9 2133 C14 2145 G 8 3102 D 3 3111 B 5 3116 C 6 3124 A 8 3133 F 8 3145 A 9 3153 C 9 3163 B12 3171 C13 3176 C15 3186 H 6 3192 H 8 6103 B 6 6110 B12 6118 H 8



CS 84 859

LM317T	4822 209 80591
LM337T	5322 209 81236
MC78M12ACT	5322 209 86176
79M12AUC	5322 209 85913
BC369	5322 130 44593
1N5060	4822 130 31164
BAW62	4822 130 30613

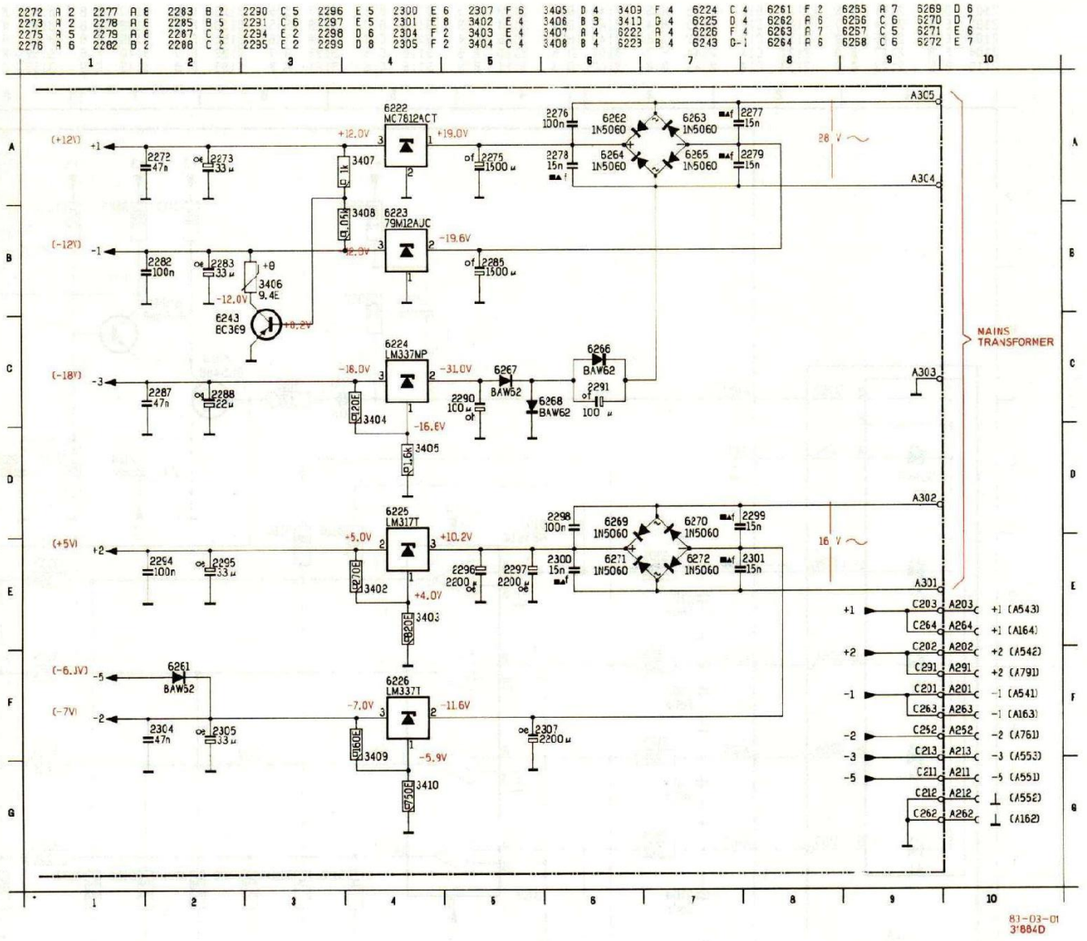
3402	270E	- 1% MR25	4822 116 51225
3403	820E	- 1% MR25	5322 116 54541
3404	120E	- 1% MR25	5322 116 54426
3405	1k6	- 1% MR25	4822 116 51241
3406	9.4E	PTC	4822 116 40031
3407	1k	- 1% MR25	4822 116 51235
3408	1k05	- 1% MR25	5322 116 55286
3409	160E	- 1% MR25	5322 116 50417
3410	750E	- 1% MR25	4822 116 51234

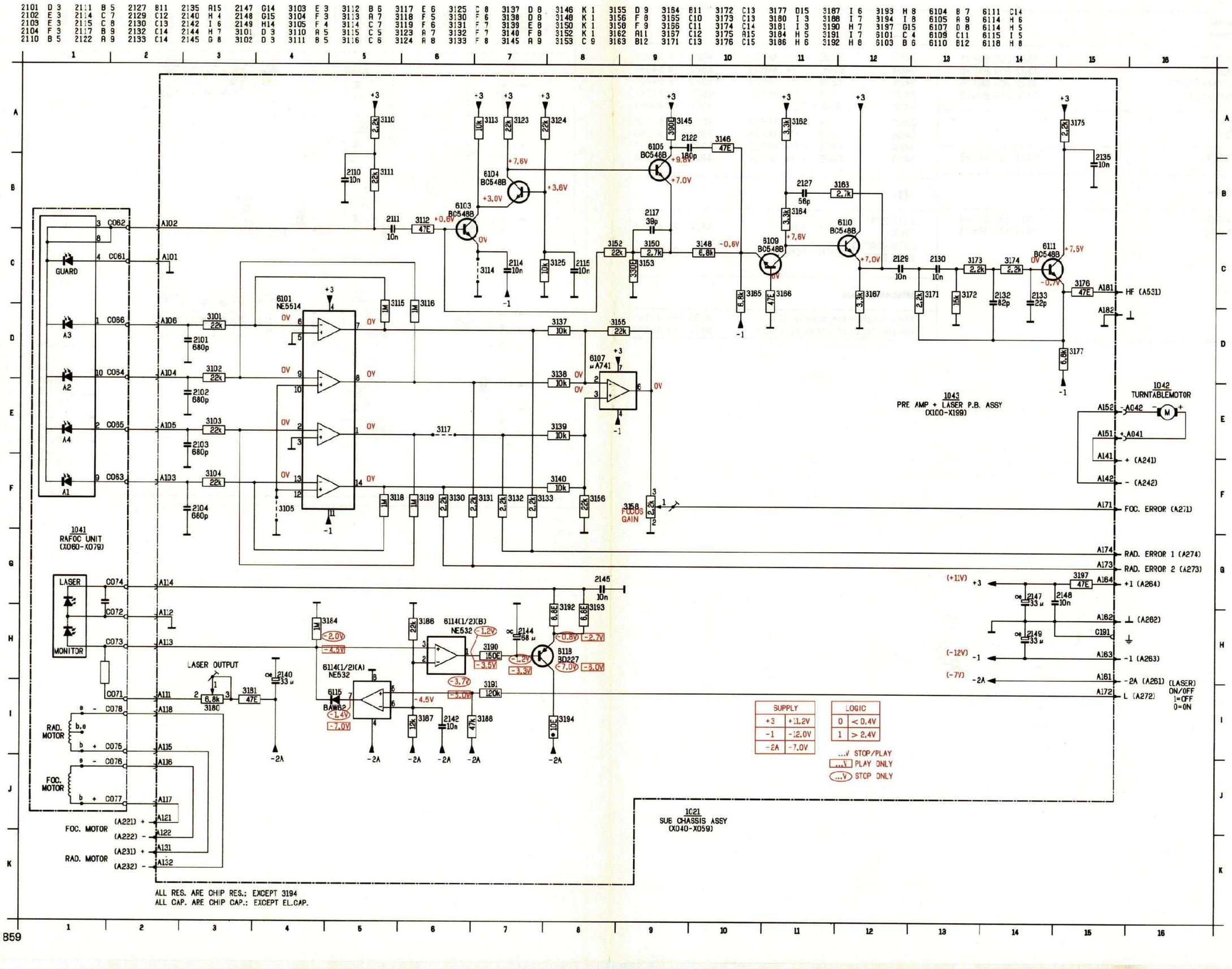
2272,2287 2304	47n - 10%	4822 121 40525
2276,2282, 2294,2298	100n - 10%	4822 121 40334

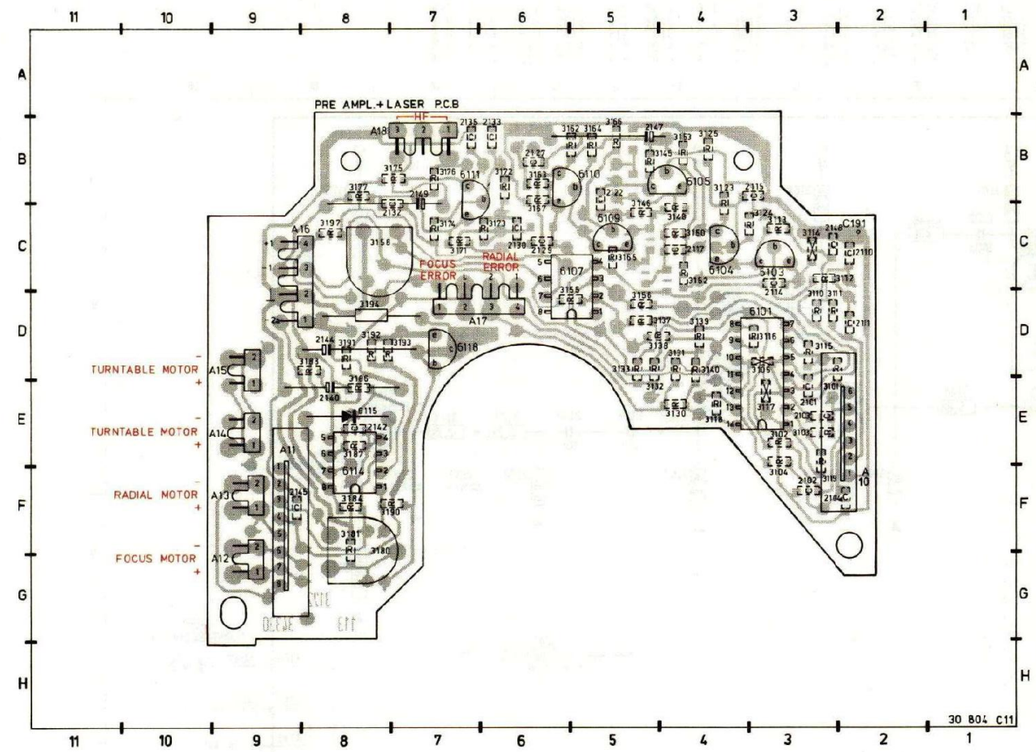
Miscellaneous

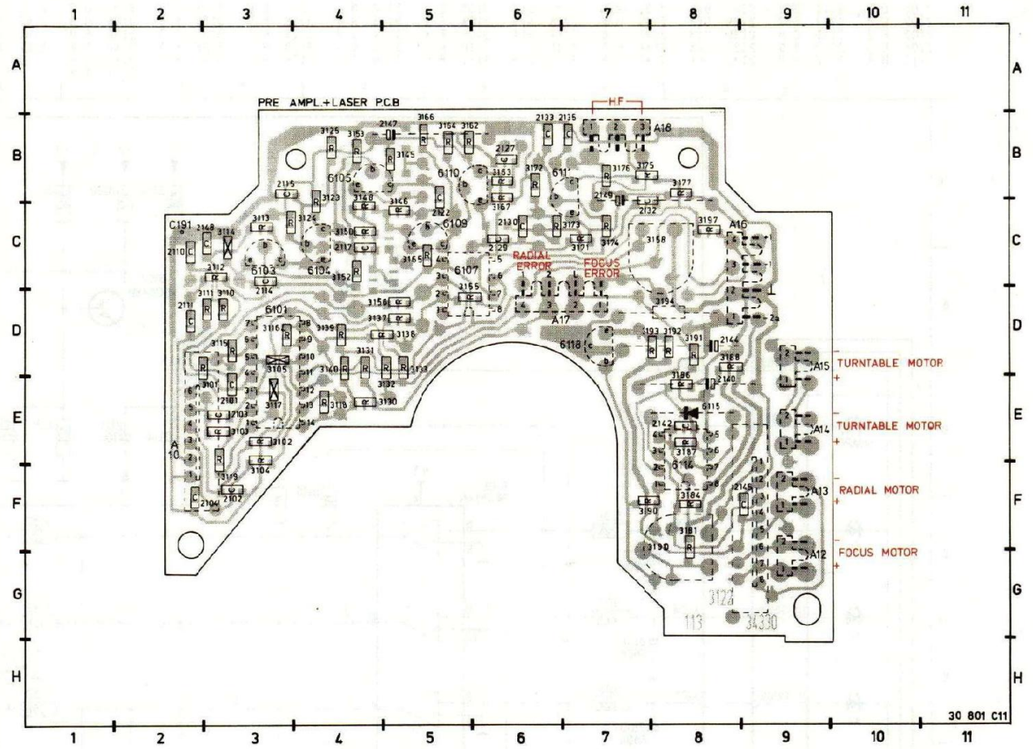
Mica washer for supply IC's	4822 255 40161
Insulating bush for supply IC's	4822 255 40174

Adapted to A01




GUARD
A3
A2
A4
A1
1041
RAFOC UNIT
(X060-X079)
6101
NE5514
6107
µA741
6104
BC548B
6105
BC548B
6103
BC548B
6109
BC548B
6110
BC548B
6111
BC548B
6114(1/2)(A)
NE532
6114(1/2)(B)
NE532
6115
BAW62
6118
BD227
LASER
MONITOR
LASER OUTPUT
RAD. MOTOR
FOC. MOTOR
FOC. MOTOR
RAD. MOTOR
1043
PRE AMP + LASER P.B. ASSY
(X100-X199)
1042
TURNTABLEMOTOR
FOCUS GAIN
1021
SUB CHASSIS ASSY
(X040-X059)
HF (A531)
FOC. ERROR (A271)
RAD. ERROR 1 (A274)
RAD. ERROR 2 (A273)
+1 (A264)
(A262)
-1 (A263)
-2A (A261)
(LASER) ON/OFF 1=OFF 0=ON
L (A272)
SUPPLY
+3 +11.2V
-1 -12.0V
-2A -7.0V
LOGIC
0 < 0.4V
1 > 2.4V
...V STOP/PLAY
...V PLAY ONLY
...V STOP ONLY
ALL RES. ARE CHIP RES.: EXCEPT 3194
ALL CAP. ARE CHIP CAP.: EXCEPT EL.CAP.



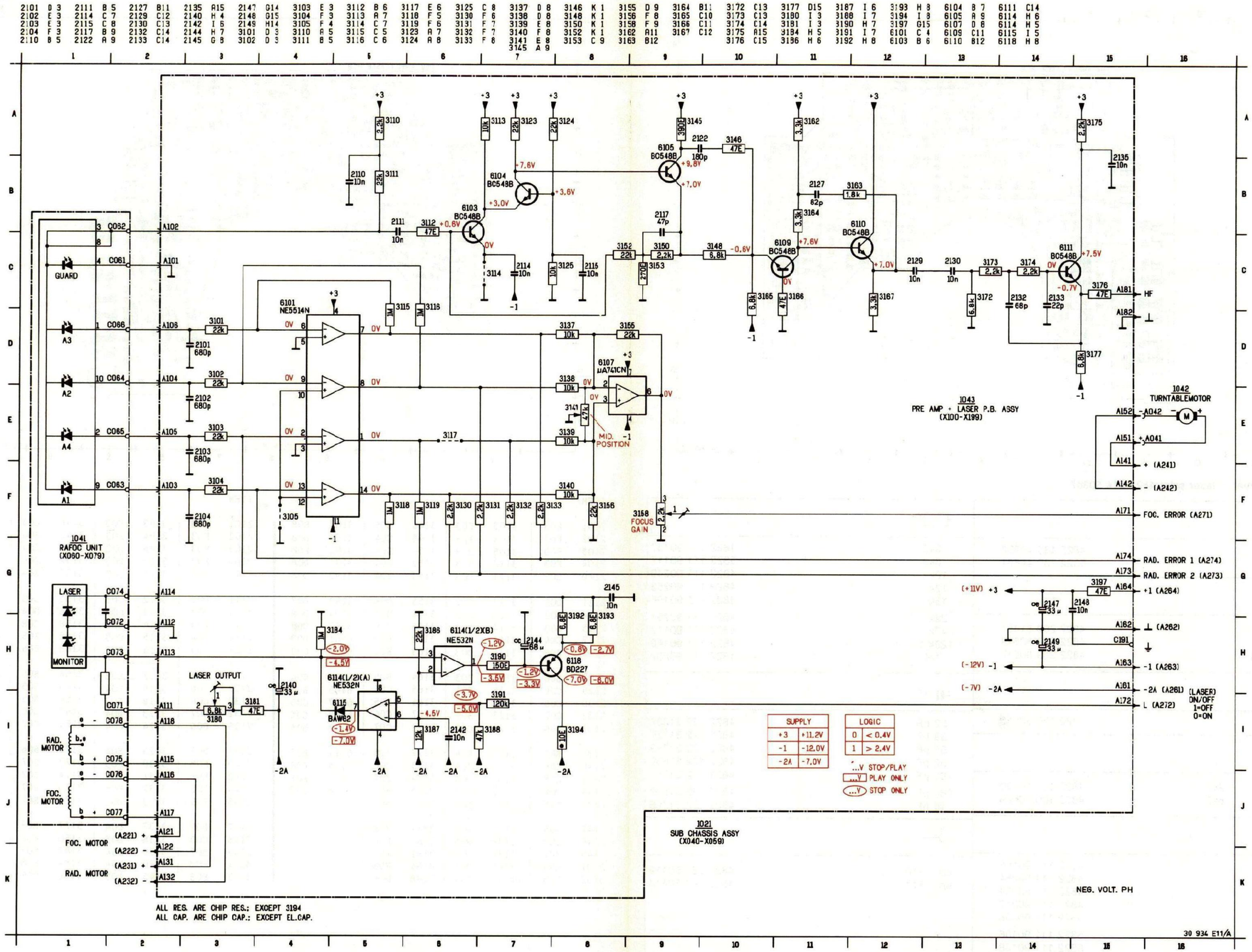


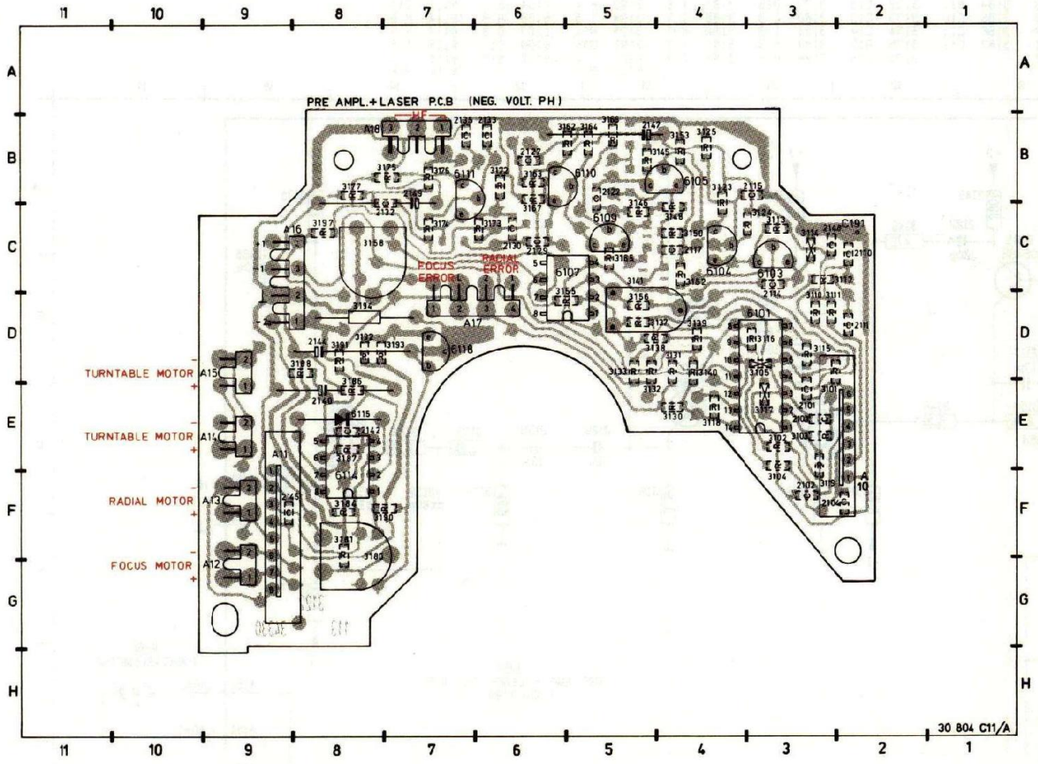
Pre-amplifier + laser print 4822 214 50307

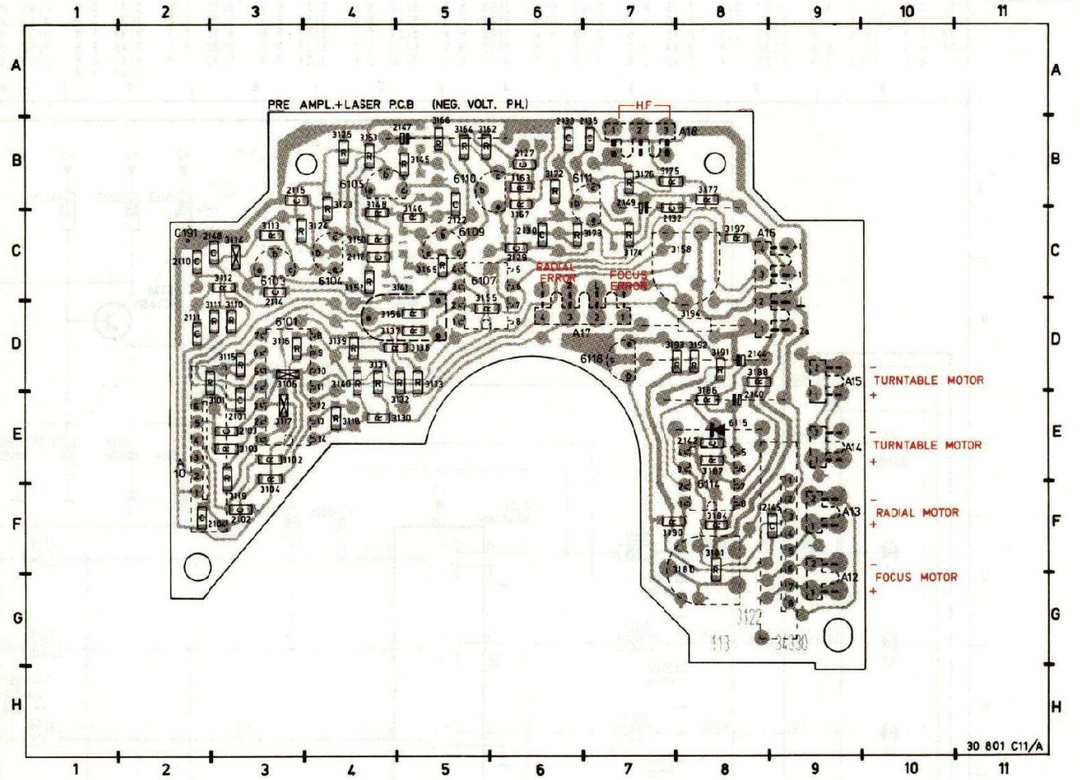
BC548B		4822 130 40937
BD227		5322 130 44661
NE5514		4822 209 81451
NE532		4822 209 80818
µA741CN		4822 209 80617
BAW62		4822 130 30613
3158	2k2	4822 100 10029
3180	6k8	4822 100 10569
0E		4822 111 90163
6E8		4822 111 90254
10E		4822 110 53054
47E		4822 111 90217
150E		5322 111 90098
330E		5322 111 90106
390E		5322 111 90138
1k2		5322 111 90096
2k2		4822 111 90248
2k7		4822 111 90179
3k3		4822 111 90157
6k8		5322 111 90117
10k		4822 111 90249
12k		4822 111 90253
15k		4822 111 90196
22k		4822 111 90251
47k		5322 111 90112
120k		4822 111 90149
1M		4822 111 90252
22 pF		4822 122 31837
39 pF		4822 122 31777
56 pF		4822 122 31779
82 pF		4822 122 31839
180 pF		4822 122 31757
680 pF		4822 122 31809
10 nF		4822 122 31728
6p - A10		4822 267 50412
8p - A11		4822 267 50413

ITEM		ITEM		ITEM		ITEM	
2101	E03	3103	E03	3146	C05	3187	E08
2102	F03	3104	F03	3148	C04	3188	D08
2103	E03	3105	D03	3150	C04	3190	F08
2104	F03	3110	D03	3152	C04	3191	D08
2110	C02	3111	D03	3153	B04	3192	D08
2111	D02	3112	C02	3155	D06	3193	D07
2114	D03	3113	C03	3156	D05	3194	D08
2115	B03	3114	C03	3158	C08	3197	C08
2117	C04	3115	D03	3162	B05	6101	D03
2122	B05	3116	D03	3163	B06	6103	C03
2127	B06	3117	E03	3164	B05	6104	C04
2129	C06	3118	E04	3165	C05	6105	B04
2130	C06	3119	F03	3166	B05	6107	C05
2132	C07	3123	B04	3167	C06	6109	C05
2133	B06	3124	C03	3171	C07	6110	B05
2135	B07	3125	B04	3172	B06	6111	B07
2140	E08	3130	E04	3173	C06	6114	F08
2142	E08	3131	D04	3174	C07	6115	E08
2144	D08	3132	E05	3175	B07	6118	D07
2145	F09	3133	D05	3176	B07		
2147	B05	3137	D05	3177	B08		
2148	C03	3138	D05	3180	F08		
2149	B07	3139	D04	3181	F08		
3101	E03	3140	D04	3184	F08		
3102	E03	3145	B04	3186	D08		

ITEM		ITEM		ITEM		ITEM	
2101	E03	3103	E03	3146	C05	3187	E08
2102	F03	3104	F03	3148	B04	3188	D08
2103	E03	3105	D03	3150	C04	3190	F07
2104	F03	3110	D03	3152	C04	3191	D08
2110	C02	3111	D03	3153	B04	3192	D08
2111	D02	3112	C03	3155	C05	3193	D08
2114	D03	3113	C03	3156	D04	3194	D08
2115	B03	3114	C03	3158	C08	3197	C08
2117	C04	3115	D03	3162	B05	6101	D03
2122	C05	3116	D03	3163	B06	6103	C03
2127	B06	3117	E03	3164	B05	6104	C04
2129	C06	3118	E04	3165	C05	6105	B04
2130	C06	3119	F03	3166	B05	6107	C05
2132	C07	3123	B04	3167	C06	6109	C05
2133	B06	3124	C04	3171	C07	6110	B05
2135	B07	3125	B04	3172	B06	6111	B07
2140	E08	3130	E05	3173	C07	6114	F08
2142	E08	3131	D04	3174	C07	6115	E08
2144	D08	3132	E05	3175	B07	6118	D07
2145	F09	3133	D05	3176	B07		
2147	B05	3137	D04	3177	B08		
2148	C03	3138	D05	3180	F08		
2149	B07	3139	D04	3181	F08		
3101	E03	3140	D04	3184	F08		
3102	E03	3145	B05	3186	E08		


1041
RAFOC UNIT
(X060-X079)
1043
PRE AMP + LASER P.B. ASSY
(X100-X199)
1042
TURNTABLEMOTOR
1021
SUB CHASSIS ASSY
(X040-X059)
GUARD
LASER
MONITOR
RAD. MOTOR
FOC. MOTOR
FOC. MOTOR
RAD. MOTOR
LASER OUTPUT
6101 NE5514N
6103 BC548B
6104 BC548B
6105 BC548B
6107 µA741CN
6109 BC548B
6110 BC548B
6111 BC548B
6114(1/2)(A) NE532N
6114(1/2XB) NE532N
6115 BAW62
6118 BD227
MID. POSITION
FOCUS GAIN
HF
FOC. ERROR (A271)
RAD. ERROR 1 (A274)
RAD. ERROR 2 (A273)
+1 (A264)
⊥ (A262)
-1 (A263)
-2A (A261)
L (A272)
(LASER) ON/OFF 1=OFF 0=ON
+ (A241)
- (A242)
SUPPLY
+3 +11.2V
-1 -12.0V
-2A -7.0V
LOGIC
0 < 0.4V
1 > 2.4V
...V STOP/PLAY
...V PLAY ONLY
...V STOP ONLY
ALL RES. ARE CHIP RES.; EXCEPT 3194
ALL CAP. ARE CHIP CAP.; EXCEPT EL.CAP.
NEG. VOLT. PH
30 934 E11/A



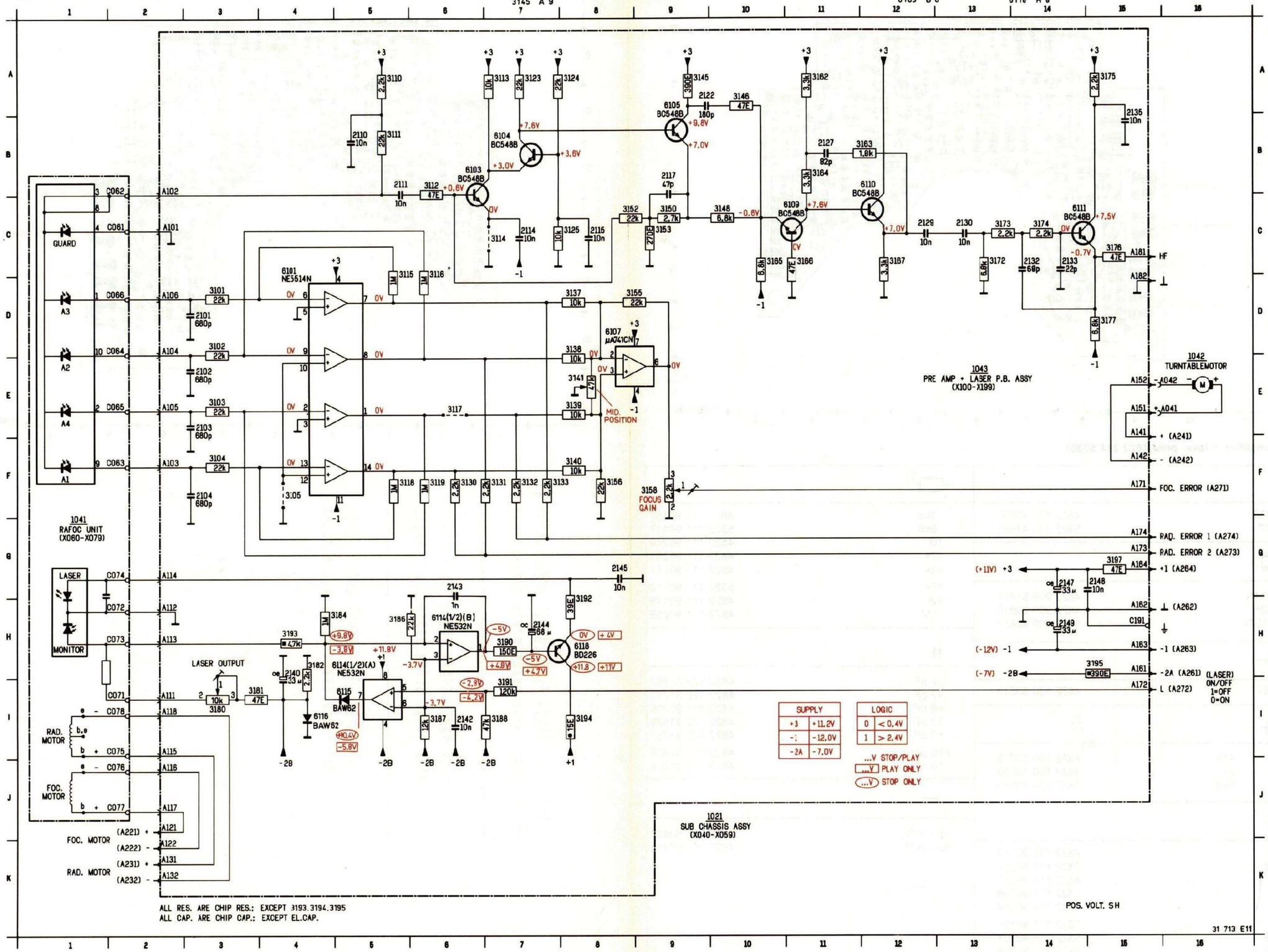


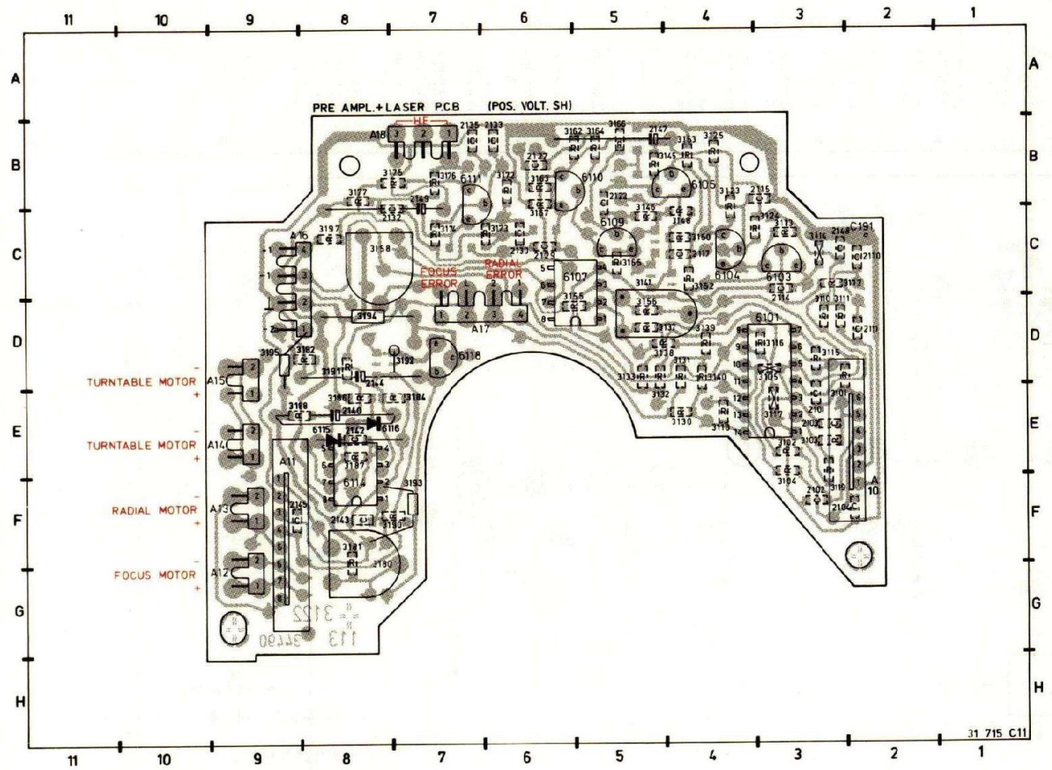
Pre-amplifier + laser print 4822 214 50307

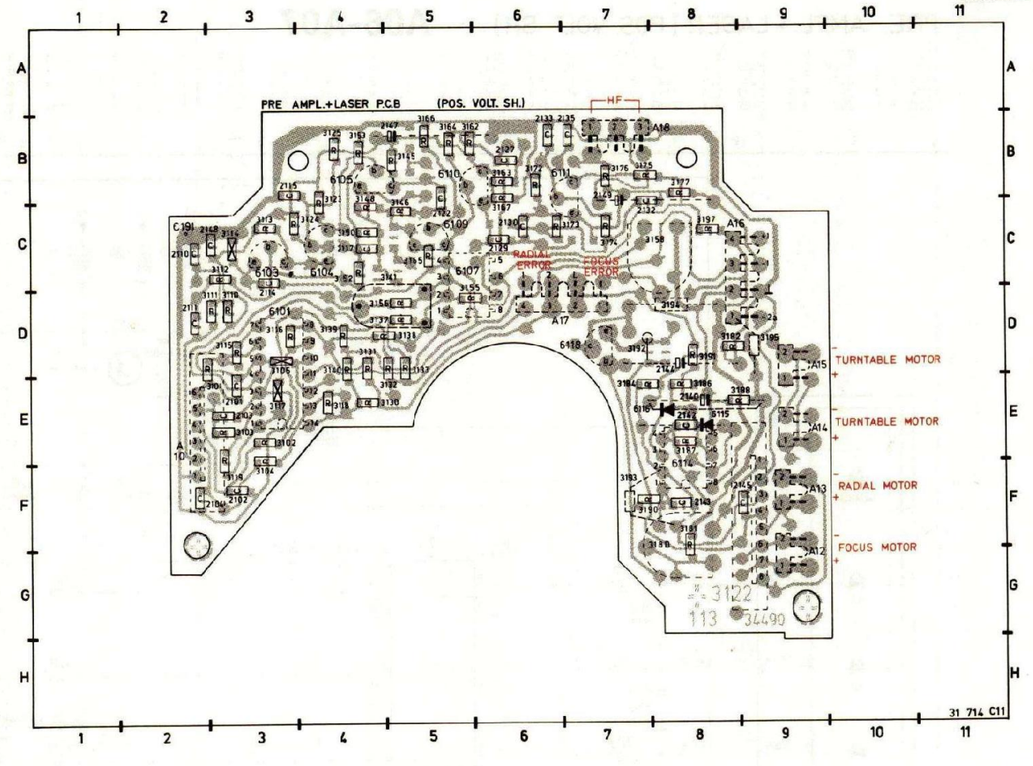
Transistors		
BC548B		4822 130 40937
BD227		5322 130 44661
ICs		
NE5514N		4822 209 81451
NE532N		4822 209 80818
μA741CN		4822 209 80617
Diodes		
BAW62		4822 130 30613
Trimmers		
3141	47k	4822 100 10079
3158	2k2	4822 100 10029
3180	6k8	4822 100 10569
Resistors		
0E		4822 111 90163
6E8		4822 111 90254
47E		4822 111 90217
150E		5322 111 90098
270E		4822 111 90154
390E		5322 111 90138
1k8		5322 111 90101
2k2		4822 111 90248
2k7		4822 111 90179
3k3		4822 111 90157
6k8		5322 111 90117
10k		4822 111 90249
12k		4822 111 90253
22k		4822 111 90251
47k		5322 111 90112
120k		4822 111 90149
1M		4822 111 90252
Capacitors		
22 pF		4822 122 31837
47 pF		4822 122 31772
68 pF		4822 111 90308
82 pF		4822 122 31839
180 pF		4822 122 31757
680 pF		4822 122 31809
10 nF		4822 122 31728
Connectors		
6p - A10		4822 267 50412
8p - A11		4822 267 50413

ITEM	PCB
2101	E03
2102	F03
2103	E03
2104	F03
2110	C02
2111	D02
2114	D03
2115	B03
2117	C04
2122	B05
2127	B06
2129	C06
2130	C06
2132	C07
2133	B06
2135	B07
2140	E08
2142	E08
2144	D08
2145	F09
2147	B05
2148	C03
2149	B07
3101	E03
3102	E03
3103	E03
3104	F03
3105	D03
3110	D03
3111	D03
3112	C02
3113	C03
3114	C03
3115	D03
3116	D03
3117	E03
3118	E04
3119	F03
3123	B04
3124	C03
3125	B04
3130	E04
3131	D04
3132	E05
3133	D05
3137	D05
3138	D05
3139	D04
3140	D04
3141	D04
3145	B04
3146	C05
3148	C04
3150	C04
3152	C04
3153	B04
3155	D06
3156	D05
3158	C08
3162	B05
3163	B06
3164	B05
3165	C05
3166	B05
3167	C06
3172	B06
3173	C06
3174	C07
3175	B07
3176	B07
3177	B08
3180	F08
3181	F08
3184	F08
3186	D08
3187	E08
3188	D08
3190	F08
3191	D08
3192	D08
3193	D07
3194	D08
3197	C08
6101	D03
6103	C03
6104	C04
6105	B04
6107	C05
6109	C05
6110	B05
6111	B07
6114	F08
6115	E08
6118	D07

2101 D 3 2102 E 3 2103 E 3 2104 F 3 2110 B 5
2111 B 5 2114 C 7 2115 C 8 2117 B 9 2122 A 9
2127 B11 2129 C12 2130 C13 2132 C14 2133 C14
2135 A15 2140 H 4 2142 I 6 2144 H 7 2145 G 8
2147 G14 2148 G15 2149 H14 3101 D 3 3102 D 3
3103 E 3 3104 F 3 3105 F 4 3110 A 5 3111 B 5
3112 B 6 3113 A 7 3114 C 7 3115 C 5 3116 C 6
3117 E 6 3118 F 5 3119 F 6 3123 A 7 3124 A 8
3125 C 8 3130 F 6 3131 F 7 3132 F 7 3133 F 8
3137 D 8 3138 D 8 3139 E 8 3140 F 8 3141 E 8 3145 A 9
3146 K 1 3148 K 1 3150 K 1 3152 K 1 3153 C 9
3155 D 9 3156 F 8 3158 F 9 3162 A11 3163 B12
3164 B11 3165 C10 3166 C11 3167 C12
3172 C13 3173 C13 3174 C14 3175 A15 3176 C15
3177 D15 3180 I 3 3181 I 3 3184 H 5 3186 H 6
3187 I 6 3188 I 7 3190 H 7 3191 I 7 3192 H 8
3193 H 4 3194 I 8 3195 H14 3197 G15 6101 C 4 6103 B 6
6104 B 7 6105 A 9 6107 D 8 6109 C11 6110 B12
6111 C14 6114 H 6 6114 H 5 6115 I 5 6116 I 4 6118 H 8







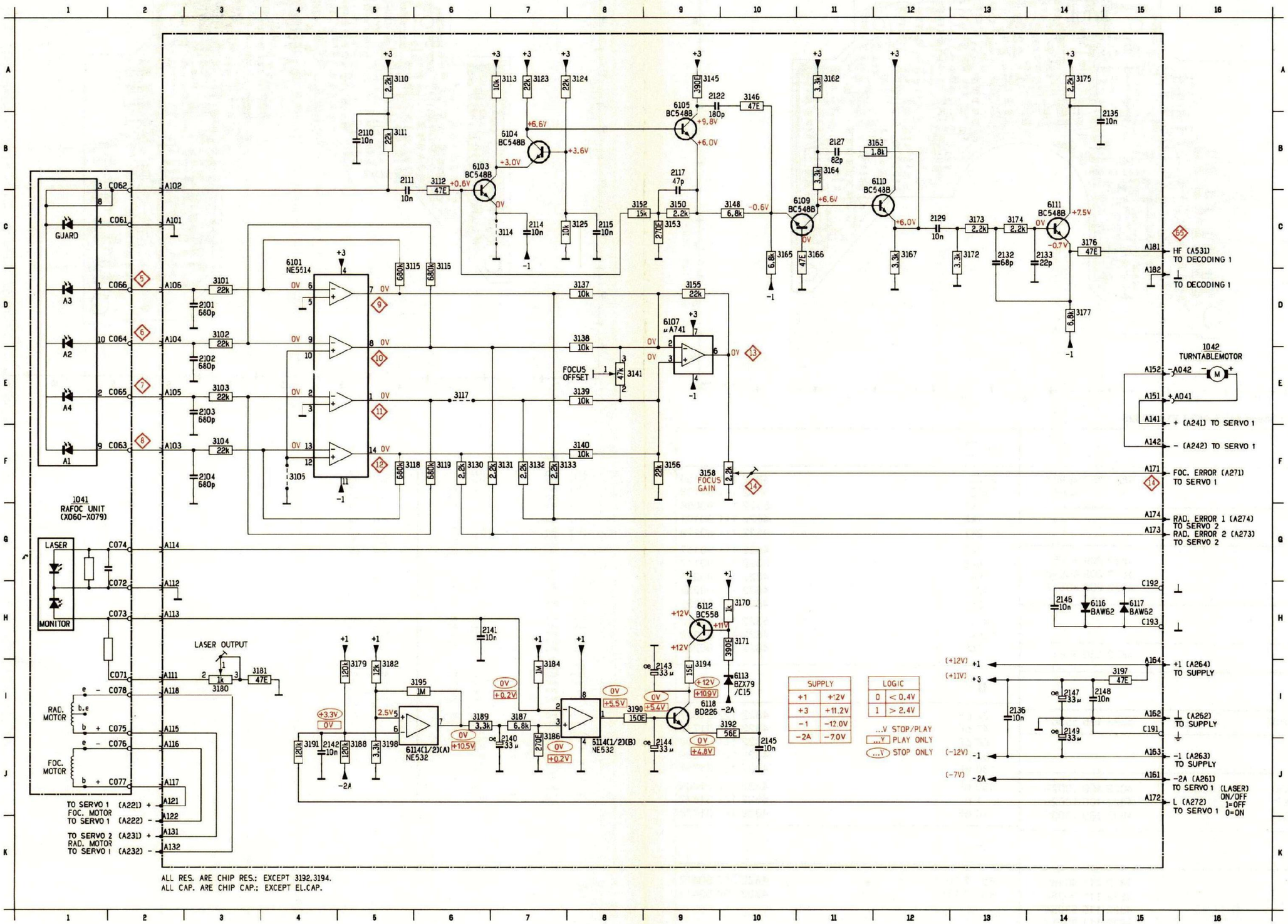
Pre-amplifier + laser print 4822 214 50325

BC548B		4822 130 40937
BD227		5322 130 44661
NE5514N		4822 209 81451
NE532N		4822 209 80818
μA741CN		4822 209 80617
BAW62		4822 130 30613
39E	PR37	5322 116 55063
3141	47k	4822 100 10079
3158	2k2	4822 100 10029
3180	10k	4822 100 10035
0E		4822 111 90163
6E8		4822 111 90254
10E		4822 110 53054
47E		4822 111 90217
150E		5322 111 90098
270E		4822 111 90154
390E		5322 111 90138
1k2		5322 111 90096
1k8		4822 111 90101
2k7		4822 111 90179
3k3		4822 111 90157
6k8		5322 111 90117
10k		4822 111 90249
12k		4822 111 90253
22k		4822 111 90251
47k		5322 111 90112
120k		4822 111 90149
1M		4822 111 90252
22 pF		4822 122 31837
47 pF		4822 122 31772
68 pF		4822 111 90308
82 pF		4822 122 31839
180 pF		4822 122 31757
680 pF		4822 122 31809
1 n		5322 122 31647
10 nF		4822 122 31728
6p - A10		4822 267 50412
8p - A11		4822 267 50413

ITEM	PCB	ITEM	PCB	ITEM	PCB
2101	E03	3118	E04	3180	F08
2102	F03	3119	F03	3181	F08
2103	E03	3123	B04	3182	D08
2104	F03	3124	C04	3184	E07
2110	C02	3125	B04	3186	E08
2111	D02	3130	E05	3187	E08
2114	D03	3131	D04	3188	E09
2115	B03	3132	E05	3190	F07
2117	C04	3133	D05	3191	D08
2122	C05	3137	D04	3192	D08
2127	B06	3138	D05	3193	F07
2129	C06	3139	D04	3194	D08
2130	C06	3140	D04	3195	D09
2132	C07	3141	C05	3197	C08
2133	B06	3145	B05	6101	D03
2140	E08	3146	B05	6103	C03
2142	E08	3148	B04	6104	C04
2143	F08	3150	C04	6105	B04
2144	D08	3152	C04	6107	C05
2145	F09	3153	B04	6109	C05
2147	B05	3155	C05	6110	B05
2148	C03	3156	D04	6111	B07
2149	B07	3158	C08	6114	F08
3101	E03	3162	B05	6115	E08
3102	E03	3163	B06	6116	E08
3103	E03	3164	B05	6118	D07
3104	F03	3165	C05		
3110	D03	3166	B05		
3111	D03	3167	C06		
3112	C03	3172	B06		
3113	C03	3173	C07		
3114	C03	3174	C07		
3115	D03	3175	B07		
3116	D03	3176	B07		
3117	E03	3177	B08		

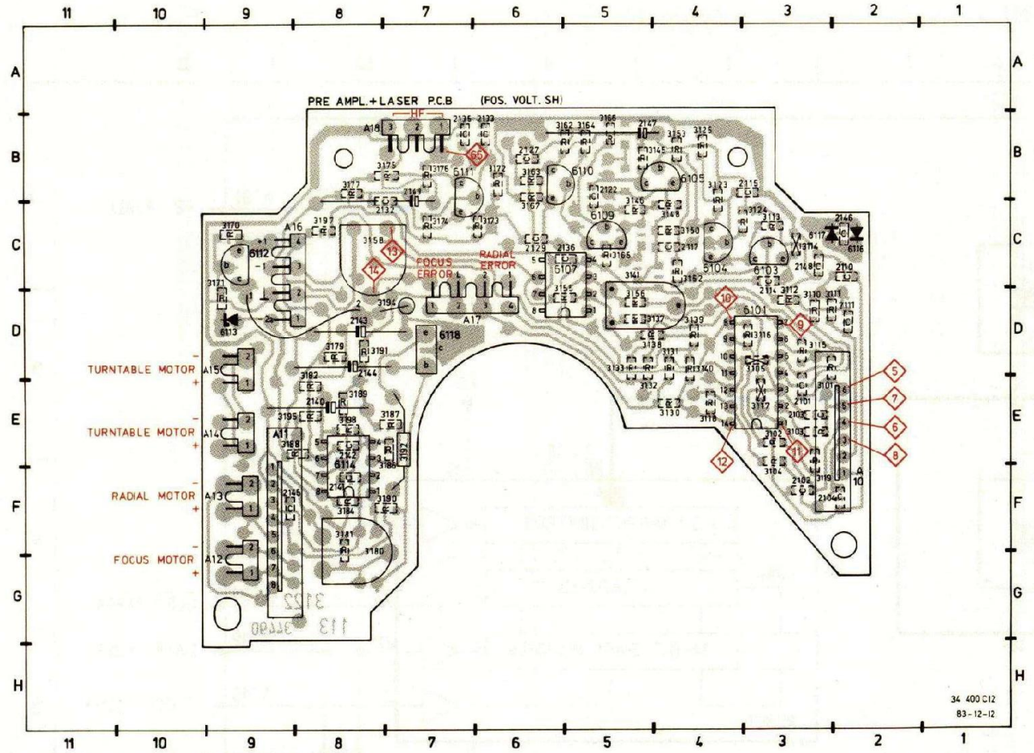
PRE.- AMPL. + LASER (POS. VOLT SH) A06-A07

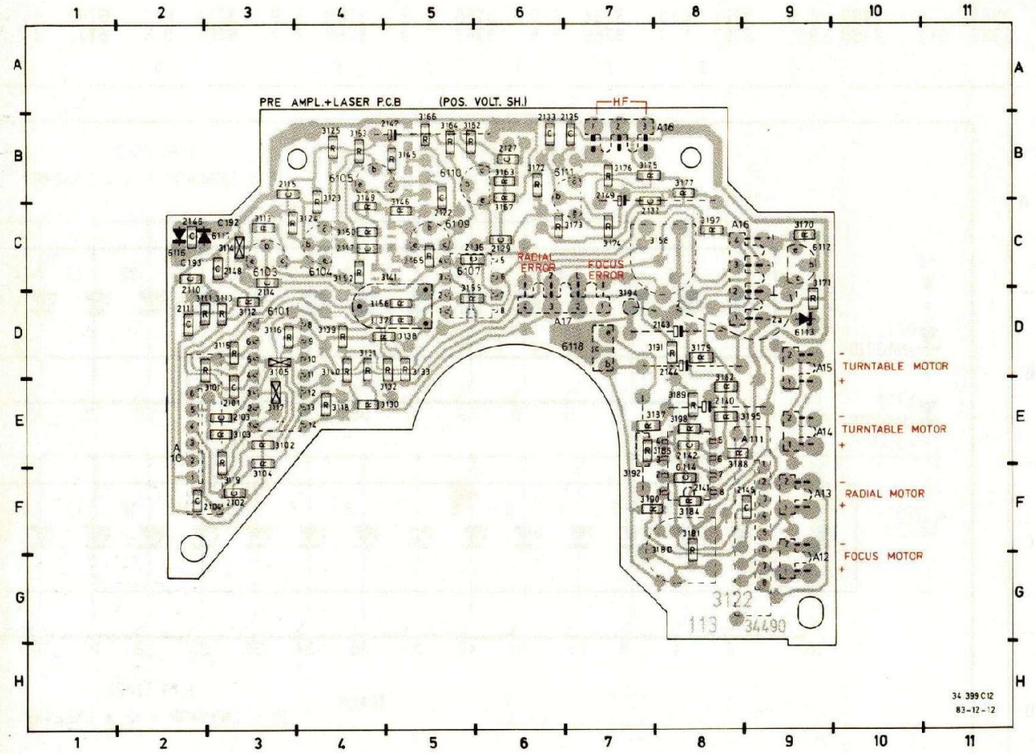
2101	D 3	2111	B 5	2127	B11	2136	I13	2144	J 9	2149	I14	3105	F 4	3114	C 7	3119	F 6	3131	F 7	3139	E 8	3146	A10	3155	D 9	3164	B11	3171	H10	3176	C14	3182	I 5	3189	I 6	3195	I 6	6104	B 7	6111	C14	6116	H14
2102	F 3	2114	C 7	2129	C12	2140	J 7	2145	J10	3101	D 3	3110	A 5	3115	C 6	3123	A 7	3132	F 7	3140	F 8	3148	C10	3156	F 9	3165	C10	3172	C13	3177	C14	3184	I 7	3190	I 8	3197	I15	6105	A 9	6112	H 9	6117	H15
2103	E 3	2115	C 8	2132	C13	2141	H 7	2146	H14	3102	D 3	3111	B 5	3116	C 6	3124	A 8	3133	F 8	3141	E 8	3150	C 9	3158	F 9	3166	C11	3173	C13	3179	I 5	3186	I 7	3191	J 4	3198	J 5	6107	D 9	6113	I10	6118	I 9
2104	F 3	2117	B 9	2133	C14	2142	J 4	2147	I14	3103	E 3	3112	B 6	3117	E 6	3125	C 8	3137	D 8	3141	E 6	3152	C 8	3162	A11	3167	C12	3174	C13	3180	I 3	3187	I 7	3192	I10	6101	C 4	6109	C11	6114(■J 8			
2110	B 5	2122	A 9	2135	B15	2143	I 9	2148	I15	3104	F 3	3113	A 7	3118	F 6	3130	F 6	3138	D 8	3145	A 9	3153	C 9	3163	B12	3170	H10	3175	A14	3181	I 3	3188	J 5	3194	I 9	6103	B 6	6110	B12	6114(■J 6			



34375E21

A06-A07



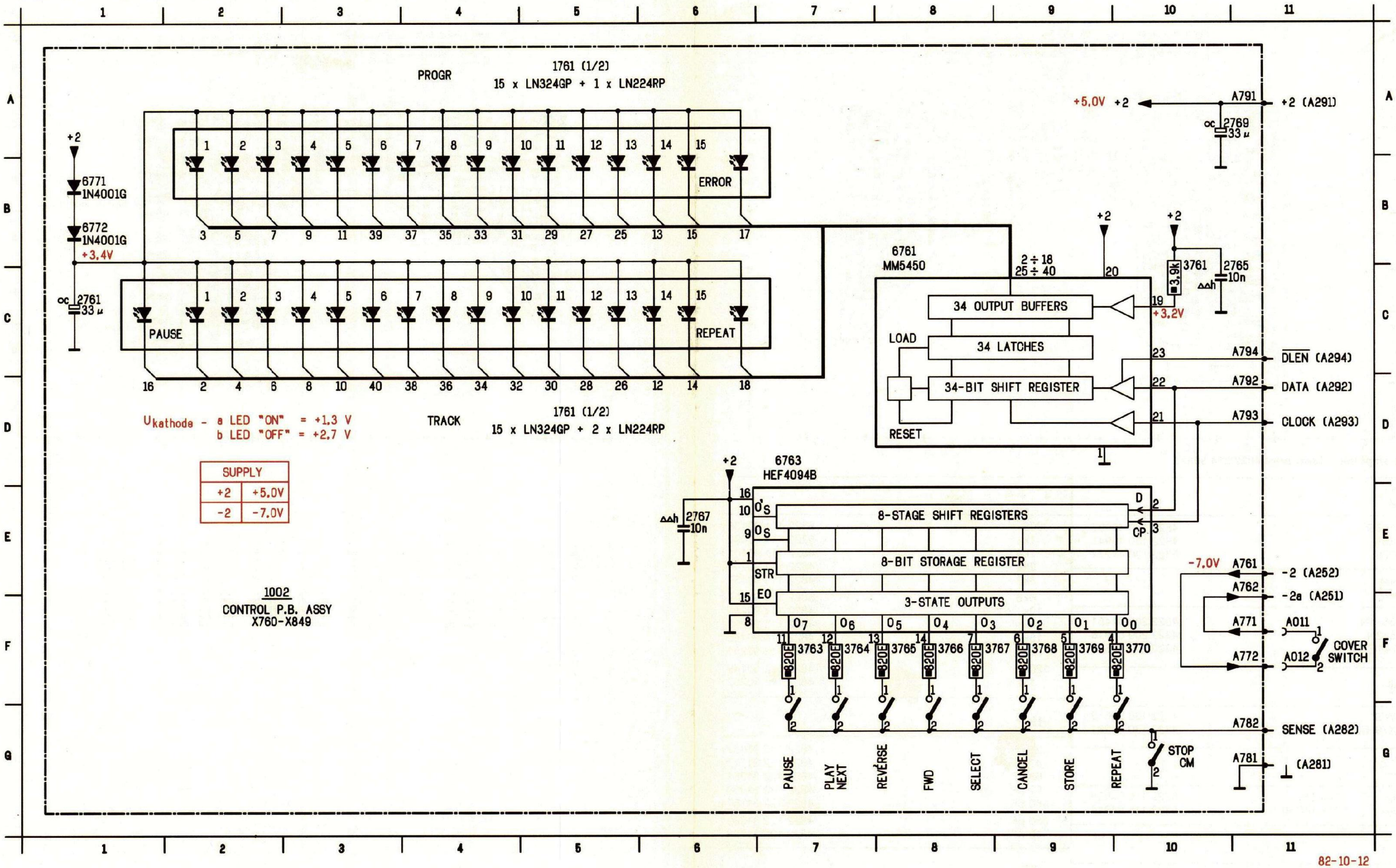


Pre-amplifier + laser print 4822 214 50325

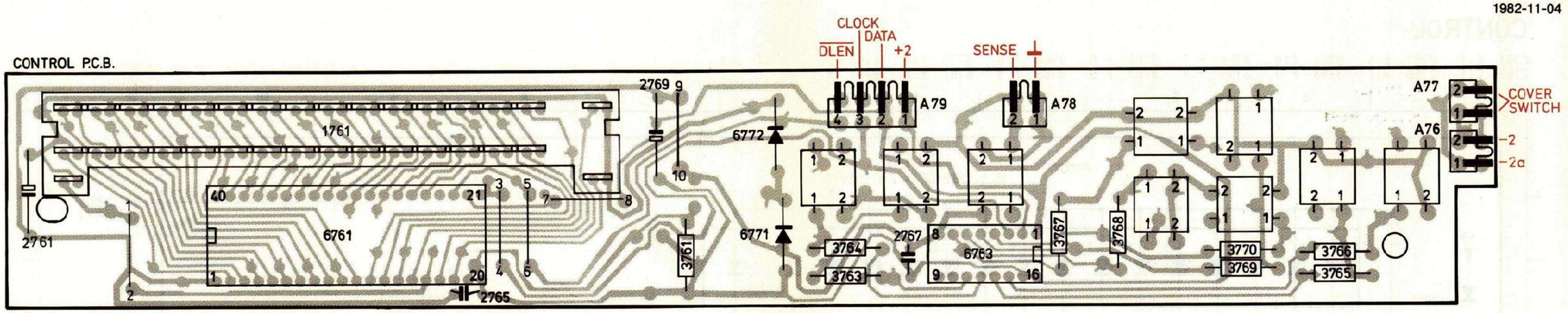
K		
BC548B		4822 130 40937
BC558		4822 130 40941
BD226		5322 130 44244
IC		
NE5514N		4822 209 81451
NE532N		4822 209 80818
µA741CN		4822 209 80617
D		
BAW62		4822 130 30613
BZX79/C15		4822 130 34281
R		
3192	56E 5%	5322 116 54929
3194	15E MR30	5322 116 54914
VR		
3141	47k	5322 101 14048
3158	2k2	4822 100 10029
3180	1k	5322 100 10112
R©		
0E		4822 111 90163
47E		4822 111 90217
150E		5322 111 90098
R©		
390E		5322 111 90138
1k		5322 111 90092
1k8		4822 111 90101
2k2		4822 111 90248
3k3		4822 111 90157
6k8		5322 111 90117
10k		4822 111 90249
12k		4822 111 90253
15k		4822 111 90196
22k		4822 111 90251
120k		4822 111 90149
1M		4822 111 90252
C©		
22 pF		4822 122 31837
47 pF		4822 122 31772
68 pF		4822 122 31961
82 pF		4822 122 31839
180 pF		4822 122 31757
680 pF		4822 122 31809
10 nF		4822 122 31728
Connector		
6p-A10		4822 267 50412
8p-A11		4822 267 50413

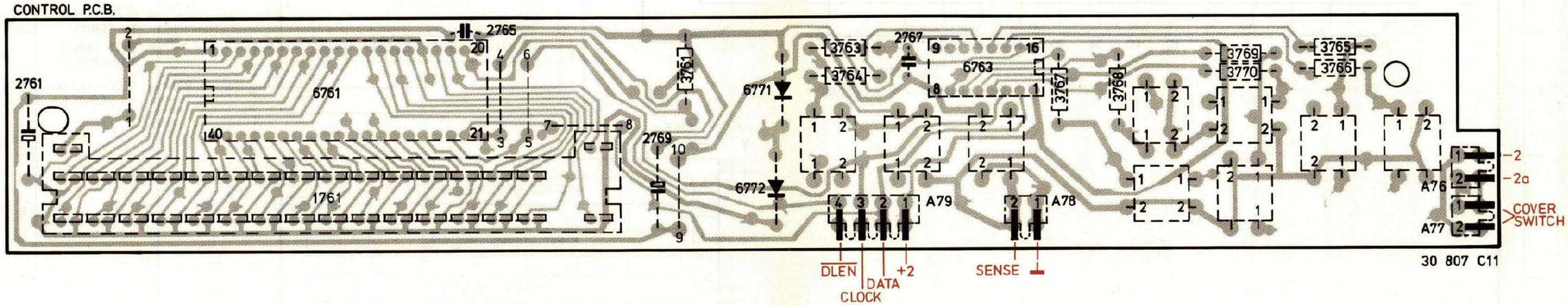
2101	E03	2111	D02	2129	C06	2142	E08	2147	B05	3103	E05	3112	D03	3117	C04	3125	B04	3135	B07
2102	F03	2112	B03	2132	C07	2143	D08	2148	C03	3104	F03	3113	C03	3118	E04	3130	E04	3137	D04
2103	E03	2114	D03	2133	B06	2144	D08	2149	B07	3105	D03	3114	C03	3119	F03	3131	E04	3138	D04
2104	F03	2122	B05	2136	C05	2145	F09	3101	E03	3110	D03	3115	D03	3123	B04	3132	E05	3139	D04
2110	C02	2127	B06	2141	F08	2146	C02	3102	E03	3111	D02	3116	D03	3124	C03	3133	E05	3140	D04
3141	C05	3152	C04	3162	B05	3167	C06	3174	C07	3180	F08	3187	E07	3192	E07	6101	E03	6109	C05
3145	B04	3153	B04	3163	B06	3170	C09	3175	B07	3181	F08	3188	E09	3194	D07	6103	C03	6110	B05
3146	C05	3155	D05	3164	B05	3171	C09	3176	B07	3182	E08	3189	E08	3195	E09	6104	C04	6111	B07
3148	C04	3156	D05	3165	C05	3172	B06	3177	B08	3184	F08	3190	F07	3197	C08	6105	E04	6112	C09
3150	C04	3158	C08	3166	B05	3173	C06	3179	D08	3186	E07	3191	D08	3198	E08	6107	C05	6113	D09
6114	E08																		
6116	C02																		
6117	C03																		
6118	D07																		

2761	C 1	2767	E 6	3761	C10	3764	F 7	3766	F 8	3768	F 9	3770	F10	6763	D 7	6772	B 1
2765	C11	2769	A11	3763	F 7	3765	F 8	3767	F 9	3769	F 9	6761	B 8	6771	B 1		


PROGR
1761 (1/2)
15 x LN324GP + 1 x LN224RP
ERROR
PAUSE
REPEAT
TRACK
1761 (1/2)
15 x LN324GP + 2 x LN224RP
6771 1N4001G
6772 1N4001G
+3,4V
2761 33 µ
Ukathode - a LED "ON" = +1,3 V
b LED "OFF" = +2,7 V
SUPPLY
+2 +5,0V
-2 -7,0V
1002
CONTROL P.B. ASSY
X760-X849
6761
MM5450
34 OUTPUT BUFFERS
LOAD
34 LATCHES
34-BIT SHIFT REGISTER
RESET
+3,2V
3761 3,9k
2765 10n
+5,0V +2
A791 +2 (A291)
2769 33 µ
A794 DLEN (A294)
A792 DATA (A292)
A793 CLOCK (A293)
6763
HEF4094B
2767 10n
8-STAGE SHIFT REGISTERS
8-BIT STORAGE REGISTER
3-STATE OUTPUTS
STR
EO
CP
-7,0V A761 -2 (A252)
A762 -2a (A251)
A771 A011
A772 A012
COVER SWITCH
A782 SENSE (A282)
A781 (A281)
3763 3764 3765 3766 3767 3768 3769 3770
820E
PAUSE
PLAY NEXT
REVERSE
FWD
SELECT
CANCEL
STORE
REPEAT
STOP CM

82-10-12
30639/C





MM5450	4822 209 10199	LN324GP (green)	4822 130 31429
HEF4094B	5322 209 14485	LN224RP (red)	4822 130 31431
1N4001G	4822 130 31438		4822 271 30259

CS 84 861

CONTROL

2761 C 1 2765 C11 | 2767 E 6 2769 A11 | 3761 C10 3763 F 7 | 3764 F 7 3765 F 8 | 3766 F 8 3767 F 9 | 3768 F 9 3769 F 9 | 3770 F10 6761 B 8 | 6763 D 7 6771 B 1 | 6772 B 1

PROGR — 1761 (1/2) — 15 x LN324GP + 1 x LN224RP

ERROR: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 — 3 5 7 9 11 39 37 35 33 31 29 27 25 13 15 17

PAUSE: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 — 16 2 4 6 8 10 40 38 36 34 32 30 28 26 12 14 18

REPEAT

+2 — 6771 1N4001G — 6772 1N4001G — +3.4V

2761 33 µ

$U_{kathode}$ - a LED "ON" = +1.3 V
b LED "OFF" = +2.7 V

TRACK — 1761 (1/2) — 15 x LN324GP + 2 x LN224RP

SUPPLY	
+2	+5.0V
-2	-7.0V

+5.0V +2 — A791 — +2 (A291) TO SUPPLY

2769 33 µ

6761 MM5450 — 2 ÷ 18, 25 ÷ 40 — 20

+2 — 3761 3,9k — 2765 10n

34 OUTPUT BUFFERS — 19 — +3.2V

LOAD — 34 LATCHES

34-BIT SHIFT REGISTER — 23 — A794 — $\overline{DLEN}$ (A294) TO SERVO 1

22 — A792 — DATA (A292) TO SERVO 1

21 — A793 — CLOCK (A293) TO SERVO 1

RESET — 1

+2 — 6763 HEF4094B

2767 10n

16 — 10 O'_S — 9 O'_S — 1 — STR — 15 EO — 8

8-STAGE SHIFT REGISTERS — D 2 — CP 3

8-BIT STORAGE REGISTER

3-STATE OUTPUTS

O_7 O_6 O_5 O_4 O_3 O_2 O_1 O_0

11 3763 | 12 3764 | 13 3765 | 14 3766 | 7 3767 | 6 3768 | 5 3769 | 4 3770

8320E

PAUSE | PLAY NEXT | REVERSE | FWD | SELECT | CANCEL | STORE | REPEAT

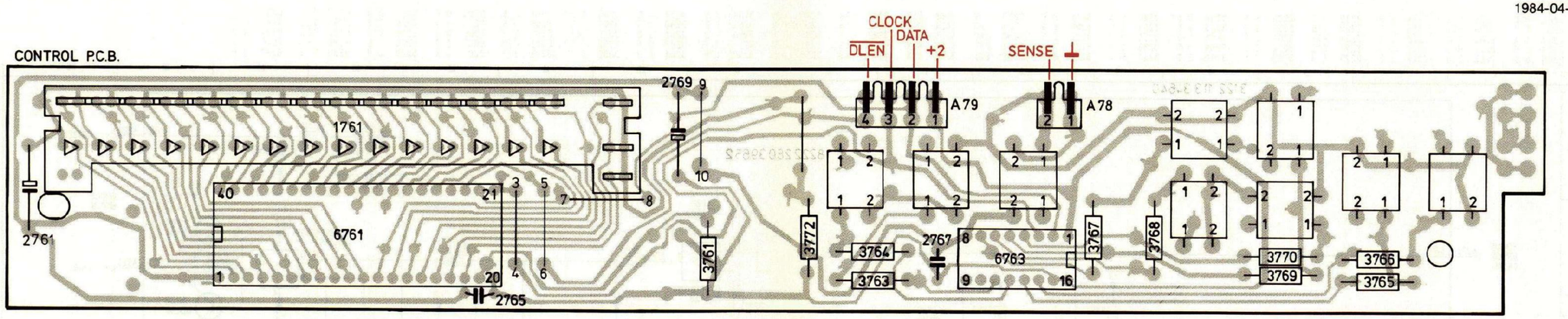
STOP CM — 11 — 2

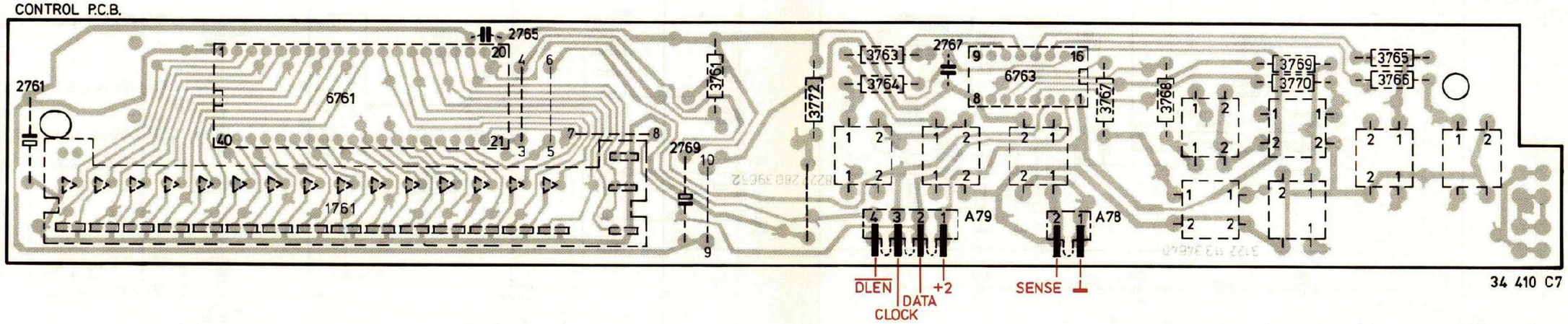
A782 — SENSE (A282) TO SERVO 1

A781 — (A281) TO SERVO 1

30 639C/A

CONTROL P.C.B.

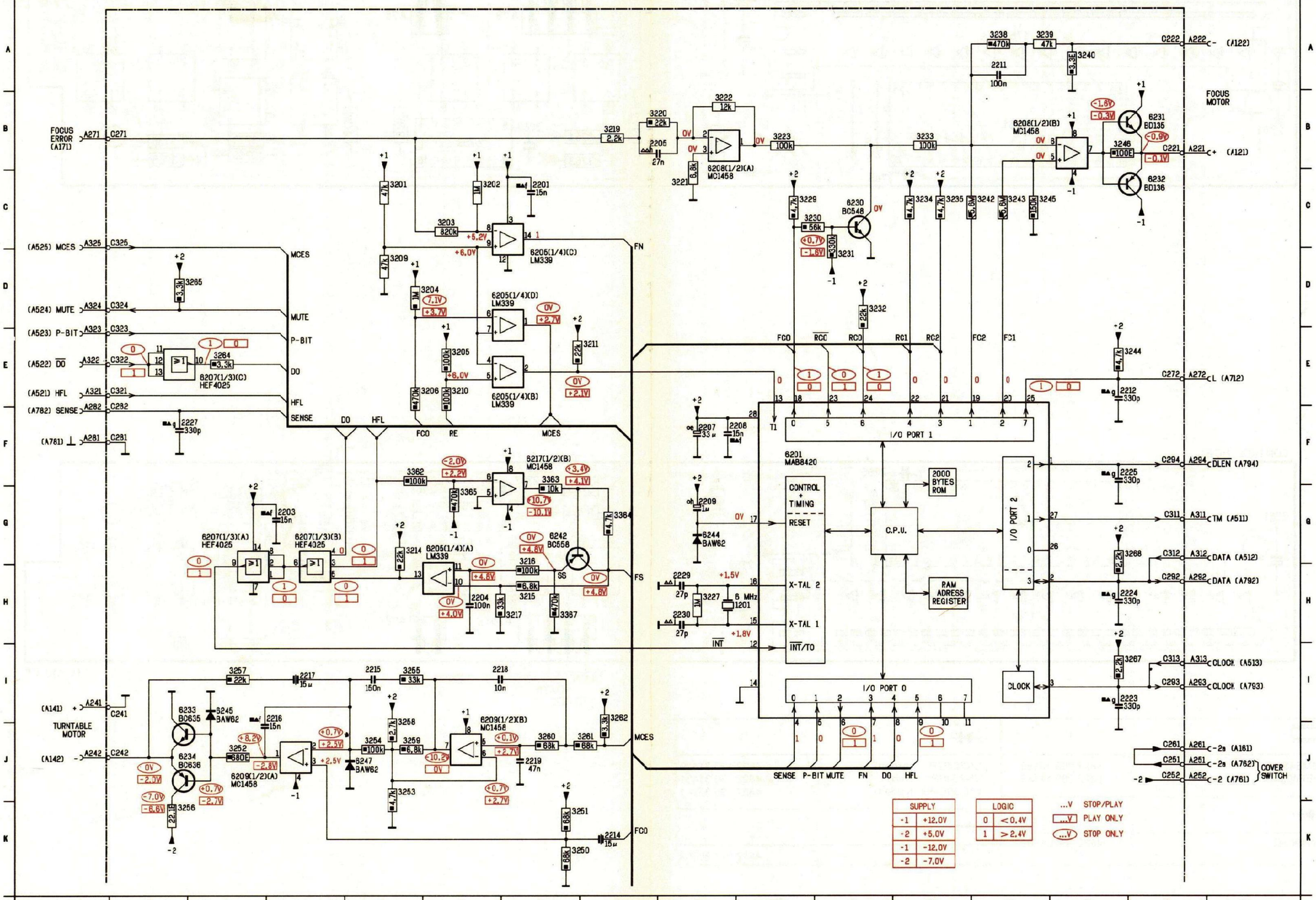




MM5450	4822 209 10199	LN324GP (green)	4822 130 31429
HEF4094BP	5322 209 14485	LN224RP (red)	4822 130 31431
		LN335GPH (green)	4822 130 32241
1N4001G	4822 130 31438		4822 271 30259

CS 95 609

1201 H10 2207 F 9 2214 K 8 2219 J 7 2229 H 9 3204 D 6 3211 E 8 3219 B 8 3227 H 9 3233 B12 3240 A14 3246 B14 3254 J 5 3259 J 5 3265 D 3 3364 G 8 6205 G 6 6207 G 3 6217 F 7 6234 J 3
2201 C 7 2208 F10 2215 I 5 2223 I15 2230 H 9 3205 E 6 3214 G 5 3220 B 9 3229 C10 3234 C12 3242 C13 3250 K 8 3255 I 5 3260 J 7 3267 I15 3365 G 6 6205 D 7 6208 B13 6230 C11 6242 G 7
2203 G 4 2209 G 9 2216 I 4 2224 H15 3201 C 5 3206 E 6 3215 H 7 3221 C 9 3230 C10 3235 C12 3243 C13 3251 K 8 3256 K 3 3261 J 8 3268 G15 3367 H 7 6205 D 7 6208 B 9 6231 B15 6244 G 9
2204 H 6 2211 A13 2217 I 4 2225 F15 3202 C 6 3209 D 5 3216 G 7 3222 B 9 3231 D11 3238 A13 3244 E15 3252 J 9 3262 I 8 3362 J 8 6201 F10 6207 E 3 6209 I 6 6232 C15 6245 I 3
2205 B 9 2212 E15 2216 I 7 2227 F 3 3203 C 6 3210 E 6 3217 H 7 3223 B10 3232 D11 3239 A13 3245 C13 3253 J 5 3256 I 5 3264 E 3 3363 F 7 6205 E 7 6207 G 4 6209 J 3 6233 I 3 6247 J 5



CS 84 862

82-10-12
30641/D

IC		
HEF4025BP		5322 209 14052
LM339N		4822 209 80631
MAB8420		4822 209 81455
MC1458N		5322 209 85512
T		
BC548B		4822 130 40937
BC558		4822 130 40941
BC635		5322 130 44349
BC636		4822 130 44283
BD135		4822 130 40823
BD136		4822 130 40824
D		
BAW62		4822 130 30613
X		
1201	6.0 MHz	4822 242 70392
R		
3201,3209, 3239	47k - 1% MR25	5322 116 54671
3202	1M - 1% MR25	5322 116 55535
3203	820k - 1% MR25	5322 116 51398
3204,3227	1M - 5% SFR25	4822 110 73187
3219	2k2 - 1% MR25	4822 116 51245
3220	22k - 1% MR25	4822 116 51257
3222	12k - 1% MR25	5322 116 50572
3223,3233	100k - 1% MR25	4822 116 51268
3256	22E1 - 1% MR25	5322 116 50256
C		
2204,2211	100n - 10%	4822 121 41672
2215	150n - 10%	4822 121 41682
2218	10n - 10%	4822 121 41677
2219	47n - 10%	4822 121 41676
IC		
28p		4822 255 40156
Miscellaneous		
Mica washer for 6231/32		4822 255 40133
Spring clip for 6231/32		4822 255 40128

ITEM	PCB														
1201	I10	2207	H10	2214	K07	2219	K09	2233	C04	2239	D05	2246	C07	2257	C06
2201	G09	2208	H08	2215	J09	2223	B09	2235	C04	2241	C07	2247	D07	2259	G08
2203	G09	2209	H11	2216	K07	2224	B09	2236	B07	2242	B07	2250	C05	2261	C08
2204	F10	2211	J06	2217	J08	2225	B08	2237	C07	2243	D07	2251	F07	2262	C08
2205	H05	2212	G04	2218	J09	2227	B09	2238	B07	2244	E07	2256	B06	2265	H05
2266	G05	2276	I02	2283	J03	2291	J03	2298	L03	2305	K10	3204	G09	3211	G10
2267	G05	2277	I02	2285	K02	2294	J10	2299	L02	2307	L02	3205	E09	3214	F10
2272	J03	2278	I03	2287	L10	2295	J11	2300	K02	3201	F09	3206	J10	3215	E10
2273	J03	2279	J03	2288	L10	2296	K04	2301	L03	3202	E10	3209	F09	3216	E10
2275	J02	2282	J04	2290	K05	2297	L03	2304	K10	3203	E09	3210	E09	3217	E10
3219	H04	3227	J10	3234	J09	3242	J06	3250	K08	3255	J08	3260	K09	3267	B07
3220	H05	3229	K06	3235	J10	3243	J06	3251	J08	3256	K06	3261	K09	3268	B07
3221	I05	3230	J06	3238	I06	3244	J09	3252	K07	3257	J08	3262	K09	3276	D05
3222	I04	3231	J06	3239	H04	3245	I06	3253	K08	3258	K08	3264	G09	3279	C04
3223	I05	3233	I05	3240	I04	3246	I04	3254	K08	3259	K08	3265	E10	3280	C05
3281	C06	3288	D06	3298	E04	3304	F04	3311	F06	3318	E05	3325	C06	3336	E07
3282	C04	3291	D06	3299	F05	3305	E04	3312	F05	3319	E05	3326	C06	3340	B10
3283	C04	3292	E06	3300	F04	3306	F05	3313	F06	3320	F05	3327	C04	3341	C06
3284	D05	3293	E06	3301	F04	3307	F05	3315	G06	3323	B06	3328	D06	3342	B10
3287	D06	3294	E06	3302	F05	3308	E04	3316	E06	3324	B06	3335	E07	3345	B05
3346	C05	3353	F07	3360	D07	3367	D10	3376	G08	3382	H06	3391	C08	3396	E08
3349	G07	3356	C08	3362	C10	3370	C06	3378	I07	3384	H05	3392	D09	3397	F08
3350	F07	3357	C08	3363	D10	3372	B05	3379	I07	3385	G05	3393	E08	3398	D08
3351	F06	3358	D08	3364	D10	3373	B05	3380	I06	3386	G06	3394	D08	3399	D08
3352	F06	3359	D08	3365	D10	3375	G07	3381	I06	3387	G05	3395	E08	3402	L07
3403	L09	3408	K05	6207	H09	6213	B04	6218	H06	6226	L08	6234	J07	6242	E10
3404	L09	3409	L08	6208	J05	6214	G06	6222	L06	6230	I06	6238	E05	6243	L06
3405	L09	3410	L09	6209	K07	6215	D08	6223	L05	6231	J04	6239	E04	6244	I11
3406	L05	6201	I09	6211	H07	6216	D05	6224	K10	6232	J04	6240	H05	6245	J07
3407	L06	6205	G10	6212	C05	6217	C10	6225	L07	6233	J07	6241	H05	6247	J07
6249	B08	6256	H07	6262	I02	6267	K05	6272	L03						
6250	F06	6257	H08	6263	J02	6268	K03								
6251	D07	6258	I08	6264	J03	6269	K03								
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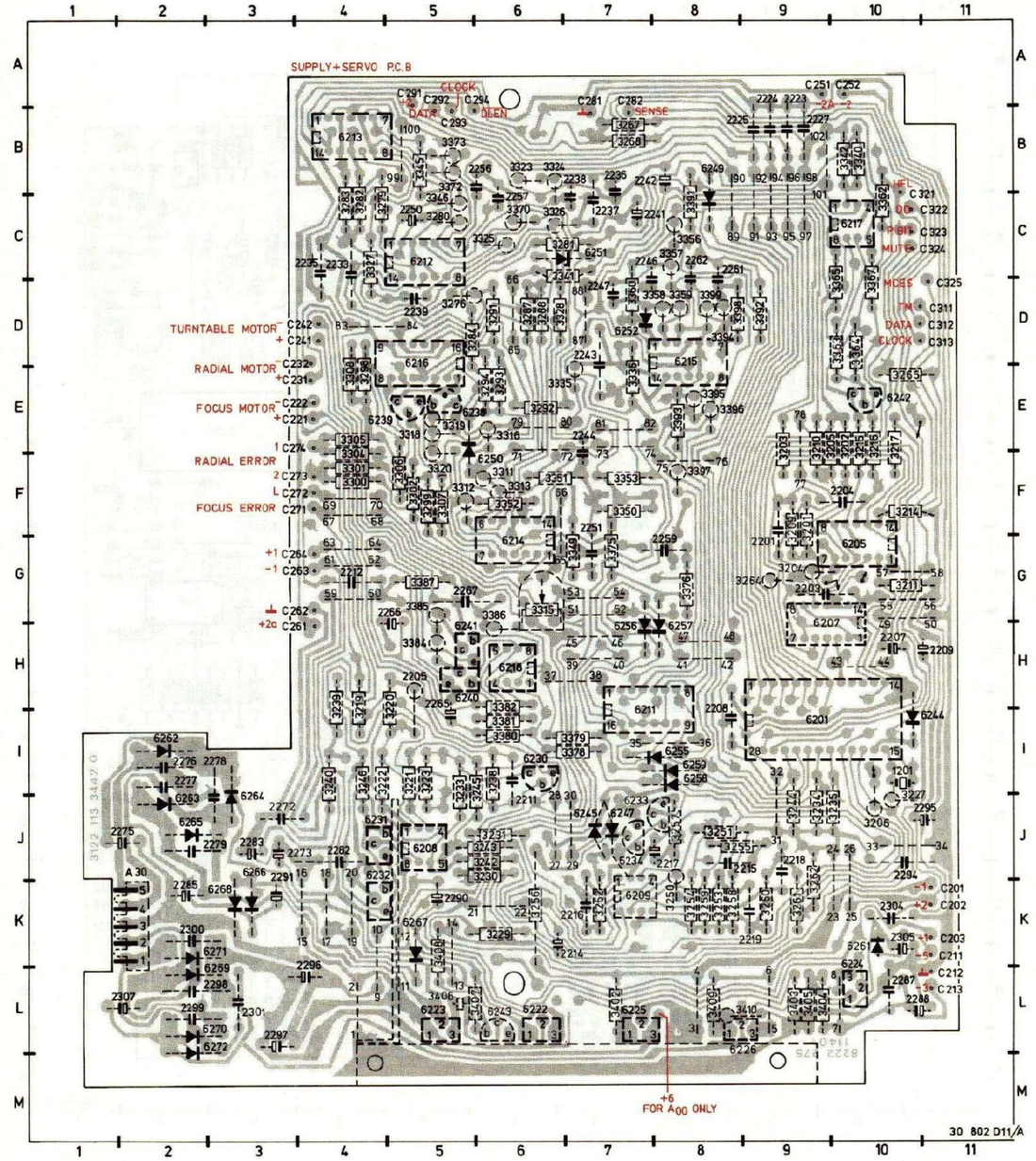
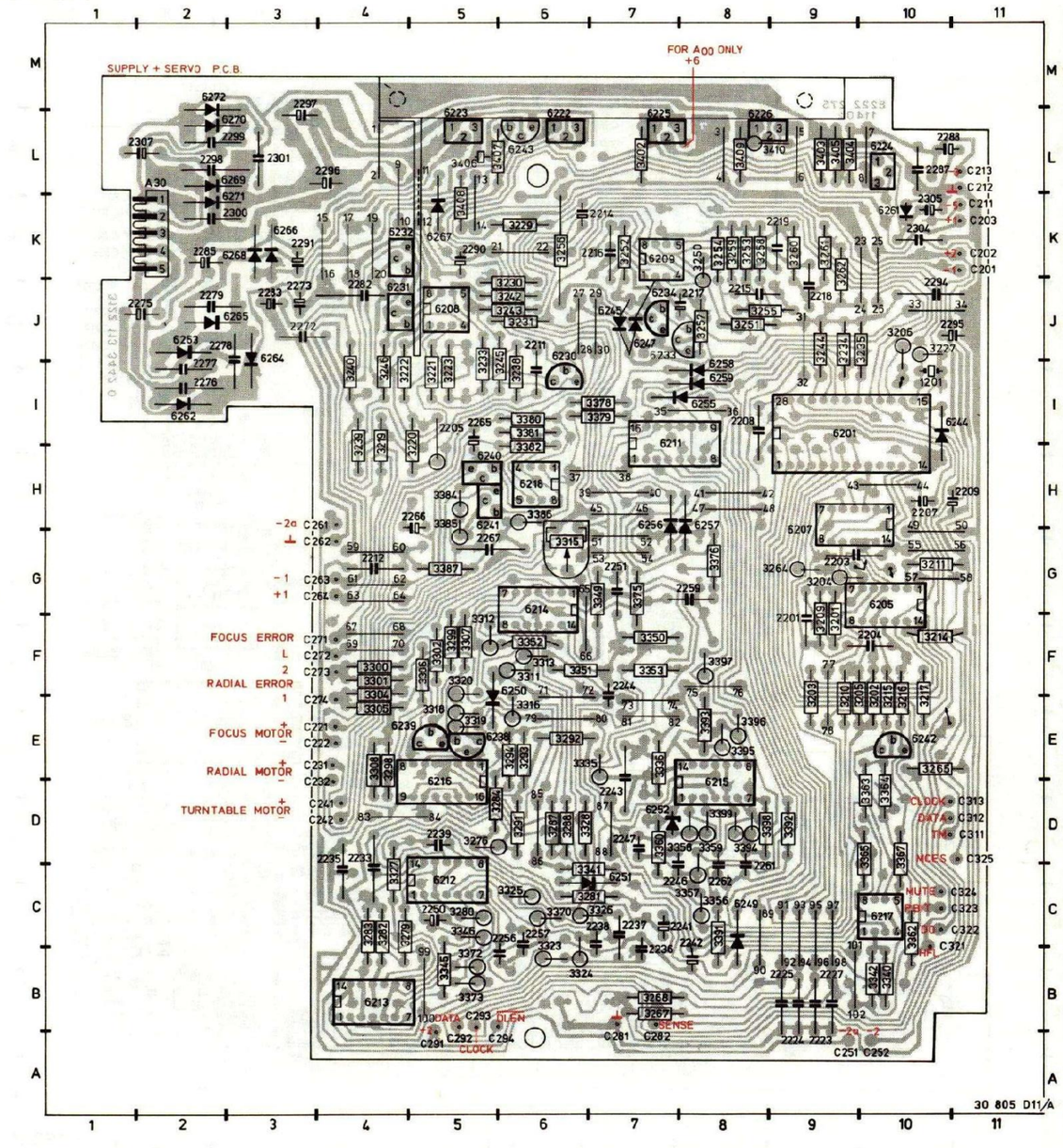
6255	I08	6261	K10	6266	J03	6271	K03								

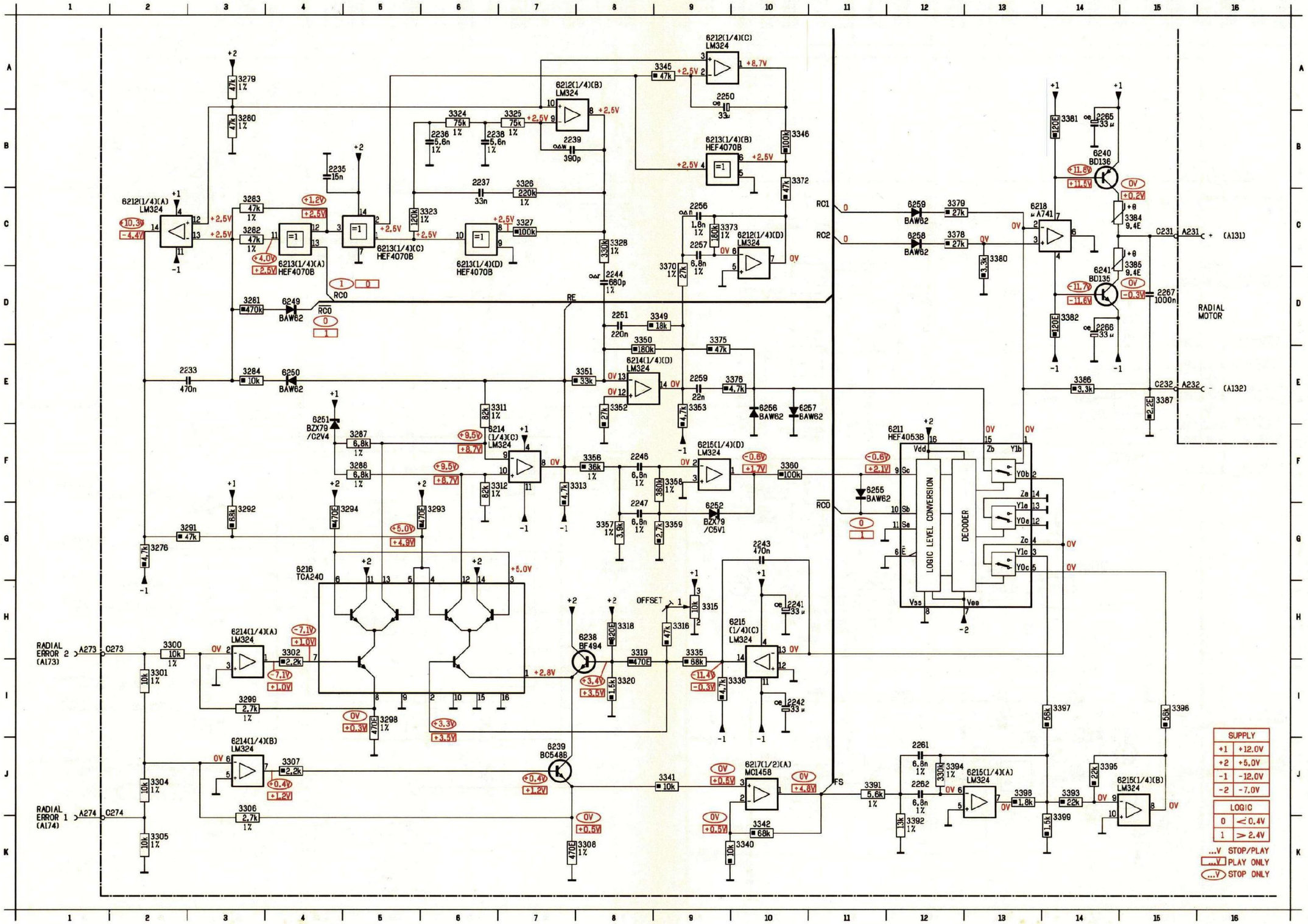




HEF4053BP			5322 209 14121
HEF4070BP			4822 209 10265
LM324N			4822 209 80587
MC1458N			5322 209 85512
TCA240			4822 209 80629
µA741CN			4822 209 80617
BC548B			4822 130 40937
BD135			4822 130 40823
BD136			4822 130 40824
BF494			4822 130 44195
BAW62			4822 130 30613
BZX79-C2V4			4822 130 31253
BZX79-C5V1			4822 130 34233
3315	10k		4822 100 10035
3279,3280, 3282,3283	47k	- 1% MR25	5322 116 54671
3287,3288	6k8	- 1% MR25	4822 116 51252
3298,3308	470E	- 1% MR25	5322 116 54854
3299,3306	2k7	- 1% MR25	4822 116 51283
3300,3301, 3304,3305	10k	- 1% MR25	4822 116 51233
3311,3312	82k	- 1% MR25	5322 116 55374
3323	120k	- 1% MR25	4822 116 51467
3324,3325	75k	- 1% MR25	4822 116 51267
3326	220k	- 1% MR25	4822 116 51272
3328,3394	330k	- 1% MR25	4822 116 51207
3357	3k9	- 1% MR25	4822 116 51249
3358	360k	- 1% MR25	5322 116 55264
3370	27k	- 1% MR25	5322 116 54652
3373	180k	- 1% MR25	5322 116 54722
3384,3385	9E4 P.T.C.		4822 116 40031
3391	5k6	- 1% MR25	4822 116 51281
3392	13k	- 1% MR25	5322 116 50522
2233,2243	470n	- 10%	4822 121 41674
2236,2238	5n6	- 1%	4822 121 50543
2237	33n	- 10%	4822 121 41675
2246,2247, 2257,2261, 2262	6n8	- 1%	4822 121 50538
2251	220n	- 10%	4822 121 41673
2256	1n8	- 1%	5322 121 54087
2259	22n	- 10%	4822 121 41664
2267	1000n	- 10%	4822 121 41719

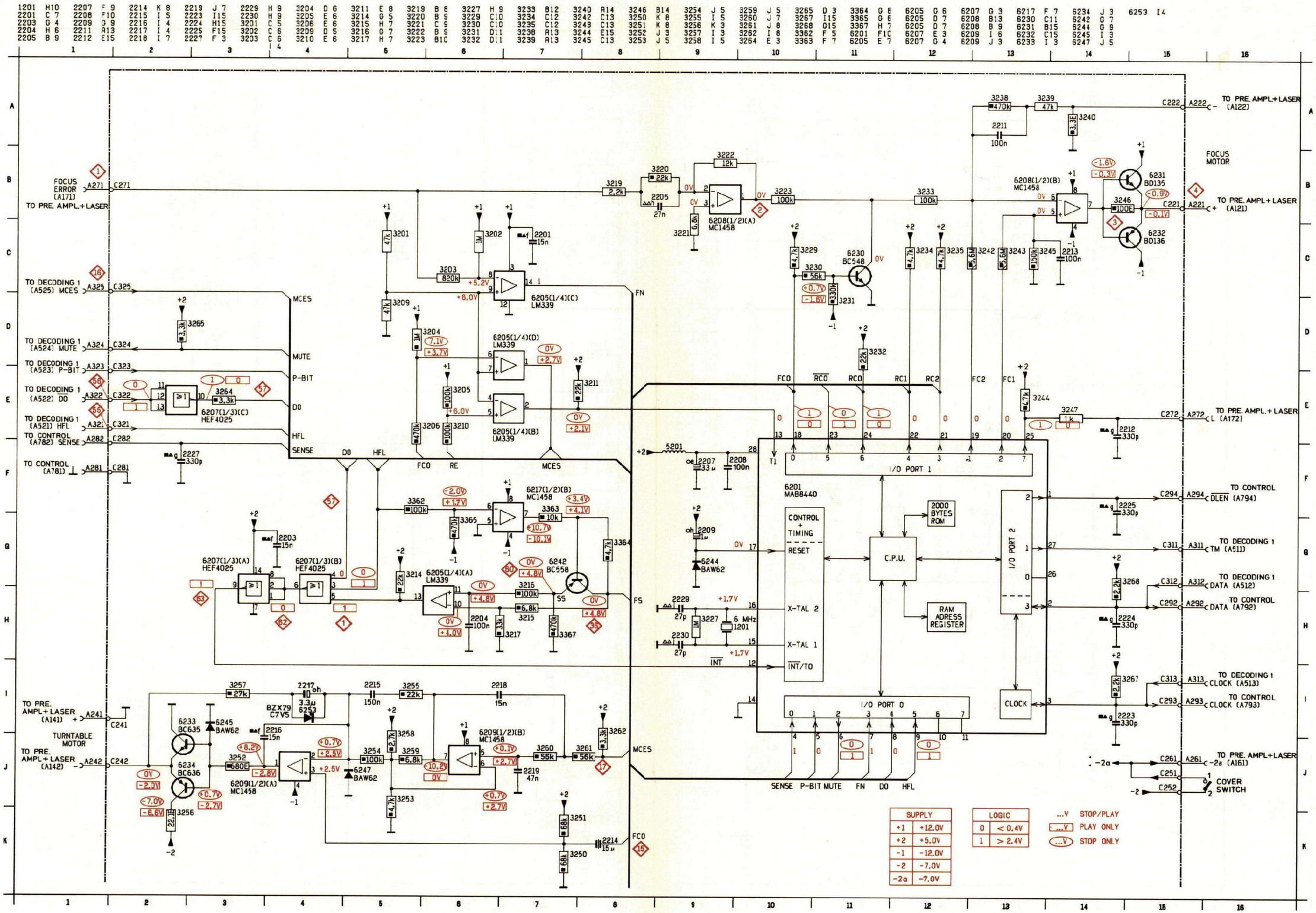
ITEM	PCB															
1201	I10	2207	H10	2214	K07	2219	K09	2233	D04	2239	D05	2246	C07	2257	C06
2201	F09	2208	I08	2215	J03	2223	B09	2235	D04	2241	C08	2247	D07	2259	G08
2203	G09	2209	H11	2216	K07	2224	B09	2236	B07	2242	C08	2250	C05	2261	C08
2204	F10	2211	J06	2217	J07	2225	B09	2237	C07	2243	D07	2251	G07	2262	C08
2205	I05	2212	G04	2218	J09	2227	B09	2238	C07	2244	F07	2256	C06	2265	I05
2266	H05	2276	I02	2283	J03	2291	K03	2298	L02	2305	K10	3204	G09	3211	G10
2267	G05	2277	I02	2285	K02	2294	J10	2299	L03	2307	L02	3205	F09	3214	F10
2272	J03	2278	J02	2287	L10	2295	J10	2300	K03	3201	F09	3206	J10	3215	F10
2273	I03	2279	J02	2288	L10	2296	L04	2301	L03	3202	F10	3209	F09	3216	F10
2275	J02	2282	J04	2290	K05	2297	M03	2304	K10	3203	F09	3210	F09	3217	F10
3219	H04	3227	J10	3234	J09	3242	J06	3250	K08	3255	J08	3260	K09	3267	B07
3220	H05	3229	K06	3235	J10	3243	J06	3251	J08	3256	K06	3261	K09	3268	B07
3221	I05	3230	J06	3238	I05	3244	J09	3252	K07	3257	J08	3262	K09	3276	D05
3222	I04	3231	J06	3239	H04	3245	I06	3253	K08	3258	K08	3264	G09	3279	C04
3223	I05	3233	I05	3240	I04	3246	I04	3254	K08	3259	K08	3265	E10	3280	C05
3281	C06	3288	D06	3298	E04	3304	F04	3311	F06	3318	E05	3325	C06	3336	E07
3282	C04	3291	D06	3299	F05	3305	E04	3312	F05	3319	E05	3326	C07	3340	B10
3283	C04	3292	E06	3300	F04	3306	F05	3313	F06	3320	F05	3327	C04	3341	C06
3284	D05	3293	E06	3301	F04	3307	F05	3315	G06	3323	C06	3328	D06	3342	B10
3287	D06	3294	E06	3302	F05	3308	E04	3316	E06	3324	B06	3335	E06	3345	B05
3346	C05	3353	F07	3360	D07	3367	D10	3376	G08	3382	H06	3391	C08	3396	E08
3349	G07	3356	C08	3362	C10	3370	C06	3378	I07	3384	H05	3392	D09	3397	F08
3350	F07	3357	C08	3363	D10	3372	B05	3379	I07	3385	H05	3393	E08	3398	D08
3351	F06	3358	D07	3364	D10	3373	B05	3380	I06	3386	H06	3394	D08	3399	D08
3352	F06	3359	D08	3365	D10	3375	G07	3381	I06	3387	G05	3395	E08	3402	L07
3403	L09	3408	K05	6207	H09	6213	B04	6218	H06	6226	L08	6234	J07	6242	E10
3404	L09	3409	L08	6208	J05	6214	G06	6222	L06	6230	J06	6238	E05	6243	L06
3405	L09	3410	L09	6209	K07	6215	D08	6223	L05	6231	J04	6239	E04	6244	I11
3406	L05	6201	I09	6211	I07	6216	D05	6224	L10	6232	K04	6240	H05	6245	J07
3407	L05	6205	G10	6212	C05	6217	C10	6225	L07	6233	J07	6241	H05	6247	J07
6249	C08	6256	H07	6262	I02	6267	K05	6272	M02						
6250	F06	6257	H08	6263	J02	6268	K03								
6251	C07	6258	I08	6264	I03	6269	L03								
6252	D07	6259	I08	6265	J03	6270	L03								
6255	I08	6261	K10	6266	K03	6271	K03								

2233 E 3 2241 H10 2250 A 9 2262 J12 3280 B 3 3288 F 5 3299 I 3 3306 J 3 3315 H 9 3324 B 6 3336 I10 3349 D 9 3357 G 8 3373 C 9 3381 B14 3391 J11 3397 I14 6212 C10 6214 J 3 6215 J13 6239 J 7 6252 G 9
2235 E 4 2242 I10 2251 D 8 2265 B14 3281 D 3 3291 G 3 3300 H 2 3307 J 4 3316 H 9 3325 B 7 3340 K10 3350 D 8 3358 F 9 3374 B10 3382 D14 3392 K12 3398 J13 6212 A 9 6214 H 3 6215 J15 6240 B14 6255 F11
2236 E 6 2243 G10 2256 C 9 2266 D14 3282 C 3 3292 G 3 3301 I 2 3308 K 8 3318 H 8 3326 B 7 3341 J 9 3351 E 8 3359 G 9 3375 D 9 3376 E10 3384 C15 3393 J14 3399 K14 6213 C 4 6214 E 8 6216 G 4 6241 D14 6256 E10
2237 E 6 2244 D 8 2257 C 9 2267 D15 3283 C 3 3293 G 6 3302 H 4 3311 E 7 3319 H 8 3327 C 7 3342 K10 3352 E 8 3360 F10 3376 C12 3385 C15 3394 J12 6211 F12 6233 B 9 6214 F 7 6217 J10 6249 D 4 6257 E11
2238 E 6 2246 F 8 2259 E 9 3276 G 2 3284 E 3 3294 G 5 3303 J 2 3312 F 8 3320 I 8 3328 C 6 3335 H 9 3343 A 9 3353 E 9 3370 D 9 3379 C12 3386 E14 3395 J14 6212 A 7 6213 C 6 6215 H10 6218 C13 6250 E 4 6258 E11
2239 E 7 2247 G 8 2261 J12 3279 A 3 3287 F 5 3298 I 5 3305 K 2 3313 F 8 3323 C 6 3335 H 9 3346 B10 3356 F 8 3372 B10 3380 C13 3387 E15 3396 I15 6212 C 2 6213 C 5 6215 F 9 6238 H 8 6251 E 4 6259 C12



CS 84 761

SERVO 1



30 641D/8

CS 95 610

HEF4025BP		4822 209 10254
LM339N		4822 209 80631
MAB8440PB/D023		4822 209 10868
MC1458N		4822 209 81349
BC548B		4822 130 40937
BC558		4822 130 40941
BC635		5322 130 44349
BC636		4822 130 44283
BD135		4822 130 40823
BD136		4822 130 40824
BAW62		4822 130 30613
1201	6.0 MHz	4822 242 70392
3201,3209, 3239	47k - 1% MR25	5322 116 54671
3202	1M - 1% MR25	5322 116 55535
3203	820k - 1% MR25	5322 116 51398
3204,3227	1M - 5% SFR25	4822 110 73187
3219	2k2 - 1% MR25	4822 116 51245
3220	22k - 1% MR25	4822 116 51257
3222	12k - 1% MR25	5322 116 51254
3223,3233	100k - 1% MR25	4822 116 51268
3256	22E1 - 1% MR25	5322 116 50256
2204,2211	100n - 10%	4822 121 41672
2208	100n - 20+100	4822 121 42019
2215	150n - 10%	4822 121 41682
2218	15n - 10%	4822 121 42021
2219	47n - 10%	4822 121 41676
IC		
28p		4822 255 40156
5201		4822 156 20966

1201	I10	2207	H10	2213	J06	2219	K09	2233	C04	2239	D05	2246	C07	2257	C06	2266	G05	2276	I02
2201	F09	2208	I08	2215	J08	2224	B09	2235	C04	2241	K06	2247	D07	2259	G08	2267	G05	2277	I02
2203	G09	2209	H10	2216	K07	2225	B09	2236	B07	2242	B08	2250	C05	2261	C08	2272	J03	2278	J03
2204	F10	2211	I06	2217	J07	2227	B09	2237	C07	2243	D07	2251	G07	2262	C08	2273	J03	2279	J02
2205	H05	2212	G04	2218	J09	2230	J11	2238	C07	2244	F07	2256	B05	2265	I05	2275	J02	2282	J04
2283	B09	2291	K03	2298	L02	2305	K10	3204	G09	3211	G10	3219	H04	3229	K06	3234	J09	3243	J06
2285	K02	2294	J10	2299	L02	2307	L02	3205	E09	3214	F10	3221	I05	3230	J06	3238	I06	3244	J09
2287	L10	2295	J10	2300	K02	3201	F09	3206	J10	3215	E10	3222	I04	3231	J06	3239	H04	3245	J06
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3254	K08	3259	K08	3265	E10	3280	C05	3288	D06	3298	E04	3304	F04	3311	F06	3318	E05	3325	C06
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3328	D06	3342	B10	3351	F06	3358	D08	3364	D10	3373	B05	3380	I06	3386	H06	3394	D08	3399	D08
3335	E07	3345	B05	3352	F06	3359	D08	3365	D10	3375	G07	3381	C06	3387	G05	3395	E08	3402	L07
3336	E07	3346	C05	3353	F07	3360	D07	3367	D10	3376	G08	3382	H06	3391	C08	3396	E08	3403	L09
3340	B10	3349	G07	3356	C08	3362	C10	3370	C06	3378	I07	3384	H05	3392	D09	3397	F08	3404	L09
3405	L09	4307	L05	6208	J05	6214	C06	6222	L06	6231	J04	6239	E05	6244	I10	6252	D07	6258	I08
3408	K05	5201	J09	6209	K07	6215	D08	6224	L10	6232	K04	6240	H05	6245	J07	6253	J08	6259	I08
3409	L08	6201	I09	6211	I07	6216	D05	6225	L07	6233	J08	6241	H05	6246	J08	6255	I08	6261	K10
3410	L08	6206	G10	6212	C05	6217	C10	6226	L08	6234	J07	6242	E10	6249	C08	6256	H07	6262	I02
4306	L05	6207	G09	6213	B04	6218	H06	6230	I06	6238	E05	6243	L06	6250	E05	6257	H08	6263	J02
6264	J03	6269	L02																
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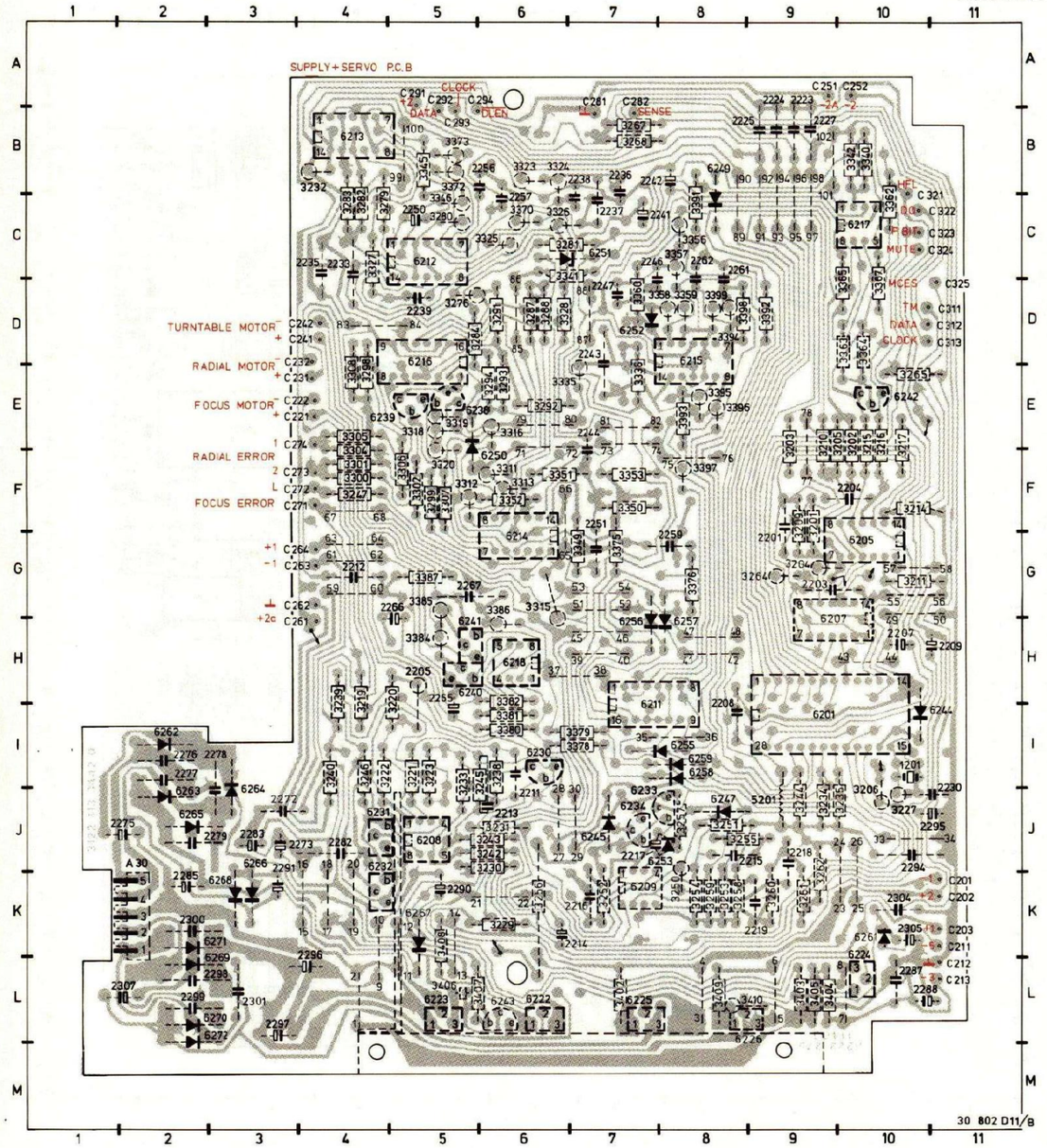
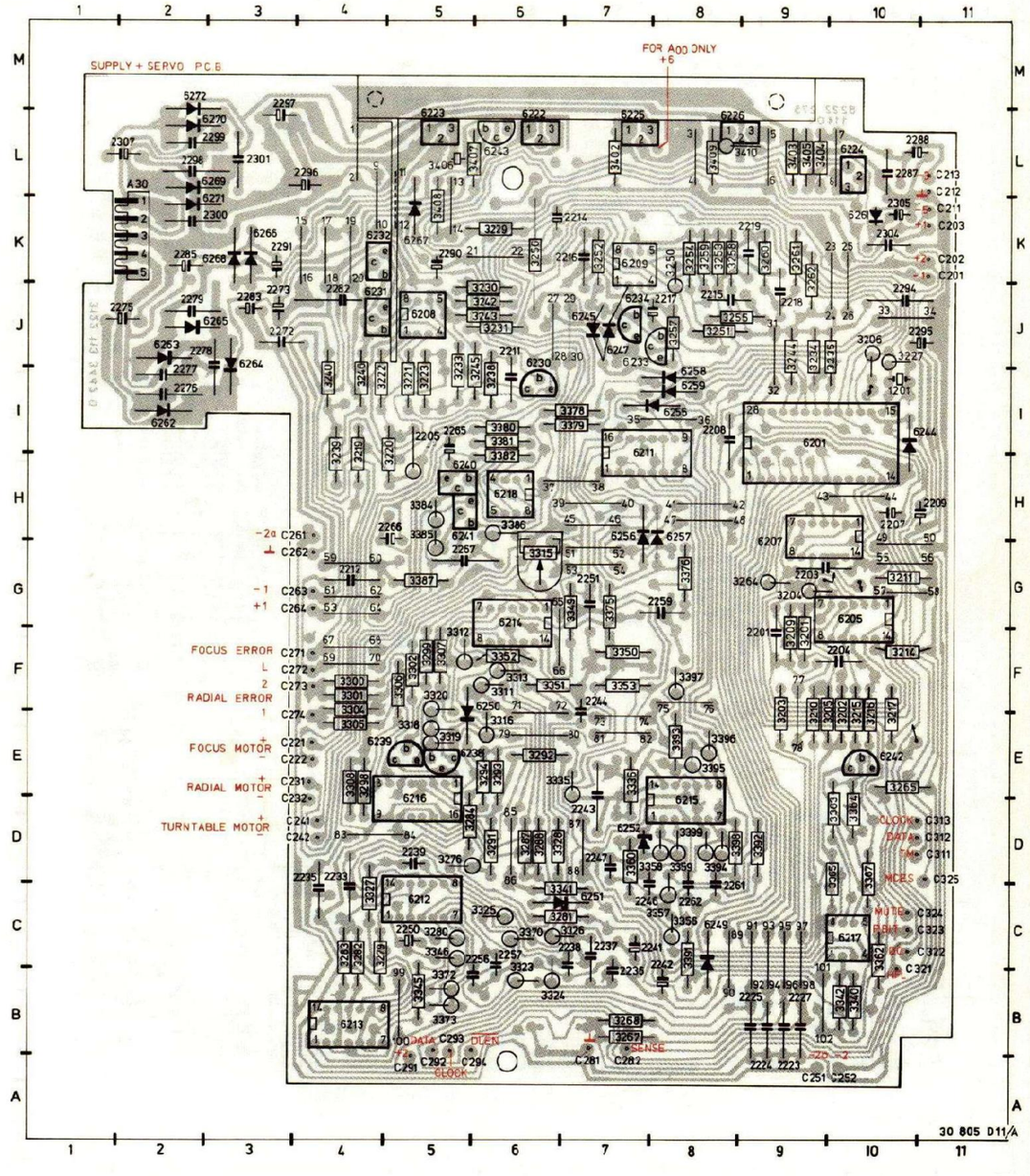
6268	K03																		





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MC1458N		5322 209 85512
TCA240		4822 209 80629
μA741CN		4822 209 80617
BC548B		4822 130 40937
BD135		4822 130 40823
BD136		4822 130 40824
BF494		4822 130 44195
BAW62		4822 130 30613
BZX79-C2V4		4822 130 31253
BZX79-C5V1		4822 130 34233
3315	10k	4822 100 10035
3279,3280, 3282,3283	47k - 1% MR25	5322 116 54671
3287,3288	6k8 - 1% MR25	4822 116 51252
3298,3308	470E - 1% MR25	5322 116 54854
3299,3306	2k7 - 1% MR25	4822 116 51283
3300,3301, 3304,3305	10k - 1% MR25	4822 116 51233
3311,3312	82k - 1% MR25	5322 116 55374
3323	120k - 1% MR25	4822 116 51467
3324,3325	75k - 1% MR25	4822 116 51267
3326	220k - 1% MR25	4822 116 51272
3328,3394	330k - 1% MR25	4822 116 51207
3357	3k9 - 1% MR25	4822 116 51249
3358	360k - 1% MR25	5322 116 55264
3370	27k - 1% MR25	5322 116 54652
3373	180k - 1% MR25	5322 116 54722
3384,3385	9E4 P.T.C.	4822 116 40031
3391	5k6 - 1% MR25	4822 116 51281
3392	13k - 1% MR25	5322 116 50522
2233,2243	470n - 10%	4822 121 41674
2236,2238	5n6 - 1%	4822 121 50543
2237	33n - 10%	4822 121 41675
2246,2247, 2257,2261, 2262	6n8 - 1%	4822 121 50538
2251	220n - 10%	4822 121 41673
2256	1n8 - 1%	5322 121 54087
2259	22n - 10%	4822 121 41664
2267	1000n - 10%	4822 121 41719

ITEM	PCB														
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2203	G09	2209	H11	2216	K07	2224	B09	2236	B07	2242	C08	2250	C05	2261	C08
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2266	H05	2276	I02	2283	J03	2291	K03	2298	L02	2305	K10	3204	G09	3211	G10
2267	G05	2277	I02	2285	K02	2294	J10	2299	L03	2307	L02	3205	F09	3214	F10
2272	J03	2278	J02	2287	L10	2295	J10	2300	K03	3201	F09	3206	J10	3215	F10
2273	J03	2279	J02	2288	L10	2296	L04	2301	L03	3202	F10	3209	F09	3216	F10
2275	J02	2282	J04	2290	K05	2297	M03	2304	K10	3203	F09	3210	F09	3217	F10
3219	H04	3227	J10	3234	J09	3242	J06	3250	K08	3255	J08	3260	K09	3267	B07
3220	H05	3229	K06	3235	J10	3243	J06	3251	J08	3256	K06	3261	K09	3268	B07
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3223	I05	3233	I05	3240	I04	3246	I04	3254	K08	3259	K08	3265	E10	3280	C05
3281	C06	3288	D06	3298	E04	3304	F04	3311	F06	3318	E05	3325	C06	3336	E07
3282	C04	3291	D06	3299	F05	3305	E04	3312	F05	3319	E05	3326	C07	3340	B10
3283	C04	3292	E06	3300	F04	3306	F05	3313	F06	3320	F05	3327	C04	3341	C06
3284	D05	3293	E06	3301	F04	3307	F05	3315	G06	3323	C06	3328	D06	3342	B10
3287	D06	3294	E06	3302	F05	3308	E04	3316	E06	3324	B06	3335	E06	3345	B05
3346	C05	3353	F07	3360	D07	3367	D10	3376	G08	3382	H06	3391	C08	3396	E08
3349	G07	3356	C08	3362	C10	3370	C06	3378	I07	3384	H05	3392	D09	3397	F08
3350	F07	3357	C08	3363	D10	3372	B05	3379	I07	3385	H05	3393	E08	3398	D08
3351	F06	3358	D07	3364	D10	3373	B05	3380	I06	3386	H06	3394	D08	3399	D08
3352	F06	3359	D08	3365	D10	3375	G07	3381	I06	3387	G05	3395	E08	3402	L07
3403	L09	3408	K05	6207	HC9	6213	B04	6218	H06	6226	L08	6234	J07	6242	E10
3404	L09	3409	L08	6208	JC5	6214	G06	6222	L06	6230	J06	6238	E05	6243	L06
3405	L09	3410	L09	6209	KC7	6215	D08	6223	L05	6231	J04	6239	E04	6244	I11
3406	L05	6201	I09	6211	IC7	6216	D05	6224	L10	6232	K04	6240	H05	6245	J07
3407	L05	6205	G10	6212	CC5	6217	C10	6225	L07	6233	J07	6241	H05	6247	J07
6249	C08	6256	H07	6262	IC2	6267	K05	6272	M02						
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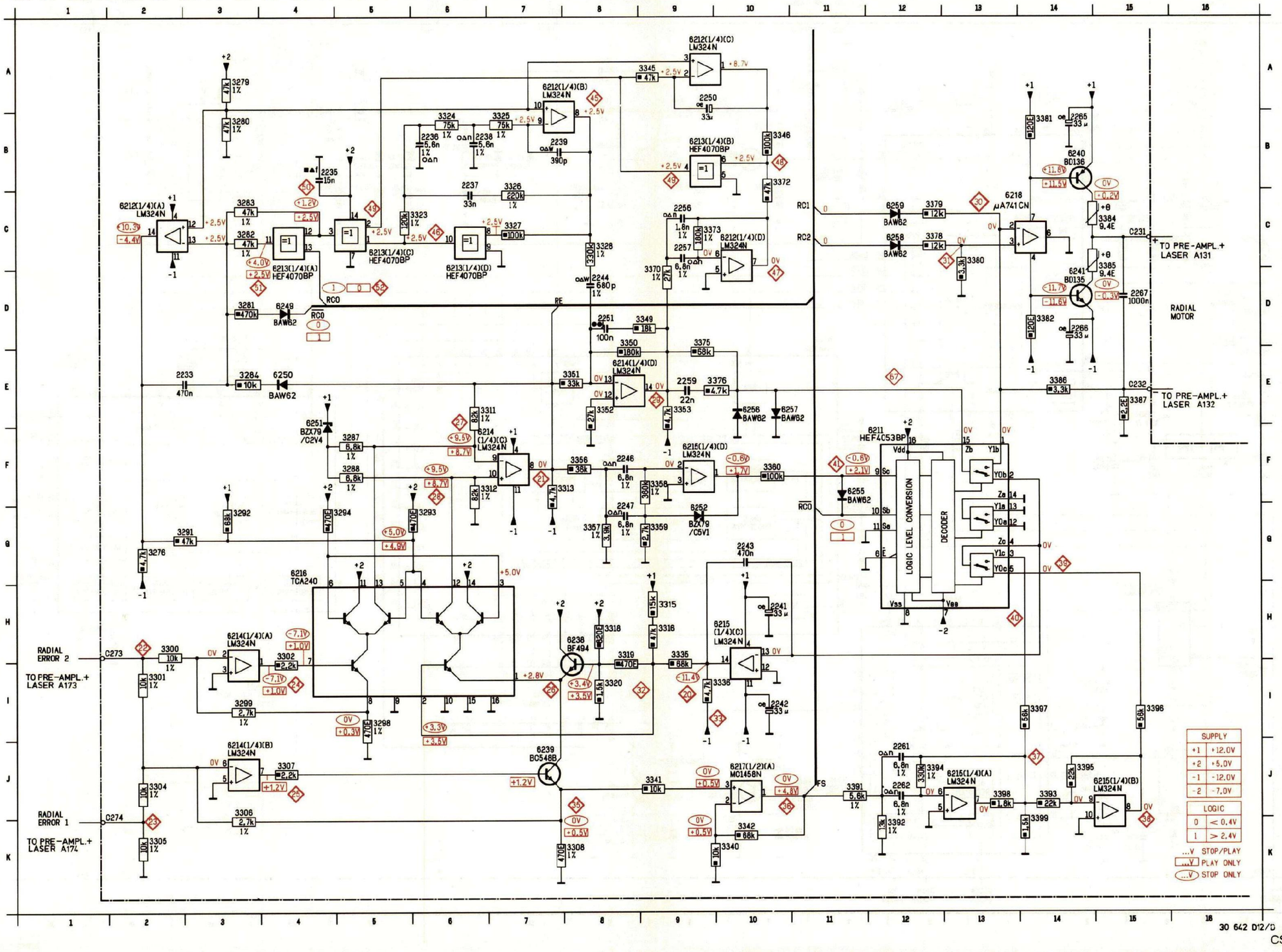
6255	I08	6261	K10	6266	KC3	6271	K03								

SERVO 2

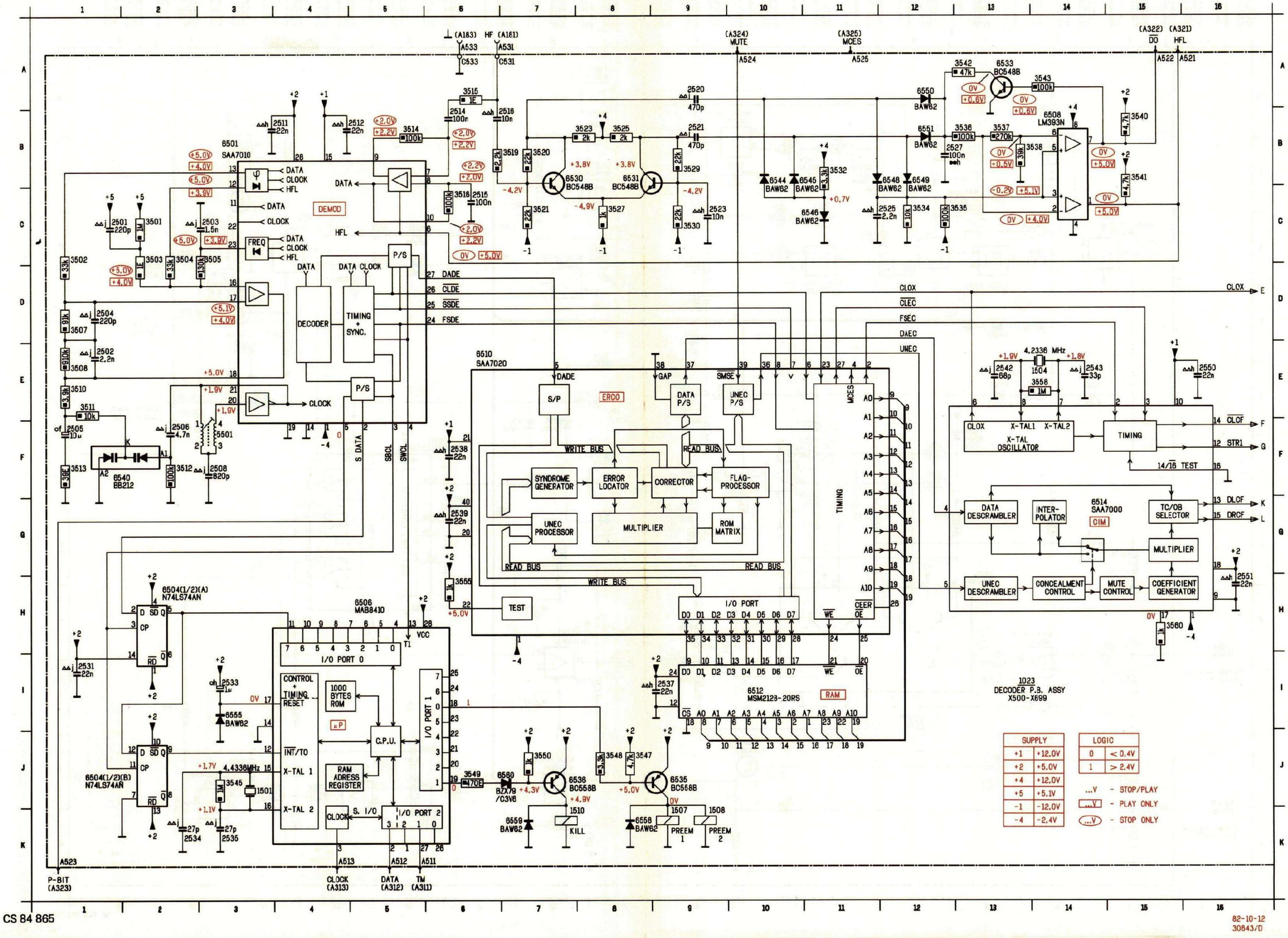
2233 E 3 2241 H10 2250 A 9 2262 J12 3280 B 3 3288 F 5 3299 I 3 3306 J 3 3315 H 9 3324 B 6 3336 I10 3349 D 9 3357 G 8 3373 C 9 3381 B14 3391 J11 3397 I14 6212 C10 6214 J 3 6215 J13 6239 J 7 6252 G 9
2235 B 4 2242 I10 2251 D 8 2265 B14 3281 D 3 3291 G 3 3300 H 2 3307 J 4 3316 H 9 3325 B 7 3340 K10 3350 D 8 3358 F 9 3375 D 9 3382 D14 3392 K12 3398 J13 6212 A 9 6214 H 3 6215 J15 6240 B14 6255 F11
2236 B 6 2243 G10 2256 C 9 2266 D14 3282 C 3 3292 G 3 3301 I 2 3308 K 8 3318 H 8 3326 B 7 3341 J 9 3351 E 8 3359 G 9 3376 E10 3384 C15 3393 J14 3399 K14 6213 C 4 6214 E 8 6216 G 4 6241 D14 6256 E10
2237 B 6 2244 D 8 2257 C 9 2267 D15 3283 C 3 3293 G 6 3302 H 4 3311 E 7 3319 H 8 3327 C 7 3342 K10 3352 E 8 3360 F10 3378 C12 3385 C15 3394 J12 6211 F12 6213 B 9 6214 F 7 6217 J10 6249 D 4 6257 E11
2238 B 6 2246 F 8 2259 E 9 3276 G 2 3284 E 4 3294 G 5 3304 J 2 3312 F 7 3320 I 8 3328 C 8 3345 A 9 3353 E 9 3370 D 9 3379 C12 3386 E14 3395 J14 6212 A 7 6213 C 6 6215 H10 6218 C13 6250 E 3 6258 C12
2239 B 7 2247 G 8 2261 J12 3279 A 3 3287 F 5 3298 I 5 3305 K 2 3313 F 8 3323 C 6 3335 H 9 3346 B10 3356 F 8 3372 B10 3380 C13 3387 E15 3396 I15 6212 C 2 6213 C 5 6215 F 9 6238 H 8 6251 E 4 6259 C12



30 642 D12/D

CS 95 613

1501	J 3	2501	C 1	2506	F 2	2515	C 6	2525	C12	2535	K 3	2543	E14	3503	C 2	3510	E 1	3515	A 6	3523	B 8	3532	B11	3538	B14	3545	J 3	3555	H 6	6504(1H	2	6512	I10	6535	J 9	6546	C11	6555	I 3
1504	E14	2502	E 1	2508	F 3	2516	B 7	2527	B13	2537	I 9	2550	E16	3504	C 2	3511	E 1	3516	C 6	3525	B 8	3534	C12	3540	B15	3547	J 8	3558	E14	6504(1J	1	6514	G14	6536	J 8	6548	B12	6558	K 8
1507	K 9	2503	C 3	2511	B 4	2520	A 9	2531	I 1	2538	F 6	2551	H16	3505	C 3	3512	F 2	3519	B 7	3527	C 8	3535	C13	3541	B15	3548	J 8	3560	H15	6506	H 5	6530	B 7	6540	F 2	6549	B12	6559	K 7
1508	K 9	2504	D 1	2512	B 5	2521	B 9	2533	I 3	2539	G 6	3501	C 2	3507	D 1	3513	F 1	3520	B 7	3529	B 9	3536	B13	3542	A13	3549	I 1	5501	F 3	6508	B14	6531	B 8	6544	B10	6550	I 1	6560	I 1
1510	K 8	2505	F 1	2514	B 6	2523	C 9	2534	K 3	2542	E13	3502	C 1	3508	E 1	3514	B 5	3521	C 7	3530	C 9	3537	B13	3543	A14	3550	J 7	6501	B 3	6510	E 6	6533	A13	6545	B11	6551	I 1		



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MAB8410		4822 209 81454
MSM2128 (RAM)		4822 209 10379
N74LS74AN		4822 209 80782
SAA7000 (CIM)		4822 209 10375
SAA7010 (DEMOD)		4822 209 10376
SAA7020 (ERCO)		4822 209 10377
BC548B		4822 130 40937
BC558B		4822 130 44197
BAW62		4822 130 30613
BB212		4822 130 31129
BZX79-C3V6		5322 130 34834
1501	4.4336 MHz (μP)	4822 242 70323
1504	4.2336 MHz (CIM)	4822 242 70643

1507,1508	PREEM	4822 280 20114
1510	KILL	4822 280 20115
5501		4822 156 21155
3501,3558	1M SFR25	4822 110 73187
2501,2502	270n - 10%	4822 121 41679
2514,2515	100n - 10%	4822 121 41678
IC		
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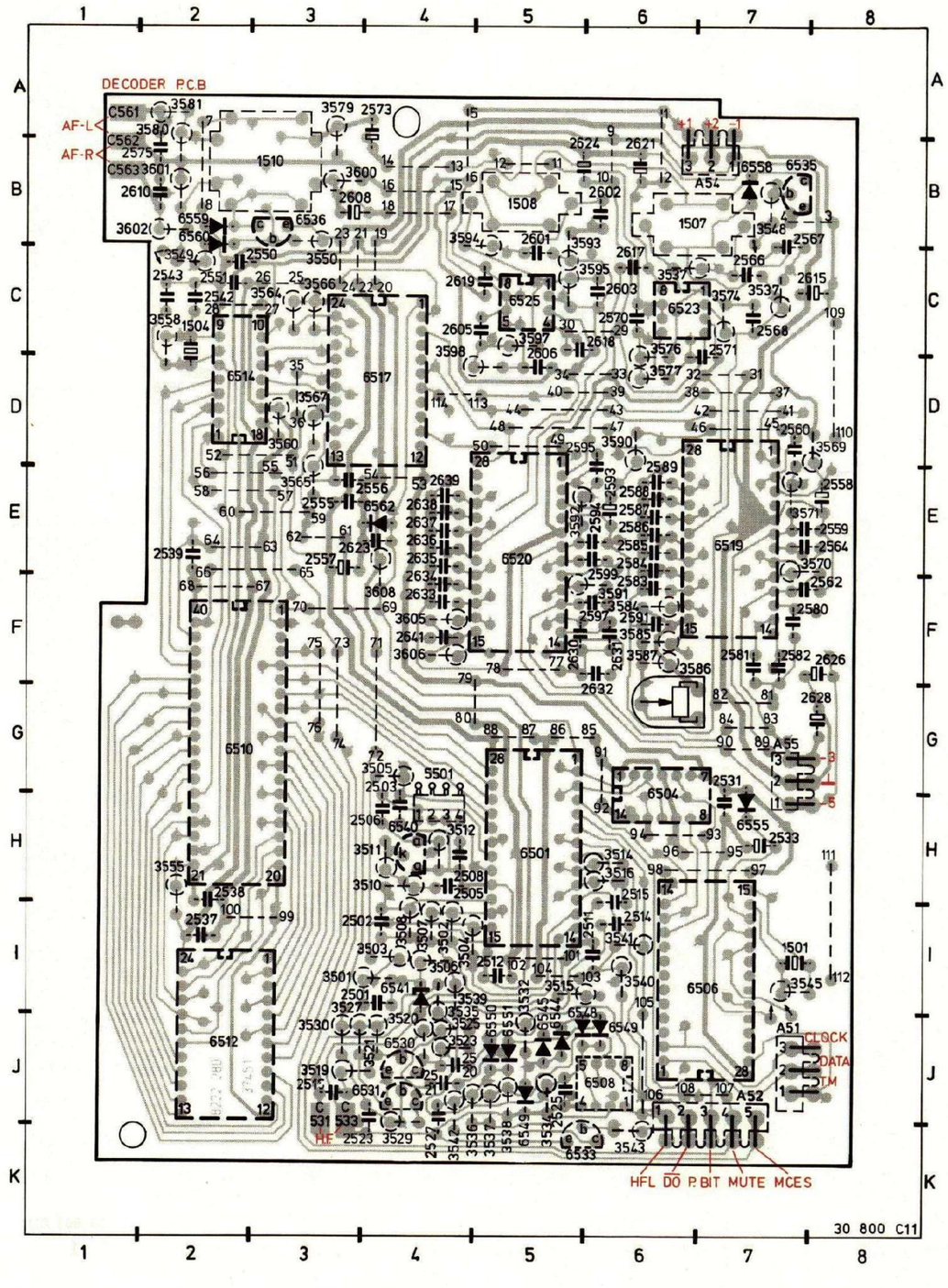
	24p	4822 255 40159
	28p	4822 255 40156
	40p	5322 255 44217



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1507	B07	2543	C02	2587	E06	2630	F05	3519	J03	3560	D03	3595	C05	6535	B07
1508	B05	2550	C03	2588	E06	2631	F06	3520	J04	3564	C03	3597	C05	6536	B03
1510	B03	2551	C03	2589	E06	2632	G06	3521	J04	3565	E03	3598	D05	6540	H04
2501	I03	2555	E03	2591	F06	2633	F04	3523	J04	3566	C03	3600	B03	6541	I04
2502	I04	2556	E04	2593	E06	2634	F04	3525	J04	3567	D03	3601	B02	6544	J05
2503	G04	2557	E03	2594	E06	2635	E04	3527	J03	3569	D08	3602	B02	6545	J05
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2511	I05	2562	F08	2601	B05	2639	E04	3534	J05	3573	C06	5501	G04	6550	J05
2512	I05	2564	E08	2602	B06	2641	F04	3535	I04	3574	C07	6501	H05	6551	J05
2514	I06	2566	C07	2603	C06	3501	I03	3536	J05	3576	C06	6504	H06	6555	H07
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2520	J04	2570	C06	2608	B03	3504	I04	3539	I04	3580	A02	6510	G02	6560	B02
2521	J04	2571	D07	2610	B02	3505	G04	3540	I06	3581	A02	6512	J02	6562	E04
2523	K04	2573	A04	2615	C08	3506	I04	3541	I06	3584	F06	6514	D02		
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2527	K04	2580	F08	2618	C06	3508	I04	3543	K06	3586	F06	6519	E07		
2531	G07	2581	F07	2619	C04	3510	H04	3545	I07	3587	F06	6520	E05		
2533	H07	2582	F07	2621	B06	3511	H04	3548	B07	3590	D06	6523	C06		
2537	I02	2583	F06	2623	E03	3512	H04	3549	C02	3591	F06	6525	C05		
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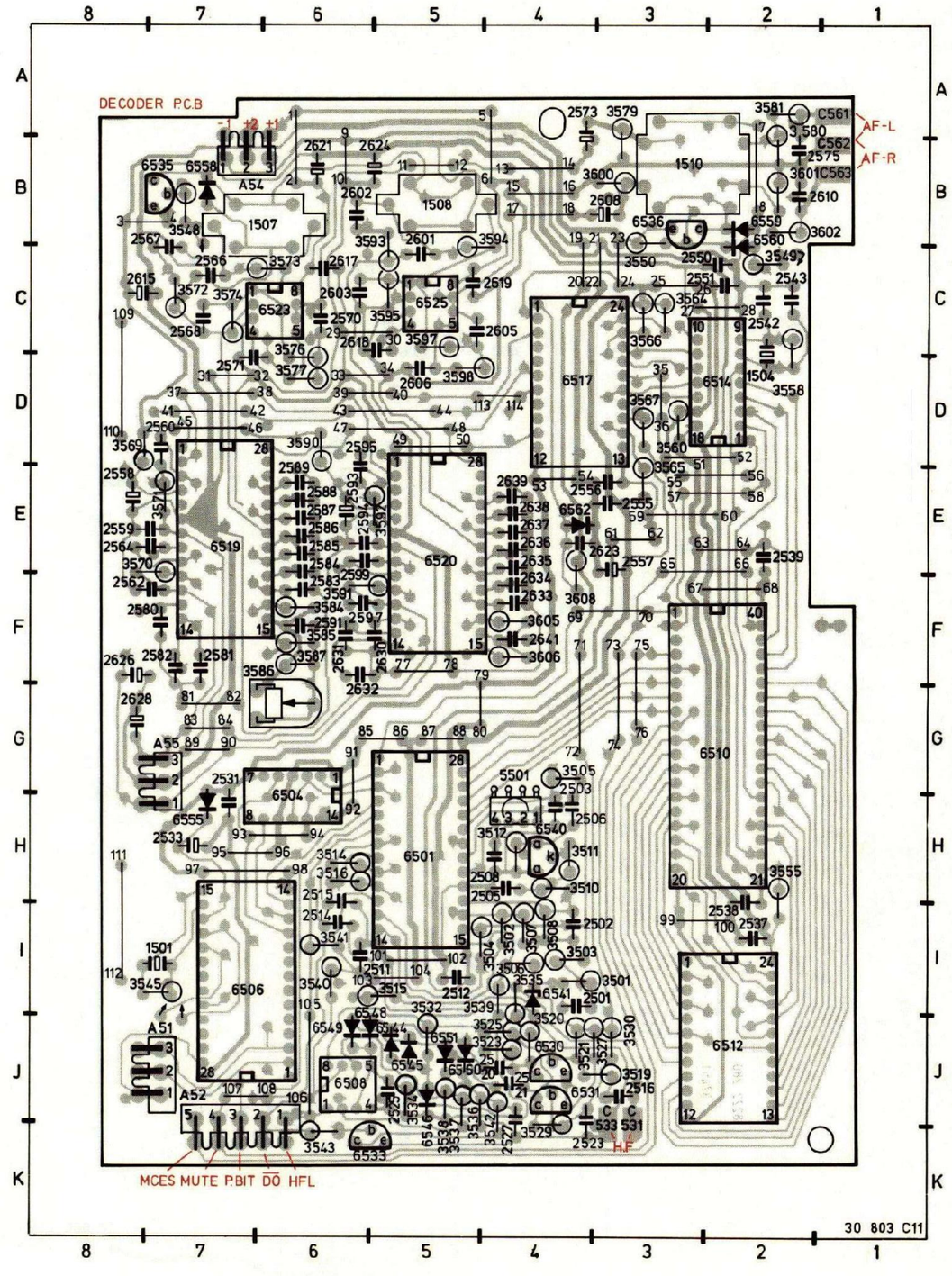

NE5532N		5322 209 86234	
SAA7030 (FIL)		4822 209 10378	
TDA1540D (DAC)		4822 209 81453	
BZX79-C2V4		4822 130 31253	
BZX79-B5V1		4822 130 34233	
3586	220E	5322 101 14009	
3574,3595	1k8 MR25	4822 116 51242	
3573,3594	1M SFR25	4822 410 73187	

2582,2583, 2584,2632, 2633,2634	100n - 10%	4822 121 41678
2566,2601	5n1 - 2%	5322 121 54148
2568,2570, 2603,2605	2n2 - 2%	4822 121 50415
2571,2606	1n2 - 2%	5322 121 54163
2580,2581, 2630,2631	0.47µ - 10%	4822 121 41681

IC

18p	4822 255 40239
24p	4822 255 40159
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40p	5322 255 44217

ITEM

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1504	C02	2542	C02	2586	E06	2628	G08	3516	H06	3558	C02	3594	B04	6533	K06
1507	B06	2543	C02	2587	E06	2630	F05	3519	J03	3560	D03	3595	C06	6535	B07
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2501	I03	2555	E03	2591	F06	2633	F04	3523	J04	3566	C03	3600	B03	6541	I04
2502	I03	2556	E04	2593	E06	2634	F04	3525	J04	3567	D03	3601	B02	6544	J05
2503	G04	2557	E03	2594	E06	2635	E04	3527	I03	3569	D08	3602	B01	6545	J05
2505	H04	2558	E08	2595	D05	2636	E04	3529	K04	3570	E08	3605	F04	6546	K05
2506	H04	2559	E08	2597	F06	2637	E04	3530	J03	3571	E07	3606	F04	6548	J06
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2511	I06	2562	F08	2601	B05	2639	E04	3534	K05	3573	C06	5501	G04	6550	J05
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2514	I06	2566	C07	2603	C06	3501	I03	3536	K05	3576	C06	6504	G06	6555	H07
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2516	J03	2568	C07	2606	C05	3503	I04	3538	K05	3579	A03	6508	J06	6559	B02
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2531	G07	2581	F07	2619	C04	3510	H04	3545	I07	3587	F06	6520	E05		
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2556	C 5	2562	A 8	2570	B12	2581	E 7	2586	E 9	2593	G 6	2601	J 1	2608	J 1	2619	H13	2628	G16	2634	J 8	2639	J10	3565	C 3	3571	B 7	3577	C12	3585	D11	3592	G 7	3598	H12	3606	J 1	6523(1	C13	6562	G14
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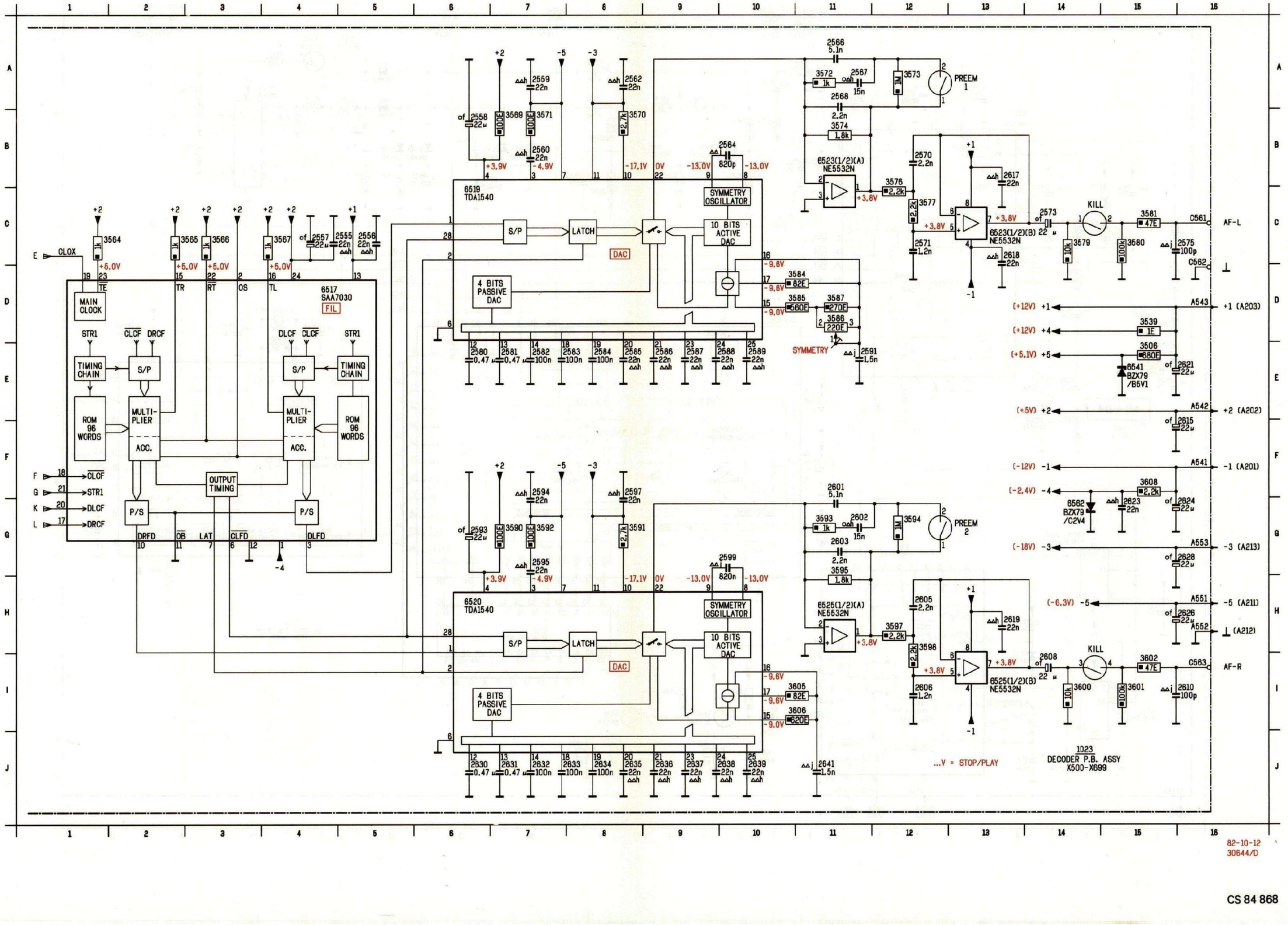

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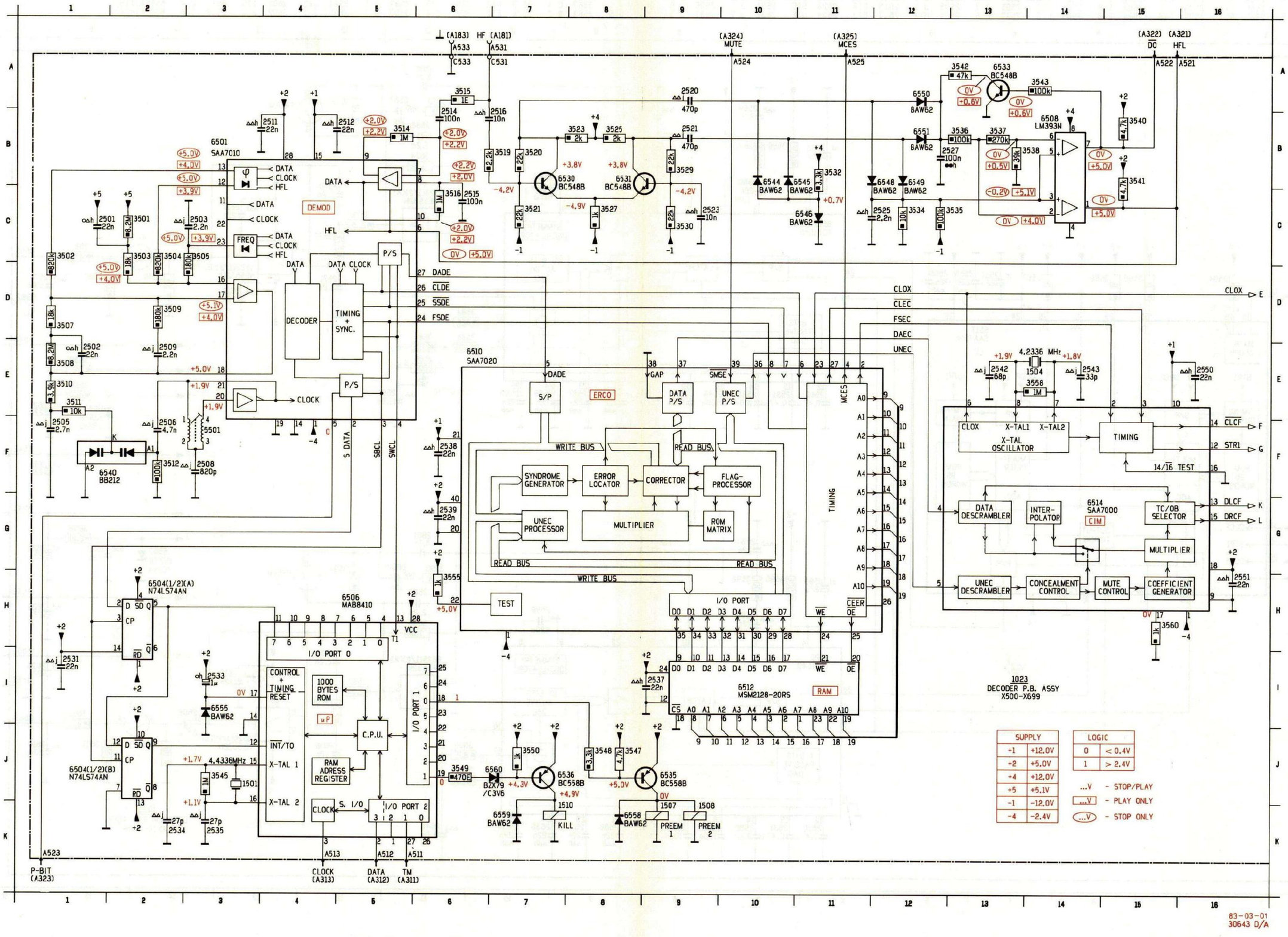

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MSM2128 (RAM)		4822 209 10379
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SAA7000 (CIM)		4822 209 10375
SAA7010 (DEMOD)		4822 209 10376
SAA7020 (ERCO)		4822 209 10377
Transistor		
BC548B		4822 130 40937
BC558B		4822 130 44197
Diode		
BAW62		4822 130 30613
BB212		4822 130 31129
BZX79-C3V6		5322 130 34834
Crystal		
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1504	4.2336 MHz (CIM)	4822 242 70643

Resistor		
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1510	KILL	4822 280 20115
Coil		
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Potentiometer		
3501,3558	1M SFR25	4822 110 73187
Capacitor		
2514,2515	100n - 10%	4822 121 41678
IC socket		
18p		4822 255 40239
24p		4822 255 40159
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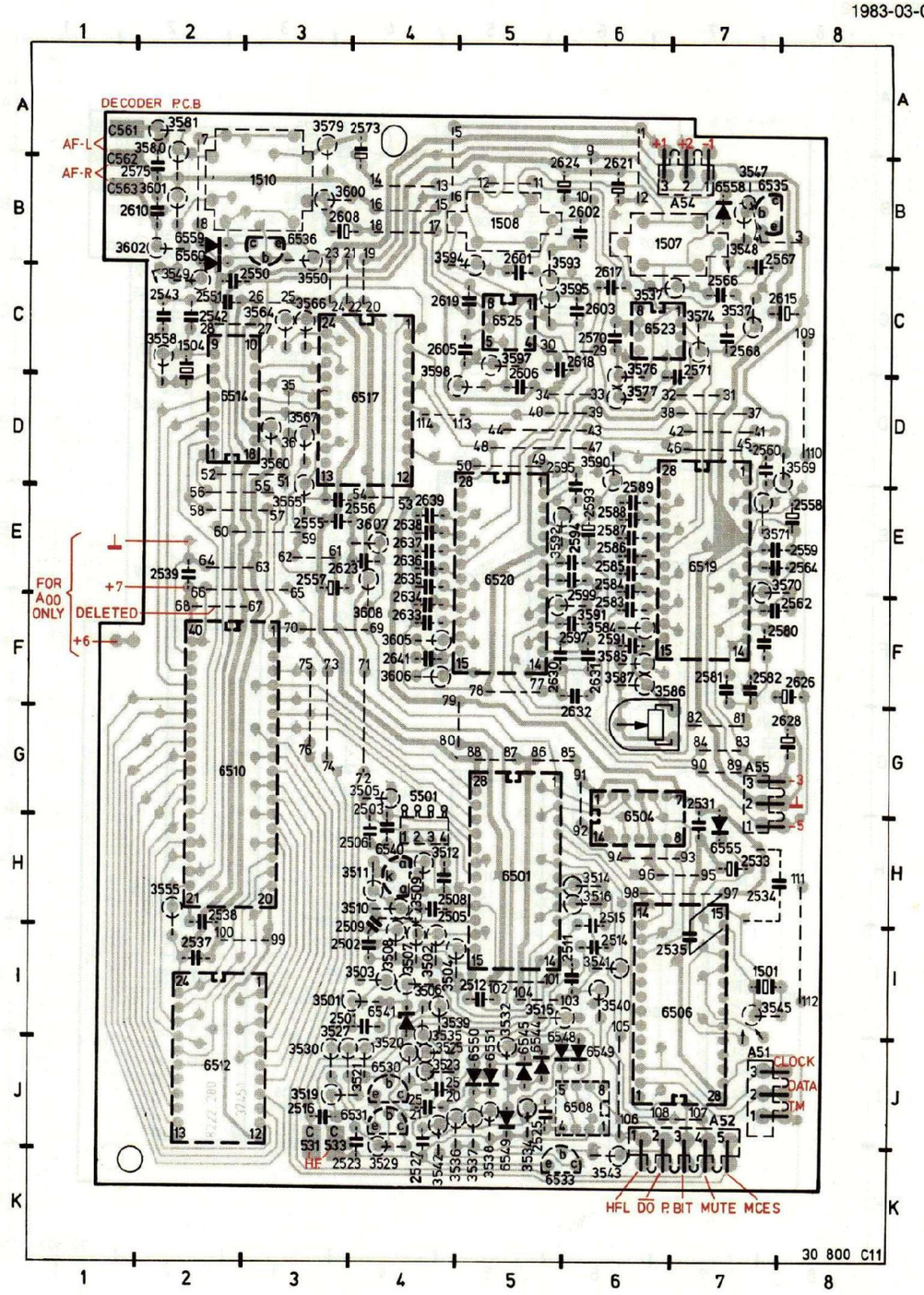
40p		5322 255 44217



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1507	B06	2503	G04	2511	I06	2520	J04	2531	G07	2538	H02	2551	C02	2559	E08
1508	B05	2505	H04	2512	I05	2521	J04	2533	H07	2539	E02	2555	E03	2560	D07
1510	B03	2506	H04	2514	I06	2523	K04	2534	H07	2542	C02	2556	E04	2562	F08
2564	E08	2571	C07	2582	F07	2587	E06	2594	E06	2602	B06	2610	B02	2621	B06
2566	C07	2573	A04	2583	F06	2588	E06	2595	D05	2603	C06	2615	C08	2623	E03
2567	B07	2575	B02	2584	E06	2589	E06	2597	F06	2605	C04	2617	C06	2624	B06
2568	C07	2580	F08	2585	E06	2591	F06	2599	F06	2606	C05	2618	C06	2626	F08
2570	C06	2581	F07	2586	E06	2593	E06	2601	B05	2608	B03	2619	C04	2628	G08
2630	F05	2635	E04	2641	F04	3505	G04	3510	H04	3516	H06	3525	J04	3534	K05
2631	F06	2636	E04	3501	I03	3506	I04	3511	H04	3519	J03	3527	I03	3535	J04
2632	G06	2637	E04	3502	I04	3507	I04	3512	H04	3520	J04	3529	K04	3536	K05
2633	F04	2638	E04	3503	I04	3508	I04	3514	H06	3521	J04	3530	J03	3537	K05
2634	F04	2639	E04	3504	I04	3509	H04	3515	I05	3523	J04	3532	I05	3538	K05
3539	I04	3545	I07	3555	H02	3566	C03	3572	C07	3579	A03	3586	F06	3593	B05
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3541	I06	3548	B07	3560	D03	3569	D08	3574	C07	3581	A02	3590	D06	3595	C06
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3543	K06	3550	C03	3565	E03	3571	E07	3577	D06	3585	F06	3592	E05	3598	C04
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3605	F04	6501	H05	6512	J02	6523	C06	6535	B07	6545	J05	6551	J05		
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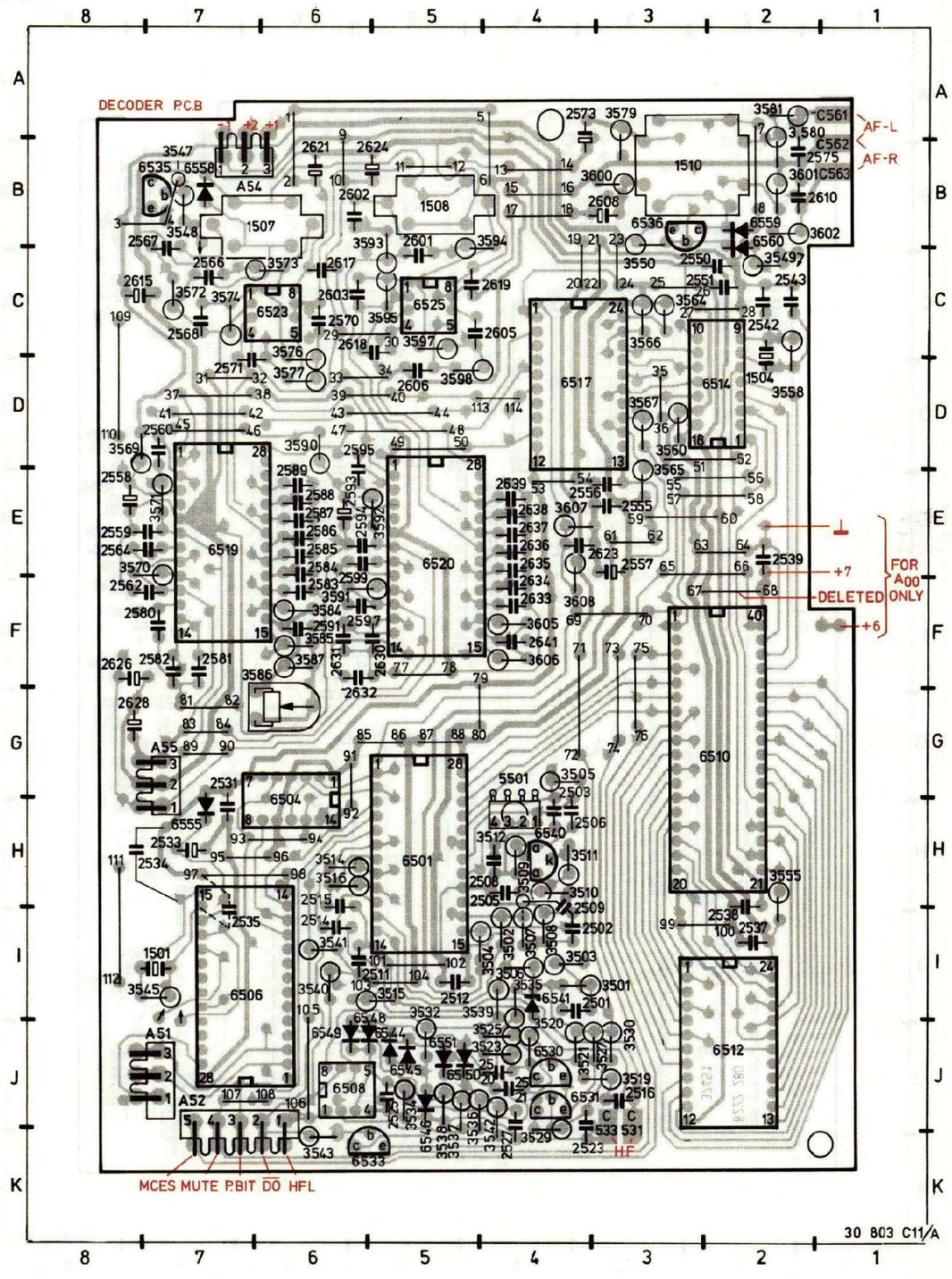

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SAA7030 (FIL)			4822 209 10378
TDA1540D (DAC)			4822 209 81453
BZX79-B5V1			4822 130 34233
3586	220E		5322 101 14009
3574,3595	1k8	MR25	4822 116 51242
3573,3594	1M	SFR25	4822 110 73187
3569,3590	100E	NFR25	4822 111 30535
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2582,2583, 2584,2632, 2633,2634	100n - 10%	4822 121 41678
2566,2601	5n1 - 2%	5322 121 54148
2568,2570, 2603,2605	2n2 - 2%	4822 121 50415
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2580,2581, 2630,2631	0.47µ - 10%	4822 121 41681

IC

18p	4822 255 40239
24p	4822 255 40159
28p	4822 255 40156
40p	5322 255 44217

ITEM	PCB														
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1504	D02	2502	I04	2509	I04	2516	J03	2527	K04	2537	I02	2550	C03	2558	E08
1507	B07	2503	G04	2511	I05	2520	J04	2531	G07	2538	I02	2551	C03	2559	E08
1508	B05	2505	H04	2512	I05	2521	J04	2533	H07	2539	E02	2555	E03	2560	D07
1510	B03	2506	H04	2514	I06	2523	K04	2534	H07	2542	C02	2556	E04	2562	F08
2564	E08	2571	D07	2582	F07	2587	E06	2594	E06	2602	B06	2610	B02	2621	B06
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3602	B02	5501	G04	6510	G02	6520	E05	6533	K06	6544	J03	6550	J05	6560	B02
3605	F04	6501	H05	6512	J02	6523	C06	6535	B07	6545	J05	6551	J05		
3606	F04	6504	H06	6514	D02	6525	C05	6536	B03	6546	K05	6555	H07		

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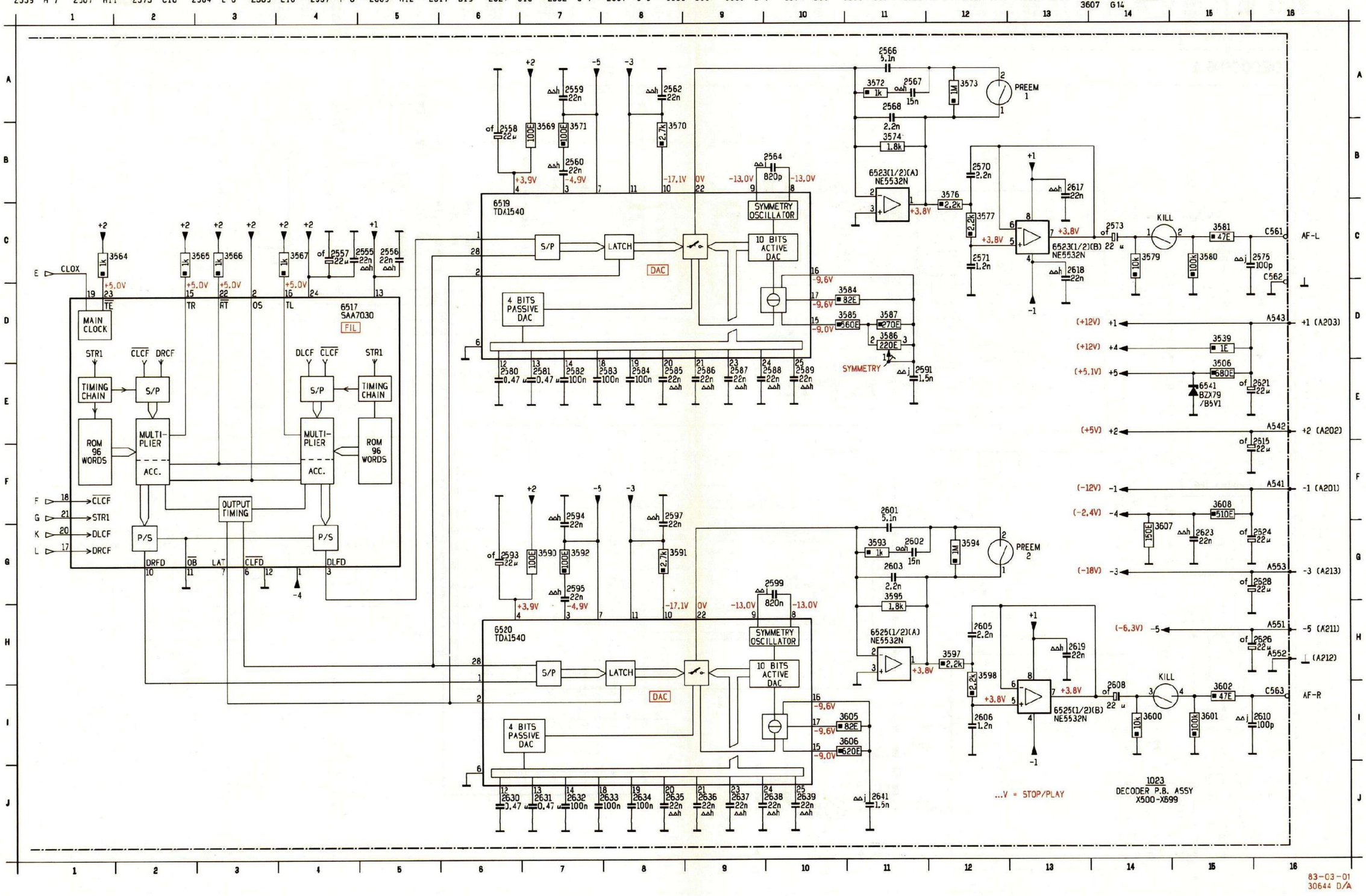

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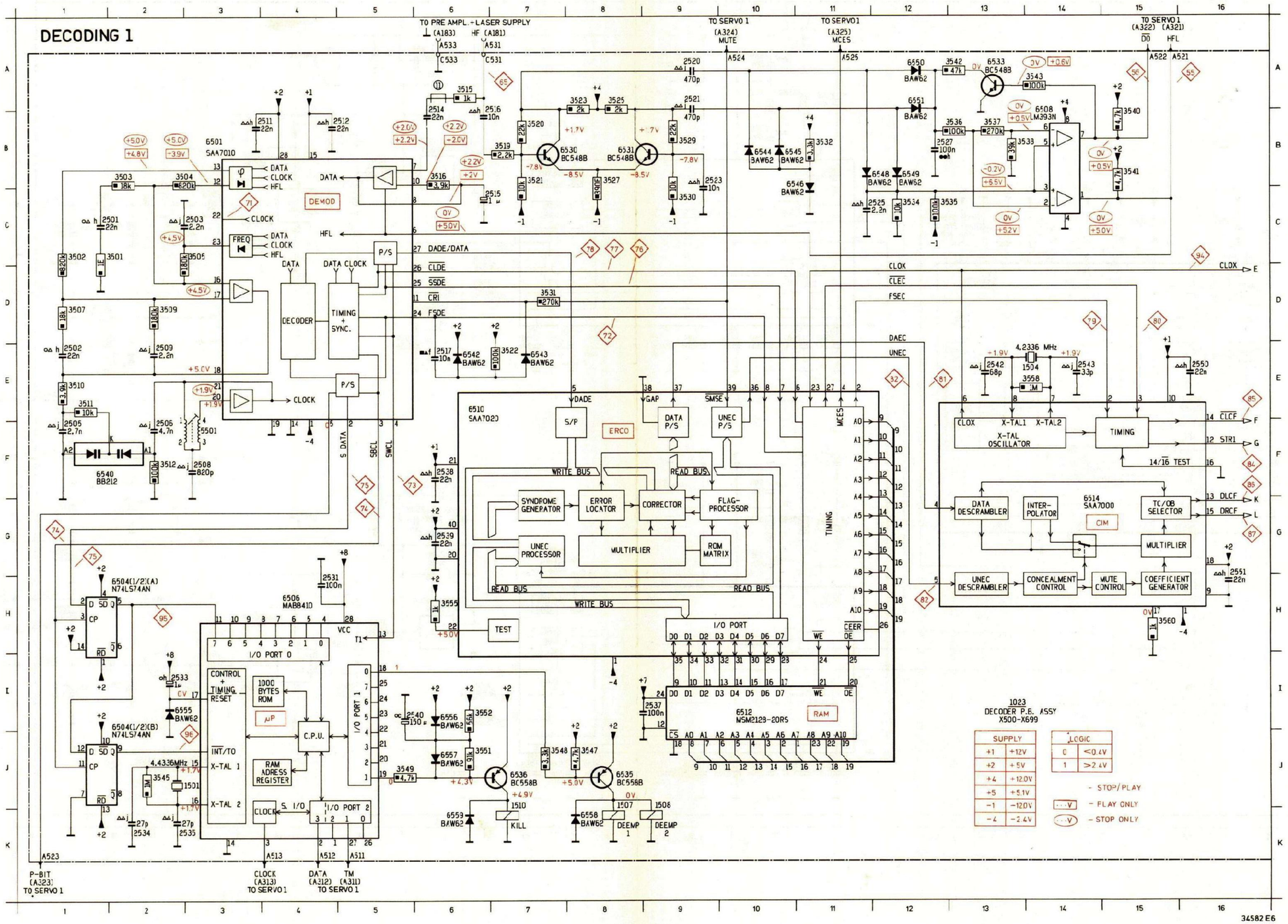

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SAA7000 (CIM)		4822 209 10375
SAA7010 (DEMOD)		4822 209 10857
SAA7020 (ERCO)		4822 209 10377
BC548B		4822 130 40937
BC558B		4822 130 44197
BAW62		4822 130 30613
BB212		4822 130 31129
1501	4.4336 MHz (μP)	4822 242 70323
1504	4.2336 MHz (CIM)	4822 242 70643

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1510	KILL	4822 280 20115
5501		4822 156 21155
5202,5503		4822 156 20966
3514,3516 } 3545,3558 }	1M SFR25	4822 110 73187
3551	91k SFR25	4822 110 70159
2514,2515	100n - 10%	4822 121 41678
2531	100n - 20+100%	4822 121 42019
IC		
18p		4822 255 40239
24p		4822 255 40159
28p		4822 255 40156
40p		5322 255 44217

1504	J02	2502	I04	2509	H04	2517	H05	2527	J04	2534	H07	2540	C03	2555	E03	2560	D07	2568	C07
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1508	J05	2505	H04	2512	I05	2521	J04	2531	H07	2537	I02	2543	C02	2557	E03	2564	E08	2573	B04
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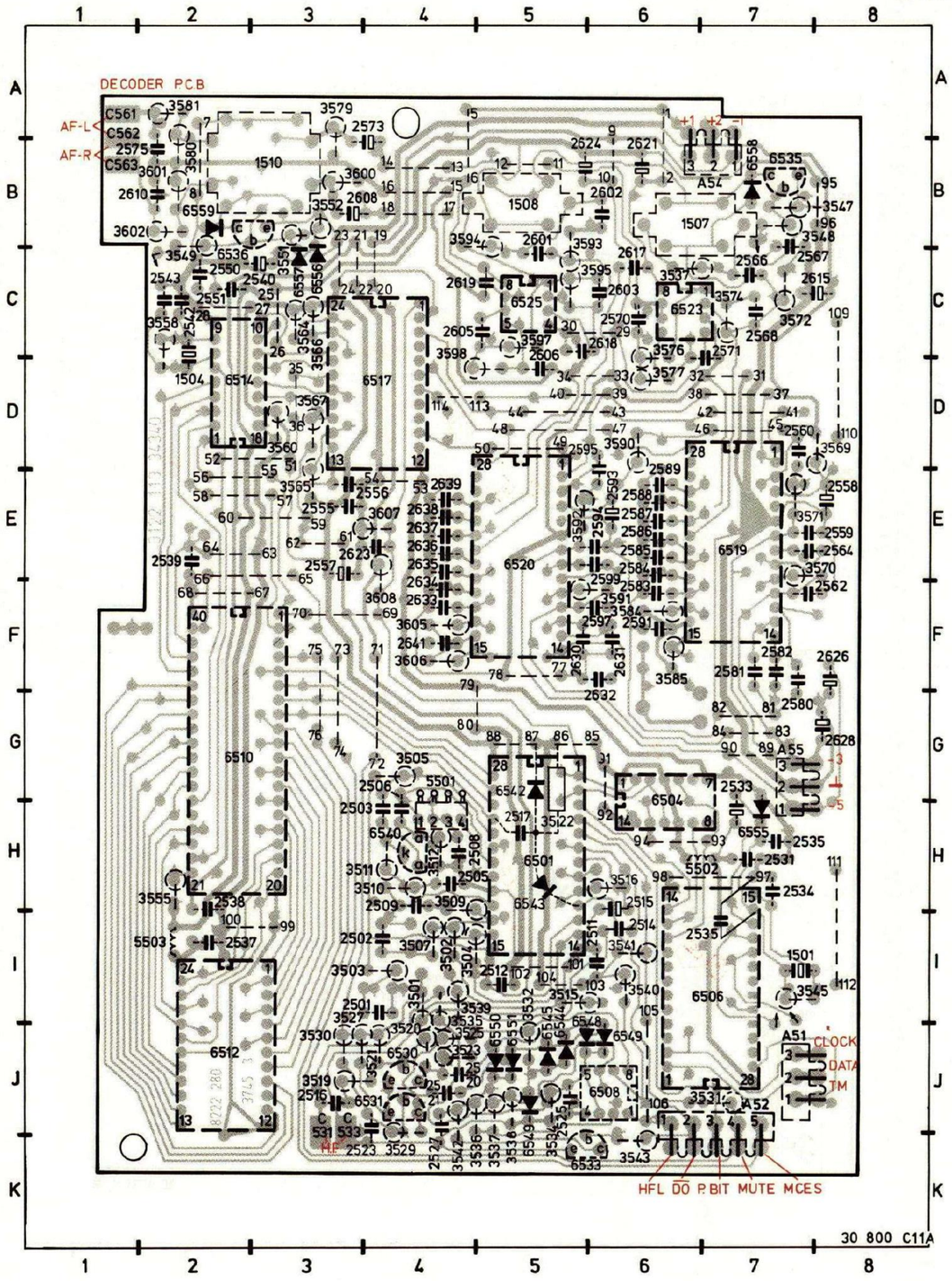
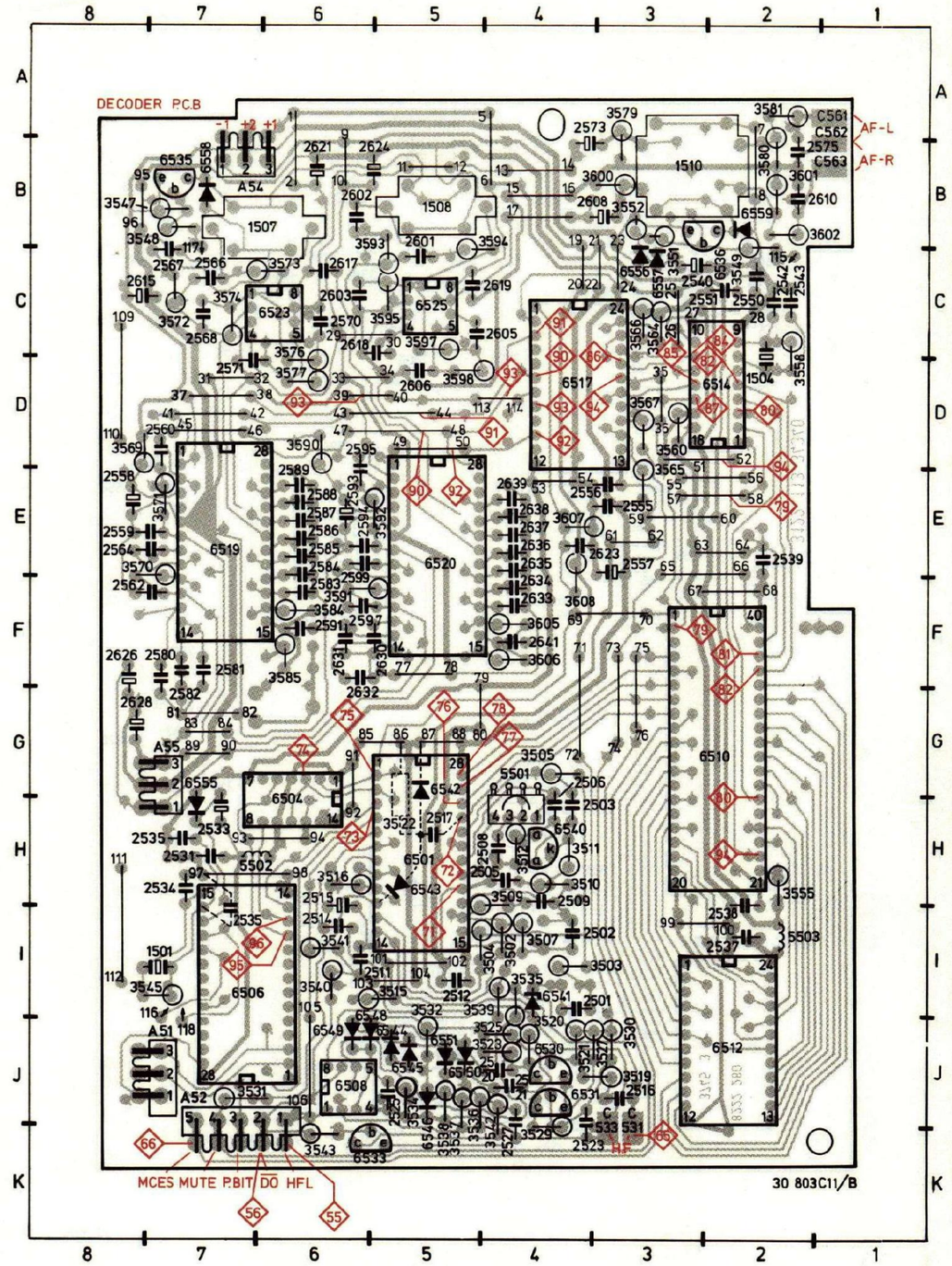
3606	F04	5503	I02	6510	G02	6520	E05	6535	B07	6543	H05	6549	J06	6557	C03				





NE5532N		5322 209 86234
SAA7030 (FIL)		4822 209 10378
TDA1540P (DAC)		4822 209 81453
3574,3595	1k8 MR25	4822 116 51242
3573,3594	1M SFR25	4822 110 73187
3569,3590	100E NFR25	4822 111 30535
3607	150E NFR25	4822 111 30539

2566,2601	5n1 - 2%	5322 121 54148
2568,2570 2603,2605	2n2 - 2%	4822 121 50415
2571,2606	1n2 - 2%	5322 121 54163
2580,2581 2630,2631	0.47µ - 10%	4822 121 41681
2582,2583, 2584,2632, 2633,2634	100n - 10%	4822 121 41678

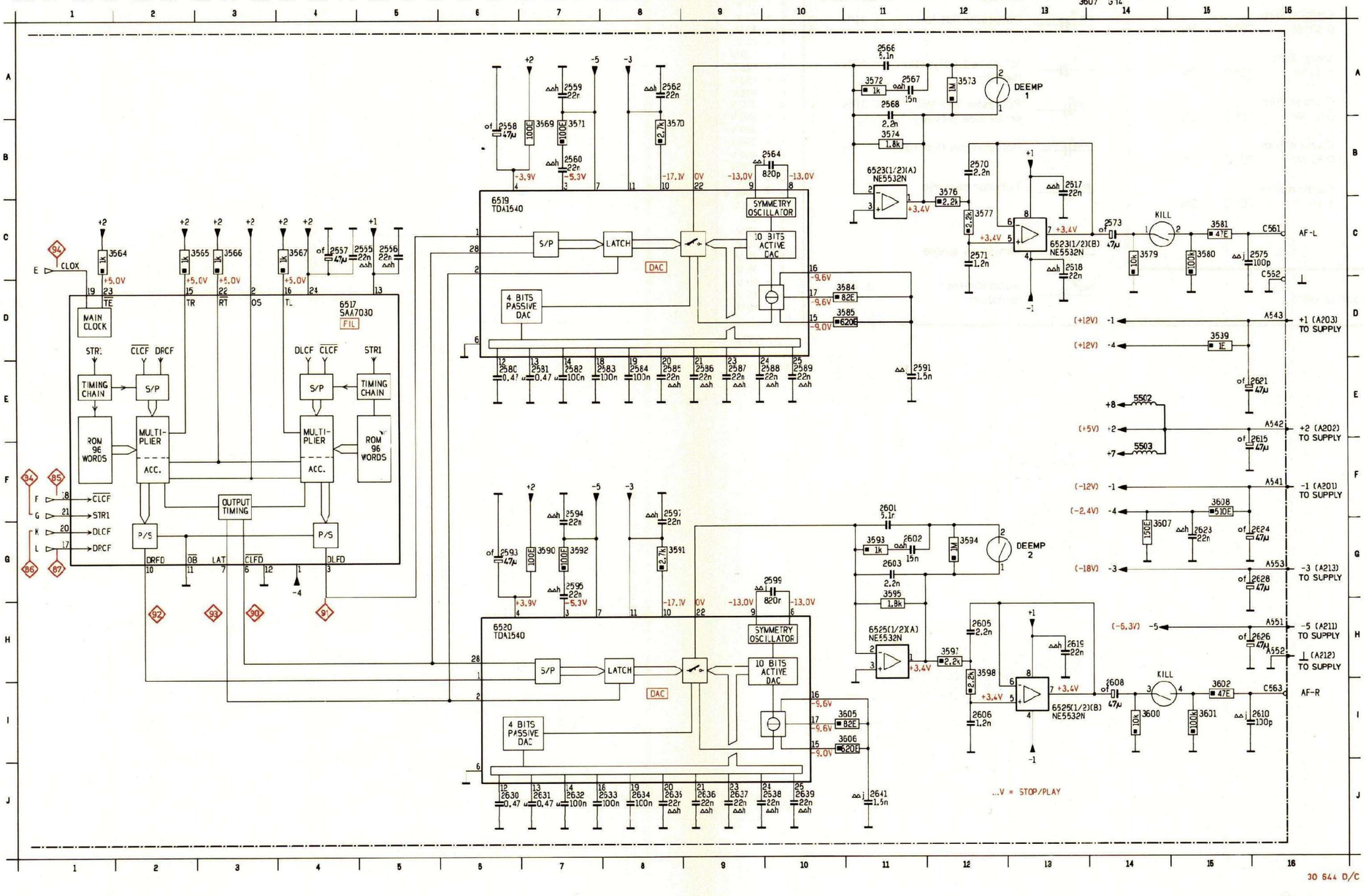
IC

18p	4822 255 40239
24p	4822 255 40159
28p	4822 255 40156
40p	5322 255 44217

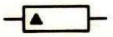
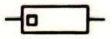
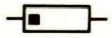
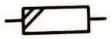
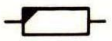
1504	D02	2502	I04	2509	H04	2517	H05	2527	J04	2534	H07	2540	C03	2555	E03	2560	D07	2568	C07
1507	B07	2503	H04	2511	I06	2520	J04	2529	J04	2535	I07	2542	C02	2556	E03	2562	F08	2571	D07
1508	B05	2505	H04	2512	I05	2521	J04	2531	H07	2537	I02	2543	C02	2557	E03	2564	E08	2573	B04
1510	B03	2506	H04	2514	H06	2523	J04	2532	J05	2538	I02	2550	C02	2558	E08	2566	C07	2575	B02
2501	I04	2508	H04	2516	I03	2525	J05	2533	H07	2539	E02	2551	C02	2559	E08	2567	C07	2580	F07
2581	F07	2586	E06	2593	E06	2601	C05	2610	B02	2623	E04	2632	F06	2637	E04	3503	I04	3510	H04
2582	F07	2587	E06	2594	E06	2602	B06	2615	C08	2626	F08	2633	F04	2638	E04	3504	I04	3511	H04
2583	F06	2588	E06	2595	E06	2605	C05	2618	C05	2628	G08	2634	F04	2639	E04	3505	G04	3512	H04
2584	E06	2589	E06	2597	F05	2606	D05	2619	C05	2630	F05	2635	E04	2641	F04	3507	I04	3515	I05
2585	E06	2591	F06	2599	E06	2608	B03	2621	B06	2631	F06	2636	E04	3502	I04	3509	H04	3516	H06
3518	I03	3525	J04	3536	J05	3541	I06	3549	B02	3560	D03	3569	D08	3576	C06	3584	F06	3593	C05
3520	J04	3527	I03	3537	J05	3542	J04	3551	B03	3564	C03	3570	E07	3577	C06	3585	F06	3594	C05
3521	J04	3530	I03	3538	J05	3543	K06	3552	B03	3565	E03	3571	E07	3579	A03	3590	C06	3595	C05
3522	G05	3534	J05	3539	I04	3547	B07	3555	H02	3566	C03	3572	C07	3580	B02	3591	F06	3597	C05
3523	J04	3535	I04	3540	I06	3548	B07	3558	C02	3567	D03	3574	C07	3581	A02	3592	E05	3598	D05
3600	B03	3607	E04	6501	H05	6512	J02	6525	C05	6536	B03	6544	J05	6550	J05	6558	B07		
3601	B02	3608	E04	6504	G06	6514	D02	6530	J04	6540	H04	6545	J05	6551	J05	6559	B02		
3602	B02	5501	G04	6506	I07	6517	D04	6531	J04	6541	I04	6546	J05	6555	H07				
3605	F04	5502	H07	6508	J06	6519	E07	6533	K06	6542	G05	6548	J06	6556	C03				
3606	F04	5503	I02	6510	G02	6520	E05	6535	B07	6543	H05	6549	J06	6557	C03				

DECODING 2

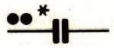
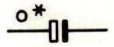
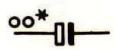
2555	C 5	2560	B 7	2568	A11	2580	E 6	2585	E 8	2591	E11	2599	J 1	2606	I12	2618	C13	2626	H16	2633	J 8	2639	J10	3564	C 2	3570	B 8	3576	J 1	3584	D11	3591	G 8	3597	J 1	3605	J 1	6520	H 6	6541	E15
2556	C 5	2562	A 9	2570	B12	2581	E 7	2586	E 9	2593	F 6	2601	J 1	2608	J 1	2619	H13	2628	G16	2634	J 8	2639	J10	3565	C 3	3571	B 7	3577	C12			3592	G 7	3598	H12	3606	J 1	6523			
2557	C 4	2564	B10	2571	C12	2582	E 7	2587	E 9	2594	F 7	2602	J 1	2610	I16	2621	E16	2630	J 6	2635	J 8	2641	J11	3566	C 3	3572	A11	3579	C14	3586	J 1	3593	J 1	3600	I14	3608	J 1	6523			
2558	B 6	2566	A11	2573	J 1	2583	E 8	2588	E10	2595	G 7	2603	J 1	2615	F16	2623	G15	2631	J 7	2636	J 9	3503	J 1	3567	C 4	3573	A12	3580	C15			3594	G12	3601	I15	6517	D 4	6525			
2559	A 7	2567	A11	2575	C16	2584	E 8	2589	E10	2597	F 8	2605	H12	2617	B13	2624	G16	2632	J 7	2637	J 9	3533	D15	3569	B 7	3574	B11	3581	C15	3590	G 7	3595	J 1	3602	J 1	6519	C 6	6525			
																																				3607	G14				



CS 95 617

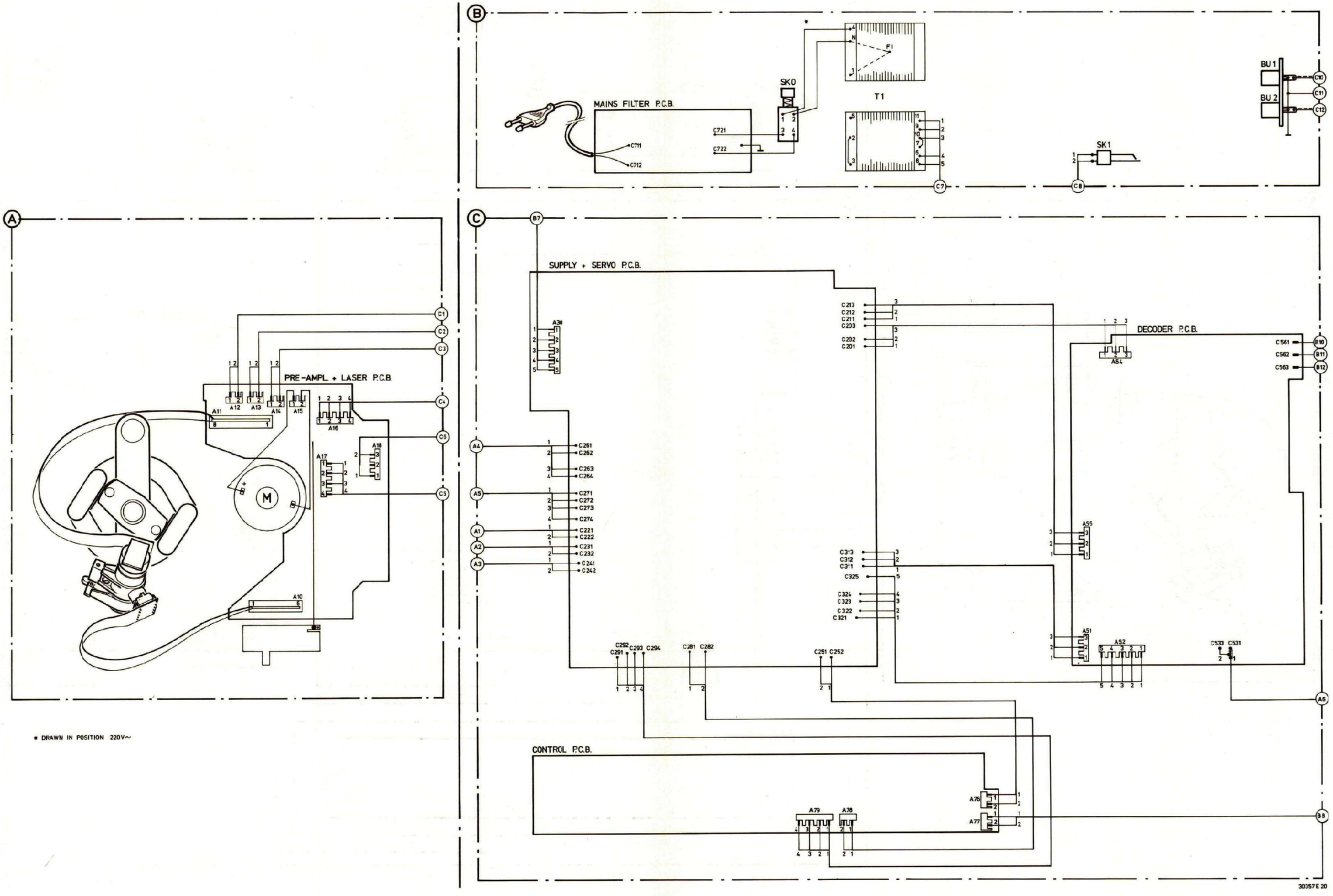
	Carbon film 0.2 W	70°C	5%
	Carbon film 0.33 W	70°C	5%
	Metal film 0.33 W	70°C	5%
	Carbon film 0.5 W	70°C	5%
	Carbon film 0.67 W	70°C	5%
	Carbon film 1.15 W	70°C	5%

© Chip component

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

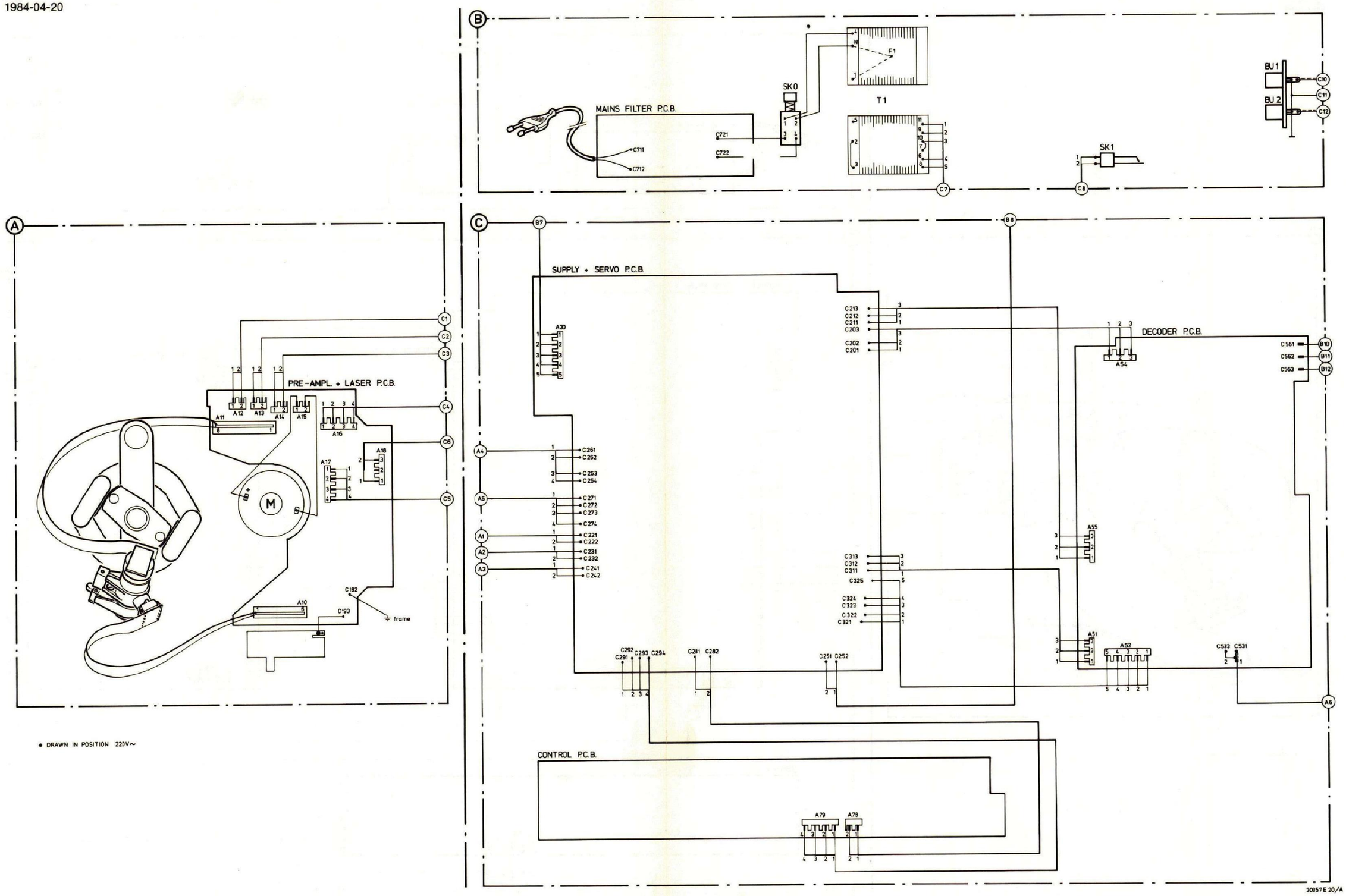
*a	= 2,5 V
b	= 4 V
c	= 6,3 V
d	= 10 V
e	= 16 V
f	= 25 V
g	= 40 V
h	= 63 V
j	= 100 V
l	= 125 V
m	= 150 V
n	= 160 V
q	= 200 V
r	= 250 V
s	= 300 V
t	= 350 V
u	= 400 V
v	= 500 V
w	= 630 V
x	= 1000 V
A	= 1,6 V
B	= 6 V
C	= 12 V
D	= 15 V
E	= 20 V
F	= 35 V
G	= 50 V
H	= 75 V
I	= 80 V

27 037A/C



* DRAWN IN POSITION 220V~

30357 E 20



* DRAWN IN POSITION 220V~

30357E 20/A

TROUBLESHOOTING METHOD

When setting up the error-finding method for Compact Disc, it turned out that a different approach than the usual approach was necessary.

It is no longer possible to assume the method in which a number of possible faults in the device form the starting point for the fault finding method.

A certain error with an associated symptom can have a large number of causes. The reason for this is that a number of closed-loop circuits occur in the Compact Disc, which can also influence each other, making obvious measurements impossible.

In the following method, the device is schematically divided into nine clearly recognizable subgroups. The defective subgroup can be located more clearly by a few adjustments. After this, the circuit can be metered according to the indicated method.

HINTS

Test CDs

It is important that the test CDs are handled with great care. The distortions on the CD (black splashes, fingerprints, etc.) are exclusive and are unambiguously positioned.

Damage can cause extra drop-outs, etc., making the wanted error on the CD just that little bit more exclusive.

Testing the proper functioning of the track detector is then no longer possible.

Measurements using op-amps

Op-amps are frequently used in the servo circuits.
These can be used as amplifiers, fillers, inverters and buffers.

In those cases where feedback looping has been applied in some way, the voltage difference at the differential inputs converges to zero. This applies to both DC and AC signals. The cause of this can be traced back to the properties of an ideal op-amp ($Z_i = \infty$ $G = \infty$ $Z_0 = 0$). When an input of an op-amp is connected directly to ground, it is virtually impossible to measure the inverting and non-inverting inputs. In such a case only the output signal is measurable.

Therefore, in most cases the AC voltage at the inputs will not be given. The DC voltages at the inputs are equal to each other.

Simulate with "O" and "1"

During troubleshooting, certain points must sometimes be connected to ground or to the supply voltage. As a result, certain circuits can be brought into a desired state, which shortens the diagnosis time. In some cases, the points in question are op-amp outputs. These outputs are short-circuit proof. i.e., they may be brought to “0” or ground with impunity.

However, the output of an op-amp should never be connected directly to the supply voltage.

Measurements of microprocessors

Microprocessor inputs and outputs must not be connected directly to the power supply ring. The inputs and outputs may only be set to 0 or ground when this is explicitly stated.

Selection of the ground potential

It is very important to choose a ground point as close as possible to the test point.

Conditions for Injection

- Injection of levels or signals from an external source should never be done if the circuit in question has no supply voltage.
- The projected levels or signalers may never exceed the supply voltage of the relevant circuit.

Short burning of the laser

After removing plug A17 and bridging the lid switch, the laser will continue to burn when the mains voltage is switched on.

The focus loop and the radial loop are then also interrupted: at points A171 (FE = Focus Error), A174 (RE1 = Radial Error 1) and A173 (RE2 = Radial Error 2).

When the unit is in service loop A, the laser will burn indefinitely, even if there is no CD on the turntable.

Irregular operation of the display

Erratic display behavior when the device is open and running may be caused by hand effect near the crystal oscillators. Switching the reset switch off and on cancels this effect.

Adherence of the test points

In the drawings of the schematics and the printed circuit boards, the test points are indicated with a number (e.g. <12> to which the fault finding method refers.

For oscillograms, amplitudes, time bases and position of the device see the list of test points.

GENERAL CHECK POINTS

In the following detailed troubleshooting method, a number of general conditions, which are necessary for a well-functioning device, will not be mentioned.

Before starting the detailed troubleshooting method, these general points should be checked first.

a. Make sure that the lid is closed or the tilt switch is bridged during measurement.
b. Make sure that the CD and objective are clean (dissolved dust, fingerprints, etc.) and work with undamaged CDs.
c. Check the presence of the necessary clock frequencies:
   - 4.433619 MHz for decoding µP
   - 6 MHz for servo µP
   - 4.233600 MHz for CIM-IC
   - 4.35 MHz for free running PLL circuits on DEMOD IC.
d. Check whether all supply voltages are present and have the correct value.
e. Check that the two "mutes" (KILL and NOT(SMSE)) are inactive so that the information flow is never interrupted.
f. Check the proper functioning of both microprocessors by means of their built-in test program and any peripheral test program.

Method:

Self-test decode µP 6506

- Take the servo µP 6201 out of its socket.
- From decoder µP 6506 connect the points 18 and 21 with 14.
- When switching on the mains voltage, connect the points 6 and 14 together.
- If the µP works properly, point 22 within 1 sec. go from "1" to "0".

Self-test servo µP 6201

- Take the decode µP out of its socket.
- Connect points 18 and 21 with 14 of servo µP 6201.
- When switching on the mains voltage, connect points 6 and 14 together.
- If the µP is functioning properly, measure point 22 within 1 sec. to go from "1" to "0".

Peripheral test servo µP 6201

1. Place a CD on the turntable and switch off the mains power. Hold down the stop key while the mains voltage is switched on.
   Release the stop button after 1 sec.
   The device is now in the so-called service loop A. In this mode, the laser and the focus control are working and the motor is running. The light pen remains against the inner stop (i.e. the light pen remains continuously below the run-in tracks).
   The radial servo system is disabled.
   In this service loop, all LEDs and operating keys can be checked as follows:
   - All program LEDs must light up and can go out one by one in a rhythm of 1Hz.
     When LED no. 15 is off, the process repeats. In the trackbar, only the LED that corresponds to the lowest program LED at that moment lights up.
   - When any of the keys, pause, select, store, cancel, repeat or reverse is pressed, the "pause" LED and “repeat" LED will cycle from on to off or vice versa.
     The "error" LED will also light up. It goes out again when a track LED lights up.
2. The player can be moved from **service loop A to service loop B** by pressing the FWD key until a whistling sound is heard.
   Now, independent of the state of the P bit and the subcode (via the bus), the radial servo system is switched on.
   The display remains in the service loop.
3. The player can be returned to normal operating mode from service loop A or B by pressing the PLAY key.
4. Eye pattern.
   Check with an oscilloscope the RF signal (called "eye pattern") on the output of the preamplifier (measurement point <65>). Set the time base to 0.5 µsec.
   The oscilloscope should show a fairly stable signal when the PLL circuit is captured and the turntable motor's servo circuit is properly regulated. A shaky or jittery picture can be caused by a bad motor or because the device is in service loop A

DETAILED TROUBLESHOOTING METHOD

A number of quick and effective checks provide an immediate answer to malfunctioning parts of the device. Two service loops (A and B) are built into µP 6201 for short-rolling the servo systems. Before placing the device in service loop, A or B, it must be checked whether the bus (clock, data or connection points 3 and 2 of µP 6201) is free of ground or supply voltage (level "low" or "high").

If the lines are free of ground or supply voltage, then all keys must be operable when the mains voltage is switched on.

For troubleshooting, the step-by-step method given below must be followed.

First step (with a CD on the turntable).
Put the player in service loop A (method: Press and hold the stop button while switching on the mains voltage). In this mode, the laser, focus control, and turntable motor control should operate. The light pen must rest against the inner side (= under the run-in tracks).

If one of the above conditions does not occur, the following questions must be answered positively in the order given.
In practice, this means that if a certain question is answered positively, this means that all previous circuits to which the questions refer are working properly.

Example: if the "eye pattern" is present then it can be concluded that the laser is working, the laser is in focus and the turntable motor is working

Remark:
In some circumstances, errors in the radial servo system can affect the focus servo system.
(e.g. When supply voltage +1 for IC 6214 fails in the radial circuit, the focus coil starts to oscillate).
In order to be able to determine whether this situation occurs, measuring point <36> (FS) must be grounded. In this way, the influence of the radial servo system on the focus servo system is eliminated.

A. Does the laser light up? (Measuring method: see Sub A)

B. Is the plate light pen angle within tolerance, i.e. equal to 90° ± 0.5° ?
   (Measuring method: see chapter 6.)

C. Does the laser provide enough light?
   (Measuring method: see Sub C).

D. Does the lens come into focus?
   (Measuring method: see Sub D),

E. Is turntable motor running and if so, is it running at the correct speed?
   (Measuring method: see Sub E).

If the answers from A to E are positive, the device should be able to be brought into service loop A.

Second step (with a CD on the turntable)
Bring the player into service loop B. (Method: Bring the device into service loop A by pressing the stop button and the power switch simultaneously. Then press and hold the FWD button until a whistle is heard.)

Now the radial servo system is switched on but the servo µP 6201 ignores the information on the P-line (P-bit) or bus (clock and information for the subcode). This means that the light pen DOES NOT SKIP to the beginning of the first track, so it will take some time before music is heard. (This depends on the length of the lead-in track). By placing the light pen under the music track by hand, music is immediately audible.

In this position, the eye pattern at the measuring point <65> should be stable, while the MCES signal at measuring point <17> should also be stable.

Note: In service loop B, the track is not only followed, but the information is also displayed, provided the digital circuit is functioning.

If one of the above conditions does not occur, in service loop A, the following questions in the given order are answered positively.

F. Does the (NOT)DO and HFL detector function?
(Measuring method see Sub F)

G. Is the track detector working?
(Measuring method: see Sub G).

H. Does the radial control function properly?
(Measuring method see Sub H).

If the answers to questions F, G and H are positive, the device should be able to be brought into service loop B.

Third step (with a CD on the turntable).
Take the player out of the service loop by pressing the play button. After a short whistle, the display shows the number of tracks written on the CD. Servo µP 6201 now responds to the information from the P line and the bus (clock and information from the subcode).

Note that the player now not only follows the track, but also can play the music if the digital and decoding circuit is OK.

If the above conditions do not occur, the questions below must be answered positively.

I. Does the P bit work?
(Measuring method: see Sub I).
J. Does the transfer of the subcode information work?
(Measuring method see Sub I).
K. Does T1 function. i.e. the polarity of RE?
(Measuring method: see Sub K).

If the answers to questions I, J and K are positive, the device must be able to be brought into normal operating condition.

Fourth step (with a CD on the turntable).
If no signal can be heard in play mode, the last question must be answered.

L. Does the digital decoding circuit function as specified?
(Measuring method - see Sub L).

Sub A. DOES THE LASER LIGHT?

Measurement method

Bring the player into service loop A without a CD on the turntable.

Now the laser should light up indefinitely.

Another method, in which the laser lights for an unlimited time and the objective remains **stationary**, is to remove plug A17 and bypass the lid switch. When the mains switch is switched on, the laser must light up.

The checking is done with a light-sensitive component that is slightly shielded from daylight.

Examples:

a. Connect a **photosensitive diode** BPW34, code number 4822 130 32108 with correct polarity to an **analog** multimeter (e.g. PM 2412). When the laser emits light, the meter will show almost full scale reading at 10 kΩ range.

b. Use a mobile phone camera and look for a tiny red dot.
c. Connect a photosensitive resistor 4822 116 10002 to a digital multimeter PM 2517E.

When the laser gives light, the resistance drops to about 8 kΩ.

If the laser does not emit light, proceed to Annex 1

Sub. C. DOES THE LASER GIVE SUFFICIENT LIGHT?

Measurement method:

(Measuring points on preamplifier board, principal diagram E and servo board, principal diagram C).

- Interrupt the collector of transistor 6230 or make pin 18 of the servo µP "low".
- Disconnect plug A17: The laser should now continue to emit light while FE, RE1 and RE2 are interrupted.
- Place a CD on the turntable and switch on the power.
- Inject directly with an LF generator (Ri ≤ 600Ω) at measuring point <1> a sinusoidal signal of 2 Vpp, with a frequency between 25Hz and 60Hz (the correct frequency depends on the player).
- Set the frequency so that the monitor diodes in the light pen output signals as indicated at metering points <5>, <6>, <7> and <8>.
  The amplitude should be between 40 mV and 80 mV.

If the amplitude is insufficient, proceed to Annex I.

Sub. D. DOES THE LENS ENTER FOCUS?

Measurement method

- **No CD on the turntable**

Turn on the power switch and press the play button.
The arm should now go to the center. Immediately afterwards, the objective must move 4X (2X when using servo uP MAB 8440) up and down to find the focus point. After that, the action stops. These actions are controlled from the servo µP.

If the lens does not move, check the servo µP, the focus circuit, or the focus coil.

- **With CD on the turntable**

Fast method

To check globally whether the focus circuit is functioning, proceed as follows:
- Place a record on the turntable.
- Bring the player into service loop A.
- Remove the CD from the turntable.
- Now check whether the objective focuses by placing a reflective part (e.g. mirror for angle measurement) above it.

Detailed method

- Check transistor 6230 (on the servo board, principal diagram C) as follows:
  Check that FN **goes low for a short time** with each pass of the nominal focus point.
  Only if focus point FN is found, FE will be enabled through transistor 6230 (base becomes negative). Check whether the base of 6230 is controlled "low" from the servo µP (= FCO).
  If this is not the case. then check the servo µP. If 6230 is sent “low”, continue.
- Test the focus circuit as follows:
  Interrupt the collector of 6230 (or make point 18 of the servo µP "low"), remove plug A17 and switch on the mains.
  The laser now gives continuous light, FE is released and the focus loop is also interrupted at measuring point <1> (=FE) on the servo board, principal diagram C.

Testing the circuit between measuring point <1> and focus coil (measuring points on the servo board, principal diagram C).

- Inject directly on measuring point <1> by means of an LF generator (Ri ≤ 600Ω) a sinusoidal signal of 10Hz, 2Vpp.
- Check whether the focus coil — so also the objective — responds.
- Check whether the voltage at measuring point <2> is 1Vpp.
- Check whether the voltage at measuring point <3> is 9Vpp.
- Check whether the voltage at measuring point <4> is 8Vpp.

Testing the sub-chassis (measuring points on the pre-amplifier board, principal diagram E and the servo board, principal diagram C).

- Inject directly at measuring point <1> a sinusoidal signal between 25Hz and 60Hz with 2Vpp, by means of an LF generator (Ri ≤ 600Ω). The correct frequency is player dependent.
- Set the frequency so that the monitor diodes in the light pen give output signals as indicated at the measuring points <5>, <6>, <7> and <8>.
- Check the measuring points <9>, <10>, <11> and <12>.
- Check measuring point <13>.
- Check measuring point <14>
  The signal at this measuring point is equal to the signal at measuring point <13>, but the amplitude depends on the position of bias resistor 3158.

If all checks are positive close the focus loop by refitting plug A17. The focus circuit should now function.

It should be noted that the amplitudes at measuring points <5> to <13> are somewhat dependent on the characteristics of the monitor diodes.

Sub. E. DOES THE TURNTABLE MOTOR RUN AND IF SO, IS IT RUNNING AT THE RIGHT SPEED?

Measuring method (measuring points on the servo board, principal diagram C)

- Put a CD on the turntable and put the device in service loop A.
- Once the focal point has been found, check at metering point <15> whether FCO is low.

If not, check the focus circuit (see Sub D).
If FCO is low, continue.

- Only switch on the mains, remove plug A52 and check the MCES signal (on the decoding board near the decoding µP) at measuring point <66> see figure F. The amplitude can be between 0.5V and 2.5V depending on the setting of the coil in the PLL circuit.

If the MCES signal is not correct, check the DEMOD and ERCO circuit, see Sub I.
If the MCES signal is correct, continue.

- Refit plug A52, remove plug A14 on the pre-amplifier board and inject a DC signal of 2.5V into the connector of plug A14. (= turntable motor). Note polarity. The turntable motor should now be running. (Due to the DC voltage of 2.5V the rotational speed of the motor is approximately equal to the rotational speed associated with the scanning of the inner tracks).
- Bring the device into service loop A.
  With a DC voltage < 2.5V, figure G must be visible at measuring point <66>.
  With a DC voltage > 2.5V, figure H must be visible at measuring point <66>.

The same difference must be measured at point <17>. If the signal at measurement point <17> is correct, check the turntable motor circuit between measurement point <17> and the turntable motor.

If the signal at measuring point <17> is not correct, check whether the MCES signal is released by FCO at the output of IC 6205D.

Method.

Interrupt the MCES signal at pin 1 of IC 6205D (= interrupt the jumper 57-58 on the servo board). Now if the MCES signal is correct, check the circuit around IC 6205D.
If the MCES signal is not correct, restore the connection 57-58 and proceed as follows:

Remove the device from the service loop by switching off the power switch. Now consecutively press the mains switch and the PLAY button (The turntable motor rotates through the gain-injected DC voltage of 2.5V).

Check the eye pattern at metering point <65>. The eye pattern can be stabilized by manually moving the light pen under the tracks or by pressing the FWD key for approximately (5 sec.)

If the eye pattern at point <65> is not present or stable, check the HF preamplifier (see Annex V). When the eye pattern is correct, continue.

- Put the device in service loop A.
  (The turntable motor dreads the injected DC voltage of 2.5V).
  Check whether the signal at measuring point <55> (= HFL) is correct, see figure Y.
  If the signal is not correct, check the HFL detector circuit (= circuit between the measuring points <65> and <55>). If the HFL signal is correct, continue.
- Take the device out of the service loop by switching off the power switch. **Consecutively** press the power switch and the PLAY button. (The turntable motor is powered by the injected DC voltage of 2.5 V).
- Check the capture of the PLL circuit of the DEMOD-IC, see Annex II.

If the PLL captures then continue.

- Check the timing signaled at the output of the DEMOD-IC coals is indicated in Sub L.

When the timing signals are correct, continue.
- If the MCES signal is still not properly present, replace the affected specific digital IC by trial and error using the service IC box, code number 4822 395 30194.
- The MCES signal should now be present and correct.

Sub. F. DOES THE (NOT)DO AND HFL DETEKTOR WORK?

Measuring method (measuring points on the servo board. Principle diagram C)

- Starting point:
  HFL = 1 if the spot is exactly on the track.
  HFL = 0 between tracks (e.g. during track jumping).
  (NOT)DO = 0 or DO = 1 at drop-cut.
  (NOT)DO = 1 or DO = 0 with no drop-out.

Approximate measurement method
(To be used in service loop A).
- Place a CD on the turntable.
- Bring the player into service loop A.
- Check whether the DO signal (measuring point <57>) is correct.
  Normally, measuring point <57> should be "low". However, in case of scratches on the CD, small "spikes" of about 100mV are visible.
- Check the HFL signal at measuring point <55>, figure Y.

Accurate measurement method

(Can only be applied with a playing device).
- Place test CD 4A (4822 397 30086) on the turntable
- Turn on the power switch and press the PLAY button.
- Select track number 10 and check measurement point <55>
  The HFL pulses must be present.
- Select track number 15 and check measurement point <56>
  The (NOT)DO pulses must be present.
  The HFL pulses must also be present at measuring point <55>.
- During track jumping, the HFL pulses are present on measurement point <55>.

Sub. G. DOES THE TRACK DETECTOR WORK?

Measuring method (measuring points on the servo print, principal diagram C).

- Place a CD on the turntable.
- Bring the device into service loop A and connect measuring point <20> to ground. If a fixed resistor is used for potentiometer R3315, fit a 330KΩ resistor between points <32> and <33> and then connect point <20> to ground.
- Measure the FS signal at measurement point <36>.
  The frequency variation depends on the eccentricity of the CD.
- Check measuring point <60>
- Check measurement point <61>. This signal cannot be triggered.
  If 3363 is interrupted, no signal may be present at measuring point <61>.
- Check the metering points <62> and <63>.

Sub. H DOES THE RADIAL CONTROL WORK PROPERLY?

Attention: The offset circuit (d-factor) and the AGC circuit (k-factor) are correction circuits.
This means that under optimal conditions (new CD, minimal deviations of the parts) it is possible that the player will function properly even though there is an error in the offset or the AGC circuits.

Measuring method (measuring points on the servo board, principal diagram D).

a. Place a CD on the turntable.
b. Turn off the AGC circuit (k-factor) and the offset circuit (d-factor).

Method: Disabling the AGC circuit: connect terminals 5 and 6 of IC6216 together or connect resistors 3293 and 3294 together.

Disabling the offset circuit:
- When potentiometer 3315 is used: Connect measuring point <20> to ground.
- When resistor 3315 is a fixed resistor: Connect test point <20> to ground and apply a resistance of 330 KΩ between the measurement points <32> and <33>.

c. Bring the device into service loop B.
   If the device now functions, check the k-factor and the d-factor (see Annexes IV and III)
   If the device does not work, continue.

d. Bring the device into service loop A and check the signal at measuring point <21>
   The AC component should be between 12Vpp, and 14Vpp, and measure symmetrically around zero volts.
   If so, continue to point e.

   If this is not the case, first check the following measuring points:
   <22>, <23> value should be 0.7Vpp
   <24> value must be 0.2Vpp
   <25> value should be 0.25Vpp
   <26> value must be 20mVpp
   <27>, <28> value measures 800mVpp, are.

Note: The frequency variation is highly dependent on the eccentricity of the CD.

If the measuring points <22> to <28> are correct, check again measuring point <21>.
If measurement point <21> is correct, continue.

e. Check measuring point <29> (= RE + 650 Hz).
   The value must be 6Vpp. If this is the gift then continue.
   When the mains switch is switched on, a signal of 650 Hz, 300mV must be present at measuring point <29>.
f. Check measurement point <67>. The measuring point is difficult to measure, although a small signal may be present. (Amplitude is player dependent, can be between 40mVpp and 200mVpp).

- To check the output stage for the radial servo, only the power switch must be switched on, and no CD must be on the turntable.
- Inject on measuring points <30> and <31> respectively a sinusoidal signal from 8Hz to10 Hz, 3Vpp. The arm then moves back and forth.
  Now radial tracking in service loop B should be possible.
- Disconnect resistors 3293 and 3294. If the original error symptom is still present, proceed to Annex IV k-factor check.
- Disconnect test point <20> from ground and, if necessary, remove the 330KΩ resistor between the test points <32> and <33> (See Note: Disabling the Offset Circuit).
  If the original error symptom is still present, proceed to Annex III: Checking the d-factor.

Sub. I. DOES THE P-BIT WORK?

Measuring method: (measuring points on the servo print, principal scheme C).

- Bring the device into service loop B.
- After about 45 sec., just before the music starts, the P bit (point 5 of the servo µP) should momentarily (about 2 sec.) be "high". This can be measured with an oscilloscope that is in the DC position DC at 2V/division.

Sub. J. DOES THE TRANSFER OF THE SUBCODE INFORMATION FUNCTION?

Measuring method: (measuring points on the decoding board principal scheme F.)

- Bring the device into service loop B.
- Check whether there is activity on the bus (points 2 and 3 of the servo uP) (i.e. signal not continuously "high" or "low").

If this is not the case, check the measuring points <72>, <73>, <74>, <75>, <95> and <96> and their relationship to each other (Trigger the oscilloscope at measuring point <72>)

Sub. K. FUNCTIONS T1, I.E. THE POLARITY OF RE?

Measuring method: (measuring points on the servo board, principal diagram C)

- Bring the device into service loop B.
- Measure T1 on PCB 13 of the servo µP.
  A square-wave signal from 0V to 5V must be present here.
  Due to the frequency variation, it is difficult to trigger from this square voltage.

Sub. L. DOES THE DIGITAL DECODER CIRCUIT OPERATE ACCORDING TO SPECIFICATION

Measuring method: (measuring points on the decoder board, principal diagrams F and G.)

- The first condition is that the motor is running at a good speed. This implies that the PLL circuit is OK.
  If not, use measurement method Sub E.
- The second condition is that the HF preamplifier functions properly. See Annex V (test method for the HF preamplifier).
- In principle, special measuring equipment is required for servicing the digital decoding circuit, in particular for measurements at the information outputs.
- For practical reasons, Service supplies an IC set, consisting of specific digital ICs code number = 4822 395 30194. Based on this set of ICs, a possibly defective IC can be located by the method of "trial" and error".
- In addition to the information outputs, which are in principle not measurable with a working device, a number of communication lines, responsible for the timing, are measurable.
  In this way, faults in the periphery of the specific digital ICs can also be localized.
  These signals can be checked with a normal oscilloscope.

The following applies to information outputs
- In a locking device it can only be checked whether information IS present or not.
- In a number of cases, measurements can be made in a non-playing device. See the tables for this.

Measurements
DEMOD

For the position of the player (start, stop, etc.): see table (principal diagram F).

- Check the clock signal at measuring point <71> This signal is also present when only the mains switch is switched on.
  Measurement point <71> captures when PLL captures.
  For control of capture: see Annex II.
- Trigger the oscilloscope with signal at measuring point <72> (=FSDE). Check the measurement points <76>, <77> and <78> and their relationship to each other.

ERCO

For the position of the player (start, stop, etc.): see table (principal scheme F).
- Check measuring point <94>.
- Check measuring point <79>
  If this point is correct, the oscilloscope will trigger with measuring point <79> (= FSEC).
- Check the measurement points <80> and <81> and their relationship to each other.
- Check the UNEC signal (= measuring point <82>). Place test plate 4A on the turntable.
  Play track no. 15 or and verify measurement point <82>.

IMPORTANT:

If UNEC (measuring point <82>) remains continuously "high" it is highly probably one of the ICs DEMOD, ERCO or RAM is defective.
If the UNEC output functions normally and there is still no music. is most likely one of the ICs CIM, FIL or DAC are defective.

CIM

For the player's mode (start, stop, etc.). see table (principal scheme F).
- Check measuring point <94>
- Check measuring point <84>
  If this is good, then trigger the oscilloscope with measuring point <84> (= STR1).
- Check the measurement points <85>, <86> and <87> and their relationship to each other.

FIL

For the player's mode (start, stop, etc.). see table (principal scheme G).
- Check measuring point <94>
- Check measuring point <84>
  If this is good, then trigger the oscilloscope with measuring point <84> (= STR1).
- Check measuring point <93>.
- Check the measurement points <90>, <91> and <92> and their relationship to each other.

DAC

(Principal scheme 3).
In the "play" position, the analog signal (=music) is present at the outputs of op-amp 6523 (=left) and op-amp 6525 (=right).
If necessary, check the KILL relay.

Annex I: LASER GIVES NO OR INSUFFICIENT LIGHT

The laser, together with the laser power supply and the monitor diode, forms a feedback loop. A defect in the laser power supply can therefore result in destruction of the laser. When replacing the laser (= new light pen) it will also become defective, since the original error in the laser power supply is still present.

On the other hand, it is impossible to check and repair a feedback system if a link is missing. For that reason, the so-called "laser simulator" is supplied. Code number: 4822 395 30203 for lasers with negative supply voltage. and 4822 395 30215 for positive supply voltage lasers.

This laser simulator consists of a printed circuit board with the laser and the monitor simulator, a switch to test the on/off position and a number of connectors.
This print can be connected to the laser power supply instead of the light pen so that the feedback system is closed.

Repair procedure

Since the light pen is very sensitive to static charges, the tools and yourself must have the same potential as the CD mechanism when measuring and adjusting the laser power supply.

- Remove the flex board from connector A11 and connect the simulator board to the connector.
- Remove plug A16 and insert it into the connector on the simulator board. Connect the 4-wire plug to connector A16.
- Disconnect plug A17 and insert the 4-wire plug into connector A17.
- Bypass the lid switch.
- Switch on the power switch, press the play button and check whether the L-line of the servo µP goes "low".
- In the quiescent state, current through the laser diode should be ≤ 1 mA. This can be checked as follows:
- Set the switch on the simulator board to the "OFF" position and the power switch to the “ON” position.
- Turn bias resistor 3180 counterclockwise (min.R) and measure voltage across resistor 3194.
- For NEG. VOLT the voltage must be ≤10mV.
- For POS. VOLT the voltage must be ≤15mV.

Checking the control of the laser power supply:

NEG.VOLT:
Set the switch on the simulator board to the "ON" position and measure the voltage between point V and ground on the simulator board.
Resistance 3180 clockwise (max. R):
Uv to ground = -120mV ± 24 mV.
Resistance 3180 counterclockwise (min. R):
Uv to ground = -720mV ± 144 mV.
Set resistor 3180 so that Uv to ground = ≈ -500 mV.

This is a preset. After the simulator board has been removed, the laser current must be set.

POS.VOLT:
Set the switch on the simulator board in the "ON" position and measure the voltages between the +V and -V points on the simulator board.
Resistance 3180 clockwise (max. R):
U+v to v = 60mV ± 30 mV
Resistance 3180 counterclockwise (min. R):
U+v to v = 560mV ± 50 mV.
Put resistor 3180 in the centre/mid position.

This is a preset. After the simulator board has been removed, the laser current must be set.

Fine adjustment of the laser current:
Play track 1 of test disc 4322 397 30086 (CD without defects).
Connect a DC voltmeter across resistor 3308 on the servo board, principal diagram D.
Regulate the laser power supply with resistor 3180 so that the voltage across resistor 3308 is 500 mV ± 50 mV.

Attention:
A laser current that is too high (> 500 mV across resistor 3308) shortens the life of the laser diode.

Note:
It is recommended to use the laser simulator board for every measurement in the laser power supply, because short-term closures with the measuring probe can have nasty consequences for the laser diode

Annex II: PLL CIRCUIT CAPTURE CHECK

(Measuring points on the decoder board, principal scheme F)

First of all, the free-running oscillator should be checked and adjusted as follows:

- Put the device in stop position.
- Connect a frequency counter between point 22 of IC 6501 (DEMOD) and ground.
- Use coil 5501 to adjust the frequency to 4.350MHz ±5KHz.

Attention
This setting must be made immediately after switching on the device.

Capture control.

- Place a CD on the turntable.
- Disconnect plug A14, inject a DC voltage of 2.5V on the connector of plug A14 (on the preamplifier, principal diagram E), and bring the device into service loop B.
- Varying the DC voltage around 2.5V should be visible on the oscilloscope at measuring point <71> in the form of frequency variation. This means that the PLL then locks.

Annex III: CONTROL OF THE d-FACTOR

(Measuring points on the servo print, principal diagram D)

Connect test point <20> to ground.
(If a fixed resistor is mounted instead of potentiometer 3315, a resistor of 330KΩ must be placed between the measuring points <32> and <33>).
Place a CD on the turntable and bring the unit into service loop A

- Check the measuring points <23> and <22>.
  Their value should be 0.7 Vpp.
  The frequency variation is strongly dependent on the eccentricity of the CD.
- Check measurement point <25>.
  The value should be 250mVpp.
- Check measurement point <35>.
  The value should be 200mVpp.
- Check measurement point <36>.
  The value should be 2Vpp.
- Check measuring points <37> and <38>.
  Their value should be 10Vpp.
  The signal is now more sinusoidal due to the 650Hz lift.
- Measuring point <39> is difficult to measure because the switch is in position Yoc and is therefore connected to the input of Op-Amp 6215.
  However, a signal of 200mVpp is present.
- Check measuring point <40>.
  The value should be 9 Vpp.

Bring the device into service loop B. A CD will still be located on the turntable and measuring point <20> will still be connected to ground (and, if necessary, the 330KΩ resistor is still connected between measuring points <32> and <33>).

Check measuring point <41>.
Check measuring point <40> on beam A of the oscilloscope and measuring point <39> on beam B of the oscilloscope.
Trigger the oscilloscope with measuring point <41>.

Disconnect measuring point <20> from ground, place the device in service loop A and check whether measuring point <20> can be set to zero volts using 3315. (If, instead of 3315, a fixed resistor is mounted, disconnect test point <20> from ground, remove the 330KΩ resistor between test points <32> and <33>. Bring the device into service loop A and check whether the voltage at Measuring point <20> is between -5V and +5V).

Annex IV: CHECKING THE k-FACTOR

(Measuring points on the servo print, principal diagram D)

a. Static

Only turn on the power switch.
i.e. RCO = high; (NOT)RCO = low so switch Yb is in position 0 and switch Yc is in position D.

- Check measuring point <45>.
  The value should be 9Vpp.
- Check measuring point <46>.
- At measuring point <29> there is now a sinusoidal signal of 650Hz, 300 mV and 180°- 45° = 135° phase shifted with the signal at measuring point <45>.
- Check measuring point <47>.
  The value should be 1.5Vpp.
- Check measuring point <48>.
  The value should be 1Vpp.
- Check the measuring points <49>, <50>, <51> and <46> in relation to each other.
  The amplitudes are 5V.
- Check integrator IC6212A.

b. Dynamic

- Place a CD on the turntable. Bring the device into service loop A and check whether the signal at measuring point <21> is 7Vpp.

- Bring the device into service loop B.
  Now (NOT)RCO = high and RCO = low.
  So switch Yb is in position 1 and switch Yc switches with a frequency of 650Hz.
  Measuring point <52> is low, so measuring point <51> is in phase with measuring point <50>.

Now at measuring point <51> Fig. U must be present with a jittered duty cycle of around 50%

Annex V: CHECKING THE HF PRE-AMPLIFIER
(Principal scheme E)

a. Check DC voltages across transistors 6103, 6104, 6105, 6109, 6110 & 6111.
b. Sensitivity control. frequency and delay characteristic:

- Take the flex boards out of the connectors A10 and A11.
- Remove the plugs A12 A13, A14, A15, A17 and A18.
- Note: DO NOT disconnect plug A16 (= power supply).
- Unscrew the PCB to inject on the track side.

Sensitivity

- Inject according to the scheme below (fig. A) between the points A101 and A102 a signal V_{in} of 140mV_{eff}, 50kHz, via RC network (see fig. A).
- The output voltage between the points A181 and A182 should be 245mV ±2dB.

Note: Make sure that the injection lead and the test lead are identical.

Frequency and delay characteristic:

- Set V_{in} so that V_{out} = 245mV = 0dB at 50kHz. See Fig. A.
- The re-delay between the injected signal and the measured signal must be 450nsec ±50nsec at 300kHz. This can be measured using a double-beam oscilloscope, with V_{in} on beam A and V_{out} on beam B. (see Fig. B).
- Check the frequency and delay characteristics for the frequencies given below.

Frequency (kHz)	V_{out} (dB)	Delay (seconds)	Delay, compared to the delay at 300kHz
1	-15 ±3		
6.3	-2 ±3		
16	-0.5 ±3		
50	0 ±3		
100	0 ±1		-50 ±20
200	+1 ±1		0 ±20
300	+1.5 ±1	450 ±50	0
500	+3.5 ±1		+20 ±20
700	+5.5 ±2		+30 ±20
1000	+8 ±2		+30 ±20
1600	+8 ±2		
2000	+4.5 ±3		

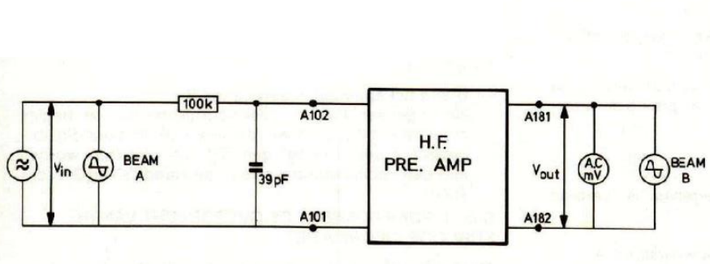


Fig. A 33 393A12

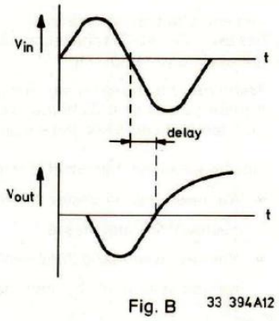
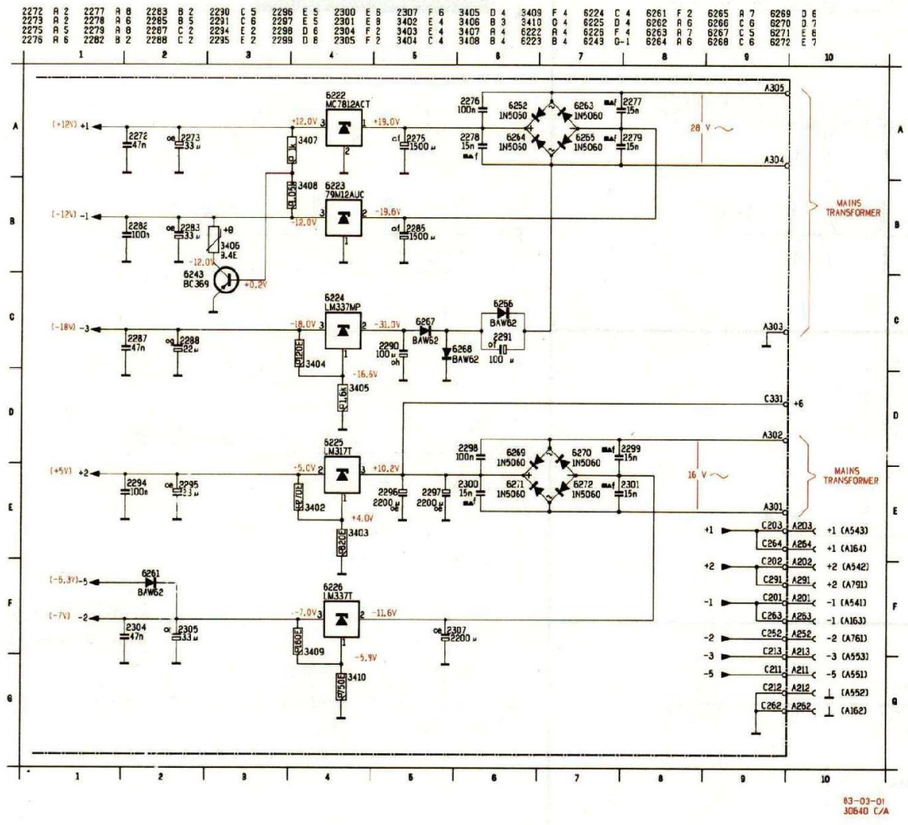


Fig. B 33 394A12

CIRCUIT DIAGRAM A (SUPPLY)



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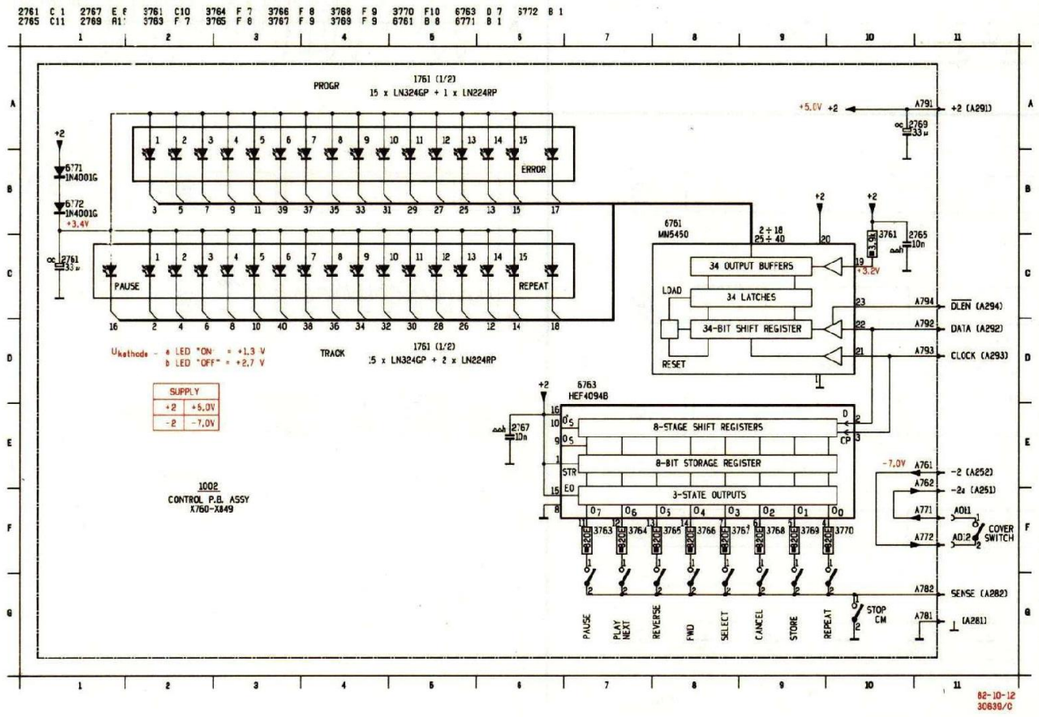
CIRCUIT DIAGRAM B (DISPLAY + CONTROL)



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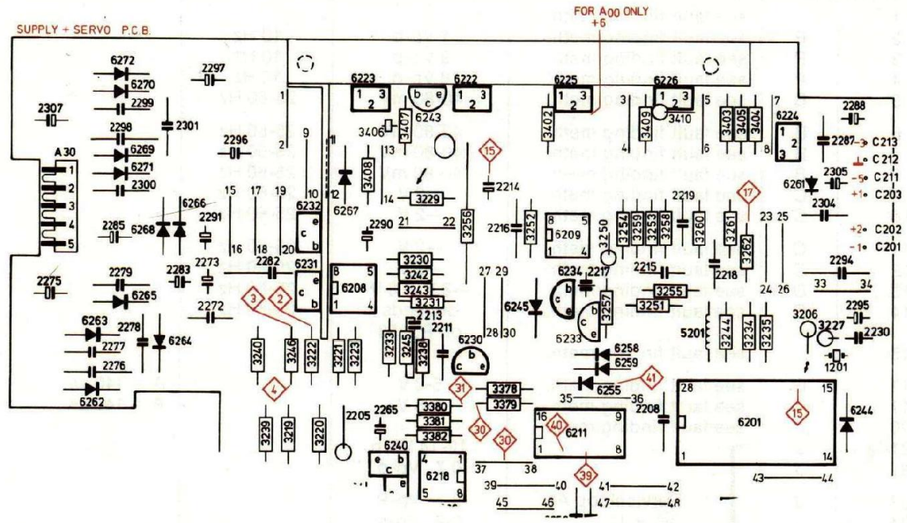
SUPPLY + SERVO P.C.B.



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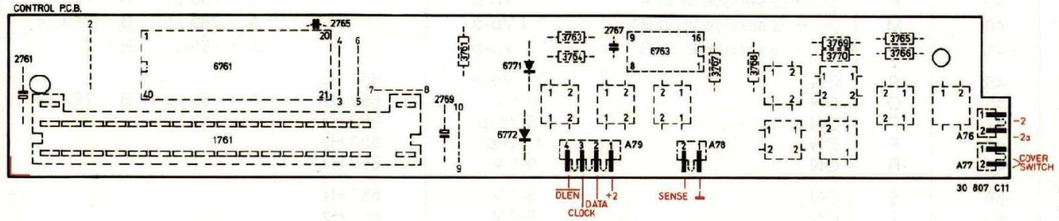
CONTROL P.C.B.



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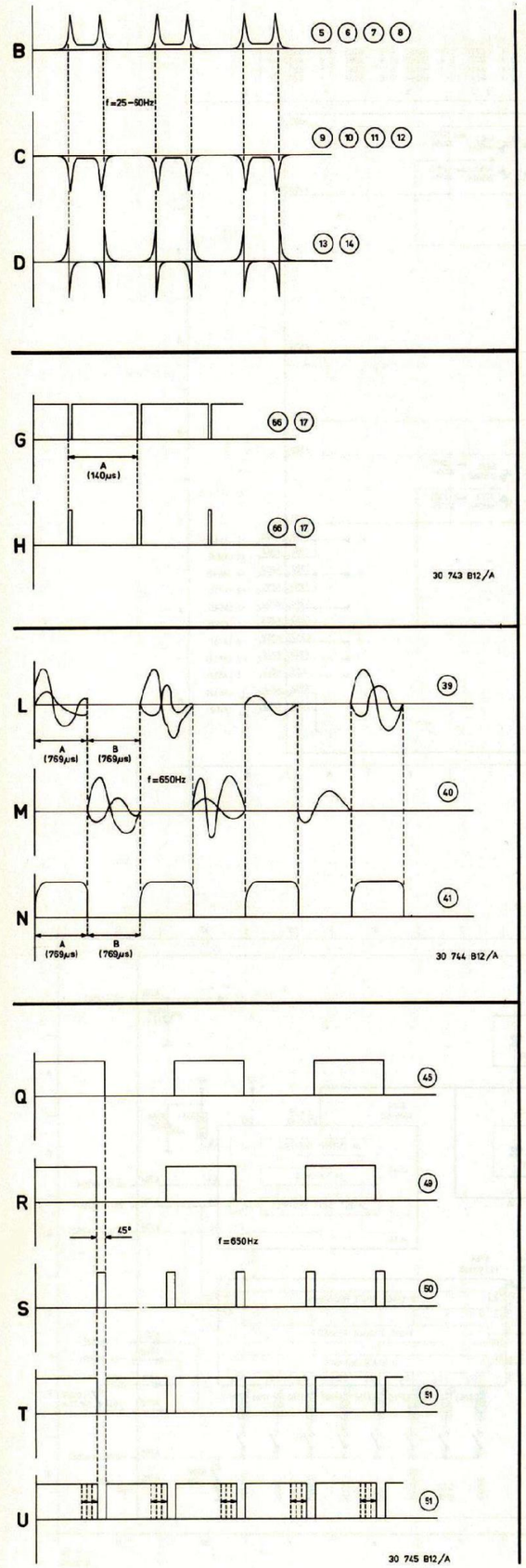
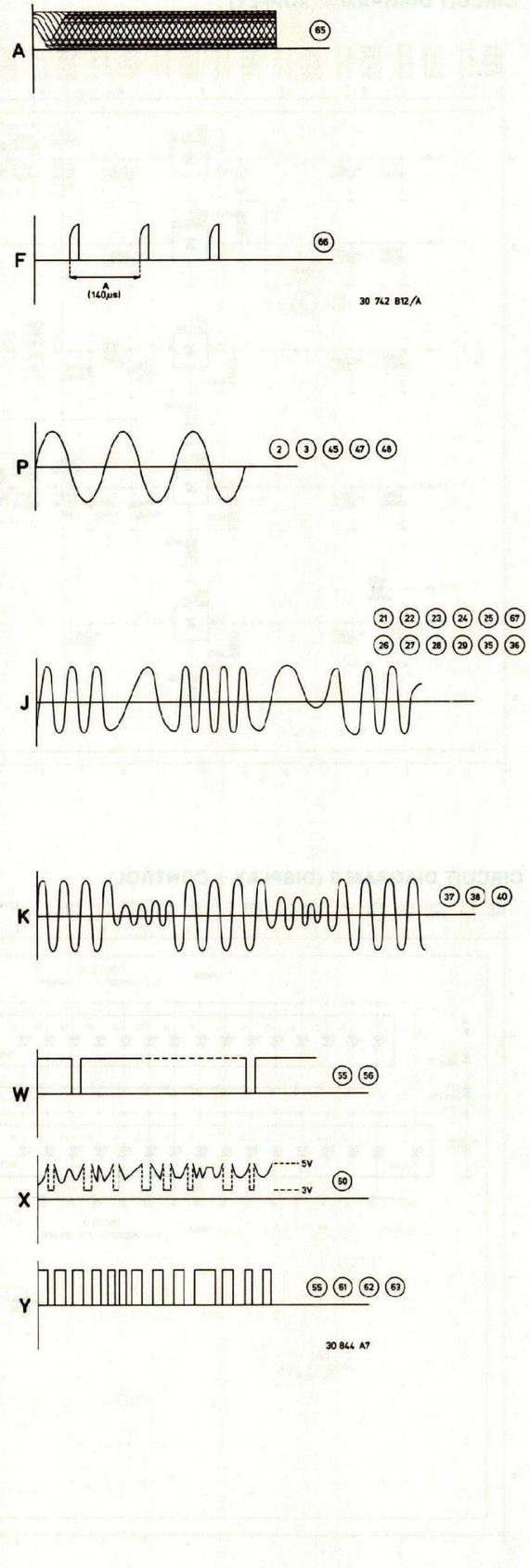
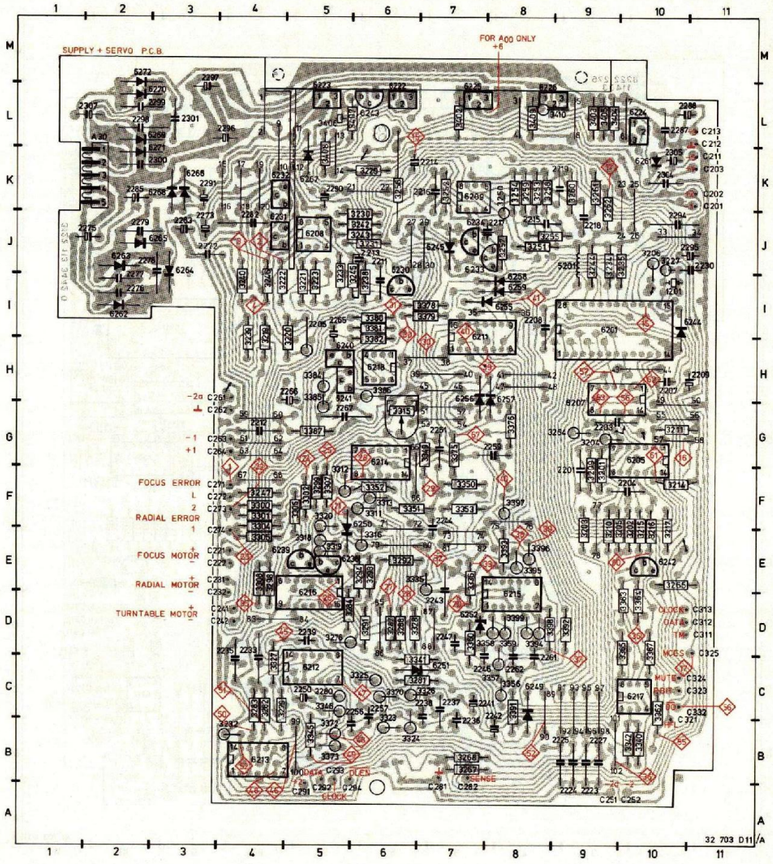
SERVO

Nr.	See	Position	Amplitude	f	Time base
1		see fault finding meth.			
2	P	see fault finding meth.	1 Vp-p	10 Hz	
3	P	see fault finding meth.	9 Vp-p	10 Hz	
4	P	see fault finding meth.	8 Vp-p	10 Hz	
5	B	see fault finding meth.	40-80 mV	25-60 Hz	
6	B	see fault finding meth.	40-80 mV	25-60 Hz	
7	B	see fault finding meth.	40-80 mV	25-60 Hz	
8	B	see fault finding meth.	40-80 mV	25-60 Hz	
9	C	see fault finding meth.	—2 V	25-60 Hz	
10	C	see fault finding meth.	—2 V	25-60 Hz	
11	C	see fault finding meth.	—2 V	25-60 Hz	
12	C	see fault finding meth.	—2 V	25-60 Hz	
13	D	see fault finding meth.	—8 V, +8 V	25-60 Hz	
14	D	see fault finding meth.	depends on R3158	25-60 Hz	
15		see fault finding meth.			
17	G	see fault finding meth.	5-0 V		A = 140 µs
17	H	see fault finding meth.	0-5 V		A = 140 µs
20		see fault finding meth.			
21	J	Serviceloop A/ ⑳ → ⏚ 5,6 IC6216 interconnected*	12-14 Vp-p		
22	J		0,7 Vp-p		
23	J		0,7 Vp-P		
24	J		0,2 Vp-p		
25	J		0,25 Vp-p		
26	J		20 mVp-p		
27	J		800 mVp-p		
28	J		800 mVp-p		
29	J		6 Vp-p		
29	P	ON	0,3 Vp-p		
30		see fault finding meth.			
31		see fault finding meth.			
32	*	see fault finding meth.			
33	*	see fault finding meth.			
35	J	⑳ → ⏚ service loop A*	200 mVp-p		
36	J	⑳ → ⏚ service loop A*	2 Vp-p		
37	K	⑳ → ⏚ service loop A*	10 Vp-p		
38	K	⑳ → ⏚ service loop A*	10 Vp-p		
39	L	⑳ → ⏚ service loop B*	0-4 Vp-p		A = 769 µs B = 769 µs
40	K	⑳ → ⏚ service loop A*	9 Vp-p		A = 769 µs B = 769 µs
40	M	⑳ → ⏚ service loop B*	0-4 Vp-p		A = 769 µs B = 769 µs
41	N	⑳ → ⏚ service loop B*	6 Vp-p		A = 769 µs B = 769 µs
45	P	ON	9 Vp-p	650 Hz	
46	Q	ON	0-5 V	650 Hz	A = 769 µs B = 769 µs
47	P	ON	1,5 Vp-p	650 Hz	
48	P	ON	1 Vp-p	650 Hz	
49	R	ON	0-5 V	650 Hz	
50	S	ON	0-5 V	650 Hz	
51	T	ON	5-0 V	650 Hz	
51	U	service loop B	5 V	650 Hz	
52		see fault finding meth.			
55	Y	service loop A	5-0 V		
55	W	play (with test disc)	5-0 V		
56	W	play (with test disc)	5-0 V		
57		see fault finding meth.			
60	X	service loop A	5-3 V		
61	Y	service loop A	5-0 V		
62	Y	service loop A	5-0 V		
63	Y	service loop A	5-0 V		
65	A	play	1 Vp-p		
66	F	see fault finding meth.	0,25-2,5 V		A = 140 µs
66	G	see fault finding meth.	5-0 V		A = 140 µs
66	H	see fault finding meth.	0-5 V		A = 140 µs
67	J	see fault finding meth.			

* If trimming potentiometer 3315 has not been used, a resistor of 330 kΩ should be mounted between the measuring-points ㉜ and ㉝.

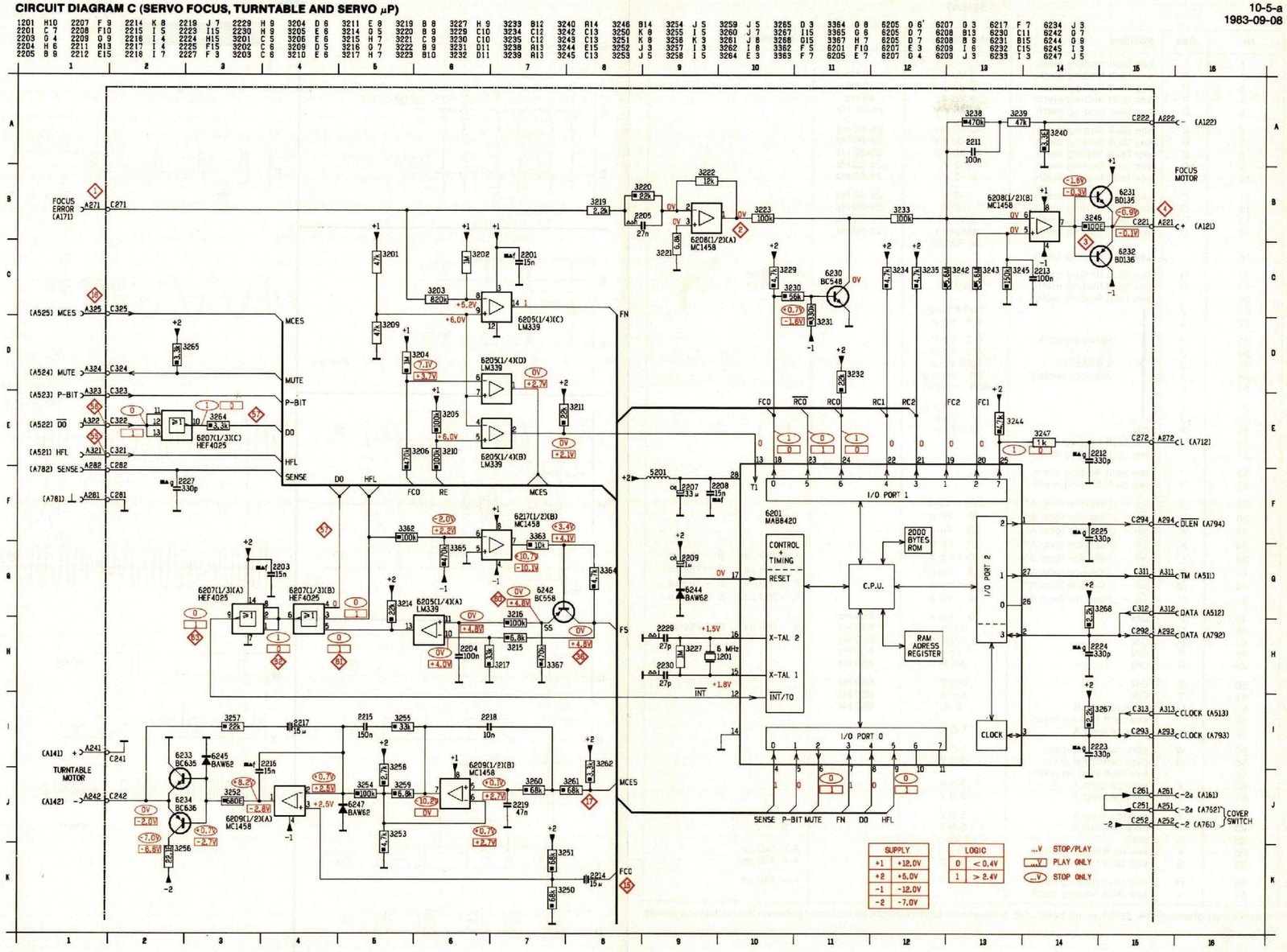






CIRCUIT DIAGRAM C (SERVO FOCUS, TURNTABLE AND SERVO μP)

10-5-a
1983-09-08



82-10-12
30641D/A

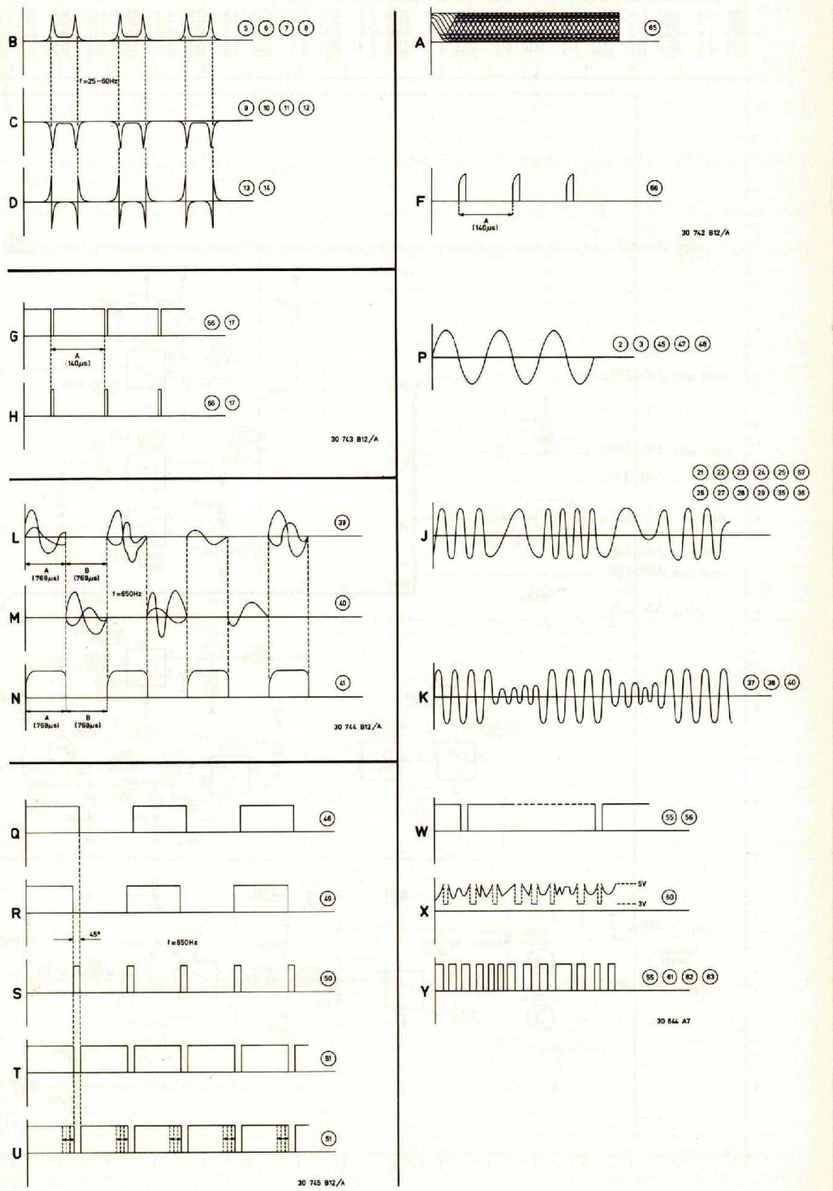
CS 90 310

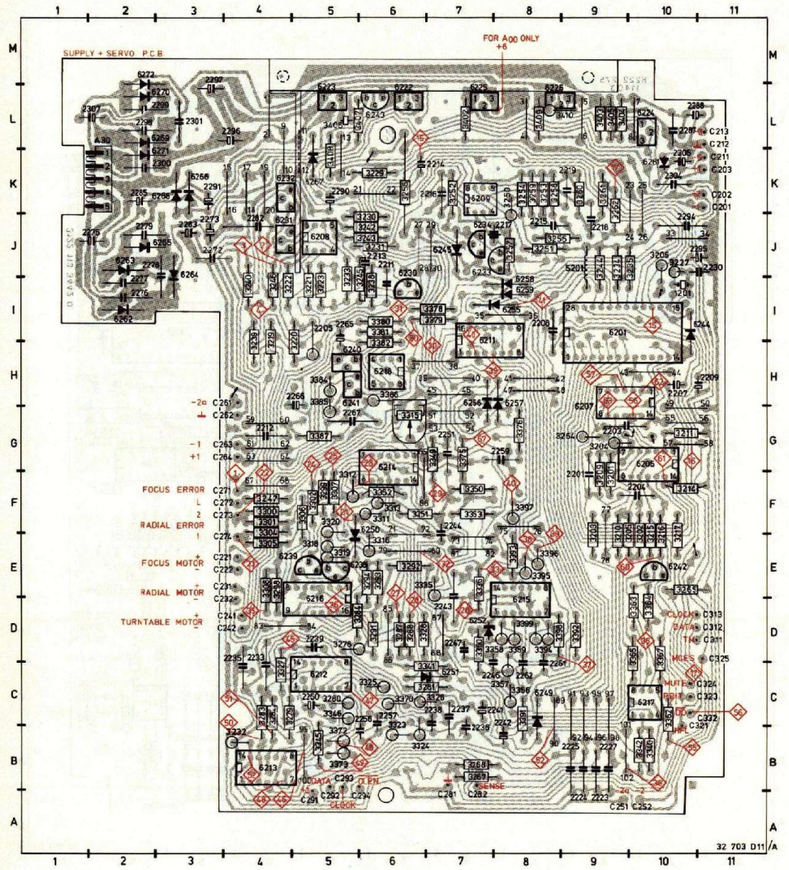
SERVO

Nr.	See	Position	Amplitude	f	Time base
1		see fault finding meth.			
2	P	see fault finding meth.	1 Vp-p	10 Hz	
3	P	see fault finding meth.	9 Vp-p	10 Hz	
4	P	see fault finding meth.	8 Vp-p	10 Hz	
5	B	see fault finding meth.	40-80 mV	25-60 Hz	
6	B	see fault finding meth.	40-80 mV	25-60 Hz	
7	B	see fault finding meth.	40-80 mV	25-60 Hz	
8	B	see fault finding meth.	40-80 mV	25-60 Hz	
9	C	see fault finding meth.	—2 V	25-60 Hz	
10	C	see fault finding meth.	—2 V	25-60 Hz	
11	C	see fault finding meth.	—2 V	25-60 Hz	
12	C	see fault finding meth.	—2 V	25-60 Hz	
13	D	see fault finding meth.	—8 V, +8 V	25-60 Hz	
14	D	see fault finding meth.	depends on R3158	25-60 Hz	
15		see fault finding meth.			
17	G	see fault finding meth.	5-0 V		A = 140 µs
17	H	see fault finding meth.	0-5 V		A = 140 µs
20		see fault finding meth.			
21	J	Serviceloop A/ ⑳ → ⏚ 5,6 IC6216 interconnected*	12-14 Vp-p		
22	J		0,7 Vp-p		
23	J		0,7 Vp-P		
24	J		0,2 Vp-p		
25	J		0,25 Vp-p		
26	J		20 mVp-p		
27	J		800 mVp-p		
28	J		800 mVp-p		
29	J		6 Vp-p		
29	P	ON	0,3 Vp-p		
30		see fault finding meth.			
31		see fault finding meth.			
32	*	see fault finding meth.			
33	*	see fault finding meth.			
35	J	⑳ → ⏚ service loop A*	200 mVp-p		
36	J	⑳ → ⏚ service loop A*	2 Vp-p		
37	K	⑳ → ⏚ service loop A*	10 Vp-p		
38	K	⑳ → ⏚ service loop A*	10 Vp-p		
39	L	⑳ → ⏚ service loop B*	0-4 Vp-p		A = 769 µs B = 769 µs
40	K	⑳ → ⏚ service loop A*	9 Vp-p		A = 769 µs B = 769 µs
40	M	⑳ → ⏚ service loop B*	0-4 Vp-p		A = 769 µs B = 769 µs
41	N	⑳ → ⏚ service loop B*	6 Vp-p		A = 769 µs B = 769 µs
45	P	ON	9 Vp-p	650 Hz	
46	Q	ON	0-5 V	650 Hz	A = 769 µs B = 769 µs
47	P	ON	1,5 Vp-p	650 Hz	
48	P	ON	1 Vp-p	650 Hz	
49	R	ON	0-5 V	650 Hz	
50	S	ON	0-5 V	650 Hz	
51	T	ON	5-0 V	650 Hz	
51	U	service loop B	5 V	650 Hz	
52		see fault finding meth.			
55	Y	service loop A	5-0 V		
55	W	play (with test disc)	5-0 V		
56	W	play (with test disc)	5-0 V		
57		see fault finding meth.			
60	X	service loop A	5-3 V		
61	Y	service loop A	5-0 V		
62	Y	service loop A	5-0 V		
63	Y	service loop A	5-0 V		
65	A	play	1 Vp-p		
66	F	see fault finding meth.	0,25-2,5 V		A = 140 µs
66	G	see fault finding meth.	5-0 V		A = 140 µs
66	H	see fault finding meth.	0-5 V		A = 140 µs
67	J	see fault finding meth.			

*If trimming potentiometer 3315 has not been used, a resistor of 330 kΩ should be mounted between the measuring-points ㉜ and ㉝.

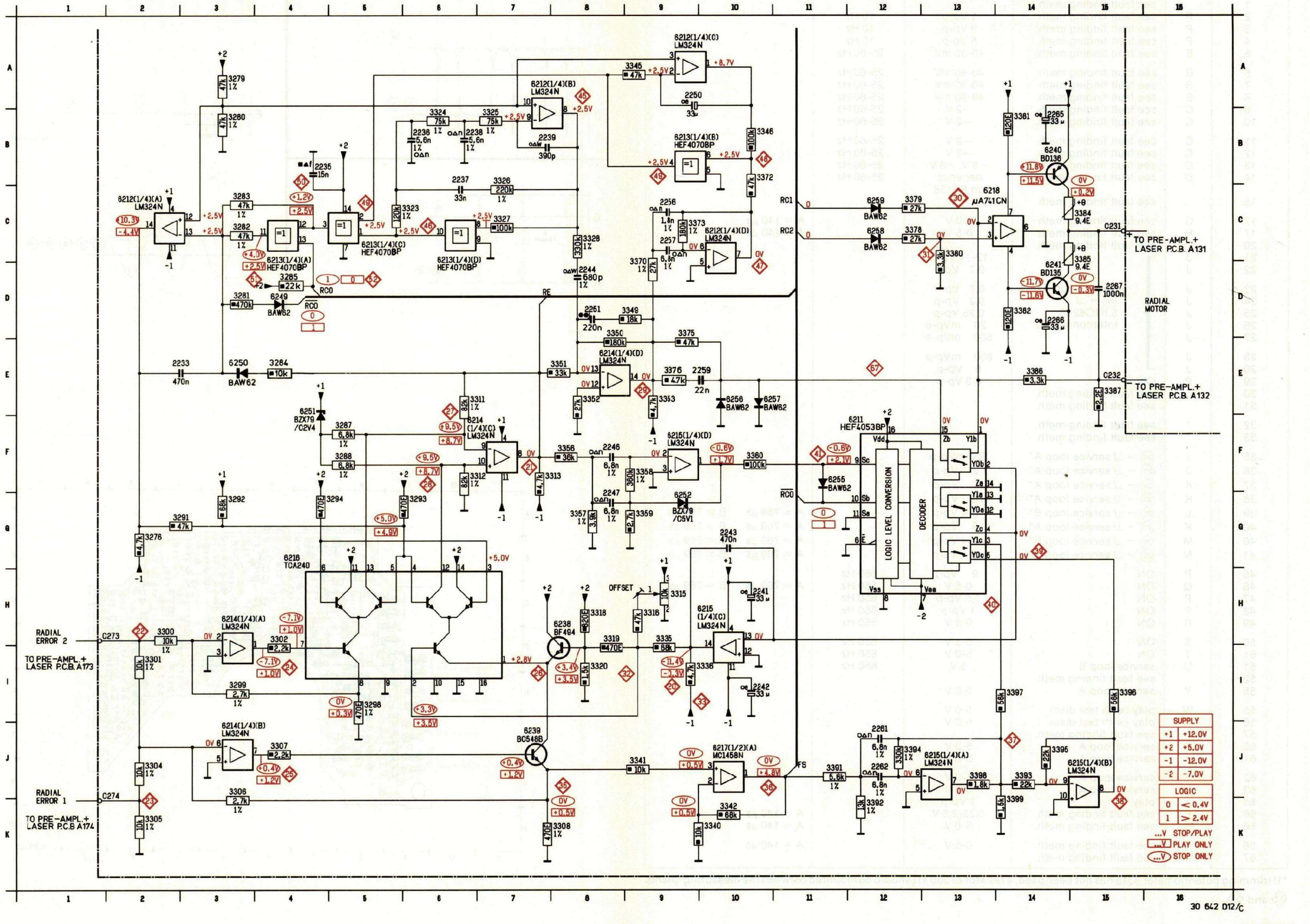
SERVO





CIRCUIT DIAGRAM D (SERVO RADIAL MOTOR)

2233	E 3	2241	H10	2250	A 9	2262	J12	3280	B 3	3287	F 5																								
2235	B 4	2242	I10	2251	D 8	2265	B14	3281	D 3	3288	F 5	3299	I 3	3306	J 3	3315	H 9	3324	B 6	3336	I10	3349	D 9	3357	G 8	3373	C 9	3381	B14	3391	J11	3397	I14	6212	C10	6214	J 3	6215	J13	6239	J 7	6252	G 9
2236	B 6	2243	G10	2256	C 9	2266	D14	3282	C 3	3291	G 3	3300	H 2	3307	J 4	3316	H 9	3325	B 7	3340	K10	3350	D 8	3358	F 9	3375	D 9	3382	D14	3392	K12	3398	J13	6212	A 9	6214	H 3	6215	J15	6240	B14	6255	F11
2237	B 6	2244	D 8	2257	C 9	2267	D15	3283	C 3	3292	G 3	3301	I 2	3308	K 8	3318	H 8	3326	B 7	3341	J 9	3351	E 8	3359	G 9	3376	E10	3384	C15	3393	J14	3399	K14	6213	C 4	6214	E 8	6216	G 4	6241	D14	6256	E10
2238	B 6	2246	F 8	2259	E 9	3276	G 2	3284	E 4	3293	G 6	3302	H 4	3311	E 7	3319	H 8	3327	C 7	3342	K10	3352	E 8	3360	F10	3378	C12	3385	E14	3395	J14	6212	A 7	6213	C 6	6215	H10	6218	C13	6250	E 3	6258	C12
2239	B 7	2247	G 8	2261	J12	3279	A 3	3285	D 4	3294	G 5	3304	J 2	3312	F 7	3320	C 6	3328	C 8	3345	A 9	3353	E 9	3370	D 9	3379	C12	3386	E14	3396	I15	6212	C 2	6213	C 5	6215	F 9	6238	H 8	6251	E 4	6259	C12



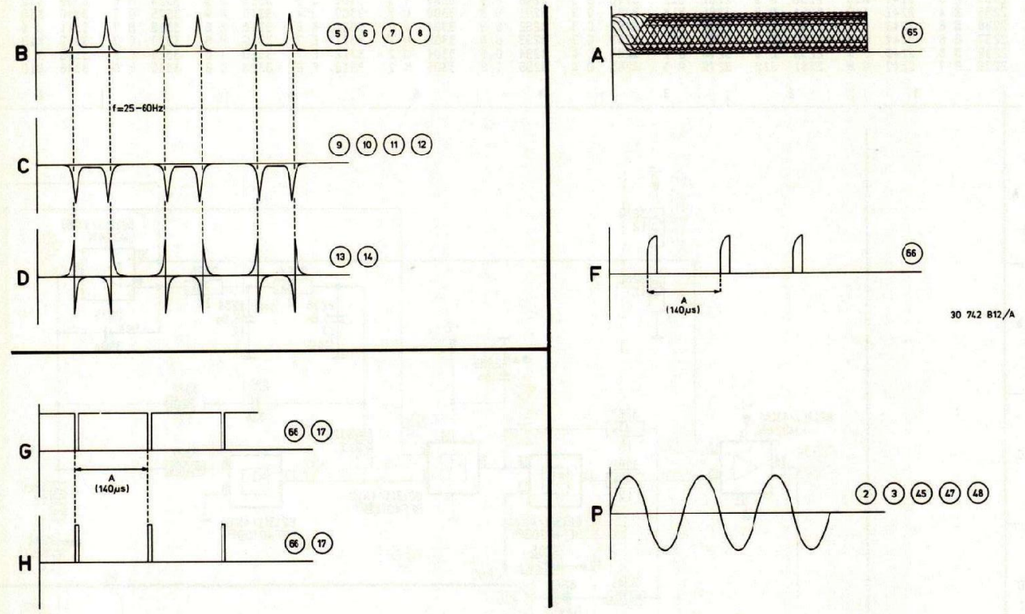
30 642 D12/C

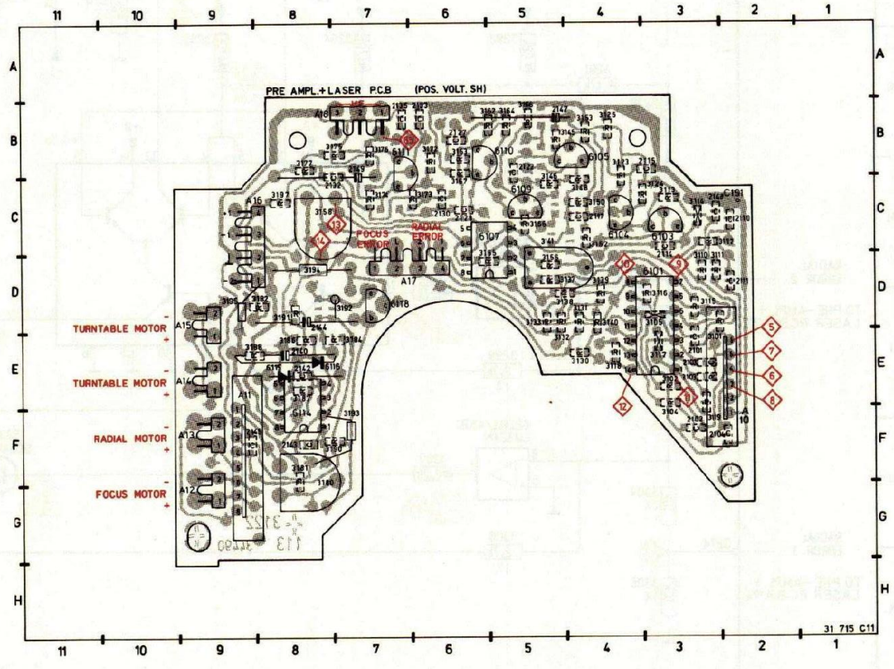
CS 90 312

SERVO

Nr.	See	Position	Amplitude	f	Time base
1		see fault finding meth.			
2	P	see fault finding meth.	1 Vp-p	10 Hz	
3	P	see fault finding meth.	9 Vp-p	10 Hz	
4	P	see fault finding meth.	3 Vp-p	10 Hz	
5	B	see fault finding meth.	40-80 mV	25-60 Hz	
6	B	see fault finding meth.	40-80 mV	25-60 Hz	
7	B	see fault finding meth.	40-80 mV	25-60 Hz	
8	B	see fault finding meth.	40-80 mV	25-60 Hz	
9	C	see fault finding meth.	—2 V	25-60 Hz	
10	C	see fault finding meth.	—2 V	25-60 Hz	
11	C	see fault finding meth.	—2 V	25-60 Hz	
12	C	see fault finding meth.	—2 V	25-60 Hz	
13	D	see fault finding meth.	—8 V, +8 V	25-60 Hz	
14	D	see fault finding meth.	depends on R3158	25-60 Hz	
15		see fault finding meth.			
17	G	see fault finding meth.	5-0 V		A = 140 µs
17	H	see fault finding meth.	0-5 V		A = 140 µs
20		see fault finding meth.			
21	J	Serviceloop A/ ⑳ → ⊥/ 5,6 IC6216 interconnected*	12-14 Vp-p		
22	J		0,7 Vp-p		
23	J		0,7 Vp-P		
24	J		0,2 Vp-p		
25	J		0.25 Vp-p		
26	J		20 mVp-p		
27	J		800 mVp-p		
28	J		800 mVp-p		
29	J		6 Vp-p		
29	P	ON	0,3 Vp-p		
30		see fault finding meth.			
31		see fault finding meth.			
32	*	see fault finding meth.			
33	*	see fault finding meth.			
35	J	⑳ → ⊥/ service loop A*	200 mVp-p		
36	J	⑳ → ⊥/ service loop A*	2 Vp-p		
37	K	⑳ → ⊥/ service loop A*	10 Vp-p		
38	K	⑳ → ⊥/ service loop A*	10 Vp-p		
39	L	⑳ → ⊥/ service loop B*	0-4 Vp-p		A = 769 µs B = 769 µs
40	K	⑳ → ⊥/ service loop A*	9 Vp-p		A = 769 µs B = 769 µs
40	M	⑳ → ⊥/ service loop B*	0-4 Vp-p		A = 769 µs B = 769 µs
41	N	⑳ → ⊥/ service loop B*	6 Vp-p		A = 769 µs B = 769 µs
45	P	ON	9 Vp-p	650 Hz	
46	Q	ON	0-5 V	650 Hz	A = 769 µs B = 769 µs
47	P	ON	1,5 Vp-p	650 Hz	
48	P	ON	1 Vp-p	650 Hz	
49	R	ON	0-5 V	650 Hz	
50	S	ON	0-5 V	650 Hz	
51	T	ON	5-0 V	650 Hz	
51	U	service loop B	5 V	650 Hz	
52		see fault finding meth.			
55	Y	service loop A	5-0 V		
55	W	play (with test disc)	5-0 V		
56	W	play (with test disc)	5-0 V		
57		see fault finding meth.			
60	X	service loop A	5-3 V		
61	Y	service loop A	5-0 V		
62	Y	service loop A	5-0 V		
63	Y	service loop A	5-0 V		
65	A	play	1 Vp-p		
66	F	see fault finding meth.	0,25-2,5 V		A = 140 µs
66	G	see fault finding meth.	5-0 V		A = 140 µs
66	H	see fault finding meth.	0-5 V		A = 140 µs
67	J	see fault finding meth.			

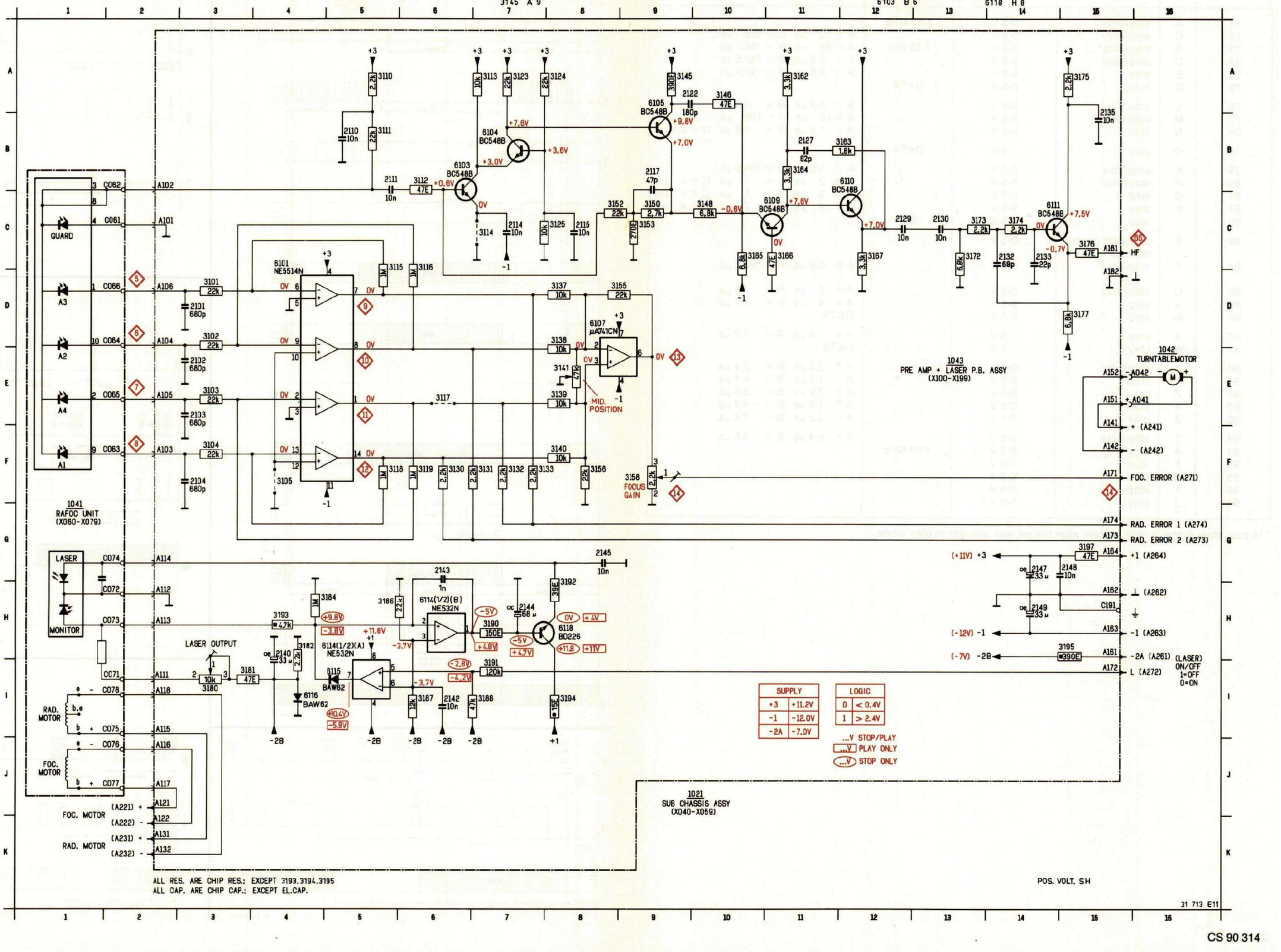
* If trimming potentiometer 3315 has not been used, a resistor of 330 kΩ should be mounted between the measuring-points ◈32 and ◈33.





CIRCUIT DIAGRAM E (LASER SUPPLY, MONITOR DIODES AND HF PRE-AMP.)

10-9-a
1983-09-08



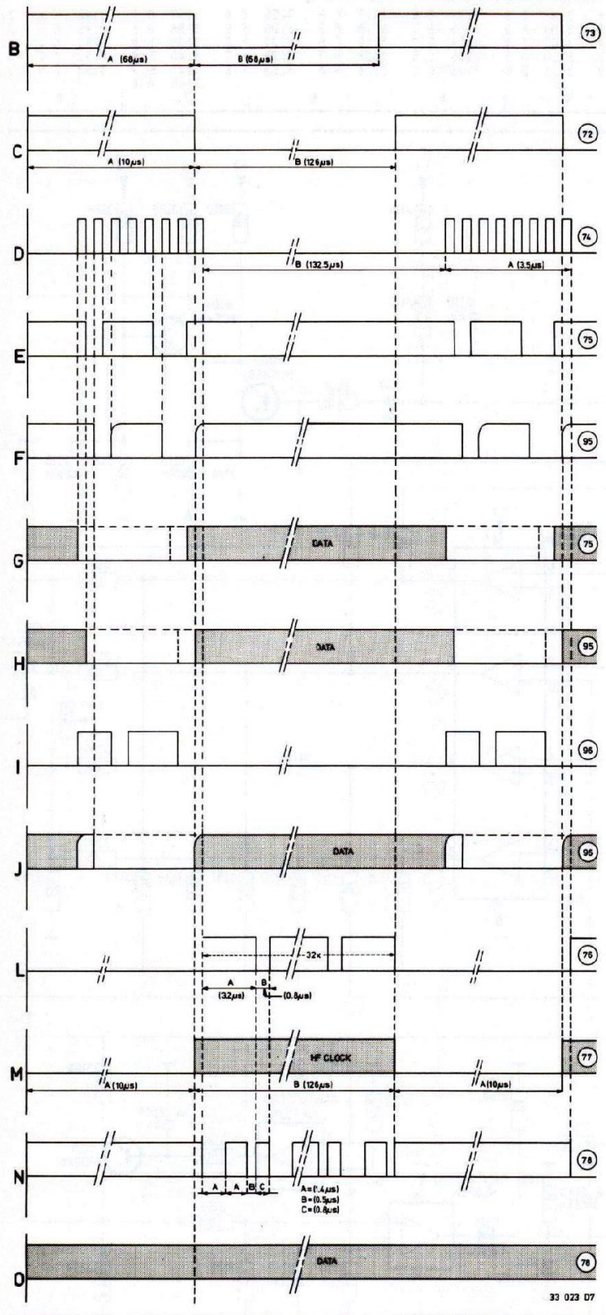
CS 90 314

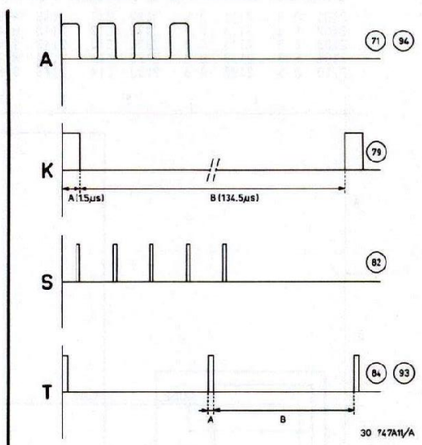
DECODING

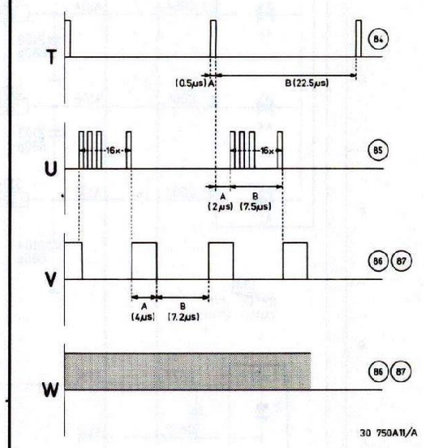
Nr.	See	Position	Amplitude	f	Time base
71	A	stop/play	0-5 V	4,32 MHz	
72	C	stop/play	0-5 V		A = 10* µs B = 126 µs
73	B	stop/play*	0-5 V	7,35 kHz	A = 68 µs B = 68 µs
74	D	stop/play	5-0 V		A = 3,5 µs B = 132,5 µs
75	E	stop	5-0 V		A = 3,5 µs B = 132,5 µs
75	G	play	0-5 V	DATA	
76	L	stop/play	0-5 V		A = 3,2 µs B = 0,8 µs
77	M	stop/play	0-5 V		A = 10 µs B = 126 µs
78	N	stop	0-5 V		A = 1,4 µs B = 0,5 µs C = 0,8 µs
78	O	play	5 V	DATA	
79	K	stop/play	0-5 V		A = 1,5 µs B = 134,5 µs
80	P	stop/play	0-5 V		A = 2 µs B = 7 µs C = 4 µs
81	Q	stop	0-5 V		A = 3 µs B = 6 µs C = 5 µs
81	R	play	0-5 V		A = 2 µs B = 7 µs C = 4 µs
82		stop	5 V	DC	
82	S	play with Drop-out test record	0-5 V		
84	T	stop/play	0-5 V		A = 0,5 µs B = 22,5 µs
85	U	stop/play	0-5 V		A = 2 µs B = 7,5 µs
86	V	stop	0-5 V		A = 4 µs B = 7,2 µs
86	W	stop	0-5 V		DATA
87	V	stop	5 V		A = 4 µs B = 7,2 µs
87	W	play	5 V		DATA
90	X	stop/play	0-5 V		A = 3,2 µs B = 2,4 µs
91	Y	stop	0-5 V		A = 1,2 µs B = 4,4 µs
91	Z	play	0-5 V		A = 3,2 µs B = 2,4 µs
92	Y	stop	0-5 V		A = 1,2 µs B = 4,4 µs
92	Z	play	0-5 V		A = 3,2 µs B = 2,4 µs
93	T	stop/play	0-5 V		A = 0,4 µs B = 5,5 µs
94	A	stop/play	0-5 V	4,23 MHz	
95	F	stop	5-0 V		
95	H	play	5-0 V		
96	I	stop	0-5 V		
96	J	play	5-0 V		

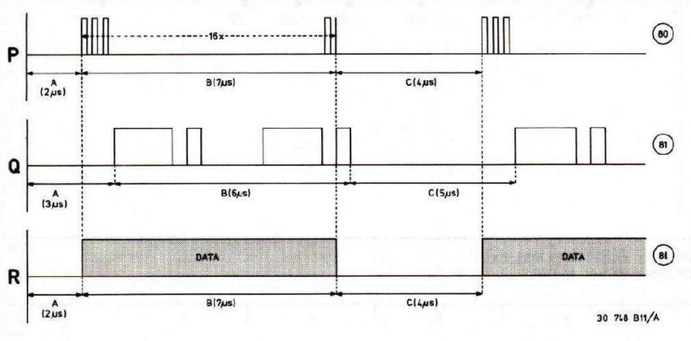
* In pos. stop, signal is only present **after** the set was brought in play mode.

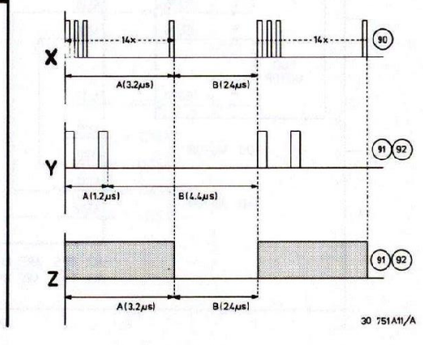
DECODING



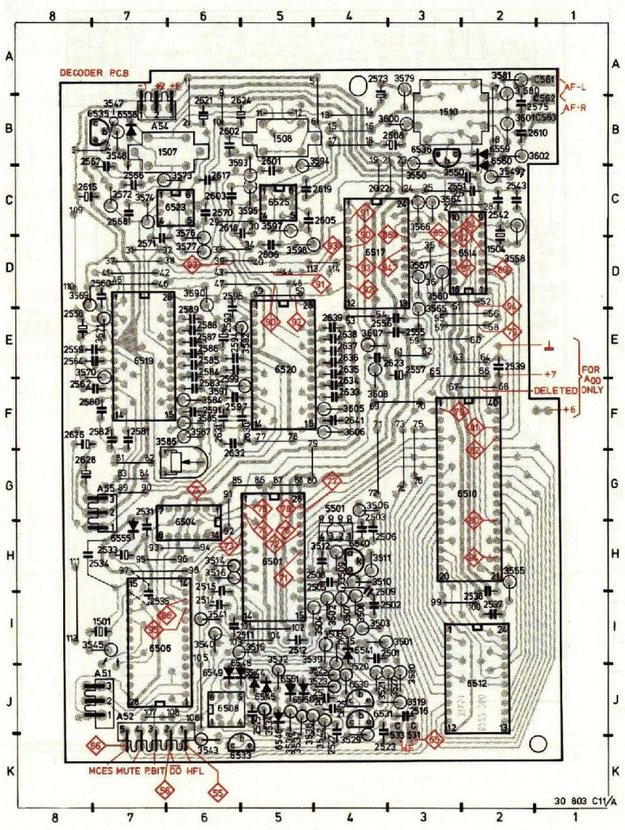


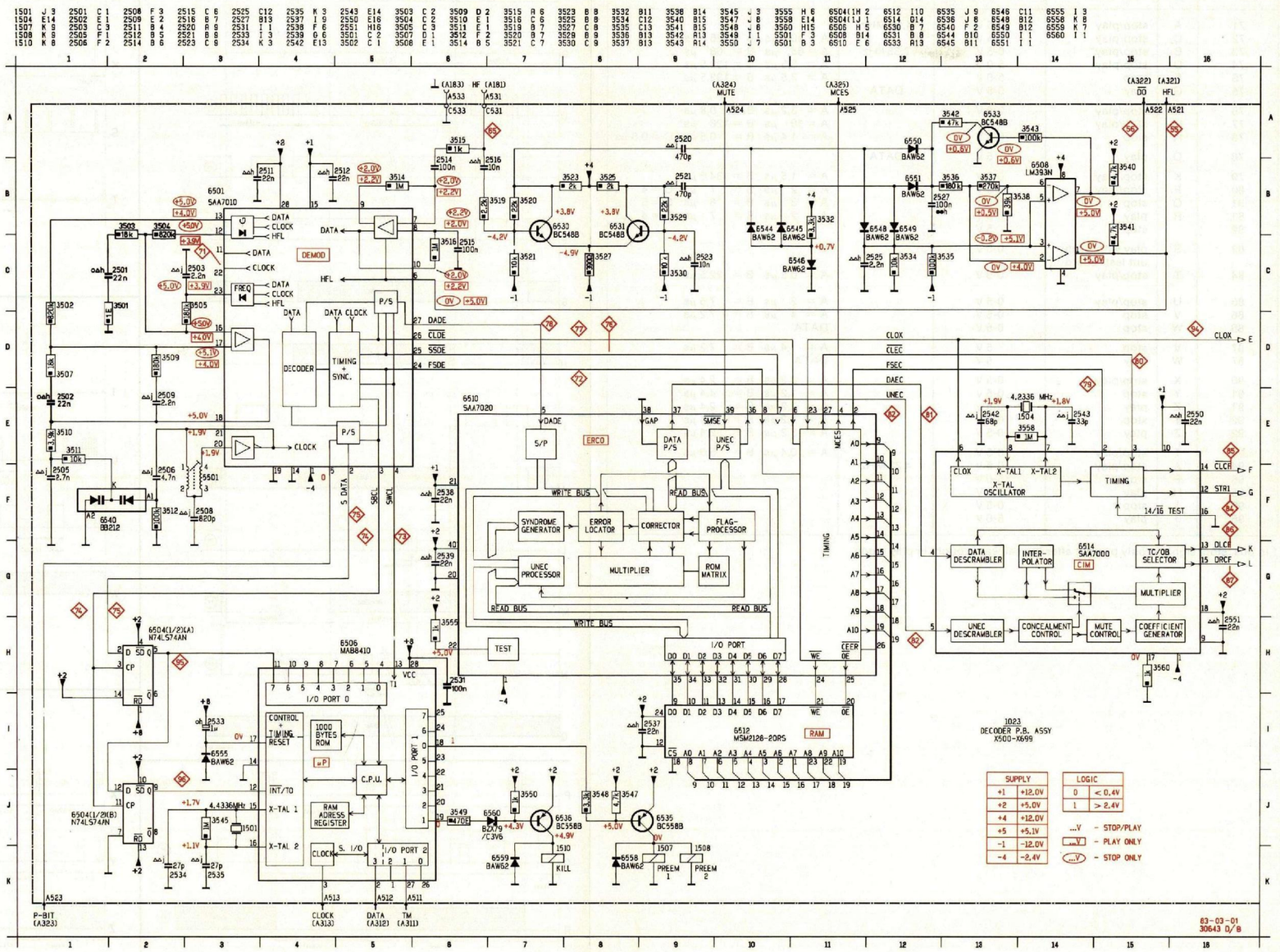






CIRCUIT DIAGRAM F (DECODING PART I, DEMOD, DECO μP, CIM AND DO, HFL DETECTOR)





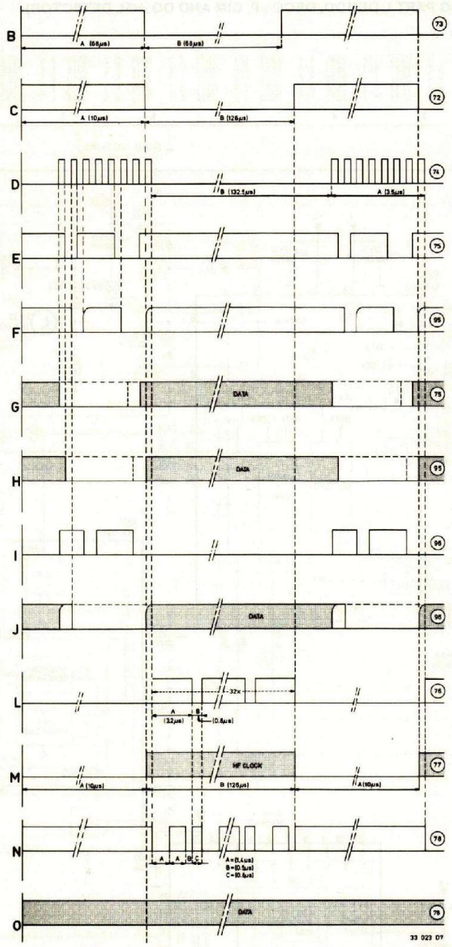
CS 90 316

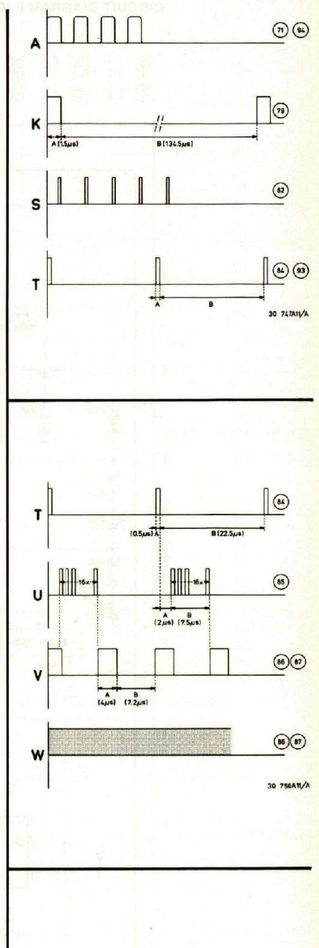
DECODING

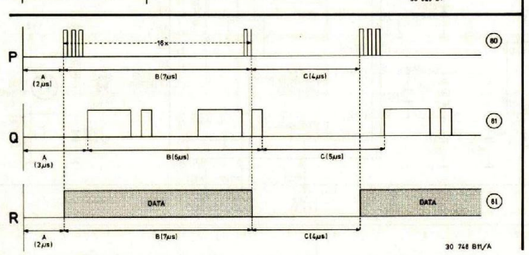
Nr.	See	Position	Amplitude	f	Time base
71	A	stop/play	0-5 V	4,32 MHz	
72	C	stop/play	0-5 V		A = 10* µs B = 126 µs
73	B	stop/play*	0-5 V	7,35 kHz	A = 68 µs B = 68 µs
74	D	stop/play	5-0 V		A = 3,5 µs B = 132,5 µs
75	E	stop	5-0 V		A = 3,5 µs B = 132,5 µs
75	G	play	0-5 V	DATA	
76	L	stop/play	0-5 V		A = 3,2 µs B = 0,8 µs
77	M	stop/play	0-5 V		A = 10 µs B = 126 µs
78	N	stop	0-5 V		A = 1,4 µs B = 0,5 µs C = 0,8 µs
78	O	play	5 V	DATA	
79	K	stop/play	0-5 V		A = 1,5 µs B = 134,5 µs
80	P	stop/play	0-5 V		A = 2 µs B = 7 µs C = 4 µs
81	Q	stop	0-5 V		A = 3 µs B = 6 µs C = 5 µs
81	R	play	0-5 V		A = 2 µs B = 7 µs C = 4 µs
82		stop	5 V	DC	
82	S	play with Drop-out test record	0-5 V		
84	T	stop/play	0-5 V		A = 0,5 µs B = 22,5 µs
85	U	stop/play	0-5 V		A = 2 µs B = 7,5 µs
86	V	stop	0-5 V		A = 4 µs B = 7,2 µs
86	W	stop	0-5 V		DATA
87	V	stop	5 V		A = 4 µs B = 7,2 µs
87	W	play	5 V		DATA
90	X	stop/play	0-5 V		A = 3,2 µs B = 2,4 µs
91	Y	stop	0-5 V		A = 1,2 µs B = 4,4 µs
91	Z	play	0-5 V		A = 3,2 µs B = 2,4 µs
92	Y	stop	0-5 V		A = 1,2 µs B = 4,4 µs
92	Z	play	0-5 V		A = 3,2 µs B = 2,4 µs
93	T	stop/play	0-5 V		A = 0,4 µs B = 5,5 µs
94	A	stop/play	0-5 V	4,23 MHz	
95	F	stop	5-0 V		
95	H	play	5-0 V		
96	I	stop	0-5 V		
96	J	play	5-0 V		

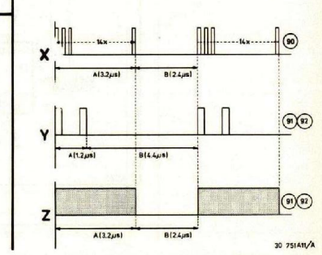
* In pos. stop, signal is only present **after** the set was brought in play mode.

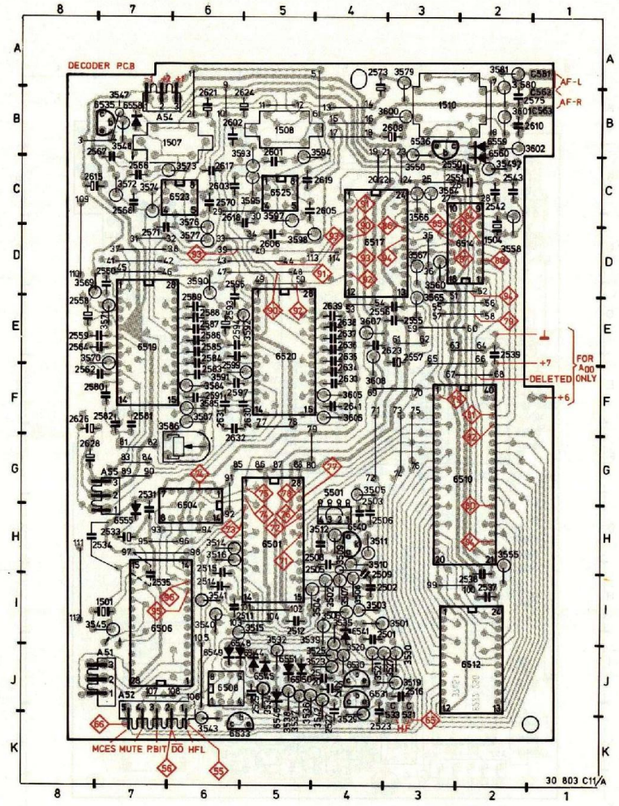
DECODING





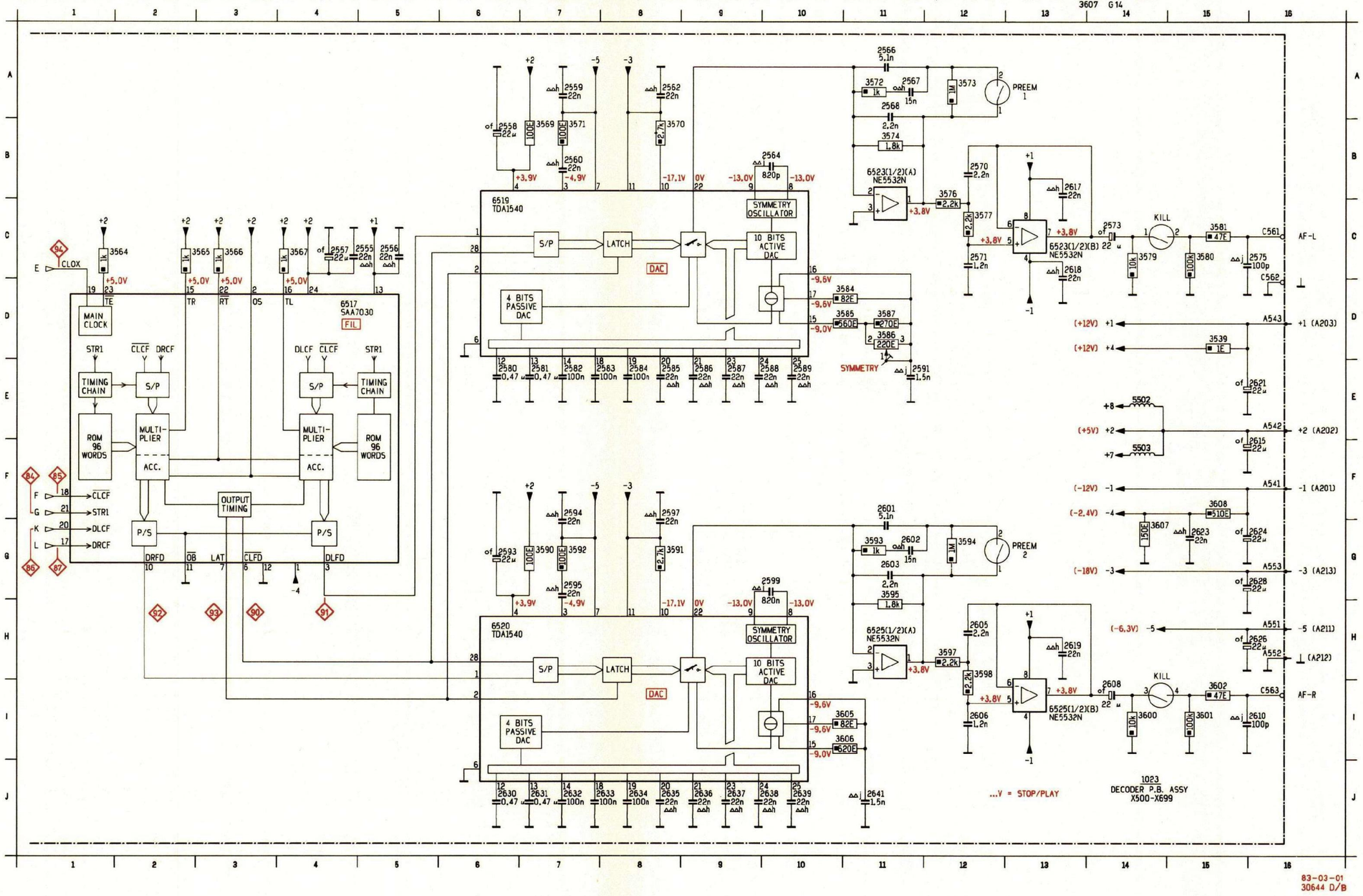






CIRCUIT DIAGRAM G (DECODING PART II, FIL, DAC's AND SUPPLY)

2555 C 5 2560 B 7 2568 A11 2580 E 6 2585 E 8 2591 E11 2599 J 1 2606 I12 2618 C13 2626 H16 2633 J 8 2638 J10 3564 C 2 3570 B 8 3576 J 1 3584 D11 3591 G 8 3597 J 1 3605 J 1 6520 H 6 6541 E15
2556 C 5 2562 A 8 2570 B12 2581 E 7 2586 E 9 2593 G 6 2601 J 1 2608 J 1 2619 H13 2628 G16 2634 J 8 2639 J10 3565 C 3 3571 B 7 3577 C12 3585 D11 3592 G 7 3598 H12 3606 J 1 6523
2557 C 4 2564 B10 2571 C12 2582 E 7 2587 E 9 2594 F 7 2602 J 1 2610 I16 2621 E16 2630 J 6 2635 J 8 2641 J11 3566 C 3 3572 A11 3579 C14 3586 J 1 3593 J 1 3600 I14 3608 J 1 6523
2558 B 6 2566 A11 2573 J 1 2583 E 8 2588 E10 2595 G 7 2603 J 1 2615 F16 2623 G15 2624 G16 2632 J 7 2637 J 9 3506 J 1 3567 C 4 3573 A12 3580 C15 3587 J 1 3594 G12 3601 I15 6517 D 4 6525
2559 A 7 2567 A11 2575 C16 2584 E 8 2589 E10 2597 F 8 2605 H12 2617 B13 2624 G16 2632 J 7 2637 J 9 3539 D15 3569 B 7 3574 B11 3581 C15 3590 G 7 3595 J 1 3602 J 1 6519 C 6 6525
3607 G14



83-03-01
30644 D/B

11. AMENDMENTS

Page changes
Entered with A83-109 dated 1983-03-02 from cancellation A00.

DESCRIPTION		REASON
Cover Sheet		CD100/05 added
Table of Contents	1-1-b	Table of contents modified
Table of Contents	1-2	Added table of contents
Specification	3-1-a	Specification expanded and modified
Repair Hints	5-1-a	Text modified
Service Tools	5-2-a	Code numbers changed
Repair Hints	5-4-a	Text expanded with regard to servicing the RAFOC unit
Measurements and Settings	6-1-a	Text modified
Measurements and Settings	6-2-a	Text modified
Electrical measurements and settings	6-3-a	Text "Laser power" adjusted
Electrical Measurements and Settings	6-4-a	Text "Adjusting the focus bandwidth" adjusted.
Exploded view of C.D.M.	7-2-1	Drawing + bill of materials adjusted
Exploded view of frame/cabinet	7-2-2	Exploded view modified
Mains filter	8-2-a	Drawing modified
Power supply	8-3-1	PCB drawing + bill of materials adjusted
Power supply	8-3-2	Schematic adapted for A01
PRE-AMP + laser schematic (NEG.VOLT.PH.)	8-5-1	Schematic adapted to production
PRE-AMP + laser PCB (NEG.VOLT.PH.)	8-5-2	PCB drawing + parts list adapted to production
PRE-AMP + laser schematic (POS.VOLT.SH.)	8-5-3	Schematic adapted for light pen with positive supply voltage
PRE-AMP + laser board (POS.VOLT.SH.)	8-5-4	PCB drawings + parts list adjusted
Servo PCB	8-9-a	PCB drawing + parts list adjusted
Servo PCB	8-10-a	PCB drawing + parts list adjusted
Decoder Schematic Part 1	8-15-1	Schematic adapted to production
Decoder PCB	8-15-2	PCB drawing adapted to production + parts list adapted
Decoder PCB	8-15-3	PCB drawing adapted to production + parts list adapted Scheme
Decoder Schematic Part 2	8-15-4	Schematic adapted to production
Standard Symbols	8-15-5	Added

Entered with A83-111 dated 1983-04-28

DESCRIPTION		REASON
Table of Contents	1-1-c	Amended
Table of Contents	1-2-a	Amended
Service Tools	5-2-b	Laser Simulator POS.VOLT.SH. added
Measurements and Settings	6-5	Measurement POS.VOLT.SH added

Entered with A83-134 dated 1983-09-08

DESCRIPTION		REASON
Fault Finding Method	10-1-a to 10-13-a	Changed Fault Finding Method

Entered with A84-118 dated 1984-04-20

DESCRIPTION		REASON
Cover Sheet		CD100/30 added
Table of Contents	1-1-e	Table of contents modified
Table of Contents	1-2-c	Table of contents added
Repair Hints	5-1-a	Pusher code number changed
Repair Hints	5-2-c	Code numbers changed
Repair Hints	5-4-b	Service RAFOC unit changed
Electrical measurements and settings	6-3-b	Changed layout
Electrical measurements and settings	6-4-b	Changed layout
Electrical measurements and settings	6-5-a	Text laser power added
Exploded view of C.D.M.	7-1-a	Changed layout
Exploded view of frame/cabinet	7-2-a	Changed layout
	7-1	Cancelled
	7-2	Cancelled
	7-2-1	Cancelled
	7-2-2	Cancelled
Main filter	8-2-b	Fuse changed
Power Supply	8-3-2a	Power supply (adapted to A09) added
Pre-amp + laser schematic (POS.VOLT SH.)	8-5-5	Schematic changed (laser power supply)
Pre-amp + laser schematic (POS.VOLT SH.)	8-5-6	Schematic changed (laser power supply)
Principal drawing Control PCB	8-7-1	Schematic changed
Wiring layout Control PCB	8-7-2	PCB adjusted
Servo schematic 1	8-11-1	Schematic changed
Servo PCB	8-11-2	Altered PCB
Servo PCB	8-11-3	Altered PCB
Servo schematic 2	8-11-4	Schematic changed
Decoder schematic 1	8-15-5	Schematic changed
Decoder PCB	8-15-6	PCB adjusted
Decoder PCB	8-15-7	PCB adjusted
Decode schematic 2	8-15-8	Schematic changed
Wiring drawing	9-2	Wiring changed
Change overview	11-1-c	Text added
Change overview	11-2	Added
Change overview	11-3	Added
Change overview	11-4	Added
Change overview	11-5	Added
Additional information	12-1-a	Text added

Parts and PCB changes
Entered with A84-118 dated 1984-04-20

CD100/00/05 SERVO PCB

PCB with Code	Expired, added, modified	Reason
A02	C2213 added	Improving focusing startup.
A03	C2259 changed to 15nF C2251 changed to 470nF C2244 changed to 560pF R3328 changed to 270k R3376 changed to 5k6 R3247 added	Improved stability. Protection of the Demod IC against electrostatic discharges.
A04	C2251 changed to 220nF	Faster capture.
A05	C2244 changed to 680pf C2259 changed to 22nF R3328 changed to 330k R3376 changed to 4k7 Trimming potentiometer R3315 changed to 15k fixed resistor.	Improve reading of the CD table of contents DC offset setting is dropped.
A06	Introduction of changed PCB layout 4 and service print.	
A07	C2217 changed to 3.3µF C2218 changed to 15nF R3255 changed to 22k R3257 changed to 27k R3260 changed to 56 k R3261 changed to 56 k D6253. BZX79/C7V5 added.	Prevent distortion of the first second of a track on some CDs. See Chapter 12 (Additional Information).
A08	Supply voltage - 2 A goes directly from the servo PCB to the lid switch.	The two connectors on the display PCB are no longer available (reduce cost).
A09	C2251 changed to 100nF R3375 changed to 68k R3315 changed to wanted in 27k	Improve reading of the CD table of contents Improve DC offset.

DECODER PCB

PCB with Code	Expired, added, modified	Reason
A01	R3501, 3502. 3504 and 3508 changed to 8M2 R3503. 3507 changed to 18k R3305, 3509 changed to 180k R2505 changed to 2k7	Improved drop-out behaviour.
A02	Stabilizer PCB for the power supply of Erco circuit expired. Demod-Erco interface PCB applied. R3515 changed to 1k	New Erco IC (M4281). Protection of Dernod-IC and Decode µP against electrostatic discharges.
A03	R3527 changed to 390Ω (390E) R3521 changed to 10k R3530 changed to 10k R3536 changed to 180k R3537 changed to 220k	Better signal processing of the HF detector circuit.
A04	Introduction of changed print layout 4 and service print. R3537 changed to 100k	 Preventing uncontrolled quick search.
A05	R3585 has been changed to 620Ω R3586, 3587 expired. R3601 has been changed to 1Ω R3506, 3508 expired. R3549 has been changed to 4k7 D6560 and R3550 expired. C2540. P3551. R3552. D6556 and D6557 added.	Installation of channel matching is unnecessary. Installation of the PLL coil is not applicable. Unpress the power off click.
A06	Demod-Erco interface PCB expired.	New Erco-IC M4282 applied.
A07	C2514 changed to 22nF C2515 changed to 1µF R3514 expired. R3516 changed to 3k9 C2517, R3522. R3531. D6542 and D6543 added.	Reduce interpolation at black spots on the CD New Demod-IC SAA7010 added.

PRE-AMP + LASER PCB

PCB with Code	Expired, added, modified	Reason
A01	C2142 expired Added R3193. R3195 and D6116.	Protection of the laser-diode.
A02	Connector A12 is rotated through 180°. **Note:** Only on this PCB marked with A02 is it mounted in this way.	Coil focus unit wound incorrectly. **Note:** when replacing with a new focus coil, turn A12, see chapter 12 (Additional information)
A03	R3152 changed to 12k R3115, 3116, 3118 and 3119 changed to 680k R3180 changed to 15 k	Increasing the HF output voltage Increasing the laser current. Adjustment of the control range of the laser current setting.
A04	Added 100nF capacitor between points 4 and 8 of IC6114. Added 10nF capacitor between points 4 and 7 of IC6107.	Protection of the laser diode against electrostatic discharges.
A05	R3152 changed to 15 k.	Increasing the HF output voltage.
A06	Introduction of modified PCB layout M2.	Modified laser diode power supply.
A07	Introduction of modified PCB layout M3.	Prevent the laser from burning when the lid is open

CD Mechanisim

PCB with Code	Expired, added, modified	Reason
A01	Change of PRE-AMP + LASER (POS.VOLT.SH.) from A00 to A01	Protection of the laser diode.
A02	PRE-AMP + LASER PCB changed from A05 to A06. Simultaneously applied new light pen.	Changed laser power supply, PCB layout and light pen. See Chapter 12 (Additional Information).
A03	Introduction of RAFOC arm in which the focus unit is integrated	Reduce Cost

Device

PCB with Code	Expired, added, modified	Reason
A01	Stabilizer PCB for the power supply of the Erco circuit has been discontinued. Demod-Erco interface PCB applied. Decoding PCB has been changed from A01 to A02.	New Erco IC (M4281).

CD100/30 SERVO PCB

PCB with Code	Expired, added, modified	Reason
A	C2217 changed to 3.3µF C2218 changed to 15nF R3255 changed to 22k R3257 changed to 27k R3260, 3261 changed to 56k D6253: BZX79/C7V5 added.	Prevent distortion of the first second of a track on some CDs. See Chapter 12 (Additional Information).
B	C2251 changed to 100nF R3375 changed to 68k	C2251 changed to 100nF R3375 changed to 68k
C and D	Never applied	
E	Changed the mounting of the transistors on the heatsink.	Reduce Cost

CD100/30 DECODER PCB

PCB with Code	Expired, added, modified	Reason
A	Demod-Erco Interface PCB expired.	New Erco IC (M4282).
B and C	C2514 changed to 22nF C2515 changed to 1µF R3516 changed to 3k9 R3514 expired C2517, R3522. R3531. D6542 and D6543 added.	Reduce interpolation at black spots on the CD New Demod-IC SAA7010 added.

12. ADDITIONAL INFORMATION

Service position of the decoder panel

Decoder panels that are NOT provided with service PCBs may NOT be placed in the horizontal service position (as given on page 5-3). These PCBs make closure in horizontal service position.

Stabilizer panel on the decoder panel

A stabilizer panel is mounted on the decoder panel for ERCO ICs that function to provide a supply voltage of 6V.
The ICs that operate on 6V are labeled "6V" or "6V and 12V".
The stabilizer panel is given on page 8-3-1.
The bias resistor must be set so that the voltage between points 10 and 20 of the ERCO IC is +6 V ± 20 mV.

µP in the servo circuit

On servo panels with stamping A03 and higher, the bridge wire 67-70 (in coordinate box F04 of the PCB drawing) has been replaced by a resistor of 1kΩ.

This resistor is added to protect the µP against static charge.

DEMOD IC

On decoder boards stamped A02 and above, resistor 3515 has been changed from 1Ω (1E) to 1kΩ.

This resistor has been modified to protect the DEMOD IC against static charge.

Connector A12 on PRE-AMP + LASER PCB

During production, focus coils were temporarily used with the winding direction reversed.

In this case, connector A12 on the PRE-AMP + LASER PCB is rotated 180° in relation to the PCB drawing. The focus coils supplied for service all have the same winding direction.

If a lens unit or PRE-AMP + LASER PCB has to be replaced, attention must be paid to the position of connector A12.

When the connector is rotated 180° compared to the drawing in the manual, the following measures must be taken.

- If the lens unit is replaced, assemble connector A12 as given in the PCB drawing.
- If the PR E-AMPL + LASER PCB is replaced, rotate connector A12 180° on the service-supplied PCB.

Changed motor control / Replaced MAB8420 by MAB8440 Servo-µP

If the servo µP MAB8420 is replaced by the MAB8440 it is desirable to make the following changes.

Change C2217 to 3.3uF
Change C2218 to 15nF
Change R3255 to 22k
Change R3257 to 27k
Change R3260 to 56k
Change R3261 to 56k
D6253: BZX79/C7V5 added.

Pre-amplifier board + light pen (POS. VOLT. SH.)

With effect from version number A06, the PCB layout of the pre-amplifier print has been changed and a new light pen is used in combination with this.

The new light pen can be recognized by some red paint on the laser mounting PCB.

Consequently, during repair, you may now be faced with the following possibilities.

A1. Devices equipped with a preamplifier board with a version number lower than A06 and a light pen not marked with paint.

If the preamplifier board is replaced by a version higher than A05, the following change must be made:

Fit a 470ohms resistor between A111 and A113.
Before switching on the device, turn R3180 all the way to the right. After switching on, carefully adjust the laser current with R3180.

A2. A light pen without a paint mark must be replaced with a light pen with a paint mark.

No change necessary, however, **before switching on** R3180 must be turned clockwise as far as possible.

After switching on, carefully adjust the laser current with R3180

B1. Devices equipped with a pre-amplifier with a performance number A06 and above **together** with a marked light pen.

If the preamplifier board is replaced by one with a lower version number than A06, R3180 must be turned all the way clockwise **before switching on** the device. After switching on, the laser current can then be carefully set with R3180.

B2. When replacing the light pen with a light pen without a paint mark, the following change must be made.

Fit a 470Ω resistor between A111 and A113.

Turn R3180 fully clockwise **before switching on** and carefully adjust the laser current with R3180 after switching on.

The new light pen will be delivered under the old order number.

To prevent unwanted high failure rates of light pens, it is used in a number of devices. where positive supply voltage lasers are used the laser current setting is increased to 800 mV (measured across R3308). this in contrast to its current value (575 mV ± 75 mV).

With this type of laser, this increase has no consequences on the expected service life.

Service
Service
Service Information

1984-09-01

CD100

A84-124

NL

Already published A83-109, A83-111, A83-134, A84-118

The following pages have been changed/added to adapt the Service Manual.

Change Sheets

1-1-f
1-2-d
8-7-2-a
8-11-3-a
11-2-a

COMPACT disc DIGITAL AUDIO

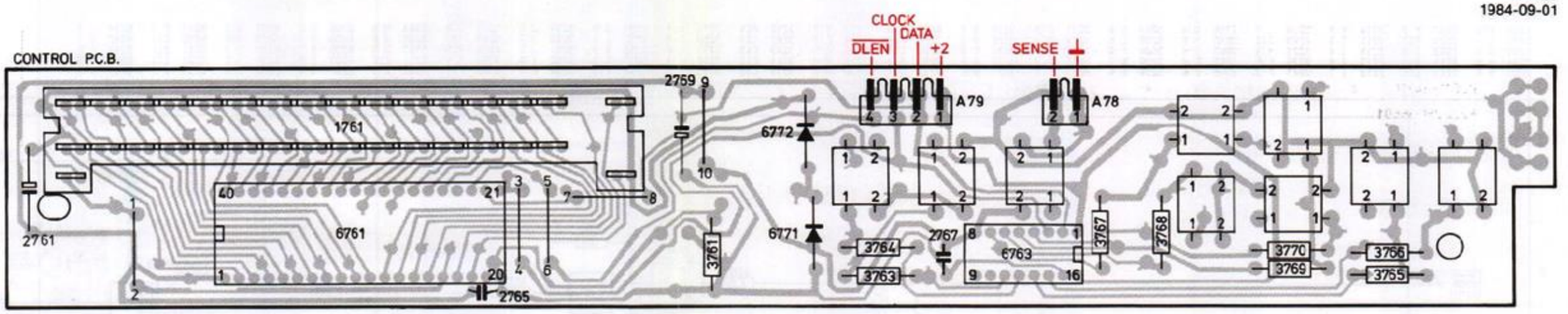
1. TABLE OF CONTENTS PER PAGE

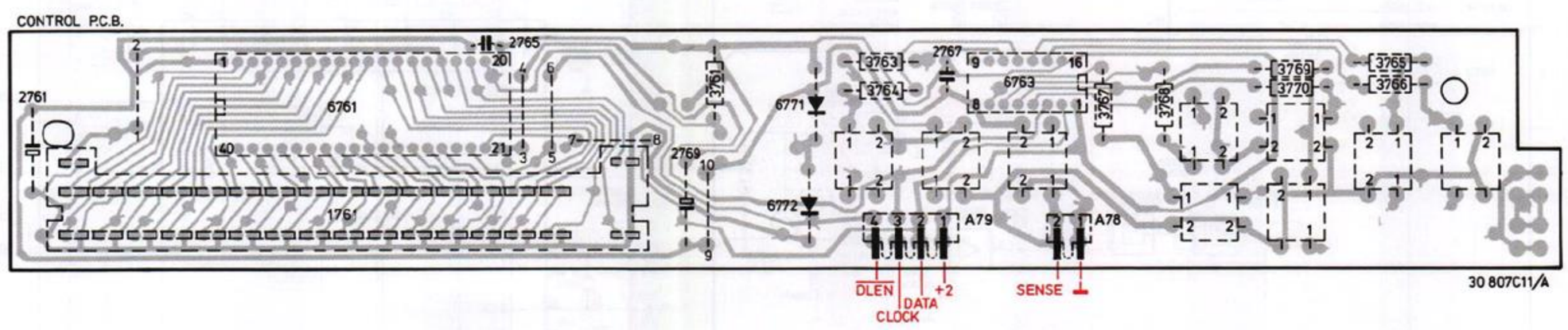
Chapter	Page	Contents	
2	2-1	Explanation of the layout of the Documentation	
3	3-1-a	Technical Specification	A83-109
4	4-1	Controls	
5	5-1-a	Repair Hints	A84-118
	5-2-c	Bill Of Materials - Tools	A84-118
	5-3	Removing the Frame	
		Replacing the Transformer Fuse	
		Servicing the Mains Input Filter	
		Servicing the Decoding Board	
		Servicing the Servo Board	
		Servicing the Switch and Display Board	
		Replacing the LED Board	
		Replacing the Turntable Motor	
	5-4-b	Replacing the Lid	A84-118
		Service of the RAFOC unit	
6	6-1-a	Turntable Height Adjustment	A83-109
		Checking the Angle Setting	
	6-2-a	Adjusting the Angle Setting	A83-109
	6-3-b	Measurement Specification	A84-118
		Changing the Transformer Connections	
		Adjusting the Offset Control	
		Control of the A.G.C. and Offset circuits	
	6-4-b	Laser Power Control and Adjustment (NEG. VOLT. PH.)	A84-118
		Adjusting the Focus Bandwidth	
	6-5-a	Laser Power Control and Adjustment (POS. VOLT. SH.)	A84-118
7	7-1-a	Exploded view of the mechanism/parts list	A84-118
	7-2-a	Exploded view of the Cabinet	A84-118
		BOMs	
		Exploded View of the Frame	

Chapter	Page	Contents	
8	8-1	Block Diagram	
	8-2-b	Mains Filter Circuit Schematic Mains Filter PCB Drawing BOM	A84-118
	8-3	Power Supply Circuit Schematic Power Supply PCB Drawing BOM	
	8-3-1	Power Supply Circuit Schematic Power Supply PCB Drawing BOM	A83-109
		6V Power Supply Circuit Schematic 6V Power Supply PCB Drawing BOM	
	8-3-2-a	Power Supply Circuit Schematic BOM	A84-118
	8-4	Pre-amplifier Circuit Schematic	
	8-5	Pre-amplifier PCB Drawing BOM	
	8-5-1	Pre-amplifier Circuit Schematic	A83-109
	8-5-2	Pre-amplifier PCB Drawing (NEG. VOLT. PH.) BOM	A83-109
	8-5-3	Pre-amplifier Circuit Schematic	A83-109
	8-5-4	Pre-amplifier PCB Drawing (POS. VOLT. SH.) BOM	A83-109
	8-5-5	Pre-amplifier Circuit Schematic	A84-118
	8-5-6	Pre-amplifier PCB Drawing (POS. VOLT. SH.) BOM	A84-118
	8-6	Control Circuit Schematic	
	8-7	Control PCB Drawing BOM	
	8-7-1	Control Circuit Schematic	A84-118
	8-7-2-a	Control PCB Drawing BOM	A84-124

Chapter	Page	Contents	
8	8-8	Servo Circuit Schematic (part 1)	
	8-9-a	Servo PCB Drawing BOM	A83-109
	8-10-a	Servo PCB Drawing BOM	A83-109
	8-11	Servo Circuit Schematic (part 2)	
	8-11-1	Servo Circuit Schematic (part 1)	A84-118
	8-11-2	Servo PCB Drawing	A84-118
	8-11-3-a	Servo PCB Drawing BOM	A84-124
	8-11-4	Servo Circuit Schematic (part 2)	A84-118
	8-12	Decoder Circuit Schematic (part 1)	
	8-13	Decoder PCB Drawing BOM	
	8-14	Decoder PCB Drawing BOM	
	8-15	Decoder Circuit Schematic (part 2)	
	8-15-1	Decoder Circuit Schematic (part 1)	A83-109
	8-15-2	Decoder PCB Drawing BOM	A83-109
	8-15-3	Decoder PCB Drawing BOM	A83-109
	8-15-4	Decoder Circuit Schematic (part 2)	A83-109
	8-15-5	Decoder Circuit Schematic (part 1)	A84-118
	8-15-6	Decoder PCB Drawing BOM	A84-118
	8-15-7	Decoder PCB Drawing BOM	A84-118
8	8-15-8	Decoder Circuit Schematic (part 2)	A84-118
	8-16	List of Standard Symbols	A83-109
9	9-1	Wiring Drawing	
	9-2	Wiring Drawing	A84-118
10	10-1-a	Fault Finding Method	A84-134
	10-2-a	Fault Finding Method	A84-134
	10-2-1	Fault Finding Method	A84-134
	10-2-2	Fault Finding Method	A84-134
	10-3-a	Fault Finding Method	A84-134
	10-4-a	Fault Finding Method	A84-134
	10-5-a	Fault Finding Method	A84-134
	10-6-a	Fault Finding Method	A84-134
	10-7-a	Fault Finding Method	A84-134
	10-8-a	Fault Finding Method	A84-134
	10-9-a	Fault Finding Method	A84-134
	10-10-a	Fault Finding Method	A84-134
	10-11-a	Fault Finding Method	A84-134
	10-12-a	Fault Finding Method	A84-134
	10-13-a	Fault Finding Method	A84-134
11	11-1-c	Amendments	A84-134
	11-2-a	Amendments	A84-124
	11-3	Amendments	A84-118
	11-4	Amendments	A84-118
	11-5	Amendments	A84-118
12	12-1-a	Additional Information	A84-118

8-7-2a
1984-09-01

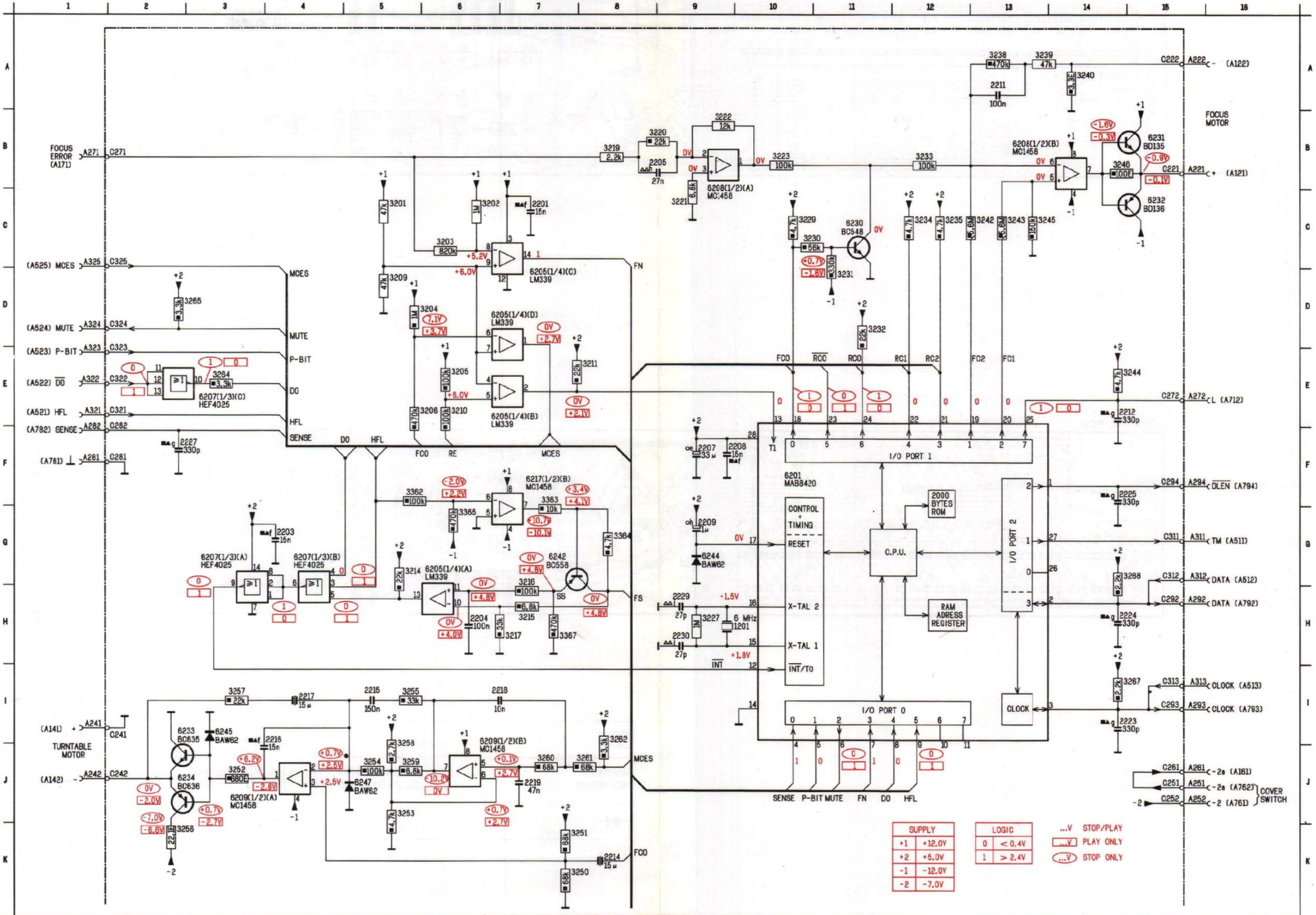




MM5450	4822 209 10199	LN324GP (green)	4822 130 31429
HEF4094B	5322 209 14485	LN224RP (red)	4822 130 31431
1N4001G	4822 130 31438		4822 271 30259

CS 97 350

1201 H10 2207 F 9 2214 K 8 2219 J 7 2229 H 9 3204 D 6 3211 E 8 3219 B 8 3227 H 9 3233 B12 3240 A14 3246 B14 3254 J 5 3259 J 5 3265 D 3 3364 G 8 6205 G 6 6207 G 3 6217 F 7 6234 J 3
2201 C 7 2208 F10 2215 I 5 2223 I15 2230 H 9 3201 C 5 3205 E 6 3214 G 5 3220 B 9 3229 C10 3230 C10 3235 C12 3242 C13 3250 K 8 3255 I 5 3260 J 7 3267 I15 3362 F 5 3365 G 6 6205 D 7 6208 B13 6230 C11 6242 G 7
2203 G 4 2209 G 9 2216 I 4 2224 H15 3201 C 5 3206 E 6 3215 H 7 3221 C 9 3230 C10 3235 C12 3243 C13 3251 K 8 3256 K 3 3261 J 8 3268 G15 3367 H 7 6205 D 7 6208 B 9 6231 B15 6244 G 9
2204 H 6 2211 A13 2217 I 4 2225 F15 3202 C 6 3209 D 5 3216 G 7 3222 B 9 3231 D11 3238 A13 3244 E15 3252 J 3 3257 I 3 3262 I 8 6201 F10 6207 E 3 6209 I 6 6232 C15 6245 I 3
2205 B 9 2212 E15 2218 I 7 2227 F 3 3203 C 6 3210 E 6 3217 H 7 3223 B10 3232 D11 3239 A13 3245 C13 3253 J 5 3258 I 5 3264 E 3 3363 F 7 6205 E 7 6207 G 4 6209 J 3 6233 I 3 6247 J 5



CS 84 862

82-10-12
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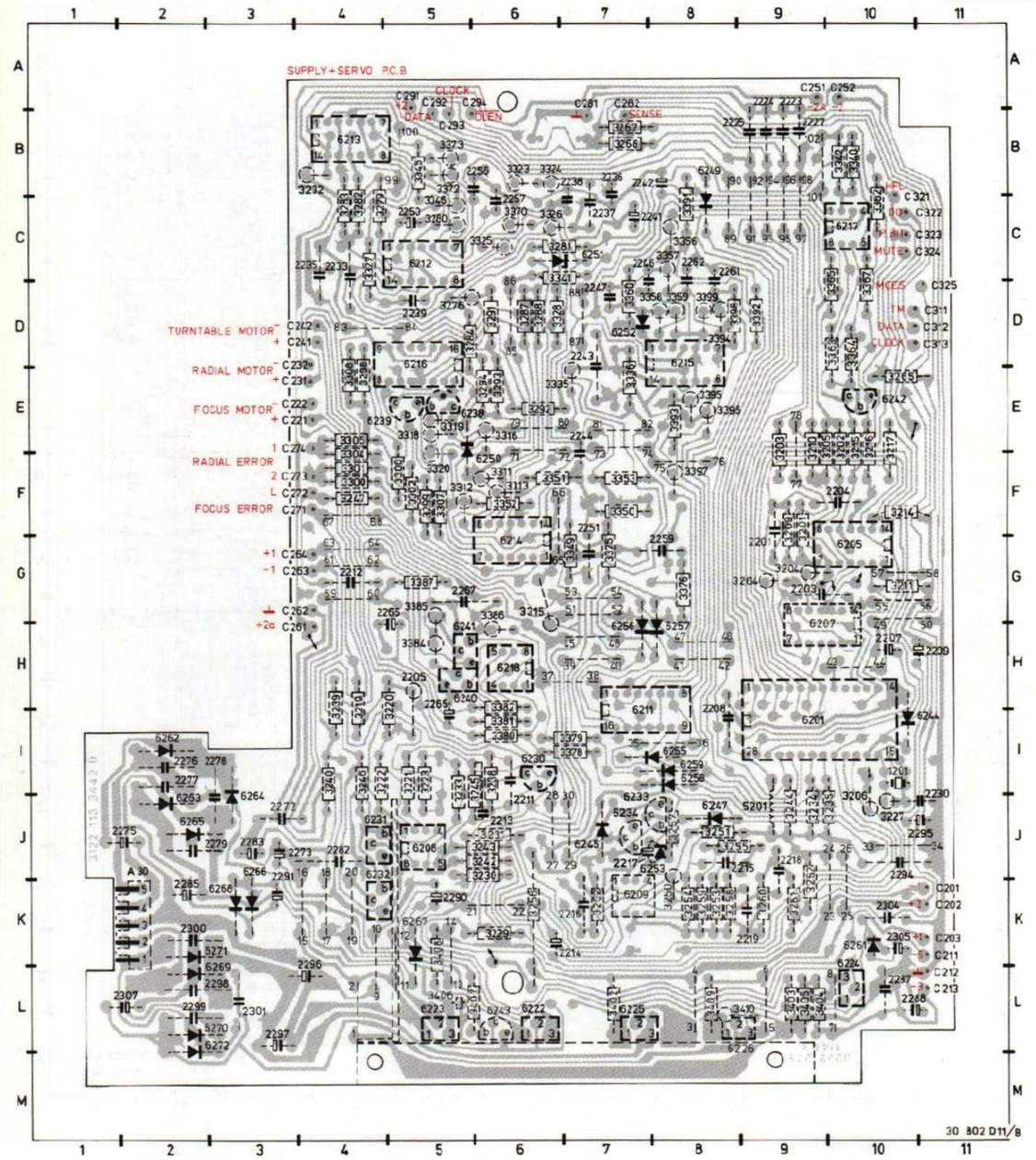
IC		
HEF4025BP		4822 209 10254
LM339N		4822 209 80631
MAB8440PB/D023		4822 209 10868
MC1458N		4822 209 81349
Transistor		
BC548B		4822 130 40937
BC558		4822 130 40941
BC635		5322 130 44349
BC636		4822 130 44283
BD135		4822 130 40823
BD136		4822 130 40824
Diode		
BAW62		4822 130 30613
Crystal		
1201	6.0 MHz	4822 242 70392
Resistor		
3201,3209,3239	47k - 1% MR25	5322 116 54671
3202	1M - 1% MR25	5322 116 55535
3203	820k - 1% MR25	5322 116 51398
3204,3227	1M - 5% SFR25	4822 110 73187
3219	2k2 - 1% MR25	4822 116 51245
3220	22k - 1% MR25	4822 116 51257
3222	12k - 1% MR25	5322 116 51254
3223,3233	100k - 1% MR25	4822 116 51268
3256	22E1 - 1% MR25	5322 116 50256
Capacitor		
2204,2211	100n - 10%	4822 121 41672
2208	100n - 20+100	4822 121 42019
2215	150n - 10%	4822 121 41682
2218	15n - 10%	4822 121 42021
2219	47n - 10%	4822 121 41676
IC		
28p		4822 255 40156
Coil		
5201		4822 156 20966



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2205	H05	2212	G04	2218	J09	2230	J11	2238	C07	2244	F07	2256	B05	2265	I05	2275	J02	2282	J04
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2288	L10	2296	L04	2301	L03	3202	E10	3209	F09	3216	E10	3223	I05	3232	B04	3240	I04	3246	I04
2290	K05	2297	L03	2304	K10	3203	E09	3210	E09	3217	E10	3227	J10	3233	I05	3242	J06	3247	F04
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3252	K07	3257	J08	3262	K09	3275	D05	3284	D05	3293	E06	3301	F04	3307	F05	3315	G06	3323	B06
3253	K08	3258	K08	3264	G09	3279	C04	3287	D06	3294	E06	3302	F05	3308	E04	3316	E06	3324	B06
3254	K08	3259	K08	3265	E10	3280	C05	3288	D06	3298	E04	3304	F04	3311	F06	3318	E05	3325	C06
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3336	E07	3346	C05	3353	F07	3360	D07	3367	D10	3376	G08	3382	H06	3351	C08	3396	E08	3403	L09
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3405	L09	4307	L05	6208	J05	6214	G06	6222	L06	6231	J04	6239	E05	6244	I10	6252	D07	6258	I08
3408	K05	5201	J09	6209	K07	6215	D08	6224	L10	6232	K04	6240	H05	6245	J07	6253	J08	6259	I08
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6264	J03	6269	L02																
6265	J02	6270	L02																
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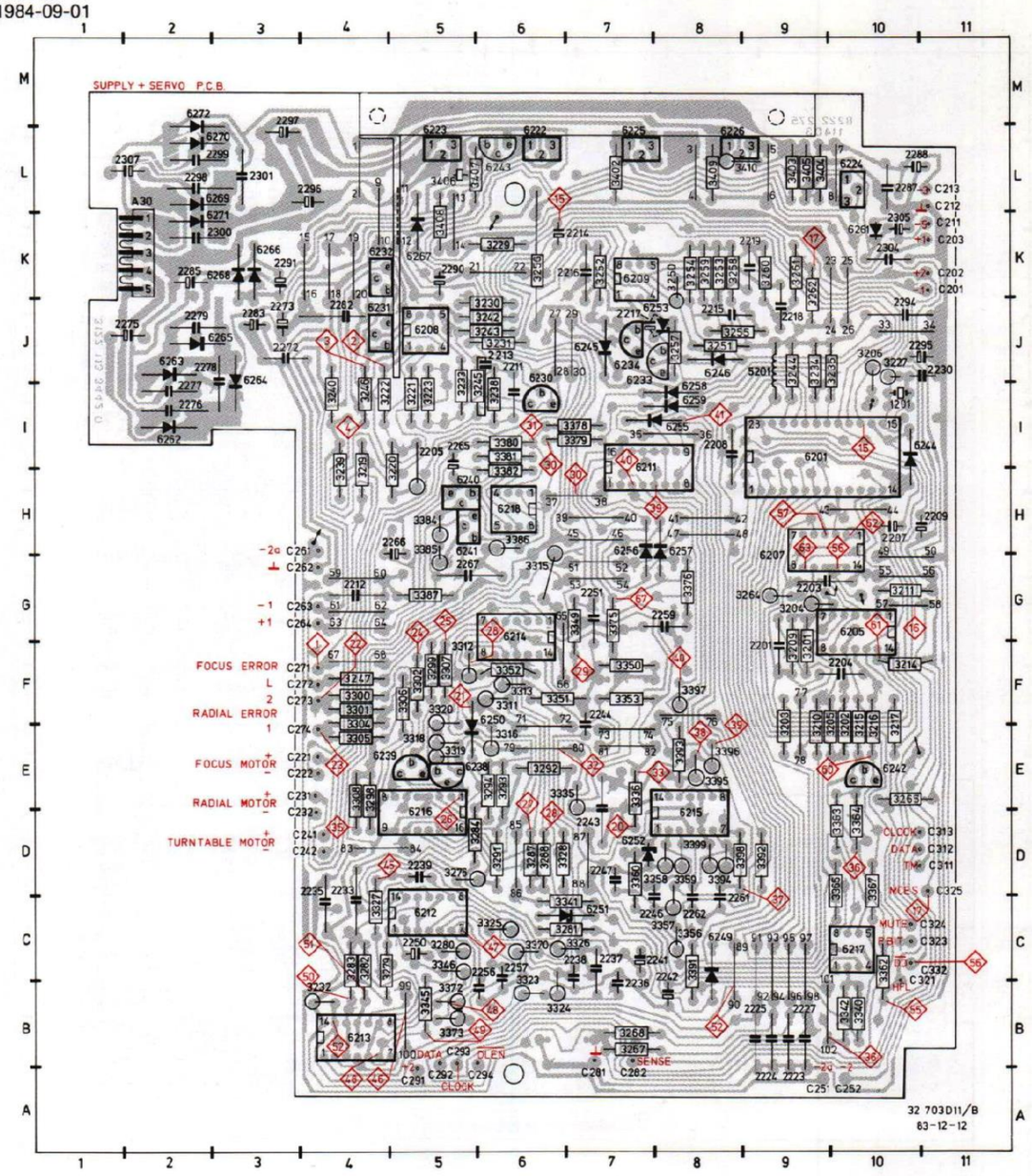
6267	K05	6272	M02																
6268	K03																		

8-11-3-a
1984-09-01



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HEF4070BP		4822 209 10265
LM324N		4822 209 80587
MC1458N		4822 209 81349
TCA240		4822 209 80629
µA741CN		4822 209 80617
BC548B		4822 130 40937
BD135		4822 130 40823
BD136		4822 130 40824
BF494		4822 130 44195
BAW62		4822 130 30613
BZX79-C2V4		4822 130 31253
BZX79-C7V5		4822 130 30861
3315	10k	4822 100 10035
3201, 3279,3280, 3282,3283	47k - 1% MR25	5322 116 54671
3287,3288	6k8 - 1% MR25	4822 116 51252
3298,3308	470E - 1% MR25	5322 116 54854
3299,3306	2k7 - 1% MR25	4822 116 51283
3300,3301, 3304,3305	10k - 1% MR25	4822 116 51253
3311,3312	82k - 1% MR25	5322 116 55374
3323	120k - 1% MR25	4822 116 51467
3324,3325	75k - 1% MR25	4822 116 51267
3326	220k - 1% MR25	4822 116 51272
3328	270k - 1% MR25	4822 116 51885
3357	3k9 - 1% MR25	4822 116 51249
3358	360k - 1% MR25	5322 116 55264
3370	27k - 1% MR25	5322 116 54652
3373	180k - 1% MR25	5322 116 54722
3384,3385	9E4 P.T.C.	4822 116 40031
3391	5k6 - 1% MR25	4822 116 51281
3392	13k - 1% MR25	5322 116 50522
3394	330k - 1% MR25	4822 116 51207
2233,2243	470n - 10%	4822 121 41674
2236,2238	5n6 - 1%	4822 121 50543
2237	33n - 10%	4822 121 41675
2246,2247, 2257,2261, 2262	6n8 - 1%	4822 121 50538
2251	100n - 10%	4822 121 41672
2256	1n8 - 1%	5322 121 54087
2259	22n - 10%	4822 121 41664
2267	1000n - 10%	4822 121 41719

1201	I10	2207	H10	2213	J06	2219	K09	2233	C04	2239	D05	2246	C07	2257	C06	2266	G05	2276	I02
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2203	G09	2209	H10	2216	K07	2225	B09	2236	B07	2242	B08	2250	C05	2261	C08	2272	J03	2278	J03
2204	F10	2211	I06	2217	J07	2227	B09	2237	C07	2243	D07	2251	G07	2262	C08	2273	J03	2279	J02
2205	H05	2212	G04	2218	J09	2230	J11	2238	C07	2244	F07	2256	B05	2265	I05	2275	J02	2282	J04
2283	B09	2291	K03	2298	L02	2305	K10	3204	G09	3211	G10	3219	H04	3229	K06	3234	J09	3243	J06
2285	K02	2294	J10	2299	L02	2307	L02	3205	E09	3214	F10	3221	I05	3230	J06	3238	I06	3244	J09
2287	L10	2295	J10	2300	K02	3201	F09	3206	J10	3215	E10	3222	I04	3231	J06	3239	H04	3245	J06
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3252	K07	3257	J08	3262	K09	3276	D05	3284	D05	3293	E06	3301	F04	3307	F05	3315	G06	3323	B06
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3327	C04	3341	C06	3350	F07	3357	C08	3363	D10	3372	B05	3379	I07	3385	G05	3393	E08	3398	D08
3328	D06	3342	B10	3351	F06	3358	D08	3364	D10	3373	B05	3380	I06	3386	H06	3394	D08	3399	D08
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3336	E07	3346	C05	3353	F07	3360	D07	3367	D10	3376	G08	3382	H06	3391	C08	3396	E08	3403	L09
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3409	L08	6201	I09	6211	I07	6216	D05	6225	L07	6233	J08	6241	H05	6246	J08	6255	I08	6261	K10
3410	L08	6206	G10	6212	C05	6217	C10	6226	L08	6234	J07	6242	E10	6249	C08	6256	H07	6262	I02
4306	L05	6207	G09	6213	B04	6218	H06	6230	I06	6238	E05	6243	L06	6250	E05	6257	H08	6263	J02
6264	J03	6269	L02																
6265	J02	6270	L02																
6266	K03	6271	K02																
6267	K05	6272	M02																
6268	K03																		

11. AMENDMENTS

Page changes
Entered with A83-109 dated 1983-03-02 from cancellation A00.

DESCRIPTION		REASON
Cover Sheet		CD100/05 added
Table of Contents	1-1-b	Table of contents modified
Table of Contents	1-2	Added table of contents
Specification	3-1-a	Specification expanded and modified
Repair Hints	5-1-a	Text modified
Service Tools	5-2-a	Code numbers changed
Repair Hints	5-4-a	Text expanded with regard to servicing the RAFOC unit
Measurements and Settings	6-1-a	Text modified
Measurements and Settings	6-2-a	Text modified
Electrical measurements and settings	6-3-a	Text "Laser power" adjusted
Electrical Measurements and Settings	6-4-a	Text "Adjusting the focus bandwidth" adjusted.
Exploded view of C.D.M.	7-2-1	Drawing + bill of materials adjusted
Exploded view of frame/cabinet	7-2-2	Exploded view modified
Mains filter	8-2-a	Drawing modified
Power supply	8-3-1	PCB drawing + bill of materials adjusted
Power supply	8-3-2	Schematic adapted for A01
PRE-AMP + laser schematic (NEG.VOLT.PH.)	8-5-1	Schematic adapted to production
PRE-AMP + laser PCB (NEG.VOLT.PH.)	8-5-2	PCB drawing + parts list adapted to production
PRE-AMP + laser schematic (POS.VOLT.SH.)	8-5-3	Schematic adapted for light pen with positive supply voltage
PRE-AMP + laser board (POS.VOLT.SH.)	8-5-4	PCB drawings + parts list adjusted
Servo PCB	8-9-a	PCB drawing + parts list adjusted
Servo PCB	8-10-a	PCB drawing + parts list adjusted
Decoder Schematic Part 1	8-15-1	Schematic adapted to production
Decoder PCB	8-15-2	PCB drawing adapted to production + parts list adapted
Decoder PCB	8-15-3	PCB drawing adapted to production + parts list adapted Scheme
Decoder Schematic Part 2	8-15-4	Schematic adapted to production
Standard Symbols	8-15-5	Added

Entered with A83-111 dated 1983-04-28

DESCRIPTION		REASON
Table of Contents	1-1-c	Amended
Table of Contents	1-2-a	Amended
Service Tools	5-2-b	Laser Simulator POS.VOLT.SH. added
Measurements and Settings	6-5	Measurement POS.VOLT.SH added

Entered with A83-134 dated 1983-09-08

DESCRIPTION		REASON
Fault Finding Method	10-1-a to 10-13-a	Changed Fault Finding Method

Entered with A84-118 dated 1984-04-20

DESCRIPTION		REASON
Cover Sheet		CD100/30 added
Table of Contents	1-1-e	Table of contents modified
Table of Contents	1-2-c	Table of contents added
Repair Hints	5-1-a	Pusher code number changed
Repair Hints	5-2-c	Code numbers changed
Repair Hints	5-4-b	Service RAFOC unit changed
Electrical measurements and settings	6-3-b	Changed layout
Electrical measurements and settings	6-4-b	Changed layout
Electrical measurements and settings	6-5-a	Text laser power added
Exploded view of C.D.M.	7-1-a	Changed layout
Exploded view of frame/cabinet	7-2-a	Changed layout
	7-1	Cancelled
	7-2	Cancelled
	7-2-1	Cancelled
	7-2-2	Cancelled
Main filter	8-2-b	Fuse changed
Power Supply	8-3-2a	Power supply (adapted to A09) added
Pre-amp + laser schematic (POS.VOLT SH.)	8-5-5	Schematic changed (laser power supply)
Pre-amp + laser schematic (POS.VOLT SH.)	8-5-6	Schematic changed (laser power supply)
Principal drawing Control PCB	8-7-1	Schematic changed
Wiring layout Control PCB	8-7-2	PCB adjusted
Servo schematic 1	8-11-1	Schematic changed
Servo PCB	8-11-2	Altered PCB
Servo PCB	8-11-3	Altered PCB
Servo schedule 2	8-11-4	Schematic changed
Decoder schematic 1	8-15-5	Schematic changed
Decoder PCB	8-15-6	PCB adjusted
Decoder PCB	8-15-7	PCB adjusted
Decode schematic 2	8-15-8	Schematic changed
Wiring drawing	9-2	Wiring changed
Change overview	11-1-c	Text added
Change overview	11-2	Added
Change overview	11-3	Added
Change overview	11-4	Added
Change overview	11-5	Added
Additional information	12-1-a	Text added

Entered with A84-124 dated 1984-09-01

DESCRIPTION		REASON
Table of Contents	1-1-f	Table of Contents modified
Table of Contents	1-2-d	Table of Contents modified
Control PCB	8-7-b	Table of Contents modified
Servo PCB	8-11-3-a	Altered PCB
Change Overview	11-2-a	Text added