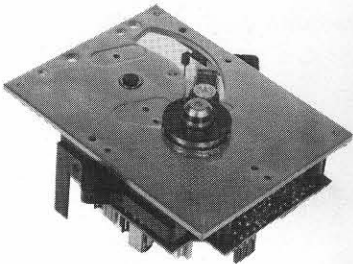


Service  
Service  
Service

COMPACT  
disc  
DIGITAL AUDIO

Compact disc player  
MECHANISM



35 992 A11

# Service Manual

For reasons of production, several versions of the C.D. mechanism have been applied.  
The C.D. mechanisms are in most cases marked with a

round, yellow sticker provided with a letter impression.  
The table below indicates with exploded view and which HF pre-amplifier/laser supply PCB should be consulted.

| Sticker C.D.M. | exploded view drawing    | H.F. Pré-amp.+laser supply PCB +circuit diagram |
|----------------|--------------------------|-------------------------------------------------|
| absent         | see *                    | see *                                           |
| A              | B                        | VI                                              |
| B              | B                        | III                                             |
| C              | see Service Manual CDM 1 | see Service Manual CDM 1                        |
| D              | see Service Manual CDM 1 | see Service Manual CDM 1                        |
| E              | B                        | V                                               |
| F              | B                        | III                                             |
| G              | see Service Manual CDM 1 | see Service Manual CDM 1                        |
| H              | see Service Manual CDM 1 | see Service Manual CDM 1                        |

| *<br>NO STICKER ON C.D.M.                                                         |                          |                                                 |
|-----------------------------------------------------------------------------------|--------------------------|-------------------------------------------------|
| C.D.M. Version                                                                    | exploded view drawing    | H.F. Pré-amp.+laser supply PCB +circuit diagram |
| Not integrated arm and pré-ampl.<br>Printed panel marked A00-A05                  | A                        | I                                               |
| Not integrated arm and pré-ampl.<br>Printed panel marked A06 and higher           | A                        | III                                             |
| Not integrated arm and pré-ampl.<br>Printed panel marked with discrete components | A                        | II                                              |
| Integrated arm and pré-ampl.<br>Printed panel marked A06 and higher               | B                        | III                                             |
| Integrated arm and pré-ampl.<br>Printed panel with discrete components            | B                        | II                                              |
| C.D.M.-1                                                                          | see Service Manual CDM-1 | see Service Manual CDM-1                        |

# SERVICING HINTS

In order to prevent loose metal objects from getting in the CD mechanism it will be necessary to see to a clean repair station.

The objective can be cleaned with a blow brush.

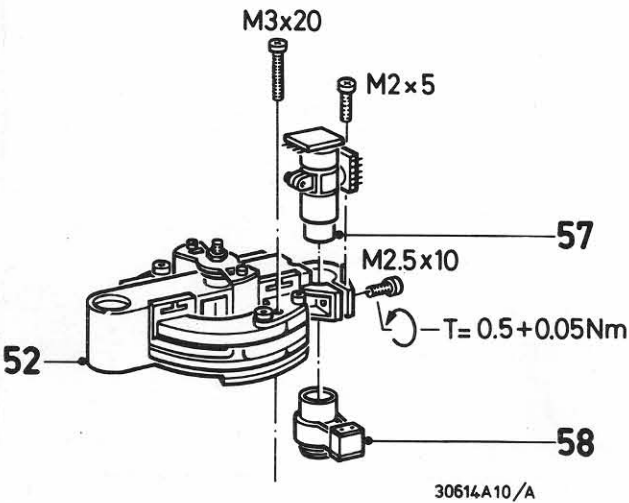
The CD-mechanism is provided with self-lubricating bearings and should thus NOT be lubricated.

Ensure that the player is not resting on the shaft of the turntable motor during repairs and measurements on the bottom.

THE LIGHT PIN IS MUCH MORE SENSITIVE TO STATIC CHARGE THAN A MOS IC. CARELESS TREATMENT DURING SERVICING MAY REDUCE LIFE EXPECTANCY DRASTICALLY. FOR THIS REASON CARE SHOULD BE TAKEN THAT DURING SERVICING THE POTENTIALS OF THE AIDS AND YOURSELF EQUAL THE POTENTIAL OF THE MECHANISM.

see "C.D. MECHANISM A"

Servicing the RAFOC unit (= Radial and Focusing unit)



- Decase the frame.
  - Take the two flex PCBs out of the connectors on the preamplifier unit.
  - The unit can be removed after the two fixing screws M3x20 have been loosened (see Fig.).
  - The unit consists of 5 service components: 2 flex PCBs, radial motor item number 52, light pin item number 57 and focusing unit item number 58.
  - If the focusing unit has to be replaced, screw M2,5x10 must be loosened and screw M2x5 removed.
  - For replacing the light pin it is not necessary to remove the RAFOC unit.
- The light pin can be replaced after screw M2,5x10 has been loosened.
- During mounting, the light pin must be pushed into the arm as far as possible, and turned clockwise.

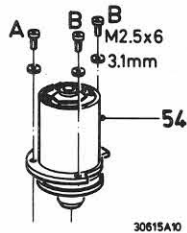
See "C.D. MECHANISM. B."

Servicing the RAFOC unit (= Radial and Focusing unit)

- Decase the frame.
  - Take the two flex PCBs out of the connectors on the preamplifier unit.
  - The unit can be removed after the two fixing screws M3 x 20 have been loosened.
  - The unit consists of 4 service components: 2 flex PCBs, radial motor + focusing unit item number 52, light pin item number 57.
  - For replacing the light pin it is not necessary to remove the RAFOC unit.
- The light pin can be removed by turning it anti-clockwise by means of an open-ended spanner of 12 mm and afterwards pulling it out of the arm.
- During mounting, the light pin must be pushed into the arm as far as possible, and turned clockwise.

Attention:  
To prevent adjustments from changing, NO SCREWS OTHER than those mentioned above should be loosened.

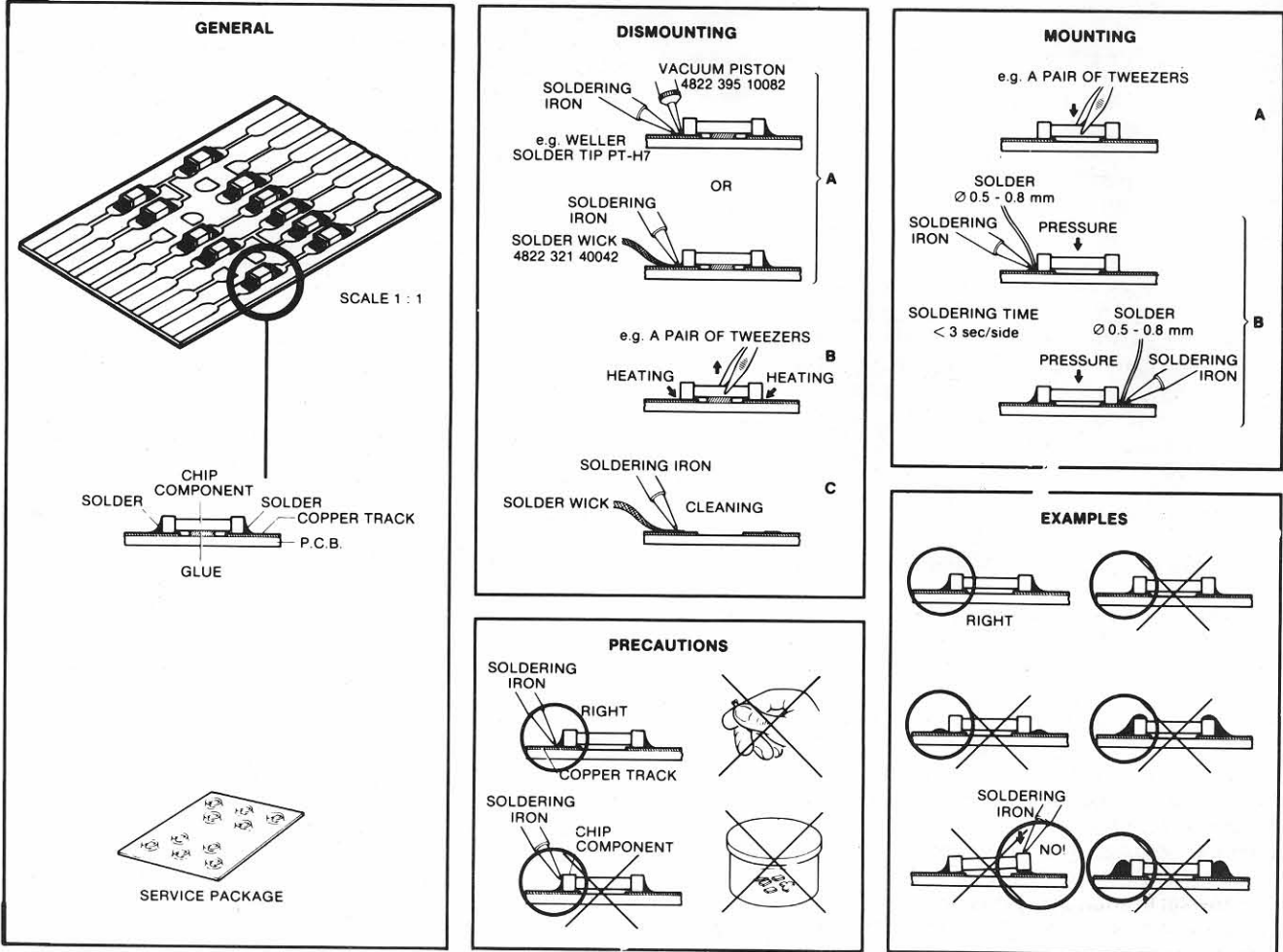
Replacing the turntable motor



- Decase the frame.
- Remove the preamplifier PCB which is fixed to the CD-mechanism by means of four screws.
- The turntable motor is fixed to the chassis plate by means of 3 screws.
- For mounting, screw A should be applied first (see Fig.).

Attention  
After mounting of the motor subsequently check:  
a. Angle disc/light path  
b. Height setting of turntable.

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

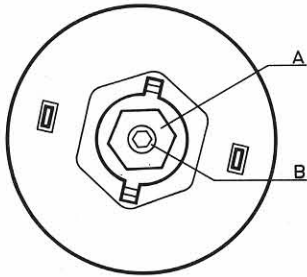


27 012C12

## MEASUREMENTS AND ADJUSTMENTS

### MECHANICAL MEASUREMENTS AND ADJUSTMENTS

#### Height setting of the turntable (see Fig.)



30 460 A12

For this alignment the unit should be in the position of normal end use. The servicing supports 4822 395 30202 can be used there.

Playback track 1 of disc 4822 397 30086 (Disc without defects).

Connect a D.C. voltmeter between the **negative pole** of the focus motor and the ground of the preamplifier printed panel.

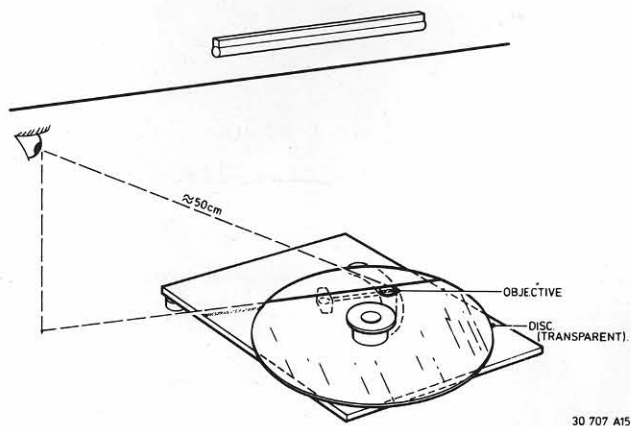
Loosen lock nut A. Adjust the turntable height with nut B until the voltage = 0 V ± 100 mV.

Tighten lock A. Ensure that the alignment does not drift during tightening.

## MECHANICAL MEASUREMENTS AND ADJUSTMENTS

### Height setting of the turntable (see service manual CD player)

#### Checking the angle setting



Place mirror 4822 395 90205 on the objective and glass disc 4822 395 90204 (with disc hold-down 4822 532 60906) on the turntable.

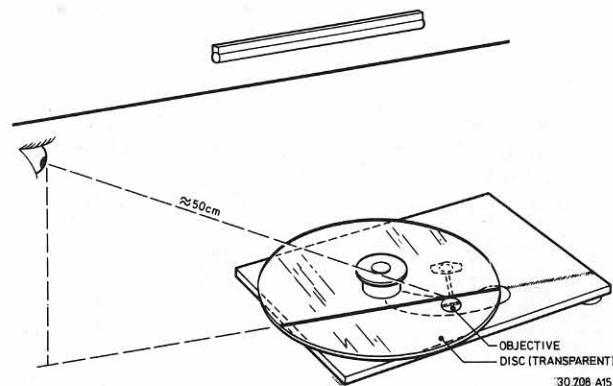
Locate the unit under a light source and under this light source a straight line should run (e.g. fluorescent tube with grid).

Set the arm to mid-position. Turn the unit until the arm is parallel to the line under the light source (see Fig.).

Look in the direction and in the prolongation of this line to its reflection on glass disc and mirror.

These lines should not be more than 4 mm apart:

Position the set in such a way that one line runs across the centre of the mirror. When the other line remains inside the mirror's surface, the distance is  $\leq 4$  mm.



Rotate the CD mechanism through  $90^\circ$  relative to the previous position.

The arm must be kept in mid-position (see Fig.).

Repeat the previous measurement.

#### Adjusting the angle setting

With respect to the adjustment of the angle between disc and light path, the factory has looked for a compromise between minimum angle deviation and minimum arm friction.

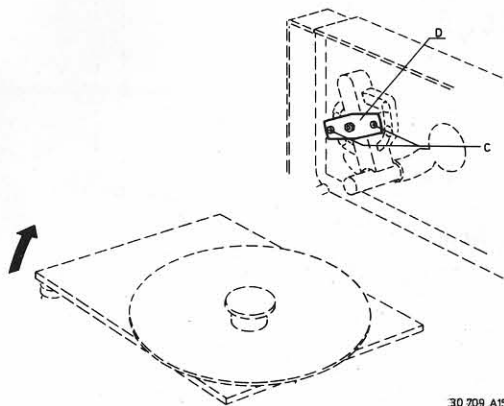
If the measurements show that the angle falls outside the tolerance given, the angle should NOT be adjusted for minimum deviation, but just within tolerance. The new setting should lie between the "old" setting and the optimum setting.

After adjustment, the friction of the arm should be checked. This is done by means of a spring-pressure gauge which is connected to the counterweight. The friction of the arm, measured over the total scanning deflection, is not allowed to exceed 30 mN.

When the friction appears to be too high, the angle should be reset to its old value. Then replace the arm by a new one and check the angle once more.

Adjustment of the angle is performed as follows:

Place the set on the servicing supports 4822 395 30202.



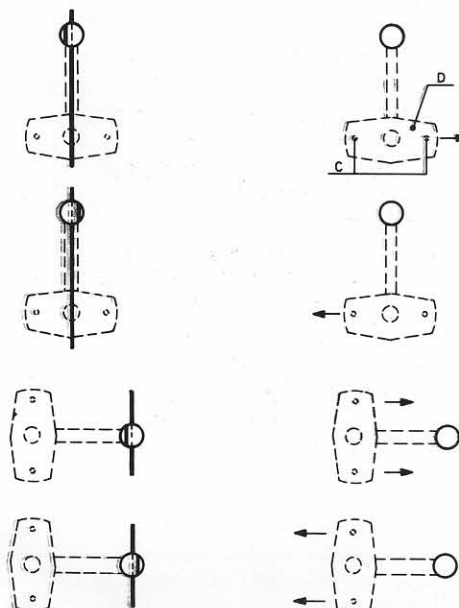
Loosen screws C (see Fig.) until bearing plate D can be shifted.

Correct the angle setting by shifting the bearing plate in the direction indicated on the Figure.

Tighten screws C ensuring that the setting does not drift. Double check the angle setting in two directions.

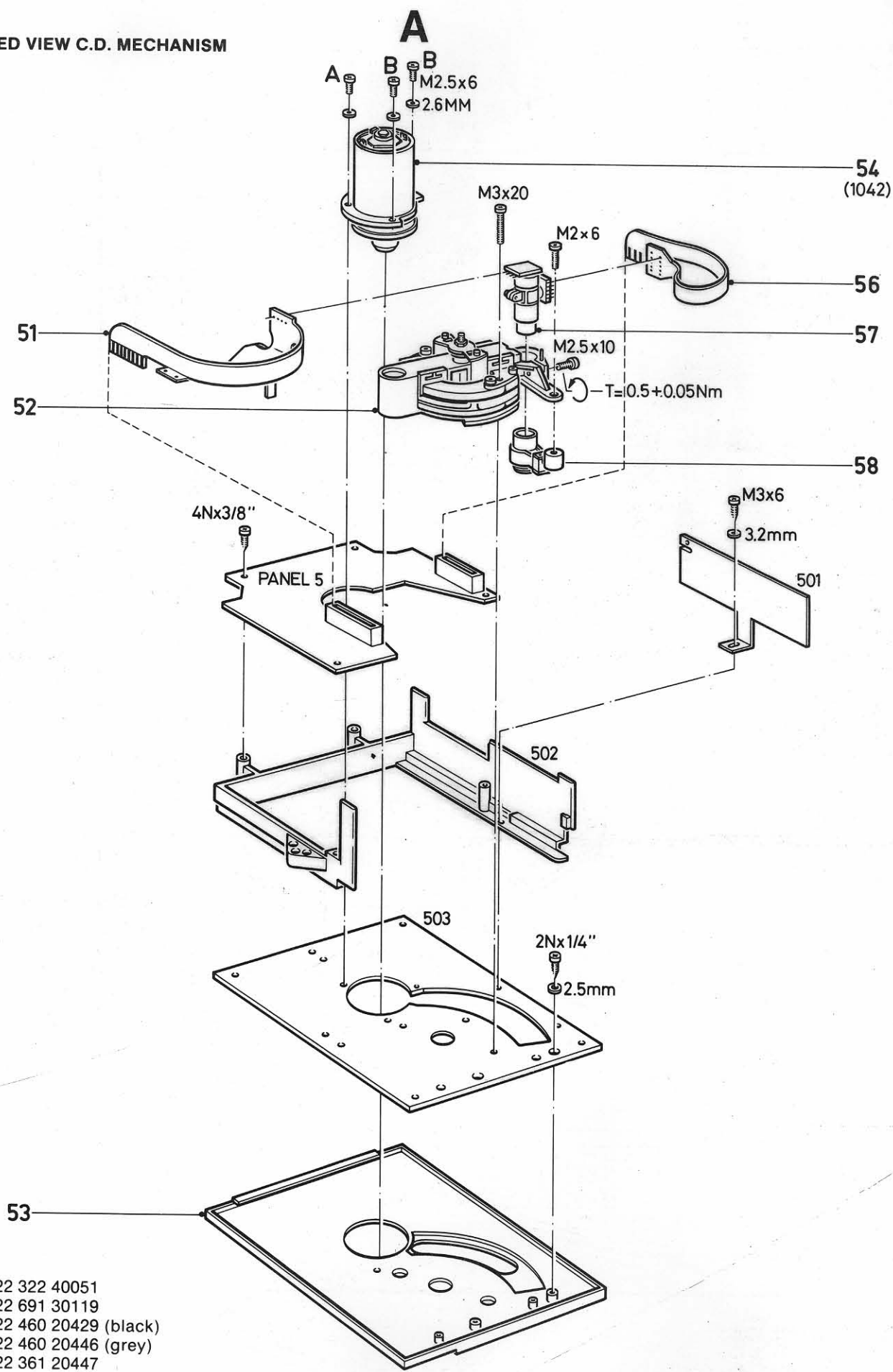
#### Attention

After setting the angle, the height setting of the turntable should be checked.

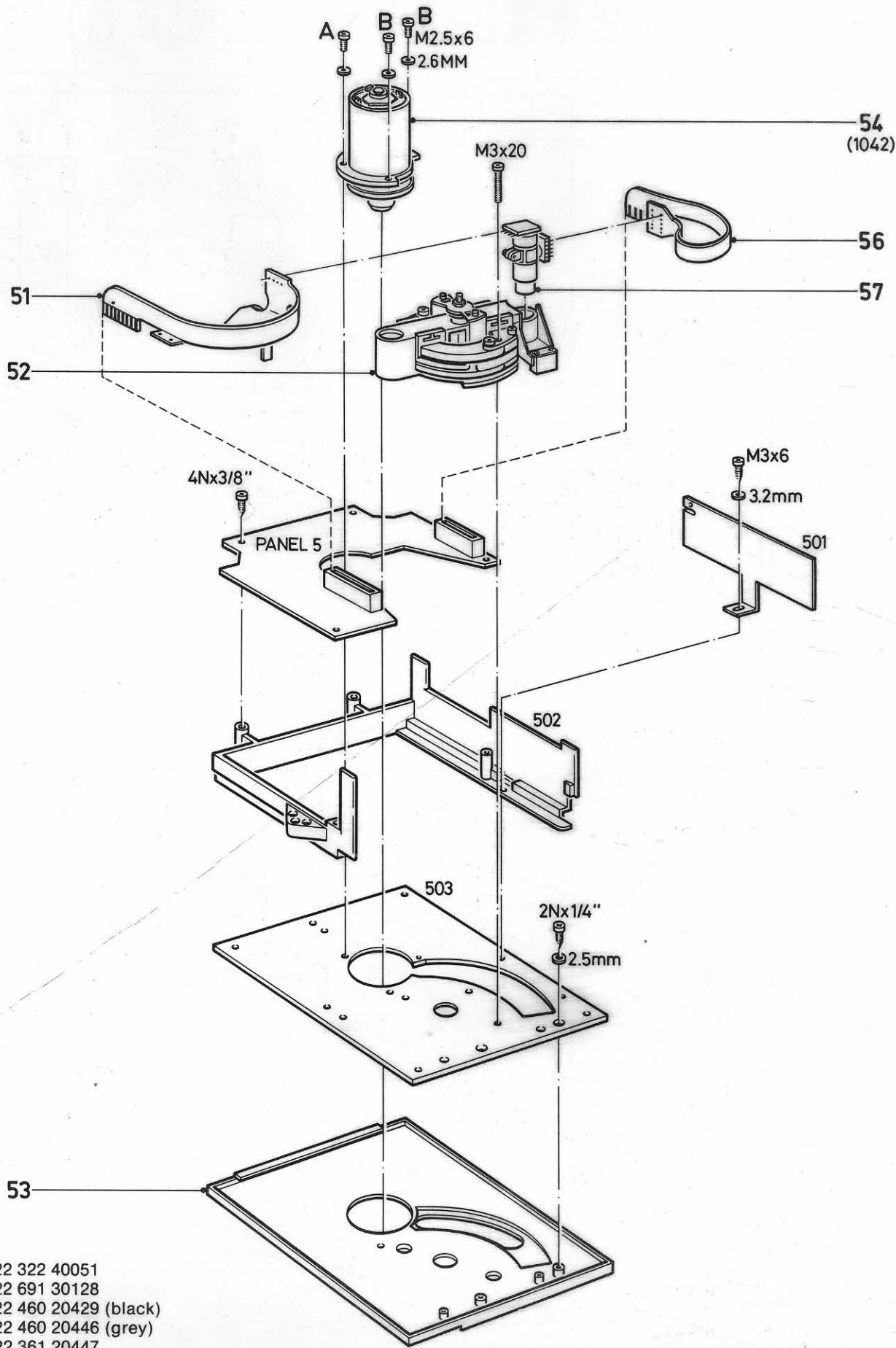




EXPLODED VIEW C.D. MECHANISM



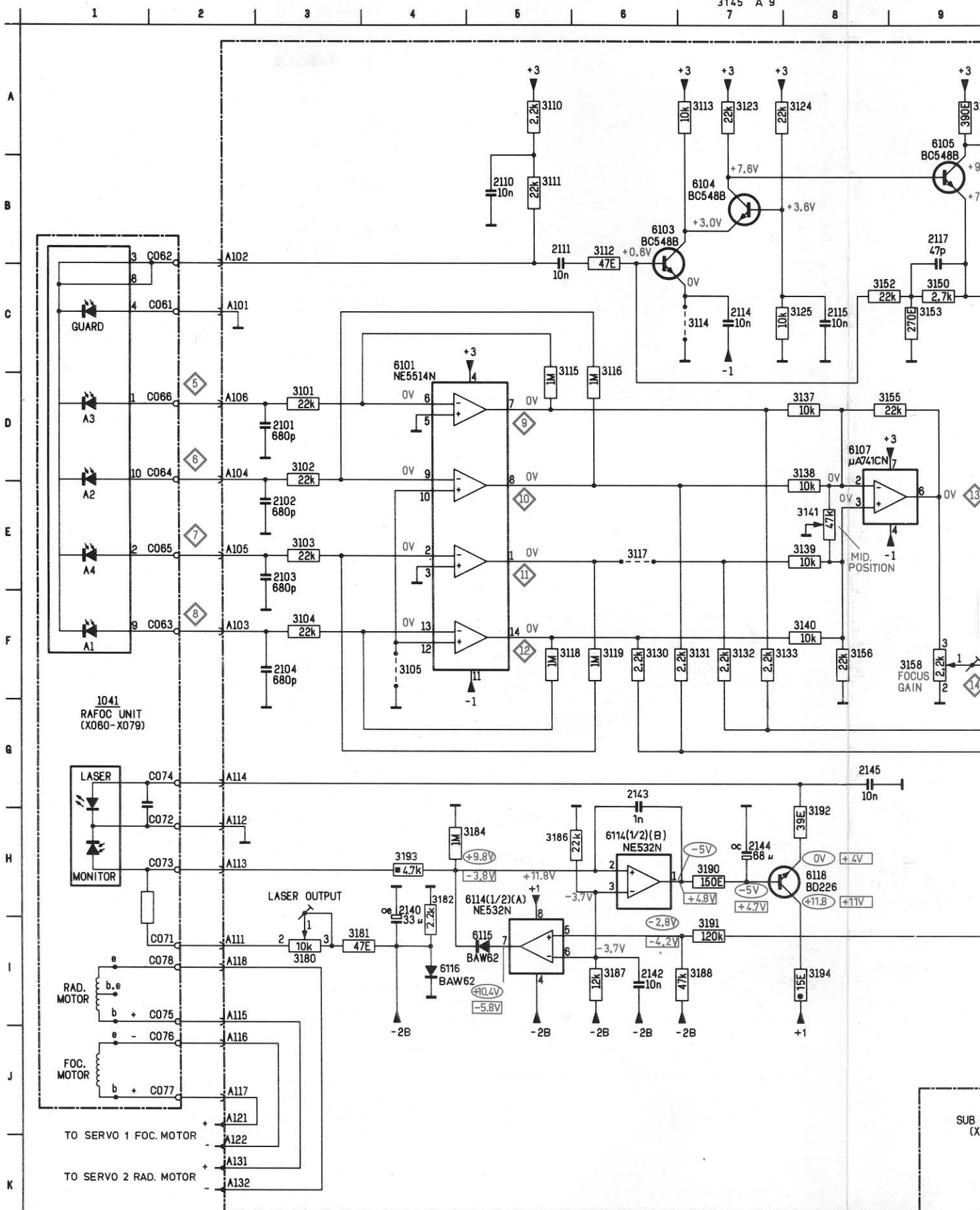
- 51 4822 322 40051
- 52 4822 691 30119
- 53 4822 460 20429 (black)
- 53 4822 460 20446 (grey)
- 54 4822 361 20447
- 54 4822 361 20484 (For tray)
- 56 4822 322 40048
- 57 4822 691 30123
- 58 4822 691 30118



- 51 4822 322 40051
- 52 4822 691 30128
- 53 4822 460 20429 (black)
- 53 4822 460 20446 (grey)
- 54 4822 361 20447
- 54 4822 361 20484 (For tray)
- 56 4822 322 40048
- 57 4822 691 30129

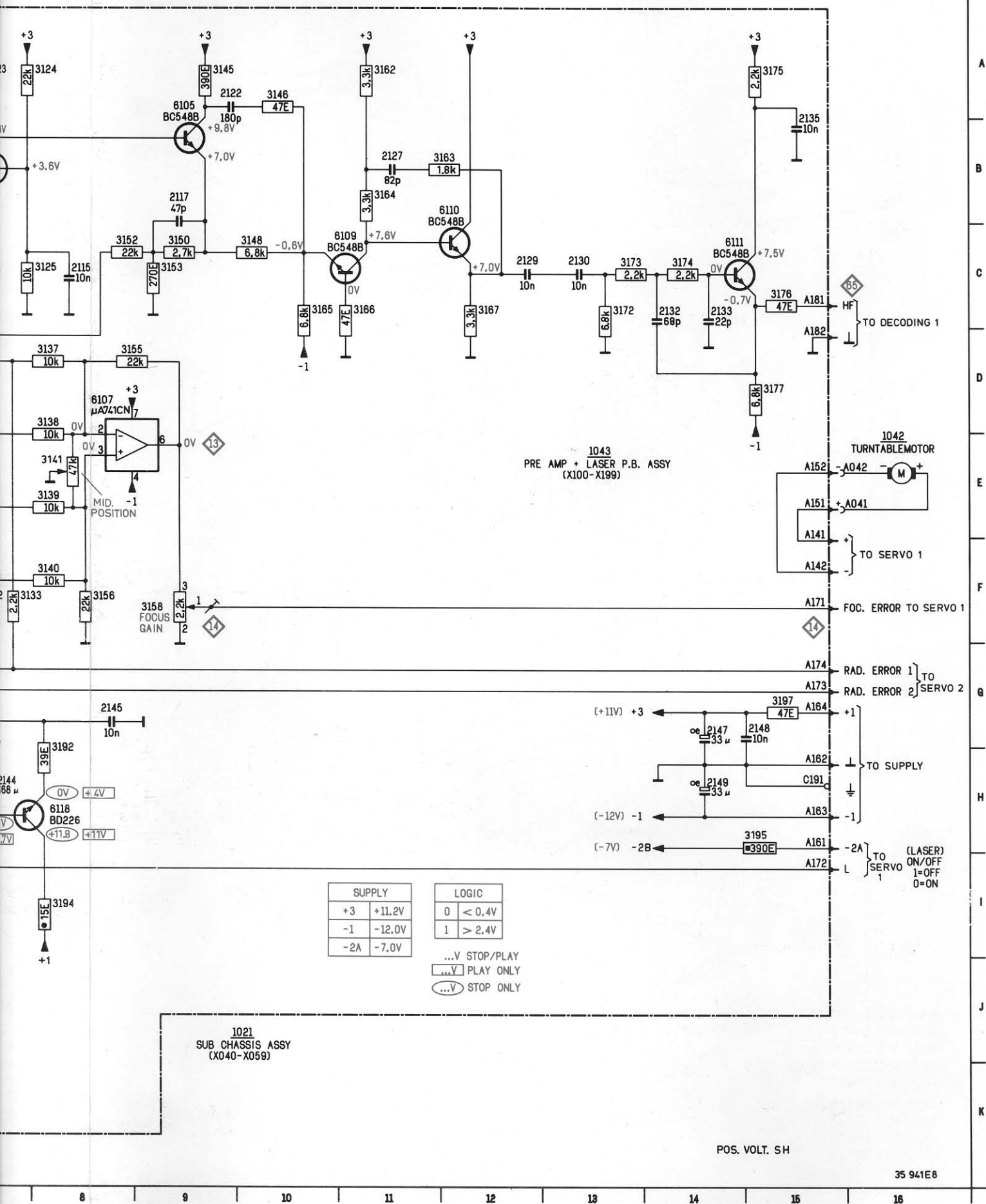
# PRE. AMPL. + LASER CIRCUIT (POS. VOLT. SH) A00 -A05

|      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |
|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|
| 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 |
| 2102 | F 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 |
| 2103 | F 3 | 2115 | C 8 | 2130 | C13 | 2142 | I 6 | 2149 | H14 | 3105 | F 4 | 3114 | C 7 | 3119 | F 6 | 3131 | F 7 | 3139 | F 8 | 3150 | K 1 | 3158 | F 9 | 3166 |
| 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 |
| 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 | 3141 | E 8 | 3153 | C 9 | 3163 | B12 |      |



ALL RES. ARE CHIP RES.; EXCEPT 3193.3194.3195  
ALL CAP. ARE CHIP CAP.; EXCEPT EL.CAP.

|     |      |     |      |      |      |      |      |      |      |      |      |     |      |      |      |      |      |      |
|-----|------|-----|------|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|------|
| D 8 | 3146 | K 1 | 3155 | D 9  | 3164 | B 11 | 3172 | C 13 | 3177 | D 15 | 3187 | I 6 | 3193 | H 4  | 6104 | B 7  | 6111 | C 14 |
| D 8 | 3148 | K 1 | 3156 | F 8  | 3165 | C 10 | 3173 | C 13 | 3180 | I 3  | 3188 | I 7 | 3194 | I 8  | 6105 | A 9  | 6114 | H 6  |
| E 8 | 3150 | K 1 | 3158 | F 9  | 3166 | C 11 | 3174 | C 14 | 3181 | I 3  | 3190 | H 7 | 3195 | H 14 | 6107 | D 8  | 6114 | H 5  |
| E 8 | 3152 | K 1 | 3162 | A 11 | 3167 | C 12 | 3175 | A 15 | 3184 | H 5  | 3191 | I 7 | 3197 | C 15 | 6109 | C 11 | 6115 | I 5  |
| A 9 | 3153 | C 9 | 3163 | B 12 |      |      | 3176 | C 15 | 3186 | H 6  | 3192 | H 8 | 6101 | C 4  | 6110 | B 12 | 6116 | I 4  |
|     |      |     |      |      |      |      |      |      |      |      |      |     | 6103 | B 6  |      |      | 6118 | H 8  |
|     | 8    |     | 9    |      | 10   |      | 11   |      | 12   |      | 13   |     | 14   |      | 15   |      | 16   |      |



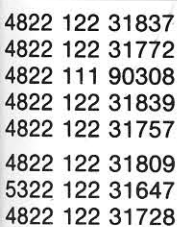




**A00 - A05**

**Laser power supply (POS. VOLT SH.)**

4822 111 90154  
5322 111 90138  
5322 111 90096  
4822 111 90101  
4822 111 90179  
4822 111 90157  
5322 111 90117  
4822 111 90249  
4822 111 90253  
4822 111 90251  
5322 111 90112  
4822 111 90149  
4822 111 90252



4822 267 50412  
4822 267 50413

Check:

Turn trimming resistor 3180 counterclockwise (min. R) and measure the voltage across resistor 3194. The voltage should be  $\leq 15$  mV.

Set the switch on the simulator PCB in the ON position and measure the voltages between points +V and -V on the simulator PCB.

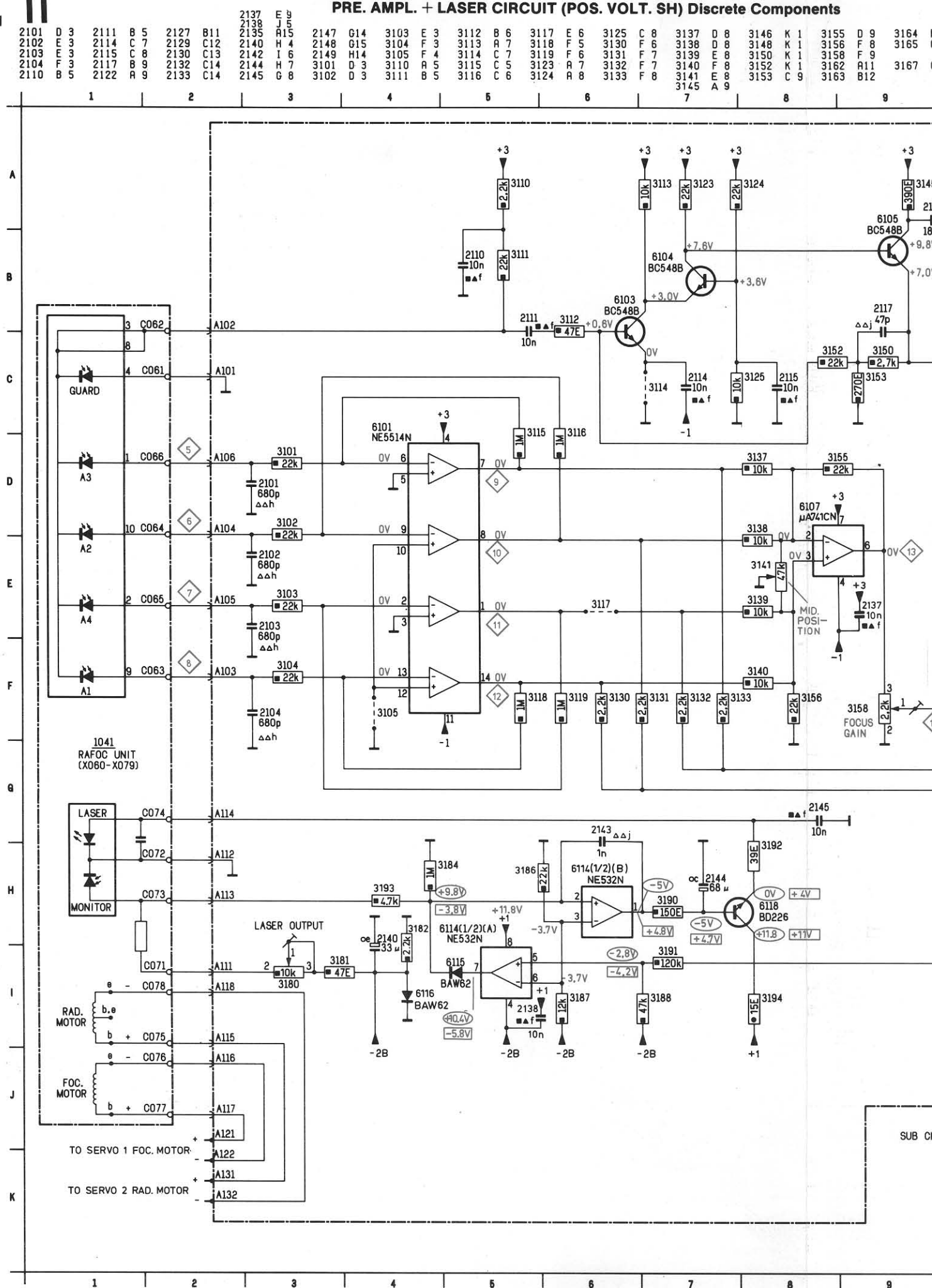
R3180 counterclockwise (min. R):  $U+v -v = 560 \text{ mV} \pm 50 \text{ mV}$ .

This is a preliminary adjustment. After the simulator PCB has been removed the laser current must be adjusted. (see service manual CD player).

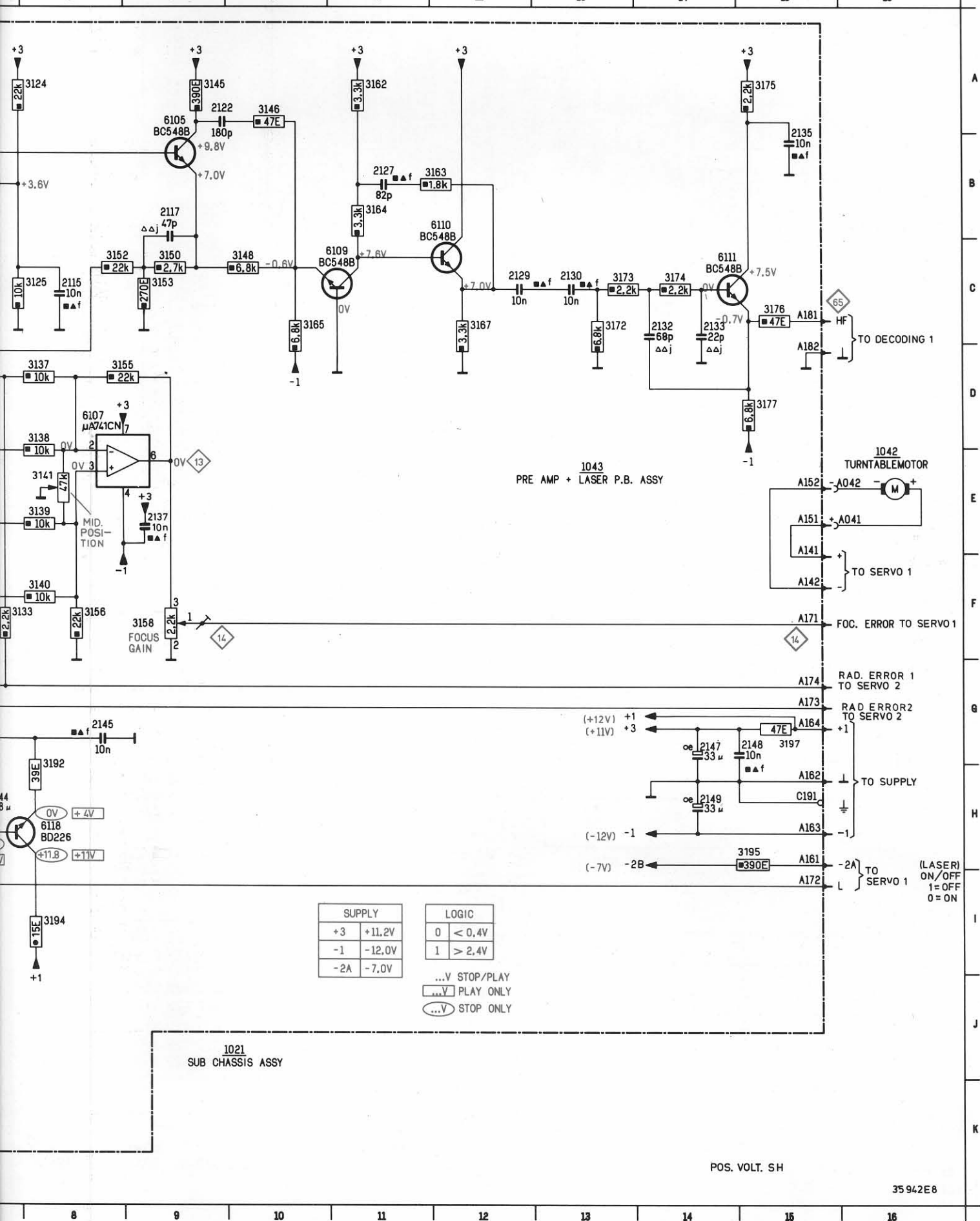
(see service manual CD player).

(see service manual CD player).

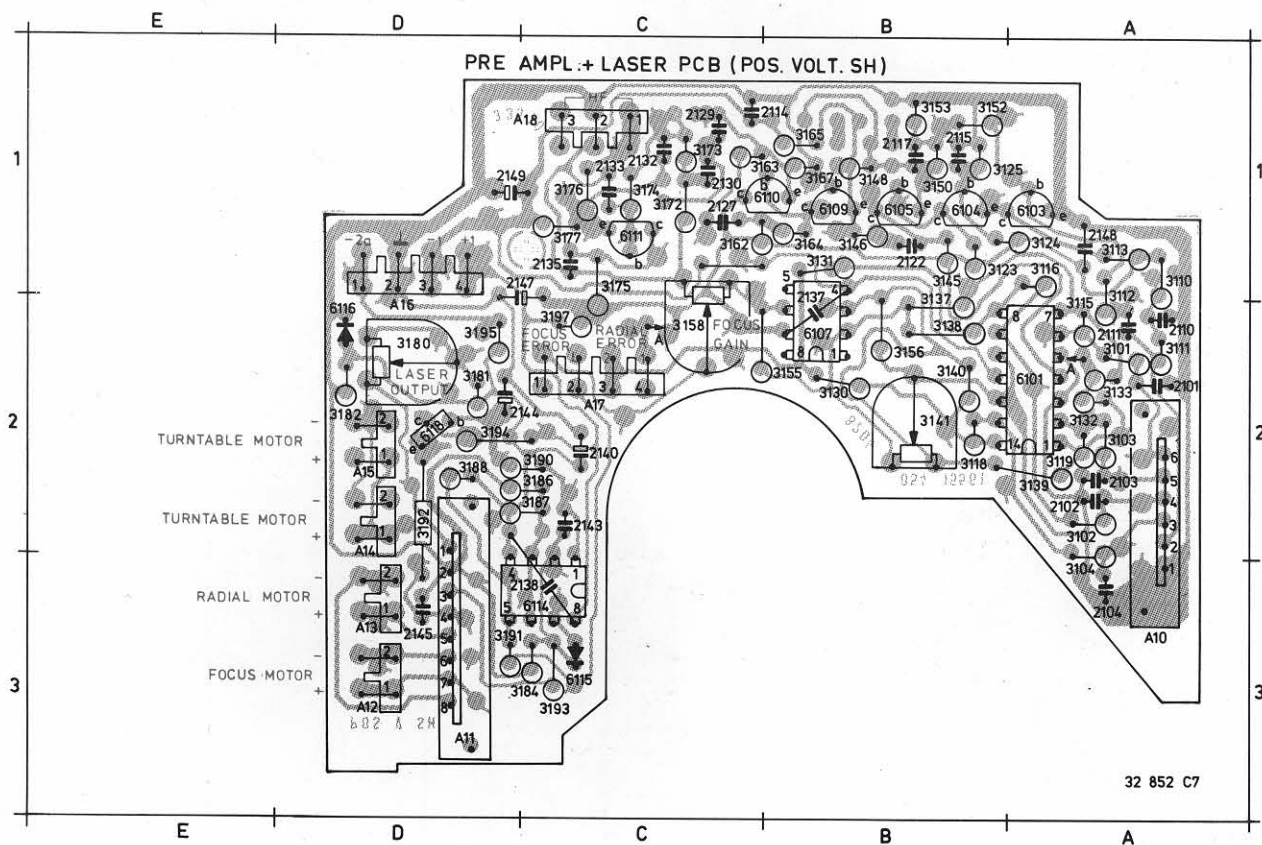
## PRE. AMPL. + LASER CIRCUIT (POS. VOLT. SH) Discrete Components



|   |      |     |      |      |      |      |      |      |      |      |      |     |      |      |      |      |      |      |
|---|------|-----|------|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|------|
| 8 | 3146 | K 1 | 3155 | D 9  | 3164 | B 11 | 3172 | C 13 | 3177 | D 15 | 3187 | I 6 | 3193 | H 4  | 6104 | B 7  | 6111 | C 14 |
| 8 | 3148 | K 1 | 3156 | F 8  | 3165 | C 10 | 3173 | C 13 | 3180 | I 3  | 3188 | I 7 | 3194 | I 8  | 6105 | A 9  | 6114 | H 6  |
| 8 | 3150 | K 1 | 3158 | F 9  |      |      | 3174 | C 14 | 3181 | I 3  | 3190 | H 7 | 3195 | H 14 | 6107 | D 8  | 6114 | H 5  |
| 8 | 3152 | K 1 | 3162 | A 11 | 3167 | C 12 | 3175 | A 15 | 3184 | H 5  | 3191 | I 7 | 3197 | C 15 | 6109 | C 11 | 6115 | I 5  |
| 8 | 3153 | C 9 | 3163 | B 12 |      |      | 3176 | C 15 | 3186 | H 6  | 3192 | H 8 | 6101 | C 4  | 6110 | B 12 | 6116 | I 4  |
| 9 |      |     |      |      |      |      |      |      |      |      |      |     | 6103 | B 6  |      |      | 6118 | H 8  |
|   | 8    |     |      | 9    |      |      | 10   |      | 11   |      | 12   |     |      |      | 13   |      |      | 14   |



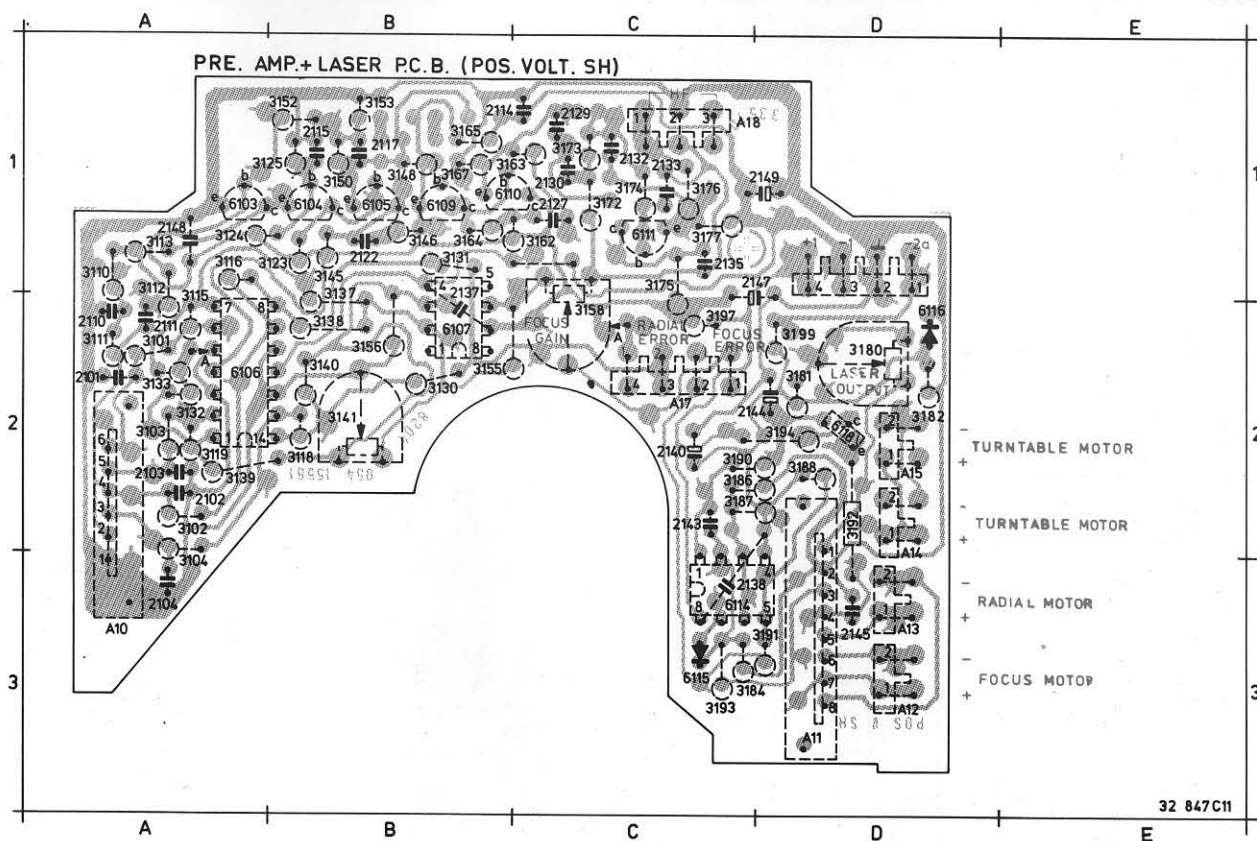
POS. VOLT. SH. (discrete components)



| ITEM | PCB |      |     |      |     |
|------|-----|------|-----|------|-----|
| 2101 | A02 | 2145 | D03 | 3130 | B02 |
| 2102 | A02 | 2147 | C01 | 3131 | B01 |
| 2103 | A02 | 2148 | A01 | 3132 | A02 |
| 2104 | A03 | 2149 | D01 | 3133 | A02 |
| 2110 | A02 | 3101 | A02 | 3137 | B01 |
| 2111 | A02 | 3102 | A02 | 3138 | B02 |
| 2114 | B01 | 3103 | A02 | 3139 | A02 |
| 2115 | B01 | 3104 | A03 | 3140 | B02 |
| 2117 | B01 | 3110 | A01 | 3141 | B02 |
| 2122 | B01 | 3111 | A02 | 3145 | B01 |
| 2127 | C01 | 3112 | A01 | 3146 | B01 |
| 2130 | C01 | 3113 | A01 | 3148 | B01 |
| 2132 | C01 | 3115 | A02 | 3150 | B01 |
| 2133 | C01 | 3116 | A01 | 3152 | B01 |
| 2135 | C01 | 3118 | B02 | 3153 | B01 |
| 2137 | B01 | 3119 | A02 | 3155 | B02 |
| 2138 | C03 | 3123 | B01 | 3156 | B02 |
| 2140 | C02 | 3124 | A01 | 3158 | C02 |
| 2143 | C02 | 3125 | A01 | 3162 | C01 |
| 2144 | C02 | 3129 | C01 | 3163 | B01 |
|      |     |      |     | 3164 | B01 |
|      |     |      |     | 3165 | B01 |
|      |     |      |     | 3167 | B01 |
|      |     |      |     | 3172 | C01 |
|      |     |      |     | 3173 | C01 |
|      |     |      |     | 3174 | C01 |
|      |     |      |     | 3175 | C01 |
|      |     |      |     | 3176 | C01 |
|      |     |      |     | 3177 | C01 |
|      |     |      |     | 3180 | D02 |
|      |     |      |     | 3181 | D02 |
|      |     |      |     | 3182 | D02 |
|      |     |      |     | 3184 | C03 |
|      |     |      |     | 3186 | C02 |
|      |     |      |     | 3187 | C02 |
|      |     |      |     | 3188 | D02 |
|      |     |      |     | 3190 | C02 |
|      |     |      |     | 3191 | D03 |
|      |     |      |     | 3192 | D02 |
|      |     |      |     | 3193 | C03 |
|      |     |      |     | 3194 | D02 |
|      |     |      |     | 3197 | C02 |
|      |     |      |     | 3199 | D02 |
|      |     |      |     | 6103 | A01 |
|      |     |      |     | 6104 | B01 |
|      |     |      |     | 6105 | B01 |
|      |     |      |     | 6106 | A02 |
|      |     |      |     | 6107 | B02 |
|      |     |      |     | 6109 | B01 |
|      |     |      |     | 6110 | B01 |
|      |     |      |     | 6111 | C01 |
|      |     |      |     | 6114 | C03 |
|      |     |      |     | 6115 | C03 |
|      |     |      |     | 6116 | D02 |
|      |     |      |     | 6118 | D02 |

Pre-amplifier + laser print 4822 214 50325

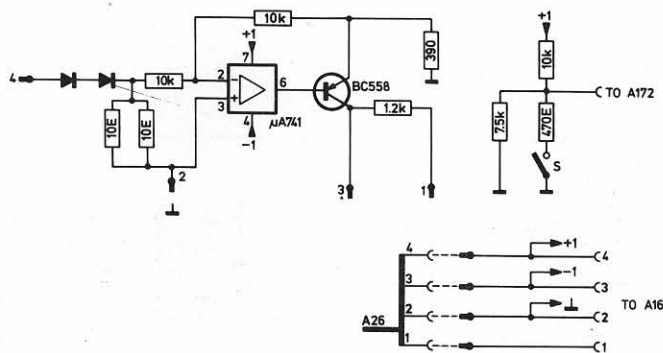
|         |                |        |              |                |
|---------|----------------|--------|--------------|----------------|
|         |                |        |              |                |
| BC548B  | 4822 130 40937 | 3192   | 39E - PR37   | 5322 116 55063 |
| BD226   | 5322 130 44244 | 3197   | 47E - 5% NFR | 4822 111 30526 |
|         |                |        |              |                |
| NE5514N | 4822 209 81451 | 3141   | 47k          | 4822 100 10598 |
| NE532N  | 4822 209 80818 | 3158   | 2k2          | 4822 100 10029 |
| μA741CN | 4822 209 80617 | 3180   | 10k          | 4822 100 10035 |
|         |                |        |              |                |
| BAW62   | 4822 130 30613 | 2122   | 180 pF - 5%  | 4822 122 31962 |
|         |                |        |              |                |
|         |                | 6p-A10 |              | 4822 267 50412 |
|         |                | 8p-A11 |              | 4822 267 50413 |



## ELECTRICAL MEASUREMENTS AND ADJUSTMENTS

## Laser power supply (POS. VOLT. SH.)

Since the light pin is very sensitive to static charges, care should be taken that during measurements and adjustments of the laser power supply the potentials of the aids and yourself equal the potential of the CD mechanism.



## Check

The laser simulator PCB nr. 2 4822 395 30215 should be used here.

Take the flex PCB out of socket A11 and connect the simulator PCB with the socket.

Remove plug A16 and insert it in the socket on the simulator PCB.

Connect the plug with 4 wires to socket A16. Take out plug A17 and insert the plug with 1 wire in socket A17.

In rest position the current through the laser diode should be  $\leq 1$  mA.

Check:

Set the switch on the simulator PCB in the OFF position and the mains switch in the ON position.

Turn trimming resistor 3180 counterclockwise (min. R) and measure the voltage across resistor 3194.

The voltage should be  $\leq 15$  mV.

Check of laser supply control:

Set the switch on the simulator PCB in the ON position and measure the voltages between points +V and -V on the simulator PCB.

Resistor 3180 counterclockwise (max. R):

$U + v - v = 60 \text{ mV} \pm 30 \text{ mV}$ .

R 3180 clockwise (min. R):

$U + v - v = 560 \text{ mV} \pm 50 \text{ mV}$ .

Set resistor 3180 in the mid-position.

This is a preliminary adjustment. After the simulator PCB has been removed the laser current must be adjusted.

(see service manual CD player).

## Adjusting the focus bandwidth

(see service manual CD player).

## Checking the AGC and offset circuit

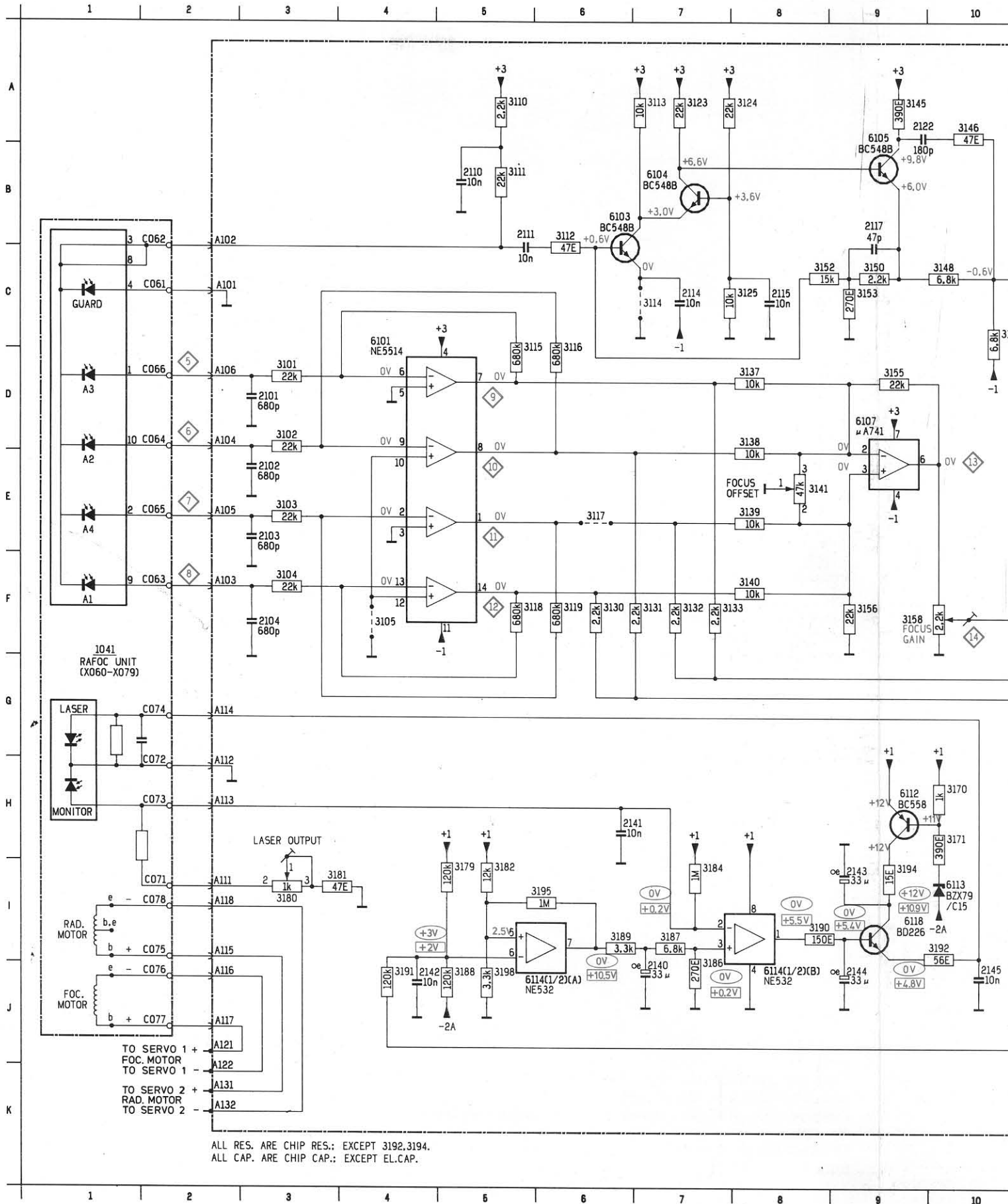
(see service manual CD player).





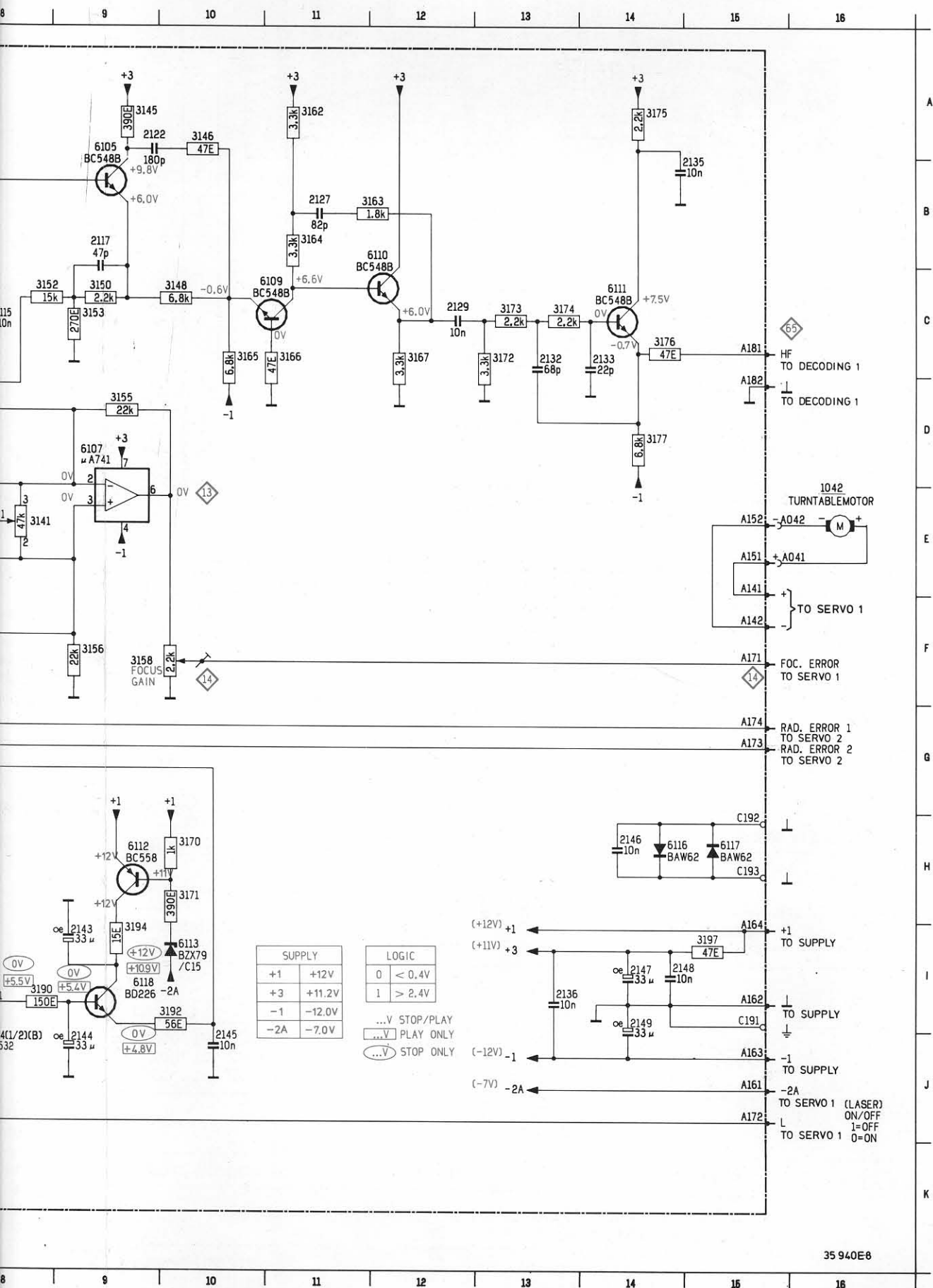
## PRE. AMPL. + LASER (POS. VOLT. SH) A06-A07

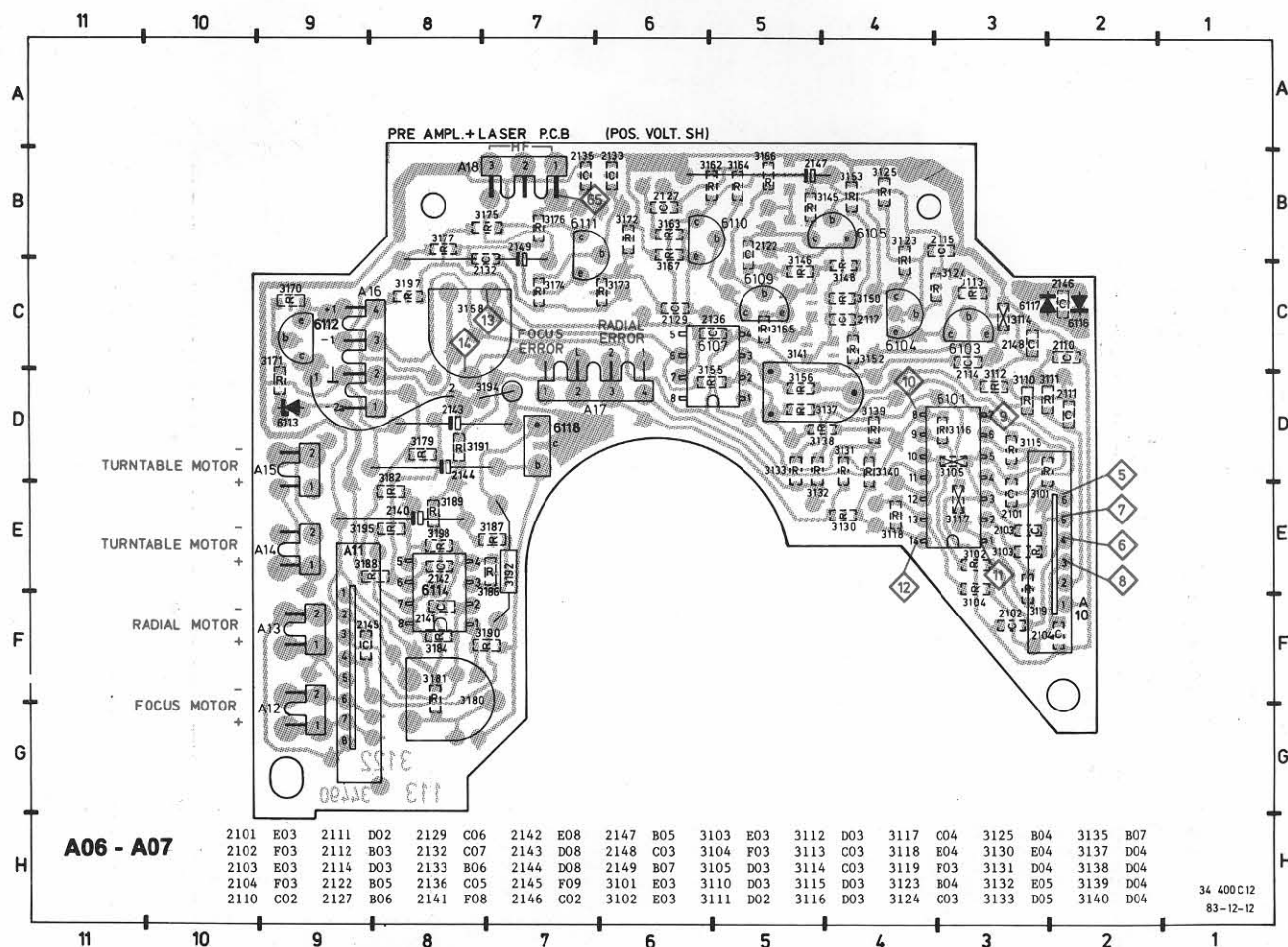
|      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |
|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|
| 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 | F 8 | 3146 | A10 | 3155 | D 9 | 3164 | B11 |
| 2102 | E 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 |
| 2103 | F 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 | F 8 | 3150 | C 9 | 3158 | F 9 | 3166 | C11 |
| 2104 | F 3 | 2117 | B 9 | 2133 | C14 | 2142 | J 4 | 2147 | I14 | 3103 | F 3 | 3112 | B 6 | 3117 | F 6 | 3125 | A 8 | 3137 | D 8 | 3141 | F 8 | 3152 | C 8 | 3162 | A11 | 3167 | C12 |
| 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 |





|   |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |
|---|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|
| 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 |
| 8 | 3148 | C10 | 3156 | F 9 | 3165 | C10 | 3172 | C13 | 3177 | D14 | 3184 | I 7 | 3190 | I 8 | 3197 | I15 | 6105 | A 9 | 6112 | H 9 | 6117 | H15 |
| 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 |
| 8 | 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 |      |     |
| 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 |      |     |





Pre-amplifier + laser print 4822 214 50325

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



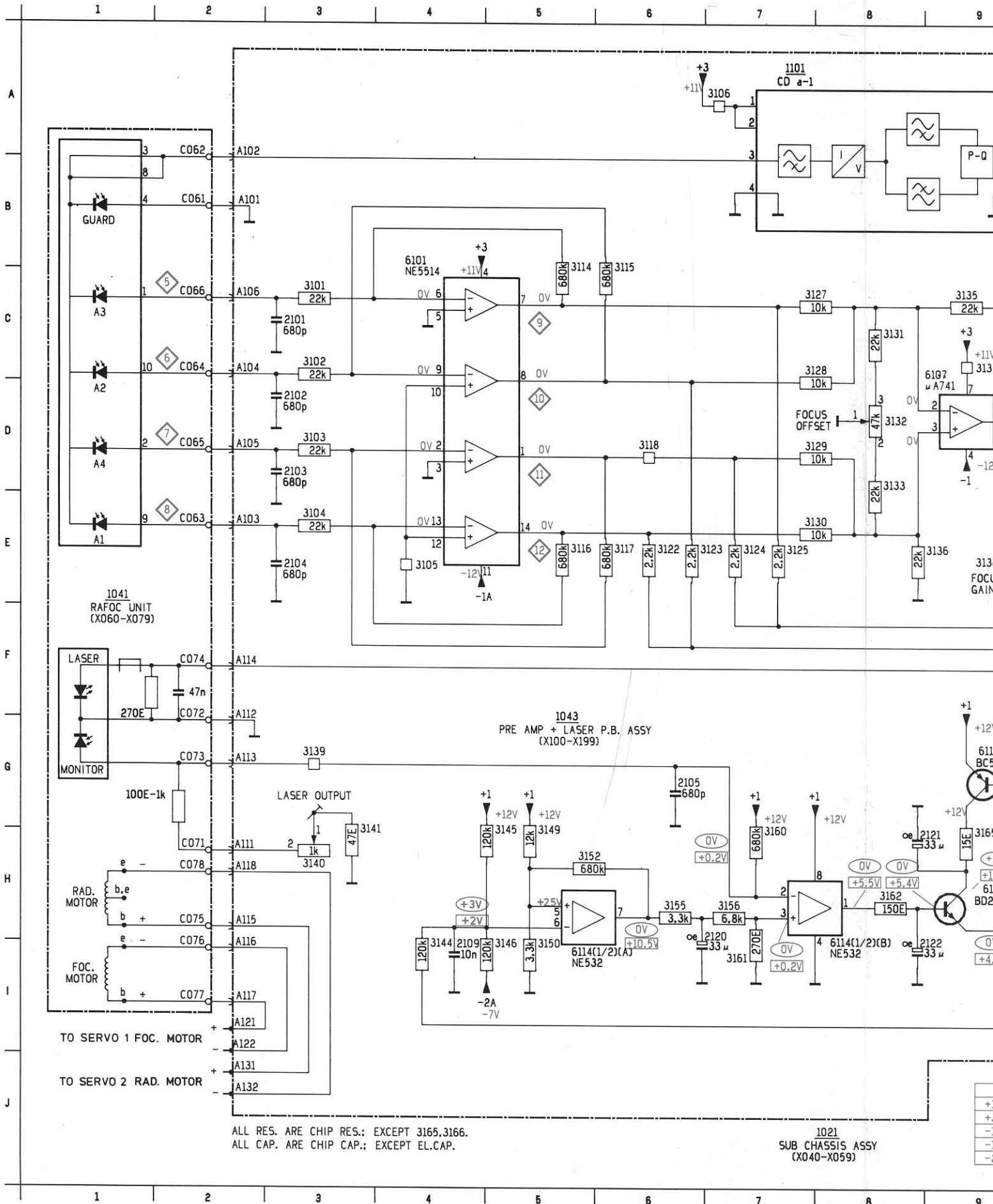
### Laser power supply

Connect the plug with 4 wires to socket A16. Take out plug A17 and insert the plug with 1 wire in socket A17.

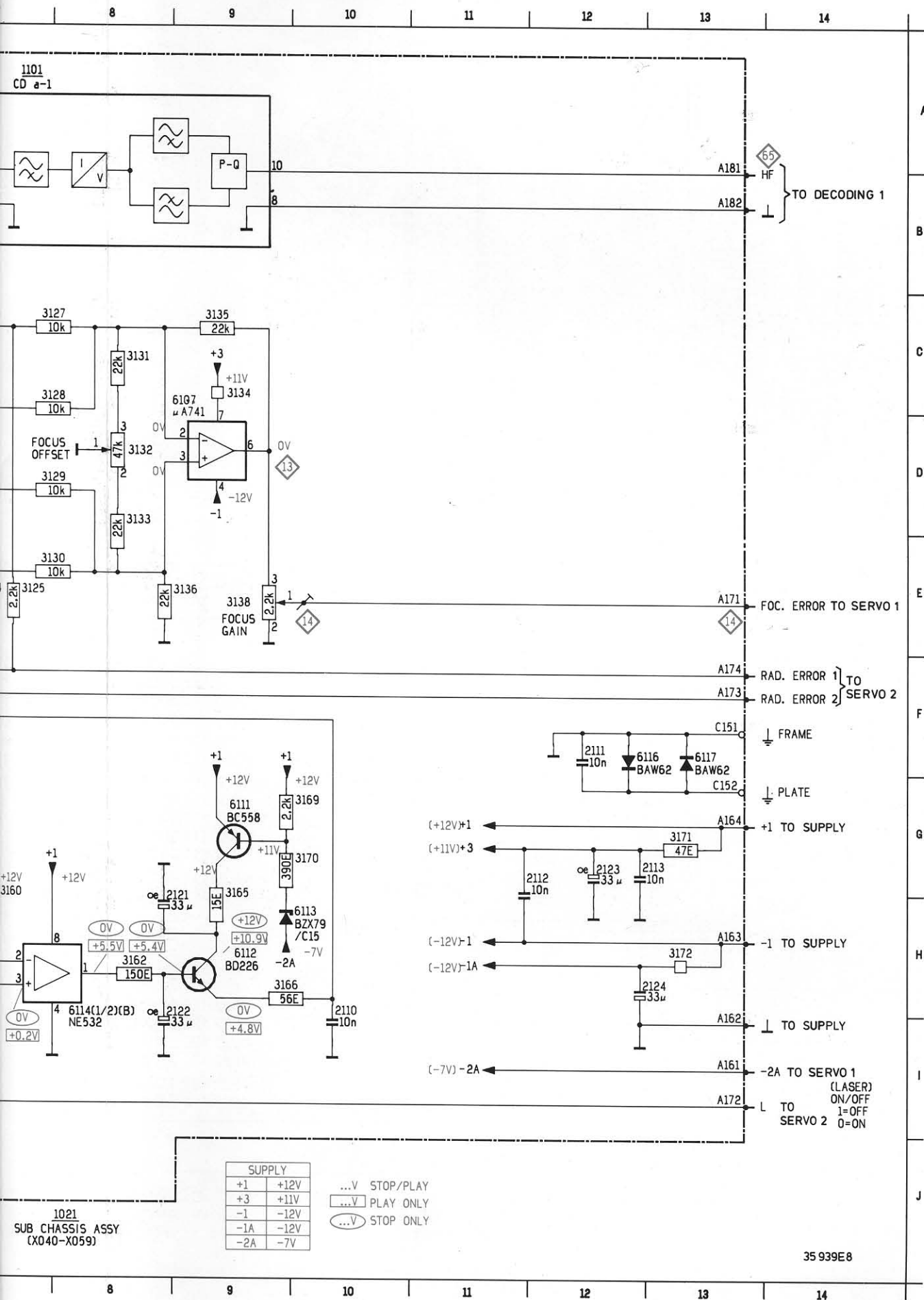
(see service manual CD player).

# IV

|      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |  |
|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|--|
| 1101 | A 7 | 2104 | E 3 | 2111 | F12 | 2121 | H 9 | 3101 | C 3 | 3105 | E 4 | 3116 | E 5 | 3123 | E 7 | 3128 | C 8 | 3132 | D 8 | 3136 | E 9 | 3141 | G 3 | 3149 |  |
| 2101 | C 3 | 2105 | G 6 | 2112 | G12 | 2122 | H 9 | 3102 | C 3 | 3106 | A 7 | 3117 | E 6 | 3124 | E 7 | 3129 | D 8 | 3133 | D 8 | 3138 | E 9 | 3144 | I 4 | 3150 |  |
| 2102 | D 3 | 2109 | I 4 | 2113 | G13 | 2123 | G12 | 3103 | D 3 | 3114 | B 5 | 3118 | D 6 | 3125 | E 7 | 3130 | E 8 | 3134 | C 9 | 3139 | G 3 | 3145 | G 5 | 3152 |  |
| 2103 | D 3 | 2110 | H10 | 2120 | H 7 | 2124 | H13 | 3104 | E 3 | 3115 | B 6 | 3122 | E 6 | 3127 | C 8 | 3131 | C 8 | 3135 | C 9 | 3140 | H 3 | 3146 | I 5 | 3155 |  |



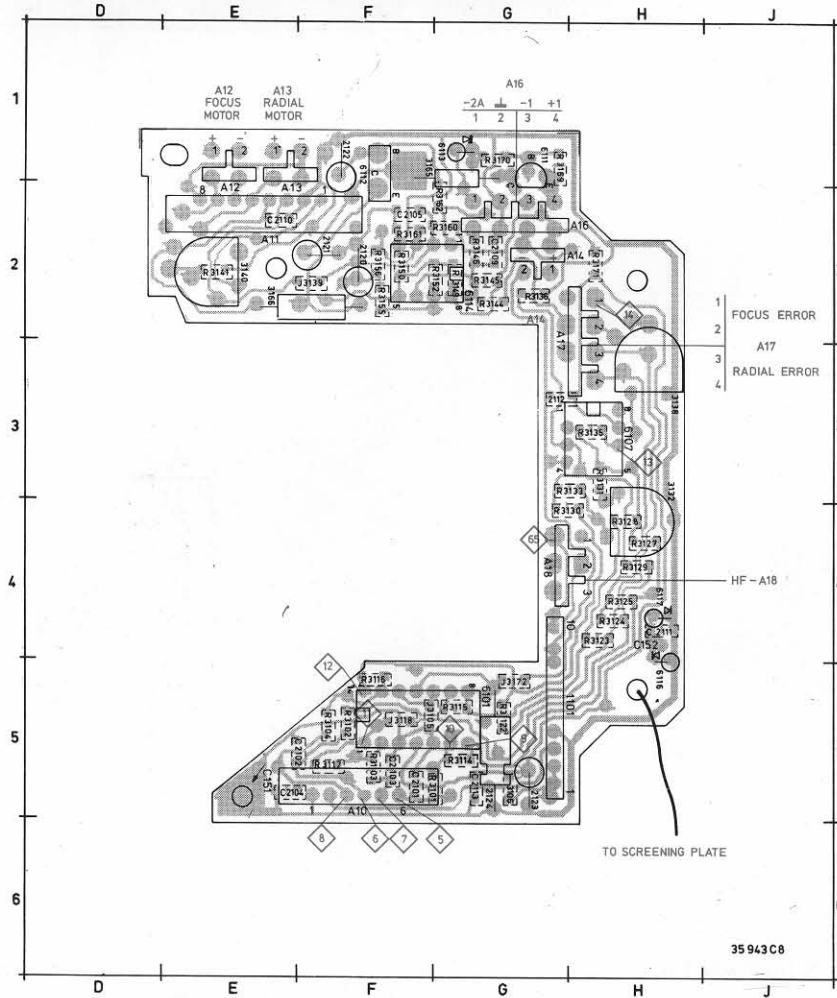
|   |      |     |      |     |      |     |      |     |      |     |      |     |           |     |           |
|---|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|-----------|-----|-----------|
| 8 | 3136 | E 9 | 3141 | G 3 | 3149 | G 5 | 3156 | H 7 | 3165 | G 9 | 3171 | G13 | 6111      | G 9 | 6114(*I 5 |
| 8 | 3138 | E 9 | 3144 | I 4 | 3150 | I 5 | 3160 | G 7 | 3166 | H 9 | 3172 | H13 | 6112      | H 9 | 6116 F13  |
| 9 | 3139 | G 3 | 3145 | G 5 | 3152 | H 5 | 3161 | I 7 | 3169 | G10 | 6101 | B 4 | 6113      | H10 | 6117 F13  |
| 9 | 3140 | H 3 | 3146 | I 5 | 3155 | H 6 | 3162 | H 8 | 3170 | G10 | 6107 | C 9 | 6114(*H 8 |     |           |



# IV

ITEM PCB

|      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |
|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|
| 1101 | H05 | 2105 | F02 | 2113 | G05 | 2124 | G05 | 3105 | F05 | 3117 | F05 | 3125 | H04 | 3131 | H03 | 3138 | H03 | 3145 | G02 | 3155 | F02 | 3165 | F01 | 3172 | G05 | 6113 | G01 |
| 2101 | F05 | 2109 | G02 | 2120 | F02 | 3101 | F05 | 3106 | G05 | 3118 | F05 | 3127 | H04 | 3132 | H03 | 3139 | F02 | 3146 | G02 | 3156 | F02 | 3166 | E02 | 6101 | G05 | 6114 | G02 |
| 2102 | F05 | 2110 | E02 | 2121 | F02 | 3102 | F05 | 3114 | G05 | 3122 | G05 | 3128 | H04 | 3133 | H03 | 3140 | E02 | 3149 | G02 | 3160 | G02 | 3169 | G01 | 6107 | H03 | 6116 | H05 |
| 2103 | F05 | 2111 | H04 | 2122 | F01 | 3103 | F05 | 3115 | G05 | 3123 | H04 | 3129 | H04 | 3135 | H03 | 3141 | E02 | 3150 | F02 | 3161 | F02 | 3170 | G01 | 6111 | G01 | 6117 | H04 |
| 2104 | E05 | 2112 | G03 | 2123 | G05 | 3104 | F05 | 3116 | F05 | 3124 | H04 | 3130 | H04 | 3136 | G02 | 3144 | G02 | 3152 | G02 | 3162 | G02 | 3171 | H02 | 6112 | F01 |      |     |

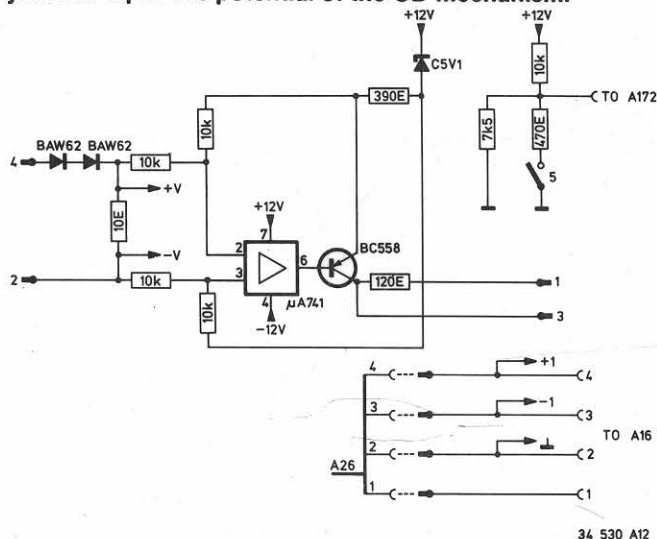
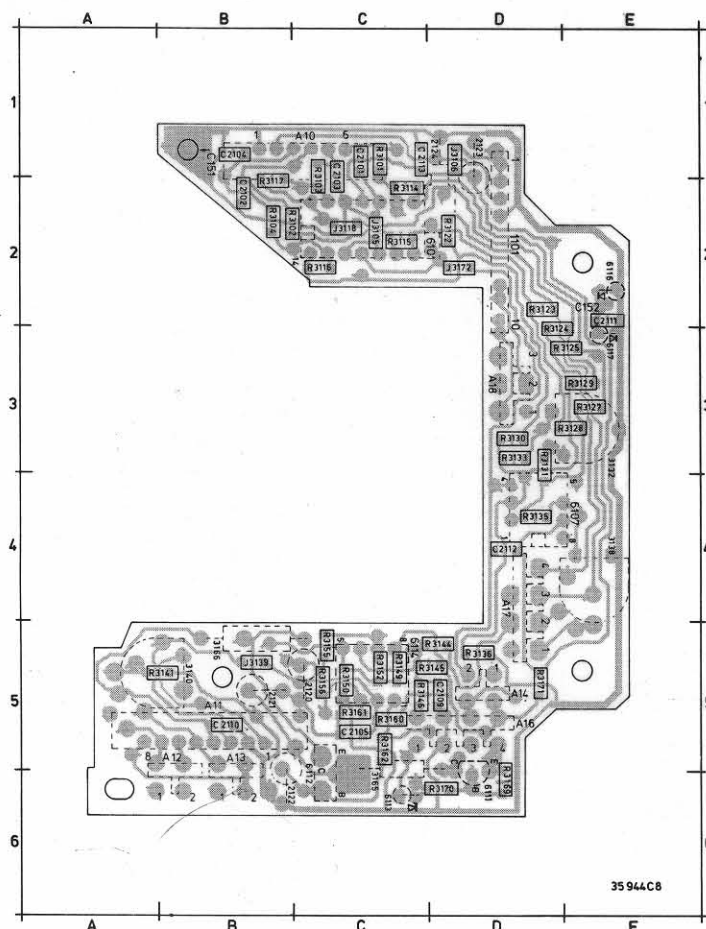


| UNIT      |                    |                |
|-----------|--------------------|----------------|
| 1101      | Thick film unit HF | 4822 218 10157 |
|           |                    |                |
| NE532N    |                    | 4822 209 80818 |
| NE5514N   |                    | 4822 209 81451 |
| μA714N    |                    | 4822 209 80617 |
|           |                    |                |
| BC558     |                    | 4822 130 40941 |
| BD226     |                    | 5322 130 44244 |
|           |                    |                |
| BZX79-C15 |                    | 4822 130 34281 |
| BAW62     |                    | 4822 130 30613 |
|           |                    |                |
| 3132      | 47k                | 4822 100 10583 |
| 3138      | 2k2                | 4822 100 20116 |
| 3140      | 1k                 | 4822 100 20115 |

|        |          |                |
|--------|----------|----------------|
|        |          |                |
| 3165   | 15E MR30 | 5322 116 54914 |
| 3166   | 56E PR37 | 5322 116 54929 |
|        |          |                |
| 0E     |          | 4822 111 90163 |
| 47E    |          | 4822 111 90217 |
| 150E   |          | 5322 111 90098 |
| 270E   |          | 4822 111 90154 |
| 390E   |          | 5322 111 90138 |
| 2k2    |          | 4822 111 90249 |
| 3k3    |          | 4822 111 90157 |
| 6k8    |          | 5322 111 90117 |
| 10k    |          | 4822 111 90249 |
| 12k    |          | 5322 111 90097 |
| 22k    |          | 4822 111 90251 |
| 120k   |          | 4822 111 90149 |
| 680k   |          | 4822 111 90488 |
|        |          |                |
| 680 pF |          | 4822 122 31809 |
| 10 nF  |          | 4822 122 31728 |

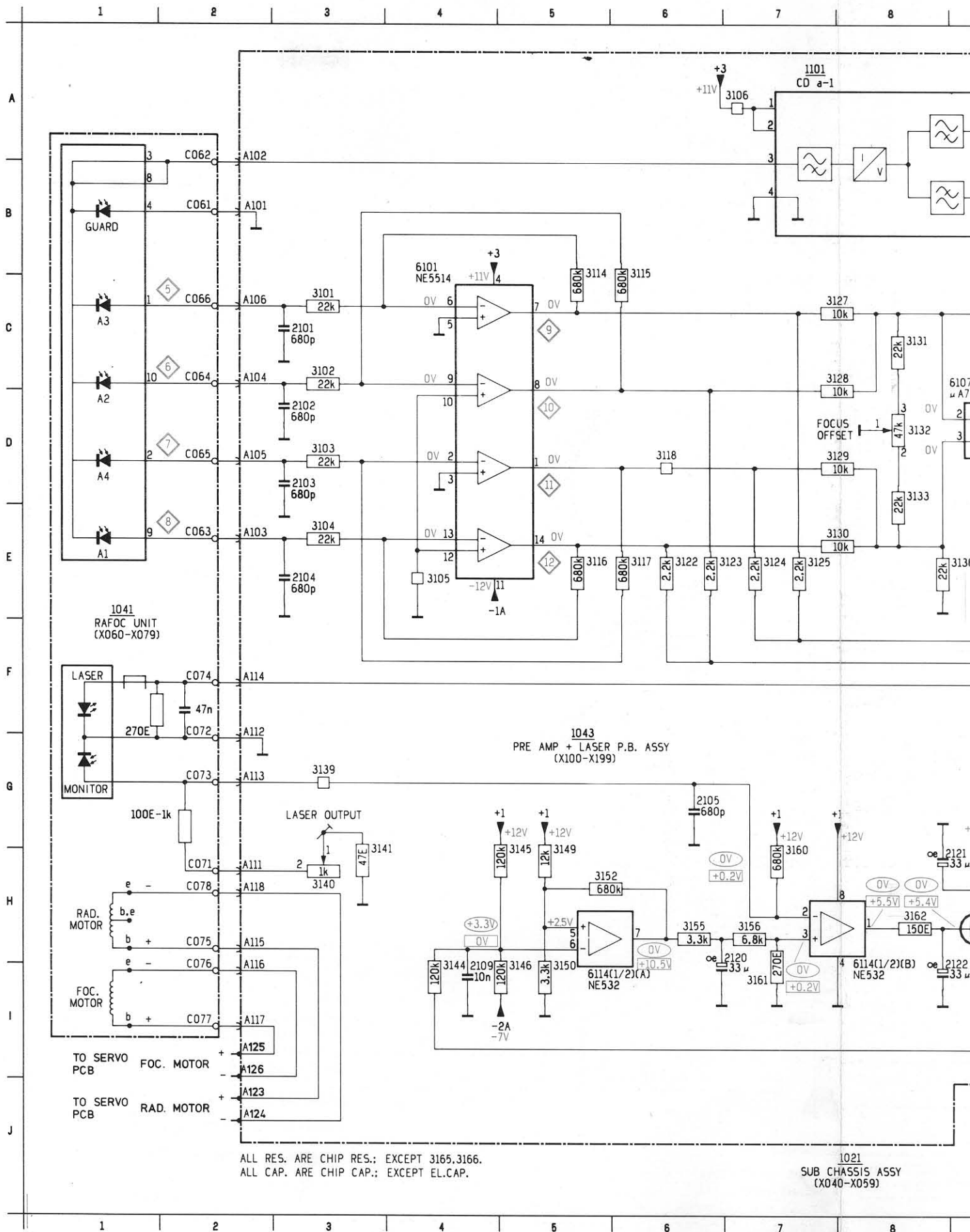


| ITEM |     | PCB  |     | 1984-06- |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |  |  |  |  |
|------|-----|------|-----|----------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|--|--|--|--|
| 1101 | D02 | 2105 | C05 | 2113     | C01 | 2124 | D01 | 3105 | C02 | 3117 | B02 | 3125 | E03 | 3131 | D03 | 3138 | E04 | 3145 | D05 | 3155 | C05 | 3165 | C06 | 3172 | D02 | 6113 | C06 |  |  |  |  |
| 2101 | C01 | 2109 | B05 | 2120     | C05 | 3101 | C01 | 3106 | D01 | 3118 | C02 | 3127 | B03 | 3132 | B03 | 3139 | B05 | 3146 | C05 | 3156 | C05 | 3166 | B05 | 6101 | D02 | 6114 | C05 |  |  |  |  |
| 2102 | B02 | 2110 | B05 | 2121     | B05 | 3102 | B02 | 3114 | C02 | 3122 | D02 | 3128 | B03 | 3133 | D03 | 3140 | B05 | 3149 | C05 | 3160 | C05 | 3169 | D06 | 6107 | E04 | 6116 | E02 |  |  |  |  |
| 2103 | C01 | 2111 | E02 | 2122     | B06 | 3103 | C01 | 3115 | C02 | 3123 | D02 | 3129 | E03 | 3135 | D04 | 3141 | B05 | 3150 | C05 | 3161 | C05 | 3170 | D06 | 6111 | D06 | 6117 | E03 |  |  |  |  |
| 2104 | B01 | 2112 | D04 | 2123     | D01 | 3104 | B02 | 3116 | C02 | 3124 | D03 | 3130 | D03 | 3136 | D05 | 3144 | B05 | 3152 | C05 | 3162 | C05 | 3171 | D05 | 6112 | C06 |      |     |  |  |  |  |

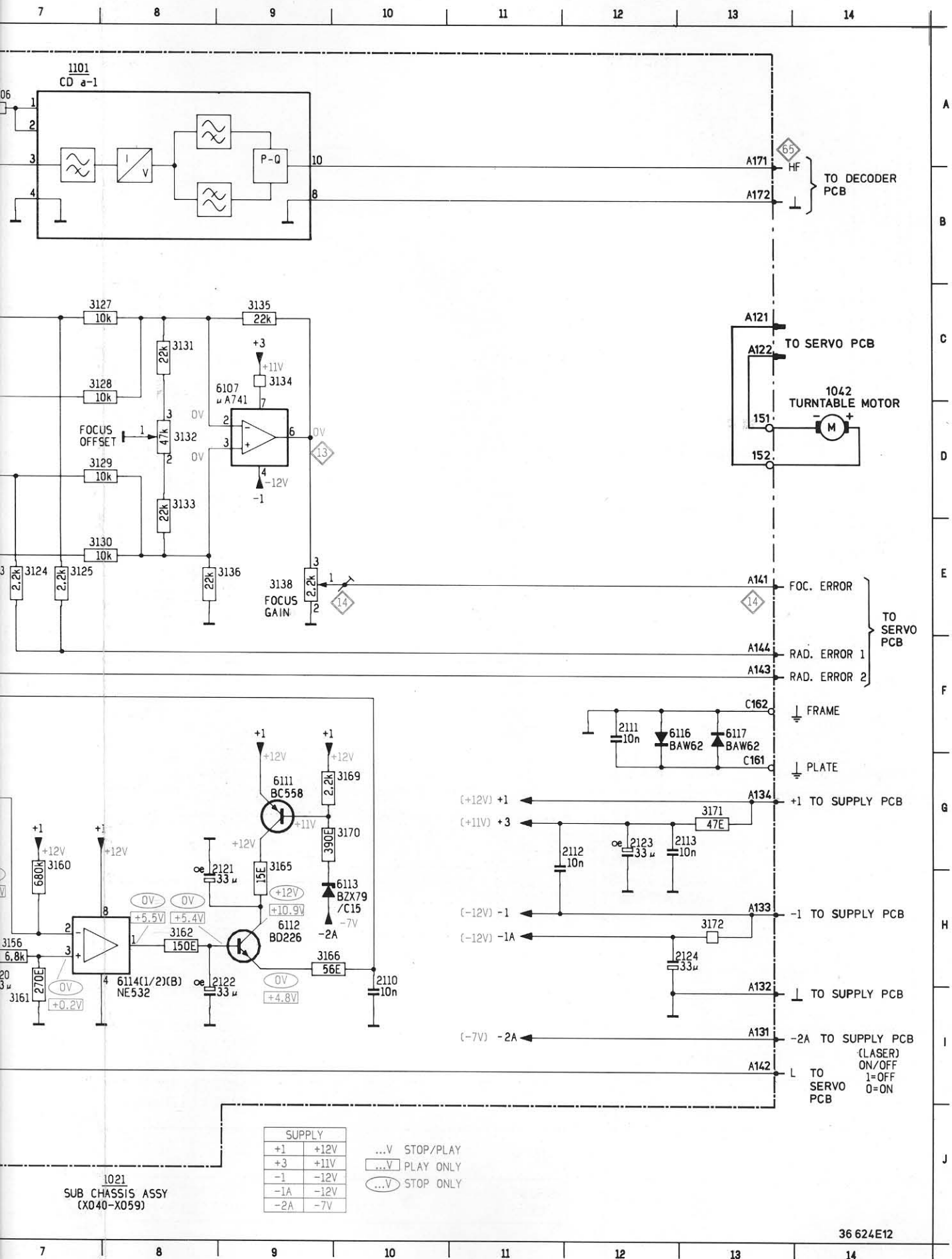


V

|      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |
|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|
| 1101 | A 7 | 2104 | E 3 | 2111 | F12 | 2121 | H 9 | 3101 | C 3 | 3105 | E 4 | 3116 | E 5 | 3123 | E 7 | 3128 | C 8 | 3132 | D 8 | 3136 | E 9 | 3141 | G 3 |
| 2101 | C 3 | 2105 | G 6 | 2112 | G12 | 2122 | H 9 | 3102 | C 3 | 3106 | A 7 | 3117 | E 6 | 3124 | E 7 | 3129 | D 8 | 3133 | D 8 | 3138 | E 9 | 3144 | I 4 |
| 2102 | D 3 | 2109 | I 4 | 2113 | G13 | 2123 | G12 | 3103 | D 3 | 3114 | B 5 | 3118 | D 6 | 3125 | E 7 | 3130 | E 8 | 3134 | C 9 | 3139 | G 3 | 3145 | G 5 |
| 2103 | D 3 | 2110 | H10 | 2120 | H 7 | 2124 | H13 | 3104 | E 3 | 3115 | B 6 | 3122 | E 6 | 3127 | C 8 | 3131 | C 8 | 3135 | C 9 | 3140 | H 3 | 3146 | I 5 |

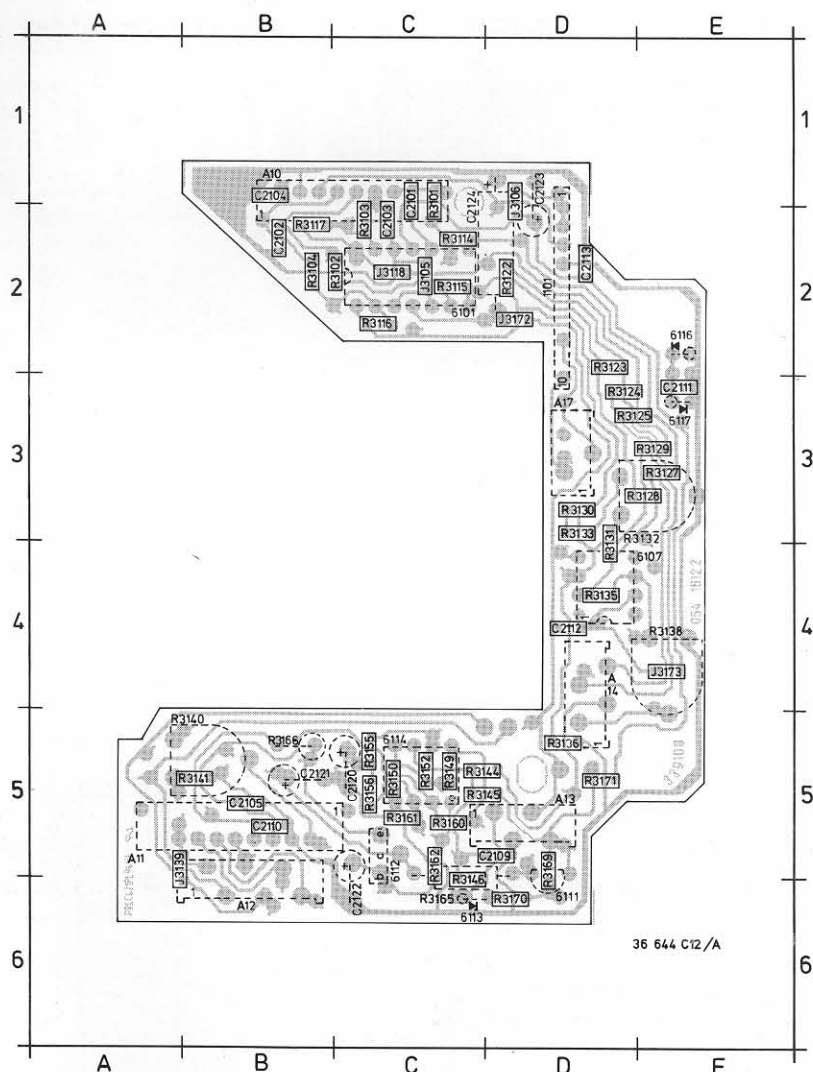


3132 D 8 3136 E 9 3141 G 3 3149 G 5 3156 H 7 3165 G 9 3171 G13 6111 G 9 6114(■) I 5  
 3133 D 8 3138 E 9 3144 I 4 3150 I 5 3160 G 7 3166 H 9 3172 H13 6112 H 9 6116 F13  
 3134 C 9 3139 G 3 3145 G 5 3152 H 5 3161 I 7 3169 G10 6101 B 4 6113 H10 6117 F13  
 3135 C 9 3140 H 3 3146 I 5 3155 H 6 3162 H 8 3170 G10 6107 C 9 6114(■) H 8





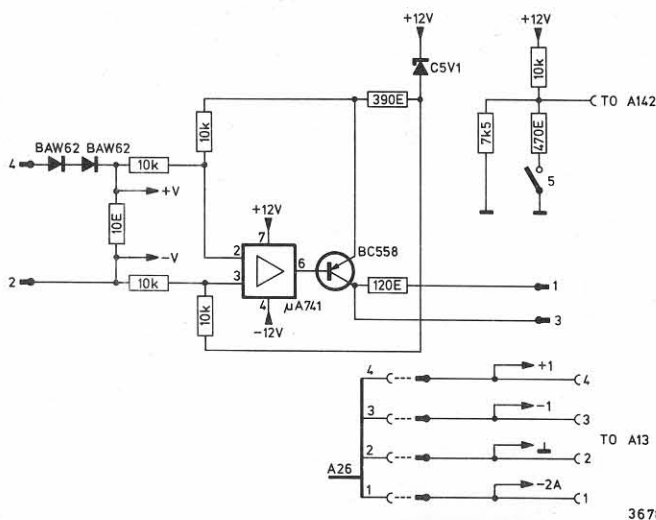
|          |          |
|----------|----------|
| 1101 D02 | 3155 C05 |
| 2101 C01 | 3156 C05 |
| 2102 B02 | 3160 C05 |
| 2103 C01 | 3161 C05 |
| 2104 B01 | 3162 C05 |
|          |          |
| 2105 B05 | 3165 C06 |
| 2109 D05 | 3166 B05 |
| 2110 B05 | 3169 D05 |
| 2111 E03 | 3170 D06 |
| 2112 D04 | 3171 D05 |
|          |          |
| 2113 D02 | 3172 D02 |
| 2120 C05 | 3173 E04 |
| 2121 B05 | 6101 C02 |
| 2122 C05 | 6107 D04 |
| 2123 D01 | 6111 D06 |
|          |          |
| 2124 D02 | 6112 C05 |
| 3101 C01 | 6113 C06 |
| 3102 B02 | 6114 C05 |
| 3103 C01 | 6116 E02 |
| 3104 B02 | 6117 E03 |
|          |          |
| 3105 C02 |          |
| 3106 D01 |          |
| 3114 C02 |          |
| 3115 C02 |          |
| 3116 C02 |          |
|          |          |
| 3117 B02 |          |
| 3118 C02 |          |
| 3122 D02 |          |
| 3123 D02 |          |
| 3124 D03 |          |
|          |          |
| 3125 D03 |          |
| 3127 E03 |          |
| 3128 E03 |          |
| 3129 E03 |          |
| 3130 D03 |          |
|          |          |
| 3131 D03 |          |
| 3132 E03 |          |
| 3133 D03 |          |
| 3135 D04 |          |
| 3136 D05 |          |
|          |          |
| 3138 E04 |          |
| 3139 B05 |          |
| 3140 B05 |          |
| 3141 B05 |          |
| 3144 C05 |          |
|          |          |
| 3145 C05 |          |
| 3146 C05 |          |
| 3149 C05 |          |
| 3150 C05 |          |
| 3152 C05 |          |



## ELECTRICAL MEASUREMENTS AND ADJUSTMENTS

### Laser power supply

Since the light pin is very sensitive to static charges, care should be taken that during measurements and adjustments of the laser power supply the potentials of aids and yourself equal the potential of the CD mechanism.



### Check

The laser simulator PCB nr. 4 (4822 395 30244) should be used here. Take the flex PCB out of socket A11 and connect the switch simulator PCB with the socket.

Remove plug A13 and insert it in the socket on the simulator PCB.

Connect the plug with 4 wires to socket A13. Take out plug A14, and insert the plug with 1 wire in socket A14.

Set the switch on the simulator PCB in the OFF position and the mains switch in the ON position.

Turn trimming resistor 3140 clockwise (max. R) and measure the voltage between points +V and -V on the simulator PCB.

The voltage should be  $\leq 15$  mV.

### Check of laser supply control:

Set the switch on the simulator PCB in the ON position and measure the voltages between points +v and -v on the simulator PCB.

Resistor 3140 clockwise (max. R):

$U + v - v = 225 \text{ mV} \pm 45 \text{ mV}$ .

Resistor 3140 counterclockwise (min. R):

$U + v - v = 750 \text{ mV} \pm 150 \text{ mV}$ .

Set resistor 3140 in mid-position.

This is a preliminary adjustment. After the simulator PCB has been removed the laser current must be adjusted. (see service manual CD player).

### Adjusting the focus bandwidth

(see service manual CD player).

### Checking the AGC and offset circuit

(see service manual CD player).

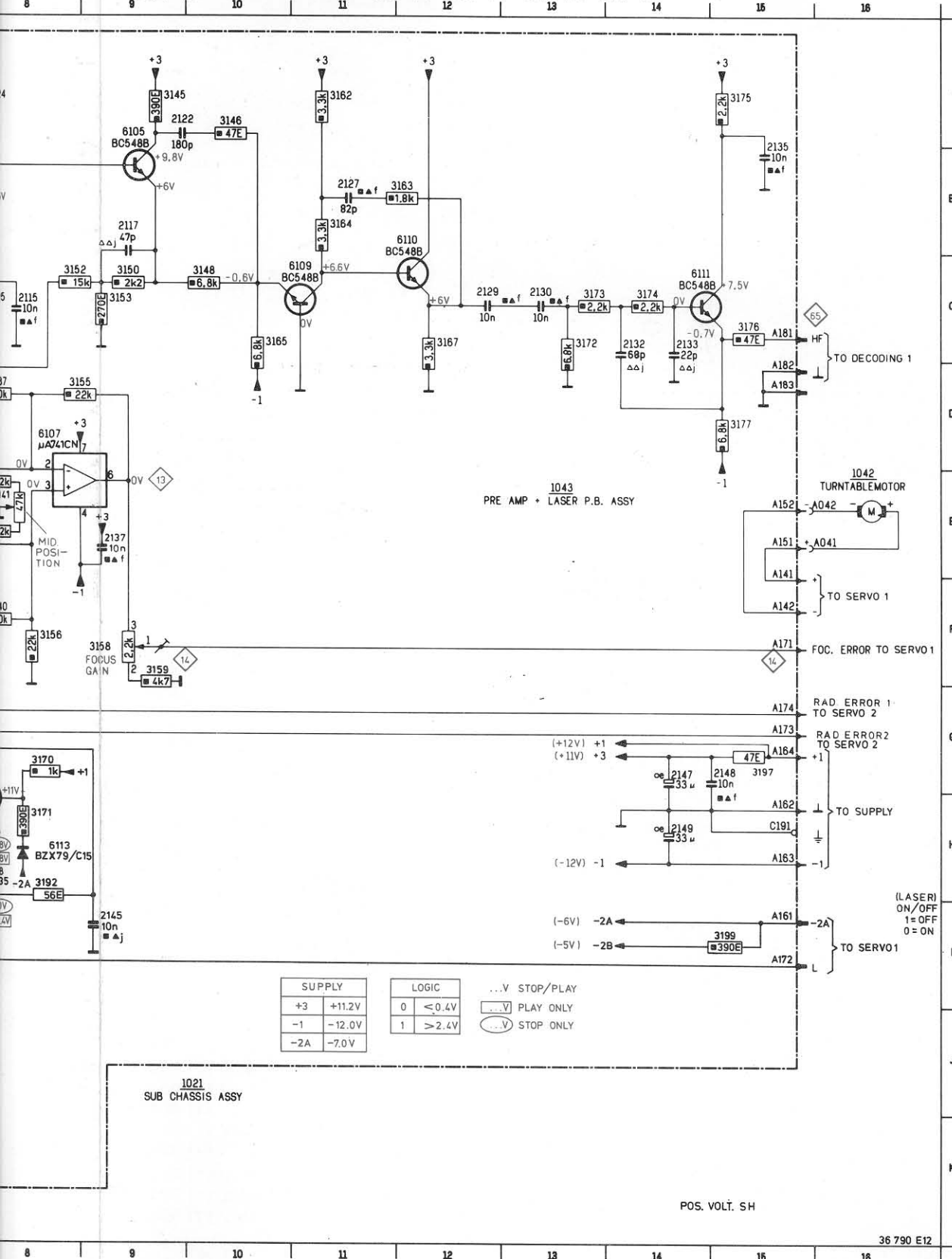
(Laser supply, Monitor diodes and HF pre-amp) Discrete Components

[illegible]



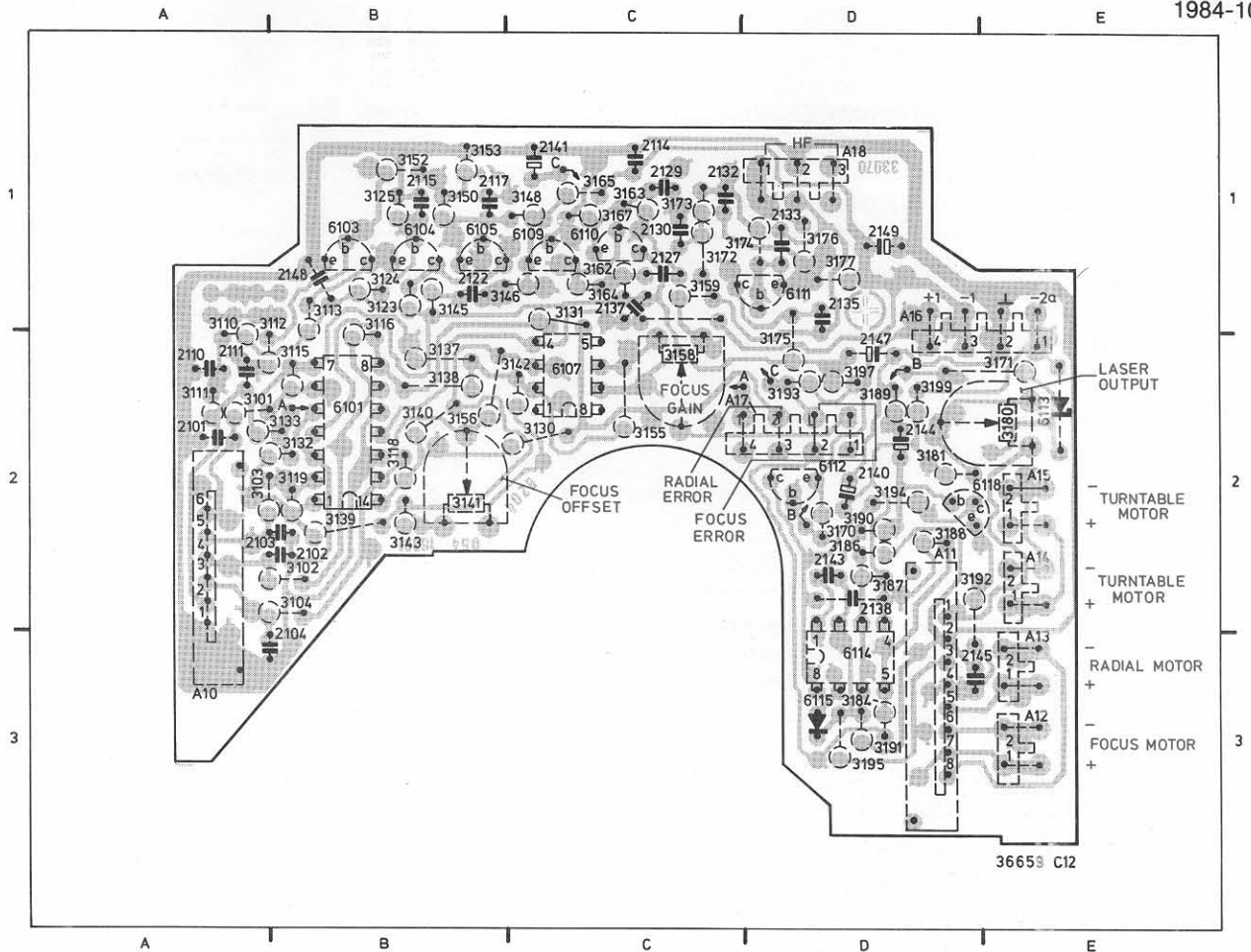
# crete Components

|    |   |   |      |   |    |      |   |    |      |   |    |      |   |    |      |   |   |      |   |    |      |   |    |      |   |    |      |   |   |
|----|---|---|------|---|----|------|---|----|------|---|----|------|---|----|------|---|---|------|---|----|------|---|----|------|---|----|------|---|---|
| 46 | K | 1 | 3155 | D | 9  | 3164 | B | 11 | 3172 | C | 13 | 3177 | D | 15 | 3187 | J | 5 | 3193 | I | 6  | 6103 | B | 6  | 6111 | C | 14 | 6118 | I | 7 |
| 48 | K | 1 | 3156 | F | 8  | 3165 | C | 10 | 3173 | C | 13 | 3180 | I | 3  | 3188 | J | 6 | 3194 | H | 7  | 6104 | B | 7  | 6112 | H | 8  |      |   |   |
| 50 | K | 1 | 3158 | F | 9  |      |   |    | 3174 | C | 14 | 3181 | I | 3  | 3189 | I | 7 | 3195 | H | 3  | 6105 | A | 9  | 6114 | I | 5  |      |   |   |
| 52 | K | 1 | 3162 | A | 11 | 3167 | C | 12 | 3175 | A | 15 | 3184 | H | 4  | 3190 | I | 6 | 3197 | C | 15 | 6107 | D | 8  | 6114 | I | 6  |      |   |   |
| 53 | C | 9 | 3163 | B | 12 | 3170 | H | 8  | 3176 | C | 15 | 3186 | H | 5  | 3191 | I | 6 | 3199 | I | 15 | 6109 | C | 11 | 6115 | I | 4  |      |   |   |
|    |   |   |      |   |    | 3171 | H | 8  |      |   |    |      |   |    | 3192 | I | 8 | 6101 | C | 4  | 6110 | B | 12 | 6116 | I | 4  |      |   |   |



[illegible]

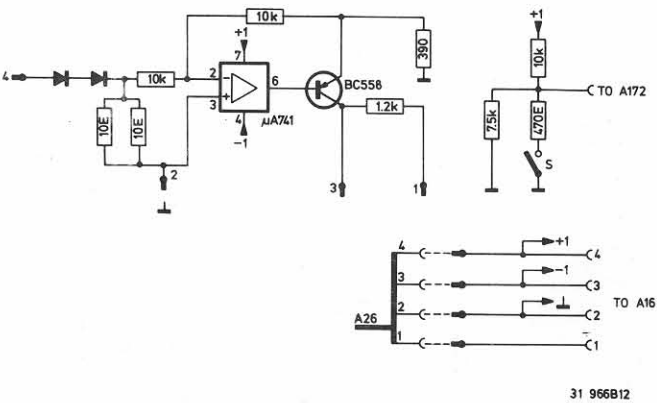
|                                                                                    |                |                                                                                     |             |                |  |
|------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------|-------------|----------------|--|
|  |                |                                                                                     |             |                |  |
| BC558B                                                                             | 4822 130 44197 | 3192                                                                                | 56E 5%      | 5322 116 54929 |  |
| BC635                                                                              | 5322 130 44349 | 3194                                                                                | 15E MR30    | 5322 116 54914 |  |
|  |                |                                                                                     |             |                |  |
| NE5514N                                                                            | 4822 209 81451 | 3141                                                                                | 47k         | 4822 100 10598 |  |
| NE532N                                                                             | 4822 209 80818 | 3158                                                                                | 2k2         | 4822 100 10029 |  |
| $\mu$ A741CN                                                                       | 4822 209 80617 | 3180                                                                                | 6k8         | 4822 100 10569 |  |
|  |                |                                                                                     |             |                |  |
| BA317                                                                              | 4822 130 30847 | 2122                                                                                | 180 pF - 5% | 4822 122 31962 |  |
|                                                                                    |                |  |             |                |  |
|                                                                                    |                | 6p-A10                                                                              |             | 4822 267 50412 |  |
|                                                                                    |                | 8p-A11                                                                              |             | 4822 267 50413 |  |



ELECTRICAL MEASUREMENTS AND ADJUSTMENTS

Laser power supply (POS. VOLT SH.)

Since the light pin is very sensitive to static charges, care should be taken that during measurements and adjustments of the laser power supply the potentials of aids and yourself equal the potential of the CD mechanism.



Check

The laser simulator PCB nr. 2 (4822 395 30125) should be used here. Take the flex PCB out of socket A11 and connect the simulator PCB with the socket.

Remove plug A16 and insert it in the socket on the simulator PCB. Connect the plug with 4 wires to socket A16. Take out plug A17 and insert the plug with 1 wire in socket A17.

In rest position the current through the laser diode should be  $\leq 1$  mA.

Check:

Set the switch on the simulator PCB in the OFF position and the mains switch in the ON position. Turn trimming resistor 3180 counterclockwise (max. R) and measure the voltage points +V and -V on the simulator PCB. The voltage should be  $\leq 15$  mV.

Check of laser supply control:

Set the switch on the simulator PCB in the ON position and measure the voltages between points +V and -V on the simulator PCB. Resistor 3180 counterclockwise (max. R):  $U + v - v = 60 \text{ mV} \pm 30 \text{ mV}$ . Resistor 3180 clockwise (min. R):  $U + v - v = 560 \text{ mV} \pm 50 \text{ mV}$ . Set resistor 3180 in mid-position. This is a preliminary adjustment. After the simulator PCB has been removed the laser current must be adjusted. (see service manual CD player).

Adjusting the focus bandwidth

(see service manual CD player).

Checking the AGC and offset circuit

(see service manual CD player).

CHANGES

PRE-AMPLIFIER PCB

| PCB with code | Deleted, added, changed                                                                                                                            | Reason                                                                                                                                                                     |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A01           | C2142 deleted<br>R3193, R3195 and D6116 added                                                                                                      | Protecting the laser diode                                                                                                                                                 |
| A02           | Connectors A12 has been turned 180°.<br><i>Attention:</i> This connector has only been mounted in this way on the pre-amplifier PCB with mark A02. | Coil focusing unit wound wrongly.<br><i>Attention:</i> When the focusing coil is replaced by a new one, coil A12 should be turned around.<br>(See Additional information). |
| A03           | R3152 changed into 12 K<br>R3115, 3116, 3118 and 3119 are changed into 680 K<br>R3180 changed into 15 K                                            | Increasing the RF output voltage<br>Increasing the laser current<br>Adapting the control range of the laser current adjustment.                                            |
| A04           | 10 nF capacitor added between pins 4 and 8 of IC6114.<br>10 nF capacitor added between pins 4 and 7 of IC6107.                                     | Protecting the laser diode against electrostatic discharges.                                                                                                               |
| A05           | R3152 changed into 15 K                                                                                                                            | Increasing the RF output voltage                                                                                                                                           |
| A06           | Introduction of changed PCB layout M2                                                                                                              | Changed laser diode power supply.<br>See Additional information.                                                                                                           |
| A07           | Introduction of changed PCB layout M3                                                                                                              | Preventing the laser from burning when the valve is open.                                                                                                                  |

## ADDITIONAL INFORMATION

### POS. VOLT. SH. PREAMPLIFIER PCB + LIGHT PEN

The layout of preamplifier PCBs with mark A06 and higher has been changed. Furthermore a new light pen has been applied in combination with this PCB.

The new light pen can be recognized by the red paint on the safety PCB.

In servicing, the following situations may occur:

- A. The set is provided with a preamplifier PCB with a mark lower than A06 and with a non-marked light pen:
  - a1. When the preamplifier PCB is replaced by a PCB with a mark higher than A05, the following measures should be taken:  
Mount a 470  $\Omega$  resistance across pins A111 and A113.  
**Before** switching on the mains switch, turn R3180 clockwise.  
**Carefully** adjust the laser current by means of R3180.
  - a2. When the light pen is replaced by a light pen with red paint on the safety PCB,  
Turn the R3180 clockwise **before** switching on the mains switch.  
**Carefully** adjust the laser current by means of R3180.
- B. The set is equipped with a preamplifier PCB with mark A06 or higher **and** with a marked light pen.
  - b1. When the preamplifier PCB is replaced by a PCB with a mark lower than A06:  
Turn R3180 clockwise **before** switching on the mains switch.  
Adjust the laser current **carefully** by means of R3180.
  - b2. When the light pen is replaced by a light pen that is **not** marked with red paint on the safety PCB, the following measures should be taken.  
Mount a 470  $\Omega$  resistance across pins A111 and A113.  
Turn R3180 clockwise **before** switching on the mains switch.  
Adjust the laser current **carefully** by means of R3180.
- C. The set is provided with a preamplifier PCB with discrete components and with a non-marked lightpen:
  - C1. When the preamplifier PCB is replaced by a PCB with chip components and marked higher than A05, the following measures should be taken:  
Mount a 470  $\Omega$  resistance across pins A111 and A113.  
**Before** switching on the mains switch, turn R3180 **clockwise**. Carefully adjust the laser current by means of R3180.
  - C2. When the lightpen is replaced by a lightpen with red paint on the safety PCB:  
Turn R3180 **counter-clockwise before** switching on the mains switch.  
Carefully adjust the laser current by means of R3180.

The new light pen is being supplied under the old order number.

In a number of sets having lasers with positive supply voltage the laser current adjustment has been increased from 575 mV  $\pm$  75 mV to 800 mV (measured across R3308) to avoid an unwanted high number of light pen failures. With this type of lasers the increase has no consequences for the expected operating life.

### Connector A12 on the PRE-AMPL + LASER PCB

During production temporarily focusing coils with a reversed winding direction have been applied.

In that case connector A12 on the PRE-AMPL + LASER PCB has been rotated through 180° relative to the PCB drawing.

The focusing coils supplied for service all have the same winding direction.

If an objective unit or PRE-AMPL + LASER PCB has to be replaced, it will be necessary to pay attention to the position of connector A12:

If the connector is rotated through 180° relative to the drawing in the manual, the following measures should be taken:

- If the objective unit is replaced, connector A12 should be mounted as given in the PCB drawing.
- If the PRE-AMPL + LASER PCB is replaced, connector A12 should be rotated through 180° on the PCB supplied by Service.