

8. MAINTENANCE

(a) Removal of Cabinet Case

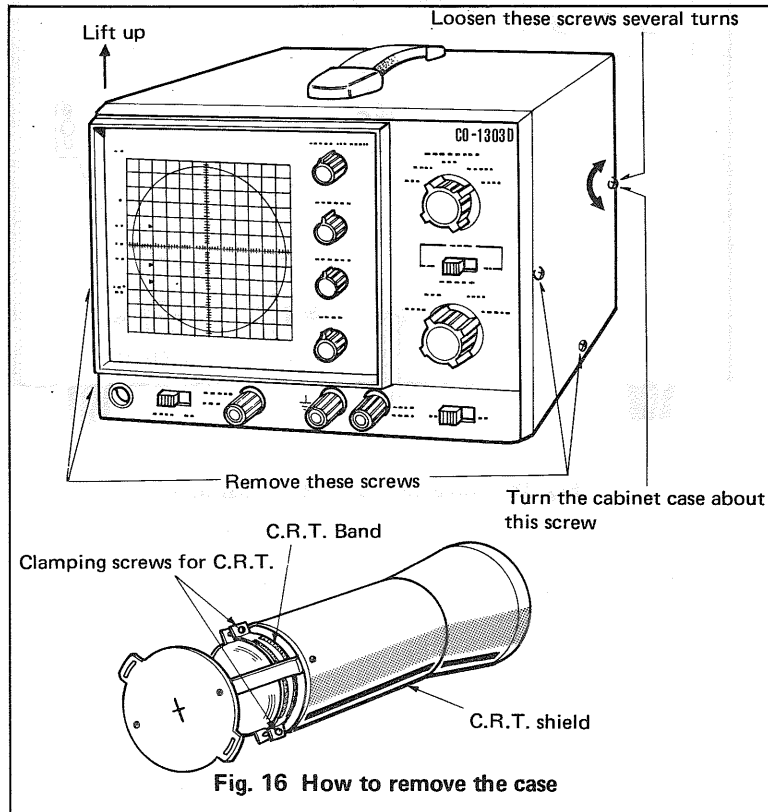


Fig. 16 How to remove the case

- 1) Remove four setscrews for the cabinet case from both side plates.
- 2) Loosen the screws located at the center rear sections of both side plates several turns.
- 3) Hold the handle of the cabinet case in your hand and lift the case up backward while rocking the case about the screws at the center rear sections of both side plates.

(b) Removal of Cathode Ray Tube

- 1) Remove the cabinet case from the unit.
- 2) Remove the socket from the cathode ray tube.
- 3) Remove two screws (A) holding the CRT mounting plate (see Fig. 15).
- 4) Pull out the CRT with mounting plate from the case.
- 5) Loosen two screws retaining the CRT band to remove the shielding plate from the CRT.

**CAUTION:** Handle the cathode ray tube with utmost care. When replacing the tube, BE CAREFUL to place the tube in the socket with the key positioned in the upper direction when viewed from the face.

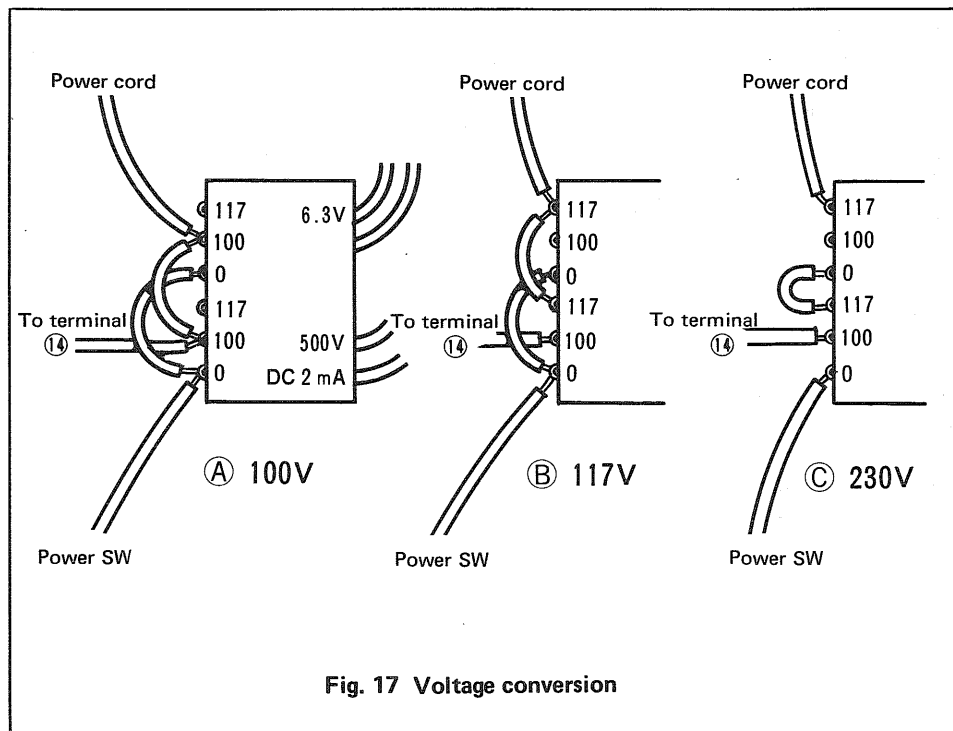
## (c) Removal of Panel

- 1) Remove the cabinet case.
- 2) Loosen mounting screws for control knobs (2 large knobs, 4 small knobs).
- 3) Unscrew the nut from the SWEEP RANGE selector switch shaft.
- 4) Remove the black screw between terminals (3) and  $\underline{\underline{4}}$  (4).
- 5) Remove two screws from the lower section of the front panel.
- 6) Carefully draw the panel forward.

**CAUTION:** Handle the panel carefully. Rough handling may bend or crack panel.

## (d) Voltage Conversion

- 1) To convert the power source voltage, first remove the power cord from the power source.
- 2) The power transformer is wired as shown in Fig. 17. If the oscilloscope is to be operated on another voltage, change the wiring and re-solder referring to Fig. 17.



## (e) Replacement of Fuse

- 1) Always disconnect power supply before replacing a fuse.
- 2) Remove the cabinet case from the unit.
- 3) Remove the fuse inserted in its holder located on the upper right corner of printed circuit board and insert a new fuse in the fuse holder.
- 4) If the fuse taken out is blown out, trouble shoot the set for brown fuse, repair the trouble and then apply the power to the set.
- 5) For 117 V operation a 0.5 A fuse should be used and for 230 V operation a 0.3 A fuse should be used.

**PARTS LIST**

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**PARTS LIST OF CO-1303D (Y71-1080-00)**

| Ref. No.             | Parts No.           | Description                              |
|----------------------|---------------------|--|
| <b>CAPACITOR</b>     |                     |  |
| C1                   | C91-0511-05         | Oil 0.1 $\mu$ F 630WV                    |
| C2                   | CC45SL2H150J        | Ceramic 15pF $\pm$ 5%                    |
| C3                   | CQ93M1H474K         | Mylar 0.47 $\mu$ F $\pm$ 10%             |
| C4                   | CQ93M1H473K         | Mylar 0.047 $\mu$ F $\pm$ 10%            |
| C5                   | CQ93M1H392K         | Mylar 3900pF $\pm$ 10%                   |
| C6, 7                | C91-0513-05         | Oil 0.47 $\mu$ F 630WV                   |
| <b>RESISTOR</b>      |                     |  |
| R1                   | RD14BB2E104J        | Carbon 100k $\Omega$ $\pm$ 5% 1/4W       |
| R2,3                 | RD14BY2H225J        | Carbon 2.2M $\Omega$ $\pm$ 5% 1/2W       |
| <b>POTENTIOMETER</b> |                     |  |
| VR1                  | R03-1019-05         | Variable resistor 2k $\Omega$ (C)        |
| VR2                  | R01-0041-05         | Variable resistor 500 $\Omega$ (B)       |
| VR3                  | R01-3027-05         | Variable resistor 10k $\Omega$ (B)       |
| VR4                  | R03-8019-05         | Variable resistor 1M $\Omega$ (B)        |
| <b>MISCELLANEOUS</b> |                     |  |
| N1                   | A01-0189-13         | Case                                     |
|                      | A10-0475-72         | Chassis                                  |
|                      | A20-0351-12         | Panel                                    |
|                      | A20-0994-13         | Panel assembly                           |
|                      | A21-0237-14         | Dress panel (1)                          |
|                      | A21-0237-04         | Dress panel (2)                          |
|                      | A40-0102-13         | Bottom plate                             |
|                      | A44-0016-24         | Rear Board (2)                           |
|                      | B20-0367-34         | Graticule                                |
|                      | B30-0043-15         | Neon lamp                                |
|                      | B40-0765-14         | Name plate                               |
|                      | B41-0094-04         | Caution label (220V - 240V)              |
|                      | B41-0111-04         | Caution label (110V - 120V)              |
|                      | B50-1445-20         | Instruction manual                       |
|                      | D32-0075-04         | Switch stopper                           |
|                      | E01-1403-05         | CRT socket                               |
|                      | E21-0131-35         | Terminal (black)                         |
|                      | E21-0301-05         | Terminal board (3P)                      |
|                      | E30-0545-05         | AC cord with plug                        |
|                      | F05-3011-05         | Fuse (0.3A)                              |
|                      | F05-5013-05         | Fuse (0.5A)                              |
|                      | F11-0189-13         | CRT shield                               |
|                      | F15-0138-04         | Felt                                     |
|                      | F15-0163-04         | Felt                                     |
|                      | F19-0210-04         | Patch                                    |
|                      | G13-0068-04         | Cushion                                  |
|                      | G13-0042-04         | Cushion                                  |
|                      | H01-5818-14         | Packing case (individual packing)        |
|                      | H10-2830-02         | Packing material, foamed styrene (Front) |
|                      | H10-2831-02         | Packing material, foamed styrene (Rear)  |
|                      | H20-1725-04         | Protection cover                         |
|                      | H25-0029-04         | Polyethylene bag                         |
|                      | J03-0003-04         | Rubber leg                               |
|                      | J20-0265-24         | CRT bracket                              |
|                      | J21-0754-34         | Terminal bracket                         |
|                      | J21-1204-04         | Power transformer bracket                |
|                      | J21-1431-14         | CRT clamping band                        |
|                      | J21-1432-14         | CRT clamping band                        |
|                      | J32-0830-04         | Boss                                     |
|                      | J41-0006-05         | Cord bushing                             |
| J42-0010-04          | Rubber bushing      |  |
| J61-0017-15          | Snap beaded band    |  |
| J61-0053-05          | Board support       |  |
| J61-0049-05          | Cable wrapping band |  |

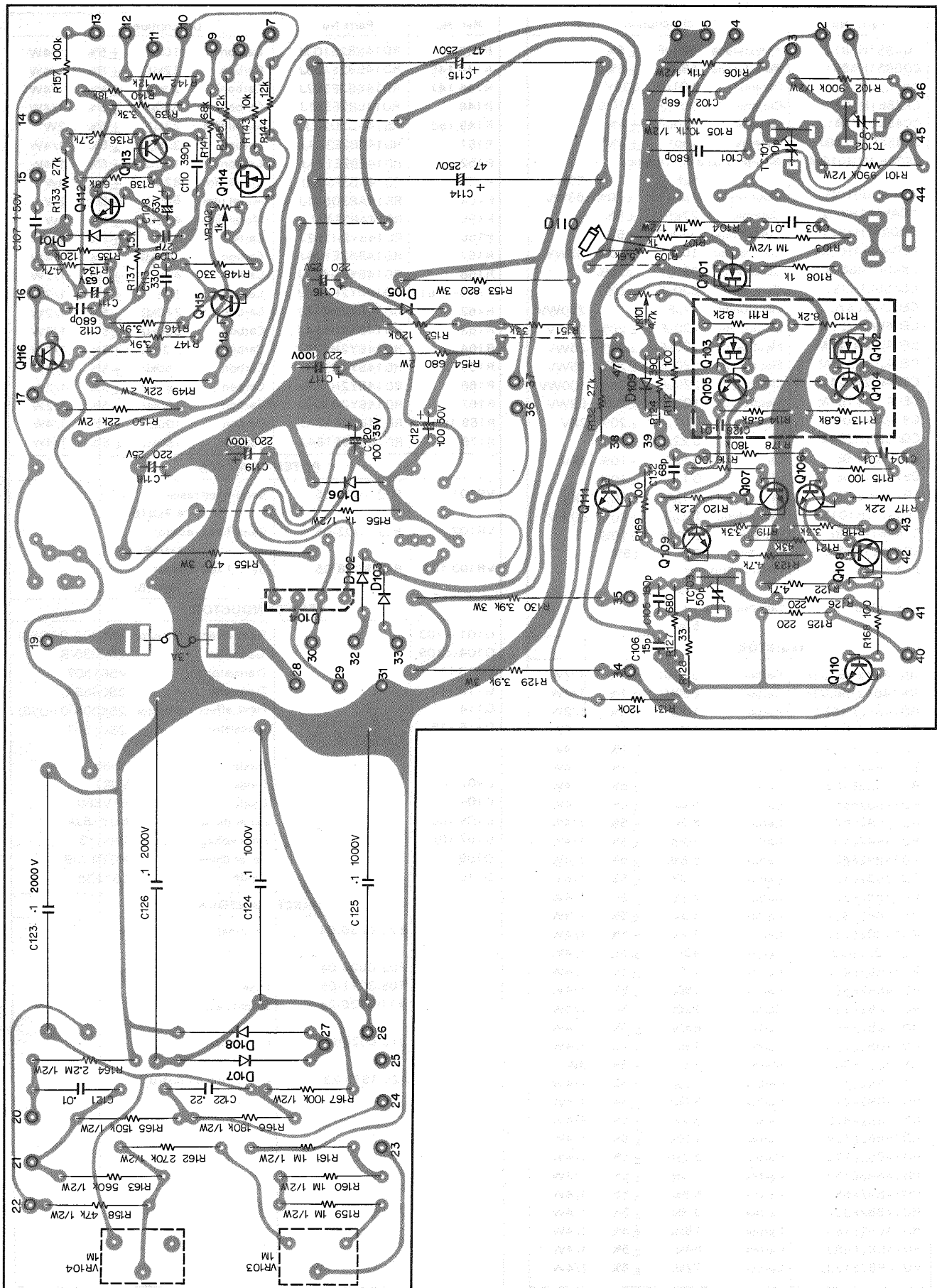
| Ref. No.                               | Parts No.   | Description          |
|--|-------------|----------------------|
|  | K01-0058-25 | Grip                 |
|  | K21-0280-14 | Knob                 |
|  | K21-0290-14 | Knob                 |
|  | L01-9516-05 | Power transformer    |
| S1                                     | S04-1034-05 | Rotary switch        |
| S2                                     | S04-1026-05 | Rotary switch        |
| S3~6                                   | S31-2007-05 | Slide switch         |
| <b>CRT (cathode ray tube), 75ARB31</b> |             |                      |
|  | X65-1120-22 | Printed circuit unit |
|  | X67-1040-00 | Cord with banana tip |

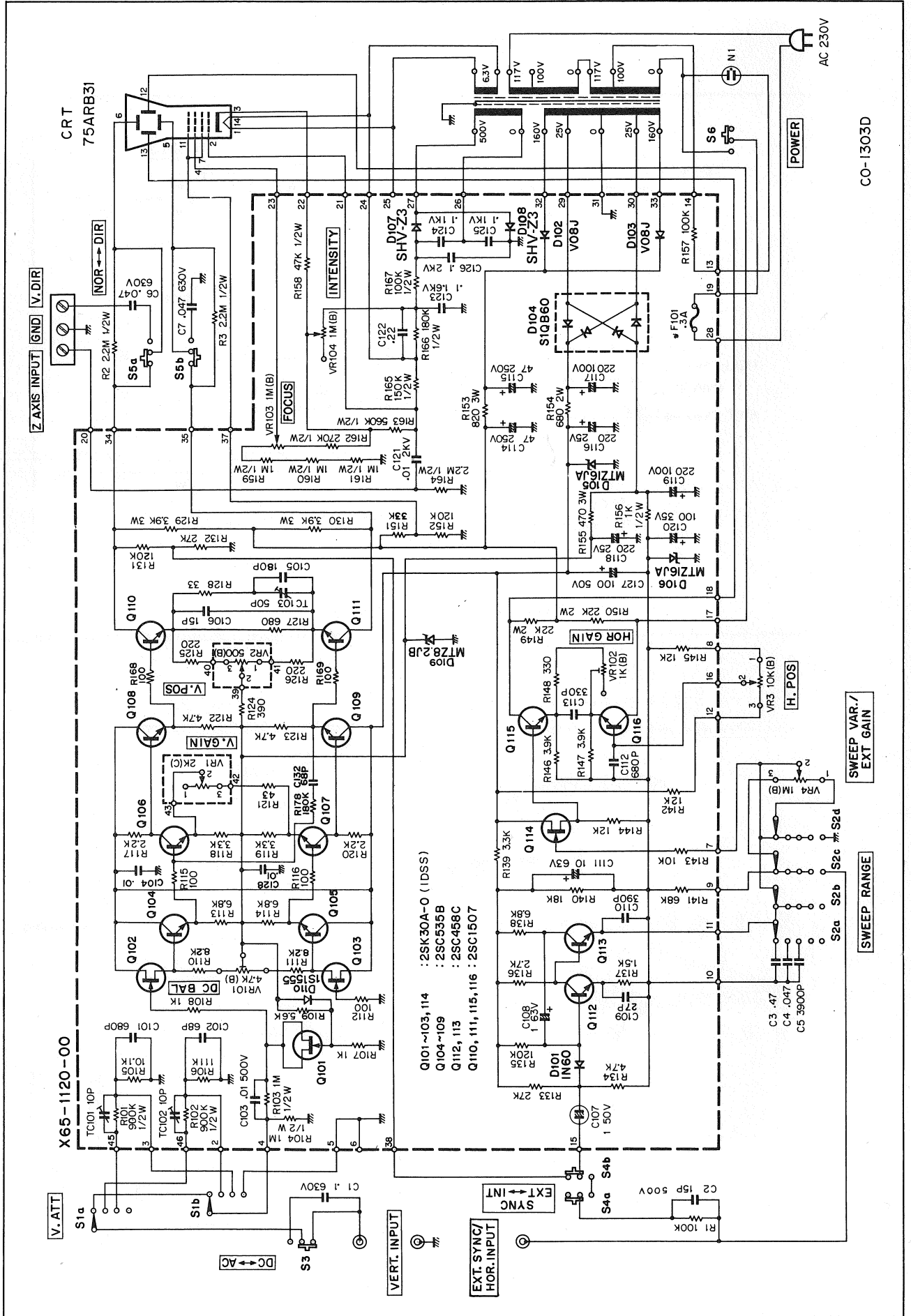
## PARTS LIST OF X65-1120-22

| Ref. No.        | Parts No.     | Description                            |
|-----------------|---------------|--|
| C101            | CQ08S1H681J   | Polystyrene 680pF ±5%                  |
| C102            | CQ08S1H680J   | Polystyrene 68pF ±5%                   |
| C103            | C91-0502-05   | Ceramic 0.01μF 630V                    |
| C104            | CK45B1H103K   | Ceramic 0.01μF ±10%                    |
| C105            | CC45SL1H181J  | Ceramic 180pF ±5%                      |
| C106            | CC45SL1H150J  | Ceramic 15pF ±5%                       |
| C107            | CE04BW1H010M  | Non-polarized electrolytic<br>1μF 50WV |
| C108            | CE4W1J010M    | Electrolytic 1μF ±20% 63WV             |
| C109            | CC45SL1H270J  | Ceramic 27pF ±5%                       |
| C110            | CQ08S1H391J   | Polystyrene 390pF ±5%                  |
| C111            | CE04W1J100M   | Electrolytic 10μF ±20% 63WV            |
| C112            | CK45B1H681K   | Ceramic 680pF ±20%                     |
| C113            | CC45SL1H331J  | Ceramic 330pF ±5%                      |
| C114,115        | CE02W2E470    | Electrolytic 47μF 250WV                |
| C116            | CE04W1E221M   | Electrolytic 220μF ±20% 25WV           |
| C117            | CE04W2A221M   | Electrolytic 220μF ±20% 25WV           |
| C118            | CE04W1E221M   | Electrolytic 220μF ±20% 25WV           |
| C119            | CE04W2A221M   | Electrolytic 220μF ±20% 100WV          |
| C120            | CE04W1V101M   | Electrolytic 100μF ±20% 63WV           |
| C121            | C91-0571-05   | Ceramic 0.01μF ±20% 2KV                |
| C122            | CQ93M1H224M   | Mylar 0.22μF ±20%                      |
| C123            | C91-0509-05   | Oil 0.1μF ±10% 2KV                     |
| C124,125        | C91-0506-05   | Oil 0.1μF ±10%                         |
| C126            | C91-0509-05   | Oil 0.1μF ±10% 2KV                     |
| C127            | CE04W1H101M   | Electrolytic 100μF ±20% 50WV           |
| C128            | CK45B1H103K   | Ceramic 0.01μF ±10%                    |
| C132            | CC45SL1H680J  | Ceramic 68p ±5%                        |
| TC101.102       | C05-0010-15   | Ceramic trimmer<br>10pF                |
| TC103           | C05-0029-15   | Ceramic trimmer<br>50pF                |
| <b>RESISTOR</b> |               |  |
| R101            | RN14BK2H9903F | Carbon 990kΩ ±1% 1/2W                  |
| R102            | RN14BK2H9003F | Carbon 900kΩ ±1% 1/2W                  |
| R103            | RD14BY2H105J  | Carbon 1MΩ ±5% 1/2W                    |
| R104            | RN14BK2H1004F | Carbon 1MΩ ±1% 1/2W                    |
| R105            | RN14BK2E1012F | Carbon 10.1kΩ ±1% 1/4W                 |
| R106            | RN14BK2E1113F | Carbon 11.1kΩ ±1% 1/4W                 |
| R107.108        | RD14BB2E102J  | Carbon 1kΩ ±5% 1/4W                    |
| R109            | RD14BB2E562J  | Carbon 5.6kΩ ±5% 1/4W                  |
| R110.111        | RD14BB2E822J  | Carbon 8.2kΩ ±5% 1/4W                  |
| R112            | RD14BB2E101J  | Carbon 100Ω ±5% 1/4W                   |
| R113.114        | RD14BB2E682J  | Carbon 6.8kΩ ±5% 1/4W                  |
| R115.116        | RD14BB2E101J  | Carbon 100Ω ±5% 1/4W                   |
| R117            | RD14BB2E222J  | Carbon 2.2kΩ ±5% 1/4W                  |
| R118.119        | RD14BB2E332J  | Carbon 3.3kΩ ±5% 1/4W                  |
| R120            | RD14BB2E222J  | Carbon 2.2kΩ ±5% 1/4W                  |
| R121            | RD14BB2E430J  | Carbon 43Ω ±5% 1/4W                    |
| R122.123        | RD14BB2E472J  | Carbon 4.7kΩ ±5% 1/4W                  |
| R124            | RD14BB2E391J  | Carbon 390Ω ±5% 1/4W                   |
| R125.126        | RD14BB2E221J  | Carbon 220Ω ±5% 1/4W                   |
| R127            | RD14BB2E681J  | Carbon 680Ω ±5% 1/4W                   |
| R128            | RD14BB2E330J  | Carbon 33Ω ±5% 1/4W                    |
| R129.130        | RS14AB3F392J  | Metal film 3.9kΩ ±5% 3W                |
| R131            | RD14BB2E124J  | Carbon 120kΩ ±5% 1/4W                  |
| R132.133        | RD14BB2E273J  | Carbon 27kΩ ±5% 1/4W                   |
| R134            | RD14BB2E472J  | Carbon 4.7kΩ ±5% 1/4W                  |
| R135            | RD14BB2E124J  | Carbon 120kΩ ±5% 1/4W                  |
| R136            | RD14BB2E272J  | Carbon 2.7kΩ ±5% 1/4W                  |
| R137            | RD14BB2E152J  | Carbon 1.5kΩ ±5% 1/4W                  |
| R138            | RD14BB2E682J  | Carbon 6.8kΩ ±5% 1/4W                  |
| R139            | RD14BB2E332J  | Carbon 3.3kΩ ±5% 1/4W                  |
| R140            | RD14BB2E183J  | Carbon 18kΩ ±5% 1/4W                   |
| R141            | RD14BB2E683J  | Carbon 68kΩ ±5% 1/4W                   |
| R142            | RD14BB2E123J  | Carbon 12kΩ ±5% 1/4W                   |

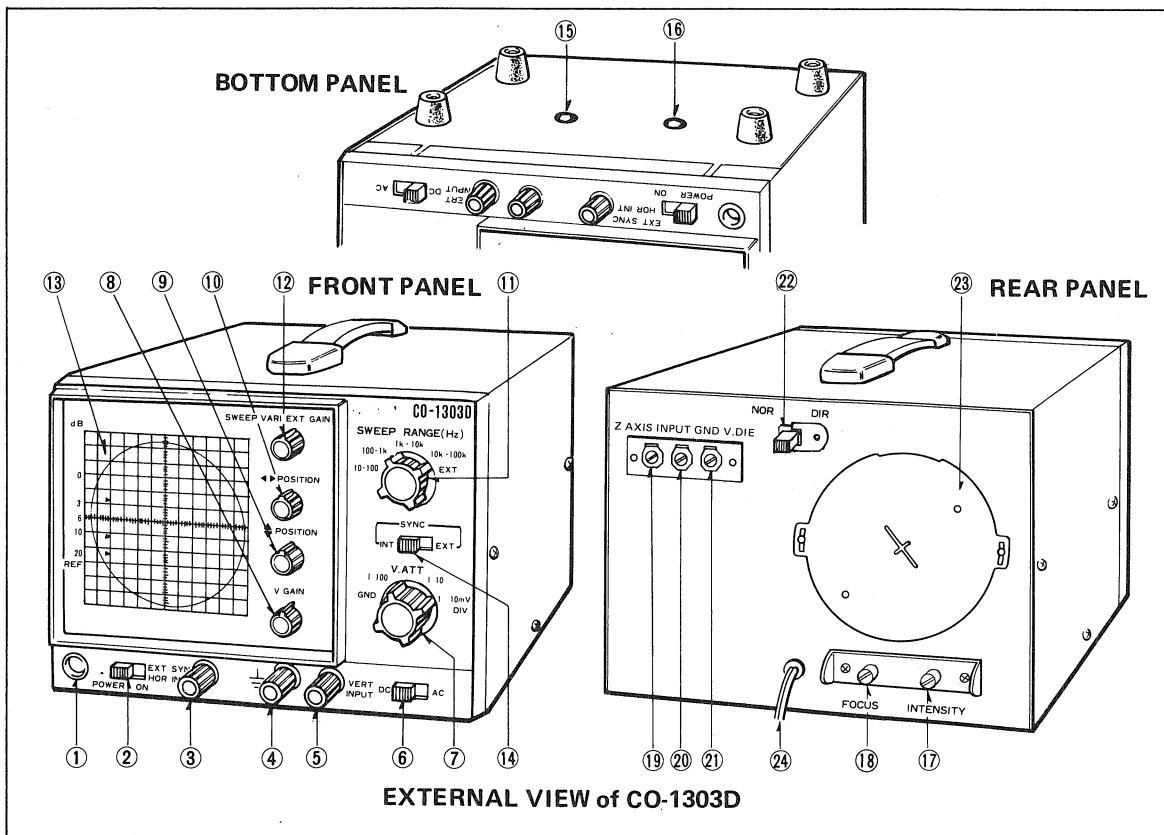
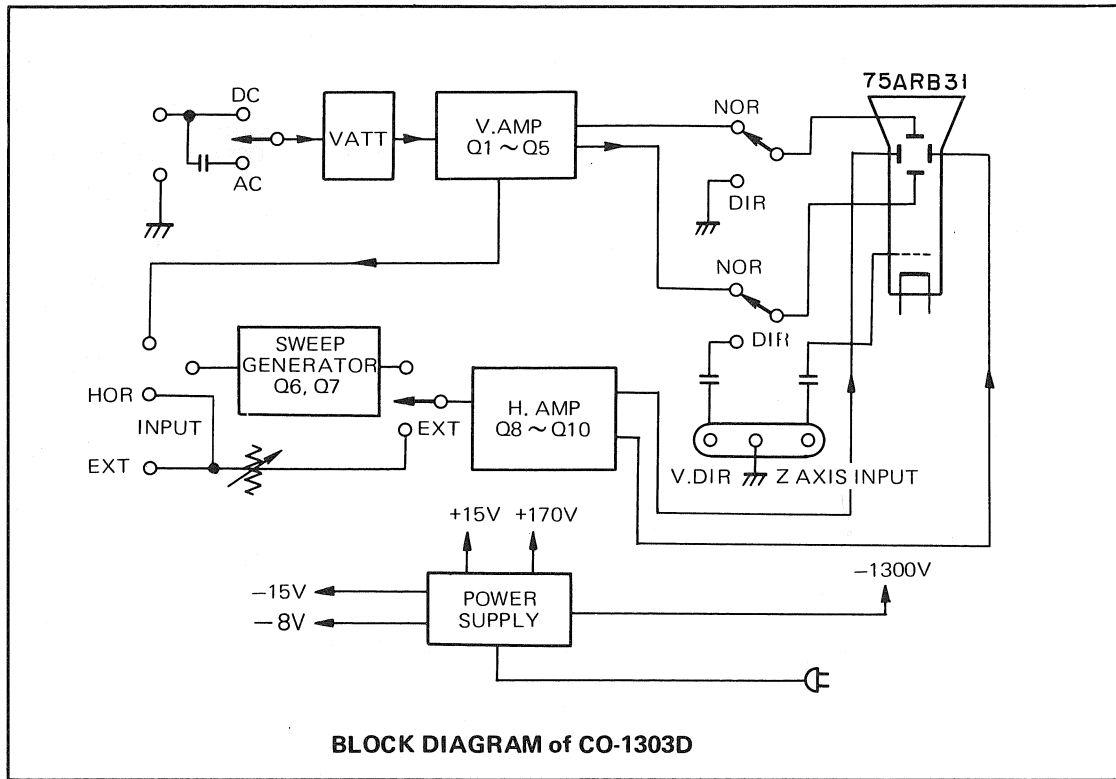
| Ref. No.              | Parts No.    | Description                             |
|-----------------------|--------------|---|
| R143                  | RD14BB2E103J | Carbon 10kΩ ±5% 1/4W                    |
| R144.145              | RD14BB2E123J | Carbon 12kΩ ±5% 1/4W                    |
| R146.147              | RD14BB2E392J | Carbon 3.9kΩ ±5% 1/4W                   |
| R148                  | RD14BB2E331J | Carbon 330Ω ±5% 1/4W                    |
| R149.150              | RS14AB3D223J | Metal film 22kΩ ±5% 2W                  |
| R151                  | RD14BB2E333J | Carbon 33kΩ ±5% 1/4W                    |
| R152                  | RD14BB2E124J | Carbon 120kΩ ±5% 1/4W                   |
| R153                  | RS14AB3F821J | Metal film 820Ω ±5% 3W                  |
| R154                  | RN14AB3D681J | Metal film 680Ω ±5% 2W                  |
| R155                  | RS14AB3F471J | Metal film 470Ω ±5% 3W                  |
| R156                  | RD14BY2H102J | Carbon 1kΩ ±5% 1/2W                     |
| R157                  | RD14BB2E104J | Carbon 100kΩ ±5% 1/4W                   |
| R158                  | RD14BY2H473J | Carbon 47kΩ ±5% 1/2W                    |
| R159~161              | RD14BY2H105J | Carbon 1MΩ ±5% 1/2W                     |
| R162                  | RD14BY2H274J | Carbon 270kΩ ±5% 1/2W                   |
| R163                  | RD14BY2H564J | Carbon 560kΩ ±5% 1/2W                   |
| R164                  | RD14BY2H225J | Carbon 2.2MΩ ±5% 1/2W                   |
| R165                  | RD14BY2H154J | Carbon 150kΩ ±5% 1/2W                   |
| R166                  | RD14BY2H184J | Carbon 180kΩ ±5% 1/2W                   |
| R167                  | RD14BY2H104J | Carbon 100kΩ ±5% 1/2W                   |
| R168.169              | RD14BB2E101J | Carbon 100Ω ±5% 1/4W                    |
| R178                  | RD14BB2E184J | Carbon 180kΩ ±5% 1/4W                   |
| <b>POTENTIOMETER</b>  |              |   |
| VR101                 | R12-1004-05  | Semi-fixed resistor<br>4.7kΩ (B)        |
| VR102                 | R12-1002-05  | Semi-fixed resistor<br>1kΩ (B)          |
| VR103.104             | R12-8008-05  | Semi-fixed resistor<br>1MΩ (B)          |
| <b>SEMI-CONDUCTOR</b> |              |   |
| Q101~103              |              | Field effect transistor 2SK30A-0 (IDSS) |
| Q104~109              |              | Transistor 2SC535-B                     |
| Q110.111              |              | Transistor 2SC1507                      |
| Q112.113              |              | Transistor 2SC458-C                     |
| Q114                  |              | Field effect transistor 2SK30A-0 (IDSS) |
| Q115.116              |              | Transistor 2SC1507                      |
| D101                  |              | Diode 1N60                              |
| D102.103              |              | Diode V08J                              |
| D104                  |              | Diode S1VB60                            |
| D105.106              |              | Zener diode MTZ16JA                     |
| D107.108              |              | High voltage diode SHV-Z3               |
| D109                  |              | Zener diode MTZ2.2JB                    |
| D110                  |              | Diode 1S1555                            |
| <b>MISCELLANEOUS</b>  |              |   |
|                       | E23-0046-04  | Terminal                                |
|                       | F02-0028-04  |   |
|                       | F05-3011-05  | Fuse                                    |
|                       | F11-0026-24  | Shield case                             |
|                       | J13-0020-05  | Fuse holder                             |
|                       | J25-1319-23  | Printed circuit board                   |

10. P.C. BOARD





12. BLOCK DIAGRAM & EXTERNAL VIEW



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A product of  
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