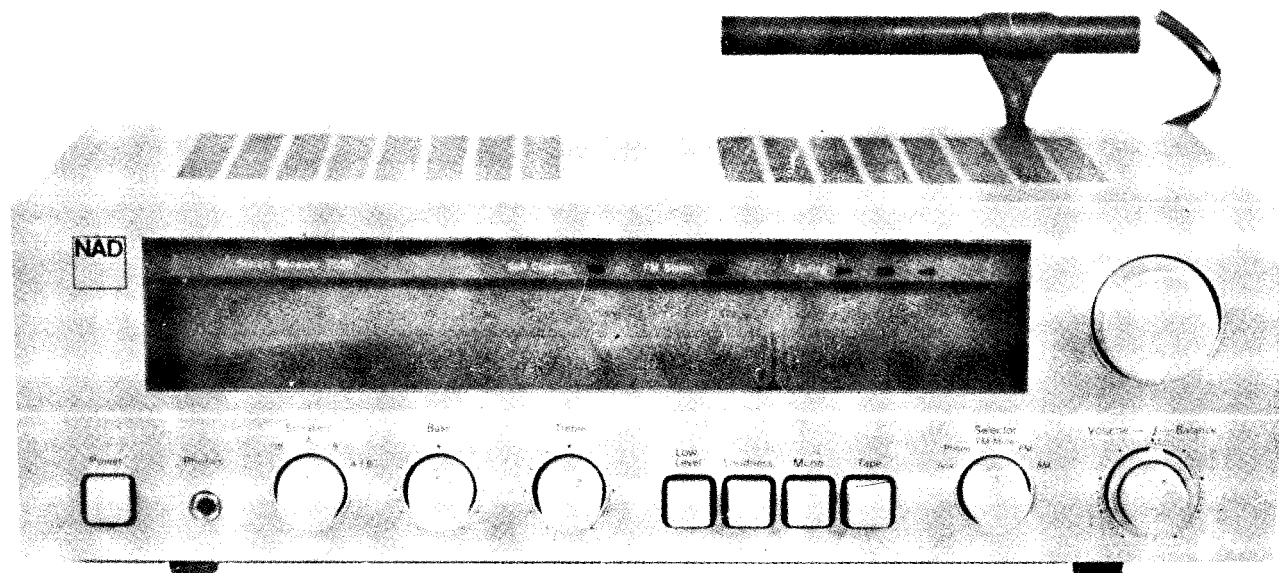


# SERVICE MANUAL

## NAD MODEL 7020

### AM/FM STEREO RECEIVER



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## SPECIFICATION

### FM Tuner Section

|   |                        |
|---|------------------------|
| Input Sensitivity IHF, 30 dB quieting                   | 1.8 $\mu$ V            |
| IHF, 50 dB S/N Mono/Stereo                              | 3.5 $\mu$ V/45 $\mu$ V |
| Signal to Noise Ratio(A weighted, at 65 dBf)Mono/Stereo | 75dB/70dB              |
| Frequency Response, 30—15K Hz                           | $\pm$ 0.5dB            |
| De-emphasis Accuracy 75 $\mu$ Sec                       | $\pm$ 0.5dB            |
| Channel Separation 1K Hz                                | 42dB                   |
| 30—15K Hz   | 32dB                   |
| Selectivity, Alternate Channel(400KHz)                  | 62dB                   |
| Capture Ratio at 45 dBf and 65 dBf                      | 1.5dB                  |
| AM Suppression at 45 dBf and 65 dBf                     | 60dB                   |
| Image Rejection   | 50dB                   |
| I.F Rejection   | 75dB                   |
| SCA Rejection   | 70dB                   |
| Pilot Signal Suppression                                | 55dB                   |
| THD at 100% Modulation 1.KHz Mono/Stereo                | 0.2%/0.3%              |
| 100 Hz Mono/Stereo                                      | 0.2%/0.3%              |
| 6KHz Mono/Stereo  | 0.3%/0.4%              |
| THD Stereo 1KHz 50%/150%                                | 0.3%/0.4%              |

### AM Tuner Section

|                    |             |
|--------------------|-------------|
| Usable Sensitivity | 350 $\mu$ V |
| Sensitivity        | 30dB        |
| Image Rejection    | 45dB        |
| IF Rejection       | 40dB        |

### Audio Section

\* measurements identified by an asterisk are taken in accordance with the new IHF A-202 amplifier measurement standard.

### Power Amplifier Section

|  |                |
|--|----------------|
| * Continuous average power output at 8 ohm 20-20K Hz both channel driven | > 20W          |
| Rated distortion.  | < 0.02%        |
| * Clipping headroom at 8 ohm   | + 1.5dB        |
| Clipping power at 8 ohm/4 ohm/2 ohm                                      | 28W/37W/42W    |
| Dynamic headroom at 8 ohm  | + 3dB          |
| Dynamic power at 8 ohm /4ohm/2ohm  | 40W/58W/72W    |
| * Reactive load rating   | + 1.7dB        |
| * Transient Overload Recovery Time                                       | < 1 $\mu$ Sec  |
| * Slew Factor  | > 50           |
| Slew Rate  | 18V/ $\mu$ sec |
| Damping factor at .50 Hz (Ref. 8 ohm)                                    | > 55           |
| T.H.D 20-20K Hz From 250m V to 20W                                       | < 0.02%        |
| S.M.P.T.E I.M.D(60Hz $\pm$ 7KHz, 4:1)From 250mWto 20W                    | < 0.02%        |
| I.H.F I.M.D(19K Hz+20K Hz) at 20W  | < 0.02%        |
| T.I.M (15K Hz Sine+3.18KHz Square Wave) at 20W                           | < 0.02%        |
| Frequency Response, 20—20K Hz(From Lab. IN)                              | $\pm$ 0.5dB    |
| Frequency Response Range $\pm$ 3dB                                       | 10—70K Hz      |

### Preamplifier Section

|   |                     |
|---|---------------------|
| * Input Impedance Resistance/Capacitance              | 47K $\Omega$ /100pF |
| Input Sensitivity(1K Hz) * For 1 Watt out/20 Watt out | 0.5mV/2.5mV         |
| Input Overload at 20Hz/1K Hz/20K Hz                   | 27mV/270mV/2V       |
| T.H.D (20—20K Hz)and IMD at + 30dB input level        | < 0.02%             |
| RIAA Response Accuracy                                | $\pm$ 0.5dB         |
| Signal to Noise Ratio A Weighted                      |                     |
| (a)With phono cartridge connected Ref 10mV/* Ref 5mV  | 80dB/75dB           |
| (b)With short-circuit input Ref 10mV                  | 84dB                |

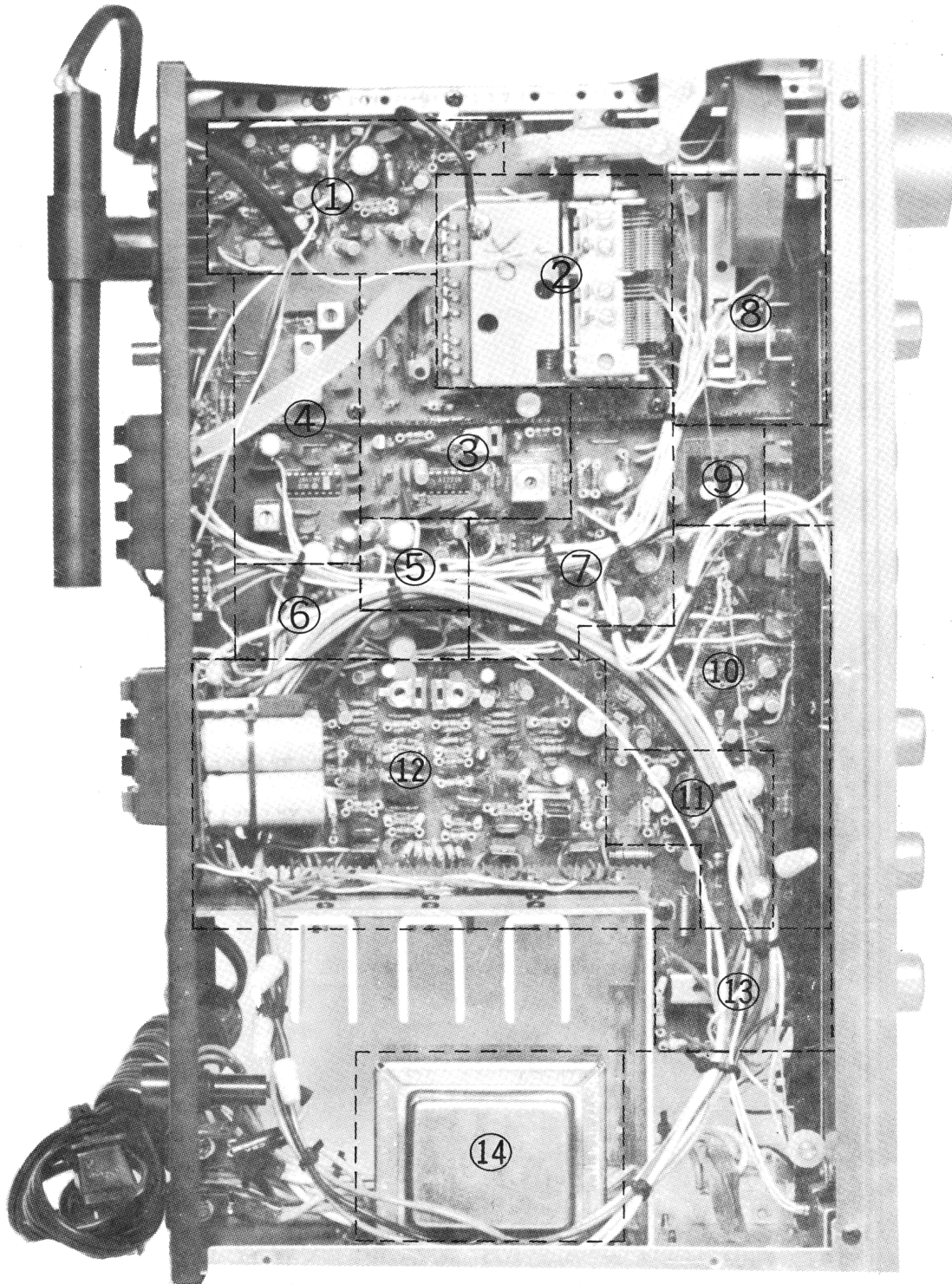
### High Level Input

|  |                     |
|--|---------------------|
| * Input impedance Resistance/Capacitance           | 20K $\Omega$ /100pF |
| Input Sensitivity * For 1 Watt out/For 20 Watt out | 30mV/150mV          |
| Signal to Noise Ratio, A—Weighted * Ref 1Watt out  | > 80dB              |
| Ref 20 Watt out                                    | > 110dB             |
| * Maximum input signal                             | Infinite            |
| Frequency Response, 20—20K Hz                      | $\pm$ 0.5dB         |

### Controls

|   |                               |
|---|-------------------------------|
| Bass control range at 50 Hz                           | $\pm$ 10dB                    |
| Treble control range at 10K Hz                        | $\pm$ 7dB                     |
| Infrasonic filter Turn Over frequency(From Normal 1N) | 15Hz                          |
| Slope (dB/octave)                                     | 12                            |
| Power Consumption                                     | 150VA                         |
| Weight  | 7.5K g                        |
| Dimension Height $\times$ Width $\times$ Depth(mm)    | 120 $\times$ 420 $\times$ 240 |

INSIDE VIEW OF UNIT



①Phono Amp

②FM RF Amp

③FM IF Amp

④AM System

⑤LED Driver

⑥Tuner Regulator

⑦MPX & Buffer

⑧Function Sw

⑨Low Pass Filter

⑩Tone Amp

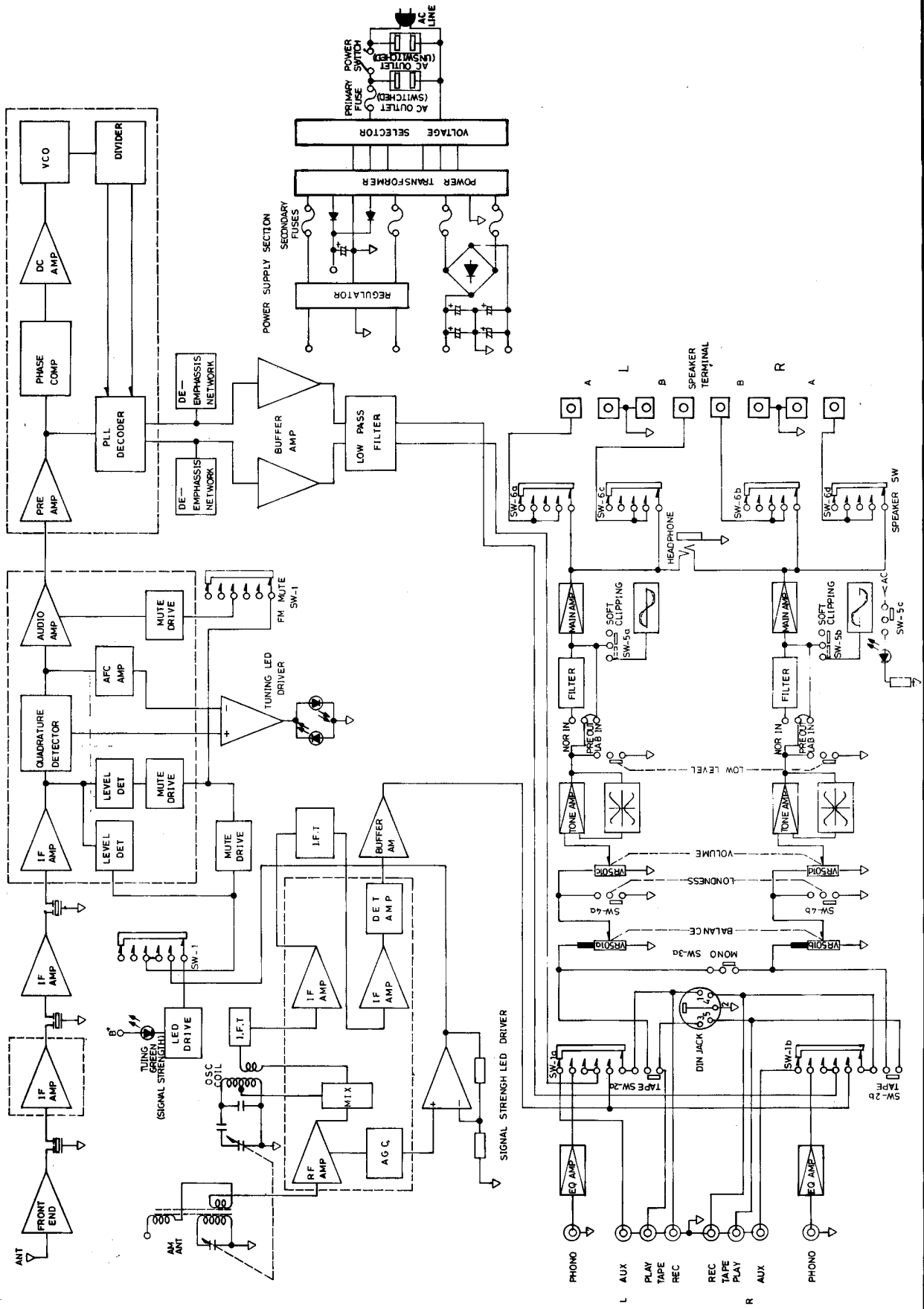
⑪Amp Regulator

⑫Power Amp

⑬Speakers Sw

⑭Power Transformer

# 7020 BLOCK DIAGRAM



## ALIGNMENT (TUNER)

| 1. AM ALIGNMENT: 1. Selector switch in AM position<br>2. AC line voltage at rated voltage<br>3. Monitor output at REC OUT |   |  |  |                           |                           |                            |                       |                    |
|---|---|--|--|---------------------------|---------------------------|----------------------------|-----------------------|--------------------|
| Section   | AM SG   |  |  | Dial Setting              | Indicator                 | Adjustment Point           | Adjust for            |                    |
|   | Connetion   | Carrier Freq.  | Modulation                                 |                           |                           |                            |                       |                    |
| AM IF   | Hot side of SG Output through 200 PF to AM antenna trimmer terminal (TPI) |  | 455KHz                                     | 30% Mod 400Hz             | Point of non-interference | T302 and T303              | Maximum output        |                    |
| AM RF   | 1   | Hot side of SG output through 200 PF to EXT AM antenna Terminal on rear panel              | 600KHz                                     | 30% Mod. 400Hz            | 600KHz                    | VTVM or Oscilloscope       | Maximum output        |                    |
|   | 2   |  | 1400KHz                                    | 30% Mod. 400Hz            | 1400KHz                   |                            |                       | TC-2 and TC-4      |
|   | 3   |  | Repeat Step 1 and Step 2                   |                           |                           |                            |                       |                    |
| 2. FM ALIGNMENT: 1. Selector Switch in FM position<br>2. AC line voltage at rated voltage<br>3. Monitor output at REC OUT |   |  |  |                           |                           |                            |                       |                    |
| Section   | FM SG   |  |  | Dial Setting              | Indicator                 | Adjustment                 | Adjust for            |                    |
|   | Connetion   | Carrier Freq.  | Modulation                                 |                           |                           |                            |                       |                    |
| AM IF   | —   |  |  | Point of non-interference | Tuning Meter of Set       | T101 (Discr. IF primary A) | Center Indication     |                    |
| FM RM   | 1   | Connect to FM 300 ohm antenna Terminal on the rear panel through FM dummy antenna.         | 90MHz                                      | 100% Mod. 400Hz           | 90MHz                     | VTVM or Oscilloscope       | Maximum output        |                    |
|   | 2   |  | 106MHz                                     |                           | 106MHz                    |                            |                       | TC-1 TC-3          |
|   | 3   |  | Repeat Step 1 and Step 2                   |                           |                           |                            |                       |                    |
| FM Mono Distortion  | 1   |  | 98MHz                                      | 100% Mod. 400Hz           | 98MHz                     | Distortion Meter*          | T101 upper side       | Minimum Distortion |
|   | 2   |  | Repeat FM IF and FM MONO DISTORTION STEP 1 |                           |                           |                            |                       |                    |
| FM Mute   | 1   | Selector Switch in FM Muting Position<br>Adjust*attenuator of FM SG for antenna input 15dB |  |                           |                           |                            |                       |                    |
|   | 2   | 98MHz  | 100% Mod 400Hz                             | 98MHz                     | VTVM or Oscilloscope      | VR101                      | Output just disappear |                    |
|   | 3   | Increase FM SG output 4dB more to get full audio output                                    |  |                           |                           |                            |                       |                    |
|   | 4   | If full audio output cannot be got repeat step 1. 2. 3.                                    |  |                           |                           |                            |                       |                    |

| 3. FM MPX ALIGNMENT 1. Same as FM ALIGNMENT 1. 2. 3.<br>2. FM SG is external modulated by stereo SG and connected to FM 300 $\Omega$ antenna terminal on the rear panel through FM dummy antenna. |      |       |  |                             |   |            |                  |  |  |
|---|------|-------|--|-----------------------------|---|------------|------------------|--|--|
| Section   | Step | FM SG | Stereo SG  | Dial Setting                | Indicator   | Adjustment | Adjust for       |  |  |
| MPX pilot   | 1    | —     | —  | Point of no signal received | Connect frequency counter through 100K $\Omega$ to TP10 | VR201      | 19KHz $\pm$ 30Hz |  |  |
|   | 2    | 98MHz | 10% 19KHz Pilot<br>90% L+R, L-R  | 98MHz                       | —   | VR201      | Stereo LED light |  |  |
| Separation  | 1    | 98MHz | 10% 19KHz pilot L only   | 98MHz                       | Connect VTVM or Oscilloscope to R REC OUT               | VR202      | Minimum output   |  |  |
|   | 2    |       | 10% 19KHz pilot R only   | 98MHz                       | Connect VTVM or Oscilloscope to L REC OUT               | VR202      | Minimum output   |  |  |
|   | 3    |       | Repeat Step 1 and Step 2   |                             |   |            |                  |  |  |
|   | 4    |       | If there is an excessive difference between leak-free effect of both channels slightly adjust VR202 so that the level of signal leakage of both channels are equal |                             |   |            |                  |  |  |

### ALIGNMENT (AUDIO)

#### **IDLE CURRENT ALIGNMENT**

1. 5 Minutes minimum pre-heating is necessary.
2. Set the volume control at minimum position.
3. Connect DC milli-voltmeter across R660 for right channel and across R659 for left channel. The meter sensitivity should be set for 30–100mV full scale deflection.
4. Insert 1 kohm carbon resistor to connect in parallel with R648(right channel) and R647(left channel).
5. After insert 1Kohm. if the reading of meter were between 30mV and 60mV then the alignment is completed.
6. If the reading were less than 30mV then the value of RX1 or RX2 should be reduced till the reading is between 30mV and 60mV.
7. If the reading were more than 60mV. then the value of RX1 or RX2 should be increase till the reading is between 30mV and 60mV.

#### **DC OFF-SET ALIGNMENT**

1. 5 minutes minimum pre-heating is necessary for DC offset adjustment.
2. Set the volume control at minimum position.
3. Speaker switch should be set to "A" position.
4. Connect a DC milli-voltmeter to the "A speaker" terminals of each channel. The meter sensitivity should be set for 100-300mV full scale deflection. The positive input of the meter should be connected to the red (+) speaker terminal.
5. If the readings are within +50mV, then no adjustment is necessary.
6. If the reading is more than +50mV then adjust VR601 (for left channel) and VR602 (for right channel) till the meter reading is zero.

| SYMBOL NO | PARTS NO      | DESCRIPTION | REF                         |        |
|-----------|---------------|-------------|-----------------------------|--------|
| C306      | 17-5D473M     | CER CAPA    | 0.047 $\mu$ F 50V $\pm$ 20% | 5.00   |
| C307      | 17-5D103M     | CER CAPA    | 0.01 $\mu$ F 50V $\pm$ 20%  | 3.40   |
| C308      | 17-5D103M     | CER CAPA    | 0.01 $\mu$ F 50V $\pm$ 20%  | 3.40   |
| C309      | 17-5D473M     | CER CAPA    | 0.047 $\mu$ F 50V $\pm$ 20% | 5.00   |
| C310      | 17-1.6E107Y   | ELEC CAPA   | 100 $\mu$ F 16V+50-10%      | 14.00  |
| C311      | 17-5D102M     | CER CAPA    | 1000PF 50V $\pm$ 20%        | 4.00   |
| C312      | 17-2.5E475Y   | ELEC CAPA   | 4.7 $\mu$ F 25V+50-10%      | 8.00   |
| C313      | 17-5D103M     | CER CAPA    | 0.01 $\mu$ F 50V $\pm$ 20%  | 3.40   |
| C314      | 17-1.6E227Y   | ELEC CAPA   | 220 $\mu$ F 16V+50-10%      | 33.50  |
| C315      | 17-2.5E475Y   | ELEC CAPA   | 4.7 $\mu$ F 25V+50-10%      | 8.00   |
| C316      | 17-5F183J     | MYLAR CAPA  | 0.018 $\mu$ F 50V $\pm$ 5%  | 8.90   |
| C317      | 17-5F152J     | MYLAR CAPA  | 0.0015 $\mu$ F 50V $\pm$ 5% | 6.50   |
| C318      | 17-5F183J     | MYLAR CAPA  | 0.018 $\mu$ F 50V $\pm$ 5%  | 8.90   |
| C319      | 17-2.5E475Y   | ELEC CAPA   | 4.7 $\mu$ F 25V+50-10%      | 8.00   |
| C320      | 17-2.5E225Y   | ELEC CAPA   | 2.2 $\mu$ F 25V+50-10%      | 8.00   |
| C321      | 17-5D102M     | CER CAPA    | 1000PF 50V $\pm$ 20%        | 4.00   |
| C401 C402 | 17-2.5E475Y   | ELEC CAPA   | 4.7 $\mu$ F/25V+75-10%      | 8.00   |
| C403 C404 | 17-5D101M     | CER CAPA    | 100P+-20%                   | 3.50   |
| C405 C406 | 17-5F 102J    | MYLAR CAPA  | 0.001 $\mu$ F/50V $\pm$ 5%  | 6.50   |
| C407 C408 | 17-0.63E 108Y | ELEC C CAPA | 1000 $\mu$ F/6.3V+50-10%    | 32.50  |
| C409 C410 | 17-5D100D     | CER CAPA    | 10P+-0.5P                   | 3.50   |
| C411 C412 | 17-5D221M     | CER CAPA    | 220P+-20%                   | 4.00   |
| C413 C414 | 17-0.63E476Y  | ELEC CAPA   | 47 $\mu$ F/6.3V+50-10%      | 9.00   |
| C415 C416 | 17-0.63E476Y  | ELEC CAPA   | 47 $\mu$ F/6.3V+50-10%      | 9.00   |
| C417 C418 | 17-5F273J     | MYLAR CAPA  | 0.027 $\mu$ F/50V $\pm$ 5%  | 8.90   |
| C419 C420 | 17-5F104J     | MYLAR CAPA  | 0.1 $\mu$ F/50V $\pm$ 5%    | 13.00  |
| C421 C422 | 17-3.5E476Y   | ELEC CAPA   | 47 $\mu$ F/35V+50-10%       | 14.00  |
| C423      | 17-5D104M     | CER CAPA    | 0.1 $\mu$ F/50V+-20%        | 10.00  |
| C425 C426 | 17-2.5E106Y   | ELEC CAPA   | 10 $\mu$ F/25V+50-10%       | 12.00  |
| C427 C428 | 17-5D104M     | CER CAPA    | 0.1 $\mu$ F/50V+-20%        | 10.00  |
| C501 C502 | 17-5F122J     | MYLAR CAPA  | 0.0012 $\mu$ F/50V+-5%      | 6.50   |
| C503 C504 | 17-5F224J     | MYLAR CAPA  | 0.22 $\mu$ F/50V+-5%        | 20.00  |
| C505 C506 | 17-5F104J     | MYLAR CAPA  | 0.1 $\mu$ F/50V+-5%         | 13.00  |
| C507 C508 | 17-5F104J     | MYLAR CAPA  | 0.1 $\mu$ F/50V+-5%         | 13.00  |
| C509 C510 | 17-5D101M     | CER CAPA    | 100P $\pm$ 20%              | 3.50   |
| C511 C512 | 17-5D100D     | CER CAPA    | 10P+-0.5P                   | 3.50   |
| C513 C514 | 17-0.63E476Y  | ELEC CAPA   | 47 $\mu$ F/6.3V+50-10%      | 9.00   |
| C515 C516 | 17-5D221M     | CER CAPA    | 220P+-20%                   | 4.00   |
| C517 C518 | 17-0.63E476Y  | ELEC CAPA   | 47 $\mu$ F/6.3V+-50-10%     | 9.00   |
| C519 C520 | 17-5F183J     | MYLAR CAPA  | 0.018 $\mu$ F/50V+-5%       | 8.90   |
| C521 C522 | 17-5F104J     | MYLAR CAPA  | 0.1 $\mu$ F/50V+-5%         | 13.00  |
| C523 C524 | 17-0.63E476Y  | ELEC CAPA   | 47 $\mu$ F/6.3V+50-10%      | 9.00   |
| C525 C526 | 17-5D124J     | MYLAR CAPA  | 0.12 $\mu$ F/50V+-5%        | 13.00  |
| C527 C528 | 17-1.6R684K   | AI CAPA     | 0.68 $\mu$ F/16V+-10%       | 38.00  |
| C529 C530 | 17-5F102J     | MYLAR CAPA  | 0.001 $\mu$ F/50V+-5%       | 6.50   |
| C531 C532 | 17-2.5E476Y   | ELEC CAPA   | 47 $\mu$ F/25V+50-10%       | 14.00  |
| C533      | 17-5E107Y     | ELEC CAPA   | 100 $\mu$ F/50V+50-10%      | 30.00  |
| C534      | 17-3.5E107Y   | ELEC CAPA   | 100 $\mu$ F/35V+50-10%      | 24.20  |
| C601 C602 | 17-1.6R105K   | AI CAPA     | 1 $\mu$ F/16V+-10%          | 25.00  |
| C603 C604 | 17-1.6R105K   | AI CAPA     | 1 $\mu$ F/16V+-10%          | 25.00  |
| C605 C606 | 17-0.63E476Y  | ELEC CAPA   | 47 $\mu$ F/6.3V+50-10%      | 9.00   |
| C609 C610 | 17-5F272J     | MYLAR CAPA  | 0.0027 $\mu$ F/50V+-5%      | 6.50   |
| C611 C612 | 17-5F102J     | MYLAR CAPA  | 0.001 $\mu$ F/50V+-5%       | 6.50   |
| C613 C614 | 17-5F102J     | MYLAR CAPA  | 0.001 $\mu$ F/50V+-5%       | 6.50   |
| C615 C616 | 17-0.63E108Y  | ELEC CAPA   | 1000 $\mu$ F/6.3V+50-10%    | 32.50  |
| C617 C618 | 17-5D470M     | CER CAPA    | 47P+-20%                    | 3.50   |
| C619 C620 | 17-5D220M     | CER CAPA    | 22P+-20%                    | 3.50   |
| C621 C622 | 17-5D220M     | CER CAPA    | 22P+-20%                    | 3.50   |
| C625 C626 | 17-2.5E476Y   | ELEC CAPA   | 47 $\mu$ F/25V+50-10%       | 14.00  |
| C627 C628 | 17-5F104J     | MYLAR CAPA  | 0.1 $\mu$ F/50V+-5%         | 13.00  |
| C629 C630 | 17-5D101M     | CER CAPA    | 100P+-20%                   | 3.50   |
| C631 C632 | 17-5F102J     | MYLAR CAPA  | 0.001 $\mu$ F/50V+-5%       | 6.50   |
| C633 C634 | 17-5F104J     | MYLAR CAPA  | 0.1 $\mu$ F/50V+-5%         | 13.00  |
| C635 C636 | 17-5D104M     | CER CAPA    | 0.1 $\mu$ F/50V+-20%        | 10.00  |
| C637 C638 | 17-5D104M     | CER CAPA    | 0.1 $\mu$ F/50V+-20%        | 10.00  |
| C641 C642 | 17-5D104M     | CER CAPA    | 0.1 $\mu$ F/50V+-20%        | 10.00  |
| C643 C644 | 17-5D104M     | CER CAPA    | 0.1 $\mu$ F/50V+-20%        | 10.00  |
| C645 C646 | 17-5D220M     | CER CAPA    | 22P+-20%                    | 3.50   |
| C647      | 17-5F102J     | MYLAR CAPA  | 0.001 $\mu$ F/50V+-5%       | 6.50   |
| C701 C702 | 17-0.63E476Y  | ELEC CAPA   | 47 $\mu$ F/6.3V+50-10%      | 9.00   |
| C703 C704 | 17-0.63E476Y  | ELEC CAPA   | 47 $\mu$ F/6.3V+50-10%      | 9.00   |
| C801 C802 | 17-35E228Y    | ELEC CAPA   | 2200 $\mu$ F/35V+50-10%     | 106.00 |
| C803 C804 | 17-3.5E228Y   | ELEC CAPA   | 2200 $\mu$ F/35V+50-10%     | 106.00 |
| C805 C806 | 17-3.5E337Y   | ELEC CAPA   | 330 $\mu$ F/35V+50-10%      | 46.80  |
| C808      | 17-5D220M     | CER CAPA    | 22P+-20%                    | 3.50   |
| C809      | 17-1.0E476Y   | ELEC CAPA   | 47 $\mu$ F/10V+50-10%       | 10.00  |
| C807      | 17.2.5E106Y   | ELEC CAPA   | 10 $\mu$ F/25V+50-10%       | 12.00  |
| C810      | 17-1.6E106Y   | ELEC CAPA   | 10 $\mu$ F/16V+50-10%       | 8.40   |
| C811      | 17-3.5E476Y   | ELEC CAPA   | 47 $\mu$ F/35V+50-10%       | 14.00  |
| C901      | 17-3.5E108Y   | ELEC CAPA   | 1000 $\mu$ /35V+50-10%      | 93.00  |

| SYMBOL NO | PARTS NO    | DESCRIPTION    | REF                |
|-----------|-------------|----------------|--------------------|
| R701,R702 | 16-¼ CN224J | CARBON RES     | 220K OHM ¼W±5%     |
| R703,R704 | 16-¼ CN682J | CARBON RES     | 6K8 OHM ¼W±5%      |
| R705,R706 | 16-¼ CN331J | CARBON RES     | 330 OHM ¼W±5%      |
| R707,R708 | 16-¼ CN561J | CARBON RES     | 560 OHM ¼W±5%      |
| R709,R710 | 16-¼ CN561J | CARBON RES     | 560 OHM ¼W±5%      |
| R711,R712 | 16-¼ CN331J | CARBON RES     | 330 OHM ¼W±5%      |
| R713,R714 | 16-¼ CN682J | CARBON RES     | 6K8 OHM ¼W±5%      |
| R715      | 16-¼ CN152J | CARBON RES     | 1K5 OHM ¼W±5%      |
| R801      | 16-¼ CN222J | CARBON RES     | 2K2 OHM ¼W±5%      |
| R802      | 16-¼ CN102J | CARBON RES     | 1K OHM ¼W±5%       |
| R803      | 16-¼ CN152J | CARBON RES     | 1K5 OHM ¼W±5%      |
| R804      | 16-¼ CN152J | CARBON RES     | 1K5 OHM ¼W±5%      |
| R805      | 16-¼ CN102J | CARBON RES     | 1K OHM ¼W±5%       |
| R806      | 16-¼ CN102J | CARBON RES     | 1K OHM ¼W±5%       |
| R807      | 16-¼ CN273J | CARBON RES     | 27K OHM ¼W±5%      |
| R808      | 16-¼ CN822J | CARBON RES     | 8K2 OHM ¼W±5%      |
| R809      | 16-¼ CN393J | CARBON RES     | 39K OHM ¼W±5%      |
| R810      | 16-¼ CN333J | CARBON RES     | 33K OHM ¼W±5%      |
| R811      | 16-½ CN275J | CARBON RES     | 2M7 OHM ½W±5%      |
| R901      | 16-½ CN100J | CARBON RES     | 10 OHM ½W±5%       |
| R902      | 16-¼ CN122J | CARBON RES     | 1K2 OHM ¼W±5%      |
| R903      | 16-¼ CN122J | CARBON RES     | 1K2 OHM ¼W±5%      |
| C101      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C102      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C103      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C104      | 17-5D103M   | CER CAPA       | 0.01 µF 50V±20%    |
| C105      | 17-5D103M   | CER CAPA       | 0.01 µF 50V±20%    |
| C106      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C107      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C108      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C109      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C110      | 17-5D331M   | CER CAPA       | 330PF 50V±20%      |
| C111      | 17-205E105Y | ELEC CAPA      | 1 µF 25V+50%-10%   |
| C112      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C113      | 17-2.5E105Y | ELEC CAPA      | 1 µF 25V+50%-10%   |
| C114      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C115      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C116      | 17-1.6E227Y | ELEC CAPA      | 220 µF 16V±50%-10% |
| C117      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C118      | 17-2.5E105Y | ELEC CAPA      | 1 µF 25V+50%-10%   |
| C119      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C120      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C121      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C122      | 17-2.5E475Y | ELEC CAPA      | 4.7 µF 25V+75%-10% |
| C123      | 17-5D102M   | CER CAPA       | 1000PF 50V±20%     |
| C124      | 17-1.6E107Y | ELEC CAPA      | 100 µF 16V+50%-10% |
| C125      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C126      | 17-5D473M   | CER CAPA       | 0.047 µF 50V±20%   |
| C201      | 17-1.6O224M | TA. CAPA       | 0.22 µF 16V±20%    |
| C202      | 17-5F473J   | MYLAR CAPA     | 0.047 µF 50V±5%    |
| C203      | 17-2.5E475Y | ELEC CAPA      | 4.7 µF 25V+50-10%  |
| C204      | 17-5U471J   | STYROLENE CAPA | 470PF 50V±5%       |
| C205      | 17-1.6O224M | TA. CAPA       | 0.22 µF 16V±20%    |
| C206      | 17-1.6O474M | TA. CAPA       | 0.47 µF 16V±20%    |
| C207      | 17-1.6E107Y | ELEC CAPA      | 100 µF 16V+50-10%  |
| C208      | 17-5U821J   | STYROLENE CAPA | 820PF 50V±5%       |
| C209      | 17-5U821J   | STYROLENE CAPA | 820PF 50V±5%       |
| C210      | 17-5F562J   | MYLAR CAPA     | 0.0056 µF 50V±5%   |
| C211      | 17-5F562J   | MYLAR CAPA     | 0.0056 µF 50V±5%   |
| C212      | 17-5F123J   | MYLAR CAPA     | 0.012 µF 50V±5%    |
| C213      | 17-5F123J   | MYLAR CAPA     | 0.012 µF 50V±5%    |
| C214      | 17-5U821J   | STYROLENE CAPA | 820PF 50V±5%       |
| C215      | 17-5U821J   | STYROLENE CAPA | 820PF 50V±5%       |
| C216      | 17-5F682J   | MYLAR CAPA     | 0.0068 µF 50V±5%   |
| C217      | 17-5F682J   | MYLAR CAPA     | 0.0068 µF 50V±5%   |
| C218      | 17-2.5E475Y | ELEC CAPA      | 4.7 µF 25V+50-10%  |
| C219      | 17-2.5E475Y | ELEC CAPA      | 4.7 µF 25V+50-10%  |
| C220      | 17-1.6E107Y | ELEC CAPA      | 100 µF 16V+50-10%  |
| C221      | 17-1.6E107Y | ELEC CAPA      | 100 µF 16V+50-10%  |
| C222      | 17-1.6E106Y | ELEC CAPA      | 10 µF 16V+50-10%   |
| C223      | 17-1.6E106Y | ELEC CAPA      | 10 µF 16V+50-10%   |
| C224      | 17-1.0S107Y | NON-POLAR CAPA | 100 µF 10V+50-10%  |
| C225      | 17-2.5E105Y | ELEC CAPA      | 1 µF 25V+50-10%    |
| C226      | 17-2.5E475Y | ELEC CAPA      | 4.7 µF 25V+50-10%  |
| C227      | 17-2.5E475Y | ELEC CAPA      | 4.7 µF 25V+50-10%  |
| C301      | 17-5D150K   | CER CAPA       | 15PF 50V±10%       |
| C302      | 17-5U361J   | STYROLENE CAPA | 360PF 50V±5%       |
| C303      | 17-5D103M   | CER CAPA       | 0.01 µF 50V±20%    |
| C304      | 17-5D103M   | CER CAPA       | 0.01 µF 50V±20%    |
| C305      | 17-5D102M   | CER CAPA       | 1000PF 50V±20%     |



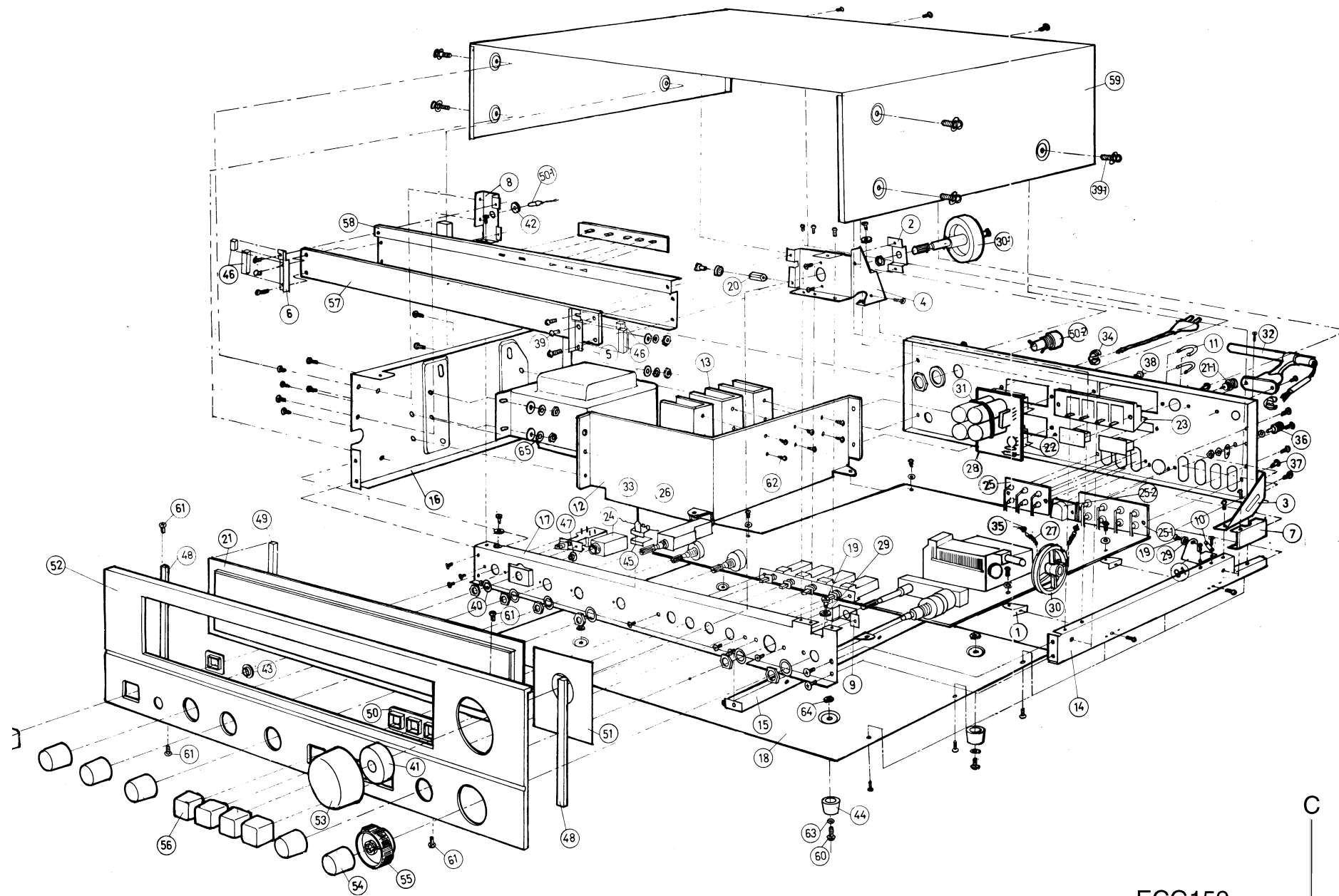
| SYMBOL NO   | PARTS NO    | DESCRIPTION                     | REF    |
|-------------|-------------|---------------------------------|--------|
| C902        | 17-3.5E337Y | ELEC CAPA 330 $\mu$ /35V+50-10% | 46.80  |
| C903        | 17-1.6E107Y | ELEC CAPA 100 $\mu$ /16V+50-10% | 14.60  |
| L101        | 29-1037     | INDUCTOR 1MH $\pm$ 10%          | 16.00  |
| L102        | 29-1034     | INDUCTOR 22 $\mu$ H $\pm$ 10%   | 15.00  |
| L103        | 29-1034     | INDUCTOR 22 $\mu$ H $\pm$ 10%   | 15.00  |
| L104        | 29-1039T    | INDUCTOR 18 $\mu$ H $\pm$ 10%   | 11.00  |
| L105        | 29-1038     | INDUCTOR 40 $\mu$ H $\pm$ 10%   | 15.00  |
| L106        | 29-1051     | INDUCTOR 2.2 $\mu$ H $\pm$ 10%  | 10.00  |
| L601,L602   | 29-1040     | INDUCTOR 1 $\mu$ H $\pm$ 10%    | 3.50   |
| T101        | 29-3008T    | FM DETECTOR COIL 10.7MHZ        | 96.00  |
| T301        | 29-3018     | AM OSC COIL                     | 25.00  |
| T302        | 29-3032     | AM IFT WITH CERAMIC FILTER      | 134.00 |
| T303        | 29-3029     | AM IFT                          | 25.00  |
| CF101       | 29-3027     | CER FILTER SFE 10.7MA8          | 61.50  |
| CF102       | 29-3027     | CER FILTER SFE 10.7MA8          | 61.50  |
| CF103       | 29-3027     | CER FILTER SFE 10.7MA8          | 61.50  |
| LPF201      | 29-3049     | LOW PASS FILTER 19, 38K HZ      | 180.00 |
| LPF202      | 29-3049     | LOW PASS FILTER 19,38K HZ       | 180.00 |
| VR101       | 29-4023     | SEMIFIXED RES 20KB              | 18.00  |
| VR201       | 29-4077     | SEMIFIXED RES 10KB              | 18.00  |
| VR202       | 29-4022     | SEMIFIXED RES 5KB               | 18.00  |
| VR601,VR602 | 29-4023     | SEMIFIXED RES 20KB              | 18.00  |
| VR501       | 29-4103A    | VOLUME & BALANCE CONTROL        | 400.00 |
| VR502,VR503 | 29-4075F    | TONE CONTROL 10KC $\times$ 2    | 180.00 |
|             | 29-5008     | AM ANT BAR                      | 290.00 |
| D101        | 30-1044     | ZENER DIODE 15V 500MW $\pm$ 5%  | 14.80  |
| D102        | 30-1019     | DIODE BAW62                     | 11.00  |
| D103        | 30-1019     | DIODE BAW62                     | 11.00  |
| D104        | 30-1019     | DIODE BAW62                     | 11.00  |
| D105        | 30-1019     | DIODE BAW62                     | 11.00  |
| D106        | 30-1019     | DIODE BAW62                     | 11.00  |
| D107        | 30-1019     | DIODE BAW62                     | 11.00  |
| D501,D502   | 30-1019     | DIODE BAW62                     | 11.00  |
| D503,D504   | 30-1019     | DIODE BAW62                     | 11.00  |
| D601,D602   | 30-1019     | DIODE BAW62                     | 11.00  |
| D603,D604   | 30-1019     | DIODE BAW62                     | 11.00  |
| D701 D702   | 30-1019     | DIODE BAW62                     | 11.00  |
| D703 D704   | 30-1019     | DIODE BAW62                     | 11.00  |
| D801 D802   | 30-1002     | DIODE 1N4002                    | 14.00  |
| D803 D804   | 30-1002     | DIODE 1N4002                    | 14.00  |
| D806        | 30-1078     | DIODE BAV19                     | 12.80  |
| BD801       | 30-1049     | BRIDGE DIODE KBL02              | 76.00  |
| ZD801       | 30-1041N    | ZENER DIODE 22V 500MW           | 20.00  |
| D901,D902   | 30-1078     | DIODE BAV19                     | 12.80  |
| D903        | 30-1044     | ZENER DIODE 15V                 | 20.00  |
| LD101       | 30-1071     | LED ORANGE                      | 15.00  |
| LD102       | 30-1071     | LED ORANGE                      | 15.00  |
| LD103       | 30-1073     | LED GREEN                       | 15.00  |
| LD201       | 30-1073     | LED GREEN                       | 15.00  |
| LD701       | 30-1073     | LED GREEN                       | 15.00  |
| Q101        | 30-2019     | TRANSISTOR 2SC930C              | 23.00  |
| Q102        | 30-2156     | TRANSISTOR 2SC1815GR            | 14.00  |
| Q103        | 30-2156     | TRANSISTOR 2SC1815GR            | 14.00  |
| Q201        | 30-2084-3   | TRANSISTOR BC549C               | 22.80  |
| Q202        | 30-2084-3   | TRANSISTOR BC549C               | 22.80  |
| Q203        | 30-2156     | TRANSISTOR 2SC1815GR            | 14.00  |
| Q204        | 30-2156     | TRANSISTOR 2SC1815GR            | 14.00  |
| Q301        | 30-2084-3   | TRANSISTOR BC549C               | 22.80  |
| Q401,Q402   | 30-2084-3   | TRANSISTOR BC549C               | 22.80  |
| Q403,Q404   | 30-2085-2   | TRANSISTOR BC559B               | 22.80  |
| Q405,Q406   | 30-2085-2   | TRANSISTOR BC559B               | 22.80  |
| Q407,Q408   | 30-2096     | TRANSISTOR BC556A               | 24.70  |
| Q409,Q410   | 30-2156     | TRANSISTOR 2SC1815GR            | 14.00  |
| Q411,Q412   | 30-2096     | TRANSISTOR BC556A               | 24.70  |
| Q501,Q502   | 30-2085-2   | TRANSISTOR BC559B               | 22.80  |
| Q503,Q504   | 30-2084-3   | TRANSISTOR BC549C               | 22.80  |
| Q505,Q506   | 30-2156     | TRANSISTOR 2SC1815GR            | 14.00  |
| Q507,Q508   | 30-2096     | TRANSISTOR BC556A               | 24.70  |
| Q509,Q510   | 30-2232     | FET E111                        | 104.00 |
| Q601,Q602   | 30-2084-3   | TRANSISTOR BC549C               | 22.80  |
| Q603,Q604   | 30-2096     | TRANSISTOR BC556A               | 24.70  |
| Q605,Q606   | 30-2096     | TRANSISTOR BC556A               | 24.70  |
| Q607,Q608   | 30-2083     | TRANSISTOR BD139                | 53.20  |
| Q609,Q610   | 30-2083     | TRANSISTOR BD139                | 53.20  |
| Q611,Q612   | 30-2169     | TRANSISTOR 2N6553               | 80.00  |
| Q613,Q614   | 30-2070     | TRANSISTOR 2N6556               | 80.00  |
| Q615,Q616   | 30-2104M    | TRANSISTOR MJ3055               | 152.00 |
| Q617,Q618   | 30-2114M    | TRANSISTOR 2N2955               | 159.60 |
| Q801        | 30-2082     | TRANSISTOR BD140                | 58.90  |
| Q802        | 30-2156     | TRANSISTOR 2SC1815GR            | 14.00  |

| SYMBOL NO | PARTS NO     | DESCRIPTION                  | REF  |
|-----------|--------------|------------------------------|------|
| R101      | 16-1/4CU330J | CARBON RES 33 OHM 1/4W ±5%   | 1.70 |
| R102      | 16-1/4CU391J | CARBON RES 390 OHM 1/4W ±5%  | 1.70 |
| R103      | 16-1/4CU331J | CARBON RES 330 OHM 1/4W ±5%  | 1.70 |
| R104      | 16-1/4CU391J | CARBON RES 390 OHM 1/4W ±5%  | 1.70 |
| R105      | 16-1/4CU153J | CARBON RES 15K OHM 1/4W ±5%  | 1.70 |
| R106      | 16-1/4CU103J | CARBON RES 10K OHM 1/4W ±5%  | 1.70 |
| R107      | 16-1/4CU222J | CARBON RES 2K2 OHM 1/4W ±5%  | 1.70 |
| R108      | 16-1/4CU330J | CARBON RES 33 OHM 1/4W ±5%   | 1.70 |
| R109      | 16-1/4CN331J | CARBON RES 330 OHM 1/4W ±5%  | 1.70 |
| R110      | 16-1/4CU103J | CARBON RES 10K OHM 1/4W ±5%  | 1.70 |
| R111      | 16-1/4CU331J | CARBON RES 330 OHM 1/4W ±5%  | 1.70 |
| R112      | 16-1/4CU563J | CARBON RES 56K OH 1/4W ±5%   | 1.70 |
| R113      | 16-1/4CU123J | CARBON RES 12K OHM 1/4W ±5%  | 1.70 |
| R114      | 16-1/4CU222J | CARBON RES 2K2 OHM 1/4W ±5%  | 1.70 |
| R115      | 16-1/4CN272J | CARBON RES 2K7 OHM 1/4W ±5%  | 1.70 |
| R116      | 16-1/4CN562J | CARBON RES 5K6 OHM 1/4W ±5%  | 1.70 |
| R117      | 16-1/4CN221J | CARBON RES 220 OHM 1/4W ±5%  | 1.70 |
| R118      | 16-1/4CN223J | CARBON RES 22K OHM 1/4W ±5%  | 1.70 |
| R119      | 16-1/4CU101J | CARBON RES 100 OHM 1/4W ±5%  | 1.70 |
| R120      | 16-1/4CU224J | CARBON RES 220K OHM 1/4W ±5% | 1.70 |
| R121      | 16-1/4CN560J | CARBON RES 56 OHM 1/4W ±5%   | 1.70 |
| R122      | 16-1/4CU104J | CARBON RES 100K OHM 1/4W ±5% | 1.70 |
| R123      | 16-1/4CN104J | CARBON RES 100K OHM 1/4W ±5% | 1.70 |
| R124      | 16-1/4CU684J | CARBON RES 680K OHM 1/4W ±5% | 1.70 |
| R125      | 16-1/4CU684J | CARBON RES 680K OHM 1/4W ±5% | 1.70 |
| R126      | 16-1/4CN102J | CARBON RES 1K OHM 1/4W ±5%   | 1.70 |
| R127      | 16-1/2CN681J | CARBON RES 680 OHM 1/2W ±5%  | 2.40 |
| R128      | 16-1/4CN103J | CARBON RES 10K OHM 1/4W ±5%  | 1.70 |
| R129      | 16-1/4CU122J | CARBON RES 1K2 OHM 1/4W ±5%  | 1.70 |
| R130      | 16-1/4CU563J | CARBON RES 56K OHM 1/4W ±5%  | 1.70 |
| R131      | 16-1/4CU123J | CARBON RES 12K OHM 1/4W ±5%  | 1.70 |
| R132      | 16-1/4CU331J | CARBON RES 330 OHM 1/4W ±5%  | 1.70 |
| R133      | 16-1/4CU473J | CARBON RES 47K OHM 1/4W ±5%  | 1.70 |
| R134      | 16-1/4CU473J | CARBON RES 47K OHM 1/4W ±5%  | 1.70 |
| R135      | 16-1/4CU473J | CARBON RES 47K OHM 1/4W ±5%  | 1.70 |
| R201      | 16-1/4CN181J | CARBON RES 180 OHM 1/4W ±5%  | 1.70 |
| R202      | 16-1/4CU153J | CARBON RES 15K OHM 1/4W ±5%  | 1.70 |
| R203      | 16-1/4CU223J | CARBON RES 22K OHM 1/4W ±5%  | 1.70 |
| R204      | 16-1/4CU102J | CARBON RES 1K OHM 1/4W ±5%   | 1.70 |
| R205      | 16-1/4CN102J | CARBON RES 1K OHM 1/4W ±5%   | 1.70 |
| R206      | 16-1/4CU392J | CARBON RES 3K9 OHM 1/4W ±5%  | 1.70 |
| R207      | 16-1/4CU392J | CARBON RES 3K9 OHM 1/4W ±5%  | 1.70 |
| R208      | 16-1/4CU564J | CARBON RES 560K OHM 1/4W ±5% | 1.70 |
| R209      | 16-1/4CU564J | CARBON RES 560K OHM 1/4W ±5% | 1.70 |
| R210      | 16-1/4CN332J | CARBON RES 3K3 OHM 1/4W ±5%  | 1.70 |
| R211      | 16-1/4CN332J | CARBON RES 3K3 OHM 1/4W ±5%  | 1.70 |
| R212      | 16-1/4CU331J | CARBON RES 330 OHM 1/4W ±5%  | 1.70 |
| R213      | 16-1/4CU331J | CARBON RES 330 OHM 1/4W ±5%  | 1.70 |
| R214      | 16-1/4CN102J | CARBON RES 1K OHM 1/4W ±5%   | 1.70 |
| R215      | 16-1/4CU102J | CARBON RES 1K OHM 1/4W ±5%   | 1.70 |
| R216      | 16-1/4CU392J | CARBON RES 3K9 OHM 1/4W ±5%  | 1.70 |
| R217      | 16-1/4CU392J | CARBON RES 3K9 OHM 1/4W ±5%  | 1.70 |
| R218      | 16-1/4CN102J | CARBON RES 1K OHM 1/4W ±5%   | 1.70 |
| R219      | 16-1/4CU102J | CARBON RES 1K OHM 1/4W ±5%   | 1.70 |
| R220      | 16-1/4CU103J | CARBON RES 10K OHM 1/4W ±5%  | 1.70 |
| R221      | 16-1/4CU223J | CARBON RES 22K OHM 1/4W ±5%  | 1.70 |
| R222      | 16-1/4CU223J | CARBON RES 22K OHM 1/4W ±5%  | 1.70 |
| R223      | 16-1/4CU473J | CARBON RES 47K OHM 1/4W ±5%  | 1.70 |
| R224      | 16-1/4CU332J | CARBON RES 3K3 OHM 1/4W ±5%  | 1.70 |
| R225      | 16-1/4CU332J | CARBON RES 3K3 OHM 1/4W ±5%  | 1.70 |
| R226      | 16-1/4CU104J | CARBON RES 100K OHM 1/4W ±5% | 1.70 |
| R227      | 16-1/4CU104J | CARBON RES 100K OHM 1/4W ±5% | 1.70 |
| R301      | 16-1/4CU470J | CARBON RES 47 OHM 1/4W ±5%   | 1.70 |
| R302      | 16-1/4CU151J | CARBON RES 150 OHM 1/4W ±5%  | 1.70 |
| R303      | 16-1/4CU152J | CARBON RES 1K5 OHM 1/4W ±5%  | 1.70 |
| R304      | 16-1/4CN331J | CARBON RES 330 OHM 1/4W ±5%  | 1.70 |
| R305      | 16-1/4CU562J | CARBON RES 5K6 OHM 1/4W ±5%  | 1.70 |
| R306      | 16-1/4CN151J | CARBON RES 150 OHM 1/4W ±5%  | 1.70 |
| R307      | 16-1/4CU103J | CARBON RES 10K OHM 1/4W ±5%  | 1.70 |
| R308      | 16-1/4CU103J | CARBON RES 10K OHM 1/4W ±5%  | 1.70 |
| R309      | 16-1/4CU272J | CARBON RES 2K7 OHM 1/4W ±5%  | 1.70 |
| R310      | 16-1/4CU181J | CARBON RES 180 OHM 1/4W ±5%  | 1.70 |
| R311      | 16-1/4CU273J | CARBON RES 27K OHM 1/4W ±5%  | 1.70 |
| R312      | 16-1/4CU273J | CARBON RES 27K OHM 1/4W ±5%  | 1.70 |
| R313      | 16-1/4CU154J | CARBON RES 150K OHM 1/4W ±5% | 1.70 |
| R314      | 16-1/4CU331J | CARBON RES 330 OHM 1/4W ±5%  | 1.70 |
| R315      | 16-1/4CN122J | CARBON RES 1K2 OHM 1/4W ±5%  | 1.70 |
| R316      | 16-1/4CU104J | CARBON RES 100K OHM 1/4W ±5% | 1.70 |
| R317      | 16-1/4CU103J | CARBON RES 10K OHM 1/4W ±5%  | 1.70 |
| R318      | 16-1/4CU103J | CARBON RES 10K OHM 1/4W ±5%  | 1.70 |

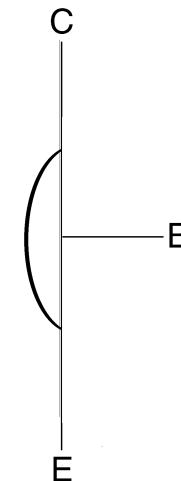
| SYMBOL NO | PARTS NO      | DESCRIPTION                      | REF  |
|-----------|---------------|----------------------------------|------|
| R319      | 16-1/4 CU104J | CARBON RES 100K OHM 1/4W ± 5%    | 1.70 |
| R320      | 16-1/4 CU104J | CARBON RES 100K OHM 1/4W ± 5%    | 1.70 |
| R401,R402 | 16-1/4 CN334J | CARBON RES 330K OHM 1/4W ± 5%    | 1.70 |
| R403,R404 | 16-1/4 CN563J | CARBON RES 56K OHM 1/4W ± 5%     | 1.70 |
| R405,R406 | 16-1/4 CN222J | CARBON RES 2K2 OHM 1/4W ± 5%     | 1.70 |
| R407,R408 | 16-1/4 CN222J | CARBON RES 2K2 OHM 1/4W ± 5%     | 1.70 |
| R409,R410 | 16-1/4 CU392J | CARBON RES 3K9 OHM 1/4W ± 5%     | 1.70 |
| R411,R412 | 16-1/4 CU560J | CARBON RES 56 OHM 1/4W ± 5%      | 1.70 |
| R413,R414 | 16-1/4 CU684J | CARBON RES 680K OHM 1/4W ± 5%    | 1.70 |
| R415,R416 | 16-1/4 CN331J | CARBON RES 330 OHM 1/4W ± 5%     | 1.70 |
| R417,R418 | 16-1/4 CN151J | CARBON RES 150 OHM 1/4W ± 5%     | 1.70 |
| R419,R420 | 16-1/4 CU221J | CARBON RES 220 OHM 1/4W ± 5%     | 1.70 |
| R421,R422 | 16-1/4 CN681J | CARBON RES 680 OHM 1/4W ± 5%     | 1.70 |
| R423,R424 | 16-1/4 CU562J | CARBON RES 5K6 OHM 1/4W ± 5%     | 1.70 |
| R425,R426 | 16-1/4 CU472J | CARBON RES 4K7 OHM 1/4W ± 5%     | 1.70 |
| R427,R428 | 16-1/4 CU272J | CARBON RES 2K7 OHM 1/4W ± 5%     | 1.70 |
| R429,R430 | 16-1/4 CN333J | CARBON RES 33K OHM 1/4W ± 5%     | 1.70 |
| R431,R432 | 16-1/4 CN153J | CARBON RES 15K OHM 1/4W ± 5%     | 1.70 |
| R433,R434 | 16-1/4 CN821J | CARBON RES 820 OHM 1/4W ± 5%     | 1.70 |
| R435,R436 | 16-1/4 CN680J | CARBON RES 68 OHM 1/4W ± 5%      | 1.70 |
| R437,R438 | 16-1/4 CN680J | CARBON RES 68 OHM 1/4W ± 5%      | 1.70 |
| R439,R440 | 16-1/4 CU681J | CARBON RES 680 OHM 1/4W ± 5%     | 1.70 |
| R441,R442 | 16-1/4 CU224J | CARBON RES 220K OHM 1/4W ± 5%    | 1.70 |
| R501,R502 | 16-1/4 CU181J | CARBON RES 180 OHM 1/4W ± 5%     | 1.70 |
| R503,R504 | 16-1/4 CN562J | CARBON RES 5K6 OHM 1/4W ± 5%     | 1.70 |
| R505,R506 | 16-1/4 CN224J | CARBON RES 220K OHM 1/4W ± 5%    | 1.70 |
| R507,R508 | 16-1/4 CN104J | CARBON RES 100K OHM 1/4W ± 5%    | 1.70 |
| R509,R510 | 16-1/4 CU272J | CARBON RES 2K7 OHM 1/4W ± 5%     | 1.70 |
| R511,R512 | 16-1/4 CN224J | CARBON RES 220K OHM 1/4W ± 5%    | 1.70 |
| R513,R514 | 16-1/4 CU104J | CARBON RES 100K OHM 1/4W ± 5%    | 1.70 |
| R515,R516 | 16-1/4 CN391J | CARBON RES 390 OHM 1/4W ± 5%     | 1.70 |
| R517,R518 | 16-1/4 CU822J | CARBON RES 8K2 OHM 1/4W ± 5%     | 1.70 |
| R519,R520 | 16-1/4 CN392J | CARBON RES 3K9 OHM 1/4W ± 5%     | 1.70 |
| R521,R522 | 16-1/4 CN682J | CARBON RES 6K8 OHM 1/4W ± 5%     | 1.70 |
| R525,R524 | 16-1/4 CN682J | CARBON RES 6K8 OHM 1/4W ± 5%     | 1.70 |
| R525,R526 | 16-1/4 CU562J | CARBON RES 5K6 OHM 1/4W ± 5%     | 1.70 |
| R527,R528 | 16-1/4 CN680J | CARBON RES 68 OHM 1/4W ± 5%      | 1.70 |
| R529,R530 | 16-1/4 CN680J | CARBON RES 68 OHM 1/4W ± 5%      | 1.70 |
| R531,R532 | 16-1/4 CN102J | CARBON RES 1K OHM 1/4W ± 5%      | 1.70 |
| R533,R534 | 16-1/4 CN181J | CARBON RES 180 OHM 1/4W ± 5%     | 1.70 |
| R535,R536 | 16-1/4 CN473J | CARBON RES 47K OHM 1/4W ± 5%     | 1.70 |
| R537,R538 | 16-1/4 CN332J | CARBON RES 3K3 OHM 1/4W ± 5%     | 1.70 |
| R539,R540 | 16-1/4 CN561J | CARBON RES 560 OHM 1/4W ± 5%     | 1.70 |
| R543      | 16-1/4 CN122J | CARBON RES 1K2 OHM 1/4W ± 5%     | 1.70 |
| R546      | 16-1/4 CN273J | CARBON RES 27K OHM 1/4W ± 5%     | 1.70 |
| R547      | 16-1/4 CN184J | CARBON RES 180K OHM 1/4W ± 5%    | 1.70 |
| R548      | 16-1/4 CN391J | CARBON RES 390 OHM 1/4W ± 5%     | 1.70 |
| R549,R550 | 16-1/4 CU682J | CARBON RES 6K8 OHM 1/4W ± 5%     | 1.70 |
| R551,R552 | 16-1/4 CU680J | CARBON RES 680 OHM 1/4W ± 5%     | 1.70 |
| R553,R554 | 16-1/4 CN106J | CARBON RES 10M OHM 1/4W ± 5%     | 1.70 |
| R601,R602 | 16-1/4 CN681J | CARBON RES 680 OHM 1/4W ± 5%     | 1.70 |
| R603,R604 | 16-1/4 CN562J | CARBON RES 5K6 OHM 1/4W ± 5%     | 1.70 |
| R605,R606 | 16-1/4 CN223J | CARBON RES 22K OHM 1/4W ± 5%     | 1.70 |
| R607,R608 | 16-1/4 CN391J | CARBON RES 390 OHM 1/4W ± 5%     | 1.70 |
| R609,R610 | 16-1/4 CN223J | CARBON RES 22K OHM 1/4W ± 5%     | 1.70 |
| R611,R612 | 16-1/4 CN122J | CARBON RES 1K2 OHM 1/4W ± 5%     | 1.70 |
| R613,R614 | 16-1/4 CN561J | CARBON RES 560 OHM 1/4W ± 5%     | 1.70 |
| R617,R618 | 16-1/4 CN222J | CARBON RES 2K2 OHM 1/4W ± 5%     | 1.70 |
| R619,R620 | 16-1/4 CN222J | CARBON RES 2K2 OHM 1/4W ± 5%     | 1.70 |
| R621,R622 | 16-1/4 CN183J | CARBON RES 18K OHM 1/4W ± 5%     | 1.70 |
| R623,R624 | 16-1/4 CN391J | CARBON RES 390 OHM 1/4W ± 5%     | 1.70 |
| R625,R626 | 16-1/2 CN471J | CARBON RES 470 OHM 1/2W ± 5%     | 2.40 |
| R627,R628 | 16-1/4 MN330J | METAL FILM RES 33 OHM 1/4W ± 5%  | 1.70 |
| R629,R630 | 16-1/4 CN391J | CARBON RES 390 OHM 1/4W ± 5%     | 1.70 |
| R631,R632 | 16-1/4 CN270J | CARBON RES 27 OHM 1/4W ± 5%      | 1.70 |
| R633,R634 | 16-1/4 CN470J | CARBON RES 47 OHM 1/4W ± 5%      | 1.70 |
| R635,R636 | 16-1/2 CN152J | CARBON RES 1K5 OHM 1/2W ± 5%     | 2.40 |
| R637,R638 | 16-1/2 CN122J | CARBON RES 1K2 OHM 1/2W ± 5%     | 2.40 |
| R639,R640 | 16-1/4 CN391J | CARBON RES 390 OHM 1/4W ± 5%     | 1.70 |
| R641,R642 |               | CARBON RES RX OHM 1/4W ± 5%      | 1.70 |
| R643,R644 | 16-1/4 CN680J | CARBON RES 68 OHM 1/4W ± 5%      | 1.70 |
| R645,R646 | 16-1/4 CN391J | CARBON RES 390 OHM 1/4W ± 5%     | 1.70 |
| R647,R648 | 16-1/4 CN181J | CARBON RES 180 OHM 1/4W ± 5%     | 1.70 |
| R649,R650 | 16-1/2 CN122J | CARBON RES 1K2 OHM 1/2W ± 5%     | 2.40 |
| R651,R652 | 16-1/4 CN181J | CARBON RES 180 OHM 1/4W ± 5%     | 1.70 |
| R653,R654 | 16- 1A100J    | METAL OXIDE RES 10 OHM 1 W ± 5%  | 7.50 |
| R655,R656 | 16- 1A221J    | METAL OXIDE RES 220 OHM 1 W ± 5% | 7.50 |
| R657,R658 | 16- 1A101J    | METAL OXIDE RES 100 OHM 1 W ± 5% | 7.50 |
| R659,R660 | 16-1/4 CN1R0J | CARBON RES 1 OHM 1/4W ± 5%       | 1.70 |
| R661,R662 | 16- 1A100J    | METAL OXIDE RES 10 OHM 1 W ± 5%  | 7.50 |

| <b>SYMBOL NO</b> | <b>PARTS NO</b> | <b>DESCRIPTION</b>  | <b>REF</b> |
|------------------|-----------------|---------------------|------------|
| Q803             | 30-2096         | TRANSISTOR BC556A   | 24.7       |
| Q804             | 30-2082         | TRANSISTOR BD140    | 58.90      |
| Q901             | 30-2178         | TRANSISTOR 2SD330   | 76.00      |
| IC101            | 30-3035         | IC HA1211           | 115.00     |
| IC102            | 30-3070         | IC LA1231N          | 280.00     |
| IC103            | 30-3032         | IC CA1458           | 108.00     |
| IC201            | 30-3015         | IC HA1156           | 180.00     |
| IC301            | 30-3036         | IC HA1197           | 236.00     |
| SW1              | 31-1135         | FUNCTION SW SRZ-L5  | 265.00     |
| SW2-SW4          | 31-1094F        | PUSH SW 4KEY-2U     | 220.00     |
| SW5              | 31-1139         | SLIDE SW SSB42      | 75.00      |
| SW6              | 31-1024         | SPEAKER SW SRZ-44   | 220.00     |
| TB1 TB2          | 35-3011         | BREAKER A-22        | 88.00      |
| SW7              | 31-1129A        | POWER SW            | 300.00     |
| SW8              | 31-1121         | VOLTAGE SELECTOR SW | 169.20     |
| SW9              | 31-1079 * F     | DE-EMPHASIS SW      | 53.00      |

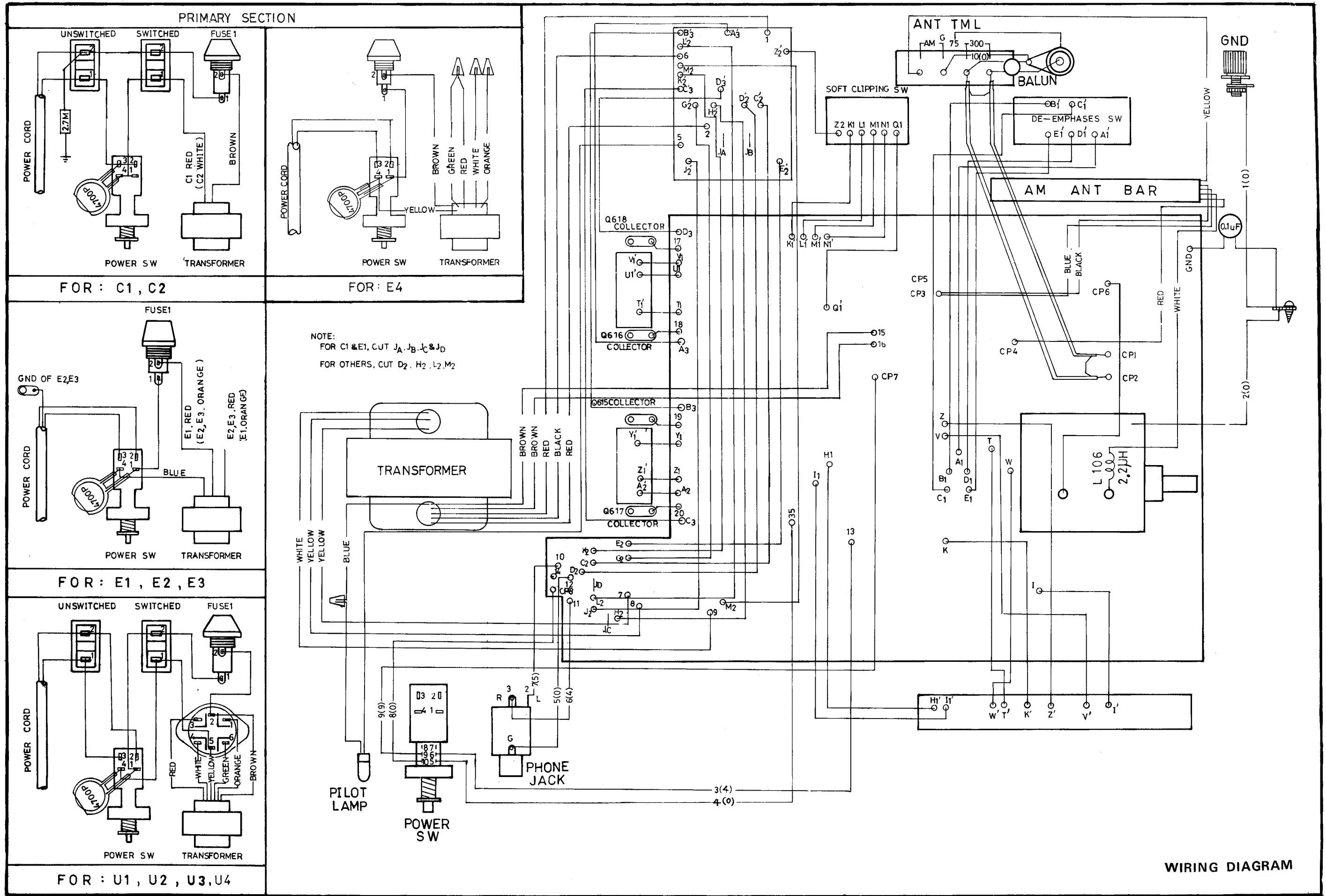
ASSEMBLY DIAGRAM



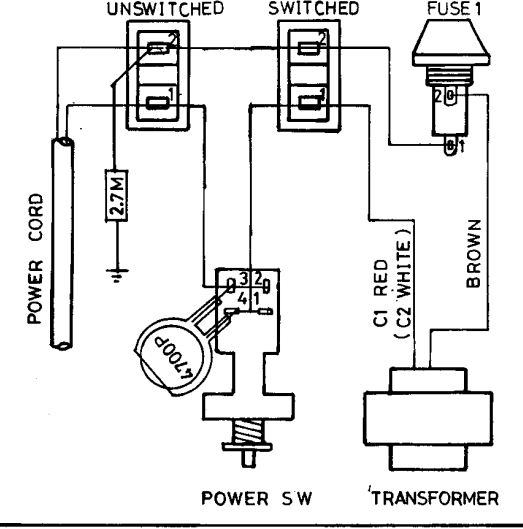
ECG159  
BC556A



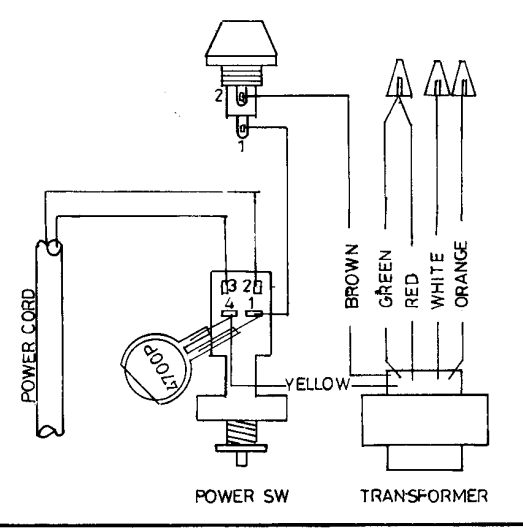
| ITEM | PARTS NO      | DESCRIPTION                  | Q'ty |
|------|---------------|------------------------------|------|
| 1    | 11-2047       | BRACKET FOR PCB              | 2    |
| 2    | 11-2086       | BRACKET FOR TUNING SHAFT     | 1    |
| 3    | 11-2104       | BRACKET                      | 1    |
| 4    | 11-2141       | BRACKET RIGHT                | 1    |
| 5    | 11-2142       | RIGHT BRACKET FOR DIAL SCALE | 1    |
| 6    | 11-2143       | LEFT BRACKET FOR DIAL SCALE  | 1    |
| 7    | 11-2173       | BRACKET FOR BACK PANEL       | 1    |
| 8    | 11-2182       | BRACKET LEFT                 | 1    |
| 9    | 11-2186       | BRACKET FOR SELECTOR SWITCH  | 1    |
| 9-1  | 11-2205       | BRACKET FOR PULLEY           | 1    |
| 10   | 11-3026       | LUG                          | 6    |
| 11   | 11-4007       | I/C JUMPER                   | 2    |
| 12   | 11-5029       | HEAT SINK A                  | 1    |
| 13   | 11-5048       | HEAT SINK B                  | 3    |
| 14   | 11-6039       | AUX. CHASSIS RIGHT           | 1    |
| 15   | 11-6044       | CENTER CHASSIS               | 1    |
| 16   | 11-6052       | AUX. CHASSIS LEFT            | 1    |
| 17   | 11-6053       | FRONT CHASSIS                | 1    |
| 18   | 11-6072       | BOTTOM CHASSIS               | 1    |
| 19   | 11-7004       | PULLEY SHAFT                 | 5    |
| 20   | 11-7027       | EXTENSIVE PULLEY SHAFT       | 1    |
| 21   | 11-8119       | DIAL PERSPEX COVER           | 1    |
| 21-1 | 12-1029       | CONNECTOR AND NUT            | 1    |
| 22   | 12-2007       | SPEAK TERMINAL SOCKET        | 2    |
| 23   | 12-2012       | ANTENNA TERMINAL SOCKET      | 1    |
| 24   | 12-2041       | PHON JACK                    | 1    |
| 25   | 12-2075       | SOCKET ASS'Y(6P)             | 1    |
| 25-1 | 12-2052       | SOCKET ASS'Y (8P)            | 1    |
| 25-2 | 12-2076       | DIN JACK                     | 1    |
| 26   | 12-4010       | POINTER                      | 1    |
| 27   | 12-5007       | SPRING FOR TUNING THREAD     | 2    |
| 28   | 13-4041       | INSULATION PLATE             | 1    |
| 29   | 13-5004       | PULLEY                       | 5    |
| 30   | 13-5006       | DIAL DRUM                    | 1    |
| 30-1 | 13-5020       | TUNING WHEEL                 | 1    |
| 31   | 13-7002       | STOPPER FOR WIRE             | 10   |
| 32   | 29-5008       | AM ANTENNA BAR               | 1    |
| 33   | 14-3001       | TUNING THREAD                | 1    |
| 34   | 14-5003       | CORD BUSH 4N-4               | 2    |
| 35   | 15-1008       | EYELET                       | 2    |
| 36   | 15-2037       | GROUND SCREW                 | 1    |
| 37   | 15-2047       | PLASTIC RIVET 3x4.5          | 4    |
| 38   | 15-2048       | PLASTIC RIVET 3x5.5          | 8    |
| 39   | 15-2049       | PLASTIC RIVET 3x6.5          | 2    |
| 39-1 | 15-2051       | SPECIAL SCREW                | 6    |
| 40   | 15-4010       | FIBER WASHER                 | 1    |
| 41   | 23-3004       | DICAST FOR TUNING KNOB       | 1    |
| 42   | 28-1016       | RUBBER BUSHING FOR LAMP      | 1    |
| 43   | 28-1017       | PHONES, INSULATION BUSH      | 1    |
| 44   | 28-1029       | RUBBER FOOT                  | 4    |
| 45   | 28-2015       | MYLAR FOR POINTER            | 1    |
| 46   | 28-2019       | LAMP RETAINER                | 2    |
| 47   | 28-2020       | COHSION FOR MIC              | 1    |
| 48   | 28-2023       | CABINET RETAINER             | 2    |
| 49   | 28-2024       | DIAL PERSPEX COVER RETAINER  | 1    |
| 50   | 28-2042       | CUSHION                      | 5    |
| 50-1 | 31-2021       | LAMP                         | 1    |
| 50-2 | 32-2005       | FUSE HOLDER                  | 1    |
| 51   | 28-2059       | MASKER FOR PANEL(A)          | 1    |
| 52   | 11-8099       | FRONT PANEL                  | 1    |
| 53   | 12-3037       | KNOB FOR TUNING              | 1    |
| 54   | 12-3038       | KNOB FOR CONTROL             | 5    |
| 55   | 12-3071       | KNOB FOR BALANCE             | 1    |
| 56   | 12-3039       | KNOB FOR PUSH                | 5    |
| 57   | 11-8098       | DIAL SCACE                   | 1    |
| 58   | 11-8100       | DIAL PLATE                   | 1    |
| 59   | 50-1024       | CABINET                      | 1    |
| 60   | S1B04+110SL-2 | MACHINE SCREW                | 8    |
| 61   | S5B03+108SL-2 | TRIANGLE SCREW               | 34   |
| 62   | S2B03+108SL-2 | TAPPING SCREW                | 17   |
| 63   | A04A07SL01    | WASHER                       | 8    |
| 64   | N04B0713.2SZ  | NUT                          | 8    |
| 65   | A04G07SL01    | SPRING WASHER                | 4    |



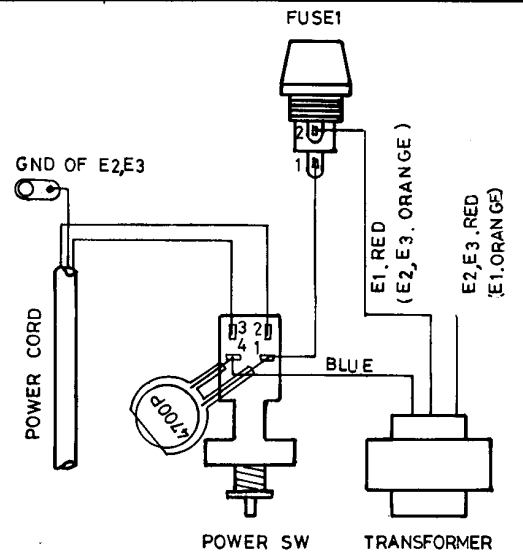
PRIMARY SECTION



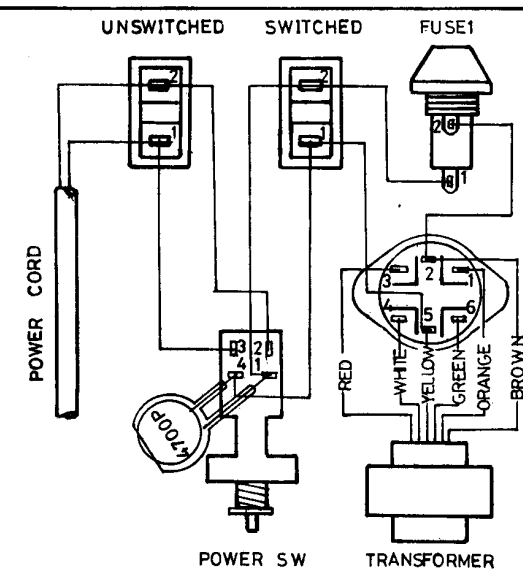
FOR : C1, C2



FOR : E4

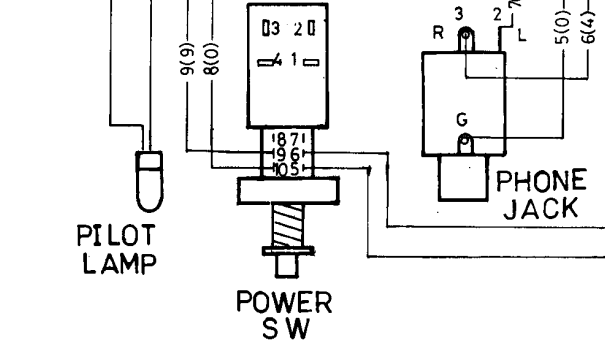
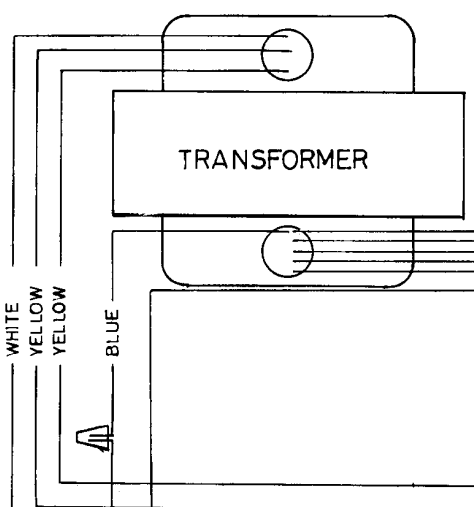


FOR : E1, E2, E3



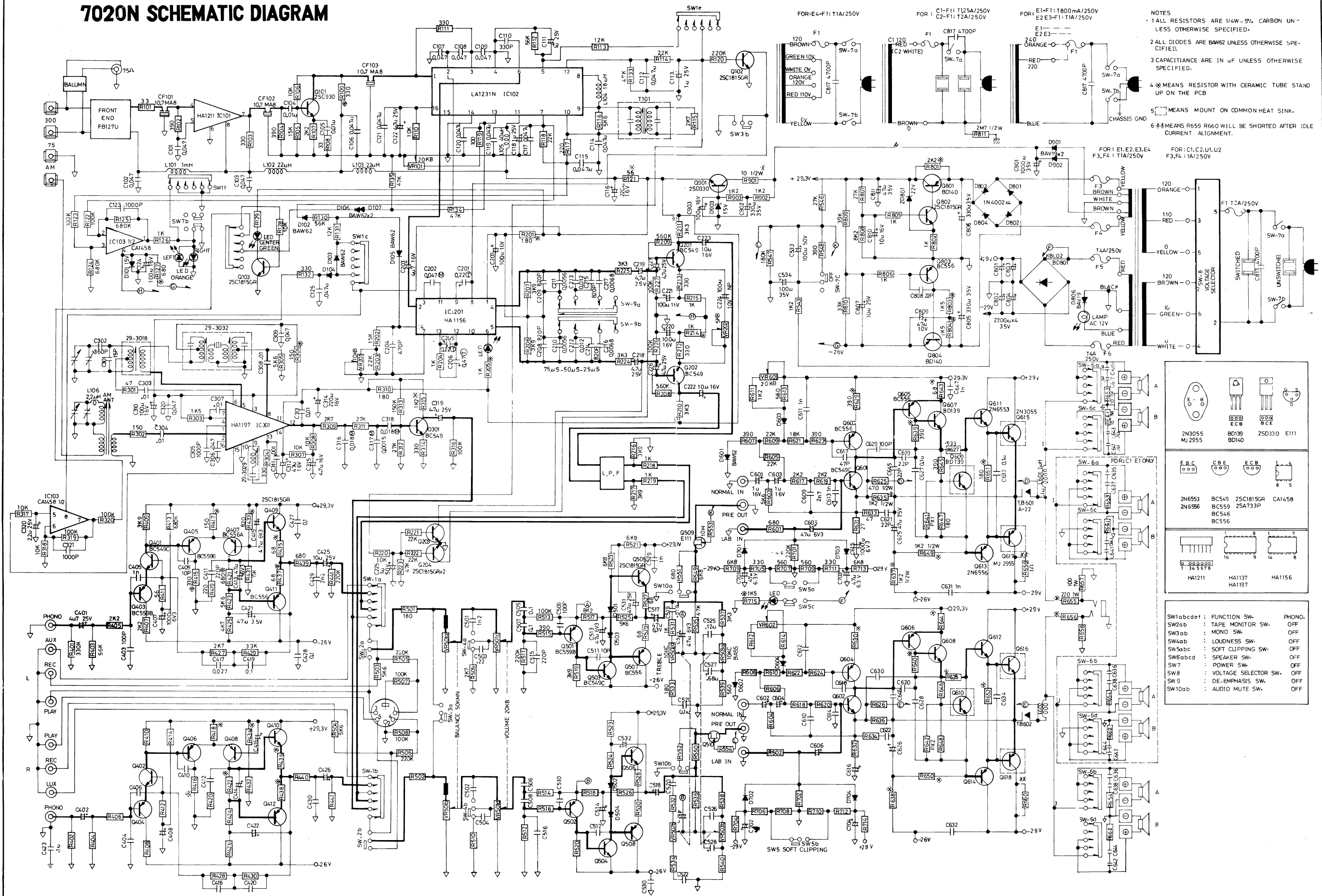
FOR : U1, U2, U3, U4

NOTE:  
FOR C1 & E1, CUT J<sub>A</sub>, J<sub>B</sub>, J<sub>C</sub> & J<sub>D</sub>  
FOR OTHERS, CUT D<sub>2</sub>, H<sub>2</sub>, L<sub>2</sub>, M<sub>2</sub>

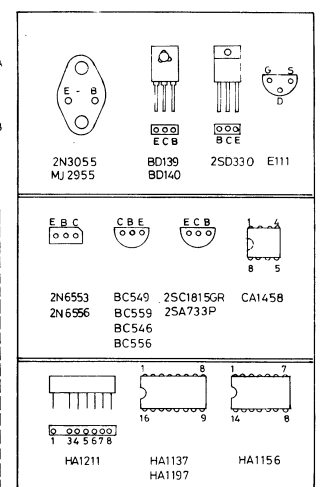
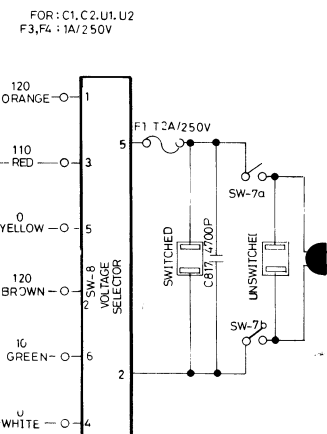


WIRING DIAGRAM

# 7020N SCHEMATIC DIAGRAM



- NOTES
- 1 ALL RESISTORS ARE 1/4W-5% CARBON UNLESS OTHERWISE SPECIFIED.
  - 2 ALL DIODES ARE BAW62 UNLESS OTHERWISE SPECIFIED.
  - 3 CAPACITANCE ARE IN UF UNLESS OTHERWISE SPECIFIED.
  - 4 \* MEANS RESISTOR WITH CERAMIC TUBE STAND UP ON THE PCB
  - 5 □ MEANS MOUNT ON COMMON HEAT SINK.
  - 6 \* MEANS R559 R660 WILL BE SHORTED AFTER IDLE CURRENT ALIGNMENT.



- |           |                      |        |
|-----------|----------------------|--------|
| SW1abcd:  | FUNCTION SW.         | PHONO. |
| SW2ab :   | TAPE MONITOR SW.     | OFF    |
| SW3ab :   | MONO SW.             | OFF    |
| SW4ab :   | LOUDNESS SW.         | OFF    |
| SW5abc :  | SOFT CLIPPING SW.    | OFF    |
| SW6abcd : | SPEAKER SW.          | OFF    |
| SW7 :     | POWER SW.            | OFF    |
| SW8 :     | VOLTAGE SELECTOR SW. | OFF    |
| SW9 :     | DE-EMPHASIS SW.      | OFF    |
| SW10ab :  | AUDIO MUTE SW.       | OFF    |