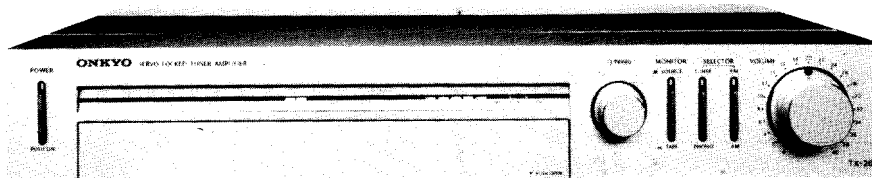


# ONKYO® SERVICE MANUAL

## SERVO LOCKED TUNER AMPLIFIER MODEL TX-20



### TABLE OF CONTENTS

| Item                             | Page |
|----------------------------------|------|
| Specifications                   | 2    |
| Service procedures               | 3    |
| Exploded view                    | 4    |
| Block diagram                    | 5    |
| Circuit description              | 5    |
| Component location               | 7    |
| Alignment procedures             | 8    |
| Stringing diagram                | 9    |
| Pc board-parts list (220V model) | 10   |
| Schematic diagram (220V model)   | 11   |
| Pc board view 220V model)        | 13   |
| Pc board view (120V model)       | 15   |
| Schematic diagram (120V model)   | 17   |
| Pc board-parts list (120V model) | 19   |
| Packing procedures               | 20   |



## SPECIFICATIONS

### AMPLIFIER SECTION

|                            |   |
|----------------------------|---|
| Output Power:              | 30 watts per channel, min. RMS, at 8 ohms both channels driven, from 20 Hz to 20,000 Hz, with no more than 0.08% total harmonic distortion. |
| Dynamic:                   | 84 watts total at 8 ohms 0.08% T.H.D.   |
| Continuous:                | 33W + 33W (8 $\Omega$ , 1 kHz, 0.08% T.H.D.)  |
| Total Harmonic Distortion: | 0.08% at rated power<br>0.04% at 1 watt output  |
| IM Distortion:             | 0.08% at rated power<br>0.04% at 1 watt output  |
| Damping Factor:            | 40 at 8 ohms  |
| Frequency Response:        | 20 Hz – 20,000 Hz ( $\pm$ 1 dB)   |
| RIAA Deviation:            | 20 Hz – 20,000 Hz ( $\pm$ 0.8 dB)   |
| Sensitivity & Impedance:   | Phono: 3 mV, 50 kohms<br>Tape Play: 150 mV, 50 kohms<br>Tape Rec: 150 mV, 2.2 kohms (PH)  |
| Phono Overload:            | 200 mV r.m.s. at 1 kHz, 0.08% T.H.D.  |
| Signal-to-Noise Ratio:     | Phono: 82 dB (at 10 mV input IHF A weighted)<br>65 dB (IHF C weighted)<br>Tape: 95 dB (IHF A weighted)<br>90 dB (IHF C weighted)            |
| Tone Controls:             | Bass: $\pm$ 9 dB at 100 Hz<br>Treble: $\pm$ 9 dB at 10 kHz  |
| High Filter:               | 6 kHz (6 dB/oct)  |
| Loudness:                  | +6 dB at 70 Hz<br>+5 dB at 10 kHz   |

### TUNER SECTION

|                             |   |
|-----------------------------|---|
| FM:                         |   |
| Tuning Range:               | 88 – 108 MHz (120V model)   |
| Tuning Range:               | 87.5 – 108 MHz (220V model)   |
| Usable Sensitivity:         | Mono: 1.9 $\mu$ V (10.8 dBf)<br>1.4 $\mu$ V (S/N 26 dB, 40 kHz Devi.) DIN<br>Stereo: 4 $\mu$ V (17.2 dBf)<br>45 $\mu$ V (S/N 46 dB, 40 kHz Devi.) DIN |
| 50 dB Quieting Sensitivity: | Mono: 3.5 $\mu$ V (16.0 dBf)<br>Stereo: 35 $\mu$ V (36.0 dBf)   |
| Intermediate Frequency:     | 10.7 MHz  |
| Capture Ratio:              | 1.5 dB  |
| Image Rejection Ratio:      | 70 dB   |
| IF Rejection Ratio:         | 85 dB   |
| Spurious Rejection Ratio:   | 90 dB   |
| Single-to-Noise Ratio:      | Mono: 72 dB<br>Stereo: 66 dB  |
| Alternate Channel Att.:     | 55 dB<br>75 dB (IHF) ( $\pm$ 400 kHz)   |
| Selectivity:                | 55 dB (DIN)<br>( $\pm$ 300 kHz, 40 kHz Devi)  |
| AM Suppression Ratio:       | 50 dB   |
| Harmonic Distortion:        | Mono: 0.12%<br>(120V model) Stereo: 0.3%  |
| Harmonic Distortion:        | Mono: 0.15%<br>(220V model) Stereo: 0.4%  |

|                     |   |
|---------------------|---|
| Frequency Response: | 30 Hz – 15,000 Hz ( $\pm$ 1.5 dB)             |
| Stereo Separation:  | 40 dB at 1 kHz<br>30 dB at 100 Hz – 10,000 Hz |
| Muting Level:       | 3 $\mu$ V (14.7 dBf)                          |
| Stereo Threshold:   | 3 $\mu$ V (14.7 dBf)                          |
| Servo Lock Level:   | 3 $\mu$ V (14.7 dBf)                          |

### AM:

|                         |                 |
|-------------------------|-----------------|
| Tuning Range:           | 525 – 1,605 kHz |
| Usable Sensitivity:     | 25 $\mu$ V      |
| Intermediate Frequency: | 455 kHz         |
| Image Rejection Ratio:  | 45 dB           |
| IF Rejection Ratio:     | 30 dB           |
| Signal-to-Noise Ratio:  | 40 dB           |
| Harmonic Distortion:    | 0.8%            |

### GENERAL (120V model)

|                     |  |
|---------------------|--|
| Power Supply:       | AC 120 volts, 60 Hz  |
| Outputs:            | Speaker A & B, Phones, Tape Rec, AC Outlet                                       |
| Inputs:             | Phono, Aux, Tape Play, FM and AM Antennas  |
| Antennas:           | FM: 300 ohms balanced<br>AM: built-in ferrite core antenna and external terminal |
| Semiconductors:     | 3 FETs, 19 transistors, 8 ICs, 25 diodes   |
| Dimensions (WxHxD): | 418 x 75 x 340 mm<br>16-9/16" x 2-61/64" x 13-7/16"                              |
| Weight:             | 7.2 kg, 15.8 lbs   |

### GENERAL (220V model)

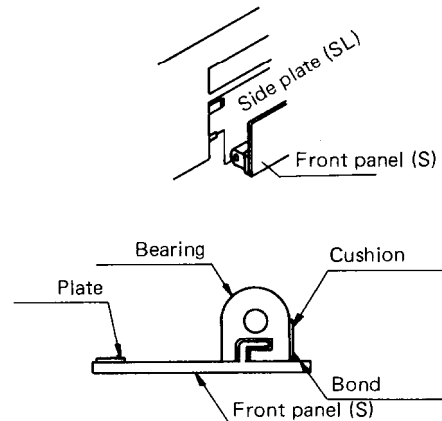
|                     |  |
|---------------------|--|
| Power Supply:       | AC 220 volts, 50 Hz  |
| Outputs:            | Speaker A & B, Phones, Tape Rec  |
| Inputs:             | Phono, Aux, Tape Play, FM and AM Antennas  |
| Antennas:           | FM: 300 ohms balanced<br>AM: built-in ferrite core antenna and external terminal |
| Semiconductors:     | 3FETs, 21 transistors, 8 ICs, 29 diodes  |
| Dimensions (WxHxD): | 418 x 75 x 340 mm<br>16-9/16" x 2-61/64" x 13-7/16"                              |
| Weight:             | 7.2 kg, 15.8 lbs   |

Specifications and features are subject to change without notice.

## SERVICE PROCEDURES

### 1. Front Panel (S) Replacement

- a) Turn the set over and remove the bond on the bottom of the (L) and (R) bearings with a knife.
- b) Return the set to the upright position and open the front panel (S). Then, following the central rib on the center of the front panel (S), slide the bearings from which the glue was removed toward the inner side. The front panel (S) will disengage from the front panel ass'y.
- c) Insert bearings (L) and (R) in the front panel (S) and attach so that bearing (R) is even with the front panel (S). Next, insert in the side panel (SR), then insert bearing (L) in side panel (SL) and attach so that it is even with the front panel (S). Finally, affix the bearings with bond (575).
- d) Attach the cushions to bearings (L) and (R).



(fig. 1)

### 2. Top Panel and Side Panel Replacement

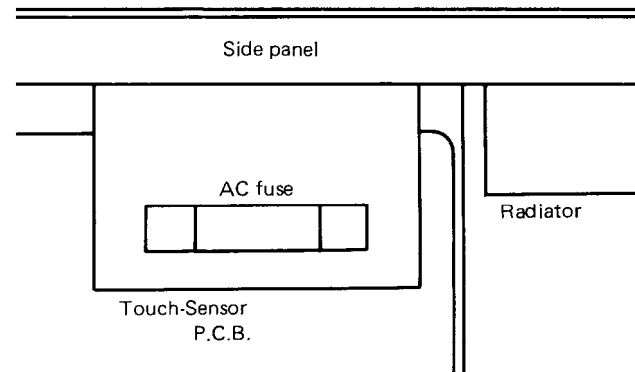
Always be sure to install the top panel before the side decorations. Also, when installing the top panel, attach (hook) the top panel to the heat sink as shown in the exploded view. When installing the side panel perform the operations in the order shown on the exploded view.

### 3. L.E.D. Replacement

- a) Remove the top cover and front panel.
- b) Remove the BASS, TREBLE, and BALANCE knobs. If they can not be removed easily, wrap a piece of flannel or other cloth around the knob and pull it out with radio pliers or other suitable tool.
- c) Remove the back plate and holder.

### 4. Replacing the Fuses

- 1) AC fuse  
Remove two screws holding the top cover and back panel, and remove the top cover.
- 2) Speaker fuse  
Remove a screw holding the fuse cover and back panel.

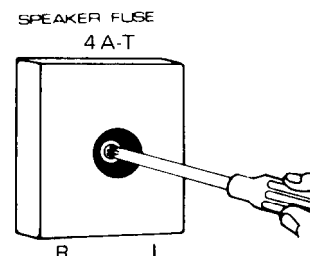


(fig. 2)

#### Precautions

1. For continued protection against fire hazard, replace only with same type and same rating fuse.

|              |           | Parts No. |            |
|--------------|-----------|-----------|------------|
| AC fuse      | 2A-T      | 252002    | 220V model |
|              | 4A (ST-6) | 252049    | 120V model |
| Speaker fuse | 4A-T      | 252014    |            |

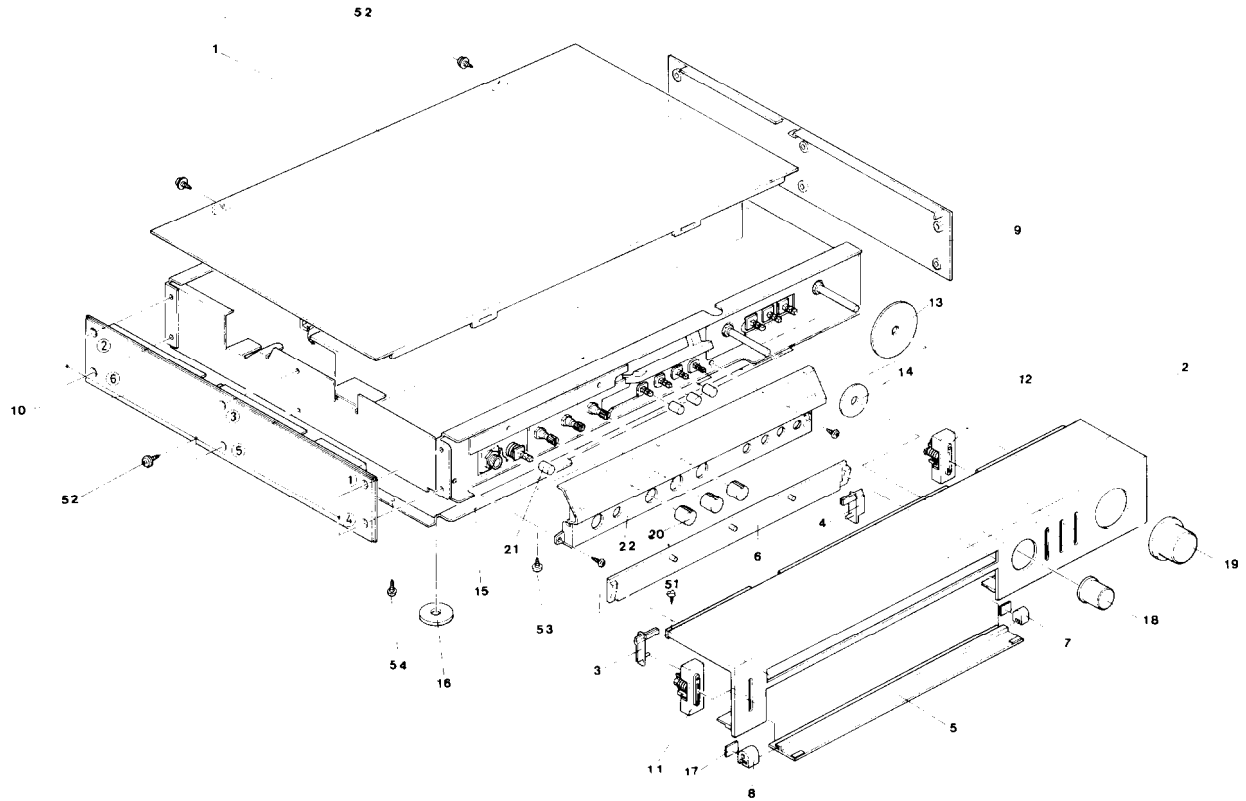


(fig. 3)

### 5. Touch-sensor Circuit

If the TUNED lamp does not turn off when you touch the tuning knob, this may be due to strong signals generated by a nearby MW or SW broadcasting station. In this case, adjust the frequency of oscillator coil with L301 until the TUNED lamp turn off.

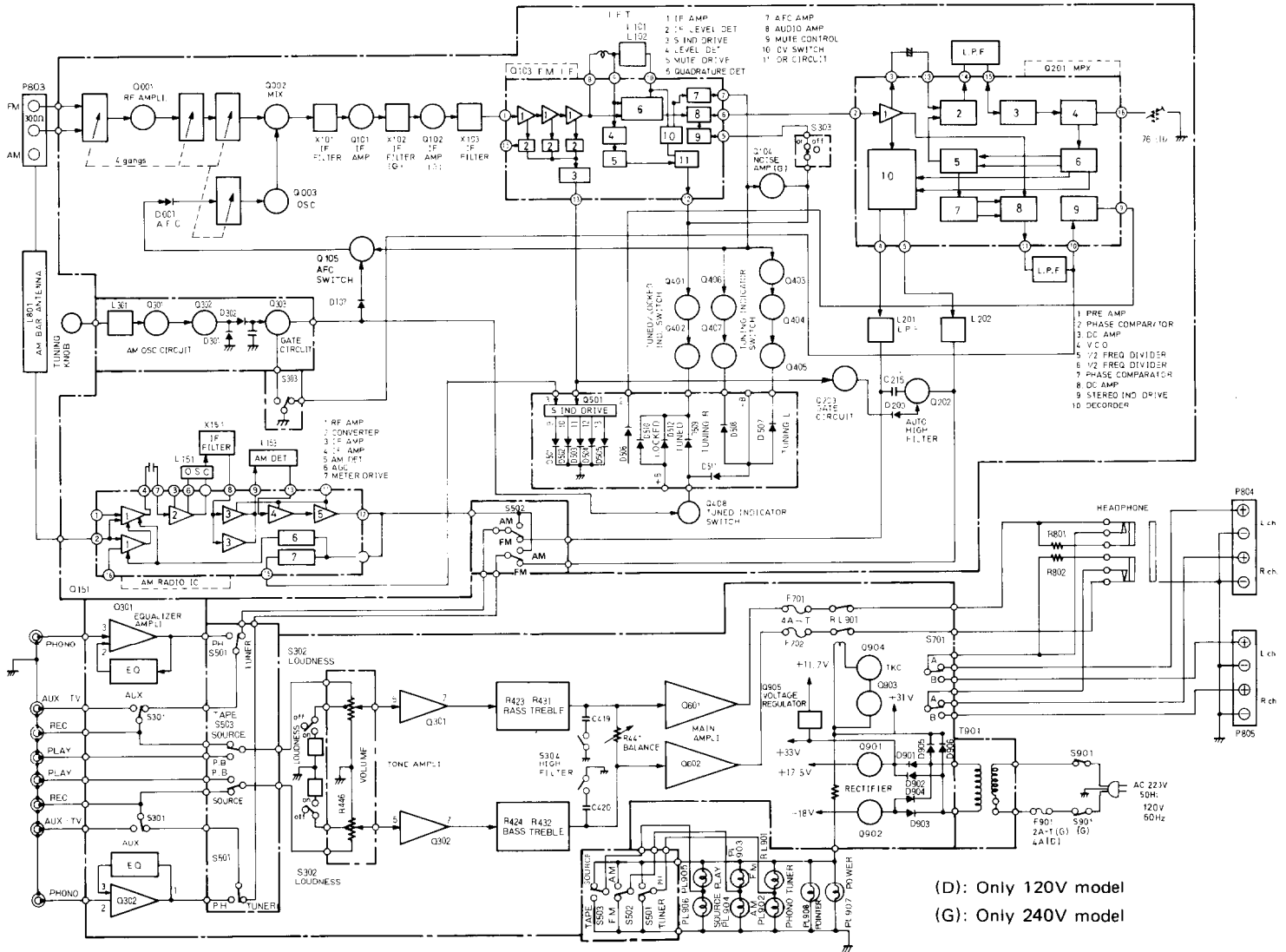
## EXPLODED VIEW



## EXPLODED VIEW – PARTS LIST

| REF. NO. | PARTS NO. | DESCRIPTION             | REF. NO. | PARTS NO. | DESCRIPTION                 |
|----------|-----------|-------------------------|----------|-----------|-----------------------------|
| 1        | 28184058A | Top cover               |          | 27267051  | Guide                       |
| 2        | 27210138  | Front panel             |          | 27180037  | Spring                      |
|          | 13609121  | Front panel ass'y       |          | 28320341  | Knob                        |
| 3        | 13918129  | Side plate (SL)         | 13       | 28140126  | Cushion                     |
| 4        | 13918128  | Side plate (SR)         | 14       | 28140127  | Cushion                     |
| 5        |           | Front panel (S) ass'y   | 15       | 27170061C | Bottom board                |
|          | 27210135  | Front panel (S)         | 16       | 27175015  | Leg                         |
|          | 27262050  | Magnet plate            | 17       | 28140189  | Cushion                     |
| 6        | 28191041  | Dial plate              | 18       | 28320339  | Tuning knob                 |
| 7        | 27300194  | Bearing (R)             | 19       | 28320338  | Volume knob                 |
| 8        | 27300195  | Bearing (L)             | 20       | 28320340  | Mode knob                   |
| 9        | 28125065  | End cap (R)             | 21       | 28320343  | Push knob                   |
| 10       | 28125066  | End cap (L)             | 22       | 28133018A | Back plate                  |
| 11       | 13918125  | Power switch knob ass'y |          | 27262047  | Plate                       |
|          | 27267050  | Guide                   |          | 27262049A | Plate (dial)                |
|          | 28198522  | Facet                   | 51       | 834130062 | 3STS+6BQ, Tapping screw     |
|          | 27180037  | Spring                  | 52       | 838230082 | 3STB+8BQ(Ni), Tapping screw |
|          | 28320341  | Knob                    | 53       | 838130062 | 3STB+6BQ, Tapping screw     |
| 12       | 13918126  | Push switch knob ass'y  | 54       | 831130082 | 3STW+8BQ, Tapping screw     |
|          | 28198522  | Facet                   |          |           |                             |

# BLOCK DIAGRAM



# CIRCUIT DESCRIPTION

## 1. Auto High Blend/Meter Display Circuits

In the Q103 IF system IC, a 3 step IF level detection circuit is built in as illustrated in the block diagram. Its output is pin 13. The relationship between the antenna input and pin 13 is shown in figure 8. This voltage is applied to pin 2 of Q510 lighting up D510–D506 (connected to the output) in response to the antenna input. When the antenna input is within about 45dB, Q203 is cut off so Q202 turns on. C215 is then connected between the left and right channels; high range noise components whose phase is reversed left-right are mixed, and at the expense of high range separation, noise is substantially reduced. At levels below 45dB, Q203 turns on and Q202 is cut off turning off the noise filter.

## 2. LOCKED/TUNED Indicator Circuits

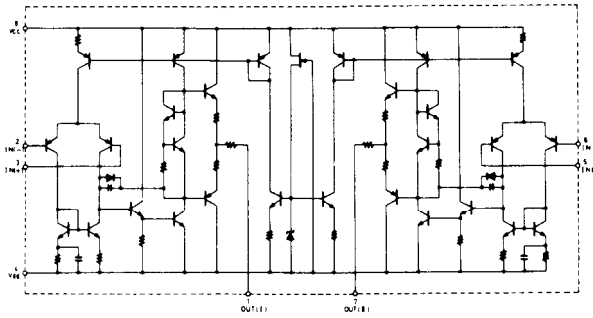
When a station is tuned from the lower frequencies upward, first, the Q103 AFC output pin 7 (fig. 8) changes as shown in fig. 2, Q406 turns on in the range of A, Q407 also turns on, and D508 lights up. Next, the locked range B is entered whereupon the Q103 pin 12 muting output goes from about 4.1V to 0V. Q401 turns off, Q402 turns on, and the D510, D512 LOCKED L.E.D. comes on and D508 turns off. In this status, when the tuning knob is released, the Q301, L301 oscillation circuit begins oscillating, the signal is amplified by Q302, both waves are rectified by D301 and D302, Q303 turns on, Q408 turns off, and the TUNED L.E.D. lights up. Also, Q105 turns off and the servo lock circuit (AFC circuit) operates. Note that when the C range is entered, Q403 turns on, Q404 and Q405 both turn off and only D507 lights up.

## 3. Muting Circuit (Only 220V model)

The muting circuit is built in Q103. It detects noise components above 200kHz in the AFC output audio signal, mixes them, activates the muting switch transistor in Q103 and turns off the output (pin 6).

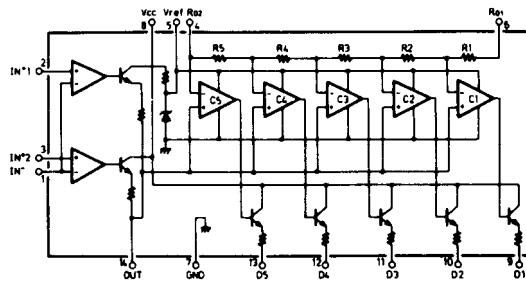
# EQUIVALENT CIRCUIT

NJM-4559DX

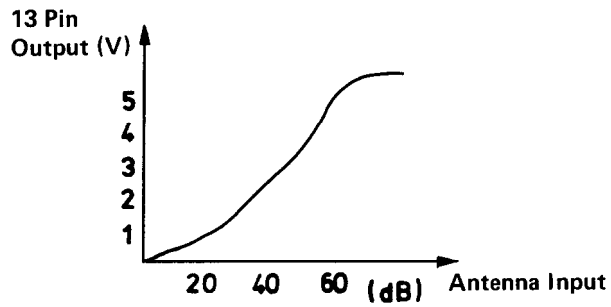


(fig. 6)

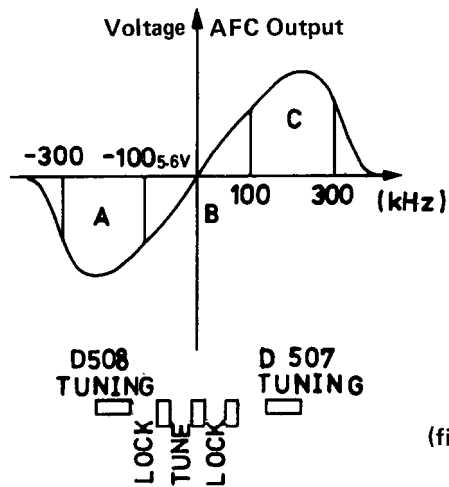
LB-1416



(fig. 7)

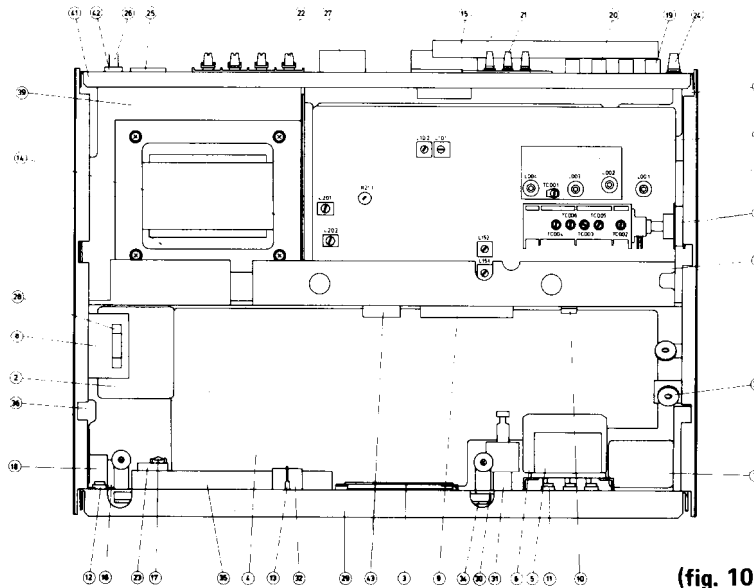


(fig. 8)



(fig. 9)

# COMPONENT LOCATION



(fig. 10)

## COMPONENT LOCATION – PARTS LIST

120V model

| REF. NO. | CIRCUIT NO. | PARTS NO. | DESCRIPTION                             |
|----------|-------------|-----------|---|
| 1        | U1          | 13609571A | NARF-671a, AM/FM tuner p.c.b.           |
| 2        | U2          | 13609572A | NAOT-672a, Touch-sensor p.c.b.          |
| 3        | U3          | 13918573  | NADIS-673, Indicator p.c.b.             |
| 4        | U4          | 13609583A | NAAF-683a, Pre./main amplifier p.c.b.   |
| 5        | U5          | 13609584A | NASW-684a, Switch p.c.b.                |
| 6        | U6          | 13918585  | NASW-685, Switch p.c.b.                 |
| 7        | U7          | 13918586  | NAVR-686, Volume control p.c.b.         |
| 8        | U8          | 13918587  | NAFU-687, Fuse p.c.b.                   |
| 9        | Q601,Q602   | 222020    | STK-463, Power ampli. IC                |
| 10       | Q905        | 222549    | FS-7812, Regulator IC                   |
| 11       | PL901-PL906 | 210061    | PL12V30mA W-0.6, Pilot lamp             |
| 12       | PL907       | 210051    | PL12V30mA W-1.5, Pilot lamp             |
| 13       | PL908       | 210062    | PL12V30mA W-1.8, Pilot lamp             |
| 14       | T901        | 230311    | NPT-676D, Power transformer             |
| 15       | L801        | 232066    | NMA-3012, AM bar antenna                |
| 16       | C901        | 3504012   | UL92-125V103M, UL capacitor             |
| 17       | R801,R802   | 441622714 | 270Ω, 1W, Metal oxide film resistor     |
| 18       | S901        | 25035047  | NPS-111-L12P, Power switch              |
| 19       | P801        | 25045025  | NPJ-4PRBL03, Phono/Aux. input terminal  |
| 20       | P802        | 25045028  | NPJ-4PRBL06, Tape input/output terminal |
| 21       | P803        | 25060020  | NTM-3WPUN1, Antenna terminal            |
| 22       | P804,P805   | 25060038  | NTM-4PRMN09, Speaker terminal           |
| 23       | P806        | 250004    | HJ-628-H5, Headphone jack               |
| 24       | P807        | 25060008  | Ground terminal                         |
| 25       |             | 25050032  | SI-6444-01, AC outlet                   |
| 26       |             | 253099A   | AS-UC-3, Power supply cord              |
| 27       | F701,F702   | 252014    | 4A-T, Speaker protection fuse           |
|          | F701a       | 25050004  | Holder for fuse                         |
| 28       | F901        | 252049    | 4A(ST-6), Power fuse                    |
| 29       | A001        | 27110088  | Front bracket                           |
| 30       | A003        | 28175022A | Empire plate                            |
| 31       | A004        | 27205019A | Drive shaft                             |
| 32       | A005        | 28165049C | Pointer ass'y                           |
| 33       | A006        | 27185002A | DP-16, Dial pulley                      |
| 34       | A007        | 27190048A | Holder                                  |
| 35       | A011        | 27130158  | Pointer rail                            |
| 36       | A029        | 27115047A | Side bracket                            |
| 37       | A030        | 27115048A | Side bracket                            |
| 38       | A034        | 27160056A | Radiator                                |
| 39       | A035        | 27130157B | Bracket for power transformer           |
| 40       | A036        | 27200021A | Dial drum                               |
|          |             | 27180044  | Spring for dial drum                    |
|          |             | 273903    | Stringing                               |
| 41       |             | 27120175  | Back panel                              |
| 42       |             | 270025    | SR-3P-4, Strainrelief                   |

## COMPONENT LOCATION – PARTS LIST

220V model

| REF. NO. | CIRCUIT NO. | PARTS NO. | DESCRIPTION                             |
|----------|-------------|-----------|---|
| 1        | U1          | 13609571B | NARF-671b, AM/FM tuner p.c.b.           |
| 2        | U2          | 13609572A | NAOT-672a, Touch-sensor p.c.b.          |
| 3        | U3          | 13918573  | NADIS-673, Indicator p.c.b.             |
| 4        | U4          | 13609583A | NAAF-683a, Pre./main amplifier p.c.b.   |
| 5        | U5          | 13609584A | NASW-684a, Switch p.c.b.                |
| 6        | U6          | 13918585  | NASW-685, Switch p.c.b.                 |
| 7        | U7          | 13918586  | NAVR-686, Volume control p.c.b.         |
| 8        | U8          | 13918587A | NAFU-687a, Fuse p.c.b.                  |
| 9        | Q601,Q602   | 222020    | STK-463, Power ampli. IC                |
| 10       | Q905        | 222549    | FS-7812, Regulator IC                   |
| 11       | PL901-PL906 | 210061    | PL12V30mA W-0.6, Pilot lamp             |
| 12       | PL907       | 210051    | PL12V30mA W-1.5, Pilot lamp             |
| 13       | PL908       | 210062    | PL12V30mA W-1.8, Pilot lamp             |
| 14       | T901        | 230312    | NPT-676G Power transformer              |
| 15       | L801        | 232066    | NMA-3012, AM bar antenna                |
| 16       | C901,C902   | 3500052   | PME271Y510CEE, IS capacitor             |
| 17       | R801,R802   | 441622714 | 270Ω, 1W, Metal oxide film resistor     |
| 18       | S901        | 25035034  | NPS-121-L, Power switch                 |
| 19       | P801        | 25045025  | NPJ-4PRBL03, Phono/Aux. input terminal  |
| 20       | P802        | 25045028  | NPJ-4PRBL06, Tape input/output terminal |
| 21       | P803        | 25060020  | NTM-3WPUN1, Antenna terminal            |
| 22       | P804,P805   | 25060038  | NTM-4PRMN09, Speaker terminal           |
| 23       | P806        | 250004    | HJ-628-H5, Headphone jack               |
| 24       | P807        | 25060008  | Ground terminal                         |
| 25       |             | 25050032  | SI-6444-01, AC outlet                   |
| 26       |             | 253088    | AS-VDE-1, Power supply cord             |
| 27       | F701,F702   | 252014    | 4A-T, Speaker protection fuse           |
|          | F701a       | 25050004  | Holder for fuse                         |
| 28       | F901        | 252002    | 2A-T, Power fuse                        |
| 29       | A001        | 27110088  | Front bracket                           |
| 30       | A003        | 28175022A | Empire plate                            |
| 31       | A004        | 27205019A | Drive shaft                             |
| 32       | A005        | 28165049C | Pointer ass'y                           |
| 33       | A006        | 27185002A | DP-16, Dial pulley                      |
| 34       | A007        | 27190048A | Holder                                  |
| 35       | A011        | 27130158  | Pointer rail                            |
| 36       | A029        | 27115047A | Side bracket                            |
| 37       | A030        | 27115048A | Side bracket                            |
| 38       | A034        | 27160056A | Radiator                                |
| 39       | A035        | 27130157B | Bracket for power transformer           |
| 40       | A036        | 27200021A | Dial drum                               |
|          |             | 27180044  | Spring for dial drum                    |
|          |             | 273903    | Stringing                               |
| 41       |             | 27120176  | Back panel                              |
| 42       |             | 25065018  | SR-3P-4, Strainrelief                   |

## ALIGNMENT PROCEDURES

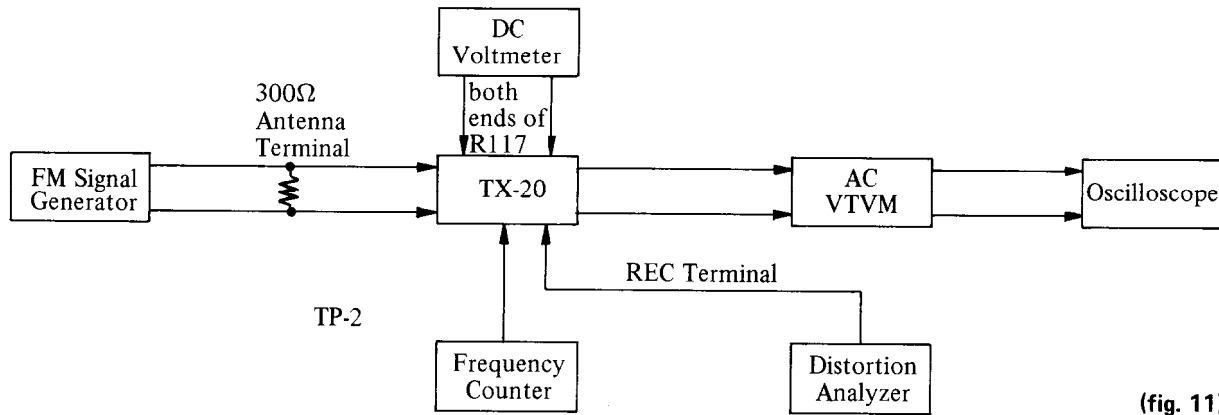
### INSTRUMENTS REQUIRED

1. AM and FM Signal Generator
2. Vacume Tube Voltage Meter (VTVM) AC, DC
3. Oscilloscope
4. Distortion Analyzer
5. Stereo Modulator
6. Frequency Counter

### GENERAL ALIGNMENT CONDITIONS

1. Signal input should be kept as low as possible.
2. Standard modulation is 400Hz 30% (AM), 1 kHz 100% (FM MONO) pilot 9% sub and main 91% (FM STEREO).
3. Standard knob position  
 SPEAKERS ..... A  
 BASS, TREBLE & BALANCE..... Center  
 HI-FILTER, LOUDNESS,  
 MUTING LOCK ..... OFF  
 TAPE ..... OFF (source)

### (1) FM FRONT END ALIGNMENT

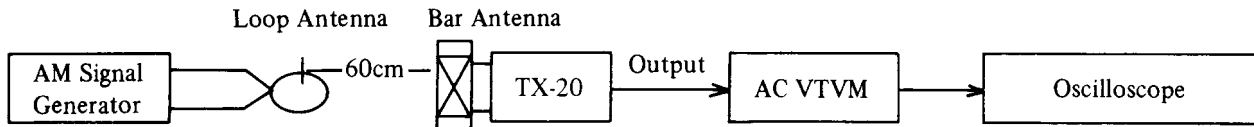


(fig. 11)

| Step | FM Signal Generator                    | Dial to set | Adjust                     | Output Indicator           | Adjust for | Remarks                           |
|------|--|-------------|----------------------------|----------------------------|------------|-----------------------------------|
| 1    | No signal                              | Quiet Point | L101                       | DC Voltmeter               | 0V         | Repeat Steps 1 and 2 as necessary |
| 2    | 98MHz 65dBf(60dB)<br>1kHz 75kHz devi.  | 98MHz       | L102                       | Distortion Analyzer        | Minimum    |                                   |
| 3    | 90MHz 65dBf(60dB)<br>1kHz 75kHz devi.  | 90MHz       | L004                       | DC Voltmeter               | 0V         | Repeat Steps 3 and 4 as necessary |
| 4    | 106MHz 65dBf(60dB)<br>1kHz 75kHz devi. | 106MHz      | TC001                      |                            |            |                                   |
| 5    | 90MHz 20dBf(15dB)<br>1kHz 75kHz devi.  | 90MHz       | L001<br>L003               | AC VTVM or<br>Oscilloscope | Maximum    | Repeat Steps 5 and 6 as necessary |
| 6    | 106MHz 20dBf(15dB)<br>1kHz 75kHz devi. | 106MHz      | TC002<br>TC004             |                            | Maximum    |                                   |
| 7    | 98MHz 65dBf(60dB)<br>no mod.           | 98MHz       | R212 <sup>or</sup><br>R213 | Frequency Counter          | 76kHz      |                                   |



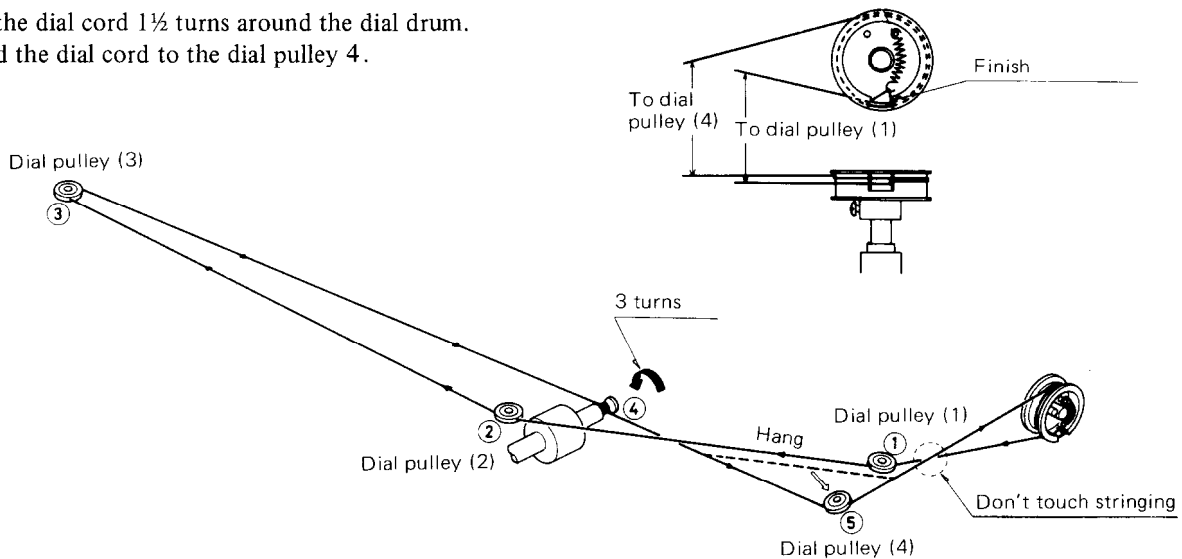
## (2) AM RF ALIGNMENT



| Step | Set Signal              | Set Radio Dial          | Adjust | VTVM reading | Remarks   |
|------|-------------------------|-------------------------|--------|--------------|---|
| 1    | 515 kHz<br>400 Hz 30 %  | Lower end<br>(515 kHz)  | L151   | Maximum      | Repeat steps 1 and 2 as necessary                       |
| 2    | 1680 kHz<br>400 Hz 30%  | Upper end<br>(1680 kHz) | TC006  | Maximum      |   |
| 3    | 600 kHz<br>400 Hz 30%   | 600 kHz                 | L801   | Maximum      | Adjust with L105 when Repeat steps 3 and 4 as necessary |
| 4    | 1400 kHz<br>400 Hz 30 % | 1400 kHz                | TC005  | Maximum      |   |

## STRINGING DIAGRAM

1. Close the variable capacitor complete and tie the dial cord to the spring of the drum.
2. Thread the dial cord in the direction of arrow from ① to ④ and wind the dial cord three turns around the tuning shaft clockwise.
3. Wind the dial cord 1½ turns around the dial drum.
4. Thread the dial cord to the dial pulley 4.



### TOUCH-SENSOR PC BOARD (NAOT-672a) – PARTS LIST

| CIRCUIT NO.        | PARTS NO.          | DESCRIPTION                           |
|--------------------|--------------------|---------------------------------------|
| Q301, Q302<br>Q303 | <b>Transistors</b> |                                       |
|                    | 2211623            | 2SC941(TM)(O)                         |
|                    | 2211255            | 2SC1815(GR)                           |
| PL301              | 211002             | <b>Neon lamp</b><br>NE-2HW            |
| D301, D302<br>D304 | <b>Diodes</b>      |                                       |
|                    | 223103<br>223105   | 1N60<br>1S1555                        |
| L301               | 232042             | <b>Coil</b><br>NMO-2504               |
| C306               | 352741001          | <b>Capacitor</b><br>10μF, 16V, Elect. |

### INDICATOR PC BOARD (NADIS-673) – PARTS LIST

| CIRCUIT NO.  | PARTS NO.              | DESCRIPTION                             |
|--|------------------------|---|
| Q501   | <b>IC</b>              |   |
|  | 222541                 | LB1426                                  |
| D501–D505<br>D506–D508<br>D509<br>D510, D512<br>D511 | <b>L.E.Ds</b>          |   |
|  | 225035                 | LN324GP                                 |
|  | 225034                 | LN224RP                                 |
|  | 225035                 | LN324GP                                 |
|  | 225034                 | LN224RP                                 |
|  | 223105                 | 1S1555                                  |
| C501<br>C502, C503                                   | <b>Capacitors</b>      |   |
|  | 352741001<br>352750471 | 10μF, 16V, Elect.<br>4.7μF, 25V, Elect. |

### AM/FM TUNER PC BOARD (NARF-671b) – PARTS LIST

| CIRCUIT NO.   | PARTS NO.              | DESCRIPTION                      |
|---|------------------------|----------------------------------|
|   | <b>ICs</b>             |                                  |
| Q103  | 222421                 | HA-1137W                         |
| Q151  | 222497                 | LA-1240                          |
| Q201  | 222453                 | HA-1196                          |
|   | <b>Transistors</b>     |                                  |
| Q001, Q002  | 2211713                | 3SK73(GR), F.E.T.                |
| Q003, Q101,<br>Q102   | 2211722                | 2SC1923(R)                       |
| Q104, Q105,<br>Q203,<br>Q401–Q403,<br>Q405, Q407,<br>Q408       | 2211255                | 2SC1815 (GR)                     |
| Q202  | 2211293                | 2SK68(M), F.E.T.                 |
| Q404, Q406  | 2211454                | 2SA1015(Y)                       |
|   | <b>Diodes</b>          |                                  |
| D001  | 233110                 | 1S2687F                          |
| D101,<br>D104–D107,<br>D109, D111,<br>D113, D151,<br>D201, D203 | 223105                 | 1S1555                           |
| D102, D103  | 223103                 | 1N60                             |
| D108, D110  | 223106                 | 1S1554                           |
| D152  | 4000022                | VD-1212                          |
|   | <b>Coils</b>           |                                  |
| L001  | 233088-1 or<br>2330106 | NFA-3001 or<br>NFA-3009, Antenna |
| L002  | 233178                 | NFRF-3015, RF                    |
| L003  | 233093                 | NFRF-3004, RF                    |
| L004  | 233180                 | NFO-3014, Oscillator             |
| L103  | 233031                 | NMC-9-1, 2.2mH, MPX              |
| L151  | 232073                 | NMO-2008, AM oscillator          |
| L201, L202  | 233181                 | NMC-5018                         |
|   | <b>Transformers</b>    |                                  |
| L101  | 233148                 | NFIF-6010P                       |
| L102  | 233149                 | NFIF-6010S                       |
| L152  | 232077                 | NMIF-6009                        |
| L153  | 232041                 | NIT-0509                         |
|   | <b>Ceramic filters</b> |                                  |
| X101–X103   | 3010035                | SFE-10.7MM                       |
| X151  | 3010034                | SFZ-455A                         |
|   | <b>Capacitors</b>      |                                  |
| VC001   | 3050006                | NVC20FQ327WD02, Variable         |
| TC001   | 3060003                | NTC-10P02, Trimmer               |
| C105, C107  | 352741001              | 10 $\mu$ F, 16V, Elect.          |
| C112  | 352780331              | 3.3 $\mu$ F, 50V, Elect.         |
| C114  | 352784791              | 0.47 $\mu$ F, 50V, Elect.        |
| C117  | 352780101              | 1 $\mu$ F, 50V, Elect.           |
| C122  | 352742201              | 22 $\mu$ F, 16V, Elect.          |
| C123  | 352741001              | 10 $\mu$ F, 16V, Elect.          |
| C124–C126   | 352780101              | 1 $\mu$ F, 50V, Elect.           |
| C128  | 352780221              | 2.2 $\mu$ F, 50V, Elect.         |
| C156  | 372323614              | 360pF $\pm$ 5%, 50V, ST          |
| C159  | 352741001              | 10 $\mu$ F, 16V, Elect.          |
| C162  | 352780471              | 4.7 $\mu$ F, 50V, Elect.         |
| C165  | 352780331              | 3.3 $\mu$ F, 50V, Elect.         |
| C166  | 352721011              | 100 $\mu$ F, 6.3V, Elect.        |
| C169  | 352744701              | 47 $\mu$ F, 16V, Elect.          |
| C201  | 352750471              | 4.7 $\mu$ F, 25V, Elect.         |
| C204, C205  | 352741001              | 10 $\mu$ F, 16V, Elect.          |
| C208  | 352780221              | 2.2 $\mu$ F, 50V, Elect.         |
| C209  | 352784791              | 0.47 $\mu$ F, 50V, Elect.        |
| C210  | 352780331              | 3.3 $\mu$ F, 50V, Elect.         |
| C211  | 372325114              | 510pF $\pm$ 5%, 50V, ST          |
| C212, C213  | 352780101              | 1 $\mu$ F, 50V, Elect.           |
| C214  | 352744711              | 470 $\mu$ F, 16V, Elect.         |
|   | <b>Resistors</b>       |                                  |
| R213  | 5225015                | N10HR10KBD, Semi-fixed           |

### PRE., AND MAIN AMPLIFIER PC BOARD (NAAF-683a) – PARTS LIST

| CIRCUIT NO.         | PARTS NO.            | DESCRIPTION                                |
|---------------------|----------------------|--|
|                     | <b>ICs</b>           |  |
| Q301, Q302          | 222534               | MJM-4559DX                                 |
| Q401, Q402          | 222020               | STK-463                                    |
| Q601, Q602          | 222549               | FS-7812                                    |
| Q905                |                      |  |
|                     | <b>Transistors</b>   |  |
| Q901, Q904          | 2211254              | 2SC1815 (Y)                                |
| Q902                | 2211454              | 2SA1015 (Y)                                |
| Q903                | 2211255              | 2SC1815(GR)                                |
|                     | <b>Diodes</b>        |  |
| D901–D904           | 223845               | GP-20D                                     |
| D905, D906,<br>D908 | 223848               | GP-08B                                     |
| D907                | 223106               | 1S1554                                     |
| D910                | 224089               | BZ-110                                     |
|                     | <b>Coil</b>          |  |
| L601, L602          | 231001               | S-1.3B                                     |
|                     | <b>Capacitors</b>    |  |
| C301, C302          | 352780101            | 1 $\mu$ F, 50V, Elect.                     |
| C307, C308          | 352734701            | 47 $\mu$ F, 10V, Elect.                    |
| C313, C314          | 392884797            | 0.47 $\mu$ F, 50V, LL                      |
| C405, C406          | 392884797            | 0.47 $\mu$ F, 50V, LL                      |
| C407, C488          | 352780101            | 1 $\mu$ F, 50V, Elect.                     |
| C409, C410          | 352742201            | 22 $\mu$ F, 16V, Elect.                    |
| C601, C602          | 352750471            | 4.7 $\mu$ F, 25V, Elect.                   |
| C607, C608          | 352734701            | 47 $\mu$ F, 10V, Elect.                    |
| C609, C610          | 352784701            | 47 $\mu$ F, 50V, Elect.                    |
| C908                | 352782211            | 220 $\mu$ F, 50V, Elect.                   |
| C909, C910          | 3504124              | 6,800 $\mu$ F, 40V, Elect.                 |
| C911, C912          | 352784701            | 47 $\mu$ F, 50V, Elect.                    |
| C915, C916          | 352752211            | 220 $\mu$ F, 25V, Elect.                   |
| C918                | 352741011            | 100 $\mu$ F, 16V, Elect.                   |
| C919                | 352782201            | 22 $\mu$ F, 50V, Elect.                    |
| C920                | 352743301            | 33 $\mu$ F, 16V, Elect.                    |
| C923–C925           | 352781001            | 10 $\mu$ F, 50V, Elect.                    |
| C929                | 352781011            | 100 $\mu$ F, 50V, Elect.                   |
| C930                | 352741001            | 10 $\mu$ F, 16V, Elect.                    |
|                     | <b>Resistors</b>     |  |
| R423, R424          | 5148036              | N16RGL250KC15,<br>Bass control variable    |
| R431, R432          | 5148036              | N16RGL250KC15,<br>Treble control variable  |
| R441                | 5104086              | N16RL50KWTP15,<br>Balance control variable |
| R605, R606          | 441521024            | 1k $\Omega$ , 1/2W, Metal oxide film       |
| R607, R608          | 441523324            | 3.3k $\Omega$ , 1/2W, Metal oxide film     |
| R611, R612          | 451633394            | 0.33 $\Omega$ , 1W, Metal                  |
| R613, R614          | 451530474            | 4.7 $\Omega$ , 1/2W, Metal                 |
| R615, R616          | 451530684            | 6.8 $\Omega$ , 1/2W, Metal                 |
| R905                | 48114704             | 47 $\Omega$ , 5W, Cement                   |
| R906                | 48151114             | 110 $\Omega$ , 7W, Cement                  |
| R911                | 441521014            | 100 $\Omega$ , 1/2W, Metal oxide film      |
| R915                | 441623314            | 330 $\Omega$ , 1W, Metal oxide film        |
|                     | <b>Switches</b>      |  |
| S301–S304           | 25035134             | NPS-422-L99                                |
|                     | 25035125             | NPS-122-L90                                |
|                     | <b>Relay</b>         |  |
| RL901               | 25065052             | NRL-2P-5A-DC24-04                          |
|                     | <b>Plate</b>         |  |
|                     | 27300130             |  |
|                     | <b>Thermo switch</b> |  |
| S903                | 25065091             | 1P-105A-95                                 |

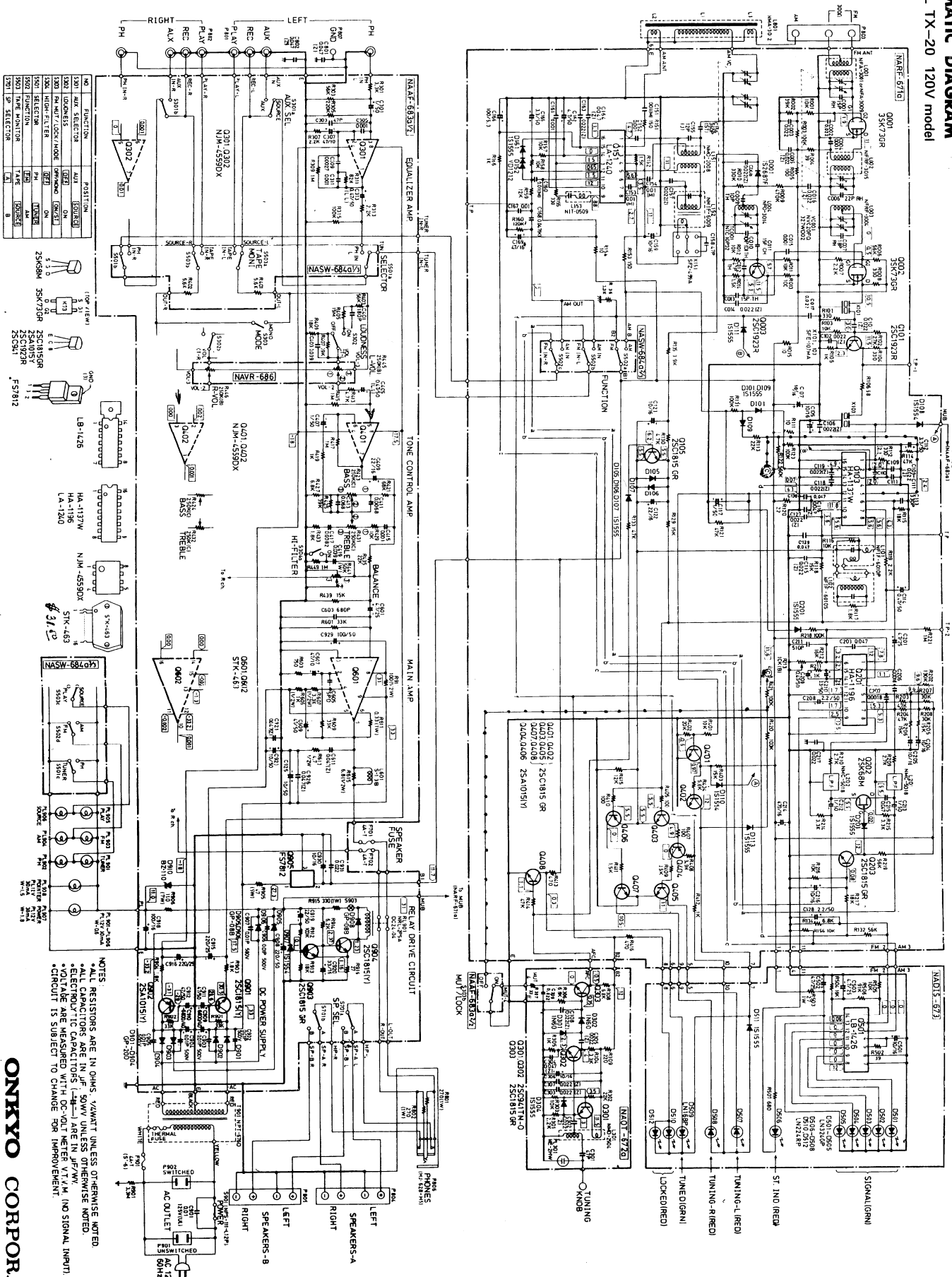
### SWITCH PC BOARD (NASW-684a) – PARTS LIST

| CIRCUIT NO. | PARTS NO. | DESCRIPTION |
|-------------|-----------|-------------|
| S501–S503   | 25035127  | NPS-342-L92 |

### VOLUME CONTROL PC BOARD (NAVR-686) – PARTS LIST

| CIRCUIT NO. | PARTS NO. | DESCRIPTION        |
|-------------|-----------|--------------------|
| R445, R446  | 5172045   | N24RGL41C250KBTP35 |

**SCHEMATIC DIAGRAM**  
**MODEL TX-20 120V model**



| NO.  | FUNCTION             | POSITION |
|------|----------------------|----------|
| 3201 | AUX SELECTOR         | AUX      |
| 3202 | RECORDS              | REC      |
| 3203 | FM W/RT / C/D/ R/O/D | FM       |
| 3204 | HIGH-FILTER          | PH       |
| 3205 | SELECTOR             | PH       |
| 3206 | FM MONITOR           | FM       |
| 3207 | SP. SELECTOR         | SP       |

**NOTES**  
 \* ALL RESISTORS ARE IN OHMS, UNLESS OTHERWISE NOTED.  
 \* ALL CAPACITORS ARE IN P.F. UNLESS OTHERWISE NOTED.  
 \* VOLTAGE ARE MEASURED WITH DC-VOLT METER V.T.V.M. AND SIGNAL INPUT.  
 \* CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.



# PRINTED CIRCUIT BOARD-PARTS LIST

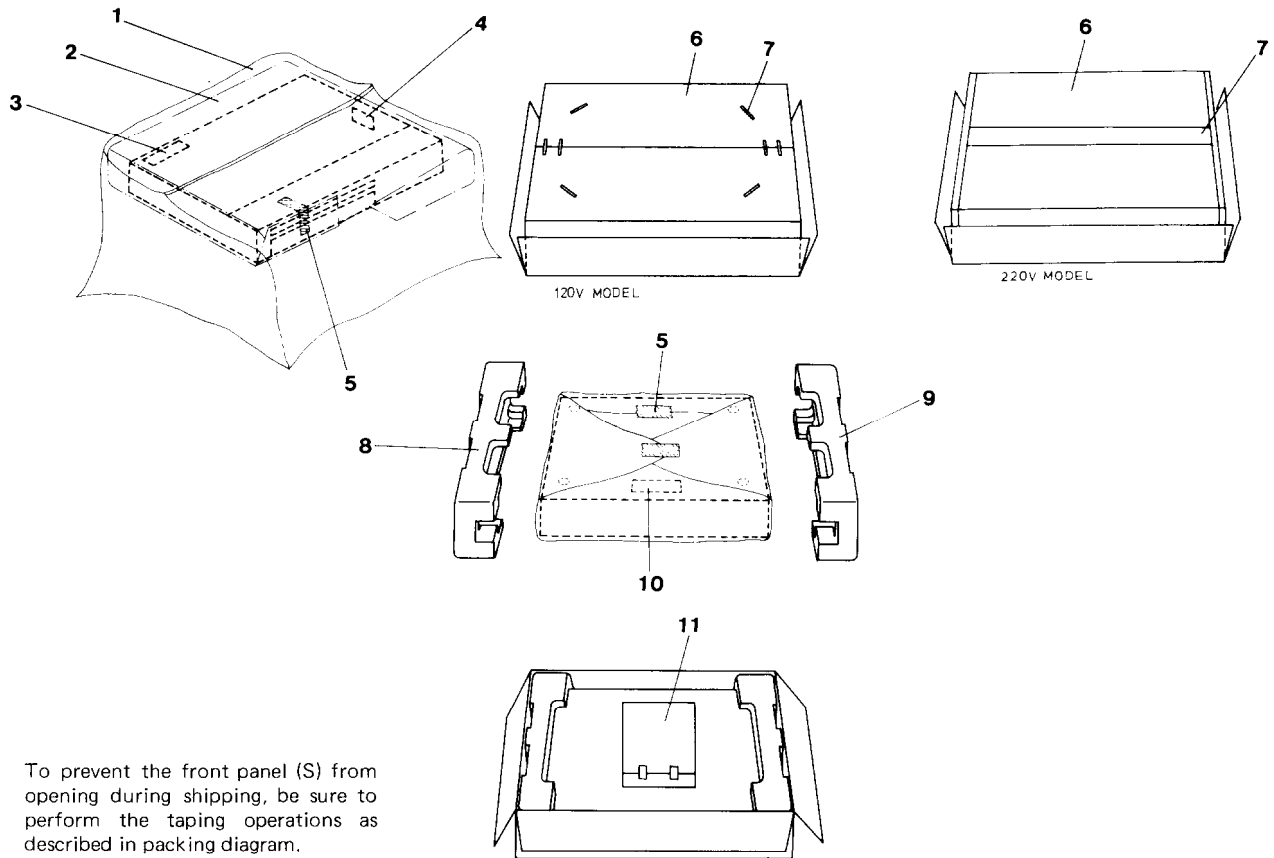
## AM/FM TUNER PC BOARD (NARF-671a) - PARTS LIST

| CIRCUIT NO.   | PARTS NO.              | DESCRIPTION                      |
|---|------------------------|----------------------------------|
|   | <b>ICs</b>             |                                  |
| Q103  | 222421                 | HA-1137W                         |
| Q151  | 222497                 | LA-1240                          |
| Q201  | 222453                 | HA-1196                          |
|   | <b>Transistors</b>     |                                  |
| Q001, Q002  | 2211713                | 3SK73(GR), F.E.T.                |
| Q003, Q101  | 2211722                | 2SC1923(R)                       |
| Q105, Q203,<br>Q401-Q403,<br>Q405, Q407,<br>Q408                                      | 2211255                | 2SC1815(GR)                      |
| Q202  | 2211293                | 2SK68(M), F.E.T.                 |
| Q404, Q406  | 2211454                | 2SA1015(Y)                       |
|   | <b>Diodes</b>          |                                  |
| D001  | 233110                 | 1S2687F                          |
| D101,<br>D105-D107,<br>D109, D111,<br>D113, D151,<br>D201, D203<br>D108, D110<br>D152 | 223105                 | 1S1555                           |
|   |                        |                                  |
|   | 223106                 | 1S1554                           |
|   | 4000022                | VD-1212                          |
|   | <b>Coils</b>           |                                  |
| L001  | 233088-1 or<br>233106  | NFA-3001 or<br>NFA-3009, Antenna |
| L002  | 233178                 | NFRF-3015, RF                    |
| L003  | 233093                 | NFRF-3004, RF                    |
| L004  | 233180                 | NFO-3014, Oscillator             |
| L151  | 232073                 | NMO-2008, AM oscillator          |
| L201, L202  | 233181                 | NMC-5018                         |
|   | <b>Transformers</b>    |                                  |
| L101  | 233148                 | NFIF-6010P                       |
| L102  | 233149                 | NFIF-6010S                       |
| L152  | 232077                 | NMIF-6009                        |
| L153  | 232041                 | NIT-0509                         |
|   | <b>Ceramic filters</b> |                                  |
| X101, X103  | 3010003                | SFE-10.7MA                       |
| X151  | 3010034                | SFZ-455A                         |
|   | <b>Capacitors</b>      |                                  |
| VC001   | 3050006                | NVC20FQ327WD02, Variable         |
| TC001   | 3060003                | NTC-10P02, Trimmer               |
| C105, C107  | 352741001              | 10 $\mu$ F, 16V, Elect.          |
| C112  | 352780331              | 3.3 $\mu$ F, 50V, Elect.         |
| C114  | 352784791              | 0.47 $\mu$ F, 50V, Elect.        |
| C117  | 352780101              | 1 $\mu$ F, 50V, Elect.           |
| C122  | 352742201              | 22 $\mu$ F, 16V, Elect.          |
| C123  | 352741001              | 10 $\mu$ F, 16V, Elect.          |
| C128  | 352780221              | 2.2 $\mu$ F, 50V, Elect.         |
| C156  | 372323614              | 360pF $\pm$ 5%, 50V, ST          |
| C159  | 352741001              | 10 $\mu$ F, 16V, Elect.          |
| C162  | 352780471              | 4.7 $\mu$ F, 50V, Elect.         |
| C165  | 352780331              | 3.3 $\mu$ F, 50V, Elect.         |
| C166  | 352721011              | 100 $\mu$ F, 6.3V, Elect.        |
| C169  | 352744701              | 47 $\mu$ F, 16V, Elect.          |
| C201  | 352750471              | 4.7 $\mu$ F, 25V, Elect.         |
| C204, C205  | 352741001              | 10 $\mu$ F, 16V, Elect.          |
| C208  | 352780221              | 2.2 $\mu$ F, 50V, Elect.         |
| C209  | 352784791              | 0.47 $\mu$ F, 50V, Elect.        |
| C210  | 352780331              | 3.3 $\mu$ F, 50V, Elect.         |
| C211  | 372325114              | 510pF $\pm$ 5%, 50V, ST          |
| C212, C213  | 352780101              | 1 $\mu$ F, 50V, Elect.           |
| C214  | 352744711              | 470 $\mu$ F, 16V, Elect.         |
|   | <b>Resistor</b>        |                                  |
| R213  | 5225015                | N10HR10KBD, Semi-fixed           |

## PRE., AND MAIN AMPLIFIER PC BOARD (NAAF-683a) - PARTS LIST

| CIRCUIT NO.                                      | PARTS NO.            | DESCRIPTION                                |
|--|----------------------|--|
|  | <b>ICs</b>           |  |
| Q301, Q302,<br>Q401, Q402,<br>Q601, Q602<br>Q905 | 222534               | NJM-4559DX                                 |
|  |                      |  |
|  | 222020               | STK-463                                    |
|  | 222549               | FS-7812                                    |
|  | <b>Transistors</b>   |  |
| Q901, Q904                                       | 2211254              | 2SC1815(Y)                                 |
| Q902   | 2211454              | 2SA1015(Y)                                 |
| Q903   | 2211255              | 2SC1815(GR)                                |
|  | <b>Diodes</b>        |  |
| D901-D904  | 223845               | GP-20D                                     |
| D905, D906,<br>D908                              | 223848               | GP-08B                                     |
| D907   | 223106               | 1S1554                                     |
| D910   | 224089               | BZ-110                                     |
|  | <b>Coil</b>          |  |
| L601, L602                                       | 231001               | S-1.3B                                     |
|  | <b>Capacitors</b>    |  |
| C301, C302                                       | 352780101            | 1 $\mu$ F, 50V, Elect.                     |
| C307, C308                                       | 352734701            | 47 $\mu$ F, 10V, Elect.                    |
| C313, C314                                       | 392884797            | 0.47 $\mu$ F, 50V, LL                      |
| C405, C406                                       | 392884797            | 0.47 $\mu$ F, 50V, LL                      |
| C407, C408                                       | 352780101            | 1 $\mu$ F, 50V, Elect.                     |
| C409, C410                                       | 352742201            | 22 $\mu$ F, 16V, Elect.                    |
| C601, C602                                       | 352750471            | 4.7 $\mu$ F, 25V, Elect.                   |
| C607, C608                                       | 352734701            | 47 $\mu$ F, 10V, Elect.                    |
| C609, C610                                       | 352784701            | 47 $\mu$ F, 50V, Elect.                    |
| C908   | 352782211            | 220 $\mu$ F, 50V, Elect.                   |
| C909, C910                                       | 3504124              | 6,800 $\mu$ F, 40V, Elect.                 |
| C911, C912                                       | 352784701            | 47 $\mu$ F, 50V, Elect.                    |
| C915, C916                                       | 352752211            | 220 $\mu$ F, 25V, Elect.                   |
| C918   | 352741011            | 100 $\mu$ F, 16V, Elect.                   |
| C919   | 352782201            | 22 $\mu$ F, 50V, Elect.                    |
| C920   | 352743301            | 33 $\mu$ F, 16V, Elect.                    |
| C923-C925  | 352781001            | 10 $\mu$ F, 50V, Elect.                    |
| C929   | 352781011            | 100 $\mu$ F, 50V, Elect.                   |
| C930   | 352741001            | 10 $\mu$ F, 16V, Elect.                    |
|  | <b>Resistors</b>     |  |
| R423, R424                                       | 5148036              | N16RGL250KC15,<br>Bass control variable    |
| R431, R432                                       | 5148036              | N16RGL250KC15,<br>Treble control variable  |
| R441   | 5104086              | N16RL50KWTP15,<br>Balance control variable |
| R605, R606                                       | 441521024            | 1k $\Omega$ , 1/2W, Metal oxide film       |
| R607, R708                                       | 441523324            | 3.3k $\Omega$ , 1/2W, Metal oxide film     |
| R611, R612                                       | 451633394            | 0.33 $\Omega$ , 1W, Metal                  |
| R613, R614                                       | 451530474            | 4.7 $\Omega$ , 1/2W, Metal                 |
| R615, R616                                       | 451530684            | 6.8 $\Omega$ , 1/2W, Metal                 |
| R905   | 48114704             | 47 $\Omega$ , 5W, Cement                   |
| R906   | 48151114             | 110 $\Omega$ , 7W, Cement                  |
| R911   | 441521014            | 100 $\Omega$ , 1/2W, Metal oxide film      |
| R915   | 441623314            | 330 $\Omega$ , 1W, Metal oxide film        |
|  | <b>Switches</b>      |  |
| S301-S304  | 25035134             | NPS-422-L99                                |
|  | 25035125             | NPS-122-L90                                |
|  | <b>Relay</b>         |  |
| RL901  | 25065052             | NRL-2P-5A-DC24-04                          |
|  | <b>Plate</b>         |  |
|  | 27300130             |  |
|  | <b>Thermo switch</b> |  |
| S903   | 25065091             | 1P-105A-95                                 |

## PACKING PROCEDURES



To prevent the front panel (S) from opening during shipping, be sure to perform the taping operations as described in packing diagram.

### PACKING PROCEDURES – PARTS LIST 120V model

| REF. NO. | PARTS NO. | DESCRIPTION                   |
|----------|-----------|-------------------------------|
| 1        | 29100033  | 650 × 750mm, Poly bag         |
| 2        | 29095064  | 900 × 400mm, Protection sheet |
| 3        | 29360295  | Label for heatsink            |
| 4        | 282969    | Caution label A (USA)         |
| 5        | 261504    | Tape                          |
| 6        | 29050292A | Carton box                    |
| 7        | 282301    | Sealing hook                  |
| 8        | 29090404A | Pad (R)                       |
| 9        | 29090403A | Pad (L)                       |
| 10       | 293041    | Caution label (USA)           |
| 11       | 13609119  | Accessory bag complete        |
|          | 29365006  | Warranty card (USA)           |
|          | 29358002  | Service station list (USA)    |
|          | 252049    | 4A-T(ST-6), Fuse              |
|          | 292064    | FM antenna                    |
|          | 29340357  | Instruction manual            |
|          | 29100006  | 350 × 250mm, Poly bag         |
|          | 29100002  | 150 × 80mm, Poly bag          |

(USA) : Only U.S.A. model

### PACKING PROCEDURES – PARTS LIST 220V model

| REF. NO. | PARTS NO.  | DESCRIPTION                   |
|----------|------------|-------------------------------|
| 1        | 29100033   | 650 × 750mm, Poly bag         |
| 2        | 29095064   | 900 × 400mm, Protection sheet |
| 3        | 29360317   | Label for heatsink            |
| 5        | 261504     | Tape                          |
| 6        | 29050292A  | Carton box                    |
| 7        | 260012     | Tape                          |
| 8        | 29090404A  | Pad (R)                       |
| 9        | 29090403A  | Pad (L)                       |
| 11       | 13609119   | Accessory bag complete        |
|          | 29365005-2 | Warranty card (G)             |
|          | 252002     | 2A-T, Fuse                    |
|          | 292064     | FM antenna                    |
|          | 29340358   | Instruction manual            |
|          | 29100006   | 350 × 250mm, Poly bag         |
|          | 29100002   | 150 × 80mm, Poly bag          |

(G) : Only Germany model

#### ONKYO CORPORATION

International Division: No. 24 Mori Bldg., 23-5, 3-chome, Nishi-Shinbashi, Minato-ku, Tokyo, Japan  
Telex: 2423551 ONKYO J. Phone: 03-432-6981

#### ONKYO U.S.A. CORPORATION

Eastern Office  
42-07 20th Avenue, Long Island City, New York 11105, U.S.A. Phone: (212) 728-4639  
Midwest Office  
935 Sivert Drive, Wooddale, Illinois 60191, U.S.A. Phone: (312) 595-2970

#### ONKYO DEUTSCHLAND GMBH, ELECTRONICS

8034 München-Germering, Industriestrasse 18, West Germany. Telex: 521726 Telefon: (089)-84-5041