

# SERVICE MANUAL

## PARTS LIST

AT-2650  
MODEL AM-2650

**AKVA**

ALSO APPLICABLE TO BLACK PANEL MODEL

---

SECTION 1

**SERVICE MANUAL**

TABLE OF CONTENTS

|       |  |    |
|-------|--|----|
| I.    | TECHNICAL DATA .....   | 2  |
|       | 1. MODEL AT-2650 .....   | 2  |
|       | 2. MODEL AM-2650 .....   | 3  |
| II.   | DISMANTLING OF UNIT .....  | 4  |
|       | 1. MODEL AT-2650 .....   | 4  |
|       | 2. MODEL AM-2650 .....   | 5  |
| III.  | CONTROLS .....   | 6  |
|       | 1. MODEL AT-2650 .....   | 6  |
|       | 2. MODEL AM-2650 .....   | 7  |
| IV.   | PRINCIPAL PARTS LOCATION .....   | 8  |
|       | 1. MODEL AT-2650 .....   | 8  |
|       | 2. MODEL AM-2650 .....   | 9  |
| V.    | OPERATING PRINCIPLES OF QUADRATURE DETECTION SYSTEM .....                            | 10 |
| VI.   | OPERATING PRINCIPLES OF PLL CIRCUIT EMPLOYED IN<br>STEREO DEMODULATION CIRCUIT ..... | 12 |
|       | 1. PLL CIRCUIT OPERATION .....   | 12 |
|       | 2. STEREO DEMODULATION CIRCUIT .....   | 13 |
| VII.  | OPERATING PRINCIPLES OF FM NOISE CANCELLER CIRCUIT .....                             | 15 |
|       | 1. BASIC CIRCUIT FOR PULSE NOISE SUPPRESSION .....                                   | 15 |
|       | 2. OPERATION PRINCIPLE WITH STEREO SIGNALS .....                                     | 15 |
|       | 3. ADJUSTMENT METHOD FOR THE PILOT SIGNAL GENERATING CIRCUIT .....                   | 16 |
| VIII. | LEVEL DIAGRAM .....  | 17 |
| IX.   | TUNER ADJUSTMENT (AT-2650) .....   | 18 |
|       | 1. FM TUNER SECTION ADJUSTMENT .....   | 19 |
|       | 2. AM TUNER SECTION ADJUSTMENT .....   | 20 |
| X.    | AMPLIFIER ADJUSTMENT (AM-2650) .....   | 21 |
|       | 1. IDLING CURRENT ADJUSTMENT .....   | 21 |
|       | 2. LEVEL METER INDICATION ADJUSTMENT .....   | 22 |
| XI.   | TUNING CORD THREADING .....  | 23 |
| XII.  | CLASSIFICATION OF VARIOUS P.C BOARDS .....   | 24 |
|       | 1. P.C BOARD TITLE AND IDENTIFICATION NUMBER .....                                   | 25 |
|       | 2. MODEL AT-2650 COMPOSITION OF VARIOUS P.C BOARDS .....                             | 28 |
|       | 3. MODEL AM-2650 COMPOSITION OF VARIOUS P.C BOARDS .....                             | 52 |
|       | <b>SCHEMATIC DIAGRAM</b>   |    |

For basic adjustments, measuring methods, and operating principles, refer to GENERAL TECHNICAL MANUAL.

# I. TECHNICAL DATA

## 1. MODEL AT-2650

### FM TUNER SECTION

|                              |   |
|------------------------------|---|
| FREQUENCY RANGE              | 87.5 MHz to 108 MHz   |
| SENSITIVITY (IHF)            | 1.6 $\mu$ V   |
| CAPTURE RATIO                | 1.2 dB  |
| SELECTIVITY (IHF)            | More than 80 dB   |
| IMAGE REJECTION              | More than 110 dB (98 MHz)                                     |
| IF REJECTION                 | More than 110 dB (98 MHz)                                     |
| SPURIOUS REJECTION           | More than 110 dB (98 MHz)                                     |
| AM SUPPRESSION               | 55 dB   |
| SIGNAL TO NOISE RATIO        | 75 dB   |
| HARMONIC DISTORTION          | MONO<br>STEREO  |
|                              | Less than 0.1% (100% modulation)                              |
|                              | Less than 0.15% (100% modulation)                             |
| FM STEREO FREQUENCY RESPONSE | 20 Hz to 15 kHz +1 dB, -3 dB                                  |
| MUTING                       | Level Control (1 $\mu$ V to 100 $\mu$ V)/Switchable to ON-OFF |
| STEREO SEPARATION            | More than 45 dB (1 kHz)                                       |
| SUB CARRIER SUPPRESSION      | More than 65 dB   |
| OUTPUT VOLTAGE               | Controllable from 0 mV to 2V (100% modulation)                |
| ANTENNA INPUT IMPEDANCE      | 300 ohms balanced, 75 ohms unbalanced                         |

### AM TUNER SECTION

|                       |   |
|-----------------------|---|
| FREQUENCY RANGE       | 520 kHz to 1,605 kHz                                      |
| SENSITIVITY (IHF)     | 80 $\mu$ V/m (bar antenna), 13 $\mu$ V (external antenna) |
| SELECTIVITY (IHF)     | More than 30 dB   |
| IMAGE REJECTION       | More than 80 dB (1,000 kHz)                               |
| IF REJECTION          | More than 70 dB   |
| SIGNAL TO NOISE RATIO | More than 50 dB   |
| OUTPUT VOLTAGE        | Controllable from 0 mV to 2V                              |
| ANTENNA               | Built-in ferrite bar antenna                              |

### MISCELLANEOUS

|                    |  |
|--------------------|--|
| SEMICONDUCTORS     | Transistors: 12, Diodes: 15, FETs: 3, ICs: 5   |
| POWER REQUIREMENTS | 120V, 60 Hz for U.S.A. and Canada<br>220V, 50 Hz for Europe except UK and Australia<br>240V, 50 Hz for UK and Australia<br>110V/220V/240V, 50/60 Hz internally switchable for other countries. |
| DIMENSIONS         | 440 (W) x 144 (H) x 368 (D) mm, (17.3 x 5.7 x 14.5")   |
| WEIGHT             | 7.5 kg (16.5 lbs)  |

\* For improvement purposes, specifications and design are subject to change without notice.

## 2. MODEL AM-2650

### POWER AMPLIFIER SECTION

|  |  |
|--|--|
| RATED OUTPUT POWER<br>2-CHANNELS DRIVEN  | 65 watts per channel, minimum RMS, at 8 ohms from 20 to 20,000 Hz with no more than 0.08% total harmonic distortion    |
| POWER BANDWIDTH (IHF)                    | 6 Hz to 60 kHz / 8 ohms (Total Harmonic Distortion: 0.08%)<br>6 Hz to 60 kHz/8 ohms (Total Harmonic Distortion: 0.08%) |
| SIGNAL TO NOISE RATIO (IHF) PHONO<br>AUX | Better than 75 dB<br>Better than 95 dB   |
| RESIDUAL NOISE                           | Less than 0.5 mV at 8 ohms   |
| CHANNEL SEPARATION (IHF) PHONO           | Better than 55 dB at 1,000 Hz  |
| DAMPING FACTOR                           | More than 30 (1 kHz, 8 ohms)   |
| OUTPUT<br>SPEAKERS<br>HEADPHONE          | A, B (4 to 16 ohms)/A+B (8 to 16 ohms)<br>4 to 16 ohms   |

### PREAMPLIFIER SECTION

|   |   |
|---|---|
| INPUT SENSITIVITY/IMPEDANCE<br>PHONO<br>AUX<br>TUNER<br>TAPE MONITOR        | PHONO 1: 3 mV/33/47/100 kohms<br>PHONO 2: 3 mV/47 kohms<br>150 mV/100 kohms<br>150 mV/100 kohms<br>PIN: 150 mV/100 kohms, DIN: 150 mV/100 kohms |
| OUTPUT LEVEL/IMPEDANCE<br>TAPE REC  | PIN: 150 mV/1 kohms, DIN: 30 mV/30 kohms  |
| FREQUENCY RESPONSE<br>PHONO (RIAA EQUALIZATION)<br>TUNER, AUX, TAPE MONITOR | 30 Hz to 15 kHz +1 dB, -1 dB<br>10 Hz to 60 kHz +1 dB, -1 dB  |
| TONE CONTROL<br>BASS<br>TREBLE  | ±9 dB at 100 Hz<br>±9 dB at 10 kHz  |
| LOUDNESS CONTROL  | +10 dB at 100 Hz, +5 dB at 10 kHz<br>(Volume control set at -30 dB position)  |
| FILTER<br>HIGH<br>LOW   | -3 dB at 10 kHz<br>-3 dB at 30 Hz   |
| AUDIO MUTE  | -20 dB attenuation  |

### MISCELLANEOUS

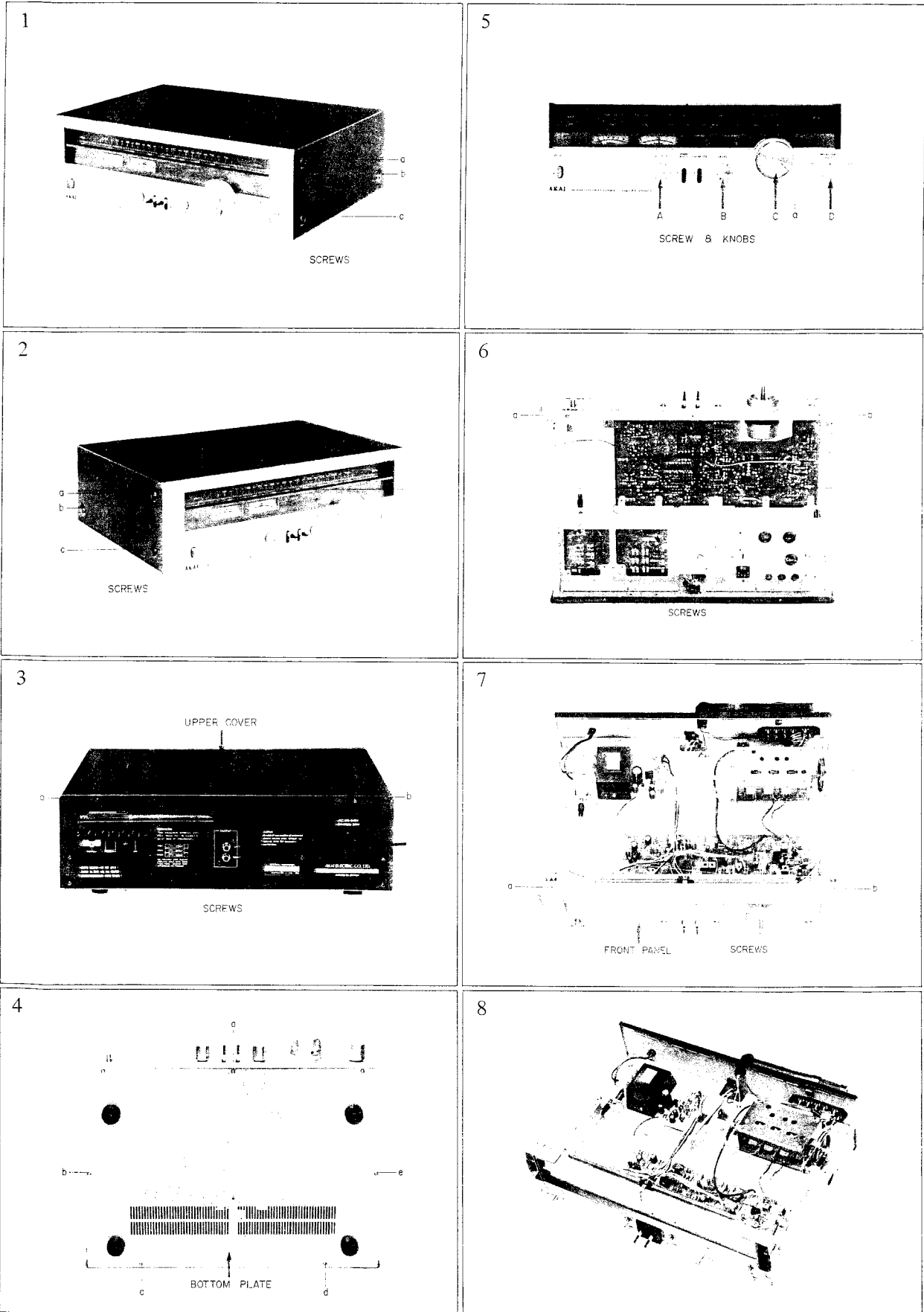
|                    |   |
|--------------------|---|
| SEMICONDUCTORS     | Transistors: 33, Diodes: 17, ICs: 4   |
| POWER REQUIREMENTS | 120V, 60 Hz for U.S.A. and Canada<br>220V, 50 Hz for Europe except UK and Australia<br>240V, 50 Hz for UK and Australia<br>110V/220V/240V, internally switchable, 50/60 Hz for other countries. |
| DIMENSIONS         | 440 (W) x 144 (H) x 345 (D) mm, (17.3 x 5.7 x 13.6")  |
| WEIGHT             | 10.9 kg (23.5 lbs)  |

\* For improvement purposes, specifications and design are subject to change without notice.

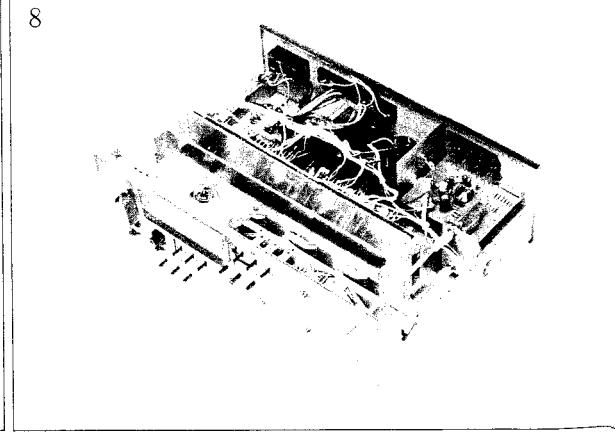
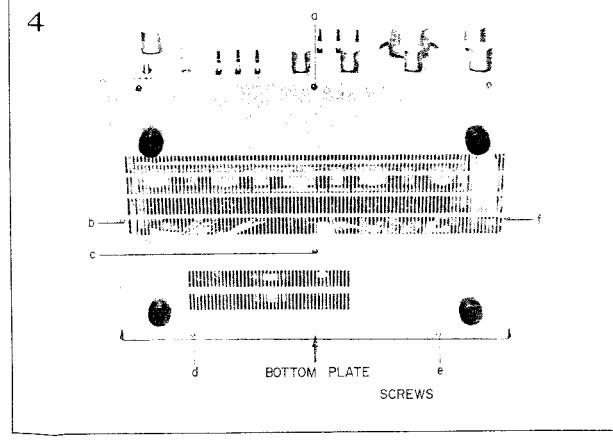
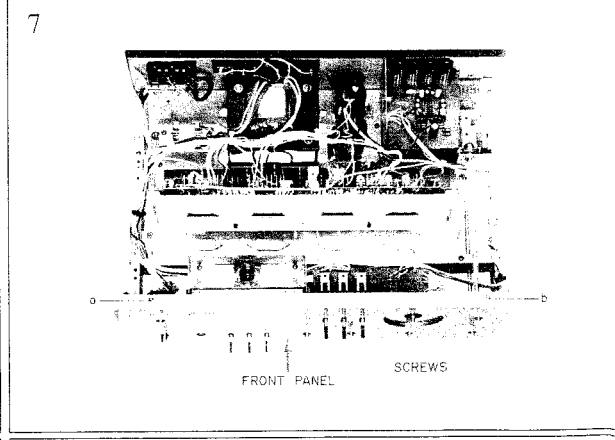
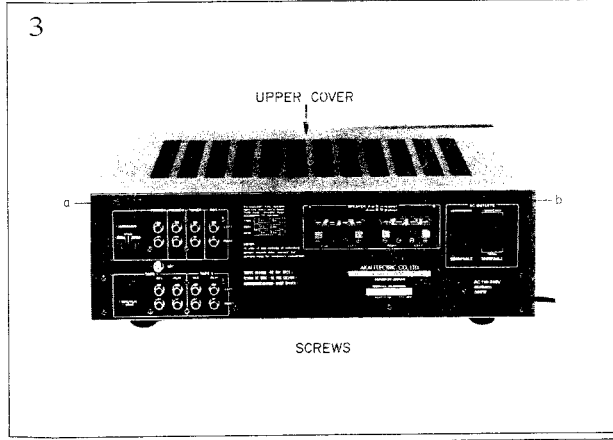
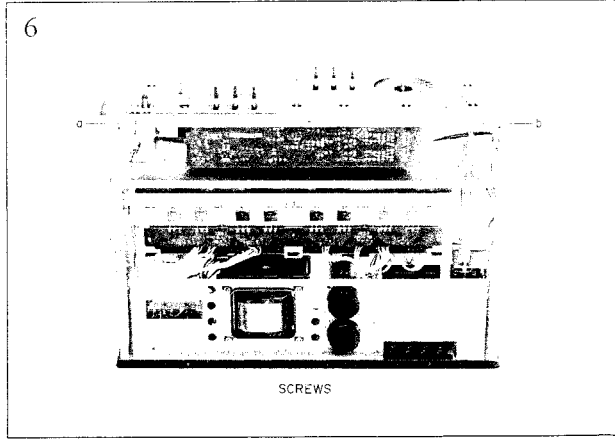
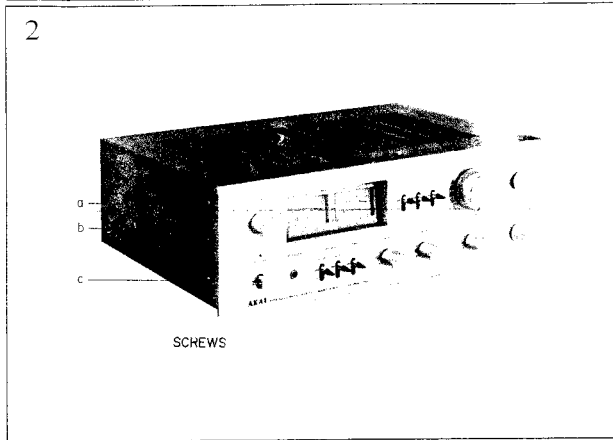
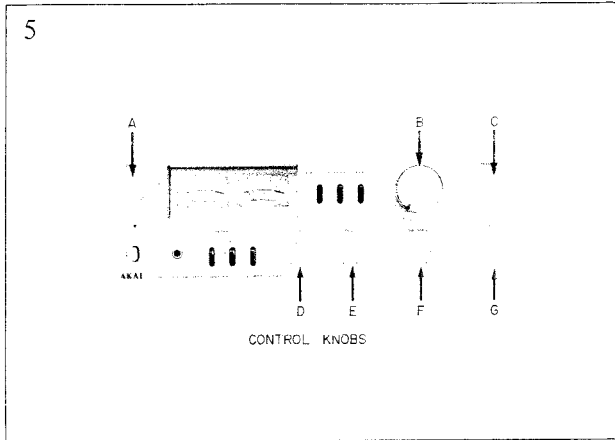
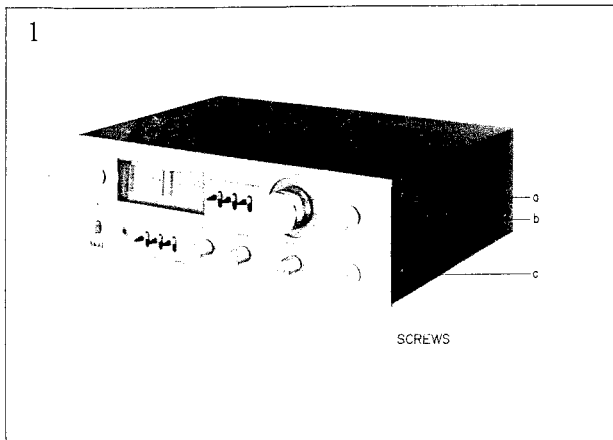
## II. DISMANTLING OF UNIT

### 1. MODEL AT-2650

In case of trouble, etc. necessitating dismantling, please dismantle in the order shown in the photographs. Reassemble in reverse order.



2. MODEL AM-2650



### III. CONTROLS

#### 1. MODEL AT-2650

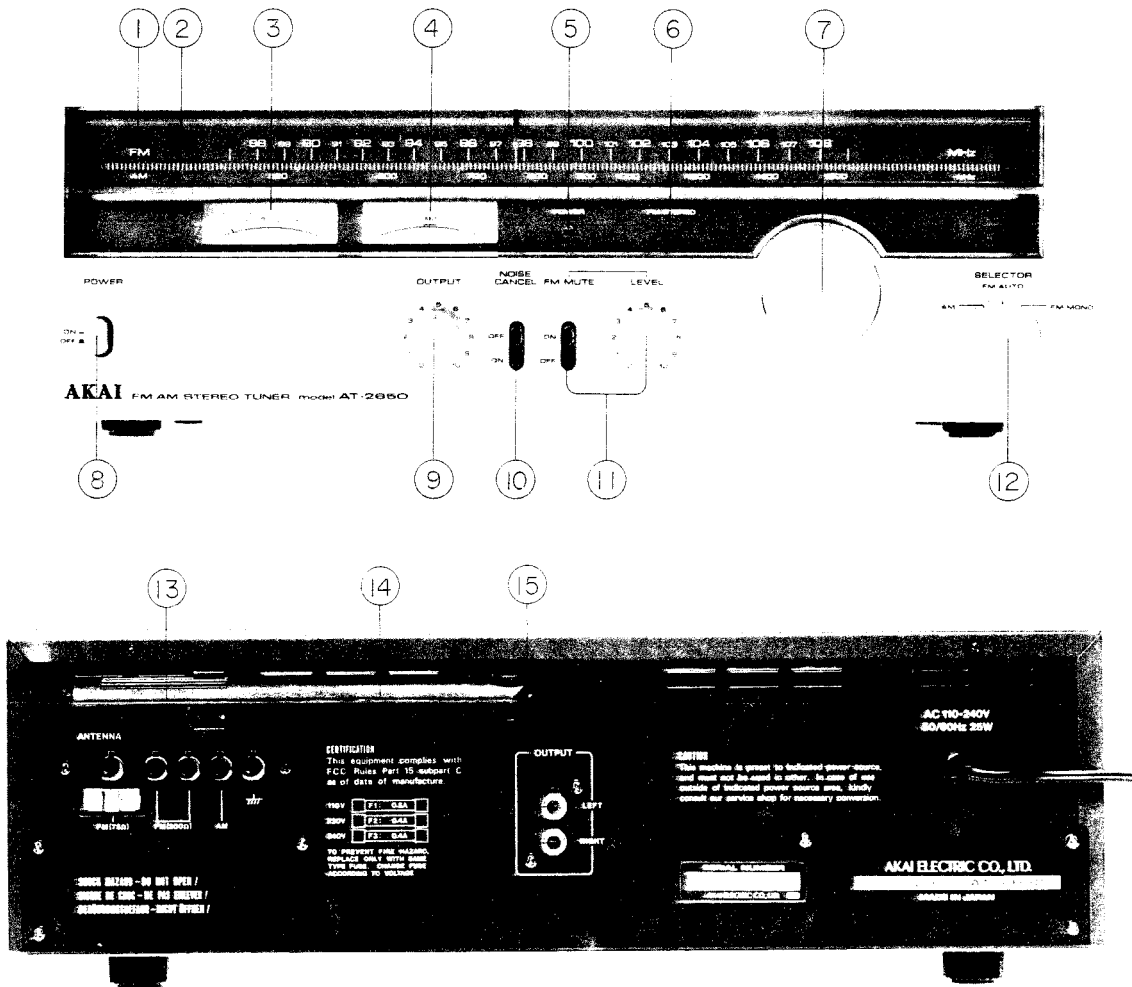


Fig. 1 Controls AT-2650

1. FM DIAL SCALE
2. AM DIAL SCALE
3. SIGNAL STRENGTH METER
4. FM TUNING METER
5. POWER INDICATOR LAMP
6. FM STEREO INDICATOR LAMP
7. TUNING KNOB
8. POWER SWITCH
9. OUTPUT LEVEL CONTROL
10. NOISE CANCEL SWITCH
11. FM MUTE SWITCH and LEVEL ADJUSTER
12. INPUT SELECTOR
13. ANTENNA TERMINALS
14. AM FERRITE BAR ANTENNA
15. OUTPUT TERMINALS

## 2. MODEL AM-2650

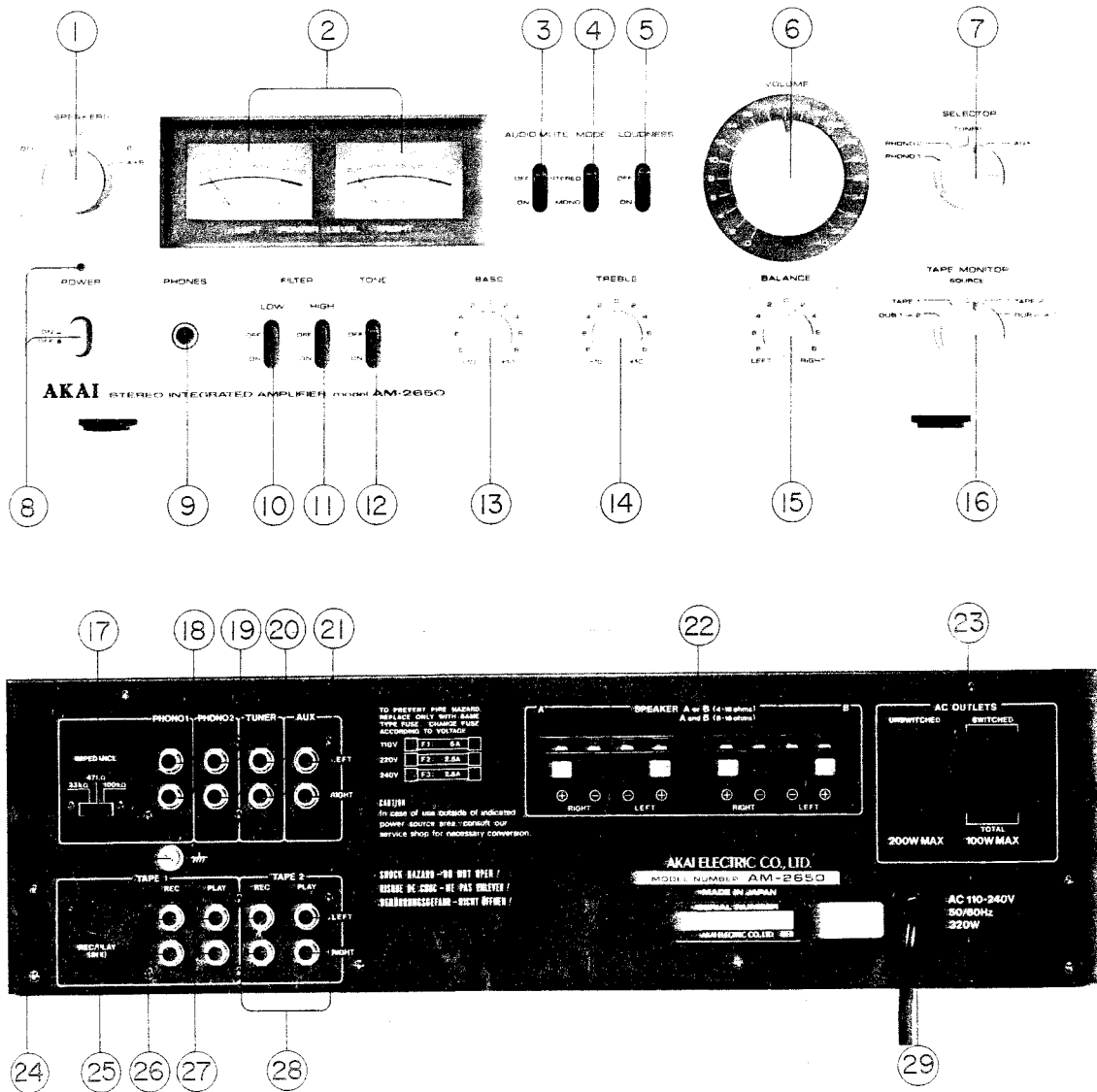


Fig. 2 Controls AM-2650

1. SPEAKER SYSTEM SELECTOR
2. OUTPUT POWER LEVEL METERS (Left and Right)
3. AUDIO MUTE SWITCH
4. MODE SWITCH
5. LOUDNESS SWITCH
6. VOLUME CONTROL
7. INPUT SELECTOR
8. POWER SWITCH and POWER INDICATOR LAMP
9. HEADPHONE JACK
10. LOW FILTER SWITCH
11. HIGH FILTER SWITCH
12. TONE SWITCH
13. BASS TONE CONTROL
14. TREBLE TONE CONTROL
15. STEREO BALANCE CONTROL
16. TAPE MONITOR SWITCH
17. IMPEDANCE SWITCH
18. PHONO 1 TERMINALS
19. PHONO 2 TERMINALS
20. TUNER TERMINALS
21. AUX TERMINALS
22. A and B SYSTEM SPEAKER TERMINALS
23. EXTRA AC OUTLETS (some models not equipped with this facility)
24. GROUND TERMINAL
25. TAPE 1 SYSTEM DIN JACK
26. TAPE 1 SYSTEM REC JACKS
27. TAPE 1 SYSTEM PLAY JACKS
28. TAPE 2 SYSTEM REC/PLAY JACKS
29. AC CORD (AC Inlet for UK and some other countries)

# IV. PRINCIPAL PARTS LOCATION

## 1. MODEL AT-2650

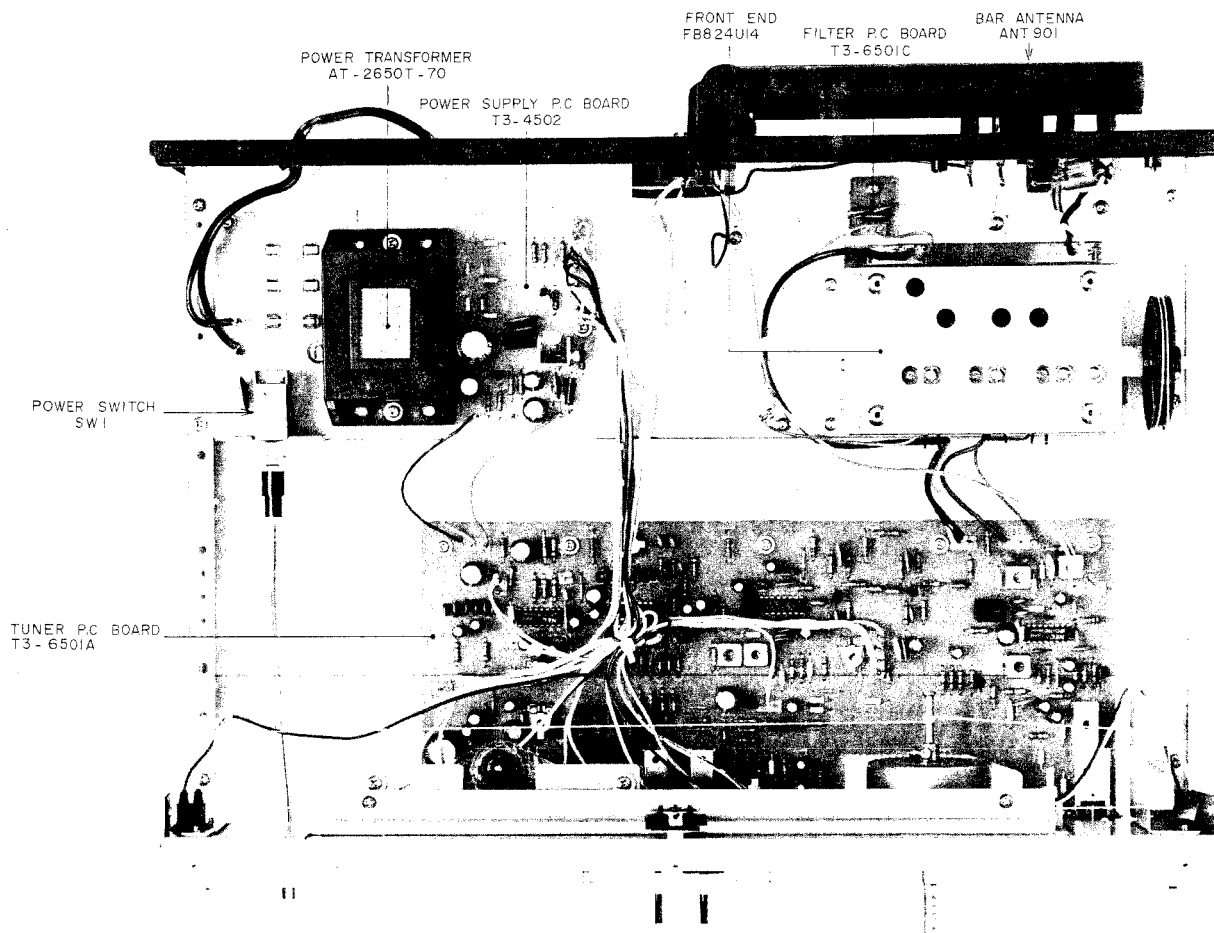


Fig. 3 Top View

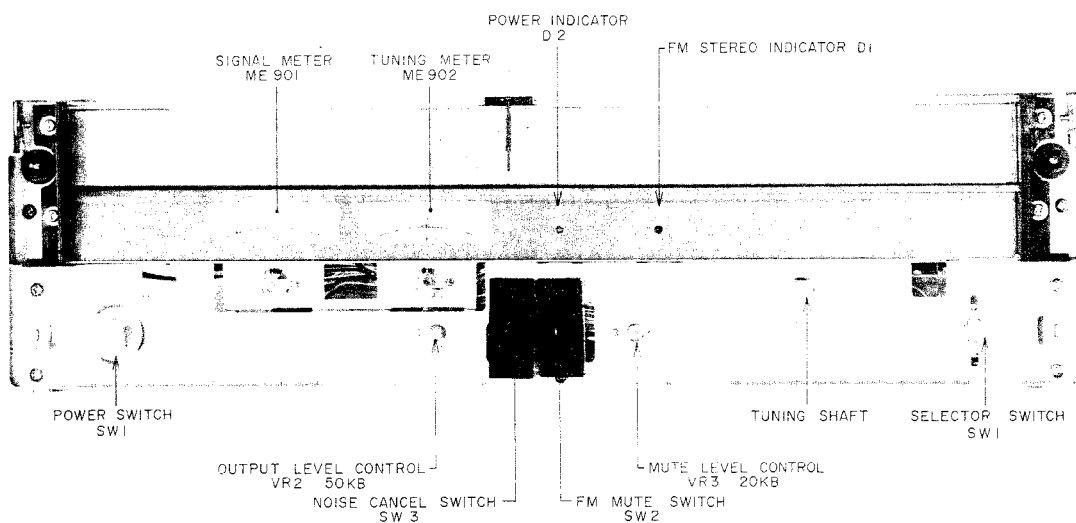


Fig. 4 Front View

2. MODEL AM-2650

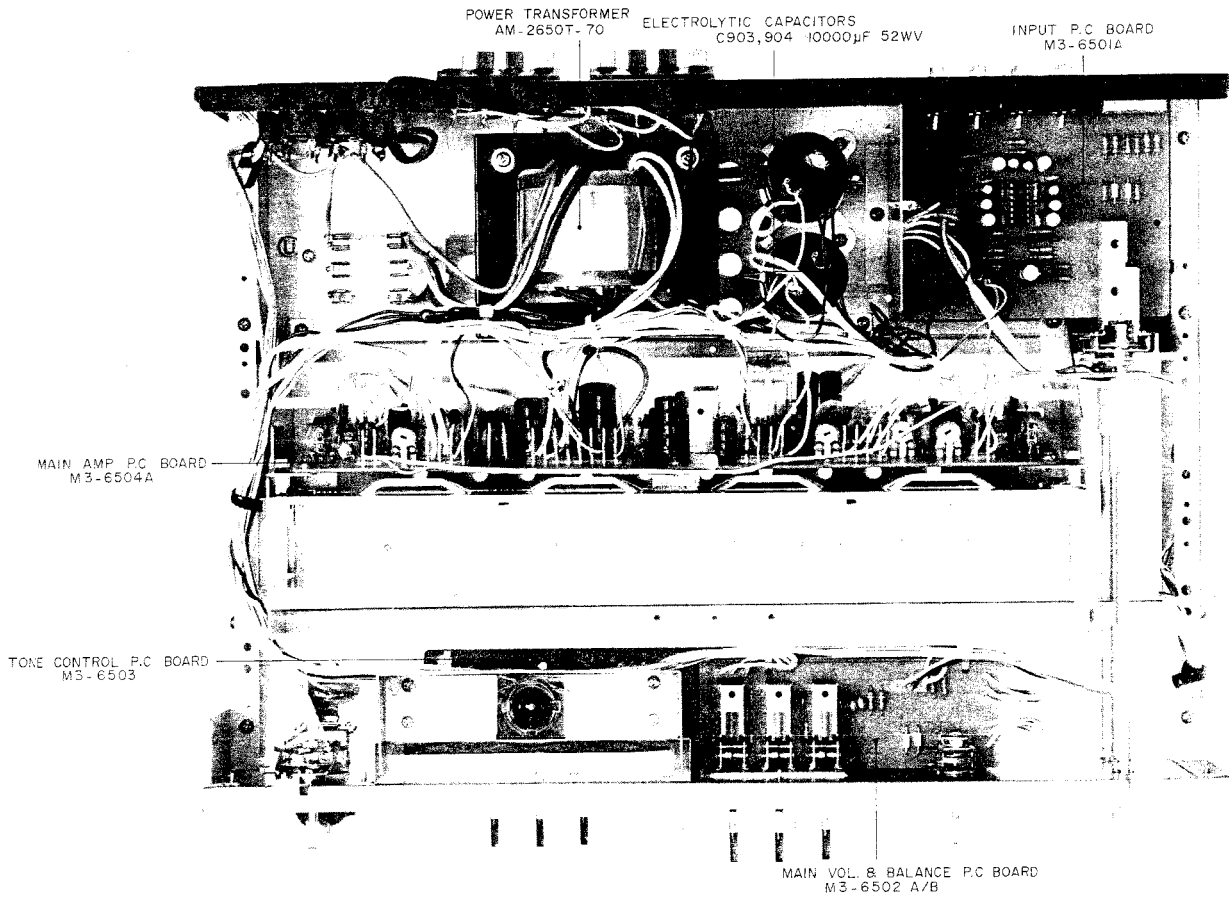


Fig. 5 Top View

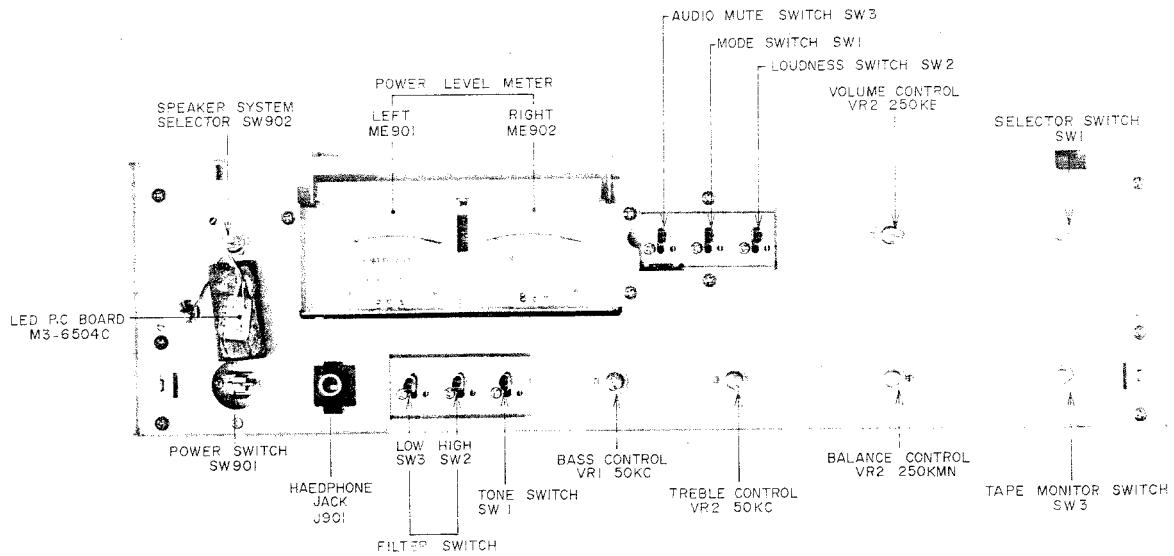


Fig. 6 Front View

# V. OPERATING PRINCIPLES OF QUADRATURE DETECTION SYSTEM

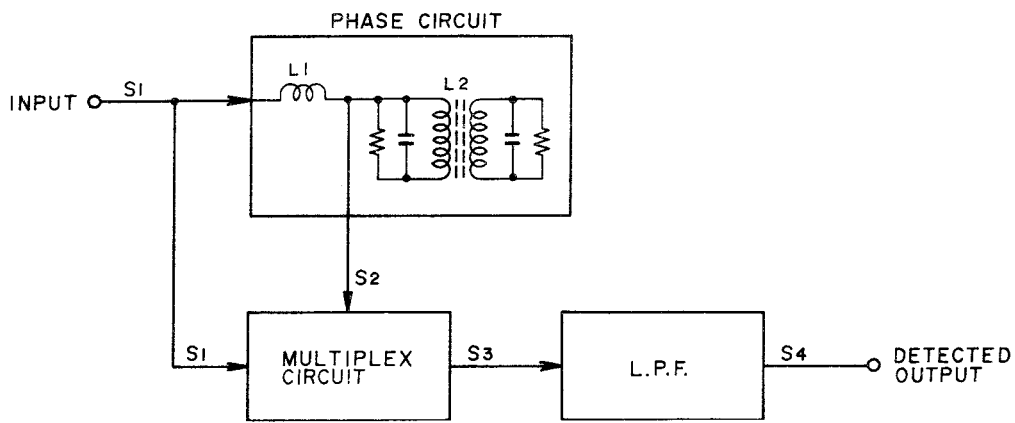


Fig. 7 Quadrature Detection Block Diagram

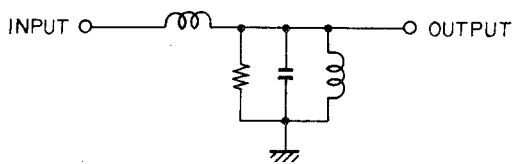


Fig. 8 Single Tuning Type

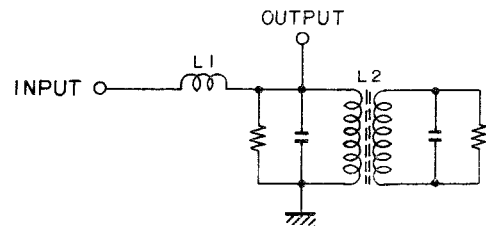


Fig. 9 Double Tuning Type

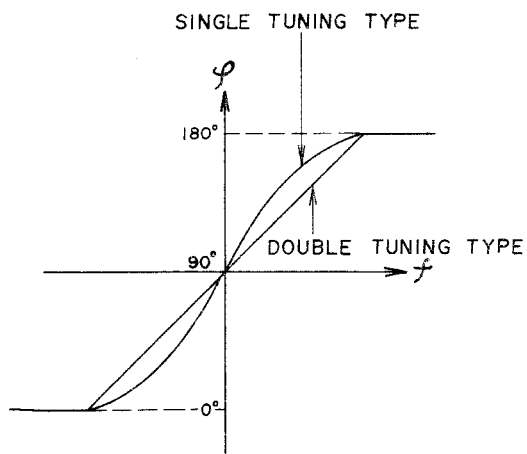


Fig. 10 Tuning Curve

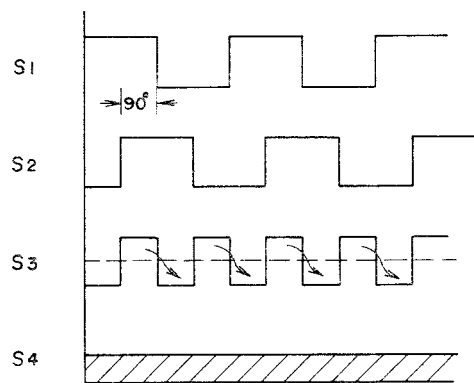


Fig. 11 Output at Non-modulation

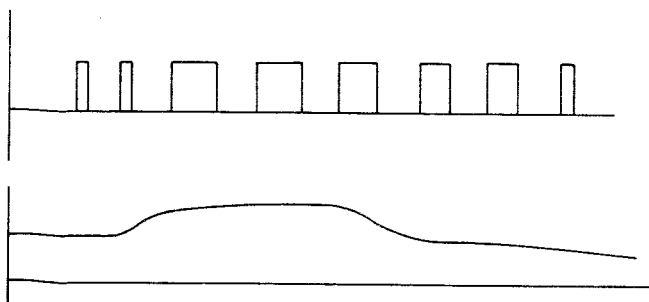


Fig. 12 Output at Modulation Time

---

The Quadrature Detection Circuit is comprised of a Phase Circuit, a Multiplier Circuit and a Low Pass Filter (L.P.F.) as shown in Fig. 7.

There are two types of Phase Circuits, the Single tuning type shown in Fig. 8 and the Double tuning type shown in Fig. 9. However, because with the double tuning type there is less frequency deviation in relation to carrier frequency, linearity is improved as shown in Fig. 10 and phase distortion is reduced, this type of phase circuit is employed in the AT-2650.

Input signal S1 is divided into the part which enters the direct multiplier circuit and the part which passes the phase circuit and enters the multiplier circuit. The signal supplied to the phase circuit is always  $90^\circ$  phase delayed at L1. Also because at Non-modulation time, L2 is tuned to 10.7 MHz, if modulation is applied and S1 is changed from 10.7 MHz, phase deviation at L2 will take place proportionately in relation to this changed part and this becomes S2 signal which is delayed in relation to S1.

At Non-modulation, because as shown in Fig. 11, the input signal S1 and  $90^\circ$  phase delayed (by means of L1) signal S2 are switched by means of the multiplier circuit, the output signal becomes S3.

Because this S3 passes the low pass filter and becomes S4 fixed direct current, the detector output is zero. Then, when modulation is applied, because the switched output is varied according to the degree of modulation, and the output which passed the low pass filter becomes the pulsating current part as shown in Fig. 12, detector output is obtained.

## VI. OPERATING PRINCIPLES OF PLL CIRCUIT EMPLOYED IN STEREO DEMODULATION CIRCUIT

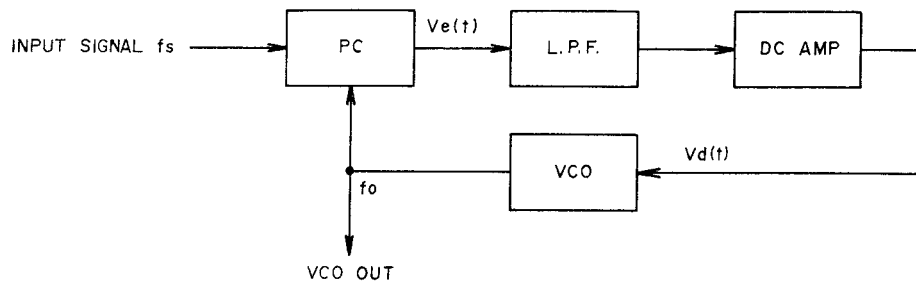


Fig. 13 PLL Circuit

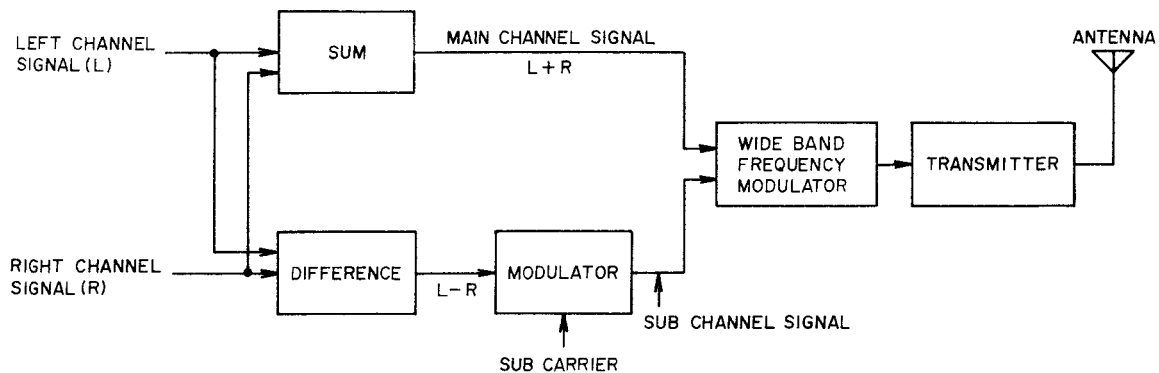


Fig. 14 FM Broadcasting System Diagram

To separate the FM stereo broadcast signal received to date into left and right signals, a 19 kHz pilot signal was successively multiplied to form a 38 kHz signal and stereo separation was effected from this. However, with this multiplier system, change in coils due to wear occurred and adjustment points were numerous, etc. Therefore, this model employs a newly developed PLL circuit which produces an exceedingly accurate 38 kHz switching signal.

### 1. PLL CIRCUIT OPERATION

PLL circuit is a kind of feedback circuit and is comprised of a Phase Comparator (PC), a Low Pass Filter (LPF), a Direct Current Amplifier (DC Amp) and a Voltage Control Oscillator (VCO) as shown in Fig. 13. The PC compares input signal  $F_s$  and VCO oscillator output and generates the difference in signal voltage  $V_e(t)$  proportionately to this phase deviation. This  $V_e(t)$  passes LPF and the DC Amp and becomes control voltage. This control voltage supplied to VCO and VCO oscillation frequency is DC controlled. When there is no input signal  $F_s$ , because there is also no  $V_e(t)$ , control voltage  $V_d(t)$  becomes zero, and VCO maintains a \*Free-running oscillation frequency. When a signal enters, VCO oscillation frequency  $F_o$  is controlled to narrow the difference between  $F_s$  by means of feedback as described above, and the PLL circuit assumes a synchronous condition. This is referred to as input signal lock. (When the difference between  $F_o$  and  $F_s$  is too large, the differential signal frequency becomes

high and is reduced at the LPF. However, because the VCO control voltage does not change, PLL will not stay within the \*lock range).

Because of the ability of the signal interference removing LPF to accumulate the previous voltage when the PLL deviates from within the lock range due to certain interference, the original condition is quickly reinstated.

\* Free running frequency: Oscillating frequency when there is no input signal.

\* Lock range: At the condition in which the VCO oscillation frequency is locked to the input signal, the lock range is the oscillating frequency in which when the input signal changes, the PLL maintains its input signal lock condition.

Accordingly, in case  $F_s$  is changed inside the PLL lock range, VCO oscillation frequency always follows this, and a no frequency deviation and no phase difference signal is obtained. In other words, VCO oscillation frequency can be locked to  $F_s$ .

## 2. STEREO DEMODULATION CIRCUIT

As shown in Fig. 14 for FM broadcasts, the sum signal (L+R) consists of left signal (L) and right signal (R) and the audio frequency band of this signal in its original form is frequency modulated.

On the other hand, the difference signal of both (L-R) is changed to high frequency through the use of the sub carrier, and is referred to as the sub channel signal. The carrier is further frequency modulated and sent to the FM stereo transmitter.

Accordingly, for composite stereo signal demodulation, the sub carrier used for demodulation at the transmitter must be the same uniform 38 kHz signal as the frequency and phase. If the 38 kHz waveform is asymmetrical, channel separation will become poor. At the PLL employed MPX stereo demodulator circuit, as shown in Fig. 13 first a 76 kHz signal is oscillated and when this passes the divider, a symmetrical 38 kHz signal is obtained.

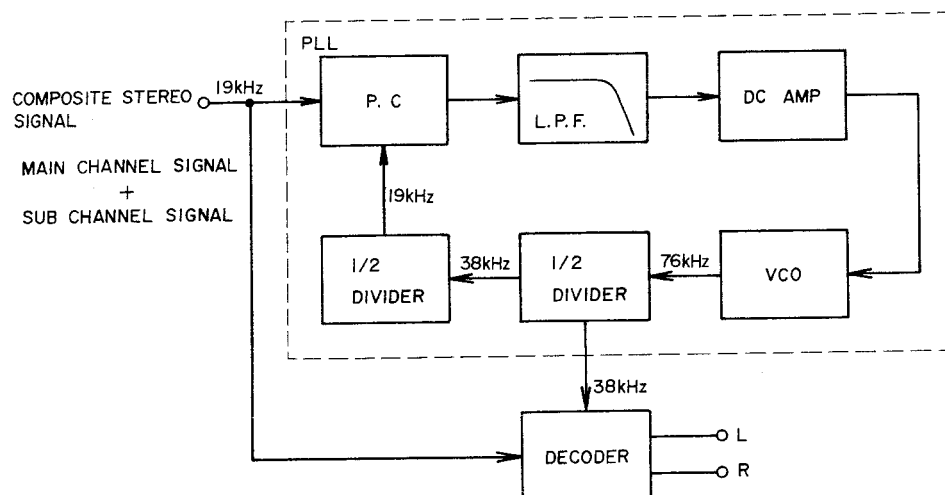


Fig. 15 MPX IC Function

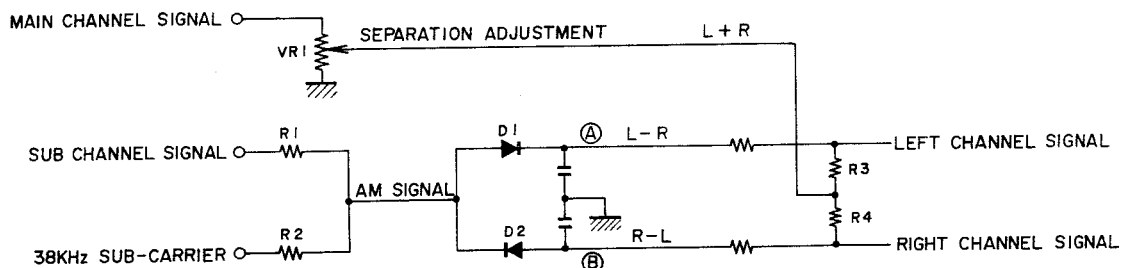


Fig. 16 Multiplex Decoder

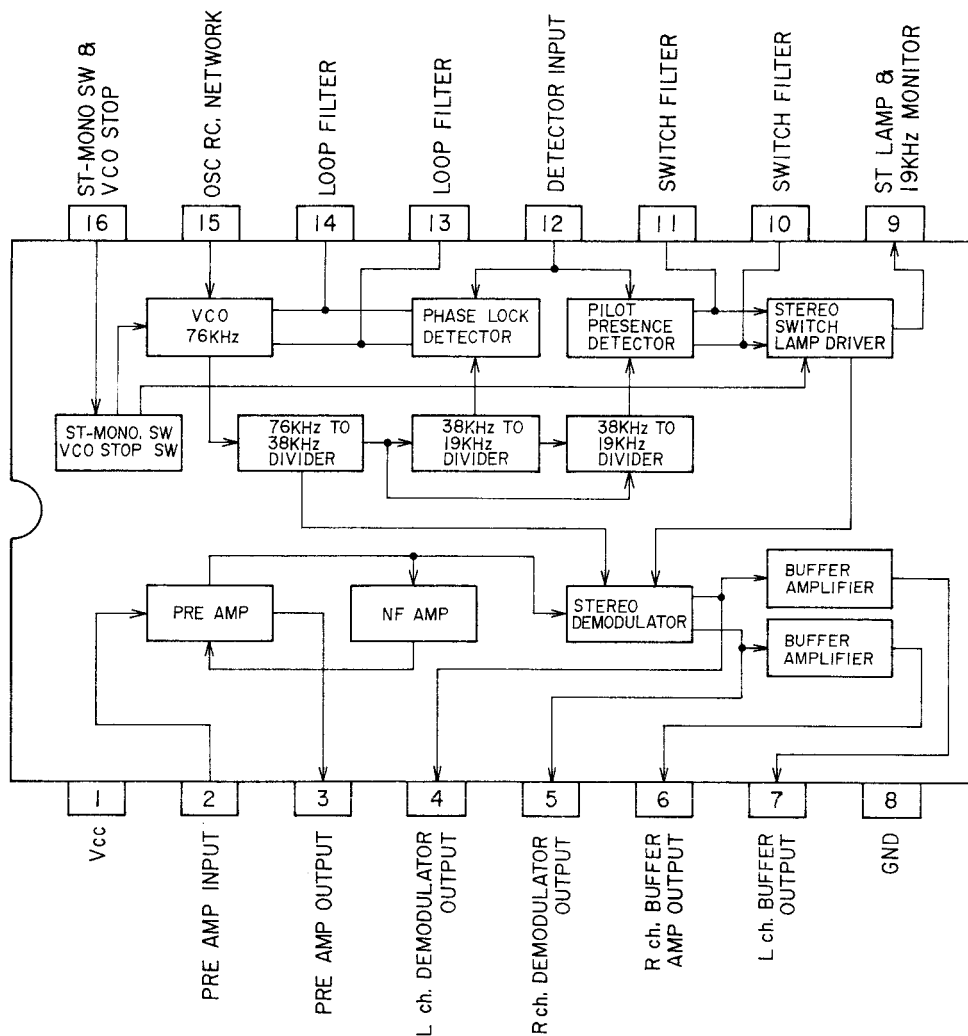


Fig. 17  $\mu$ PC1173C Block Diagram

This 38 kHz sub carrier is supplied to the multiplex decoder together with the sub channel of the composite stereo signal. At the multiplex decoder, left and right channel audio signals are separated in order as shown in Fig. 16.

The 38 kHz sub carrier composited with the sub channel signal of which the carrier part was removed when sub channel signal and sub carrier passed R1, R2 produces the regular AM wave. Then, because this envelop is detected by mutually reverse polarity connected diodes D1 and D2, L-R signal is emitted at point  $\textcircled{A}$  and R-L signal at point  $\textcircled{B}$ .

Also, because the main channel signal (L+R) is supplied to R3, R4 center point,  $\textcircled{A}$  $\textcircled{B}$  point voltage is added and subtracted and becomes

$$(L+R) + (L-R) = 2L \text{ (left channel)}$$

$$(L+R) + (R-L) = 2R \text{ (right channel)}$$

The level of the main channel signal (L+R) can be adjusted by means of the variable resistor VR (VR1) for optimum separation.

However, please refer to Fig. 17 for the Block Diagram of PLL IC  $\mu$ PC1173C used in the model AT-2650.

## VII. OPERATING PRINCIPLES OF FM NOISE CANCELLER CIRCUIT

IC LA2100 used in this model is a monolithic IC for FM noise canceller use. Situated between the FM detector and the stereo demodulator, this circuit features effective elimination of pulsive external noise such as engine noise.

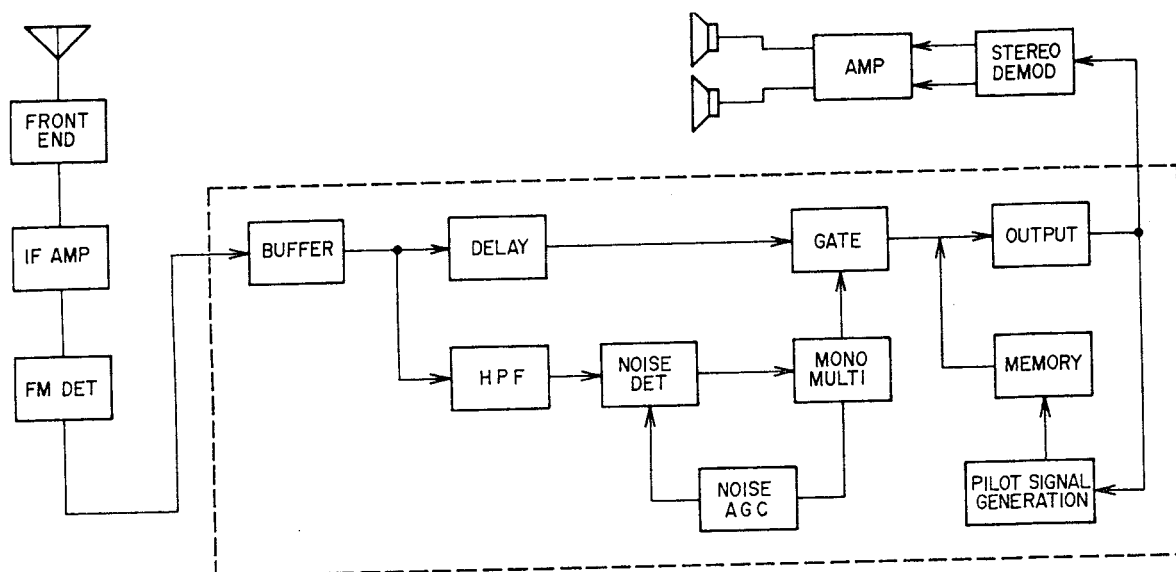


Fig. 18 Function Structure LA2100

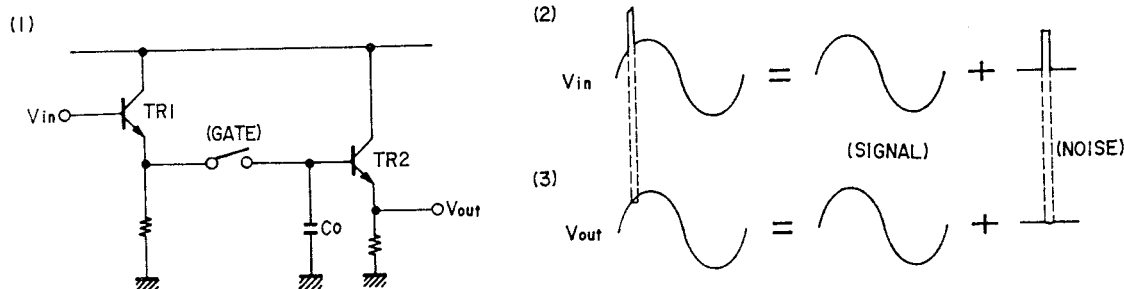


Fig. 19 Basic circuit for pulse noise suppression and wave forms

### 1. BASIC CIRCUIT FOR PULSE NOISE SUPPRESSION

The composition of LA2100 is made up of a gate circuit and a holding condenser to eliminate pulse noise.

When the gate is closed as in Fig. 19(1), condenser  $C_o$  is driven by a low impedance (emitter follower TR1) and therefore the output signal is the same as the  $V_{in}$  input.

When pulse noise enters, the gate opens immediately, and condenser  $C_o$  maintains the signal level prior to noise input. When the noise stops, the gate closes and the wave form returns to normal. The output wave form  $V_{out}$  becomes similar to the wave form of Fig. 19(3). In terms of noise alone, it means that the noise (2) is suppressed as in (3).

### 2. OPERATION PRINCIPLE WITH STEREO SIGNALS

When the aforementioned circuit is used on the stereo signals, the pilot signal is cut out while the gate is open and distorts the stereo composite signal to generate irritating noise. To prevent this distortion, during the time gate is open a 19 kHz sine wave of the same amplitude and phase as that of the pilot signal is generated from the pilot signal generating circuit (19 kHz sine wave generating circuit). This is added to the holding condenser Fig. 19(1) electric potential while the gate is open and compensates the pilot signal.

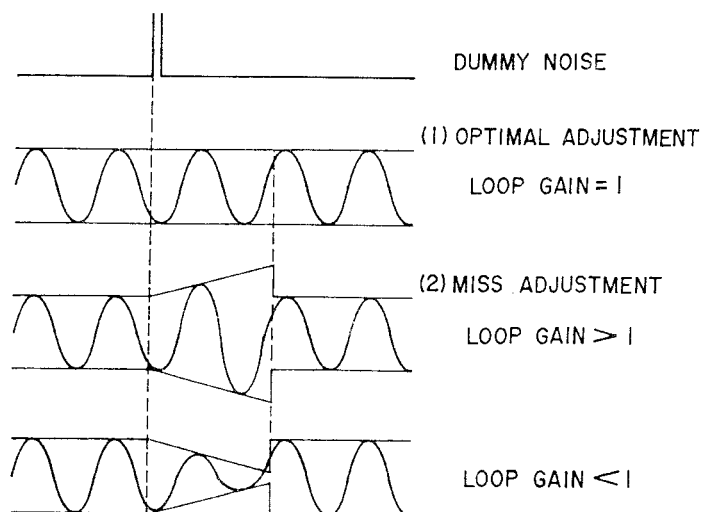


Fig. 20 Pilot signal generating circuit adjustment and pin wave form (non-modulated stereo signal)

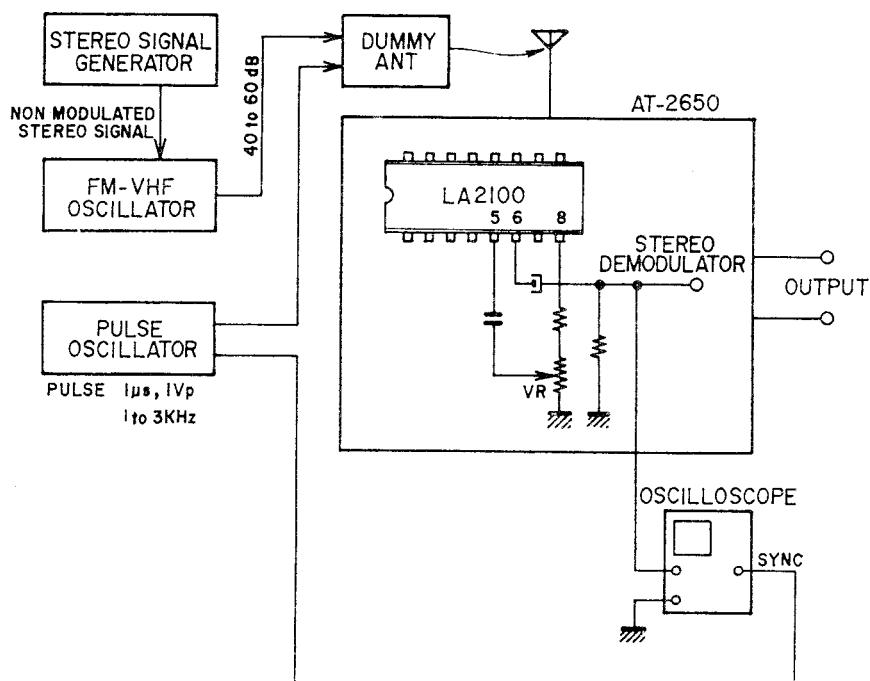


Fig. 21 Pilot signal generating circuit adjustment method

### 3. ADJUSTMENT METHOD FOR THE PILOT SIGNAL GENERATING CIRCUIT

(Refer to Figs. 20, 21 and 23)

To compensate the pilot signal, the 19 kHz sine wave amplitude must be equal to the amplitude before the gate is opened. To do this, set the loop gain of the pilot signal generating circuit to 1 with the adjustment volume as in Fig. 20 (1).

Actual adjustment involves the following: make con-

nections as in Fig. 21 and switch the noise cancel switch on. Oscillate non modulated stereo signal and pulse, and observe the wave forms on the oscilloscope. Next, adjust the adjustment volume VR5 5 kΩ so that the amplitude at the gate is equal to the amplitude before and after.

Although the adjustment can be made as above, it has been fully adjusted at the factory and should not need readjustment unless it has been touched otherwise.

# VIII. LEVEL DIAGRAM

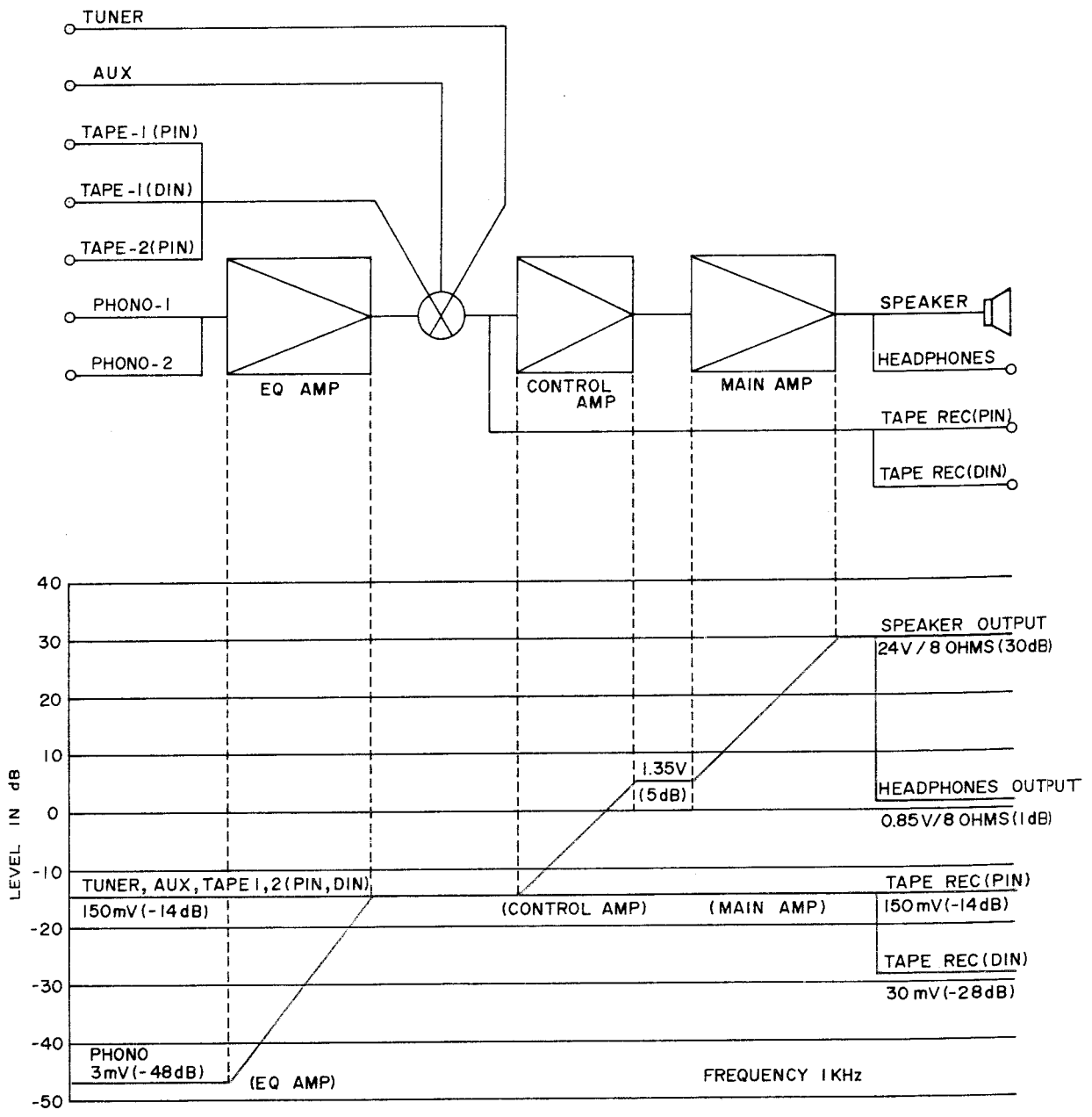


Fig. 22 Level Diagram AM-2650

# IX. TUNER ADJUSTMENT (AT-2650)

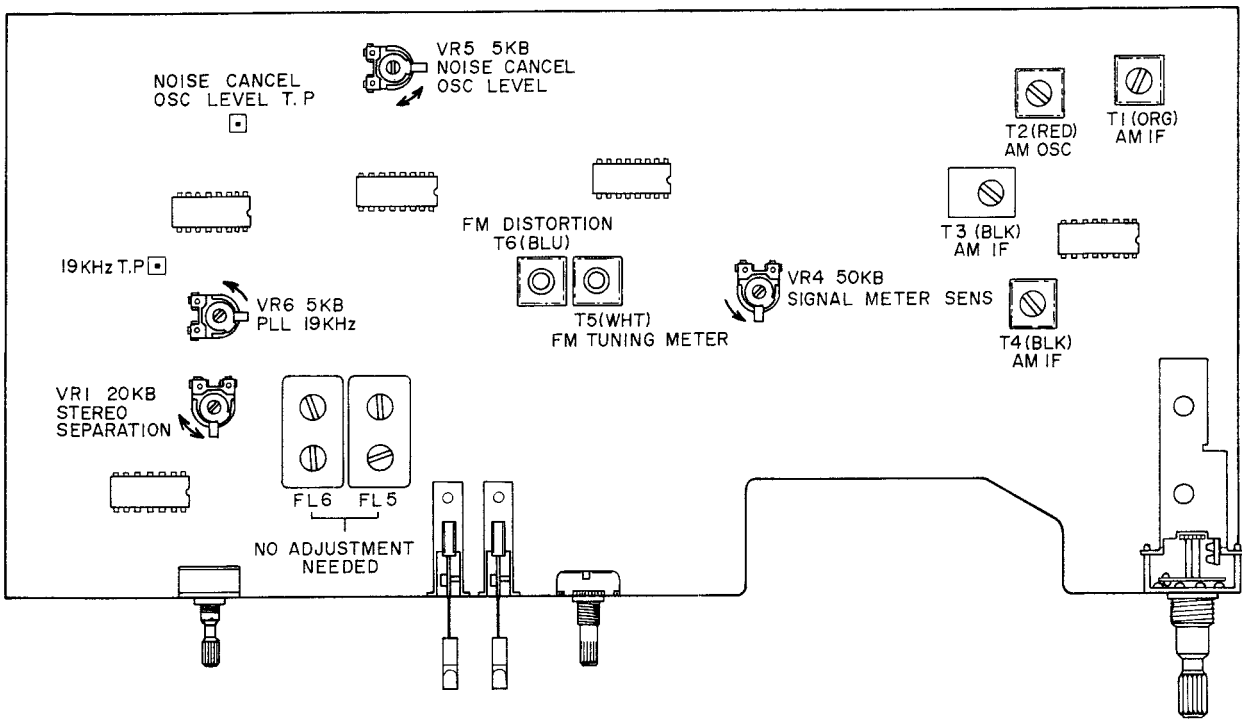


Fig. 23 Tuner P.C Board T3-6501A

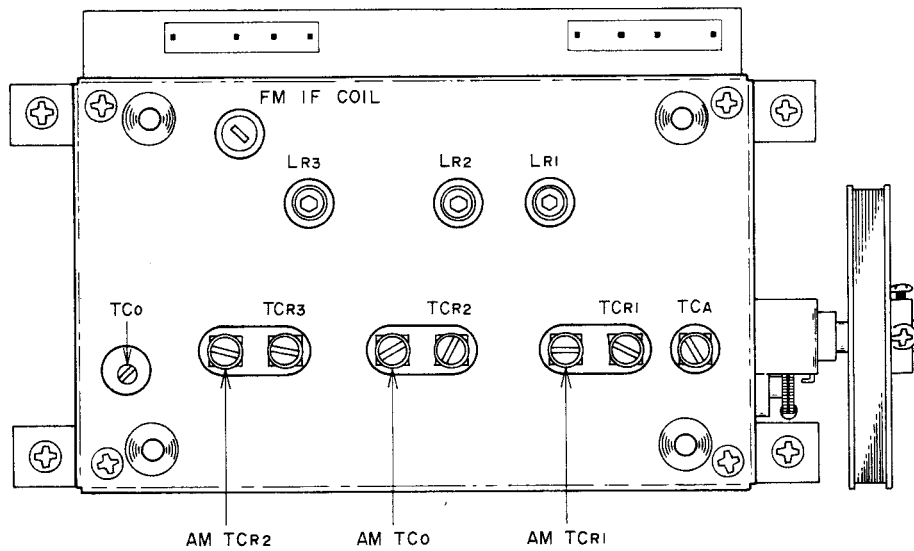


Fig. 24 Front End FB824U14

## 1. FM TUNER SECTION ADJUSTMENT (Refer to Figs. 23, 24)

| Step | Adjustment Item                            | Adjustment Point                  | Result                           | Remarks   |
|------|--|-----------------------------------|----------------------------------|---|
| 1    | Front End IF Coil                          | IF Coil (Front End)               | Maximum Noise Level              | SELECTOR to FM MONO. FM MUTE and NOISE CANCEL to OFF. Tune only noise without interference of broadcasting. |
| 2    | Tuning Meter Centering                     | T5 (WHT) (Tuner P.C Board)        | Centered Tuning Meter Indication | Same as above.  |
| 3    | Distortion Factor                          | T6 (BLU) (Tuner P.C Board)        | Less than 0.1% Distortion Factor | 98 MHz, 60 dB (mono) input. Less than 0.1% on both channels See NOTE 1.                                     |
| 4    | Confirmation of Tuning Meter Indication    |                                   |                                  | If Tuning Meter Indication is not centered re-adjust Step 2 and 3 above.                                    |
| 5    | High Range Scale Indication                | TCo (Front End)                   | Maximum Output                   | 108 MHz, 60 dB (mono) input. TUNING INDICATOR to 108 MHz. Error: Within $\pm 250$ kHz.                      |
| 6    | Confirmation of Low Range Scale Indication |                                   | Maximum Output                   | 88 MHz, 60 dB (mono) input. TUNING INDICATOR to 88 MHz. Error: Within $\pm 250$ kHz.                        |
| 7    | High Range Sensitivity                     | TCA, TCR1, TCR2, TCR3 (Front End) | Less than 3% Distortion Factor   | 108 MHz, Less than 4 dB(mono) input.  |
| 8    | Low Range Sensitivity                      | LR1, LR2, LR3 (Front End)         | Less than 3% Distortion Factor   | 98 MHz, Less than 3 dB(mono) input. See NOTE 2.   |
| 9    | Confirmation of Mid Range Sensitivity      |                                   | Less than 3% Distortion Factor   | 98 MHz, Less than 4 dB(mono) input. See NOTE 2.   |
| 10   | PLL Free Running Frequency                 | VR6 5 kB (Tuner P.C Board)        | 19.00 kHz                        | FM SELECTOR to FM AUTO. FM MUTE to ON. Connect frequency counter to Test Point. See NOTE 3.                 |
| 11   | Confirmation of Stereo Indicator Lighting  |                                   |                                  | 98 MHz. 60 dB (stereo) input. Unlet stereo indicator indicates no stereo separation.                        |
| 12   | Stereo Separation (Left→Right)             | VR1 20 kB (Tuner P.C Board)       | More than 45 dB                  | FM MUTE to OFF. 98 MHz, 60 dB (stereo), Lch input Minimum output of R ch.                                   |
| 13   | Stereo Separation (Right→Left)             | VR1 20 kB (Tuner P.C Board)       | More than 45 dB                  | 98 MHz, 60 dB (stereo), Rch input Minimum output of L ch  |
| 14   | Signal Meter Sensitivity                   | VR4 50 kB (Tuner P.C Board)       | Indicator at "4.5"               | 98 MHz, 100 dB (mono) input   |

Car t-1

- NOTES: 1. When the distortion factor is not less than 0.1% in Step 3 adjust by turning the Front End IF C oil core but not more than 1/2 turn.
2. In the event that distortion factor in Step 9 is not less than 3%, re-adjust step 7 & 8 obtain 3% distortion factor.
3. PLL IC free running frequency must be an exact 19.00 kHz.

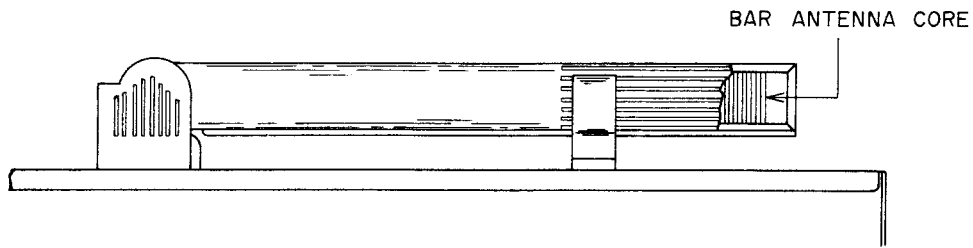


Fig. 25 Bar Antenna

2. AM TUNER SECTION ADJUSTMENT (Refer to Figs. 23, 24 and 25)

| Step | Adjustment Item             | Adjustment Point  | Result                                      | Remarks  |
|------|-----------------------------|---|---|--|
| 1    | Low Range Scale Indication  | T2 (RED)<br>(Tuner P.C Board)                                     | Maximum Output                              | SELECTOR to AM. 520 kHz 50 dB input. TUNING INDICATOR to 520 kHz. Error: Within 2% |
| 2    | High Range Scale Indication | AM TCo<br>(Front End)   | Maximum Output                              | 1,400 kHz 50 dB input. TUNING INDICATOR to 1,400 kHz Error: Within 2%              |
| 3    | Low Range Sensitivity       | Bar Antenna core<br>T1 (ORG)<br>T3, T4 (BLK)<br>(Tuner P.C Board) | Maximum Output<br>Minimum Distortion Factor | 520 kHz 50 dB input. Less than 10% Distortion Factor.                              |
| 4    | High Range Sensitivity      | AM TCR1<br>AM TCR2<br>(Front End)                                 | Maximum Output<br>Minimum Distortion Factor | 1,400 kHz 50 dB input. Less than 10% Distortion Factor.                            |

Chart-2

NOTE: For best results, repeat Steps 1 through 4 two or three times.

# X. AMPLIFIER ADJUSTMENT (AM-2650)

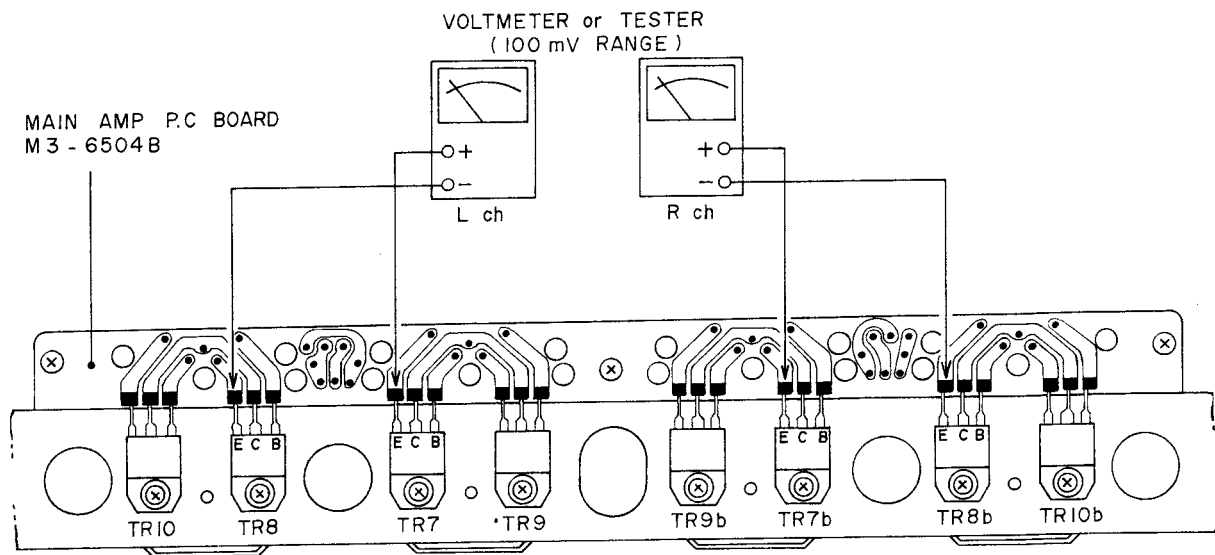


Fig. 26 Instrument Connection

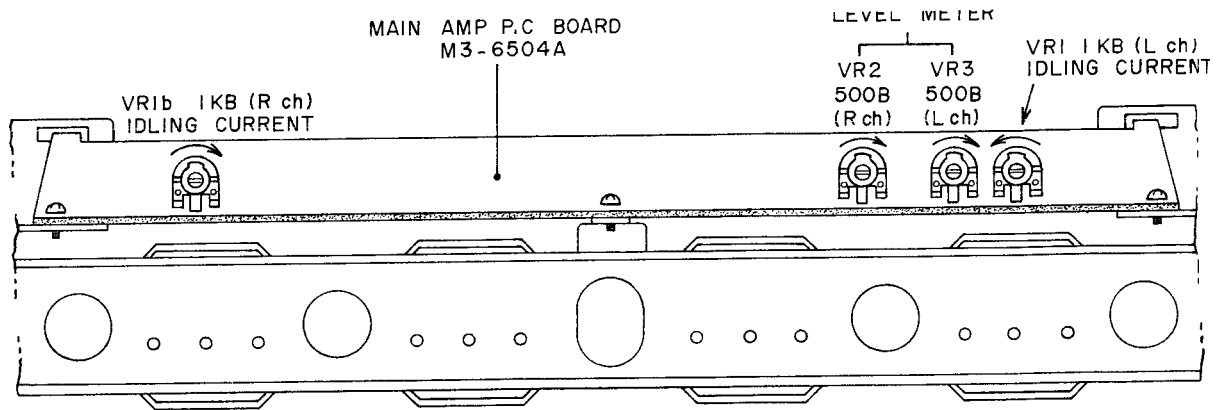


Fig. 27 Adjustment Points

## 1. IDLING CURRENT ADJUSTMENT (Refer to Figs. 26, 27)

| Step | Adjustment Item                | Adjustment Point                          | Result              | Remarks   |
|------|--------------------------------|---|---------------------|---|
| 1    | Idling Current (Left Channel)  | VR1 1 k $\Omega$<br>(Main Amp P.C Board)  | 15 mV<br>$\pm 5$ mV | Use a Voltmeter or Tester with DC 100mV range.<br>(Idling Current is 30 mV $\pm 10$ mV) |
| 2    | Idling Current (Right Channel) | VR1b 1 k $\Omega$<br>(Main Amp P.C Board) | 15 mV<br>$\pm 5$ mV |   |

Chart-3

\* Be careful not to damage the Power Transistors.

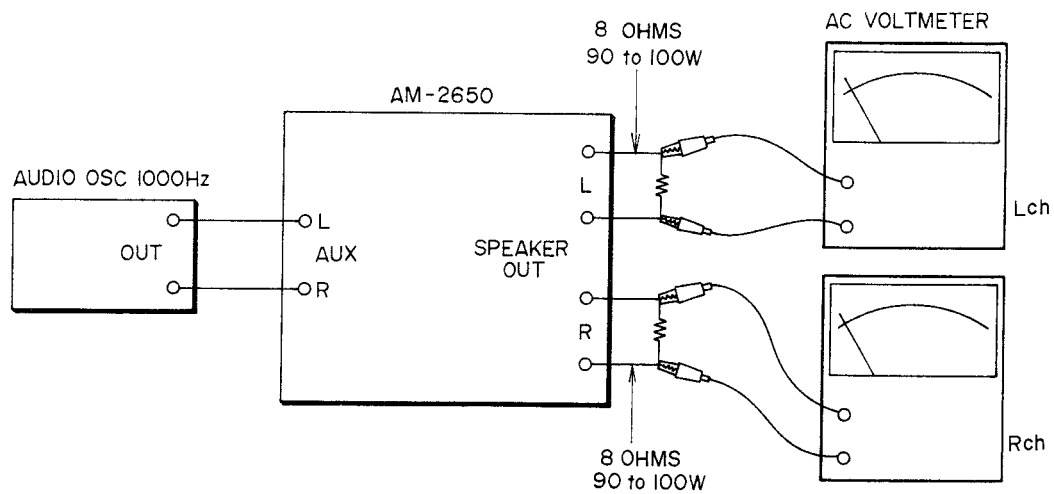


Fig. 28 Instrument Connection

## 2. LEVEL METER INDICATION ADJUSTMENT (Refer to Figs. 27, 28)

- 1) Connect a load of 8 ohms and AC Voltmeter (approx 50V range) to the speaker terminals in parallel.
- 2) Supply a signal of 1,000 Hz to the AUX Terminal.
- 3) Adjust main volume so that 22.8V is indicated by the AC Voltmeter.
- 4) Adjust semi-fixed volumes VR3 500B (L ch), and VR2 500B (R ch) on the Main Amp P.C Board. Level meter indication should be "65" with the above condition.

# XI. TUNING CORD THREADING

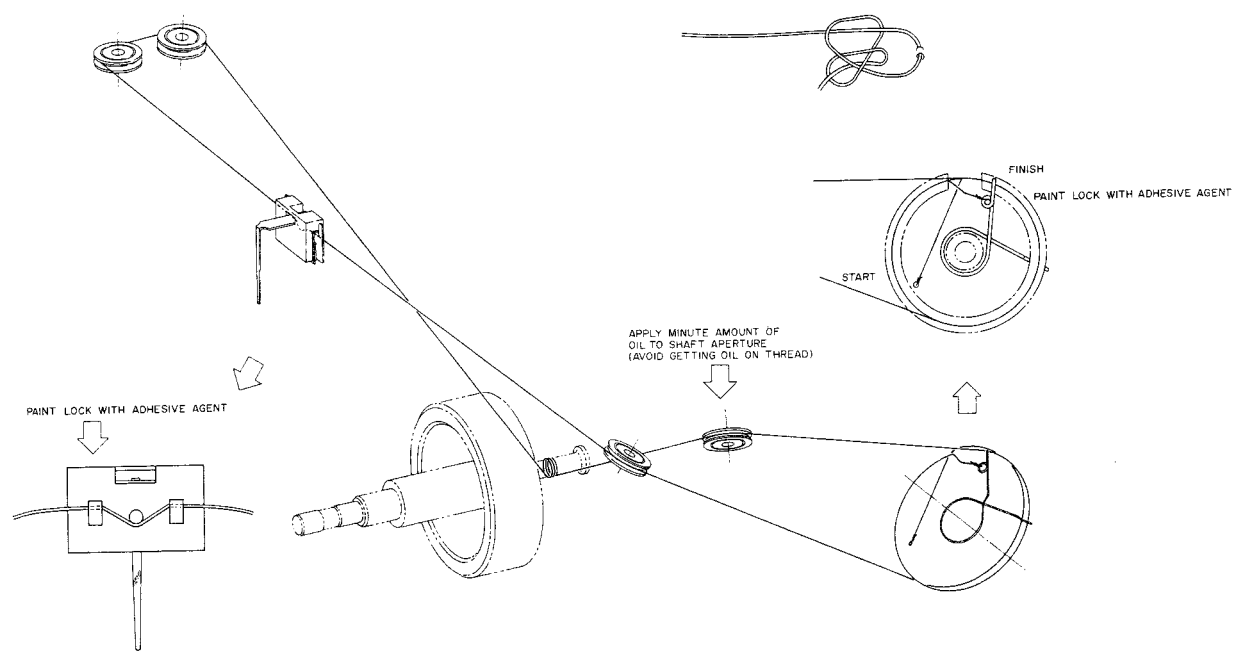


Fig. 29 Tuning Cord Threading

## XII. CLASSIFICATION OF VARIOUS P.C BOARDS

---

### 1. P.C BOARD TITLES AND IDENTIFICATION NUMBERS

#### 1) Model AT-2650

| P.C Board Title        | P.C Board Number |
|------------------------|------------------|
| Tuner P.C Board        | T3-6501A         |
| Power Supply P.C Board | T3-4502          |
| LED P.C Board          | T3-6501B         |
| Filter P.C Board       | T3-6501C         |

Chart-4

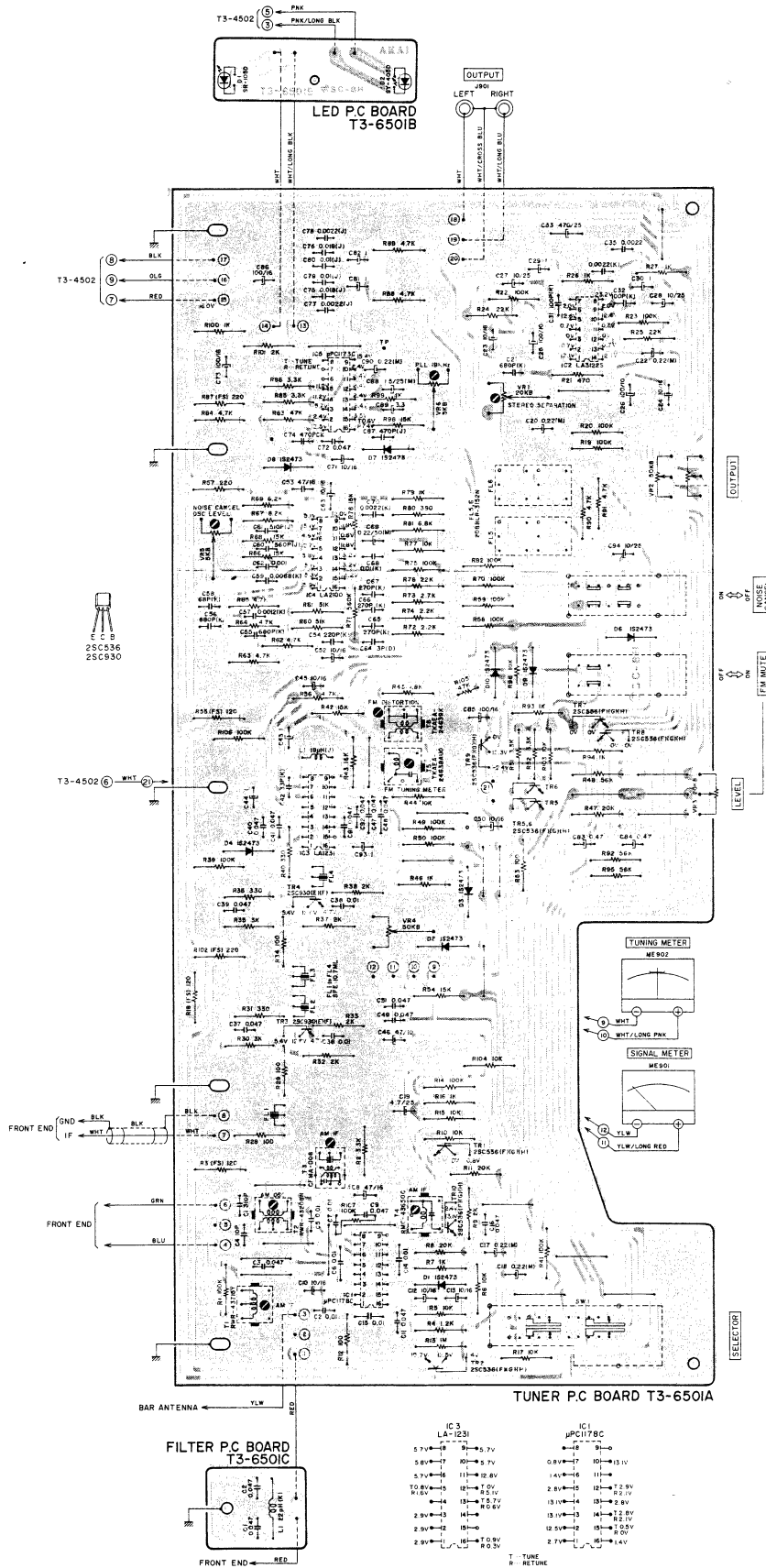
#### 2) Model AM-2650

| P.C Board Title               | P.C Board Number |
|-------------------------------|------------------|
| Main Amp P.C Board            | M3-6504A/B       |
| Tone Control P.C Board        | M3-6503          |
| Main Vol. & Balance P.C Board | M3-6502A/B       |
| Input P.C Board               | M3-6501A         |
| Tape P.C Board                | M3-6501B         |
| LED P.C Board                 | M3-6504C         |

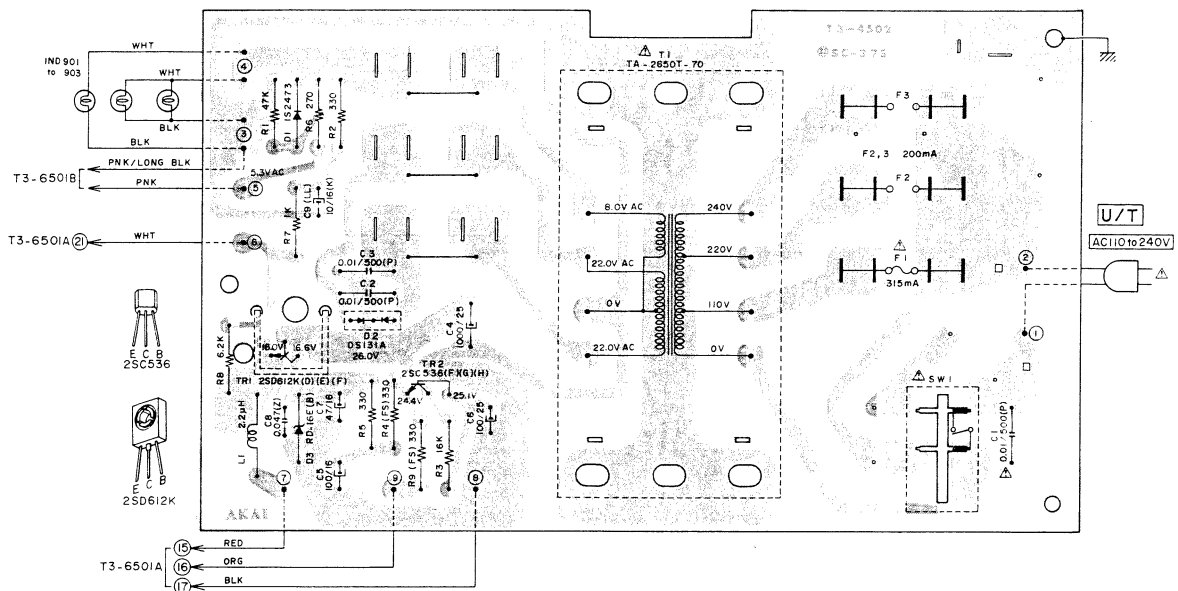
Chart-5

## 2. MODEL AT-2650 COMPOSITION OF VARIOUS P.C BOARDS

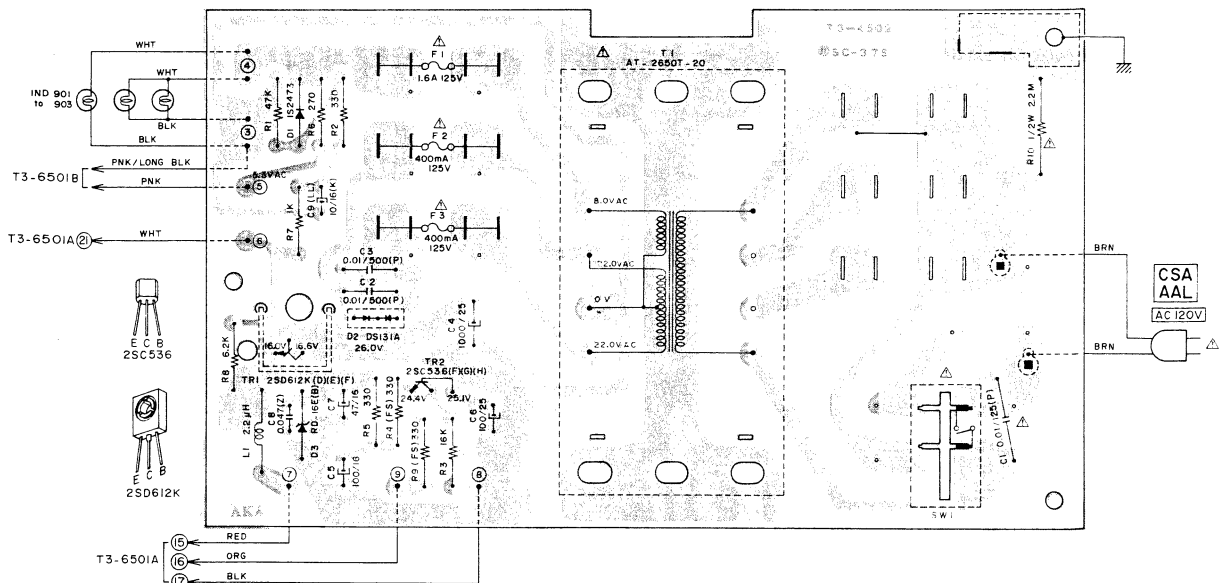
### 1) TUNER P.C BOARD T3-6501A (2ED), LED P.C BOARD T3-6501B & FILTER P.C BOARD T3-6501C



## 2) POWER SUPPLY P.C BOARD T3-4502 (U/T)



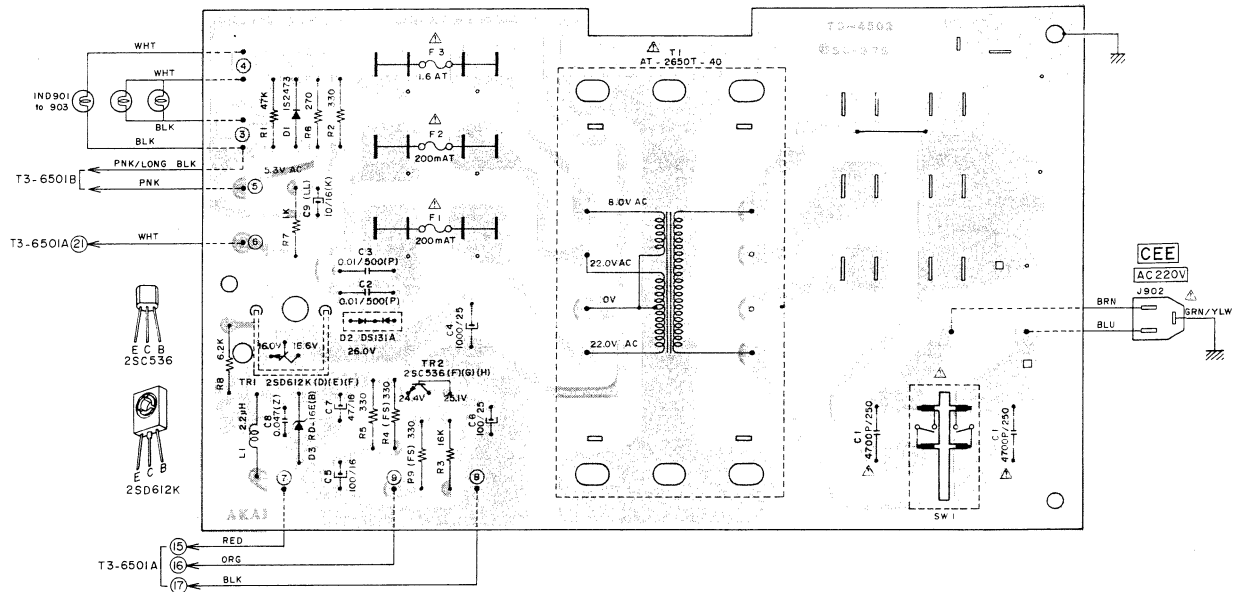
## 3) POWER SUPPLY P.C BOARD T3-4502 (CSA, AAL)



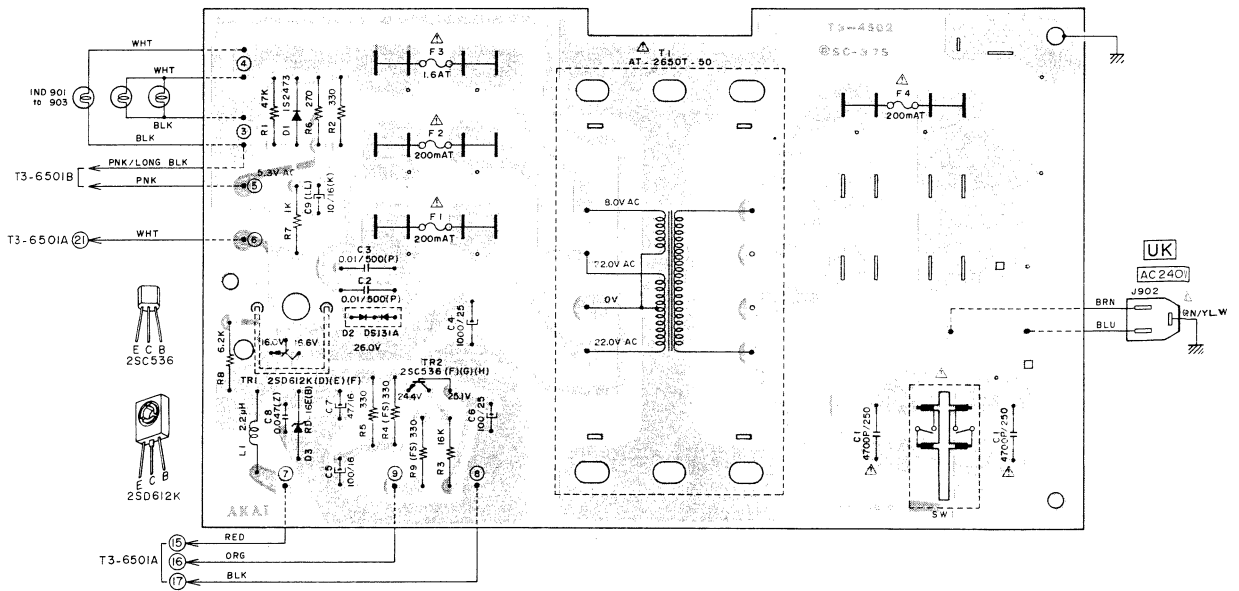
WARNING:  $\Delta$  INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.

AVERTISSEMENT:  $\Delta$  IL INDIQUE LES COMPOSANTS CRITIQUES DE SÛRETÉ. POUR MAINTENIR LE DEGRÉ DE SÛRETÉ DE L'APPAREIL, NE REMPLACEZ LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SÛRETÉ QUE PAR DES PIÈCES RECOMMANDÉES PAR LE FABRICANT.

4) POWER SUPPLY P.C BOARD T3-4502 (CEE)



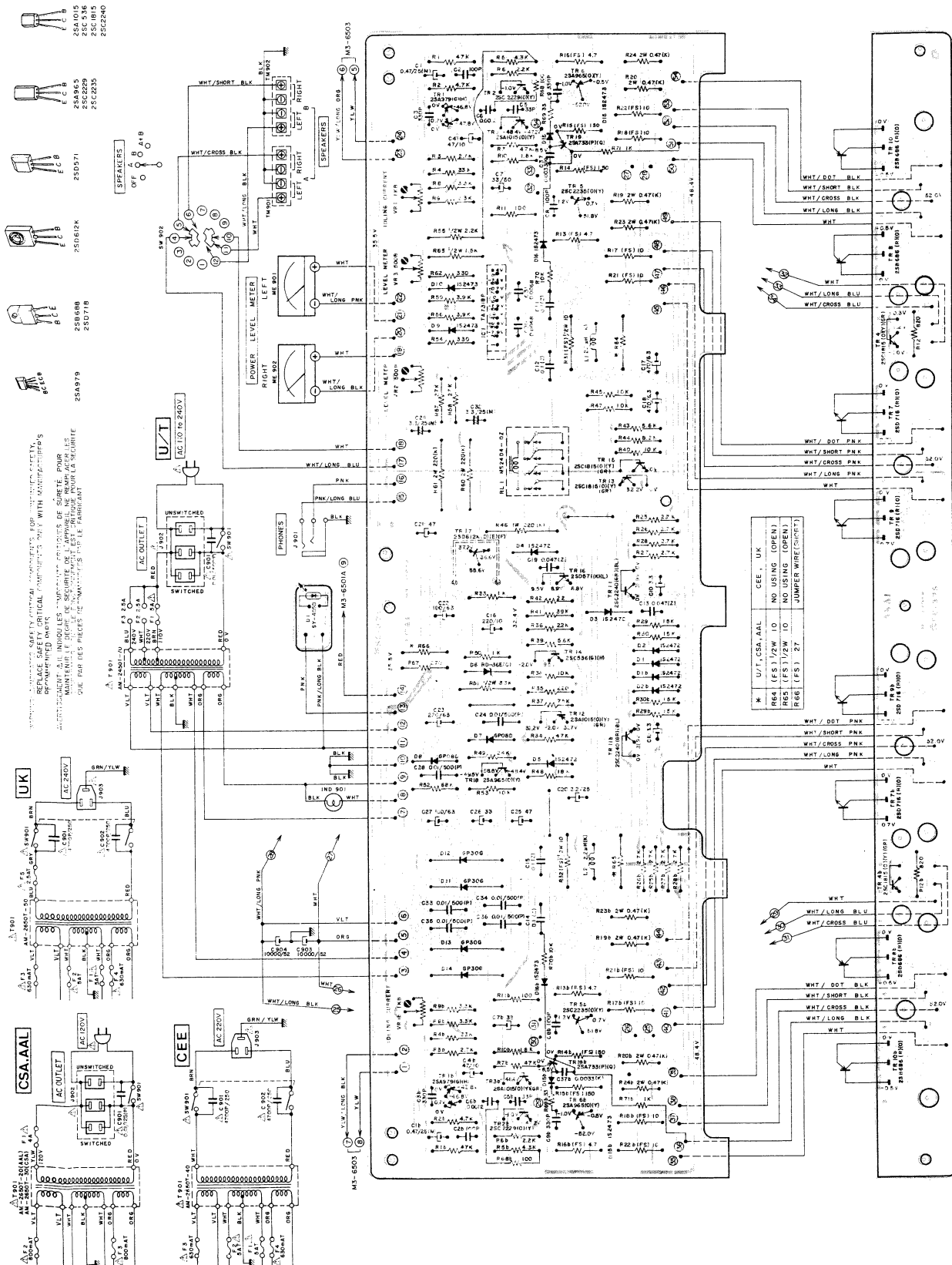
5) POWER SUPPLY P.C BOARD T3-4502 (UK)



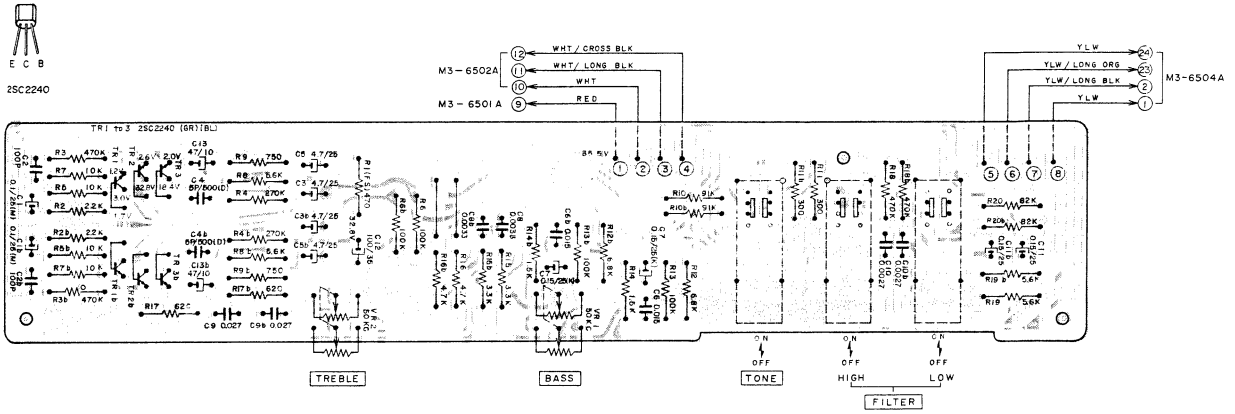
WARNING: Δ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.  
 AVERTISSEMENT: Δ IL INDIQUE LES COMPOSANTS CRITIQUES DE SÛRETÉ. POUR MAINTENIR LE DEGRÉ DE SÛRETÉ DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SÛRETÉ QUE PAR DES PIÈCES RECOMMANDÉES PAR LE FABRICANT.

### 3. MODEL AM-2650 COMPOSITION OF VARIOUS P.C BOARDS

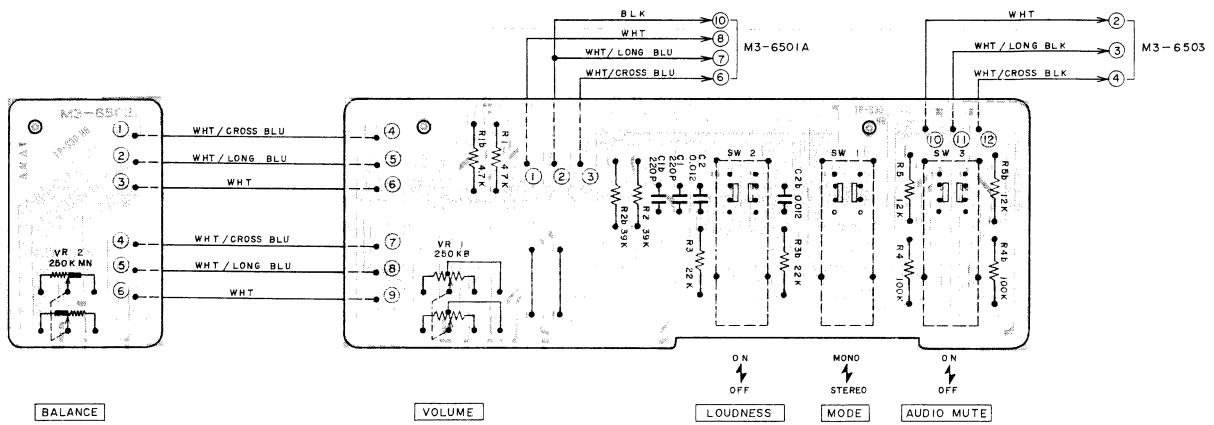
#### 1) MAIN AMP P.C BOARD M3-6504A/B & LED P.C BOARD M3-6504C



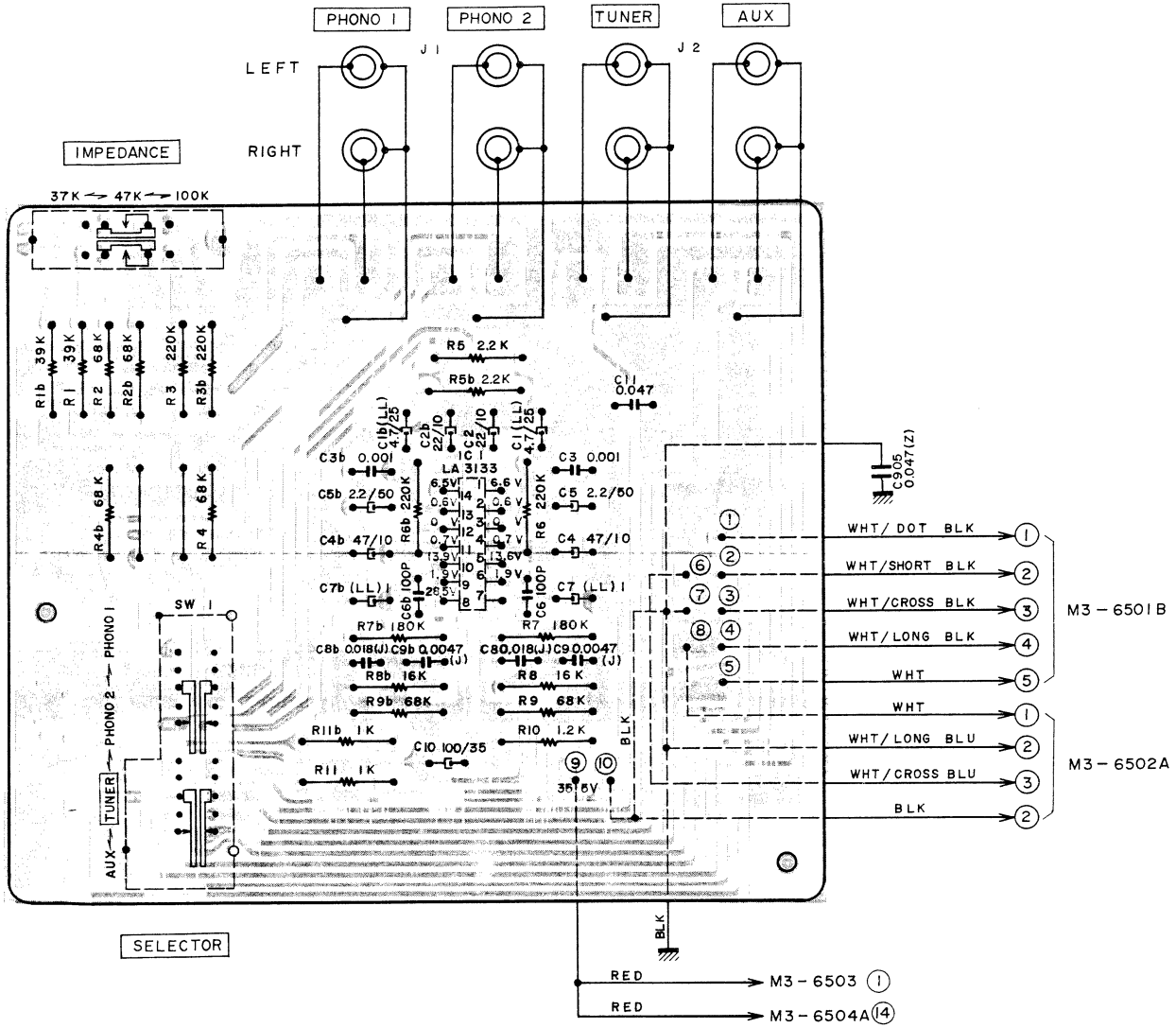
2) TONE CONTROL P.C BOARD M3-6503



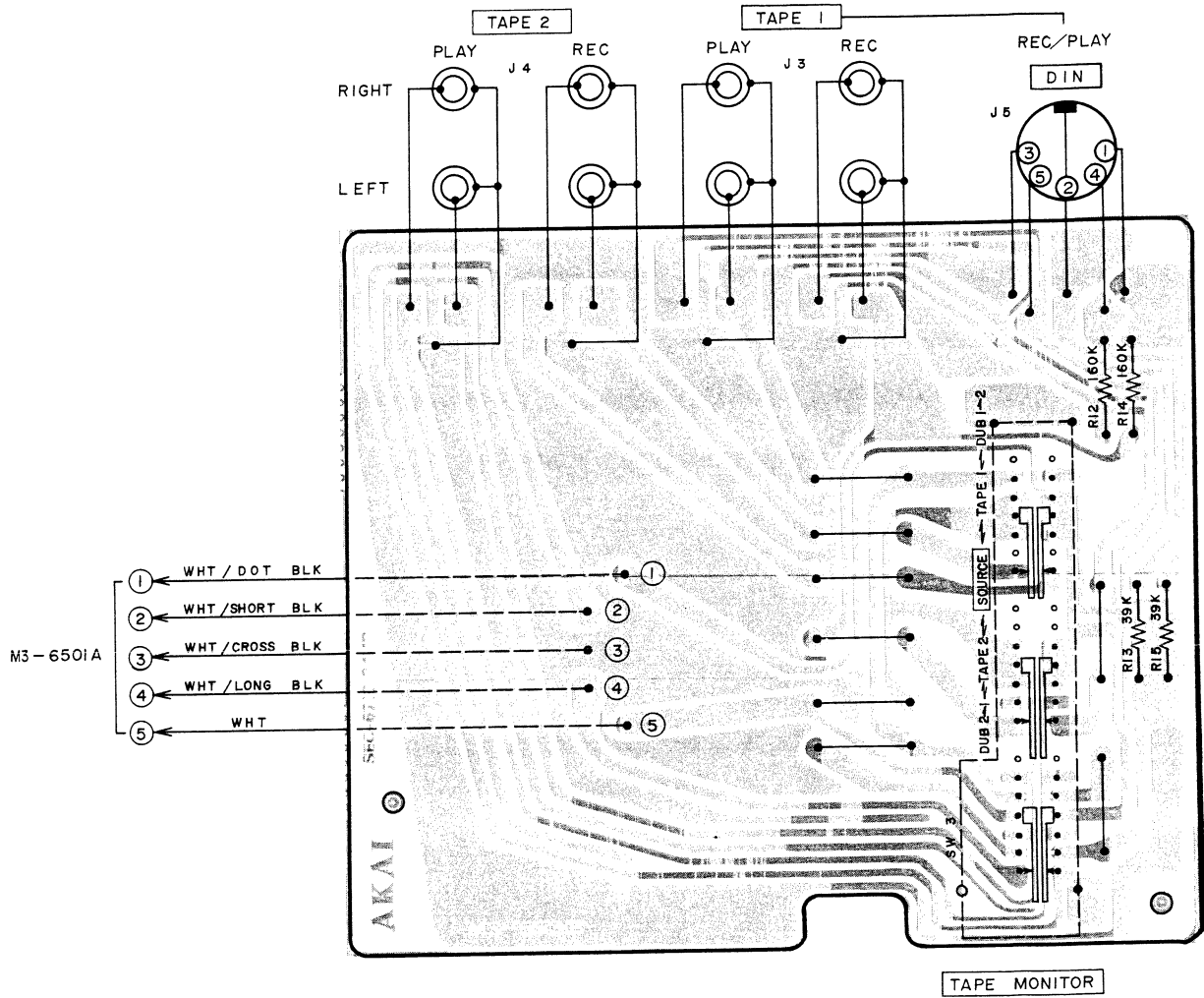
3) MAIN VOL. & BALANCE P.C BOARD M3-6502A/B



4) INPUT P.C BOARD M3-6501A



5) TAPE P.C BOARD M3-6501B



---

SECTION 2

**PARTS LIST**

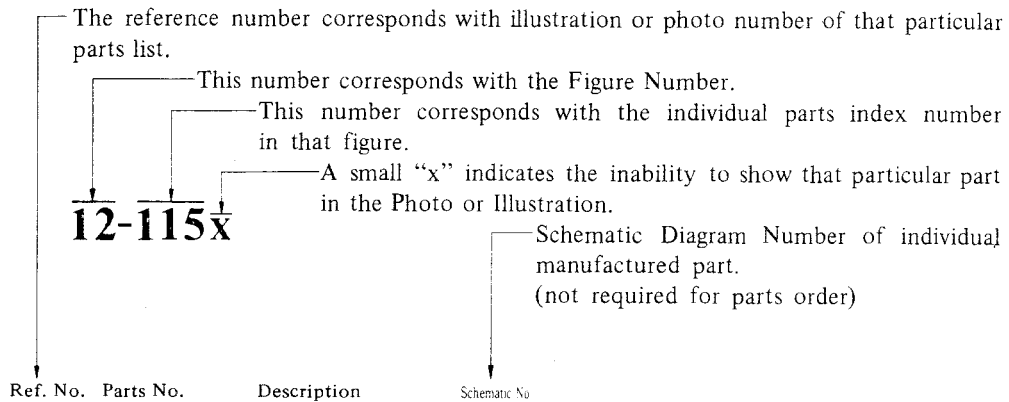
TABLE OF CONTENTS

|   |    |
|---|----|
| 1. RECOMMENDED SPARE PARTS LIST .....                     | 38 |
| <b>MODEL AT-2650</b>                                      |    |
| 2. TUNER P.C BOARD (T3-6501A) BLOCK .....                 | 40 |
| 3. FILTER P.C BOARD (T3-6501C) BLOCK .....                | 40 |
| 4. POWER SUPPLY P.C BOARD (T3-4502) BLOCK .....           | 41 |
| 5. ASSEMBLY BLOCK .....                                   | 42 |
| 6. FINAL ASSEMBLY BLOCK .....                             | 44 |
| <b>MODEL AM-2650</b>                                      |    |
| 7. INPUT & TAPE P.C BOARD (M3-6501A/B) BLOCK .....        | 45 |
| 8. MAIN VOL. & BALANCE P.C BOARD (M3-6502A/B) BLOCK ..... | 45 |
| 9. TONE CONTROL P.C BOARD (M3-6503) BLOCK .....           | 46 |
| 10. MAIN AMP P.C BOARD (M3-6504A) BLOCK .....             | 46 |
| 11. ASSEMBLY BLOCK .....                                  | 48 |
| 12. FINAL ASSEMBLY BLOCK .....                            | 50 |
| INDEX .....   | 51 |

Resistor and Capacitor which is not listed in this parts list, please refer to COMMON LIST FOR SERVICE PARTS.

## HOW TO USE THIS PARTS LIST

1. This parts list is compiled by various individual blocks based on assembly process.
2. When ordering parts, please describe parts number, serial number, and model number in detail.
3. How to read list.



| Ref. No.                  | Parts No. | Description                | Schematic No. |
|---------------------------|-----------|----------------------------|---------------|
| <b>FLYWHEEL BLOCK #13</b> |           |                            |               |
| 12-115x                   | 800425    | Flywheel Block Assy. Comp. | RDG #13       |
| 12-116                    | 244506    | Flywheel Only              | RD-233        |
| 12-117x                   | 244754    | Felt, Flywheel             | RD-275        |
| 12-118                    | 251324    | Main Metal Case            | RD-236        |
| 12-119                    | 253080    | Main Metal                 | RD-237        |

4. The symbol numbers shown on the P.C. Board list can be matched with the Composite Views of components of the Schematic Diagram or Service Manual.
5. The indications of Resistors and Capacitors in the photos of P.C. Board are being eliminated.
6. The shape of the parts and parts name, etc. can be confirmed by comparing them with the parts shown on the Electrical Parts Table of P.C. Board.
7. Both the kind of part and installation position can be determined by the Parts Number. To determine where a parts number is listed, utilize Parts Index at end of Parts List.  
It is necessary first of all to find the Parts Number. This can be accomplished by using the Reference Number listed at right of parts number in the Parts Index. (meaning of ref. no. outlined in Item 3 above).
8. Utilize separate "Price List for Parts" to determine unit price. The most simple method of finding parts Price is to utilize the reference number.

### CAUTION:

1. When placing an order for parts, be sure to list the parts no. model no., and description. There are instances in which if any of this information is omitted, parts cannot be shipped or the wrong parts will be delivered.
2. Please be careful not to make a mistake in the parts no. If the parts no. is in error, a part different from the one ordered may be delivered.
3. Because parts number and parts unit supply in the Preliminary Service Manual (Basic Parts List) may be partially changed, please use this parts list for all future reference.

**WARNING:**   △ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMEMNDED PARTS.

**AVERTISSEMENT:**   △ IL INDIQU LES COMPOSANTS CRITIQUES DE SURETE. POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOM. MANDEES PAR LE FABRICANT.

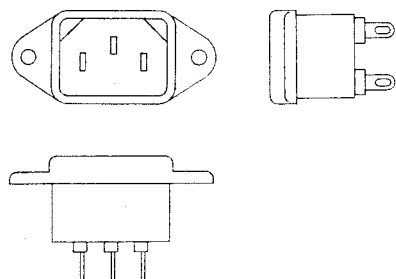
## AC INLET SYSTEM

This model is equipped with an AC INLET SYSTEM. Please refer to the AC INLET SYSTEM CHART below for the specific type. By the AC INLET SYSTEM, AC (mains) cord can be connected to and disconnected from the model because the model is provided with socket exclusively for AC (mains) cord on its main body.

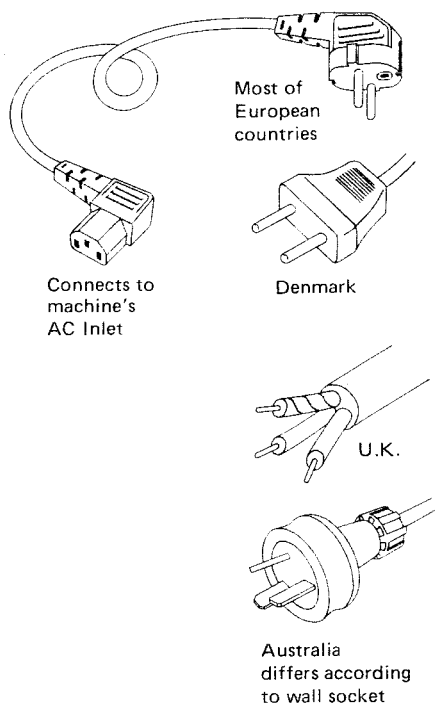
Please note, however, that certain models are not equipped with this system and has a built-in AC (mains) cord as before.

### AC INLET SYSTEM CHART

#### CLASS I



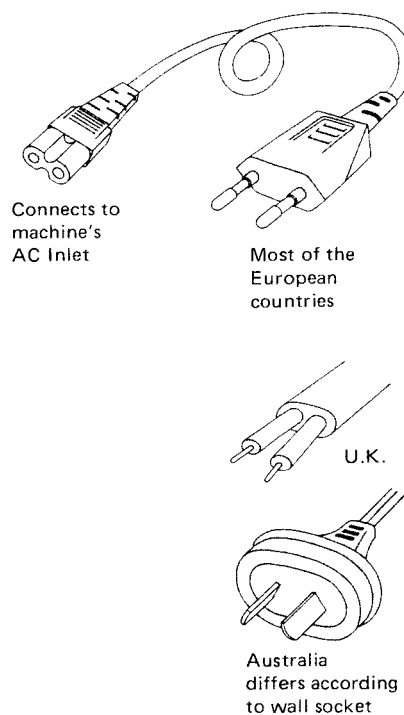
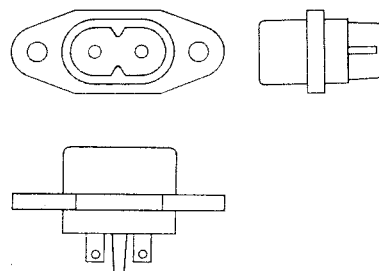
Picture 1  
AC INLET  
to be  
installed  
on machines



Picture 2  
AC (mains)  
cord

#### CLASS II

☐ This mark indicating double insulation will be attached to machine's rear panel



#### Parts List for AC (mains) Cord Set

|          | Standard | Description             | Type of AC Inlet | Parts No. |
|----------|----------|-------------------------|------------------|-----------|
| Class I  | CEE      | Cord Set CEE (3 cores)  | 3P               | EW302993  |
|          | BEAB     | Cord Set BEAB (3 cores) | 3P               | EW302994  |
|          | SAA      | Cord Set SAA (3 cores)  | 3P               | EW302996  |
|          | U/T      | Cord Set U/T (3 cores)  | 3P               | EW302646  |
| Class II | CEE      | Cord Set CEE (2 cores)  | 2P               | EW638144  |
|          | BEAB     | Cord Set BEAB (2 cores) | 2P               | EW302995  |
|          | SAA      | Cord Set SAA (2 cores)  | 2P               | EW302991  |
|          | U/T      | Cord Set U/T (2 cores)  | 2P               | EW302899  |

## 1. RECOMMENDED SPARE PARTS LIST

Because, if the parts listed below are on hand, almost any repair can be accomplished, we suggest that you stock these Recommended Spare Parts Items.

### Model AT-2650/BL

| Parts No. | Description                                      | Note     |
|-----------|--|----------|
| BA311920  | Tuner P.C Board Comp. AT-2650                    |          |
| BA308069  | Power Supply P.C Board Comp. AT-2450 (U/T)       |          |
| BA308067  | Power Supply P.C Board Comp. AT-2450 (CSA) (AAL) |          |
| BA308066  | Power Supply P.C Board Comp. AT-2450 (CEE)       |          |
| BA311178  | Power Supply P.C Board Comp. AT-2450 (UK)        |          |
| BT308859  | △ Power Trans. AT-2650T-70                       | U/T      |
| BT308829  | △ Power Trans. AT-2650T-20                       | CSA, AAL |
| BT308830  | △ Power Trans. AT-2650T-40                       | CEE      |
| BT308831  | △ Power Trans. AT-2650T-50                       | UK       |
| ED624903  | Silicon Diode 1S2473                             |          |
| ED223547  | Silicon Diode DS131A                             |          |
| ED308860  | Zener Diode RD-16E (B)                           |          |
| ED698826  | LED SR-105D                                      |          |
| ED308592  | LED SY-405D                                      |          |
| EF306125  | △ Fuse 315mA 250V                                | U/T      |
| EF308933  | △ Fuse 200mA 250V                                | U/T      |
| EF308848  | △ Fuse 400mA 125V                                | CSA, AAL |
| EF308847  | △ Fuse 1.6A 125V                                 | CSA, AAL |
| EF300596  | △ Fuse (FST) 200mAT                              | CEE, UK  |
| EF601964  | △ Fuse (SEMKO T Type) 1.6AT                      | CEE, UK  |
| EI307199  | IC $\mu$ PC1178C                                 |          |
| EI697871  | IC LA-3122S                                      |          |
| EI307198  | IC LA1231  |          |
| EI310299  | IC LA2100  |          |
| EI308850  | IC $\mu$ PC1173C                                 |          |
| EL307157  | Lamp (Cord Type) 8V 300mA (300mm x 2)            |          |
| EL308839  | Lamp (Cord Type) 8V 300mA (500mm x 2)            |          |
| EL308840  | Lamp (Cord Type) 8V 300mA (600mm x 2)            |          |
| EM308844  | Signal Meter KL-243X-35                          |          |
| EM300355  | Signal Meter KL-243X-26                          | BL       |
| EM308843  | Tuning Meter KL-243X-36                          |          |
| EM300354  | Tuning Meter KL-243X-27                          | BL       |
| ER308617  | Ceramic Filter SFE10.7ML-Z                       |          |
| ER308855  | Low Pass Filter 208BLR-3152N                     |          |
| ES308852  | Rotary SW. SRZK-043S                             |          |
| ES310169  | Lever SW. SLR522                                 |          |
| ES310301  | Lever SW. SLR542                                 |          |
| ES308858  | △ Push SW. JP29 (w/o label)                      | U/T      |
| ES308863  | △ Push SW. JP29 (w/label)                        | CSA, AAL |
| ES242346  | △ Push SW. JP17                                  | CEE, UK  |
| ET632215  | Transistor 2SC536 (F) (G) (H)                    |          |
| ET618873  | Transistor 2SC930 (E) (F)                        |          |
| ET307193  | Transistor 2SD612K (D) (E) (F)                   |          |

Model AM-2650/BL

| Parts No. | Description                                  | Note     |
|-----------|--|----------|
| BA311962  | Input & Tape P.C Board Comp. AM-2650         |          |
| BA311967  | Tone Control P.C Board Comp. AM-2650         |          |
| BA311955  | Main Amp P.C Board Comp. AM-2650 (U/T) (CSA) |          |
| BA311956  | Main Amp P.C Board Comp. AM-2650 (CEE) (UK)  |          |
| BT310145  | △ Power Trans. AM-2650T-70                   | U/T      |
| BT310142  | △ Power Trans. AM-2650T-30                   | CSA      |
| BT310141  | △ Power Trans. AM-2650T-20                   | AAL      |
| BT310143  | △ Power Trans. AM-2650T-40                   | CEE      |
| BT310144  | △ Power Trans. AM-2650T-50                   | UK       |
| ED214457  | Silicon Diode 1S2472                         |          |
| ED240377  | Zener Diode RD36E (C)                        |          |
| ED300924  | Silicon Diode GP08D                          |          |
| ED624903  | Silicon Diode 1S2473                         |          |
| ED245428  | Silicon Diode GP30G                          |          |
| EF575223  | △ Fuse 5A 250V                               | U/T      |
| EF562691  | △ Fuse 2.5A 250V                             | U/T      |
| EF378595  | △ Fuse ST-6 4A                               | CSA, AAL |
| EF277424  | △ Fuse ST-4 0.8A                             | CSA, AAL |
| EF249851  | △ Fuse (SEMKO T Type) 5AT                    | CEE, UK  |
| EF601942  | △ Fuse (SEMKO T Type) 630MAT                 | CEE, UK  |
| EF623125  | △ Fuse (SEMKO T Type) 2.5AT                  | UK       |
| EI305696  | IC LA3123                                    |          |
| EI308865  | IC TA7318P                                   |          |
| EJ293365  | 4P PIN Jack                                  |          |
| EJ698051  | DIN Jack                                     |          |
| EJ301199  | Headphone Jack 3P64M                         |          |
| EJ306942  | 4P Push Terminal S-Q2361                     |          |
| EM310163  | Level Meter D18C56R                          |          |
| EM310164  | Level Meter D18C57R                          | BL       |
| EP245305  | Relay MS24D4-0Z                              |          |
| ES310171  | Rotary SW. SRZ-K044T                         |          |
| ES310170  | Slide SW. 23460                              |          |
| ES308884  | Rotary SW. SRZ-K065T                         |          |
| ES310169  | Lever SW. SLR522                             |          |
| ES224436  | △ Push SW. JP01                              | U/T      |
| ES280258  | △ Push SW. SDV1P TV-5 (w/label)              | CSA, AAL |
| ES242346  | △ Push SW. JP17                              | CEE, UK  |
| ES308581  | Rotary SW. SR321N 1-2-4                      |          |
| ET307195  | Transistor 2SC2240 (GR) (BL)                 |          |
| ET308866  | Transistor 2SA979 (G) (H)                    |          |
| ET310168  | Transistor 2SC2229 (O) (Y)                   |          |
| ET308867  | Transistor 2SA1015 (O) (Y) (GR)              |          |
| ET305221  | Transistor 2SC1815 (O) (Y) (GR)              |          |
| ET308870  | Transistor 2SC2235 (O) (Y)                   |          |
| ET308868  | Transistor 2SA965 (O) (Y)                    |          |
| ET310166  | Transistor 2SD716 (AKAI) (R) (O)             |          |
| ET310165  | Transistor 2SB686 (AKAI) (R) (O)             |          |
| ET310166  | Transistor 2SD716 (AKAI) (R) (O)             |          |
| ET307195  | Transistor 2SC2240 (GR) (BL)                 |          |
| ET403391  | Transistor 2SC536 (G) (H)                    |          |
| ET666404  | Transistor 2SD571 (K) (L)                    |          |
| ET307193  | Transistor 2SD612K (D) (E) (F)               |          |
| EW306428  | △ AC Cord                                    | U/T      |
| EW305691  | △ AC Cord CUL                                | CSA, AAL |

## MODEL AT-2650

### 2. TUNER P.C BOARD (T3-6501A) BLOCK

| Symbol No. | Parts No. | Description  | Schematic No. |
|------------|-----------|--|---------------|
| 2-1        | BA311920  | Tuner P.C Board Comp.<br>AT-2650                         |               |
| 2-IC1      | EI307199  | IC $\mu$ PC1178C   | 45-8-268      |
| 2-IC2      | EI697871  | IC LA-3122S  | 45-8-185      |
| 2-IC3      | EI307198  | IC LA1231  | 45-8-267      |
| 2-IC4      | EI310299  | IC LA2100  | 45-8-319      |
| 2-IC5      | EI308850  | IC $\mu$ PC1173C   | 45-8-318      |
| 2-TR1,2    | ET632215  | Transistor 2SC536(F)(G)(H)                               | 45-1-55       |
| 2-TR3,4    | ET618873  | Transistor 2SC930(E)(F)                                  | 45-1-185      |
| 2-TR5to10  | ET632215  | Transistor 2SC536(F)(G)(H)                               | 45-1-55       |
| 2-D1to4    | ED624903  | Silicon Diode 1S2473                                     | 45-3-28       |
| 2-D6to10   | ED624903  | Silicon Diode 1S2473                                     | 45-3-28       |
| 2-T1       | EO310302  | AM-RF Coil RWR-43715Y                                    | 23-1-298      |
| 2-T2       | EO307186  | OSC Coil RWR-43208N                                      | 23-4-47       |
| 2-T3       | BT307204  | AM-IF Trans. CFMA-008                                    | 53-1-131      |
| 2-T4       | EO307205  | AM-IF Coil RMC-43650C                                    | 23-1-292      |
| 2-T5       | EO307202  | Detection Coil<br>TKAEA-24638AUO                         | 23-1-290      |
| 2-T6       | EO307203  | Detection Coil<br>TKAEA-24639X                           | 23-1-291      |
| 2-L1       | EO650610  | Inductor 144LZ 18 $\mu$ H(J)                             | 23-1-240      |
| 2-FL1to4   | ER308617  | Ceramic Filter SFE10.7ML-Z                               | 53-1-139      |
| 2-FL5,6    | ER308855  | Low Pass Filter<br>208BLR-3152N                          | 53-1-140      |
| 2-SW1      | ES308852  | Rotary SW. SRZK-043S                                     | 25-6-160      |
| 2-SW2      | ES310169  | Lever SW. SLR522   | 25-12-43      |
| 2-SW3      | ES310301  | Lever SW. SLR542   | 25-12-45      |
| 2-VR1      | EV560136  | Semi-fixed/Vol.<br>V10K8-4-2 20 k $\Omega$               | 36-10-250     |
| 2-VR2      | EV308854  | Single Axial 2 Throw Vol.<br>GM70R871C 50 k $\Omega$ x2  | 36-22-40      |
| 2-VR3      | EV314538  | Vol. VM10R907A-20 k $\Omega$                             | 36-6-37       |
| 2-VR4      | EV308842  | Semi-fixed/Vol.<br>D10 Axial Type 50 k $\Omega$          | 36-10-274     |
| 2-VR5,6    | EV307246  | Semi-fixed/Vol.<br>D10 Axial Type 5 k $\Omega$           | 36-10-274     |
| 2-C1       | EC650406  | Styrol/C. (Vert. Type)<br>310PF(J) 50WV                  | 24-11-3       |
| 2-C60,61   | EC435690  | Styrol/C. (Vert. Type)<br>560PF(J) 50WV                  | 24-11-3       |
| 2-C87      | EC405898  | Styrol/C. (Vert. Type)<br>470PF(J) 50WV                  | 24-11-3       |
| 2-C88      | EC638188  | Solid Aluminum/C.<br>(Vert. Type)<br>1.5 $\mu$ F(M) 25WV | 24-19-2       |

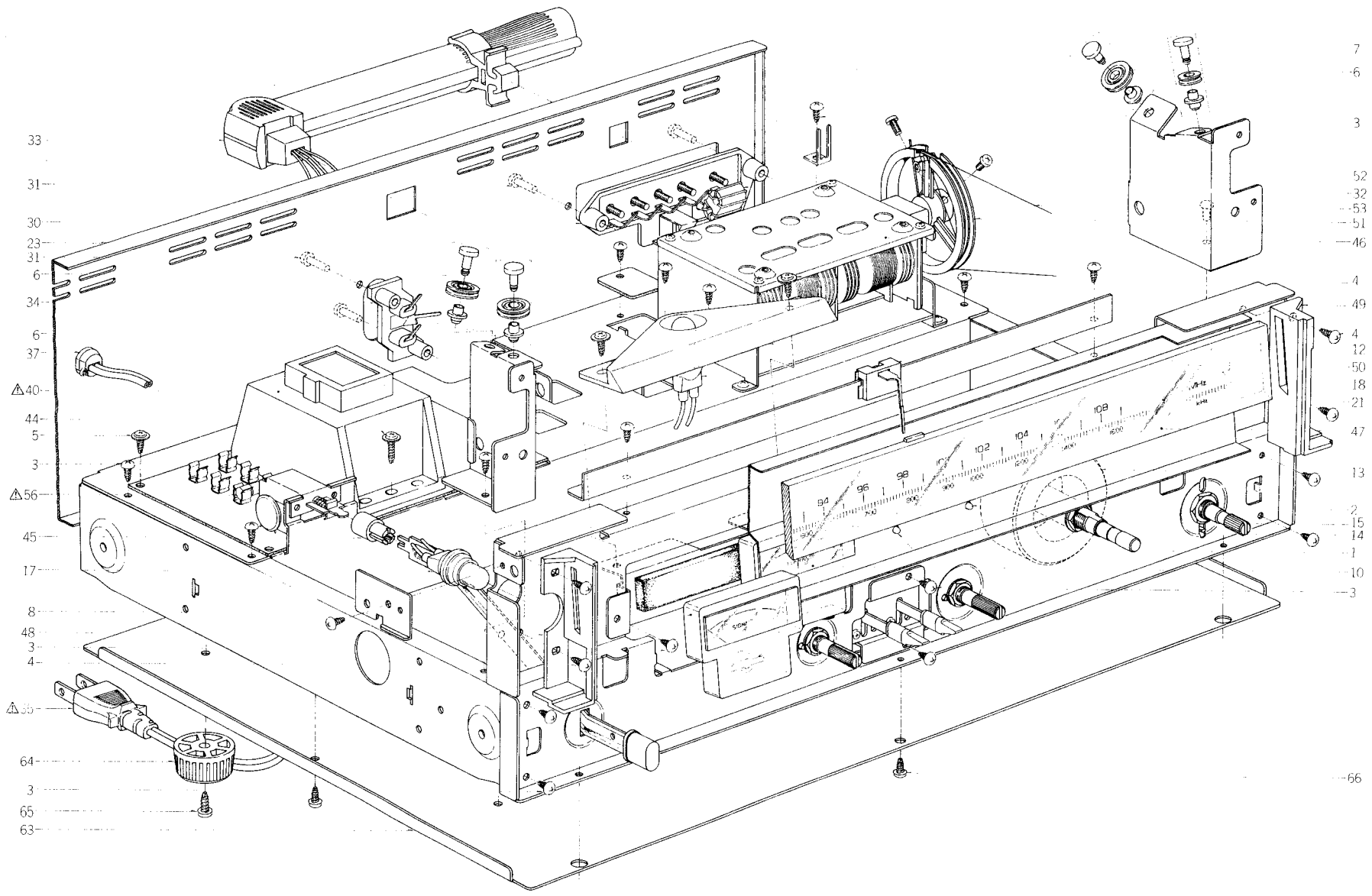
### 3. FILTER P.C BOARD (T3-6501C) BLOCK

| Symbol No. | Parts No. | Description                 | Schematic No. |
|------------|-----------|-----------------------------|---------------|
| 3-L1       | EO539820  | Peaking Coil 2.2 $\mu$ H(K) | 23-1-187      |

#### 4. POWER SUPPLY P.C BOARD (T3-4502) BLOCK

| Symbol No. | Parts No. | Description  | Schematic No. |
|------------|-----------|--|---------------|
| 4-1        | BA308069  | Power Supply P.C Board Comp.<br>AT-2450 (U/T)                      | T3-4550       |
| 4-2        | BA308067  | Power Supply P.C Board Comp.<br>AT-2450 (CSA) (AAL)                | T3-4550       |
| 4-3        | BA308066  | Power Supply P.C Board Comp.<br>AT-2450 (CEE)                      | T3-4550       |
| 4-4        | BA311178  | Power Supply P.C Board Comp.<br>AT-2450 (UK)                       | T3-4550       |
| 4-TR1      | ET307193  | Transistor 2SD612K(D)(E)(F)  | 45-1-308      |
| 4-TR2      | ET632215  | Transistor 2SC536(F)(G)(H)   | 45-1-55       |
| 4-D1       | ED624903  | Silicon Diode 1S2473   | 45-3-28       |
| 4-D2       | ED223547  | Silicon Diode DS131A   | 45-2-67       |
| 4-D3       | ED308860  | Zener Diode RD-16E(B)  | 45-6-72       |
| 4-L1       | EO539820  | Peaking Coil 2.2 $\mu$ H(K)  | 23-1-187      |
| 4-SW1      | ES308858  | $\Delta$ Push SW. JP29 (w/o label)<br>(U/T)                        | 25-5-299      |
| 4-SW1      | ES308863  | $\Delta$ Push SW. JP29 (w/label)<br>(CSA, AAL)                     | 25-5-300      |
| 4-SW1      | ES242346  | $\Delta$ Push SW. JP17 (CEE, UK)                                   | 25-5-224      |
| 4-5        | ZS325495  | Tapping Screw #2, 3x6 (BR)   |               |
| 4-C1       | EC204671  | $\Delta$ Ceramic/C. DD31-6E<br>0.01 $\mu$ F(P) 500WV(U/T)          | 24-5-66       |
| 4-C1       | EC294118  | $\Delta$ Ceramic/C. DPN6600 YM<br>0.01 $\mu$ F(P) 125WV (CSA, AAL) | 24-5-70       |
| 4-C1       | EC301320  | $\Delta$ MP/C. 4700PF(M) 250WV<br>(CEE, UK)                        | 24-9-122      |
| 4-C2,3     | EC204671  | Ceramic/C. DD31-6E<br>0.01 $\mu$ F(P) 500WV                        | 24-5-66       |

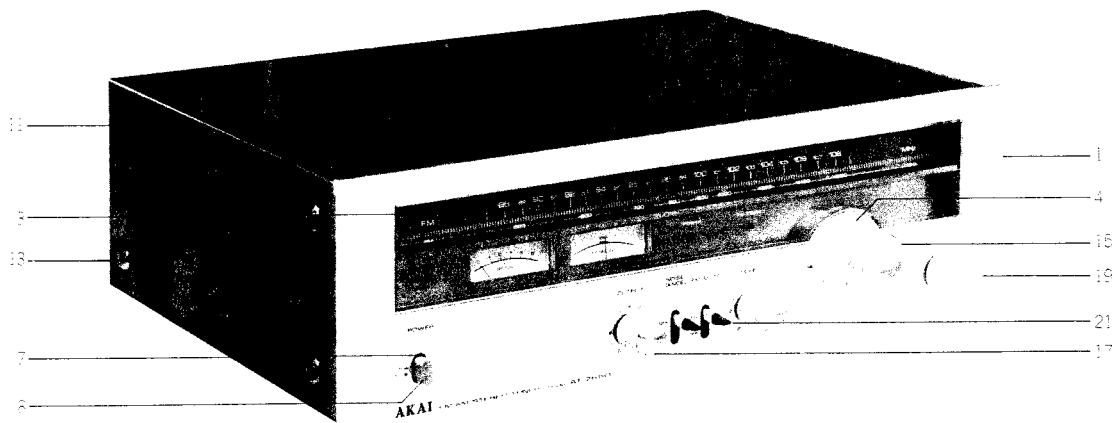
5. ILLUSTRATION OF ASSEMBLY BLOCK



## 5) ASSEMBLY BLOCK

| Ref. No.                   | Parts No. | Description                                      | Schematic No. | Ref. No. | Parts No. | Description                                | Schematic No. |
|----------------------------|-----------|--|---------------|----------|-----------|--|---------------|
| <b>LED P.C BOARD BLOCK</b> |           |  |               |          |           |  |               |
| 5-1                        | ED698826  | LED SR-105D                                      | 45-15-16      | 5-54x    | ZS434250  | Screw, pan head 4x8, w/washer<br>(CEE, UK) |               |
| 5-2                        | ED308592  | LED SY-405D                                      | 45-15-20      | 5-55x    | ZW413188  | Nut M4, #1 (CEE, UK)                       |               |
| <b>ASSEMBLY BLOCK</b>      |           |  |               |          |           |  |               |
| 5-3                        | ZS325495  | Tapping Screw #2, 3x6 (BR)                       |               | 5-56     | EF306125  | △ Fuse 315mA 250V (U/T)                    | 39-1-64       |
| 5-4                        | ZS498273  | Tapping Screw #2,<br>3x8(BR) W=8                 |               | 5-57x    | EF308933  | △ Fuse 200mA 250V (U/T)                    | 39-1-64       |
| 5-5                        | ZS297641  | Tapping Screw #2, 3x8(BIND)<br>W=10              |               | 5-58x    | EF308848  | △ Fuse 400mA 125V<br>(CSA, AAL)            | 39-1-65       |
| 5-6                        | MZ307170  | Pulley   | 13-2-39       | 5-59x    | EF308847  | △ Fuse 1.6A 125V<br>(CSA, AAL)             | 39-1-65       |
| 5-7                        | MR308836  | Pulley   | 13-2-40       | 5-60x    | EF300596  | △ Fuse (FST) 200mAT<br>(CEE, UK)           | 39-1-61       |
| 5-8                        | FM308844  | Signal Meter KL-243X-35                          | 46-1-214      | 5-61x    | EF601964  | △ Fuse (SEMKO T Type)<br>1.6AT (CEE, UK)   | 39-1-53       |
| 5-9x                       | EM300355  | Signal Meter KL-243X-26(BL)                      | 46-1-165      | 5-62x    | EF300596  | △ Fuse (FST) 200mAT (UK)                   | 39-1-61       |
| 5-10                       | EM308843  | Tuning Meter KL-243X-36                          | 46-1-213      | 5-63     | SP308634  | Bottom Plate                               | T3-4523       |
| 5-11x                      | EM300354  | Tuning Meter KL-243X-27(BL)                      | 46-1-163      | 5-64     | SA312465  | Circular Foot(A) Part CA                   | CA-6014       |
| 5-12                       | TA308638  | Meter Illumination Plate                         | T3-4526       | 5-65     | ZS565942  | Tapping Screw #2, 4x8(Pan)                 |               |
| 5-13                       | TA308837  | Flywheel   | 13-2-46       | 5-66     | ZS447840  | Tapping Screw #2, 3x8(BR)                  |               |
| 5-14                       | ZW308889  | Washer   | 25-6-160      |          |           |  |               |
| 5-15                       | ZW308890  | Nut  | 25-6-160      |          |           |  |               |
| 5-16x                      | ZS379350  | Screw, pan head 3x6                              |               |          |           |  |               |
| 5-17                       | EL307157  | Lamp (Cord Type)<br>8V 300mA (300mmx2)           | 28-2-71       |          |           |  |               |
| 5-18                       | EL308839  | Lamp (Cord Type)<br>8V 300mA (500mmx2)           | 28-2-71       |          |           |  |               |
| 5-19x                      | EL308840  | Lamp (Cord Type)<br>8V 300mA (600mmx2)           | 28-2-71       |          |           |  |               |
| 5-20x                      | ZW231030  | Nylon Rivet (FNRP) 3x4.5<br>(Black)              | 2-7-54        |          |           |  |               |
| 5-21                       | SP308606  | Meter Panel                                      | T3-4503       |          |           |  |               |
| 5-22x                      | SP308607  | Meter Panel (BL)                                 | T3-4503       |          |           |  |               |
| 5-23                       | SP310290  | Rear Panel (F) (U)(U/T)                          | T3-6506       |          |           |  |               |
| 5-24x                      | SP310291  | Rear Panel (G) (C)(CSA)                          | T3-6506       |          |           |  |               |
| 5-25x                      | SP310292  | Rear Panel (H) (A)(AAL)                          | T3-6507       |          |           |  |               |
| 5-26x                      | SP310293  | Rear Panel (I) (E)(CEE)                          | T3-6507       |          |           |  |               |
| 5-27x                      | SP310294  | Rear Panel (J) (B)(UK)                           | T3-6508       |          |           |  |               |
| 5-28x                      | ZS447761  | Tapping Screw #2, 3x6(BR)<br>(Black)             |               |          |           |  |               |
| 5-29x                      | ZS308673  | Tapping Screw 3x20 (Pan)<br>w/guide (Except U/T) | 7-1-68        |          |           |  |               |
| 5-30                       | EJ308832  | SP Antenna Terminal Plate<br>UD-0059             | 32-1-92       |          |           |  |               |
| 5-31                       | ZS522865  | Tapping Screw #2, 3x12(BR)<br>(Black)            |               |          |           |  |               |
| 5-32                       | BT444137  | Balum Trans. 75 ohms -<br>300 ohms               | 23-1-129      |          |           |  |               |
| 5-33                       | EE310307  | Bar Antenna                                      | 55-1-56       |          |           |  |               |
| 5-34                       | EJ308834  | 2P PIN Jack T-5511                               | 31-5-143      |          |           |  |               |
| 5-35                       | EW306428  | △ AC Cord (U/T)                                  | 26-3-64       |          |           |  |               |
| 5-36x                      | EW305691  | △ AC Cord CUL (CSA, AAL)                         | 26-3-65       |          |           |  |               |
| 5-37                       | EZ631945  | Strain Relief SR-4N-4<br>(U/T, CSA, AAL)         | 2-7-49        |          |           |  |               |
| 5-38x                      | EJ296853  | △ 3P In-Let CM-3 (CEE, UK)                       | 31-1-199      |          |           |  |               |
| 5-39x                      | ZS463353  | Tapping Screw #2, 3x8(BR)<br>(Black) (CEE, UK)   |               |          |           |  |               |
| 5-40                       | BT308859  | △ Power Trans.<br>AT-2650T-70(U/T)               | 38-4-666      |          |           |  |               |
| 5-41x                      | BT308829  | △ Power Trans.<br>AT-2650T-20(CSA, AAL)          | 38-4-663      |          |           |  |               |
| 5-42x                      | BT308830  | △ Power Trans.<br>AT-2650T-40(CEE)               | 38-4-664      |          |           |  |               |
| 5-43x                      | BT308831  | △ Power Trans.<br>AT-2650T-50(UK)                | 38-4-665      |          |           |  |               |
| 5-44                       | ZS308513  | Tapping Screw #2, 3x12(BR)<br>W=8                |               |          |           |  |               |
| 5-45                       | TC289484  | SW. Joint  | CM-6015       |          |           |  |               |
| 5-46                       | EE310308  | Front End FB824U14                               | 57-2-48       |          |           |  |               |
| 5-47                       | TA310304  | Scale Plate (B)                                  | T3-4504       |          |           |  |               |
| 5-48                       | TA308639  | Scale Plate Support (L)                          | T3-4527       |          |           |  |               |
| 5-49                       | TA308640  | Scale Plate Support (R)                          | T3-4528       |          |           |  |               |
| 5-50                       | TA308109  | Pointer Part AT-2450                             | T3-4535       |          |           |  |               |
| 5-51                       | MI301149  | Dial Wheel                                       | 2-15-17       |          |           |  |               |
| 5-52                       | ZG300891  | Dial Wheel Spring                                | AB-3533       |          |           |  |               |
| 5-53                       | TA307160  | Dial String TK-1064 D0.5                         | 8-2-1         |          |           |  |               |

## 6. PHOTO OF FINAL ASSEMBLY BLOCK



### 6) FINAL ASSEMBLY BLOCK

| Ref. No.                    | Parts No. | Description                               | Schematic No. |
|-----------------------------|-----------|---|---------------|
| <b>FRONT PANEL BLOCK</b>    |           |   |               |
| 6-1                         | BD311924  | Front Panel Block Comp.<br>AT-2650        | T3-6510       |
| 6-2x                        | BD311925  | Front Panel Block Comp.<br>AT-2650-BL     | T3-6510       |
| 6-3                         | TA308613  | Front Plate                               | T3-4507       |
| 6-4                         | SK308641  | Tuning Knob Stand                         | T3-4529       |
| 6-5x                        | SK308642  | Tuning Knob Stand (BL)                    | T3-4529       |
| 6-6x                        | ZS497878  | Tapping Screw #2, 3x10 (BR)<br>W=8        |               |
| 6-7                         | SE308529  | Button Escutcheon (A)                     | CY-6013       |
| <b>FINAL ASSEMBLY BLOCK</b> |           |   |               |
| 6-8                         | SK305674  | Power SW. Cap                             | CN-6338       |
| 6-9x                        | SK306130  | Power SW. Cap (BL)                        | CN-6338       |
| 6-10x                       | ZS447840  | Tapping Screw #2, 3x8 (BR)                |               |
| 6-11                        | BC308635  | Upper Cover (A) (Except AAL)              | T3-4524       |
| 6-12x                       | BC308636  | Upper Cover (B) (AAL)                     | T3-4524       |
| 6-13                        | ZS537006  | Screw, binding head 4x8<br>(Black)        |               |
| 6-14x                       | ZS308846  | Tapping Screw #2, 3x8 (BR)<br>(Oval Neck) | 7-1-69        |
| 6-15                        | SK308643  | Tuning Knob                               | T3-4530       |
| 6-16x                       | SK308644  | Tuning Knob (BL)                          | T3-4530       |
| 6-17                        | SK308565  | Knob (A)                                  | M3-4531       |
| 6-18x                       | SK308566  | Knob (A-BL)                               | M3-4531       |
| 6-19                        | SK308567  | Knob (B)                                  | M3-4532       |
| 6-20x                       | SK308568  | Knob (B-BL)                               | M3-4532       |
| 6-21                        | SK310130  | Lever Knob                                | M3-6515       |

## MODEL AM-2650

### 7. INPUT & TAPE P.C BOARD (M3-6501A/B) BLOCK

| Symbol No. | Parts No. | Description                             | Schematic No. |
|------------|-----------|---|---------------|
| 7-1        | BA311962  | Input & Tape P.C Board<br>Comp. AM-2650 | M3-6518       |
| 7-IC1      | EI305696  | IC LA3123                               | 45-8-270      |
| 7-SW1      | ES310171  | Rotary SW. SRZ-K044T                    | 25-6-159      |
| 7-SW2      | ES310170  | Slide SW. 23460                         | 25-3-158      |
| 7-SW3      | ES308884  | Rotary SW. SRZ-K065T                    | 25-6-158      |
| 7-J1to4    | EJ293365  | 4P PIN Jack                             | 31-1-197      |
| 7-J5       | EJ698051  | DIN Jack                                | 31-1-158      |

### 8. MAIN VOL. & BALANCE P.C BOARD (M3-6502A/B) BLOCK

| Symbol No. | Parts No. | Description                                 | Schematic No. |
|------------|-----------|---|---------------|
| 8-VR1      | EV307188  | Single Axial 2 Throw Vol.<br>GM80E-250 kBx2 | 36-22-35      |
| 8-VR2      | EV307189  | Single Axial 2 Throw Vol.<br>GM70E-250 kMN  | 36-22-36      |
| 8-SW1to3   | ES310169  | Lever SW SLR522                             | 25-12-43      |

## 9. TONE CONTROL P.C BOARD (M3-6503) BLOCK

| Symbol No. | Parts No. | Description   | Schematic No. |
|------------|-----------|---|---------------|
| 9-1        | BA311967  | Tone Control P.C Board<br>Comp. AM-2650             | M3-6519       |
| 9-TR1to3   | ET307195  | Transistor 2SC2240<br>(GR) (BL)                     | 45-1-302      |
| 9-VR1,2    | EV308596  | Single Axial 2 Throw Vol.<br>GM70E-50kCx2           | 36-22-39      |
| 9-SW1to3   | ES310169  | Lever SW. SLR522                                    | 25-12-43      |
| 9-R1       | ER308598  | Carbon/R. (Homing Type)<br>F 1/4W 470 ohms (J)      | 35-11-25      |
| 9-C7       | EC662308  | Solid Aluminum/C.<br>(Vert. Type) 0.15μF(K)<br>25WV | 24-19-2       |
| 9-C11      | EC662308  | Solid Aluminum/C.<br>(Vert. Type) 0.15μF(K)<br>25WV | 24-19-2       |

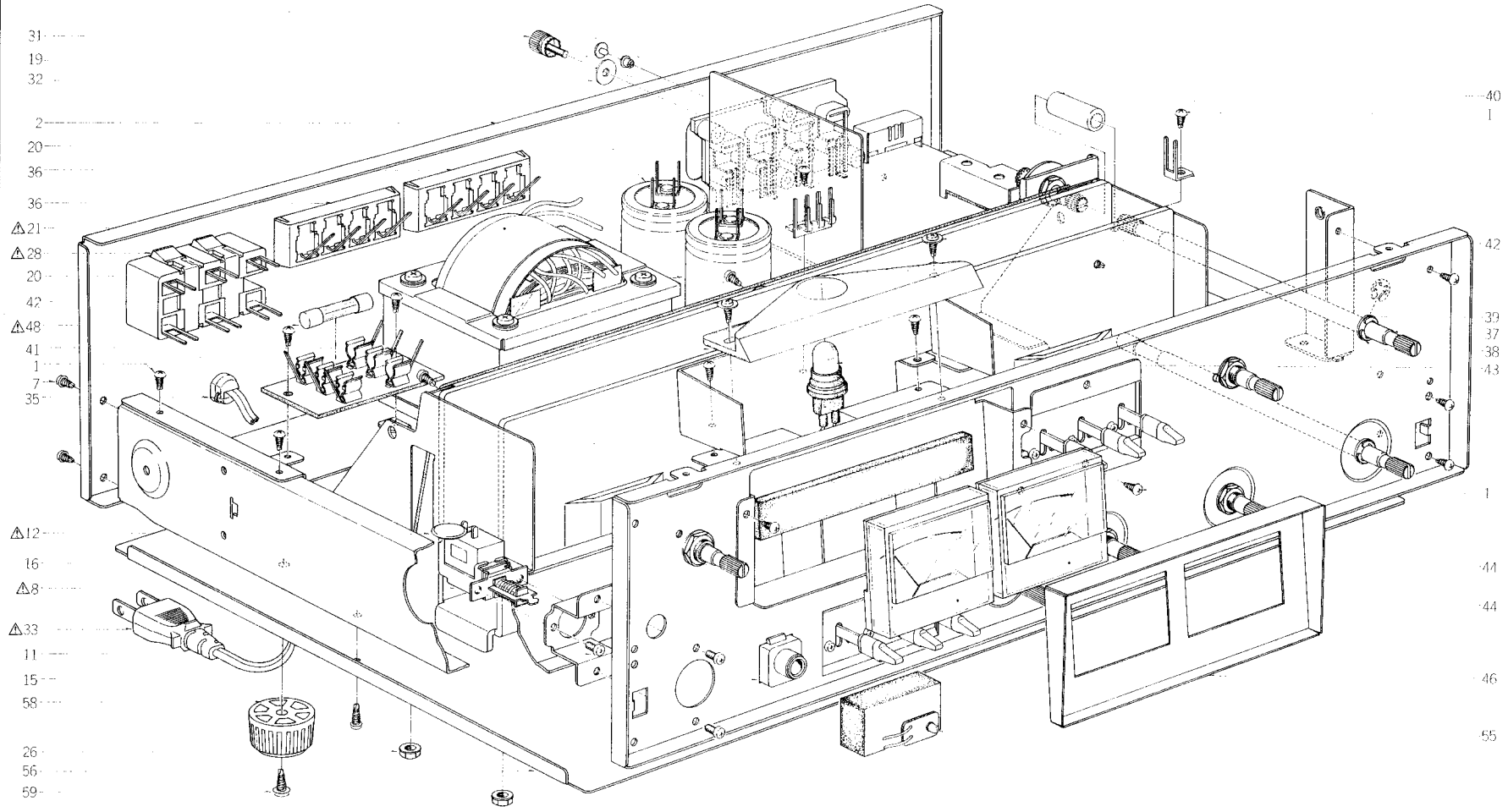
## 10. MAIN AMP P.C BOARD (M3-6504A) BLOCK

| Symbol No. | Parts No. | Description  | Schematic No. |
|------------|-----------|--|---------------|
| 10-1       | BA311955  | Main Amp P.C Board<br>Comp. AM-2650<br>(U/T) (CSA)         |               |
| 10-2       | BA311956  | Main Amp P.C Board<br>Comp. AM-2650<br>(CEE) (UK)          |               |
| 10-IC1     | EI308865  | IC TA7318P   | 45-8-306      |
| 10-TR1     | ET308866  | Transistor 2SA979(G)(H)                                    | 45-1-324      |
| 10-TR2     | ET310168  | Transistor 2SC2229(O)(Y)                                   | 45-1-305      |
| 10-TR3     | ET308867  | Transistor 2SA1015<br>(O)(Y)(GR)                           | 45-1-328      |
| 10-TR4     | ET305221  | Transistor 2SC1815<br>(O)(Y)(GR)                           | 45-1-299      |
| 10-TR5     | ET308870  | Transistor 2SC2235(O)(Y)                                   | 45-1-331      |
| 10-TR6     | ET308868  | Transistor 2SA965(O)(Y)                                    | 45-1-329      |
| 10-TR7     | ET310166  | Transistor 2SD716<br>(AKAI)(R)(O)                          | 45-1-332      |
| 10-TR8     | ET310165  | Transistor 2SB686<br>(AKAI)(R)(O)                          | 45-1-330      |
| 10-TR9     | ET310166  | Transistor 2SD716<br>(AKAI)(R)(O)                          | 45-1-332      |
| 10-TR10    | ET310165  | Transistor 2SB686<br>(AKAI)(R)(O)                          | 45-1-330      |
| 10-TR11    | ET307195  | Transistor 2SC2240<br>(GR)(BL)                             | 45-1-302      |
| 10-TR12    | ET308867  | Transistor 2SA1015<br>(O)(Y)(GR)                           | 45-1-328      |
| 10-TR13    | ET305221  | Transistor 2SC1815<br>(O)(Y)(GR)                           | 45-1-299      |
| 10-TR14    | ET403391  | Transistor 2SC536(G)(H)                                    | 45-1-55       |
| 10-TR15    | ET305221  | Transistor 2SC1815<br>(O)(Y)(GR)                           | 45-1-299      |
| 10-TR16    | ET666404  | Transistor 2SD571(K)(L)                                    | 45-1-218      |
| 10-TR17    | ET307193  | Transistor 2SD612K<br>(D)(E)(F)                            | 45-1-306      |
| 10-TR18    | ET308868  | Transistor 2SA965(O)(Y)                                    | 45-1-329      |
| 10-D1to5   | ED214457  | Silicon Diode 1S2472                                       | 45-3-41       |
| 10-D6      | ED240377  | Zener Diode RD36E(C)                                       | 45-6-72       |
| 10-D7,8    | ED300924  | Silicon Diode GP08D  | 45-2-68       |
| 10-D9,10   | ED624903  | Silicon Diode 1S2473                                       | 45-3-28       |
| 10-D11to14 | ED245428  | Silicon Diode GP30G  | 45-2-69       |
| 10-RL1     | EP245305  | Relay MS24D4-OZ  | 47-1-28       |
| 10-L1,2    | EO650823  | Phase Compensation Coil<br>2.2μH(K)                        | 23-1-239      |
| 10-VR1     | EV300921  | Semi-fixed/Vol.<br>V10K8-1-2 1kB                           | 36-10-255     |
| 10-VR2,3   | EV301637  | Semi-fixed/Vol.<br>V10K8-1-2 500 ohms(B)                   | 36-10-255     |
| 10-R13     | ER308872  | Carbon/R. (Homing Type)<br>F 1/4W 4.7 ohms(J)              | 35-11-25      |
| 10-R14,15  | ER308873  | Carbon/R. (Homing Type)<br>F 1/4W 150 ohms(J)              | 35-11-25      |
| 10-R16     | ER308872  | Carbon/R. (Homing Type)<br>F 1/4W 4.7 ohms(J)              | 35-11-25      |
| 10-R17,18  | ER310147  | Carbon/R. (Homing Type)<br>F 1/4W 10 ohms(J)               | 35-11-25      |
| 10-R19,20  | ER310879  | Cement/R. (Metal Plate)<br>2W 0.47 ohm(K)                  | 36-16-82      |
| 10-R21,22  | ER310147  | Carbon/R. (Homing Type)<br>F 1/4W 10 ohms(J)               | 35-11-25      |
| 10-R23,24  | ER310879  | Cement/R. (Metal Plate)<br>2W 0.47 ohm(K)                  | 35-16-82      |
| 10-R31,32  | ER308875  | Carbon/R. (Homing Type)<br>F 1/2W 10 ohms(J)<br>(U/T, CSA) | 35-11-27      |
| 10-R46     | ER389687  | Metal Oxide Film/R.<br>1W 220 ohms (K)                     | 35-15-10      |
| 10-R60,61  | ER409814  | Metal Oxide Film/R.<br>2W 220 ohms(K)                      | 35-15-8       |
| 10-R64,65  | ER308875  | Carbon/R. (Homing Type)<br>F 1/2W 10 ohms(J)               | 35-11-27      |
| 10-R66     | ER308876  | Carbon/R. (Homing Type)<br>F 1/4W 27 ohms(J)<br>(U/T)      | 35-11-25      |

When ordering parts, please describe Parts Number, Description, and Model Number in detail.

---

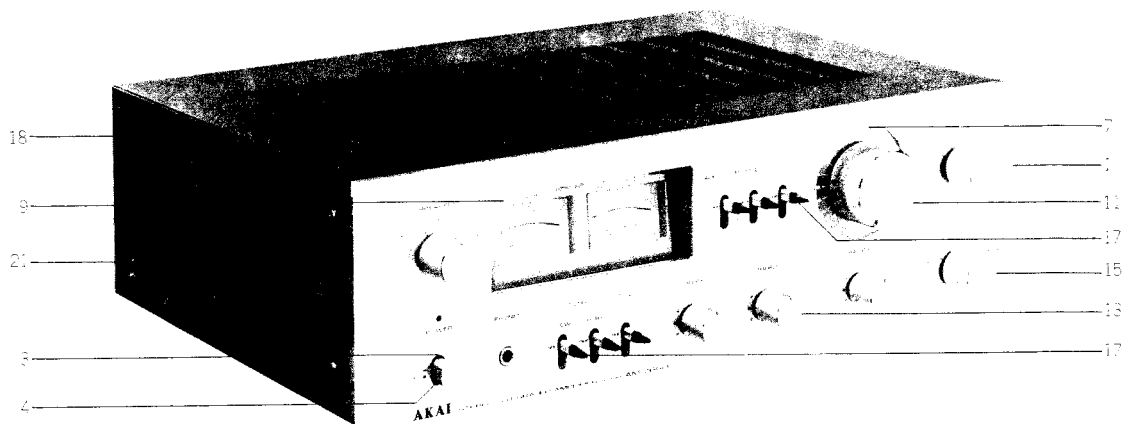
| Symbol No. | Parts No. | Description   | Schematic No. |
|------------|-----------|---|---------------|
| 10-C1      | EC621257  | Solid Aluminum/C.<br>(Vert. Type) 0.47 $\mu$ F(M)<br>25WV | 24-19-2       |
| 10-C20     | EC662128  | Solid Aluminum/C.<br>(Vert. Type) 2.2 $\mu$ F(M)<br>25WV  | 24-19-2       |
| 10-C29     | EC308877  | NP Elect./C. (Homing<br>Type) 3.3 $\mu$ F(M) 25WV         | 24-17-31      |
| 10-C32     | EC308877  | NP Elect./C. (Homing<br>Type) 3.3 $\mu$ F(M) 25WV         | 24-17-31      |
| 10-3       | ZS325495  | Tapping Screw #2, 3x6<br>(BR)                             |               |
| 10-4       | ZS447840  | Tapping Screw #2, 3x8<br>(BR)                             |               |
| 10-5       | ZW310167  | Insulator Washer AC331                                    | 45-16-35      |
| 10-6       | ZS421806  | Screw, pan head 3x8                                       |               |



11. ILLUSTRATION OF ASSEMBLY BLOCK



## 12. PHOTO OF FINAL ASSEMBLY BLOCK



### 12) FINAL ASSEMBLY BLOCK

| Ref. No.                    | Parts No. | Description                           | Schematic No. |
|-----------------------------|-----------|---------------------------------------|---------------|
| <b>FRONT PANEL BLOCK</b>    |           |                                       |               |
| 12-1                        | BD311969  | Front Panel Block Comp.<br>AM-2650    | M3-6517       |
| 12-2x                       | BD311970  | Front Panel Block Comp.<br>AM-2650-BL | M3-6517       |
| 12-3                        | SE306863  | Button Escutcheon                     | M3-2522       |
| 12-4                        | SK306864  | Push Button                           | M3-2523       |
| 12-5x                       | SK306866  | Push Button (BL)                      | M3-2523       |
| 12-6x                       | ZG306867  | Taper Spring                          | M3-2524       |
| 12-7                        | TA308532  | Vol. Plate                            | M3-4507, 4508 |
| 12-8x                       | TA308998  | Vol. Plate (BL)                       | M3-4507, 4508 |
| 12-9                        | TA308534  | Meter Plate                           | M3-4509       |
| <b>FINAL ASSEMBLY BLOCK</b> |           |                                       |               |
| 12-10x                      | ZS447840  | Tapping Screw #2, 3x8 (BR)            |               |
| 12-11                       | SK308562  | Vol. Knob                             | M3-4530       |
| 12-12x                      | SK308563  | Vol. Knob (BL)                        | M3-4530       |
| 12-13                       | SK308565  | Knob (A)                              | M3-4531       |
| 12-14x                      | SK308566  | Knob (A-BL)                           | M3-4531       |
| 12-15                       | SK308567  | Knob (B)                              | M3-4532       |
| 12-16x                      | SK308568  | Knob (B-BL)                           | M3-4532       |
| 12-17                       | SK310130  | Lever Knob                            | M3-6515       |
| 12-18                       | BC308561  | Upper Cover (A) (Except AAL)          | M3-4529       |
| 12-19x                      | BC308571  | Upper Cover (B) (AAL)                 | M3-4529       |
| 12-20x                      | ZS447761  | Tapping Screw #2, 3x6 (BR)<br>(Black) |               |
| 12-21                       | ZS537006  | Screw, binding head 4x8<br>(Black)    |               |

# INDEX

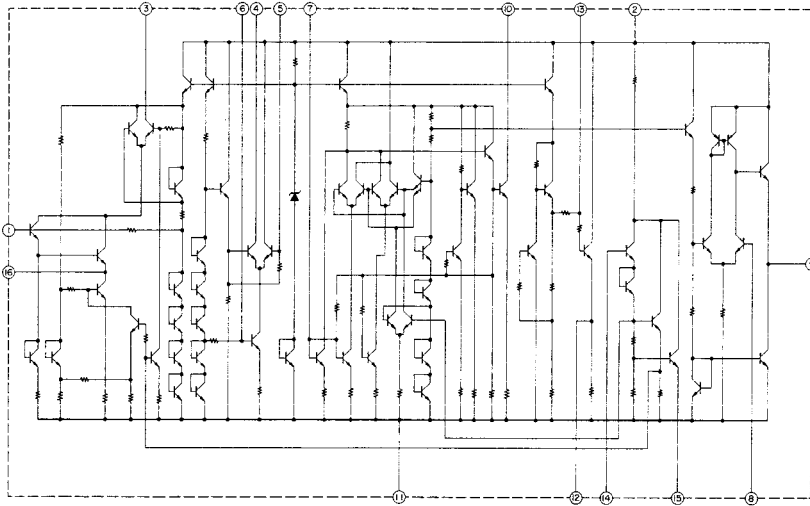
| Parts No. | Ref. No. & Symbol No. | Parts No. | Ref. No. & Symbol No. | Parts No. | Ref. No. & Symbol No. | Parts No. | Ref. No. & Symbol No. | Parts No. | Ref. No. & Symbol No. |
|-----------|-----------------------|-----------|-----------------------|-----------|-----------------------|-----------|-----------------------|-----------|-----------------------|
| BA308066  | 4-3                   | EI310299  | 2-IC4                 | ET403391  | 10-TR14               | ZG300891  | 5-52                  |           |                       |
| BA308067  | 4-2                   | EI697871  | 2-IC2                 | ET618873  | 2-TR3,4               | ZG306867  | 12-6x                 |           |                       |
| BA308069  | 4-1                   | EJ240535  | 11-28                 | ET632215  | 2-TR1,2               | ZS297641  | 5-5                   |           |                       |
| BA311178  | 4-4                   | EJ293365  | 7-J1to4               | ET632215  | 2-TR5to10             | ZS308513  | 5-44                  |           |                       |
| BA311920  | 2-1                   | EJ296853  | 5-38x                 | ET632215  | 4-TR2                 | ZS308673  | 5-29x                 |           |                       |
| BA311955  | 10-1                  | EJ296853  | 11-29x                | ET666404  | 10-TR16               | ZS308846  | 6-14x                 |           |                       |
| BA311956  | 10-2                  | EJ301199  | 11-15                 | EV300921  | 10-VR1                | ZS325495  | 4-5                   |           |                       |
| BA311962  | 7-1                   | EJ306940  | 11-31                 | EV301637  | 10-VR2,3              | ZS325495  | 5-3                   |           |                       |
| BA311967  | 9-1                   | EJ306942  | 11-36                 | EV307188  | 8-VR1                 | ZS325495  | 10-3                  |           |                       |
| BC308561  | 12-18                 | EJ308832  | 5-30                  | EV307189  | 8-VR2                 | ZS325495  | 11-1                  |           |                       |
| BC308571  | 12-19x                | EJ308834  | 5-34                  | EV307246  | 2-VR5,6               | ZS379350  | 5-16x                 |           |                       |
| BC308635  | 6-11                  | EJ698051  | 7-J5                  | EV308596  | 9-VR1,2               | ZS379350  | 11-11                 |           |                       |
| BC308636  | 6-12x                 | EL307157  | 5-17                  | EV308842  | 2-VR4                 | ZS421806  | 10-6                  |           |                       |
| BD311924  | 6-1                   | EL308839  | 5-18                  | EV308854  | 2-VR2                 | ZS434250  | 5-54x                 |           |                       |
| BD311925  | 6-2x                  | EL308839  | 11-43                 | EV314538  | 2-VR3                 | ZS434250  | 11-27x                |           |                       |
| BD311969  | 12-1                  | EL308840  | 5-19x                 | EV560136  | 2-VR1                 | ZS447761  | 5-28x                 |           |                       |
| BD311970  | 12-2x                 | EM300354  | 5-11x                 | EW305691  | 5-36x                 | ZS447761  | 11-7                  |           |                       |
| BT307204  | 2-T3                  | EM300355  | 5-9x                  | EW305691  | 11-34x                | ZS447761  | 12-20x                |           |                       |
| BT308829  | 5-41x                 | EM308843  | 5-10                  | EW306428  | 5-35                  | ZS447840  | 5-66                  |           |                       |
| BT308830  | 5-42x                 | EM308844  | 5-8                   | EW306428  | 11-33                 | ZS447840  | 6-10x                 |           |                       |
| BT308831  | 5-43x                 | EM310163  | 11-44                 | EZ631945  | 5-37                  | ZS447840  | 10-4                  |           |                       |
| BT308859  | 5-40                  | EM310164  | 11-45x                | EZ631945  | 11-35                 | ZS447840  | 11-57x                |           |                       |
| BT310141  | 11-23x                | EO307186  | 2-T2                  | MI301149  | 5-51                  | ZS447840  | 12-10x                |           |                       |
| BT310142  | 11-22x                | EO307202  | 2-T5                  | MR308836  | 5-7                   | ZS463353  | 5-39x                 |           |                       |
| BT310143  | 11-24x                | EO307203  | 2-T6                  | MS308569  | 11-37                 | ZS463353  | 11-30x                |           |                       |
| BT310144  | 11-25x                | EO307205  | 2-T4                  | MZ307170  | 5-6                   | ZS497878  | 6-6x                  |           |                       |
| BT310145  | 11-21                 | EO310302  | 2-T1                  | SA312465  | 5-64                  | ZS498273  | 5-4                   |           |                       |
| BT444137  | 5-32                  | EO539820  | 3-L1                  | SA312465  | 11-58                 | ZS498273  | 11-42                 |           |                       |
| EC204671  | 4-C1                  | EO539820  | 4-L1                  | SE306863  | 12-3                  | ZS522865  | 5-31                  |           |                       |
| EC204671  | 4-C2,3                | EO650610  | 2-L1                  | SE308529  | 6-7                   | ZS522865  | 11-17x                |           |                       |
| EC204671  | 11-12                 | EO650823  | 10-L1,2               | SK305674  | 6-8                   | ZS537006  | 6-13                  |           |                       |
| EC294118  | 4-C1                  | EP245305  | 10-RL1                | SK306130  | 6-9x                  | ZS537006  | 12-21                 |           |                       |
| EC294118  | 11-13x                | ER308598  | 9-R1                  | SK306864  | 12-4                  | ZS565942  | 5-65                  |           |                       |
| EC301320  | 4-C1                  | ER308617  | 2-FL1to4              | SK306866  | 12-5x                 | ZS565942  | 11-59                 |           |                       |
| EC301320  | 11-14x                | ER308855  | 2-FL5,6               | SK308562  | 12-11                 | ZS608185  | 11-18x                |           |                       |
| EC308585  | 11-20                 | ER308872  | 10-R13                | SK308563  | 12-12x                | ZW231030  | 5-20x                 |           |                       |
| EC308877  | 10-C29                | ER308872  | 10-R16                | SK308565  | 6-17                  | ZW270123  | 11-38                 |           |                       |
| EC308877  | 10-C32                | ER308873  | 10-R14,15             | SK308565  | 12-13                 | ZW308889  | 5-14                  |           |                       |
| EC405898  | 2-C87                 | ER308875  | 10-R31,32             | SK308566  | 6-18x                 | ZW308890  | 5-15                  |           |                       |
| EC435690  | 2-C60,61              | ER308875  | 10-R64,65             | SK308566  | 12-14x                | ZW310167  | 10-5                  |           |                       |
| EC621257  | 10-C1                 | ER308876  | 10-R66                | SK308567  | 6-19                  | ZW322110  | 11-39                 |           |                       |
| EC638188  | 2-C88                 | ER310147  | 10-R17,18             | SK308567  | 12-15                 | ZW413188  | 5-55x                 |           |                       |
| EC650406  | 2-C1                  | ER310147  | 10-R21,22             | SK308568  | 6-20x                 | ZW413267  | 11-26                 |           |                       |
| EC662128  | 10-C20                | ER310879  | 10-R19,20             | SK308568  | 12-16x                | ZW651082  | 11-32                 |           |                       |
| EC662308  | 9-C7                  | ER310879  | 10-R23,24             | SK308641  | 6-4                   | ZW698308  | 11-19                 |           |                       |
| EC662308  | 9-C11                 | ER389687  | 10-R46                | SK308642  | 6-5x                  |           |                       |           |                       |
| ED214457  | 10-D1to5              | ER409814  | 10-R60,61             | SK308643  | 6-15                  |           |                       |           |                       |
| ED223547  | 4-D2                  | ES224436  | 11-8                  | SK308644  | 6-16x                 |           |                       |           |                       |
| ED240377  | 10-D6                 | ES242346  | 4-SW1                 | SK310130  | 6-21                  |           |                       |           |                       |
| ED245428  | 10-D11to14            | ES242346  | 11-10x                | SK310130  | 12-17                 |           |                       |           |                       |
| ED300924  | 10-D7,8               | ES280258  | 11-9x                 | SP308535  | 11-46                 |           |                       |           |                       |
| ED308592  | 5-2                   | ES308581  | 11-16                 | SP308536  | 11-47x                |           |                       |           |                       |
| ED308592  | 11-55                 | ES308852  | 2-SW1                 | SP308560  | 11-56                 |           |                       |           |                       |
| ED308860  | 4-D3                  | ES308858  | 4-SW1                 | SP308606  | 5-21                  |           |                       |           |                       |
| ED624903  | 2-D1to4               | ES308863  | 4-SW1                 | SP308607  | 5-22x                 |           |                       |           |                       |
| ED624903  | 2-D6to10              | ES308884  | 7-SW3                 | SP308634  | 5-63                  |           |                       |           |                       |
| ED624903  | 4-D1                  | ES310169  | 2-SW2                 | SP310123  | 11-2                  |           |                       |           |                       |
| ED624903  | 10-D9,10              | ES310169  | 8-SW1to3              | SP310124  | 11-4x                 |           |                       |           |                       |
| ED698826  | 5-1                   | ES310169  | 9-SW1to3              | SP310125  | 11-3x                 |           |                       |           |                       |
| EE103307  | 5-33                  | ES310170  | 7-SW2                 | SP310126  | 11-5x                 |           |                       |           |                       |
| EE310308  | 5-46                  | ES310171  | 7-SW1                 | SP310127  | 11-6x                 |           |                       |           |                       |
| EF249851  | 11-52x                | ES310301  | 2-SW3                 | SP310290  | 5-23                  |           |                       |           |                       |
| EF277424  | 11-51x                | ET305221  | 10-TR4                | SP310291  | 5-24x                 |           |                       |           |                       |
| EF300596  | 5-60x                 | ET305221  | 10-TR13               | SP310292  | 5-25x                 |           |                       |           |                       |
| EF300596  | 5-62x                 | ET305221  | 10-TR15               | SP310293  | 5-26x                 |           |                       |           |                       |
| EF306125  | 5-56                  | ET307193  | 4-TR1                 | SP310294  | 5-27x                 |           |                       |           |                       |
| EF308847  | 5-59x                 | ET307193  | 10-TR17               | TA307160  | 5-53                  |           |                       |           |                       |
| EF308848  | 5-58x                 | ET307195  | 9-TR1to3              | TA308109  | 5-50                  |           |                       |           |                       |
| EF308933  | 5-57x                 | ET307195  | 10-TR11               | TA308532  | 12-7                  |           |                       |           |                       |
| EF378595  | 11-50x                | ET308866  | 10-TR1                | TA308534  | 12-9                  |           |                       |           |                       |
| EF562691  | 11-49x                | ET308867  | 10-TR3                | TA308613  | 6-3                   |           |                       |           |                       |
| EF575223  | 11-48                 | ET308867  | 10-TR12               | TA308638  | 5-12                  |           |                       |           |                       |
| EF601942  | 11-53x                | ET308868  | 10-TR6                | TA308638  | 11-41                 |           |                       |           |                       |
| EF601964  | 5-61x                 | ET308868  | 10-TR18               | TA308639  | 5-48                  |           |                       |           |                       |
| EF623125  | 11-54x                | ET308870  | 10-TR5                | TA308640  | 5-49                  |           |                       |           |                       |
| EI305696  | 7-IC1                 | ET310165  | 10-TR8                | TA308837  | 5-13                  |           |                       |           |                       |
| EI307198  | 2-IC3                 | ET310165  | 10-TR10               | TA308998  | 12-8x                 |           |                       |           |                       |
| EI307199  | 2-IC1                 | ET310166  | 10-TR7                | TA310304  | 5-47                  |           |                       |           |                       |
| EI308850  | 2-IC5                 | ET310166  | 10-TR9                | TA646773  | 11-40                 |           |                       |           |                       |
| EI308865  | 10-IC1                | ET310168  | 10-TR2                | TC289484  | 5-45                  |           |                       |           |                       |

SECTION 3

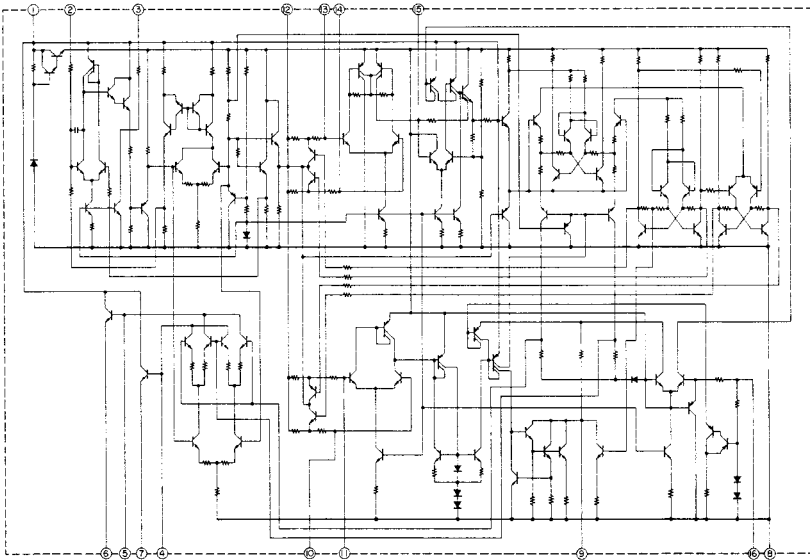
**SCHEMATIC DIAGRAM**

1. AT-2650 No.2-1 1562446A SCHEMATIC DIAGRAM
2. AM-2650 No.2-2 1562447A SCHEMATIC DIAGRAM

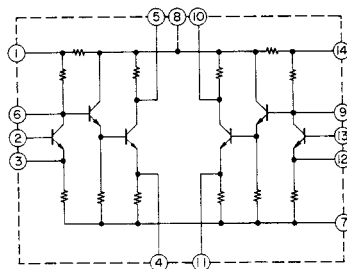
$\mu$ PC1178C

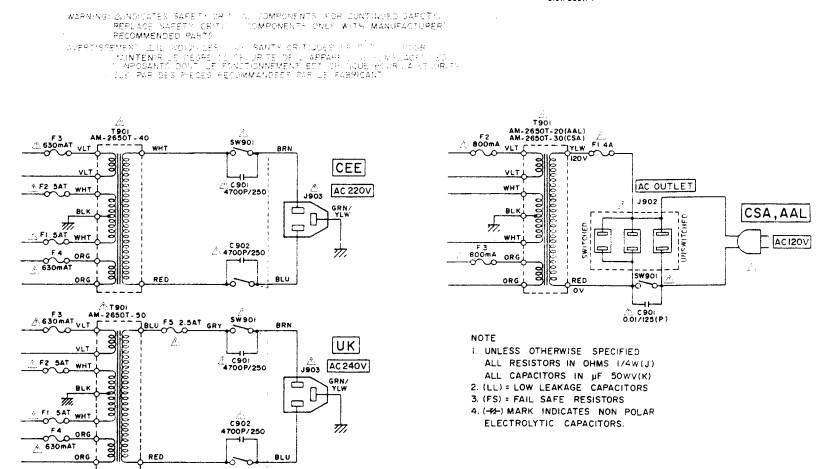
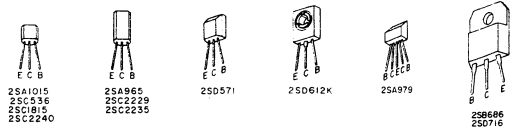
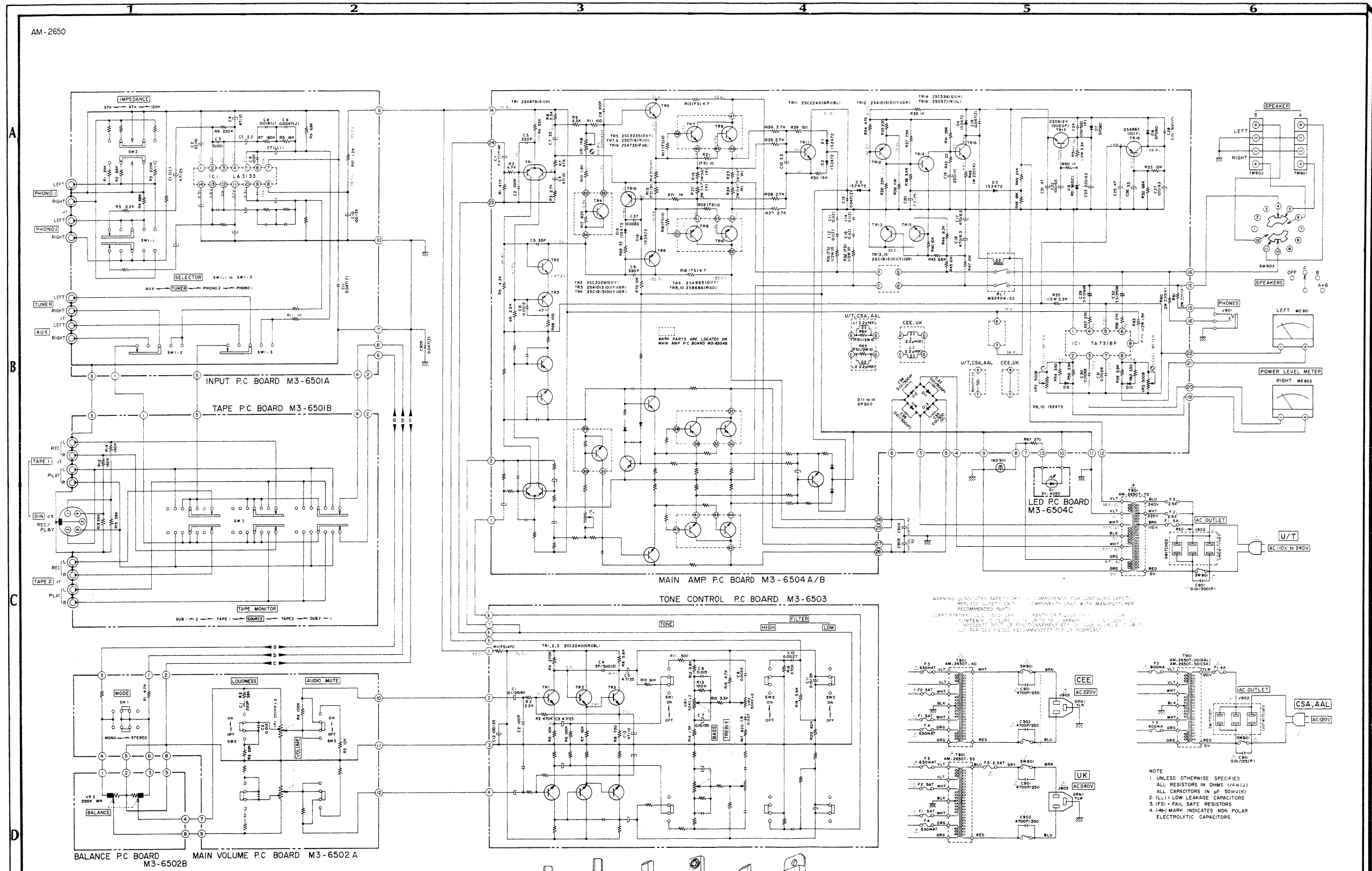


$\mu$ PC1173C

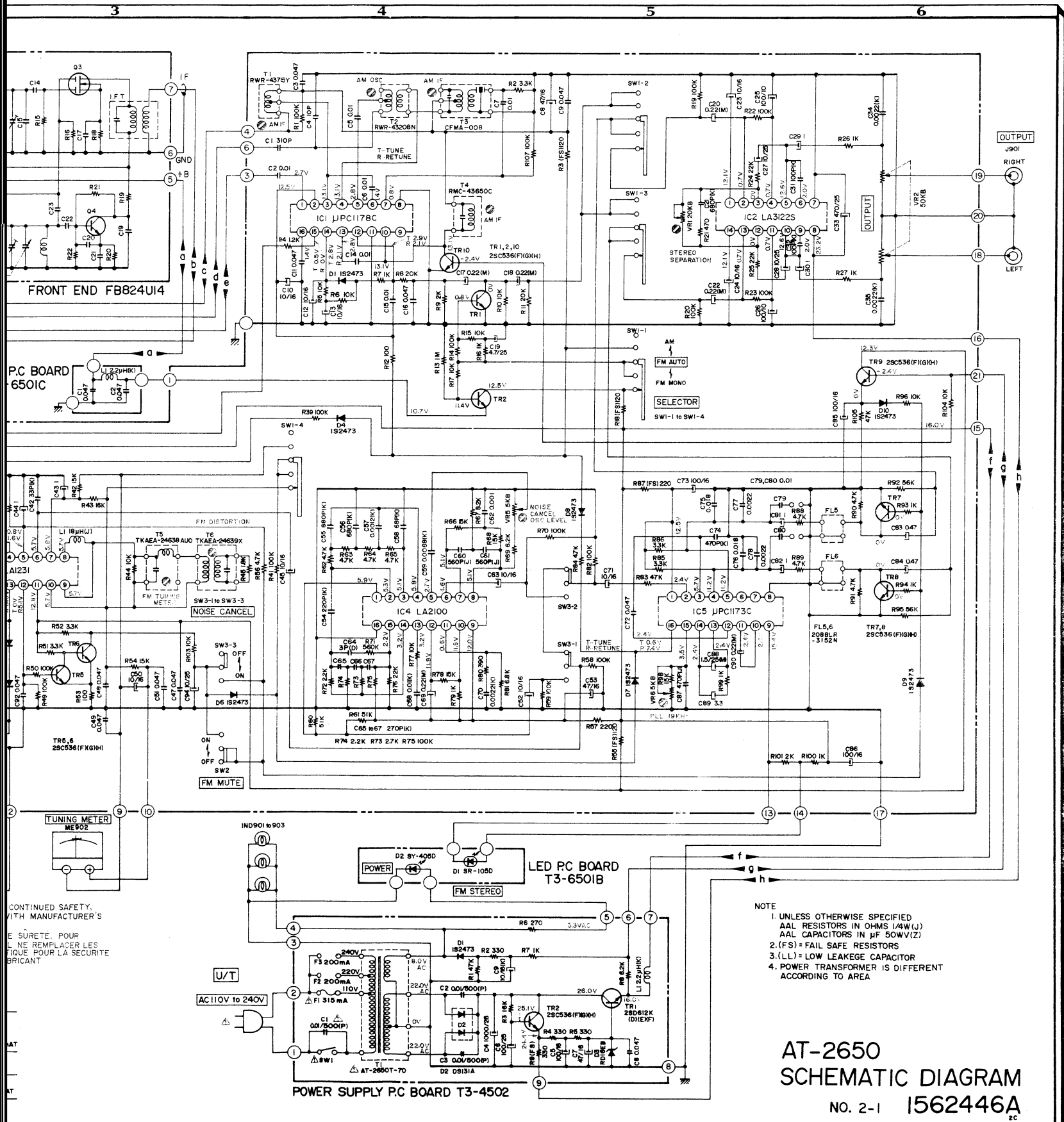


LA3122S/LA3133





NOTE  
 1 UNLESS OTHERWISE SPECIFIED  
 ALL RESISTORS IN OHMS (4W/1J)  
 ALL CAPACITORS IN μF (50WV/1K)  
 2 (LL) LOW LEAKAGE CAPACITORS  
 3 (FS) FAIL SAFE RESISTORS  
 4 (-) MARK INDICATES NON POLAR ELECTROLYTIC CAPACITORS



CONTINUED SAFETY,  
WITH MANUFACTURER'S  
E SÛRETÉ. POUR  
NE REMPLACER LES  
TIQUE POUR LA SÛRETÉ  
BRICANT

- NOTE
1. UNLESS OTHERWISE SPECIFIED  
ALL RESISTORS IN OHMS (1/4W/1%)  
ALL CAPACITORS IN μF (50V/1Z)
  2. (FS) = FAIL SAFE RESISTORS
  3. (LL) = LOW LEAKAGE CAPACITOR
  4. POWER TRANSFORMER IS DIFFERENT  
ACCORDING TO AREA

**AT-2650**  
**SCHEMATIC DIAGRAM**  
NO. 2-1 1562446A  
2C