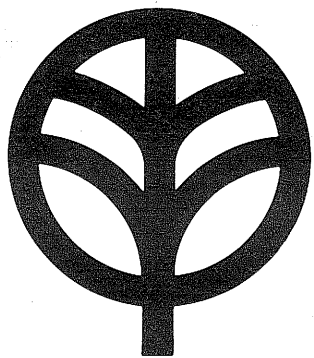




**KENWOOD**

# SERVICE MANUAL

**TL-922**



**LINEAR AMPLIFIER**

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# SECTION 1. IMPORTANT NOTICE

The following explicit definitions apply in this manual.  
Be sure to read these definitions:

**NOTE** ..... inconvenience only — no damage or personal injury.

**CAUTION** ..... equipment damage may occur, but not personal injury.

**WARNING** ..... personal injury may occur — do not disregard.

## WARNING

### LETHAL VOLTAGES PRESENT

Observe all standard safety procedures regarding high RF, AC and DC potentials.

## SECTION 2.1 TECHNICAL SPECIFICATIONS

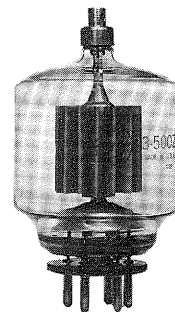
|                                                   |                                                                                                                                |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Transmit Frequency Range</b> .....             | 160 m through 10 m amateur bands                                                                                               |
| <b>Excitation Energy Required</b> .....           | 80W nominal, 120W maximum                                                                                                      |
| <b>Mode and Duty Cycle</b> .....                  | SSB, continuous for 30 minutes<br>CW and RTTY, key-down continuous for 10 minutes                                              |
| <b>Rated Plate Input</b> .....                    | 2 KW P.E.P. SSB 1 KW CW, RTTY                                                                                                  |
| <b>Plate Voltage (at No signal)</b> .....         | 3.1 KV DC-SSB, 2.2 KV — CW, RTTY                                                                                               |
| <b>Circuit Type</b> .....                         | Class AB2 grounded grid linear amplifier                                                                                       |
| <b>3rd Order Intermodulation Distortion</b> ..... | Below — 30 dB                                                                                                                  |
| <b>Input Impedance</b> .....                      | 50Ω, unbalanced at better than 1.5 SWR                                                                                         |
| <b>Output Impedance</b> .....                     | 50 to 75Ω, unbalanced                                                                                                          |
| <b>Cooling</b> .....                              | Forced Air                                                                                                                     |
| <b>Interlock Safety Features</b> .....            | Primary high voltage circuit cut-off<br>Secondary high-voltage circuit grounding                                               |
| <b>Thermal Protector</b> .....                    | Locks out transmit relays if power transformers overheat                                                                       |
| <b>Fan Motor Delay Stop Time</b> .....            | 140 ± 30 seconds (on room temperature)                                                                                         |
| <b>ALC</b> .....                                  | Negative going, adjustable threshold — 8V DC maximum output (typical)                                                          |
| <b>Power Tubes Used</b> .....                     | Eimac 3-500Z, two pieces                                                                                                       |
| <b>Semiconductors</b> .....                       | Diodes, 18 peices<br>Zener diode, 1 piece                                                                                      |
| <b>Power Requirements</b> .....                   | 120V, 5A; 220/240V, 14A; 50/60 Hz; for maximum SSB input                                                                       |
| <b>Cables Supplied</b> .....                      | Power cable with 2-pin grounding plug, 2 m long<br>Signal cable (coaxial) with M-type connector, 1.5 m<br>Control cable, 1.5 m |
| <b>Dimensions</b> .....                           | 390 mm (15-3/8") × 190 mm (7-1/2") × 407 mm (16")<br>Values in parenthesis include protrusions                                 |
| <b>Weight</b> .....                               | Net 31 kg (68 lbs.)<br>Shipping 38 kg (83 lbs.)                                                                                |

## SECTION 2.2 TUBE SPECIFICATIONS

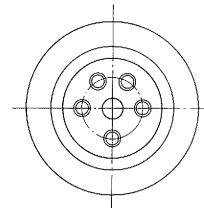
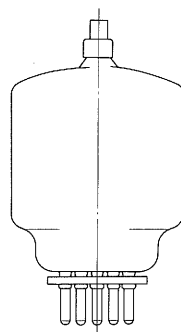
|                                                                 |         |
|-----------------------------------------------------------------|---------|
| Filament                                                        |         |
| Voltage.....                                                    | 5.0V    |
| Current.....                                                    | 14.2A   |
| Direct Interelectrode Capacitances (grounded grid) <sup>2</sup> |         |
| Input .....                                                     | 8.3pF   |
| Output.....                                                     | 4.7pF   |
| Feedback.....                                                   | 0.07pF  |
| Frequency of Maximum Rating                                     |         |
| CW .....                                                        | 110 MHz |

|                               |                           |
|-------------------------------|---------------------------|
| Operating Position.....       | Vertical, base down or up |
| Maximum Operating Temperature |                           |
| Plate Seal.....               | 225°C                     |
| Base Seals .....              | 200°C                     |
| Cooling.....                  | Radiation and forced air  |
| Base.....                     | 5 Pin Special             |

|                         |             |
|-------------------------|-------------|
| Maximum Ratings         |             |
| DC Plate Voltage .....  | 4000 Volts  |
| DC Plate Current.....   | 0.35 Ampere |
| Plate Dissipation ..... | 500 Watts   |
| Grid Dissipation .....  | 20 Watts    |



<3-500Z External View>



(tube basing)

## SECTION 3. FEATURES

- Class AB2, grounded grid linear amplifier using two high-performance Eimac 3-500Z power tubes. Covers all bands 160 m through 10 m for SSB, CW and RTTY modes of operation.
- Highly reliable, it is designed to provide stable, high RF output power for extended periods of continuous use.
- Low intermodulation distortion through the use of negative R.F. feedback (unique to Trio-Kenwood linear design).
- Quick Turn-on. Warm-up is not necessary. The 3-500Z tubes are fast heating.
- Double safety systems, comprised of interlocking switches. One interrupts the high voltage primary circuit while the second directly grounds the secondary high voltage circuit. Bleeder resistors are provided for discharging the high voltage capacitors and "DANGER" warnings are posted at high voltage positions. Please observe all warnings, they are for your protection.
- Fan motor delay stop circuit comprised of a thermal delay relay will hold the cooling fan on for 140 seconds (TYP) after power is removed from the unit and will measurably extend tube life.
- Mode switch for efficient linear operation selects between SSB mode for maximum PEP output with good linearity, and CW Mode for low power consumption and heat generation during extended periods of operation.
- Linear amplification control switch allows straight-through operation without shutting off the unit.
- Variable threshold will accommodate exciters 80W to 120W (nominal) by varying the ALC threshold level. This prevents overdriving the final power tubes and limits the amplifier to its linear range, guaranteeing low distortion at maximum power.
- Two panel meters: one meter always indicates the (Ip) plate current; the second selectively reads (Ig) grid current, (Rf) relative output, or (Hv) high voltage.
- Rigid mechanical structure: The die-cast side panels effectively support the weight of the amplifier against shocks and jarring during transportation. Recessed side panel handles are provided so the amplifier can be easily carried.
- Vernier plate tuning dial facilitates easy tuning, particularly for the higher bands.
- Neat, contemporary appearance. Mechanical arrangement and advanced design match the TS-820 and the TS-520 Series transceivers.
- Power source selecting: Power source can be selected in two sources (120V ↔ 240V).

## SECTION 4. CIRCUIT DESCRIPTION

1. The TL-922 is a grounded grid class AB<sub>2</sub> amplifier consisting of two Eimac Hi-mu, zero bias triodes, 3-500Z, providing the following features:
  - 1) Low IMD (intermodulation distortion) through negative RF feedback.
  - 2) The grounded grid circuit does not require neutralization.
  - 3) Due to its low input impedance, no cathode-swamping resistors are required.
  - 4) High stability at any frequency.
  - 5) Excitation energy is added to the RF output and is not lost.

**Figure 1** shows a circuit diagram of the Linear Power Amplifier.

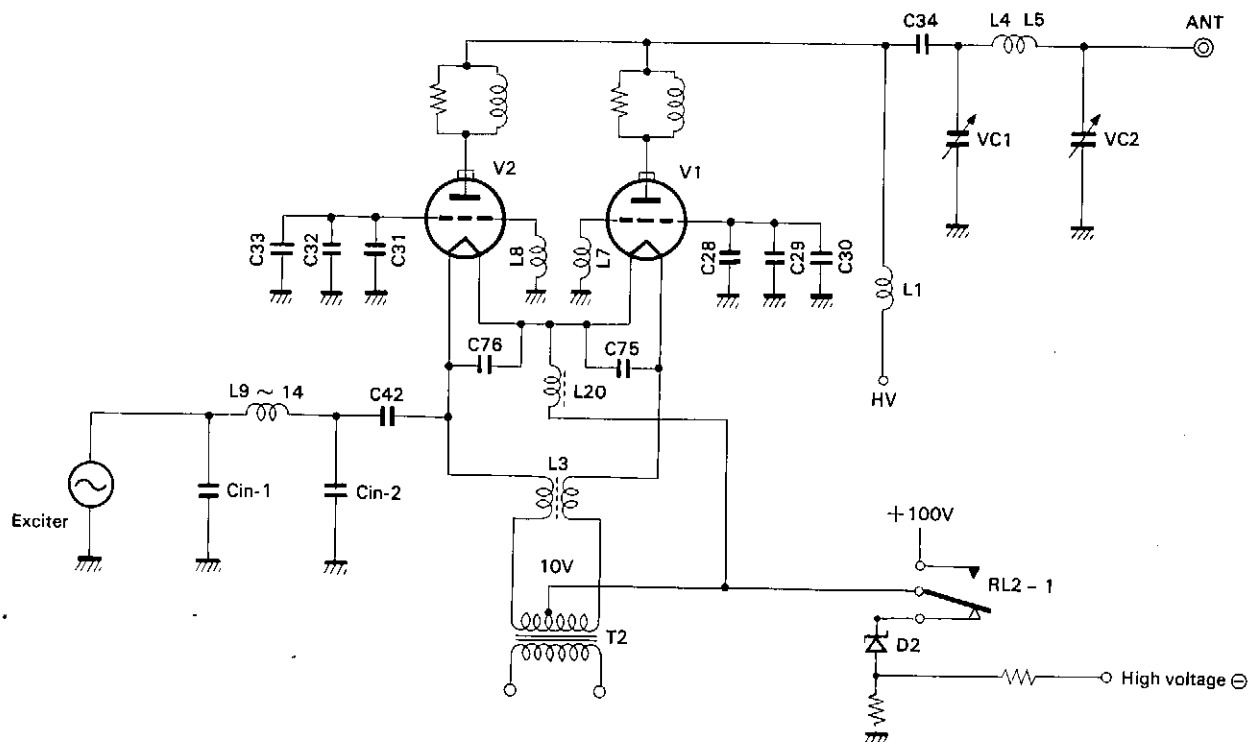
The input matching circuit, comprised of L9 through L14, Cin-1, and Cin-2, matches the exciter impedance with the input circuit impedance to efficiently feed exciter energy into the power tubes. The tubes are heated by the center tapped filament transformer T2 requiring current only half the usual, preventing voltage drop due to wire resistance.

The choke coils L20 and L3 high frequency isolate the filaments from the filament transformer. The bias

voltage, which determines the operating point of the tubes is produced across zener diode D2. This diode carries the full current of the tubes excepting filaments. The grids are DC grounded through L7 and L8 and high-frequency grounded by C28 through C33. The  $\pi$  network, comprised of VC1, L4, L5 and VC2, matches the plate impedance to the antenna. The tubes are cut off to stand by through a positive voltage of approximately 100V applied to the filament circuit.

### 2. Power Supply

The plate high voltage is supplied from a voltage doubling rectifier comprised of a large-capacity, small-sized transformer T1, fourteen high-voltage rectifier diodes rated 800 PIV and eight 200 $\mu$ F electrolytic capacitors rated 550V surge. To improve reliability, the diodes are P.C.B. mounted and the electrolytic capacitors are held by plastic spacers. Filament voltage, relay energizing voltage (in common with the tube cut-off bias voltage), and pilot lamp voltage are supplied from transformer T2. Each primary of the power transformers T1 and T2 has two windings, each of which is fused. Note that fuses are not changed when the input line voltage has been changed.



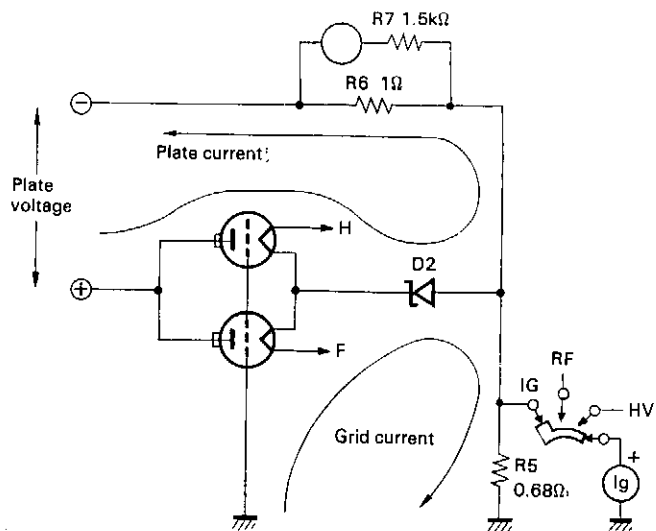
**Fig. 1 Linear Power Amplifier and Mode Switching Circuit**

## SECTION 4. CIRCUIT DESCRIPTION

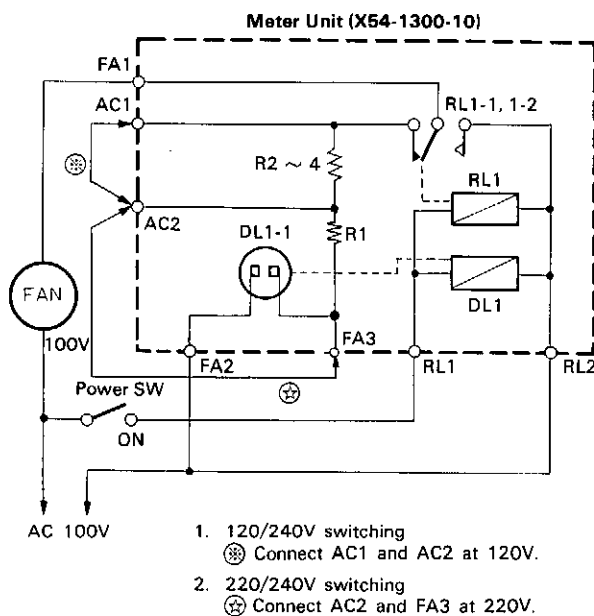
### 3. Fan Motor Delay Stop Circuit

The cooling fan is held on for approximately 2 minutes to cool the power tubes after the POWER switch is turned off. This is accomplished by the fan motor delay stop circuit comprised of a bimetal thermal relay.

**Figure 2** is a schematic diagram illustrating the circuit. When the POWER switch is at OFF, both the relay RL1 and the thermal relay DL1 are not activated and the fan is off. By turning the POWER switch to ON, RL1 is activated, starting the fan. At the same time, voltage is applied to DL1 generating heat, which makes the contact DL1-1 close in approximately 60 seconds. By turning the POWER switch to OFF, RL1 is deenergized, returning contacts RL1-1 and RL1-2 to their home positions. But, the fan continues operating as the thermal relay contact DL1-1 is still closed. DL1-1 opens after approximately 140 seconds thereby stopping the fan.



### Fig. 3 Meter Drive Circuit



**Fig. 2 Fan Motor Delay Stop Circuit**

#### 4. Meter Drive Circuit

The power tube Ip (plate current) and Ig (grid current) can be read on individual meters. **Figure 3** is the meter drive circuit. Ip (plate current) is measured through shunt resistor R6 (1Ω), and deflects the Ip meter through R7 (1.5kΩ) which adjusts meter sensitivity. Similarly, Ig (grid current) is measured on the Multimeter. Additional to Ig, the Multimeter can selectively read relative RF output (which is a rectified RF signal), and Hv (plate voltage). Precise plate voltage reading is obtained through three serial voltage dividing resistors of 5% tolerance.

## 5. Spark Suppressor

The TL-922 contains an oversized relay for conservative operation and its action is slower than smaller relays. The TL-922 is momentarily run leaving the antenna circuit open in such operations as VOX. This leads to high Q at the output circuit which would cause excessive voltage at the plate tuning capacitor. This could arc the capacitor. To prevent this, a discharge gap device is installed at the antenna relay terminals to dissipate any unusually high voltage. During relay changeover, you might sometimes hear arcing from the discharge gap. This is not a failure and should be considered normal.

## 6. Mode Selecting Circuit

Zener diode D2 connected to the filament return circuit biases the cathode positive during transmission (makes the grid negative to the cathode). Thus, the grid is biased without floating it. Bias voltage is low to achieve low distortion. Plate voltage is 2.2kV, idling current 100mA in CW mode and 3.1kV at approximately 200mA in SSB mode. Therefore, plate dissipation power always exceeds 200W.

In SSB mode, the zener diode is shorted by S3 lowering distortion (**See Fig. 1**).

| MODE | At no signal  | At transmission |
|------|---------------|-----------------|
| SSB  | Approx. 3100V | Approx. 2500V   |
| CW   | Approx. 2200V | Approx. 1700V   |

MODE (SSB  $\leftrightarrow$  CW) is switched by switching the second tap of the high voltage transformer.

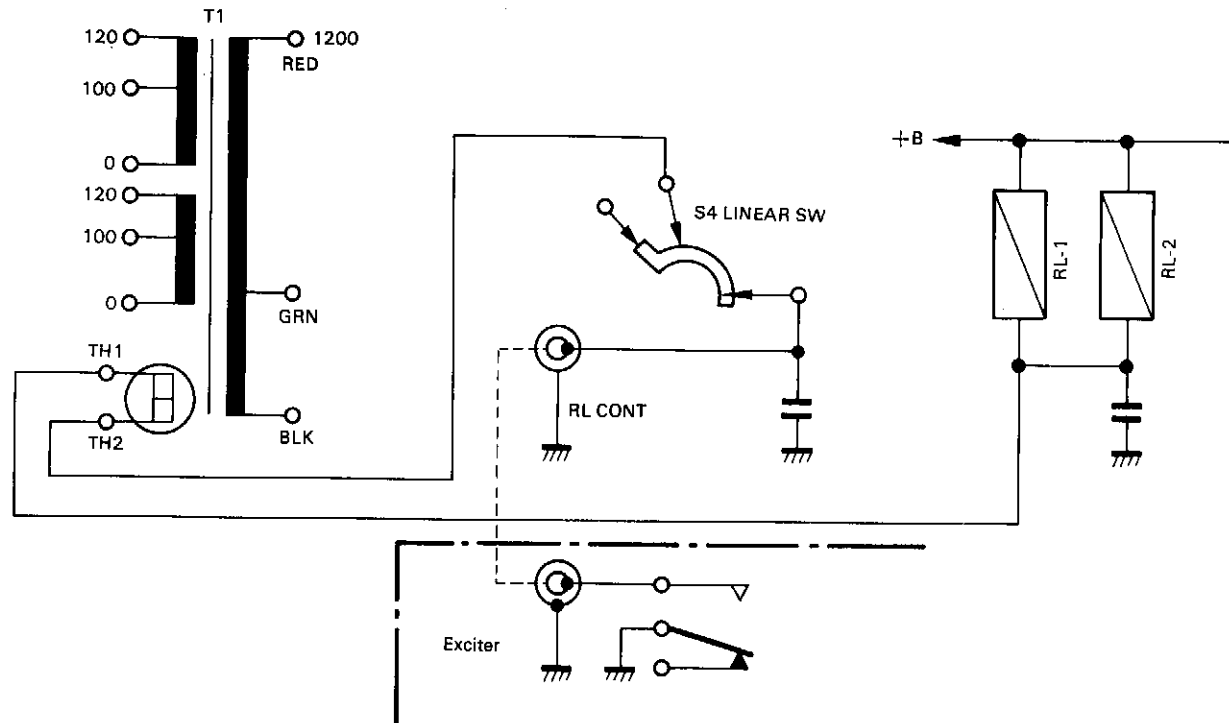
## SECTION 4. CIRCUIT DESCRIPTION

## 7. High Voltage Transformer Protection.

If the temperature of T1 rises over 145°C, the transformer protection thermostat locks the transmit relay in STBY. If protection has occurred, it has likely been caused by a continuous run exceeding the rated capacity of the amplifier. Leave the POWER switch "ON" to allow forced air cooling. While cooling, the exciter will operate straight through. (**Fig. 4**)

## 8. High Voltage Primary and Secondary Safety Circuits

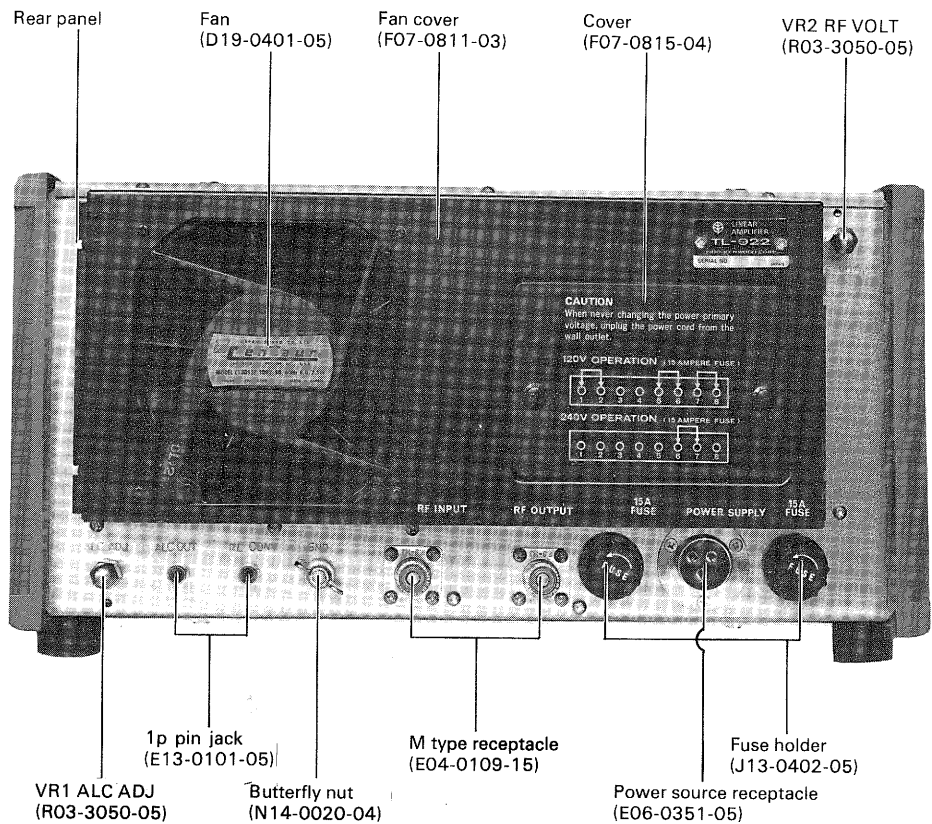
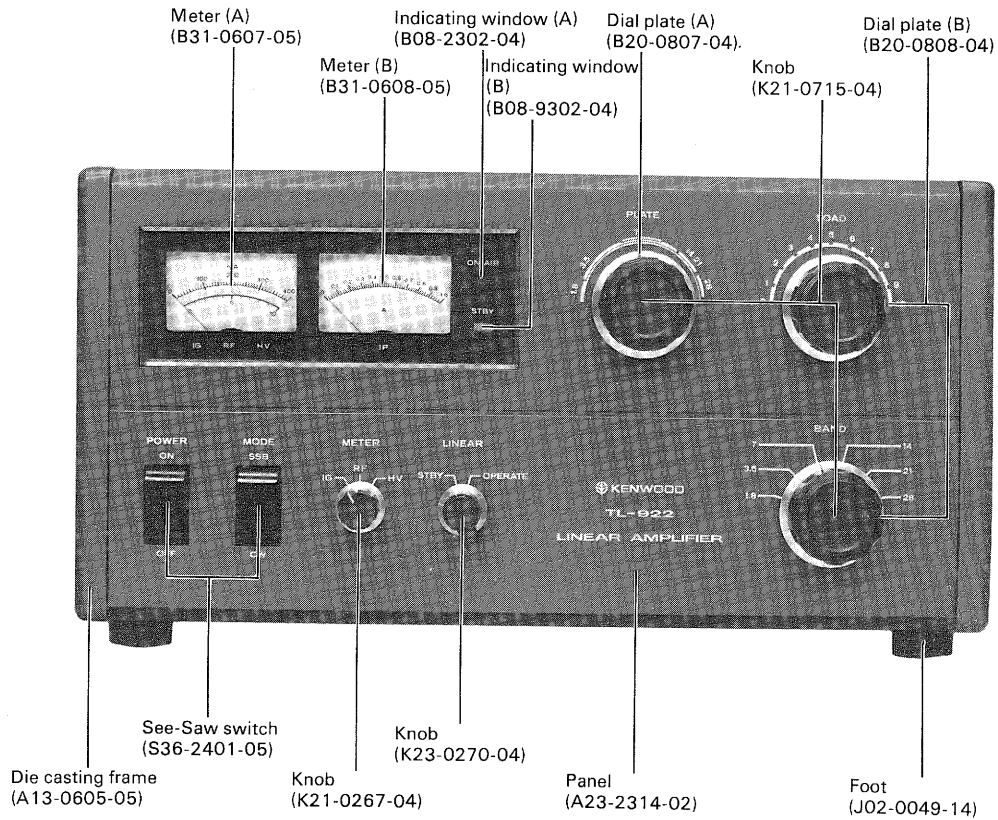
When the top cover is opened, the high voltage transformer primary is switched off by S2. Power supply capacitors will discharge in 20 ~ 30 seconds. When the transmitting tube age is opened, the interlock grounds the B+ supply, discharging the power supply capacitors directly.



**Fig. 4 Transformer Thermal Protection Circuit**

# SECTION 5. VIEWS

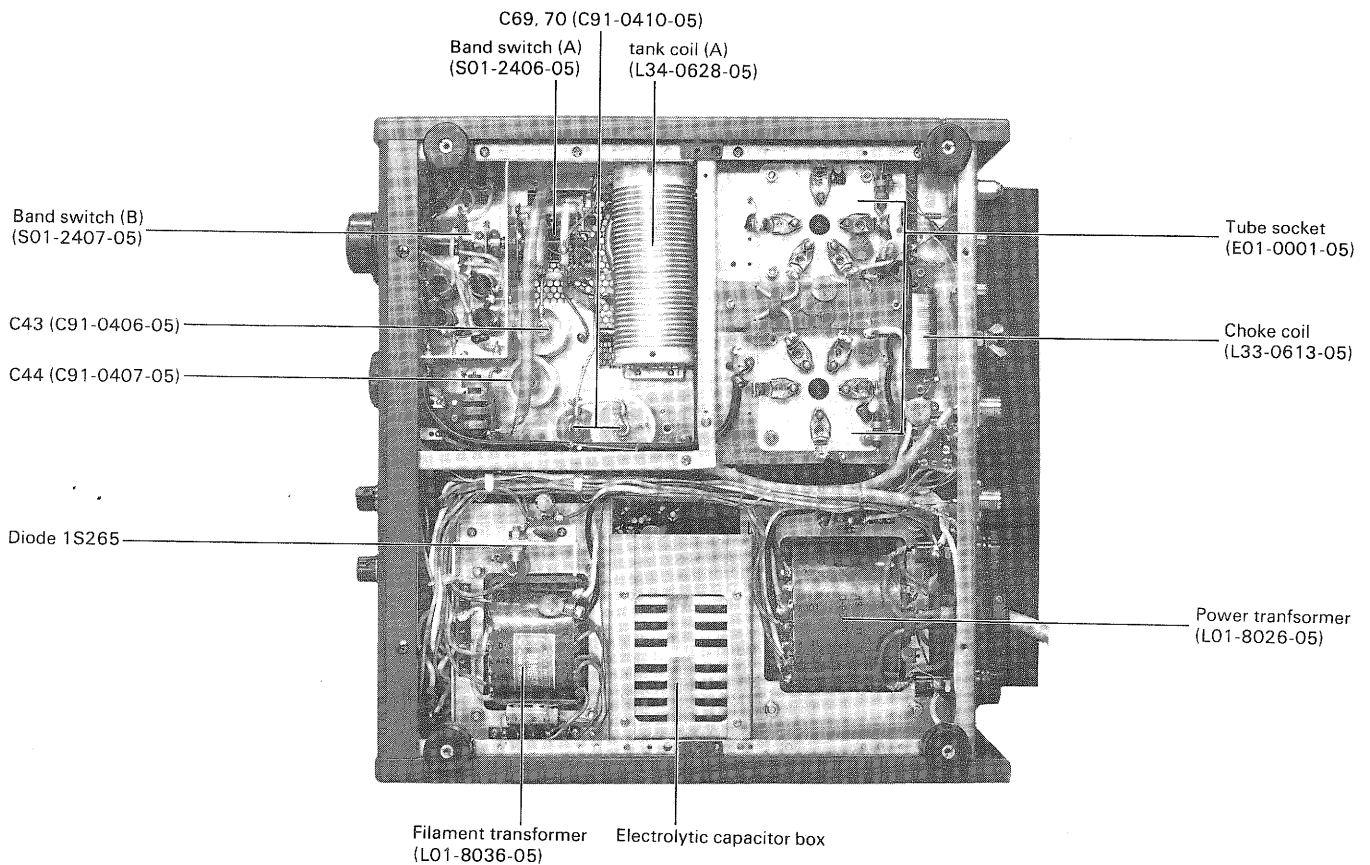
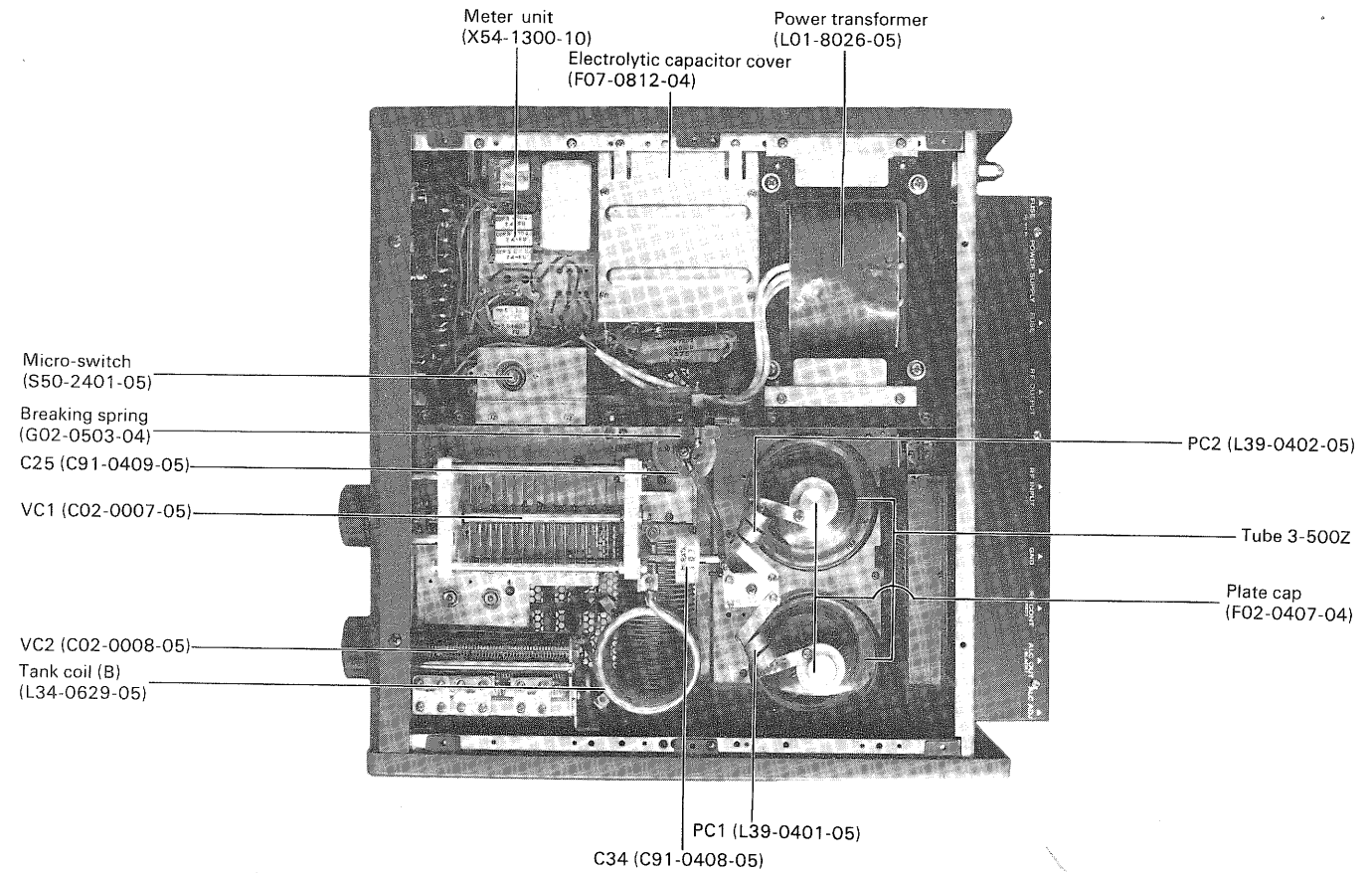
## ▼ EXTERNAL VIEW





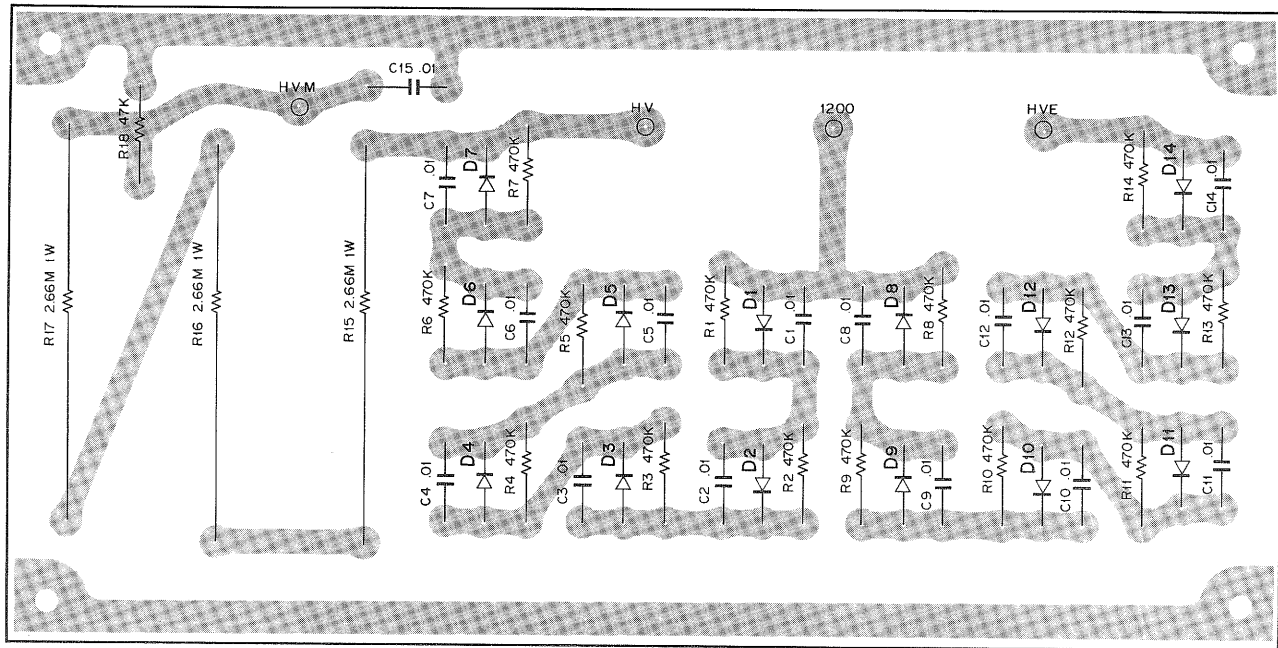
# SECTION 5. VIEWS

## ▼ INTERNAL VIEW

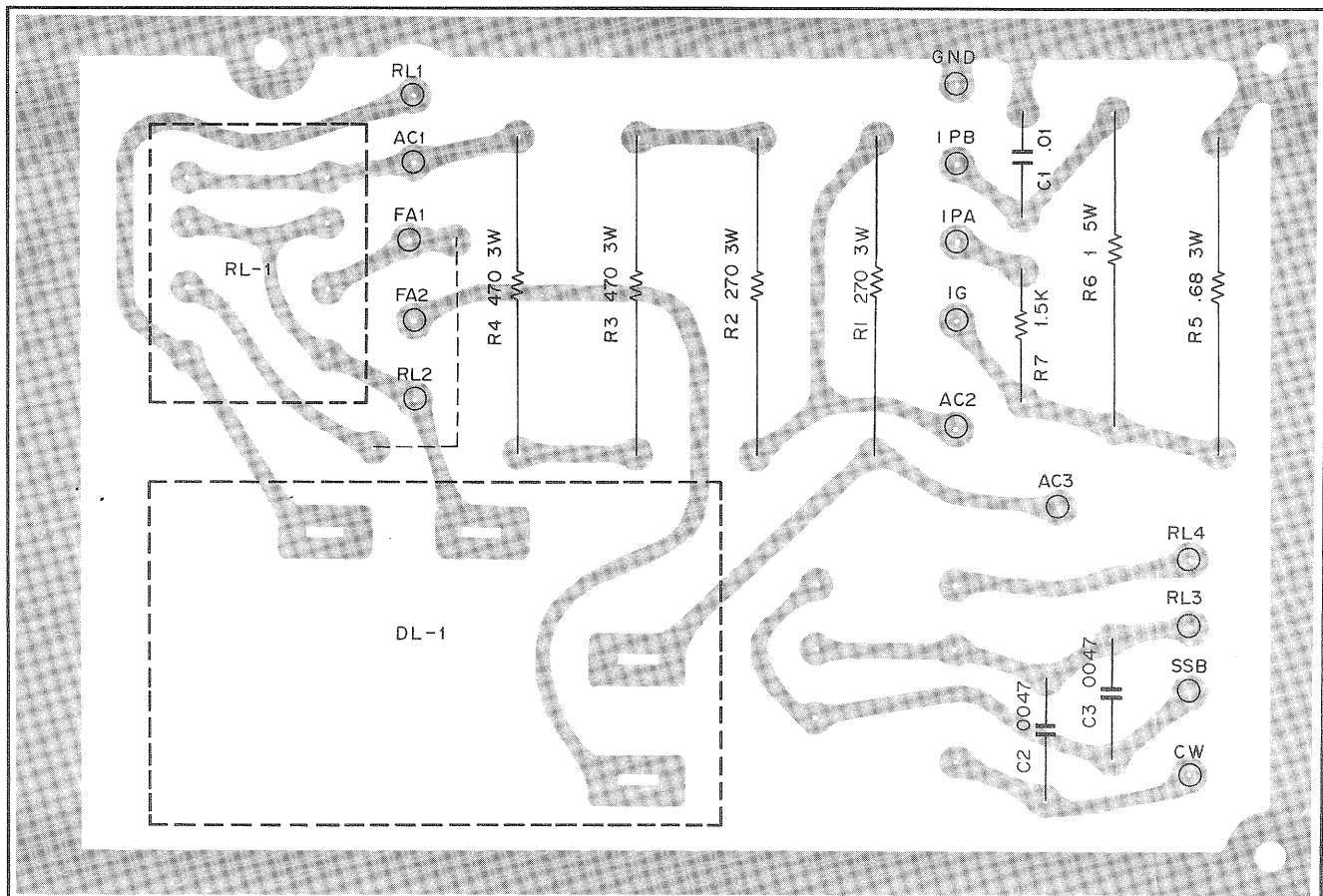


## SECTION 6. PRINTED CIRCUIT BOARDS

### ▼ Rectifier Unit (X43-1280-10)



### ▼ Meter Unit (X54-1300-10)



# SECTION 7. PARTS LIST

## NOTE:

Resistors except the special type (example: cement, metal film, etc.) are not detailed in PARTS LIST. With regard to the value, refer to the schematic diagram or the PC board illustration. Resistors not detailed are carbon type (1/4 or 1/8W). You should give an order for the carbon resistors according to the ways described as follows:

A carbon resistor's part number is; example RD14BY 2E 222J.

### 1. Kinds of the carbon resistor



RD14BY



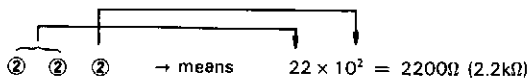
RD14CY

### 2. Wattage

1/4W → 2E

1/8W → 2B

### 3. Resistance value



Significant figure Multiplier

Example:

221 → 220Ω

222 → 2.2kΩ

223 → 22kΩ

224 → 220kΩ

225 → 2.2MΩ

### 4. Tolerance

J = ±5% (Gold color)

K = ±10% (Silver color)

## GENERAL

☆: New parts

[K]: USA, [W]: Europe

| Ref. No.         | Parts No.      | Description               | Re-<br>marks |
|------------------|----------------|---------------------------|--------------|
| <b>CAPACITOR</b> |                |                           |              |
| C1,2             | C90-0300-05    | Ceramic 470pF AC150V      | ☆            |
| C3               | CE02W2C330     | Electrolytic 33μF 160WV   |              |
| C4               | CK45D2H472M    | Ceramic 4700pF ±20%       | ☆            |
| C5,6             | CK45D1H223M    | Ceramic 0.011μF ±20%      |              |
| C7~14            | CK45E2H103P    | Ceramic 0.01μF +100%, -0% | ☆            |
| C15~22           | C90-0803-05    | Electrolytic 200μF 500WV  |              |
| C23,24           | CK45E2H103P    | Ceramic 0.01μF +100%, -0% | ☆            |
| C25              | C90-0409-05    | HV Capacitor 2000pF 15kV  |              |
| C26              | CE04W1C101     | Electrolytic 100μF 16WV   | ☆            |
| C27              | CK45E2H103P    | Ceramic 0.01μF +100%, -0% |              |
| C28~33           | CM93D2H221J    | Mica 220pF ±5%            | ☆            |
| C34              | C91-0408-05    | HV Capacitor 2000pF 15kV  |              |
| C35              | CC45SL1H100D   | Ceramic 10pF ±0.5pF       | ☆            |
| C36~39           | CK45E2H103P    | Ceramic 0.01μF +100%, -0% |              |
| C40              | CC45SL2H150J   | Ceramic 15pF ±5%          | ☆            |
| C41              | CC45SL2H470J   | Ceramic 47pF ±5%          |              |
| C42              | CK45E2H103P    | Ceramic 0.01μF +100%, -0% | ☆            |
| C43              | C91-0406-05    | HV Capacitor 100pF 7.5kV  |              |
| C44              | C91-0407-05    | HV Capacitor 200pF 7.5kV  | ☆            |
| C45              | C91-0413-05    | HV Capacitor 47pF 3.15kV  |              |
| C46              | Missing Number |                           | ☆            |
| C47              | CM93D2H561J    | Mica 560pF ±5%            |              |
| C48,49           | CM93D2H102J    | Mica 1000pF ±5%           | ☆            |
| C50              | CM93D2H561J    | Mica 560pF ±5%            |              |
| C51~53           | CM93D2H331J    | Mica 330pF ±5%            | ☆            |

| Ref. No.         | Parts No.      | Description                                                        | Re-<br>marks |
|------------------|----------------|--------------------------------------------------------------------|--------------|
| C54              | CM93D2H471J    | Mica 470pF ±5%                                                     | ☆            |
| C55              | CM93D2H101J    | Mica 100pF ±5%                                                     |              |
| C56,57           | CM93D2H221J    | Mica 220pF ±5%                                                     |              |
| C58              | CM93D2H121J    | Mica 120pF ±5%                                                     |              |
| C59              | CM93D2H221J    | Mica 220pF ±5%                                                     |              |
| C60              | CM93D2H121J    | Mica 120pF ±5%                                                     |              |
| C61~65           | CK45E2H103P    | Ceramic 0.01μF +100%,—0%                                           |              |
| C66              | C91-0412-05    | Ceramic 4700pF AC500V                                              |              |
| C67,68           | Missing Number |                                                                    |              |
| C69,70           | C91-0410-05    | HV Capacitor 500pF 3kV                                             |              |
| C71~74           | Missing Number |                                                                    | ☆            |
| C75,76           | CK45E2H103P    | Ceramic 0.01μF +100%,—0%                                           |              |
| C77              | CC45SL2H220J   | Ceramic 22pF ±5%                                                   |              |
| C78              | CK45E2H103P    | Ceramic 0.01μF +100%,—0%                                           |              |
| RESISTOR         |                |                                                                    |              |
| R1~21            | RC05GF2H000J   | Carbon 000Ω* ±5% 1/2W<br>*Refer to schematic diagram.              | ☆            |
| R11              | RS14AB3A683J   | Metal film 68kΩ ±5% 1W                                             |              |
| R13~20           | RS14AB3Y473J   | Metal film 47kΩ ±5% 7W                                             |              |
| SEMICONDUCTOR    |                |                                                                    |              |
| D1               | V11-0285-05    | Diode V06E                                                         | ☆            |
| D2               | V11-3161-76    | Zener diode 1S265                                                  |              |
| D3               | V11-0370-05    | Diode 1S1587                                                       |              |
| D4               | V11-0051-05    | Diode 1N60                                                         |              |
| D7               | V11-0270-05    | Diode U05B                                                         |              |
| POTENTIOMETER/VC |                |                                                                    |              |
| VR1,2            | R03-3050-05    | 10kΩ (B) Potentiometer                                             | ☆            |
| VC1              | C02-0007-05    | Variable capacitor (plate)<br>154pF AC 4kV a minute                |              |
| VC2              | C02-0008-05    | Variable capacitor (load) 1920pF<br>(1150pF+770pF) DC 1kV a minute |              |
| SWITCH/RELAY     |                |                                                                    |              |
| S1               | S36-2401-05    | See-saw switch                                                     | ☆            |
| S2               | S50-2401-05    | Micro switch                                                       |              |
| S3               | S36-2401-05    | See-saw switch                                                     | ☆            |
| S4               | S01-1042-05    | Rotary switch STBY                                                 |              |
| S5               | S01-1017-05    | Rotary switch meter                                                | ☆            |
| S6               | S01-2407-05    | Band switch B                                                      |              |
| S7               | S01-2406-05    | Band switch A                                                      | ☆            |
| RL1              | S51-2403-05    | Relay                                                              |              |
| RL2              | S51-2402-05    | Relay                                                              | ☆            |
| COIL/TRANSFORMER |                |                                                                    |              |
| L1               | L33-0610-05    | Choke coil 160μH PLATE                                             | ☆            |
| L2               | L33-0609-05    | Choke coil 12μH                                                    |              |
| L3               | L33-0612-05    | Choke coil 22μH Filament                                           | ☆            |
| L4               | L34-0629-05    | Tank coil B 14~28 MHz                                              |              |
| L5               | L34-0628-05    | Tank coil A 1.9~7 MHz                                              | ☆            |
| L7,8             | L33-0259-05    | Choke coil 470μH (Safety)                                          |              |
| L9               | L34-0630-05    | Input tuning coil A 1.9 MHz                                        | ☆            |
| L10              | L34-0631-05    | Input tuning coil B 3.5 MHz                                        |              |
| L11              | L34-0632-05    | Input tuning coil C 7MHz                                           | ☆            |
| L12              | L34-0633-05    | Input tuning coil D 14 MHz                                         |              |
| L13              | L34-0634-05    | Input tuning coil E 21 MHz                                         | ☆            |
| L14              | L34-0635-05    | Input tuning coil F 28 MHz                                         |              |
| L15~17           | L34-0637-05    | Beads (Ferrite)                                                    | ☆            |
| L18              | L33-0611-05    | Choke coil 1 mH                                                    |              |
| L19              | L34-0637-05    | Beads (Ferrite)                                                    | ☆            |
| L20              | L33-0613-05    | Choke coil 80μH                                                    |              |
| T1               | L01-8026-05    | Power transformer                                                  | ☆            |
| T2               | L01-8036-05    | Filament transformer                                               |              |

## SECTION 7. PARTS LIST

| Ref. No.             | Parts No.   | Description                                       | Re-<br>marks |
|----------------------|-------------|---------------------------------------------------|--------------|
| PC1                  | L39-0401-05 | Parastic suppressor<br>(clockwise winding)        | ☆            |
| PC2                  | L39-0402-05 | Parastic suppressor<br>(counterclockwise winding) | ☆            |
| <b>MISCELLANEOUS</b> |             |                                                   |              |
| V3                   |             | Surge absorber DSA-301LS                          | ☆            |
| —                    | A01-0715-05 | Case                                              | ☆            |
| —                    | A01-0717-03 | Control case                                      | ☆            |
| —                    | A20-2314-02 | Panel                                             | ☆            |
| —                    | A20-2316-02 | Panel assembly                                    | ☆            |
| —                    | B08-2302-04 | Indicating window A (red)                         | ☆            |
| —                    | B08-9302-04 | Indicating window B (white)                       | ☆            |
| —                    | B09-0003-05 | Coupling × 2                                      | ☆            |
| —                    | B10-0609-03 | Front glass                                       | ☆            |
| —                    | B20-0807-04 | Dial plate A 8φ                                   | ☆            |
| —                    | B20-0808-04 | Dial plate B × 2 6φ                               | ☆            |
| —                    | B30-0048-05 | Lamp × 6 8V 50 mA                                 | ☆            |
| —                    | B31-0607-05 | Meter A HV, IG, RF                                | ☆            |
| —                    | B31-0608-05 | Meter B Ip                                        | ☆            |
| —                    | B40-2423-04 | Model name plate                                  | ☆            |
| —                    | B46-0058-00 | Warranty card [K]                                 | ☆            |
| —                    | B50-2552-00 | Operating manual                                  | ☆            |
| —                    | D19-0401-05 | Fan                                               | ☆            |
| —                    | D40-0602-05 | Vernier mechanism assembly                        | ☆            |
| —                    | E01-0001-05 | Tube socket 5P × 2                                | ☆            |
| —                    | E04-0109-15 | M type receptacle × 2                             | ☆            |
| —                    | E06-0351-05 | Power source receptacle 3p                        | ☆            |
| J1,2                 | E13-0101-05 | Pin jack 1P × 2                                   | ☆            |
| —                    | E20-0314-05 | Terminal strip 3P                                 | ☆            |
| —                    | E20-0512-05 | Terminal strip 5P × 3                             | ☆            |
| —                    | E20-0881-05 | Terminal strip 8P [K: 1] [W: 2]                   | ☆            |
| —                    | E20-1003-05 | Terminal strip 10P                                | ☆            |
| —                    | E22-0207-05 | Lug                                               | ☆            |
| —                    | E23-0014-04 | Acme terminal × 2                                 | ☆            |
| —                    | E23-0402-05 | Straight through time terminal                    | ☆            |
| —                    | E23-0403-05 | Joint terminal                                    | ☆            |
| —                    | E23-0404-05 | Press-fit terminal × 23                           | ☆            |
| —                    | E23-0406-04 | Lugs × 4                                          | ☆            |
| —                    | E29-0402-04 | Shorted terminal                                  | ☆            |
| —                    | F02-0407-04 | Plate cap × 2                                     | ☆            |
| —                    | F02-0408-04 | Heat radiator                                     | ☆            |
| —                    | F05-1533-05 | Fuse 15A × 4                                      | ☆            |
| —                    | F15-1610-03 | Shading plate                                     | ☆            |
| —                    | F15-0614-04 | Switch mask                                       | ☆            |
| —                    | F20-0507-02 | Separating plate                                  | ☆            |
| —                    | F20-0508-04 | Insulating plate                                  | ☆            |
| —                    | F29-0014-05 | Insulating washer × 4                             | ☆            |
| —                    | G02-0503-04 | Breaking spring                                   | ☆            |
| —                    | G09-0401-04 | Back spring × 2                                   | ☆            |
| —                    | G13-0612-04 | Cushion × 2                                       | ☆            |
| —                    | H01-2554-04 | Carton case (inside) [K]                          | ☆            |
| —                    | H01-2555-04 | Carton case (inside) [W]                          | ☆            |
| —                    | H03-1655-04 | Carton case (outside) [K]                         | ☆            |
| —                    | H03-1656-04 | Carton case (outside) [W]                         | ☆            |
| —                    | H12-0418-04 | Cushion (Set)                                     | ☆            |
| —                    | H12-0429-04 | Cushion                                           | ☆            |
| —                    | H12-0435-03 | Cushion (Bottom)                                  | ☆            |
| —                    | H12-0436-04 | Cushion (Middle)                                  | ☆            |
| —                    | H20-1403-03 | Protection cover                                  | ☆            |
| —                    | H25-0106-04 | Polyethylene bag                                  | ☆            |

| Ref. No. | Parts No.   | Description                                | Re-<br>marks |
|----------|-------------|--------------------------------------------|--------------|
| —        | H25-0117-04 | Polyethylene bag                           |              |
| —        | H39-0101-05 | Joint (plastics) × 4                       |              |
| —        | J02-0049-14 | Foot × 6                                   |              |
| —        | J13-0402-05 | Fuse holder × 2                            | ☆            |
| —        | J21-2537-04 | PC board A × 2                             | ☆            |
| —        | J21-2538-03 | PC board B                                 | ☆            |
| —        | J29-0401-04 | GND hard-ware                              | ☆            |
| —        | J30-0061-04 | Spacer (rubber) × 2                        |              |
| —        | J30-0503-04 | Spacer (for foot) × 8                      | ☆            |
| —        | J32-0710-04 | Stud A (high voltage)                      | ☆            |
| —        | J32-0711-04 | Stud B (power source)                      | ☆            |
| —        | J32-0712-04 | Round boss × 2                             | ☆            |
| —        | J42-0038-04 | Bushing × 2                                |              |
| —        | J59-0001-05 | Grommet (carrying handle) × 2              |              |
| —        | J59-0002-05 | Plunger × 2                                |              |
| —        | J61-0019-05 | Vinyl tie × 3                              |              |
| —        | K01-0401-05 | Carring handle × 2                         | ☆            |
| —        | K21-0267-04 | Knob (small) METER                         |              |
| —        | K21-0715-04 | Knob (large) × 3                           | ☆            |
| —        | K23-0270-04 | Knob LINEAR                                |              |
| —        | N09-0256-05 | GND screw × 27                             |              |
| —        | N10-2030-46 | Nut                                        |              |
| —        | N10-2040-46 | Nut (socket) × 8                           |              |
| —        | N10-3060-11 | Nut (M6) (for GND)                         |              |
| —        | N14-0020-04 | Butterfly nut (M6) (for GND)               |              |
| —        | N14-0069-14 | Cap nut                                    |              |
| —        | N15-1030-46 | Washer × 8                                 |              |
| —        | N15-1040-46 | Washer × 8                                 |              |
| —        | N16-0038-46 | Spring washer                              |              |
| —        | N16-0040-46 | Spring washer × 20                         |              |
| —        | N16-0060-14 | Spring washer (for GND)                    |              |
| —        | N19-0089-00 | Washer (for GND)                           |              |
| —        | N19-0603-04 | Nylon washer × 8 (for socket)              | ☆            |
| —        | N30-4012-46 | Pan head screw × 4<br>(for auxiliary foot) |              |
| —        | N35-4006-11 | Binding screw × 12 (case, handle)          |              |
| —        | N87-3010-46 | Tapping screw × 4 (Terminal stand)         |              |
| —        | N87-4012-46 | Tapping screw × 2 (Foot)                   |              |
| —        | X42-1090-10 | Power cord assembly with plug              | ☆            |
| —        | X42-1110-10 | Control cable ass'y                        | ☆            |
| —        | X42-1120-10 | Coaxial cable ass'y                        | ☆            |
| —        | X43-1280-10 | Rectifier unit                             | ☆            |
| —        | X54-1300-10 | Meter unit                                 | ☆            |

### POWER CORD ASS'Y (X42-1100-00)

| Ref. No. | Parts No.   | Description  | Re-<br>marks |
|----------|-------------|--------------|--------------|
| —        | E07-0351-05 | Plug 3P      |              |
| —        | E19-0251-05 | AC plug 2P   |              |
| —        | J61-0014-05 | Free-up belt | ☆            |

### CONTROL CABLE ASS'Y (X42-1110-10)

| Ref. No. | Parts No.   | Description          | Re-<br>marks |
|----------|-------------|----------------------|--------------|
| —        | E12-0010-05 | RCA type pin plug 1P |              |
| —        | E14-0801-05 | US plug              |              |
| —        | J42-0402-05 | Cord bushing         | ☆            |

## SECTION 7. PARTS LIST

### COAXIAL CABLE ASS'Y (X42-1120-10)

| Ref. No. | Parts No.   | Description     | Re-<br>marks |
|----------|-------------|-----------------|--------------|
| —        | E05-0117-05 | M type plug × 2 |              |

### RECTIFIER UNIT (X43-1280-10)

| Ref. No.      | Parts No.    | Description          |        |              | Re-<br>marks |
|---------------|--------------|----------------------|--------|--------------|--------------|
| CAPACITOR     |              |                      |        |              |              |
| C1 ~ 15       | CK45E2H103P  | Ceramic              | 0.01μF | + 100%, - 0% |              |
| RESISTOR      |              |                      |        |              |              |
| R1 ~ 14       | RC05GF2H474J | Carbon               | 470kΩ  | ±5%          | 1/2W         |
| R15 ~ 17      | R92-0608-05  | Cement               | 2.66MΩ |              | 1W           |
| R18           | RC05GF2H473J | Carbon               | 47kΩ   | ±5%          | 1/2W         |
| SEMICONDUCTOR |              |                      |        |              |              |
| D1 ~ 14       | V11-0282-09  | Diode V08J           |        |              |              |
| MISCELLANEOUS |              |                      |        |              |              |
| —             | E23-0047-04  | Lapping terminal × 4 |        |              |              |

### METER UNIT (X54-1300-10)

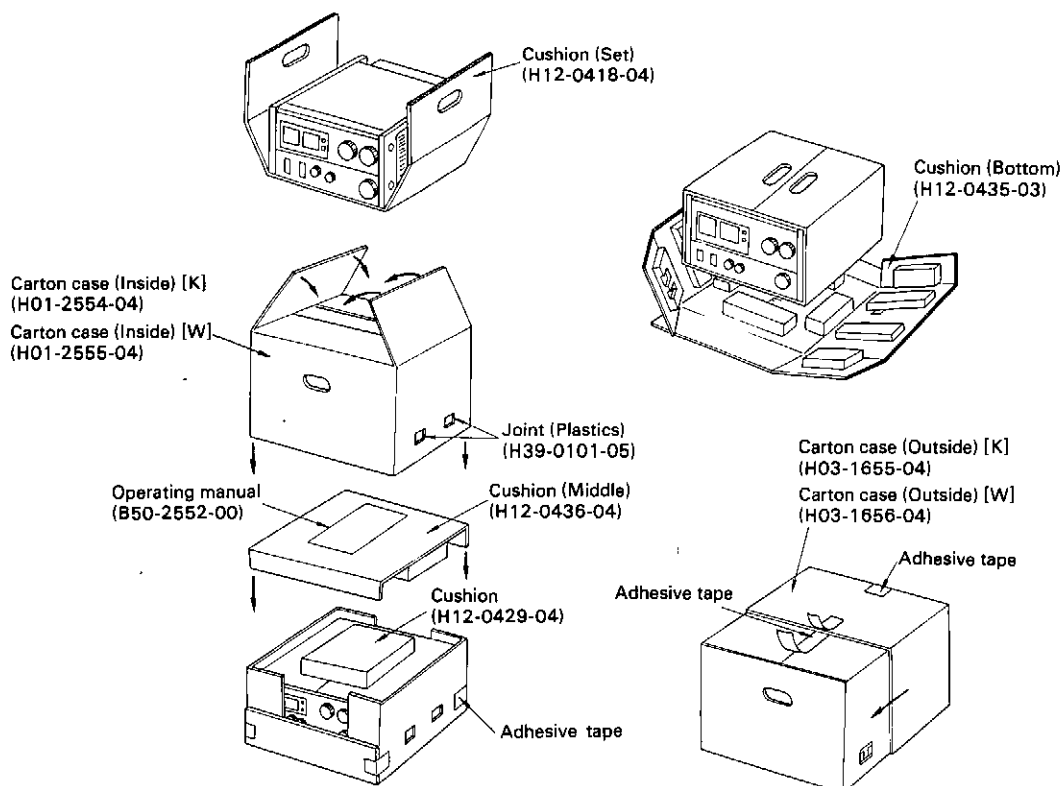
| Ref. No.         | Parts No.   | Description                    | Re-<br>marks |
|------------------|-------------|--------------------------------|--------------|
| <b>CAPACITOR</b> |             |                                |              |
| C1               | CK45E2H103P | Ceramic 0.01 $\mu$ F +100%.—0% |              |
| C2,3             | C91-0412-05 | Ceramic 0.0047 $\mu$ F AC 500V |              |

| Ref. No.             | Parts No.    | Description                        | Re-<br>marks |
|----------------------|--------------|------------------------------------|--------------|
| <b>RESISTOR</b>      |              |                                    |              |
| R1                   | R92-0610-05  | Cement 270 $\Omega$ $\pm$ 5% 3W    | ☆            |
| R2~4                 | R92-0614-05  | Cement 470 $\Omega$ $\pm$ 5% 3W    | ☆            |
| R5                   | R92-0606-05  | Cement 0.68 $\Omega$ $\pm$ 5% 3W   | ☆            |
| R6                   | R92-0607-05  | Cement 1 $\Omega$ $\pm$ 5% 5W      | ☆            |
| R7                   | RC05GF2H152J | Carbon 1.5k $\Omega$ $\pm$ 5% 1/2W |              |
| <b>MISCELLANEOUS</b> |              |                                    |              |
| RL1                  | S51-2404-05  | Relay                              | ☆            |
| DL1                  | S59-1402-05  | Timer relay (100V 140 sec.)        | ☆            |
| —                    | E23-0047-04  | Lapping terminal                   |              |

### ACCESSORIES (Supplied)

- Operating manual (B50-2552-00)..... 1 copy
- AC power cord (X42-1090-10) ..... 1 piece
- Coaxial cable, 1.5 m, with M-type connectors (X42-1100-00) ..... 1 piece
- Control cable (X42-1110-10) ..... 1 piece
- Spare fuse, 15A (F05-1533-05) ..... 2 pieces
- Foot (J02-0049-14) ..... 2 pieces
- Screws, 4 × 12 mm long (N30-4012-46) ..... 2 pieces
- Plate cap (F02-0407-04) ..... 2 pieces
- Parasitic suppressor coil, right hand (L39-0401-05) ..... 1 piece
- Parasitic suppressor coil, left hand (L39-0402-05) ..... 1 piece
- Screw, 3 × 6 mm long (N30-3006-46) ..... 4 pieces
- Plain washer (N15-1030-46) ..... 4 pieces
- Spring washer (N16-0030-46) ..... 4 pieces

## SECTION 8. PACKING



## SECTION 9. DISASSEMBLY AND ADJUSTMENT NOTES

These are high voltage and large current handling circuits. Exercise the greatest care when working inside the unit. Carelessness could endanger your life.

### WARNING

- 1) Disconnect the AC line cord before removing the covers. When the top cover is removed, the primary protection switch will disconnect AC input to the high voltage transformer. However, the low voltage transformer remains connected to the AC line. When the transmitting tube compartment cover is removed, the high voltage secondary supply will be grounded, but the electrolytic capacitors may remain charged. Use an insulated screw driver to verify they are fully discharged.
- 2) Adjustments are made with both safety interlocks bypassed, and lethal voltages are present at both sides of the cha-sis. Observe all standard safety procedures regarding high RF, AC and DC potentials.

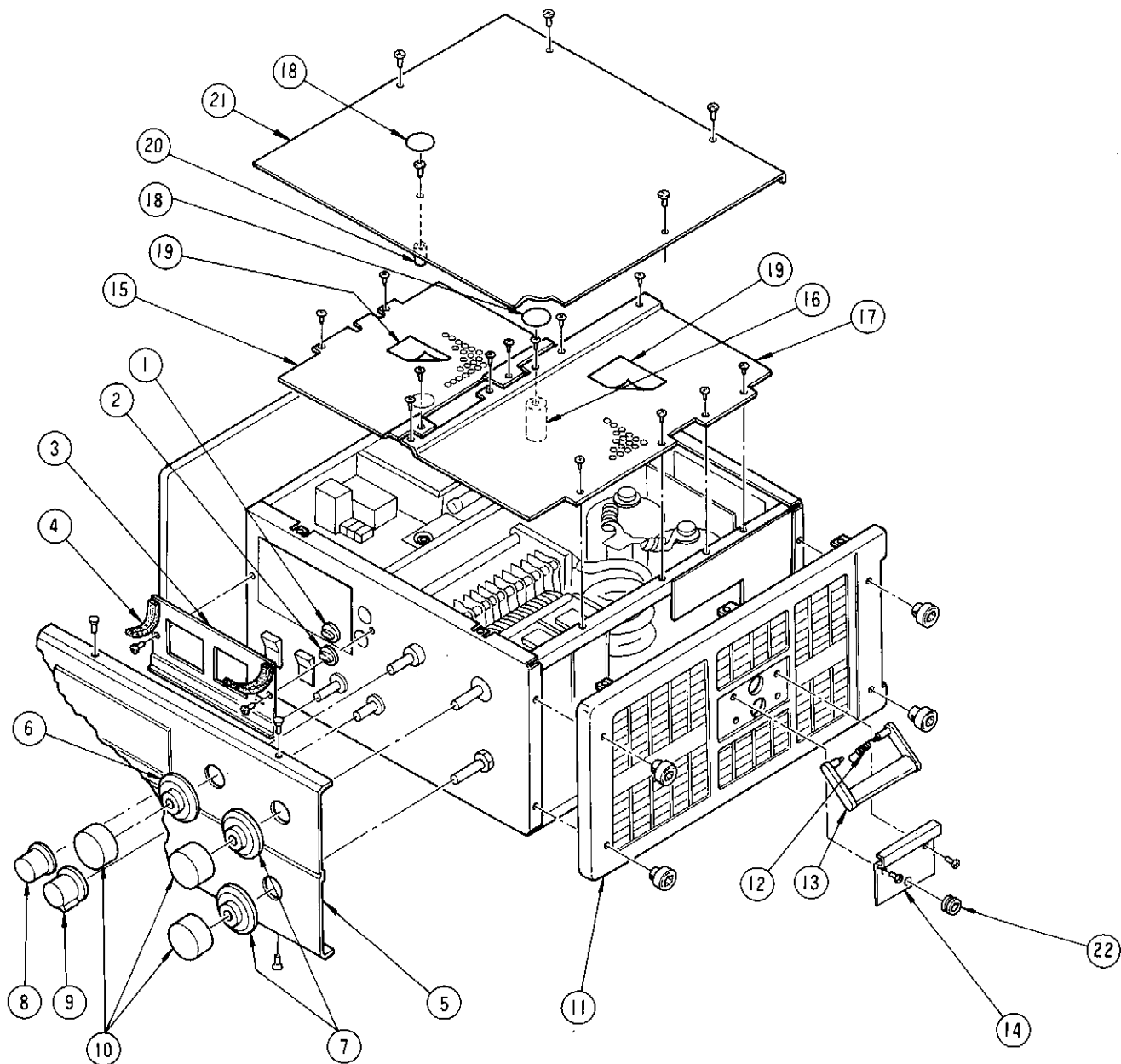
### TUBE REPLACEMENT

In addition to the preceeding warnings, please observe the following:

### CAUTION

At no time should excessive force be applied to glass envelopes or ceramic sockets. Excessive strain on the pins may fracture the envelope. Check pin indexing before you attempt to insert tubes. Always handle the tube by its envelope, not by the plate cap.

## SECTION 10. DISASSEMBLY



| No. | Description         | Parts No.   | Remarks           | No. | Description                    | Parts No.   | Remarks          |
|-----|---------------------|-------------|-------------------|-----|--------------------------------|-------------|------------------|
| 1   | Indicating window A | B08-2302-04 | ON AIR            | 12  | Back spring                    | G09-0401-04 |                  |
| 2   | Indicating window B | B08-9302-04 | STBY              | 13  | Carrying handle                | K01-0401-05 |                  |
| 3   | Blinding plate      | F15-0610-03 |                   | 14  | Handle cover                   |             |                  |
| 4   | Cushion             | G13-0612-04 |                   | 15  | Control case                   | A01-0717-03 |                  |
| 5   | Panel ass'y         | A20-2317-02 |                   | 16  | Short stud A                   | J32-0710-04 | for High voltage |
| 6   | Dial plate A        | B20-0807-04 | PLATE             | 17  | Shield plate                   |             |                  |
| 7   | Dial plate B        | B20-0808-04 | LOAD, BAND        | 18  | Caution sticker                |             |                  |
| 8   | Knob                | K21-0267-04 | METER             | 19  | Caution sticker (High voltage) |             |                  |
| 9   | Knob                | K23-0270-04 | LINEAR            | 20  | Short stud B                   | J32-0711-04 | for Power source |
| 10  | Knob                | K21-0715-04 | PLATE, LOAD, BAND | 21  | Case                           | A01-0715-02 |                  |
| 11  | Die-casting frame   |             |                   | 22  | Bushing                        | J42-0038-04 |                  |

Fig. 5 Chassis and Front Panel

# SECTION 10. DISASSEMBLY

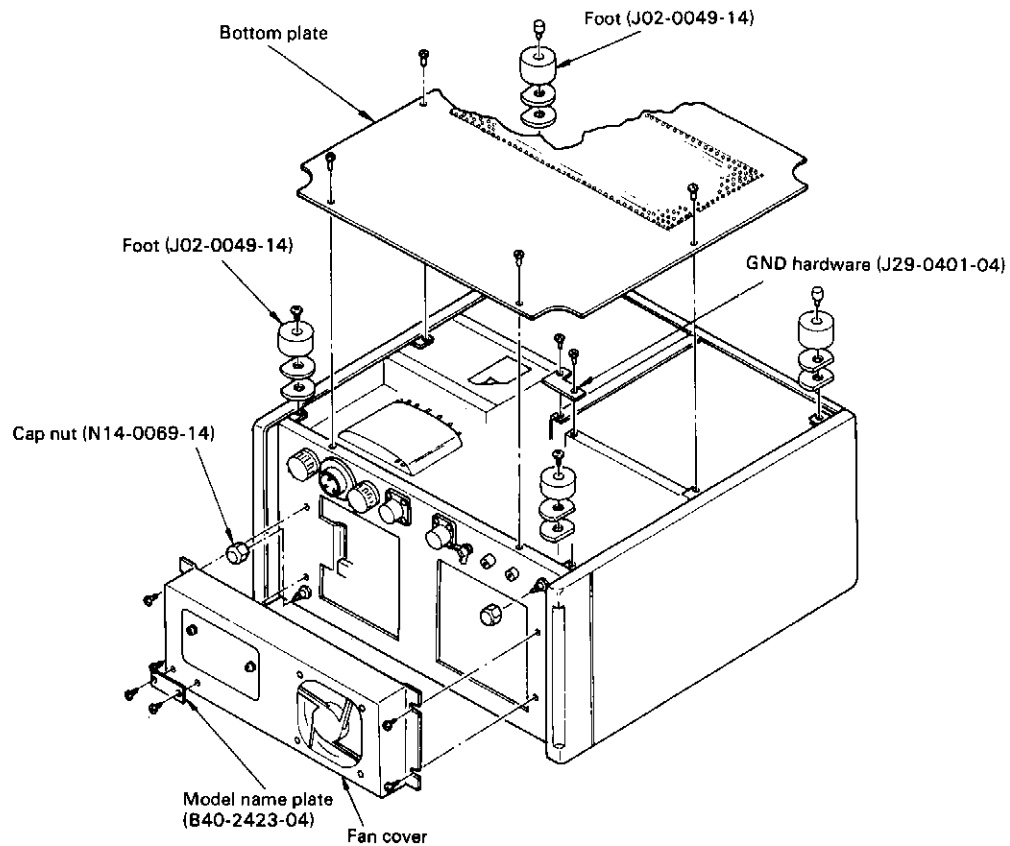


Fig. 6 Subpanel

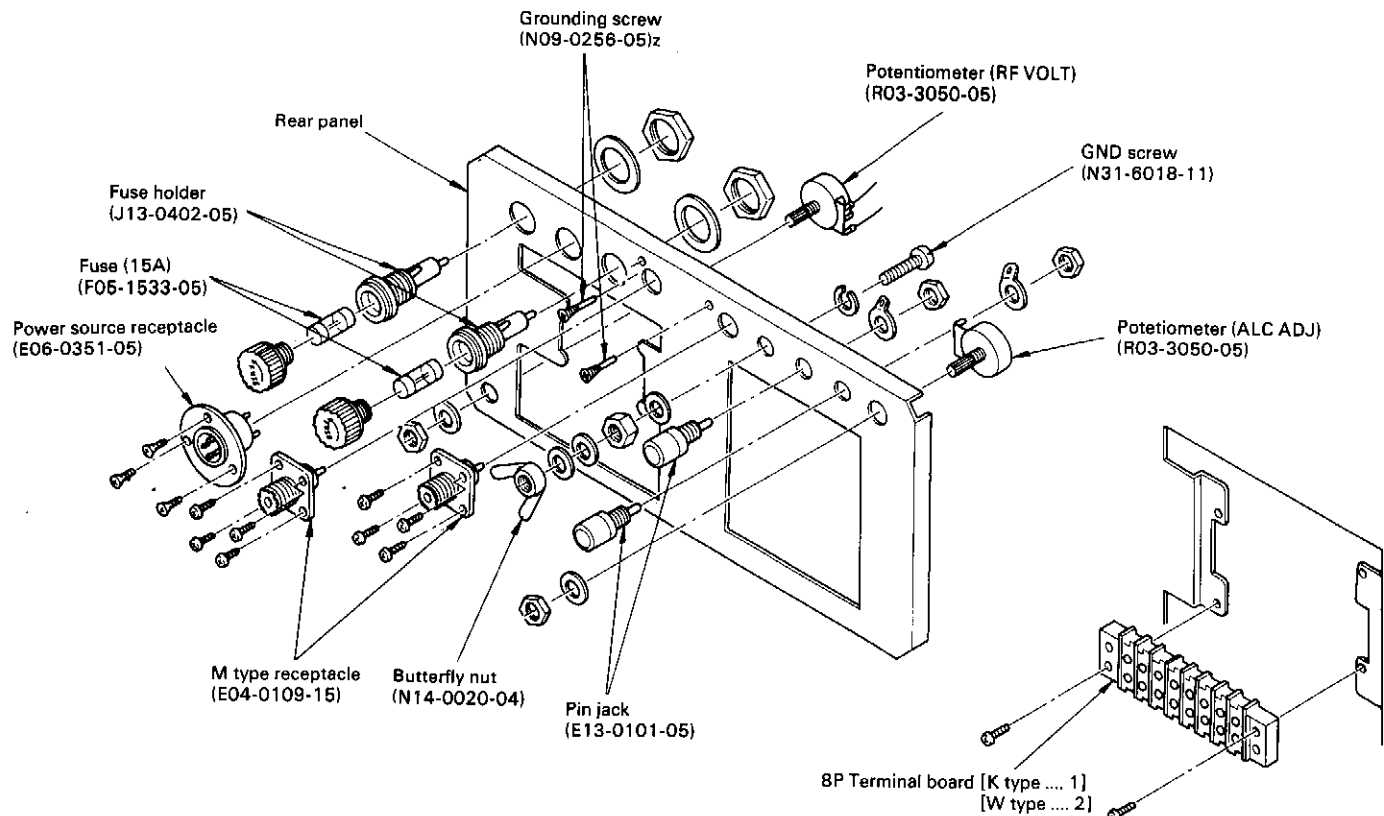
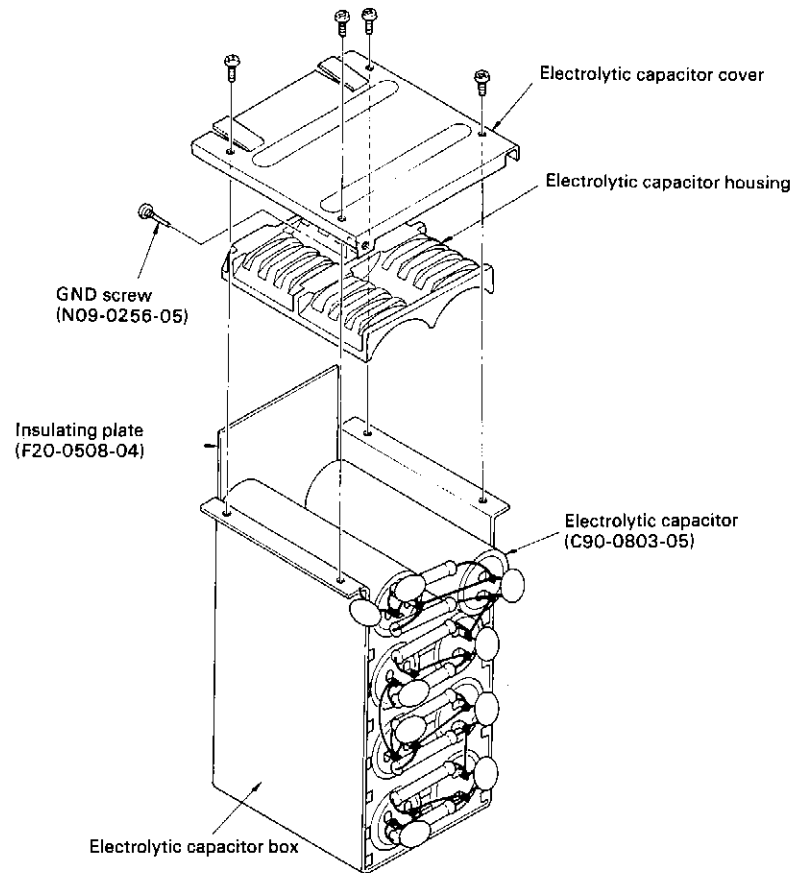


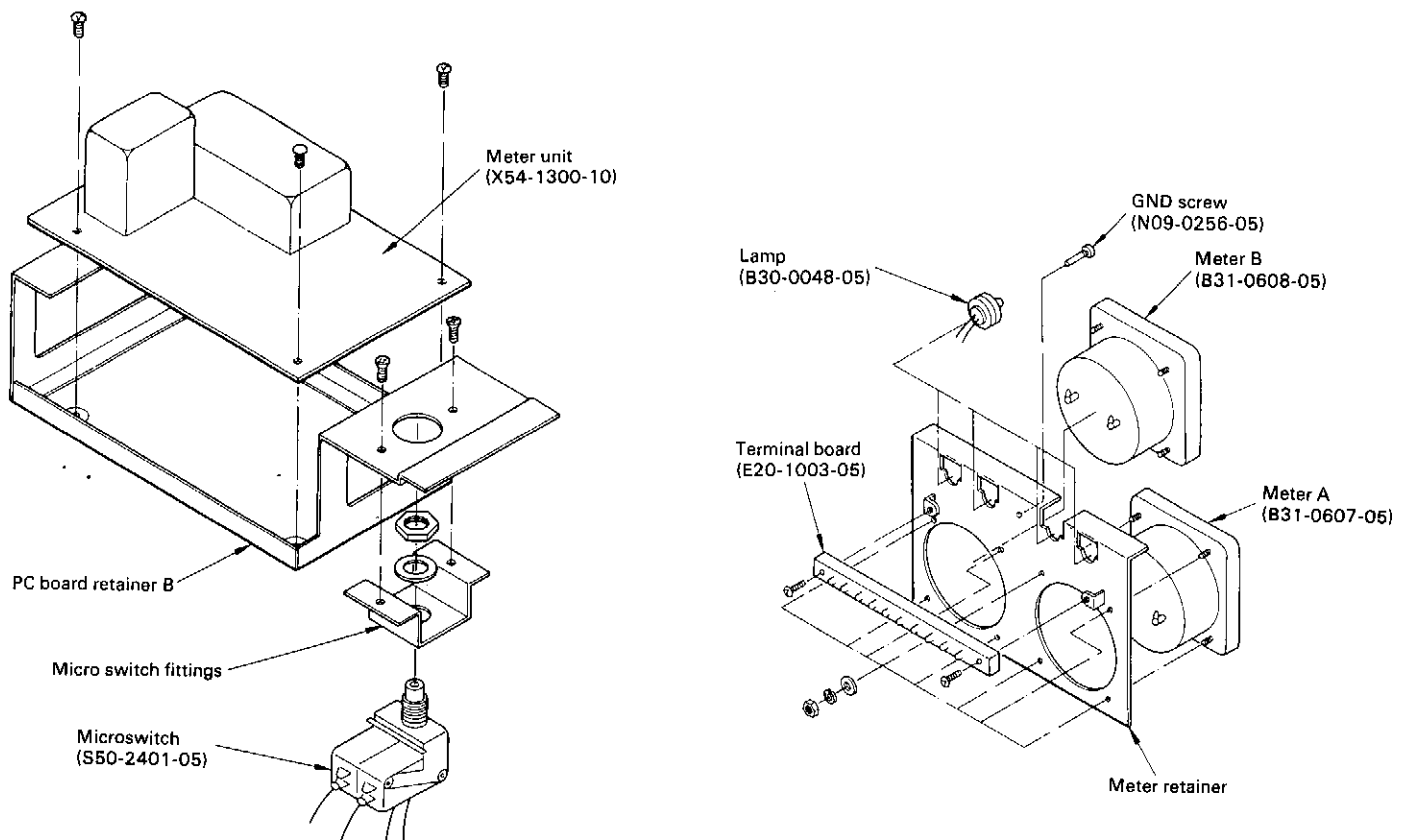
Fig. 7 Rear Panel



## SECTION 10. DISASSEMBLY



**Fig. 8 Electrolytic Assembly**



**Fig. 9 Relay and Meter Mountings**

## SECTION 10. DISASSEMBLY

### Power Transformer: (Fig. 10)

- 1) Remove the upper and lower cases.
- 2) Remove the upper shielding plate.
- 3) Loosen 2 upper screws of the electrolytic capacitor assembly.
- 4) Remove leads from the transformer.
- 5) Remove 8 screws marked ★.

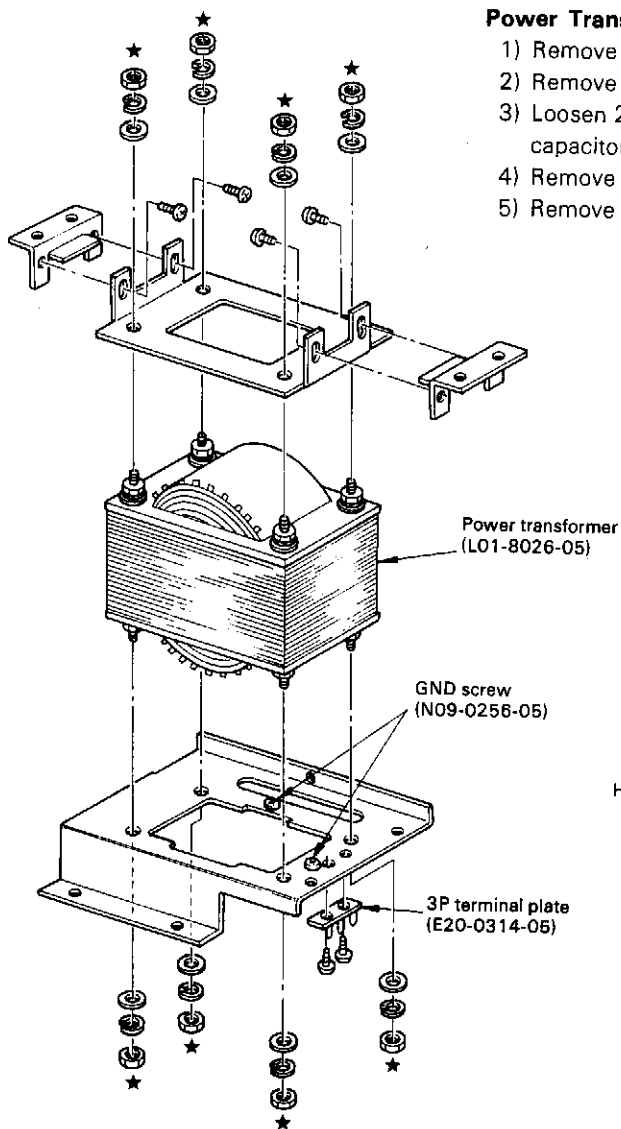


Fig. 10 Disassembly Power Transformer

### Filament Transformer: (Fig. 11)

- 1) Remove the upper and lower cases.
- 2) Remove the upper shielding plate.
- 3) Remove the meter unit mounting and disconnect leads CW, SSB and RL3.
- 4) Remove heater transformer leads.
- 5) Remove 4 screws marked ★.

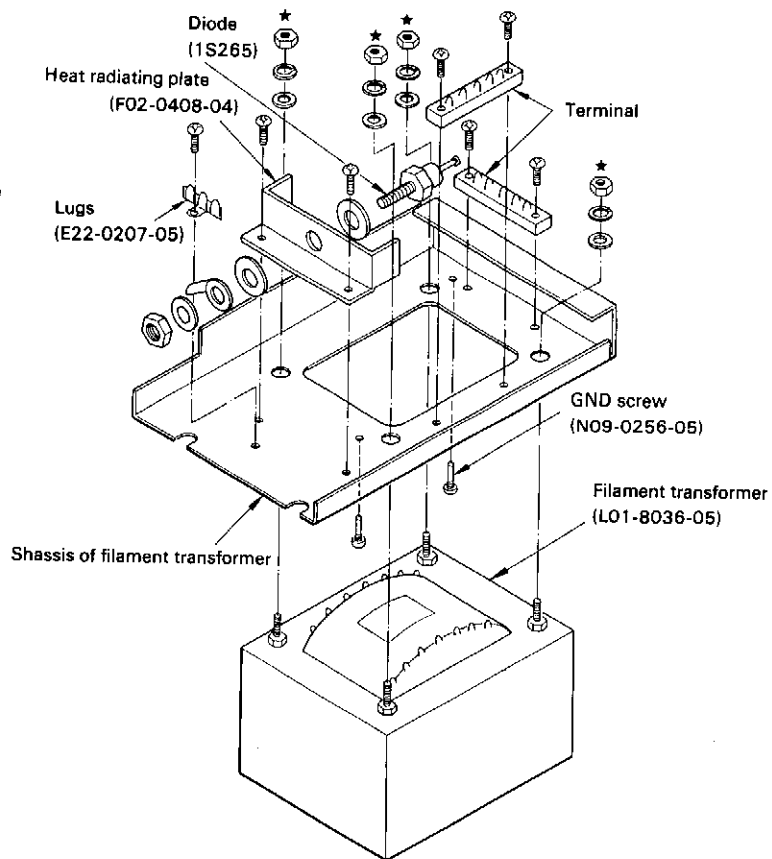


Fig. 11 Disassembly Filament Transformer

## SECTION 10. DISASSEMBLY

### Plate Variable Capacitor: (Fig. 12a)

- 1) Remove the top cover and the cage cover.
- 2) Remove screws marked ★ and the HV capacitor C34.

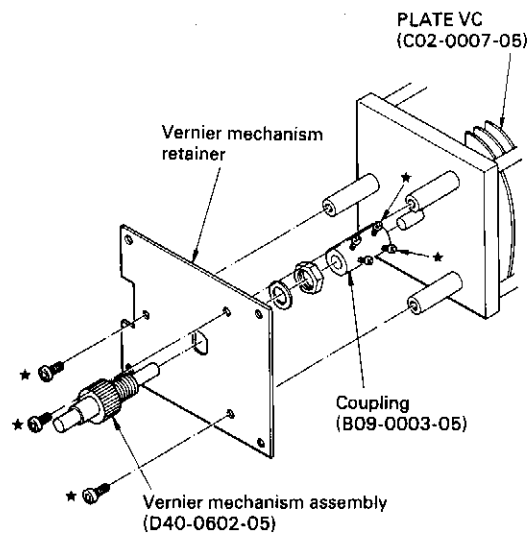


Fig. 12a Disassembly Plate Variable Capacitor

### Coupling Capacitor:

- 1) Remove the top cover and the cage cover.
- 2) Remove screws according to Fig. 12b.

#### NOTE:

Treat the coupling capacitor carefully.

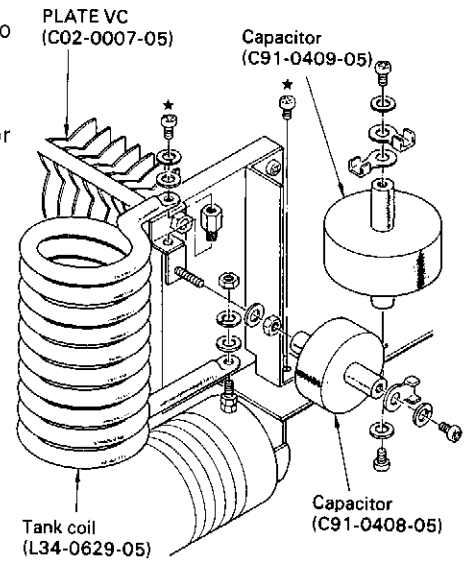


Fig. 12b Output Coupling Capacitor

### Rectifying Unit: (Fig. 13)

- 1) Remove the upper and lower cases.
- 2) Remove the cage cover.
- 3) Remove the meter mounting.
- 4) Remove the HV lead.
- 5) Remove 3 screws marked ★.
- 6) Rotate the assembly clockwise and withdraw.

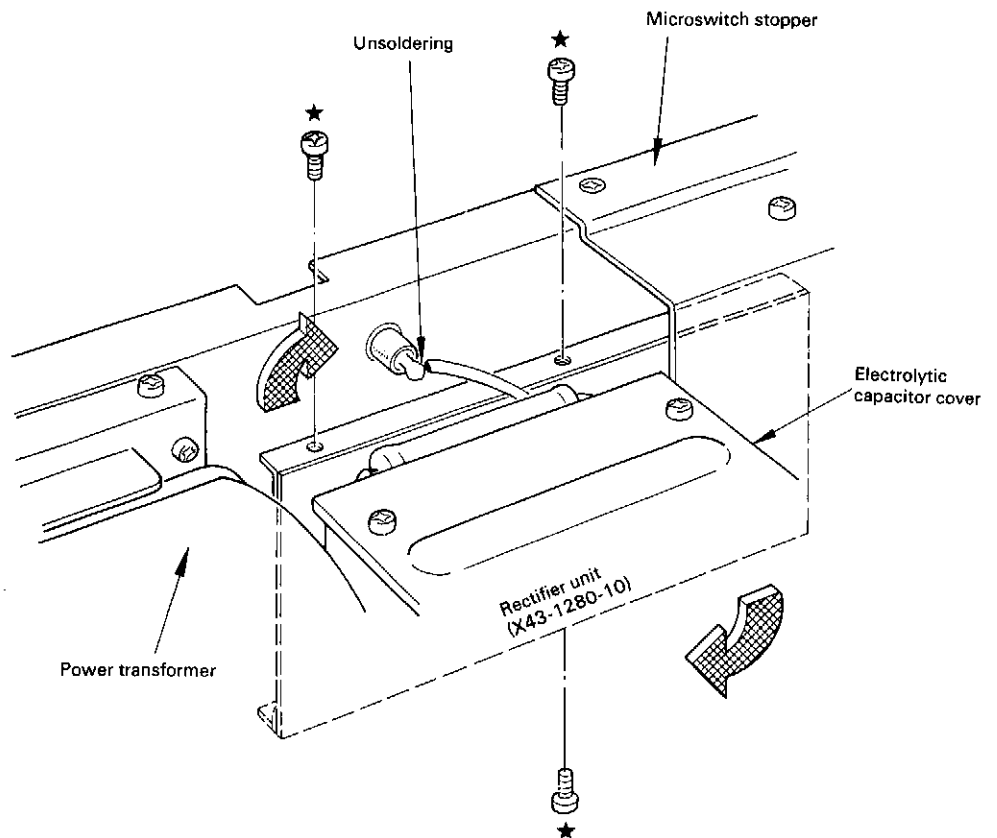


Fig. 13 Rectifying Unit

# SECTION 11. LINE VOLTAGE CHANGE

## WARNING

DISCONNECT THE AC INPUT POWER CABLE FROM THE TL-922 BEFORE PROCEEDING.

There are two versions of the TL-922; A 240/120V line model and a 220/240V line model. The input voltage in either version can be changed either up or down as required, by changing the power transformer input links located in the duct on the rear panel.

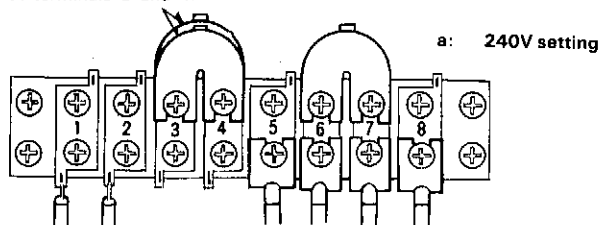
### NOTE:

The 240/120V version was set in the 120V position and the 220/240V version in the 220V position.

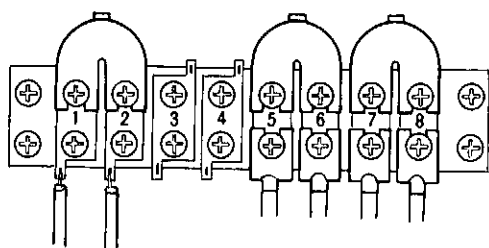
To change link positions, remove the access cover by the two black snap fasteners. Loosen the screws holding the shorting bars, a few turns only. (Do not loosen excessively as they could drop into the amp.) Draw each shorting bar upward for removal, and replace the bars for the operating voltage desired (**Fig. 14**). Be sure to tighten the screws from which the shorting bars were removed, besides securing the bars in their new positions.

**CAUTION: BE SURE TO TIGHTEN ALL LOOSENED SCREWS.**

Spare shorting bars are secured at terminals 3 and 4.



b: 120V setting



**Fig. 14a 240/120V Version [K type]  
Input Voltage Terminal Boards**

### NOTE:

Fuses need not be changed in current rating when the input voltage is changed.

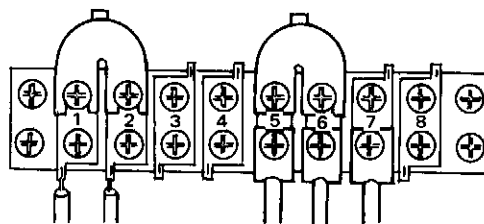
#### 1) 240/120V Version

This version has one input voltage terminal board, which was set to 120V at the factory. For 240V line, replace the short bars as illustrated. Spare shorting bars are secured at Terminals 3 and 4.

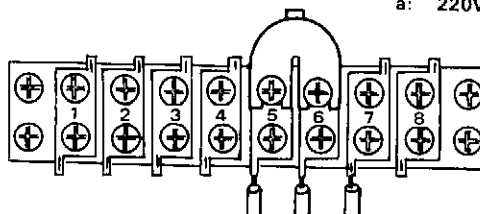
#### 2) 220/240V Version

This version has two input voltage terminal boards, which were set to 220V at the factory. For 240V line, replace the shorting bars as illustrated.

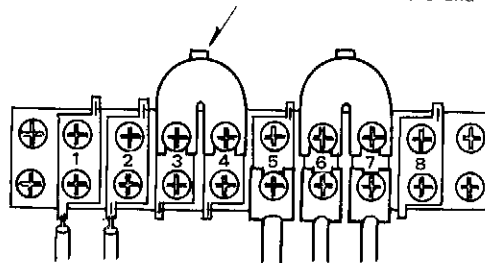
**CAUTION: BE SURE TO TIGHTEN ALL LOOSENED SCREWS.**



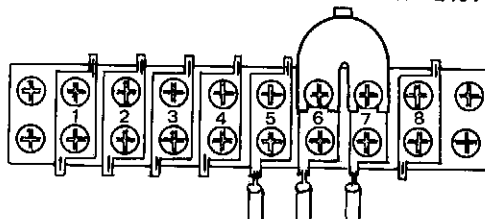
a: 220V setting



Spare shorting bar is secured at a terminals 3 and 4.

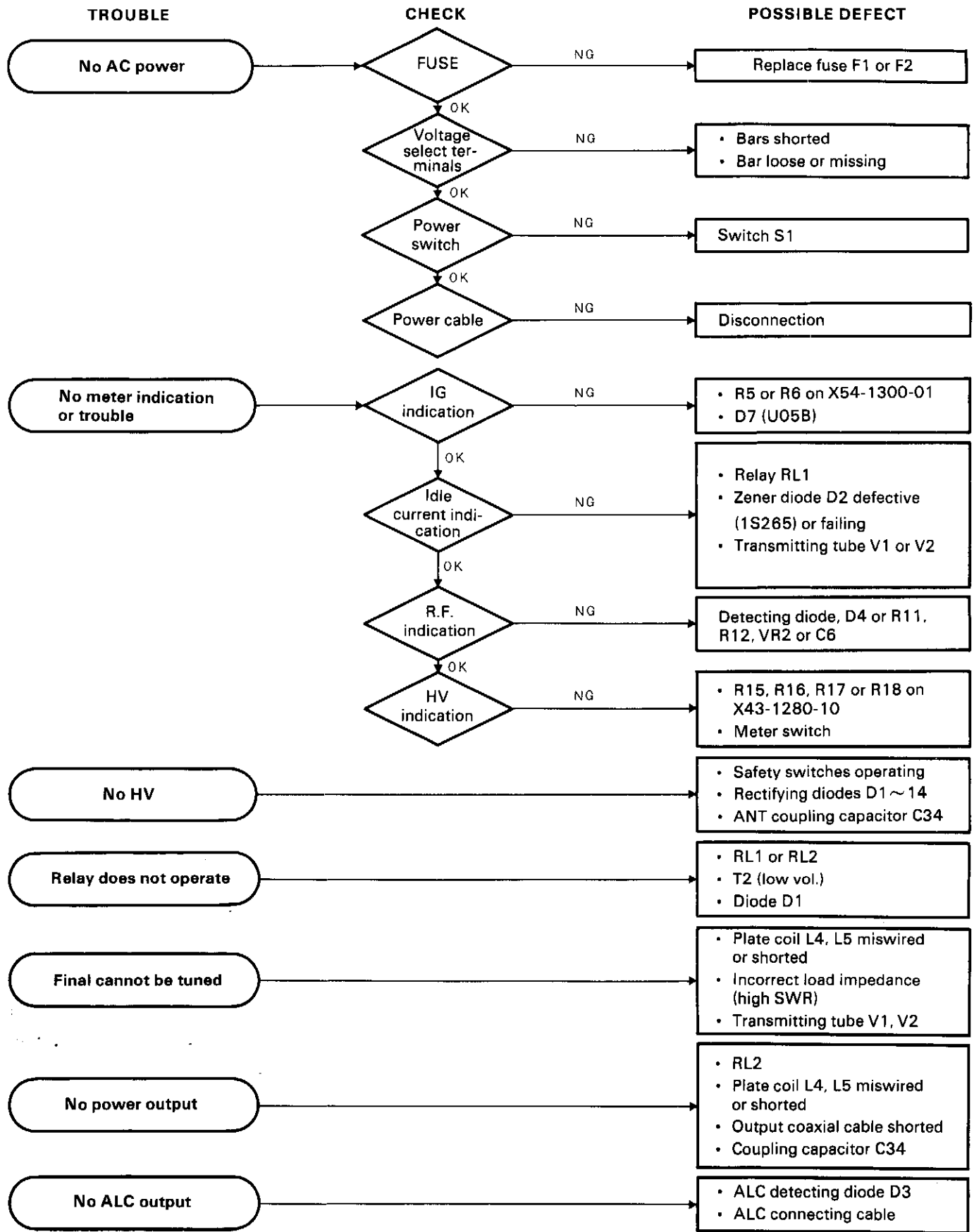


b: 240V setting



**Fig. 14b 220/240V Version [W type]  
Input Voltage Terminal Boards**

## SECTION 12. TROUBLESHOOTING



# SECTION 13. ADJUSTMENTS

## Measuring Instruments

1. Voltmeter
  - Input impedance..... more than 1M $\Omega$
  - Range ..... F.S. = 1.5 ~ 3500V AC, DC
2. RF Dummy Load
  - Impedance..... 50 ~ 75 $\Omega$
  - 1000W or greater dissipation
3. Exciter
  - 100 ~ 120W output  
(Example: TS-820D, S; TS-520D, S)
4. Ohmmeter
  - Range ..... 1k $\Omega$  ~ 500k $\Omega$
5. In-line watt meter, 100W or greater and 1500W or greater element.

## ■ Preparation

### WARNING:

### Lethal Voltages Present!

1. Disconnect the power cable.
2. Check for two 15A fuses.
3. Check for correct AC input voltage setting. (**Fig. 14**)
4. Remove the top and bottom covers (**Fig. 5** and **6**).
5. Defeat the HV interlock with a suitable insulator.

## ■ Continuity Test

1. Measuring Instrument  
Ohmmeter
2. Measuring Point
  - a. Between V1, V2 plates and chassis: more than 300k $\Omega$ .
  - b. Between TH1 and TH2 of the high voltage transformer: 0 $\Omega$  (switch closed).

## ■ Voltage Check

1. Measuring Instrument  
Voltmeter
2. Measuring Point

### WARNING:

### Lethal Voltages Present!

- a. Remove the top cover which will open the primary safety switch disconnecting T1.
- b. Connect AC power.

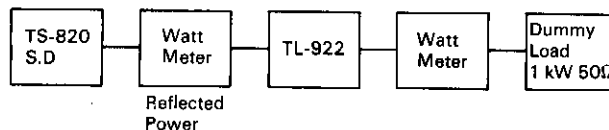
### WARNING:

### Avoid High Voltage Contacts!

- c. Turn the POWER SW on and check the following voltages.

|                                 | Check Point                        | Value to be Measured                   |
|---------------------------------|------------------------------------|----------------------------------------|
| Heater voltages                 | Pin No. 1 of V1<br>Pin No. 1 of V2 | 10V AC $\pm$ 0.5V<br>5V AC $\pm$ 0.25V |
| Voltage between relay terminals | Pins of RL1 and RL2                | Approximately 120V DC                  |

- d. Turn the POWER SW off and bypass the primary microswitch. Connect the meter leads and then turn the POWER SW on. Check the plate voltage.  
CW mode: Approx. 2.2kV  
SSB mode: Approx. 3.1kV



**Fig. 15 Equipment Connection**

## ■ BIAS Current Check

1. Measuring Instrument
  - a. Exciter (Ex.: TS-820S)
  - b. RF Dummy Load
2. Method
  - a. Connect the exciter to the linear amplifier according to **Fig. 15**.
  - b. Connect AC power and turn the POWER SW on. Check that the linear amplifier is controlled by the stand-by switch of the exciter.
  - c. Check the Ip readings for:
 

|          |       |               |
|----------|-------|---------------|
| CW mode  | 100mA | CW            |
| SSB mode | 200mA | SSB (nominal) |
  - d. Place the LINEAR SW in the OPERATE position. Adjust plate and loading, checking Ip for any indication of self-oscillation.

## ■ Input Tuning Coil Adjustment

1. Measuring Instruments
  - a. Exciter
  - b. Wattmeter, 100W element
  - c. RF dummy load
2. Adjusting Method
  - a. Connect equipment according to **Fig. 15**.
  - b. Place the LINEAR SW in STBY. Set the exciter output to 80W at 1.9 MHz.
  - c. Set the linear amplifier in 1.9 MHz BAND and place the LINEAR SW in OPERATE.
  - d. While transmitting, adjust the core of input tuning coil so that V.SWR is minimum at 1.900 MHz. Repeat the procedure for the remaining frequencies:

| BAND     | FREQUENCY  | ADJUST |
|----------|------------|--------|
| 1.9 MHz  | 1.900 MHz  | L9 A   |
| 3.5 MHz  | 3.750 MHz  | L10 B  |
| 7.0 MHz  | 7.150 MHz  | L11 C  |
| 14.0 MHz | 14.175 MHz | L12 D  |
| 21.0 MHz | 21.225 MHz | L13 E  |
| 28.0 MHz | 28.800 MHz | L14 F  |

## SECTION 13. ADJUSTMENTS

Bottom View

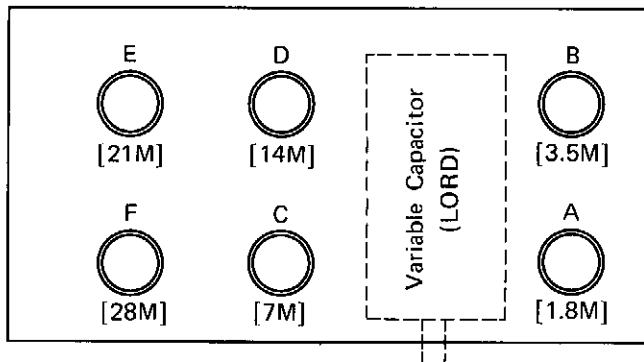


Fig. 16 Coil Locations

### ■ RF Meter Adjustment

1. Measuring Instruments  
Same as Section 5.
2. Method
  - a. Interconnect according to **Fig. 15**.
  - b. Set the exciter and the linear amplifier to 14 MHz BAND and adjust for maximum output power.
  - c. Place the METER SWITCH in the RF position and set the RF VOLT pot on the rear panel to indicate "7". Check this value at every band.

#### NOTE:

This value will be obtained when the RF dummy load is 50Ω impedance. When the impedance is 75Ω, the indicated value will be slightly higher but should be less than "10".

### ■ ALC Voltage Adjustment

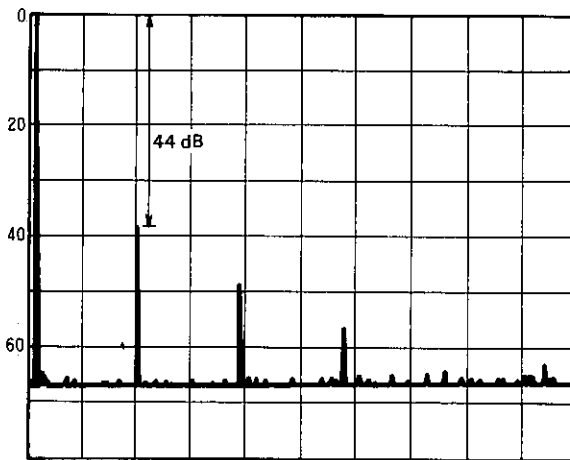
1. Measuring Instruments  
Same as Section 5.
2. Method
  - a. Interconnect according to **Fig. 15**.
  - b. Set the exciter and the linear amplifier to 14 MHz BAND and adjust for maximum output power.
  - c. With 80W excitation, check for — 10V or less at the ALC output terminal with the ALC pot on the rear panel at MAX.
  - d. Set the exciter output to maximum and adjust the ALC pot for 500W output.

### ■ Fan Motor Delay Stop Circuit Check

1. Measuring Instruments  
No instrument is needed.
2. Checking Method  
After two minutes of power on at STBY, switch power off and verify a 2 minute delay for fan shut-off, ±30 seconds. (At the room temperature of 25°C). In the case of the room temperature of — 10°C ~ +40°C, the delay time lies in 90 sec ~ 190 sec.

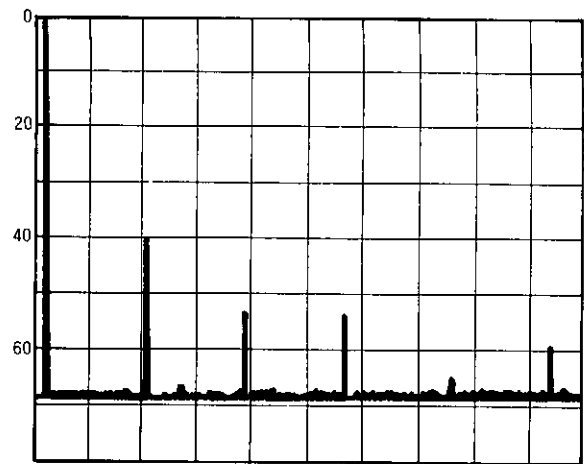
# SECTION 14: REFERENCE DATA (EXAMPLE)

**Spurious Radiation (Harmonies)**



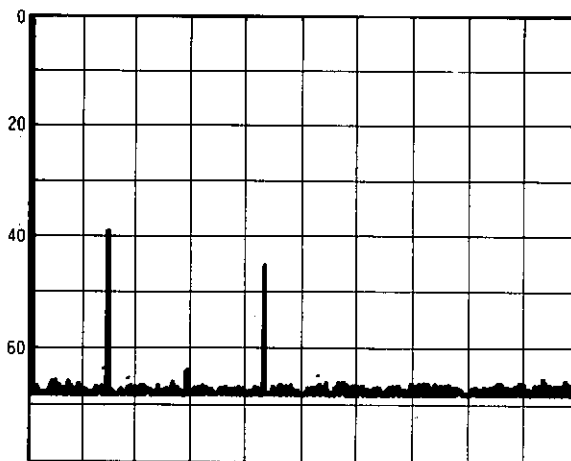
1.9 MHz 3.75 MHz  
 B.W 10 kHz S.T. 0.1 sec/div  
 S.W 1 MHz/div  
 6 dB/Oct  
 (EXAMPLE)  
 Second harmonics  
 Nominal value: 38 dB  
 Correcting value: 6 dB  
 Therefore  
 Real value: 44 dB  
 Third harmonics  
 Real value: 47 dB  
 Force harmonics  
 Real value: 50 dB

**Spurious Radiation (Harmonies)**



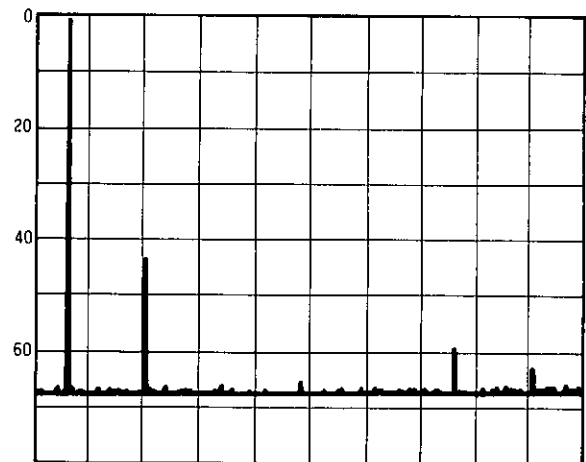
3.75 MHz  
 B.W 10 kHz S.T. 0.1 sec/div  
 S.W 5 MHz/div  
 6 dB/Oct

**Spurious Radiation (Harmonies)**



7.15 MHz  
 B.W 10 kHz S.T. 0.1 sec/div  
 S.W 5 MHz/div  
 6 dB/Oct

**Spurious Radiation (Harmonies)**

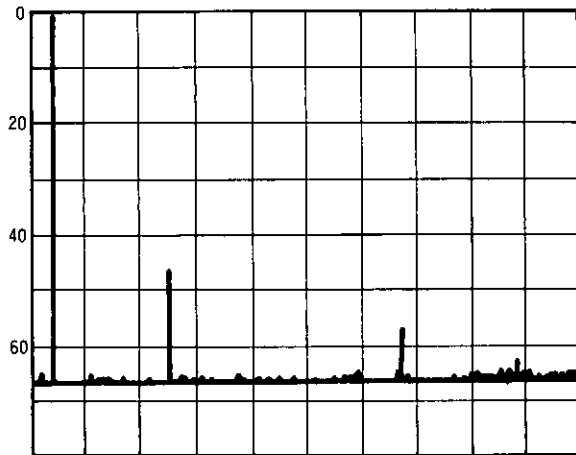


14.175 MHz  
 B.W 10 kHz S.T. 0.1 sec/div  
 S.W 5 MHz/div  
 6 dB/Oct



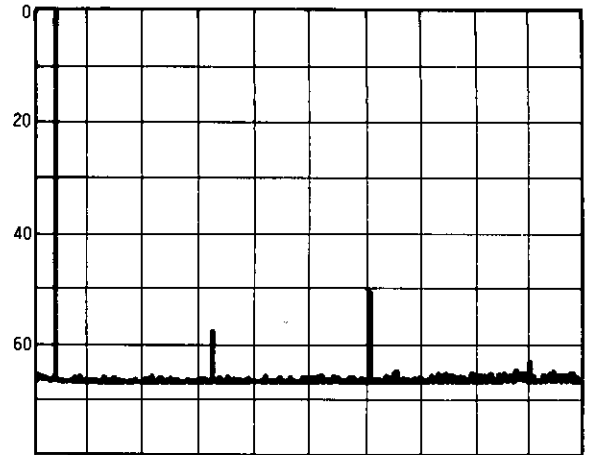
# SECTION 14. REFERENCE DATA (EXAMPLE)

**Spurious Radiation (Harmonics)**



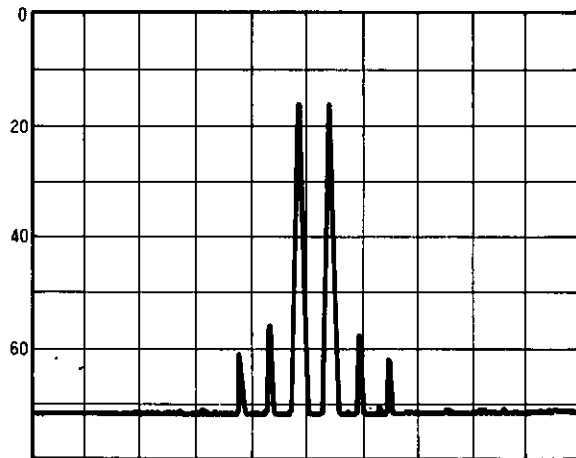
21.225 MHz  
S.T 0.1 sec/div  
S.W 10 MHz/div  
B.W 10 kHz  
6 dB/Oct

**Spurious Radiation (Harmonics)**



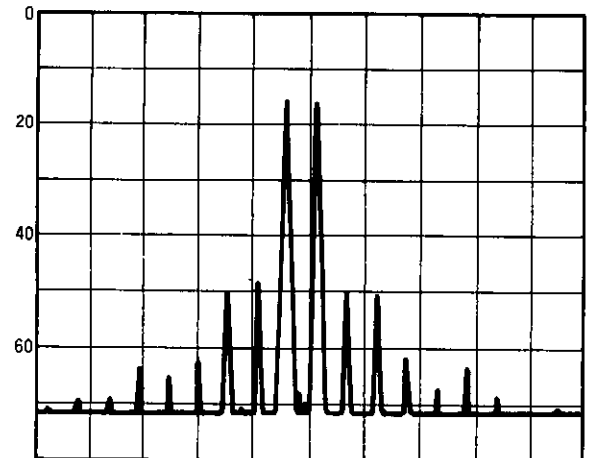
28.8 MHz  
S.T 0.1 sec/div  
S.W 10 MHz/div  
B.W 10 kHz  
6 dB/Oct

**IMD Products**



TS-820 only 14.175 MHz  
2 tone Output 5.0W  
B.W 0.03 kHz  
S.T 2 sec/div  
S.W 1 kHz/div

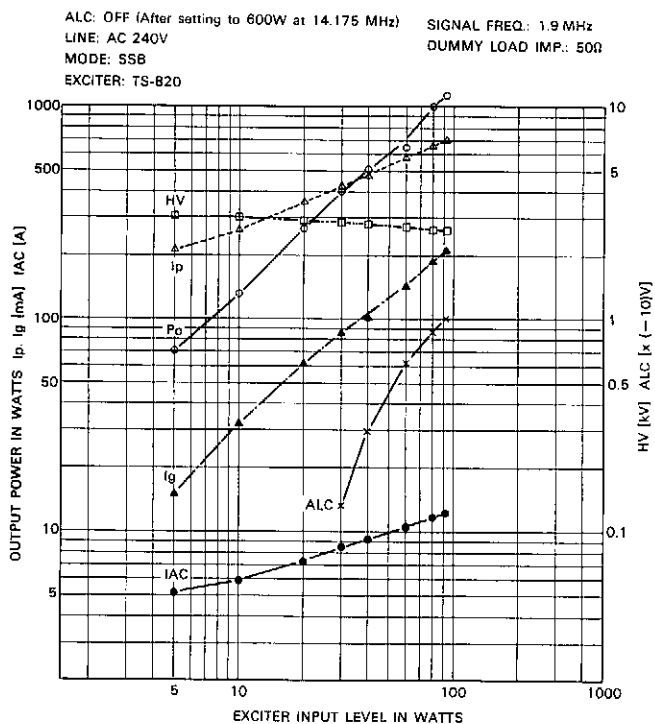
**IMD Products**



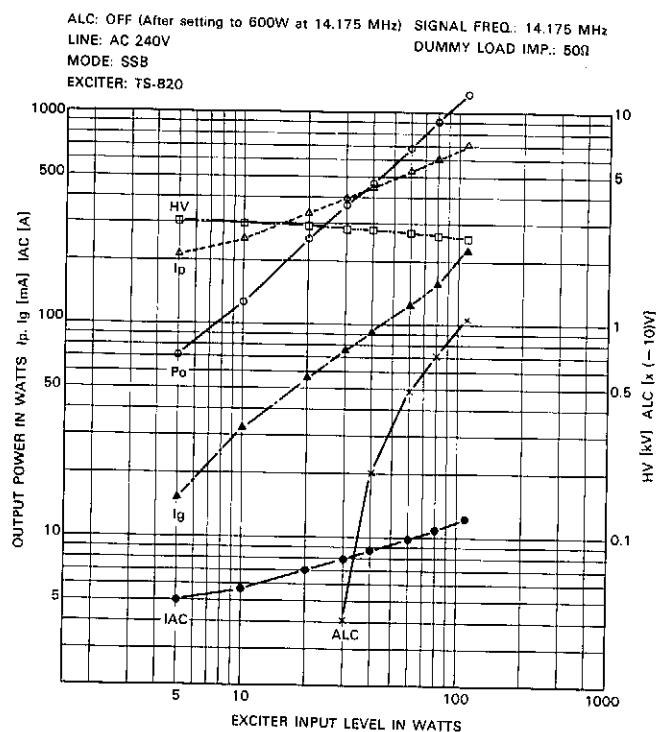
TS-820 + TL-922 14.175 MHz  
2 tone Output 320W  
B.W 0.03 kHz  
S.T 2 sec/div  
S.W 1 kHz/div

# SECTION 14. REFERENCE DATA (EXAMPLE)

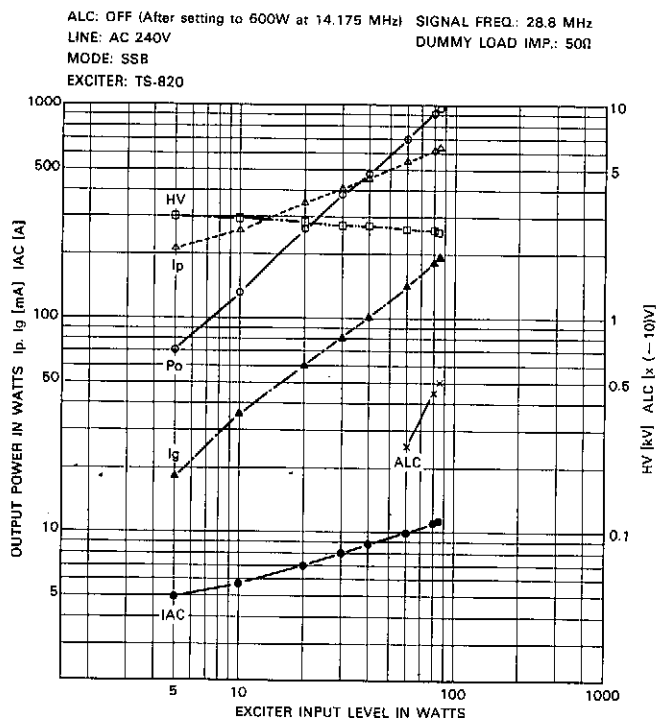
## OUTPUT VS INPUT



## OUTPUT VS INPUT

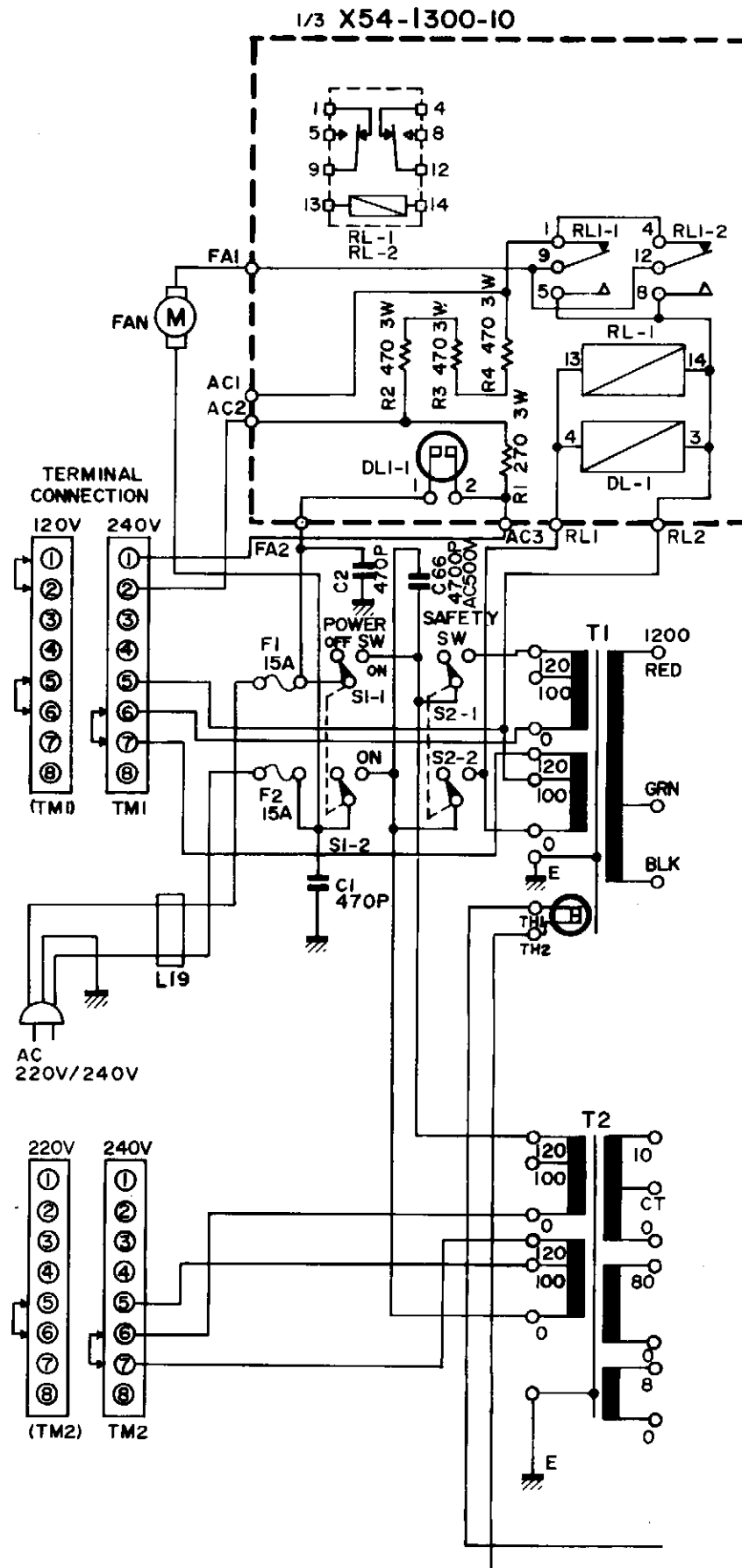


## OUTPUT VS INPUT



# SECTION 15. SCHEMATIC DIAGRAM

Modification for W Type

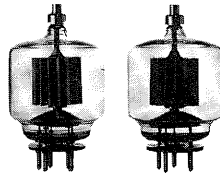
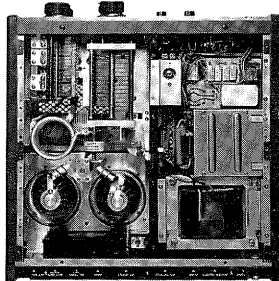


# TRIO HF LINEAR AMPLIFIER TL-922

The TL-922 is an HF all band linear amp based on the pursuit of complete performance, and employing a pair of 3-500Z high performance transmitting tubes.

## FEATURES

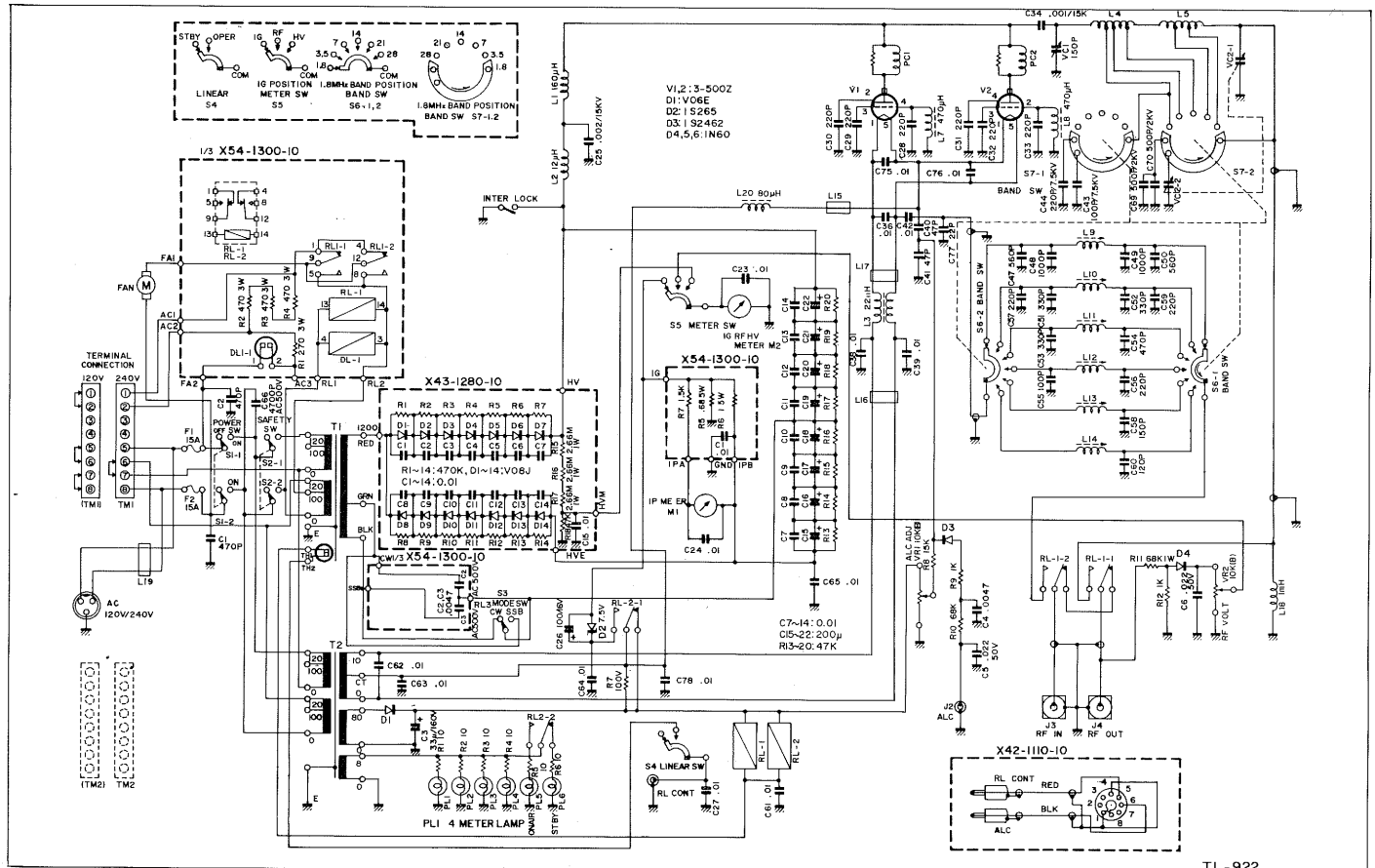
- Employment of high performance transmitting tube, EIMAC 3-500Z.
- Class AB<sub>2</sub> grounded-grid circuit.
- Excellent IMD (intermodulation products distortion) characteristics.
- Comprehensive safety protection.
- Newly developed DELAY circuit for cooling blower.
- Variable threshold level type ALC circuit.
- Employment of two meter system to monitor operation.
- Matching all TRIO HF transceivers and transmitters.



## SPECIFICATIONS

|                   |                                                      |
|-------------------|------------------------------------------------------|
| Frequency Range   | 160 meter band — 1.8 to 2.0 MHz                      |
|                   | 80 meter band — 3.5 to 4.0 MHz                       |
|                   | 40 meter band — 7.0 to 7.3 MHz                       |
|                   | 20 meter band — 14.0 to 14.35 MHz                    |
|                   | 15 meter band — 21.0 to 21.45 MHz                    |
|                   | 10 meter band — 28.0 to 29.7 MHz                     |
| Mode              | SSB, CW, RTTY                                        |
| Drive Power       | 80 Watts or more for full output                     |
| RF Input Power    | SSB: 2,000 Watts PEP                                 |
|                   | CW, RTTY: 1,000 Watts DC                             |
| Circuitry         | Class AB <sub>2</sub> Grounded-grid Linear Amplifier |
| Input Impedance   | 50 Ohms                                              |
| Output Impedance  | 50 to 75 Ohms                                        |
| Tubes             | 2 X 3-500Z                                           |
| Power Requirement | 120/220/240 VAC, 50/60 Hz                            |
| Dimension         | 15-3/8(390)W X 7-1/2(190)H X 16(407)D inch (mm)      |
| Weight            | 68 lbs. (31 kg)                                      |

## CIRCUIT DIAGRAM



**Note:** The circuit and ratings may change without notice due to developments in technology.

The TL922 operates satisfactorily on the 10, 18, and 24 MHz WARC bands into a well matched load, by using the band switch position for the next highest band i.e. for 10 MHz use 14, for 18 MHz use 21, for 24 MHz use 28.

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# SCHEMATIC DIAGRAM

Circuits and specifications are subject to change for improvement.

