

# Service Manual

**CIRCUIT DESCRIPTIONS  
REPAIR & ADJUSTMENTS**



**ORDER NO.  
ART-653-0**

**STEREO TUNER**

# TX-520

**MODEL TX-520 COMES IN FIVE VERSIONS DISTINGUISHED AS FOLLOWS;**

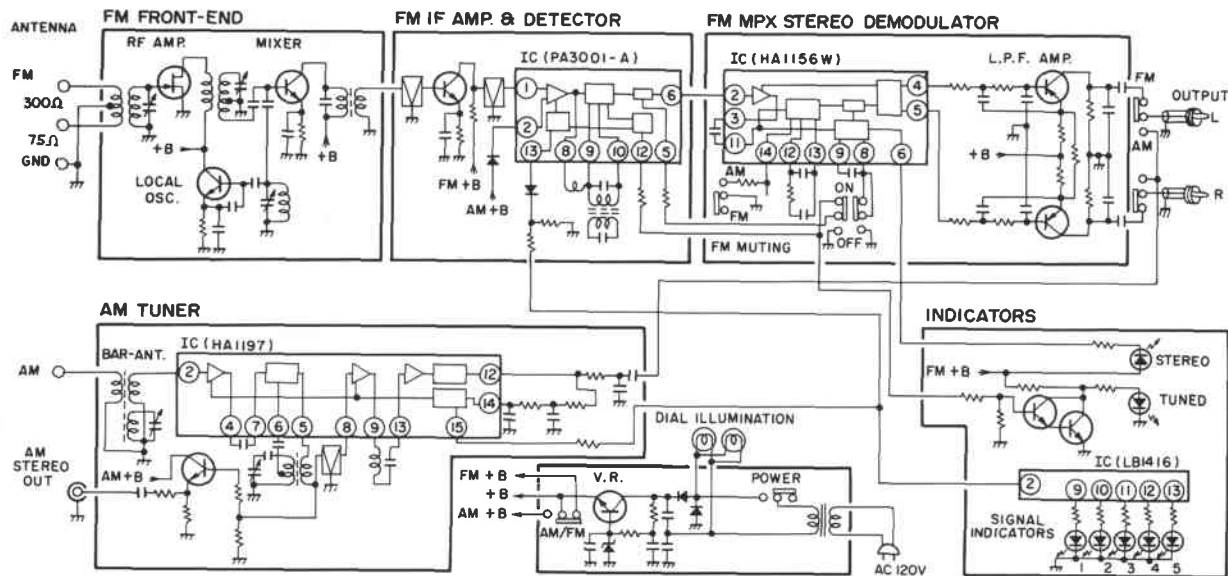
| Type | Voltage                                  | Remarks              |
|------|------------------------------------------|----------------------|
| KU   | AC120V only                              | U.S.A. model         |
| YP   | AC240V only                              | Australia model      |
| S/G  | AC110V, 120V, 220V and 240V (Switchable) | U.S. Military model  |
| S    | AC110V, 120V, 220V and 240V (Switchable) | General export model |
| SS   | AC110V, 120V, 220V and 240V (Switchable) | South Africa model   |

- This service manual is applicable to the KU type.
- When repairing the YP, S and S/G types, please see page 25.
- Ce manuel d'instruction se réfère au mode de réglage, en français.
- Este manual de servicio trata del método de ajuste escrito en español.

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### 3. BLOCK DIAGRAM



### 4. CIRCUIT DESCRIPTIONS

#### FM Tuner

The FM front end is comprised of a J-FET (2SK168) single-state RF amplifier, an NPN transistor mixer, and an NPN transistor modified Clapp local oscillator.

The IF stage consists of 2 dual-element ceramic filters, a single transistor amplifier element, and an IF system IC (PA3001-A) which incorporates the IF limiter amplifier, FM detector, and the FM muting circuit.

#### FM Multiplex Stereo Decoder

The stereo decoder stage employs an FM MPX IC (HA1156W-P), while the subcarrier signals (frequencies above 19kHz) are removed by an -18dB/oct. active filter consisting of a PNP transistor. This active filter also serves as an amplifier for frequencies within its passband, and eliminates crosstalk.

#### AM Tuner

This employs a 2-ganged tuning capacitor, a dual-element ceramic filter, and an IC (HA1197) consisting of a RF amplifier, mixer, 2-stage IF amplifier, detector and AGC circuit.

#### Signal Strength Indicator

The TX-520 signal strength meter is a 5-point LED display meter driven by the meter drive IC (LB1416). The signal meter drive signals from the FM and AM tuner sections are applied to a set of 5 voltage comparators which are activated according to the difference between the applied signal level and the respective reference voltage levels allotted to each comparator, resulting in the LEDs(1-5) being lighted.

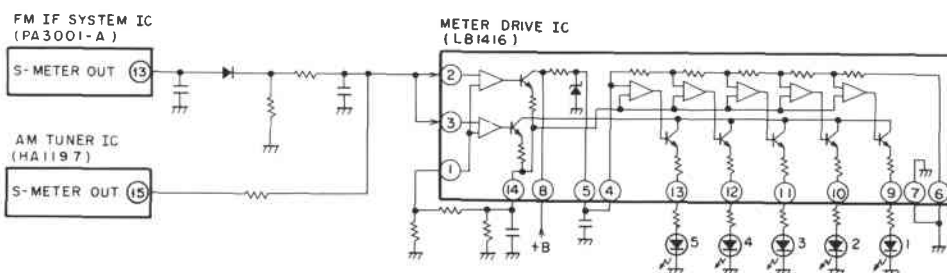
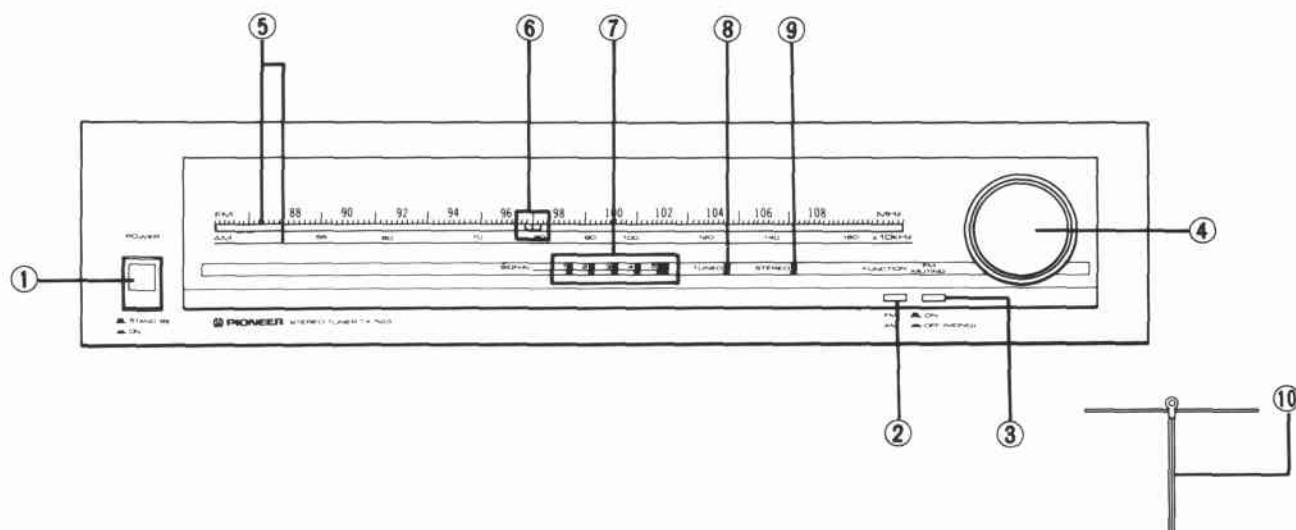


Fig. 4-1 Signal indicator circuit

## 2. FRONT PANEL FACILITIES



### ① POWER SWITCH

When this switch is set to the ON position, power is supplied to the tuner's main circuits. The unit's power switch is geared to selecting the transformer's secondary and so even at the STAND-BY position, the unit's circuitry will work as long as the power cord is connected to the power outlet.

Disconnect the power cord from the power outlet when you do not plan to use the unit for a long period of time.

### ② FUNCTION SWITCH

When listening to an FM broadcast — Set the function switch to the OUT (  ) position.

When listening to an AM broadcast — Set the function switch to the depressed (  ) position.

### ③ FM MUTING SWITCH

When selecting an FM broadcasting station, this switch removes the irritating noise between stations. It should normally be in the ON position.

When the signal is weak and there is a great deal of noise or distortion with this switch ON, making it difficult to hear, then it should be pressed to put it in the OFF position (in this case mono reproduction is obtained).

This switch does not work for AM broadcasts.

### ④ TUNING KNOB

Turn this to select a broadcasting station (FM or AM).

### ⑤ DIAL SCALE

This indicates the frequency of the broadcasting station (FM or AM).

upper number (88 — 108) — frequency of FM station

lower number (55 — 160) — frequency of AM station

### ⑥ DIAL POINTER

This moves right or left when the tuning knob is turned. Line it up with the frequency of the station you want to listen to.

### ⑦ SIGNAL INDICATOR

This indicates the strength of the signal from the (AM or FM) broadcasting station to which you are presently listening. The larger the number of the lamps lit up, the stronger the signal (a strong signal indicates that reception conditions are optimum).

### ⑧ TUNED INDICATOR

This lights up when an FM broadcasting station is being received. This lamp does not light up when an AM broadcast is being received.

### ⑨ STEREO INDICATOR

This lamp lights up automatically when an FM broadcast is in stereo. It does not light up when the FM MUTING switch is set to OFF.

### ⑩ FM T-TYPE ANTENNA

This antenna permits FM broadcasts to be heard until a regular FM antenna is installed.

#### NOTE:

When the broadcasting station is far away, or in case of weak signals blocked by mountains, it might not be possible to receive FM broadcasts with this antenna. In such a case, please install an antenna exclusively for FM use outdoors.

# 1. SPECIFICATIONS

## FM Tuner Section

|                                        |                                          |
|----------------------------------------|------------------------------------------|
| Usable Sensitivity                     | 10.8dBf (1.9 $\mu$ V)                    |
| 50dB Quieting Sensitivity              |                                          |
| MONO                                   | 17.3dBf (4.0 $\mu$ V)                    |
| STEREO                                 | 39.2dBf (50 $\mu$ V)                     |
| Signal-to-Noise Ratio (at 65dBf)       |                                          |
| MONO                                   | 75dB                                     |
| STEREO                                 | 70dB                                     |
| Distortion (at 65dBf)                  |                                          |
| MONO                                   | 1kHz; 0.1%                               |
| STEREO                                 | 1kHz; 0.2%                               |
| Capture Ratio                          | 1dB                                      |
| Alternate Channel Selectivity (400kHz) | 60dB                                     |
| Stereo Separation                      |                                          |
| 1kHz                                   | 40dB                                     |
| Frequency Response                     | 30Hz to 15kHz $\pm 0.5$ dB               |
| Spurious Response Ratio                | 75dB                                     |
| Image Response Ratio                   | 55dB                                     |
| IF Response Ratio                      | 80dB                                     |
| AM Suppression Ratio                   | 55dB                                     |
| Muting Threshold                       | 19.2dBf (5 $\mu$ V)                      |
| Antenna Input                          | 300 ohms balanced,<br>75 ohms unbalanced |

## AM Tuner Section

|                      |               |
|----------------------|---------------|
| Sensitivity          |               |
| IHF ferrite antenna  | 300 $\mu$ V/m |
| IHF external antenna | 30 $\mu$ V    |

|                       |                           |
|-----------------------|---------------------------|
| Selectivity           | 25dB                      |
| Signal to Noise Ratio | 50dB                      |
| Image Response Ratio  | 40dB                      |
| IF Response Ratio     | 70dB                      |
| Antenna               | Ferrite loopstick antenna |

## Audio Section

|                          |                     |
|--------------------------|---------------------|
| Output (Level/Impedance) |                     |
| FM (100% MOD)            | 650mV/3.6k $\Omega$ |
| AM (30% MOD)             | 150mV               |

## Miscellaneous

|                          |                                                                 |
|--------------------------|-----------------------------------------------------------------|
| Power Requirements       | AC 120V, 50/60Hz                                                |
| Power Consumption        | 11W                                                             |
| Dimensions               | 420(W) x 94(H) x 254(D)mm<br>16-9/16(W) x 3-11/16(H) x 10(D) in |
| Weight (Without Package) | 3.2kg (6lb 13oz)                                                |

## Furnished Parts

|                        |   |
|------------------------|---|
| FM T-type antenna      | 1 |
| Operating Instructions | 1 |

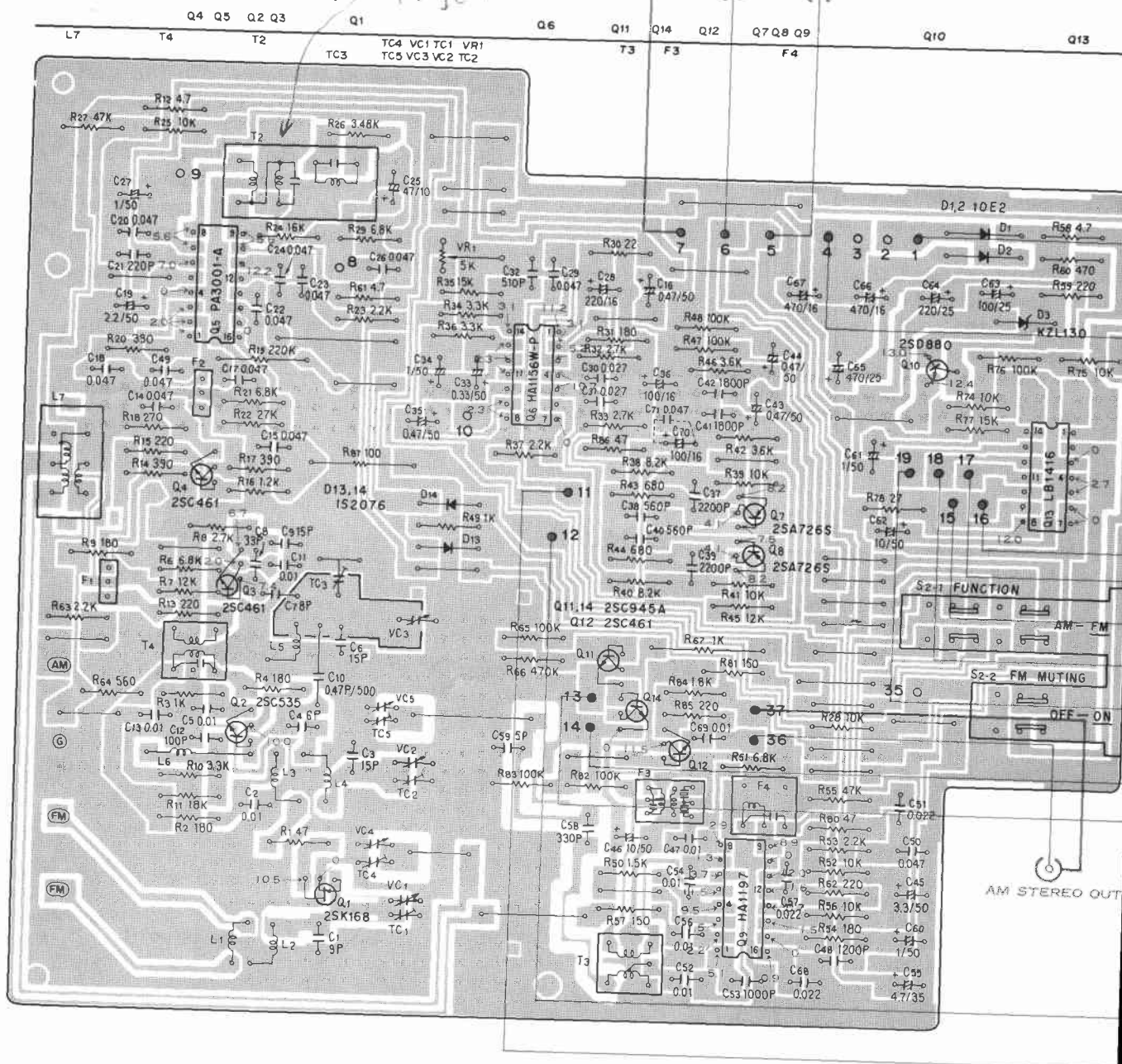
## NOTE:

*Specifications and the design subject to possible modification without notice due to improvements.*

## 7. P.C.BOARDS CONNECTION DIAGRAM

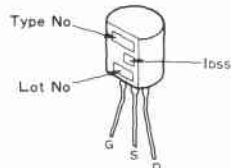
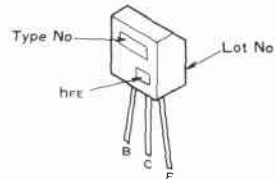
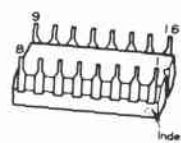
A

TUNER Ass'y (GWE-152)

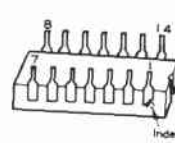
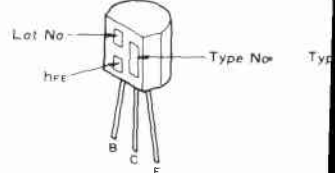
Faulty  
T2 IC PA30001-A

## External Appearance of Transistors and ICs

2SK168

2SC461  
2SC535PA3001-A  
HA1197

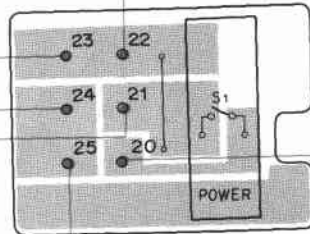
HA1156W-P

2SA726S  
2SC2575

DIAL POINTER

PL2  
8V 100mAPL1  
8V 0.3A

(POWER)

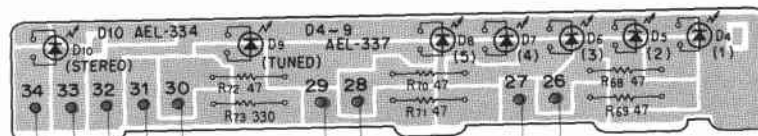
**SWITCH Ass'y  
(GWS-346)**

T1: POWER TRANSFORMER

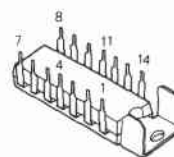
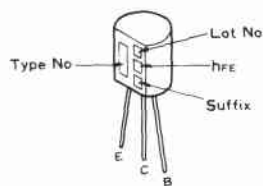
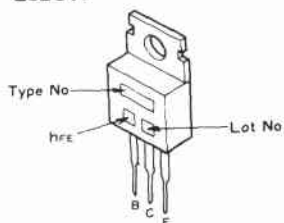
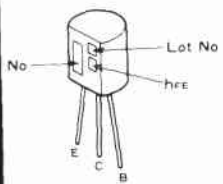
R100 2.2M (1/2W)

BLU

BLU

AC 120V  
60Hz**LED Ass'y (GWX-638)**

A750

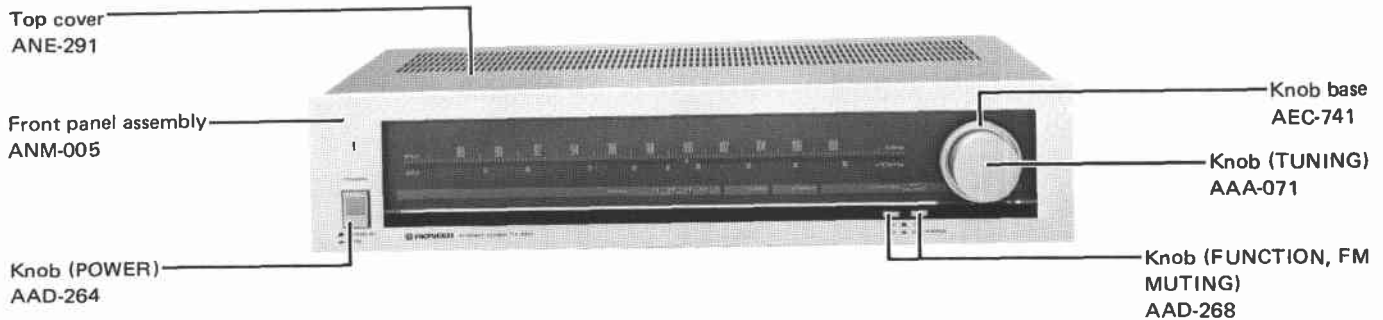
**2SD880  
2SD313****2SC945A****LB1416**

## 5. PARTS LOCATION

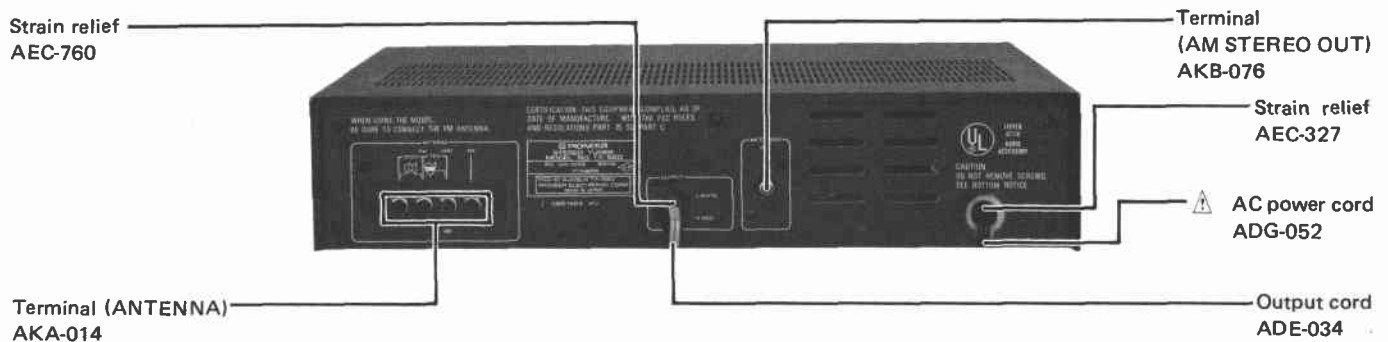
### NOTES:

- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks  $\star\star$  and  $\star$ .  
 $\star\star$  GENERALLY MOVES FASTER THAN  $\star$   
 This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

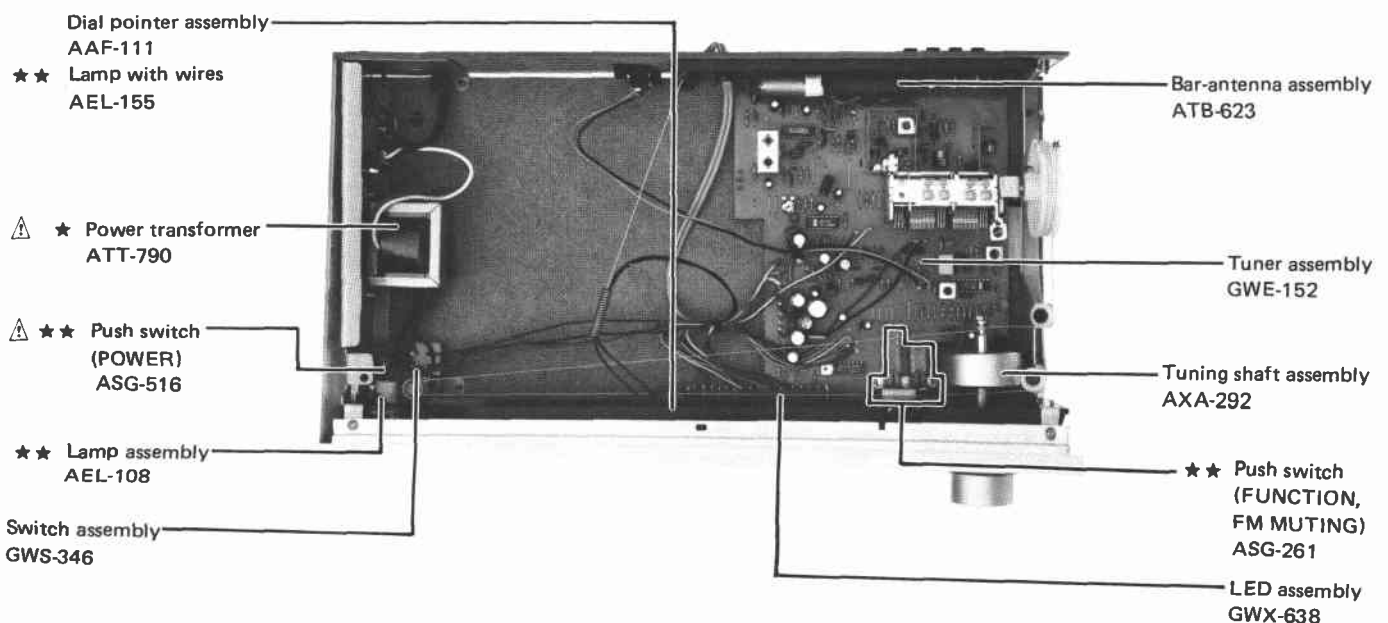
### Front Panel View



### Rear Panel View



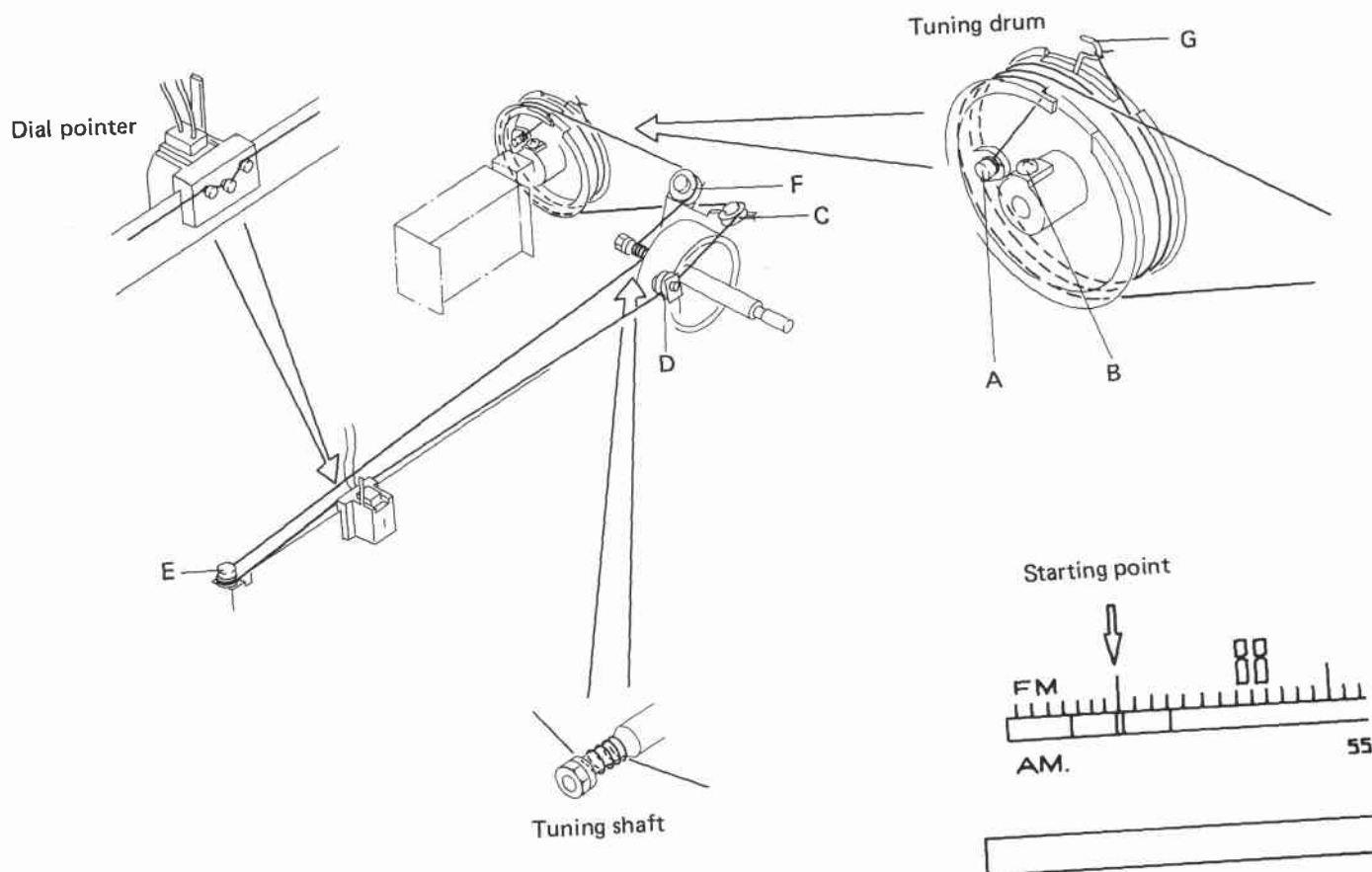
### Top View



## 6. DIAL CORD STRINGING

1. Remove the top cover and front panel.
2. Remove the tuning drum from the shaft of the tuning capacitor.
3. Tie one end of the cord to the stud A located inside the tuning drum.
4. Rotate the tuning capacitor right around until the rotor blades are fully intermeshed.
5. Secure the tuning drum back onto the tuning capacitor shaft, making sure that the securing screw B faces directly upward.
6. Pass the cord out through the small opening in the circumference of the tuning drum (see diagram), and then take it over pulleys C, D and E in that sequence.
7. Wind the cord around the tuning shaft 3 times.
8. Pass it over pulley F, wind it around the tuning drum 2 times, and finally tie it to the spring hook G so that it is tensioned.

9. Turn the tuning shaft, and check that the cord moves smoothly.
10. Cut off any excess cord.
11. Turn the tuning shaft counter-clockwise as far as it will go.
12. Align the dial pointer with the starting point of the dial scale, and then pass the cord over it.
13. Check that the dial pointer is in line with the starting point of the dial scale.
14. Finally apply the locking paint to the cord securing positions (stud A and spring hook G) and the dial pointer connection.



## 9. ELECTRICAL PARTS LIST

### NOTES:

- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).

560Ω    56 × 10<sup>1</sup>    561 . . . . RD%PS 561 J

57kΩ    47 × 10<sup>3</sup>    473 . . . . RD%PS 473 J

0.5Ω    0R5 . . . . . RN2H 0R5 K

1Ω    010 . . . . . RS1P 010 K

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ    562 × 10<sup>1</sup>    5621 . . . . RN%SR 5621 F

- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks  $\star\star$  and  $\star$ .  
 $\star\star$  GENERALLY MOVES FASTER THAN  $\star$   
 This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

### Miscellaneous Parts

| Mark             | Part No. | Symbol & Description                         | Mark | Part No.      | Symbol & Description                                       |
|------------------|----------|----------------------------------------------|------|---------------|------------------------------------------------------------|
| $\Delta$ $\star$ | ATT-790  | T1 Power transformer                         |      | CKDYB 222K 50 | C37, C39                                                   |
| $\star\star$     | AEL-108  | PL1 Lamp assembly                            |      | CKDYX 273M 25 | C30, C31                                                   |
| $\star\star$     | AEL-155  | PL2 Lamp with wires                          |      | CKDYF 103Z 50 | C2, C5, C11, C13, C47, C52, C54, C56, C69                  |
| $\Delta$         | ACN-029  | R100 Carbon composition resistor (2.2M/1/2W) |      | CKDYF 473Z 50 | C14, C15, C17, C18, C20, C22, C23, C26, C29, C49, C50, C71 |
| $\Delta$         | ADG-052  | AC power cord                                |      | CKDYX 473M 25 | C24                                                        |
| $\Delta$         | ADE-034  | Output cords with phono plugs                |      | CKDYF 223Z 50 | C51, C57, C68                                              |
|                  | GWE-152  | Tuner assembly                               |      | CQSA 331K 50  | C58                                                        |
|                  | GWS-346  | Switch assembly                              |      | CQSA 511J 50  | C32                                                        |
|                  | GWX-638  | LED assembly                                 |      | CEA R33M 50L  | C33                                                        |
|                  | AKB-076  | Terminal (AM STEREO OUT)                     |      | CEA 010M 50L  | C34                                                        |
|                  |          |                                              |      | CEA R47M 50L  | C16, C35, C43, C44                                         |
|                  |          |                                              |      | CEA 010M 50L  | C27, C60, C61                                              |
|                  |          |                                              |      | CEA 2R2M 50L  | C19                                                        |
|                  |          |                                              |      | CEA 100M 50L  | C46, C62                                                   |
|                  |          |                                              |      | CEA 470M 10L  | C25                                                        |
|                  |          |                                              |      | CEA 4R7M 35L  | C55                                                        |
|                  |          |                                              |      | CEA 101M 25L  | C63                                                        |
|                  |          |                                              |      | CEA 221M 16L  | C28                                                        |
|                  |          |                                              |      | CEA 221M 25L  | C64                                                        |
|                  |          |                                              |      | CEA 471M 16L  | C66, C67                                                   |
|                  |          |                                              |      | CEA 471M 25L  | C65                                                        |
|                  |          |                                              |      | CEA 3R3M 50L  | C45                                                        |
|                  |          |                                              |      | CEA 101M 16L  | C36, C70                                                   |

### Tuner Assembly (GWE-152)

#### CAPACITORS

| Mark | Part No.      | Symbol & Description |
|------|---------------|----------------------|
|      | ACK-012       | VC Tuning capacitor  |
|      | ACM-006       | TC3 Ceramic trimmer  |
|      | CCDUJ 090D 50 | C1                   |
|      | CGB R47K 500  | C10                  |
|      | CCDZM 050D 50 | C59                  |
|      | CCDSL 060D 50 | C4                   |
|      | CCDCH 080D 50 | C7                   |
|      | CCDCH 150J 50 | C9                   |
|      | CCDRH 150J 50 | C6                   |
|      | CCDUJ 150J 50 | C3                   |
|      | CCDCH 330J 50 | C8                   |
|      | CCDSL 101J 50 | C12                  |
|      | CCDSL 221J 50 | C21                  |
|      | CKDYB 561K 50 | C38, C40             |
|      | CKDYB 102K 50 | C53                  |
|      | CKDYB 122K 50 | C48                  |
|      | CKDYB 182K 50 | C41, C42             |

## RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

| Mark | Part No.    | Symbol & Description                                 |
|------|-------------|------------------------------------------------------|
| ★    | ACP-079     | VR1 Semifixed (5k-B)                                 |
|      | RD%PM □□□J  | R1-R4, R6-R25, R27-R34,<br>R36-R67, R74-R78, R80-R87 |
|      | RN%PQ □□□□F | R26, R35                                             |

## SEMICONDUCTORS

| Mark | Part No.   | Symbol & Description |
|------|------------|----------------------|
| ★★   | 2SK168     | Q1                   |
| ★★   | 2SC535     | Q2                   |
| ★★   | 2SC461     | Q3, Q4, Q12          |
| ★★   | PA3001-A   | Q5                   |
| ★★   | HA1156W-P  | Q6                   |
| ★★   | 2SA726S    | Q7, Q8               |
| ★★   | (2SA750)   |                      |
| ★★   | HA1197     | Q9                   |
| ⚠ ★★ | 2SD880     | Q10                  |
| ⚠ ★★ | (2SD313)   |                      |
| ★★   | LB1416     | Q13                  |
| ★★   | 2SC945A    | Q11, Q14             |
| ★★   | (2SC2575)  |                      |
| ⚠ ★  | 10E2       | D1, D2               |
| ⚠ ★  | (SIB01-02) |                      |
| ★    | KZL130     | D3                   |
| ★    | 1S2076     | D13, D14             |
| ★    | (1S1555)   |                      |
| ★    | (1S2473)   |                      |

## COILS, FILTERS

| Mark | Part No. | Symbol & Description     |
|------|----------|--------------------------|
|      | ATE-049  | T2 FM det. transformer   |
|      | ATB-066  | T3 AM osc. coil          |
|      | ATE-008  | T4 FM IF transformer     |
|      | T24-028  | L6 RF choke coil         |
|      | ATB-623  | L7 Bar-antenna assembly  |
|      | ATF-053  | F1, F2 FM ceramic filter |
|      | ATF-121  | F3 AM ceramic filter     |
|      | ATF-038  | F4 AM IF filter          |

## OTHERS

| Mark | Part No.     | Symbol & Description                    |
|------|--------------|-----------------------------------------|
| ★★   | ASG-261      | S2 Push switch<br>(FUNCTION, FM MUTING) |
|      | AKA-014      | Terminal 4-P (ANTENNA)                  |
|      | PMZ30P060FMC | Screw 3 X 6                             |
|      | VBZ30P100FZK | Screw 3 X 10                            |

## Switch Assembly (GWS-346)

| Mark | Part No. | Symbol & Description   |
|------|----------|------------------------|
| ⚠ ★★ | ASG-516  | S1 Push switch (POWER) |

## LED Assembly (GWX-638)

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

| Mark | Part No.   | Symbol & Description |
|------|------------|----------------------|
|      | RD%PM □□□J | R68-R73              |
| ★    | AEL-337    | D4-D9 LED (Green)    |
| ★    | AEL-334    | D10 LED (Red)        |

## 12. ADJUSTMENTS

### 12.1 FM TUNER SECTION

- Connect the FM signal generator (FM SG) to the FM antenna 300 $\Omega$  terminal through a 300 $\Omega$  dummy antenna.
- Set the FUNCTION switch to the FM position, the MUTING switch to the OFF position.
- The tuning coil in the FM front end does not have an adjusting core.  
Consequently, tracking adjustments at 90MHz are performed by regulating the gap between rotor and stator of the tuning capacitors (VC1, VC2 and VC3).  
The expression "adjust VC (VC1, VC2 and VC3)" found in the text means that the two outer rotor blades of each of these tuning capacitors are to be extended outwards with spatula (Part No. GGK-066) as shown in Fig. 12-1.

| Step | FM SG (400Hz, $\pm$ 75kHz deviation)                        |            | Position of dial pointer | Adjustment point                                                                       | Adjustment specification                                                                                           |
|------|-------------------------------------------------------------|------------|--------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
|      | Frequency                                                   | Level      |                          |                                                                                        |                                                                                                                    |
| 1    | Idle                                                        |            | 106MHz                   | T2-N                                                                                   | 0V DC between terminal no. 8 and no. 9.                                                                            |
| 2    | 106MHz                                                      | 60 to 80dB | 106MHz                   | TC3                                                                                    | Adjust until DC voltage between terminal no. 35 and ground is maximum, and 0V DC between terminal no. 8 and no. 9. |
| 3    | 90MHz                                                       | 60 to 80dB | 90MHz                    | VC3                                                                                    |                                                                                                                    |
| 4    | Repeat steps 2 to 3 above.                                  |            |                          |                                                                                        |                                                                                                                    |
| 5    | 106MHz                                                      | 20dB       | 106MHz                   | TC1,TC2                                                                                |                                                                                                                    |
| 6    | 90MHz                                                       | 20dB       | 90MHz                    | VC1,VC2                                                                                |                                                                                                                    |
| 7    | Repeat steps 5 to 6 until maximum sensitivity is attained.  |            |                          |                                                                                        |                                                                                                                    |
| 8    | 98MHz                                                       | 66dB       | 98MHz                    | T4                                                                                     | Adjust until DC voltage between terminal no. 35 and ground is maximum.                                             |
| 9    | Idle                                                        |            | 98MHz                    | T2-N                                                                                   | 0V DC between terminal no. 8 and no. 9.                                                                            |
| 10   | 98MHz                                                       | 66dB       | 98MHz                    | T2-D                                                                                   | Adjust until distortion at OUTPUT terminal is minimum.                                                             |
| 11   | Repeat steps 9 to 10 until both specifications are correct. |            |                          |                                                                                        |                                                                                                                    |
| 12   | Set the MUTING switch to the ON position.                   |            |                          |                                                                                        |                                                                                                                    |
| 13   | 98MHz                                                       | Variable   | 98MHz                    | Check that the muting circuit is not functioning at above 26dB.<br>If not, remove R22. |                                                                                                                    |

### Multiplex Decoder Section

- Connect the FM multiplex stereo signal generator (FM MPX SG) to the FM SG external modulation terminal.
- Set the output of the FM SG to 98MHz and level to 86dB (with modulation mode set to EXTERNAL) and tune the TX-520 unit to that frequency (98MHz).
- Set the MUTING switch to the ON position.

| Step | FM MPX SG                                                                    | Adjustment point       | Adjustment specification                                        |
|------|------------------------------------------------------------------------------|------------------------|-----------------------------------------------------------------|
| 1    | Idle (no modulation)                                                         | VR1                    | Adjust signal at terminal no. 10 to 19kHz (within $\pm$ 100Hz). |
| 2    | Main (1kHz, L+R, $\pm$ 67.5kHz deviation)<br>Pilot (19kHz, 7.5kHz deviation) | T4<br>within $\pm$ 90° | Adjust until distortion at OUTPUT terminal is minimum.          |

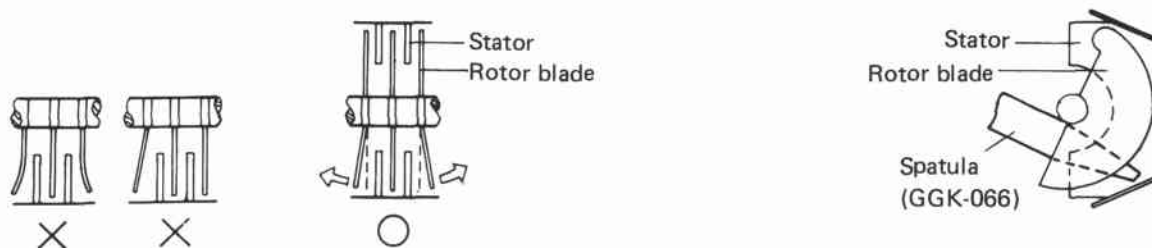


Fig. 12-1 Adjustment of tuning capacitor

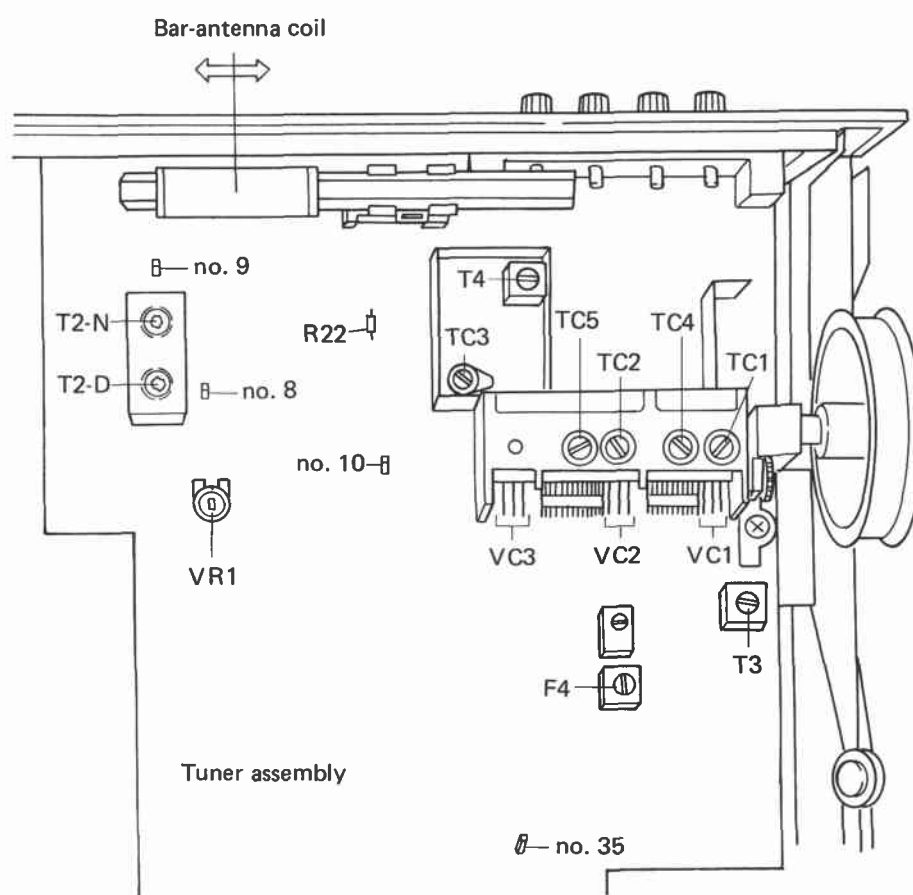
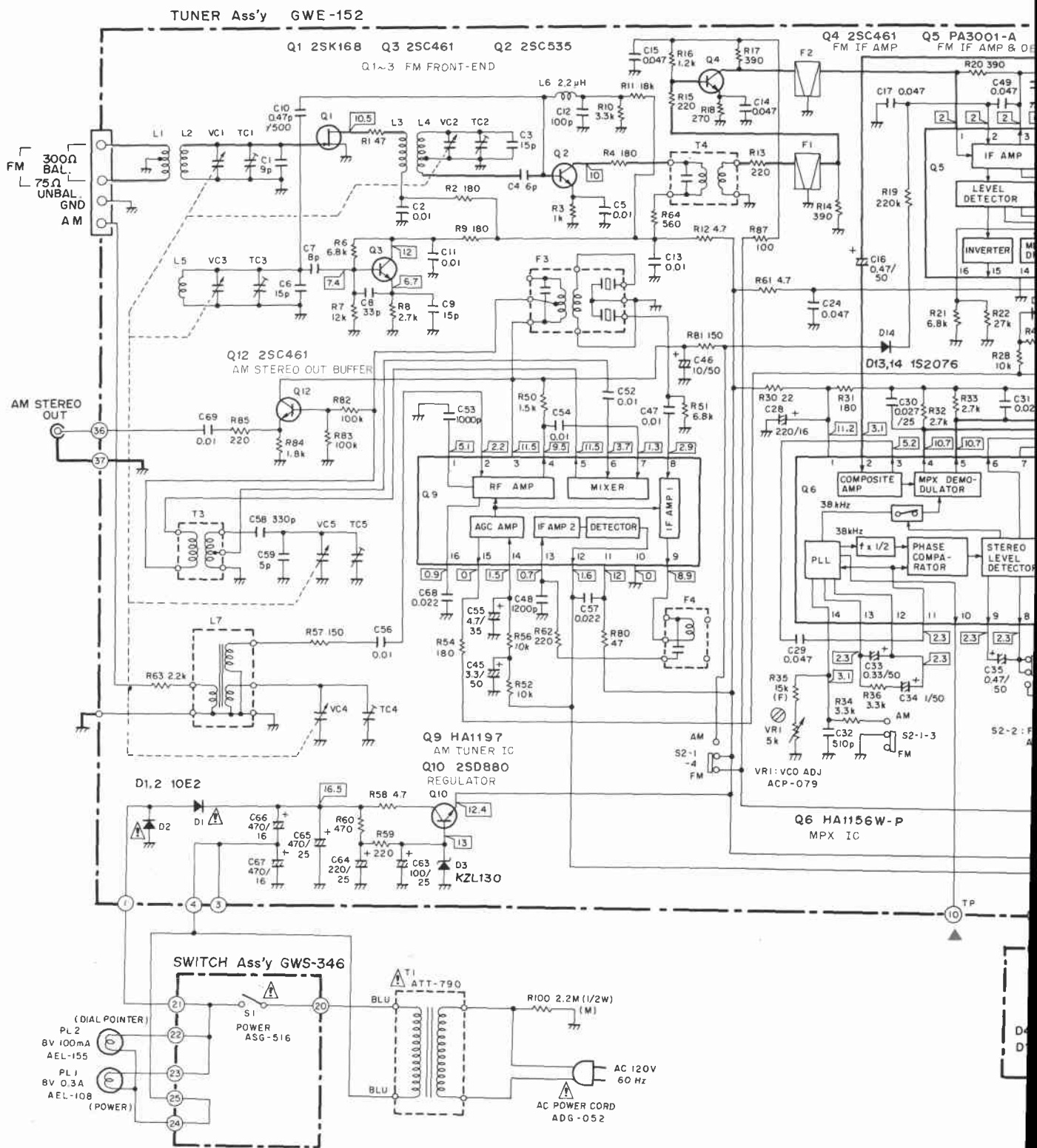


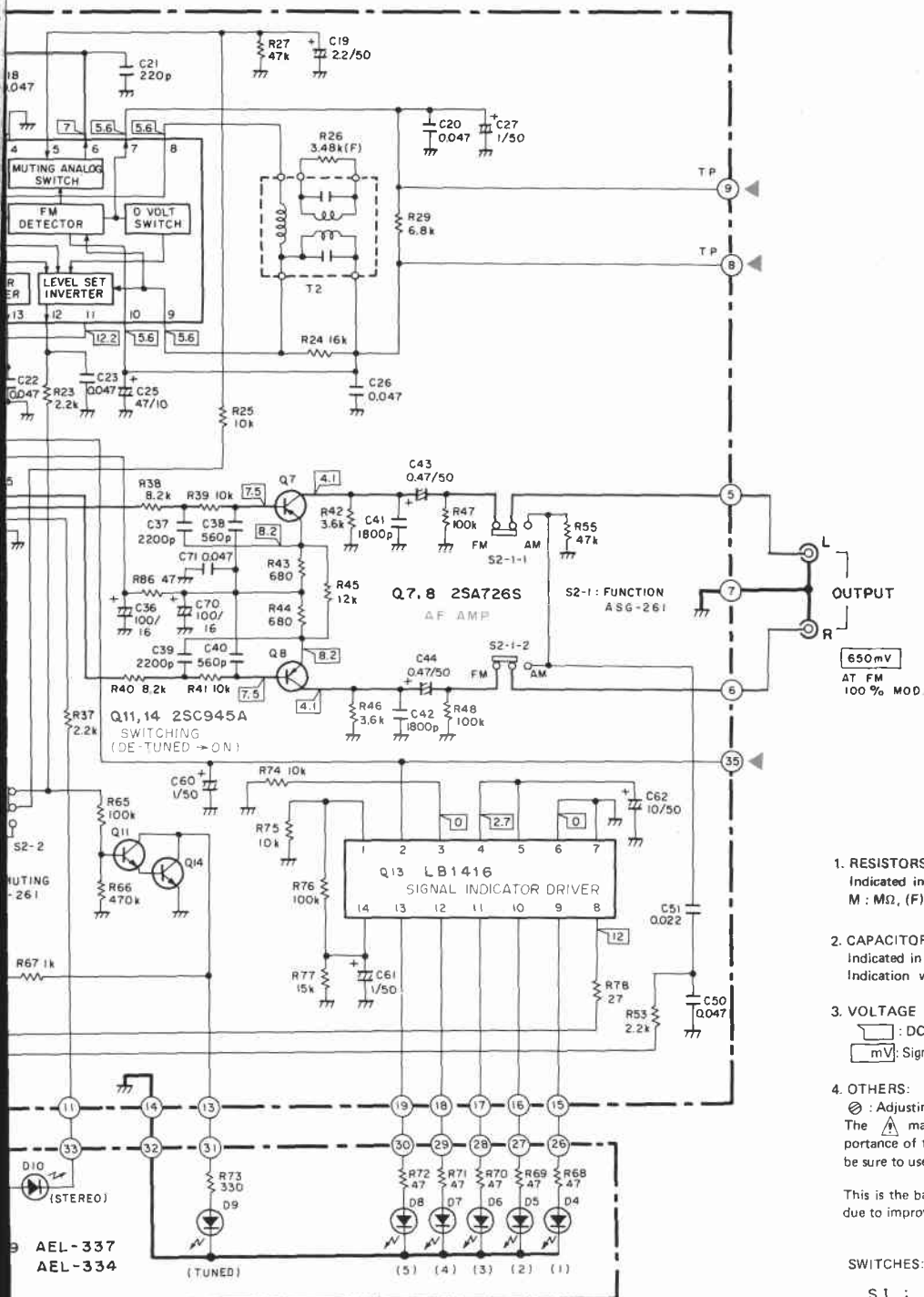
Fig. 12-2 Adjustment points and measuring points

# 8. SCHEMATIC DIAGRAM



## NOTE:

The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.



## 1. RESISTORS:

Indicated in  $\Omega$ ,  $\frac{1}{4}W$ ,  $\pm 5\%$  tolerance unless otherwise noted k : k $\Omega$ , M : M $\Omega$ , (F) :  $\pm 1\%$ , (G) :  $\pm 2\%$ , (K) :  $\pm 10\%$ , (M) :  $\pm 20\%$  tolerance

## 2. CAPACITORS:

Indicated in capacity ( $\mu F$ )/voltage (V) unless otherwise noted p : pF. Indication without voltage is 50V except electrolytic capacitor.

## 3. VOLTAGE

$\square$  : DC voltage (V) at no input signal  
 $\square$  mV : Signal voltage at FM 400Hz 75kHz DEV.

## 4. OTHERS:

$\otimes$  : Adjusting point.  
 The  $\triangle$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

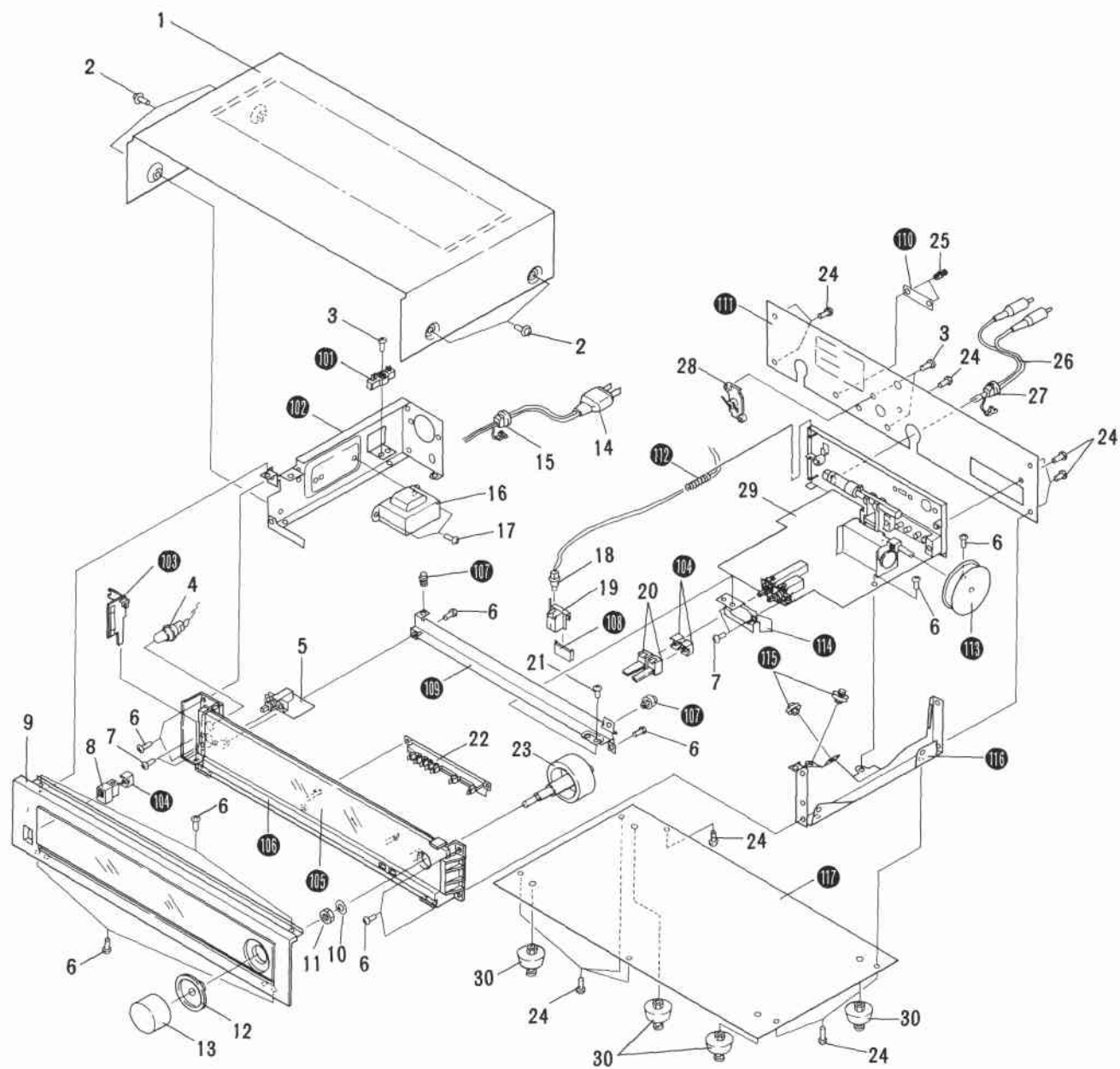
This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

## SWITCHES:

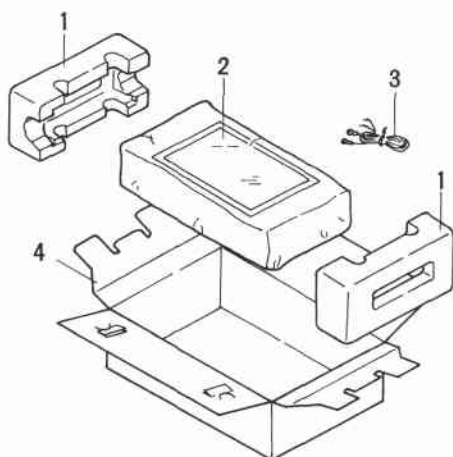
S1 : POWER ON - STAND-BY  
 S2-1 : FUNCTION FM - AM  
 S2-2 : FM MUTING ON - OFF

The underlined indicates the switch position.

# 10. EXPLODED VIEW



## 11. PACKING



| Mark | No. | Part No. | Description            |
|------|-----|----------|------------------------|
|      | 1.  | AHA-290  | Side pad               |
|      | 2.  | ARB-403  | Operating instructions |
|      | 3.  | ADH-004  | T-type FM antenna      |
|      | 4.  | AHD-899  | Packing case           |

### Parts List of Exploded View

#### NOTES:

- Parts without part number cannot be supplied.
- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks  $\star\star$  and  $\star$ .

$\star\star$  GENERALLY MOVES FASTER THAN  $\star$

This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

| Mark         | No.         | Part No.     | Description                | Mark | No.  | Part No. | Description              |
|--------------|-------------|--------------|----------------------------|------|------|----------|--------------------------|
|              | 1.          | ANE-291      | Top cover                  |      | 26.  | ADE-034  | Output cords             |
|              | 2.          | FBT40P080FZK | Screw 4 X 8                |      | 27.  | AEC-760  | Strain relief            |
|              | 3.          | VBZ30P100FZK | Screw 3 X 10               |      | 28.  | AKB-076  | Terminal (AM STEREO OUT) |
| $\star\star$ | 4.          | AEL-108      | Lamp assembly              |      | 29.  | GWE-152  | Tuner assembly           |
|              | 5.          | GWS-346      | Switch assembly            |      | 30.  | AEC-609  | Foot assembly            |
|              | 6.          | VBZ30P080FMC | Screw 3 X 8                |      | 31.  |          |                          |
|              | 7.          | PMZ30P060FMC | Screw 3 X 6                |      | 32.  |          |                          |
|              | 8.          | AAD-264      | Knob (POWER)               |      |      |          |                          |
|              | 9.          | ANM-005      | Front panel assembly       |      |      |          |                          |
|              | 10.         | WA92F140U050 | Flat washer                |      |      |          |                          |
|              | 11.         | NK90FUC      | Nut M9                     |      | 101. |          | Terminal strip 2-P       |
|              | 12.         | AEC-741      | Knob base                  |      | 102. |          | Side frame L             |
|              | 13.         | AAA-071      | Knob (TUNING)              |      | 103. |          | Side cover               |
| $\Delta$     | 14.         | ADG-052      | AC power cord              |      | 104. |          | Flexible joint           |
|              | 15.         | AEC-327      | Strain relief              |      | 105. |          | Dial scale board         |
| $\Delta$     | $\star$ 16. | ATT-790      | Power transformer (120V)   |      | 106. |          | Sub-panel                |
|              | 17.         | ABA-252      | Screw 3 X 8                |      | 107. |          | Pulley assembly          |
| $\star\star$ | 18.         | AEL-155      | Lamp with wires            |      | 108. |          | Smoother                 |
|              | 19.         | AAF-111      | Dial pointer assembly      |      | 109. |          | Plate                    |
|              | 20.         | AAD-268      | Knob (FM MUTING, FUNCTION) |      | 110. |          | Serial number plate      |
|              | 21.         | PMZ30P40FZB  | Screw 3 X 4                |      | 111. |          | Rear panel               |
|              | 22.         | GWX-638      | LED assembly               |      | 112. |          | Guide arm                |
|              | 23.         | AXA-292      | Tuning shaft assembly      |      | 113. |          | Tuning drum              |
|              | 24.         | ABA-246      | Screw 3 X 12               |      | 114. |          | Holder                   |
|              | 25.         | AEC-678      | Nylon rivet                |      | 115. |          | Pulley assembly          |
|              |             |              |                            |      | 116. |          | Side frame R             |
|              |             |              |                            |      | 117. |          | Bottom plate             |

## 12.2 AM TUNER SECTION

- Connect the AM signal generator (AM SG) to the AM ANTENNA terminal through a 10k $\Omega$  resistor.
- Set the FUNCTION switch to the AM position.

| Step | AM SG (400Hz, 30% modulation)                                  |       | Position of dial pointer | Adjustment point | Adjustment specification                                       |
|------|----------------------------------------------------------------|-------|--------------------------|------------------|----------------------------------------------------------------|
|      | Frequency                                                      | Level |                          |                  |                                                                |
| 1    | 1400kHz                                                        | 100dB | 1400kHz                  | TC5              | Adjust until demodulated signal at OUTPUT terminal is maximum. |
| 2    | 600kHz                                                         | 100dB | 600kHz                   | T3               |                                                                |
| 3    | Set the AM SG to 30dB output level, repeat steps 1 to 2 above. |       |                          |                  |                                                                |
| 4    | 1400kHz                                                        | 50dB  | 1400kHz                  | TC4              | Adjust until demodulated signal at OUTPUT terminal is maximum. |
| 5    | 600kHz                                                         | 50dB  | 600kHz                   | Bar-antenna*     |                                                                |
| 6    | Repeat steps 4 to 5 until maximum sensitivity is attained.     |       |                          |                  |                                                                |
| 7    | 1000kHz                                                        | 50dB  | 1000kHz                  | F4               | Adjust until maximum sensitivity is attained.                  |

\*Slide the bar-antenna coil along the core.

## 12. RÉGLAGE

### 12.1 SECTION TUNER FM

- Raccorder le générateur de signaux FM (FM SG) à la borne de l'antenne FM 300  $\Omega$  au moyen d'une antenne fictive de 300  $\Omega$ .
- Amener l'interrupteur FUNCTION en position FM et l'interrupteur MUTING en position OFF.
- La bobine d'accord à l'entrée FM n'est pas pourvue de bobine de réglage. Par conséquent, les alignements à 90 MHz sont exécutés en réglant l'espace entre le rotor et le stator des condensateurs d'accord (VC1, VC2 et VC3). L'expression "Régler VC (VC1, VC2 et VC3)" dans le texte signifie que les deux palettes du rotor extérieur de chacun de ces deux condensateurs d'accord doivent être tournées vers l'extérieur au moyen d'une spatule (pièce n° GGK-066), comme indiqué sur la figure 12-1.

| Pas | FM SG<br>(400 Hz, $\pm$ 75 kHz dérive)                                     |            | Position de<br>l'indicateur | Point de<br>réglage                                                                                         | Spécification de réglage                                                                                                         |
|-----|----------------------------------------------------------------------------|------------|-----------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
|     | Fréquence                                                                  | Niveau     |                             |                                                                                                             |                                                                                                                                  |
| 1   | Déwatté                                                                    |            | 106 MHz                     | T2-N                                                                                                        | 0V CC entre la borne n° 8 et n° 9.                                                                                               |
| 2   | 106 MHz                                                                    | 60 à 80 dB | 106 MHz                     | TC3                                                                                                         | Régler jusqu'à ce que le voltage CC entre la borne n° 35 et la mise à terre est au maximum et 0V CC entre la borne n° 8 et n° 9. |
| 3   | 90 MHz                                                                     | 60 à 80 dB | 90 MHz                      | VC3                                                                                                         |                                                                                                                                  |
| 4   | Répéter le pas 2 et 3                                                      |            |                             |                                                                                                             |                                                                                                                                  |
| 5   | 106 MHz                                                                    | 20 dB      | 106 MHz                     | TC1, TC2                                                                                                    |                                                                                                                                  |
| 6   | 90 MHz                                                                     | 20 dB      | 90 MHz                      | VC1, VC2                                                                                                    |                                                                                                                                  |
| 7   | Répéter les pas 5 et 6 jusqu'à ce que la sensibilité maximum est atteinte. |            |                             |                                                                                                             |                                                                                                                                  |
| 8   | 98 MHz                                                                     | 66 dB      | 98 MHz                      | T4                                                                                                          | Régler jusqu'à ce que le voltage CC entre la borne n° 35 et la mise à terre est au maximum.                                      |
| 9   | Déwatté                                                                    |            | 98 MHz                      | T2-N                                                                                                        | 0V CC entre la borne n° 8 et n° 9.                                                                                               |
| 10  | 98 MHz                                                                     | 66 dB      | 98 MHz                      | T2-D                                                                                                        | Régler jusqu'à ce que la distortion à la borne OUTPUT est minimum.                                                               |
| 11  | Répéter les pas 9 et 10 jusqu'à l'obtention des valeurs correctes.         |            |                             |                                                                                                             |                                                                                                                                  |
| 12  | Amener l'interrupteur MUTING en position ON.                               |            |                             |                                                                                                             |                                                                                                                                  |
| 13  | 98 MHz                                                                     | Variable   | 98 MHz                      | Contrôler si le circuit de silencieux fonctionne au dessus de 26 dB. Si cela n'est pas le cas, enlever R22. |                                                                                                                                  |

### Section décodeur multiplex

- Raccorder le générateur de signaux stéréo multiplex FM à la borne de modulation externe FM SG.
- Régler la valeur de sortie du FM SG à 98 MHz, le niveau à 86 dB (la commande de modulation étant sur EXTERNAL) et le TX-520 à la même fréquence (98 MHz).
- Amener l'interrupteur MUTING en position ON.

| Pas | FM MPX SG                                                                                          | Point de réglage      | Spécification de réglage                                           |
|-----|----------------------------------------------------------------------------------------------------|-----------------------|--------------------------------------------------------------------|
| 1   | Déwatté (pas de modulation)                                                                        | VR1                   | Régler le signal à la borne n° 10 à 19 kHz (entre $\pm$ 100 Hz)    |
| 2   | Principal<br>(1 kHz, L+R, $\pm$ 67,5 kHz déviation)<br>Pilote<br>(19 kHz, $\pm$ 7,5 kHz déviation) | T4<br>entre $\pm$ 90° | Régler jusqu'à ce que la distortion à la borne OUTPUT est minimum. |

## 12. AJUSTE

### 12.1 SECCIÓN DEL SINTONIZADOR DE FM

- Conectar el generador de señales de FM (FM SG) al terminal de 300 ohmios de la antena de FM a través de una antena ficticia de 300 ohmios.
- Poner el selector de función (FUNCTION) en la posición FM y el interruptor de silenciamiento (MUTING) en la posición OFF.
- La bobina de sintonización de la sección de entrada de FM no está provista de núcleo de ajuste. Consecuentemente, los ajustes de seguimiento a 90 MHz se llevan a cabo regulando el entrehierros entre el rotor y el estator de los capacitores de sintonización (VC1, VC2 y VC3). La expresión "ajustar los VC (VC1, VC2 y VC3)" que se encuentra en el texto significa que las dos paletas del rotor exterior de cada uno de estos capacitores tienen que extenderse hacia afuera con la espátula (parte no. GGK-066) como se muestra en la figura 12-1.

| Paso | FM SG<br>(400 Hz, desviación de $\pm 75$ kHz)                             |            | Posición del<br>indicador del<br>cuadrante | Punto de<br>ajuste                                                                                              | Especificación del ajuste                                                                                                     |
|------|---------------------------------------------------------------------------|------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
|      | Frecuencia                                                                | Nivel      |                                            |                                                                                                                 |                                                                                                                               |
| 1    | Libre                                                                     |            | 106 MHz                                    | T2-N                                                                                                            | 0V CC entre el terminal no. 8 y el no. 9.                                                                                     |
| 2    | 106 MHz                                                                   | 60 a 80 dB | 106 MHz                                    | TC3                                                                                                             | Ajustar hasta que la tensión de CC entre el terminal no. 35 y masa sea el máximo, y 0V CC entre el terminal no. 8 y el no. 9. |
| 3    | 90 MHz                                                                    | 60 a 80 dB | 90 MHz                                     | VC3                                                                                                             |                                                                                                                               |
| 4    | Repetir los pasos 2 y 3 de arriba.                                        |            |                                            |                                                                                                                 |                                                                                                                               |
| 5    | 106 MHz                                                                   | 20 dB      | 106 MHz                                    | TC1, TC2                                                                                                        |                                                                                                                               |
| 6    | 90 MHz                                                                    | 20 dB      | 90 MHz                                     | VC1, VC2                                                                                                        |                                                                                                                               |
| 7    | Repetir los pasos 5 y 6 hasta que se consiga la máxima sensibilidad.      |            |                                            |                                                                                                                 |                                                                                                                               |
| 8    | 98 MHz                                                                    | 66 dB      | 98 MHz                                     | T4                                                                                                              | Ajustar hasta que la tensión de CC entre el terminal no. 35 y masa sea el máximo.                                             |
| 9    | Libre                                                                     |            | 98 MHz                                     | T2-N                                                                                                            | 0V CC entre el terminal no. 8 y el no. 9.                                                                                     |
| 10   | 98 MHz                                                                    | 66 dB      | 98 MHz                                     | T2-D                                                                                                            | Ajustar hasta que la distorsión en el terminal de salida (OUTPUT) sea la mínima.                                              |
| 11   | Repetir los pasos 9 y 10 hasta que ambas especificaciones sean correctas. |            |                                            |                                                                                                                 |                                                                                                                               |
| 12   | Poner el interruptor de silenciamiento (MUTING) en la posición ON.        |            |                                            |                                                                                                                 |                                                                                                                               |
| 13   | 98 MHz                                                                    | Variable   | 98 MHz                                     | Comprobar que el circuito de silenciamiento no esté funcionando por encima de 26 dB. Si no es así, extraer R22. |                                                                                                                               |

#### Sección del decodificador de multiplex

- Conectar el generador de señales estereofónicas de multiplex de FM (FM MPX SG) al terminal de modulación exterior del FM SG.
- Ajustar la salida del FM SG a 98 MHz y el nivel a 86 dB (con el modo de modulación ajustado a EXTERNAL) y sintonizar el TX-520 a esta frecuencia (98 MHz).
- Poner el interruptor de silenciamiento (MUTING) en la posición ON.

| Paso | FM MPX SG                                                                                                          | Punto de ajuste                | Especificación del ajuste                                                        |
|------|--------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------------------------------------------------------|
| 1    | Libre (sin modulación)                                                                                             | VR1                            | Ajustar la señal en el terminal no. 10 a 19 kHz (dentro de $\pm 100$ Hz).        |
| 2    | Principal<br>(1 kHz, Izq. + Der., $\pm 67,5$ kHz de desviación)<br>Piloto<br>(19 kHz, $\pm 7,5$ kHz de desviación) | T4<br>dentro de $\pm 90^\circ$ | Ajustar hasta que la distorsión en el terminal de salida (OUTPUT) sea la mínima. |

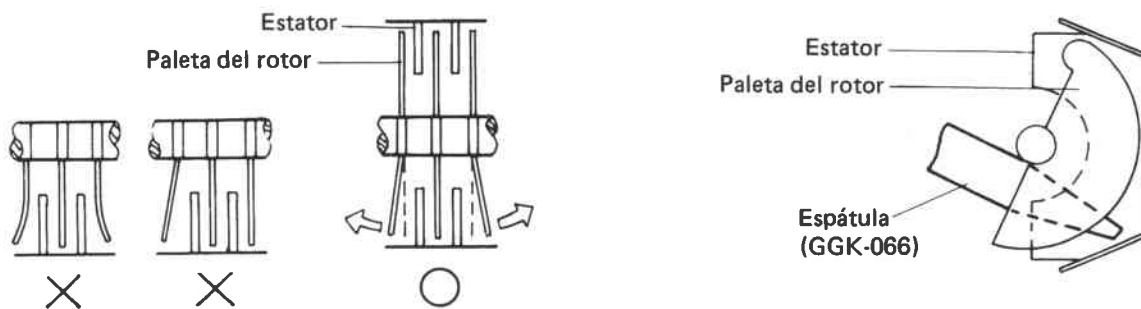


Fig. 12-1 Ajuste capacidad de sintonización

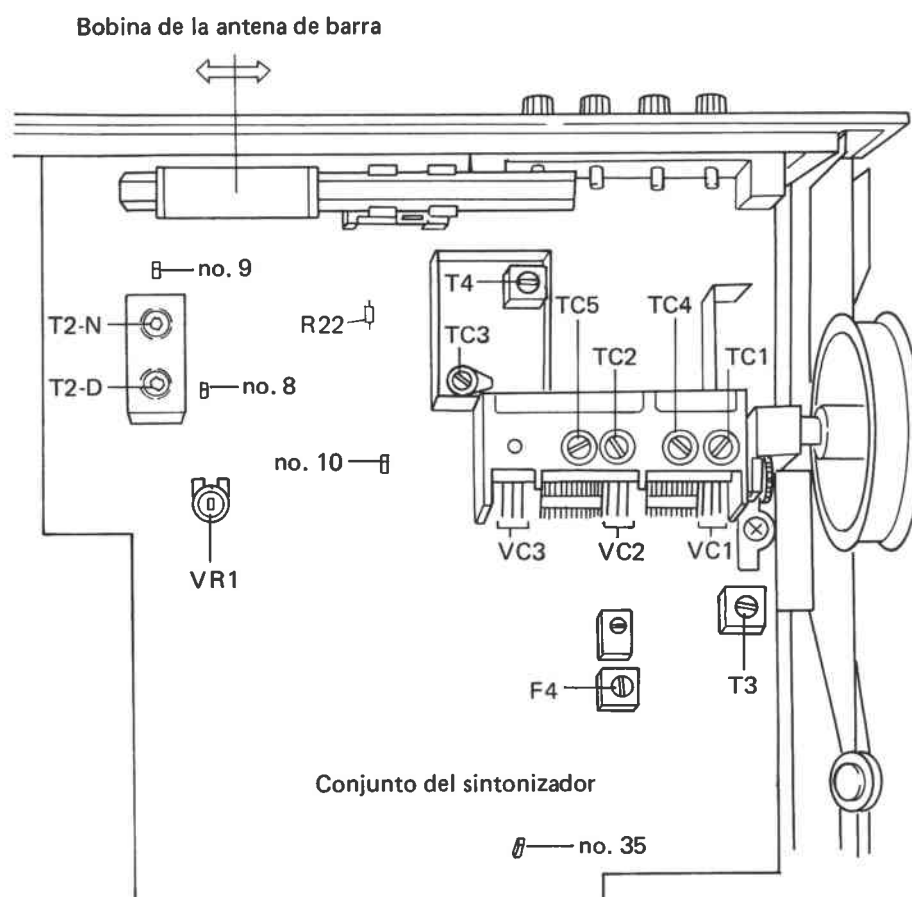


Fig. 12-2 Puntos de ajuste y de medición

## 12.2 SECCIÓN DEL SINTONIZADOR DE AM

- Conectar el generador de señales de AM (AM SG) al terminal para antena de AM (AM ANTENNA) a través de un resistor de 10 K ohmios.
- Poner el selector de función (FUNCTION) a la posición de AM.

| Paso | AM SG<br>(400 Hz, modulación al 30% )                                           |        | Posición del<br>indicador del<br>cuadrante | Punto de<br>ajuste | Especificación del ajuste                                                              |
|------|---------------------------------------------------------------------------------|--------|--------------------------------------------|--------------------|----------------------------------------------------------------------------------------|
|      | Frecuencia                                                                      | Nivel  |                                            |                    |                                                                                        |
| 1    | 1400 kHz                                                                        | 100 dB | 1400 kHz                                   | TC5                | Ajustar hasta que la señal demodulada en el terminal de salida (OUTPUT) sea la máxima. |
| 2    | 600 kHz                                                                         | 100 dB | 600 kHz                                    | T3                 |                                                                                        |
| 3    | Ajustar el AM SG a 30 dB de nivel de salida, repetir los pasos 1 y 2 de arriba. |        |                                            |                    |                                                                                        |
| 4    | 1400 kHz                                                                        | 50 dB  | 1400 kHz                                   | TC4                | Ajustar hasta que la señal demodulada en el terminal de salida (OUTPUT) sea la máxima. |
| 5    | 600 kHz                                                                         | 50 dB  | 600 kHz                                    | Antena de barra*   |                                                                                        |
| 6    | Repetir los pasos 4 y 5 hasta que se consiga la máxima sensibilidad.            |        |                                            |                    |                                                                                        |
| 7    | 1000 kHz                                                                        | 50 dB  | 1000 kHz                                   | F4                 | Ajustar hasta lograrse la máxima sensibilidad.                                         |

\* Deslizar la bobina de la antena de barra por el núcleo.



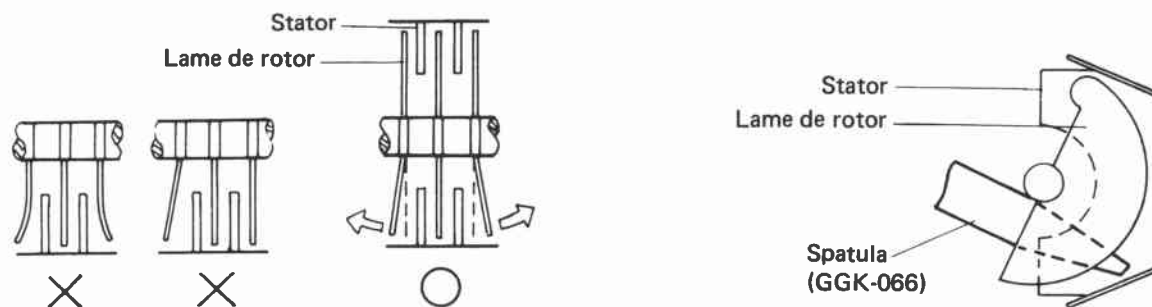


Fig. 12-1 Réglage du condensateur d'accord

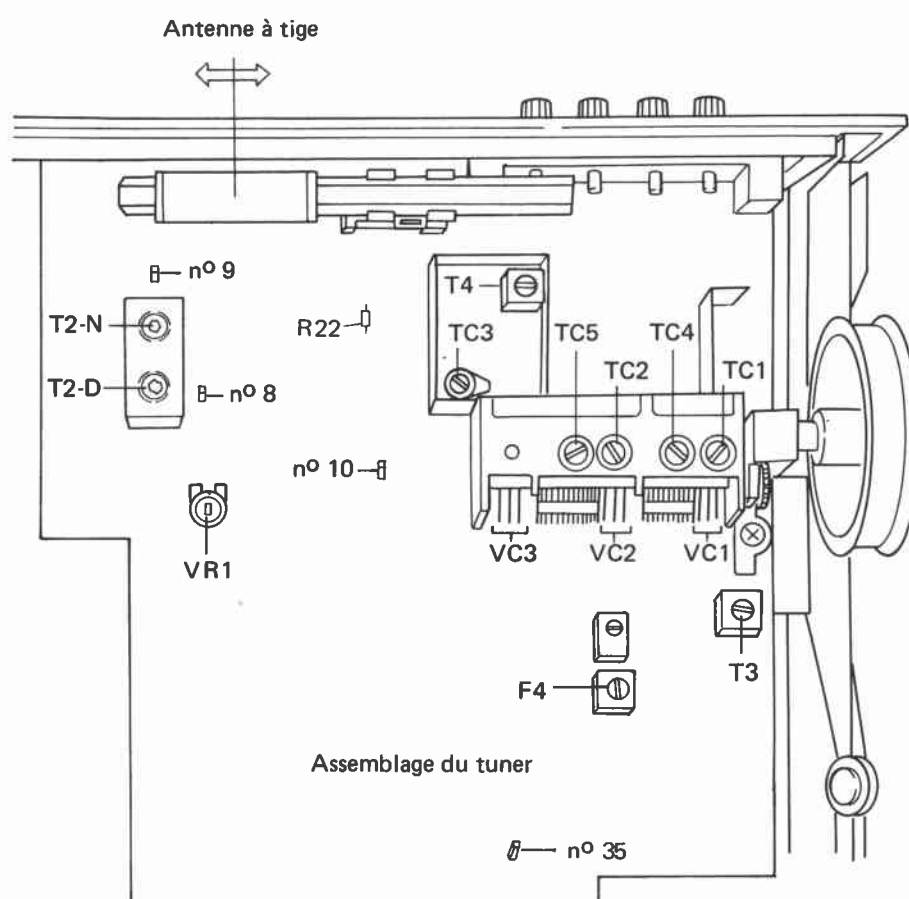


Fig. 12-2 Points de réglage et de mesure

## 12.2 SECTION TUNER AM

- Raccorder le générateur de signaux AM (AM SG) à la borne AM ANTENNA au moyen d'une résistance de 10 k $\Omega$ .
- Amener l'interrupteur FUNCTION en position AM.

| Pas | AM SG<br>(400 Hz, 30% modulation)                                      |        | Position de<br>l'indicateur | Point de<br>réglage | Spécification de réglage                                                |
|-----|------------------------------------------------------------------------|--------|-----------------------------|---------------------|-------------------------------------------------------------------------|
|     | Fréquence                                                              | Niveau |                             |                     |                                                                         |
| 1   | 1400 kHz                                                               | 100 dB | 1400 kHz                    | TC5                 | Régler jusqu'à ce que le signal démodulé à la borne OUTPUT est maximum. |
| 2   | 600kHz                                                                 | 100dB  | 600 kHz                     | T3                  |                                                                         |
| 3   | Régler le AM SG sur 30 dB de niveau de sortie; répéter les pas 1 et 2. |        |                             |                     |                                                                         |
| 4   | 1400 kHz                                                               | 50 dB  | 1400 kHz                    | TC4                 | Régler jusqu'à ce que le signal démodulé à la borne OUTPUT est maximum. |
| 5   | 600 kHz                                                                | 50 dB  | 600 kHz                     | Antenne-<br>tige*   |                                                                         |
| 6   | Répéter les pas 4 et 5 jusqu'à l'obtention de la sensibilité maximum.  |        |                             |                     |                                                                         |
| 7   | 1000 kHz                                                               | 50 dB  | 1000 kHz                    | F4                  | Régler jusqu'à obtention de la sensibilité maximum.                     |

\* Faire glisser la bobine de l'antenne à tige le long de l'âme.

ADDITIONAL

PIONEER

# Service Manual

STEREO TUNER

# TX-520

YP, S, S/G

This additional service manual is applicable to the YP type (Australia model), S type (General export model) and S/G type (U.S. Military model). The basic performance of the YP, S and S/G types is the same as the KU type (U.S.A. model), please refer to the KU type service manual (pp. 1-23) with the exception of this informations.

## SPECIFICATIONS

The specifications for YP, S and S/G types are the same as the KU type except for following sections:

### Miscellaneous

#### Power Requirements

YP type ..... a.c.240V, 50/60Hz  
S and S/G type ..... AC110/120/220/240V (Switchable), 50/60Hz  
Power Consumption ..... 13W

## MISCELLANEOUS PARTS

### NOTES:

- Parts without part number cannot be supplied.
- The  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks **★★** and **★**.  
**★★ GENERALLY MOVES FASTER THAN ★**  
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

The parts for YP, S and S/G types are the same as the KU type except for following sections:

| Mark                                                                                  | Symbol & Description                       | Part No. |         |         |          | Remarks |
|---------------------------------------------------------------------------------------|--------------------------------------------|----------|---------|---------|----------|---------|
|                                                                                       |                                            | KU type  | YP type | S type  | S/G type |         |
|  ★ | T1 Power transformer (120V)                | ATT-790  | ....    | ....    | ....     |         |
|                                                                                       | (240V)                                     | ....     | ATT-699 | ....    | ....     |         |
|                                                                                       | (110V/120V/220V/240V)                      | ....     | ....    | ATT-700 | ATT-700  |         |
|    | R100 Carbon composition resistor (2.2M/½W) | ACN-029  | ....    | ....    | ....     |         |

| Mark  | Symbol & Description         | Part No. |         |         |          | Remarks |
|-------|------------------------------|----------|---------|---------|----------|---------|
|       |                              | KU type  | YP type | S type  | S/G type |         |
| ⚠     | Tuner assembly               | GWE-152  | GWE-156 | GWE-153 | GWE-154  |         |
|       | LED assembly                 | GWX-638  | GWX-644 | GWX-639 | GWX-640  |         |
|       | Switch assembly              | GWS-346  | GWS-340 | GWS-334 | GWS-335  |         |
|       | AC power cord                | ADG-052  | ADG-043 | ADG-046 | ADG-046  |         |
|       | Output cords with phonoplugs | ADE-034  | ADE-033 | ADE-033 | ADE-033  |         |
| ⚠ ★ ★ | Line voltage selector        | ....     | ....    | AKX-063 | AKX-063  |         |
|       | Terminal (AM STEREO OUT)     | AKB-076  | ....    | ....    | ....     |         |
|       | Operating instructions       | ARB-403  | ARB-404 | ARB-404 | ARB-404  |         |
|       | Packing case                 | AHD-899  | AHD-900 | AHD-900 | AHD-900  |         |

## P.C. BOARD ASSEMBLIES

### Tuner Assembly (GWE-156)

#### CAPACITORS

| Mark | Part No.      | Symbol & Description                                       |                  |
|------|---------------|------------------------------------------------------------|------------------|
|      | ACK-012       | VC                                                         | Tuning capacitor |
|      | ACM-006       | TC3                                                        | Ceramic trimmer  |
|      | CCDUJ 090D 50 | C1                                                         |                  |
|      | CGB R47K 500  | C10                                                        |                  |
|      | CCDZM 050D 50 | C59                                                        |                  |
|      | CCDSL 060D 50 | C4                                                         |                  |
|      | CCDCH 080D 50 | C7                                                         |                  |
|      | CCDCH 150J 50 | C9                                                         |                  |
|      | CCDRH 150J 50 | C6                                                         |                  |
|      | CCDUJ 150J 50 | C3                                                         |                  |
|      | CCDCH 330J 50 | C8                                                         |                  |
|      | CCDSL 101J 50 | C12                                                        |                  |
|      | CCDSL 221J 50 | C21                                                        |                  |
|      | CKDYB 561K 50 | C38, C40                                                   |                  |
|      | CKDYB 102K 50 | C53                                                        |                  |
|      | CKDYB 122K 50 | C48                                                        |                  |
|      | CKDYB 182K 50 | C41, C42                                                   |                  |
|      | CKDYB 222K 50 | C37, C39                                                   |                  |
|      | CKDYX 273M 25 | C30, C31                                                   |                  |
|      | CKDYF 103Z 50 | C2, C5, C11, C13, C47, C52, C54, C56                       |                  |
|      | CKDYF 473Z 50 | C14, C15, C17, C18, C20, C22, C23, C26, C29, C49, C50, C71 |                  |
|      | CKDYX 473M 25 | C24                                                        |                  |
|      | CKDYF 223Z 50 | C51, C57, C68                                              |                  |
|      | CQSA 331K 50  | C58                                                        |                  |
|      | CQSA 511J 50  | C32                                                        |                  |
|      | CEANL R33M 50 | C33                                                        |                  |
|      | CEANL 010M 50 | C34                                                        |                  |
|      | CEA R47M 50L  | C16, C35, C43, C44                                         |                  |
|      | CEA 010M 50L  | C27, C60, C61                                              |                  |
|      | CEA 2R2M 50L  | C19                                                        |                  |
|      | CEA 100M 50L  | C46, C62                                                   |                  |
|      | CEA 470M 10L  | C25                                                        |                  |

| Mark | Part No.     | Symbol & Description |
|------|--------------|----------------------|
|      | CEA 4R7M 35L | C55                  |
|      | CEA 101M 25L | C63                  |
|      | CEA 221M 16L | C28                  |
|      | CEA 221M 25L | C64                  |
|      | CEA 471M 16L | C66, C67             |
|      | CEA 471M 25L | C65                  |
|      | CEA 3R3M 50L | C45                  |
|      | CEA 101M 16L | C36, C70             |

#### RESISTORS

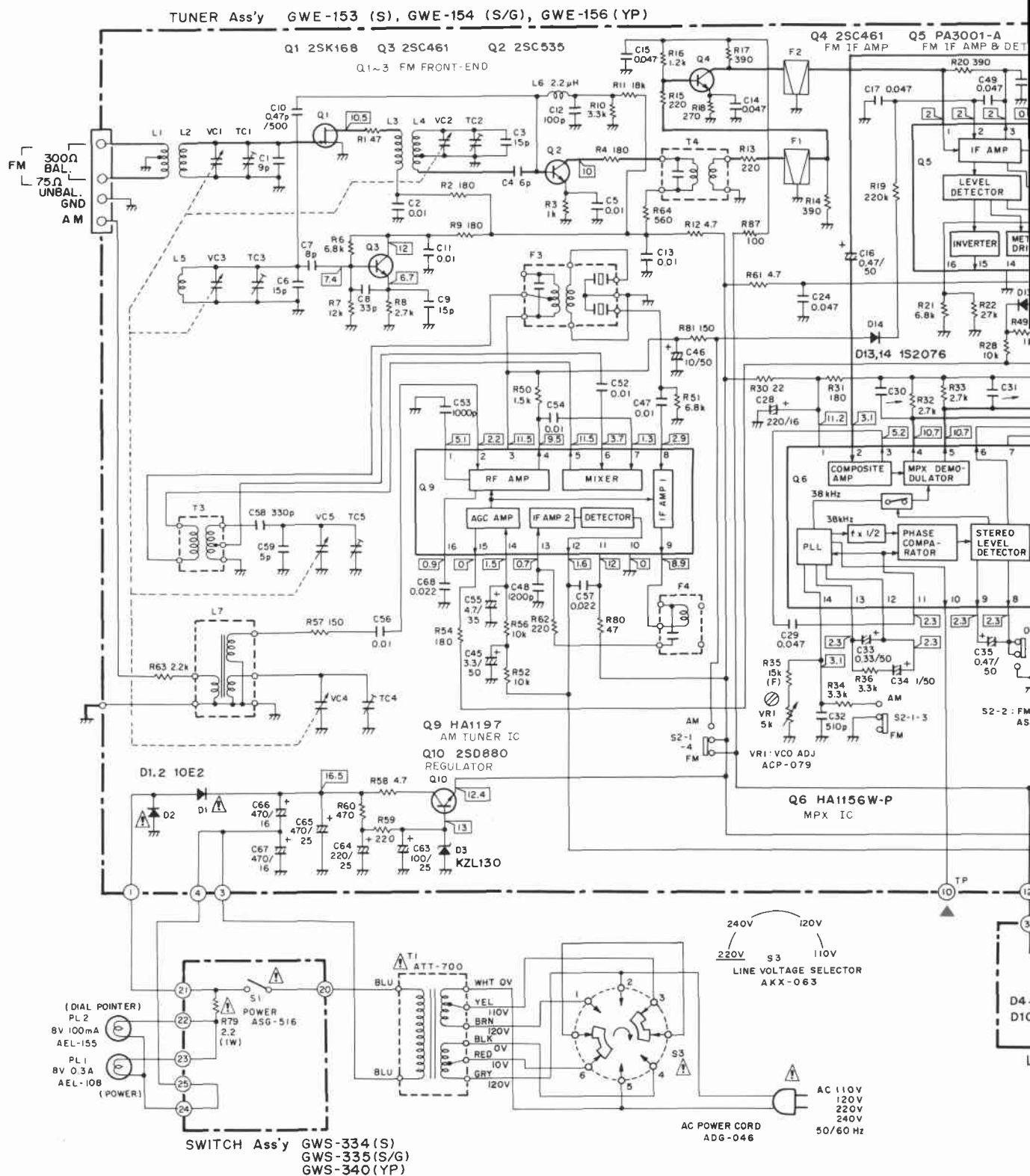
NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

| Mark | Part No.    | Symbol & Description                                                   |
|------|-------------|------------------------------------------------------------------------|
| ★    | ACP-079     | VR1 Semifixed (5k-B)                                                   |
|      | RD¼PM □□□J  | R1-R4, R6-R25, R27-R34, R86, R36-R67, R74-R78, R80, R81, R87, R26, R35 |
|      | RN¼PQ □□□□F |                                                                        |

#### SEMICONDUCTORS

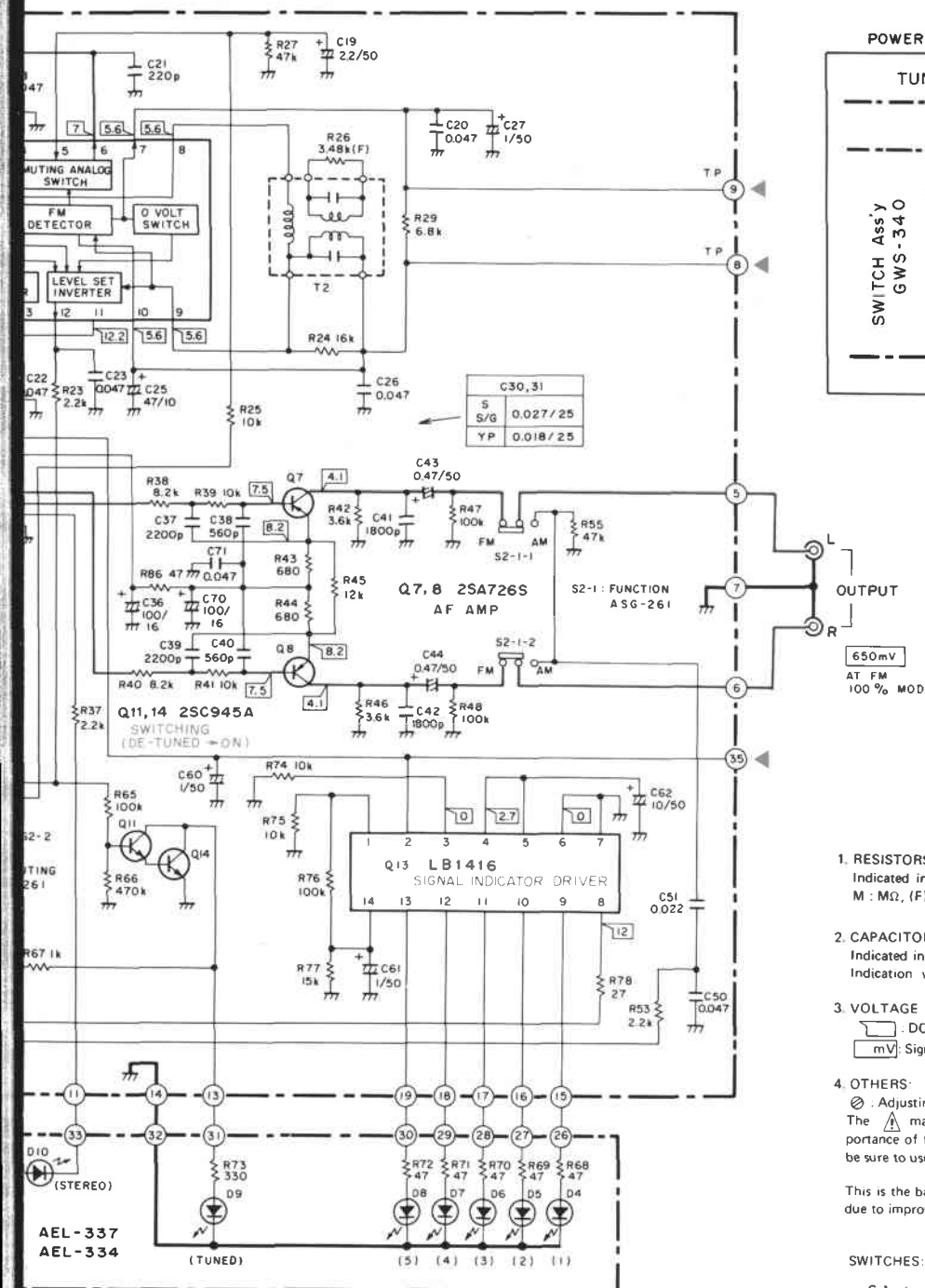
| Mark | Part No.   | Symbol & Description |
|------|------------|----------------------|
| ★★   | 2SK168     | Q1                   |
| ★★   | 2SC535     | Q2                   |
| ★★   | 2SC461     | Q3, Q4               |
| ★★   | PA3001-A   | Q5                   |
| ★★   | HA1156W-P  | Q6                   |
| ★★   | 2SA726S    | Q7, Q8               |
| ★★   | (2SA750)   |                      |
| ★★   | HA1197     | Q9                   |
| ⚠ ★★ | 2SD880     | Q10                  |
| ⚠ ★★ | (2SD313)   |                      |
| ★★   | LB1416     | Q13                  |
| ★★   | 2SC945A    | Q11, Q14             |
| ★★   | (2SC2575)  |                      |
| ⚠ ★  | 10E2       | D1, D2               |
| ⚠ ★  | (SIB01-02) |                      |
| ★    | KZL130     | D3                   |
| ★    | 1S2076     | D13, D14             |
| ★    | (1S1555)   |                      |
| ★    | (1S2473)   |                      |

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## NOTE:

The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.



1. RESISTORS:  
Indicated in  $\Omega$ ,  $\frac{1}{2}W$ ,  $\pm 5\%$  tolerance unless otherwise noted k - k $\Omega$ , M - M $\Omega$ , (F) -  $\pm 1\%$ , (G) -  $\pm 2\%$ , (K) -  $\pm 10\%$ , (M) -  $\pm 20\%$  tolerance

2. CAPACITORS:  
Indicated in capacity ( $\mu F$ )/voltage (V) unless otherwise noted p - pF  
Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE  
□: DC voltage (V) at no input signal  
mV: Signal voltage at FM 400Hz 75kHz DEV.

4. OTHERS:  
⊗: Adjusting point.  
The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

## SWITCHES:

S1 : POWER ON - STAND-BY  
S2-1: FUNCTION FM - AM  
S2-2: FM MUTING ON - OFF  
S3 : LINE VOLTAGE SELECTOR  
110V - 120V - 220V - 240V

The underlined indicates the switch position.

## COILS, FILTERS

| Mark | Part No. | Symbol & Description    |
|------|----------|-------------------------|
|      | ATE-049  | T2 FM det. transformer  |
|      | ATB-066  | T3 AM osc. coil         |
|      | ATE-008  | T4 FM IF transformer    |
|      | T24-028  | L6 RF choke coil        |
|      | ATB-623  | L7 Bar-antenna assembly |
|      | ATF-053  | F1,F2 FM ceramic filter |
|      | ATF-108  | F3 AM ceramic filter    |
|      | ATF-038  | F4 AM IF filter         |

## OTHERS

| Mark | Part No.     | Symbol & Description                    |
|------|--------------|-----------------------------------------|
| ★★   | ASG-261      | S2 Push switch<br>(FUNCTION, FM MUTING) |
|      | AKA-016      | Terminal 4-P (ANTENNA)                  |
|      | PMZ30P060FMC | Screw 3 x 6                             |
|      | VBZ30P100FZK | Screw 3 x 10                            |

## Tuner Assembly (GWE-153, GWE-154)

The component parts of GWE-153 and GWE-154 are the same as the GWE-156 with the exception of following sections:

| Symbol No.            | Part No.<br>(GWE-156)      | Part No.<br>(GWE-153, 154) |
|-----------------------|----------------------------|----------------------------|
| C30, C31              | CKDYX 183M 25              | CKDYX 273M 25              |
| F3                    | ATF-108                    | ATF-121                    |
| Description           | Part No.<br>(GWE-154, 156) | Part No.<br>(GWE-153)      |
| Terminal<br>(ANTENNA) | AKA-016                    | AKA-014                    |

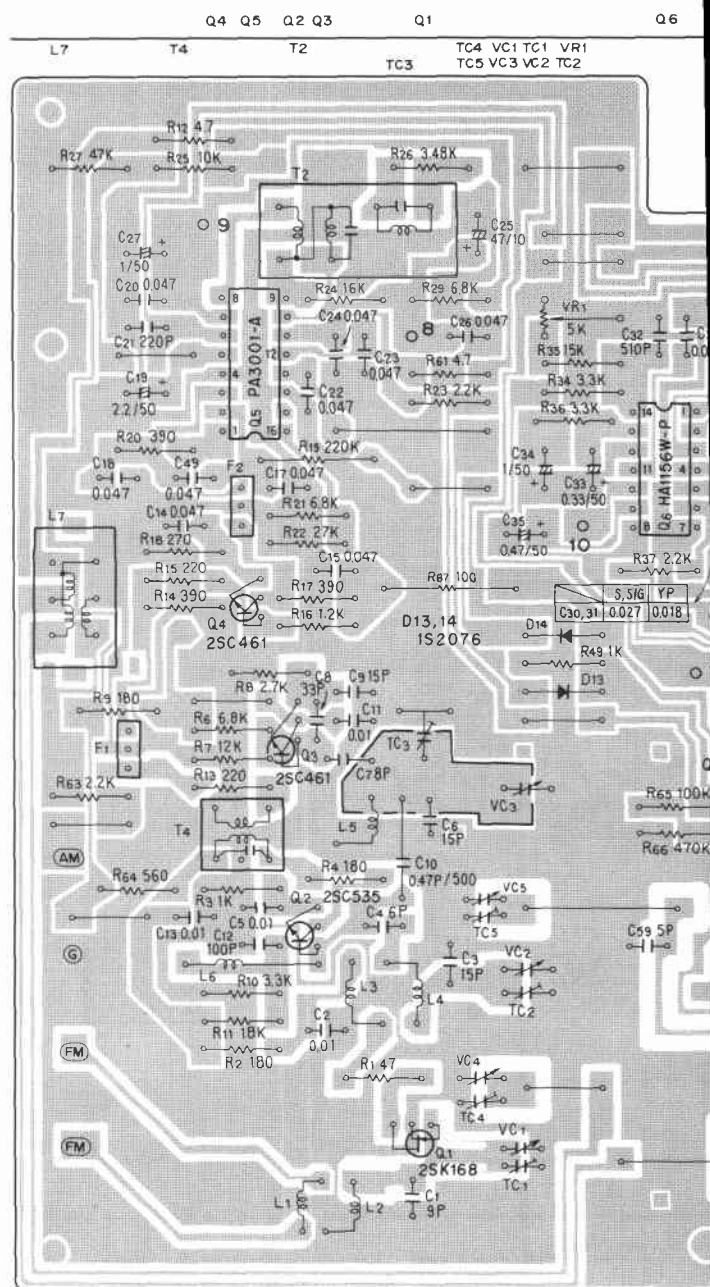
## LED Assembly (GWX-639, GWX-640, GWX-644)

These assemblies are the same as the GWX-638 (for KU type).

## Switch Assembly (GWS-334, GWS-335, GWS-340)

| Mark | Part No.  | Symbol & Description   |
|------|-----------|------------------------|
| △ ★★ | ASG-516   | S1 Push switch (POWER) |
| △    | RN1P 2R2K | R79                    |

## Tuner Assembly (GWE-153, GWE-154, GWE-156)



## Switch Assembly (GWS-340, GWS-334, GWS-335)

