PIONEER®

Service Manual

CIRCUIT DESCRIPTIONS
REPAIR & ADJUSTMENTS

ORDER NO.
ARP-119-0

FM/AM DIGITAL SYNTHESIZED TUNER

TX-930

MODEL TX-930 (TX-930L) COMES IN NINE VERSIONS DISTINGUISHED AS FOLLOWS:

Model	Voltage	Remarks
TX-930/KU	AC120V only	U.S.A. model
TX-930/HE	AC220V and 240V (switchable)	European continent model
TX-930/HEZ	AC220V and 240V (switchable)	West Germany model
TX-930/YP	AC240V only	Australia model
TX-930/SS	AC110V, 120V, 220V and 240V (switchable)	South Africa model
TX-930/S/G	AC110V, 120V, 220V and 240V (switchable)	U.S. military model
TX-930/S	AC110V, 120V, 220V and 240V (switchable)	General export model
TX-930L/HE	AC220V and 240V (switchable)	European continent model with AM-LW band tuner
TX-930L/HB	AC220V and 240V (switchable)	United Kingdom model with AM-LW band tuner

- **This service manual is applicable to the KU type.**
- **Ce manuel d'instruction se refère au mode de réglage, en français.**
- **Este manual de servicio trata del método de ajuste escrito en español.**

CONTENTS

1. SPECIFICATIONS

FM Tuner Section

Usable Sensitivity 10.8dBf (0.95μV)
50dB Quieting Sensitivity . . . . . Mono; 15.8dBf (1.7μV)
Stereo; 38dBf (22μV)
Signal-to-Noise Ratio . . . . . Mono; 78dB (at 85dBf)
Stereo; 75dB (at 85dBf)
Distortion (at 65dBf)
Mono 1kHz; 0.08%
Stereo 1kHz; 0.15%
Capture Ratio 1.0dB
Alternate Channel Selectivity 400kHz; 50dB
Stereo Separation 1kHz; 40dB
100kHz to 10kHz; 40dB
Frequency Response . . . . . 20Hz to 15kHz $^{+0.2}_{-1.0}$dB
Spurious Response Ratio 70dB
Image Response Ratio 40dB
IF Response Ratio 80dB
AM Suppression Ratio 50dB
Muting Threshold 19.2dBf (5μV)
Antenna Input . . . . . 300ohms balanced,
75ohms unbalanced

AM Tuner Section

Sensitivity (IHF, external antenna) 30μV
Selectivity 25dB
Signal-to-Noise Ratio 50dB
Image Response Ratio 40dB
IF Response Ratio 60dB
Antenna . . . . . Loop antenna

Audio Section

FM (100% MOD) 650mV/2.2kΩ
AM (30% MOD) 190mV/2.2kΩ

Miscellaneous

Power Requirements AC120V, 60Hz
Power Consumption 17watts
Dimensions . . . . . 420(W) x 69(H) x 219(D)mm
16-9/19(W) x 2-11/16(H) x 8-5/8(D)in
Weight (without package) 2.9kg (6lb 6oz)

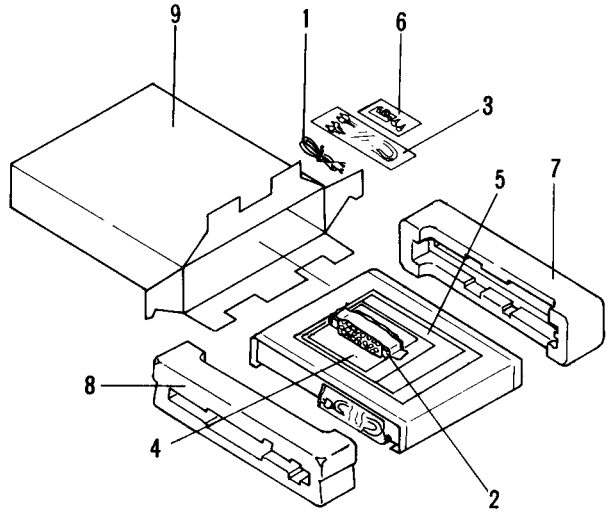
Furnished Parts

FM T-type Antenna 1
AM Loop Antenna 1
Antenna Catcher 1
Connection Cord with Pin Plugs 1
Operating Instructions 1

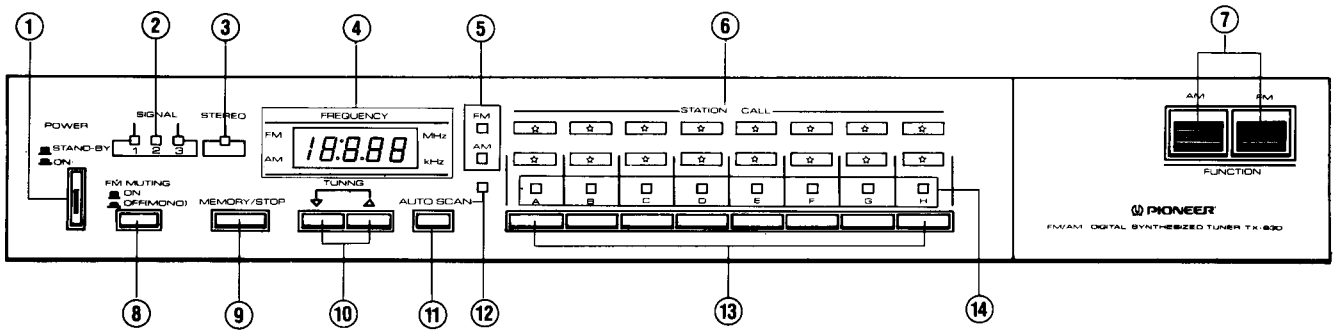
NOTE:
Specifications and design subject to possible modification without notice.

2. PACKING

Mark	No.	Part No.	Description
	1.	ADH-005	T-type FM antenna
	2.	ATB-076	AM loop antenna
	3.	ADE-051	Connection cord
	4.	AAN-047	Station card set
	5.	ARB-493	Operating instructions
	6.	AEA-054	Loop antenna holder
	7.	AHA-296	Front pad
	8.	AHA-297	Rear pad
	9.	AHE-052	Packing case



3. FRONT PANEL FACILITIES



① POWER SWITCH (POWER)

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 SIGNAL INDICATOR

This shows the strength of the signals picked up from the broadcasting station.

③ FM STEREO INDICATOR

This lights when a stereo program has been picked up during an FM broadcast.

④ FREQUENCY DISPLAY

⑤ FUNCTION INDICATORS

⑥ STATION NAME DISPLAY PANEL

Pull this out from the front at the top. After the station has been preset into the STATION CALL switch, remove the corresponding card from the accessory "station card" and slide it into position.

⑦ FUNCTION SWITCHES

These are used to select the FM and AM broadcasting bands.

⑧ FM MUTING SWITCH

ON: The muting circuit is actuated during FM station tuning to suppress the irritating inter-station noise and make the tuning operation more pleasant.

OFF (MONO):

This position is set when the desired station cannot be picked up satisfactorily at the ON position. In this case, even a stereo program will be heard in mono.

⑨ MEMORY/STOP SWITCH

This is pressed once the desired station has been picked up in the auto scan mode. It is also pressed when a station which has been picked up in the manual tuning mode is preset into a STATION CALL switch.

⑩ TUNING SWITCHES

These are pushed when locating stations. A station can be located with a single push in the auto scan mode. In the manual scan mode, one push advances the frequency by 100 kHz in the FM band and by 10 kHz in the AM band.

△ : Push to locate a station broadcasting on a frequency higher than that displayed.

▽ : Push to locate a station broadcasting on a frequency lower than that displayed.

⑪ AUTO SCAN SWITCH

This is used to select the tuning mode: auto scan or manual scan.

⑫ AUTO SCAN INDICATOR

This lights when the tuner has been set to the AUTO SCAN mode.

⑬ STATION CALL SWITCHES

These are used to preset broadcasting stations. Each switch from "A" to "H" can be used to preset one FM station and one AM station.

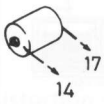
⑭ STATION INDICATORS

These indicators light in succession when a station has been picked up in the auto scan mode or when the MEMORY/STOP switch is pressed while a station is being tuned in. The position of the STATION CALL switch which has been pressed is indicated during preset tuning.

4. PARTS LOCATION

- Memory backup battery on the battery assembly

Ni-Cd

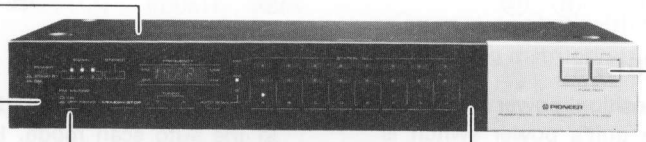


Lithium

NOTES:

- *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.
- *Either of batteries (Ni-Cd or Lithium) is used to the memory backup in the KU type.*

Front Panel View



Top cover
ANE-393

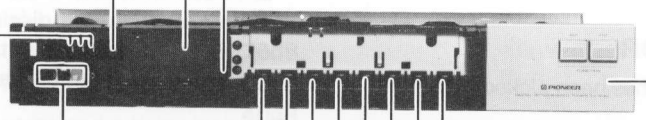
Knob (POWER)
AAD-417

Knob (FM MUTING)
AAD-482

Knob (FM, AM)
AAD-481

Front cover
ANM-209

Front View with Panel Removed



★ LED numeric display
AEL-395

★ LED (Red, STEREO)
AEL-372

★ LED (Green, SIGNAL)
AEL-371

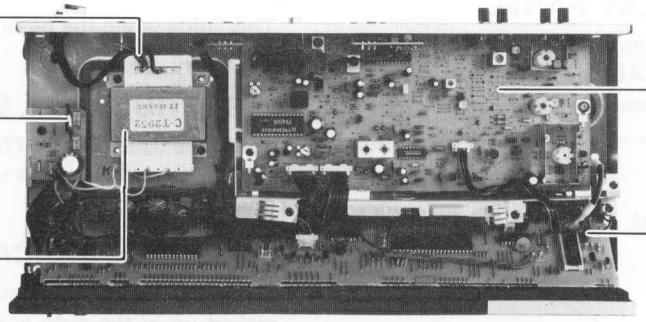
★★ Push switch (POWER, FM MUTING)
ASG-540

★ LED (Green, FM, AM, AUTO SCAN)
AEL-383

Front base assembly
ANR-515

★ LED (Red, STATION)
AEL-372

Top View



⚠ Carbon composition resistor 2.2MΩ/½W
ACN-029

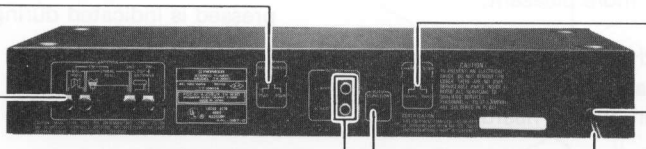
Lithium battery
AEX-008
(Ni-Cd battery)
(AEX-011)

⚠ ★ Power transformer
ATT-916

Tuner assembly
AWM-439

★ Crystal resonator
ASS-018

Rear Panel View



★★ Slide switch
(FM DE-EMPHASIS)
ASH-015

Terminal (ANTENNA)
AKA-017

Terminal (OUTPUT)
AKB-077

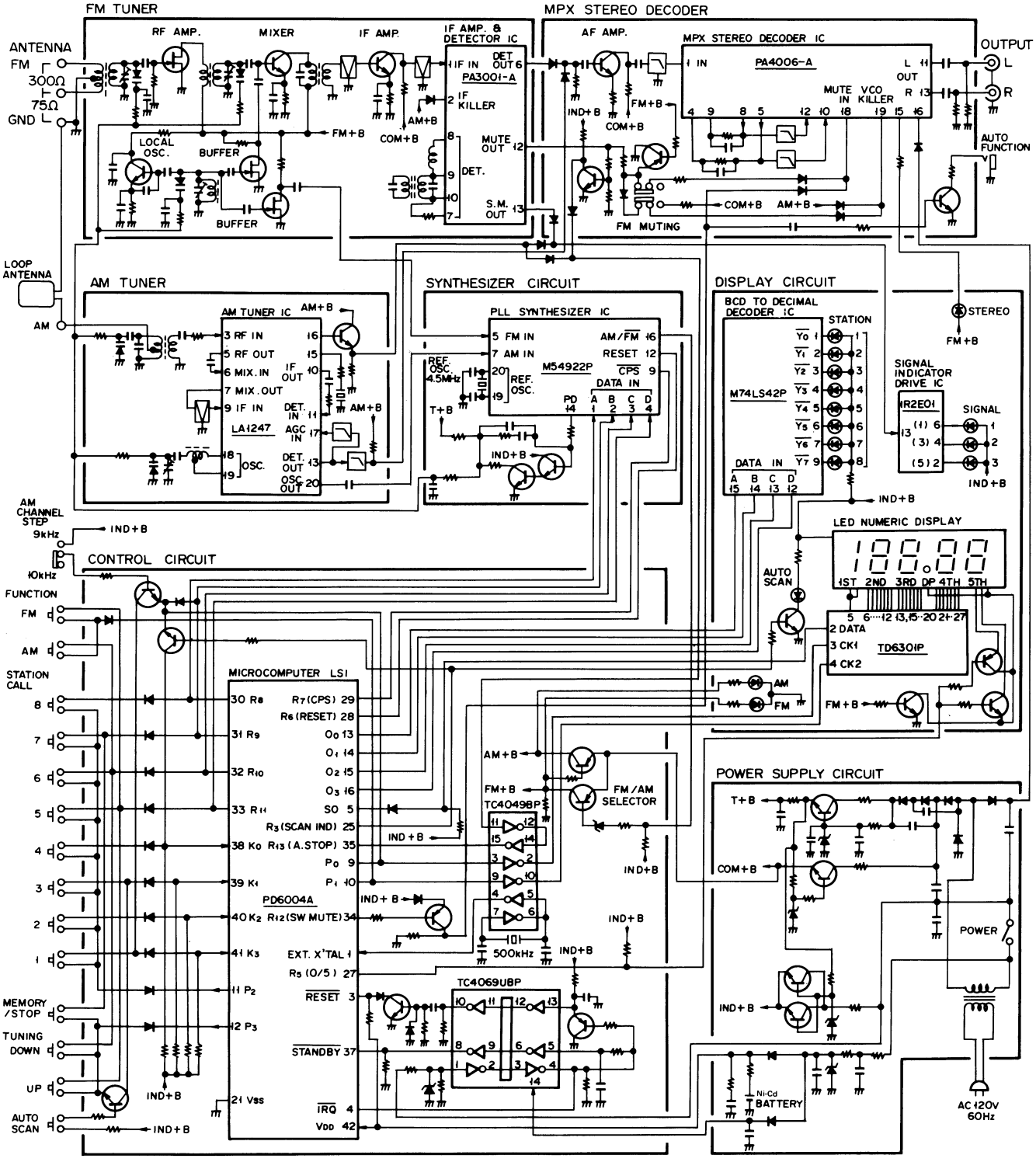
★★ Slide switch
(AM CHANNEL STEP)
ASH-015

Strain relief
AEC-327

⚠ AC power cord
ADG-052

Terminal
(AUTO FUNCTION)
AKN-034

5. BLOCK DIAGRAM



6. CIRCUIT DESCRIPTIONS

FM Front-End

The FM front-end uses a J-FET RF amplifier (single stage), and variable capacitance diodes the equivalent of a 3-ganged tuning capacitor. The local oscillator uses an output buffer amp to maintain stability during strong signal reception.

The local oscillator signal is input into the synthesizer circuit and compared with the reference signal, and the resulting tuning voltage is applied to the variable capacitance diodes where it becomes the oscillator frequency (or tuning frequency).

- **Pulse-Swallow PLL Synthesizer**

When the VCO (Voltage Controlled Oscillator) frequency is very high and the CMOS programmable divider operating frequency is exceeded, the PLL will cease to function. Two methods are presently available to resolve this problem. In one of these methods (the fixed divider system), an ECL (Emitter to Emitter Coupled Logic) prescaler is positioned in front of the programmable divider. And when, for example, a 1/10 prescaler is employed to obtain 25kHz step frequencies, the reference frequency will be 2.5kHz. This frequency is very low and cannot be adequately removed by the low-pass filter. As a result, signal components are leaked into the mixer leading to deterioration in the S/N ratio. This is one of the main disadvantages of the fixed divider system.

The other method available is the pulse-swallow system which employs a special frequency divider called a "two-modulus prescaler" instead of the prescaler used in the fixed divider system. In this method, a 25kHz step synthesizer will generate a 25kHz reference frequency and a 50kHz step synthesizer will generate a 50kHz reference frequency, resulting in a much higher S/N ratio than in the fixed prescaler system.

The pulse-swallow system employed in the TX-930 is incorporated in an IC (M54922P) controlled by microcomputer.

FM IF Amplifier and Detector

The IF stage is composed of two dual element ceramic filters, one transistor and IF system IC (PA3001-A) (consisting of an IF limiter amplifier, quadrature detector, and meter drive).

Multiplex Decoder

This section consists of IC (PA4006-A), and contains the PLL system switching signal generator circuit, chopper type MPX decoder, pilot signal automatic canceller, stereo auto selector, VCO killer circuit, muting amplifier, muting control circuit, and stereo reception indicator circuit.

The chopper type switching circuit either does or does not establish a signal, thereby generating no noise or distortion.

AM Tuner

The AM tuner section uses IC (LA1247) and variable capacitance diodes the equivalent of a 2-ganged tuning capacitor.

The local oscillator signal is input into the synthesizer circuit and compared with the reference signal. The resulting tuning voltage is applied to the variable capacitance diodes where it becomes the oscillator frequency (tuning frequency).

The AM tuner of TX-930L is a two wave-band tuner with MW (medium wave) and LW (long wave).

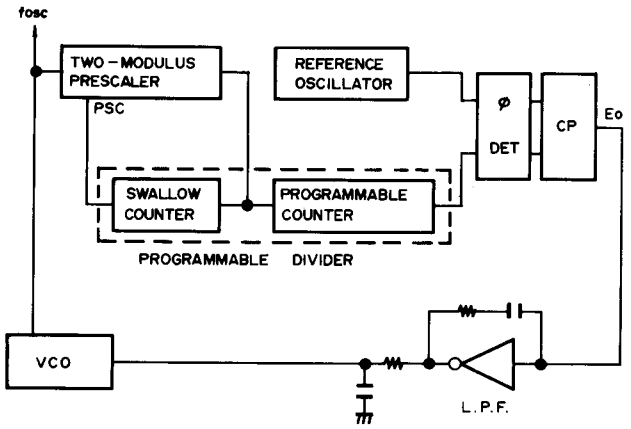


Fig. 6-1 Pulse swallow system

Control Section

The TX-930 (and TX-930L) tuner is equipped with a microcomputer (PD6004A) which makes tuner operations easier. The PD6004A is a 4-bit microcomputer designed for synthesized tuner/receiver control purposes. In the TX-930, this multi-function microcomputer is used in the quartz PLL synthesizer and tuned frequency display control circuitry. The PD6004A pin description is outlined in Fig. 6-3. Note that the TX-930/SS uses PD6004B.

The TX-930L is basically the same as the TX-930, but includes two bands (medium and long wave) in the AM tuner section (medium wave band). The reception band is changed by switching the tuning circuit electronically in a switching circuit containing FETs and diodes.

PD6004A Input Key Matrix Description

Operation instructions are applied to PD6004A by selective input of key scan clock pulses (outputs from P0 ~ P3) to the key input pins (K0 ~ K3 and R8 ~ R11). The PD6004A input key matrix is shown in Fig. 6-2.

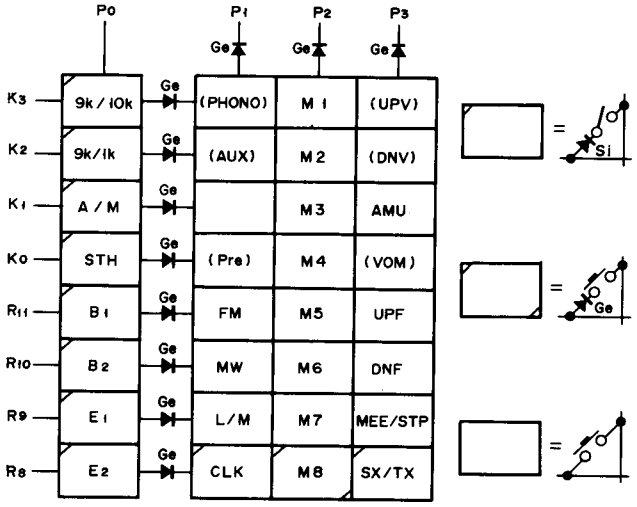


Fig. 6-2 Input key matrix of PD6004A

9k/10k (P0 → K3) : AM-MW tuning frequency step switching

AM-MW tuning frequency is changed in 9kHz steps when P0 is connected to K3, and in 10kHz steps when open. In the KU, S and S/G types, this selection can be made by the AM CHANNEL STEP switch located on the rear panel. In the HE, HB, HEZ, SS and YP types, the frequency step is fixed at 9kHz.

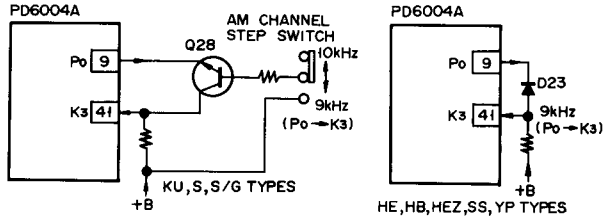


Fig. 6-4 AM-MW channel step selection

PD6004A

Pin No.	Symbol	Description
1	Extal	Clock pulse input (500kHz)
2	Xtal	Oscillator output (open)
3	$\overline{\text{RESET}}$	Reset input (effective low)
4	$\overline{\text{IRQ}}$	Inhibit mode control 1
5	SO	Frequency display data output
6	SI	(ground)
7	$\overline{\text{SC/TO}}$	(open)
8	$\overline{\text{TC}}$	(ground)
9	P0	CK1 — Data transfer clock output
10	P1	CK2 — Data transfer clock output
11	P2	Key scan clock output
12	P3	Key scan clock output
13	O0	A — STATION indicators data output (4-bit BCD code)
14	O1	B — STATION indicators data output (4-bit BCD code)
15	O2	C — STATION indicators data output (4-bit BCD code)
16	O3	D — STATION indicators data output (4-bit BCD code)
17	O4	VCA control data output
18	O5	VCA control data output
19	O6	VCA control data output
20	O7	VCA control data output
21	VSS	(ground)
22	R0	VCA control data output
23	R1	VCA indicator output
24	R2	VCA memory indicator output
25	R3	Audio mute indicator output
26	R4	Scan indicator output
27	R5	FM 5-th digit control output (0/5), LW indi. out
28	R6	RESET — Data transfer clock output
29	R7	CPS — Data transfer clock output
30	R8	A — Synthesizer control data output / Key input
31	R9	B — Synthesizer control data output / Key input
32	R10	C — Synthesizer control data output / Key input
33	R11	D — Synthesizer control data output / Key input
34	R12	Muting output
35	R13	Scan stop input
36	R14	(ground)
37	$\overline{\text{STBY}}$	Inhibit mode control 2
38	K0	Key input
39	K1	Key input
40	K2	Key input
41	K3	Key input
42	VDD	+5V power source

Fig. 6-3 Pin description of PD6004A

9k/1k (P0 → K2) : AM-LW tuning frequency step switching

AM-LW tuning frequency is changed in 9kHz steps when P0 is connected to K2, and in 1kHz steps when left open. This only applies to the TX-930L (with LW tuner), the frequency step being fixed at 9kHz steps. Long wave tuning frequencies are determined by (9N + 2) kHz where N is an integer number from 17 to 31.

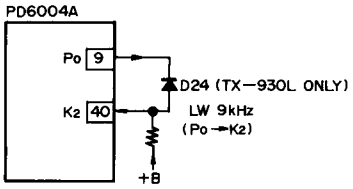


Fig. 6-5 AM-LW channel step selection

B1 (P0 → R11) and B2 (P0 → R10) : FM-IF offset switching

10.700MHz when both links are open. In the SS type, however, both links are connected (operation by lower heterodyne).

E1 (P0 → R9) and E2 (P0 → R8) : Switching for different regions

The E1 link is connected in the KU type, the E2 link in the S, S/G HE, HB, YP and HEZ types, and both E1 and E2 in the SS type.

SX/TX (P3 → R8) : Microcomputer function restriction

When left open, PD6004A is limited to tuner operations. In addition to disabling the UPV, DNV, and VOM keys, the VCA display (outputs from O4 ~ O7 and R4) is disregarded.

AMU (P3 → K1) : T input for binary F.F.

Although originally designed for audio muting purposes, this link is used as the latching circuit for the non-lock type switch in the TX-930 AUTO SCAN switching mechanism. When the front panel AUTO SCAN button is pressed, the level at pin 25 (R3) of PD6004A is inverted each time Q11 is turned on (high/low switching). The STH key is replaced by a transistor (Q12) which is controlled by the output from pin 25. Note that the AMU key is not used in the TX-930L, and that pin 25 of PD6004A is kept at high level.

A/M (P0 → K1) : Tuning mode switching

This link is left open for manual tuning mode setting.

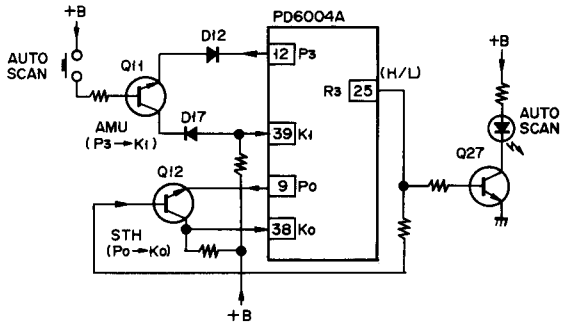


Fig. 6-7 Tuning mode selection of TX-930

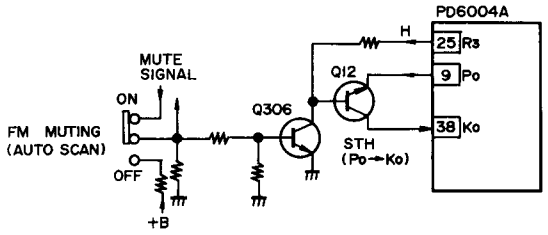


Fig. 6-8 Tuning mode selection of TX-930L

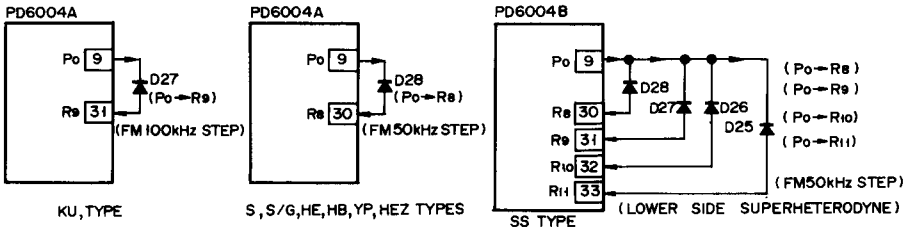


Fig. 6-6 FM channel step selection

STH (P0 → K0) : Short time hold search tuning switch

Input key for AUTO SCAN tuning mode (see note 1). This key has priority over the A/M key.

When the front panel AUTO SCAN button is pressed in the TX-930, Q11 (AMU key) is turned on, resulting in inversion of the level (high/low) at pin 25 of PD6004A. Q12 is turned on when pin 25 is at high level, thereby switching the tuning mode to AUTO SCAN.

In the TX-930L, pin 25 of PD6004A is kept at high level (since AMU key is not used). The AUTO SCAN switch is not independent, but also serves as the FM MUTING switch (see Fig. 6-8). When the FM MUTING switch is ON, Q306 is turned off and Q12 (STH key) is turned on. (Since the muting signal level is low, Q306 is not turned on by this action). When the FM MUTING switch is OFF, Q306 is turned on and Q12 (STH key) is turned off.

FM (P1 → R11) : FM mode switch

When the front panel FM button is pressed, PD6004A passes data signals to the PLL synthesizer IC (M54922P) and numeric display driver IC (TD6301AP). The signal composition of the signal passed from PD6004A to M54922P is outlined in Fig. 6-9. After the RESET input is changed to low level, M54922P reads 4 x 5 bit data by synchronizing with the CPS input. The first four pieces of data are used in setting the frequency division of the programmable divider, and the fifth piece of data sets the operation mode.

The output level at pin 16 of M54922P is a low level during FM mode. Q24 is thus turned on, resulting in FM + B being supplied to the tuner section to start FM tuner operation.

The data signal passed from PD6004A to TD6301P (note 2) is 16-bit binary code serial data. This is converted to 4-bit x 4 parallel data by data transfer clocks (CK1 and CK2) in TD6301P, and then to 7-segment decimal data to drive the LED numeric display (the four most significant digits). The fifth digit (least significant digit) is the 10kHz unit column where only 0 or 5 is displayed (the frequency being changed in 50kHz steps in the HE, HB, HEZ, S/G, S and SS types). This display is controlled by output data from pin 27 of PD6004A (H: 0 and L : 5).

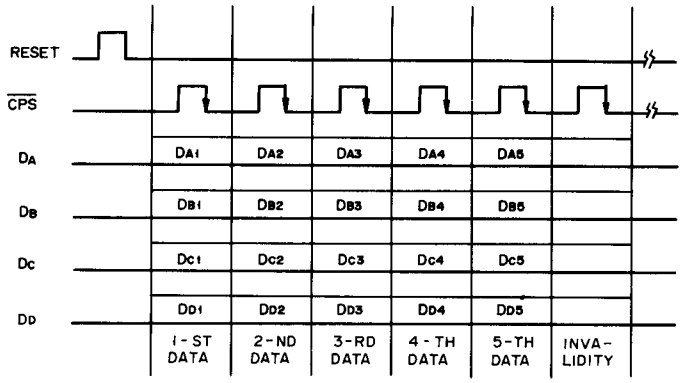


Fig. 6-9 Synthesizer control data

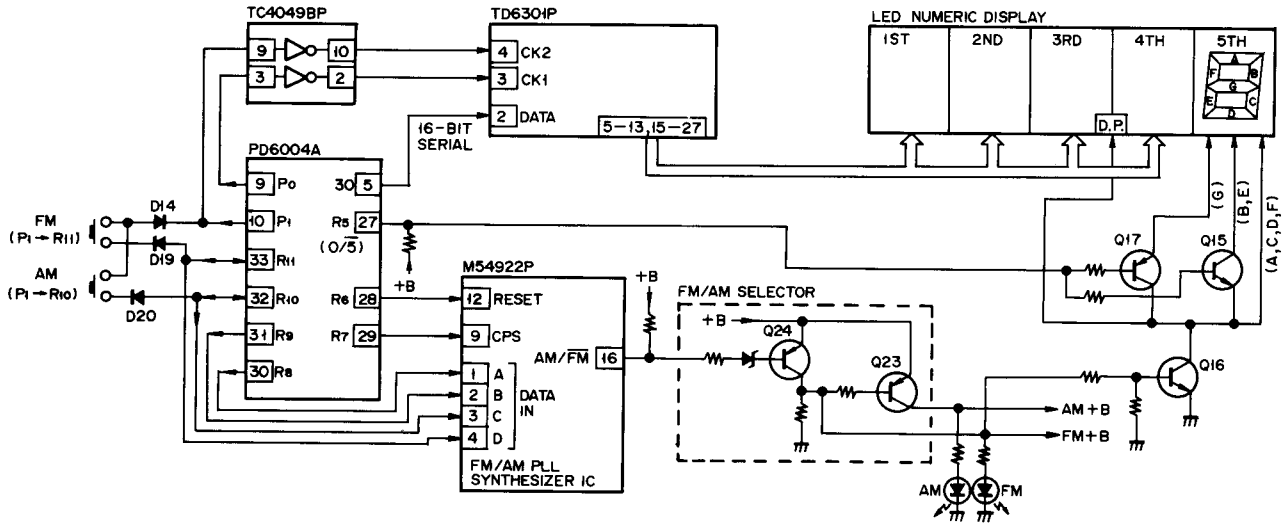


Fig. 6-10 FM, AM function selection

MW (P1 → R10) : AM mode switching

When the front panel AM button is pressed, PD6004A passes a data signal to M54922P and TD6301P (note 2). Pin 16 of M54922P is changed to high level during AM mode, resulting Q24 being turned off and Q23 being turned on. AM + B is thus supplied to the tuning section to start AM tuner operation. Since FM + B is not supplied, Q16 is turned off, and the fifth digit and decimal point in the LED numeric display are turned off.

L/M (P1 → R9) : AM band switching

This input key is used only in the TX-930L. Each time the front panel AM BAND button is pressed and Q305 turned on (P1 → R11), the tuning band in AM mode is switched (medium wave and long wave bands). Pin 27 of PD6004A is at low level for LW, and at high level for MW. AM + B (the power supplied during AM mode) serves as the power supply for the LW and MW indicators. Since Q303 and Q304 are both off when LW is selected, the LW indicator lights up. Q303 and Q304 are both on when MW is selected, resulting in the MW indicator lighting up.

The tuning circuit in the AM tuner section is switched electronically by a switching circuit containing FETs and diodes.

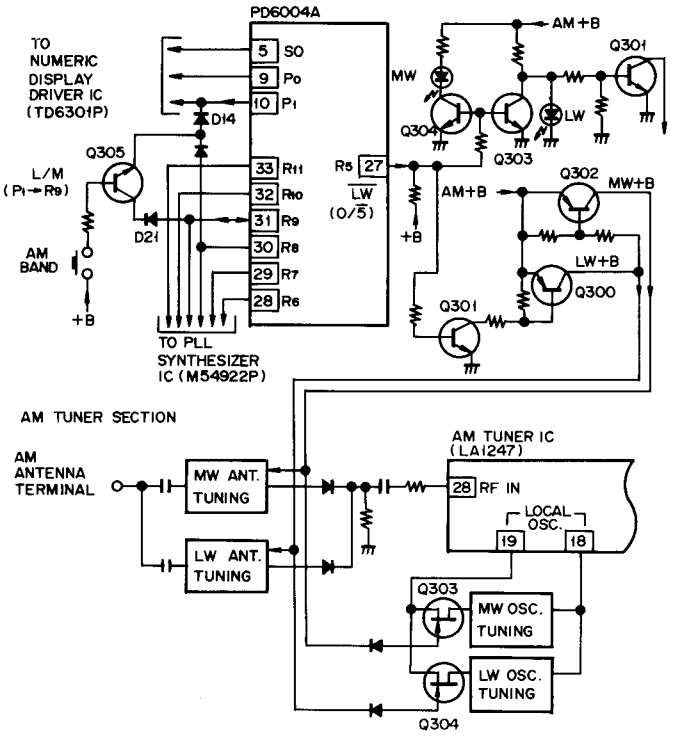


Fig. 6-11 MW/LW band selection for TX-930L

M1-M8 (P2→K3~K0 and R11~R8) : Frequency preset switches

When one of the front panel STATION CALL buttons 1 to 8 is pressed, the corresponding memory address is specified for read out of the frequency data stored in that memory. At the same time, PD6004A passes display data (4-bit BCD code) to M74LS42P for lighting of the STATION indicator corresponding to the specified memory. If the specified memory is blank, the current tuned frequency is maintained (without any other further operation).

And if the memory is in memory write enabled status, the currently tuned frequency is stored in the specified memory.

UPF, DNF (P3 → R11, P3 → R10) : Tuning switches

When the front panel TUNING UP or DOWN button is pressed during MANUAL tuning mode, the tuning frequency is increased or decreased by one step (50kHz or 100kHz steps during FM mode and 9kHz or 10kHz steps during AM mode). If the button remains depressed, the frequency is changed continuously, stopping when the button is released again. Frequency scanning stops automatically when either end of the tuning band is reached.

When the UP or DOWN button is pressed during AUTO SCAN tuning mode, the tuning frequency starts to scan in the specified direction. If the end of the band is reached, the scanning operation pauses for about 0.5 second, and then resumes in the same direction starting from the other end of the band.

If pin 35 (R13) of PD6004A is changed to high level during AUTO SCAN mode, the scanning operation is stopped, and memory write enabled status is set for five seconds. (The STATION indicators flash on and off furing this period). If a memory address is specified by pressing one of the STATION CALL buttons during this period, the frequency at that time is stored in the memory, and the frequency scanning is then resumed. If nothing is done during the five-second scanning pause, scanning is resumed automatically at the end of the five-second period. The signal applied to pin 35 of PD6004A is the result of level inversion of the FM MUTING signal during FM mode, and makes use of the AM SIGNAL STRENGTH meter drive signal during AM mode. The tuned frequency is detected by these signals being changed to high level.

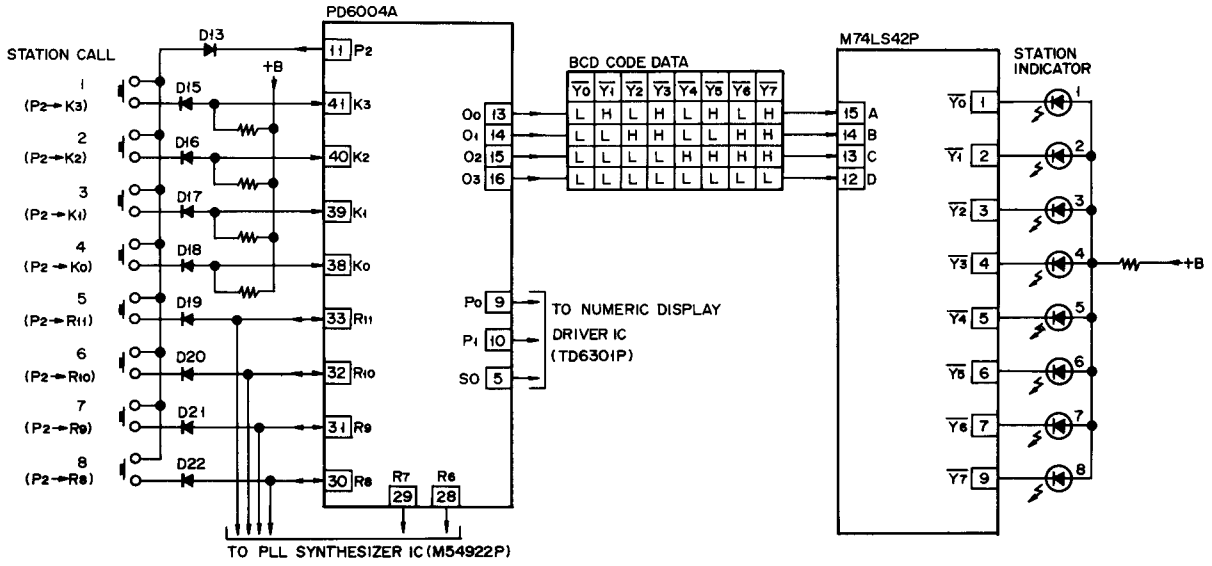


Fig. 6-12 Preset of broadcasting stations

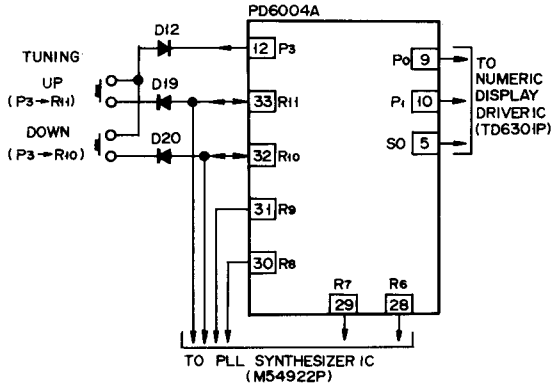


Fig. 6-13 Tuning control keys

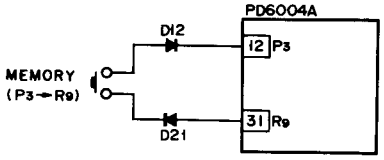


Fig. 6-14 Memory key

*** R12 (pin 34 of PD6004A)**

Pin 34 PD6004A is switched to low level for about one second when the FM, MW, or L/M key is switched on. And when M1 ~ M8, UPF, or DNF is switched on, the pin is switched to low level for about 0.7 second. This serves as the muting signal used in eliminating switching noise following level inversion. The pin 34 output also serves as the automatic switching signal applied to the amplifier component equipped with an automatic function selector feature.

MEE/STP (P3 → R9) : Memory write switch

When the front panel MEMORY button is pressed, memory write enabled status is set for about five seconds. During this five-second period, STATION indicators 1 to 8 flash on and off until some other relevant key is operated, or until the five-second period is completed. This key also serves as the frequency scanning stop switch.

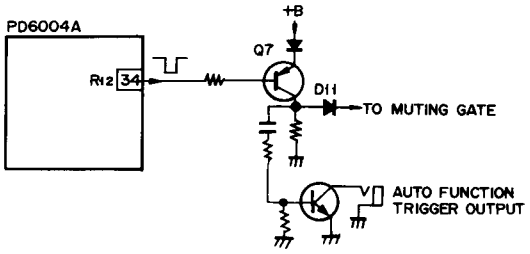


Fig. 6-15 Switching mute/auto function trigger

NOTE 1:
The TX-930 AUTO SCAN switch starts the scanning of tuning frequencies when the TUNING UP or DOWN button is pressed. If a broadcasting station is tuned during this scanning, the scanning is stopped for about five seconds. Presetting of the tuned frequency is enabled during this five-second period (the STATION indicators flash on and off indicating that presetting is possible), and if any of the STATION CALL buttons from 1 to 8 is pressed, the tuned frequency is stored in the memory corresponding to the pressed button, and the scanning operation is subsequently resumed. If no buttons are pressed, the scanning resumes after a wait of five seconds.
NOTE 2:
The TX-930L uses TD6301AP which differs from TD 6301P in that the displayed band edge is 153kHz during LW reception. (The corresponding frequency indicated by TD6301P is 155kHz).

Microcomputer Operation Control

The TX-930 POWER switch is connected to the secondary coil of the power supply transformer. When the POWER switch is switched off (STANDBY position), power is still supplied to the microcomputer (PD6004A) so as to maintain the microcomputer memory functions. And even if the AC mains power is disconnected completely, the memories are still preserved by a built-in lithium (Ni-Cd) battery (note 3).

The levels of the $\overline{\text{IRQ}}$ and $\overline{\text{STBY}}$ pins in PD6004A are set to low level when the POWER switch is in the STANDBY position. In this condition, PD6004A can suspend all operations and stop the clock pulse signals applied to E. Xtal pin. PD6004A can thus preserve the memory contents with a consumption current of less than 10μA (2.5V min).

When the power is switched on again, a negative pulse is applied to the $\overline{\text{RESET}}$ pin to restart PD6004A functions. The $\overline{\text{RESET}}$ signal is generated by utilizing the rising edge of the $\overline{\text{IRQ}}$ signal. The power supply sequence for stop/restart in outlined in Fig. 6-17.

NOTE 3:
Either of batteries (Ni-Cd or Lithium) is used to the memory backup in the KU type.

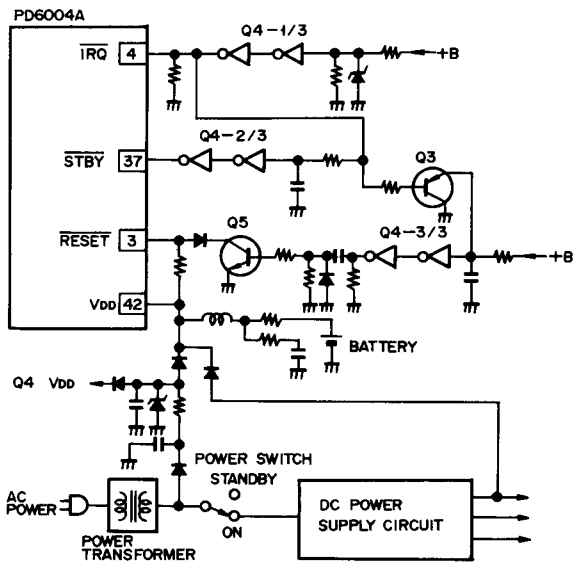


Fig. 6-16 Microcomputer back-up power supply

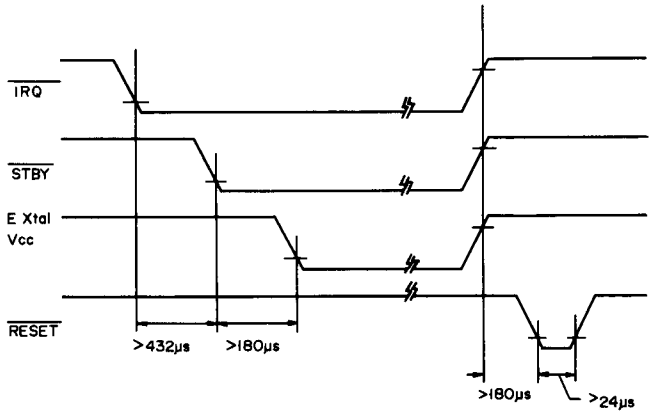
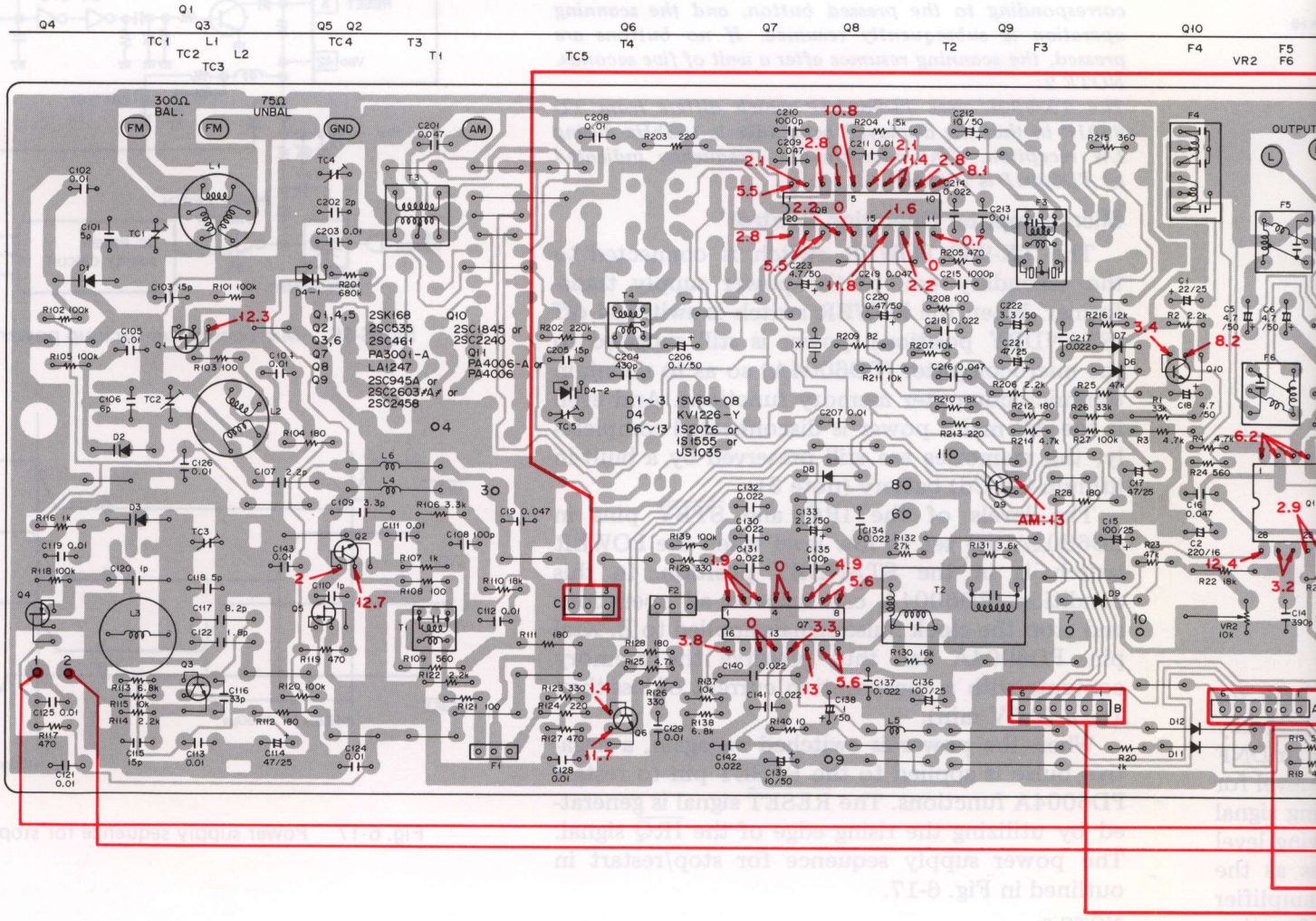


Fig. 6-17 Power supply sequence for stop/restart

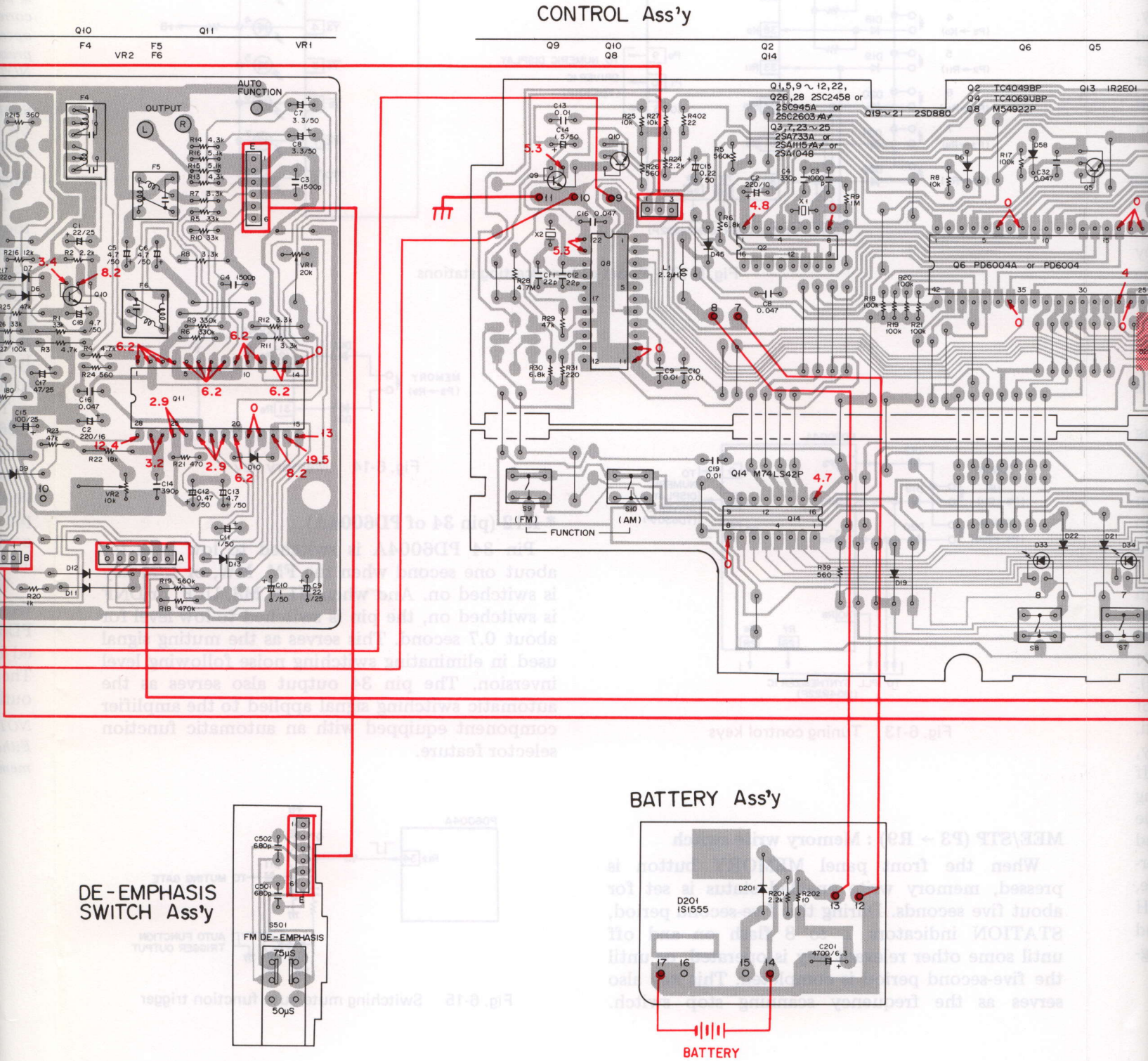
7. P.C. BOARDS CONNECTION DIAGRAM

TUNER Ass'y AWM-439



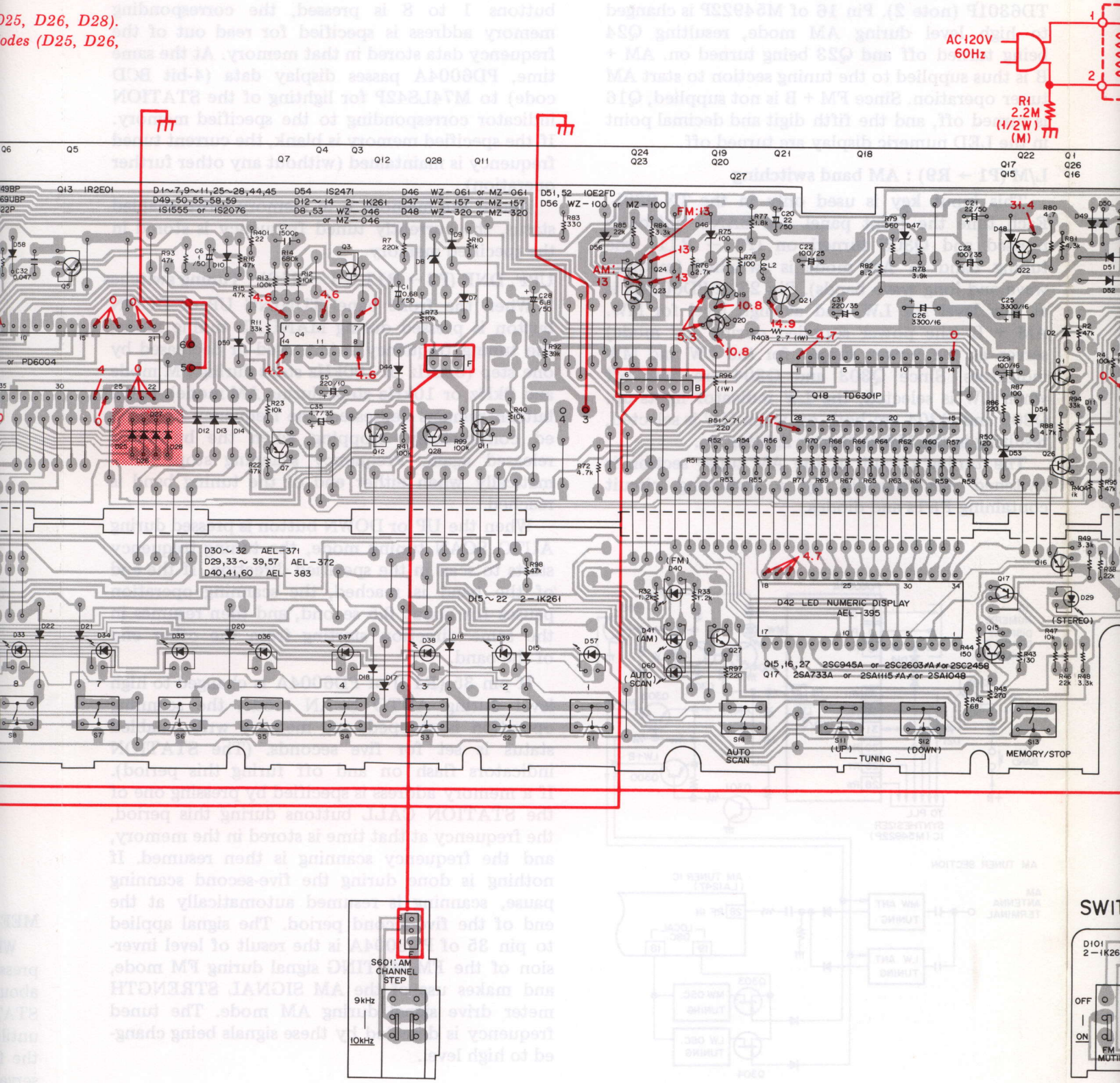
NOTE:
The microcomputer LSI (PD6004A) has been desiged to match different versions (KU, S and S/G types) by combination of the diodes (D25—D28) connected between pin no. 9 and nos. 30—33.

- *In the KU type, remove the diodes (D25, D26, D28).*
- *In the S and S/G types, remove the diodes (D25, D26, D27).*

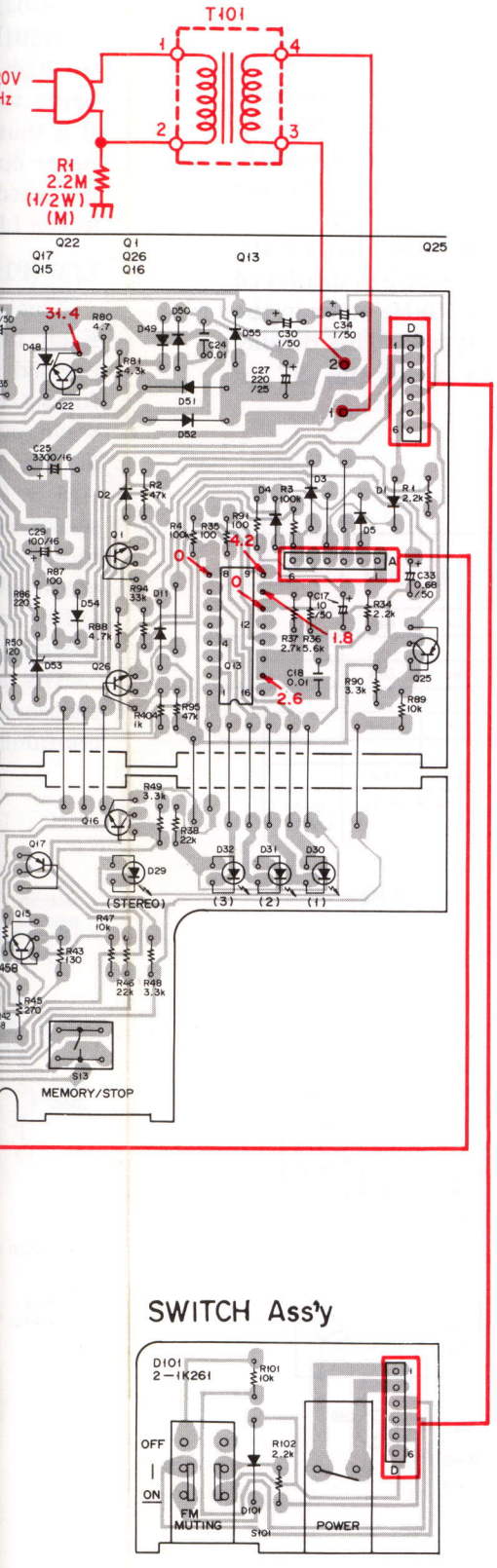


been desiged to types) by combi- ted between pin

025, D26, D28). odes (D25, D26,

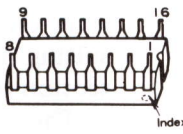


AM CH STEP SWITCH Ass'y

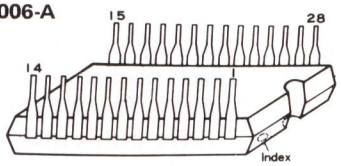


External Appearance of Transistors and ICs

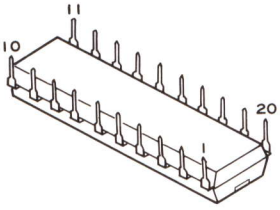
PA3001-A
TC4049BP
IR2E01
M74LS42P



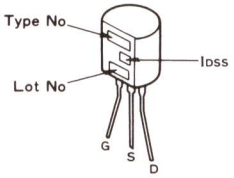
PA4006-A



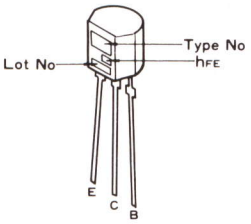
LA1247



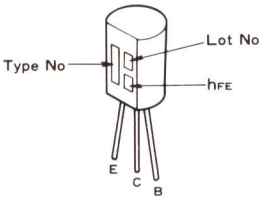
2SK168



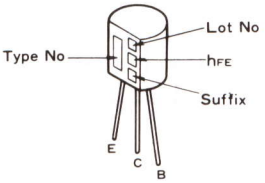
2SC535
2SC461



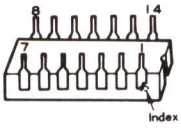
2SC1845



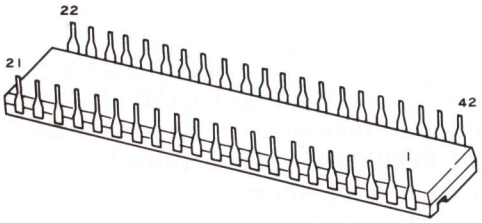
2SC945A
2SA733A



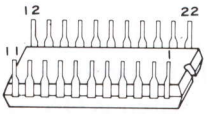
TC4069UBP



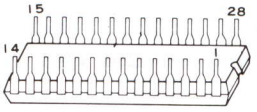
PD6004A



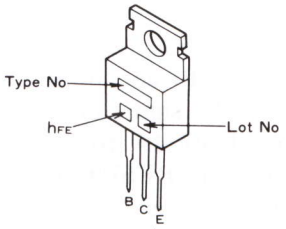
M54922P



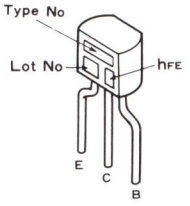
TD6301P



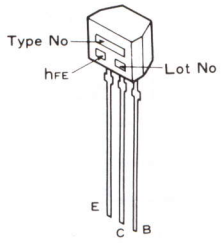
2SD880



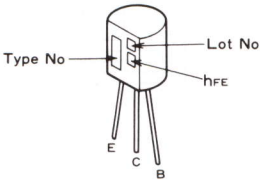
2SC2603/A/
2SA1115/A/



2SA1048
2SC2458

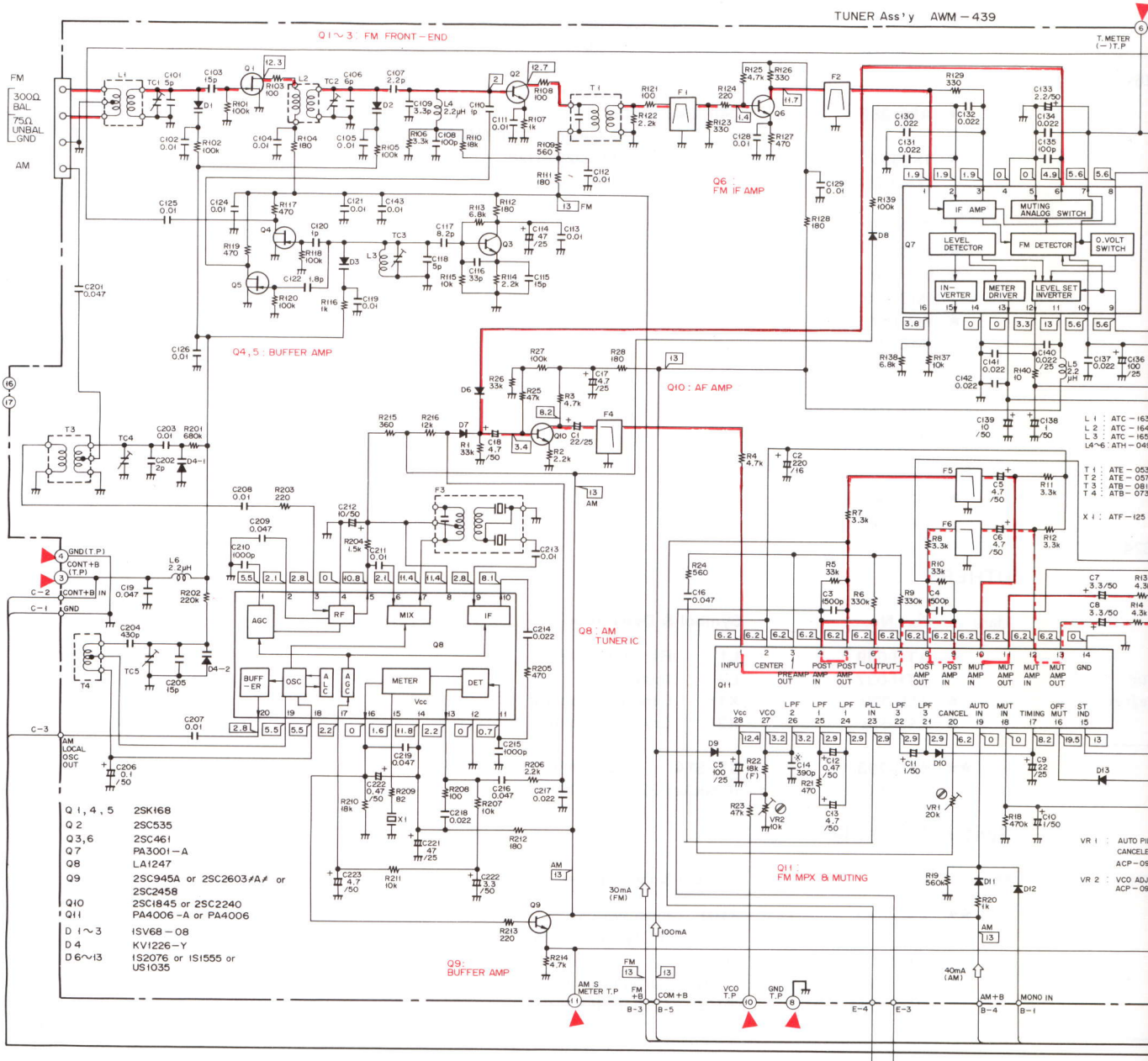


2SC2240



A B C D

8. SCHEMATIC DIAGRAM



Q1,4,5	2SK168
Q2	2SC535
Q3,6	2SC461
Q7	PA3001-A
Q8	LA1247
Q9	2SC945A or 2SC2603≠A≠ or 2SC2458
Q10	2SC1845 or 2SC2240
Q11	PA4006-A or PA4006
D1~3	1SV68-08
D4	KV1226-Y
D6~13	1S2076 or 1S1555 or US1035

1. RESISTORS.
Indicated in Ω, ¼W, ⅛W, ±5% tolerance unless otherwise noted k; kΩ, M; MΩ, (F); ±1%, (G); ±2%, (K), ±10%, (M); ±20% tolerance

2. CAPACITORS:
Indicated in capacity (μF)/voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE CURRENT.
DC voltage (V) at no input signal
mA; DC current at no input signal
mV; Signal voltage at FM 400Hz± 75kHz DEV

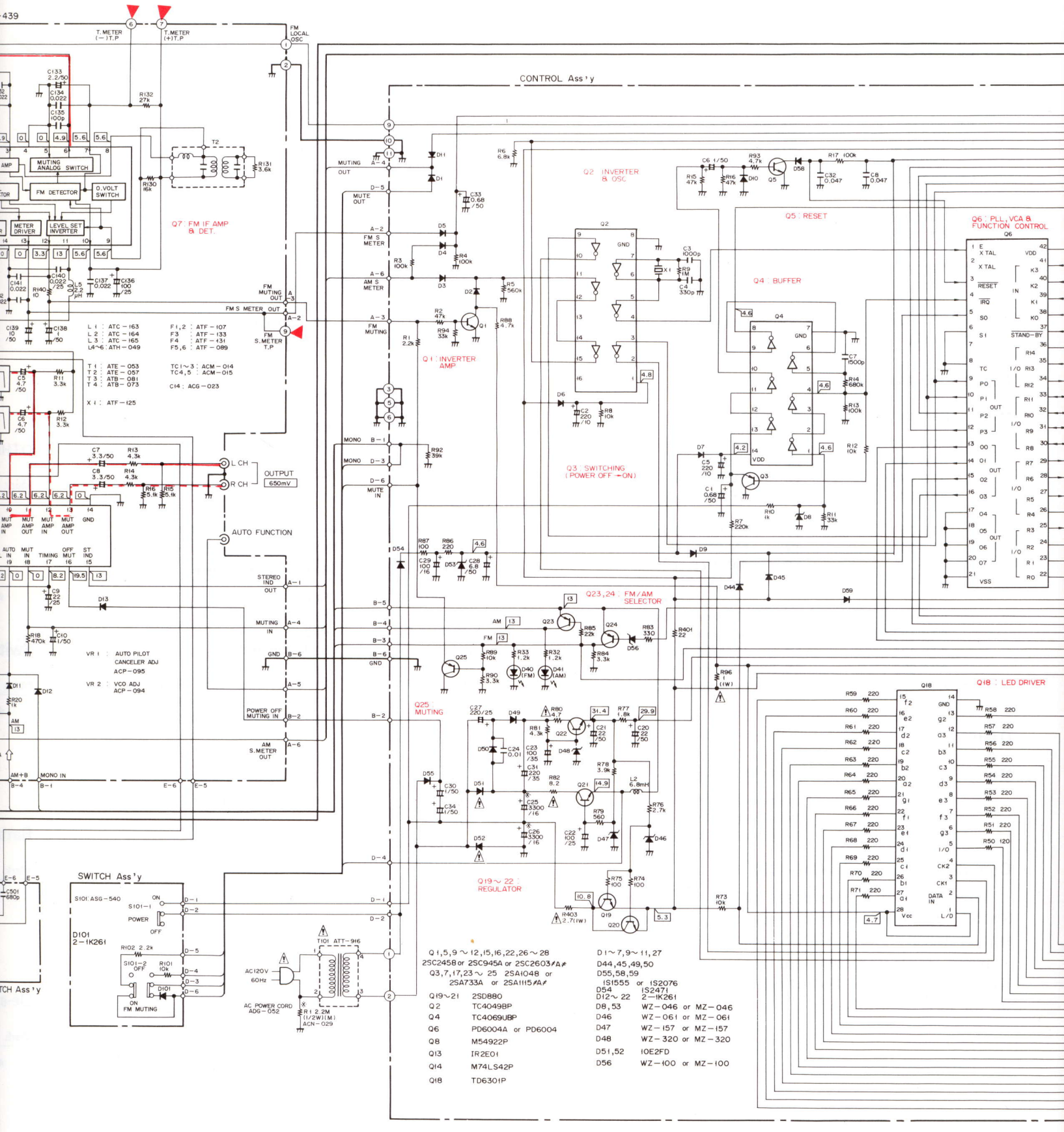
4. OTHERS:
⊘ : Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
※ marked capacitors and resistors have parts numbers.

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

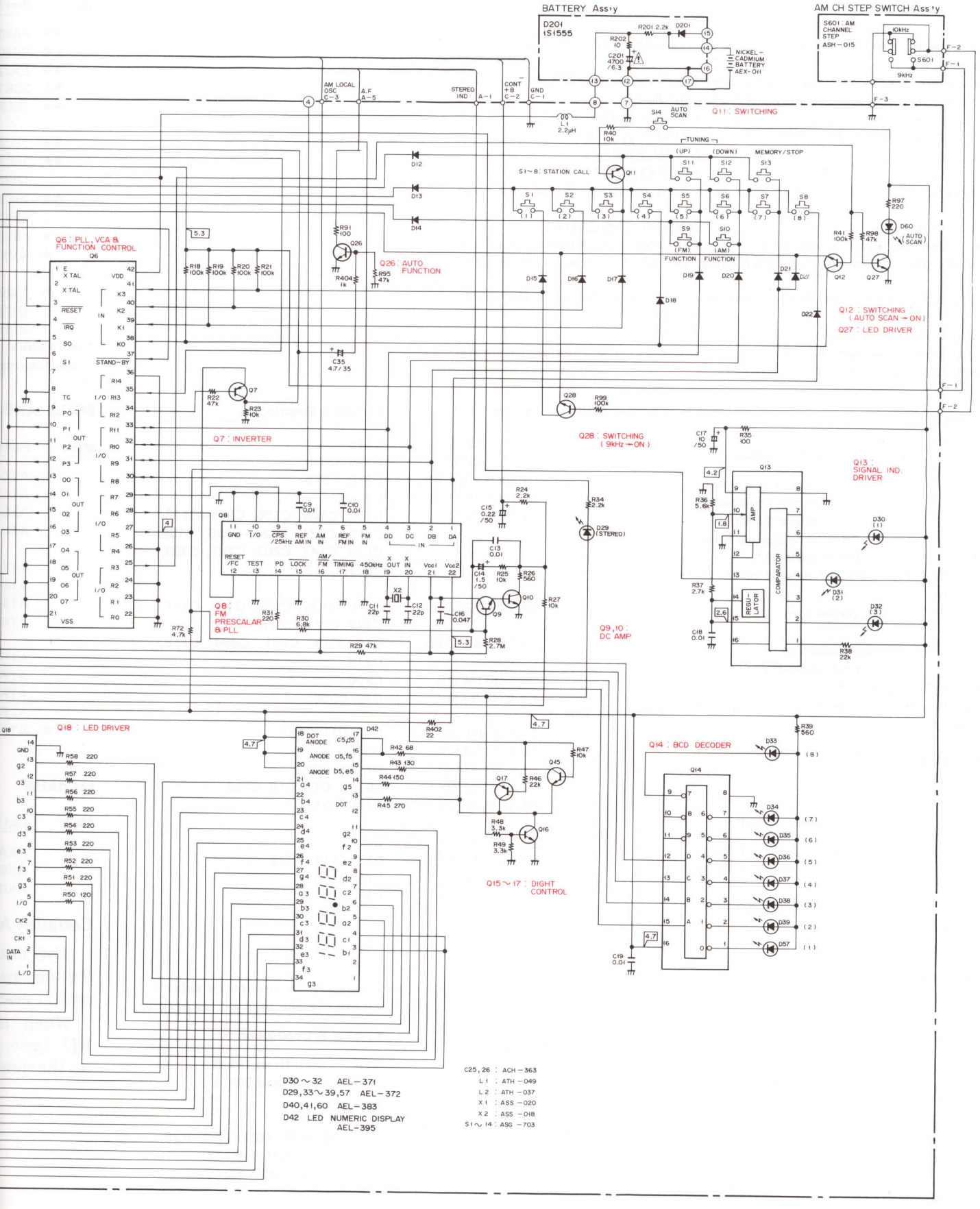
5. SWITCHES

S1	STATION CALL (1)	ON – OFF
S2	STATION CALL (2)	ON – OFF
S3	STATION CALL (3)	ON – OFF
S4	STATION CALL (4)	ON – OFF
S5	STATION CALL (5)	ON – OFF
S6	STATION CALL (6)	ON – OFF
S7	STATION CALL (7)	ON – OFF
S8	STATION CALL (8)	ON – OFF
S9	FUNCTION (FM)	ON – OFF
S10	FUNCTION (AM)	ON – OFF
S11	TUNING (UP)	ON – OFF
S12	TUNING (DOWN)	ON – OFF
S13	MEMORY/STOP	ON – OFF
S14	AUTO SCAN	ON – OFF
S101-1	POWER	ON – OFF
S101-2	FM MUTING	ON/AUTO – OFF/MODE
S501	FM DE-EMPHASIS	50μs – 75μs
S601	AM CHANNEL STEP	9kHz – 10kHz

The underlined indicates the switch position.


CONTROL Ass'y
T. METER (−) T.P
T. METER (+) T.P
FM LOCAL OSC
MUTING ANALOG SWITCH
FM DETECTOR
O. VOLT SWITCH
METER DRIVER
LEVEL SET INVERTER
Q7 : FM IF AMP & DET.
FM MUTING OUT
FM S METER OUT
FM S METER T.P
L1 : ATC−163
L2 : ATC−164
L3 : ATC−165
L4~6 : ATH−049
F1,2 : ATF−107
F3 : ATF−133
F4 : ATF−131
F5,6 : ATF−089
T1 : ATE−053
T2 : ATE−057
T3 : ATB−081
T4 : ATB−073
TC1~3 : ACM−014
TC4,5 : ACM−015
C14 : ACG−023
X1 : ATF−125
L CH
R CH
OUTPUT 650mV
AUTO FUNCTION
STEREO IND OUT
MUTING IN
GND
POWER OFF MUTING IN
AM S.METER OUT
AM+B
MONO IN
VR1 : AUTO PILOT CANCELER ADJ ACP−095
VR2 : VCO ADJ ACP−094
SWITCH Ass'y
S101 : ASG−540
D101 2−1K261
AC120V 60Hz
AC POWER CORD ADG−052
T101 ATT−916
MUTE OUT
FM S METER
AM S METER
FM MUTING
MONO
MUTE IN
Q1 : INVERTER AMP
Q2 : INVERTER & OSC
Q3 : SWITCHING (POWER OFF −ON)
Q4 : BUFFER
Q5 : RESET
Q6 : PLL, VCA & FUNCTION CONTROL
Q23,24 : FM/AM SELECTOR
Q25 : MUTING
Q19~22 : REGULATOR
Q18 : LED DRIVER
Q1,5,9~12,15,16,22,26~28 2SC2458 or 2SC945A or 2SC2603 ≠A≠
Q3,7,17,23~25 2SA1048 or 2SA733A or 2SA1115 ≠A≠
Q19~21 2SD880
Q2 TC4049BP
Q4 TC4069UBP
Q6 PD6004A or PD6004
Q8 M54922P
Q13 IR2E01
Q14 M74LS42P
Q18 TD6301P
D1~7,9~11,27 1S1555 or 1S2076
D44,45,49,50 1S2471
D55,58,59 2−1K261
D54
D12~22
D8,53 WZ−046 or MZ−046
D46 WZ−061 or MZ−061
D47 WZ−157 or MZ−157
D48 WZ−320 or MZ−320
D51,52 10E2FD
D56 WZ−100 or MZ−100

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



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 x 10¹*	*561*	*RD¼PS* 5 6 1 *J*
47kΩ	*47 x 10³*	*473*	*RD¼PS* 4 7 3 *J*
0.5Ω	*0R5*	. . . . .	*RN2H* 0 R 5 *K*
1Ω	*010*	. . . . .	*RS1P* 0 1 0 *K*

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

5.62kΩ	*562 x 100*	*5621*	*RN¼SR* 5 6 2 1 *F*

- *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.

Miscellaneous Parts

Mark	Part No.	Symbol & Description
⚠ ★	ATT-916	T101 Power transformer
⚠	ACN-029	R1 Carbon composition resistor 2.2M/½W
	AEX-011	Ni-Cd alkaline storage battery
	(AEX-008)*	(Lithium battery)*

* Either of batteries (Ni-Cd or Lithium) is used to the memory backup in the KU type.

⚠	ADG-052	AC power cord
	AWM-439	Tuner assembly
	AWM-433	Complex assembly*

* Complex assembly (AWM-433) is composed of Control assembly, Switch assembly, Battery assembly, De-emphasis switch assembly and AM CH. step switch assembly.

Tuner Assembly (AWM-439)

CAPACITORS

Mark	Part No.	Symbol & Description
	ACM-014	TC1–TC3 Ceramic trimmer
	ACM-015	TC4, TC5 Ceramic trimmer
	ACG-023	C14 Ceramic 390p/50V
	CCPSL 010M 50	C120
	CCPSL 1R8M 50	C122
	CCPSL 2R2K 50	C107
	CCPCH 3R3K 50	C109
	CCPCH 8R2K 50	C117
	CKPYX 223N 25S	C140
	CQSA 431J 50	C204
	CCDRH 050C 50	C101
	CCDRH 060D 50	C106
	CCDTH 050C 50	C118
	CCDTH 150J 50	C205
	CCDCH 010C 50	C110
	CCDCH 020C 50	C202
	CCDCH 150J 50	C103, C115
	CCDCH 330J 50	C116
	CCDSL 101J 50	C108, C135
	CKDYB 102K 50	C210, C215
	CKDYB 152K 50	C3, C4
	CKDYF 103Z 50	C102, C104, C105, C111–C113, C119, C121, C124–C126, C128, C129, C143, C203, C207, C208, C211, C213
	CKDYF 223Z 50	C130–C132, C134, C137, C141, C142, C214, C217, C218
	CKDYF 473Z 50	C16, C19, C201, C209, C216, C219
	CEA 0R1M 50L	C206
	CEA R47M 50L	C12, C220
	CEA 010M 50L	C10, C11, C138
	CEA 2R2M 50L	C133
	CEA 3R3M 50L	C7, C8, C222
	CEA 4R7M 50L	C5, C6, C13, C18, C223
	CEA 100M 50L	C139, C212
	CEA 220M 25L	C1, C9
	CEA 470M 25L	C17, C114, C221
	CEA 101M 25L	C15, C136
	CEA 221M 16L	C2

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-094	VR2 Semi-fixed 10k-B
★	ACP-095	VR1 Semi-fixed 20k-B
	RN¼PQ □□□□ F	R22
	RD1/8PM □□□ J	R1–R16, R18–R21, R23–R28, R101–R104, R106–R132, R137–R140, R201–R216

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	PA3001-A	Q7
★★	PA4006-A	Q11
★★	LA1247	Q8
★★	2SK168	Q1, Q4, Q5
★★	2SC535	Q2
★★	2SC461	Q3, Q6
★★	2SC2240 (2SC1845)	Q10
★★	2SC2458 (2SC945A)	Q9
★	1SV68-08	D1–D3
★	KV1226-Y	D4
★	1S2076 (1S1555) (US1035)	D6–D13

* KV1226-Y consists of two vari-cap diodes with indentical characteristics.

COILS AND FILTERS

Mark	Part No.	Symbol & Description
	ATC-163	L1 FM ANT. coil
	ATC-164	L2 FM RF coil
	ATC-165	L3 FM osc. coil
	ATH-049	L4–L6 RF choke coil
	ATE-053	T1 FM IF transformer
	ATE-057	T2 FM DET transformer
	ATB-081	T3 AM ANT. coil
	ATB-073	T4 AM osc. coil
	ATF-107	F1, F2 FM ceramic filter
	ATF-133	F3 AM ceramic filter
	ATF-131	F4 114k/164k filter
	ATF-089	F5, F6 Low-pass filter
★	ATF-125	X1 Ceramic resonator

OTHERS

Mark	Part No.	Symbol & Description
	AKA-017	Terminal (ANTENNA)
	AKB-077	Terminal (OUTPUT)
	AKN-034	Terminal (AUTO FUNCTION)

Complex Assembly (AWM-433)

This assembly is composed of Control assembly, Switch assembly, Battery assembly, De-emphasis switch assembly and AM CH. step switch assembly.

When replacing the control assembly in the KU type, remove the diodes D25, D26, D28 on the new assembly.

Control Assembly

CAPACITORS

Mark	Part No.	Symbol & Description
	ACH-363	C25, C26 Electrolytic 3300/16V
	CEA 221M 35L-SF	C31
	CEA 221M 25L-SF	C27
	CEA 221M 10L	C2, C5
	CEA 101M 35L	C23
	CEA 101M 25L	C22
	CEA 101M 16L	C29
	CEA 220M 50L	C20, C21
	CEA 100M 50L	C17
	CEA 6R8M 50L	C28
	CEA 1R5M 50L	C14
	CEA R68M 50L	C1, C33
	CEA R22M 50L	C15
	CEA 010M 50L	C6, C30, C34
	CCDCH 220J 50	C11, C12
	CKDYB 331K 50	C4
	CKDYB 102K 50	C3
	CKDYB 152K 50	C7
	CKDYF 103Z 50	C9, C10, C13, C18, C19, C24
	CKDYF 473Z 50	C8, C16, C32
	CEJA 4R7M 35	C35

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
⚠	RFA¼PL 4R7J	R80
⚠	RS1LF □□□J	R96, R403
⚠	RD¼PMF □□□J	R82
	RD¼PM □□□J	R28, R39, R72
	RD1/8M □□□J	R1–R27, R29–R38, R40–R71, R73–R79, R81, R83–R95, R97–R99, R401, R402, R404

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	TC4049BP	Q2
★★	TC4069UBP	Q4
★★	PD6004A (PD6004)	Q6
★★	M54922P	Q8
★★	IR2E01	Q13
★★	M74LS42P	Q14
★★	TD6301P	Q18
★★	2SD880	Q19–Q21
★★	2SC2458 (2SC945A) (2SC2603/A/)	Q1, Q5, Q9–Q12, Q15, Q16, Q22, Q26–Q28
★★	2SA1048 (2SA733A) (2SA1115/A/)	Q3, Q7, Q17, Q23–Q25

Mark	Part No.	Symbol & Description
⚠ ★	10E2FD	D51, D52
★	AEL-395	D42 LED numeric display
★	AEL-371	D30–D32 LED (green, SIGNAL)
★	AEL-372	D29, D33–D39, D57 LED (red, STEREO, STATION)
★	AEL-383	D40, D41, D60 LED (green, FUNCTION)
★	1S1555 (1S2076)	D1–D7, D9–D11, D25–D28, D44, D45, D49, D50, D55, D58, D59
★	2-1K261	D12–D22
★	1S2471	D54
★	WZ-320 (MZ-320)	D48
★	WZ-157 (MZ-157)	D47
★	WZ-100 (MZ-100)	D56
★	WZ-061 (MZ-061)	D46
★	WZ-046 (MZ-046)	D8, D53

OTHERS

Mark	Part No.	Symbol & Description
	ATH-049	L1 RF choke coil
	ATH-037	L2 Inductor
★	ASS-020	X1 Ceramic resonator
★	ASS-018	X2 Crystal resonator
★★	ASG-703	S1–S14 Tact switch
	AKH-022	IC socket 22-P (for Q8)

Switch Assembly

Mark	Part No.	Symbol & Description
★★	ASG-540	S101 Push switch (POWER, FM MUTING)
★	2-K261	D101
	RD1/8PM 103J	R101 Carbon film resistor
	RD1/8PM 222J	R102 Carbon film resistor

Battry Assembly

Mark	Part No.	Symbol & Description
⚠	CEA 472M 6L-SF	C201
	RD1/8PM 222J	R201
	RD1/8M 100J	R202
★	1S1555 (1S2076)	D201

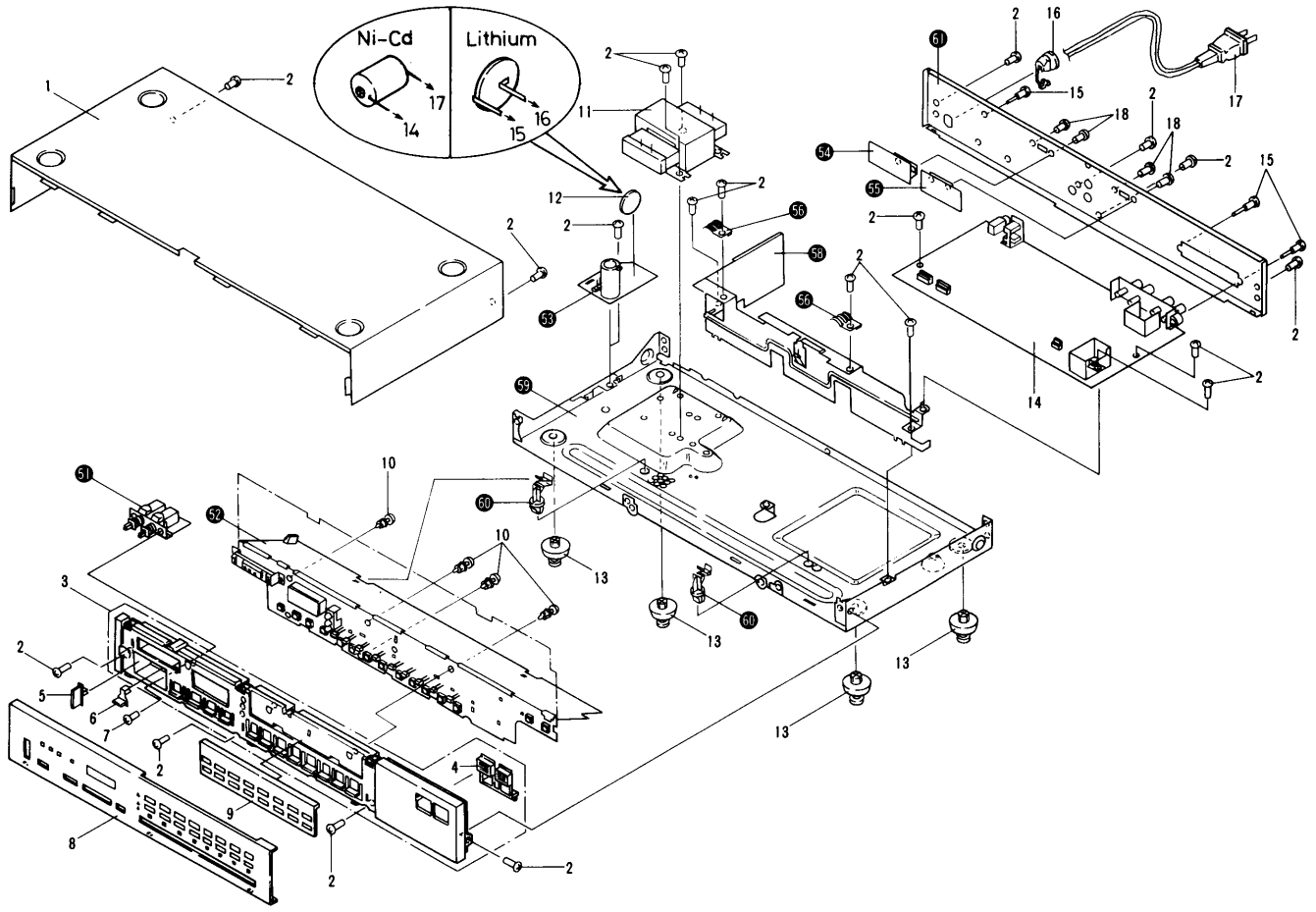
De-emphasis Switch Assembly

Mark	Part No.	Symbol & Description
★★	ASH-015	S501 Slide switch (DE-EMPHASIS)
	CKDYB 681K 50	C501, C502

AM CH. Step Switch Assembly

Mark	Part No.	Symbol & Description
★★	ASH-015	S601 Slide switch (AM CHANNEL STEP)

10. EXPLODED VIEW



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.

Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
	1.	ANE-393	Top cover		16.	AEC-327	Strain relief
	2.	BBZ30P080FZK	Screw 3 x 8	⚠	17.	ADG-052	AC power cord
	3.	ANR-515	Front base assembly		18.	PMZ30P060FZB	Screw 3 x 6
	4.	AAD-481	Knob (FM, AM)				
	5.	AAD-417	Knob (POWER)		51.		Switch assembly
					52.		Control assembly
	6.	AAD-482	Knob (FM MUTING)		53.		Battery assembly
	7.	PMZ30P060FMC	Screw 3 x 6		54.		AM CH. step switch assembly
	8.	ANM-209	Front cover		55.		De-emphasis switch assembly
	9.	ANR-514	Card holder				
	10.	AEC-384	Nylon rivet		56.		Spring for ground
					57.		. . . . .
⚠ ★	11.	ATT-916	Power transformer		58.		Shield plate
	12.	AEX-011	Ni-Cd battery		59.		Chassis
		(AEX-008)	(Lithium battery)		60.		PC board holder
	13.	AEC-784	Foot assembly				
	14.	AWM-439	Tuner assembly		61.		Rear panel
	15.	ABA-115	Screw with bar		51~55.	AWM-433	Complex assembly

11. ADJUSTMENTS

FM Tuner Section

- Connect the FM signal generator (FM SG) to the FM ANTENNA 300Ω terminal through a 300Ω dummy antenna.
- Set the TX-930 to the FM band and MANUAL tuning mode.
- Set the FM MUTING switch to the OFF position.

(*1) Tune the FM SG to the TX-930.

(*2) Connect the FM multiplex stereo signal generator to the FM SG external modulator terminal. Set the modulation to Pilot 19kHz/±7.5kHz deviation only.

(*3) Connect the FM multiplex stereo signal generator to the FM SG external modulator terminal. Set the modulation to Main 1kHz/L +R/±67.5kHz deviation, Pilot 19kHz/±7.5kHz deviation.

Step	FM SG (400Hz, ±75kHz deviation)		TX-930 Frequency display	Adjustment point	Adjustment procedure
	Frequency	Level			
1.	No signal		87.5MHz	L3	6.5V DC between terminal no. 3 and no. 4 (ground).
2.	No signal		108.0MHz	TC3	20V DC between terminal no. 3 and no. 4 (ground).
3.	Repeat steps 1 and 2 until both specifications are correct.				
4.	90.0MHz (*1)	20dB	90.0MHz	L1,L2	Adjust until DC voltage between terminal no. 9 and ground is maximum.
5.	106.0MHz (*1)	20dB	106.0MHz	TC1, TC2	
6.	Repeat steps 4 and 5 until maximum sensitivity is attained.				
7.	98.0MHz (*1)	20dB	98.0MHz	T1	Adjust until DC voltage between terminal no. 9 and ground is maximum.
8.	98.0MHz (*1)	60dB	98.0MHz	T2 (CENTER)	0V DC between terminal no. 6 and no. 7.
9.	98.0MHz (*1)	60dB	98.0MHz	T2 (DIST)	Adjust until distortion at OUTPUT terminal is minimum.
10.	Repeat steps 8 and 9 until both requirements are satisfied.				
11.	Set the FM MUTING switch to the ON position.				
12.	98.0MHz (*1)	Variable	98.0MHz	R137	Confirm that muting operation stops above 28dB — if not, remove R137.
13.	98.0MHz (*1)	80dB (not modulation)	98.0MHz	VR2	Adjust signal between terminal no. 10 and no. 8 (ground) to 76kHz (±150Hz)
14.	98.0MHz (*1) Set to pilot modulation (*2)	80dB	98.0MHz	VR1	Adjust so that a leakage of 19kHz at OUTPUT terminal is balanced between R and L channels and minimized at the same time.
15.	98.0MHz (*1) Set to stereo modulation (*3)	60dB	98.0MHz	T1 (within ±90°)	Adjust until distortion at OUTPUT L or R terminal is minimum.

AM Tuner Section

- Connect the furnished AM loop antenna between terminals AM ANTENNA and GND.
- Connect the AM signal generator (AM SG) to the AM ANTENNA terminal through a 10kΩ resistor.
- Set the TX-930 to the AM (MW) band and MANUAL tuning mode.
- Set the AM CHANNEL STEP switch to the 9kHz position (KU, S and S/G types).

(*4) Tune the AM SG to the TX-930.

Step	AM SG (400Hz, 30% modulation)		TX-930 Frequency display	Adjustment point	Adjustment procedure
	Frequency	Level			
1.	No signal		522kHz	T4	2V DC between terminal no. 3 and no. 4 (ground).
2.	No signal		1620kHz	TC5	25V DC between terminal no. 3 and no. 4 (ground).
3.	Repeat steps 1 and 2 until both specifications are correct.				
4.	603kHz (*4)	40dB	603kHz	T3	Adjust until DC voltage between terminal no. 11 and ground is maximum.
5.	1395kHz (*4)	40dB	1395kHz	TC4	
6.	Repeat steps 4 and 5 until maximum sensitivity is attained.				

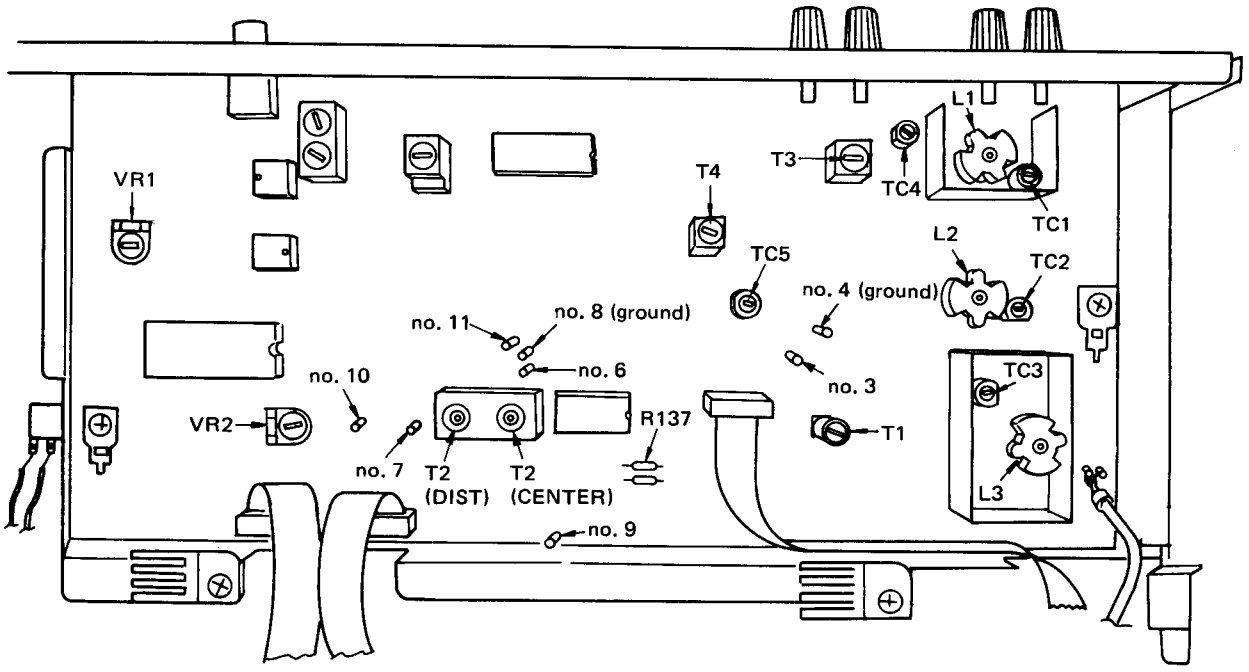


Fig. 11-1 Adjustment points and measuring points

11. RÉGLAGE

Partie tuner FM

- Raccorder le générateur de signal FM (FM SG) à la borne d'antenne FM ANTENNA 300Ω au moyen d'une antenne fictive de 300Ω.
- Régler le TX-930 sur la gamme FM et sur le mode d'accord manuel (MANUAL).
- Régler le commutateur de silencieux FM (FM MUTING) sur la position déclenché (OFF).

(*1) Accorder le FM SG sur le TX-930.

(*2) Raccorder le générateur de signal stéréo FM multiplex à la borne de modulateur extérieur du FM SG. Régler la modulation pour Pilot 19kHz/écart ±7,5kHz uniquement.

(*3) Raccorder le générateur de signal stéréo FM multiplex à la borne de modulateur extérieur du FM SG. Régler la modulation pour Main 1kHz/L+R/ écart ±67,5kHz, Pilot 19kHz/écart ±7,5kHz.

Etape	FM SG (400Hz, écart ±75kHz)		Affichage de fréquence du TX-930	Point de réglage	Procédure de réglage
	Fréquence	Niveau			
1.	Pas de signal		87,5MHz	L3	6,5V c.c. entre les bornes n° 3 et n° 4 (masse).
2.	Pas de signal		108,0MHz	TC3	20V c.c. entre les bornes n° 3 et n° 4 (masse).
3.	Répéter les étapes 1 et 2 jusqu'à ce que les deux caractéristiques soient correctes.				
4.	90,0MHZ (*1)	20dB	90,0MHz	L1,L2	Régler jusqu'à ce que la tension continue entre la borne n° 9 et la masse soit maximum.
5.	106,0MHz (*1)	20dB	106,0MHz	TC1,TC2	
6.	Répéter les étapes 4 et 5 jusqu'à l'obtention de la sensibilité maximum.				
7.	98,0MHz (*1)	20dB	98,0MHz	T1	Régler jusqu'à ce que la tension continue entre la borne n° 9 et la masse soit maximum.
8.	98,0MHz (*1)	60dB	98,0MHz	T2 (CENTER)	0V c.c. entre les bornes n° 6 et n° 7.
9.	98,0MHz (*1)	60dB	98,0MHz	T2 (DIST)	Régler jusqu'à ce que la distorsion à la borne de sortie (OUTPUT) soit minimum.
10.	Répéter les étapes 8 et 9 jusqu'à ce que les deux exigences soient remplies.				
11.	Régler le commutateur de silencieux FM (FM MUTING) sur la position enclenché (ON).				
12.	98,0MHz (*1)	Variable	98,0MHz	R137	Vérifier que le fonctionnement du silencieux s'arrête au-dessus de 28dB. Sinon, retirer R137.
13.	98,0MHz (*1)	80dB (pas de modulation)	98,0MHz	VR2	Régler le signal entre les bornes n° 10 de n° 8 (masse) sur 76kHz (±150Hz).
14.	98,0MHZ (*1) Régler sur la modulation de Pilot (*2).	80dB	98,0MHz	VR1	Régler de manièra à ce qu'une fuite de 19kHz à la borne de sortie (OUTPUT) soit simultanément minimum et équilibrée entre les canaux gauche et droite.
15.	98,0MHz (*1) Régler sur la modulation de stéréo (*3).	60dB	98,0MHz	T1 (à ±90° près)	Régler jusqu'à ce que la distorsion à la borne de sortie gauche ou droite (OUTPUT L ou R) soit minimum.

Partie tuner AM

- Raccorder le cadre d'antenne AM fourni entre les bornes AM ANTENNA et GND (masse).
- Raccorder le générateur de signal AM (AM SG) à la borne d'antenne AM (AM ANTENNA) au moyen d'une résistance de 10kΩ.
- Régler le TX-930 sur la gamme AM/PO (AM/MW) et sur le mode d'accord manuel (MANUAL).
- Régler l'interructeur AM CHANNEL STEP sur la position 9kHz (types KU, S et S/G).

(*4) Accorder le AM SG sur le TX-930.

Etape	FM SG (400Hz, modulation 30%)		Affichage de fréquence du TX-930	Point de réglage	Procédure de réglage
	Fréquence	Niveau			
1.	Pas de signal		522kHz	T4	2V c.c. entre les bornes nº 3 et nº 4 (masse).
2.	Pas de signal		1620kHz	TC5	25V c.c. entre les bornes nº 3 et nº 4 (masse).
3.	Répétor les étapes 1 et 2 jusqu'à ce que les deux caractéristiques soient correctes.				
4.	603kHz (*4)	40dB	603kHz	T3	Régler jusqu'à ce que la tension continue entre la borne nº 11 et la masse soit maximum.
5.	1395kHz (*4)	40dB	1395kHz	TC4	
6.	Répéter les étapes 4 et 5 jusqu'à l'obtention de la sensibilité maximum.				

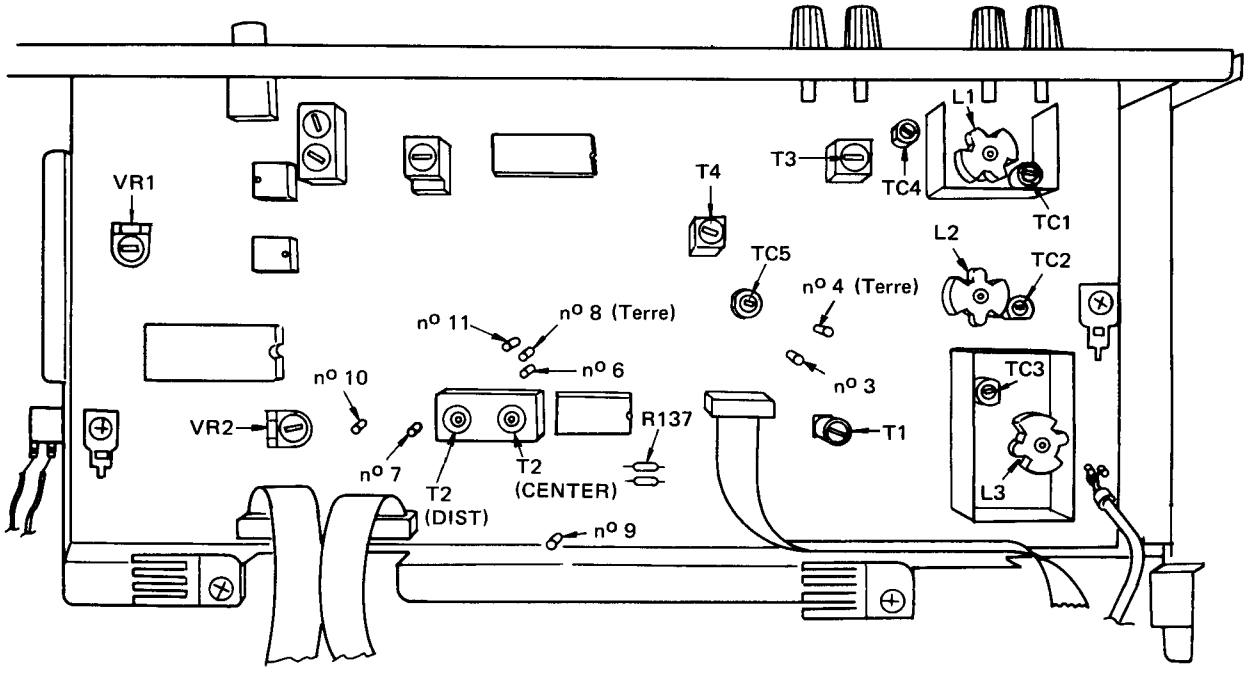


Fig. 11-1 Points de réglage et points de mesurage

11. AJUSTE

Sección del sintonizador de FM

- Conectar el generador de señales de FM (FM SG) al terminal FM ANTENNA 300Ω a través de una antena ficticia de 300 ohmios.
- Establecer el TX-930 en la banda de FM y el modo de sintonización MANUAL.
- Poner el interruptor FM MUTING en la posición OFF.

(*1) Sintonizar el FM SG con el TX-930.

(*2) Conectar el generador de señales estereofónicas de FM multiplex al terminal de modulador exterior del FM SG. Ajustar la modulación a piloto 19kHz/±7,5kHz de desviación solamente.

(*3) Conectar el generador de señales estereofónicas de FM multiplex al terminal de modulador exterior del FM SG. Ajustar la modulación a principal 1kHz/L+R/±67,5kHz de desviación, y piloto 19kHz/±7,5kHz de desviación.

Paso	FM SG (400Hz, ±75kHz de desviación)		Frecuencímetro del TX-930	Punto de ajuste	Procedimientos de ajuste
	Frecuencia	Nivel			
1.	Sin señal		87,5MHz	L3	6,5V CC entre los terminales no. 3 y no. 4 (masa).
2.	Sin señal		108,0MHz	TC3	20V CC entre los terminales no. 3 y no. 4 (masa).
3.	Repetir los pasos 1 y 2 hasta que ambas especificaciones sean correctas.				
4.	90,0MHz (*1)	20dB	90,0MHz	L1,L2	Ajustar hasta que le tensión de CC entre el terminal no. 9 y masa sea la máxima.
5.	106,0MHz (*1)	20dB	106,0MHz	TC1,TC2	
6.	Repetir los pasos 4 y 5 hasta lograrse la máxima sensibilidad.				
7.	98,0MHz (*1)	20dB	98,0MHz	T1	Ajustar hasta que la tensión de CC entre el terminal no. 9 y masa sea la máxima.
8.	98,0MHz (*1)	60dB	98,0MHz	T2 (CENTER)	0V CC entre los terminales no. 6 y no. 7.
9.	98,0HMz (*1)	60dB	98,0MHz	T2 (DIST)	Ajustar hasta que la distorsión en el terminal OUTPUT sea la mínima.
10.	Repetir los pasos 8 y 9 hasta que se satisfagan ambos requisitos.				
11.	Poner el interruptor FM MUTING en la posición ON.				
12.	98,0MHz (*1)	Variable	98,0MHz	R137	Confirmar que la operación de silenciamiento se detiene por encima de los 28dB - si no se así, extraer R137.
13.	98,0MHz (*1)	80dB (sin modulación)	98,0MHz	VR2	Ajustar la señal entre el terminal no. 10 y el no. 8 (masa) a 76kHz (±150Hz).
14.	98,0MHz (*1) Ajustar a la modulación piloto (*2)	80dB	98,0MHz	VR1	Ajustar de modo que la fuga de 19kHz en el terminal OUTPUT se equilibre entre los canales R y L y se minimice al mismo tiempo.
15.	98,0MHz (*1) Ajustar a la modulación estereofónica (*3)	60dB	98,0MHz	T1 (dentro de ±90°)	Ajustar hasta que la distorsión en el terminal OUTPUT L o R sea la mínima.

Sección del sintonizador de AM

- Conectar la antena de cuadro de AM suministrada entre los terminales AM ANTENNA y GND.
- Conectar el generador de señales de AM (AM SG) al terminal AM ANTENNA a través de un resistor de 10K ohmios.
- Establecer el TX-930 en la banda de AM (MW) y en el modo de sintonización MANUAL.
- Poner el conmutador de pasos del canal de AM (AM CHANNEL STEP) en la posición de 9kHz (tipos KU, S y S/G).

(*4) Sintonizar el AM SG con el TX-930.

Paso	FM SG (400Hz, 30% de modulación)		Frecuencímetro del TX-930	Punto de ajuste	Procedimientos de ajuste
	Frecuencia	Nivel			
1.	Sin señal		522kHz	T4	2V CC entre los terminales no. 3 y no. 4 (masa).
2.	Sin señal		1620kHz	TC5	25V CC entre los terminales no. 3 y no. 4 (masa).
3.	Repetir los pasos 1 y 2 hasta que ambas especificaciones sean correctas.				
4.	603kHz (*4)	40dB	603kHz	T3	Ajustar hasta que la tensión de CC entre el terminal no. 11 y masa sea la máxima.
5.	1395kHz (*4)	40dB	1395kHz	TC4	
6.	Repetir los pasos 4 y 5 hasta lograrse la máxima sensibilidad.				

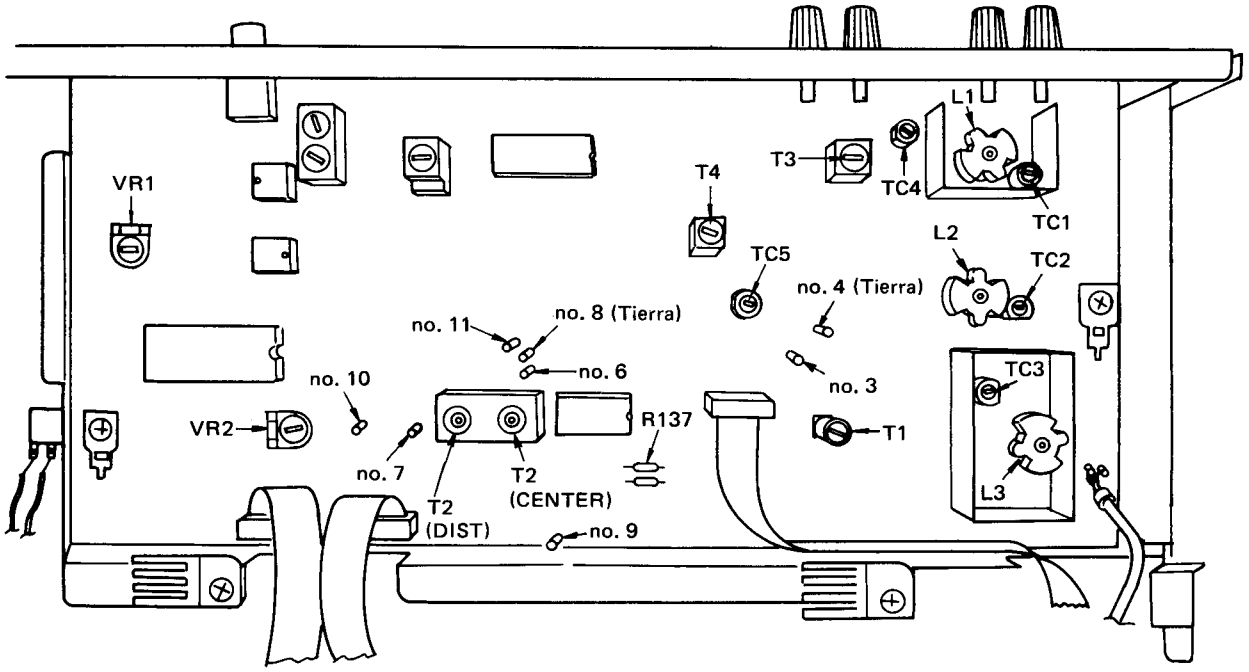


Fig. 11-1 Puntos de ajuste y puntos de medida