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ADDITIONAL

PIONEER

Service Manual

SCHALTUNGSDIENST LANGE
PIONEER
BELEGEXEMPLAR

LFD. NR.:

1347

ORDER NO.
ARP-122-0

FM/AM DIGITAL SYNTHESIZED TUNER

TX-930L

HE, HB

MODEL TX-930L COMES IN TWO VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
HE	220V and 240V (Switchable)	European continent model
HB	220V and 240V (Switchable)	United Kingdom model

The basic performance of the model TX-930L is the same as the model TX-930. The AM tuner of TX-930L is a two wave-band tuner with MW (medium wave) and LW (long wave). Please refer to the TX-930/KU service manual (ARP-119) with the exception of this service manual. This additional service manual is applicable to the TX-930L/HE and TX-930L/HB.

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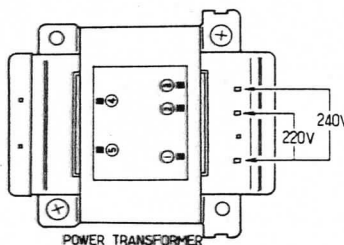
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Line Voltage Selection

Line voltage can be changed with following steps.

1. Disconnect the AC power cord.
2. Remove the top cover.
3. Change the connection of the power transformer primary taps.
4. Stick the line voltage label on the rear panel.

Part No.	Description
AAX-193	220V label
AAX-192	240V label



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1347

1. SPECIFICATIONS

FM Tuner Section

Usable Sensitivity	10.8 dBf (0.95 μ V)
50 dB Quieting Sensitivity	Mono; 15.8 dBf (1.7 μ V)
	Stereo; 38 dBf (22 μ V)
Sensitivity (DIN)	Mono; 1 μ V
	Stereo; 38 μ V
Signal-to-Noise Ratio	Mono; 78 dB (at 85 dBf)
	Stereo; 75 dB (at 85 dBf)
Signal-to-Noise Ratio (DIN)	Mono; 72 dB
	Stereo; 62 dB
Distortion (at 65 dBf)	
Mono	1 kHz; 0.08%
Stereo	1 kHz; 0.15%
Capture Ratio	1.0 dB
Alternate Channel Selectivity	400 kHz; 50 dB
Stereo Separation	1 kHz; 40 dB
	100 Hz to 10 kHz; 40 dB
Frequency Response	20 Hz to 15 kHz; ± 1.5 dB
Spurious Response Ratio	70 dB
Image Response Ratio	40 dB
IF Response Ratio	80 dB
AM Suppression Ratio	50 dB
Muting Threshold	19.2 dBf (5 μ V)
Antenna Input	300 ohms balanced,
	75 ohms unbalanced

MW Tuner Section

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

LW Tuner Section

Sensitivity (IHF, external antenna)	45 μ V
Selectivity	25 dB
Signal-to-Noise Ratio	50 dB
Image Response Ratio	40 dB
IF Response Ratio	60 dB
Antenna	Loop antenna

Audio Section

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

Miscellaneous

Power Requirements	AC 220 V, 50 Hz
Power Consumption	17 W
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)	2.9 kg (6 lb 6 oz)

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. 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 × 10¹ 561 RD4PS 561 J

47kΩ 47 × 10³ 473 RD4PS 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 × 100 5621 RN4SR 5621 F

- The Δ 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.

Contrast of Miscellaneous Parts

ELECTRICAL PARTS

Mark	Symbol & Description	Part No.			Remarks
		TX-930/KU	TX-930L/HE	TX-930L/HB	
Δ ★	T101 Power transformer (120V)	ATT-916	.....	.....	
Δ ★	T101 Power transformer (220/240V)	.....	ATT-906	ATT-906	
Δ	R1 Carbon composition resistor 2.2M½W	ACN-029	.....	.....	
	Lithium battery	AEX-008	AEX-008	AEX-008	
	(Ni-Cd alkaline storage battery)*	(AEX-011)*	.....	.....	
Δ	AC power cord	ADG-052	ADG-062	ADG-063	
	Tuner assembly	AWM-439	AWM-420	AWM-420	
	Complex assembly	AWM-433	AWM-419	AWM-419	

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

EXTERIOR COMPONENTS

Mark	Symbol & Description	Part No.			Remarks
		TX-930/KU	TX-930L/HE	TX-930L/HB	
	Top cover	ANE-393	ANE-386	ANE-386	
	Front base assembly	ANR-515	ANR-516	ANR-516	
	Front cover	ANM-209	ANM-210	ANM-210	

PACKING AND FURNISHED PARTS

Mark	Symbol & Description	Part No.			Remarks
		TX-930/KU	TX-930L/HE	TX-930L/HB	
	Packing case	AHE-052	AHE-040	AHE-040	
	Operating instructions (English)	ARB-493	.....	ARB-495	
	(English/German/French/Italian)	.....	ARE-038	.....	
	Station card set	AAN-047	AAN-042	AAN-042	

Tuner Assembly (AWM-420)

CAPACITORS

Mark	Part No.	Symbol & Description
	ACM-014	TC1-TC3 Ceramic trimmer
	ACM-015	TC4, TC5 Ceramic trimmer
	ACM-017	TC300, TC301 Ceramic trimmer
	ACG-023	C14 Ceramic 390p/50V
	ACG-024	C201, C300 Ceramic 0.1/25V

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
CQSA 820J 50	C301
CQSA 181G 50	C307
CQSA 271J 50	C308

CCDCH 220J 50	C312
CCDRH 050C 50	C101
CCDRH 060D 50	C106
CCDTH 050C 50	C118
CCDTH 100D 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, C112, C113, C119, C121, C124, C125, C126, C128, C129, C143, C203, C207, C208, C211, C213
CKDYF 223Z 50	C130, C131, C132, C134, C137, C141, C142, C214, C217, C218
CKDYF 473Z 50	C16, C19, C209, C216, C219, C302, C303, C304, C309

Mark	Part No.	Symbol & Description
	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, C310
	CEA 100M 50L	C139, C212
	CEA 220M 25L	C1, C9, C311
	CEA 470M 25L	C17, C221
	CEA 101M 25L	C15, C114, 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 1802F	R22
	RD1/8PM □□□J	R1-R16, R18-R21, R23-R28, R101-R132, R137-R140, R201-R216, R300-R314

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	PA3001-A	Q7
★★	PA4006-A	Q11
★★	LA1247	Q8
★★	2SK168	Q1, Q4, Q5
★★	2SK241	Q303, Q304
★★	2SC535	Q2
★★	2SC461	Q3, Q6
★★	2SC2240 (2SC1845)	Q10
★★	2SC2458 (2SC2603/A/)	Q9, Q301
★★	2SA1048 (2SA1115/A/)	Q300, Q302
★	1SV68-08	D1, D2, D3
★	KV1226-Y	D4, D306
★	1S2076	D6-D13, D301-D305, D307, D308
* KV1226-Y consists of two vari-cap diodes with identical 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-MW ANT. coil
	ATB-073	T4 AM-MW osc. coil
	ATD-014	T300 AM-LW ANT. coil
	ATD-013	T301 AM-LW 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-132	X1 Ceramic resonator

OTHERS

Mark	Part No.	Symbol & Description
	AKA-018	Terminal (ANTENNA)
	AKB-077	Terminal (OUTPUT)
	AKN-034	Terminal (AUTO FUNCTION)

Complex Assembly (AWM-419)

This assembly is composed of Control assembly, Switch assembly and Battery assembly.

Control Assembly

CAPACITORS

Mark	Part No.	Symbol & Description
	ACH-363	C25, C26 Electrolytic 3300/16V
	CEA 221M 35L	C31
	CEA 221M 25L	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 2R2M 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 R47M 50	C301
	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 □□□J	R80, R82
△	RS1LF □□□J	R96, R403
	RD¼PM □□□J	R28, R39, R72, R301, R302
	RD1/8PM □□□J	R1-R27, R29-R38, R41-R71, R73-R79, R81, R83-R95, R303-R309, R401, R402, R404

SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★	TC4049BP	Q2
★★	TC4069UBP	Q4
★★	PD6004A (PD6004)	Q6
★★	M54922P	Q8
★★	IR2E01	Q13
★★	M74LS42P	Q14
★★	TD6301AP	Q18
★★	2SD880 (2SD313)	Q19, Q21

Mark	Part No.	Symbol & Description
★★	2SC2458 (2SC945A)	Q1, Q5, Q9, Q10, Q12, Q15, Q16, Q22, Q26, Q301, Q303-Q306
★★	2SA1048 (2SA733A)	Q3, Q7, Q17, Q23-Q25
★★	2SA1115/A/)	
★★	2SJ74NFRE	Q302
△	★ 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, D302 LED (Green, FUNCTION)
	★ 1S1555 (1S2076)	D1-D7, D9-D11, D23, D24, D28, D44, D45, D49, D50, D55, D58, D59
	★ 1S2471	D54
	★ 2-1K261	D12-D22, D301
	★ 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
	★ SZ-027	D61

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
	AKH-022	IC socket

Switch Assembly

The switch assembly for TX-930L/HE, HB is the same as the TX-930/KU.

Battery Assembly

The battery assembly for TX-930L/HE, HB is the same as the TX-930/KU.

3. P.C. BOARD PATTERNS

A

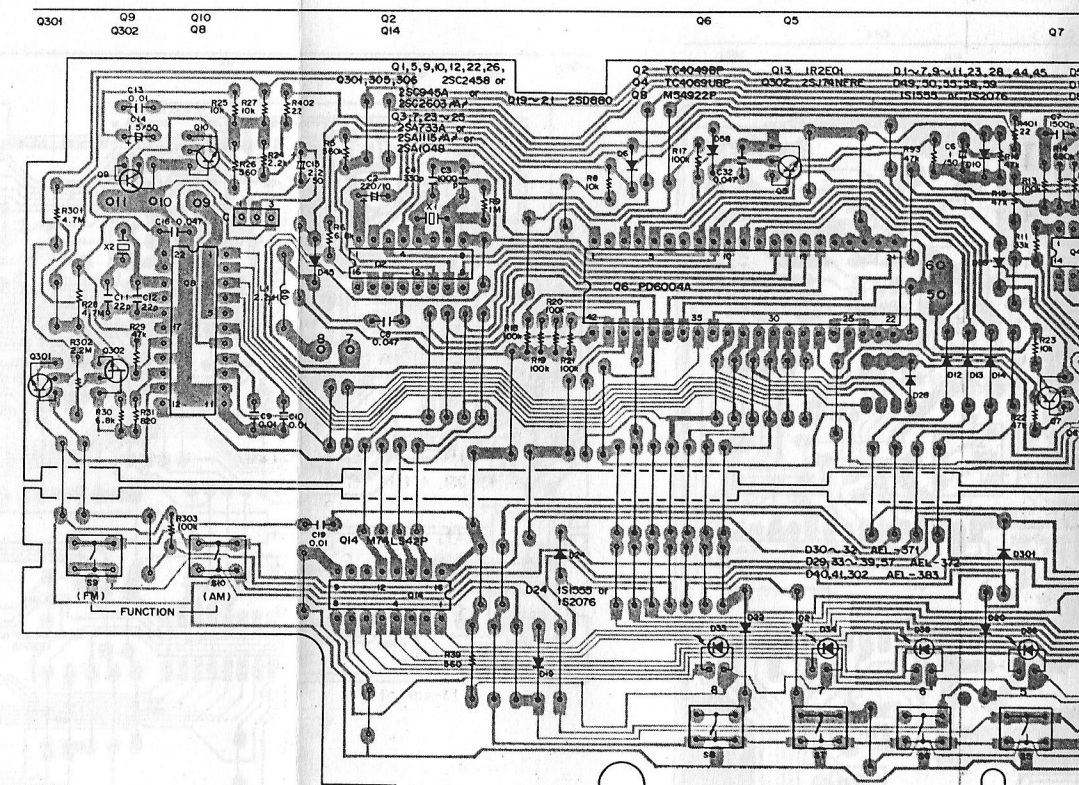
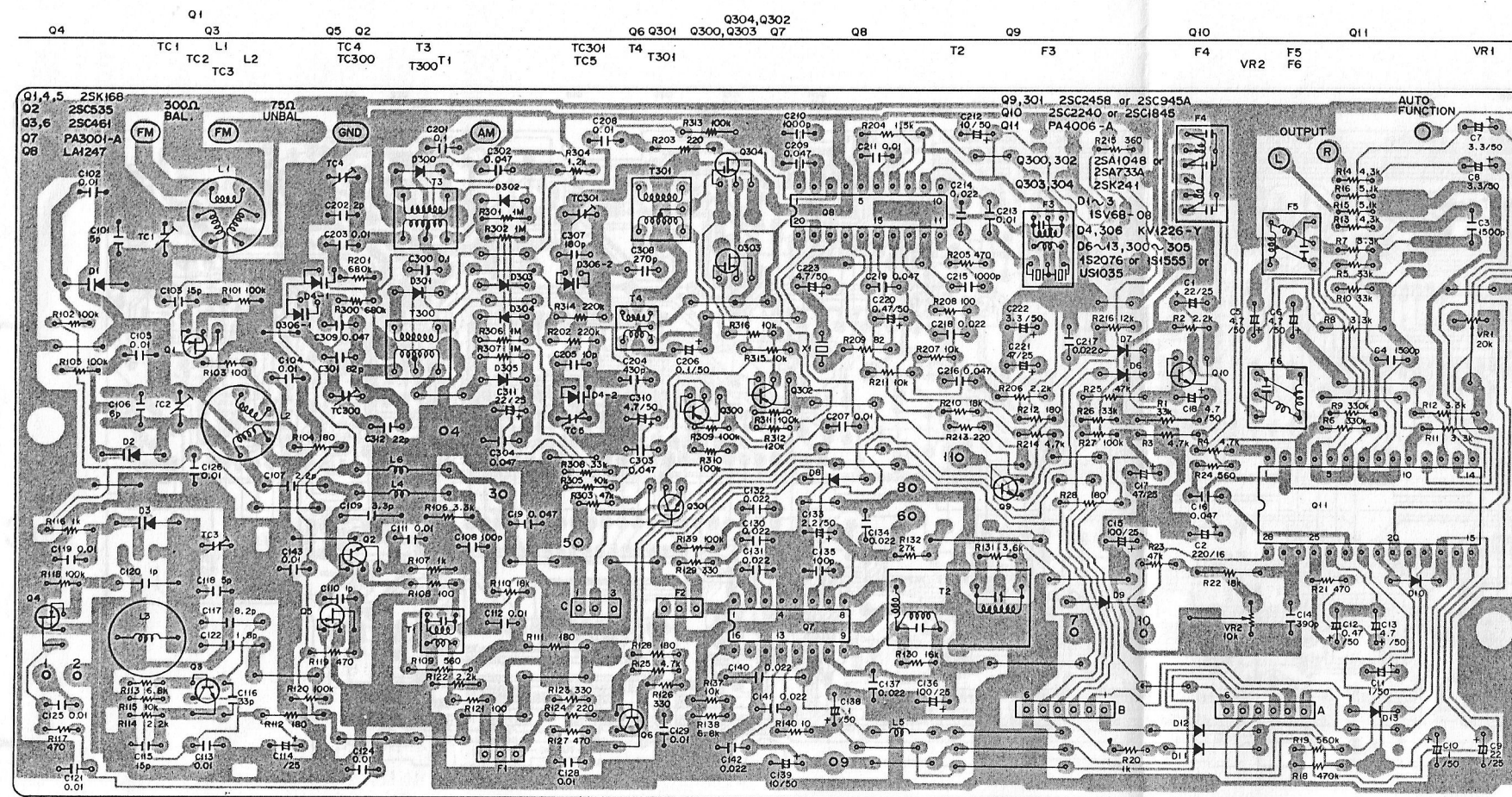
Tuner Assembly (AWM-420)

B

C

D

Control Assembly for HE and HB types



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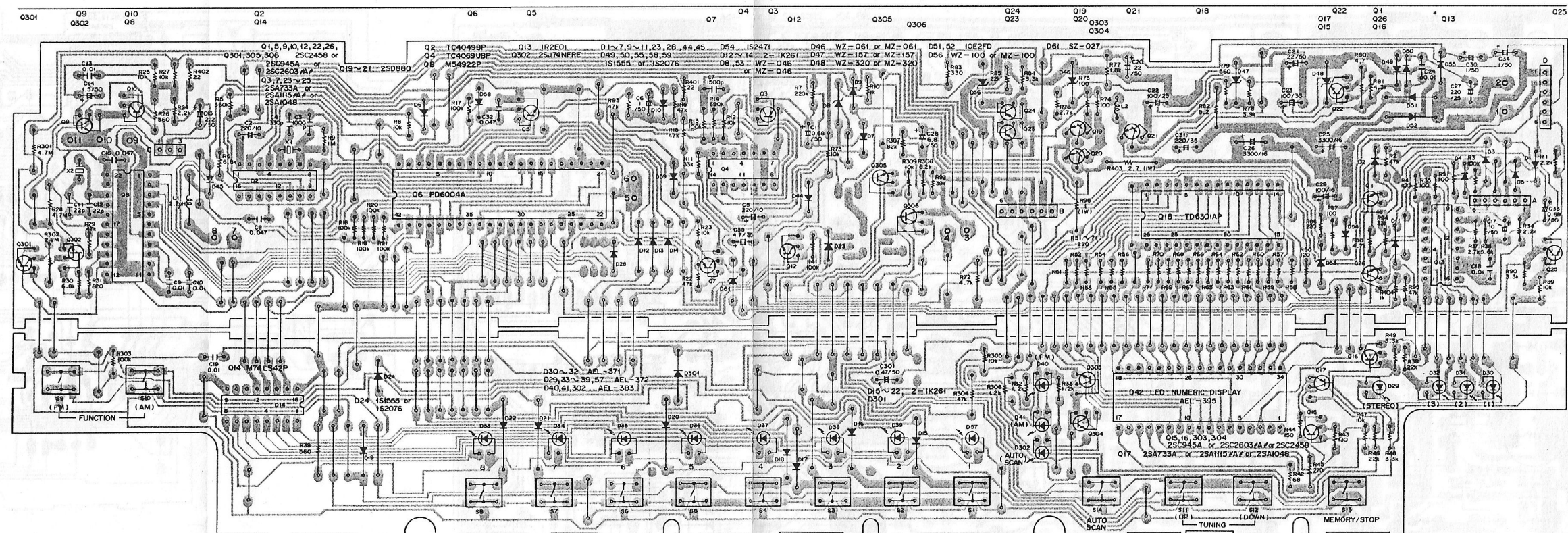
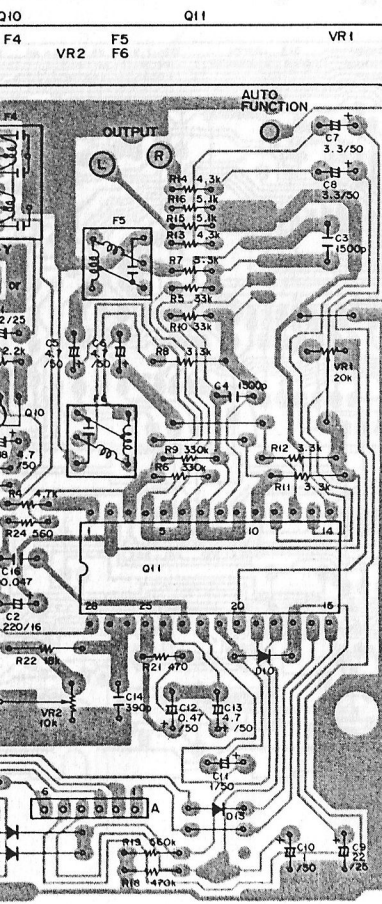
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A

Control Assembly for HE and HB types



B

C

D

4

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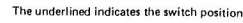
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5. ADJUSTMENT

AM Long Wave Band 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 10k Ω resistor.
 - Set the TX-930L to the AM-LW band (MANUAL tuning mode).
- (*4) Tune the AM SG to the TX-930L.

Step	AM SG (400Hz, 30% modulation)		TX-930L Frequency display	Adjustment Point	Adjustment procedure
	Frequency	Level			
1.	No signal		155kHz	T301	2.2V DC between terminal no. 3 and no.4 (ground).
2.	No signal		281kHz	TC301	20V DC between terminal no. 3 and no. 4 (ground).
3.	Repeat steps 1 and 2 until both specifications are correct.				
4.	164kHz (*4)	40dB	164kHz	T300	Adjust until DC voltage between terminal no. 11 and ground is maximum.
5.	254kHz (*4)	40dB	254kHz	TC300	
6.	Repeat steps 4 and 5 until maximum sensitivity is attained.				

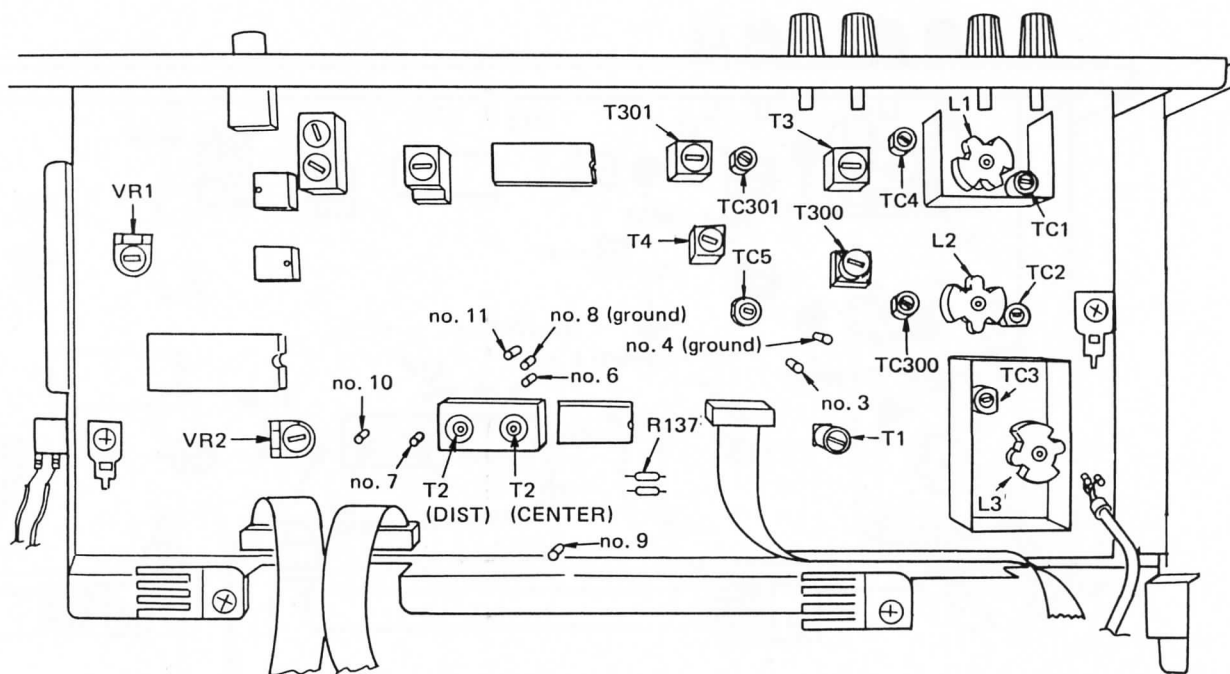


Fig. 5-1 Adjustment points and measuring points of TX-930L

5. RÉGLAGE

Section AM à ondes longues

- 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 10k Ω .
- Régler le TX-930L sur la gamme AM/GO (AM/LW) et sur le mode d'accord manuel (MANUAL).
- (*4) Accorder le AM SG sur le TX-930L.

Etape	FM SG (400Hz, modulation 30%)		Affichage de fréquence du TX-930L	Point de réglage	Procédure de réglage
	Fréquence	Niveau			
1.	Pas de signal		155kHz	T301	2.2V c.c. entre les bornes n° 3 et n° 4 (masse).
2.	Pas de signal		281kHz	TC301	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.	164kHz (*4)	40dB	164kHz	T300	Régler jusqu'à ce que la tension continue entre la borne n° 11 et la masse soit maximum.
5.	254kHz (*4)	40dB	254kHz	TC300	
6.	Répéter les étapes 4 et 5 jusqu'à l'obtention de la sensibilité maximum.				

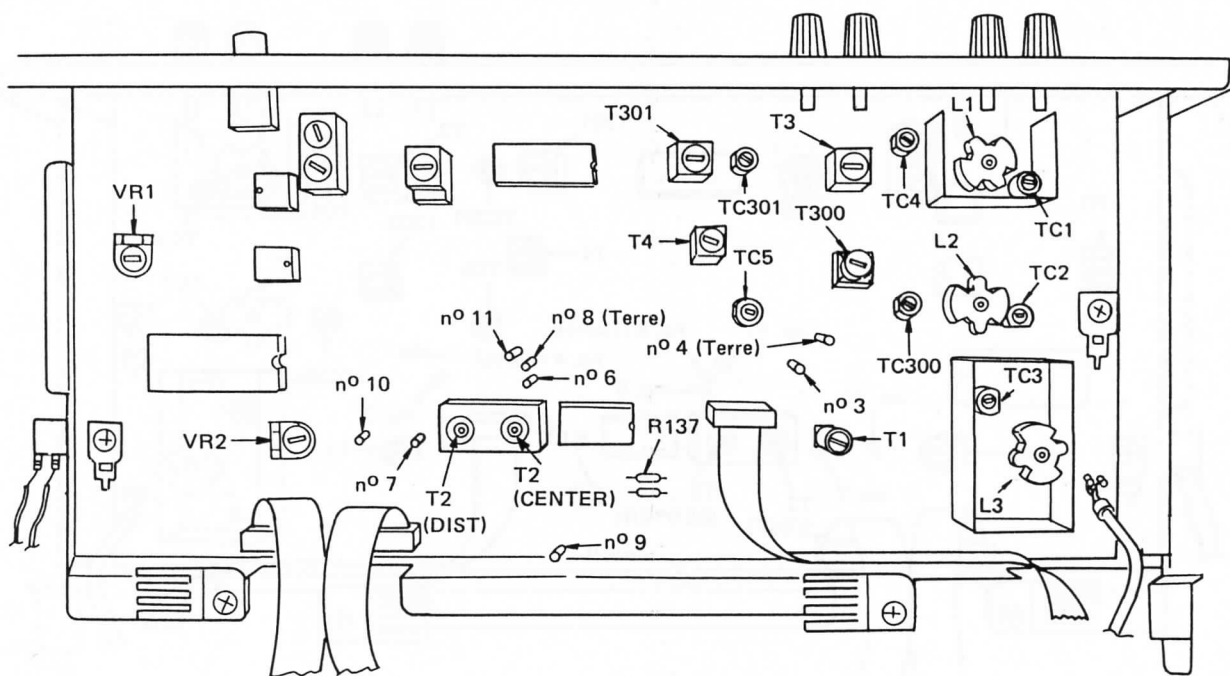


Fig. 5-1 Points de réglage et points de mesurage de TX-930L

5. AJUSTE

Sección de AM de la banda de onda larga

- 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-930L en la banda de AM/LW y en el modo de sintonización MANUAL.
- (*4) Sintonizar el AM SG co el TX-930L.

Paso	FM SG (400Hz, 30% de modulación)		Frecuenci metro del TX-930L	Punto de ajuste	Procedimientos de ajuste
	Frecuencia	Nivel			
1.	Sin señal		155kHz	T301	2.2V CC entre los terminales no. 3 y no. 4 (masa).
2.	Sin señal		281kHz	TC301	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.	164kHz (*4)	40dB	164kHz	T300	Ajustar hasta que la tensión de CC entre el terminal no. 11 y masa sea la máxima.
5.	254kHz (*4)	40dB	254kHz	TC300	
6.	Repetir los pasos 4 y 5 hasta lograrse la máxima sensibilidad.				

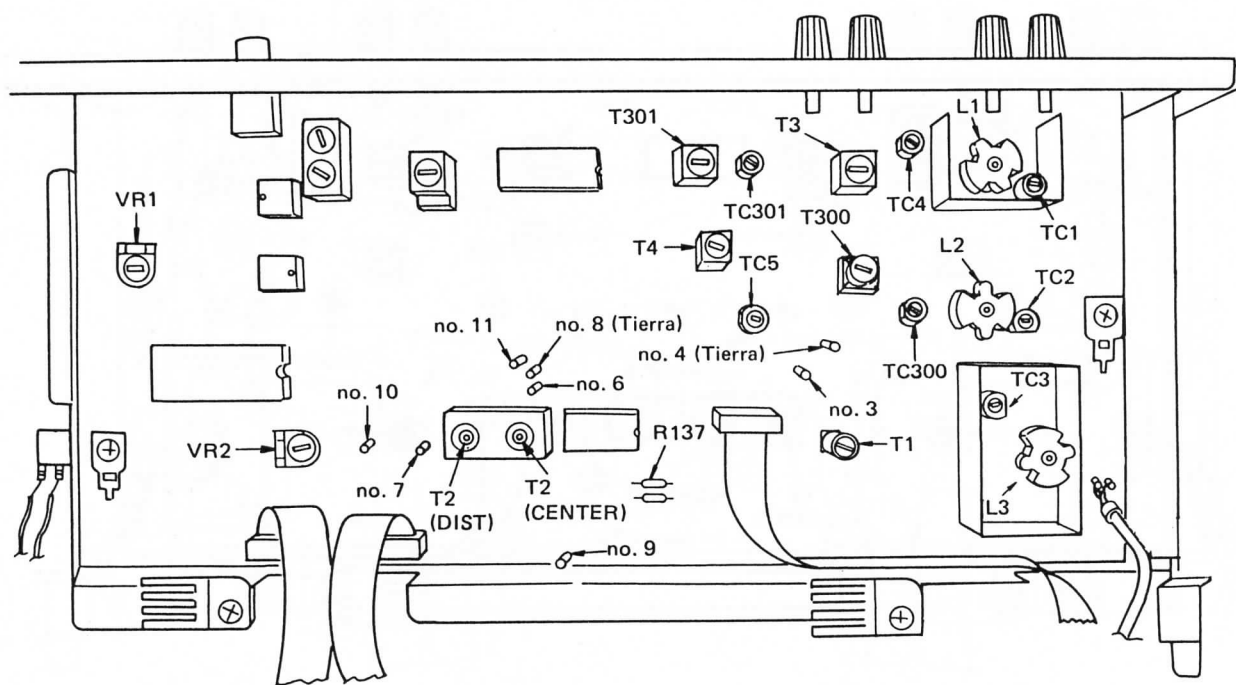


Fig. 5-1 Puntos de ajuste y puntos de medida de TX-930L