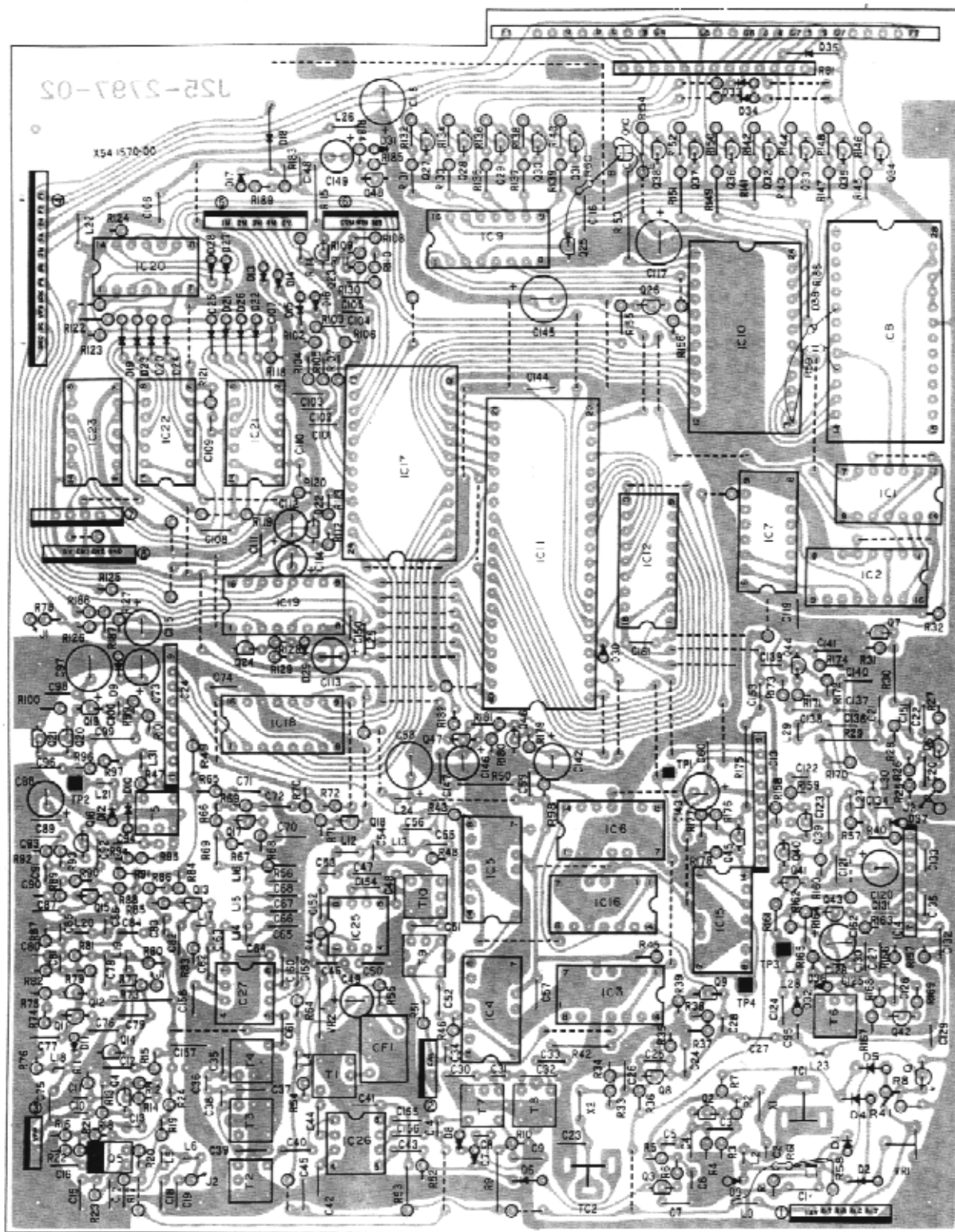


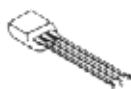
▶ DIGITAL UNIT (X54-1570-00)



Q1~4,6~9,12,13,15~18,23~26,42~46: 25C1815(Y) Q5 3SK73(GR) Q10,22,27~30,47,48 7SA1015(Y) Q11,14: 25C1959(Y)
Q19~21,39~41: 25C1775(E)

IC1,20~23 TC4011BP IC2 TC4027BP IC3~6,15,18 SN74LS90N IC7: TC4518BP IC8 TC5032P IC9: SN74LS247N IC10,17: μPDR243C
IC11 μPDR048C-155 IC12 IC9122P IC13,24 TC5081P IC14: μPC1037H IC18: MC14569B IC19: HD74LS151P IC25~27: SN16913P
D1,2,4,5,13~31,33~35,38 1S1555 D3,10,12,32,36 1SV540C D6~8,11: 1S1587 D9 W2-050 D37: W2-061

2SA1015(Y)
25C1775(E)
25C1815(Y)
25C1959(Y)



3SK73(GR)



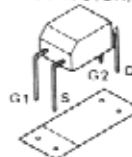
TC5081P



μPC1037H



Attachment direction of Q5 3SK73(GR)



VFO-230

VFO-230 Semiconductor

☆: New Parts

VFO-230 General

Item	Name	Parts No.	Re- marks
Diode	1S1555	V11-0076-05	
	1S1587	V11-0370-05	
	V06B	V11-0219-05	
Vari-cap diode	1SV54GC	V11-4173-46	☆
Thermistor	25D29	V11-3360-16 500Ω at 25°C	
Zener diode	XZ-049	V11-4175-46	
	WZ-050	V11-4102-10	
	WZ-061	V11-0243-05	
	WZ-110	V11-4161-46	☆
LED	WZ-150	V11-0307-05	
	SLP-144	V11-6172-76	
Photo inter-ruptor	TLR-205	V11-3162-96	
	ON 1105	V11-1173-76	☆
Display tube	9-BT-12	V40-7760-86	
TR	2SA496 (Y)	V01-0113-05	
	2SA1015 (Y)	V01-1015-06	
	2SC1775 (E)	V03-1775-06	
	2SC1815 (Y)	V03-1815-06	
	2SC1959 (Y)	V03-1959-06	
FET	2SD880 (Y)	V04-0880-16	
	3SK73 (GR)	V09-1002-46	
IC	HD74LS151P	V30-1008-26	
	LM358P	V30-1024-56	
	MC14569B	V30-1100-06	
	SN16913P	V30-1048-06	
	SN74LS90N	V30-1005-26	
	SN74LS247N	V30-1030-56	
	TA78L012AP	V30-1189-16	
	TC4011BP	V30-0301-70	
	TC4027BP	V30-1050-06	
	TC4518BP	V30-1039-06	
	TC5032P	V30-1091-06	
	TC5081P	V30-1132-06	
	TC9122P	V30-1036-16	
	μPC1037H	V30-1179-16	☆
	μPC14305H	V30-1029-36	
	μPD8048C-155	V30-1176-26	☆
	μPD8243C	V30-1177-16	☆

Ref No.	Parts No.	Description	Re- marks
	A01-0786-03	Case (Upper)	☆
	A01-0787-12	Case (Lower)	☆
	A20-2398-03	Panel (K)(W)	☆
	A20-2396-03	Panel (T)	☆
	B09-0011-04	Cap	
	B10-0632-04	Escutcheon glass	
	B10-0635-14	Front glass (A)	☆
	B10-0636-04	Front glass (B)	☆
	B20-0816-04	Dial scale (B)	
	B46-0058-10	Warranty card (K)	
	B50-2753-00	Operating manual (K)(W)	☆
	B50-2754-00	Operating manual (T)	☆
	E06-0852-05	8P DIN socket	
	E14-0101-05	Pin plug	
	E13-0101-05	Pin jack	
	E30-0181-05	AC cord with plug (K)	
	E30-0585-05	AC cord with plug (W)	
	E30-0602-05	AC cord with plug (T)	
	E30-1632-05	Gnd cable	
	E30-1672-05	VFO cable	☆
	F05-3011-05	Fuse 0.3A (T)(W)	☆
	F05-5011-05	Fuse 0.5A (K)	
	G01-0804-04	Coil spring	
	G09-0410-05	D spring	
	H01-2711-04	Carton case (inside) (K)(W)	☆
	H01-2712-04	Carton case (inside)(T)	☆
	H10-2545-02	Packing fixture (F)	
	H10-2525-02	Packing fixture (R)	
	H20-0276-03	Protective cover	
	H25-0117-04	Accessories bag	
	J02-0049-14	Foot (large)	
	J13-0407-15	Fuse holder	
	J32-0714-04	Hex. boss	
	J32-1030-14	Round boss (foot)	
	J41-0006-05	Cord bush (K)	
	J41-0024-15	Cord bush (T)(W)	
	K21-0753-04	Main knob	
	K23-0738-04	Knob 1	
	K27-0422-04	Push knob (A), Main	☆
	K27-0423-04	Push knob (B), VFO	☆
	K27-0424-04	Push knob (C), Memo	☆
	K29-0716-04	Knob	
	K29-0726-04	Knob, Memo	
	K29-0738-04	Knob 6	
	L01-8044-05	Power trans	☆
L2, 4	L40-1011-04	Ferri-inductor 100μH	
L1, 3, 5	L40-1511-03	Ferri-inductor 150μH	
L5, 6	L40-6891-13	Ferri-inductor 6.8μH	
	N09-0256-05	Gnd screw	
	N14-0115-05	Flange nut (Hex bolt)	
	N14-0404-04	Flange nut (Pow trans)	
	N14-0509-05	Wing nut, GND	
	N14-0519-05	Fastener (Hex bolt)	☆

VFO-230

Ref No	Parts No.	Description	Re marks
	N19-0608-04	Washer (encoder)	
	N99-0306-04	Hex. head screw	
	S31-2027-05	Slide switch (T)(W)	
	X43-1380-00	Power supply unit	☆
	X54-1570-00	Digital unit	☆
	X54-1580-00	Encoder unit	☆

Power supply unit (X43-1380-00)

Ref. No.	Parts No.	Description	Re marks
C2	C90-0829-05	E 4700 μ F 35V	☆
C3	CE04W1C102M	E 1000 μ F 16V	
C4	CE04W1C101Q	E 100 μ F 16V	
C5	CE04W1C220M	E 22 μ F 16V	
C6	CE04W1E100M	E 10 μ F 25V	
C7	CE04W1A470M	E 47 μ F 10V	
C11	CE04W1C101Q	E 100 μ F 16V	
C12	CE04W1C102M	E 1000 μ F 16V	
C14	CE04W1E221M	E 220 μ F 25V	
C15	CE04W1C221M	E 220 μ F 16V	
C16	CE04W1E221M	E 220 μ F 25V	
	E23-0046-04	Square terminal	
R4	RS14AB3A4R7J	Metal film 4.7 Ω 1W	
R12	RS14GB3D270J	Metal film 27 Ω 2W	
R20	RS14AB3A221J	Metal film 220 Ω 1W	
	R92-0150-05	Short jumper	
VR1	RO1-2406-05	Pot. 5k Ω (B)	☆
S1~3	S40-2420-05	Push switch (C) T-F set, RIT, LOCK	☆
S4~6	S42-3403-05	Push switch (B) TX-VFO, MAIN, MEMO	☆
S7~9	S42-3402-05	Push switch (A) RX-VFO, MAIN, MEMO	☆
S10	S01-2425-05	Rotary switch M. CH	☆
S11.12	S50-1403-05	Tact switch MR, MIN	
RL1.2	S51-1404-05	Relay	
BZ1	T95-0051-05	Transducer	

Digital unit (X54-1570-00)

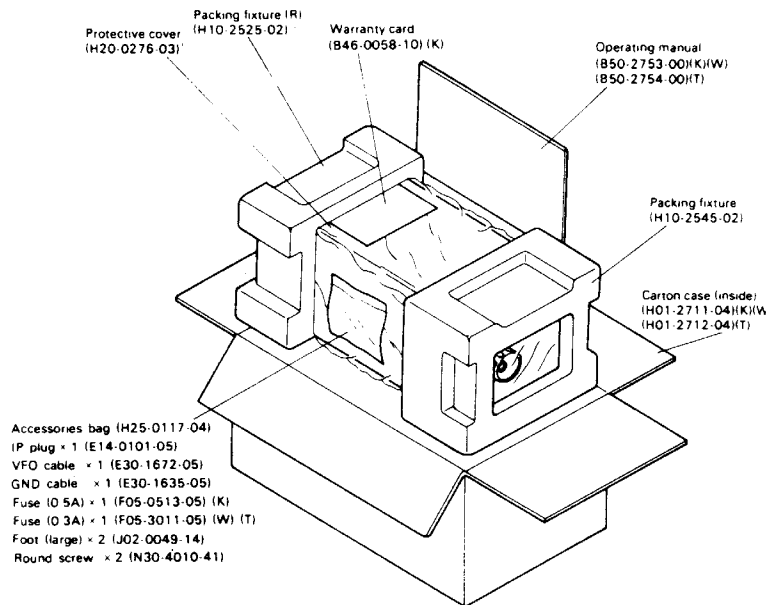
Ref. No.	Parts No.	Description	Re marks
C2	CC45UJ1H330J	C 33pF	
C4	CC45SL1H151J	C 150pF	
C5.6	CC45SL1H100D	C 10pF ± 0.5 pF	
C8	CC45SL1H220J	C 22pF	
C10.11	CC45CH1H050C	C 5pF ± 0.25 pF	
C14	CC45SL1H220J	C 22pF	
C15.16	C91-0456-05	C 0.047 μ F	
C17	CC45SL1H101J	C 100pF	
C18	CC45SL1H221J	C 220pF	
C19	CC45SL1H101J	C 100pF	
C23	CC45SL1H390J	C 39pF	
C24	CC45SL1H470J	C 47pF	
C25	CC45SL1H331J	C 330pF	

Ref No	Parts No.	Description	re marks
C27	CC45CH1H070D	C 7pF ± 0.5 pF	
C28	CC45SL1H150J	C 15pF	
C30	CC45RH1H820J	C 82pF	
C31	CC45RH1H020C	C 2pF ± 0.25 pF	
C32	CC45RH1H820J	C 82pF	
C33	CC45SL1H221J	C 220pF	
C34	CC45CH1H010C	C 1pF ± 0.25 pF	
C35	CC45RH1H101J	C 100pF	
C36	CC45RH1H020C	C 2pF ± 0.25 pF	
C37	CC45RH1H101J	C 100pF	
C38	CC45RH1H020C	C 2pF ± 0.25 pF	
C39	CC45RH1H101J	C 100pF	
C49	CE04W1C470M	E 47 μ F 16V	
C51	CC45RH1H050C	C 5pF ± 0.25 pF	
C52	CC45SL1H101J	C 100pF	
C53	CQ92M1H562K	ML 0.0056 μ F 50V	
C54	CQ92M1H123K	ML 0.012 μ F 50V	
C55	CQ92M1H562K	ML 0.0056 μ F 50V	
C56	CQ92M1H473K	ML 0.047 μ F 50V	
C57	C91-0456-05	C 0.047 μ F	
C58	CE04W1A221M	E 220 μ F 10V	
C59.60	C91-0456-05	C 0.047 μ F	
C65	CC45SL1H151J	C 150pF	
C66.67	CC45SL1H271J	C 270pF	
C68	CC45SL1H151J	C 150pF	
C69	CC45SL1H101J	C 100pF	
C72	CC45SL1H101J	C 100pF	
C73	CE04W1A101M	E 100 μ F 10V	
C74	C91-0456-05	C 0.047 μ F	
C80	CC45SL1H150J	C 15pF	
C81	CC45SL1H100D	C 10pF ± 0.5 pF	
C83	CC45SL1H220J	C 22pF	
C84	CC45CH1H070D	C 7pF ± 0.5 pF	
C85.86	CC45SL1H330J	C 33pF	
C88	CE04W1E100Q	E 10 μ F 25V	
C90	CC45RH1H050C	C 5pF ± 0.25 pF	
C91	CC45RH1H120J	C 12pF	
C93	CC45RH1H470J	C 47pF	
C94	CC45RH1H390J	C 39pF	
C95	CC45SL1H330J	C 33pF	
C97	CE04W1C101Q	E 100 μ F 16V	
C98	C91-0456-05	C 0.047 μ F	
C99	CQ92M1H104K	ML 0.1 μ F 50V	
C100	CQ92M1H102K	ML 1000pF 50V	
C106	C91-0456-05	C 0.047 μ F	
C111	C91-0456-05	C 0.047 μ F	
C112.113	CE04W1A470Q	E 47 μ F 10V	
C114.115	CE04W1H010M	E 1 μ F 50V	
C116	C91-0456-05	C 0.047 μ F	
C117	CE04W1A101M	E 100 μ F 10V	
C118	CE04W1E470Q	E 47 μ F 25V	
C119	C91-0456-05	C 0.047 μ F	
C120	CE04W1C101Q	E 100 μ F 16V	
C121	C91-0456-05	C 0.047 μ F	
C123	CQ92M1H104K	ML 0.1 μ F 50V	
C125	CC45RH1H120J	C 12pF	
C126	CC45RH1H470J	C 47pF	
C127	CC45RH1H680J	C 68pF	
C128	CC45RH1H050C	C 5pF ± 0.25 pF	
C129	CC45SL1H330J	C 33pF	
C134	CC45SL1H470J	C 47pF	
C136	CC45SL1H101J	C 100pF	

Ref. No.	Parts No.	Description	Re- marks
C137	CC45SL1H470J	C 47pF	
C142	CE04W1H2R2M	E 2.2μF 50V	
C143	CE04W1A101M	E 100μF 10V	
C144	C91-0456-05	C 0.047μF	
C145	CE04W1A221M	E 220μF 10V	
C146	CE04W1A470Q	E 47μF 10V	
C147	C91-0456-05	C 0.047μF	
C149	CE04W1H4R7Q	E 4.7μF 50V	
C152	CQ92M1H473K	ML 0.047μF 50V	
C153	CC45SL1H150J	C 15pF	
C161	C91-0456-05	C 0.0047μF	
C162	CE04W1C470M	E 47μF 16V	
	E23-0046-04	Square terminal	
	G13-0635-04	Cushion	☆
TC1	C05-0048-05	Ceramic trimmer 70pF	
TC2	C05-0035-05	Ceramic trimmer 50pF	
L1	L40-1021-03	Ferri-inductor 1mH	
L2	L40-4701-03	Ferri-inductor 47μH	
L3	L40-1511-03	Ferri-inductor 150μH	
L4	L40-4711-03	Ferri-inductor 470μH	
L5. 6	L40-2211-03	Ferri-inductor 220μH	
L7~11	Not Used		
L12-13	L40-3325-04	Ferri-inductor 3.3mH	
L14~16	L40-1011-03	Ferri-inductor 100μH	
L17~19	L40-4711-03	Ferri-inductor 470μH	
L20	L40-1501-03	Ferri-inductor 15μH	
L21	L40-4711-03	Ferri-inductor 470μH	
L22	L40-1511-04	Ferri-inductor 150μH	
L23	L40-1501-03	Ferri-inductor 15μH	
L24. 25	L40-1511-03	Ferri-inductor 150μH	
L26	L40-1511-04	Ferri-inductor 150μH	
L27	L40-1021-03	Ferri-inductor 1mH	
L28	L40-1511-03	Ferri-inductor 150μH	
L29. 30	L40-1001-03	Ferri-inductor 10μH	
L31	L40-1021-03	Ferri-inductor 1mH	
T1	L34-0991-05	Tuning coil 470kHz	☆
T2~4	L34-0996-15	Tuning Coil 4.5 MHz	☆
T5	L32-0636-05	Oscillating Coil	☆
T6	L32-0193-05	Oscillating coil	
T7. 8	L34-0996-15	Tuning coil 4.5MHz	☆
T9. 10	L34-0991-05	Tuning coil 470kHz	☆
CF1	L72-0321-05	Ceramic filter CFW470C	☆
X1	L77-0874-05	Crystal 5MHz	☆
X2	L77-0482-05	Crystal 10MHz	☆
VR1	R12-3045-05	Trim. pot 10kΩ (B)	
VR2	R12-5014-05	Trim. pot 100kΩ (B)	
RB1	R90-0523-05	Rosistor block 47kΩ × 12	
	R92-0150-05	Short jumper	

Ref. No.	Parts No.	Description	re- marks
C1	CE04W1A470Q	E 47μF 10V	
	D09-0303-04	Encoder slit	☆
	D21-0817-05	Shaft ass'y	☆
	G02-0519-04	Plate spring	☆
VR1. 2	R12-1040-05	Trim pot 4.7 kΩ (B)	

PACKING



ADJUSTMENTS

TEST EQUIPMENT REQUIRED

1. VTVM or DVM

- 1) Input resistance: More than 1 MΩ
- 2) Voltage range: 1.5 to 1000V AC/DC

NOTE:

A high-precision voltmeter may be used. However, accurate readings can not be obtained for high-impedance circuits.

2. RF VTVM

- 1) Input impedance: 1 MΩ and less than 3 pF.
- 2) Voltage range: 10 mV to 300V
- 3) Frequency range: 50 MHz or greater

3. OSCILLOSCOPE

Requires high sensitivity and external synchronization capability.

4. STANDARD SIGNAL GENERATOR (SSG)

- 1) Frequency range: 1.8 to 30 MHz
- 2) Output: -20dB/0 1 μV~120 dB/1V
- 3) Output Z= 50Ω
Generator must be frequency stable

5. FREQUENCY COUNTER

- 1) Minimum input voltage: 50 mV
- 2) Frequency range: Greater than 50 MHz

VFO-230

ADJUSTMENTS

Item	Condition	Measurement			Adjustment			Specification	Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method		
Setting	VFO-230: Front panel • MEMORY CH : 1 • FUNCTION RECEIVE : VFO TRANSMIT : VFO • RIT : Centered • RIT SW : OFF • LOCK SW : OFF • T,F SET : OFF TS-830S • BAND : 14 • MODE : CW • POWER : ON • SG SW rear panel : OFF • CAL SW : OFF								

Use an insulated tuning tool for adjusting trimmer capacitors, coil slugs, etc.

Item	Condition	Measurement			Adjustment			Specification	Remarks	
		Test equipment	Unit	Terminal	Unit	Parts	Method			
1. Reference oscillator adjustment		F.counter	Digital	TP1	Digital	TC2		5.000MHz±5 Hz		
	[Calibration using the TS-830S] Interconnect the TS-830S ANT terminal and the VFO-230 CAL terminal. Set the FUNCTION (REC) switch on the VFO-230 to MAIN. With the TS-830, receive a beat frequency at around 14.000, then set the CAL switch to ON (a double beat will be obtained).							Obtain a zero beat between the double beats.		
	VFO-230: Set the FUNCTION (REC) switch to VFO. Turn the dial to check the following frequencies: L900.0, 0.0, 100.0, 200.0, 300.0, 400.0, 500.0							Check the frequency departure from the display on the TS-830.	Within ±100 Hz.	Check
2. PLL-1 adjustment	Turn the control until 19.9 is obtained on the display.	F.counter	Digital	TP4				798 kHz	Check	
		DVM		TP3	Digital	T6	Set to 9.5V			
	Turn the control to scan the displayed frequency from 0.0 to 19.9.		Digital					2~9.5V±0.5V	Check	
3. PLL-2 adjustment	Set the dial to display a frequency of 10.0.	RF VTVM	Digital	IC26 ②	Digital	T9 T10	Maximum (There should be a peak.)			
				IC26 ①		T1 T7 T8	Maximum (Broad at T1)			
				Q17 ③		T2 T3 T4	Maximum			
	Set the dial to a frequency display of 599.9.	DVM	Digital	TP2		T5	Set to 9.5V	2.0~9.5V±0.5V	Check	
	Turn the dial to scan displayed frequency from L900.0 to 599.9.	F.counter	Rear panel	DIN connector ①				5.4~6.1 MHz		
		RF VTVM	Digital	Q17 ③	Digital	T4	Reset to maximum			