

**TEST EQUIPMENT REQUIRED****1. VTVM or DVM**

- 1) Input resistance: More than 1 M $\Omega$
- 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 M $\Omega$  and less than 3 pF
- 2) Voltage range: 10 mV to 300V
- 3) Frequency range: 50 MHz or greater

**3. AF VTVM**

- 1) Frequency range: 50 Hz to 10 kHz
- 2) Input impedance: 1 M $\Omega$  or greater
- 3) Voltage range: 10 mV to 30V

**4. AF GENERATOR (AG)**

- 1) Frequency range: 200 Hz to 5 kHz
- 2) Output: 2 mV~ 1V, low distortion

**5. AF DUMMY LOAD**

- 1) Impedance: 8 $\Omega$
- 2) Dissipation: 3W or greater

**6. RF DUMMY LOAD (POWER METER)**

- 1) Impedance: 50 $\Omega$
- 2) Dissipation: 100W continuous or greater
- 3) Frequency limits: 1.8 to 30 MHz

**7. OSCILLOSCOPE**

Requires high sensitivity and external synchronization capability.

**8. SWEEP GENERATOR**

- 1) Center frequency: 8 to 40 MHz
- 2) Sweep bandwidth: Maximum  $\pm 16$  MHz
- 3) Output voltage: More than 0.1V

**9. STANDARD SIGNAL GENERATOR (SSG)**

- 1) Frequency range: 1.8 to 30 MHz
- 2) Output: -20 dB/0.1  $\mu$ V~120 dB/1V
- 3) Output Z= 50 $\Omega$

Generator must be frequency stable.

**10. FREQUENCY COUNTER**

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

**11. NOISE GENERATOR**

Must generate ignition-like noise containing harmonics beyond 30 MHz.

**12. Spectrum analyzer**

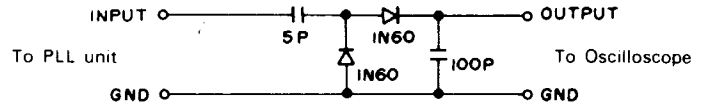
- 1) Frequency range: 100 kHz to 110 MHz
- 2) Bandwidth: 1 kHz to 3 MHz

**NOTE:**

R-1000 receiver may be used.

**13. Detector**

For adjustment of PLL unit BPF.

**14. Directional coupler****15. 8P DIN connector**

Refer to Fig. 11 on page 41.

**16. FIX-CH Adjusting crystal element**

- 1) 5.750 MHz (center 250 kHz)

**PREPARATION**

Unless otherwise specified, set the controls as follows.

**Rear panel**

SG SW OFF

**Front panel**

MODE	TUNE	TONE	MAX
CAR	MIN	RF GAIN	MAX
VOX	OFF	PROC	OFF
METER	IP	BAND	1.5
RIT/XIT	CENTERED	DH	OFF
HEATER	OFF	MONI	OFF
FIX	OFF	RIT	OFF
RF ATT	OFF	NOTCH	OFF
XIT	OFF	VBT	MAX
IF SHIFT	CENTERED	AF GAIN	MIN

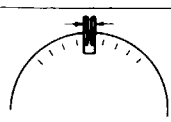
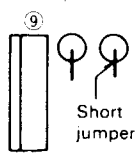
# ADJUSTMENTS

TS-830S, M

Item	Condition	Measurement			Adjustment			Specification	Remarks
		Test equipment	Unit	Terminal	Unit	Parts	Method		
1. 9V AVR and 3.6V adjustment		DVM	AF	TP-6 Pin 5. connector ③	AF	VR4 VR3	9V 3.6V	9V±0.05V 3.6V±0.05V	RF1
2. Base current adjustment	SG SW ON MODE USB METER IP HEATER ON FIX ON DRIVE Fully clockwise BIAS VR Rotate	IP meter							
	STBY REC. SG SW OFF							*After checking the above.	Set to 60 mA
3. Carrier adjustment ①  NOTE: When making any one of the adjustments in items 3., 4., 5., or 6., observe the listed order of adjustment.	IF SHIFT Centered VBT Fully clockwise MODE USB	RF VTVM	IF	TP3	PLL	NOTE: T16	0.3V	0.3V±1dB	NOTE: The slug of T16 should be turned counterclockwise for this adjustment after the peak point is determined.
	MODE LSB STBY REC ↑ SEND	f. counter					VR2	Obtain the same frequency for both transmission and reception.	±20Hz
	STBY REC						TC2	8828.50kHz	
	MODE USB						TC3	8831.50kHz	
	MODE CW STBY SEND						VR3	8830.70kHz	
	STBY REC								
4. IF SHIFT check	MODE LSB VBT Fully clockwise Rotate the IF SHIFT and check the variation	f. counter	IF	TP3				Set IF SHIFT to center. More than + 1.1 kHz Less than - 1.1 kHz	
	MODE USB: Same as above								
	STBY SEND Regardless of the IF SHIFT setting							8831.50 kHz	USB
	STBY REC							8828.50 kHz	LSB
	IF SHIFT Centered VBT Fully counterclockwise							Reference the above frequency Less than - 1.1 kHz	USB, LSB
5. VBT adjustment and check	VBT Fully clockwise	RF VTVM	IF	TP1	IF	NOTE: L16	1.0V	1.0V±1dB	NOTE: The slug of L16 should be turned counterclockwise for this adjustment after the peak point is determined.
		F.counter					TC2	8375.00kHz	
	VBT Fully counterclockwise							Reference the above frequency Less than - 2.4 kHz	
	STBY SEND Regardless of VBT setting							Reference the above frequency Less than ±70 Hz	
STBY REC									

# ADJUSTMENTS

Item	Condition		Measurement			Adjustment			Specification	Remarks	
			Test equipment	Unit	Terminal	Unit	Parts	Method			
6. Carrier adjustment <sup>2</sup>	IF SHIFT VBT MODE	Centered Fully clockwise USB	RF VTVM	IF		IF	L19 L20	Max. level			
							NOTE: L20			NOTE: The slug of L20 should be adjusted while it is turned counter-clockwise	
	MODE	LSB							0.3V ± 1 dB	If the voltage is outside the specified limit, adjust L19 and L20 until the voltage is 0.3V for both USB and LSB.	
	MODE	USB	F counter						456.5 kHz	Reference value	
	MODE	LSB							453.5 kHz		
	MODE	CW							455.7 kHz		
STBY	SEND										
STBY	REC										
7. VFO. RIT. FIX CH check and adjustment	Scale: 0 ~ 500									Should rotate smoothly and have no abnormal noise.	
	Rear panel VFO	SG SW OFF 250	RF VTVM	PLL	Pin 2, connector ⑤ 1P (GND)	When the voltage is outside specification				200mV ± 1 dB	
						VFO	TC2	200 mV			
	MODE STBY	CW SEND	F.counter	Rear panel	EXT VFO 1P 7P (GND)	VFO	L4 When the frequency is outside specification.	800 Hz UP	800 ± 50 Hz	CW SHIFT	
	Set the VFO dial to 50. At this time set the CAL control to the index.		F.counter	Rear panel	EXT VFO	VFO	L3		5550.00 kHz ± 200 Hz	Repeat the adjustment several times until the frequency is within specification.	
	Set the VFO dial to approx. 450. Set the CAL control dial calibrated under this VFO setting exactly to the index.				1P 7P (GND)		TC1		5950.00 kHz ± 200 Hz		
	Tune in 5550.00 kHz with the main tuning knob.										The 50 kHz point on the dial scale must be aligned to the index.
	Under the above condition, set the CAL control to the index. Turn the main tuning, and set the calibrated CAL control to the index in the order of 0, 100, 200, 300, 400, and 500 to check frequency deviation at each 100 kHz point.						0 100 200 300 400 500	5.5 MHz 5.6 5.7 5.8 5.9 6.0		Within ± 2 kHz	Check the scale (Electrically)
Set the CAL control back to 250 under the above condition (do not turn excessively), then further set back the CAL control to 0 with respect to the frequency at 250 to check the difference from the reference frequency.									Less than 400Hz	Backlash	



# ADJUSTMENTS

Item	Condition	Measurement			Adjustment			Specification	Remarks									
		Test equipment	Unit	Terminal	Unit	Parts	Method											
	Set point 0 on the dial scale and the CAL control to the index. When the CAL control calibrated at each 100 kHz is set at the index, check the deviation of the dial scale at each point.							Should come in contact with the pointer.	Check the scale (mechanically)									
	RIT: Centered RIT switch: ON Set the VFO main control to 5750.000 kHz				AF	VR2	5750.000 kHz											
	Check that the same frequency is obtained when the RIT switch is turned ON and OFF.							Less than 50 Hz										
	RIT switch: ON  VFO: 250 RIT control: fully counter-clockwise (⊖ position) RIT control: fully clockwise (⊕ position)							- 1.5 kHz or less + 1.5 kHz or more Reference to the center (φ) position of the RIT control.										
	RIT OFF																	
	Install the 5750 kHz quartz crystal into the socket on the PLL unit.				PLL	TC4	Centered	Normal oscillation must be obtained.										
							TC 4 Variable	Variable range ±250 Hz										
FIX ON	RF VTVM					Centered	Output level 0.2V ± 2 dB											
	Remove the quartz crystal from its socket. FIX OFF																	
8. Counter reference oscillator adjustment		F counter	PLL	TP2	PLL	TC1	1000.000 kHz											
9. VCO adjustment and check	Check the frequencies at the following points and adjust coils until those given in brackets are obtained.	F.counter DVM	RF(PLL) PLL	TP3(D40) TP1	Adjusting point													
					VFO	0	250	500	Unit	Part								
					BAND													
					1 5	10.33 MHz	10.58 MHz (4.0V)	10.83 MHz	PLL	T2								
					3 5	12.33	12.58	12.83		T1								
					7	15.83	16.08 (4.75)	16.33			T3							
					10	18.83	19.08	19.33				T4						
					14	22.83	23.08 (4.5)	23.33					T6					
					18	26.83	27.08 (5.0)	27.33						T5				
					21	29.83	30.08 (3.5)	30.33							T5			
					24 5	33.33	33.58	33.83								T5		
					28	36.83	37.08	37.33									T5	
28 5	37.33	37.58	37.83 (4.75)	T5														
29	37.83	38.08	38.33		T5													
29 5	38.33	38.58	38.83			T5												
Check the level at each of the above points.	RF VTVM	RF	TP3															1V <sup>-3</sup> / <sub>-2</sub> dB
Both edges of the VFO frequency in each band										Display should indicate								
10. BPF-A	Disconnect connectors 1 and 3 on the PLL unit. Connect the cathode of D24 (1S1555) to the jumper wire next to R44 with a clip lead. Connect the sweep generator RF output to the EXT-VFO connector.	Sweep generator, Oscilloscope	PLL				Q35 Ⓢ	PLL	T13 T14 T15	Adjust until the response shown to the right is obtained.								