SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

When you adjust the contents on pages 5-4 and 5-5, SOFTWARE ADJUSTMENT, the optional CS-F500 ADJ ADJUSTMENT SOFTWARE (Rev. 1.0 or later), *OPC-1122 JIG CABLE (modified OPC-1122 CLONING CABLE; see illustration below) are required.

■ SYSTEM REQUIREMENTS

- IBM PC compatible computer with an RS -232C serial port (38400 bps or faster)
- Microsoft Windows 95/98 or Windows ME
- Intel Pentium 100 MHz processor or faster
- At least 16 MB RAM and 10 MB of hard disk space
- 640×480 pixel display (800×600 pixel display recommended)

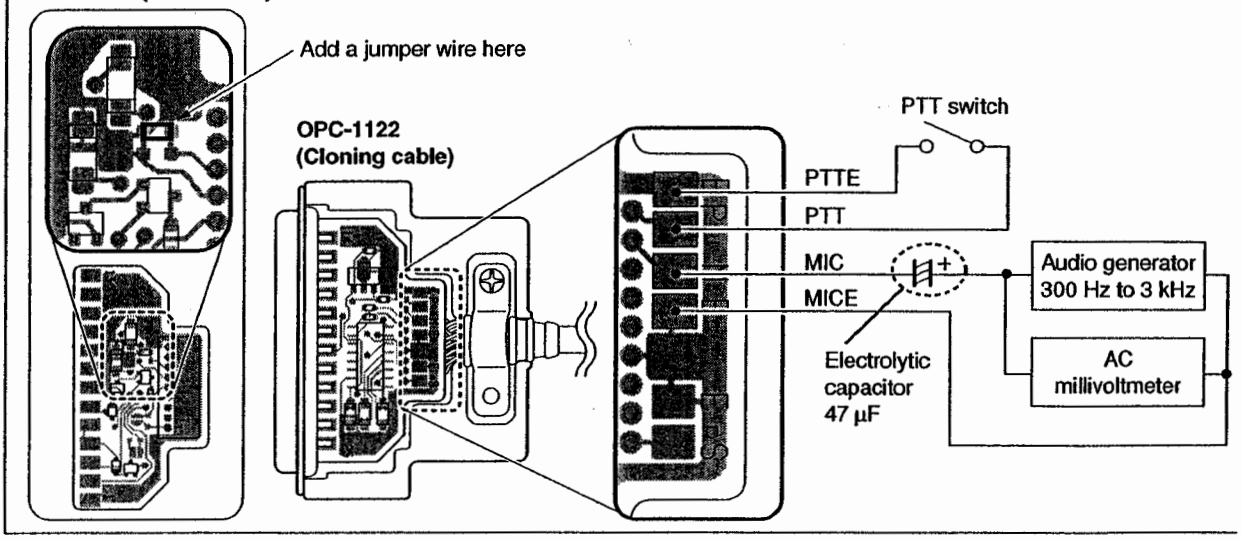
■ ADJUSTMENT SOFTWARE INSTALLATION

① Boot up Windows.
 - Quit all applications when Windows is running.
② Insert the 'CS-F500' into the appropriate CD-ROM drive.
③ Select 'Run' from the [Start] menu.
④ Type the setup program name using the full path name, then push [Enter] key.
 (ex. D:\CSF500ADJ\disk1\Setup.exe)
⑤ Follow the prompts.
⑥ Program group 'CS-F500 ADJ' appears in the 'Programs' folder of the [Start] menu.

■ STARTING SOFTWARE ADJUSTMENT

① Connect IC-F510, F520 or F521 and PC with *OPC-1122 JIG CABLE.
② Turn the transceiver power ON.
③ Boot up Windows, and click the program group 'CS-F500 ADJ' in the 'Programs' folder of the [Start] menu, then CS-F500 ADJ's window appears.
④ Click 'Connect' on the CS-F500's window, then appears IC-F510, F520 or F521's up-to-date condition.
⑤ Set or modify adjustment data as desired.

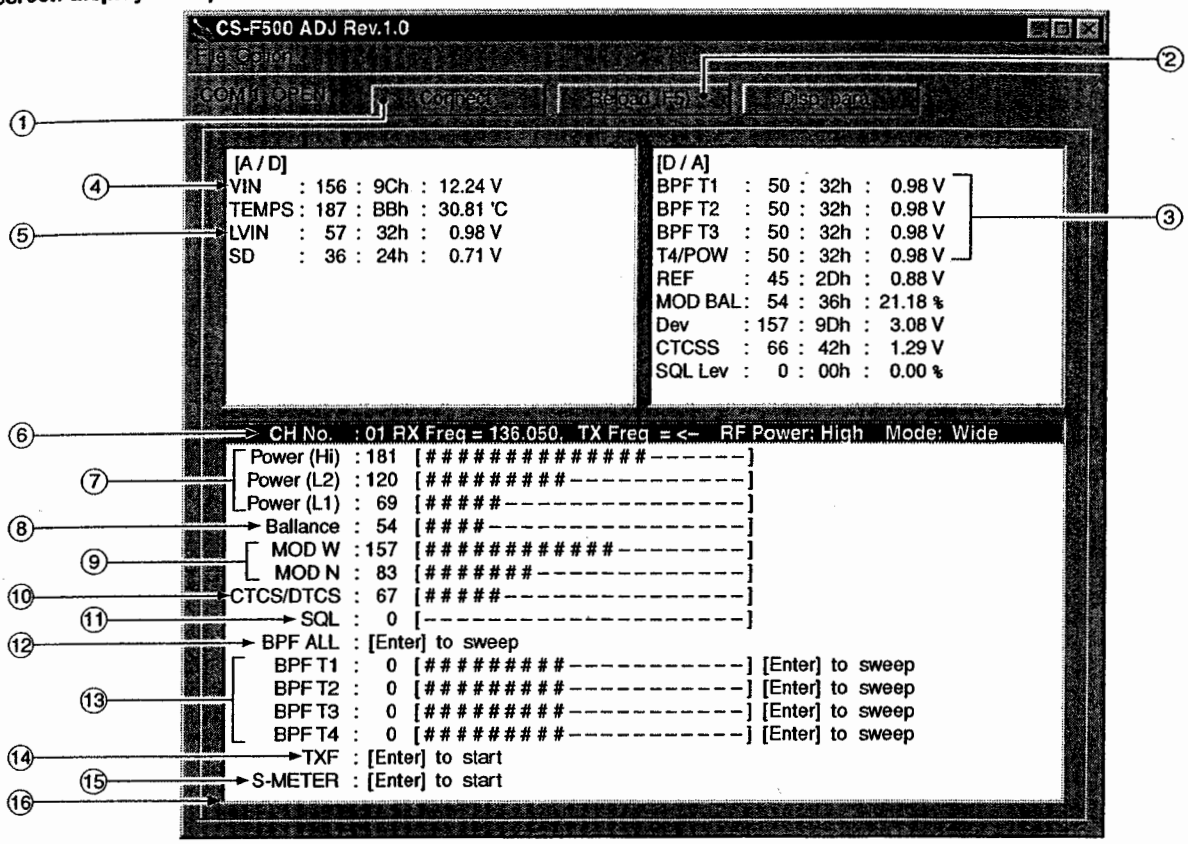
• *OPC-1122 (JIG CABLE)



■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 13.2 (13.6) V DC Current capacity : 20 A or more	Audio generator	Frequency range : 300–3000 Hz Measuring range : 1–500 mV
RF power meter (terminated type)	Measuring range : 1–75 W Frequency range : 100–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Standard signal generator (SSG)	Frequency range : 0.1–300 MHz Output level : 0.1 µV–32 mV (–127 to –17 dBm)
Frequency counter	Frequency range : 0.1–300 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
FM deviation meter	Frequency range : DC–300 MHz Measuring range : 0 to ±10 kHz	AC millivoltmeter	Measuring range : 10 mV–10 V
DC voltmeter	Input impedance : 50 kΩ/V DC or better	External speaker	Input impedance : 4 Ω Capacity : 7 W or more
		Attenuator	Power attenuation : 50 or 60 dB Capacity : 100 W or more

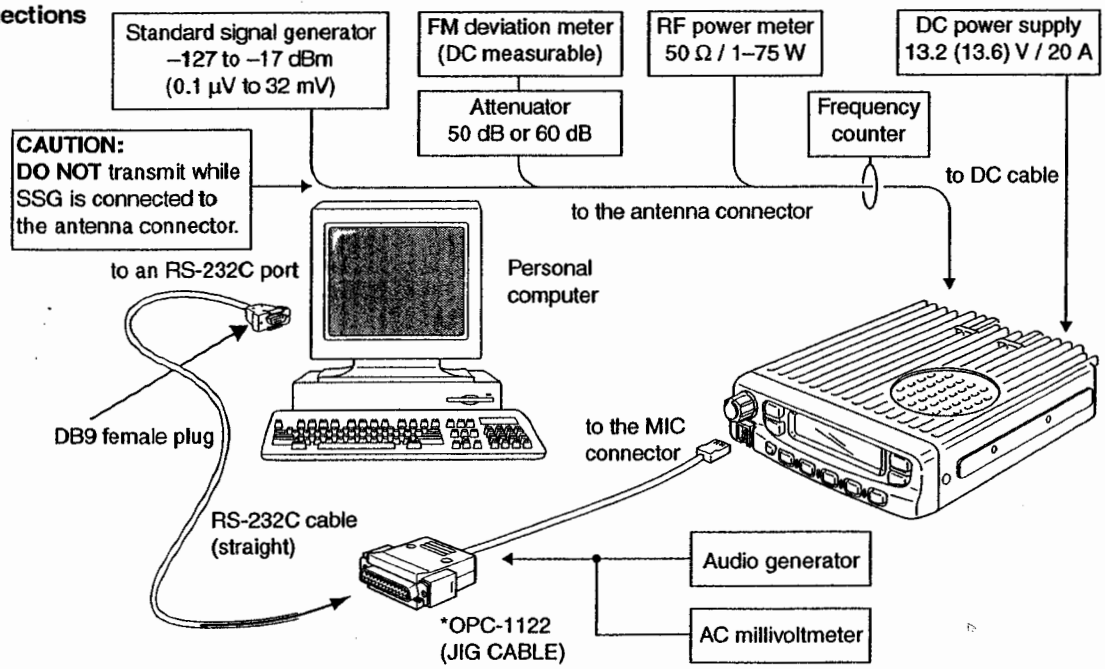
• **Screen display exampe**



NOTE: The above values for settings are example only.
Each transceiver has its own specific values for each setting.

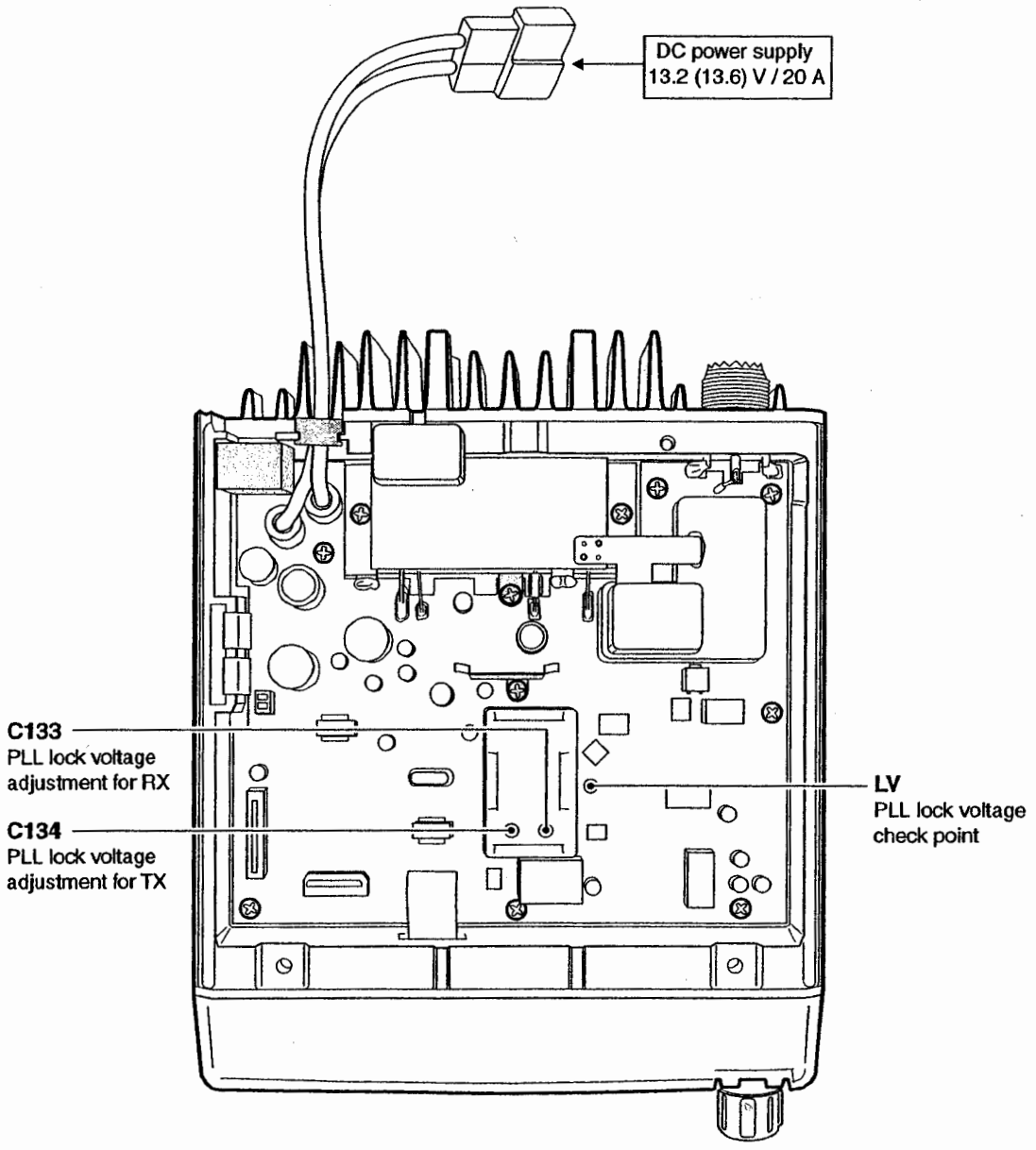
① : Transceiver's connection state
② : Reload adjustment data
③ : Receive sensitivity measurement
④ : Connected DC voltage
⑤ : PLL lock voltage
⑥ : Operating channel select
⑦ : RF output power
⑧ : Modulation balance
⑨ : FM deviation
⑩ : CTCSS/DTCS deviation
⑪ : Squelch level
⑫ : Receive sensitivity (automatically)
⑬ : Receive sensitivity (manually)
⑭ : Reference frequency
⑮ : S-meter
⑯ : Adjustment items

• **Connections**



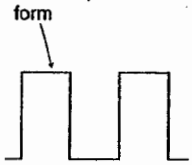
5-2 PLL ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMEN	
			UNIT	LOCATION		UNIT	ADJUS
PLL LOCK VOLTAGE	1	• Operating freq. : 136.000 MHz • Receiving	MAIN	Connect a digital multimeter or an oscilloscope to the check point, "LV".	1.4 V	MAIN	C133
	2	• Output power : Low1 • Transmitting			1.0 V		C134
	3	• Operating freq. : 174.000 MHz • Receiving			3.5–4.5 V		Verify
	4	• Output power : Low1 • Transmitting			3.0–4.0 V		



5-3 SOFTWARE ADJUSTMENT

Select an operation using [↑] / [↓] keys, then set specified value using [←] / [→] keys on the connected computer keyboard.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE
			UNIT	LOCATION	
REFERENCE FREQUENCY [TXF]	1	• Operating freq. : 174.000 MHz • Output power : Low1 • Connect the RF power meter or 50 Ω dummy load to the antenna connector. • Transmitting	Rear panel	Loosely couple a frequnecy counter to the antenna connector.	174.0000 MHz
OUTPUT POWER [Power (Hi)]	1	• Operating freq. : 155.000 MHz • Output power : High • Transmitting	Rear panel	Connect an RF power meter to the antenna connector.	25.0 W [25W] 50.0 W [50W]
[Power (L2)]	2	• Output power : Low2 • Transmitting			10.0 W [25W] 25.0 W [50W]
[Power (L1)]	3	• Output power : Low1 • Transmitting			2.5 W [25W] 5.0 W [50W]
MODULATION BALLANCE [Ballance]	1	• Operating freq. : 155.000 MHz • Output power : Low1 • Push [P0] key while transmitting	Rear panel	Connect an FM deviation meter with an oscilloscope to the antenna connector through an attenuator.	Set to square wave form 
FM DEVIATION [MOD W]	1	• Operating freq. : 155.000 MHz • Output power : Low1 • IF bandwidth : Wide • Connect an audio generator to the [MIC] jack through the JIG cable and set as: 1.0 kHz/40 mVrms • Set an FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • Transmitting	Rear panel	Connect an FM deviation meter to the antenna connector through the attenuator.	±4.1 kHz [N/W] ±3.3 kHz [N/M]
[MOD N]	2	• IF bandwidth : Narrow • Transmitting			±2.1 kHz
CTCSS/DTCS DEVIATON [CTCS/DTCS]		• Operating freq. : 155.000 MHz • Output power : Low1 • IF bandwidth : Wide • CTCSS : 88.5 Hz • DTCS code : 007 • Set the FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • No audio applied to the [MIC] connector. • Transmitting	Rear panel	Connect an FM deviation meter to the antenna connector through the attenuator.	±0.7 kHz

SOFTWARE ADJUSTMENT – continued

Select an operation using [↑] / [↓] keys, then set specified value using [←] / [→] keys on the connected computer keyboard.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE
			UNIT	LOCATION	
RX SENSITIVITY [BPF T1] – [BPF T4]	1	• Operating freq. : 136.000 MHz • IF bandwidth : Wide • Connect a standard signal generator to the antenna connector and set as: Frequency : 136.000 MHz Level : 10 µV* (–87 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz [N/W] ±2.8 kHz [N/M] • Receiving	MAIN	Connect a SINAD meter with a 4 Ω load to the external [SP] jack.	Minimum distortion level
		CONVENIENT: The BPF T1–BPF T4 can be adjusted automatically. ①-1: Set the cursol to "BPF ALL" on the adjustment program and then push [ENTER] key. ①-2: The connected PC tunes BPF T1–BPF T4 to peak levels. or ②-1: Set the cursol to one of BPF T1, T2, T3, or T4 as desired. ②-2: Push [ENTER] key to start tuning. ②-3: Repeat ②-1 and ②-2 to perform additional BPF tuning.			
S-METER [S-METER]	1	• Operating freq. : 136.000 MHz • IF bandwidth : Wide • Connect an SSG to the antenna connector and set as: Frequency : 136.000 MHz Level : 14 µV* (–84 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz [N/W] ±2.8 kHz [N/M] • Receiving			Push [ENTER] key on the connected computer keyboard to set "S3 level".
	2	• Set an SSG as : Level : 0.45 µV* (–114 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz [N/W] ±2.8 kHz [N/M] • Receiving			Push [ENTER] key on the connected computer keyboard to set "S1 level".
SQUELCH LEVEL [SQL]	1	• Operating freq. : 155.000 MHz • IF bandwidth : Narrow • Connect an SSG to the antenna connector and set as: Frequency : 155.000 MHz Level : 0.2 µV* (–121 dBm) Modulation : 1 kHz Deviation : ±1.75 kHz • Receiving	Rear panel	Connect a SINAD meter with a 4 Ω load to the external [SP] jack.	Set "SQL level" to close squelch. Then set "SQL level" at the point where the audio signals just appears.

*The output level of the standard signal generator (SSG) is indicated as the SSG's open circuit.