IC-F50 ADJUSTMENT PROCEDURES

1 PREPARATION

When adjusting IC-F50, the optional CS-F50 ADJ ADJUSTMENT SOFTWARE (Rev. 1.0 or later), *OPC-966 JIG CABLE (modified OPC-966 CLONING CABLE) are required.

■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE		EQUIPMENT	GRADE AND RANGE	
DC power supply	Output voltage	: 7.5 V DC	Audio generator	Frequency range	: 300–3000 Hz
	Current capacity	: 5 A or more		Output level	: 1–500 mV
FM deviation meter	Frequency range	: DC–300 MHz	Attenuator	Power attenuation	: 40 or 50 dB
	Measuring range	: 0 to ±10 kHz		Capacity	: 10 W or more
Frequency counter	Frequency range	: 0.1–300 MHz	Standard signal generator (SSG)	Frequency range	: 100–300 MHz
	Frequency accuracy	: ±1 ppm or better		Output level	: 0.1 µV–32 mV
	Sensitivity	: 100 mV or better			(–127 to –17 dBm)
Digital multimeter	Input impedance	: 10 MΩ/V DC or better	DC voltmeter	Input impedance	: 50 kΩ/V DC or better
RF power meter (terminated type)	Measuring range	: 1–10 W	Oscilloscope	Frequency range	: DC–20 MHz
	Frequency range	: 100–300 MHz		Measuring range	: 0.01–20 V
	Impedance	: 50 Ω	AC millivoltmeter	Measuring range	: 10 mV–10 V
	SWR	: Less than 1.2 : 1			

■ SYSTEM REQUIREMENTS
- IBM® PC compatible computer with an RS-232C serial port (38400 bps or faster).
- Microsoft® Windows® 95 or Windows 98
- Intel i486DX processor or faster (Pentium 100 MHz or faster recommended)
- 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 cloning software CD-ROM 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.
   (For example; D:\Setup.exe)
⑤ Follow the prompts.
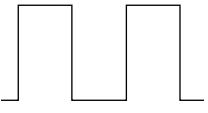⑥ Program group 'CS-F50 ADJ' appears in the 'Programs' folder of the [Start] menu.

■ STARTING SOFTWARE ADJUSTMENT
① Connect IC-F50 and PC with *OPC-966 JIG CABLE.
② Turn the transceiver power ON.
③ Boot up Windows, and click the program group 'CS-F50 ADJ' in the 'Programs' folder of the [Start] menu, then CS-F50 ADJ's window appears.
④ Click 'Connect' on the CS-F50's window, then appears IC-F50's up-to-date condition.
⑤ Set or modify adjustment data as desired.

• High power transmittion
When adjusting the output power (high power), the battery type detector must be connected to GND (see illustration at below). Otherwise the transceiver does not transmit high power, the output power will be low.

2 SOFTWARE ADJUSTMENT (PLL AND TRANSMITTING)

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

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE
			UNIT	LOCATION	
PLL LOCK VOLATGE [LV (RX LVA)] [LV (TX LVA)]	1	• Operating freq. : 174.000 MHz • Receiving	Soft ware	Check the "LV" item on the CS-F50 ADJ's display.	3.5 V
	2	• Operating freq. : 174.000 MHz • Transmitting			3.5 V
	3	• Operating freq. : 136.000 MHz • Receiving	Soft ware	Check the "LV" item on the CS-F50 ADJ's display.	0.9–1.5 V (Verify)
	4	• Operating freq. : 136.000 MHz • Transmitting		Connect a digital multimeter to the "LV" line.	0.9–1.5 V (Verify)
REFERENCE FREQUENCY [REF]	1	• Operating freq. : 174.000 MHz • Output power : Low1 • Connect an RF power meter or 50 Ω dummy load to the antenna connector. • Transmitting	Top panel	Loosely couple a frequnecy counter to the antenna connector.	174.0000 MHz
OUTPUT POWER [Power (Hi)]	1	• Operating freq. : 174.000 MHz • Output power : High • Transmitting	Top panel	Connect an RF power meter to the antenna connector.	5.0 W
[Power (L2)]	2	• Output power : Low2 • Transmitting			2.0 W
[Power (L1)]	3	• Output power : Low1 • Transmitting			1.0 W

FM DEVIATION [MOD N] (Narrow)	1	• Operating freq. : 155.000 MHz
		• Output power : Low1
		• IF bandwidth : Narrow
		• Set the FM deviation meter as:
		    HPF : OFF
		    LPF : 20 kHz
		    De-emphasis : OFF
		    Detector : (P–P)/2
		• Connect the audio generator to the multi connector through the JIG cable (*OPC-966) and set as : 1.0 kHz/150 mVrms
		• Transmitting
			Top panel	Connect an FM deviation meter to the antenna connector through the attenuator.	±2.10 kHz

[MOD Ratio] (Middle)	2	• IF bandwidth : Middle • Transmitting			±3.20 kHz
[MOD Ratio] (Wide)	3	• IF bandwidth : Wide • Transmitting			±4.10 kHz
MODULATION BALLANCE [BAL N] (Narrow)	1	*IMPORTANT!:* Set DTCS code to 174.000 MHZ using CS-F50 CLONING SOFTWARE in advance.		Connect an FM deviation meter with an oscilloscope to the antenna connector through an attenuator.	Set to square wave form

	2	• Operating freq. : 174.000 MHz
		• Output power : Low1
		• No audio applied to the [MIC] input.
		• Set an FM deviation meter as:
		    HPF : OFF
		    LPF : 20 kHz
		    De-emphasis : OFF
		    Detector : (P–P)/2
		• IF bandwidth : Narrow
		• Transmitting			

[BAL Ratio] (Middle)	3	• IF bandwidth : Middle • Transmitting			
[BAL Ratio] (Wide)	4	• IF bandwidth : Wide • Transmitting			

SOFTWARE ADJUSTMENT(PLL AND TRANSMITTING) – continued

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

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE
			UNIT	LOCATION	
CTCSS/DTCS DEVIATION [CTCS/DTCS]	1	***IMPORTANT!:*** Set CTCSS frequency (151.4 Hz) to 155.000 MHz using CS-F50 CLONING SOFTWARE in advance.	Top panel	Connect an FM deviation meter to the antenna connector through the attenuator.	±0.68 kHz
	2	• Operating freq.　: 155.000 MHz • Output power　　: Low1 • IF bandwidth　　: Wide • CTCSS　　　　: 151.4 Hz • DTCS code　　　: 007 • No audio applied to the [MIC] input. • Transmitting			

3 SOFTWARE ADJUSTMENT (RECEIVING)

• Select an operation using [↑] / [↓] keys, then set specified value using [←] / [→] keys on the connected computer keyboard.
• Need to adjust "S-METER ADJUSTMENT" after "RX SENSITIVITY ADJUSTMENT" is adjusted.
  Otherwise, "S-METER ADJUSTMENT" will not be adjusted properly.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE
			UNIT	LOCATION	
RX SENSITIVITY [BPF T1], [BPF T2]	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 • Receiving	MAIN	Connect a SINAD meter with an 8 Ω load to the multi connector through the JIG cable (*OPC-966).	Minimum distortion level
		CONVENIENT: The BPF T1, BPF T2 can be adjusted automatically. ①-1: Set the cursor to "BPF ALL" on the adjustment program and then push [ENTER] key. ①-2: The connected PC tunes BPF T1, BPF T2 to peak levels. 　　　　　　　　　or ②-1: Set the cursor to one of BPF T1, T2 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 : 4.5 µV* (–94 dBm) 　　Modulation : 1 kHz 　　Deviation : ±3.5 kHz • Receiving			Push [ENTER] key on the connected computer keyboard to set "S6 level".
	2	• Set an SSG as : 　　Level : 0.25 µV* (–119 dBm) 　　Modulation : 1 kHz 　　Deviation : ±3.5 kHz • Receiving			Push [ENTER] key on the connected computer keyboard to set "S1 level".
SQUELCH LEVEL [SQL]	1	• Operating freq. : 155.000 MHz • IF bandwidth : Wide • Connect an SSG to the antenna connector and set as: 　　Frequency : 155.000 MHz 　　Level : 0.18 µV* (–122 dBm) 　　Modulation : 1 kHz 　　Deviation : ±3.5 kHz • Receiving	Front panel	Internal speaker	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.