IC-F60/F61 ADJUSTMENT PROCEDURES

1 PREPARATION

When adjusting IC-F60/F61, 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 Current capacity : 5 A or more	Audio generator	Frequency range : 300–3000 Hz Output level : 1–500 mV
FM deviation meter	Frequency range : DC–800 MHz Measuring range : 0 to ±10 kHz	Attenuator	Power attenuation : 40 or 50 dB Capacity : 10 W or more
Frequency counter	Frequency range : 0.1–800 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Standard signal generator (SSG)	Frequency range : 100–800 MHz Output level : 0.1 µV–32 mV (–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 Frequency range : 100–800 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
		AC millivoltmeter	Measuring range : 10 mV–10 V

■ SYSTEM REQUIREMENTS

• IBM® PC compatible computer with an RS-232C serial port (38400 bps or faster).
• Microsoft® Windows® 95 or Windows® 98

■ 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-F60/F61 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-F60/F61’s up-to-date condition.
⑤ Set or modify adjustment data as desired.

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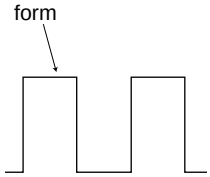
2 SOFTWARE ADJUSTMENT (TRANSMITTING)

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. : 400.000 MHz [LM] 450.000 MHz [MH] • Receiving	Soft ware	Check the “LV” item on the CS-F50 ADJ’s display.	1.0 V
	2	• Operating freq. : 400.000 MHz [LM] 450.000 MHz [MH] • Transmitting			1.0 V
	3	• Operating freq. : 470.000 MHz [LM] 520.000 MHz [MH] • Receiving	Soft ware	Check the “LV” item on the CS-F50 ADJ’s display.	3.3–4.5 V (Verify)
	4	• Operating freq. : 470.000 MHz [LM] 520.000 MHz [MH] • Transmitting		Connect a digital multimeter to the “LV” line.	3.3–4.5 V (Verify)
REFERENCE FREQUENCY [REF]	1	• Operating freq. : 470.000 MHz [LM] 520.000 MHz [MH] • Output power : Low1 • Connect an RF power meter or 50 Ω dummy load to the antenna connector. • Transmitting	Top panel	Loosely couple a frequency counter to the antenna connector.	470.0000 MHz [LM] 520.0000 MHz [MH]
OUTPUT POWER [Power (Hi)]	1	• Operating freq. : 400.000 MHz [LM] 450.000 MHz [MH] • Output power : High • Transmitting	Top panel	Connect an RF power meter to the antenna connector.	4.0 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. : 435.000 MHz [LM] 485.000 MHz [MH] • 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

SOFTWARE ADJUSTMENT(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	
MODULATION BALANCE [BAL N] (Narrow)	1	***IMPORTANT!:*** Set DTCS code to 435.000 MHz for [LM] (485 MHz for [MH]) using CS-F50 CLONING SOFTWARE in advance.	Top panel	Connect an FM deviation meter with an oscilloscope to the antenna connector through an attenuator.	Set to square wave form 
	2	• Operating freq. : 435.000 MHz [LM] 485.000 MHz [MH] • 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			
CTCSS/DTCS DEVIATION [CTCS/DTCS]	1	***IMPORTANT!:*** Set CTCSS frequency to 151.4 Hz 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. : 435.000 MHz [LM] 485.000 MHz [MH] • 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. : 400.000 MHz [LM] 450.000 MHz [MH] • IF bandwidth : Wide • Connect a standard signal generator to the antenna connector and set as: Frequency : 400.000 MHz [LM] 450.000 MHz [MH] 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. : 400.000 MHz [LM] 450.000 MHz [MH] • IF bandwidth : Wide • Connect an SSG to the antenna connector and set as: Frequency : 400.000 MHz [LM] 450.000 MHz [MH] Level : 4.5 µV* (–94 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz • Receiving	Push the [ENTER] key on the connected computer’s 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 the [ENTER] key on the connected computer keyboard to set “S1 level”.		
SQUELCH LEVEL [SQL]	1	• Operating freq. : 470.000 MHz [LM] 520.000 MHz [MH] • IF bandwidth : Wide • Connect an SSG to the antenna connector and set as: Frequency : 470.000 MHz [LM] 520.000 MHz [MH] Level : 0.2 µV* (–121 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.