

# IC-F3021T/F3021S ADJUSTMENT PROCEDURES

## 1 PREPARATION

When adjusting IC-F3021T/IC-F3021S, the optional CS-F3020 ADJ ADJUSTMENT SOFTWARE (Rev. 1.0 or later), OPC-478 CLONING CABLE (RS-232C type), OPC-478U CLONING CABLE (USB type) and a JIG CABLE (see illustration at page 9) are required.

### ■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 7.2 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 $\pm 10$ kHz	Attenuator	Power attenuation : 20 or 30 dB Capacity : 10 W or more
Frequency counter	Frequency range : 0.1–800 MHz Frequency accuracy : $\pm 1$ ppm or better Sensitivity : 100 mV or better	Standard signal generator (SSG)	Frequency range : 100–800 MHz Output level : 0.1 $\mu$ V to 32 mV (–127 to –17 dBm)
Digital multimeter	Input impedance : 10 M $\Omega$ /V DC or better	DC voltmeter	Input impedance : 50 k $\Omega$ /V DC or better
RF power meter (terminated type)	Measuring range : 1–10 W Frequency range : 100–800 MHz Impedance : 50 SWR : Better 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

- Microsoft® Windows® 98/98SE/Me/2000
- RS-232C serial port (D-sub 9 pin)
- USB port

### ■ ADJUSTMENT SOFTWARE INSTALLATION

- ① Boot up Windows.  
- Quit all applications when Windows is running.
- ② Insert the cloning software CD into the appropriate CD 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.  
Program group 'CS-F3020 ADJ' appears in the 'Programs' folder of the [Start] menu.

### ■ BEFORE STARTING SOFTWARE ADJUSTMENT

Program the adjustment frequencies into the transceiver using with the CS-F3020 before starting the software adjustment. Otherwise, the transceiver can not start software adjustment.

**CAUTION!:** BACK UP the originally programmed memory data in the transceiver before programming the adjustment frequencies.  
When program the adjustment frequencies into the transceiver, the transceiver's memory data will be overwritten and lose original memory data at the same time.

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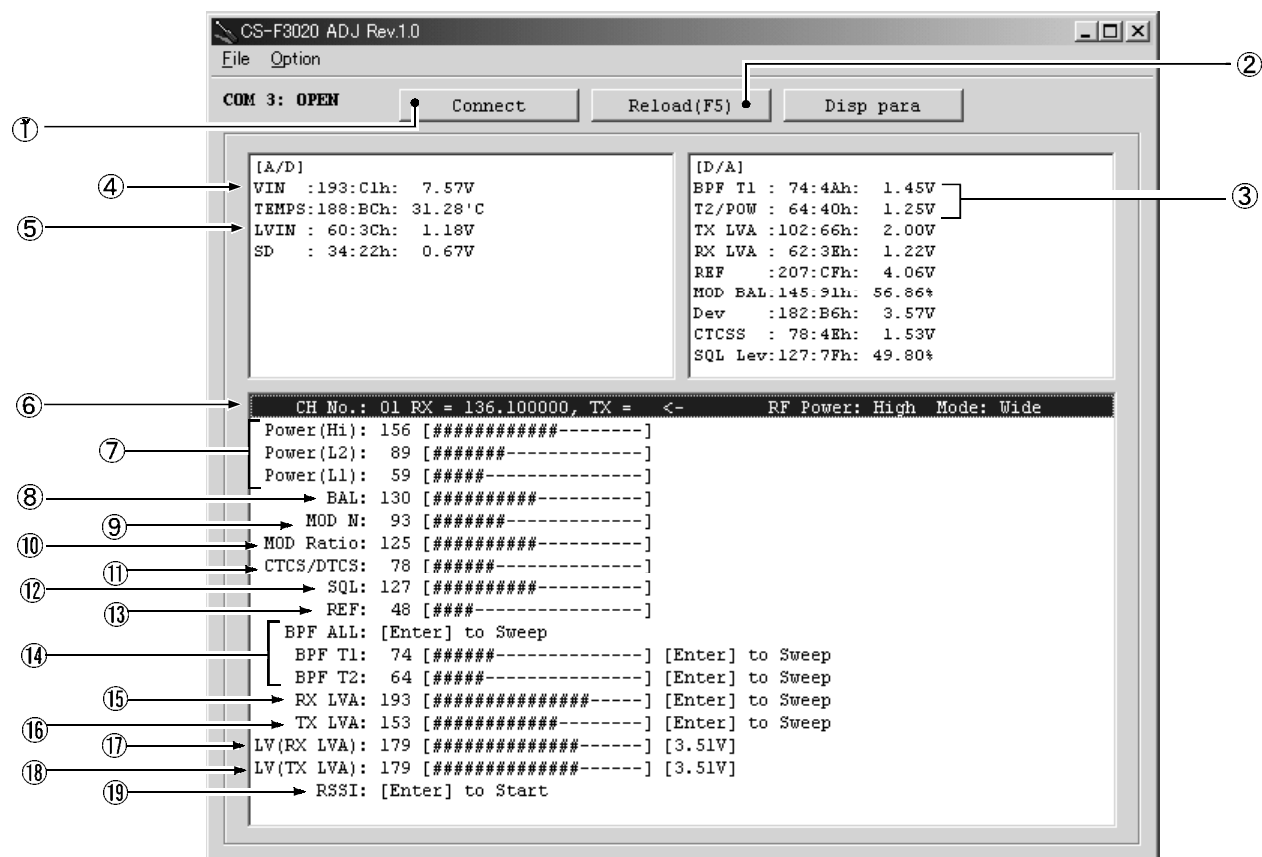
### ■ STARTING SOFTWARE ADJUSTMENT

- ① Connect the transceiver and PC with the OPC-478/U and JIG CABLE.
- ② Turn the transceiver power ON.
- ③ Boot up Windows, and click the program group 'CS-F3020 ADJ' in the 'Programs' folder of the [Start] menu, then CS-F3020 ADJ's window appears.
- ④ Click 'Connect' on the CS-F3020's window, then appears the transceiver's adjustment screen.
- ⑤ Set or modify adjustment data as desired.

### • ADJUSTMENT FREQUENCY LIST

CH	FREQUENCY	ADJUSTMENT ITEM
1	155.000 MHz	TX power : High Bandwidth : Wide
2	155.000 MHz	TX power : Low2 Bandwidth : Wide
3	155.000 MHz	TX power : Low Bandwidth : Wide
4	155.000 MHz	TX power : High Bandwidth : Narrow
5	136.000 MHz	TX power : High Bandwidth : Wide
6	155.000 MHz	TX power : High CTCSS : 151.4 Hz DTCS code : 007 Bandwidth : Wide
7	174.000 MHz	TX power : High Bandwidth : Wide

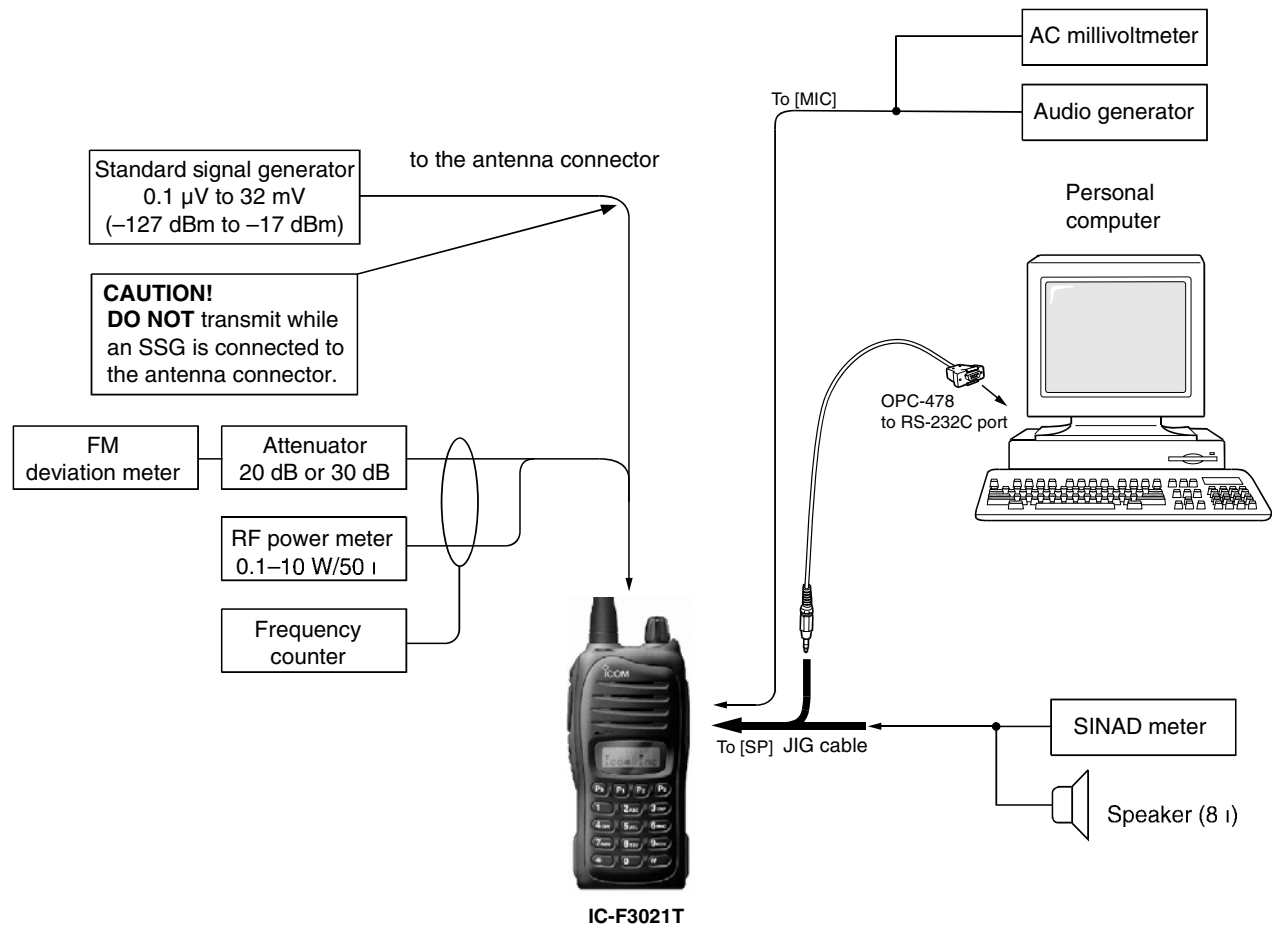
## CS-F3020 ADJ'S SCREEN EXAMPLE



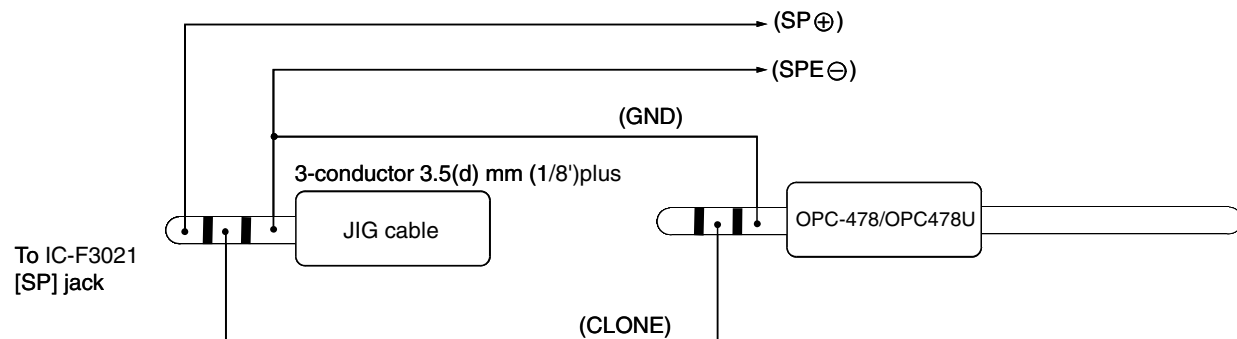
**NOTE:** The above values for settings are example only.  
Each transceiver has its own specific values for each setting.

- |                                      |   |
|--------------------------------------|---|
| ① : Transceiver's connection state   | ⑪ : CTCSS/DTCS deviation                |
| ② : Reload adjustment data           | ⑫ : Squelch level                       |
| ③ : Receive sensitivity measurement  | ⑬ : Reference frequency                 |
| ④ : Connected DC voltage measurement | ⑭ : Receive sensitivity (automatic)     |
| ⑤ : PLL lock voltage measurement     | ⑮ : PLL lock voltage for RX (automatic) |
| ⑥ : Operating channel select         | ⑯ : PLL lock voltage for TX (automatic) |
| ⑦ : RF output power                  | ⑰ : PLL lock voltage for RX (manual)    |
| ⑧ : FM modulation balance (Narrow)   | ⑱ : PLL lock voltage for TX (manual)    |
| ⑨ : FM deviation (Narrow)            |   |
| ⑩ : FM deviation (Wide/Middle)       | ⑲ : S-meter adjustment                  |

## • CONNECTION

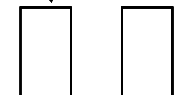


## • JIG CABLE



## 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 VOLTAGE [LV(RX LVA)] [LV(TX LVA)]	1	• Operating CH : CH7 • Receiving	PC screen	Check the “LVIN” item on the CS-F3020ADJ’s screen.	3.5 V
	2	• Operating CH : CH7 • Transmitting			3.5 V
	<b>CONVENIENT:</b> The PLL lock voltage can be adjusted automatically. Set the cursor to “RX LVA”/“TX LVA” and then push [ENTER] key.				
	3	• Operating CH : CH5 • Receiving	PC screen	Check the “LVIN” item on the CS-F3020ADJ’s screen.	0.9–1.5 V (Verify)
	4	• Operating CH : CH5 • Transmitting			1.0–1.6 V (Verify)
REFERENCE FREQUENCY [REF]	1	• Operating CH : CH7 • Connect the RF power meter or 50 dummy load to the antenna connector. • Transmitting	Top panel	Loosely couple the frequency counter to the antenna connector.	174.0000 MHz
OUTPUT POWER [Power (Hi)]	1	• Operating CH : CH1 • Transmitting	Top panel	Connect the RF power meter to the antenna connector.	5.0 W
[Power (L2)]	2	• Operating CH : CH2 • Transmitting			2.0 W
[Power (L1)]	3	• Operating CH : CH3 • Transmitting			1.0 W
MODULATION BALANCE [BAL]	1	• Operating CH : CH4 • 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 • Push [P0] while transmitting	Top panel	Connect the FM deviation meter with the oscilloscope to the antenna connector through the attenuator.	Set to square wave form 
FM DEVIATION [MOD N] (Narrow)	1	• Operating CH : CH4 • Set the FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • Connect the audio generator to the [MIC] connector and set as : 1.0 kHz/150 mVrms • Transmitting	Top panel	Connect the FM deviation meter to the antenna connector through the attenuator.	±2.10 kHz
[MOD Ratio] (Wide)	2	• Operating CH : CH1 • Transmitting			± 4.10 kHz
CTCSS/DTCS DEVIATION [CTCS/DTCS]		• Operating CH : CH6 • No audio applied to the [MIC] input. • Transmitting	Top panel	Connect the FM deviation meter to the antenna connector through the attenuator.	±0.70 kHz
DIGITAL DEVIATION* [Dig MOD]	1	• Preset [Digital Mode]	Top panel	Connect the FM deviation meter to the antenna connector through the attenuator	±1.41 kHz to ±1.45 kHz
	2	• Frequency. : 155 MHz • Set the FM deviation meter to same condition as "MODULATION BALANCE." • Transmitting			

## 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 <ul style="list-style-type: none"> <li>• Operating CH : CH5</li> <li>• Connect the standard signal generator to the antenna connector and set as: Frequency : 136.000 MHz Level : 10 <math>\mu</math>V* (–87 dBm) Modulation : 1 kHz Deviation : <math>\pm</math>3.5 kHz</li> <li>• Receiving</li> </ul>	Side panel	Connect the SINAD meter with an 8 load to the [SP] jack through the JIG cable.	Minimum distortion level
	<b>CONVENIENT:</b> The BPF T1, BPF T2 can be adjusted automatically. ① -1: Set the cursor to “BPF ALL”on the CS-F3020 ADJ’s screen 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 <ul style="list-style-type: none"> <li>• Operating CH : CH5</li> <li>• Connect the SSG to the antenna connector and set as: Frequency : 136.000 MHz Level : 14 <math>\mu</math>V* (–84 dBm) Modulation : 1 kHz Deviation : <math>\pm</math>3.5 kHz</li> <li>• Receiving</li> </ul>	Push the [ENTER] key on the connected computer’s keyboard to set “L2 level”.		
	2 <ul style="list-style-type: none"> <li>• Set the SSG as : Level : 0.45 <math>\mu</math>V* (–114 dBm)</li> <li>• Receiving</li> </ul>	Push the [ENTER] key on the connected computer keyboard to set “L0 level”.		
SQUELCH LEVEL [SQL]	1 <ul style="list-style-type: none"> <li>• Operating CH : CH1</li> <li>• Connect the SSG to the antenna connector and set as: Frequency : 155.000 MHz Level : 0.2 <math>\mu</math>V* (–121 dBm) Modulation : 1 kHz Deviation : <math>\pm</math>3.5 kHz</li> <li>• Receiving</li> </ul>	Side panel	Connect speaker to the [SP] jack through the JIG cable.	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.