

# IC-706MKIIG ADJUSTMENT PROCEDURES

## 1 PREPARATION BEFORE SERVICING

### ■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GREDE AND RANGE	EQUIPMENT	GREDE AND RENGE
DC power supply	Output voltage : 13.8 V DC Current capacity : 30 A or more	Distortion meter	Frequency range : 1 kHz $\pm$ 10 % Measuring range : 1–100 %
RF power meter (terminated type)	Measuring range : 10–200 W Frequency range : 1.8–500 MHz Impedance : 50 $\Omega$ SWR : Less than 1.2 : 1	Oscilloscope	Frequency range : DC–100 MHz Measuring range : 0.01–10 V
Frequency counter	Frequency range : 0.1–500 MHz Frequency accuracy : $\pm$ 1 ppm or better Sensitivity : 100 mV or better	Digital multimeter	Input impeadance : 10 M $\Omega$ /DC or beter
RF voltmeter	Frequency range : 0.1–500 MHz Measuring range : 0.01–10 V	AC millivoltmeter	Measuring range : 10 mV–10 V
Standard signal generator (SSG)	Frequency range : 0.1–30 MHz Output level : 0.1 $\mu$ V–32 mV (–127 to –17 dBm)	DC voltmeter	Input impedance : 50 k $\Omega$ /V DC or better
FM deviation meter	Frequency range : 0–500 MHz Measuring range : 0 to $\pm$ 5 kHz	DC ammeter	Measurement capability: 1 A/50 A
Modulation analyzer	Frequency range : At least 500 MHz Measuring range : 0–100 %	Audio generator	Frequency range : 300–3000 Hz Measuring range : 1–500 mV
		Spectram analyzer	Frequency range : At least 1000 MHz Spectraum bandwidth : 100 kHz or more
		Attenuator	Power attenuation : 50 or 60 dB Capacity : 150 W or more
		External speaker	Input impedance : 8 $\Omega$ Capacity : 5 W or more

## 2 PLL ADJUSTMENTS

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT		
		UNIT	LOCATION		UNIT	ADJUST	
REFERENCE FREQUENCY	1	<ul style="list-style-type: none"> <li>• Display frequency: Any</li> <li>• L623 (PLL unit) : Center</li> <li>• Receiving</li> </ul>	PLL	Connect an RF voltmeter to check point P681.	Maximum level (0 dB or more)	PLL	L681, L682
	2						Connect a frequency counter to check point P681.
REFERENCE LOOP LOCK VOLTAGE	1	<ul style="list-style-type: none"> <li>• Display frequency: 0.0300 MHz</li> <li>• Mode : USB</li> <li>• Receiving</li> </ul>	PLL	Connect a digital multimeter or oscilloscope to check point CP131.	2.0 V	PLL	C4
MAIN LOOP LOCK VOLTAGE	1	<ul style="list-style-type: none"> <li>• Display frequency: 128.99999 MHz</li> <li>• Mode : USB</li> <li>• Receiving</li> </ul>	PLL	Connect a digital multimeter or oscilloscope to check point CP401.	4.0 V	PLL	C306
	2	<ul style="list-style-type: none"> <li>• Display frequency: 199.99999 MHz</li> <li>• Mode : USB</li> <li>• Receiving</li> </ul>			4.0 V		C335
	3	<ul style="list-style-type: none"> <li>• Display frequency: 470.00000 MHz</li> <li>• Mode : USB</li> <li>• Receiving</li> </ul>			4.0 V		C367

## 3 TRANSMITTER ADJUSTMENTS

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT			
		UNIT	LOCATION		UNIT	ADJUST		
TRANSMIT TOTAL GAIN	1	<ul style="list-style-type: none"> <li>• Display frequency: 14.10000 MHz</li> <li>• Mode : USB</li> <li>• [Q1 RF POWER] : H</li> <li>• Connect an audio generator to [MIC] connector and set as: 1.5 kHz/3 mV</li> <li>• Transmitting</li> </ul>	Rear Panel	Connect an RF power meter to [ANT1] connector.	Maximum RF power	MAIN	L511, L512, L562, L563, L566	
	2						• Transmitting	50 W
OUTPUT POWER	1	<ul style="list-style-type: none"> <li>• Display frequency: 14.10000 MHz</li> <li>• Mode : USB</li> <li>• [Q2 MIC GAIN] : 5</li> <li>• Connect an audio generator to [MIC] connector and set as: 1.5 kHz/30 mV</li> <li>• Transmitting</li> </ul>	Rear Panel	Connect an RF power meter to [ANT1] connector.	100 W	MAIN	R1082	
	2	<ul style="list-style-type: none"> <li>• Display frequency: 52.00000 MHz</li> <li>• Transmitting</li> </ul>			100 W		R1084	
	3	<ul style="list-style-type: none"> <li>• Display frequency: 145.00000 MHz</li> <li>• Transmitting</li> </ul>			Connect an RF power meter to [ANT2] connector.		50 W	R1086
	4	<ul style="list-style-type: none"> <li>• Display frequency: 435.00000 MHz</li> <li>• Transmitting</li> </ul>			20 W		R1088	
CARRIER SUPPRESSION	1	<ul style="list-style-type: none"> <li>• Display frequency: 14.10000 MHz</li> <li>• Mode : USB and LSB</li> <li>• Apply no signal to [MIC] connector.</li> <li>• Transmitting</li> </ul>	Rear Panel	Connect a spectrum analyzer to [ANT1] connector via an attenuator.	Minimum carrier level	MAIN	R1045	

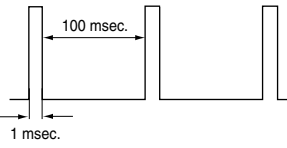
## TRANSMITTER ADJUSTMENTS (continued)

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
FM VCO	1 <ul style="list-style-type: none"> <li>• Display frequency: 29.10000 MHz</li> <li>• Mode : FM</li> <li>• [Q1 RF POWER] : H</li> <li>• [M4 TON] : OFF</li> <li>• Apply no signal to [MIC] connector.</li> <li>• Transmitting</li> </ul>	MAIN	Connect a digital multimeter to check point CP1011.	1.8 V	MAIN	C1022
FM DEVIATION	1 <ul style="list-style-type: none"> <li>• Display frequency: 29.10000 MHz</li> <li>• Mode : FM</li> <li>• [Q1 RF POWER] : H</li> <li>• [M4 TON] : OFF</li> <li>• [Q2 MIC GAIN] : 5</li> <li>• Connect an audio generator to [MIC] connector and set as: 1 kHz/30 mV</li> <li>• Transmitting</li> </ul>	Rear Panel	Connect an FM deviation meter to [ANT1] connector via an attenuator.	±4.5 kHz	MAIN	R1002
RESIDUAL AM	1 <ul style="list-style-type: none"> <li>• Display frequency: 29.10000 MHz</li> <li>• Mode : FM</li> <li>• [Q1 RF POWER] : H</li> <li>• [M4 TON] : OFF</li> <li>• [Q2 MIC GAIN] : 5</li> <li>• Connect an audio generator to [MIC] connector and set as: 1 kHz/30 mV and OFF</li> <li>• Transmitting</li> </ul>		Connect an RF power meter to [ANT1] connector.	Minimum power difference with modulation and unmodulation.	MAIN	adjust in sequence L511, L512, then adjust L562, L563, L566.
	2	After adjustment, vary the TRANSMIT TOTAL GAIN and OUTPUT POWER adjustments.				
AM MODULATION	1 <ul style="list-style-type: none"> <li>• Display frequency: 14.10000 MHz</li> <li>• Mode : AM</li> <li>• [Q1 RF POWER] : H</li> <li>• [Q2 MIC GAIN] : 5</li> <li>• Disconnect the plug from J281 on the MAIN board.</li> <li>• Apply no signal to [MIC] connector.</li> <li>• Transmitting</li> </ul>	MAIN	Connect an oscilloscope to check point CP1041.	100 mVp-p	MAIN	R1042
	2 <ul style="list-style-type: none"> <li>• Connect the plug to J281 on the MAIN board.</li> <li>• Apply no signal to [MIC] connector.</li> <li>• Transmitting</li> </ul>	Rear Panel	Connect an RF power meter to [ANT1] connector.	35 W		R1080
	3 <ul style="list-style-type: none"> <li>• Connect an audio generator to [MIC] connector and set as: 1 kHz/30 mV</li> <li>• Transmitting</li> </ul>		Connect a modulation analyzer to [ANT1] connector via an attenuator.	90 % modulation		R999
CW CARRIER LEVEL	1 <ul style="list-style-type: none"> <li>• Display frequency: 14.10000 MHz</li> <li>• Mode : CW</li> <li>• [Q1 RF POWER] : H</li> <li>• [Q5 KEY SPEED] : 60</li> <li>• [M4 BRK] : BK (semi break-in)</li> <li>• CW paddle : n</li> <li>• Connect an RF power meter to [ANT1] connector.</li> <li>• Transmit dots for a while using a paddle.</li> </ul>		Connect an oscilloscope to check point CP921 and [ANT1] connector.	At the point where the CW carrier completely comes up in a 10 msec. delay after CP921 voltage comes up. 	MAIN	R921

## TRANSMITTER ADJUSTMENTS (continued)

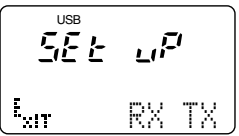



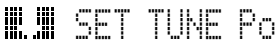







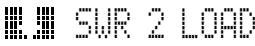
ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT			
		UNIT	LOCATION		UNIT	ADJUST		
IDLING CURRENT (for drive amplifiers)	1	<ul style="list-style-type: none"> <li>• Display frequency: 14.10000 MHz</li> <li>• Mode : USB</li> <li>• [Q2 MIC GAIN] : 1 (minimum)</li> <li>• turn R162, R174, R175, R214, R231 (on the PA unit) to maximum counterclockwise position.</li> <li>• Disconnect the plug from J571 on the PA unit.</li> <li>• Transmitting</li> </ul>	PA	Connect a DC ammeter between the DC power supply and transceiver's DC power socket (P601 on the PA unit).	0.5 A increase from that R162 is in maximum counterclockwise position.	PA	R162	
	2	<ul style="list-style-type: none"> <li>• Display frequency: 145.10000 MHz</li> <li>• Mode : USB</li> <li>• [Q2 MIC GAIN] : 1 (minimum)</li> <li>• Transmitting</li> </ul>			1.0 A increase from step 1.		R214	
	(for final amplifiers)	3	<ul style="list-style-type: none"> <li>• Display frequency: 14.10000 MHz</li> <li>• Mode : USB</li> <li>• [Q2 MIC GAIN] : 1 (minimum)</li> <li>• Transmitting</li> </ul>			1.0 A increase from that R174 is in maximum counterclockwise position.		R174
		4	<ul style="list-style-type: none"> <li>• Transmitting</li> </ul>			1.0 A increase from step 3.		R175
		5	<ul style="list-style-type: none"> <li>• Display frequency: 145.10000 MHz</li> <li>• Mode : USB</li> <li>• [Q2 MIC GAIN] : 1 (minimum)</li> <li>• Transmitting</li> </ul>			2.0 A increase from step 4.		R231
SWR DETECTION	1	<ul style="list-style-type: none"> <li>• Display frequency: 14.10000 MHz</li> <li>• Mode : USB</li> <li>• Ground CP1071 on the MAIN board.</li> <li>• Connect an audio generator to [MIC] connector and set as: 1.5 kHz/30 mV</li> <li>• Transmitting</li> </ul>	Rear Panel	Connect an RF power meter to [ANT1] connector.	100 W	Quick set mode	Q2 MIC GAIN	
	2	<ul style="list-style-type: none"> <li>• Transmitting</li> </ul>	FILTER	Connect a digital multimeter to check point W16.	Minimum voltage	FILTER	C58	
	3	After remove the jumper wire from CP1071 on the MAIN board.						

## 4 RECEIVER ADJUSTMENTS

ADJUSTMENT	ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
RECEIVER TOTAL GAIN	1 <ul style="list-style-type: none"> <li>• Display freq. : 14.10000 MHz</li> <li>• Mode : USB</li> <li>• [RIT] : OFF</li> <li>• [M4 AGC] : Fast (F AGC)</li> <li>• [M3 NB] : OFF</li> <li>• [P.AMP/ATT] : Preamp ON</li> <li>• Connect a standard signal generator to the [ANT1] connector and set as: <ul style="list-style-type: none"> <li>Frequency : 14.10150 MHz</li> <li>Level : 0.5 <math>\mu</math>V* (-113 dBm)</li> <li>Modulation : OFF</li> </ul> </li> <li>• Receiving</li> </ul>	Rear Panel	Connect an AC millivoltmeter to the [EXT SP] jack with an 8 $\Omega$ dummy load.	Maximum AF output level	MAIN	L731, L741
	2 <ul style="list-style-type: none"> <li>• [P.AMP/ATT] : Preamp OFF</li> <li>• Set an SSG as: <ul style="list-style-type: none"> <li>Frequency : 14.10150 MHz</li> <li>Level : 500 <math>\mu</math>V* (-53 dBm) and OFF</li> <li>Modulation : OFF</li> </ul> </li> <li>• Receiving</li> </ul>	Rear Panel	Connect an AC millivoltmeter to the [EXT SP] jack with a 8 $\Omega$ dummy load.	30 dB of AF level difference	MAIN	R741
WFM RECEIVING	1 <ul style="list-style-type: none"> <li>• Display freq. : 14.10000 MHz</li> <li>• Mode : WFM</li> <li>• Set an SSG as: <ul style="list-style-type: none"> <li>Frequency : 14.10000 MHz</li> <li>Level : 500 <math>\mu</math>V* (-53 dBm)</li> <li>Modulation : OFF</li> </ul> </li> <li>• Receiving</li> </ul>	MAIN	Connect a digital multimeter or oscilloscope to check point CP631.	4.0 V	MAIN	L632
NOISE BLANKER	1 <ul style="list-style-type: none"> <li>• Display freq. : 14.10000 MHz</li> <li>• Mode : USB</li> <li>• [P.AMP/ATT] : Preamp ON</li> <li>• [M3 NB] : OFF</li> <li>• R623 (MAIN) : Center</li> <li>• Connect an SSG to the [ANT1] connector and set as: <ul style="list-style-type: none"> <li>Frequency : 14.1015 MHz</li> <li>Level : 18 <math>\mu</math>V* (-82 dBm)</li> <li>Modulation : OFF</li> </ul> </li> <li>and apply the following signal to the [ANT1] connector.</li> </ul>  <ul style="list-style-type: none"> <li>• Receiving</li> </ul>	MAIN	Connect an oscilloscope to check point CP632.	Adjust the maximum noise wave displayed on the oscilloscope.	MAIN	L621, L633
	2 <ul style="list-style-type: none"> <li>• [M3 NB] : ON</li> <li>• Set an SSG as: <ul style="list-style-type: none"> <li>Level : 10 <math>\mu</math>V* (-87 dBm)</li> <li>Modulation : OFF</li> </ul> </li> <li>• Receiving</li> </ul>			At the point where the noise just reduces.		

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

## 5 SET MODE ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITION	DISPLAY	OPERATION
ENTERING ADJUSTMENT SET MODE	1 <ul style="list-style-type: none"> <li>• Enter adjustment set mode: <ol style="list-style-type: none"> <li>① Turn power OFF.</li> <li>② Terminate the [REMOTE] jack with a 3.5(d) mm mini-plug.</li> <li>③ While pushing [P.AMP/ATT] and [TUNE/CALL], turn power ON.</li> </ol> </li> </ul>		Push [F-3 (TX)] to enter the TX adjustment setting mode. Then advance to the following setting, or push [UP]/[DN] to scroll the display.
Id APC	1 <ul style="list-style-type: none"> <li>• Connect an RF power meter to [ANT1] connector.</li> <li>• Connect a DC ammeter between the DC power supply and transceiver's DC power socket (P601 on the PA unit).</li> <li>• Transmit using an external PTT switch.</li> </ul>		Set a total current at 15 A by adjusting R1125 on the MAIN board. Push [MENU] to set the "SET IdAPC" after returning receiving condition.
FILTER CALIBRATION	1 <ul style="list-style-type: none"> <li>• Connect an RF power meter to [ANT1] connector.</li> </ul>	GO FILTER CAL	Push and hold [MENU (GO)] to make the calibration. • Transceiver transmits for a while.
POWER METER (14 MHz)	1 <ul style="list-style-type: none"> <li>• Connect an RF power meter to [ANT1] connector.</li> <li>• Transmit using an external PTT switch.</li> </ul>		Set to 90 W using [MAIN DIAL], then push [MENU] while transmitting.
	2 <ul style="list-style-type: none"> <li>• Transmit using an external PTT switch.</li> </ul>		Set to 50 W using [MAIN DIAL], then push [MENU] while transmitting.
TUNING POWER (14 MHz)	1 <ul style="list-style-type: none"> <li>• Connect an RF power meter to [ANT1] connector.</li> <li>• Transmit using an external PTT switch.</li> </ul>		Set to 10 W using [MAIN DIAL], then push [MENU] while transmitting.
	(50 MHz)	2 <ul style="list-style-type: none"> <li>• Transmit using an external PTT switch.</li> </ul>	
POWER METER (145 MHz)	1 <ul style="list-style-type: none"> <li>• Connect an RF power meter to [ANT2] connector.</li> <li>• Transmit using an external PTT switch.</li> </ul>		Set to 45 W using [MAIN DIAL], then push [MENU] while transmitting.
	2 <ul style="list-style-type: none"> <li>• Transmit using an external PTT switch.</li> </ul>		Set to 25 W using [MAIN DIAL], then push [MENU] while transmitting.
POWER METER (430 MHz)	1 <ul style="list-style-type: none"> <li>• Connect an RF power meter to [ANT2] connector.</li> <li>• Transmit using an external PTT switch.</li> </ul>		Set to 18 W using [MAIN DIAL], then push [MENU] while transmitting.
	2 <ul style="list-style-type: none"> <li>• Transmit using an external PTT switch.</li> </ul>		Set to 10 W using [MAIN DIAL], then push [MENU] while transmitting.
ALC METER	1 <ul style="list-style-type: none"> <li>• Connect an RF power meter to [ANT1] connector.</li> <li>• Connect an audio generator to [MIC] connector and set as : Level : 1.5 kHz/30mV</li> <li>• Transmit using an external PTT switch.</li> </ul>		Push and hold [MENU] to set ALC reference level while transmitting.
SWR METER	1 <ul style="list-style-type: none"> <li>• Connect a 50 Ω dummy load or power meter to [ANT1] connector.</li> </ul>		Push [MENU] to set SWR reference level.
	2 <ul style="list-style-type: none"> <li>• Connect a 50 Ω dummy load or power meter to [ANT1] connector.</li> </ul>		Push [MENU] to set SWR2 level. • The display returns to the same as the ADJUSTMENT SET MODE above.
	Push [F-1 (EXIT)] to exit adjustment set mode.		

## SET MODE ADJUSTMENT (continued)

ADJUSTMENT	ADJUSTMENT CONDITION	DISPLAY	OPERATION
ENTERING ADJUSTMENT SET MODE	1 <ul style="list-style-type: none"> <li>Enter adjustment set mode:               <ol style="list-style-type: none"> <li>Turn power OFF.</li> <li>Terminate the [REMOTE] jack with a 3.5(d) mm mini-plug.</li> <li>While pushing [P.AMP/ATT] and [TUNE/CALL], turn power ON.</li> </ol> </li> </ul>		Push [F-2 (RX)] to enter the RX adjustment setting mode. Then advance to the following setting, or push [UP]/[DN] to scroll the display.
SENSITIVITY	1 <ul style="list-style-type: none"> <li>Connect a standard signal generator to [ANT2] and set as:               <ul style="list-style-type: none"> <li>Frequency : 60.05150 MHz</li> <li>Modulation : OFF</li> </ul> </li> <li>Receiving</li> </ul>		Set a connected SSG's level at 10 dB of S/N ratio with AC millivolt-meter.
	2 <ul style="list-style-type: none"> <li>Receiving</li> </ul>		Set maximum AF level using the [MAIN DIAL], then push [MENU] to set the "VHF1 BPF1 L".
	3 <ul style="list-style-type: none"> <li>Same operation as step 2 for the listed BPFs.</li> <li>Set an SSG as:               <ul style="list-style-type: none"> <li>Modulation : OFF</li> <li>VHF1 BPF2 L : 60.05150 MHz</li> <li>VHF1 BPF1 M : 90.50150 MHz</li> <li>VHF1 BPF1 H : 128.9515 MHz</li> <li>VHF2 BPF1 L : 129.1015 MHz</li> <li>VHF2 BPF1 M : 145.1515 MHz</li> <li>VHF2 BPF1 H : 170.0015 MHz</li> <li>UHF BPF1 L : 400.0015 MHz</li> <li>UHF BPF1 M : 435.1515 MHz</li> <li>UHF BPF1 H : 470.0015 MHz</li> </ul> </li> <li>Receiving</li> </ul>	<ul style="list-style-type: none"> <li>VHF1 BPF2 M : Same as left</li> <li>VHF1 BPF2 H : Same as left</li> <li>VHF2 BPF2 L : Same as left</li> <li>VHF2 BPF2 M : Same as left</li> <li>VHF2 BPF2 H : Same as left</li> <li>UHF BPF2 L : Same as left</li> <li>UHF BPF2 M : Same as left</li> <li>UHF BPF2 H : Same as left</li> </ul>	
S-METER	1 <ul style="list-style-type: none"> <li>Connect an SSG to [ANT1] connector and set as:               <ul style="list-style-type: none"> <li>Frequency : 14.1515 MHz</li> <li>Level : OFF</li> </ul> </li> <li>Receiving</li> </ul>		Push [MENU] to set the "S0 level".
	2 <ul style="list-style-type: none"> <li>Set an SSG as :               <ul style="list-style-type: none"> <li>Level : 50 μV (-73 dBm)</li> <li>Modulation : OFF</li> </ul> </li> <li>Receiving</li> </ul>		Push [MENU] to set the "S9 level".
	3 <ul style="list-style-type: none"> <li>Set an SSG as :               <ul style="list-style-type: none"> <li>Level : 50 mV (-13 dBm)</li> <li>Modulation : OFF</li> </ul> </li> <li>Receiving</li> </ul>		Push [MENU] to set the "+60 dB level". <ul style="list-style-type: none"> <li>The display returns to the same as the ADJUSTMENT SET MODE above.</li> </ul>
	Push [F-1 (EXIT)] to exit adjustment set mode.		