SECTION 5 ADJUSTMENT PROCEDURES

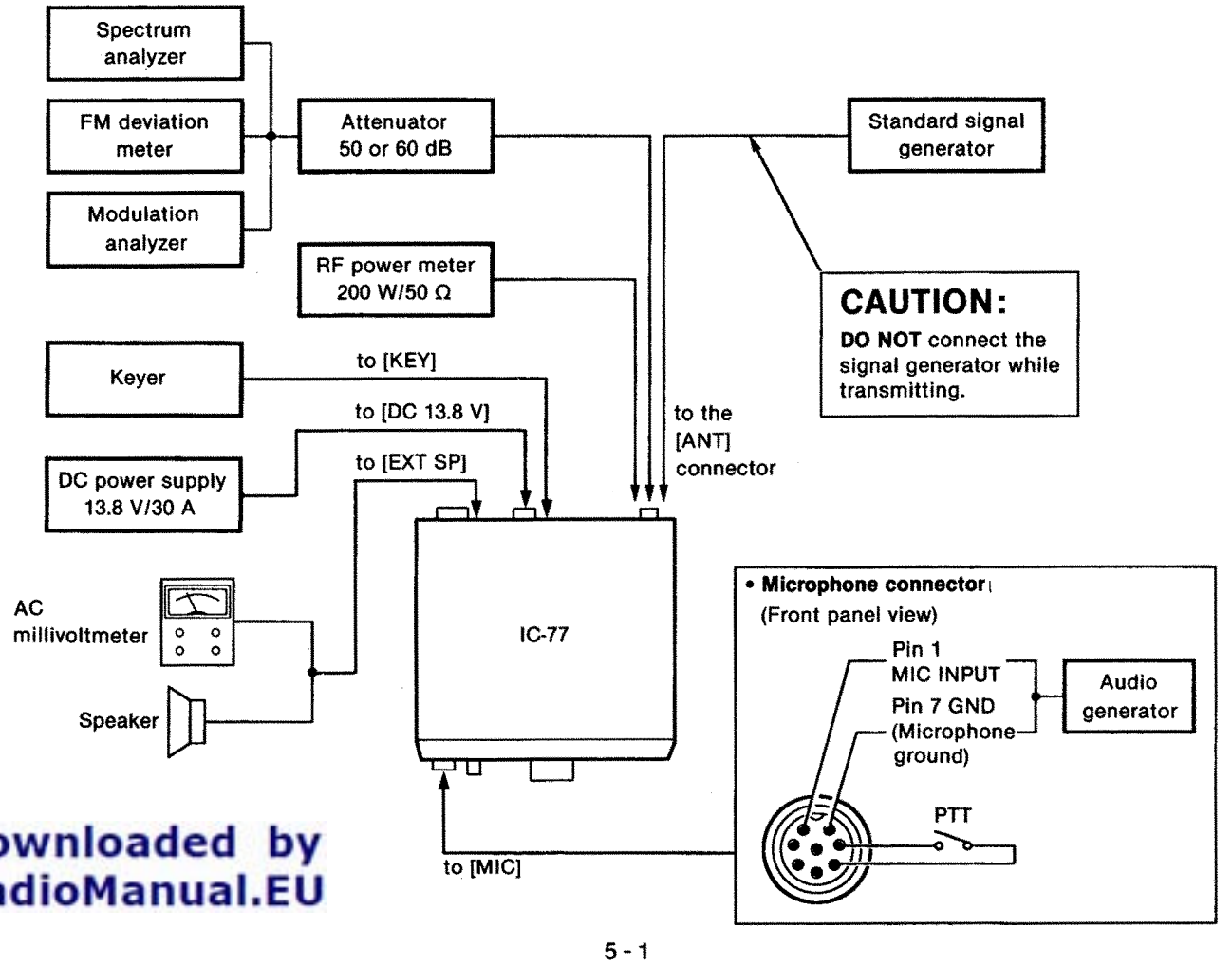
5-1 PREPARATION BEFORE SERVICING

■ REQUIRED TEST EQUIPMENT

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 13.8 V DC Current capacity : 30 A or more	AC millivoltmeter	Measuring range : 10 mV-10 V
		DC voltmeter	Input impedance : 50 kΩ/DC or better
RF power meter (terminated type)	Measuring range : 10-200 W Frequency range : 1.8-30 MHz Impedance : 50 Ω SWR : Less than 1.2:1	Ammeter	Measurement capability: 1 A and 30 A
		Audio generator	Frequency range : 300-3000 MHz Output level : 1-500 mV
Frequency counter	Frequency range : 0.1-100 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Attenuator	Power attenuation : 50 or 60 dB Capacity : 150 W or more
		Spectrum analyzer	Frequency range : At least 90 MHz Spectrum bandwidth : ±100 kHz or more
RF voltmeter	Frequency range : 0.1-100 MHz Measuring range : 0.01-10 V	FM deviation meter	Frequency range : At least 30 MHz Measuring range : 0 to ±10 kHz
Digital multimeter	Input impedance : 10 MΩ/DC or better	Modulation analyzer	Frequency range : At least 30 MHz Measuring range : 0-100%
Standard signal generator (SSG)	Frequency range : 0.1-100 MHz Output level : 0.1 µV-32 mV (−127 to −17 dBm)	External speaker	Impedance : 8 Ω Max. input power : 5 W
Distortion meter	Frequency range : 1 kHz±10% Measuring range : 1-100%		
Oscilloscope	Frequency range : DC-20 MHz Measuring range : 0.01-10 V		

CW: Clockwise CCW: Counterclockwise

■ CONNECTION



5-2 PLL ADJUSTMENT

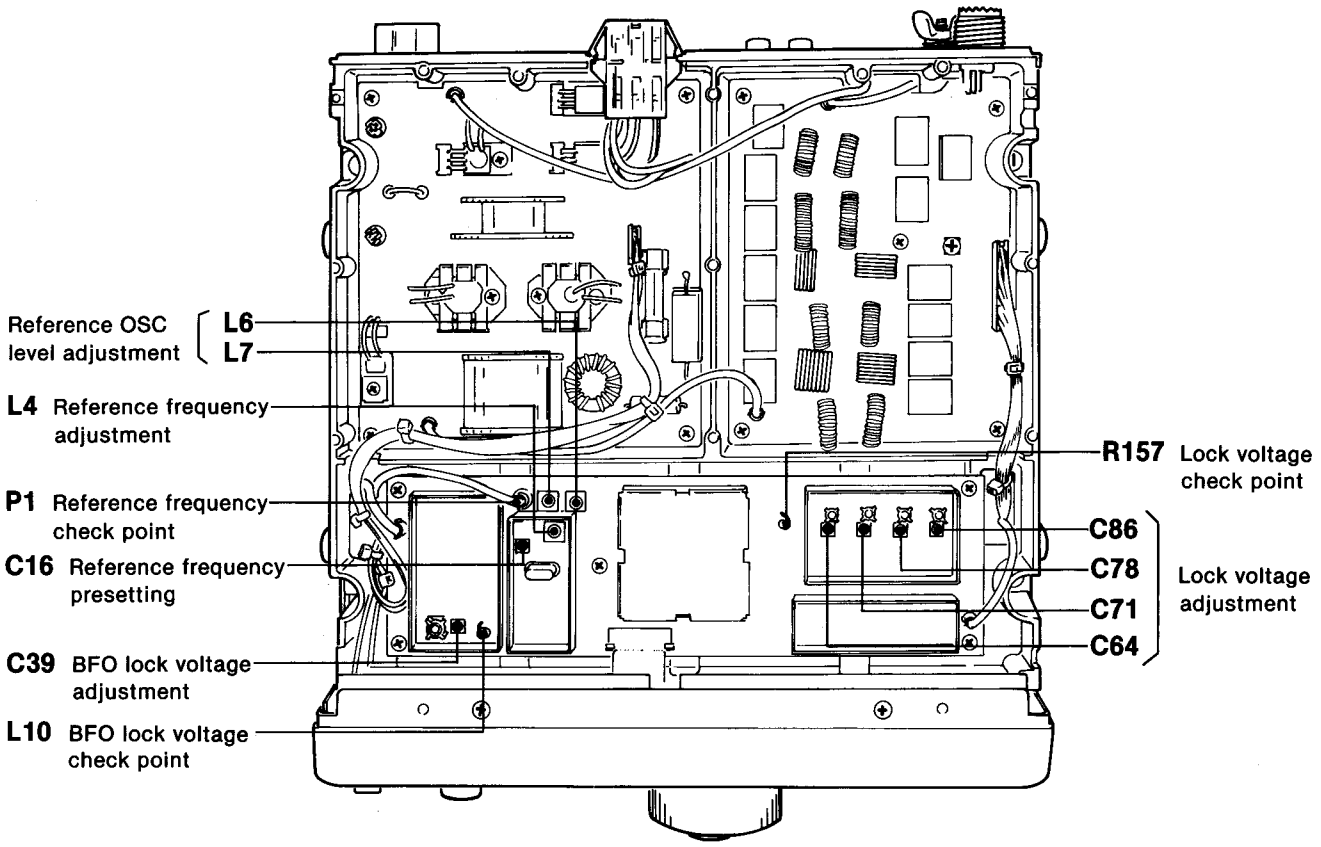
ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
REFERENCE FREQUENCY	1	• Displayed frequency: 14.1000 MHz • Mode : USB • Terminate P1 with a 50 Ω resistor. • Receiving	PLL	Connect the frequency counter to P1.	Preset to center as shown below. 	PLL	C16
	2				64.0000 MHz		L4
	3			Connect the RF voltmeter to P1.	Maximum level		L6, L7
	4	After adjustment, remove the resistor from P1 and re-plug P1.					
BFO PLL LOCK VOLTAGE	1	• Displayed frequency: 14.0000 MHz • Mode : LSB • Receiving	PLL	Connect the digital multimeter or oscilloscope to L10.	1.9 V DC	PLL	C39
LOCK VOLTAGE	1	• Displayed frequency: 7.9999 MHz • Mode : USB • Receiving	PLL	Connect the digital multimeter or oscilloscope to R157.	6.0 V DC	PLL	C64
	2	• Displayed frequency: 14.9999 MHz			6.0 V DC		C71
	3	• Displayed frequency: 21.9999 MHz			6.0 V DC		C78
	4	• Displayed frequency: 30.0000 MHz			6.0 V DC		C86
	5	• Displayed frequency: 0.5000 MHz, 8.0000 MHz, 15.0000 MHz and 22.0000 MHz			More than 1.7 V DC		Verify

5-3 RECEIVER ADJUSTMENT

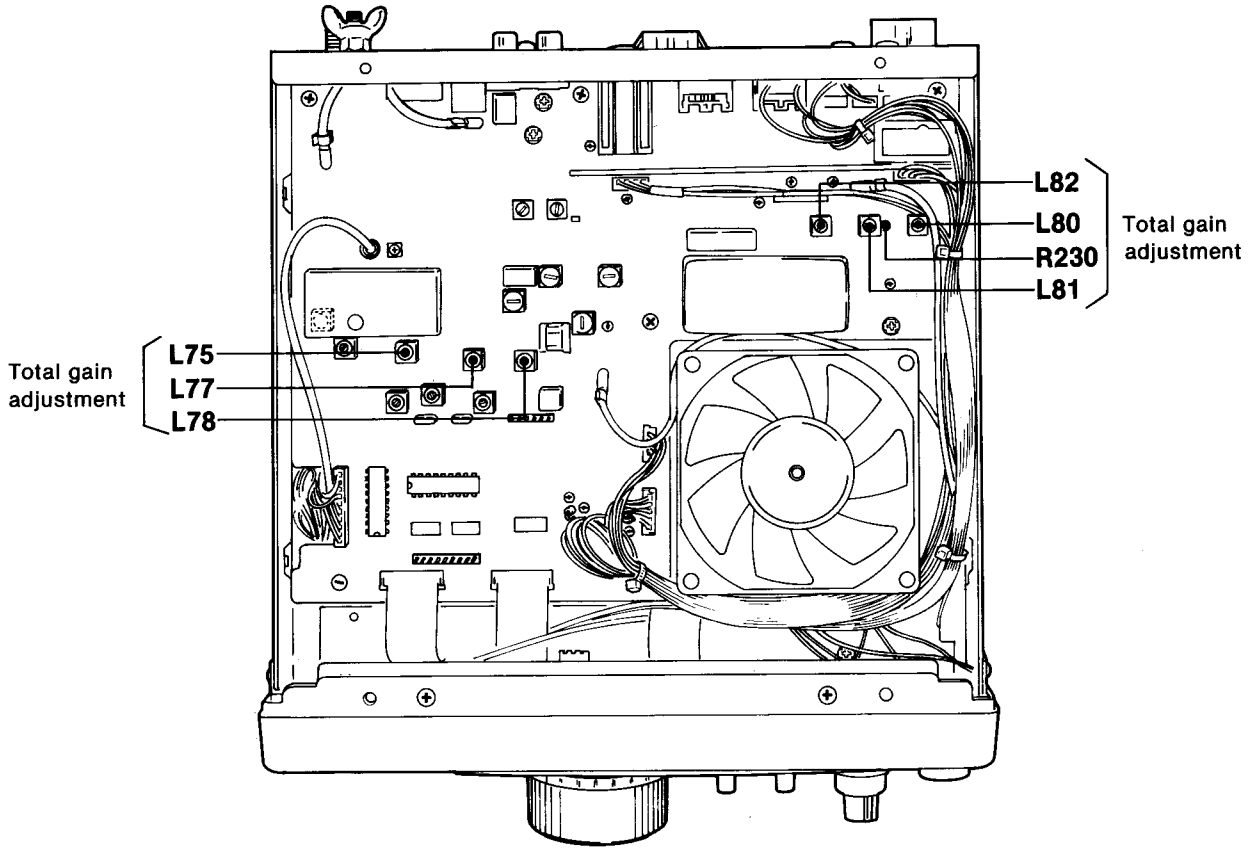
ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
TOTAL GAIN	1	• Displayed frequency: 14.1000 MHz • Mode : USB • [RIT] switch : OFF • [NB] switch : OFF • [PRE AMP] switch : OFF • Connect the SSG to the [ANT] connector and set as: Frequency : 14.1010 MHz Level : 1.0 μV* (−107 dBm) Modulation: OFF • Receiving	Rear panel	Connect the AC millivoltmeter to the [EXT SP] jack with an 8 Ω load.	Maximum audio output level	MAIN	Adjust in sequence L75, L77, L78, L82, L81, L80
	2	• Set the SSG as: Level : 1.0 mV* (−47 dBm) and OFF			30 dB of AF level difference	MAIN	R230

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

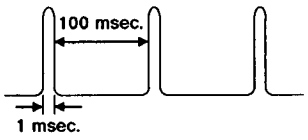
• PLL UNIT



• MAIN UNIT

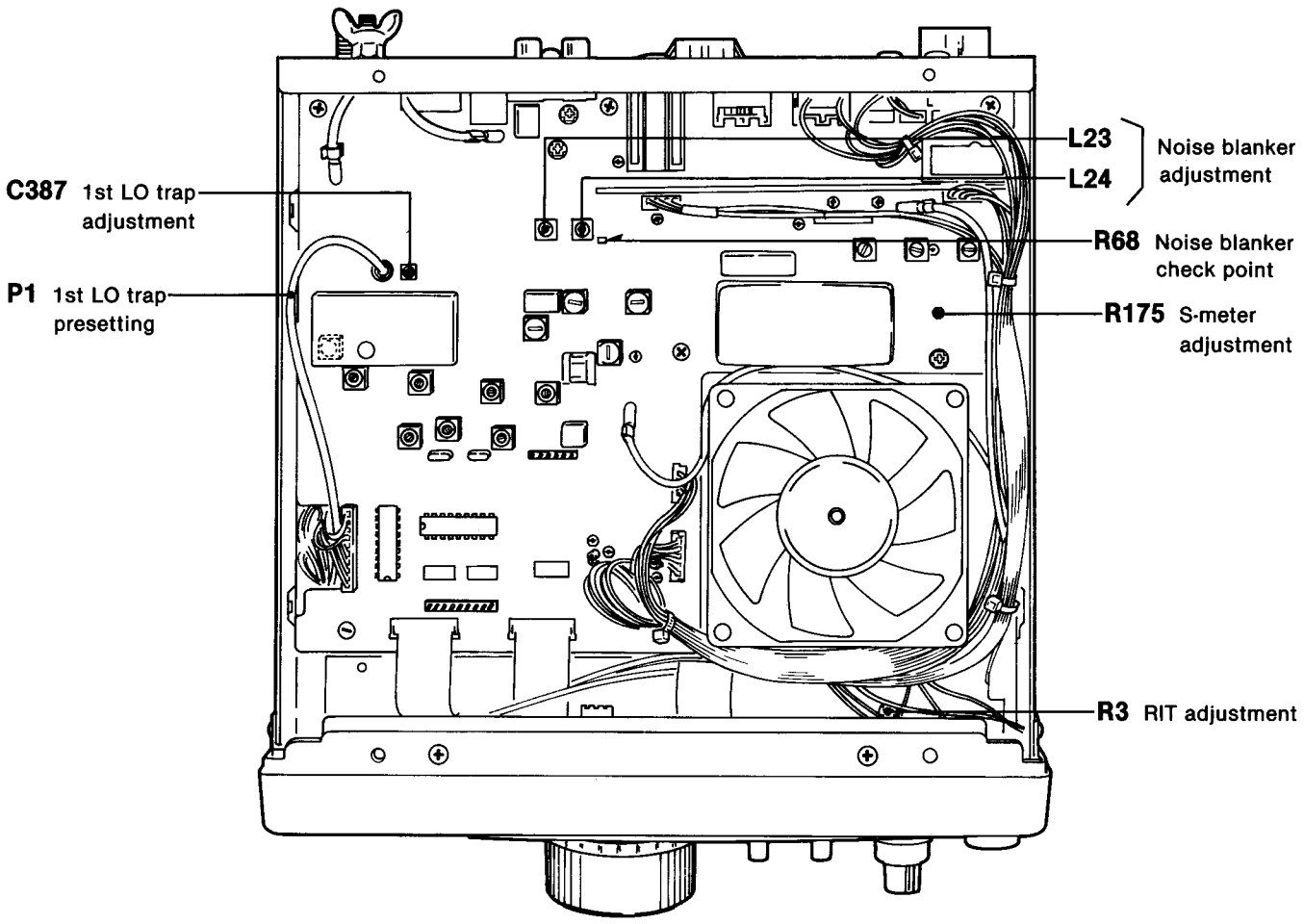


RECEIVER ADJUSTMENT (CONTINUED)

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
S-METER	1	• Displayed frequency: 14.1000 MHz • Mode : USB • [RIT] switch : OFF • [NB] switch : OFF • [PRE AMP] switch : OFF • Connect the SSG to the [ANT] connector and set as: Frequency : 14.1000 MHz Level : 25 µV* (−79 dBm) Modulation: OFF • Receiving	Function display	S-indicator	5 dots just appear. ▬▬▬▬▬	MAIN	R175
NOISE BLANKER	1	• Displayed frequency: 14.1000 MHz • Mode : USB • [NB] switch : OFF • [PRE AMP] switch : ON • Receiving • Connect the SSG to the [ANT] connector and set as: Frequency : 14.1000 MHz Level : 3.2 µV* (−97 dBm) Modulation: OFF • Apply the following signal to the SSG's output.  	MAIN	Connect the oscilloscope to R68.	Adjust for maximum waveform on the oscilloscope.	MAIN	L23, L24
	2	• [NB] switch : ON • Set the SSG as: Level : 10 µV* (−87 dBm) Modulation: OFF • Apply the same signal as shown above.			The noise must be blanked.		Verify
1st LO TRAP	1	• Displayed frequency: 14.1000 MHz • Mode : USB • [PRE AMP] switch : OFF • Connect the SSG to P1 (MAIN unit) and set as: Frequency : 64.4550 MHz Level : 3.2 µV* (−97 dBm) Modulation: OFF • Receiving	Rear panel	Connect the AC millivoltmeter to the [EXT SP] jack with an 8 Ω load.	Adjust for minimum speaker output.	MAIN	C387
	1						
RIT	1	• Displayed frequency: 14.1000 MHz • Mode : USB • Connect the SSG to the [ANT] connector and set as: Level : 50 µV* (−73 dBm) Modulation: OFF • [RIT] control : Center • [RIT] switch : ON and OFF • Receiving	Front panel	Speaker	Same tone pitch on both conditions.	VR	R3

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

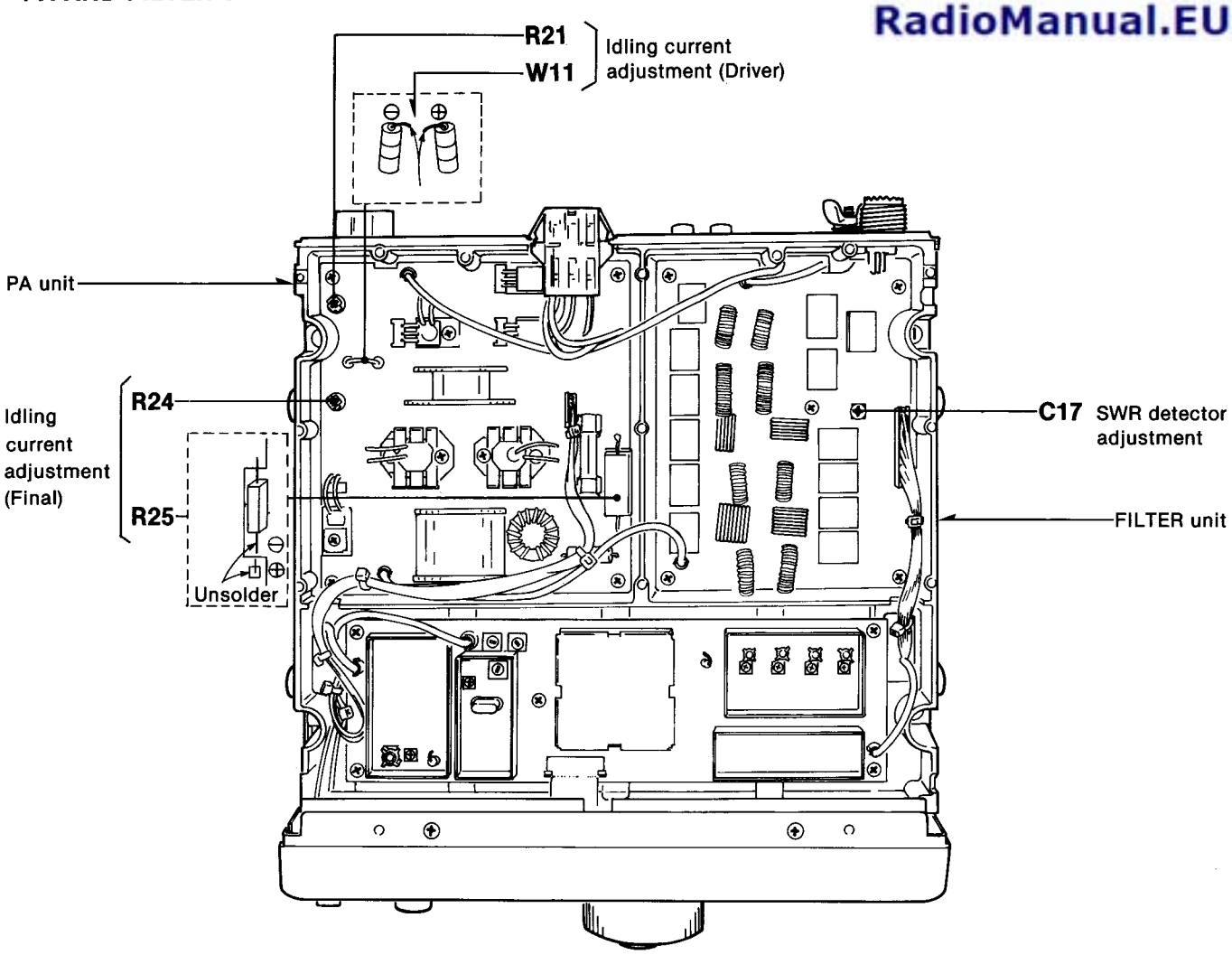
• MAIN AND VR UNITS



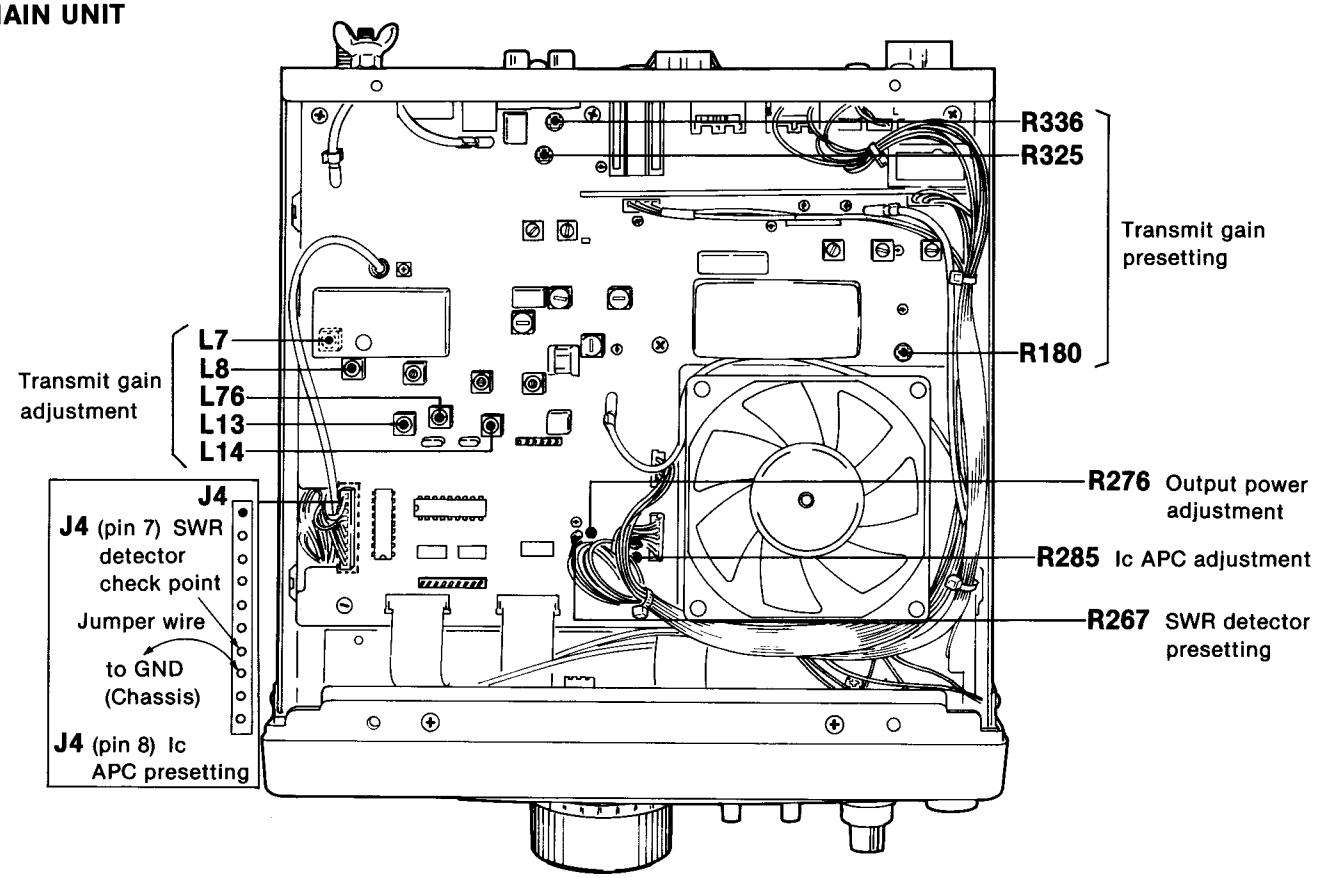
5-4 TRANSMITTER ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
IDLING CURRENT Ⓐ For drive transistors	1	• Displayed frequency: 14.1000 MHz • Mode : USB • [RF PWR] control : Max. CCW • [MIC] control : Max. CCW • Transmitting	PA	Unsolder W11 and connect the ammeter to the unsoldering points.	100 mA	PA	R21
Ⓑ For final transistors	2			Unsolder R25 and connect the ammeter to the unsoldering points.	300 mA		R24
	3	After adjustment, re-solder W11 and R25.					
SWR DETECTOR	1	• Displayed frequency: 14.1000 MHz • Mode : USB • [RF PWR] control : Max. CCW • Connect the jumper wire between R267 (MAIN unit) and a ground.	Rear panel	Connect the RF power meter to the [ANT] connector.	100 W	Front panel	[MIC] control
	2	• Connect the audio generator to the [MIC] connector and set as: Level : 30 mV Frequency : 1.5 kHz • Transmitting	MAIN	Connect the DC voltmeter to J4 (pin 7).	Minimum	FILTER	C17
	3	After adjustment, remove the jumper wire from R267.					
TRANSMIT GAIN	1	• Displayed frequency: 14.1000 MHz • Mode : USB • [RF PWR] control : Max. CW • R180 (MAIN unit) : Max. CW • R325, R336 (MAIN unit): Center	Rear panel	Connect the RF power meter to the [ANT] connector.	50 W	Front panel	[MIC] control
	2	• Connect the audio generator to the [MIC] connector and set as: Level : 3 mV Frequency : 1.5 kHz • Transmitting			Maximum	MAIN	L14, L76, L13, L8, L7
OUTPUT POWER	1	• Displayed frequency: 14.1000 MHz • Mode : USB • [RF PWR] control : Max. CW • [MIC] control : Center • Connect the audio generator to the [MIC] connector and set as: Level : 30 mV Frequency : 1.5 kHz • Transmitting	Rear panel	Connect the RF power meter to the [ANT] connector.	100 W	MAIN	R276
Ic APC	1	• Displayed frequency: 14.1000 MHz • Mode : USB • [RF PWR] control : Max. CW • [MIC] control : Center • Connect the jumper wire between J4 (pin 8, MAIN unit) and a ground. • Connect the audio generator to the [MIC] connector and set as: Level : 30 mV Frequency : 1.5 kHz • Transmitting	Rear panel	Connect the ammeter between the DC power supply and IC-77.	22 A	MAIN	R285

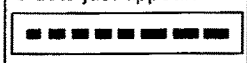
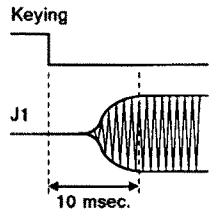
• PA AND FILTER UNITS



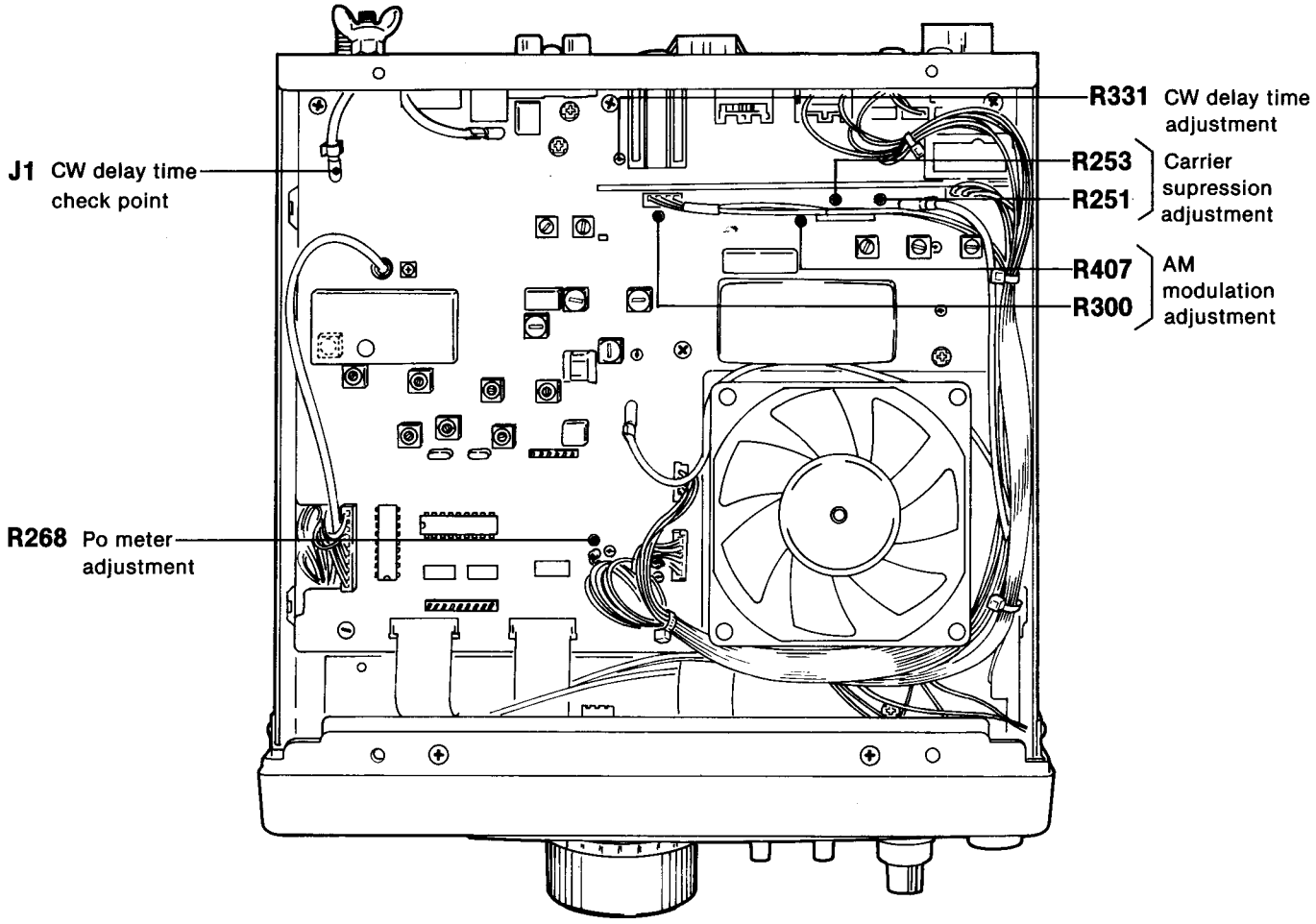
• MAIN UNIT



TRANSMITTER ADJUSTMENT (CONTINUED)

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
Po METER	1	• Displayed frequency: 14.1000 MHz • Mode : USB • Connect the audio generator to the [MIC] connector and set as: Level : 30 mV Frequency : 1 kHz • Transmitting	Rear panel	Connect the RF power meter to the [ANT] connector.	85 W	Front panel	[RF PWR] control
	2		Function display	RF indicator	8 dots just appear. 	MAIN	R268
CARRIER SUPPRESSION	1	• Displayed frequency: 14.1000 MHz • Mode : USB • [MIC] control : Max. CCW • Apply no signal to the [MIC] connector. • Transmitting	Rear panel	Connect the spectrum analyzer to the [ANT] connector via the attenuator.	Minimum carrier level (Less than −40 dB)	MAIN	R251, R253 (Alternate adjustment)
AM MODULATION (#02 only)	1	• Displayed frequency: 14.1000 MHz • Mode : AM • R300 (MAIN unit) : Center • [RF PWR] control : Max. CW • [MIC] control : Center • Connect the audio generator to the [MIC] connector and set as: Level : 3 mV Frequency : 1 kHz • Transmitting	Rear panel	Connect the modulation analyzer to the [ANT] connector via the attenuator.	70% modulation	MAIN	R407
	2	• Set the audio generator as: Level : 30 mV Frequency : 1 kHz			90% modulation		R300
CW DELAY TIME (#02 only)	1	• Displayed frequency: 14.1000 MHz • Mode : CW • [RF PWR] control : Max. CW • Connect a keyer to the [KEY] jack and key down.	MAIN	Connect the oscilloscope to J1 and the keyer.	Adjust as follows: 	MAIN	R331

• **MAIN UNIT**




POWER
PREAMP
HF TRANSCEIVER
RIT
RIT
FC
MIC
RF PWR
LOCK
ICOM
IC-77

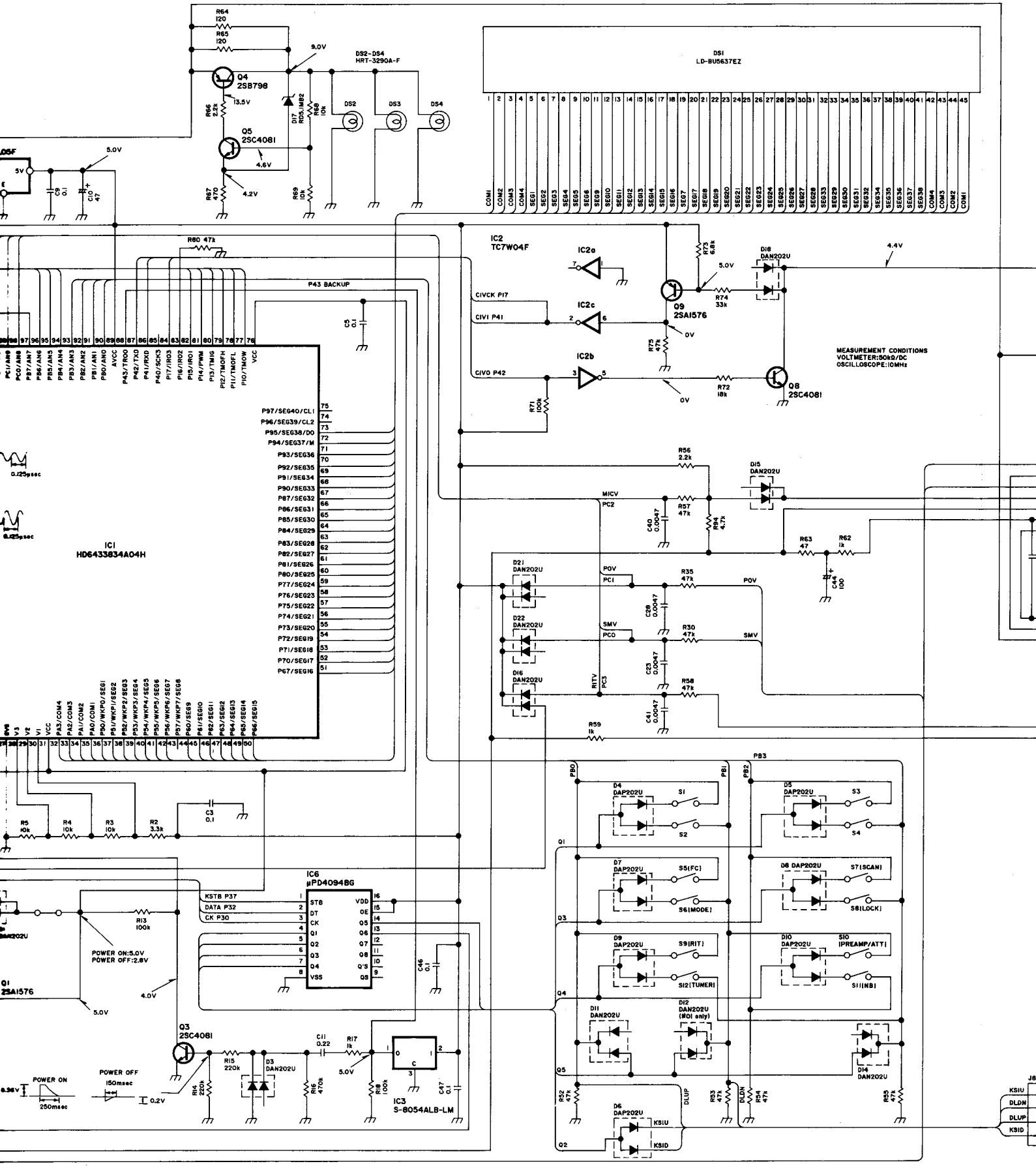

RX
PREAMP
700000
RIT
RIT
FC
PREAMP/ATT
MODE
NB
SCAN
SQL
MIC
RF PWR
LOCK


POWER
NB
RIT
LSB
VFO A
10.76 1.2
18
HF TRANSCEIVER
TUNER
PHONES
MIC
RIT
AF-⊙-SQL
RIT
TS
PREAMP/ATT
MODE
NB
SCAN
MIC
RF PWR
LOCK
FUNC
A/B
V/M
SPLIT
M▸VFO
ICOM
IC-707

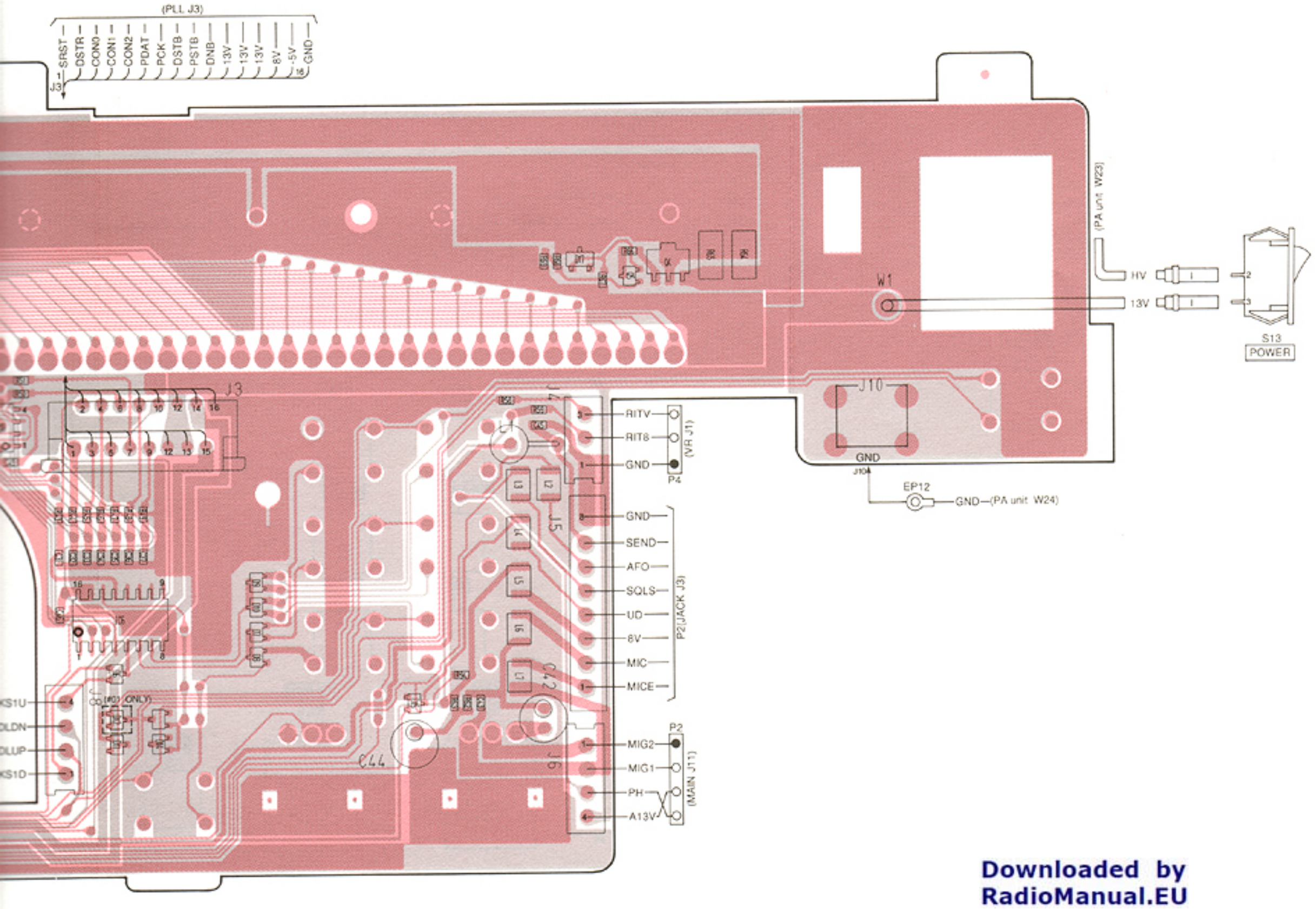
The Icom IC-77 is the version marine of Icom IC-707.

For maximum of power HF on IC-77:
1) Remove screws open case from transceiver.
2) In the main unite find the R276 trimer close the fan (left side).
3) Connect the dummy load and power meter.
4) Turn on the transceiver.
5) whith a screwdriver turn right the trimmer slowly looking the power meter until the max power.
6) reassemble the radio.

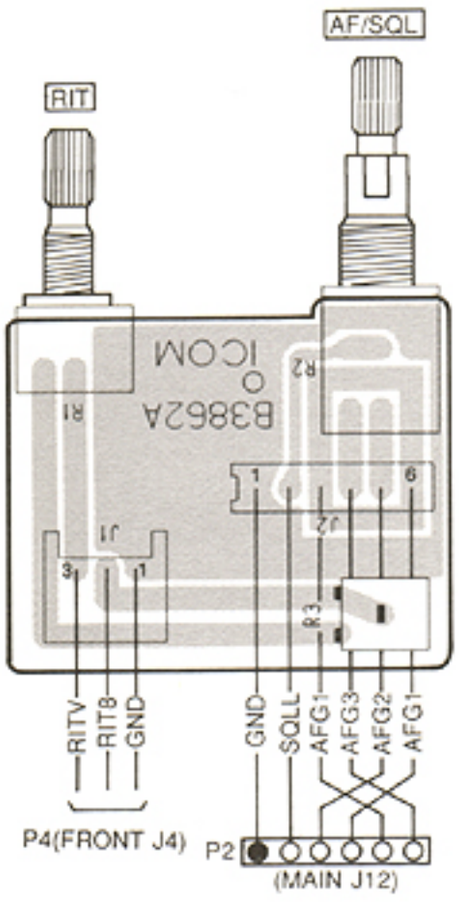
Expanded RF modification 1.6-30MHz:
1) Remove screws open case from transceiver.
2) Locate front unit board.
3) Remove D12 if exist.
4) Add D13 if no exist (with D12 by example).
5) Add D11 if no exist (with D14 by example).
6) Remove D14.
7) Reassemble the radio.
It is possible use other type of diode.


DS1
LD-BU5637EZ
DS2-DS4
HRT-3290A-F
Q4
2SB798
Q5
2SC4081
IC1
HD6433834A04H
IC2
TC7W04F
IC2a
IC2b
IC2c
Q9
2SA1576
Q8
2SC4081
Q1
2SA1576
Q3
2SC4081
IC6
μPD4094BG
IC3
S-8054ALB-LM
P43 BACKUP
CIVCK P17
CIVI P41
CIVO P42
MICV
PC2
POV
PC1
SMV
PCO
RITV
PC3
KSTB P37
DATA P32
CK P30
POWER ON:5.0V
POWER OFF:2.8V
POWER ON
POWER OFF
150msec
250msec
0.2V
MEASUREMENT CONDITIONS
VOLTMETER:50kΩ/DC
OSCILLOSCOPE:10MHz
S1
S2
S3
S4
S5(FC)
S6(MODE)
S7(SCAN)
S8(LOCK)
S9(RIT)
S10(PREAMP/ATT)
S12(TUNER)
S11(NB)
KSIU
KSID
DLDN
DLUP

The combination of this page and the next page show the unit layout in the same configuration as the actual P.C. Board.



• VR UNIT



• JACK UNIT