BR777
ALIGNMENT PROCEDURE

1. REFERENCE TEST EQUIPMENT

A. HP8921A Cell site test set or HP8920A, B Communication Test Set with Spectrum Analyzer option.
B. Fluke 187 Digital Voltmeter
C. HP E3615A Power supply

2. TEST POINT

A. ANTENNA	: Test point is not prepared. Use antenna contact with ANTENNA_GND_T(antenna ground).
B. VCO reference voltage	: Test point 1 is prepared.
C. RX audio output	: Test point SPKOUT is prepared.
D. TX Mic. Input	: Test point MICIN is prepared.
E. Battery Vcc	: Test point BAT is prepared.
F. Up Key	: Test point UP is prepared.
G. Down Key	: Test point DW is prepared.
H. Function Key	: Test point Menu is prepared.
I. Monitor Key	: Test point SCAN is prepared.
J. PTT Key	: Test point PTT is prepared.
K. CALL Key	: Test point CALL is prepared.

Note. : All key can be activated when connect with ground except Power key.

3. VCO ALIGNMENT

A. Set unit to Channel 1 and connect a voltmeter to TP1 (VCO PD).
B. Press & hold PTT.
C. Extend L303 until the voltmeter reads 1.0V.
D. Release PTT button so units is in receiving mode and monitor the voltage on TP1. The voltage should be in the range 1.0Vds +/-0.5V
E. Set unit to channel 4.
F. Press & hold the PTT switch and observe the voltage on TP4. The voltage should be 1 – 2.4 Vdc.
G. Release PTT and observe the voltage on TP1. The voltage should read between 1.0 – 2.4 Vdc.

Note : VCO shield-can should be soldered after VCO alignment is finished.

4. TRANSMITTER FREQUENCY ALIGNMENT

A. Press & hold the PTT button.
B. Align CT201 trimmer capacitor such that the output frequency is equal to the channel frequency with a maximum error of +/- 200 Hz. CT201 is located on the left side of VCO shield can.

5. TRANSMITTER OUTPUT POWER CONFIRMATION

A. Set unit to channel 1 and power Hi mode.
B. Press & hold the PTT button.
C. Transmit power should normally be between 1.0W to 1.5W.

6. TRANSMITTER DEVIATION ALIGNMENT

A. Connect an audio generator (600 ohms) to the ear jack. The audio frequency should be set at 1KHz with a level of 200mV RMS.
B. Connect an FM deviation meter (communications test set) to Antenna contact. Set the monitor to read peak to peak divided by two [(pk-pk)/2] deviation. Set filter of equipment from 25Hz to 15KHz.
C. Press & hold the PTT button.
D. Align RV2 for +/- 2.0 kHz deviation (+/-0.1KHz). RV2 is located on the bottom of the VCO shield can.
E. Decrease audio generator level until deviation reads +/- 1.5 kHz (approximately 4mV) and record generator level. Level should be between 2 mV and 5 mV.
F. Confirm that transmit audio distortion is less than 5%.

7. RECEIVER ALIGNMENT

A. Set the output level of the RF signal generator for -47dBm. The generator should be set for 1.5 kHz deviation at 1 kHz audio.
B. Set volume level 4 (It is initial.).
C. Connect Audio analyzer to SPKOUT.
D. Set equipment filter 25Hz to 15KHz.
E. Align CF3 to get a maximum output level & a minimum distortion and confirm that Rx audio distortion is less than 3%.
F. Confirm that Rx Sensitivity is less than –120dBm (nominally –123dBm) by reducing the output level of the RF signal generator until a 12 dB SINAD reading is achieved.
H. Set SSG output level until 9dB sinad sensitivity and confirm until the unit is un-squelched.
I. Set signal generator level to –47dBm.
J. With 1.5KHz deviation at 1KHz modulation, set volume for maximum audio. Audio level should be on over than 1.5Vrms.

8. BATTERY INDICATOR CONFIRMATION

A. Set unit to receiving mode. Don’t set transmitter mode..
B. Set power supply voltage to 3.7 Vdc.
C. Decrease power supply voltage until low battery icon blinks.

9. POWER OFF CURRENT CONSUMPTION

A. Set power supply voltage to 3.7 Vdc and connect to unit.
B. Confirm current. It must be less than 100uA.

10. FREQUENCIES TABLE

Display #	Freq. MHz	Display #	Freq. MHz
1	464.5000	29	462.9125
2	464.5500	30	464.4875
3	467.7625	31	464.5125
4	467.8125	32	464.5375
5	467.8500	33	464.5625
6	467.8750	34	466.0375
7	467.9000	35	466.0625
8	467.9250	36	466.0875
9	461.0375	37	466.1125
10	461.0625	38	466.1375
11	461.0875	39	466.1625
12	461.1125	40	466.1875
13	461.1375	41	466.2125
14	461.1625	42	466.2375
15	461.1875	43	466.2625
16	461.2125	44	466.2875
17	461.2375	45	466.3125
18	461.2625	46	466.3375
19	461.2875	47	466.3625
20	461.3125	48	467.7875
21	461.3375	49	467.8375
22	461.3625	50	467.8625
23	462.7625	51	467.8875
24	462.7875	52	467.9125
25	462.8125	53	469.4875
26	462.8375	54	469.5125
27	462.8625	55	469.5375
28	462.8875	56	469.5625

BR777
LABORATORY TESTING PROCEDURES

UNIT TEST - (UNIT ASSEMBLED)

TEST PREPARATION

1) Install 1 Lithium Ion battery.
   - Left bottom terminal is the system plus polarity
   - Right bottom terminal is the system minus polarity.

2) Press the power button.

SYSTEM TEST

1) Radiated Transmit and Receive performance may be observed.

2) Audio out & Audio in are available at the Headset jack.

LABORATORY TEST - (UNIT UN-ASSEMBLED)

TEST PREPARATION

1) Disassemble unit (4 screws – 2 behind battery cover). Remove the back cabinet.

2) Remove the antenna and install a 50 ohm coax cable in its place.

3) Either clip alligator leads or solder test leads to the power supply connections. The positive terminal is the lower right terminal. The negative terminal is the lower left terminal. (battery side view)

4) Connect 3.7VDC power source to the terminals, observing correct polarity.

5) Connect an 16-ohm load through the Headset jack (right terminal of 2.5mm stereo phone plug).

6) Connect a audio generator with 10uF coupling capacitor through the Headset jack (left terminal of 2.5mm stereo phone plug).

7) Select desired channel 1- 4 using CH up/down keypad switch.

BR777
LABORATORY TESTING PROCEDURES

SPECIFIC TEST METHODS AND GUIDANCE

Modulation Characteristics – *(paragraph 2.1047(a) of the Rules)*

FOR TX AUDIO FILTER RESPONSE

1. Connect audio generator with 10uF coupling capacitor to microphone input jack. Press PTT button.
2. Connect RF output with modulation meter. (Filters of modulation meter should be set to a 50Hz to 15KHz.)
3. Adjust audio generator about 5-6mVrms for 0.75KHz modulation.
4. While transmitting, sweep generator and note measurement.
5. Please compensate the back-ground noise level.

Modulation Characteristics – *(paragraph 2.1047(b) of the Rules*

FOR TX AUDIO LOW PASS FILTER RESPONSE.

1. Connect audio generator with 10uF coupling capacitor to microphone input jack. Press PTT button.
2. Connect AC voltmeter or other test equipment via jumper wire to the junction of R39 & C53.
3. Adjust audio generator for 200mV.
4. While transmitting, sweep generator and note measurement.

Occupied Bandwidth – *(paragraph 2.1049(c) of the Rules)*

1. Connect an audio frequency sweep generator with 10uF coupling capacitor to microphone input jack.
2. Adjust audio generator to a frequency of 2500Hz and a level of 100mV rms (+16dB above 10-12mV per FCC).
3. With a spectrum analyzer, transmit the radio and monitor the transmitter though an antenna.
4. Note required measuements per FCC.

BR777
PRODUCTION SPECIFICATION

1. GENERAL SPECIFICATION

	Items	Specifications
1	**Tx Frequency range**	461.0375MHz ～ 469.5625MHz
2	**Tx VCO Frequency range**	Same as item 1
3	**RX Frequency range**	Same as item1
4	**RX VCO Frequency range**	4439.6375MHz ～ 448.1625MHz (Lower Heterodyne)
5	**Channel Number** **Channel Spacing**	4CH 25KHz
6	**Frequency Control**	PLL Synthesizer with Temperature Compensated Crystal Reference
7	**IF frequencies**	21.4 MHz for 1'st IF 450KHz for 2'nd IF
8	**Modulation**	FM (F3E emissions)
9	**Standard Test Modulation signal**	Modulated audio Frequency : 1KHz Test modulation : +/-1.5KHz
10	**TX Frequency stability**	Max. +/-2.5ppm (-30℃ to +60℃)
11	**Nominal test temperature Range**	25℃ +/- 5℃
	Extreme operating temperature Range	-20℃ to +50℃
12	**Antenna Impedance**	50 ohm +/- 25 ohm
13	**Power source**	1 Lithium Ion battery
14	**Test Power Supply Voltage**	3.7Vdc. +/-0.1Vdc
	Extreme Supply Voltage Range	3.2Vdc to 4.2Vdc
15	**Battery life time (Typ. 5/5/90 duty)**	Min. 45 Hours
16	**Microphone**	Self contained Electret
17	**Speaker**	Self contained 16 ohm

2. DETAILED SPECIFICATION

A. RECEIVER SECTIONS

* Normal test condition *

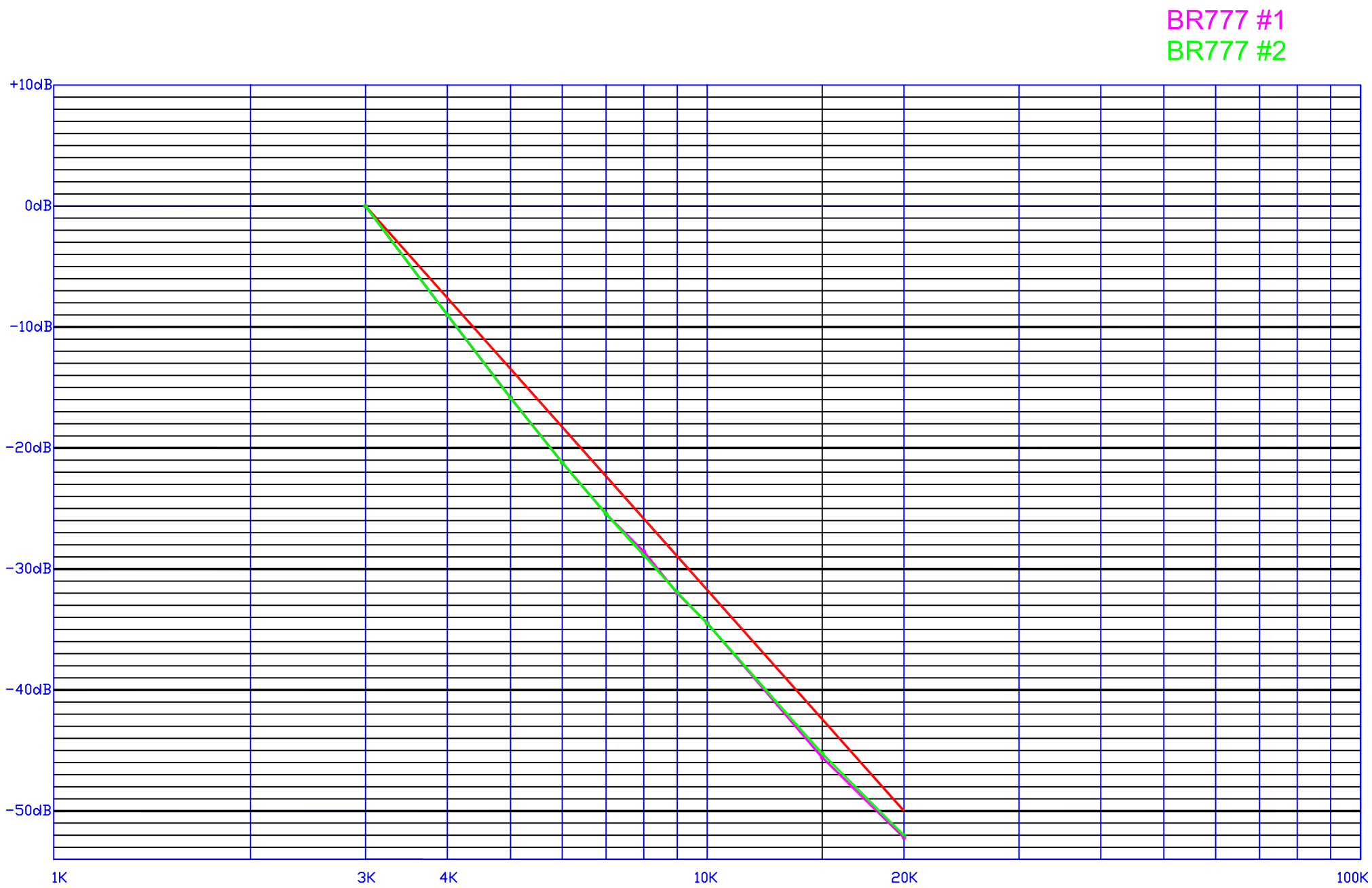
	TYP.	LIMIT
1. MAXIMUM USABLE SENSITIVITY * 1KHz +/-1.5KHz DEV. * REF. CHANNEL 1 & 4	-120dBm	<-118dBm
2. 20dB QUIETING SENSITIVITY * 1HKz +/-1.5KHz DEV. * REF. CHANNEL 1 & 4, 12dB SINADDER	-114dBm	<-110dBm
3. ADJACENT CHANNEL TWO SIGNAL SELECTIVITY & SENSITIZATION * +/- 1 CHANNEL SPACING		>50dB
4. INTER-MODULATION SPURIOUS RESPONSE ATTENUATION		>50dB
5. SPURIOUS EMISSIONS * CONDUCTIVE CONNECTION		<-53dBm
6. RECEIVE FREQUENCY RESPONSE * REF. 1KHz +/-1.5KHz DEV. 250Hz 3KHz	 -18.0dB -12.0dB	 +/-2.0dB +/-3.0dB
7. AUDIO OUTPUT LEVEL * REF. 1KHz +/-1.5KHz DEV. * (No LOAD) * Volume Max.	1.8V	>1.3V
8. AUDIO OUTPUT DISTORTION * REF. 1KHz +/-1.5KHz DEV. * (No LOAD)		<5%
9. MAX. S/N RATIO * REF. 1KHz +/-1.5KHz DEV. * (No LOAD)	36 dB	>30dB
10. RX VCO REF. VOLTAGE * REF. CHANNEL 1 * REF. CHANNEL 4	1.0V 2.0V	+/-0.3V +/-0.3V
11. SQUELCH THRESHOLD * REF. 1KHz +/-1.5KHz DEV.*	9dBsinadder	-3dB - +3dB
16. CURRENT CONSUMPTION * Un-squelched Volume Max. * Squelched * Power Off	200mA 35mA 50uA	+/-40mA <40mA <100uA

BR777
PRODUCTION SPECIFICATION

B. TRANSMITTER SECTIONS

	TYP	LIMIT
1. TRANSMITTER FREQUENCY TOL. * REF. CHANNEL 1		<+/-200Hz
2. TRANSMITTER RF POWER * REQUIRED CONDUCTIVE CONNECTION * REF. CHANNEL 1 Hi Power (DC3.7V) Low Power	 1.2W 0.4W	 +0.3W / -0.2W +0.3W / -0.2W
3. TRANSMITTER OCCUPIED BANDWIDTH * REQUIRED CONDUCTIVE CONNECTION * REF. CHANNEL 1 @12.5KHz		<-50dBC
4. TRANSMITTER SPURIOUS * REQUIRED CONDUCTIVE CONNECTION * REF. CHANNEL 8		<-50dBC
5. MODULATION SENSITIVITY * REF. 1KHz AUDIO * CHANNEL 1 , @+/-1.5KHz	 4mV	 +/-2mV
6. MODULATION LIMITING * REF. 1KHz AUDIO, CHANNEL 1 * (INPUT AUDIO ; 200mVrms)	 +/-2.2KHz	 +/-0.2KHz
7. CTCSS CODE DEVIATION * CH 1 * CH38	 0.4KHz 0.4KHz	 +/-0.1KHz +/-0.1KHz
8. MODULATION AUDIO DISTORTION * REF. 1KHz AUDIO +/-1.5KHz	 3%	 <5%
8.TX AUDIO FREQUENCY RESPONSE * REF. 1KHz AUDIO, CHANNEL 1 * (INPUT AUDIO ; 3mVrms) 250Hz 3KHz 6KHz	 -31.0dB +6.0dB -16.0dB	 +/-3.0dB +/-3.0dB +/-3.0dB
9. TX MODUALTION S/N * REF. 1KHz AUDIO, CHANNEL 1 * (REF. INPUT AUDIO ; 12mVrms)	 	 >30dB
10. TX VCO REF. VOLTAGE * CHANNEL 1 * CHANNEL 14	 1.0V 2.0V	 +/-1.0V +/-1.0V
11. CURRENT CONSUMPTION * DC5V Power Hi	 800mA	 +/-200mA

Frequency Response of the Audio Low Pass Filter



BR777
TX AUDIO TEST RESULT

Frequency Response of Audio Low Pass Filter (150mV input)

	3K	4K	5K	6K	7K	8K	9K	10K	15K	20K
#1	0	-8.90	-15.80	-21.10	-25.30	-28.90	-32.00	-34.50	-45.40	-52.1
#2	0	-9.00	-15.90	-21.20	-25.30	-28.90	-31.90	-34.50	-45.20	-50.2