1.1 Apply +3 V to the battery terminals with the proper polarity. Use a ferrite isolator on the power cable to help prevent RF energy from affecting power supply operation and voltage readings.

1.2 Ensure that audio gain is set to standard setting. If "-10dB" dot is present in display, then hold channel button down until the dot goes away.

1.3 If required to minimize radiated emissions, remove L641 to disengage the antenna.

1.4 De-solder mic cartridge wires and connect the audio input generator to CON1 & CON2. Alternatively, for the ATE fixture, the audio signal may be input at TPA0.

1.5 Turn on the BLX2 by holding down the POWER button (SW313), or on the ATE fixture short TPPWR to DGND.

1.6 The transmitter will power up with its frequency set to the previously selected channel. Use the channel button to select a test frequency from chart, (see Table 9).

RF Tuning

2.0 **VCO Tuning:** Set the transmitter to LOW channel (see Table 9). Tune CV500 for a DC voltage at PLL_TV in the range 0.9-1.1V for all bands except H8, H8E, H9, H10, H10E, H11, H62, J10, JB, K3E, R12, S8, T11, and X7. Tune H8, H8E, H9, H10, H10E, H11, H62 J10, J11, K3E, R12, and S8 to 1.4-1.6V. Tune JB to 1.9-2.1V. Tune X7 to 2.0-2.2V. Tune T11 to 3.4-3.6V.

2.1 Set the transmitter to HIGH channel (see Table 9).
Make sure that the voltage at PLL_TV is ≤ 4.6V for all bands.

2.2 **Frequency Alignment:** Make sure no audio signal is applied to the transmitter, by shorting the microphone capsule leads. Set the transmitter to MID (see Table 9). Use a frequency counter or spectrum analyzer to measure the carrier frequency at the node between L606 and C617. Adjust CV501 while monitoring the output carrier such that the frequency is within ± 1 kHz of the specified frequency (per Table 9). **This test is not valid for board group 190-23744**.

2.3 **RF Power** Verify L641 installed, then using a power meter or spectrum analyzer, check the power level of the carrier at LOW/CENTER/HIGH frequencies (see Table 9) at I600 and verify that the measurement agrees with the **I600 Pout RANGE** values in the following table (Table 10).
Account for cable losses.
For a more accurate output power measurement, perform the following procedure:

a) Remove L641.
b) Remove and replace C617 with the **50 Ohm C617 Part Number/Value** in (Table 10).
c) Attach 50 Ohm coaxial connection at the node that connects L606, C617, & L641 then check the power level of the carrier at LOW/CENTER/HIGH frequencies (see Table 9).
d) Verify that the measurement agrees with the **50 Ohm Pout RANGE** values in (Table 10).
e) Remove 50 Ohm coaxial connection and restore L641 and C617 to their original values.

Table 10 RF Power

		Pout RANGE (dBm)

GROUP	50 Ohm C617 Part Number/Value	50 Ohm Pout RANGE	***I600 Pout RANGE
H8 & H8E*	150QC688CA/6.8pF	6 – 10 dBm	7.1 – 13.1
H9	150QC688CA/6.8pF	10 ± 3 dB	7.1 – 13.1
H10	150QC688CA/6.8pF	10 ± 3 dB	7.1 – 13.1
H10E*	150QC688CA/6.8pF	10 ± 3 dB	7.1 – 13.1
H11**	150QC688CA/6.8pF	7 – 12 dBm	7 – 12.25
H62*	150QC688CA/6.8pF	6 – 10 dBm	7.1 – 13.1
J10	150QC688CA/6.8pF	10 ± 3 dB	4.4 – 11.0
J11**	150QC688CA/6.8pF	7 – 12 dBm	4.4 – 11.0
M15 & M17	150QC828CA/8.2pF	10 ± 3 dB	3.4 – 9.8
K12 & K14	150QC688CA/6.8pF	10 ± 3 dB	5.1 – 11.2
L19	150QC688CA/6.8pF	10 ± 3 dB	4.7 – 10.8
Q24	150QC568CA/5.6pF	10 ± 3 dB	7.5 – 13.6
Q25	150QC568CA/5.6pF	10 ± 3 dB	7.5 – 13.6
Q26	150QC568CA/5.6pF	10 ± 3 dB	6.6 – 12.7
S8*	150QC478CA/4.7pF	6 – 10	6.4 – 11.5
R12*	150QC568CA/5.6pF	6 – 10	6.4 – 11.5
JB*	150QC478CA/4.7pF	6 – 10	7.5 – 12.5
T11*	150QC478CA/4.7pF	6 – 10	6.1 – 11.2
X7*	150QC478CA/4.7pF	6 – 10	3.0 – 8.1
K3E*	150QC688CA/6.8pF	6 – 10	5.8 – 10.9
M16	150QC828CA/8.2pF	10 ± 3 dB	2.6 – 8.7
M18	150QC828CA/8.2pF	10 ± 3 dB	2.6 – 8.7
P18	150QC828CA/8.2pF	10 ± 3 dB	3.3 – 9.4

*Limited to 10 dBm maximum **radiated output power**.
**Power specification adjusted to accommodate SAR compliance
***ATE limits adjusted for rack, fixture, and probe variables

Deviation Adjustment

The following procedure requires a tuned BLX4 or other IF receiver that is designed to operate in the BLX2 handheld transmitter's band.

3.1 **Determine Deviation Reference Level**

- Connect the RF signal generator to one of the receiver antenna ports, or connect antennas to transmit wirelessly. The BLX2 handheld should be OFF.
- Set the receiver channel to match that of the handheld transmitter being tested.
- Set the RF signal generator to the corresponding carrier frequency.
  Set its RF power out to –50 dBm.
- On the RF signal generator, apply a dual sine modulation function with
  FM rate1 = 1 kHz, FM rate2 = 32.768 kHz, and ***ampl = 12%***. Set deviation to ***37.5 kHz***.
  (For X7 band, apply a dual sine modulation function with
  FM rate1 = 1 kHz, FM rate2 = 32.768 kHz, and ampl = 16%. Set deviation to 27.5 kHz.)

Note: The above settings correspond to approximately 33 kHz audio deviation (24 kHz audio deviation for X7 band).

- Measure and record the audio level at the unbalanced output of the BLX4 receiver. This is the ***deviation reference level (0dBr)***.
- Disconnect and turn off the RF signal generator.

3.2 Tune Compander & Deviation

- Apply +3V to the battery terminals on the BLX2 handheld and power up the unit (SW313). Make sure gain is in the standard setting (NO "-10dB" dot lit).
- Connect the audio generator output to the BLX2 audio input, and set the audio generator frequency to 1kHz with an initial level of ***-35 dBV (-32.8dBu)***.
- Adjust the generator level to give ***-15.8 dBV (-13.6dBu) ± 0.1 dB at TPA1***.
- Tune compressor: adjust ***TR160*** to get ***-6.40 dBV (-4.2dBu) ± 0.15 dB at TPA2***.
- Tune deviation: adjust ***TR200*** until the audio level at the unbalanced output of the BLX4 receiver is equal to ***+5.0dBr*** (should this be 0dBr ? –Kevin) (relative to ***deviation reference level***) ± 0.25dB.

  If using a modulation analyzer, adjust for deviation of 36.8kHz +/- 150Hz (For X7 band: 25.2kHz +/- 150Hz).

VI Test for Product Acceptance

Tests to be done in sequential order.

NOTE 1: It is highly recommended that the following tests be conducted in an RF screen room.
NOTE 2:Test numbers are for ambient conditions of 25°C ± 5°C (77°F ± 9°F) and relative humidity 10-60%. Operation near climate limits may result in the following variances:

- Audio Deviation Test: Measured deviation should be within ±10kHz of nominal value (See "*Audio Deviation Test"* under the "Closed Box Acceptance Tests" for more detail)
- RF Output Power: Measured power should be at least –5dBm (See "*RF Output Power Test"* under the "Closed Box Acceptance Tests" for more detail)
- RF Frequency Stability: Measured frequency should be within +/- 5kHz of the transmitter frequency (See "*RF Frequency Stability Test"* under the "Closed Box Acceptance Tests" for more detail)

1.0 Initial Setup
Connect the (+) terminal of the power supply through a milliammeter to the positive battery terminal and the (-) terminal to the negative battery terminal. Connect a DC Voltmeter across the battery terminals. Connect the audio generator to CON1 & CON2. Connect the RMS audio voltmeter across the generator. Connect the audio distortion analyzer between TPA2 (output of VCA) and ground.

2.0 Current Consumption Test
With +3Vdc to the battery terminals and the power turned on (SW313), measure the current drain using a DC milliammeter. It should be 110 ± 15mA.

3.0 Reverse Battery Protection Test
Adjust the bench power supply voltage to -3.0 ± 0.1 Vdc as indicated on the DC voltmeter. Measure the current drain on the milliammeter. The current should be less than 0.5 mA.

4.0 Voltage Regulation Check
With power applied properly, and the unit switched on, the following DC voltages should be measured at the corresponding test points with respect to ground (TPEGND).

TPB+ (Battery input) = 3 ± 0.2 Volts
TP_5V (Power Converter) = 5 ± 0.2 Volts
TP +3.3V (Power Converter) = 3.3 ± 0.2 Volts
TPA1 (Audio Preamp) = 2.5 ± 0.2 Volts
TPA3 (Tone Key Summing Amp) = 2.5 ± 0.2 Volts
TPVREF = 2.5 ± 0.1 Volts

5.0 Frequency Response Test
Make sure gain is in the standard setting (NO "-10dB" dot lit). Set the audio generator frequency to 1kHz with an amplitude of -20.0dBu. Activate the 30kHz LPF on the audio generator and disengage the 400Hz HPF. Record the 1kHz AC level at TPA2 - this is the ***1kHz reference level***. Change the generator's frequency to 100Hz and measure the

level at TPA2 to be –1.8dB ± 0.25dB relative to the ***1kHz reference level***. Next, change the generator's frequency to 10kHz and measure the level at TPA2 to be +3.0dB ± 0.25dB relative to the ***1kHz reference level***.

6.0 Distortion Test

Make sure gain is in the standard setting (NO "-10dB" dot lit). Set the audio generator frequency to 1kHz with an amplitude of -30.0dBu. Activate the 30kHz LPF on the audio generator. Measure the total harmonic distortion and noise (THD+N) at TPA2 to be less than 0.7%.

7.0 RF Output Power and Frequency Stability.

Choose any group and channel free of interference. Using a spectrum analyzer with the *appropriate-band* UA820 antenna, measure the approximate near field radiated power as follows: Set the SPAN=100 MHz, REF LVL=10dBm. Extend the UA820 away from the analyzer into the horizontal plane (straight out). Align the BLX2 antenna parallel to the UA820 as close as possible. Move the unit along the UA820 antenna and rotate it until you find a maximum peak. Do a peak search and measure the power to be at least 2 dBm for J10, M15, M16, M17, K12, K14, L19, P18, Q25 and Q26 bands and at least 0 dBm for H8, H8E, H9, H10, H11, H62, K3E, R12, JB, S8, T11, and X7 bands. Set span to 200 kHz and peak search onto the carrier. Measure the frequency to be within +/- 5 kHz of the nominal frequency you are testing. (See at end of the document.)

8.0 Tone Key Level Test

- View transmitting carrier on the spectrum analyzer with a span of 100 kHz. Use the "Peak Search, Marker Delta, Next Peak" soft-keys on the analyzer.
- Conduct test in a quiet environment, and do not speak during test.
- Change gain to "-10dB" setting by holding in "channel" button until gain dot lights.
- Use a DC power supply voltage of 2 – 3 Vdc ("fresh battery," green LED).
- Measure the 32.768 kHz tone key level to be -22 dBc ± 3 dB.
- Lower DC power supply voltage to 1.8 Vdc ("low battery," red LED).
- Measure the 32.768 kHz tone key level to be -15 dBc ± 3 dB.
- Change gain back to "0dB" setting by holding in "channel" button until gain dot light turns off.

"Closed Box" Acceptance Tests

RF Output Power Test

Test Equipment
Spectrum Analyzer
UA820 antenna

Set Up
Set the BLX2 transmitter on any frequency free of interference. Place the corresponding UA820 antenna on the spectrum analyzer input. Set the spectrum analyzer center frequency to the same frequency as the transmitter. Set the span to 100 MHz and the reference level to 10 dBm.

Procedure
Measure the approximate near-field radiated power by aligning the BLX2 antenna parallel to the UA820 antenna and keeping the antennas together as close as possible. Move the unit along the UA820 antenna and rotate it until you find a maximum peak. Perform a peak search and measure the power to be at least 0 dBm.

RF Frequency Stability Test

Test Equipment
Frequency Counter
UA820 antenna

Set Up
Set the BLX2 transmitter on any frequency free of interference. Place the corresponding UA820 antenna on the frequency counter input.

Procedure
Hold the BLX2 antenna up to the frequency counter antenna. Measure the frequency to be within +/- 5 kHz of the transmitter frequency.

Audio Deviation Test

Test Equipment
Spectrum Analyzer
UA820 antenna

Set Up
Set the BLX2 transmitter on any frequency free of interference. Make sure gain is in the standard setting (NO "-10dB" dot lit). Place the corresponding UA820 antenna on the spectrum analyzer input. Set the spectrum analyzer center frequency to the same frequency as the transmitter. Set the span to 100 kHz and the reference level to 10 dBm.

Use Sound Check system to acoustically input signal to BLX2. Use level setting of 100mV (-20dB). Set the spectrum analyzer to max hold, by using the "Trace" and "Max Hold A" buttons.

Hold the BLX2 parallel to the UA820. Move the unit around the antenna until the waveform stabilizes. **Using the "Peak Search, Marker Delta, Next Peak" soft-keys on the analyzer, measure the span of the waveform to be 43kHz +/- 7kHz PEAK TO PEAK**. Note: For **X7** Band the span will be **28kHz +/- 7kHz PEAK TO PEAK** due to Korean requirements.

Tone Key Level Test

Test Equipment

Spectrum Analyzer
UA820 antenna

Set Up

Conduct the test in a quiet environment and do not speak during the test. Set the BLX2 transmitter on any frequency free of interference. Change the gain to the "-10dB" setting by holding in the "channel" button until the gain dot is lit. Place the corresponding UA820 antenna on the spectrum analyzer input. Set the spectrum analyzer center frequency to the same frequency as the transmitter. Set the span to 100 kHz and the reference level to 10 dBm.

Procedure

Hold the unit up to the UA820 antenna. Use the "Peak Search, Marker Delta, Next Peak" soft-keys on the analyzer. The 32.768 kHz tone key level should measure between -15 dBc and -30 dBc (below the carrier power level). Change gain back to "0dB" position by holding in "channel" button until gain dot is not lit.