

## **MB1 Transmitter Tune-up Procedure**

### **Equipment Required**

RF spectrum analyzer with sensitivity of  $-100$  dBm or better, frequency range of 10 MHz to 3 GHz or wider, capable of non-distorted  $+20$  dBm input. Capable of measuring occupied bandwidth and power output. Device used in development: Rohde & Schwarz FSEA 3.5 GHz spectrum analyzer

Current limiting power supply capable of supplying 400 mA at 4 Volts with an accuracy of 3% or better. Device used in development: HP 6112A

### **Test Accessories**

2 feet of 50 Ohm flexible coaxial cable. The cable should be terminated with a mating connector for the spectrum analyzer and with an SSMA male connector for mating to the transmitter under test. The cable should have its loss characteristics measured (about 1 dB) and all power measurements should compensate for this loss.

50 Ohm, 10 dB Attenuator pad.

Non-ferrous tuning tool appropriate for tuning surface-mount variable capacitors.

Battery eliminator module for applying power to the unit under test.

Electrically conductive tweezers for entering calibration mode. Note that this procedure is performed on the PCBs when they are removed from their enclosure and is accessible only to Zaxcom employees.

### **RF Tuning**

All RF tuning adjustments are made on the TX-RF PCB board.

Apply power to the transmitter using the battery eliminator module. Set the external power supply to 3.8 Volts current limited at 400 mA. Observe that the transmitter passes its self-diagnostic tests.

Setup the Rohde & Schwarz FSEA 3.5 GHz spectrum analyzer to the following settings:

Start Frequency = 1 MHz

Stop Frequency = 3.5 GHz

Resolution bandwidth = 300 kHz

Using the front panel user interface of the transmitter under test, tune the transmitter to the center of its tuning range. Connect the antenna output of the device under test to the spectrum analyzer through a 50 ohm 10 dB attenuator. Tune C207 to produce maximum amplitude carrier. Tune C300 to produce maximum power output. Alternately tune C73 and C120 to produce maximum power output at the fundamental frequency. Tune C399 such that the 2nd harmonic is minimized. Observe the output of the transmitter to ensure power output is close to 50 mW ( $\pm 1$  dB). Repeat entire procedure. Set the spectrum analyzer to 99% occupied bandwidth mode and ensure that the occupied bandwidth is less than 180 kHz. Adjust transmitter to its lowest and highest operating frequencies. Ensure that all harmonics are suppressed at least 45 dB with respect to the fundamental output frequency at both minimum and maximum possible operating frequencies.

### **IQ Calibration**

Using the metallic tweezers, short the resistor (R113) on the TX-DSP board to enable IQ calibration mode. On the front panel interface, choose the "Cal I" menu. Repeatedly press INC or DEC to minimize the carrier output. Choose the "CAL Q" menu and repeat. Repeat procedure for both Q and I until minimum possible carrier is obtained. Hold the FNCT key for 3 seconds until display flashes to indicate settings have been stored in FLASH ROM.