

**1. PURPOSE**

This procedure is used to test and tune the RF module of the PDL base after it has been manufactured or repairs have been performed.

**2. HISTORY**

May 27, 1999 – initial release

**3. REFERENCES**

A00938 - ASSY, PDL BASE, RFMOD,450  
D00485 - SCHEM,PDLBASE,RFMOD

**4. REQUIRED EQUIPMENT**

Communications Monitor (Motorola R2570A)  
Scalar Analyzer (Hewlett Packard 8711B)  
DC Power Supply (minimum 10V/2A)  
Personal Computer (PC)  
Reference TXMOD circuit  
A00935 – ASSY,PDLBASE,I/O INTFC  
Digital Oscilloscope – TDS 340  
Small (0.10”) flat head screwdriver  
DVM  
PDLCONF.EXE - factory version  
Various batch files for modem configuration

**5. PROCEDURE****5.1 Set Up Equipment**

Attach the interface board A00935 to the PC and power supply. Confirm that the test frequencies below have been programmed correctly into the communications monitor.

Channel	Receive / Transmit Frequency	Frequency Band 410-430MHz	Frequency Band 430-450MHz	Frequency Band 450-470MHz
ch0 preset 00	Middle Freq.	420.15MHZ	442.15MHz	460.15MHz
ch1 preset 01	Low Freq.	410.15MHz	430.15MHz	450.15MHz
ch2 preset 02	High Freq.	429.85MHz	449.85MHz	469.85MHz
ch3 Preset 03	L.O. (middle)	474.60MHz	494.60 MHz	514.60 MHz

Attach coaxial cables to the GENOUT and RFIO to the similarly labeled ports on the communications monitor. Attach a 1 Mohm probe with a 3 kHz audio filter to the SINAD port of the communications monitor. Attach the RF sensor coil/cable assembly to antenna port. Connect the Reference TXMOD circuit to the EXT MOD IN port on the communications analyzer.

Recall network analyzer test program “ IF54M021.MM”. Attach test probes to the input and output and normalize the analyzer while shorting them together.

Connect the modulation output of the communications monitor to the digital oscilloscope. The DISPLAY mode of the oscilloscope should be set for Dot Accumulate with the sample time set for 1.5 seconds. The time scale should be set for 500 usec per division and the voltage scale for 1 Volt per division.

## 5.2 Attach the UUT

Apply a serial number (with bar code) label to the UUT. Connect the UUT to the interface board with the ribbon cable. Connect the GENOUT cable from the communications monitor to the connector labeled J3 (RFIN) and the RFIO cable from the communications monitor to the connector labeled J4 (RFOUT) of the UUT.

## 5.3 Configure the UUT

Run the program PDLCONF. Apply power as instructed by PDLCONF. Using the Factory menu on the screen follow the prompts to configure the modem with factory default settings for testing.

## 5.4 IF Filter Tuning

Inject the sweeping signal from generator of the analyzer into test point 7 on the UUT. Measure the output of the IF filter with the other probe at test point 9 of the UUT. Adjust variable inductors L16 and L17 along with variable capacitor VC1 for best filter shape as observed by the template on the analyzer display.

## 5.5 Frequency error (local oscillator leakage)

Adjust the communications monitor to receive at ch03 (preset 03) and use the spectrum analyzer display mode with RFIO set to the "ANT" port. Set attenuation at 0dB and place the sniffer probe on the antenna input port next to the mixer (U16) of the UUT. Adjust VC3 next to the reference crystal until the displayed frequency error value is within +/- 100 Hz. Record the value.

## 5.6 RXA dc level

Configure the communications monitor to **generate** at ch00 (preset 00) at an output power of – 110 dBm. Execute the batch file RM on the PC and adjust variable inductor L6 while reading the RXA voltage at TP12 until a value between 1.35VDC and 1.45VDC is achieved.

## 5.7 CD Level Setting

Continue to generate at ch0 with the communications monitor. Run the batch file CDLEV and change the output power level when instructed. Program the calibrated values in the memory of the UUT as instructed.

## 5.8 12dB SINAD – middle frequency

Continue to generate at ch00 (preset 00). With the AUD screen, configure the communications monitor to generate a 1kHz sine wave with 3kHz of deviation turned **on**. With the DISP screen, configure the communications monitor in SINAD mode. With the RF screen, lower the output power of the communications monitor until a 12dB SINAD reading is obtained. Record the power value.

## 5.9 12dB SINAD – low frequency

Change the frequency of the communications monitor to ch01 (preset 01). Execute the batch file RL. With the RF screen, lower the output power of the communications monitor until a 12dB SINAD reading is obtained. Record the power value.

## 5.10 12dB SINAD – high frequency

Change the frequency of the communications monitor to ch02 (preset 02). Execute the batch file RH. With the RF screen, lower the output power of the communications monitor until a 12dB SINAD reading is obtained. Record the power value.

## 5.11 Receiver Eye Pattern – middle frequency

Use the communications monitor to generate at ch00 (preset 01) and input external modulation into the communications monitor from the Reference TXMOD circuit. Use the digital oscilloscope

to display the Modulation Output signal from the communications monitor. If the displayed eye pattern is not “open”, repeat the IF filter tuning process (step 5.4).

#### **5.12 TX Current Adjustments**

Change the communications monitor to MONITOR mode and select the MODULATION SCOPE for the display option. Select ch00 (preset 00) for middle frequency. Execute the batch file DM to command the radio to transmit at the middle frequency with modulation. While transmitting, adjust VC2 until the current meter value is maximized. It should read between 800mA and 1200mA. Record the value.

#### **5.13 Deviation - Middle Frequency**

With the radio still transmitting, adjust R34 for a deviation between 3.7kHz and 4.3kHz. Record the value.

#### **5.14 Square Wave / RF Power - High Frequency**

Select ch02 (preset 02) for high frequency. Execute the batch file SH to transmit a square wave at high frequency. Tune R107 for an ideal square wave response. After 30 seconds of transmission has passed, record the RF output power. Stop transmission.

#### **5.15 Square Wave / RF power - Middle Frequency**

Set the communications monitor to receive at ch0 (preset 00). Execute the batch file SM to transmit at the middle channel with a square wave. Tune R107 for the proper square wave response. Record the RF output power immediately. Stop transmission.

#### **5.16 Square Wave / RF power - Low Frequency**

Set the communications monitor to receive at ch1 (preset 01). Execute the batch file SL to transmit at low frequency with a square wave. Tune R107 for the proper square wave response. Record the RF output power. Stop transmission. Repeat 5.14 through 5.16 until no further adjustments have been made.

#### **5.17 Transmitter Eye Pattern - Middle Frequency**

Leave the radio transmitting and use the digital oscilloscope to display the Modulation Output signal from the communications monitor. If the displayed eye pattern is not “open” repeat steps 5.14 to 5.16 for Square Wave Adjust.

#### **5.18 Package radio**

Turn off power to the UUT. Remove the grounding nut from the transistor. If any of the tests failed, add notes to the report sheet. Fold the report sheet and put it in an anti-static bag with the radio.