Panasonic
Matsushita Mobile Communications Development Corporation of U.S.A.

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Tune Procedure

Revised 4/25/2001

The following Tune Procedure has been re-issued due to some errors found in the original submitted on 3/19/2001. The changes are as listed below.

All PL2 power adjust targets have been adjusted down to allow for manufacturing variances. The maximum value allowed in PL2 as set by the SAR limits as been lowered by 0.5 dBm. This is to allow for a 0.3 dBm target window and a 0.2 dBm guard band.

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EV description

1. EV Specification / Tune Procedure

This specification contains only the information required for electronic adjustment of the ATLAS handset. The specification contains two sections; the adjustment procedure, and the adjustment range and configuration matrix.
Adjustment Procedure – Gives a detailed description of each adjustment of the handset in the required sequence.
Adjustment Range and Configuration Matrix – Gives the adjustment parameter, adjustment limits, and default EV value, and brief equipment set up for each adjustment.

1.1. Electronic Adjustment Support – Overview

ATLAS will support electronic adjustment of various audio and RF related parameters through an external test set by putting the radio into adjust mode. This document covers the adjustment procedure using the external test set. All adjustments are typically done using channel 350 in the cellular band or channel 1000 in the PCS band unless otherwise specified with the transceiver and audio control set as required for the adjustment. The ATLAS electronic adjustment allows for the setting of the following parameters:

- Battery
- AFC Tuning
- Power Level
- Compressor Reference Level
- Standard Deviation
- Max Deviation
- SAT Deviation
- WBD / ST Deviation
- DTMF Deviation
- Expander Reference Level
- RX Audio Level
- Analog RSSI Calibration
- Digital RSSI Calibration

1.2. Test Set Adjustment Operation

The test set originated adjustments generally operate as follows:
1. Commands are sent as 9600-baud asynchronous serial data with 8 data bits, non-parity and 1 stop bit. Commands are received on the RX data line and responses are sent on the TX data line. All commands are sent through the serial bus in the following format (in hex):
00 80 NN CC (D1) (D2) (D3) … (Dn)
Where NN is the number of bytes sent (command plus data), CC is the command op code, and D1 through Dn are data associated with the command (see individual command below for number of data bytes expected).
2. The adjust mode is entered by first sending the *Test Mode* and then sending the *Adjust Mode* command.
3. A set adjustment command (such as *Set SA*T) is sent to set up the hardware for the specified test with the current adjustment.
4. The *Set Current Adjustment Value* command is issued along with a value which is used to set the selected adjustment and update the hardware. This may be repeated as necessary until the final adjustment value is determined.

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5. The *Exit Adjustment Mode* command is issued to exit adjustment mode with the option to save all adjustments to nonvolatile memory. Handset returns to test mode.
6. The *Exit Active Adjustment Mode* command is issued to exit the current adjustment with the option to save to active memory. Handset is still in adjustment mode.
7. When all adjustments are complete, the *Normal Mode* command can be sent to return the unit to normal operation.
8. ALL RF POWERS LISTED ARE **CORRECTED FOR LOSSES IN THE ADJUSMENT FIXTURE PER BAND.**
9. Adjustments must be performed at +25 ±5 °C in the order specified. Adjustments performed outside the temperature range may produce erroneous results.

1.3. Enter Adjust Mode

Use this command to put the unit under test (UUT) into adjust mode. This must be done before issuing any other adjust commands.

1 Apply DC power (5.8+/-0.2[V]) to DC-PWR-IN at the I/O connector of the UUT.
2 Send Enter Test Mode command and then send Adjust Mode command.

1.4. Battery

This procedure calibrates the battery monitoring circuits for charging, LVA, and auto shutdown. The phone stays in initial state. The ANA_SW3 switch in the power control IC is configured through the serial interface to select battery level monitor circuit or battery ID as its output.

Adjustment Parameter	Sequence of Events	Device / Ports	Data	Returned Data
Charge Completed DA Reference	1. Send Adjust Charge Completed DA Reference command.	DAC3		Ack or Nak, Current Val
	2. Apply 84 ohms (50 mA load) to the battery terminals.			
	3. Measure DC voltage at battery terminals.			
	4. Adjust DAC for a voltage of 3.70 ±0.02 V.			
	5. Send Set Current Adjustment Value command.	DAC3	0 to 3FF	Ack or Nak
	6. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak
Battery Low Reference Voltage	7. Send Adjust Battery Low Reference Voltage command.	ADC3		Ack or Nak, 0 to 3FF
	8. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak
Charge Completed DA Reference	9. Send Adjust Charge Completed DA Reference command.	DAC3		Ack or Nak, Current Val
	10. Apply 84 ohms (50 mA load) to the battery terminals.			

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	11. Measure DC voltage at battery terminals.			
	12. Adjust DAC for a voltage of 4.20 ±0.02 V.			
	13. Send Set Current Adjustment Value command.	DAC3	0 to 3FF	Ack or Nak
	14. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak
Battery High Reference Voltage	15. Send Adjust Battery High Reference Voltage command.	ADC3		Ack or Nak, 0 to 3FF
	16. Send Exit Active Adjustment command.		Save or discard	Ack or Nak
Charge Completed Reference Current	17. Apply 84 ohms (50 mA load) to the battery terminals.			
	18. Send Adjust Charge Completed Reference Current command. Charge Completed DA Reference adjusted above for 4.20 ±0.02 V is applied at DAC3.	ADC4		Ack or Nak, 0 to 3FF
	19. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak
Charge Start DA Reference	20. Send Adjust Charge Start DA Reference command.	DAC3		Ack or Nak, Current Val
	21. Apply 12 ohms (350 mA load) to the battery terminals.			
	22. Measure DC voltage at battery terminals.			
	23. Adjust DAC for a voltage of 4.20 ±0.02 V.			
	24. Send Set Current Adjustment Value command.	DAC3	0 to 3FF	Ack or Nak
	25. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak
Charge Completion Timer Start Current	26. Apply 12 ohms (350 mA load) to the battery terminals.			
	27. Send Adjust Charge Completion Timer Start Current command. Charge Start DA Reference adjusted above is applied at DAC3.	ADC4		Ack or Nak, 0 to 3FF
	28. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak

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Battery Temperature	29. Apply 10 kΩ resistor from battery temperature terminal to battery negative terminal.			
	30. Send Adjust Battery Temperature command.	ADC2		Ack or Nak, 0 to 3FF
	31. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak

1.5. AFC Tuning

This procedure adjusts the AFC reset value and determines the AFC slope of the VCTCXO relative to 800 MHz. Temperature of the UUT must be +25 ±5 °C for this adjustment. The phone is either left in its initial state or set to Mode-AMPS-TX. Caution: As an option, the transmitter can be turned on at PL7 to measure the transmit frequency and could effect the adjustment if left on longer than 1 minute.

Adjustment Parameter	**Sequence of Events**	**Device / Ports**	**Data**	**Returned Data**
AFC Reset and AFC Slope	1. Send Adjust AFC command.	DAC 0		Ack or Nak, Current Val
	2. Adjust AFC Value to 1.4 VDC.	DAC 0		
	3. Send Set Current Adjustment Value command.		242, 11	Ack or Nak
	4. Measure the frequency (Hz) of the VCTCXO or the transmitter.			
	5. Adjust AFC Value to 1.5 VDC.	DAC 0		
	6. Send Set Current Adjustment Value command.		26F, 11	Ack or Nak
	7. Measure the frequency (Hz) of the VCTCXO or the transmitter.			
	8. Calculate AFC Slope as follows: • Scale Factor = (Freq at 1.5 V - Freq at 1.4 V) / 45 • AFC Slope = Int[(800 / 19.44 or 836.49) * Scale Factor]			

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	9. Calculate AFC Reset as follows: • AFC Reset = 242 + Hex{[19440000or 836490000 - Freq at 1.4 V] / Scale Factor}			
	10. Send Set Current Adjustment Value command.	DAC 0	AFC Reset (AC to 3FF), AFC Slope (A to 12)	Ack or Nak
	11. Measure the frequency of the VCTCXO or the transmitter. Should be within 0.1 ppm.			
	12. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak

1.6. Power Level adjustment

This procedure adjusts the power output for PL2 through PL7 in the cellular band for AMPS, the power output for PL2 through PL10 in the cellular band for TDMA mode, and the power output for PL2 through PL10 in the PCS band for TDMA mode. The phone is set to either Mode-AMPS-TX, Mode-TDMA800-TX-Burst, or Mode-PCS-TX-Burst.

Adjustment Parameter	Sequence of Events	Device / Ports	Data	Returned Data
TX AGC AMPS *, TX AGC TDMA LOW BAND *, and TX AGC TDMA HIGH BAND *	1. Apply 4.20 ±0.02 V to BATT+.			
	2. Send Adjust Power Level command.	DAC 2	Mode, Band, Channel, and PL	Ack or Nak, Current Val
	3. Measure the output power.			
	4. Adjust output power per the table below.			
	5. Send Set Current Adjustment Value command.	DAC 2	0 to 3FF	Ack or Nak
	6. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak
	7. Repeat above steps for all channels and power levels listed in the table below.			

Note: The following power levels listed do not include any adjustments for cable or connector path loss.

AMPS

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PL	Adjust to: (dBm)				
	Channel 991	Channel 175	Channel 383	Channel 592	Channel 799
2	21.9 ± 0.3	21.9 ± 0.3	21.9 ± 0.3	21.9 ± 0.3	21.9 ± 0.3
3	22.4 ± 0.3	22.4 ± 0.3	22.4 ± 0.3	22.4 ± 0.3	22.4 ± 0.3
4	TBD	TBD	19.5 ± 0.3	TBD	TBD
5	TBD	TBD	15.5 ± 0.3	TBD	TBD
6	TBD	TBD	11.5 ± 0.3	TBD	TBD
7	TBD	TBD	7.5 ± 0.3	TBD	TBD

TDMA Low Band

PL	Adjust to: (dBm)				
	Channel 991	Channel 175	Channel 383	Channel 592	Channel 799
2	26.7 ± 0.3	26.7 ± 0.3	26.7 ± 0.3	26.7 ± 0.3	26.7 ± 0.3
3	23.5 ± 0.3	23.5 ± 0.3	23.5 ± 0.3	23.5 ± 0.3	23.5 ± 0.3
4	TBD	TBD	19.5 ± 0.3	TBD	TBD
5	TBD	TBD	15.5 ± 0.3	TBD	TBD
6	TBD	TBD	11.5 ± 0.3	TBD	TBD
7	TBD	TBD	7.5 ± 0.3	TBD	TBD
8	TBD	TBD	2.5 ± 0.5	TBD	TBD
9	TBD	TBD	-2.5 ± 0.5	TBD	TBD
10	TBD	TBD	-7.5 ± 0.5	TBD	TBD

TDMA High Band

PL	Adjust to: (dBm)				
	Channel 2	Channel 500	Channel 1000	Channel 1500	Channel 1998
2	26.2 ± 0.3	26.2 ± 0.3	26.2 ± 0.3	26.2 ± 0.3	26.2 ± 0.3
3	23.5 ± 0.3	23.5 ± 0.3	23.5 ± 0.3	23.5 ± 0.3	23.5 ± 0.3
4	TBD	TBD	19.5 ± 0.3	TBD	TBD
5	TBD	TBD	15.5 ± 0.3	TBD	TBD
6	TBD	TBD	11.5 ± 0.3	TBD	TBD
7	TBD	TBD	7.5 ± 0.3	TBD	TBD
8	TBD	TBD	1.5 ± 0.5	TBD	TBD
9	TBD	TBD	-3.5 ± 0.5	TBD	TBD
10	TBD	TBD	-8.5 ± 0.5	TBD	TBD

1.7. Compressor reference Level Calibration

This adjustment sets the transmitter compressor input and output levels so that the modulation output is at the specified deviation. The phone is set to Mode-AMPS-TX, compandor on, set TX audio path for external I/O port, TX unmated

Adjustment Parameter	**Sequence of Events**	**Device / Ports**	**Data**	**Returned Data**
UMicGn	1. Send Adjust Compressor Reference command.			Ack or Nak, Current Val

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	2. Apply 1004 Hz, -20 dBV (100 mVrms) to TX Audio.			
	3. Measure the FM deviation of the transmitted signal with a modulation analyzer. Set the high pass filter to 300 Hz and the low pass filter to 3 kHz.			
	4. Toggle compandor off and on.			
	5. Send Compandor Off / On command.			Ack or Nak
	6. Measure the difference in FM deviation between Compandor Off and Compandor On.			
	7. Adjust UMicGn to achieve a difference in FM deviation of less than 5 %. • If FM deviation (Compandor Off) > FM deviation (Compandor On) then decrease UMicGn. • If FM deviation (Compandor Off) < FM deviation (Compandor On) then increase UMicGn.			
	8. Send Set Current Adjustment Value command.		CB to 142	Ack or Nak
	9. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak

1.8. Standard Deviation

This adjsutment sets the transmitter modulation output at the specified deviation. **The Compressor Reference Level must be adjusted prior to this adjustment.** The phone is set to Mode-AMPS-TX, compandor on, set TX audio path for external I/O port, TX unmuted

Adjustment	Sequence of Events	Device /	Data	Returned

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Parameter		Ports		Data
TxModGain	1. Send Adjust Standard Deviation command.			Ack or Nak, Current Val
	2. Apply 1004 Hz, -20 dBV (100 mVrms) to TX Audio.			
	3. Measure the FM deviation of the transmitted signal with a modulation analyzer. Set the high pass filter to 300 Hz and the low pass filter to 3 kHz.			
	4. Adjust TxModGain to achieve an FM deviation of 2.9 ± 0.1 kHz.			
	5. Send Set Current Adjustment Value command.		80 to 100	Ack or Nak
	6. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak

1.9. Max Deviation

This adjustment sets the transmitter maximum deviation. **The Compressor Reference Level must be adjusted prior to this adjustment.** The phone is set to Mode-AMPS-TX, compandor on, set TX audio path for external I/O port, TX unmuted.

Adjustment Parameter	Sequence of Events	Device / Ports	Data	Returned Data
TxAudioLmtThr	1. Send Adjust Maximum Deviation command.			Ack or Nak, Current Val
	2. Apply 1004 Hz, + 9 dBV (2.76 Vrms) to TX Audio.			
	3. Measure the FM deviation of the transmitted signal with a modulation analyzer. Set the high pass filter to 300 Hz and the low pass filter to 3 kHz.			
	4. Adjust TxAudioLmtThr to achieve an FM deviation of 11.6 ± 0.2 kHz.			

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	5. Send Set Current Adjustment Value command.		3000 to 6DB7	Ack or Nak
	6. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak

1.10. SAT Deviation

This adjustment sets the deviation of the transmitted SAT. **The Compressor Reference Level and Standard Deviation must be adjusted prior to this adjustment.** The phone is set to Mode-AMPS-TX, compandor on, SAT activated (6,000 Hz), TX muted.

Adjustment Parameter	Sequence of Events	Device / Ports	Data	Returned Data
TxSATGain	1. Send Adjust SAT Deviation command.			Ack or Nak, Current Val
	2. Measure the FM deviation of the transmitted signal with a modulation analyzer. Set the high pass filter to 300 Hz and the low pass filter to 15 kHz.			
	3. Adjust TxSATGain to achieve an FM deviation of 2.2 ± 0.05 kHz.			
	4. Send Set Current Adjustment Value command.		10 to 40	Ack or Nak
	5. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak

1.11.1 WBD Deviation

This adjustment sets the deviation of transmitted Wideband Data. **The Compressor Reference Level and Standard Deviation must be adjusted prior to this adjustment.** The phone is set to Mode-AMPS-TX, compandor off, WBD activated (5,000 Hz tone only), TX muted.

TxManGain5k	1. Send Adjust ST Deviation command.			Ack or Nak, Current Val
	2. Measure the FM deviation of the transmitted signal with a modulation analyzer. Set the high pass filter to 300 Hz and the low pass filter to 15 kHz.			

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	3. Adjust TxManGain5k to achieve an FM deviation of 8.0 ± 0.1 kHz.			
	4. Send Set Current Adjustment Value command.		80 to 200	Ack or Nak
	5. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak

1.11.2 ST Deviation

This adjustment sets the deviation of transmitted ST. **The Compressor Reference Level and Standard Deviation must be adjusted prior to this adjustment.** The phone is set to Mode-AMPS-TX, compandor off, ST activated (10,000 Hz tone only), TX muted.

Adjustment Parameter	Sequence of Events	Device / Ports	Data	Returned Data
TxManGain10k	1. Send Adjust ST Deviation command.			Ack or Nak, Current Val
	2. Measure the FM deviation of the transmitted signal with a modulation analyzer. Set the high pass filter to 300 Hz and the low pass filter to 15 kHz.			
	3. Adjust TxManGain10k to achieve an FM deviation of 8.0 ± 0.1 kHz.			
	4. Send Set Current Adjustment Value command.		80 to 200	Ack or Nak
	5. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak

1.12. DTMF Deviation

This adjustment sets the transmitter deviation of a single tone from each DTMF tone set. **The Compressor Reference Level and Standard Deviation must be adjusted prior to this adjustment.** The phone is set to Mode-AMPS-TX, compandor on, 941 Hz DTMF tone activated for the low set, 1633 Hz DTMF tone activated for the high set, and TX muted.

Adjustment Parameter	Sequence of Events	Device / Ports	Data	Returned Data

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TxDTMFGainLo	1. Send Adjust DTMF Deviation command.		Tone	Ack or Nak, Current Val
	2. Measure the PM deviation of the transmitted signal with a modulation analyzer. Set the high pass filter to 300 Hz and the low pass filter to 3 kHz.			
	3. Adjust TxDTMFGainLo to achieve a PM deviation of 4.5 ± 0.2 radians.			
	4. Send Set Current Adjustment Value command.		24 to 8F	Ack or Nak
	5. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak
TxDTMFGainHi	6. Send Adjust DTMF Deviation command.		Tone	Ack or Nak, Current Val
	7. Measure the PM deviation of the transmitted signal with a modulation analyzer. Set the high pass filter to 300 Hz and the low pass filter to 3 kHz.			
	8. Adjust TxDTMFGainHi to achieve a PM deviation of 4.5 ± 0.2 radians.			
	9. Send Set Current Adjustment Value command.		24 to 8F	Ack or Nak
	10. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak

1.13. Expander Reference Level calibration

This adjustment sets the receiver expandor input reference levels so that the demodulation output is at the required levels. The phone is set to Mode-AMPS-RX, expandor on, set RX audio path for external I/O port, RX unmuted.

Adjustment Parameter	Sequence of Events	Device / Ports	Data	Returned Data

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RxModGain	1. Send Adjust Expandor Reference command.			Ack or Nak, Current Val
	2. Apply RF signal on ch 383, -50 dBm, 1004 Hz tone @ 2.9 kHz FM dev.			
	3. Measure the AC voltage of RX audio.			
	4. Toggle compandor off and on.			
	5. Send Compandor Off / On command.			Ack or Nak
	6. Measure the difference in AC voltage between Compandor Off and Compandor On.			
	7. Adjust RxModGain to achieve a difference in AC voltage of less than 5 %. • If AC voltage (Compandor Off) > AC voltage (Compandor On) then increase RXMODGAIN. • If AC voltage (Compandor Off) < AC voltage (Compandor On) then decrease RXMODGAIN.			
	8. Send Set Current Adjustment Value command.		100 to 200	Ack or Nak
	9. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak

1.14. RX Audio Level Calibration

This adjustment sets the RX audio output level to the required levels. **The Expandor Reference Level must be adjusted prior to this adjustment.** The phone is set to Mode-AMPS-RX, expandor on, set RX audio path for external I/O port, RX unmuted.

Adjustment	Sequence of Events	Device /	Data	Returned

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Parameter		Ports		Data
USpkrGn	1. Send Adjust RX Audio command.			Ack or Nak, Current Val
	2. Apply RF signal on ch 383, -50 dBm, 1004 Hz tone @ 2.9 kHz FM dev.			
	3. Measure the AC voltage of RX audio.			
	4. Adjust USpkrGn to achieve an AC voltage of -30 ± 0.5 dBV (31.65 ± 1.8 mVrms).			
	5. Send Set Current Adjustment Value command.		CB to 142	Ack or Nak
	6. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak

1.15. Analog RSSI Calibration

This procedure calibrates RSSI to standard RF levels in the cellular and PCS bands. The RSSI from the Leo IC is measured using ADC0. The phone is set to either Mode-TDMA800-RX, or Mode-PCS-RX.

Adjustment Parameter	Sequence of Events	Device / Ports	Data	Returned Data
RSSI ANALOG LOWBAND *, RSSI ANALOG HIGHBAND *	1. Apply a π/4 shifted DQPSK signal, data = PN9, into the RF port for each of the channels and RF levels listed for each band in the table below.			
	2. Send Adjust RSSI - Analog command.	ADC 0	Band, Channel, RF Level	Ack or Nak, D to 3FF
	3. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak
	4. Repeat above steps for each of the channels and RF levels listed for each band in the table below.			

RSSI Calibration Points

RF Input Level (dBm)	Low Band Channels	High Band Channels

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-100	383	1000
-80	383	1000
-45	383	1000
-30	383	1000
-60	991, 175, 383, 592, 799	2, 500, 1000, 1500, 1998

Note: The above RF input levels listed do not include any adjustments for cable or connector path loss.

1.16. Digital RSSI calibration

This procedure calibrates RSSI to standard RF levels in the cellular and PCS bands. **The RX AGC must be adjusted prior to this adjustment.** The RSSI is calculated by the DSP and is retrieved through the ARM OAK interface. The phone is set to either Mode-TDMA800-RX, or Mode-PCS-RX.

Adjustment Parameter	**Sequence of Events**	**Device / Ports**	**Data**	**Returned Data**
RSSI DIGITAL OFFSET LOWBAND *, RSSI DIGITAL OFFSET HIGHBAND *	1. Apply a π/4 shifted DQPSK signal, data = PN9, into the RF port for each of the channels and RF levels listed for each band in the table below.			
	2. Send Adjust RSSI - Digital Offset command.		Band, Channel	Ack or Nak, F6 to 0A
	3. The Offset is calculated as follows (in Hex): Offset = RSSI + 46			
	4. Send Exit Active Adjustment command.		Save or Discard	Ack or Nak
	5. Repeat above steps for each of the channels and RF levels listed for each band in the table below.			

RSSI Calibration Points

RF Input Level (dBm)	Low Band Channels	High Band Channels
-70	991, 175, 383, 592, 799	2, 500, 1000, 1500, 1998

Note: The above RF input levels listed do not include any adjustments for cable or connector path loss.

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PARTS LIST

Reference	Part Number	Description
C101	F1G1H4R0A404	4p
C102	CC1005	OPEN
C103	F1G1H470A409	47p
C104	F1G1H100A406	10p
C105	F1G1H560A016	56p
C106	F1G1H560A016	56p
C107	F1G1H100A406	10p
C109	F1G1H4R0A404	4p
C110	F1G1A3330001	0.033u
C111	F1G1H101A016	100p
C112	F1G1A3330001	0.033u
C113	F1G1H102A402	0.001u
C114	F1G1H102A402	0.001u
C115	F1G1H3R0A442	3p
C116	F1G1H4R0A404	4p
C117	F1G1H100A406	10p
C118	F1G1H9R0A406	9p
C120	F1G1H101A016	100p
C121	F1G1H101A016	100p
C122	F1G1H150A409	15p
C126	F1G1H1R0A389	1p
C127	F1G1H6R0A406	6p
C128	F1G1H6R0A406	6p
C130	F1G1H2R0A389	2p
C131	F1G1H2R0A389	2p
C132	F1G1H102A402	0.001u
C133	F1G1H101A016	100p
C134	F1G1H9R0A406	9p
C137	F1G1H1R0A389	1p
C138	F1G1H101A016	100p
C139	F1G1H1R0A389	1p
C140	F1G1H120A409	12p
C141	F1G1H101A016	100p
C143	F1G1H1R5A389	1.5p
C146	F1G1C103A034	0.01u
C147	F1G1C103A034	0.01u
C149	F1G0J1040003	0.1u
C150	F1G1H470A409	47p
C151	F1G1H152A402	0.0015u
C152	F1G1C103A034	0.01u
C154	F1G1H102A402	0.001u
C155	F1G1H101A016	100p
C156	F1G1H101A016	100p
C157	CC1005	OPEN
C158	ECHU1C103JB5	0.01u
C159	F1G1H102A402	0.001u
C162	CC1005	OPEN

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C163	F1G0J1040003	0.1u
C164	F1G1C103A034	0.01u
C165	F1G1H102A402	0.001u
C166	F1G1H101A016	100p
C168	F1G1H102A402	0.001u
C169	F1G1H330A409	33p
C170	F1G1H1R5A389	1.5p
C171	F1G1H2R0A389	2p
C172	F1G1H3R0A442	3p
C173	CC1005	OPEN
C174	F1G1H102A402	0.001u
C203	F1G1H102A402	0.001u
C204	F1G1C103A034	0.01u
C205	F1G1H101A016	100p
C206	F1G1H150A409	15p
C207	F1G1C103A034	0.01u
C208	F1G1H9R0A406	9p
C209	F1G1A473A002	0.047u
C210	F1G0J1040003	0.1u
C211	F1G0J1040003	0.1u
C212	F1G1C103A034	0.01u
C213	F1G1H101A016	100p
C214	F1G1H150A409	15p
C215	F1G1H7R0A406	7p
C216	F1G1H150A409	15p
C217	F1G1H2R0A389	2p
C218	F1G1C103A034	0.01u
C219	F1G1H101A016	100p
C220	F1G1H1R5A389	1.5p
C221	F1J1C1050014	1u
C222	F1G1H9R0A406	9p
C223	F1G1H220A409	22p
C224	ECST1AZ105R	1u
C225	F1G1H221A402	220p
C226	F1G1H150A409	15p
C227	F1G1H150A409	15p
C228	F1G1H9R0A406	9p
C229	F1G1C103A034	0.01u
C230	F1G1C103A034	0.01u
C231	F1G1H3R0A442	3p
C232	F1G1H150A409	15p
C233	ECST0JZ225R	2.2u
C234	F1H1E223A029	0.022u
C235	F1G1H332A402	0.0033u
C236	F1G1H101A016	100p
C237	F1G1H101A016	100p
C238	CC1005	OPEN
C239	F1G1C103A034	0.01u
C240	F1G1H101A016	100p
C241	F1G1H2R0A389	2p
C242	F1G1H101A016	100p
C243	F1G1H101A016	100p

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C244	F1G1H5R0A404	5p
C245	F1G1H101A016	100p
C246	F1G1H101A016	100p
C247	F1G1H470A409	47p
C249	F1G1H470A409	47p
C251	F1G1H220A409	22p
C252	F1G1H390A409	39p
C253	F1G1H5R0A404	5p
C254	F1G1H101A016	100p
C255	F1G1H9R0A406	9p
C256	ECST0JZ106R	10u
C257	F1G1C103A034	0.01u
C258	F1G1H8R0A406	8p
C259	F1G1H101A016	100p
C260	F1G1C103A034	0.01u
C261	F1G1H102A402	0.001u
C265	F1G1C103A034	0.01u
C266	F1G1H3R0A442	3p
C267	F1G1H3R0A442	3p
C268	F1G1H9R0A406	9p
C269	F1G1H3R0A442	3p
C270	F1G1H3R0A442	3p
C271	F1G1H102A402	0.001u
C272	F1G1H9R0A406	9p
C273	F1G1H4R0A404	4p
C274	F1G1C103A034	0.01u
C275	F1G1C103A034	0.01u
C278	ECST0JZ106R	10u
C280	CC1005	OPEN
C281	CC1005	OPEN
C283	F1G1H2R0A389	2p
C301	CC1005	OPEN
C302	F1G1H101A016	100p
C303	F1G1C103A034	0.01u
C304	ECST0JZ225R	2.2u
C305	F1G1H102A402	0.001u
C306	F1G0J1040003	0.1u
C307	F1G1H3R0A442	3p
C309	F1G1H102A402	0.001u
C310	F1G1H222A402	0.0022u
C311	F1G0J1040003	0.1u
C312	F1G0J1040003	0.1u
C313	ECHU1C103JB5	0.01u
C314	F1G1H102A402	0.001u
C315	F1G1C103A034	0.01u
C316	F1G1H102A402	0.001u
C318	F1G1E472A042	0.0047u
C319	F1G1H102A402	0.001u
C320	CC1005	OPEN
C321	F1G0J1040003	0.1u
C322	F1G1H470A409	47p
C323	F1G1C103A034	0.01u

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C325	F1G1H102A402	0.001u
C326	CC1005	OPEN
C327	F1G1H102A402	0.001u
C328	F1G1H102A402	0.001u
C401	F1G1H150A409	15p
C402	F1G1H150A409	15p
C403	F1G0J1040003	0.1u
C404	F1G0J1040003	0.1u
C405	F1H0J1050009	1u
C406	F1H0J1050009	1u
C407	F1H0J1050009	1u
C408	F1H0J1050009	1u
C409	F1G0J1040003	0.1u
C410	F1G0J1040003	0.1u
C411	F1G0J1040003	0.1u
C412	F1G0J1040003	0.1u
C413	F1G0J1040003	0.1u
C414	F1H0J1050009	1u
C427	F1G1A473A002	0.047u
C444	F1G1C103A034	0.01u
C445	F1G1C103A034	0.01u
C446	F1G1C103A034	0.01u
C447	F1G1C103A034	0.01u
C448	F1G1C103A034	0.01u
C449	F1G1C103A034	0.01u
C450	F1G1C103A034	0.01u
C451	F1G1C103A034	0.01u
C452	F1G1C103A034	0.01u
C453	F1G1C103A034	0.01u
C454	F1G1C103A034	0.01u
C455	F1G1C103A034	0.01u
C456	F1G1C103A034	0.01u
C457	F1G1C103A034	0.01u
C458	F1G1C103A034	0.01u
C459	F1G1C103A034	0.01u
C460	ECST0JZ475R	4.7u
C500	F1G0J1040003	0.1u
C501	F1G0J1040003	0.1u
C502	F1G0J1040003	0.1u
C503	ECST0GZ226R	22u
C504	ECST0GZ226R	22u
C506	ECST0JZ106R	10u
C507	ECST0JZ685R	6.8u
C508	ECST0JZ685R	6.8u
C510	CC1005	OPEN
C511	CC1005	OPEN
C512	CC1005	OPEN
C513	F1G1C103A034	0.01u
C515	F1H0J1050009	1u
C516	F1H0J1050009	1u
C517	F1H1C333A041	0.033u
C518	F1H1C333A041	0.033u

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C519	F1G1H101A016	100p
C520	F1G1H471A402	470p
C521	F1G1H471A402	470p
C522	F1G1A473A002	0.047u
C523	F1H0J1050009	1u
C524	F1G1C103A034	0.01u
C525	F1G1H101A016	100p
C526	F1J1A2250002	2.2u
C528	F1H0J1050009	1u
C529	F1G1H101A016	100p
C530	F1H1A224A006	0.22u
C531	F1G1H101A016	100p
C532	F1G0J1040003	0.1u
C533	F1G1H220A409	22p
C534	F1J1A2250002	2.2u
C536	F1G1H220A409	22p
C537	F1G1C103A034	0.01u
C538	F1H1C223A041	0.022u
C539	F1G1H101A016	100p
C540	F1H0J1050009	1u
C541	ECST0GZ226R	22u
C542	F1J1A2250002	2.2u
C543	F1G0J1040003	0.1u
C544	F1G1H220A409	22p
C545	CC1005	OPEN
C546	CC1005	OPEN
C560	F1G1C103A034	0.01u
C561	F1H0J1050009	1u
C562	ECST0JZ106R	10u
C563	ECST0JZ106R	10u
C564	CC1005	OPEN
C565	ECST0JZ106R	10u
C566	CC1005	OPEN
C567	ECST0JZ106R	10u
C568	CC1005	OPEN
C569	ECST0JZ685R	6.8u
C570	CC1005	OPEN
C571	ECST0GZ335R	3.3u
C572	CC1005	OPEN
C573	ECST0JZ106R	10u
C574	CC1005	OPEN
C575	ECST0JZ685R	6.8u
C576	CC1005	OPEN
C577	ECST0JZ685R	6.8u
C578	CC1005	OPEN
C579	ECST1AZ105R	1u
C580	CC1005	OPEN
C581	CC1005	OPEN
C582	CC1005	OPEN
C584	F1G1H332A402	0.0033u
C585	F1G1H102A402	0.001u
C586	F1G0J1040003	0.1u

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C588	F1G1C103A034	0.01u
C589	F1G1C103A034	0.01u
C591	CC1005	OPEN
C592	CC1005	OPEN
C593	ECST0JZ106R	10u
C594	F1G0J1040003	0.1u
C595	F1G0J1040003	0.1u
C596	F1G0J1040003	0.1u
C597	F1G0J1040003	0.1u
C598	F1H1A4740005	0.47u
C599	F1G0J1040003	0.1u
D101	B0CCAB000002	
D202	B0CDAB000016	
D203	B0ACAD000001	
D401	B0BD6R800004	
D402	B0BD6R800004	
D403	B0BD6R800004	
D404	B0JCDC000001	
D405	B0JCDC000001	
D407	B0JCDC000001	
D413	LNJ115W8PRA	
D508	MA2S11100L	
D509	MA2SD1000L	
D510	B0JCMC000004	
D511	MAZ80680ML	
D512	LNJ717W80RAV	
E101	AN76116A	
FL100	MMCD_SAYHT83 6MAA0T01R02	
FL101	J0ZZB0000036	
FL102	J0B1967B0001	1.96Ghz
FL103	J0C1967B0002	
FL104	J0C8816B0006	
FL105	FS76016A	136.26Mhz
FL201	FY76026A	
FL202	FY76032A	
G500	BD76012A	
J101	PY76037A	
J402	JA76026A	
J403	K3ZZ00200009	
J504	JC76001A	
L101	G1C1N8Z00004	1.8nH
L102	G1C56NJ00007	56nH
L103	G1C12NJ00011	12nH
L104	G1C8N2J00004	8.2nH
L105	G1C2N7Z00007	2.7nH
L106	HK1608	OPEN
L107	G1C2N7Z00007	2.7nH
L108	G1C56NJ00010	56nH
L109	G1C56NJ00010	56nH
L110	G1C6N8J00004	6.8nH
L111	G1C10NJ00008	10nH

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L112	G1C4N7Z00004	4.7nH
L113	G1C18NG00002	18nH
L114	HK1608	OPEN
L115	HK1608	OPEN
L117	HK1608	OPEN
L118	G1CR22J00006	220nH
L119	G1C3N3Z00005	3.3nH
L120	G1C3N9Z00004	3.9nH
L201	G1CR10G00003	100nH
L202	G1CR10G00003	100nH
L203	G1C3N3Z00005	3.3nH
L204	G1C15NG00004	15nH
L205	G1C10NJ00011	10nH
L206	G1C1N2Z00002	1.2nH
L207	G1C15NJ00008	15nH
L208	G1C18NJ00011	18nH
L209	G1C10NJ00011	10nH
L210	G1C1N2Z00002	1.2nH
L211	G1C27NJ00010	27nH
L212	G1C10NJ00008	10nH
L213	G1C27NJ00010	27nH
L214	G1C8N2J00004	8.2nH
L215	G1C39NG00001	39nH
L216	G1C2N7Z00007	2.7nH
L222	G1C6N8J00004	6.8nH
L223	G1C4N7Z00004	4.7nH
L224	G1C8N2J00004	8.2nH
L225	G1C1N2Z00002	1.2nH
L501	ELJRFR10JF2	100nH
L502	ELJRFR10JF2	100nH
L503	ELJRF68NJF2	68nH
L504	ELJRF68NJF2	68nH
L505	ELJRF68NJF2	68nH
L506	ELJRF68NJF2	68nH
MK500	9ZA751A	
P400	PY76036B	
P500	PY76041A	
P501	PY76041A	
P502	PY76041A	
P503	PY76041A	
Q101	YUMB9NTN	
Q200	YUMB9NTN	
Q201	B1GBCFJJ0001	10k
Q300	B1GFACAA0001	
Q404	B1GFCFJN0010	10
Q501	B1DHDC000006	
Q503	B1DHDC000006	
Q505	B1DHDC000006	
Q508	2SD19790VL	
Q509	B1GBCFNN0001	47k
Q510	B1CFJC000001	
R101	ERJ2GEJ104X	100k

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R102	ERJ2GEJ104X	100k
R103	ERJ2GEJ180X	18
R105	ERJ2GEJ100X	10
R106	ERJ2GEJ100X	10
R107	ERJ2GEJ223X	22k
R108	ERJ2GEJ683X	68k
R109	ERJ2GEJ273X	27k
R110	ERJ2GEJ100X	10
R111	ERJ2GEJ180X	18
R112	ERJ2GEJ100X	10
R113	ERJ2GEJ102X	1k
R114	ERJ2GEJ102X	1k
R115	ERJ2GE0R00X	0
R116	ERJ2GEJ123X	12k
R117	ERJ2GEJ562X	5.6k
R118	ERJ2GEJ473X	47k
R119	ERJ2GEJ104X	100k
R120	ERJ2GEJ100X	10
R121	ERJ2GEJ104X	100k
R122	ERJ2GEJ471X	470
R123	ERJ2GEJ101X	100
R124	ERJ2GEJ821X	820
R125	ERJ2GEJ101X	100
R126	ERJ2GEJ101X	100
R127	ERJ2GE0R00X	0
R128	ERJ2GE0R00X	0
R129	ERJ2GE0R00X	0
R130	ERJ2GE0R00X	0
R131	ERJ2GEJ471X	470
R132	ERJ2GEJ271X	270
R133	ERJ2GEJ271X	270
R134	ERJ2GEJ471X	470
R135	ERJ2GEJ271X	270
R136	ERJ2GEJ271X	270
R137	ERJ2GE0R00X	0
R138	ERJ2GEJ331X	330
R139	ERJ2GEJ102X	1k
R140	ERJ2GEJ100X	10
R201	ERJ2GEJ152X	1.5k
R202	ERJ2GE0R00X	0
R203	ERJ2GEJ103X	10k
R205	ERJ2GEJ181X	180
R206	ERJ2GEJ100X	10
R207	ERJ2GEJ821X	820
R208	ERJ2GEJ100X	10
R210	ERJ2GEJ103X	10k
R211	ERJ2GEJ103X	10k
R212	ERJ2GEJ103X	10k
R213	ERJ2GEJ103X	10k
R214	RY1005	OPEN
R215	ERJ2GEJ393X	39k
R216	ERJ2GEJ103X	10k

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R217	ERJ2GEJ431X	430
R218	ERJ2GEJ472X	4.7k
R219	ERJ2GEJ562X	5.6k
R220	ERJ2GEJ103X	10k
R221	ERJ2GEJ332X	3.3k
R222	ERJ2GEJ562X	5.6k
R223	ERJ2GEJ562X	5.6k
R224	ERJ2GEJ562X	5.6k
R226	ERJ2GEJ472X	4.7k
R227	ERJ2GEJ102X	1k
R229	ERJ2GEJ472X	4.7k
R230	ERJ2GEJ153X	15k
R238	ERJ2GEJ473X	47k
R239	ERJ2GEJ273X	27k
R242	ERJ2GEJ123X	12k
R243	RY1005	OPEN
R244	ERJ2GE0R00X	0
R245	ERJ2GE0R00X	0
R246	ERJ2GE0R00X	0
R248	ERJ2GE0R00X	0
R249	ERJ2GE0R00X	0
R250	ERJ2GE0R00X	0
R251	ERJ2GE0R00X	0
R300	ERJ2GEJ271X	270
R301	ERJ2GEJ180X	18
R302	ERJ2GEJ271X	270
R303	ERJ2GEJ183X	18k
R305	ERJ2GE0R00X	0
R306	ERJ2GEJ123X	12k
R308	ERJ2GEJ101X	100
R309	ERJ2GEJ101X	100
R310	ERJ2GEJ101X	100
R311	ERJ2GEJ393X	39k
R312	ERJ2GEJ561X	560
R313	ERJ2GEJ681X	680
R315	ERJ2GEJ821X	820
R316	ERJ2GEJ183X	18k
R317	ERJ2GEJ393X	39k
R318	ERJ2GEJ681X	680
R401	ERJ2GEJ102X	1k
R402	RY1005	OPEN
R404	RY1005	OPEN
R407	RY1005	OPEN
R408	ERJ2GE0R00X	0
R409	ERJ2GEJ104X	100k
R415	ERJ2GEJ155X	1.5M
R416	ERJ2GEJ304X	300k
R424	ERJ2GEJ101X	100
R425	ERJ2GEJ101X	100
R426	ERJ2GEJ101X	100
R427	ERJ2GEJ101X	100
R428	ERJ2GEJ101X	100

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R429	ERJ2GEJ101X	100
R430	ERJ2GEJ101X	100
R431	ERJ2GEJ101X	100
R432	ERJ2GEJ101X	100
R433	ERJ2GEJ101X	100
R448	ERJ2GEJ104X	100k
R449	ERJ2GE0R00X	0
R450	ERJ2GEJ222X	2.2k
R451	ERJ2GE0R00X	0
R461	ERJ3GEYJ181V	180
R462	ERJ3GEYJ560V	56
R468	ERJ2GEJ104X	100k
R469	ERJ2GEJ104X	100k
R473	ERJ2GEJ104X	100k
R474	RY1005	OPEN
R475	ERJ2GE0R00X	0
R479	ERJ2GEJ562X	5.6k
R480	ERJ2GEJ104X	100k
R481	ERJ2GEJ104X	100k
R482	RY1005	OPEN
R483	ERJ2GE0R00X	0
R484	ERJ2GEJ104X	100k
R485	ERJ2GEJ104X	100k
R486	ERJ2GEJ104X	100k
R490	ERJ2GE0R00X	0
R491	RY1005	OPEN
R503	ERJ2GEJ4R7X	4.7
R505	ERJ2GEJ4R7X	4.7
R506	ERJ2GE0R00X	0
R510	ERJ2GEJ103X	10k
R517	ERJ2GEJ394X	390k
R518	ERJ2GEJ104X	100k
R519	ERJ2GEJ104X	100k
R520	ERJ2GEJ273X	27k
R521	ERJ2GEJ273X	27k
R522	ERJ2GEJ153X	15k
R523	ERJ2GEJ334X	330k
R524	ERJ2GEJ104X	100k
R535	ERJ2GEJ334X	330k
R536	ERJ2GEJ133X	13k
R537	ERJ2GEJ222X	2.2k
R538	ERJ2GEJ222X	2.2k
R539	ERJ2GE0R00X	0
R540	ERJ2GEJ104X	100k
R541	ERJ2GEJ333X	33k
R542	ERJ2GE0R00X	0
R543	ERJ2GEJ104X	100k
R544	ERJ2GEJ222X	2.2k
R545	ERJ2GEJ204X	200k
R546	ERJ2GEJ683X	68k
R547	ERJ2GEJ222X	2.2k
R552	ERJ3GEYJ2R7V	2.7

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R553	ERJ6GEYJ5R6V	5.6
R554	ERJ3EKF1002V	10k
R556	ERJ2GE0R00X	0
R558	ERJ3GEYJ121V	120
R559	ERJ3GEYJ121V	120
R560	ERJ3GEYJ151V	150
R563	ERJ2GEJ104X	100k
R564	ERJ2GE0R00X	0
R568	ERJ6RSFR15V	0.15
R569	RY1005	OPEN
R570	ERJ2GE0R00X	0
R571	ERJ2GE0R00X	0
R572	RY1005	OPEN
R573	ERJ2GE0R00X	0
R574	ERJ2GE0R00X	0
R575	ERJ2GE0R00X	0
R576	ERJ2GE0R00X	0
R577	ERJ2GEJ104X	100k
R578	ERJ2GE0R00X	0
R579	ERJ2GE0R00X	0
R580	ERJ2GE0R00X	0
R581	ERJ2GE0R00X	0
RT200	D4CC11030008	10k
S400	EVQPUD02K	
U101	C1CB00001279	T/R Switch
U102	C1CB00000966	LNA/Mixer IC
U103	UZ76037A	RX Backend IC
U201	C1CB00000993	Transmit IC
U202	AN8000MSTXL	Ripple Filter
U204	J2ABE0000019	Isolator 800 Mhz
U205	J2ABF0000004	Isolator 1900 Mhz
U207	C1CB00000855	Cellular Band PA
U208	C1CB00001005	PCS Band PA
U300	C1CB00000965	PLL IC
U304	AN8000MSTXL	Ripple Filter
U305	UY76177A	VCO
U306	UY76179A	VCTCXO/19.44Mhz
U401	C2ZBZ0000331	Baseband IC
U402	C3ZBN0000010	32M/4Mbit Memory IC
U503	AN6588GJMEBV	Power Control IC
Y401	H0J327200022	32 kHz Crystal, +/-20 ppm

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