CCS Technical Documentation
NPD-4 Series Transceivers

Troubleshooting – Antennas

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Troubleshooting - Antennas

The NPD-4 handset features three antennas: the main CDMA internal antenna, the extendable whip antenna, and the global positioning system (GPS) internal antenna.

This troubleshooting guide addresses potential failures that will affect the antenna performance of the phone, and discusses methods for correction of these failures.

Failures and Corrective Measures

Internal antenna not installed or unplated internal antenna installed

A properly installed and plated 3585i antenna module is shown in Figure 1.

The antenna module consists of the main internal antenna, the whip antenna, and the GPS antenna.

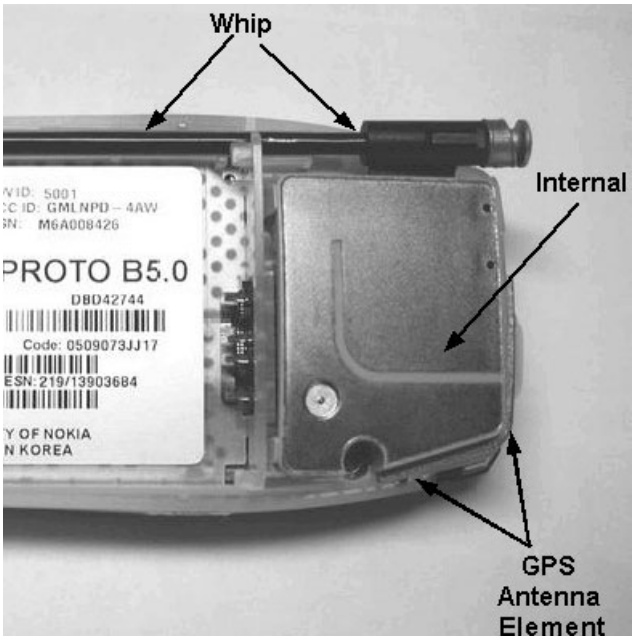

Figure 1: 3585i Antenna Module installed

If the 3585i antenna module is missing, install one. If an unplated internal antenna is installed, replace it with a properly plated internal antenna module.

If the internal antenna is not installed, the antenna gain will be degraded by more than 25 dB. This is also true if the GPS antenna is not installed. The main antenna and the GPS antenna are tested with the CPL-X.

Stamped contact spring clips missing/mis-installed for internal antenna

Figure 2 shows the RF feed and ground stamped contact clips properly installed. If either contact is missing or bent, replace antenna module with new antenna.

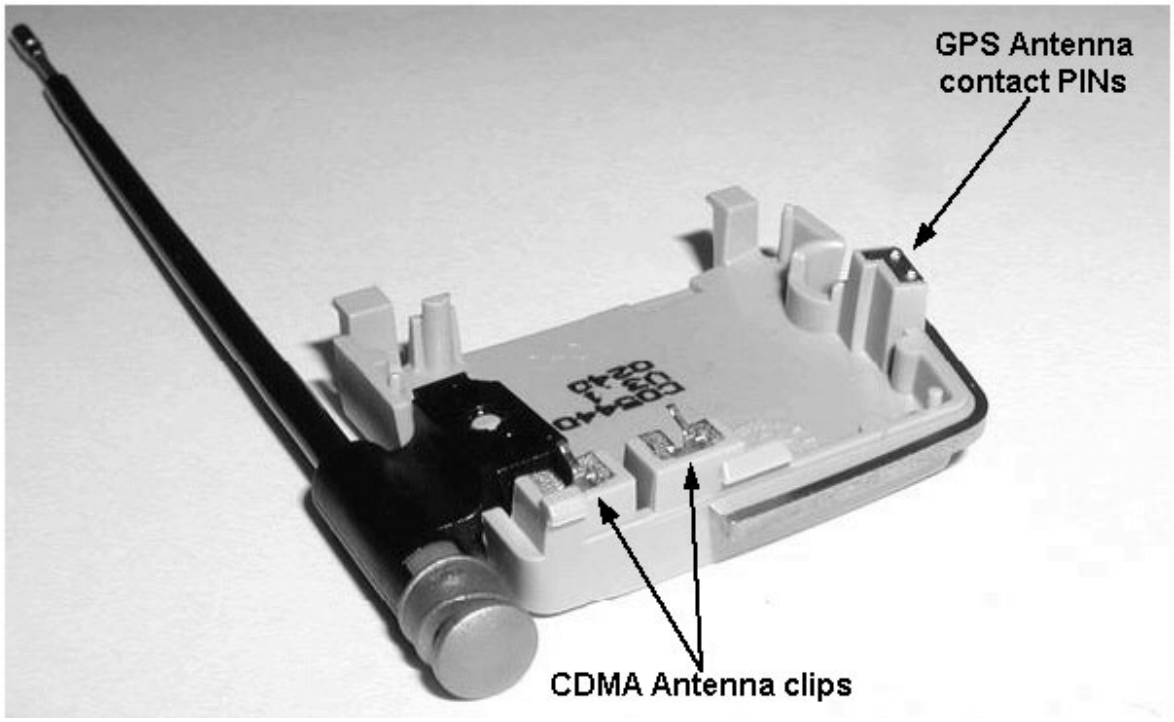

Figure 2: RF feed and ground stamped contact clips

GPS antenna C-clips bent or missing

If either of the C-clips is bent or missing, install new ones on the PWB. Also check the GPS antenna contact dimples in case of peeled off metallization.

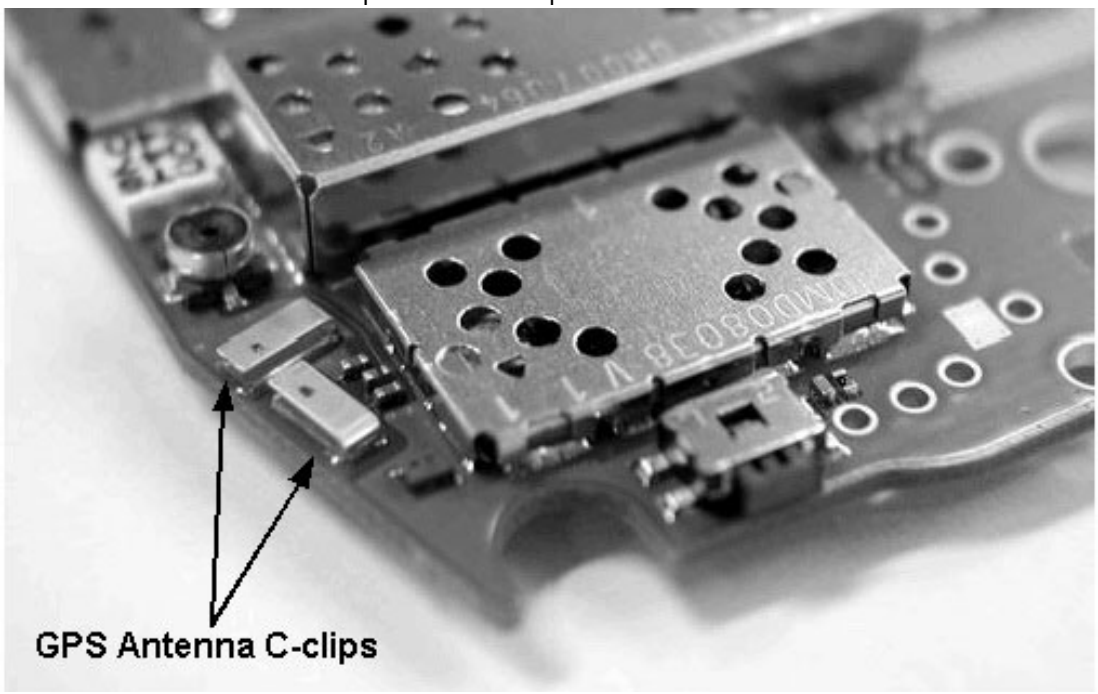

Figure 3: Stamped contact clip for GPS installed on PWB

Bottom antenna clip bent or missing

The bottom antenna clip is located near the bottom of the phone in the D-cover. A properly installed bottom antenna clip is shown in Figure 4.

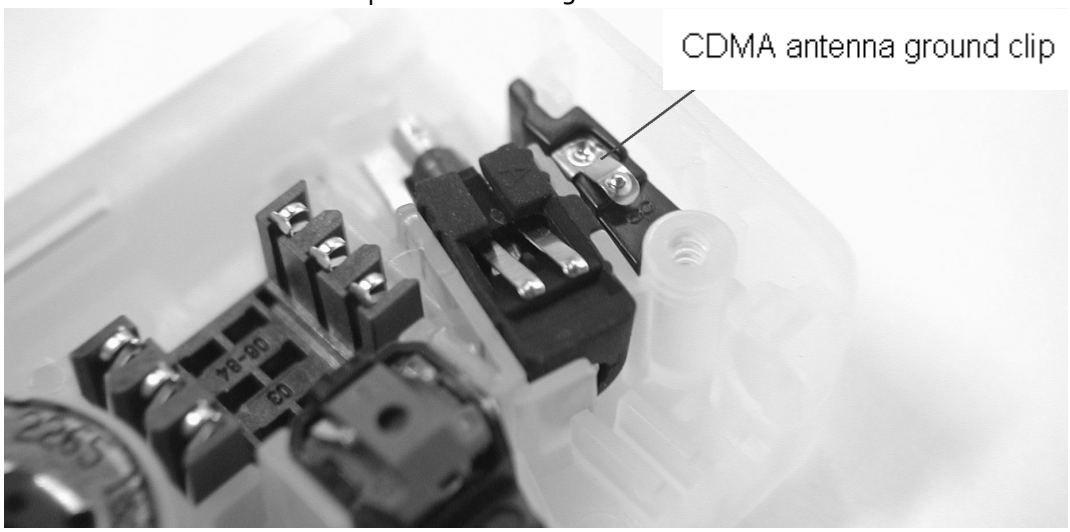

Figure 4: Properly installed bottom antenna clip

If the bottom antenna clip is bent or missing, then it should be carefully replaced with a new one.

The degradation in antenna performance is only about 2 to 4 dB in the receive portion of the CELL band when the whip is retracted. PCS band, retracted whip, degradation will be 10 to 15 db.

Missing whip

If the whip is missing, then the whip portion of the antenna module should be replaced. Figure 5 shows a properly installed whip antenna.

The whip will perform 2 dB better than the internal antenna in free space. The whip will perform up to 3 dB better than the internal antenna in talk position.

Figure 5: Properly installed whip antenna

Ungrounded display frame

The display frame is normally grounded by two spring clips (Figure 6). The figure shows the display frame grounding locations. If clips are missing or bent, replace display module (UI) with a good one.

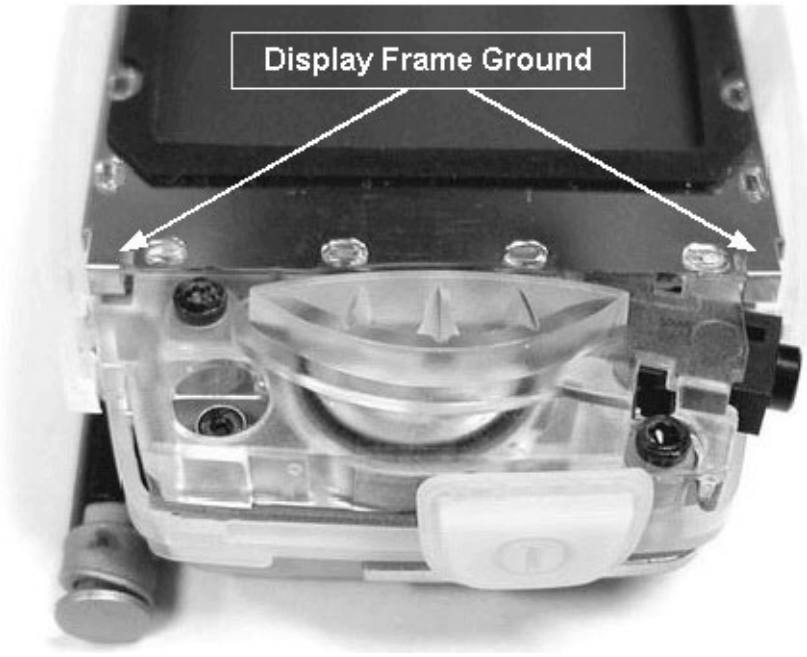

Figure 6: Display frame grounded by two spring clips

The D cover and light guide have snaps near the display frame ground positions. Make sure they are locked in position for ESD protection. These snap features help maintain display leg contact with the PWB.

Testing CDMA Antenna

Calibration Factors

Defining AMS RF coupler CPL-11 calibration numbers will be conducted in the test adapter MJF-19. The calibration numbers will be obtained by utilizing a phone with known RF and antenna performance. Each test adapter should only require a single calibration on CELL800 and GPS bands at used test frequencies. Additional calibrations should only be needed if the test adapter is substantially modified (reassembled, changed parts, dropped etc.).

Calibration Factor for CELL800 frequency

Transmitter of the phone with known output power and antenna performance will be turned on at the maximum output power (all bits up) by using call box. The transmitted power will be measured on the RF connector and through coupler at CDMA channel 384. The difference between the transmitted and received powers will be used as the calibration number (path loss on CELL band including coupler, cable and attenuator path losses) for the coupler on CELL band.

Nominal value for power measured at RF connector is 25,2 dBm. Coupler path loss is normally ~10...11 dB at CELL band. If 10 dB attenuator and cable with ~1 dB loss is used, total path loss is 21...22 dB and measured power would be from 4.2 to 3.2 dBm [25,2dBm – (21...22 dB)]. However, path loss has to be measured separately for every coupler since path losses vary depending on used setup, cables and attenuator.

Measurement Procedure for CELL800/PCS1900 phones

1. Place the phone display up with the whip antenna retracted in the test adapter MJF-11.
2. Turn on the phone's transmitter at CELL band on CDMA mode channel 384 at maximum output power (nominal 25.2 dBm at RF connector).
3. Measure the RF power with CPL-11 coupler. This will represent the internal antenna to RF coupler measurement.
4. Turn the phone's transmitter off.

CDMA Antenna test fails measured power is outside test limits

Min (measured power + coupler, cable and attenuator path loss)	Nominal	Max (measured power + coupler, cable and attenuator path loss)
22,0 dBm	25,2 dBm	28,0 dBm

Testing GPS Antenna

Calibration Factor for GPS

GPS test mode 3: GPS receiver will be fed with **CW signal**. With –110 dBm signal level on RF connector [(-110 dBm + cable loss) at signal generator output] GPS receiver should

report C/No ratio of 35 dBHz. Reported C/No figure will be recorded with signal fed to RF connector. C/No value will be read with coupler engaged. GPS signal level must be increased until same C/No value is recorded. The difference between the CW signal levels at the generator will be used as the calibration number (Path loss on GPS band including coupler, cable and attenuator losses).

Nominal coupler path loss at GPS band is 17...18 dB. If 10 dB attenuator and cable with 1 dB loss is used total path loss is 28...29 dB. Signal level at generator output has to be –82...-81 dBm [-110 dBm –(-28 dB...-29 dB)]. However path loss has to be measured separately for every coupler since path losses vary depending on used setup, cables and attenuator.

Measurement Procedure for GPS antenna

1 Place the phone with the whip antenna retracted onto the test adapter MJF-19 with CPL-11 antenna coupler and place inside shield box.

2 CW Signal generator will be turned on [with power -110 dBm + coupler, cable and attenuator path loss at GPS band] fed to RF coupler.

3 Read reported C/No figure with test mode 3 three to four times to see if it is stable.

GPS Antenna test fails if C/No value is outside test limits

Min	Nominal	Max
31,0 dBHz	35,0 dBHz	38,5 dBHz

Continuity Test

Both antennas must be tested if antenna ground pin is touching PWB ground. Test will be conducted with multimeter capable of measuring continuity or resistance. Test there is 0 Ω resistance between Internal antenna and Battery ground clip. Make same test between GPS antenna and Battery ground clip. If there is no contact to ground, check antenna contacts.

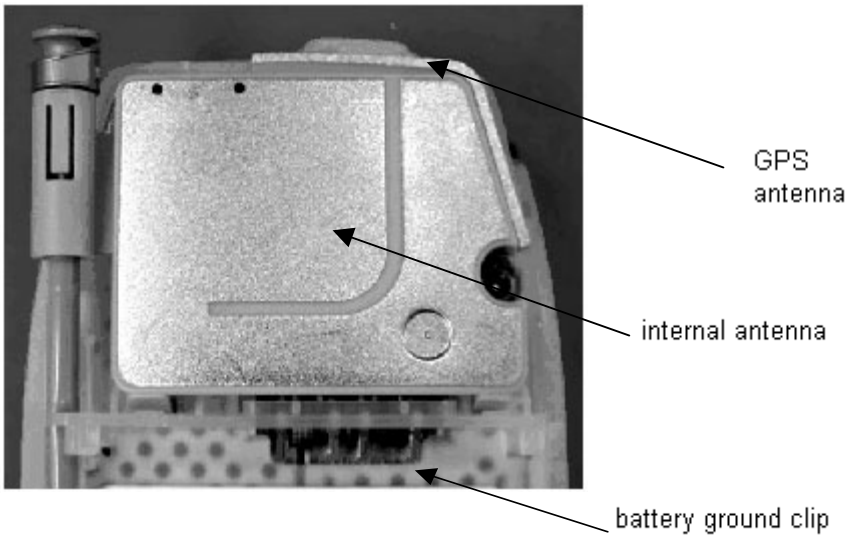

Figure 7: Back and top of Expedition antenna on D-cover