

# The National Geodetic Survey's Antenna Calibration Program

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## SUMMARY

The GPS antenna calibration program at the National Geodetic Survey (NGS), an office of NOAA's National Ocean Service, aims to determine the phase center variations and phase center offsets for geodetic quality antennas with respect to the Dorne/Margolin T choke ring antenna (JPL D/M+crT). The average L1 and L2 phase center offsets are typically measured from an antenna's reference point (ARP) via an in situ calibration procedure, coordinated by the Instrumentation and Methodologies Branch in Corbin, Virginia. The testing environment consists of two reinforced 6 in. diameter concrete piers along a north-south line which are used to mount the reference and test antennas. The north (reference) and south (test) piers are approximately 5.0 m apart, 1.8 m high and are located in a relatively flat grassy field. Two GPS receivers, with a common rubidium oscillator as an external frequency standard, are used to track satellites down to an elevation of 10°. For the actual calibration procedure, an elevation cutoff angle of 15° is usually chosen while solving for the baseline length and the location of the test antenna's L1 and L2 phase centers. A single frequency solution with 24 hours of data is then performed to determine the baseline length between the two pier-mounted antennas using the PAGES software suite. Due to the extremely short baseline, double difference phase observations essentially cancel any tropospheric and ionospheric effects on the solution. Additional steps are then taken to determine the offsets from the ARP to the phase centers for L1 and L2. Calibration results for numerous antennas, engineering diagrams, photographs and additional information on the GPS antenna calibration program can be found at <http://www.ngs.noaa.gov/ANTCAL/>.

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