Grenada

by Clifford J. Mugnier, C.P., C.M.S.

Discovered by Christopher Columbus in 1498 on his third voyage, the island was not settled until 1609 when the English attempted to establish tobacco plantations. Native Carïb Indians made numerous raids on the English settlers and convinced them to abandon the island. In 1650, the governor of Martinique purchased Grenada from the Carïbs, and re-settled the island with about 200 French citizens. After a year of subsequent raids by the Carïbs, a contingent of French soldiers was sent to Grenada to secure the island. The Carïbs were routed at Sauteurs Bay, but rather than surrender, the entire Carïb population leaped to their deaths from the island cliffs. Thanks to *Lonely Planet 2004*: "The French then set about establishing plantations of indigo, tobacco, coffee, cocoa and sugar, which were worked by African slaves. Grenada remained under French control until captured by the British in 1762. Over the next two decades it teetered between the two colonial powers until it was ceded to the Brits in 1783. It remained under British rule until independence, though animosity lingered between the British colonialists and the minority French settlers, with violence erupting periodically. In 1877, Grenada became a Crown Colony. In 1967, Grenada became an associate state within the British Commonwealth. Grenada and the neighboring Grenadine Islands of Carriacou and Petit Martinique adopted a constitution in 1973 and became an independent nation in 1974."

Dubbed the "Spice Island" because of its impressive production of nutmeg, mace, cinnamon, ginger, and cloves, Grenada has a rugged mountainous interior of rainforests and waterfalls and an indented coastline with protected bays and secluded beaches. Grenada is comprised of the islands of Grenada, Carriacou, and Petit Martinique. Located just north of Trinidad and Tobago (*PE&RS,* November 2000), and just south of St. Vincent (*PE&RS,* February 2004), the area of Grenada (340 km^2), is twice the size of Washington, D.C. With a coastline of 121 km, the terrain is volcanic in origin with central mountains. The lowest point is the Caribbean Sea, and the highest point is Mount Saint Catherine (840 m).

The British Directorate of Colonial Surveys (DCS) flew the first aerial photography of Grenada in 1951. The original geodetic surveys of the island were performed by DCS in 1953, and the origin point is the astronomical station GS 8, Santa Maria (at the Santa Maria Hotel yard), where: Φ_o = 12° 02' 36.56" N and Λ_o = 61° 45' 12.495" West of Greenwich. The defining azimuth to G5 North Extension is α_o = 207° 30' 46.55" East of North, and scale is defined by the length from G1 West Base (Grand Anse Rum Distillery Hill) to G2 East Base (SE of the Grand Anse Rum Distillery chimneys) of 1991.394 meters. The height of Santa Maria (H_o) = 160.24 feet, determined by leveling from the Colony bench mark at St. Georges Harbor which is 3.17 feet above mean sea level. The ellipsoid of reference is the Clarke 1880 where: a = 6,378,249.145 m, $1/f$ = 293.465. The grid system used for Grenada is the BWI Transverse Mercator Grid where the central meridian, λ_o = 62° W, the latitude of origin φ_o = equator, the scale factor at the latitude of origin m_o = 0.9995, False Easting = 400 km, and False Northing = nil. The formulae are the Gauss-Krüger, but for such a small span of latitude and longitude that includes all three islands; the distinction in this case is irrelevant. As is common with the BWI Grid usage, the grid is used as an "atlas index" numbering system for the popular tourist maps, and is not numbered with coordinate values but with an alphanumeric system for facile use to locate tourist interest points. The grid is easy to recover if one is familiar with the standard BWI grid conventions, but the defining parameters are unfortunately obscure to many:

"In Grenada, four Navy A-7 Corsair aircraft strafed a U.S. Army command post, inflicting 17 American casualties (Doton, *Acquisition Quarterly Review,* 1996). That tragedy highlighted the Services' failure to establish a common positional picture. Each Service brought its own maps and map systems to the fight. The ground forces were unable to accurately describe a point on the ground to the supporting pilots. Air, ground, and sea Services planned and operated using separate maps referenced to three distinctly different coordinate systems. Accustomed to large-scale maps depicting terrain in familiar grids, Army units deploying from Fort Bragg used maps constructed by the Army's 100th Engineer Company (Cartographic), from a tourist map with an arbitrary grid overlay. Despite pictures of palm trees in the margins, the map was excellent. Constructed by British military engineers, the base map included highly accurate survey data replete with topographic contours. The American Army engineers merely added black grid lines for ground troops to use as a grid reference system. While this worked well for the Army, coordinates from the gridded overlay were useless to any combatant without a copy of the modified tourist map. Some historians link the strafing of the U.S. Army command post to this lack of a common positional picture. "Ground units experienced difficulty in orienting themselves and in directing supporting gunfire and airstrikes. [This] inadvertent airstrike…has been blamed partly on this chart confusion problem" (Rivard, *DTIC* 1985). The failure to create a common reference for

continued on page 129

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Grids & Datums

continued from page 127

planning highlighted the Services' utter lack of attention to planning the joint fight. The 'tourist map' debacle merited considerable media attention, providing further grist for 1986 Goldwater-Nichols Act proponents." (Gruetzmacher, Holtery, and Putney , Joint Forces Staff College Joint and Combined Staff Officer School, #02-02, 2002)

A GPS survey by the U.S. National Geodetic Survey (NGS) occupied the station GS 15, Fort Frederick in 1996. I computed a singlepoint datum shift relation from Grenada 1953 Datum to WGS 84 Datum as: $\Delta X = +72$ m, $\Delta Y = +213$ m, and $\Delta Z = +93$ m. Thanks to Dennis McCleary of NGA for validation that the Santa Maria "astro" position was the same as the geodetic position I received from Dave Doyle of NGS.

Cliff Mugnier teaches Surveying, Geodesy, and Photogrammetry at Louisiana State University. He is the Chief of Geodesy at LSU's Center for GeoInformatics (Dept. of Civil and Environmental Engineering), and his geodetic research is mainly in the subsidence of Louisiana and in Grids and Datums of the world. He is a Board-certified Photogrammetrist and Mapping Scientist (GIS/LIS), and he has extensive experience in the practice of Forensic Photogrammetry.

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