Grids & Datums

REPUBLIC OF MALDIVES

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

"Upon Conversion (to Islam – Ed.), in 1153 AD, the Maldives was declared a Sultanate, and the ruling monarch adopted the name of al Sultan Muhammad Ibn Abdullah Siri Bavanaadittiya Mahaa Radhun, popularly known as Dharumavantha Rasgefaanu" (Republic of Maldives Official Website). The Maldives was under European control from the 16th century, and came under British protection in the 19th century. It became independent in 1965, and proclaimed itself a republic in 1968.

The Maldives is about 1.7 times the size of Washington, D.C., and is comprised of 1,190 islands grouped into 26 atolls (200 inhabited islands, plus 80 islands with tourist resorts). It is an archipelago with a strategic location astride and along major sea-lanes in the Indian Ocean. The coastline is 644 km in length, and 80% of the land area is less than 1 meter above local mean sea level. The highest point is an unnamed location on Wilingili island in the Addu Atoll at 2.4 meters (7.9 ft). There are 19 administrative divisions consisting of the following atolls: Alifu, Baa, Dhaalu, Faafu, Gaafu Alifu, Gaafu Dhaalu, Gnaviyani, Haa Alifu, Haa Dhaalu, Kaafu, Laamu, Lhaviyani, Maale (Male), the City of Male, Meemu, Noonu, Raa, Seenu, Shaviyani, Thaa, and Vaavu.

During WWII, the Maldives was still part of the British Indian Ocean Territory, and the British Grid that covered the entire area was the "Maldive-Chagos Belt." The defining Gauss-Krüger Transverse Mercator parameters include: Latitude of Origin, (φ_o) = Equator, by definition, Central Meridian, (λ_o) = 73° 30' East of Greenwich, Scale Factor at Origin (m_o) = unity, False Easting = 417,000 Indian yards, False Northing = 1,450,000 Indian yards. The ellipsoid of reference was the Everest 1830 where a = 6,974,310.60 Indian yards, $1/f$ = 300.8017, and 1 Indian yard = 0.914399205 m). The limits of the Maldive-Chagos Belt were: North – Parallel of 8° N, East – Meridian of 76° East, South – Parallel of 10° South, and West – Meridian of 72° East. The standard British Military Grid color was not specified, but the color found published for this Belt was black. An example computation test point is: φ = 6° 31' 22.717" S, λ = 72° 00' 36.426" E, X = 236,791.02 yds., Y = 66,963.14 yds. (Note that my own computation yielded X = 236,791.016 yds., Y = 66,963.138 yds. – Ed.)

The name of the local Maldives astronomic datum is unknown, but in July of 2004, Ruth Adams of the UK Hydrographic Office stated that "The difference between the original astro graticule and WGS84 Datum is over 3 miles" (The Hydrographic Journal). The difference is primarily in the East-West component; that being a function of time-keeping chronometer error.

A recent issue of Coordinates magazine, contained an article by V. Raghu Venkataraman, et al., about the National Remote Sensing Agency (NRSA), Hyderabad, India that performed a "large scale topographical mapping for the Republic of Maldives." General photogrammetric details were discussed, but no details of the local grid parameters or transformation parameters from the local datum(s) to WGS84 were offered.

Thanks to John W. Hager, I was able to garner some of the inscrutable details of the Maldives: "For Gan 1970 located at AR1, Φ_o = 0° 41' 48.123" S, Λ_o = 73° 09' 49.038" E, International ellipsoid. For Gan located at Cag 11T, Φ_o = 0° 42' 02.204" S, Λ_o = 73° 09' 44.854" E, International ellipsoid. I made a further note on Gan 1970 that I was not sure that it was the datum point but another point connected to the datum point. The station designation "Cag" has the earmark of being British, something to do with Chagos. I have two names but the same coordinates. First is Maradu (1923) at station "D", Φ_o = 0° 39' 43.62 S, Λ_o = 73° 07' 38.114" E, Everest 1830 ellipsoid. This was from "Addu Atoll Survey" of Aug. - Sept. 1942. Obviously the position, presumably an astro, is much earlier. For the second, Manira at station Maralu (027), with the same coordinates but International ellipsoid. I have a note questioning whether Manira is a typo for Mahira and also that the position for Mahira (8) is Φ_o = 0° 34' 27.56" S, Λ_o = 73° 12' 44.77" E."

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According to the now-obsolete NGA Technical Report TR8350.2, the 3-parameter transformation from the local native Maldives Datum on the island of Gan ("Gan 1970" referenced on the International 1909 ellipsoid) to WGS84 Datum is: ΔX = –133 m, ΔY = –321 m, ΔZ = +50 m.; the relation is based on only one observed point, and the uncertainty of each translation component is stated to be ±25 meters. Thanks again to John W. Hager for his help on this enigma!

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