Grids & Datums

TURKMENISTAN

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

"Present-day Turkmenistan covers territory that has been at the crossroads of civilizations for centuries. The area was ruled in antiquity by various Persian empires, and was conquered by Alexander the Great, Muslim crusaders, the Mongols, Turkic warriors, and eventually the Russians. In medieval times Merv (today known as Mary) was one of the great cities of the Islamic world and an important stop on the Silk Road" (*World Factbook, 2012*). "Merv suffered a number of attacks over the course of its history, but instead of being rebuilt on top of the older ruins, Merv slowly spread west. In total, five cities were constructed next to each other, largely because of the shifting rivers. The oldest section was the Erk Kala and in later centuries most people lived in the vast walled city called Sultan Kala. All of this was completely eradicated in 1221 under the onslaught of the Mongols. In 1218 Jenghiz Khan demanded a substantial tithe of grain from Merv, along

larger than California, the lowest point is Vpadina Akchanaya (–81 m), *note:* Sarygamysh Koli is a lake in northern Turkmenistan with a water level that fluctuates above and below the elevation of Vpadina Akchanaya (the lake has dropped as low as –110 m) and the highest point is Gora Ayribaba (3,139 m)" (*World Factbook, 2012*).

By 1912, longitudes had been transmitted via telegraph from Tashkent, Uzbekistan to Aşgabat, Merv, and Türkmenbaşy. Also, a line of Astro Station observations had been performed from Türkmenbaşy up to the Aral Sea and then down southeast along the border with Uzbekistan to the tripoint with Afghanistan. These observations were presumably calculated on the Bessel 1841 ellipsoid where $a = 6,377,397.15$ m and $1/f = 299.1528$. After the Russian revolution and the founding of the Soviet, geodetic work progressed towards standardization. The country is still on the old Soviet datum, "System 42" with origin at

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Bordered by Afghanistan (744 km) (*PE&RS*, January 2004), Iran (992 km), Kazakhstan (379 km) (*PE&RS*, April 2010), Uzbekistan (1,621 km) (*PE&RS*, December 1998), and the Caspian Sea (1,768 km); the terrain is flat to rolling sandy desert with dunes rising to mountains in the south and low mountains along the border with Iran. "Slightly

Pulkovo Observatory where: $\Phi_o = 59°\ 46'\ 18.55"$ North, $\Lambda_o = 30°\ 19'\ 42.09"$ East of Greenwich, the defining azimuth at the point of origin to Signal A is: $\alpha_o = 317°\ 02'\ 50.62"$ and the ellipsoid of reference is the Krassovsky 1940 where $a = 6,378, 245$ meters, and $1/f = 298.3$. The Russia Belts are a Grid System identical to UTM except that the scale factor at origin is $m_o = 1.0$. The closest transformation parameters available for Turkmenistan are the 3-parameter transformation from System 42 to WGS 84 in the Caspian Sea area of Kazakhstan are: $\Delta X = +14.471$ m, $\Delta Y = -132.753$ m, $\Delta Z = -83.454$ m, and are based on an occupation at 5 stations: Bolat, Yesim Sevirne, Dlinnaya Dolina, Daralsai, and Aul.

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