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GIS integration of the 1:75,000 Romanian topographic map series from the World War I

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During the WWI, the Kingdom of Romania developed a 1:75,000 topographic map series, covering not only the actual territory of the country (the former Danube Principalities and Dobrogea) but also Bessarabia (now the Republic of Moldova), which was under Russian rule. The map sheets were issued between 1914 and 1917. The whole map consists of two zones; Columns A-F are the western zone, while Columns G-Q are belonging to the eastern one. To integrate the scanned map sheets to a geographic information system (GIS), the parameters of the map projection and the geodetic datum should be defined as well as the sheet labelling system. The sheets have no grid lines indicated; most of them have latitude and longitude lines but some of them have no coordinate descriptions. The sheets, however, can be rectified using their four corners as virtual control points, and using the following grid and datum parameters:

Eastern zone: • Projection type: Bonne. • Projection center: latitude=46d 30m; longitude=27d 20m 13.35s (from Greenwich). • Base ellipsoid: Bessel 1841 • Datum parameters (from local to WGS84): dX=+875 m; dY=-119 m; dZ=+313 m. • Sheet size: 40*40 kilometers, projection center is the NW corner of the 779 (Column L; Row VII) sheet.

Western zone: • Projection type: Bonne. • Projection center: latitude=45d; longitude=26d 6m 41.18s (from Greenwich); • Base ellipsoid: Bessel 1841 • Datum parameters (from local to WGS84): dX=+793 m; dY=+364 m; dZ=+173 m. • Sheet size: 0.6*0.4 grad (new degrees), except Column F, which is wider to east to fill the territory to the zone boundary. In Columns E and F geographic coordinates are indicated in new degrees, with the prime meridian of Bucharest.

Apart from the system of columns and rows, each sheet has its own label of three or four digit. The last two digit correspond to the column number (69 for Column A going up to 84 for Column Q) while the first digit(s) refer directly to row number (1-15).

During the rectification process, the coordinates of the corners (the control points) should be defined in the respective Bonne zone projected coordinates. It can be done by simple additions in the eastern zone but it needs conversion from geographic to projected coordinates in the western one. The general accuracy of this geo-referencing method is up to 200 meters – this error is the same in the 1:75,000 series of the Habsburg Empire made from the 1880s.