

## Voyager Control Networks of Uranus Moons - Archive Description.

This archive has been created as part of a project to put planetary control networks on the web. These control networks originated from the RAND corporation (Merton Davies and Tim Colvin) and were provided to Brent Archinal of the USGS in 2000. The control network solutions were originally performed with software developed at RAND and documented by Colvin (1992). The RAND software was subsequently converted into files that could be used with (successively) the RAND/USGS Planetary Geodesy (RUPG) Software, and the USGS ISIS2 “randlsq” software. In 2020, the RAND control network files were converted to the “.net” binary format, used in ISIS3 and later versions of ISIS (hereafter just shown as “ISIS3+”). These were then processed via the ISIS3+ “Jigsaw” program, which had been based on randlsq and is described by Edmundson et al. 2012. Each RAND-format control network is essentially a set of photogrammetric solution (input and output) files. The input files consist of a parameter input file for specifying how the solution should be done, a priori information on control point (the measured points in common to multiple images, sometimes called tie points) locations and spacecraft position and pointing information, and pixel location measurements of the control points on images of a planetary body. The output files include the body coordinates of the control points in latitude, longitude, and radius, revised orientation information (camera pointing) for the images, and (optionally) updated information on the size and orientation of the body. The binary ISIS3+ “.net” format contains all network data in a single file. The primary use of such information is for the creation of image mosaics of the planetary body. However, as just noted, these solutions can also provide fundamental data on the size and shape of the body, its spin orientation and rate, and the direction of its polar axis in space. The control point coordinates also usually serve as a coordinate reference frame that can be used to define the fundamental coordinate reference system for the body in question. Formatting of these control network data has been updated for compatibility with the USGS ISIS2 and ISIS3+ planetary imaging and cartography software. These networks were generated using images from the Voyager 2 mission (Davies et al., 1987). This release comprises data from original RAND control network solutions, the ISIS2 “matchpoint” formatted control networks, and RAND and USGS (jigsaw-processed) solutions to the control networks in ISIS3+ format.

## References

Colvin, Tim R., Photogrammetric Algorithms and Software for Spacecraft Optical Imaging Systems. Santa Monica, CA: RAND Corporation, 1992.  
<https://www.rand.org/pubs/notes/N3330.html>.

Edmundson, K. L. ; Cook, D. A. ; Thomas, O. H. ; Archinal, B. A. ; Kirk, R. L., 2012, Jigsaw: the ISIS3 Bundle Adjustment for Extraterrestrial Photogrammetry, ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume I-4, 2012, pp.203-208

M.E. Davies, T.R. Colvin, F.Y. Katayama, P.C. Thomas, 1987, The control networks of the satellites of Uranus, Icarus, 71, pp. 137-147, [https://doi.org/10.1016/0019-1035\(87\)90168-0](https://doi.org/10.1016/0019-1035(87)90168-0)