ISIS Planetary Geodesy Software

(formerly RAND/USGS Planetary Geodesy (RUPG) Software)

Randlsq Program Parameter Input format

File: ISIS-PG-FMT501.doc, .pdf, or .asc

Version: 2006.08.10

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Description: Primary input of *randlsq* program flow parameters. This version is for now standard 7 character control point names, although was originally only for lunar solutions.

File input:

Group 1 (1 record, note 2):

Name	Columns	Format	Description (units)
npic	1-5	I5	Number of images (unitless).
npoi	6-15	I10	Number of control points (unitless).
nmea	16-25	I10	Number of measurements (unitless).
nit	26-30	I5	Number of iterations of solution (unitless). Note 7.
iout	31-35	I5	If iout=0, then an output pole, points, and picture file is not produced. If iout=1, then an output pole, points, and picture file is produced.
ntot	36-40	I5	Number of types of variables for which a solution is required. The variable types are given below under group 3 input.
nsw	41-45	I5	Number of single variables to be weighted (unitless).
isol	46-50	I5	If isol=1 then individual radii are used at control points. If isol=2, then a single body-wide radius is used. If isol=3, then a tri-axial ellipsoid is being used (and the "pole, points, and picture" file must have apriori values for these).
iew	51-55	I5	If iew=0, then east longitudes are used. If iew=1, then west longitudes are used.
list	56-60	I5	If list=0, then output is directed to the terminal. If list=1, then output is direct to a user-specified file.
nfirst	61-70	I10	Number of conjugate gradient solution iterations (unitless).

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k100   71-75   I5   If DATFMT parameter equals "RANDCLEM", then
this is multiplied by 100000 and added to "nmea". (The reason for this is
currently not clear, but is perhaps to increase the size of buffer space for
Clementine solutions) (unitless).

iawt   76-80   I5   Angle weighting type. If 0, use RAND (power
of 10) style weighting. If 1, actual uncertainty is given.

Sample (from Mars solution):

=> 6371   37652   90130   4   1   6   2   1   1   1   99998<=

Group 2 (1 record):

Body   1-10   A10   Name of the target planetary body (all
uppercase and left justified). Allowable names are:

ADRASTEA
AMALTHEA
ARIEL
CALLISTO
DIONE
ENCELADUS
EUROPA
GANYMEDE
GASPRA
IAPETUS
IDA
IO
MARS
MERCURY
METIS
MIMAS
MIRANDA
MOON
PHOEBE
RHEA
TETHYS
THEBE
TITAN
TRITON

Sample (from Mars solution, par0014-030606.dat):

=>MARS<=

Group 3 ("ntot" records):

Idtot   1-6   I6   Variable type for which a solution is
required. Possible types are:

    1: latitude of point (degrees)
    2: longitude of point (degrees)

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      3: radius of point (km)
      4: alpha angle of C matrix (degrees)
      5: delta angle of C matrix (degrees)
      6: kappa angle of C matrix (degrees)
      7: right ascension of pole (degrees)
      8: declination of pole (degrees)
      9: rotation rate of pole (degrees/day)
     10: a-axis of ellipsoid (km)
     11: b-axis of ellipsoid (km)
     12: c-axis of ellipsoid (km)
     13: ellipsoidal longitude offset (degrees)
```

gweight   7-11   I5   If "iawt"=0, weight to apply to the above
variable (power of ten, units as described above). Use e.g. "-38" to allow a
variable to freely adjust and "20" to fix it to the a priori value. E.g. use
"20" for Mars radii known from MOLA. Note 6.

gunc   12-35   D24.16   If "iawt"=1, uncertainty to be used to
compute weight (weight = 1 / uncertainty**2) to apply to the above variable
(units as described above) (degrees). If this value is zero or less than 1.D0-
10, it is reset to 1.D0-20. Note 5. Ignored if iawt.ne.1 or if idtot is not 4,
5, or 6.

Sample (from Mars solution, par0014-030606, fixing radii of all points, as input
from MOLA interpolation):


```
=>     1  -38<=
=>     2  -38<=
=>     3   20<=
=>     4  -38<=
=>     5  -38<=
=>     6  -38<=
```


Group 4 ("nsw" records):

iswt   1-6   I6   Single variable for which a weight is
required.

sweight   7-11   I5   Weight to apply to the above variable (power
of ten, units as described above). Use e.g. "-38" to allow a variable to freely
adjust and "20" to fix it to the a priori value. E.g. use "20" for the
latitude, longitude, and radii of a landing site whose coordinates are known by
radio tracking. Note 6.

Sample (from Mars solution, par0014-030606.dat, fixing latitude and longitude of
first point, the Pathfinder landing site):

```
=>     1   20<=
=>     2   20<=
```


Notes:

1. Currently read from *randlsq* program unit 11.
2. This record was read with a "(I6,11I5)" format by the *weighter2*.f (Mars control network) program, which has been superseded by the *randlsq.F* program.
3. Lines beginning with a "#" will eventually be treated as comments.
4. If use of a ground point file is specified as a randlsq program parameter, the radii will be fixed via weighting, on the assumption that if radii are available for any points, they should be available for all points (and should be set as a priori values).
5. In (mostly test) versions of *randlsq.F* before 2005.11.17, this value was treated as the actual weight to be applied (rather then the uncertainty). Unfortunately most lunar (Clementine) control network runs (from 2004.08 to 2005.11) had assumed this was the uncertainty, when in fact it was used as the weight itself, and therefore need to be treated with caution. BA, 2005.11.17.
6. In versions of *randlsq.F* after about 2005.11 (and special Clementine solution versions before that) point weights can be set individually in the poles, points, and positions file, and the angle weights can be set for each type of angle if iawt.eq.1. In either case, these weights will override any set here using the gweight or sweight values. *However, a bug currently exists that the old listing of these RAND style weights at the top of the residual output file (under "WEIGHTS") will incorrectly still list these weights as being the ones applied when they are not*. BA, 2005.12.27.
7. If the number of iterations is 1, as a minor bug, the names of the parameters will be blank in any parameter uncertainty output, since they are not set until the end of the first iteration. BA, 2006.02.20.

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Reference: Model, program, and format generally follow that specified in:

Colvin, Tim R. (1992). "Photogrammetric Algorithms and Software for Spacecraft Optical Imaging Systems," *A RAND NOTE*, N-3330-JPL.

Note that the original format indicates the use of 5 character control point names.

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Document History:

Begun 2006.08.10 by B. Archinal, based on RUPG-FMT5032.doc.

Modifications:

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(End of document.)