ANNEX N

GLOBAL POSITIONING SYSTEM DATA TRANSFER FORMAT
(G-FILE)

This annex contains information about the Global Positioning System (GPS) Data Transfer Format (G-File) records. The G-File consists of eight 80-column record types that are used to document the results of the computation of relative vectors, expressed as components, from simultaneously observed GPS phase measurements. There may be only one G-file for a project. Each G-file must contain one Project Record (A) and one or more Session Header Records (B). A Session Header Record (B) is required for each individually processed vector or each simultaneously processed group of vectors (session) at three or more survey points. Each Session Header Record is followed by one or more Vector (C) and/or Long Vector (F) Records, Correlation (D) or Covariance (E) Records, optional Coordinate (G) Records, and optional and/or required Station Information (H) Records. Vector and Long Vector Records contain relative vector components between two survey points. Correlation Records contain the off-diagonal elements only of the correlation matrix for the vector components in a session. Covariance Records contain the off-diagonal elements only of the covariance matrix for the vector components in a session. The records for a simultaneously processed vector set may only contain correlation **or** covariance records but not a mix of the two. A Long Vector Record may only be used when a vector component is larger than +/- 999,999.9999 meters. The Coordinate (G) Records may be used to record, for informational purposes within the G-file, the coordinates of survey points held fixed during the vector computations or to provide location information regarding the G-file. Relative vectors are required even if coordinates are included. Station Information Records are used to document differing conditions or solution types for vectors within a session. The Station Information Record (H) is required only when an external time standard is used with a receiver, when a comment needs to be made about a station occupation, or when information about a station occupation or vector solution is not the same as for all other stations or vectors in a session. Multiple H records are allowed.

This annex documents the record formats, provides an explanation of the fields within each record, and gives G-file examples using the various record types.

| CC-1 CODE | RECORD TYPE | |
|---|---|---|
| A | Project Record | **(The A record is required)** |
| B | Session Header Record | **(The B record is required)** |
| C | Vector Record | **(The C record is required)** |
| D | Correlation Record | **(Either the D record or the** |
| E | Covariance Record | **E record is required)** |
| F | Long Vector Record | |
| G | Coordinate/Absolute Position Record (optional) | |
| H | Station Information Record | |

Project Record

| | | |
|---|---|---|
| 01-01 | A | |
| 02-03 | Job Code (Chapter 1) | Alpha |
| 04-07 | Year, Start of Project (local) (CCYY) | Integer |
| 08-09 | Month, Start of Project (local) (MM) | Integer |
| 10-11 | Day, Start of Project (local) (DD) | Integer |
| 12-15 | Year, End of Project (local) (CCYY) | Integer |
| 16-17 | Month, End of Project (local) (MM) | Integer |
| 18-19 | Day, End of Project (local) (DD) | Integer |
| 20-78 | Title of project | Alpha |
| 79-80 | Reserved | |

Session Header Record

| | | |
|---|---|---|
| 01-01 | B | |
| 02-05 | Year, First Actual Measurement (UTC) (CCYY) | Integer |
| 06-07 | Month, First Actual Measurement (UTC) (MM) | Integer |
| 08-09 | Day, First Actual Measurement (UTC) (DD) | Integer |
| 10-13 | Time, First Actual Measurement (UTC) (HHMM) | Integer |
| 14-17 | Year, Last Actual Measurement (UTC) (CCYY) | Integer |
| 18-19 | Month, Last Actual Measurement (UTC) (MM) | Integer |
| 20-21 | Day, Last Actual Measurement (UTC) (DD) | Integer |
| 22-25 | Time, Last Actual Measurement (UTC) (HHMM) | Integer |
| 26-27 | Number of Vectors in the Session | Integer |
| 28-42 | Software Name & Version | Alpha |
| 43-47 | Orbit Source **(agency that computes orbit)** | Alpha |
| 48-51 | Orbit accuracy estimate **(XX.xx meters)** Implied | Decimal |
| 52-53 | Solution coordinate system code (table, N-6) | Integer |
| 54-55 | Solution meteorological use code (table, N-6) | Integer |
| 56-57 | Solution ionosphere use code (table, N-6) | Integer |
| 58-59 | Solution time parameter use code (table, N-6) | Integer |
| 60-60 | Nominal accuracy code (table, N-8) | Integer |
| 61-66 | Processing agency code (Annex C) | Alpha |
| 67-70 | Year of Processing (CCYY) | Integer |
| 71-72 | Month of processing (MM) | Integer |
| 73-74 | Day of processing (DD) | Integer |
| 75-80 | Solution Type (table, N-7) | Alpha |

**Note: Columns 43 through 47 of Record B contains the symbol of the agency which computes and provides GPS satellite orbit information. Columns 61 through 66 contains the symbol of the agency that does the observation reduction processing.** Columns 52 through 80 of Record B assume all stations use identical observing and computation procedures. If this is not the case use Record H to record the differences for each of those stations which vary from those conditions noted on the B record.

Vector Record

| | | | |
|---|---|---|---|
| 01-01 | C | | |
| 02-05 | Origin Station Serial Number (ssn) (vector tail) | | Integer |
| 06-09 | Differential Station Serial Number (vector head) | | Integer |
| 10-20 | Delta X | (XXXXXXX.xxxx meters) | Implied Decimal |
| 21-25 | Standard Deviation | (X.xxxx meters) | Implied Decimal |
| 26-36 | Delta Y | (XXXXXXX.xxxx meters) | Implied Decimal |
| 37-41 | Standard Deviation | (X.xxxx meters) | Implied Decimal |
| 42-52 | Delta Z | (XXXXXXX.xxxx meters) | Implied Decimal |
| 53-57 | Standard Deviation | (X.xxxx meters) | Implied Decimal |
| 58-58 | Rejection Code (use upper case R to reject) | | Alpha |
| 59-68 | Origin Station Data Media Identifier | | (See page N-6) |
| 69-78 | Differential Station Data Media Identifier | | (See page N-6) |
| 79-80 | Reserved | | |

Note: Standard deviation values must be positive, non-zero numbers.

Correlation Record

| | | | |
|---|---|---|---|
| 01-01 | D | | |
| 02-04 | Row Index Number | | Integer |
| 05-07 | Column Index Number | | Integer |
| 08-16 | Correlation | (XX.xxxxxxx) | Implied Decimal |
| 17-19 | Row Index Number | | Integer |
| 20-22 | Column Index Number | | Integer |
| 23-31 | Correlation | (XX.xxxxxxx) | Implied Decimal |
| 32-34 | Row Index Number | | Integer |
| 35-37 | Column Index Number | | Integer |
| 38-46 | Correlation | (XX.xxxxxxx) | Implied Decimal |
| 47-49 | Row Index Number | | Integer |
| 50-52 | Column Index Number | | Integer |
| 53-61 | Correlation | (XX.xxxxxxx) | Implied Decimal |
| 62-64 | Row Index Number | | Integer |
| 65-67 | Column Index Number | | Integer |
| 68-76 | Correlation | (XX.xxxxxxx) | Implied Decimal |
| 77-80 | Reserved | | |

Note: This record is to record the off-diagonal correlates only from the session (or vector) correlation matrix. Since the correlation matrix is symmetric about the diagonal only the upper or the lower half should be recorded.

Covariance Record

| | | |
|---|---|---|
| 01-01 | E | |
| 02-04 | Row Index Number | Integer |
| 05-07 | Column Index Number | Integer |
| 08-19 | Covariance (XXXX.xxxxxxxx meters$^2$) | Implied Decimal |
| 20-22 | Row Index Number | Integer |
| 23-25 | Column Index Number | Integer |
| 26-37 | Covariance (XXXX.xxxxxxxx meters$^2$) | Implied Decimal |
| 38-40 | Row Index Number | Integer |
| 41-43 | Column Index Number | Integer |
| 44-55 | Covariance (XXXX.xxxxxxxx meters$^2$) | Implied Decimal |
| 56-58 | Row Index Number | Integer |
| 59-61 | Column Index Number | Integer |
| 62-73 | Covariance (XXXX.xxxxxxxx meters$^2$) | Implied Decimal |
| 74-80 | Reserved | |

Note: This record is to record the off-diagonal covariances only from the vector variance-covariance matrix. The square root of the diagonal elements, the component standard deviations, are recorded on records C and F. Since the variance-covariance matrix is symmetric about the diagonal only the upper or the lower half should be recorded.

Long Vector Record

| | | |
|---|---|---|
| 01-01 | F | |
| 02-05 | Origin Station Serial Number (ssn) (vector tail) | Integer |
| 06-09 | Differential Station Serial Number (vector head) | Integer |
| 10-22 | Delta X (XXXXXXXXX.xxxx meters) | Implied Decimal |
| 23-27 | Standard Deviation (X.xxxx meters) | Implied Decimal |
| 28-40 | Delta Y (XXXXXXXXX.xxxx meters) | Implied Decimal |
| 41-45 | Standard Deviation (X.xxxx meters) | Implied Decimal |
| 46-58 | Delta Z (XXXXXXXXX.xxxx meters) | Implied Decimal |
| 59-63 | Standard Deviation (X.xxxx meters) | Implied Decimal |
| 64-64 | Rejection Code (use upper case R to reject) | Alpha |
| 65-65 | Origin station manufacturer code | (N-6) |
| 66-68 | Origin station UTC day of year of occupation (DDD) | Integer |
| **69-69** | Origin station year of occupation (Y) UTC | Integer |
| 70-70 | Origin station session indicator | Alpha |
| 71-71 | Differential station manufacturer code | (N-6) |
| 72-74 | Differential station day of year (DDD) UTC | Integer |
| 75-75 | Differential station year of occupation (Y) UTC | Integer |
| 76-76 | Differential station session indicator | Alpha |
| 77-80 | Reserved | |

Note: Standard deviation values must be positive, non-zero numbers.

Coordinate Record

```
01-01  G
02-02  Blank
03-03  Record usage code K - see below
04-05  Blank
06-09  Station Serial Number
10-10  Blank
11-14  Optional "short" station name - see below
15-15  Blank
16-20  Coordinate frame designator (e.g. NAD 83, WGS 84, NAD 27,
        WGS 72, ITR 90, etc.; inquire for additions)
21-21  Blank
22-33  X coordinate (XXXXXXXX.xxxx meters)        Implied Decimal
34-34  Blank
35-46  Y coordinate (YYYYYYYY.yyyy meters)        Implied Decimal
47-47  Blank
48-59  Z coordinate (ZZZZZZZZ.zzzz meters)        Implied Decimal
60-60  Blank
61-64  Sigma X (SS.ss m) blank if unknown or greater than 99.99 m
65-65  Blank
66-69  Sigma Y (SS.ss m) blank if unknown or greater than 99.99 m
70-70  Blank
71-74  Sigma Z (SS.ss m) blank if unknown or greater than 99.99 m
75-80  Reserved
```

K = 0 or blank indicates that the position is approximate and has no particular interpretation.
K = 1 indicates that these are exact coordinates (to 0.1 mm) used during the processing of the G-file vectors.

The 4 character "short" name, if used, should be the same abbreviation used elsewhere in the G-file or other related data files.

Station Information Record

```
01-01  H
02-05  Station Serial Number (ssn)                          Integer
06-09  Four Character Identifier                            Alpha
10-11  External frequency standard code (table, N-8)
12-13  Vector meteorological use code   (table, N-6)
14-15  Vector time parameter use code   (table, N-6)
16-17  Vector ionosphere use code       (table, N-6)
18-23  Vector Solution type             (table, N-7)
24-78  Comments                                             Alpha
79-80  Reserved
```

Use comment field to record clarifying information or instrument type if noted as "other" in Data Media Identifier.

**CODE TABLES**

Solution Coordinate Reference System Codes

01 -- WGS 72 Precise Ephemeris [DMA] Used from GPS beginning through 1/3/87
02 -- WGS 84 Precise Ephemeris [DMA] from 1/4/87 through 1/1/94
03 -- WGS 72 Broadcast Ephemeris [DOD] from GPS beginning through 1/22/87
04 -- WGS 84 Broadcast Ephemeris [DOD] from 1/23/87 through 6/28/94
05 -- ITRF 89 Epoch 1988.0 (International Earth Rotation Service
**NOT USED AS A GPS REFERENCE FRAME**
06 -- NEOS 91.25 Epoch 1988 [NGS] from Spring 1991 through 10/19/91
**SPECIAL VLBI COORDINATE SOLUTION written by Mike Abell**
07 -- NEOS 90 Epoch 1988.0 [NGS] from 10/20/91 through 8/15/92
08 -- ITRF 91 Epoch 1988.0 [NGS] from 8/16/92 through 12/19/92
09 -- SIO/MIT 1992.57 Epoch 1992.57 [NGS] from 12/20/92 through 11/30/93
10 -- ITRF 91 Epoch 1992.6 [NGS] from 12/1/93 through 1/8/94
11 -- ITRF 92 Epoch 1994.0 [NGS] from 1/9/94 through 12/31/95
12 -- ITRF 93 Epoch 1995.0 [NGS] from 1/1/95 through 6/29/96
13 -- WGS 84 (G730) Epoch 1994.0 [DMA] from 1/2/94 through 9/28/96
14 -- WGS 84 (G730) Epoch 1994.0 Broadcast [DOD USAF] from 6/29/94 through 1/28/97
15 -- ITRF 94 Epoch 1996.0 [NGS] from 6/30/96 through 2/28/98
16 -- WGS 84 (G873) Epoch 1997.0 [NIMA] (formerly DMA) from 9/29/96 to the present
17 -- WGS 84 (G873) Epoch 1997.0 Broadcast [DOD USAF] from 1/29/97 to the present
18 -- ITRF 96 Epoch 1997.0 [NGS] from 3/1/98 through 7/31/99
19 -- ITRF 97 Epoch 1997.0 [NGS] from 8/1/1999 through 6/3/2000
20 –- IGS 97 Epoch 1997.0 [NGS] from 6/4/2000 through 12/1/2001
21 –- ITRF 00 Epoch 1997.0
22 –- IGS 00 Epoch 1998.0 [NGS] from 12/2/2001 to the present

Solution Meteorological Use Codes

01 -- Default values used (model used)
02 -- Observed meteorological data used
03 -- Water vapor radiometer used

Solution Ionosphere Use Code

01 -- None
02 -- Dual frequency ionospheric correction used
03 -- Ionospheric model used

Solution Time Parameter Use Codes

01 -- Observed time synchronization data used
02 -- Time parameters solved for in data reduction

Data Media Identifier

Required format: ADDDYSCCCC

where, A is one of the following characters which indicates the manufacturer of the receiver used for the observation:
A = Ashtech, Inc; C = Topcon Corp; D = Del Norte Technology, Inc;
E = Magellan; G = Allen Osborne; I = Istac; J = Javad Position Systems;
K = Sokkia; L = MINI-MAC$^{R}$; M = MACROMETER$^{R}$; N = Norstar Instruments;
O = Motorola, Inc; P = Spectra Precision; Q = 3S Navigation;
R = Trimble Navigation Ltd.; S = SERCEL, Inc; T = Texas Instruments;
V = NovAtel Communications Ltd; W = Wild, Leica, Magnavox; X = other

DDD is the day of the year of the first data epoch (UTC)
Y is the last digit of the year of the first data epoch (UTC)
S is an alphanumeric designation of the session
CCCC is the project unique, four character abbreviation of a station designation

**CODE TABLES** (continued)

Solution Type Use Codes

| | | | | | |
|---|---|---|---|---|---|
| + L1TD-- | L1SDFL | L1DDFL | IFDDFL | OTDDFL | K1DDFX |
| + L2TD-- | L1SDFX | L1DDFX | IFDDFX | OTDDFX | K2DDFX |
| + IFTD-- | L1SDPF | L1DDPF | IFDDPF | OTDDPF | KIDDFX |
| + WLTD-- | | | | | KWDDFX |
| | | L2DDFL | WLDDFL | | P1DDFX |
| | | L2DDFX | WLDDFX | | P2DDFX |
| | | L2DDPF | WLDDPF | | PIDDFX |
| | | | | | PWDDFX |

Where: L1 = Frequency 1
L2 = Frequency 2
IF = Ionosphere Free Combination (Static) *
WL = Wide Lane Combination (Static or Rapid Static)**
OT = Other (Explain in Station Information Record)

K1 = L1 Kinematic Observation (Single visit, continuous lock - also known as Continuous Kinematic, Stop and Go Kinematic, or On-the-Fly Kinematic)
K2 = L2 Kinematic
KI = Ionosphere Free Combination Kinematic *
KW = Wide Lane Combination Kinematic **

P1 = L1 Pseudo-kinematic (Two or more visits, intermittent lock - also known as Pseudo-static, Intermittent Static or Reoccupation techniques)
P2 = L2 Pseudo-kinematic
PI = Ionosphere Free Combination Pseudo-kinematic *
PW = Wide Lane Combination Pseudo-kinematic **

TD = Triple Difference Solution
DD = Double Difference Solution
SD = Single Difference Solution

FL = Float (real number) estimate of biases
FX = Fixed integer estimate of biases
PF = Partial, fixed integer estimate of biases (Not all integer biases determinable).

\+ Triple Difference Solutions have no integer ambiguities, leave trailing columns blank.
* IF = ionosphere free = $\{f^2_1/(f^2_1 - f^2_2)\}L_1 - \{f_1 f_2/(f^2_1 - f^2_2)\}L_2$
** WL = wide lane = L1 - L2

Where, $f_1$ = 1575.42 mHz, $f_2$ = 1227.60 mHz, and $L_1$ and $L_2$ are phase measurements in units of cycles.

**CODE TABLES** (continued)

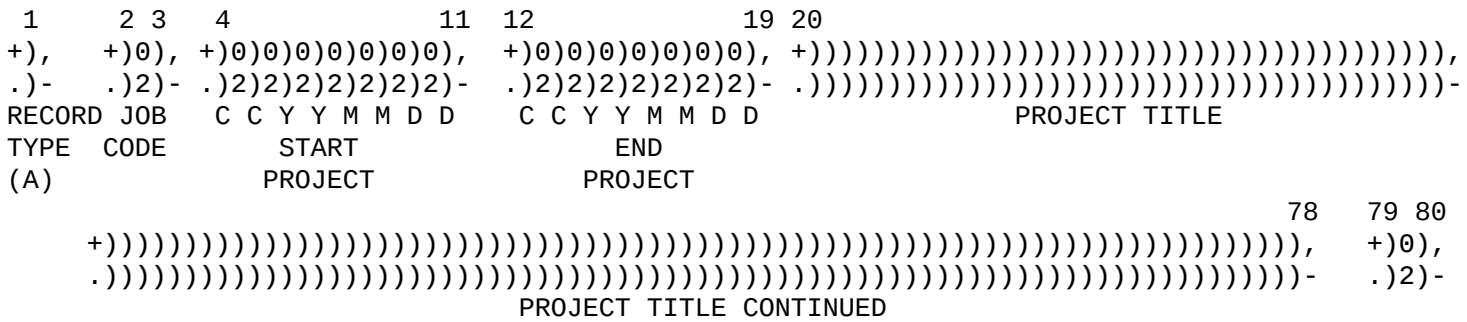
External Frequency Standard

01 -- No external frequency standard used
02 -- Rubidium frequency standard used
03 -- Cesium frequency standard used
04 -- Hydrogen Maser frequency standard used
05 -- External crystal frequency standard used
06 -- Other (Comment in Station Information Record)

Vector Nominal Accuracy Codes

| | | Order/Class |
|---|---|---|
| 4 -- Intended accuracy | 100 ppm plus 5.0 cm | 3 |
| 3 -- Intended accuracy | 50 ppm plus 3.0 cm | 2-II |
| 2 -- Intended accuracy | 20 ppm plus 2.0 cm | 2-I |
| 5 -- Intended accuracy | 10 ppm plus 1.0 cm | 1 |
| 6 -- Intended accuracy | 1 ppm plus 0.8 cm | B |
| 7 -- Intended accuracy | 0.1 ppm plus 0.5 cm | A |
| 8 -- Intended accuracy | 0.01 ppm plus 0.3 cm | AA |

PROJECT RECORD

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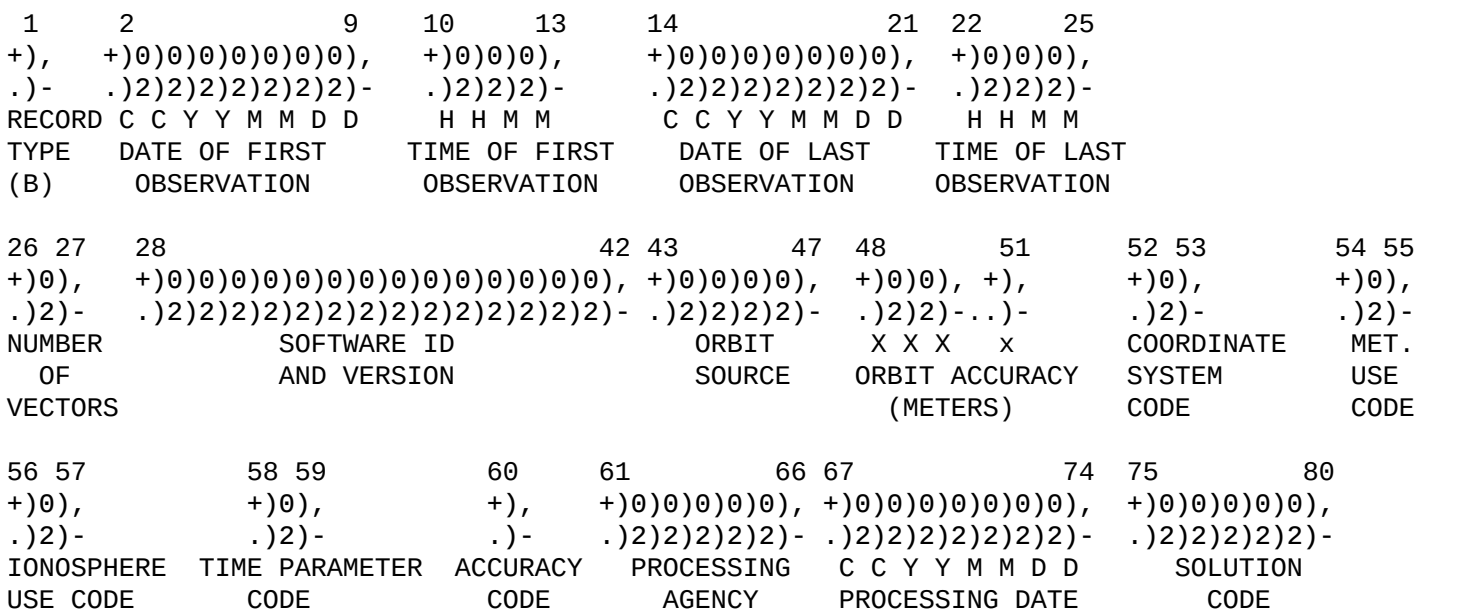
GROUP HEADER RECORD



VECTOR RECORD

```
 1     2     5   6     9   10                    20  21         25 26                    36
+),   +)0)0)0), +)0)0)0),  +)0)0)0)0)0)0), +)0)0)0),  +), +)0)0)0), +)0)0)0)0)0)0), +)0)0)0),
.)-   .)2)2)2)- .)2)2)2)-  .)2)2)2)2)2)2)-..)2)2)2)-  .)-..)2)2)2)- .)2)2)2)2)2)2)-..)2)2)2)-
RECORD  ORIGIN DIFFERENTIAL X X X X X X X   x x x x    X   x x x x   X X X X X X X   x x x x
TYPE     SSN       SSN         DELTA X                   SIGMA X        DELTA Y
(C)                            (METERS)                  (METERS)       (METERS)

37         41 42                    52  53         57   58    59                 68
+), +)0)0)0), +)0)0)0)0)0)0), +)0)0)0),  +), +)0)0)0),   +),   +)0)0)0)0)0)0)0)0)0),
.)-..)2)2)2)- .)2)2)2)2)2)2)-..)2)2)2)-  .)-..)2)2)2)-   .)-   .)2)2)2)2)2)2)2)2)2)-
 X   x x x x   X X X X X X X   x x x x    X   x x x x   REJECT  ORIGIN STATION DATA
   SIGMA Y        DELTA Z                   SIGMA Z      CODE    MEDIA IDENTIFIER
   (METERS)       (METERS)                  (METERS)

69                 78 79 80
+)0)0)0)0)0)0)0)0)0), +)0),
.)2)2)2)2)2)2)2)2)2)- .)2)-
DIFFERENTIAL STATION  BLANK
DATA MEDIA IDENTIFIER
```

CORRELATION RECORD

```
 1      2   4   5   7   8                16  17   19 20   22 23                31 32   34
+),    +)0)0), +)0)0), +)0), +)0)0)0)0)0)0),  +)0)0), +)0)0), +)0), +)0)0)0)0)0)0), +)0)0),
.)-    .)2)2)- .)2)2)- .)2)-..)2)2)2)2)2)-  .)2)2)- .)2)2)- .)2)-..)2)2)2)2)2)- .)2)2)-
RECORD   ROW   COLUMN   X X   x x x x x x x     ROW   COLUMN   X X   x x x x x x x    ROW
TYPE    INDEX  INDEX       CORRELATION         INDEX  INDEX      CORRELATION         INDEX
(D)      NO.    NO.                             NO.    NO.                             NO.

35   37 38                46  47   49 50   52 53                61 62   64 65   67
+)0)0), +)0), +)0)0)0)0)0)0),  +)0)0), +)0)0), +)0), +)0)0)0)0)0)0), +)0)0), +)0)0),
.)2)2)- .)2)-..)2)2)2)2)2)-  .)2)2)- .)2)2)- .)2)-..)2)2)2)2)2)- .)2)2)- .)2)2)-
COLUMN   X X   x x x x x x x     ROW   COLUMN   X X   x x x x x x x    ROW   COLUMN
INDEX       CORRELATION         INDEX  INDEX       CORRELATION        INDEX  INDEX
 NO.                             NO.    NO.                             NO.    NO.

68                76 77     80
+)0), +)0)0)0)0)0)0), +)))))),
.)2)-..)2)2)2)2)2)- .)))))))-
 X X   x x x x x x x     BLANK
     CORRELATION
```

COVARIANCE RECORD

```
 1      2   4   5   7   8                       19  20   22 23   25
+),    +)0)0), +)0)0), +)0)0)0), +)0)0)0)0)0)0)0),  +)0)0), +)0)0),
.)-    .)2)2)- .)2)2)- .)2)2)2)-..)2)2)2)2)2)2)-  .)2)2)- .)2)2)-
RECORD   ROW   COLUMN   X X X X   x x x x x x x x     ROW   COLUMN
TYPE    INDEX  INDEX        COVARIANCE                INDEX  INDEX
(E)      NO.    NO.         (METERS²)                 NO.    NO.

26                      37 38   40 41   43 44                      55 56   58 59   61
+)0)0)0), +)0)0)0)0)0)0)0), +)0)0), +)0)0), +)0)0)0), +)0)0)0)0)0)0)0), +)0)0), +)0)0),
.)2)2)2)-..)2)2)2)2)2)2)2)- .)2)2)- .)2)2)- .)2)2)2)-..)2)2)2)2)2)2)2)- .)2)2)- .)2)2)-
 X X X X   x x x x x x x x    ROW   COLUMN   X X X X   x x x x x x x x    ROW   COLUMN
      COVARIANCE              INDEX  INDEX        COVARIANCE              INDEX  INDEX
      (METERS²)               NO.    NO.         (METERS²)               NO.    NO.

62                      73 74     80
+)0)0)0), +)0)0)0)0)0)0)0), +)))))))),
.)2)2)2)-..)2)2)2)2)2)2)2)- .)))))))-
 X X X X   x x x x x x x x    BLANK
      COVARIANCE
      (METERS²)
```

LONG VECTOR RECORD

```
 1      2     5    6     9    10                          22  23         27
+),    +)0)0)0),  +)0)0)0),   +)0)0)0)0)0)0)0)0), +)0)0)0),  +), +)0)0)0),
.)-    .)2)2)2)-  .)2)2)2)-   .)2)2)2)2)2)2)2)2)-..)2)2)2)-  .)-..)2)2)2)-
RECORD   ORIGIN  DIFFERENTIAL  X X X X X X X X X   x x x x    X   x x x x
TYPE      SSN        SSN                 DELTA X                SIGMA X
(F)                                      (METERS)               (METERS)


28                          40 41         45  46                          58  59         63
+)0)0)0)0)0)0)0)0), +)0)0)0), +), +)0)0)0),  +)0)0)0)0)0)0)0)0), +)0)0)0),  +), +)0)0)0),
.)2)2)2)2)2)2)2)2)-..)2)2)2)- .)-..)2)2)2)-  .)2)2)2)2)2)2)2)2)-..)2)2)2)-  .)-..)2)2)2)-
 X X X X X X X X X   x x x x   X   x x x x    X X X X X X X X X   x x x x    X   x x x x
             DELTA Y             SIGMA Y                 DELTA Z               SIGMA Z
             (METERS)            (METERS)                (METERS)              (METERS)


64       65    66       70   71    72       76     77  80
+),      +),   +)0)0)0)0),   +),   +)0)0)0)0),     +)))),
.)-      .)-   .)2)2)2)2)-   .)-   .)2)2)2)2)-     .))))-
REJECT  ORIG    D D D Y S    DIFF   D D D Y S       BLANK
CODE    INST    ORIGIN DAY   INST  DIFFERENTIAL
        CODE    IDENTIFIER   CODE   IDENTIFIER
```

COORDINATE RECORD (Optional)

```
 1        2    3    4 5    6     9   10   11     14  15   16       20   21
+),      +),  +),  +)0),  +)0)0)0),  +),  +)0)0)0),  +),  +)0)0)0)0),  +),
.)-      .)-  .)-  .)2)-  .)2)2)2)-  .)-  .)2)2)2)-  .)-  .)2)2)2)2)-  .)-
RECORD  BLANK  K   BLANK   STATION  BLANK   SHORT   BLANK COORDINATE  BLANK
TYPE         (0,1)         SERIAL           NAME          FRAME
(G)                        NUMBER                         DESIGNATOR


22                       33  34    35                       46  47
+)0)0)0)0)0)0)0), +)0)0)0),  +),   +)0)0)0)0)0)0)0), +)0)0)0),  +),
.)2)2)2)2)2)2)2)-..)2)2)2)-  .)-   .)2)2)2)2)2)2)2)-..)2)2)2)-  .)-
 X X X X X X X X   x x x x  BLANK   Y Y Y Y Y Y Y Y   y y y y  BLANK
   X COORDINATE  (METERS)             Y COORDINATE  (METERS)


48                       59  60   61       64  65   66       69  70   71       74  75 80
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    Z COORDINATE  (METERS)           (METERS)           (METERS)           (METERS)
```

STATION INFORMATION RECORD

```
 1      2     5   6     9    10 11   12 13   14 15   16 17   18         23
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RECORD  STATION    FOUR       EXT.    MET.    TIME     ION.      SOLUTION
TYPE    SERIAL   CHARACTER    FREQ.   USE    PARAM.   USE         TYPE
(H)     NUMBER   IDENTIFIER   CODE    CODE   CODE     CODE


24                                                                                                                  78
+)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0)0),
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## G-FILE EXAMPLES

Below are fragments from six independent, simulated GPS Data Transfer Format files (G-FILEs). There is one Project record (A) per G-file. Each session vector set, or individually computed vector in a multi-receiver session, requires a Session Record (B). Each vector requires at least one Vector Record (C) or Long Vector Record (F). Vector Records with Coordinate Records must follow the same Session Record. Station Information (H) Records are required as circumstances dictate and may be optionally added where not required. These records must be followed by sufficient Correlation (D) or Covariance Records (E) to express all off-diagonal correlation or covariance terms in the matrix half provided from the session computation. Correlation and Covariance Records may not be intermixed.

1. Project (A), Session (B), Vector (C), and Correlation (D) records for a single vector between two stations in a two receiver session or individually computed vector in a multi-receiver session.

```
AKS19890616198908l0
B19890622210419890623003201OMNI21JUL89    BDCST200040101025NGS    19890919L1DDFX
C02860255   22818804  691  517712752 1665  621497962 1259 M1739APACIM1739AK60A
D  1  2 -1507832  1  3 -1653265  2  3 -9400487
```

2. Project (A), Session (B), Vector (C), and Correlation (D) records for a three-receiver (two vector) session computed simultaneously in session mode.

```
AA21989061619890810
B19890719192019890719202202OMNI21JUL89    NSWC  200020202026NGS   19891010IFDDFL
C02520251    2090836   21    3595939   80    5412122   45 T1735BTOLPT1735BIO35
C02520250  -42878920   42  -19024426   93  -28455946   69 T1735BTOLP71735BIO17
D  1  2 -3449463  1  3  -169254  1  4 -7443040  1  5 -3452654  1  6  1753975
D  2  3 -7698120  2  4 -6329835  2  5  1258498  2  6  8573493  3  4 -6485385
D  3  5 -6084380  3  6  -477478  4  5 -6124087  4  6 -3864367  5  6  8630812
```

Note: If a multi-receiver session is computed as if all possible vectors are independent, then there would be Session, Vector, and Correlation records for each vector in the session. Thus, the record sequence would be A, B, C, D, B, C, D, B, C, D, etc. The Session records would be nearly identical to the multi-receiver example except that start and stop times could vary with each vector. The number of vectors indicated on each Session Record would be one, i.e., there would be a Session Record for each vector and the cross correlation terms between vectors would not exist.

3. Project (A), Session (B), Vector (C), and Correlation (D) Records for a five-receiver (four vector) session computed simultaneously in session mode.

```
AW11989061619890810
B19890718192419890718225204OMNI21JUL89    BDCST 200020202025NGS   19891003L1DDFL
C03000287    5764741   77    1459095   44    2345097   54 R1765ASMILR1765ANEOP
C03000223  -52521873   47    -229406  101   -1142670   75 R1765ASMILR1765ACESZ
C03000305  -42878920   42  -19024426   93  -28455945   69 R1765ASMILR1765AX042
C03000240    7097171   69   -1171456   40   -1443438   46 R1765ASMILR1765AG042
D  1  2 -7621157  1  3 -6268111  1  4  1032188  1  5 -7397468  1  6  2749723
D  1  7 -7716473  1  8 -6339150  1  9  1294594  1 10 -2396473  1 11 -2753742
D  1 12 -5804898  2  3  -791184  2  4 -6108347  2  5 -1739462  2  6  9010327
D  2  7 -7729301  2  8 -6463718  2  9  1526641  2 10 -3826492  2 11  3610736
D  2 12 -6449538  3  4   170894  3  5 -6299216  3  6 -1003847  3  7 -5307149
D  3  8 -7680811  3  9 -6477668  3 10  1506536  3 11 -9537262  3 12 -1836426
D  4  5 -6154878  4  6  -248020  4  7 -6087715  4  8 -1633847  4  9  6354725
D  4 10 -7804602  4 11 -6047825  4 12  1262026  5  6  3746287  5  7 -7243634
D  5  8 -6110139  5  9  -321344  5 10 -6165227  5 11  8362528  5 12  9162533
D  6  7 -5971690  6  8  -516393  6  9 -6136978  6 10 -9354622  6 11  1535474
D  6 12 -5920223  7  8  -559594  7  9 -6153794  7 10  2645373  7 11 -5373742
D  7 12 -5527744  8  9 -7793107  8 10  1043462  8 11  5378213  8 12 -2564522
D  9 10 -5371777  9 11 -7908942  9 12  1046883 10 11  8354256 10 12 -3372634
D 11 12  7153372
```

4. Project (A), Session (B), Vector (C), and Covariance (E) Records for a three-receiver (two vector) session computed simultaneously in session mode.

```
AC51989061619890810
B19890719192019890719202202OMNI21JUL89    NSWC  200020202026NGS   19891010WLDDPF
C02520251    2090836   21    3595939   80    5412122   45 T1735BTOLPT1735BIO35
C02520250  -42878920   42  -19024426   93  -28455946   69 T1735BTOLPT1735BIO17
E  1  2    -3449231  1  3     169013  1  4    -7443219  1  5    -3452017
E  1  6    -1753648  2  3    7698884  2  4    -6329438  2  5     1258689
E  2  6     8573027  3  4   -6485903  3  5    -6084227  3  6     -477369
E  4  5     6124824  4  6   -3864711  5  6     8630682
```

5. Project (A), Session (B), Long Vector (F), and Correlation (D) Records for a three-receiver (two vector) session computed simultaneously in session mode.

```
AM31989061619890810
B19900312192019900312202203OMNI21JUL89    NSWC  200050202027NGS  19900605IFDDPF
F02520251  -7398138095   62   -611028070  140   -759539795   81 R0710AR0710A
F02520210 -28097365450    2   6537703840    2   1612488880    2 R0710AR0710A
D  1  2 -3449463  1  3  -169254  1  4 -7443040  1  5 -3452654  1  6  1753975
D  2  3 -7698120  2  4 -6329835  2  5  1258498  2  6  8573493  3  4 -6485385
D  3  5 -6084380  3  6  -477478  4  5 -6124087  4  6 -3864367  5  6  8630812
```

6. Project (A), Session (B), Vector (C), Coordinate (G), Station Information (H), and Correlation (D) Records for a five-receiver session computed simultaneously.

```
AG41989061619890810
B19921019162019921019202204OMNI06JAN93    NGS    50090202027NGS   19930115IFDDFX
C02520251 -121666909   30  157350726   56  117976050   41 R2932ANORDR2932ASECO
C02520250 -418472429   32  247232117   60    8372071   44 R2932ANORDR2932ABURR
C02520253 -553950607   35  500052515   64  221106176   48 R2932ANORDR2932AFIGU
C02520254 -289152973   31  300310186   55  183697838   42 R2932ANORDR2932APINE
G 1  0252 NORD SIO92 -25711011350 -45925184360  35928923390  010  010  010
H0252NORD01020202IFDDFXREFERENCE STATION
D  1  2 -7621157  1  3 -6268111  1  4  1032188  1  5 -7397468  1  6  2749723
D  1  7 -7716473  1  8 -6339150  1  9  1294594  1 10 -2396473  1 11 -2753742
D  1 12 -5804898  2  3  -791184  2  4 -6108347  2  5 -1739462  2  6  9010327
D  2  7 -7729301  2  8 -6463718  2  9  1526641  2 10 -3826492  2 11  3610736
D  2 12 -6449538  3  4   170894  3  5 -6299216  3  6 -1003847  3  7 -5307149
D  3  8 -7680811  3  9 -6477668  3 10  1506536  3 11 -9537262  3 12 -1836426
D  4  5 -6154878  4  6  -248020  4  7 -6087715  4  8 -1633847  4  9  6354725
D  4 10 -7804602  4 11 -6047825  4 12  1262026  5  6  3746287  5  7 -7243634
D  5  8 -6110139  5  9  -321344  5 10 -6165227  5 11  8362528  5 12  9162533
D  6  7 -5971690  6  8  -516393  6  9 -6136978  6 10 -9354622  6 11  1535474
D  6 12 -5920223  7  8  -559594  7  9 -6153794  7 10  2645373  7 11 -5373742
D  7 12 -5527744  8  9 -7793107  8 10  1043462  8 11  5378213  8 12 -2564522
D  9 10 -5371777  9 11 -7908942  9 12  1046883 10 11  8354256 10 12 -3372634
D 11 12  7153372
```