U.K.O.O.A. P1/90 POST PLOT DATA EXCHANGE TAPE

1990 FORMAT

Prepared by
The Surveying and Positioning Committee
For The
U.K.O.O.A. Exploration Committee
June 28, 1990

General

The data required for conventional 2-D Seismic Surveys is the position of shotpoints (energy source, common midpoint, etc) as defined in the header.

In this document the term 'shotpoint' refers to the 'centre of source' and the term 'common mid point' refers to the 'mid point between the centre of source and the near trace'

For all other surveys there are two ways of exchanging data; "pre-stacked" or "post-stacked". The post-stacked data are "bin" positions which are stored in the same way as 2-D shotpoint positions.

The pre-stacked data should contain all the information that is required for binning; i.e., the position of the energy source and all receiver groups. This makes for consistency of data format/content and allows for re-binning on a purely positional basis.

For 3-D offshore surveys the co-ordinates of each defined receiver group are listed following each shotpoint. For onshore 3-D surveys and for onshore 2-D surveys requiring special processing it is necessary to establish three data files. A separate file for each of the two main elements, source positions and receiver positions, with a third file to define the relationship between source and receiver groups. These files are :
   a) Source positions—this is for a 2-D shotpoint record.
   b) Receiver group positions—this is for a 2-D shotpoint record.
   c) A relation record—this details which receiver groups were being recorded at a specific shot.

In view of the large number of traces/receiver groups per shotpoint it is necessary to minimise storage. This is achieved by using only grid co-ordinates for trace positions, combining several traces in one record and by storing receiver group positions of onshore surveys only once.

It is assumed that this format is for the exchange of data from a single survey, and not for compiled databases including multiple surveys.

Tape Specification

Half inch magnetic tape: IBM compatible

Number of tracks: 9

Number of bytes per inch: 6250 - standard (1600 or 800 are permissible)

Mode: Coded EBCDIC or ASCII

Record Length: 80 bytes

Block Size: 8000 bytes

Blocks physically separated by inter-record gap. (1600 bytes for 1600/800 bpi)

Disk Specification

Form: MS-DOS IBM PC compatible

Size/Capacity/Density: 3.5 in. / 720k /Double

Mode: Coded ASCII

Record length: 80 bytes with CR/LF after character 80.

In the interest of standardization 3.5 in x 720k disks have been chosen as standard. Other formats and media are acceptable by prior arrangement between the affected parties e.g. client, contractor, broker

File Description

A tape or disk may contain one or more files depending on the type of survey. Each file is started by a number of "Reader Records" followed by data records and closed by an EOF statement in col 1-3 of the final record.

A tape file is closed by one IBM file mark.

A tape must be closed by two IBM file marks.

Multiple lines per files are allowed, as long as all data and header records are consistent.

Tape and Disk Labelling

Each tape or disk should be adequately labelled so that its format and content can be readily ascertained. This labelling should include, as a minimum:

SURVEY AREA/NAME   :CONTRACTOR   :SURVEY TITLE

TAPE DATA FORMAT	: MODE	: DENSITY	: BLOCK SIZE	: RECORD
e.g. IBM	: EBCDIC	: 6250 bpi	: 8000 BYTES	: 80 bytes

DISK DATA FORMAT	: MODE	: DENSITY	: CAPACITY	: RECORD
e.g. MS-DOS	: ASCII	: DOUBLE	:720K	: 80 bytes

Header Record Specification

General

Each file should start with a number of header records which contain information about, and parameters controlling, all of the data records which follow.

The general format for header record is : -

	COLS	FORMAT
a) Record Identifier "H"	1	Al
b) Header Record Type	2 - 3	I2
c) Header Record Type Modifier	4 - 5	I2
d) Parameter Description	6 - 32	A27
e) Parameter Data	33 - 80	See Below

Header record types 0100 to 0800 and 1200 to 2000 inclusive are mandatory for all surveys even if an "N/A" entry is required. Header record types 0900 and 1000 are additionally mandatory for all offshore surveys. Header record type 1100 is also mandatory for offshore 3-D surveys but is not needed for other surveys. Header records of types 2100 to 2500 are mandatory as far as they are applicable to the projection used.

Text fields should be left justified, and numeric fields right justified unless otherwise stated.

Configuration details.

For multi vessel, multi source, multi streamer operations the format allows unique identification of each of these components.

Header records H0101,H0102, H0103, H0104 are used to define the survey details, and the source / streamer / tailbuoy configuration associated with each vessel.

For consistency, the following order convention has been adopted:

• From Starboard, Top, Back through Front, Bottom, Port

e.g. Vessel 1 : Sources 2: Streamers 3 (Sob Top & Btm, Port)

   Vessel 2 : Sources 2: Streamers 2 (mini,main)

		NAME	VESSEL ID	SRCE ID	STRMR ID	TB ID	OTHER ID
H0102	Vessel Details	M/V Oilfinder	1	0	0	0	0
H0103	Source Details	Stb Source	1	1	0	0	0
H0103	Source Details	Port Source	1	2	0	0	0
H0104	Streamer Details	Stb Upper 240 ch	1	0	1	1	0
H0104	Streamer Details	Sob lower 240 ch	1	0	2	2	0
H0104	Streamer Details	Port Cable 120 ch	1	0	3	3	0
H0102	Vessel Details	M/V Dryhole	2	0	0	0	0
H0103	Source Details	Sob Source	2	3	0	0	0
H0103	Source Details	Port Source	2	4	0	0	0
H0104	Streamer Details	Back main 190 ch	2	0	4	4	0
H0104	Streamer Details	Front mini 20 ch	2	0	5	5	0
H0105	Other Details	Front Nav. Float	2	0	0	0	1

Vessel IDs should be used for all survey details, e.g., in H09XX

H0105 Other Details can be used when a towed body, such as a float, is used for for acoustic ranging. A full description should be put in H2600.

Line Prefix

H0203 should be used only where the line name exceed 12 characters.

Offset Definitions

The offset code defines the type of offset data expected.

The code is 1 for polar data: 2 for rectangular data

Code 1: Polar: Offset A = radial distance from ship's reference point to the offset point.

   Offset B = angle from ship's head (clockwise)

Code 2: Rectangular: Offset A=X axis offset across ship's axis, positive to starboard.

   Offset B=Y axis offset along ship's axis, positive towards the bows.

The units for linear and angular measurements are as described in H2000 and H2002.

Note that the offset orientation is always with the ship's head (gyro) and that the origin is the ship's reference point unless otherwise specified.

Datum and spheroid information

H1600 and H1601 require datum transformation parameters. These are defined by the Bursa-Wolfe transformation model:

|X| |DX| | 1   -RZ   +RZ | |X|

|Y| |DY| + (SCALE). |+RZ   1   -RX | |Y|

|Z| |DZ| |-RZ   +RX   1 | |Z|
 (2)   (1)

where   X,Y,Z   are geocentric cartesian coordinates in metres

        DX,DY,DZ   are translation parameters in metres

        RX,RY,RZ   are clockwise rotations defined in arc secs, but converted to radians for use in the formula

        SCALE = [l + S.(10e-6)] where S is in parts per million

EXAMPLE:[For checking formula only.]

	FROM	Datum 1: WGS72 TO Datum 2: WGS84
Semi Major Axis a		6378135.0 metres 6378137.0 metres
I/f		298.26 298.257223563
Latitude		39 13 26.5782 N 39 13 26.6976 N
Longitude		98 32 32.2870 W 98 32 31.7330 W
Spheroidal Height: 570.88 metres		573.249 metres
X	-734985.205	-734972.229
Y	-4893185.191	-4893118.272
Z	4011976.605	4011982.012
DX	0.0	
DY	0.0	
DZ	+4.5 metres	
RX	0.0	
RY	0.0	
RZ	+0.554 arc secs = 0.000002686 radians	
S	+0.2263 ppm	

Vertical Datum

Header record H1700 must specify the vertical datum

e.g   LAT   Lovest Astronomic Tide

        MSL   Mean Sea Level

        SL   Sea Level

        ES   Echo Sounder

The units of measurement are specified in H2001. These should, wherever possible, be consistent with the position data.

Depths will be referred to the coordinated data point, unless otherwise stated in header record H1700.

e.g.   H1700   LAT : Centre of Source

or   H1700   SL : Echo Sounder

Header H2600 should be used to specify details of depth data reduction - e.g. tide /velocity/transducer correction.

Projection Data

Projection data is specified in header records H1800 - H2509

The following projection type codes have been defined:
001 -U.T.M. Northern Hemisphere
002 -U.T.M. Southern Hemisphere
003 -Transverse Mercator (North Oriented)
004 -Transverse Mercator (South Oriented)
005 -Lambert Conic Conformal, o e standard parallel
006 -Lambert Conic Conformal, two standard parallels
007 -Mercator
008 -Cassini-Soldner
009 -Skew Or homorphic
010 -Stereographic
011 -Nev Zealand Map Grid
999 -Any other projection or non-standard variation of the above projections.

Requirements for projection definition include the following header records:-

Transverse Mercator	2200 2301 2302 2401 2402
U.T.M.	1900 2200
Oblique Mercator	2301 2302 2401 2402 2509 and 2506 or 2507 or 2508
Lambert Conformal (1SP)	2100 2200 2301 2302 2401 2402
Lambert Conformal (2SP)	2100 2200 2301 2302 2401 2402
Stereographic	2301 2302 2401 2402

Where a survey crosses the equator from South to North, and the whole survey is shot on a Southern hemisphere UTM zone, then coordinates may exceed 9,999,999.9. The format cannot accept this, so a warning note must be written to H2600 advising that 10,000,000 must be added to such coordinates.

Definition of Units

H2000 Grid unit code is 1 for metres, 2 for any other unit.

H2001 Height unit code is 1 for metres, 2 for any other unit.

H2002 Angular unit code is 1 for degrees, 2 for grads.

Other Relevant Information

Header record type H2600 is a free format statement of any other relevant information such as base station coordinates and geodetic control, description of additional data in receiver group records, survey adjustments done/not done, misclosures etc. H2600 may be repeated as often as required.

Formats of parameter data fields for each of the header record types are: -

TYPES	ITEM	COLS	FORMAT
H0100	Description of survey area	33-80	A48
H0101	General survey details	33-80	A48
H0102	Vessel details - Name:IDs	33-76	A24 5(I4)
H0103	Source details - Name:IDs	33-76	A24, 5(I4)

H0104	Streamer details - Descr'n:IDs	33-76	A24, 5(I4)
H0105	Other details - Description:IDs	33-76	A24, 5(I4)
H0200	Date of survey	33-80	A48
H0201	Date of issue of post-plot tape (d.m.y.)	33-80	A48
H0202	Tape version identifier	33-80	A48
H0203	Line prefix	33-80	A48
H0300	Details of client	33-80	A48
H0400	Details of geophysical contractor	33-80	A48
H0500	Details of positioning contractor	33-80	A48
H0600	Details of positioning processing contractor	33-80	A48
H0700	Descriptions of positioning and onboard computer system(s).	33-80	A48
H0800	Co-ordinate location e.g . centre of source	33-80	A48
H0900	Offset from ship system position to co-ordinate location - Vessel ID:Code: A : B	33-56 2(F8.2)	I4,I4
H09XX	Other specified offsets e.g. antenna, XX in range 1 - 99 - Vessel ID:Code: A : B	33-56 2(F8.2)	I4,I4
H1000	Clock time in respect of GMT (clock display in advance of G T expressed as GMT + N hours)	33-80	A48
H1100	Number of receiver groups per shot	33-36	I4
H1400	Geodetic datum description as used for survey Datum name: Spheroid name: a : 1/f	33-80 F12.3,F12.7	2(A12)
H1401	Transformation parameters for H1400 to WGS84 dx=:dy= :dz= :rx= :ry= :rz= :s=	33-78 3(F6.3),F10.7	3(F6. 1)
H1500	Geodetic datum description:as used for post Datum name : Spheroid name: a : 1/f	33-80 F12.3,F12.7	2(A12)
H1501	Transformation parameters for H1500 to WGS84 dx= :dy= :dz= :rx= :ry= :rz= :s=	33-78 3(F6.3),F10.7	3(F6.1)
H1510	Township system and a description of the specific township used.	33-80	A48
H1600	Transfomation parameters between (Datum 1) and H1500 (Datum 2) dx= :dy= :dz= :rx= :ry= :rz= :s =	33-78	3(F6.1) 3(F6.3),F10.7
H1700	Vertical datum - Name : Origin	33-80	2(A24)
H1800	Projection code : description	33-80	A4,A44
H1810	Township relative coordinates	33-80	A48
H1900	Projection zone (including hemisphere for U.T.M.)	33-80	A48
H1910	For Township & Range, description of principal meridian	33-80	A48

H2000	Description of grid units - Code :		33-72	I1,A24,
	Unit of Measurement : Conversion factor to		F15.12	
	International Metres			
H2001	Description of height units - Code :		33-72	I1,A24
	Unit of measurement : Conversion factor to		F15.12	
	International Metres			
H2002	Description of angular units - Code :		33-57	I1,A24
	Unit of measurement			
H2100	Latitude of standard parallel(s) (d.m.s. N/S)		33-56	2(I3,I2) F6.3,A1)
	(grads N/S)		2(F11.7,A1)	
H2200	Longitude of central meridian (d.m.s. E/W)		33-44	I3,I2
			F6.3,A1)	
	(grads E/W)		F11.7,A1	
H2301	Grid origin Latitude,Longitude, d.m.s. N/E)		33-56	2(I3,I2
			F6.3,A1)	
	(grads N/E)		2(F11.7,A1)	
H2302	Grid co-ordinates at grid origin (E,N)		33-56	2(F11.2 A1)
H2401	Scale factor			33-44 F12.10
H2402	Latitude/Longitude at which scale factor is defined		33-56	2(I3,I2
			F6.3,A1)	
	(grads N/E)		2(F11.7,A1)	
H2506	Latitude/Longitude of two points defining		33-80	4(I3,I2
	initial line of projection	(d.m.s)	F6.3,A1)	
		(grads)	4(F11.7,A1)	
H2507	Circular bearing of initial line of		33-44	I3,I2,
	projection	(d.m.s.)	F7.4	
		(grads)	F12.7	
H2508	Quadrant bearing of initial line of		33-44	A1,2Z2,
	projection	(N/S,d.m.s.,E/V)	F6.3,A1	
		(N/S,grads ,E/V)	A1,F10.7,A1	
H2509	Angle from skew to rectified grid (d.m.s.)		33-44	I3,I2
			F7.4	
		(grads)	F12.7	
H2600	Any other relevant information		6-80	A74

N.B.   SEE HEADER RECORD SPECIFICATION [PAGES 4 TO 7] FOR DETAILED EXPLANA-
TIONS OF HEADER INFORMATION.

Data Record Specification

The data record will vary depending on the type of survey and the data content. The general content of offshore and onshore surveys is given separately. For conventional surveys a series of point records is required.

Where spare characters are available in the format, these can be used at the discretion of the client/contractor. The definition must then be included in H2600.

Two types of point record exist:. Type 1 for coordinates quoted in terms of grid or graticule values, and Type 2 for those quoted as local offsets from Townships or Section Markers.

The Type 2 record applies only to North American Onshore surveys.

Offshore surveys

Conventional 2-D Surveys:

The data set consists of one file with header records followed by a series of "Point Records" containing one shotpoint position each. Header record H0800 indicates whether the coordinated point represent the "shotpoint" or the "common mid point".

When one parameter changes the complete header record should be rewritten.

Other surveys:

The data set contains one file. Following the header the position of the shotpoint is given in a point record and the positions of the receiver groups in "Receiver Group Records" immediately following the point record.

Onshore surveys

Conventional 2-D Surveys:

The data set consists of one file with point records. Each record contains data for one point ('shotpoint' or 'CMP' as specified in header record H0800).

Other surveys:

The data set consists of three files with an identical block of header records:

First File : Point records with positions of receiver groups

Second File : Point records with positions of shotpoints.

Third File : Relation records specifying for each shot the relation between recording channel numbers and receiver groups.

In order to avoid ambiguities each physical position in the field (shotpoint or receiver group) must have a unique name.

The format of the data records is: -

Type 1: Grid or Geographical coordinates.

ITEM	DESCRIPTION	COL	FORMAT
1.Record identification	"S" = Centre of Source "G" = Receiver Group "Q" = Bin Centre "A" = Antenna Position "T" = Tailbuoy Position "C" = Common Mid Point "V" = Vessel Reference Point "E" = Echo Sounder "Z" = Other, defined in H0800	1	A1
2. Line name	(left justified, including reshoot code)	2-13	A12
3. Spare		14-16	A3
4. Source Identifier (right justified)		17-19	A3
5. Point number (right justified)		20-25	A6
6. Latitude	(d.m.s. N/S) (grads N/S)	26-35	2(I2), F5.2,A1 F9.6,A1

7. Longitude	(d.m.s. E/ W)	36-46	I3,I2 F5.2,A1
	(grads E/W)		F10.6,A1
8. Map grid Easting	(metres)	47-55	F9.1
	(non metric)		I9
9. Map grid Northing	(metres)	56-64	F9.1
	(non metric)		I9
10. Water depth	(datum defined in H1700)	65-70	F6.1
	(non metric)		I6
11. Julian Day of year		71-73	I3
12. Time (h.m.s.,GMT or as stated in H1000)		74-79	3I2
13.	Spare	80	1X

14. Applicable to 3-D Offshore Survey - see 1-80 ITEM 14

ITEM 14. Receiver Group Records (3-D Offshore Surveys)

ITEM	DESCRIPTION	COL	FORMAT
14a	Record identification "R"	1	A1
14b	Receiver group number	2- 5	14
14c	Map grid Easting (metres)	6-14	F9.1
	(non metric)		I9
14d	Map grid Northing (metres)	15-23	F9. 1
	(non metric)		I9
14e	Cable depth (metres) (or additional information as specified in H2600)	24-27	F4. 1
	(non metric)		I4
14f	Receiver group number	28-31	I4
14g	Map grid Easting (metres)	32-40	F9.1
	(non metric)		I9
14h	Map grid Northing (metres)	41-49	F9.1
	(non metric)		I9
14i	Cable depth (etc.)	50-53	F4.1
14j	Receiver group number	54-57	I4
14k	Map grid Easting (metric)	58-66	F9.1
	(non metric)		I9
141	Map grid Northing (metric)	67-75	F9.1
	(non metric)		I9
14m	Cable depth (etc.)	76-79	I4
14n	Streamer ID	80	I1

N.B. A cable "depth" above the vertical datum (e.g. Transition Zone Survey) will be recorded as a negative value.

Type 2: Coordinate data as local offsets from Township/section corners.

ITEM	DESCRIPTION	COL	FORMAT
1. Record identification	"S" = Centre of Source "G" = Receiver Group "Q" = Bin Centre	1	A1
2.	Line name (left justified) including reshoot code	2-17	A16
3.	Point number (right justified)	18-25	A8
4.	Record type identifier,"L"	26	A1
5.	Offset of point from ref. point in Easterly direction (E=+ve,V=-ve)	27-33	F7.1
6.	Offset of point from ref. point in Northerly direction (N=+ve,S=-ve)	34-40	F7.1
7.	Reference point name	41-56	A16
8.	Reference point latitude (d.m.s. N/S) (grads N/S)	57-66	I2,I2, F5.2,A1 F9.6,A1
9.	Reference point longitude (d.m.s E/) (grads E/W)	67-77	I3,I2, F5.1,A1 F10.6,A1
10.	Spare	78-80	3X

Relation Records - (3-D onshore surveys)

This record type is used to define the relation between recording channels and receiver groups.

For each shotpoint there is at least one relation record. Each of these records specifies a section of consecutively numbered channels and receiver groups. After a numbering gap or a change in line name for the receiver groups a new relation record has to be given (see example).

Channel numbers should be in ascending order.

ITEM	DESCRIPTION	COL	FORMAT
1.	Record identification "X"	1	A1
2.	Line name of shotpoint (left adjusted)	2-17	A16
3.	Shotpoint number (right adjusted)	18-25	A8
4.	FROM: Channel Number	26-29	I4
5.	TO: Channel Number	30-33	I4
6.	Line number of receiver group (left adjusted)	34-49	A8
7.	FROM: Receive group number (right adjusted)	50-57	A8
8.	TO: Receiver group number	58-65	A8
9.	Spare	66-80	15X