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AGSO WIDE-ANGLE SEISMIC PROFILING DATABASE

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AGSO WIDE-ANGLE SEISMIC PROFILING DATABASE

by

I. S. LUKASZYK

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DEPARTMENT OF PRIMARY INDUSTRIES AND ENERGY

Minister for Primary Industry and Energy: The Hon. J. Anderson M.P.

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EXECUTIVE SUMMARY

Over many years the Australian Geological Survey Organisation (AGSO), and its predecessor the Bureau of Mineral Resources, Geology and Geophysics (BMR), has acquired wide-angle seismic profiling data to determine velocity structures of geological features within various minerals and petroleum provinces. Wide-angle seismic profiling is a technique used where the shot-to-receiver offset is significantly greater than the target depth, e.g. for target horizons at 10 km the shot-to-receiver offset may be in the range 0-100 km. Basic information on the various surveys is commonly contained in operational reports written on each survey and published as AGSO (or BMR) Records.

With the rapid increases in the amount of data acquired in recent years as data acquisition methods have improved and the resolution of geological structure has become more demanding, it has become impractical to publish all the data from surveys in hard-copy form. Basic information such as recording station locations, shot data, shot times, instruments used, etc., is now stored in computer data files on various media. Hence there is a need to develop a database system to keep track of all the basic survey information.

This Record descibes an AGSO wide-angle seismic profiling database that has been established using Microsoft Access® software which should enable users to locate and access basic survey information and data. It has been set up in such a way that it can be modified and improved with the addition of future data and new "fields" of information as required. The current database includes more recent surveys in the Browse Basin and Otway Basin. Survey data are accessed using a unique identifier for each survey (based on the date of firing the first shot). The scope of data being accessed will improve with the addition of older survey data. It is intended that database information and the computer data files be archived at regular intervals on a CD-ROM format.

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INTRODUCTION

Large wide-angle seismic profiling data sets acquired by the Australian Geological Survey Organisation (AGSO) over many years warrant an adequate archival system. The current practice of storing data files on the local network needs to be revised in the light of an ever increasing volume of data. Other means of long term storage are being considered, eg. CD-ROMs, Optical Disks, etc. Whichever way the system develops, the users will have to know where the various data sets are located and how to access them. A unified database containing all the relevant information for a particular survey can provide a solution to this problem.

As it stands, the process of converting analog seismic records to digital format is quite complex and involves generation of a large number of files. Over many years, various Fortran programs have been written to further streamline the digitising process and limit data duplication. Survey parameters, such as station locations and operating times, traverse information, distances and azimuths, are currently stored as individual files on the DATA8 disk of the AGSO ONSHORE Server. These files follow various naming conventions and are therefore not very easy to identify or access. The database will store all the survey information and will allow users to quickly identify where the data files are located and what processing steps have been applied to the data. The system will also allow queries on recorder operating times, shot distances and azimuths, first break picks, etc. This Record describes a relational database model, specifically designed to accommodate wide-angle seismic data sets acquired by analogue or digital seismic recorders, both onshore and offshore (ocean bottom seismographs).

RELATIONAL DATABASE MODEL

Microsoft Access® is a commercial relational database package for the PC Windows environment. Various commercial textbooks describe MS Access® and its use. It organises data in TABLES, which form the basis of the relational structure. Different tables hold data which describe specific objects, like a seismic recorder or station. The purpose of having tables is to minimise duplication of fields in a database. It is easier to link two tables by a common field rather than to duplicate information into a single large table. This linking relates tables to each other, hence "relational database".

Access® database files have a *.MDB extension. Upon entry, the user sees a folder window listing all the tables in the database. Double clicking on a table opens it and displays the data in the form of a spreadsheet. Fields in the tables can be updated and therefore if one wants to view data rather than change it, FORMS provide a better alternative. Forms can be made "read only" to prevent users from changing something by mistake. Forms can also be customised, so that users can filter data in a table according to certain parameters. Forms can be accessed by clicking on the form folder. Output from the form can also be viewed as a spreadsheet table and can be downloaded into Excel or a text file. Other folders in Access® contain QUERIES, REPORTS, MACROS and MODULES. QUERIES can select and update data from various tables; REPORTS generate written summaries of data within a given table. MACROS and MODULES run internal and external tasks (written in Visual Basic). In short, the system can be developed further to accommodate the various needs of its users. The interface can also be made more user-friendly without affecting existing data structures.

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WIDE-ANGLE SEISMIC DATABASE STRUCTURE

SURVEYS.MDB is a wide-angle seismic profiling database which contains information on the recent surveys conducted by the Land Seismic Group of the Australian Geological Survey Organisation.

The main table, ***SURVEYS***, contains basic parameters for a given seismic:

- *SurveyNo* (commonly derived from the date of the first shot)
- *MarineID* (corresponding marine survey number, if applicable)
- *SurveyName* (usually giving location and year)
- *Seismic Method* (onshore, offshore or both)
- *Country*
- *State*
- *MapSheet* (1:1,000,000)
- *GeologicalProvince*
- *StartDate*
- *EndDate* (UT Date)

The corresponding form also displays number of recorders, stations and traverses (these are calculated from other tables). The total number of records (surveys in this case) is displayed at a lower left of the form. To navigate through the records, click on the arrow buttons at the bottom right of the form (PageUp and PageDown keys do the same). All other tables are linked to *SURVEYS* table by a *SurveyNo* field (ie. there must be an entry in the *SURVEYS* table before data can be entered in other tables).

Table ***DATAARCHIVES*** is a catalogue showing locations of digitised shot data. The fields are:

- *SurveyNo* (linked to *SURVEYS* table)
- *StationNo*
- *TraverseNo*
- *ClockDrifts* (Yes/No field showing if the archived data was corrected for a recorder clock drift)
- *TapeSpeed* (Yes/No field showing if the tape playback speed corrections were applied)
- *Cracked* (Yes/No field showing how the data is stored - in cracked format (individual shot files) or in uncracked format (large files containing many shots)
- *Picked* (Yes/No field showing record section first break picking status)
- *Modelled* (Yes/No field showing if the data was modelled by a ray tracing programs), *ArchivePath* (network path where the data is located)
- *FileName* (name of the archived data file(s))

At the time of writing, all refraction files reside on the L:\ drive (DATA8 ONSHORE), but in due course they will be moved to another storage medium. Contents of the *ArchivePath* field can therefore be updated to show CD-ROM volume number or other type of ID field can be added to the database. Form *DATAARCHIVES* allows users to query the locations of the data and to find out its processing stage. *QueryDataArchives* command button runs a filter on the contents of the table with

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a given survey and station number. Other queries can be written, selecting data which hasn't been clock drift corrected, etc.

Table ***RECORDERS*** contains basic information on the recording units used during refraction seismic surveys. Data fields are:

- *SurveyNo*
- *RecorderNo*
- *RecorderBrand* (brand name of the recording unit, eg. PI, AKAI, TANDBERG, etc.)
- *RecorderType* (analog, digital, etc.)
- *ComponentsRecorded* (seismic components recorded, e.g. vertical, transverse, radial, hydrophone)

Records are grouped by survey number (not recorder number, since recorder numbers may be identical for different types of units used). Again, the corresponding form provides a query filter.

Table ***RECTIMES*** contains operating times of recording stations. Those times can be in different time zones (as long as there is a corresponding entry in the *TIMEZONES* table). The fields are:

- *SurveyNo*
- *StationNo*
- *RecorderNo* (included here because one station can have many recorders operating at various times)
- *GainSetting* (gain setting of the recorder, which can be set to *different* values at various times)
- *Attenuation* (used to obtain net gain value)
- *FilterSetting* (it can also be different at different times)
- *TimeZone* (time zone of the recorder, linked to the *TIMEZONES* table)
- *DateOn* (includes day and time in 24hr clock)
- *DateOff*
- *ErrorOn* (comparator error readout for analog clocks)
- *ErrorOff*

Form *RECTIMES* shows calculated fields of net recorder gain and UT operating time. *QueryRecorderTimes* command button selects recorders for a particular survey.

Table ***SHOTDIST*** contains distance and azimuth data from shots to recorders. The fields are:

- *SurveyNo*
- *StationNo*
- *TraverseNo*
- *ShotpointNo*
- *Distance*
- *Azimuth*

SurveyNo, *StationNo* and *TraverseNo* identify a particular distance file and have to be added in Excel prior to database import. *ShotpointNo*, *Distance* and *Azimuth* are imported directly from a *file* used in digitising. *QueryShotDist* on *SHOTDIST* form selects a group of records based on survey, station and traverse number.

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Table ***SHOTPOS*** provides locations and UT times of individual shots. It may duplicate already existing database structures for the marine data; table *TRAVERSES* gives start and end times of the lines, and can be used for land data also (with a position field added). The fields are:

- *SurveyNo*
- *TraverseNo*
- *ShotpointNo*
- *Latitude*
- *Longitude*
- *UTDate*
- *DecSec* (hundredths of a second of the shot time)
- *WaterDepth*
- *Gravity*
- *Magnetics*.

Table ***STATIONS*** contains basic station information. Data fields are:

- *SurveyNo*
- *StationNo*
- *StationName*
- *Latitude*
- *Longitude*
- *Elevation*

Table ***TIMEPICKS*** lists travel-times picked from the seismic record sections. Data can be imported from the text files used in the modelling packages, with the added fields of *SurveyNo*, *StationNo* and *TraverseNo*. The other fields are:

- *Distance*
- *ReducedTTime*
- *NormalizingVelocity*

The last two fields are native to the record section used for picking. By convention, distances are negative West of the station for West-East trending lines and negative South of the station for North-South trending lines. The corresponding form gives a filter selecting a particular pick file.

Table ***TIMEZONES*** contains a list of recorder time zones used in the whole database. There are only two field at present,

- *TimeZone*
- *UTCorrection* (in hours)

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Table ***TRAVERSES*** contains start and end UT dates of traverses. The fields are:

- *SurveyNo*
- *TraverseNo*
- *StartDate*
- *EndDate*

Additional fields may be added here, like shot numbers and locations, which would help to catalogue land shots and dispense with the *SHOTPOS* table.

Some of the forms in *SURVEYS.MDB* are based on queries: *CHOOSEAZIMUTH*, *CHOOSEDISTANCE*, *CHOOSERECORDERLINETIMES*, *SHOTDISTCONTENTS* and *TIMEPICKSCONTENTS*. The output of each query is presented in the form view.

CHOOSEAZIMUTH prompts the user for a survey number and azimuth range. The query searches table *SHOTDIST* giving minimum and maximum shotpoint numbers for a specific traverse at a specific station satisfying this criterion. *CHOOSEDISTANCE* queries table *SHOTDIST* on distance range, giving output similar to that of *CHOOSEAZIMUTH*.

CHOOSERECORDERLINETIMES is designed to find out which traverses were recorded by a given station on a given survey. Recorder operating times are converted to Universal Time and compared with line shooting times.

SHOTDISTCONTENTS and *TIMEPICKSCONTENTS* are summaries of the data in *SHOTDIST* and *TIMEPICKS* tables. They sort the data into station-line pairs and tell how many of those are found in each table. Minimum and maximum distances and azimuths are also selected for every pair.

DATABASE USERS

Microsoft Access® contains a facility which permits creation of *USER GROUPS* sharing a common database. Members of the same group run Access® using the same system files, specifying privileges to each user. There are two system files: *SYSTEM.LDB* and *SYSTEM.MDA*. They should always be placed in the C:\ACCESS\SETUP directory. Currently, spare copies of these reside on the L:\SEISMIC\USER\DATABASE.

To add a new user to the group, do the following:

1. Copy *SYSTEM.LDB* and *SYSTEM.MDA* to your C:\ACCESS\SETUP directory.
2. Click on the *MSAccess Workgroup Administrator* icon, which should be located in your Microsoft Office directory (with other Access® icons).
3. The location of the system database file should be on the network I:\ drive, I:\ACCESS\SYSTEM.MDA. Click on the *Join...* button and change the location to C:\ACCESS\SETUP\SYSTEM.MDA.
4. Click *OK* and *Exit* following the successful link.

Every time you run Access® from now on, you will be prompted for a password identifying you as a member of the seismic group.

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Surveys database has three user groups: *ADMIN*, *USERS* and *GUESTS*. ADMIN has all the privileges to the database (ie. can modify table and form structures, as well as add, delete or update data). USERS can add, delete and update data in tables only, but they cannot change database design. GUESTS can view data only.

At the moment, only three database users exist. They are prompted for their user names every time they try to run Access® and *SURVEYS.MDB*. Individual users can set passwords by going into *SECURITY - CHANGE PASSWORD...* menu while in Access®. New users can be added by *ADMIN* at a later stage.

Only one *ADMIN* and *GUEST* exist at the moment. *ADMIN* account is protected by a password. Only *ADMIN* can read the database exclusively (ie. not in a shared environment).

DATABASE INTERFACE

SURVEYS.MDB can import data into individual tables from external spreadsheets or text files. Prior to import one has to make sure that the format of these files agrees with the structure of the table (ie. the number of columns is correct and that the data is in the right order). The following example illustrates a typical import to a shot distance table, *SHOTDIST*. The input file is generated by program DISTANCE during processing of analog data.

Shot distance files have a *.PDP extension and contain a one row header (giving information on the station and traverse number, eg. "Stn 16, Line 401 Shot Distance File"), followed by data columns: shot number, distance from the station, shot time, azimuth, water depth. Prior to import into table *SHOTDIST*, one needs to remove the header, shot time and water depth columns. It is easiest done in Excel®:

1. Open a file and start import from the second row (that gets rid of the header). Choose Next.
2. Skip the shot time and water depth columns and click on Finish.
3. Data records in table *SHOTDIST* are identified by a survey, station and traverse numbers. Add these three columns in front of shot number, distance and azimuth.
4. Duplicate the entries for the rest of the spreadsheet.
5. Save the file in an Excel® format.
6. Open the surveys database and click on the import button - .
7. Select data source (Microsoft Excel 5.0) and the file name, click on Import.
8. In Table Options, choose Append to Existing Table and select *SHOTDIST*.
9. Click on OK.

Once the import is finalised, status message will be given (number of records added and number of potential import errors). *IMPORT ERRORS* table will give the row numbers and fields (from the original Excel® file) with problems. These can be cross-checked and corrected later (errors may occur due to incorrect data formats (eg. ascii characters in number fields, etc.)). Access® will not import a given field for a particular record if errors are detected ie. if there are problems with the azimuth field, it will remain blank (null) for a given shotpoint. One can select records with null fields by running an Access® query and typing the correct values at a later stage. Once all the errors are fixed, the *IMPORT ERRORS* table can be deleted from the database. Note the import procedure can be cancelled if an excessive number of errors occurs.

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REFERENCES

COLLINS, C.D.N., LUKASZYK, I.S., RIEKE, U.R., 1995 - Browse Basin - northwest Kimberley seismic refraction survey, 1993: operational report. *AGSO Record* 1995/76

FINLAYSON, D.M., CHUDYK, E.C., COLLINS, C.D.N. & LUKASZYK, I.S., 1995 - Otway Basin 1994-95, wide-angle seismic recording using the "Rig Seismic" airgun source: operational report. *AGSO Record* 1995/62.

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APPENDIX 1

WIDE-ANGLE SEISMIC PROFILING DATABASE: TABLE RELATIONSHIPS

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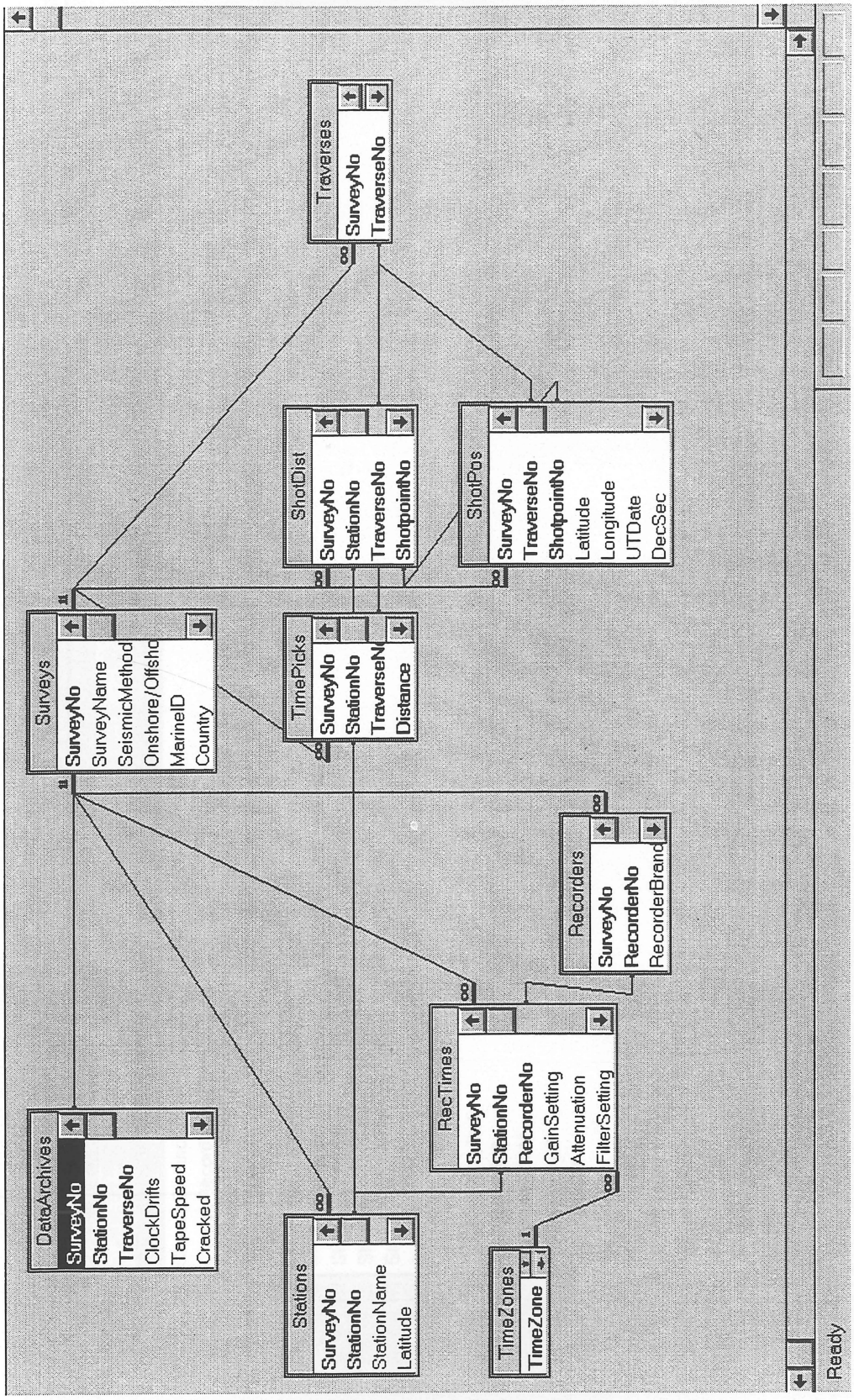
SURVEYS.MDB: Relationships Between Tables



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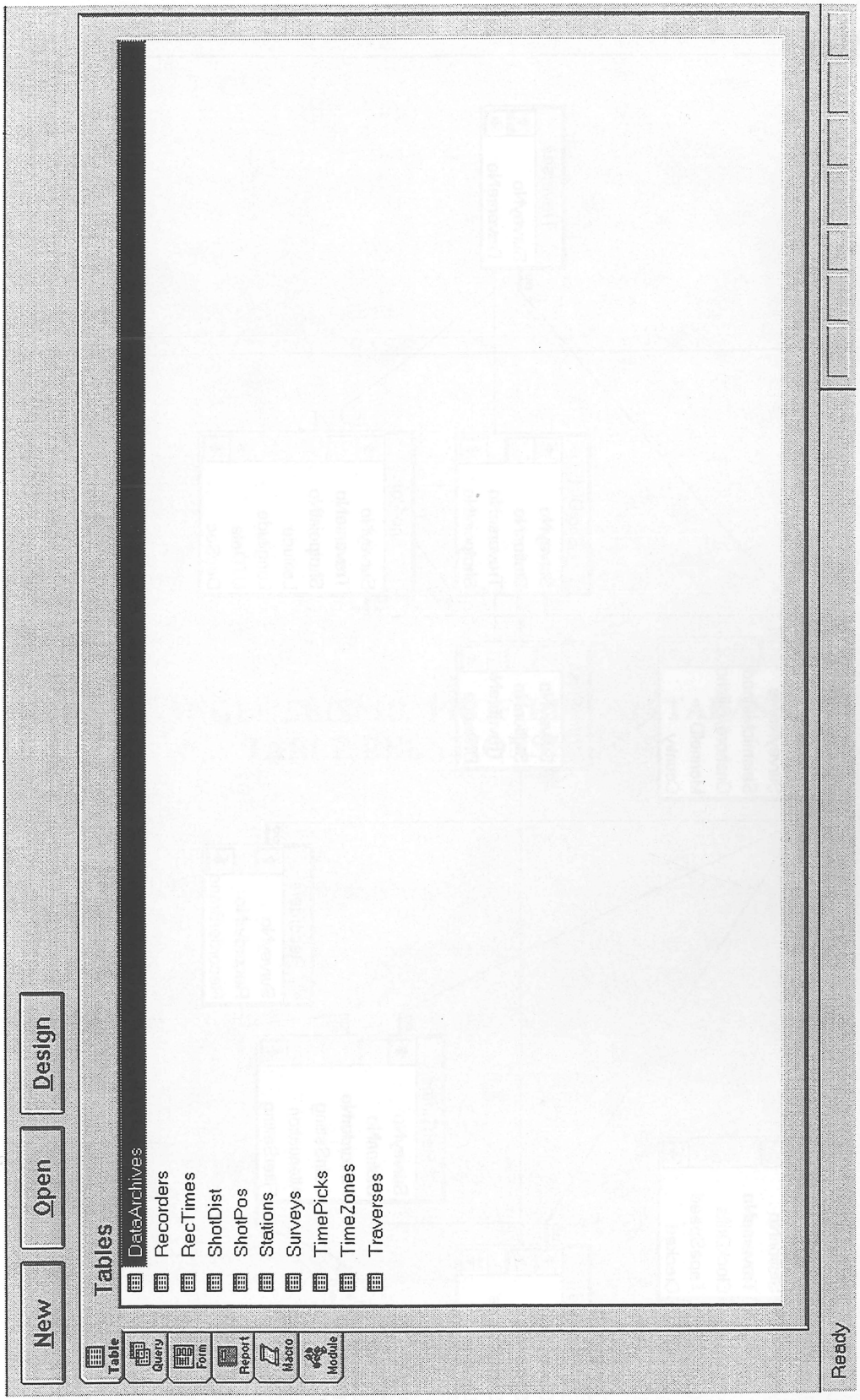
SURVEYS.MDB: Table Menu



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SURVEYS.MDB: Form Menu

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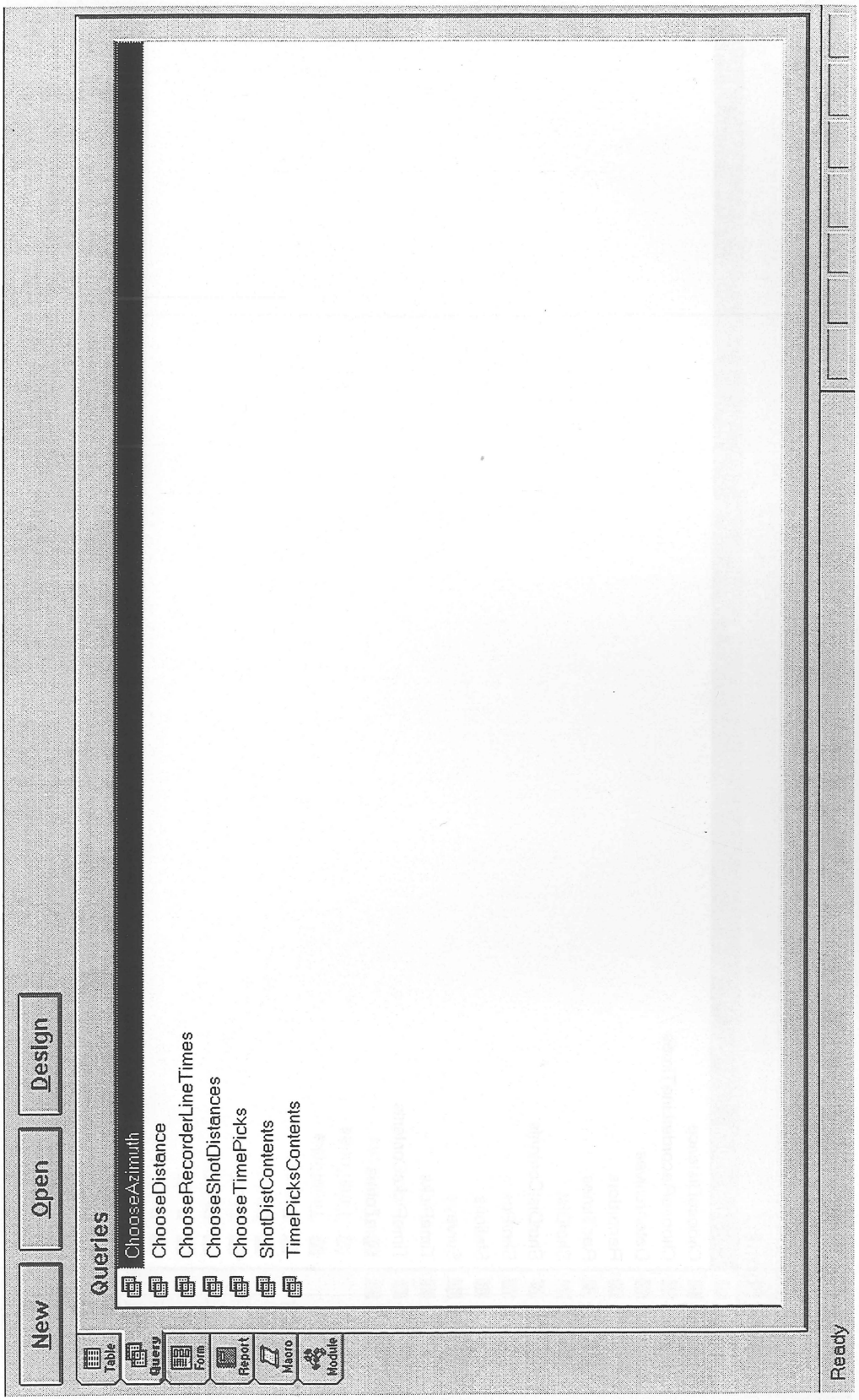
SURVEYS.MDB: Query Menu



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APPENDIX 2

WIDE-ANGLE SEISMIC PROFILING DATABASE: FORMS

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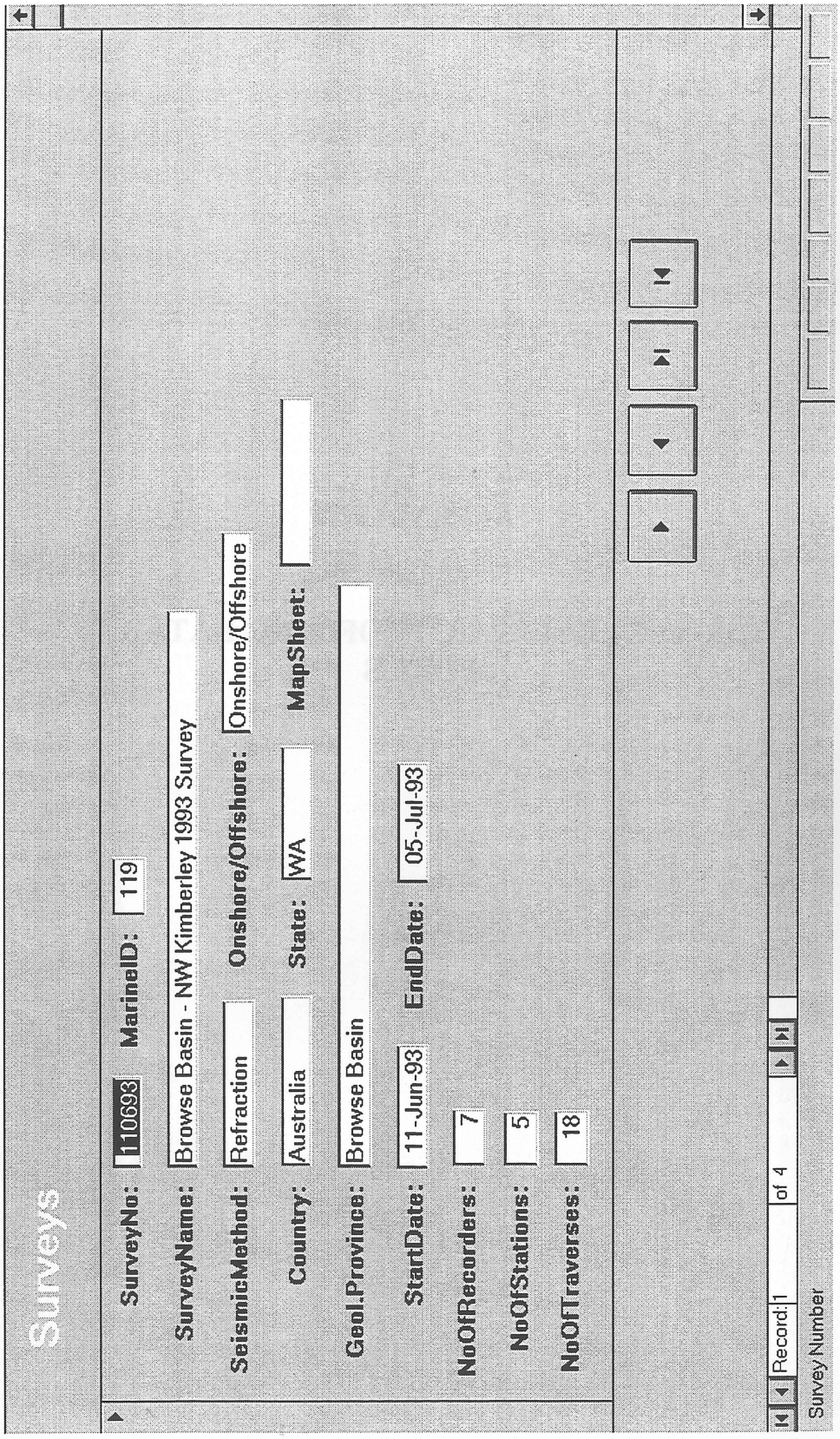
Main Surveys Form (SURVEYS)



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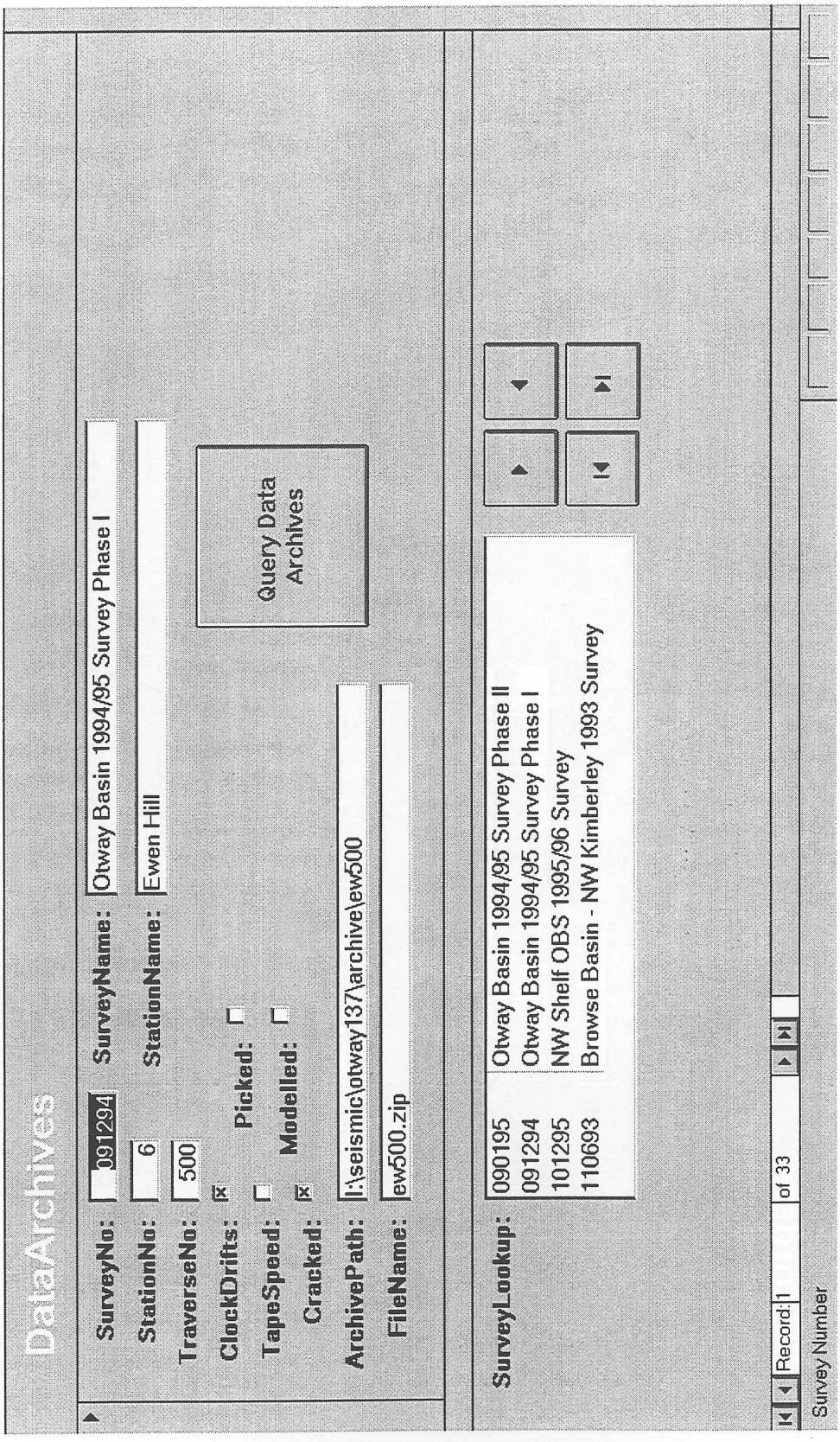
Data Archives Form (DATAARCHIVES)



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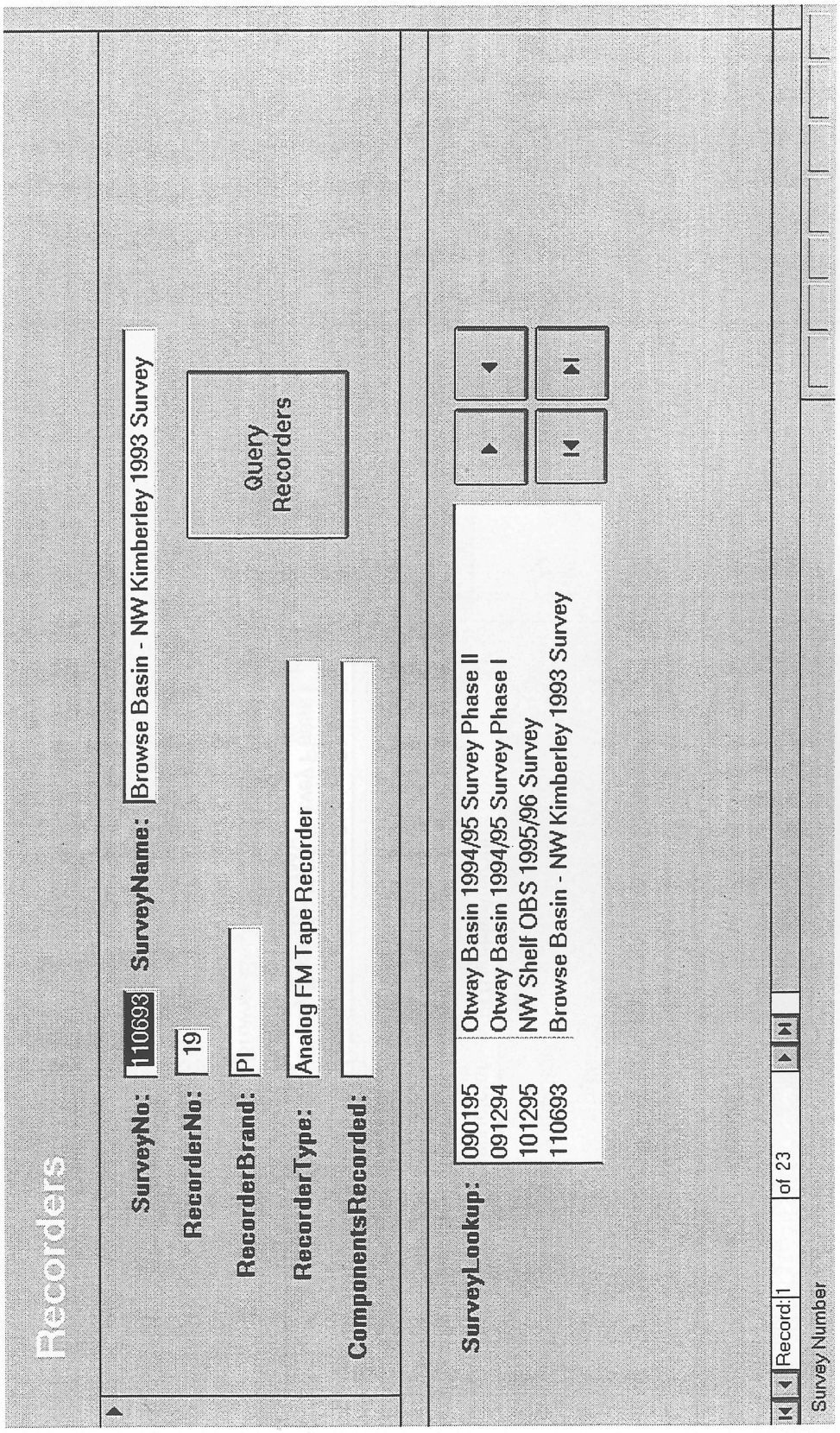
Recorders Form (RECORDERS)



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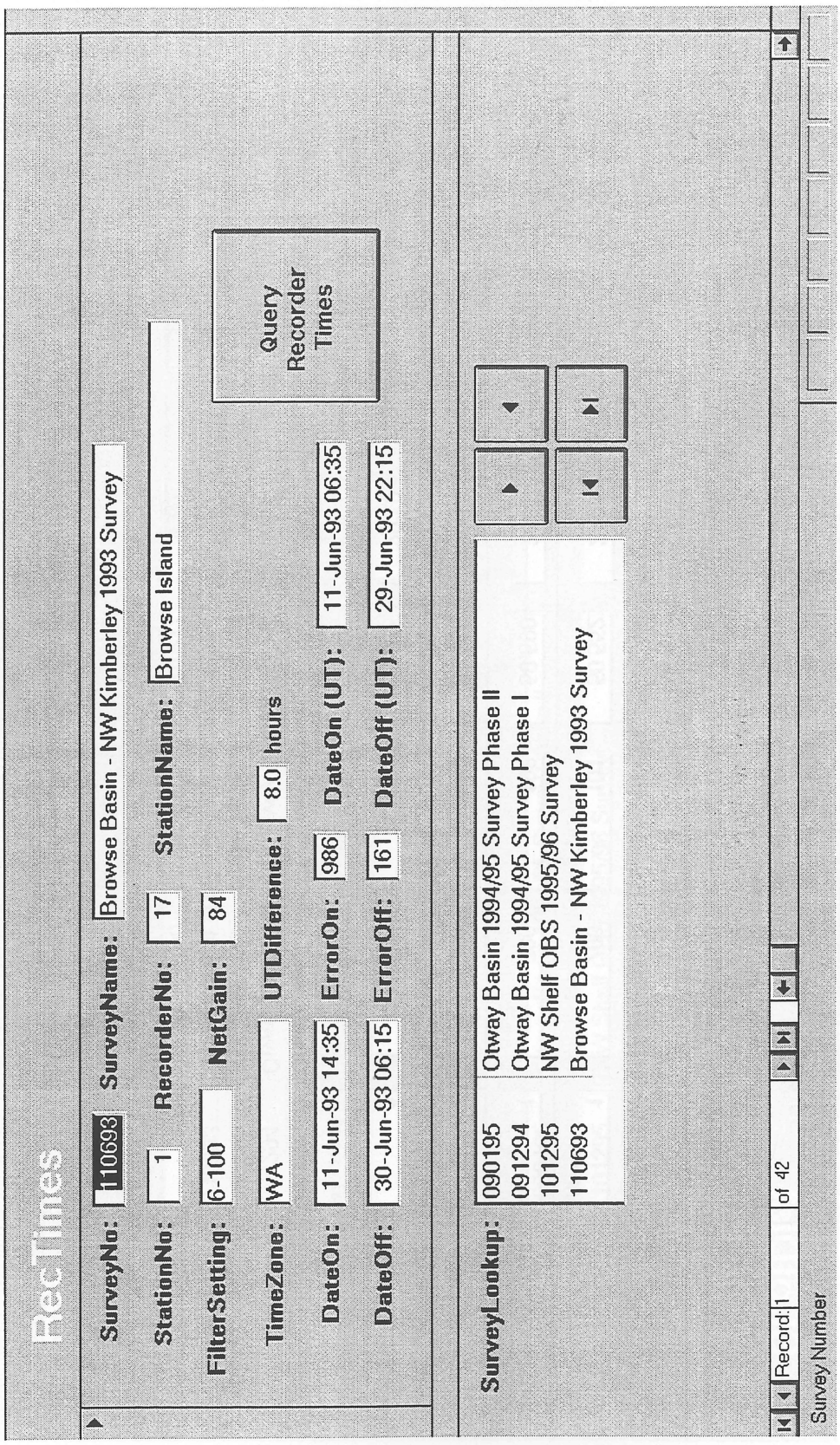
Recording Times Form (RECTIMES)



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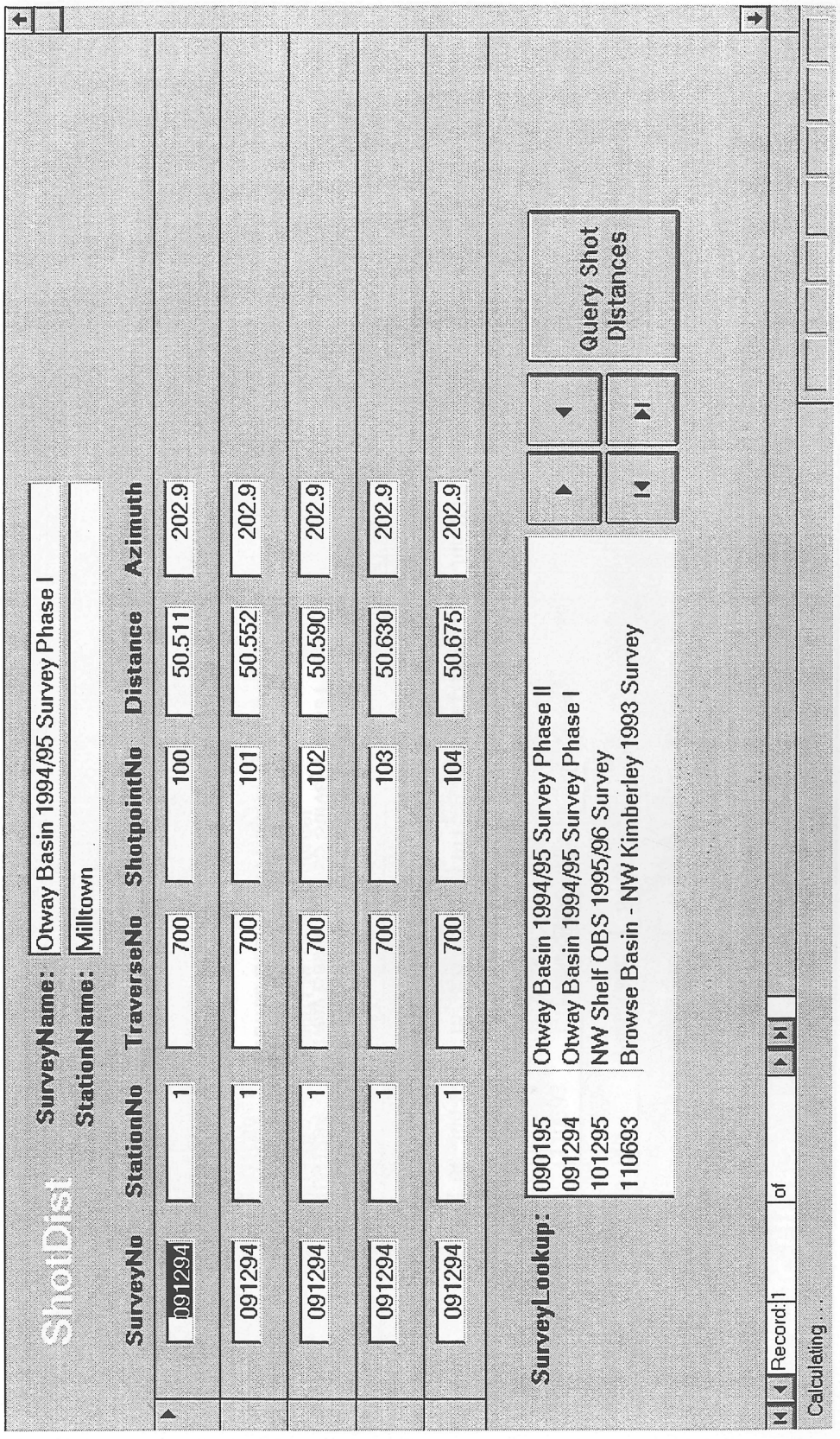
Shot Distance Form (SHOTDIST)



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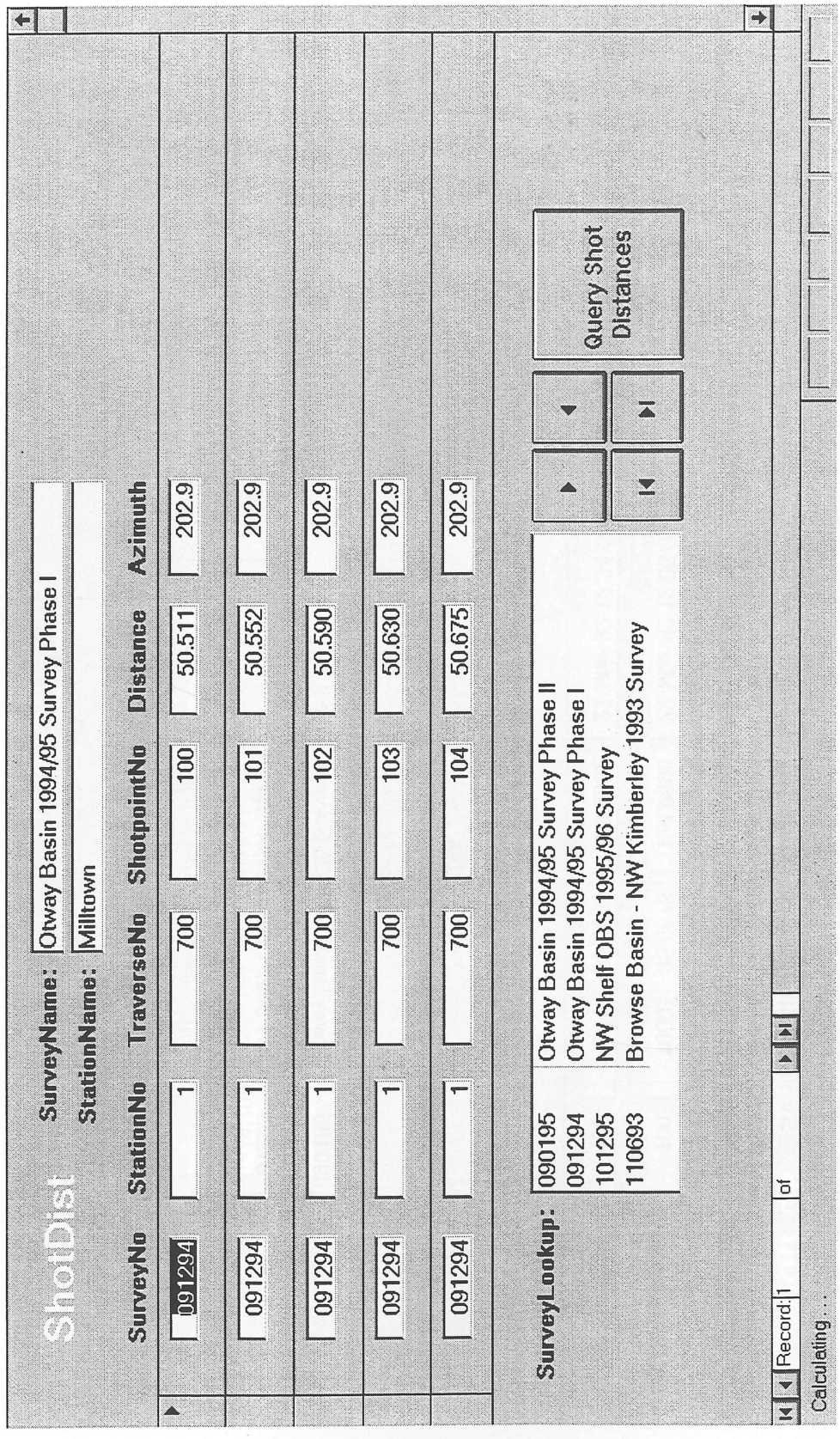
Contents of Shot Distance Form (SHOTDISTCONTENT)



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Shot Positions Form (SHOTPOS)

ShotPos SurveyName: Browse Basin - NW Kimberley 1993 Survey

SurveyNo	LineNo	ShotNo	Latitude	Longitude	Universal Time	"Sec	Water	Gravity	Magnetics
110693	100	1000	-35.6676	124.9898	22-Mar-92 12:33:34	56	-123	56	45
110693	100	1001	-35.6690	124.9902	22-Mar-92 12:34:34	22	-121	57	46

SurveyLookup:

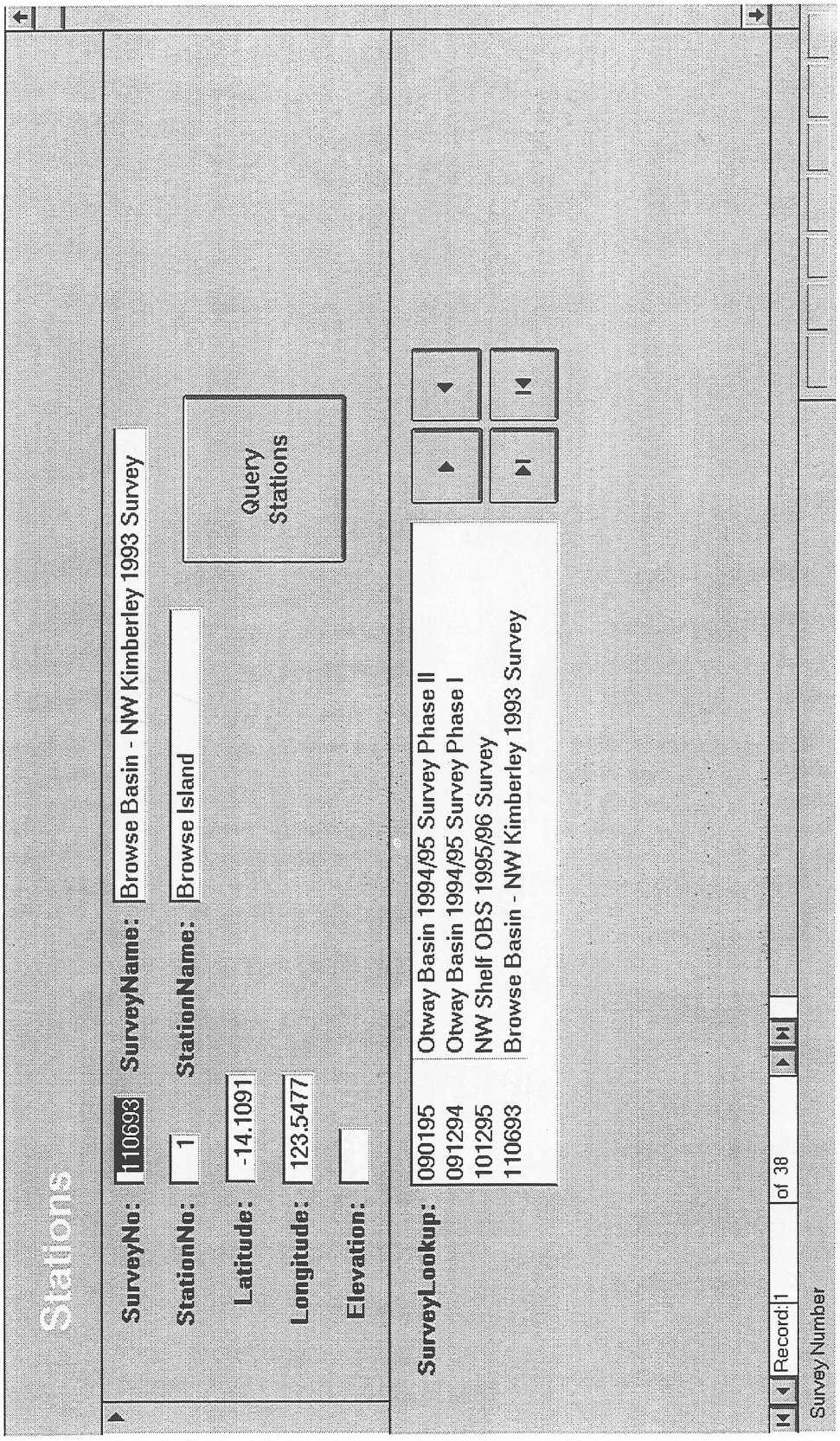
090195	Otway Basin 1994/95 Survey Phase II
091294	Otway Basin 1994/95 Survey Phase I
101295	NW Shelf OBS 1995/96 Survey
110693	Browse Basin - NW Kimberley 1993 Survey

Query Shot Positions

Record: 1 of 2

Survey Number

Stations Form (STATIONS)



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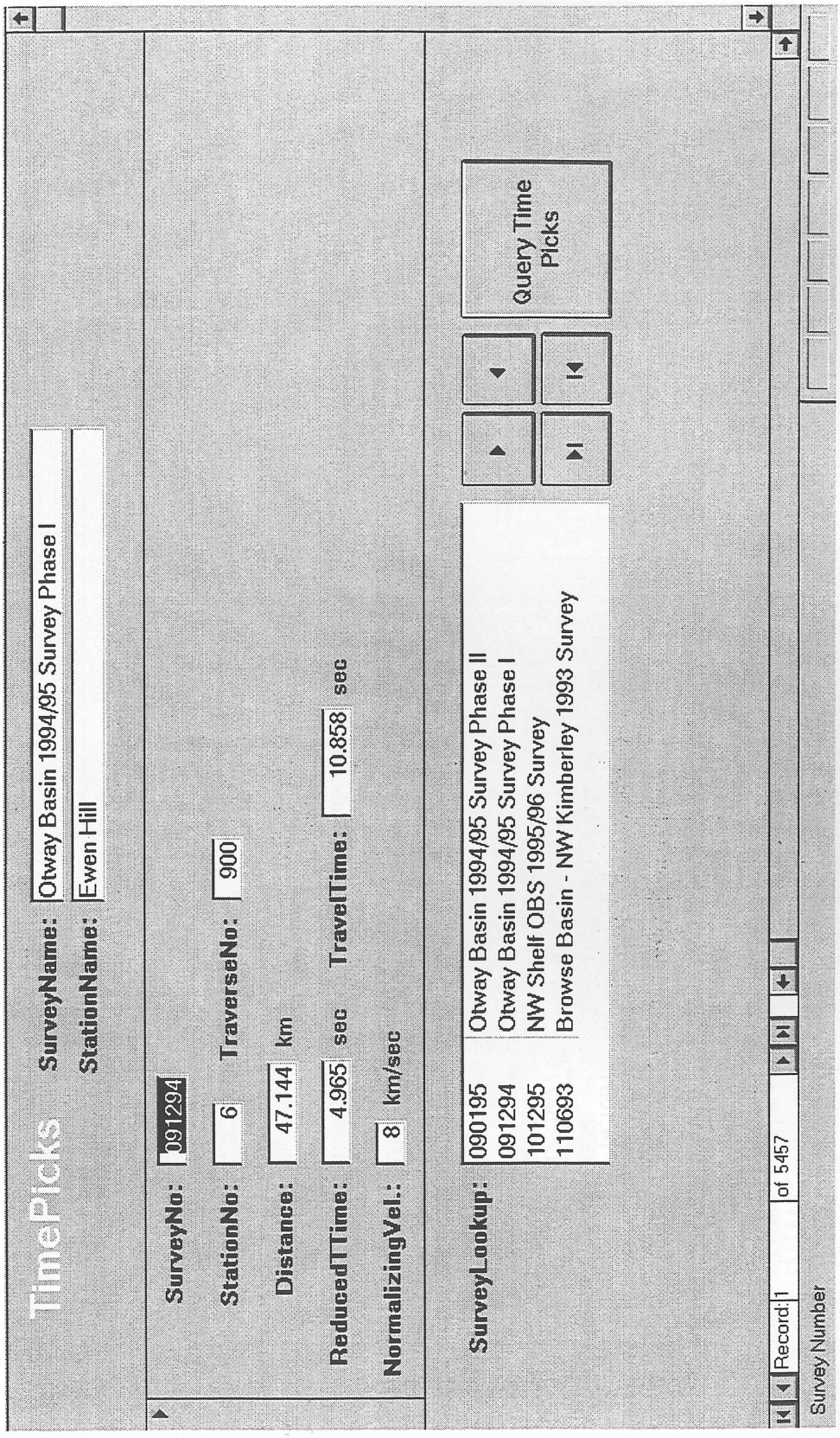
Record Section Picks Form (TIMEPICKS)



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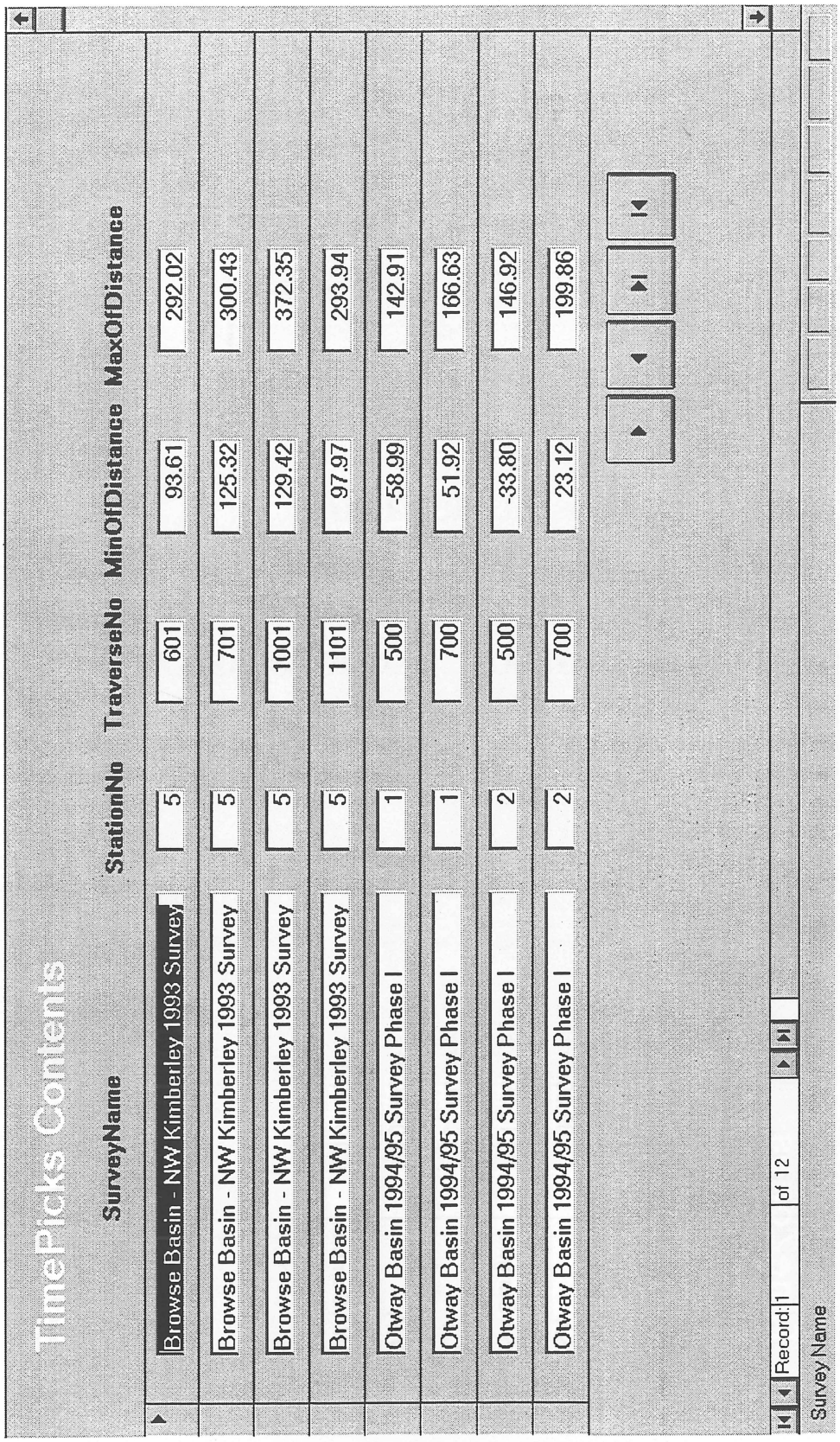
Contents of Record Section Picks Form (TIMEPICKSCONTENTS)



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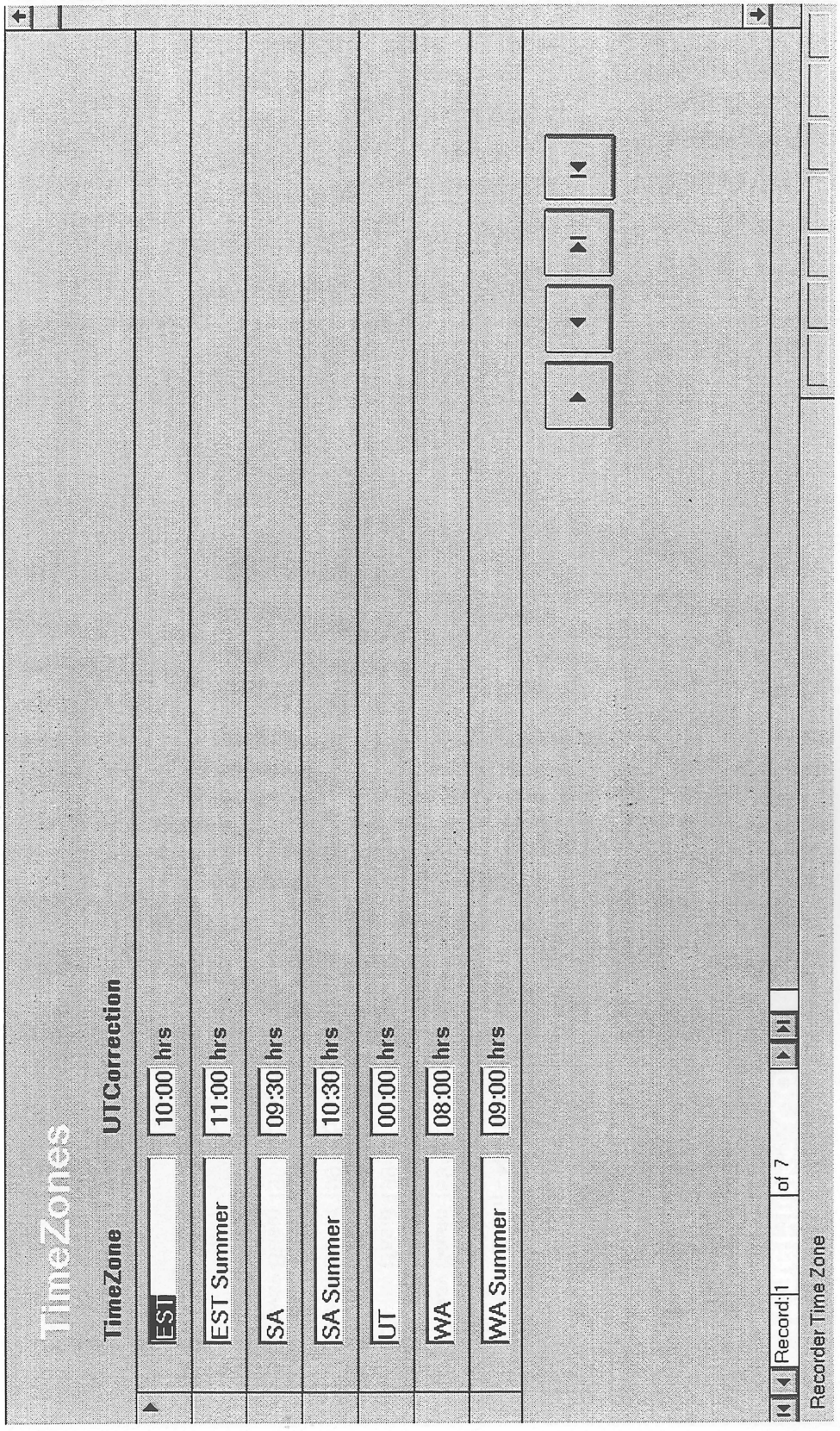
Recording Time Zones Form (TIMEZONES)



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APPENDIX 3

WIDE-ANGLE SEISMIC PROFILING DATABASE: EXAMPLES OF DATA FORMATS AND TABLE DESIGNS

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Structure of SURVEYS and RECORDERS tables

Surveys

5/31/96

SurveyNo	SurveyName	SeismicMethod	Onshore/Offshore	MarineID	Country	State	GeologicalProvince	MapSheet	StartDate	EndDate
030395	Tasmania Basin 1995 Survey	Refraction	Onshore/Offshore	148	Australia	TAS	Tasmania Basin			
090195	Otway Basin 1994/95 Survey Phase II	Refraction	Onshore/Offshore	151	Australia	SA,VIC	Otway Basin Voluta Trough		09-Jan-95	22-Jan-95
091294	Otway Basin 1994/95 Survey Phase I	Refraction	Onshore/Offshore	137	Australia	VIC	Otway Basin Mussel Platform		09-Dec-94	22-Dec-94
101295	NW Shelf OBS 1995/96 Survey	Refraction	Onshore/Offshore	168	Australia	NT,WA	Canning, Carnarvon, Browse, Petrel Basin		10-Dec-95	27-Jan-96
110693	Browse Basin - NW Kimberley 1993 Survey	Refraction	Onshore/Offshore	119	Australia	WA	Browse Basin		11-Jun-93	05-Jul-93

Recorders

SurveyNo	RecorderNo	RecorderBrand	RecorderType	ComponentsRecorded
090195	16	PI	Analog FM Tape Recorder	
090195	17	PI	Analog FM Tape Recorder	
090195	18	PI	Analog FM Tape Recorder	
090195	19	PI	Analog FM Tape Recorder	
090195	20	PI	Analog FM Tape Recorder	
090195	21	PI	Analog FM Tape Recorder	
091294	17	PI	Analog FM Tape Recorder	
091294	18	PI	Analog FM Tape Recorder	
091294	19	PI	Analog FM Tape Recorder	
091294	20	PI	Analog FM Tape Recorder	
091294	21	PI	Analog FM Tape Recorder	
101295	16	PI	Analog FM Tape Recorder	
101295	17	PI	Analog FM Tape Recorder	
101295	19	PI	Analog FM Tape Recorder	
101295	20	PI	Analog FM Tape Recorder	
101295	21	PI	Analog FM Tape Recorder	
110693	16	PI	Analog FM Tape Recorder	
110693	17	PI	Analog FM Tape Recorder	
110693	18	PI	Analog FM Tape Recorder	
110693	19	PI	Analog FM Tape Recorder	
110693	20	PI	Analog FM Tape Recorder	
110693	21	PI	Analog FM Tape Recorder	
110693	30	TANDBERG	Analog FM Tape Recorder	

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Structure of DATAARCHIVES table

SurveyNo	StationNo	TraverseNo	ClockDrifts	TapeSpeed	Cracked	Picked	Modelled	ArchivePath	FileName
091294	1	400	No	No	No	No	No	I:\seismic\otway137\archive\mi400\pdp11	mi400raw.zip
091294	1	401	Yes	Yes	Yes	No	No	I:\seismic\otway137\archive\mi401	mi401.zip
091294	1	500	Yes	Yes	Yes	Yes	Yes	I:\seismic\otway137\archive\mi500	mi500.zip
091294	1	501	Yes	Yes	Yes	Yes	Yes	I:\seismic\otway137\archive\mi501	mi501.zip
091294	1	700	Yes	No	Yes	Yes	Yes	I:\seismic\otway137\archive\mi700	mi700a.zip, mi700b.zip
091294	2	400	No	No	No	No	No	I:\seismic\otway137\archive\qo400\pdp11	qo400raw.zip
091294	2	401	No	No	No	No	No	I:\seismic\otway137\archive\qo401\pdp11	qo401raw.zip
091294	2	500	Yes	Yes	Yes	Yes	Yes	I:\seismic\otway137\archive\qo500new	qo500n.zip
091294	2	501	Yes	No	Yes	Yes	Yes	I:\seismic\otway137\archive\qo501	qo501.zip
091294	2	700	Yes	No	Yes	Yes	Yes	I:\seismic\otway137\archive\qo700new	qo700na.zip, qo700nb.zip
091294	3	500	Yes	Yes	Yes	Yes	Yes	I:\seismic\otway137\archive\rr500	rr500.zip
091294	3	501	Yes	Yes	Yes	Yes	Yes	I:\seismic\otway137\archive\rr501	rr501.zip
091294	3	700	Yes	No	Yes	Yes	Yes	I:\seismic\otway137\archive\rr700	rr700a.zip, rr700b.zip
091294	3	900	Yes	No	Yes	No	No	I:\seismic\otway137\archive\rr900	rr900a.zip, rr900b.zip
091294	4	500	Yes	Yes	Yes	No	No	I:\seismic\otway137\archive\la500	la500.zip
091294	4	501	Yes	Yes	Yes	No	No	I:\seismic\otway137\archive\la501	la501.zip
091294	4	700	Yes	No	Yes	Yes	Yes	I:\seismic\otway137\archive\la700	la700a.zip, la700b.zip
091294	4	900	No	No	No	No	No	I:\seismic\otway137\archive\la900\pdp11	la900raw.zip
091294	6	500	Yes	No	Yes	No	No	I:\seismic\otway137\archive\ew500	ew500.zip
091294	6	501	Yes	No	Yes	No	No	I:\seismic\otway137\archive\ew501	ew501.zip
091294	6	900	Yes	Yes	Yes	Yes	Yes	I:\seismic\otway137\archive\ew900	ew900a.zip, ew900b.zip
110693	1	701	No	Yes	No	No	No	I:\seismic\nwshelf\brwse119\archive\br701	br701.zip
110693	1	1001	No	Yes	No	No	No	I:\seismic\nwshelf\brwse119\archive\br1001	br1001.zip
110693	3	501	Yes	Yes	No	No	No	I:\seismic\nwshelf\brwse119\archive\la501	la501.zip
110693	3	701	Yes	Yes	No	No	No	I:\seismic\nwshelf\brwse119\archive\la701	la701.zip
110693	3	801	Yes	Yes	No	No	No	I:\seismic\nwshelf\brwse119\archive\la801	la801.zip
110693	3	802	No	No	No	No	No	I:\seismic\nwshelf\brwse119\archive\la802	la802.zip
110693	3	901	No	Yes	No	No	No	I:\seismic\nwshelf\brwse119\archive\la901	la901.zip
110693	3	902	Yes	Yes	No	No	No	I:\seismic\nwshelf\brwse119\archive\la902	la902.zip
110693	5	601	Yes	Yes	No	Yes	No	I:\seismic\nwshelf\brwse119\archive\cl601	cl601.zip
110693	5	701	Yes	Yes	No	Yes	No	I:\seismic\nwshelf\brwse119\archive\cl701	cl701.zip
110693	5	1001	Yes	Yes	No	Yes	No	I:\seismic\nwshelf\brwse119\archive\cl1001	cl1001.zip
110693	5	1101	Yes	Yes	No	Yes	No	I:\seismic\nwshelf\brwse119\archive\cl1101	cl1101.zip

Structure of SHOTDIST and STATIONS tables

Stations

SurveyNo	StationNo	StationName	Latitude	Longitude	Elevation
090195	1	Noolook	-37.0033	139.8592	-10
090195	2	Deep Swamp	-36.7512	140.2258	50
090195	3	Jip Jip	-36.4863	140.1805	40
090195	4	Taratap Road	-36.6498	139.8920	-61
090195	5	Woakwine	-37.3783	140.0377	37
090195	6	East Avenue	-37.0467	140.2772	-4
090195	7	Milltown	-38.0375	141.6693	100
090195	8	Kongorong	-37.8755	140.5977	63
090195	9	Riddles Road	-38.2390	142.2333	70
090195	10	Mylor	-38.5283	142.9137	93
090195	11	Red Lane	-38.0495	142.3490	133
091294	1	Milltown	-38.0375	141.6693	100
091294	2	Gorae	-38.2585	141.5253	40
091294	3	Riddles Road	-38.2390	142.2333	70
091294	4	Red Lane	-38.0443	142.2333	125
091294	5	Mylor	-38.5283	142.9137	93
091294	6	Ewen Hill	-38.2703	143.0677	137
101295	1	Withnell Bay	20.5689	116.8029	23
101295	2	Mt Anketel Road	20.7336	117.0658	61
101295	3	East Harding River	20.8496	117.2629	36
101295	4	Peawah Hill	20.6504	117.9113	28
101295	5	Beach Well Road	19.8215	120.5128	73
101295	6	Evarramulgarra Well Road	19.8860	120.5663	42
101295	7	Gravel Pit Road	19.9286	120.5606	82
101295	8	Cockatoo Island	16.0953	123.6072	112
101295	9	Koolan Island North	16.1318	123.7753	143
101295	10	Koolan Island South	16.1282	123.7812	171
101295	11	Kimbolton	16.6975	123.8319	94
101295	12	Geebung	14.2053	127.3503	112
101295	13	Kulumburu Mission	14.2975	126.6421	13
101295	14	Carson River	14.4905	126.7661	11
101295	15	Troughton Island	13.7528	126.1457	78
101295	16	Bathurst Island - Port Hurd	11.6897	130.2020	11
110693	1	Browse Island	-14.1091	123.5477	
110693	2	Bigge Island	-14.6236	125.1223	
110693	3	Lamarck Island	-14.7877	125.0262	
110693	4	Mitchell Plateau	-14.7925	125.8255	
110693	5	Cape Leveque	-16.3981	122.9272	

ShotDist

SurveyNo	StationNo	TraverseNo	ShotpointNo	Distance	Azimuth
091294	1	700	100	50.511	202.9
091294	1	700	101	50.552	202.9
091294	1	700	102	50.590	202.9
091294	1	700	103	50.630	202.9
091294	1	700	104	50.675	202.9
091294	1	700	105	50.724	202.9
091294	1	700	106	50.773	202.9
091294	1	700	107	50.827	202.9
091294	1	700	108	50.881	203.0
091294	1	700	109	50.928	203.0
091294	1	700	110	50.976	203.0
091294	1	700	111	51.023	203.0
091294	1	700	112	51.072	203.0
091294	1	700	113	51.120	203.0
091294	1	700	114	51.166	203.0
091294	1	700	115	51.214	203.1
091294	1	700	116	51.263	203.1
091294	1	700	117	51.311	203.1
091294	1	700	118	51.361	203.1
091294	1	700	119	51.410	203.1
091294	1	700	120	51.458	203.1
091294	1	700	121	51.505	203.1
091294	1	700	122	51.557	203.1
091294	1	700	123	51.607	203.2
091294	1	700	124	51.655	203.2
091294	1	700	125	51.702	203.2
091294	1	700	126	51.749	203.2
091294	1	700	127	51.799	203.2
091294	1	700	128	51.845	203.2
091294	1	700	129	51.892	203.2
091294	1	700	130	51.943	203.3
091294	1	700	131	51.994	203.3
091294	1	700	132	52.042	203.3
091294	1	700	133	52.089	203.3
091294	1	700	134	52.137	203.3
091294	1	700	135	52.186	203.3
091294	1	700	136	52.236	203.3
091294	1	700	137	52.287	203.3
091294	1	700	138	52.335	203.4
091294	1	700	139	52.384	203.4
091294	1	700	140	52.426	203.4
091294	1	700	141	52.477	203.4
091294	1	700	142	52.529	203.4
091294	1	700	143	52.577	203.4
091294	1	700	144	52.625	203.4

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Structure of RECTIMES table

RecTimes

SurveyNo	StationNo	RecorderNo	GainSetting	Attenuation	FilterSetting	TimeZone	DateOn	DateOff	ErrorOn	ErrorOff
090195	1	18	90	6	6-100	EST Summer	09-Jan-95 12:30	22-Jan-95 13:01	982	494
090195	2	19	96	6	6-100	EST Summer	09-Jan-95 16:53	18-Jan-95 17:34	995	004
090195	3	17	96	6	6-100	EST Summer	09-Jan-95 20:29	17-Jan-95 10:03	044	097
090195	4	20	96	6	6-100	SA Summer	11-Jan-95 13:00	17-Jan-95 08:06	003	087
090195	5	16	90	6	6-100	EST Summer	13-Jan-95 17:47	22-Jan-95 14:44	020	029
090195	6	21	96	6	6-100	EST Summer	15-Jan-95 18:21	18-Jan-95 19:07	010	004
090195	7	17	96	6	6-100	EST Summer	17-Jan-95 15:10	20-Jan-95 18:55	003	029
090195	8	20	96	6	6-100	SA Summer	17-Jan-95 17:16	22-Jan-95 16:34	002	019
090195	9	19	96	0	6-100	EST Summer	19-Jan-95 14:57	23-Jan-95 12:27	008	997
090195	10	21	96	0	6-100	EST Summer	19-Jan-95 18:23	21-Jan-95 10:00	002	
090195	10	21	96	0	6-100	EST Summer	21-Jan-95 13:30	23-Jan-95 16:14	003	077
090195	11	17	96	6	6-100	EST Summer	20-Jan-95 21:29	23-Jan-95 13:47	000	020
091294	1	20	90	6	0.01-20	EST Summer	09-Dec-94 09:10	21-Dec-94 09:19	995	180
091294	2	17	90	6	0.01-20	EST Summer	09-Dec-94 11:02	21-Dec-94 10:30	008	087
091294	3	21	90	6	0.01-20	EST Summer	09-Dec-94 14:12	21-Dec-94 13:05	993	215
091294	4	18	90	6	0.01-20	EST Summer	09-Dec-94 16:10	21-Dec-94 13:54	997	391
091294	5	16	90	6	0.01-20	EST Summer	10-Dec-94 10:07	21-Dec-94 16:23	997	
091294	6	19	90	6	0.01-20	EST Summer	10-Dec-94 13:08	22-Dec-94 08:53	002	910
101295	1	16	96	0	6-100	UT	19-Dec-95 04:50	27-Dec-95 01:20	998	934
101295	2	21	96	0	6-100	UT	19-Dec-95 07:56	27-Dec-95 03:51	007	857
101295	3	17	96	0	6-100	UT	19-Dec-95 09:28	27-Dec-95 05:35	294	
101295	4	19	96	0	6-100	UT	24-Dec-95 04:12	26-Dec-95 10:32	995	250
101295	5	20	96	0	6-100	UT	29-Dec-95 05:41	04-Jan-96 00:51	002	
101295	6	17	96	0	6-100	UT	29-Dec-95 23:19	04-Jan-96 14:52	998	
101295	7	16	96	0	6-100	UT	29-Dec-95 11:21	04-Jan-96 03:58	007	964
101295	8	16	96	0	6-100	UT	06-Jan-96 00:26	11-Jan-96 00:00	003	945
101295	9	20	96	0	6-100	UT	06-Jan-96 01:35	11-Jan-96 00:32	003	143
101295	10	17	96	0	6-100	UT	06-Jan-96 02:18	11-Jan-96 00:47	999	903
101295	11	19	96	0	6-100	UT	06-Jan-96 05:35	11-Jan-96 01:25	992	264
101295	12	17	96	0	6-100	UT	13-Jan-96 04:24	17-Jan-96 00:56	002	923
101295	13	20	96	0	6-100	UT	13-Jan-96 06:36	20-Jan-96 02:21	293	817
101295	14	19	96	0	6-100	UT	13-Jan-96 02:36	20-Jan-96 03:59	002	075
101295	15	17	96	0	6-100	UT	17-Jan-96 02:40	20-Jan-96 00:54	999	948
101295	16	16	96	0	6-100	UT	13-Jan-96 03:44	27-Jan-96 01:00	004	
110693	1	16	90	6	6-100	WA	11-Jun-93 15:01	30-Jun-93 06:26	995	877
110693	1	17	90	6	6-100	WA	11-Jun-93 14:35	30-Jun-93 06:15	986	161
110693	1	20	90	6	6-100	WA	20-Jun-93 10:37	05-Jul-93 14:59	000	204
110693	1	30	90	6	0.01-20	WA	23-Jun-93 14:08	30-Jun-93 06:49	001	875
110693	2	19	90	6	6-100	WA	15-Jun-93 10:51	05-Jul-93 09:55	002	838
110693	3	21	90	6	6-100	WA	15-Jun-93 13:58	05-Jul-93 12:17	981	871
110693	4	20	90	6	6-100	WA	15-Jun-93 14:46	20-Jun-93 10:00	002	998
110693	5	18	90	6	6-100	WA	17-Jun-93 12:04	03-Jul-93 06:38	003	

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Structure of TIMEPICKS and TRAVERSES tables

Traverses

SurveyNo	TraverseNo	StartDate	EndDate
090195	101	15-Jan-95 09:46	15-Jan-95 18:32
090195	201	16-Jan-95 00:13	16-Jan-95 09:00
090195	502	19-Jan-95 02:39	19-Jan-95 03:54
090195	502	19-Jan-95 03:56	20-Jan-95 03:42
090195	503	20-Jan-95 15:56	21-Jan-95 09:18
090195	801	16-Jan-95 13:16	16-Jan-95 23:15
090195	1000	12-Jan-95 05:27	13-Jan-95 03:10
090195	1100	14-Jan-95 01:15	14-Jan-95 19:30
090195	1200	17-Jan-95 05:41	17-Jan-95 11:05
090195	1200	17-Jan-95 11:05	18-Jan-95 04:35
090195	1300	21-Jan-95 20:55	22-Jan-95 05:41
091294	100	30-Nov-94 10:34	02-Dec-94 18:29
091294	200	03-Dec-94 12:24	04-Dec-94 02:15
091294	300	04-Dec-94 18:12	05-Dec-94 06:45
091294	301	05-Dec-94 19:43	06-Dec-94 19:23
091294	400	08-Dec-94 22:27	09-Dec-94 11:04
091294	401	09-Dec-94 19:25	09-Dec-94 22:30
091294	402	16-Dec-94 05:52	16-Dec-94 16:20
091294	500	10-Dec-94 06:09	10-Dec-94 22:50
091294	501	11-Dec-94 01:48	11-Dec-94 11:14
091294	600	12-Dec-94 07:45	12-Dec-94 23:22
091294	601	18-Dec-94 05:29	18-Dec-94 16:07
091294	700	14-Dec-94 07:45	15-Dec-94 14:16
091294	800	17-Dec-94 00:45	17-Dec-94 19:22
091294	900	18-Dec-94 18:39	20-Dec-94 07:49
101295	101	20-Dec-95 00:42	20-Dec-95 22:04
101295	102	22-Dec-95 11:34	23-Dec-95 08:03
101295	103	25-Dec-95 09:05	26-Dec-95 06:58
101295	201	30-Dec-95 01:30	31-Dec-95 03:59
101295	202	02-Jan-96 07:49	03-Jan-96 14:32
101295	301	06-Jan-96 11:41	07-Jan-96 11:59
101295	302	09-Jan-96 12:16	10-Jan-96 16:36
101295	401	14-Jan-96 12:06	15-Jan-96 15:03
101295	501	18-Jan-96 14:02	19-Jan-96 16:05
110693	101	08-Jun-93 16:34	09-Jun-93 00:57
110693	102	09-Jun-93 07:23	11-Jun-93 06:16
110693	201	11-Jun-93 17:52	12-Jun-93 03:02
110693	202	12-Jun-93 09:08	12-Jun-93 20:00
110693	301	15-Jun-93 06:55	15-Jun-93 22:59
110693	401	16-Jun-93 09:09	17-Jun-93 19:38
110693	402	18-Jun-93 03:00	18-Jun-93 14:26
110693	501	19-Jun-93 05:33	20-Jun-93 05:57
110693	502	20-Jun-93 11:43	20-Jun-93 23:40

TimePicks

SurveyNo	StationNo	TraverseNo	Distance	ReducedTTime	NormalizingVelocity
091294	1	500	-58.989	5.201	8
091294	1	500	-58.764	5.161	8
091294	1	500	-58.194	5.105	8
091294	1	500	-57.531	5.028	8
091294	1	500	-56.841	4.962	8
091294	1	500	-56.081	4.885	8
091294	1	500	-55.475	4.875	8
091294	1	500	-54.837	4.847	8
091294	1	500	-53.999	4.790	8
091294	1	500	-53.288	4.753	8
091294	1	500	-52.717	5.893	8
091294	1	500	-52.591	4.740	8
091294	1	500	-52.203	5.885	8
091294	1	500	-51.960	7.905	8
091294	1	500	-51.855	4.723	8
091294	1	500	-51.596	7.860	8
091294	1	500	-51.458	5.870	8
091294	1	500	-51.258	9.361	8
091294	1	500	-51.121	4.727	8
091294	1	500	-50.991	7.801	8
091294	1	500	-50.921	5.843	8
091294	1	500	-50.803	9.267	8
091294	1	500	-50.429	7.717	8
091294	1	500	-50.414	4.709	8
091294	1	500	-50.387	5.750	8
091294	1	500	-50.245	9.122	8
091294	1	500	-49.854	7.612	8
091294	1	500	-49.758	4.694	8
091294	1	500	-49.690	5.662	8
091294	1	500	-49.663	8.997	8
091294	1	500	-49.272	5.633	8
091294	1	500	-49.269	7.501	8
091294	1	500	-49.250	8.864	8
091294	1	500	-49.151	4.671	8
091294	1	500	49.125	4.713	8
091294	1	500	49.547	7.162	8
091294	1	500	49.588	4.736	8
091294	1	500	50.109	4.781	8
091294	1	500	50.460	7.288	8
091294	1	500	50.569	4.799	8
091294	1	500	50.959	4.791	8
091294	1	500	51.339	11.561	8
091294	1	500	51.491	4.782	8

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Structure of SHOTPOS and TIMEZONES tables

ShotPos

SurveyNo	TraverseNo	ShotpointNo	Latitude	Longitude	UTDate	DecSec	WaterDepth	Gravity	Magnetics
110693	100	1000	-35.6676	124.9898	22-Mar-92 12:33:34	56	-123	56	45
110693	100	1001	-35.6690	124.9902	22-Mar-92 12:34:34	22	-121	57	46

TimeZones

TimeZone	UTCorrection
EST	10:00
EST Summer	11:00
SA	09:30
SA Summer	10:30
UT	00:00
WA	08:00
WA Summer	09:00

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Contents of SHOTDIST table (SHOTDISTCONTENTS output)

ShotDistContents

SurveyNumber	StationNo	TraverseNo	MinOfDistance	MaxOfDistance	FirstOfAzimuth	LastOfAzimuth
091294	1	400	105.36	210.95	233.3	255.0
091294	1	401	88.66	107.64	254.0	265.1
091294	1	500	49.25	136.92	225.4	123.2
091294	1	501	134.17	222.32	123.7	132.3
091294	1	700	50.51	314.65	202.9	214.0
091294	2	400	89.21	186.58	237.1	268.4
091294	2	401	77.62	91.00	266.9	282.8
091294	2	500	22.44	136.81	240.2	111.7
091294	2	501	133.89	216.76	111.9	125.4
091294	2	700	23.10	287.27	197.8	214.7
091294	3	500	38.26	93.28	258.0	128.5
091294	3	501	81.05	171.46	129.4	137.5
091294	3	700	73.06	327.95	250.5	223.0
091294	4	500	59.35	100.04	245.8	138.3
091294	4	501	96.22	187.96	139.4	142.0
091294	4	700	82.84	344.07	236.2	220.5
091294	6	500	48.81	164.98	264.0	188.3
091294	6	501	48.76	129.89	191.8	160.3
101295	12	401	35.38	375.96	42.1	5.7
101295	14	401	94.29	442.38	45.5	45.0
101295	15	501	85.58	337.53	331.3	52.7
101295	16	401	59.05	390.85	271.8	231.2
110693	1	701	20.17	175.99	219.2	61.7
110693	1	1001	37.96	254.40	22.6	223.7
110693	3	501	111.99	331.21	267.1	283.5
110693	3	701	136.65	277.18	257.0	340.2
110693	3	801	111.55	175.30	314.4	317.1
110693	3	802	167.61	313.42	317.8	310.6
110693	3	901	266.06	323.96	320.3	327.6
110693	3	902	125.46	323.96	320.3	338.9
110693	5	601	82.21	313.06	325.1	9.6
110693	5	701	125.37	360.21	339.1	29.7
110693	5	1001	129.50	398.08	17.6	302.5
110693	5	1101	98.04	299.01	303.6	311.4

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Contents of TIMEPICKS table (TIMEPICKSCONTENTS output)

TimePicksContents

SurveyNo	StationNo	TraverseNo	MinOfDistance	MaxOfDistance
91294	1	500	-58.99	142.91
91294	1	700	51.92	166.63
91294	2	500	-33.80	146.92
91294	2	700	23.12	199.86
91294	3	500	-93.26	111.84
91294	3	700	73.07	191.67
91294	4	700	82.84	239.01
91294	6	900	47.14	227.41
110693	5	601	93.61	292.02
110693	5	701	125.32	300.43
110693	5	1001	129.42	372.35
110693	5	1101	97.97	293.94

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APPENDIX 4

WIDE-ANGLE SEISMIC PROFILING DATABASE: ARCHIVAL STRUCTURE FOR OTWAY BASIN 1994/95 PHASE I REFRACTION SURVEY

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DIRECTORY PATH: L:\SEISMIC\OTWAY137

REPORT.DOC: Operational Report for the Otway Basin 1994/95 Refraction Survey (Finlayson and others, 1995)

OTWAY137.XLS: Spreadsheet containing basic survey parameters, eg. station positions and operating times, traverse information, analog recorder clock drifts. Both phases of the survey (December 1995 and January 1996 are covered).

STATUS.XLS: Spreadsheet containing current status of analog to digital conversion of December 1995 refraction data.

FLOWCHTS.XLS: Spreadsheet showing processing stream used for the Otway 1995 data (includes the names of Fortran programs and examples of generated files).

All the digitised shot data reside in the **ARCHIVE** directory.

STATION NUMBERS, NAMES AND ABBREVIATIONS

STATION NO.	STATION NAME	STATION ABBREVIATION
1	Milltown	mi
2	Gorae	go
3	Riddles Road	rr
4	Red Lane 1	la
6	Ewen Hill	ew

Data Sets are grouped in Station-Traverse Subdirectories, eg. digitised files from Station 1 are located in mi*** subdirectory, where *** is the Traverse Number. Shotpoint files are stored in a compressed form (*.zip file(s), eg. mi500.zip for Station 1, Line 500). Upon decompression, the files are grouped in subdirectories containing approx. 2,000 shots at a time (A, B, C, etc..). These files have been corrected for the station clock drift by program TRUETIM3. The original PDP11 files are kept in PDP11 Subdirectory, all in one compressed file (eg. mi500raw.zip for Station 1, Line 500). Zipped file includes data in original PDP11 format as well as PC reformatted version (character "n" in second letter of the file prefix). Drifts Subdirectory contains list of shot file names used by TRUETIM3 for clock corrections. Additional Subdirectory Cfcorr contains a list of the old tape speed correction factors from the shot headers (which have been averaged to improve record section plots).

It is noted here that most of the archived files are NOT corrected for the variable playback tape speed (sampling interval). CORRFAC must therefore be run on the cracked files prior to plotting (existance of Cfcorr subdirectory means that the archived data has been corrected). Also, due to error in reading the GPS clock on board of "Rig Seismic", 903ms must be SUBTRACTED from the shot times in the headers (alternatively, 903ms must be ADDED to the picks after processing). Corrected picks are stored in the MODEL directory (additional "c" is added to the pick file name).

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BATHYM directory contains plots of water depth along the specific traverses and original ascii data from "Rig Seismic" for all the lines.

GRAVITY directory stores scanned images of the gravity field in the offshore Otway Basin.

PLOTS directory containes seismic record sections in the *.TIFF format (used for publication purposes).

SHOTS directory contains original "Rig Seismic" files giving positions and Julian Day times of the shots (note the earlier mentioned 903ms problem).

STATIONS directory contains station position file (STATIONS.POS) and clock drift file for the recorders (Drifts subdirectory). Individual station subdirectories contain PDP11 distance files and Excel® files containing shot files corrected for local time (e.g. daylight saving) and for errors due to incorrect dip-switch settings on the Omega radio time signal receivers.

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APPENDIX 5

WIDE-ANGLE SEISMIC PROFILING DATABASE: ARCHIVAL STRUCTURE FOR BROWSE BASIN 1993 REFRACTION SURVEY

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DIRECTORY PATH: L:\SEISMIC\NWSHELF\BRWSE119

REPORT.DOC: Operational Report for the Browse Basin 1993 Refraction Survey (Collins and others, 1995).

STATUS.XLS: Spreadsheet containing current status of analog to digital conversion of June 1993 refraction data.

FLOWCHTS.XLS: Spreadsheet showing processing stream used for the Browse 1993 data (includes the names of Fortran programs and examples of generated files).

All the digitised shot data resides in the **ARCHIVE** directory.

STATION NUMBERS, NAMES AND ABBREVIATIONS

STATION NO	STATION NAME	STATION ABBREVIATION
1	Browse Is	br
2	Bigge Is	bi
3	Lamarck Is	la
4	Mitchell Plateau	mp
5	Cape Leveque	cl

Data Sets are grouped in Station-Traverse Subdirectories, eg. digitised files from Station 1 are located in br*** subdirectory, where *** is the Traverse Number. Shotpoint files are stored in a compressed form (*.zip file, eg. br1001.zip for Station 1, Line 1001). These files are stored in an uncracked form i.e. in large multi-shot files (as opposed to Otway Basin Phase I December 1993 survey).

These files have been corrected for the station clock drift by program NEWTIME. The original PDP11 files are kept in PDP11 Subdirectory, all in one compressed file (eg. br1001raw.zip for Station 1, Line 1001). Zipped file includes data in original PDP11 format. Drifts Subdirectory contains a list of shot file names used by NEWTIME for clock corrections. Subdirectory Cfcorr contains a list of the old tape speed correction factors from the shot headers (which have been averaged to improve record section plots).

Record section time picks are stored in the MODEL directory.

BATHYM directory contains plots of water depth along the specific traverses.

SHOTS directory contains a zipped file SHOTS.ZIP with original "Rig Seismic" files giving positions and Julian Day times of the shots (all lines) and merged shot files for individual traverses (used by program DISTANCE).

STATIONS directory contains station position file (STATIONS.POS). ShipClok subdirectory contains drift files for the GED clock used on board of "Rig Seismic". Individual station subdirectories contain PDP11 distance files and station drift files in Drift subdirectory. Net station

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clock error has been interpolated using ship clock errors and analog recorder clock errors, final files have the format NETERR**.TXT, where ** is the station number. Spreadsheets contain drift plots for the recorder clocks.

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