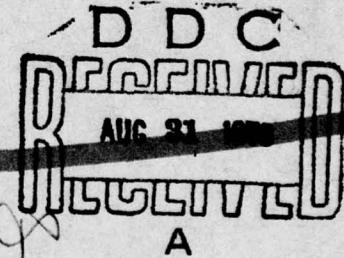DIGITIZED NAVIGATION, DEPTH AND MAGNETIC DATA

FROM SCRIPPS CRUISES PROCESSED THROUGH 1977

LEVEL II

SIO REFERENCE SERIES

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By

S. M. Smith, U. G. Albright, V. W. Psaropulos, G. Papadopoulos, L, Hydock

SIO Geological Data Center

June 1978   Reference 78-15

University of California   Scripps Institution of Oceanography

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The SIO

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Geological Data Center (GDC) coordinates underway data collection; processes the digital nagivation, depth and magnetics; and produces cruises reports and computer generated plots for archiving and distribution. The data center also archives, microfilms, and indexes seismic profiler (airgun), echosounder and magnetometer records. (Gravity data are archived and processed separtely under the direction of LeRoy M. Dorman.)

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DIGITIZED NAVIGATION, DEPTH AND MAGNETIC DATA
FROM SCRIPPS CRUISES PROCESSED THROUGH 1977.

By

S. M. Smith, U. G. Albright, V. W. Psaropulos, G. Papadopoulos & L. Hydock

SIO Geological Data Center

TABLE OF CONTENTS

1.0   INTRODUCTION

The Geological Data Center (GDC) coordinates underway data collection; processes the digital navigation, depth and magnetics; and produces cruise reports and computer generated plots for archiving and distribution. The data center also archives, micro-films, and indexes seismic profiler (airgun), echosounder and magnetometer records. (Gravity data are archived and processed separately under the direction of LeRoy M. Dorman.)

The report on the digitized depth and magnetic data includes a cruise leg index; track charts labeled with the cruise identi-fiers; descriptions of the standard forms of output; and information about formats and obtaining digital data. It is essentially an updated version of the SIO Reference Report 76-4 issued in 1976.

Between 1976 when the last general index report was issued and December 1977, the cutoff date for this report, 33 legs of current Scripps cruises and 13 legs of Glomar Challenger (Deepsea Drilling Project) have been processed by the data center. Navi-gation, but no depth and magnetics, has also been processed for the early legs 4 through 12 of the Challenger. (Navigation = 193,734 miles; magnetics = 131,515 miles; and depth = 131,862 miles.)

The total amounts in the SIO digital underway data bank are now:

        Navigation = 1,238,634 miles
        Magnetics = 1,125,415 miles
        Depth   = 1,063,262 miles

2.0   DATA COVERAGE

2.1 SIO Data - A world track chart of Scripps cruises with digitized depth or magnetic data is shown in Figure 1. Navigation and magnetics have been digitized for essentially all the SIO cruises which collected magnetic data from 1960 through 1977. Depths are also digitized for all cruises except for some of the older cruises prior to the mid-1960's. The Deep Sea Drilling Project (DSDP) cruises of the Glomar Challenger are complete between legs 15 and 56. Depth and magnetics have been done for portions of DSDP legs 7, 8 and 9; magnetics for leg 12; and depth and magnetics provided by Lamont Geological Observatory for legs 13 and 14. Digital navigation is also available for DSDP legs 4 through 12.

2.2 Non-SIO Data - Data from a dozen cruise legs collected on non-SIO ships but processed by our group are included in the index and incorporated in the SIO data base. In addition, the data center is archiving an increasing volume of digitized data collected by other institutions in response to requests made by SIO staff for data in specific areas. Most of these data are in the merge format of the National Geophysical and Solar-Terrestrial Data Center (Boulder, Colorado) (the NGDC "merge-merge" format). These data are not indexed in this report, but individual track plots of each cruise or data set at a scale of 0.16 inches/degree longitude (the data center's "world" scale) and a world-wide composite index are available for inspection at the data center.

SCRIPPS CRUISES WITH
DIGITIZED DEPTH OR MAGNETIC DATA

Processed Through December 1977

Geological Data Center
Scripps Institution of Oceanography
La Jolla, CA 92093

Figure 1
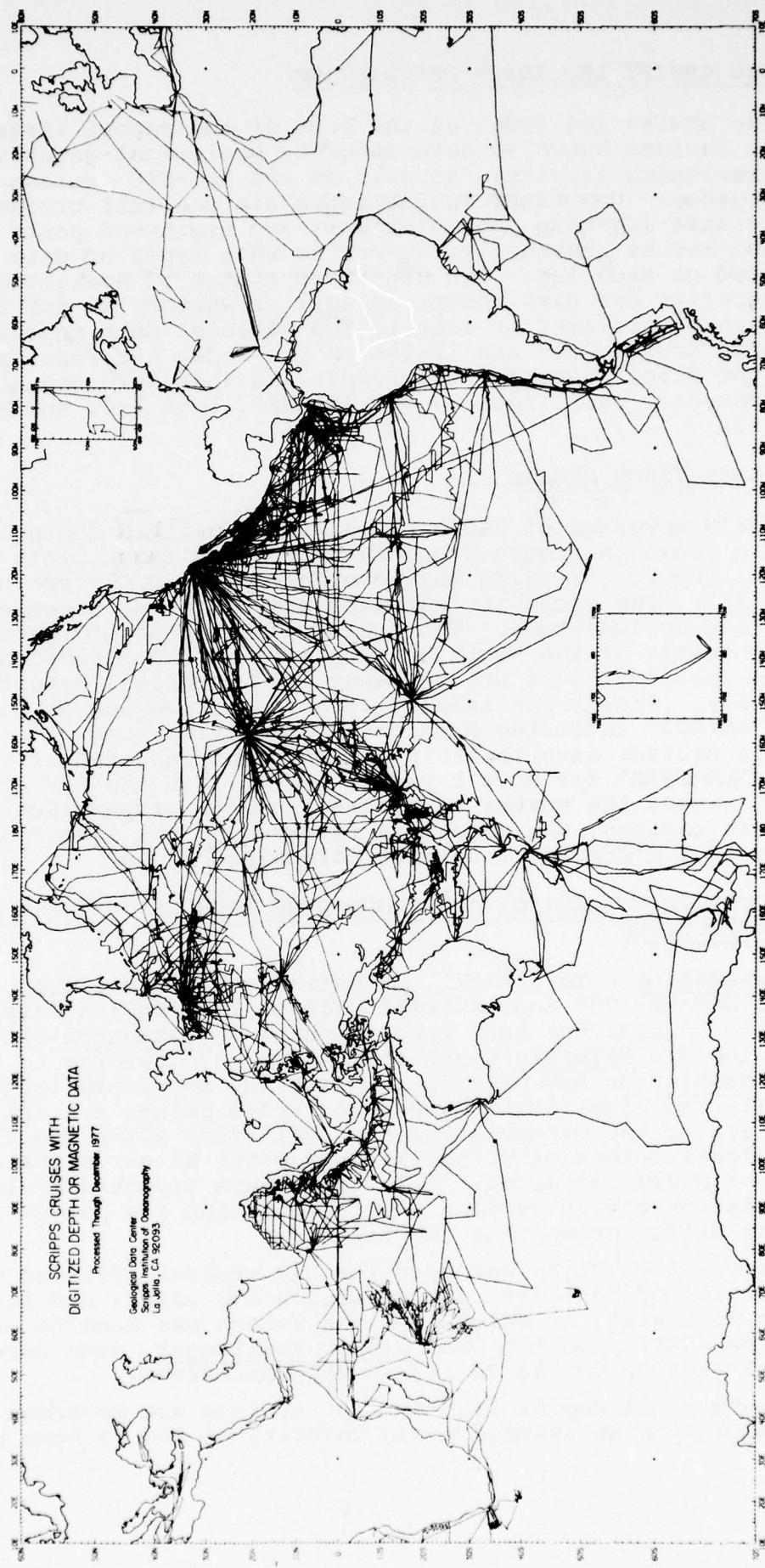
3.0 SIO CRUISE LEG INDEX DESCRIPTION

The cruise leg index at the back of the report lists all Scripps cruises known to have underway geological-geophysical data (including gravity), as well as the non-SIO cruises digitized by our group. Contained in the index are the full cruise name and ship; cruise-leg-ship abbreviations; and begin-end ports and dates. A symbol key is provided to determine what types of data were collected on each leg. The digitized status of navigation, depth and magnetics are also shown, as well as whether or not the data have been microfilmed or sent to the national data center. The following cruise legs are listed in the index but were processed after the cutoff date for the report and therefore are not on the track charts: DSDP, legs 57-59; INDOMED, legs 1-6; and GUAYMAS, legs 1-3.

4.0 INDEX TRACK CHARTS

World coverage of SIO cruises with digitized depth or magnetic data are shown in Figure 1 and on four index track plots accompanying this report (or which may be ordered from GDC - see back page of report). The plots are Mercator projection at a scale of 0.312 inches/degree longitude. The scale matches that of the two topographic charts of the North and South Pacific published by the Scripps Institution of Oceanography (IMR Technical Reports TR-17 and TR-56). Tracks are labeled with the cruise-leg abbreviation (e.g. "AMPHO3" indicates Amphitrite Expedition, Leg 3). A few two-ship cruises have the ship abbreviation included as well (e.g. "NOVAO7AR" for Nova Expedition, Leg 7 on the R/V Argo). In several areas, the number of tracks prevents proper identification. For these regions, the reader is referred to the larger plots at a scale of 1.2"/degree longitude maintained by GDC.

5.0 NOTES ON COLLECTION AND PROCESSING METHODS, UNITS & APPLIED CORRECTIONS

5.1 Navigation - In general, celestial control was used on all cruises before 1968 and is still used on the smaller ships. Satellite control has been used on the R/V Washington since 1968 and on the R/V Melville since it was put into service in 1970. On the Washington and Melville, course and speed are logged automatically and significant course and speed points are extracted from a log of two minute averages. All other ships use the conventional method of establishing a point at an indicated change of course or speed. All tracks were smoothed by linear interpolation and correction of drift between fix pairs, assuming constant drift between the two fixes.

5.2 Time - Local time was used for all cruises prior to the introduction of satellite navigation on SIO ships, and for several cruises following, at which time the switch was made to Greenwich Mean Time (GMT). On the DSDP Glomar Challenger, data were recorded in local time up to leg 22 and in GMT thereafter.

5.3 Depth - All depths from Scripps cruises are recorded in units of fathoms with an assumed sound velocity of 800 fathoms per second.

Prior to leg 45 of Glomar Challenger (DSDP), depths were recorded in the same units. From leg 45 to the present, depths are in meters with an assumed velocity of 1500 m/second. No Matthews Table, tidal or transducer depth corrections have been applied (transducer depth on Scripps ships ranges from 2 to 4 fathoms). The digitizing interval ranges between 1 and 6 minutes of ship time. Prior to 1967, the interval was 3 or 6 minutes and has usually been 5 minutes since then.

5.4 Magnetics - All magnetic values are in units of gamma with no corrections for diurnal variations. Magnetic anomalies were calculated by removing the regional field using IGRF 1965.0 for cruises processed prior to mid-1977 (through INDOPAC expedition and DSDP leg 53). IGRF 1975.0 has been used subsequently. For data stored in the CDC 3600 computer system, the field is calculated at points no farther apart than 500 miles along the track or when the course changes by 50 degrees, and a linear interpolation applied to the points between. Before 1967, most magnetics were digitized at 6 minute intervals. Since then, the digitizing interval has been 5 minutes to match the depth interval. There has, however, been an intermittent and recurring problem of digitizing time offset from the even 5 minutes for magnetics logged through the automatic logging systems on the two ships, Washington and Melville (e.g. values were logged at 02, 07, 12 minutes, etc., instead of 00, 05, 10). This time offset should be taken into account by those wishing to merge the magnetics with the depths.

6.0 DATA DISTRIBUTION POLICY

The following is a summary of the data distribution policy established by the Geologic Data Center Steering Committee. Questions regarding these policies should be directed to the committee chairman, who may be contacted through the data center.

Underway data, except navigation, may be declared proprietary by a cruise leg chief scientist who may restrict its distribution for one year. After one year, the data will normally become available to others at Scripps, and at the end of two years will be sent to the national data center to be made available to anyone. Data not declared proprietary will be held for institution use for a total of two years. These are general guidelines only, and the steering committee considers exceptions on a case-by-case basis. Users who request data that is on "hold" will be referred to the steering committee or chief scientist by the data center staff, who maintain lists of current "hold" cruises.

Data from Glomar Challenger is declared proprietary by the Deep Sea Drilling Project for 12 months after each leg and is then sent to the national data center. Challenger records and plots are archived by DSDP (Barbara Long, Science Information Facility, Deep Sea Drilling Project, Scripps Institution of Oceanography, La Jolla, CA. 92093. Phone: (714) 452-3506).

Non-Scripps users requesting digital data will be referred to

the national data center if the data in question has previously
been sent to that facility. (Contact Marine Geology and Geophysics
Branch, National Geophysical and Solar-Terrestrial Data Center,
Code D621, Boulder, CO. 80302. Phone: (303) 499-1000, ext. 6338).

7.0 STANDARD FORMS OF OUTPUT - PLOTS AND LISTINGS

Beginning in January 1972, the forms of output given below
have been generated for each leg of major cruises on the two
ships having shipboard computers (R/V Washington and Melville)
and for geological/geophysical expeditions on smaller vessels.
These data are normally processed within one or two months after
the end of each cruise leg.

7.1 Standard Reports, Plotted Output and Listings - For information
on the availability and costs of reproduction of data in the
following forms, contact S.M. Smith, Curator, Geological Data
Center, (A-023), Scripps Institution of Oceanography, La Jolla,
California 92093 (Telephone (714) 452-2752).

A) "Informal Cruise Report and Index of Navigation, Depth,
    and Subbottom Profile Data", which contains:

   a) Index Chart - gives track of cruise leg and
       boundaries of depth compilation plots (see below).

   b) Track Charts - annotated with dates and hour
       ticks (scale = 0.312"/degree longitude).

   c) Profiles - depth and magnetic anomaly vs. distance.
       Dates and positions of major course changes
       (greater than 30 degrees) are annotated. Sections
       of track having subbottom profile (airgun) records
       have a solid black line along the bottom of the
       profile.

B) Navigation Plots - Annotated with date and hour ticks.
    Scale is 1.2"/degree longitude.

C) Navigation listing of times and positions of course
    and speed changes, fixes and drift velocity.

D) Depth compilation plots - depths printed along the
    track in fathoms (assumed sound velocity of 800 fm./sec.)
    at approximately 1 mile spacing, plotted at 4"/degree
    with standard Defence Mapping Agency BC series bound-
    aries. Depths from leg 45 and later of DSDP Challenger
    are plotted in meters (1500 m/sec. velocity).

E) Plots of magnetic anomaly profiles along track -
    map scale = 1.2"/degree; anomaly scale between 15 N
    and 15 S latitude = 500 gamma/inch; anomaly scale
    north of 15 N and south of 15 S = 1000 gamma/inch,
    from values retrieved at approximately 1 mile spacing
    and regional field removed using the IGRF 1965.0 or
    IGRF 1975.0 (see section 5.4).

7.2 Special Plots - Mercator projection plots can be generated with
chart scales and parameters for printing or profiling magnetic and

-4-

depth values different from those provided as standard output. A document, "User's Guide for Depth, Magnetic and Track Plotting Programs for the CDC 3600 Computer", which describes the detailed input specifications, is available from the GDC.

Track plots and compilation plots (depth, magnetic or gravity values printed, not profiled, along the track) can also be made from the non-SIO data in the NGDC "merge-merge" format.

7.3 S.I.O. Sample Index - The SIO Sample Index is a listing that contains the beginning and end times and positions of all underway records and other geological, biological and physical oceanographic samples collected on SIO cruises. The index contains no results, but a disposition code indicates who to contact for further information about a particular item. Contact the Geological Data Center for details.

8.0 DIGITAL DATA FORMATS

The tape format used for storing depth and magnetic data in the SIO underway data base is highly machine and installation dependent and was designed specifically for optimum storage and retrieval on the CDC 3600 computer located at the UCSD Computer Center. Over the past few years, several alternative formats have been devised to transmit data to government agencies and other institutions. Because it is not feasible to re-process all the data into a single exchange format, a given cruise may exist in one or more of the exchange formats, depending on the age of the cruise and when it was processed. These exchange formats are outlined below and described in the appendices. Contact GDC about which formats are available for a specific cruise.

8.1 Card Formats - in time series (not recommended for large volume data transfers).

    8.1.1 Cruises prior to 1969 are in miscellaneous x-y digitizer formats.

    8.1.2 Post-1969 Cruises
    "SIO2 Navigation Format (see Appendix I)
    "SIO2 Depth and Magnetics" Format (see Appendix II).

8.2 Tape Formats

    8.2.1 Time Series - available for all cruises processed through 1975.

        8.2.1.1 "Time in Accumulated minutes vs. Navigation" Format (see Appendix III).
        8.2.1.2 "Time in Accumulated minutes vs. Depth or Magnetic Total Field" (see Appendix IV).

    8.2.2 "NAS Navigation" Format - the standard National Geophysical Data Center format, with time in hour, minute, day, month and year. Available for cruises after 1972 (see Appendix V).

    8.2.3 Merge Formats - time and position vs. depth and/or magnetics.

8.2.3.1 "NGDC Merge-Merge" Format. The standard NGDC merge format, combining time, position, course, speed, depth, magnetics and gravity. Available for cruises after 1972 (see Appendix VI).

8.2.3.2 "SIO Modified Merge" Format. Time, position and one of three variables of depth, magnetic total field or magnetic anomaly. Developed to send SIO "historical" (pre-1973) data to NGDC. Will not be maintained for post-1972 data (see Appendix VII).

Note: As of April 1978, the new exchange format sponsored by NGDC, identified as "MGD77" has not been implemented at Scripps.

9.0 ACKNOWLEDGMENTS

```
*****************************
*                           *
*      S.I.O.  CRUISES       *
*                           *
*   WITH  UNDERWAY  DATA     *
*                           *
*   (DEPTH, MAGNETICS, )     *
*   (SUBBOTTOM PROFILER)     *
*   (    AND GRAVITY    )    *
*                           *
*****************************
```

*** VERSION AS OF APRIL 1978 ***

COMPILED BY

GEOLOGICAL DATA CENTER

SCRIPPS INSTITUTION
OF OCEANOGRAPHY
LA JOLLA, CA. 92093

                    SYMBOL KEY

+   DIGITIZING DONE OR RECORDS AT DATA CENTER
O   NOT DONE OR NOT ARCHIVED
/   PART DONE OR PART HERE
M   RECORDS OR NAVIGATION ON MICROFILM
-   NOT GOING TO BE DONE
(BLANK)   STATUS UNKNOWN
E   EDO DEPTH RECORD (PRE-1958 CRUISES)
P   PRECISION DEPTH RECORD (PDR,GDR)
(S.I.) SAMPLE INDEX AVAILABLE
*   SENT TO NATIONAL GEOPHYSICAL DATA CENTER

NOTES
-----

1) THIS LIST CONTAINS ALL SIO CRUISES KNOWN TO HAVE COLLECTED UNDERWAY DATA.
   PLEASE BRING ERRORS OR OMISSIONS TO OUR ATTENTION.

2) CONTACT THE GEOLOGICAL DATA CENTER, ROOM 1314 OLD RITTER HALL, PHONE
   (714)452-2752, REGARDING ORIGINAL DEPTH, MAGNETIC AND PROFILER RECORDS,
   INDEX PLOTS, MICROFILMS, REPRODUCTIONS OF PROFILER RECORDS, DIGITAL
   DATA AND PROCESSING, INFORMAL CRUISE REPORTS, (FOR CRUISES AFTER 1971)
   AND COMPUTER GENERATED PLOTS.

3) GRAVITY DATA ARE COLLECTED AND SELECTIVELY PROCESSED UNDER DIRECTION OF
   L.M. DORMAN (PHONE 452-2406).   (STATUS OF GRAVITY SHOWN ONLY FOR
   POST-1971 CRUISES.)

4) DATA FROM THE DEEPSEA DRILLING PROJECT CRUISE OF D/V GLOMAR CHALLENGER
   ARE PROCESSED BY THE DATA CENTER AND ARCHIVED AT DSDP, SIO (CONTACT
   B. LONG, ROOM 8, DSDP BUILDING, PHONE 452-3506).

5) CRUISE LEGS WITH DIGITAL DATA HAVE 8 CHARACTER IDENTIFIER.
   CRUISE ABBREV.=4 CHAR.,LEG=2 CHAR.,SHIP ABBREV.=2 CHAR.
   SINGLE LEG CRUISES HAVE LEG IDENTIFIER OF '-1' INSTEAD OF '01'.

```
                         NAV DEPTH MAG   SUB   GRAV

                          D  1 D     D 3 P     P
                       P  I  2 I     I . R     R
                       L  G    G   R G 5 D   R D
    ID.   CRUISE NAME - SHIP    O  I  K I   E I K F   F C   BEGIN    END
    NUM   LEG - PORTS           T  T  H T   C T H L   C S   DATE     DATE
```

ID NUM	CRUISE NAME – SHIP / LEG – PORTS	PLOT	DIGIT	12KHT	DIGIT	DIREC	DIGIT	PROFL	3.5KHL	PROC	PROCS	BEGIN DATE	END DATE
040	ACAPULCO TRENCH-BAIRD(SEE 046)												
092	ACAPULCO GEOLOGICAL EXPED (AGE)	+		P	O	0	–	0	0			11SEP56	8NOV56
119	AGASSIZ 69/06/1	0	0	0	0	0	0	+	M			19JUN69	29JUN69
011	AMPHITRITE-ARGO												
	AMPHO1AR SAN DIEGO-PAPEETE,TAHI.	+	+*	M	+*	+	+*	0	0			03DEC63	06JAN64
	AMPHO2AR PAPEETE-PAGO PAGO,SAMOA	+	+*	P	+*	+	+*	0	0			09JAN64	23JAN64
	AMPHO3AR PAGO PAGO-SAN DIEGO	+	+*	P	+*	+	+*	0	0			27JAN64	29FEB64
125	ANTIPODE-MELVILLE (S.I.) FOR LEGS 16 AND 17 ONLY												
	ANTPO1MV SAN DIEGO-SAN FRANCISCO	+	+*	P	O	+	+*	+	M			16JUN70	29JUN70
	ANTPO2MV SAN FRANCISCO-ADAK,ALA.	+	+*	P	+*	+	+*	+	M			03JUL70	22JUL70
	ANTPO3MV ADAK,ALASKA-TOKYO,JAPAN	+	+*	P	+*	+	+*	+	M			25JUL70	20AUG70
	ANTPO4MV TOKYO,JAPAN-MANILA	+	+*	O	+*	+	+*	M	M			28AUG70	18SEP70
	ANTPO5MV MANILA-MAURITIUS	+	+*	P	+*	+	+*	+	M			24SEP70	17OCT70
	ANTPO6MV MAURITIUS-MAURITIUS	+	+	P	O	+	+	+	+			26OCT70	24NOV70
	ANTPO7MV MAURITIUS-MAURITIUS	+	+	P	O	+	+	+	+			27NOV70	16DEC70
	ANTPO8MV MAURITIUS-MOMBASA	+	+	P	O	+	+	+	+			07JAN71	16FEB71
	ANTPO9MV MOMBASA-MOMBASA	+	+*	O	+*	+	+*	+	M			21FEB71	15MAR71
	ANTP10MV MOMBASA-COLOMBO	+	+*	P	+*	+	+*	+	M			18MAR71	04APR71
	ANTP11MV COLOMBO-PADANG	+	+*	O	+*	+	+*	+	M			15APR71	02MAY71
	ANTP12MV PADANG-SINGAPORE	+	+*	O	+*	+	+*	+	M			26MAY71	17JUN71
	ANTP13MV SINGAPORE-GUAM	+	+*	O	+*	+	+*	M	M			25JUN71	16JUL71
	ANTP14MV GUAM-PAGO PAGO	+	+*	O	+*	+	+*	+	M			27JUL71	08AUG71
	ANTP15MV PAGO PAGO-TONGA	0	0	P	+	0	0	+	0			13AUG71	24AUG71
	ANTP16MV TONGA-PAGO PAGO	+	+*	P	+*	+	+*	+	M			26AUG71	09SEP71
	ANTP17MV PAGO PAGO-SAN DIEGO	+	+*	O	+*	+	+*	M	M			11SEP71	03OCT71
112	APHRODITE - E.B.SCRIPPS												
	APRO-1EB	+	+*	P	+*	+	+*	0	0			14JUL68	20JUL68
041	ARGO SHAKEDOWN	+	0	P	O	+	0	0	+			21JUL61	01AUG61
166	ARGO 3-65-ARGO	+	0	P	O	0	0	0	+			03MAR70	05APR70
160	ARGUELLO-BAIRD	+	0	0	0	0	0	0	+			16MAR57	26MAR57
129	ARIES-T.WASHINGTON												
	ARES1AWT SAN DIEGO-EASTER IS.	+	+*	P	+*	+	+*	+	M			15NOV70	02DEC70
	ARES1BWT EASTER IS.-PAPEETE	+	+*	P	+*	+	+*	+	M			04DEC70	22DEC70
	ARES1CWT PAPEETE-WELLINGTON,N.Z.	+	+*	P	+*	+	+*	+	O			26DEC70	04JAN71
	ARESO2WT WELLINGTON-WELLINGTON	0	+*	P	+*	+	+*	+	M			07JAN71	21FEB71
	ARESO3WT WELLINGTON-TAHITI	0	+	/	0	/	0	+	+			01MAR71	27MAR71
	ARESO4WT TAHITI-HONOLULU	0	+*	P	+*	+	+*	+	O			01APR71	29APR71
	ARESO5WT HONOLULU-TOKYO,JAPAN	0	+*	P	+*	+	+*	+	M			06MAY71	06JUN71
	ARESO6WT TOKYO-YOKOHAMA,JAPAN	0	+*	P	+*	+	+*	+	O			12JUN71	27JUL71
	ARESO7WT YUKOHAMA,JAPAN-HONOLULU	+	+*	P	+*	+	+*	+	M			27JUL71	30AUG71
	ARESO8WT HONOLULU-HONOLULU	+	0	P	O	+	0	+	0			04SEP71	19SEP71
	ARESO9WT HONOLULU-SAN DIEGO	+	0	0	0	+	0	0	0			22SEP71	14OCT71
136	BAJA 69-0CONOSTOTA												
	BJ69-1OT	0	+				+*	0	+			08FEB69	FEB69
094	BAJA SLOPE-BAIRD	0	0	P	0	0	–	0	0			28APR61	07MAY61
137	BENTHYFACE-MELVILLE (S.I.)												
	BNFCO1MV SAN DIEGO-MANZANILLO	+	+*	P	+*	+	+*	0	0	0	0	21MAY73	03JUN73
	BNFCO2MV MANZANILLO-SAN DIEGO	+	+*	P	+*	+	+*	0	M	0	0	06JUN73	07JUL73

```
                              NAV DEPTH MAG   SUB   GRAV

                           D  1 D     D   3 P    P
                        P  I  2 I     I   . R    R
                        L  G    G     R G 5 0    R O
ID.   CRUISE NAME - SHIP   O  I  K I   E I K F   E C   BEGIN    END
NUM   LEG - PORTS          T  T  H T   C T H L   C S   DATE     DATE
------------------------------------------------------------------------

045 BILLABONG-ALPHA HELIX        + 0   0 0   0 0   0 0           19MAR66 22NOV66
085 BLUE FLASH-H M SMITH         + 0   P 0   0 -   0 M           13MAY63 23MAY63
145 BODEGA -BAIRD                                  M            17NOV63 25NOV63
152 BOMDROP(MN7503KK)-KANA KEOKI (S.I.)
    MN7503KK HONOLULU-HONOLULU   + +*  0 0*  0 0*  + 0   0 0  21NOV75  9DEC75
043 BUNACCA-BAIRD                + 0   P 0   0 -   0 M           26JUL63 13SEP63
163 BONGO TWO-MELVILLE           + 0   0 0   0 0   0 +           25MAR70 29MAR70
037 CAPRICORN-BAIRD              + 0   E -   0 -   0 0           27OCT52 21FEB53
044 CAPRICORN-HORIZON
    CAPH-AHO                     + +   E -   +     0 0           26SEP52 07DEC52
    CAPH-BHO                     + +*  E -   + +*  0 0           04JAN53 23JAN53
    CAPH-CHO                     + +*  E -   + +*  0 0           26JAN53 20FEB53
023 CARROUSEL-BAIRD
    CARRO1BD SAN DIEGO-VALPARAISO,CH + +*  M +*  + +*  0 +       13JUN64 14JUL64
    CARRO2BD VALPARAISO-SAN DIEGO    + +*  M +*  + +*  0 +       20JUL64 18AUG64
101 CASCADIA                     + 0   E -   0 -   0 0           15SEP52 25SEP52
133 CATO-MELVILLE (S.I.)
    CATO01MV SAN DIEGO-HONOLULU,HAWA + +*  M +*  + +*  0 0   0 0 07JUN72 05JUL72
    CATO02MV HONOLULU-PAPEETE,TAHITI + +*  M +*  + +*  0 0   0 0 10JUL72 10AUG72
    CATO03MV PAPEETE-PAPEETE,TAHITI  + +*  M +*  + +*  M M   0 0 14AUG72 08SEP72
    CATO04MV PAPEETE-VALPARAISO,CHIL + +*  M +*  + +*  M M   0 0 13SEP72 04OCT72
    CATO05MV VALPARAISO-RIO,BRAZIL   + +*  M +*  + +*  M M   0 0 11OCT72 03NOV72
    CATO06MV RIO,BRAZIL-RIO,BRAZIL   + +*  M +*  + +*  M M   0 0 07NOV72 16DEC72
    CATO07MV RIO,BRA-CRISTOBAL,C.Z.  + +*  M +*  + +*  M M   0 0 20DEC72 13JAN73
    CATO08MV BALBOA,C.Z.-SAN DIEGO   + +*  M +*  + +*  M M   0 0 19JAN73 14FEB73
102 CEDROS DEEP-BAIRD                    E 0   0 -   0 0         21JUL52 01AUG52
146 CHANEEL-OCONOSTOTA
    CHNL010T SAN DIEGO-EUREKA                          M        22AUG68 25AUG68
    CHNL020T EUREKA-SAN FRANCISCO                      M        26AUG68 27AUG68
    CHNL030T SAN FRANCISCO-SAN FRAN      + 0                    28AUG68  6SEP68
    CHNL040T SAN FRANCISCO-SAN DIEGO     + 0           M        18SEP68 25SEP68
020 CHINOOK-BAIRD
    CHINO1BD SAN DIEGO-ADAK,ALASKA   +*  P /*       0 0         29JUN56 22JUL56
        (DIGITAL DEPTH TAPE ID='CHIN-A')
    CHINO2BD ADAK-HONOLULU               P          0 0         25JUL56 12AUG56
    CHINO3BD HONOLULU-SAN DIEGO      +*  P /*       0 0         14AUG56 23AUG56
        (DIGITAL DEPTH TAPE ID='CHIN-B')
019 CHINOOK-STRANGER
    CHIN-1ST SAN DIEGO-HONOLULU      +*  P /*                   29JUN56 12AUG56
046 CHUBASCO-BAIRD                       E -   0 -   0 0         12OCT54 20DEC54
047 CHUBASCO-HORIZON                     E -   0 -   0 0          9NOV54 20DEC54
048 CIRCE-ARGO
    CIRCO1AR SAN DIEGO-HONOLULU      +          +     + M       07MAR68 17MAR68
    CIRCO2AR HONOLULU-PENANG         + +*  P +*  + +*  + M       31MAR68 29APR68
    CIRCO3AR PENANG-COLOMBO          +          + +*   M        03MAY68 02JUN68
    CIRCO4AR COLOMBO-COLOMBO         +          + +*   M        06JUN68 28JUN68
    CIRCO5AR COLOMBO-MAURITIUS       +      + +*  + +*  M        02JUL68 31JUL68
    CIRCO6AR MAURITIUS-MAURITIUS     +          + +*            04AUG68 01SEP68
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                          NAV DEPTH MAG   SUB   GRAV

                           D  1 U        D  3 P    P
                         P I  2 I      .I  . R    R
                         L G    G     R G  5 O    R O
   ID.   CRUISE NAME - SHIP     O I  K I  E I  K F  E C  BEGIN    END
   NUM   LEG - PORTS            T T  H T  C T  H L  C S  DATE     DATE
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      CIRCO7AR MAURITIUS-LOURENCO,MARQ   +        + +*            05SEP68 03OCT68
      CIRCO8AR LOURENCO,MARQUES-LUANDA + +* P +* + +* + M         09OCT68 05NOV68
      CIRCO9AR LUANDA-FORTALEZA         + +* P +* + +* + M         09NOV68 03DEC68
      CIRC10AR FORTALEZA-CRISTOBAL                         M       06DEC68 23DEC68
      CIRC11AR CRISTOBAL-CRISTOBAL           .             M       03JAN69 18JAN69
      CIRC12AR CRISTOBAL-SAN DIEGO               +         M       19JAN69 30JAN69
  144 CUCOTOW-MELVILLE  (S.I.)
      CCTW-TMV SAN DIEGO-SAN DIEGO      0 +* M 0  0 0  M M  0 0 19AUG74 22AUG74
      CCTW01MV SAN DIEGO-ACAPULCO       + +* P +* + +* M 0  0 0 26AUG74 20SEP74
      CCTW02MV ACAPULCO-BALBOA,C.Z.     + +* P +* + +* M M  0 0 25SEP74 18OCT74
      CCTW03MV BALBOA-BALBOA,C.Z.       + +* P +* + +* + M  0 0 22OCT74 16NOV74
      CCTW04MV BALBOA-SAN DIEGO         + +* M +* + +* M M  0 0 20NOV74 18DEC74
  049 COSTA RICA DOME-BAIRD            + 0 P 0  0 -  0 0       6NOV59  7DEC59
  025 CRISSCROSS-BAIRD
      CRCS01SB SAN DIEGO-BALBOA,C.Z.    + +* P +* + +* 0 0    21FEB63 10MAR63
      CRCS02SB BALBOA-PUNTARENAS        + +* P +* + +* 0 0    13MAR63 01APR63
      CRCS03SB PUNTARENAS-SAN DIEGO     + +* P /* + +* 0 0    04APR63 19FEB63
  126 CRUNCH-OCONOSTOTA
      CRUN-10T SAN DIEGO-SAN DIEGO      + +* + +* + +* 0 0    28JUL69  1AUG69
  050 CUSP-BAIRD                         E -  0 -  0 0    21JUL56 16AUG56
  051 CUSP-HORIZON                       E -  0 -  0 0    21JUL56 15AUG56
  124 DEEP SEA DRILLING PROJECT - GLOMAR CHALLENGER (S.I.) LEGS 22 TO PRESENT
      DSDP01GC ORANGE,TEX.-HOBOKEN,N J 0 0  0 0  0 0  0 0      11AUG68 23SEP68
      DSDP02GC HOBOKEN-DAKAR,SENEGAL   0 0  P 0  +    0 +      01OCT68 24NOV68
      DSDP03GC DAKAR-RIO,BRAZIL        + +  0 0  0 0  0 0      01DEC68 25JAN69
      DSDP04GC RIO-SAN CRISTOBAL,PAN.  + +  M 0  M 0  0 M      27JAN69 24MAR69
      DSDP05GC SAN DIEGO-HONOLULU      + +  M 0  M 0  0 M      12APR69 05JUN69
      DSDP06GC HONOLULU-APRA,GUAM      + +  M 0  M 0  0 M      11JUN69 05AUG69
      DSDP07GC APRA,GUAM-HONOLULU      + +* M /* M /* 0 M      08AUG69 02OCT69
      DSDP08GC HONOLULU-PAPEETE,TAHITI + +* M /* M /* 0 M      08OCT69 02DEC69
      DSDP09GC PAPEETE-BALBOA,PANAMA   + +* M /* M /* 0 M      06DEC69 27JAN70
      DSDP10GC GALVESTON,TEX.-MIAMI    + +  M 0  M 0  0 M      13FEB70 05APR70
      DSDP11GC MIAMI-HOBOKEN,N.J.      + +  M 0  M 0  0 M      08APR70 01JUN70
      DSDP12GC BOSTON,MAS.-LISBON,PORT + +  M 0  M +* 0 M      19JUN70 11AUG70
      DSDP13GC LISBON-LISBON,PORTUGAL  + +  M +* M +* 0 M      13AUG70 06OCT70
      DSDP14GC LISBON-SAN JUAN,P.R.    + +  M +* M +* 0 M      09OCT70 30NOV70
      DSDP15GC SAN JUAN,P.R.-CRISTOBAL + +* M +* M +* 0 M      05DEC70 02FEB71
      DSDP16GC CRISTOBAL,PAN.-HONOLULU + +* M +* M +* 0 M      02FEB71 30MAR71
      DSDP17GC HONOLULU-HONOLULU       + +* M +* M +* 0 M      30MAR71 25MAY71
      DSDP18GC HONOLULU-KODIAC,ALASKA  + +* M +* + +* 0 M      29MAY71 20JUL71
      DSDP19GC KODIAC-YOKAHAMA,JAPAN   + +* M +* M +* 0 M      22JUL71 09SEP71
      DSDP20GC YOKAHAMA-SUVA,FIJI      + +* M +* M +* 0 M      17SEP71 10NOV71
      DSDP21GC SUVA,FIJI-DARWIN,AUS.   + +* M +* M +* 0 M  0 0 09NOV71 11JAN72
      DSDP22GC DARWIN,AUST-COLOMBO,CEY + +* M +* M +* 0 M  0 0 14JAN72 05MAR72
      DSDP23GC COLOMBO-FR.SOMALILAND   + +* M +* M +* 0 M  0 0 08MAR72 12APR72
      DSDP24GC FR.SOMALILAND-MAURITIUS + +* M +* + +* 0 M  0 0 03MAY72 26JUN72
      DSDP25GC MAURITIUS-DURBAN,AFRICA + +* M +* M +* 0 M  0 0 28JUN72 22AUG72
      DSDP26GC DURBAN,S.A.-PERTH,AUST  + +* M +* + +* 0 M  0 0 06SEP72 29OCT72
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                           NAV DEPTH MAG   SUB  GRAV

                            D   1 D   D   3 P    P
                            P   I 2 I  I  . R    R
                            L   G   G R G 5 0    R O
     ID.   CRUISE NAME - SHIP   O   1 K 1 E 1 K F  E C    BEGIN    END
     NUM   LEG - PORTS          T   T H T C T H L  C S    DATE     DATE
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ID. NUM	CRUISE NAME - SHIP / LEG - PORTS	NAV		DEPTH		MAG		SUB		GRAV		BEGIN DATE	END DATE
	DSDP27GC FREMANTLE-FREMANTLE,AUS	+	+*	M	+*	+	+*	0	M	0	0	01NOV72	08DEC72
	DSDP28GC FREEMANTLE-CHRISTCHURCH	+	+*	M	+*	+	+*	0	M	0	0	20DEC72	26FEB73
	DSDP29GC LYTTLETON,N.Z.-WELLNGTN	+	+*	M	+*	+	+*	0	M	0	0	02MAR73	17APR73
	DSDP30GC WELLNGTN,N.Z.-APRA,GUAM	+	+*	M	+*	+	+*	0	M	0	0	24APR73	12JUN73
	DSDP31GC APRA,GUAM-HOKODATE,JAP.	+	+*	M	+*	M	+*	0	M	0	0	15JUN73	04AUG73
	DSDP32GC HOKODATE-HONOLULU	+	+*	M	+*	M	+*	0	M	0	0	15AUG73	11OCT73
	DSDP33GC HONOLULU-PAPEETE,TAHITI	+	+*	M	+*	M	+*	0	M	0	0	03NOV73	17DEC73
	DSDP34GC PAPEETE-CALLAO,PERU	+	+*	M	+*	M	+*	0	M	0	0	20DEC73	02FEB74
	DSDP35GC CALLAO,PERU-USHUAIA,AR.	+	+*	M	+*	+	+*	0	M	0	0	13FEB74	29MAR74
	DSDP36GC USHUAIA,ARG.-RIO,BRAZIL	+	+*	M	+*	+	+*	0	M	0	0	04APR74	22MAY74
	DSDP37GC RIO-DUBLIN,IRELAND	+	+*	M	+*	+	+*	0	M	0	0	30MAY74	30JUL74
	DSDP38GC DUBLIN-AMSTERDAM,NETH.	+	+*	M	+*	+	+*	0	M	0	0	02AUG74	26SEP74
	DSDP39GC AMSTERDAM-CAPE TOWN	+	+*	M	+*	+	+*	0	M	0	0	09OCT74	16DEC74
	DSDP40GC CAPE TOWN-ABIDJAN,I.C.	+	+*	M	+*	M	+*	0	M	0	0	19DEC74	24FEB75
	DSDP41GC ABIDJAN-MALAGA,SPAIN	+	+*	M	+*	+	+*	0	M	0	0	17FEB75	10APR75
	DSDP42GC MALAGA-ISTANBUL,TURK.	+	+*	M	+*	+	+*	0	M	0	0	14APR75	10JUN75
	DSDP43GC ISTANBUL-NORFOLK,VIR.	+	+*	M	+*	+	+*	0	M	0	0	11JUN75	12AUG75
	DSDP44GC NORFOLK-NORFOLK,VIR.	+	+*	M	+*	+	+*	0	M	0	0	16AUG75	29SEP75
	DSD44AGC NORFOLK-SAN JUAN,P.R.	+	+*	M	+*	+	+*	0	M	0	0	08NOV75	27NOV75
	DSDP45GC SAN JUAN-SAN JUAN,P.R.	+	+*	M	+*	+	+*	0	M	0	0	30NOV75	20JAN76
	DSDP46GC SAN JUAN-CANARY ISLANDS	+	+*	M	+*	M	+*	0	M	0	0	28JAN76	10MAR76
	DSDP47GC CANARY IS.-BREST,FRANCE	+	+*	M	+*	M	+*	0	M	0	0	20MAR76	11MAY76
	DSDP48GC BREST-ABERDEEN, SCOT.	+	+	*M	+*	M	+*	0	M	0	0	22MAY76	13JUL76
	DSDP49GC ABERDEEN-FUNCHAL, MAD.	+	+*	M	+*	M	+*	0	M	0	0	18JUL76	04SEP76
	DSDP50GC FUNCHAL-FUNCHAL,MADEIRA	+	+	M	+	M	+	0	M	0	0	11SEP76	10NOV76
	DSDP51GC FUNCHAL-SAN JUAN	+	+	M	+	M	+	0	M	0	0	11NOV76	17JAN77
	DSDP52GC SAN JUAN-SAN JUAN,P.R.	+	+	M	+	M	+	0	M	0	0	29JAN77	9MAR77
	DSDP53GC SAN JUAN-CRISTOBAL,PAN.	+	+	M	+	M	+	0	M	0	0	13MAR77	25APR77
	DSDP54GC CRISTOBAL-LOS ANGELES	+	+	P	+	+	+	0	M	0	0	29APR77	18JUN77
	DSDP55GC LOS ANGELES-YOKOHAMA	+	+	P	+	+	+	0	M	0	0	13JUL77	5SEP77
	DSDP56GC YOKOHAMA-TOKYO	+	+	P	+	+	+	0	M	0	0	10SEP77	10OCT77
	DSDP57GC TOKYO-YOKOHAMA	+	+	M	+	M	+	M	M	0	0	16OCT77	04DEC77
	DSDP58GC YOKOHAMA-OKINAWA	+	+	P	+	+	+	+	M	0	0	11DEC77	30JAN78
	DSDP59GC OKINAWA-GUAM	+	+	P	+	+	+	+	M	0	0	3FEB78	15MAR78
	DSDP60GC GUAM-GUAM											21MAR78	16MAY78
	(CRUISE IN PROGRESS)												
	DSDP61GC GUAM-MAJURO											22MAY78	6JUL78
	DSDP62GC MAJURO-SEATTLE											8JUL78	4SEP78
	DSDP63GC SEATTLE-MANZANILLO											12SEP78	3NOV78
	DSDP64GC MANZANILLO-MAZATLAN											8NOV78	27DEC78
	DSDP65GC MAZATLAN-MANZANILLO											2JAN79	21FEB79
	DSDP66GC MANZANILLO-MANZANILLO											26FEB79	18APR79
	DSDP67GC MANZANILLO-SAN JOSE											23APR79	11JUN79
	DSDP68GC SAN JOSE-GUAYAQUIL											16JUN79	5AUG79
	DSDP69GC GUAYAQUIL-BALBOA											10AUG79	28SEP79
153	DEEPSONDE-T.WASHINGTON (S.I.)												
	DPSN01WT SAN DIEGO-SAN DIEGO	+	+	P	+	+	+	M	M	+	+	10JAN76	01FEB76
	DPSN02WT SAN DIEGO-SAN DIEGO	+	+	P	+	+	+	M	M	+	+	09FEB76	02MAR76

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                              NAV DEPTH MAG  SUB  GRAV

                               D  1 D     D  3 P   P
                              P I 2 I     I  . R   R
                              L G   G  R G 5 O   R O
 ID.   CRUISE NAME - SHIP     O I K I E I  K F  E C  BEGIN    END
 NUM     LEG - PORTS          T T H T C T  H L  C S  DATE     DATE
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 142 DELONEER-OCONOSTOTA
     DELO-1OT SAN DIEGO-SAN DIEGO   0 +  M +*  0 -  0 0      18SEP72 26SEP72
 029 DODO-ARGO
     DODO01AR SAN DIEGO-HONOLULU       P 0  + 0  0 0         08APR64 28APR64
     DODO02AR HONOLULU-HONOLULU        P 0  + 0  0 0         30APR64 08MAY64
     DODO03AR HONOLULU-KWAJALEIN       P 0  + 0  0 0         10MAY64 27MAY64
     DODO04AR KWAJALEIN-DARWIN           0  + 0  0 0         29MAY64 11JUN64
     DODO05AR DARWIN-MAURITIUS       +    0  + +*  0 0       15JUN64 13JUL64
     DODO06AR MAURITIUS-MOMBASA      0    0  + 0  0 0        16JUL64 30JUL64
     DODO07AR MOMBASA-MAURITIUS      0    0  0 0  0 0        04AUG64 07SEP64
     DODO08AR MAURITIUS-COLOMBO      +    +* + +*  0 0       10SEP64 10OCT64
     DODO09AR COLOMBO-SINGAPORE      +    0  + +*  0 0       13OCT64 03NOV64
     DODO10AR SINGAPORE-MANILA          0  0 0  0 0          06NOV64 20NOV64
     DODO11AR MANILA-GUAM              0  + 0  0 0           22NOV64 01DEC64
     DODO12AR GUAM-SAN DIEGO           P 0  + 0  0 0         03DEC64 23DEC64
 052 DOLDRUMS-BAIRD                  +    P 0  0 -  0 0      03AUG58 30SEP58
 030 DOLDRUMS-HORIZON
     DLDR01HO SAN DIEGO-BALBOA,C.Z.  + +*  M     + +*  0 +   01AUG58 02SEP58
     DLDR02HO BALBOA-SAN DIEGO       + +*  M     + +*  0 +   07SEP58 30SEP58
 053 DOLDRUMS-STRANGER               +     E -  0 -  0 0     01AUG58 30SEP58
 002 DOLPHIN-HORIZON
     DOLP01HO                        + +*  P /*  0 0  0 0    28MAR58 01MAY58
        (DIGITAL DEPTH TAPE ID='DOLP-A')
     DOLP02HO                        + +*  M /*  + +*  0 0   05MAY58 09JUN58
        (DIGITAL DEPTH TAPE ID='DOLP-B')
 054 DORADO-HORIZON                  + 0  P 0  0 -  0 0       7JUL59 20AUG59
 010 DOWNWIND-SPENCER BAIRD
     DNWB-ABD SAN DIEGO-PAPEETE      + +*  P +*  0 -  0 0    21OCT57 15NOV57
     DNWB-BBD PAPEETE-VALPARAISO,CH. + +*  P +*  0 -  0 0    19NOV57 21DEC57
     DNWB-CBD VALPARAISO-CALLAO,PERU + +*  P +*  0 -  0 0    28DEC57 15JAN58
     DNWB-DBD CALLAO-SAN DIEGO       + +*  P +*  0 -  0 0    18JAN58 01MAR58
 009 DOWNWIND-HORIZON
     DNWH-AHO SAN DIEGO-PAPEETE      + /*  P /*  0 -  0 0    21OCT57 15NOV57
     DNWH-BHO PAPEETE-VALPARAISO,CH. + 0  P 0  0 -  0 0      19NOV57 23DEC57
     DNWH-CHO VALPARAISO-CALLAO,PERU + 0  P 0  0 -  0 0      29DEC57 15JAN58
     DNWH-DHO CALLAO-SAN DIEGO       + /*  P /*  0 -  0 0    21JAN58 28FEB58
 100 EASTROPAC-M-WASHINGTON          0 0  P 0  0 -  0 0
 055 EASTROPIC-BAIRD                 + 0  E -  0 -  0 0        OCT55   DEC55
 056 EASTROPIC-HORIZON               + 0  E -  0 -  0 0      30CT55 14DEC55
 170 EPLL(EAST PACIFIC LONGLINE)- THOMAS WASHINGTON (S.I.)
     EPLL-1WT SAN DIEGO-SAN DIEGO    + +  P +  + +  + +  + 0  11OCT77 03NOV77
 104 EQUAPAC-STRANGER                     E -  0 -  0 0      20AUG56 04OCT56
 149 EQUAPAC-HORIZON                                          AUG56   SEP56
 141 FURYDICE-T WASHINGTON (S.I.)
     ERDC01WT SAN DIEGO-HONOLULU     + +*  M +*  + +*  M M  + 0  04SEP74 16SEP74
     ERDC02WT HONOLULU-PAGO PAGO     + +*  M +*  + +*  + M  + 0  20SEP74 30OCT74
     ERDC03WT PAGO PAGO-NOUMEA       + +*  M +   + +   M M  + 0  04NOV74 30NOV74
     ERDC04WT NOUMEA-SINGAPORE       + +*  M +*  + +*  M M  0 0  05DEC74 22DEC74
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ID. NUM	CRUISE NAME - SHIP / LEG - PORTS	NAV DPLOT	NAV DIGIT	DEPTH 12KHZ	DEPTH DIGIT	MAG DIREC	MAG DIGIT	SUB 3.5KHZ	SUB PROFL	GRAV PREC	GRAV PROCS	BEGIN DATE	END DATE
	ERDC05WT SINGAPORE-SURABAYA	+	+*	0	+	+	+	M	M	+	+	30DEC74	08FEB75
	ERDC06WT SURABAYA-CEBU,PHILIPP.	+	+*	0	+*	+	+*	M	M	+	0	12FEB75	18FEB75
	ERDC07WT CEBU-GUAM	+	+*	P	+	+	+	M	0	+	0	21FEB75	20MAR75
	ERDC08WT GUAM-GUAM	+	+*	P	0	+	+	0	M	0	0	24MAR75	01APR75
	ERDC09WT GUAM-MAJURO	+	+*	P	+*	+	+*	+	M	0	0	03APR75	05MAY75
	ERDC10WT MAJURO-MAJURO	+	+*	P	+*	+	+*	0	0	0	0	10MAY75	13JUN75
	ERDC11WT MAJURO-SAN DIEGO	+	+*	P	+*	+	+*	M	M	+	0	20JUN75	18JUL75
168	EXITO-OCONOSTOTA												
	XITO-1OT SAN DIEGO-SAN DIEGO	+	0	+	0	0	0	0	+	0	0	04MAR73	06APR73
	XITO-2OT SAN DIEGO-SAN DIEGO	+	0	+	0	0	0	0	0	0	0	01MAY73	28MAY73
086	EXJIBIA-T.WASHINGTON	0	0	P	0	0	-	0	0			16JUL66	10AUG66
035	FANFARE-BAIRD	+	0	P	0	+	0	0	0			9JUL59	20JUL59
099	FANFARE-SMITH			P								06JUL59	26JUL59
171	FARALLON BASIN SURVEY-AGASSIZ												
	FARA-1AZ SAN DIEGO-SAN DIEGO	+	0	+	0	0	0	0	0			01OCT74	05NOV74
087	FLIP-HORIZON	0	0	P	0	0	-	0	0			24AUG63	7OCT63
089	FLORA II-HORIZON	+		P	0	0	-	+					
148	FRANCIS DRAKE-MELVILLE (S.I.)												
	FDRK01MV SAN DIEGO-USHUAIA,ARG.	+	+*	0	+*	+	+*	+	0	0	0	20JAN75	14FEB75
	FDRK02MV USHUAIA-USHUAIA,ARG.	+	+*	M	+*	0	0*	M	0	0	0	19FEB75	23APR75
	FDRK03MV USHUAIA-BALBOA,C.Z.	+	+*	M	+*	M	+*	M	0	0	0	05APR75	10MAY75
	FDRK04MV BALBOA-MANZANILLO,MEX.	+	+*	P	+*	+	+*	0	0	0	0	14MAY75	21MAY75
	FDRK05MV MANZANILLO-SAN DIEGO	+	+*	+	+*	+	+*	+	M	0	0	24MAY75	12JUN75
158	FDRAKE77-MELVILLE (S.I.)												
	FD7701MV SAN DIEGO-VALPARAISO	+	+	+	+	+	+	+	0	0	0	15DEC76	01JAN77
	FD7702MV VALPARAISO-P.ARENAS	+	+	M	+	M	+	M	0	0	0	10JAN77	12FEB77
	FD7703MV P.ARENAS-SAN MARTIN	+	+	0	0	M	+	+	0	0	0	16FEB77	28FEB77
	FD774AMV SAN MARTIN-CALLAO	+	+	P	+	0	0	+	0	0	0	03MAR77	09MAR77
	FD774BMV CALLAO-CALLAO	+	+	P	+	+	+	+	0	0	0	11MAR77	30MAR77
	FD774CMV CALLAO-CALLAO	+	+	0	0	0	0	+	0	0	0	02APR77	25APR77
	FD774DMV CALLAO-BALBOA	+	+	+	+	+	+	+	0	0	0	03MAY77	27MAY77
	(THERE IS NO LEG 5)												
	FD7706MV BALBOA-ACAPULCO	+	+	+	+	+	+	+	0	0	0	30MAY77	29JUN77
	FD7707MV ACAPULCO-SAN DIEGO	+	+	+	+	+	+	+	0	0	0	30JUN77	09JUL77
082	GAM-E.B.SCRIPPS												
	GAM--1EB	+	+*	P	+*	+	+*	0	0			01NOV67	13NOV67
083	GAM II-E.B.SCRIPPS												
	GAM2-1EB	+	+*	P	+*	+	+*	0	+			06FEB68	26FEB68
115	GAMBUL-E.B.SCRIPPS												
	GMBL01EB SAN DIEGO-SAN DIEGO	+	+*	P	+*	+	+*	0	0			02OCT68	14OCT68
	GMBL02EB SAN DIEGO-SAN DIEGO	+	+*	P	+*	+	+*	0	0			16OCT68	01NOV68
118	GAMETE-AGASSIZ												
	GMET-1AZ	+	+*	P	0	+	+*	0	0			MAR69	
139	GEOSECS-MELVILLE (S.I.)												
	GECS-AMV SAN DIEGO-HONOLULU	+	+*	P	+*	+	+*	0	0	0	0	23AUG73	10SEP73
	GECS-BMV HONOLULU-ADAK,ALASKA	+	+*	P	+*	+	+*	0	0	0	0	16SEP73	06OCT73
	GECS-CMV ADAK-TOKYO,JAPAN	+	+*	P	+*	+	+*	0	0	0	0	08OCT73	25OCT73
	GECS-DMV TOKYO-HONOLULU	+	+*	P	+*	+	+*	0	0	0	0	31OCT73	29NOV73

		NAV	DEPTH		MAG		SUB		GRAV			
ID. NUM	CRUISE NAME – SHIP LEG – PORTS	D P L O T	1 1 2 I T	D 2 1 K H	D 1 I T	D I R E C	3 . G I T	P R 5 K H	P R 0 F L	P R E C	P R O C S	BEGIN DATE	END DATE

	GECS-EMV HONOLULU-PAGO PAGO	+	+*	P	+*	+	+*	0	0	0	0	04DEC73	29DEC73
	GECS-FMV PAGO PAGO-WELLINGTON	+	+*	P	+*	+	+*	0	0	0	0	03JAN74	27JAN74
	GECS-GMV WELLINGTON-WELLINGTON	+	+*	P	+*	+	+*	0	0	0	0	05FEB74	04MAR74
	(THERE IS NO LEG H)												
	GECS-IMV WELLINGTON-PAPEETE,TAH.	+	+*	P	+*	+	+*	0	0	0	0	13MAR74	07APR74
	GECS-JMV PAPEETE-PAPEETE,TAHITI	+	+*	P	+*	+	+*	0	0	0	0	12APR74	09MAY74
	GECS-KMV PAPEETE,TAH.-SAN DIEGO	+	+*	P	+*	+	+*	0	0	0	0	14MAY74	10JUN74
157	GOBS-E.B.SCRIPPS												
057	GORDA-HORIZON	+	0	P	0	+	-	0	0			8MAY65	23MAY65
173	GUAYMUS-T. WASHINGTON (S.I.)												
	GUAY01WT SAN DIEGO-GUAYMUS,MEX.	+	+	M	+	M	+	M	M	+	+	9FEB78	24FEB78
	GUAY02WT GUAYMUS-GUAYMUS,MEXICO	+	+	M	+	M	+	M	M	+	+	2MAR78	7MAR78
	GUAY03WT GUAYMUS-SAN DIEGO	+	+	M	+	M	+	M	M	+	+	8MAR78	17MAR78
058	HAWAII-BAIRD		0	E	-	0	-	0	0			11JUL59	24AUG59
088	HAYSTACK-BAIRD	+	0	P	0	0	-	0	0			24OCT64	3NOV64
162	HEAT FLOW-BAIRD	+	0	0	0	0	0	0	0			07MAR55	15MAR55
116	HERM-OCONO.												
	HERM-1OT	+	+*	P	+*	+	+*	0	0			15JAN69	19JAN69
005	HILO-SMITH												
	HILO01SM SAN DIEGO-LAHAINA,HAW.	+	+*	P	+*	+	0	0	0			16MAR62	31MAR62
	HILO02SM LAHAINA-HILO,HAWAII	+	+*	P	0		0	0	0			03APR62	14APR62
	HILO03SM HILO-SAN DIEGO	+	+*	P	+*	+	+*	0	0			16APR62	07MAY62
013	HILO-STRANGER												
	HILO01ST SAN DIEGO-KAHALUI,HAW	+	+*	P	0		0	0	0			16MAR62	01APR62
	HILO02ST KAHALUI-HILO,HAWAII	+	+*	P	0		0	0	0			03APR62	14APR62
	HILO03ST HILO-SAN DIEGO	+	+*	P	/*	+	+*	0	0			16APR62	30APR62
103	HUDDELL	+	-	P	-	0	-	0	0			17SEP56	15OCT56
131	HYPOGENE-MELVILLE (S.I.)												
	HYPO-1MV SAN DIEGO-SAN DIEGO	+	+*	M	+*	+	+*	M	M	+	+*	11MAR72	21APR72
132	IGUANA- E.B.SCRIPPS (S.I.)												
	IGUA01EB SAN DIEGO-ACAPULCO,MEX	+	+*	P	+*	+	+*	0	M	0	0	31MAR72	07APR72
	IGUA02EB ACAPUL-GUAYQUIL,ECUADOR	+	+*	P	+*	+	+*	0	M	0	0	09APR72	17APR72
	IGUA03EB GUAY-PUNTA AREN,CSTRICA	+	+*	P	+*	+	+*	0	M	0	0	21APR72	30APR72
	IGUA04EB PUNTA ARENA-ACAPULC,MEX	+	+*	P	+*	+	+*	0	M	0	0	02MAY72	11MAY72
	IGUA05EB ACAPULCO,MEX-SAN DIEGO	+	+*	P	+*	+	+*	0	M	0	0	15MAY72	22MAY72
169	INDOMED 77-MELVILLE (S.I.)												
	INMD01MV SAN DIEGO-BALBOA	+	+	0	0	+	+	+	0	0	0	24SEP77	31OCT77
	INMD02MV BALBOA-CADIZ, SPAIN	+	+	0	0	+	+	+	0	0	0	07NOV77	01DEC77
	INMD03MV CADIZ-ALEXANDRIA	+	+	0	0	+	+	+	0	0	0	4DEC77	12DEC77
	INMD04MV ALEXANDRIA-MAURITIUS	+	+	0	0	+	+	+	0	0	0	6DEC77	22JAN78
	INMD05MV MAURITIUS-FREEMANTLE	+	+	0	0	+	+	+	0	0	0	28JAN78	25FEB78
	INMD06MV FREEMANTLE-COLOMBO	+	+	0	0	+	+	+	0	0	0	06MAR78	31MAR78
	INMD07MV COLOMBO-MAURITIUS											04APR78	25APR78
	INMD08MV MAURITIUS-MAURITIUS											29APR78	28MAY78
	(CRUISE IN PROGRESS)												
	INMD09MV MAURIT9US-PORT SAID											01JUN78	04JUL78
	INMD10MV PORT SAID-ROTA											19JUL78	06AUG78
	INMD11MV ROTA-SAN JUAN											10AUG78	12SEP78

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                              NAV DEPTH MAG  SUB  GRAV

                         D   1 D      D 3 P    P
                      P  I   2 I      I . R    R
                      L  G     G    R G 5 0    R  O
 ID.  CRUISE NAME - SHIP   O  I   K I    E I K F    E     BEGIN    END
 NUM   LEG - PORTS         T  T   H T    C T H L    C  S  DATE     DATE
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ID NUM	CRUISE NAME - SHIP / LEG - PORTS	NAV		DEPTH		MAG		SUB		GRAV		BEGIN DATE	END DATE
	INMD12MV SAN JUAN-MONTEVIDEO											17SEP78	18OCT78
	INMD13MV MONT.-COM. RIVADAVIA											27OCT78	14NOV78
	INMD14MV RIVADAVIA-PT. ARENAS											17NOV78	24DEC78
	INMD15MV PUNTA ARENAS-PUNTA AREN.											29DEC78	3FEB79
	INMD16MV PUNTA ARENAS-MAZATLAN											9FEB79	3MAR79
	INMD17MV MAZATLAN-MAZATLAN											7MAR79	1APR79
	INMD18MV MAZATLAN-SAN DIEGO											5APR79	30APR79
155	INDOPAC-T.WASHINGTON (S.I.)												
	INDP01WT SAN DIEGO-YOKOHAMA	+	+	P	+	+	+	M	O	+	O	23MAR76	30APR76
	INDP02WT YOKOHAMA-AGANA,GUAM	+	+	P	+	+	+	+	O	+	O	5MAY76	19MAY76
	INDP03WT AGANA,GUAM-AGANA	+	+	P	+	+	+	+	O	+	O	25MAY76	19JUN76
	INDP04WT AGANA,GUAM-AGANA	+	+	P	+	+	+	+	M	+	+	22JUN76	5JUL76
	INDP05WT AGANA-KEELUNG,TAIWAN	+	+	P	+	+	+	+	M	+	+	7JUL76	27JUL76
	INDP06WT KEELUNG-SUBIC BAY	+	+	P	+	+	+	M	M	+	O	30JUL76	12AUG76
	INDP07WT SUBIC BAY-DARWIN	+	+	P	+	+	+	M	M	+	+	14AUG76	29AUG76
	INDP08WT DARWIN-AGANA,GUAM	+	+	P	+	+	+	+	M	+	+	31AUG76	30SEP76
	INDP09WT AGANA-AGANA,GUAM	+	+	P	+	+	+	+	O	+	O	12JAN77	22JAN77
	INDP10WT AGANA-SINGAPORE	+	+	P	+	+	+	M	M	+	+	25JAN77	21FEB77
	INDP11WT SINGAPORE-PHUKET	+	+	0	0	+	+	M	M	+	O	01MAR77	21MAR77
	INDP12WT PHUKET-PADANG,INDO	+	+	+	+	+	+	M	M	+	O	24MAR77	10APR77
	INDP13WT PADANG-PADANG,INDO.	+	+	0	0	+	+	M	M	+	+	12APR77	23APR77
	INDP14WT PADANG,INDO.-HONOLULU	+	+	P	+	M	+	M	M	+	+	27APR77	28MAY77
	INDP15WT HONOLULU-HONOLULU	+	+	P	+	0	0	0	0	0	0	03JUN77	30JUN77
	INDP16WT HONOLULU-SAN DIEGO	+	+	P	+	+	+	+	O	0	0	05JUL77	31JUL77
004	JAPANYON-SPENCER BAIRD												
	JPYN01BD SAN DIEGO-HONOLULU	+	+*	P	+*	+	+*	0	0			27MAY61	06JUN61
	JPYN02BD HONOLULU-TOKYO	+	+*	P	+*	+	+*	0	0			09JUN61	01JUL61
	JPYN03BD TOKYO-TOKYO	0	0	0	0	0	0	0	0			07JUL61	27JUL61
	JPYN04BD TOKYO-HONOLULU	+	+*	P	+*	+	+*	0	0			01AUG61	18AUG61
	JPYN05BD HONOLULU-SAN DIEGO	+	+*	P	+*	+	+*	0	0			22AUG61	15SEP61
039	JASPER SEAMOUNT-HORIZON			E	-	+	0	0	0			19JUN51	28JUN51
059	KAYAK-OCONOSTOTA			P	0	0	-	0	M			28AUG64	23SEP64
122	KNOCK KNOCK-ARGO	+	0	P	0			0	0			22JUL60	29JUL60
018	LEAPFROG-SMITH	+	/*	P	/*	0	-	0	0			24JUL61	12SEP61
060	LEAPFROG-STRANGER			P	0	0	-	0	0			31JUL61	15SEP61
014	LIMBO-HORIZON	+	/*	P	/*	0	-	0	0			16MAY60	01JUL60
012	LUSIAD-ARGO												
	LUSI01AR SAN DIEGO-MANILA	+	+*	P	+*		+*	0	0			15MAY62	11JUN62
	LUSI02AR MANILA-SINGAPORE			P		+		0	0			16JUN62	24JUN62
	LUSI03AR SINGAPORE-MOMBASA					0	0	0	0			28JUN62	24JUL62
	LUSI04AR MOMBASA-COLOMBO					0	0	0	0			28JUL62	25AUG62
	LUSI05AR COLOMBO-COCHIN					0	0	0	0			28AUG62	29SEP62
	LUSI6AAR COCHIN-MAURITIUS	+	+	P	0	+	+*	0	0			04OCT62	26OCT62
	LUSI6BAR MAURITIUS-FREMANTLE	+	+	P	0	+	+*	0	0			30OCT62	28NOV62
	LUSI6CAR FREMANTLE-DARWIN	+	+	P	0	+	+*	0	0			02DEC62	23DEC62
	LUSI6DAR DARWIN-DJAKARTA	+	+	P	0	+	+*	0	0			01JAN63	23JAN63
	LUSI6EAR DJAKARTA-COLOMBO	+	+	P	0	+	+*	0	0			26JAN63	12FEB63
	LUSI7AAR COLOMBO-MOMBASA	+	+	P	0	+	+*	0	0			16FEB63	17MAR63

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                                    NAV  DEPTH MAG   SUB   GRAV

                                  D   1 D       D   3 P     P
                               P  I   2 I       I   . R     R
                               L  G     G     R G 5 O     R  O
   ID.   CRUISE NAME - SHIP    O  I     K     I E I K     E  C    BEGIN      END
   NUM   LEG - PORTS           T  T     H     T C T H     C  S    DATE       DATE
   --------------------------------------------------------------------------------

         LUSI7BAR MOMBASA-PENANG          + +  P 0  +  +* 0 0     21MAR63  12APR63
         LUSI7CAR PENANG-MOMBASA          + +  P 0  +  +* 0 0     17APR63  15MAY63
         LUSI7DAR MOMBASA-CAPETOWN        + +  P 0  +  +* 0 0     18MAY63  29MAY63
         LUSI08AR CAPETOWN-FREETOWN       +    P 0  +        0 0  04JUN63  08JUL63
         LUSI09AR FREETOWN-PANAMA         + +  P      0 0    0 0  11JUL63  30JUL63
         LUSI10AR PANAMA-SAN DIEGO        + +* P /*  +  +* 0 0    02AUG63  15AUG63
    001 LUSIAD-HORIZON
         LUSI01HO COCHIN-MAURITIUS                   0 0    0 0   04OCT62  26OCT62
         LUSI02HO MAURITIUS-FREMANTLE                0 0    0 0   30OCT62  28NOV62
         LUSI03HO FREMANTLE-PORT DARWIN              0 0    0 0   02DEC62  23DEC62
         LUSI04HO PORT DARWIN-PORT MORESB            0 0    0 0   28DEC62  02JAN63
         LUSI05HO PORT MORESBY-GUADALCANA            0 0    0 0   02JAN63  09JAN63
         LUSI06HO GUADALCANAL-KWAJALEIN              0 0    0 0   10JAN63  17JAN63
         LUSI07HO KWAJALEIN-HONOLULU      + /* + /*  0 0    0 0   21JAN63  04FEB63
            (DIGITAL DEPTH TAPE ID='LUSI-A')
         LUSI08HO HONOLULU-SAN DIEGO      + +* + /*  0 0    0 0   06FEB63  19FEB63
            (DIGITAL DEPTH TAPE ID='LUSI-B')
    038 MENDOCINO-60-BAIRD                0  P 0  +  0    0 0        APR57    APR57
    061 MIDPAC-HORIZON                    + 0  E -  0  -  0 0      27JUL50  28OCT50
    062 MOHOLE PROJECT-BAIRD                         0  -  0 0
    063 MOHOLE PROJECT-HORIZON                       0  -  0 0
    064 MOHOLE PROJECT-ORCA                          0  -  0 0
    006 MONSOON-ARGO
         MONS01AR SAN DIEGO-CAIRNS        + +* P +*  +  +* 0 0    26AUG60  06OCT60
         MONS02AR CAIRNS-DJAKARTA           +  P 0   +  +* 0 0    17SEP60  14NOV60
         MONS03AR DJAKARTA-MAURITIUS        +  P +*  +  +* 0 0    18NOV60  07DEC60
         MONS4AAR MAURITIUS-FREMANTLE       +  P +*  +  +* 0 0    10DEC60  02JAN61
         MONS4BAR FREMANTLE-HOBART          +        +  +* 0 0    06JAN61  15JAN61
         MONS05AR HOBART-WELLINGTON       + +* P +*  +  +* 0 0    17JAN61  22JAN61
         MONS06AR WELLINGTON-WELLINGTON   + +* P +*  +  +* 0 0    28JAN61  22FEB61
         MONS07AR WELLINGTON-PAPEETE      + +* P +*  +  +* 0 0    24FEB61  15MAR61
         MONS08AR PAPEETE-SAN DIEGO       + +* P +*  +  +* 0 0    23MAR61  18APR61
    008 MUKLUK-SPENCER BAIRD
         MKLK01BD SAN DIEGO-KODIAK,ALASKA + +* P /*  0  -  0 0    08JUL57  04AUG57
         MKLK02BD KODIAK,ALAS.-SAN DIEGO  + +* P /*  0  -  0 0    06AUG57  26AUG57
    065 MUKLUK-HORIZON                    + 0  P 0   0  -  0 0     9JUL57  24AUG57
    165 MV70-03-MELVILLE                  + 0  P 0   0 0    0 0   20MAR70  24MAR70
    003 NAGA-STRANGER
         NAGA01ST SAN DIEGO-HONOLULU      + +  P /*  0 0    0 0   17JUN59  28JUN59
         NAGA02ST HONOLULU-GUAM           + 0  P 0   0 0    0 0   03JUL59  21JUL59
         NAGA03ST GUAM-MANILA             + 0  P 0   0 0    0 0   24JUL59   8AUG59
         NAGA04ST MANILA-NHATRANG,V.N.    + 0  E 0   0 0    0 0   13AUG59  17AUG59
         NAGAS1ST BANGKOK-BANGKOK         + 0  E 0   0 0    0 0   19OCT59  31OCT59
         NAGAS2ST BANGKOK-BANGKOK         + 0  E 0   0 0    0 0   16NOV59  16DEC59
         NAGAS3ST BANGKOK-BANGKOK         + 0  E 0   0 0    0 0   19JAN60  31JAN60
         NAGAS4ST BANGKOK-BANGKOK         + 0  E 0   0 0    0 0   15FEB60  21MAR60
         NAGAS5ST BANGKOK-BANGKOK         + 0  E 0   0 0    0 0   21APR60   3MAY60
         NAGAS6ST BANGKOK-BANGKOK         + 0  E 0   0 0    0 0   23MAY60  28JUN60
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ID. NUM	CRUISE NAME - SHIP / LEG - PORTS	NAV PLOT	NAV DIGIT	DEPTH 12KHT	DEPTH DIGIT	MAG DIRECT	MAG DIGIT	SUB 3.50KHL	GRAV PREC	BEGIN DATE	END DATE
	NAGAS7ST BANGKOK-BANGKOK	+	0	E	0	0	0	0	0	02AUG60	15AUG60
	NAGAS8ST BANGKOK-BANGKOK	+	0	E	0	0	0	0	0	06SEP60	08OCT60
	NAGAS9ST BANGKOK-BANGKOK	+	0	E	0	0	0	0	0	9NOV60	25NOV60
	NAGAS9A BANGKOK-BANGKOK	+	0	E	0	0	0	0	0	08DEC60	14DEC60
	NAGAS10 BANGKOK-BANGKOK	+	0	E	0	0	0	0	0	10JAN61	13FEB61
	NAGAS11A G. OF THAILAND-DARWIN	+	0	P	0	0	0	0	0	15MAR61	21APR61
	NAGAS11B DARWIN-MANILA	+	0	E	0	0	0	0	0	23APR61	3MAY61
	NAGAS11C MANILA-GUAM	+	0	E	0	0	0	0	0	6MAY61	20MAY61
	NAGAS11D GUAM-HONOLULU	+	0	E	0	0	0	0	0	23MAY61	10JUN61
	NAGAS11E HONOLULU-SAN DIEGO	+	0	E	0	0	0	0	0	13JUN61	26JUN61
066	NORPAC-BAIRD			E	-	0	-	0	0	08AUG55	19SEP55
067	NORPAC-HORIZON			E	-	0	-	0	0	03AUG55	08SEP55
068	NORPAC-STRANGER			E	-	0	-	0	0	09AUG55	21SEP55
069	NORTHERN HOLIDAY-HORIZON			E	-	0	-	0	0	31JUL50	25SEP50
033	NOVA-ARGO										
	NOVA01AR SAN DIEGO-PAGO PAGO,SA.	+	+*	P	+*	+	+*	0	M	17APR67	16MAY67
	NOVA02AR PAGO PAGO-HONOLULU	+	+*	P	+*	+	+*	0	M	31MAY67	09JUN67
	NOVA03AR HONOLULU-SUVA,FIJI	+	+*	P	+*	+	+*	0	M	16JUN67	08JUL67
	NOVA04AR SUVA-NOUMEA,N.CALEDONIA	+	+*	P	+*	+	+*	0	M	12JUL67	08AUG67
	NOVA05AR NOUMEA-AUCKLAND,N.Z.	+	+*	P	+*	+	+*	0	M	11AUG67	12SEP67
	NOVA06AR AUCKLAND-SUVA,FIJI	+	+*	P	+*	+	+*	0	M	18SEP67	02OCT67
	NOVA07AR SUVA-PAGO PAGO	+	+*	P	0	+	+*	0	M	07OCT67	26OCT67
	NOVA08AR PAGO PAGO-PAGO PAGO	+	+*	P	+*	+	+*	0	M	29OCT67	19NOV67
	NOVA09AR PAGO PAGO-HILO,HAWAII	+	+*	P	+*	+	+*	0	M	22NOV67	09DEC67
	NOVA10AR HILO-SAN DIEGO	+	+*	P	+*	+	+*	0	M	11DEC67	19DEC67
032	NOVA-HORIZON										
	NOVA1AHO KWAJALEIN-BRISBANE,AUS.	+	+*	P	+*	+	+*	0	M	07APR67	03MAY67
	NOVA1BHO BRISBANE-NOUMEA,N.CAL.	+	+*	P	+*	+	+*	0	M	06MAY67	29MAY67
	NOVA02HO NOUMEA-SUVA,FIJI	+	+*	V	+*	0	-	0	M	31MAY67	01JUL67
	NOVA03HO SUVA-SUVA	+	+*	P	+*	+	+*	0	M	04JUL67	11JUL67
	NOVA04HO SUVA-NOUMEA,NEW CALDON.	+	+*	P	+*	+	+*	0	M	11JUL67	07AUG67
	NOVA05HO NOUMEA-AUCKLAND,N.ZEAL.	+	+*	P	+*	+	+*	0	M	11AUG67	12SEP67
	NOVA06HO AUCKLAND-SAN DIEGO	+	+*	P	+*	+	+*	0	M	18SEP67	14OCT67
021	PAPAGAYO-SPENCER BAIRD										
	PAPA01BD SAN DIEGO-PUNTARENAS	+	+*	M	+*	+	+*	+	0	18JUN65	29JUN65
	PAPA02BD PUNTARENAS-MANZANILLO	+	+*	M	+*	+	+*	+	0	02JUL65	30JUL65
	PAPA03BD MANZANILLO-SAN DIEGO	+	+*	M	+*	+	+*	+	0	01AUG65	12AUG65
093	PELAGIC AREA SURVEY-BAIRD	+		E	-	0	-	0	0		
143	PIFAN-HORIZON										
	PIFN-1HO SAN DIEGO-SAN FRANCISCO	0	+	0	+*	0	0	0	+	04SEP64	19SEP64
015	PIONEER-60										
	PN6001PN SAN FRANCISCO-KWAJALEIN	+	+*		/*	0	-	0	0	24MAR60	13APR60
121	PIQUERO-THOMAS WASHINGTON										
	PIQR01WT SAN DIEGO-ANTOFAGASTA,C	+	+*	P	/*	+	/*	0	+	09DEC68	01JAN69
	PIQR02WT ANTOFA.-VALPARAISO,CH.	+	0	P		+	0	0	+	02JAN69	07JAN69
	PIQR03WT VALPARAISO-VALPARAISO	+	+*	P	+*	+	+*	0	+	11JAN69	19FEB69
	PIQR04WT VALPARAISO-CALLAO,PERU	+	+*	P	+*	+	+*	0	+	25FEB69	10MAR69
	PIQR05WT CALLAO-CALLAO,PERU	+	+*	P	+*	+	+*	0		14MAR69	17APR69

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                                NAV DEPTH MAG  SUB  GRAV

                                D   1 D       D   3 P    P
                                P   I 2 I     I   . R    R
                                L   G   G     R G 5 0  R O
 ID.    CRUISE NAME - SHIP      O   I K I     E I K F  E C  BEGIN     END
 NUM    LEG - PORTS             T   T H T     C T H L  C S  DATE      DATE
-----------------------------------------------------------------------------

        PIQRO6WT CALLAO-CALLAO,PERU    + +* P +* + +* / +        23APR69 20MAY69
        PIQRO7WT CALLAO-CALLAO,PERU    0 0  0 0  + 0   0 +       27MAY69 22JUN69
        PIQRO8WT CALLAO-BALBOA,C.Z.    + +*   0   + +*   0 +     25JUN69 05JUL69
        PIQRO9WT BALBOA-SAN DIEGO      + 0 P 0  .0 0   0 +       09JUL69 11AUG69
    156 PLEIADES-MELVILLE (S.I.)
        PLDS-TMV SAN DIEGO-SAN DIEGO   0 + M 0  M 0  M M  0 0    02APR76 05APR76
        PLDS01MV SAN DIEGO-BALBOA,C.Z. + + 0 +  + +  + 0  0 0    27APR76  5JUN76
        PLDS02MV BALBOA,C.Z.-BALBOA    + + 0 +  + +  + 0  0 0    11JUN76  9JUL76
        PLDS03MV BALBOA,C.Z.-HONOLULU  + + 0 +  M +  M M  0 0    13JUL76 12AUG76
        PLDS04MV HONOLULU-SAN DIEGO    + 0 + +  + 0  + 0  0 0    17AUG76 23SEP76
    016 PROA-SPENCER BAIRD
        PROA01BD SAN DIEGO-GUAM          +*  P    0     0 0      15MAR62 04APR62
        PROA02BD GUAM-SUVA,FIJI        0 0  0 0  0 0   0 0       10APR62 10JUN62
        PROA3ABD SUVA-APIA,SAMOA         +* P +*  0 0   0 0      13JUN62 01AUG62
        PROA3BBD APIA-HONOLULU           +* P +*  0 0   0 0      06AUG62 31AUG62
        PROA04BD HONOLULU-SAN DIEGO      +* P /*  + +*  0 0      04SEP62 03OCT62
    090 QUARTET-HORIZON             + 0 P 0   0 -   0 +          25JAN65  3FEB65
    120 QUEBRADA-T.WASH.            0    0    0                  06NOV69 21DEC69
    017 RISEPAC-SPENCER BAIRD
        RISP01BD SAN DIEGO-CALLAO,PERU + +* M +* + +*  0 +       27OCT61 27NOV61
        RISP02BD CALLAO-PAPEETE,TAHITI + +* M +* + +*  0 +       30NOV61 31DEC61
        RISP03BD PAPEETE-SAN DIEGO     + +* M +* + +*  0 +       03JAN62 05FEB62
    161 SAHUL SHELF - STRANGER (PART OF NAGA EXPEDITION LEG SIIA)
    113 SATPAC-DAVIS
        SATP-1DV SEATTLE-SEATTLE,WASH. + +* P +* + +*  0 0       07SEP68 13SEP68
    117 SCAN-ARGO
        SCAN01AR SAN DIEGO-SAN DIEGO   + +* P +* + +*  + M       04MAR69 30MAR69
        SCAN02AR SAN DIEGO-HONOLULU    + +* P +* + +*  + M       08APR69 04MAY69
        SCAN03AR HONOLULU-YOKOHAMA,JAPAN + +* P +* + +*  + M     10MAY69 09JUN69
        SCAN04AR YOKOHAMA-APRA,GUAM    + +* P +* + +*    M       15JUN69 30JUN69
        SCAN05AR APRA,GUAM-SAN DIEGO   + +* P +* + +*    M       04JUL69 04AUG69
        SCAN06AR SAN DIEGO-HONOLULU    0 0 P 0  0 0   + 0        12AUG69 12SEP69
        SCAN07AR HONOLULU-PAPEETE,TAHITI 0 0 P 0  0 0   0 0      19SEP69 14OCT69
        SCAN08AR PAPEETE-PAPEETE,TAHITI + +* P +* + +*    M      18OCT69 13NOV69
        SCAN09AR PAPEETE-BALBOA,C.Z.   + +* P +* + +*  + M       18NOV69 20DEC69
        SCAN10AR BALBOA-ACAPULCO,MEX.  + +* P +* + +*    M       30DEC69 28JAN70
        SCAN11AR ACAPULCO,MEX.-SAN DIEGO + +* P +* + +*    M     01FEB70 19FEB70
    070 SCOT-BAIRD                 + 0 P -   0 -   0 0           28APR58 07JUL58
    123 SEVEN TOW-T.WASHINGTON
        7TOW01WT SAN DIEGO-HONOLULU    + 0 P 0  + 0    +         22JAN70 24FEB70
        7TOW02WT HONOLULU-HONOLULU     0 0   0  0 0    0         28FEB70 20MAR70
        7TOW3AWT HONOLULU-HONOLULU     + 0 P 0  + 0    +         23MAR70 03APR70
        7TOW3BWT HONOLULU-PAGOPAGO,SAMOA + +* P +* + +*  +       06APR70 22APR70
        7TOW04WT PAGOPAGO-TONGA,TAPU IS. + 0 P 0  + 0  0 +       25APR70 13MAY70
        7TOW05WT TUNGA-APIA,SAMOA      + +* P +* + +*    +       16MAY70 30MAY70
        7TOW06WT APIA,SAMOA-HONOLULU   + +* P +* + +*    M       03JUN70 29JUN70
        7TOW07WT HONOLULU-ADAK,ALASKA  + 0 P 0  0 0    0         02JUL70 23JUL70
        7TOW08WT ADAK-ASTORIA,OREGON   + +* P 0  + +*   M        26JUL70 17AUG70
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                                    NAV DEPTH MAG    SUB  GRAV

                               D    1 D       D   3 P    P
                          P    I    2 I       I   . R    R
                          L    G      G       R G 5 0    R O
 ID.   CRUISE NAME - SHIP      O    1    K I       E I K F    E C   BEGIN   END
 NUM   LEG - PORTS        T    T    H T       C T H L    C S   DATE    DATE
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      7TOW9AWT ASTORIA,ORE-EUREKA,CAL.    0    P 0    + 0             21AUG70 03SEP70
      7TOW9BWT EUREKA-EUREKA,CAL.       + 0    P 0    + 0       M     04SEP70 14SEP70
      7TOW10WT EUREKA-SAN DIEGO,CAL.    + +*   P 0    + +*      M     15SEP70 25SEP70
071 SHELLBACK-HORIZON                        E -    0 -    0 0        17MAY52 27AUG52
072 SHOW-ARGO (SAME AS ZETES LEG 6)
073 SHOW-HORIZON                        + 0    P 0    0 -    0        11MAY56 12JUL56
105 SHUTTLE                                  E -    0 -    0 0         2MAY52 21JUN52
140 SIQUEIROS-THOMAS WASHINGTON (S.I.)
      SIQR-1WT SAN DIEGO-SAN DIEGO      + +*   M +*   + +*    M M   + + 17JUN74 21JUL74
031 SIXPAC-HORIZON
      SIXP-1HO HONOLULU-HONOLULU        + +*   P +*   + +*    0 +     31MAR66 18APR66
095 SOUTHERN BORDERLAND   II-HORIZON    + 0    P 0    0 -    0 0      04DEC59 21DEC59
042 SOUTHERN BORDERLAND   III-BAIRD     + 0    P 0    + 0    0 0      12FEB60 19FEB60
096 SOUTHERN BORDERLAND   IV-BAIRD      + 0    P 0    0 -    0 0      12MAR60 18MAR60
097 SOUTHERN BORDERLAND   V-ORCA        + 0    P 0    0 -    0 0      03AUG60 09AUG60
098 SOUTHERN BORDERLAND   VI-ORCA       + 0    P 0    0 -    0 0      14OCT60 18OCT60
167 SOUTHERN BORDERLANDS-DAVIS
      SOB001DV SAN DIEGO-SAN DIEGO      + 0    P 0    0 0    0 0      11FEB65 26FEB65
      SOB002DV SAN DIEGO-SAN DIEGO      + 0    0 0    0 0    0 +      20DEC65 22DEC65
      SOB003DV SAN DIEGO-SAN DIEGO      + 0    0 0    0 0    0 +      15JAN66 22JAN66
      SOB004DV SAN DIEGO-SAN DIEGO      + 0    P 0    0 0    0 +      05JAN67 11JAN67
      SOB005DV SAN DIEGO-SAN DIEGO      + 0    0 0    0 0    0 +      03FEB67 06FEB67
      SOB006DV SAN DIEGO-SAN DIEGO      + 0    0 0    0 0    0 +      20JUL67 22JUL67
130 SOUTHTOW-T.WASHINGTON (S.I.)
      SOTW00WT SAN DIEGO-SAN DIEGO      + 0    P 0    + 0    0 +   0 0 10DEC71 14DEC71
      SOTW01WT SAN DIEGO-TAHITI         + +*   P +*   + +*    M M   0 0 06JAN72 09FEB72
      SOTW02WT TAHITI-VALPARAISO,CHILE  + +*   M +*   + +*    M M   0 0 15FEB72 21MAR72
      SOTW03WT VALPO-ANTOFAGASTA,CHILE  + +*   P +*   + +*    M M   0 0 31MAR72 20APR72
      SOTW04WT ANTAFA,CHIL-CALLAO,PERU  + +*   M +*   + +*    0 M   0 0 25APR72 15MAY72
      SOTW05WT CALLAO-QUAYAQUIL,ECUADR  + +*   P +*   + +*    + M   0 0 22MAY72 12JUN72
      SOTW06WT GUAYAQUIL-BALBOA,C.Z.    + +*   P +*   + +*    + M   0 0 19JUN72 12JUL72
      SOTW07WT BALBOA,C.Z.-CALLAO,PERU  + +*   P +*   + +*    + M   0 0 18JUL72 07AUG72
      SOTW08WT CALLAO-PAPEETE,TAHITI    + +*   P +*   + +*    + M   0 0 11AUG72 11SEP72
      SOTW09WT PAPEETE-PAGO PAGO,SAMOA  + +*   P +*   + +*    0 M   0 0 18SEP72 19OCT72
      SOTW10WT PAGO PAGO-PAGO PAGO,SAM  + +*   P +*   + +*    + M   0 0 26OCT72 20NOV72
      SOTW11WT PAGO PAGO-APIA,W.SAMOA   + +*   P +*   + +*    + M   0 0 25NOV72 20DEC72
      SOTW12WT PAGO PAGO,SAMOA-HONO,HA  + +*   P +*   + +*    + M   0 0 30DEC72 23JAN73
      SOTW13WT HONO,HAWAII-SAN DIEGO    + +*   P +*   + +*    + 0   0 0 27JAN73 21FEB73
091 SPECTACLE HILLS-HORIZON            + 0    E -    0 -    0 0      16JAN56 22JAN56
084 SPHERES-HORIZON                    0 0    P 0    0 -    0 0
127 SPLIT 1-E.B.SCRIPPS
      SPL1-1EB                         0 +*   P 0       +*   0 0      21AUG69 23AUG69
128 SPLIT 2-E.B.SCRIPPS
      SPL2-1EB                         0 +*   P 0       +*   0 0      25AUG69 29AUG69
026 STEP 1-HORIZON
      STEP01HO SAN DIEGO-CALLAO,PERU    / /*   P /*   0 -    0 0      15SEP60 21OCT60
           (DIGITAL DEPTH TAPE ID='STEP-A')
      STEP02HO CALLAO-ANTOFAGASTA,CHILI                               25OCT60 14NOV60
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                                    NAV DEPTH MAG   SUB  GRAV

                                    D  1 D      D 3 P   P
                                    P  I 2 I      I . R   R
                                    L  G   G    R G 5 0 R 0
     ID.   CRUISE NAME - SHIP       O  I K I    E I K F E C   BEGIN    END
     NUM   LEG - PORTS              T  T H T    C T H L C S   DATE     DATE
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         STEP03HO ANTOFAGASTA-SAN DIEGO   / /* P /* 0 -  0 0      17NOV60 14DEC60
              (DIGITAL DEPTH TAPE ID='STEP-B')
     111 STYX-ALEXANDER AGASSIZ
         STYX01AZ SAN DIEGO-HONOLULU,HAW. + +* P +* + +* 0 0      02APR68 26APR68
         STYX02AZ HONOLULU-PAGO PAGO,SAM. + +* P +* + +* 0 M      02MAY68 24MAY68
         STYX03AZ PAGO PAGO-APIA,SAMOA    + +* P +* + +* 0        28MAY68 16JUN68
         STYX04AZ APIA-APIA,SAMOA         + +* P +* + +* 0        20JUN68 14JUL68
         STYX05AZ APIA-PAGO PAGO,SAMOA    + +* P +* + +* 0        18JUL68 04AUG68
         STYX06AZ PAGO PAGO-HONOLULU      + +* P +* + +* 0        07AUG68 18AUG68
         STYX07AZ HONOLULU-MIDWAY ISLAND  + +* P +* + 0  0        24AUG68 01OCT68
         STYX08AZ MIDWAY-HONOLULU         + +* P +* + +* 0        07OCT68 03NOV68
         STYX09AZ HONOLULU-PAGO PAGO,SAM. + +* P +* + +* 0        08NOV68 25NOV68
         STYX10AZ PAGO PAGO-SAN DIEGO     + +* P +* + +* 0        25NOV68 08DEC68
     022 SWANSONG-ARGO
         SWAN-1AR                         + +* P /* + +* 0 0      05SEP61 1DEC61
     138 TASADAY-THOMAS WASHINGTON (S.I.)
         TSDY01WT SAN DIEGO-HONOLULU      0 0  0 0  0 0  0 0  0 0 05JUN73 02JUL73
         TSDY02WT HONOLULU-HONOLULU       0 +* 0 0  0 0  0 0  0 0 06JUL73 17JUL73
         TSDY03WT HONOLULU-YOKOHAMA,JAPAN + +* P +* + +* + M  0 0 21JUL73 06AUG73
         TSDY04WT YOKOHAMA-YOKOHAMA       + +* M +* 0 0  0 0  0 0 10AUG73 10SEP73
         TSDY05WT YOKOHAMA-SINGAPORE      + +* P +* + +* M M  0 0 13SEP73 06OCT73
         TSDY06WT SINGAPORE-SINGAPORE     + +  0 +  + +  M M  + 0 13OCT73 20NOV73
         TSDY07WT SINGAPORE-APRA,GUAM     + +* P +* + +* + M  + 0 27NOV73 21DEC73
         TSDY08WT APRA,GUAM-HONOLULU      + +* P +* + +* M M  + 0 27DEC73 16JAN74
         TSDY09WT HONOLULU-HONOLULU       + +* P +* + +* 0 0  0 0 22JAN74 17FEB74
                  ( THERE IS NO LEG 10 )
         TSDY11WT HONOLULU-SAN DIEGO      + +* 0 0  0 0  0 0  0 0 23FEB74 18MAR74
     159 T.B. DAVIE
         TBD 01TD                         + +  0 0  0 +* 0 0      03OCT74
         TBD 02TD                         + +  0 0  0 +* 0 0      15OCT74
     007 TETHYS-SPENCER BAIRD
         TETH01BD SAN DIEGO-HONOLULU,HA.  + +  P 0  0 0  0 0      14JUN60 16JUL60
         TETH02BD HONOLULU-HONOLULU       + +* P /* 0 0  0 0      17JUL60 01AUG60
         TETH03BD HONOLULU-SAN DIEGO      + +* P /* 0 0  0 0      04AUG60 18AUG60
     134 TIPTOW-T.WASHINGTON
         TPTW-1WT                         0 +          +* 0 M     24APR68 15MAY68
     110 TODOS SANTOS-SMITH                    P 0  + 0  0 0      28SEP59 03OCT59
     109 TORO-BAIRD                            E -  0 -  0 0      7MAY53 19MAY53
     114 TOW I-.WASH                      + 0 P -  + 0  0 +       07SEP66 05OCT66
     164 TOW JUAN-WASHINGTON              + 0 P 0  0 0  0 0       15MAY67 23MAY67
     135 TOWMAS-T.WASHINGTON
         TOWM-1WT                         0 +          +* 0 M     07NOV67 10DEC67
     074 TRANSPAC-BAIRD                   + 0 E -  0 -  0 0       23JUL53 30NOV53
     028 TRIPOD-ARGO
         TRIP01AR SAN DIEGO-PUNTARENAS    + +* M +* + +* 0 0      14OCT66 10NOV66
         TRIP02AR PUNTARENAS-ACAPULCO     + +* M +* + +* 0 0      14NOV66 29NOV66
         TRIP03AR ACAPULCO-SAN DIEGO      + +* M +* + +* 0 0      02DEC66 21DEC66
     036 T. WASHINGTON-65-1
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                            NAV  DEPTH MAG   SUB  GRAV

                         D  1 D      D 3 P    P
                      P  I 2 I      I . R    R
                      L  G   G    R G 5 0    R O
 ID.   CRUISE NAME - SHIP   O  I K I    E I K F    E C   BEGIN    END
 NUM   LEG - PORTS          T  T H T    C T H L    C S   DATE     DATE
------------------------------------------------------------------------

       W651-1WT                 + +* P 0   + +* 0 M     07FEB66 01MAR66
 108 VACQUIER MAG-S.BAIRD         0 P 0   + 0  0 0      30JUL59 28AUG59
 075 VERMILION SEA-BAIRD          0 P 0   0 -  0 0        FEB59   JUN59
 076 VERMILION SEA-HORIZON        0 P 0  ·0 -  0 0        FEB59   JUN59
 107 VIZCAINO BAY-HORIZON         0 E -   0 -  0 0      31JAN56  7FEB56
 024 WAHINE-BAIRD
     WAHI01BD SAN DIEGO-HONOLULU + 0 M 0   0 -  0 0      16FEB65 19MAR65
     WAHI02BD HONOLULU-SAN DIEGO     M 0   0 -  0 M      22MAR65 10APR65
 077 WIGWAM-BAIRD                 0 E -   0 -  0 0
 078 WIGWAM-HORIZON               0 E -   0 -  0 0
 079 WIGWAM-PAOLINA-T             0 E -   0 -  0 0
 080 WIGWAM-T-441                 0 E -   0 -  0 0
 147 WILDCAT-OT                     P 0             M    20AUG67 25SEP67
 106 YOYO-BAIRD                     E -   0 -  0 0      20FEB54  3MAR54
 027 ZAPOTEC-BAIRD             + /* P /*  0 -  0 0      24OCT60  6NOV60
 081 ZEPHYRUS-HORIZON          + 0 P 0   0 -  0 +      17JUN62 16SEP62
 034 ZETES - ARGO
     ZTES01AR SAN DIEGO-KODIAK,ALASKA + +  P 0   0 0  0 0   04JAN66 24JAN66
     ZTES2AAR KODIAK-ADAK,ALASKA      + +* P +*  0 0  0 0   27JAN66 20FEB66
     ZTES2BAR ADAK-HAKODATE,JAPAN     + +* P +*  + +* 0 0   23FEB66 01APR66
     ZTES03AR HAKODATE-HAKODATE,JAPAN + +* P +*  + +* 0 +   05APR66 02MAY66
     ZTES04AR HAKODATE-TOKYO,JAPAN    + +* P +*  + +* 0 +   06MAY66 26MAY66
     ZTES4BAR TOKYO-TOKYO,JAPAN       + +* P +*  + -  0 0   30MAY66 05JUN66
     ZTES05AR TOKYO-HONOLULU,HAWAII   + +* P +*  + +* 0 0   10JUN66 21JUN66
     ZTES06AR HONOLULU-HILO,HAWAII    + +* P +*  + +* 0 0   23JUN66 12JUL66
     ZTES6BAR HILO-HONOLULU,HAWAII    + +* P +*  + +* 0 0   13JUL66 18JUL66
     ZTES07AR HONOLULU-SAN DIEGO      + +* P +*  + +* 0 0   23JUL66 08AUG66
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                                    NAV  DEPTH  MAG   SUB   GRAV

                                    D    1 D    D 3 P    P
                                  P I    2 1    I . R    R
                                  L G    G      R G 5 D  R O
   ID.   CRUISE NAME - SHIP       O I    K I    E I K F  E C   BEGIN    END
   NUM   LEG - PORTS              T T    H T    C T H L  C S   DATE     DATE
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*** NON-SIO CRUISES PROCESSED BY U/W DATA PROCESSING GROUP ***

```
901 EXPLORER 60
    XP6001EX                         + +* 0 -  + +* 0 0      17FEB60
150 GALLIENI
    GAL14AGA REUNION-MAURITIUS(PART)  0 /  0 /  0 0  0 0     16FEB71 19FEB71
    GAL14BGA MADAGAS.-C.RECIFE(PART)  0 /  0 /  0 0  0 0     17MAR71 24APR71
    GAL15AGA REUNION-KERGUELEN(PART)  0 /  0 /  0 0  0 0     10FEB72 17FEB72
    GAL15BGA KERGUELEN-MAURIT.(PART)  ) /  0 /  0 0  0 0     14MAR72 19MAR72
544 HUNT
    HUNTO1HT                          + +* + +* + +*         06OCT69 26OCT69
    HUNTO2HT                          + +* + +* + +*         02NOV69 23NOV69
    HUNTO3HT                          + +* + +* + +*         29NOV69 17DEC69
151 MARION DUFRESNE
    MDUFOAMD REUNION-REUNION(PART)    0 /  0 /  0 0  0 0     28APR73 11MAY73
    MDUFOBMD REUNION-MAURITIUS(PART)  0 /  0 /  0 0  0 0     29MAY73  6JUN73
    MDUF1AMD MAURITIUS-REUNION(PART)  0 /  0 /  0 0  0 0     11JUN73 16JUN73
    MDUF1BMD REUNION-MAURITIUS(PART)  0 /  0 /  0 0  0 0      8JUL73 11JUL73
    MDUFO3MD REUNION-KERGUELEN(PART)  0 /  0 /  0 0  0 0     27MAR74 29MAR74
154 MEL1-1-MELVILLE
    MEL1-1MV SAN DIEGO-SAN DIEGO      + +  0 0  + 0  + 0     10APR76 16APR76
888 SEIFUMARU-70
    SF70-1SF                          0 +* 0 +* 0 0  0 M     20MAY70
543 SILASBENT-BENT
    SILSO1BT                          + +* + +* + +*         05OCT69 23OCT69
    SILSO2BT                          + +* + +* + +*         29OCT69 23NOV69
    SILSO3BT                          + +* + +* + +*         29NOV69 21DEC69
809 VALERO-70
    VL70-1VR                          0 +* 0 0  0 +* 0 0     18NOV70 01DEC70
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SIO2 NAVIGATION FORMAT

****
NAVIGATION TIME SERIES - GENERAL INFORMATION
****

1. FORMAT = SIO2(SCRIPPS DESIGNATION)
2. TIME BASE = HOUR, MINUTE, MONTH, DAY, YEAR (GMT)
3. SIGN CONVENTION = (SEE FORMAT)
4. POSITION CONTROL = SATELLITE NAVIGATION
5. CRITERIA FOR TURNING POINT SELECTION = GYRO AND E-M LOG SAMPLED AT 2 SEC.
   INTERVALS, AVERAGED FOR 2 MIN. INTERVALS AND THIS VALUE STORED. A COURSE
   OR SPEED CHANGE IS DEFINED AS OCCURRING WHENEVER THE DR POSITION FROM A
   GIVEN 2 MIN. VALUE DIFFERS FROM THE POSITION DETERMINED FROM EXTENDING
   THE PREVIOUS 2 MIN. VALUE BY MORE THAN 0.01 MILE.
6. CURRENT VELOCITY DETERMINATION = (NOT SUPPLIED IN SIO2 FORMAT)
7. TRACK CORRECTION METHOD = STANDARD METHOD FOR TRACK BETWEEN PAIRS OF FIXES.
   DRIFT(CURRENT) VECTOR CALCULATED BY DIFFERENCE IN POSITION OF DR TRACK
   AND SECOND FIX. THIS VECTOR THEN ADDED PROPORTIONALLY TO ALL COURSE AND
   SPEED POINTS BETWEEN THE TWO FIXES.

* NAVIGATION FORMAT(SIO2) *

    FORMAT(1X,2I2,1X,3I2,I4,2X,I2,1X,F4.1,A1,1X,I3,1X,F4.1,A1,2X,2A8,10X,2A8)

COLS.	FORMAT	VARIABLE
2- 3	I2	HOURS, TIME OF NAV. POINT
4- 5	I2	MINUTES
7- 8	I2	MONTH
9-10	I2	DAY
11-12	I2	YEAR
13-16	I4	TIME ZONE (INTEGER ONLY - BLANK, 0, OR -0 IF GMT)
19-20	I2	LATITUDE, DEGREES
22-25	F4.1	LATITUDE, MINUTES AND TENTHS
26	A1	LATITUDE, HEMISPHERE, N=NORTH, S=SOUTH
28-30	I3	LONGITUDE, DEGREES
32-35	F4.1	LONGITUDE, MINUTES AND TENTHS
36	A1	LONGITUDE, HEMISPHERE, E=EAST, W=WEST
39-54	2A8	COMMENTS ABOUT POINT(SAT=SATELLITE FIX,*=STAR FIX, LOR=LORAN,RAD=RADAR,LAN=LOCAL APPARENT NOON, C/C=COURSE CHANGE,C/S=SPEED CHANGE,C/CS=BOTH CSE AND SPEED CHANGE (THIS COMMENT FIELD WILL BE BLANK IF GENERATED ON IBM 1800 COMPUTER)
65-80	2A8	CRUISE,SHIP,LEG IDENTIFICATION (CRUISE AND LEG IN COLS.65-69 IF GENERATED ON IBM 1800 COMPUTER,AND REMAINDER OF FIELD IS BLANK)

       $$$ END DOCUMENTATION - SIO2 NAVIGATION FORMAT $$$

SIO2 DEPTH/MAGNETICS FORMAT
------------- -----------------

```
**************************************
DEPTH TIME SERIES - GENERAL INFORMATION
**************************************
```

1. FORMAT = SIO2(SCRIPPS DESIGNATION)
2. TIME BASE = HOUR,MINUTE,DAY,MONTH,YEAR(GMT)
3. FATHOMETER = GIFFT DEPTH RECORDER
4. TRANSDUCER DEPTH(R/V MELVILLE) = APPROX. 15 FEET (NO CORRECTION APPLIED)
5. DEPTHS IN FATHOMS(800FM/SEC.ASSUMED SOUND VELOCITY)
6. NO SOUND VELOCITY CORRECTIONS APPLIED.
7. DIGITIZED FROM VALUES LOGGED MANUALLY FROM ANALOGUE RECORD AT 5 MINUTE INT.
8. ESTIMATED ACCURACY FROM TRACK CROSSINGS = 0.2 TO 2 MILE

```
******************************************
MAGNETIC TIME SERIES - GENERAL INFORMATION
******************************************
```

1. FORMAT = SIO2(SCRIPPS DESIGNATION)
2. TIME BASE = HOUR,MINUTE,DAY,MONTH,YEAR(GMT)
3. INSTRUMENT USED = VARIAN MAGNETOMETER
4. READINGS IN GAMMA,TOTAL FIELD,NO REGIONAL FIELD OR DIURNAL VARIATION REMOVED
5. DIGITIZING INTERVAL = 5 MINUTES FROM DATA AUTO LOGGED AT 1 MINUTE INTERVAL
6. AVERAGE DISTANCE SENSOR TOWED BEHIND SHIP = 500 FEET
7. ESTIMATED ACCURACY FROM TRACK CROSSINGS = 0.2 TO 2 MILE

* DEPTH OR MAGNETIC TIME SERIES FORMAT(SIO2) *

TIME SERIES DECKS CONTAIN 2 FORMATS. ONE DAY-HEADER CARD PRECEEDS THE DATA
CARDS FOR EACH DAY. THE LAST CARD CONTAINING DATA(WHICH MAY BE PARTIALLY
BLANK) FOR EACH DAY IS FOLLOWED BY A BLANK CARD. MORE THAN ONE DAY-HEADER
CARD MAY BE REQUIRED PER DAY IF THE TIME ZONE CHANGES.

```
- DAY-HEADER CARD FORMAT -
  FORMAT(I2,1X,I2,1X,I4,3X,F5.1)
```

COLS.	FORMAT	VARIABLE
1- 2	I2	DAY
4- 5	I2	MONTH
7-10	I4	YEAR
14-18	F5.1	TIME ZONE

```
- DATA CARD FORMAT -
  FORMAT(8(1X,I2,I2,I5))
```

COLS.	FORMAT	VARIABLE
2- 3	I2	HOUR
4- 5	I2	MINUTE
6-10	I5	DEPTH (IN UNCORRECTED FATHOMS) OR MAGNETICS (TOTAL FIELD IN GAMMA)
11-20 TO 71-80		ABOVE SEQUENCE REPEATS

$$$ END DOCUMENTATION - SIO2 DEPTH/MAGNETICS FORMAT $$$

TIME IN ACCUM. MINUTES-VS-NAVIGATION FORMAT

S M SMITH (S.I.O.) NOV. 7,1969 (REV. JUNE 1972)

HEADER CARD
------ ----

CARD FORMAT(I4,1X,A8,1X,2A8,I4,1X,I4,1X,I6,I4,1X,A8,A4)

COL.	FORMAT	EXPLANATION
1- 4	I4	FILE NUMBER OF SOURCE TAPE
6-13	A8	ALPHAMERIC IDENTIFIER OF SOURCE TAPE
15-30	2A8	ALPHAMERIC CRUISE,SHIP,LEG IDENTIFIER
31-34	I4	CRUISE ID. NUMBER
36-39	I4	START TIME OF DATA IN HOURS AND MINUTES
41-46	I6	START DATE OF DATA (MONTH,DAY,YEAR)
47-50	I4	START TIME ZONE OF DATA(NEGATIVE EAST OF GREENWICH, POSITIVE TO WEST)
52-63	A8,A4	DATE DATA WAS ADDED TO SOURCE TAPE

DATA CARDS
---- -----

CARD FORMAT(I7,2F10.3,F10.2,I5)

COL.	FORMAT	EXPLANATION
1- 7	I7	TIME IN ACCUMULATED MINUTES FROM START OF DATA FILE
8-17	F10.3	LATITUDE (DECIMAL DEGREES FROM EQUATOR,POSITIVE TO NORTH, NEGATIVE TO SOUTH)
18-27	F10.3	LONGITUDE (DECIMAL DEGREES,ORIGIN AT GREENWICH MERIDIAN INCREASING POSITIVELY TO WEST 0 TO 359.9999...
28-37	F10.2	DISTANCE IN NAUTICAL MILES FROM START OF DATA FILE
38-42	I5	POINT IDENTIFIER

```
                              = 1 FIRST POINT OF FILE
                              = 2 CALCULATED POINT OR FIX
                              = 3 (DEPTH OR MAGNETIC DATA FLAG)
                              = 4 FIVE DEGREE CROSSING - SOUTH TO NORTH
                              = 5 FIVE DEGREE CROSSING - NORTH TO SOUTH
                              = 6 FIVE DEGREE CROSSING -  WEST TO EAST
                              = 7 FIVE DEGREE CROSSING -  EAST TO WEST
```

TAPE FORMAT (AS WRITTEN ON CDC 3600 AT UCSD COMPUTER CENTER)

TAPE IS 7 TRACK,EVEN(BCD)PARITY,NRZ MODE. DENSITY WILL BE 200,556,OR 800 BPI AS
REQUESTED. EACH CRUISE LEG FORMS A FILE TERMINATED BY AN EOF MARK. THE 80 CHAR-
ACTER CARD IMAGES ARE BLOCKED INTO RECORDS OF 8000 CHARACTERS(100 CARDS). THE
LAST RECORD OF EACH FILE WILL BE FILLED OUT WITH BLANKS(OR OTHER CHARACTER AS
REQUESTED). THE HEADER CARD IMAGE IS IN THE FIRST 80 CHARACTERS OF THE FIRST
RECORD OF EACH FILE. THE EOF MARK OF THE LAST FILE IS FOLLOWED BY A TERMINATION
LABEL CONSISTING OF AN EOF MARK AND A 16 CHARACTER BCD RECORD'□ENDREEL FINAL '
(WHERE □ IS EQUIVALENT TO 36 OCTAL EXTERNAL BCD CODE)

$$$ END DOCUMENTATION - TIME IN ACCUM. MINUTES-VS-NAVIGATION $$$

TIME IN ACCUM. MINUTES-VS-DEPTH OR MAGNETICS FORMAT

S M SMITH (S.I.O.)   NOV. 7,1969

HEADER CARD
------ ----

CARD FORMAT(I4,1X,A8,1X,2A8,I4,1X,I4,1X,I6,I4,1X,A8,A4)

COL.	FORMAT	EXPLANATION
1- 4	I4	FILE NUMBER OF SOURCE TAPE
6-13	A8	ALPHAMERIC IDENTIFIER OF SOURCE TAPE
15-30	2A8	ALPHAMERIC CRUISE,SHIP,LEG IDENTIFIER
31-34	I4	CRUISE ID. NUMBER
36-39	I4	START TIME OF DATA IN HOURS AND MINUTES
41-46	I6	START DATE OF DATA (MONTH,DAY,YEAR)
47-50	I4	START TIME ZONE OF DATA(NEGATIVE EAST OF GREENWICH, POSITIVE TO WEST)
52-63	A8,A4	DATE DATA WAS ADDED TO SOURCE TAPE

DATA CARDS (PRINTED LIST HAS SPACES ADDED FOR LEGIBILITY)
---- -----

CARD FORMAT(16I5)

COL.	FORMAT	EXPLANATION
1- 5	I5	TIME OF DEPTH OR MAGNETIC VALUE(I) IN ACCUMULATED MINUTES FROM START OF DATA FILE
6-10	I5	VALUE(I) DEPTH IN UNCORRECTED FATHOMS MAGNETICS,TOTAL FIELD IN GAMMA,RECORDED VALUE ROUNDED DOWN TO NEXT LOWER INTEGER MULTIPLE OF 5 GAMMA
11-15	I5	TIME OF VALUE(I+1)
16-20	I5	VALUE(I+1)
.		
.		
71-75	I5	TIME OF VALUE(I+7)
76-80	I5	VALUE(I+7)

TAPE FORMAT (AS WRITTEN ON CDC 3600 AT UCSD COMPUTER CENTER)

TAPE IS 7 TRACK,EVEN(BCD)PARITY,NRZ MODE. DENSITY WILL BE 200,556,OR 800 BPI AS
REQUESTED. EACH CRUISE LEG FORMS A FILE TERMINATED BY AN EOF MARK. THE 80 CHAR-
ACTER CARD IMAGES ARE BLOCKED INTO RECORDS OF 8000 CHARACTERS(100 CARDS). THE
LAST RECORD OF EACH FILE WILL BE FILLED OUT WITH BLANKS(OR OTHER CHARACTER AS
REQUESTED). THE HEADER CARD IMAGE IS IN THE FIRST 80 CHARACTERS OF THE FIRST
RECORD OF EACH FILE. THE EOF MARK OF THE LAST FILE IS FOLLOWED BY A TERMINATION
LABEL CONSISTING OF AN EOF MARK AND A 16 CHARACTER BCD RECORD'□ENDREEL FINAL '
(WHERE □ IS EQUIVALENT TO 36 OCTAL EXTERNAL BCD CODE)

$$$ END DOCUMENTATION - TIME IN ACCUM. MINUTES-VS-DEPTH/MAGNETICS $$$

NAS NAVIGATION FORMAT

*** TAPE CHARACTERISTICS ***

Tape is 7 track, 556 bpi density, even parity mode.

*** PHYSICAL RECORD STRUCTURE ***

Physical records are fixed length of 5200 BCD characters containing 100 logical records of 52 characters each. The last physical record in each file is filled out to 8000 characters as necessary with blanks.

*** FILE STRUCTURE ***

Each file is terminated by an EOF mark and contains navigation points for one cruise leg (about one ship-month).

*** LOGICAL RECORD STRUCTURE ***

See sample given below and next page, reproduced from "Formats for Marine Geophysical Data Exchange", publication of the National Research Council, National Academy of Sciences, June 1972.

NAS NAVIGATION FORMAT (continued)

Each point in the navigation time series should be represented by one record containing the following parameters:

Parameter	Format	Value
Ship and cruise identification	xxxxxxxx	V2108
Time zone	±xx.xx	-05.5
Year	xx	69
Month	xx	10
Day	xx	23
Hour	xx	12
Minute	xx.x	15.7
Latitude	±xx.xxxx	-35.1234 + for north / - for south
Longitude	±xxx.xxxx	-178.1234 + for east / - for west
Navigation point identification	x	1 (1 for fix, 2 for change of course and/or speed
Fix description *	x	1
Azimuth of current	xxx	320 degrees following the navigation point
Velocity of current	xx.x	2.7 knots following the navigation point

---

* Code for fix description

0	Unspecified	6	Loran A
1	Decca	7	Loran C
2	Visual	8	Omega or VLF
3	Radar	9	Satellite
4	Celestial - Star fix		
5	Celestial - Advanced sun line		

$$$ END DOCUMENTATION - NAS NAVIGATION FORMAT $$$

NGDC MERGE-MERGE FORMAT

*** TAPE CHARACTERISTICS ***
Tape is 7 track, 556 bpi density, even parity mode.

*** FILE STRUCTURE ***
Each file is terminated by an EOF mark and contains data for one cruise
leg (about one ship-month).

*** PHYSICAL RECORD STRUCTURE ***
Physical records are fixed length of 8000 BCD characters containing 100
logical records of 80 characters each. The last physical record in each
file is filled out to 8000 characters as necessary with blanks.

*** LOGICAL RECORD STRUCTURE ***
See sample below, reproduced from "Formats for Marine Geophysical Data
Exchange", a publication of the National Research Council, National
Academy of Sciences, June 1972.

* = Fields not present(filled with blanks) on tapes generated at SIO as of April 1976.
Each logical record includes time-date;position;depth in fathoms(800 fm/sec.);
magnetic total field; magnetic residual(anomaly,with field removed with IGRF1965),
all interpolated to even 5 minute intervals of ship time. Depth and magnetics
originally logged at non-five minute intervals are interpolated if break in data
does not exceed 15 minutes. If gap is greater,then that field is blank filled.

$$\$\$\$ \text{ END DOCUMENTATION} - \text{NGDC MERGE-MERGE FORMAT } \$\$\$$$

```
C   ***********************************
C   **          DESCRIPTION OF          **
C   ** S.I.O. MODIFIED MERGED TAPES **
C   ***********************************
C
C
C
C         DOCUMENTED BY STUART M. SMITH
C         UNDERWAY DATA PROCESSING GROUP
C         GEOLOGICAL DATA CENTER
C         SCRIPPS INSTITUTION OF OCEANOGRAPHY
C         LA JOLLA, CALIFORNIA 92037
C         APRIL 1975
C
C
C
C   ***************
C   *** GENERAL ***
C   ***************
C   THIS FORMAT HAS BEEN DEVELOPED TO TRANSFER HISTORICAL S.I.O. DEPTH ,MAGNETIC
C   FIELD,AND MAGNETIC ANOMALY DATA TO THE MARINE GEOLOGY AND GEOPHYSICS BRANCH,
C   NATIONAL GEOPHYSICAL AND SOLAR-TERRESTRIAL DATA CENTER,
C   ENVIRONMENTAL DATA SERVICE,NOAA,WASHINGTON,D.C.
C   EACH FILE ON TAPE CONTAINS ONE OF THE THREE ABOVE DATA TYPES FOR ONE CRUISE
C   LEG (ABOUT ONE SHIP-MONTH). EACH LOGICAL RECORD CONTAINS THE GMT TIME,DATE,
C   POSITION, AND VALUE FOR ONE DATA POINT.
C
C
C   ******************************
C   *** TAPE CHARACTERISTICS ***
C   ******************************
C   TAPE IS 7 TRACK,556 BPI,EVEN PARITY MODE.
C
C
C   ****************************
C   *** TAPE ORGANIZATION ***
C   ****************************
C   EACH TYPE OF DATA(DEPTH,MAGNETIC TOTAL FIELD AND MAGNETIC ANOMALY) IS STORED
C   ON A SEPARATE SERIES OF TAPES IN ALPHABETIC ORDER OF CRUISE NAME, ONE
C   CRUISE LEG PER FILE.   DEPTH IS ON TAPE 'MERDP-1' THROUGH TAPE 'MERDP-4'.
C          MAGNETIC TOTAL FIELD IS ON TAPE 'MERMG-1' THROUGH TAPE 'MERMG-4'.
C             MAGNETIC ANOMALY IS ON TAPE 'MERAN-1' THROUGH TAPE 'MERAN-4'.
C
C
C   ***********************************
C   *** PHYSICAL RECORD STRUCTURE ***
C   ***********************************
C   PHYSICAL RECORDS ARE FIXED LENGTH OF 8000 BCD CHARACTERS CONTAINING 200 LOG-
C   ICAL RECORDS OF 40 CHARACTERS EACH( IDENTIFIER BLOCK IS AN EXCEPTION,SEE
C   BELOW). LAST RECORD OF EACH FILE IS FILLED OUT TO 8000 CHARACTERS AS NECESS-
C   ARY WITH BLANKS.
C
C
C   ***********************************
C   *** LOGICAL RECORD STRUCTURES ***
C   ***********************************
C
C   * IDENTIFIER BLOCK FORMAT *   (THE ID BLOCK IS CONTAINED IN THE FIRST 80
C                                  CHARACTERS OF THE FIRST RECORD OF EACH FILE).
C
```

```
C   CHAR.    FORMAT   VARIABLE
C   -----    ------   --------
C   1-3       I3      FILE NUMBER ON SIO SOURCE TAPE
C   4-11      A8      SIO SOURCE TAPE IDENTIFIER
C   12-27     A16     FILE IDENTIFIER (SEE DESCRIPTION BELOW)
C   28-30     I3      CRUISE ID NUMBER(ASSIGNED IN CHRON. ORDER OF PROCESSING)
C   31-32     I2      HOUR      OF FIRST NAV. POINT FOR LEG (SEE NOTE BELOW)
C   33-34     I2      MINUTE    OF FIRST NAV. POINT
C   35-36     I2      MONTH     OF FIRST NAV. POINT
C   37-38     I2      DAY       OF FIRST NAV. POINT
C   39-40     I2      YEAR      OF FIRST NAV. POINT
C   41-43     I3      TIME ZONE OF FIRST NAV. POINT
C   44-55     A12     DATE FILE ADDED TO SIO SOURCE TAPE
C
C   ** NOTE **   TIMES ASSOCIATED WITH VALUES IN DATA RECORDS ARE IN GMT REGARD-
C                LESS OF TIMEZONE ORIGINALLY USED TO RECORD DATA.  NOTE ALSO
C                THAT THE TIME OF THE FIRST DATA POINT MAY OR MAY NOT BE
C                AT THE SAME TIME AS THAT GIVEN FOR THE FIRST NAVIGATION
C                POINT (EVEN AFTER CONVERTED TO GMT).
C
C   * FILE IDENTIFIER *  THE 16 CHARACTER FILE IDENTIFIER IS LOCATED IN CHAR-
C   ACTERS 12-27 OF THE IDENTIFIER BLOCK.  IT CONTAINS THE CRUISE-LEG-SHIP ID,
C   FILE TYPE,AND FLAGS TO INDICATE POSITION CONTROL,UNITS OF MEASUREMENT,
C   CALIBRATION OR CORRECTIONS APPLIED, AND DIGITIZING INTERVAL.
C
C
C   FILE
C   IDENT.
C   CHAR.    VARIABLE    CONTENTS
C   ---------------------------------------------------------------------------
C   1-4      CRUISE ID.  4 LETTER ABBREVIATION TO MATCH SAMPLE AND CRUISE INDEX.
C
C   5-6      LEG NUMBER  (01,02,3A,ETC.  '-1' INSTEAD OF '01' INDICATES
C                        SINGLE LEG CRUISE.).
C
C   7-8      SHIP ID.    2 LETTER CODE TO MATCH SAMPLE AND CRUISE INDEX.
C
C   9        '-'         (MINUS CHARACTER).
C
C   10-11    FILE TYPE...A=MAG ANOMALY VERSUS  N=NAVIGATION OR  T=TIME
C                        M=MAG. FIELD  VERSUS  N=NAVIGATION OR  T=TIME
C                        D=DEPTH       VERSUS  N=NAVIGATION OR  T=TIME
C                        G=GRAVITY     VERSUS  N=NAVIGATION OR  T=TIME
C                        N=NAVIGATION  VERSUS  T=TIME
C
C                        FOR EXAMPLE, DT=DEPTH VS. TIME
C                                     MN=MAG. TOTAL FIELD VS. NAVIGATION
C                                     NT=NAVIGATION VS. TIME
C
C   12       UNITS.......DEPTH........F=FATHOMS
C                                     M=METERS
C                                     T=TIME IN SECONDS
C                        MAGNETICS....G=GAMMAS
C                                     M=MASONS(SIO UNIT=GAMMA/5)
C                        GRAVITY......G=GAUSS
C                        NAVIGATION...CSE/SPEED CHANGE
C                                     R=REQUESTED CHANGE
C                                     A=AUTO LOGGED
C
```

```
C     13          CALIBRATION.DEPTH........8=800 FM/SEC.
C                 OR                       2=820 FM/SEC.
C                 CORRECTION               4=1463 M/SEC.
C                                          5=1500 M/SEC.
C                                          M=CORRECTED BY MATTHEWS TABLES
C                          MAG ANOMALY..5=IGRF 1965.0
C                          MAG FIELD....='*'
C                          NAVIGATION...TRACK ADJUSMENT
C                                       L=LINEAR INTERPOLATION BETWEEN FIX PAIRS.
C                                       S=LEAST SQUARES FIT TO SERIES OF FIXES.
C                                       H=HAND ADJUSTED TO TRACK CROSSINGS,ETC.
C
C     14          DIGITIZING..DEPTH, MAGNETICS,AND GRAVITY
C                 INTERVAL                 1=1 MINUTE OF SHIPTIME
C                                             TO
C                                          9=9 MINUTES
C                                          T=10 MINUTES
C                                          F=15 MINUTES
C                                          H=HALF HOUR
C                                          P=PEAK AND TROUGH OR CHANGE OF SLOPE.
C
C                          NAVIGATION...DEFINITION OF CSE/SPEED CHANGE IF
C                                       AUTO LOGGING IS USED.
C                                       1=.01 MILE DEVIATION FROM PREVIOUS POINTS.
C                                        ='*' IF NOT AUTOLOGGED.
C
C
C     15-16       POSITION....MAJOR CONTROL(CHAR. 15),MINOR CONTROL(CHAR.16)
C                 CONTROL                  S=SATELLITE
C                                          C=CELESTIAL
C                                          R=RADAR
C                                          L=LORAN
C                                          O=OMEGA
C                                          D=DEAD RECKONING
C
C
C     * DATA RECORD FORMAT *   (TIME AND DATE ARE IN GMT)
C
C     CHAR.    FORMAT   VARIABLE
C     -----    ------   --------
C     2-3      I2       YEAR
C     5-6      I2       MONTH
C     8-9      I2       DAY
C     11-12    I2       HOUR
C     13-14    I2       MINUTE
C     16-23    F8.4     LATITUDE(DECIMAL DEGREES,NORTH(+),SOUTH(-))
C     25-33    F9.4     LONGITUDE(DECIMAL DEGREES,EAST(+),WEST(-))
C     35-40    I6       DATA VALUE,DEPENDING ON DATA TYPE
C                          DEPTH=FATHOMS(800 FM/SEC CALIBRATION).
C                       MAGNETIC TOTAL FIELD = GAMMA (TRUNCATED TO NEXT LOWEST
C                          5 GAMMA MULTIPLE (E.G. 45784 STORED AS 45780).
C                       MAGNETIC ANOMALY = GAMMA (TRUNCATED AS ABOVE. REGIONAL
C                          FIELD REMOVED USING IGRF 1965.0 BY LINEAR INTERPOLATION
C                          BETWEEN NAVIGATION POINTS LOCATED NO MORE THAN
C                          200 MILES APART ALONG SHIP TRACK.)
C
C     $$$ END DOCUMENTATION - S.I.O. MODIFIED MERGED TAPES $$$
```

ORDER FORM

Track Charts of Digitized Depth and Magnetic Data from Scripps Cruises
Processed Through December 1977

Four track charts on Mercator projection at a scale of 0.312 inches per degree
longitude accompany SIO Reference Report 78-15.

        Chart 1:   North Pacific Ocean

        Chart 2:   South Pacific Ocean

        Chart 3:   North Atlantic/Indian Oceans

        Chart 4:   South Atlantic/Indian Oceans

To obtain ozalid copies of these charts, contact:

        Stuart M. Smith A-023
        Geological Data Center
        Scripps Institution of Oceanography
        University of California, San Diego
        La Jolla, California 92093

Send track charts of digitized depth and magnetic data (SIO Reference 78-15) to:

Name_____

Address_____

       _____

       _____

circle charts requested: 1   2   3   4