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OPERATIONS REPORT
OF HIGH-RESOLUTION
MARINE GEOPHYSICAL
SURVEY - GULF OF MEXICO

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INTRODUCTION

During the Summer of 1980, Intersea Research Corporation collected high-resolution marine geophysical data in the Gulf of Mexico for the U.S. Geological Survey (USGS). A total of 13,061 kilometers were surveyed on the Federal Outer Continental Shelf (OCS) for the Federal Government. Data obtained were delivered to the U.S.G.S. for its own internal uses. The area surveyed by Intersea was distributed across the Gulf of Mexico from the High Island Area offshore Texas to the South Marsh Island Area off Louisiana. The data collection effort was conducted from July through September, 1980 utilizing two survey vessels. U.S.G.S. data quality checks and inspections, and technological input continued throughout the duration of the project.

This report presents a summary of the field operations which includes a chronology of events, a description of the vessels, descriptions of the navigational and geophysical equipment, and an outline of the field procedures used in data collection. Operational statistics computed for the survey vessels are also presented. The appendices to this Operations Report present materials on the electronic navigational systems, the manufacturer's specifications sheets for the geophysical equipment used, the shipboard procedures and duties of the seismic crew, and the daily operator logs for each of the survey vessels.

DESCRIPTION OF INSTRUMENTS

The survey vessels, navigation instruments, and geophysical equipment used in the data collection are briefly described below. The equipment per survey vessel is listed in Tables 1 and 2. More detailed information regarding specific pieces of equipment can be found in Appendices A and B.

Survey Vessels

At the project's conception, only one vessel appeared necessary to meet the proposed deadlines. The 100-foot M/V AMARILLO under charter from Brazosport Marine Service, Inc., Freeport, Texas, was promptly reoutfitted after completing a previous U.S.G.S. shoot in the Gulf of Mexico. Part-way through the project, the AMARILLO was diverted to reshoot a portion of an earlier project and encountered weather delays. This necessitated mobilization of a second vessel to insure the meeting of deadlines. The M/V EL PASO coming off contract from the reshoot was assigned to this project; but after sea trials, it was judged inadequate and her charter was terminated. Equipment was transferred to the 110-foot M/V SEA RAIDER chartered from Dinko's Marine Service, Arkansas Pass, Texas which joined with the AMARILLO to finish this shoot.

The geophysical instruments on both vessels were housed in two converted hoist-aboard shipping containers. On each boat one container housed the recording instruments and the other the sparker source. Navigation instruments were installed in the lounge area on the AMARILLO and within the wheelhouse on the SEA RAIDER.

Brief Specifications for each of the survey vessels are presented in Tables 1 and 2. Also listed are the periods of field service, mobilization and demobilization.

Navigation Instruments

Two navigation systems were used for positioning by our sub-contractor,

TABLE 1

Instrumentation Used Aboard M/V Amarillo

Vessel - M/V AMARILLO

Specifications: Principal dimensions - 100' x 24' x 12'
Draft - 7'
Clear deck space 50' x 24'
Main Propulsion - 2 GMV 1271
Generators - 2 GM 40 kw
Navigation 7 communications - SSB radio.
VHF radio, auto pilot, radar, Loran
Capacities - 14,000 gal. of fuel and 24,000
gal. of potable water
Accommodations - 19 persons
U.S. Coast Guard Certification Pending

List of Equipment June 30, 1980 thru October 1, 1980

Navigation Instruments

- UCJB-1000 Loran C Receiving System Integrated with Magnavox
Model MX-702A Satellite System
1. (2) ML-200 Loran C Receivers with Antenna Compler Unit
 2. (1) HP-5061-A Cesium Beam Frequency Standard
 3. (2) UCJB-200 TI-733 Thermal Printer with Cassette Recording
 4. (1) HP-21 MX Computer
 5. (1) HP-2100 Computer
 6. (3) CRT Monitors
 7. (1) Set Program Tapes

Geophysical Instruments

Echo Sounder	Raytheon DE 731 with 7139 Transducer
Sub-Bottom Profiler	ORE 140 Transceiver ORE 1036 Transducer ORE 315 Heave Compensator EPC 4600 Recorder
Sparker Source 300-500 Joules	Teledyne 40-tip Mini-Sparker EG&G 232-A Power Supply EG&G 231-A Trigger Bank EG&G 233-A Capacitor Bank

TABLE 1 (Cont'd)

Sparker Analog
Recording System

Teledyne 28420 Hydrophone
Del Norte 502 Seismic Amplifier
OSE 3009-30 Hydrophone Filter/Amplifier
EPC 4600 Recorder

Periods of Service:

Mobilization: In Freeport, TX on June 30 to July 2, 1980

Data Collection: July 2 to August 2, 1980
August 18 to September 30, 1980

Diversion to
Reshoot: August 3 to August 17, 1980

Demobilization: In Freeport, TX from September 30 to October 1,
1980

TABLE 2

Instrumentation Used Aboard M/V SEA RAIDER

Vessel - M/V SEA RAIDER

Specifications: Principal dimensions - 110' x 26' x 11'
Draft - 7' normal
Clear deck space - 60' x 22'
Main propulsion - 2 16V 92 GM
Generators - 2 471/50 kw
Navigation and communications - VHF radio,
Auto Pilot, Radar, Loran, Fathometer
Capacities - 25,000 gal. of fuel and 20,000
gal. of water
Accommodations - 26 persons
U.S. Coast Guard Certified

Navigation Instruments

List of Equipment August 29, 1980 thru October 1, 1980

- A. UBDC-1000 Digital Lorac Recording System
 - 1. (2) UAJD-1000 Lorac Receivers
 - 2. (1) HP-21 MX Computer
 - 3. (2) HP-7402 Analog Recorders
 - 4. (2) Electrohome EVM-1410 CRT Monitors
 - 5. (1) UCJB-2000 TI-733 Thermal Printer with Cassette Recording
 - 6. (1) Set Network Crystals and Network program tapes
- B. Magnavox Model MX-702A Navigation/Positioning Fixing System
 - 1. (1) Magnavox MX-702A-3 Satellite Receiver
 - 2. (1) HP02100 Computer
 - 3. (1) UCJB-2000 TI-733 Thermal Printer with Cassette Recording
 - 4. (1) Magnavox Satellite Antenna and Pre-Amp
 - 5. (1) Set Sat/Nav Patch Tapes for Converting Satellite Coordinates to Lorac Coordinates

Geophysical Instruments

Echo Sounder	Raytheon DE 731 with 7193 Transducer
Sub-Bottom Profiler	ORE 140 Transceiver ORE 1036 Transducer ORE 315 Heave Compensator EPC 4100 Recorder
Sparker Source 300-500 Joules	EG&G 232-A Power Supply EG&G 231-A Trigger Bank EG&G 233-A Capacitor Bank Teledyne 40-tip Mini-Sparker
Sparker Analog Recording System	Teledyne 28420 Hydrophone OSE 3009-30 Hydrophone Filter/Amplifier Del Norte 502 Seismic Amplifier

TABLE 2 (Cont'd)

EPC 4100 Recorder

Periods of Service

Mobilization: In Sabine Pass, Texas from August 29 to August 31, 1980

Data Collections: September 1 to September 30, 1980

Demobilization: In Freeport, Texas on September 30 and October 1, 1980

Lorac Service Corporation. A Lorac Positioning System combined with a Satellite Navigation System was installed on the M/V SEA RAIDER. The M/V AMARILLO was equipped with a Loran C Receiving System integrated with a Magnavox Satellite System. The specific components per system per vessel are listed in Tables 1 and 2. The instruments' specification and information on the various land-based networks are presented in Appendix A.

The Lorac Positioning System is a hyperbolic system utilizing phase comparison techniques. The range of system is between 160 and 325 kilometers depending on location of the shore stations, type of antenna, and ionospheric conditions. Accuracy is dependent on location and ionospheric disturbances, ranging from ± 3 to ± 30 meters.

The UBDC-1000 Digital Lorac Recording System mobilized aboard the M/V SEA RAIDER was representative of the typical Lorac System. The principal components were a Model UAJD-1000 Lorac Receiver with antenna, a HP-21 MX Computer, a HP-7402 Analog Recorder, CRT monitors, and a TI-733 electronic data terminal. A Satellite Navigation System was used on the M/V SEA RAIDER to maintain lane count. The Magnavox MX-702A-3 Satellite Receiver and companion antenna HP-2100 computer, and an UCJB-2000 TI-733 Termal Printer.

The M/V AMARILLO was equipped with a Lorac's Model UWB-1000 Loran C Receiving System integrated with a Magnavox Model MX-702A Satellite System. The integrated Loran C/Satellite system is useful for positioning of the more distant lines on the outer shelf and upper slope off Texas and Louisiana. The record labels on the data itself note the navigation system used for each line. The Loran C. Satellite system proved to be a 24-hour per day all weather conditions positioning system.

Navigation fixes were simultaneously registered on all geophysical recordings at 305-meter (1000-foot) intervals along survey lines. After processing, a navigation post-plot showing the position of all survey lines and fixes was prepared by the electronic positioning subcontractor at a scale of 1:100,000.

Geophysical Instruments

Geophysical instruments on the two boats were identical. Tables 1 and 2 list all pieces of equipment by vessel and Appendix B contains the manufacturer specification sheets.

Echo Sounder

The recording fathometer on the vessels was a Raytheon DE-731 having a frequency of 41 kHz and a beam width of 17 degrees.

Sub-Bottom Profiler

The sub-bottom profiler used on all survey lines was the Ocean Research Equipment, Inc. ("ORE") Model 1036. The variable power (up to 10 kw) tuned transducer system was mounted in a tow-fish housing. The 250 millisecond sub-bottom profiler records were recorded on an EPC 4600 or 4100 graphic recorder with reversible sweep capability.

The ORE 1036 Sub-Bottom Profiler was equipped with an ORE Model 315 Heave Compensator. Based output from a gimballed accelerometer/electronics package mounted in the tow fish, the return signals from the bottom and sub-bottom are delayed accordingly so that wave action and boat heave is eliminated from the recordings. A HP-3968 FM/Display Recorder taped the returned signal.

Sparker Source

The sparker source used on both vessels was a Teledyne 40-tip Mini-sparker powered by an EG&G system at 300 to 500 joules. A one-second "pop" rate remained constant throughout the survey.

Frequency versus power spectrum displays of the sparker source were obtained using a Hewlett Packard Spectrum Analyzer Model 3583A. Spectrum displays were found to be variable between firings of the spark source. Representative spectrum displays are presented as Figure 1 for the

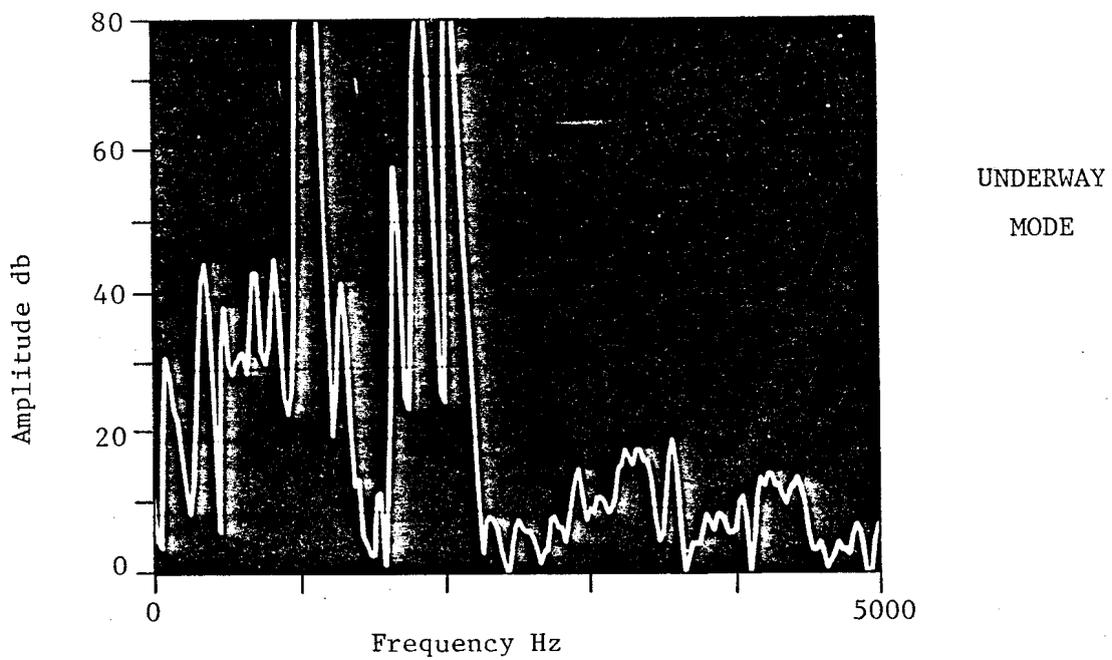
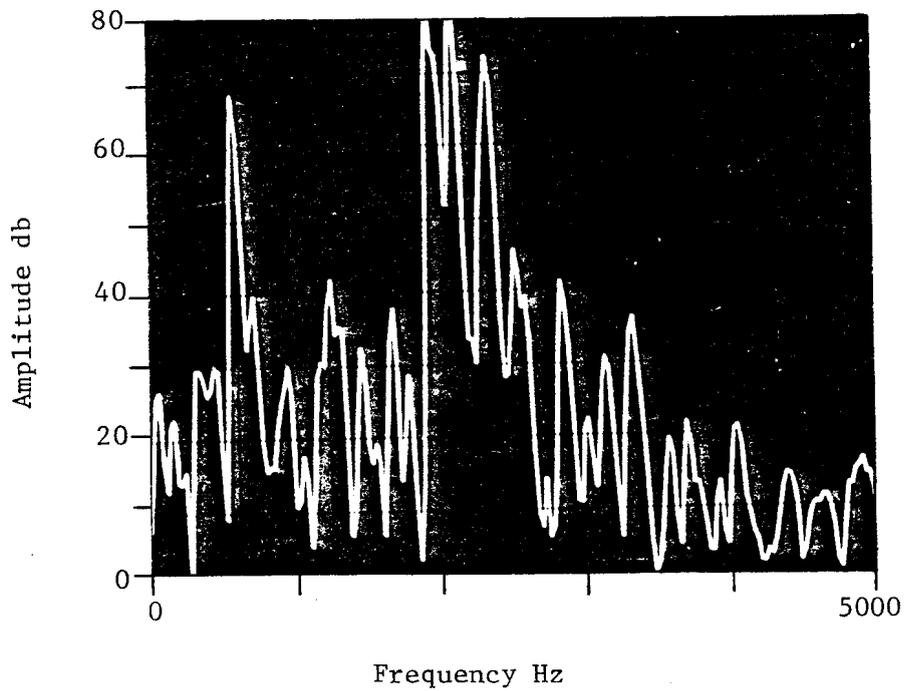


Figure 1. Frequency vs. Power Spectrum Displays for 40-tip Mini-Sparker at 400 Joules.

AMARILLO mini-sparker. Tests were recorded in both the static and underway-survey modes. The static mode procedure involved suspension of the hydrophone between the boat and a bouy while bouying the mini-sparker. In the underway mode, the boat was in gear making approximately 5.5 knots. The direct arrival signal was detected by the single channel hydrophone in both cases. A photograph from a Polaroid camera was used to record the CRT display of the frequency spectrum.

Sparker Recording System

The hydrophone unit consisted of a single channel Teledyne 28420 Univisual Hydrostreamer containing Model B-1 hydrophones and an OSE 3009-30 Hydrophone Filter/amplifier. A Del Norte 502 Seismic Amplifier was used to amplify and filter the returned signal before display by an EPC recorder as a one-half second record. In addition, the raw signal was recorded on tape by a Hewlett-Packard HP-3968 FM/Direct Recorder in anticipation of possible replay uses.

HISTORY OF FIELD OPERATIONS

Summary of Field Work

Reoutfitting of the M/V AMARILLO began on June 30, 1980 at Freeport, Texas and continued to July 2nd at which time the vessel sailed for the survey area. During shakedown and initial surveying, navigation and equipment problems forced a return to Freeport for repairs on July 7th. Repairs were completed the same day and after one more shakedown day production mode shooting commenced on July 9th. Data acquisition continued until August 2nd at which time the AMARILLO was diverted to reshoot specific areas of a previous project. On August 18th, the vessel returned to shooting on this contract and continued data acquisition until September 30th after which it was demobilized.

Towards the middle of August, it became apparent that a second vessel would be necessary for completion of the project on schedule, so the M/V EL PASO was assigned to aid in data collection. After several days of shakedown, the EL PASO was deemed inadequate and equipment was transferred to the M/V SEA RAIDER at Sabine Pass, Texas. No production data was collected by the EL PASO. Production mode shooting on the SEA RAIDER commenced September 1st and continued until September 30th. Demobilization of both the AMARILLO and SEA RAIDER was completed on October 1, 1980 in Freeport, Texas.

The area to be surveyed during this project was divided into six subareas numbered west to east and south to north. Area one, the southwesternmost was surveyed first, followed by the other five in succeeding order. The AMARILLO collected in all subareas except number four which was shot by the SEA RAIDER. Vessel crew lists are shown as Tables 3 and 4.

Operational Statistics

The amount of time devoted to each task of the field data collection program for the entire project is tabulated in Tables 5 and 6. In

TABLE 3

INTERSEA SEISMIC PERSONNEL M/V AMARILLO

7/2

Walter Bayer - Party Chief
 Jose Gomez - Electronic Technician
 T.J. Burns - Electronic Technician
 Steve Joy - Operator

9/10

John Colton - Party Chief
 Jeff Stewart - Geologist
 Wayne Cox - Geologist
 Bill Lusic - Electronic Technician
 Jose Gomez - Electronic Technician

7/7

John Colton - Party Chief
 Jerry McNaboe - Geologist
 Walter Bayer - Electronic Technician
 T.J. Burns - Electronic Technician

9/19

John Colton - Party Chief
 Wayne Cox - Geologist
 T.J. Burns - Electronic Technician
 Bill White - Technician

7/18

John Colton - Party Chief
 Walter Bayer - Electronic Technician
 Bill White - Technician
 Steve Joy - Operator

8/1

Tom Harmon - Party Chief
 Walter Bayer - Electronic Technician
 Jim Windes - Technician
 Bill White - Technician

8/17

Tom Harmon - Party Chief
 Bill Lusic - Electronic Technician
 Bill White - Technician
 Jim Windes - Technician

9/5

John Colton - Party Chief
 Wayne Cox - Geologist
 Bill Lusic - Electronic Technician
 Bill White - Technician

9/7

John Colton - Party Chief
 Wayne Cox - Geologist
 Bill Lusic - Electronic Technician
 Jose Gomes - Electronic Technician
 Bill White - Technician

TABLE 4

INTERSEA SEISMIC PERSONNEL M/V SEA RAIDER

8/29

Jack Donovan - Party Chief
Tom Odom - Electronic Technician
Bob Fryer - Technician

9/4

Jack Donovan - Party Chief
Jeff Stevens - Geologist
Jerry McNaboe - Geologist
Tom Odom - Electronic Technician
Jose Gomez - Electronic Technician
Bob Fryer - Technician

9/23

Tom Harmon - Party Chief
Jeff Stevens - Geologist
Jerry McNaboe - Geologist
Joe Gomez - Electronic Technician
Jim Windes - Technician
Bob Fryer - Technician

TABLE 5

PROJECT OPERATIONAL STATISTICS

	<u>Hours</u>	<u>Percentage</u>	<u>Mileage</u>
Production Time	1454.3	57.1	
Miles Successfully Surveyed (Reshoot)			13,061.93km (325.83 +km)
Transit Time	362.5	14.2	
Downtime at Sea			
Navigation	158.8	6.2	
Equipment	154.7	6.1	
Vessel	6.0	0.2	
Weather	29.0	1.1	
Downtime in Port			
Resupply	146.9	5.8	
Equipment	40.2	1.6	
Vessel	59.3	2.3	
Weather	138.4	5.4	
 TOTALS	 2550.1	 100	 13,061.93km (8116.29 m)

TABLE 6

OPERATIONAL STATISTICS BY VESSEL

	M/V AMARILLO		M/V SEA RAIDER		M/V EL PASO	
	<u>Hrs.</u>	<u>%</u>	<u>Hrs.</u>	<u>%</u>	<u>Hrs.</u>	<u>%</u>
<u>Production Time</u>	1071.7	61.5	383.6	51.0		
<u>Transit Time</u>	171.4	9.9	166.4	22.2	24.7	42.5
<u>Downtime at Sea</u>	(307.7)	(17.6)	(40.8)	(5.4)		
Navigation	141.5	8.1	17.3	2.3		
Equipment	139.0	8.0	15.7	2.1		
Vessel	6.0	0.3				
Weather	21.2	1.2	7.8	1.0		
<u>Downtime in Port</u>	(190.2)	(10.9)	(120.5)	(21.4)		
Resupply	74.8	4.3	48	6.4	24.1	41.3
Equipment	37.7	2.2	2.5	0.3		
Vessel	4.8	0.2	4.5	6.0	9.5	16.2
Weather	72.9	4.2	65.5	8.7		
 TOTAL	 1741	 100	 750.8	 100	 58.3	 100
 MILEAGE	 10,090.35 km		 2,971.58 km		 0	
	(6,269.84 mi)		(1,846.45 mi)			

compiling these statistics from the Daily Operators Log, the time period started at the sailing of the vessel for the work area after completion of boat mobilization. The allocation to the categories listed in Tables 5 and 6 were made in accordance with the following definitions:

Production Time

Production time commences with the start of the first line on a block and continues until the last line was finished. Turns between lines and any minor breakdown or other minor interruptions are counted as production time. Other interruptions are logged under the appropriate downtime category.

Transit Time

Transit time includes all time required for the vessel to travel between port and the survey area as well as the running time between survey areas. It also includes travel time required for navigation calibration at an offshore platform, and time for bar checks of the echo sounder. Time running to and from port for vessel and equipment repairs are classified as transit time.

Downtime at Sea

This category is subdivided into four groups:

Vessel: Vessel break downs at sea causing interruption of production time for more than a half hour are accounted for until the repair is made at sea or the vessel gets underway for port and shore repairs.

Navigation: This category includes navigation signal losses due to skywaves, weather, interference, down shore base stations and shipboard equipment. It includes the time from when a line is aborted due to navigation until the start of the rerun line or a new line. A navigation outage includes the delay required to obtain necessary satellite passes or to recalibrate lane count at a platform. It also includes all prior survey time that must be repeated due to a lane count error.

Survey Equipment: Production outages due to Intersea's equipment for more than half hour are tabulated from the breakdown time to when production resumes or when transit time starts for the run to port.

Weather: This represents weather standby time at sea until production resumes. It also includes transit time to the dock until weather standby in port begins.

Downtime in Port

Port time is subdivided into four categories:

Resupply: This port time represents time for crew rotation, refueling and refurbishing of grocery and other supplies. Other miscellaneous and unidentifiable port time is contained in this category.

Vessel: This represents time in port for repair of the vessel until the ship is ready to go to sea.

Equipment: This represents time in port for the repair of Intersea's or navigational equipment until the equipment has been repaired.

Weather: This represents time spent at the dock due to inclement weather. Such time may be used to resupply the vessel and repair equipment. However, if the weather is such that the vessel could not work at sea, the time is categorized as weather downtime even if the opportunity was used for resupply or other maintenance purposes.

FIELD PROCEDURES

Data from the fathometer, sub-bottom profiler, mini-sparker were recorded simultaneously over the specified grids:

	W-E	N-S
Texas	4.572 km	4.572 km
Louisiana	4.572 km	Variable

Preplots of the vessel's intended positions along each survey line were used by the navigator to direct the vessel along the desired course. A shot point interval of 305 meters was chosen for the entire survey. At every fix location, the Lorac or Loran C navigation data were logged and all geophysical instrument recorders, charts, and tapes were simultaneously marked by a common event signal activated by the navigator.

Lane count calibrations for the Lorac Positioning System were made at known calibrated platform sites as often as possible. Between initial Lorac calibration and subsequent post survey verification at the platform sites, the Satellite Navigation system was used to maintain lane count. The Loran C system was calibrated by a series of satellite navigation fixes. Frequent updates from the Satellite Navigation system were obtained to verify and correct the Loran C positions during the course of the survey.

The survey line numbering system increased from west to east and north to south beginning at the northwest corner of the area. The westernmost north-south line was assigned a line number of 302 and line numbers increased in units of one consecutively to the east. Similarly, the northernmost east-west line was numbered 185, and line numbers increased in units of one to the south. The shot point numbering system was similar to the line numbering systems. Shot point numbers starting with 100 at the northern or western area boundary increased from west to east and north to south down the survey lines.

Survey crews were instructed not to shoot in water depths of less than 6 meters and at the discretion of both the party chief and the captain of their respective survey vessels, lines could be terminated in water depths greater than 6 meters to avoid risk of loss of vessel and/or geophysical equipment.

The basic tow geometries of the geophysical systems on the respective survey vessels are presented in Figures 2 and 3. The actual setback distances and tow depths used are noted on the labels attached to the records for each geophysical instrument. The fathometer transducer was mounted at the end of a vertical pipe secured to the side of the vessel. The transducer depths are noted in the label of each fathometer record. Bar checks to calibrate the fathometers were made at various times. Often sea state, current and wind conditions and survey made it impossible to successfully perform bar checks when attempted. Tabulation of bar checks per vessel are listed in Tables 7 and 8.

The "Tow fish" transducer for the sub-bottom profiler could be deployed from 1 to 50 feet below surface, depending on water depth. Depth permitting, the ORE fish was towed 25 to 40 feet beneath the surface. The tow depth is noted on the line labels of each sub-bottom profiler record. The sub-bottom profiler was gated out during the receiving period of the sparker. Control of ORE firing was necessitated to avoid system interference.

As previously described, the spark source electrical power was the same on the two vessels. The spark source was fired at a tow depth of approximately 5 feet while the hydrophone was balanced for towing at 5 to 8 feet. Filter setting and tow configuration tests of the sparker system were performed before and during the survey to maintain optimum record quality. The pop rate of the sparker was one second and analog record length was 0.5 seconds. The survey vessel speed during the analog shooting varied from 5.5 to 6.5 knots. All of this information is noted on the sparker record labels for each survey line.

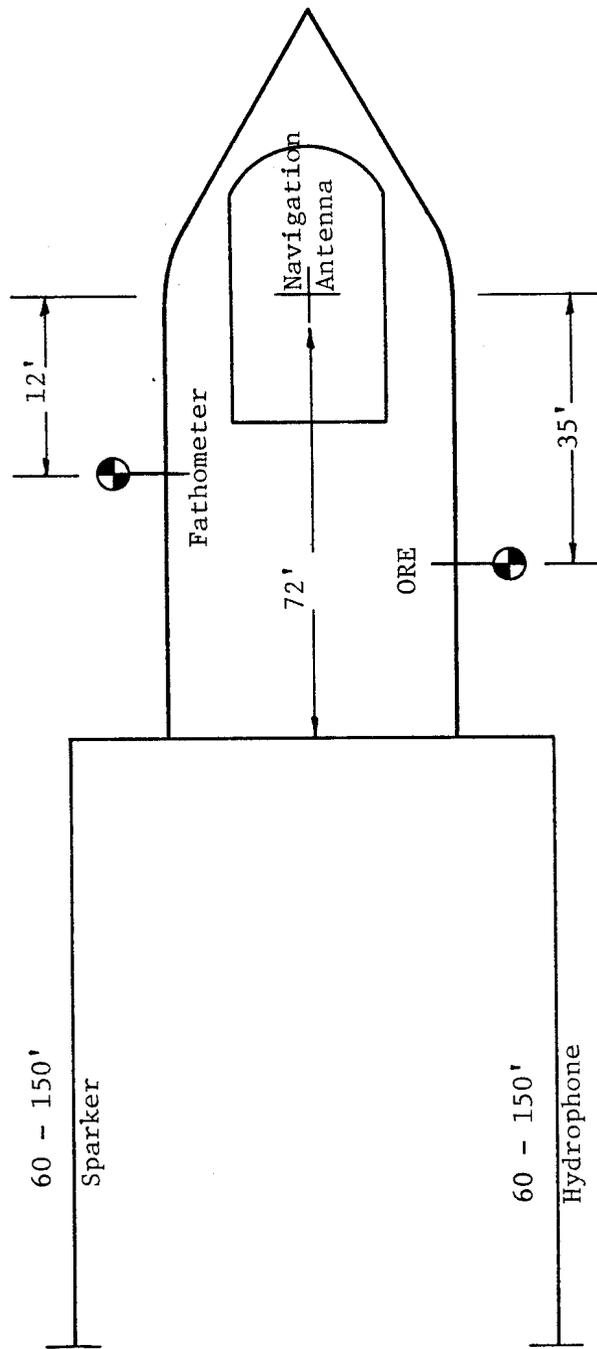


FIGURE 2. Tow Geometry of M/V AMARILLO.

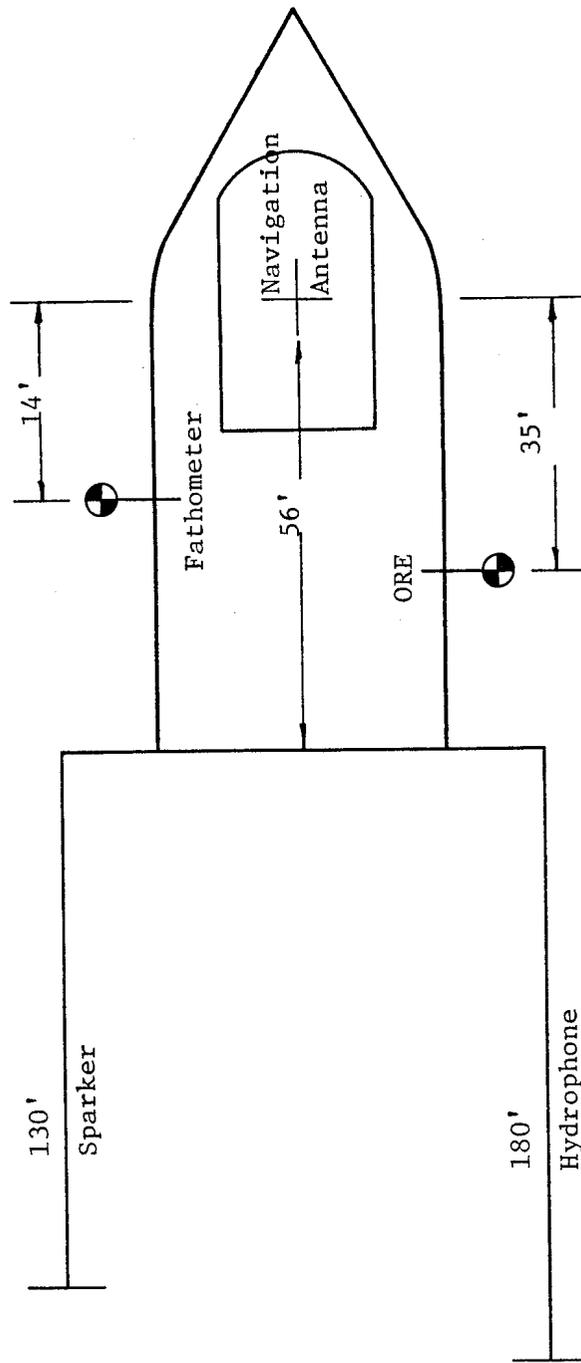


FIGURE 3. Tow Geometry of M/V SEA RAIDER.

TABLE 7
BAR CHECK CALIBRATIONS M/V AMARILLO

<u>DATE</u>	<u>LINE</u>	<u>RESULTS</u>
7/17/80	203W	+2.3%
7/21/80	204E	+2.1%
7/26/80	215BW	+0.3%
8/23/80	348N	+5.0%
9/27/80	201N	+3.9%

TABLE 8
BAR CHECK CALIBRATIONS M/V SEA RAIDER

<u>DATE</u>	<u>LINE</u>	<u>RESULTS</u>
9/2/80	302N	?
9/4/80	304N	+5.0%
9/11/80	305N	+1.8%
9/28/80	327BN	+1.0

The duties of watch leader and operator of each geophysical instrument were posted in the instrument house. These duty lists and field procedures are presented in Appendix C.

U.S.G.S. Quality Control

Throughout the survey, Dr. Berryhill of the U.S.G.S. inspected the data as a client quality control procedure and in two instances sent U.S.G.S. technicians to aid in the collection of optimum quality records. Mr. John West was aboard the M/V AMARILLO August 16-17, and Mr. Ron Miller rode both the AMARILLO and the SEA RAIDER September 5-11. In both cases equipment testing and test shooting were required by the U.S.G.S. representatives. Mr. West, during the first field inspection requested an increase in sparker power to 1000J to achieve more penetration, but agreed to accept a 500J source. During the second field inspection, U.S.G.S. equipment was substituted for Intersea's in an attempt to reduce noise. This proved fruitless. Office replay at different filter settings was suggested to eliminate noise and enhance the data to Dr. Berryhill's satisfaction.

OFFICE PROCEDURES

All data were shipped by Intersea's shore logistics personnel to our offices in San Diego, California and Houston, Texas. The echo sounder, sub-bottom profiler, and mini-sparker field records and FM tapes were shipped to the San Diego office for annotation, reproduction and replay experimentation. Navigation data were received in Houston, where post-plots were generated.

Written monthly progress reports were submitted to the USGS each month describing the progress of data acquisition, the status of deliverable items, and any problems affecting the requirements of the program. This was done in an effort to keep the USGS fully informed as to the progress and problems of the geophysical survey.

Data Annotation and Reproduction

During onboard data acquisition, labels were attached to the analog field records by the survey crew to document recording parameters and survey procedures. These labels included at a minimum the following information: data set identifier, date and time, line number, instrument settings, power and filter levels, record time or depth scale, vessel speed and direction, remarks regarding instrument malfunctions, sea state, and a diagram of tow configuration with set back distances and other acquisition parameters important to data interpretation.

In the office, the first, last and every fifth shot point were numbered over the entire length of each survey record. Also affixed were line intersections which were determined from the navigation postplot. All record annotations and labels were of sufficient size to be clearly legible after record reduction.

One vellum copy of the fathometer records was made without reduction to meet the 13 inch specification. The 19-inch sparker and sub-bottom profiler records were reduced approximately 50 percent to achieve the 11.5-inch paper width. One prefolded blackline copy of each record was

then made from the final zerox vellums for the sub-bottom profiler and echo sounder while a zerox vellum and zerox bond of the sparker data were delivered.

After the records were properly annotated, one positive microfilm copy of archival quality was made of the sub-bottom profiler and mini-sparker records by a continuous flow 35 mm camera with a reduction ratio not exceeding 20:1. The microfilming sequence was sequential by area, line number, and seismic system with all rolls of microfilm being clearly indexed displaying the data-set identifier, areas and line numbers at the beginning and end of each film.

Bathymetry Data Reduction

The Raytheon 731 echo sounder records were interpreted by Intersea's staff who optically digitized every shot point (305 meters) along the survey line using an Intersea designed system. It consisted of a Motorola 6809-Based Microcomputer controlling a Houston Instruments High Pad Digitizer. The resultant digitized data were stored on magnetic floppy disks. After digitization the bathymetric data were checked by manual comparison with the analog field records and by an automated error check program. The data were then corrected for sound velocity, tides, and transducer depth. After all corrections, the data were transferred to a Burroughs 7800 Mainframe Computer where they were integrated with edited navigation data in a 9-track tape format specified by the USGS. A flow diagram depicting the Bathymetry Data Management System is shown as Figure 4.

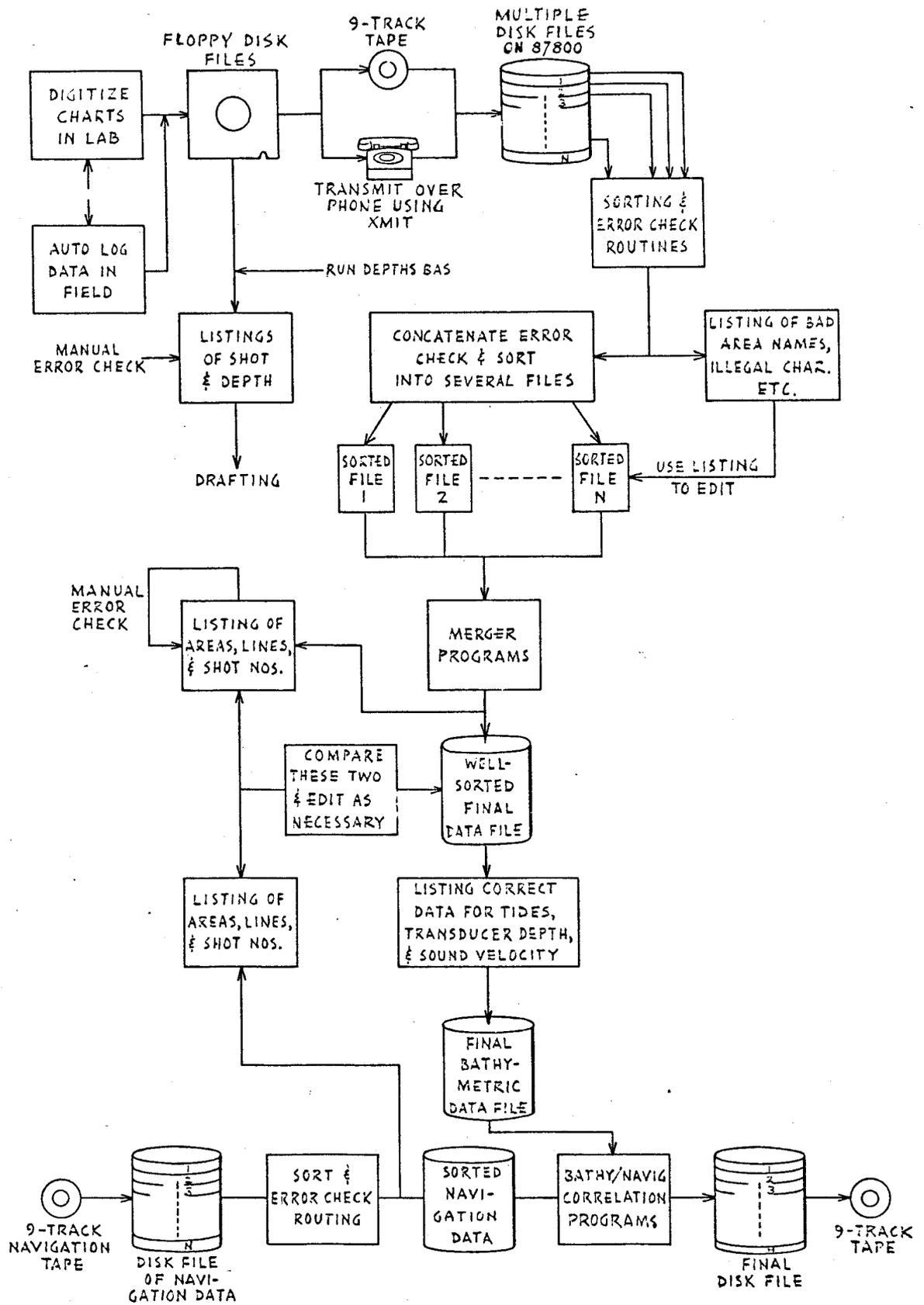
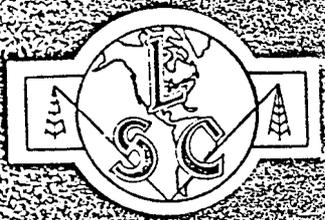


FIGURE 4. Bathymetry Data Management Scheme.

APPENDIX A

NAVIGATION INSTRUMENTS AND NETWORKS

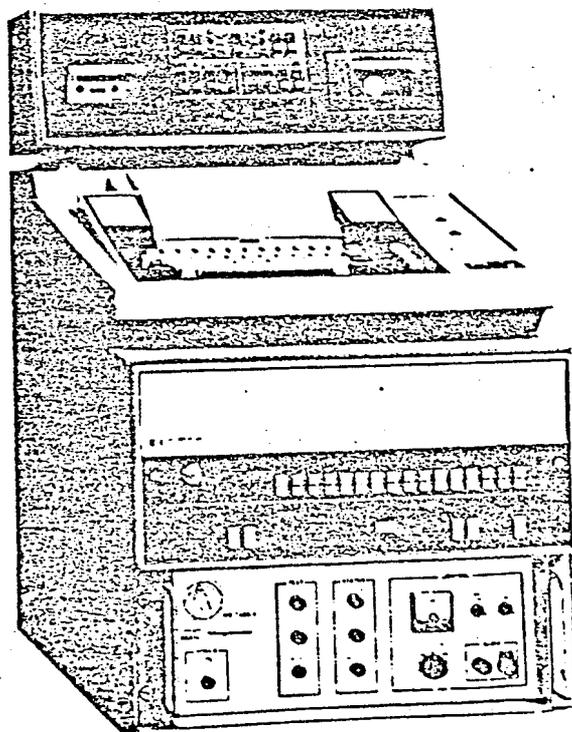
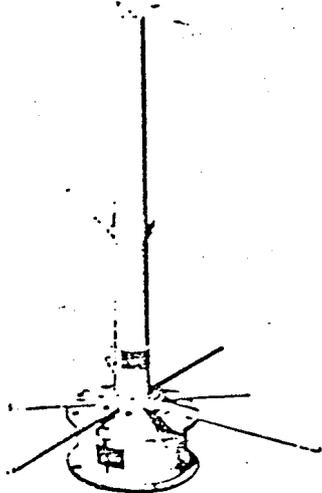


SATELLITE NAVIGATION SYSTEM

The Satellite Navigation System is a shipboard receiving system which provides position fixes by receiving and processing signals from orbiting U.S. Navy Navigation Satellite System TRANSIT satellites. The SAT/NAV system coverage is worldwide and does not depend upon transmissions from shore based installations. Signals are not affected by weather or propagation conditions because they are line-of-sight from the satellite to the receiver.

SAT/NAV systems provide intermittent position fixes rather than continuous navigation data, obtaining a single position fix each time one of the orbiting satellites is received. The navigation program can provide dead reckoning positioning between satellite passes but the SAT/NAV system is most effective when integrated with another type electronic positioning system. The result is continuous positioning updated by satellite positions.

Lorac Service Corporation offers the popular Magnavox MX-702A/hp Navigation/Positioning Fixing System singly, integrated with LSC's own LORAC and LORAN C systems, or for integration with the client's own systems. Positioning services by LSC include equipment, expert operators and technicians, computing and mapping services, and qualified service and repair facilities for equipment belonging to others.



I-9



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SATELLITE NAVIGATION SYSTEM

THEORY OF OPERATION

Each TRANSIT satellite broadcasts two stable radio frequencies that are modulated with a navigation message that defines the position of the satellite. The SAT/NAV receiving system receives and records this navigation message and measures the frequency shift in the satellite signal frequencies produced by the Doppler effect of the relative motion between the satellite and the receiving antenna. Message and Doppler measurements are stored by the computer, which then automatically converts the satellite orbital data from the navigation message, the series of Doppler counts, and data defining the motion of the vessel into a position fix in latitude and longitude. With as many as 5 or 6 TRANSIT satellites in orbit, position fixes are provided at approximately one to two hour intervals, more frequently at northern latitudes.

EQUIPMENT SUPPLIED

LSC's shipboard SAT/NAV systems are Magnavox Model MX-702A/hp Navigation/Positioning Fixing Systems. Major components are the Magnavox 702A Satellite Receiver and Antenna System, Hewlett-Packard 21MX Series Computer, and Texas Instruments 733 ASR Electronic Data Terminal, plus the latest version of the Magnavox navigation program. The Data Terminal provides teletype keyboard and printer facilities plus tape cassette transports for program loading and data recording. LSC maintains a complete inventory of spare parts and components.

SYSTEM ACCURACY

Atmospheric refraction error is eliminated from satellite signals by the use of two different carrier frequencies. Mean sea level deviations from the reference ellipsoid are corrected according to the geoidal height contour map provided with each system.

Certain criteria are judged to reject fixes suspected of having excessive error. These include maximum elevation of the satellite above the horizon, the number and symmetry of Doppler frequency counts, and the number of iterations required to reach a convergence solution.

An accurate knowledge of the ship's motion during the satellite pass is mandatory in order to obtain an accurate fix. This data may be obtained from the ship's

gyrocompass and speed log, or from another navigation system. With the ship's velocity measured accurately, the fix accuracy from a single satellite pass is 40 meters RMS and can be as small as 10 meters RMS with multiple fixes from a stationary location.

APPLICATIONS

The TRANSIT SAT/NAV system is the only truly global navigation system that exists today. Stand-alone systems are used by tankers, freighters, naval vessels, survey ships, even yachts for navigation, particularly in remote areas not covered by LORAN A or LORAN C.

For geophysical exploration and oceanographic surveys that require continuous positioning data, SAT/NAV systems are integrated with other types of electronic positioning equipment. LSC has successfully combined SAT/NAV with LORAC. Single satellite fixes provided with LORAC velocity data are sufficiently accurate to verify LORAC lane count. This arrangement permits LORAC operations far offshore without reliance on visual check points.

When SAT/NAV is integrated with LSC's Three-Range LORAN C system, each system enhances the accuracy of the other. Automatic integration is obtained through "direct memory access," a feature that permits one system's computer to access data in the memory of the other system's computer without interrupting its program. Thus, the SAT/NAV system obtains accurate LORAN C velocity data whenever needed, while the SAT/NAV fix updates the LORAN C positions to compensate for errors introduced by weather or propagation conditions, sky waves, and frequency standard drift.

Where conventional land survey techniques are too slow or costly, or survey control points are unavailable, inaccurate, or inaccessible, multiple SAT/NAV fixes are used to establish control points. The 3-D program solution provides a three-dimensional position from a series of fixes obtained at a particular location within just a few hours.

LSC has Magnavox MX-702-3D Satellite Survey Systems designed particularly for land survey applications as well as for rig positioning. The SAT/NAV system will navigate the offshore drilling rig to the drilling site, then pinpoint the final rig position using multiple fix techniques.

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October, 1976

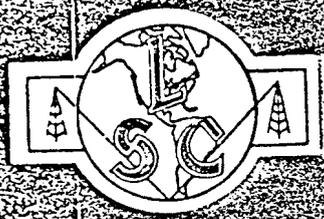


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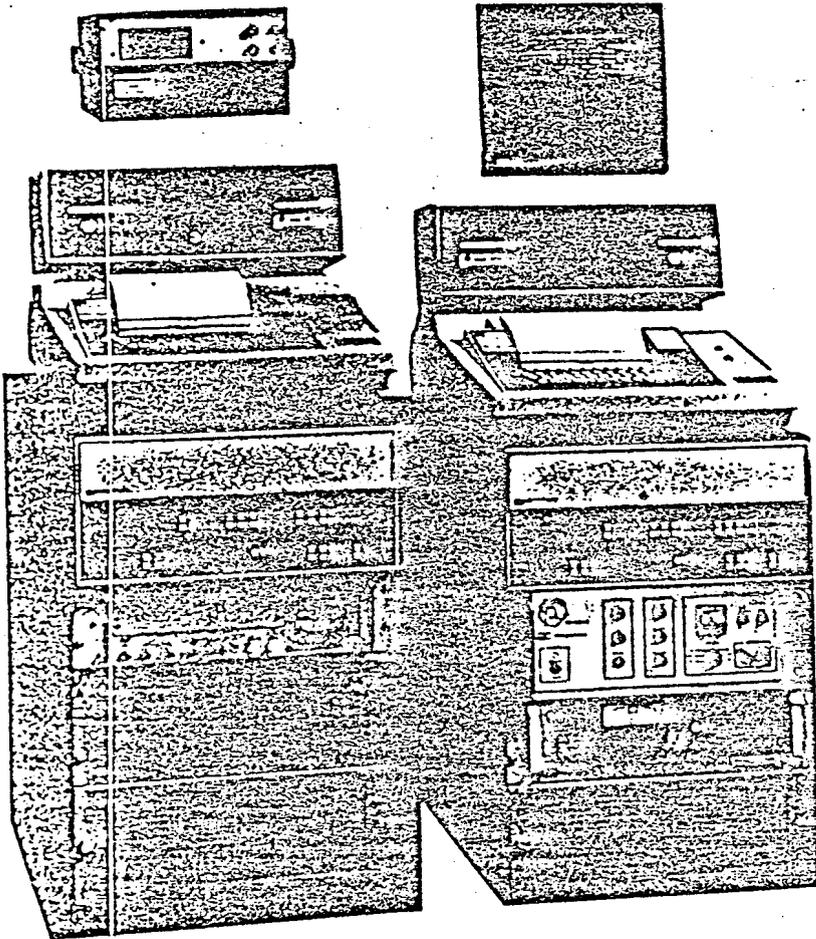
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INTEGRATED LORAN C/SATELLITE NAVIGATION SYSTEMS



- Continuous 3-Range LORAN C Positioning
- Position displayed in Latitude and Longitude
- High Resolution Position Update from Sat/Nav
- Repeatable Fix Accuracy of 100 Feet RMS
- 24-Hour All-Weather Operation
- Worldwide Service

With geophysical exploration moving to ever increasing distances offshore, no single electronic positioning system can satisfy all of today's precision navigation requirements. When two systems are integrated, the best features of each are utilized while at the same time the accuracies of both are increased because data from one system helps reduce errors in the other.

Lorac Service Corporation's Integrated LORAN C/Satellite Navigation Systems provide long range continuous LORAN C positioning updated by satellite fixes. By exchanging data,

both systems become less sensitive to velocity error. In the ranging mode, frequency standard drift is corrected. Digital filtering smoothes position data to further increase accuracy.

Designed especially for high accuracy geophysical surveys, the systems are capable of long periods of continuous operation with very little operator intervention. The many unique features are also applicable to:

RIG POSITIONING	X	CABLE LAYING	X
HYDROGRAPHIC AND OCEANOGRAPHIC SURVEY	X	NAVAL OPERATIONS	X
SHIP TRIALS	X	BUOY POSITIONING.	

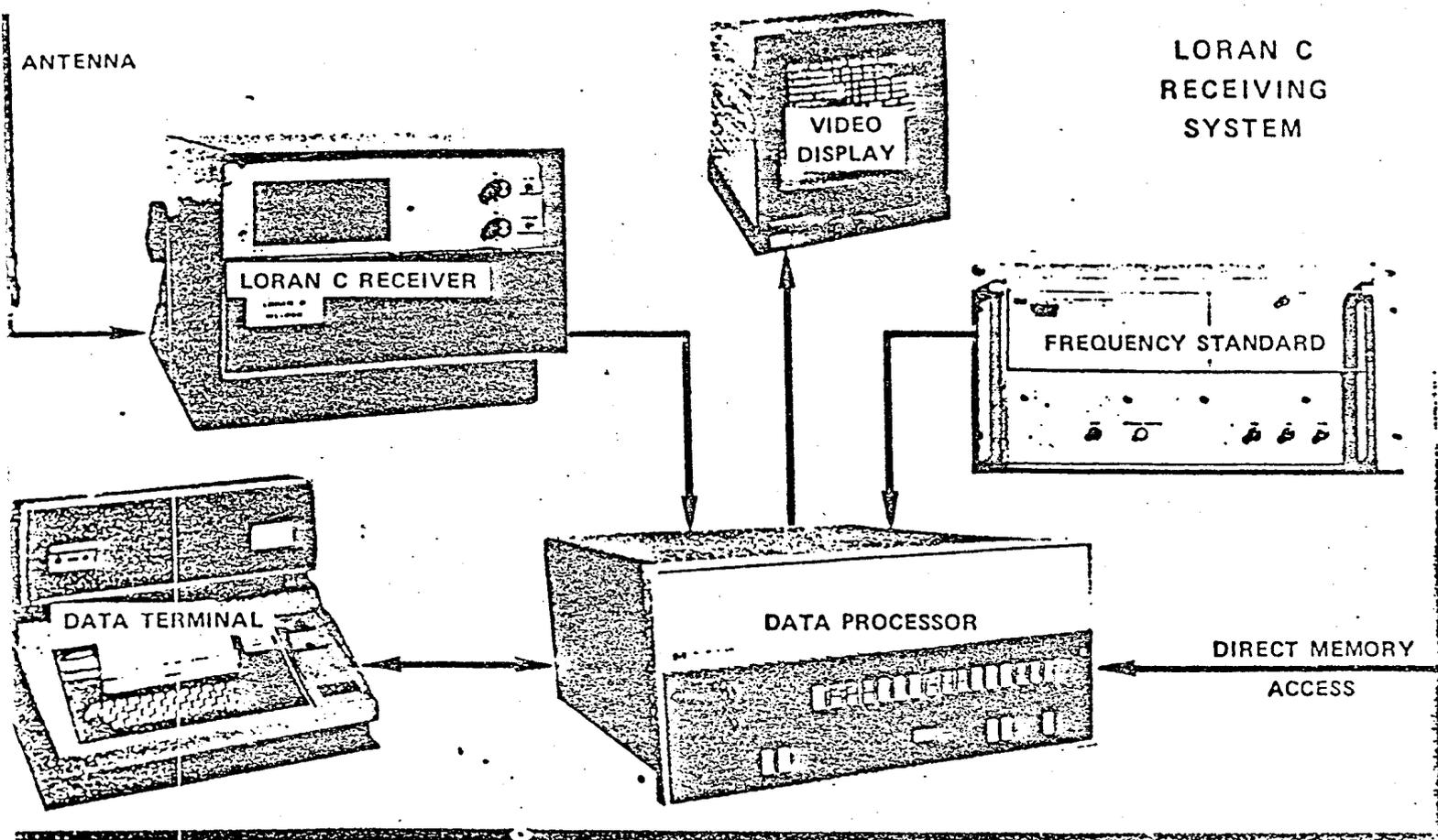


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SYSTEM DESCRIPTION

The LORAN C receiving system combines the standard LSC digital recording system with a modified Micrologic ML-200 LORAN C receiver. This receiver is highly rated for its accuracy and sensitivity. The ranging technique used with a cesium beam frequency standard provides continuous positioning from ranges measured to any three transmitters of the same LORAN C chain.

With velocity and heading calculated from LORAN C positions available to the Satellite Navigation system, the result is satellite fixes free from velocity errors. In effect, satellite fixes become geodetic positions accurate enough for LORAN C update.

The LSC method provides optimum integration using fully automatic two-way interfacing by taking advantage of the direct memory access (DMA) capability of the Hewlett-Packard 21 MX Series minicomputers. DMA gives each computer direct access to the memory of the other without interrupting the other computer's program.

In operation, the satellite computer reads LORAN C velocity data whenever needed for the satellite fix computation. Each satellite fix is judged for accuracy and, if found acceptable, is compared with the corresponding LORAN C fix to calculate the difference between fixes. These differences are entered into Robust Median filter arrays where data from successive satellite fixes are accumulated.

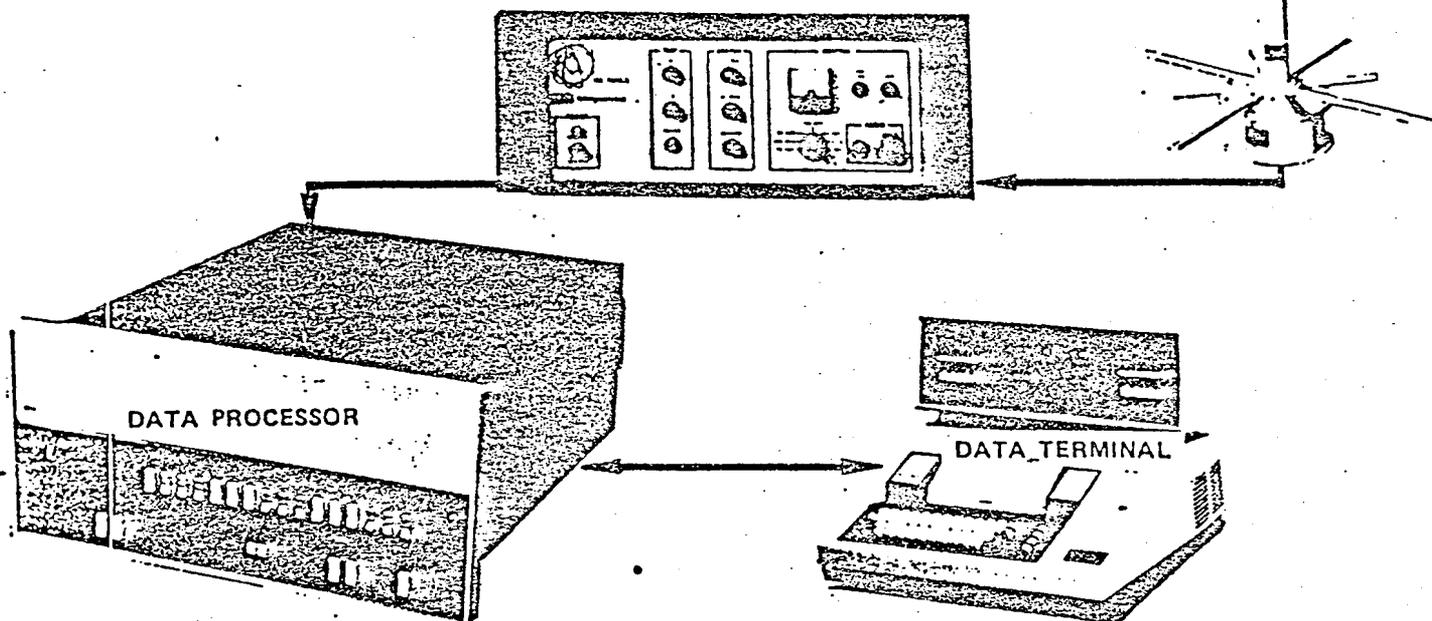
The actual update applied for correction to the LORAN C position coordinates is derived from the accumulated history of satellite fixes and not from a single fix. System integration may be accomplished automatically without operator intervention although there is provision for manual update if desired.

The use of separate data processing equipment with each system has distinct advantages. Both the LORAN C and the satellite systems can be operated stand alone. Software is less complex. With interchangeable components,

SATELLITE NAVIGATION SYSTEM

ANTENNA
ASSEMBLY

SATELLITE RECEIVER



system -troubleshooting is simplified and spare parts inventories reduced.

LSC's integrated systems offer the best characteristics of LORAN C and Sat/Nav while enhancing the accuracies of both. Better accuracy is not the only feature. The LORAN C computing system eliminates the need for lists of pre-computed position coordinates. Instead, the computer program is initialized with the coordinates of the beginning and end of a line only. The program then computes and "fires" shot points, displays course and distance to the end of the line, even calculates the amount of deviation and direction off line. All fix data appears in video displays and is recorded by both teleprinter and tape cassette at selected time or distance intervals or upon operator demand.

Available as an option, a CalComp Model 836 (or equivalent model) drum plotter can be added to plot position fixes on board in real time and in UTM or Lambert coordinates. This plotter can store up to 50 map pages, any of which may be recalled within seconds.

LORAN C SYSTEM

The Model UCJB-1000 LORAN C Receiving System combines commercially available components with software developed by LSC. The receiver is self-initializing with an automatic operating sequence. An automatic cycle matching feature eliminates the need for an oscilloscope monitor. Components are:

- Micrologic ML-200 LORAN C Receiver
- Receiving Antenna System
- Hewlett-Packard 2108A Computer or equivalent
- Texas Instrument 733 Electronic Data Terminal
- Hewlett-Packard 5062C Cesium Beam Frequency Standard or equivalent
- Ann Arbor KSR Display Terminal with two Video Monitors
- California Instruments Invertron Model LC-1201B Power Line Conditioner

SATELLITE NAVIGATION SYSTEM

For satellite positioning, LSC uses the Magnavox MX-702A/hp Shipboard Navigation System. Experienced with this system since 1969, LSC services its own equipment. Components are:

- Magnavox MX-702A-3 Receiver
- Magnavox Antenna Assembly
- Hewlett-Packard 2108A Computer or equivalent
- Texas Instrument 733 Electronic Data Terminal

INTEGRATED LORAN C/SATELLITE NAV. JATION SYSTEMS

PERFORMANCE CAPABILITIES

ACCURACY: With LORAN C calibrated frequently by satellite passes, frequency standard drift and cycle matching errors are eliminated. The integrated systems are therefore capable of a position accuracy of 100 feet RMS.

RANGE: The LORAN C is capable of accurate range measurements as far as 1200 miles from the base transmitting stations. The three stations measured may be selected for favorable angles of intersection.

NAVIGATION DATA PROVIDED: LORAN C positions are displayed and recorded in latitude and longitude, or optionally, in UTM or Lambert coordinates. Other navigation data displayed is: time and date, true course to 1 degree, true speed to 0.1 knot, water current direction and speed (with ship's speed log and gyrocompass interfaced into the system), off line deviation and direction, heading correction, distance to and bearing of the next target point.

DIAGNOSTIC ROUTINES: Should transmitting station failure occur, or LORAN C signals deteriorate for any reason, diagnostic routines determine these conditions with appropriate display. Three range fixes are judged on the basis of fix triangle size with unacceptable fixes noted. The system will continue to operate with weak signals or two range fixes with some reduction in position accuracy.

UNIQUE FEATURES

- ▲ Three range LORAN C position solutions.
- ▲ Digital filtering of position data.
- ▲ Real time position coordinate computations.
- ▲ Choice of fix coordinates: Latitude and Longitude, UTM or Lambert.
- ▲ True speed and heading displayed.
- ▲ Computes off line deviation and heading corrections.
- ▲ Relay closure at shot point activates seismic equipment.
- ▲ No pre-computed data required, shot point data entered in latitude and longitude.
- ▲ Video display of all navigation data.
- ▲ Capable of two range operation with reduced accuracy.
- ▲ All fix and navigation data recorded by teleprinter and on magnetic tape.
- ▲ All software on magnetic tape cassettes.
- ▲ Diagnostic routines to indicate irregularities.
- ▲ Fix data logged at selected intervals or upon demand.
- ▲ Integrates with client's existing systems.
- ▲ Optional on-board drum plotter.

DIMENSIONS AND WEIGHTS

LORAN C SYSTEM					SATELLITE NAVIGATION SYSTEM				
	Width	Depth	Height	Weight		Width	Depth	Height	Weight
Console*:	20"	25"	29"	250 lb.	Console*:	20"	25"	29"	200 lb.
Antenna:	1½"	1½"	10'	5 lb.	Antenna Assy.:	11"	11"	46"	35 lb.
Data Terminal:	22"	20"	15"	55 lb.	Data Terminal:	22"	20"	15"	55 lb.
Video Monitor:	14"	14"	13"	40 lb.					
Receiver*:	17.5"	13"	8.5"	26 lb.					

POWER REQUIREMENTS

Console*:	115 VAC ± 10%, 50/60 Hz, 850 Watts	Console*:	115 VAC ± 10%, 50/60 Hz, 1000 Watts
Data Terminal:	115 VAC ± 10%, 50/60 Hz, 200 Watts	Data Terminal:	115 VAC ± 10%, 50/60 Hz, 200 Watts
Video Monitor:	115 VAC ± 10%, 60 Hz, 40 Watts		
Receiver*:	115 VAC ± 10%, 48/440 Hz, 60 Watts		

*Maximums shown, change with receiver and computer model.

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LORAN C ACCURACY AND REPEATABILITY

LSC THREE-RANGE SYSTEM

SYSTEM DESCRIPTION:

All Loran C stations use a cesium standard for a basic timing reference. They are required to maintain this timing reference to less than 50 nanoseconds relative to the National Bureau of Standards master clock.

If a cesium standard is also used in receiving loran signals, and if it can be determined the exact time that each pulse is being transmitted; then the arrival time of that pulse is a measure of the direct range to that station.

The mechanics of determining the exact time of transmission is accomplished by having the receiving set at a known location and computing the actual ranges to each loran station. With this information, the timing from the on-board cesium is slewed (in software) to force the measured ranges to agree with the computed values. The system is then calibrated and will henceforth measure direct ranges to the selected three stations.

There is, however, some differences in the drift rate between the on-board standard and those at the loran stations. This can be as small as 10 nanoseconds per day and up to an average of 200 to 300 nanoseconds per day. The drift is compensated by periodically comparing the system position with a position derived from the Navigation Satellite System. Data from selected satellite passes are stored in a special filter. The output from the filter is used to update the loran-derived position. This not only compensates for clock drift but also for other bias in the loran signals due to transmission anomalies.

LORAN C ACCURACY AND REPEATABILITY
LSC THREE-RANGE SYSTEM
PAGE 2

The geodetic accuracy therefore, is as accurate as a filtered accumulation of satellite fixes. The accuracy of each satellite fix is enhanced by utilizing an accurate speed and heading derived from the loran signals. Under these conditions, an accumulation of satellite fixes can be expected to provide system updates with an accuracy of 30 to 40 meters. Long term repeatability is also as good as an accumulation of satellite fixes.

MODES OF OPERATION:

1. Three Range - Three Base Solution

This mode measures direct ranges to the Master and any two Slave stations. A pair of ranges yields a position. There are three pairs available, yielding a three-point fix, or a triangle. The system position is taken as the center of the triangle. This is normally the most accurate position fix available.

There is however, a situation where this solution becomes undesirable. One of the pairs used in this mode is the Slave 1 and Slave 2 pair. When the line between these stations is approached, the solution from this pair becomes more and more inaccurate, thereby distorting the triangle and the subsequent system position. This effect is overcome by the following mode.

2. Three Range - Two Base Solution

This mode also utilizes direct ranges from the Master and two slaves, but has the capability of dropping any one range pair from the solution. Thus, if the vessel was approaching the Slave 1 - Slave 2 baseline, that range pair would be dropped. The solution would then be based on the position defined by the Master - Slave 1 pair and the position defined by the Master - Slave 2 range pair. The system uses the average of the two positions for the final position.

LORAN C ACCURACY AND REPEATABILITY
LSC THREE-RANGE SYSTEM
PAGE 3

This mode is particularly useful in coastal areas since there are a number of Slave-Slave baselines parallel to the coast. It is also useful where a Master-Slave baseline or baseline extension is near the operating area. That pair can be deleted from the solution while maintaining excellent accuracy from the remaining two pairs.

Both operating modes have numerous continuous checks on the quality of signals received and the position solution. If any of these parameters go out of tolerance a warning is displayed to the operator.

LORAN-C CONTOUR CHARTS:

The Coast Guard is required to maintain the timing accuracy of the Loran C transmissions to ± 50 nanoseconds, which in the ranging mode is equal to ± 50 feet of range.

The contours were generated by taking a position and changing one range by plus 50 feet and plotting the resulting system position; then changing the same range by minus 50 feet and computing that result. The same was repeated for the other two ranges

The result was six difference system positions. The maximum deviation from the true position was measured and a RMS value taken. This RMS is the value assigned for the contour. Locations having RMS errors of 100, 150 and 200 feet were plotted on the charts as contour lines. These contours represent the short-term repeatability of the system.

One set of contours was generated for the three-base solution (dashed lines) and another set for the two-base solution (solid lines).

It is apparent from the charts that the three-base solution would be useful only at extreme ranges.

LORAC RADIO POSITIONING NETWORKS

- I. Type of System Used: Hyperbolic
- II. System Designation: UBUB-1000 Lorac Radio Positioning System
- III. System Specifications:
 - A. Frequency band: 1.6 to 2.5 KHz
 - B. Power Output: 300 Watts
 - C. Type of Emission
Base Stations: Ao
Reference Stations: AQ
 - D. Ambient Temperature: 0 to 50° C.
 - E. Relative Humidity: to 95%
 - F. Power: 115 VAC \pm 10%, 2400 Watts maximum
50 to 60 Hz \pm 5%
- IV. Transmitting Station Equipment
 - A. UBUB-1200 CW Base Station (3 each)
 1. UFD-1100 RF Amplifier
 2. UBEB-1000 Oscillator - Exciter
 3. UPK-1100 Power Supply
 4. UBUB-1113 Antenna Systems
 - B. UBUB-1100 AM Reference Station (1 each)
 1. UBHC-1000 Calibration Preamplifier
 2. UQD-1100 Modulator
 3. UBEB-1000 Oscillator - Exciter
 4. UBOA-1000 Oscilloscope
 5. UPK-1100 Power Supply
 6. UFD-1100 R. F. Amplifier
 7. UBUB-1113 Antenna System
 8. UBUB-1114 Reference Receiving System
- V. Lorac Network & Fundamental Constants
 - A. Network A (Attached)
 - B. Network BC (Attached)
 - C. Network DE (Attached)
 - D. Network FG (Attached)
 - E. Network T (Attached)

LORAC NETWORK and FUNDAMENTAL CONSTANTS

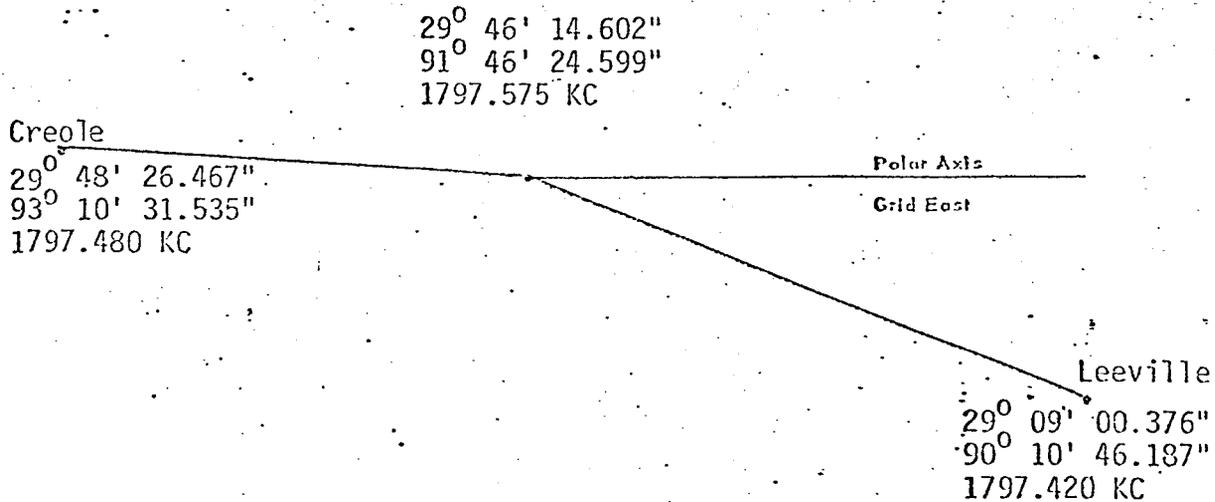
Lorac B System

VELOCITY: 983 219 472.98 ft/sec.			PROJECTION: UTM CM = 93 ⁰		
x_m	1	2029428.670000	y_m	2	10806510.950000
x_g	3	2540621.750000	y_g	4	10589650.100000
x_r	5	1584798.650000	y_r	6	10817800.930000
c_g^2	7	77086748325.652230	c_r^2	8	49455829583.400190
c_s	9	277645.004143	c_r	10	222386.666829
$c_g \sin \alpha_g$	11	-108430.425000	$c_r \sin \alpha_r$	12	5644.990000
$c_g \cos \alpha_g$	13	255596.540000	$c_r \cos \alpha_r$	14	-222315.010000
v_g	15	273.5086329294	v_r	16	273.4995031934
E_g	17	1050.000000	E_r	18	910.000000
$1/2 w_g$		0.00182809586171	$1/2 w_r$		0.00182815688571
f_g		1797420.000000	f_r		1797480.000000
h_g		2285025.210000	h_r		1807113.660000
k_g		10698080.525000	k_r		10812155.940000
$\sin \alpha_r$		-0.39053620047884	$\sin \alpha_r$		0.02538367106485
$\cos \alpha_g$		0.92058757112811	$\cos \alpha_r$		-0.99967778270964
NETWORK	A		COMPUTED BY		
DATE	February 13, 1974		CHECKED BY		

Lg Min. = 34.98
Lg Max. = 2065.02

Lr Min. = 96.60
Lr Max. = 1723.40

FOR
NETWORK DIAGRAM



Normal Net - Not Modified

LORAC NETWORK and FUNDAMENTAL CONSTANTS

"B" SYSTEMS

VELOCITY: 983 219 774 ft/sec.

PROJECTION: So. Central Texas Lambert

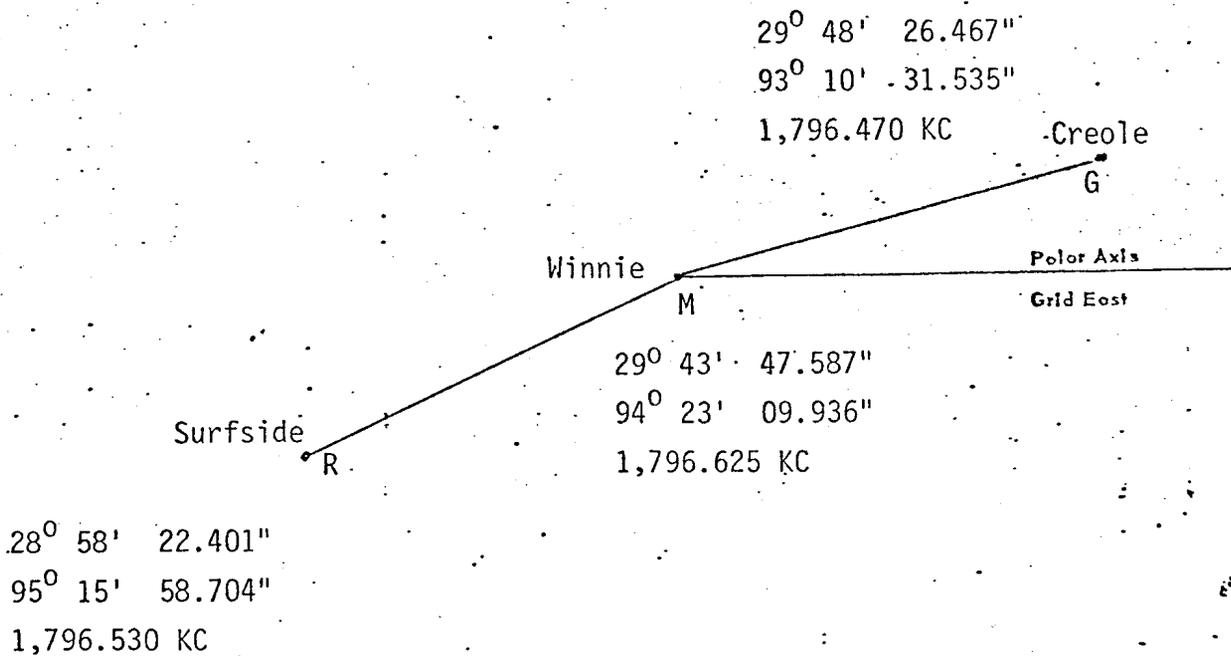
x_m	1	3463980.	y_m	2	718453.
x_g	3	3846434.	y_g	4	763728.
x_r	5	3193581.	y_r	6	433387.
c_g^2	7	37080063245.977612	c_r^2	8	38594544924.854404
c_g	9	192561.842653	c_r	10	196454.943753
$c_g \sin \alpha_g$	11	22637.534485	$c_r \sin \alpha_r$	12	-142532.783386
$c_g \cos \alpha_g$	13	191226.580994	$c_r \cos \alpha_r$	14	-135199.669323
w_g	15	273.6532683540	w_r	16	273.6441289596
E_g	17	770.000000	E_r	18	770.000000
$1/2 w_g$.00182712964843	$1/2 w_r$.00182719067243
f_g		1796470.	f_r		1796530.
h_g		3655206.824836	h_r		3328780.574523
k_g		741090.073303	k_r		575919.755432
$\sin \alpha_g$.11755981441047	$\sin \alpha_r$		-.72552403448572
$\cos \alpha_g$.99306580347729	$\cos \alpha_r$		-.68819682895446
N_g		155.	N_r		95.

NETWORK	DE	COMPUTED BY
DATE	March 27, 1979	CHECKED BY

Lg Min = 66.257324
Lg Max = 1473.742676

FOR NETWORK DIAGRAM

Lg Min = 51.991112
Lg Max = 1488.008789



Normal Net - Not Modified

LORAC NETWORK and FUNDAMENTAL CONSTANTS

Lorac B System

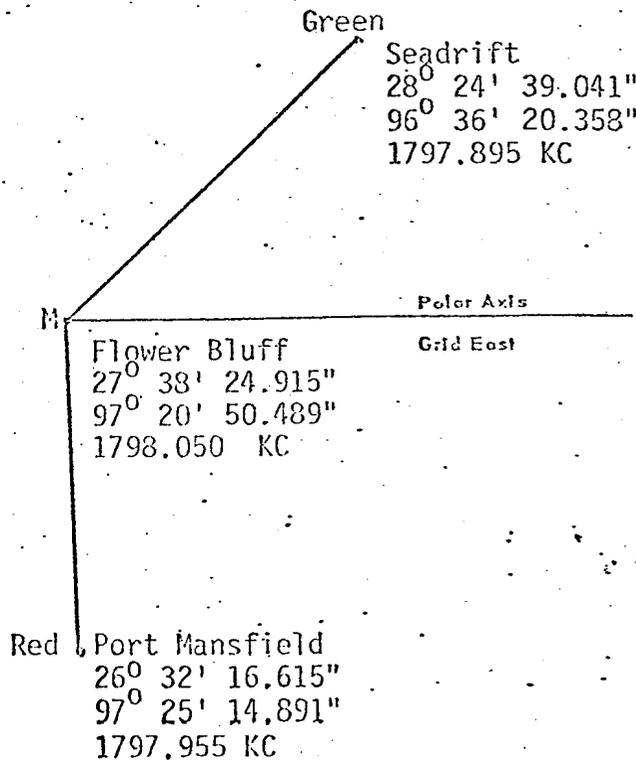
VELOCITY: 983 219 472.98 ft/sec			PROJECTION: UTM CM = 93°		
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x_g	3	-481302.870000	y_g	4	10327531.360000
x_r	5	194680.840000	y_r	6	9654528.270000
c_g^2	7	34038834059.269630	c_r^2	8	40440435594.869120
c_g	9	184496.162722	c_r	10	201098.074568
$c_g \sin C_g$	11	136300.040000	$c_r \sin C_r$	12	-200201.505000
$c_g \cos C_g$	13	124342.805000	$c_r \cos C_r$	14	-18968.210000
v_g	15	273.4363725357	v_r	16	273.4272476230
E_g	17	700.000000	E_r	18	770.000000
$1/2 w_g$		0.001822857896835	$1/2 w_r$		0.001822863999234
f_g		1797895.000000	f_r		1797955.000000
h_g		10191231.320000	h_r		9854729.775000
k_g		0.73876896943989	k_r		-0.99554163027315
$\sin C_g$		0.67395375971214	$\sin C_r$		-0.09432318057131
$\cos C_g$			$\cos C_r$		

NETWORK	FG	COMPUTED BY
DATE	July 16, 1973	CHECKED BY

Lg Min. = 26.26
Lg Max. = 1373.74

Lr Min. = 35.95
Lr Max. = 1504.05

FOR
NETWORK DIAGRAM



Normal Net - Not Modified

LORAC NETWORK and FUNDAMENTAL CONSTANTS

"B" SYSTEMS

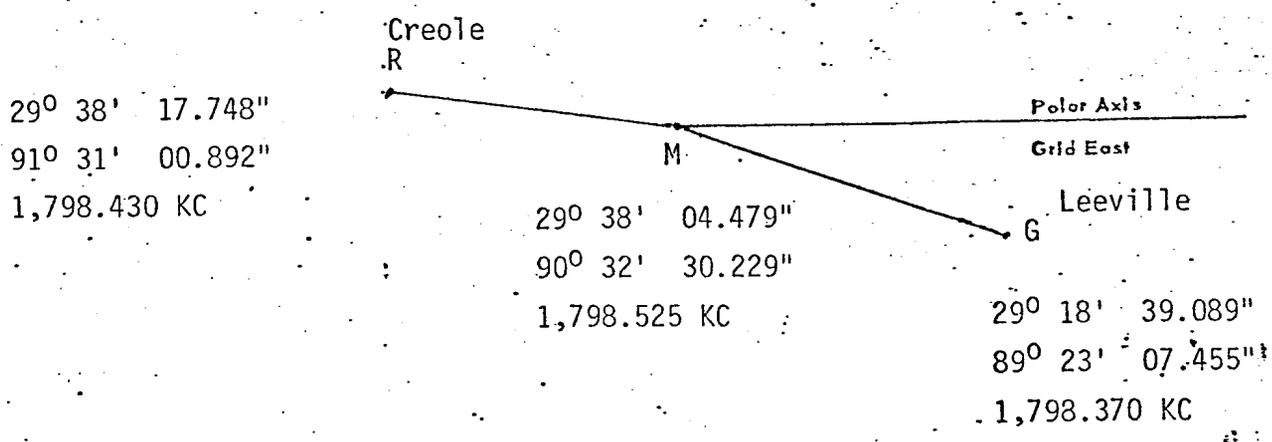
VELOCITY: 983 219.774 ft/sec.			PROJECTION: So. La. Lambert		
x_m	1	2251488.	y_m	2	352846.
x_g	3	2620824.	y_a	4	239537.
x_r	5	1941682.	y_r	6	353364.
c_g^2	7	37311922684.855858	c_r^2	8	23995095560.987636
c_g	9	193162.943353	c_r	10	154903.504031
$c_g \sin \alpha_g$	11	-56654.323914	$c_r \sin \alpha_r$	12	259.021240
$c_g \cos \alpha_g$	13	184667.837662	$c_r \cos \alpha_r$	14	-154903.287470
w_g	15	273.3641503136	w_r	16	273.3550302209
E_g	17	750.000000	E_r	18	600.000000
$1/2 w_g$.00182906207499	$1/2 w_r$.00182912309898
f_g		1798370.	f_r		1798430.
h_g		2436155.693206	h_r		2096584.568076
k_g		296190.980530	k_r		353104.325683
$\sin \alpha_g$		-.29329809812407	$\sin \alpha_r$.00167214577782
$\cos \alpha_g$.95602103828060	$\cos \alpha_r$		-.99999860196294
N_g		155.	N_r		95.

NETWORK	T	COMPUTED BY	
DATE	March 4, 1980	CHECKED BY	

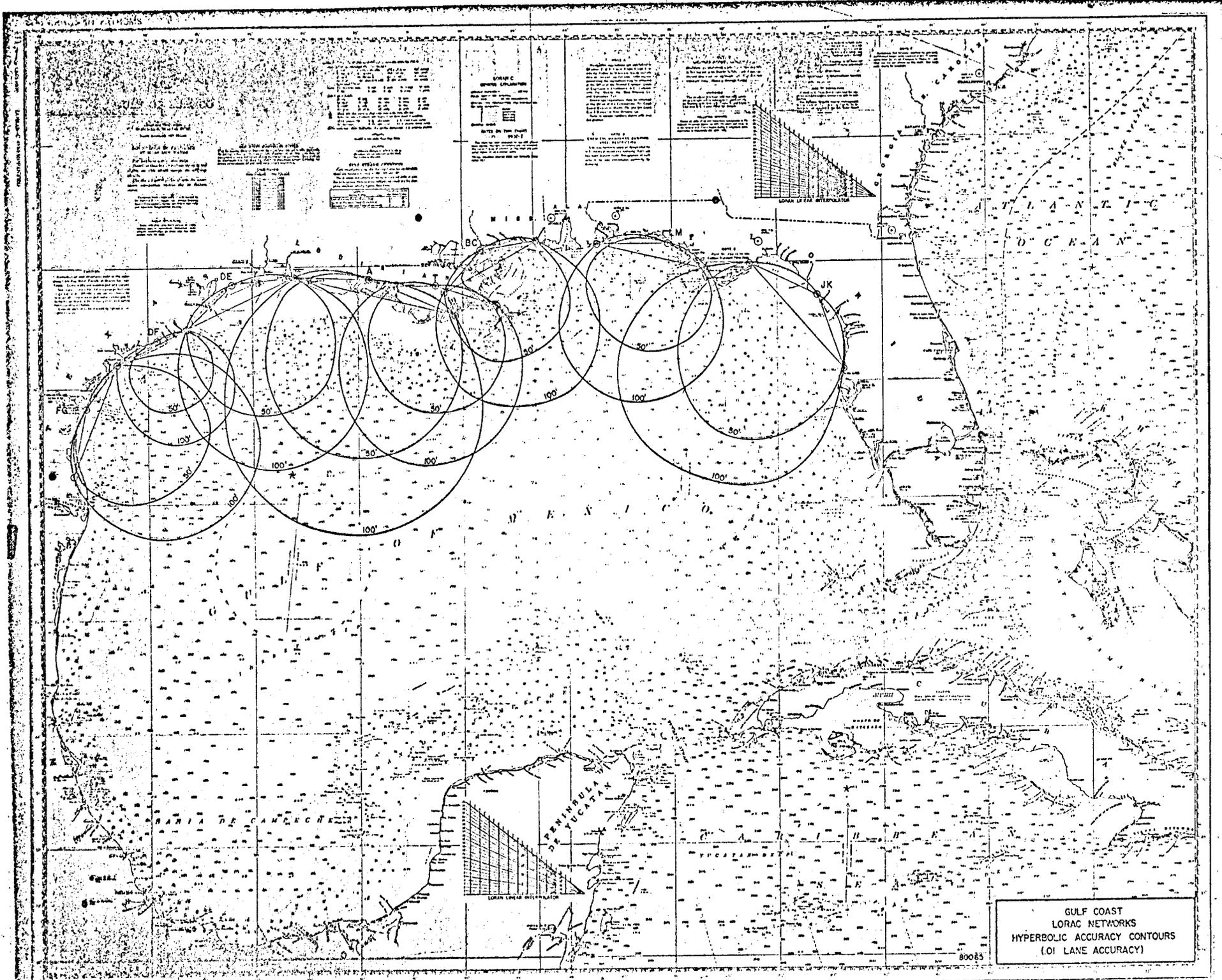
Lg Min = 43.368896
Lg Max = 1456.631104

Lg Min = 33.297531
Lg Max = 1166.702393

FOR NETWORK DIAGRAM



Normal Net - Not Modified



GULF COAST
 LORAC NETWORKS
 HYPERBOLIC ACCURACY CONTOURS
 (OF LANE ACCURACY)

80085

GULF OF MEXICO

NAVY DEPARTMENT
NAVY OFFICE OF HYDROGRAPHY
WASHINGTON, D. C.

NAVY DEPARTMENT
NAVY OFFICE OF HYDROGRAPHY
WASHINGTON, D. C.

NAVY DEPARTMENT
NAVY OFFICE OF HYDROGRAPHY
WASHINGTON, D. C.

Latitude	Longitude	Depth (Fathoms)
24° 00' N	81° 00' W	10
24° 00' N	81° 15' W	15
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24° 00' N	81° 45' W	25
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24° 00' N	154° 45' W	1485
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24° 00' N	155° 45' W	1505
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2		

1:100,000 Scale
LITHOGRAPHED AND PRINTED AT THE NAVY BUREAU OF HYDROGRAPHY

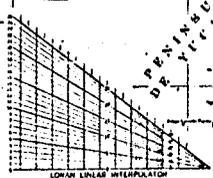
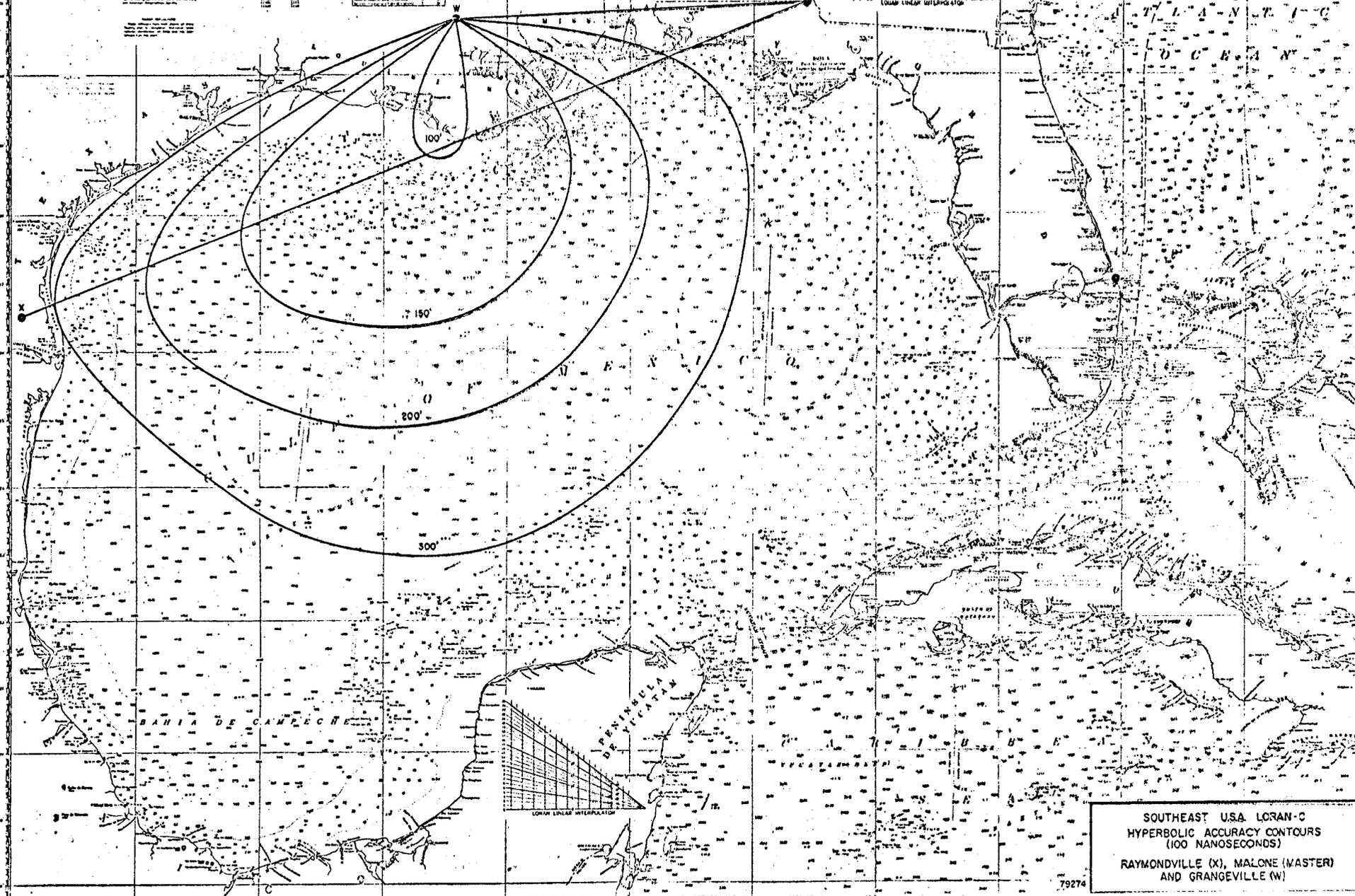
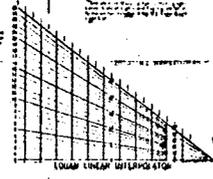
GULF OF MEXICO

MEASUREMENTS IN FATHOMS
Scale 1:100,000
The numbers in fathoms are based on the mean low water level of the Gulf of Mexico. The numbers in meters are based on the mean low water level of the Gulf of Mexico.

MEASUREMENTS IN METERS
Scale 1:100,000
The numbers in meters are based on the mean low water level of the Gulf of Mexico. The numbers in fathoms are based on the mean low water level of the Gulf of Mexico.

SELF STRAIN ELEMENTS
The numbers in fathoms are based on the mean low water level of the Gulf of Mexico. The numbers in meters are based on the mean low water level of the Gulf of Mexico.

LORAN-C GENERAL LAYOUT
BASED ON THE DATE 1967



**SOUTHEAST U.S.A. LORAN-C
HYPERBOLIC ACCURACY CONTOURS
(100 NANOSECONDS)**
RAYMONDVILLE (X), MALONE (MASTER)
AND GRANGEVILLE (W)

79274

MOBILE RECEIVERS

FUNCTIONAL DESCRIPTION

The LORAC Receivers UAJB, C, D and E-1000, transistorized, low power, compact units which incorporate the receiver and indicators into a single case, receive signals from a LORAC network, and display the position coordinates in the form of two drum counter readings.

Continuous-rotation resolvers are used to measure the phase differences between a pair of Red Lane signals and between a pair of Green Lane signals developed in the network. These phase differences are translated to LORAC positions by two sets of drum counters which are servo controlled. The phasemeter counters show intra-lane position to 0.01 lane, and the counters maintain cumulative lane counts. Reset switches are provided to set the counters to any starting point and the counter reading may be changed by removing

the front bezel and rotating each digit cylinder manually. The receiver model numbers indicate the type(s) of auxiliary display devices which the receiver will drive. The table below correlates model numbers with auxiliary equipment. All models of the receiver are compatible with the Remote-Tuned Antenna System and the Manual-Tuned Antenna System.

The receiver construction permits the unit to be used as a fine frequency receiver or a Lane Identification receiver. Mode of operation is determined by the positions of the switches mounted on the rear of the chassis.

Other features include plug-in card assemblies to provide easier servicing and a case with recessed handles in the sides to assist the operator when it is necessary to lift or carry the receiver.

MODELS	OPERATES
UAJB-1000	Analog Recorders Zero Header
UAJC-1000	Analog Recorders
UAJD-1000	Zero Header Analog Recorders Actrac Course Plotter Data Recording Systems
UAJE-1000	Analog Recorders Actrac Course Plotter Data Recording Systems

SPECIFICATIONS

ACCURACY: Four electrical degrees standard deviation under normal operating conditions as follows: Input signals between 5 microvolts and 0.2 volt; signal to noise ratio 2 to 1 or greater; difference between input signal strengths up to 40 db; rate of phase change equivalent to that resulting from moving receiver along LORAC baseline at speed of 20 knots.
TRACKING RESPONSE: At least 40 rpm of indicator dial along LORAC baseline (approximately 80 knots at 2 mc) without lane loss.
FREQUENCY RANGE: 1.7 to 2.5 megacycles (with suitable crystals).
TYPE RECEIVER: Superheterodyne; crystal controlled (enclosed in a 85°C. oven); C-W type or A9 reception.
SELECTIVITY: Bandwidth 500 cycles at 6 db voltage points; 2500 cycles at 60 db voltage points.
SENSITIVITY: One Microvolt.
INTERMEDIATE FREQUENCY: 455 kilocycles.
AMBIENT TEMPERATURE LIMITATIONS: 0 to 50 degrees C.

POWER SUPPLY CHARACTERISTICS: Input voltage, 115 vac $\pm 10\%$, 60 to 400 cps $\pm 5\%$; Power consumed, 115 watts.

FILTERS: Plug-in type.

AVC: Voltage developed at detector controls RF amplifier. Separate audio limiter controls audio level.
OPERATING CONDITIONS. Continuous duty.

ENCLOSURE: Enclosed and ventilated; servo section cooled by forced-air; air intake equipped with cleanable filters.

INDICATOR: Each phasemeter is controlled by a high-performance, closed-loop, 60 cycle servo system. Each phasemeter has provisions for a 60-cycle synchro output (Type 18 CX6b) for driving auxiliary display devices.

DIMENSIONS: 8 inches high x 20 inches wide x 18 inches deep, weight 75 pounds.

FINISH: Light gray with dark gray trim enamel exterior.



Lorac Service Corporation

8125 WESTGLEN DRIVE
(713) 785-5850

HOUSTON, TX. 77063
TELEX: 775850

EQUIPMENT BULLETIN

SECTION C7 – MARK 220 ANALOG RECORDER

SPECIFICATIONS

- Channels:** 2 analog, 2 event
- Chart:** Type: Roll paper, 275 ft. long x 4.3 inches wide
Grid: Two 40 mm grids graduated in 50 divisions across the span, 5 mm increments on time axis; right and left event marker channels
Speed: 1, 5, 25, 125 mm/sec and 1, 5, 25 and 125 mm/min
Speed Accuracy: $\pm 0.25\%$
- Ink System:** Pressurized fluid with a capacity of 1 oz., sufficient for 1 year of normal recording
- Input:** Measurement Range: 1 millivolt per chart division to 500 volts DC full scale
Circuit: Differential, balanced to ground
Impedance: 10 megohms balanced, 5 megohms each terminal to ground
Sensitivity: 1 mv/div to 10 volts/div
- Power:** 115 VAC, 165 volt-amperes, 120 watts
- Weight:** 25 pounds
- Dimensions:** 9-1/8 inches wide, 13-1/2 inches high, 13-1/4 inches deep including take-up (shockmounts extra)
- Environment:** 0-55°C operating, -40 to +85°C in storage

HP 7402-A ANALOG RECORDER

SPECIFICATIONS

Channels: 2 Analog, 2 Event

Chart: Type: Roll paper, 275 ft. rolls
Speed: 1, 5, 25 and 125 mm/sec plus 1, 5, 25 and 125 mm/min
with 009 option
Speed Accuracy: $\pm 0.5\%$ plus power line frequency variations
Weave: ± 0.25 mm

Weight: 40 lbs. with two preamplifiers and chart paper (shockmounts extra)

Dimensions: 9-15/16 inches wide, 15-1/8 inches deep plus 6 inches for paper
table and take-up reel, 11-3/16 inches high (shockmounts extra)

Environment: 0-55°C, 25-40°C when relative humidity is above 95%



SECTION C2. 21 MX COMPUTERS

SPECIFICATIONS

Power: 110/220 vac \pm 20%, single phase
47-66 Hz
525 watts max. (2108A), 800 watts max (2112A)

Environment: 32°F to 131°F operating
-40°F to 167°F non-operating
50-95% relative humidity
Altitude: 15,000 feet operating
25,000 feet non-operating
Can withstand vibration of 1g at 44 Hz.

Weights and Dimensions:

2108A:	Weight: 45 pounds
	Width: 16-3/4 inches
	Height: 8-3/4 inches
	Depth: 23-1/2 inches
2112A:	Weight:
	Width: 16-3/4 inches
	Height: 12-1/4 inches
	Depth: 24-1/2 inches



SECTION C1. 2100A COMPUTER

DESCRIPTION

The Hewlett-Packard 2100A Computer is a compact data processor contained in a single cabinet designed for rack mounting. Basic characteristics are a 16-bit word length with a 17th bit for memory parity checking, parallel logic, and power fail interrupt with automatic restart. It uses magnetic core memory with a protected 64 word block for the stored loader program. There are provisions internally for 14 I/O channels. It provides for two optional direct memory access (DMA) channels program-assignable to any two of the I/O channels.

SPECIFICATIONS

Power:	115VAC \pm 10%, single phase
	230VAC \pm 10%, single phase
	47.5 to 66 Hz
	800 watts nominal, 1400 watts maximum
Weights and Dimensions:	Weight: 115 pounds
	Height: 12 inches
	Width: 16.75 inches
	Depth: 26 inches
Environmental:	32° to 131° F operating
	-40° to +167° F non-operating
	50% to 95% relative humidity
	Altitude: 15,000 feet operating
	25,000 feet non-operating



Lorac Service Corporation

8125 WESTGLEN DRIVE
(713) 785-5850

HOUSTON, TX. 77063
TELEX: 775850

EQUIPMENT BULLETIN

SECTION C6 — UCJB-2000 DATA TERMINAL

SPECIFICATIONS

Power: 115 + 10%, -15%, volts rms or
230 + 10%, -15%, volts rms by field modification
48 to 62 Hz.
200 VA maximum at maximum rated voltage

Weight: 55 pounds

Dimensions: 21.18 inches wide, 19.50 inches deep, 14.62 inches high

Transmission Code: US ASCII, seven level, 11 bits per character; this includes 7 data bits, parity bit, start bit, two stop bits.

Interface Line: Conforms to EIA Standard RS232C

**MAGNAVOX MODEL 702-A NAVIGATION POSITIONING
FIXING SYSTEM**

Specifications*

MX702A/hp System Specifications

Power: 115 Volts AC, 60 Hz, 1,000 Watts Nominal Standard (Optional Voltages & Line Frequencies are Available)

Satellite Fix Accuracy: 25 meters RMS Single Static Satellite Pass

Console Weight: 375 lbs. (170.1 kg)

Software (Binary Tapes): Navigation program (including position fix, dead reckoning, automatic update, alerts) and hardware diagnostics.

MX702A Receiver Specifications

Carrier Frequencies: 399.968 mc \pm 10 KHz
149.980 mc \pm 3.750 KHz

Sensitivity: -145 dbm for 3 db S/N

Selectivity:

Pre-amplifier	3 db	30 db
High Channel	1.0 MHz	2.6 MHz
Low Channel	1.5 MHz	3.1 MHz

Equivalent Final Noise Bandwidth

High Channel	40 Hz (20 Hz loop noise bandwidth)
Low Channel	20 Hz (10 Hz loop noise bandwidth)

Dynamic Range: -90 dbm to -145 dbm

Intermodulation Products: -55 db

Phase Tracking Error: 15° maximum

AGC: Coherent with less than \pm 5% variation over entire dynamic range

Frequency Stability: 2 parts in 10¹¹ per 2 minutes

Signal Acquisition: Search—Automatic programmed for satellite doppler at horizon (manual or optional computer override available)
Lock—Automatic when satellite signal is in loop passband

Single Channel Reacquire: Automatic slaved to locked channel (manual override available)

Dual Channel Reacquire: Automatic saw-tooth search in direction of doppler rise (manual override available)

Signal Rejection: Automatic if doublet synchronization is not achieved in 30 seconds to prevent false lock on undesirable signal

Receiver Output Logic Levels: 0 Volts = Logical One
+5 Volts = Logical Zero

Doppler Integration: 4.6 second readout synchronized with satellite message allows a combination of 23 second doppler periods to be used for position determination

Message Recovery: Automatic from either locked channel

Tuning: Automatic

Power: 115 Volts AC, 60 Hz, 80 Watts Standard
110/230 Volts AC, 50 Hz, Optional

Weight: 50 lbs. (22.7 kg.)

Dimensions: 7"H x 17"W x 19"D
(178 mm x 432 mm x 483 mm)

Self Test Included as Standard

MX702A/hp Antenna/Preamplifier Group Specifications

Type: Dual Frequency, Vertically polarized, omnidirectional azimuth coverage

Sealed: Per Mil-Std-108

Cable: Armored coaxial (200' supplied as standard)

Weight: 50 lbs. (22.7 kg)

Overall Height: 46" (3" Diam.) (1168 mm) (76 mm dia.)

EVM-1410 CRT Monitor:

Power: 90-132 or 180-264 vac, 45-65 Hz, 60 watts maximum

Environment: 0°C to 50°C maximum operating range
MTBF = 20,000 hours at normal line voltage and 25°C ambient temperature

Dimensions: 13-3/8 inches wide
13-1/8 inches high
13-1/4 inches deep (+3 inches minimum for connectors)



Lorac Service Corporation

8125 WESTGLEN DRIVE
(713) 785-5850

HOUSTON, TX. 77063
TELEX: 775950

EQUIPMENT BULLETIN

SECTION C13 — ML-200 LORAN C RECEIVER

SPECIFICATIONS

Search Time:	30 to 90 seconds
Settle Time:	200 to 800 seconds
Dynamic Range:	Differential: 86 db Overall: 110 db
Sensitivity:	10 microvolts
Bandwidth:	Search: 3 KHz Track: 16 KHz
Notch Filters:	65 to 155 KHz, 26 db
Velocity:	Operates up to 3000 knots with zero tracking error due to velocity
Warmup Time:	None
Antenna:	6 foot whip
Dimensions and Weights:	Receiver: 14.5" wide, 8.5" high, 10.2" deep, 25 pounds Antenna Coupler: 14.5" high, 2.2" diameter, 2 pounds
Environment:	Receiver: -5°C to +55°C Antenna Coupler: -40°C to +70°C
Power Requirements:	110/220 ±20% VAC, 48-440 Hz, 60 watts or 12/24/32 ±20% VDC, 70 watts, 100% overvoltage for 0.2 sec. tolerated



SECTION C9. 5061A FREQUENCY STANDARD

DESCRIPTION

The Hewlett-Packard Model 5061A Cesium Beam Frequency Standard uses a cesium beam tube resonator to stabilize the output frequency of a quartz crystal oscillator. Solid state components and the closed-loop, self-checking control circuit provide an accuracy of ± 1 part in 10^{11} .

In the beam tube, a beam of Cesium 133 atoms passes through a microwave cavity. A microwave magnetic field is applied by multiplying the quartz crystal oscillator to a frequency near the transition frequency of Cesium 133 (9, 192, 631, 770.0 Hz). When the microwave frequency deviates from the center frequency of the atomic resonance, a current is generated that has a magnitude proportional to the frequency deviation and a phase which indicates whether the oscillator signal is above or below the transition frequency of the Cesium beam. This current is filtered, amplified, and detected to provide a dc voltage proportional to the frequency deviation. The integral of this dc voltage automatically corrects the quartz oscillator frequency.

Available output frequencies of the unit are 5 MHz, 1 MHz, and 100 KHz. Standby power is provided by an internal battery that is automatically recharged with a front panel lamp to indicate when the battery is being used or is being charged.

SPECIFICATIONS

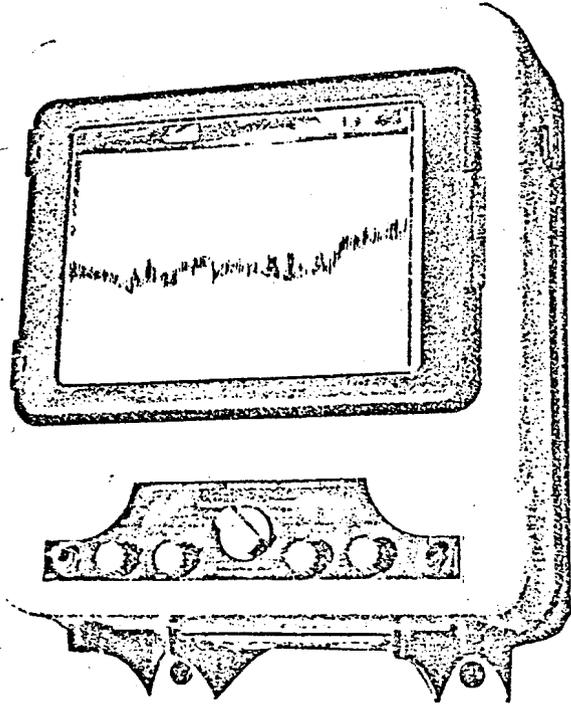
Output:	5 MHz, 1 MHz, 100KHz, 1V rms into 50 ohms
Cesium Beam Tube:	Operating Life: 4 years typical Shelf Life: 2 years in temperatures up to 35°C if proper storage procedures are followed.
Power:	115 or 230 VAC $\pm 10\%$, 50 to 400 Hz, or 22 to 30 VDC, 22 Watts
Weight:	72 pounds with battery option.
Dimensions:	16-3/4" wide, 8-3/4" high, 18-3/8" deep.
Environmental:	Operating temperature: 0 to 50°C. Non operating temperature: -40 to +50°C Humidity: to 95% at 40°C operating.

APPENDIX B
GEOPHYSICAL INSTRUMENTS

RAYTHEON MARINE

RAYTHEON

**DE-731 RECORDER
FATHOMETER® DEPTH SOUNDER**



The DE-731 is a ruggedly built feet and fathom recording Fathometer depth sounder. It is a fully solid-state and weatherproof unit that delivers powerful performance and offers a number of desirable features that include "Whiteline" operation.

Heavy duty construction and advanced electronics insure maximum reliability with a minimum of power consumption. For easy serviceability most circuitry is mounted on plug-in printed circuit boards.

Precise recordings to depths of 410 feet or 410 fathoms are presented through four overlapping phases in feet and fathoms, selectable by a front panel switch. The functions of adjustable chart lights and fix marker are also controlled on the front panel.

A built-in phase indicator marks the lower portion of the chart paper, noting permanently the feet phase in use. A hinged front window panel enables easy access to chart paper for manual notations.

The DE-731 offers easy-to-read 7" chart paper, and a chart speed that is continuously variable between 4" and 40" per hour. A hinged front cover and a sliding recording mechanism simplify chart paper replacement.

Features

- White-Line Operation
- Eight Depth Ranges
- Magnetic Keying
- Phase-Indicator
- "Zero" Adjustment: Electronic Adjustment by Control Knob
-5' to +60' Adjustment
- Depths to 410 feet or 410 fathoms
- Choice of Transducers

DE-731 RECORDER FATHOMETER® DEPTH SOUNDER

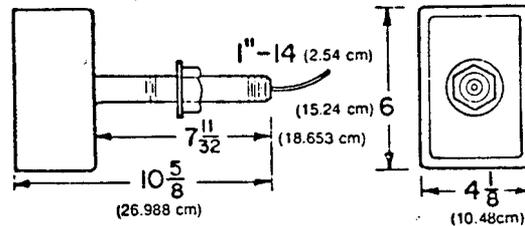
Specifications

Ranges:	Phase 1 0-110 feet or fathoms Phase 2 100-210 feet or fathoms Phase 3 200-310 feet or fathoms Phase 4 300-410 feet or fathoms	Accuracy:	± 1% (can be adjusted by internal control)
Voltages:	115VAC 50/60 cycle or 32VDC Basic 220/240VAC — Internal Adjustment 12VDC or 24VDC — Accessory Adaptors	Frequency:	40 kHz
Power Requirements:	12VDC input 3.0 amps 24VDC input 1.45 amps 32VDC input 1.20 amps 117/220VAC input 40 watts	Chart Speed:	Continuously adjustable 4" to 40" per hour
		Chart Paper:	60' (18.3m) long, 7" (17.8cm) wide
		Dimensions:	19" (48.3cm) H, 15½" (39.4cm) W, 8½" (21.6cm) D
		Weight:	40 lbs. (18.1kg) approx.

Transducers

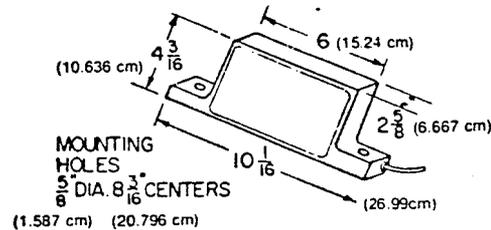
Model 7193 — Thru-hull design. Naval bronze. Urethane window.

Frequency	40 KHz
Source Level db re 1 μbar/volt	64 typical
Receive Sensitivity db re 1 volt/μbar	-79 typical
Beam Width at -3 db	17° x 25° typical
Built-in Transformer	No
Impedance	200 ohms typical
Pulse Power	700 watts
Weight	13 lbs. with cable
Cable	2 conductor shielded, 20 AWG, neoprene jacket. 30' long. (Belden 8412)
Connector	None supplied



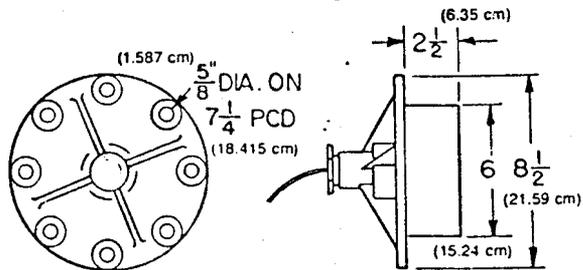
Model 7210 — Keel mounting version of 7193. Naval bronze. Urethane window.

Frequency	40 KHz
Source Level db re 1 μbar/volt	64 typical
Receive Sensitivity db re 1 volt/μbar	-79 typical
Beam Width at -3 db	17° x 25° typical
Built-in Transformer	No
Impedance	200 ohms typical
Pulse Power	700 watts
Weight	13 lbs. with cable
Cable	2 conductor shielded, 20 AWG, neoprene jacket. 30' long. (Belden 8412)
Connector	None supplied



Model 7510 — Stainless steel housing. Urethane window. Painted black to distinguish from 7511.

Frequency	40 KHz
Source Level db re 1 μbar/volt	65 typical
Receive Sensitivity db re 1 volt/μbar	-75 typical
Beam Width at -3 db	20° typical
Built-in Transformer	Yes
Impedance	200 ohms typical
Pulse Power	700 watts
Weight	20 lbs.
Cable	2 conductor shielded, 18 AWG, neoprene jacket. 30' long
Connector	None supplied



Raytheon Factory Sales & Service Facilities: Seattle; Wilmington (Los Angeles); New Orleans; Tampa; Norfolk; Brooklyn; Houston.

In Europe: Raytheon Service Co., 6-8, Siljengade, 2300 Copenhagen S, Denmark, Telephone 57-0611.

Other world areas: Raytheon Company, International Affairs, Manchester, New Hampshire 03103, Telex 94-3459.



RAYTHEON MARINE COMPANY
676 Island Pond Road
Manchester, New Hampshire 03103
Telephone (603) 668-1600

C2RS473-2

PRINTED IN U.S.A.

O. R. E. SUB-BOTTOM PROFILING SYSTEM, MODEL 1036

ORE[®]

Description:

The O. R. E. Model 1036 multi-frequency, Sub-Bottom Profiling System is an easily handled, portable unit capable of obtaining high resolution sub-bottom profiles while operating at vessel speeds up to 12 knots.

The system includes the following components:

1. O. R. E. Model 136, 3.5 kHz - 7.0 kHz, Towed Transducer Vehicle and Faired Cable Assembly.
2. O. R. E. Model 140, 10 kw Transceiver with continuously adjustable frequency from 1 kHz - 12 kHz and automatic bottom tracking Time Varying Gain.
3. Hydro Products/Giffit Model 4000 Precision Graphic Recorder.
4. O. R. E. Model 115 Hand Powered Winch, designed to accommodate faired cable.

Additional Models available include:

Model 1032 with 3.5 kHz - 7.0 kHz, two or four element, light-weight transducer array, adapted for over-the-side mounting on small boats.

Model 1038 with 1.4 kHz, four-element Towed Transducer Vehicle, for deeper penetration.

Features:

- Continuously variable frequency from 3.5 kHz to 7.0 kHz (Model 1036 and Model 1032) permits the operator to trade off penetration and resolution while observing the record.
- Adjustable keying allows the operator to select the transmitted pulse length to optimize penetration and resolution.
- Programmed range gating allows expansion and examination of bottom structure in fine detail.
- Special techniques eliminate transducer mechanical ringing permitting clear records to be obtained in water as shallow as five feet.
- Output power is adjustable to 10 kw, far higher than other systems, providing increased penetration and shorter pulse lengths, for higher resolution.
- Time Varying Gain triggers automatically at first bottom echo to optimize penetration without masking bottom reflection. Both TVG rate and delay are adjustable.
- Winch permits easy handling by one man. Entire unit is skid mounted, air shippable.

Applications:

The Model 1036 System, and its Model 1032 and 1038 variations, establish a new level of performance which make it possible to obtain useful information on sub-bottom structure for a number of important applications:

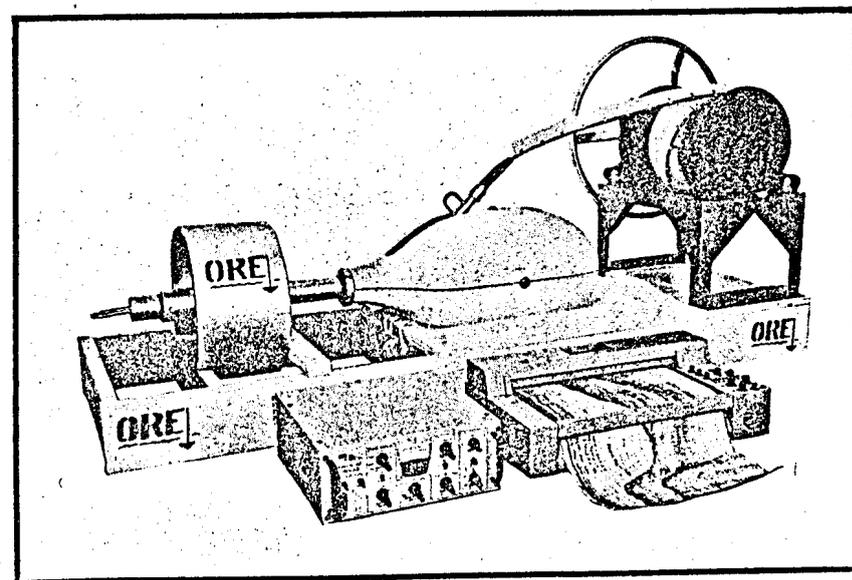
OIL EXPLORATION — Used to supplement the usual high energy seismic sources, the O. R. E. System can provide high resolution records of the first several hundred feet of sub-bottom.

CONSTRUCTION SITE SURVEY — The O. R. E. System may be used in conjunction with widely spaced corings, to obtain accurate profiles of large areas, rapidly, and at low cost.

PRE-DREDGING SURVEY — The Profiler provides an efficient, economical tool for speedy estimation of dredging problems and costs.

SAND AND GRAVEL INVENTORY — With its high power and low operating frequencies, the O. R. E. Profiling System provides sufficient penetration to map deposits of coarse sand and gravel.

POLLUTION STUDIES — Available in a lightweight configuration for over-the-side mounting on small boats, the Profiler provides a convenient tool for surveying disposal areas and for predicting future deposition of water-borne sediments.



Specifications:

Transducer Array

Model 136

Frequency 3.5 kHz to 7.0 kHz
 Maximum Power 10 kw at 1% duty cycle
 Beamwidth 55 degrees at 3.5 kHz
 40 degrees at 5.0 kHz
 30 degrees at 7.0 kHz
 Source Level 114 db ref. 1 μ b. at 1 yd.
 Vehicle Weight 270 pounds in air
 Dimensions 60" x 18" x 14"
 Cable 74 feet armored conducting cable lower
 24 feet faired.

Model 132

Same transducer specifications in four-transducer configuration, but mounted on pivoting over-the-side bracket rather than in towed vehicle.

Model 138

Frequency: 1.4 kHz
 Maximum Power 10 kw at 1% duty cycle
 Source Level 116-118 db ref. 1 μ b. at 1 yd.
 Beamwidth 55 degrees
 Vehicle Weight 950 pounds in air
 Length 96 inches

O. R. E. Model 140 Transceiver

Power Output 10 kw
 Transmit Frequency Adjustable 1-12 kHz
 Receiver Frequency Adjustable 1-12 kHz
 Receiver Bandwidth Adjustable
 Time Varying Gain Adjustable rate and delay
 Automatic bottom tracking
 Power Requirements 115 VAC \pm 10% 57-63 Hz, consumption
 200 watts nominal.
 Dimensions 17" x 17" x 7"
 Weight — 50 pounds

Recorder

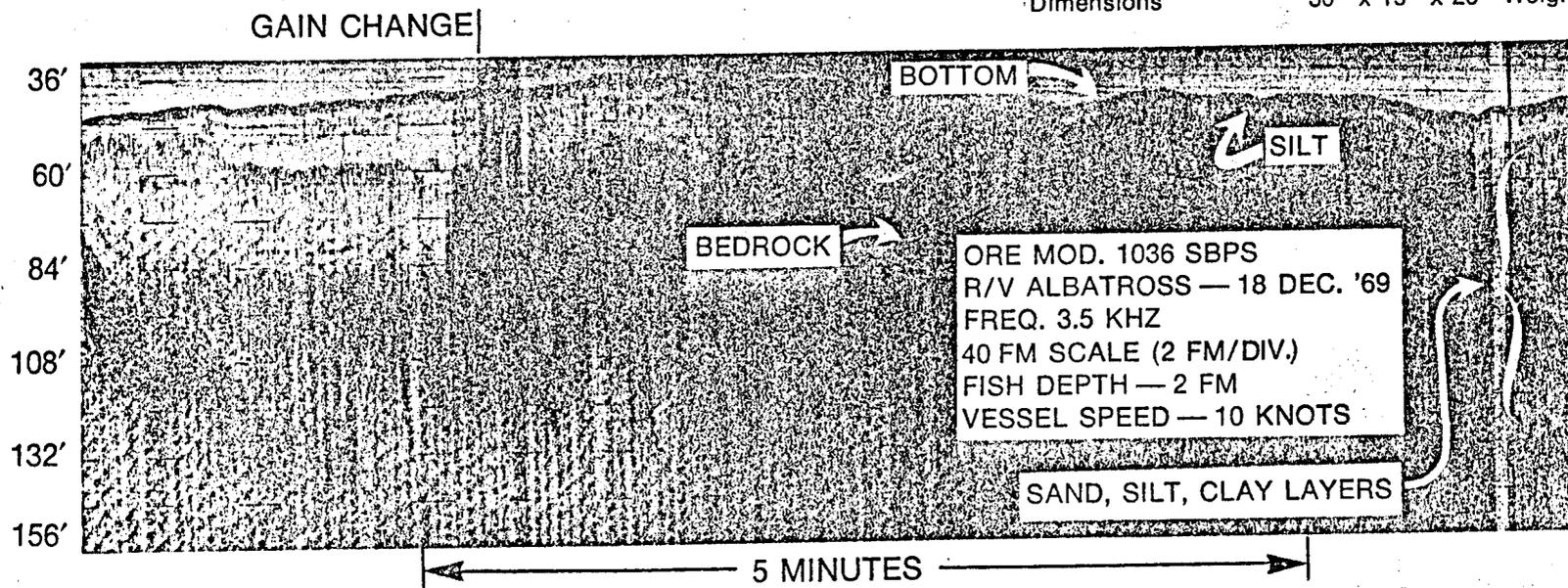
Hydro Products/Giffit Model 4000

Recorder Paper Type 19" wet paper (11" available)
 Paper Feed Rates .010", .005", .003", or .002" per sweep
 Sweep Scale 20, 40, 100, 200, 400, 1000 and 2000 fathoms (Calibration in meters and milliseconds available)
 Pulse Length Adjustable
 Program Length Variable from 2 to 8 sweeps
 Dimensions 28" x 15½" x 7½"
 Weight — 65 pounds

O. R. E. Model 115 Winch

Operation Hand-powered, 2-speed
 Capacity Designed to handle O. R. E. Faired Cable.
 Maximum capacity 150 feet, 50 feet faired.
 Dimensions 30" x 15" x 26" Weight — 300 pounds

III-15



MODEL 315

O.R.E. HEAVE COMPENSATOR



Now Available To Retrofit Existing Profilers and Bathymetric Systems

- **Minimizes Distortion of Sub-Bottom and Bathymetry Records Caused By Vertical Movement of Ship or Tow Vehicle**
- **Produces Truer Picture of Seafloor Topography, Sub-Bottom Layers, Pipelines, Trench Profiles**
- **Easily Interfaced With Most Standard Profilers or Bathymetric Systems**
- **Accelerometer-Based Technique, Not Limited to Deep Water Use**
- **Proven System . . . Repeated Choice for Major North Sea Pipeline Surveys**

DESCRIPTION

The well known O.R.E. Heave Compensator, used for several years in the Model 3000 Pipeliner, is now available for convenient field integration with most standard profilers and depth measurement systems. The Model 315 is comprised of a gimballed accelerometer/electronics package which is installed adjacent to the operating sonar transducers. This can be either in a towed transducer vehicle or near a through hull or "over-the-side" installed transducer. The accelerometer package is operated in conjunction with a shipboard electronics module which is integrated with a sub-bottom profiling or hydrographic recorder.

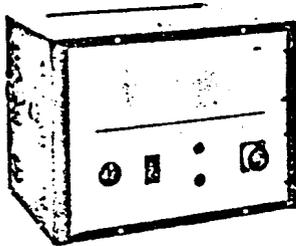
The raw acceleration signal is integrated two successive times, resulting in a displacement signal, which is used to fm modulate a 25 kHz carrier. This signal is transmitted via coaxial or multiconductor cable to the surface electronics, where it is demodulated and converted to a time delay signal proportional to displacement.

The associated sonar system graphic recorder key pulse is delayed in accordance with this signal allowing a bottom recording that is truly representative of bottom topography while the key pulse signature on the recording will display the transducer heave.



II-36

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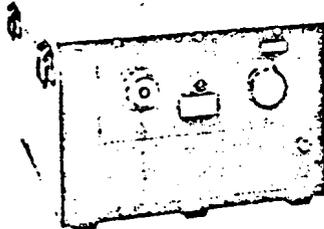
Power Supply (Model 232-A)

Power Supply (Model 232-A)

The Model 232-A Power Supply is a high voltage source for charging capacitor banks, such as the Model 231-A Triggered Capacitor Bank and the Model 233-A supplementary Capacitor Bank. It is ruggedly constructed and completely safety interlocked for operator protection.

SPECIFICATIONS

Input Voltage: 110, 120, 220, 230, and 240 VAC, 50-60 Hz single phase
Input Power: average 3.3 Kw, peak 14.4 kvA
Output Voltage: 3.8 kv DC maximum
Charging Rate: 0.5 seconds per 1000 watt-seconds
Size: 40cm (H) x 55cm (W) x 39cm (D) (15 1/4" x 21 1/4" x 15 1/4")
Weight: 75 kg (212 pounds)



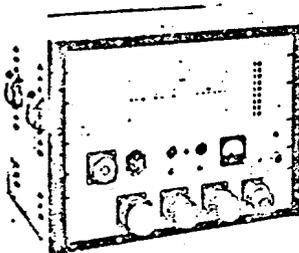
Capacitor Bank (Model 233-A)

Capacitor Bank (Model 233-A)

The Model 233-A Capacitor Bank is an auxiliary energy storage unit used with the Model 232-A Power Supply and the Model 231-A Triggered Capacitor Bank. It is normally connected in parallel with, and controlled by, the Triggered Capacitor Bank. A safety interlock relay is provided.

SPECIFICATIONS

Capacitance: 500 microfarads
Energy Storage: 3600 watt-seconds at 3.8 kv
Size: 33cm (H) x 51cm (W) x 65cm (D) (13" x 20" x 25 1/4")
Weight: 132 kg (242 pounds)



Triggered Capacitor Bank
(Model 231-A)

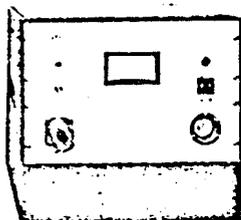
Triggered Capacitor Bank (Model 231-A)

The Model 231-A Triggered Capacitor Bank is a combination capacitor bank and high energy switching device which is charged by the Model 232-A Power Supply. It provides over 1000 watt-seconds of energy storage and is capable of controlling and switching 9000 watt-seconds of energy. The additional storage is obtained from the supplementary Model 233-A Capacitor Banks. The patented RAILGAP high energy switch is an extremely reliable device requiring little adjustment for electrode wear.

Automatic and manual triggering provisions are included. Operator safety interlocks are an integral feature.

SPECIFICATIONS

Trigger Input: Contact closure or 12 VDC positive pulse (from Model 255 Engineering Survey Recorder)
Capacitance: 160 microfarads
Energy Storage: 1000 watt-seconds at 3.8 kv
Size: 40cm (H) x 55cm (W) x 39cm (D) (15 1/4" x 21 1/4" x 15 1/4")
Weight: 58 kg (145 pounds)



Model 234 Energy Source

The Model 234 Energy Source

The Model 234 Energy Source is a small, compact power supply, trigger and energy storage unit. Featuring quiet operation through silent ignitron triggering, the unit delivers 100, 200 or 300 watt seconds at 3500 volts in 3 selectable steps to drive the UNI-BOOM Unit Pulse Boomer. May be used with other EG&G discharge type sound sources, as well.

SPECIFICATIONS

Input Power Requirements:

Voltage:	115 ± 15 VAC, 45 to 65 Hz	230 ± 30 VAC, 45 to 65 Hz
Peak Current:	100 Amperes	50 Amperes
Average Current:	30 Amperes	15 Amperes
Average Power:	2.2 Kilowatts	2.2 Kilowatts

Trigger:

Pulse Amplitude: +5 to +15 volts into 700 ohms
Pulse Width: 5 to 500µs [50% points]
Rise Time: Less than 5µs

Manual trigger also provided

Charging Voltage: 3.5 Kilovolts Nominal

Life Expectance: 10 million discharges without component replacement at any output energy specified.

Dimensions: 51cm (W) x 48cm (H) x 56cm (D) (20" x 19" x 22")

Weight: 73 kg (160 lbs)

Safety Features: • Cover Interlock • Dump Relay • Shunt Resistors • Circuit Breaker



OCEAN SEISMIC ELECTRONICS INC.

MODEL 3009-30 FILTER/AMPLIFIER

OSE's Model 3009-30 Filter/Amplifier is designed for use with the Model 241 Hydrophone Array. It acts as ship-board amplifier and interface to other processors and recording instruments. Switchable 58-62 Hz notch filter is also provided. ± 15 VDC power supply also powers 241 summing amplifier.

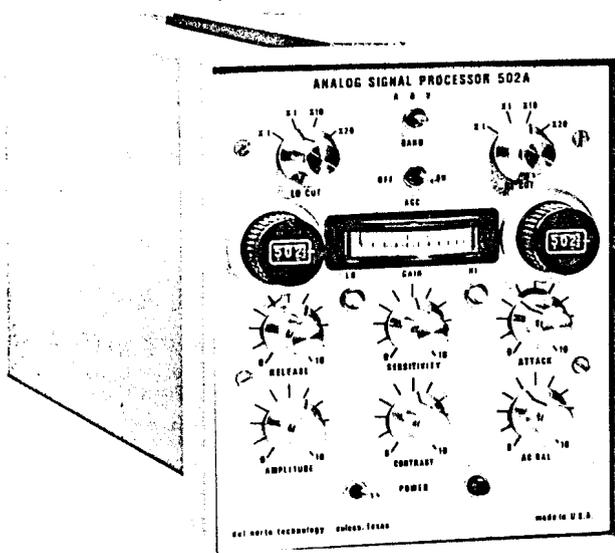
Frequency Bandwidth	10Hz-7KHz
Channels	1
Gain	40 db adjustable
Weight	5 Lbs.
Filters	58-62 Hz notch (switchable)
Power Requirements	120 VAC, 60 Hz



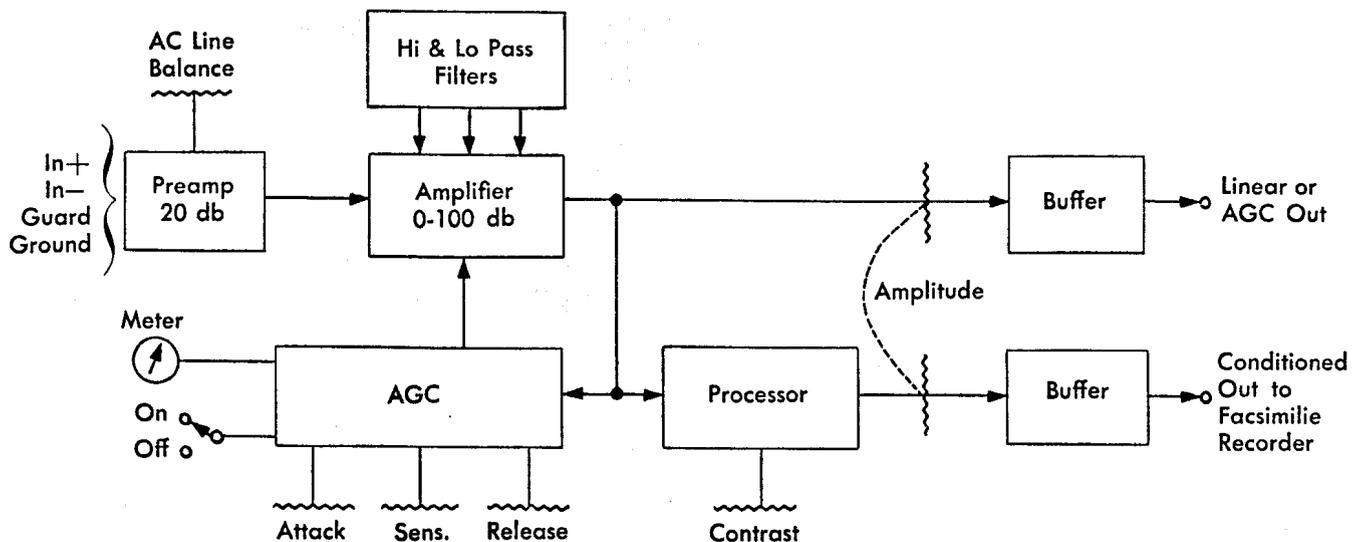
del norte

model 502

seismic amplifier



- 100 db dynamic range
- Adjustable attack and release rates
- Low noise and distortion
- 20 db/octave high and low pass filters
- Filters continuously tuneable
- 117 vac and ± 12 vdc operation
- Meter monitors AGC level



A versatile single channel seismic amplifier, the Model 502 may be adjusted for optimum response in applications ranging from refraction studies to high resolution profiling. A convenient front panel grouping of operating controls qualifies this amplifier as a research instrument, and provisions for external control of passband and gain allow its use in computer controlled systems.

Linear and automatic gain control modes are provided. In the linear mode, gain may be set manually using the sensitivity control or may be adjusted by an external signal. In the AGC mode, gain is automatically adjusted so that the output amplitude remains essentially constant over an input signal range of 100 db. AGC attack and release rates are adjustable so that response may be optimized for a broad range of signal and recording conditions.

Continuously variable high and low pass filters allow selection of any segment of the 10 Hz to 20 KHz band. The high pass filter may be set to track the low pass filter with either a one or a one-half octave bandwidth providing single knob tuning throughout the band. AGC attack and release rates may also be set to track as tuning is varied.

Two independent output channels are provided. The first conditions the amplified signal for maximum resolution and contrast when using facsimile recorders such as the Raytheon PSR 1910B or EPC Model 4600. The second provides a linear (unconditioned) output.

SPECIFICATIONS

INPUT	Differential, guarded, 40K ohm impedance, or 1000 ohm transformer
OUTPUTS	1) Linear, 2 vpp into 10K load 2) Conditioned for graphic (facsimile) recorder 2 vpp into 1K load
INTERNAL NOISE	Less than 1uv RTI at 100-200 Hz bandwidth
GAIN	20 to 120 db, 2 μ v input for 2 v full scale output
POWER	\pm 12 vdc, 100 ma. 117 vac converter furnished
SIZE	5 $\frac{1}{2}$ "w x 6 $\frac{1}{2}$ "h x 11 $\frac{1}{2}$ "d (14cm x 17cm x 29cm)
WEIGHT	6 $\frac{1}{2}$ pounds (3 kg)

del norte technology, inc.

1100 PAMELA DRIVE

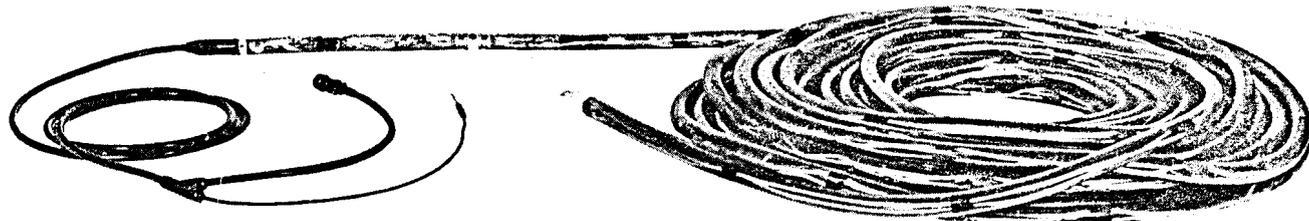
P.O. BOX 696

EULESS, TEXAS 76039

(817) 267-3541

UNIVERSAL HYDROSTREAMER

**Model
28420**

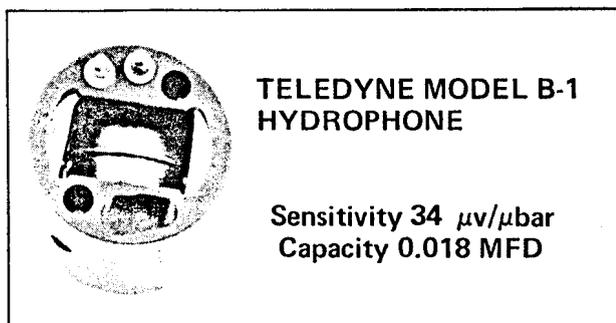


The Teledyne Model 28420 Hydrostreamer™ is provided to fulfill the need for a rugged cable of standard design and simple construction. It can be furnished in various hydrophone group configurations and towing leader lengths. Teledyne Model B-1 hydrophones with high sensitivity, acceleration cancellation and hermetic sealing are used in this streamer to insure good signal-to-noise ratio and reliability.

These cables are constructed to customer specifications as to numbers of hydrophone groups, intervals and array geometry. A wide range of configurations can be provided while using standard components in all cables.

Teledyne offers a complete repair service to its customers for fast turn around of any damaged cables. All components for the Model 28420 are carried in stock.

The check list on the back of this brochure shows all the information required for ordering the Model 28420 hydrophone array.



**TELEDYNE MODEL B-1
HYDROPHONE**

**Sensitivity 34 $\mu\text{v}/\mu\text{bar}$
Capacity 0.018 MFD**

GENERAL SPECIFICATIONS

THE TOWING LEADER is constructed with polyurethane jacket, central stress member and molded header.

Outside Dia. — 0.645 inch
Length — 600 feet maximum
Stress Member — 0.125 torque balanced wire rope
Shielding — Basket weave, 32 AWG copper
Conductors — 8 twisted prs. 26 AWG
Weight — 0.24 lbs. per foot
Header Dia. — 1.5 inches

THE ACTIVE SECTION consists of an oil-filled PVC sheath containing the hydrophones and associated components. Hydrophone groups can be brought out with or without matching transformer. Facilities are provided for fluid filling and removal.

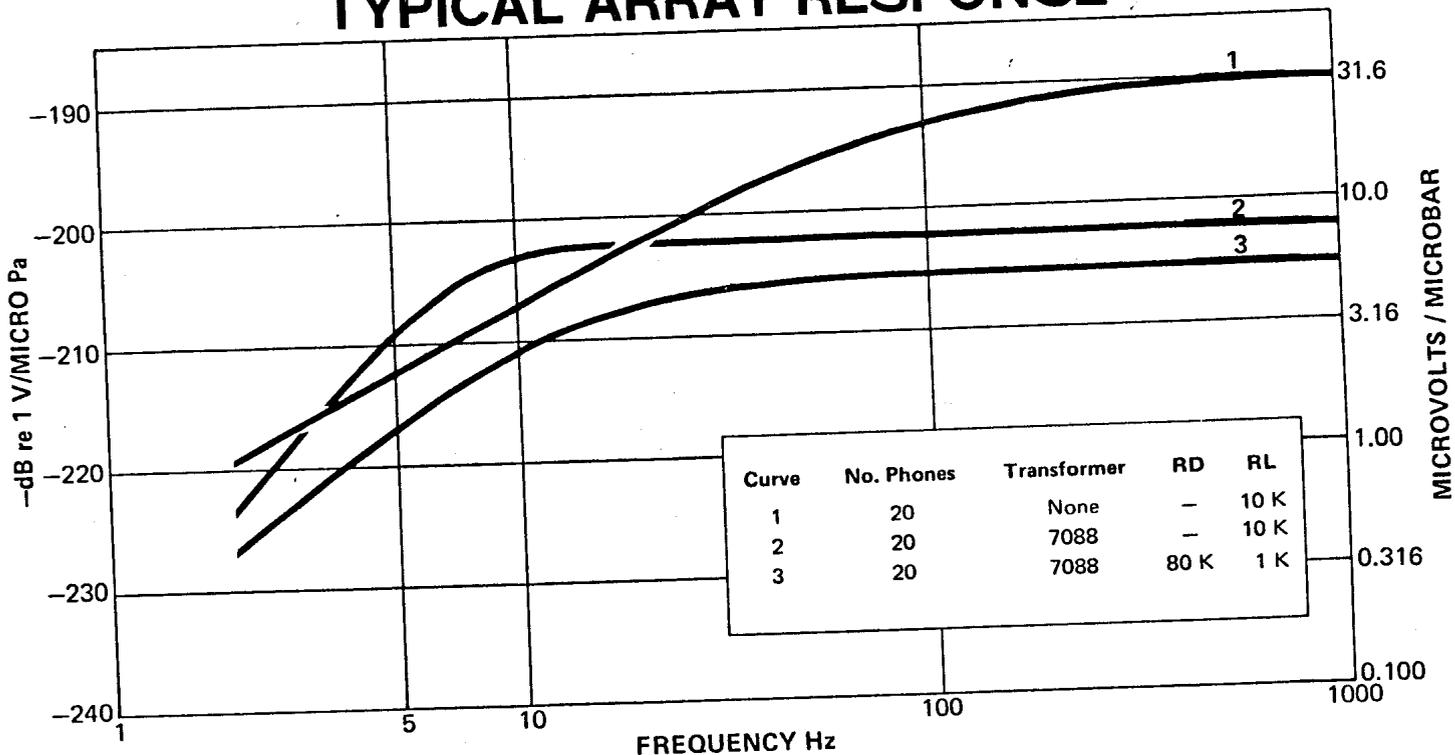
Outside Dia. — 1.5 inch
Inside Dia. — 1.25 inch
Length — 350 feet maximum
Stress Member — 2 each 0.188 braided ropes
Conductors — 26 AWG twisted pairs
Depth Transducer — Potentiometric, 0-50 feet, 0-5000 ohms (optional)
Hydrophones — Up to 6 individual groups of Model B-1 hydrophones*
Weight — 0.78 lbs./ft.
Fill Fluid — Shell Sol 71

*U.S. Patent No. 3970878

**TELEDYNE
EXPLORATION**

5825 CHIMNEY ROCK ROAD • P.O. BOX 36269 • HOUSTON, TEXAS 77036
PHONE (713) 666-2561 CABLE: TELEDYNE HOUSTON

TYPICAL ARRAY RESPONSE



INFORMATION REQUIRED FOR ORDERING

The Model 28420 Hydrostreamer consists of standard components that can be arranged to suit various requirements. Completion of the following check-list will provide all information necessary for price quotation:

Towing Leader 300 feet

Active (Oil-Filled) Section 24 feet

Number of Hydrophone Groups 25

Number of Hydrophones per Group _____

Length of each Group 24' feet

Distance between Group Centers _____ feet

Transformer Coupled Output _____ yes no

Depth Transducer _____ yes no

 **TELEDYNE EXPLORATION**

5825 Chimney Rock Road P. O. Box 36289 Houston, Texas 77036 713/666-2561
 Offices Midland/New Orleans/Denver/Calgary/The Hague

Summary Specifications

Operational

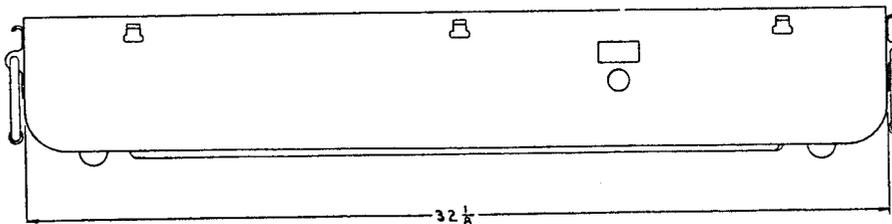
<i>Sweep Rates</i>	0.25, 0.50, 0.75, 1.0, 2.0, 3.0, 4.0, 8.0 seconds per sweep.
<i>Single Sweep</i>	Available at rates of 1.0 seconds per sweep or greater.
<i>Scale Lines</i>	10, 100 or 1000 millisecond intervals.
<i>Sweep Direction</i>	Left-to-right or right-to-left selectable.
<i>Phasing</i>	Manual; provided by front panel control.
<i>Programming</i>	Key, gate, or print from 1 to 10 sweeps.
<i>Keying</i>	Center or edge; selectable by front panel control.
<i>Key Pulse</i>	Variable length from 0.5 to 50.0 milliseconds. Selectable 0-5v positive going or 5v-ground negative going.
<i>Event Mark</i>	Manual — Internal and remote in or out. Automatic at intervals of 2, 5 or 30 minutes — internal and remote in or out. Intensity control provided.

Graphic

<i>Paper Type</i>	Dry electrosensitive (NDK), 19 $\frac{3}{4}$ " wide by 100' roll length.
<i>Recording Width</i>	19.2 inches.
<i>Paper Dynamic Range</i>	23db from white to black.
<i>Paper Advance</i>	Variable 50 to 200 lines per inch. Rapid advance provided.
<i>Chart Illumination</i>	Provided by front panel control.

Internal

<i>Input Impedance</i>	10k ohms; all inputs.
<i>Amplifier Gain</i>	Linear (fixed over sweep) 0-1000. Spreading (time varied over sweep) 0-1000.
<i>Frequency Response</i>	Flat ± 1 db from 1Hz to 100KHz; $E_{in} \geq 0.1v$.
<i>Calibration</i>	20Hz signal inserted at amplifier input by front panel control.
<i>Contrast</i>	Print current limiter, adjustable by front panel control.
<i>Input Threshold</i>	Adjustable by front panel control.
<i>Power Required</i>	150 watts, 100-130vac, 50-60Hz.



Mechanical

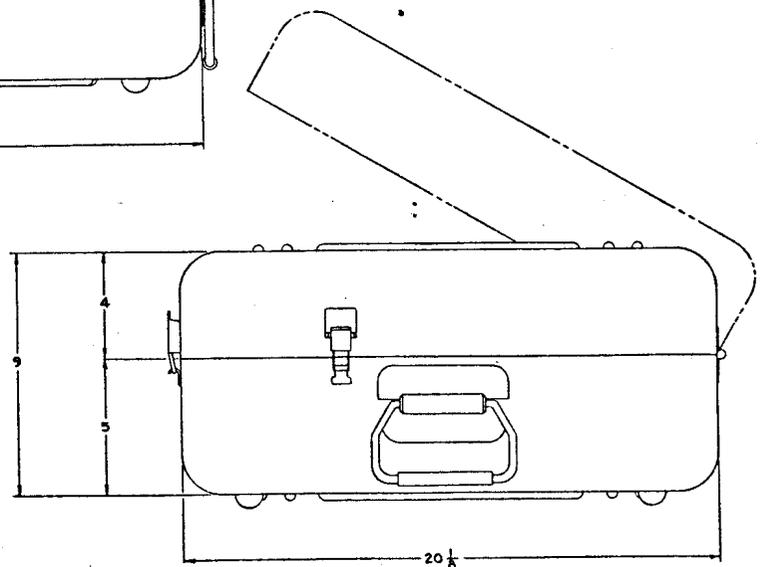
Dimensions

32 $\frac{1}{8}$ " wide,
20 $\frac{1}{4}$ " deep, 5 $\frac{1}{2}$ " high
(9 $\frac{3}{4}$ " with cover).

82 cm wide,
51 cm deep, 14 cm high
(24.5 cm with cover)

Weight

70 pounds.
32 kg



EPC

EPC LABS INC.
PO BOX 97
123 Brimbal Avenue
Beverly, Mass. 01915
(617) 927-2523

Features

Direct Digital Stylus Drive
Complete Tape Compatibility
Single Sweep Operation
Left-Right or Right-Left Scan
Up to 10 Scans Per Cycle

Crystal Controlled Time Base
19³/₄" Dry Recording Paper
All Outputs Short Circuit Proof
Rugged, Corrosion Resistant Design
Spreading Loss Compensation (TVG)

Independent Time Base Reference From Front Panel Accutron®

The Model 4100 is a portable, multi-application graphic recorder, designed for operation in the rugged marine environment. Applications include hydrography, marine geophysical and oceanographic surveys, offshore oil/mineral exploration and engineering site/construction surveys.

The recorder utilizes high resolution, dry paper recording (NDK), and incorporates all-silicon integrated circuits and transistors.

Standard features of the Model 4100, not available or optional on competitive equipment, provide broad flexibility under varying operational conditions.

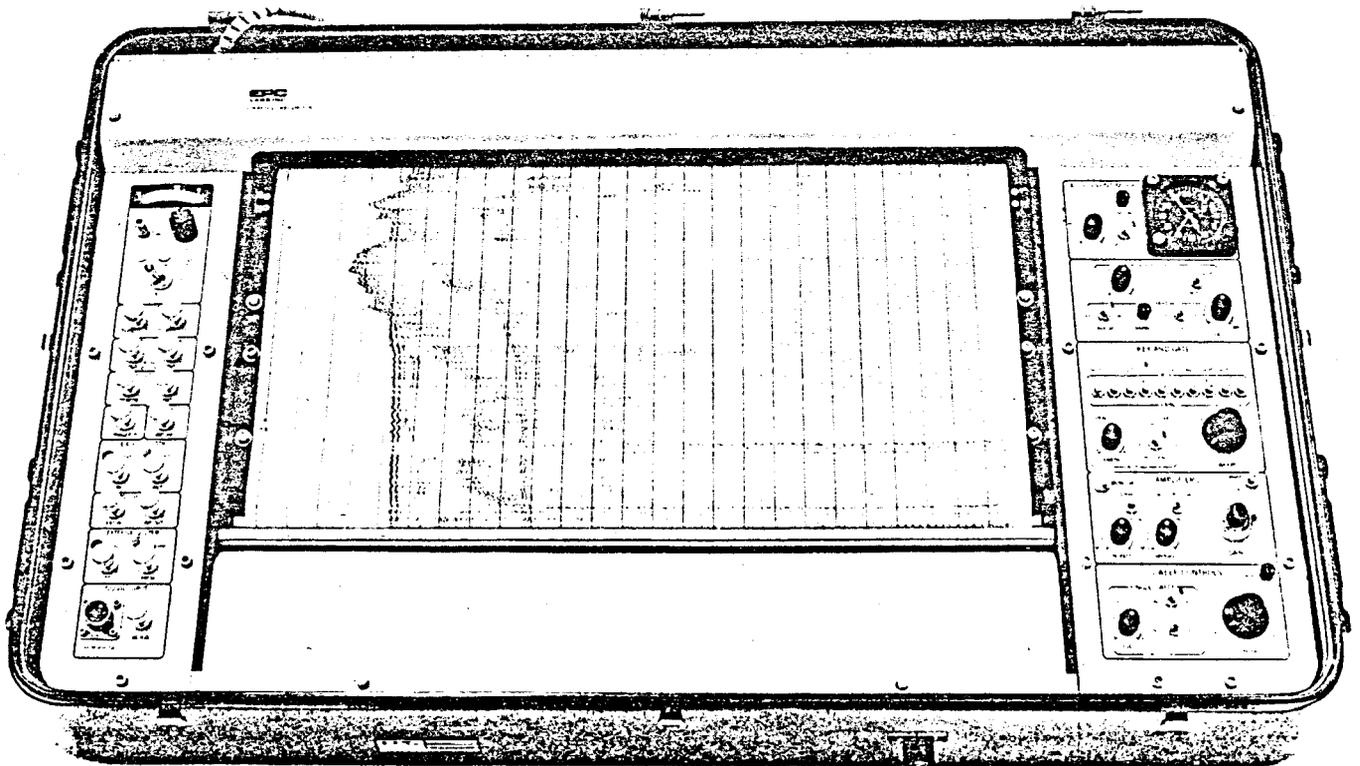
For example, the unique digital direct drive feature enables reproduction of pretaped recordings with exact synchronization at a speed equal to or faster

than that from which the tapes were made. In the single sweep mode it is possible to generate records from tapes which incorporate no time channel. In addition, the left-right/right-left scan feature allows exact record position matching when surveying on a grid pattern, thus providing record overlay analysis capability.

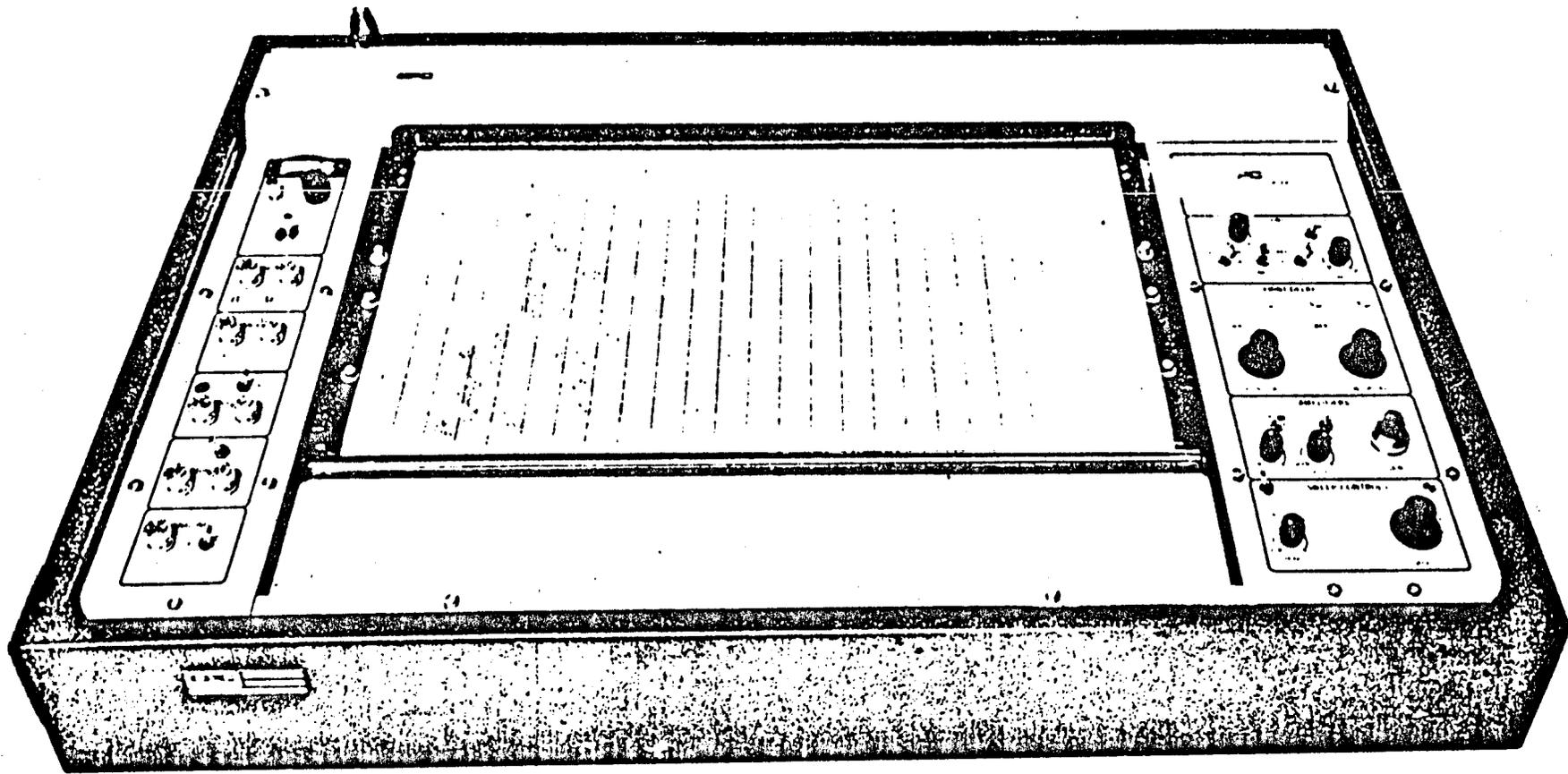
The recorder incorporates two independent time references: 1) an internal crystal for the generation of scale lines and control of sweep speed. 2) a panel mounted Accutron® which is used both as a calibration reference and a survey chronometer.

A complete spares complement, packed securely within the case cover, is included with each Model 4100 recorder.

EPC MODEL 4100



EPCC MODEL 4600



II-38

FEATURES

Direct Digital Stylus Drive
Complete Tape Compatibility
Crystal Controlled Scale Lines
19 2" Dry Recording Paper
Jitter-free Single Scan
Up To 4 Scans Per Cycle
All Outputs Short Circuit Proof
All Silicon Components
Rugged, Corrosion Resistant
Design

SUMMARY SPECIFICATIONS

Operational

Sweep Rates	0.125, 0.25, 0.50, 1.0, 2.0, 4.0 sweeps per second, plus variable
Single Sweep	Available at rates of 1.0 seconds per sweep or greater
Scale Lines	10, 100 or 1000 millisecond intervals
Sweep Direction	Left to right (right to left can be supplied)
Phasing	Manual, provided by front panel control
Print Delay	Gate or print from 1 to 4 sweeps
Key Pulse	Selectable 0-5v positive going or 5v- ground negative going
Event Mark	Manual - Internal and remote in or out.

Graphic

Paper Type	Dry electrosensitive (NDK) 19 2" wide by 80' roll length
Recording Width	19 2 inches
Paper Dynamic Range	23db from white to black
Paper Advance	Variable 50 to 200 lines per inch. Rapid advance provided
Chart Illumination	Provided by front panel control

Internal

Input Impedance	10k ohms; all inputs.
Amplifier Gain	Linear 0-1000
Frequency Response	Flat ± 1 db from DC to 100KHz. $E_{in} \geq 0.1v$
Contrast	Print current limiter, adjustable by front panel control
Input Threshold	Adjustable by front panel control
Power Required	120 watts, 100-130vac, 50/60 Hz

Mechanical

Dimensions	32" wide 20" deep 5" high 81 cm wide, 50 cm deep, 13 cm high
Weight	65 pounds 29.5 kg

Summary Specifications

Stylus Drive — The stylus sweep speed can be continuously varied from 125 milliseconds per scan to 8 seconds per scan. The drive circuitry may be synchronized to an external source for tape compatible recording. A manual phasing switch is provided. Stylus direction is left-to-right; however, units can be ordered from the factory incorporating right-to-left printing.

Scale Lines — The scale lines are generated from an internal crystal and may be printed on the chart at 10, 100, 1000 millisecond intervals. A scale line intensity control is provided. The 100 ms and 1000 ms scale lines are articulated.

Single Scan — The recorder may be operated in a single scan mode at speeds of one sweep per second and slower. Acceleration time at the one second sweep is 15 milliseconds, decreasing to 0 at the 4 second sweep. Jitter is negligible.

Programming — The Model 4600 may be programmed for up to 4 scans per cycle. Any one of the 4 scans may be selected to print.

Keying — A 2 millisecond TTL compatible positive or negative-going pulse is supplied at the

Amplifiers — The gain control is continuously adjustable for input voltages in the range of 100 millivolts to 10 volts. A threshold control is supplied for eliminating noise. The contrast control allows adjustment of the maximum black level. The input signal may be selected to print positive or negative-going pulses, or both. A manual event mark is provided. The frequency response of the amplifiers is AC 1 Hz or DC to 100 kHz.

Recording Medium — The Model 4600 prints on 19 $\frac{3}{4}$ " wide x 80' long dry electrosensitive paper. The dynamic range of the paper from white to black is 23DB. Paper advance is continuously adjustable from 50 to 200 lines per inch in addition to the rapid take-up mode. A paper take-up roll is supplied.

General Features — All inputs are 10K ohms. All outputs are short circuit proof. Silicon transistors and integrated circuits are used throughout. The majority of the electronic components are mounted on the main wire wrap panel for easy replacement.

Mechanical — Dimensions — 32" wide, 20" deep, 5" high. Weight — 65 pounds. Power required — 120 watts, 100-130 VAC, 50-60Hz.

Operational

Sweep Rates	0.125, 0.25, 0.50, 1.0, 2.0, 4.0 sweeps per second; plus variable.
Single Sweep	Available at rates of 1.0 seconds per sweep or greater.
Scale Lines	10, 100 or 1000 millisecond intervals.
Sweep Direction	Left-to-right (right to left can be supplied).
Phasing	Manual; provided by front panel control.
Print Delay	Gate or print from 1 to 4 sweeps.
Key Pulse	Selectable 0-5v positive going or 5v-ground negative going.
Event Mark	Manual — Internal and remote in or out.

Graphic

Paper Type	Dry electrosensitive (NDK), 19 $\frac{3}{4}$ " wide by 80' roll length.
Recording Width	19.2 inches.
Paper Dynamic Range	23db from white to black.
Paper Advance	Variable 50 to 200 lines per inch. Rapid advance provided.
Chart Illumination	Provided by front panel control.

Internal

Input Impedance	10k ohms; all inputs.
Amplifier Gain	Linear 0-1000.
Frequency Response	Flat ± 1 db from DC to 100KHz; $E_n \geq 0.1v$.
Contrast	Print current limiter, adjustable by front panel control.
Input Threshold	Adjustable by front panel control.
Power Required	120 watts, 100-130vac, 50-60Hz.



EPC LABS INC.
PO BOX 97
123 Brimbal Avenue
Beverly, Mass. 01915
(617) 927-2523

APPENDIX C
FIELD PROCEDURES AND SAMPLE END-OF-LINE LABELS



INTERSEA RESEARCH CORPORATION

DUTIES OF SHORE SUPPORT PERSON

Preface

The primary objective of the shore support person is to help maximize the efficiency of the survey vessel. We can accomplish this objective only by (1) reducing the number of times the vessel must return to port; and (2) fastest possible turn around of vessel during its necessary visits in port. Careful attention must be given to the vessel's progress and plans, and rapid response must be given to fulfilling the vessel's needs. Constant availability of the shore support person is essential to being contacted either by the vessel or by Intersea office personnel.

1. In following the vessel along the coast, the shore support person must select motels which have 24-hour per day phone answering service. Locations (towns) will be coordinated with Intersea Operations Manager.
2. Coordinate with Intersea's Operations Manager and investigate in each new coastal area:
 - (a) Ways to deliver small items to vessel at sea such as small boat; or to obtain a ride on, or to send a package on, a crew boat, work boat or helicopter to an offshore platform for pickup by the vessel.
 - (b) Sources (supplier) for fuel, groceries, dockage, water, electronic parts, welding services, radio/radar repair, etc. and set up Intersea credit where possible for fuel and groceries. Notify Intersea Operations Manager if credit is not available.
3. Accumulate supplies, parts, etc. received from Intersea office, or picked up at suppliers, and deliver to vessel on arrival in port.
4. Make specific arrangements for dockage, fuel and water for vessel on arrival in port (fuel by tanker truck or fuel dock -- check prices). Notify vessel by radio or through Intersea offices where to dock.
5. Order and pick up groceries for vessel and other requested supplies. Meet boat with these items upon vessel's arrival at the dock.

DUTIES OF SHORE SUPPORT PERSON (continued)

6. While vessel is in port, serve as chauffer for geophysical crew requiring supplies or parts not already obtained.

7. Ship data via airlines freight insured as follows:

(a) Magnetic tapes with two copies of digital log to IRC, 7476-A Harwin Drive, Houston, Texas 77036, insured for \$100 per line mile of data.

(b) Chart recordings with two copies of "Operator's Log" to IRC, 11760 Sorrento Valley Road, San Diego, California 92121, (sealed in plastic garbage bags within cardboard box to avoid water damage), insured for \$80 per line mile of data.

8. Promptly mail to IRC office, or send with data shipments to office all charge slips from suppliers, and weekly time sheets and expense reports from personnel on vessel as well as from one's self.

9. Maintain a log book of contacts with vessel, IRC office personnel, suppliers, etc.

10. Remain in motel room as much as possible near phone while vessel is at sea. For planned absences exceeding one hour, leave message with motel operator.

11. Handle cash for mileage reward to crew (if any established) and obtain receipts from each person for payments made.



INTERSEA RESEARCH CORPORATION

February 1980

DUTIES OF PARTY CHIEF

1. Insure that operators are annotating records correctly and completely.
2. Maintain daily operation log in detail.
3. Verify that all instruments are functioning properly.
4. Check all rigging, fairleads and streamed gear for chafing or fouling.
5. Insure that all winches are dogged after changing cable length.
6. Insure confidentiality of data by sorting, logging and storing all charts, records and logs properly.
7. Sparker tips should be checked at least once per watch.
8. Instruct bridge personnel to notify instrument room of vessels or other obstacles which may require evasive action, and to not stop the vessel or backdown without assurance that all gear is aboard. Any such occurrences will be logged.
9. Instruct navigator to increase vessel speed while making turns during line changes.
10. Instruct navigator to advise instrument room of navigation problems (loss of lane count, calibration site), necessity of rerunning lines, and periodically verify fix number with instrument room.
11. Set up communication system and check in times with shore support personnel.
12. Authorize and order all supplies. Check daily with operators and subcontractors regarding anticipated needs, and relay piece-meal these needs to shore support personnel to permit more efficient and complete procurement and prompt turn-around in port.
13. Coordinate personnel rotation, bad weather standby in port, and routine in port maintenance and resupply of vessel.



INTERSEA RESEARCH CORPORATION

February 1980

DATA ACQUISITION PROCEDURES FOR

ECHO SOUNDING

1. Bar check calibration before and after 100-line miles of survey, single block survey or daily. Other suitable calibration methods may be employed with client approval. Enter calibration method and annotate strip chart.
2. Leave blank strip chart at end of each line for attachment of label.
3. Annotate record during survey of all changes to include but not be limited to:
 - a. Scale - Beginning of each line
 - b. Frequency Changes/Gain Changes
 - c. Unusual Targets or Events
 - d. Course/Speed Changes
4. Supply all information required to complete line label at beginning and end of each chart roll.
5. Always verify scale with your relief during watch change.
6. Check transducer depth daily as depth will change with varying vessel draft (less fuel, etc.).
7. Run echo sounder on shallowest scale before starting each line; this will give the outgoing pulse hence verifying the instrument settings for transducer depth, velocity settings, etc.



INTERSEA RESEARCH CORPORATION

February 1980

DATA ACQUISITION PROCEDURES FOR

SUB-BOTTOM PROFILER (ORE AND UNIBOOM)

1. If possible, test lines should be run in areas of known geology while enroute to the survey area.
2. If less than 25 feet of penetration is achieved in survey area, system must be checked to insure that it is functioning properly before proceeding with survey.
3. Supply all information required to complete line label at beginning and end of each chart roll.
4. At the end of each line, clean paper will be advanced for attachment of line label.
5. The source and receiver geometry and all changes will be logged on the chart roll.
6. Annotate record during survey of all changes to include but not be limited to:
 - a. Scale Changes
 - b. Frequency/Gain Changes
 - c. Course/Speed Changes
 - d. Unusual Targets or Events
7. When using heave compensator, proper annotation of horizontal scale with reference to time zero will be logged on each line. Record will be collected before or after line with heave compensator off in order to verify horizontal scale differential.



INTERSEA RESEARCH CORPORATION

February 1980

DATA ACQUISITION PROCEDURES FOR

SEISMIC PROFILING

General

1. Supply all information required to complete line label at beginning and end of each chart roll.
2. At the end of each line, clean paper will be advanced for attachment of line label.
3. The source and receiver geometry and all changes will be logged on the chart roll as they occur.
4. Annotate record during survey of all changes to include but not be limited to:
 - a. Scale
 - b. Frequency/Gain Changes
 - c. Unusual targets or Events
 - d. Power of Source
5. Always verify scale with your relief during watch change.

Sparker

1. For multi-channel operations data will be collected with the timer set in the "shallow water" mode so that the DAS start up is 26 ms before the firing of the sparker. THE TIMER WILL NEVER BE SET SO THAT THE DAS START TIME IS THE SAME TIME AS THE SPARKER FIRING.
2. Precise geometry for source setback, streamer setback, streamer configuration and position of isolation section will be noted. Perpendicular offset between source and stream is also necessary. Accurate measurements are critical and essential for data processing.
3. The source and receiver depths shall be constantly monitored and the depths for each line recorded.
4. For multi-trace cables, all traces must be good. Any bad trace must be reported to the Party Chief immediately. A bad trace is

SEISMIC PROFILING (continued)

defined as unusable (whether dead, saturated with 60 Hertz noise, with other noise, or for any other reason).

5. Noise strips shall be taken between each line during a turn and at selected intervals along a line. Any noise level above that selected prior to the survey will be reported to the Party Chief. Camera records will be labeled and delivered along with the other shipboard data.
6. All data acquisition problems must be noted on the digital observer's report.
7. High cut filter must be set to remove possible aliasing.
8. Water depth information from the echo sounder must be entered for the beginning, end, and any non-linear change along a line.
9. Fill in all blanks on EVERY page of the digital observer's report.
10. The system polarity shall be checked and the results recorded in the field or observer's notes.
11. The sparker source shall be periodically checked and electrodes changed as needed.
12. The analog record should have a low enough gain so that amplitude anomalies could be detected. The trace must be identified (near or far).

OPERATIONS CHECK LIST

Multi-Channel Seismic System

1. Minimum of 90 percent of traces live before starting line.
2. Shutdown at less than 80 percent of system live.
3. Onboard monitoring system always operational.
4. Geophysical cable straight and towing true.
5. Energy source operating at acceptable output.

Subbottom System, Profilers, and Bubble Detector

1. System on with adequate number of power banks.
2. Proper record display as agreed upon with U.S. Geological Survey representative.
3. Adequate paper supply to complete line.

Fathometer

1. System on and recording acceptably.
2. Periodic calibration.

Side Scan Sonar

1. System on with both channels operating and recording acceptably.
2. Fish towing true and at proper depth.
3. Winch fully operational.
4. If wet paper used, the paper should be wet before recording and dry before rolling.

Overall Geophysical Systems

1. Navigation system working and calibrated and automatically recording shot point intervals on all seismic records.
2. Power generating system(s) stable and capable of running all gear.
3. Interference between all seismic systems and boat machinery minimal and acceptable.
4. All recorders cleaned, calibrated and equipped with adequate paper for ensuring line.
5. Filter settings for all systems appropriately adjusted.

A more detailed check list will be developed after specific geophysical instruments are known; this check list shall be incorporated in the resulting contract. Offerors are requested to specify the geophysical instrument and include a proposed check list.



INTERSEA RESEARCH CORPORATION

Client 1

Area _____ Block 2

Date _____ Line No. _____

Time _____ to 3

Direction _____ Vessel Name _____

Vessel Speed 4 Sea State 5

Positioning Used _____

Fix Mark Interval 6

Vertical Scale _____ ms. between Lines

Type System ALL LABELS

Power of System _____

Distance to Source _____ to Receiver _____

Depth of Source _____ of Receiver _____

Gain Setting _____

Filters: Lo _____ Hi _____ Operator 7

Rep. Rate _____ Sweep Rate _____

Firing Rate _____ Sec.

Remarks: _____

ALL LABELS

1. USGS - GM18726
2. All blocks surveyed in order they are crossed
3. Include time zone
Standard EST or CST
Daylight Savings EDT or CDT
4. Knots
5. Beaufort Scale
6. Distance between shot points
7. Operator responsible for recording data and annotating record



INTERSEA RESEARCH CORPORATION

Client _____

Area _____ Block _____

Date _____ Line No. _____

Time _____ to _____

Direction _____ Vessel Name _____

Vessel Speed _____ Sea State _____

Positioning Used _____

Fix Mark Interval _____

Vertical Scale 1 m. between Lines

Type System RAYTHEON DE719 OR DE731

Power of System _____

Distance to Source 2 to Receiver _____

Depth of Source 3 of Receiver _____

Gain Setting _____

FREQUENCY
~~XXXXXX~~ Lo 4 Operator _____

Rep. Rate _____ Sweep Rate _____

Firing Rate _____ Sec.

Remarks: _____

RAYTHEON DE719 or 731

1. Scale in feet or fathoms
2. Distance from navigation antenna to transducer
3. Depth below surface of transducer. This varies with draft of boat so check daily.
4. 208 kHz for DE719
41 kHz for DE731



INTERSEA RESEARCH CORPORATION

Client _____

Area _____ Block _____

Date _____ Line No. _____

Time _____ to _____

Direction _____ Vessel Name _____

Vessel Speed _____ Sea State _____

Positioning Used _____

Fix Mark Interval _____

Vertical Scale 1 ms. between Lines

Type System ORE

Power of System 2

Distance to Source 3 to Receiver 5

Depth of Source 4 of Receiver 6

Gain Setting _____

Filters: ~~XX~~ XX⁷ Operator _____

Rep. Rate 8 Sweep Rate 9

Firing Rate _____ Sec.

Remarks: _____

ORE

1. 10, 100, or 1,000 ms between lines on EPC record
2. Determined by outgoing power setting on ORE transceiver
3. Distance from navigation antenna to ORE
4. Towing depth of ORE fish below the surface
5. Same as distance to source
6. Same as depth of source
7. Transmit and receive setting on transceiver
8. Time between pulses
9. Time for stylus to cross EPC record



INTERSEA RESEARCH CORPORATION

Client _____

Area _____ Block _____

Date _____ Line No. _____

Time _____ to _____

Direction _____ Vessel Name _____

Vessel Speed _____ Sea State _____

Positioning Used _____

Fix Mark Interval _____

Vertical Scale 1 ms. between Lines

Type System SPARKER (2)

Power of System 3

Distance to Source 4 to Receiver 6

Depth of Source 5 of Receiver 7

Gain Setting _____

Filters: Lo 8 Hi 9 Operator _____

Rep. Rate 10 Sweep Rate 11

Firing Rate _____ Sec.

Remarks: _____

SPARKER

1. 10, 100, or 1,000 ms between lines on EPC record
2. Number of sparker tips fired in sparker array
3. Determined by the number of capacitor banks on line
4. Distance from navigation antenna to sparker array
5. Depth below surface of sparker array
6. Digital - distance from navigation antenna to stern
+ lead in cable + stretch section (isolation
section) + 1/2 near trace active group

Analog - distance from navigation antenna + cable
lead in + 1/2 active section
7. Depth below surface of hydrophone
- 8.)) Determined from Del Norte signal processor or
9.)) Quantum analog summer
10. Time between pulses
11. Time for stylus to cross EPC record

Digital sparker hydrophone nomenclature:

15 phones per group

2 groups per section

6 sections equals 12 channels

Stretch section or isolation section = streamer
without phones

APPENDIX D
DAILY OPERATOR LOGS
M/V AMARILLO
AND
M/V SEA RAIDER

M/V AMARILLO DAILY OPERATOR LOGS

INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo

Client U.S.G.S. 4081

Area U.S.G.S. La. 1

Block Area 1 Date 7/2/80

Time _____ Remarks _____

BOAT CREW LIST

Jim Johnson - Captain

Bob Enos - Mate

Jon Bynum - Cook

Gene Lee - Deck Hand

G. Whittey - Eng.

SEISMIC CREW LIST

Jose Gomez - Party Chief

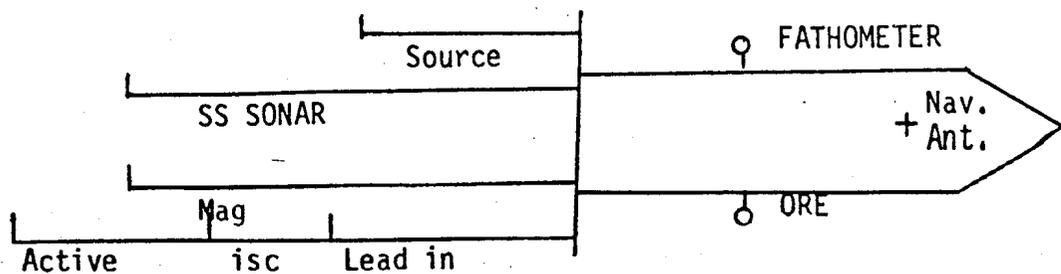
Walter Bayer - Technician

T.J. Burns - Technician

Steve Joy - Operator

M.C. Hall - Operator

F.A. (Red) Black - Operator



INTERSEA RESEARCH CORPORATION

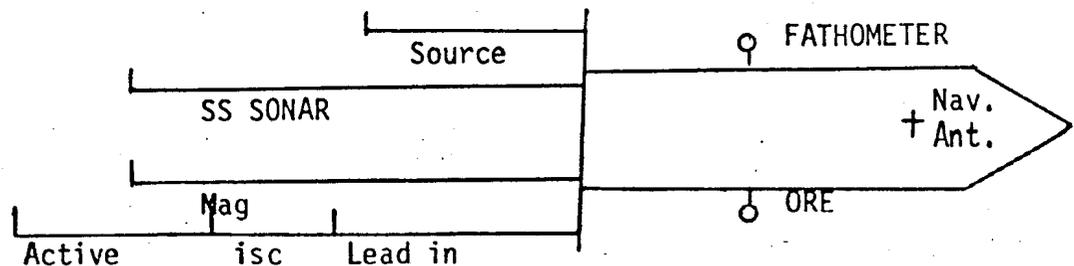
DAILY OPERATOR LOG

Boat Amarillo
Client U.S.G.S. Area Freeport Block _____ Date 7/2/80

Time	Remarks
0600	As of this time the boat is still in port, the sperry gyro compass is down and the repairman has yet to arrive. The ship also needs to take on fuel and water.
1000	Ship still in port, taken on fuel and water but gyro still in need of repair.
1300	Gyro repairman still hasn't arrived.
1630	Gyro repairman still hasn't arrived.
1650	Repairman arrives, repairs underway.
1940	Gyro repair completed
1944	All lines cast off, Amarillo heading out to sea.

7/3/80

0040	Begin streaming out gear and checking to make sure it's working properly.
0158	Gear check completed.
0548	B.O.L. 302 South Area 1 F.S.P. 350
0818	Circle due to Fathometer failure. last good S.P. 269
0905	Restart Line 302 South at S.P. 271
1220	Discontinue shooting at S.P. 154 because thunderstorms in the area are interfering with the navigation.
1300	Reversed polarity on sparker.
1734	Restarted Line No. 302 South Area 1 F.S.P. 174
1942	E.O.L. USGS-La-A1-302 South U.S.P. 99



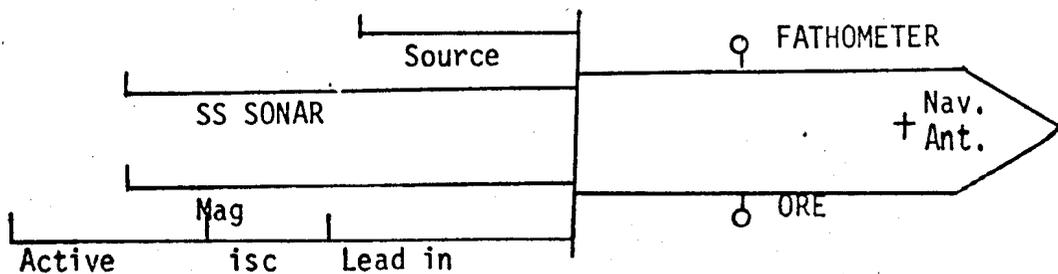
INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat w/v Amarillo

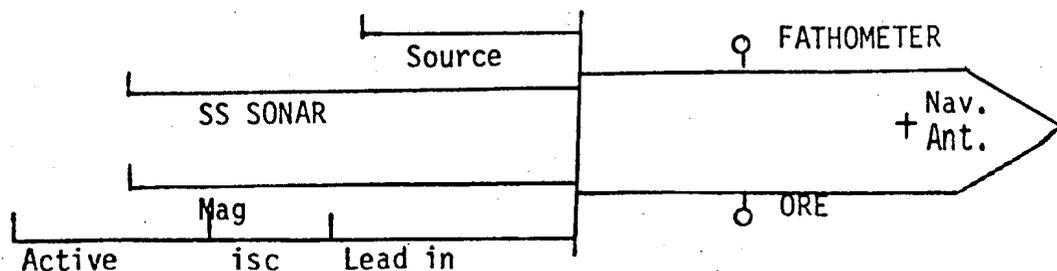
Client U.S.G.S.-1081 Area USGS-Louisiana -1 Block Area 1 Date 7/4/80

Time	Remarks
1911	Let sparker cable out to 100ft. and hydromone cable out to 200 ft.
2140	B.O.L. 217 East USGS LA-A1-217E F.S.P. 100
2248	Have to go off line to avoid Rig at S.P. 138
2335	Have to go off line to avoid Rig at S.P. 167
0000	60.2 Statute miles completed on 7/3/80
7/4/80	Bad Radar failure, cause unknown.
0027	Moving slightly off track to avoid Rig at S.P. 195
0112	Reverse polarity on sparker
0507	E.O.L. 217 East USGS-LA-217E L.S.P. 359
0510	Trimmed sparker tips
0639	We are experiencing heavy traffic in shipping lanes. Have to avoid ships by turning off line.
0705	B.O.L. U.S.G.S.-La-A1-216 West F.S.P. 359
1130	Have to circle because of Sparker problems L.S.P. 210 First production S.P. will be S.P. 207
1210	B.O.R. U.S.G.S.*La-A1-216W A213
1217	Restart tape at S.P. 208
1534	E.O.L. U.S.G.S.-La-A1-216West L.S.P. 99
1540	Making some changes in navigation system, estimated down time 2-3 hrs.
1545	Pull in Sparker cable, trim tips.



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat M/V AmarilloClient USGS-4081Area USGS-La-Area 1Block Area 1 Date 7/5/80

Time	Remarks
1832	B.O.L. USGS-La-A1-215East F.S.P. 100
2230	Abort USGS-La-A1-215East because of Sparker problems L.S.P. 255
7/5/80	Poor navigation requires reshooting of all prior lines. Miles 0.0
0034	Change Sparker power supply and make repairs
0125	Pull in Sparker cable and trim tips
0205	Pull in Sparker cable and retrim tips
0252	B.O.L. USGS-La-A1-216West F.S.P. 359
0257	Increase speed to allow vessel to pass behind us.
0303	Have to circle because of traffic in shipping lanes.
442	B.O.L. Repeat USGS-La-A1-216West F.S.P. 359
1131	Sparker malfunction, ship circling, last good S.P. 125
1139	Ship into turn, navigation into dead reckoning, lost calibration. Will take two satellite passes (about 3 hrs.) before navigation can be recalibrated.
1450	Navigation back, heading for S.P. 127
1502	Resume shooting USGS-La-216W Repeat F.S.P. 127
1602	E.O.L. La-A1-216W Repeat L.S.P. 99
1620	Make bar check for fathometer, trim Sparker tips
1702	B.O.L. La-A1-217East Repeat F.S.P. 100
2025	Trim Sparker tips, lost 1.33 shot points.
7/6/80	Completed 96.2 acceptable statute miles on 7/5/80



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

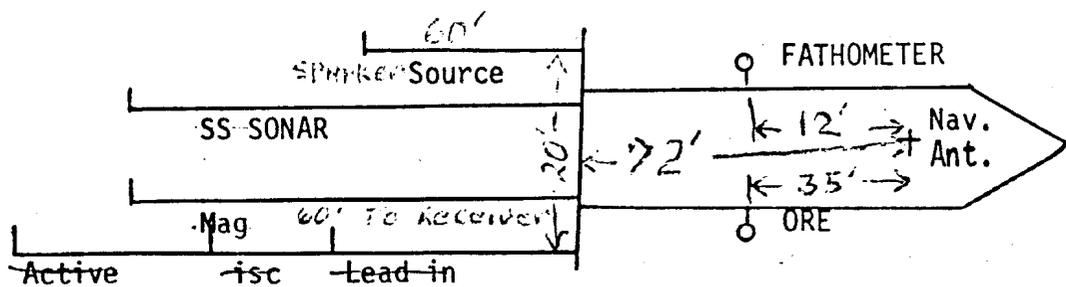
Boat M/V Amarillo

Client USGS 1081

Area USGS-La-Area 1

Block Area 1 Date 7/6/80

Time	Remarks
0025	E.O.L. USGS-La-A1-217E Repeat I.S.P. 359
0030	Trim Sparker tips
0123	B.O.L. USGS-La-A1-215W Repeat F.S.P. 359
0750	Trim Sparker tips, Sparker will need overhaul at the end of this line
0841	E.O.L. USGS-La-A1-215W Repeat I.S.P. 99
0846	Reversed polarity on sparker
0945	Use of ships S.S.B. Radio has dropped navigation, will need two satellite passes to recalibrate.
1030	Sparker rebuilt and operating properly
1425	Sea is getting to rough, rulling in gear.
1443	Heading in to port
	Total acceptable mileage shot thus far is 147.7 statute miles.
2210	Arrive Freeport harbor
7/7/80	
1000	Crew up, waiting for replacements for T.J. Burns and W. Bayer
1410	Turn off generator to service. Will take at least 3 hrs. to recalibrate navigation.
1510	Try to restart generator, battery appears to be dead, begin recharging
1720	John Colton and Jerry McNaboe arrive from Houston to replace Burns and Bayer.



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat M/V AmarilloClient USGS 14081Area USGS LA-Area 1Block Area 1 Date 7-7-80

Time _____ Remarks _____

1720 (cont.) Personnel on board:

SEISMIC CREW

LORAC

SNIP CREW

John Colton (party chief)

F.A. Black

Jim Johnson (Capt.)

Jerry McNaboe (Geologist)

M.C. Hall

V.R. Enos (Mate)

Jose Gomez (Technician)

G. Whittey (Eng.)

Steve Joy (Operator)

Jon G. Bynum (Cook)

Gene Lee (Deck Hand)

1730 Try to start 12 KW ONAN generator - Battery and solenoid problems

1830 Generator on line - Power to navigation.

1840 Navigators programing nav. computers.

338 LORAC operational - Dpt. Freeport TX. U/W to USGS LA.-area 1

7-8-80

0615 Approaching survey area - Deploying gear.

0630 Gear deployed.

0700 ORE tuned and working good. Still trying to ~~get~~ improve sparker record.

0936 2.7 NM to WAPT Navigation needs to wait for satellite to check position - this will cause approx. a 30 minute delay in start of line.

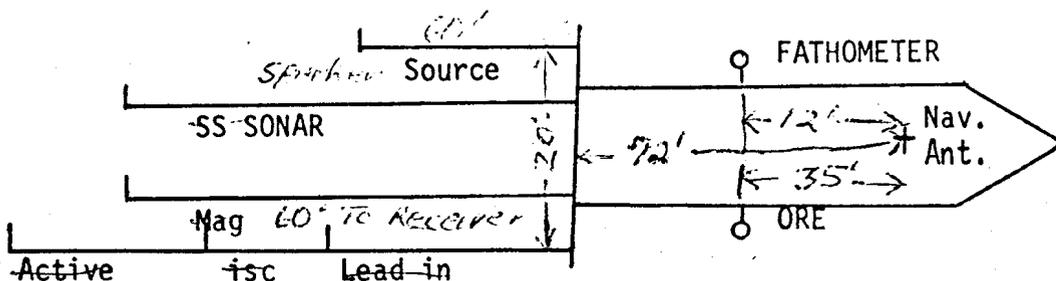
1000 Continue tuning for optimum records.

1130 Sparker tips trimmed

1200 Change watch

1400 Called Houston - complete up-date. Radio took out navigation; must recal.

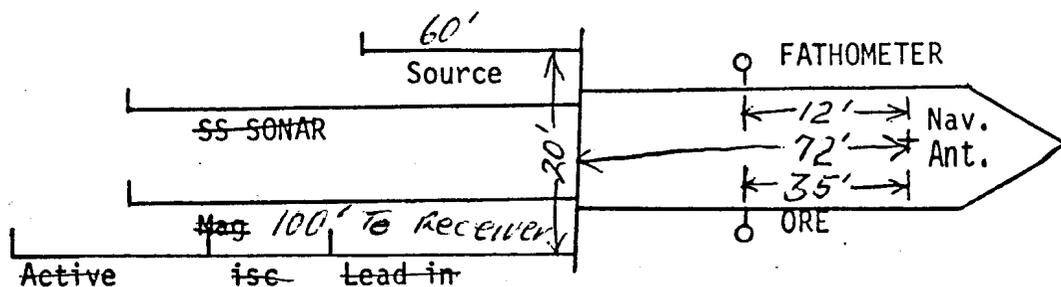
1737 BOL USGS LA*area 1 302 south FSP 349



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOG

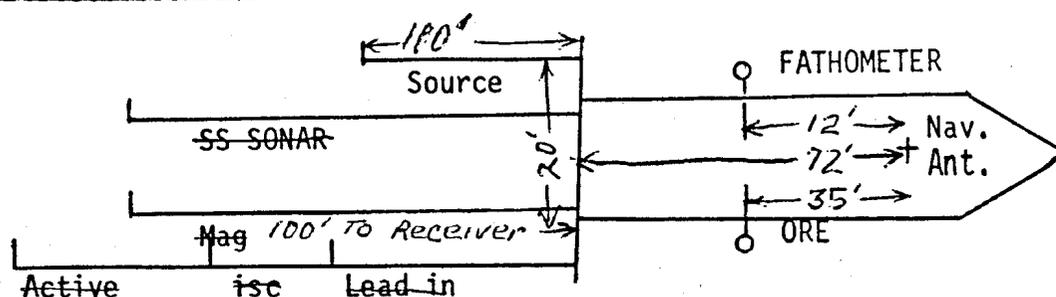
Boat M/V Amarillo
 Client USGS 4081 Area USGS LA-area 1 Block Area 1 Date 7-8-80

Time	Remarks
1742	Navigation dropped out, abort line. Cause of nav. failure unknown.
1800	Change watch.
2020	UHF call to McKay ref. computer problems. USGS tech. expected Hou. 7-9.
2055	Informed by LORAC that we will not have a good position until approx. 0400 due to too low or too high sat. passes.
9 July 1980	
0000	Change watch, waiting for navigation.
0600	Change watch.
0626	Three miles away from line.
0658	BOL USGS-LA-302A south FSP 349
1050	Sparker tips trimmed.
1200	Change watch
1315	Navigator informed us that the shot point numbers for USGS-A1-LA-302A South are off by one shot point. All shot points are one shot point xxx lower than they should be. e.g. s.p. 135 is actually s.p. 136. We are continueing to number the data as we were before receiving this information.
1332	Circle due to rain squalls in area interfering with navigation. LSP 126
1426	Restart USGS-LA-A1-302A south at shot pt. 131
1527	EOL USGS-LA-A1*302A south LSP 98
1545	Sparker tips trimmed.
1600	The geometry of the sparker was changed to improve the record. The



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat M/V AmarilloClient usgs 4081Area USGS-LA-area 1Block Area 1 Date 9 July '80

Time	Remarks
1600 (cont.)	hydrophone has been let out 40 feet. It is now trailing 100 feet behind the ship. Sparker cable also out 100'.
1637	BOL USGS-LA-A1-303 north FSP 100
2045	Attempt to call Houston, no luck on any channel
2200	Attempt to call Houston,
2213	Ship on line - will circle. LSP 295, will restart at s.p. 293.
2323	Sparker tips trimmed.
2300	More ships on line - must circle to avoid them. 85 miles compt. on 7/9/80
7-10-80	
0000	Changed watch
0004	Restart of line USGS-LA-A1-303 North FSP 293
0011	Abort line LA-A1-303 North because ship too far off line
0125	Restart USGS-LA-A1-303 North FSP 293
0244	Changed stylus belt on ORE - no shot points lost.
0250	EOL USGS-LA-A1-303 North LSP 350
0255	Sparker tips trimmed
0337	BOL USGS-LA-A1-304 south FSP 350
0600	Changed watch
0814	Contacted Houston - informed them of improved sparker record; will not need USGS tech.
1007	Sparker tips trimmed.
1054	EOL USGS-LA-A1-304 south LSP 99



INTERSEA RESEARCH CORPORATION

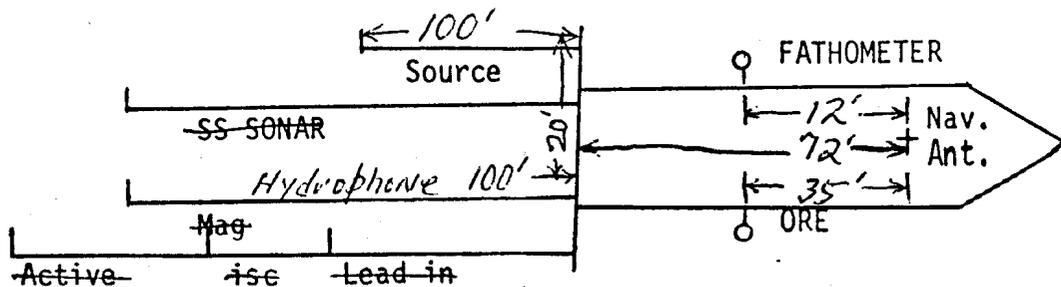
DAILY OPERATOR LOG

Boat M/V Amarillo

Client USGS-4081

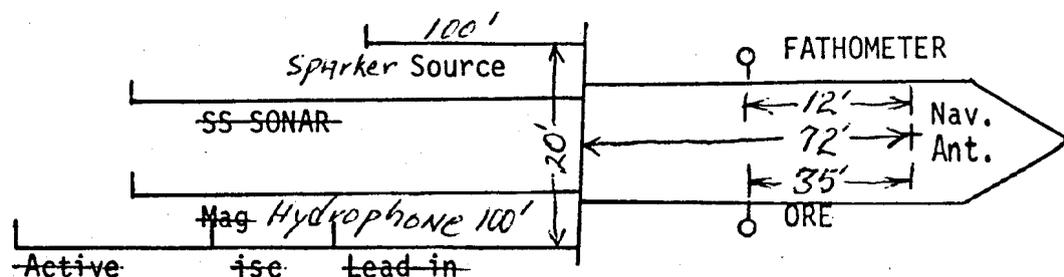
Area USGS-Louisiana-A 1 Block Area 1 Date 7-10-80

Time	Remarks
1100	Navigation Taking satellite pass.
1120	Pulled in sparker, rechecked tips- reversed polarity.
1202	BOL USGS-LA-A1-305 N FSP 100
1259	Change stylus belt on ORE, lost 1 shot point.
1600	Trimmed sparker tips, lost one shot point.
1604	Change paper on ORE, no shot points lost.
1659	Changed paper on fathometer, lost one shot point.
1722	Changed paper on sparker, no shot points lost.
1756	Changed stylus on ORE, one shot point lost.
1845	Changed stylus on ORE, one shot point lost.
1910	EOL USGS-LA-A1-305 N 1sp 350
1920	Sparke tips trimmed.
1948	BOL USGS-LA-A1-306 S FSP 350
2053	Change stylus on ORE, one shot point lost.
11 July 1980	123.9 Statute miles shot on 7/10/80
0000	Change watch
0158	Trim Sparker tips
0258	E.O.L. USGS-LA-A1-306S F.S.P. 00
0301	Trim Sparker tips
0356	E.O.L. USGS-LA-A1-307N F.S.P. 100
0510	Change ORE paper, no shot points lost.
0634	Pulled in hydrophone to remove seaweed. ERRANT



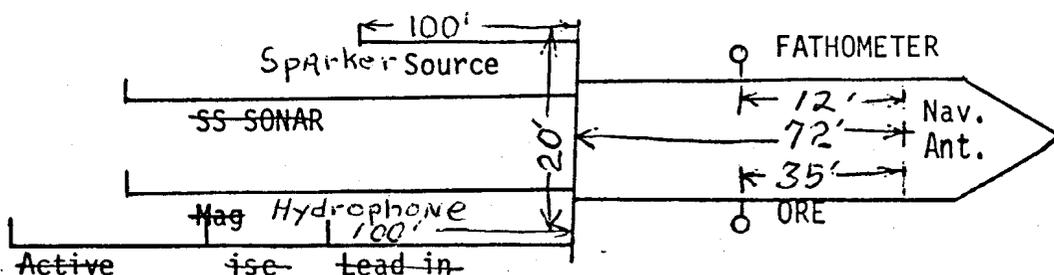
INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat M/V AmarilloClient USGS 4081Area USGS-LouisianaBlock Area 1 Date 10 July '80

Time	Remarks
0658	Changed stylus on ORE, one shot point lost.
0735	Changed stylus on ORE, one shot point lost.
0830	Changed stylus on ORE, one shot point lost.
0934	Contacted Angus McKay - USGS suggested new filter settings for Del Norte: Lo cut = 200 Hz Hi cut = 1000 Hz
1002	Changed stylus on ORE, No shot points lost.
1059	EOL USGS-LA-A1-307 N LSP 350
1105	Trimmed tips on sparker; Cleaned seaweed from over-the-side equip.
1150	BOL USGS-LA-A1-308 N South FSP 350
1200	Changed watch
1220	Change stylus belt on ORE, lost 1 shot point.
1320	Abort line La-A1-308S because of steering problems with boat.
1438	Regain steering, make bar check on Fathometer
1515	Restart line USGS-LA-A1-308S F.S.P. 295
1602	Change stylus belt on ORE, lost 1 shot point.
1757	Changed stylus belt on ORE, lost one shot point.
1800	watch change.
1802	Change stylus on ORE, one shot point lost.
1916	Clear seaweed from hydrophone.
1932	change paper on ORE, one shot point lost.
2005	Change stylus on ORE, one shot point lost.



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat M/V AmarilloClient USGS-4081 Area USGS Louisiana Block Area 1 Date 7-11-80

Time	Remarks
2111	EOL USGS-LA-A1-308 S LSP 99
2130	Trimmed sparker tips
2201	BOL USGS-LA-A1-309 N FSP 100
0000	Change watch at shot point 173, total mileage for 7/11/80 is 128 statute miles.
7/12/80	
0128	Trimmed sparker tips, lost one shot point.
0341	Change stylus belt on ORE, No shot points lost.
0501	EOL USGS-LA-A1-309 N LSP 350
0600	Change watch, trimmed sparker tips.
0607	BOL-USGS-LA-A1-310 S FSP 350
0748	Change paper on ORE. no shot points lost.
0859	Change stylus on ORE, one shot point lost.
0909	Change paper on fathometer, one shot point lost.
0913	Change stylus on ORE, no shot points lost.
0956	Change paper on sparker, no shot points lost.
1127	Change stylus on ORE, two shot points lost (approx. 1100 feet)
1200	Change watch
1208	Trim Sparker tips, lost 1 shot point.
1255	E.O.L. USGS-LA-A1-310S L.S.P. 99
1409	B.O.L. USGS-LA-A1-311N F.S.P. 100
1522	Shot point 144 we are 280yds. west of line to avoid anchored tanker

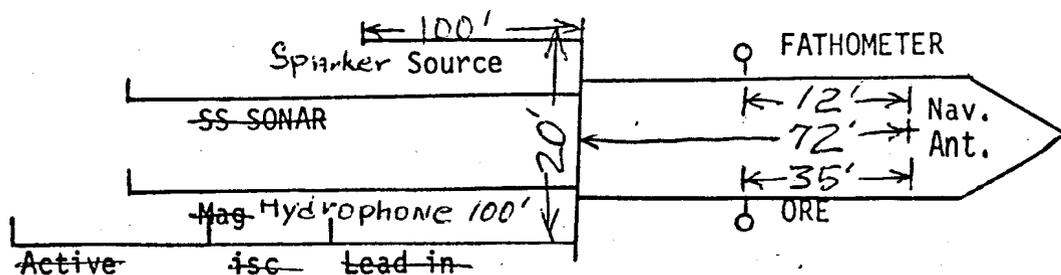


INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat M/V AnarilloClient USGS-4081 Area USGS Louisiana Block Area 1 Date 7-12-80

Time	Remarks
1612	Slowed to avoid vessel
1650	Resumed normal speed
1751	Trimmed sparker tips, lost one shot point.
1815	Abort line USGS-LA-A1-311 N at shot point 246 - navigation drop-out
1905	Restart line USGS-LA-A1-311 N at shot point 244
2000	Change paper on ORE, no shot points lost.
2056	Change stylus on ORE, One shot point lost.
2158	EOL USGS-LA-A1-312x8 311 North LSP 350
2206	Trimmed sparker tips and reversed polarity.
2235	BOL USGS-LA-A1-312 S. FSP 350
0000	Change watch, L.S.P. of day = 300, mileage for 7/12/80 = 137.9

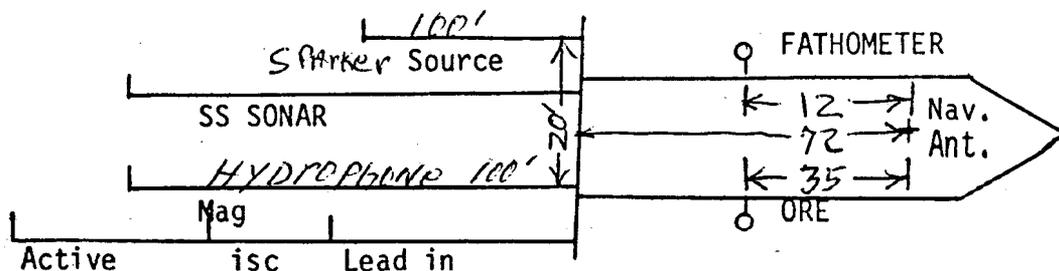
7/13/80

0226	Slowed down to avoid vessel in shipping lanes
0232	Resumed normal speed
0237	Trim Sparker tips, lost 1 shot point
0600	Change watch
0601	EOL USGS-LA-AL-312 S LSP 99 Navigation receiving satellite pass.
0614	Trim sparker tips
0703	BOL USGS-LA-A1*313 N FSP 100
0819	Change paper on ORE, no shot points lost.
0825	Attempt to contact Houston - couldn't get through.
0920	Change stylus on ORE, two shot points lost (approx 2000 feet)



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat M/V AmarilloClient USGS 4081 Area USGS Louisiana Block Area 1 Date 7-13-80

Time	Remarks
0945	Large water column anomaly (gas) at s.p. 206 - ORE & Fathometer.
1015	Attempt to radio Houston - could not make contact.
1037	Change stylus on ORE, one shot point lost.
1118	S.P. 255 - Lg. water column anomaly (gas) recorded on ORE & Fathometer.
1156	Trim Sparker tips, lost 1 shot point
1200	Change watch
1353	E.O.L. USGS-LA-A1-313N L.S.P. 350
1358	Rebuild Sparker array, clean kelp off of ORE and Fathometer cables, make bar check on Fathometer.
1504	Resume motoring towards next line.
1528	B.O.L. USGS-LA-A1-314X South F.S.P. XNW 350
1531	Change direction of stylus on ORE, lost 1 shot point.
1601	Ship slowing to avoid vessel in shipping lanes
1614	Resumed normal speed.
2050	Change paper on ORE
2108	Contacted Angus McKay - ref. progress report. Radio interferes with navigation, ORE, and sparker records.
2113	Change stylus on ORE
2152	Ship slowing to avoid vessel on line.
2158	Resumed normal speed
2213	Trimmed sparker tips, lost one shot point.
2228	EOL USGS-LA-A1-314 S LSP 99



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo

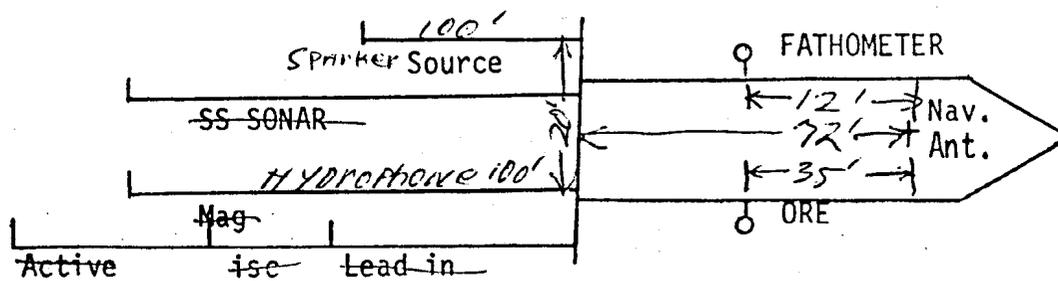
Client USGS 4081

Area USGS Louisiana

Block Area 1

Date 7-13-80

Time	Remarks
2320	Maneuvering around rig obstruction
2321	ORE malfunction - will circle
2325	ORE functioning - heading for line.
2355	B.O.L. USGS-LA-A1-315N F.S.P. 100
2358	Platform right at begining of line, navigation on first few shot points erratic because of this rig.
0000	Change watch, L.S.P. of day 103, total mileage for day 123.9
7/14/80	
0023	Change fathometer paper, lost 1 shot point.
0058	Sparker malfunction, have to circle.
0151	Resume shooting line LA-A1-315N F.S.P. 135
0429	Trim Sparker tips, lost 1 shot point.
0704	Trimmed sparker tips
0710	Change stylus on ORE, one shot point lost
	315
0736	EOL USGS-LA-A1-844 N LSP 350
0745	Trimmed sparker tips
0811	Long line change due to navigation taking satellite pass.
0835	Attempt to call Houston failed.
0848	BOL USGS-LA-A1-316 S FSP 350
1042	Change paper on ORE, no shot points lost
1131	Change stylus on ORE, 1 shot point lost.
1149	Trim Sparker tips, 1 shot point lost



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo

Client USGS-4081

Area USGS-Louisiana

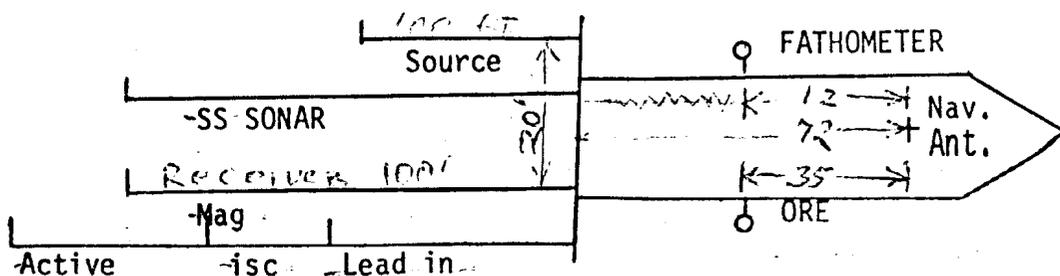
Block Area 1

Date 7/14/80

Time	Remarks
1200	Change watch
1400	Increase speed to avoid vessel.
1406	Resume normal speed.
1550	E.O.L. USGS-LA-A1-316 South L.S.P. 99
1555	Trim Sparker tips, change power and trigger supply mechanisms for Sparker.
1630	B.O.L. USGS-LA-A1-317N F.S.P. 100
2001	
2001	Change paper on fathometer, lost one shot point.
2019	Abort line USGS-LA-A1-317 N: navigation lost signal. (LSP 239)
2030	Trimmed sparker tips
2127	Radioed Houston - lost contact during call.
2400	Change watch. Last shot point today was Y 239 (line 317N)
	Total millage today = 120.6

7/15/80

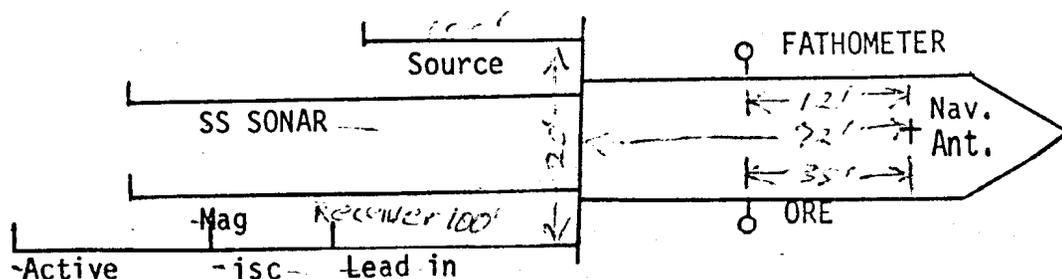
0010	Service 12 Kw generator - oil change, oil filter, and primary fuel filter.
0100	Still waiting for navigation.
0900	Navigation up - heading for line.
0948	RSOL USGS-LA-A1-317 N at S.P. 234
1040	Change paper on ORE
1117	Change paper on ORE (bad role) - ^{no} one shot point lost.
1125	Change stylus on ORE - one shot point lost.



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOG

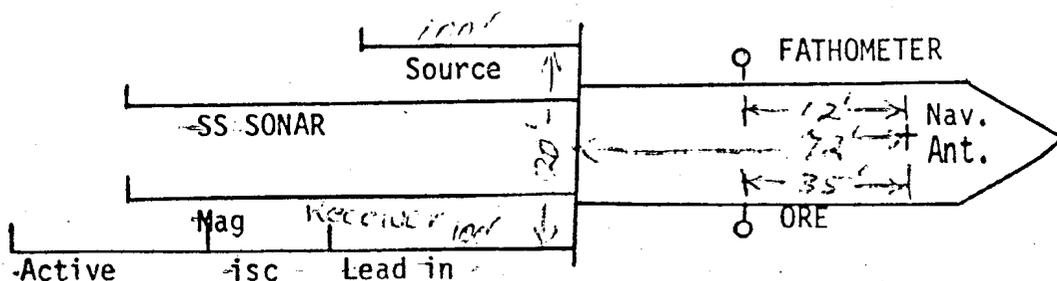
Boat M/V Amarillo
 Client USGS 4081 Area USGS Louisiana Block Area 1 Date 7-15-80

Time	Remarks
1245	Sparker malfunction, lost two shot points.
1302	EOL USGS-LA-A1-317 N LSP 350
1328	Trimmed sparker tips
1318	BOL USGS-LA-A1-318 S FSP 350
1529	Change paper on ORE, no shot points lost
1621	Trimmed sparker tips, lost one shot points
1937	Speed decreased due to ship on line.
2037	EOL USGS-LA-A1-318 S LSP 99
2040	Trimmed sparker tips
2045	Navigation down lost calibration.
2115	Navigation up, heading for line.
2157	BOL USGS-LA-A1-319 N FSP 100
2203	BOL USGS-LA-A1-319 N FSP 100
2239	Abort line 319 N at shot point 126 - Navigation down.
0000	Change watch, L.S.P. of day 126, total mileage of day = 74.4
7/16/80	
0408	Regain navigation, heading towards line.
0425	R.S.O.L. USGS-LA-A1-319N F.S.P. 125
0520	Begin veering off line to left at shot point 160, to avoid rig.
0550	ORE recorder malfunction, have to circle.
0600	Change watch
0625	RSOL USGS-LA-A1-319 N at S.P. 180



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat M/V AmarilloClient USGS 4081Area USGS LouisianaBlock Area 1 Date 7-16-80

Time	Remarks
0654	Change stylus on ORE, one shot point lost
0718	Trimmed sparker tips. One shot point lost on sparker.
0908	Change stylus on ORE, one shot point lost.
0930	Sea is picking up - records are getting noisy.
0955	Change paper on ORE, no shot points lost.
1027	Change paper on fathometer, no shot points lost.
1035	Change stylus on ORE, one shot point lost.
1104	EOL USGS-LA-A1-319 N LSP 350
1117	Trimmed sparker tips, reversed polarity.
1130	Cleared seaweed from over-side gear
1148	BOL USGS-LA-A1-201WX FSP 357
1200	Change watch
1332	ORE malfunction(EPC Recorder) , have to circle.. I.S.P. 295
1413	R.S.O.L. USGS-LA-A1-201W F.S.P. 297
1640	Trim sparker tips, lost 1 shot point.
1800	Change watch
1942	EOL USGS-LA-A1-201 W LSP 99
2015	Radioed Houston - ref.: supplies needed, personnel rotation, and arrival time in Freeport, TX. (Fri. morning 7/18/80)
2101	Change stylus on ORE. one shot point lost
2102	BOL USGS-LA-A1-202E FSP 100 (LSP 359)
2150	Change stylus on sparker, one shot point lost.

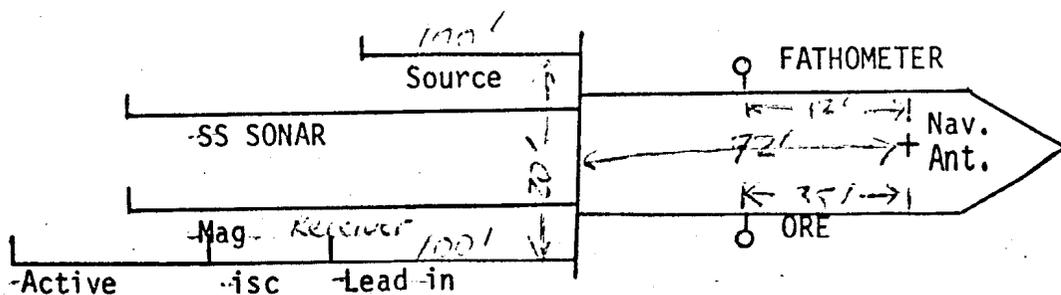


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS 4081 Area USGS Louisiana Block Area Date 7-16-80

Time	Remarks
2248	Decrease speed to avoid vessel on line
2251	Resume speed
2350	Trimmed sparker tips, lost one shot point.
0000	Change watch, L.S.P. of day 208, total mileage for day = 111.9
<u>7/17/80</u>	
0140	Veering left to avoid rig on line, S.P. 259
0140	Ship back on line, S.P. 272
0358	E.O.L. USGS-La-A1-202E L.S.P. 359
0402	Trim sparker tips.
0442	B.O.L. USGS-La-A1-203W E.S.P. 359
0541	Onan generator malfunction, all systems shut down. L.S.P. 328
0708	Generator back on line - governor spring broke.
0736	Sparke tips trimmed.
0740	Gear on board - drifting, awaiting satellite pass for navigation; estimated start-up time: 1130 UR.
0900	Ran bar check on Fathometer
0945	Called Houston - ref. generator part number and fathometer calibration.
1200	Change watch
1204	Navigation completes satellite pass - U/W to R.S.O.L. position, navigation will take one more satellite pass to complete calibration.
1328	Navigation recalibrated, heading for line.
1355	R.S.O.L. USGS-La-A1-203W E.S.P. 330



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

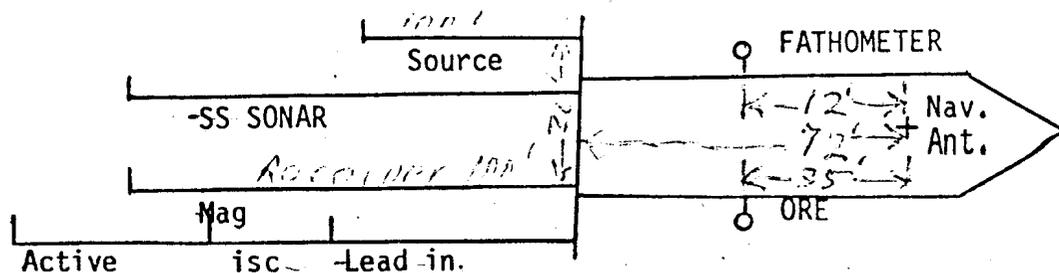
Boat M/V Amarillo

Client USGS-4081

Area USGS-Louisiana

Block Area 1 Date 7/17/80

Time	Remarks
1633	Change paper on ORE, lost 1 shot point.
1700	Trim sparker tips, lost 1 shot point.
1800	Change watch
1900	Decrease speed to avoid ship on line
1920	Resume normal speed.
2018	EOL USGS-LA-A1- 203 W 1sp 99
2033	All gear aboard U/W Freeport, TX.
7/18/80	
0530	Arrive Freeport TX.



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo

Client USGS-4081

Area USGS-Louisiana

Block Area 1 Date 7/19/80

Time	Remarks
7/18/80	
0531	Ship docked at Freeport.
1100	Routine Maintenance - Rebuild Sparker, service Onan generator and replace Governor spring.
1400	A. M ^C Kay and USGS Rep. review records.
1900	S. Side Band radio repaired.

CREW LIST

Seismic Crew

Ship Crew

Bob White Party Chief

Jim Johnson Capt.

John Colton Tech.

Bob Enos Mate

Walter Bayer Tech.

G. Whitley Eng.

Steve Joy Operator

Don Vandermark Cook

Eddie Ruiz Deck Hand

Red Black Lorac

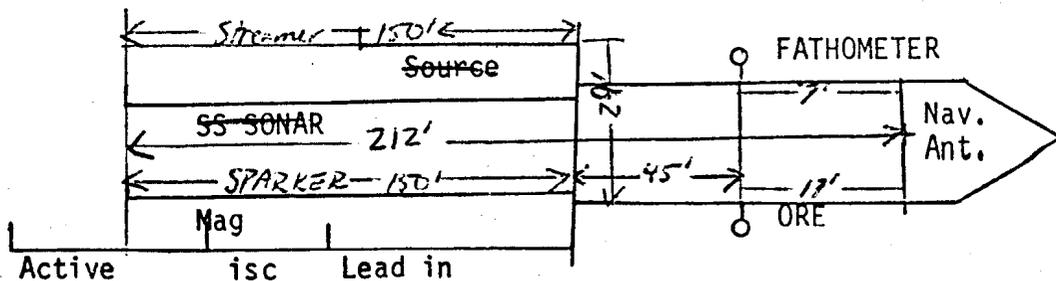
M.C. Hall Lorac

Dub Wampler Lorac

Jose Gomez and Jerry M^CNaboe departed ship 7/19/80

7/19/80

0600 Ship ready to sail, ship's mate missing.



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

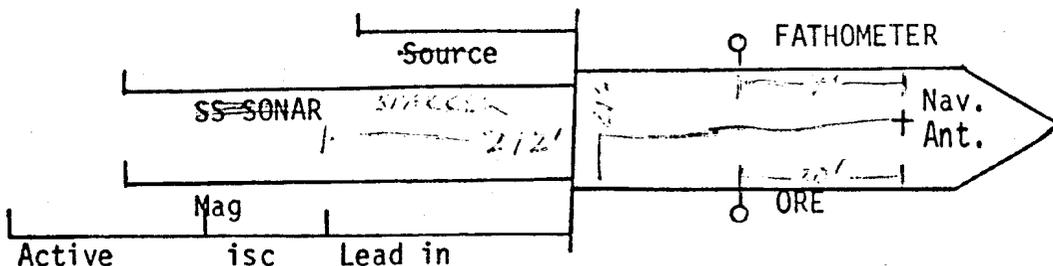
Boat M/V Amarillo

Client USGS-4081

Area USGS-Louisiana

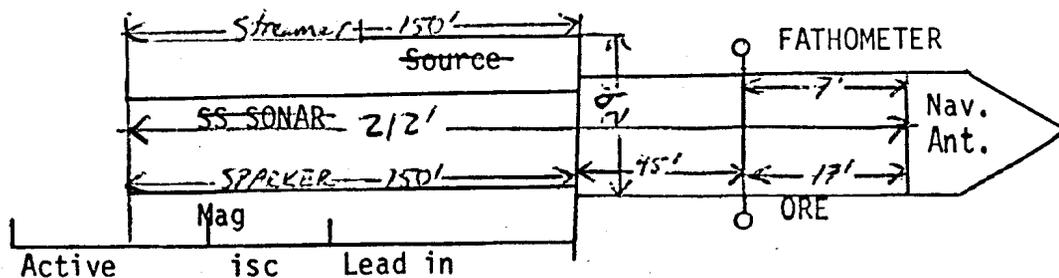
Block Area 1 Date 7/19/80

Time	Remarks
0705	All lines cast off, ship heading towards work area.
1725	Hydrophone over side for noise checks, seas 3-5ft. w/occasional 7-8ft., wind 15-18kts.
1755	Sparker test, too much noise, records completely unacceptable.
1810	Head to Galveston, seas too rough to shoot, tropical depression about 60 miles away is continuing towards us. Forecast calls for wind and seas to continue to build through Sunday. Attempted radio contact with Houston. (vhf)
2120	Radio contact.
2330	Arrive Grasso Dock in Galveston.
7/20/80	
0947	Leave for dock 41 and El Paso
1400	Wait for weather report update.
7/21/80	
0940	All lines cast off, leaving Galveston and heading for work area.
1520	ORE and Fathometer in the water.
1530	Ran bar check on Fathometer.
1636	E.O.L. USGS-La-A1-204E E.S.P. 100
2212	Trim Sparker tips, lost 1 shot point.
2225	Change stylus belt on ORE, lost 1 shot point.
2248	Change paper on ORE, no shot points lost.
2359	E.O.L. USGS-La-A1-204E L.S.P. 359



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat M/V AmarilloClient USGS-4081Area USGS-LouisianaBlock Area 1 Date 7/22/80

Time	Remarks
0016	Trim Sparker Tips
0043	B.O.L. USGS-La-A1-205W F.S.P. 359
0050	S.P. 357 & 358 Sparker not firing properly, checking-Ships speed being rduced.
0247	Changed paper on Fathometer, lost one S.P.
0346	Canged Reels between S.P. 260 & 259 F.S.P. on Reel # 7057 is 259
0522	Trim Sparker Tips- lost 1.5 S.P.
0600	Changed Watch
0740	Loran C having problems w/navigation due to rain squalls.
0811	Abort USGS-La-A1-205W due to severe rain squalls, L.S.P. 119
1200	Changed Watch
1459	R.S.O.L. USGS-La-A1-205W F.S.P. 123
1542	E.O.L. USGS-La-A1-205W L.S.P. 99
1600	Trim Sparker and reverse polarity
1605	Fuel return line broken on Onan Generator
1643	B.O.L. USGS-La-A1-206E F.S.P. 100
1744	Reduced speed to avoid ship
1753	Resumed previous RPM
1800	Change watch
1941	Onan fuel line repaired.
2208	Trim Sparker tips, lost 1 shot point.
7/23/80	



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

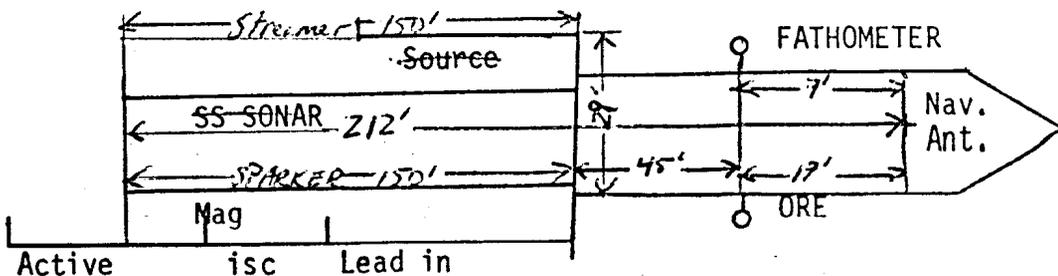
Boat M/V amarillo

Client USGS-4081

Area USGS-Louisiana

Block Area 1 Date 7/23/80

Time	Remarks
0000	Changed Watch, L.S.P. of day 356, mileage for day - 97.7
0004	E.O.L. USGS-La-A1-206E L.S.P. 359
0126	B.O.L. USGS-La-A1-207W F.S.P. 359
0142	Evasive action to left of line to avoid an oil well and a gas well at S.P. 350
0149	Back on line at S.P. 346
0259	Changed paper on Sparker EPC-no shots lost
0429	Trim Sparker-missed two S.P.
0432	Abort line-Sparker was hang firing. Will restart at S.P. 267
0438	Changed Fathometer paper
0543	R.S.O.L. USGS-La-A1-207w S.P.267
0600	Change watch.
0616	Change paper on ORE, lost 1 show point.
0720	Cut kelp from Fathometer and ORE cables while shooting.
0810	Abort line at s.p. 181 due to traffic in shipping lanes.
0810	
0841	R.S.O.L. USGS-La-A1-207W F.S.P. 182
0855	Abort line, more traffic in lane. L.S.P. 176
1004	R.S.O.L. USGS-La-A1-207W F.S.P. 175
1007	Change stylus on ORE, lost 1 shot point.
1200	Changed Watch
1207	E.O.L. USGS-La-A1-207W L.S.P. 99



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

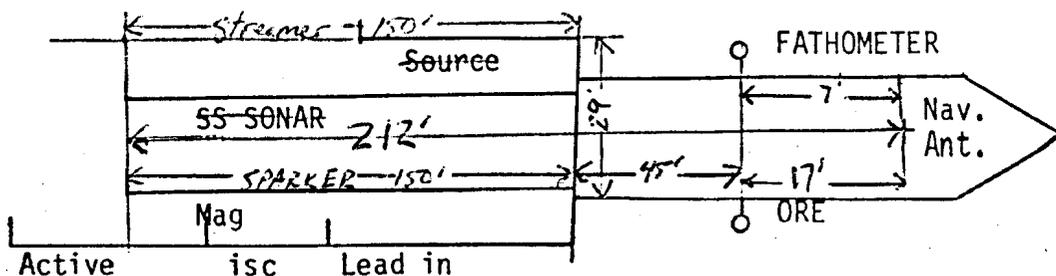
Boat M/V Amarillo

Client USGS-4081

Area USGS-Louisiana

Block Area 1 Date 7/23/80

Time	Remarks
1200	Changed Watch
1204	E.O.L. USGS-La-A1-207W L.S.P. 99
1250	B.O.L. USGS-La-A1-208E F.S.P. 100
1432	Trim Sparker lost 1.5 S.P.
1800	Change watch
1955	Change paper on ORE, lost no shot points.
2044	E.O.L. USGS-La-A1-208E L.S.P. 359
2050	Trim Sparker tips
2053	Change stylus on ORE
2122	B.O.L. USGS-La-A1-209W F.S.P. 359
2219	Turning left to avoid rig on line, s.n. 322 110yds. left of line.
2228	At s.n. 319 we are 360yds. right of XN line avoiding same rig.
2234	At s.n. 315 we are 150yds. left Y of line still avoiding same rig.
2242	Zig-zags stabilizing, returning to proper coarse. S.p. 311
7/24/80	
0000	Changed Watch last S.P. of day 264, mileage for day = 115.9
0002	Changed Fathometer paper - lost one S.P.
0142	Trim Sparker lost one S.P.
0449	E.O.L. USGS-La-A1-209W L.S.P. (X) 99
0507	Trim Sparker
0546	B.O.L. USGS-La-A1-210E F.S.P. 100
0600	Change watch

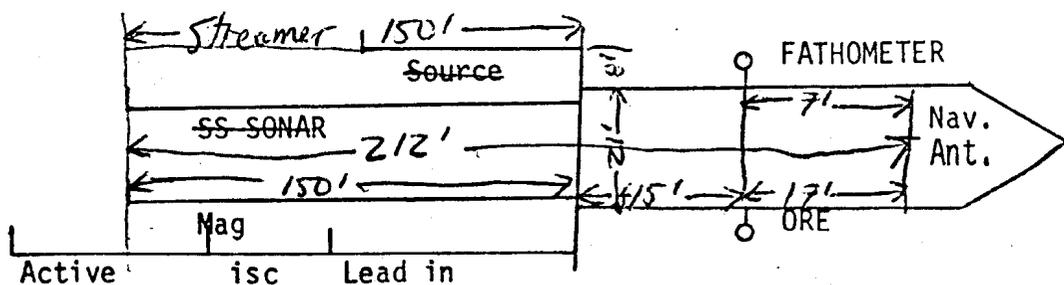


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS-4031 Area USGS-Louisiana Block Area 1 Date 7/24/80

Time	Remarks
0748	Change stylus on Sparker, lost 1 shot point.
0847	Change paper on ORE, no shot points lost
0850	Change paper on Sparker, no shot points lost.
1014	Trim Sparker tips, lost 1 shot point.
1200	Changed Watch
1259	F.O.L. USGS-La-A1-210E L.S.P. 359
1305	Pulled in Hydrophone and Sparker - began Bar Check
1324	Completed Bar Check
1339	Trim Sparker tips
1407	B.O.L. USGS-La-A1-211W F.S.P. 359
1700	E Experienced Opan problems - changed air filter
1800	Change watch
1801	Change paper on ORE, lost 1 shot point.
1907	Change stylus on ORE, lost 2 shot points.
1925	Trim Sparker tips, lost 1 shot point.
2113	E.O.L. USGS-La-A1-211X W L.S.P. 359/100
2120	Stop boat- cut kelp off ORE and Fathometer cables.
2130	Trim sparker tips- boat underway.
2215	B.O.L. USGS-La-A1-212E F.S.P. 100
2254	Change paper on ORE, no shot points lost.
7/25/80	0000 Changed Watch L.S.P. of day 162 Total Miles 141.5
0301	Trim Sparker Lost 1.2 S.P.

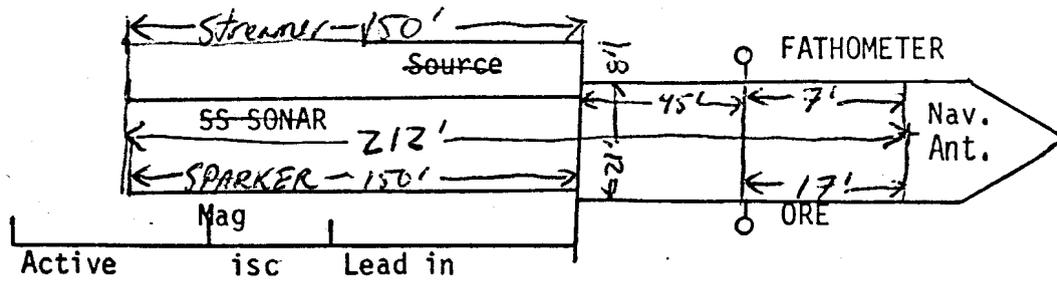


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS-4081 Area USGS-Louisiana Block Area 1 Date 7/25/80

Time	Remarks
0526	E.O.L. USGS-LA-A1-212E L.S.P. 359
0527	Maintaining course for a Satellite fix
0600	Change watch
0638	B.O.L. USGS-LA-A1-213W F.S.P. 359
0648	Abort line USGS-LA-A1-213W, Sparker records not acceptable, LSP 354
0652	Pull in Sparker and Hydrophone cables- check tips- remove kelp.
0658	Change stylus on Sparker.
0705	Add oil and water to Onan generator.
0754	R.S.O.L. USGS-LA-A1-213W F.S.P. 359
0910	Abort line USGS-LA-A1-213W, rain squalls interfering with navigation, L.S.P. 314
0911	On advise of navigation, line will be resumed at shot point 323 336
0925	Radio call Houston Chan 2, C. Williams update producyion, line miles suggest swapping out 12 kw generator
1056	R.S.P.L. USGS -LA-A1 213 W fsp 326
1200	Changed Watch
1347	Changed paper on ORE no S.P. lost
1406	Changed Stylus on ORE no S.P. lost
1427	Aborting line at S.P. 210 - off course
1435	Trim Sparker
1450	R.S.O.L. USGS-LA-A1-213W F.S.P. 214
1455	Lorac Display Terminal out - trash on screen

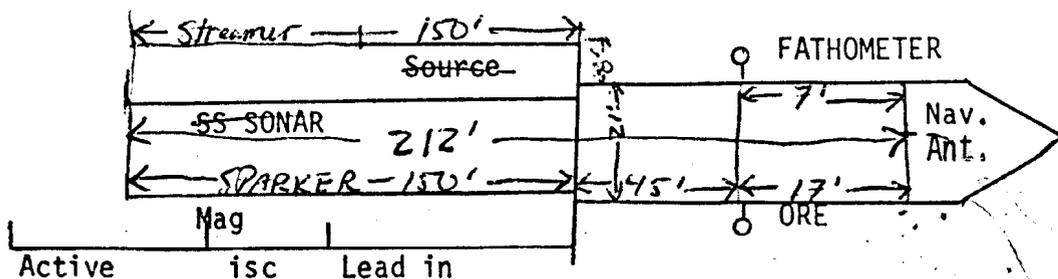


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS-4081 Area USGS-Louisiana Block Area 1 Date 7/25/80

Time	Remarks
1507	Tweaked Lorac Display Unit - 0 K now
1510	S.P. 214A - 210A and S.P. 209 -206 Missed on Fathometer (on wrong scale
1713	Changed paper on Sparker - no S.P. lost
1800	Change watch
1819	E.O.L. USGS-La-A1-213W L.S.P. 99
1830	Trim Sparker tips
1835	Sea state 3-4, swells 4-6ft. with occasional 7-8ft.
1916	B.O.L. USGS-La-A1-214E F.S.P. 100
2350	Trim Sparker tips, lost 1 shot point.
7/26/80	
0000	Changed Watch - last S.P. of day 259, mileage = 115.6
0131	Slowing down to avoid a ship
0243	E.O.L. USGS-La-A1-214E L.S.P. 359
0305	Trim Sparker
0326	B.O.L. USGS-La-A1-215BW F.S.P. 359
0600	Change Watch
0824	Change fathometer paper, lost one SP
0855	Abort line. Onan glitch wipes out navigation. Change oil, oil and fuel filters.
0910	Onan up. Navigation estimates 5 hrs.
1200	Change watch.
1500	No signal recieved from Raymondville, all other stations recievable. Informed Navigation will swithh to florida station.



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

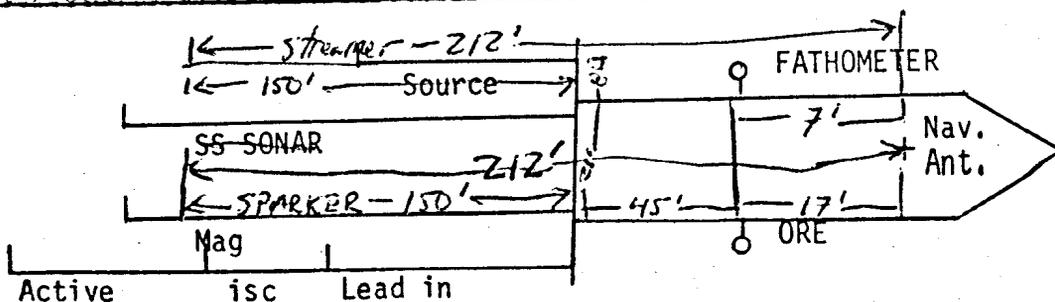
Boat M/V Amarillo

Client USGS-4081

Area USGS-Louisiana

Block Area 1 Date 7/26/80

Time	Remarks
1800	Change watch
2100	Sea state 2-3, swells 3-5 ft.
2149	R.S.O.L. USGS-La-A1-215BW F.S.P. 161
2331 7/27/80	E.O.L. USGS-La-A1-215BW L.S.P. 99
0000	Changed Watch L.S.P. of day 99, mileage=65.6
0021	B.O.L. USGS-1a-A1-216BE F.S.P. 100
0250	Trim Sparker - lost 1.2 S.P.
0443	Changed paper on ORE - lost .5 S.P.
0600	Change watch
0635	Abort line, have to circle, too far off course - L.S.P. 321
0722	R.S.O.L. USGS-La-A1-216BE F.S.P. #317
0832	E.O.L. USGS-La-A1-216BE L.S.P. 359
0837	Trim Sparker tips Reversed polarity
0915	B.O.L. USGS-La-A1-217BW F.S.P. 359
1015	Change paper on Sparker, lost 1 shot point.
1200	Changed Watch
1332	Trim Sparker - Lost 1.5 S.P.
1636	E.O.L. USGS-La-A1-217BW L.S.P. 99
1653	All gear aboard Enroute Area 2
1800	Change watch
2200	Arrive Area 2, ORE and Fathometer in water
2220	Steering and/or Gyro out- unable to maintain straight course



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

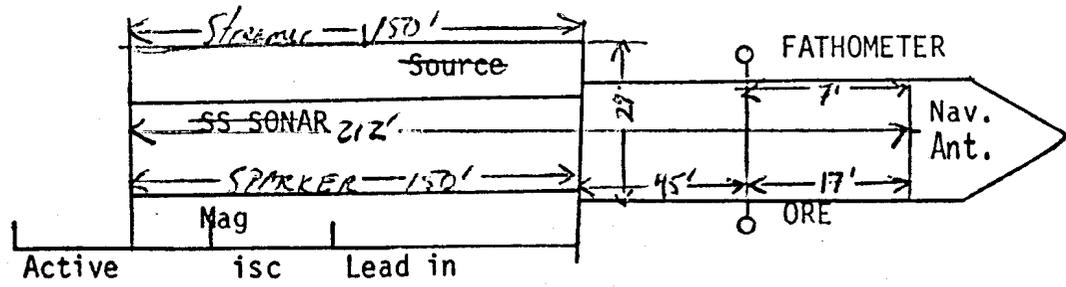
Boat M/V Amarillo

Client USGS-4081

Area USGS-Louisiana

Block Area 2 Date 7/28/80

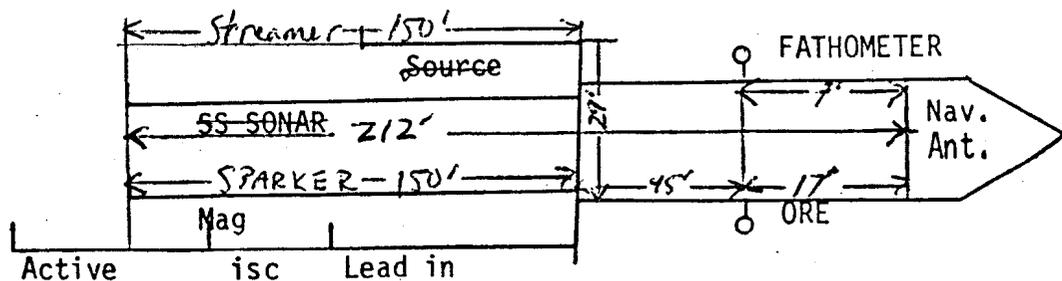
Time	Remarks
2306	Steering repaired, approaching line
2310	Sparker gear in water
2322	B.O.L. USGS-La-A2-320N F.S.P. 100
2357	Changed paper on ORE - lost 1 S.P.
7/28/80	
0000	Changed Watch - L.S.P. of day 124 - total miles 102.8
0316	Off line at S.P. 245 to avoid oil well
0352	Trim Sparker - lost 1.2 S.P.
0402	Aborted line at S.P. 273 -off course due to thunder showers
0519	R,S.O.L. USGS-La-A2-320N F.S.P. 270A
0600	Changed Watch
0640	Abort line-too far off course- LSP 318- will resume at 310
0730	Lost Navigation-rain Squalls in area-jogging
1200	Changed Watch- nderway to R.S.O.L. at S.P. 310
1300	Gear in water
1318	R.S.O.L. USGS-La-A1-320A F.S.P. 310A
1352	Aborted line to far off course
1426	R.S.O.L. USGS-la-A2-320N F.S.P. 327A
1508	E.O.L. USGS-La-A2-320N L.S.P. 350
1552	B.O.L. USGA-La-A2-321S F.S.P. 350
1615	Aborted line to far off course, last S.P. 322
1616	Loran C lost calibration - estimate will be up at 2100
1800	Change watch



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS-4081 Area USGS-Louisiana Block Area 2 Date 7/29/80

Time	Remarks
2321	R.S.O.L. USGS-La-A2-321S F.S.P. 323
7/29/80	
0000	Changed Watch - last S.P. of day 302 - Total miles 50
0212	Trim Sparker - lost 1.5 S.P.
0315	Changed paper on ORE no S.P. lost
0531	E.O.L. USGS-La-A2-321S L.S.P. 99
0600	Change watch trim sparker tips
0622	B.O.L. USGS-La-A2-322N F.S.P. 100
1040	Trim Sparker tips, lost 1.5 shot points.
1135	Change paper on Sparker, lost 1 shot point.
1200	Changed Watch
1312	E.O.L. USGS-La-A2-322N L.S.P. 350
1334	Pulled Hydrophone and Sparker aboard - ran bar check on Fathometer
1336	Ready to go - Navigation waiting on Satellite pass
1357	Trim Sparker
1429	B.O.L. USGS-La-A1-323S F.S.P. 350
1640	Changed paper on ORE - no S.P. lost
1702	Off course to avoid oil rig at S.P. 259
1800	Change watch
1836	Trim sparker tips, lost 1 shot point.
2117	E.O.L. USGS-La-A2-323S L.S.P. 99 will track satellite before line change

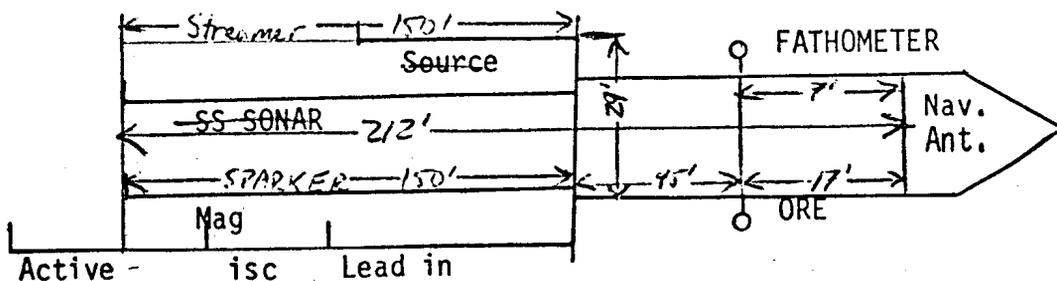


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS-4081 Area USGS-Louisiana Block Area 2 Date 7/30/80

Time	Remarks
2223	B.O.L. USGS-La-A2-324N F.S.P. 100
2233	Avoiding rig, 90 [#] yds. off coarse to right.
2340	Trim Sparker tips, lost 1.5 shot points.
7/30/80	
0000	Changed Watch - last S.P. of day 160 - Total miles 144.0
0458	Changed Stylus on ORE - lost .5 S.P.
0507	E.O.L. USGS-La-A2-324N L.S.P. 350
0530	Trim Sparker
0547	B.O.L. USGS-La-A2-325S F.S.P. 350
0600	Change watch
0750	Heard Houston on Side Band radio- called but no contact.
0949	Trim Sparker tips, lost 1.5 shot points.
1200	Changed Watch
1216	Aborted line - to far off course
1320	R.S.O.L. USGS-La-A2-325S F.S.P. 112
1341	E.O.L. USGS-La-A2-325S L.S.P.99
1350	Pulled Hydrophone and Anarker aboard
1400	Trim Sparker
1420	All gear in water
1430	USGS-La-A2-326N F.S.P. 100
1523	Changed Stylus on sparker - lost 1 S.P.
1723	Changed Paper on Sparker - no S.P. lost



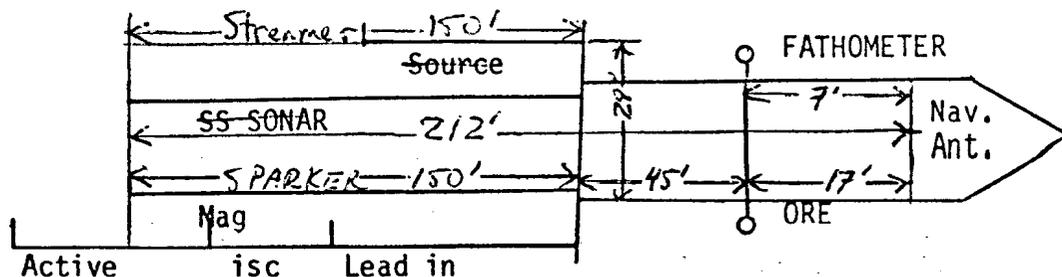
INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo

Client USGS-4081 Area USGS-Louisiana Block Area 2 Date 7/30/80

Time	Remarks
1800	Change watch
1843	Trim Sparker tips, lost 1 shot point
1905	Change paper on \bar{N} Fathometer, lost 1 shot point.
1910	Change paper on ORE, lost 0.5 shot points.
2108	E.O.L. USGS-La A2-326N L.S.P. 350
2115	Trim Sparker tips Extended line change, sat pass
2206	B.O.L. USGS-La-A2-327S F.S.P. 350
7/31/80 0000	Changed Watch - Last S.P. of day 285 - Total miles 143.0
0026	Changed Stylus on ORE
0253	Trim Sparker - Lost 1.5 S.P.
0308	Sparker sounding funny - pulled in and checked - lost 1.5 S.P.
0452	E.O.L. USGS-La-A2-327S L.S.P. 99
0513	Trim Sparker
0528	B.O.L. USGS-La-A2-328N F.S.P. 100
0600	Change watch
0758	Change paper on ORE, no shot points lost.
0955	Trim Sparker tips, lost 1.5 shot points.
1200	Change watch
1206	E.O.L. USGS-La-A2-328N (345)
1308	B.O.L. USGS-La-A2-329S F.S.P. 350
1552	Trim Sparker - lost 1.5 S.P.
1745	ORE EPC recorder 5 volts out - aborted line



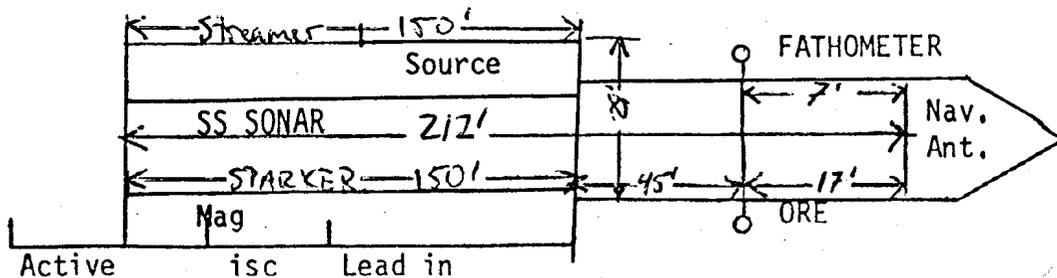
INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo

Client USGS-4081 Area USGS-Louisiana Block Area 2 Date 7/31/80

Time	Remarks
1800	Change watch
1819	R.s.o.l. USGS-La-A2-329S E.S.P. 187
2000	Repaired EPC 5volt power supply.
2041	E.O.L. USGS-La-A2-329S L.S.P. 99
2045	Trim Sparker tips, change paper on ORE.
2119	B.O.L. USGS-La-A2-330N E.S.P. 100
8/01/80	
0000	Changed Watch - Last S.P. of day 200 - Total miles 148.6
0057	Trim Sparker - Lost 1.5 S.P.
0336	Changed stylus on ORE
0354	E.O.L USGS-La-A2-329N L.S.P. 350
0408	Gear aboard - in transit to Cameron as instructed by office
1030	Arrive Cameron dock



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo

Client USGS-GM18930

Area La. Area 2

Block _____

Date 8-16-80

Time _____ Remarks _____

8-16-80

0515 Arrive Maxie Pierce fuel dock, Intracoastal City.

0800 Onan repairman arrives with regulator board and spare generator.

0830 Start Onan with new parts.

0924 Welder comes to install sparker outrigger.

0940 Bill Luksic and Skip Hall arrive in Intersea Van.

0945 Onan repairman leaves. Takes his extra generator with him, leaves spare regulator board.

1100 Welding completed.

1120 Rick Shannon leaves for airport to pick up Joan West-USGS tech.

1200 Diesel mechanics due to arrive for repairs on starboard engine. Valve trouble suspected. Eddie Eyer wants repairs made before ship leaves dock.

1600 John West aboard. Seismic and Navigation set. Supplies already onloaded. No Mechanics yet. Boat down. Standing by.

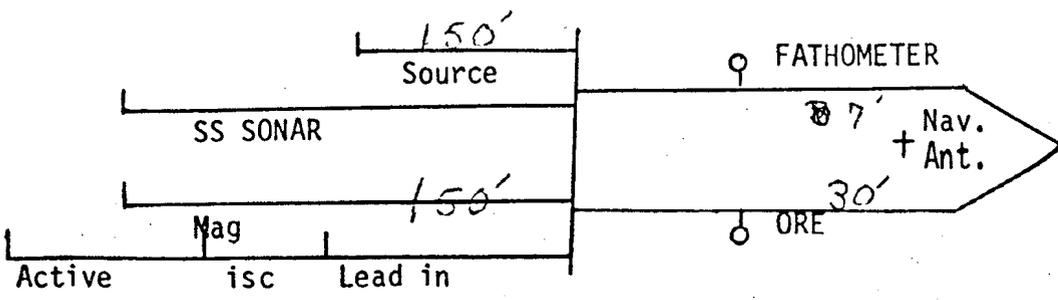
1700 Walter Bayer leaves for Houston.

8-17-80

1000 Diesel Mechanics arrive. Dismantle head. One valve burned.

1600 Engine operating.

1630 Cast off. Will tweak sparker and rendezvous with El Paso, before work area.



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat Amarillo
 Client USGS-GM18930 Area La-A2 Block _____ Date 8-17-80

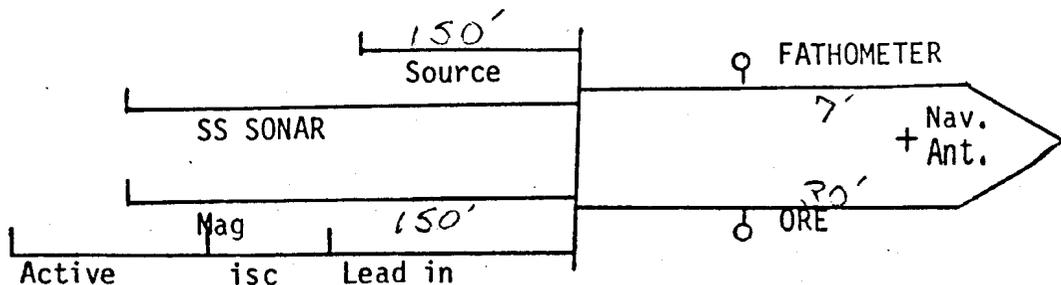
Time	Remarks
2030	Equipment Hooked up. Begin testing sparker. Change ASP filters to 100 and 1500. Try various powers. 300, 500, 1000 J. USGS rep John West says they need more penetration. Prefers 1000 J. Mini Sparker can't handle the power, blows tips. Record Quality much different. West informed of past meeting with Berryhill and Intersea understanding that job specified more resolution and less penetration. West insists USGS wants penetration, settles for 500J.
2300	Haul gear for El Paso Rendezvous. Offload one trigger bank and 7 boxes mag tape, and John West.

Boat Personnel

Seismic	Navigation	Boat Crew
Tom Harnon	Red Black	Forrest Whitley
Bill White	Dub Wampler	Rick Shannon
Jim Windes	Skip Hall	Art Monge
Bill Luksic		Buck Luttrell
		Ron Carrol

8-18-80

0102 BOL USGS LA-A2-S FSP 350.
 0122 New Belt on ORE no shots lost.
 0151 Abort line at SP 326. Off line.
 0221 Resume 331 S @SP325-A.
 0550 Trimed Sparker Tips.

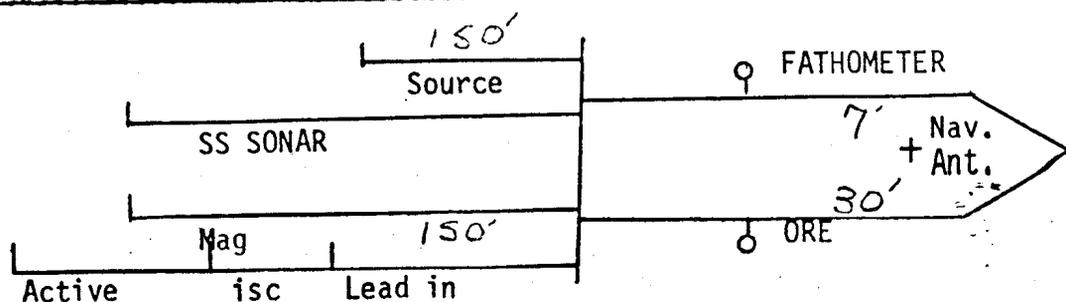


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS - GM18930 Area LA-A2 Block _____ Date 8/18/30

Time	Remarks
0904	EOL USGS LA-A2-331S. LSP-99
0904	Pulled sparker in and trimmed tips.
0938	BOL USGS LA-A2-332N FSP-100
1350	New reel on tape
1403	Trim tips 1.5 sp. lost
1415	Change paper ORE $\frac{1}{2}$ sp. lost
1657	EOL USGS LA-A2-332N.
1714	All Equip. hauled in. Enroute to oil platform to verify navigation
	8-19-30
0215	Navigation system up and operating- Underway to work area
	Sparkeer trimmed & polarity reversed- All gear in the water and ready
0227	BOL USGS LA A2-333S FSP 350
0557	Trimmed sparker
0619	End of tape @ SP. 196 - Cont. with SP. 195 on new tape reel # 0806
0923	EOL USGS LA-A2-333S. LSP 99
0958	BOL USGS LA-A2-334N. FSP 100
1130	Changed tape @ 1130 CDT SP 155, SP 196 on new tape Reel # 0807
1333	Trimmed sparker Lost 1 shot point
1701	EOL USGS LA-A2-334N. LSP 350
1710	Changed tape
1723	Trimmed sparker
1744	BOL USGS LA-A2-335S. FSP 350

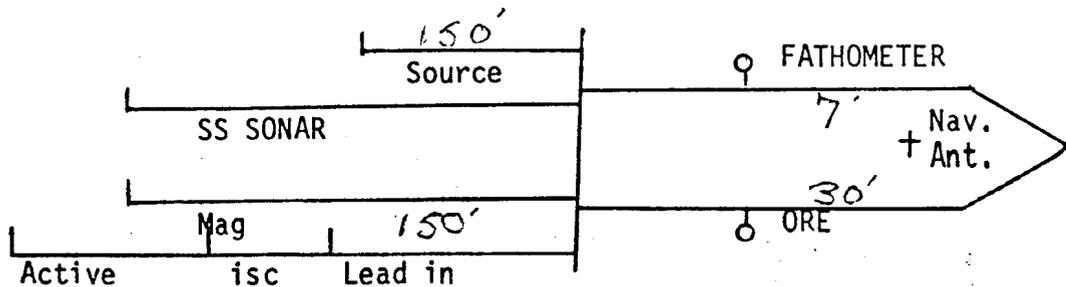


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

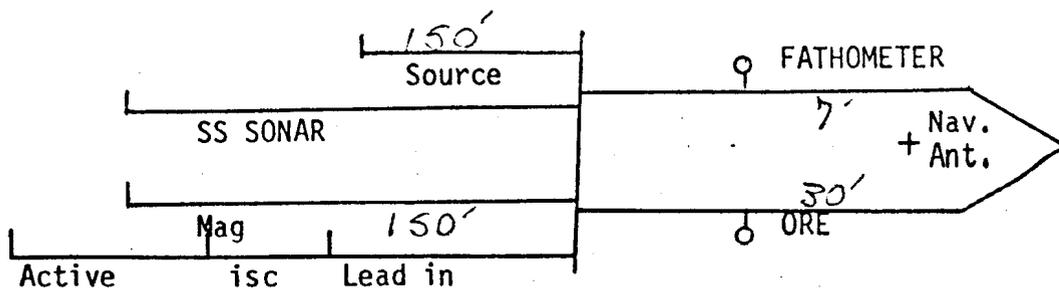
Boat M/V Amarillo
 Client USGS - GM18930 Area LA-A2 Block _____ Date 8/19/80

Time	Remarks
1945	Changed ORE paper missed end of SP, 276
2052	Changed tape at SP, 234. SP 235 will cont. on next tape reel # 0809
2215	Barge anchored on line, will go around. SP 185 thru 182 off track.
2400	Last shot of the day-120 of 335S Total miles today=138
0033	EOL 335S @ SP-100 (Extended to SP-099) 8-20-80
0044	Trimmed sparker tips
0109	BOL 336N @ SP-100
0111	Changed tape @SP-117 SP-118 on reel #0810
0336	Increased speed to 7.5 Kts. to avoid ship approaching track off port bow.
0344	Resumed normal speed
0535	Change paper on ORE. SP269
0514	Changed tape @SP-274
0707	Trimmed sparker @ SP323
0754	EOL USGS LA-A2-336N. LSP 350
0857	BOL USGS LA-A2-337S. FSP 350
1057	Changed tape @ SP-278. Will cont. line with SP-277 on next tape # 0812.
1315	Trimmed sparker and reversed polarity.
1405	Fathometer appears to have increased receiver noise.
1407	Changed stylus belt on ORE/EPC recorder SP-160
1515	Changed tape @ SP-121. SP-120 cont. on reel # 0813.
1545	EOL USGS LA-A2-337S. LSP 99
1645	BOL USGS LA-A2-338N FSP 100



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat M/V AmarilloClient USGS - GM18930 Area LA-A2 Block _____ Date 8/20/80

Time	Remarks
2018	End of tape @ sp-238. Will cont. line with sp-279 on tape # 0814.
2020	Trimmed sparker @ SP-238 missed 1 shot point
2311	EOL USGS LA A2 328M LSP 350
2340	POI USGS LA A3 339S FSP 350
2400	Last shot of the day 339 Total Miles = 146
0125	Change paper- Sparker- lost 1/2 shot point 8-21-80
0337	Changed ORE recorder belt @ SP-203
0350	Changed tape @ SP-192- Line 339S -cont. on Reel #0816
0426	Trimmed sparker @ SP-172 Missed 7/10 SP
0623	EOL USGS LA-A3-339S LSP 99
630	Navigation power surge - pulled gear in and heading for rig to calibrate
0700	Rebuilt Sparker cable and switched hydrophone cable.
1024	BOI USGS- LA-A3-340N FSP 100 Power of Sparker now 300J.
1203	Changed tape at SP-157
1517	Trimmed sparker lost 1.5 SPS.
1600	Changed ORE recorder paper lost 1 SP.
1615	Changed tape @ SP-314. SP-315 on reel # 0818
1620	Recommendation: Subject..Sparkeer Tins-Evidently, ion depletion and subsequent rapid erosion of copper tins especially under power usage above 300J. necessitates frequent trimming and ultimately short sparker life Perhaps an alloyed or plated tin would be less subject to such electrolytic loss.

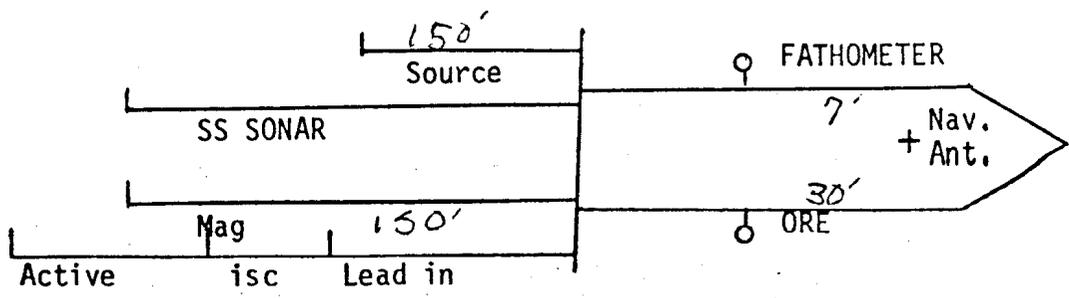


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS - GM18930 Area LA-A3 Block _____ Date 8/21/80

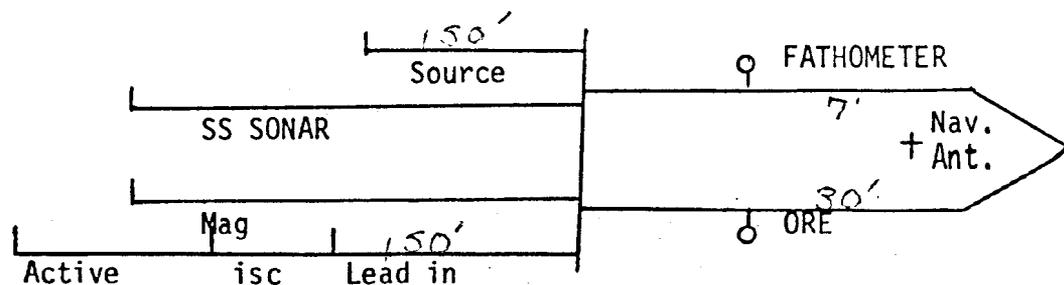
Time	Remarks
1709	EOL USGS LA-A3-340N LSP 350
1712	Trimmed Sparker
1747	BOL USGS LA-A3-341S FSP 350
2100	End of tape @ SP-233 Will cont. with SP-232 on reel # 0819
2400	LSP of the day #121 Total Miles=136 8-22-80
0033	EOL 341S GM 18930 LA-A3 LSP-099
0045	Trimmed Sparker- Changed paper on Fathometer & stylus belt ORE recorder
0109	BOL 342N GM 18930 LA-A3 FSP-100
0315	ORE developed mechanical chatter in stylus mechanism
0400	Changed FPC recorder @ SP-202 Lost 1 SP
0755	EOL USGS- LA-A3-342N LSP 350
0800	Pulled sparker in and trimmed tips.
0822	BOL USGS LA-A3-343S FSP 350
1033	Changed tape @ SP-268 SP-267 continued on Reel # 0822
1235	Trimmed sparker tips. Lost 1.5 Sp.
1118	Changed tape @ SP-112
1450	Changed paper on ORE recorder @ SP-110
1506	EOL 343S USGS- GM 18930 LA-A3 LSP 099
1520	Trimmed Sparker
1552	BOL 344N USGS GM 18930 FSP 100
1941	End of tape @ SP-239 Will cont. with SP-240 on next tape # 0824
2236	EOL USGS LA-A3-344N LSP 350



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOG

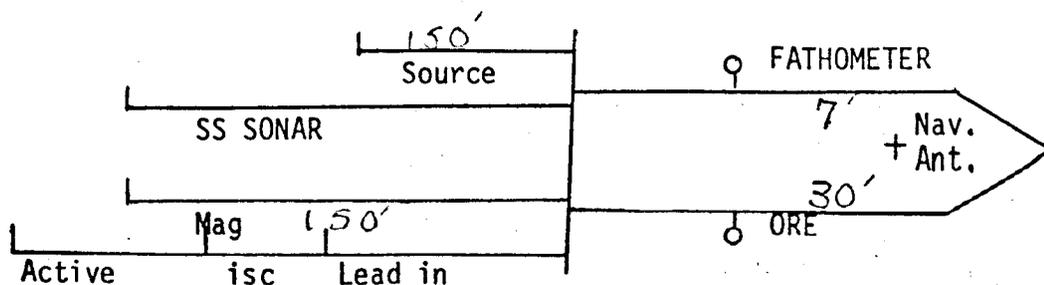
Boat M/V Amarillo
 Client USGS-GM18930 Area LA-A3 Block _____ Date 8/22/80

Time	Remarks
2240	Trimmed Sparker
2310	BOL USGS LA-A3-315S FSP 350
2400	LSP of the day-#321 Total Miles== 149 8-23-80
0030	Changed tape @ SP-303 SP-302 on Reel #0825
0307	Trimmed Sparker @ SP-204 Lost 1.5 sp
0410	Changed tape @ SP-145 Remainder of Line 345S on Reel #0826
0556	EOL USGS-LA-A3 line 345S LSP 99
0600	Trimmed Sparker and switched polarity.
0630	BOL USGS LA-A3 Line-346N FSP 100
)("C924 End of tape @ SP-204 SP-205 on reel # 0827
0726	Changed paper (ORE) Lost .5 SP
1316	EOL 346N LA-A3 USGS-GM18930 LSP-350
1320	Changed tape for line 347S Reel # 0828
1342	Changed EPC belts (ORE & SParker)
1330	Trimmed sparker
1340	Changed stylus & cleaned print rail of Fathometer
1407	BOL347S USGS-GM 18930 LA-A3 FSP-350
1816	End of tape @ SP-195. Will cont. with SP-194 on tape # 0829.
2054	EOL USGS LA-A3-347S LSP 99
2100	Trimmed Sparker
2124	BOL USGS LA-A3-348N FSP 100
2300	End of tape @ SP-155. Will cont. with SP-156 on tape # 0830



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat M/V AmarilloClient USGS - GM18930 Area LA-A3 Block _____ Date 8/24/80

Time	Remarks
2325	8-23-80 Changed paper on ORE recorder
0001	8-24-80 Last Sp of the day #194 of line348N Total miles=154
0127	Onan out. Abort line@SP-245 Change oil and filters
0200	Onan restarted Heading for platform to re-calibrate NAVAIDS
0515	NAVAIDS calibrated Trimmed Sparker Heading back to line to resume @ SP-214
0537	USGS GM18930 LA-A3 Line 348N resumed @ SP-214
0631	End of tape @ SP-277. Will cont. with SP-273 on next tape # 0831
0821	EOL USGS LA-A3-348N LSP-350
0830	Pulled sparker and hydrophone on board, trimmed sparker. Heading south to start east & west lines block # 2&3.
1125	Fathometer Bar Checked
1513	BOL USGS LA-A2&3 line # 217W FSP 787
2100	Trimmed sparker
2112	End of tape @ SP-543. Will cont. with SP-543 On next tape # 0833
2300	Abort line. lost signal with Loran C. Will resume line @ SP-488. ✓
0710	Loran C. signal good. 8-25-80
0723	Resume line 217-W @ SP-488
1005	End of tape @ SP-339. Will cont. with SP-338 on next tape #0834.
1055	EOL USGS LA*A2&3 line 217W LSP-356
1105	Trimmed Sparker
1123	BOL USGS LA*Area -2&3 line 216E FSP-356



INTERSEA RESEARCH CORPORATION

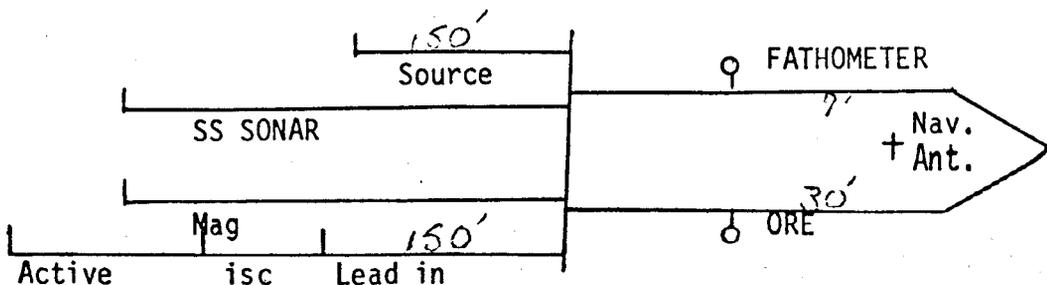
DAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS - GM18930 Area LA-A-2&3 Block _____ Date 8/25/80

Time	Remarks
1315	Changed tape @ SP-482. SP-483 on following tape # 0835
1500	Changed ORE (EPC) paper @ SP-500
1523	Trimmed sparker @ SP-502 lost 1.5 sds.
1810	Changed Fathometer paper @ SP-605. Will cont. with SP-606 on next tape.
1855	End of tape @ SP-632. Will cont. with SP-633 on tape # 0836
2040	Trimmed sparker tips.
2305	EOL USGS LA-A-2&3 line-216E LSP 788
2315	Trimmed Sparker and switched polarity.
2344	EOL USGS LA-Area-2&3 line 215W FSP-787

8-26-80

001	Last shot point of the day #778 Total miles=106
0248	Ship diverted from track to avoid oil rig @ SP-575 by 170 yds.
0300	Trimmed sparker tips
0400	Changed tape @ SP-632
0401	Changed sparker recorder paper
0555	Abort line 215-W @ SP-562. Loran C down again.
1100	Heading back to restart line.
1143	Resume line @ SP-563
1151	Abort line sparker miss firing
1207	Sparke back on line heading back to SP-563.
1257	Resumed line @ SP-563
1500	Changed tape @ SP-489

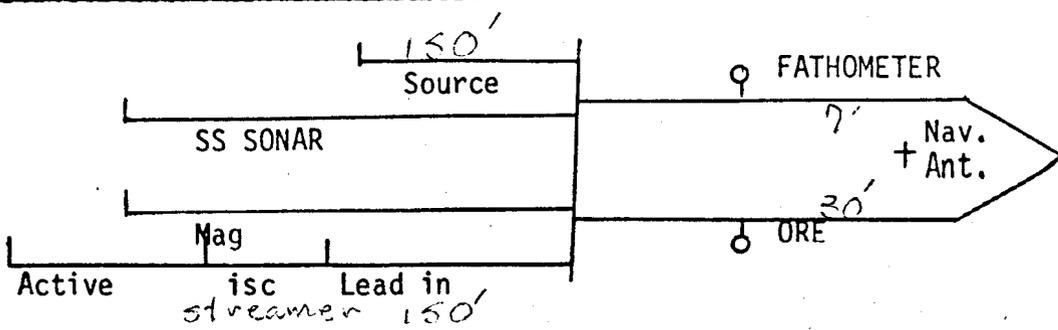


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DAILY OPERATOR LOG

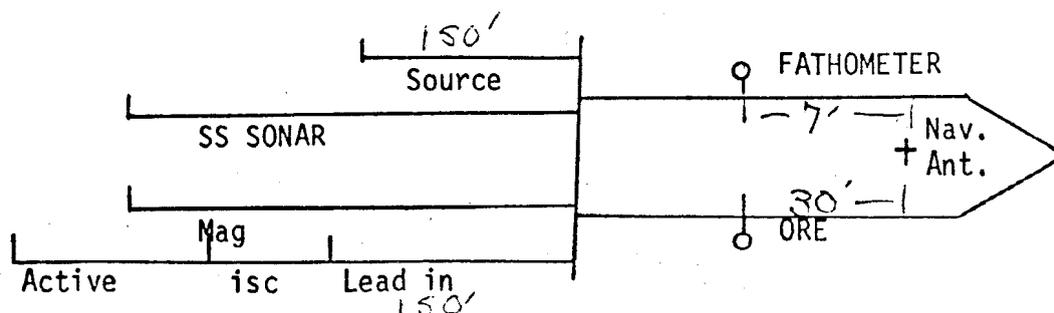
Boat M/V Amarillo
 Client USGS - GM18930 Area LA-A-2&3 Block _____ Date ~~8/27/80~~ 8/28/80

Time	Remarks
1600	Trimmed Sparker tips @ SP-150 lost 1.5 SP.
1824	EOL USGS LA-Area-2&3 line 215-W LSP-356
1830	Trimmed Sparker
1853	BOL USGS-LA Area-2&3 line 214E FSP-356
1905	Changed ORE/EPC paper @ SP-363
2243	Trimmed Sparker @ SP-495
2305	Changed tape @ SP-510 (continued on reel# 0841
8-27-80	
2400	Last shot of the day #514 Total Miles= 115.
0259	Trimmed Sparker @ SP-657
0326	Tape Changed @SP668-669 to reel#0842
0433	Changed Fathometer paper @ SP-715 SP-716 cont. on reel #0842
0617	EOL USGS-GM 18930 LA-Area 2&3 Line 211 E LSP 788
0649	BOL USGS-GM 18930 LA-Area 2&3 Line 213W FSP 787 Trimmed Sparker
0800	Changed tape @ SP 743 Continued line w/SP744 on reel #0843
1107	Changed sparker/EPC paper @ SP623 Trimmed sparker
1204	Changed tape @ SP585 Continued line @SP584 on reel #0844
1445	Trimmed sparker @ SP479 Lost 1SP
1612	Changed ORE/EPC paper @SP424
1618	Changed tape @ SP419 Line continued on reel # 0845
1752	EOL USGS-LA Area-2&3 Line 213W LSP-356
1700	Trimmed Sparker



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat M/V AmarilloClient USGS - GM18930 Area Louisiana Area 2&3 Block Date 8/27/80

Time	Remarks
1838	BOL USGS-LA Area-2&3. Line 212-E FSP-356
2112	End of tape @ SP-152. Cont. with SP-153 on tape # 0846
2230	Trimmed Sparker @ SP-500 Missed 1 $\frac{1}{2}$ sp.
2400	Last SP- of the day SP-537- Total miles =
0049	Depart from track @ SP-590 to avoid massive oil rbg.
0114	Returned to track @ SP-605
0123	End of tape @ SP-611. Will cont. with SP-612 on reel # 0847
0124	Depart track to avoid ship.
0126	Back on track.
0222	Trimmed sparker @ SP-647 lost 1 SP.
0315	Departed from track @ SP-752 to avoid oil rig and bouys.
0530	Back on course
0536	End of tape @ SP-763 Will cont. with SP-764 on reel # 0848.
0611	EOL USGS-LA Area-2&3 line 212-E LSP-788 Trimmed Sparker .
0714	BOL USGS-LA Area-2&3 line 211-W FSP-787
1115	EOT @ SP-654 Continued on reel # 0849
1213	Trim Sparker tips Lost 1.5 shot points
1316	Chgd. Sparker/ EPC paper @ SP-615
1417	Chgd. ORE/EPC paper @ SP-538
1503	Break off line @ SP-510 for radio xmsn. to Houston base. Trim sparker
1555	Resume line @ SP-511
1619	Chg. tape @ SP-498 SP-497 cont. on reel #0850



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo

Client USGS - GM 18930

Area LA-Area 2&3

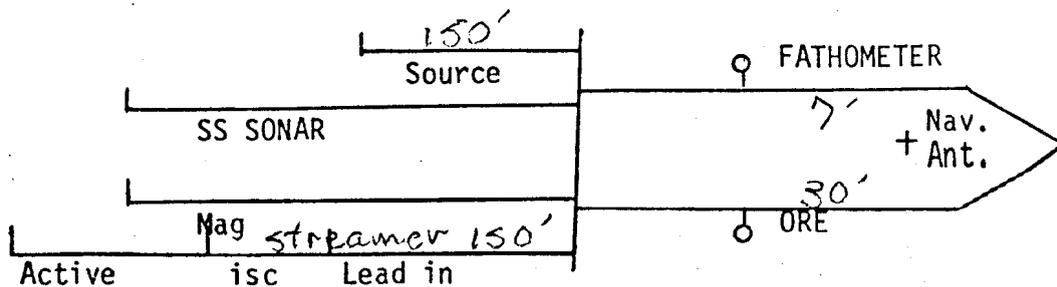
Block _____

Date 8-28-80

Time	Remarks
1700	Chr. ORF/EPC belt @SP-47' Lost .5 Shot points
2016	EOL USGS-LA Area-2&3 line 211-W LSP-356
2035	All gear aboard heading for coastal city.

8-29-80

0700 Maxie Pierce Dock, Intercoastal City, LA.



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DAILY OPERATOR LOG

Boat M/V Amarillo

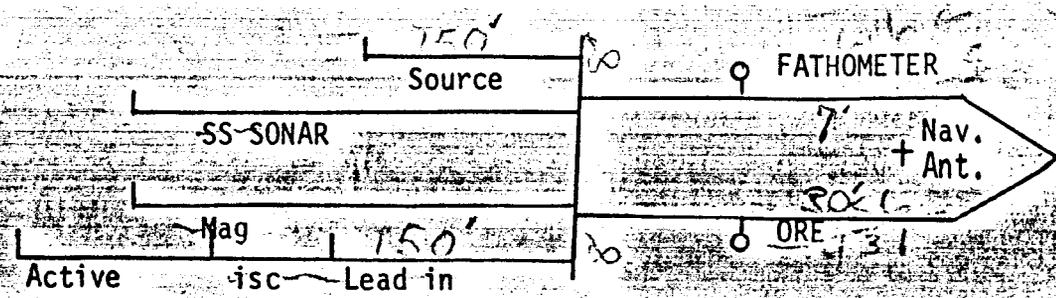
Client USGS - GM18930

Area LA Area-2&3

Block _____

Date 8/30/80

Time	Remarks
0700	Arrived @ Maxie Pierce Dock, Intercoastal City, La.
0900	Filled up on fuel, water, groceries ETC.
1000	Shore support arrived, brought supplies and crew change. Shipped Data Hydrophone cable and power supply. Navigator Chuck Dickenson and Gambill Worth 1st mate, boat crew came aboard.
1332	Leaving Intercoastal City, for prospect. 4^u
0000	Arrive work area - tie off to platform navigation thinks there is too much noise to start shooting lines. Feel they need better signals.
0630	Navigation feels signals are up to par, will proceed to start of line.
0730	All gear is in water, we are now heading down on line.
0802	BOL USGS-LA Area-2&3 line 210-W FSP-787
1220	Changed tape @ SP-635. SP-634 on reel # 0952.
1240	Trimmed Sparker @ SP-623
1254	Changed paper ORE/EPC lost 1 sp.
1311	Sparkeer tripped out-rear Pnl. of sparkeer can box out of place shorted sparkeer panel replaced- back on line lost 1 SP.
1615	Trimmed Sparker @ SP- 492 lost 1 1/2 sp.
1630	Changed tape @ SP 483. SP-482 on reel # 0853.
1633	Changed ORE/EPC belt @ SP-479
1952	EOL USGS - LA Area-2&3 line 210-W ISP-356
2000	Trimmed Sparker
2025	BOL USGS-LA Area-2&3 line 209-E FSP-356

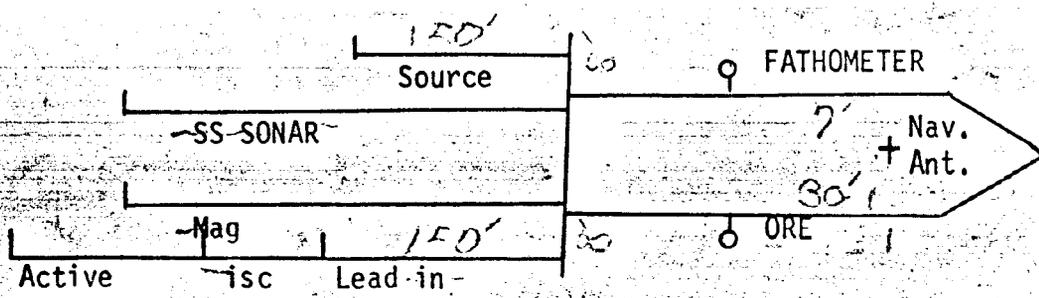


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS - GM18930 Area Louisiana Area2-Block _____ Date 8/30/80

Time	Remarks
2310	Changed paper on ORE recorder @ SP-455
2333	New belt on sparker/EPC @ SP-470, missed SP-471 8/31/80 491
0035	Changed tape @ SP-509 Will cont. with SP-510 on reel # 0855
0042	Trimmed Sparker @ SP-513 lost 1sp.
0057	Changed Sparker/EPC paper @ SP-534
0219	Changed ORE/EPC stylus belt @ SP-577
0420	Trimmed Sparker @ SP-652 lost 1sp.
0145	End of tape @ SP-667. will cont. with SP-668 on reel # 0856
0757	EOL USGS-LA Area-2&3 line 209-E LSP-788
0800	Trimmed Sparker
0843	BOL USGS-LA Area-2&3 line 208-W FSP-787
0938	End of tape @ SP-752. will cont. with SP-751 on reel # 0857
1255	Trimmed Sparker @ SP-699. lost less than 1 SP.
1400	Changed tape @ SP-591. will cont. with SP-589 on reel # 0858
1644	Trimmed Sparker @ SP-490 lost 1sp.
1807	End of tape @ SP-438. will cont. with SP-437 on reel #0859
1852	Changed paper ORE/EPC recorder @ SP-410
2018	EOL USGS-LA Area-2&3 line 208-W LSP-356
2020	Trimmed Sparker
2050	BOL USGS-LA Area-2&3 line 207-E FSP-356
2250	End of tape @ SP-430. will cont. with SP-431 on reel # 0860

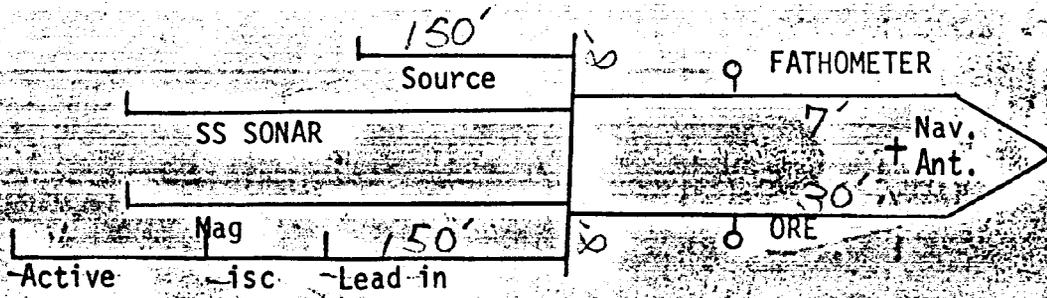


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS - GM19930 Area Louisiana Area-2&3 Block Date 9/1/80

Time	Remarks
0000	Last SP. of the day line 207-E SP-474. Total miles =
0055	Trimmed Sparker @ SP-506. lost 1sp.
0304	Changed tape @ SP-581, will cont. with SP-582 on reel # 0901
0438	Changed ORE/EPC stylus belt @ SP-610
0500	Trimmed Sparker @ SP-656
0712	End of tape @ SP-732. will cont. with sp_733 on reel # 0902
0843	EOL USGS-LA Area-2&3 line 207-E ISP-788
0845	Trimmed Tips - mini spaker
0912	BOI USGS-LA Area-2&3 line 206-W FSP 787
1152	End of tape @ SP-690. will cont. with SP-689 on reel # 0903
1222	Trimmed Sparker @ SP-632 lost 1sp.
1601	End of tape @ SP-535. will cont. with SP-535 on reel # 0904
1728	Trimmed Sparker @ SP-478 lost 1 sp.
2017	End of tape @ SP-383. will cont. with SP-383 on reel # 0905
2101	EOL USGS-LA Area-2&3 line 206-W ISP-356
2105	Trimmed Sparker
2145	BOI USGS-LA Area-2&3 line 205-E FSP-356
2355	End of chart on fathometer @ SP-435, will cont. with SP-436 on next roll.
0000	Last SP. of the day was SP-438. Total miles = 153
0118	End of tape @ SP-481. cont. on reel # 0906
0155	Changed paper on Sparker/EPC recorder
0157	Changed paper on ORE/EPC recorder

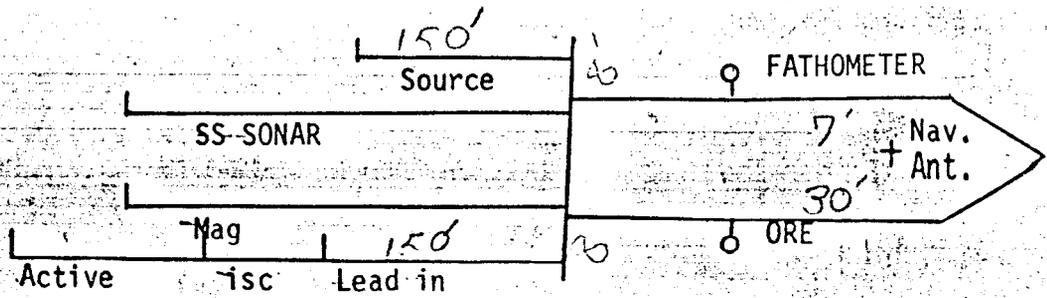


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS - GM18930 Area Louisiana A-2&3 Block _____ Date 9/2/80

Time	Remarks
0237	Trimmed Sparker @ SP-528, lost Iso.
0530	End of tape @ SP-629, will cont. with SP-629 on reel # 0907
0710	Trimmed Sparker Tins @ SP-690
0939	End of tape @ SP-777, will cont. with SP-778 on reel # 0908
0957	EOL USGS-LA Area-2&3 line 205-E LSP-788
1000	Trimmed Sparker Tins.
1038	BOL USGS-LA Area-2&3 line 204-W FSP-787
1200	Ships Speed Flunctuating
1220	Loran C/ down due to thunderstorm interference, line aborted will pick up @ SP-725-A
1440	Resume line 204-W @ SP-725-A
1548	End of tape @ SP-641, will cont. with SP-640 on reel # 0909
1610	Trimmed Sparker Tins @ SP-628, lost Iso.
2000	EOL @ SP 184 line continued on reel #0910
2018	Trimmed sparker @ SP479
2220	EOL USGS LA-A 2&3 line 204W LSP356
2225	Trimmed sparker
2232	EOL USGS LA-A2&3 line 203E FSP 356
2400	LSP of the day 360 of line 203E Total miles=147 9-3-80
0015	EOL @ SP386 continue line/SP387 on reel #0911
0105	Trimmed sparker @ SP#505 Lost LSP
0420	Changed sparker/EPC paper @SP 517



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo

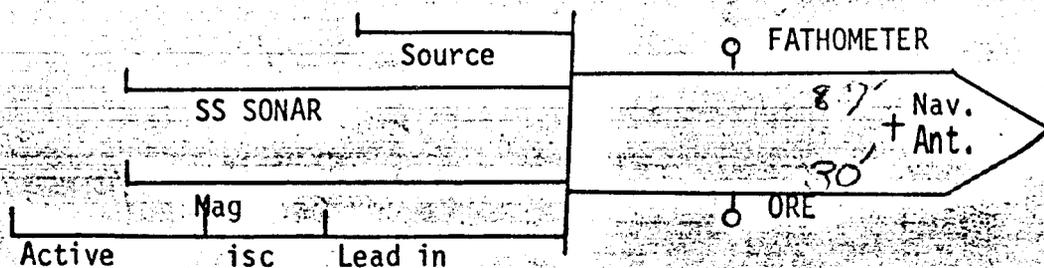
Client USGS-GM18930

Area LA-Area 2&3

Block _____

Date 9-3-80

Time	Remarks
0457	Changed tape @ SP536 continued w/SP 537 on reel #0912
0522	Changed fathometer paper @SP 551 Line 203E LA-A2&3
0735	Trimmed Sparker Tins @ SP-632
0908	End of tape @ SP-688, will cont. with SP-689 on tape # 0913
0952	Changed paper on ORE/EPC recorder @ SP-716
1157	EOL USGS-LA Area-2&3 line 203-E LSP-788
1200	Trimmed Sparker Tins
1310	BOL USGS-LA Area-2&3 line 202-W FSP-787
1430	End of tape @ SP-736, will cont. with SP-737 on reel # 0914
1739	Trimmed Sparker Tins @ SP-622, lost 1sq.
1845	End of tape @ SP-587, will cont. with SP-578 on reel # 0915
2045	Changed paper on ORE/EPC recorder @ SP-505
2127	Trimmed Sparker Tins @ SP-478
2300	End of tape @ SP-421, will cont. with SP-420 on reel # 0916
2400	Last shot of the day... ¹⁶⁷ SP-384 Total Miles=159
0048	EOL 202W USGS-GM18930 LA-A2&3 LSP-356 9-4-80
0158	Trimmed sparker BOL 201E USGS-GM18930 LA-A2&3 FSP- ⁷⁸⁹ 356
0416	Changed tape @SP431 SP432 on reel #0917 ⁴³²
0720	Trimmed and repaired sparker cable @ SP-535, missed 5 1/2 shots.
0730	Changed paper on ORE/EPC recorder @ SP-545
0830	End of tape @ SP-580, will cont. with SP-581 on reel # 0918
1234	Trimmed Sparker @ SP-720

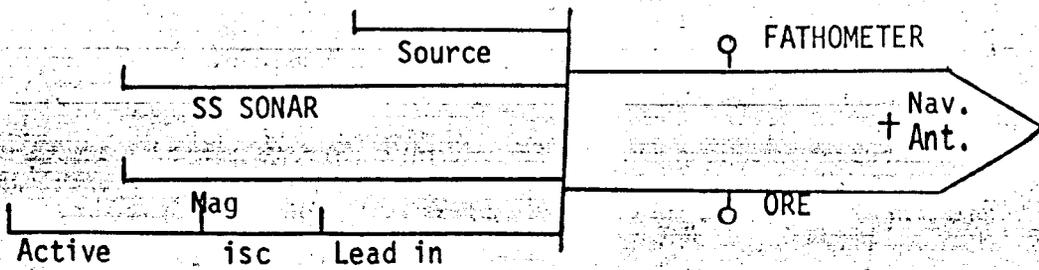


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo
Client USGS * GM18930 Area LA Area-2&3 Block _____ Date 9/1/80

Time	Remarks
1242	End of tape @ SP-725, will cont. with SP-726 on reel # 0919
1431	EOL, USGS-LA Area-2&3 line 201-E LSP-798
1530	Heading for Intercoastal city, for crew change and USGS rep.
1830	Begin running tape tests - different filter settings -line 209E reel # 0854
2035	End of tape tests
0015	Arrive Maxie Pierce fuel docks.



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo

Client USGS GM T8930

Area _____

Block _____

Date 9/5/80

Time _____ Remarks _____

0015 Arrive Maxie Pierce fuel docks.

Crew change; Forrest Whitely replaces Art Monge as engineer.

John Colton and Wayne Cox replace Tom Harmon and Jim Windes.

USGS rep. Ron Miller comes on board.

Attempt to improve sparker records on play back- changing filters and gains.

Ron Miller sees no improvement, cant filter out noise without reducing gain

to a point where almost total wipeout of data occurs. Miller decides to

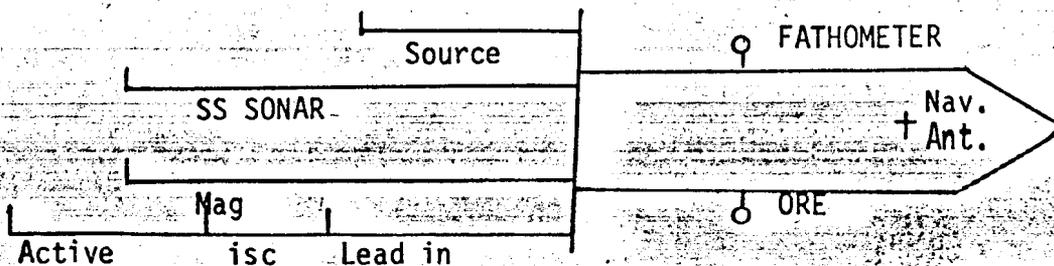
discontinue playback.

1500 Standing by for weather - gusts to 40+ MPH.

Records have been recorded from hydrophone to amplifier (40 db) to

tape recorder to ASP to EPC since August 18.

2400 Standing by for weather.



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

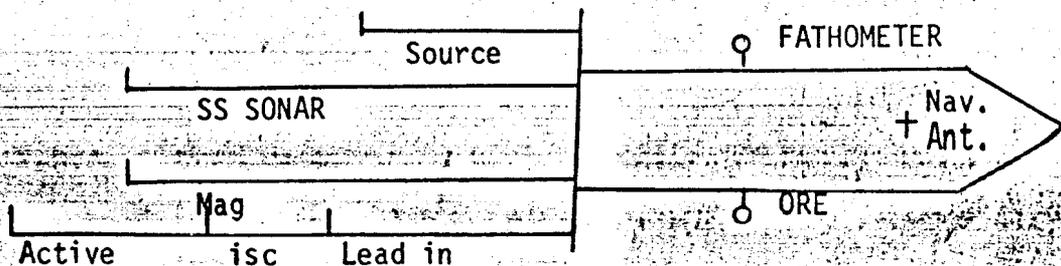
Boat M/V Amarillo

Client USGS GM I8930

Area _____

Block _____ Date 9-6-80

Time	Remarks
0800	Standing by for weather.
	Re-build sparker, change oil and filter in Onan, secure bowline on fathometer transducer.
1505	Depart Maxie Pierce docks for (O.C.) cruise.
***** 9-7-80 *****	
0330	Sparker and hydrophone in water and 600 yds. from first shot point. Ready to comence test shooting USGS GM I8930 LA-A3 Line 340 N
0405	Testing with various gain settings of ASP to obtain max. signal/noise ratio. John Colton at the controls---USGS Ron Miller observing.
0445	Dropping port M/V engine off line to try and eliminate harmonics generated by differing reduction gearing necessitated by unmatched screws. (No appreciable noise reduction)
0450	Dropping starboard engine off-line, restarting port engine. Maintaining vessel speed at approximately 3.5 kts.
0500	Increase vessel speed to approx. 5.0 kts, on port engine and reduced gain on ASP
0510	Re-locate sparker to stbd. side next to H. Phone
0525	Exchange USGS H. Phone w/ IRC H. Phone (USGS' in water). Results: Very weak signal from USGS phone.
0554	IRC phone back in water, 300 ft back
0600	Captain says can operate on one engine only. Re-starting stbd engine and re-configuring lab so that H. Phone connects directly to the EPC



INTERSEA RESEARCH CORPORATION

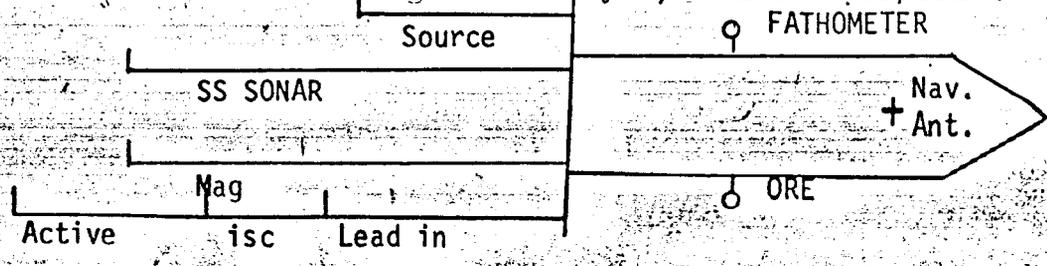
DAILY OPERATOR LOG

Boat M/V Amarillo
Client USGS CM 18020 Area _____ Block _____ Date 9-7-80

Time	Remarks
0730	Exchange original IRC phone with spare IRC phone.
0830	Radio contact w/ Houston. Will attempt rendezvous w/ M/V Sea Raider to swap ASP as tests show negative results.
1505	Rendezvous w/ Sea Raider
1525	Jose Gomez comes aboard w/ USGS ASP to run tests with data pre-recorded by the Amarillo.
1615	Leased ASP (Del Norte) assumed defective as compared to ASP on loan from USGS.
1635	Test line shooting w/ USGS ASP on line to determine its effectiveness.
1900	Switch to spare IRC phone for noise comparison.
2000	Discontinue testing after noise check w/ vessel running at various speeds and coasting w/ engines in neutral. Noise problem continues. Decide to shut down and pull in gear. Cannot satisfy USGS rep. with available equipment, client suspects excessively noisy hydrophone. However no comparisons can be made since- with USGS phone, as said phone is a dead phone
2100	Contact Sea Raider and inform of decision to go to Galveston
	Additional test with IRC Del Norte ASP shows it to be O.K. Operator error, being driven too high an amplitude.

*****9-8-80*****

0745	Arrive Galveston - contact Houston office. Client rep contacts USGS office, sending complete system.
0945	Paul Horrer and Angus Mackay arrive from Houston. Meet with Ron Miller and review records. Decide further testing necessary w/ other equipment.



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat w/v Amarillo
 Client USGS GM 18030 Area _____ Block _____ Date 9-9-80

Time _____ Remarks _____

1100 Impco repairman arrives.
 1315 USGS phone, power, and sparker delivered.
 1900 Transit to Prospect.

****9-9-80****

0158 USGS gear deployed
 0215 Begin test line 302NS sp. 225-100
 0225 Continue on line. not recording key pulse. not compatible w/ Bel Norte and EPCs-corrected.

0335 Sp 185 switch to Teledyne sparker. ASP' comparison shows little difference both working. Water column noise reduced - penetration good w/ both sources and both phones.

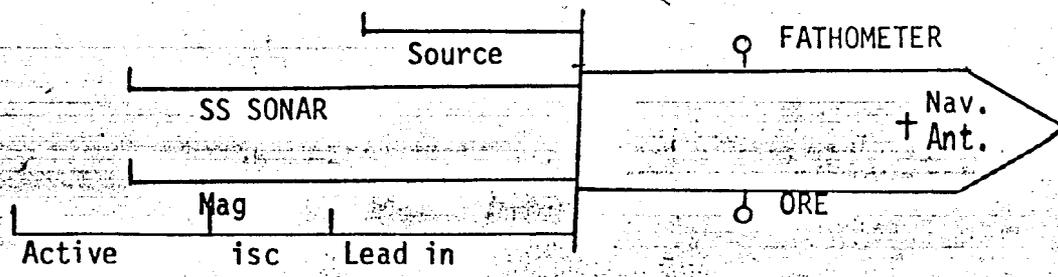
0625 Pull in all gear to rendezvous w/ Sea Raider.
 0857 BOL, 302 N(test) FSP 120. Using IRC system. Filters= 300/T100

1200 Lose navigation circa SP210. end line. Continue testing while waiting to Sea Raider Comparison. Client thinks data acceptable. concerned with bubble pulse.

1500 Comparing data of Sea Raider. results similar.
 1530 Haul for shallow water portion of line 302 N.
 1840 BOL Test 302 N@ SP218. Noiser some good penetration. Much tweaking and geometry experiments.

9-10-80

0122 BOL @ SP 553. Wreck in area. Head south to try another tow variation.



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat W/V Amarillo
 Client USGS-GM1893C Area Louisiana Block Area 5&6 Date 9-10-80

Time Remarks
 0139 All gear aboard head to Sabine.
 0540 Arrive Sabine.
 0900 Ron Miller leaves for Houston with test Data and Usgs equipment. Will meet with IRC and USGS offices.

1640 Jeff Stewart comes on board, Bill White departs, Wayne Cox assumes party chief, Memo from Paul Horner says Dr. Berryhill (USGS) accepts Amarillo test line data.

1730 Onload 6024 g. of fuel oil, and 2 bbl. of lube oil at Festi Fuel Docks.
 2015 Onload \$471.00 of groceries.
 2030 Depart Sabine for area 6&5

*****9-II-80*****

0230 Deploy gear. Calibrate echo sounder. Sparker aft 150', h.phone aft 175'.
 0135 BOL 200E LA. 5&6 FSP 356.
 0445 Event mark not working - 6v. dry cell dead - sparker paper advance not working. Abort line, will re-start @ FSP
 0645 BOL 200E.(re-start) LA. 5&6 FSP 356. Sea state I. SP 400 switch to D.N. pho
 0930 Trim tips. Loose 1.5 SPs.

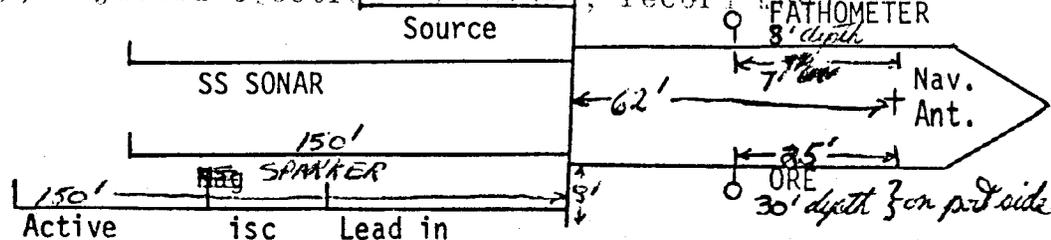
1200 Watch change.
 1215 Change streamers from Del Norte to Teledyne.

1253 Change tape; new reel #0922 FSP 540: lost 1 SP

1310 Let out additional 50' of streamer cable.

1357 Trim Sparker tips; reset sparker line at 150', at SP 581: lost 1.5 SP.

1636 Sparker firing weakly; adjusted electrode spacing; record better.



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo

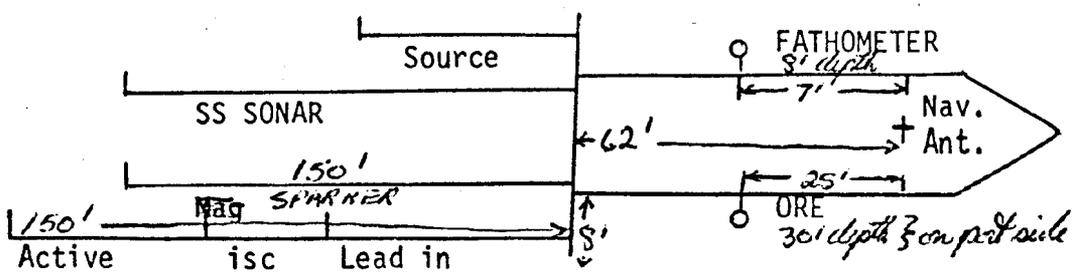
Client USGS GM 18930

Area Louisiana

Block Area 5&6

Date 9-11&12-80

Time	Remarks
1703	Change tape, new reel #0923 FSP 677; lost one SP
1733	Sandpaper the electrodes and adjust spacing at SP 694.
1750	Trim tips and rough sandpaper electrodes at SP 703; lost 1.5 SP
1800	watch change
1930	Reduce ORE depth to 20'. Miss 1 SP
2019	EOL 200 E. LA-Area 5&6 LSP 788. Line length = 81.63 miles
2056	BOL 199 West. LA-Area 5&6 FSP 787. Sea state I
2113	100 yds. off line due to oil platform.
2150	Change tape. New reel #0924 FSP on reel = 757. Loose approx. 10 SPs.
322310	Trim tips. Loose 1.5 SPs.
0	Last shot point of the day = #684. Total line mileage today = 100.9 s.m.
2405	Watch change. Sea state I
*****9-12-80*****	
0015	Sparker not firing; lost 1 SP.
0242	Change stylus on sparker EPC; lost 1 SP.
0248	50 yds. off line for two SP's due to navigation buoy's.
0325	Change tape: new reel #0925 FSP 558; lost undetermined number of SP's.
0354	Trim sparker tips; lost 1 SP. #543.
0600	Watch change
0730	Change tape. New reel = # 0926 FSP #415. Lost SP 416.
0835	Change ORE paper. LSP 381. Miss 1 SP.
0920	EOL 199 West. LA-5&6, LSP 356 Miss first 3 SPs on tape reel #0926



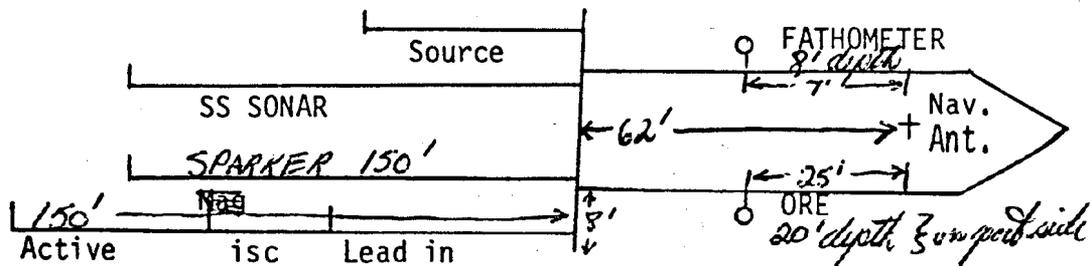
INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat Amarillo

Client USGS CM I8030 Area Louisiana 5&6 Block Area 5&6 Date 12-50

Time	Remarks
1016	BOL I98 East LA-5&6 FSP 356 Sea state I
1200	Watch change
1245	Change tape, new reel #0927 FSP 437; lost 1 SP.
1320	Change fathometer tape LSP 454; new tape FSP 457.
1345	Trim sparker tips; lost 1.5 SP's.
1518	ORE time lines blurred and vertical lines in record; clean stylus, record normal, lost 1 SP; Fish dragging excessively, possibly seaweed on the cable.
1635	Clean ORE stylus
1645	Change ORE stylus; lost 2 SP's.
1650	Change tape, new reel #0928, FSP 577, lost 1 SP; reel #0927 LSP 575.
1700	ORE stylus cleaned.
1800	Watch change.
1816	Trim tips, miss 1 sp.
1855	EOL I98 E. LA- 5&6. LSP 649. Sea state I. This line = 55.3 statute miles.
1940	Decrease ORE depth to 15'. Will cut lines short due to shallow water.
1951	BOL I27 West. La-Area 5, FSP 628
2152	Change tape. New reel = # 0929, FSP on reel =#559
2302	Trim tips. Miss 1 SP
2400	Watch change. Sea state I. Last SP of day=486 .Total line mileage today XXXX = 113.7 statute miles.

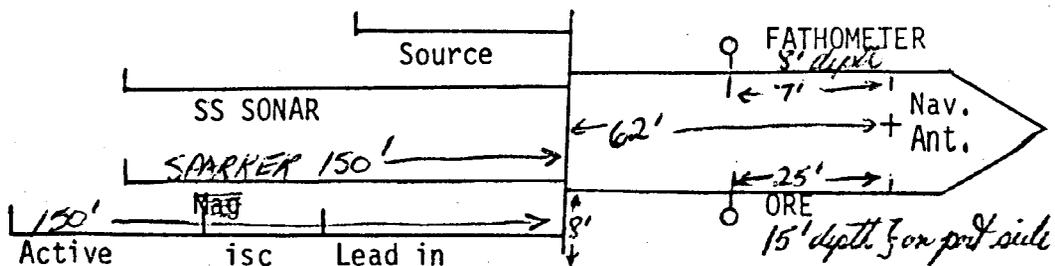


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V AmarilloClient USGS GM 18930Area LouisianaBlock Area 586 Date 9-13

Time	Remarks
0205	Change tape; new reel #0930 FSP 415, lost 1 SP; reel #0929 LSP 417.
0349	EOL 197W LSP 356 (51.5 miles for this line)
0350	Change stylus on sparker and ORE EPC's, advance tape and fathometer reels for new line
0400	Trim sparker tips
0425	BOL 196E FSP 356.
0446	Off line 200 yds. for platform and anchor buoy.
0540	Replace sparker EPC stylus belt; lost 2 SP's.
0600	Watch change.
0645	Change tape. New reel=#0931, FSP 434
0910.	Trim tips. Miss 1+ SP.
1055	Change tape. New reel = # 0932 , FSP = # 570
1200	Watch change. Sea state I
1235	ORE restart
1241	EOL 196E LSP 625; line cut short at 20' depth; (50.9 miles this line)
1250	Change ORE and Sparker stylus, advance tape and fathometer reels
1300	Trim sparker tips
1323	BOL 195W FSP 625.
1512	Change tape, new reel #0933 FSP 547, lost 1 SP; reel #0932 LSP 545.
1632	Trim sparker tips, lost 1 SP #493.
1800	Watch change. Sea state I
1953	Tape change. New reel = # 0934, FSP 409 . reel #0933 LSP 410
2125	Trim tips. Miss 1.5 SPs.



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

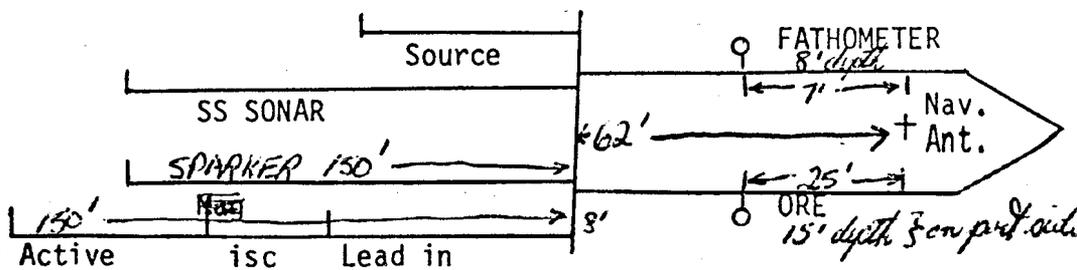
Boat Amarillo

Client USGS GM I8930 Area Louisiana 5 Block _____ Date 9-13/14-80

Time	Remarks
2206	BOL I94 East. LA-area 5 FSP 356
2400	Watch change. Sea state 2. Last SP of the day=418 , total mileage today = 138.1 statute miles

***** 9-14-80 *****

0042	Change tape, new reel #0935 FSP 442, lost 1 SP; reel #0934 LSP #440
0124	Clean ORE EPC. optical cuppler had to be cleaned, abort line, circle to SP 455A.
0130	Change fathometer tape LSP 469; new reel FSP 455A
0225	Restart line 194E at SP 455A
0315	Change ORE EPC=optical cuppler.
0320	Clean sparker EPC
0350	Change sparker EPC stylus belt.
0531	Change tape, new reel #0936 FSP 563, lost 1 SP. Reel #0935 LSP 561
0530	Trip sparker tips, lost 1 SP #563.
0600	Watch change. Sea state I
0824	EOL I94 E. LA-area 5 LSP ^{FSP} 359 _A <i>60</i>
0913	BOL I93 W. LA-5&6 FSP 675. Event mark problem. Will re-start.
1010	BOL I93 W. (re-start) LA -5&6, FSP 675
1112	Change tape, New reel = # 0937 FSP 639
1200	Watch change. Sea state I
1422	Off track 500 yds. due to platform and anchor buoy.
1525	Change tape, new reel #0938 FSP 491, lost 1 SP; reel #0937 LSP 493



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat M/V Amarillo

Client USGS GM 10030

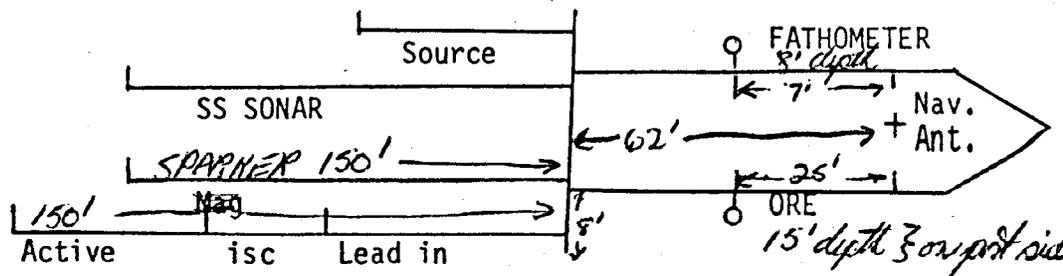
Area Louisiana

Block Area 5&6 Date 9-14&15-80

Time	Remarks
1913	EOL I93 W. LA-Area 5&6 LSP 356. Sea state I. Trim tips.
2001	BOL I92 E. LA- area 5&6 FSP 356.
2315	Changes in tow geometry of hydrophone
2400	Change tape. New reel = # 0940 , FSP 495. Watch change. Last SP of the day = 494. Total line mileage today = 132 statute miles.

***** 9-15-80 *****

0000	Watch change
0009	Change in geophone geometry-shorten.
0100	From SP ⁵⁰⁰⁻⁵⁴⁰ ship track affected by currents: max. offset \pm 100 yds.
0258	Trim Sparker tins; lost 1.5 SP's. #596.
0258	Change sparker EPC stylus, lost 1 SP
0417	Change tape. new reel #0941 FSP 641, lost 1 SP; reel #0940 LSP 639.
0517	EOL La.-A-5&6 Line 192E LSP 675 (60.4 miles this line)
0525	Change ORE and Sparker EPC stylus. change ORE paper.
0621	BOL I91 W. La-5&6, FSP 662. Sea state I
0740	SP 615 Vessel 200 yds off line due to oil platform. Presently running \pm through the platform jungle!
0925	Change tape. New reel = # 0942, FSP 555
1056	Change fathometer paper. LSP roll # 3 = 503. FSP roll # 4 = 502
1135	Trim tips. Miss 2 sp. # 480
1200	Watch Change



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat W/V Amarillo

Client USGS GM 18980

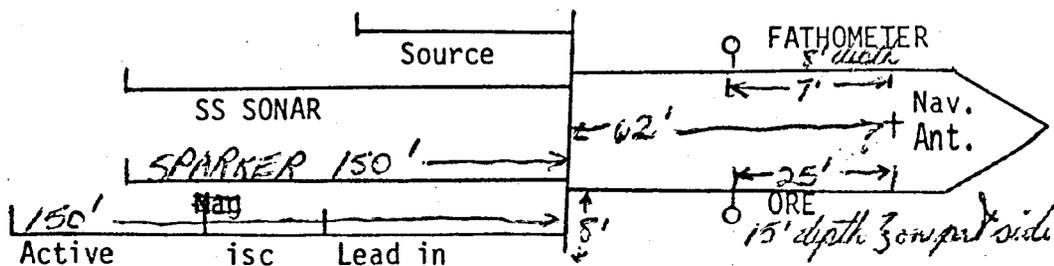
Area Louisiana

Block Area 5&6 Date 9-15&16-80

Time	Remarks
1444	Tape change, new reel #0943 FSP 401, lost 1 SP; reel #0912 LSP 403.
1451	EOL La.-A-5&6 Line 191W LSP 356 (57.0 miles this line)
1455	Change ORE and Sparker EPC stylus
1520	Change Sparker Polarity
1546	EOL La.-A-5 Line 190E FSP 356 ✓
1800	Watch change. Sea state I
1830	Trim tips. Miss 1 1/2 SPs @ SP 446
1845	Change tape. New reel = 2#0944, FSP 456
2255	EOL 190 E. LA-5 LSP 604 also = LSP of the day. Total line mileage today = 139 statute miles.
330	Calibrate echosounder to a depth of 10' below xducer. Trim tips. Sample taken at end of line 190 ± SP # 604. = dark brown, non-effervescent, slightly plastic mud.

***** 9-16-80 *****

0000	Steaming for starting point of line 189W: watch change.
0005	Ore lowered to ± 18'
0100	Change tape, new reel #0945, line 189W FSP 523, reel #0944 LSP 604.
0105	Deploy gear.
0110	EOL La.-A-5 line 189W FSP 523
0250	Change sparker EPC paper.
0310	Trim sparker tips.
0517	Change tape, new reel #0946 FSP 384, lost 1 SP; reel #0945 LSP 386

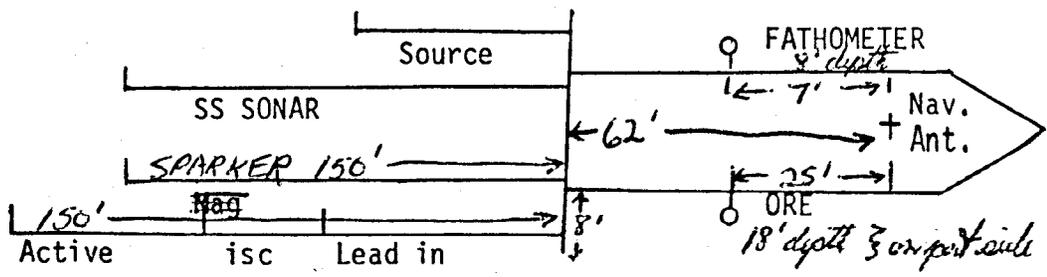


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat w/v Amarillo
 Client USGS GM 18930 Area Louisiana Block/Area 5 Date 9-16-80

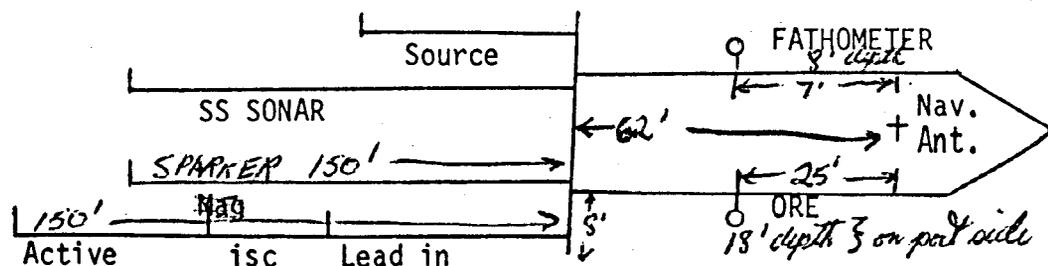
Time	Remarks
0600	Watch change
0603	EOL I89 W. La-area 5 LSP 356 . 31.6 statute miles this line.
0646	BOL I88 E. LA- area 5 FSP 356
0945	Trim tips. Miss $I\frac{1}{2}$ SPs. @ # 420
1014	EOL I88 E. LA- area 5 LSP 481. 23.7 statute miles this line.
1114	BOL I87 W. LA- area 5 FSP 447 ✓
1200	Watch Change Sea State 1
1315	EOL La.-a-5 line 187W LSP 356 (17.2 statute miles this line)
1350	Steaming for BOL 320S; Will start doing N*S lines today, the remaining two E*W lines, 185&186 are being run by the M/V Sea Raider.
1400	All stop: to repack boat's stuffing box, and to attach deployment cable to fathometer, old one had rotted through. Wayne and Jeff dive to secure new cable and clean ORE cable of seaweed. Also, trimmed sparker tips and taped blowouts.
1430	Steaming for BOL 320S
1540	BOL La.-A-5 line 320S FSP 591, (Starting N*S lines moving eastward through Area's 5&6)
1703	Change tape, new reel #0948 FSP 542, lost LSP; reel #0947 LSP 544
1800	Watch change. Sea state 1
2115	Change tape, new reel = # 0949 , fsp = 400. LSP reel 0948 = # 401
2250	EOL 320 S. LA- area 5 LSP 347/46.2 statute miles this line. Trim tips
2320	BOL 321 N. LA-area 5 FSP 347. Sea state 2. Start of line 150yds. off track
2400	Watch change. Last SP of the day= #371. Total line miles today=128.5 track



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOG

Boat M/V Amarillo
 Client USGS GM 18930 Area Louisiana 5 Block Area 5 Date 9-17

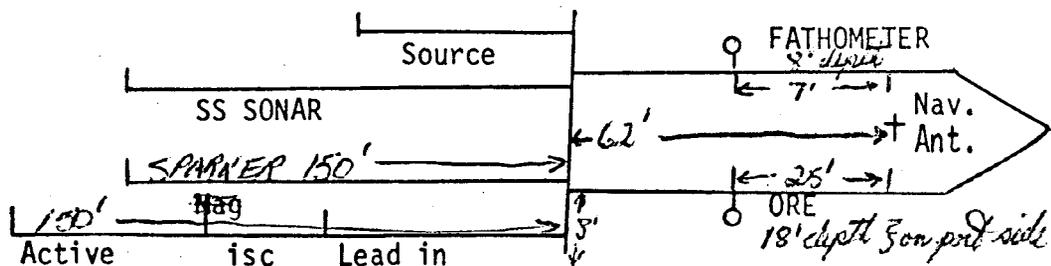
Time	Remarks
0115	Change ORE EPC paper: lost 1 SP.
0156	Change tape, new reel #0950 FSP 437, lost 1 SP; reel #0949 LSP 435
0227	Change fathometer paper, new roll #5, FSP 457 La.-A-5, roll #4 LSP 453
0400	Trim sparker tips
0405	Replace sparker EPC stylus
0410	Sparker EPC problem; circle to SP 505A
0442	Restart line La.-A-5 321N at SP 505A.
0600	Watch change. Sea state 3
0710	EOL 321 N. LA=area 5 LSP 584. Trim tips. Begin thunder storm, S/S 3.
0745	BOL 322 -ABCET-NAV OUT. Standing by for electrical storm, tied up to a production platform.
1030	Decide to run into shallow water and wait out storm.
1130	Standing by just south of Gran Chenier.
1345	Depart stand by area for line 322 S. LA-area 5. Nav up and operational.
1445	Tie up at platform so Lorac C can calibrate. they lost all signals
1450	Bar check fathometer and set ORE at 18'.
1645	Steaming for line 322S: Lorac up.
1717	BOL La.-A-5 line 322S FSP 577
1730	ONAN down. Loose navigation. Pull in gear.
1835	ONAN up - re-calibrating LORAN C. standing by for SAT passes.
2030	Lorac discovers SAT up-date hardware problem, attempting to correct.
2400	Standing by for Lorac. Total line mileage today= a mere 40.3 s.m.



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat AmarilloClient USGS GM 18930 Area Louisiana #5 Block _____ Date 9-18-80

Time	Remarks
0530	Lorac reports system up and operational.
0610	Depart platform for line 322 S. LA-area 5.
0645	BOL 322 S. LA-area 5. FSP 577. Sea state 2 (re-start # 2)
1002	Change tape. New reel = # 0952, FSP 462. LSP reel # 0951 = # 463.
1135	Trim tips. Miss $1\frac{1}{2}$ SPs @ SP 3 407
1200	Watch change
1317	EOL La.-A-5 line 322S LSP 347 (43.6 miles this line)
1320	Change ORE and Sparker EPC paper and stylus
1409	BOL La.-A-5 line 323N FSP 347
1438	Clean sparker high voltage rails and reversed polarity.
1516	Trim sparker tips
1517	Change tape, new reel #0953 FSP 382, lost 2 SP; reel #0952 LSP 379
1712	Trim sparker tips; lost 1 SP # 449
1800	Watch change.
1920	Change tape. New reel = # 0954. FSP 526. LSP reel # 0953 = # 525
2045	EOL 323 N. LA-area 5 LSP 576. Total line mileage today = 87.9 statute mls
2115	All gear secure. U/W for rendezvous w/ Sea Raider.
2400	Rendezvous w/ Sea Raider, onload Area 4 data. U/W to Cameron LA.

*****9-19-80*****



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOG

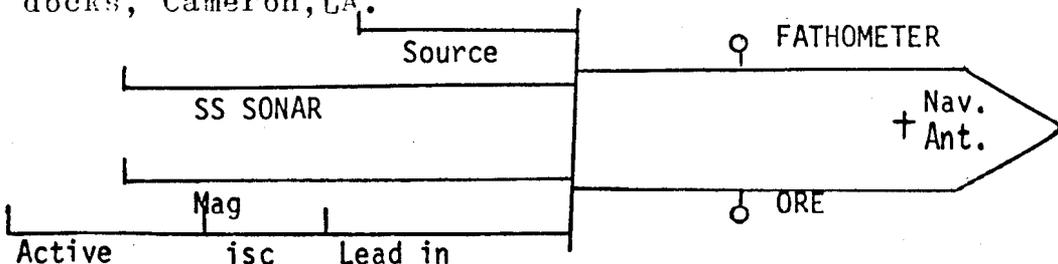
OCT 6 1980

Boat AmarilloClient USGS GM 18900Area Louisiana

Block _____

Date 9-19-80

Time	Remarks
0300	Tie up Gulf fuel docks. Cameron, LA.
0930	IRC personnel arrive. Bob Fryer and T.J. Burns replace Jeff Stewart and Bill Luksic.
1145	On load groceries. Standing by for ships crew change.
1215	Ships personnel arrive. Rick Shannon, Homer Tyron on board
1305	Depart Cameron for LA- area 5 line 324 S.
1340	Informed by Bob Fryer that he will not sail aboard the Amarillo since it is "infested" by "crabs". He wanted to know if the vessel had been fumigated. he was told no. He contacted Houston office to advise them that he wanted off - J. Colton told R. Ashly we would return to port and offload Fryer.
1435	Tie up to dock in Cameron, LA.
1500	Phone call to Houston office. R. Ashly informs J. Colton that Dr. Berryhill (USGS) desires filter settings of 200 Hz. low cut for water depths of greater less than 45' and 300 Hz. for depths less than 45'. R. Ashly also informs Colton that B. Fryer has been canned and that we - the Amarillo will sail one man short, taking on a replacement sent out by the Sea Raider next week.
1520	Depart Cameron for LA- area 5.
1540	Vessel hard aground off coast guard station.
1715	Relief captain. Rick Shannon informs that there may be possible steering gear damage, and has requested diver inspection. Presently under tow by M/V Blue Guppy.
1810	Tie up to Gulf fuel docks, Cameron, LA.



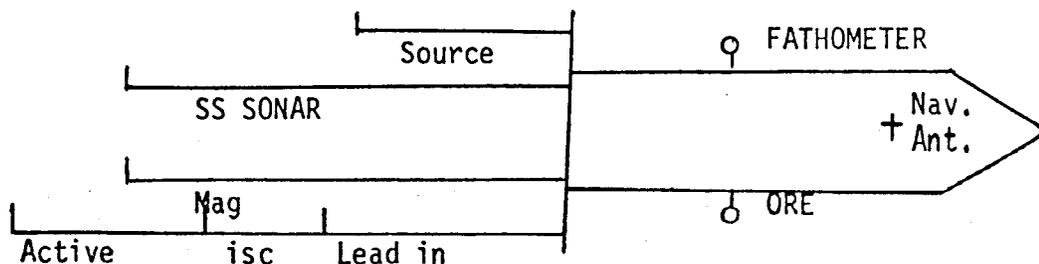
INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat Amarillo

Client USGS CM 18920 Area Louisiana 5 Block _____ Date 9-19-80

Time	Remarks
1956	Depart Gulf docks, u/w to work area. Steering gear corrected by ships engineer.
2300	Deploy gear and calibrate fathometer. ORE @ 20'.
2336	BOL 324 S. LA-5 FSP 568. Sea state 1
2400	Watch change. Last SP of the day = #551. Total line mileage today=3.2 s *****9-20-80*****
0315	Trim tips. Miss 1 1/2 sp @ # 422
0555	EOL 324 S. LA-5 LSP 347. This line = 41.8 statute miles.
0600	Watch change. Sea state 2. Trim tips.
0654	BOL 254 325 N. LA-5 FSP 347
0900	Called in to Houston base, routine traffic
1139	Increase Sparker to cut to 300 hz
1200	Watch Change. sea state 2
1210	Trim tips. Miss 1 1/2 SPs. @ # 516.
1310	EOL 325 N. LA- 5 LSP 561. 40.5 miles this line.
1320	Gear aboard, steaming to rendezvous w/ Sea Raider.
1445	Rendezvous w/ Sea Raider. Pass over 2 1/2 cartons of milk smokes, 4 gal. of milk, and 3 dzn eggs.
1740	BOL 326 S. LA-5 FSP 553. Miss SPs 553&554 on fathometer @ BOL
1853	Reduce to cut on sparker to 200 hz
1957	Reduce speed, sparker records too noisy sea state 3
2015	115 yds off course, shrimp boat on our track

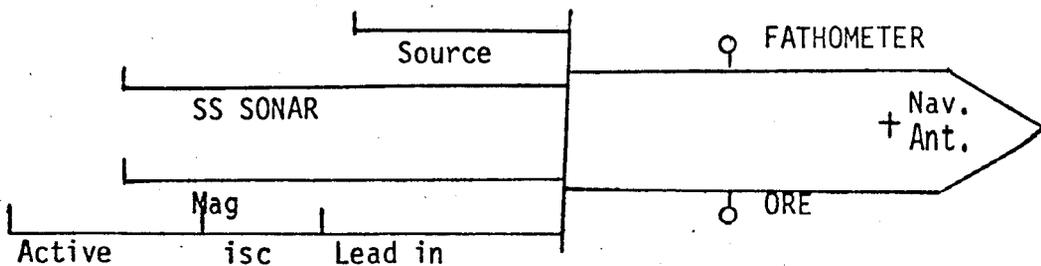


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat Amarillo
 Client USGS GM 18930 Area Louisiana 5 Block _____ Date 9-20-80

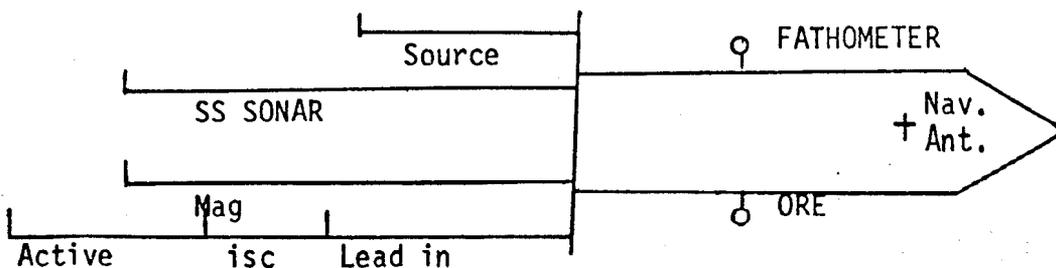
Time	Remarks
2352	Change tape. New reel = # 0959 FSP 360
2400	Watch change. LSP of day = 357. Total miles today = 116.0 statute miles
	*****9-21-80***** 0021 EOL 326 S. LA-5 LSP 347. 0056 BOL 327 N FSP 347
0436	Change tape. New reel = # 0960 fsp 467. Reel # 0959 LSP 466
0540	Trim tips. Miss 1 1/2 SPs @ # 500
055S	Change low cut to 300 Hz. Excessive noise on sparker record.
0600	Watch change sea state 3
0708	EOL 327 N. LA- 5 LSP 546. 37.7 statute miles this line.
0720	Add + 2 lbs of lead to H. Phone in order to increase depth.
0757	BOL 323 S FSP 540 LSP 347
1813	Pass current info to Sea Raider SP 505 vessel off line to avoidrix and buoy cluster
0916	SP 501 500 yds off track SP 497 back on line
0936	Changed tape new reel #0961 FSP 491 reel 0960 LSP 492
1007	Malfunction in trigger bank (shorted capacitor) switched T.P. circling r restart SP 480
1031	Trim Sparker tips
1039	Continue Line 328 S SP 480
1240	Change stylus on ORE miss SP 417
1453	EOL 328 S. LA- 5 LSP 347. 35.5 statute miles this line. Trim tips.
1606	BOL 329 N. LA-5 FSP 347



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOG

Boat Amarillo
 Client USGS GM 18930 Area Louisiana 5 Block _____ Date 9-21/

Time	Remarks
1700	Change to spare Teledyne streamer to try and eliminate some of the noise on the sparker record. Miss 1½ SPS. @ # 376
1800	Watch change, sea state 2
1829	Trim Sparker tips SP 428
2130	EOL 329 N. LSP 534 35.4 miles this line
2224	BOL 330 S. FSP 530 Return to original H-fone configuration
2335	Reduce boat speed to avoid vessel SP 491
2400	Watch change. LSP of day = # 480. Total miles today = 121 statute miles
0024	change tape , new reel = # 0964 FSP 466
0135	200+ yds off track due to platform.
0413	EOL 330 S. LSP 347. Trim tips.
0455	BOL 331 N. FSP 347
0504	Change sparker stylus belt @ SP 352
0600	Change watch sea state 2
0758	Pass current line info to Sea Raider
0900	Change tape. New reel 0966 FSP 472
1016	EOL 331 N. LSP 526
1124	BOL 332 S. FSP 526 Trim Sparker tips
1155	Slowing due to traffic
1643	EOL 332 LSP 347 . 33.9 statute miles this line. Trim tips.
1736	BOL 333 N. LA- 5 FSP 347
1835	Change tape. #0968 FSP 382

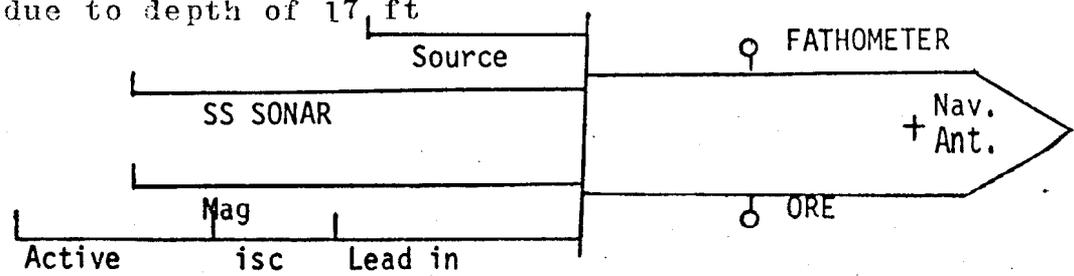


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat Amarillo
 Client USGS GM 18930 Area Louisiana Block _____ Date 9/22/80

Time	Remarks
2225	EOL 333 N LSP 524 Trim sparker tips
2313	BOL 334 S FSP 521 Start new tape 0959
2400	2354 100+ yds. off line due to platform.
***** 23 Sept 1980 *****	
0000	Change watch Sea state 2. Last SP of day = #499. 123 miles today
0325	Change tape. New reel = # 0970 FSP 379
0422	EOL 334 S. LSP 347 Trim tips
0503	BOL 335 N FSP 347
0515	Paper advance problem on sparker EPC
0911	Change tape LSP 455 FSP 457 tape #0971
0951	EOL 335 N LSP 517 Trim tips 32.3 miles this line.
1033	BOL 336 S FSP 516
1041	Abort line. shrimp boat on collision course
1058	Restart line at sp 511
1200	Watch change.
1308	Change tape. New reel = # 0972 FSP 438
1551	EOL 336 S. LSP 347. 32 statute miles this line. Trim tips.
1635	BOL 337 N. FSP 347
1757	Change tape. New reel = # 0973 FSP 396
1800	Change watch
2007	SP 481 100 yds off track, avoiding rig
2100	SP 500 avoiding rig SP 501 318 yds off
2117	EOL 337 N LSP 511 due to depth of 17 ft



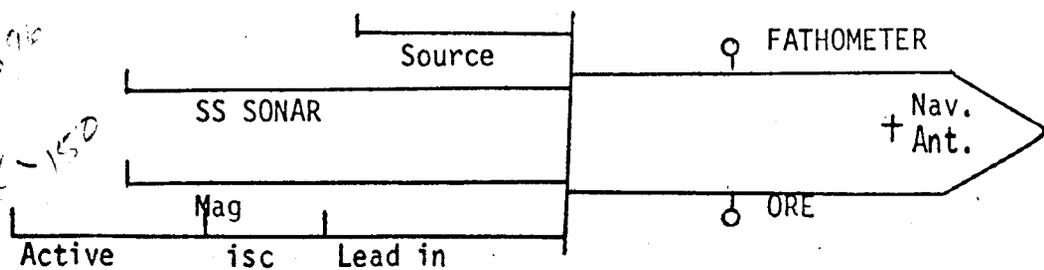
INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat Amarillo
 Client USGS GM 18930 Area Louisiana Block _____ Date 9/23/80

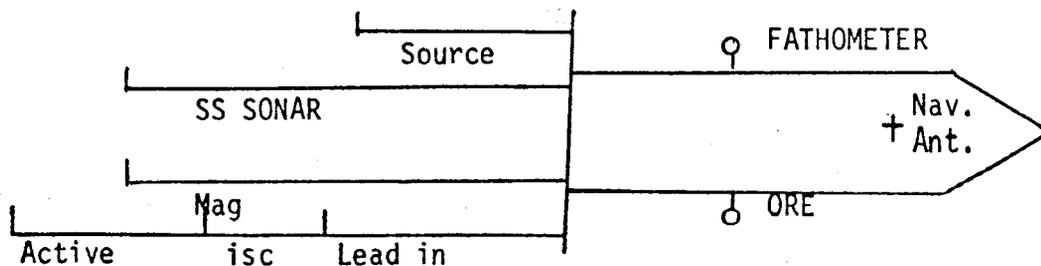
Time	Remarks
2200	BOL 338 S FSP 504
2252	Avoiding rig SP 47C 60 yds off track
2400	Watch change LSP of day 442. 127.0 statute miles today
***** 9-24-80*****	
0005	Raise ORE to 15'.
0008	Contact w/ Sea Raider. They dont have a technician for us so we'll postpone rendezvous for now.
0010	Circling up due to ORE problem.
0057	Re-start line 338 S. FSP 442
0330	Change tape. New reel = # 0975 FSP 366
0405	EOL 338S. LA=5 LSP 347
0420	Radio contact w/ Sea Raider, they do have a tech for us- haul in all gear- u/w for rendezvous.
0730	Rendezvous w/ Sea Raider. Danny Riggs aboard
1149	BOL 339 N. LA-6 FSP 416. Sea state 2
1200	Shift change shooting line 339 n
1315	Radio contact with Sea Raider, Give Daily Production Report.
1400	Changed Fathometer Reel (Nav. informed of error on line 201)
1429	EOL. -339N. LA- 6 LSP 501 This line = 16.1 statute miles
1445	Changed sparker tips
1506	BOL- FSP-498 Line -340 S. LA.-6 9-24-80
1745	EOL 340 LA- 6 LSP 410. 16.7 miles this line. Trim tips.
1929	BOL 339(part 2) LA- 6 fsp 393

Handwritten notes:
 307
 307
 46
 307-501-0
 307-150-150



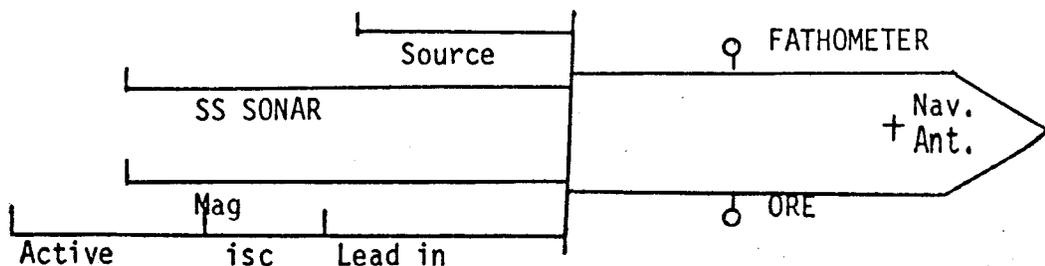
INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat AmarilloClient USGS GM 18930 Area Louisiana 6 Block _____ Date 9-24-80

Time	Remarks
2059	EOL339 S. (part 2) LA- 6 LSP 347
2147	BOL 340 N.(part 2) FSP 347 LA- area 6
2236	Change tape. New reel = # 0977 FSP 374
2312	EOL 340 N. (part 2) LA-6 LSP 392. 2355 BOL 341 S. LA-6 FSP 387
2400	LSP of the day = 385. 81.5 statute miles today
***** 9-25-80 *****	
0111	EOL-341S. LSP-347
0155	BOL-342 N. FSP-347
0315	EOL-342N. LSP-406 Changed Tape #0978 Clend Sparker (11.2 miles) this line.
0531	BOL-343 S. FSP-450
0804	SP 365. 360 yds. off track due to jack-up
0839	EOL 343 S. LA-6 LSP 347. 19.5 statute miles this line.
0917	BOL344 N. LA-6 FSP 347
1011	Change tape. New reel = # 0979. FSP 380
1125	CDT EOL 344 N. LA-6 LSP 425. 14.7 statute miles this line. rev. polar. Trim tips
1200	Shift Change NAV. out due to weather
1225	Contact Sea Raider, Arrange to talk @1400 hr.
1330	Nav. back, Heading for line 345 S
1402	BOL-345 S. FSP-439 (this line 17.61 miles)
1435	Sea Raider Called said to monitor @1500Hr. and talk to Houston Round Robin
1500	Talked To Sea Raider and Houston
1510	Slowing Speed For Shrimp Boat



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGBoat AmarilloClient USGS GM 18930Area LouisianaBlock 6Date 9-25-80

Time	Remarks
1656	EOL-345 S. LSP-347 Changed tape #0980 (Last Shot Point 318)
1741	BOL-346 N. FSP-347 LSP-451
1800	Watch change ### - Sea state 1.
1820	Slowing due to traffic @ SP 360
1930	Trim tips. Miss 1 SP @ 406
2045	EOL 45 346N. LSP 451. 19.7 statute miles this line. Trim tips.
2118	BOL 347 S, FSP 450. Start of line 100 yds. off track.
2218	Change tape. New reel = # 0981 FSP 414
2400	Watch change sea state 1. LSP of day 359. 112 statute miles today
*****9-26-80*****	
0023	EOL-347 S. LSP-347 Trimed Sparker Tips
0100	BOL-348 N. FSP-347 LSP-45 ⁵
0115	Had To Go Off Track Due To Rig Hazards
0303	Changed Tape #0982 (FSP On Tape 416)
0417	EOL-348 N. LSP-455 . 20.3 statute miles this line
0511	BOL-195 W. FSP-787
0645	EOL 195 W. LA- 6 LSP 733. 10.2 statute miles this line. Trim tips
0730	BOL 196 E. LA-6 FSP 725
0816	Change tape. New reel = # 0983 FSP 766
0925	CPT EOL 196 E. LSP 787 11.8 statute miles this line.
0959	BOL 197W LA-6 FSP 787. Sea state 3
1223	EOL-197 W. LSP-796
0130	Changed Fathometer Roll #9



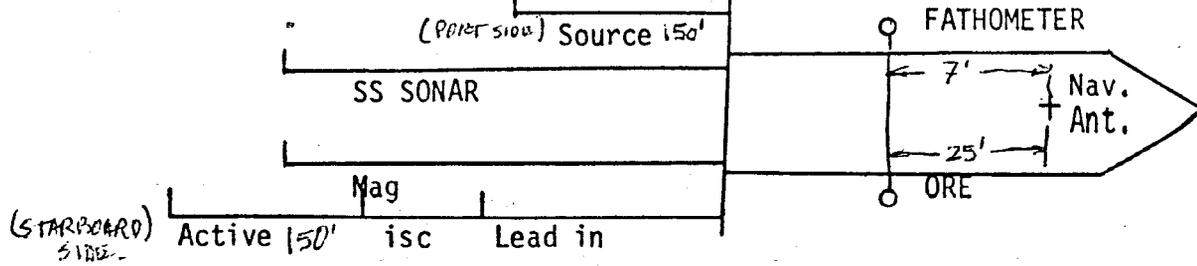
INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat AMARILLO

Client JSGS GM 18950 Area Louisiana Block 6 Date 9-26-80

Time	Remarks
1445	BOL-198 E. FSP-647 LSP-737
1557	Changed Tape #C984 (LSP on old tape-684)
1700	Had Radio Contact With SEA RADER, Received Additional Work Order.
1800	Watch change sea state 3.
1858	EOL 198 E. LSP 788 26.7 statute miles this line. Trim tips. Re-mob source to port side of vessel. Sparker aft 150' and approx. 37' from hydrophone. Drop ORE to 20'
1945	BOL 201 W. (re-shoot) ABORT DUE TO EXCESSIVE VESSEL SPEED.
2125	BOL 201 W. LA-3 (restart) (re-shoot) FSP 787
2222	Change tape. New reel = # 0935 FSP 753
0000	Watch change. LSP of day = # 695. 103.9 Stat. miles today. Trim tips
0010	Trimed Sparker Tips sn.#694
0233	Changed Tape #0986 (FSP on new tape-610)
0248	Trimed Sparker Tips
0547	Trimed Sparker Tips at SP.499
0600	Watch Change. **** Sea state 2, rain storm starting. Vessel presently w/ 4000 gal. of fuel.
0613	ABORT line due to rain storm - erratic LORAN C readings. (SP 484)
0740	Re-start line 201 W. (FSP 487)
0808	Change tape. New reel = # 0987 FSP 471
0943	Trim tips. Miss 1 SP @ # 416
1135	EOL 201 W. LSP 356 LA-area 2. 81.6 miles this line
1200	Haul in gear - calibrate fathometer - u/w to Cameron, LA.



INTERSEA RESEARCH CORPORATION

Boat Amarillo

DAILY OPERATOR LOG

Client USGS GM 18930 Area Louisiana Block _____ Date 9-27/9-28-80

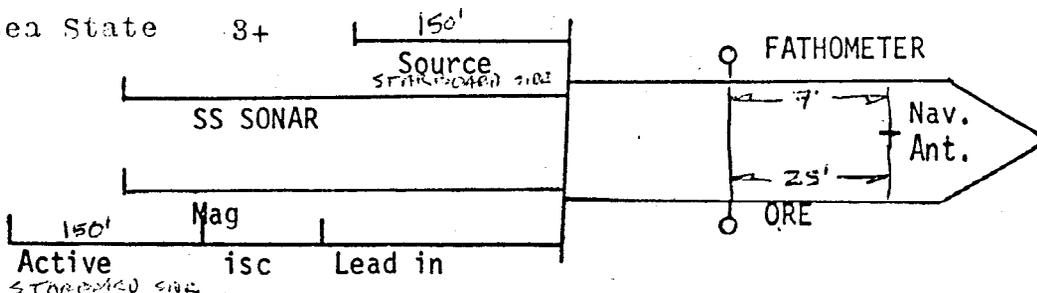
Time	Remarks
1300	Attempt contact via marine operator w/ C. Williams, IRC Houston and San Diego, and R. Ashley --- no contact made.
1710	Tie up @ Shell fuel docks Cameron, LA.
1800	Onload 5241 gal. fuel and \$90.00 groceries.
1830	Telephone to P. Horrler. Paul says to stand by for good seas before attempting to shoot line 327.
1850	Telephone to J. Donovan in Corpus Cristi, Jack gives me specs . for shooting line 327. Says Sea Raider shooting the same line.
2310	Red Black (Lorac) informs he would like to wait for 3 SAT passes to calibrate LORAN C before leaving docks.

2400 Standing by for LORAN C calibration. Total line mileage today= 64.2 sm.

*****9-28-30*****

0250	Cast off lines, u/w to line 327A. LA-area 5
0730	Deploy gear. ORE @ 20' , source re-mobed to starboard side 20' aft.
0807	BOL 327A. LA-5/2 FSP 546. Sea state 2.
1145	Trim tips. Miss 1 SP @ 422
1200	Watch change. Sea state 3+
1215	Changed Tape #0989 FSP-405
1510	Tremed Sparker Tips @ SP.309
1627	Changed Tape#0990 LSP-267 FSP-266
1745	Changed Range On Fathometer From 0-110 TO 100-210
1755	Trimed Sparker Tips At SP.-217

1800 Watch Change Sea State 3+

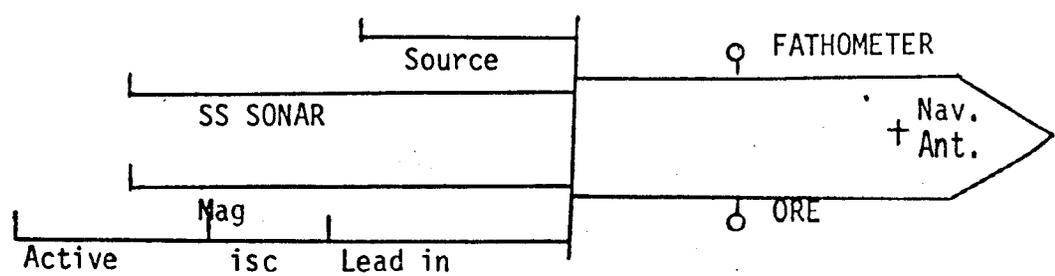


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Boat Amarillo
 Client USGS GM 18930 Area Louisiana 5/2 Block _____ Date 9-28/9-29-80

Time	Remarks
2039	Change tape. New reel =# 0991, FSP 122
2110	Trim tips. Miss 1 1/2 SPs @ 104. Change tow geometry - sparker now off starboard side, 150' aft, approx. 37' from hydrophone.
2119	SP 100 - now leaving area 2 shooting south - continueing line 327A.
2300	Pass Sea Raider shooting north @ SP 39 - slight interference on records.
2310	Slowing due to excessive traffic on line.
2315	Avoiding rig - 190 yds. off line.
2400	Watch change. LSP of day = # 009. 101.7 statute miles today. Trim tips.
0035	Changed range On Fathometer from 200-310 To 300-410
0050	Changed Tape#0992 LSP- -20 FSP- -21
0135	Changed Range On Fathometer 300-410FT. To 0-110FATH.
0117	Changed Event Mark To Manual On Fathometer
0155	Shifted ORE Delay To 1x2& Sweep Speed T0500 Ms.
0205	Changed Range On Fathometer From 0-110 To 100-210 Fath. At SP.-66
0219	EOL-327A. South LSP -74 Trimmed tips
0253	BOL-327b. NORTH FSP. -74
0315	Changed Range On Fathometer From 100-210 To 0-110 FATH.
0520	Changed Fathometer Roll At SP.7 - FSP.-12. New roll = # 12
0543	Trimed Tips At SP.26
0548	Changed Range On Fathometer From ^{FATH} 0-110 To 200-310 FEET
0600	Watch Change.
0915	Trim tips. Miss 1 SP @ 149



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

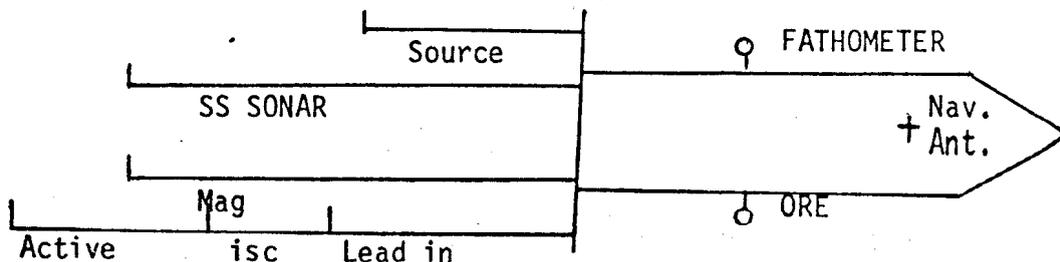
Boat Amarillo
 Client USGS GM 18930 Area Louisiana 2 Block _____ Date 9-29-80

Time	Remarks
0920	Radio contact w/ Houston base instructs us to shoot 10 miles into LA-area 5 before cutting off line 327B.
0945	Event mark closure problems from navigation. Miss SPs 164 to 166
1200	Watch change
1215	Trimed Tips Missed 1 SP. At 251
1350	Changed Tape#0995 LSP-306 FSP-307
1539	Trimed Tips Missed 1 SP. At 366
1658	EOL-327B. NORTH LSP-412 9-29-80
1700	Haul in gear, bar check fathometer. U/W to Freeport, TX.

*****9-30-80*****

35 Tie up to docks, Freeport, TX.
 Vessel presently with 5000 gal. of fuel, and 133 gal. of lube oil.

J. E. Shannon Capt



M/V SEA RAIDER DAILY OPERATOR LOGS

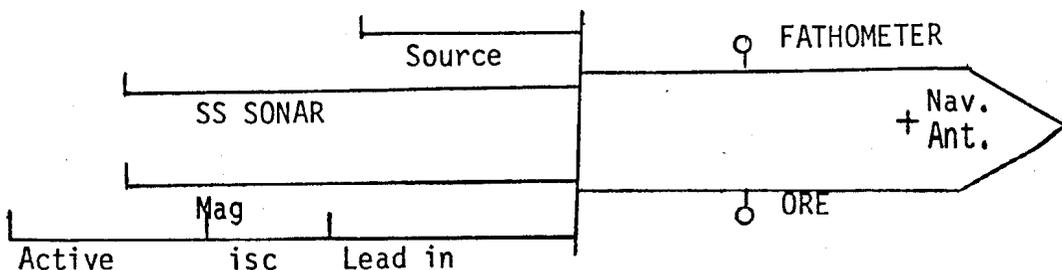
Sea Raider

INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Client USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 8-27&28&29-80

Time	Remarks
1030	Do ships laundry, shop for groceries and misc. ship needs
2100	U/W for work area 4 Intersea project #4081; relief for Bob Fryer - Walter Bear; additional IRC crew, Jeff Stewart-Geologist. 8-28-80
0600	Capt. informs J. Donovan that ships battery problems et al necessitate 2 hr. run to Freeport for repairs
0745	Radio Houston CH. 2 ships situation; material to fix El Paso will be at dock at 0830
0900	Arrive Freeport pier- no one there.
1030	Working on constant voltage battery charger; 2 hr. job.
1230	Work not completed yet.
1400	Informed of new boat "Sea Raider" at Sabine Pass, transfer gear there.
1600	Still working on wiring system on El Paso
1800	Still working; decide to bring on 10 amp charger aboard to be able to get to Sabine Pass; Sailing with Capt., Eng., and cook
1830	U/W Sabine Pass to transfer equipment at Offshore Salvage and Diving
2300	U/W Sabine Pass 8-29-80
0710	Docked at Diving pier Sa bine Pass; Sea Raider not here yet.
0745	Capt. (Fred) will not allow any equipment to be removed from El Paso until clearance from Steve or Ed from his office
0800	Land line to Houston - payment will be made by 1000 local; set crain for removal of doghouse and sparker shack at 1300.
1300	Crain alongside
1500	All Intersea equipment off; LORAC not off yet.
1530	El Paso back deck weld spots ground and painted
1600	LORAC not off yet
1615	Sea Raider alongside; loading Intersea Equipment

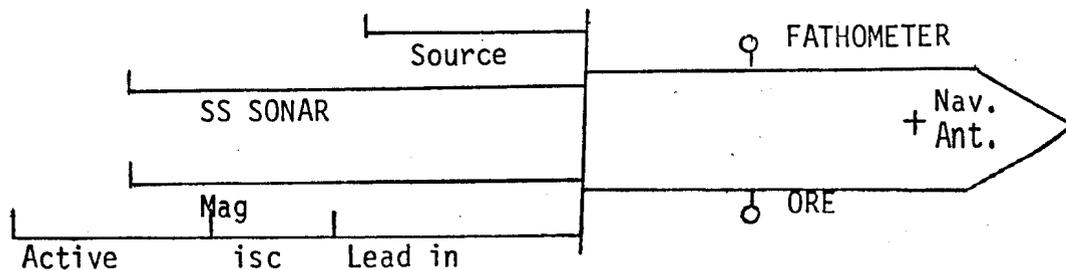


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

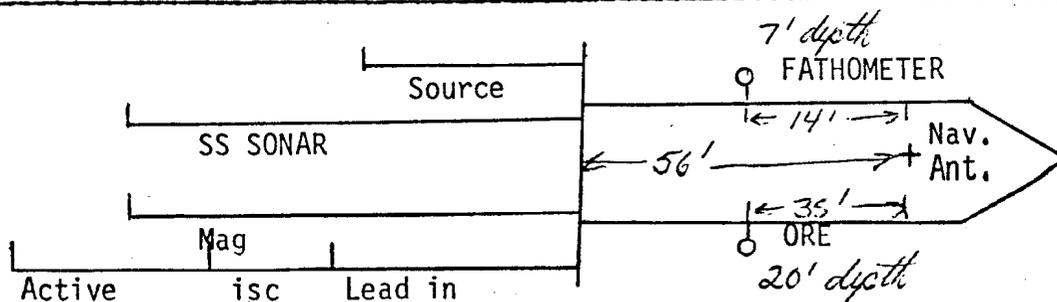
Client USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 8-29,30-80

Time	Remarks
1830	All Intersea equipment aboard Sea Raider; LORAC arrives at pier.
2030	LORAC gear off El Paso
2045	El Paso U/W to Freeport.
2100	Welders through.
	8-30-80
2700	Checking out equipment, running cables.
0800	Ships 75KW generator down- called repairman; owner also called
0815	LORAC can't fit gear on bridge; go buy deck house, airconditioner, and lumber for shelves.
1030	LORAC puts gear on bridge; returned house, kept airconditioner
1500	Intersea ready to go
1515	LORAC still has problems
1600	Electrician working on hookup for LORAC power
1615	LORAC down; have to drive to Houston to get new equipment
1900	Diesel mechanic aboard for 75 KW generator; informed Capt. it would take 7-8 hrs. to fix.
2115	LORAC people back from Houston and install new gear
2300	Houston teck departs for Houston; gear OK
2345	75 KW generator still down



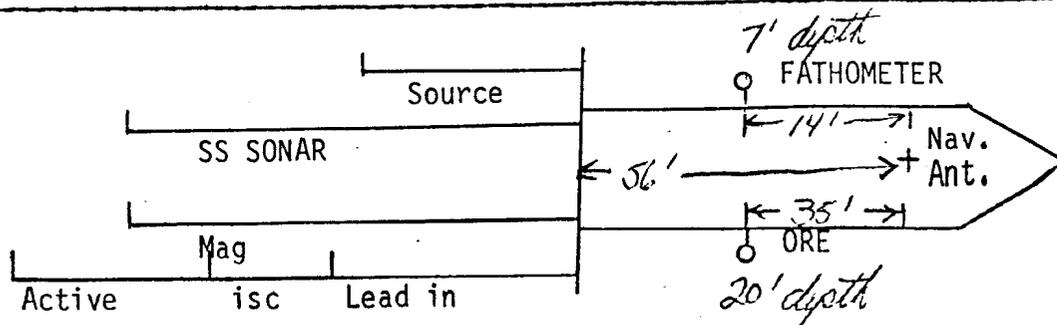
INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGClient USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 8-31-80

Time	Remarks
0100	75 KW generator almost ready
0200	Checkout run for generator - NO GO; governor problem
0300	LORAC computer down
0900	LORAC and 75 KW generator still down
1230	LORAC teck a board with a nother set of new gear
1400	LORAC on line ; all equipment up
1515	Diesel fixed
1530	U/W calibration area
2000	Arrive calibration area
2200	Calibrated - LORAC equipment up
2215	Streaming all Intersea gear for checkout
2230	Bar check on 731 fathometer
2245	U/W at 5 knots to calibrate Ore, tape recorder, sparker, fathometer
2345	Heading for SW corner of block 4 USGS - Intersea project #408†



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGClient USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 9-1-80

Time	Remarks
0100	ORE and tape recorder OK
0200	Still tuning up mini sparker
0300	Sparker OK; one 4100 recorder down
0430	Weld parted on 731 fathometer, forward stay parted; lost all hardware and mounting
0445	40 KW generator down, fuel pump gave up; have spare aboard
0500	U/W to cameron, La. Industrial Marine Service dock for: new 731 mount to be built and send for parts
0900	At dock; contact Houston; C. Williams having new fathometer head flown to Cameron by sea plane.
0915	Designed new fathometer head mount, having Industrial Marine Service build it.
0930	Capt. informed J. Donovan 4 in. line in screws while docking
1000	Call Diving service to cut line off; cleared it with Mr. Denco ship will pay
1300	Sea plane arrives with 731 fathometer head
1530	Welders finished with mounting for fathometer
1600-	U/W to SW corner of block 4 and recalibrate LORAC
1930	Calibration complete - 9 miles from block 4; streaming equipment for final checkout
2000	ONAN down; change filters; water in fuel pump bowl
2030	ONAN up
2100	All systems up
2200	Heading for SW corner of block 4

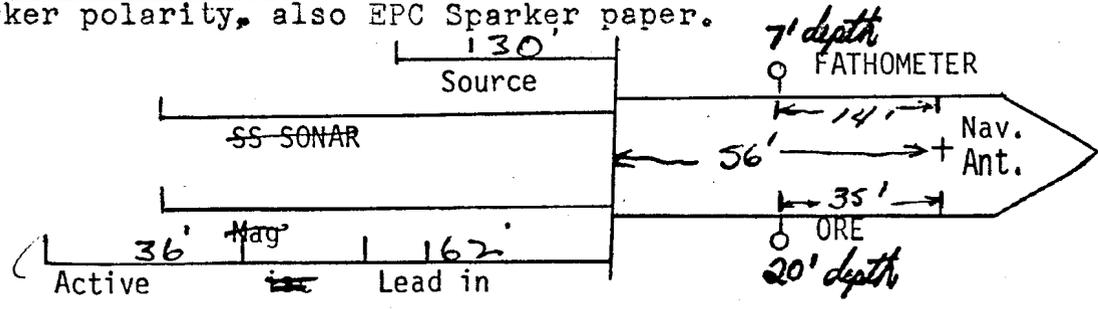


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Client USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 9-1-80 & 9-2-80

Time	Remarks
0312	BOL Louisiana 4-200 W FSP 357
0400	Last SP for 9-1-80 was SP330. 9-2-80
0315	Circle-missed over 1 SP while reversing Sparker tips; Last good SP 234
0348	Resume line at SP 235A
0600	Change watch- Walt on.
0605	Abort shooting ONAN generator out
0630	Water in fuel line of generator
0730	Change watch - Jeff on
0735	Abort shooting - Sparker out.
0745	Trim Sparker and change polarity
0800	Sparker in water but not shooting; checking power supply and for short
0900	Radio Houston CH.2; no contact
1000	Radio Houston CH.2; no contact
1000	Radio Houston CH.2; contact, change call times to 1000 and 1500
1045	Sparker fixed; resume line on SP 156A
1050	Fix Sparker echo on ORE record so that its trace is level.
1100	Change Stylus on ORE.
1215	Change tape; start reel # 003; last SP on reel #002 is SP108.
1234	EOL La. 4 200-W LSP 99
1235	Change Sparker polarity.
1305	Change stylus on Sparker, fathometer paper, direction of stylus spin. and Sparker polarity, also EPC Sparker paper.

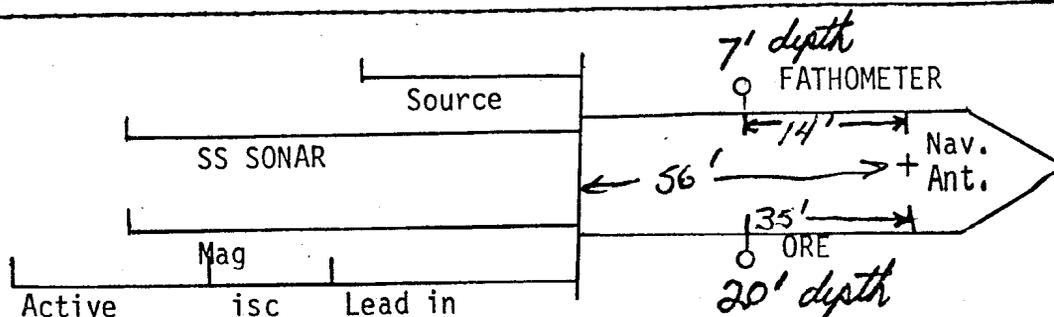


INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGClient USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 9-2&3-80

Time	Remarks
1325	Bar check for fathometer 56 34 1/2 2
1410	BOL La. 4-302-N FSP 100
1800	Reverse Sparker tips at SP 227-229
1817	Change tape to reel #004 at SP 237-238
1820	ONAN generator failed - circle at SP 238, restart at SP 236, last good SP was SP 237.
1845	Change watch; Jeff and Walt on
1920	Restart line 302N at SP 236A
2141	EOL La.-4-302N LSP 313 note: SP 285-313 double timing lines
2145	Trim Sparker; change stylus on ORE; reverse stylus on both ORE and Sparker for south line.
2256	BOL La.-4-303S FSP 312
2257	Fathometer zeroing adjustment
2320	Circle due to EPC stylus belt problems. Last good SP was 305.
2359	Circle due to Lorac nav. problem.

9-3-80

0012	Resume line La-A4-303-S at SP 305A.
0303	Changed to tape reel #006 at SP 207
0335	Reverse Sparker tip polarity at SP 188-186
0435	Change stylus belt on ORE EPC at SP 154
0607	EOL La.-4-303S LSP 99
0610	Change watch: Jeff and Walt on
0612	Shut Down ONAN to change filter and refuel
0613	Trim Sparker tips



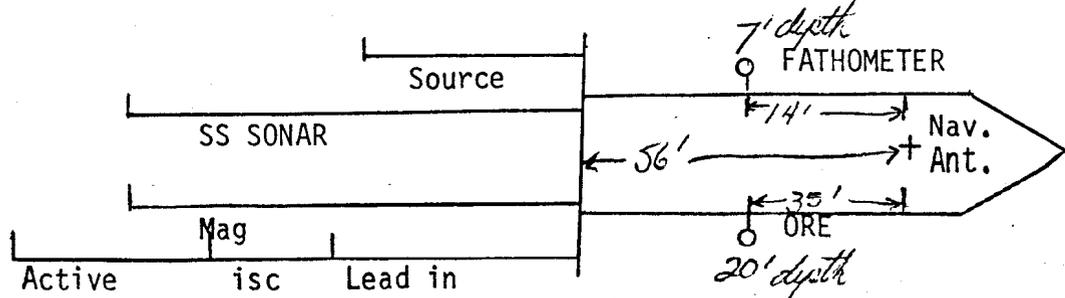
Sea Raider

INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

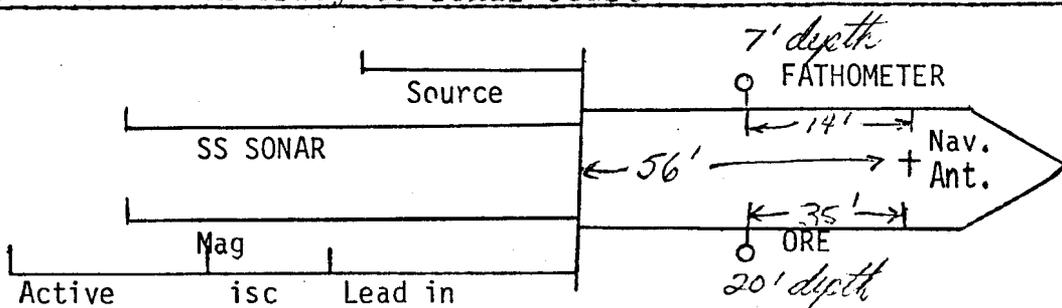
Client USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 9-3-80

Time	Remarks
0733	ROL La.-4-304N FSP 100
0738	ORE problem; circle to SP 100
0806	Restart line 304N at SP 100A
0820	ORE paper Change
0825	ORE timing line problem; last good SP 107; Change ORE stylus
0927	Restart line 304N at SP 105A
1006	Change tape to reel #007 line La.-4-304N FSP 127
1025	ONAN generator out; LORAC down; last good SP 135
1040	Contact Houston- request misc. parts; Houston changed radiocall # to Industrial Ch.#1 WQC-214 #2
1137	ONAN and LORAC up; restart line La.-4-304N at SP 134A
1130	Bar Check fathometer
1220	Change EPC paper on Sparker.
1230	Swap Sparker leads a t SP 160-162
1255	Change fathometer paper at SP 172; starting roll #3.
1311	ONAN generator failed at SP 184
1420	Cannot repair ONAN generator; retrieving outboard gear. Contacted Houston and new generator will meet us at Cameron, La.
1430	Transit to Cameron, La.
1930	Arrive Cameron La.
1945	IRC shore support (Steve) arrives
2000	Exchange generators: Steve takes old one and new one from ElectricRental Systems Inc., 1500 Fulton St., New Iberia, La.
2100	Welders Finish 70560
2200	Depart Cameron La. for block #4.



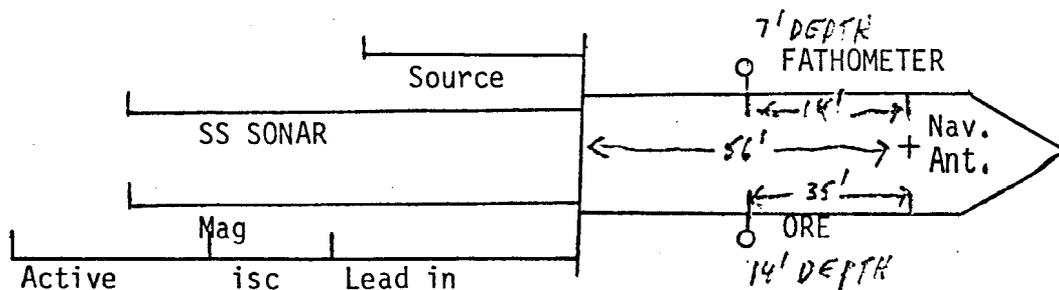
INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGClient USGS CM 18930 Area Louisiana Area 4 Block Area 4 Date 9-4-80

Time	Remarks
0115	Calibrate LORAC; Continue to block 4
0300	Deploying out-board gear
03 05	Bar check fathometer at 40'
0315	New ONAN failed
0330	Trim sparker
0400	ONAN generator repaired, replace fuel filters; Begin deploying new streamer and sparker for tests.
0450	Begin test run at 5 knots with 30' offset.
0545	Complete test line, retrieve test streamer
0600	All gear deployed; Heading for line 304N
0705	Resume line La.-A4-304N at SP 182A
0715	Circle at SP 187 due to EPC malfunction
0800	Resume line 304N at SP 182A
0801	Change watch, Jeff and Walt on.
0954	Circle at SP 238 so to; Trim sparker, change polarity, put new tape reel #008 on recorder, rewind reel #007, clean EPC.
1020	Contact Houston; USGS does not approve of data completed.
1030	Bring in all gear; last good SP is SP 238 on line 304N.
1045	U/W for Sabine, Offshore and Diving Salvage marine dock
1400	Arrive Sabine marine dock
1420	Contact Houston via land line. Standby for USGS rep. and Jose Gomez
2330	Jose Gomez and Jerry McNaboe Aboard
9/5/80	
0730	Tropical storm Denese - Underway to Texas coast



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGClient USGS-GM-18930 Area Louisiana Area 1 Block Area 1 Date 9/5/80

Time	Remarks
0900	Rain and wind
1000	Standby for weather and USGS rep.
1200	Contact Houston - Stand by
9/6/80	
0800	Standing by for weather and UAGS Rep.
0830	Contact Houston - sending tapes and data back - spending day cleaning up.
0900	Loaded groceries on board.
9/7/80	
0930	Underway to work area - heading for deep water of Area 1 will transfer USGS rep. to M/V Sea Raider when possible.
1030	Contact Houston chan. 2 - Houston request meet M/V Amarillo at East Cameron 97 to transfer our Del Norte amplifier.
1045	Radio Amarillo - no contact.
1100	Radio Amarillo chan 16 - no contact
1115	Radio Amarillo chan 16 - no contact.
1130	Houston requested we monitor chan. 1
1145	Radio Amarillo chan. 1, 2, and 16 - no contact
1200	Radio Houston - no contact
1230	Radio Houston chan. 1 - no contact.
1300	Radio Houston chan. 1 - no contact
1330	Contact Houston - Del Norte and Jose Gomez to transfer to Amarillo

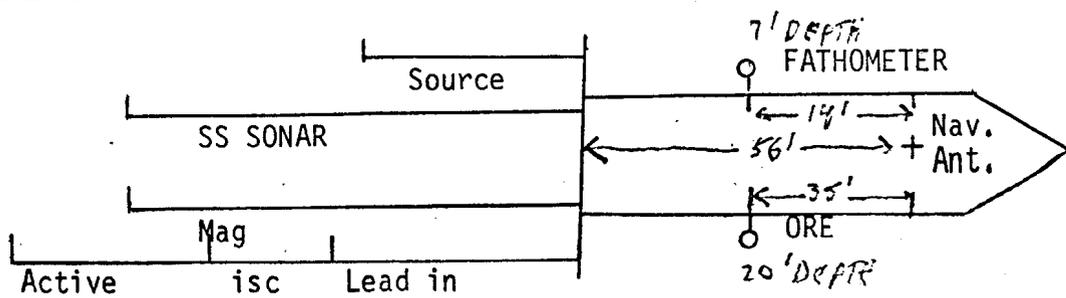


INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Client USGS-GM-18930 Area Louisiana Area 4 Block Area 4 Date 9/7/80

Time	Remarks
1330	Amarillo Underway lat. 29 deg to South
1500	Met Amarillo - transferred Jose Gomez and our Dal Norte
1515	Transfer complete - standing by at 29:08 - 93:15 deg.
1520	Radio Houston - no contact
1525	Contact with KWX 994 unit 16 Cameron, La. - Requested land-line call to Houston with progress rep ort.
1600	Radio Houston - no contact.
1800	Standing by
2100	Amarillo and Sea Raider in contact - USGS still not satisfied Amarillo to Galveston - Sea Raider to follow - will dock at pier 14 or 15 City dock.
2110	Underway to Galveston, Tex
9/8/80	
0430	Arriver Gaveston City dock pier 18.



INTERSEA RESEARCH CORPORATION

M/V Sea Raider

DAILY OPERATOR LOGClient USGS-GM-18930 Area Louisiana Block Area 4 Date 9-10-80

Time _____ Remarks _____

Wednesday Sept. 10, 1980

0200 Main generator down; #2 generator in bad shape. Must return to Galv.

0445 Arrived dock 18, Galveston

0730 Land line to Houston: told to fix generator and stand by.

1100, Dinko generator man aboard.

1530 Generator failed load test.

1545 José Gomez aboard to fix deñ Norte etc.

1600 Set sailing time for 1800

1800 Generator up - LORAC net green side down, possible interference
from large dock-side crain.

1810 U/W calibration area off Galveston.

Thursday, Sept. 11, 1980

0030 Deploying gear - setting up.

0300 Head for line

0334 BOL LA-A4-305N FSP 348

0700 Reverse polarity on sparker tips at s.p. 443

0710 S.P. 454 - Change ASP low band filter from 300 Hz to 200 Hz

Tape format; ch. 1 = 6.4 KHz

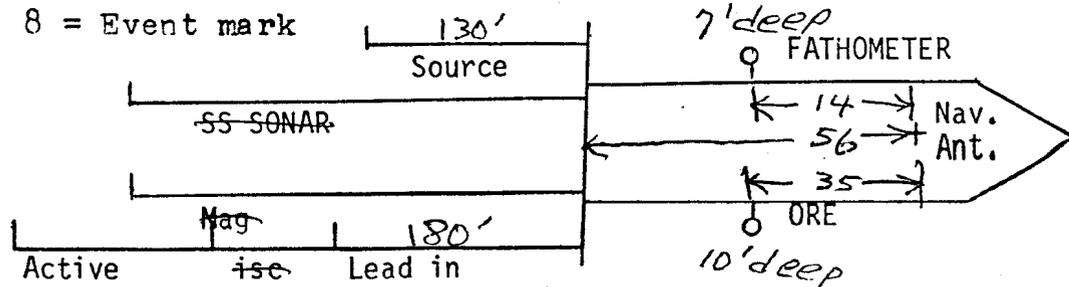
ch. 2 = ORE data

ch. 3 = Sparker data

ch. 5 = Sparker key pulse

ch. 6 = ORE key pulse

ch. 8 = Event mark



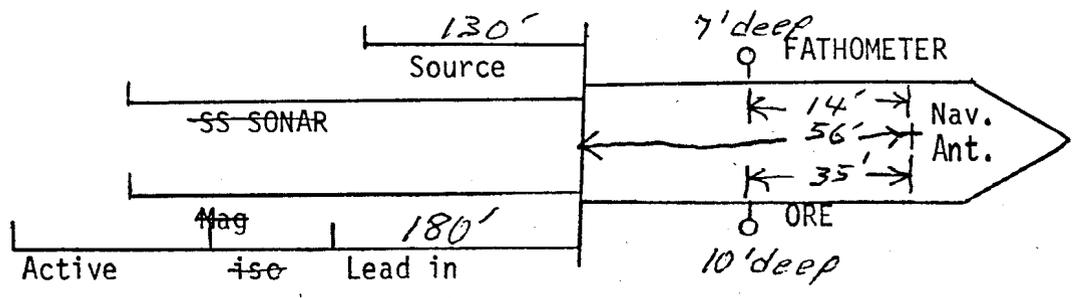
INTERSEA RESEARCH CORPORATION

M/V Sea Raider

DAILY OPERATOR LOG

Client USGS GM-18930 Area Louisiana Area 4 Block Area 4 Date 9-11-80

Time	Remarks
0935	Change speed to 4.5 knots to avoid jack-up rig crossing bow.
0937	Back up to speed 5.5 knots
0950	EOL LA-A4- 304-S LSP 561 LINE 305 NORTH
1015	Trimmed sparker tips
1130	Circle - sparker malfunction; contactor burned
1240	Heading for line
1254	BOL LA-A4-304-S FSP 506 560 (on record) 560 213
1348	Change paper on sparker
1539	Change polarity on sparker at s.p. 469
1600	Change low band filter from 200 Hz to 300 Hz at s.p. 457
1800	Changed watch - Sea State 0
1845	Changed Stylus on ORE EPC
1901	E.O.L. USGS-La-A4-304S LSP 347
2034	BOL USGS-La-A4-306N FSP 348
2230	Changed Stylus on ORE EPC
2320	Changed polarity on Sparker at sp 439
2325	Changed Stylus on Sparker EPC
2356	S.P. 462 - Changed low band filter setting from 300 Hz to 200 Hz
2359	LSP of day was 464; total line miles for 9-11-80 = 102.65 miles. ✓
Friday, Sept. 12, 1980	
0032	S.P. 482 - Changed reels on tape recorder.
0214	EOL at S.P. 538. Line terminated due to hazardous shooting conditions, (ie. under-water obstructions, and shallow water).

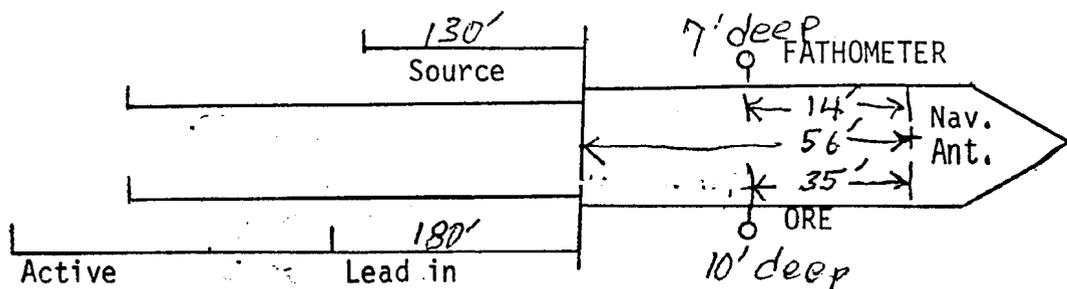


INTERSEA RESEARCH CORPORATION

M/V Sea Raider

DAILY OPERATOR LOGClient USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 9-12-80

Time	Remarks
0230	Sparker tips trimmed. U/W to line LA-A4-310-S - will shoot 307 to 309 during day-lite hours (to avoid shipping lanes at night).
0432- 0525	<i>BOL- LA-A4-310 SOUTH. FSP 591</i> Reduce speed to avoid vessel on line.
0537	Resume normal shooting speed.
0600	Changed watch - sea state 0
0727	Passed within 50 ft of two calibration towers between SP 505 and SP 501
0739	Changed Del Norte low cut filter to 300 Hz at SP 495
0817	Changed sparker polarity at SP 470
0900	Radio contact with Houston
0920	Radio contact with Amarillo
0957	Changed paper on ORE
1004	Radio contact with Houston - passed progress report
1006	Radio contact with Amarillo to coordinate data transfer
1058	Radio contact with Houston
1059	Radio contact with Amarillo
1143	ECL USGS LA-A4-310-S LSP 347 - Long line change to pick up line 307-N in daylight hours. Sparker tips trimmed.
1319	BOL LA-A4-307-N FSP 348
1653	S.P. 462 - Reverse polarity on sparker tips.
1656	S.P. 464 - Change Del Norte low cut filter to 200 Hz
1800	Changed watch - sea state 1



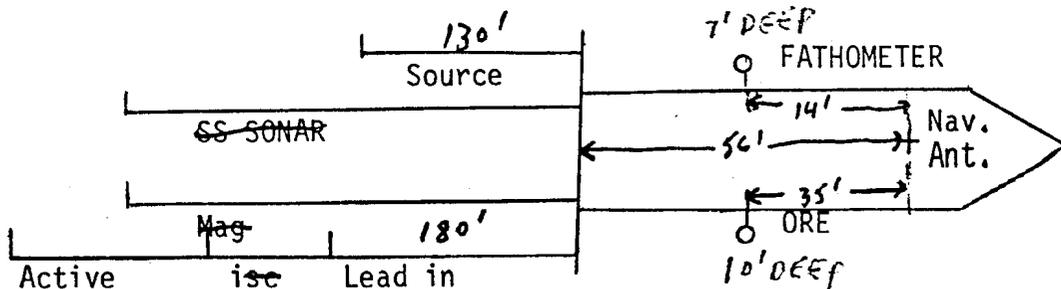
INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

M/V Sea Raider

Client USGS-GM-18930 Area Louisiana Area 4 Block Area 4 Date 9/12/80

Time	Remarks
1822	Changed paper on Sparker EPC
1828	Changed Stylus on ORE EPC
1854	Passed within 50 ft of oil rig at SP 532
2014	EOL USGS-La-A4-307N LSP 580
2025	Trim Sparker
2059	BOL USGS-La-A4-308S FSP 591
2300	Sparker EPC problem - will restart at SP 532
2341	RSOL La-A4-30 8S FSP 532A
2359	LSP of day = 523; Total line miles for 9-12-80 = 117.80 mi
Saturday, Sept. 13, 1980	
0125	S.P. 469 - Change Del Norte low band filter to 300 Hz.
0128	S.P. 467 - Reverse sparker tip polarity.
0459	EOL LA-A4-308-S LSP 347
0515	Sparker tips trimmed
0550	BOL LA-A4-309-N FSP 348
0600	Changed watch - sea state 1
	Radio
0810	Radio Houston - no contact
0817	Radio Houston - no contact
0820	Radio contact with Amarillo
0902	Changed Paper on ORE EPC
0917	Changed Stylus on ORE EPC
0928	Changed Sparker low cut filter to 200 at SP 467



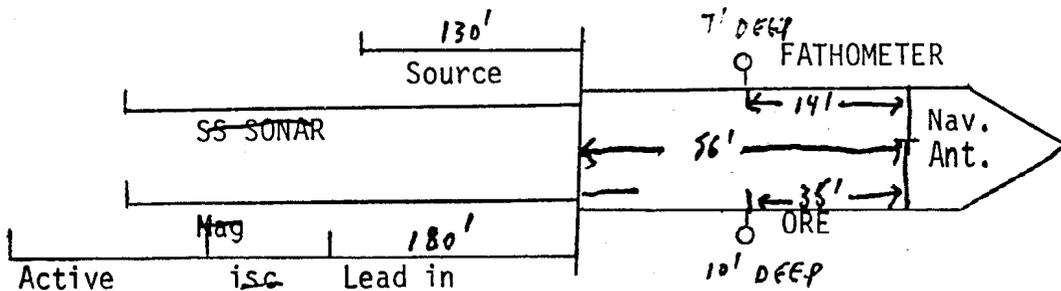
INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

M/V Sea Raider

Client USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 9/13/80

Time	Remarks
0934	Changed sparker polarity at SP 470
1115	Radio contact with Houston - passed progress report
1117	Radio contact with Amarillo
1211	S.P. 556 - Changed reels on tape recorder.
1310	EOL LA-A4-309-N LSP 592
1325	Trimmed sparker tips
1420	BOL LA-A4-311-s FSP 591
1730	Changed reels on tape recorder.
1800	Changed watch - sea state 1
1802	Changed polarity on sparker at SP 469
2050	Changed polarity on sparker at SP 371
2051	Changed paper on ORE EPC
2103	Changed stylus on sparker EPC
2134	EOL La-A4-311S LSP 347
2150	Trimmed sparker
2155	Onan down for maintenance - changed primary and secondary fuel filters and the oil filter
2315	Onan up
2330	Cleaned tap e head and rollers
2359	LSP of day was 347 of line 311S; Total line miles 9-13-80 = 126 32
Sunday, Sept. 14, 1980	
0015	EOL LA-A4-312-N FSP 348



INTERSEA RESEARCH CORPORATION

M/V Sea Raider

DAILY OPERATOR LOG

Client USGS GM-18930

Area Louisiana Area 4

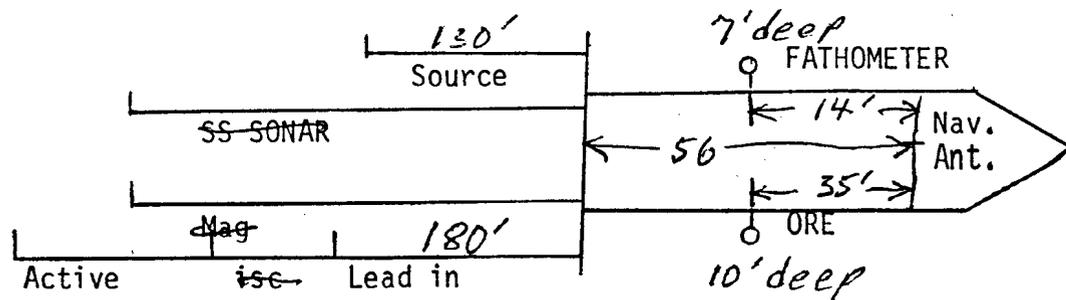
Block Area 4

Date 9-14-80

Time	Remarks
0257	S.P. 441 - Change stylus on ORE
0350	S.P. 470 - Switch polarity on sparker tips.
0433	S.P. 494 - Change Del Norte low band filter to 200,Hz.
0600	Changed watch - sea state 1
0738	EOL La-A4-312N LSP 592
0815	All gear aboard - underway to calibrate Lorac navigational system
0940	Calibrated at Sabine Bank Lamp - lane count o.k. -underway to

WORK area

1221	BOL LA-A4-313-S FSP 591
1318	S.P. 560 - Changed reel on tape recorder.
1551	S.P. 474 - Del Norte low band filter switched to 300 Hz.
1600	S.P. 470 - Sparker tip polarity switched.
1800	Change watch - sea state 1
1930	EOL La-A4-313S LSP 347
1945	Gear aboard - ran Bar Check on fathometer
2000	Gear streamed - heading for line
2031	BOL La-A4-314N FSP 348
2318	Changed Del Norte low cut filter at SP 438 to 200 Hz
2326	Changed Del Norte low cut filter to 300 Hz at SP 448
2359	LSP of the day was 460. Total line milage for 9-14-80 was 113.6
9-15-80 0030	Circle at S.P. 476 - sparker EPC malfunction. Will resume at s.p.465A
0050	Sparke tips trimmed.

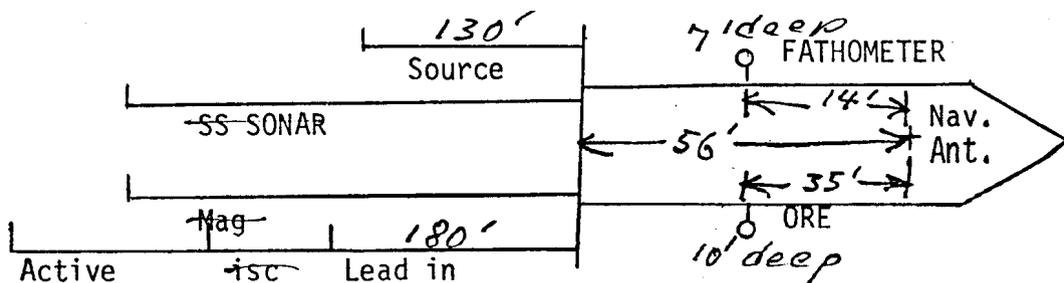


INTERSEA RESEARCH CORPORATION

M/V Sea Raider

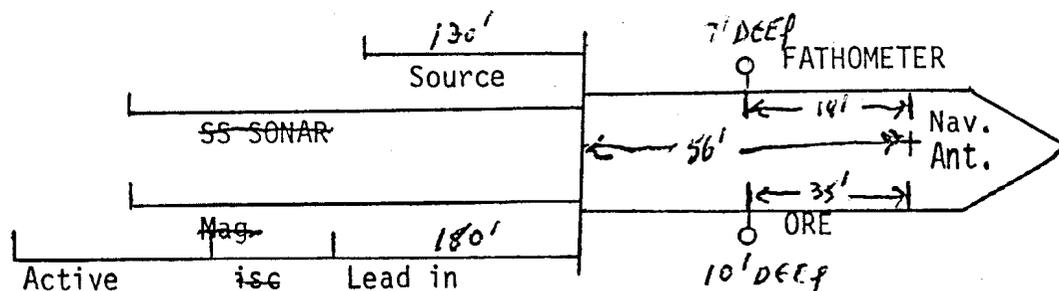
DAILY OPERATOR LOGClient USGS GM-18930 Area Louisiana Area 4 Block Area 4 Date 9-15-80

Time	Remarks
0148	RSOL LA-A4-314-N FSP 465A
0246	S.P. 496 - Switched Del Norte low band filter to 200 Hz.
0347	S.P. 528 - Reverse sparker tip polarity.
0542	EOL LA-A4-314-N LSP 592
0623	BOL La-A4-315S FSP 591
0730	Radio contact with Amarillo
0735	Radio Houston - no contact
0738	Radio contact with Amarillo
0743	Radio contact with Houston - passed progress report
0814	Changed paper on ORE EPC
0820	Radio contact with Amarillo
0935	Changed Del Norte low cut filter to 300 Hz at SP 472
0940	Changed sparker polarity at SP 470
1211	S.P. 383 - Changed stylus on ORE EPC
1312	EOL LA-A4-315-S LSP 347
NOTE: Data for line LA-A4-315-S is all void due to nav. error. Wrong coordinants were used.	
1551	BOL LA-A4-316-N FSP 348
1800	Changed watch - sea state 1
1815	Changed polarity on sparker at SP 470
1935	Lost SP 519 - Lorac computer out - will circle and RSOL at SP 516
2042	RSOL La-A4-316N FSP 516



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGClient M/V Sea Raider
USGS GM 18930Area Louisiana Area 4 Block Area 4 Date 9/15/80

Time	Remarks
2049	Changed Del Norte low cut filter to 200Hz at SP 519
2205	Changed paper on ORE EPC
2226	Lorac computer down - Multiple shot points
2310	RSOL La-A4-316N FSP 579A
2333	EOL La-A4-316N LSP 592
2359	LSP of day was 592 - Total milage for 9-15-80 = 71.21
Tuesday, Sept 16, 1980	
0026	BOL LA-A4-315-g FSP 591 (reshoot)
0351	S.P. 472 - Change stylus on ORE EPC
0355	S.P. 470 - Change Del Norte Low cut filter to 300 Hz
0357	S.P. 469 - Switched polarity on sparker tips.
0600	Changed watch, sea state 1
0614	Changed paper on ORE EPC
0719	EOL La-A4-315S LSP 347
0815	Radio contact with Amarillo
0820	Radio Houston - no contact
0825	Radio contact with Houston - passed progress report
0830	Radio contact with Amarillo
0905	BOL La-A 4-317N FSP 348
1132	Changed stylus on ORE EPC
1243	S.P. 472 - Changed Del Norte Low cut filter to 200 Hz.
1246	S.P. 473 - Switched sparker tip polarity.



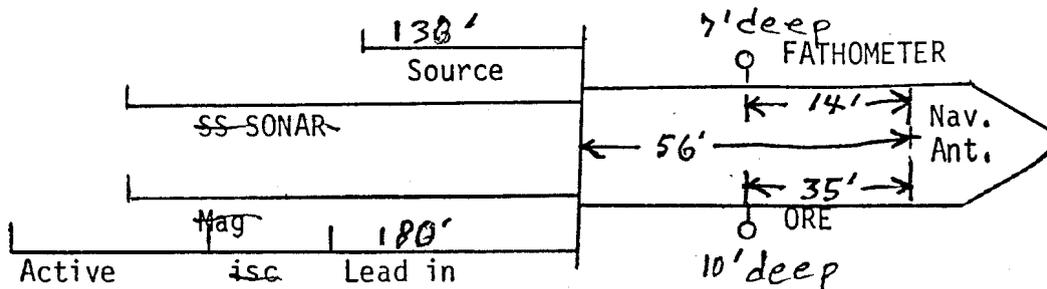
INTERSEA RESEARCH CORPORATION

M/V Sea Raider

DAILY OPERATOR LOG

Client USGS GM-18930 Area Louisiana Area 4 Block Area 4 Date 9-16-80

Time	Remarks
1440	S.P. 538 - Temp. lost auto pilot.
1445	S.P. 541 - Auto pilot back on.
1449	S.P. 543 - Abort line LA-A4-317-N - Nav. lost lane count due to ships generator malfunction. U/W to calibration point.
1630	Calibration complete; U/W to work area.
1730	Serviced Onan - do playbacks - trim sparker
1900	Gear streamed - heading for line
	RSOL
1919	BOL La-A4-317N FSP 541
2047	EOL La-A4-317N LSP 592
2143	BOL La-A4-318S FSP 591
2315	Off course to avoid a bouy
2359	LSP of day was 522 - Total milage for 9-16-80 = 105.5
Wednesday, Sept 17, 1980	
0103	S.P. 488 - Auto event marker malfunction, must mark manually.
0118	S.P. 480 - Auto event marker working.
0142	S.P. 468 - change paper on fathometer. Seas increasing
0143	S.P. 466 - Del Norte low cut filter changed to 300 Hz.
0145	S.P. 465 - Changed stylus on ORE EPC.
0151	S.P. 461 - Reverse polarity of sparker tips.
0519	EOL LA-A4-318-S LSP 347 Seas increasing to sea state 5; record quality decreasing. Must reshoot due to poor quality of sparker data.

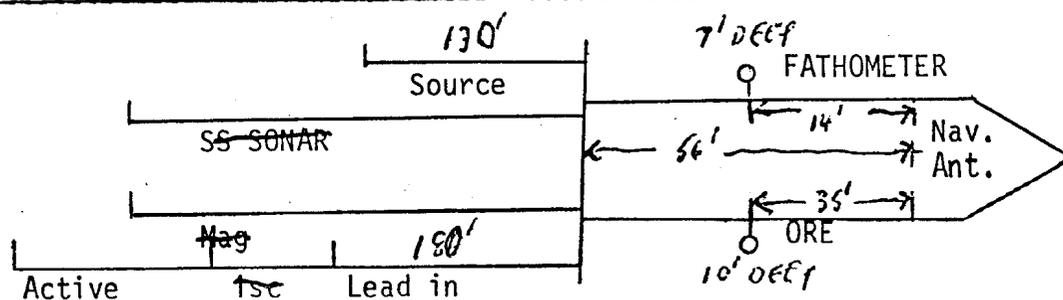


INTERSEA RESEARCH CORPORATION

M/V Sea Raider

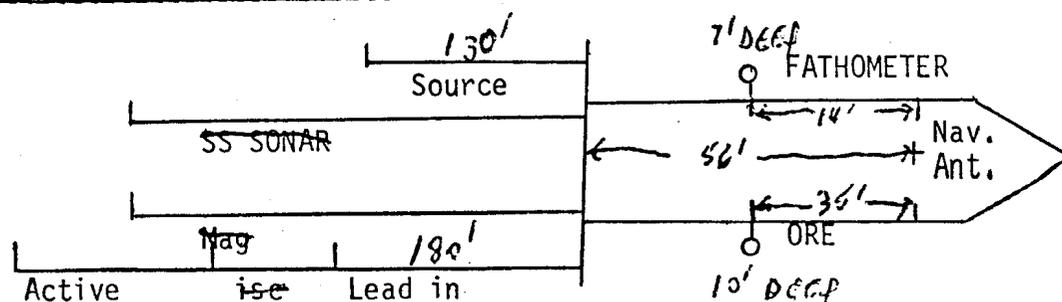
DAILY OPERATOR LOGClient: USGS GM 18930 Area Loiusiana Area 4 Block Area 4 Date 9/17/80

Time	Remarks
0555	Trim sparke tips - dep loy - head for neares E-W line. Noise generated by sea excessive on N-S lines.
0600	Changed watch
0731	BOL La-A4-199W FSP 357
0930	Radio contact with Houston on chan 1 - passed progress report
0954	Changed paper on ORE EPC
1055	Changed stylus on ORE EPC
1133	Changed polarity on sparker at SP 235
1554	EOL LA-A4-199-W LSP 99
1605	Allgear aboard - heading for line 189E
1800	Moniter Onan power from 15:00 to 18:00 - ok - changed watch
1830	Gear streamed - heading for line
1856	BOL -La-A4-189E FSP 100
1904	Cirsle ORE malfunction
1933	BOL- La-A4-189E FSP 100
2342	Changed sparker polarity at SP 228
2359	LSP of day was 236; Total milage for day was 107.76
Thursday, Sept. 18, 1980	
0300	Replace ORE EPC stylus belt at S.P. 308
0351	EOL LA-A4-189-E LSP 358
0355	Install new sparker tip array
0435	New sparker tip array installed



INTERSEA RESEARCH CORPORATIONM/V Sea RaiderDAILY OPERATOR LOGClient USGS GM-18930 Area Louisiana Area 4 Block Area 4 Date 9-18-80

Time	Remarks
0500	Circle due to drilling rig
0529	BOL LA*A4-188-W FSP 357
0600	Changed watch - sea state 2
0730	Changed paper on ORE EPC - lost SP's 294 to 287 - tape O.K.
0755	Radio contact with Amarillo
0800	Radio Houston - no contact
0810	Radio Houston - Houston unable to copy
0830	Radio Houston thru WLO - passed progress report
0832	Radio contact with Amarillo
0915	Changed sparker polarity at SP 237
1125	Navigation out - circle
1152	RSOL La-A4-188W FSP159
1317	S.P. - 112 off line due to bouy
1339	EOL LA-A4-188-W LSP 99
1350	Trimmed sparker tips
1537	
1557	BOL LA-A4-186-E FSP 100. Shot points 100 to 112 are south of line to avoid jetty.
1754	S.P. 179 - Passed by platform
1800	Changed watch - sea state 2
1943	Changed sparker polarity at SP 241
1947	Passed oil well on our port side at SP 244
2010	Changed paper on ORE EPC

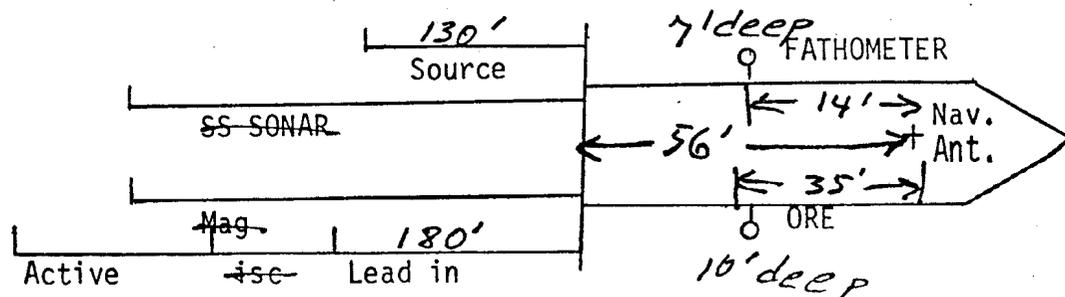


INTERSEA RESEARCH CORPORATION

M/V Sea Raider

DAILY OPERATOR LOGClient USGS GM-18930 Area Louisiana Area 4 Block Area 4 Date 9-18-80

Time	Remarks
2329	EOL LA-A4-186-E LSP 357. Retrieve streamer & sparker cable. Rondevous with M/V Amarillo to transfer data.
2359	LSP of day was 357 of line LA-A4-186-E: Total milage for 9-18-80 was 120.64
Friday Sept. 19, 1980	
0030	Transfer of data to M/V Amarillo, complete. Heading for line.
0100	Trimmed sparker tips.
0201	BOL LA-A4-319-S FSP 591
0256	S.P. 562 - Circle due to poor ORE data. Will pick up line at S.P. 570
0341	RSOL LA-A4-319-S FSP 570A
0554	Del Norte Filter switched to 300 Hz At S.P. 502
0600	Changed watch - sea state 2
0700	Changed sparker polarity at SP 470
0800	Houston calling - heavy traffic - unable to contact
0810	Radio contact with Houston thru WLO - passed progress report
0922	Changed paper on ORE EPC
1000	Weather report - N E winds in thunderstorm areas Texas to Florida Winds to turn to S E and S during the next 24 hours. Will increase to gusts of 55 MPH Sat morning with 10 to 12 ft seas.
1046	EOL La-A4-319S LSP 347
1110	All gear aboard - heading for new work area

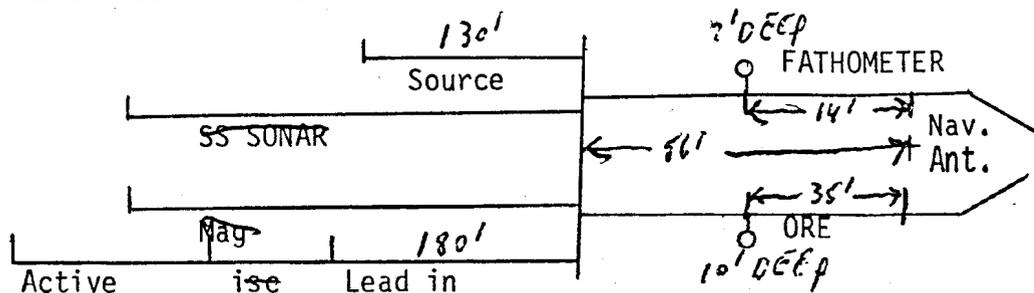


INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOG

M/V Sea Raider

Client USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 9/19/80

Time	Remarks
1435	Gear deployed - heading for line
1450	BOL La-A4-187W FSP 357
1452	SP 356 changed Del Norte filter to 200 Hz
1518	SP 336 Del Norte switch to 300 Hz
1800	Changed watch - sea state 1
1822	Changed sparker polarity at SP 230
1953	Aborted line - shrimp crossing course
2012	RSOL La-A4-187W FSP 179A Slowed
2018	Slowed to allow boat to cross bow
2021	Circle - boat crossing bow
2040	RSOL La-A4-187W FSP 179A
2225	Changed sparker polarity at SP 117
2254	EOL La-A4-187W LSP 99
2315	Trimmed spark er
2359	LSP of day was 99 of line LA-A4-187-W - Total line milage for 9-19-80 was 95.04
Saturday Sept. 20, 1980	
0036	BOL LA-A4-190-E FSP 100
0118	S.P. 125 - Change paper on ORE EPC
0411	S.P. 231 - Switched sparker tip polarity.
0645	Circle - sparker EPC problem
0715	RSOL La-A4-190E FSP 310



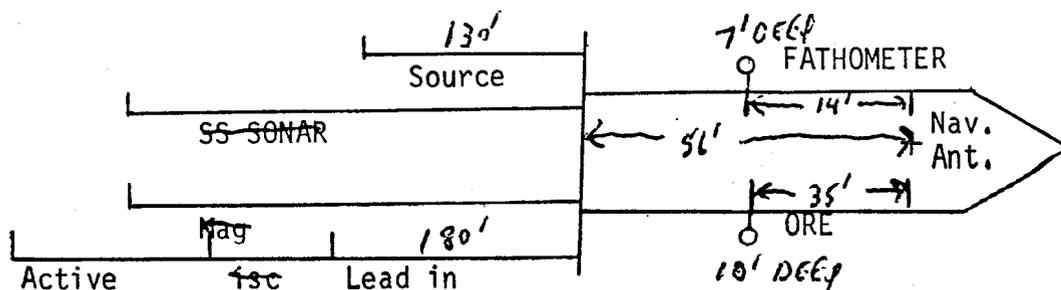
INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

M/V Sea Raider

Client USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 9/20/80

Time	Remarks
0820	Radio contact with Houston - passed progress report
0851	EOL La-A4-190E LSP 358
0920	All gear aboard - heading for northern line
1117	BOL La-A4-1 85W FSP 268
1224	S.P. 232 - Abort line: ORE EPC malfunction, will pick up line at shot point 239.
1245	Sparker tips trimmed.
1300	Radio contact with Randy Ashley in Houston regarding Del Norte filter settings. WE are to set the low-cut filter at 200 Hz in shallow water (ie. less than 45 feet) and 300 Hz in deep water (ie. greater than 45 feet). The high-cut filter is to remain at 1500 Hz.
1315	Radio contact with Amarillo. We will rendezvous with The Amarillo to exchange supplies.
1330	U/W to rendezvous with Amarillo
1440	Onan generator down - Nav. lost lane count.
1445	At rendezvous with Amarillo - Transfer supplies.
1520	Onan generator back up - primary and secondary fuel filters changed U/W to calibration point
1640	Arrived at calibration point
1658	Calibration complete - Heading for line LA-A4-191-W
1816	Arrived at work area - gear deployed, heading for line.



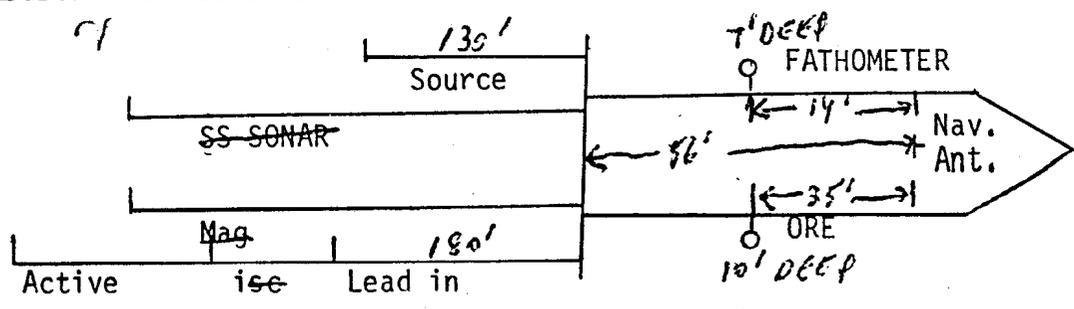
INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

M/V Sea Raider

Client USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 9/20/80

Time	Remarks
1824	ORE EPC problem
2002	EPC repaired - heading for line
2018	BOL La-A4-191W FSP 357
2022	ORE EPC blew fuse in 20 volt power supply
2058	RSOL La-A4-191W FSP 357
2145	Changed Del Norte low cut filter to 200 Hz at SP 331
2359	LSP of day was 256 of line LA-A4-191-W; total milage for
	9-20-80 = 74.81
Sunda y Sept. 21, 1980	
0133	S.P. 206 - Switched polarity of sparker tips.
0414	S.P. 197 - Changed stylus on ORE EPC.
0420	S.P. 122 - Changed stylus on sparker EPC.
0504	xxx EOL LA-A4-191-W LSP 99
0520	Trimmed sparker tips
0611	BOL La-A4-192E FSP 100
0800	Radio Houston - no contact
0813	Radio contact with Amarillo
1025	Changed sparker polarity at SP 230
1250	S.P. 307 - Change stylus belt on ORE EPC
1308	S.P. 316 - Off line to south to avoid vessel on line.
1313	S.P. 320 - Back on line.
1418	ORE EOL LA-A4-191-E LSP 358

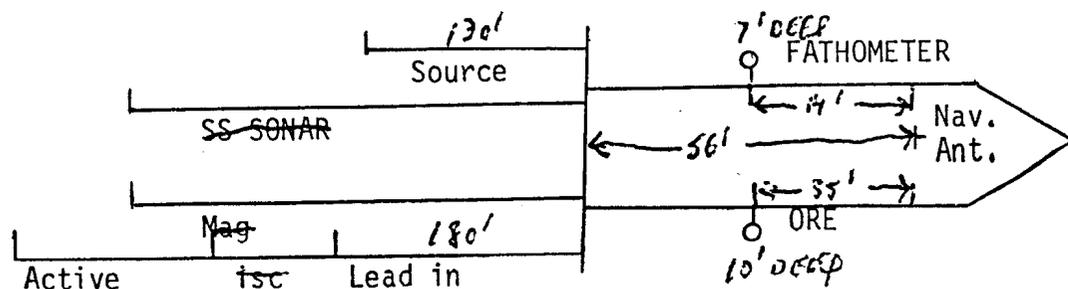


INTERSEA RESEARCH CORPORATIONM/V Sea RaiderDAILY OPERATOR LOGClient USGS gm-18930 Area Louisiana Area 4 Block Area 4 Date 9/21/80

Time	Remarks
1430	Trimmed sparker tips.
1507	BOL LA-A4-193-W FSP 357
1611	S.P. 322 - Changed Del Norte low-cut filter from 200 HZ to 300 HZ.
1800	Changed watch - sea state 2
1852	changed sparker polarity at SP 230
1939	Changed stylus on ORE EPC
1948	Changed Del Norte low cut filter to 200 Hz at SP 196
2236	EOL La-A4-193W LSP 99
2345	Trimmed sparker tips.
2359	LSP of day was 99 of line 193-W. Total line milage for 9-21-80 was 127.27

Monday Sept. 22, 1980

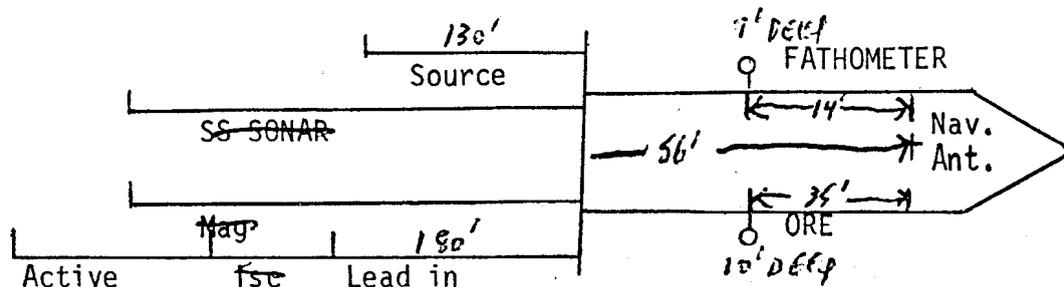
0004	BOL LA-A4-194-E FSP 100
0146	S.P. 156 - Changed Del Norte low-cut filter from 200Hz to 300Hz
0147	xxx S.P. 157 - Changed stylus belt on ORE EPC
0509	S.P. 272 - Switched polarity of sparker tips.
0600	Changed watch- sea state 2
0654	Changed stylus on sparker EPC
0739	EOL La-A4-195E LSP 358
0802	Radio contact with Houston - passed progress report
0833	BOL La-A4-195W FSP 357
0945	Lost power on Onan - circle - will pick up line at AP 322



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOG

Client M/V Sea Raider
USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 9/22/80

Time	Remarks
1 014	RSOL La-A4-195W FSP 322A
1113	Changed paper on ORE EPC
1119	Changed Del Norte low cut filter to 200 Hz
1132	Circle - Onan problem
1206	RSOL LA-A4-195-W FSP 280
1218	S.P. 274 - Abort line, nav. computer down.
1244	RSOL LA-A4-195-W FSP 275A
1303	S.P. 264 - Change stylus belt on ORE EPC.
1311	S.P. 262 - Abort line; nav. comp. down, replace card.
1406	Trimmed sparker tips.
1422	RSOL LA-A4-195-W FSP 265A
1522	S.P. 231 - Change Del Norte filter from 200 Hz to 300 Hz.
1650	S.P. 182 - Change paper on fathometer.
1656	S.P. 177 - Reverse sparker tip polarity.
1730	S.P. 156 - Change stylus on ORE EPC
1800	Changed watch - sea state 2
1809	Changed Del Norte low cut filter to 200 Hz at SP 134
1910	EOL La-A4-195W FSP 99
2002	BOL La-A4-196E FSP 100
2022	Circle - ORE EPC problem - will restart line
2049	BOL La-A4-196E FSP 100
2359	S.P. 203 - Abort line; ship in channel. LSP of day was 2 03



INTERSEA RESEARCH CORPORATION

DAILY OPERATOR LOG

Client USGS GM 18930 Area Louisiana Area 4 Block Area 4 Date 9-23-80

Time _____ Remarks _____

0359 (cont.) of line LA-A4-196-E, Total milage for 9-22-80
was 117.23

Tuesday, Sept. 23, 1980

0044 ~~RSOLKA~~ LA-A4-196-E FSP 202A

0049 S.P. 204 - Switched polarity of sparker tips.

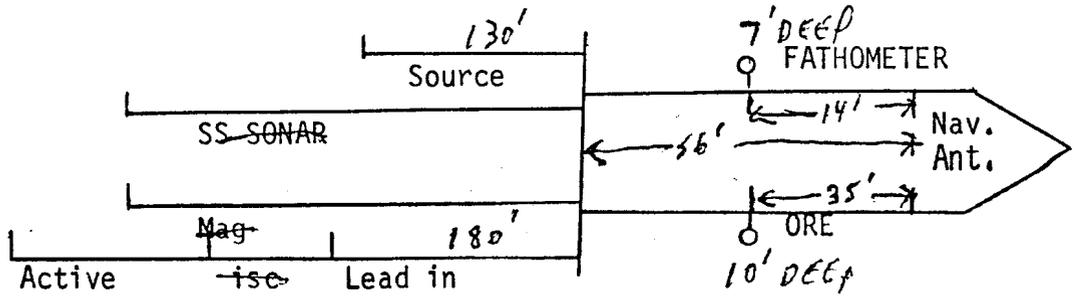
0805 Arrived

0331 SP 300 - broke off line to make ETA at Sabine, Tex

0343 All gear aboard - underway to calibration point

0500 Calibration complete - underway to Sabine, Tex

0805 Arrived Sabire, Tex



INTERSEA RESEARCH CORPORATION

M/V Sea Raider

DAILY OPERATOR LOG

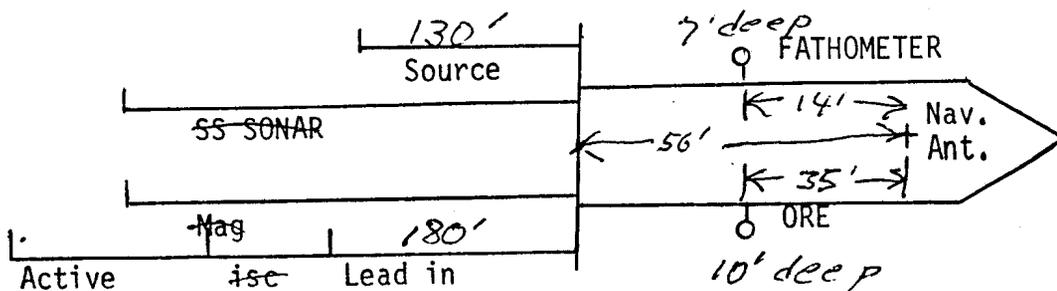
Client USGS-GM-18930

Area Louisiana Area 4

Block Area 4

Date 9-23-80

Time	Remarks
0805	Arrived at Sabine TX. Standing by for fuel. Dinko engineer aboard checking generator. Tack on fuel, water and supplies. Seismic crew change: Jack Donovan and Walter Bayer are replaced by Tom Harmon and Jim Windes. Danny Riggs is Aboard and will be transferred to the Amarillo.
0905	Depart Sabine TX.
0930 to 0940	Cal. LORAC. Stand by - working on ships' main engine.
Wednesday Sept. 24, 1980	
0030	U/W to work area (area 4)
0045	Gear deployed - heading for line.
0316	RSOL LA-A4-196-E FSP 098
0344	S.P. 214 - Circle. ORE EPC problems.
0410	Radio contact with Amarillo, will rendezvous with them to transfer Danny Riggs.
0430	All gear aboard - U/W to rendezvous
0735	Alongside Amarillo - Danny Riggs transfers to Amarillo
0740	U/W to work area
1044	Arrived at work area, deploying gear and working on same. ORE EPC not printing properly.
1150	ORE EPC up - heading for line
1200	Circle - ORE EPC down
1330	Heading for line

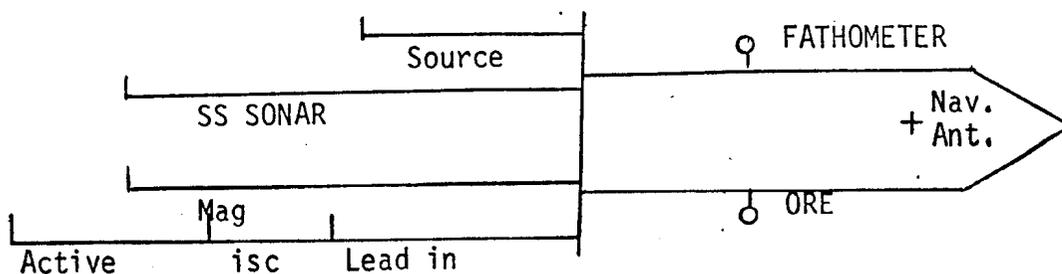


INTERSEA RESEARCH CORPORATION

M/V Sea Raider

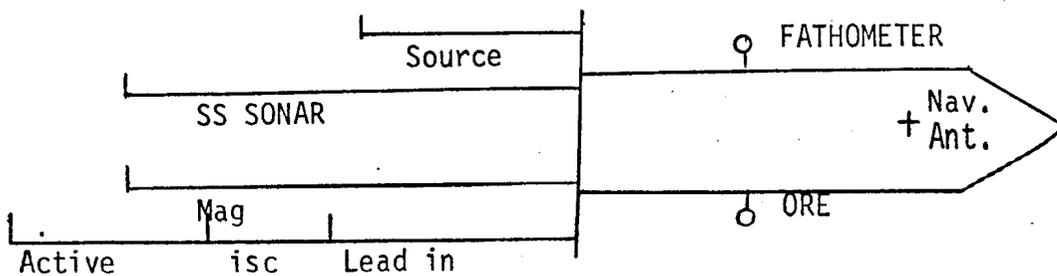
DAILY OPERATOR LOGClient USGS GM-18930 Area Louisiana Area 4 Block Area 4 Date 9-24-80

Time	Remarks
1426	RSOL LA-A4-196-E FSP 298B
1528	S.P. 330 - Reverse sparker tip polarity.
1613	EOL LA-A4-196-E LSP 358
1630	Trimmed sparker tips
1702	BOL LA-A4-197-W FSP 357
1823	EOT @ sp. 310 will cont. with sp. 309 on tape # 61
2115	Reverse sparker tip polarity @ sp. 203
2120	Changed stylus on sparker/EPC recorder @ sp. 200
2233	FOT @ sp. 158 will cont. with sp. 158 on tape # 62
2359	LSP of day was 105 of line LA-A4-197-W: total milage for 9-24-80 was 59.1
Thursday Sept. 25, 1980	
0008	EOL LA-A4-197-W LSP 99
0020	Trimmed sparker tips
0110	BOL LA-A4-198-E FSP 100
0148	S.P. 122 - Changed Del Norte Low-cut filter from 300 Hz to 270 Hz
0151	S.P. 124 - " " " " " " " 270 Hz to 250 Hz
0216	S.P. 140 - Abort line, sparker malfunction.
0255	Changed sparker trigger bank. Nav. computer down.
0308	Trimmed sparker tips.
0400	Nav. computer up - heading for line.
0422	RSOL LA-A4-198-E @ sp. 138-A
0445	Abort line Sparker malfunction



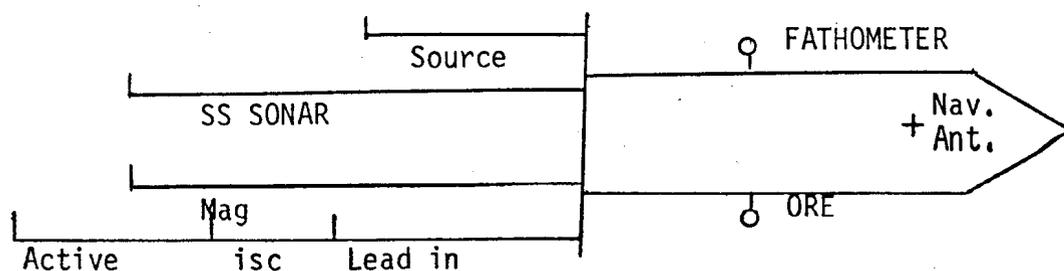
INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGClient USGS - GM 18930 Area LA-A4-4 Block Area-4 Date 9-25-80

Time	Remarks
0640	Sparker is working heading back to resume line
0708	Res-tart of line LA-A4-198-E @ sp. 138-A
0805	EOT @ sp. 169 will cont. with sp. 170 on tape # 63
0815	END of paper on fathometer @ sp. 175. SP. 176 will start on new rol
0915	Refilled the Onan with fuel.
1005	Changed stylus belt on ORE/EPC recorder @ sp. 234
1115	S.P. 267 - Trimmed sparker tips, missed 2 shot points.
1254	S.P. 321 - Changed stylus on ORE EPC.
1257	S.P. 323 - Reversed sparker tip polarity.
1358	EOL LA-A4-198-E LSP 358
1415	Trimmed sparker tips
1430	Add one quart oil to Onan gen.
1440	Head for line LA-A4-318 - reshoot.
1630	Nav. having problem getting on line
1741	BOL LA-A4-318-N FSP-348 Reshoot
1841	Circle for Navigation will resume line from beginning
1915	USGS LA-A4-318-N FSP-348 Reshoot
2115	EOT @ sp. 418 will cont. with sp. 418 on tape # 65
2135	Changed paper on ORE/EPC @ sp. 429
2140	Changed stylus belt on ORE/EPC @ sp. 432
2200	Circled for navigation will resume line @ sp. 443-A
2230	Trimmed Sparker Tips =



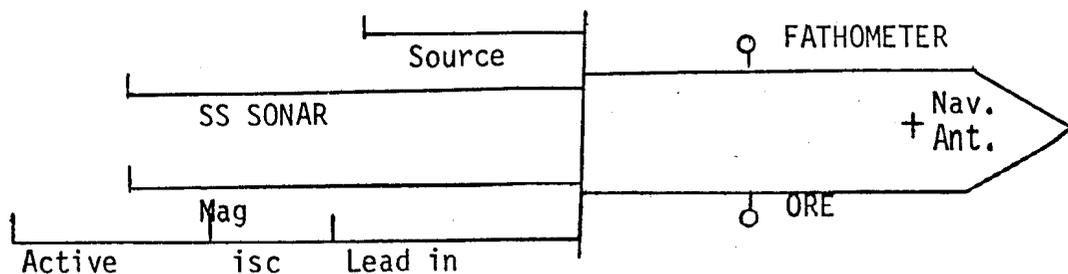
INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGClient USGS GM-18930 Area Louisiana Area 4 Block Area 4 Date 9-25-80

Time	Remarks
2336	Resume line LA-A4-318-N @ s.p. 443A Last good s.p. was 445
2359	LSP of day was 446 of line 318-N Total milage for 9-25-80 was 68.56
Friday, Sept. 25, 1980	
0052	S.P. 484 - Changed Del Norte low-cut filter from 200Hz to 225Hz.
0054	S.P. 486 - " " " " " " " 225Hz to 250Hz.
0101	S.P. 490 - " " " " " " " 250Hz to 275Hz.
0111	S.P. 496 - " " " " " " " 275Hz to 300Hz.
0117	S.P. 499 - Changed paper on sparker EPC
0135	Nav. down due to electrical storm. Last good s.p. was # 504.
0200	All gear aboard; U/W to calibration point.
0700	All gear has been deployed and were heading down on line
0736	Restart of line 318-N @ SP. 500A
0858	EOT @ SP. 547 will cont. with SP. 548 on tape # 66
1014	EOL USGS LA-A4-318N LSP-592
1126	EOL LA-A4-185-W FSP 249, continued from 9-20-80
1200	Change watch
1320	S.P. 174 - Reverse sparker tip polarity
1423	S.P. 140 to 125 - Off line to avoid platforms
1522	EOL LA-A4-185-W LSP 99
1540	Radio contact w/Houston. We are to shoot comparison line # 327 thru area 5 & 2 plus about 40 miles - shoot south then north.



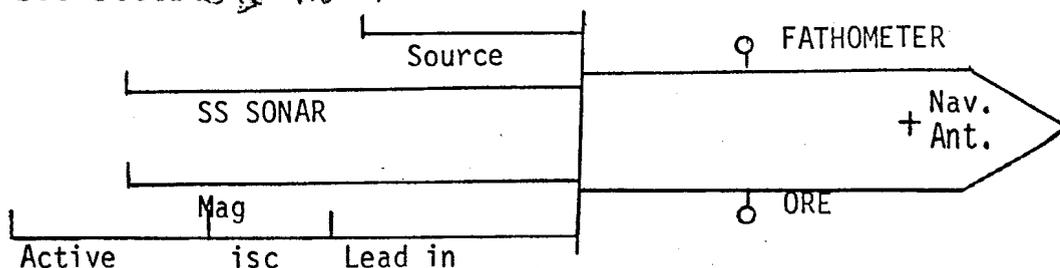
INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGClient USGS GM-18930 Area Louisiana Area 4 Block Area 4 Date 9-26-80

Time	Remarks
1545	All gear aboard. U/W to line 327.
2359	LSP of day was 99 of line LA-A4-185-W. Total milage for 9-26-80 was 28 miles.
Sat. Sept. 27, 1980	
0030	Arrived at work area - deploying gear.
0100	Gear deployed; heading for line.
0145	BOL LA-A5/A2-327-S FSP 100 (this is a test line)
0145 0155	Abort line 327-S Off line, will restart.
0311	RSOL LA-A5/A2-327-S FSP 100A
0430	S.P. 141, Change high-cut filter from 1500 Hz to 1400 Hz
0436	S.P. 145, " " " " " 1400 Hz to 1300 Hz
0443	S.P. 149, " " " " " 1300 Hz to 1200 Hz
0457	S.P. 157, " " " " " 1200 Hz to 1100 Hz
0513	S P. 166, " " " " " 1100 Hz to 1000 Hz
0518	S.P. 169, reverse sparker tip polarity.
0522	S.P. 172, Change stylus on ORE EPC
0533	Nav. lost lane count. Last good shot point was 175.
1042	Restart of line LA-A5/A2 line 327-S @ sp. 175
1428	Reverse sparker tip polarity @ SP. 291.
1432	Abort line, Note: Shooting into rough seas creating noise.
2222	Restart of line 327-S @ SP. 291
2359	LSP of day was 346



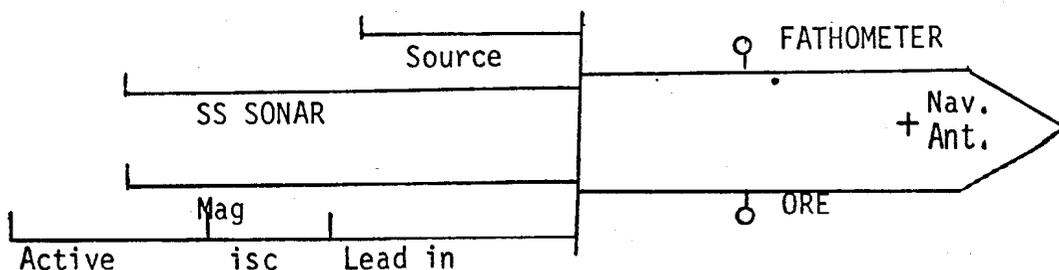
INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGClient USCGS-CM 18930 Area LA-45-2 Block _____ Date 9/28/30

Time	Remarks
0021	Changed paper on ORE/EPC
0040	Changed stylus on ORE/EPC SP. 3 67
0045	Changed paper on fathometer @ SP. 370
0046	Reversed sparker tip polarity @ SP. 370
0210	SP. 415 Nav. lost lane count-circled- last good SP. 408 Trimmed Sparker Tips, LEt Streamer cable out another 50 ft. offset now 100 ft.
0500	Circle on approach to line - nav. operator error
0603	Resume line 327-S @ SP. 406-A
0622	Hot @ SP. 416, will cont. with SP. 417 on tape # 70
0704	Circle for navigation @ SP. 438, will resume line back @ SP.406-B
0909	Restart of line 327-S @ SP. 406-B
0947	Switched pola-rity @ SP. 426
1223	S.P. 508 - Trimmed sparker tips, one shot point lost.
1300	S.P. 509 - Changed stylus on ORE EPC.
1344	S.P. 551 - Reduce speed for tug & barge.
1358	S.P. 558 - Resume speed.
1430	S.P. 575 - Reverse sparker tip polarity.
1435	S.P. 578 - Change stylus on ORE EPC.
1513	S.P. 597 - Change paper on ORE EPC.
1700	S.P. 657 - Trimmed sparker tips.
1837	ORE has been delayed to 250 ms. Depth of source 30 ft. There is now a $\frac{1}{8}$ sec record @ <u>sp-710-720</u> OF line 327-S



INTERSEA RESEARCH CORPORATIONDAILY OPERATOR LOGClient USGS-GM 18930 Area LA - Area 5-2 Block _____ Date 9/28/80

Time	Remarks
1854	Broke line off @ SP. 720 water depth increasing rapidly-will start line back to the north @ sp. 720
1945	BOL LA-Area-5-2 line 327-N FSP-720 6/8/8 Test line
1950	ORE record length is 500 ms, DEPTH of ORE 30 ft, .5 ms pulse length (FROM SP 720 - 703)
2020	AT sp. 702 we changed back to 250 ms
2100	Changed paper @ SP. 675 on EPC/Sparker
2145	Changed stylus belts on both EPC, S To head in north direction @ SP. 651
2154	EOT @ SP. 647, will cont. with SP. 647 on reel # 73
2207	Swithed polarity @ SP. 639
2359	LSP of day was 576 of line 327-N
Monday, Sept. 29, 1980	
0015	S.P. 569 - Trimmed sparker tips.
0140	S.P. 519 - Changed peper on ORE EPC.
0200	S.P. 509 - Reversed polarity of sparker tips.
0430	S.P. 425 - Trimmed sparker tips.
0617	EOT @ sp. 364, will cont. with sp. 363 on reel # 75
0655	Switched polarity @ sp. 342
0817	Circle up for navigation, @ sp. 300, will resume line @ sp. 302
0820	Trimmed sparker tips before restart of line 327-N
0850	Restart of line @ sp. 302 line 327-N
0850	RSOL 327-N @ s.p. 245



INTERSEA RESEARCH CORPORATION

M/V Sea Raider

DAILY OPERATOR LOG

Client USGS GM-18930 Area Louisiana Area 5/2 Block Date 9-29-80

Time	Remarks
1035	S.P. 245 - Changed paper on Fathometer
1100	S.P. 230 - Changed reel on tape recorder.
1109	S.P. 225 - Changed paper on ORE EPC
1140	S.P. 212 - Switch polarity of sparker tips.
1200	S.P. 197 - Raise ORE tow fish to 10 feet below surface.
1335	S.P. 143 to 141 - Trimmed sparker tips.
1456	EOL LA-Area 5,2 -327-N LSP 99
1508	All gear aboard. U/W to calibration point.
1600	At calibration point
	Sept. 30, 1980
0800	Arr. Freeport TX.

