UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

SEISMIC PROFILES OF THE OFFSHORE GULF OF ALASKA TERTIARY PROVINCE, R/V THOMPSON, SEPT-OCT 1974

By

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Open-file report

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This report is preliminary
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reviewed for conformity with
Geological Survey standards

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In September and October 1974, the U. S. Geological Survey, in conjunction with the University of Washington, conducted a geophysical cruise in the Gulf of Alaska (Fig. 1, Location map) to obtain data for the appraisal of resources and environmental hazards prior to oil and gas lease sales. Records were acquired along approximately 6500 kilometres of track lines, as shown on Maps 1 and 2, and included seismic reflection, gravity, and magnetic data. This report indicates the seismic reflection records that are publicly available and it includes a text listing system specifications, shipboard procedures and navigational accuracy, and maps of the track lines (Maps 1 and 2). The microfilm prints of the seismic reflection records and the shipboard logs are available from:

Alaska Technical Data Unit
345 Middlefield Road
Menlo Park, CA 94025
Phone: (415) 323-8111, Ext 2342

National Geophysical and Solar Terrestrial Data Center
EDS/NOAA
Boulder, Colorado 80302

Five reversed refraction lines were also shot; these have been

available in Open File Report 75-283 (Core and others, 1975), and track lines for the five profiles are shown on Map 1. The gravity and magnetic data are still in preparation and will be made available later.

The cruise consisted of four legs: Leg I was a transit from Seattle, Washington, to Yakutat, Alaska, Leg II was between Yakutat Bay and Kayak Island to collect data (Map 1), Leg III was between Kayak Island and Montague Island to collect data (Map 2), and Leg IV was a transit back to Seattle. The records in this open file are from Legs II and III, with one additional line shot on Leg IV between Kayak Island and Yakutat Bay (Line 24, Map 1). T Table 1 shows the start and end times for the four legs and major breaks within Legs II and III. (Note: Julian Day written on all records is one day more than the actual Julian Day for a particular date, due to an error at the beginning of the cruise.) All the times on Maps 1 and 2 and written on the records are local times.

Three separate seismic reflection systems were operated simultaneously and provided high frequency and intermediate frequency acoustic records. The specifications for each system are shown in Table 2. Examples of records from each of the systems showing annotation of the lines are shown in Figures 2-4. Examples of the shipboard logs kept for each system are shown in Figures 5-7.

The precision of navigation on Legs II and III was variable because of bad weather and failure of the Decca Hi Fix system. Navigational systems operated include not only Decca Hi Fix, but also Satellite navigation, and Loran A. Table 3 lists the navigation systems and shows the periods during which they were used. The accuracy of navigation is determined by the systems operating, and can be considered in three general categories. Satellite navigation only (approximately 3400 km) is probably on the order of less than 1 to 2 km. Decca navigation (approximately 1550 km) is on the order of 250 metres or better. A third mode is with the Decca system operating, but with obvious lane count inaccuracies as determined by satellite, Loran, radar, bathymetry, or shoreline positions with respect to the post-plotted lines (approximately 1550 km). In these cases, satellite positions were used but are somewhat more accurate due to the control of ships tracks by Decca; position accuracies are probably on the order of 0.5 km.

Interpretation of the geophysical data has been underway since the cruise. Preliminary reports have been released as U. S. Geological Survey Open Files 75-283 (Core and others, 1975), 75-504 (Carlson and others, 1975), 75-505 (Molnia and Carlson, 1975b), 75-506 (Molnia and Carlson, 1975a), 75-507 (Carlson and Molnia, 1975), and 75-508 (Bruns and Plafker, 1975).

REFERENCES CITED

Bruns, Terry R. and Plafker, George, 1975, Preliminary Structural Map of Part of the Offshore Gulf of Alaska Tertiary Province, U.S. Geol. Survey Open File Map 75-508.

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Molnia, Bruce F. and Carlson, Paul R., 1975a, Base map of the northern Gulf of Alaska, U. S. Geol. Survey Open File Map 75-506.

Molnia, Bruce F. and Carlson, Paul R., 1975b, Surface sediment distribution map, northern Gulf of Alaska, U. S. Geol. Survey Open File Map 75-505.

TABLE 1

CRUISE SUMMARY Sept - Oct 1974

Leg	Date	JD	Time	Comments[1]
I	3 Sep	249	0900	Leave Seattle
	11 Sep	255	1230	Arrive Yakutat, End Leg I
II	13 Sep	257	0130	Leave Yakutat
	14 Sep	258	0230	Anchor in Icy Bay, weather
	16 Sep	260	0100	Leave Icy Bay, resume shooting
	29 Sep	273	1030	Arrive Cordova, End Leg II
III	3 Oct	277	0900	Leave Cordova
		278	1740	EOL, Head for PWS, weather
		280	1500	Leave PWS, BOL 58
		285	0230	EOL, Head for Shelter at KI, weather
		285	1000	Leave KI, resume shooting
		287	0500	Enter PWS, weather
		289	1830	Leave PWS, resume shooting
		295	0120	Anchor at KI, weather
		295	1600	Leave KI, resume shooting
		297	1200	Enter PWS, weather
		298	1300	Arrive Cordova, End Leg III
IV	25 Oct	299	1000	Leave Cordova
	1 Nov	306	0700	Arrive Seattle, End of Cruise

[1]Abbreviations used: BOL - Beginning of line
EOW - End of line
PWS - Prince William Sound
KI - Kayak Island.

TABLE 2

SEISMIC REFLECTION SYSTEMS

Equipment	Deployed	Power	Sensor	Filters	Fire and Sweep Rate	Signal Processor	Display
3.5 kHz correlated Transducer	Hull mounted	-	Hull mounted transceiver	-	1 Sec	Raytheon PTR-105	Raytheon UGR-196
Minisparker	Two cages towed amid Ship	variable 400-800 J,	Single channel Teledyne high Resolution Hydrophone Streamer	variable between 100-900 Hz; generally 250-590 Hz	1 Sec	Teledyne Model 300 Amplifier	Raytheon UGR-196
Airgun Two Bolt 40 cu in airguns with wave shape kits	Two airguns Towed astern	2-40 cu in with WSK	200 ft single Channel Hydrophone streamer Offset approximately 200'	40-80 Hz	4 Sec	Del Norte Model 502 Analog Signal Processor	Raytheon PER 196

TABLE 3

NAVIGATION CONTROL

Start JD	Start Time	End JD	End Time	Nav[1] Systems	Comment
257	0130	269	1930	S, L	Begin Leg III
269	1930	272	2045	S, D	End Leg II
277	2100	278	1500	D	Begin Leg III
278	1500	280	1430	S, L	
280	1430	281	0300	D	
281	0300	281	2040	S, L	
281	2040	285	0030	S, D	
285	0030	285	1000	S, L	
285	1000	287	0230	D	
287	0230	289	1930	S, L	
289	1930	290	0130	D	
290	0130	290	1845	S, L	
290	1845	292	1400	L	
292	1400	293	0740	S, L	
293	0740	294	1615	D	
294	1615	298	1300	S, L	End Leg III

[1] S, L - Stands for satellite and Loran-A navigation

S, D - Stands for Decca operating but not used for final map

D - Stands for Decca navigation.

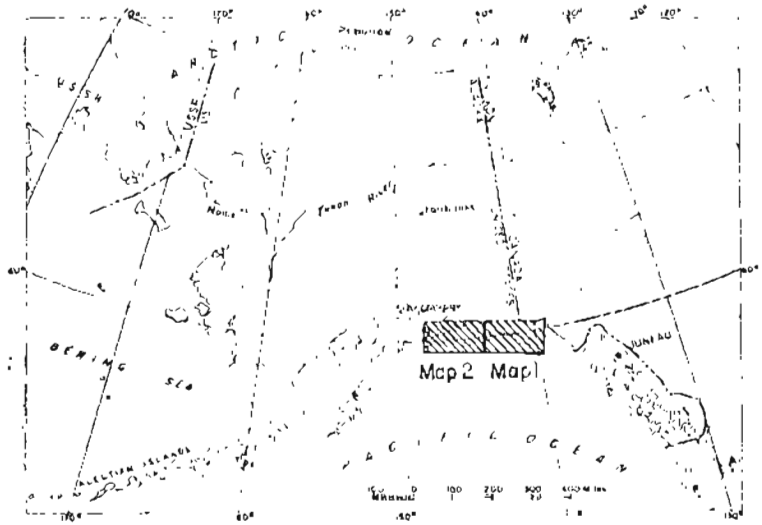

Figure 1. Index showing location of map areas.

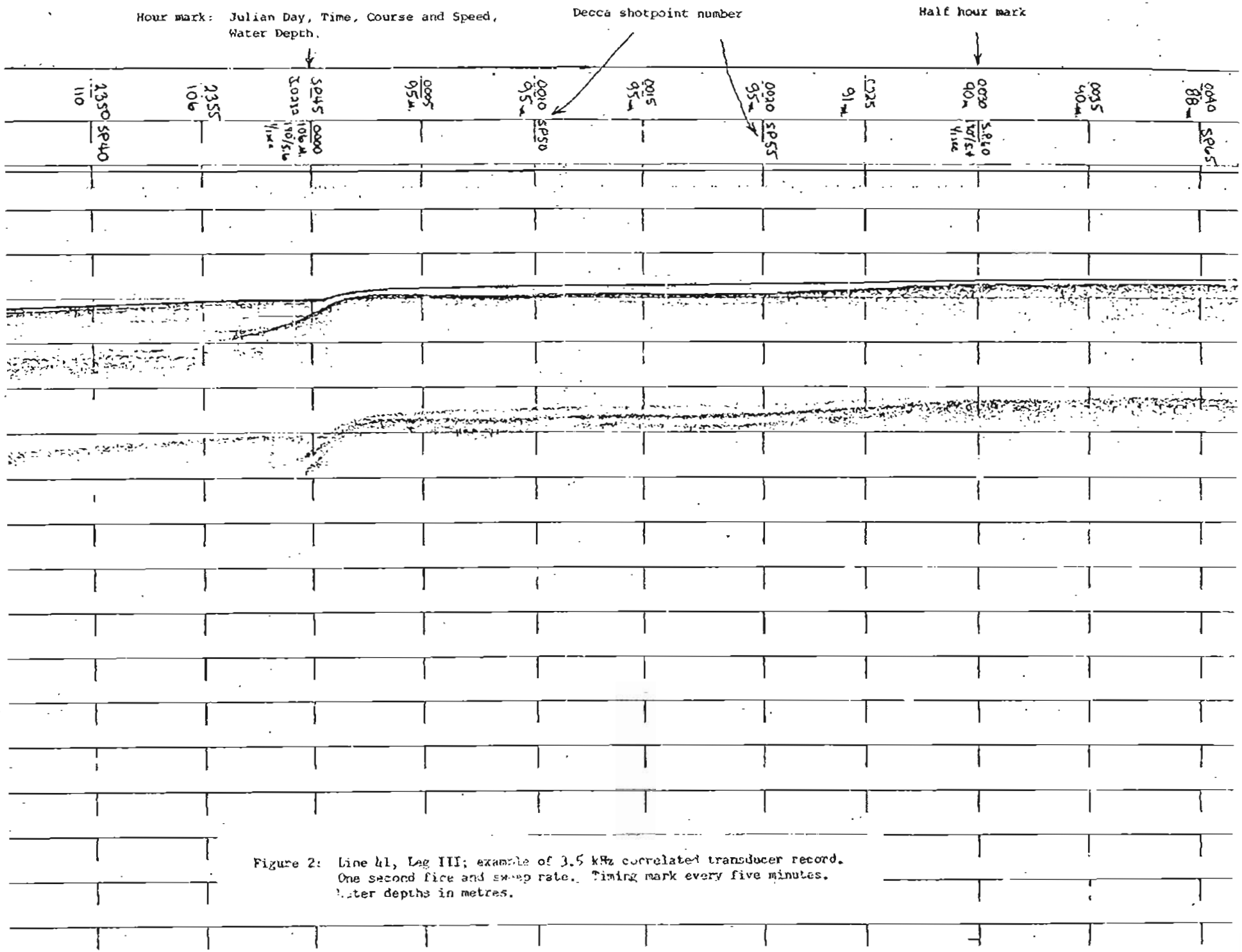

Figure 2: Line 41, Leg III; example of 3.5 kHz correlated transducer record. One second fire and sweep rate. Timing mark every five minutes. Water depths in metres.

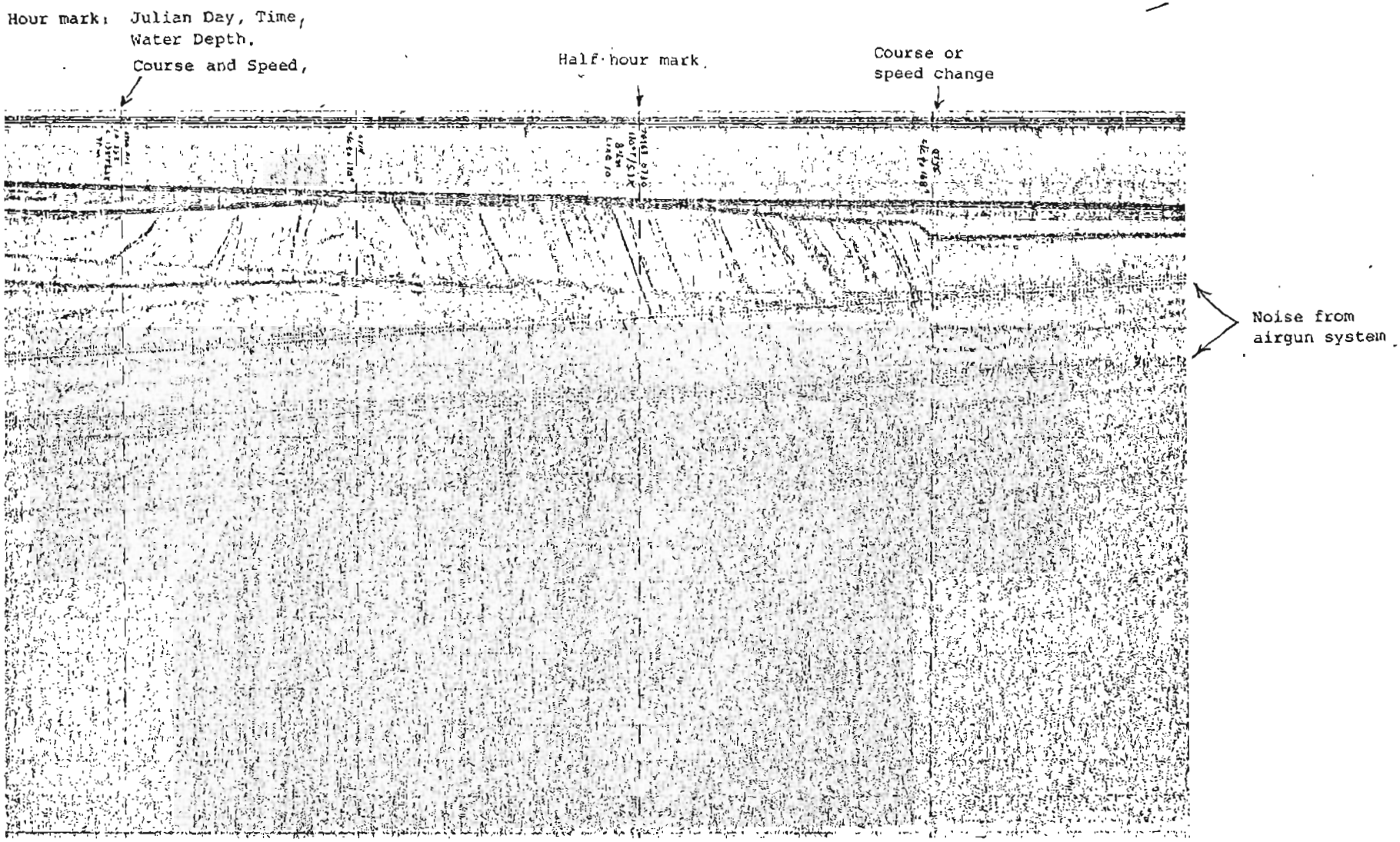

Figure 3: Line 10, Leg II, example of minisparker record. One second fire and sweep rate. Timing marks every half hour or at course and speed changes.

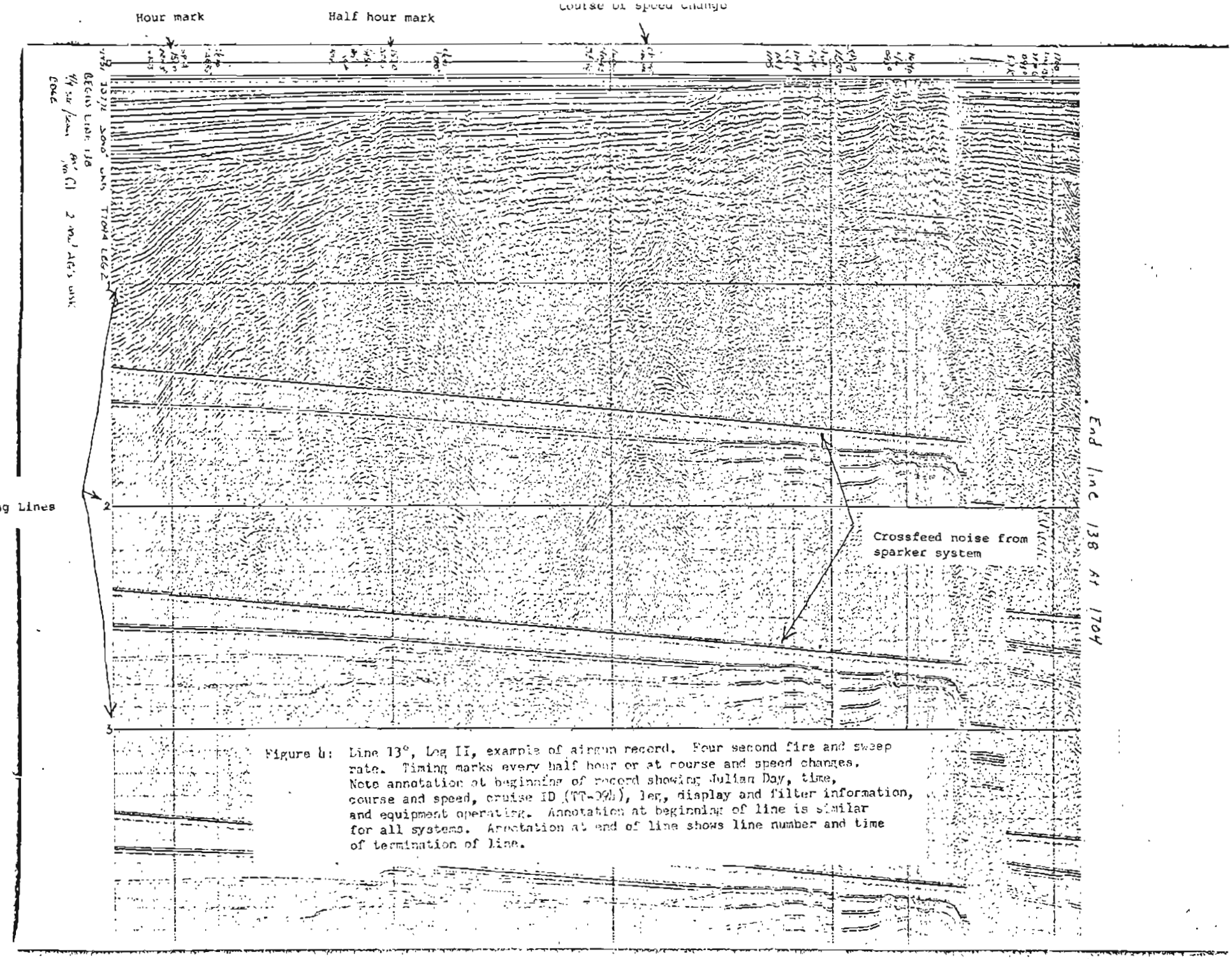

Figure 4: Line 13°, Leg II, example of airgun record. Four second fire and sweep rate. Timing marks every half hour or at course and speed changes. Note annotation at beginning of record showing Julian Day, time, course and speed, cruise ID (TT-09L), leg, display and filter information, and equipment operating. Annotation at beginning of line is similar for all systems. Annotation at end of line shows line number and time of termination of line.

GULF OF ALASKA 1974 USGS GEOL. SURVEY

SEISMIC LOG: DATE 261 LINE # 41 Leg III-TT094 SHIP: T. G. THOMPSON PAGE 70 OF 310

TIME	COURSE & SPEED	WATER DEPTH IN METERS	SWEEP SPEED SECONDS	EDGE OR CENTER KEY	FILTERS ~~HIGH~~/LOW	BATHYMETRY REMARKS: GUNS, HIGH RESOLUTION INSTRUMENTS
2250		66	0			SP10
2255		77				→ NORTHERN LIGHTS STRONG
2300	180°/5.6	88	1/1 SEC	EDGE	128 4/N	ABOUT 2200 HR SP15
2305		93				
2310		101				SP20
2315		104				
2320		108				SP25
2325		110				
2330	180°/5.8	110	1/1SEC	EDGE	128 4/N	SP30
2335		113				
2340		112				SP35
2345		112				
2350		110				SP40
2355		106				
0000	180°/5.6	106				SP 45
0005		95				
0010		95				SP 50
0015		95				
0020		95				SP 55
0025						

Figure 5: Example of ship log for 3.5 kHz system; for line 41, Leg III, (Fig. 2)

GULF OF ALASKA 1974 -- USGS GEOL. SURVEY leg 2

SEISMIC LOG: DATE 263 LINE # 7 SPARKER SHIP: T. G. THOMPSON PAGE 10 OF 46

TIME	COURSE & SPEED	WATER DEPTH IN METERS	SWEEP SPEED SECONDS	EDGE OR CENTER KEY	FILTERS HIGH/LOW	REMARKS: GUNS, HIGH RESOLUTION INSTRUMENTS
0430	000°/6.3KN	[illegible]	1SEC	[illegible]	310/170	
0450	c/c 355°					
0500	355°/6.8KN	55	"	"	"	
0530	[illegible]	[illegible]	"	"	"	
0535	c/c 231°					BEGIN LINE 109
0600	231°/6.3KN	70	"	"	"	
0630	231°/6.0KN	55	"	"	"	
0635	c/c N5°					BEGIN LINE 10
0700	175°/6.6K	71 m	1sec	edge/[illegible]	310/170	
0714	c/c	to 170°				
0730	170°/6.3K	84 m	1sec	edge/[illegible]	310/170	
0745	168°					c/ to 168°
0800	168°/6.1KN	89.6	1SEC	E/N	725/170	LINE 10
0825	c/c TO	160°				
0830	160°/6.2KN	115.2	1SEC	E/N	725/170	LINE 10
0893	MOMENTARY	REDUCTION	IN SPEED	FOR	ENGINE	WORK
0900	160°/6.9KN	137.2	1SEC	E/N	725/170	LINE 10
0930	160°/6.1KN	151.8	1SEC	E/N	725/170	LINE 10

Figure 6: Example of ship log for minisparker system; for line 10, Leg II (Fig. 3)

GULF OF ALASKA 1974 USGS GEOL. SURVEY

SEISMIC LOG: DATE 272 LINE # 67/138 TT094 Leg II SHIP: T. G. THOMPSON PAGE 49 OF 51

TIME	COURSE & SPEED	WATER DEPTH IN METERS	SWEEP SPEED SECONDS	EDGE OR CENTER KEY	FILTERS HIGH/LOW	REMARKS: Airgun GUNS, HIGH RESOLUTION INSTRUMENTS	
1444		End	Line 67				sp 93
1445	C/C To 090						
1451	S/O 090	Begin	Line 138				
1454	Δ090°/6kts		4/4 sec scan	Edge	80/40	0-1600 fms	sp 01
1500	Δ090°/6kts	95m	"	"	"	"	sp 04
1530	Δ085/6kts	71m	"	"	"	"	sp 19
1600	Δ080/4.5kts		"	"	"	"	sp 34
1603	C/C 090°						
1624	C/C 105°						
1630	Δ105/5.8kts	40m	"	"	"	"	sp 49
1640	C/C 095°						
1700	Δ095/5.3kts	93m	"	"	"	"	sp 64
1704	C/C 183°	End	Line 138				
1710	S/O 183°						
1712		Begin	Line 32				sp 01
1730	Δ188°/5.9kts	133m	4/4 sec scan	Edge	80/40	0-1600 fms	sp 10
1800	Δ183/6.2kts	139m	"	"	"	"	sp 25
1830	Δ183/6.0kts	139	"	"	"	"	sp 40
1900	Δ183/5.9kts	143	"	"	"	"	sp 55
1930	Δ183/6.4kts						sp 70

Figure 7: Example of ship log for airgun system; for line 138,