

# 76023

CRUISE REPORT - FAY 018  
U.S. GEOLOGICAL SURVEY - WOODS HOLE  
by L.D. McGinnis and S.D. Locker

ROSCOP  
5 OCT 76

- |                               |                             |
|-------------------------------|-----------------------------|
| 1. SHIP                       | R/V H.J.W. FAY              |
| 2. CRUISE                     | 018 (Lines #18 through #32) |
| 3. AREA OF OPS                | S.E. Georgia Embayment      |
| 4. DATES OF OPS               | 2-15 July 1976              |
| 5. PERSONNEL AND AFFILIATIONS |                             |

Chief Scientists - L.D. McGinnis - U.S.G.S., Woods Hole  
 Ship Captain - J.P. Olander - Tracor  
 Cruise Curator - S.D. Locker - U.S.G.S., Woods Hole

Technicians

Frank Jennings, Chief (1)  
 Felicity Oram (1)  
 Gerald McCarthy (1)

Navigators

Don Moller, Chief (3)  
 Scott Heald (1)  
 Kathy Kent (1)  
 Paul Berezna (2)

Watch Standers

Stan Locker, Chief (1)  
 Sandy Conley (1)  
 Bill Patterson (4)  
 Lin Morse (1)  
 Rob Pexton (1)  
 Dick Gardner (5)

- <sup>1</sup>USGS, Woods Hole  
<sup>2</sup>Western Geophysical  
<sup>3</sup>WHOI  
<sup>4</sup>USGS, Denver (Phoenix)  
<sup>5</sup>USGS, Montgomery (WRD)

6. CRUISE OBJECTIVE

Geophysical reconnaissance of the S.E. Georgia Embayment for regional environmental analyses.

7. SCIENTIFIC EQUIPMENT

- a) Single-channel seismic airgun reflection system with 160, 80, 40 and 20 in<sup>3</sup> airguns firing simultaneously at 10 to 15 sec intervals.
- b) 12 Techtron (?) sonobuoy profiles shot along lines 31 and 32 at about 40 km intervals. Maximum shot to hydrophone distance-20 km.
- c) 3.5 kHz fathometer
- d) Vibrating string Gravimeter
- e) Magnetometer-Gravimeter system

f) Single channel, high resolution seismic reflection system using a sparker energy source (600 joule) firing every 1.0 sec.

#### 8. NAVIGATIONAL SYSTEM

Integrated navigational system with:

- a) Loran C receiver
- b) Satellite receiver
- c) MK-29 gyrocompass
- d) speed log
- e) fathometer
- f) velocimeter
- g) calendar clock

#### 9. DATA ACQUIRED ON:

- ✓ a) 1 flatbed recorder (Raytheon)-airgun system
- b) 1 flatbed recorder (Raytheon)-3.5 kHz
- c) 1 flatbed recorder (EPC)-sparker
- ✓ d) strip chart recorder-magnetometer and gradimeter
- ✓ e) strip chart recorder-gravity meter
- ~~b~~ f) navigation computer print out data
- ✓ g) 1 flatbed recorder (Raytheon)-sonobuoy
- h) tapes recorded on 7 channel Honeywell recorder for airgun, sparker, 3.5, grav., mag., and nav. systems
- i) tapes recorded for sonobuoy refraction data

#### 10. NARRATIVE AND COMMENTS

Fay cruise 018 departed Charleston, S.C. at 0700 GMT on 2 July 1976 with 14 science staff, 15 ships crew and the captain's wife and 2 children. All equipment was over the side and operations began on line 18 at 1000 GMT. All systems were operational except the sparker which was on loan from Teledyne and received on 1 July 1976. A malfunctioning sparker triggering condensor was diagnosed by Frank Jennings and it was decided to complete the first two lines (18 and 19) without the sparker before returning to Charleston for spares. D. Moller requested 1 to 2 hours delay at the end of line 18 to determine satellite fixes. We returned to Charleston at 1900 GMT on 3 July for spares. After receiving them from Kevin King put to sea at 1920 GMT.

On July 3 at 2030, all systems were again in the water and operations were continued. On the final day of the cruise, line 19 was repeated with the sparker, since the line crossed two sites of the proposed USGS drilling program

Profiling proceeded uneventfully, with watchstanders becoming familiarized with equipment by 5 July. All sea sickness among the troops was gone by the 5th and cruise schedules started to fall into routines. Seas were calm and weather generally fair. The captain's wife and son began to stand watches in the lab regularly. Cooperation between ship's crew and science personnel was excellent.

Marked differences in geological provinces are evident from the sparker and airgun records. Relief on the shelf, west of the Florida-Hatteras slope, is negligible. A mound or erosional remnant generally marks the shelf break. The Blake Plateau displays considerable diversity, with hills and valleys having relief up to 70 to 80 meters. Stratification in the hills and truncation of strata along the slope strongly suggests the entire Blake Plateau is a product of erosion. Sparker records on the shelf were generally excellent with penetration of 0.4 to 0.5 seconds (two-way time) not unusual. Penetration on the Blake Plateau was another matter. Reflection times greater than 0.2 (two-way) were rare. I suspect this is due to the acoustical properties of the near bottom lithologies. A flat-lying, good reflector could often be followed from the continental shelf under the slope to the Blake Plateau where it lies near the surface of the Plateau. This unit was probably critical in preventing deeper erosion on the Plateau.

An area of complex faulting was observed on the sparker records on the dogleg between lines 24 and 25. Although bottom sediments at the water sediment interface were smooth and underformed, horst-graben structures, having throws 15 to 30 meters, were evident at two-way times about 0.1 to

0.2 sec below the interface. Strike of the faults is not known, although they did not show up on the lines radiating away from the shoreline and thus they may parallel these lines. Efforts were made to repeat these observations on the tie line paralleling the dogleg, but rough seas and high noise levels prevented the recording of not only subsurface reflectors but even a reliable bottom reflector. The failure of achieving good sparker records along the tie line was the most serious disappointment of the cruise. Consideration was given to resurveying the tie lines (31 and 32), but lack of time prevented any make-up work. No time lee-way was available for weather delays, thus it was necessary to continue along the planned tracks without deviation. Because of the nature of the faults described above and the fact that they lie about 100 km due east of a prime lease area in the S.E. Georgia Embayment serious consideration should be given to planning a cruise to survey, in detail, this fault system. Time loss during the cruise included that (about 4 hours) involving the sparker triggering device, 10 hours to evacuate an ailing crewman (Bob Crews, wiper) suspected of having a heart attack but which turned out to be a ruptured esophagus and a 15 hour delay at the beginning of the cruise while waiting for an engineer replacement.

A final malfunction of one of the surveying systems occurred about midnight GMT on July 8 when the gravity meter was discovered by Don Moller to be behaving erratically. After some three hour ship-to-shore communications with Perry Parks, the meter again became operational late on 12 July, barely on time to do the tie lines 31 and 32.

Personnel on the cruise were a pleasure to work with. Ships moral was far above that experienced last year. Capt Olander went out of his way to assist our programs and made every effort to complete the cruise outline, even to the point where he encouraged completing lines on the south

end of the survey area knowing this would eat into his scheduled shore time. Dick Gardner from the USGS-WRD in Montgomery, Alabama, was an excellent addition to the cruise for his knowledge of onshore geology and hydrology and also for his broad experience in geological and geophysical reconnaissance techniques. Bill Patterson from the USGS seismic data reduction center in Denver, was able to assume watch standing responsibilities in a relatively short time as he became proficient in the mid-watch period. Since participating in Fay cruise 018 we feel that the acquisition of cruise personnel from various branches of the survey is certainly an excellent idea. The practice should be continued and perhaps expanded to include technical specialists in instrumentation and navigation as well.

## II. TABULATED INFORMATION

- a) Days at sea - 13 days, 4 hrs, 25 min
- b) Working days at sea - 12 days, 12 hrs, 25 min
- c) Total ship track - 3871 km
- d) Total track/system

3.5 kHz	-	2665 km	2515 km	
sparker	-	2950 "	2808 "	
airgun	-	3163 "	3019 "	
sonobuoy	-	509 "	268 "	12 profiles
magnetics	-	3163 "	3019 "	
gravity	-	2996 "	2848 "	

- e) Description of geophysical lines-

13 lines were run normal to the coastline between 33°N and 29°30'N. Two lines comprised 1 long tie-line parallel to the shelf break. In addition 4 short lines were run in the area between latitude 30°40'N to 31°10'N and longitudes 80°30' to 80°W.

The lines and numbering system was continued from Fay cruise 017 to the north at 18. Lines on 018 were numbered from 18 to 32 and the "dogleg" following each line was considered part of the

preceding line.

12 sonobuoy refraction profiles were completed along lines 31 and 32, all on the Blake Plateau. Sonobuoy stations were numbered from 2 to 13 with #2 on the north and #13 on the south.

# Daily distance/system

FAY CRUISE  
018

SYSTEM	DATE (July)														TOTAL
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
5 KHZ	147	208	236	265	222	235	161	258	271	264	231	7	10	-	2515
PARKER	-	32	236	265	222	235	161	258	271	264	231	366	161	106	2808
RGUN	147	208	236	265	222	235	161	258	271	264	231	366	155	-	3019
MAGNETICS	147	208	236	265	222	235	161	258	271	264	231	366	155	-	3019
GRAVITY	184	271	236	265	222	235	317	-	-	-	199	366	380	173	2848
NOBODY	-	-	-	-	-	-	-	-	-	-	-	199	69	-	268

(distance in Km)

= 12 STATIONS

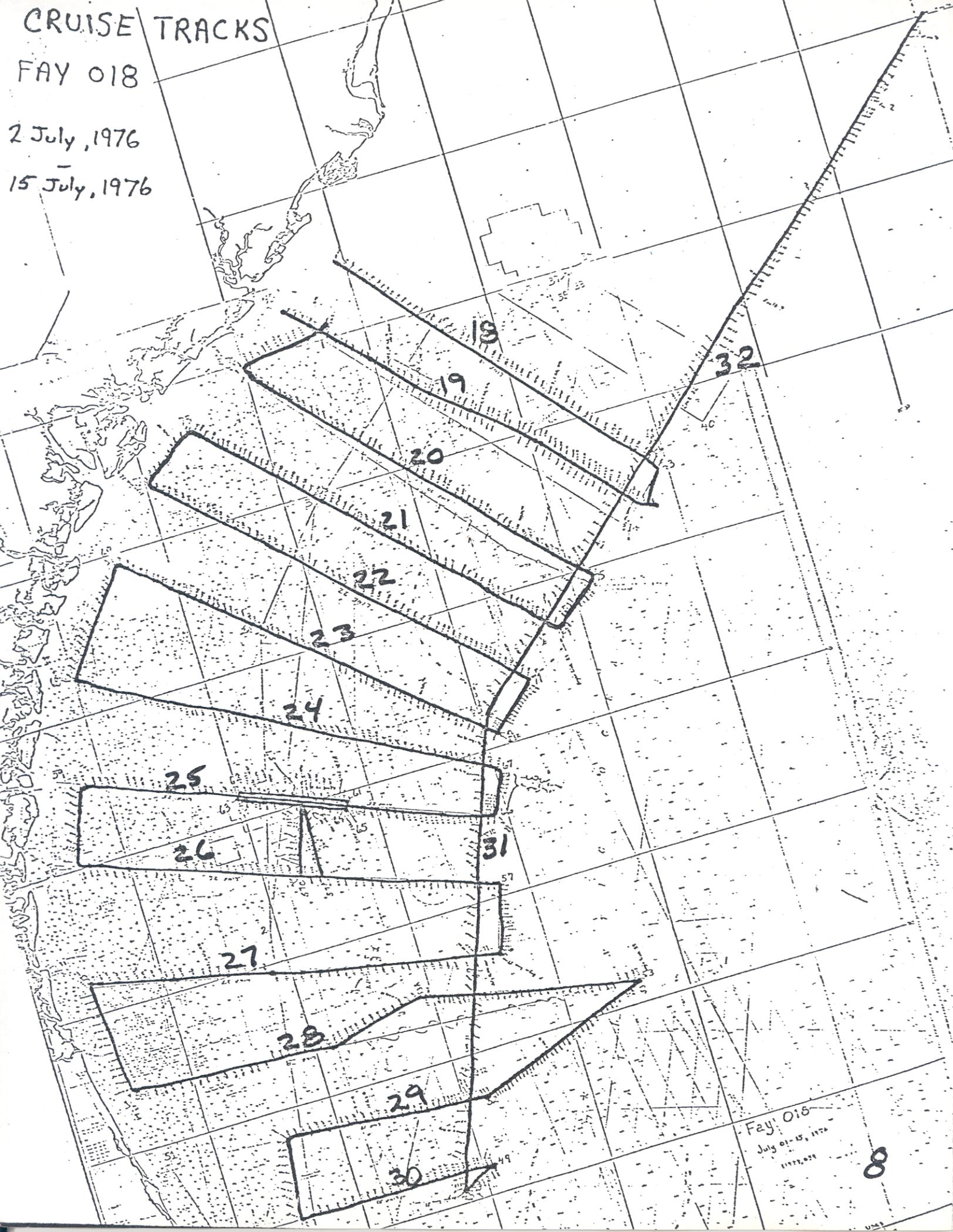
USE THESE

# CRUISE TRACKS

FAY 018

2 July, 1976

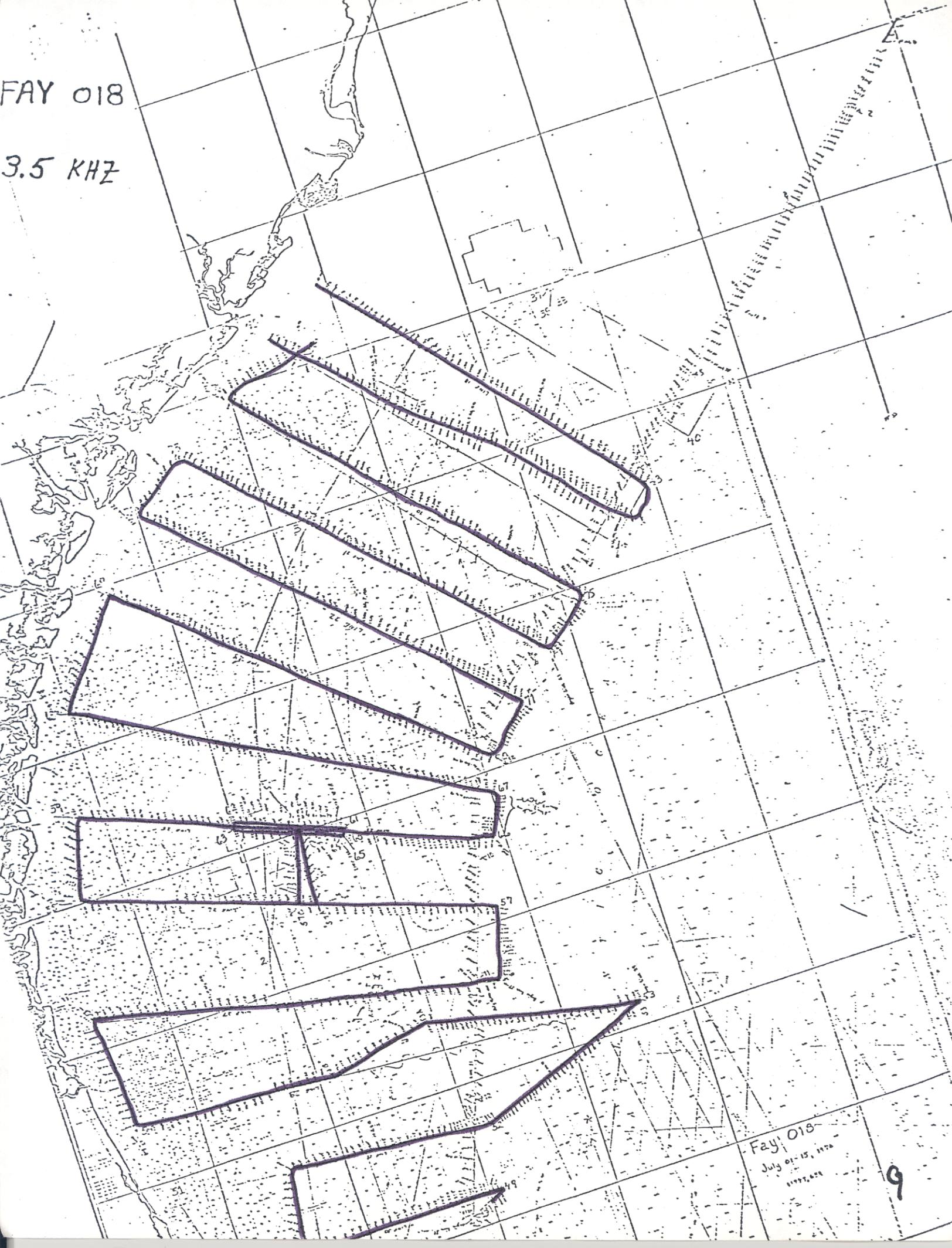
15 July, 1976



Fay 018  
July 01-15, 1976  
11777-021

FAY 018

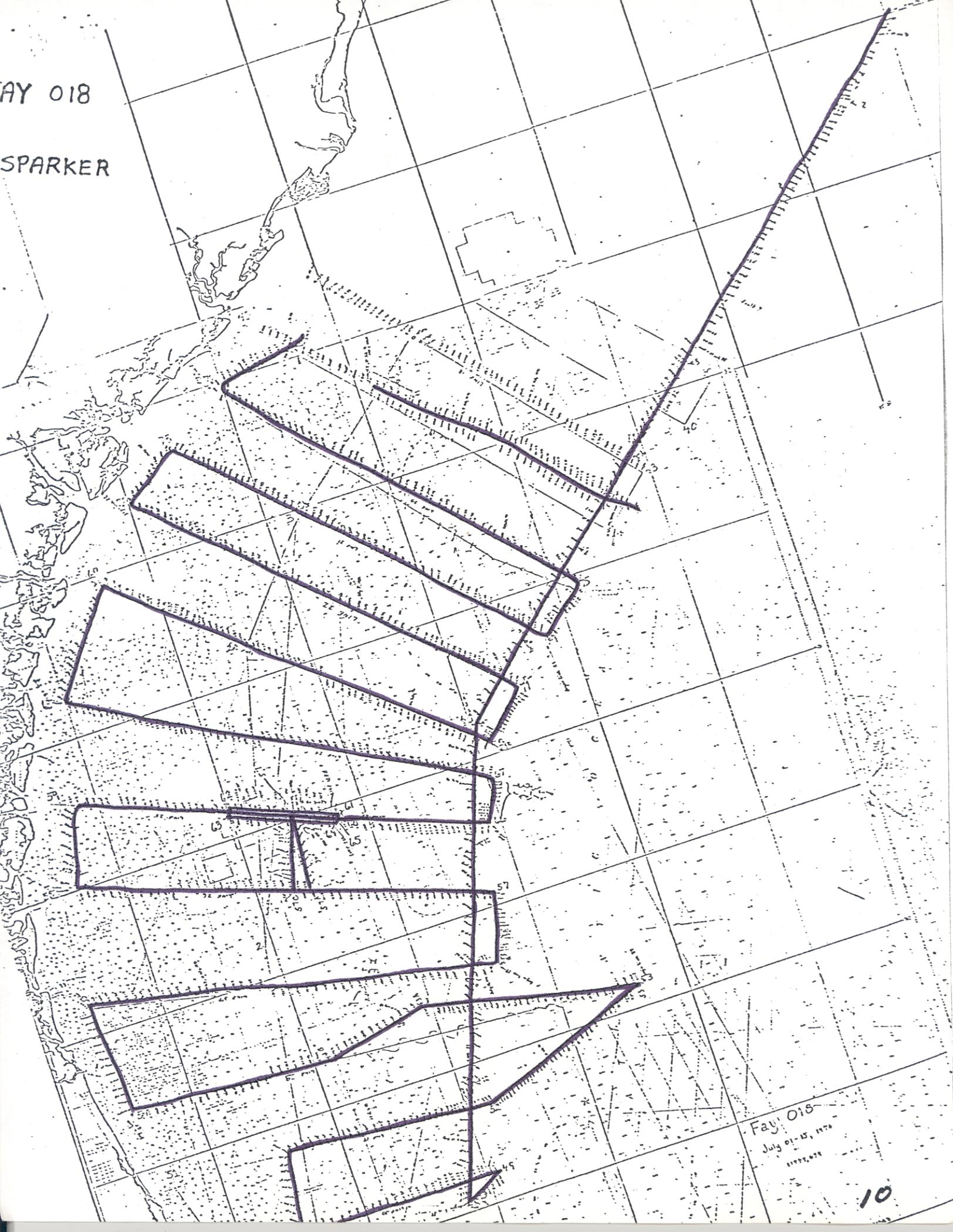
3.5 KHZ



Fay 018  
July 01-15, 1974  
11117,001

FAY 018

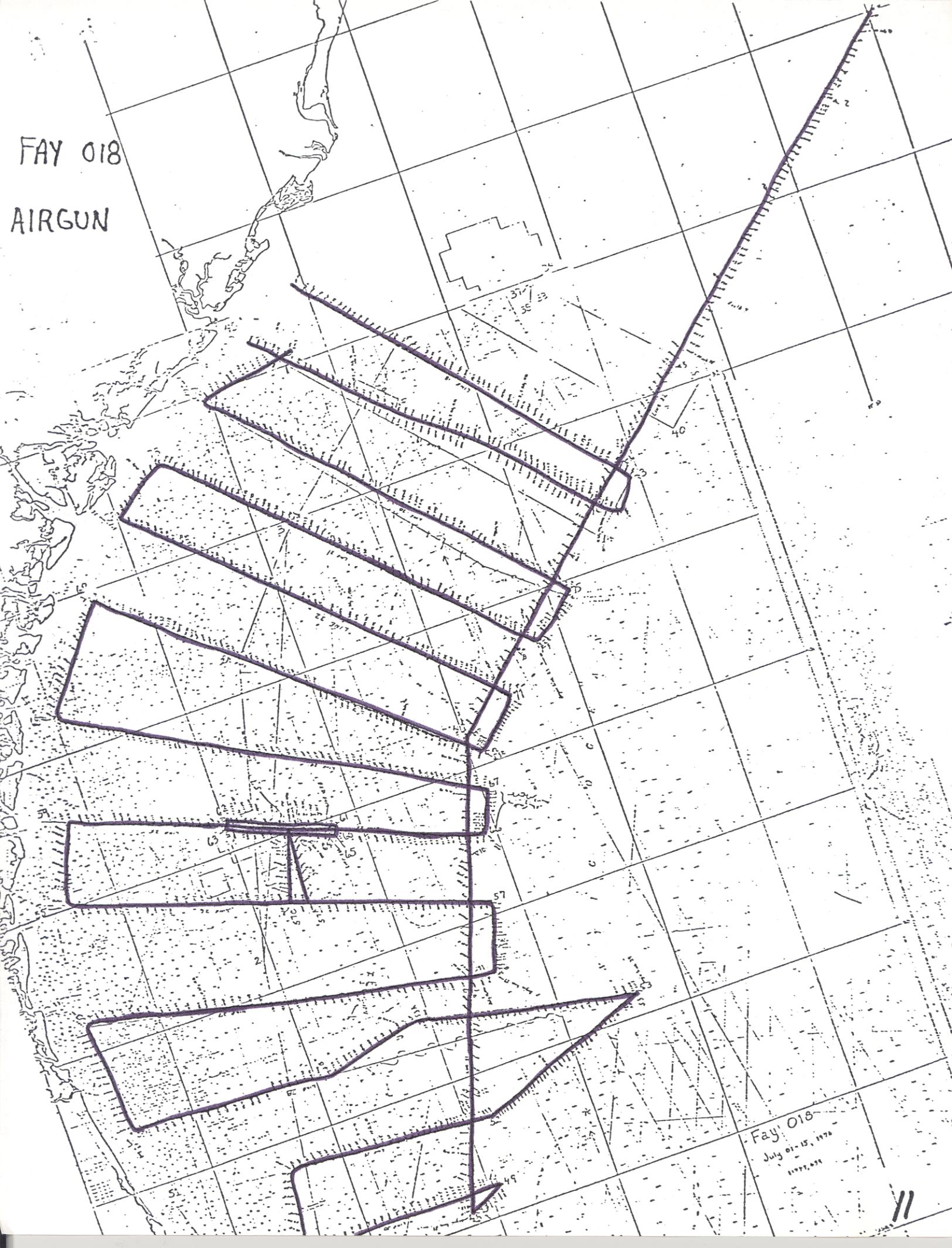
SPARKER



Fay 018  
July 01-15, 1974

FAY 018

AIRGUN



Fay 018

July 01-15, 1976

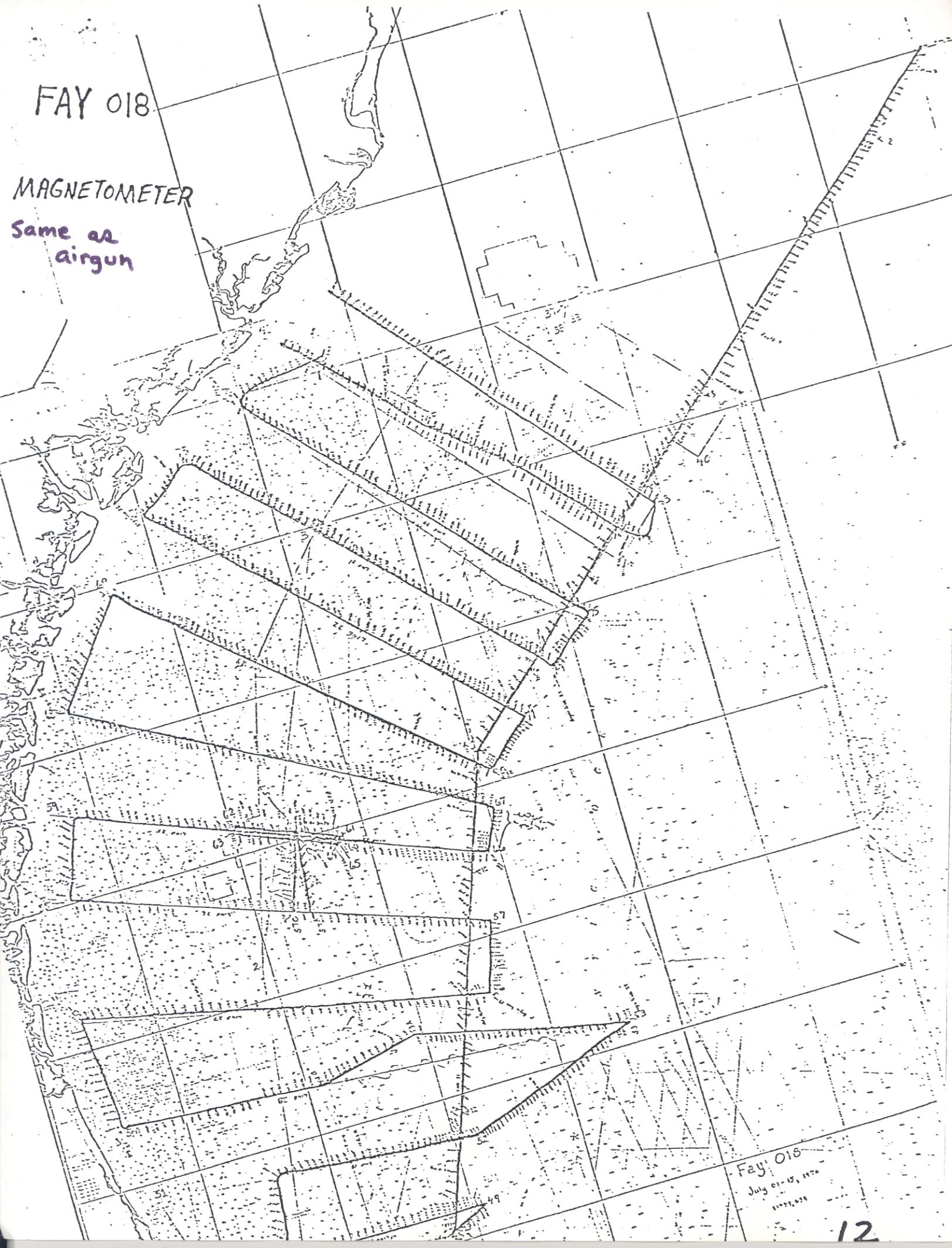
11997,031

11

FAY 018

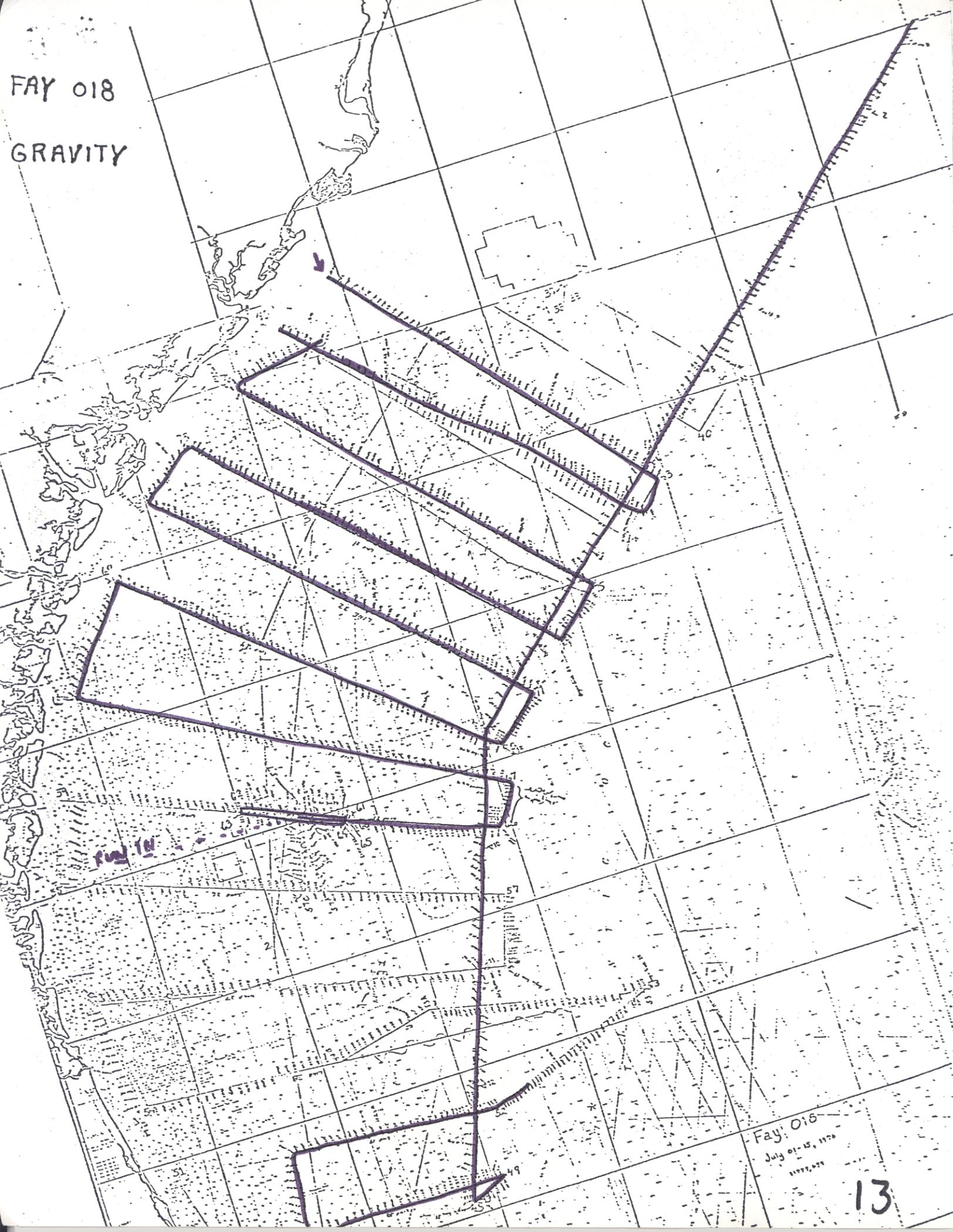
MAGNETOMETER

Same as  
airgun



Fay 018  
July 01-15, 1970  
1000,000

FAY 018  
GRAVITY



Fay 018  
July 01-15, 1954  
1177,021

