

# FLIGHT SUMMARY REPORT

**Flight Number:** 94-036  
**Calendar/Julian Date:** 02 February 1994 • 33  
**Sensor Package:** Wild-Heerbrug RC-10  
Modis Airborne Simulator (MAS)  
Aerosol Particulate Sampler (APS)  
Large Area Collectors (LACs)  
**Area(s) Covered:** Gulf Coast

**Investigator(s):** Menzel, U. of Wisconsin

**Aircraft #:** 706

## SENSOR DATA

<b>Accession #:</b>	04691	-----	-----	-----
<b>Sensor ID #:</b>	076	108	024	100
<b>Sensor Type:</b>	RC-10	MAS	APS	LACs
<b>Focal Length:</b>	12" 304.89 mm	-----	-----	-----
<b>Film Type:</b>	Aerochrome IR SO-060	-----	-----	-----
<b>Filtration:</b>	Wratten 12	-----	-----	-----
<b>Spectral Band:</b>	510-900 nm	-----	-----	-----
<b>f Stop:</b>	11	-----	-----	-----
<b>Shutter Speed:</b>	1/250	-----	-----	-----
<b># of Frames:</b>	372	-----	-----	-----
<b>% Overlap:</b>	60	-----	-----	-----
<b>Quality:</b>	Excellent	Excellent	-----	-----
<b>Remarks:</b>	Camera clock offset 13.1 seconds from navigation data			

## Airborne Science and Applications Program

The Airborne Science and Applications Program (ASAP) is supported by three ER-2 high altitude Earth Resources Survey aircraft. These aircraft are operated by the High Altitude Missions Branch at NASA-Ames Research Center, Moffett Field, California. The ER-2s are used as readily deployable high altitude sensor platforms to collect remote sensing and *in situ* data on earth resources, celestial phenomena, atmospheric dynamics, and oceanic processes. Additionally, these aircraft are used for electronic sensor research and development and satellite investigative support.

The ER-2s are flown from various deployment sites in support of scientific research sponsored by NASA and other federal, state, university, and industry investigators. Data are collected from deployment sites in Kansas, Texas, Virginia, Florida, and Alaska. Cooperative international scientific projects have deployed the aircraft to sites in Great Britain, Australia, Chile, and Norway.

Photographic and digital imaging sensors are flown aboard the ER-2s in support of research objectives defined by the sponsoring investigators. High resolution mapping cameras and digital multispectral imaging sensors are utilized in a variety of configurations in the ER-2s' four pressurized experiment compartments. The following provides a description of the digital multispectral sensor(s) and camera(s) used for data collection during this flight.

### Modis Airborne Simulator

The Modis Airborne Simulator (MAS) is a modified Daedalus multispectral scanner. It records up to twelve 8-bit channels, which can be selected from an array of fifty available spectral bands. The band selection is made prior to flight and the instrument is hard-wired to that configuration. Channel 1 is used to store additional bits which provide 10-bit resolution for Channels 9 through 12. The band configuration for this flight is as follows:

<u>Data System Channel</u>	<u>MAS Channel</u>	<u>Band edges <math>\mu\text{m}</math></u>
1	---	LSBs for Channels 9-12
2	1	0.529 - 0.572
3	2	0.635 - 0.688
4	3	0.688 - 0.729
5	4	0.729 - 0.769
6	7	0.852 - 0.893
7	39	4.875 - 5.025
8	40	5.025 - 5.175
9*	31	3.659 - 3.810
10*	45	10.791 - 11.239
11*	47	12.539 - 12.986
12*	46	11.799 - 12.246

\*10-bit resolution

#### Sensor/Aircraft Parameters:

Spectral Channels:	50
Output Channels:	Seven 8-bit and four 10-bit
IFOV:	2.5 mrad
Ground Resolution:	163 feet (50 meters at 65,000 feet)
Total Scan Angle:	85.92°

Pixels/Scan Line:	716
Scan Rate:	6.25 scans/second
Ground Speed:	400 kts (206 m/second)
Roll Correction:	Plus or minus 3.5 degrees (approx.)

### **Aerosol Particulate Sampler**

The Aerosol Particulate Sampler (APS) has been developed and is operated by Dr. Guy Ferry of the NASA-Ames Research Experiments Branch. The sampler is a non-imaging sensor designed to gather high altitude dust particles for laboratory research.

### **Large Area Collectors**

The Large Area Collectors (LACs) are flown on NASA high altitude ER-2s in support of the NASA-Johnson Space Center Cosmic Dust Program. The LACs are used to collect comparatively unaltered cosmic dust from the stratosphere at ER-2 flight altitudes of 65,000 feet or higher. Sufficient quantities of extraterrestrial materials are collected to allow chemical and mineralogical compositions of individual particles to be determined. Study of these materials whose sources may be comets, asteroid collisions, planetary impacts, and meteorite ablation provide valuable information about the origin and history of the solar system.

Additional information regarding the Large Area Collectors may be obtained from Michael E. Zolensky, NASA-Johnson Space Center, SN2, Houston, Texas 77058 (Telephone: 713-483-5128).

### **Camera Systems**

Various camera systems and films are used for photographic data collection. Film types include high definition color infrared, natural color, and black and white emulsions. Available photographic systems are as follows:

- Wild-Heerbrug RC-10 metric mapping camera
  - 9 x 9 inch film format
  - 6 inch focal length lens provides area coverage of 16 x 16 nautical miles from 65,000 feet
  - 12 inch focal length lens provides area coverage of 8 x 8 nautical miles from 65,000 feet
- Hycon HR-732 large scale mapping camera
  - 9 x 18 inch film format
  - 24 inch focal length lens provides area coverage of 4 x 8 nautical miles from 65,000 feet
- IRIS II Panoramic camera
  - 4.5 x 34.7 inch film format
  - 24 inch focal length lens
  - 90 degree field of view provides area coverage of 2 x 21.4 nautical miles from 65,000 feet

The U.S. Geological Survey's EROS Data Center at Sioux Falls, South Dakota serves as the archive and product distribution facility for NASA-Ames aircraft acquired photographic and digital imagery. For information regarding photography and digital data (including areas of coverage, products, and product costs) contact EROS Data Center, Customer Services, Sioux Falls, South Dakota 57198 (Telephone: 605-594-6151).

For specific information regarding flight documentation, sensor parameters, and areas of coverage contact the Aircraft Data Facility, NASA-Ames Research Center, Mail Stop 240-6, Moffett Field, California 94035-1000 (Telephone: 415-604-6252). Additional information regarding ER-2 acquired photographic and digital data is also available through the Aircraft Data Facility.

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 94-036**

Accession # 04691  
Sensor # 076

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	1712-1785	14:56:43	15:31:04	65000/19800	Minor-30% scattered cumulus (frames 1773-1779)
C - D	1786-1810	15:39:43	15:50:54	"	Clear
D - E	1811-1848	15:57:12	16:14:26	"	Very minor cumulus (frames 1842-1844)
F - G	1849-1891	16:23:06	16:42:37	"	Clear
H - I	1892-1927	16:51:45	17:07:58	"	Clear
J - K	1928-1937	17:31:42	17:35:51	"	Clear
L - M	1938-1949	17:46:06	17:51:10	"	Minor-10% cirrus (frames 0045-0048)
N - O	1950-1960	17:58:01	18:02:38	"	Clear
P - Q	1961-1971	18:10:04	18:14:40	"	Clear
R - H	1972-1989	18:16:45	18:24:38	"	Clear

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 94-036**

Accession # 04691

Sensor # 076

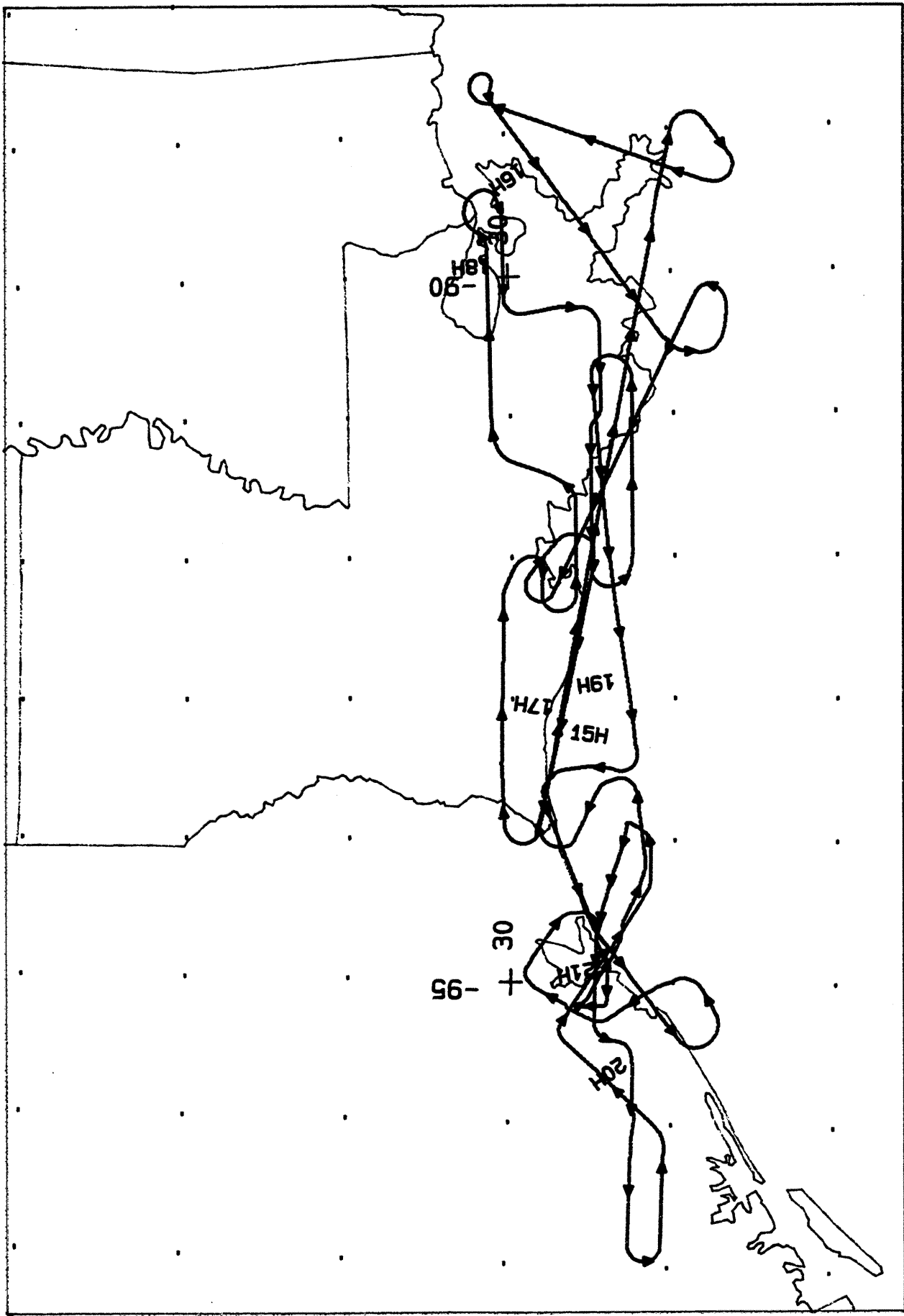
Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
S - T	1990-1999	18:33:38	18:37:47	65000/19800	Clear
I - U	2000-2017	19:13:11	19:21:00	"	10% cirrus (frames 2011-2014); oblique (frame 2017)
U - V	2018-2034	19:21:28	19:28:52	"	Clear
W - X	2035-2039	19:38:10	19:40:01	"	Clear
Y - Z	2040-2043	19:47:00	19:48:22	"	Clear
1 - X	2044-2051	19:54:07	19:57:20	"	Clear
2 - 3	2052-2067	20:05:12	20:12:06	"	Clear
4 - 5	2068-2078	20:15:28	20:20:05	"	Clear
6 - 1	2079-2083	20:29:19	20:31:10	"	Clear
<b>APS ON/OFF TIME 14:59:00/20:30:00</b>					

# MAS SCANNER FLIGHT LINE DATA

## FLIGHT NO. 94-036

DAEDALUS FLIGHT DATA  
FLIGHT NUMBER: 94-036

Check Points	A c t u a l t i m e (GMT) b e g i n e n d	A c t u a l s c a n l i n e b e g i n e n d	A l t i t u d e f e e t / m e t e r	S c a n S p e e d (r p s)	t o t a l G o o d s c a n l i n e s	t o t a l I n t e r p o l a t e d s c a n l i n e s	t o t a l R e p e a t e d s c a n l i n e s
A-B	14:56:72.0 15:31:75.0	11613 24708	65000/19812	6.25	13095	1	0
C-D	15:39:74.0 15:50:77.0	27876 32133	65000/19812	6.25	4258	0	0
D-E	15:56:71.0 16:14:71.0	34212 40746	65000/19812	6.25	6534	1	0
FG	16:22:74.0 16:42:72.0	43815 51339	65000/19812	6.25	7525	0	0
HI	16:51:79.0 17:07:79.0	54804 60843	65000/19812	6.25	6039	1	0
J-K	17:31:74.0 17:35:78.0	69654 71238	65000/19812	6.25	1585	0	0
L-M	17:45:71.0 17:51:71.0	74802 76980	65000/19812	6.25	2179	0	0
NO	17:57:78.0 18:02:74.0	79455 81237	65000/19812	6.25	1783	0	0
PQ	18:09:74.0 18:14:70.0	83910 85692	65000/19812	6.25	1783	0	0
RH	18:16:71.0 18:24:74.0	86385 89454	65000/19812	6.25	3070	0	0
S-T	18:32:75.0 18:37:79.0	92325 94404	65000/19812	6.25	2080	0	0
I-U	19:12:74.0 19:20:79.0	107571 110343	65000/19812	6.25	2773	0	0
U-V	19:21:77.0 19:28:72.0	110640 113412	65000/19812	6.25	2773	0	0
W-X	19:37:73.0 19:39:76.0	116778 117669	65000/19812	6.25	892	0	0
Y-Z	19:46:70.0 19:48:75.0	120243 120837	65000/19812	6.25	595	0	0
1-X	19:53:71.0 19:57:70.0	122619 124104	65000/19812	6.25	1486	0	0
2-3	20:04:71.0 20:12:70.0	126975 129648	65000/19812	6.25	2674	0	0
4-5	20:15:71.0 20:19:77.0	130836 132618	65000/19812	6.25	1783	0	0
6-1	20:28:78.0 20:31:71.0	135984 136749	65000/19812	6.25	766	0	0

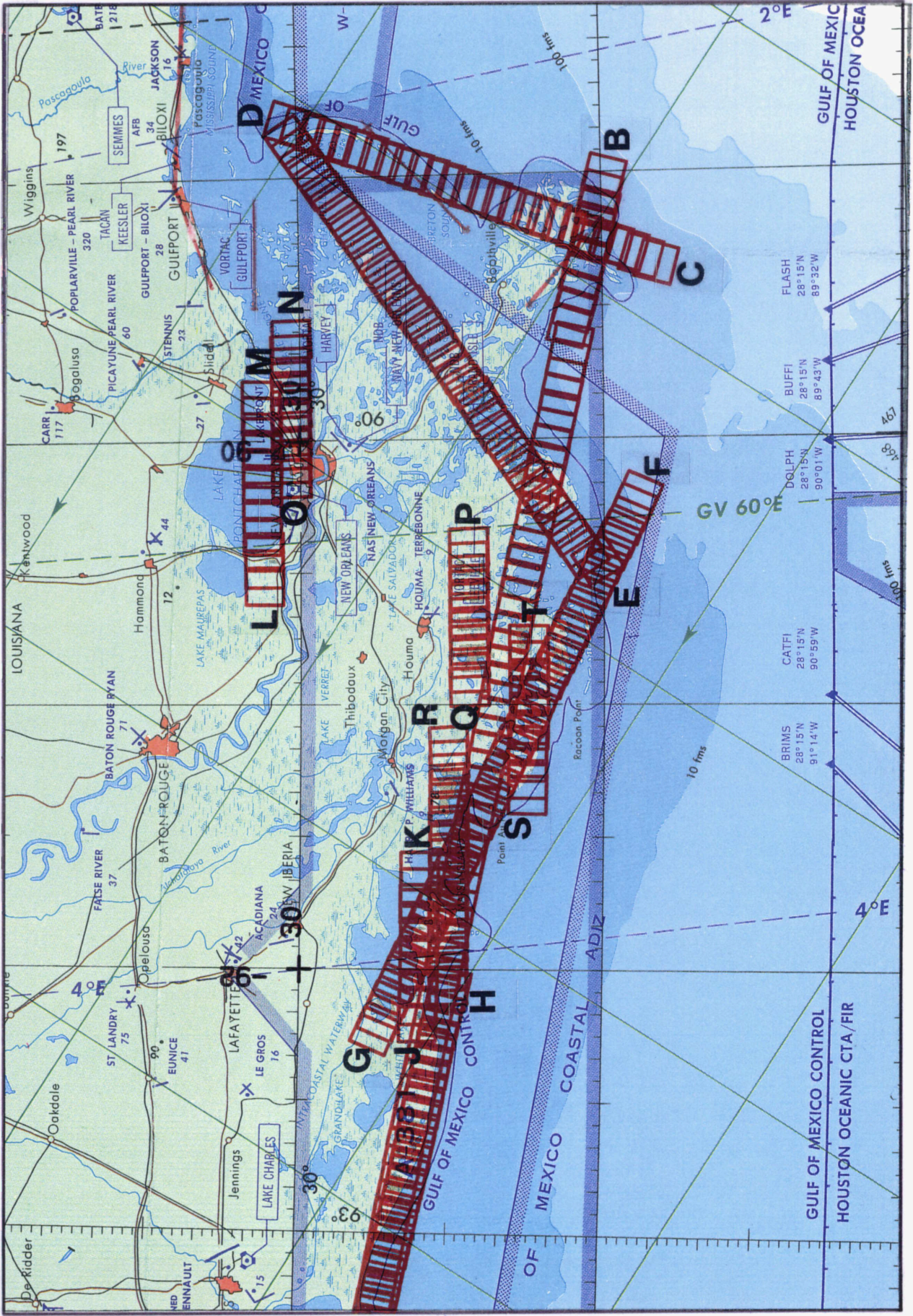


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