

FLIGHT SUMMARY REPORT

Flight Number: 93-088
Calendar/Julian Date: 26 April 1993 • 116
Sensor Package: Wild-Heerbrug RC-10
Modis-N Airborne Simulator (MAS)
Thematic Mapper Simulator (TMS)
Area(s) Covered: San Francisco Bay Area

Investigator(s): Westerman, LMSC

Aircraft #: 708

SENSOR DATA

Accession #:	04556	----	----
Sensor ID #:	076	108	074
Sensor Type:	RC-10	MAS	TMS
Focal Length:	12" 304.89 mm	----	----
Film Type:	High Definition Aerochrome IR SO-131	----	----
Filtration:	cc.10B	----	----
Spectral Band:	510-900 nm	----	----
f Stop:	4	----	----
Shutter Speed:	1/150	----	----
# of Frames:	118	----	----
% Overlap:	60	----	----
Quality:	Excellent	Fair	Good
Remarks:	Camera clock offset 3.02 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.

Thematic Mapper Simulator

The Daedalus Thematic Mapper Simulator (TMS) is a multispectral scanner flown aboard the ER-2 aircraft which simulates spatial and spectral characteristics of the seven Landsat-D Thematic Mapper bands. The specific bands are as follows:

<u>Daedalus Channel</u>	<u>TM Band</u>	<u>Wavelength, μm</u>
1	A	0.42 - 0.45
2	1	0.45 - 0.52
3	2	0.52 - 0.60
4	B	0.60 - 0.62
5	3	0.63 - 0.69
6	C	0.69 - 0.75
7	4	0.76 - 0.90
8	D	0.91 - 1.05
9	5	1.55 - 1.75
10	7	2.08 - 2.35
11	6	8.5 - 14.0 low gain
12	6	8.5 - 14.0 high gain

Sensor/aircraft parameters are as follows:

IFOV:	1.25 mrad
Ground Resolution:	81 feet (25 meters) at 65,000 feet
Total Scan Angle:	43°
Swath Width:	8.4 nmi (15.6 km) at 65,000 feet
Pixels/Scan Line:	716
Scan Rate:	12.5 scans/second
Ground Speed:	400 kts (206 m/second)

Information on data tape format, logical record format, and scanner calibration data may be obtained from the Aircraft Data Facility, NASA-Ames Research Center, Mail Stop 240-6, Moffett Field, California 94035-1000 (Telephone: 415-604-6252).

Modis-N Airborne Simulator

The Modis-N Airborne Simulator (MAS) is a modified Daedalus multispectral scanner. It records up to 12 8-bit channels, which can be selected from an array of 50 available spectral bands. The band selection is made prior to flight and the instrument is hard-wired to that configuration. Channel one can be used to store additional bits which provide 10-bit resolution for channels 9 through 12. The band configuration for this deployment is as follows:

<u>Channel</u>	<u>Band edges μm</u>
2	0.529 - 0.572
3	0.635 - 0.688
4	0.896 - 0.927
5	1.595 - 1.652
6	1.805 - 1.855
7	1.855 - 1.905
8	1.905 - 1.955
9*	3.659 - 3.810
10*	8.342 - 8.738
11*	10.259 - 10.725
12*	11.799 - 12.246

* 10-bit resolution

Sensor/Aircraft Parameters:

Spectral Channels:	50
Output Channels:	7 8-bit and 4 10-bit
IFOV:	0.5 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.)

Information on data tape format, logical record format, and scanner calibration data may be obtained from the Aircraft Data Facility, NASA-Ames Research Center, Mail Stop 240-6, Moffett Field, California 94035-1000 (Telephone: 415-604-6252).

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.

**CAMERA FLIGHT LINE DATA
FLIGHT NO. 93-088**

Accession # 04556
Sensor # 076

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
B - C	7547-7576	21:02:51	21:16:46	65000/19800	Clear
D - E	7577-7605	21:22:15	21:35:37	"	10% cumulus (frames 7577-7580)
F - G	7606-7634	21:38:46	21:52:04	"	Clear
H - I	7635-7664	21:57:22	22:11:05	"	10% cumulus (frames 7635-7638)

TMS SCANNER FLIGHT LINE DATA

FLIGHT NO. 93-088

06/04/88 FLIGHT DATA
 FLIGHT NUMBER: 93-088

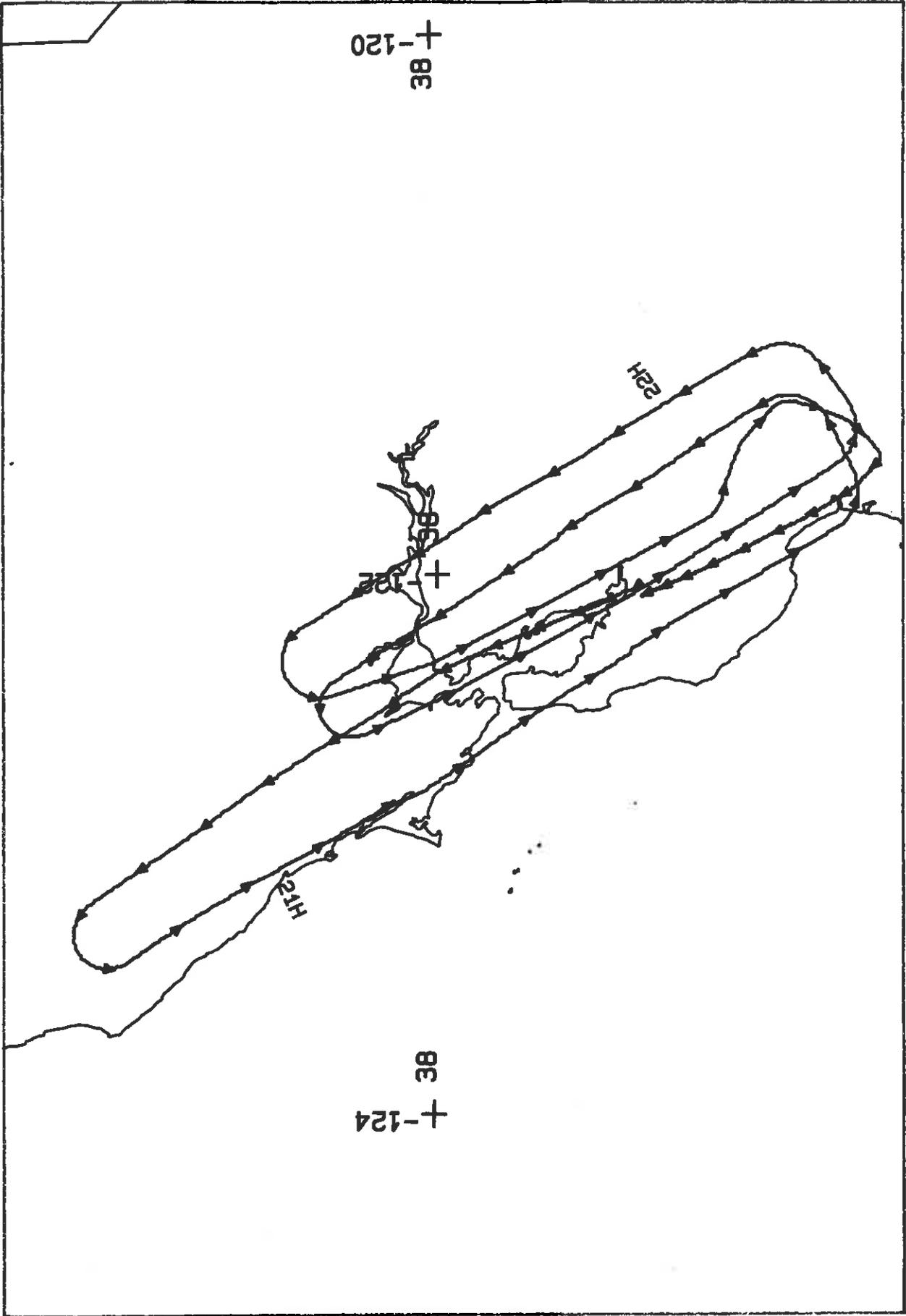
Check Points	Actual Time (min)	Actual Scanline Length (ft)	Altitude ft/MSL	Scan Speed (ft/s)	Total Scanline Length	Total Interpolated Scanlines	Total Repaired Scanlines
A - C	21:17:38.0	2992	6500	12.50	15763	1	0
D - E	21:22:12.0	4768	6500	12.50	16306	1	0
F - G	21:31:25.0	5923	6500	12.50	16301	0	0
H - I	21:37:30.0	7452	6500	12.50	16400	0	0
J - K	22:11:35.0	8679	6500	12.50	1661	0	0
K - L	22:17:25.0	8905	6500	12.50	3763	0	0

MAS SCANNER FLIGHT LINE DATA

FLIGHT NO. 93-088

PROJALUS FLIGHT DATA
 FLIGHT NUMBER: 93-088

Check Points	Check Time begin	Check Time (GMT) end	Scan line begin	Scan line end	Altitude feet/meter	Scan Speed (FPS)	Total Scan lines	Total Integrated Scanlines	Total Repeats Scanlines
A - C	21:07:55.0	21:11:11.5	1902	2133	6300/19012	6.20	7930	0	0
D - E	21:22:12.0	21:35:46.0	23704	26735	6300/19012	6.20	5061	1	0
F - G	21:30:26.0	21:32:26.0	29753	30001	6300/19012	6.20	5054	0	0
H - I	21:57:30.0	22:11:26.5	36675	42104	6300/19012	6.20	3211	0	0
J - K	22:14:56.5	22:17:5.0	43233	44133	6300/19012	6.20	898	0	0
K - L	22:17:23.0	22:21:44.0	48329	49355	6300/19012	6.20	1627	0	0

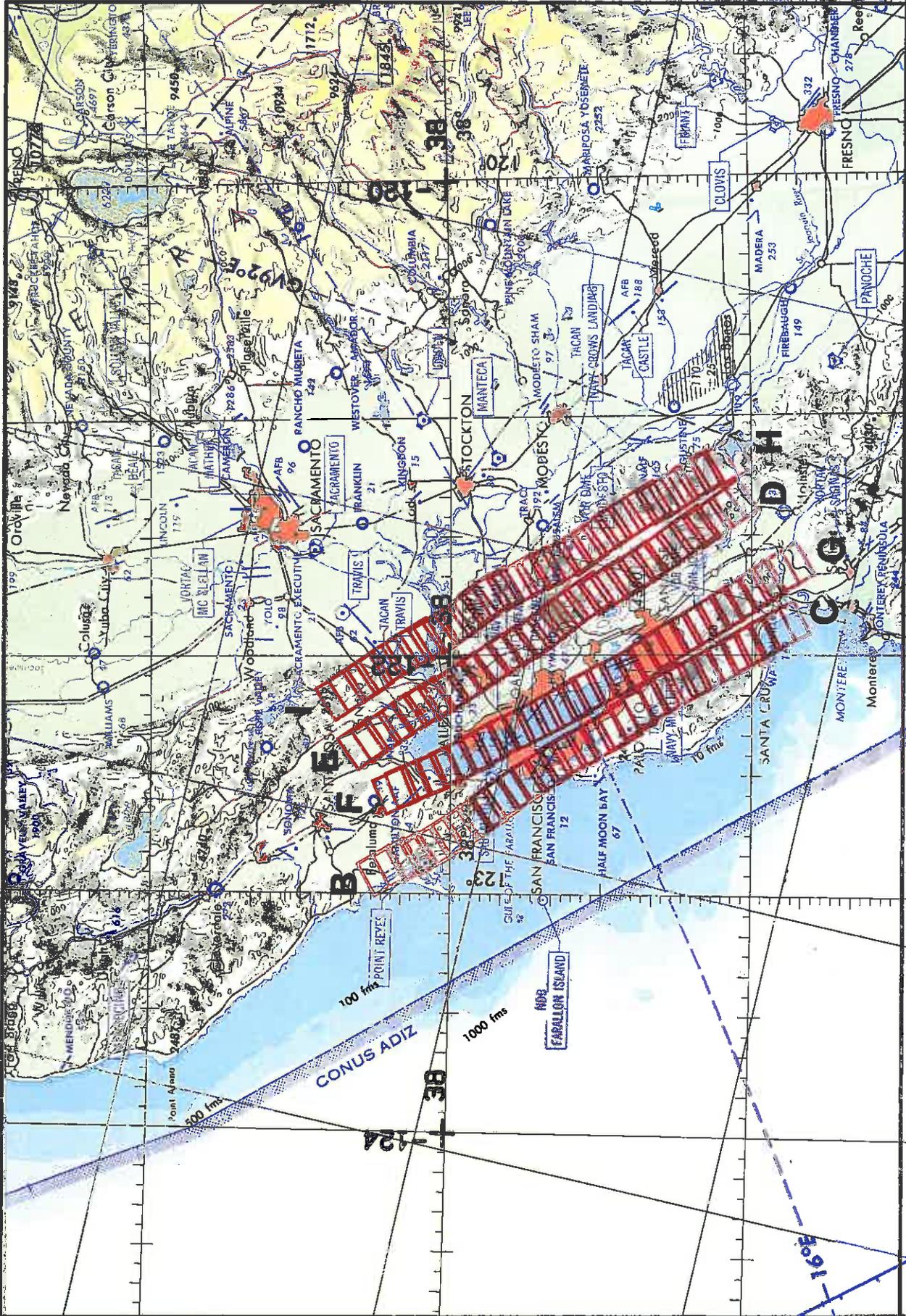


FLIGHT 93-088

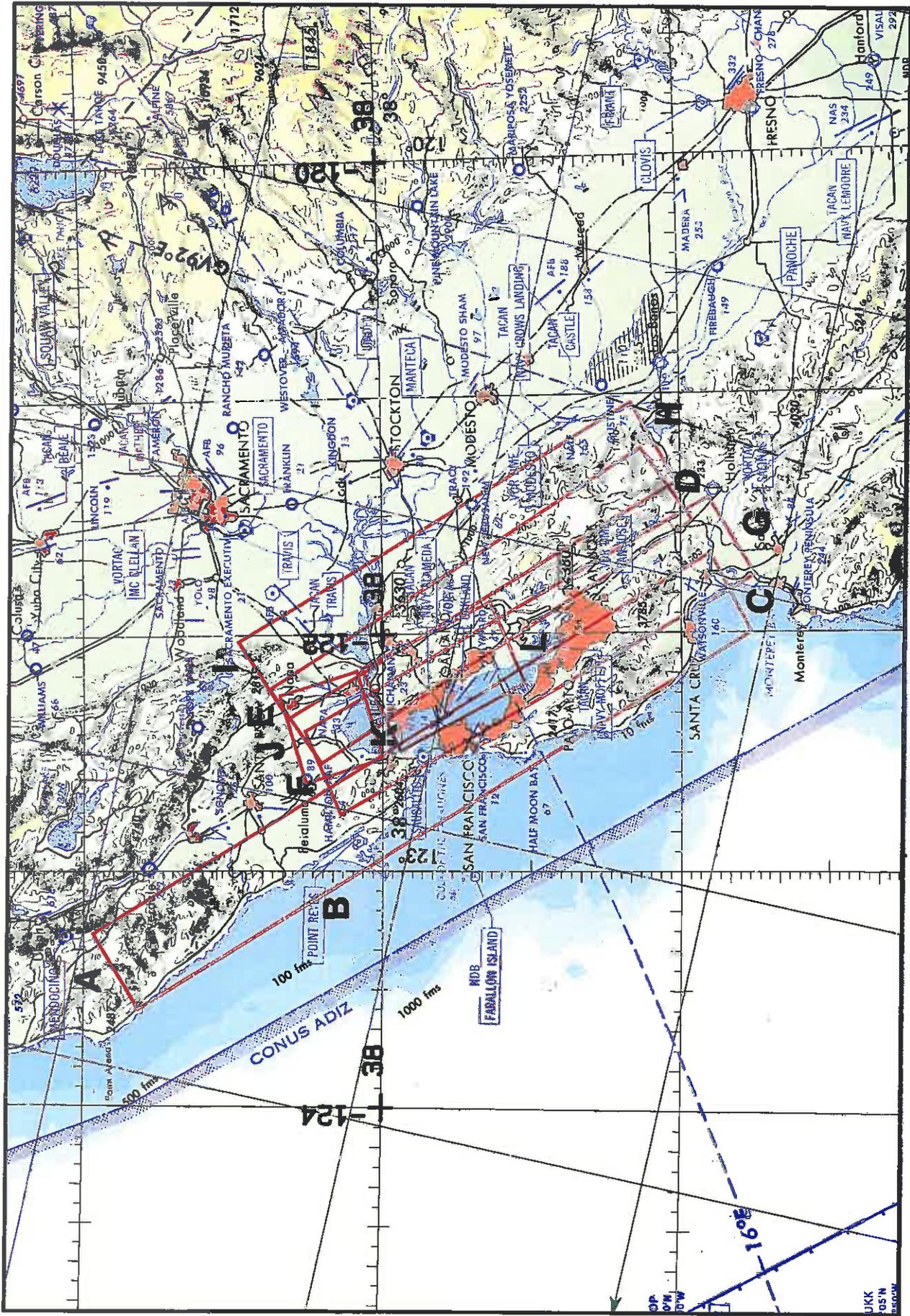
26 APRIL 1993

A/C 708

TMS / MAS



FLIGHT 93-088 26 APRIL 1993 A/C 708 RC-10 Accession 404208 JNC 43



FLIGHT 99-068

26 APRIL 1999

A/C 708

NAS / T48

JNC 49

MOR

UKK
05'N
124°W