

FLIGHT SUMMARY REPORT

Flight Number: 93-162
Calendar/Julian Date: 10 September 1993 • 253
Sensor Package: Wild-Heerbrug RC-10
Thematic Mapper Simulator (TMS)
Modis Airborne Simulator (MAS)
Area(s) Covered: San Francisco Bay Area

Investigator(s): Westerman, LMSC

Aircraft #: 708

SENSOR DATA

Accession #:	04632	-----	-----
Sensor ID #:	076	074	108
Sensor Type:	RC-10	TMS	MAS
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:	85	-----	-----
% Overlap:	60	-----	-----
Quality:	Excellent	Very good	Good
Remarks:	Camera clock offset 4.2 minutes 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)

NOTE: 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 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. The following MAS band combination (configuration LMSC) was used on this flight:

<u>Data System Channel</u>	<u>MAS Channel</u>	<u>Band edges μm</u>
1	--	-----
2	1	0.529 - 0.572
3	2	0.635 - 0.688
4	8	0.896 - 0.927
5	10	1.595 - 1.652
6	14	1.805 - 1.855
7	15	1.855 - 1.905
8	16	1.905 - 1.955
9	31	3.659 - 3.810
10	42	8.342 - 8.738
11	44	10.259 - 10.725
12	46	11.799 - 12.246

Sensor/Aircraft Parameters:

Spectral Channels:	50
Output Channels:	Twelve 8-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.)

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. 93-162**

Accession # 04632

Sensor # 076

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	6270-6297	19:29:52	19:42:53	65000/19800	Clear
C - E	6298-6325	19:46:15	19:59:12	"	Minor strato-cumulus (frame 6311); 10-40% strato-cumulus (frames 6312-6320)
F - G	6326-6353	20:02:55	20:15:49	"	10-20% coastal stratus (frames 6326-6328); 10-90% coastal stratus (frames 6330-6341); 10-30% coastal stratus (frames 6349-6353);
H	6354	20:28:24	_____	20600/6300	Clear

TMS SCANNER FLIGHT LINE DATA

FLIGHT NO. 93-162

DAEDALUS FLIGHT DATA FLIGHT NUMBER: 93-162

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 (rps)	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	19:34:10.0 19:47:38.0	31927 42025	65000/19812	12.50	10098	1	0
D-E	19:52:23.0 20:03:52.0	45589 54202	65000/19812	12.50	8613	1	0
F-G	20:07:10.0 20:21:25.0	56677 67369	65000/19812	12.50	10693	0	0

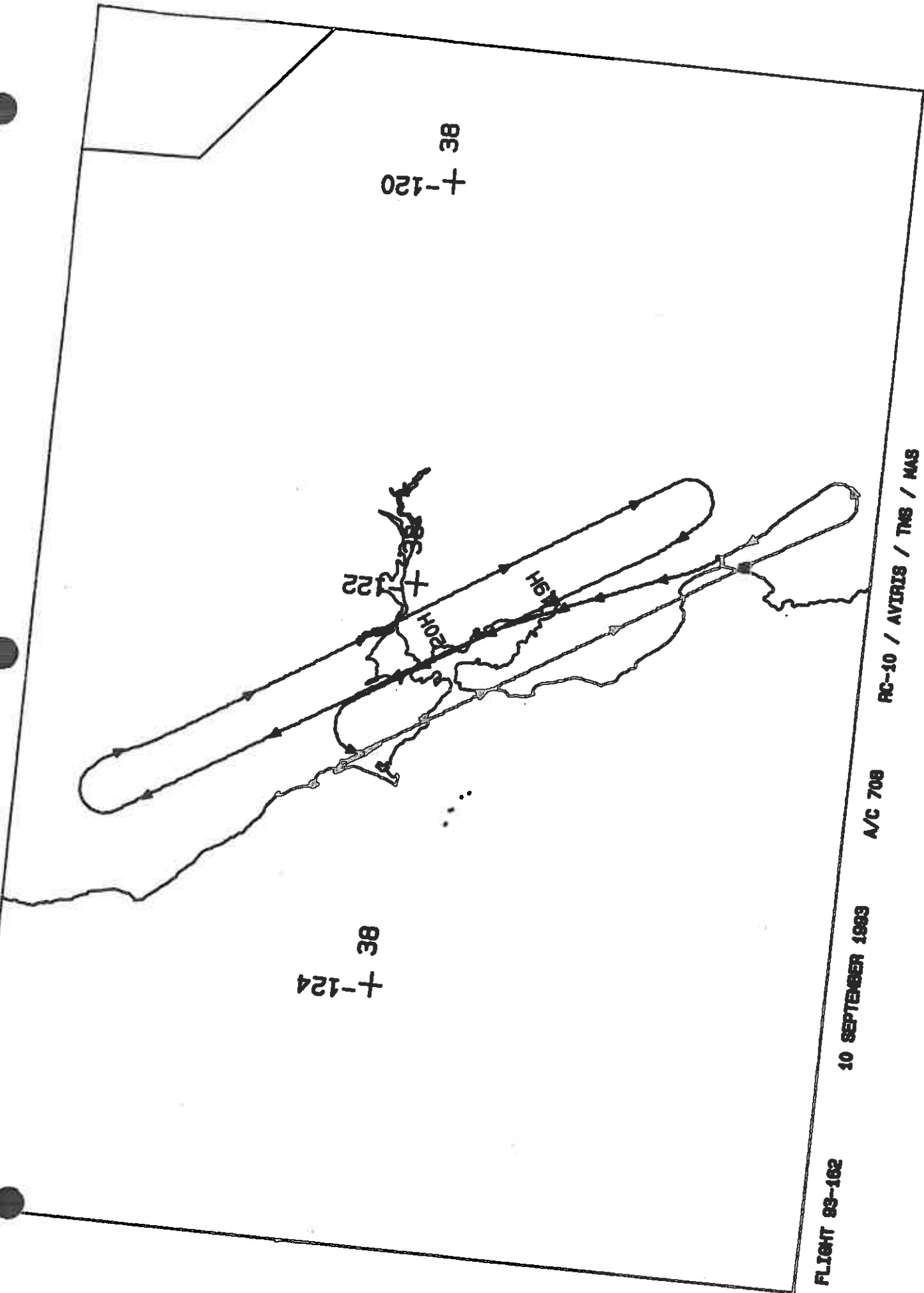
MAS SCANNER FLIGHT LINE DATA

FLIGHT NO. 93-162

DAEDALUS FLIGHT DATA FLIGHT NUMBER: 93-162

Check Points	Actual time begin	Actual scanline begin	Altitude feet/meter	Scan Speed (rps)	total Good scanlines	total Interpolated scanlines	total Repeated scanlines	
A-B	19:34:36.0	19:47:36.0	16059	20910	65000/19812	6.20	4852	0
D-E	19:52:22.0	20:03:15.0	22692	26751	65000/19812	6.20	4059	1
F-G	20:07:13.0	20:21:17.0	28236	33483	65000/19812	6.20	5248	0

NOTE: Scan Speed (rps) is 6.25 NOT 6.20



38
+124

38
+120

120H
122

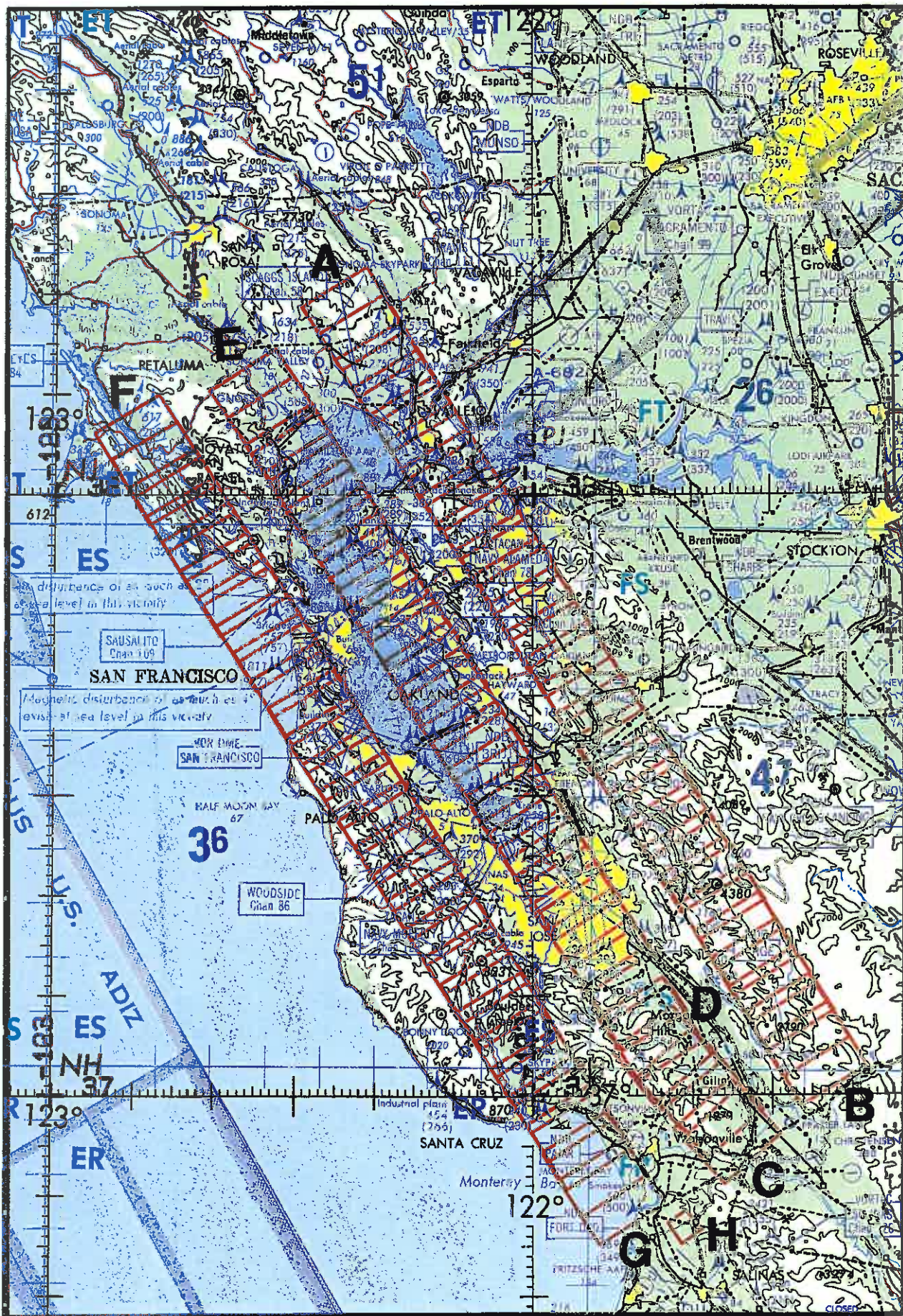
19H

FLIGHT 83-162

10 SEPTEMBER 1993

A/C 708

RC-10 / AVIRIS / TMS / MAS



FLIGHT 93-182
 10 SEPTEMBER 1993
 A/C 709
 RC-10 / TMS / MAS
 ONC 6-18