

# FLIGHT SUMMARY REPORT

**Flight Number:** 93-098  
**Calendar/Julian Date:** 07 May 1993 • 127  
**Sensor Package:** Wild Heerbrug RC-10  
Thematic Mapper Simulator (TMS)  
NASA Aircraft Satellite Instrument  
Calibration (NASIC)  
**Area(s) Covered:** Sierra Nevada

**Investigator(s):** Functional Sensor Flight

**Aircraft #:** 708

## SENSOR DATA

<b>Accession #:</b>	04551	-----	-----
<b>Sensor ID #:</b>	076	074	104
<b>Sensor Type:</b>	RC-10	TMS	NASIC
<b>Focal Length:</b>	12" 304.89 mm	-----	-----
<b>Film Type:</b>	Aerochrome IR SO-134	-----	-----
<b>Filtration:</b>	Wratten 12	-----	-----
<b>Spectral Band:</b>	510-900 nm	-----	-----
<b>f Stop:</b>	8	-----	-----
<b>Shutter Speed:</b>	1/400	-----	-----
<b># of Frames:</b>	85	-----	-----
<b>% Overlap:</b>	60	-----	-----
<b>Quality:</b>	Fair	Good	-----
<b>Remarks:</b>	Data overexposed; camera clock offset 10.4 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, <math>\mu m</math></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).

### NASA Aircraft Satellite Instrument Calibration

The NASA Aircraft Satellite Instrument Calibration (NASIC) is a scanner developed to calibrate research and operational instruments in orbit onboard NOAA and NASA satellites. The NASIC consists of a double Ebert Monochrometer flown on NASA-Ames ER-2 aircraft. Airborne Satellite Calibration System missions are flown coincident with satellite overpasses and fly the same view vector as the satellite instrument over a selected ground scene. The system is used to calibrate instruments such as the Advanced Very High Resolution Radiometer (AVHRR), the Thematic Mapper (TM), and the Coastal Zone Color Scanner (CZCS).

Sensor parameters are as follows:

Detector:	Double Monochrometer with Holographic Grating
Across Track FOV:	8°
Along Track FOV:	4°
Ground Swath Dimensions:	1.5 x 0.75 nmi (2.8 x 1.4 km)
Spectral Range:	400-1035 nm
Scans/Data Collection Leg:	36 + 2 Baseline Housekeeping
Data Points/Scan Line:	184
Data Point Spectral Range:	3.5 nm

For information regarding the NASIC project and data contact Peter Abel, Laboratory for Terrestrial Physics, Code 920.1, NASA-Goddard Space Flight Center, Greenbelt, Maryland 20771. (Telephone: 301-286-7754).

### 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**

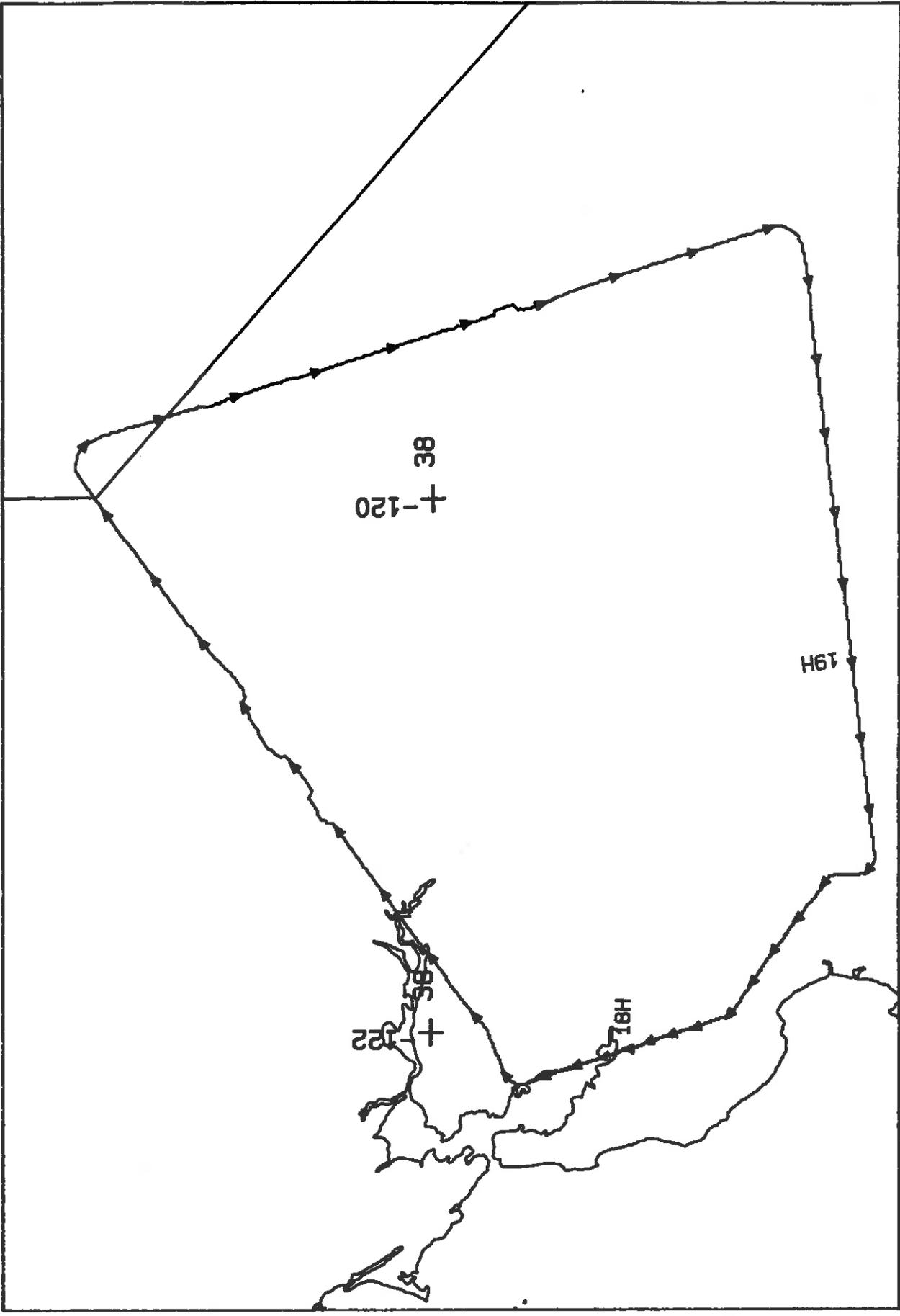
**FLIGHT NO. 93-098**

**Accession # 04551**

**Sensor # 076**

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - C	7914-7934	18:19:34	18:29:12	65000/19800	10-40% scattered cumulus (frames 7917-7928); oblique (frame 7934)
C - F	7935-7974	18:29:41	18:48:26	"	10-20% scattered cumulus (frames 7971-7974); oblique (frame 7974)
F - G	7975-7998	18:48:55	18:59:55	"	10-20% scattered cumulus (frames 7975-7980); oblique (frame 7975)





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