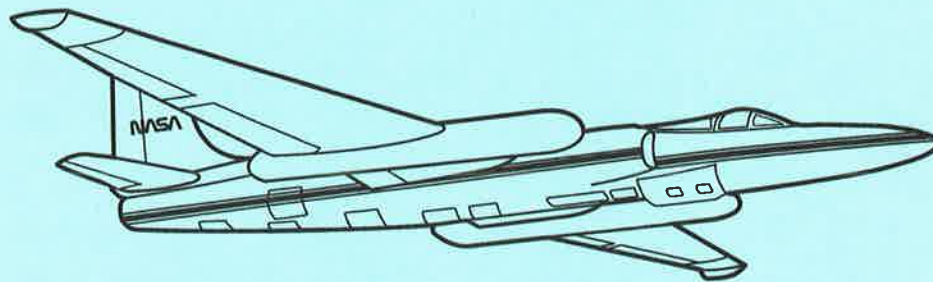
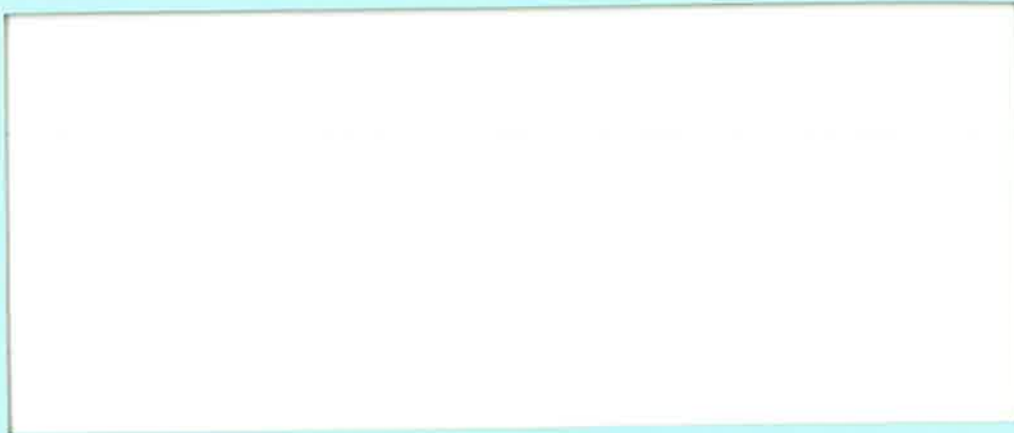


**SCIENCE AND APPLICATIONS AIRCRAFT DIVISION  
AIRBORNE SCIENCE AND APPLICATIONS PROGRAM**



**ER-2  
FLIGHT SUMMARY REPORT**



National Aeronautics and  
Space Administration  
**Ames Research Center**  
Moffett Field, California 94035-1000

**Aircraft Data Facility  
NASA Ames Research Center  
Mail Stop 240-6  
Moffett Field, California 94035-1000  
(415) 604-6252**

G  
70.4  
F58

# FLIGHT SUMMARY REPORT

**Flight Number:** 94-087  
**Calendar/Julian Date:** 20 May 1994 • 140  
**Sensor Package:** Wild-Heerbrug RC-10  
 Airborne Visible and Infrared Imaging Spectrometer (AVIRIS)  
 Aerosol Particulate Sampler (APS)  
 Large Area Collectors (LACs)  
**Area(s) Covered:** California

**Investigator(s):** Melack, UCSB; Green and Evans, JPL; Kruse, U. of Colorado  
**Aircraft #:** 706

## SENSOR DATA

<b>Accession #:</b>	04731	-----	-----	-----
<b>Sensor ID #:</b>	076	099	024	100
<b>Sensor Type:</b>	RC-10	AVIRIS	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>	1/200	-----	-----	-----
<b># of Frames:</b>	209	-----	-----	-----
<b>% Overlap:</b>	60	-----	-----	-----
<b>Quality:</b>	Excellent	-----	-----	-----
<b>Remarks:</b>	Camera clock offset 3.1 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.

## Airborne Visible and Infrared Imaging Spectrometer

The Airborne Visible and Infrared Imaging Spectrometer (AVIRIS) is the second in the series of imaging spectrometer instruments developed at the Jet Propulsion Laboratory (JPL) for earth remote sensing. This instrument uses scanning optics and four spectrometers to image a 614 pixel swath simultaneously in 224 contiguous spectral bands (0.4-2.4  $\mu\text{m}$ ).

AVIRIS parameters are as follows:

IFOV:	1 mrad
Ground Resolution:	66 feet (20 meters) at 65,000 feet
Total Scan Angle:	30°
Swath Width:	5.7 nmi (10.6 km) at 65,000 feet
Spectral Coverage:	0.41-2.45 $\mu\text{m}$
Pixels/Scan Line:	614
Number of Spectral Bands:	224
Digitization:	10-bits
Data Rate:	17 MBPS

<u>Spectrometer</u>	<u>Wavelength Range</u>	<u>Number of Bands</u>	<u>Sampling Interval</u>
1	0.41 - 0.70 $\mu\text{m}$	31	9.4 nm
2	0.68 - 1.27 $\mu\text{m}$	63	9.4 nm
3	1.25 - 1.86 $\mu\text{m}$	63	9.7 nm
4	1.84 - 2.45 $\mu\text{m}$	63	9.7 nm

All AVIRIS data is decommutated and archived at JPL and not currently available for public distribution. For further information contact Rob Green at Jet Propulsion Laboratory, 4800 Oak Grove Drive, Mail Stop 183-501, Pasadena, California 91109-8099.

## 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. 94-087**

Accession # 04731

Sensor # 076

Page 1/2

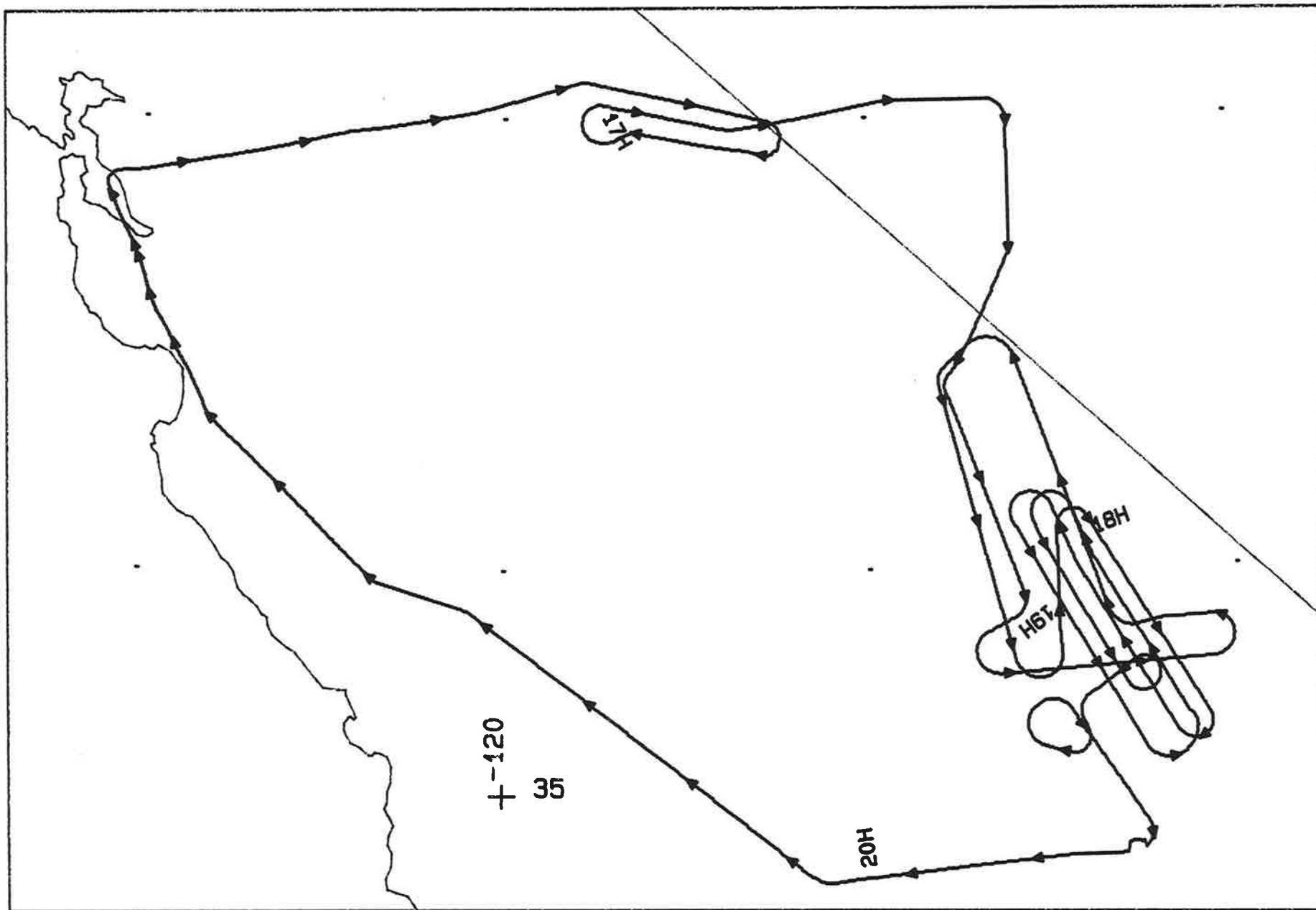
Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	3666-3674	16:43:28	16:47:15	65000/19800	10-30% cumulus
C - D	3675-3683	16:52:18	16:56:04	"	20-50% cumulus
E - F	3684-3692	17:00:50	17:04:35	"	Minor-40% cumulus (frames 3685-3692)
G - H	3693-3703	17:17:29	17:21:41	"	10% cumulus
I - J	3704-3722	17:28:40	17:36:48	"	10-40% cumulus (frames 3704-3710); 10% cumulus (frames 3712-3714 and 3719-3721)
K - L	3723-3740	17:42:09	17:49:51	"	Clear
M - N	3741-3762	17:57:41	18:07:27	"	10-30% cumulus (frames 3760-3762)
O - K	3763-3785	18:13:26	18:23:11	"	10-40% cumulus (frames 3763-3767); oblique (frame 3785)
P - Q	3786-3802	18:33:36	18:40:50	"	10% cumulus (frames 3786-3789)
R - S	3803-3818	18:44:53	18:51:22	"	Clear

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 94-087**

Accession # 04731

Sensor # 076

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
T - U	3819-3834	18:57:22	19:03:56	65000/19800	10-30% cumulus (frames 3819-3823)
V - W	3835-3849	19:10:59	19:17:13	"	Clear
X - Y	3850-3864	19:23:14	19:29:26	"	10-40% cumulus (frames 3850-3852)
Z - 1	3865-3874	19:43:36	19:47:45	"	Clear
<b>APS ON/OFF 16:44:00/20:27:00</b>					



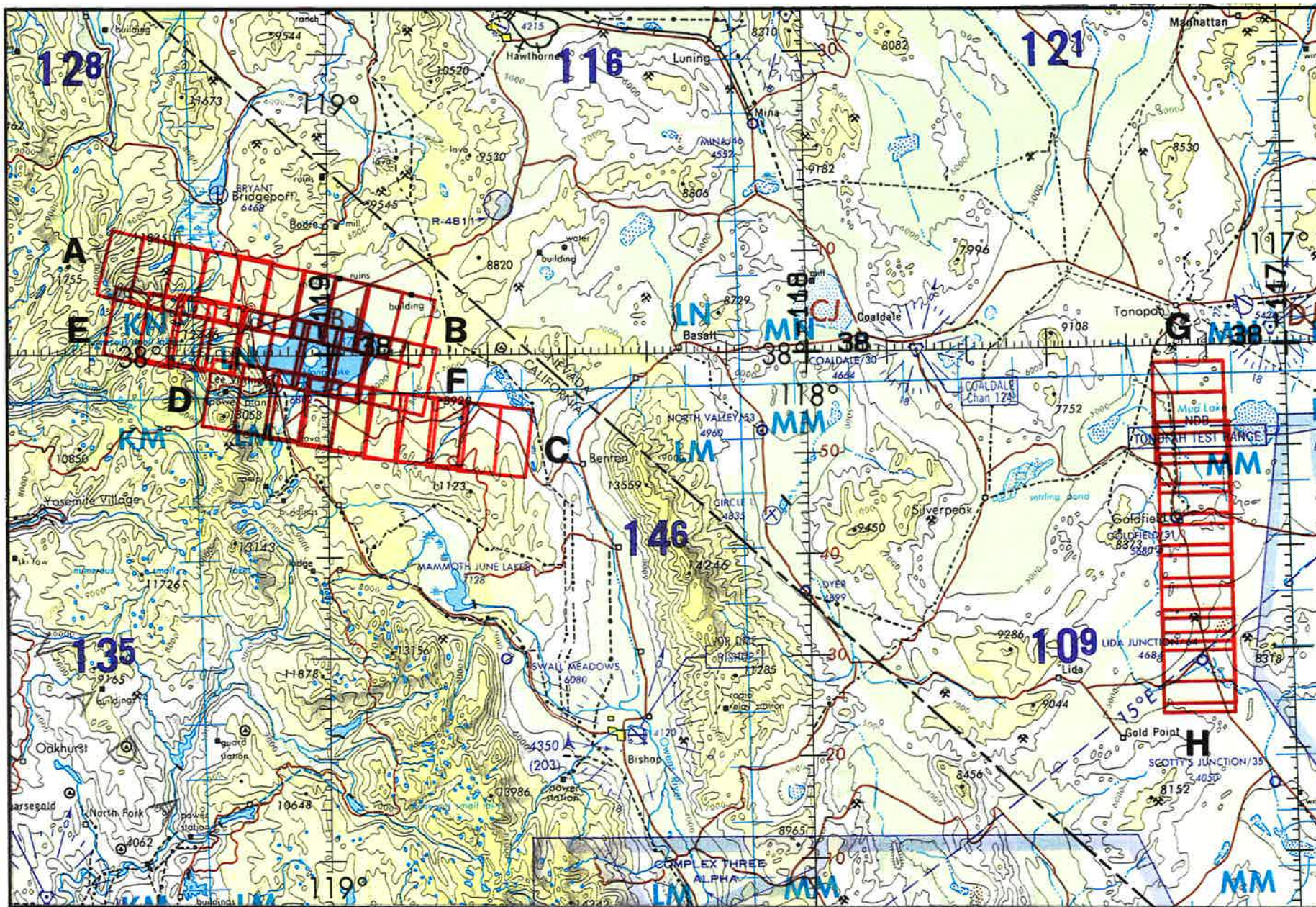
FLIGHT 94-087

20 MAY 1994

A/C 706

RC-10 / AVIRIS





FLIGHT 94-087

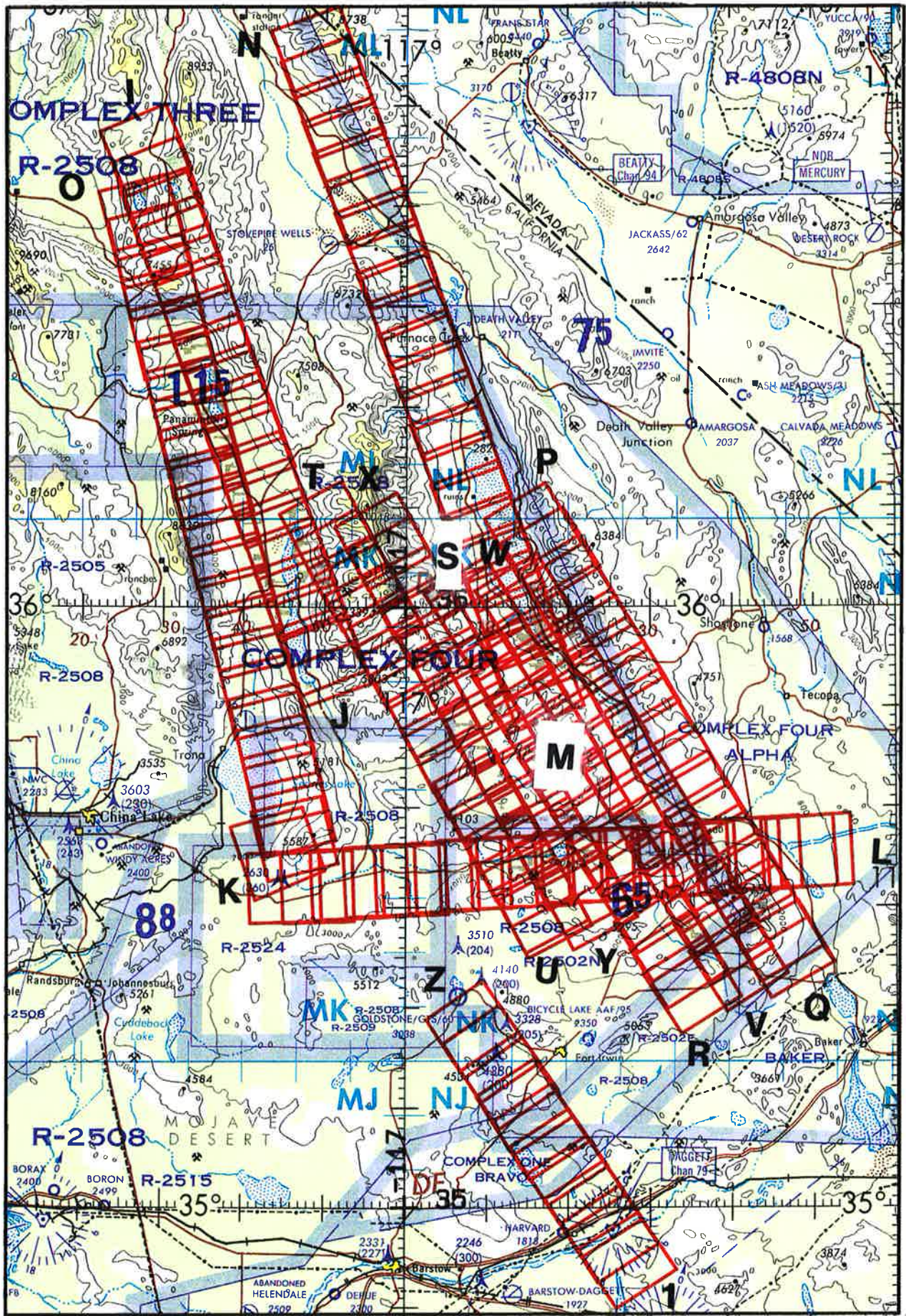
20 MAY 1994

A/C 706

RC-10 / AVIRIS

ONC 6-18





FLIGHT 94-087  
20 MAY 1994  
A/C 706  
RC-10 / AVIRIS  
CNC 6-18