

# FLIGHT SUMMARY REPORT

**Flight Number:** 94-142  
**Calendar/Julian Date:** 16 September 1994 • 259  
**Sensor Package:** Wild-Heerbrug RC-10  
Airborne Visible and Infrared Imaging  
Spectrometer (AVIRIS)  
Thematic Mapper Simulator (TMS)  
**Area(s) Covered:** Canada

**Investigator(s):** Sellers, GSFC

**Aircraft #:** 706

## SENSOR DATA

<b>Accession #:</b>	04810	----	----
<b>Sensor ID #:</b>	034	099	074
<b>Sensor Type:</b>	RC-10	AVIRIS	TMS
<b>Focal Length:</b>	12" 304.66 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>	8	----	----
<b>Shutter Speed:</b>	1/200	----	----
<b># of Frames:</b>	129	----	----
<b>% Overlap:</b>	60	----	----
<b>Quality:</b>	Good	----	Good
<b>Remarks:</b>	Camera clock offset 18.4 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.

## 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.

## 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)

## 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. 94-142**

Accession # 04810

Sensor # 034

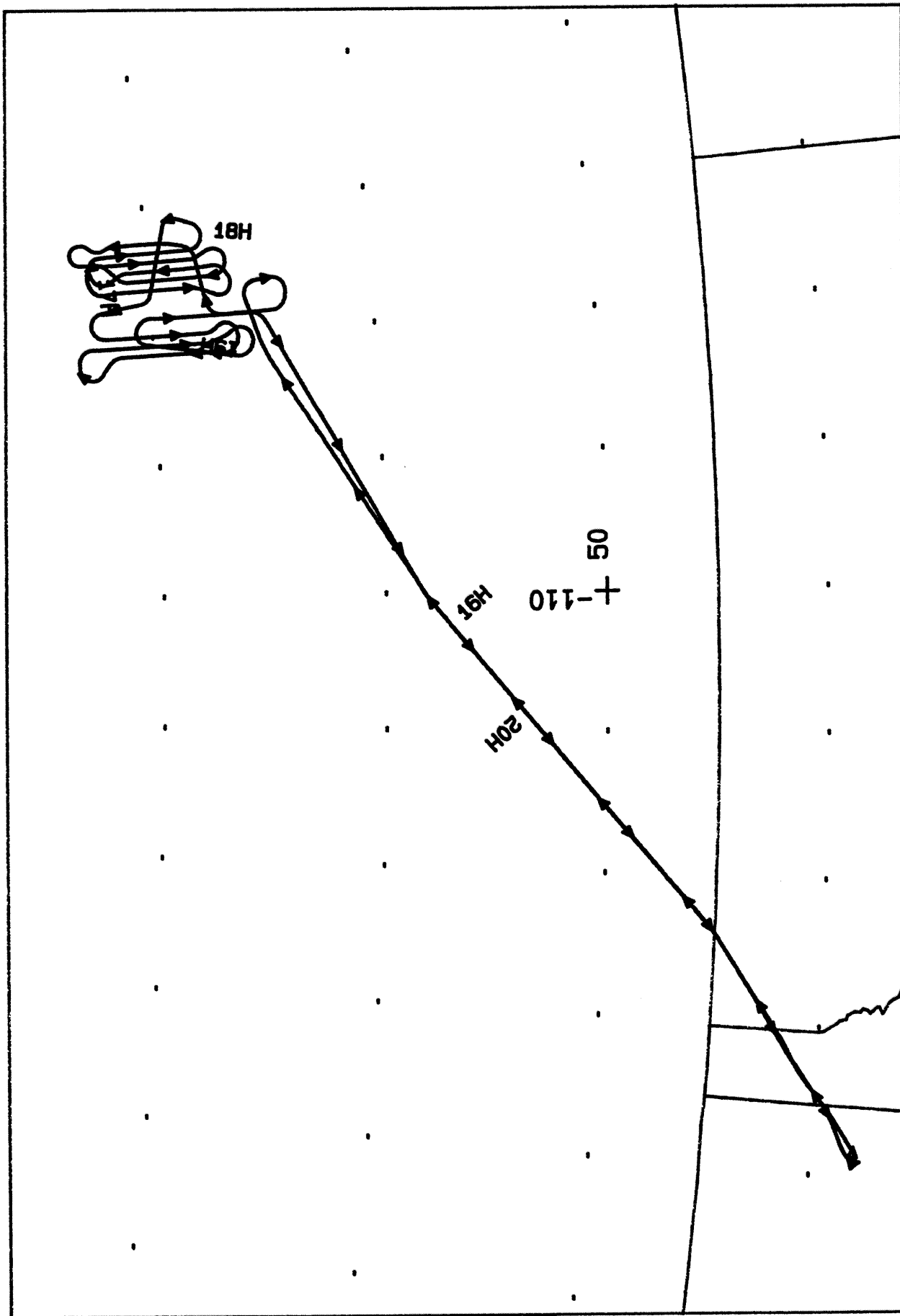
Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	6535-6539	16:39:06	16:41:01	65000/19800	Clear
C - D	6540-6548	16:48:34	16:52:24	"	Clear
E - F	6549-6561	17:01:43	17:07:29	"	Clear; emulsion abrasion (frame 6552)
G - H	6562-6571	17:15:25	17:19:44	"	Clear
I - J	6572-6581	17:29:01	17:33:20	"	Clear
K - L	6582-6591	17:41:41	17:46:00	"	Clear
M - N	6592-6601	17:54:00	17:58:19	"	Clear
O - P	6602-6610	18:06:03	18:09:54	"	Clear
Q - R	6611-6623	18:19:42	18:25:28	"	Clear
S - T	6624-6637	18:33:13	18:39:29	"	Clear
U - V	6638-6650	18:48:52	18:54:38	"	Clear
S - W	6651-6659	19:04:56	19:08:47	"	Clear
B - A	6660-6663	19:18:09	19:19:36	"	Clear

# TMS SCANNER FLIGHT LINE DATA

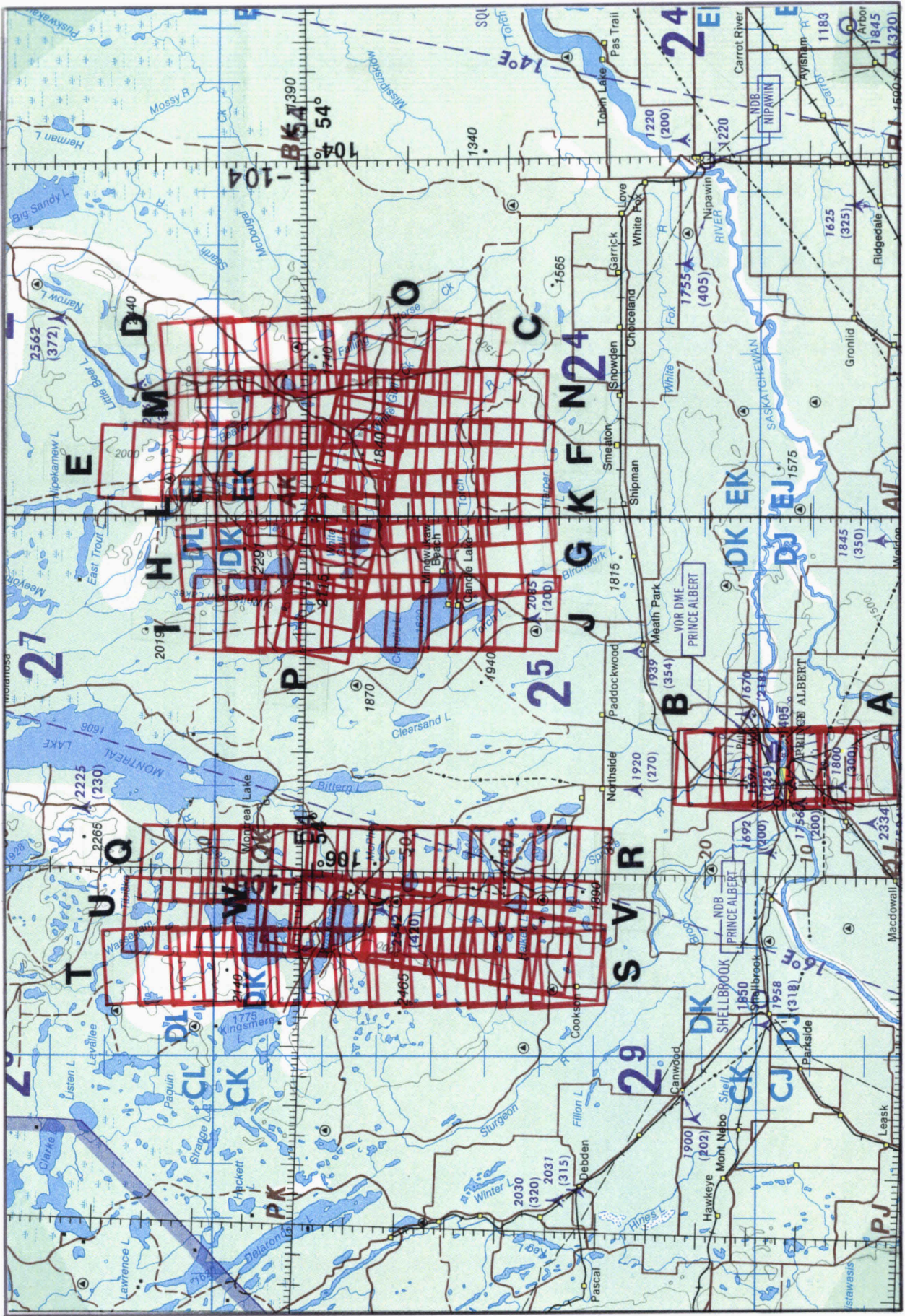
## FLIGHT NO. 94-142

DAEDALUS FLIGHT DATA  
FLIGHT NUMBER: 94-142

Check Points	A c t u a l t i m e b e g i n	A c t u a l e n d	A c t u a l s c a n l i n e b e g i n	A c t u a l e n d	Altitude foot/meter	Scan Speed (rps)	total G o o d s c a n l i n e s	total I n t e r p o l a t e d s c a n l i n e s	total R e p e a t e d s c a n l i n e s
A-B	16:38:00.0	16:41:4.0	80000	82277	65000/19812	12.50	2278	0	0
C-D	16:47:53.0	16:53:5.0	87326	91187	65000/19812	12.50	3862	0	0
E-F	17:00:58.0	17:07:19.0	97028	101731	65000/19812	12.50	4704	0	0
G-H	17:14:28.0	17:19:32.0	107027	110789	65000/19812	12.50	3763	0	0
I-J	17:27:57.0	17:33:9.0	117026	120087	65000/19812	12.50	3862	0	0
K-L	17:40:46.0	17:45:54.0	126530	130342	65000/19812	12.50	3813	0	0
M-N	17:53:3.0	17:58:15.0	135638	139499	65000/19812	12.50	3862	0	0
O-P	18:05:4.0	18:09:52.0	144548	148112	65000/19812	12.50	3565	0	0
Q-R	18:18:9.0	18:25:25.0	154250	159646	65000/19812	12.50	5397	0	0
S-T	18:32:1.0	18:39:13.0	164546	169892	65000/19812	12.50	5347	0	0
U-V	18:47:45.0	18:54:49.0	176220	181475	65000/19812	12.50	5248	0	0
S-W	19:03:45.0	19:08:49.0	188100	191870	65000/19812	12.50	3763	0	0
B-A	19:17:45.0	19:19:45.0	198503	199980	65000/19812	12.50	1486	0	0



FLIGHT 94-142      16 SEPTEMBER 1984      A/C 706      RC-10 / AVIRIS / TMS



FLIGHT 94-142      16 SEPTEMBER 1994      A/C 706      RC-10 / TMS / AVIRIS      ONC E-16