

# FLIGHT SUMMARY REPORT

**Flight Number:** 95-119  
**Calendar/Julian Date:** 13-14 June 1995 • 164, 165  
**Sensor Package:** Wild-Heerbrugg RC-10  
Modis Airborne Simulator (MAS)  
Airborne Visible and Infrared Imaging  
Spectrometer (AVIRIS)  
Aerosol Particulate Sampler (APS)  
**Area(s) Covered:** Alaska

**Investigator(s):** King, NASA-GSFC

**Aircraft #:** 706

## SENSOR DATA

<b>Accession #:</b>	04936	----	----	----
<b>Sensor ID #:</b>	034	108	099	024
<b>Sensor Type:</b>	RC-10	MAS	AVIRIS	APS
<b>Focal Length:</b>	12" 304.66 mm	----	----	----
<b>Film Type:</b>	Panatomic X Aerographic II 2412	----	----	----
<b>Filtration:</b>	Wratten 12	----	----	----
<b>Spectral Band:</b>	510-700 nm	----	----	----
<b>f Stop:</b>	11	----	----	----
<b>Shutter Speed:</b>	1/300	----	----	----
<b># of Frames:</b>	333	----	----	----
<b>% Overlap:</b>	60	----	----	----
<b>Quality:</b>	Excellent	----	----	----
<b>Remarks:</b>	Camera clock offset 10.3 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 decommuted 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.

### Modis Airborne Simulator

The Modis Airborne Simulator (MAS) is a modified Daedalus multispectral scanner configured to replicate the capabilities of the Moderate-Resolution Imaging Spectrometer (MODIS), an instrument to be orbited on an EOS platform. MODIS is designed for the measurement of biological and physical processes and atmospheric temperature. The Modis Airborne Simulator records fifty 12-bit channels of multispectral data and is configured as follows:

Spectral Channel	Band center (μm )	Bandwidth (μm )	Spectral Range
1	0.549	0.044	0.527-0.571
2	0.658	0.053	0.631-0.684
3	0.704	0.042	0.683-0.725
4	0.745	0.041	0.725-0.766
5	0.786	0.041	0.765-0.807
6	0.827	0.042	0.806-0.848
7	0.869	0.042	0.848-0.891
8	0.909	0.033	0.893-0.926
9	0.947	0.046	0.924-0.970
10	1.608	0.053	1.582-1.635
11	1.670	0.052	1.644-1.695
12	1.723	0.05	1.698-1.748
13	1.775	0.05	1.750-1.800
14	1.825	0.046	1.802-1.849
15	1.88	0.045	1.856-1.901
16	1.93	0.45	1.909-1.954
17	1.98	0.048	1.955-2.003
18	2.03	0.048	2.005-2.053
19	2.08	0.047	2.056-2.103
20	2.128	0.047	2.105-2.152
21	2.177	0.047	2.154-2.201
22	2.227	0.047	2.203-2.250
23	2.276	0.047	2.253-2.300
24	2.326	0.047	2.303-2.350
25	2.375	0.047	2.351-2.398

Spectral Channel	Band center (μm )	Bandwidth (μm )	Spectral Range
26	2.958	0.136	2.889-3.026
27	3.119	0.123	3.058-3.181
28	3.265	0.146	3.192-3.338
29	3.437	0.142	3.366-3.509
30	3.565	0.144	3.493-3.637
31	3.747	0.138	3.668-3.816
32	3.893	0.156	3.815-3.971
33	4.064	0.143	3.992-4.135
34	4.156	0.065	4.124-4.189
35	4.389	0.113	4.332-4.446
36	4.514	0.140	4.444-4.584
37	4.647	0.144	4.575-4.720
38	4.823	0.179	4.734-4.913
39	4.992	0.145	4.919-5.064
40	5.139	0.122	5.078-5.120
41	5.275	0.124	5.214-5.337
42	8.557	0.396	8.359-8.755
43	9.711	0.509	9.457-9.966
44	10.473	0.441	10.252-10.693
45	10.976	0.439	10.757-11.196
46	11.929	0.421	11.719-12.140
47	12.822	0.376	12.634-13.010
48	13.190	0.447	12.966-13.413
49	13.661	0.587	13.368-13.954
50	14.155	0.395	13.957-14.352

#### Sensor/Aircraft Parameters:

Spectral Bands: 50 (digitized to 16-bit resolution)  
 IFOV: 2.5 mrad  
 Ground Resolution: 163 feet (50 meter at 65,000 feet)  
 Swath Width: 22.9 mi/19.9 nmi (36 km)  
 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.)

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.

### 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.

### 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-Heerbrugg 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).

Additional information regarding ER-2 acquired photographic and digital data is available through the Aircraft Data Facility at Ames Research Center. 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).

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 95-119**

Accession # 04936

Sensor # 034

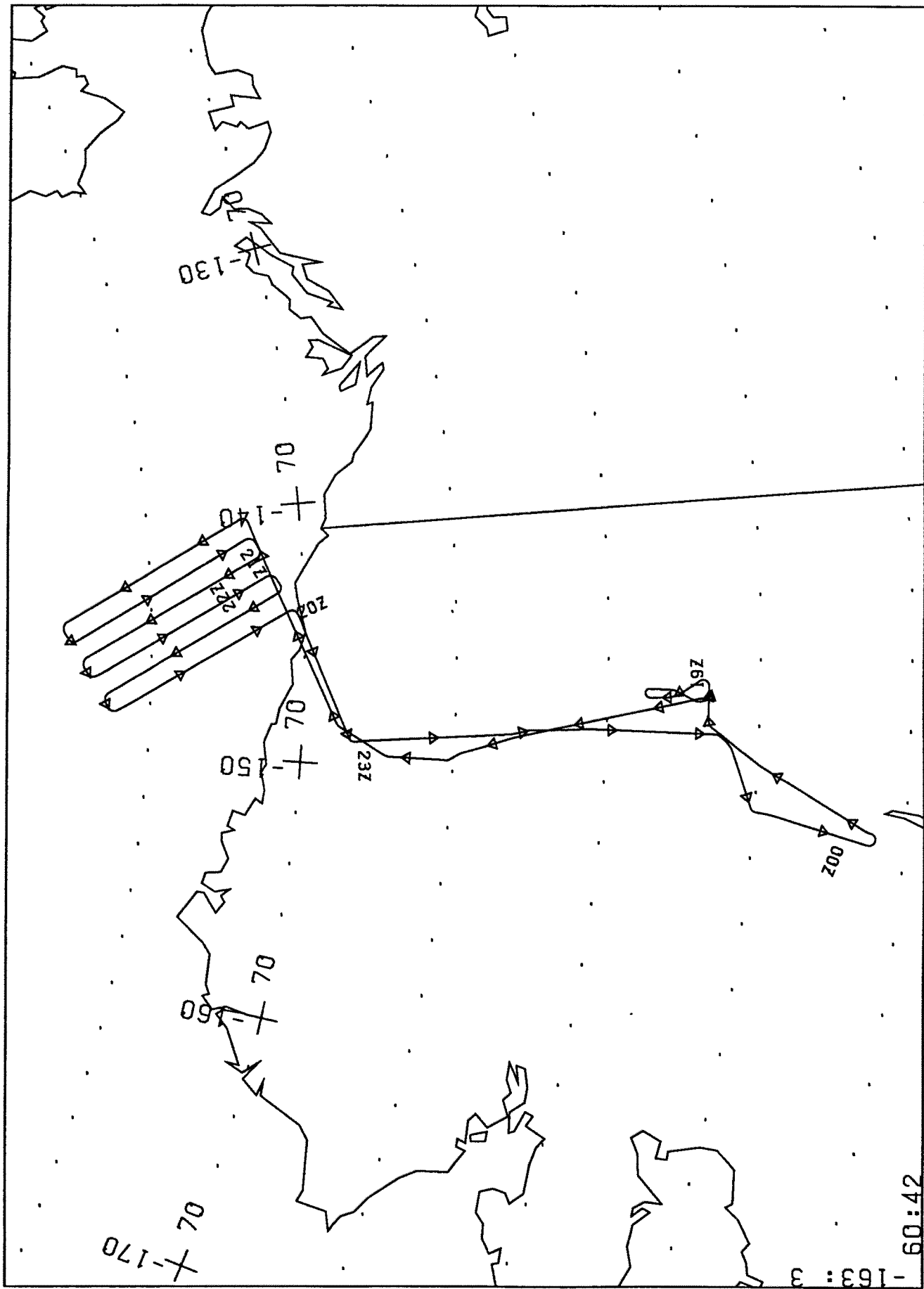
Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	6444-6451	19:37:02	19:40:21	65000/19800	30-80% cumulus (frames 6444-6449)
C - D	6452-6457	19:44:25	19:46:47	"	Minor-10% cumulus (frames 6456-6457)
E - F	6458-6503	20:14:22	20:35:37	"	50-90% cumulus (frames 6458-6465); 10-40% cumulus (frames 6466-6469); 50-100% cumulus (frames 6470-6503)
G - H	6504-6550	20:39:40	21:01:24	"	50-100% cirrus and cumulus (frames 6504-6530); 10-30% cirrus (frames 6531-6534); 40-100% cumulus (frames 6535-6550)
I - J	6551-6596	21:05:08	21:26:25	"	20-30% cumulus (frames 6551-6553); 50-100% cumulus (frames 6554-6560); minor-30% cumulus (frames 6561-6570); 50-100% cumulus (frames 6571-6596)
K - L	6597-6642	21:30:18	21:51:34	"	40-100% cumulus (frames 6597-6623); minor-50% cumulus and cirrus (frames 6624-6642)

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 95-119**

**Accession # 04936**

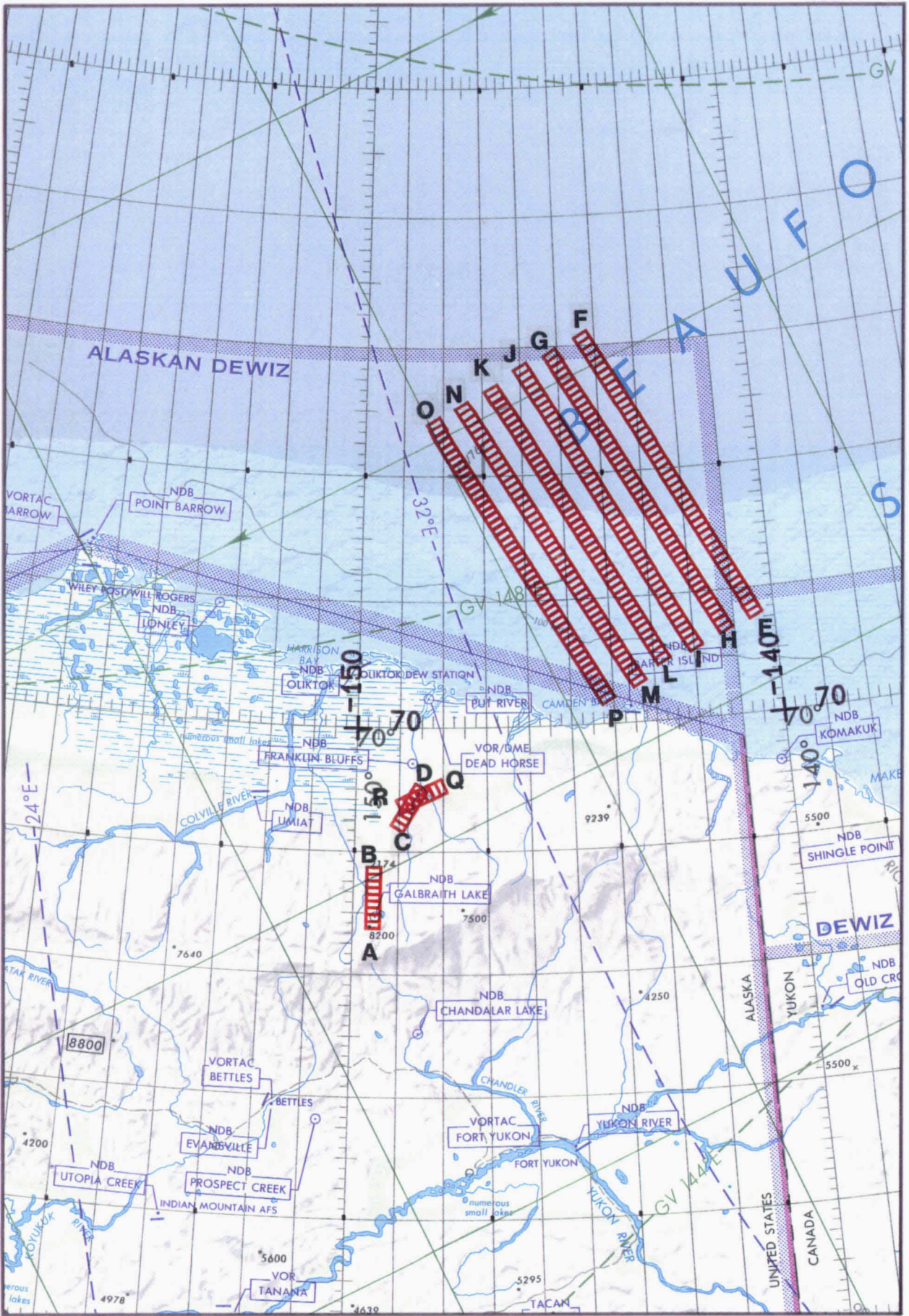
**Sensor # 034**

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
M - N	6643-6688	21:55:33	22:16:49	65000/19800	Minor-20% cirrus (frames 6643-6663); 30-100% cirrus and cumulus (frames 6664-6688)
O - P	6689-6735	22:20:31	22:42:16	"	30-80% cirrus and cumulus (frames 6689-6694); minor-20% cirrus (frames 6695-6702); 40-100% cumulus (frames 6703-6711); minor-20% cumulus (frames 6712-6713 and 6730-6734); thin cirrus (frames 6714-6729)
Q - R	6736-6741	22:56:20	22:58:41	"	Clear
S - T	6742-6750	23:36:18	23:40:03	"	Minor-20% cumulus
U - V	6751-6772	23:53:40	00:03:32	"	Minor-20% cumulus (frames 6765-6772)
W - X	6773-6776	00:31:13	00:32:15	"	Clear
<b>APS ON/OFF TIME</b>		<b>19:31:00/00:34:00</b>			



60:42

FLIGHT 95-119 13 JUNE 1995 R/C 706 RC-10 / MAS-50  
 LAMBERT CONFORMAL PROJECTION: SP1 = 60.6 SP2 = 71.3 CM = -145.8 ROTATED BY 0.0  
 18:58:16 TO 0:58:46 UT SCALE 1:7.81E+06 TIME TICK EVERY 10.00 MINUTES



GNC 6

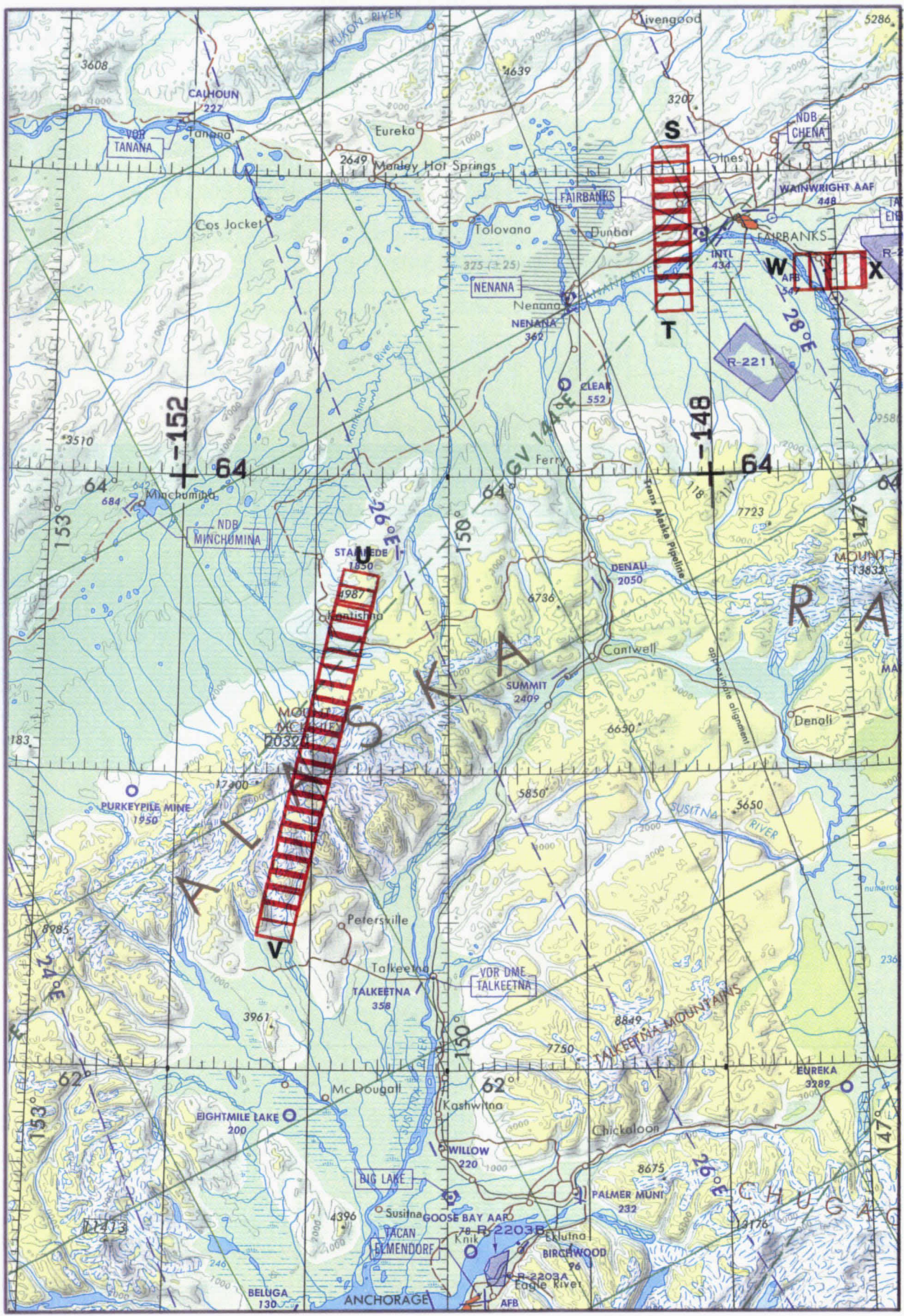
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