FLIGHT SUMMARY REPORT

Flight Number: 93-136

Calendar/Julian Date: 12 July 1993 • 193

Sensor Package: Wild-Heerbrug RC-10
Airborne Visible and Infrared Imaging Spectrometer (AVIRIS)
Modis Airborne Simulator (MAS)

Area(s) Covered: Mid-Atlantic Coast

Investigator(s): Kaufman, NASA-Goddard **Aircraft #:** 708

SENSOR DATA

Accession #:	04593	-----	-----
Sensor ID #:	034	099	108
Sensor Type:	RC-10	AVIRIS	MAS
Focal Length:	12" 304.66 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:	120	-----	-----
% Overlap:	60	-----	-----
Quality:	Excellent	-----	Good
Remarks:	Camera clock offset 53.4 seconds from navigation data		Data time offset 56.4 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 mm).

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 mm
Pixels/Scan Line:	614
Number of Spectral Bands:	224
Digitization:	10-bits
Data Rate:	17 MBPS

Spectrometer	Wavelength Range	Number of Bands	Sampling Interval
1	0.41 - 0.70 mm	31	9.4 nm
2	0.68 - 1.27 mm	63	9.4 nm
3	1.25 - 1.86 mm	63	9.7 nm
4	1.84 - 2.45 mm	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.

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. Channel 1 is used to store additional bits which provide 10-bit resolution for channels 9 through 12. The following MAS band combination (configuration SCARP1) was used on this flight for Smoke, Cloud, and Radiation (SCAR) experiments:

Data System Channel	MAS Channel	Band edges µm
1	--	--------
2	1	0.529 - 0.572
3	2	0.635 - 0.688
4	7	0.852 - 0.893
5	9	0.926 - 0.969
6	15	1.855 - 1.905
7	20	2.126 - 2.173
8	31	3.659 - 3.810
9*	42	8.342 - 8.738
10*	45	10.791 - 11.239
11*	48	13.023 - 13.375
12*	46	11.799 - 12.246

* 10-bit resolution

Sensor/Aircraft Parameters:

Spectral Channels:	50
Output Channels:	Seven 8-bit and four 10-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).

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. 93-136

Accession # 04593

Sensor # 034

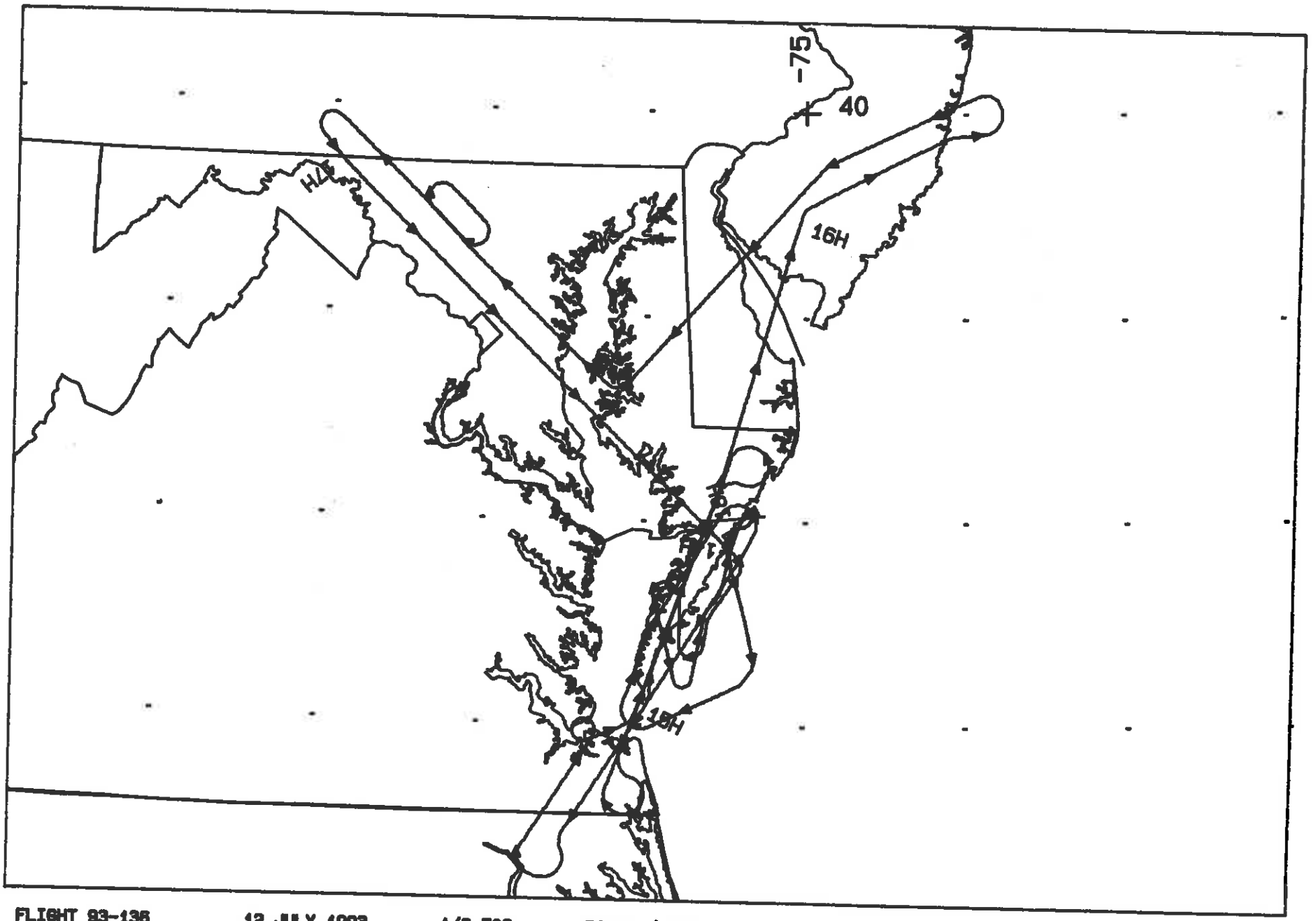
Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
B - C	9006-9017	14:38:23	14:43:09	65000/19800	Clear
D - E	9018-9028	14:48:36	14:53:21	"	Clear
B - F	9029-9042	14:59:15	15:05:25	"	Thin cirrus (frames 9041-9042)
F - B	9043-9054	15:19:22	15:24:33	"	Clear
B - F	9055-9067	15:38:13	15:43:21	"	Minor smoke (frames 9064-9066)
H - I	9068-9081	16:00:48	16:06:50	"	10-40% cirrus and cumulus
J - K	9082-9095	16:12:17	16:18:19	"	20-50% cirrus and cumulus
M - N	9096-9107	16:34:33	16:39:38	"	10-60% scattered cumulus
O	9108	16:42:52	———	"	90% cumulus
P - Q	9109-9125	16:49:14	16:56:10	"	30-90% cumulus

MAS SCANNER FLIGHT LINE DATA

FLIGHT NO. 93-136

DAEDALUS FLIGHT DATA
FLIGHT NUMBER: 93-136

Check Points	Actual time (GMT) begin	Actual time (GMT) end	Actual scanline begin	Actual scanline end	Altitude feet/meter	Scan Speed (rps)	total Good scanlines	total Interpolated scanlines	total Repeated scanlines
A-C	14:29:41.Ø	14:43:13.Ø	14327	19376	65ØØØ/19812	6.2Ø	5Ø5Ø	Ø	Ø
D-E	14:48:31.Ø	14:53:34.Ø	21356	23237	65ØØØ/19812	6.2Ø	1882	Ø	Ø
B-G	14:59: 7.Ø	15:Ø9:11.Ø	25316	29Ø78	65ØØØ/19812	6.2Ø	3763	Ø	Ø
G-B	15:15:17.Ø	15:28:15.Ø	31355	362Ø6	65ØØØ/19812	6.2Ø	4852	Ø	Ø
B-F	15:34:21.Ø	15:43:21.Ø	38483	41849	65ØØØ/19812	6.2Ø	3367	Ø	Ø
H-I	16:ØØ:33.Ø	16:Ø6:54.Ø	48284	5Ø66Ø	65ØØØ/19812	6.2Ø	2377	Ø	Ø
J-K	16:11:55.Ø	16:18:16.Ø	52541	54917	65ØØØ/19812	6.2Ø	2377	Ø	Ø
L-N	16:32:34.Ø	16:39:58.Ø	6Ø263	63Ø35	65ØØØ/19812	6.2Ø	2773	Ø	Ø
O	16:4Ø:3Ø.Ø	16:42:53.Ø	63233	64124	65ØØØ/19812	6.2Ø	892	Ø	Ø
P-Q	16:48:58.Ø	16:56: 6.Ø	664Ø1	69Ø74	65ØØØ/19812	6.2Ø	2673	1	Ø



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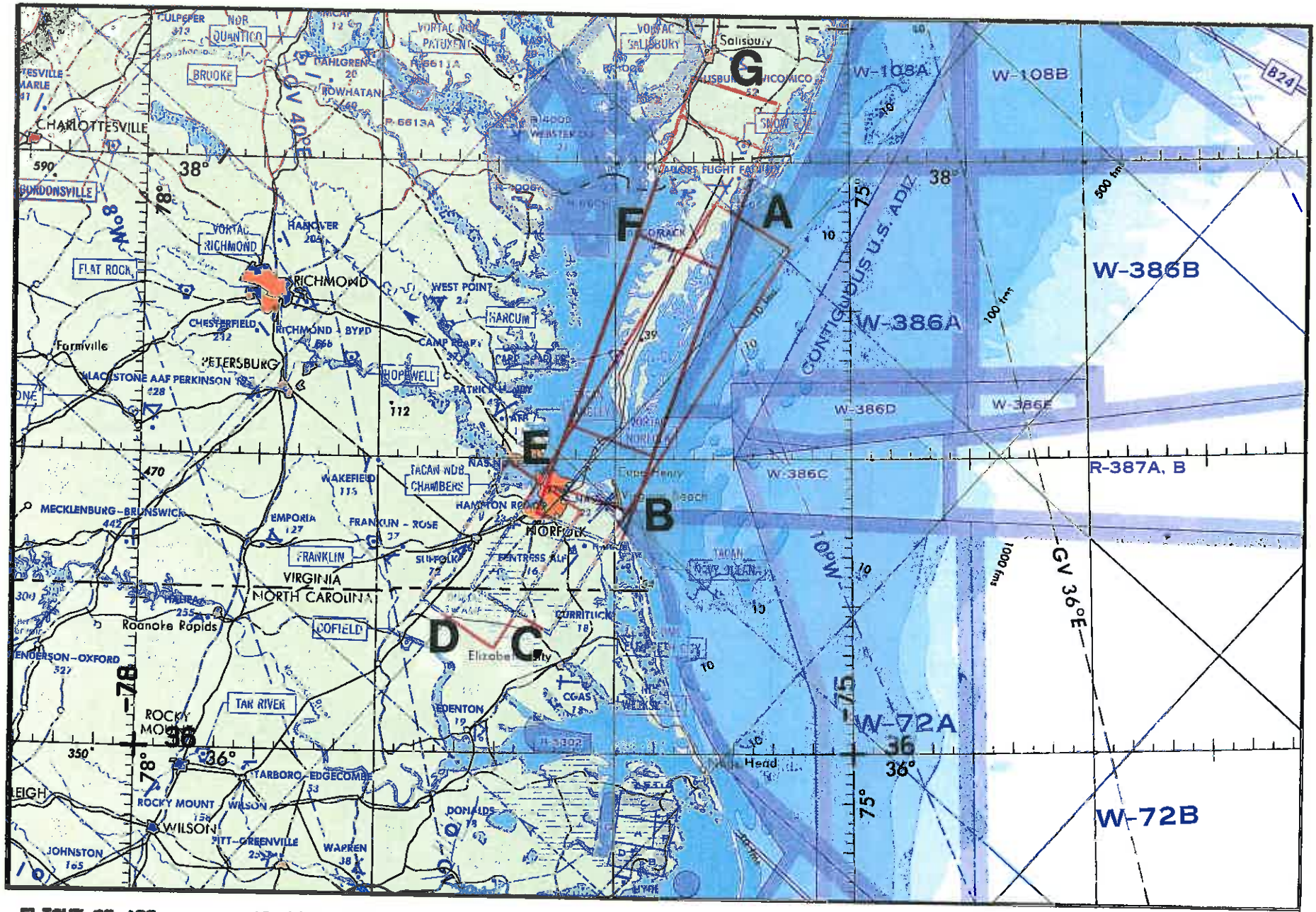

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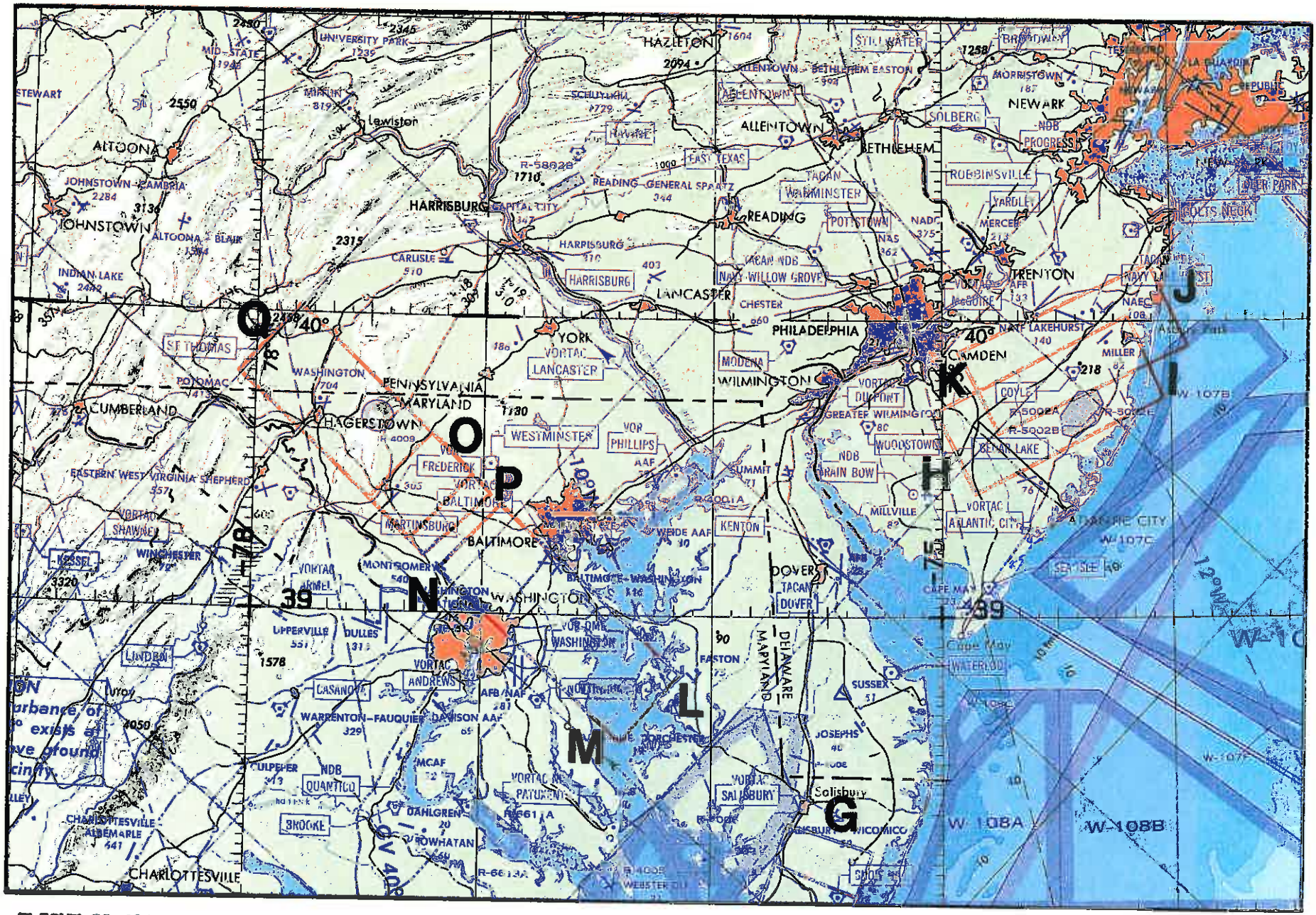
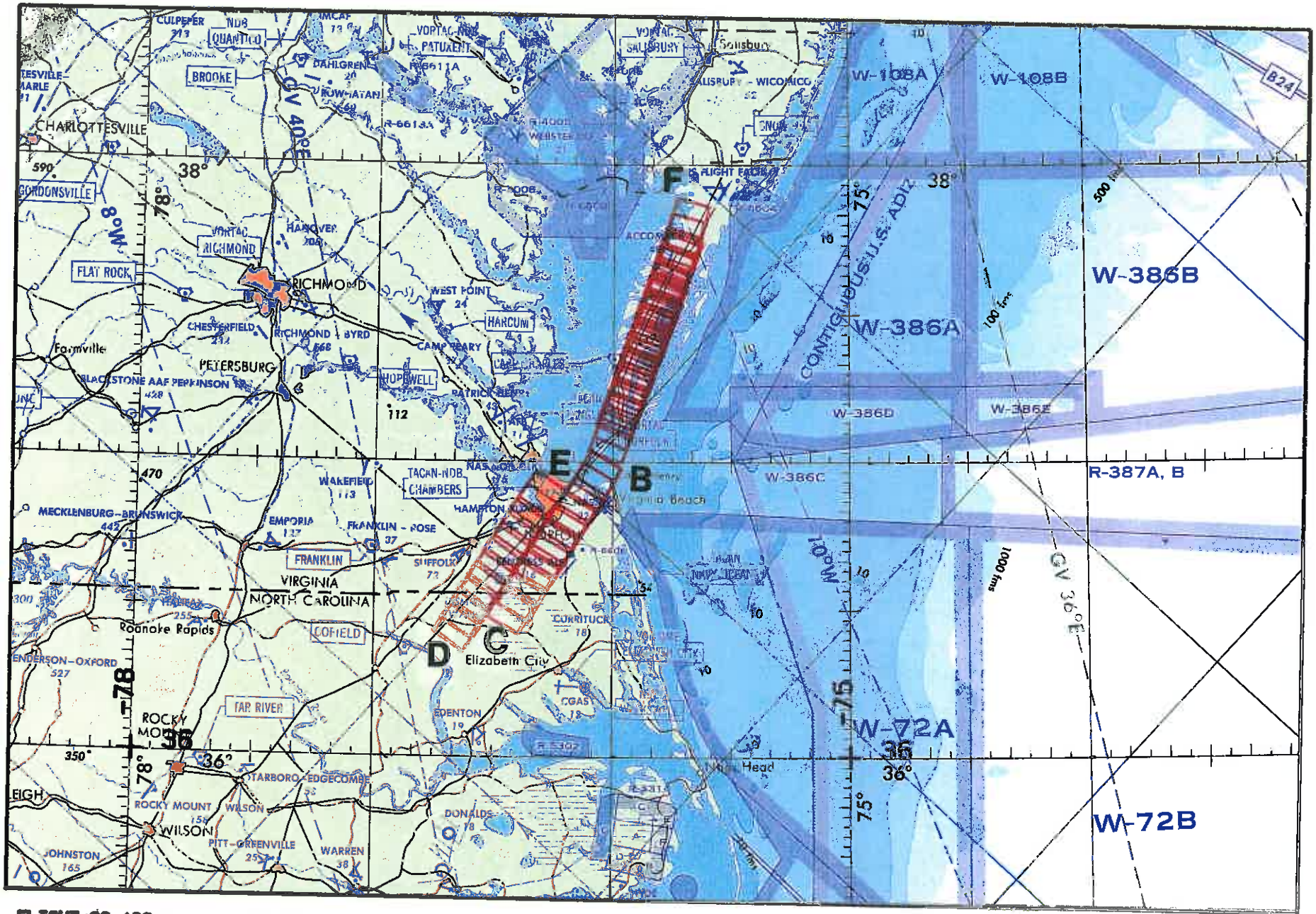


FLIGHT 93-136 12 JULY 1993 A/C 708 NAS JNC 45



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