NASA ER-2 DEPLOYMENT

CLOUDS AND AEROSOL METEOROLOGICAL EXPERIMENT
CAMEX

FY-1995
MISSION SUMMARIES
22 August to 02 September 1995

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Clouds and Aerosol Meteorological Experiment
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22 AUGUST TO 02 SEPTEMBER 1995

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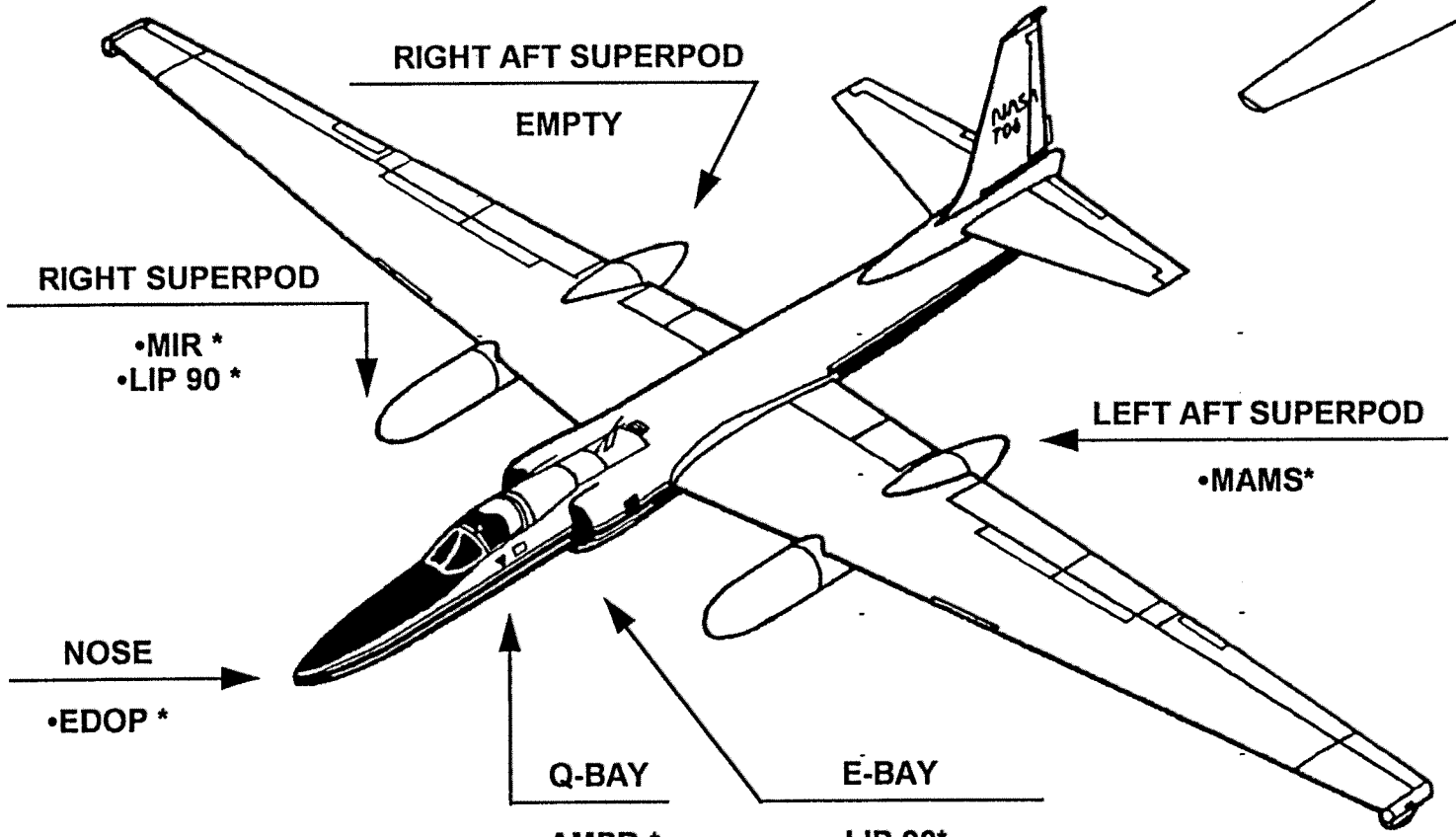
95-181	22 August	Ferry Flight -- Moffett Field to Wallops Island
95-182	23 August	East Coast
95-183	25 August	Cape Cod
95-184	26 August	South Carolina/Alabama
95-185	28 August	South East Atlantic Coast
95-186	29 August	Atlantic Ocean
95-187	02 September	Atlantic Ocean/East of Florida

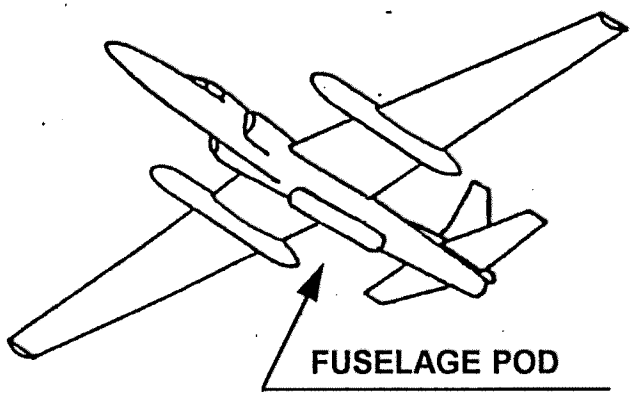
CAMEX 2 (FORMERLY GVEX HURRICANE) CONFIGURATION

PROJECT MANAGER: JOHN AREVESEN

AS OF 6/5/95

AIRCRAFT 706





Instrument Status

†† New Instrument (FRR)
† Repackage Instrument FRR)
** Recertify Instrument
* Current Instrument

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.

Multispectral Atmospheric Mapping Sensor

The Multispectral Atmospheric Mapping Sensor (MAMS) is a modified Daedalus Scanner flown aboard the ER-2 aircraft. It is designed to study weather related phenomena including storm system structure, cloud-top temperatures, and upper atmosphere water vapor. The scanner retains the eight silicon-detector channels in the visible/near-infrared region found on the Daedalus Thematic Mapper Simulator, with the addition of four channels in the thermal infrared relating to specific water vapor features. The specific bands are as follows:

Daedalus Channel	Wavelength, μm
1	LSBs for Channels 9-12
2	0.45 - 0.52
3	0.52 - 0.60
4	0.57 - 0.67
5	0.60 - 0.73
6	0.65 - 0.83
7	0.72 - 0.99
8	0.83 - 1.05
9	3.55 - 3.93 low range
10	3.55 - 3.93 high range
11	10.3 - 12.1
12	12.5 - 12.8

Sensor specifications are as follows:

IFOV:	5.0 mrad
Ground Resolution:	325 feet (99 meters) at 65,000 feet
Total Scan Angle:	86°
Swath Width:	20 nmi (37 km) at 65,000 feet
Pixels/Scan Line:	716
Scan Rate:	6.25 scans/second

Ground Speed:	400 kts (206 m/second)
Digitization:	8-bit channels 2-8
	10-bit channels 9-12

The data will not be archived at EROS Data Center because this is an experimental system with low spatial resolution and unique spectral characteristics. As all scenes will be primarily cloud-covered there would be little terrestrial application for the data. Further information concerning the data can be obtained from principal investigator, Gregory S. Wilson, Atmospheric Effects Branch, George C. Marshall Space Flight Center, National Aeronautics and Space Administration, Marshall Space Flight Center, Alabama 35812-5001.

Advanced Microwave Precipitation Radiometer

The Advanced Microwave Precipitation Radiometer (AMPR) is a scanning passive microwave radiometer operating at frequencies of 10, 19, 37, and 85 GHz. The AMPR is configured to fit into the Q-bay of the ER-2 and scans cross-track +/- 45° to the left and right of nadir. The instrument's principle use is for gathering microwave image data of cloud water and precipitation primarily over the ocean. Some data collected also will be used for studies of vegetation, ground moisture, sea surface state, and snow cover. The AMPR is sponsored by Dr. Roy W. Spencer, NASA/MSFC, ES43, Huntsville, Alabama 35812.

NOTE: 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).

ER-2 Doppler Radar

The ER-2 Doppler Radar (EDOP) is an X-band (9.6 GHz) Doppler radar located in the nose of the aircraft. EDOP has two 0.76 meter diameter antennas. One antenna is nadir pointing with pitch stabilization and the other is forward pointing. EDOP will map high resolution time-height sections of reflectivity, vertical hydrometeor velocity, and vertical air motion (when the hydrometeor fallspeed and aircraft motions are removed). The forward beam will measure the linear depolarization ratio (LDR) which provides useful information on orientation of the hydrometeors, hydrometeor phase, and size. For additional information regarding EDOP contact Gerald Heymsfield, NASA Goddard Space Flight Center, Code 912, Goddard Space Flight Center, Greenbelt, MD 21077 (Telephone 301-286-4661). EDOP system specifications are as follows:

Center Frequency	9.6 GHz
Peak Power	20 kW
Duty Cycle	.01 max.
Pulse Length	.25, 1.0 ms
Antenna Diameter	.76 m
Antenna Beamwidth	2.9°
First Side-lobe Level	<-30 dB
Cross Polarization Level	<-38 dB
Receiver Dynamic Range	110 dB
Number of Doppler Channels	2
Number of Log Reflectivity Channels	3
Nadir Beam:	
Transmit Polarization	Horizontal

Received Polarization	Copolarized
Forward Beam:	
Transmit Polarization	Vertical
Received Polarization	Copolarized and Cross-polarized

Lightning Instrument Package

The Lightning Instrument Package (LIP) comprises a set of optical and electrical sensors with a wide range of temporal, spatial, and spectral resolution to observe lightning and investigate electrical environments within and above thunderstorms. The instruments provide measurements of the air conductivity and vertical electric field above thunderstorms and provide estimates of the storm electric currents. In addition, LIP will detect total storm lightning and differentiate between intracloud and cloud-to-ground discharges. These data will be used in studies of lightning/storm structure and lightning precipitation relationships. The LIP is sponsored by Dr. Richard Blakeslee, NASA/MSFC, ES43, Huntsville, Alabama 35812.

NOTE: Information on data tape format, logical record format, and scanner calibration data may be obtained from the NASA-Ames Aircraft Data Facility at (415) 604-6252.

Millimeter-Wave Imaging Radiometer

The Millimeter-Wave Imaging Radiometer (MIR) is a nine channel radiometer developed for atmospheric research. Three dual pass band channels are centered about the strongly opaque 183 GHz water absorption line and a fourth channel is located at 150 GHz. These four channels have varying degrees of opacity from which the water vapor profile can inferred. There are two additional channels located at 89 GHz and 220 GHz. The design includes three additional channels centered about 325 GHz which are supplied by the Georgia Institute of Technology.

Frequencies and polarization were chosen to match those of the Advanced Microwave Sounding Unit-B (AMSU-B) planned for NOAA operational polar weather satellites and the Earth Observing System (EOS). Frequencies also match closely with those of the Special Sensor Microwave Temperature Sounder-2 (SSMT-2) now aboard the DMSP satellite.

Information regarding this instrument may obtained from Paul Racette, NASA-Goddard Space Flight Center, Code 975, Greenbelt, MD 20771.

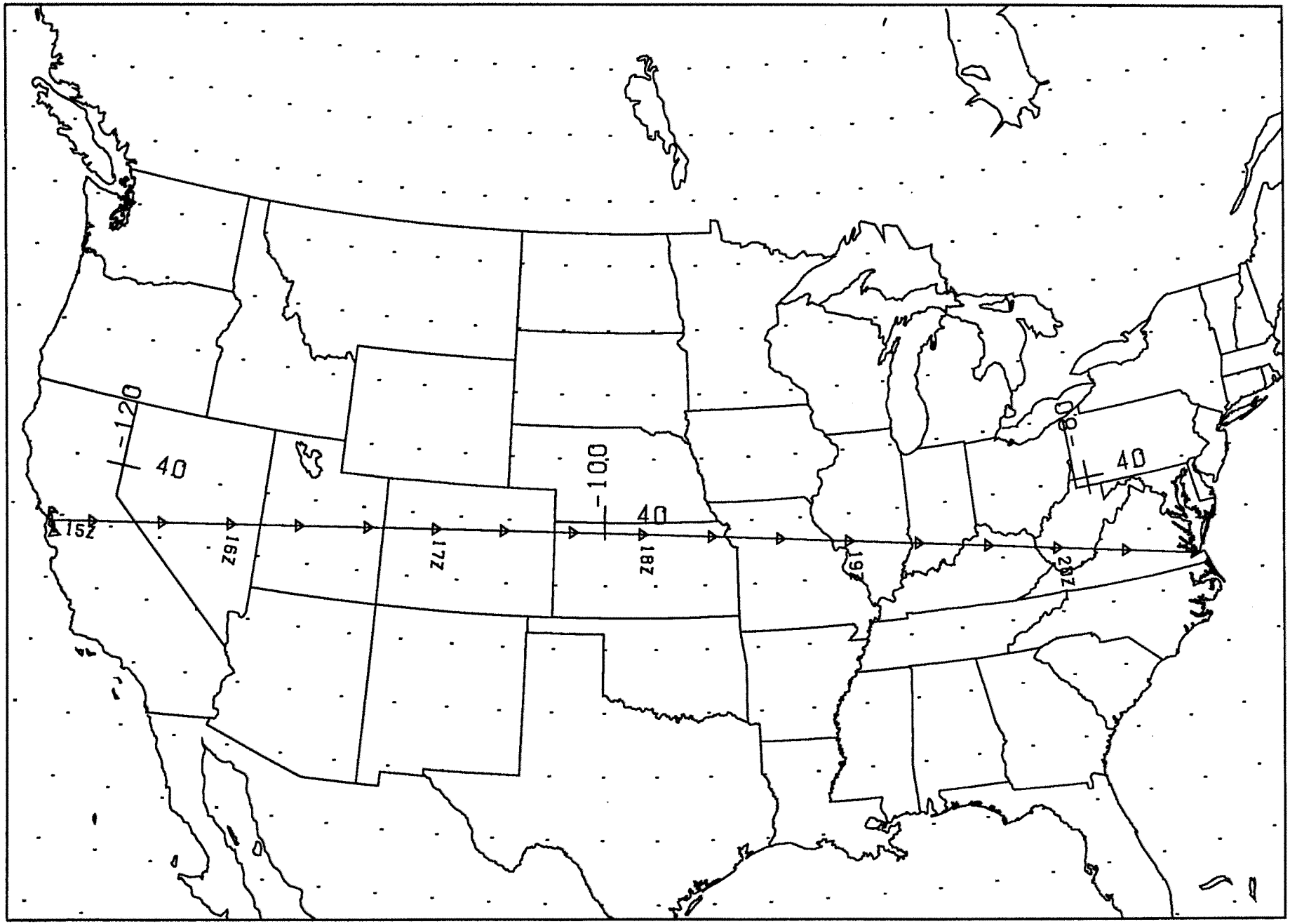
CAMEX

Multispectral Atmospheric Mapping System (MAMS)

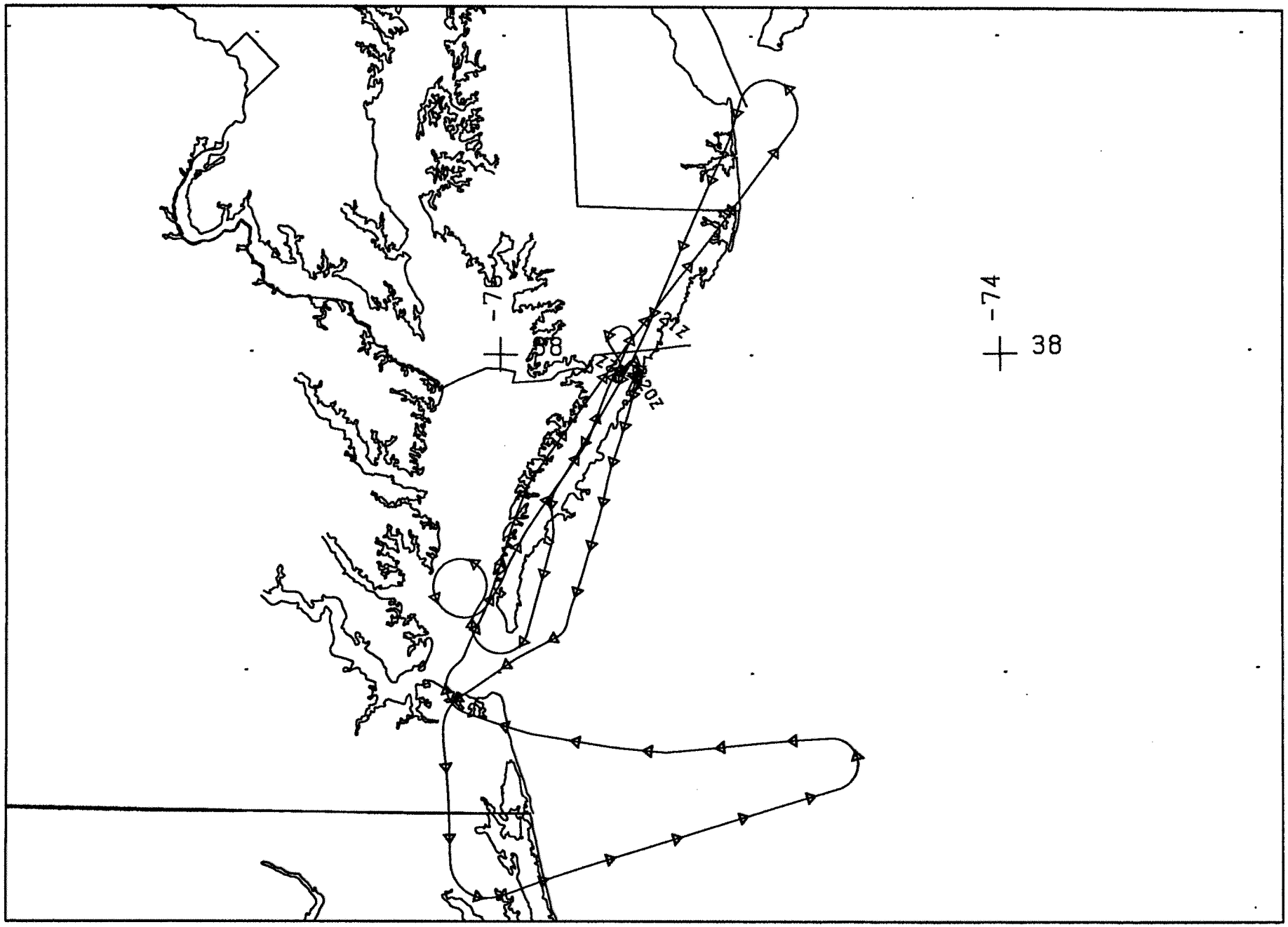
Data Acquisition Summary

Flt. Num.	Date	Take-Off	Landing	MAMS On	MAMS Off	Location	Comments
95-181	8/22/95	15:00	21:05	15:30	20:39	Ferry Flight	Gains reduced in channels 2 and 3
95-182	8/23/95	20:00	22:05	20:20	21:29	VA	Good data
95-183	8/25/95	10:45	16:10	-	-	Cape Cod, MA	Exabyte Failure, No data
95-184	8/26/95	20:30	02:30	20:53	01:55	MD, VA, NC, SC, GA	Good data
95-185	8/28/95	21:30	03:45	21:47	03:13	Atlantic Ocean	Good data, Some zero saturation in IR.
95-186	8/29/95	00:00	06:10	-	-	Wallops / Ocean Bouys	Exabyte Failure, No data
95-187	9/02/95	19:30	02:05	19:49	01:32	FL and VA	Good data

All times are GMT



FLIGHT 95-181 22 AUGUST 1995 A/C 706 MAMS



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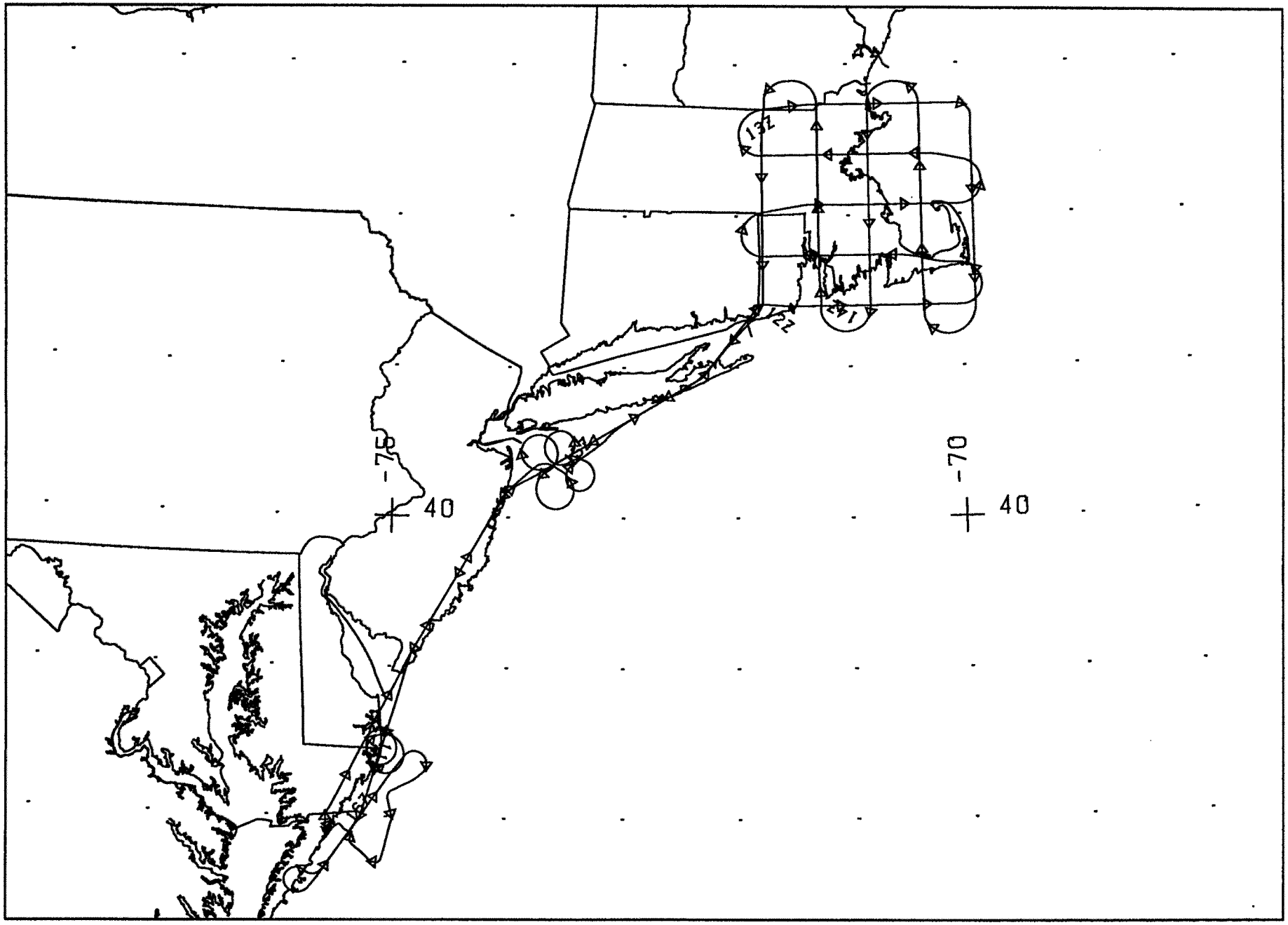

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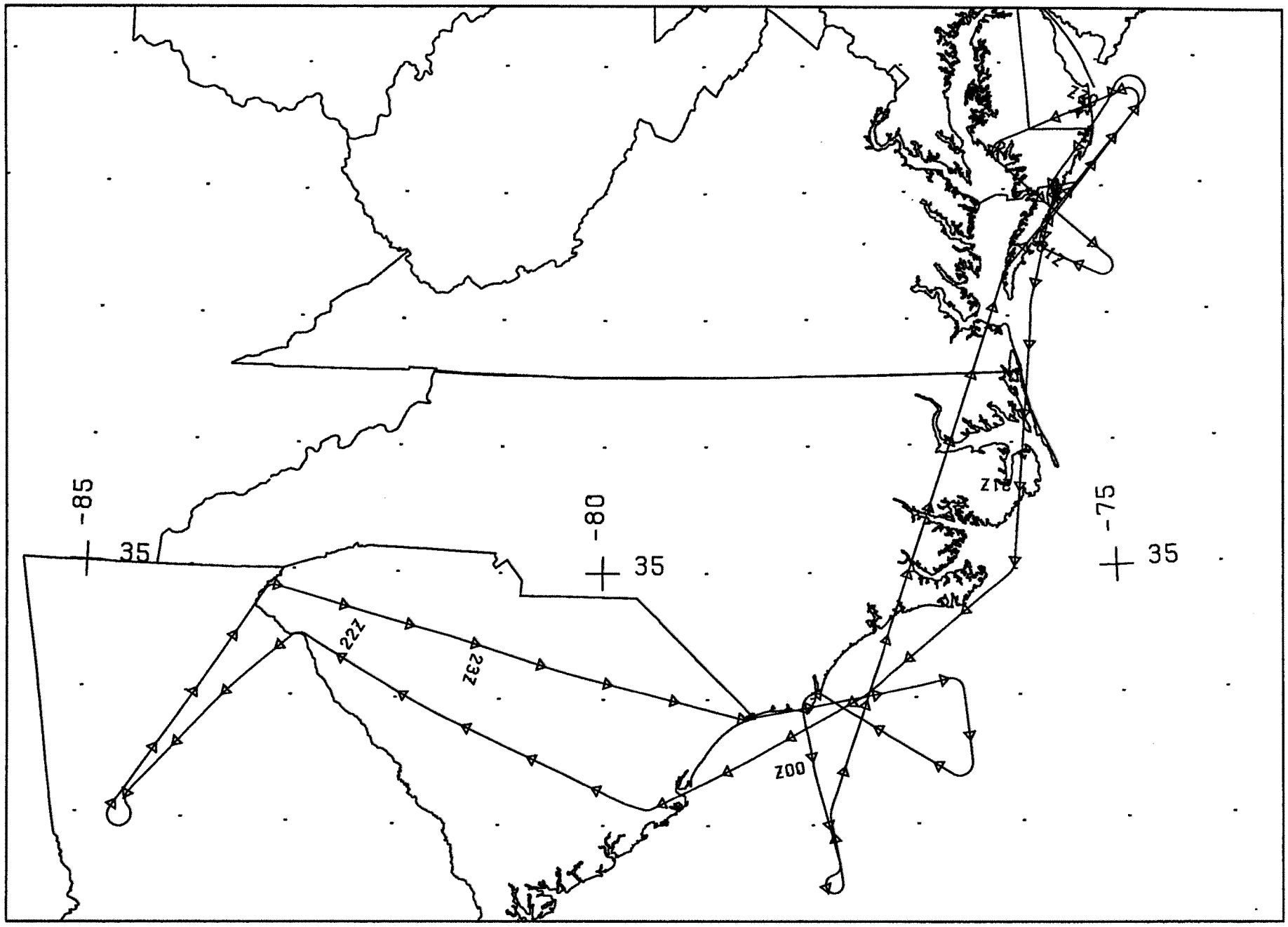

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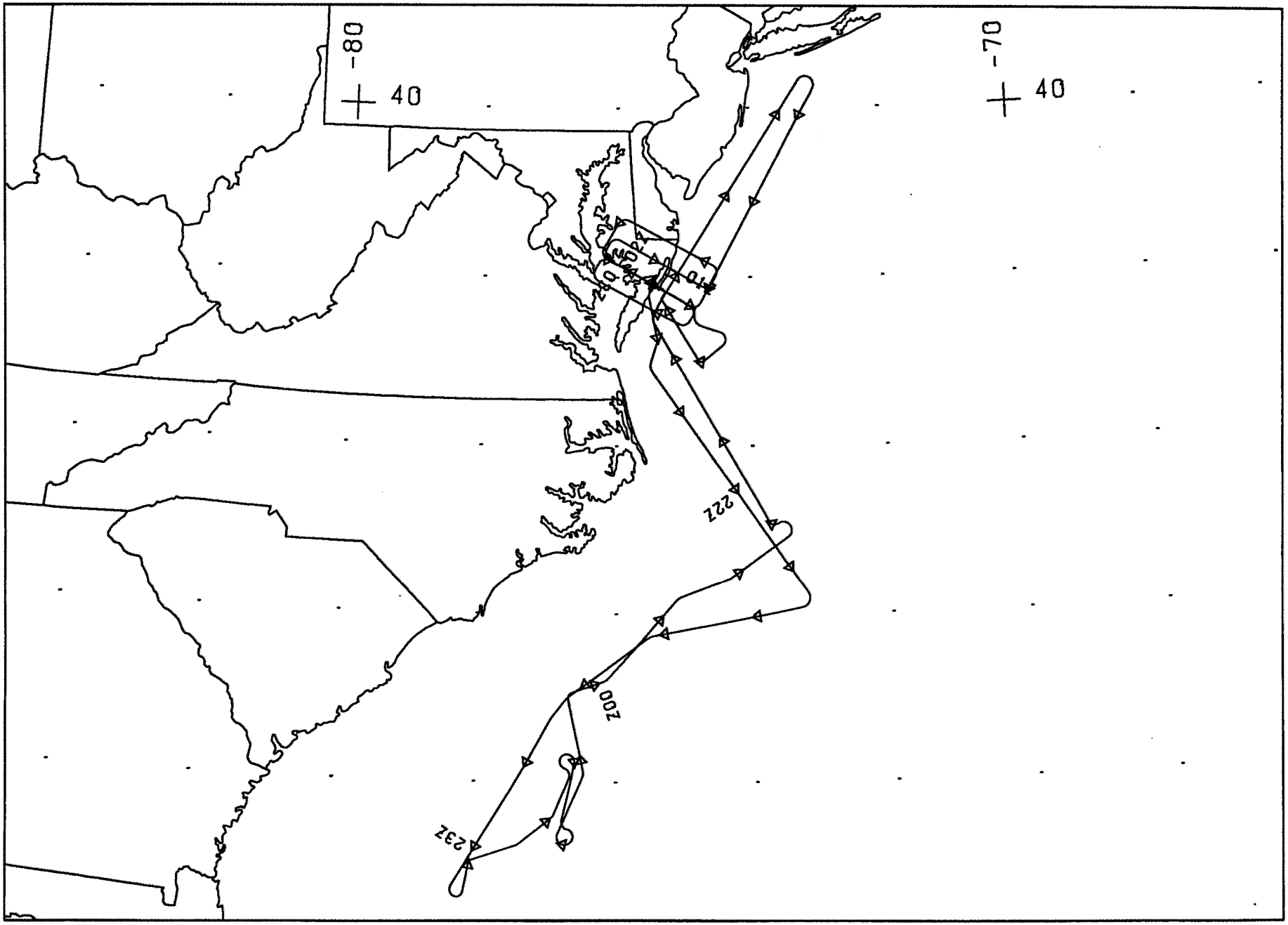

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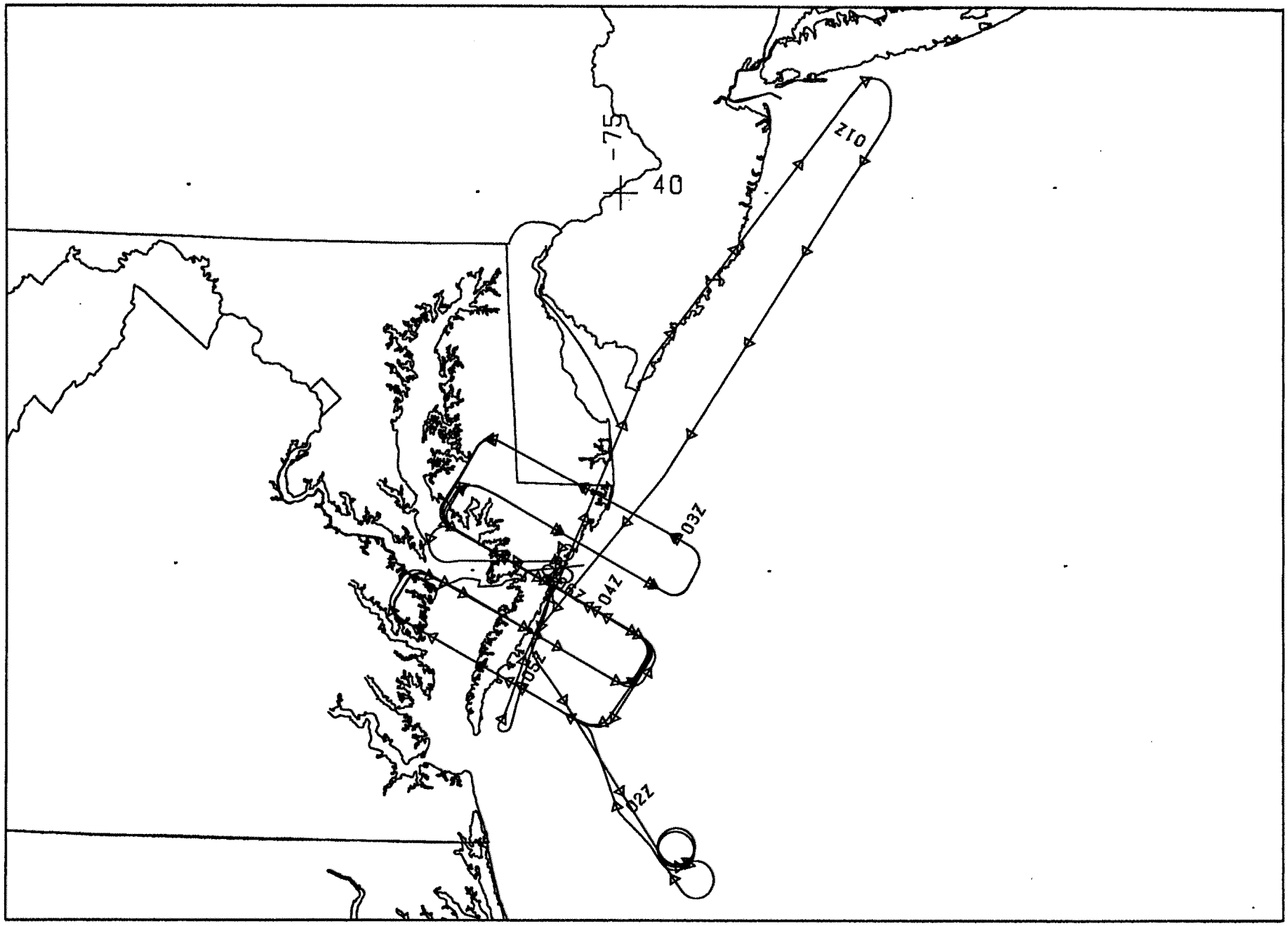

FLIGHT 95-186 30 AUGUST 1995 (GMT) A/C 706 MAMS