

**NASA ER-2 BRAZIL DEPLOYMENT**

**Smoke, Cloud, and Radiation-Brazil  
SCAR-B**

**FY-1995**

**MISSION SUMMARIES**

**13 August to 12 September 1995**

**FY-1995  
SMOKE, CLOUD, AND RADIATION-BRAZIL  
SCAR-B  
NASA ER-2 BRAZIL DEPLOYMENT**

**MISSION SUMMARIES  
13 AUGUST TO 18 SEPTEMBER 1995**

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## 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.

## 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.

### Cloud Lidar System

The Cloud Lidar System (CLS) is flown on the ER-2 to conduct cloud radiation and severe storm field experiments. Designed to operate at high altitudes in order to obtain measurements above the highest clouds, the instrument provides the true height of cloud boundaries and the density structure of less dense clouds. The height structure of cirrus, cloud top density and multiple cloud layers may also be profiled. System specifications are as follows:

Transmitter	
Laser Type:	Nd:YAG I,II
Wavelength:	1064, 532 nm
Pulse Energy:	90, 30 mJ
PRF:	10 Hz
Beamwidth:	1 mrad
Data Acquisition:	Measurements at 20m intervals at 200 m/sec aircraft speed

Receiver	
Diameter:	0.15 m
Beamwidth:	1.4 mrad
Polarization:	v & h

Data System	
Range Resolution:	7.5 m
Number of Channels:	4
Samples per Channel:	3310
Record Capacity:	8 hours

For additional information regarding this instrument contact Dr. James Spinhirne, NASA-Goddard Space Flight Center, Code 917, Greenbelt, MD 20771.

### Video Imaging System

The Video Imaging System (VIS) is designed as a visual Line-of-Flight tracker, producing a flight record on standard or Super-VHS, with a selection of ground coverage and image recording intervals. The system consists of a Hitachi KP-C551 Color Camera, A Panasonic AG-6750A Time Lapse Video Recorder, DC/AC Inverter, Control Box, Pressure Suitcase, and a Installation Rack. The system may be configured to acquire natural color or black and white imagery. IRIG-B navigation data is also recorded in flight. The VIS is designed to be installed in either the Pod or Nose of the ER-2 aircraft, using a modified RC-10 Rack. Control circuitry is designed to operate the system using the same controls as the RC-10 camera.

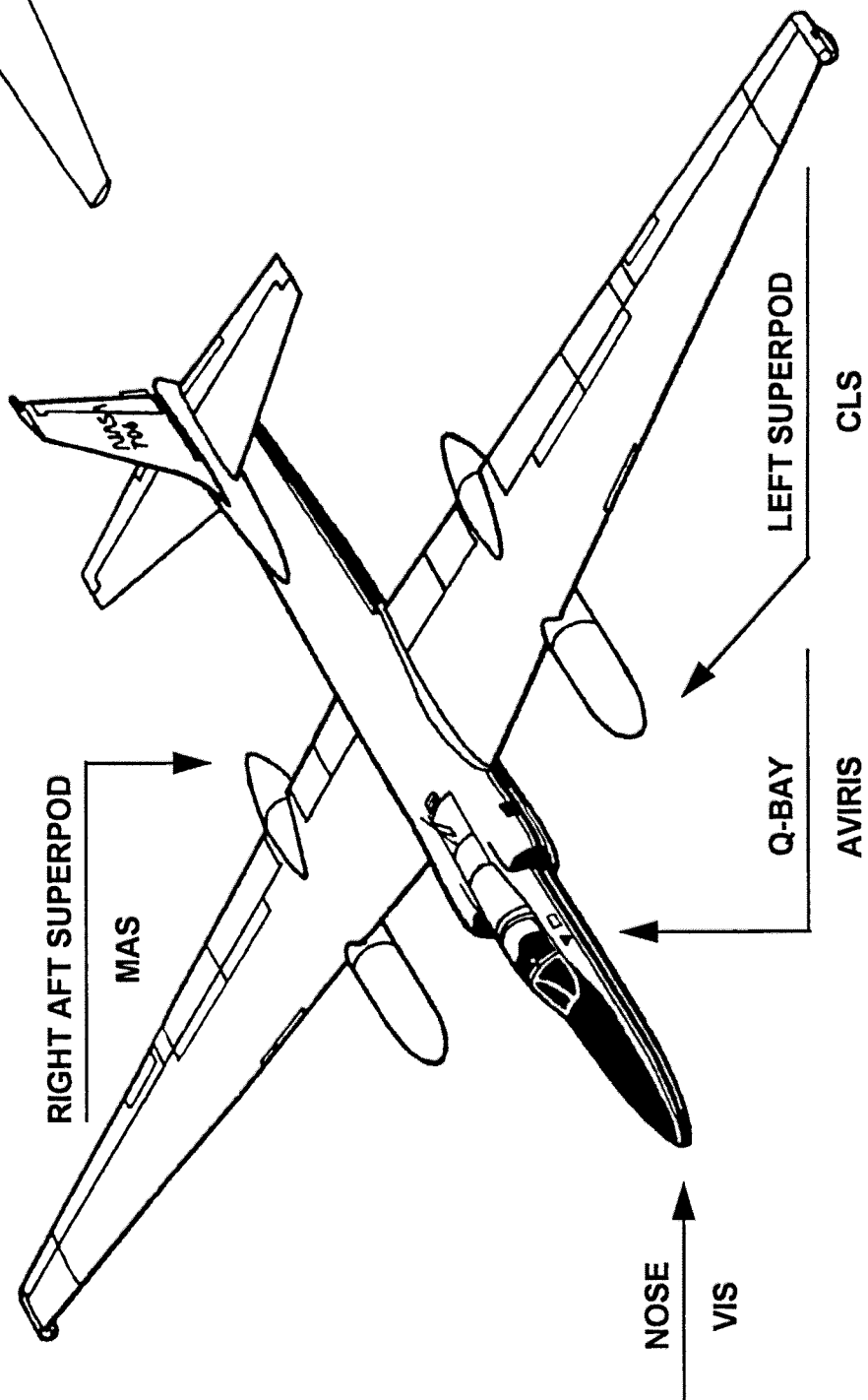
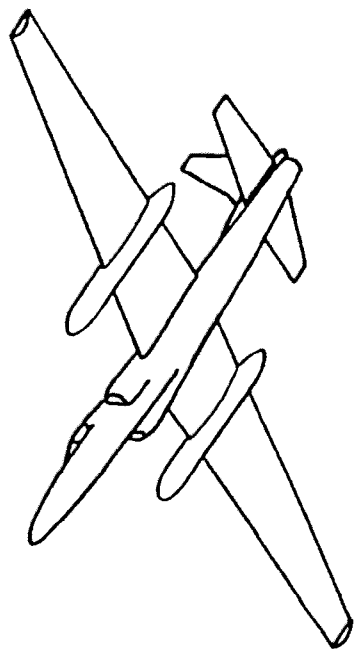
For additional information regarding VIS contact the Aircraft Data Facility, NASA Ames Research Center, MS 240-6 Moffett Field, CA 94035-1000 (Telephone: 415-604-6252).

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).

# SCAR B CONFIGURATION

AIRCRAFT 708

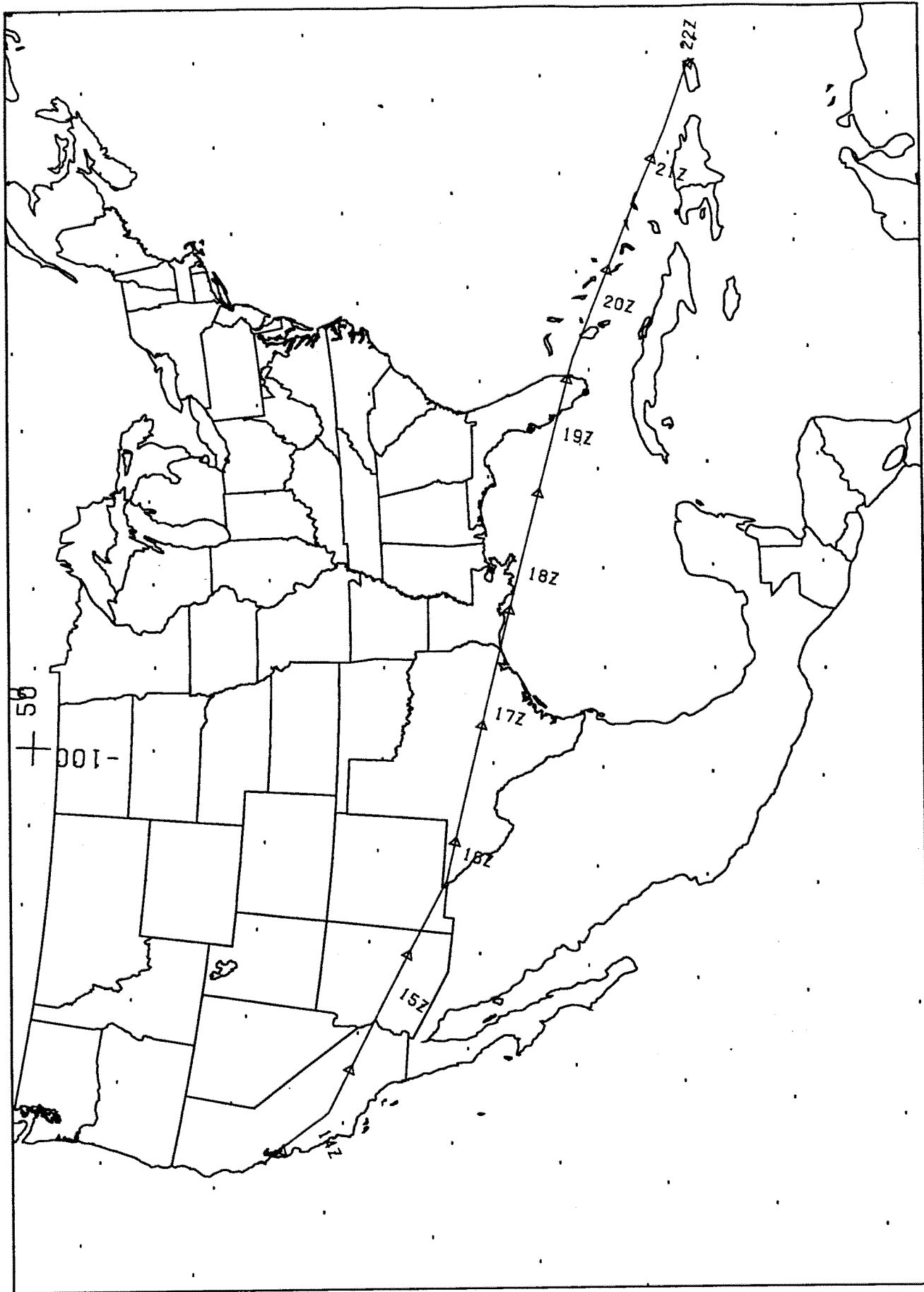


**SCAR-B**  
**MODIS Airborne Simulator (MAS)**  
**Data Collection Summary**

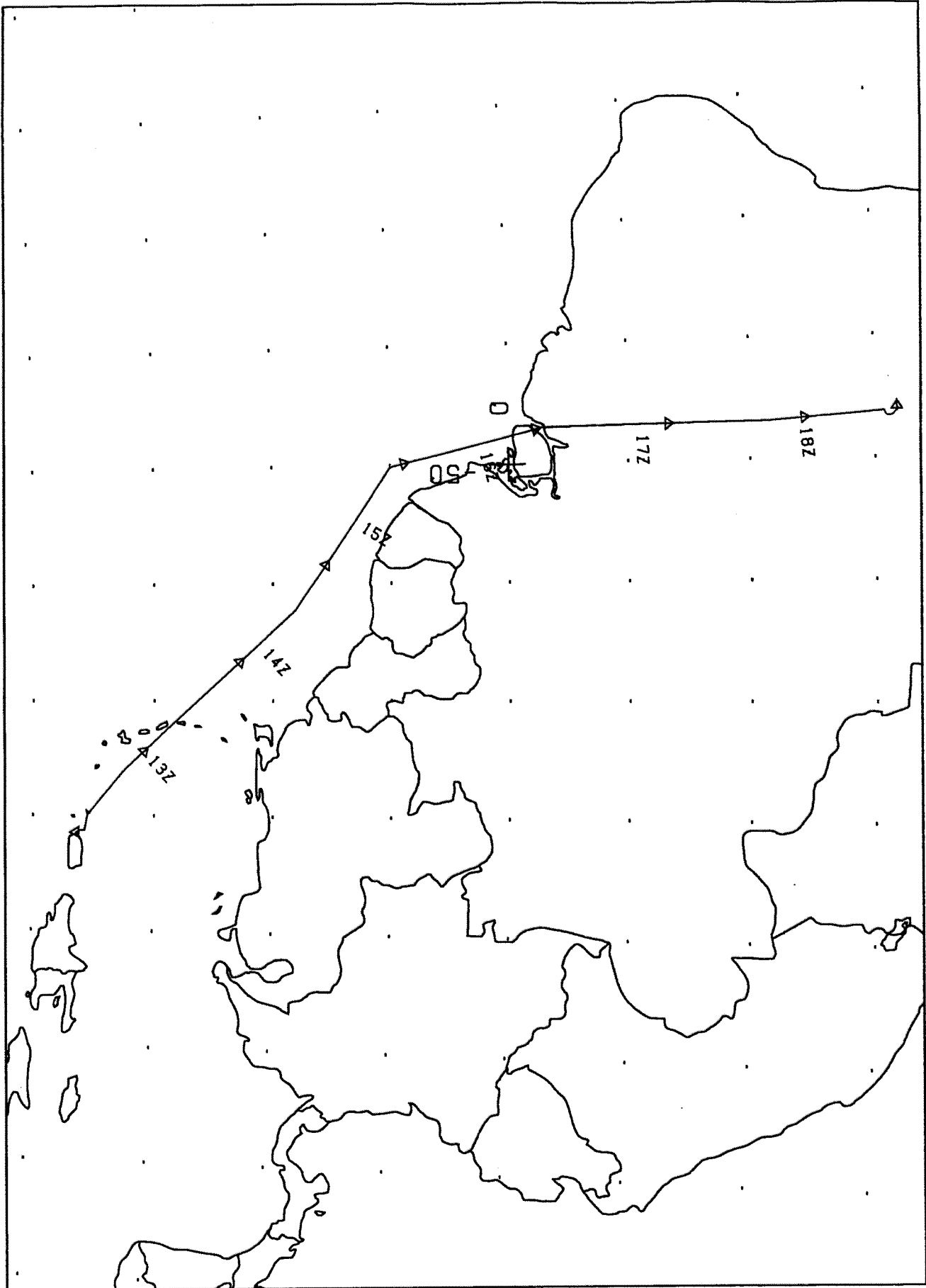
Flt. Num.	Date	Take-Off	Landing	MAS On	MAS Off	Place Name	Comments
95-160	16 Aug	13:28	16:30	14:00	16:00	North Brazilia	Good Data
95-161	18 Aug	16:30	22:35	17:10	20:16	North Brazilia, Alta Foresta	Good Data
95-162	20 Aug	13:30	20:00	14:26	19:26	Campo Grande, Pantanal, Cuiaba, Alta Foresta, N.Brazilia	Good Data
95-163	23 Aug	13:30	20:25	15:02	19:17	Cuiaba, Vilhena, Parana	Good Data
95-164	25 Aug	13:15	20:45	14:54	19:00	Cuiaba, Vilhena, Parana	Power cycled during pre_ft, No Hemisphere data
95-165	27 Aug	16:30	22:30	18:05	21:26	Cuiaba, Vilhena, Alta Foresta, Rio Arinas,	Intermittent Port 4 failure
95-166	30 Aug	13:15	18:04	14:44	16:23	Cuiaba, Campo Verde	Good data
95-167	1 Sept	11:25	17:50	12:54	16:44	Cuiaba, Campo Verde, Pantanal, Gleba Arinos, Alta Foresta	Intermittent Port 4 failure
95-168	4 Sept	13:15	21:15	14:43	19:12	Cuiaba, Rondonia, Mato Grosso	Two pre-flight hemisphere runs, Intermittent Port 4 failure
95-169	7 Sept	13:25	20:10	14:54	18:25	Cuiaba, Campo Verde, Porto Vello, Rondonia, Rio Teles	Intermittent Port 4 failure, Tape duplication errors
95-170	11 Sept	13:25	20:35	14:14	19:28	Porto National,	Intermittent Port 4 failure, Tape duplication errors

All times are GMT

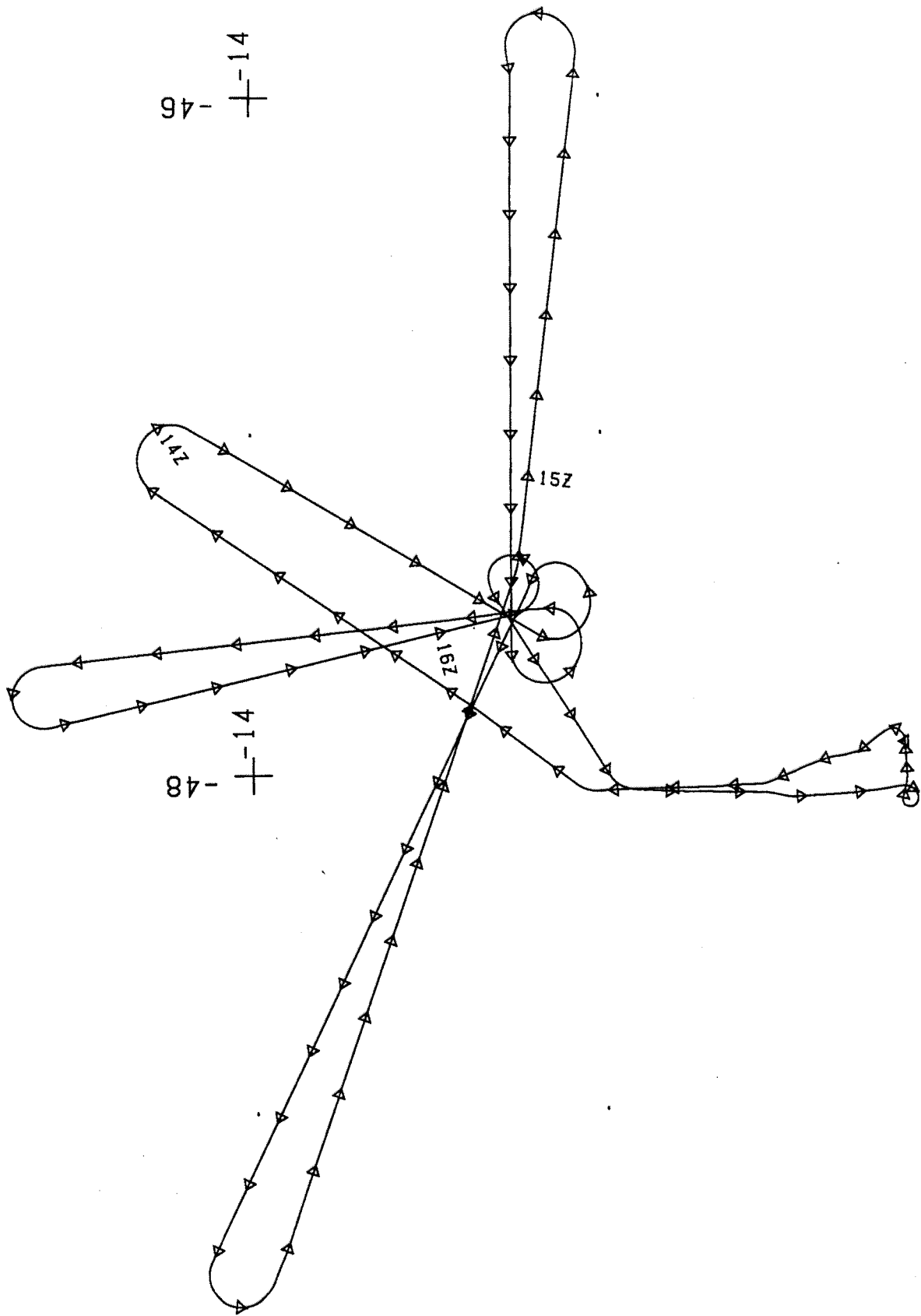




FLIGHT 95-158      13 AUGUST 1995      A/C 708      MAS-50 / VIS / CLS



FLIGHT 95-159 14 AUGUST 1995 A/C 708 NO INSTRUMENTS RECORDED DATA



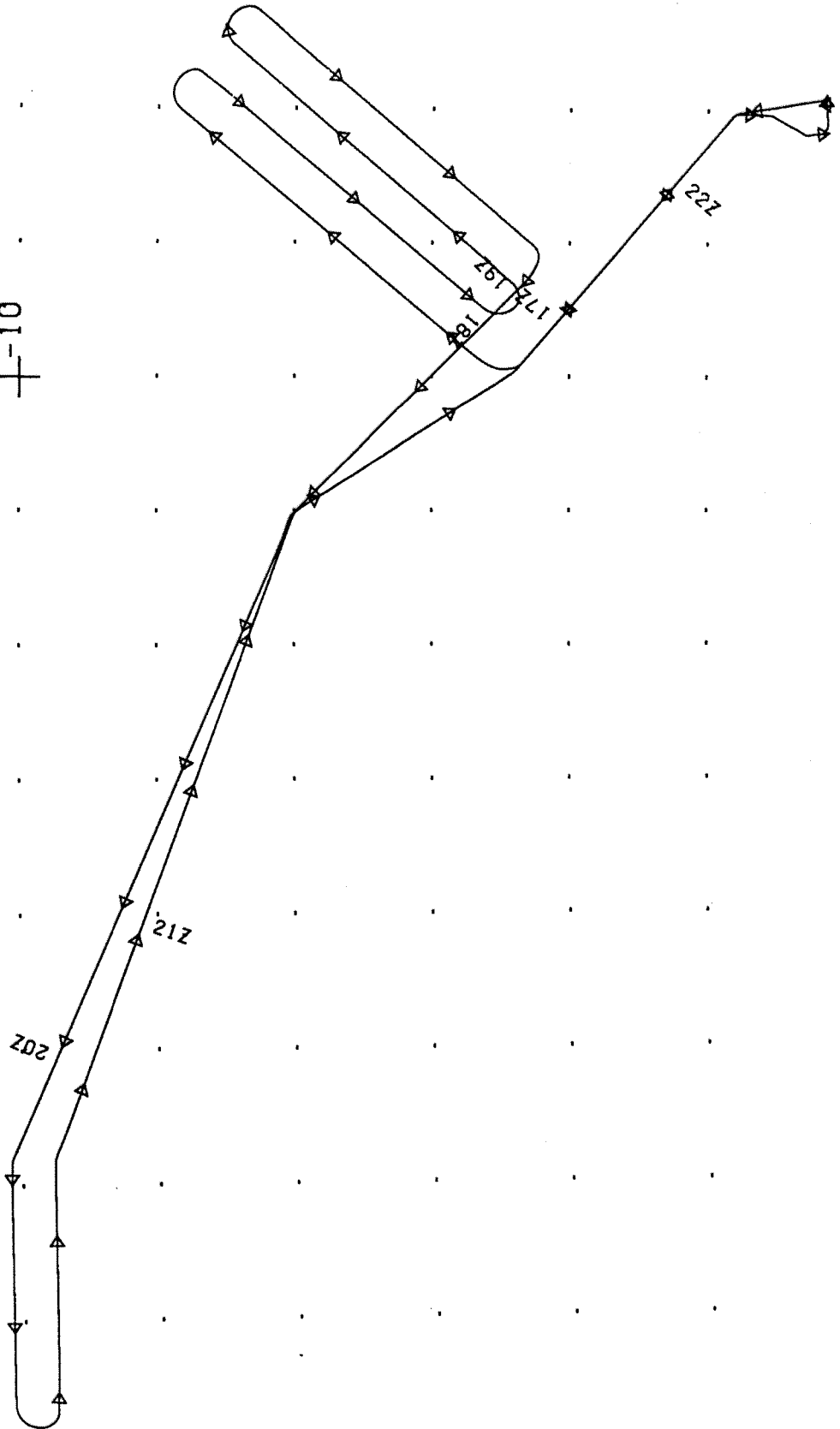
MAS-50 / VIS / CLS / AVIRIS

R/C 708

16 AUGUST 1995

FLIGHT 95-160

01-10  
-50

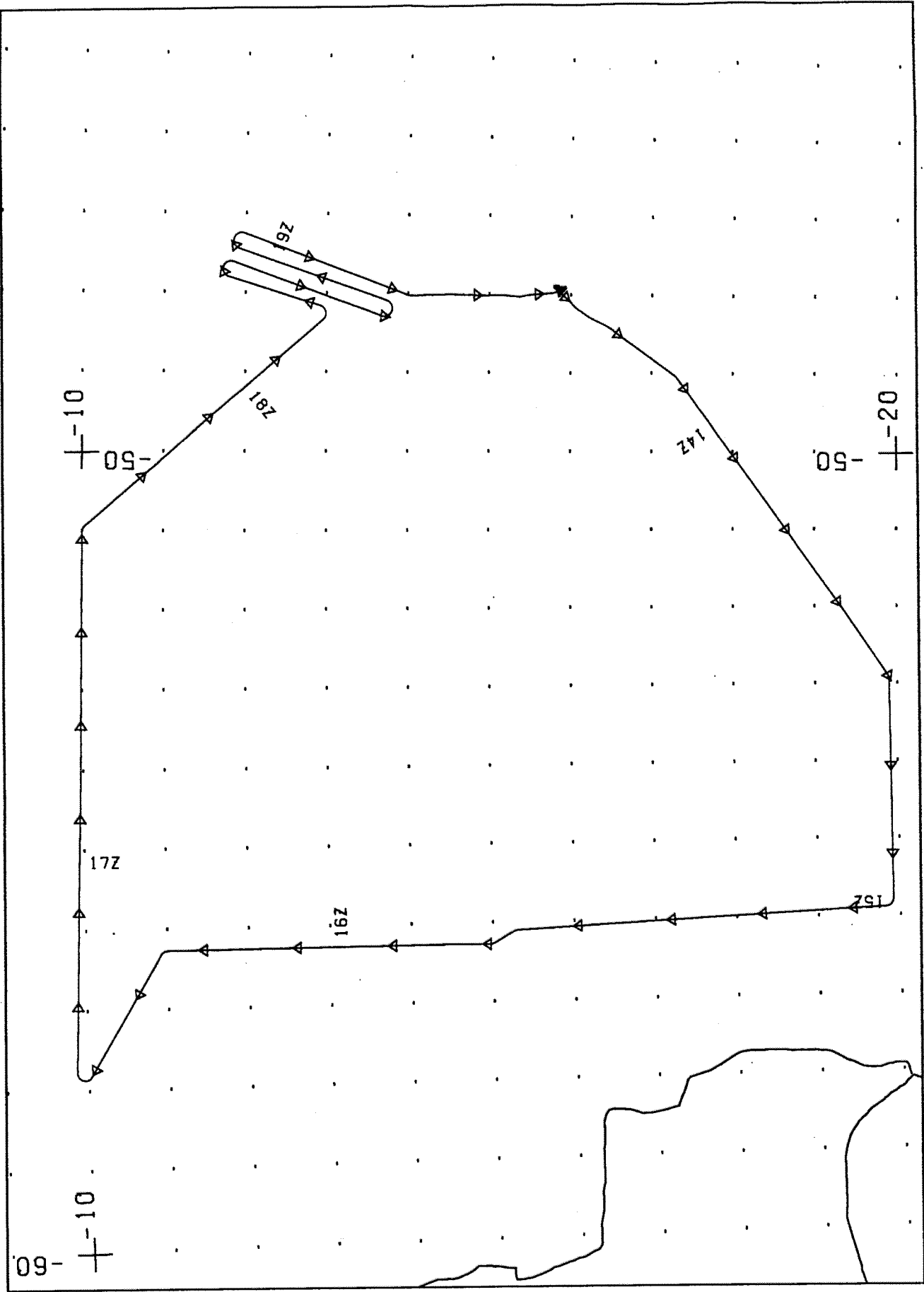


FLIGHT 95-161

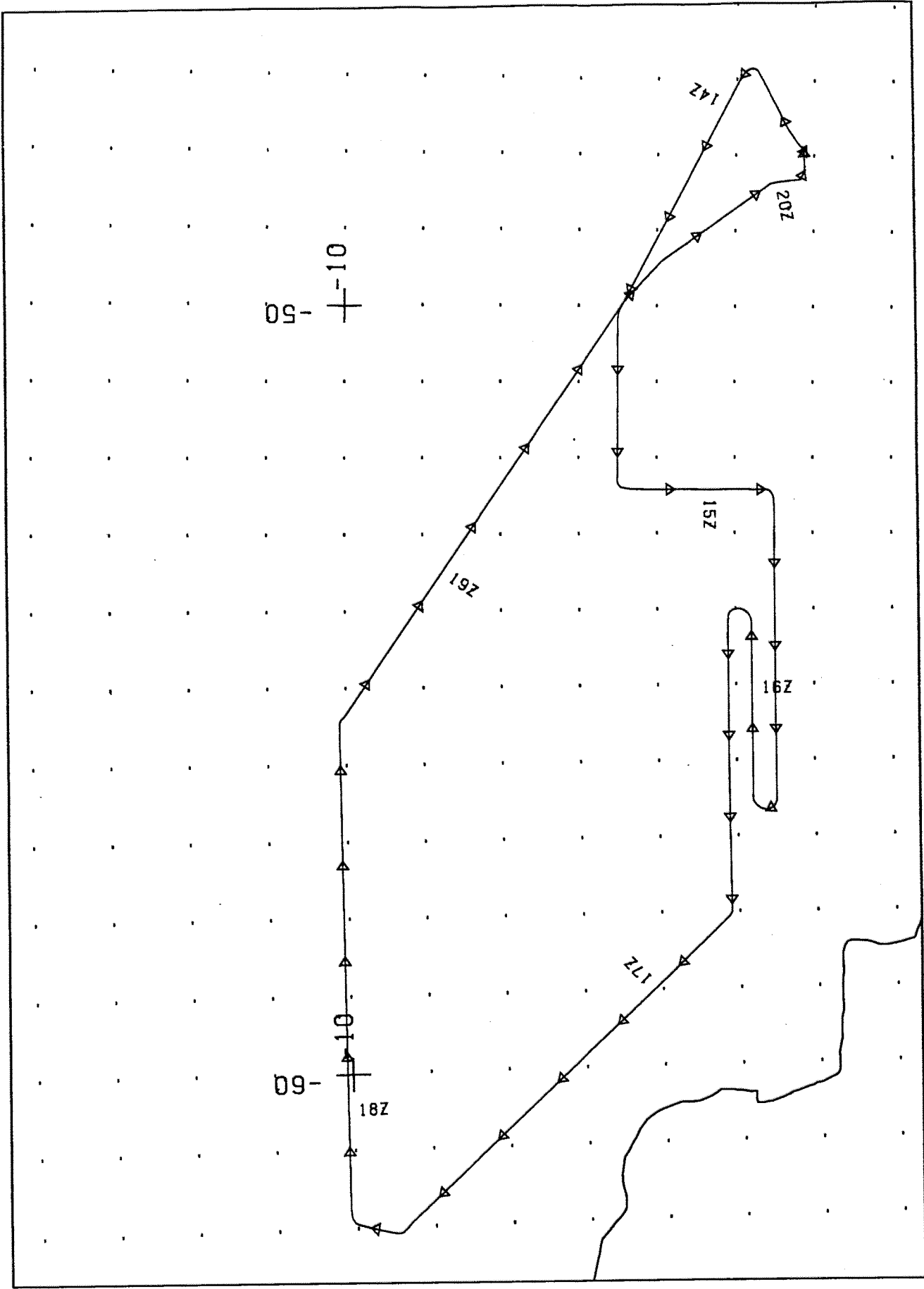
18 AUGUST 1995

R/C 708

MAS-50 / VIS / CLS / AVIRIS



FLIGHT 95-162 20 AUGUST 1995 R/C 708 MAS-50 / VIS / CLS / AVIRIS

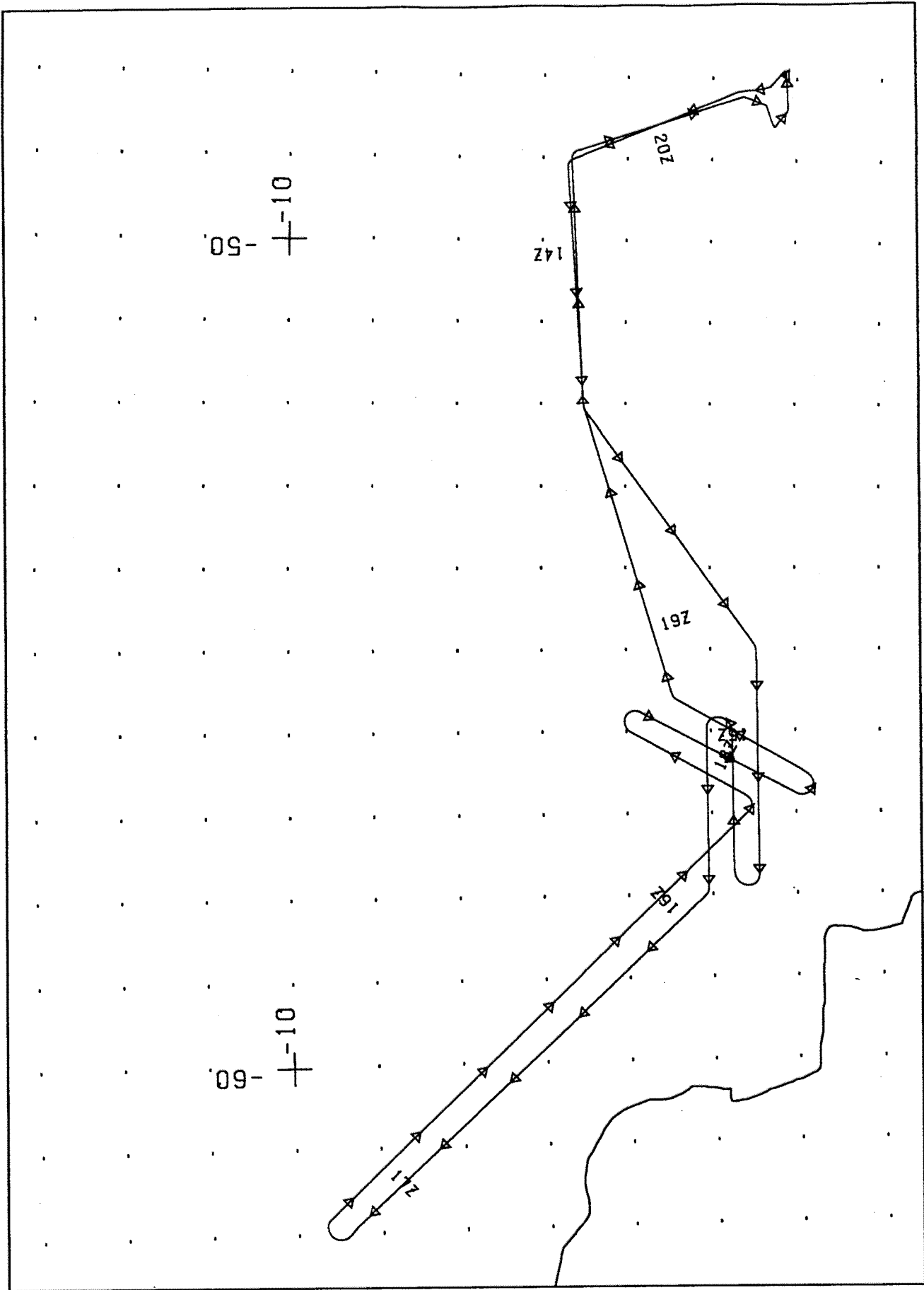


MRS-50 / VIS / CLS / AVIRIS

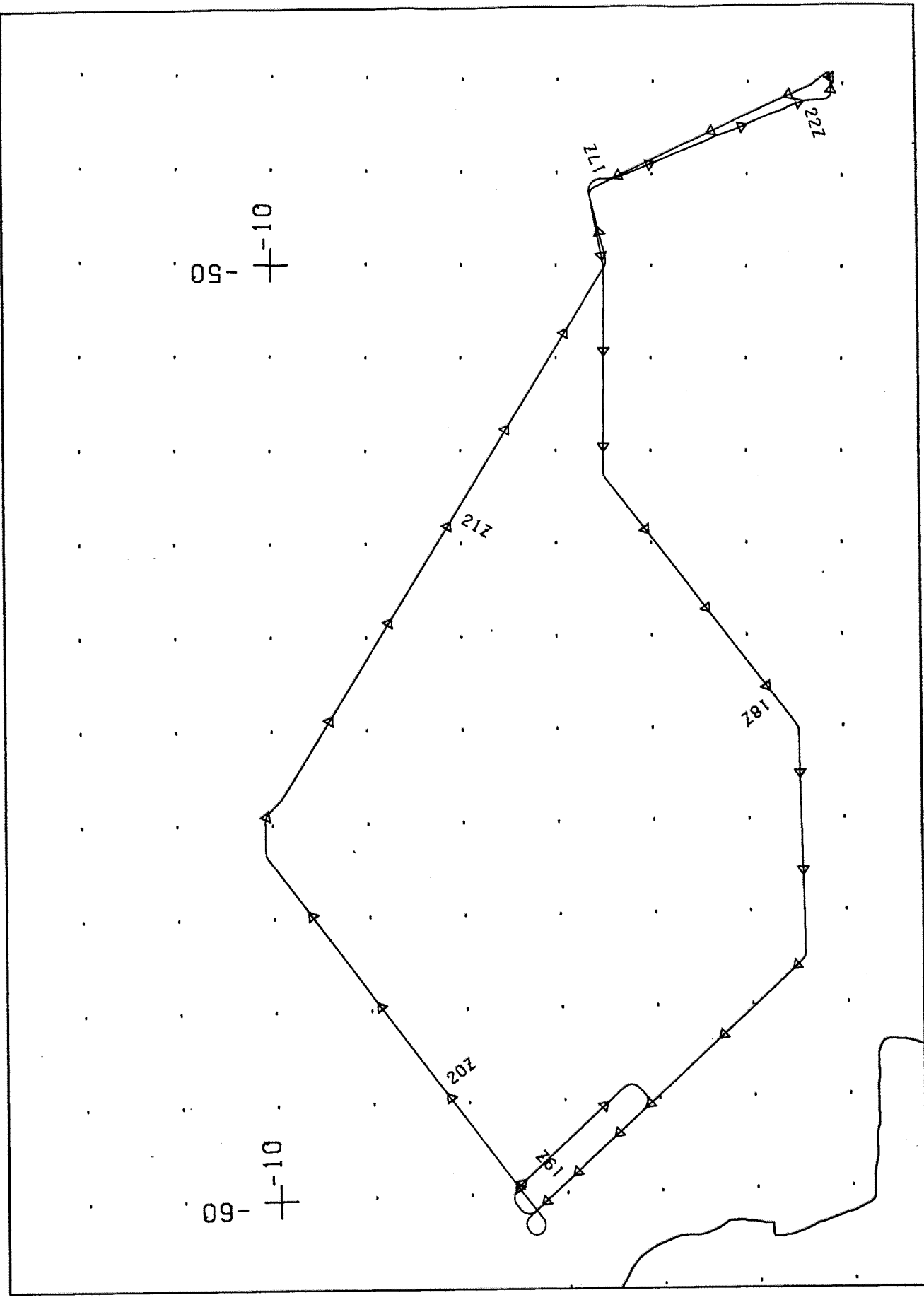
A/C 708

23 AUGUST 1995

FLIGHT 95-163



FLIGHT 95-164      25 AUGUST 1995      A/C 708      MRS-50 / VIS / CLS / AVIRIS



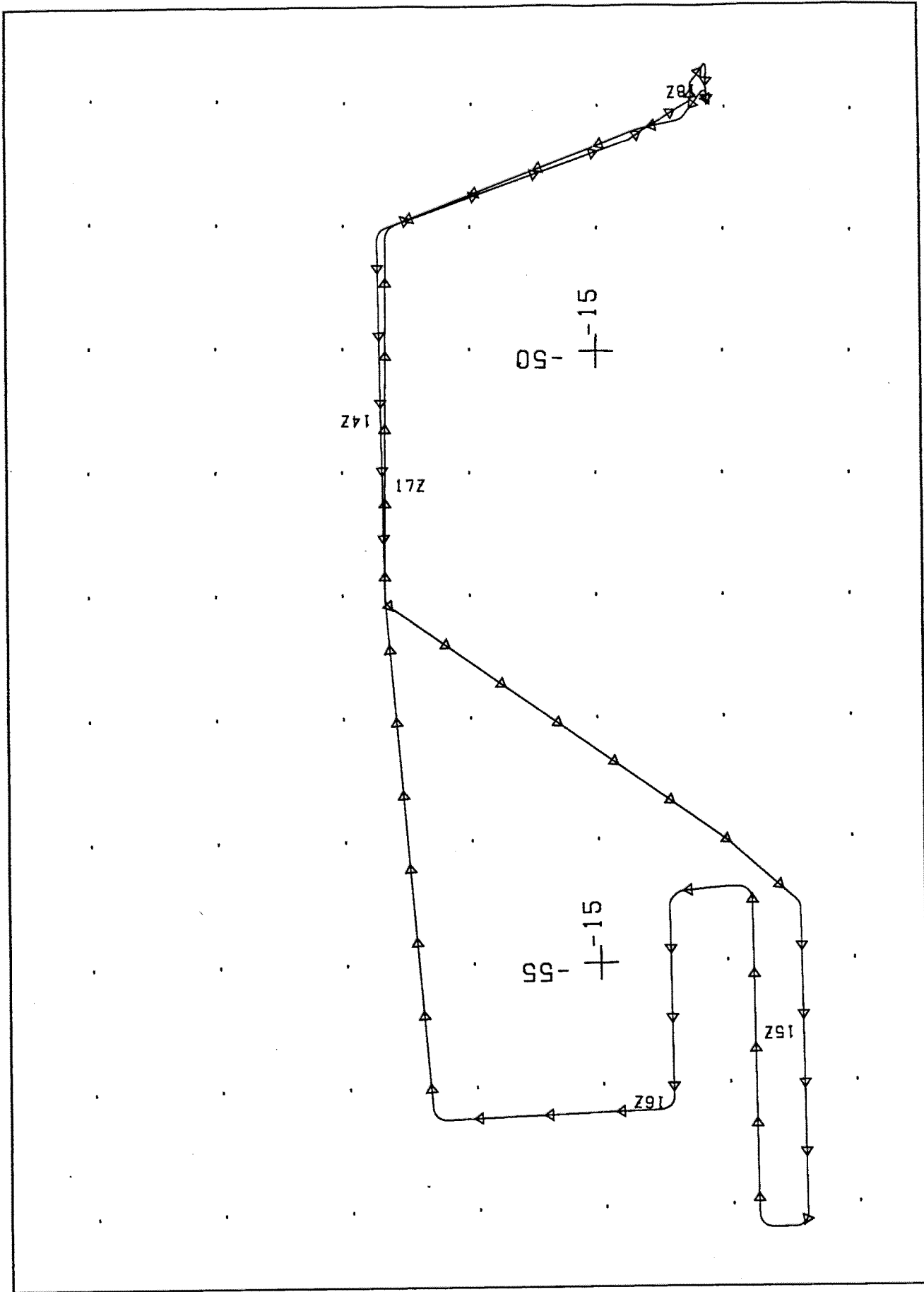
MRS-50 / VIS / CLS / AVIRIS

R/C 708

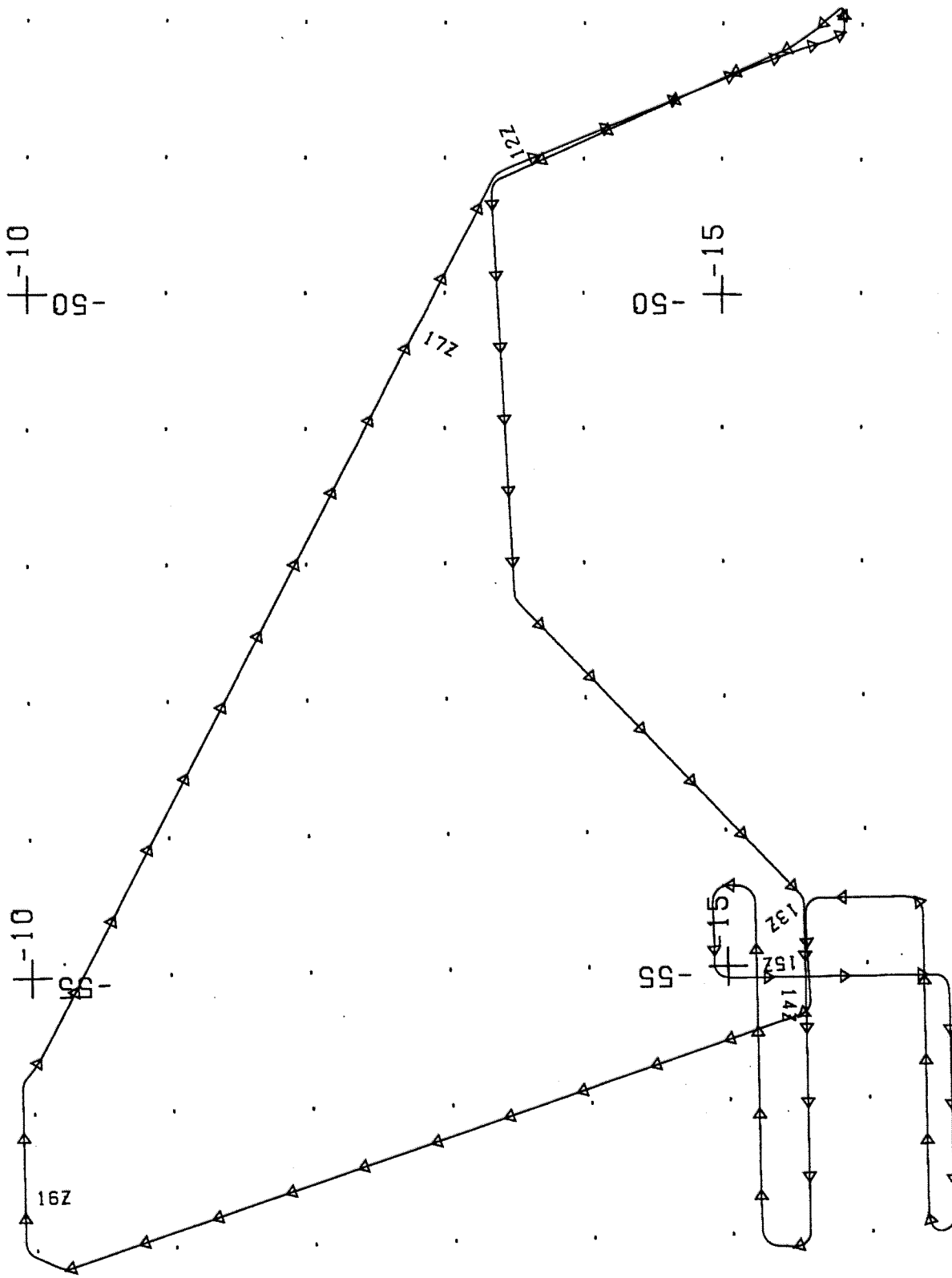
27 AUGUST 1995

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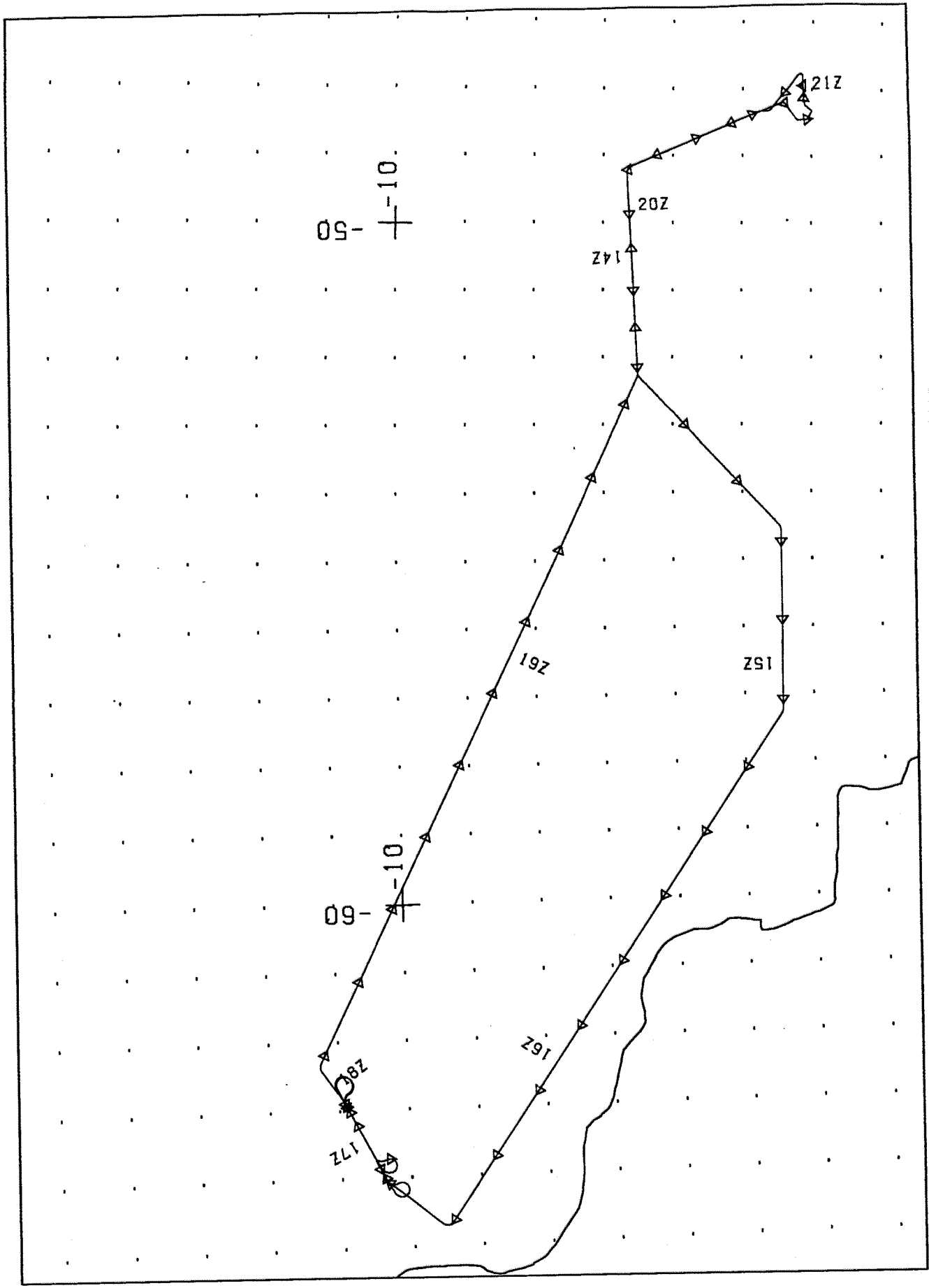




FLIGHT 95-166      30 AUGUST 1995      A/C 708      MAS-50 / VIS / CLS / AVIRIS



FLIGHT 95-167    1 SEPTEMBER 1995    A/C 708    MAS-50 / VIS / CLS / AVIRIS

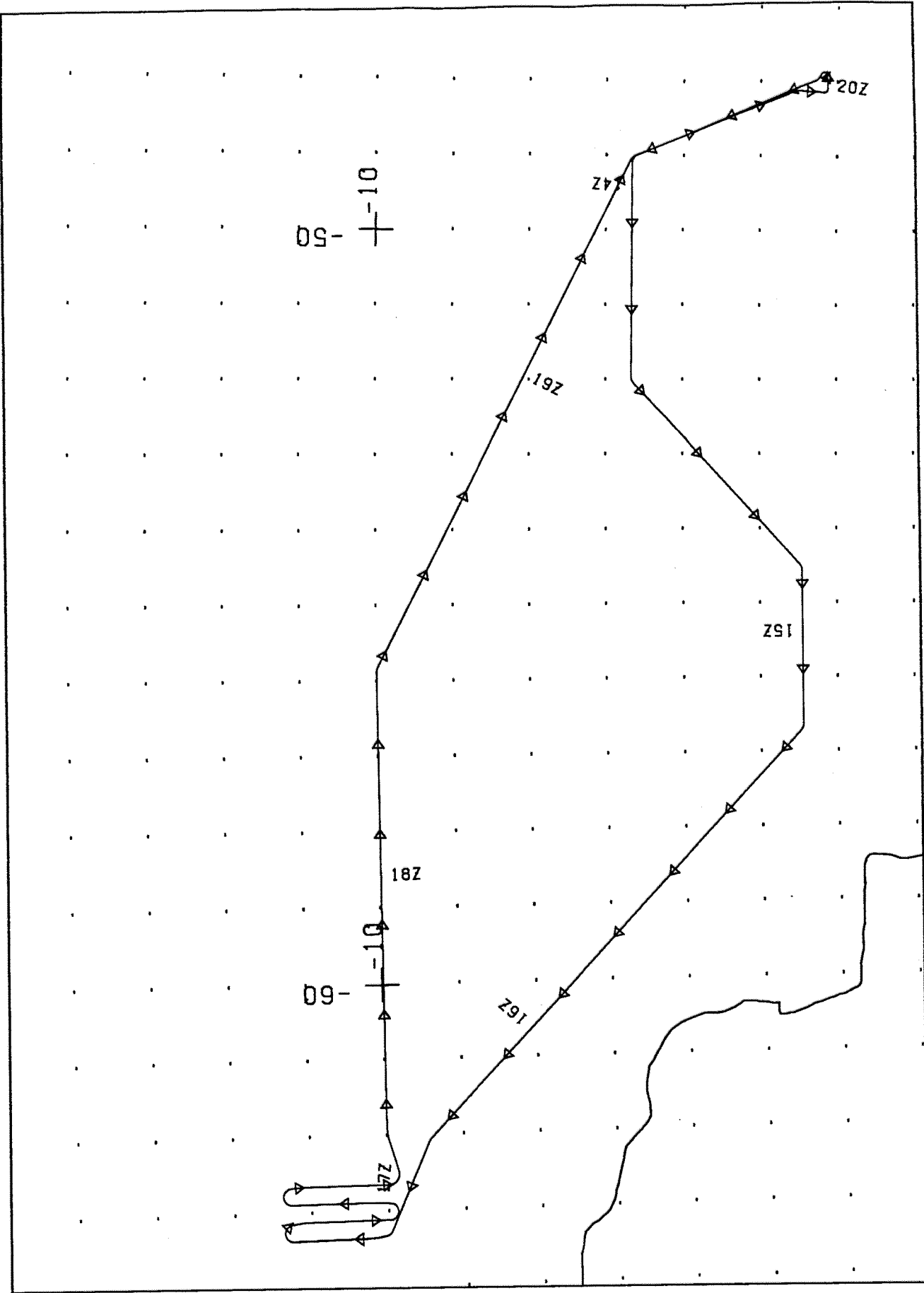


MAS-50 / VIS / CLS / AVIRIS

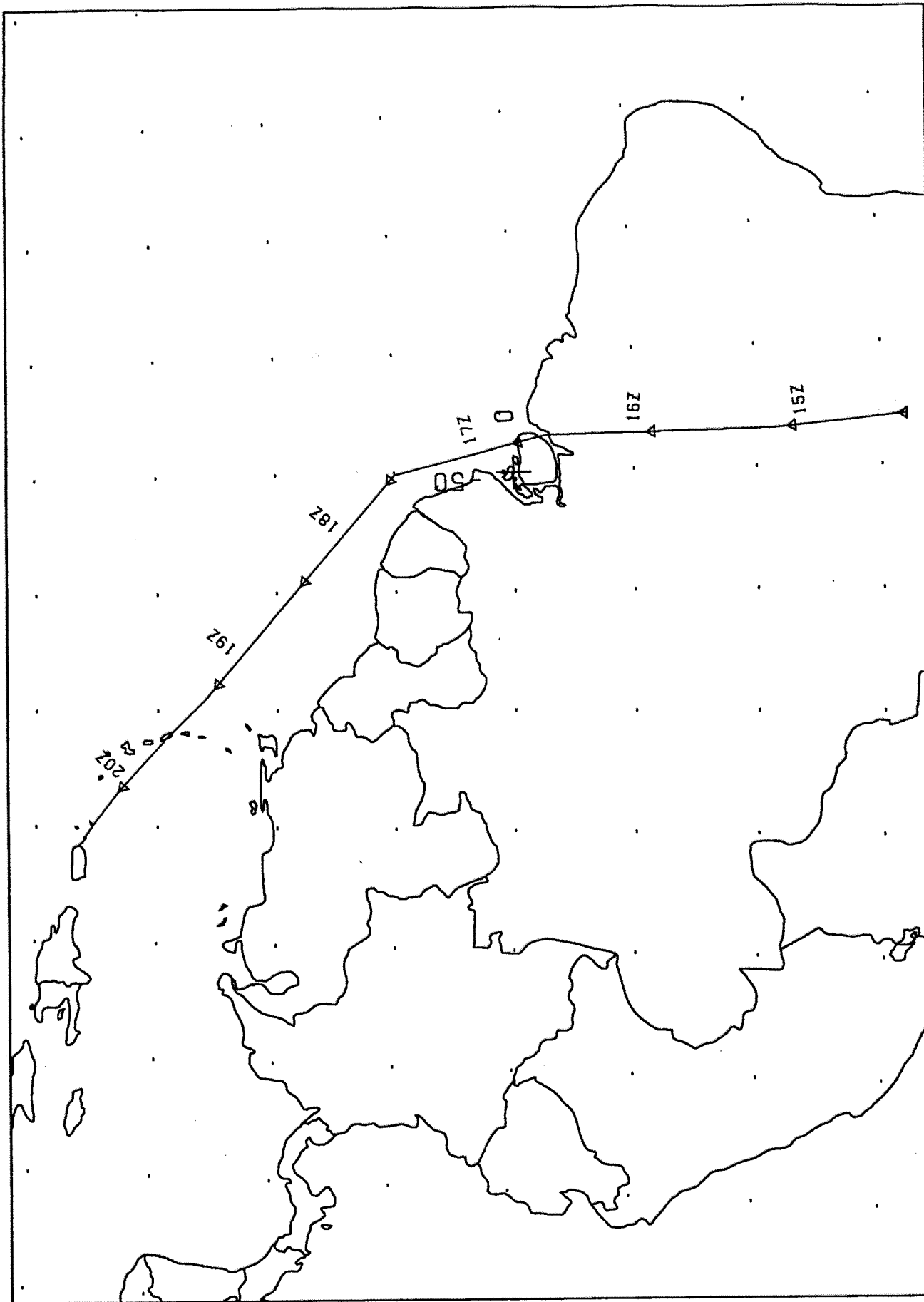
A/C 708

4 SEPTEMBER 1995

FLIGHT 95-168



FLIGHT 95-169      7 SEPTEMBER 1995      A/C 708      MAS-50 / VIS / CLS / AVIRIS



FLIGHT 95-171 18 SEPTEMBER 1995 A/C 708