FLIGHT SUMMARY REPORT

Flight #: 91-089

Date: 15 May 1991

Sensor Package: Wild-Heerbrug RC-10
Airborne Visible and Infrared Imaging Spectrometer (AVIRIS)
Thematic Mapper Simulator (TMS)
Thermal Infrared Multispectral Scanner (TIMS)

Area(s) Covered: California and Nevada

Investigator(s): Green and Conel, JPL
Ustin, University of California

Aircraft #: 706

Flight Request: 91L230, 91L242, 91U248

Julian Date: 135

SENSOR DATA

Accession #:	04220	-----	-----	-----
Sensor ID #:	033	099	101	086
Sensor Type:	RC-10	AVIRIS	TMS	TIMS
Focal Length:	6" 153.17 mm	-----	-----	-----
Film Type:	High Definition Aerochrome IR SO131	-----	-----	-----
Filtration:	cc.10B	-----	-----	-----
Spectral Band:	510-900 nm	-----	-----	-----
f Stop:	4	-----	-----	-----
Shutter Speed:	1/100	-----	-----	-----
# of Frames:	55	-----	-----	-----
% Overlap:	60	-----	-----	-----
Quality:	Excellent	-----	Excellent	-----
Remarks:	Data annotation underexposed -- unreadable			No data recorded

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 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 μm).

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 μm
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 μm	31	9.4 nm
2	0.68 - 1.27 μm	63	9.4 nm
3	1.25 - 1.86 μm	63	9.7 nm
4	1.84 - 2.45 μm	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.

Thermal Infrared Multispectral Scanner

The Thermal Infrared Multispectral Scanner (TIMS) is a multispectral scanning system using a dispersive grating and a six element mercury cadmium telluride detector array to produce six discrete channels in the 8.2 μm to 12.2 μm region.

Channel	Wavelength, μm	NET
1	8.2 - 8.6	< 0.3° C
2	8.6 - 9.0	< 0.3° C
3	9.0 - 9.4	< 0.3° C
4	9.4 - 10.2	< 0.3° C
5	10.2 - 11.2	< 0.3° C
6	11.2 - 12.2	< 0.3° C

Sensor/aircraft parameters are as follows:

IFOV:	2.5 mrad
Ground Resolution:	163 feet (50 meters) at 65,000 feet
Total Scan Angle:	76.56°
Swath Width:	16.9 nmi (31.3 km) at 65,000 feet
Pixels/Scan Line:	638
Scan Rate:	7.3 (scans/second)
Ground Speed:	400 kts. (206 m/second)

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:

Daedalus Channel	TM Band	Wavelength, μm
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)

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 or FTS 464-6252.

CAMERA FLIGHT LINE DATA
FLIGHT NO. 91-089

Accession # 04220

Sensor # 033

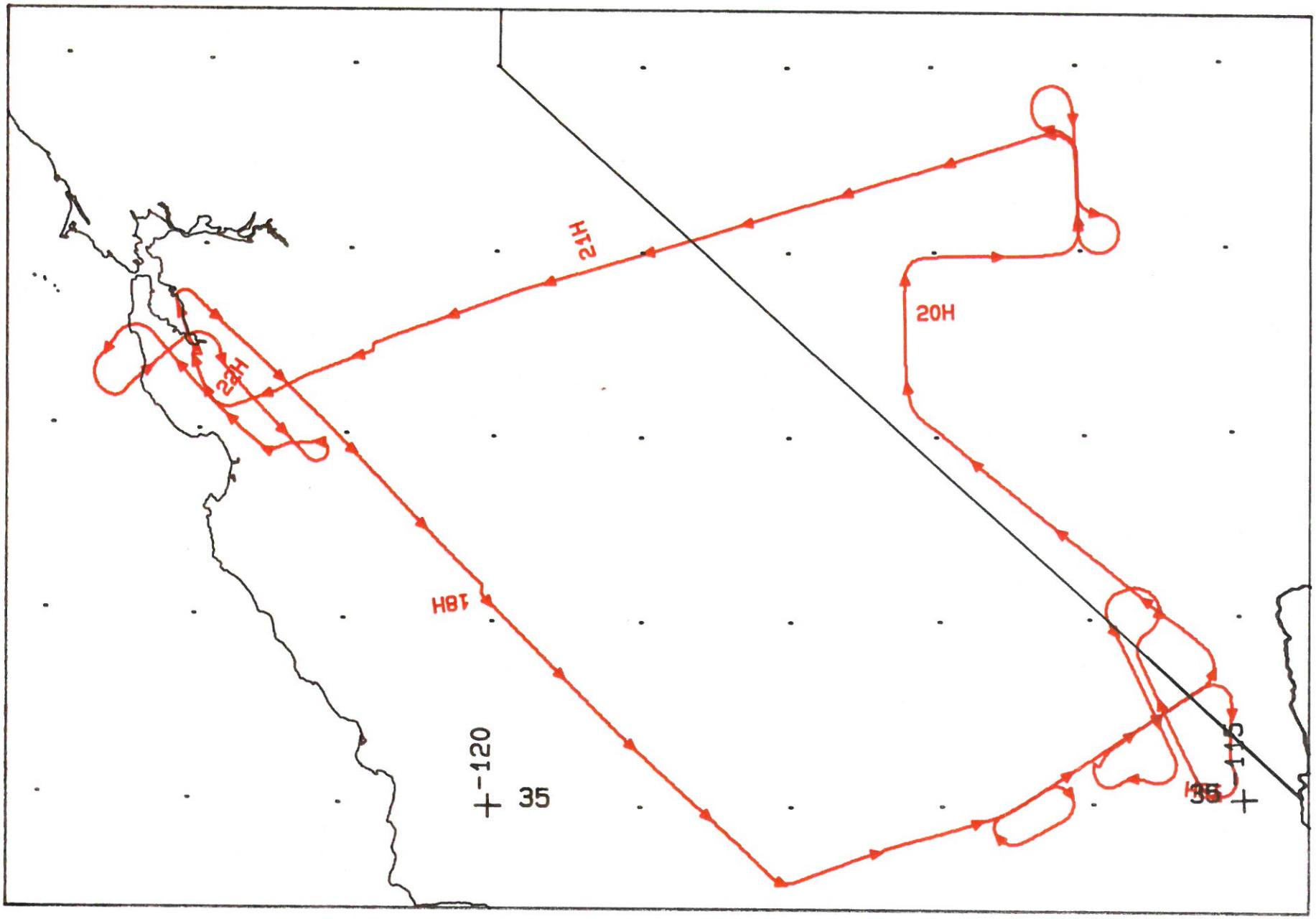
Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	5155-5162	18:48:00	18:53:30	65000/19800	Clear
C - D	5163-5169	19:02:50	19:07:20	"	Clear
E - F	5170-5177	19:17:10	19:22:55	"	Clear
A - B	5178-5184	19:30:35	19:35:15	"	Clear
G - H	5185-5189	19:57:45	20:00:35	"	Clear
I - J	5190-5193	20:12:30	20:14:20	"	Clear
J - I	5194-5197	20:23:07	20:24:55	"	Clear
I - J	5198-5201	20:32:58	20:34:50	"	Clear
K - L	5202-5205	21:22:10	21:24:08	"	10% cumulus (frames 5202-5203 and 5205)
M - N	5206-5209	21:32:20	21:34:10	"	10-20% strato-cumulus (frames 5206-5209)

SCANNER FLIGHT LINE DATA

FLIGHT NO. 91-089

DAEDALUS FLIGHT DATA
FLIGHT NUMBER: 91-089

Check Points	Actual time (GMT) begin	end	Actual scanline begin	end	Altitude feet/meter	Scan Speed (rps)	total Good scanlines	total Interpolated scanlines	total Repeated scanlines
A-B	18:48: 0.0	18:53:29.0	64358	68468	65000/19812	12.50	4101	0	10
C-D	19:02:49.0	19:07:21.0	75476	78876	65000/19812	12.50	3401	0	0
E-F	19:17: 6.0	19:22:59.0	86190	90607	65000/19812	12.50	4401	0	17
A-B	19:30:35.0	19:35:15.0	96309	99811	65000/19812	12.50	3501	0	2
G-H	19:57:49.0	20:00:37.0	116745	118845	65000/19812	12.50	2101	0	0
I-J	20:11:50.0	20:14:22.0	127258	129158	65000/19812	12.50	1901	0	0
J-I	20:23: 2.0	20:24:54.0	135064	137064	65000/19812	12.50	1401	0	0
I-J	20:32:55.0	20:34:55.0	143074	144574	65000/19812	12.50	1501	0	0
K-L	21:22:12.0	21:24: 8.0	180045	181499	65000/19812	12.50	1455	0	0
M-N	21:32:19.0	21:34:52.0	187644	189553	65000/19812	12.50	1901	0	9



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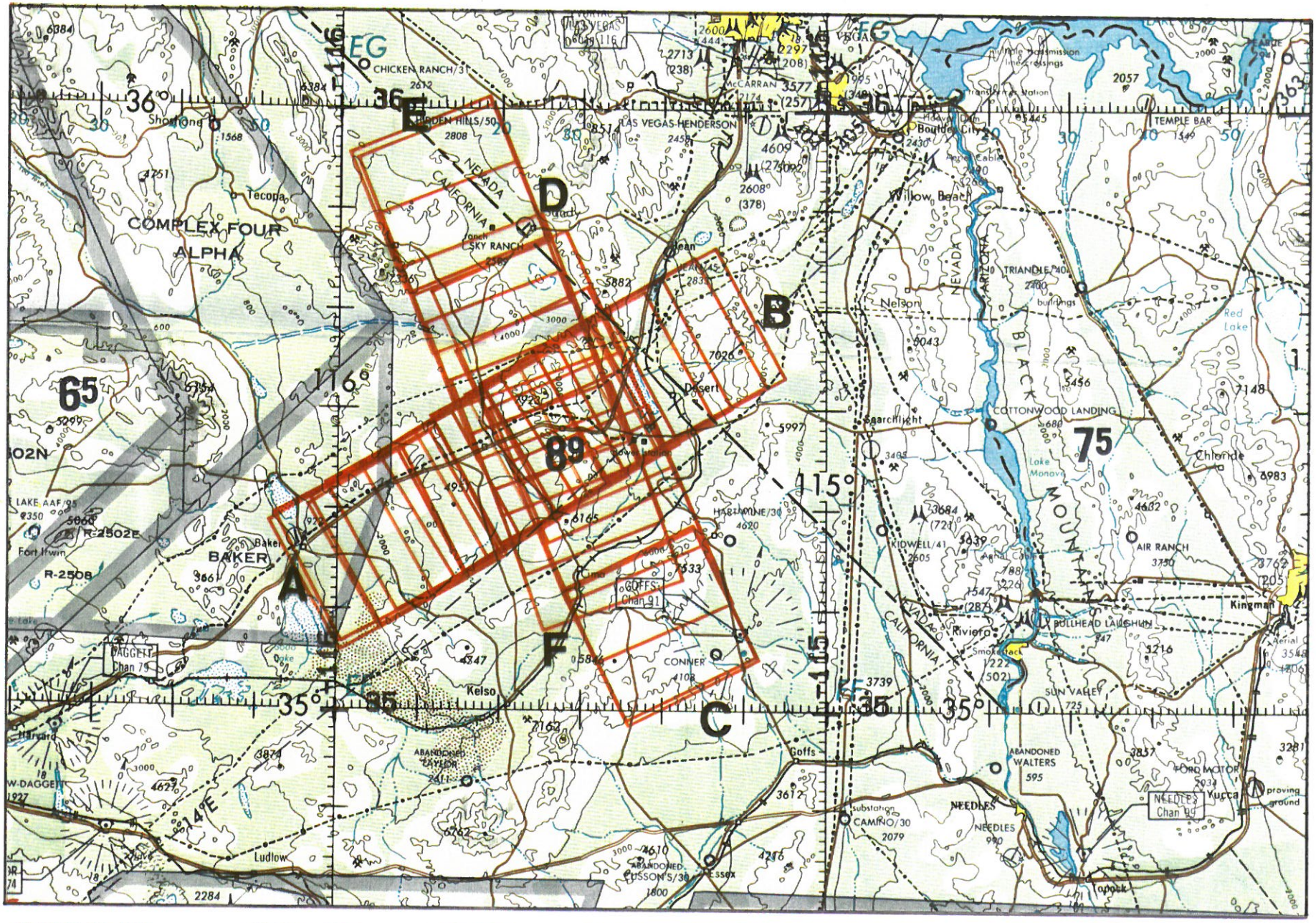

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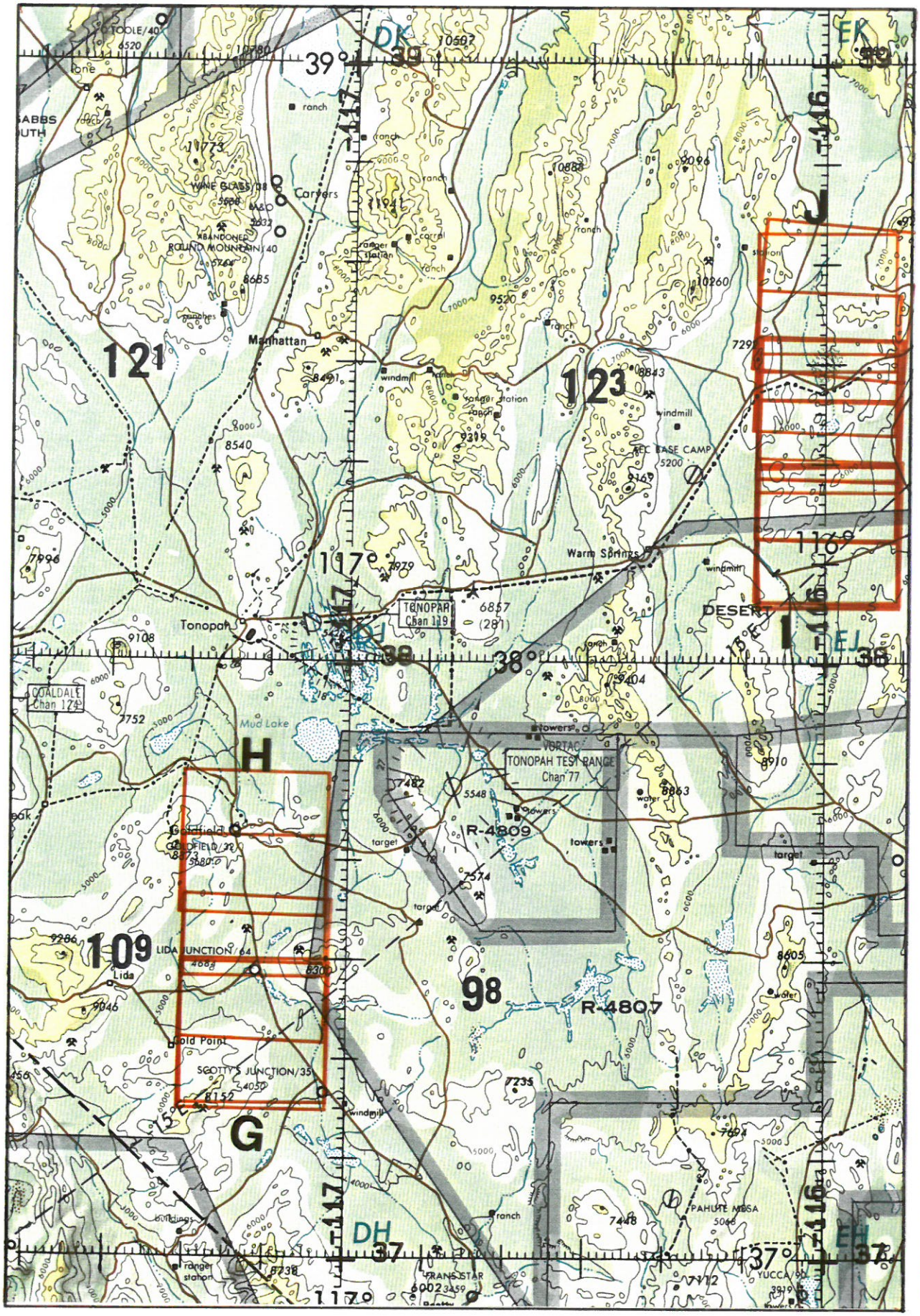
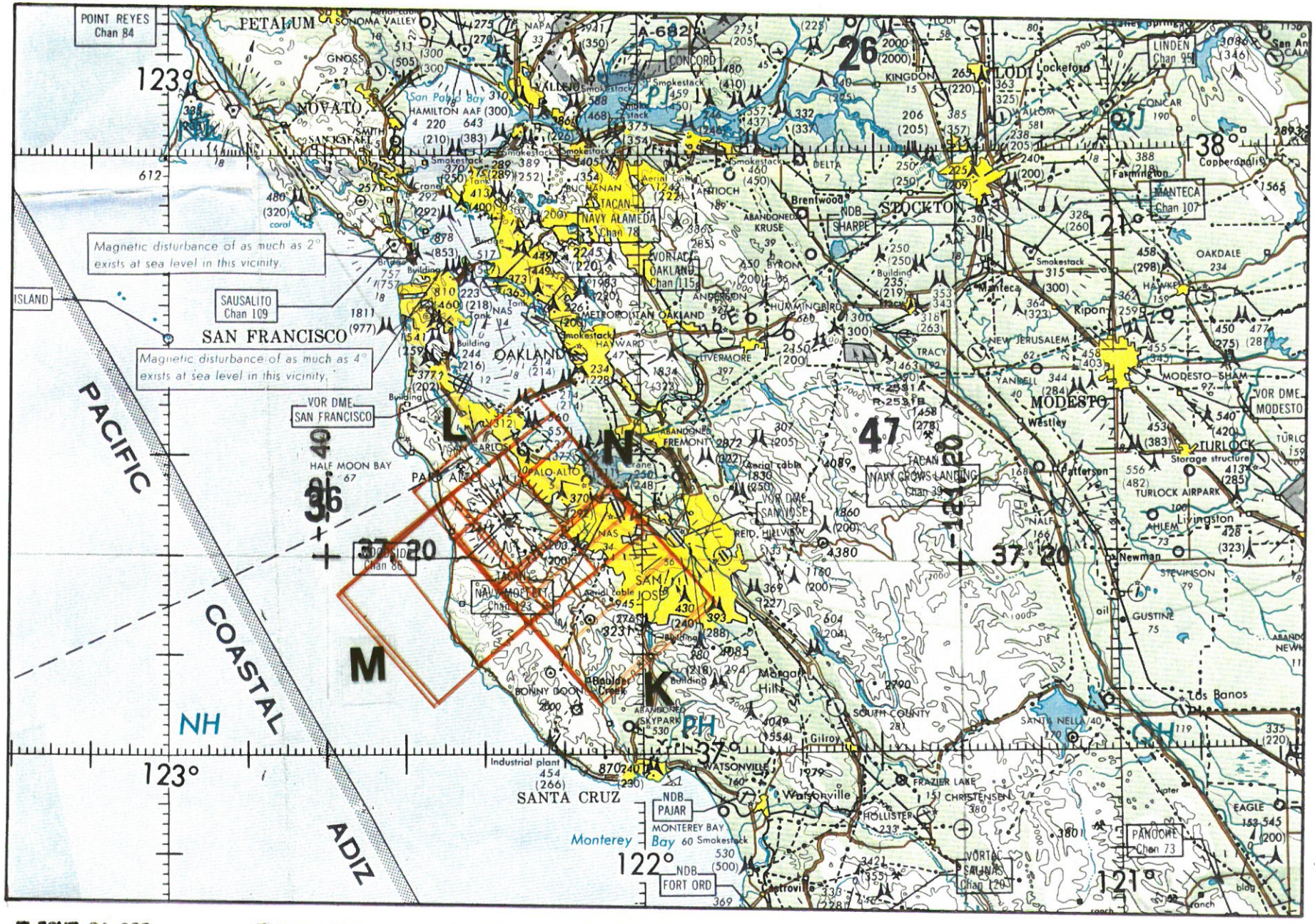


FLIGHT 91-089 15 May 1991 A/C 706 AVIRIS / TMS / RC-10 Accession # 04220 ONC 6-18



FLIGHT 91-089 15 May 1991 A/C 706 AVIRIS / TMS / RC-10 Accession # 04220 ONC 6-18