FLIGHT SUMMARY REPORT

Flight Number: 10-940

Calendar/Julian Date: 25 August 2010 (237)

Sensor Package: Cirrus Digital Camera System (DCS)
Airborne Visible and Infrared Imaging Spectrometer (AVIRIS)
MODIS/ASTER Airborne Simulator

Area(s) Covered: Utah / Colorado

Investigator(s): Townsend (University of Wisconsin) **Aircraft:** ER-2 #809

SENSOR DATA

Accession #:	05963	___	___
Sensor ID #:	167	099	124
Sensor Type:	DCS	AVIRIS	MASTER
Focal Length:	50mm	___	___
Film Type:	___	___	___
Filtration:	Wratten 12	___	___
Spectral Band:	510-990nm	___	___
f-Stop:	11	___	___
Shutter Speed:	1/500	___	___
# of Frames:	62	___	___
% Overlap:	40%	___	___
Quality:	Excellent		Good
Remarks:			Dropped Scanlines

NASA Airborne Science Program

The National Aeronautics and Space Administration maintains a variety of aircraft and sensor systems dedicated to the support of remote sensing research. Two Lockheed ER-2s (S-model U-2); two WB-57 high altitude aircraft; a DC-8; a Lockheed Orion P-3B; Global Hawk and the Altair unmanned aerial vehicle (supported by General Atomics) provide multi-level platforms for both NASA and investigator-owned sensors. Data are collected for atmospheric, land, and ocean processes in support of the NASA Earth Science program, as well as for universities and other government agencies.

Additionally contracted aircraft from Department of Energy, and Twin Otter International provide remote sensing platforms for the program.

The NASA aircraft, located at the Dryden Aircraft Operations Facility, Ellington Field and Wallops Flight Facility, are used as test-beds for advanced sensor design and satellite simulation, as well as to support scientific and operational data collection campaigns. Numerous sensor systems are in use and under development by NASA, including multispectral imaging devices, a SAR system, and a suite of medium-format digital cameras. All instruments are spectrally, spatially, and radiometrically calibrated on a routine basis. The aircraft themselves are equipped with navigation systems that continuously record GPS location and platform attitude data.

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:	34^{o}
Swath Width:	5.9 nautical mile (11 km) at 65,000 feet
Spectral Coverage:	0.41-2.45 μm
Pixels/Scan Line:	677
Number of Spectral Bands:	224
Digitization:	12-bits
Data Rate:	20.4 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 processed and archived at JPL. For further information contact Rob Green at Jet Propulsion Laboratory, 4800 Oak Grove Drive, Mail Stop 183-501, Pasadena, California 91109-8099. http://aviris.jpl.nasa.gov/

MASTER (MODIS/ASTER Airborne Simulator

The MODIS/ASTER Airborne Simulator (MASTER) is designed to closely match NASA's EOS ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer). It is intended primarily to study geologic and other Earth surface properties. It has a variable scan speed which allows data to be acquired on both high and low altitude aircraft. Its fifty spectral bands are configured below:

Band	Bandwidth	Resolution	*Band*	*Bandwidth*	*Resolution*
1	0.438-0.482	5-50m	**26**	3.075-3.231	5-50m
2	0.479-0.522	5-50m	**27**	3.231-3.377	5-50m
3	0.521-0.564	5-50m	**28**	3.385-3.535	5-50m
4	0.562-0.603	5-50m	**29**	3.538-3.694	5-50m
5	0.633-0.692	5-50m	**30**	3.692-3.826	5-50m
6	0.692-0.734	5-50m	**31**	3.846-3.999	5-50m
7	0.731-0.773	5-50m	**32**	3.999-4.154	5-50m
8	0.781-0.823	5-50m	**33**	4.157-4.310	5-50m
9	0.848-0.889	5-50m	**34**	4.307-4.460	5-50m
10	0.886-0.927	5-50m	**35**	4.456-4.603	5-50m
11	0.927-0.966	5-50m	**36**	4.597-4.760	5-50m
12	1.582-1.636	5-50m	**37**	4.753-4.911	5-50m
13	1.638-1.691	5-50m	**38**	4.906-5.054	5-50m
14	1.694-1.745	5-50m	**39**	5.044-5.205	5-50m
15	1.749-1.801	5-50m	**40**	5.203-5.342	5-50m
16	1.803-1.853	5-50m	**41**	7.587-7.943	5-50m
17	1.852-1.898	5-50m	**42**	7.950-8.398	5-50m
18	1.896-1.953	5-50m	**43**	8.447-8.806	5-50m
19	1.956-2.006	5-50m	**44**	8.882-9.307	5-50m
20	2.057-2.105	5-50m	**45**	9.503-9.902	5-50m
21	2.134-2.185	5-50m	**46**	9.912-10.327	5-50m
22	2.185-2.236	5-50m	**47**	10.338-10.922	5-50m
23	2.233-2.284	5-50m	**48**	10.977-11.652	5-50m
24	2.294-2.363	5-50m	**49**	11.864-12.364	5-50m
25	2.362-2.426	5-50m	**50**	12.638-13.119	5-50m

Sensor/Aircraft Parameters:

Spectral Bands:	50 (16-bit resolution)
IFOV:	2.5mrad
Swath width:	19.9nm (36km) at 65,000ft
Ground Resolution	5-50m (variable w/ altitude)
Total FOV:	85.92 degrees
Pixels/Scanline:	716
Scan Rate:	6.25 – 25 Hz
URL Reference:	http://masterweb.jpl.nasa.gov

Cirrus Digital Camera System (DCS)

Cirrus Digital Systems provides the digital camera. It consists of a Hasselblad camera body with a Kodak camera back and CCD array. It can be configured to acquire either false color infrared or natural color imagery.

Lens	Array Size	Array Width	Field of View (FOV)	Altitude (feet)	Ground Coverage	Nominal Resolution
50mm	4072 x 4072 (pixels)	36.72mm	40.3°	65000	7.9nm	3.5m
50mm	4072 x 4072 (pixels)	36.72mm	40.3°	45000	5.4nm	2.5m
50mm	4072 x 4072 (pixels)	36.72mm	40.3°	28000	3.4nm	1.5m
50mm	4072 x 4072 (pixels)	36.72mm	40.3°	13000	1.6nm	0.7m

Note: Nominal resolution references the smallest target that can be imaged.

Airborne Sensor Facility

The Airborne Sensor Facility at NASA Ames Research Center web site:

http://asapdata.arc.nasa.gov/

Additional information regarding flight documentation to include archive searches may be obtained from the following:

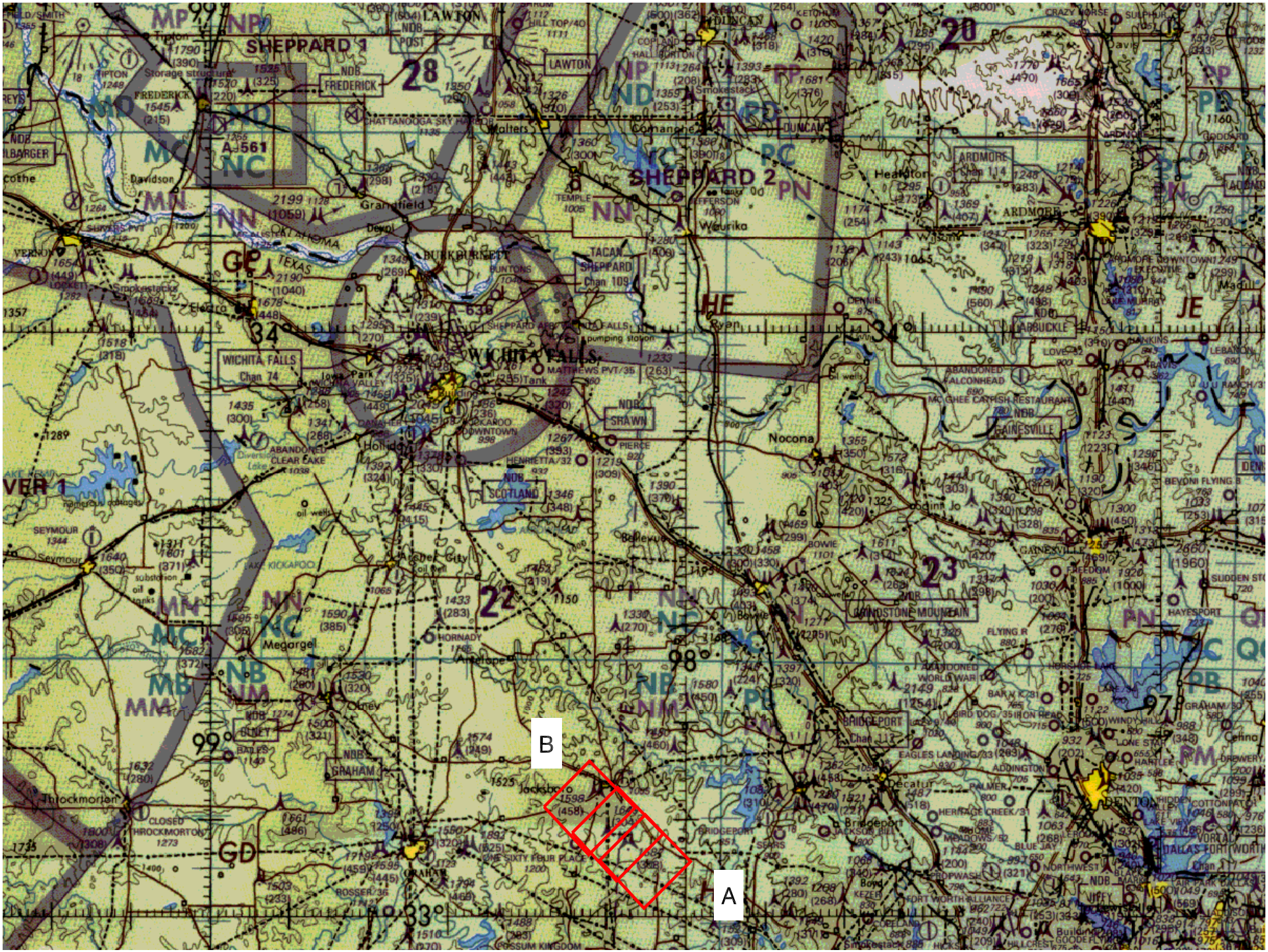
Airborne Sensor Facility
MS 244-15
NASA Ames Research Center
Moffett Field, CA 94035
Telephone: (650)604-6252 (FAX 4987)

CAMERA FLIGHT LINE DATA
FLIGHT NO. 10-940

Accession # 05963

Sensor # 167

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	True Heading / Line ID
		START	END		
A - B	7049-7051	16:49:40	16:50:52	61200/18660	315° / Jack County Tx (Engineering Run)
C - D	7052-7061	18:07:34	18:13:00	64900/19790	297° / Niwot Ridge Flux Tower Colorado
E - F	7062-7067	18:53:08	18:56:09	65000/19820	231° / Aspen1 Utah - Swan Flats
G - H	7068-7071	19:25:38	19:27:26	65200/19880	216° / Aspen2 Utah - Fish Lake
I - J	7072-7078	19:38:10	19:41:47	65300/19910	184° / Aspen3 Utah - Cedar Mountain
J - I	7079-7087	19:49:14	19:54:04	65200/19880	9° / Aspen3 Utah - Cedar Mountain
H - G	7088-7092	20:04:28	20:06:53	65100/19850	37° / Aspen2 Utah - Fish Lake
K - L	7093-7110	20:27:43	20:37:58	65100/19850	131° / Colorado Aspen



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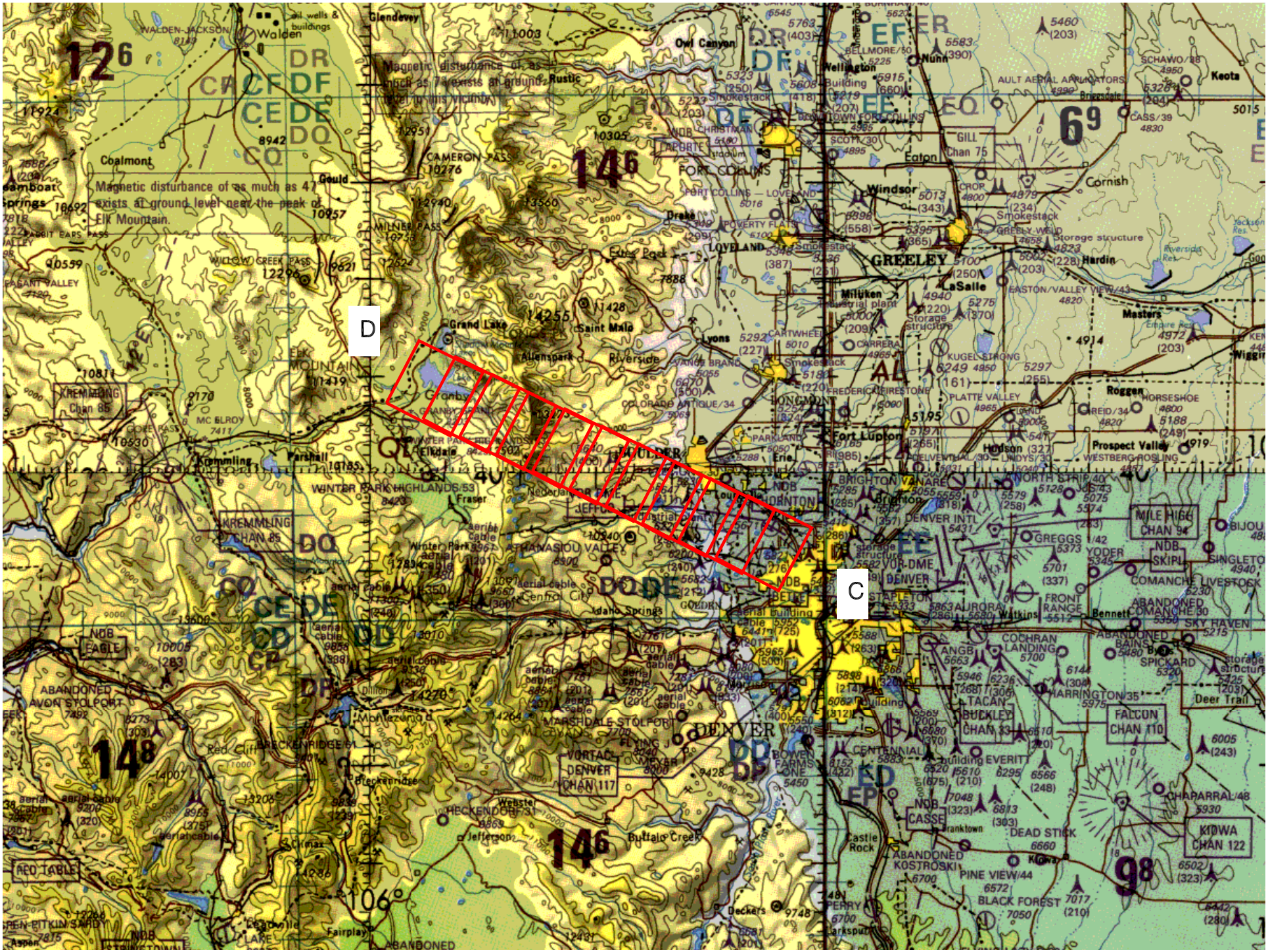
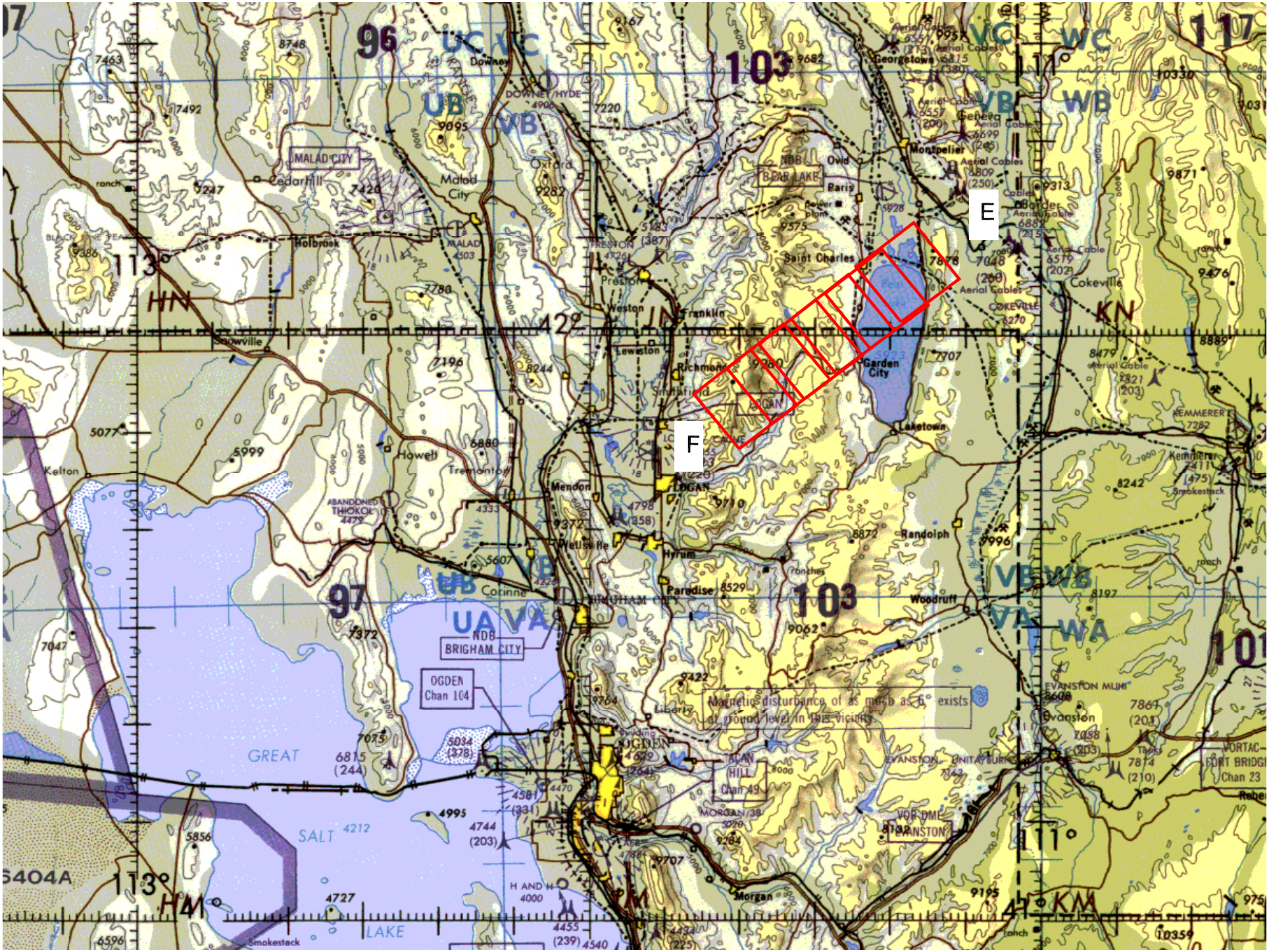
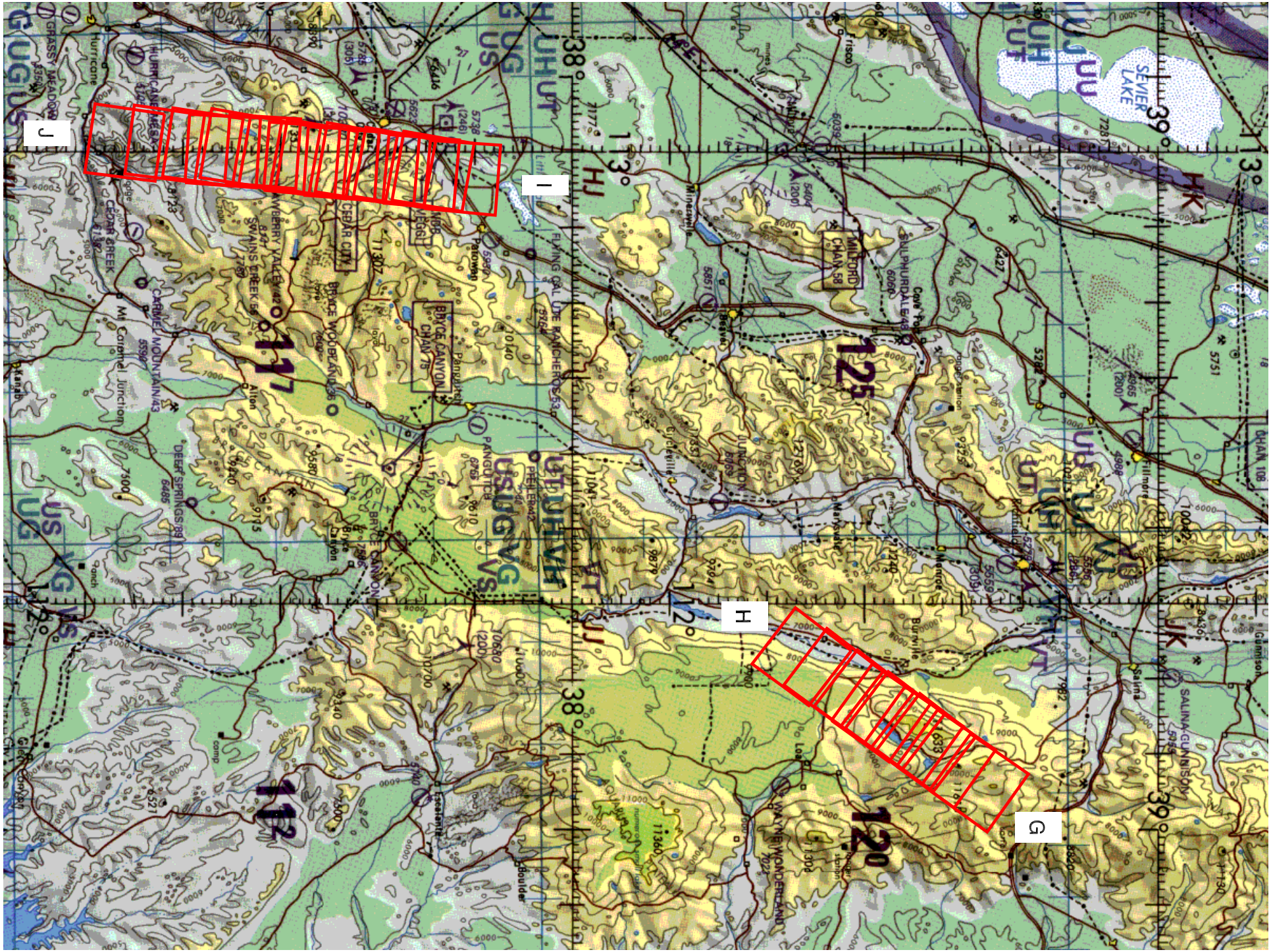


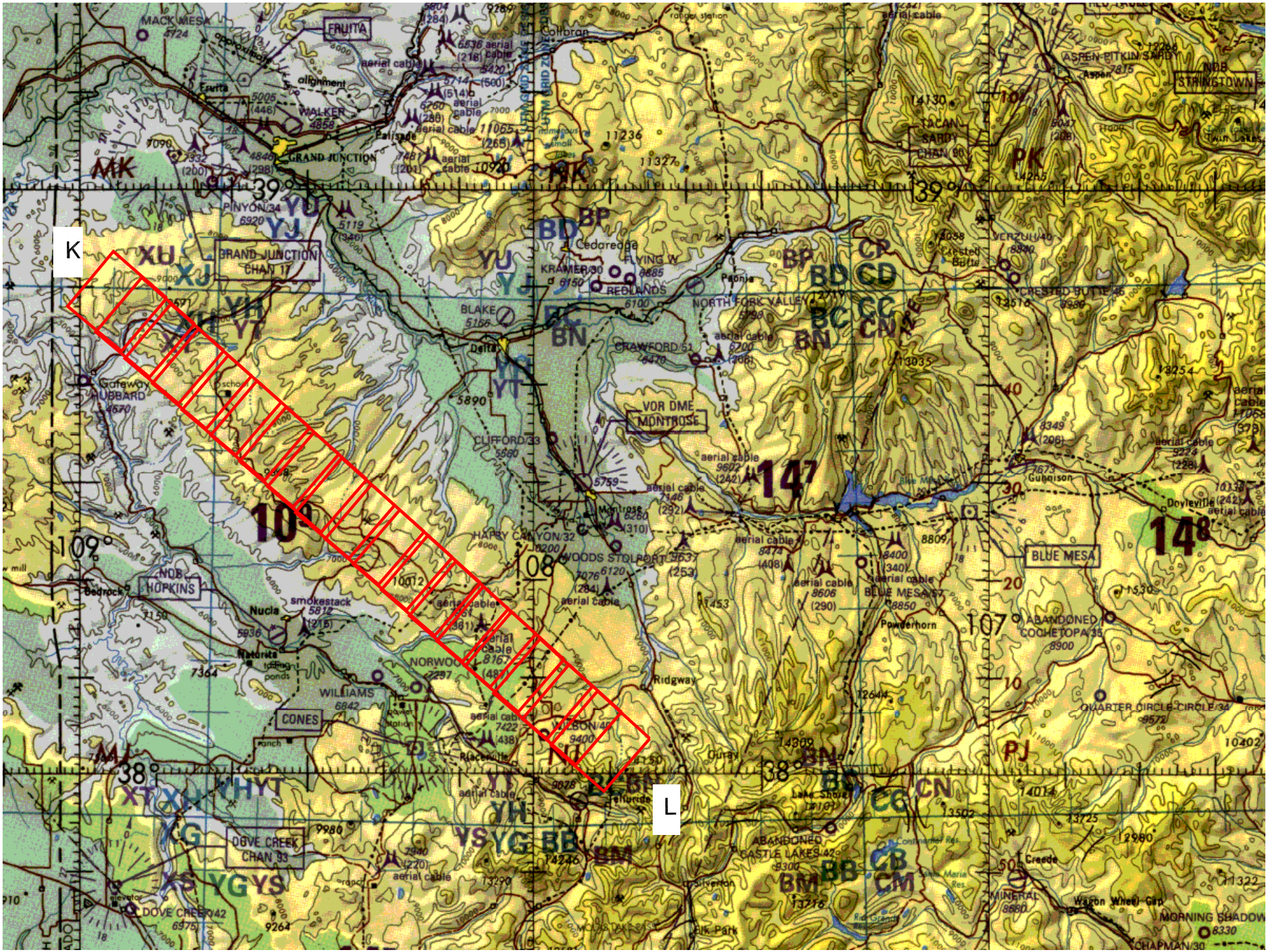
FLIGHT 10-940 25 AUGUST 2010 A/C 809 DCS



FLIGHT 10-940 25 AUGUST 2010 A/C 809 DCS



FLIGHT 10-940 25 AUGUST 2010 A/C 809 DCS



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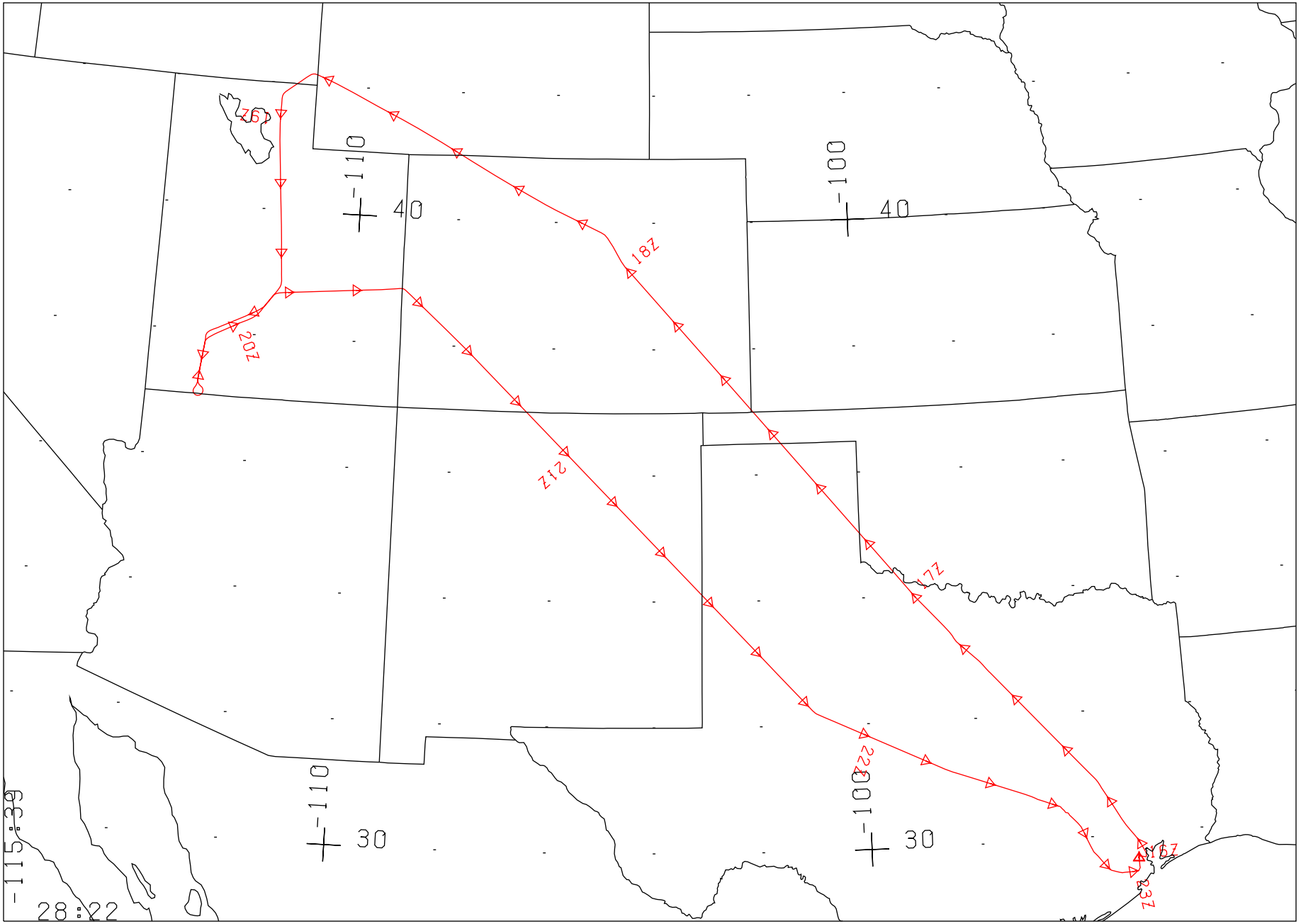

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LAMBERT CONFORMAL PROJECTION: SP1 = 27.3 SP2 = 40.0 CM = -104.1 ROTATED BY 0.0

16:00:00 TO 23:10:00 UT SCALE 1:9.38E+06 TIME TICK EVERY 10.00 MINUTES