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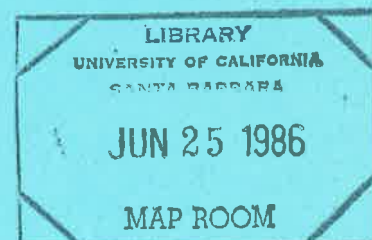
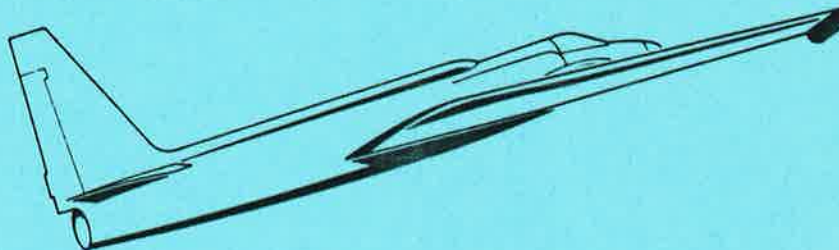
Airborne Instrumentation Research Project

Flight Summary Report

Flight No. 85-177

Date 29 September 1985

FSR-



NASA

National Aeronautics and
Space Administration

Ames Research Center
Moffett Field, California 94035

Airborne Missions and Applications Division

FLIGHT SUMMARY REPORT

Flight No: 85-177

Date: 29 September 1985

Julian Date: 272

Sensor Package: Daedalus Thematic Mapper Simulator (TMS)
RC-10 Camera

Aircraft No: 706

Purpose of Flight: #1048 Support
Requestor: Wrigley

Area(s) Covered: White Sands, New Mexico
Yuma, Arizona

SENSOR DATA

Accession No:	03504	---
Sensor ID No:	034	074
Sensor Type:	RC-10	TMS
Focal Length:	304.66mm 12"	---
Film Type:	High Definition Aerial, 3414	---
Filtration:	Wratten12	---
Spectral Band:	510-700nm	see write-up
f Stop:	Variable(see Flight line-data)	---
Shutter Speed:	1/175	---
No. of Frames:		---
% Overlap:	60	---
Quality:	Excellent	Excellent
Remarks:	---	---

FLIGHT SUMMARY

85-177

This flight was flown in support of Flight Request #1048 (Wrigley, NASA/ARC) under the FY 1985 Airborne Instrumentation Research Program (AIRP) plan. Daedalus Thematic Mapper Simulator (TMS) data and black and white photography were acquired over a test target area in the White Sands area of New Mexico. Photographic data was also acquired over Tucson, Arizona during return of the aircraft to Moffett Field, California (see Track Map).

Multiple passes were conducted over the test target with varying photographic exposures. Although substantial cumulus cloud cover was in the immediate area, the target was cloud-free. No camera or processing malfunctions were noted and the quality of the data is rated as excellent.

Thematic Mapper Simulator

The Daedalus Thematic Mapper Simulator (TMS) is a high altitude multi-spectral scanner flying on the U-2 and ER-2 aircraft which simulates spatial and spectral characteristics of the seven Landsat-D Thematic Mapper bands. The specific bands are as follows:

<u>Daedalus Channel</u>	<u>TM Band</u>	<u>Wavelength um</u>
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 low gain	10.4 - 12.5
12	6 high gain	10.4 - 12.5

Sensor/aircraft parameters are:

IFOV: 1.3 mr
Ground Resolution: 91 feet (28 meters at 70,000 feet)
Total scan angle: 43°
Swath width: 9.0 nmi (16.6 km at 70,000 feet)
Pixels/scan line: 716 (750 following rectification)
Scan rate: 12.5 scans/sec
Aircraft velocity: 390 kts (200 m/sec)

FLIGHT SUMMARY

U-2 Thematic Mapper Simulator Calibration Data

85-177

<u>Daedalus Channel Number</u>	<u>TM Channel Number</u>	<u>Radiance/Count mW/cm²-μm-sr Count</u>	<u>Sensitivity (NER)</u>
1	A	<u>0.100</u>	< .81
2	1	<u>0.084</u>	< .076
3	2	<u>0.076</u>	< .054
4	B	<u>0.062</u>	< .121
5	3	<u>0.078</u>	< .038
6	C	<u>0.071</u>	< .040
7	4	<u>0.102</u>	< .020
8	D	<u>0.085</u>	< .030
9	5	<u>0.022</u>	< .067
10	7	<u>0.010</u>	< .031

(Radiance/Count should be multiplied by gray-level value to obtain radiance. No "tare" correction is necessary.)

Thermal Data

		<u>Digital Count</u>		<u>NEΔT</u>
		<u>BB1</u>	<u>BB2</u>	
11	6 (Low Gain)	<u>110</u>	<u>152</u>	< .35°C
12	6 (High Gain)	<u>88</u>	<u>175</u>	< .35°C

Reference Sources

Black Body 1: +8.31

Black Body 2: +32.10

Note: Calibration values vary throughout flight. Refer to housekeeping information for exact values.

TMS DATA LOGICAL RECORD FORMAT

16-BIT WORD NUMBER	CONTENTS
1-25	Channel Scanline Housekeeping Information
1	Data frame status 0 Good frame 10-16 Interpolated data 20-26 Repeated data 30-36 Zero-fill for data
2	Run number
3-4	Scanline number (32-bit integer)
5-6	Thumbwheel switches (32-bit integer): expressed as 8 digits in the form YYFFFJJJ, where YY is the last two digits of the year FFF is the flight number JJJ is the Julian day of the year
7	Black body 1 thermal reference temperature (degrees C * 100)
8	Black body 2 thermal reference temperature (degrees C * 100)
9	Scan speed (scans/second * 10)
10	GMT hours
11	GMT minutes
12	GMT seconds (* 10)
13	Demagnification value (* 100)
14	Filler
15	Gain value (* 100)
16	Channel number
17-18	Time (32-bit integer): expressed as a 7-digit number in the form HHMMSST
19	Black body 1 radiance count
20	Black body 2 radiance count
21	Aircraft roll angle (signed integer, positive is left): 0.03 degrees per count, 0.06 degrees per pixel, and thus two counts per pixel.
22-25	Filler
26-383	Digitized Video Pixel Information
26	Digitized video pixel no. 1 and no. 2
27	Digitized video pixel no. 3 and no. 4
28	Digitized video pixel no. 5 and no. 6
⋮	⋮
⋮	⋮
382	Digitized video pixel no. 713 and no. 714
383	Digitized video pixel no. 715 and no. 716

NOTE: Housekeeping information consists of 16-bit integers, unless otherwise noted. Video pixel data consist of two 8-bit samples packed into one 16-bit word. Geometrically corrected data contains 750 8-bit pixels, expanding the logical record format to 400 words.

TMS SCANNER DATA TAPE FORMAT

The Applications Aircraft Data Management Facility converts scanner data recorded on 14-track high-density tape to standard 9-track computer-compatible tapes (CCT) for the user. Density of CCTs can be 6250, 1600, or 800 bpi, depending on the user's preference. The logical record length is fixed at 766 8-bit bytes for raw data and 800 for geometrically corrected data. The first 50 bytes of all records are house-keeping information; the next 716 (or 750 for geometrically corrected data) are digitized video pixel data.

All channels for a particular flight segment are written in a single tape file in a line-interleaved format, as follows:

record 1 = scanline 1, channel 1
record 2 = scanline 1, channel 2
record 3 = scanline 1, channel 3
•
•
record 12 = scanline 1, channel 12
record 13 = scanline 2, channel 1
record 14 = scanline 2, channel 2
etc.

Users can request that tapes be blocked to contain all channels of a single scanline sequentially in one record. In such cases physical record length equals the number of channels multiplied by the logical record length (766 or 800 bytes).

CAMERA FLIGHT LINE DATA
FLIGHT NO. 85-177

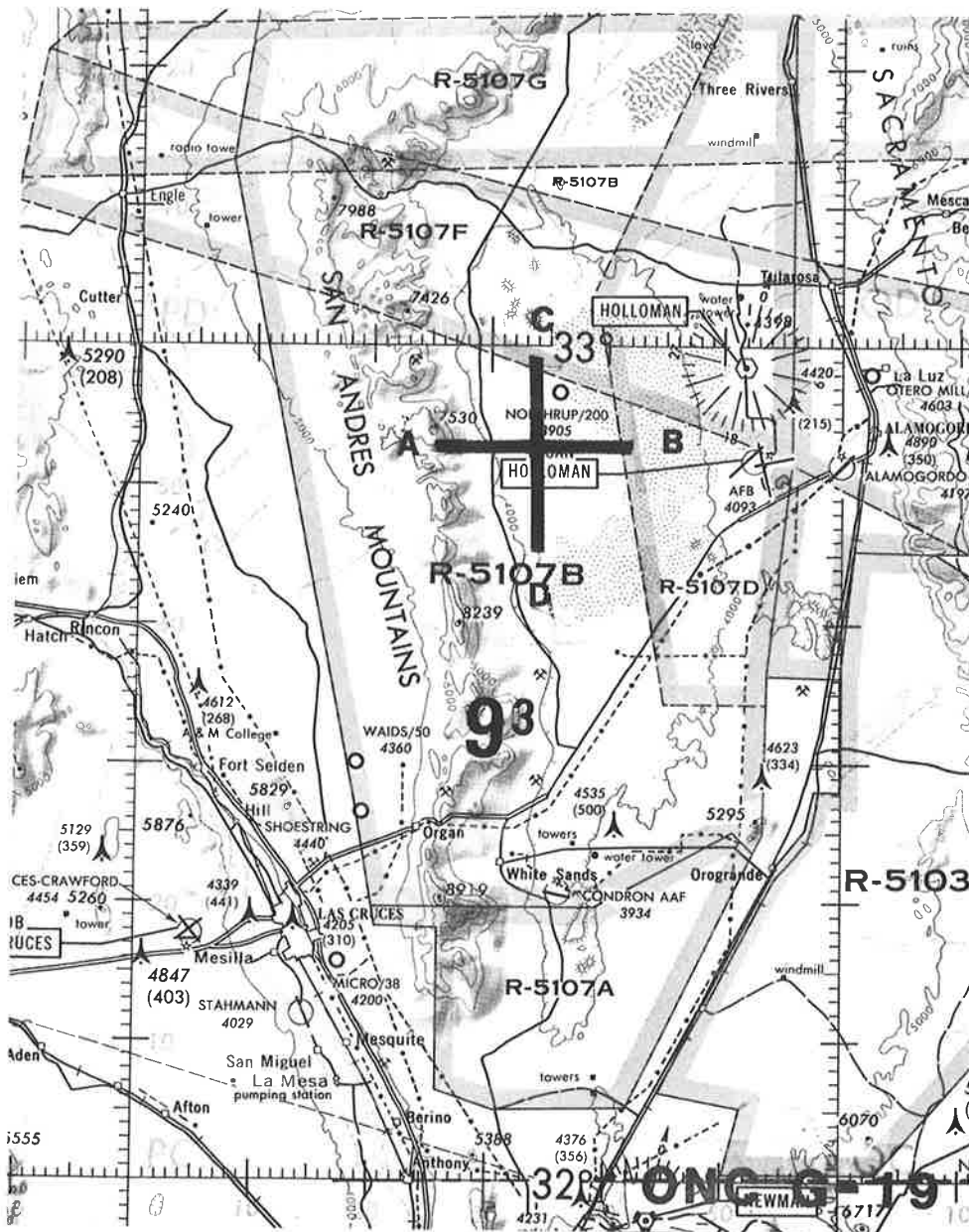
Sensor #	Check Points	Frame Numbers	Time (GMT—hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
			START	END		
034	A-B	0472-0477	17:05:18	17:08:17	65000/19800	W-E pass over target area f 5.6
	C-D	0478-0483	17:14:31	17:16:27	"	N-S pass over target area; f 5.6
	A-B	0484-0489	17:21:50	17:23:45	"	W-E pass over target area; f 4.0
	C-D	0490-0495	17:29:37	17:31:32	"	N-S pass over target area; f 4.0
	A-B	0496-0501	17:37:03	17:38:58	"	W-E pass over target area; f 8.0
	C-D	0502-0507	17:44:38	17:44:34	"	N-S pass over target area; f 8.0
	---	0508-0513	18:48:02	18:49:25	"	clear S-N pass over Yuma, Arizona
	---	0514-0517	18:55:22	18:55:55	"	clear; clearing frames over Chocolate Mountains, CA; 33°12'N/115°10'W

SCANNER FLIGHT LINE DATA

FLIGHT NO. 85-177

DAEDALUS FLIGHT DATA FLIGHT NUMBER: 85-177

Check Points	flightline number	A c t u a l t i m e		A c t u a l s c a n l i n e		Altitude feet/meter	Scan Speed (rps)	total G o o d scanlines	total Interpolated scanlines	total Repeated scanlines	total Zero-fill scanlines
		begin	end	begin	end						
A-B	1	1706190	1708180	114343	115839	65000/19812	12.5	1439	0	58	0
C-D	2	1714330	1716070	120521	121696	65000/19812	12.5	1054	0	122	0
A-B	3	1721500	1723500	125989	127491	65000/19812	12.5	1486	0	17	0
C-D	4	1729380	1731430	131831	133400	65000/19812	12.5	1564	0	6	0
A-B	5	1737040	1739020	137409	138886	65000/19812	12.5	1472	0	6	0
C-D	6	1744390	1746420	143102	144632	65000/19812	12.5	1525	0	6	0



FLIGHT 85-177
29 September 1985
Data Run
Daedalus TMS/RC-10 —