

# FLIGHT SUMMARY REPORT

**Flight #:** 92-160  
**Date:** 20 September 1992  
**Sensor Package:** Dual Wild-Heerbrug RC-10  
Dual Hycon HR-732  
Thematic Mapper Simulator (TMS)  
**Area(s) Covered:** Hawaiian Islands

**Investigator(s):** Masumoto, State of Hawaii

**Aircraft #:** 708

**Flight Request:** 2XZ2040

**Julian Date:** 264

## SENSOR DATA

<b>Accession #:</b>	04467	04468	04469
<b>Sensor ID #:</b>	034	026	038
<b>Sensor Type:</b>	RC-10	RC-10	HR-732
<b>Focal Length:</b>	12" 304.66 mm	12" 304.97 mm	24" 609.6 mm
<b>Film Type:</b>	High Definition Aerochrome IR SO-131	Aerial Color SO-242	High Definition Aerochrome IR SO-131
<b>Filtration:</b>	cc.10B	None	cc.30B
<b>Spectral Band:</b>	510-900 nm	400-700 nm	510-900 nm
<b>f Stop:</b>	4	4	8
<b>Shutter Speed:</b>	1/150	1/200	1/75
<b># of Frames:</b>	94	93	191
<b>% Overlap:</b>	60	60	60
<b>Quality:</b>	Excellent	Excellent	Excellent
<b>Remarks:</b>			

## SENSOR DATA continued

<b>Accession #:</b>	4470	-----
<b>Sensor ID #:</b>	039	101
<b>Sensor Type:</b>	HR-732	TMS
<b>Focal Length:</b>	24" 609.6 mm	-----
<b>Film Type:</b>	High Definition Aerial Film 3414	-----
<b>Filtration:</b>	Wratten-12	-----
<b>Spectral Band:</b>	510-700 nm	-----
<b>f Stop:</b>	8	-----
<b>Shutter Speed:</b>	1/75	-----
<b># of Frames:</b>	191	-----
<b>% Overlap:</b>	60	-----
<b>Quality:</b>	Excellent	Excellent
<b>Remarks:</b>		

## Hurricane Iniki

On September 11, 1992 Hurricane Iniki swept through the Hawaiian Islands causing extensive damage to residential and commercial structures, agricultural crops, and natural vegetation. In response to this disaster, NASA deployed a high altitude ER-2 aircraft to Barbers Point NAS on the island of Oahu. From that operational base the ER-2 flew nine missions from September 16 to October 1 for purposes of acquiring high resolution photography and digital imaging of the devastated areas. These disaster assessment flights are summarized in this volume.

## 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 and camera system(s) used for data collection during this flight.

## 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:

<u>Daedalus Channel</u>	<u>TM Band</u>	<u>Wavelength, <math>\mu\text{m}</math></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	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)

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.

### Camera Systems

Various camera systems and films are used for photographic data collection. Film types include high definition color infrared, natural color, and black and white emulsions. Available photographic systems are as follows:

- Wild-Heerbrug RC-10 metric mapping camera
  - 9 x 9 inch film format
  - 6 inch focal length lens provides area coverage of 16 x 16 nautical miles from 65,000 feet
  - 12 inch focal length lens provides area coverage of 8 x 8 nautical miles from 65,000 feet
- Hycon HR-732 large scale mapping camera
  - 9 x 18 inch film format
  - 24 inch focal length lens provides area coverage of 4 x 8 nautical miles from 65,000 feet
- IRIS II Panoramic camera
  - 4.5 x 34.7 inch film format
  - 24 inch focal length lens
  - 90 degree field of view provides area coverage of 2 x 21.4 nautical miles from 65,000 feet

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).

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 92-160**

Accession # 04467

Sensor # 034

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	6627-6634	19:19:33	19:22:55	59000/18000	10-20% scattered cumulus
C - D	6635-6641	19:33:03	19:35:56	62000/18900	10-20% scattered cumulus (frames 6635-6639)
E - F	6642-6645	19:50:10	19:51:36	"	20-40% scattered cumulus
G - H	6646-6652	20:02:20	20:05:11	61000/18600	10-60% cumulus
I - J	6653-6655	20:07:29	20:08:26	60000/18300	30-80% cumulus and strato-cumulus
K - L	6656-6658	20:15:37	20:16:34	"	Very minor cumulus
L - M	6659-6668	20:17:02	20:21:19	"	10-50% cumulus; oblique (frame 6659)
N - O	6669-6688	20:26:17	20:35:18	"	Minor-80% cumulus (frames 6670-6688)
P - Q	6689-6697	20:39:21	20:43:09	"	10-50% cumulus

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 92-160**

Accession # 04467

Sensor # 034

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
R - S	6698-6704	20:45:36	20:48:27	60000/18300	20-80% cumulus and strato-cumulus
T - U	6705-6709	20:54:05	02:05:58	"	Minor-40% cumulus and strato-cumulus
L - V	6710-6715	21:01:50	21:04:12	61000/18600	20-50% cumulus
W - X	6716-6720	21:06:52	21:08:46	"	40-60% cumulus and strato-cumulus

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 92-160**

Accession # 04468

Sensor # 026

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	1954-1961	19:19:02	19:22:27	59000/18000	10% scattered cumulus
C - D	1962-1967	19:32:38	19:35:03	62000/18900	10-20% scattered cumulus (frames 1962-1966)
E - F	1968-1971	19:49:45	19:51:11	"	10-40% scattered cumulus
G - H	1972-1978	20:01:50	20:04:42	61000/18600	10-60% cumulus
I - J	1979-1981	20:07:03	20:08:00	60000/18300	30-80% cumulus and strato-cumulus
K - L	1982-1984	20:15:11	20:16:08	"	Very minor cumulus
L - M	1985-1994	20:16:36	20:20:53	"	10-50% cumulus; oblique (frame 1985)
N - O	1995-2014	20:25:51	20:34:51	"	Minor-80% cumulus (frames 1996-2014)
P - Q	2015-2023	20:38:55	20:42:42	"	10-50% cumulus

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 92-160**

Accession # 04468

Sensor # 026

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
R - S	2024-2030	20:45:09	20:47:58	60000/18300	20-80% cumulus and strato-cumulus
T - U	2031-2035	20:53:38	20:55:30	"	Minor-40% cumulus and strato-cumulus
L - V	2036-2041	21:01:25	21:03:46	61000/18600	20-50% cumulus
W - X	2042-2046	21:06:26	21:08:18	"	40-60% cumulus and strato-cumulus



**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 92-160**

Accession # 04469

Sensor # 038

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	001-0017	19:19:09	19:22:51	59000/18000	Minor-20% scattered cumulus; partially light struck (frame 0001)
C - D	0018-0030	19:32:42	19:35:27	62000/18900	Minor-30% scattered cumulus (frames 0019 0026)
E - F	0031-0039	19:49:49	19:51:38	"	10-60% scattered cumulus
G - H	0040-0054	20:01:54	20:05:05	61000/18600	Minor-80% cumulus
I - J	0055-0059	20:07:07	20:08:01	60000/18300	40-80% cumulus and strato-cumulus
K - L	0060-0064	20:15:15	20:16:09	"	Very minor cumulus
L - M	0065-0086	20:16:23	20:21:08	"	Minor-60% cumulus (frames 0066-0086); oblique (frame 0065)
N - O	0087-0127	20:25:55	20:34:56	"	Minor-80% cumulus (frames 0089-0127)

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 92-160**

Accession # 04469

Sensor # 038

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
P - Q	0128-0145	20:38:59	20:42:49	60000/18300	10-50% cumulus
R - S	0146-0159	20:45:14	20:48:10	"	10-90% cumulus and strato-cumulus
T - U	0160-0168	20:53:42	20:55:29	"	Minor-40% cumulus and strato-cumulus
L - V	0169-0181	21:01:28	21:04:10	61000/18600	10-80% cumulus
W - X	0182-0191	21:06:30	21:08:31	"	30-60% cumulus and strato-cumulus; processing stain (frame 0191)

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 92-160**

Accession # 04470

Sensor # 039

Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
A - B	0001-0017	19:19:10	19:22:52	59000/18000	Minor-20% scattered cumulus
C - D	0018-0030	19:32:43	19:35:28	62000/18900	Minor-30% scattered cumulus (frames 0019-0026)
E - F	0031-0039	19:49:50	19:51:39	"	10-60% scattered cumulus
G - H	0040-0054	20:01:55	20:05:06	61000/18600	Minor-80% cumulus
I - J	0055-0059	20:07:08	20:08:02	60000/18300	40-80% cumulus and strato-cumulus
K - L	0060-0064	20:15:16	20:16:10	"	Very minor cumulus
L - M	0065-0086	20:16:24	20:21:09	"	Minor-60% cumulus (frames 0066-0086); oblique (frame 0065)
N - O	0087-0127	20:25:56	20:34:58	"	Minor-80% cumulus (frames 0089-0127)
P - Q	0128-0145	20:39:00	20:42:50	"	10-50% cumulus

**CAMERA FLIGHT LINE DATA  
FLIGHT NO. 92-160**

Accession # 04470

Sensor # 039

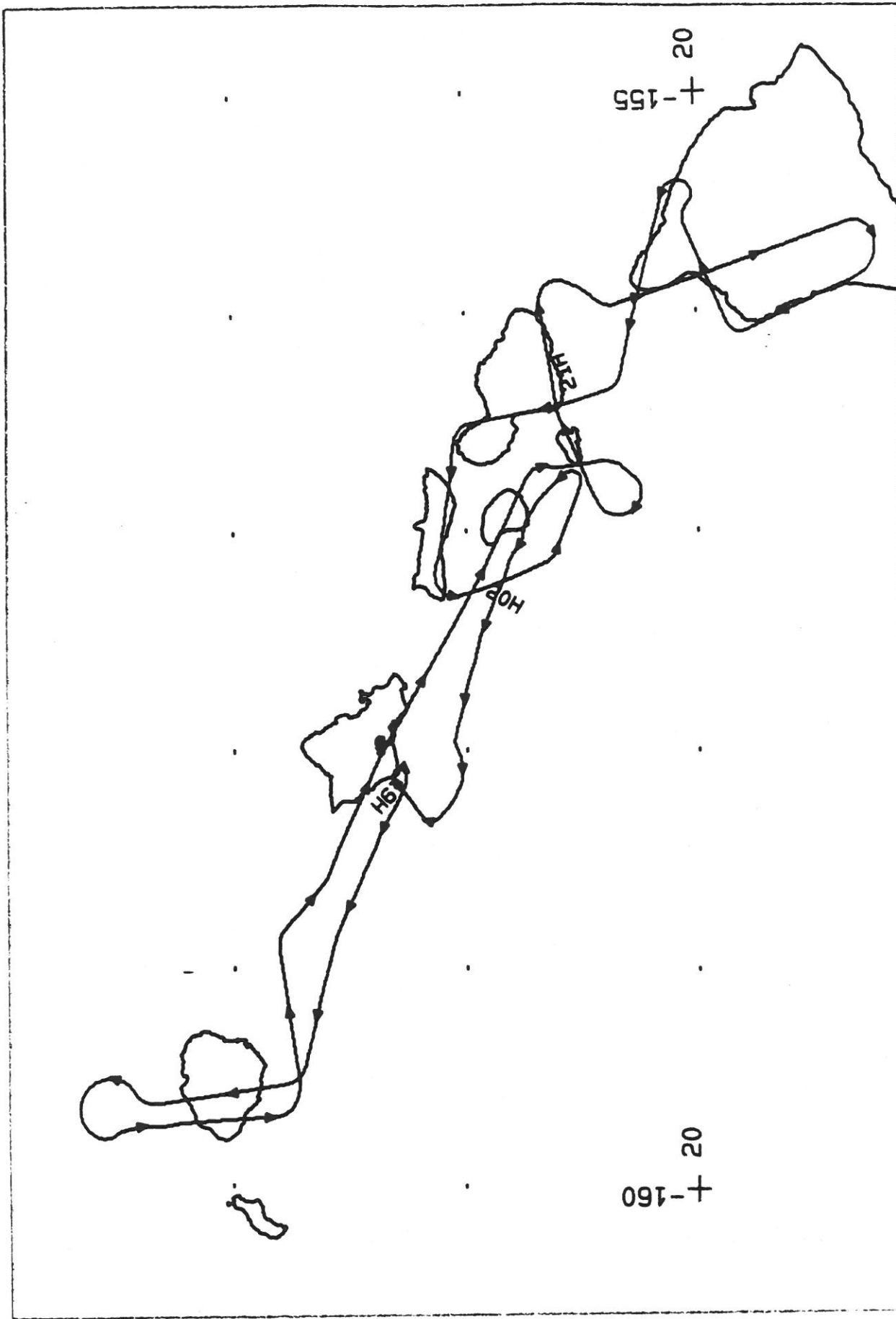
Check Points	Frame Numbers	Time (GMT-hr, min, sec)		Altitude, MSL feet/meters	Cloud Cover/Remarks
		START	END		
R - S	0146-0159	20:45:15	20:48:11	60000/18300	10-90% cumulus and strato-cumulus
T - U	0160-0168	20:53:43	20:55:30	"	Minor-40% cumulus
L - V	0169-0181	21:01:29	21:04:11	61000/18600	10-80% cumulus; minor handling scratches (frames 0169-0170)
W - X	0182-0191	21:06:31	21:08:32	"	30-60% cumulus and strato-cumulus; minor handling emulsion abrasions (frames 0190-0191)

# TMS SCANNER FLIGHT LINE DATA

## FLIGHT NO. 92-160

DAEDALUS FLIGHT DATA  
FLIGHT NUMBER: 92-160

Check Points	Actual Time (GMT)	Actual Scanline begin	Actual Scanline end	Altitude feet/meter	Scan Speed (fps)	total good scanlines	total Interpolated scanlines	total Repeated scanlines	
A-B	19:18:37.0	19:25:11.0	20354	24472	59000/17983	12.50	3129	0	10
C-D	19:32:08.0	19:35:36.0	30182	32788	62000/18897	12.50	2601	0	6
E-F	19:43:06.0	19:51:39.0	42133	43056	62000/18377	12.50	2701	0	8
G-H	20:01:04.0	20:05:04.0	51874	54876	61000/18592	12.50	3000	1	2
I-J	20:05:56.0	20:08:00.0	56276	57030	50000/18233	12.50	801	0	4
K-L	20:14:00.0	20:16:17.0	61562	63284	60000/18288	12.50	1701	0	2
L-M	20:16:47.0	20:21:06.0	63634	65396	60000/18288	12.50	3201	0	12
N-O	20:25:36.0	20:34:59.0	70300	77316	60000/18288	12.50	7000	1	16
P-Q	20:38:39.0	20:42:44.0	80316	83122	60000/18288	12.50	2901	0	6
R-S	20:44:04.0	20:48:05.0	84122	87132	60000/18288	12.50	3001	0	10
T-U	20:52:14.0	20:55:51.0	90254	92758	60000/18288	12.50	2700	1	4
L-V	21:01:12.0	21:04:17.0	96979	99285	61000/18592	12.50	2301	0	6
W-X	21:05:26.0	21:09:15.0	100900	102737	61000/18372	12.50	2086	0	4



FLIGHT 92-160

20 September 1992

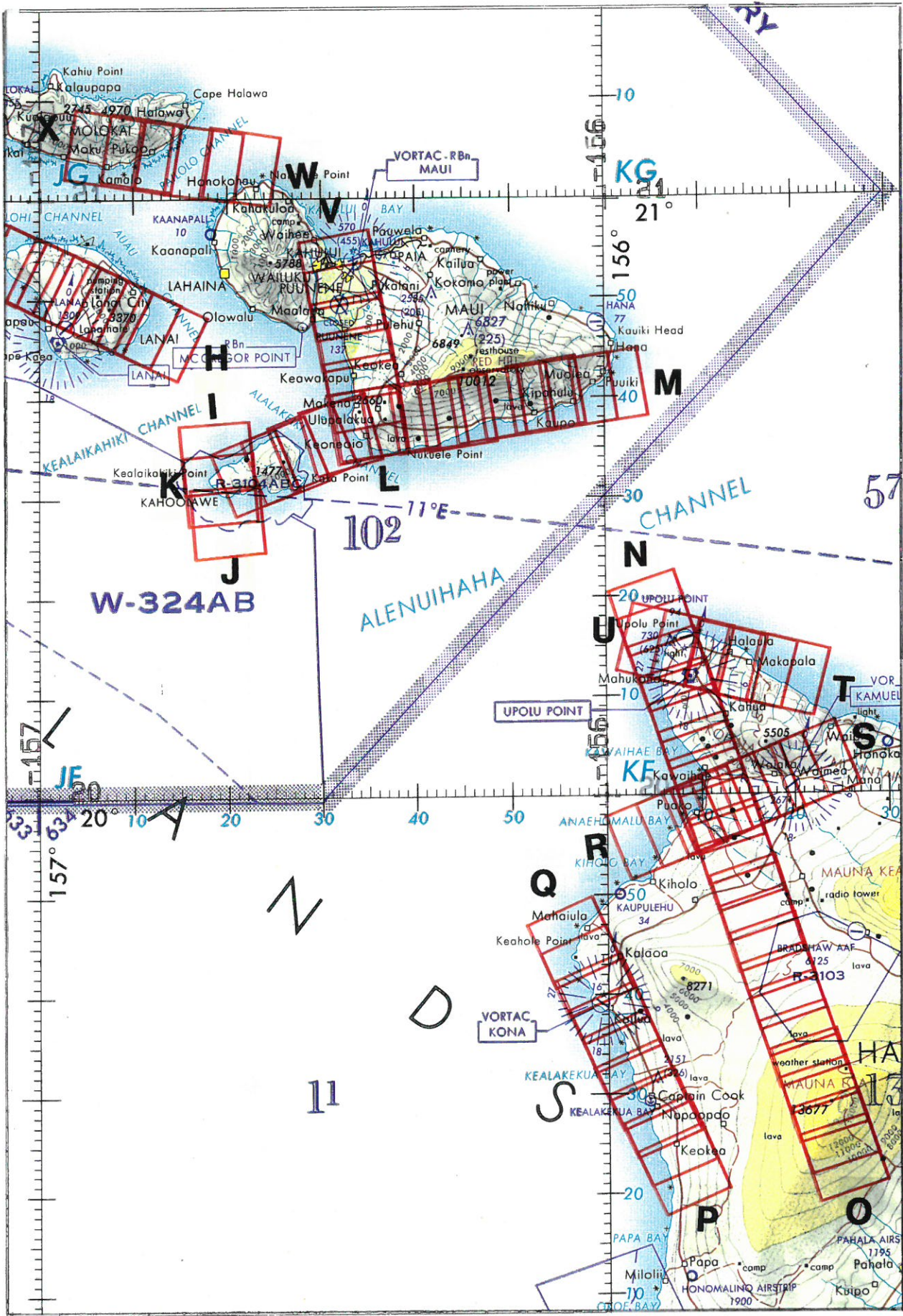
A/C 708

Dual HR-732 / Dual RC-10 / TMS









FLIGHT 92-160  
 20 SEPTEMBER 1992  
 A/C 706  
 DUAL RP-10 / DUAL HR-732 / TMS  
 CNG J-19