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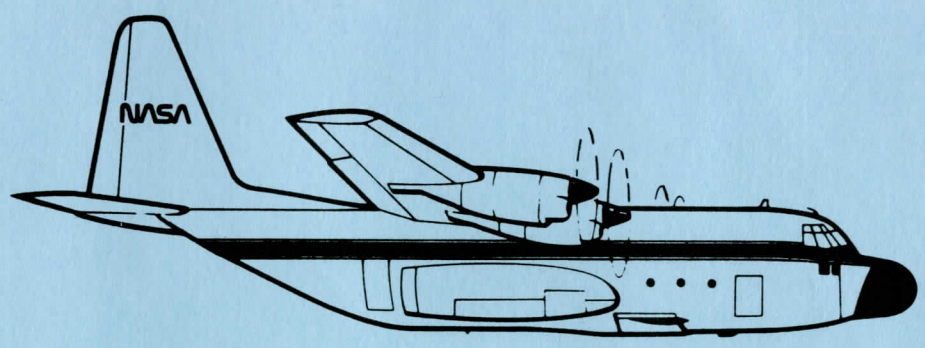
SCIENCE AND APPLICATIONS AIRCRAFT DIVISION

AIRBORNE SCIENCE AND APPLICATIONS PROGRAM

Flight Number:	94-002-02
Calendar/Julian Date:	22 January 1994 • 022
Sensor Package:	Zeiss Camera NS001 Multispectral Scanner
Area(s) Covered:	Southern California Earthquake Assessment



C-130
FLIGHT SUMMARY REPORT

NASA
National Aeronautics and
Space Administration

Ames Research Center
Moffett Field, California 94035-1000

Aircraft Data Facility
NASA-Ames Research Center
Mail Stop 240-6
Moffett Field, California 94035-1000
(415) 604-6252 • FTS 464-6252

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Flight Number:	94-002-02
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Area(s) Covered:	Southern California Earthquake Assessment

Investigator(s): FEMA **Aircraft #:** 707

SENSOR DATA

Accession #:	04689	-----
Sensor ID #:	075	072
Sensor Type:	Zeiss	NS001
Focal Length:	6" 153.16 mm	-----
Film Type:	Double X Aerographic 2405	-----
Filtration:	Clear	-----
Spectral Band:	400-700 nm	-----
f Stop:	Unknown	-----
Shutter Speed:	Unknown	-----
# of Frames:	967	-----
% Overlap:	Variable	-----
Quality:	Excellent	Good
Remarks:	Intermittant mis-metering throughout data	

NASA C-130 Earth Resources Aircraft Program

The NASA Earth Resources Aircraft Program at Ames Research Center operates a C-130B aircraft to acquire data for earth science research. The aircraft provides a platform for a variety of sensors that collect data in support of scientific projects sponsored by NASA, as well as federal, state, university, and industry investigators. These data are applied to research in the areas of forestry, agriculture, land use and land cover analysis, hydrology, geology, photogrammetry, oceanography, meteorology, and other earth resource disciplines. Data from operational sensors and newly developed or prototype instruments are used in applications programs examining agricultural biospheres, ozone depletion, tropical rain forest destruction, wildlife habitats, tropical disease vectors, forest wildfires, and geologic remote sensing.

The C-130B is a low and medium altitude, moderate speed aircraft. It is capable of flying up to 25,000 feet above sea level at speeds between 150 and 300 knots. The aircraft and its complement of onboard sensors provide a readily deployable remote sensing platform for support of scientific research throughout the coterminous United States, Alaska, and Hawaii. Additionally, the aircraft has been deployed in support of research in Australia, Bermuda, Puerto Rico, France, Germany, Austria, and Italy.

Photographic and digital imaging sensors are flown aboard the C-130 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 on the C-130. The following provides a description of the digital multispectral sensors used for data collection during this flight.

NS001 Multispectral Scanner

The NS001 Multispectral Scanner (MS) used on the C-130B aircraft contains the seven Landsat-D Thematic Mapper bands plus a band from 1.13 to 1.35 micrometers. The specific bands are as follows:

Band	Spectral bandwidth, *mm*
1	.458 - .519
2	.529 - .603
3	.633 - .697
4	.767 - .910
5	1.13 - 1.35
6	1.57 - 1.71
7	2.10 - 2.38
8	10.9 - 12.3

Sensor specifications are as follows:

IFOV:	2.5 mrad
Ground Resolution:	25 feet (7.6 meters) at 10,000 feet
Total Scan Angle:	100°
Swath Width:	3.9 nmi (7.2 km) at 10,000 feet
Pixels/Scan Line:	699

The format of the flight data consists of 838 eight-bit words per frame (data for one wavelength band throughout a scan line). Of these, 699 are the video information and the remainder are information on Greenwich time, scan line number, calibration lamp voltage and current, blackbody temperatures, etc.

Computer compatible tapes (CCTs) are produced from the flight tapes, and consist of header information followed by scanner video data.

Zeiss Cameras:

The C-130 may accommodate two Zeiss mapping cameras during any data flight. A combination of films and focal lengths may be employed depending on an investigator's requirements. Six and twelve inch focal lenses are available and are selected by investigators based on their resolution and scale requirements. The film emulsions available include color infrared, natural color, and black and white.

Additional information on data tape format, logical record format, and scanner calibration data may be obtained from the NASA-Ames Aircraft Data Facility, M.S. 240-6, Moffett Field, CA 94035-1000, Telephone (415) 604-6252.

CAMERA FLIGHT LINE DATA
FLIGHT NO. 94-002-02

Accession # 04689

Sensor # 075

Site #	Line #	Run #	Frame #	Time (GMT-hr, min, sec) START	Time (GMT-hr, min, sec) END	Altitude, MSL feet/meters	Cloud Cover/Remarks
---	---	---	0000-0001	16:53:05	16:53:09	17500/5330	20% cumulus; clearing frames 36 23 N 120 46 W
413	9	1	0002-0040	17:32:37	17:38:57	7500/2280	Clear
413	10	1	0041-0067	17:43:03	17:47:23	"	Clear
413	16	1	0068-0117	17:54:24	18:02:33	8000/2440	Clear
413	17	1	0118-0167	18:07:27	18:15:37	"	Clear
413	18	1	0168-0220	18:19:27	18:28:07	7500/2280	Clear
413	19	1	0221-0271	18:32:11	18:40:31	"	Clear
---	---	---	0272-0287	18:41:07	18:41:33	"	Clear; clearing frames El Cariso County Park
---	---	---	0288-0289	18:49:51	18:49:53	7000/2130	Clear; oblique frames Tujunga, CA
413	20	1	0290-0339	18:53:19	19:01:30	"	Clear

CAMERA FLIGHT LINE DATA
FLIGHT NO. 94-002-02

Accession # 04689

Sensor # 075

Site #	Line #	Run #	Frame #	Time (GMT-hr, min, sec) START	Time (GMT-hr, min, sec) END	Altitude, MSL feet/meters	Cloud Cover/Remarks
413	21	1	0340-0390	19:06:01	19:14:21	7000/2130	Clear
413	22	1	0391-0441	19:19:02	19:27:22	"	Clear
413	23	1	0442-0494	19:31:27	19:40:07	"	Clear
413	24	1	0495-0545	19:44:06	19:52:26	"	Clear
413	15	1	0546-0576	20:00:54	20:05:55	"	Clear
413	25	1	0582-0632	20:18:06	20:26:27	"	Clear
413	26	1	0633-0686	20:31:38	20:40:28	"	Clear
413	27	1	0687-0740	20:44:19	20:53:09	"	Clear
413	28	1	0741-0792	20:57:59	21:06:29	"	Clear
413	29	1	0793-0842	21:11:00	21:19:10	"	Clear
413	29	2	0843-0846	21:21:08	21:21:38	"	Clear

CAMERA FLIGHT LINE DATA
FLIGHT NO. 94-002-02

Accession # 04689

Sensor # 075

Site #	Line #	Run #	Frame #	Time (GMT-hr, min, sec) START	Time (GMT-hr, min, sec) END	Altitude, MSL feet/meters	Cloud Cover/Remarks
---	---	---	0847-0864	21:22:15	21:22:49	6000/1830	Clear; clearing frames Murietta Canyon, CA
---	---	---	0865-0867	21:29:46	21:29:49	"	Clear; clearing frames 34 08 N 119 14 W
413	9	2	0868-0907	21:38:17	21:44:47	7500/2280	Clear
413	30	1	0908-0913	21:50:14	21:51:05	8500/2590	Clear
413	31	1	0914-0922	21:51:55	21:53:15	"	Clear
---	---	---	0923	21:55:41	---	"	Clearing frame Torrance Municipal Airport
413	32	1	0924-0970	21:57:40	21:59:59	"	Clear
---	---	---	0971	22:02:07	---	10500/3200	Clearing frame Brentwood, CA

NOTE 1: MSL IS MGL (RADAR ALTITUDE NOT PRESSURE)
NOTE 2: NO IMAGES ACQUIRED FOR FRAMES 0577-0581

NS001 SCANNER FLIGHT LINE DATA

FLIGHT NO. 94-002-02

NS001 FLIGHT DATA
FLIGHT NUMBER: 94-002-02

	Site	Line	Run	Actual time (GMT) begin	Actual time (GMT) end	Actual scanline begin	Actual scanline end	Altitude feet/meter	Scan Speed (rps)	total Good scanlines	total Interpolated scanlines	total Repeated scanlines
1.	413	9	1	17:32:36.3	17:38:38.8	1971	11519	8100/ 2468	25.00	9534	1	14
2.	413	10	1	17:43: 6.1	17:47:31.1	17690	24305	7400/ 2255	25.00	6614	0	2
3.	413	16	1	17:54:19.8	18:02:46.2	33955	45353	7900/ 2407	23.00	11387	1	11
4.	413	17	1	18:07:17.9	18:15:39.3	51822	63335	7800/ 2377	23.00	11486	0	28
5.	413	18	1	18:19:23.9	18:28: .2	68493	80350	7400/ 2255	23.00	11826	1	31
6.	413	19	1	18:32: 7.9	18:40:34.3	86037	97665	8600/ 2621	23.00	11533	0	96
7.	413	20	1	18:53:20.7	19:01:38.1	115263	126684	7200/ 2194	23.00	11372	0	50
8.	413	21	1	19:05:59.7	19:14:25.1	132693	144298	7800/ 2377	23.00	11585	1	20
9.	413	22	2	19:19: 5.8	19:27:40.2	150794	163384	6400/ 1950	25.00	12579	0	12
10.	413	23	1	19:31:32.8	19:40: 2.2	168977	180674	7400/ 2255	23.00	11680	1	17
11.	413	24	2	19:44:12.9	19:52:40.3	186430	198031	6900/ 2103	23.00	11634	0	18
12.	413	15	1	20:01: 2.6	20:06:38.7	209421	216468	7600/ 2316	21.00	7009	1	38
13.	413	25	1	20:18:15.7	20:26:39.1	231452	243011	7300/ 2225	23.00	11515	1	44
14.	413	26	1	20:31:41.9	20:40:44.3	249963	262419	7300/ 2225	23.00	12417	1	39
15.	413	27	1	20:44:27.9	20:53:20.3	267554	279779	6300/ 1920	23.00	12214	0	12
16.	413	28	1	20:58:12.1	21:06:51.5	286478	298405	5500/ 1676	23.00	11904	1	23
17.	413	29	1	21:11:11.2	21:19:29.3	304368	315812	7000/ 2133	23.00	11423	0	22
18.	413	29	2	21:21:23.0	21:21:54.2	318417	319135	6100/ 1859	23.00	715	0	4
19.	413	9	2	21:38:34.4	21:45: 8.6	342102	351154	7800/ 2377	23.00	9035	0	18
20.	413	30	1	21:50:12.4	21:51:30.8	358128	359930	7800/ 2377	23.00	1797	1	5
21.	413	31	1	21:52:16.6	21:53:44.4	360980	362996	7800/ 2377	23.00	2013	0	4
22.	413	32	1	21:56:52.9	22:00:18.9	367326	372055	8500/ 2590	23.00	4724	0	6

NS001 CALIBRATION VALUES

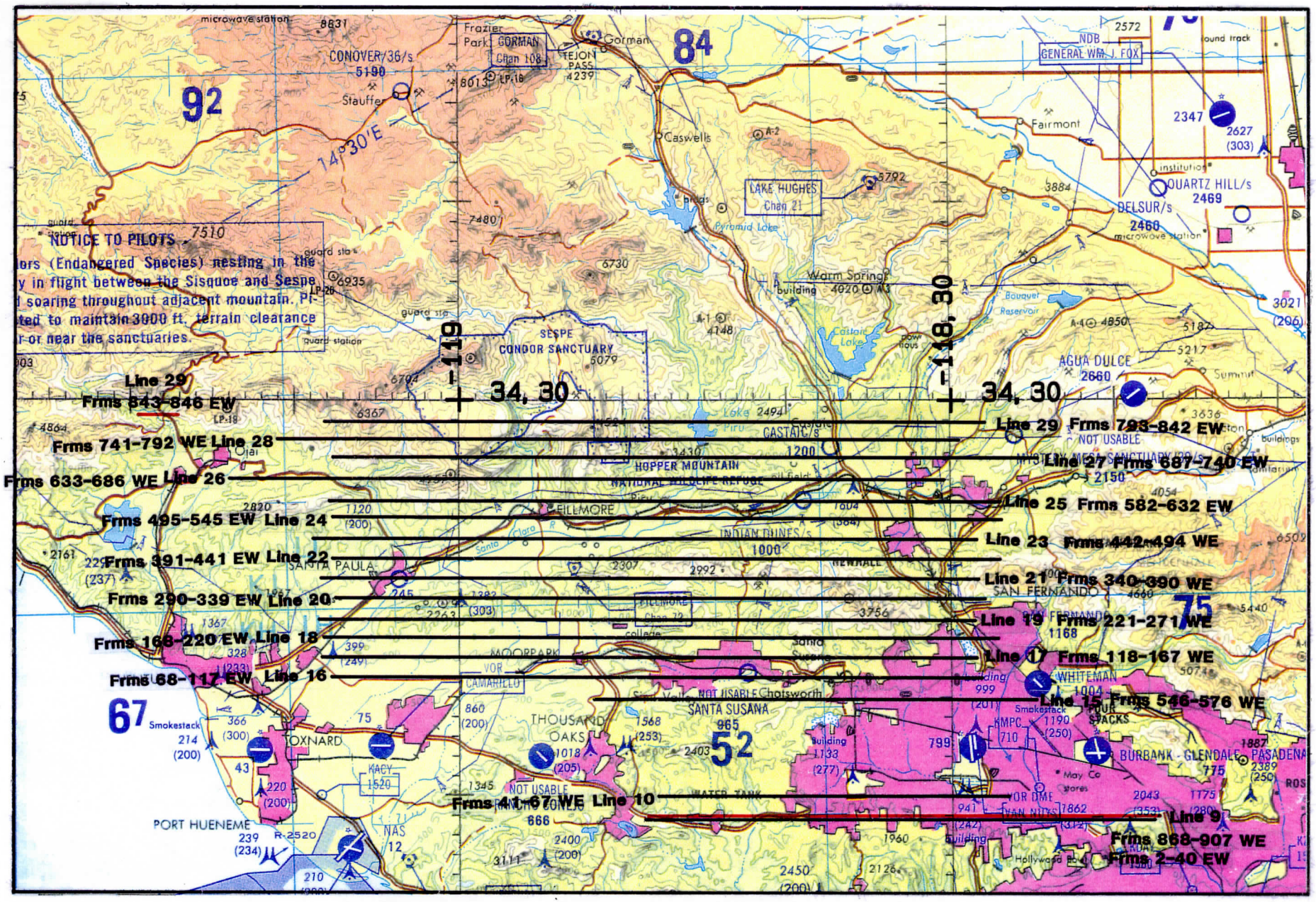
FLIGHT NO. 94-002-02

NS001 CALIBRATION VALUES — Calibration File (APR93::DA

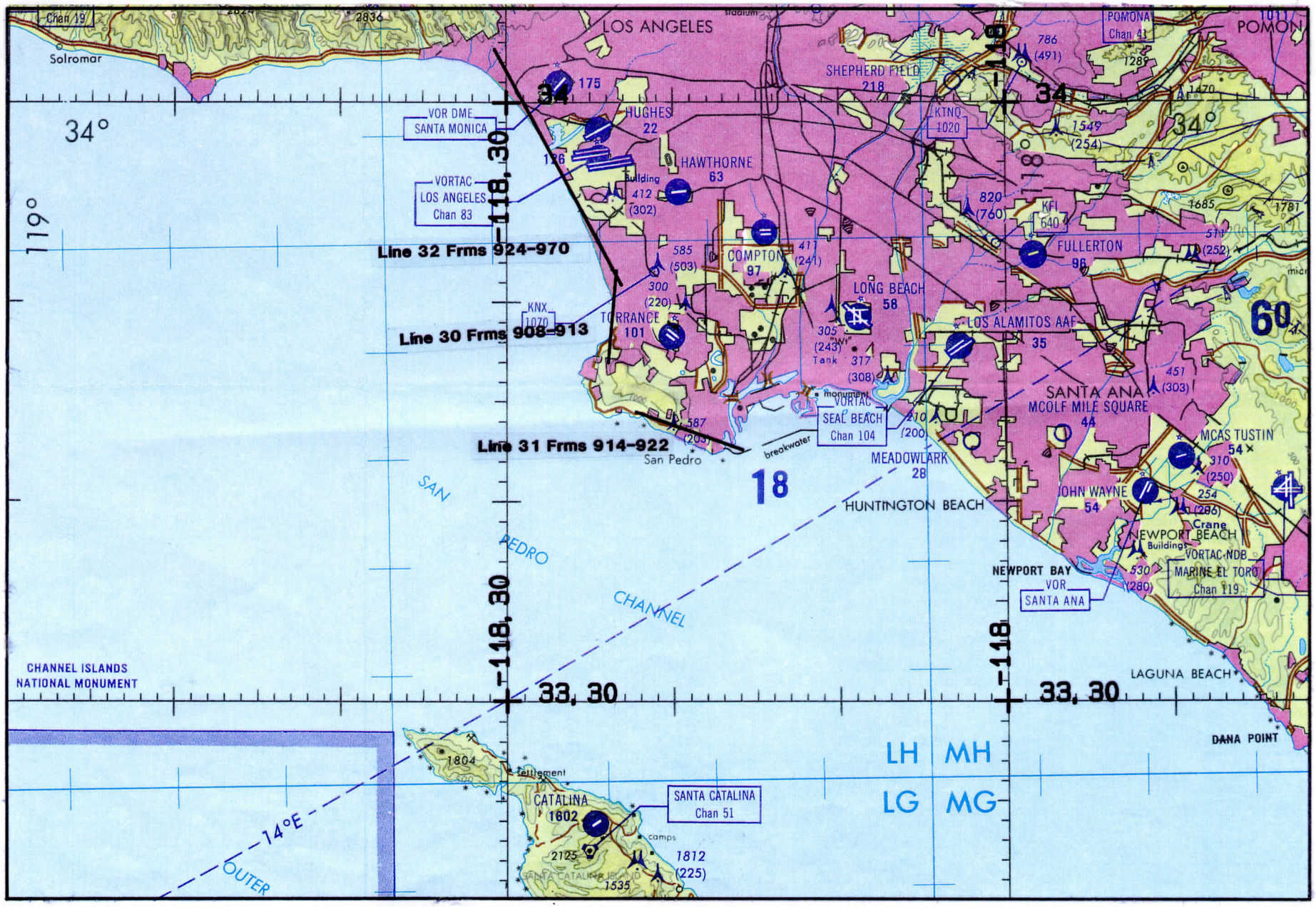
FLIGHT LINE	Channel 1 TARE	Channel 1 CALIB	Channel 2 TARE	Channel 2 CALIB	Channel 3 TARE	Channel 3 CALIB	Channel 4 TARE	Channel 4 CALIB	Channel 5 TARE	Channel 5 CALIB	Channel 6 TARE	Channel 6 CALIB	Channel 7 TARE	Channel 7 CALIB	Channel 8 REF SOURCE (Degrees C) BB1	Channel 8 REF SOURCE (Degrees C) BB2	Channel 8 RESPONSE (Counts) BB1	Channel 8 RESPONSE (Counts) BB2	Channel 8 Degrees per Count
1	24	0.0	21	0.0	23	0.0	16	0.0	24	0.0	22	0.0	5	0.00	10.10	25.00	44.5	172.6	.116*
2	24	0.0	21	0.0	24	0.0	16	0.0	25	0.0	22	0.0	6	0.00	10.01	25.00	45.1	181.3	.110
3	23	0.0	21	0.0	24	0.0	15	0.0	25	0.0	22	0.0	6	0.00	9.96	24.97	44.8	184.8	.107
4	25	0.0	22	0.0	25	0.0	16	0.0	26	0.0	23	0.0	8	0.00	13.00	27.95	13.3	158.7	.103
5	24	0.0	22	0.0	25	0.0	15	0.0	25	0.0	23	0.0	8	0.00	15.03	29.97	13.1	160.4	.101*
6	26	0.0	23	0.0	27	0.0	16	0.0	27	0.0	24	0.0	9	0.00	14.99	29.94	14.4	140.1	.119*
7	26	0.0	23	0.0	27	0.0	16	0.0	27	0.0	24	0.0	9	0.00	14.97	29.95	14.3	137.9	.121
8	25	0.0	23	0.0	26	0.0	15	0.0	27	0.0	24	0.0	9	0.00	14.97	29.94	13.9	138.0	.121*
9	25	0.0	23	0.0	26	0.0	15	0.0	26	0.0	24	0.0	9	0.00	14.95	29.91	13.7	138.0	.120*
10	25	0.0	23	0.0	26	0.0	15	0.0	26*	0.0	24	0.0	9	0.00	14.96	29.92	13.7	137.6	.121*
11	25	0.0	23	0.0	26	0.0	15	0.0	26	0.0	24	0.0	9	0.00	14.96	29.92	16.9	133.1	.129
12	25	0.0	23	0.0	26	0.0	16	0.0	26	0.0	24	0.0	9	0.00	19.94	39.94	45.6	198.5	.131
13	25	0.0	23	0.0	26	0.0	16	0.0	26	0.0	24	0.0	9	0.00	19.91	39.93	45.7	199.9	.130
14	25	0.0	23	0.0	26	0.0	16	0.0	26*	0.0	24	0.0	9	0.00	19.94	39.95	45.6	198.9	.130
15	25	0.0	23	0.0	26	0.0	15	0.0	26*	0.0	24	0.0	9	0.00	19.91	39.93	45.6	188.8	.140*
16	25	0.0	23	0.0	26	0.0	16	0.0	26	0.0	24	0.0	9	0.00	19.90	39.94	36.9	156.9	.167*
17	25	0.0	23	0.0	26	0.0	15	0.0	26	0.0	24	0.0	9	0.00	19.97	39.96	36.4	156.4	.167*
18	25	0.0	23	0.0	26	0.0	15	0.0	26	0.0	24	0.0	9	0.00	19.97	39.97	36.7	155.9	.168
19	25	0.0	23	0.0	26	0.0	15	0.0	26	0.0	24	0.0	9	0.00	17.92	37.96	36.2	153.5	.171
20	24	0.0	23	0.0	26	0.0	15	0.0	26	0.0	24	0.0	9	0.00	18.00	38.00	36.3	154.7	.169
21	25	0.0	24*	0.0	26	0.0	15	0.0	26	0.0	24	0.0	11*	0.00	17.98	37.97	36.3	153.7	.170
22	25	0.0	23	0.0	26	0.0	15	0.0	26*	0.0	24	0.0	9	0.00	17.92	37.99	36.3	154.3	.170

* This value varied excessively over the flightline.

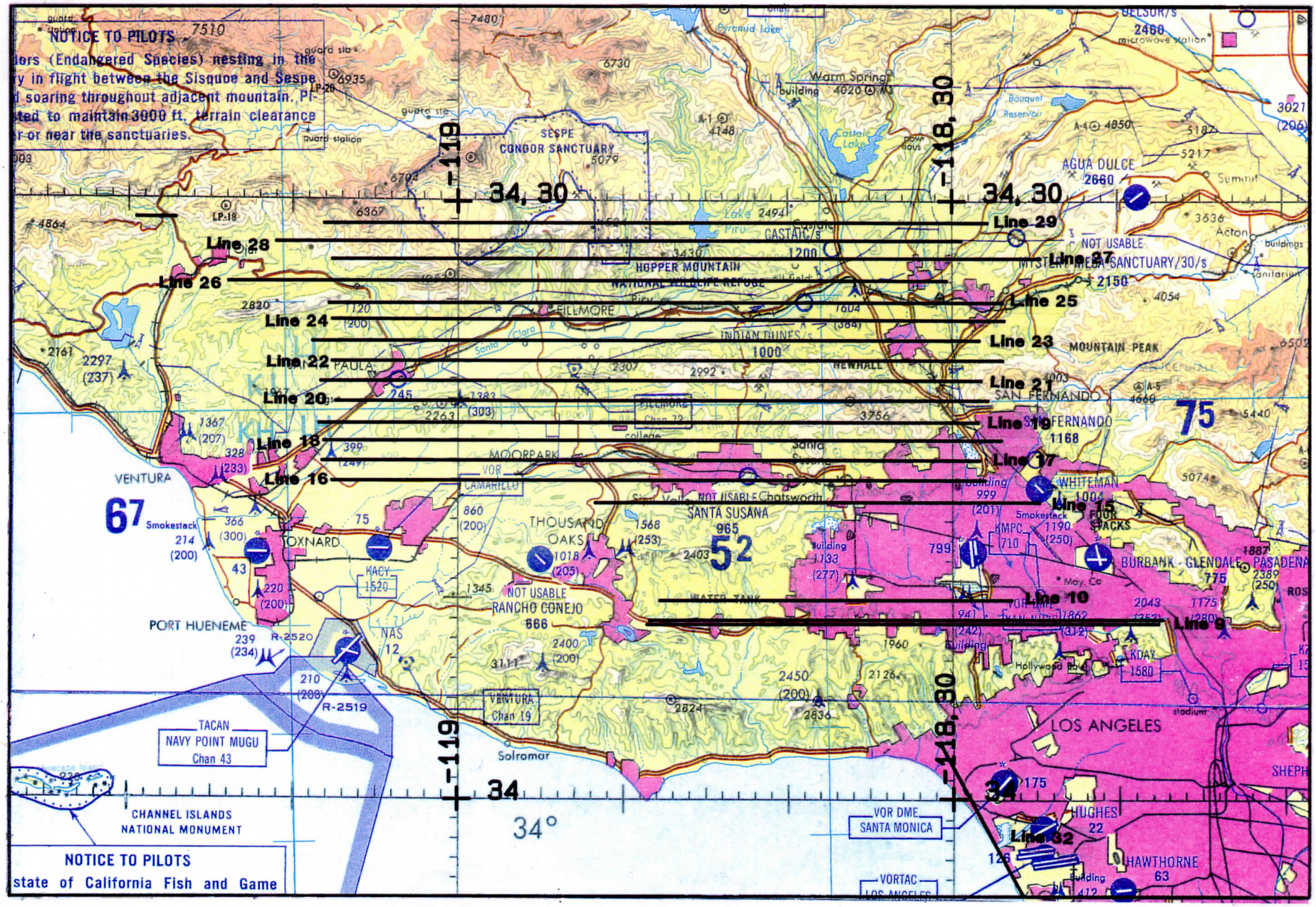
1. TARE value in digital counts.
2. CALIB in (Microwatts/square CM/Micron/steradian) per count.
3. Word 19 of each scanline is CALIB times 100.



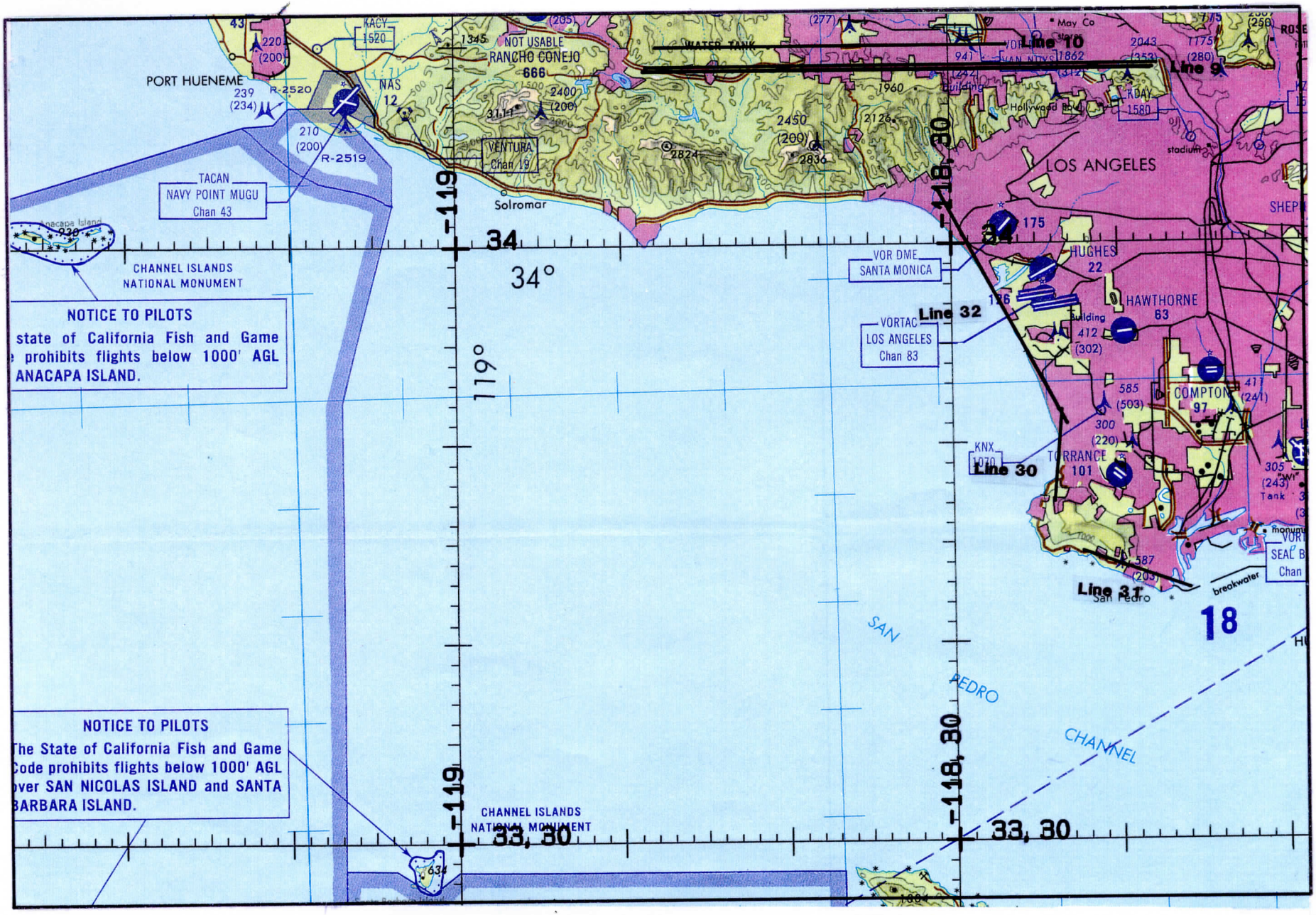
FLIGHT 94-002-02 22 JANUARY 1994 A/C 707 Center Point Coverage 1:500K



FLIGHT 94-002-02 22 JANUARY 1994 A/C 707 TPC G-18C



FLIGHT 94-002-02 22 JANUARY 1994 A/C 707 NS001 / ZEISS TPC 6-18



FLIGHT 94-002-02 22 JANUARY 1994 A/C 707 NS001 / ZEISS TPC G-18