

**CSIRO Marine Laboratories
Report 203**

**A Catalogue of
NOAA-AVHRR Satellite
Imagery Received in Perth,
Western Australia, 1981-1987**

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Abstract

This catalogue lists the NOAA/AVHRR satellite data received by the joint WAIT/CSIRO satellite facility in Perth, Western Australia, over the period 1981-1987. A bibliography of papers and reports based on this unique data set is appended.

Catalogue of NOAA-AVHRR Data

The first Australian receiving station for data from the Advanced Very High Resolution Radiometer (AVHRR) on the NOAA series of environmental satellites was established in Perth towards the end of 1981. Since that time, over 1200 passes have been received and archived. At the end of 1987, however, a new satellite station was set up under the auspices of WASTAC (Western Australian Satellite Technology and Applications Consortium) to replace the ageing original facility.

This report documents the establishment and development of the facility, and catalogues the archived passes between 1981 and 1987 as a permanent record of the tapes available. The data on these tapes are expected to be of immense value to a wide variety of users into the future.

Historical Background

During the late 1970s, the School of Electrical and Electronic Engineering at the Western Australian Institute of Technology (WAIT, now Curtin University of Technology) designed and built a GMS satellite data receiving facility on the institute's campus at Bentley, south of Perth, under the direction of Dr Bill Carroll (WASTAC 1987).

Since 1978, the Remote Sensing Group of the CSIRO Division of Land Resources Management at Floreat Park (Perth) had been working with NOAA/TIROS-N data obtained from the United States for a preliminary study of the ocean circulation off Western Australia. To overcome the difficulties and delays in acquiring tapes by this method, Dr Frank Honey of the CSIRO group discussed with Bill Carroll the possibility of establishing a local NOAA/AVHRR receiving station. In 1980/81 the GMS facility at Bentley was upgraded to receive AVHRR data. This joint CSIRO/WAIT project (Carroll 1982) thus established the first AVHRR receiving station in Australia (and, indeed, one of the first in the world). Despite a host of apocryphal tales that have circulated about the origins of the receiver, it was in fact designed and constructed at the Institute of Technology, and (for cost-effectiveness) was mounted on a Bofors gun-mount.

From here began a series of early-morning starts with a crew, often comprising students, manually operating the somewhat clumsy facility. The first pass in the present archive is dated 20 August 1981, from the NOAA-6 satellite. The quality of data from those first passes was not always good, but scribbled comments on some of the tape labels bear testimony to the communal delight when a really good pass was successfully received. Some of those early images of the Leeuwin Current remain among the finest available.

Over the years, student projects at WAIT have played an important role in building up the facility. Initially, only every second line of data (and indeed only 1780 of the 2048 pixels in each scan-line) could be acquired because of limitations in the transmission system. Both the software and hardware for acquiring the data were progressively refined, however, and by mid-1983 the full data set (i.e. all lines, containing all 2048 pixels) was being received regularly. As the 1600 bpi tapes can hold only some 2800 lines of data, the portion of the image actually archived on tape was between the latitudes of approximately 10 and 40 degrees south; this adequately covers the Australian continent and adjacent waters. (Because of the tedium of the manually operated receiver, a fully automatic station was envisaged from the beginning.

A second-hand receiving dish was procured from the United States satellite station at Carnarvon, but with declining funds and technical problems with the sheer weight of the dish, that fully automatic station never came to fruition).

Most of the funding for the initial establishment of the facility was provided by the Fishing Industry Research Trust Account (FIRTA) for the imagery to be used in a study of the relationship between tuna catches and sea-surface temperatures off the south coast of Western Australia (Myers and Hick 1985). Subsequent funding over the years has come from the Marine Sciences and Technologies (MST) Grant scheme, with grants to apply the data to studying cyclone activity and oceanic processes on the North-West Shelf, and to the structure and behaviour of the Leeuwin Current.

Some highlights of the imagery include detection of a cloud of volcanic ash (which almost brought down a British Airways jumbo jet north of Australia by clogging its engines), pictures showing the extent of severe flooding of the Fitzroy River, and sea-surface temperature images revealing the complex of eddies and meanders that comprise the Leeuwin Current.

By 1984, the two leading investigators had left the scene and operation of the WAIT receiver came under the control of Dr Doug Myers. With extensive support from his electronics team, Doug has spent a large proportion of his time and energy seeking funding for maintaining the increasingly temperamental facility at WAIT. In later years, the efforts of Mahn Young have made possible the continuous acquisition of data to the archive. The Remote Sensing Group at Floreat Park came under the direction of Dr Fred Prata, who had been a research fellow at WAIT and was developing a major computer package specifically for processing AVHRR data for SST retrievals and image geolocation. This program (PESST, or Procedure for Estimating Sea-Surface Temperature; Prata 1985) was implemented at the Floreat Park facility, where it is routinely used for processing and displaying NOAA/AVHRR imagery.

The original Curtin University receiver has now been replaced by the new WASTAC facility, although for a period at the end of 1987, WASTAC continued to acquire data from the old receiver while the new station was being established. The last pre-WASTAC pass was from NOAA-9 on 25 September 1987.

Orbital characteristics of the NOAA satellites

The swath width of a NOAA/AVHRR pass is some 2900 km, comprising 2048 pixels each 1.1 km square (sub-satellite point). The ellipse of coverage from the Perth receiver is illustrated in Figure 1 (Carroll 1982). Because of the curvature and rotation of the earth, the images are greatly distorted at the edges, and must be geo-located and remapped for detailed analysis.

Ascending orbits (south-to-north) of the odd-numbered series of satellites (NOAA-7 and -9) occur in the early afternoon local time; the descending passes (north-to-south) occur soon after midnight. For the even-numbered satellites (NOAA-6, -8 and -10), the ascending passes are around dusk and the descending orbits about dawn (Table 1). As two satellites are scheduled to be orbiting at all times, four nominal overhead passes can be acquired each day; however, as the receiver can also acquire data from adjacent passes, a total of 12 passes per day can

theoretically be received. Because of staffing and other operational limitations, generally one pass has been taken each afternoon, but night-time or weekend passes have been taken irregularly for special purposes.

Table 1: Approximate times (WA Standard Time) of ascending and descending passes (and number of archived tapes)

Satellite	Descending	Ascending
NOAA-6	0500-0900 (20)	1800-2200 (9)
NOAA-7	0000-0400 (53)	1300-1800 (702)
NOAA-8	0500-0900 (15)	1800-2000 (8)
NOAA-9	0000-0400 (20)	1300-1800 (426)
NOAA-10	0500-0900 (7)	1800-2200 (11)
TOTAL PASSES	115	1157

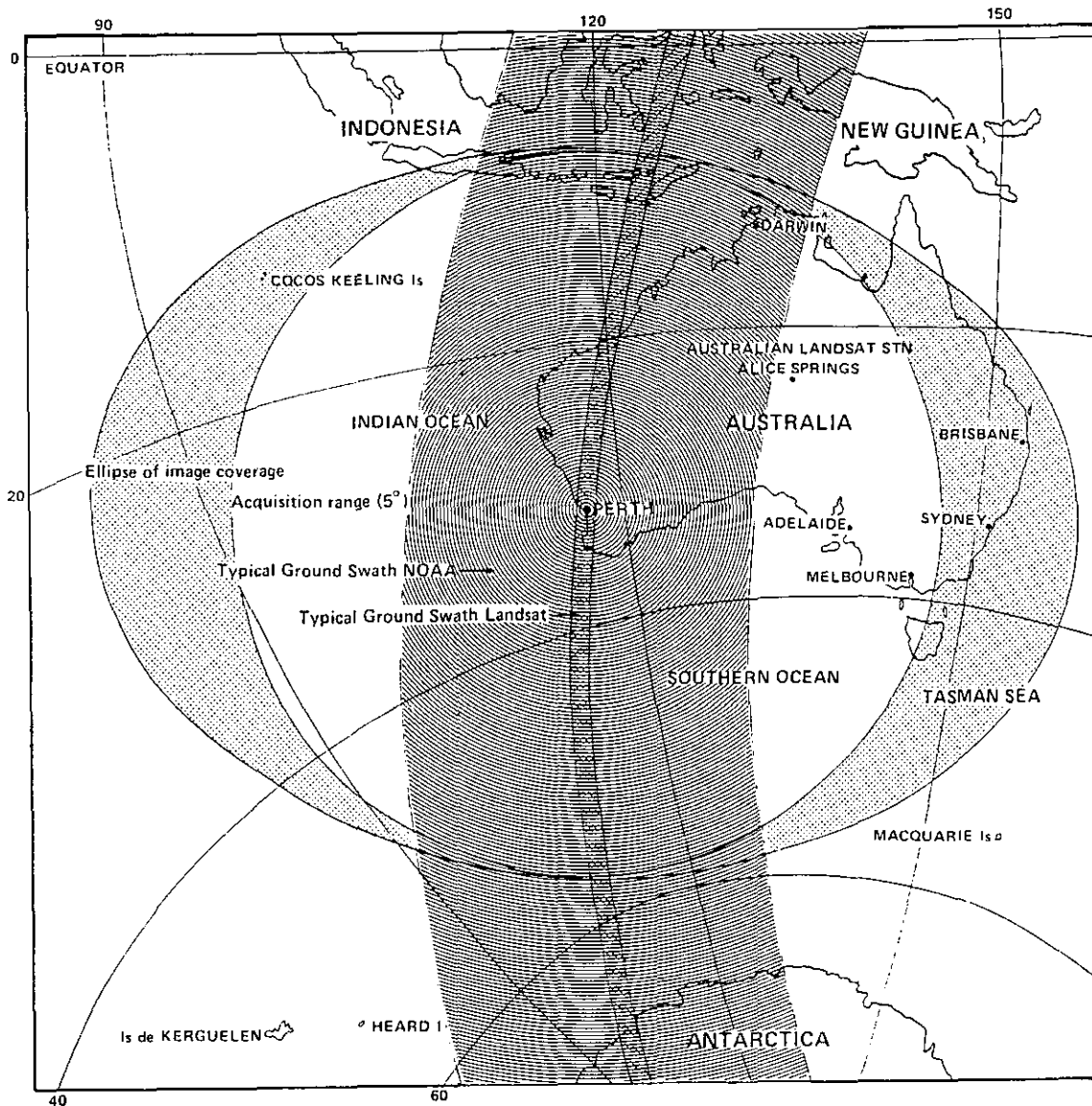


Figure 1: The area of coverage of the AVHRR receiver at Curtin University (after Carroll, 1982). The swath of a NOAA overhead pass is shaded, and the total possible coverage is indicated by the stippled ellipse. For comparison, the swath of a LANDSAT pass over Perth is hatched.

Data Format

The data are archived onto 2400 foot, half-inch, 1600 bits-per-inch (bpi) magnetic tapes, as an image of that transmitted by the satellite except for the pre- and post-sync pulses. A tape therefore contains all the data for every line received, including time-code, calibration information, and AVHRR/TOVS (Tiros Operational Vertical Sounder) etc. earth data. There are no headers, and triplets of the original 10-bit words have been packed into two 16-bit words (with two zero bits). The 5-channel data are in "Band-Interleaved-by-Pixel" (BIP) format, with channel 5 duplicating channel 4 for the even-numbered satellites (6, 8 and 10), which have a 4-channel instrument. The 10-bit quantization gives 1024 levels of dynamic range.

From the inception of the receiving facility, an attempt has been made to produce so-called "Quicklook" images showing the whole pass, as a "first-look" at the area covered and the cloud distribution. Initially, these were produced at Floreat Park in hard-copy photographic form, but subsequently 35 mm slides have been prepared at Curtin University. The format of these slides has gradually been improved over the years, but there are occasional gaps in the collection.

Description of the Catalogue

This catalogue contains basic information for each pass in the archive as a record of the dates/times and areas available. For each record, the data are:

Satellite/Orbit Number

Date (Day/Month/Year)

Pass time (W. Australian Standard Time, i.e. GMT-8 hours)

Maximum elevation (above the horizon, East or West)

Location:

FP	=	CSIRO Floreat Park
CU	=	Curtin University
CF	=	both at Curtin and Floreat
ER	=	tape erased (poor quality)
?	=	present location of tape unknown

Quicklook: Q if 35 mm Quicklook slide exists; otherwise blank

Comment: includes corrections, extra information, etc.

Gaps have been left where the information is either missing or clearly wrong.

The catalogue has been compiled from three main sources:

- (1) The primary source has been the tapes themselves, where available; however, the tape labels are not always legible or correct.
- (2) Various partial lists of orbits have been compiled from time-to-time by users, generally with a particular period and purpose in mind; the accuracy of this information depends on the dedication of the original authors of the lists.
- (3) The Quicklook slides, some of which contain relevant information, while others have been used solely to establish that the passes were taken and to estimate the approximate maximum elevation (and hence area of coverage).

As many tapes are at present missing (or perhaps erased), much of the data here has been compiled from only one of the above sources and some judgement has been required to resolve inconsistencies.

Every effort has been made to ensure that the information in this catalogue is correct (despite missing or illegible scribbles on the tape labels). Three checking routines have been applied:

- (1) A simple check for numerical sequence of orbits.
- (2) A date/time/orbit check, by interpolating between pairs of passes (say 6 months apart) and checking that the orbit numbers and dates/times of intermediate passes were correct. A number of errors have been found in this way, and where there is little doubt as to the correct information, it has been included in this catalogue. Because past image processing has used the information listed on the tapes, however, the original (incorrect) data are also given under "comments".
- (3) A check on the maximum elevation in relation to the start and end azimuth positions; this also enabled Easterly and Westerly passes to be distinguished (as the earlier data tapes rarely recorded this). Again, many apparent errors have been detected and (hopefully) corrected. Figure 2 shows the approximate ranges of start-and-end azimuths for ascending and descending passes. Where these are consistent with the maximum elevation as listed on the tape label, Easterly or Westerly passes have been assessed, but in some cases it has not been possible to determine the true overpass position.

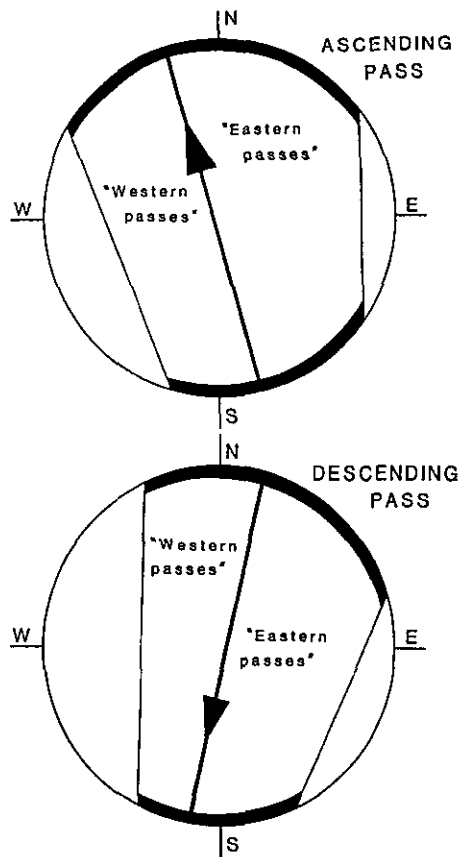


Figure 2: Approximate trajectories of NOAA ascending and descending passes over Western Australia.

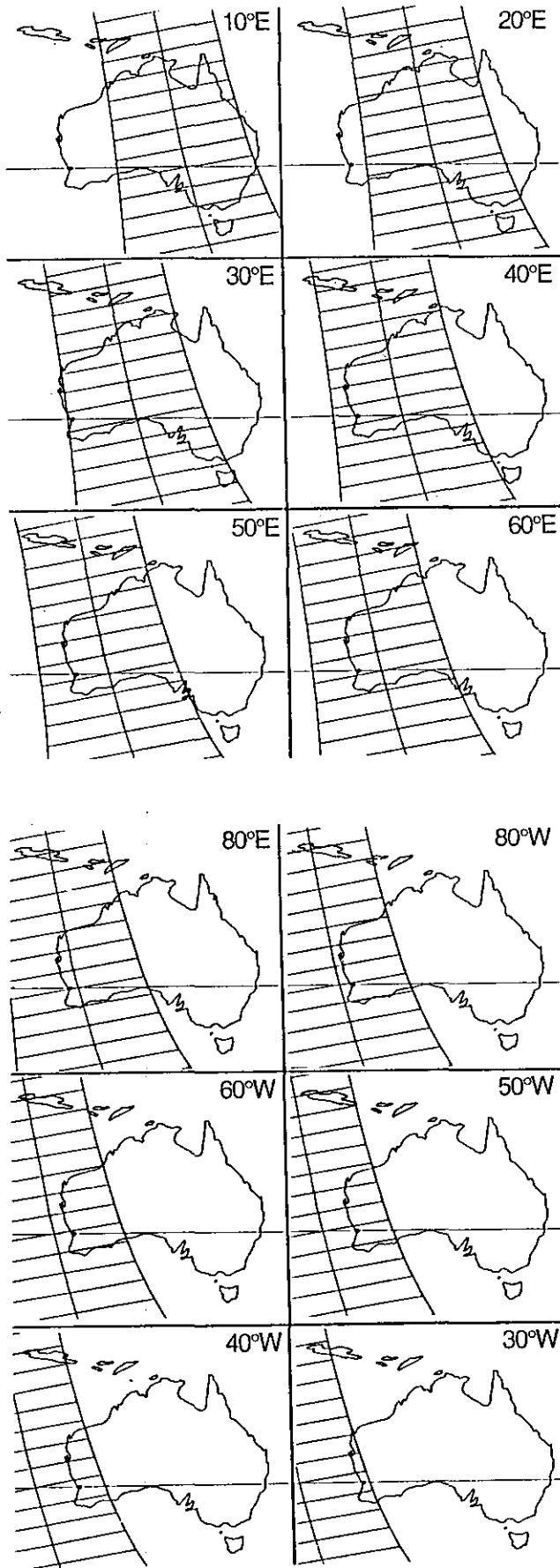


Figure 3: Relative positions of NOAA swaths for different maximum elevations of the satellite orbit.
E = Eastern passes, W = Western passes.

Availability of Data

The approximate positions of NOAA passes across Australia at varying elevations, both East and West, are shown in Figure 3 to indicate the data coverage. From this diagram, potential users can assess whether any particular pass covers their area of interest, allowing for cloudiness (no attempt has been made to quantify cloud cover here).

Of the 1270 passes listed here, 195 tapes are at present housed in the School of Electrical and Electronic Engineering at Curtin University and 897 at the CSIRO Division of Exploration Geoscience at Floreat Park. (A few tapes have been copied and exist at both institutions.) The respective custodians are Dr Doug Meyers and Mr Richard Stuart.

At least 32 tapes have been erased (because of extremely poor quality data; the tapes were then re-used), while the remaining 141 may either have been erased or are stashed away in offices somewhere! It is hoped that these tapes will be returned to complete the archive.

A more complete database of this archive is held on an IBM-compatible computer at Floreat Park, Curtin University, the WASTAC office and the CSIRO Division of Oceanography at Marmion. The full database contains the information in this catalogue as well as the start- and end-azimuths and the equatorial longitude and crossing time (used in geolocation of the imagery).

Quicklook collections are maintained at Curtin University, CSIRO Floreat Park, CSIRO Division of Oceanography at Marmion (Perth), and the WASTAC office at the Western Australian Department of Land Administration (Remote Sensing Applications Centre).

Acknowledgements

The scientific industrial communities in Western Australia owe much to the foresight of the pioneers Frank Honey and Bill Carroll in establishing the satellite station in Perth, to Doug Meyers and Fred Prata for maintaining and further developing the facilities, and to the teams of technical assistants operating the system.

In producing this report, I am grateful to Valerie Pearce and Deborah Murray for many hours spent sorting and checking the thousand-plus tapes in the archive, and to Steven Pearce for entering all the data into the database.

Catalogue of NOAA/AVHRR Satellite Imagery

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
6/	20/8/81	2136	—	?	—	780 pixels, every 2nd line
7/	23/8/81	1441	?	—	—	
7/886	25/8/81	1430	42E	?	—	
7/914	27/8/81	1407	—	?	—	Tape labelled 7/915
6/11267	28/8/81	0755	—	?	—	
7/985	1/9/81	1451	72E	?	—	
7/1168	14/9/81	1405	24E	?	—	
7/1210	17/9/81	1331	10E	?	—	
7/1281	22/9/81	1415	30E	?	—	
7/1282	22/9/81	1554	28W	?	—	
7/1295	23/9/81	1402	24E	ER	—	
7/1309	24/9/81	1351	20E	?	—	
7/1310	24/9/81	1530	47W	?	—	
6/11764	2/10/81	0603	13E	?	—	
6/11765	2/10/81	0741	65W	?	—	
6/11778	3/10/81	0541	7E	FP	—	
6/11779	3/10/81	0718	75E	CU	—	
6/11828	6/10/81	—	7E	FP	—	
7/1478	6/10/81	1311	6E	ER	—	
7/1620	16/10/81	1440	55E	?	—	
7/1626	17/10/81	0025	5E	?	—	
7/1627	17/10/81	0205	62E	FP	Q	
7/1663	19/10/81	1547	33W	FP	Q	
7/1676	20/10/81	1352	20E	FP	Q	
7/1677	20/10/81	1536	—	FP	Q	
7/1690	21/10/81	1344	15E	?	—	
7/1691	21/10/81	1524	54W	FP	Q	
7/1704	22/10/81	1334	10E	FP	Q	
7/1705	22/10/81	1513	71W	FP	Q	
7/1790	28/10/81	1545	35W	?	—	
7/1803	29/10/81	1353	18E	?	—	
7/1804	29/10/81	1533	47W	FP	Q	
7/1817	30/10/81	1341	12E	?	Q	
7/1818	30/10/81	1520	65W	FP	Q	2 tapes
7/1874	3/11/81	1434	46E	?	—	
7/1902	5/11/81	1411	27E	ER	Q	
7/2015	13/11/81	1419	33E	?	—	
7/2071	17/11/81	1335	10E	?	—	
7/2072	17/11/81	1514	73W	FP	Q	
7/2086	18/11/81	1502	85E	FP	Q	
7/2100	19/11/81	1451	70E	?	Q	
6/12462	20/11/81	0714	69E	FP	—	
7/2114	20/11/81	1439	50E	?	—	
7/2170	24/11/81	1354	17E	?	—	
7/2171	24/11/81	1534	47W	FP	Q	
7/2198	26/11/81	1332	9E	?	—	
7/2199	26/11/81	1511	79W	?	—	
7/2212	27/11/81	1321	6E	FP	Q	
7/2213	27/11/81	1459	80E	FP	Q	
7/2255	30/11/81	1424	35E	FP	Q	
7/2269	1/12/81	1413	27E	?	—	
7/2283	2/12/81	1402	20E	?	Q	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/2284	2/12/81	1542	39W	?	—	
6/12647	3/12/81	0715	70E	FP	00	
7/2311	4/12/81	1339	11E	FP	00	
7/2312	4/12/81	1518	67W	?	—	
7/2354	7/12/81	1443	55E	CU	—	
7/2368	8/12/81	1432	42E	CU	—	
7/2382	9/12/81	1420	32E	CU	0	
7/2396	10/12/81	1409	25E	CU	—	
7/2410	11/12/81	1357	19E	?	—	
7/2411	11/12/81	1537	43W	?	—	
7/2453	14/12/81	1502	83E	FP	00	
7/2467	15/12/81	1451	65E	FP	000	
7/2481	16/12/81	1439	49E	?	00	
7/2565	22/12/81	1328	9E	?	—	
7/2947	18/1/82	1456	70E	CU	—	
7/3272	10/2/82	1529	57W	?	—	
7/3286	11/2/82	1517	74W	FP	00	
7/3371	17/2/82	1548	39W	?	00	
7/3384	18/2/82	1356	16E	CU	—	
7/3385	18/2/82	1536	51W	FP	00	
7/3498	26/2/82	1542	44W	ER	0000	
7/3568	3/3/82	1443	48E	FP	0000	
7/3681	11/3/82	1450	56E	FP	00	
7/3737	15/3/82	1403	19E	CU	—	
7/3738	15/3/82	1543	44W	FP	0	
7/3836	22/3/82	1421	29E	?	—	
7/3837	22/3/82	1601	30W	?	—	
7/3865	24/3/82	1537	51W	FP	00	
7/3878	25/3/82	1346	12E	CU	—	
7/3879	25/3/82	1525	66W	FP	0	
7/3892	26/3/82	1335	8E	ER	—	
7/3893	26/3/82	1513	85E	FP	0	
7/3935	29/3/82	1438	42E	CU	—	
7/3978	1/4/82	1543	44W	FP	0000	
7/3992	2/4/82	1531	58W	FP	0000	
7/4062	7/4/82	1432	36E	?	—	
7/4076	8/4/82	1420	28E	FP	0000	
7/4077	8/4/82	1602	31W	?	—	
7/4161	14/4/82	1405	54E	FP	0000	
7/4190	16/4/82	1607	32E	?	—	
7/4232	19/4/82	1531	61W	?	—	
7/4260	21/4/82	1508	72E	FP	—	
7/4288	23/4/82	1445	45E	FP	0	
7/4345	27/4/82	1538	55W	FP	—	
7/4358	28/4/82	1347	11E	FP	—	
7/4359	28/4/82	1526	70W	FP	0	
7/4372	29/4/82	1335	8E	?	—	
7/4373	29/4/82	1513	80E	FP	0	
7/4387	30/4/82	1501	67E	?	—	
7/4429	3/5/82	1426	31E	FP	00	
7/4485	7/5/82	1340	9E	FP	00	
7/4486	7/5/82	1519	80W	?	—	
7/4557	12/5/82	1601	33W	?	0	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/4570	13/5/82	1408	20E	?		
7/4571	13/5/82	1548	42W	ER		
7/4585	14/5/82	1536	55W	?	000	
7/4641	18/5/82	1449	52E	FP	000	
7/4669	20/5/82	1425	30E	FP	000	
7/4670	20/5/82	1606	29W	?		
7/4740	25/5/82	1507	76E	?		
7/4754	26/5/82	1455	59E	FP	000	
7/4782	28/5/82	1431	35E	FP	0000	
7/4839	1/6/82	1524	72W	?	0000	
7/4952	9/6/82	1529	67W	FP	0000	Tape labelled 10 June
7/4980	11/6/82	1505	74E	FP	0000	
7/5051	16/6/82	1547	45W	?	0000	
7/5121	21/6/82	1447	47E	FP	0000	
7/5135	22/6/82	1435	36E	FP	0000	
7/5136	22/6/82	1616	25W	?		
7/5220	28/6/82	1504	70E	?	0000	
7/5234	29/6/82	1452	53E	FP	0000	
7/5248	30/6/82	1441	40E	FP	0000	
7/5339	7/7/82	0054	10E	FP	0000	
7/5340	7/7/82	0231	87W	FP	0000	
7/5347	7/7/82	1457	54E	FP		Tape labelled 7/5348
7/5488	17/7/82	1439	38E	FP		
7/5516	19/7/82	1416	22E	FP	000	
7/5530	20/7/82	1404	16E	FP	000	
7/5531	20/7/82	1544	50W	?		
7/5544	21/7/82	1353	12E	FP	0000	
7/5545	21/7/82	1532	66W	FP	0000	
7/5558	22/7/82	1342	8E	FP	0000	
7/5559	22/7/82	1520	82E	FP	0000	
7/5572	23/7/82	1329	5E	FP		
7/5573	23/7/82	1507	73E	FP		
7/5615	26/7/82	1432	32E	FP		
7/5657	29/7/82	1357	14E	FP		
7/5658	29/7/82	1536	58W	FP		
7/5665	30/7/82	0258	51W	FP		
7/5672	30/7/82	1524	76W	FP		
7/5728	3/8/82	1437	36E	CU	0	
7/5729	3/8/82	1618	25W	?		
7/5743	4/8/82	1606	31W	FP	00	
7/5771	6/8/82	1541	53W	FP	000	
7/5813	9/8/82	1506	69E	FP	0000	
7/5869	13/8/82	1419	23E	FP	0000	
7/5870	13/8/82	1559	36W	?	0000	
7/5912	16/8/82	1523	80W	FP	0000	
7/5926	17/8/82	1511	75E	FP	0000	
7/5933	18/8/82	0232	86E	FP	0000	
7/5968	20/8/82	1435	33E	FP	0000	
7/5969	20/8/82	1616	26W	?	0000	
7/6025	24/8/82	1528	72W	FP	0000	
7/6039	25/8/82	1516	82E	FP	0000	
7/6067	27/8/82	1452	49E	FP	0000	
7/6109	30/8/82	1417	22E	FP	0	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/6110	30/8/82	1557	40W	?	Q	
7/6124	31/8/82	1545	52W	FP	Q	
7/6138	1/9/82	1533	68W	FP	Q	
7/6166	3/9/82	1509	72E	FP	Q	
7/6208	6/9/82	1434	32E	ER	Q	
7/6237	8/9/82	1551	45W	FP	Q	
7/6251	9/9/82	1538	60W	FP	Q	
7/6420	21/9/82	1455	51E	FP	Q	
7/6434	22/9/82	1443	40E	FP	Q	
7/6463	24/9/82	1600	37W	?	Q	
7/6504	27/9/82	1345	9E	FP	Q	
7/6505	27/9/82	1524	83E	FP	Q	
7/6512	28/9/82	0245	71W	FP	Q	
7/6518	28/9/82	1334	6E	FP	Q	
7/6519	28/9/82	1513	75E	FP	Q	
7/6525	29/9/82	0056	9E	FP	Q	
7/6526	29/9/82	0233	82W	FP	Q	
7/6533	29/9/82	1500	57E	FP	Q	
7/6539	30/9/82	0045	6E	FP	Q	
7/6540	30/9/82	0222	66E	FP	Q	
7/6547	30/9/82	1449	42E	FP	Q	
7/6554	1/10/82	0209	50E	FP	Q	
7/6561	1/10/82	1436	32E	FP	Q	
7/6660	8/10/82	1453	46E	FP	Q	
7/6731	13/10/82	1535	71W	FP	Q	
7/6759	15/10/82	1509	67E	FP	Q	
7/6801	18/10/82	1434	29E	?	Q	
7/6830	20/10/82	1550	50W	FP	Q	
7/6844	21/10/82	1538	65W	FP	Q	
7/6851	22/10/82	0259	56W	FP	Q	
7/6858	22/10/82	1526	85E	CU	Q	
7/6900	25/10/82	1450	42E	FP	Q	
7/6957	29/10/82	1542	60W	FP	Q	
7/6999	1/11/82	1506	61E	FP	Q	
7/7027	3/11/82	1443	35E	?	Q	
7/7042	4/11/82	—	—	ER	Q	
7/7056	5/11/82	1559	42W	?	Q	
7/7112	9/11/82	1511	65E	FP	Q	
7/7126	10/11/82	1459	50E	FP	Q	
7/7197	15/11/82	1540	66W	FP	Q	
7/7211	16/11/82	1532	83E	FP	Q	
7/7218	17/11/82	0300	76W	FP	Q	
7/7225	17/11/82	1515	71E	FP	Q	
7/7239	18/11/82	1503	55E	FP	Q	
7/7246	19/11/82	0225	64E	FP	Q	
7/7253	19/11/82	1452	41E	FP	Q	
7/7267	20/11/82	1440	31E	FP	Q	
7/7351	26/11/82	1331	3E	FP	Q	
7/7423	1/12/82	1548	54W	FP	Q	
7/7444	3/12/82	0300	61W	FP	Q	
7/7451	3/12/82	1523	90	FP	Q	
7/7521	8/12/82	1424	22E	FP	Q	
7/7536	9/12/82	1552	50W	FP	Q	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/7550	10/12/82	1540	66W	FP	Q	
7/7627	16/12/82	0202	37E	FP	Q	
7/7635	16/12/82	1609	36W	?	Q	
7/7649	17/12/82	1556	46W	?	Q	
7/7691	20/12/82	1520	79E	FP	Q	
7/7705	21/12/82	1508	61E	FP	Q	
7/7719	22/12/82	1455	—	ER	Q	
7/7776	26/12/82	1600	56W	FP	Q	
7/7790	27/12/82	1536	73W	FP	Q	
7/7804	28/12/82	1524	84E	?		
7/7917	5/1/83	1528	90	FP	Q	
7/7924	6/1/83	0250	77W	FP	Q	
7/7931	6/1/83	1516	71E	?	Q	
7/7945	7/1/83	1504	53E	FP		
7/7987	10/1/83	1427	—	?	Q	
7/7988	10/1/83	1608	36W	?	Q	
7/8001	11/1/83	1414	20E	?	Q	
7/8002	11/1/83	1556	47W	CU	Q	
7/8015	12/1/83	1404	13E	ER	Q	
7/8016	12/1/83	1544	62W	CU		
7/8029	13/1/83	1353	9E	?	Q	
7/8030	13/1/83	1532	83W	CU	Q	
7/8037	14/1/83	0253	70W	FP	Q	
7/8043	14/1/83	1337	6E	FP	Q	
7/8044	14/1/83	1520	77E	CU	Q	
7/8100	18/1/83	1431	25E	FP	Q	
7/8114	19/1/83	1420	19E	FP	Q	
7/8128	20/1/83	1409	14E	?	Q	
7/8129	20/1/83	1548	30W	CU	Q	
7/8143	21/1/83	1536	77W	FP	Q	
7/8185	24/1/83	1459	47E	?	Q	
7/8199	25/1/83	1446	35E	?	Q	
7/8213	26/1/83	1436	27E	FP	Q	
7/8214	26/1/83	1616	32W	FP	Q	
7/8227	27/1/83	1424	21E	ER	Q	
7/8228	27/1/83	1604	41W	FP	Q	
7/8241	28/1/83	1412	15E	FP	Q	
7/8242	28/1/83	1552	54W	FP		
7/8255	29/1/83	1359	11E	FP		
7/8256	29/1/83	1538	72W	FP	Q	
7/8269	30/1/83	1348	7E	FP		
7/8270	30/1/83	1527	85E	?	Q	
7/8284	31/1/83	1514	66E	?	Q	
7/8298	1/2/83	1503	50E	FP	Q	
7/8312	2/2/83	1451	38E	FP	Q	
7/8326	3/2/83	1439	29E	FP	Q	
7/8340	4/2/83	1427	22E	ER	Q	
7/8341	4/2/83	1608	35W	?	Q	
7/8355	5/2/83	1554	51W	?	Q	
7/8383	7/2/83	1531	75E	?	Q	
7/8397	8/2/83	1518	70E	FP	Q	
7/8411	9/2/83	1506	53E	FP	Q	
7/8425	10/2/83	1454	49E	?	Q	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/8439	11/2/83	1442	30E	ER	Q	
7/8496	15/2/83	1534	84W	FP	Q	
7/8524	17/2/83	1510	56E	FP	Q	
7/8530	18/2/83	0054	6E	?	—	
7/8531	18/2/83	0230	65E	FP	Q	
7/8538	18/2/83	1458	42E	FP	Q	
7/8580	21/2/83	1422	19E	?	Q	
7/8581	21/2/83	1602	46W	?	Q	
7/8594	22/2/83	1410	14E	?	Q	
7/8595	22/2/83	1550	60W	FP	Q	
7/8609	23/2/83	1537	79W	FP	Q	
7/8622	24/2/83	1347	6E	FP	Q	Tape labelled 23 Feb.
7/8623	24/2/83	1525	80E	FP	Q	
7/8637	25/2/83	1513	60E	FP	Q	
7/8679	28/2/83	1437	26E	ER	Q	
7/8680	28/2/83	1618	33W	FP	Q	
7/8693	1/3/83	1426	20E	FP	Q	
7/8694	1/3/83	1606	43W	FP	Q	
7/8707	2/3/83	1414	15E	FP	Q	
7/8708	2/3/83	1553	56W	FP	Q	
7/8721	3/3/83	1401	10E	?	Q	
7/8722	3/3/83	1541	74W	FP	Q	
7/8735	4/3/83	1349	7E	ER	Q	
7/8736	4/3/83	1529	84E	FP	Q	
7/8792	8/3/83	1441	26E	ER	Q	
7/8793	8/3/83	1621	31W	?	Q	
7/8807	9/3/83	1609	40W	?	Q	
7/8820	10/3/83	1417	16E	FP	Q	
7/8834	11/3/83	1404	10E	ER	Q	
7/8835	11/3/83	1545	69W	FP	Q	
7/8877	14/3/83	1503	53E	FP	Q	
7/8891	15/3/83	1457	42E	ER	Q	
6/19309	16/3/83	0747	48W	FP	Q	Tape labelled 6/9309
7/8905	16/3/83	1445	30E	?	Q	
7/8919	17/3/83	1432	26E	?	—	
7/8920	17/3/83	1614	38W	FP	Q	Tape labelled 0178 h
7/8933	18/3/83	1420	22E	?	—	
7/8934	18/3/83	1600	49W	FP	Q	
6/19351	19/3/83	0636	32E	FP	Q	Tape labelled 6/9351
6/19358	19/3/83	1857	18E	FP	Q	Tape labelled 6/9358
7/8962	20/3/83	1535	85W	FP	Q	
7/8969	21/3/83	0256	75W	FP	Q	
6/19379	21/3/83	0551	11E	FP	Q	Tape labelled 6/9379
6/19380	21/3/83	0728	70W	CU	Q	Tape labelled 6/380
7/8976	21/3/83	1524	75E	FP	Q	
6/19387	21/3/83	1949	63E	FP	Q	Tape labelled 6/9387
7/8983	22/3/83	0245	83E	FP	Q	
6/19394	22/3/83	0704	62E	?	Q	Tape labelled 6/9394
7/8990	22/3/83	1511	56E	FP	Q	
6/19401	22/3/83	1925	34E	FP	Q	Tape labelled 6/9401
6/19408	23/3/83	0642	36E	FP	Q	Tape labelled 6/9408
7/9004	23/3/83	1500	43E	FP	Q	
7/9018	24/3/83	1447	32E	FP	Q	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/9032	25/3/83	1435	25E	FP	Q	
7/9033	25/3/83	1616	34W	FP	Q	
7/9074	28/3/83	1400	10E	ER	Q	
7/9075	28/3/83	1539	79W	?	Q	
7/9088	29/3/83	1349	6E	FP	Q	
7/9089	29/3/83	1527	79E	ER	Q	
7/9103	30/3/83	1515	65E	?	Q	
7/9117	31/3/83	1503	45E	?	Q	
7/9201	6/4/83	1352	7E	ER	Q	
7/9202	6/4/83	1531	80E	FP	Q	
7/9216	7/4/83	1518	64E	?	Q	
7/9230	8/4/83	1507	49E	ER	Q	
7/9272	11/4/83	1430	21E	?	—	
7/9273	11/4/83	1611	41W	FP	Q	
7/9286	12/4/83	1418	16E	?	Q	
7/9287	12/4/83	1558	53W	?	Q	
7/9300	13/4/83	1407	12E	ER	Q	
7/9301	13/4/83	1546	70W	?	Q	
7/9314	14/4/83	1355	8E	ER	Q	
7/9315	14/4/83	1534	84E	FP	Q	
7/9328	15/4/83	1343	5E	?	Q	
7/9329	15/4/83	1522	69E	FP	Q	
7/9371	18/4/83	1446	30E	FP	Q	
7/9372	18/4/83	1626	29W	?	Q	
7/9385	19/4/83	1434	23E	FP	Q	
7/9386	19/4/83	1614	38W	?	Q	
7/9399	20/4/83	1421	21E	?	Q	
7/9400	20/4/83	1602	49W	?	Q	
7/9413	21/4/83	1410	13E	?	Q	
7/9414	21/4/83	1549	64W	?	Q	
7/9427	22/4/83	1358	9E	?	Q	
7/9428	22/4/83	1537	84	?	Q	
7/9484	26/4/83	1449	33E	?	Q	
7/9498	27/4/83	1437	25E	ER	Q	
7/9512	28/4/83	1425	19E	ER	Q	
7/9513	28/4/83	1605	45W	FP	Q	
7/9526	29/4/83	1413	14E	ER	Q	
7/9527	29/4/83	1552	59W	FP	Q	
7/9583	3/5/83	1504	47E	FP	Q	
7/9597	4/5/83	1452	36E	FP	—	
7/9611	5/5/83	1440	27E	FP	Q	
7/9612	5/5/83	1620	32W	FP	Q	
7/9625	6/5/83	1428	21E	FP	Q	
7/9626	6/5/83	1608	42W	?	Q	
7/9667	9/5/83	1353	7E	ER	Q	
7/9668	9/5/83	1532	80E	FP	Q	
7/9682	10/5/83	1520	63E	FP	Q	
7/9696	11/5/83	1508	47E	FP	Q	
7/9710	12/5/83	1455	36E	FP	Q	
7/9767	16/5/83	1547	72W	FP	Q	
7/9780	17/5/83	1356	8E	FP	Q	
7/9781	17/5/83	1535	86E	FP	Q	
7/9795	18/5/83	1523	66E	FP	Q	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/9809	19/5/83	1511	50E	FP	Q	
7/9879	24/5/83	1411	12E	FP	Q	First tape with 2048 pixels
7/9880	24/5/83	1551	68W	FP	Q	
7/9893	25/5/83	1400	8E	FP	Q	
7/9894	25/5/83	1538	84E	?	Q	
7/9907	26/5/83	1348	5E	ER	Q	
7/9908	26/5/83	1526	71E	FP	Q	
7/9922	27/5/83	1514	54E	FP	Q	
7/9964	30/5/83	1438	23E	FP	Q	
7/9965	30/5/83	1618	37W	?	Q	
7/9978	31/5/83	1426	18E	?	Q	
7/9979	31/5/83	1606	48W	FP	Q	
6/20391	31/5/83	0744	49W	FP	Q	Tape labelled 6/931
7/9992	1/6/83	1414	13E	FP	Q	
7/9993	1/6/83	1554	64W	?		
6/20404	1/6/83	0543	10E	FP	Q	Tape labelled 6/404
6/20405	1/6/83	0728	78W	FP	Q	Tape labelled 6/405
7/10006	2/6/83	1403	9E	FP	Q	
7/10007	2/6/83	1541	84W	FP	Q	
7/10020	3/6/83	1351	6E	FP	Q	
7/10021	3/6/83	1529	74E	FP	Q	
7/10077	7/6/83	1441	25E	FP	Q	Tape labelled 7/5/83
7/10091	8/6/83	1429	19E	FP	Q	
7/10092	8/6/83	1609	46W	FP	Q	
7/10106	9/6/83	1557	60W	?	Q	
7/10119	10/6/83	1406	9E	?		
7/10120	10/6/83	1545	78W	FP	Q	
8/1042	10/6/83	0725	78W	FP	Q	
7/10176	14/6/83	1456	34E	FP	Q	Tape labelled 7/176
8/1113	15/6/83	0718	88	FP	Q	
7/10204	16/6/83	1432	40W	ER		
7/10219	17/6/83	1600	57W	CU	Q	First tape with all lines
7/10275	21/6/83	1512	50E	FP	Q	2 tapes, labelled 7/275
8/1198	21/6/83	0649	44E	FP	Q	
7/10289	22/6/83	1459	36E	FP	Q	2 tapes, labelled 7/289
7/10303	23/6/83	1447	28E	FP	Q	2 tapes, labelled 7/303
7/10304	23/6/83	1628	31W	?		2 tapes, labelled 7/304
7/10317	24/6/83	1436	21E	CU	Q	2 tapes, labelled 7/317
7/10318	24/6/83	1616	41W	ER	Q	
7/10359	27/6/83	1400	8E	FP	Q	2 tapes, labelled 7/359
7/10360	27/6/83	1539	86W	?		
7/10373	28/6/83	1349	4E	FP	Q	2 tapes, labelled 7/373
7/10374	28/6/83	1527	67E	FP	Q	2 tapes, labelled 7/374
7/10388	29/6/83	1515	51E	FP	Q	2 tapes, labelled 7/388
7/10402	30/6/83	1503	38E	FP	Q	2 tapes, labelled 7/402
7/10416	1/7/83	1451	29E	FP	Q	Tape labelled 7/416
7/10458	4/7/83	1414	12E	FP	Q	Tape labelled 7/458
7/10459	4/7/83	1554	66W	FP	Q	2 tapes, labelled 7/459
7/10472	5/7/83	1403	8E	CU	Q	Tape labelled 7/472
7/10473	5/7/83	15428	7W	FP	Q	2 tapes, labelled 7/473
7/10480	6/7/83	0303	75W	FP	Q	Tape labelled 7/480
7/10486	6/7/83	1351	5E	FP	Q	Tape labelled 7/486
7/10487	6/7/83	1530	71E	FP	Q	

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8/1411	6/7/83	0627	23E	FP	Q	Tape labelled 6/7/82
7/10501	7/7/83	1518	54E	FP	Q	Tape labelled 7/501
7/10515	8/7/83	1506	41E	FP	Q	Tape labelled 7/515
7/10557	11/7/83	1430	18E	FP	Q	Tape labelled 7/557
7/10571	12/7/83	1418	13E	FP	Q	Tape labelled 7/571
7/10572	12/7/83	1557	63W	FP	Q	Tape labelled 7/572
7/10585	13/7/83	1406	9E	FP	Q	Tape labelled 7/585
7/10600	14/7/83	1533	75E	FP	Q	Tape labelled 7/600
7/10614	15/7/83	1521	57E	FP	Q	Tape labelled 7/614
7/10671	19/7/83	1612	46W	FP	Q	Tape labelled 7/671
7/10685	20/7/83	1600	61W	FP	Q	Tape labelled 7/685
7/10699	21/7/83	1548	80W	FP	Q	Tape labelled 7/699
7/10713	22/7/83	1536	77E	FP	Q	
7/10727	23/7/83	1524	60E	FP	Q	Tape labelled 7/727
7/10784	27/7/83	1616	43W	FP	Q	Tape labelled 7/784
7/10797	28/7/83	1424	15E	FP	Q	Tape labelled 7/797
7/10798	28/7/83	1603	56W	FP	Q	
7/10811	29/7/83	1409	10E	FP	Q	Tape labelled 7/811
7/10812	29/7/83	1551	74W	FP	Q	Tape labelled 7/812
7/10854	1/8/83	1515	48E	FP	Q	Tape labelled 7/854
7/10868	2/8/83	1503	36E	FP	Q	Tape labelled 7/868
7/10896	4/8/83	1439	21E	CU	Q	Tape labelled 7/896
7/10897	4/8/83	1619	41W	FP	Q	Tape labelled 7/897
7/10911	5/8/83	1607	53W	FP	Q	Tape labelled 7/911
7/10953	8/8/83	1530	66E	FP	Q	Tape labelled 7/953
7/10967	9/8/83	1518	50E	FP	Q	Tape labelled 7/967
7/10981	10/8/83	1506	37E	FP	Q	Tape labelled 7/981
7/10995	11/8/83	1454	29E	FP	Q	Tape labelled 7/995
7/11009	12/8/83	1442	21E	CU	Q	
7/11052	15/8/83	1545	87E	FP	Q	
7/11066	16/8/83	1533	69E	FP	Q	
7/11080	17/8/83	1521	53E	?		
7/11094	18/8/83	1509	39E	FP	Q	
7/11108	19/8/83	1456	29E	FP	Q	
7/11150	22/8/83	1421	13E	FP	Q	
7/11164	23/8/83	1409	9E	FP	Q	
7/11165	23/8/83	1548	83W	FP	Q	
7/11179	24/8/83	1536	74E	FP	Q	
7/11193	25/8/83	1524	56E	FP	Q	
7/11207	26/8/83	1512	42E	FP	Q	
7/11250	29/8/83	1616	45W	FP	Q	
7/11263	30/8/83	1423	14E	?	Q	
7/11264	30/8/83	1603	60W	FP	Q	
7/11277	31/8/83	1412	10E	FP		
7/11278	31/8/83	1551	79W	FP	Q	
7/11306	2/9/83	1527	60E	FP	Q	
7/11348	5/9/83	1450	26E	FP	Q	
7/11363	6/9/83	1619	43W	?		
7/11376	7/9/83	1427	14E	FP	Q	
7/11377	7/9/83	1606	57W	?	Q	
7/11390	4/9/83	1441	20E	FP	Q	
7/11476	14/9/83	1621	41W	FP	Q	
7/11489	15/9/83	1429	15E	FP	Q	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/11490	15/9/83	1609	54W	FP	Q	
7/11504	16/9/83	1556	71W	FP	Q	
7/11546	19/9/83	1520	50E	FP	Q	
8/2492	20/9/83	0731	73W	FP	Q	
7/11701	30/9/83	1447	23E	CU	Q	
7/11702	30/9/83	1627	37W	FP	Q	
7/11715	1/10/83	1435	17E	CU	Q	
7/11716	1/10/83	1615	48W	FP	Q	
7/11729	2/10/83	1423	13E	FP	Q	
7/11730	2/10/83	1602	65W	FP	Q	
7/11743	3/10/83	1411	9E	FP	Q	
7/11758	4/10/83	1538	74E	FP		
7/11772	5/10/83	1526	56E	FP		
7/11786	6/10/83	1514	42E	FP	Q	
7/11800	7/10/83	1502	32E	FP	Q	
7/11843	10/10/83	1606	61W	FP	Q	
7/11856	11/10/83	1415	9E	ER	Q	
7/11857	11/10/83	1554	81W	FP	Q	
7/11871	12/10/83	1541	77E	FP	Q	
7/11899	14/10/83	1517	44E	FP	Q	
7/11913	15/10/83	1504	33E	FP	Q	
7/11941	17/10/83	1441	19E	FP	Q	
7/11942	17/10/83	1621	44W	FP	Q	
7/11955	18/10/83	1429	14E	FP	Q	
7/11956	18/10/83	1609	57W	FP	Q	
8/2904	19/10/83	0706	63E	FP	Q	
7/11970	19/10/83	1557	76W	FP	Q	
7/11976	20/10/83	0140	14E	FP	Q	
7/11977	20/10/83	0318	65W	FP	Q	
8/2918	20/10/83	0644	38E	FP	Q	
7/11983	20/10/83	1406	7E	FP	Q	
7/11984	20/10/83	1545	82E	CU	Q	
8/2932	21/10/83	0624	24E	FP	Q	
7/11998	21/10/83	1532	62E	FP	Q	
7/12012	22/10/83	1519	46E	FP	Q	
7/12026	23/10/83	1507	35E	FP	Q	
7/12040	24/10/83	1455	26E	FP	Q	
7/12041	24/10/83	1636	33W	?	Q	
7/12054	25/10/83	1443	20E	CU	Q	
7/12055	25/10/83	1623	42W	FP	Q	
7/12068	26/10/83	1431	15E	FP	Q	
7/12069	26/10/83	1611	56W	FP	Q	
7/12082	27/10/83	1419	11E	FP	Q	
7/12083	27/10/83	1559	74W	FP	Q	
7/12096	28/10/83	1408	7E	FP	Q	
7/12097	28/10/83	1546	80E	FP	Q	
7/12111	29/10/83	1534	64E	FP	Q	
7/12139	31/10/83	1510	36E	FP	Q	
7/12153	1/11/83	1458	28E	FP	Q	
8/3103	2/11/83	0705	60E	FP	Q	
7/12167	2/11/83	1446	21E	FP	Q	
7/12182	3/11/83	1614	53W	FP	Q	
7/12195	4/11/83	1423	11E	FP	Q	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/12196	4/11/83	1602	70W	FP	—	
7/12224	6/11/83	1537	68E	FP	Q	
7/12238	7/11/83	1525	51E	FP	Q	
7/12252	8/11/83	1513	39E	FP	Q	
7/12259	9/11/83	0234	45E	FP	Q	Tape labelled 0334 h
7/12266	9/11/83	1501	29E	FP	Q	
8/3210	9/11/83	2016	72W	FP	Q	
7/12273	10/11/83	0222	35E	FP	Q	
8/3217	10/11/83	0732	72W	FP	Q	
7/12280	10/11/83	1449	22E	FP	Q	
8/3231	11/11/83	0711	70E	FP	Q	
7/12337	14/11/83	1541	72E	?	Q	
7/12379	17/11/83	1504	31E	FP	Q	
7/12422	20/11/83	1607	63W	FP	Q	
7/12436	21/11/83	1556	82W	?	Q	
7/12450	22/11/83	1544	75E	FP	Q	
7/12457	23/11/83	0300	85E	FP	Q	
7/12464	23/11/83	1532	58E	FP	Q	
7/12478	24/11/83	1518	41E	FP	Q	
7/12485	25/11/83	0239	49E	FP	Q	
8/3430	25/11/83	0709	65E	?	Q	
7/12492	25/11/83	1506	31E	FP	Q	
7/12521	27/11/83	1622	46W	FP	Q	
7/12549	29/11/83	1557	80W	?	Q	
8/3501	30/11/83	0701	53E	FP	Q	
7/12563	30/11/83	1545	76E	CU	Q	
7/12577	1/12/83	1533	57E	FP	Q	
7/12591	2/12/83	1521	43E	FP	Q	
7/12648	6/12/83	1612	60W	FP	Q	
7/12676	8/12/83	1547	79E	FP	Q	
7/12683	9/12/83	0308	88	?	Q	
7/12690	9/12/83	1536	61E	FP	Q	
7/12704	10/12/83	1523	45E	FP	Q	
7/12718	11/12/83	1511	35E	FP	Q	
7/12732	12/12/83	1459	26E	FP	Q	
8/3679	12/12/83	2004	83E	FP	Q	
7/12746	13/12/83	1447	20E	FP	—	
7/12761	14/12/83	1615	57W	FP	Q	
7/12775	15/12/83	1603	76W	CU	Q	
7/12789	16/12/83	1550	82E	FP	Q	
7/12803	17/12/83	1538	62E	FP	Q	
7/12817	18/12/83	1526	47E	FP	Q	
7/12845	20/12/83	1502	27E	FP	Q	
7/12859	21/12/83	1450	20E	CU	Q	
7/12860	21/12/83	1630	42W	FP	Q	
7/12873	22/12/83	1438	15E	FP	Q	
7/13057	4/1/84	1519	38E	FP	Q	
8/4084	10/1/84	0716	73E	FP	Q	
7/13142	10/1/84	1546	77E	FP	Q	
7/13156	11/1/84	1534	53E	FP	Q	
7/13226	16/1/84	1434	13E	FP	Q	
7/13227	16/1/84	1613	63W	FP	Q	
7/13240	17/1/84	1422	9E	FP	—	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/13241	17/1/84	1601	83W	FP	Q	
7/13255	18/1/84	1555	74E	FP	Q	
7/13269	19/1/84	1537	56E	FP	Q	
7/13283	20/1/84	1524	42E	FP	Q	
7/13326	23/1/84	1628	46W	FP	Q	
7/13340	24/1/84	1616	61W	FP	Q	
7/13354	25/1/84	1604	81W	CU	Q	
7/13368	26/1/84	1551	77E	FP	Q	
7/13382	27/1/84	1539	58E	FP	Q	
7/13396	28/1/84	1527	43E	FP	Q	
7/13452	1/2/84	1439	14E	FP	Q	
7/13467	2/2/84	1606	77W	FP	Q	
7/13480	3/2/84	1416	6E	FP	Q	
7/13481	3/2/84	1554	80E	FP	Q	
7/13523	6/2/84	1518	34E	FP	Q	
7/13551	8/2/84	1453	20E	CF	Q	
7/13552	8/2/84	1633	43W	FP	Q	
7/13566	9/2/84	1621	58W	FP	Q	
7/13580	10/2/84	1609	76W	?	Q	
7/13622	13/2/84	1532	49E	FP	Q	
7/13636	14/2/84	1520	37E	FP	Q	
7/13650	15/2/84	1508	28E	FP	Q	
7/13658	16/2/84	0410	26W	?	Q	
7/13664	16/2/84	1456	21E	FP	Q	
7/13678	17/2/84	1444	16E	FP	Q	
7/13679	17/2/84	1624	53W	FP	Q	
7/13777	24/2/84	1458	22E	FP	Q	
7/13778	24/2/84	1639	40W	FP	Q	
7/13819	27/2/84	1423	8E	FP	Q	
7/13820	27/2/84	1602	90	FP	Q	
7/13834	28/2/84	1549	68E	FP	Q	
7/13848	29/2/84	1537	52E	FP	Q	2 tapes
8/4802	29/2/84	2000	70E	FP	Q	2 tapes
7/13855	1/3/84	0258	61E	FP	Q	2 tapes
8/4809	1/3/84	0717	75E	FP	Q	2 tapes
8/4816	1/3/84	1938	44E	FP	Q	2 tapes
7/13932	6/3/84	1426	9E	FP	Q	
7/13933	6/3/84	1605	84W	FP	Q	
7/13947	7/3/84	1552	72E	FP	Q	
7/13961	8/3/84	1540	53E	FP	Q	
7/13975	9/3/84	1528	40E	FP	Q	
7/14018	12/3/84	1631	48W	FP	Q	
7/14032	13/3/84	1618	63W	FP	Q	
7/14046	14/3/84	1606	83W	FP	Q	
7/14060	15/3/84	1554	74E	CU	Q	
7/14074	16/3/84	1542	56E	CU	Q	2 tapes
7/14159	22/3/84	1609	78W	FP	Q	
7/14172	23/3/84	1418	6E	FP	Q	
7/14215	26/3/84	1519	33E	FP	Q	
7/14229	27/3/84	1507	25E	FP	Q	
7/14244	28/3/84	1635	45W	CU	Q	
7/14258	29/3/84	1623	60W	CU	Q	
7/14272	30/3/84	1610	77W	FP	Q	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/14314	2/4/84	1534	45E	FP	Q	
7/14328	3/4/84	1521	34E	FP	Q	
7/14357	5/4/84	1637	44W	FP	Q	
7/14371	6/4/84	1625	57W	FP	Q	
7/14413	9/4/84	1548	62E	FP	Q	
7/14427	10/4/84	1535	47E	FP	Q	
7/14441	11/4/84	1524	35E	FP	Q	
7/14470	13/4/84	1640	42W	FP	Q	
7/14526	17/4/84	1549	64E	FP	Q	
7/14667	27/4/84	1528	37E	FP	Q	
7/14724	1/5/84	1619	71W	CU	Q	
7/14738	2/5/84	1607	84E	CU	Q	
7/14752	3/5/84	1555	67E	FP	Q	
7/14766	4/5/84	1542	50E	FP	Q	
7/14907	14/5/84	1520	30E	FP	Q	
7/14964	18/5/84	1611	84	CU	—	
7/15034	23/5/84	1510	23E	FP	Q	
7/15154	1/6/84	0231	27E	?	Q	
7/15232	6/6/84	1538	43E	FP	Q	
7/15246	7/6/84	1525	33E	FP	—	
7/15260	8/6/84	1514	25E	FP	Q	
7/15303	11/6/84	1617	80W	FP	Q	
7/15331	13/6/84	1552	59E	FP	Q	
7/15345	14/6/84	1540	44E	FP	—	
7/15359	15/6/84	1527	34E	FP	Q	
7/15402	18/6/84	1631	59W	FP	Q	
7/15415	19/6/84	1439	10E	FP	—	
7/15416	19/6/84	1618	77W	FP	—	
7/15429	20/6/84	1428	6E	CU	—	
7/15529	27/6/84	1620	75W	FP	—	
7/15543	28/6/84	1608	83E	FP	—	
7/15557	29/6/84	1555	63E	FP	—	
7/15655	6/7/84	1431	7E	FP	—	
7/15741	12/7/84	1636	53W	FP	—	
7/15755	13/7/84	1624	70W	FP	—	
7/15797	16/7/84	1547	49E	FP	—	
7/15832	19/7/84	0244	33E	FP	—	
7/15896	23/7/84	1601	67E	FP	—	
7/15910	24/7/84	1549	49E	FP	—	
7/15931	26/7/84	0258	45E	CF	—	
7/15938	26/7/84	1524	29E	FP	—	
7/16051	3/8/84	1527	29E	FP	Q	
7/16058	4/8/84	0247	35E	FP	Q	
7/16150	10/8/84	1540	40E	FP	Q	
7/16157	11/8/84	0301	47E	FP	Q	
7/16235	16/8/84	1606	69E	FP	Q	
7/16298	21/8/84	0239	27E	FP	—	
7/16404	28/8/84	1519	22E	?	—	
7/16411	29/8/84	0241	27E	FP	—	
7/16447	31/8/84	1622	86W	CU	—	
7/16489	3/9/84	1545	40E	FP	Q	
7/16496	4/9/84	0306	46E	CF	Q	
7/16588	10/9/84	1559	55E	FP	Q	

Tape labelled 29/8/85

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/16616	12/9/84	1534	31E	FP	—	
7/16674	16/9/84	1808	9W	?	—	
7/16708	19/9/84	0322	65E	FP	Q	
7/16729	20/9/84	1536	31E	FP	Q	
7/16736	21/9/84	0258	37E	FP	Q	
7/16786	24/9/84	1627	81W	FP	Q	
7/16814	26/9/84	1602	57E	FP	Q	
7/16913	3/10/84	1616	78E	FP	Q	
7/16941	5/10/84	1552	45E	FP	Q	
7/16983	8/10/84	1515	19E	CU	—	
7/16997	9/10/84	1503	14E	CF	—	
7/16998	9/10/84	1643	60W	CU	—	
7/17011	10/10/84	1451	10E	FP	—	
7/17026	11/10/84	1618	78E	CU	—	
7/17032	12/10/84	0202	10E	FP	—	
7/17040	12/10/84	1606	60E	FP	—	
7/17054	13/10/84	1553	45E	FP	—	
7/17082	15/10/84	1529	26E	CU	—	
7/17097	16/10/84	1657	44W	FP	Q	
7/17111	17/10/84	1644	59W	FP	Q	
7/17118	18/10/84	0405	50W	FP	Q	
7/17124	18/10/84	1453	10E	FP	—	
7/17125	18/10/84	1632	78W	FP	—	
7/17131	19/10/84	0214	14E	FP	Q	
7/17132	19/10/84	0353	67W	FP	Q	
7/17210	24/10/84	1658	44W	FP	Q	
7/17223	25/10/84	1506	14E	CU	Q	
7/17224	25/10/84	1645	58W	FP	Q	
7/17230	26/10/84	0226	18E	FP	—	
7/17231	26/10/84	0406	49W	FP	Q	
6/27709	26/10/84	0635	51E	FP	Q	
7/17238	26/10/84	1633	76W	FP	Q	
7/17280	29/10/84	1556	47E	FP	Q	
7/17322	1/11/84	1520	20E	FP	—	
7/17351	3/11/84	1634	75W	FP	Q	
7/17379	5/11/84	1610	64E	CU	Q	
7/17407	7/11/84	1546	36E	CU	Q	
7/17464	11/11/84	1638	72W	FP	Q	
7/17492	13/11/84	1612	64E	FP	Q	
7/17499	14/11/84	0332	73E	FP	Q	
7/17506	14/11/84	1600	48E	FP	Q	
7/17513	15/11/84	0320	56E	FP	Q	
7/17520	15/11/84	1547	36E	FP	—	
7/17534	16/11/84	1534	27E	FP	Q	
7/17577	19/11/84	1638	72W	FP	Q	
7/17619	22/11/84	1601	49E	FP	Q	
7/17676	26/11/84	1652	53W	FP	Q	
7/17690	27/11/84	1640	71W	FP	Q	
7/17704	28/11/84	1627	86E	FP	Q	
7/17718	29/11/84	1615	65E	FP	Q	
7/17732	30/11/84	1603	49E	CU	Q	
7/17789	4/12/84	1653	53W	FP	Q	
7/17803	5/12/84	1641	69W	FP	Q	

Tape labelled 1436 h

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
6/28279	5/12/84	0716	55W	FP	Q	
6/28293	6/12/84	0652	82E	FP		
7/17845	8/12/84	1604	50E	CU	Q	
7/17873	10/12/84	1539	28E	CU	Q	
7/17887	11/12/84	1527	21E	FP		
7/17902	12/12/84	1655	52W	CU	Q	
7/17916	13/12/84	1642	69W	FP	Q	
7/17930	14/12/84	1630	84E	FP	Q	
7/17972	17/12/84	1553	38E	FP	Q	
7/18015	20/12/84	1656	51W	CU	Q	
7/18029	21/12/84	1644	68W	FP	Q	
7/18043	22/12/84	1632	89	FP	Q	
7/18050	23/12/84	0352	77W	FP	Q	
7/18057	23/12/84	1619	68E	FP	Q	
7/18064	24/12/84	0340	79E	FP	Q	
7/18071	24/12/84	1607	52E	FP	Q	
7/18085	25/12/84	1554	39E	FP	Q	
7/18128	28/12/84	1658	50W	FP	Q	
7/18142	29/12/84	1646	67W	FP	Q	
7/18170	31/12/84	1620	56E	FP	Q	
7/18184	1/1/85	1608	52E	FP	Q	
7/18212	3/1/85	1544	29E	FP	Q	
7/18226	4/1/85	1531	22E	FP		
7/18255	6/1/85	1647	66W	FP	Q	
7/18297	9/1/85	1609	52E	FP	Q	
7/18311	10/1/85	1557	37E	FP	Q	
7/18325	11/1/85	1544	29E	FP	Q	
7/18367	14/1/85	1508	12E	FP	Q	
7/18368	14/1/85	1647	68W	FP	Q	
9/491	16/1/85	1455	83W	FP	Q	
9/505	17/1/85	1445	78E	FP	Q	
9/519	18/1/85	1434	61E	FP	Q	
7/18481	22/1/85	1648	66W	CU	Q	
9/575	22/1/85	1352	23E	CU	Q	
9/858	11/2/85	1521	49W	FP	Q	
7/18777	12/2/85	1549	30E	CU	Q	
9/886	13/2/85	1459	77W	CU	Q	
7/18820	15/2/85	1652	66W	FP	Q	
9/970	19/2/85	1356	25E	FP	Q	
9/985	20/2/85	1526	44W	FP	Q	
9/1013	22/2/85	1504	70W	FP	Q	
7/18933	23/2/85	1653	65W	CU	Q	
9/1041	24/2/85	1443	73E	FP		
7/18961	25/2/85	1628	72E	FP	Q	
6/29468	26/2/85	1944	69W	FP	Q	
7/18975	26/2/85	1616	54E	FP	Q	
9/1069	26/2/85	1421	44E	FP	Q	
6/29482	27/2/85	1921	67E	FP	Q	
7/18989	27/2/85	1604	41E	FP	Q	
9/1076	27/2/85	0143	52E	FP	Q	
9/1083	27/2/85	1411	35E	FP	Q	
9/1097	28/2/85	1401	27E	FP	Q	
9/1111	1/3/85	1350	22E	FP		

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
7/19017	1/3/85	1539	23E	FP	—	
9/1126	2/3/85	1520	50W	FP	Q	
7/19032	2/3/85	1707	49W	FP	Q	
6/29525	2/3/85	1948	62W	CU	Q	
9/1154	4/3/85	1458	80W	FP	Q	
7/19060	4/3/85	1642	82E	CU	Q	
9/1168	5/3/85	1448	80E	FP	Q	
7/19074	5/3/85	1629	65E	?	Q	
7/19088	6/3/85	1617	55E	CU	Q	
9/1196	7/3/85	1426	49E	CU	Q	
7/19102	7/3/85	1605	41E	CU	Q	
7/19116	8/3/85	1552	31E	CU	Q	Tape time labelled 1523
7/19145	10/3/85	1709	48W	FP	Q	
9/1253	11/3/85	1524	45W	CU	Q	
9/1281	13/3/85	1503	73W	FP	Q	
7/19201	14/3/85	1619	55E	FP	Q	
9/1309	15/3/85	1442	69E	FP	Q	
6/29752	18/3/85	1826	18E	CU	Q	
9/1379	20/3/85	1349	21E	FP	Q	
9/1393	21/3/85	1339	16E	CU	Q	
9/1436	24/3/85	1447	77E	FP	Q	
7/19356	25/3/85	1543	23E	CU	Q	
9/1450	25/3/85	1436	60E	CU	Q	
7/19370	26/3/85	1531	17E	CU	Q	
7/19371	26/3/85	1711	48W	CU	Q	
9/1457	26/3/85	0158	69E	CF	Q	
9/1464	26/3/85	1425	47E	CU	Q	
7/19385	27/3/85	1658	63W	CU	Q	
9/1478	27/3/85	1415	37E	CU	Q	
9/1485	28/3/85	0137	44E	FP	Q	
9/1492	28/3/85	1404	29E	CU	Q	
9/1503	28/3/85	1451	83	CU	—	
7/19399	28/3/85	1646	82W	CU	Q	
7/19413	29/3/85	1634	74E	CU	Q	
7/19427	30/3/85	1621	55E	FP	Q	
9/1535	31/3/85	1513	59W	FP	Q	
9/1549	1/4/85	1502	76W	FP	Q	
9/1563	2/4/85	1451	75E	?	Q	
9/1577	3/4/85	1441	67E	FP	Q	
9/1591	4/4/85	1430	52E	CU	Q	
9/1605	5/4/85	1419	41E	CU	Q	
9/1619	6/4/85	1409	32E	CU	Q	
9/1633	7/4/85	1359	26E	FP	Q	
9/1647	8/4/85	1348	19E	CU	Q	
9/1676	10/4/85	1507	69W	CU	Q	
9/1789	18/4/85	1522	49W	FP	Q	
9/1803	19/4/85	1512	62W	FP	Q	
9/1831	21/4/85	1450	80E	FP	Q	
9/1845	22/4/85	1440	64E	FP	Q	
9/1859	23/4/85	1429	50E	FP	Q	
9/1873	24/4/85	1419	39E	FP	Q	
9/1901	26/4/85	1358	24E	FP	—	
9/1930	28/4/85	1517	57W	FP	Q	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
9/1972	1/5/85	1445	71E	FP	Q	
9/2042	6/5/85	1351	21E	CU	Q	
9/2043	6/5/85	1532	40W	CU	Q	
9/2056	7/5/85	1341	16E	CU	Q	
9/2057	7/5/85	1521	51W	FP	Q	
9/2070	8/5/85	1331	13E	CU	Q	
9/2071	8/5/85	1511	65W	FP	Q	
9/2085	9/5/85	1500	81W	FP	Q	
9/2099	10/5/85	1450	79E	FP	Q	
9/2141	13/5/85	1418	37E	FP	Q	
9/2155	14/5/85	1407	30E	CU	Q	
9/2169	15/5/85	1357	23E	CU	Q	
9/2183	16/5/85	1346	18E	CU	Q	
9/2198	17/5/85	1516	59W	FP	Q	
9/2240	20/5/85	1444	68E	CU	Q	
9/2254	21/5/85	1433	53E	CU	Q	
9/2268	22/5/85	1422	42E	FP	Q	
9/2282	23/5/85	1412	33E	FP	Q	
9/2296	24/5/85	1401	26E	CU	Q	
9/2395	31/5/85	1427	46E	FP	Q	
9/2465	5/6/85	1335	13E	FP	Q	
9/2466	5/6/85	1514	62W	CU		
9/2480	6/6/85	1503	79W	FP	Q	
9/2536	10/6/85	1421	42E	CU	Q	
9/2550	11/6/85	1411	32E	FP	Q	
9/2578	13/6/85	1350	19E	FP	Q	
9/2579	13/6/85	1530	44W	FP	Q	
9/2592	14/6/85	1340	15E	FP	Q	
9/2635	17/6/85	1447	72E	CU	Q	
9/2663	19/6/85	1426	44E	FP	Q	
9/2677	20/6/85	1415	35E	CU	Q	
9/2691	21/6/85	1405	32E	CU	Q	
9/2733	24/6/85	1334	13E	CU	Q	
9/2748	25/6/85	1502	81	FP	Q	
9/2832	1/7/85	1359	24E	FP	Q	
9/2846	2/7/85	1349	18E	FP	Q	
9/2860	3/7/85	1338	14E	CU	Q	
9/2861	3/7/85	1518	59W	FP	Q	
9/2874	4/7/85	1328	10E	CU	Q	
9/2875	4/7/85	1507	74W	FP	Q	
9/2931	8/7/85	1425	42E	FP	Q	
9/2959	10/7/85	1403	26E	FP	Q	
9/2973	11/7/85	1353	20E	CU	Q	
9/2987	12/7/85	1343	16E	FP	Q	
9/2988	12/7/85	1523	53W	FP	Q	
9/3030	15/7/85	1451	75E	CU	Q	
9/3044	16/7/85	1440	59E	FP	Q	
9/3058	17/7/85	1430	46E	FP	Q	
9/3072	18/7/85	1419	36E	CU	Q	
9/3128	22/7/85	1337	13E	FP	Q	
9/3129	22/7/85	1517	61W	FP	Q	
8/12095	26/7/85	2003	79E	CU	Q	
9/3185	26/7/85	1434	80E	CU	Q	

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9/3199	27/7/85	1424	40E	FP	Q	
9/3213	28/7/85	1413	31E	FP	Q	
9/3227	29/7/85	1403	24E	FP	Q	
9/3241	30/7/85	1352	19E	CU	Q	
9/3255	31/7/85	1342	15E	CU	Q	
9/3270	1/8/85	1511	71W	FP	Q	
8/12180	1/8/85	1934	39E	FP	Q	
8/12187	2/8/85	0651	40E	FP	Q	
9/3312	4/8/85	1439	56E	FP	Q	
9/3326	5/8/85	1428	44E	CU	—	
9/3340	6/8/85	1418	34E	FP	Q	
9/3354	7/8/85	1407	27E	CU	Q	
9/3368	8/8/85	1357	21E	CU	—	
9/3382	9/8/85	1336	16E	CU	Q	
9/3425	12/8/85	1454	79E	FP	Q	
9/3439	13/8/85	1444	62E	FP	Q	
9/3446	14/8/85	0205	71E	FP	Q	
9/3453	14/8/85	1433	48E	FP	Q	
9/3467	15/8/85	1422	38E	FP	Q	
9/3481	16/8/85	1412	30E	CU	—	
9/3566	22/8/85	1448	69E	CU	Q	
9/3636	27/8/85	1355	20E	CU	Q	
9/3651	28/8/85	1525	53W	CU	Q	
9/3665	29/8/85	1514	68W	FP	Q	
9/3721	2/9/85	1432	46E	FP	Q	
9/3728	3/9/85	0141	53E	FP	Q	
9/3749	4/9/85	1410	28E	FP	Q	
9/3763	5/9/85	1400	22E	FP	Q	
9/3777	6/9/85	1349	17E	FP	—	
9/3834	10/9/85	1447	65E	CU	Q	
6/32273	11/9/85	1912	71E	FP	Q	
9/3855	12/9/85	0158	59E	FP	Q	
9/3862	12/9/85	1426	40E	FP	Q	
6/32280	12/9/85	0628	68E	FP	Q	
9/3919	16/9/85	1524	56W	CU	Q	
9/3933	17/9/85	1513	71W	CU	Q	
9/3961	19/9/85	1452	72E	FP	Q	
9/3975	20/9/85	1441	56E	CU	Q	
9/3982	21/9/85	0202	65E	FP	Q	
9/4017	23/9/85	1409	27E	CU	Q	
9/4046	25/9/85	1528	51W	FP	Q	
9/4060	26/9/85	1517	65W	CU	—	
9/4074	27/9/85	1506	82W	FP	Q	
9/4102	29/9/85	1445	62E	FP	Q	
9/4109	30/9/85	0207	71E	FP	Q	
9/4130	1/10/85	1424	38E	FP	Q	
9/4158	3/10/85	1403	24E	FP	Q	
9/4172	4/10/85	1353	19E	FP	Q	
9/4215	7/10/85	1501	85E	FP	—	
8/13147	8/10/85	2000	77E	FP	Q	
9/4243	9/10/85	1439	53E	FP	Q	
9/4257	10/10/85	1429	42E	FP	Q	
9/4271	11/10/85	1418	33E	FP	Q	

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9/4314	14/10/85	1527	54W	FP	Q	
9/4342	16/10/85	1506	85W	FP	Q	
9/4370	18/10/85	1444	59E	FP	Q	
9/4412	21/10/85	1413	28E	FP	Q	
9/4455	24/10/85	1521	62W	FP	Q	
9/4469	25/10/85	1510	79W	FP	Q	
9/4511	28/10/85	1438	51E	FP	Q	
9/4518	29/10/85	0159	59E	FP	Q	
9/4525	29/10/85	1427	39E	FP	Q	
9/4539	30/10/85	1417	31E	FP	Q	
9/4553	31/10/85	1407	24E	FP	Q	
9/4624	5/11/85	1453	70E	FP	Q	
9/4638	6/11/85	1443	55E	FP	Q	
9/4652	7/11/85	1432	43E	FP	Q	
9/4666	8/11/85	1421	34E	FP	Q	
9/4708	11/11/85	1350	16E	FP	Q	
9/4709	11/11/85	1530	52W	FP	Q	
9/4722	12/11/85	1340	12E	FP	Q	
9/4723	12/11/85	1519	66W	FP	Q	
9/4736	13/11/85	1329	9E	FP	Q	
9/4737	13/11/85	1509	81W	FP	Q	
9/4750	14/11/85	1320	6E	FP	Q	
9/4751	14/11/85	1458	78E	FP	Q	
9/4765	15/11/85	1447	61E	FP	Q	
9/4807	18/11/85	1416	29E	FP	Q	
9/4821	19/11/85	1405	23E	FP	Q	
9/4920	26/11/85	1431	40E	FP	Q	
9/4934	27/11/85	1420	32E	FP	Q	
9/4948	28/11/85	1410	25E	FP	Q	
9/4962	29/11/85	1359	20E	FP	Q	
7/22579	29/11/85	1557	80	FP		Tape labelled 7/12579
9/5019	3/12/85	1456	73E	FP	Q	
9/5033	4/12/85	1446	57E	FP	Q	
9/5047	5/12/85	1435	44E	FP	Q	
9/5061	6/12/85	1425	35E	FP		
9/5103	9/12/85	1353	17E	FP	Q	
9/5104	9/12/85	1533	50W	FP	Q	
9/5117	10/12/85	1343	13E	FP	Q	
9/5118	10/12/85	1522	64W	FP	Q	
9/5132	11/12/85	1512	79W	FP	Q	
9/5202	16/12/85	1419	30E	FP	Q	
9/5216	17/12/85	1408	23E	FP		
9/5244	19/12/85	1347	14E	FP	Q	
9/5245	19/12/85	1527	58W	FP	Q	
9/5259	20/12/85	1516	74W	FP	Q	
9/5301	23/12/85	1444	53E	FP		
9/5386	29/12/85	1520	67W	FP		
9/5428	1/1/86	1448	58E	FP		
9/5456	3/1/86	1427	36E	FP	Q	
9/5498	6/1/86	1356	17E	FP	Q	
9/5513	7/1/86	1525	62W	FP	Q	
9/5527	8/1/86	1514	78W	FP	Q	
9/5555	10/1/86	1453	64E	FP	Q	

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9/5597	13/1/86	1421	31E	FP	Q	
9/5611	14/1/86	1411	24E	FP	Q	
9/5639	16/1/86	1350	15E	FP	Q	
9/5640	16/1/86	1529	57W	FP	Q	
9/5654	17/1/86	1519	72W	FP	Q	
9/5696	20/1/86	1447	50E	?	Q	
9/5710	21/1/86	1436	43E	FP	Q	
9/5724	22/1/86	1426	34E	FP	Q	
9/5738	23/1/86	1415	27E	FP	Q	
9/5752	24/1/86	1404	21E	FP	Q	
9/5809	28/1/86	1502	76E	FP	Q	
9/5823	29/1/86	1451	60E	FP	Q	
9/6006	11/2/86	1413	25E	FP	Q	
9/6020	12/2/86	1403	20E	FP	Q	
9/6035	13/2/86	1532	56W	FP	Q	
9/6049	14/2/86	1521	70W	FP	Q	
9/6091	17/2/86	1449	56E	FP	Q	
9/6105	18/2/86	1438	44E	FP	Q	
9/6119	19/2/86	1428	35E	FP	Q	
9/6133	20/2/86	1418	27E	FP	Q	
9/6190	24/2/86	1515	82W	FP	Q	
9/6218	26/2/86	1454	61E	FP	Q	
9/6232	27/2/86	1443	48E	FP	Q	
9/6246	28/2/86	1432	38E	FP	Q	
9/6303	4/3/86	1530	60W	FP	Q	
9/6317	5/3/86	1519	75W	FP	Q	
9/6324	6/3/86	0241	65W	FP	Q	
9/6331	6/3/86	1510	65E	?	Q	
9/6338	7/3/86	0230	82W	FP	Q	
9/6345	7/3/86	1458	68E	FP	Q	
9/6352	8/3/86	0220	78E	FP	Q	
9/6408	12/3/86	0137	30E	FP	Q	
9/6415	12/3/86	1405	20E	FP	Q	
9/6430	13/3/86	1535	55W	FP	Q	
9/6444	14/3/86	1524	70W	FP	Q	
9/6486	17/3/86	1452	57E	FP	Q	
9/6500	18/3/86	1441	45E	FP	Q	
9/6507	19/3/86	0203	53E	FP	Q	
9/6514	19/3/86	1431	35E	CU	Q	
9/6528	20/3/86	1420	28E	CU	Q	
9/6542	21/3/86	1409	22E	CU	Q	
9/6585	24/3/86	1517	81W	FP	Q	
9/6599	25/3/86	1507	80E	FP	Q	
9/6613	26/3/86	1456	62E	FP	Q	
9/6740	4/4/86	1500	68E	FP	Q	
9/6782	7/4/86	1429	32E	FP	Q	
9/6789	8/4/86	0150	39E	CU	Q	
9/6796	8/4/86	1418	25E	CU	Q	
9/6825	10/4/86	1537	53W	CU	Q	
9/6839	11/4/86	1526	69W	CU	Q	
9/6909	16/4/86	1433	35E	FP	Q	
9/6923	17/4/86	1422	27E	FP	Q	
9/6937	18/4/86	1412	22E	CU	Q	

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
9/6980	21/4/86	1520	80W	FP	Q	
9/6994	22/4/86	1509	79E	CU	Q	Q
9/7008	23/4/86	1458	63E	CU	Q	Q
9/7022	24/4/86	1448	49E	CU	Q	Q
9/7093	29/4/86	1535	58W	FP	Q	Q
9/7107	30/4/86	1524	70W	?	Q	Q
9/7135	2/5/86	1518	69E	FP	Q	Q
9/7205	7/5/86	1409	20E	CU	Q	Q
9/7276	12/5/86	1456	58E	FP	Q	Q
9/7304	14/5/86	1435	35E	CU	Q	Q
9/7318	15/5/86	1424	28E	CU	Q	Q
9/7332	16/5/86	1414	22E	CU	Q	Q
9/7375	19/5/86	1522	80W	CU	Q	Q
9/7389	20/5/86	1519	79E	FP	Q	Q
9/7417	22/5/86	1450	49E	CU	Q	Q
9/7431	23/5/86	1439	39E	CU	Q	Q
9/7473	26/5/86	1407	19E	CU	Q	Q
9/7488	27/5/86	1537	58W	CU	Q	Q
9/7502	28/5/86	1526	74W	CU	Q	Q
9/7516	29/5/86	1515	83E	FP	Q	Q
9/7530	30/5/86	1504	69E	CU	Q	Q
9/7586	3/6/86	1422	26E	CU	Q	Q
9/7629	6/6/86	1530	69W	FP	Q	Q
9/7713	12/6/86	1426	28E	FP	Q	Q
9/7727	13/6/86	1416	22E	CU	Q	Q
9/7812	19/6/86	1506	50E	FP	Q	Q
9/7826	20/6/86	1441	39E	FP	Q	Q
9/7840	21/6/86	1430	31E	FP	Q	Q
9/7868	23/6/86	1409	19E	CU	Q	Q
9/7882	24/6/86	1359	14E	CU	Q	Q
9/7883	24/6/86	1538	58W	FP	Q	Q
9/7911	26/6/86	1517	86E	FP	Q	Q
9/7981	1/7/86	1424	26E	CU	Q	Q
9/7982	1/7/86	1604	34W	FP	Q	Q
9/7996	2/7/86	1554	42W	CU	Q	Q
9/8010	3/7/86	1543	54W	CU	Q	Q
9/8024	4/7/86	1532	69W	FP	Q	Q
9/8066	7/7/86	1500	58E	FP	Q	Q
9/8080	8/7/86	1449	46E	FP	Q	Q
9/8094	9/7/86	1439	36E	FP	Q	Q
9/8122	11/7/86	1417	22E	FP	Q	Q
9/8179	15/7/86	1514	80E	CU	Q	Q
9/8193	16/7/86	1504	63E	FP	Q	Q
9/8194	16/7/86	1646	20W	—	Q	Q
9/8207	17/7/86	1453	49E	FP	Q	Q
9/8221	18/7/86	1443	39E	CU	Q	Q
9/8263	21/7/86	1411	19E	CU	Q	Q
9/8292	23/7/86	1530	73W	CU	Q	Q
9/8320	25/7/86	1508	69E	FP	Q	Q
9/8362	28/7/86	1436	33E	FP	Q	Q
9/8376	29/7/86	1426	26E	CU	Q	Q
9/8390	30/7/86	1415	20E	CU	Q	Q
9/8405	31/7/86	1545	54W	CU	Q	Q

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9/8419	1/8/86	1534	69W	CU	Q	Q
9/8461	4/8/86	1502	58E	FP	Q	Q
9/8475	5/8/86	1451	45E	CU	Q	Q
9/8489	6/8/86	1440	35E	CU	Q	Q
9/8503	7/8/86	1429	28E	CU	Q	Q
9/8517	8/8/86	1419	22E	FP	Q	Q
9/8560	11/8/86	1527	81W	FP	Q	Q
9/8574	12/8/86	1516	79E	FP		Q
9/8588	13/8/86	1506	62E	FP	Q	Q
9/8602	14/8/86	1455	49E	CU	Q	Q
9/8616	15/8/86	1444	38E	CU		Q
9/8658	18/8/86	1412	18E	CU		Q
9/8673	19/8/86	1542	58W	CU	Q	Q
9/8687	20/8/86	1531	74W	FP		Q
9/8715	22/8/86	1510	68E	CU		Q
9/8757	25/8/86	1438	32E	CU	Q	Q
9/8771	26/8/86	1427	25E	CU	Q	Q
9/8785	27/8/86	1417	20E	CU		Q
9/8786	27/8/86	1557	42W	CU		Q
9/8856	1/9/86	1503	57E	FP	Q	Q
9/8870	2/9/86	1452	44E	FP	Q	Q
9/8884	3/9/86	1442	35E	FP	Q	Q
9/8891	4/9/86	0204	41E	FP	Q	Q
9/8898	4/9/86	1431	27E	CU	Q	Q
9/8912	5/9/86	1421	21E	FP	Q	Q
9/8941	7/9/86	1540	64W	FP	Q	Q
9/8997	11/9/86	1457	48E	CU	Q	Q
9/9011	12/9/86	1446	38E	FP	Q	Q
9/9053	15/9/86	1414	18E	FP	Q	Q
9/9068	16/9/86	1543	59W	FP	Q	Q
9/9082	17/9/86	1533	75W	FP	Q	Q
9/9110	19/9/86	1511	67E	CU	Q	Q
9/9152	22/9/86	1439	32E	CU	Q	Q
9/9166	23/9/86	1429	25E	CU	Q	Q
9/9195	25/9/86	1548	55W	CU	Q	Q
9/9209	26/9/86	1537	70W	FP	Q	Q
9/9265	30/9/86	1454	44E	CU	Q	Q
9/9279	1/10/86	1443	35E	FP	Q	Q
9/9293	2/10/86	1433	27E	CU	Q	Q
9/9307	3/10/86	1422	21E	CU	Q	Q
9/9378	8/10/86	1509	61E	FP	Q	Q
9/9392	9/10/86	1458	48E	FP	Q	Q
9/9406	10/10/86	1447	37E	CU	Q	Q
9/9477	15/10/86	1534	76W	FP	Q	Q
9/9533	19/10/86	1451	40E	FP	Q	Q
9/9547	20/10/86	1441	32E	CU	Q	Q
9/9575	22/10/86	1419	20E	CU	Q	Q
9/9590	23/10/86	1549	56W	FP	Q	Q
9/9604	24/10/86	1535	72W	CU	Q	Q
9/9646	27/10/86	1506	56E	CU	Q	Q
9/9660	28/10/86	1455	44E	CU	Q	Q
9/9674	29/10/86	1445	34E	CU	Q	Q
9/9688	30/10/86	1434	27E	CU	Q	Q

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9/9702	31/10/86	1423	21E	CU	Q	
9/9773	5/11/86	1510	60E	CU	Q	
9/9787	6/11/86	1459	47E	CU	Q	
9/9801	7/11/86	1448	35E	CU	Q	
9/9844	10/11/86	1557	48W	FP		
9/9886	13/11/86	1524	80E	FP		
9/9999	21/11/86	1539	72W	FP	Q	
9/10055	25/11/86	1456	42E	CU	Q	
9/10098	28/11/86	1604	42W	FP	Q	
9/10168	3/12/86	1510	58E	FP	Q	
9/10182	4/12/86	1500	45E	CU	Q	
9/10253	9/12/86	1547	63W	CU	Q	
9/10267	10/12/86	1536	80W	CU	Q	
9/10281	11/12/86	1526	80E	FP	Q	
9/10295	12/12/86	1515	62E	FP	Q	
9/10351	16/12/86	1432	23E	FP	Q	
9/10366	17/12/86	1601	46W	FP	Q	
9/10380	18/12/86	1551	59W	FP	Q	
9/10648	6/1/87	1548	64W	FP	Q	
10/1760	19/1/87	1949	66E	FP	Q	
9/10831	19/1/87	1509	51E	FP	Q	
9/10845	20/1/87	1457	40E	FP	Q	
9/10859	21/1/87	1447	31E	FP	Q	
9/10888	23/1/87	1606	45W	FP	Q	
9/10944	27/1/87	1523	69E	FP	Q	
9/10958	28/1/87	1513	54E	FP		
9/11028	2/2/87	1419	16E	FP	Q	
10/1959	2/2/87	1950	59E	FP	Q	
10/1966	3/2/87	0703	59E	FP	Q	
10/1973	3/2/87	1925	36E	FP	Q	
9/11057	4/2/87	1538	85E	FP	Q	
9/11071	5/2/87	1527	74E	FP	Q	
9/11085	6/2/87	1516	59E	FP	Q	
9/11142	10/2/87	1613	39W	FP	Q	
9/11170	12/2/87	1552	64W	FP	Q	
9/11184	13/2/87	1542	79W	FP	Q	
9/11325	23/2/87	1534	86E	FP	Q	
9/11332	24/2/87	0256	81W	FP	Q	
9/11339	24/2/87	1524	67E	FP	Q	
9/11346	25/2/87	0246	77E	FP	Q	
9/11353	25/2/87	1513	53E	FP	Q	
9/11360	26/2/87	0235	62E	FP	Q	
9/12609	25/5/87	1602	62W	FP		
9/12637	27/5/87	1540	80E	FP		
9/12651	28/5/87	1529	60E	FP		
9/12721	2/6/87	1437	18E	FP		
9/12750	4/6/87	1555	73W	FP		
9/12764	5/6/87	1544	86E	FP		
9/12820	9/6/87	1500	31E	FP		
9/12834	10/6/87	1449	25E	FP		
9/12863	12/6/87	1608	56W	FP		
9/12905	15/6/87	1536	70E	FP		
9/12933	17/6/87	1515	43E	FP	Q	

Tape labelled 28 Jan.

Sat/Orbit	Date	Pass Time	Elev	Loc	QLK	Comment
9/12961	19/6/87	1453	26E	FP	—	
9/13004	22/6/87	1601	68W	FP	Q	
9/13018	23/6/87	1550	82W	FP	—	
9/13032	24/6/87	1539	75E	FP	—	
9/13117	30/6/87	1616	50W	FP	—	
9/13131	1/7/87	1605	64W	FP	—	
9/13145	2/7/87	1554	79W	FP	—	
9/13159	3/7/87	1543	80E	FP	— Q	
9/13215	7/7/87	1500	30E	FP	—	
9/13229	8/7/87	1449	23E	FP	—	
9/13243	9/7/87	1438	18E	FP	—	
9/13258	10/7/87	1607	61W	FP	Q	
9/13300	13/7/87	1535	66E	FP	Q	
9/13314	14/7/87	1524	52E	FP	Q	
9/13328	15/7/87	1514	40E	FP	Q	
9/13723	12/8/87	1513	37E	FP	Q	
9/13737	13/8/87	1503	29E	FP	—	
9/13808	18/8/87	1549	80E	FP	—	
9/13822	19/8/87	1538	65E	FP	Q	
9/13850	21/8/87	1517	39E	FP	Q	
10/4831	23/8/87	2003	83E	FP	Q	
10/4845	24/8/87	1942	50E	FP	Q	
10/4852	25/8/87	0659	51E	FP	Q	
9/13907	25/8/87	1614	57W	FP	Q	
9/13921	26/8/87	1603	73W	FP	Q	
10/4874	26/8/87	2039	43W	FP	Q	
10/4881	27/8/87	0755	43W	FP	Q	
9/13935	27/8/87	1553	88E	FP	Q	
10/4888	27/8/87	2017	72W	FP	Q	
10/4895	28/8/87	0733	71W	FP	Q	
9/13949	28/8/87	1542	69E	FP	Q	
10/4902	28/8/87	1955	67E	FP	Q	
10/4909	29/8/87	0711	69E	FP	Q	
9/13963	29/8/87	1531	54E	FP	Q	
10/4959	1/9/87	2008	82W	FP	Q	
10/4966	2/9/87	0725	87W	FP	Q	
9/14019	2/9/87	1448	19E	FP	—	
9/14020	2/9/87	1629	42W	FP	Q	
10/4980	3/9/87	0703	56E	FP	Q	
9/14055	5/9/87	0329	59W	FP	Q	
10/5044	7/9/87	1938	45E	FP	Q	
9/14104	8/9/87	1524	44E	FP	Q	
9/14118	9/9/87	1513	34E	FP	Q	
9/14146	11/9/87	1452	21E	FP	—	
9/14175	13/9/87	1611	40W	FP	Q	
9/14288	21/9/87	1625	48W	FP	—	
9/14302	22/9/87	1614	61W	FP	—	
9/14344	25/9/87	1541	63E	FP	—	

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