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ATLAS OF SKYLAB ATM/S056 SUPER-LONG EXPOSURES AND STEPPED-IMAGE FRAMES

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16. ABSTRACT

During the course of Skylab, more than 27 000 photographs (filterheliograms) of the Sun were obtained with the ATM/S056 X-Ray Telescope. Of these pictures, 552 were taken in the "Super-Long" (S^L) operational mode, a mode specifically developed for the second and third manned Skylab missions which allowed exposures of arbitrary length. Also, 122 of these S^L exposures displayed "stepped images," resulting from the step-wise transport of the film with the shutter open, thus yielding high-time resolution (≈ 0.25 second) images of bright active region cores and, occasionally, flare kernels. This report presents a description of the S^L mode of operation and tabulates the exposure information regarding the S^L pictures. It also identifies those frames which display stepped images.

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I. INTRODUCTION

During the manned Skylab missions, more than 27 000 photographs (filterheliograms) were obtained with the Apollo Telescope Mount (ATM)/S056 X-Ray Telescope. Of these, 552 resulted from the performance of a specially developed operational mode, used only in the second and third manned missions, called "Super Long" (S^L). These S^L exposures were performed in an attempt to ascertain the sites and magnitudes of weak X-ray emitters in the Sun's corona.

The S^L mode, which allowed exposures of arbitrary length, was specially developed in that it had not been a regular or routine operational mode with pre-determined exposure length, as were the Single Frame, Patrol, and Active modes used in normal or daily S056 camera operations. Essentially, the mode was effected when the astronaut selected one of the instrument's five X-ray filters, the Single Frame mode and long exposure multiplier, initiated the operation (which opened the shutter), and then depowered the camera. By use of a clock, the astronaut could then perform timed exposures of arbitrary length. At the end of the exposure, he repowered the camera which advanced the film (the shutter remained open) and then terminated the operation.

Each S^L frame is, thus, seen as two separate pictures: a primary (P) frame and a secondary (S) frame, i.e., P + S. Occasionally, the astronaut failed to properly terminate the S^L exposure, thus yielding anomalously long secondary exposures. Also, he sometimes performed back-to-back S^L exposures without properly reinitializing the mode. In these instances, more than one secondary frame was generated (i.e., $P + S_1 + S_2 + \ldots$), whereas in most cases the first secondary image (S_1) was actually the primary image of the subsequent S^L operation. Also, although rather infrequently, the astronaut repowered the camera after only a very brief primary exposure, perhaps to verify its proper operation, proper selection of filter, or proper pointing, then depowered it to perform the desired operation. Again, the imagery appeared

as a primary exposure plus two or more secondary frames, dependent on the number of times the camera was depowered and repowered before termination of the operation. In general, the astronauts performed the operations exactly as specified and performed many nonscheduled operations which greatly expanded the S056 coverage.

Figure 1 compares a typical non-S^L operational frame (in this case, a Patrol Long, Filter 4, bandpass: 6-18Å, exposure: 2:59) with a typical S^L exposure (same filter, primary exposure: 11:55-1/2). Both photographs were taken on January 21, 1974, and are separated in time by approximately 1 h and 20 min. One clearly distinguishable characteristic of an S^L frame is the "split" data block lights. This occurs because of the power-down and subsequent power-up before terminating the exposure. The data block lights, the bright dots in columns and rows to the right of the image, describe exactly the camera mode of operation, filter, exposure multiplier, start time (in spacecraft clock days, hours, minutes, seconds, and fraction of second), and stop time (in minutes, seconds, and fraction of second). Visual reading of them yields the exposure information. A typical non-S^L exposure has no split data lights because the film is stationary from the start of the operation through its termination. In contrast, the S^L exposure displays "split" data lights where the termination time is recorded after the film has been transported; this is a result of the power-up film-advance concept employed in the design of the S056 instrument.

Figure 2 illustrates the frame format of a typical S^L exposure and shows how anomalous operations as mentioned previously affect the location and placement of the data lights. Because Skylab also provided a means of recording the instrument's housekeeping data for later transmission and subsequent analysis, the telemetry records, in conjunction with the visual reading of the data block lights, offer a way whereby the investigator can accurately determine the exposure times and know precisely when the astronaut powered-down, powered-up, and terminated the operation (see Section II).

An added bonus of this mode of operation, not realized until after the films were returned to Earth for processing and initial analysis had begun, was that during periods of enhanced solar activity (e.g., bright active regions or flares), the cores of the brightest X-ray emitters, and in some cases flare kernels, were clearly visible as a number of "stepped-image frames" between the primary and secondary pictures. These stepped images resulted from the step-wise film advance with the shutter open which occurred upon repowering the camera after the timed S^L exposure. Each stepped image was displaced sufficiently and its exposure known accurately, so that a determination of its energy flux and structure versus time could be accomplished. Since the film

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a. Typical non-S^L exposure. Patrol Long, Filter 4, Bandpass 6-18 Å, Exposure, 2:59, Date 21 January 1974, DOY 386, Start Time 1701:18¼ UT.

Figure 1. A comparison of a typical and nontypical S^L exposure.

3
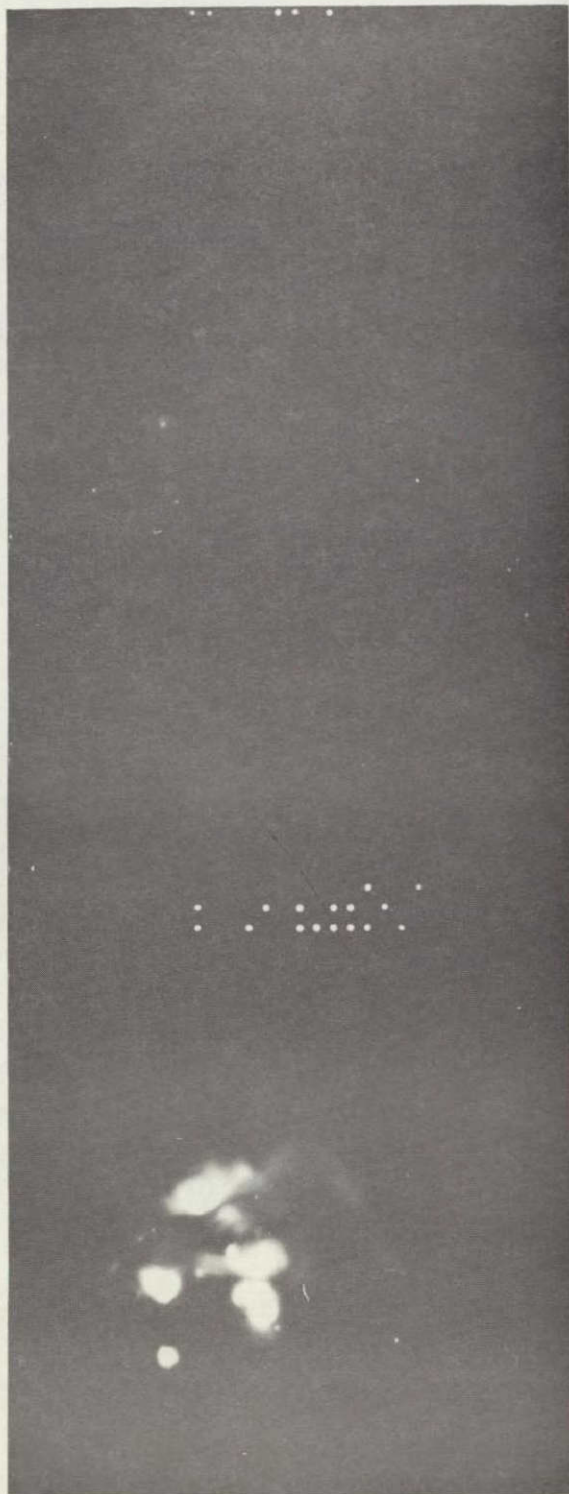
b. Typical S^L exposure. Filter 4, Bandpass 6-18 Å, Exposure (P) 11:55$\frac{1}{2}$,
Date 21 January 1974, DOY 386, Start Time 1822:39$\frac{1}{4}$ UT.

Figure 1. (Concluded)
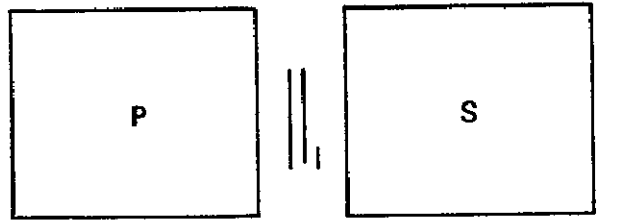
a. Schematic of frame format of a typical S^L exposure $(P + S)$.
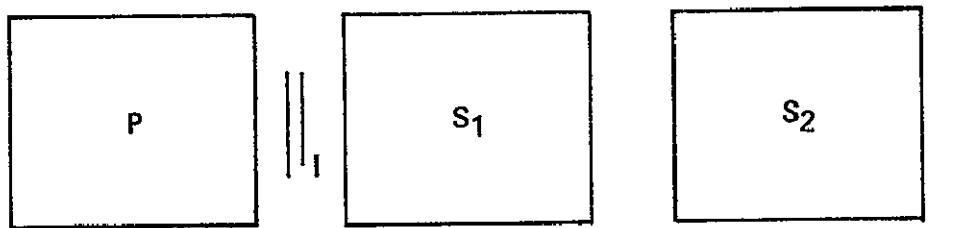
b. Schematic of frame format of an atypical S^L exposure, Case 1: $P + S_1 + S_2$.
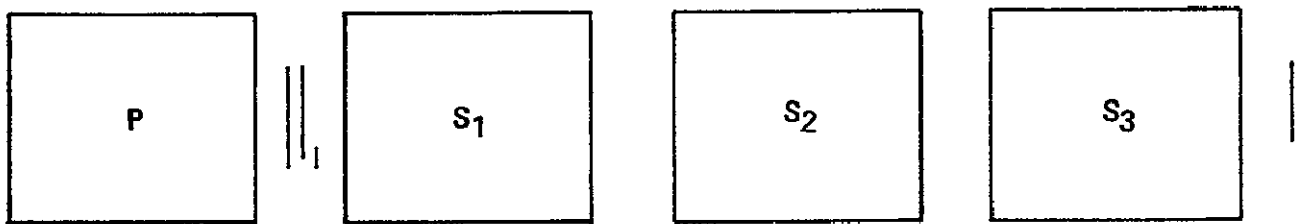
c. Schematic of frame format of an atypical S^L exposure, Case 2: $P + S_1 + S_2 + S_3$.

Figure 2. Comparison of typical and atypical S^L exposures.

advance pulse was 40 ms and each pulse was separated in time by 278 ms, an exposure of 238 ms was attained in each stepped image. Also, since 10 discrete pulses were used to advance the film, a typical stepped-image S^L frame would appear as a primary image, 9 stepped images, and a secondary image. In all, 122 stepped-image frames have been observed.

The purpose of this report is to present exposure information regarding the 552 S^L exposures performed by the Skylab astronauts using the ATM/S056 X-ray Telescope, and to identify those frames which show stepped images. Specific details concerning the S056 instrument description not contained in this report can be found in the work of Walsh et al.[1] Other works[2,3] containing additional details are to be published. An appendix, however, is included to give a few of the specifics concerning the five X-ray filters.

II. APPROACH

The approach used in the determination of the exposure time for the 552 S^L frames was the following: First, the films were reviewed and the individual S^L frames identified (by their split data lights). Any anomalous frame formatting was noted, as were stepped-images. Next, the data block lights of each of the S^L frames were read. This was followed by a painstaking review of the telemetry records, which gave a similar start time and secondary frame stop time, in addition to the stop time of the primary frame, corresponding to the start of the film advance caused by the repowering of the camera. Finally, a review of the S056 console logs, ATM schedule pads, and other miscellaneous data was accomplished to determine the exposure times of those few frames which, either because of noisy telemetry or overlapping images, had erroneous or disguised exposure information.

1. Walsh, E. J., Sokolowski, T. I., Miller, G. M., Cofield, Jr., K. L., Douglas, J. D., Lewter, B. J., Burke, H. O. and Davis, A. J.: 1974, "Design Characteristics of a Skylab Soft X-ray Telescope." Proc. SPIE 44, 175-184.

2. Underwood, J. H., Milligan, J. E., DeLoach, A. C. and Hoover, R. B.: 1976, "The S056 X-ray Telescope Experiment on the Skylab-Apollo Telescope Mount." Appl. Opts. (in press).

3. DeLoach, A. C., Hoover, R. B., Wilson, R. M., Milligan, J. E. and Underwood, J. H.: 1976, "The Skylab/ATM S056 Solar X-Ray Telescope: Design and Performance." (to be submitted as NASA TN).

Third generation NASA/Johnson Space Center (JSC) produced films were used in the initial determination of the S^L pictures and the stepped images. The individual frames were visually read and an "S056 Operations Log" constructed. NASA/Marshall Space Flight Center (MSFC) Data Systems Laboratory provided telemetry records concerning all S056 operational periods. A comparison of these printouts with the S^L frame entries contained in the S056 Operations Log then allowed the determination of the "true" primary exposure, as well as the secondary exposure. Where an accurate determination of the exposures could not be achieved either from telemetry records or the general (P + S) exposure information as learned from the data lights (only 12 such cases, of which only 2 could in no way be directly determined), an attempt was made to gain this information from other sources; e.g., crew transcripts, ATM Schedule Pads, Logs, etc.

III. TABLES

The results of the study to determine S^L exposures and those frames which displayed stepped images appear in the following tables. Table 1 presents those S^L frames contained in the Skylab 3 Load 2 (S0212 black-and-white) film; Table 2 presents the Skylab 3 Load 3 (S0212 black-and-white) film; Table 3 presents the SL4 Load 4 (S0212 black-and-white) film; and Table 4 presents the SL4 Load 5 (S0242 color film). Those entries which also display stepped images are indicated by an "s" in the comments column.

"F.N." lists the S^L frame by its frame number as compiled in the S056 Operations Log, "FIL." identifies the filter used, "DATE/DOY" the date and day-of-year of the operation, "START" the start time of the exposure, "STOP (P)" the stop time of the primary exposure (corresponding to the repower time), "EXP.(P)" the primary frame exposure time, "STOP (S)" the stop time of the secondary exposure, "EXP. (S)" the secondary frame(s) exposure time, and "COMMENTS" appropriate remarks concerning the frame. Individual legends for each table follow their respective table, and list those appropriate remarks as indicated in the comments column.

TABLE 1. SL3 LOAD 2 (BLACK AND WHITE) SUPER-LONG (S^L) LISTING

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP(S)	EXP. (S)	Comments
1483	2	8/13/73 (225)	$0039:17\frac{3}{4}$	$0046:08\frac{1}{2}$	$6:50\frac{3}{4}$	$0059:09\frac{1}{2}$	13:01	a,b
1876	5	8/14 (226)	$0121:34\frac{1}{2}$	$0136:31\frac{1}{4}$	$14:56\frac{3}{4}$	$0245:44\frac{1}{4}$	69:13	a,c
2919	3	8/16 (228)	1509:33	$1519:33\frac{1}{4}$	$10:00\frac{1}{4}$	$1519:51\frac{1}{4}$	00:18	
2920	3		$1520:14\frac{1}{4}$	1526:13	$5:58\frac{3}{4}$	1526:22	00:09	
2921	5		1655:38	$1715:37\frac{3}{4}$	$19:59\frac{3}{4}$	$1715:45\frac{3}{4}$	00:08	
3455	3	8/17 (229)	$2111:58\frac{1}{4}$	2112:14	$00:15\frac{3}{4}$	2120:54 (S_1) 2121:32 (S_2)	8:40 (S_1) 0:38 (S_2)	d
3540	3	8/18 (230)	$1227:21\frac{1}{2}$	$1231:20\frac{1}{2}$	3:59	$1231:23\frac{1}{2}$	00:03	
3541	3		$1233:57\frac{1}{2}$	$1248:56\frac{3}{4}$	$15:59\frac{1}{4}$	$1249:01\frac{3}{4}$	00:05	
3590	3		1544:05	1545:07	1:02	1549:49	4:43	e
3662	4		$1726:04\frac{3}{4}$	$1733:33\frac{3}{4}$	7:29	$1733:47\frac{3}{4}$	00:14	
3941	3	8/19 (231)	$1447:15\frac{1}{4}$	$1459:14\frac{1}{4}$	11:59	$1459:25\frac{1}{4}$	00:11	
3942	4		$1459:33\frac{1}{4}$	$1508:32\frac{1}{4}$	8:59	$1508:46\frac{1}{4}$	00:14	
4305	3	8/20 (232)	1112:59	$1123:28\frac{3}{4}$	$10:29\frac{3}{4}$	$1124:58\frac{3}{4}$	00:30	
4462	3		1611:25	$1621:39\frac{3}{4}$	$10:14\frac{3}{4}$	$1621:46\frac{3}{4}$	00:07	
4637	5		$(2212:08\frac{1}{2})$	?	?	?	?	f
4693	4		2339:11	$2352:18\frac{3}{4}$	$13:07\frac{3}{4}$	$2352:26\frac{3}{4}$	00:08	
4718	3	8/21 (233)	0113:56	0119:57	6:01	$0123:32\frac{3}{4}$	$3:35\frac{3}{4}$	

TABLE 1. (Concluded)

F. N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
4724	4		$0127{:}26\frac{3}{4}$	$0133{:}26\frac{3}{4}$	6:00	$0133{:}34\frac{3}{4}$	00:08	
5075	3		2320:52	2328:46	7:54	2328:52	00:08	
5417	3	8/22 (235)	0004:23	$0014{:}25\frac{1}{4}$	$10{:}02\frac{1}{4}$	0014:31	$00{:}05\frac{3}{4}$	
5449	4		(0137:54)	$0150{:}00\frac{3}{4}$	$(12{:}06\frac{3}{4})$	0150:09	$00{:}08\frac{1}{4}$	

a. S^L exposure not properly terminated. Shutter open for inordinate amount of time (secondary exp.).

b. Both P and S images bright; SS(400K) ~ 0050. Pointing change in secondary.

c. Door closed $0140{:}46\frac{1}{4}$. Aperture door closed $0143{:}11\frac{1}{2}$. Door reopened $0211{:}53\frac{1}{4}$. Aperture door reopened $0233{:}05\frac{1}{4}$. SS(400K) ~ 0143. SR(400K) ~ 0215 (next pass). Crew informed to close shutter.

d. Multiple secondaries; $P + S_1 + S_2$. Primary image is faint. S_1 image is the main exposure (~ 9 min exp.).

e. Normal P + S exposure pattern; however, secondary image indicated that the crewman cycled to filter 1 with shutter open and repointed. Selected filter 1 1549:28. Terminated exposure 1549:49.

f. No scheduled S^L exposure. SS(400K) 2238. Possible exposure terminate times are $(2219{:}38\frac{1}{2})$, $(2227{:}38\frac{1}{2})$, or $(2235{:}38\frac{1}{2})$, implying exposure lengths of (7:30), (15:30) or (23:30), respectively. Telemetry data noisy.

TABLE 2. SL3 LOAD 3 (BLACK AND WHITE) SUPER-LONG (S^L) LISTING

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP.(P)	STOP (S)	EXP.(S)	Comments
591	3	8/25/73 (237)	2343:12¼	2347:11¼	3:59	2347:18¼	:07	
646	3	8/26 (238)	1341:35¼	1346:35¼	5:00	1346:42¼	:07	
995	3	8/27 (239)	1305:57	1309:08¾	3:11¾	1309:16¾	:08	
1653	3	8/28 (240)	1830:25	?	?	(1840:34)	?	a
2041	4	8/29 (241)	(1909:40½)	1924:39	(14:58½)	1924:46	:07	
2445	3	8/31 (243)	0040:26¼	0055:24	14:57¾	0055:30¼	:06¼	
2773	3	9/1 (244)	0131:06¼	0151:04¾	19:58½	0151:05	:00¼	
3031	3	9/2 (245)	0057:09¼	0111:19½	14:10¼	0111:31	:11½	
3278	3	9/3 (246)	0139:50	0154:53	5:03	0154:58	:05	
3300	3		1244:38¾	1248:40¾	4:02	1248:45¾	:05	
3301	4		1250:38¾	1304:36¾	13:58	1307:44	3:07¼	b,s
3326	3		1725:34	1732:33	6:59	1732:40	:07	
3328	4		1841:12¾	1849:11¾	7:59	(1849:23¼)	(:11½)	s
3330	3		1858:12¾	?	?	(1903:14)	?	c
3608	3	9/5 (248)	1426:23½	1434:22½	7:59	1434:29½	:07	
3609	3		1519:32¼	1534:27¼	4:55	1534:33¼	:06	
3610	4		1534:59¼	1549:56	14:56¾	1550:03	:07	s
3611	5		1550:27½	1605:24	14:56½	1605:33	:09	

TABLE 2. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP.(P)	STOP (S)	EXP.(S)	Comments
3863	4	9/6 (249)	$0232{:}57\frac{1}{4}$	$0240{:}52\frac{1}{2}$	$7{:}55\frac{1}{4}$	$0240{:}59$	$:06\frac{1}{2}$	s
3994	5		$2258{:}02\frac{1}{4}$	$2304{:}01\frac{3}{4}$	$5{:}59\frac{1}{2}$	$2304{:}08$	$:06\frac{1}{4}$	
4002	3	9/7 (250)	$0009{:}42\frac{1}{2}$	$0017{:}37\frac{1}{2}$	$7{:}55$	$0017{:}46\frac{1}{2}$	$:09$	
4003	4		$0018{:}01\frac{1}{2}$	$0025{:}56\frac{1}{2}$	$7{:}55$	$0026{:}05\frac{3}{4}$	$:09\frac{1}{4}$	s
4004	3		$0031{:}55\frac{3}{4}$	$0041{:}55\frac{1}{2}$	$9{:}59\frac{3}{4}$	$0042{:}04\frac{1}{4}$	$:08\frac{3}{4}$	s
4005	4		$0042{:}48\frac{1}{4}$	$0049{:}32\frac{1}{2}$	$6{:}44\frac{1}{4}$	$0049{:}38\frac{1}{4}$	$:05\frac{3}{4}$	
4024	3		$0202{:}09\frac{1}{4}$	$0212{:}18\frac{1}{4}$	$10{:}09$	$0212{:}27\frac{1}{4}$	$:09$	s
4025	4		$0212{:}33\frac{1}{4}$	$0221{:}30$	$8{:}56\frac{3}{4}$	$0221{:}50\frac{3}{4}$	$:20\frac{3}{4}$	
4198	3		$1442{:}31\frac{1}{4}$	$1446{:}58\frac{1}{4}$	$4{:}27$	$1447{:}08\frac{1}{4}$	$:10$	
4333	3	9/8 (251)	$0256{:}03$	$0303{:}24$	$7{:}21$	$0303{:}26$	$:02$	
4334	4		$0303{:}50$	$0312{:}01\frac{1}{2}$	$8{:}11\frac{1}{2}$	$0312{:}07\frac{3}{4}$	$:06\frac{1}{4}$	
4438	3		$1830{:}53\frac{1}{2}$	$1844{:}02\frac{3}{4}$	$13{:}09\frac{1}{4}$	$1844{:}11\frac{3}{4}$	$:09$	
4440	3		$1932{:}49$	$1942{:}45$	$9{:}56$	$1942{:}53$	$:08$	
4442	4		$1953{:}21\frac{1}{4}$	$2003{:}19$	$9{:}57\frac{3}{4}$	$2003{:}26\frac{1}{4}$	$:07\frac{1}{4}$	s
4474	3	9/9 (252)	$0034{:}13$	$0045{:}23$	$11{:}10$	$0045{:}37$	$:14$	
4476	4		$0051{:}17\frac{1}{4}$	$0058{:}17$	$6{:}59\frac{3}{4}$	$0058{:}24\frac{1}{2}$	$:07\frac{1}{2}$	
4487	3		$0211{:}31\frac{3}{4}$	$0220{:}27\frac{3}{4}$	$8{:}56$	$0220{:}35\frac{3}{4}$	$:08$	
4488	4		$0221{:}08\frac{3}{4}$	$0230{:}05\frac{3}{4}$	$8{:}57$	$0230{:}13$	$:07\frac{1}{4}$	s

TABLE 2. (Continued)

F. N.	FIL.	DATE/DOY	START	STOP (P)	EXP.(P)	STOP (S)	EXP(S)	Comments
4502	3		$1138{:}16\frac{1}{4}$	$1143{:}17\frac{1}{4}$	5:01	$1143{:}25\frac{1}{4}$	:08	
4699	3	9/10 (253)	$0123{:}36\frac{1}{2}$	$0133{:}33\frac{3}{4}$	$9{:}57\frac{1}{4}$	$0133{:}40\frac{3}{4}$	:07	
4700	4		$0133{:}48\frac{3}{4}$	$0141{:}47\frac{1}{2}$	$7{:}58\frac{3}{4}$	$0141{:}54\frac{1}{4}$	$:06\frac{3}{4}$	
4701	5		0142:03	$0149{:}58\frac{1}{4}$	$7{:}55\frac{1}{4}$	$0150{:}04\frac{3}{4}$	$:06\frac{1}{2}$	
5008	3		$1409{:}04\frac{1}{2}$	$1412{:}35\frac{1}{2}$	3:31	$1412{:}41\frac{1}{2}$	:06	
5009	3		$1505{:}57\frac{1}{2}$	$1517{:}57\frac{1}{2}$	12:00	$1518{:}04\frac{1}{2}$	:07	
5010	4		$1518{:}32\frac{1}{2}$	$1530{:}32\frac{1}{4}$	$11{:}59\frac{3}{4}$	$1530{:}41\frac{1}{4}$	:09	
5011	5		$1531{:}07\frac{1}{4}$	$1543{:}04\frac{1}{4}$	11:57	$1543{:}14\frac{1}{4}$	:10	
5062	3		$2129{:}17\frac{1}{4}$	$2139{:}16\frac{3}{4}$	$9{:}59\frac{1}{2}$	$2139{:}33\frac{3}{4}$	:17	
5063	4		2139:43	$2149{:}43\frac{1}{4}$	$10{:}00\frac{1}{4}$	$2149{:}54\frac{1}{4}$	:11	s
5064	5		$2150{:}08\frac{1}{4}$	$2200{:}08\frac{1}{2}$	$10{:}00\frac{1}{4}$	$2200{:}20\frac{1}{2}$	:12	s
5065	3		$2242{:}34\frac{1}{4}$	?	?	?	?	d
5066	4		$(2258{:}16\frac{1}{4})$	$2313{:}14\frac{1}{4}$	(14:58)	$2313{:}20\frac{1}{2}$	$:06\frac{1}{4}$	s
5068	3	9/11 (254)	0015:23	0030:26	15:03	0030:33	:07	e
5069	4		0031:07	$0046{:}06\frac{3}{4}$	$14{:}59\frac{3}{4}$	$(0046{:}13\frac{1}{4})$	$(:06\frac{1}{2})$	s
5070	5		$0046{:}33\frac{3}{4}$	0101:33	$14{:}59\frac{1}{4}$	$0101{:}39\frac{1}{4}$	$:06\frac{1}{4}$	
5182	3		$1900{:}18\frac{3}{4}$	$1915{:}18\frac{1}{2}$	$14{:}59\frac{3}{4}$	$1915{:}24\frac{1}{2}$	:06	e
5183	4		$1915{:}50\frac{1}{2}$	$1930{:}50\frac{1}{4}$	$14{:}59\frac{3}{4}$	$1930{:}56\frac{1}{2}$	$:06\frac{1}{4}$	s

TABLE 2. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5184	5		$1931:21^3/_4$	1945:21	$13:59^1/_4$	$1945:26^1/_4$	$:05^1/_4$	s
5203	3		2346:52	$2358:50^1/_4$	$11:58^1/_4$	$2358:57^1/_2$	$:07^1/_4$	
5205	4	9/12 (255)	$0005:36^3/_4$	$0014:45^1/_4$	$9:08^1/_2$	$0014:52^1/_4$	:07	s
5206	5		0015:02	$0024:05^1/_4$	$9:03^1/_4$	$0024:12^3/_4$	$:07^1/_2$	
5225	3		$0135:33^1/_2$	$0144:29^1/_2$	8:56	$0144:35^1/_2$	:06	
5226	4		$0144:49^1/_2$	0153:45	$8:55^1/_2$	$0153:52^1/_2$	$:07^1/_2$	s
5246	3		$(1511:41^1/_4)$	1521:40	$(9:58^3/_4)$	1521:54	:14	
5247	4		1522:36	1532:36	10:00	$1532:44^1/_2$	$:08^1/_2$	s
5249	5		$1534:26^3/_4$	$1544:25^3/_4$	9:59	$1544:40^3/_4$	:15	
5250	3		$1549:16^3/_4$	?	?	$(1558:04^1/_2)$	?	f
5311	5		$2332:50^3/_4$	$2340:50^1/_4$	$7:59^1/_2$	2340:56	$:05^3/_4$	
5312	3	9/13 (256)	(0009:13)	?	?	(0014:19)	?	g
5333	3		$0025:11^3/_4$	$0030:11^1/_4$	$4:59^1/_2$	$0030:17^1/_2$	$:06^1/_4$	e
5334	4		$(0234:13^1/_4)$	0242:12	$(7:58^3/_4)$	0242:14	:02	s
5413	3		$2231:29^3/_4$	$2239:28^1/_2$	$7:58^3/_4$	$2239:52^1/_2$	:14	
5414	4		$2240:05^3/_4$	$2248:05^1/_2$	$7:59^3/_4$	$2248:20^1/_4$	$:14^3/_4$	s
5417	3	9/14 (257)	$0009:35^1/_4$	$0016:35^1/_4$	7:00	$0016:52^1/_4$	:17	
5418	4		$0017:05^1/_4$	$0019:15^1/_4$	2:10	$0019:30^1/_4$	:15	s

TABLE 2. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5419	3		$0020{:}05\frac{1}{4}$	$0029{:}04\frac{3}{4}$	$8{:}59\frac{1}{2}$	$0029{:}46\frac{1}{4}$	$:41\frac{1}{2}$	
5420	4		$0029{:}50\frac{1}{4}$	$0033{:}51\frac{1}{2}$	$4{:}01\frac{1}{4}$	$0034{:}16\frac{1}{4}$	$:24\frac{3}{4}$	s
5464	3		(1353: ? ?)	1405:36	?	1405:42	:06	h
5465	4		1406:37	$1419{:}36\frac{3}{4}$	$12{:}59\frac{3}{4}$	$1419{:}41\frac{3}{4}$	:05	s
5502	3		$1837{:}05\frac{1}{4}$	$1849{:}00\frac{3}{4}$	$11{:}55\frac{1}{2}$	$1849{:}08\frac{1}{4}$	$:07\frac{1}{2}$	
5503	4		$1849{:}19\frac{1}{4}$	$1901{:}15\frac{1}{2}$	$11{:}56\frac{1}{4}$	1901:23	$:07\frac{1}{2}$	s
5504	5		$1901{:}49\frac{1}{2}$	$1913{:}52\frac{3}{4}$	$12{:}03\frac{1}{4}$	$1914{:}00\frac{3}{4}$	:08	
5535	3	9/15 (258)	$2222{:}02\frac{3}{4}$	2237:59	$15{:}56\frac{1}{4}$	$2238{:}07\frac{1}{2}$	$:08\frac{1}{2}$	e
5536	4		2238:45	$2254{:}41\frac{1}{2}$	$15{:}56\frac{1}{2}$	$(2254{:}47\frac{1}{4})$	$(:05\frac{3}{4})$	
5537	3	9/16 (259)	$0004{:}27\frac{1}{2}$	$0016{:}27\frac{1}{2}$	12:00	$0016{:}33\frac{1}{4})$	$:05\frac{3}{4}$	e
5538	4		$0017{:}27\frac{3}{4}$	$0029{:}28\frac{1}{4}$	$12{:}00\frac{1}{2}$	$0042{:}01\frac{1}{2}$ (S$_1$) $0042{:}07\frac{3}{4}$ (S$_2$)	$12{:}23\frac{1}{4}$ (S$_1$) $:06\frac{1}{4}$ (S$_2$)	i
5573	3		$2147{:}22\frac{1}{2}$	$2159{:}19\frac{1}{2}$	11:57	$2159{:}26\frac{1}{2}$	:07	
5574	4		$2159{:}38\frac{1}{2}$	$2211{:}35\frac{1}{2}$	11:57	$2211{:}43\frac{1}{2}$	:08	
5575	5		$2212{:}00\frac{3}{4}$	2223:57	$11{:}56\frac{1}{4}$	$2224{:}04\frac{1}{2}$	$:07\frac{1}{2}$	
5605	3	9/17 (260)	$1620{:}44\frac{1}{4}$	$1631{:}44\frac{1}{4}$	11:00	$1631{:}51\frac{1}{4}$	:07	
5607	3		$1948{:}58\frac{1}{2}$	1953:59	$5{:}00\frac{1}{2}$	$1954{:}05\frac{1}{4}$	$:06\frac{1}{4}$	e
5608	4		$1954{:}16\frac{1}{4}$	2004:21	$10{:}04\frac{3}{4}$	$2004{:}27\frac{3}{4}$	$:06\frac{3}{4}$	

TABLE 2. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5610	5		$2004{:}50\tfrac{3}{4}$	$2014{:}47\tfrac{3}{4}$	9:57	$2014{:}56\tfrac{1}{2}$	$:08\tfrac{3}{4}$	
5645	3	9/18 (261)	$(20??{:}??)$	?	?	$(2037{:}27\tfrac{3}{4})$	?	j
5646	4		$2037{:}49\tfrac{1}{4}$	$2049{:}54\tfrac{1}{2}$	12:05	$2050{:}01\tfrac{1}{2}$	:07	
5647	5		$2050{:}30\tfrac{1}{4}$	2102:29	$11{:}58\tfrac{3}{4}$	2102:37	:08	
5690	3	9/19 (262)	$1537{:}37\tfrac{3}{4}$	1546:38	$9{:}00\tfrac{1}{4}$	1546:45	:07	e
5709	4		$2151{:}03\tfrac{1}{2}$	2200:04	$9{:}00\tfrac{1}{2}$	2200:14	:10	s
5710	4	9/20 (263)	$(0907{:}04\tfrac{3}{4})$	$0919{:}46\tfrac{3}{4}$	(12:42)	$0919{:}55\tfrac{3}{4}$	:09	
5729	3		$1425{:}04\tfrac{3}{4}$	1438:05	$13{:}00\tfrac{1}{4}$	1438:23	:18	
5730	4		1439:05	1450:05	11:00	1450:48	:43	s
5731	5		$(1451{:}05\tfrac{1}{4})$	1503:05	$(11{:}59\tfrac{3}{4})$	1503:25	:20	
5732	3		$1746{:}49\tfrac{1}{2}$	$1803{:}45\tfrac{1}{2}$	6:56	$1803{:}53\tfrac{1}{2}$	:08	e
5772	3	9/21 (264)	0809:13	0814:24	5:11	0814:30	:06	e
5773	3		$0928{:}14\tfrac{3}{4}$	$0938{:}14\tfrac{3}{4}$	10:00	$0938{:}27\tfrac{3}{4}$	:13	
5774	4		$0938{:}44\tfrac{3}{4}$	$0948{:}44\tfrac{3}{4}$	10:00	$0948{:}58\tfrac{3}{4}$	:14	
5775	3		$0951{:}43\tfrac{3}{4}$	$1046{:}58\tfrac{1}{2}$	$55{:}14\tfrac{3}{4}$	$1047{:}08\tfrac{1}{2}$	:10	e
5776	4		$1047{:}28\tfrac{1}{2}$	$1057{:}25\tfrac{1}{2}$	9:57	$1057{:}37\tfrac{1}{2}$	:12	s
5777	5		$1057{:}55\tfrac{1}{2}$	$1108{:}25\tfrac{1}{2}$	10:30	$1108{:}52\tfrac{1}{2}$	:27	
5778	3		$1228{:}46\tfrac{1}{2}$	$1237{:}47\tfrac{1}{2}$	9:01	$1238{:}01\tfrac{1}{2}$	:14	
5780	4		$1248{:}47\tfrac{1}{2}$	$1253{:}47\tfrac{1}{4}$	$4{:}59\tfrac{3}{4}$	$1253{:}57\tfrac{1}{4}$	:10	s

TABLE 2. (Concluded)

a. Telemetry data noisy. Door closed 1842:36$\frac{1}{4}$. Door reopened 1914:27. ATM Schedule Pad (Pad) shows: S^L3 15:00.

b. Door closed 1300:12$\frac{3}{4}$. Door reopened 1333:00$\frac{1}{2}$.

c. Telemetry data noisy. Door closed 1909:54$\frac{3}{4}$: Door reopened 1945:49$\frac{3}{4}$. Pad shows: S^L3 8:00, S^L4 8:00, S^L5 8:00.

d. Data lights indecipherable. Pad shows: S^L3 15:00, S^L4 15:00, S^L5 15:00. Telemetry data noisy.

e. Data lights indecipherable. Times determined via telemetry.

f. Telemetry data noisy. Log shows SS(400K) $\sim$ 1555.

g. Telemetry data noisy. Uncertain in data block reading. Log shows S^L3 5:00 (astronaut confirmed). Exposure performed during night cycle (?)

h. Telemetry data noisy. Data lights indecipherable in the seconds column.

i. Multiple secondaries; i.e., $P + S_1 + S_2$.

j. Telemetry data noisy. Data lights indecipherable in the minutes and seconds column. Pad shows S^L3 12:00, S^L4 12:00, S^L5 12:00, SS(400K) 2107.

s. Stepped-image frame.

TABLE 3. SL4 LOAD 4 (BLACK AND WHITE) SUPER LONG (S^L) LISTING

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
275	2	12/17/73 (361)	0130:57¾	0137:52	6:54¼	0138:12½	:20½	s
276	4		0138:29¾	0141:07¾	2:38	0141:17½	:09¾	s
319	1		1326:15¾	1334:14¾	7:59	1355:42½ (S_1) 1359:31½ (S_2)	21:27¾ (S_1) 3:39 (S_2)	a
320	4'		1402:51¾	1414:18¾	11:27	1414:49¾	:31	
322	4		1456:06½	1504:00½	7:54	1504:22½	:22	s
324	2		1514:46¾	1524:07	9:20¼	(1524:27½)	(:20½)	
325	2		1526:23¾	1546:43½	20:19¾	1547:19½	:36	
326	4		1629:50¼	1637:46¼	7:56	1639:25¼	:39	s
327	2		1646:05¼	1656:08¼	10:03	1656:26	:17¾	
328	4		1657:04½	1707:06¼	10:01¾	1707:37¼	:31	
329	5		1709:35¼	1720:34½	10:59¼	(1721:37¼)	(1:02¾)	
331	2		1805:59	1818:00	12:01	1818:06	:06	s
332	4		1937:58½	1950:01½	12:03	1950:08½	:07	s
333	1		2110:53½	2120:55¾	10:02¼	2121:03¼	:07½	
334	5		2242:09	2254:12	12:03	2254:17	:05	
335	2	12/28 (362)	0018:06¾	0030:04¾	11:58	0030:33¾	:29	s
541	2		2341:55¾	2352:13	10:17¼	2352:23¾	:10¾	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
542	3	12/29 (363)	0011:16½	0027:18¼	16:01¾	0035:02	7:43¾	b
543	3		0122:59½	0143:09¼	10:10	0143:21¼	:12	
544	3		0304:44½	0324:46	20:01½	0324:52¾	:06¾	
563	2		1412:11¼	1417:10¼	4:59	1417:15¼	:05	s
564	1		1418:24¼	1424:12¼	5:48	1424:21¼	:09	
565	3	12/30 (364)	0203:46¼	?	?	(0215:30)	?	c
566	4		0224:57¾	0253:01	28:03¼	0253:21	:20	
591	3		1435:55	1518:01¾	42:06¾	1524:07¾	6:06	
592	4		1607:12¾	1652:01	44:48¼	1652:10¼	:09¼	
594	2		2041:39	2049:42	8:03	2049:48	:06	
595	4		2050:04	2058:03	7:59	2058:10	:07	
596	1		2058:52	2108:50	9:58	2108:57	:07	
597	5		2109:24	2129:23	19:59	2129:31½	:08½	
598	4		2226:54½	2304:02½	37:08	2304:14½	:12	
619	1	12/31 (365)	0153:13	0201:11¼	7:58¼	0201:17¾	:06½	
620	1		0201:23½	0209:07	7:43½	0209:21¾	:14¾	
645	4		1426:45	1434:47	8:02	1435:00	:13	
646	2		1525:38¾	1610:01½	44:22¾	(1610:14¾)	(:13¼)	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
659	1		$2157:34\frac{3}{4}$	$2205:34\frac{3}{4}$	8:00	$2205:42\frac{3}{4}$	:08	
660	5		$2206:04\frac{3}{4}$	$2214:17\frac{1}{2}$	$8:12\frac{3}{4}$	$2214:23\frac{1}{4}$	$:05\frac{3}{4}$	
661	2	1/1 (366)	0040:16	0048:16	8:00	0048:24	:08	
662	2		0048:43	0056:43	8:00	0056:55	:12	
705	1		$0239:40\frac{3}{4}$	$0247:40\frac{3}{4}$	8:00	$0247:48\frac{3}{4}$	:08	
706	5		$0248:02\frac{3}{4}$	$0256:01\frac{3}{4}$	7:59	$0256:14\frac{3}{4}$	:13	
731	2		$2053:07\frac{3}{4}$	$2058:08\frac{1}{2}$	$5:00\frac{3}{4}$	$2059:31\frac{3}{4}$	$:23\frac{1}{4}$	
732	2		$2059:38\frac{3}{4}$	$2107:43\frac{3}{4}$	8:05	$2107:51\frac{3}{4}$	:08	
733	2		$2108:04\frac{3}{4}$	$2116:05\frac{3}{4}$	8:01	$2116:18\frac{3}{4}$	:13	
734	2		$2258:49\frac{1}{4}$	2316:07	$17:17\frac{3}{4}$	2316:20	:13	
765	2	1/2 (367)	$1540:51\frac{1}{2}$	$1548:52\frac{1}{2}$	8:01	$1549:56\frac{1}{2}$	1:04	
766	1		$1600:23\frac{1}{2}$	1607:35	$7:11\frac{1}{2}$	$1607:51\frac{1}{4}$	$:16\frac{1}{4}$	
767	4		1608:09	1618:09	10:00	$1652:49\frac{1}{2}$	$34:40\frac{1}{2}$	d, s
834	2	1/3/74 (368)	1215:59	1223:02	7:03	1223:09	:07	s
835	4		1223:24	$1230:22\frac{3}{4}$	$6:58\frac{3}{4}$	$1230:30\frac{3}{4}$	:08	
964	1		$1953:45\frac{1}{2}$	$2001:46\frac{1}{2}$	8:01	$2001:53\frac{3}{4}$	$:07\frac{1}{4}$	
965	4		$2002:14\frac{3}{4}$	$2021:02\frac{1}{4}$	$18:47\frac{1}{2}$	$2021:15\frac{1}{4}$	$:13\frac{1}{4}$	e
966	2		$2139:22\frac{1}{2}$	2154:10	$14:47\frac{1}{2}$	$2154:25\frac{1}{2}$	$:15\frac{1}{2}$	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP (S)	Comments
985	1	1/4 (369)	$1304{:}56\frac{1}{4}$	$1313{:}09\frac{3}{4}$	$8{:}13\frac{1}{2}$	$1313{:}28\frac{1}{2}$	$:18\frac{3}{4}$	
986	4		$1313{:}42\frac{3}{4}$	$1322{:}02\frac{1}{2}$	$8{:}19\frac{3}{4}$	$1322{:}14\frac{1}{2}$	:12	
987	1		$1405{:}59\frac{1}{2}$	$1414{:}13\frac{1}{2}$	8:14	$1414{:}54\frac{1}{2}$	:41	f
988	4		$1415{:}01\frac{1}{2}$	$1423{:}10\frac{1}{2}$	8:09	$1423{:}22\frac{1}{2}$	:12	
989	2		1423:30	$1431{:}37\frac{1}{2}$	$8{:}07\frac{1}{2}$	$1431{:}50\frac{1}{2}$	:13	
990	5		$1432{:}08\frac{1}{2}$	$1440{:}54\frac{1}{2}$	8:46	$1443{:}57\frac{1}{4}$	$3{:}02\frac{3}{4}$	
1003	1		$1545{:}51\frac{1}{4}$	$1552{:}55\frac{1}{4}$	7:04	$1553{:}18\frac{1}{4}$	:23	
1004	5		$1553{:}25\frac{1}{4}$	$1600{:}24\frac{1}{4}$	6:59	$1601{:}28\frac{1}{4}$	1:04	
1041	4		1747:33	$1757{:}40\frac{1}{2}$	$10{:}07\frac{1}{2}$	$1806{:}48\frac{1}{2}$	9:08	e
1102	5	1/5 (370)	$0138{:}24\frac{1}{4}$	$0147{:}20\frac{1}{4}$	8:56	$0147{:}30\frac{1}{4}$	:10	
1128	2		1344:16	1351:15	6:59	1351:29	:14	s
1147	4		$1401{:}17\frac{1}{4}$	$1410{:}32\frac{1}{2}$	$9{:}15\frac{1}{4}$	1410:52	$:19\frac{1}{2}$	
1158	2		1515:59	$1553{:}06\frac{3}{4}$	$37{:}07\frac{3}{4}$	$1553{:}23\frac{3}{4}$	:17	
1166	4		$1702{:}05\frac{1}{4}$	$1710{:}05\frac{1}{4}$	8:00	$1710{:}12\frac{1}{2}$	$:07\frac{1}{4}$	
1167	5		1710:35	$1718{:}43\frac{3}{4}$	$8{:}08\frac{3}{4}$	$1718{:}53\frac{1}{2}$	$:09\frac{3}{4}$	
1175	1		$1811{:}19\frac{1}{2}$	$1819{:}24\frac{1}{2}$	8:05	$1819{:}46\frac{1}{2}$	:22	
1176	2		$1819{:}53\frac{1}{2}$	$1827{:}52\frac{1}{4}$	$7{:}58\frac{3}{4}$	$1828{:}01\frac{1}{4}$	:09	s
1178	2		1847:04	$1852{:}28\frac{1}{4}$	$5{:}24\frac{1}{4}$	$1852{:}41\frac{1}{4}$	:13	s

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP (S)	Comments
1179	1		$1937{:}46\frac{1}{4}$	$1945{:}45\frac{1}{4}$	7:59	$1946{:}09\frac{1}{4}$	:24	
1180	5		$1946{:}20\frac{1}{4}$	1954:21	$8{:}03\frac{3}{4}$	1954:33	:12	
1181	2		1955:28	2003:27	7:59	2003:37	:10	s
1182	4		2003:59	$2011{:}59\frac{1}{2}$	$8{:}00\frac{1}{2}$	$2013{:}45\frac{1}{2}$	1:46	
1285	1	1/6 (371)	$1451{:}13\frac{3}{4}$	1459:12	$7{:}58\frac{1}{4}$	$1459{:}19\frac{1}{4}$	$:07\frac{1}{4}$	
1295	4		$1559{:}23\frac{3}{4}$	$1607{:}23\frac{3}{4}$	8:00	$1607{:}32\frac{3}{4}$	:09	
1308	1		$1619{:}52\frac{1}{2}$	$1624{:}52\frac{1}{4}$	$4{:}59\frac{3}{4}$	$1625{:}00\frac{1}{2}$	$:08\frac{1}{4}$	
1321	2		2030:32	$2034{:}32\frac{1}{2}$	$4{:}00\frac{1}{2}$	$2034{:}38\frac{3}{4}$	$:06\frac{1}{4}$	s
1322	4		$2035{:}04\frac{1}{2}$	$2047{:}04\frac{3}{4}$	$12{:}00\frac{1}{4}$	$2047{:}13\frac{3}{4}$	:09	s
1379	3		$2345{:}01\frac{1}{2}$	0034:02	$49{:}00\frac{1}{2}$	0034:18	:16	
1386	4	1/7 (372)	$0258{:}58\frac{3}{4}$	$0306{:}58\frac{3}{4}$	8:00	$0307{:}09\frac{3}{4}$	:11	s
1387	5		$0307{:}17\frac{3}{4}$	$0315{:}20\frac{3}{4}$	8:03	$0315{:}40\frac{3}{4}$	:20	
1388	1		$0315{:}58\frac{3}{4}$	$0323{:}59\frac{3}{4}$	8:01	$0324{:}21\frac{3}{4}$	:22	
1390	2		$0327{:}56\frac{3}{4}$	$0332{:}56\frac{3}{4}$	5:00	$0333{:}15\frac{3}{4}$	:19	s
1398	4		$1234{:}19\frac{3}{4}$	$1242{:}15\frac{1}{2}$	$7{:}55\frac{3}{4}$	1243:36	$1{:}20\frac{1}{2}$	s
1421	5		1412:43	1423:43	11:00	1423:54	:11	
1445	2		$1537{:}58\frac{3}{4}$	$1543{:}58\frac{1}{4}$	$5{:}59\frac{1}{2}$	$1544{:}14\frac{3}{4}$	$:16\frac{1}{2}$	s
1446	4		$1544{:}26\frac{3}{4}$	$1554{:}27\frac{1}{2}$	$10{:}00\frac{3}{4}$	1554:42	$:14\frac{1}{2}$	s

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
1460	1		$1953{:}55\frac{3}{4}$	$1959{:}58\frac{3}{4}$	6:03	$2000{:}04\frac{3}{4}$	:06	
1461	5		$2000{:}35\frac{3}{4}$	$2010{:}35\frac{3}{4}$	10:00	$2010{:}42\frac{3}{4}$	:07	
1462	2		$2013{:}57\frac{1}{2}$	$2017{:}57\frac{3}{4}$	$4{:}00\frac{1}{4}$	$2018{:}03\frac{1}{2}$	$:05\frac{3}{4}$	s
1463	4		$2018{:}15\frac{1}{2}$	$2026{:}15\frac{1}{2}$	8:00	2026:30	$:14\frac{1}{2}$	s
1482	2	1/8 (373)	0104:39	0109:50	5:11	0110:00	:10	s
1483	4		0110:07	0118:29	8:22	$0118{:}39\frac{3}{4}$	$:10\frac{3}{4}$	s
1532	1		$1443{:}03\frac{3}{4}$	$1453{:}05\frac{1}{2}$	$10{:}01\frac{3}{4}$	$1453{:}33\frac{3}{4}$	$:28\frac{1}{4}$	
1533	5		$1453{:}55\frac{1}{2}$	$1503{:}57\frac{3}{4}$	$10{:}02\frac{1}{4}$	$1504{:}19\frac{3}{4}$	:22	
1535	4		$1508{:}18\frac{3}{4}$	?	?	$(1517{:}33\frac{3}{4})$	?	g
1537	2		1906:47	$1913{:}48\frac{3}{4}$	$7{:}01\frac{3}{4}$	$1913{:}54\frac{1}{4}$	$:05\frac{1}{2}$	s
1538	4		1914:11	1921:11	7:00	1921:17	:06	s
1551	1		$1941{:}48\frac{1}{2}$	$1949{:}48\frac{3}{4}$	$8{:}00\frac{1}{4}$	$1949{:}58\frac{1}{4}$	$:09\frac{1}{2}$	h
1552	5		$1950{:}05\frac{1}{2}$	$1955{:}30\frac{1}{4}$	$5{:}24\frac{3}{4}$	1955:42	$:11\frac{3}{4}$	
1565	5		$2047{:}24\frac{1}{2}$	2053:03	$5{:}28\frac{1}{2}$	$2101{:}19\frac{3}{4}$ (S_1) $2101{:}25\frac{3}{4}$ (S_2)	$8{:}16\frac{3}{4}$ (S_1) :06 (S_2)	i
1566	1		$2101{:}49\frac{3}{4}$	$2109{:}48\frac{3}{4}$	7:59	$2109{:}54\frac{1}{2}$	$:05\frac{3}{4}$	
1567	2		2115:57	$2125{:}57\frac{3}{4}$	$10{:}00\frac{3}{4}$	$2126{:}02\frac{3}{4}$	:05	s
1707	4	1/9 (374)	1845:02	$1852{:}37\frac{1}{2}$	$7{:}35\frac{1}{2}$	$1852{:}53\frac{1}{2}$	:16	s

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
1708	5		$1853:04\frac{1}{4}$	$1902:15\frac{3}{4}$	$9:11\frac{1}{2}$	$1902:28\frac{3}{4}$	:13	
1709	2		1908:25	$1914:01\frac{3}{4}$	$5:36\frac{3}{4}$	$1914:16\frac{3}{4}$	:15	s
1728	4		$2313:57\frac{1}{4}$	$2319:10\frac{3}{4}$	$5:13\frac{1}{2}$	$2319:21\frac{1}{4}$	$:10\frac{1}{2}$	s
1765	4	1/10 (375)	1628:38	$1641:33\frac{3}{4}$	$12:55\frac{3}{4}$	1641:44	$:10\frac{1}{4}$	
1772	4		$1805:31\frac{3}{4}$	$1814:20\frac{1}{2}$	$8:48\frac{3}{4}$	$1814:31\frac{1}{4}$	$:10\frac{3}{4}$	s
1774	5		$1815:07\frac{1}{2}$	1819:13	$4:05\frac{1}{2}$	$1819:29\frac{1}{4}$	$:16\frac{1}{4}$	
1775	5		$1824:41\frac{3}{4}$	$1834:09\frac{1}{2}$	$9:27\frac{3}{4}$	$1834:30\frac{1}{4}$	$:20\frac{3}{4}$	
1838	4		2102:35	2112:16	9:41	2112:28	:12	
1840	5		2117:08	2127:12	10:04	2127:21	:09	
1841	1		2127:59	2136:05	8:06	2136:16	:11	
1842	2		2136:21	?	?	$(2141:12\frac{1}{4})$	?	j, s
1861	4		$2259:54\frac{3}{4}$	$2303:00\frac{3}{4}$	3:06	$2303:15\frac{3}{4}$	:15	h
1929	4	1/11 (376)	1535:47	1547:35	11:48	1547:46	:11	s
1930	5		1548:01	1600:40	12:39	$1600:50\frac{3}{4}$	$:10\frac{3}{4}$	
1932	1		$1604:15\frac{1}{2}$	1616:46	$12:30\frac{1}{2}$	$1617:03\frac{1}{2}$	$:17\frac{1}{2}$	
2094	2		$2202:19\frac{3}{4}$	2208:22	$6:02\frac{1}{4}$	2208:32	:10	s
2095	2		2208:45	$2214:48\frac{1}{4}$	$6:03\frac{1}{4}$	$2215:07\frac{1}{4}$	:19	s
2109	2		$2358:25\frac{1}{4}$	$0006:30\frac{1}{4}$	8:05	$0006:37\frac{3}{4}$	$:07\frac{1}{2}$	s

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
2477	5	1/13 (378)	$1439{:}12\frac{1}{2}$	$1447{:}47\frac{3}{4}$	$8{:}35\frac{1}{4}$	$1448{:}02\frac{1}{2}$	$:14\frac{3}{4}$	
2478	1		1448:25	$1457{:}24\frac{3}{4}$	$8{:}59\frac{3}{4}$	$1457{:}40\frac{3}{4}$	:16	s
2766	5		$2032{:}06\frac{3}{4}$	$2040{:}06\frac{3}{4}$	8:00	$2040{:}12\frac{3}{4}$	:06	
2767	1		$2040{:}24\frac{3}{4}$	2048:25	$8{:}00\frac{1}{4}$	2048:31	:06	s
2768	4		$2048{:}47\frac{1}{2}$	$2054{:}47\frac{3}{4}$	$6{:}00\frac{1}{4}$	$2054{:}55\frac{3}{4}$	:08	s
2886	4	1/14 (379)	$1221{:}41\frac{3}{4}$	$1231{:}56\frac{3}{4}$	10:14	$1235{:}14\frac{1}{4}$	3:18	s
2888	5		$1237{:}11\frac{1}{4}$	$1246{:}54\frac{1}{4}$	9:43	$1247{:}09\frac{1}{4}$	:15	
2907	5		$1357{:}52\frac{1}{2}$	1405:54	$8{:}01\frac{1}{2}$	1406:01	:07	
2908	1		1406:26	1415:01	8:35	1415:55	:54	
2921	5		$1841{:}23\frac{1}{4}$	$1849{:}13\frac{1}{4}$	7:50	$1849{:}24\frac{3}{4}$	$:11\frac{1}{2}$	
2923	1		$1855{:}10\frac{1}{4}$	$1900{:}03\frac{1}{2}$	$4{:}53\frac{1}{4}$	$1900{:}09\frac{3}{4}$	$:06\frac{1}{4}$	
2924	5		$1942{:}01\frac{1}{2}$	1950:01	$7{:}59\frac{1}{2}$	1950:15	:14	
2925	1		$(1950{:}38\frac{3}{4})$	$1958{:}49\frac{1}{4}$	$(8{:}10\frac{1}{2})$	$2013{:}03\frac{1}{4}$ (S_1) $2013{:}15\frac{3}{4}$ (S_2)	14:14 (S_1) $:12\frac{1}{2}$ (S_2)	k
2926	2		2013:33	$2021{:}34\frac{3}{4}$	$8{:}01\frac{3}{4}$	$2021{:}42\frac{1}{4}$	$:07\frac{1}{2}$	s
3089	4	1/15 (380)	1330:32	1331:04	:32	1340:26 (S_1) 1341:37 (S_2)	9:22 (S_1) 1:11 (S_2)	l, s
3254	4		$1735{:}11\frac{1}{4}$	1743:12	$8{:}00\frac{3}{4}$	$1743{:}22\frac{1}{4}$	$:10\frac{1}{4}$	s
3261	5		1747:05	$1755{:}08\frac{1}{2}$	$8{:}03\frac{1}{2}$	$1755{:}15\frac{1}{4}$	$:06\frac{3}{4}$	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
3268	1		$1757:38\frac{1}{4}$	$1805:37\frac{3}{4}$	$7:59\frac{1}{2}$	$1805:44$	$:06\frac{1}{4}$	
3275	2		$1808:05\frac{1}{4}$	$1813:03\frac{3}{4}$	$4:58\frac{1}{2}$	$1813:11\frac{1}{4}$	$:07\frac{1}{2}$	s
3282	5		$1859:29$	$1907:33$	$8:04$	$1907:58$	$:25$	
3284	1		$1908:12$	$1916:08\frac{1}{4}$	$7:56\frac{1}{4}$	$1916:29\frac{3}{4}$	$:21\frac{1}{2}$	
3285	2		$1916:53\frac{1}{4}$	$1921:59$	$5:05\frac{3}{4}$	$1922:23$	$:24$	s
3497	4	1/16 (381)	$0149:08$	$0202:08$	$13:00$	$0202:17$	$:09$	s′
3750	5		$1955:31$	$2003:34$	$8:03$	$2003:53$	$:19$	
3751	1		$(2004:01\frac{1}{4})$	$2012:01\frac{1}{4}$	$(8:00)$	$2032:05\frac{1}{4}$	$20:04$	h
3752	2		$2036:05$	$2044:23\frac{3}{4}$	$8:18\frac{3}{4}$	$2044:34\frac{3}{4}$	$:11$	s
3753	4		$2044:39\frac{3}{4}$	$2050:24\frac{3}{4}$	$5:45$	$2050:35\frac{3}{4}$	$:11$	s
3826	4		$2318:53\frac{1}{2}$	$2328:54\frac{1}{2}$	$10:01$	$2329:01\frac{1}{2}$	$:08$	s
4290	1	1/17 (382)	$1744:05\frac{1}{2}$	$1752:04$	$7:58\frac{1}{2}$	$1752:17$	$:13$	
4291	2		$1752:33\frac{3}{4}$	$1800:33\frac{1}{2}$	$7:59\frac{3}{4}$	$1800:43\frac{3}{4}$	$:10\frac{1}{4}$	s
4292	4		$1813:08\frac{3}{4}$	$1821:06\frac{1}{4}$	$7:57\frac{1}{2}$	$1821:24$	$:17\frac{3}{4}$	s
4294	5		$1822:15\frac{1}{2}$	$1829:54\frac{1}{4}$	$7:38\frac{3}{4}$	$1830:05\frac{1}{4}$	$:11$	
4295	5		$1831:59\frac{1}{2}$	$1838:31\frac{1}{4}$	$6:31\frac{3}{4}$	$1838:54\frac{1}{4}$	$:23$	
4433	4		$2112:35\frac{3}{4}$	$2132:43\frac{3}{4}$	$20:08$	$2132:54$	$:10\frac{1}{4}$	
4434	5		$2133:02\frac{1}{2}$	$2148:14\frac{3}{4}$	$15:12\frac{1}{4}$	$2148:36\frac{3}{4}$	$:22$	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP (S)	Comments
4710	4	1/18 (383)	1610:53	1619:43	8:50	1619:51	:08	
4711	5		1619:59	1624:37	4:38	1624:49	:12	
4718	2		$1732:58\frac{1}{4}$	$1743:38\frac{3}{4}$	$10:40\frac{1}{2}$	$1743:57\frac{3}{4}$	:19	s
4719	4		$1744:11\frac{1}{2}$	1751:41	$7:29\frac{1}{2}$	$1751:50\frac{1}{4}$	$:09\frac{1}{4}$	
4720	5		$1751:57\frac{3}{4}$	$1759:34\frac{3}{4}$	7:37	$1759:54\frac{3}{4}$	:20	
4838	1		$2149:36\frac{1}{2}$	2157:29	$7:52\frac{1}{2}$	2157:47	:18	
4839	5		2157:58	2205:56	7:58	2206:31	:35	
4840	4		2216:35	2226:34	9:59	2226:42	:08	s
4841	2		2226:51	2233:45	6:54	2233:58	:13	s
4898	1	1/19 (384)	$1219:45\frac{3}{4}$	$1231:10\frac{3}{4}$	11:25	$1231:23\frac{3}{4}$	:13	
4899	5		$1231:37\frac{3}{4}$	$1240:30\frac{3}{4}$	8:53	$1240:41\frac{3}{4}$	:11	
4948	4		$1822:54\frac{1}{4}$	$1830:15\frac{1}{4}$	7:21	$1830:27\frac{1}{4}$	:12	
4949	5		$1832:17\frac{3}{4}$	$1842:24\frac{3}{4}$	10:07	$1842:45\frac{1}{2}$	$:20\frac{3}{4}$	
4950	2		$1842:55\frac{3}{4}$	$1852:56\frac{3}{4}$	10:01	$1853:07\frac{3}{4}$	:11	s
5059	4		$2300:29\frac{1}{4}$	2309:30	$9:00\frac{3}{4}$	$2309:48\frac{3}{4}$	$:18\frac{3}{4}$	
5060	5		$2309:58\frac{1}{2}$	2318:59	$9:00\frac{1}{2}$	2319:10	:11	
5061	1		2319:17	2328:19	9:02	2328:46	:27	
5062	2		2329:10	$2335:10\frac{1}{2}$	$6:00\frac{1}{2}$	$2335:23\frac{3}{4}$	$:13\frac{1}{4}$	s

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5081	1	1/20 (385)	$0047{:}55\frac{3}{4}$	$0055{:}55\frac{3}{4}$	8:00	$0056{:}05\frac{3}{4}$	:10	
5082	2		$0056{:}13\frac{3}{4}$	0106:27	$10{:}13\frac{1}{4}$	$0107{:}05\frac{3}{4}$	$:38\frac{3}{4}$	
5083	5		0107:15	$0115{:}19\frac{1}{4}$	$8{:}04\frac{1}{4}$	$0115{:}41\frac{1}{2}$	$:22\frac{1}{4}$	
5152	1		$1431{:}46\frac{1}{2}$	$1439{:}47\frac{1}{2}$	8:01	1439:57	$:09\frac{1}{2}$	
5153	1		$1444{:}00\frac{1}{2}$	$1452{:}02\frac{1}{2}$	8:02	$1452{:}11\frac{1}{2}$	:09	
5154	5		$1452{:}19\frac{1}{2}$	$1500{:}05\frac{1}{2}$	7:46	$1500{:}27\frac{1}{4}$	$:21\frac{3}{4}$	
5155	2		$1500{:}50\frac{1}{4}$	$1508{:}12\frac{1}{4}$	7:22	$1508{:}19\frac{1}{4}$	:07	s
5174	1		$1615{:}40\frac{1}{4}$	$1623{:}41\frac{1}{4}$	8:01	$1632{:}24\frac{1}{4}$ (S$_1$) $1632{:}33\frac{1}{4}$ (S$_2$)	8:43 (S$_1$) :09 (S$_2$)	m
5193	2		(1805:41)	$1812{:}51\frac{3}{4}$	$(7{:}10\frac{3}{4})$	$1813{:}06\frac{3}{4}$	:15	s
5206	4		$2049{:}37\frac{1}{2}$	$2102{:}43\frac{1}{2}$	13:06	$2102{:}56\frac{1}{2}$	:13	
5208	2		2112:24	$2119{:}25\frac{1}{4}$	$7{:}01\frac{1}{4}$	$2121{:}04\frac{1}{4}$	1:39	s
5215	2		$2210{:}58\frac{1}{4}$	$2233{:}57\frac{1}{2}$	$22{:}59\frac{1}{4}$	$2234{:}36\frac{1}{2}$	:39	n
5216	5		$2234{:}49\frac{1}{4}$	$2244{:}15\frac{1}{4}$	9:26	$2244{:}35\frac{1}{4}$	:20	
5217	1		$2244{:}46\frac{1}{4}$	$2252{:}49\frac{1}{2}$	$8{:}03\frac{1}{4}$	$2253{:}04\frac{3}{4}$	$:15\frac{1}{4}$	
5219	4		2343:35	$2353{:}34\frac{1}{2}$	$9{:}59\frac{1}{2}$	$2353{:}43\frac{3}{4}$	$:09\frac{1}{4}$	s
5220	5		$2353{:}56\frac{1}{4}$	0004:00	$10{:}03\frac{3}{4}$	0004:14	:14	
5221	1	1/21 (386)	0004:20	0014:23	10:03	0015:04	:41	h

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5222	2		0015:09	0022:13	7:04	(0022:24)	(:11)	s
5247	4		0145:19$\frac{3}{4}$	0153:19$\frac{3}{4}$	8:00	0153:32$\frac{3}{4}$	:13	
5249	5		0154:08$\frac{3}{4}$	0200:58$\frac{1}{2}$	6:49$\frac{3}{4}$	0201:10$\frac{1}{2}$	:12	
5280	4		1356:49$\frac{1}{2}$	1406:53$\frac{1}{2}$	10:04	1407:09$\frac{1}{2}$	:16	
5281	5		1407:16$\frac{1}{2}$	1417:17$\frac{1}{2}$	10:01	1417:29$\frac{1}{2}$	:12	
5282	2		1418:12$\frac{1}{2}$	1426:14$\frac{1}{2}$	8:02	1426:33$\frac{1}{2}$	:19	s
5290	4		1515:58$\frac{1}{4}$	1526:59$\frac{1}{2}$	11:01$\frac{1}{4}$	1527:14$\frac{1}{2}$	:15	
5291	5		1527:24$\frac{1}{4}$	1538:25$\frac{1}{4}$	11:01	1538:32$\frac{1}{4}$	:07	
5292	1		1538:55$\frac{1}{4}$	1549:56$\frac{1}{4}$	11:01	1550:13$\frac{1}{4}$	:17	
5293	2		1550:23$\frac{1}{4}$	1558:24$\frac{1}{4}$	8:01	1558:40$\frac{1}{4}$	:16	s
5330	1		1714:30$\frac{3}{4}$	1722:31	8:00$\frac{1}{4}$	1722:37	:06	
5331	2		1722:55	1730:55	8:00	1731:00	:05	s
5344	4		1822:39$\frac{1}{4}$	1834:34$\frac{3}{4}$	11:55$\frac{1}{2}$	1834:48	:13$\frac{1}{4}$	s
5345	5		1836:05$\frac{1}{4}$	1848:07$\frac{3}{4}$	12:02$\frac{1}{2}$	1848:35$\frac{3}{4}$	:28	
5346	1	. .	1848:40$\frac{3}{4}$	1900:39$\frac{3}{4}$	11:59	1900:58$\frac{3}{4}$	:19	
5347	2		1901:12$\frac{3}{4}$	1907:19$\frac{3}{4}$	6:07	1907:31$\frac{3}{4}$	:12	s
5662	2	1/22 (387)	1606:51$\frac{3}{4}$	1612:55$\frac{1}{4}$	6:03$\frac{1}{2}$	1613:01	:05$\frac{3}{4}$	s
5690	1		2048:16$\frac{1}{4}$	2056:15$\frac{3}{4}$	7:59$\frac{1}{2}$	2056:21$\frac{3}{4}$	:06	s

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5691	2		2056:32	$2104:32\frac{1}{4}$	$8:00\frac{1}{4}$	2104:38	$:05\frac{3}{4}$	s
5692	1		$2104:48\frac{3}{4}$	$2112:48\frac{1}{4}$	$7:59\frac{1}{2}$	$2112:54\frac{1}{4}$	:06	s
5693	5		$2113:05\frac{1}{4}$	$2117:09\frac{1}{4}$	4:04	$2117:14\frac{1}{4}$	:05	s
5745	1	1/23 (388)	$1401:07\frac{3}{4}$	$1401:24\frac{1}{2}$	$:16\frac{3}{4}$	$1405:19\frac{3}{4}$ (S_1) $1405:34$ (S_2)	$3:55\frac{1}{4}$ (S_1) $:14\frac{1}{4}$ (S_2)	i, s
5746	1		1405:42	$1421:45\frac{1}{4}$	$16:03\frac{1}{4}$	$1422:02\frac{1}{4}$	:17	s
5747	2		$1422:08\frac{1}{4}$	$1438:09\frac{1}{4}$	16:01	$1438:20\frac{1}{4}$	:11	s
5760	1		1535:53	$1551:57\frac{1}{4}$	$16:04\frac{1}{4}$	$1552:26\frac{3}{4}$	$:29\frac{1}{2}$	
5761	5		$1552:34\frac{3}{4}$	1608:48	$16:13\frac{1}{4}$	1609:05	:17	
5829	1		$2006:34\frac{1}{4}$	$2014:33\frac{1}{4}$	7:59	2014:46	$:12\frac{3}{4}$	s
5830	4		$2015:52\frac{1}{2}$	$2023:54\frac{1}{4}$	$8:01\frac{3}{4}$	$2024:03\frac{1}{4}$	:09	s
5869	5		$2148:55\frac{3}{4}$	$2220:56\frac{1}{4}$	$32:00\frac{1}{2}$	$2221:17\frac{3}{4}$	$:21\frac{1}{2}$	
5900	2		$2347:56\frac{3}{4}$	$2353:01\frac{1}{4}$	$5:04\frac{1}{2}$	2353:07	$:05\frac{3}{4}$	s
5901	4		2353:16	$2359:44\frac{1}{2}$	$6:28\frac{1}{2}$	2359:51	$:06\frac{1}{2}$	s
5909	4	1/24 (389)	$0055:20\frac{1}{2}$	$0114:46\frac{1}{2}$	19:26	$0115:00\frac{1}{2}$	:14	s
5910	5		$0115:25\frac{1}{2}$	$0130:52\frac{1}{4}$	$15:26\frac{3}{4}$	$0131:03\frac{3}{4}$	$:11\frac{1}{2}$	
5930	5		1322:02	$1336:18\frac{1}{4}$	$14:16\frac{1}{4}$	$1336:26\frac{1}{4}$	:08	
5933	4		$1337:18\frac{1}{4}$	$1353:14\frac{1}{4}$	15:56	$1353:26\frac{1}{4}$	:12	s

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
5935	1		$1919{:}57\tfrac{1}{4}$	$1927{:}56\tfrac{1}{2}$	$7{:}59\tfrac{1}{4}$	$1928{:}05\tfrac{1}{2}$	:09	
5936	2		$1928{:}22\tfrac{1}{2}$	$1936{:}23\tfrac{3}{4}$	$8{:}01\tfrac{1}{4}$	$1936{:}32\tfrac{1}{2}$	$:08\tfrac{3}{4}$	s
5937	4		$1936{:}47\tfrac{1}{4}$	$1944{:}49\tfrac{1}{4}$	8:02	$1944{:}57\tfrac{1}{4}$	:08	s
5938	5		$1945{:}28\tfrac{1}{4}$	$2005{:}31\tfrac{1}{4}$	20:03	$2005{:}41\tfrac{1}{4}$	:10	
6019	1	1/25 (390)	$1406{:}24\tfrac{1}{4}$	$1417{:}26\tfrac{3}{4}$	$11{:}02\tfrac{1}{2}$	$1417{:}37\tfrac{1}{4}$	$:10\tfrac{1}{2}$	
6020	2		$1419{:}44\tfrac{1}{4}$	1430:47	$11{:}02\tfrac{3}{4}$	1431:43	:56	
6021	5		1436:43	$1448{:}34\tfrac{3}{4}$	$11{:}51\tfrac{3}{4}$	$1448{:}43\tfrac{3}{4}$	:09	
6023	1		$1840{:}39\tfrac{1}{4}$	$1848{:}40\tfrac{1}{2}$	$8{:}01\tfrac{1}{4}$	$1848{:}48\tfrac{1}{4}$	$:07\tfrac{3}{4}$	
6024	2		$1849{:}09\tfrac{1}{2}$	$1857{:}08\tfrac{1}{2}$	7:59	1857:15	$:06\tfrac{1}{2}$	s
6131	2	1/26 (391)	$1501{:}48\tfrac{1}{4}$	$1506{:}48\tfrac{1}{4}$	5:00	$1506{:}56\tfrac{1}{4}$	:08	s
6132	2		$1508{:}02\tfrac{1}{2}$	1513:02	$4{:}59\tfrac{1}{2}$	$1513{:}10\tfrac{3}{4}$	$:08\tfrac{3}{4}$	s
6133	2		1515:34	$1520{:}36\tfrac{1}{4}$	$5{:}02\tfrac{1}{4}$	1520:54	$:17\tfrac{3}{4}$	s
6134	2		$1522{:}32\tfrac{1}{4}$	$1527{:}34\tfrac{1}{2}$	$5{:}05\tfrac{1}{4}$	$1527{:}54\tfrac{1}{2}$	:20	s
6135	2		$1528{:}52\tfrac{1}{2}$	$1533{:}53\tfrac{1}{2}$	5:01	$1534{:}12\tfrac{1}{2}$	:19	s
6136	2		$1535{:}02\tfrac{1}{2}$	$1540{:}02\tfrac{1}{2}$	5:00	$1540{:}12\tfrac{1}{2}$	:10	s
6155	5		$(2120{:}26\tfrac{1}{2})$	$2154{:}29\tfrac{1}{2}$	(34:03)	$2154{:}45\tfrac{1}{2}$	:16	
6163	4		$2309{:}38\tfrac{1}{4}$	$2328{:}15\tfrac{1}{4}$	18:37	$2328{:}26\tfrac{1}{4}$	:11	
6170	4	1/27 (392)	0026:38	$0040{:}51\tfrac{1}{4}$	$14{:}13\tfrac{1}{4}$	$(0041{:}00\tfrac{3}{4})$	$(:09\tfrac{1}{2})$	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
6171	5		0042:17	0100:30$\frac{3}{4}$	18:13$\frac{3}{4}$	0101:24	:53$\frac{1}{4}$	
6172	5		0141:52$\frac{3}{4}$	0230:47$\frac{1}{2}$	48:54$\frac{3}{4}$	0231:05$\frac{1}{2}$	:18	
6191	4		1448:33$\frac{1}{2}$	1455:14$\frac{1}{2}$	6:41	1455:23$\frac{1}{2}$	:09	
6198	1		2213:11	2221:14	8:03	2221:26	:12	
6199	5		2221:57	2230:01	8:04	2230:17	:16	
6228	2		2350:58$\frac{3}{4}$	2355:59$\frac{3}{4}$	5:01	2356:05$\frac{3}{4}$	:06	
6229	5		2356:27$\frac{3}{4}$	0007:27$\frac{3}{4}$	11:00	0007:33$\frac{3}{4}$	:06	
6254	2	1/28 (393)	1205:51$\frac{1}{2}$	1216:51$\frac{3}{4}$	11:00$\frac{1}{4}$	1216:58$\frac{3}{4}$	:07	
6523	5	1/29 (394)	1420:50$\frac{1}{2}$	1431:49$\frac{3}{4}$	10:59$\frac{1}{4}$	1432:04$\frac{1}{2}$	:14$\frac{3}{4}$	
6525	4		1440:06	1444:05$\frac{1}{4}$	3:59$\frac{1}{4}$	1444:17$\frac{3}{4}$	:12$\frac{1}{2}$	
6526	5		1444:24$\frac{1}{4}$	1457:06$\frac{1}{4}$	12:42	1457:29$\frac{1}{4}$	:23	
6527	1		1457:36$\frac{1}{4}$	1502:39$\frac{1}{4}$	5:03	1502:57$\frac{1}{4}$	:18	
6552	4		2242:12$\frac{3}{4}$	2254:00$\frac{1}{2}$	11:47$\frac{3}{4}$	2256:38$\frac{3}{4}$	2:38$\frac{1}{4}$	
6553	2	1/30 (395)	0025:45	0025:54$\frac{3}{4}$	:09$\frac{3}{4}$	0056:06$\frac{1}{2}$ (S_1) 0057:13$\frac{1}{2}$ (S_2) 0057:21$\frac{1}{2}$ (S_3)	31:11$\frac{3}{4}$ (S_1) :07 (S_2) :08 (S_3)	o
6572	5		1401:55	1428:09$\frac{1}{4}$	26:14$\frac{1}{4}$	1428:52$\frac{3}{4}$	:43$\frac{1}{2}$	
6574	1		2006:28$\frac{1}{2}$	2014:28$\frac{1}{4}$	7:59$\frac{3}{4}$	2014:34$\frac{1}{4}$	:06	
6575	5		2014:45$\frac{1}{4}$	2022:48$\frac{1}{4}$	8:03	2022:55$\frac{1}{4}$	:07	

TABLE 3. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP (P)	STOP (S)	EXP (S)	Comments
6642	5	1/31 (396)	$1930:57\frac{1}{4}$	1956:00	$25:02\frac{3}{4}$	1956:10	:10	
6643	3	2/1 (397)	$1327:10\frac{1}{4}$	$1327:13\frac{1}{4}$	:03	$1338:06\ (S_1)$ $1338:20\ (S_2)$ $1342:20\frac{1}{4}\ (S_3)$	$10:52\frac{3}{4}\ (S_1)$ $:14\ \ \ (S_2)$ $4:00\frac{1}{4}\ (S_3)$	o
6685	1		$2313:49\frac{1}{2}$	$2319:13\frac{1}{2}$	5:24	$2319:22\frac{1}{2}$	:09	
6686	5		$2319:34\frac{1}{2}$	$2329:14\frac{1}{2}$	9:40	$2329:25\frac{1}{2}$	:11	
6688	4		$2337:51\frac{1}{2}$	$2346:40\frac{1}{2}$	8:49	$2346:46\frac{1}{2}$	:06	
6706	1	2/3 (399)	0135:20	$0141:15\frac{3}{4}$	$5:55\frac{3}{4}$	$0141:22\frac{3}{4}$	:07	
6707	5		$(0141:45\frac{1}{2})$	$0153:54\frac{3}{4}$	$(12:09\frac{1}{4})$	$0153:59\frac{3}{4}$	:05	

a. Multiple secondaries; i.e., $P + S_1 + S_2$. Filter changed in S_1 (to Fil. 2). Also, repointed in S_1 and S_2.

b. Pad shows $S^L 3$ 20:00, SS(400K) 0026.

c. Telemetry data noisy. Pad shows $S^L 3$ 13:00.

d. Pad shows $S^L 2$ 8:00, $S^L 1$ 7:00, $S^L 4$ 7:00, $S^L 5$ 7:00, SS(400K) 1614. Repointed in S.

e. Repointed in S.

f. Filter changed in S (appears to have been cycled from 1 to 1).

g. Telemetry data noisy. Pas shows $S^L 1$ 10:00, $S^L 5$ 10:00, SS(400K) 1516).

h. Filter changed in S.

i. Multiple secondaries; i.e., $P + S_1 + S_2$.

TABLE 3. (Concluded)

j. Telemetry data noisy. Pad shows no S^L operations scheduled. SS (400K) 2140.

k. Multiple secondaries; i. e. , $P + S_1 + S_2$. Filter changed in S_1. Repointed in S_1. Pad shows S^L5 8:00, S^L1 8:00, S^L4 8:00, S^L2 8:00, SS 2034.

l. Multiple secondaries; i. e. , $P + S_1 + S_2$. Repointed in S_1.

m. Multiple secondaries; i. e. , $P + S_1 + S_2$. Filter changed in S_1.

n. Filter changed in P.

o. Multiple secondaries; i. e. , $P + S_1 + S_2 + S_3$.

s. Stepped-image frame.

TABLE 4. SL4 LOAD 5 (COLOR) SUPER-LONG (S^L) LISTING

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
115	4	11/27/73 (331)	2159:01	2207:05	8:04	2207:43	:38	
122	5		2215:39¾	2224:18½	8:38¾	2225:10½	:52	
186	4	11/28 (332)	0226:52	0238:54½	12:02½	0240:10	1:15½	
282	4		2232:21½	2244:22¼	12:00¾	2244:34¼	:12	
283	2		2245:33¾	2250:42½	5:08¾	2250:53¼	:10¾	
284	1		2251:36½	2302:37½	11:01	2302:47½	:10	
297	4	11/29 (333)	0145:56	0157:58	12:02	0158:07	:09	
461	2		2026:41½	2031:42¼	5:00¾	2032:00½	:18¼	
462	1		2033:00¾	2041:02	8:01¼	2041:13	:11	
548	4	11/30 (334)	0245:26	0258:32	13:06	0258:39	:07	
573	2		1522:31¾	1528:02	5:30¼	1528:14	:12	
581	4	12/1 (335)	0207:12½	0219:17	12:04½	(0234:19½)	(15:02½)	a, b, c
607	1		(2218:47½)	2231:50¼	(13:02¾)	2231:59¼	:09	
608	2		2236:37¼	2242:37½	6:00¼	2242:45½	:08	
645	4	12/2 (336)	(0250:38½)	0303:43½	(13:05)	(0307:40¾)	(3:57¼)	d, s
902	4	12/3 (337)	0211:52	0223:51½	11:59½	0224:01½	:10	
933	2		1640:14¼	1644:49¼	4:35	1645:02¼	:13	
934	2		1805:02½	1810:13¾	5:11¼	1810:24¾	:11	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
935	4		$1811{:}19\frac{3}{4}$	$1817{:}24\frac{3}{4}$	6:05	$1817{:}35\frac{3}{4}$	:11	
966	2		$1944{:}15\frac{1}{2}$	$1950{:}43\frac{1}{2}$	6:28	$1950{:}55\frac{1}{2}$	:12	
967	4		$2037{:}42\frac{1}{4}$	$2045{:}54\frac{3}{4}$	$8{:}12\frac{1}{2}$	2046:03	$:08\frac{1}{4}$	
968	1		$2046{:}25\frac{1}{2}$	$2054{:}25\frac{1}{4}$	$7{:}59\frac{3}{4}$	$2054{:}33\frac{1}{4}$	:08	
969	4		2210:04	$2223{:}22\frac{1}{4}$	$13{:}18\frac{1}{4}$	$2223{:}57\frac{1}{4}$	:35	
970	5		2235:21	$2256{:}12\frac{3}{4}$	$20{:}51\frac{3}{4}$	$2256{:}22\frac{1}{4}$	$:09\frac{1}{2}$	
971	4		$2341{:}55\frac{3}{4}$	$2349{:}55\frac{1}{2}$	$7{:}59\frac{3}{4}$	$2350{:}02\frac{1}{4}$	$:06\frac{3}{4}$	
972	1		2350:20	$2358{:}24\frac{3}{4}$	$8{:}04\frac{3}{4}$	$2358{:}31\frac{3}{4}$	:07	
1063	4	12/4 (338)	$0325{:}00\frac{1}{4}$	$0335{:}10\frac{1}{4}$	10:10	(0335:16)	(:06)	e
1088	2		$1730{:}36\frac{3}{4}$	$1735{:}40\frac{3}{4}$	5:04	$1735{:}53\frac{3}{4}$	:13	
1095	1		$1829{:}48\frac{1}{4}$	$1842{:}01\frac{1}{2}$	$12{:}13\frac{1}{4}$	$1842{:}11\frac{1}{2}$	:10	
1096	4		$1843{:}01\frac{1}{2}$	1855:00	$11{:}58\frac{1}{2}$	1855:14	:14	
1097	5		1855:33	$1908{:}59\frac{1}{2}$	$13{:}26\frac{1}{2}$	$1909{:}13\frac{1}{2}$	:14	
1098	1		$1954{:}52\frac{1}{4}$	$2006{:}51\frac{1}{4}$	11:59	$2007{:}02\frac{1}{2}$	$:11\frac{1}{4}$	
1099	5		(2007:38)	$2019{:}43\frac{1}{4}$	$(12{:}05\frac{1}{4})$	$2019{:}53\frac{1}{4}$	:10	
1246	2	12/5 (339)	$1440{:}26\frac{1}{4}$	$1445{:}24\frac{1}{2}$	$4{:}58\frac{1}{4}$	$1445{:}38\frac{3}{4}$	$:14\frac{1}{4}$	
1253	2		$1649{:}58\frac{3}{4}$	$1653{:}57\frac{3}{4}$	3:59	$1654{:}07\frac{3}{4}$	:10	
1261	1		$1748{:}10\frac{3}{4}$	$1758{:}12\frac{1}{2}$	$10{:}01\frac{3}{4}$	$1758{:}26\frac{1}{2}$	:14	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
1262	4		$1806:59\frac{3}{4}$	$1816:58\frac{1}{4}$	$9:58\frac{1}{2}$	$1817:06\frac{3}{4}$	$:08\frac{1}{2}$	
1263	5		$1818:09\frac{1}{2}$	$1827:20\frac{1}{2}$	9:11	$1827:33\frac{1}{2}$	:13	
1366	5	12/6 (340)	0202:42	0213:13	10:31	0213:28	:15	
1415	1		$1658:39\frac{1}{2}$	$1711:39\frac{1}{4}$	$12:59\frac{3}{4}$	1711:47	$:07\frac{3}{4}$	
1428	4		$1719:16\frac{1}{2}$	$1731:19\frac{1}{2}$	12:03	$1731:27\frac{3}{4}$	$:08\frac{1}{4}$	
1435	1		$1737:08\frac{1}{2}$	$1745:01\frac{1}{2}$	7:53	$1745:08\frac{1}{2}$	:07	
1442	1		$1855:46\frac{1}{4}$	$1915:46\frac{1}{4}$	20:00	$1915:57\frac{1}{4}$	:11	
1449	1		2026:58	2034:58	8:00	2035:10	:12	
1450	4		$(2041:04\frac{1}{2})$	2049:04	$(7:59\frac{1}{2})$	2050:48	1:44	
1451	5		2051:09	2052:14	1:05	2052:30	:16	
1458	1		$2153:27\frac{1}{4}$	$2201:33\frac{3}{4}$	$8:06\frac{1}{2}$	$2201:50\frac{3}{4}$	:17	
1459	4		$2207:07\frac{3}{4}$	$2215:11\frac{3}{4}$	8:04	$2215:29\frac{3}{4}$	:18	
1460	5		2217:23	$2225:21\frac{3}{4}$	$7:48\frac{3}{4}$	$2225:34\frac{3}{4}$	:13	
1486	2	12/7 (341)	$0126:29\frac{1}{4}$	$0131:49\frac{1}{4}$	5:20	$0132:05\frac{1}{4}$	:16	
1495	1		$1522:22\frac{3}{4}$	$1530:50\frac{3}{4}$	8:28	$1531:06\frac{3}{4}$	:16	
1502	1		1620:51	$1628:50\frac{3}{4}$	$7:59\frac{3}{4}$	1629:07	$:16\frac{1}{4}$	
1503	4		$1632:30\frac{1}{2}$	$1640:29\frac{3}{4}$	$7:59\frac{1}{4}$	$1640:42\frac{3}{4}$	:13	
1504	5		$1644:10\frac{1}{2}$	$1652:10\frac{1}{2}$	8:00	$1652:27\frac{1}{2}$	:17	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
1505	2		$1654{:}13\frac{1}{2}$	$1701{:}13\frac{1}{2}$	7:00	$1701{:}25\frac{1}{2}$	:12	
1518	4		$1907{:}02\frac{1}{4}$	$1927{:}05\frac{1}{4}$	20:03	$1927{:}18\frac{1}{4}$	:13	
1539	5		(2127:23)	$2135{:}22\frac{1}{2}$	$(7{:}59\frac{1}{2})$	2135:31	$:08\frac{1}{2}$	
1576	4		$2308{:}31\frac{1}{4}$	$2316{:}30\frac{1}{4}$	7:59	2316:38	$:07\frac{3}{4}$	
1595	5	12/8 (342)	$0207{:}19\frac{3}{4}$	$0223{:}20\frac{3}{4}$	16:01	$2330{:}00\frac{3}{4}$	:10	
1626	1		$1415{:}30\frac{3}{4}$	$1423{:}33\frac{1}{4}$	$8{:}02\frac{1}{2}$	$1423{:}48\frac{1}{2}$	$:15\frac{1}{4}$	
1627	2		$1423{:}58\frac{3}{4}$	$1431{:}01\frac{3}{4}$	7:03	$1431{:}17\frac{3}{4}$	:16	
1628	4		$1431{:}29\frac{3}{4}$	$1440{:}30\frac{3}{4}$	9:01	$1440{:}53\frac{3}{4}$	:23	
1629	5		$1440{:}58\frac{3}{4}$	$1449{:}19\frac{3}{4}$	8:21	$1450{:}10\frac{3}{4}$	:51	
1650	2		$1910{:}52\frac{3}{4}$	$1916{:}46\frac{1}{4}$	$5{:}53\frac{1}{2}$	$1917{:}03\frac{3}{4}$	$:17\frac{1}{2}$	
1651	4		$1917{:}31\frac{3}{4}$	$1927{:}46\frac{3}{4}$	10:15	$1928{:}03\frac{3}{4}$	:17	
1682	1		$2046{:}20\frac{1}{2}$	2056:17	$9{:}56\frac{1}{2}$	$2056{:}25\frac{3}{4}$	$:08\frac{3}{4}$	
1733	1	12/9 (343)	$1647{:}32\frac{1}{4}$	$1652{:}31\frac{1}{4}$	4:59	$1652{:}39\frac{1}{2}$	$:08\frac{1}{4}$	
1734	2		$1656{:}47\frac{1}{4}$	$1701{:}43\frac{1}{4}$	4:56	$1701{:}54\frac{1}{4}$	:11	
1735	4		1705:30	1710:30	5:00	1710:39	:09	
1736	5		1710:47	1717:45	6:58	1718:24	:39	
1745	1		1809:19	1814:18	4:59	1814:28	:10	
1746	2		1815:30	1820:31	5:01	1820:39	:08	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
1747	4		1821:38	1826:38	5:00	1826:45	:07	
1748	5		1827:50¼	1832:53½	5:03¼	1833:00¾	:07¼	
1749	5		1837:59	?	?	(1848:32)	?	f, g
1756	1		1953:11¾	1957:11¾	4:00	1957:23¾	:12	
1757	4		2000:06¾	2008:11	8:04¼	2008:25¼	:14¼	
1758	5		2009:39¾	2020:45½	11:05¾	2020:59½	:14	
1765	2		2146:43¼	2154:04½	7:21¼	2154:16¼	:11¾	
1824	2	12/10 (344)	1921:34¾	1930:37	9:02¼	1931:18½	:11½	
1825	5		1934:29¾	1939:49¾	5:20	1940:02¾	:13	
1863	5		2105:50	2112:31½	6:41½	2113:17½	:46	
1888	1		2234:08¼	2244:02	9:53¾	2244:15	:13	
1925	2		2359:59	0007:39	7:40	(0014:23¼)	(6:44¼)	a,h
1980	2	12/11 (345)	1708:19½	1718:18¾	9:59¼	1718:28¾	:10	
2011	1		1842:54¼	1856:10½	13:16¼	1856:23½	:13	
2042	5		2020:28¾	2031:15¼	10:46½	2031:24¾	:09½	
2055	2		2146:58	2154:56¾	7:58¾	2155:04¾	:08	
2056	1		2155:24¾	2203:24½	7:59¾	2203:31¾	:07¼	
2069	2		2300:50¾	2308:50¾	8:00	2309:07¾	:17	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
2070	4		$2310{:}00^{3}/_{4}$	$2317{:}59^{3}/_{4}$	7:59	$2318{:}26^{3}/_{4}$	:27	
2071	2		$2319{:}01^{3}/_{4}$	$2327{:}02^{3}/_{4}$	8:01	$2327{:}32^{3}/_{4}$	:30	
2072	5		$2327{:}42^{3}/_{4}$	$2335{:}42^{1}/_{4}$	$7{:}59^{1}/_{2}$	$2335{:}58^{3}/_{4}$	$:16^{1}/_{2}$	
2135	4	12/12 (346)	$0231{:}25^{1}/_{4}$	$0239{:}25^{1}/_{4}$	8:00	$0239{:}43^{1}/_{4}$	:18	
2136	5		$0239{:}53^{1}/_{4}$	$0244{:}51^{1}/_{4}$	4:58	$0245{:}07^{1}/_{4}$	:16	
2156	2		0405:33	0410:13	4:40	0410:20	:07	
2157	2		0412:04	0417:03	4:59	0417:09	:06	
2536	2	12/14 (348)	$0103{:}48^{1}/_{4}$	$0112{:}32^{1}/_{4}$	8:44	$0112{:}47^{1}/_{4}$	:15	
2543	4		0236:41	0244:41	8:00	0244:57	:16	
2544	5		0249:59	0256:17	6:18	0256:33	:16	
2575	1		1443:57	$1453{:}55^{1}/_{4}$	$9{:}58^{1}/_{4}$	$1454{:}01^{1}/_{4}$	:06	
2576	4		1458:02	1503:01	4:59	1503:10	:09	
2577	2		1506:41	1511:40	4:59	1511:48	:08	
2596	4		$1640{:}39^{3}/_{4}$	$1647{:}10^{3}/_{4}$	6:31	$1647{:}26^{3}/_{4}$	:16	
2597	5		$1649{:}30^{3}/_{4}$	$1655{:}31^{3}/_{4}$	6:01	$1655{:}47^{3}/_{4}$	:16	
2623	4		$1811{:}08^{1}/_{2}$	$1819{:}08^{1}/_{4}$	$7{:}59^{3}/_{4}$	$1819{:}20^{1}/_{4}$	:12	
2660	2		1956:38	$2001{:}24^{1}/_{4}$	$4{:}46^{1}/_{4}$	$2001{:}41^{1}/_{4}$	:17	
2715	4		2221:17	2227:16	5:59	$2227{:}27^{1}/_{4}$	$:11^{1}/_{4}$	

TABLE 4. (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP.)P)	STOP (S)	EXP. (S)	Comments
2812	2	12/15 (349)	1552:15	1557:16	5:01	1557:24	:08	
2813	4		1558:26	1601:54	3:28	1602:02	:08	
2838	2		$1718:38\frac{3}{4}$	$1723:42\frac{3}{4}$	5:04	$1723:55\frac{3}{4}$	:13	
2839	4		$1724:19\frac{3}{4}$	$1732:19\frac{1}{4}$	$7:59\frac{1}{2}$	$1733:13\frac{1}{4}$	:54	
2840	5		$1733:21\frac{1}{2}$	$1736:36\frac{3}{4}$	$3:15\frac{1}{4}$	$1736:53\frac{3}{4}$	:15	
2841	5		$1739:44\frac{3}{4}$	$1747:39\frac{3}{4}$	7:55	$1748:00\frac{3}{4}$	:21	
2854	4		$1859:20\frac{1}{2}$	$1907:24\frac{1}{4}$	$8:03\frac{3}{4}$	1907:42	$:17\frac{3}{4}$	
2929	5	12/16 (350)	$(1323:31\frac{1}{4})$	$1331:31\frac{1}{4}$	(8:00)	$1333:27\frac{1}{4}$	:56	
2973	1		1626:15	$1633:14\frac{3}{4}$	$6:59\frac{3}{4}$	$1633:26\frac{3}{4}$	:12	s
2974	2		$1633:58\frac{3}{4}$	$1639:05\frac{3}{4}$	5:07	$1647:19\frac{1}{2}$ (S_1) $1647:37\frac{3}{4}$ (S_2)	$8:13\frac{3}{4}$ (S_1) $:18\frac{1}{4}$ (S_2)	a, i, s
3465	2	12/17 (351)	$2020:25\frac{1}{4}$	2033:44	$13:18\frac{3}{4}$	2034:04	:20	
3534	2		$2327:19\frac{3}{4}$	2333:21	$6:01\frac{1}{4}$	$2333:56\frac{1}{4}$	$:35\frac{1}{4}$	
3535	5		$2334:48\frac{1}{4}$	2340:49	$6:01\frac{3}{4}$	2341:30	:41	
3536	4		$2358:18\frac{1}{2}$	$0006:19\frac{1}{2}$	8:01	$0007:38\frac{1}{2}$	1:19	
3537	5	12/18 (352)	$0007:44\frac{1}{2}$	$0013:19\frac{1}{4}$	$5:34\frac{3}{4}$	$0013:32\frac{1}{4}$	:13	
3581	2		1407:10	1412:10	5:00	1412:23	:13	
3588	2		$1639:06\frac{1}{2}$	$1644:05\frac{1}{2}$	4:59	$1644:19\frac{1}{2}$	:14	

TABLE 4.   (Continued)

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
3595	4		$1703{:}20\frac{1}{2}$	$1710{:}28$	$7{:}07\frac{1}{2}$	$1710{:}42\frac{3}{4}$	$:14\frac{3}{4}$	s
3596	5		$1711{:}10\frac{3}{4}$	$1719{:}12\frac{1}{2}$	$8{:}01\frac{3}{4}$	$1719{:}26\frac{1}{2}$	$:14$	
3711	5	12/19 (353)	$0018{:}13\frac{1}{4}$	$0030{:}11\frac{3}{4}$	$11{:}58\frac{1}{2}$	$0030{:}20\frac{1}{2}$	$:08\frac{3}{4}$	
3712	1		$0030{:}45\frac{3}{4}$	$0035{:}46\frac{1}{4}$	$5{:}00\frac{1}{2}$	$0035{:}54$	$:07\frac{3}{4}$	
3713	2		$0036{:}30$	$0042{:}31$	$6{:}01$	$(0042{:}40\frac{1}{4})$	$(:09\frac{1}{4})$	j
3738	1		$0216{:}05\frac{3}{4}$	$0221{:}36\frac{3}{4}$	$5{:}31$	$0221{:}48\frac{3}{4}$	$:12$	
3909	4	12/20 (354)	$0149{:}16$	$0154{:}47$	$5{:}31$	$0154{:}56$	$:09$	
3934	5		$1518{:}36\frac{3}{4}$	$1525{:}37\frac{1}{2}$	$7{:}00\frac{3}{4}$	$(1533{:}39)$	$(8{:}01\frac{1}{2})$	a, k
3935	4		$1535{:}33\frac{3}{4}$	$1540{:}32\frac{3}{4}$	$4{:}59$	$1540{:}44\frac{3}{4}$	$:12$	
3936	2		$1541{:}20\frac{3}{4}$	$1546{:}20\frac{3}{4}$	$5{:}00$	$1546{:}27\frac{3}{4}$	$:07$	
3937	5		$1639{:}41\frac{3}{4}$	$1646{:}39\frac{3}{4}$	$6{:}58$	$1646{:}46\frac{3}{4}$	$:07$	
3938	1		$1646{:}56\frac{3}{4}$	$1653{:}57\frac{1}{2}$	$7{:}00\frac{3}{4}$	$1654{:}05\frac{1}{2}$	$:08$	
3964	4		$1841{:}50$	$1848{:}03$	$6{:}13$	$1848{:}13$	$:10$	
3965	5		$1848{:}19$	$1854{:}40\frac{1}{2}$	$6{:}21\frac{1}{2}$	$1855{:}37\frac{3}{4}$	$:57\frac{1}{4}$	
4155	3	12/21 (355)	$1728{:}59\frac{1}{4}$	$1806{:}18\frac{1}{4}$	$37{:}19$	$1806{:}30\frac{1}{4}$	$:12$	
4864	2	12/23 (357)	$1341{:}11$	$1349{:}12$	$8{:}01$	$1349{:}22$	$:10$	
4865	5		$1349{:}28$	$1352{:}46$	$3{:}18$	$1352{:}54$	$:08$	
4891	3		$1911{:}10\frac{1}{4}$	$1926{:}18\frac{3}{4}$	$15{:}08\frac{1}{2}$	$1926{:}29\frac{3}{4}$	$:11$	

F.N.	FIL.	DATE/DOY	START	STOP (P)	EXP. (P)	STOP (S)	EXP. (S)	Comments
4892	4		$1934{:}41\frac{3}{4}$	$2001{:}03\frac{3}{4}$	$6{:}22$	$2001{:}20\frac{3}{4}$	$:17$	
4894	3		$2050{:}45\frac{1}{4}$	$2114{:}03\frac{1}{2}$	$23{:}18\frac{1}{4}$	$2114{:}13\frac{1}{2}$	$:10$	
4895	1		$2122{:}13\frac{1}{2}$	$2134{:}14$	$12{:}00\frac{1}{2}$	$2134{:}34$	$:20$	
4914	5	12/24 (358)	$1355{:}18\frac{3}{4}$	$1355{:}56\frac{3}{4}$	$:38$	$1356{:}02\frac{3}{4}$	$:06$	
4915	5·		$1356{:}18\frac{3}{4}$	$1406{:}23\frac{3}{4}$	$10{:}05$	$1406{:}31\frac{3}{4}$	$:08$	
4934	1		$1438{:}17\frac{1}{2}$	$1446{:}16\frac{1}{2}$	$7{:}59$	$1446{:}24\frac{1}{2}$	$:08$	
4997	3		$1833{:}13\frac{3}{4}$	$1858{:}11$	$24{:}57\frac{1}{4}$	$1858{:}26$	$:15$	
4998	4		$1902{:}02$	$1912{:}26$	$10{:}24$	$(1913{:}29\frac{3}{4})$	$(1{:}03\frac{3}{4})$	1
4999	3		$2008{:}19$	$2049{:}40\frac{1}{2}$	$41{:}21\frac{1}{2}$	$2054{:}27\frac{3}{4}$	$4{:}47\frac{1}{4}$	

a. Multiple secondaries; i.e., $P + S_1 + S_2$.

b. "ATM Schedule Pad" (Pad) shows: S^L4 12:00, S^L1 10:00, S^L2 5:00, SS 0235.

c. STOP(S) entry could be either $(0226{:}19\frac{1}{2})$ or $(0234{:}19\frac{1}{2})$ implying EXP. (S) to be either $(7{:}02\frac{1}{2})$ or $(15{:}02\frac{1}{2})$, respectively.

d. Pad shows: S^L4 12:00, SS 0327.

e. Pad shows: S^L2 6:00, SS 0337.

f. Pad shows: S^L1 5:00, S^L2 5:00, S^L4 5:00, S^L5 continue to 40K, SS(400K) 1848. Telemetry data noisy.

g. STOP(S) entry could be either (1840:32) or (1848:32) implying EXP. (S) to be either (2:34) or (10:34). No visible image in P.

TABLE 4.   (Concluded)

h. Pad shows: No S^L exposures planned, SS 0019.   Secondary filters unknown.

i. Pad shows: S^L1 7:00, S^L2 5:00, S^L5 7:00, SS 1706. S_1 image may be S^L5 schedule exposure.

j. Pad shows: S^L5 12:00, S^L1 5:00, S^L2 6:00, SS 0104.

k. Pad shows: S^L5 7:00, S^L1 7:00, S^L4 5:00, S^L2 5:00, SS 1556.

l. Pad shows: S^L3 15:00, S^L4 21:00, SS 1925.

s. Stepped-image frame.

APPENDIX

S056 X-RAY FILTER CHARACTERISTICS

Filter	Material	Bandpass ($\overset{\circ}{A}$)*
1	0.500-mil aluminum	8-16
2	0.250-mil aluminum	6-8, 8-22
3	0.086-mil titanium	6-14, 27-47
4	1.000-mil beryllium	6-18
5	3.000-mil beryllium	6-13

*Wavelength region where the product of filter transmission and telescope reflectivity exceeds 10^{-4}.
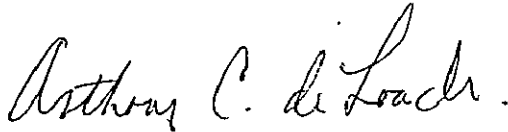
APPROVAL

ATLAS OF SKYLAB ATM/S056 SUPER-LONG EXPOSURES AND STEPPED-IMAGE FRAMES

By Robert M. Wilson

The information in this report has been reviewed for security classification. Review of any information concerning Department of Defense or Atomic Energy Commission programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

This document has also been reviewed and approved for technical accuracy.

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