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SKYLAB EXPERIMENT PERFORMANCE EVALUATION MANUAL

Appendix N: Experiment S183 Ultraviolet Panorama (MSFC), Revision 1

By K. S. Purushotham
Teledyne Brown Engineering Company
Huntsville, Alabama

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NASA-GEORGE C. MARSHALL SPACE FLIGHT CENTER
Marshall Space Flight Center, Alabama 35812

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Revision " 1" Changes

Page	Description
N-7 to N-11	Functional Block Numbers 3.1.1, 3.1.2, 3.1.3, 3.4.1, 3.5.1.1.1.1. Editorial changes only. Functional Block Number 3.3. Changed experiment priority number.
N-13	Functional Block Number 3.5.1.1.1.6. Editorial change only.
N-14	Functional Block Number 3.5.1.2.1.1. Editorial change only.
N-16	Functional Block Number 3.5.2.4. Editorial change only.
N-17	Functional Block Number 3.5.2.6.6. Rewritten to reflect changes in the mission rules.
N-18	Functional Block Number 3.5.2.7.2.2. Rewritten to reflect changes in the mission rules.
N-20	Functional Block Number 3.5.2.7.2.3.1.4. Rewritten to reflect changes in mission rules.
N-21	Functional Block Number 3.5.2.7.2.3.2.5. Rewritten to reflect changes in mission rules.
N-36	Added an additional telemetry measurement.
N-43	Added an additional telemetry measurement.
N-49	Editorial change only.
N-50	Added an additional telemetry measurement.
N-52	Editorial change only.
N-54 to N-56	Replaced telemetry signal to reflect the updated information.
N-57	Added combined telemetry signal profile.
N-63	Contingency Plan O17A2. Added new contingency plan to reflect changes in mission rules. Added an additional malfunction problem and related contingency plan for operation step no. O1.8.
N-64	Rewritten contingency plan O1101A1 and O1101B1 to reflect changes in mission rules.
N-70	Changes made to the references.

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Appendix M: Thomas, O. H., Experiment S-150, Galactic X-Ray Mapping, Teledyne Brown Engineering Company, Inc., Huntsville, Alabama, 1-14-72.

Appendix N: Purushotham, K. S., Experiment S-183, Ultraviolet Panorama, Teledyne Brown Engineering Company, Inc., Huntsville, Alabama, 3-9-72.

APPENDIX N. EXPERIMENT S-183, ULTRAVIOLET PANORAMA (MSFC)

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Prepared By:

K. S. Purushotham

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DEFINITION OF SYMBOLS

A	Analog
$\bar{A}$	All Time
AM	Airlock Module
AMS	Articulated Mirror System
CM	Command Module
CMG	Control Moment Gyro
D	Digital
DAC	Digital Acquisition Camera
E	Event
FBD	Functional Block Diagram
FC	Film Carrousel
FCC	Film Carrousel Container
FCH	Film Carrousel Handle
GMT	Greenwich Mean Time
H	Housekeeping
HOSC	Huntsville Operations Support Center
I	Intermittent
OMSF	Office of Manned Space Flight
OWS	Orbital Workshop
P_{f_n}	Net Probability of Failure
P_{f_t}	Total Probability of Failure
P_s	Probability of Success
R	Real Time
SA	Spectrograph Assembly
SAL	Scientific Airlock
TBD	To Be Determined
TBS	To Be Supplied
TM	Telemetry

SECTION I.

EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS

TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 1 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER*	REMARKS
	MIN.	NOM.	MAX.		
3.0 Analyze and predict facet performance profiles for Skylab Experiment S-183, Ultraviolet Panorama.				N/A	Refer to functional item 3.1.
3.1 Make explicit statements about objectives in qualitative and quantitative terms.				N/A	Refer to functional item 3.1.1.
3.1.1 Specify the time required for S-183 tasks to be performed:				N/A	Crew time is defined as that time required to set up, perform, and stow the S-183 experiment. Experiment S-183 requires 70 ultraviolet (UV) photographs of 24 preselected starfields for two missions. The scheduling of the experiment is ill-defined because the documentation is inconsistent. However, on the basis of the latest information available, it is apparent that the experiment is assigned to SL-2, SL-3 or SL-4 missions. Reference documents 1, 2, 3, and 10.
• SL-2 Mission					
--Crew Time		hr:min			
-Setup		4:25			
-Operation		8:20			
-Stowage		3:20			
• SL-3 or SL-4 Mission					
--Crew Time					
-Setup		4:25			
-Operation		8:20			
-Stowage		3:20			

*Criticality Category Number Definition:

- Category I--Experiment and equipment whose failure could adversely affect crew safety.
- Category II--Experiment and equipment whose failure could result in not achieving a primary mission objective, but does not adversely affect crew safety.
- Category IIIa--Experiment and equipment whose failure could result in not achieving a secondary mission objective, but which does not adversely affect crew safety or preclude the achievement of any primary mission objective.
- Category IIIb--Experiment and equipment whose failure could not result in a loss of primary or secondary mission objectives and does not adversely affect crew safety.

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TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 2 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.1.2 Specify the type of criteria that is to be maximized or minimized.				N/A	

SL-3 Functional Objectives:

Functional Objectives	Starfield No.	Ascension Time (hr:min:sec)	Declination	No. of Exposures
FO-1	1	0:30:8.4	+60°39'22"	2 to 3
FO-2	2	0:34:10.3	+53°37'19"	2 to 3
FO-3	3	1:22:31.5	+59°58'34"	2 to 3
FO-4	4	2:18:51.2	+55°37'5"	2 to 3
FO-5	5	3:25:00.1	+59°46'5"	2 to 3
FO-6	6	3:32:55.5	+48°1'41"	2 to 3
FO-7	7	3:44:30.4	+23°57'8"	2 to 3
FO-8	8	3:46:22.6	+32°56'23"	2 to 3
FO-9	9	5:03:00.2	+41°10'8"	2 to 3
FO-10	10	5:10:55.3	-12°59'57"	2 to 3
FO-11	11	5:16:43.0	+33°54'28"	2 to 3
FO-12	12	5:22:26.9	+6°18'22"	2 to 3

SL-3 or SL-4 Functional Objectives:

Functional Objectives	Starfield No.	Ascension Time (hr:min:sec)	Declination	No. of Exposures
FO-1	13	5:29:30.6	-7°20'13"	2 to 3
FO-2	14	5:32:23.8	+24°09'30"	2 to 3
FO-3	15	5:33:40.5	-1°13'56"	2 to 3
FO-4	16	6:11:33.3	+17°55'20"	2 to 3
FO-5	17	6:26:18.9	-32°32'51"	2 to 3
FO-6	18	6:30:12.0	+7°22'16"	2 to 3
FO-7	19	6:51:52.0	-11°58'29"	2 to 3
FO-8	20	7:16:49.0	-26°29'36"	2 to 3
FO-9	21	7:32:02.4	-36°13'43"	2 to 3
FO-10	22	7:56:17.4	-45°26'31"	2 to 3
FO-11	23	8:45:25.0	-56°35'7"	2 to 3
FO-12	24	8:48:03.9	-45°7'16"	2 to 3

TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 3 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.1.3 Specify the percentage of acceptable max./min. for each criterion.	33.12%	66.2%	100%	N/A	The minimum acceptable percentage of 33.12% is derived as follows. Photographing of each starfield is considered to be a functional objective. It is required to photograph 24 starfields and is desired to get 3 exposures of each starfield (4.15%). Take at least one exposure of starfield; this constitutes one-third of the desired 4.15% or 1.38% of total objective. The experiment has 24 functional objectives in SL-2 and SL-3 or SL-4 missions. Hence, (24)(1.38%) = 33.12%, the minimum acceptable percentage for each criterion. The above values are subjective estimates.
3.1.4 Specify the experiment constraints and operational tolerances: • Musts • Must Nots • Wants • Don't Wants.				N/A	• Musts --Experiment S-183 must time-share the (-Z) Anti-solar Scientific Airlock with Experiments S-019, S-063, T-027/S-073, and S-149. --The Control Moment Gyro (CMG) dumps and thruster firings must be inhibited during S-183 experiment operation. --Any external lights less than 6000 Å which might reflect light into the experiment must be off during the operation of the experiment. --All ports or windows that might reflect light of less than 6000 Å in the experiment must be covered. --Crew motions must be restricted during the experiment operation. • Must Nots --Experiment S-183 must not be performed during the daylight position of the orbit. It is only performed during the dark portion of the orbit. --Experiment S-183 must not operate concurrently with Experiment M-509, T-013, or T-020. • Wants --The S-019 Articulated Mirror System (AMS) should be evacuated and stowed within 30 min of experiment disassembly for stowage. --It is desired that Experiment S-183 be performed as close to the operation of Experiment S-019, Ultraviolet Stellar Astronomy, as possible. This is done to ensure that performance of photographic film is similar and that the results of the two experiments are directly comparable. --Spacecraft pointing accuracy is to be ±2° of solar inertial reference to ensure easy target access and recognition through the finder telescope. --Internal lighting of 0.5 ft-c is required to perform the experiment. --The experiment line of sight shall be aligned to within ±30 arc minutes of each selected starfield. Note: No instrumentation is planned for use in orbit to verify that the above requirements will be met during experiment operation. If the experiment operation or data is degraded by operation of the lights outside the specified limits, instrumentation should be provided to ensure that experiment data are valid. Otherwise, limits should be specified as approximate guidelines rather than requirements. --Tape recording is required of crew comments during operation of S-183.

TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA — FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 4 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.1.4 (Concluded)					--It is desired that Experiment S-183 be demounted and stowed per procedure if the observing and photographing periods are separated by more than 12 hr. This will minimize exposure time to radiation. --Time correlation to within ±1.0 sec Greenwich Mean Time (GMT) will be required with the Shutter Open timing signal. • Don't Wants --N/A Reference documents 2 and 4.
3.2 Define decision rules and success criteria for experiment objectives.				N/A	If the experiment is aborted, then the probability of success (P_s) is equal to 0.0. If the experiment is compromised and minimum information is salvaged, $P_s = 0.1 - 0.5$; if the maximum information is salvaged, $P_s = 0.5 - 0.9$. If the experiment is completed as scheduled, $P_s = 1.0$. These values are subjective estimates.
3.3 Specify the experiment priority (numerical statement) for a given Skylab flight designation.				N/A	Experiment S-183 (FO-1 through FO-12) will be scheduled on the SL-2 mission and the experiment priority number is 490. Experiment S-183 will again be performed on the SL-3 or SL-4 mission, and its priority number is TBD. Also refer to functional item 3.1.1. Reference documents 4, 10 and 13.
3.4 Briefly describe and list the major subsystems for Experiment S-183.				N/A	Refer to functional items 3.4.1 and 3.4.2.
3.4.1 Describe the major functions.				N/A	Experiment S-183 is designed to study the hot stars that are distributed in different regions of the sky in relation to the Milky Way. The color indices of these stars will be obtained from the spectro-photometry of S-183 in the spectral regions centered at 1800 Å to 3100 Å. Each of the two spectral regions will appear as bands with a full width at half maximum of 600 Å. Experiment S-183 uses the -Z Anti-solar Scientific Airlock (SAL) during programmed night passes. In order to obtain the desired experiment pointing, the S-019 AMS is used. The AMS is installed on the SAL and the S-183 Spectrograph Assembly (SA), in turn, is installed on the AMS for experiment operation. A film carrousel and a Data Acquisition Camera (DAC) with film will be installed in the SA. The film carrousel and DAC 16mm film will simultaneously record UV photographs of each starfield. The SA is an electrically operated system that requires spacecraft power. A control panel has been provided to control and monitor functions of SA. Reference documents 2 and 4.

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TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 5 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.4.2 List major components.				N/A	The major subsystem components are: • S-019 Articulated Mirror System • S-183 Spectrograph Assembly • Film carrousel • Film storage container • Blank film door • DAC interface cable • SAL power cable • SAL instrumentation cable • Support fixture. Reference documents 2 and 4.
3.5 Define the S-183 Experiment/ Carrier subsystem interface: • Physical --Mechanical --Electrical --Communication and Data --Support • Environmental --Natural and Induced --Contamination • Operational --Pointing and Control --Crew Safety --Sequence --Operability				N/A	A set of Functional Block Diagrams (FBD) is submitted as Figure N-1 and is used as a sub-system component listing. Critical subsystem components will be identified and evaluated for failure and correlated to possible experiment/carrier interface problems. Reference documents 2 and 4.
3.5.1 S-019 Articulated Mirror System				N/A	Refer to functional item 3.5.1.1.1.1
3.5.1.1.1.1 Specify the total probability of failure (P_{f_t}) and the net prob-		$P_{f_t} = 0.1$		IIIb	This mechanism is located in the AMS and allows the operator to manually control the extension or retraction of the mirror through the -Z SAL. The movement of the mirror is controlled by a knob that has graduations marked on it to display the position of the mirror

TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 6 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.5.1.1.1.1 (Concluded) ability of failure (P_{f_n}) for the mirror extension mechanism.	0	$P_{f_n} = 0.04$ $P_{f_n} = 0.06$	14 in.	N/A	as it is extended or retracted. As the knob is rotated, the torque is transmitted through a double-sealed shaft to a beveled gear set and a roller chain sprocket set. This roller chain drives the spline of the ball spline assembly of the rear dynamic plate. The ball spline assembly contains a sprocket which drives four ball nut assemblies on four ball screws by means of a synchronized chain drive. This action moves the rear dynamic plate through a total travel of 12.12 in. from full extension to full retraction. The chain drive simultaneously drives four sprockets, which, in turn, drive four ball nut assemblies on the front dynamic plate. The front dynamic plate moves through 12.12 in. total travel from full extension to full retraction. The four ball nuts ride on four hollowed ball screws with internal piston cylinders which are a part of the jettison system. The ball screws are located within outboard guide rails which are externally teflon-coated. This design provides for very accurate alignment of the forward state and mirror fork assembly during the transition stage of extension. All bearings are anti-friction units. The extension mechanism is essentially backlash-free to provide positive control of the mechanism. If the mechanism were to fail, the following situations could occur: • Mechanical --The mismatching of gears could bind the gears and, if the astronaut were to exert an undue torque on the extension mechanism knob, there is a possibility that the gears would break. A loose chain may prevent the full extension of the mirror even though the display on the knob is indicating full extension. • Environmental --There is a possibility of moisture remaining in the mirror canister after it is stowed and evacuated. It is not known whether all of the moisture can be removed. The remaining moisture could cause the intricate mechanism to freeze or bind, and the mechanism may fail to operate. If the extension mechanism fails to retract while the mirror is in an extended position, the SAL outer door cannot be closed. A jettisoning device will be used to jettison the mirror mechanism. The following indications can be used to determine the failure of components of the mirror extension mechanism: • It requires approximately 13 turns of the extension knob to completely extend the mirror. Continuous rotation of the knob beyond 13 turns is an indication that the roller chain drive or the synchronized chain drive has failed. • Intermittent slip of the extension knob is an indication of broken gears of the beveled gear drive. • Tight rotation of the extension knob indicates that the ball screws are binding. Reference document 6.

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TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 7 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.5.1.1.1.2 Specify the P_{f_t} for the Mirror jettisoning mechanism.		nil		IIIb	This mechanism allows the operator to jettison the mirror during experiment operation in the event of a mechanical failure in the tilt, rotation, and extension mechanism. This device operates on the entire range of the extension mechanism. The jettisoning mechanism utilizes two high-pressure CO_2 bottles for ejection purposes. The jettisoning mechanism consists of: • A latch mechanism to separate the forward structure from the mounting plate. • The jettison cylinders/pistons to guide and impart motion to the forward section to be jettisoned. A four-position, single knob controls both mechanisms. This jettisoning device has a very high reliability and the probability of failure is nil. If the mechanism should fail, the following situation could occur: • Mechanical --It would be impossible to eject the mirror mechanism. The following indications can be used to determine the failure of the ejection mechanism: • If no thump feeling is felt when the ejection lever is operated, it is an indication of ejection mechanism failure. • A sight through the finder telescope would indicate whether the mechanism has been ejected or not. • If the SAL door cannot be closed, it is an indication that the mirror mechanism has not been ejected. Reference document 6.
3.5.1.1.1.6 Specify the P_{f_t} and P_{f_n} for the tilt-drive mechanism.		$P_{f_t} = 0.1$ $P_{f_n} = 0.07$		IIIb	The tilt-drive mechanism is controlled by a knob located on the top right side of the rear canister. This mechanism allows the astronauts to manually control the tilt movement of the mirror. This mirror rotates through 20° with zero reference being the tilt position of 45° to the -Z (dynamic) axis. The overall pointing accuracy of the mechanism should be approximately ±0.5° . This mechanism consists of the differential gear drive pinion, fork assembly, and digital counter gear train. If the tilt-drive mechanism were to fail, the following situations could occur: • Mechanical --It could fail to function due to the jamming of gears or the freezing of bearings or binding of ball assembly that moves the fork base plate. If the mirror tilt mechanism is jammed in other than its zero reference axis, it would be difficult to retract the mirror into the mirror canister, thus preventing the SAL door from being closed. In such an event, it would become necessary to eject the entire mirror mechanism.

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TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 8 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.5.1.1.1.6 (Concluded)		$P_{f_n} = 0.03$			• Environmental --Refer to functional item 3.5.1.1.1.1, Environmental. The following indications can be used to determine the failure of the mirror tilt-drive mechanism: • Binding of the tilt knob is an indication of frozen bearings, frozen tangent arm on tilt ring gear, or binding of gears. • Slippage of the tilt knob indicates that the gears are broken in the tilt mechanism drive train. • Failure of the Tilt Display to register any change in the movement of the mirror indicates that the tilt gear mechanism has malfunctioned. Reference document 6.
3.5.1.1.1.7 Specify the P_{f_t} and P_{f_n} for the mirror rotation mechanism.		$P_{f_t} = 0.1$ $P_{f_n} = 0.07$ $P_{f_n} = 0.03$		IIIb	The mirror rotation mechanism is controlled by the rotation knob located on the top left side of the rear canister. The mirror can be rotated either in a clockwise or counterclockwise direction through 360°, the zero reference being a mirror rotation position of 45° to the +X axis (dynamic). Overall pointing accuracy should be within ±0.5°. If the mirror rotation mechanism were to fail, the following situations could occur: • Mechanical --The mirror could fail to rotate if the ring drive pinion is jammed. In the event of such a failure, the mirror should be jettisoned if the mirror assembly cannot be retracted and thereby preventing the closure of the SAL door. • Environmental --Refer to functional item 3.5.1.1.1, Environmental. The following indications can be used to determine the failure of the mirror rotation mechanism: • Refer to applicable paragraph under functional item 3.5.1.1.1.6. Reference document 6.
3.5.1.2.1.1 Specify the P_{f_t} for the front seals.		nil		IIIb	These seals are located on the front side of the canister, which interfaces with the Anti-solar SAL (-Z SAL). The P_{f_t} for the front seal is small. If the seal were to fail, the following situation could occur: • Mechanical --It could cause cluster leakage of (TBD/hr) to outer space.

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TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 9 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.5.1.2.1.1 (Concluded)					The following indications can be used to determine the failure of the front seals: • Any whistling or hissing noise detected between the interfaces of the S-019 AMS and the SAL. • Suction of a piece of paper held near the interface of SAL and S-019 AMS. Reference document 7.
3.5.1.2.1.2 Specify the P_{f_t} for the rear seals.		nil		IIIb	Rear seals are located in the rear side of the canister which interfaces with the S-183 SA or S-019 optical canister. The P_{f_t} for the rear seals is small. If the seals were to fail, the following situation could occur: • Mechanical --The mirror and other optical equipment in the SA and S-019 mirror system would be contaminated, causing degradation of their optical quality. The following indications can be used to determine the failure of the rear seals: • Refer to applicable paragraph under functional item 3.5.1.2.1.1. Reference document 2 and 4.
3.5.1.2.2 Specify the P_{f_t} for the Seaton-Wilson Vent Valve		nil		IIIb	This valve is located on the top of the front section of the AMS and has a cap. The valve is used to pressurize or depressurize the canister, as required. The P_{f_t} for this valve is small. If the valve should fail, the following situation could occur: • Mechanical --If the valve is frozen, it will be impossible to pressurize or depressurize the AMS. --If the valve leaks, the mirror and the optics may fog, causing degradation of the film and the optics. The following indications can be used to determine the failure of the Seaton-Wilson valve: • If the valve cannot be depressed, it is an indication that the valve is frozen in the closed position. Reference documents 2, 4, and 8.
3.5.2 S-183 Spectrograph Assembly.				N/A	Refer to functional item 3.5.2.1.3.

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TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 10 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.5.2.1.3 Specify the P_{f_t} for the reticle lights.		nil		IIIb	The reticle lights illuminate the reticle and are located in the finder telescope. The lighted reticle assists in centering the star and in noting any drift rates. The P_{f_t} for this light is small. If the light should fail, the following situation could occur: • Electrical --It would be difficult to verify the starfield zone sighted. The following indications can be used to determine the failure of the reticle lights: • If the lights fail to illuminate when the switch is turned on, it is an indication that the lamps have failed. If the light is on and off intermittently, it may indicate faulty contact in the reticle light switch positions. Reference document 8.
3.5.2.4 Specify the P_{f_t} for the power cable.		0.1		IIIb	This cable provides spacecraft power to the SA and all its electrical functions. The experiment end of the cable will have a microdot connector to mate with the SA power connector. The othe end of the cable will have a zero-g connector to mate with OWS -Z (anti-solar) SAL power connector. If the cable should fail, the following situation could occur: • Electrical --Power failure could occur if the cable is open or shorted. This would result in loss of the experiment. The following indications can be used to determine the failure of the power cable: • Reticle lights not lighted • Film plate indicator light not lighted. Reference document 9.
3.5.2.6.6.2 Specify the P_{f_t} for the automatic power supply cut-off system.		0.1			The automatic power supply cut-off system is designed to guard the SA electrical motors against overheating. To do this the system checks the input drive signal and cuts off the general power supply to the system at the end of a certain time, if the circuit senses an open winding in the motor circuitry or a continuous input drive signal (not an impulse signal). If this system should fail, the following situation could occur: • Electrical --If this circuit fails, the power supply to the affected area could not be cut off. This might cause either the magazine motor to advance continuously or the film transport mechanism to operate continuously--depending on which motor circuit is affected.

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TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 11 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.5.2.6.6.2 (Concluded)					The following indications can be used to determine the failure of the automatic power supply cut-off system: • No audible or visual indications are available to verify the failure of the automatic power supply cut-off system. Reference documents 4 and 8.
3.5.2.6.6.3 Specify the P_{f_t} for the shutter motor command circuit.		0.1		N/A	This circuit controls the shutter motor to either open or close the experiment's shutter, as required. If this circuit should fail, the following situation could occur: • Electrical --The shutter would remain in open or closed position. If the shutter remains open at all times, it may degrade the film plates. If the shutter remains closed, it could be opened manually and the experiment may be continued. The following indication could be used to determine the failure of the shutter motor command circuit: • If the K7000 telemetry signal that is generated each time the shutter opens is not received by Ground Control. Reference documents 4 and 8.
3.5.2.6.7 Specify the P_{f_t} for the film plate indicator.		nil		IIIb	The film plate counter indicates the number of a film plate between two picture taking cycles (standby position), and it shows the number of the next picture to be taken. During a cycle (operate position), it shows the number of the plate being exposed. If the indicator were to fail, the following situation could occur: • Electrical --If a failure occurs in the film plate circuitry, the numbers will not light. This would make it difficult to determine how many film plates were left or already exposed. The following indications can be used to determine the failure of film plate counter: • If the light does not appear on the film plate counter and yet audible noise of the components of the SA is heard, it indicates that a failure has occurred in the film plate counter power supply circuit. • If the numbers on the counter do not change as the magazine advances, it indicates failure of the counter advance logic circuit. Reference documents 4, 8, and 9.

S&E-ASTN-OT(6-71)

TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 12 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.5.2.7 Cameras				N/A	Refer to functional item 3.5.2.7.2.2.
3.5.2.7.2.2 Specify the P_{f_t} for the shutter mechanism.		0.2		IIIb	The shutter is located immediately behind the entrance pupil. The shutter is operated by an electric motor which requires 28 Vdc nominal and approximately 23.2 W of power for opening and closing the shutter. If the shutter mechanism should fail, the following situation could occur: • Mechanical --Refer to functional item 3.5.2.6.6.3. The following indications could be used to determine the failure of shutter mechanism: • Refer to applicable paragraph under functional item 3.5.2.6.6.3. Reference document 8.
3.5.2.7.2.3.1.1.1. Specify the P_{f_t} for the SC-5 film.		0.2		IIIb	SC-5 type film is used in the S-183 Spectrograph Camera. The film is coated with an ultraviolet-sensitive emulsion. Type SC-5 is currently provided on a 5.2 mil triacetate clear base in 35mm x 180mm film strips. But the emulsion will have to be on 2- by 3-in. flat glass plates for the S-183 experiment. It is assumed that the film strips are cemented to the glass plates. These glass plates are mounted on a frame made of teflon-treated Delrin. The sensitivity of the film plate is 0.12μ x 0.50μ. Care should be taken to keep the film in such an environment where the temperature is not to exceed 80 °F, relative humidity 45% ±15% and radiation exposure changes to be $\Delta D = 0.30$ for a 28-day mission. If the film should degrade, the following situation could occur: • Environmental --Temperature and humidity -The SC-5 type film used in this experiment is one of the most temperature/humidity-sensitive films in the corollary experiments. Prediction of the effect on the final photographic image of any given temperature/humidity condition is complicated by the variability of the film itself. There is an appreciable variation in film response between different strips of film from the same emulsion batch and even more variation between different emulsion batches. Any prediction of the effect of temperature/humidity conditions is, consequently, a more or less educated guess. -Low pressure and low humidity will also affect the film. The film is exposed to near-vacuum conditions during experiment operation. The resulting low relative humidity will produce the major effects attributable to the film emulsion's reaction to the low pressure. The manner in which the SC-5 film

TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 13 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.5.2.7.2.3.1.1.1 (Concluded)					is mounted for use in the Experiment S-183 carrousel could result in an outgassing problem under near-vacuum pressure conditions. Type SC-5 emulsion is currently only provided on a 5.2 mil triacetate clear base in 35mm x 180mm film strips. For Experiment S-183 the emulsion will have to be on flat glass plates. It is understood that the suggested method of supplying the glass plates is to cement the standard SC-5 film to the glass plates. As mentioned above, outgassing of emulsion and cement could occur. Such an outgassing could cause the film to peel off the plates, curl up, and jam the film transport mechanism. Outgassing could result in contamination of the mirrors and other optical devices in the S-183 equipment, causing degradation of experiment data. -It is suggested that tests and further investigation be undertaken in this area. --Radiation: -The radiation changes should not exceed $\Delta D = 0.030$ for a 28-day mission. Excess radiation will cause the film to fog and destroy its photographic quality. There is no visual or any other means to determine that the film has failed. However, the OWS film vault contains a dosimeter that gives a gross indication of film integrity as correlated against predicted radiation damage. Reference documents 2, 4, and 11.
3.5.2.7.2.3.1.3 Determine the P_{f_t} for the film carrousel advance stepper motor.		Nil		IIIb	This motor is located inside the SA and advances the film carrousel in steps through a system of reduction gears. Advancement of this carrousel takes place after each plate is exposed and returned to the carrousel. Logic circuits control the proper movement of this motor. This motor requires 28 Vdc nominal and 15.96 W for operation. It is estimated that P_{f_t} for the motor is small. If the motor should fail, the following situation could occur: • Electrical --If the motor should fail because of a malfunction in its electrical system, the carrousel will not advance, thus causing a loss of the experiment. The following indications could be used to determine the failure of the carrousel advance stepper motor: • As the carrousel advances each time, the number on the film plate counter should change. No change indicates that a failure might have occurred in the motor circuit. • If no audible pulses are heard from the stepper motor, it is an indication of a failure of the motor. Reference document 9.

S&E-ASTN-OT(6-71)

TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 14 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.5.2.7.2.3.1.4 Specify the P_{f_t} for the reduction gears.		0.1		IIIb	These gears reduce the speed of the stepper motor. The gears are made of stainless steel and delrin. If the gears should fail, the following situation could occur: • Mechanical --A malfunction of these gears could be caused by improper matching or mismatching of the gears. If this malfunction should occur during experiment operation, the SA will shut off automatically. This would result in substantial loss of experiment data. The experiment will be continued with the use of the DAC camera. The following indications can be used to determine the failure of the reduction gears: • The numbers on the film plate counter do not change. • The stepper motor audible clicks could be heard for 20 to 40 sec, and it will shut off automatically. Reference documents 4 and 8.
3.5.2.7.2.3.2 Specify the P_{f_t} for the film transport mechanism.		0.1		IIIb	The film transport mechanism is located inside the SA structure. It consists of an electrical motor (stepper), guiding frame, springs, and gears. The gears are made of stainless steel. It requires 28 Vdc nominal and 31.5 W of power per exposure. An exposure consists of removing the film plate from the magazine, transporting it to the focal plane, and returning the plate to the magazine. This mechanism transfers the film plate from the magazine to the focal plane. At this time a microswitch is triggered and a signal is telemetered to the ground through the AM Data System, indicating that the film is in the focal plane. After the completion of exposure, the film is returned to the magazine. Also at this time the second microswitch is triggered to send a signal by telemetry to ground indicating that the film-plate has returned to the carrousel. The measurement numbers are: Measurement No. — Event K7001 — Film plate in focal plane. K7002 — Film plate returned to magazine. If this mechanism should fail, the following situation could occur: • Mechanical --This mechanism is of a very delicate construction and could fail because of jamming of gears, misalignment of film plate in the guiding grooves and failure of the cam to push the film plate to correct focal plane. If this mechanism failed to operate, it would result in substantial loss of experiment data. Experiment will be continued with the use of the DAC camera.

S&E-ASTN-OT(6-71)

TABLE N-I. EXPERIMENT S-183, ULTRAVIOLET PANORAMA PRE-FLIGHT OPERATIONS EVALUATION ANALYSIS (Sheet 15 of 15)

FUNCTIONAL BLOCK NUMBER AND TITLE	EXPECTED RANGE AND DIMENSION OF VARIABLES			CRITICALITY CATEGORY NUMBER	REMARKS
	MIN.	NOM.	MAX.		
3.5.2.7.2.3.2 (Concluded)					The following indications could be used to determine the failure of this mechanism: • The sequence light will not go off after each exposure is completed. • Failure to receive a K7001 S183 signal indicates that a failure occurred during the transfer of film plate from the magazine to the focal planes. • Failure to receive K7002 S183 signal indicates that the film plate has not returned to magazine. Reference documents 8 and 9.
3.5.2.7.2.3.2.5 Specify the P_{f_t} for the "off-course" microswitches.		0.2		IIIb	These microswitches are provided to identify the positions of film plates in the SA camera. In addition to providing telemetry signals to tell the position of film plates, they are connected to the logic circuits to assist in carrying out the proper sequence of operation of film transport and film carrousel mechanism. If the switches were to fail, the following situation could occur: • Electrical --The camera mechanism will cease to function. This would result in substantial loss of experiment data; however, the experiment will be continued with the use of the DAC camera. The following indications can be used to determine the failure of the "off-course" microswitches: • Refer to applicable paragraph under functional item 3.5.2.6.7.2.3.2. Reference documents 2, 4, and 9.

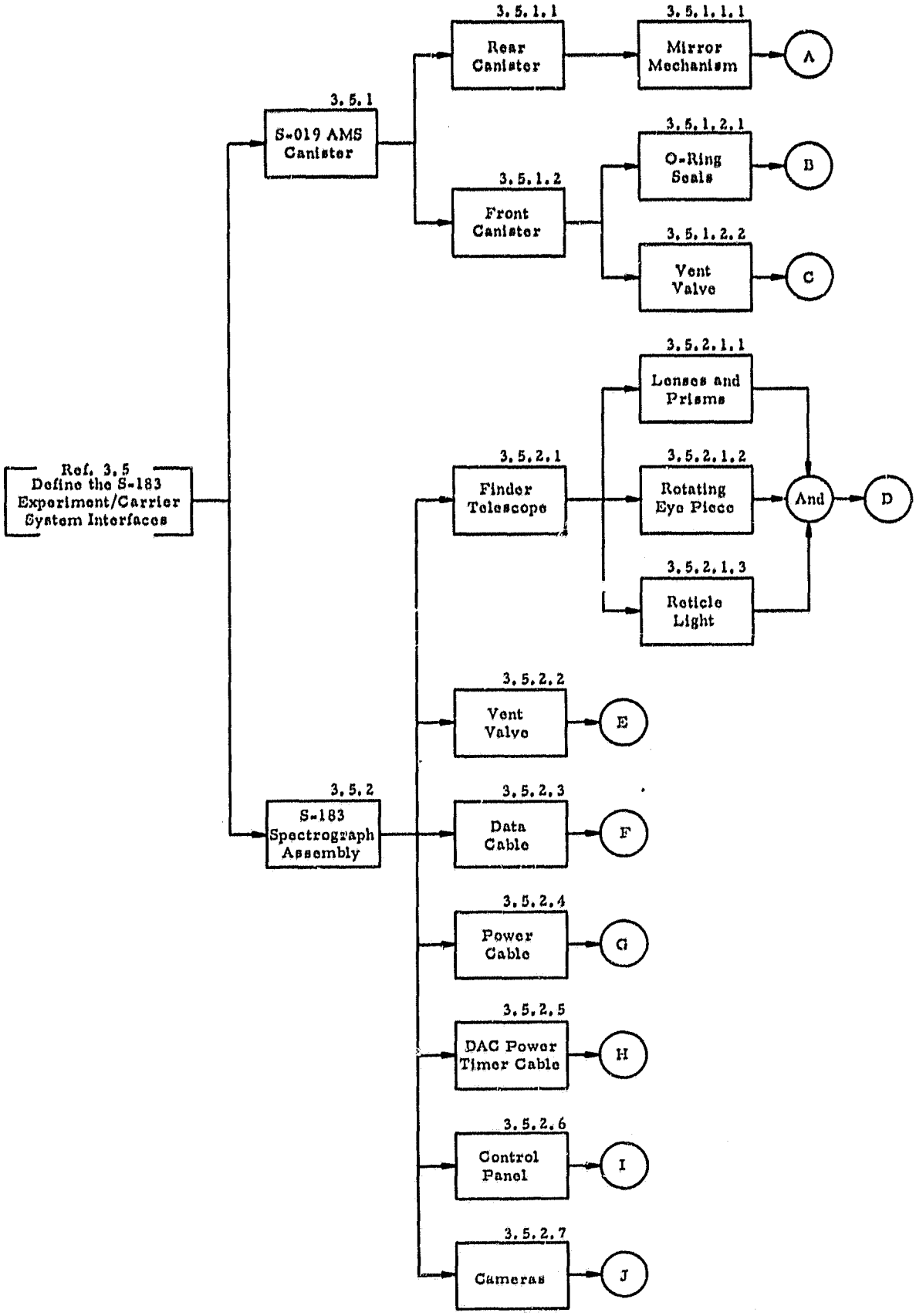


FIGURE N-1. EXPERIMENT S-183, ULTRAVIOLET PANORAMA FUNCTIONAL BLOCK DIAGRAM (Sheet 1 of 9)

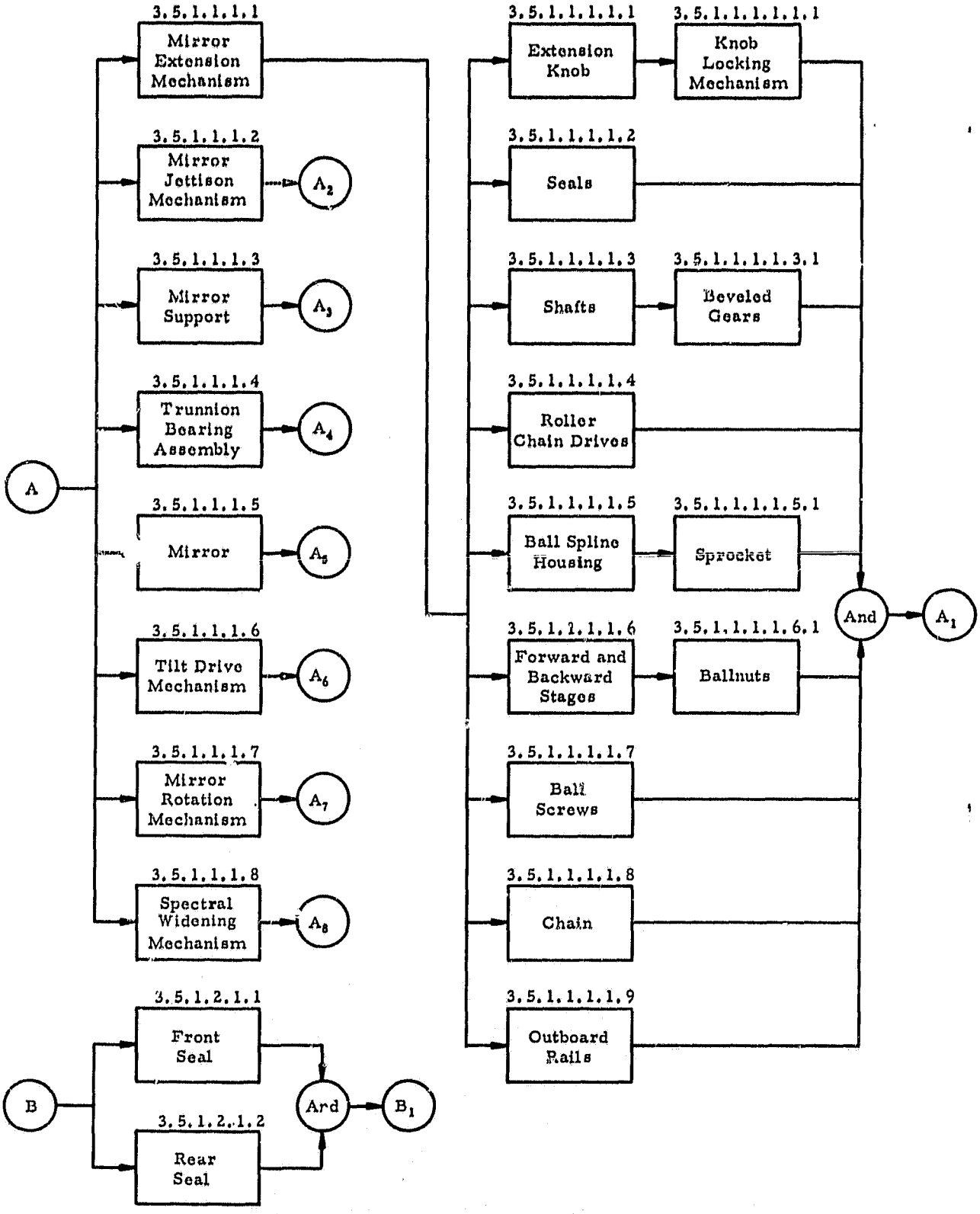


FIGURE N-1. EXPERIMENT S-183, ULTRAVIOLET PANORAMA FUNCTIONAL BLOCK DIAGRAM (Sheet 2 of 9)

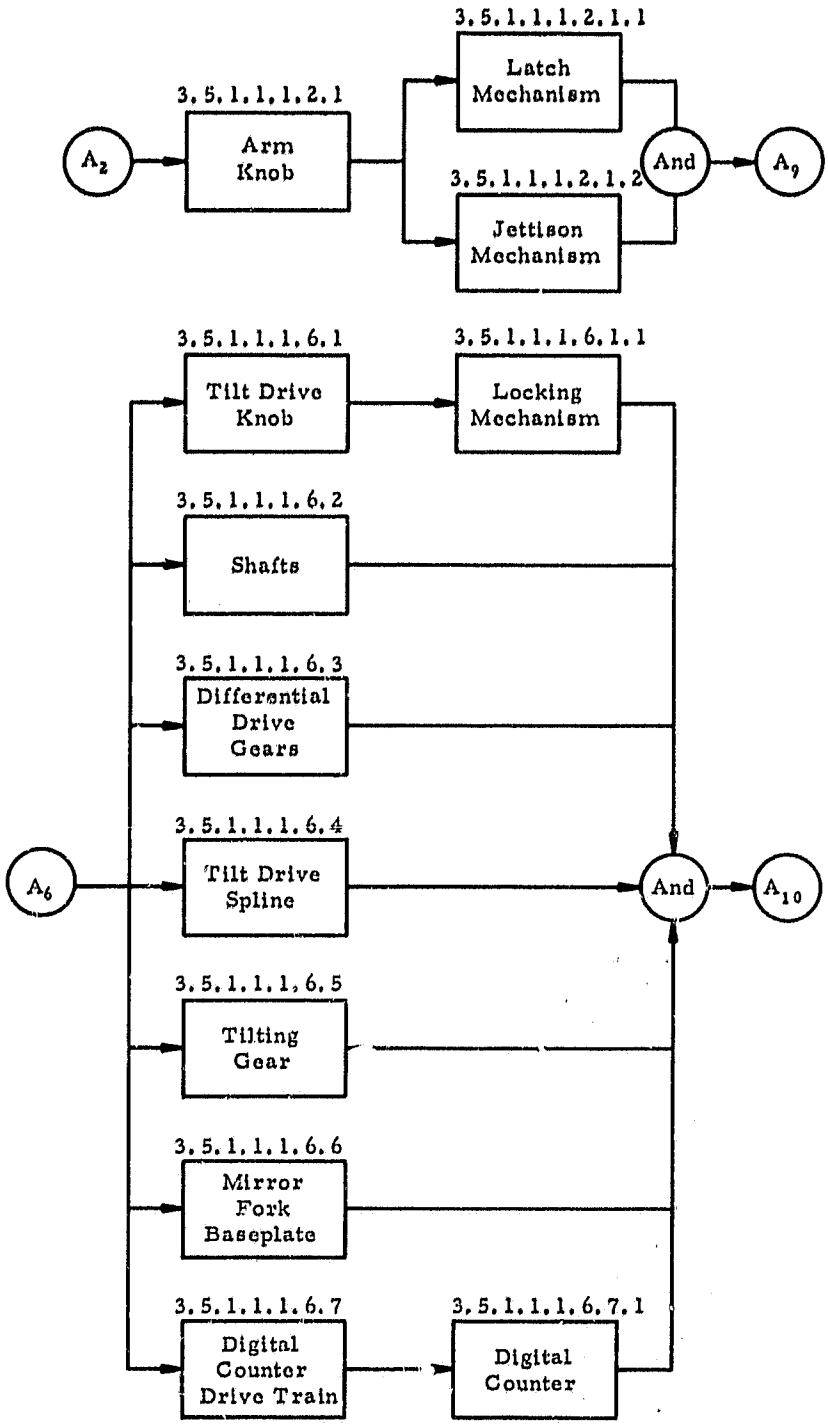


FIGURE N-1. EXPERIMENT S-183, ULTRAVIOLET PANORAMA FUNCTIONAL BLOCK DIAGRAM (Sheet 3 of 9)

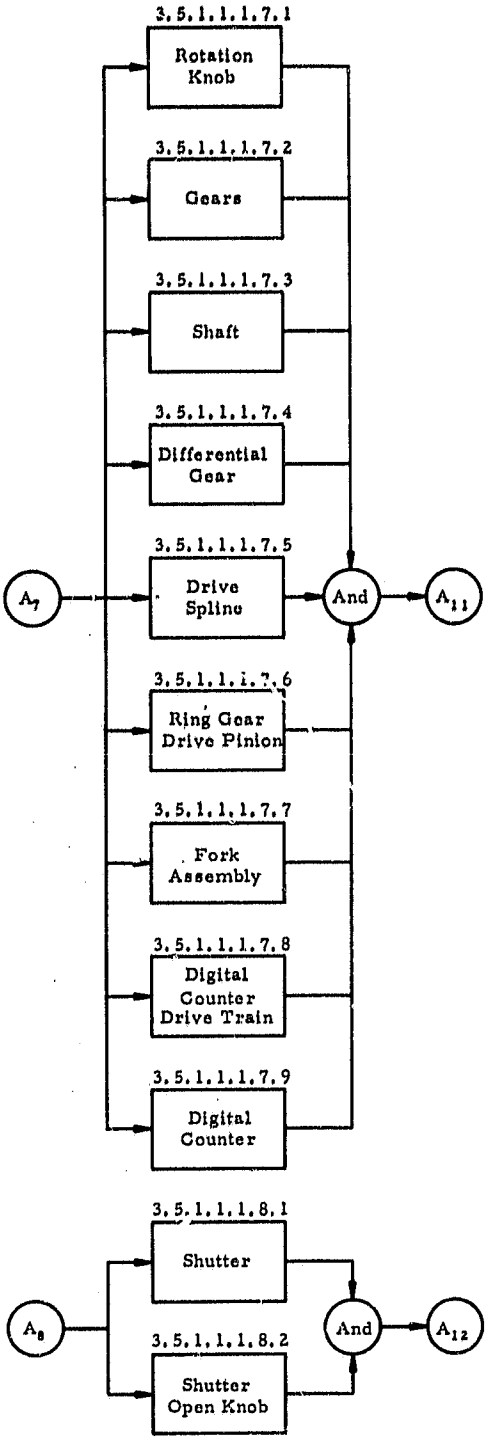


FIGURE N-1. EXPERIMENT S-183, ULTRAVIOLET PANORAMA FUNCTIONAL BLOCK DIAGRAM (Sheet 4 of 9)

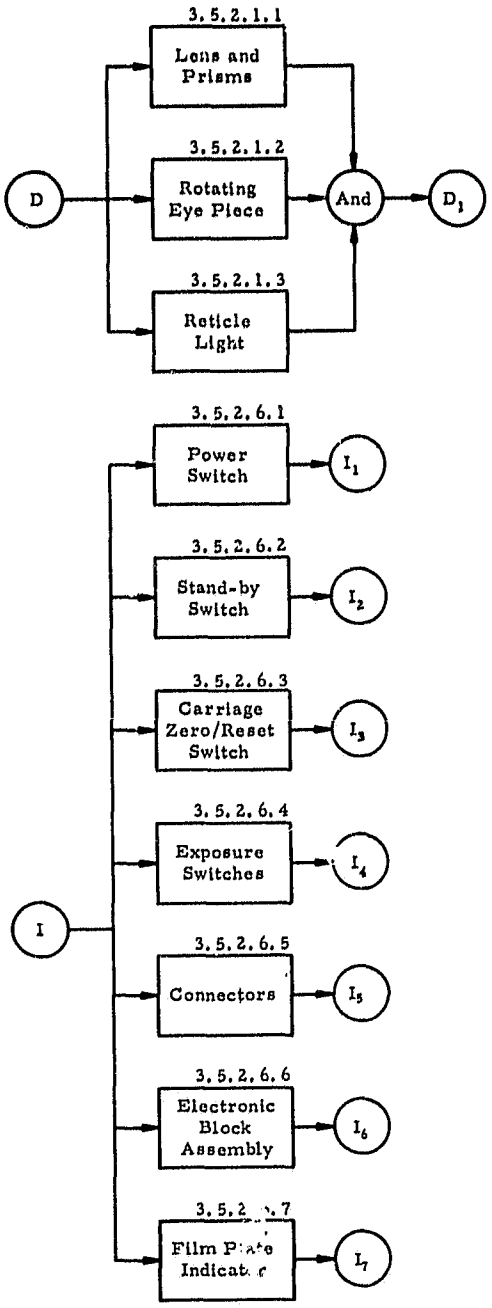


FIGURE N-1. EXPERIMENT S-183, ULTRAVIOLET PANORAMA FUNCTIONAL BLOCK DIAGRAM (Sheet 5 of 9)

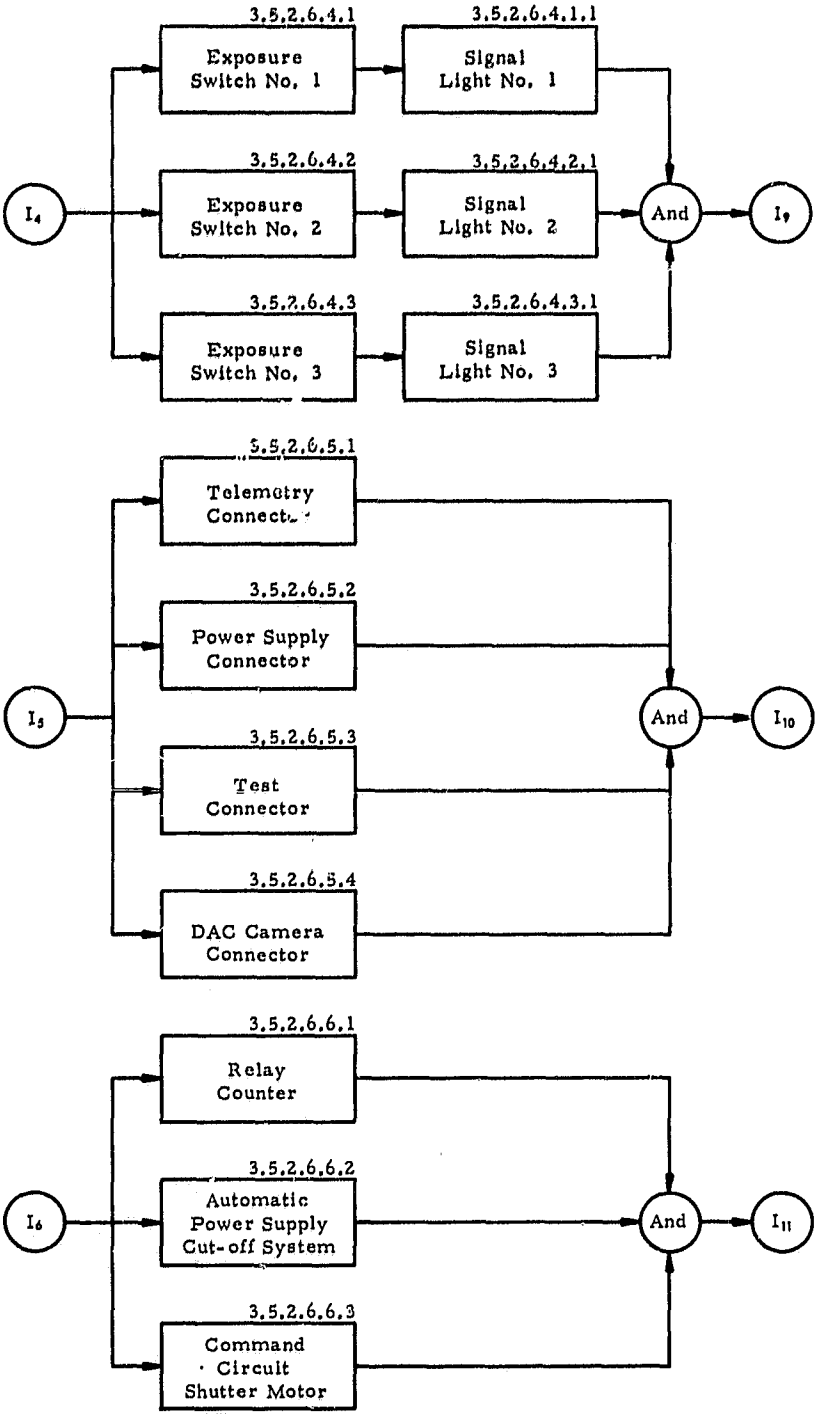


FIGURE N-1. EXPERIMENT S-183, ULTRAVIOLET PANORAMA FUNCTIONAL BLOCK DIAGRAM (Sheet 6 of 9)

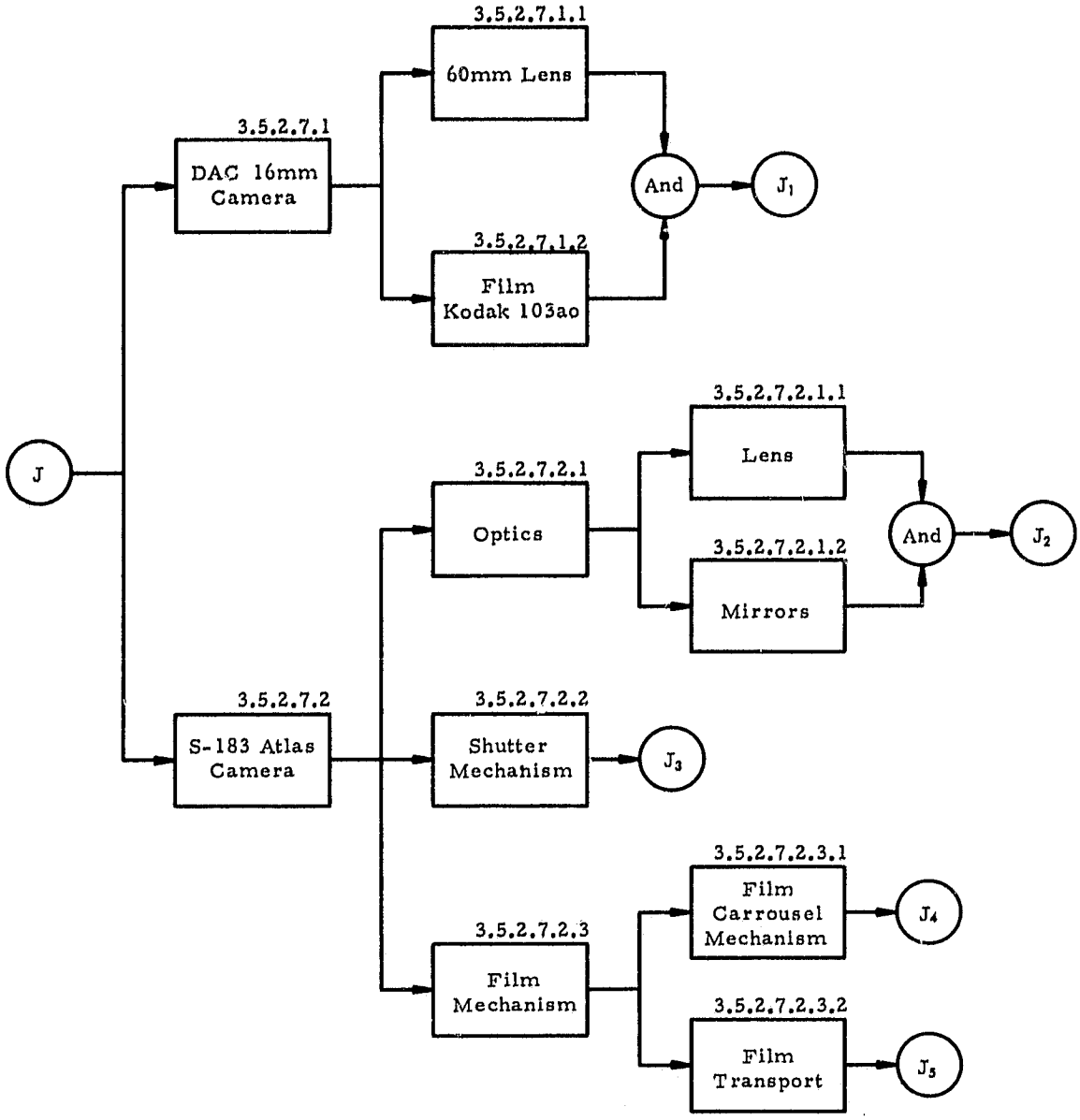


FIGURE N-1. EXPERIMENT S-183, ULTRAVIOLET PANORAMA FUNCTIONAL BLOCK DIAGRAM (Sheet 7 of 9)

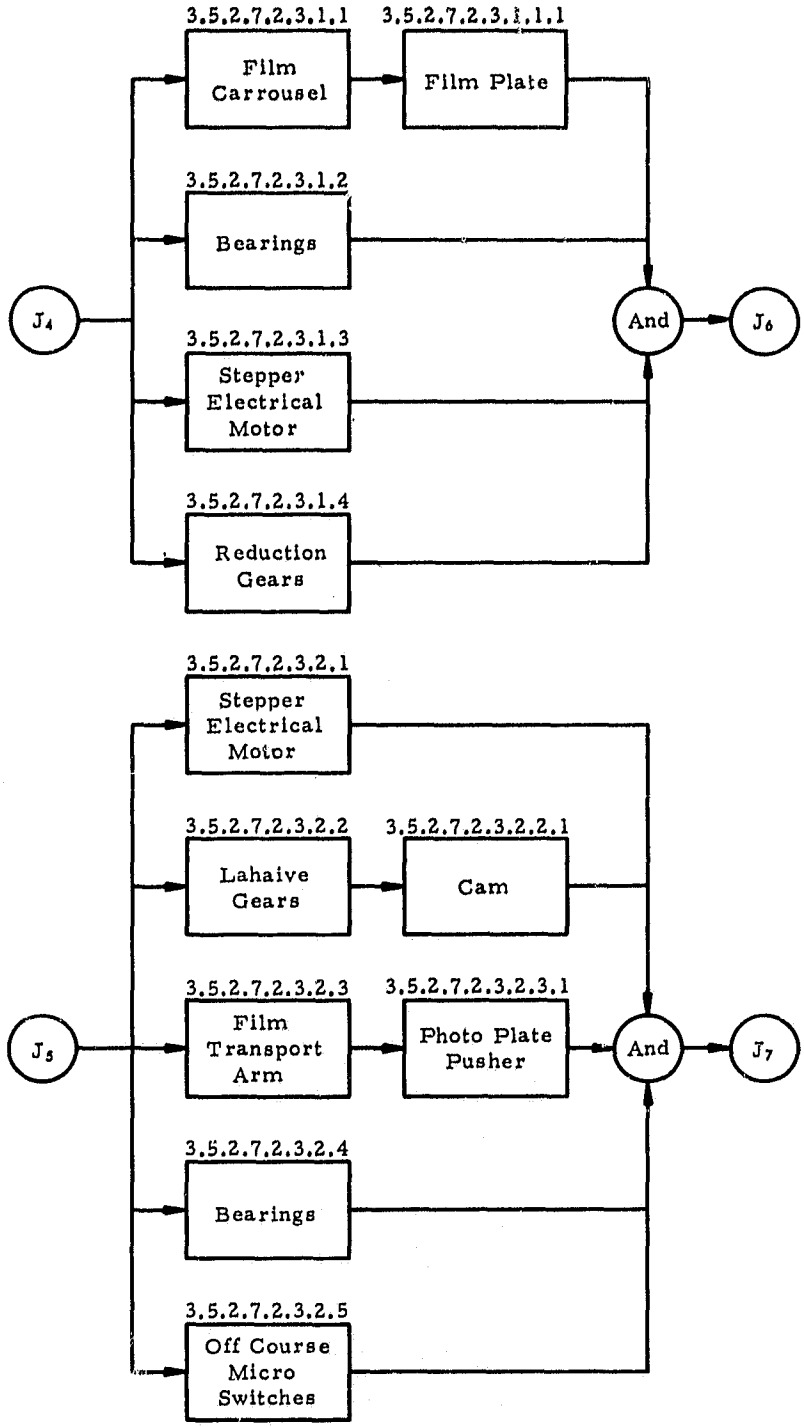


FIGURE N-1. EXPERIMENT S-183, ULTRAVIOLET PANORAMA FUNCTIONAL BLOCK DIAGRAM (Sheet 8 of 9)

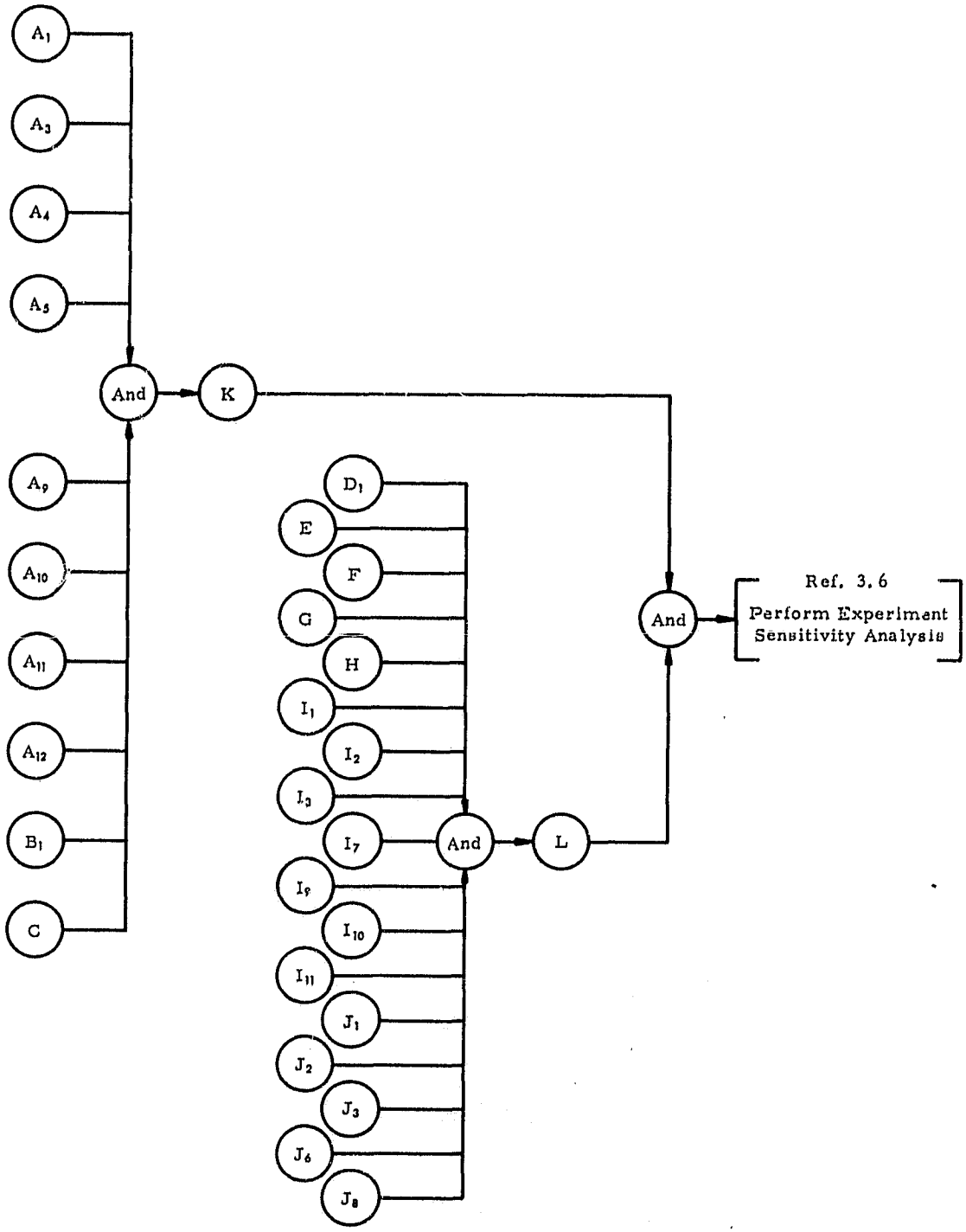
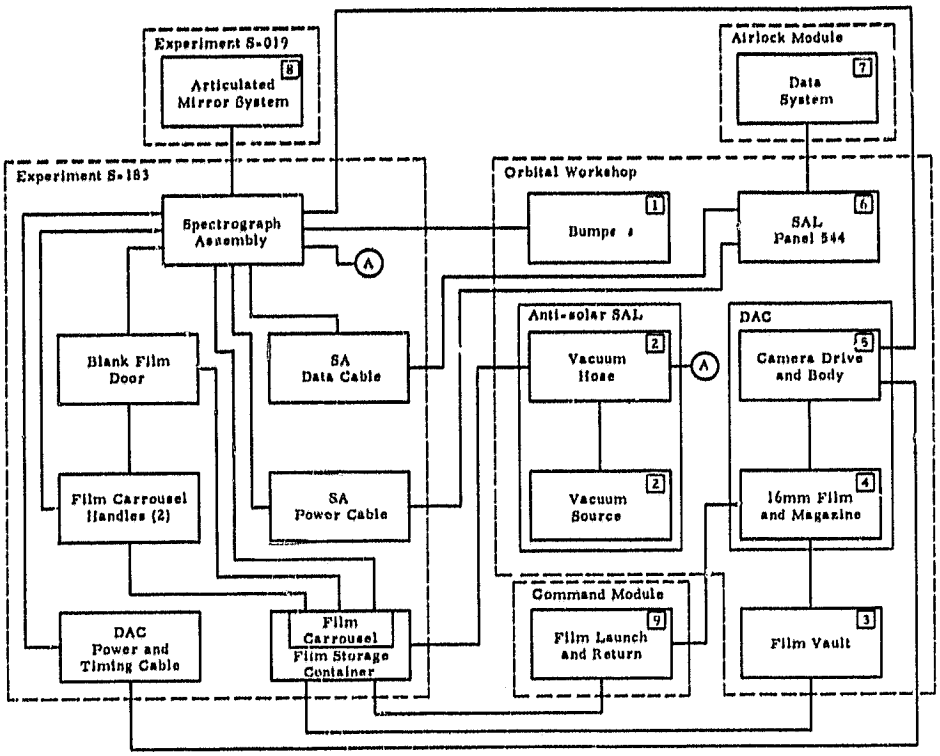


FIGURE N-1. EXPERIMENT S-183, ULTRAVIOLET PANORAMA FUNCTIONAL BLOCK DIAGRAM (Sheet 9 of 9)

SECTION II.

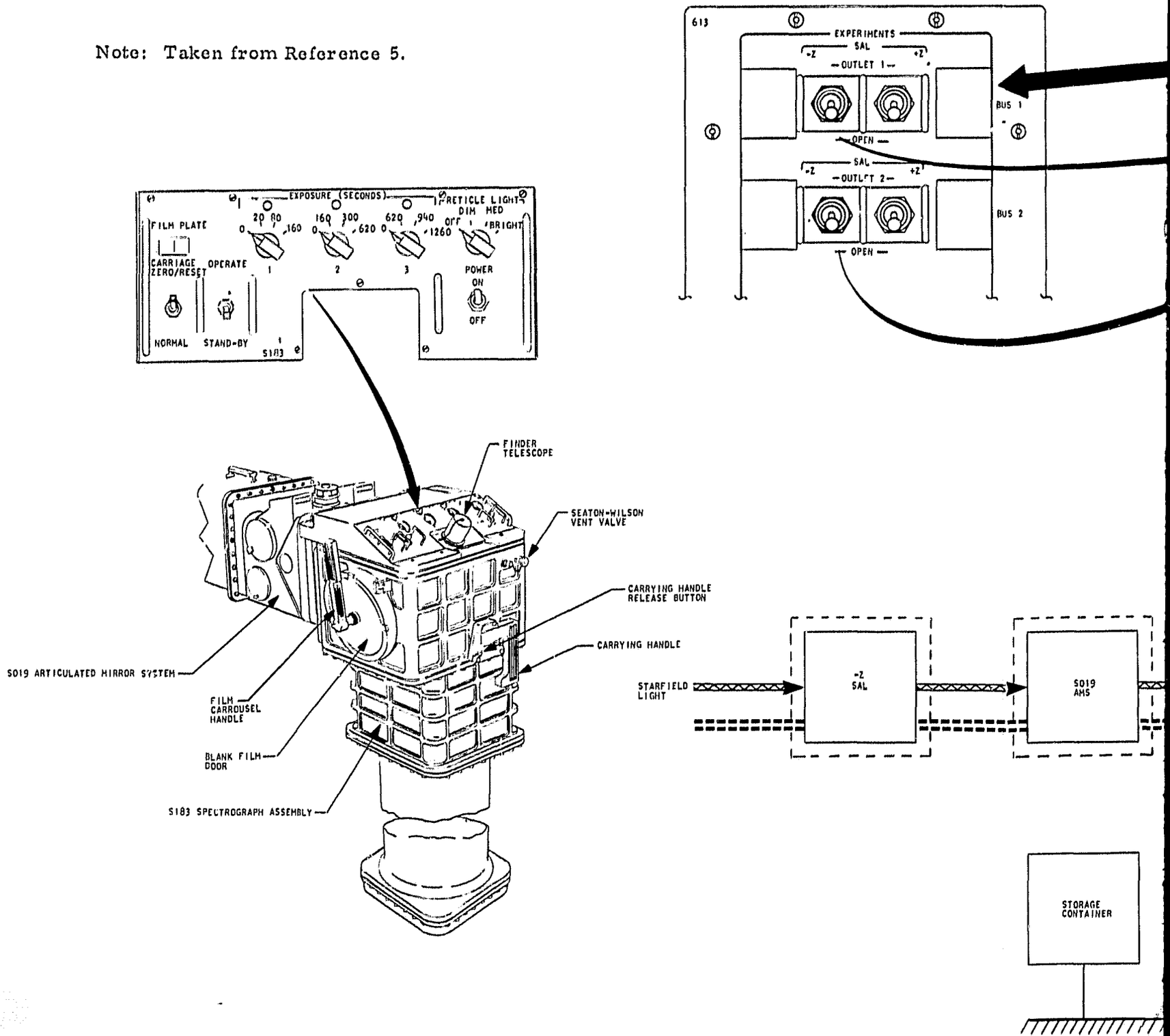
EXPERIMENT S-183, ULTRAVIOLET PANORAMA INTERFACE BLOCK DIAGRAM



Code	Data Source	Remarks
1	Crew	There is a mechanical interface between the bumpers and the SA. The bumpers are mounted to the OWS forward compartment floor and provide longitudinal and lateral support to the SA and AMS assembly mounted on the SAL. The interface prevents the SA from being accidentally loaded by the crew members pushing off the S-183/S-019 structural arrangement.
2	SAL Pressure Gage	There is no direct interface between the Anti-solar SAL vacuum source and the SA (see Find Letter A). A flexible hose is used to evacuate the SA and the film storage container. An environmental interface is established when the vacuum hose is secured to the SA and film storage container.
3	Crew	There is a mechanical interface with the film storage container, the film carrousel, and the film blank door. There is an environmental interface with the film vault when the film is stowed or removed.
4	Crew	The 16mm DAC film and magazine have a mechanical and environmental interface with CM. The film and the magazine are stowed in the CM during launch return and resupply. Furthermore, these items are loaded into the DAC which, in turn, is attached to the SA. It is necessary to store the film under certain environmental conditions. The 103aO film is not readily affected by humidity, but the temperature in the stowage area should not be allowed to exceed 80 °F.
5	Crew	The DAC body has a mechanical interface with the SA. The DAC is attached to the SA so that photographic data can be acquired. The DAC also has an electrical interface with the SA through the DAC power and timing cable. This cable allows the SA to provide the DAC with power and commands for taking photographic exposures of the starfields as a matter of record. The cable has a microdot connector, and the other end of this cable has a branch so that it can mate with the DAC power and remote control connectors.
6	M7002-440 M7003-440 M7004-440 M7005-440	There are electrical interfaces among the OWS panel 544, the S-183 power, and data cables. Power and telemetry are distributed from Panel 544 and further routed to SA Panel 546 for electro-mechanical operation. The cables have a zero-g connector to mate with Panel 544.
7	K7000S183 K7001S183 K7002S183	There is an electrical interface between the AM Data System and the S-183 Spectrograph. However, the S-183 Data Cable does tie into OWS Panel 544 and then back to the AM Data System. Telemetry measurement signals are routed through the cabling from the SA, stored, and then transmitted through the AM Data System.
8	Crew	S-019 AMS has a mechanical interface with the S-183 SA. The AMS provides S-183 with the capability to view the starfield and obtain the desired experiment pointing and alignment.
9	TBD	The film storage container and film carrousel have a mechanical and environmental interface with the CM. The film storage container with the film carrousel and the 16mm DAC film and the magazine are stowed in the CM locker during launch, return, and resupply. If Experiment S-183 is performed during Mission SL-2, the film is stowed in the OWS film vault at launch and returned in CM. Since the SC-5 film is highly sensitive to changes of temperature and humidity it is necessary that certain environmental conditions be met for stowage purposes. The temperature and relative humidity levels of the stowage locker should be maintained at 80 °F and 45 ±15%, respectively, at all times.

FIGURE N-2. EXPERIMENT S-183, ULTRAVIOLET PANORAMA INTERFACE BLOCK DIAGRAM

Note: Taken from Reference 5.



FOLDOUT FRAME 2

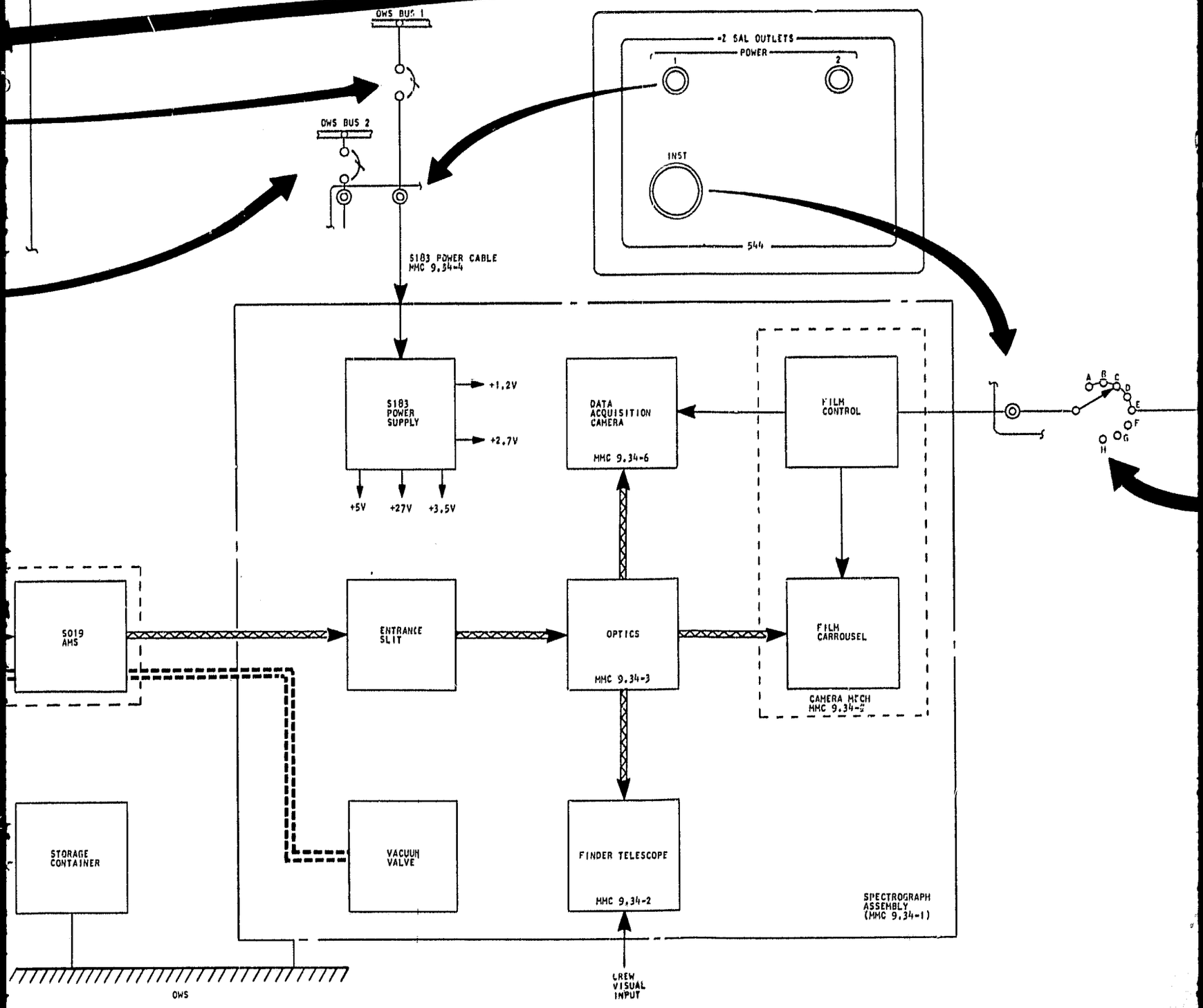
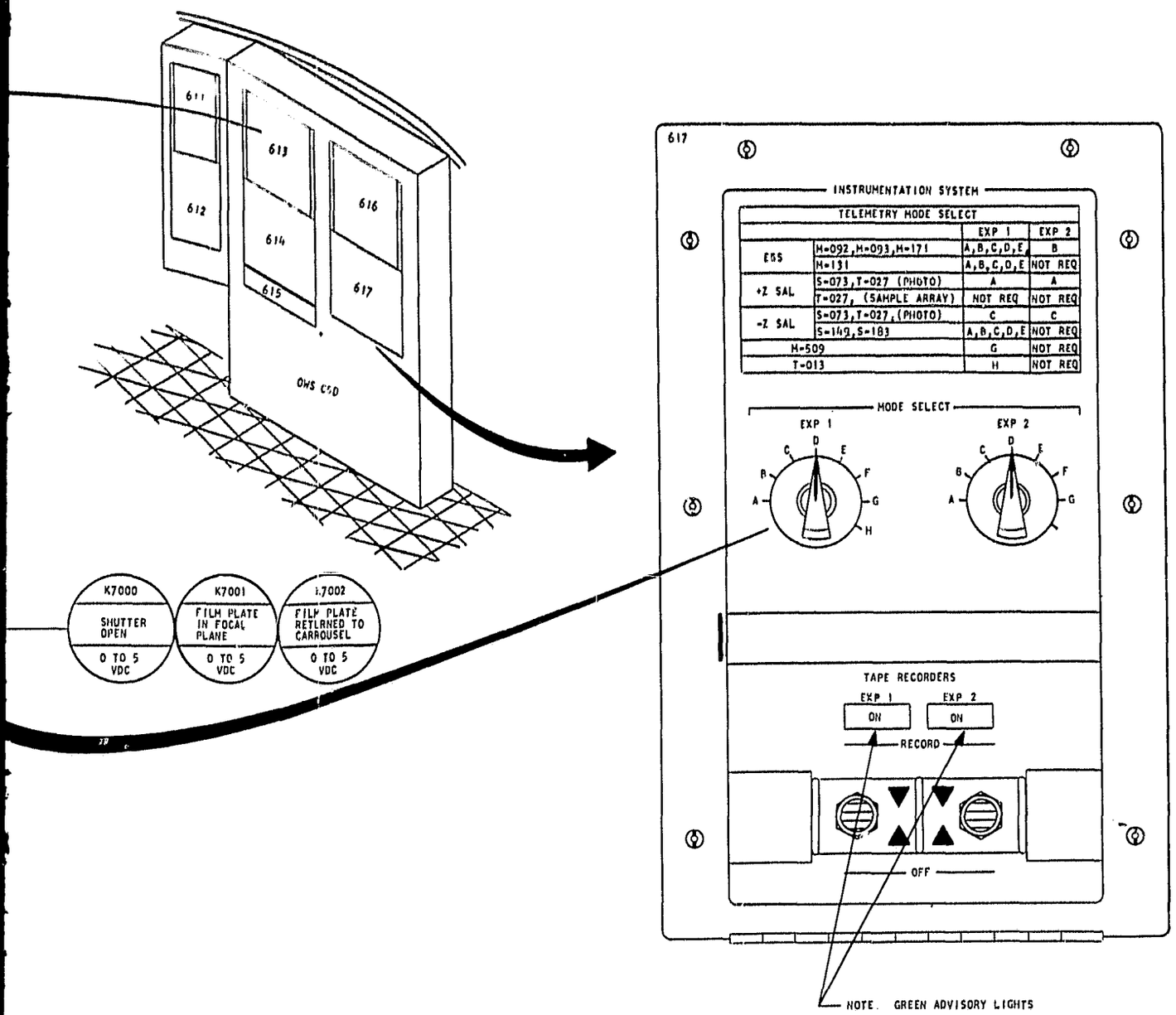


FIGURE N-3. EXPERIMENT S-183, ULTRAVIOLET PANORAMA SYSTEMS DIAGR

FOLDOUT FRAME 3

1-91/1-92



INTERFACE LEGEND

LIGHT

HEAT

MECHANICAL

MOUNTING

VACUUM

S183 EXPERIMENT
UV PANORAMA
SYSTEMS SCHEMATICS

IAGRAM

SECTION IV.

EXPERIMENT S-183, ULTRAVIOLET PANORAMA DATA REQUIREMENTS SUMMARY

TABLE N-II. EXPERIMENT S-183, ULTRAVIOLET PANORAMA DATA REQUIREMENTS SUMMARY

Measurement Name	Range and Dimension of Variable	Measurement Number	Telemetry Assignment Channel	Data Return	Data Time	Remarks
Astronaut Voice Comments and Recording						
• Starfield number	1 to 24	N/A	N/A	Intermittent	Real	
• Exposure time	20 to 1260 sec	N/A	N/A	Intermittent	Real	
• Time of exposure sequence initiation "mark"	N/A	N/A	N/A	Intermittent	Real	
• Film Plate Number	1 to 35	N/A	N/A	Intermittent	Real	
• Data Acquisition Camera	TBD	N/A	N/A	Intermittent	Real	
• Mirror:						
--Tilt setting	0 to 20°	N/A	N/A	Intermittent	Real	
--Rotation setting	0 to 360°	N/A	N/A	Intermittent	Real	
• Onboard TV (OWS)	TBD	N/A	N/A	Intermittent	Real/All	
• Shutter Open	0 to 5 Vdc	K7000S183	WP1B105A14HK52 WP1B105A31HK64	Event	Real/All	
• Film Plate in Focal Plane	0 to 5 Vdc	K7001S183	WP1B105A18HK53 WP1B105A04HK65	Event	Real/All	
• Film Plate Return to Carrousel	0 to 5 Vdc	K7002S183	WP1B105A22HK54 WP1B105A09HK66	Event	Real/All	
• Onboard Timing (GMT)	TBD	K502-512	WP1A124A04D107 WP1A045A03D107 WP1A046A03D107 WP1A047A03D107	Event	Real	
• Voltage: PDCS, OWS Bus No. 1	0 to 35 Vdc	M7002-440	WP1B050A21LH05	Analog (Housekeeping)	Real	
• Voltage: PDCS, OWS Bus No. 2	0 to 35 Vdc	M7003-440	WP1B010A21LH05	Analog (Housekeeping)	Real	
• Current: PDCS, OWS Bus No. 1	0 to 140 A	M7004-440	WP1B074A09HE43	Analog (Housekeeping)	Real	
• Current: PDCS, OWS Bus No. 2	0 to 140 A	M7005-440	WP1B034A01HD41	Analog (Housekeeping)	Real	
• Voltage: Instrument, BUS B AM	0 to 6.5 Vdc	M522-514	WP1B139A3[illegible]T03	Analog (Housekeeping)	Real	
• Log Book	N/A	N/A	N/A	N/A	N/A	TBD

SECTION V.

EXPERIMENT S-183, ULTRAVIOLET PANORAMA DATA REQUEST FORMS

DATA REQUEST FORM
Skylab Program

	DRF Control No.		Date
	Exp/Sys No. ASTN-SDI/OWS/S-183		Revision
Mission: SL-3/SL-4	Period of Interest: Flight/Experiment Manned	Op. Need Date:	Rev Date:

Request Contact		Data Recipient		Date Req: Real/All Time
Name	E. Fleischman	Name	W. R. Bock	Qty: 1
Organization	MSFC, PM-MO-I	Address	MSFC, S&E-ASTN-SDF	
Phone	205-453-3657	Phone	205-453-3810	

Reference Documents: ERD: S-183, unnumbered, undated; RFP: MSC-03625, 9-27-71

MRD Content

Detailed Requirements:

The Payload Integration Section (S&E-ASTN-SDI) requires the capability to monitor the S-183 Ultraviolet Panorama event data. The event data are needed when the experiment is operated during each cycle. An experiment cycle is approximately 40 min maximum duration.

A GMT tag correlation is needed for the experiment when it is initialized start and should be depicted on a CRT display or strip chart recorder with the capability of providing a hard copy to the user.

Comments & Explanation:

These data will be used to measure and evaluate the experiment carrier interfaces so that the Skylab mission evaluation reporting requirements can be fulfilled. (See OMSF Program Directive 55, M-D ML 3200, 138, 5-71.)

Originator		Integrator	
Name	W. A. Clarke	Name	J. R. Riquelmy
Organization	MSFC, S&E-ASTN-SDI	Organization	MSFC, S&E-ASTN-SDF
Phone	205-453-3811	Phone	205-453-3810
Signature / Date		Signature / Date	
Request Aproval		**Implementing Agency**	
Name	H. Golden	Name	
Organization	MSFC, PM-MO-I	Organization	
Phone	205-453-3735	Phone	
Signature / Date		Signature / Date	

MSFC - Form 65 (October 1970)

DRF Control No.	Exp/Sys No. ASTN-SDI/OWS/S-183	Revision	Date

Detailed Requirements:

MEASUREMENT NO.	MEASUREMENT NAME
K7000 S183	Shutter Open
K7001 S183	Film plate in Focal Plane
K7002 S183	Film Plate Return to Carousel
K502-512	On-board Timing (GMT)

Page 1 of 1

DATA REQUEST FORM Skylab Program	DRF Control No.	Date 2-14-72
	Exp/Sys No. ASTN-SDI/OWS/S-183	Revision

Mission	Period of Interest	Op. Need Date	Rev Date
SL-3/SL-4	Flight/Experiment Manned		

Request Contact	Data Recipient	Date Req
Name E. Fleischman Organization MSFC, PM-MO-I Phone 205-453-3657	Name W. R. Bock Address MSFC, S&E-ASTN-SDF Phone 205-453-3810	Real/All Time Qty 1

Reference Documents

MRD Content

Detailed Requirements:

Voice loop of Astronaut comments concerning Experiment S-183 set-up, operation, observation, and termination procedures and task compliance are needed.

On-board TV, located in the OWS, is required to record S-183 experiment equipment set-up and disassembly from the anti-solar SAL.

Comments & Explanation:

The data will be used to measure and evaluate the integrity of experiment/carrier interfaces so that the Skylab mission evaluating requirements can be fulfilled (See OMSF program directive 35. M-D ML 3200, 138.5-71.)

Originator	Integrator
Name W. A. Clarke Organization MSFC, S&E-ASTN-SDI Phone 205-453-3811 Signature Date	Name J. R. Riquelmy Organization MSFC, S&E-ASTN-SDF Phone 205-453-3810 Signature Date
Request Aproval	**Implementing Agency**
Name H. Golden Organization MSFC, PM-MO-I Phone 205-453-3735 Signature Date	Name Organization Phone Signature Date

MSFC - Form 65 (October 1970)

DATA REQUEST FORM
Skylab Program

DRF Control No.	Date
	2-14-72
Exp/Sys No. ASTN-SDI/OWS/S-183	**Revision**

Mission	Period of Interest	Op. Need Date	Rev Date
SL-3/SL-4	Flight/Experiment Manned		

Request Contact	Data Recipient	Date Req
Name: E. Fleischman Organization: MSFC, PM-MO-I Phone: 205-453-3657	Name: W. R. Bock Address: MSFC, S&E-ASTN-SDI Phone: 205-453-3810	All Time Qty: 1

Reference Document: ERD: S-183, Unnumbered, undated; RFP: MSC-03625, 9-27-71

MRD Content

Detailed Requirements:

Voice transcripts of astronaut comments are needed from MSC for all S-183 experiment activities. The transcript should be made available to S&E-ASTN-SDI as soon as possible after the experiment start-up.

One copy of the Astronaut Log is needed after the completion of the SL-3/SL-4 mission.

Comments & Explanation:

These data will be used to measure and evaluate the integrity of experiment/carrier interfaces so that the Skylab Mission Evaluating Requirements can be fulfilled (See OMSF Program Directive 35, M-D ML3200.138.5-71).

Originator	Integrator
Name: W. A. Clarke Organization: MSFC, S&E-ASTN-SDI Phone: 205-453-3811 Signature: Date	Name: J. R. Riquelmy Organization: MSFC, S&E-ASTN-SDF Phone: 205-453-3810 Signature: Date
Request Aproval	**Implementing Agency**
Name: H. Golden Organization: MSFC, PM-MO-I Phone: 205-453-3735 Signature: Date	Name: Organization: Phone: Signature: Date

MSFC - Form 65 (October 1970)

DATA REQUEST FORM

Skylab Program

	DRF Control No.		Date 2-14-72
	Exp/Sys No. ASTN-SDI/OWS/S-183		Revision
Mission SL-3/SL-4	Period of Interest Flight/Experiment Manned	Op. Need Date	Rev Date

Request Contact		Data Recipient		Date Req
Name	E. Fleischman	Name	W. R. Bock	Real Time
Organization	MSFC, PM-MO-I	Address	MSFC, S&E-ASTN-SDF	Qty 1
Phone	205-453-3657	Phone	205-453-3810	

Reference Document: ERD: S-183, unnumbered, undated; RFP: MSC-03625, 9-27-71

MRD Content

Detailed Requirements:

The S&E-ASTN-SDI section needs to assess the level of the OWS Bus 1 and 2 voltage and current for the S-183 experiment. The voltage and current levels are needed 10 min before and after the start of the S-183 experiment.

The voltage and current levels should be displayed as analog data on a CRT for real time application, and on a strip chart recorder as a 4020 plot for all time application.

Capability of providing a hard copy of the data presented on the CRT along with its associated GMT should be made available to the user.

Comments & Explanation:

This data will be used to measure and evaluate the integrity of experiment/carrier interfaces so that Skylab Mission Evaluation reporting requirements can be fulfilled (See OMSF Program Directive 35, M-D MC 3200-138, 5-71).

Originator		Integrator	
Name	W. A. Clarke	Name	J. R. Riquelmy
Organization	MSFC, S&E-ASTN-SDI	Organization	MSFC, S&E-ASTN-SDF
Phone	205-453-3811	Phone	205-453-3810
Signature	Date	Signature	Date
Request Aproval		**Implementing Agency**	
Name	H. Golden	Name	
Organization	MSFC, PM-MO-I	Organization	
Phone	205-453-3735	Phone	
Signature	Date	Signature	Date

MSFC - Form 65 (October 1970)

DRF Control No.	Exp/Sys No.	Revision	Date
	ASTN-SDI/OWS/S-183		

Detailed Requirements:

MEASUREMENT NO.	MEASUREMENT NAME
M7002-440 (Housekeeping)	Voltage-PDCS, OWS Bus No. 1
M7003-440 (Housekeeping)	Voltage-PDCS, OWS Bus No. 2
M7004-440 (Housekeeping)	Current-PDCS, OWS Bus No. 1
M7005-440 (Housekeeping)	Current-PDCS, OWS Bus No. 2
M522-514 (Housekeeping)	Voltage-AM Instrument Bus B

DATA REQUEST FORM Skylab Program	DRF Control No.	Date 12/2/71
	Exp/Sys No. ASTN-SD/OWS/T020-034	Revision

Mission	Period of Interest	Op. Need Date	Rev Date
SL-1/2, 3 & 4	Flt		

Request Contact	Data Recipient	Date Req
Name Organization Phone	Name Mr. W. R. Bock Address S&E-ASTN-SDF Phone MSFC, Alabama 35812 205-453-3810	Qty 1

Reference Document:

MRD Content

Detailed Requirements:

MOPS Format for Experiments T020, S183 and Proton Spectrometer

Provide MOPS format for the following parameters associated with experiment T020 Foot-Controlled Maneuvering Unit and S183

Comments & Explanation:

Originator	Integrator
Name Mr. W. R. Bock Organization MSFC/S&E-ASTN-SDF Phone 205-453-3810 Signature Date	Name J. R. Riquelmy Organization S&E-ASTN-SDF Phone 205-453-3810 Signature Date
Request Aproval	**Implementing Agency**
Name Organization Phone Signature Date	Name Organization Phone Signature Date

MSFC - Form 65 (October 1970)

DRF Control No.	Exp/Sys No. ASTN-SD/OWS/T020-034	Revision	Date 12/2/71

Detailed Requirements:

EXPERIMENT T020

Meas. No.	Title
D7111 436	PRESS, PCS, H/A Low Range Sens 1
D232 504	" N_2 Supply Bottle 1
D233 504	" " " " 2
D235 503	" " " " 4
D236 502	" " " " 5

EXPERIMENT S183

K7000 S183	Shutter Open
K7001 S183	Film Plate in Focal Plane
K7002 S183	" " Returned to Carousel

PROTON SPECTROMETER

C0028 806	TEMP, Detector Head
C0029 806	" Electronic Package
K0021 806	Digital Word
M0005 806	Total Dose Count Rate D_4
M0006 806	Accidental Coincidence D_1/D_2 Voltage

SECTION VI.

EXPERIMENT S-183, ULTRAVIOLET PANORAMA ENGINEERING CHANGE REQUESTS

Engineering Change Requests for Experiment S-183 are N/A

SECTION VII.

EXPERIMENT S-183, ULTRAVIOLET PANORAMA EVALUATION SEQUENCE

TABLE N-III. EXPERIMENT S-183, ULTRAVIOLET PANORAMA EVALUATION SEQUENCE (Sheet 1 of 11)

Assignments

Mission:

- SL-2 and SL-3 or SL-4

Orbital Assembly:

- OWS

Carrier:

- Located at Anti-solar SAL (-Z dynamic) in the forward compartment of the OWS, at OA Sta. No. 3019.555

Conditions

Crew:

- The PLT operates the SA
- The CDR or SPT will assist in experiment setup and storage

Experiment:

- Experiments S-063, M-071 and ATM are operating during S-183 operation.
  --Power: 28 Vdc supplied by OWS Bus No. 1
  --Preparation Phase: TBD hr
  --Operation Phase: TBD hr
  --Termination Phase: TBD hr

Ground Support:

- Prelaunch: The S-183 Spectrograph is pressurized to 14 psia GN_2 cover gas
- Post-launch: N/A

Requirements

Functional Objectives:

- FO-1 thru FO-12 are to be accomplished on SL-2 and SL-3 or SL-4 (refer to functional item 3.1.2, Table N-I).

Experiment Evaluation Team - Key Personnel Locator

Name	Responsibility	Office Address, Symbol, and Telephone Number
Dr. Georges Courtes	Principal Investigator (PI)	Laboratoire d'Astronomie Spatiale du CRNS, Marseilles, France
Mr. A. Magnon	Experiment Developer (ED)	French Government, France
Mr. Sam Walls	MSFC Experiment Manager (EM)	MSFC, Bldg. 4201, PM-SL-DP, 205-453-3184
Mr. W. L. Howard	S&E Integration Engineer (IE)	MSFC, Bldg. 4487, S&E-ASTR-GP, 205-453-0786
Miss M. J. Smith	S&E Experiment Engineer (EE)	MSFC, Bldg. 4200, S&E-R-F, 205-453-1128
Mr. W. R. Bock	Technical Discipline Manager (TDM)	MSFC, Bldg. 4610, S&E-ASTN-SDF, 205-453-3810
Mr. K. S. Purushotham	Experiment Evaluation Engineer (EEE)	Teledyne Brown Engineering Co., Huntsville, Alabama, ASD-SHI, 205-532-1561
Mr. A. A. Flowers	Mission Operation Design Support (MODS)	Martin Marietta Corporation, Huntsville, Alabama 205-837-1820, ext. 305
Mr. R. Lewthwaite	Experiment Integration Engineer (EIE)	Bendix Corporation, Denver, Colorado, 303-761-1163, ext. 3752
Mr. Larry M. Hirsh	Flight Controller (FC)	Philco Ford, MSC, Bldg. 30, Houston, Texas, 483-4717

TABLE N-III. EXPERIMENT S-183, ULTRAVIOLET PANORAMA EVALUATION SEQUENCE (Sheet 2 of 11)

Operation Step Number*	Data: Return: Recorder Number	Measurement Name, Number, and Signal	Telemetry Assignment Channel	Functions**	Frequency***	Range and Dimension of Variables	Limits of Concern	Evaluation: Check: Satisfactory	Anomaly	Remarks****	Contingencies: See Contingency Plan Number	Remarks
P-60 mn GMT 11:40 for SL-3; GMT 17:50 for SL-4.	Experiment Evaluation Team manned and available. Contact Experiment S-183, Technical Discipline Manager, S&E-ASTN-SD: HOSC Telephone No. TBD, Astronautics Laboratory Telephone No. 205-453-3810.											
	Reference: Skylab Flight Plan, SL-1/2 and SL-3 and SL-4, Summary Timelines, MSC-03625, latest revision, and Skylab Experiment Operations Handbook, Volume II: Experiment Operational Procedures, MSC.											
P-10 mn GMT 12:30 for SL-3; GMT 18:40 for SL-4.	Commence experiment preparation (ground action).											
P 1.0	Determine experiment status.											
P 1.1	Acquire status and evaluate the performance of the following measurements:											
	TBS	Voltage--PDCS, OWS Bus No. 1		H	C	Range: 0 to 35 Vdc	TBD			P1IA1		
		M7002-440	WP1B050A21LH05			Read: 24 to 35 Vdc						
	TBS	Voltage--PDCS, OWS Bus No. 2		H	C	Range: 0 to 35 Vdc	TBD			P1IA1		
		M7003-440	WP1B010A21LH05			Range: 24 to 35 Vdc						
	TBS	Voltage--~~AM Instru~~-ment Bus B	WP1B139A30LT08	H	C	Range: 0 to 6.5 Vdc						

*P - Preparation
O - Operations
T - Termination
L - Lift-off (Booster)

**E - Event
H - Housekeeping
A - Analog
D - Digital

***C - Continuous
I - Intermittent
D - Discrete (Specified number of times)

****R - Real Time
N - Near/Real Time
A - All Time

ASTN-72-1-OT (Jan 72)

TABLE N-III. EXPERIMENT S-183, ULTRAVIOLET PANORAMA EVALUATION SEQUENCE (Sheet 3 of 11)

Operation Step Number*	Data: Return: Recorder Number	Data: Return: Measurement Name, Number, and Signal	Data: Return: Telemetry Assignment Channel	Data: Return: Function**	Data: Return: Frequency***	Data: Return: Range and Dimension of Variables	Data: Return: Limits of Concern	Data: Evaluation: Check: Satisfactory	Data: Evaluation: Check: Anomaly	Data: Evaluation: Remarks****	Contingencies: See Contingency Plan Number	Contingencies: Remarks
P = 0 min GMT 12:40 for SL-3; GMT 18:50 for SL-4	Commence experiment preparation (flight action).											
P 2.0	Monitor and evaluate the experiment performance.											
P 2.1	Prepare Anti-solar SAL and perform leak checks.									P21A1 P21A2 P21A3		
P 2.2	Remove Experiment S-019 AMS from the storage container.									P22A1		
P 2.3	Pressurize AMS equal to OWS.									P23A1		
P 2.4	Install AMS in the Anti-solar SAL.									P24A1 P24A2		
P 2.5	Equalize the pressure of the Experiment S-183 SA to that of OWS internal atmosphere while in the support fixture.											
P 2.6	Install the Experiment S-183 bumpers on OWS forward compartment floor grid near Anti-solar SAL.											
P 2.7	Remove the Experiment S-183 SA from the support fixture and attach it on the Experiment S-019 AMS.									P27A1		
P 2.8	Obtain the film storage container from the film vault and equalize the container pressure to that of the OWS internal atmosphere.											
P 2.9	Install the DAC camera with 16mm film magazine on the SA.											

*P - Preparation
O - Operations
T - Termination
L - Lift-off (Booster)

**E - Event
H - Housekeeping
A - Analog
D - Digital

***C - Continuous
I - Intermittent
D - Discrete
(Specified number of times)

****R - Real Time
N - Near/Real Time
A - All Time

ASTN-72-1-OT (Jan 72)

TABLE N-III. EXPERIMENT S-183, ULTRAVIOLET PANORAMA EVALUATION SEQUENCE (Sheet 4 of 11)

Operation Step Number*	Data: Return: Recorder Number	Data: Return: Measurement Name, Number, and Signal	Data: Return: Telemetry Assignment Channel	Data: Return: Function**	Data: Return: Frequency***	Data: Return: Range and Dimension of Variables	Data: Return: Limits of Concern	Data: Evaluation: Check: Satisfactory	Data: Evaluation: Check: Anomaly	Data: Evaluation: Remarks****	Contingencies: See Contingency Plan Number	Remarks
P 2.10	Remove blank film door from the SA and restrain.											
P 2.11	Remove the film carrousel from the film storage container and install it on the SA by verifying for proper alignment.										P211A1 P211B1	
P 2.12	Install the blank film door on the film stowage container and stow it in the OWS film vault.											
P 2.13	Verify SA control panel power switches are in off condition before installing cables.											
P 2.14	Install the power cable 40M32749 and the instrumentation cable 40M32750 between OWS panel 544 and the SA control panel. Connect the IMAG power and timing cable TBD to the SA.											
P 2.15	Ensure that the SA is not operating. (Panel lights should not be illuminated.)											
	TBS	Shutter open.		E	I	Range: 0 to 5 Vdc						
		K7000S183	WP1B105A14HK52 WP1B105A31HK64			Read: 5 Vdc						
	TBS	Film plate in focal plane.		E	I	Range: 0 to 5 Vdc						
		K7001S183	WP1B105A18HK53 WP1B105A04HK65			Read: 5 Vdc						
	TBS	Film plate returned to carrousel.		E	I	Range: 0 to 5 Vdc						
		K7002S133	WP105A22HK54 WP105A08HK66			Read: 5 Vdc						
O 1.0	Commence experiment operations.											

*P - Preparation
O - Operations
T - Termination
L - Lift-off (Booster)

**E - Event
H - Housekeeping
A - Analog
D - Digital

***C - Continuous
I - Intermittent
D - Discrete
(Specified number of times)

****R - Real Time
N - Near Real Time
A - As Time

ASTN-72-1-OT (Jan 72)

TABLE N-III. EXPERIMENT S-183, ULTRAVIOLET PANORAMA EVALUATION SEQUENCE (Sheet 5 of 11)

Operation Step Number*	Data: Return: Recorder Number	Measurement Name, Number, and Signal	Telemetry Assignment Channel	Function**	Frequency***	Range and Dimension of Variables	Limits of Concern	Evaluation: Check: Satisfactory	Anomaly	Remarks****	Contingencies: See Contingency Plan Number	Remarks
O 1.1	Acquire status and evaluate the performance of the following measurements:											
	TBS	Voltage--PDCS, OWS Bus No. 1		H	C	Range: 0 to 35 Vdc	TBD				P11A1	
		M7002-440	WP1B050A21LH05			Read: 24 to 35 Vdc						
	TBS	Current--PDCS, OWS Bus No. 1		H	C	Range: 0 to 140 A					P11A1	
		M7004-440	WP1B074A09HEA3			Read: 0 to 140 A						
O 1.2	Evaluate the Anti-solar SAL according to operating procedures.											
O 1.3	Open Anti-solar SAL door.											
O 1.4	Deploy Experiment S-019 AMS and secure.										O14A1	
O 1.5	Activate Experiment S-183 SA Control Panel (Power On).										O15A1	
O 1.5.1	Film plate indicator lamp is on.											
O 1.5.2	Reticle lamp is on.											
O 1.6	Rotate AMS tilt and rotation knobs and acquire appropriate starfield.										O16A1	

* P - Preparation
O - Operations
T - Termination
L - Lift-off (Booster)

** E - Event
H - Housekeeping
A - Analog
D - Digital

*** C - Continuous
I - Intermittent
D - Discrete (Specified number of times)

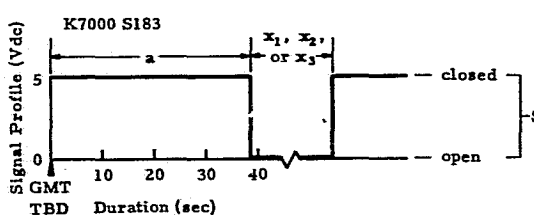
**** R - Real Time
N - Near/Real Time
A - All Time

ASTN-72-1-OT (Jan 72)

TABLE N-III. EXPERIMENT S-183, ULTRAVIOLET PANORAMA EVALUATION SEQUENCE (Sheet 6 of 11)

Operation Step Number*	Data: Return: Recorder Number	Data: Return: Measurement Name, Number, and Signal	Data: Return: Telemetry Assignment Channel	Data: Return: Function**	Data: Return: Frequency***	Data: Return: Range and Dimension of Variables	Data: Return: Limits of Concern	Evaluation: Check: Satisfactory	Evaluation: Check: Anomaly	Evaluation: Remarks****	Contingencies: See Contingency Plan Number	Contingencies: Remarks
O 1.7	Operate Zero/Reset switch to manually advance the film carrousel until 01 appears on the film plate counter.										O17A1 O17A2	
O 1.8	Set the exposure sequence switches (3) to the appropriate settings (observe that the lamps are illuminated) and toggle the Sequence switch to the START position.										O18A1 O18A2	
O 1.9	Record the necessary data required for the experiment in the logbook and/or voice.											
O 1.10	Verify the exposure sequence completion (lamps will go off).										O110A1 O110A2	
O 1.10.1	Verify shutter open.											
	TBS	K7000S183	WP1B105A14HK52 WP1B105A31HK64	E	I	Range: 0 or 5 Vdc Read: 0 Vdc after 38.75 sec for x_1 thru x_3	TBD				O1101A1 O1101B1 O1101B2	

Typical K7000S183 Measurement:



Notes:

- Constant a is a time span of 38.75 sec.

Exposure	Setting No.	Duration of Shutter Open (sec)
x_1	1	20
	2	80
	3	160
x_2	1	160
	2	300
	3	620
x_3	1	620
	2	940
	3	1260

* P - Preparation
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T - Termination
L - Lift-off (Booster)

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H - Housekeeping
A - Analog
D - Digital

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I - Intermittent
D - Discrete
(Specified number of times)

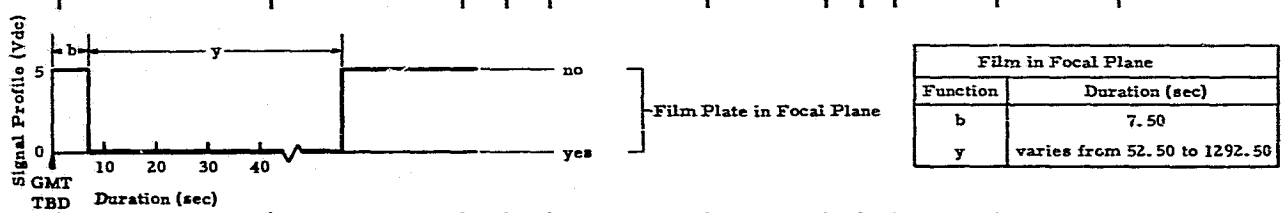
**** R - Real Time
N - Near/Real Time
A - All Time

ASTN-72-1-OT (Jan 72)

TABLE N-III. EXPERIMENT S-183, ULTRAVIOLET PANORAMA EVALUATION SEQUENCE (Sheet 7 of 11)

Operation Step Number*	Data: Return: Recorder Number	Data: Return: Measurement Name, Number, and Signal	Data: Return: Telemetry Assignment Channel	Data: Return: Function**	Data: Return: Frequency***	Data: Return: Range and Dimension of Variables	Data: Return: Limits of Concern	Data: Evaluation: Check: Satisfactory	Data: Evaluation: Check: Anomaly	Data: Evaluation: Remarks****	Contingencies: See Contingency Plan Number	Remarks
O 1.10.2	Verify film plate in focal plane.											
	TBS	Film plate in focal plane.		E	I	Range: 0 or 5 Vdc	TBD				O1102A1 O1102B1 O1102C1	
		K7001S183	WP1B105A18HK53 WP1B105A04HK65			Read: 0 Vdc after 7.5 sec for y						

Typical K7001S183 Measurement:



Film in Focal Plane	
Function	Duration (sec)
b	7.50
y	varies from 52.50 to 1292.50

* P - Preparation
O - Operations
T - Termination
L - Lift-off (Booster)

** E - Event
H - Housekeeping
A - Analog
D - Digital

*** C - Continuous
I - Intermittent
D - Discrete
(Specified number of times)

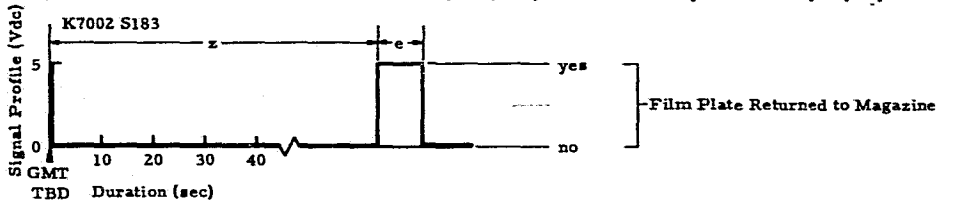
**** R - Real Time
N - Near/Real Time
A - All Time

ASTN-72-1-OT (Jan 72)

TABLE N-III. EXPERIMENT S-183, ULTRAVIOLET PANORAMA EVALUATION SEQUENCE (Sheet 8 of 11)

Operation Step Number*	Data: Return: Recorder Number	Data: Return: Measurement Name, Number, and Signal	Data: Return: Telemetry Assignment Channel	Data: Return: Function**	Data: Return: Frequency***	Data: Return: Range and Dimension of Variables	Data: Return: Limits of Concern	Data: Evaluation: Check: Satisfactory	Data: Evaluation: Check: Anomaly	Data: Evaluation: Remarks****	Contingencies: See Contingency Plan Number	Remarks
O 1.10.3	Verify film plate returned to magazine.											
	TBS	Film plate returned to magazine.		E	I	Range: 0 or 5 Vdc	TBD				O1102B1 O1102A1	
		K7002S183	WP1B105A22HK54 WP1B105A08HK66			Read: 5 Vdc after 67.50 sec for the duration of e						

Typical K7002S183 Measurement:



Film Plate in Carrousel	
Function	Duration (sec)
e	8.75
z	varies from 67.50 to 1307.50

* P - Preparation
O - Operations
T - Termination
L - Lift-off (Booster)

** E - Event
H - Housekeeping
A - Analog
D - Digital

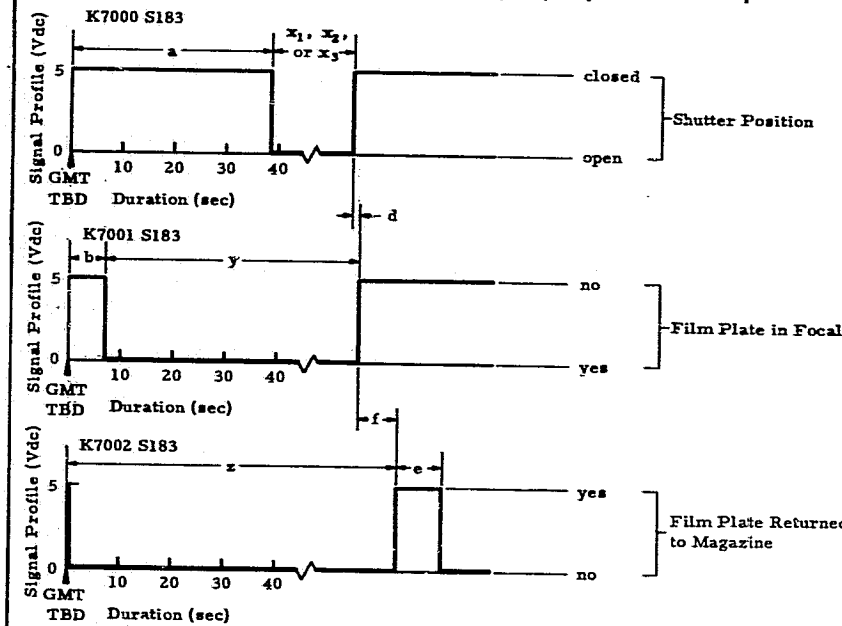
*** C - Continuous
I - Intermittent
D - Discrete
(Specified number of times)

**** R - Real Time
N - Near/Real Time
A - All Time

ASTN-7231-OT (Jan 72)

TABLE N-III. EXPERIMENT S-183, ULTRAVIOLET PANORAMA EVALUATION SEQUENCE (Sheet 9 of 11)

Operation Step Number*	Data: Return: Recorder Number	Data: Return: Measurement Name, Number, and Signal	Data: Return: Telemetry Assignment Channel	Data: Return: Function**	Data: Return: Frequency***	Data: Return: Range and Dimension of Variables	Data: Return: Limits of Concern	Data: Evaluation: Check: Satisfactory	Data: Evaluation: Check: Anomaly	Data: Evaluation: Remarks****	Contingencies: See Contingency Plan Number	Remarks
1.10.4		Telemetry Composite of Spectrograph Assembly										



Exposure	Setting No.	Duration of Shutter Open (sec)
x_1	1	20
	2	80
	3	160
x_2	1	160
	2	300
	3	620
x_3	1	620
	2	940
	3	1260

Function	Duration (sec)	Remarks
a	38.75	Constant time span. The shutter opens 38.75 sec after the cycle has begun.
b	7.50	Time required for the film plate to travel from the magazine to the focal plane.
c	31.25	The shutter opens 31.25 sec after the film plate has arrived at the focal plane.
d	1.25 approx	The film plate will leave focal plane after the closure of the shutter.
e	8.75	Time required for the magazine to advance.
f	7.50	Time required for the film plate to travel from focal plane to the carrousel.
y	varies from 52.50 to 1292.50	Duration of stay of film plate in the focal plane.
z	varies from 67.50 to 1307.50	Time required for the film plate to travel from the carrousel to focal plane and back to carrousel.

* P - Preparation
O - Operations
T - Termination
L - Lift-off (Booster)

** E - Event
H - Housekeeping
A - Analog
D - Digital

*** C - Continuous
I - Intermittent
D - Discrete
(Specified number of times)

**** R - Real Time
N - Near/Real Time
A - All Time

ASTN-72-1-OT (Jan 72)

TABLE N-III. EXPERIMENT S-183, ULTRAVIOLET PANORAMA EVALUATION SEQUENCE (Sheet 10 of 11)

Operation Step Number*	Data: Return: Recorder Number	Data: Return: Measurement Name, Number, and Signal	Data: Return: Telemetry Assignment Channel	Data: Return: Function**	Data: Return: Frequency***	Data: Return: Range and Dimension of Variables	Data: Return: Limits of Concern	Data: Evaluation: Check: Satisfactory	Data: Evaluation: Check: Anomaly	Data: Evaluation: Remarks****	Contingencies: See Contingency Plan Number	Contingencies: Remarks
O 1.11	Partial SA control panel deactivation.										O18A1 O18A2	
O 1.11.1	Return Sequence Switch to standby position.											
O 1.11.2	Set exposure switches (3) to zero position.											
O 1.11.3	Turn reticle light switch to off position.											
O 1.12	Manually advance film carrousel for removal.										O17A1 O17A2	
O 1.14	Turn power switch to off position.											
O 1.15	Unlock the AMS tilt and rotation knob locks. Set the tilt and rotation indicators to 000.0.										O115A1	
O 1.16	Unlock AMS mirror extension knob and fully retract the mirror.										O116A1	
O 1.17	Close, lock, and repressurize SAL door; check integrity of seals using SAL operating procedures.										O117A1 O117A2	
	Note: • If a starfield target is to be photographed in the next orbit, repeat Steps O 1.0 thru O 1.17. • If the experiment has to be terminated, follow Steps T 1.0 thru T 1.8.											
T 1.0	Commence Experiment Termination											
T 1.1	Remove Power, Data, DAC Power and timing Cable from the experiment and stow.											
T 1.2	Obtain the film Storage Container and the blank film door from the OWS film vault and restrain.											

*P - Preparation
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T - Termination
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**E - Event
H - Housekeeping
A - Analog
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***C - Continuous
I - Intermittent
D - Discrete
(Specified number of times)

****R - Real Time
N - Near/Real Time
A - All Time

ASTN-72-1-OT (Jan 72)

TABLE N-III. EXPERIMENT S-183, ULTRAVIOLET PANORAMA EVALUATION SEQUENCE (Sheet 11 of 11)

Operation Step Number*	Data: Return: Recorder Number	Data: Return: Measurement Name, Number, and Signal	Data: Return: Telemetry Assignment Channel	Data: Return: Function**	Data: Return: Frequency***	Data: Return: Range and Dimension of Variables	Data: Return: Limits of Concern	Data: Evaluation: Check: Satisfactory	Data: Evaluation: Check: Anomaly	Data: Evaluation: Remarks****	Contingencies: See Contingency Plan Number	Contingencies: Remarks
T 1.3	Remove the film carrousel from the SA and install blank film door.											
T 1.4	Install the film carrousel in film storage and stow in the OWS film vault.											
T 1.5	Remove film magazine from DAC and stow in the film vault.											
T 1.6	Remove DAC and stow.											
T 1.7	Remove S-183 SA from S-019 AMS and stow it on the support fixture.											
T 1.8	Remove S-019 AMS from the SAL, install front and rear covers, and evacuate the AMS.											
T 1.9	Stow Experiment S-019 in the storage container and secure.											

*P - Preparation
O - Operations
T - Termination
L - Lift-off (Booster)

**E - Event
H - Housekeeping
A - Analog
D - Digital

***C - Continuous
I - Intermittent
D - Discrete
(Specified number of times)

****R - Real Time
N - Near/Real Time
A - All Time

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SECTION VIII.

EXPERIMENT S-183, ULTRAVIOLET PANORAMA MALFUNCTION AND CONTINGENCY PLAN OUTLINE

TABLE N-IV EXPERIMENT S-183, ULTRAVIOLET PANORAMA MALFUNCTION AND CONTINGENCY PLAN OUTLINE - EXPERIMENT PREPARATION (P) (Sheet 1 of 2)

Operation Step Number	Experiment/Crew Tasks	Possible Malfunction	Contingency Plan	Remarks (malfunctions, corrections, results)
P 1.1	Acquire status and evaluate the performance of the following measurements.	P11A OWS Bus voltage decreasing to 24 Vdc.	P11A1 No contingency planned as long as OWS Bus voltage is 28^{+2}_{-4} Vdc. If the Bus voltage drops below 24 Vdc, do not begin the experiment.	
P 2.1	Prepare Anti-solar SAL and perform leak checks.	P21A SAL door leaks.	P21A1 Verify SAL vent valve closed. P21A2 Evacuate SAL and recycle the door. P21A3 If the SAL door leakage rate exceeds TBD, do not conduct the experiment.	
P 2.2	Remove Experiment S-019 AMS from the storage container.	P22A Container lid will not open.	P22A1 Use portable astronaut tool to force the latches to release and/or the top to open.	
P 2.3	Pressurize AMS equal to pressure of OWS.	P23A Seaton-Wilson Valve is inoperative and cannot permit pressurization of AMS.	P23A1 Use portable astronaut tool to crack the end cover of AMS until the AMS is repressurized.	
P 2.4	Install the AMS in the Anti-solar SAL.	P24A Interfaces will not align properly, and SAL lock will not function.	P24A1 Remove S-019 AMS, and examine the sealing surfaces for contamination and/or warpage. If found to be contaminated, clean the surface, replace the seals, and reinstall the AMS in the SAL. If warped, install the AMS in the SAL and check for excessive leakage. If the leakage rate exceeds TBD rate, close the SAL door, remove the AMS, and terminate the experiment. P24A2 If it is impossible to secure the AMS in the SAL, terminate the experiment.	
P 2.7	Remove Experiment S-183 SA from the support fixture and install it	P27A Interfaces will not align properly, and AMS lock will not	P27A1 Remove the SA from the AMS, and examine the sealing surfaces for	P

TABLE N-IV. EXPERIMENT S-183, ULTRAVIOLET PANORAMA MALFUNCTION AND CONTINGENCY PLAN OUTLINE - EXPERIMENT PREPARATION (P) (Sheet 2 of 2)

Operation Step Number	Experiment/Crew Tasks	Possible Malfunction	Contingency Plan	Remarks (malfunctions, corrections, results)
P 2.7 (Concluded)	on the Experiment S-019 AMS.	function.	any damage. If found damaged, replace the seals, and reinstall the SA on the AMS.	
P 2.11	Remove the film carrousel from the film storage container and install it on the SA by verifying for proper alignment and securing.	P211A Interfaces will not align properly.	P211A1 Remove the film carrousel from the SA. Examine the seals for any damage. If damaged, replace the seals, and reinstall the carrousel.	
		P211B Carrousel will not lock in position.	P211B1 Remove the carrousel from the SA, verify for proper alignment mark on both the SA and the film carrousel, reinstall it on the SA, and lock. If the carrousel cannot be reinstalled and locked, terminate the experiment.	P

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TABLE N-V. EXPERIMENT S-183, ULTRAVIOLET PANORAMA MALFUNCTION AND CONTINGENCY PLAN OUTLINE - EXPERIMENT OPERATION (O) (Sheet 1 of 3)

Operation Step Number	Experiment/Crew Tasks	Possible Malfunction	Contingency Plan	Remarks (malfunctions,corrections,results)
O 1.4	Deploy Experiment S-019 AMS and secure.	O14A Mirror will not extend and deploy.	O14A1 Experiment S-183 cannot be performed and must be terminated.	
O 1.5	Activate Experiment S-183 SA Control Panel (POWER ON).	O15A Film plate indicator lamp and reticle lamp not illuminated.	O15A1 Check S-183 power cable for proper connection. If found to be loose, secure properly, and continue the experiment. If the cable is found to be defective, replace it with Experiment T-027/S-073 power cable.	
O 1.6	Rotate AMS tilt and rotation knobs and acquire appropriate starfield.	O16A Mirror will not tilt or rotate.	O16A1 If the mirror tilt and rotation mechanism is jammed in the 000.0 position, retract the mirror into the SAL, close SAL, and terminate the experiment.	
O 1.7	Operate zero/reset switch to manually advance the film carrousel until 01 appears on the film plate counter.	O17A Magazine does not advance.	O17A1 Recycle the zero/reset switch. If the magazine advances, continue with the S-183 experiment in a nominal fashion. O17A2 If the magazine fails to advance the SA cannot be operated; however, the experiment is continued using the DAC.	
O 1.8	Set the exposure switches (3) to the appropriate settings (observe that the lamps are illuminated), and toggle the sequence switch to the start position.	O18A Open circuit; the exposure switch is shorted to ground.	O18A1 First verify the zero/reset switch to normal position. Operate the sequence switch to STANDBY. Recycle the suspected exposure switches several times in all positions. Set the exposure switch to the desired position and continue with experiment.	
		O18B Exposures with time inconsistencies.	O18B1 Same as above.	
O 1.10	Verify the exposure sequence completion (lamps will go off).	O110A Lights may not go off because of a possible incompletion of a sequence.	O110A1 Rotate the suspect exposure switches several times, then set them to the desired position.	

TABLE N-V. EXPERIMENT S-183, ULTRAVIOLET PANORAMA MALFUNCTION AND CONTINGENCY PLAN OUTLINE – EXPERIMENT OPERATION (O)
(Sheet 2 of 3)

Operation Step Number	Experiment/Crew Tasks	Possible Malfunction	Contingency Plan	Remarks (malfunctions, corrections, results)
O 1.10 (Concluded)		O110B Exposure lamps flickered because of a possible power interception.	O110B1 No crew action. However, note that there are three additional film plates.	
			O110A2 The film plate might be jammed in the transport mechanism. Remove the magazine and extract the film plate. Reinstall the magazine and continue with experiment.	
O 1.10.1	Verify shutter open or closed.	O1101A Shutter motor circuit burned out.	O1101A1 Manually open the shutter and continue with experiment.	
		O1101B Shutter stuck closed.	O1101B1 Set the zero/reset until the counter reads 36. Set the zero/reset switch to normal, retract AMS mirror into the SAL, close the SAL door, re-pressurize SAL, and remove the film carrousel. Open the shutter manually, reinstall the film carrousel and continue with experiment.	
		O1101C Shutter stays open.	O1101C1 Continue the experiment in degraded mode.	
O 1.10.2	Verify film plate in focal plane.	O1102A Film plate may be jammed during transit between focal plane and the magazine.	O1102A1 Close the SAL; remove the film carrousel. Remove the jammed film plate from the SA, reinstall the carrousel, and continue with experiment.	
		O1102B Possible failure of stepper motor.	O1102B1 Continue experiment using DAC camera.	
		O1102C Possible jamming of film transport mechanism gears.	O1102C1 Refer to contingency plan O1102A1.	
O 1.15	Unlock the AMS tilt and rotation knob locks. Set the tilt and rotation indicators to 000.0.	O115A Mirror tilt and rotation mechanism is jammed.	O115A1 The mirror cannot be retracted to other than 000.0 position. Hence, jettison the mirror mechanism and terminate the experiment	

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TABLE N-V. EXPERIMENT S-183, ULTRAVIOLET PANORAMA MALFUNCTION AND CONTINGENCY PLAN OUTLINE - EXPERIMENT OPERATION (O) (Sheet 3 of 3)

Operation Step Number	Experiment/Crew Tasks	Possible Malfunction	Contingency Plan	Remarks (malfunctions, corrections, results)
O 1.16	Unlock AMS extension knob and fully retract the mirror.	O116A Mirror is jammed in extended position and cannot be retracted.	O116A1 Jettison the mirror mechanism, and close the SAL door.	
O 1.17	Close, lock, and repressurize SAL door, and check the integrity of seals using SAL operating procedures.	O117A SAL door leaks.	O117A1 Verify SAL vent valve closed. O117A2 Evacuate SAL and recycle the door. Note: If the SAL door leakage rate exceeds TBD, S-183 SA and S-019 AMS must not be removed from SAL.	

O

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TABLE N-VI. EXPERIMENT S-183, ULTRAVIOLET PANORAMA MALFUNCTION AND CONTINGENCY PLAN OUTLINE - EXPERIMENT TERMINATION (T)

Operation Step Number	Experiment/Crew Tasks	Possible Malfunction	Contingency Plan	Remarks (malfunctions, corrections, results)
	No contingency plans are identified for the termination section of the experiment at this time.			

T

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SECTION IX.

EXPERIMENT S-183, ULTRAVIOLET PANORAMA MALFUNCTION ANALYSES

Malfunction Analyses for Experiment S-183 are TBS.

SECTION X. CONCLUSIONS AND RECOMMENDATIONS

1. An analysis of the mechanical properties of the SC-5 film reveals that a probability exists that the film could peel away from the film plate and jam the film transport mechanism. The SC-5 film is exposed to near-space vacuum conditions during experiment operations. Outgassing of triacetate and cement could also have a deleterious effect on other mechanical components internal to the S-183 SA. This area is under investigation.

2. If a malfunction occurs in the electronic components--specifically, in the logic circuit--it may be difficult to determine the particular component that has failed. However, it is possible to generate a complete timeline history of Measurement Numbers K7000 S183, shutter open; K7001 S183, film plate in focal plane; and K7002 S183, film plate returned to carrousel. Further, it has been determined that a complete logic timing diagram can be constructed to show how the above event measurements are correlated to 2 analog and 47 event internal circuit functions of the S-183 experiment.

3. The Data Requirements Summary lists only those S-183 experiment measurements that are considered sufficient to analyze the experiment interfaces and assist in malfunction analysis.

4. No apparent Category I failures were found in this experiment. However, an analysis of the electrical components reveals that if the FC2 mainline power fuse fails, it constitutes a single-point failure and will result in loss of the S-183 experiment. It is recommended that a circuit breaker be installed in place of the FC2 fuse.

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MSFC—RSA, Ala